GROUP 80

CONFIGURATION DIAGRAMS

CONTENTS

NOTES

GROUP 26

FRONT AXLE

CONTENTS

GENERAL INFORMATION

M1261000100820

For the front axle, the double-row angular contact ball bearing with an integral oil seal is adopted as a wheel bearing, and EBJ-ETJ type constant velocity joint as a driveshaft.

It has the following features:

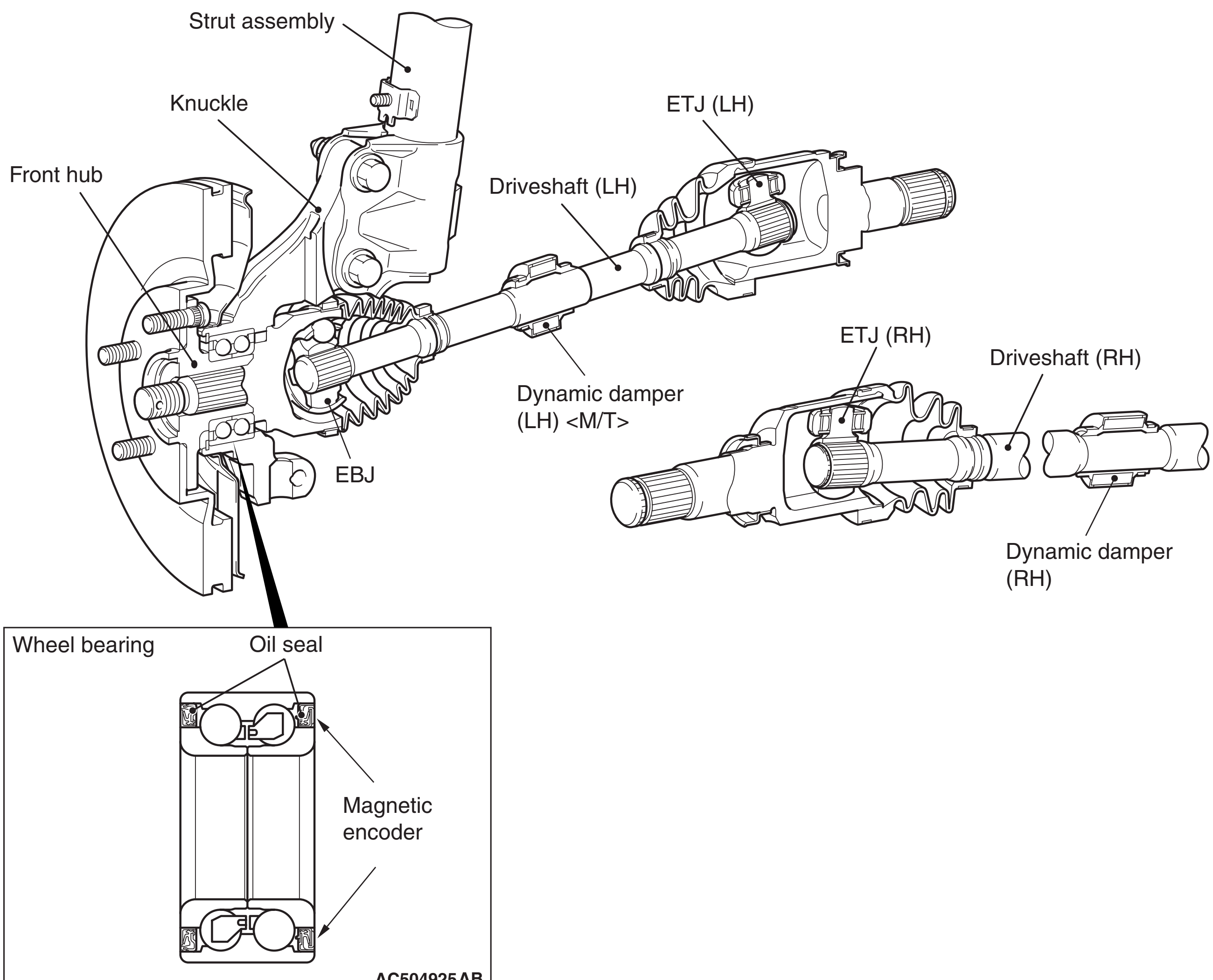
- The driveshaft incorporates lightweight and compact EBJ-ETJ type constant velocity joints.
- Lead-free grease for the constant velocity joint is adopted.
- Hexavalent chromium is eliminated from the dust cover material.
- The number of parts is reduced by integrating the magnetic encoder for ABS wheel speed detection into the wheel bearing. <Vehicles with ABS>

NOTE:

ETJ (High Efficiency Compact Tripod Joint): the lighter and smaller constant velocity joint compared with the conventional TJ has been installed.

EBJ (High Efficiency Compact Birfield Joint): the lighter and smaller constant velocity joint compared with the conventional BJ has been achieved by adopting the eight small balls.

CONSTRUCTION DIAGRAM



AC606246 AB

SPECIFICATIONS

GENERAL SPECIFICATIONS

M1261000200399

Item			Specification
Wheel bearing	Type		Double-row angular contact ball bearing
Driveshaft	Joint type	Outer	EBJ
		Inner	ETJ

SERVICE SPECIFICATIONS

M1261000300879

Item		Standard value	Limit
Wheel bearing end play mm (in)		–	0.05 (0.002)
Wheel bearing rotation starting torque N· m (in-lb)		–	1.8 (16)
ETJ boot assembly dimension mm (in)		80 ± 3 (3.15 ± 0.12)	–
Opening dimension of the special tool (MB991561) mm (in)	EBJ boot band (small) crimping	2.9 (0.11)	–
	EBJ boot band (large) crimping	3.2 (0.13)	–
EBJ boot band crimping size mm (in)		2.4 – 2.8 (0.10 – 0.11)	–

LUBRICANTS

M1261000400939

Item	Specifid lubricant		Quantity
ETJ boot grease	Repair kit grease	M/T-LH	120 ± 10 g (4.2 ± 0.3 oz)
		M/T-RH	130 ± 10 g (4.6 ± 0.3 oz)
		CVT	120 ± 10 g (4.2 ± 0.3 oz)
EBJ boot grease	Repair kit grease		110 ± 10 g (3.9 ± 0.3 oz)

FRONT AXLE DIAGNOSIS

TROUBLESHOOTING STRATEGY

M1261005600187

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a front axle fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

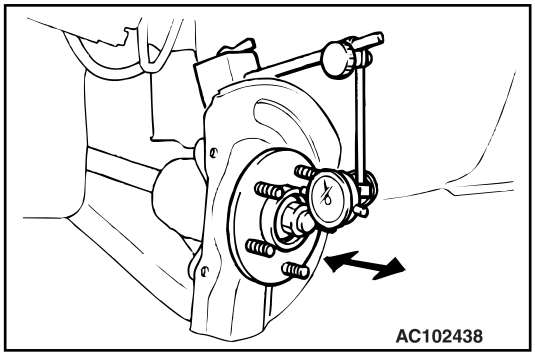
SYMPTOM CHART

M1261005700300

Symptom		Inspection procedure	Reference page
Driveshaft	Noise during wheel rotation	1	P.26-4
	Noise due to excessive play of wheel in turning direction	2	P.26-5

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Noise during Wheel Rotation



DIAGNOSIS

STEP 1. Check the wheel bearing end play.

(1) Remove the caliper assembly and suspend it with a wire.
(2) Remove the brake disc from the front hub.
(3) Attach a dial gauge as shown in the illustration, and then measure the end play while moving the hub in the axial direction.

Limit: 0.05 mm (0.002 inch)

Q: Is the wheel bearing end play within the limit?

YES : Go to step 2.
NO : Replace the part, then go to Step 5.

STEP 2. Check the driveshaft and inner shaft for bending.

Q: Is the driveshaft and inner shaft bent?

YES : Go to step 3.
NO : Replace the part. Then go to Step 5.

STEP 3. Check the center bearing for wear.

Q: Is the center bearing worn?

YES : Replace the bearing. Then go to Step 5.
NO : Go to step 4.

STEP4. Check the driveshaft assembly for wear or damage.

Q: Is the driveshaft assembly worn or damaged?

YES : Replace the driveshaft assembly. Then go to Step 5.
NO : There is no action to be taken.

STEP 5. Retest the system.

Q: Is the abnormal noise eliminated?

YES : The procedure is complete.
NO : Repeat from Step 1.

INSPECTION PROCEDURE 2: Noise Due to Excessive Play of Wheel in Turning Direction

DIAGNOSIS

STEP 1. Check for play in the inner shaft and side gear serration, the driveshaft and side gear serration, or the driveshaft and front hub serration.

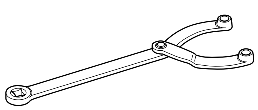
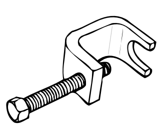
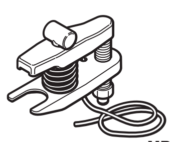
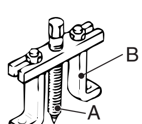
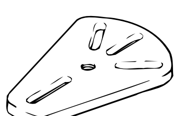
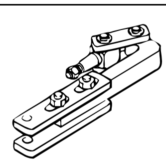
Q: Is the play found?
- **YES :** Replace the part. Then go to Step 2.
- **NO :** The procedure is complete.

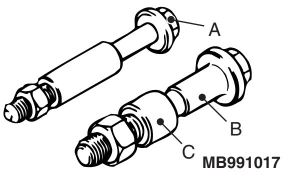
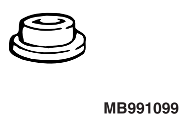
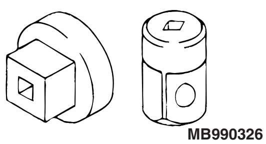
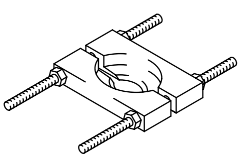
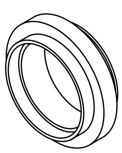
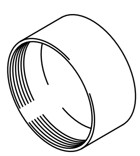
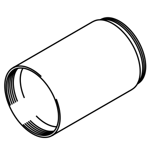
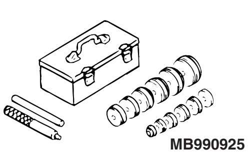
STEP 2. Retest the system.

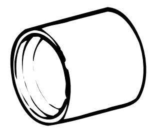
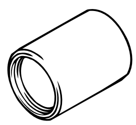
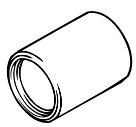
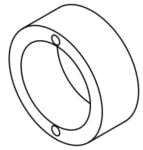
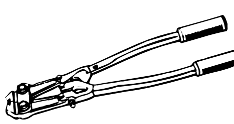
Q: Is the abnormal noise eliminated?
- **YES :** The procedure is complete.
- **NO :** Repeat from Step 1.

SPECIAL TOOLS

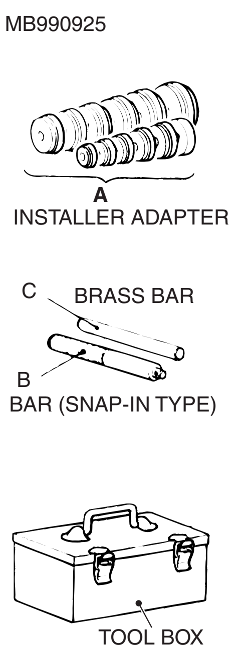
M1261000601055

Tool	Tool number and name	Supersession	Application
 B990767	MB990767 Front hub and flange yoke holder	MB990767-01	Fixing of the hub
 MB991618	MB991618 Hub bolt remover	General service tool	Removal of the hub bolt
 MB991897	MB991897 or MB992011 Ball joint remover	MB991113-01, MB990635-01 or General service tool	Knuckle and tie rod end ball joint disconnection *NOTE: Steering linkage puller (MB990635 or MB991113)is also used to disconnect knuckle and tie rod end ball joint.*
 MB990241AD	MB990241 Axle shaft puller A: MB990242 Puller shaft B: MB990244 Puller bar	MB990241-01 or General service tool	Removal of the driveshaft
 MB991354	MB991354 Puller body	General service tool	
	MB991056 or MB991355 Knuckle arm bridge	MB991056-01	• Removal of the hub • Removal of the wheel bearing

Tool	Tool number and name	Supersession	Application
	A: MB991017 B: MB990998 C: MB991000 A, B: Front hub remover and installer C: Spacer	MB990998-01	• Removal of the hub • Provisional holding of the wheel bearing • Measurement of hub starting torque • Measurement of wheel bearing end play *NOTE: MB991000, which belongs to MB990998, should be used as a spacer.* • Removal of the wheel bearing inner race (outside) (Use MB991000 with MD998801.)
	MB991099 Oil seal installer guide	–	Measurement of hub starting torque
	MB990326 Preload socket	General service tool	
	MD998801 Remover	–	Removal of the wheel bearing inner race (outside)
	MB992150 Oil seal installer	–	Installation of the wheel bearing inner race (outside)
	MD998812 Installer cap	–	
	MD998813 Installer	–	
	MB990925 Bearing and oil seal installer set	MB990925-01 or General service tool	Removal of the wheel bearing

Tool	Tool number and name	Supersession	Application
 MB991388	MB991388 Bush remover base	–	Press-fitting of the dust cover
 MB991576	MB991576 Base	–	
 MB990890	MB990890 Rear suspension bushing base	MB990890-01	Installation of the wheel bearing
	MD999528 Adapter	–	
 MB991561	MB991561 Boot band crimping tool	MB991561	EBJ boot (resin boot) band installation

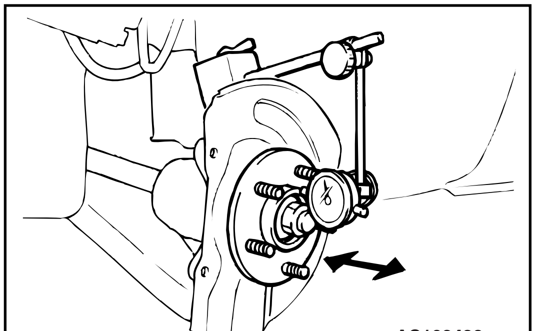
MB990925 BEARING AND OIL SEAL INSTALLER SET

TOOL	TYPE	TOOL NUMBER	O D mm (in)
 ACX02372 AC	A	MB990926	39.0 (1.54)
		MB990927	45.0 (1.77)
		MB990928	49.5 (1.95)
		MB990929	51.0 (2.00)
		MB990930	54.0 (2.13)
		MB990931	57.0 (2.24)
		MB990932	61.0 (2.40)
		MB990933	63.5 (2.50)
		MB990934	67.5 (2.66)
		MB990935	71.5 (2.81)
		MB990936	75.5 (2.97)
		MB990937	79.0 (3.11)
	B	MB990938	–
	C	MB990939	–

ON-VEHICLE SERVICE

WHEEL BEARING END PLAY CHECK

M1261001100340



AC102438

1. Remove the caliper assembly, and retain it with a wire and the like to prevent from falling.
2. Set a dial gauge as shown in the figure. Move the hub in the axial direction and measure the end play.

   Limit : 0.05 mm (0.002 inch)

3. After checking, install the brake disc and the caliper assembly, and tighten the caliper mounting bolt to the specified torque.

   Tightening torque: 100 ± 10 N· m (74 ± 7 ft-lb)

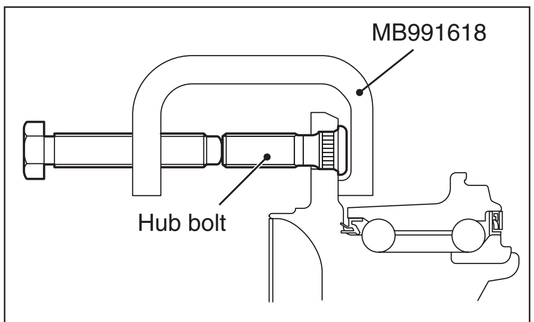
HUB BOLT REPLACEMENT

M1261001000503

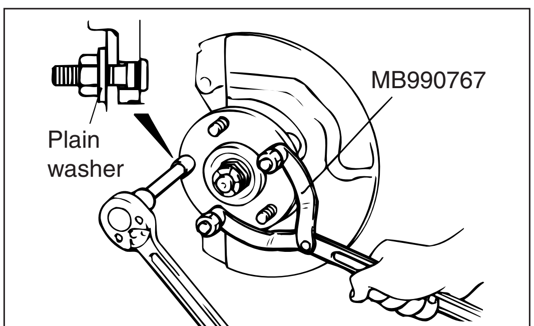
Required Special Tools:

- MB990767: Front Hub and Flange Yoke Holder
- MB991618: Hub Bolt Remover

1. Remove the caliper assembly and suspend it with wire so that it does not fall.
2. Remove the brake disc.
3. Use special tool MB991618 to remove the hub bolts.



AC302114AF



AC102440AC

4. Install the plain washer to the new hub bolt, and install the bolt with a nut while holding the hub with special tool MB990767.
5. Install the brake disc, caliper assembly and tighten the caliper assembly mounting bolts to the specified torque.

   Tightening torque: 100 ± 10 N· m (74 ± 7 ft-lb)

FRONT AXLE HUB ASSEMBLY

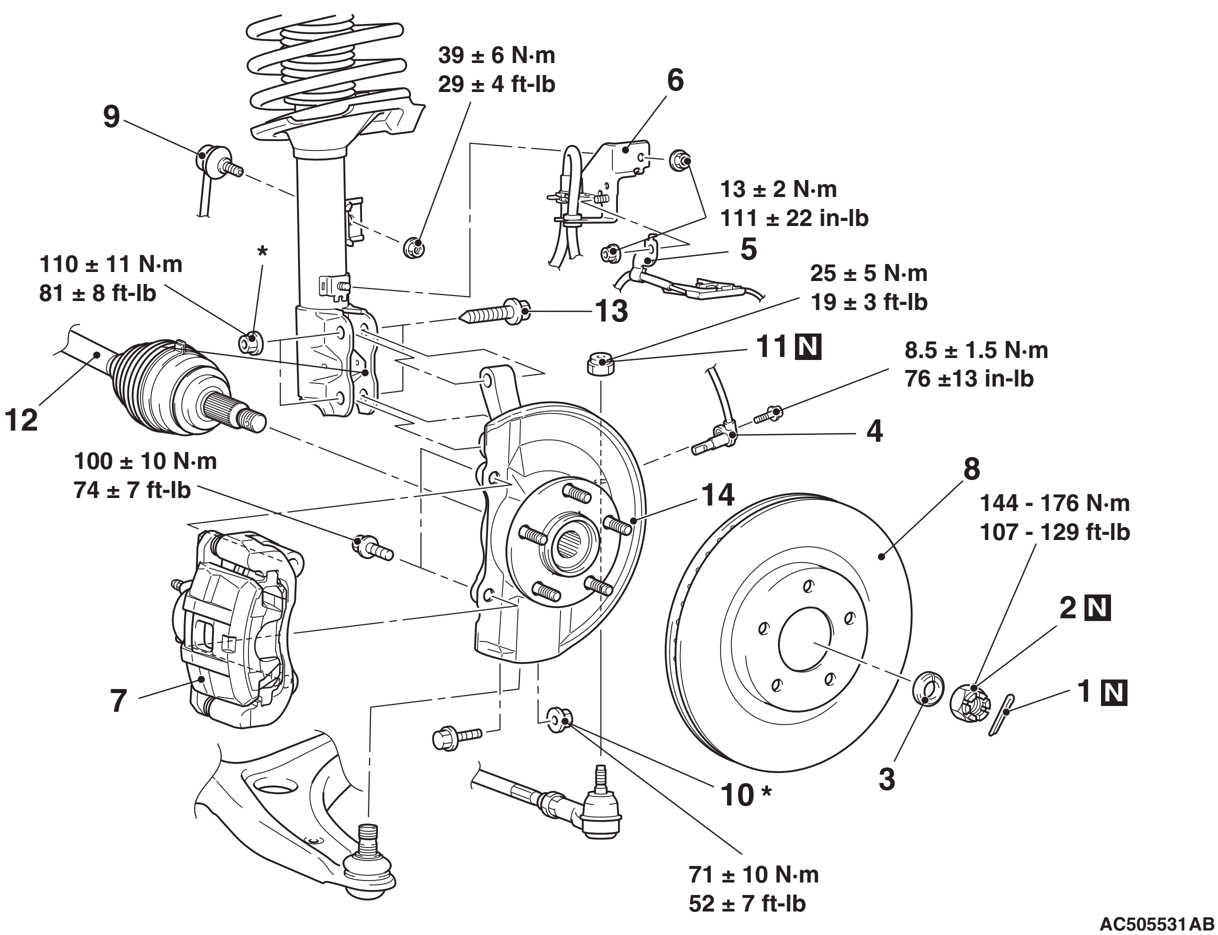
REMOVAL AND INSTALLATION

M1261001701129

⚠ CAUTION

- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it. <Vehicles with ABS>**
- **When removing and installing the front wheel hub assembly, make sure that the magnetic encoder for wheel speed detection (integrated with the inner oil seal) does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **When removing and installing the front wheel speed sensor, make sure that the pole piece at the end does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **The parts indicated by * are the nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Post-installation operation
- Using your fingers, press the Ball Joint Dust Cover to check for a crack or damage.



Removal steps

1. Split pin
2. <<**A**>> >>**A**<< Driveshaft nut
3. >>**A**<< Washer
4. Front wheel speed sensor <Vehicles with ABS>

Removal steps (Continued)

5. Front wheel speed sensor harness bracket <Vehicles with ABS>
6. Brake hose bracket
7. <<**B**>> Caliper assembly
8. <<**C**>> Brake disc
9. Stabilizer link connection

Removal steps (Continued)

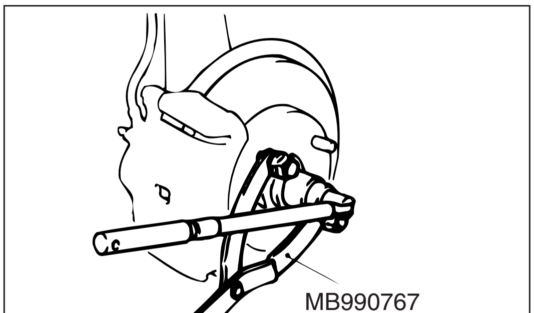
10. Self-locking nut (lower arm ball joint connection)
<<D>> 11. Self-locking nut (tie-rod end connection)
<<E>> 12. Drive shaft
13. Hub knuckle assembly and strut mounting bolt and nuts
14. Hub knuckle assembly

Required Special Tools:

- MB990242: Puller Shaft
- MB990244: Puller Ball
- MB990767: Front Hub and Flange Yoke Holder
- MB991354: Puller Body
- MB991897 or MB992011: Ball Joint Remover

REMOVAL SERVICE POINTS

<<A>> DRIVESHAFT NUT REMOVAL



AC102462 AB

CAUTION

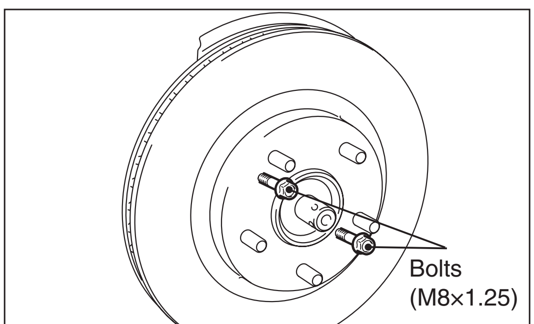
Do not apply the vehicle weight on the front wheel hub assembly with the driveshaft nut loosened. Otherwise, the wheel bearing may be broken.

Use special tool MB990767 to counter the hub as shown in the figure to remove the driveshaft nut.

<<B>> CALIPER ASSEMBLY REMOVAL

Secure the removed caliper assembly with wire, etc.

<<C>> BRAKE DISC REMOVAL



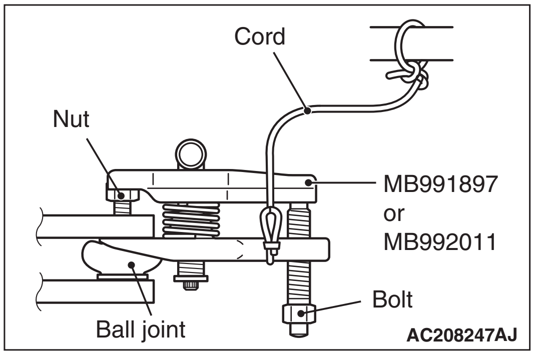
AC505409 AB

If the brake disc removal is difficult, install bolts (M8 x 1.25 mm) shown in the figure, and tighten them evenly and gradually to remove the brake disc.

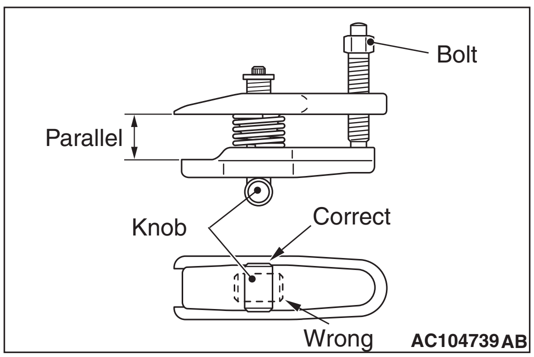
<<D>> SELF-LOCKING NUT (TIE-ROD END CONNECTION) REMOVAL

⚠ CAUTION

- **Loosen the self-locking nut (tie-rod end connection) from the ball joint, but do not remove here. Use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a rope.**



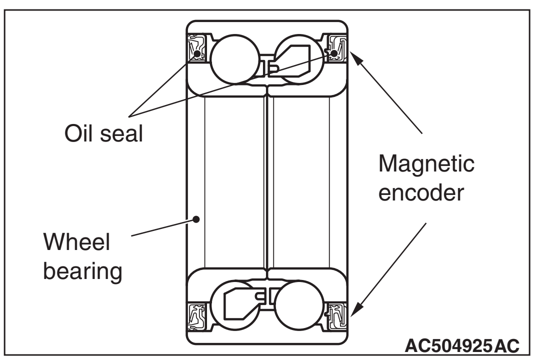
1. Install special tool MB991897 or MB992011 as shown in the figure.



2. Turn the bolt and knob to make the special tool jaws parallel, then hand-tighten the bolt. After tightening, check that the jaws are still parallel.

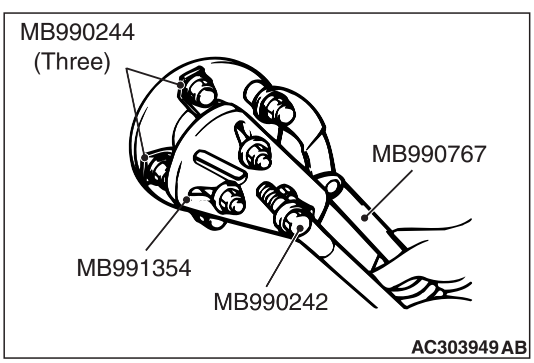
   NOTE: To adjust the special tool jaws to be parallel, set the orientation of the knob as shown in the figure.
3. Unscrew the bolt to disconnect the ball joint.

<<E>> DRIVESHAFT REMOVAL



⚠ CAUTION

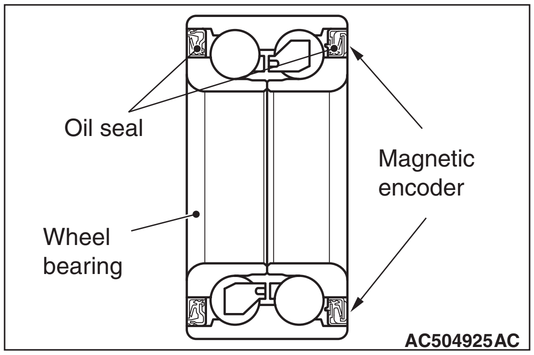
- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder does not collect metallic particles. <Vehicles with ABS>**
- **When removing the driveshaft, make sure that it does not contact with the magnetic encoder (integrated with the inner oil seal) to avoid damage. <Vehicles with ABS>**



If the driveshaft is seized, use special tools MB990242 and MB990244, MB991354 and MB990767 to push the driveshaft out from the hub.

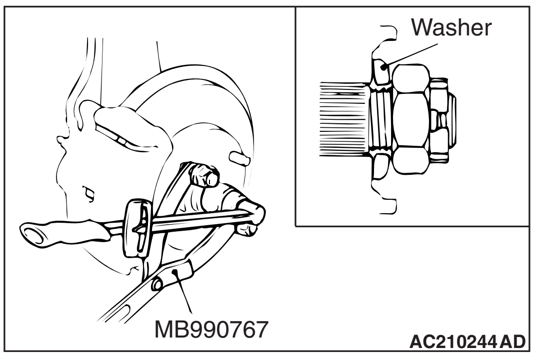
INSTALLATION SERVICE POINTS

>>A<< WASHER/DRIVESHAFT NUT INSTALLATION



⚠ CAUTION

- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it.. <Vehicles with ABS>**
- **When installing the driveshaft, make sure that it does not contact with the magnetic encoder (integrated with the inner oil seal) to avoid damage. <Vehicles with ABS>**
- **Do not apply the vehicle weight on the wheel bearing before fully tightening the driveshaft nut. Otherwise, the wheel bearing may be broken.**



1. Be sure to install the driveshaft washer in the illustrated direction.
2. Use special tool MB990767 to tighten the driveshaft nut. At this time, tighten the nuts within the specified torque range considering the final tightening.

   Tightening torque: 144 - 176 N· m (107 - 129 ft-lb)

3. If the pin holes do not align with the pins, tighten the driveshaft nut [less than 200 N· m (147 ft-lb)] and find the nearest hole then bend the split pin to fit it.

INSPECTION

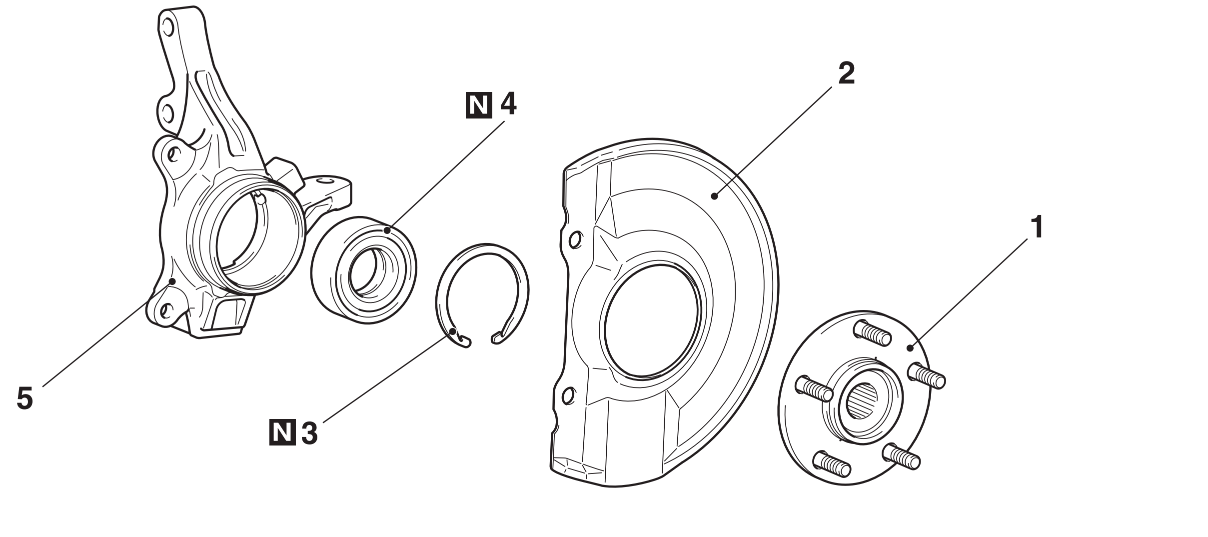
M1261001800178

- Check the hub for cracks and spline for wear.
- Check the knuckle for cracks.
- Check for defective bearing.

  NOTE: If the meshing of the wheel bearing outer race and the knuckle, or of the wheel bearing inner race and the hub, is loose, replace the bearing or damaged parts.

DISASSEMBLY AND ASSEMBLY

M1261001900528



		Disassembly steps
<<**A**>>	1.	Hub
	2.	Dust shield
	3.	Snap ring
<<**B**>>	4.	Wheel bearing
	5.	Knuckle
		Assembly steps
	5.	Knuckle
>>**A**<<	4.	Wheel bearing
	3.	Snap ring
>>**B**<<	2.	Dust shield
	1.	Hub
>>**C**<<	•	Hub starting torque check
>>**D**<<	•	Wheel bearing end play check

Required Special Tools:

- MB990326: Preload Socket
- MB990883: Rear Suspension Bushing Arbor
- MB990890: Rear Suspension Bushing Base
- MB990935: Installer Adapter
- MB990938: Brass Bar
- MB991000: Spacer
- MB991017: Front Hub Remover and Installer
- MB991056 or MB991355: Knuckle Arm Bridge
- MB991099: Oil Seal Installer Guide
- MB991388: Bush Remover Base
- MB991576: Base
- MB992150: Oil Seal Installer
- MD999528: Adapter
- MD998801: Remover
- MD998812: Installer Cap
- MD998813: Installer

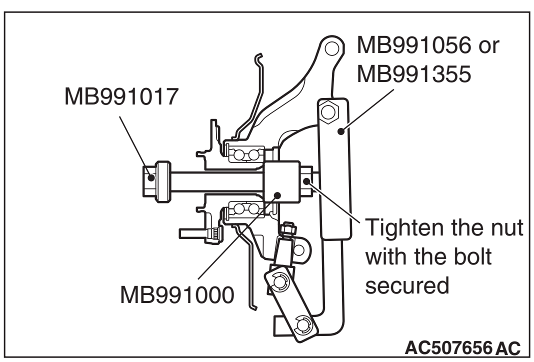
DISASSEMBLY SERVICE POINTS

<<A>> HUB REMOVAL

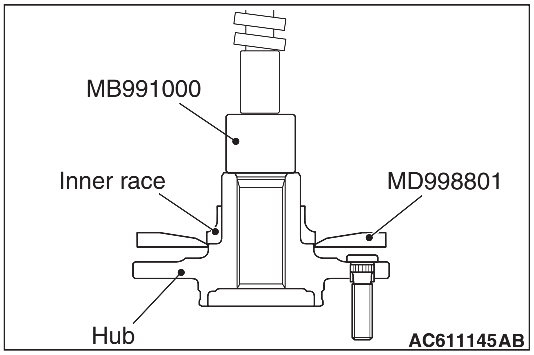
⚠ CAUTION

In the hub removal operation, make sure to replace the wheel bearing with new one.

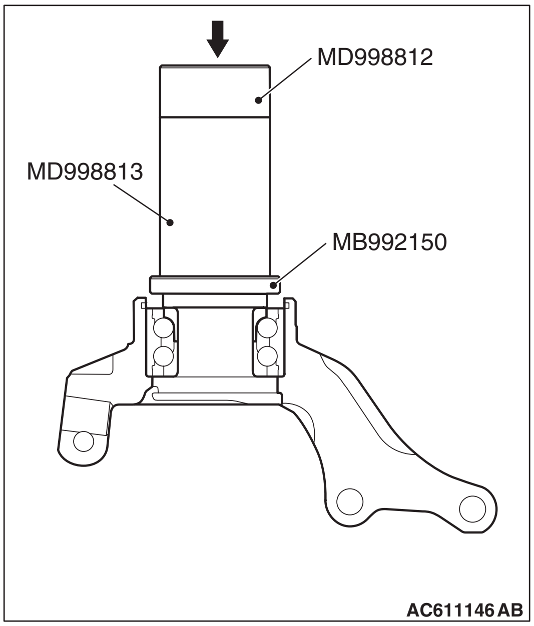
Use special tools MB991017, MB991056 or MB991355, MB991000 to pull out the hub from the knuckle.



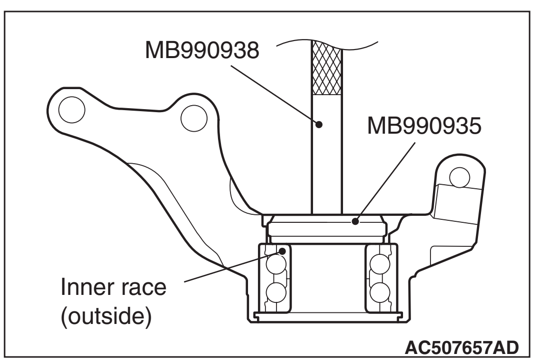
<<B>> WHEEL BEARING REMOVAL



1. Use special tools MD998801 and MB991000 to remove the wheel bearing inner race (outside) from the hub.



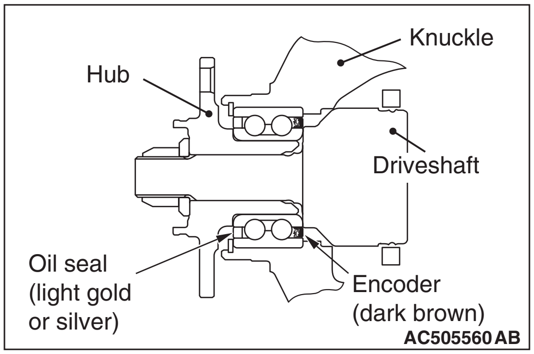
2. Use special tools MB992150, MD998812 and MD998813 to assemble the inner race (outside) removed from the hub to the wheel bearing.



3. Use special tools MB990935 and MB990938 to remove the wheel bearing.

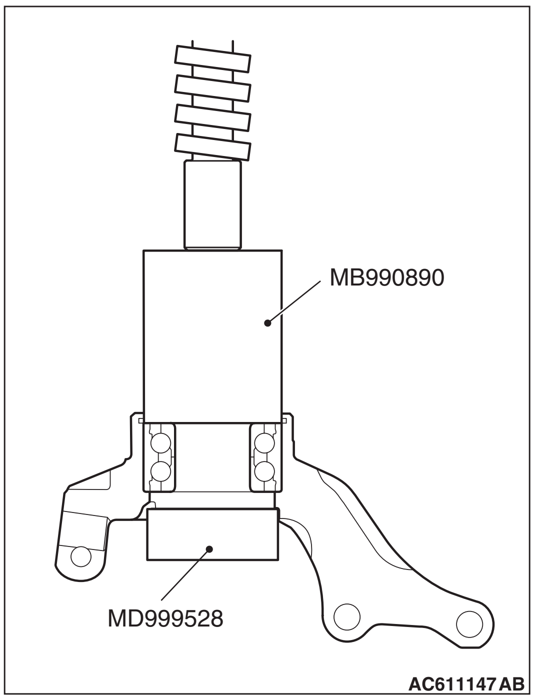
ASSEMBLY SERVICE POINTS

>>A<< WHEEL BEARING INSTALLATION



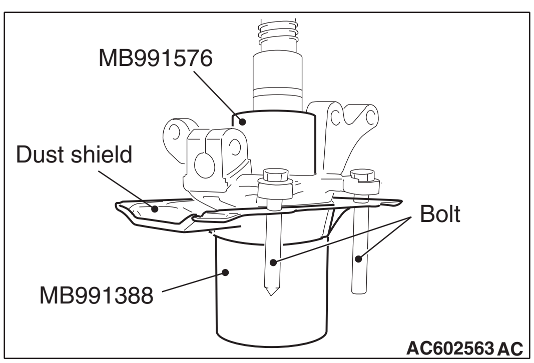
⚠ CAUTION

- **The magnetic encoder for wheel speed sensor is installed in the wheel bearing. Install the wheel bearing so that the encoder is positioned in the direction shown in the figure.**
- **When press-fit the wheel bearing, push the outer race.**



Use special tools MB990890 and MD999528 to press-fit the wheel bearing.

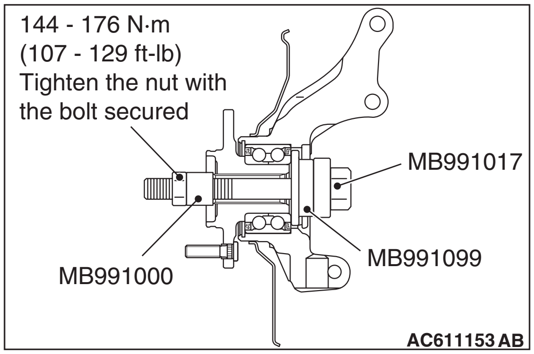
>>B<< DUST SHIELD INSTALLATION



Use special tools MB991388 and MB991576 to press-fit the knuckle into the dust shield.

NOTE: Use the bolts (M12) to align the caliper mounting holes.

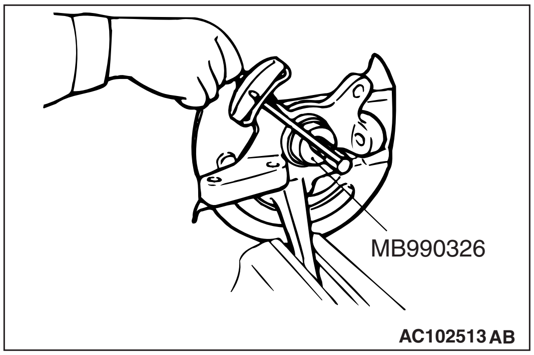
>>C<< HUB ROTATION STARTING TORQUE CHECK



1. Set special tools MB991000, MB991017 and MB991099 as shown in the figure, tighten the nut to the specified torque, and press-fit the hub into the knuckle.

   Tightening torque: 144 - 176 N· m (107 - 129 ft-lb)

2. Rotate the hub to make the bearing well-greased.

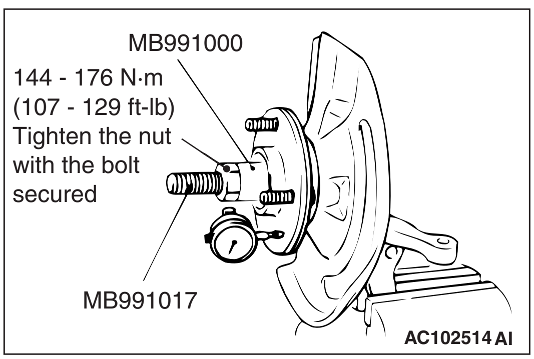


3. Use Special tool MB990326 to measure the hub rotation starting torque.

   Limit: 1.8 N· m (16 in-lb)

4. Hub rotation starting torque should be within the limit value, and there should be no roughness and gritty feeling in rotation.

>>D<< WHEEL BEARING END PLAY CHECK



1. Use special tools MB991000 and MB991017 to measure to determine whether the wheel bearing end play is within the specified limit or not.

   Limit: 0.05 mm(0.002 inch)

2. If the end play is not within the limit range while the nut is tightened to the specified torque, the bearing, hub and/or knuckle have probably not been installed correctly. Replace the bearing and re-install.

   Tightening torque: 144 - 176 N· m (107 - 129 ft-lb)

INSPECTION

M1261002000045

- Check the front hub and brake disc mounting surfaces for galling and contamination.
- Check the knuckle inner surface for galling and cracks.

DRIVESHAFT ASSEMBLY

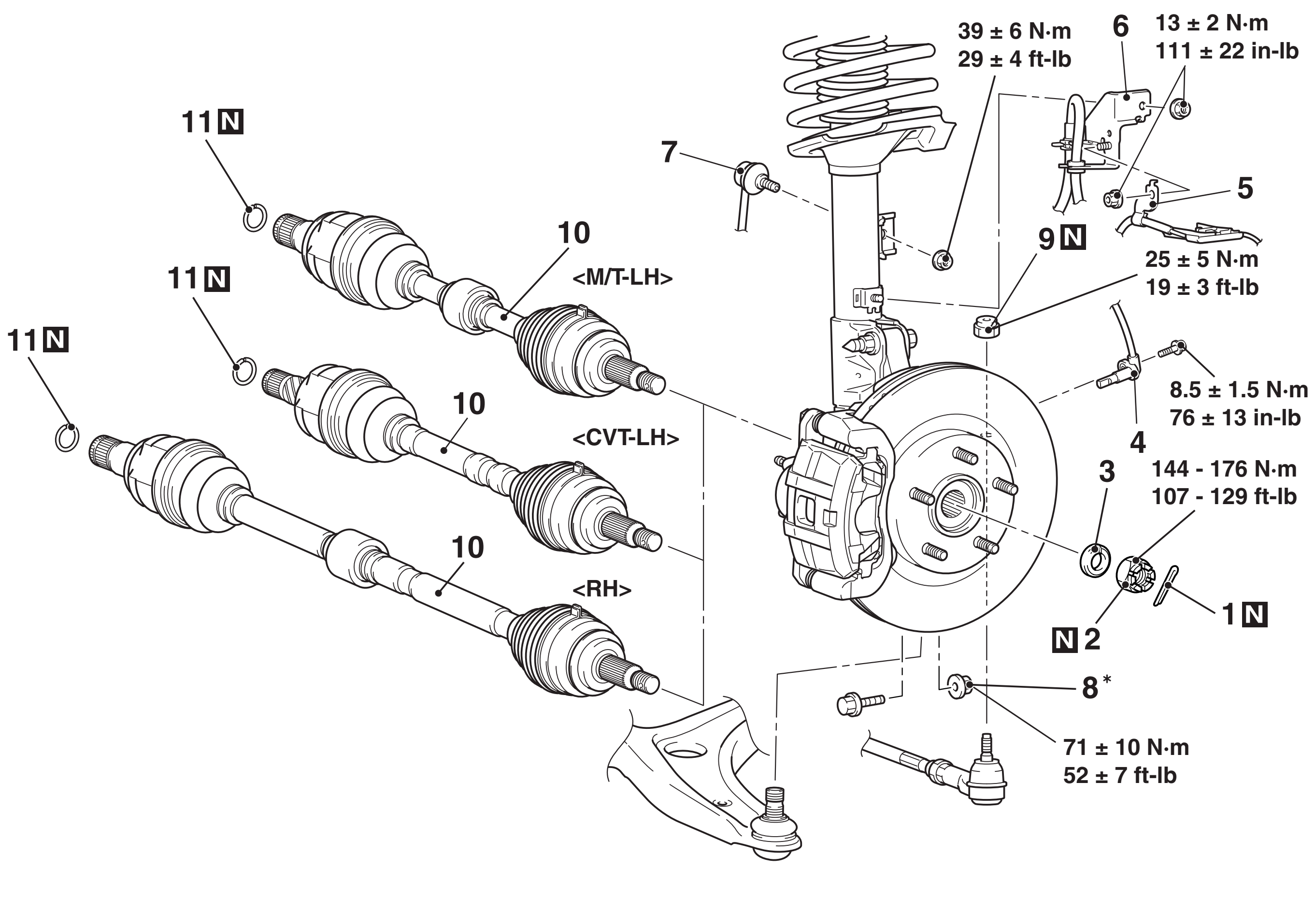
REMOVAL AND INSTALLATION

M1261003501187

⚠ CAUTION

- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it. <Vehicles with ABS>**
- **When removing and installing the driveshaft assembly, make sure that the wheel speed detection magnetic encoder (integrated with the inner oil seal) does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **When removing and installing the front wheel speed sensor, make sure that the pole piece at the end does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **The parts indicated by * are the nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal operation	**Post-installation operation**
• Transmission fluid draining (Refer to GROUP 22A, On-vehicle Service, Transmission oil changeP.22A-8.)<M/T> • CVT fluid draining (Refer to GROUP 23A, On-vehicle Service, CVT fluid changeP.23A-134.)<CVT>	• Using your fingers, press the Ball Joint Dust Cover to check for a crack or damage. • Transmission fluid refilling (Refer to GROUP 22A, On-vehicle Service, Transmission oil changeP.22A-8.)<M/T> • CVT fluid refilling (Refer to GROUP 23A, On-vehicle Service, CVT fluid changeP.23A-134.)<CVT>



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Removal steps

		1. Split pin
<<**A**>>	>>**B**<<	2. Driveshaft nut
	>>**B**<<	3. Washer
		4. Front wheel speed sensor <Vehicles with ABS>
		5. Front wheel speed sensor harness bracket <Vehicles with ABS>
		6. Brake hose bracket
		7. Stabilizer link connection
		8. Self-locking nut (lower arm ball joint connection)
<<**B**>>		9. Self-locking nut (tie-rod end connection)

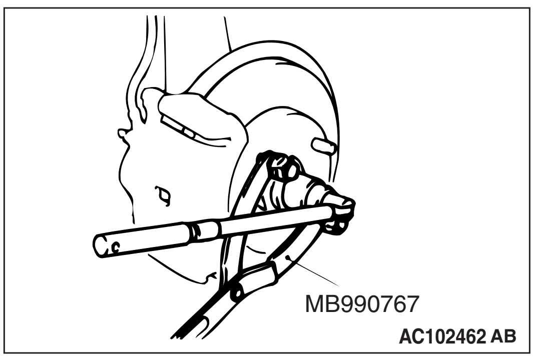
Removal steps (Continued)

<<**C**>>	>>**A**<<	10. Driveshaft assembly
		11. Circlip

Required Special Tools:
- MB990242: Puller Shaft
- MB990244: Puller Bar
- MB990767: Front Hub and Flange Yoke Holder
- MB991000: Spacer
- MB991017: Front Hub Remover and Installer
- MB991354: Puller Body
- MB991897 or MB992011: Ball Joint Remover

REMOVAL SERVICE POINTS

<<A>> DRIVESHAFT NUT REMOVAL



⚠ CAUTION

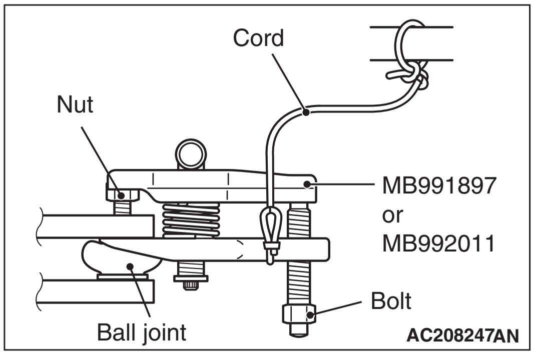
Do not apply the vehicle weight on the wheel bearing with the driveshaft nut loosened. Otherwise, the wheel bearing may be broken.

Use special tool MB990767 to counter the hub as shown in the figure to remove the driveshaft nut.

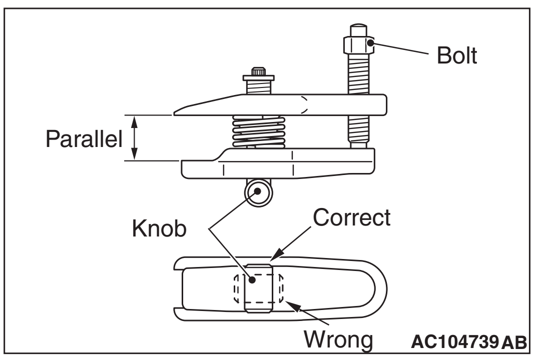
<<B>> SELF-LOCKING NUT (TIE-ROD END CONNECTION) REMOVAL

⚠ CAUTION

- **Loosen the self-locking nut (tie-rod end connection) from the ball joint, but do not remove here. Use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a rope.**



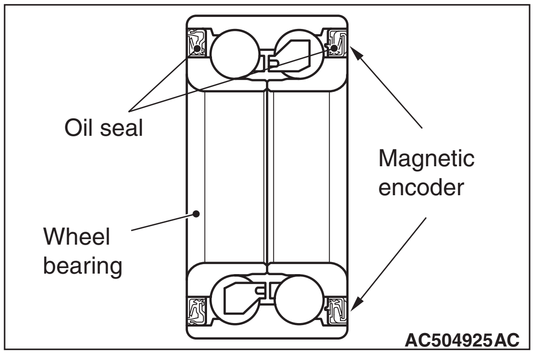
1. Install special tool MB991897 or MB992011, as shown in the figure.



2. Turn the bolt and knob to make the special tool jaws parallel, then hand-tighten the bolt. After tightening, check that the jaws are still parallel.

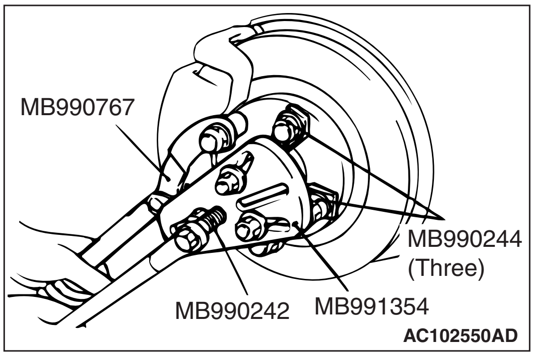
   NOTE: To adjust the special tool jaws to be parallel, set the orientation of the knob as shown in the figure.
3. Unscrew the bolt to disconnect the ball joint.

<<C>> DRIVESHAFT ASSEMBLY REMOVAL

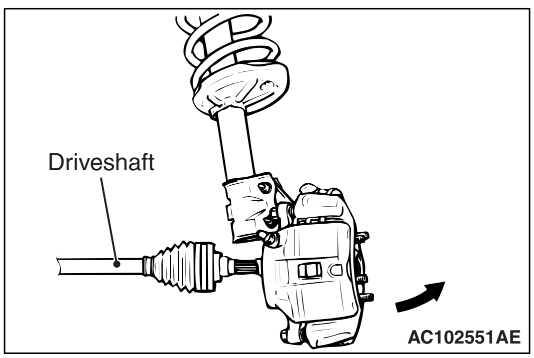


⚠ CAUTION

- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder does not collect metallic particles. <Vehicles with ABS>**
- **When removing the driveshaft, make sure that it does not contact with the magnetic encoder (integrated with the inner oil seal) to avoid damage. <Vehicles with ABS>**



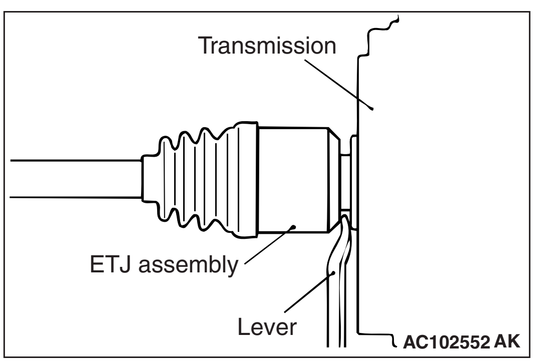
1. If the driveshaft is seized with the hub, use special tools MB990242 and MB990244, MB990767 and MB991354 to push the driveshaft assembly out from the hub.



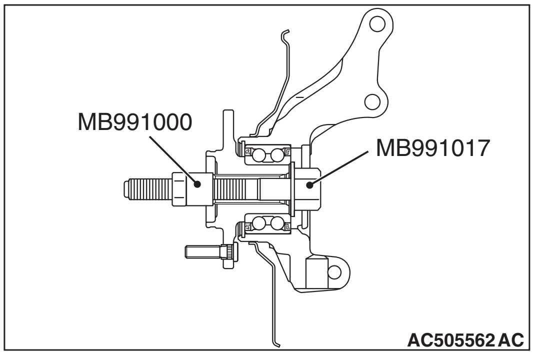
2. While pulling the lower side of the brake disc toward you, remove the driveshaft assembly from the hub.

⚠ CAUTION

- **Never pull out the driveshaft assembly from the EBJ assembly side. Otherwise, the ETJ assembly may be damaged. Always pull out from the ETJ side with a lever.**
- **Care must be taken to ensure that the oil seal of the transmission is not damaged by the spline part of the driveshaft assembly.**



3. Insert a lever between the transmission case or transfer and driveshaft assembly, and then pull the driveshaft assembly out from the transmission.

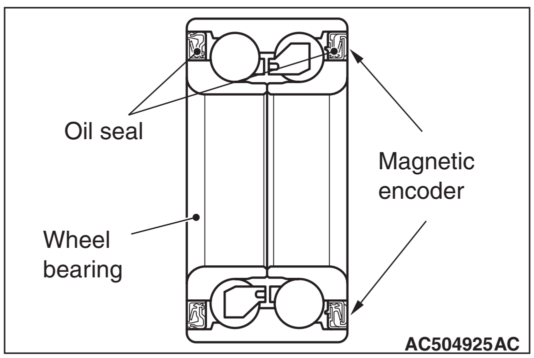


⚠ CAUTION

Do not apply the vehicle weight to the wheel bearing with the driveshaft assembly removed. If, however, the vehicle weight shall be applied to the bearing (in order to move the vehicle), tighten the following special tools MB991000 and MB991017 to the specified torque 144 - 176 N· m (107 - 129 ft-lb).

INSTALLATION SERVICE POINTS

>>A<< DRIVESHAFT ASSEMBLY INSTALLATION



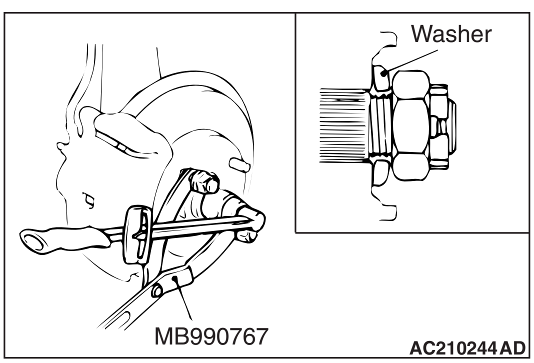
⚠ CAUTION

- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it.. <Vehicles with ABS>**
- **When installing the driveshaft, make sure that it does not contact with the magnetic encoder (integrated with the inner oil seal) to avoid damage. <Vehicles with ABS>**
- **Care must be taken to ensure that the oil seal of the transmission is not damaged by the spline part of the driveshaft assembly.**

>>B<< WASHER/DRIVESHAFT NUT INSTALLATION

⚠ CAUTION

Do not apply the vehicle weight on the front wheel hub assembly before fully tightening the driveshaft nut. Otherwise, the wheel bearing may be broken.



1. Incorporate the driveshaft assembly washer as shown in the illustration.
2. Use special tool MB990767 to tighten the driveshaft nut. At this time, tighten the nuts within the specified torque range considering the final tightening.

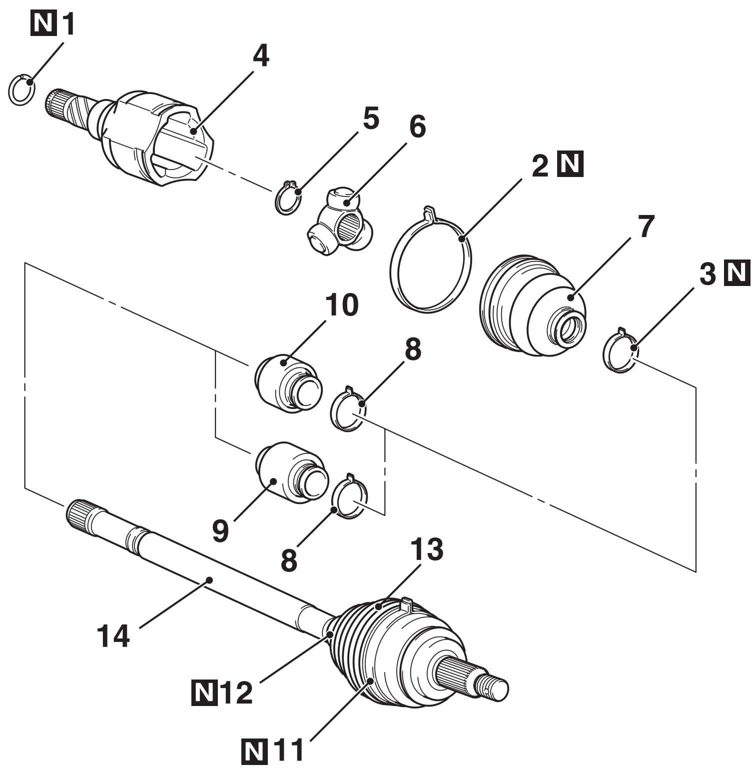
   Tightening torque: 144 - 176 N· m (107 - 129 ft-lb)
3. If the pin holes do not align with the pins, tighten the driveshaft nut [less than 200 N· m (147 ft-lb)] and find the nearest hole then bend the split pin to fit it.

DISASSEMBLY AND ASSEMBLY

M1261003701404

⚠ CAUTION

As for the EBJ assembly, only the EBJ boot can be replaceable, and other parts cannot be disassembled.



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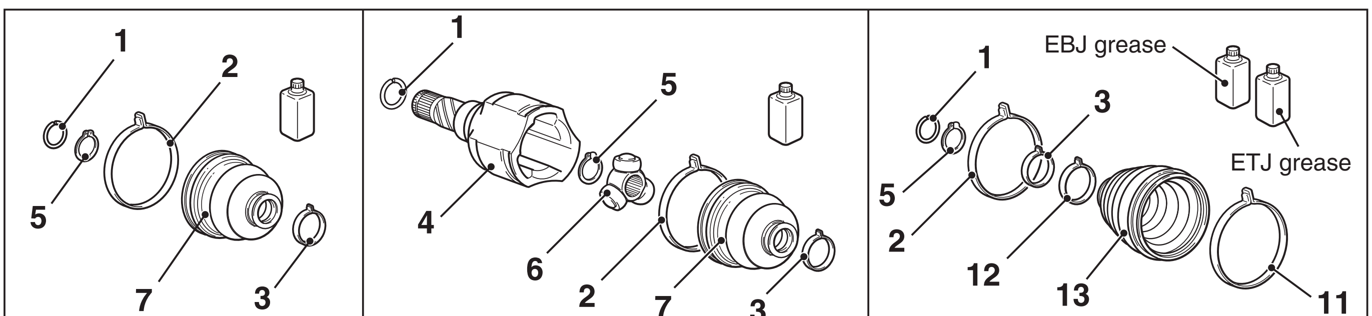


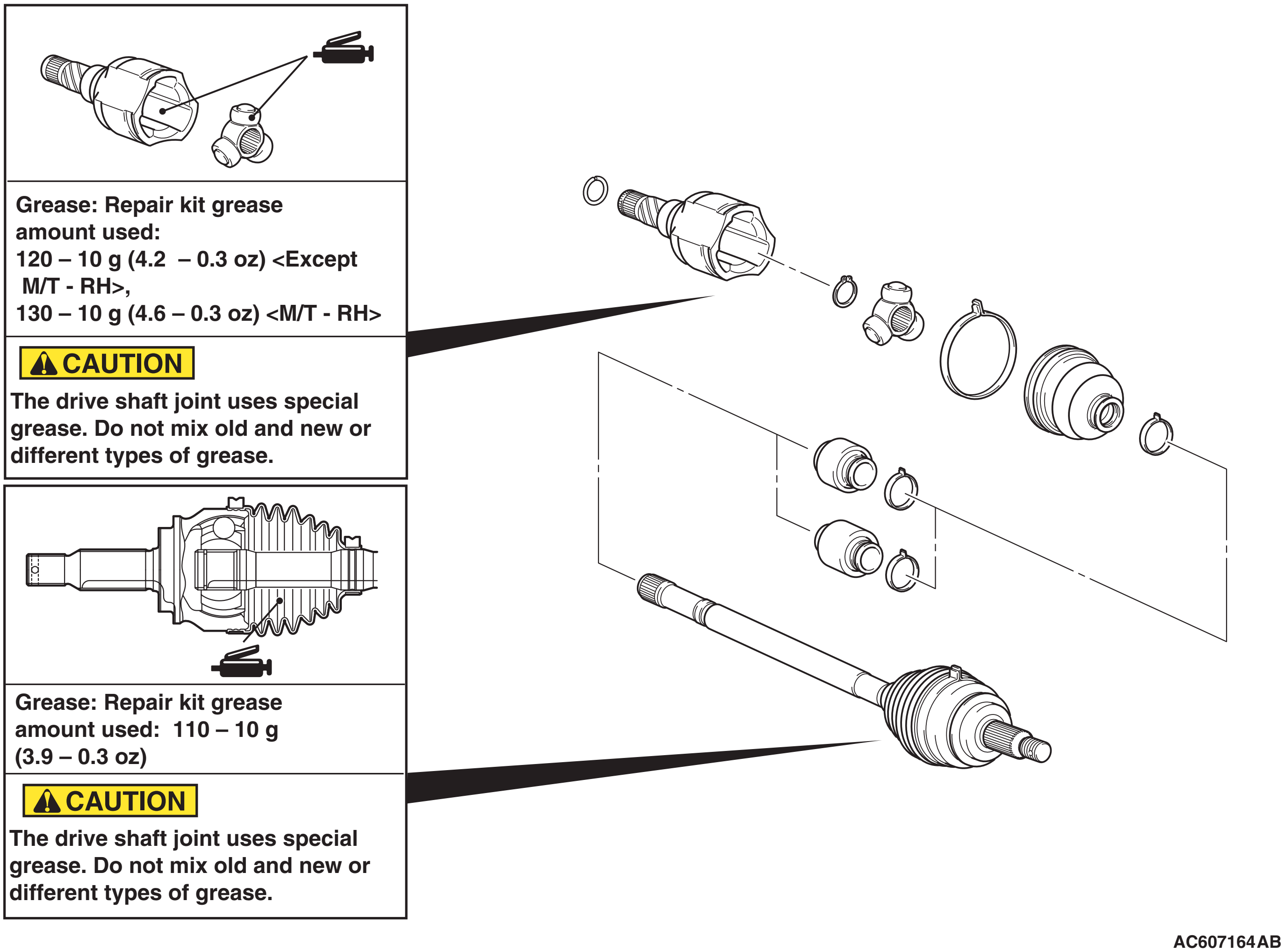
ETJ boots repair kit	ETJ repair kit	EBJ boots repair kit

AC607140 AB

			Disassembly steps
		1.	Circlip
	>>C<<	2.	ETJ boot band (large)
	>>C<<	3.	ETJ boot band (small)
<<A>>	>>B<<	4.	ETJ case
		5.	Snap ring
<<A>>	>>B<<	6.	Spider assembly
<<B>>	>>A<<	7.	ETJ boot

		Disassembly steps (Continued)
>>A<<	8.	Damper band
>>A<<	9.	Dynamic damper (LH)
>>A<<	10.	Dynamic damper (RH)
	11.	EBJ boot band (large)
	12.	EBJ boot band (small)
	13.	EBJ boot
	14.	EBJ assembly

LUBRICATION POINTS



DISASSEMBLY SERVICE POINTS

<<A>> ETJ CASE/SPIDER ASSEMBLY REMOVAL

CAUTION

Do not disassemble the spider assembly.

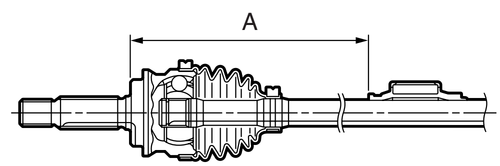
1. Wipe off grease from the spider assembly and the inside of the ETJ case.
2. Always clean the spider assembly when the grease contains water or foreign material.

<<B>> ETJ BOOT REMOVAL

1. Wipe off the grease on the shaft spline.
2. When reusing the ETJ boot, wrap plastic tape around the shaft spline to avoid damaging the boot.

ASSEMBLY SERVICE POINTS

>>A<< DYNAMIC DAMPER/DAMPER BAND/ETJ BOOT INSTALLATION



AC208295 AE

⚠ CAUTION

There should be no grease adhered to the rubber part of the dynamic damper.

1. Install the dynamic damper in the position (A) shown in the figure .

    A: 221 ± 3 mm (8.70 ± 0.12 inches) <M/T-LH>
    A: 426 ± 3 mm (16.77 ± 0.12 inches) <M/T-RH, CVT-RH>

2. Secure the damper band.
3. Wrap plastic tape around the shaft spline, and then install the ETJ boot band (small) and ETJ boot.

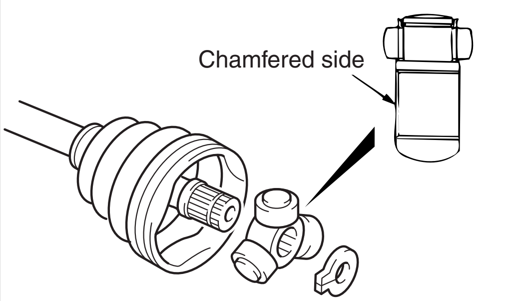
>>B<< SPIDER ASSEMBLY/ETJ CASE INSTALLATION

⚠ CAUTION

- **The driveshaft joint use special grease. Do not mix old and new or different types of grease.**
- **If the spider assembly has been cleaned, take special care to apply the specified grease.**

1. Apply the specified grease furnished in the repair kit to the spider assembly between the spider axle and the roller.

    Specified grease: Repair kit grease



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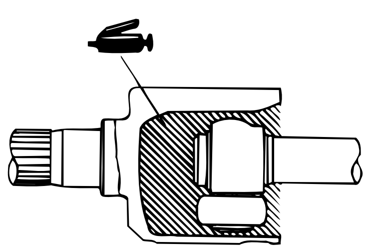
2. Install the spider assembly to the shaft from the direction of the spline chamfered side.

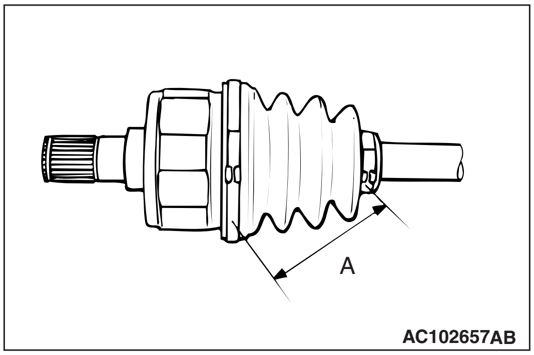

AC102656 AB

3. After applying the specified grease to the ETJ case, insert the driveshaft and apply grease one more time.

    Specified grease: Repair kit grease
    Amount to use:
    120 ± 10 g (4.2 ± 0.3 ounce) <Except M/T-RH>
    130 ± 10 g (4.6 ± 0.3 ounce) <M/T-RH>

    NOTE: When using the repair kit grease, put half of the grease into the joint and the other half into the boot as a guideline, and use the grease completely.

>>C<< ETJ BOOT BAND (SMALL)/ETJ BOOT BAND (LARGE) INSTALLATION



Adjust the distance (A shown in the illustration) between the boot bands to the standard value to adjust the air volume inside the ETJ boot to the specified value, then be sure to tighten the ETJ boot band (large) and ETJ boot band (small).

Standard value (A):
80 ± 3 mm (3.15 ± 0.12 inches)

INSPECTION

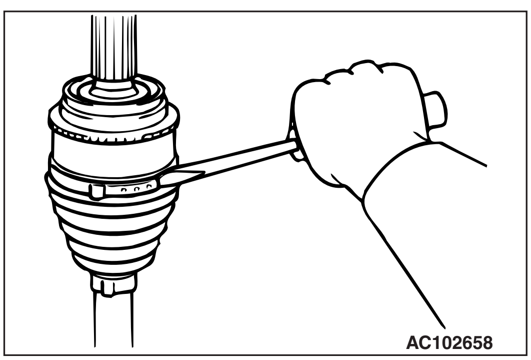
M1261003800301

- Check the driveshaft for damage, bending or corrosion.
- Check the inner shaft for damage, bending or corrosion.
- Check the output shaft for damage, bending or corrosion.
- Check the driveshaft spline part for wear or damage.
- Check the inner shaft spline part for wear or damage.
- Check the output shaft spline part for wear or damage.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside ETJ case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the center bearing for seizure, discoloration or roughness of rolling surface.
- Check the dust cover for damage or deterioration.

EBJ BOOT REPLACEMENT

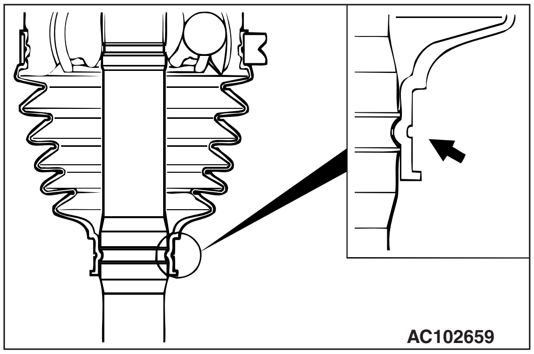
M1261007500119

Required Special Tool:
MB991561:Boot Band Crimping Tool

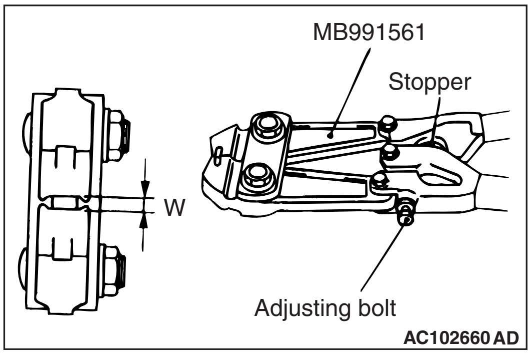


1. Remove the boot bands (large and small).

   NOTE: The boot bands cannot be re-used.
2. Remove the EBJ boot.
3. Wrap a plastic tape around the shaft spline, and assemble the boot band and EBJ boot.



4. Align the center groove on the EBJ boot small end with the shaft groove.

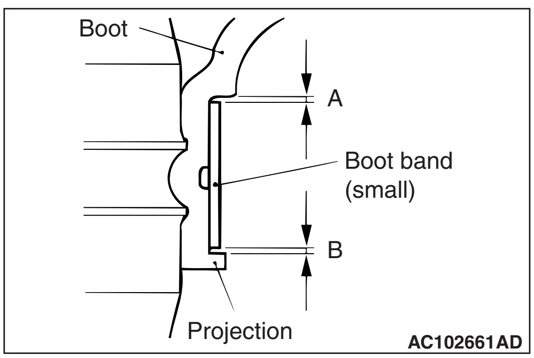


5. Turn the adjusting bolt on special tool MB991561 so that the size of the opening (W) is at the standard value.

   Standard value (W): 2.9 mm (0.11 inch)
   - **<If it is larger than 2.9 mm (0.11 inch)>**
     Tighten the adjusting bolt.
   - **<If it is smaller than 2.9 mm (0.11 inch)>**
     Loosen the adjusting bolt.

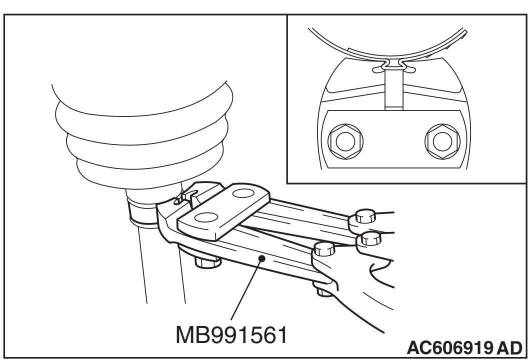
   NOTE: The value of W will change by approximately 0.7 mm (0.03 inch) for each turn of the adjusting bolt.

   NOTE: The adjusting bolt should not be turned more than once.

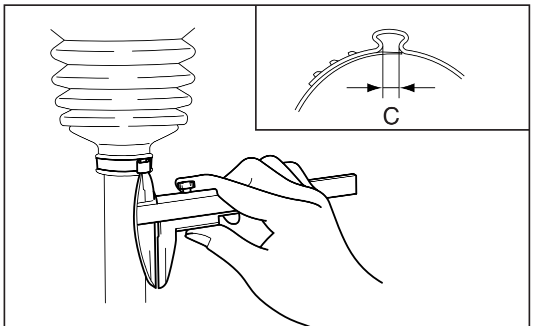


6. Position the EBJ boot band (small) so that there is even clearance at either end (A and B).

⚠ CAUTION
- **Secure the driveshaft in an upright position and clamp part of the boot band to be crimped securely in the jaws of the special tool MB991561.**
- **Crimp the boot band until special tool MB991561 touches the stopper.**



7. Use special tool MB991561 to crimp the boot band (small).



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8. Check that the crimping amount (C) of the boot band is at the standard value.

   Standard value (C): 2.4 – 2.8 mm (0.10 – 0.11 inch)

   <If the crimping amount is larger than 2.8 mm (0.11 inch)>

   Readjust the value of (W) in step 5 according to the following formula, and then repeat the operation in step 7.

   W = 5.5 mm (0.22 inch) – C

   Example: If C = 2.9 mm (0.11 inch), then W = 2.6 mm (0.10 inch)

   <If the crimping amount is smaller than 2.4 mm (0.10 inch)>

   Remove the EBJ boot band, readjust the value of (W) in step 5 according to the following formula, and then repeat the operations in steps 6 and 7 using a new EBJ boot band.

   W = 5.5 mm (0.22 inch) – C

   Example: If C = 2.3 mm (0.09 inch), then W = 3.2 mm (0.13 inch)

9. Check that the boot band is not sticking out past the place where it has been installed. If the boot band is sticking out, remove it and then repeat steps 6 to 8, using a new boot band.

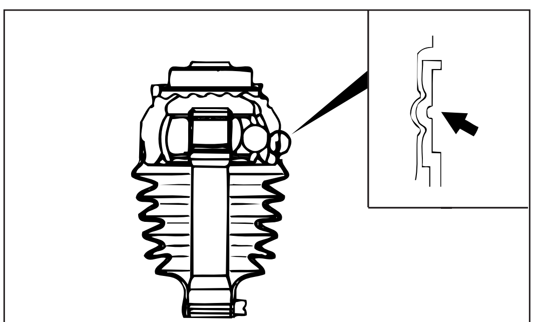
⚠ CAUTION

The driveshaft joint uses special grease. Do not mix old and new or different types of grease.

10. Fill the inside of the boot with the specified amount of the specified grease.

    Specified grease: Repair kit grease

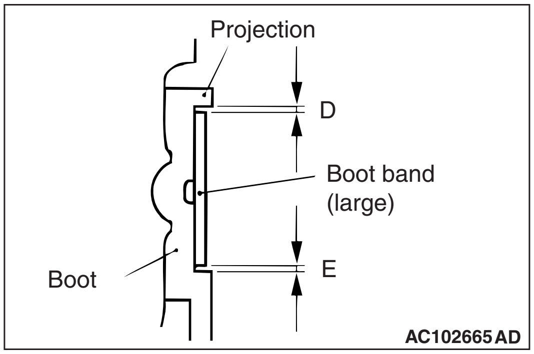
    Amount to use: 110 ± 10 g (3.9 ± 0.3 ounces)


AC102664 AC

11. Align the center groove on the EBJ boot big end with the EBJ case groove.

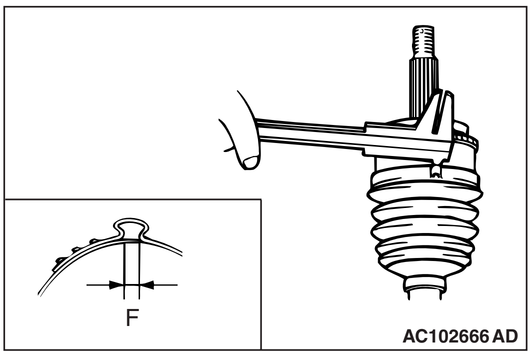
12. Follow the same procedure as in step 5 to adjust the size of the opening (W) on the special tool so that it is at the standard value.

    Standard value (W): 3.2 mm (0.13 inch)



13.Position the EBJ boot band (large) so that there is even clearance at either end (D and E).

14.Use special tool MB991561 to crimp the EBJ boot band (large) in the same way as in step 7.



15.Check that the crimping amount (F) of the boot band is at the standard value.

Standard value (F): 2.4 – 2.8 mm (0.10 – 0.11 inch)

<If the crimping amount is larger than 2.8 mm (0.11 inch)>

Readjust the value of (W) in step 12 according to the following formula, and then repeat the operation in step 14.

W = 5.8 mm (0.23 inch) – F

Example: If F = 2.9 mm (0.11 inch), then W = 2.9 mm (0.11 inch)

<If the crimping amount is smaller than 2.4 mm (0.10 inch)>

Remove the EBJ boot band, readjust the value of (W) in step 12 according to the following formula, and then repeat the operations in steps 13 and 14 using a new BJ boot band.

W = 5.8 mm (0.23 inch) – F

Example: If F = 2.3 mm (0.09 inch), then W = 3.5 mm (0.14 inch)

16.Check that the boot band is not sticking out past the place where it has been installed. If the boot band is sticking out, remove it and then repeat steps 13 to 15, using a new boot band.

GROUP 27

REAR AXLE

CONTENTS

GENERAL INFORMATION

M2270000100478

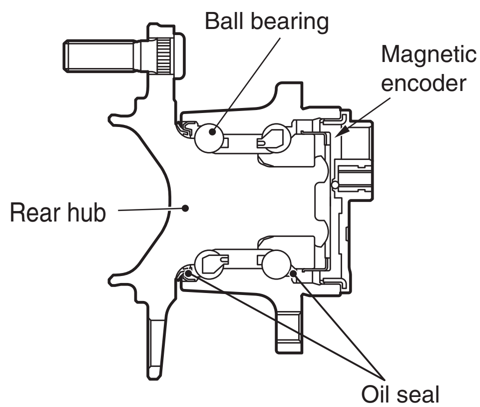
The rear axle has the following features:

- The wheel bearing is a unit ball bearing (double-row angular contact ball bearing) which incorporates the oil seals and is highly resistant to thrust loads.
- The number of parts has been reduced by integrating the magnetic encoder for ABS wheel speed detection into the wheel bearing. <Vehicles with ABS>

SPECIFICATIONS

Item		Specification
Wheel bearing	Type	Unit ball bearing (double-row angular contact ball bearing)

CONSTRUCTION DIAGRAM



AC606273 AB

GROUP 5

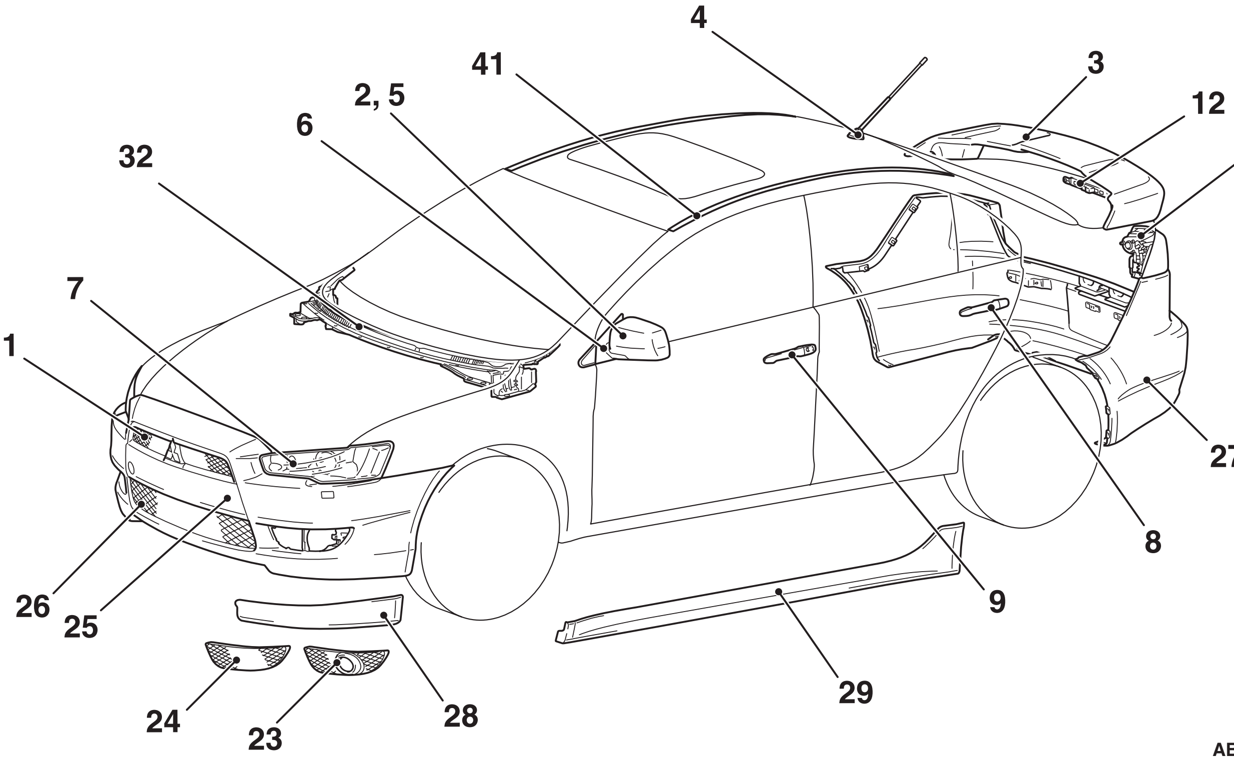
SYNTHETIC-RESIN PARTS

CONTENTS

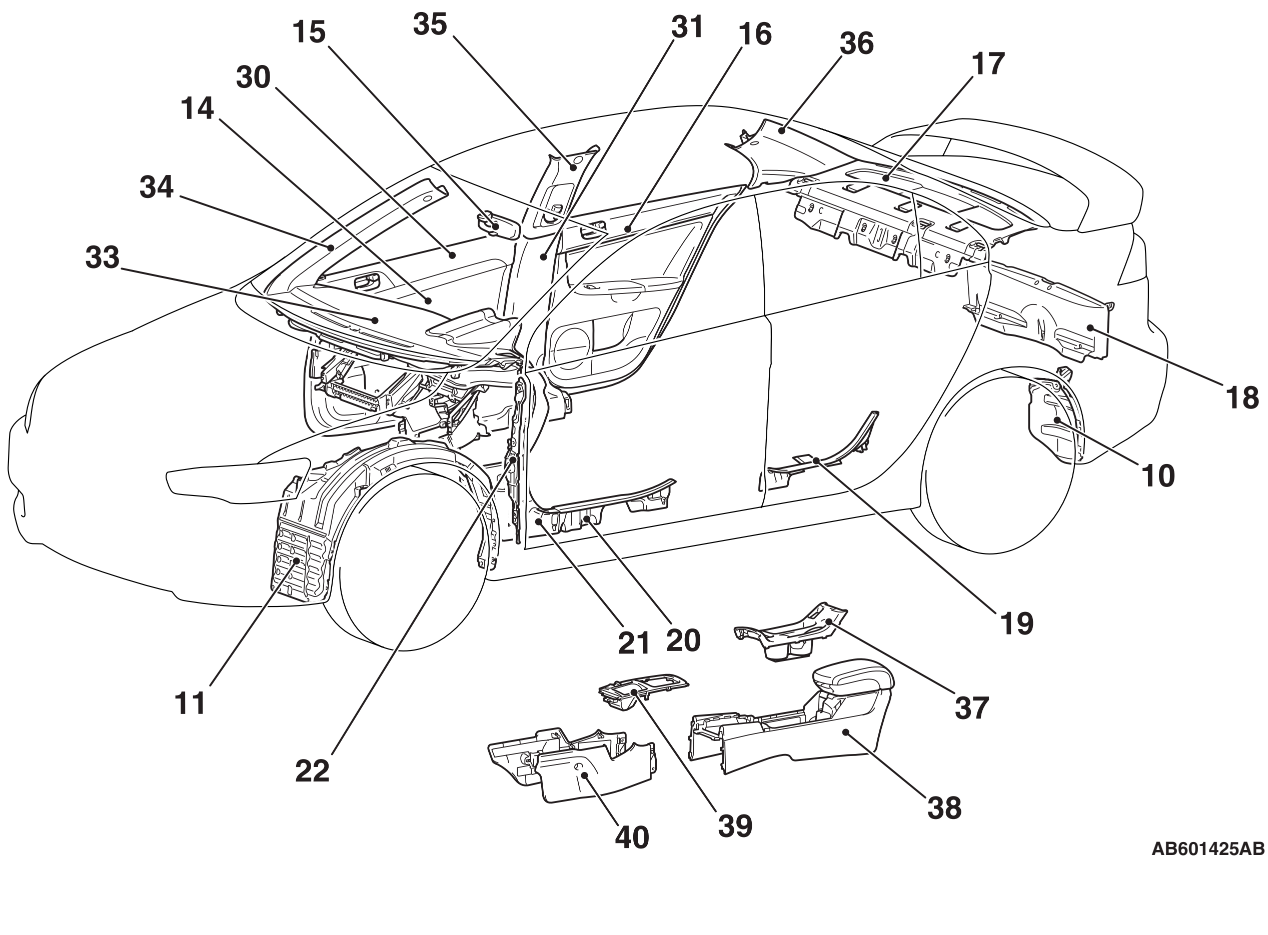
LOCATION OF SYNTHETIC-RESIN PARTS

M4050001000980

The location and material of each of the principal synthetic-resin parts are shown below.



AB601424AB



AB601425AB

NO.	PART NAME	NAME OF RESIN	ABBREVIATION	HEAT-RESISTANT TEMP [° C (° F)]
1 2 3	Radiator grille Door mirror cover (colour) Rear spoiler	Acrylonitrile butadiene styrene	ABS	80 (176)
4	Roof antenna base	Acrylonitrile ethylene styrene	AES	80 (176)
5 6	Door mirror cover (black) Door mirror	Acrylonitrile styrene acrylate	ASA(AAS)	80 (176)
7	Headlight	Polycarbonate	PC	120 (248)
8 9	Rear door outside handle Front door outside handle	Polycarbonate+Polyethylene terephthalate	PC+PET	120 (248)
10 11	Rear splash shield Front splash shield	High density polyethylene	PE-HD (HDPE)	70 –90 (158 –194)
12 13	High-mounted stoplight Trunk lid light	Polymethyl methacrylate	PMMA	80 (176)
14 15 16 17 18 19 20 21 22	Front door trim lower Inside rear view mirror Rear door trim Rear shelf trim Rear end trim Rear scuff plate Front scuff plate Cowl side trim Fender protector	Polypropylene	PP	80 (176)
23 24 25 26 27 28	Fog light bezel <With fog light> Air intake bezel <Without fog light> Front bumper face Under grille Rear bumper face Front air dam	Rubber denatured polypropylene	PP+E/P	80 (176)
29	Side air dam	Talc filled rubber modified polypropylene (20%)	PP+E/P-TD20	110 (230)
30 31	Front door trim upper Center pillar trim lower	Talc filled polypropylene (10%)	PP-TD10 (PPF)	110 –120 (230 –248)

NO.	PART NAME	NAME OF RESIN	ABBREVIATION	HEAT-RESISTANT TEMP [° C (° F)]
32	Front deck garnish	Talc filled polypropylene (20%)	PP-TD20 (PPF)	120 –130 (248 –266)
33	Instrument panel			
34	Front pillar trim			
35	Center pillar trim upper			
36	Rear pillar trim			
37	Cup holder			
38	Floor console			
39	Floor console panel			
40	Console side cover			
41	Roof drip molding	Polyvinyl chloride	PVC	80 (176)

NOTE:

- *If the material symbols designated by the ISO differ from the old symbols, both are given, with the old symboling enclosed in brackets.*

  ISO: International Standardization Organization.
- *A slash (/) in the material symbol indicates that two different materials make two-layer construction. A plus sign (+) indicates that the two different materials mix each other.*
- *The indicated heat-resistant temperature for parts which are composed of two or more types of material is the value for the material with the lowest heat-resistant temperature.*
- *The material symbols for synthetic-resin parts are embossed on the parts in hidden places.*

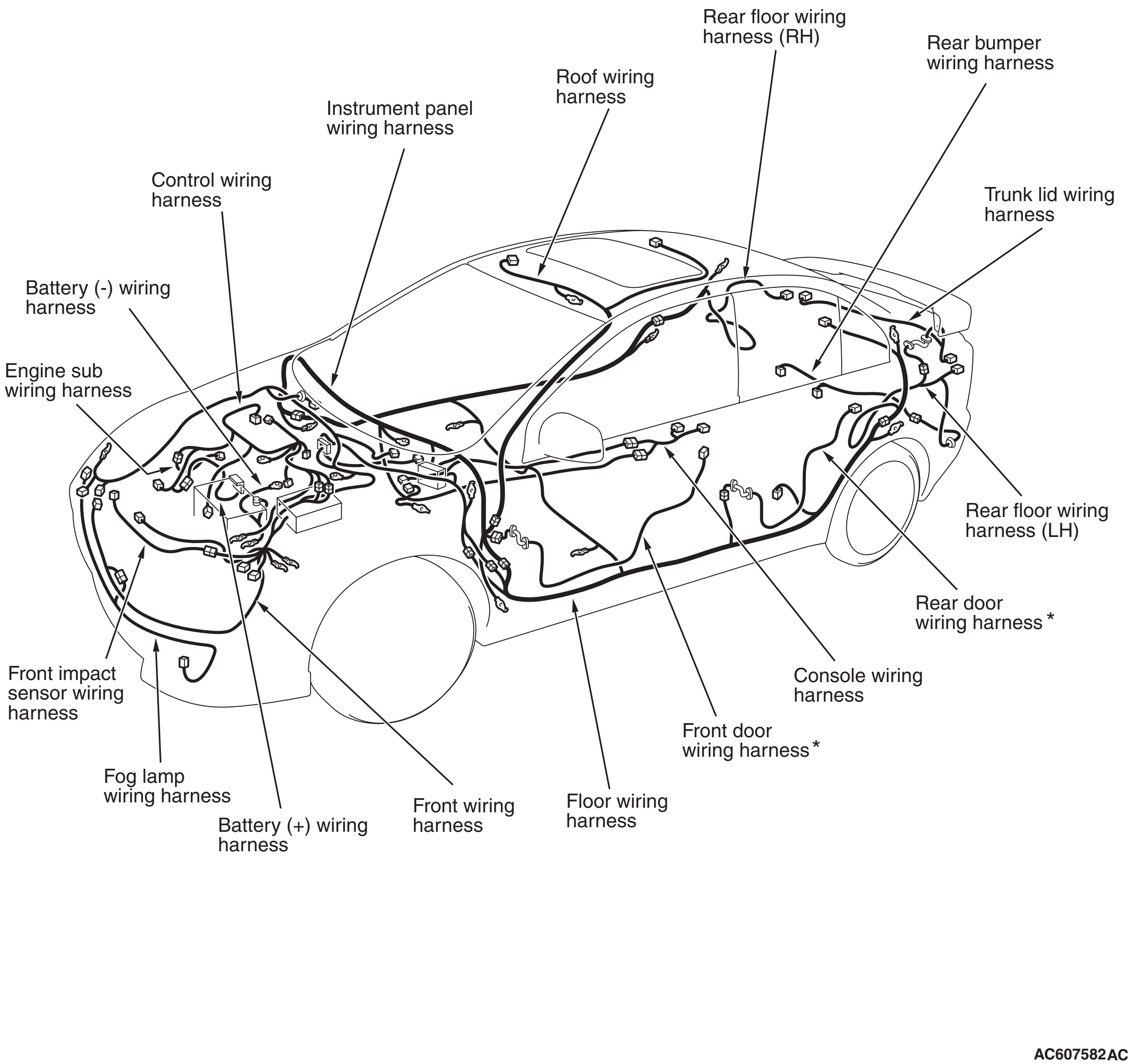
GROUP 80A

CONFIGURATION DIAGRAMS

CONTENTS

OVERALL CONFIGURATION DIAGRAM

M1801000101818



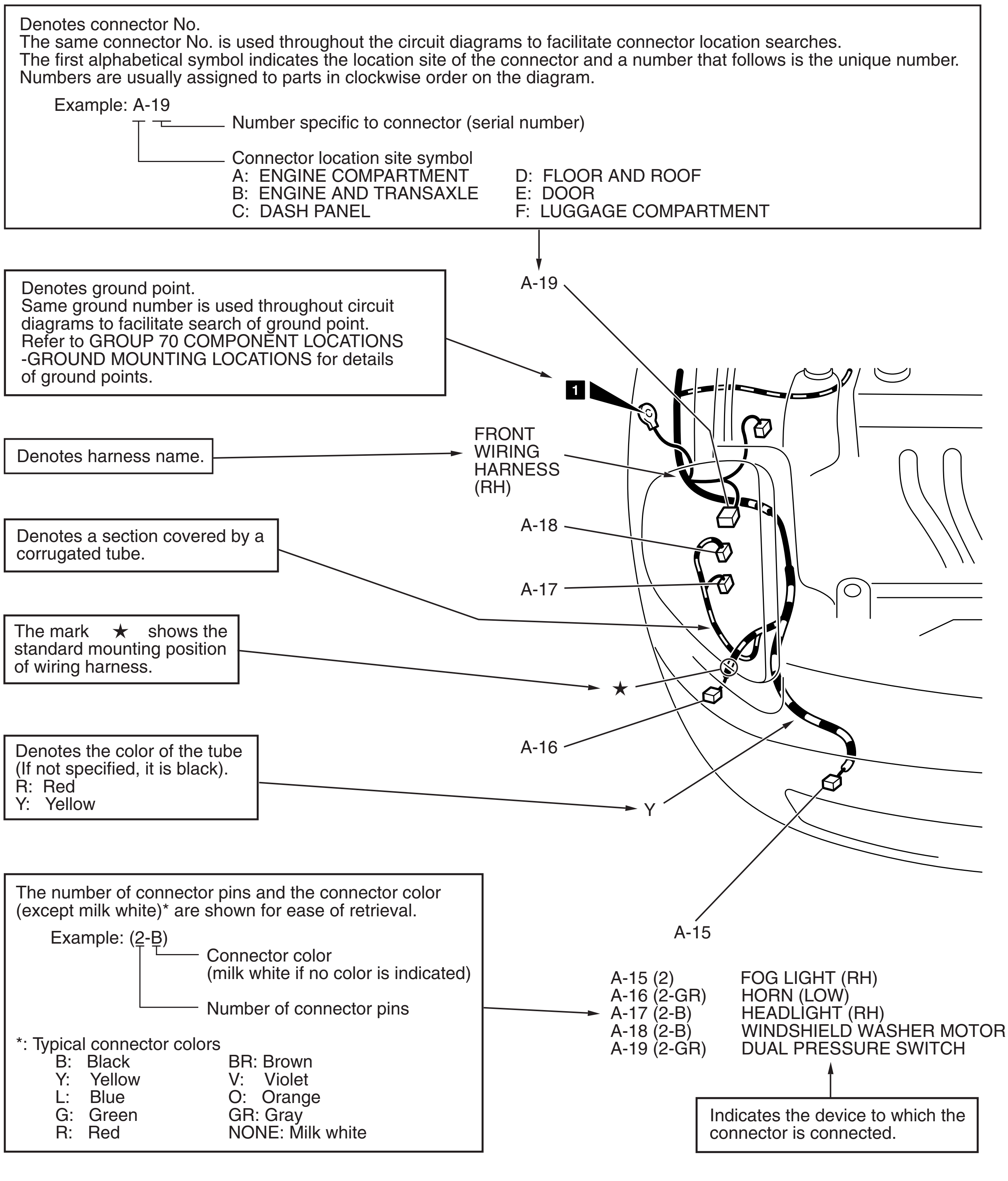
NOTE:

1. *This illustration shows only major wiring harnesses.*
2. **: also equipped at the right side.*

HOW TO READ CONFIGURATION DIAGRAMS

M1801000200555

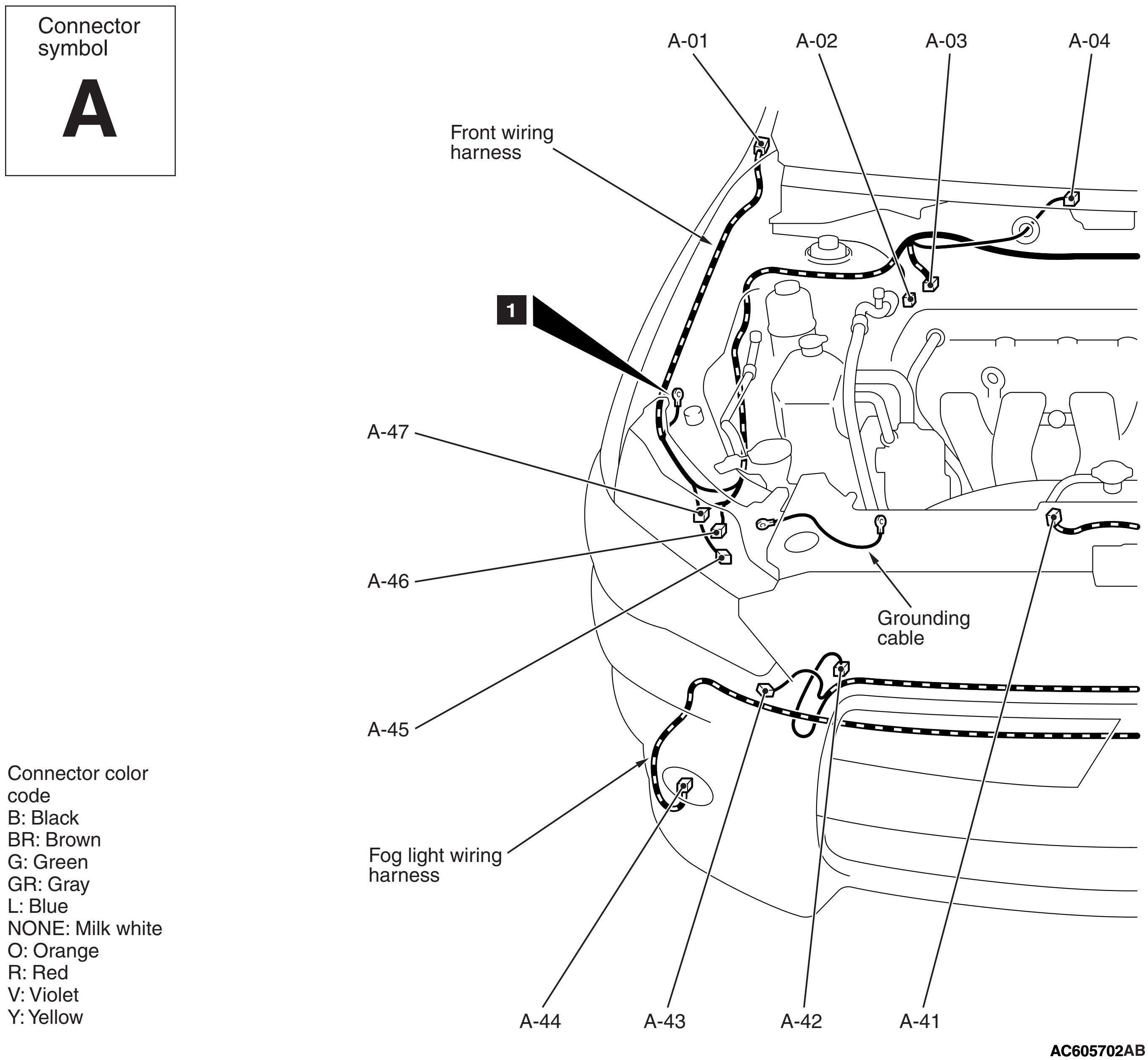
The wiring harness diagrams clearly show the connector locations and harness configurations on actual vehicles. Some variations are included in one configuration diagram. Accordingly, some diagrams may not be applicable for individual vehicles.



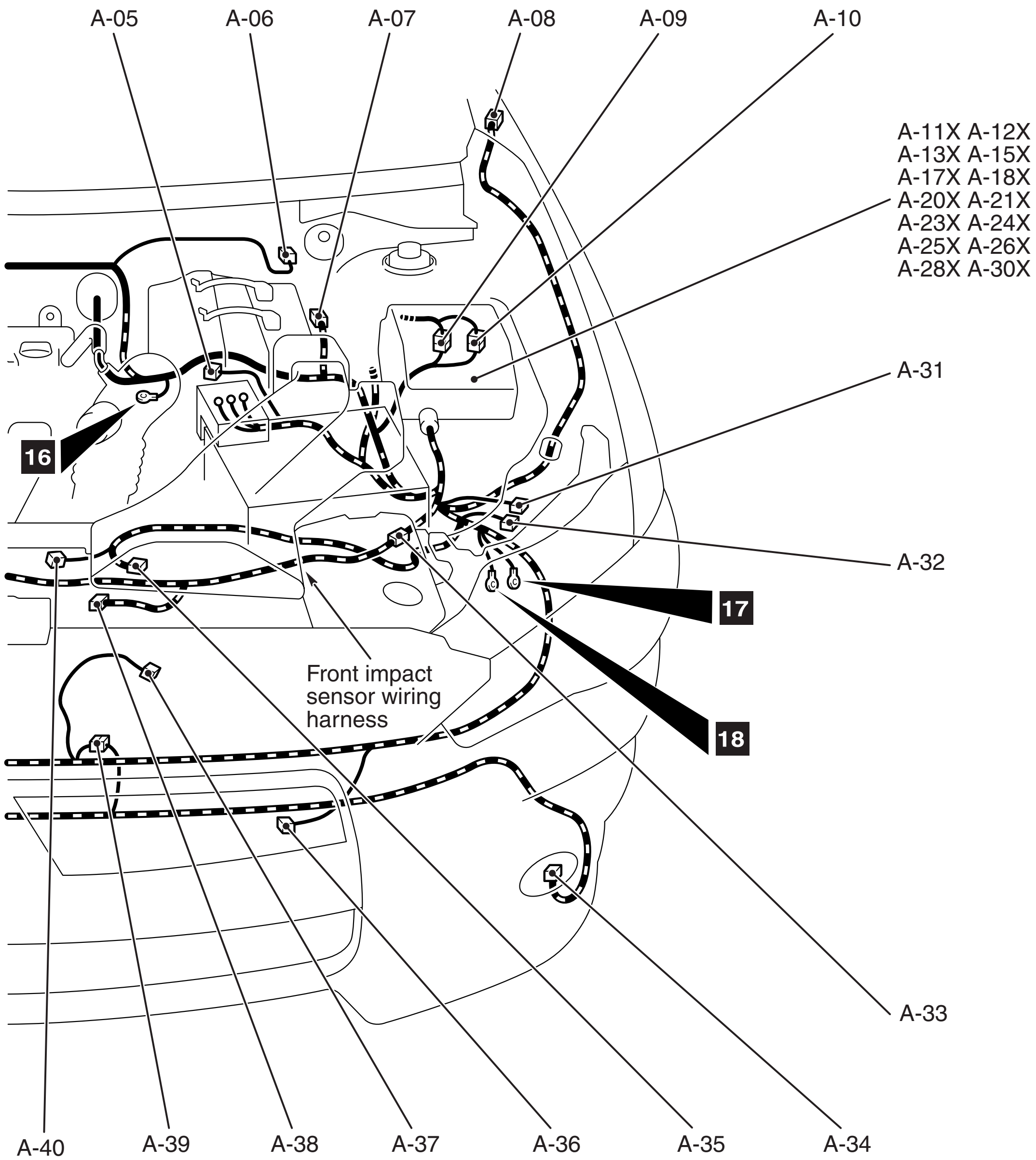
AC208446AK

ENGINE COMPARTMENT

M1801000303391



A-01	(2-B)	Side turn-signal light (RH)
A-02	(2-B)	Front wheel speed sensor (RH)
A-03	(26-B)	ABS-ECU
A-04	(5-GR)	Windshield wiper motor
A-05	(4-GR)	Mass airflow sensor
A-06	(2-B)	Brake fluid level switch
A-07	(2-B)	Front wheel speed sensor (LH)
A-08	(2-B)	Side turn-signal light (LH)
A-09	(24)	Front wiring harness and control wiring harness combination
A-10	(20)	Front wiring harness and control wiring harness combination
A-11X	(4)	Fog light relay
A-12X	(4)	Horn relay
A-13X	(4)	A/C compressor clutch relay
A-15X	(4)	CVT control relay
A-17X	(4)	Headlight relay (High)
A-18X	(4)	Throttle actuator control motor relay
A-20X	(4)	Daytime running light relay
A-21X	(4)	Injector relay
A-23X	(4)	Condenser fan relay
A-24X	(4)	Stater relay
A-25X	(4)	Headlight relay (Low)
A-26X	(4)	Radiator fan relay



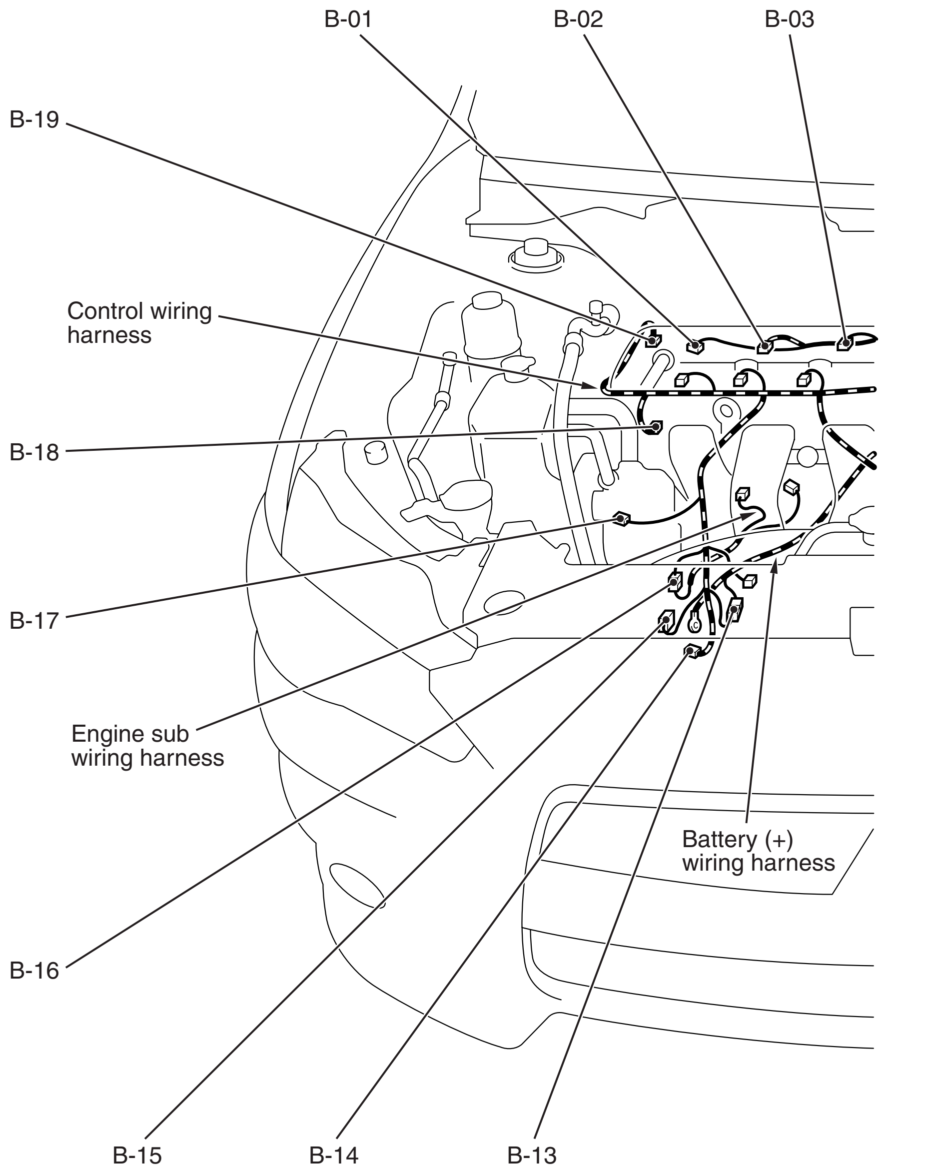
AC605703AB

A-28X	(4)	Fan control relay
A-30X	(4)	MFI relay
A-31	(12-B)	Headlight assembly (LH)
A-32	(6-B)	No connection
A-33	(4-B)	Front wiring harness and front impact sensor wiring harness combination
A-34	(2-B)	Fog light (LH)
A-35	(2-GR)	Radiator fan motor
A-36	(2-B)	Ambient air temperature sensor
A-37	(1-B)	Horn (Low)
A-38	(2-Y)	Front impact sensor (LH)
A-39	(2-B)	Front wiring harness and fog light wiring harness combination
A-40	(2-B)	Condenser fan motor
A-41	(2-Y)	Front impact sensor (RH)
A-42	(3-B)	A/C pressure sensor
A-43	(1-B)	Horn (High)
A-44	(2-B)	Fog light (RH)
A-45	(2-B)	Washer motor
A-46	(6-B)	No connection
A-47	(12-B)	Headlight assembly (RH)

ENGINE AND TRANSAXLE

M1801000402373

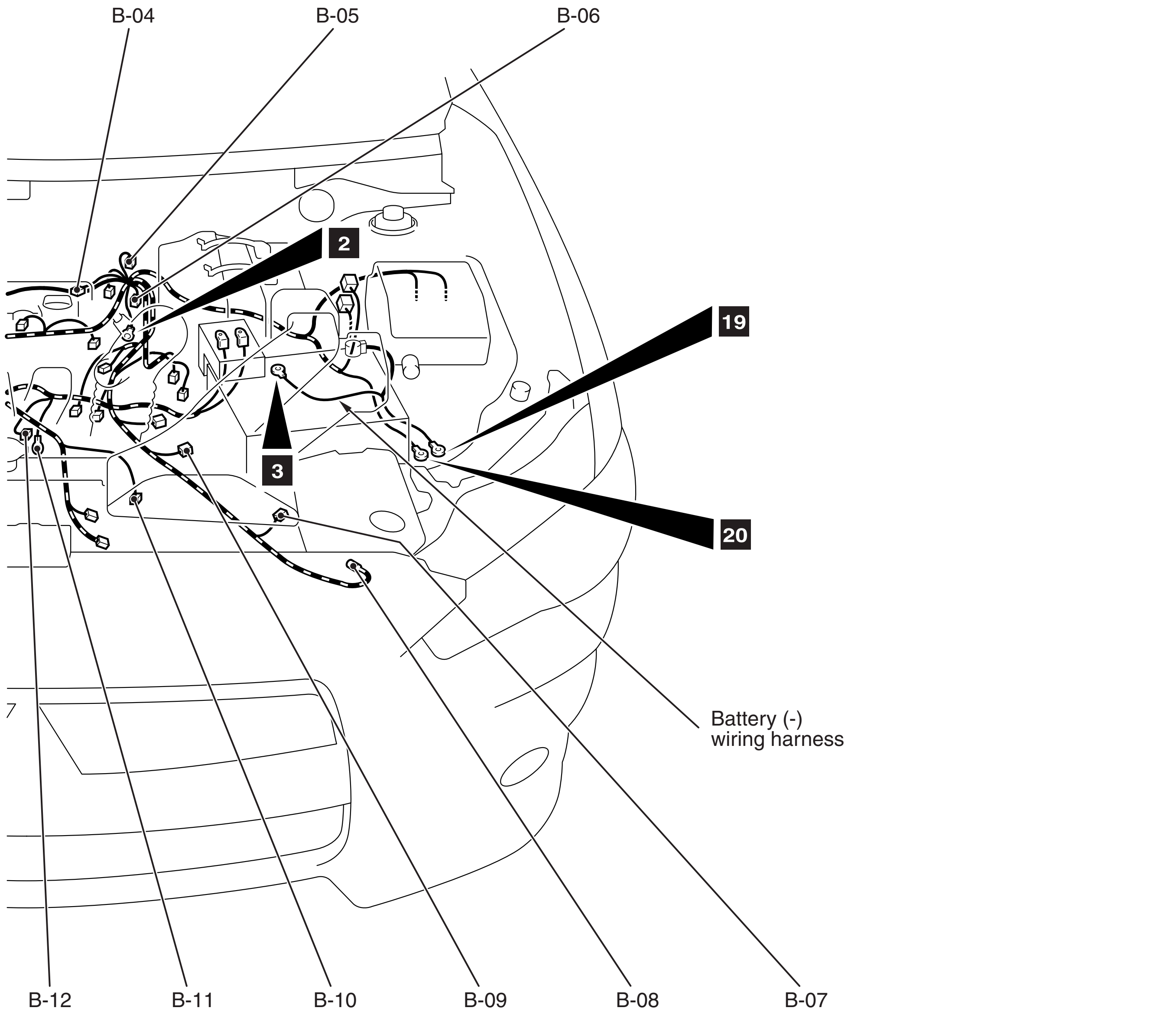
Connector symbol
B -01 thru -19



Connector color code
B: Black
BR: Brown
G: Green
GR: Gray
L: Blue
NONE: Milk white
O: Orange
R: Red
V: Violet
Y: Yellow

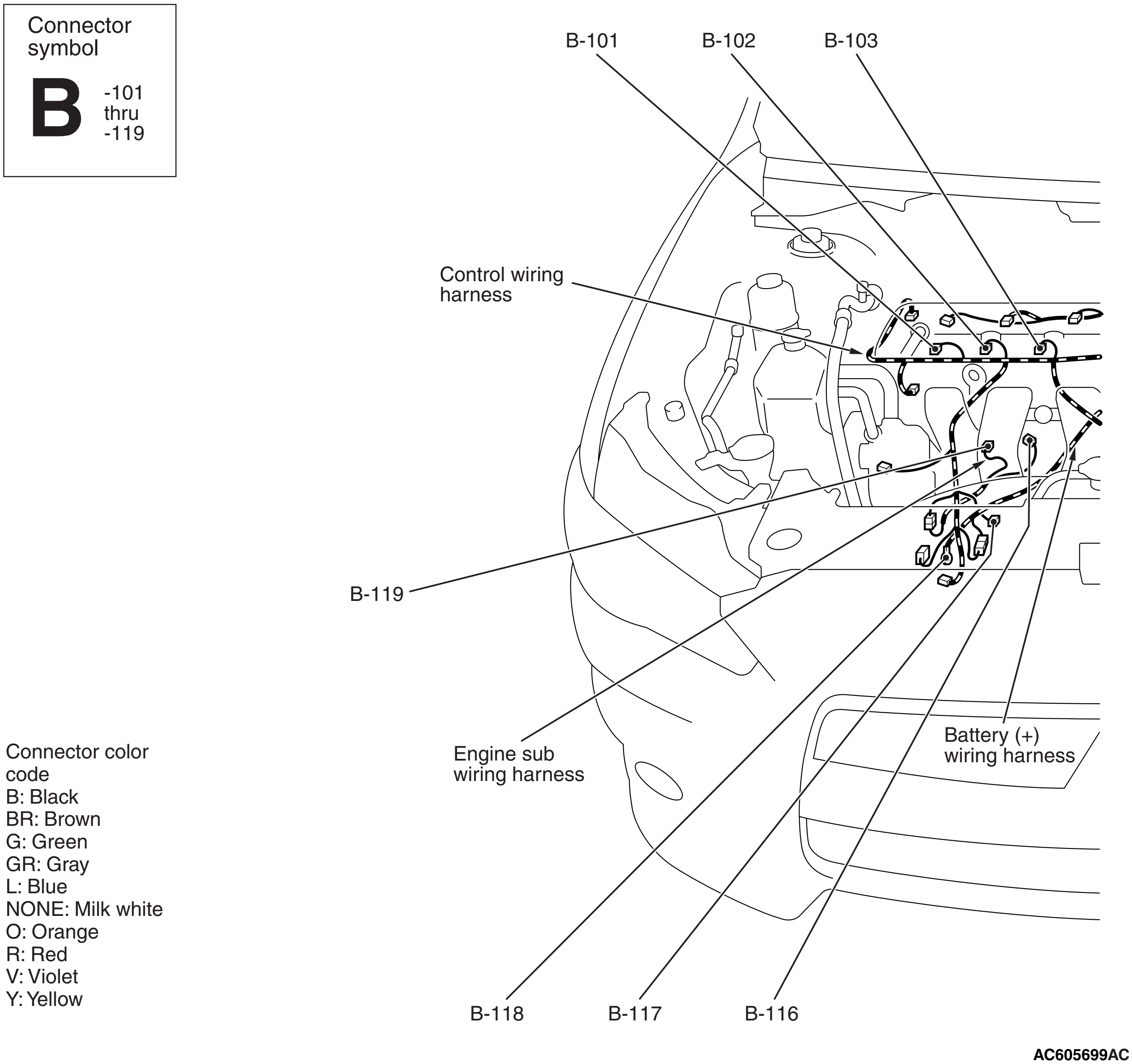
AC605699AB

B-01	(3-B)	Ignition coil 1
B-02	(3-B)	Ignition coil 2
B-03	(3-B)	Ignition coil 3
B-04	(3-B)	Ignition coil 4
B-05	(4-B)	Heated oxygen sensor (Front) <Vehicles for California>
B-06	(2-B)	Engine coolant temperature sensor
B-07	(3-B)	Primary pulley speed sensor <CVT>
B-08	(22-B)	CVT assembly < CVT>
B-09	(10-B)	Transmission range switch <CVT>
B-10	(6-B)	Throttle body assembly

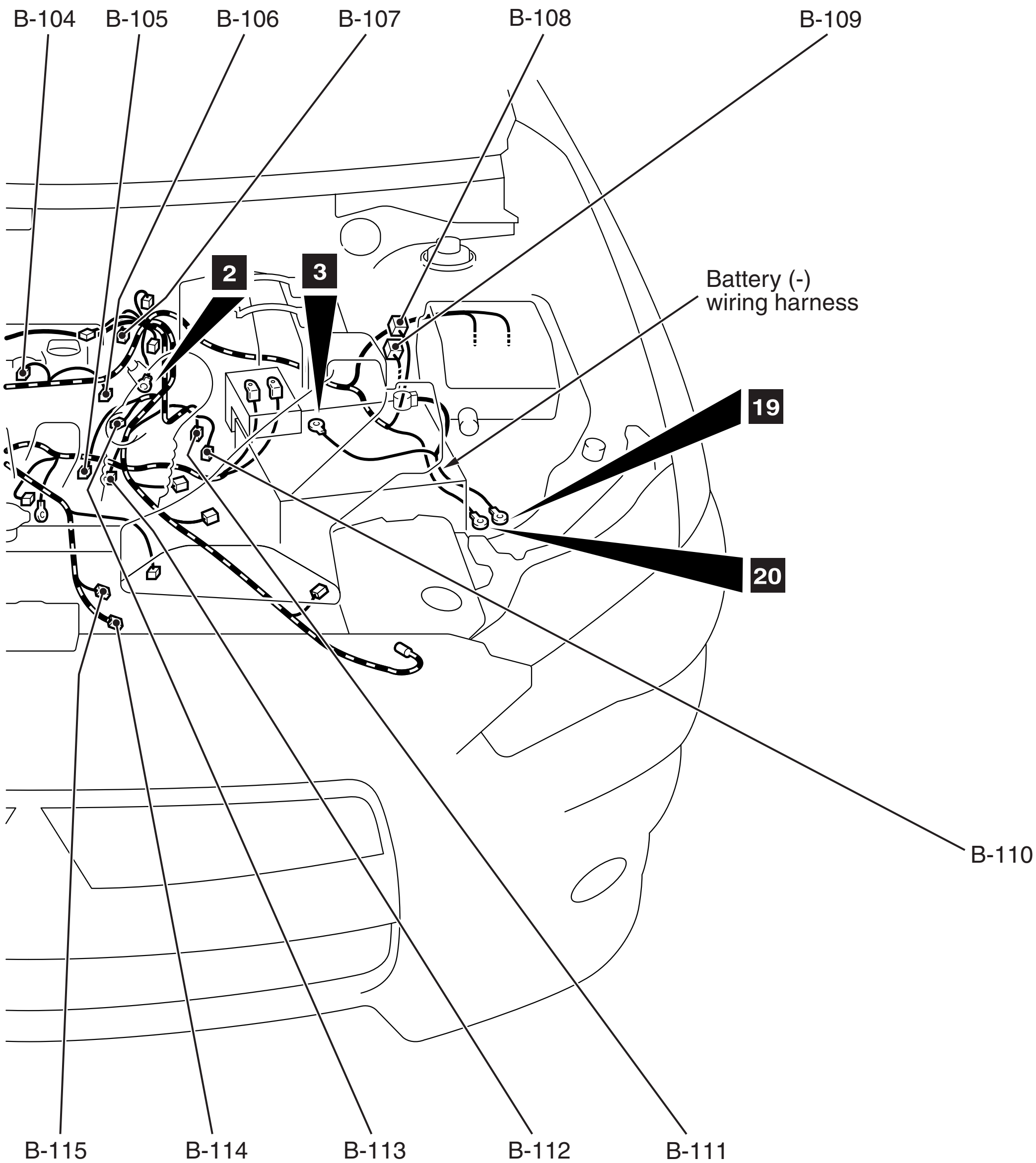


B-11	(1)	Starter
B-12	(1-B)	Starter
B-13	(1-B)	Control wiring harness and battery (+) wiring harness combination
B-14	(1-B)	A/C compressor assembly
B-15	(4-GR)	Generator
B-16	(3-B)	Control wiring harness and engine sub wiring harness combination
B-17	(1-B)	Power steering pressure switch
B-18	(2)	Intake engine oil control valve
B-19	(2)	Exhaust engine oil control valve

ENGINE AND TRANSAXLE (CONTINUED)



B-101	(2-GR)	Injector 1
B-102	(2-GR)	Injector 2
B-103	(2-GR)	Injector 3
B-104	(2-GR)	Injector 4
B-105	(3-GR)	Crankshaft position sensor <CVT>
B-106	(3-GR)	Intake camshaft position sensor
B-107	(3-GR)	Exhaust camshaft position sensor
B-108	(64-GR)	Engine control module
B-109	(48-GR)	Engine control module
B-110	(2-B)	Backup light switch <M/T>
B-111	(3-B)	Vehicle speed sensor <M/T>



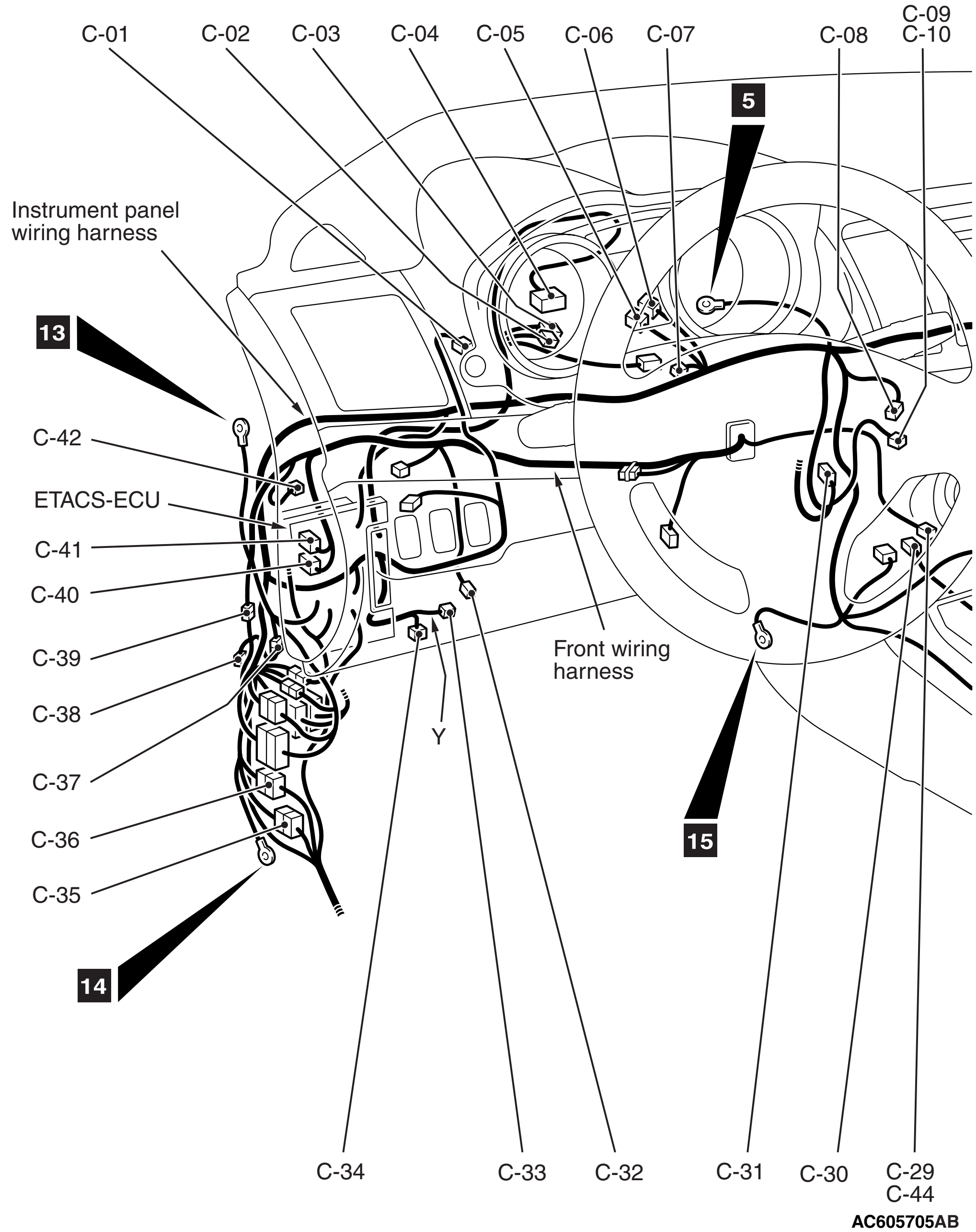
AC605700AC

B-112	(3-GR)	Crankshaft position sensor <M/T>
B-113	(3-B)	Secondary pulley speed sensor <CVT>
B-114	(6-GR)	Exhaust gas recirculation valve
B-115	(2-B)	Evaporative emission purge solenoid
B-116	(2-B)	Knock sensor
B-117	(3-B)	Manifold absolute pressure sensor
B-118	(1)	Generator
B-119	(1)	Engine oil pressure switch

DASH PANEL

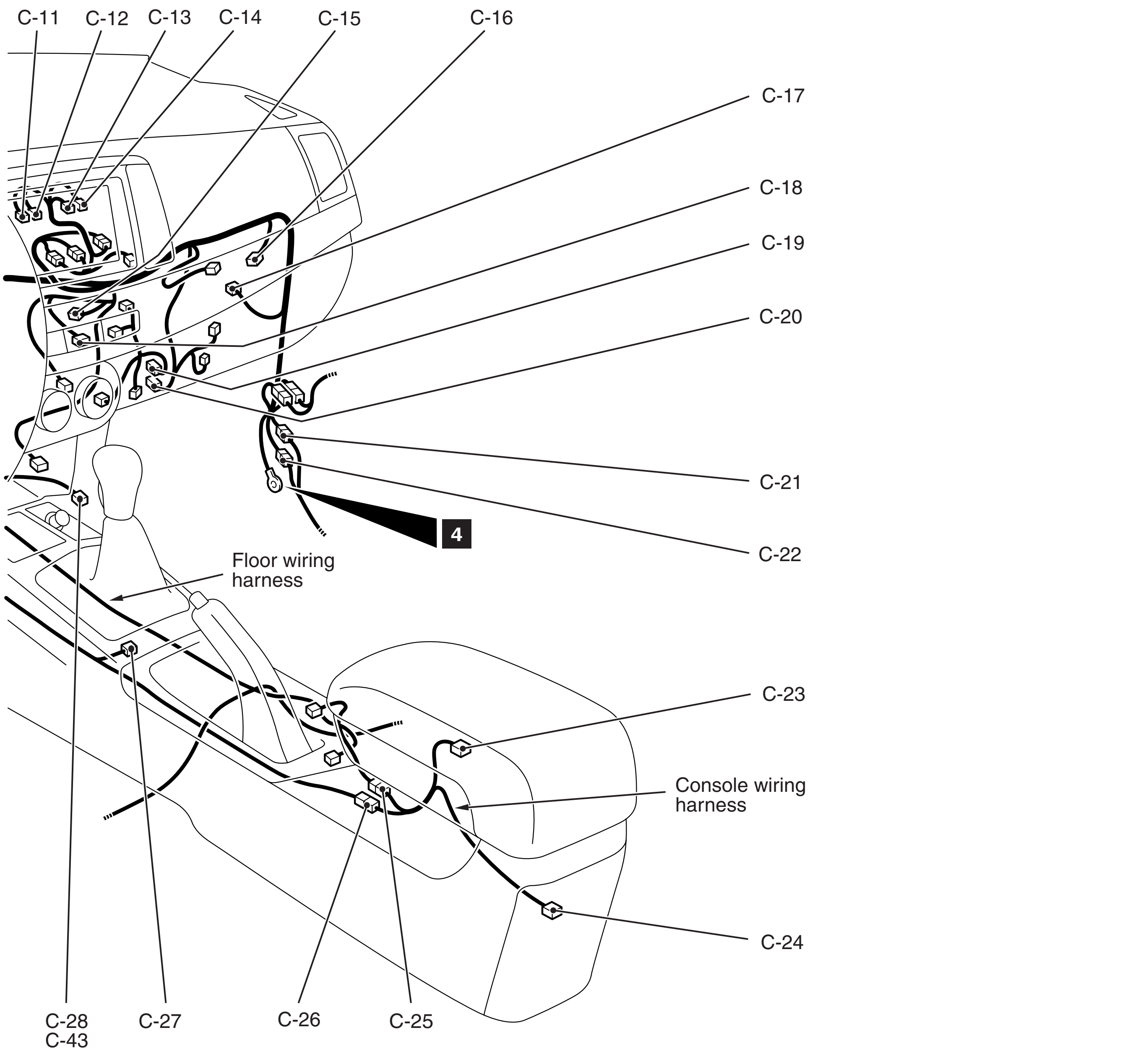
M1801000602236

Connector symbol
C -01 thru -43



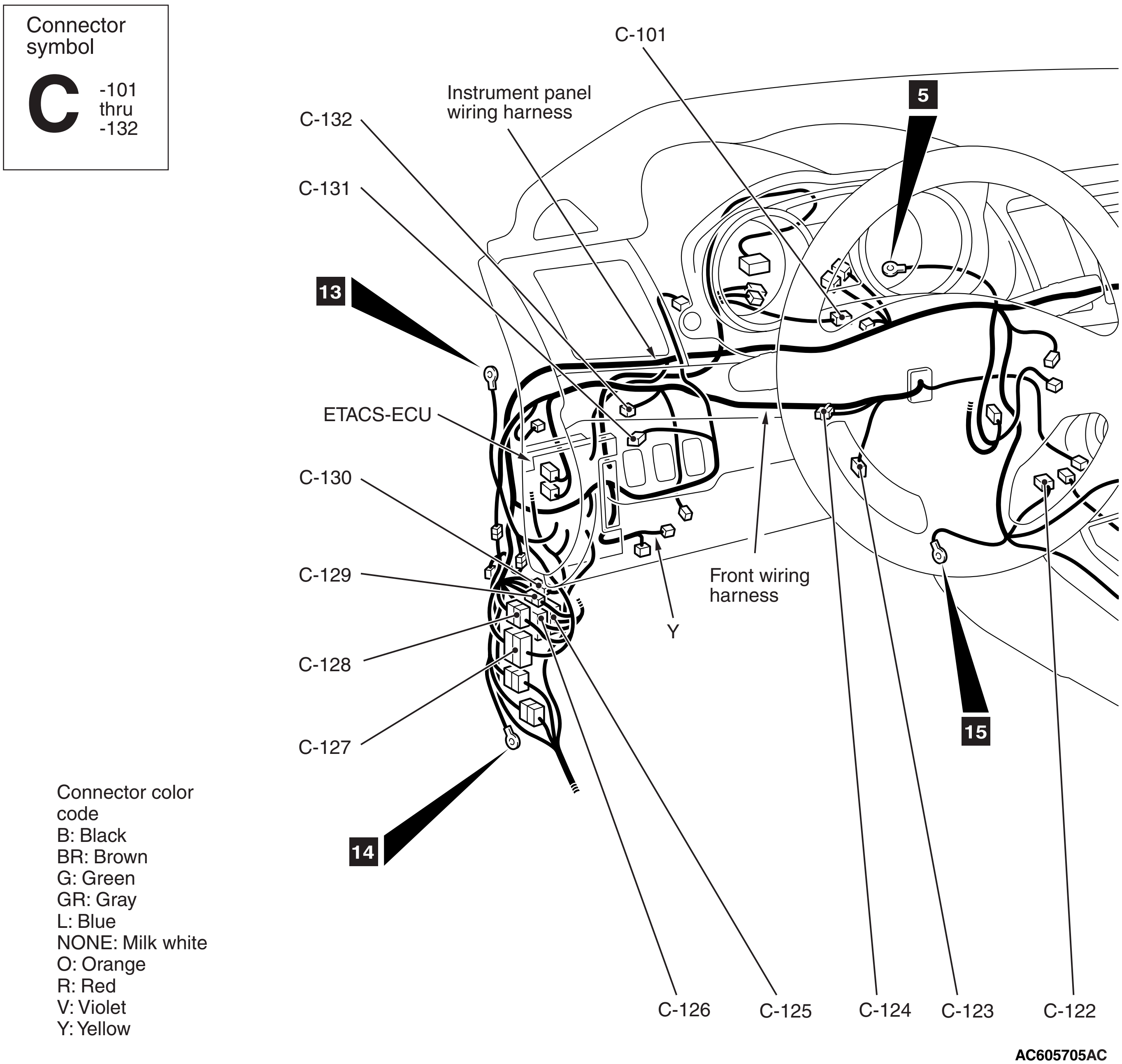
Connector color code
B: Black
BR: Brown
G: Green
GR: Gray
L: Blue
NONE: Milk white
O: Orange
R: Red
V: Violet
Y: Yellow

C-01	(4)	Meter information switch
C-02	(12)	Joint connector (2)
C-03	(24)	Joint connector (1)
C-04	(24)	Combination meter
C-05	(24)	Joint connector (CAN2)
C-06	(24)	Joint connector (CAN1)
C-07	(24)	Joint connector (3)
C-08	(2)	Interior temperature sensor
C-09	(12)	Wireless control module <Vehicles without KOS>
C-10	(12)	Receiver antenna module <Vehicles with KOS>
C-11	(7)	Audio visual navigation unit
C-12	(32)	Audio visual navigation unit
C-13	(5)	Audio visual navigation unit
C-14	(17)	Audio visual navigation unit
C-15	(2)	Radio antenna
C-16	(4-Y)	Passenger's (Front) air bag module (Squib)
C-17	(14)	Satellite radio tuner
C-18	(6-B)	Center panel unit
C-19	(16-B)	A/C-ECU
C-20	(20-B)	A/C-ECU
C-21	(20)	Instrument panel wiring harness and floor wiring harness combination
C-22	(22)	Instrument panel wiring harness and floor wiring harness combination
C-23	(9)	Heated seat switch
C-24	(2)	Accessory socket (Rear floor console)

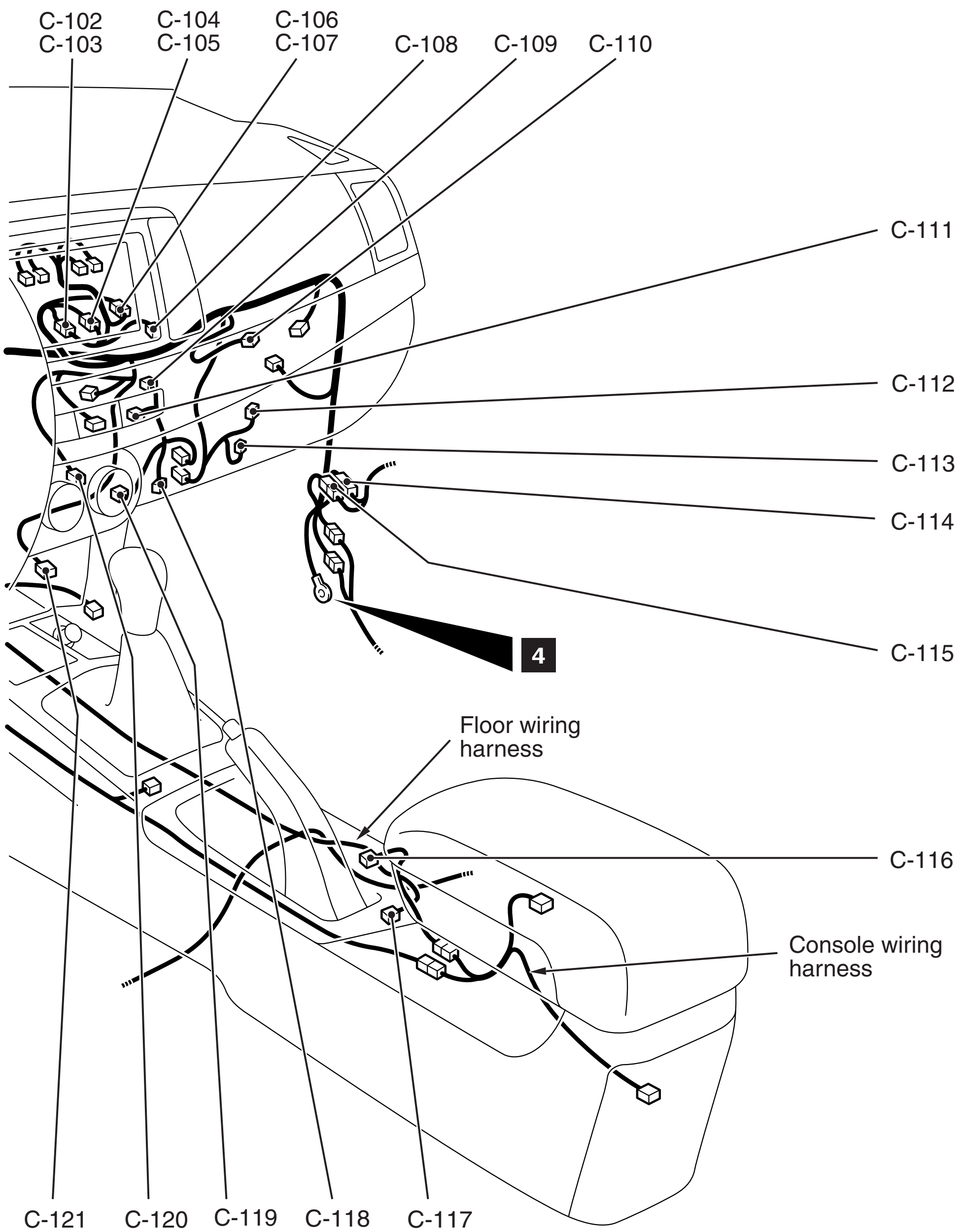


C-25	(4)	Floor wiring harness and console wiring harness combination
C-26	(6)	Instrument panel wiring harness and console wiring harness combination
C-27	(10)	Shift switch assembly
C-28	(2)	Accessory socket (Front floor console)
C-29	(4-B)	Heated oxygen sensor (Rear) <Vehicles for California>
C-30	(32-Y)	SRS-ECU
C-31	(40)	KOS-ECU
C-32	(4)	Stoplight switch
C-33	(2-B)	Knee air bag module (Squib)
C-34	(16-B)	Data link connector
C-35	(24)	Instrument panel wiring harness and floor wiring harness combination
C-36	(20)	Instrument panel wiring harness and floor wiring harness combination
C-37	(12)	Front wiring harness and floor wiring harness combination
C-38	(24)	Joint connector (4)
C-39	(22)	Front wiring harness and floor wiring harness combination
C-40	(22)	Transaxle control module <CVT>
C-41	(26)	Transaxle control module <CVT>
C-42	(2)	Clutch monitoring switch <M/T>
C-43	(2)	Cigarette lighter (Front floor console)
C-44	(4-B)	Heated oxygen sensor (Front) <Except for California>

DASH PANEL (CONTINUED)



C-101	(6)	Photo sensor
C-102	(24)	Radio, CD player or CD changer <Vehicles with audio amplifier>
C-103	(24)	Instrument panel wiring harness and audio navigation display wiring harness combination
C-104	(20)	Radio, CD player or CD changer
C-105	(20)	Instrument panel wiring harness and audio navigation display wiring harness combination
C-106	(18)	Radio, CD player or CD changer
C-107	(18)	Instrument panel wiring harness and audio navigation display wiring harness combination
C-108	(10)	CAN box unit
C-109	(5)	Outside/inside air selection damper control module
C-110	(24)	Hands free module
C-111	(5)	Mode selection damper control motor
C-112	(4)	Power transistor
C-113	(2)	Blower motor
C-114	(12)	Instrument panel wiring harness and front door wiring harness (RH) combination
C-115	(24-BR)	Instrument panel wiring harness and front door wiring harness (RH) combination

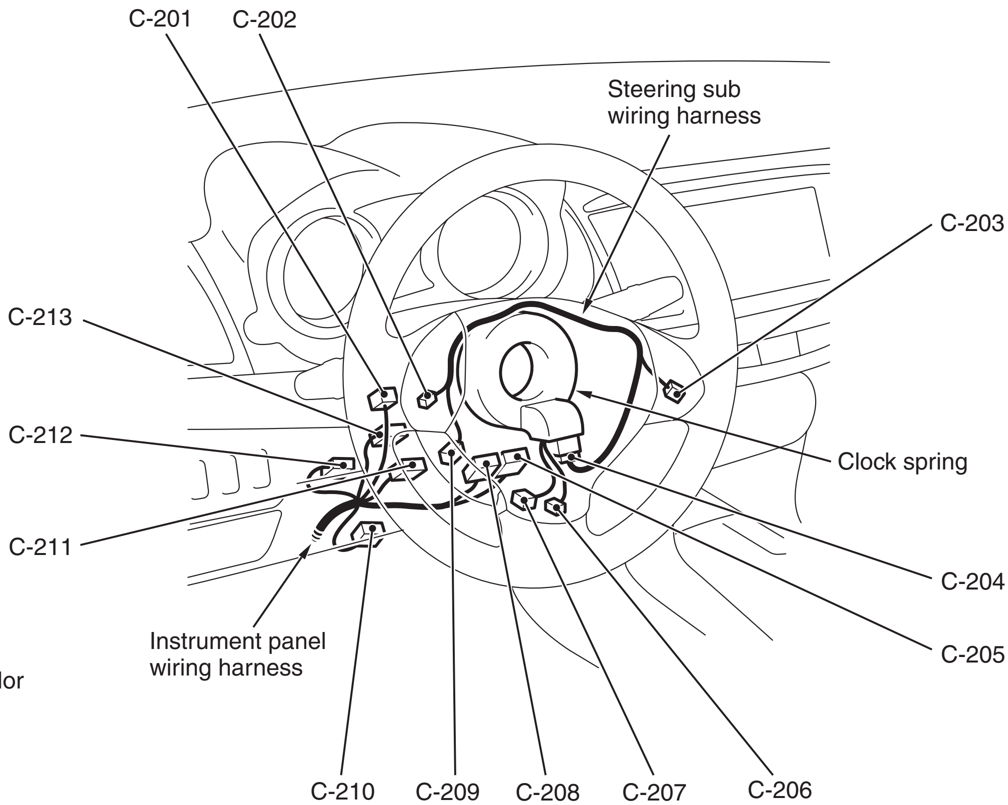


C-116	(3)	Inside transmission antenna assembly (Front)
C-117	(1-B)	Parking brake switch
C-118	(5)	Air mixing damper control motor
C-119	(2)	Air thermo sensor
C-120	(12)	A/C control panel
C-121	(6-B)	Audio and video adapter
C-122	(24-Y)	SRS-ECU
C-123	(6-B)	Accelerator pedal position sensor
C-124	(24)	Joint connector (CAN3)
C-125	(12)	Instrument panel wiring harness and front door wiring harness (LH) combination
C-126	(24-BR)	Instrument panel wiring harness and front door wiring harness (LH) combination
C-127	(16)	Instrument panel wiring harness and front wiring harness combination
C-128	(22)	Instrument panel wiring harness and front wiring harness combination
C-129	(2)	Instrument panel wiring harness and front wiring harness combination
C-130	(12)	Instrument panel wiring harness and roof wiring harness combination
C-131	(6-GR)	No connection
C-132	(2)	Clutch interlock switch <M/T>

DASH PANEL (CONTINUED)

Connector symbol
C -201 thru -213

Steering column



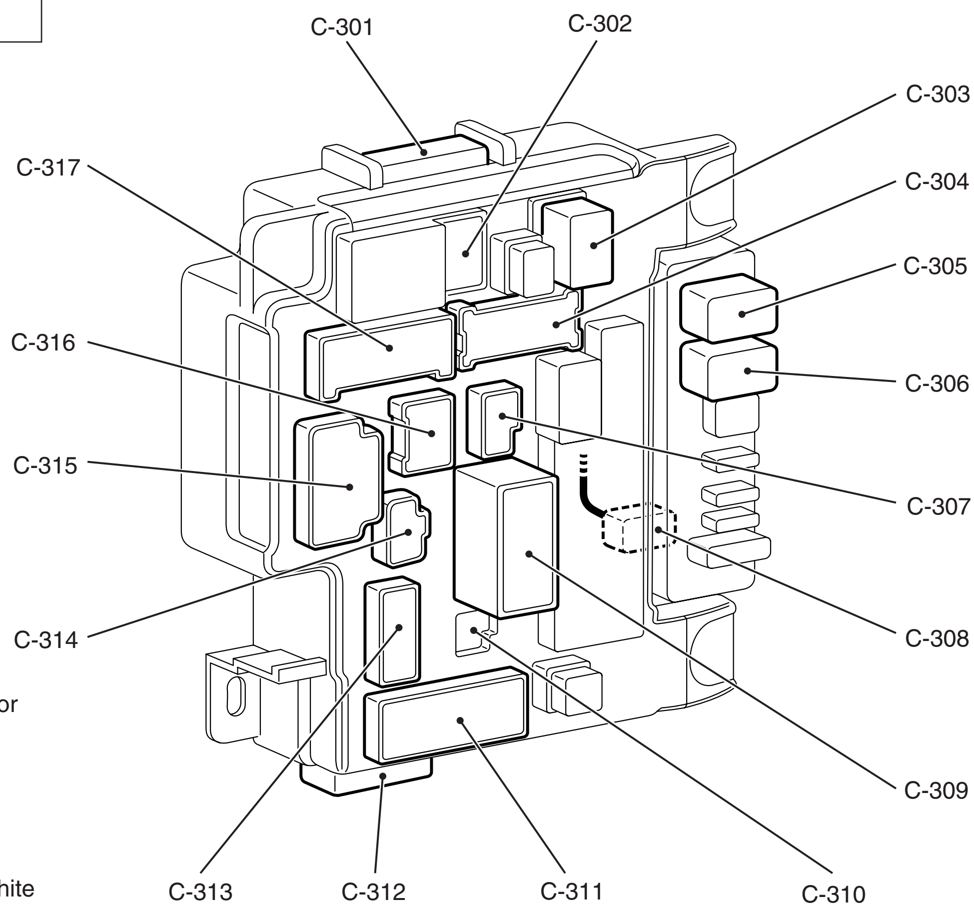
Connector color code
B: Black
BR: Brown
G: Green
GR: Gray
L: Blue
NONE: Milk white
O: Orange
R: Red
V: Violet
Y: Yellow

AC605708AB

C-201	(10)	Column switch
C-202	(5-R)	Steering wheel audio remote control switch
C-203	(4-L)	Auto-cruise control switch
C-204	(5)	Clock spring and steering sub wiring harness combination
C-205	(6)	Clock spring
C-206	(1)	Horn switch
C-207	(4-Y)	Driver's air bag module (Squib)
C-208	(4-Y)	Clock spring
C-209	(4-Y)	Steering wheel voice control switch
C-210	(3)	Paddle shift switch
C-211	(5)	No connection
C-212	(6)	Ignition switch
C-213	(12)	Key reminder switch

Connector symbol
C -301 thru -317

ETACS-ECU



Connector color code
B: Black
BR: Brown
G: Green
GR: Gray
L: Blue
NONE: Milk white
O: Orange
R: Red
V: Violet
Y: Yellow

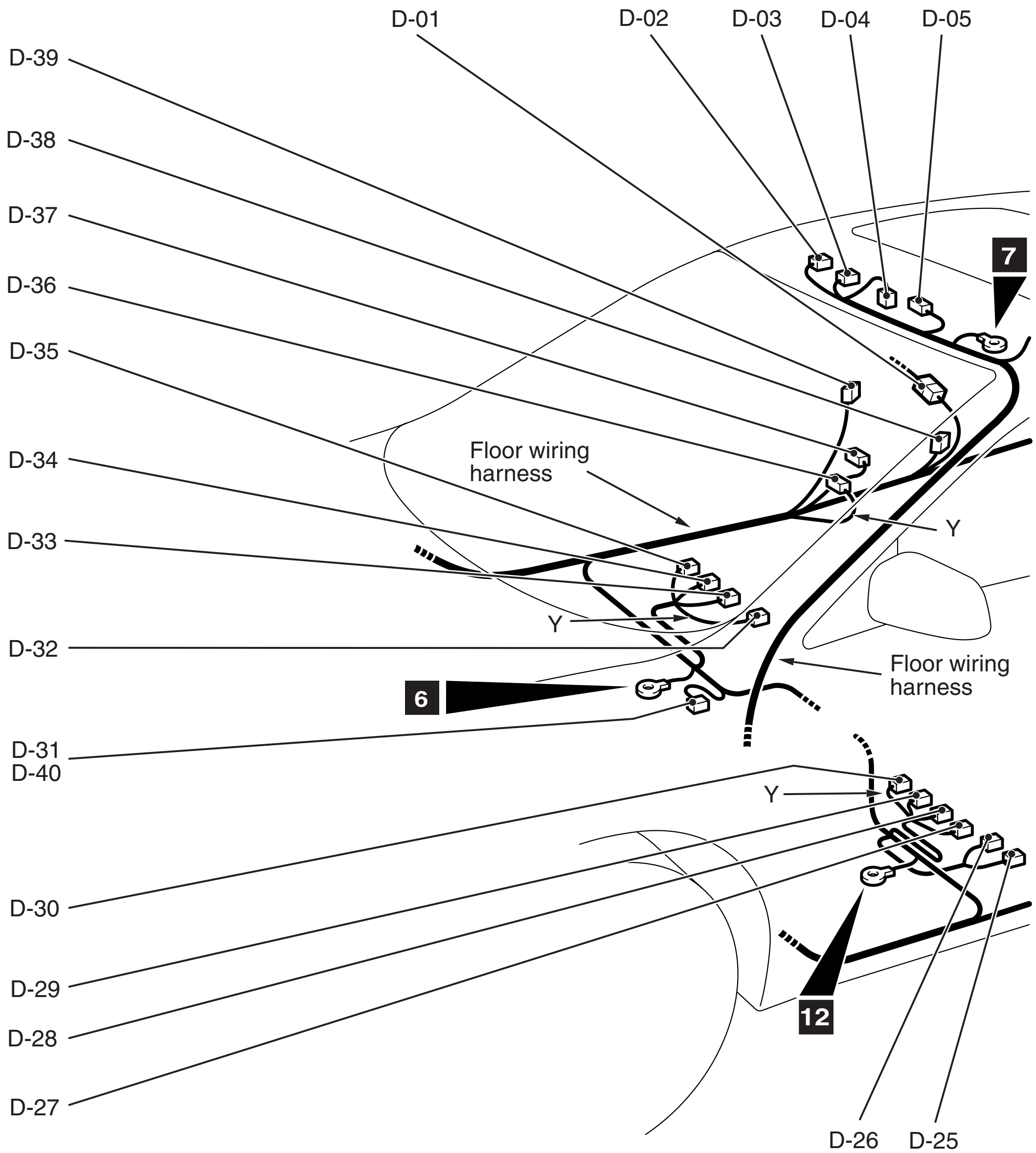
C-301	(24)	Instrument panel wiring harness and ETACS-ECU combination
C-302	(4)	No connection
C-303	(4)	Blower relay
C-304	(16)	Front wiring harness and ETACS-ECU combination
C-305	(4)	Heated seat relay
C-306	(4)	Rear window defogger relay
C-307	(2-B)	Instrument panel wiring harness and ETACS-ECU combination
C-308	(1-GR)	Instrument panel wiring harness and ETACS-ECU combination
C-309	(2-B)	Front wiring harness and ETACS-ECU combination
C-310	(4)	No connection
C-311	(20)	Floor wiring harness and ETACS-ECU combination
C-312	(16)	Front wiring harness and ETACS-ECU combination
C-313	(16-BR)	Floor wiring harness and ETACS-ECU combination
C-314	(2)	Floor wiring harness and ETACS-ECU combination
C-315	(19)	Instrument panel wiring harness and ETACS-ECU combination
C-316	(6)	Roof wiring harness and ETACS-ECU combination
C-317	(15)	Instrument panel wiring harness and ETACS-ECU combination

FLOOR AND ROOF

M1801000902389

Connector symbol

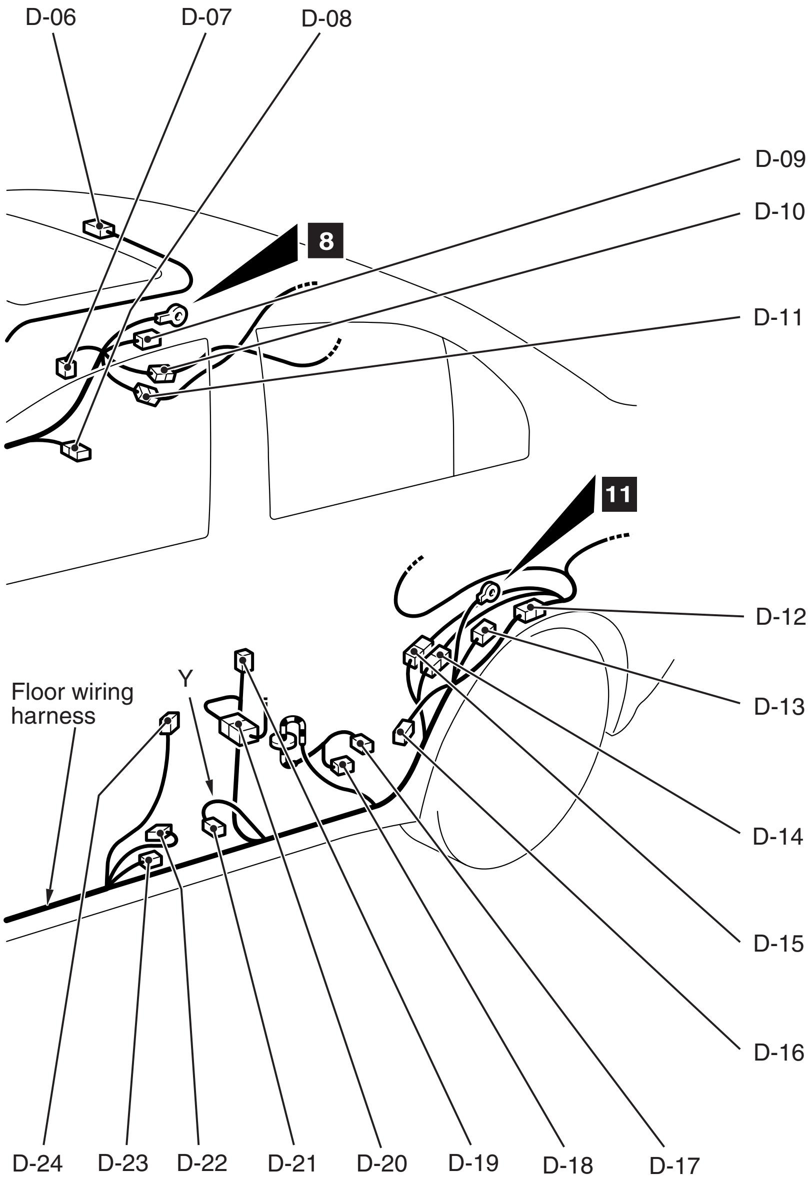
D



Connector color code
B : Black
BR : Brown
DG:Dark grey
G : Green
GR : Gray
L : Blue
None : Milk white
O : Orange
R : Red
V : Violet
Y : Yellow

AC605709AB

D-01	(10)	Floor wiring harness and rear door wiring harness (RH) combination
D-02	(3)	Front dome light
D-03	(3)	Microphone unit
D-04	(6-B)	Sunroof switch
D-05	(10-GR)	Sunroof motor assembly
D-06	(2-GR)	Rear dome light
D-07	(3)	Rear door switch (RH)
D-08	(2)	Floor wiring harness and fuel wiring harness combination
D-09	(4-Y)	No connection
D-10	(2-Y)	Floor wiring harness and rear floor wiring harness (RH) combination
D-11	(22)	Floor wiring harness and rear floor wiring harness (RH) combination
D-12	(2-Y)	Floor wiring harness and rear floor wiring harness (LH) combination
D-13	(4-Y)	No connection
D-14	(24-BR)	Floor wiring harness and rear floor wiring harness (LH) combination
D-15	(18)	Floor wiring harness and rear floor wiring harness (LH) combination
D-16	(3)	Rear door switch (LH)
D-17	(3-B)	Fuel tank differential pressure sensor
D-18	(5-GR)	Fuel pump module



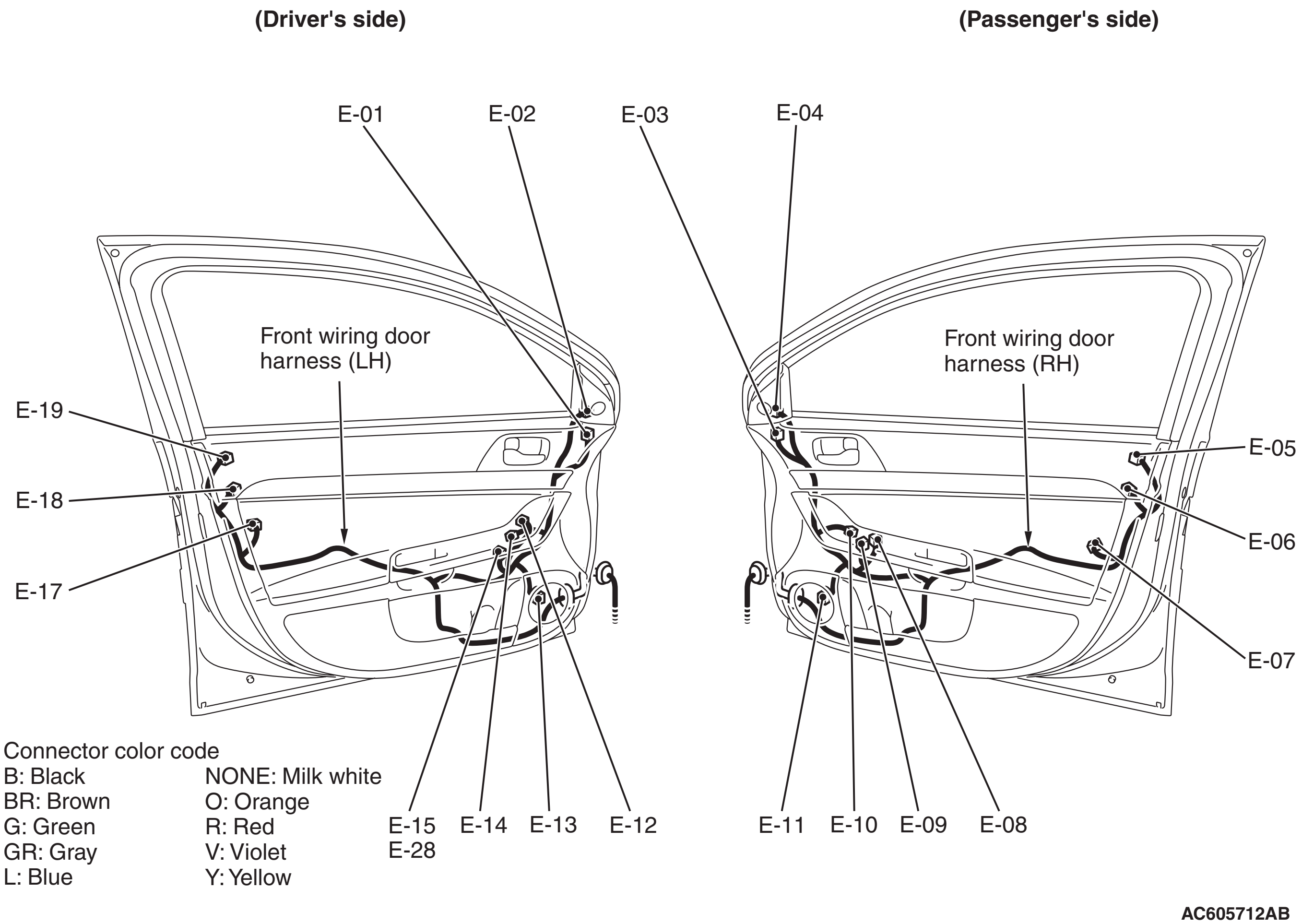
D-19	(3)	Outside transmission antenna assembly (Driver's side)
D-20	(10)	Floor wiring harness and rear door wiring harness (LH) combination
D-21	(2-B)	Seat belt pre-tensioner (LH)
D-22	(4-Y)	Side impact sensor (LH)
D-23	(12)	Joint connector (5)
D-24	(3)	Front door switch (LH)
D-25	(18)	Audio amplifier
D-26	(14)	Audio amplifier
D-27	(4-B)	Heated seat assembly (LH)
D-28	(2-GR)	Seat slide sensor
D-29	(4-B)	Seat belt switch (Driver's side)
D-30	(2-Y)	Side-airbag module (Squib) (LH)
D-31	(4-B)	Heated oxygen sensor (3rd) <Vehicles for California>
D-32	(2-Y)	Side-airbag module (Squib) (RH)
D-33	(2-B)	Seat belt switch (Passenger's side)
D-34	(4-B)	Heated seat assembly (RH)
D-35	(6)	Front seat assembly (LH)
D-36	(2-B)	Seat belt pre-tensioner (RH)
D-37	(4-Y)	Side impact sensor (RH)
D-38	(3)	Outside transmission antenna assembly (Passenger's side)
D-39	(3)	Front door switch (RH)
D-40	(4-B)	Heated oxygen sensor (Rear) <Except for California>

DOOR

M1801001402020

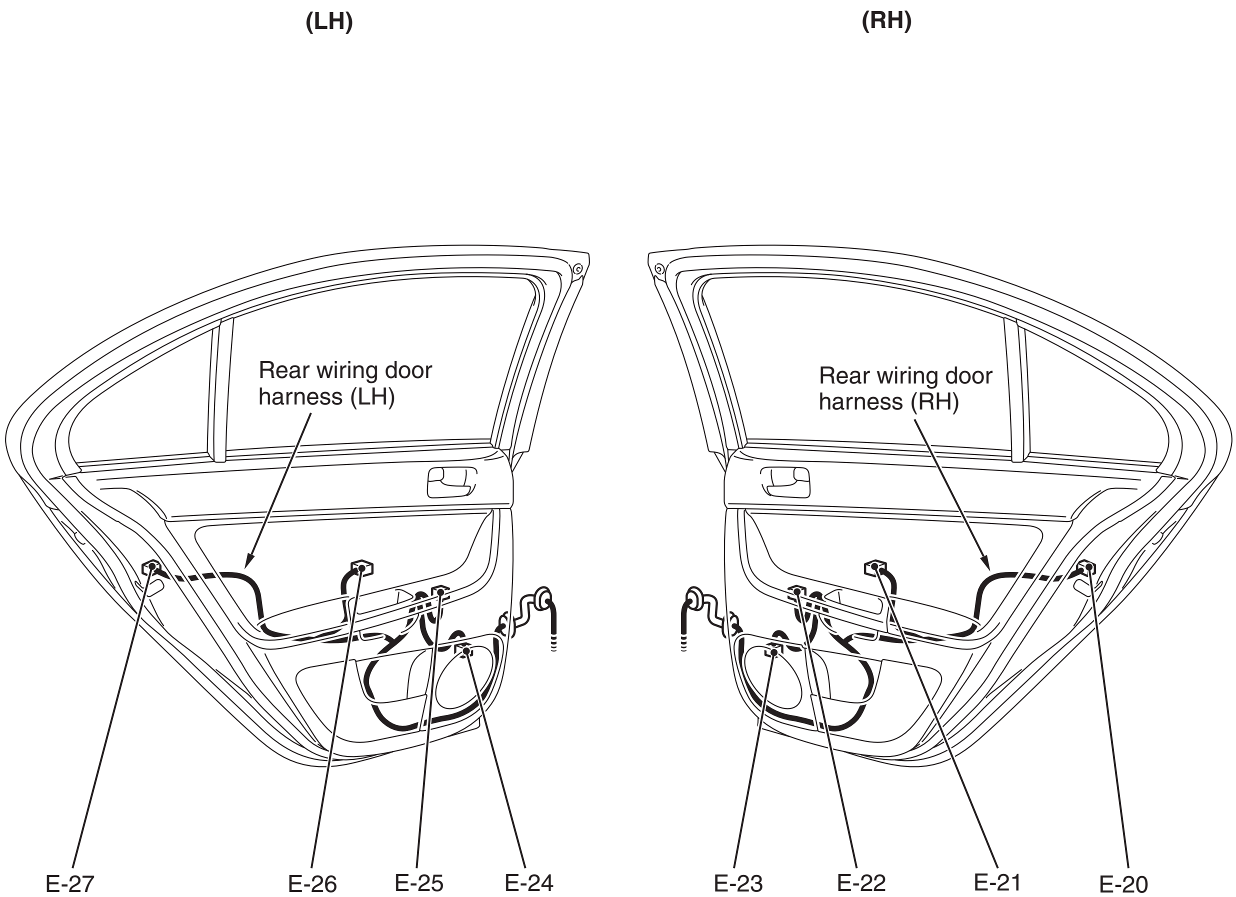
Connector symbol
E

FRONT DOOR



E-01	(10)	Door mirror assembly (LH)
E-02	(2-B)	Tweeter (LH)
E-03	(10)	Door mirror assembly (RH)
E-04	(2-B)	Tweeter (RH)
E-05	(6)	Unlock sensor (RH)
E-06	(2-GR)	Lock switch (RH)
E-07	(6-B)	Front door lock actuator (RH)
E-08	(4)	Front power window sub switch
E-09	(8)	Front power window sub switch
E-10	(6-GR)	Front power window motor (RH)
E-11	(2)	Front door speaker (RH)
E-12	(11-L)	Remote controlled mirror switch
E-13	(2)	Front door speaker (LH)
E-14	(6-GR)	Front power window motor (LH)
E-15	(14)	Power window main switch <Vehicles with auto down mechanism>

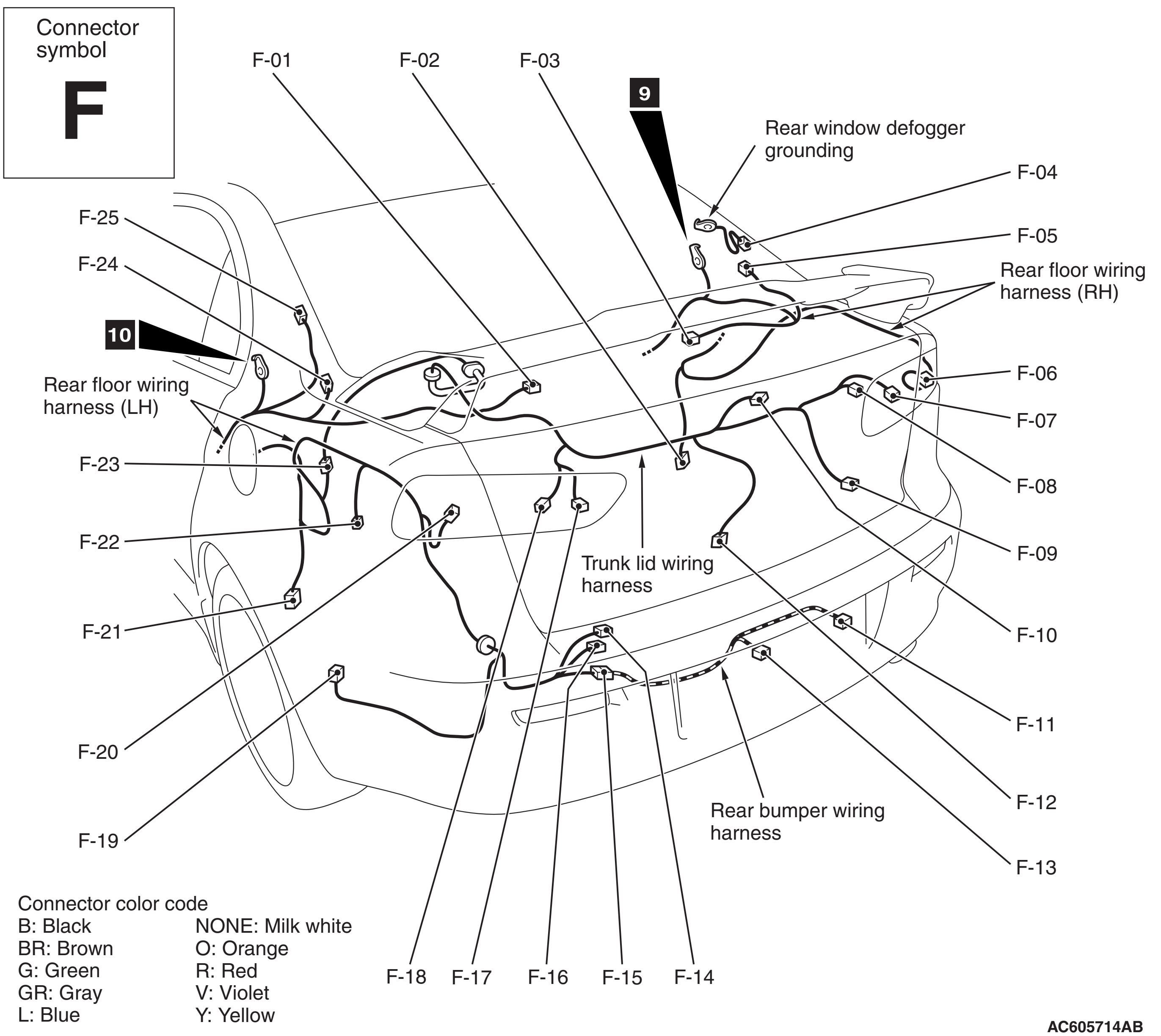
REAR DOOR



E-17	(6-B)	Front door lock actuator (LH)
E-18	(2-GR)	Lock switch (LH)
E-19	(6)	Unlock sensor (LH)
E-20	(6-B)	Rear door lock actuator (RH)
E-21	(6-GR)	Rear power window motor (RH)
E-22	(8)	Rear power window sub switch (RH)
E-23	(2)	Rear door speaker (RH)
E-24	(2)	Rear door speaker (LH)
E-25	(8)	Rear power window sub switch (LH)
E-26	(6-GR)	Rear power window motor (LH)
E-27	(6-B)	Rear door lock actuator (LH)
E-28	(19)	Power window main switch <Vehicles with auto up and down mechanism>

LUGGAGE COMPARTMENT

M1801001500764



F-01	(2)	Luggage compartment light
F-02	(2-B)	Rear wheel speed sensor (RH)
F-03	(3)	Inside transmission antenna assembly
F-04	(1-B)	Rear window defogger (−)
F-05	(2-B)	Curtain air bag module (Squib) (RH)
F-06	(4)	Rear combination light (RH)
F-07	(2)	Rear lid light (RH)
F-08	(3)	Backup light (RH)
F-09	(2)	Trunk lid opener
F-10	(2-GR)	High-mounted stoplight
F-11	(2-GR)	License plate light (RH)
F-12	(3)	Trunk lid lock actuator
F-13	(2-GR)	License plate light (LH)
F-14	(2-GR)	Outer tone alarm
F-15	(2-B)	Rear floor wiring harness (LH) and rear bumper wiring harness combination
F-16	(3-GR)	Outside transmission antenna assembly (Trunk lid)
F-17	(3)	Backup light (LH)
F-18	(2)	Rear lid light (LH)
F-19	(2-GR)	Evaporative emission ventilation solenoid
F-20	(4)	Rear combination light (LH)
F-21	(2-B)	Rear wheel speed sensor (LH)
F-22	(4-B)	Sub woofer
F-23	(10)	Rear floor wiring harness (LH) and trunk lid wiring harness combination
F-24	(2-B)	Curtain air bag module (Squib) (LH)
F-25	(1-B)	Rear window defogger (+)

GROUP 34

REAR SUSPENSION

CONTENTS

GENERAL INFORMATION

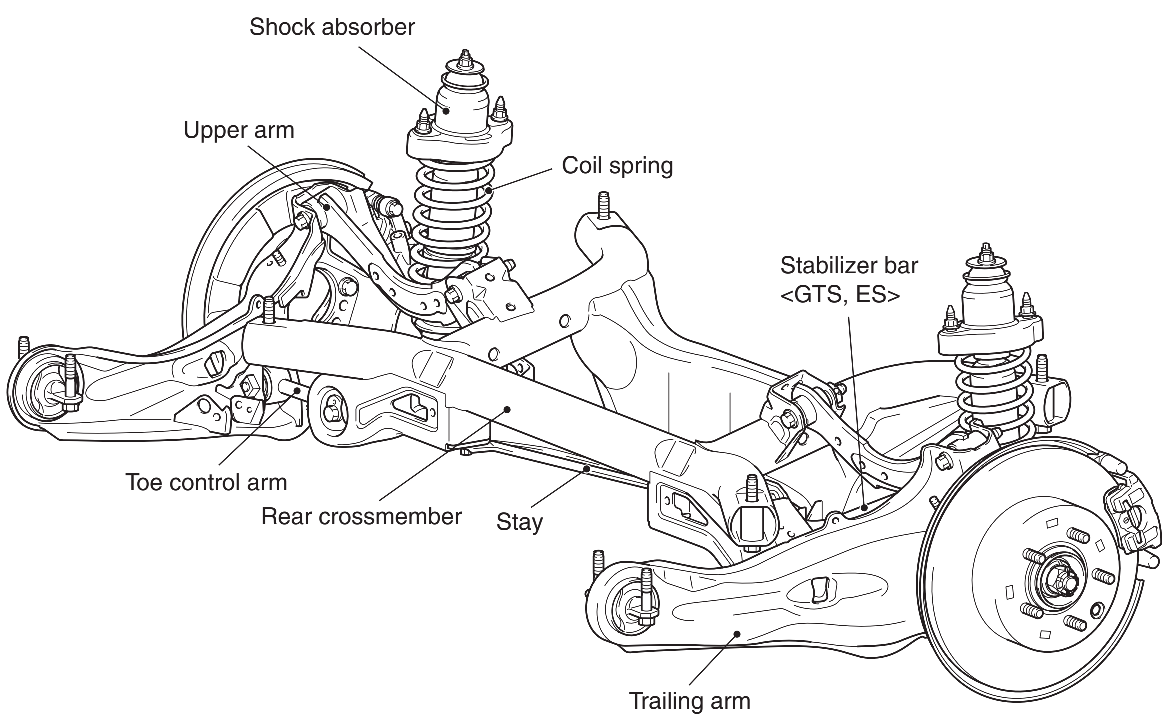
M2340000100977

The trailing arm type multi-link suspension is adopted.

MAIN FEATURES

- The wheel tread is increased to improve cornering ability.
- The roll center height is modified to improve the steering ability.
- A double crossmember is adopted and the upper arm, lower arm, toe control arm are joined to the crossmember to improve suspension alignment accuracy and maintenance performance.
- Improvement of arms installation accuracy eliminates the camber adjustment to improve maintenance performance.
- The trailing arm bushings are installed in the upper position to improve the movement of the suspension when the vehicle negotiates bumps and increase riding comfort.
- Twin tube type shock absorber is adopted to secure optimum rolling rigidity and improve the steering ability.
- A high efficiency ball joint type stabilizer link is adopted to improve steering ability.
- The toe control arm is installed in the lower position to increase toe and camber rigidity and improve steering ability.

CONSTRUCTION DIAGRAM



AC606248 AB

SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension type	Trailing arm type multi-link

WHEEL ALIGNMENT

Item	Specification
Camber	−0° 55'
Toe-in mm (in)	3 (0.12)

COIL SPRING

Item	Specification	
	DE, ES	GTS
Wire diameter mm (in)	11 (0.4)	11 (0.4)
Mean diameter of coil mm (in)	91 (3.6)	91 (3.6)
Free length mm (in)	351 (13.8)	334 (13.1)

NOTES

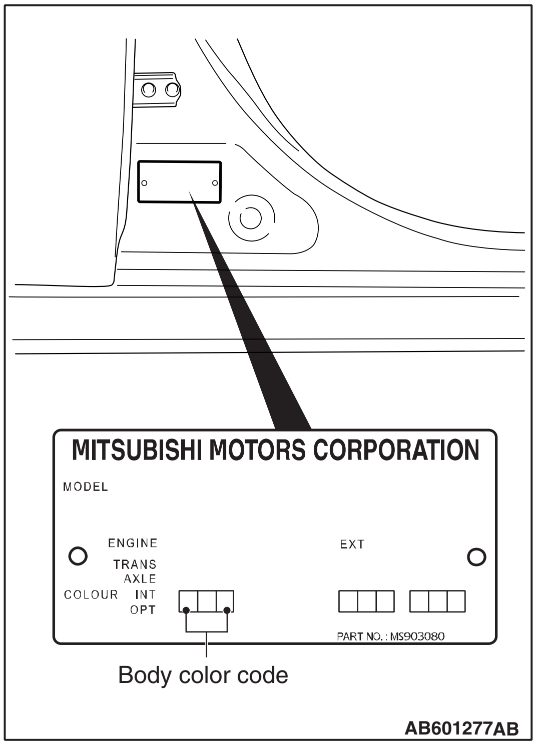
GROUP 6

BODY COLOR

CONTENTS

BODY COLOR CODE

M4060001000679



Body color code is stamped on the name plate, which is attached on the underside of the center pillar (Right side).

BODY COLOR CHARTS

M4060002001396

Check the vehicle's body color code, and then use this body color chart to determine the refinishing paint supplier from which the color can be purchased.

Color	Color code	Color number	Color name (Previous name)	Composition of film
SILVER	A31	CMA10031	Cool Silver Metallic	Metallic
MEDIUM PURPLISH GRAY	A39	CMA10039	Medium Purplish Gray Mica	Metallic + Interferenced Pearl
GREENISH SILVER	A86	CMA10086	Greenish Silver Metallic	Metallic + Interferenced Pearl
BLUE	T70	CMT10070	Blue Mica	Pearl
BEIGE	S18	CMS10018	Platinum Beige Metallic	Metallic + Interferenced Pearl
BLACK	X42	AC11342	Black Mica (Amethyst Black)	Interferenced Pearl
WHITE	W37	CMW10037	White Solid	Solid
RED	P26	CMP10026	Red Metallic	Metallic

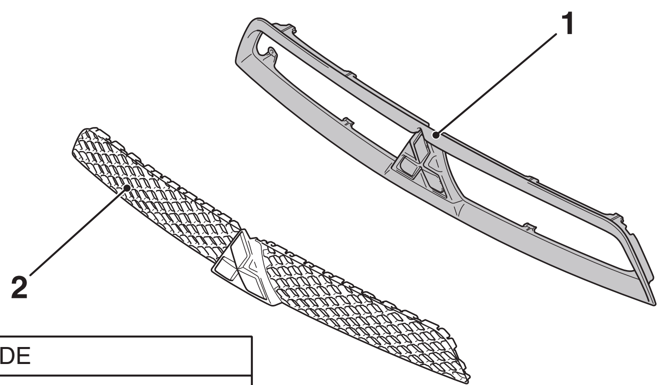
NOTE:

- *It is a solid, but clear coating is applied.*
- *For painting, inner panel colors should be similar to the outer panel colors.*

BODY COLORING

RADIATOR GRILLE

M4060007000592

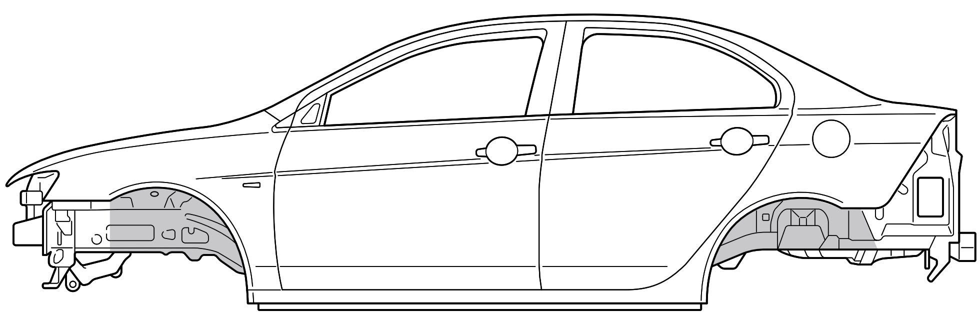


	ES, GTS	DE
1	Chrome plating	Dark gray (CMH18031)
2	Material color	Material color

AB601174AB

WHEELHOUSE

M4060012000327



: Black (AC10657)

AB601150AB

NOTES

GROUP 31

WHEEL AND TIRE

CONTENTS

GENERAL INFORMATION

M2310000100941

- The wheels and tires of the following specifications have been established.
- Adopt the Tire Pressure Monitoring System (TPMS).
  - Warns driver of low tire pressure by illuminating the TPMS warning light on the combination meter.
- Warns driver of TPMS probrems by flashing* the TPMS warning light on the combination meter.

*NOTE: *: Change to continuous illumination after flashing for about 1 minute.*

SPECIFICATIONS

ROAD WHEEL AND TIRE

Item		**DE**	**ES**	**GTS**
TPMS warning pressure kPa (psi)	Warning ON	174 (25.2) or less	174 (25.2) or less	174 (25.2) or less
	Warning OFF	189 (27.4) or less	189 (27.4) or less	189 (27.4) or less
Wheel	Type	Steel type or Aluminium type*	Aluminum type	Aluminum type
	Size	16 × 6 1/2JJ	16 × 6 1/2JJ	18 × 7JJ
	Amount of wheel offset mm (in)	46 (1.8)	46 (1.8)	46 (1.8)
	PCD mm (in)	114.3 (4.50)	114.3 (4.50)	114.3 (4.50)
Tire	Size	P205/60R16 91H	P205/60R16 91H	P215/45R18 89V

SPARE WHEEL AND TIRE

Item		**Specification**
Wheel	Type	Steel type
	Size	16 × 4T
	Amount of wheel offset mm (in)	40 (1.6)
	PCD mm (in)	114.3 (4.50)
Tire	Size	T125/70D16 96M

NOTE:

- *The * mark indicates optional item.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

TIRE PRESSURE MONITORING SYSTEM (TPMS)

M2310000200067

Refer to GROUP 42B –Keyless Operation System (KOS) P.42B-20 or GROUP 42C –Wireless Control Module (WCM) P.42C-9.

GROUP 34

REAR SUSPENSION

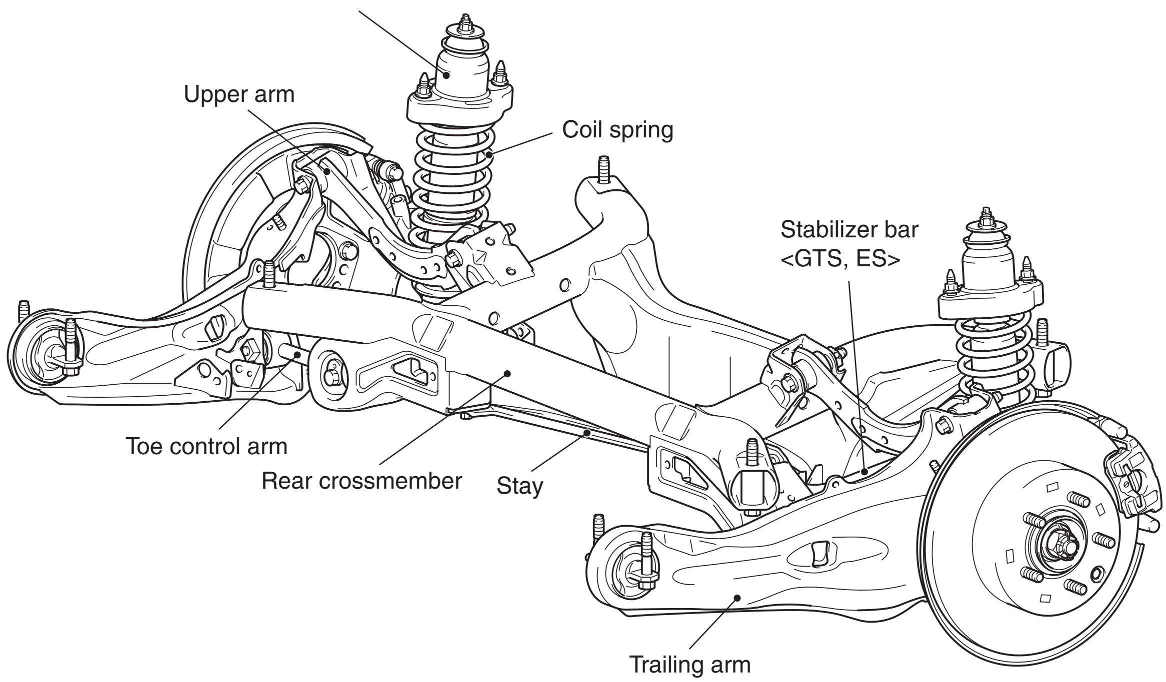
CONTENTS

GENERAL INFORMATION

M1341000101066

The trailing arm type multi-link suspension has been adopted.

CONSTRUCTION DIAGRAM



SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1341012700415

Item	Specification
Control link	
Control link to crossmember nut	71 ± 10 N· m (52 ± 2 ft-lb)
Control link to rear height sensor nut	9.5 ± 2.5 N· m (84 ± 22 in-lb)
Control link to trailing arm nut	71 ± 10 N· m (52 ± 2 ft-lb)
Lower arm	
Lower arm to crossmember nut	71 ± 10 N· m (52 ± 2 ft-lb)
Lower arm to trailing arm nut	71 ± 10 N· m (52 ± 2 ft-lb)
Lower arm to shock absorber nut	71 ± 10 N· m (52 ± 2 ft-lb)
Lower arm to stabilizer link nut	39 ± 6 N· m (29 ± 4 ft-lb)
Rear suspension crossmember	
Crossmember bracket mounting bolt	71 ± 10 N· m (52 ± 2 ft-lb)
Crossmember stay mounting bolt	11 ± 3 N· m (97 ± 26 in-lb)
Rear wheel speed sensor clamp bolt	11 ± 2 N· m (98 ± 17 ft-lb)

Item	Specification
Shock absorber assembly	
Shock absorber assembly to body nut	45 ± 7 N· m (33 ± 5 ft-lb)
Shock absorber assembly to lower arm nut	71 ± 10 N· m (52 ± 2 ft-lb)
Shock absorber self-locking nut	25 ± 5 N· m (19 ± 3 ft-lb)
Stabilizer bar	
Stabilizer link nut	39 ± 6 N· m (29 ± 4 ft-lb)
Stabilizer bracket bolt	31 ± 4 N· m (23 ± 3 ft-lb)
Trailing arm	
Trailing arm to rear hub assembly bolt	95 ± 14 N· m (70 ± 10 ft-lb)
Trailing arm to brake hose bracket nut	11 ± 2 N· m (98 ± 17 in-lb)
Trailing arm to body bolt	110 ± 11 N· m (81 ± 8 ft-lb)
Rear wheel speed sensor to trailing arm bolt	11 ± 2 N· m (98 ± 17 in-lb)
Upper arm	
Upper arm to crossmember bolt	71 ± 10 N· m (52 ± 2 ft-lb)
Upper arm to trailing arm	71 ± 10 N· m (52 ± 2 ft-lb)

GENERAL SPECIFICATIONS

M1341000200424

COIL SPRING

Item	Specification	
	DE, ES	GTS
Wire diameter mm (in)	11 (0.4)	11 (0.4)
Average out side diameter mm (in)	91 (3.6)	91 (3.6)
Free length mm (in)	351 (13.8)	334 (13.1)

SERVICE SPECIFICATIONS

M1341000300904

Item	Standard value
Toe in mm (in)	3 ± 2 (0.12 ± 0.08)
Camber	−0° 55' ± 0° 30' (left/right difference 30'max)
Control link pillow ball bushing and upper arm pillow ball bushing rotation torque N· m (in-lb)	2.0 – 3.5 (17.7 – 31.0)
Stabilizer link ball joint rotation torque N· m (in-lb)	0.5 – 2.9 (4.4 – 25.7)

REAR SUSPENSION DIAGNOSIS

INTRODUCTION TO REAR SUSPENSION DIAGNOSIS

M1341013100160

If the rear suspension is faulty, the vehicle will not run straightforward or noise will occur. Incorrect wheel alignment, malfunction of shock absorber, stabilizer bar, coil spring, control arms or worn or out-of-balance will cause these problems.

REAR SUSPENSION DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1341013200167

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a rear suspension fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1341013500306

Symptom	Inspection procedure	Reference page
Squeaks or other abnormal noise	1	P.34-4
Poor ride	2	P.34-5
Body tilting	3	P.34-5

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Squeaks or other Abnormal Noise

DIAGNOSIS

STEP 1. Check for loose rear suspension installation bolts and nuts.

Q: Are the rear suspension installation bolts and nuts loose?
YES : Retighten them, then go to Step 5.
NO : Go to Step 2.

STEP 2. Check the malfunction of shock absorbers (worn bushings).

Q: Are the shock absorbers (bushings) in good condition?
YES : Go to Step 3.
NO : Replace the faulty part, then go to Step 5.

STEP 3. Check the upper arms and/or lower arms and/or control links for deformity or damage.

Q: Are the upper arms and/or lower arms and/or control links in good condition?
YES : Go to Step 4.
NO : Replace the faulty part, then go to Step 5.

STEP 4. Check the trailing arms for deformity or damage.

Q: Are the trailing arms in good condition?
YES : Go to Step 5.
NO : Replace the faulty part, then go to Step 5.

STEP 5. Retest the system.

Q: Is the malfunction eliminated?
YES : The procedure is complete.
NO : Return to Step 1.

INSPECTION PROCEDURE 2: Poor Ride

DIAGNOSIS

STEP 1. Check the excessive tire inflation pressure.

Refer to GROUP 31, On-vehicle Service −Tire Inflation Pressure Check P.31-7.

Q: Is the tire inflation pressure in good condition?

YES : Go to Step 2.
NO : Adjust the pressure, then go to Step 4.

STEP 2. Check for malfunction of shock absorbers (weak or broken springs).

Q: Are the shock absorbers in good condition?

YES : Go to Step 3.
NO : Replace the faulty part, then go to Step 4.

STEP 3. Check the stabilizer bar and/or stabilizer links for deformity or damage.

Q: Are the stabilizer bar and/or stabilizer link deformed or damaged?

YES : Replace the faulty part, then go to Step 4.
NO : Go to Step 4.

STEP 4. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.
NO : Return to Step 1.

INSPECTION PROCEDURE 3: Body Tilting

DIAGNOSIS

STEP 1. Check for weak or deteriorated bushings.

Q: Are the bushings in good condition?

YES : Go to Step 2.
NO : Replace the faulty part, then go to Step 5.

STEP 2. Check for weak or broken springs.

Q: Are the springs in good condition?

YES : Go to Step 3.
NO : Replace the faulty part, then go to Step 5.

STEP 3. Check the upper arms and/or lower arms and/or control links for deformity or damage.

Q: Are the upper arms and/or lower arms and/or control links deformed or damaged?

YES : Replace the faulty part, then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trailing arms for deformity or damage.

Q: Are the trailing arms deformed or damaged?

YES : Replace the faulty part, then go to Step 5.
NO : Go to Step 5.

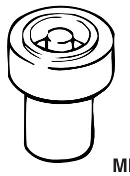
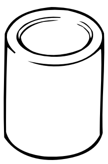
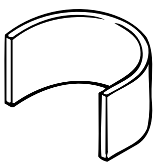
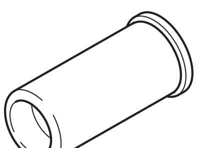
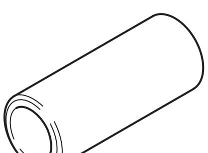
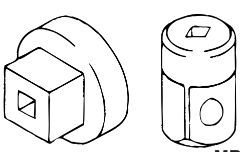
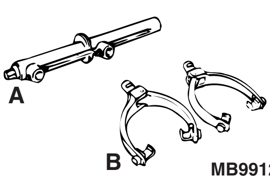
STEP 5. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.
NO : Return to Step 1.

SPECIAL TOOL

M1341000600767

Tool	Tool number and name	Supersession	Application
 MB991447	MB992123 Arm bushing remover and installer	–	Lower arm bushing removal and press-fit
	MB991448 Bushing remover and installer base	MB991448-01	
	MB991449 Bushing remover and installer supporter	–	
 B992121	MB992121 Arm bushing remover and installer	–	Trailing arm bushing removal and press-fit
 MB992125	MB992125 Arm bushing base	–	
 MB990326	MB990326 Preload socket	General service tool	Stabilizer link ball joint rotation torque measurement
 MB991237	• A: MB991237 Spring compressor body • B: MB991239 Arm set	MIT221369 or general service tool	Coil spring removal and installation

ON-VEHICLE SERVICE

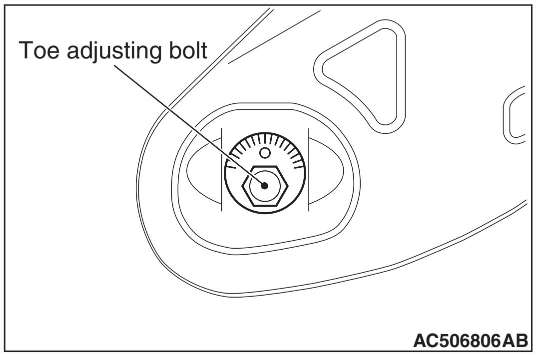
REAR WHEEL ALIGNMENT CHECK AND ADJUSTMENT

M1341011000899

1. Before the wheel alignment measurement, adjust the rear suspension, wheel, and tires in good condition.
2. Park the vehicle on a level surface to measure the wheel alignment.

TOE-IN

Standard value: 3 ± 2 mm (0.12 ± 0.08 inch)



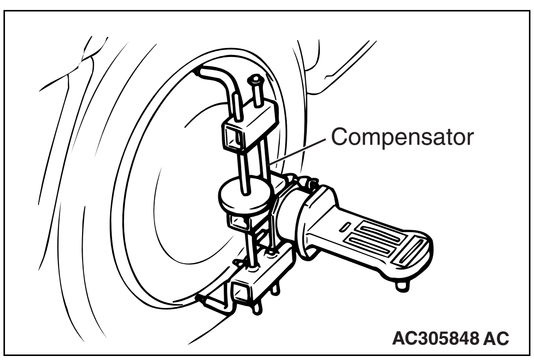
If it is out of the standard range, adjust as follows:
Turn the toe adjusting bolt (the mounting bolt inside the body on the control link) to adjust.

Left wheels: Clockwise → (+) Toe in
Right wheels: Clockwise → (-) Toe in

Toe-in varies approximately 2.6 mm (0.10inch) (equivalent to 0° 16' of the toe angle for one side) for each scale mark.

CAMBER

Standard value: -0° 55' ± 0° 30' (left/right difference 0° 30' max)



NOTE:
- *For vehicles with aluminum wheels, attach the camber/caster/kingpin gauge by using a compensator.*
- *The camber is pre-adjusted at factory and is not adjustable.*

STABILIZER LINK BALL JOINT DUST COVER INSPECTION

M1341019100027

1. Using your fingers, press the dust cover to check for a crack or damage.
2. If the dust cover has a crack or damage, replace the stabilizer link.

   NOTE: If the dust cover has a crack or damage, the ball joint could be damaged.

CONTROL LINK, UPPER ARM AND LOWER ARM

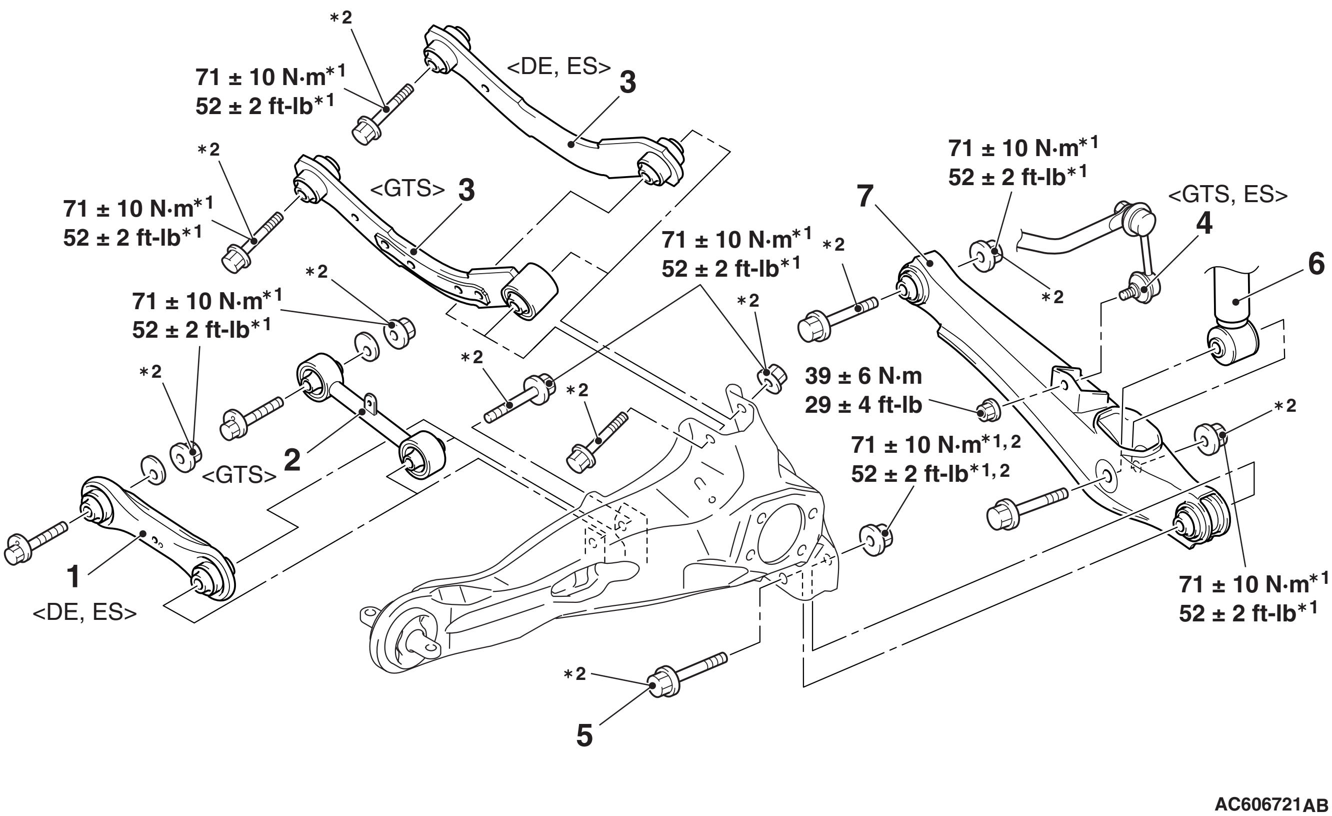
REMOVAL AND INSTALLATION

M1341004800406

⚠ CAUTION

- **The parts indicated by *1 should be temporarily tightened, and then fully tightened with the vehicle standing on the ground at the curb weight condition.**
- **The parts indicated by *2 are the bolts/nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Post-installation operation
• Using your fingers, press the Ball Joint Dust Cover to check for a crack or damage. • Wheel alignment check and adjustment (Refer to P.34-7.)



Control link and upper arm removal

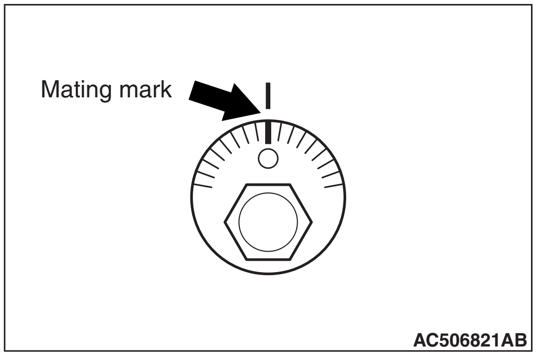
<<A>>		1.	Control link <DE, ES>
<<A>>	>>B<<	2.	Control link <GTS>
	>>A<<	3.	Upper arm
		•	Fuel tank vapor hose connection (Refer to GROUP 13B, Fuel tank P.13B-9.)

Lower arm removal steps

4. Stabilizer link connection <GTS, ES>
5. Lower arm and trailing arm connection
6. Shock absorber connection
- Rear suspension crossmember stay (Refer to P.34-22.)
7. Lower arm

REMOVAL SERVICE POINT

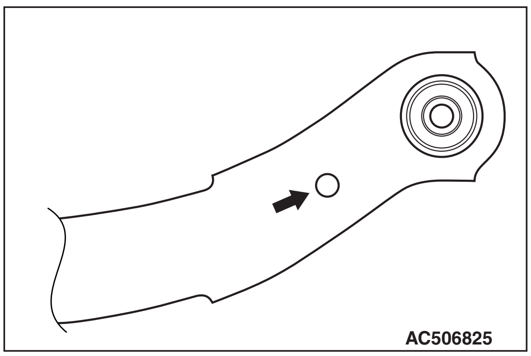
<<A>> CONTROL LINK REMOVAL



Make a mating mark on the toe adjusting bolt, and remove the control link.

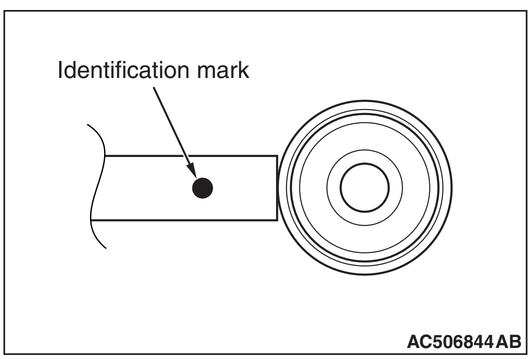
INSTALLATION SERVICE POINTS

>>A<< UPPER ARM INSTALLATION



Install the upper arm so that the hole faces the body side.

>>B<< CONTROL LINK <GTS> INSTALLATION



Install the control link so that the identification mark faces the outside of the body.

CONTROL LINK, UPPER ARM AND LOWER ARM INSPECTION

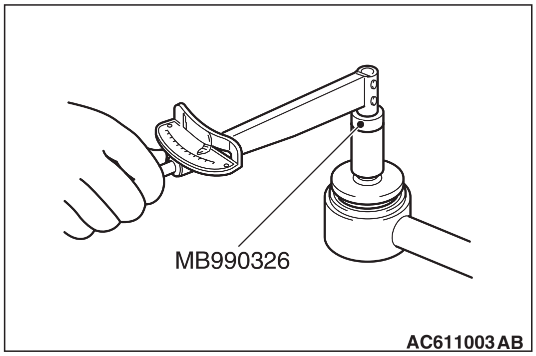
M1341004900298

- Check the bushings for wear and deterioration.
- Check the control link, upper arm and lower arm for bending or breakage.
- Check all bolts for condition and straightness.

CONTROL LINK AND UPPER ARM PILLOW BALL BUSHING ROTATION STARTING TORQUE CHECK<GTS>

Required Special Tool:

- MB990326: Preload socket



1. Insert the bolts to the control link and the upper arm pillow ball bushing (vehicle body outside bushing) respectively, and install the nuts with the washers from the opposite side. Rotate the inner cylinder (including washer) for several turns, and measure the rotation starting torque of the control link and the upper arm pillow ball bushing respectively using the special tool MB990326.

   Standard value: 2.0 –3.5 N· m (17.7 –31.0 in-lb)

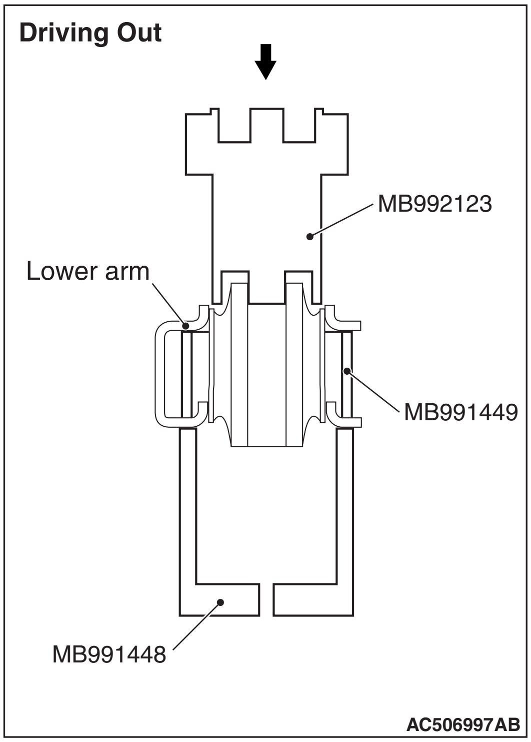
2. When the measured value exceeds the standard range, replace the control link or the upper arm pillow ball bushing.
3. When the measured value is less than the standard range, check that the control link and the upper arm ball joint has no looseness or gritty feeling. If there is no looseness or gritty feeling, it is judged as usable.

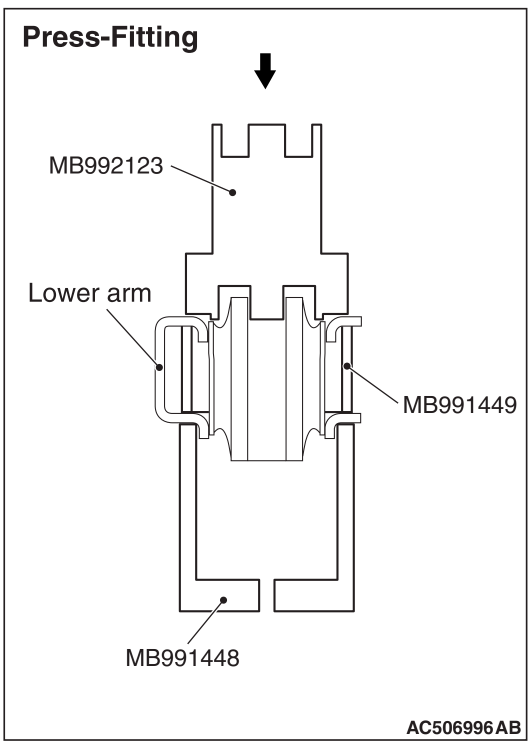
LOWER ARM BUSHING REPLACEMENT

M1341011800312

Required Special Tools:

- MB992123: Arm Bushing Remover and Installer
- MB991448: Bushing Remover and Installer Base
- MB991449: Bushing Remover and Installer Supporter





⚠ CAUTION

As the bushing has different outer diameters at both ends, be careful not to confuse the removal direction with the press-fit direction.

Use the special tools MB992123, MB991448 and MB991449 to remove and press-fit the lower arm bushing.

TRAILING ARM

REMOVAL AND INSTALLATION

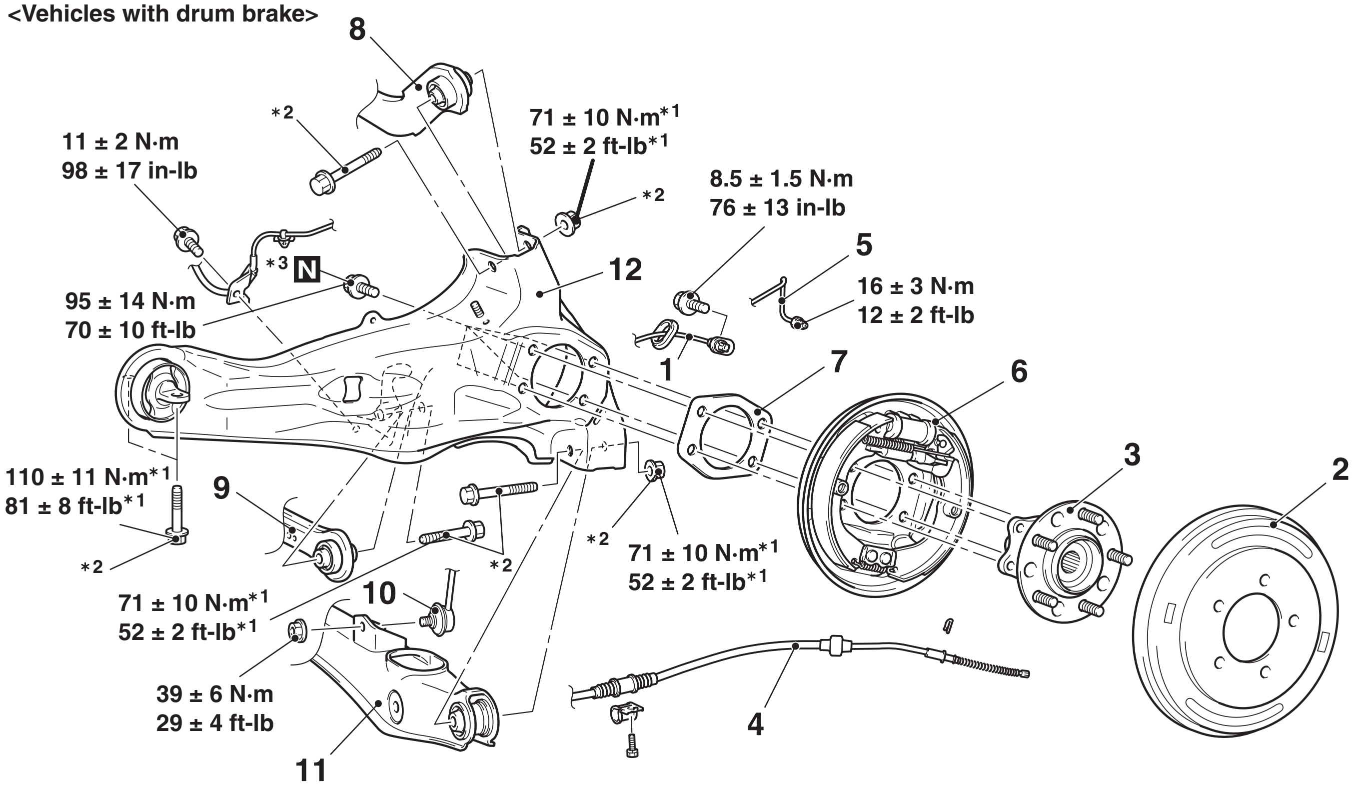
M1341002200851

⚠ CAUTION

- **The parts indicated by *1 should be temporarily tightened, and then fully tightened with the vehicle standing on the ground at the curb weight condition.**
- **The parts indicated by *2 are the bolts/nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**
- **The part indicated by *3is the bolt/nut with friction coefficient stabilizer. In removal, replace it with new one.**

Pre-removal operation	Post-installation operation
• Brake Fluid Draining (Refer to GROUP 35A, On-vehicle Service–Basic Brake System Bleeding P.35A-25.)	• Using your fingers, press the Ball Joint Dust Cover to check for a crack or damage. • Brake Fluid Refilling and Bleeding (Refer to GROUP 35A, On-vehicle Service–Basic Brake System Bleed-ingP.35A-25). • Wheel Alignment Check and Adjustment (Refer to P.34-7.) • Parking Brake Pedal Stroke Check and Adjustment (Refer to GROUP 36, On-vehicle Service –Parking Brake Pedal Stroke Check and Adjustment P.36-10.)

<Vehicles with drum brake>



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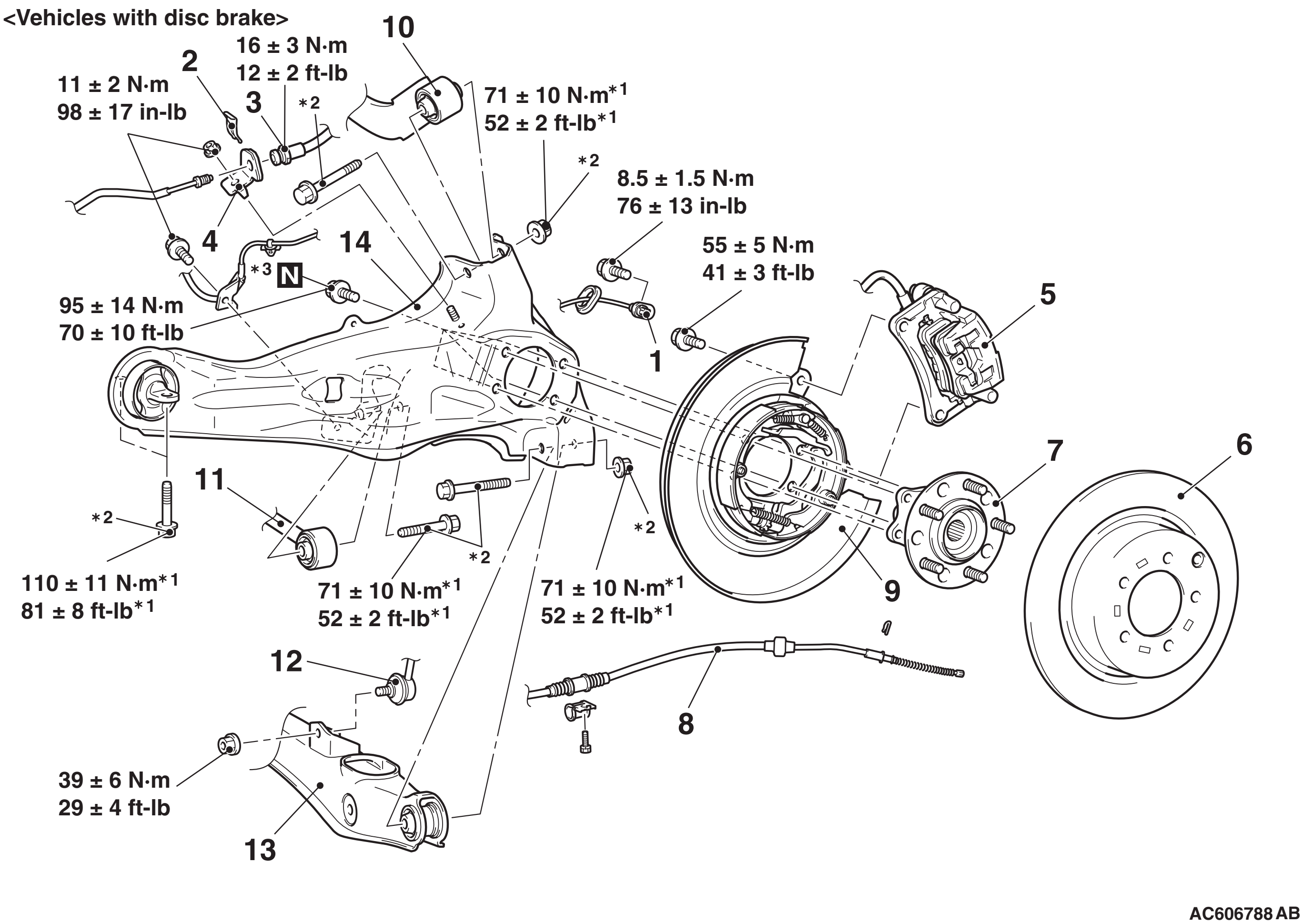
Removal steps

1. Rear wheel speed sensor <Vehicles with ABS>
2. Rear brake drum
3. Rear hub assembly
4. Parking brake cable
5. Rear brake tube

Removal steps (Continued)

6. Rear brake assembly
7. Spacer
8. Upper arm connection
9. Control link connection
10. Stabilizer link connection
11. Lower arm connection
12. Trailing arm assembly



Removal steps

1. Rear wheel speed sensor <Vehicles with ABS>
2. Clamp
3. Brake hose connection
4. Brake hose bracket
5. <<**A**>> Caliper assembly
6. Brake disc
7. Rear hub assembly

Removal steps (Continued)

8. Parking brake cable
9. Rear brake assembly
10. Upper arm connection
11. Control link connection
12. Stabilizer link connection
13. Lower arm connection
14. Trailing arm assembly

REMOVAL SERVICE POINT

<<A>> CALIPER ASSEMBLY REMOVAL

Retain the removed caliper assembly with a wire and the like to prevent from falling.

INSPECTION

M1341002300290

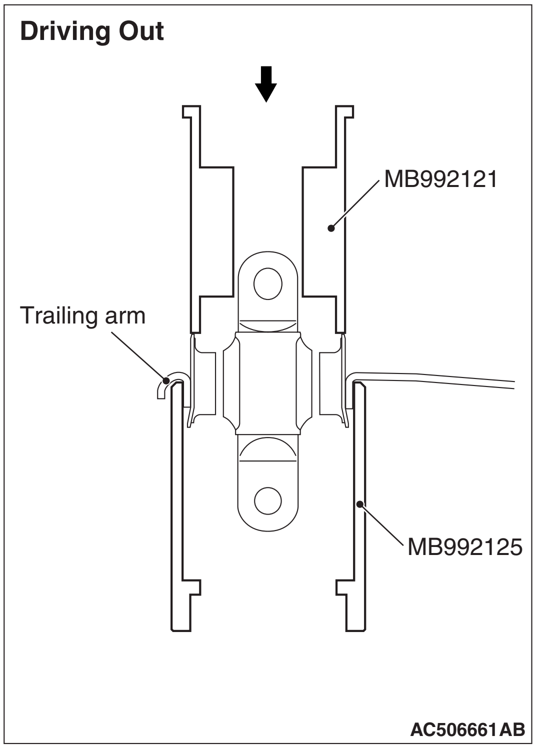
- Check the bushings for wear and deterioration.
- Check the trailing arm for bending or damage.

TRAILING ARM BUSHING REPLACEMENT

M1341011300384

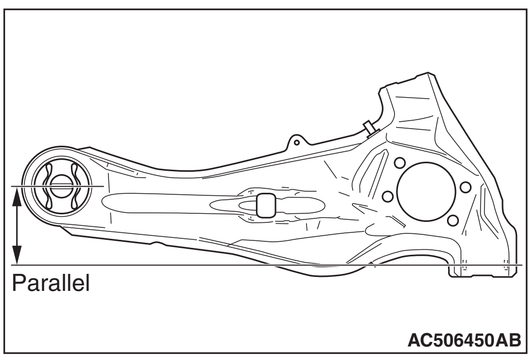
Required Special Tools:

- MB992121: Arm Bushing Remover and Installer

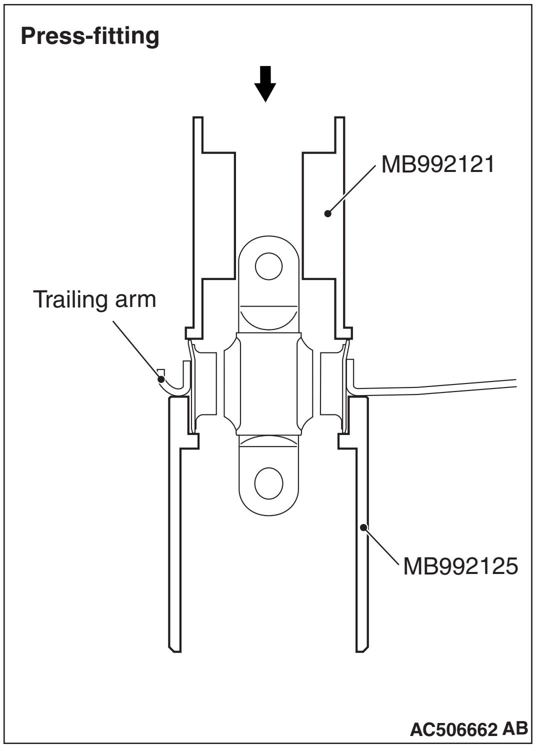


- MB992125: Arm Bushing Base

1. Use the special tools MB992121 and MB992125 to remove the trailing arm bushing:



2. Determine the installation direction and the installation position of the trailing arm bushing.
   (1) Install so that the protruding side of the trailing arm bushing inner pipe faces inside the body.
   (2) Position the trailing arm bushing inner space as shown in the figure.



3. Use the special tools MB992121 and MB992125 to press-fit the trailing arm bushing up to the position shown in the figure:

SHOCK ABSORBER ASSEMBLY

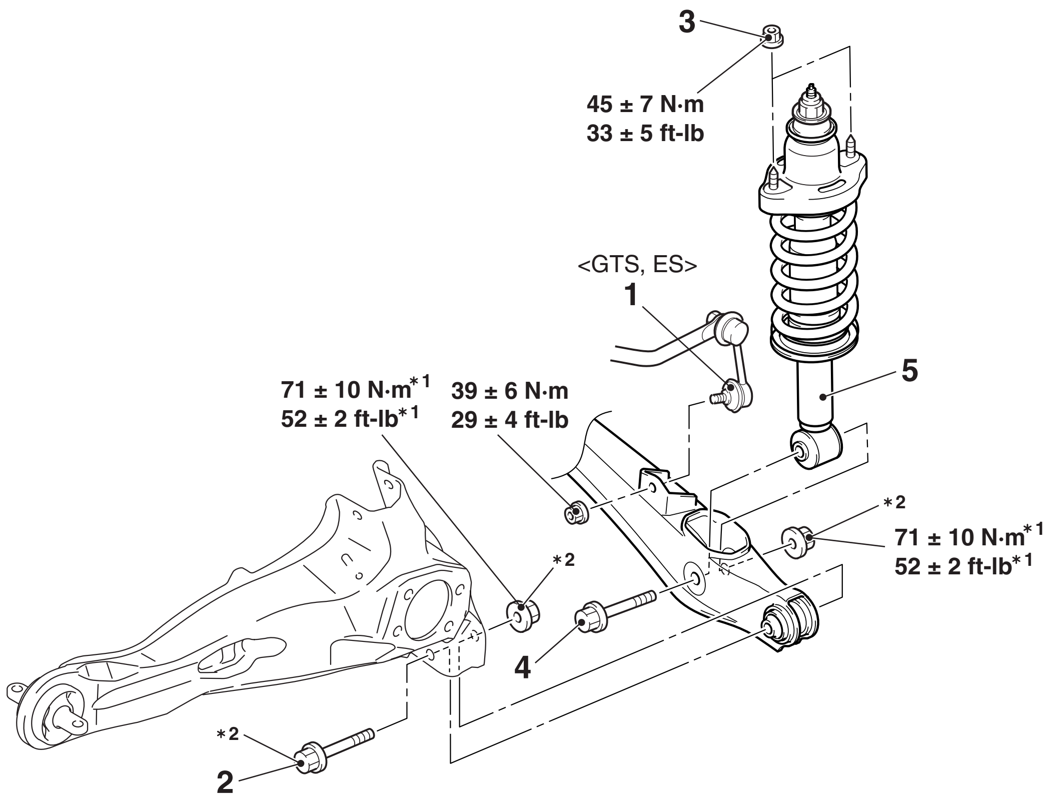
REMOVAL AND INSTALLATION

M1341002500603

⚠ CAUTION

- **The parts indicated by *1 should be temporarily tightened, and then fully tightened with the vehicle standing on the ground at the curb weight condition.**
- **The parts indicated by *2 are the bolts/nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal and post-installation operation
- Using your fingers, press the Ball Joint Dust Cover to check for a crack or damage.
- Trunk Side Trim Removal and Installation (Refer to GROUP 52A –Trim P.52A-10.)



Removal steps
1. Stabilizer link connection <GTS, ES>
2. Lower arm and trailing arm connection

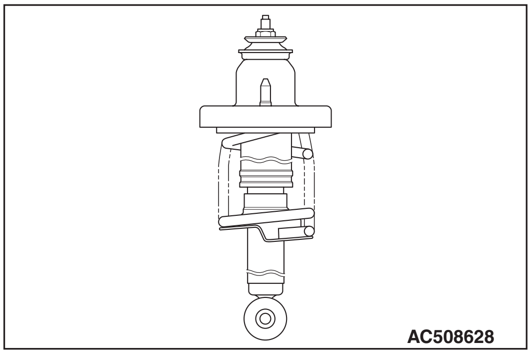
Removal steps (Continued)
3. Shock absorber mounting nut
4. Shock absorber and lower arm connection

>>**A**<< 5. Shock absorber assembly

INSTALLATION SERVICE POINT

>>A<< SHOCK ABSORBER ASSEMBLY INSTALLATION

Install the shock absorber assembly so that the coil spring end faces the rear of the vehicle.



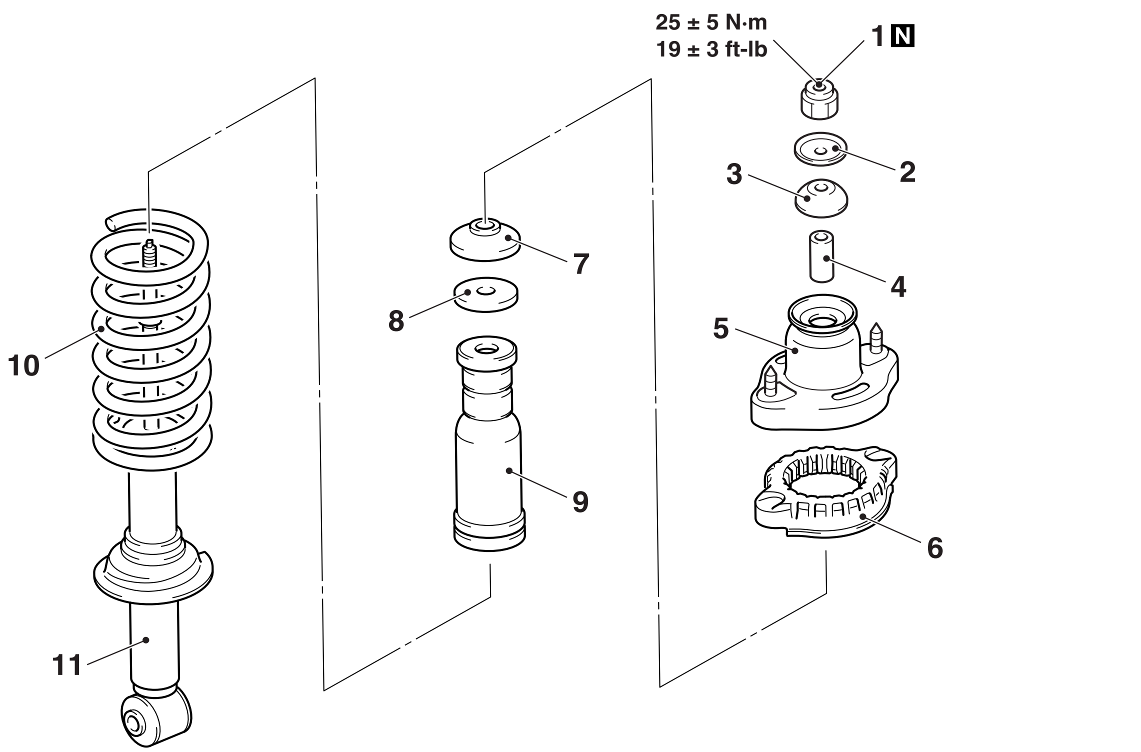
INSPECTION

M1341002600246

- Check the rubber parts for cracks and wear.
- Check the shock absorber for malfunctions, oil leakage, or abnormal noise.

DISASSEMBLY AND ASSEMBLY

M1341002700180



AC506862AB

Disassembly steps

<<A>>	>>B<<	1.	Self-locking nut
		2.	Washer
		3.	Bushing B
		4.	Collar
		5.	Spring upper bracket assembly
		6.	Spring upper pad
		7.	Bushing A

Disassembly steps (Continued)

	8.	Plate
	9.	Bump rubber
>>A<<	10.	Coil spring
	11.	Shock absorber

Required Special Tools:

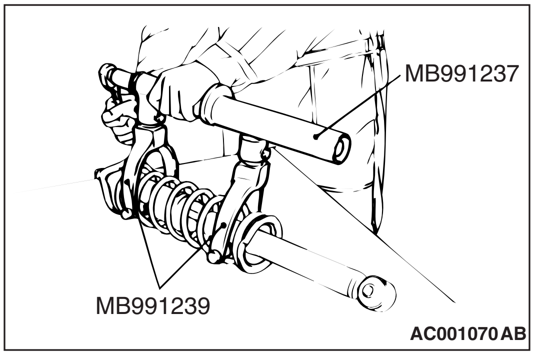
- MB991237: Spring Compressor Body
- MB991239: Arm Set

DISASSEMBLY SERVICE POINT

<<A>> SELF-LOCKING NUT REMOVAL

⚠ CAUTION

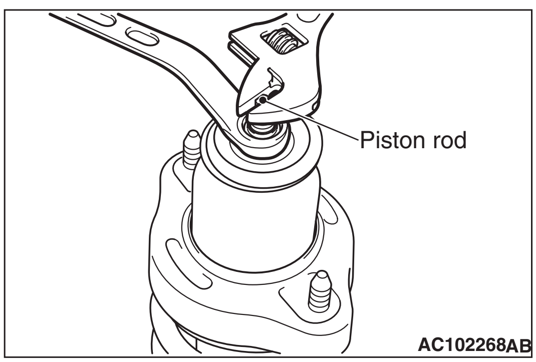
- **To hold the coil spring securely, install the special tool MB991239 evenly, and so that the space between both arms of the special tool will be maximum within the installation range.**
- **Do not use an impact wrench to tighten the bolt of the special tool MB991237. It will break the special tool.**



1. Use the special tools MB991237 and MB991239 to compress the coil spring.

⚠ CAUTION

The locking nut for the piston rod inside the shock absorber may be loose. Do not use an impact wrench to loosen the self-locking nut.



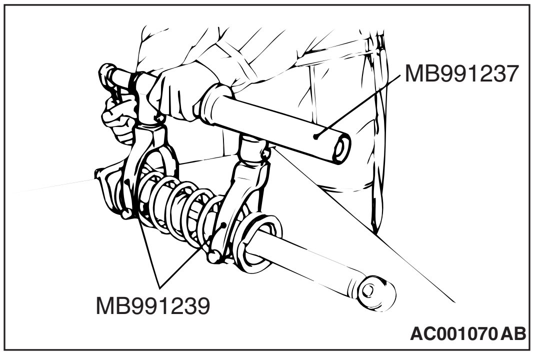
2. While holding the piston rod, remove the self-locking nut.

ASSEMBLY SERVICE POINTS

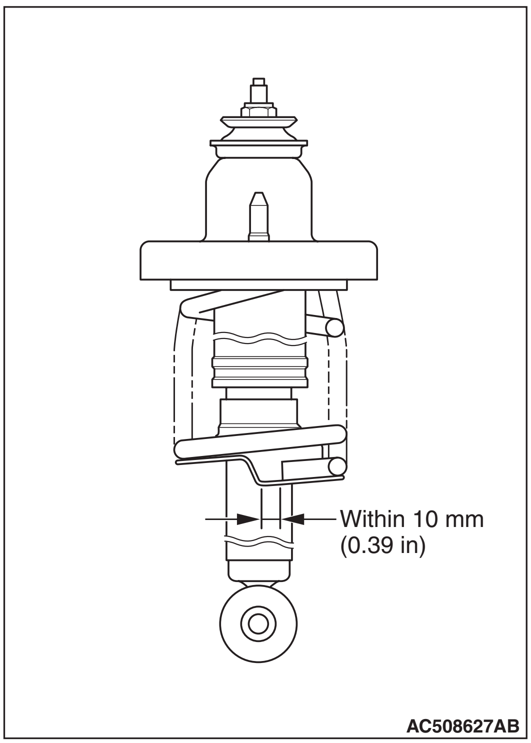
>>A<< COIL SPRING INSTALLATION

⚠ CAUTION

Do not use an impact wrench to loosen the bolt of the special tool MB991237. It will break the special tool.

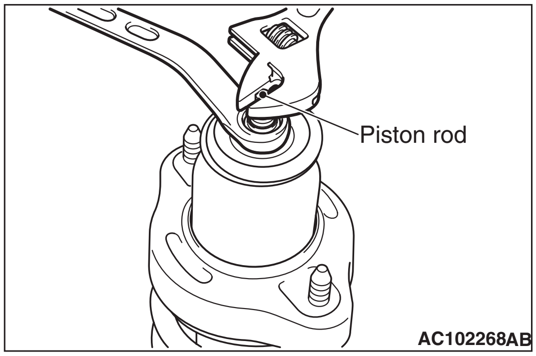


1. Use the special tools MB991237 and MB991239 to compress the coil spring, and install it to the lower spring pad.



2. Align the end of the coil spring with the shock absorber as shown in the figure.

>>B<< SELF-LOCKING NUT INSTALLATION



⚠ CAUTION

The locking nut for the piston rod inside the shock absorber may be loose. Do not use an impact wrench to tighten the self-locking nut.

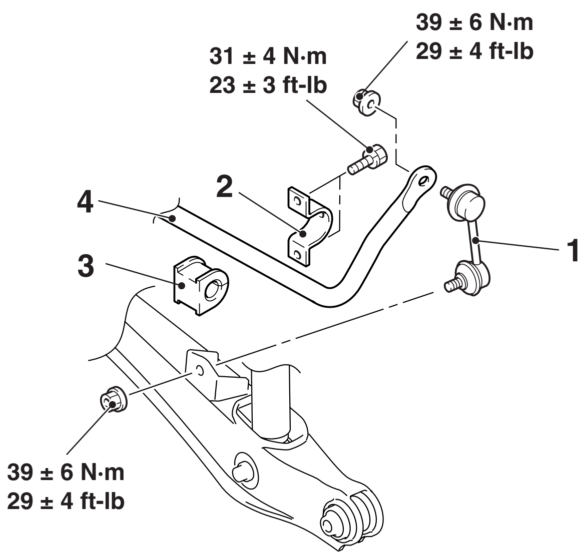
Counter the piston rod of the shock absorber as shown in the figure, and tighten the self-locking nut to the specified torque.

Tightening torque: 25 ± 5 N· m (19 ± 3 ft-lb)

STABILIZER BAR <GTS, ES>

REMOVAL AND INSTALLATION

M1341003000496



Removal steps

1. Stabilizer link

>>**A**<< 2. Stabilizer bracket

>>**A**<< 3. Bushing

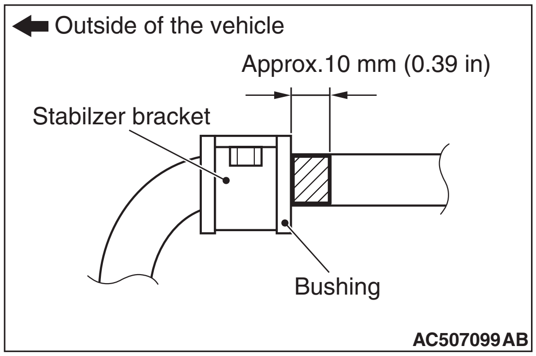
Removal steps (Continued)

- Rear suspension crossmember (Refer to P.34-22.)

>>**A**<< 4. Stabilizer bar

INSTALLATION SERVICE POINT

>>A<< STABILIZER BAR/BUSHING/STABILIZER BRACKET INSTALLATION



Position the identification mark of the stabilizer bar at the left side of the vehicle as shown in the figure, and tighten the stabilizer bracket mounting bolt.

INSPECTION

M1341001400540

- Check the bushings for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check all bolts for condition and straightness.

STABILIZER LINK BALL JOINT ROTATION TORQUE CHECK

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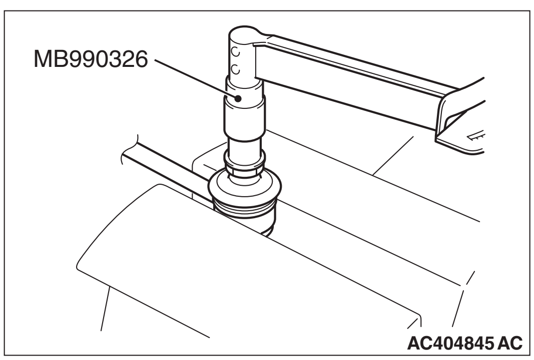


Required Special Tool:

- MB990326: Preload socket

1. Move the stabilizer link ball joint stud back and forth for several times, install the stud with nut, and measure the stabilizer link ball joint rotation torque using the special tool MB990326.

   Standard value: 0.5 – 2.9 N· m (4.4 – 25.7 in-lb)

2. When the measured value exceeds the standard range, replace the stabilizer link.
3. When the measured value is lower than the standard value, check the stabilizer link ball joint that there is no looseness or gritty feeling. If there is no looseness or gritty feeling, it is judged as usable.

STABILIZER LINK BALL JOINT DUST COVER CHECK

M1341013000107

1. Using your fingers, press the dust cover to check for a crack or damage.
2. If the dust cover has a crack or damage, replace the stabilizer link.

   NOTE: If the dust cover has a crack or damage, the ball joint could be damaged.

REAR SUSPENSION CROSSMEMBER

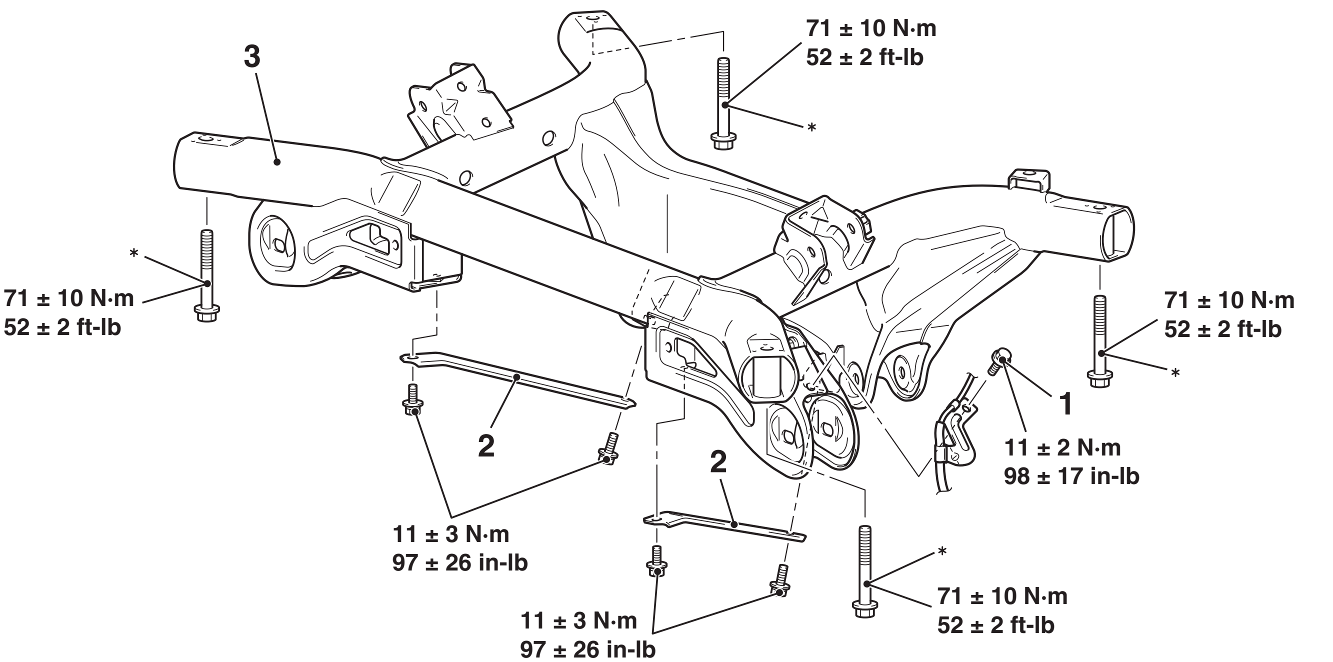
REMOVAL AND INSTALLATION

M1341006800468

⚠ CAUTION

- **The part indicated by *is the bolt with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal operation	**Post-installation operation**
• Control link arm removal (Refer to P.34-8.) • Upper arm removal (Refer to P.34-8.) • Lower arm removal (Refer toP.34-8.) • Rear suspension stabilizer bar removal (Refer toP.34-20.) • Center exhaust pipe and main muffler removal (Refer to GROUP 15 –Exhaust Pipe and Muffler P.15-11.)	• Center exhaust pipe and main muffler installation (Refer to GROUP 15 –Exhaust Pipe and Muffler P.15-11.) • Rear suspension stabilizer bar installation (Refer toP.34-20.) • Lower arm installation (Refer toP.34-8.) • Upper arm installation (Refer to P.34-8.) • Control link installation (Refer to P.34-8.) • Rear wheel alignment check and adjustment (Refer toP.34-7.)



Removal steps

1. Rear wheel speed sensor clamp <Vehicles with ABS>

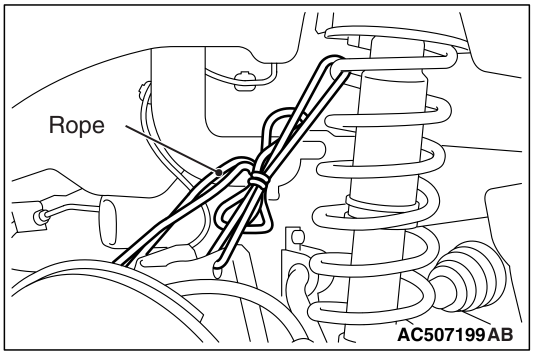
Removal steps (Continued)

2. Rear suspension crossmember stay

<<**A**>> 3. Rear suspension crossmember

REMOVAL SERVICE POINTS

<<A>> REAR SUSPENSION CROSSMEMBER REMOVAL



To avoid the brake hose load, fix the trailing arm assembly with a rope as shown in the figure.

INSPECTION

M1341006900120

- Check the crossmember for cracks or deformation.
- Check all bolts for condition and straightness.

NOTES

GROUP 9

BASE OF BODY REPAIR

CONTENTS

GENERAL

M4090000100018

Group 9 is applicable for all models.

WELDING

WELDING

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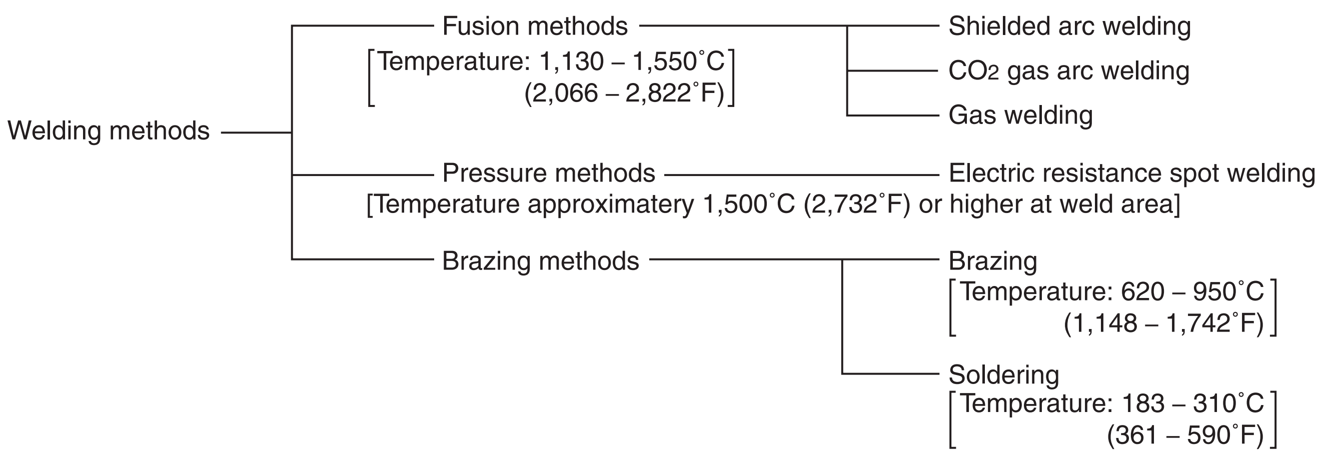
Welding is the partial joining of two or more metals by deposition; the welding methods used for body maintenance and repair can be classified into the following methods.



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FUSION WELDING

Fusion welding is a method of welding in which the weld connection is made by forming or supplying the weld metal at the part where the weld is to be made.

PRESSURE WELDING

Pressure welding is a method of welding in which the weld connection is made by applying external pressure while the part where the weld is to be made is in a molten or semi-molten condition.

ELECTRIC RESISTANCE SPOT WELDING

Electric resistance spot welding is a method for fusing metal parts together. Two or three metal sheets are positioned between two copper-alloy electrode tips, and pressure and a large current are then applied, thus causing the contacting surfaces to heat up and fuse together because of the electric contact resistance.

BRAZING

Brazing is a method of welding in which the weld connection is made by supplying a filler metal (which is molten at a temperature lower than the melting temperature of the base metal) at the place where the joining is to be made without melting the base metal itself.

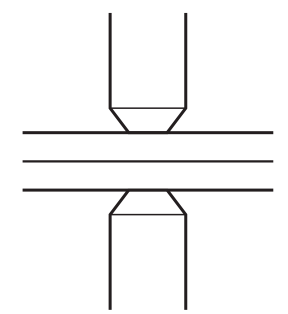
M4090002000039

ADVANTAGES OF ELECTRIC RESISTANCE SPOT WELDING

- Because the time required for welding at each point is brief, the work can be done quickly and at reduced cost.
- Because both metals are fused and pressure applied to make the weld, the strength and reliability are both high.
- Because the time required to make the welds is short, there is little occurrence of distortion of the panel due to heat.

PROCEDURE

There are three basic stages in electric resistance spot welding.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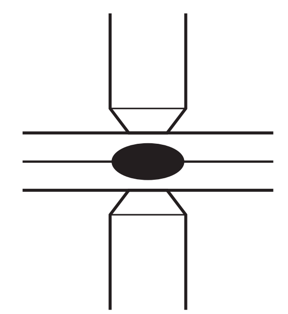
1. Initial pressure application stage
   This stage precedes the current application. Applying pressure to the steel panels through the electrode tips ensures a uniform contact resistance and a smoother current flow.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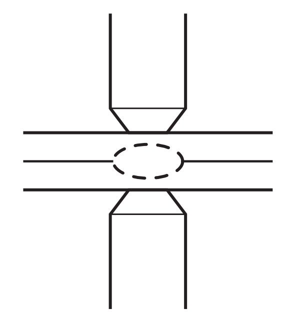
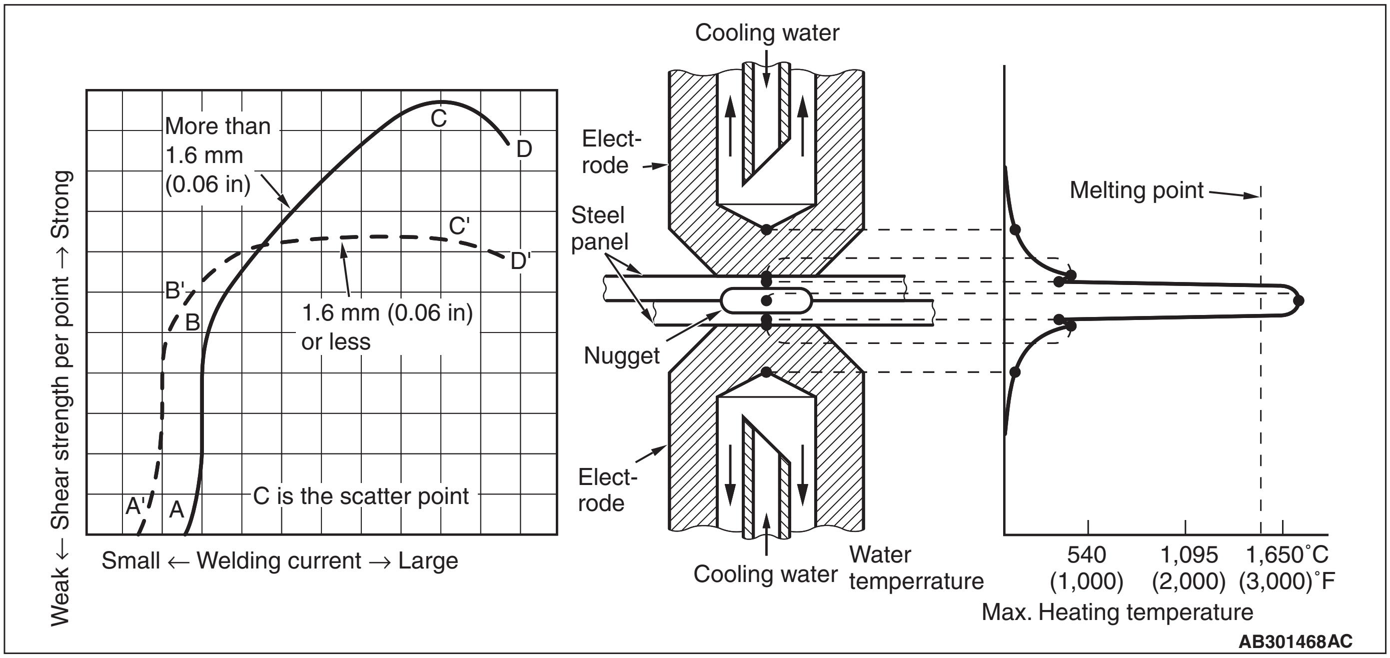
2. Current application stage
   While an ample amount of pressure is being applied, the current is sent through the electrode tips. The contact resistance causes the contact surfaces of the steel panels to heat up and fuse together.


AB200028

3. Holding stage
   When the current application is finished and a nugget (a solidified piece of molten metal) forms at the weld, the pressure application is continued in order to strengthen the weld. This is the most important stage of electric resistance spot welding in ensuring the strength of the weld.

NUGGET FORMATION

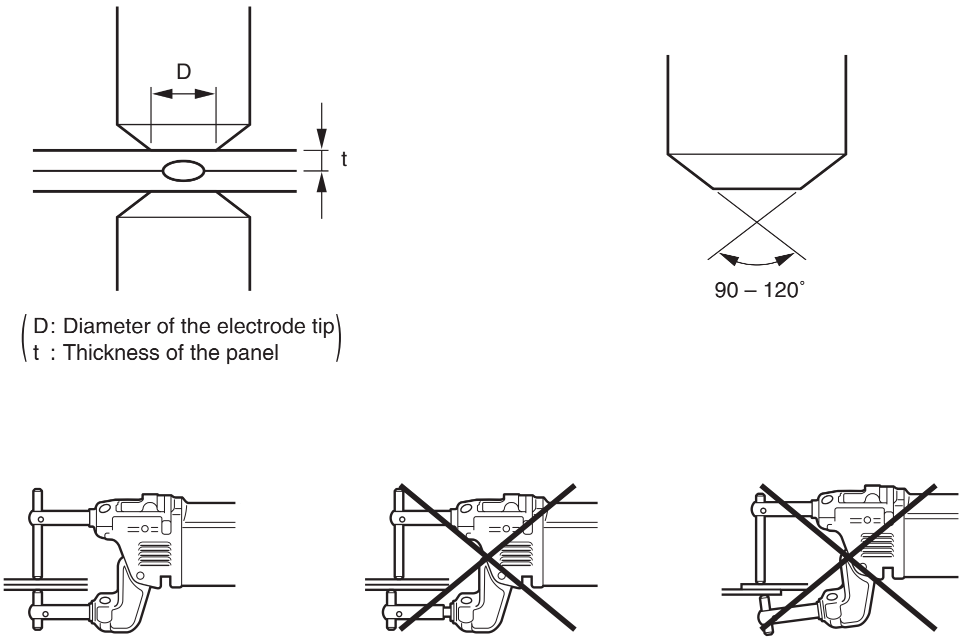


Generally speaking, the size of the nugget will increase as the welding current increases, and as the size of the nugget increases, the strength of the weld will also increase.

Nugget formation will not begin until the current level reaches a certain point; however, once this welding current level is passed, the strength will increase rapidly (between points A and B).

As the current level increases further, the weld strength for thick panels [more than 1.6 mm (0.06 inch)] continues to increase proportionately (between points B and C); however, for thin panels [1.6 mm (0.06 inch) or less], the weld strength reaches a peak very quickly and will increase only slightly, even if the current level increases (between points B' and C'). Then, for both thick panels and thin panels, the molten metal will scatter if the current level increases past a certain point.

NOTES REGARDING WELDING



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1. Selection of the electrode tips
   - Select the electrode tips according to the thickness of the panels to be welded.
     D = 2t + 3 mm (D = 2t + 0.1 inch)
   - The angle of the tip should be between 90 degree angle and 120 degree angle.
   - To always keep the end of tip in the correct shape, use a tip cutter, file or similar tool to shape it if it becomes worn.
2. Alignment of the electrode tips
   - Adjust the arms so that the upper and lower electrode tips are in a straight line.
3. Alignment and length of the arms
   - Adjust the electrode tips so that the upper and lower arms are parallel.
   - Select an appropriate arm length. Note, however, that the arm length should not be more than 350 mm (13.8 inches) in order to ensure nugget strength.
4. The weld points
   - The overall strength will increase as the pitch decreases; however, if the pitch decreases too much, the current will be short-circuit diverted to the previous weld point and the strength of the individual nuggets will be insufficient.
   - Make the spot welds at the center of the flanges to provide sufficient adhesion. When welding at an edge, make the spot welds at least 5 mm (0.2 inch) from the edge of the flange.
   - The number of spot weld points should be the same as, or slightly more than the number of original repair welds.
   - When spot welding three or more panels together, if painted surfaces cause a loss of conductivity, make the welds at the same places as the factory welds. If this is done, extra welds will not be necessary, but if extra welds are necessary, switch to plug welding.

WELDING REQUIREMENTS

Standard steel plate (SPCC, etc.)

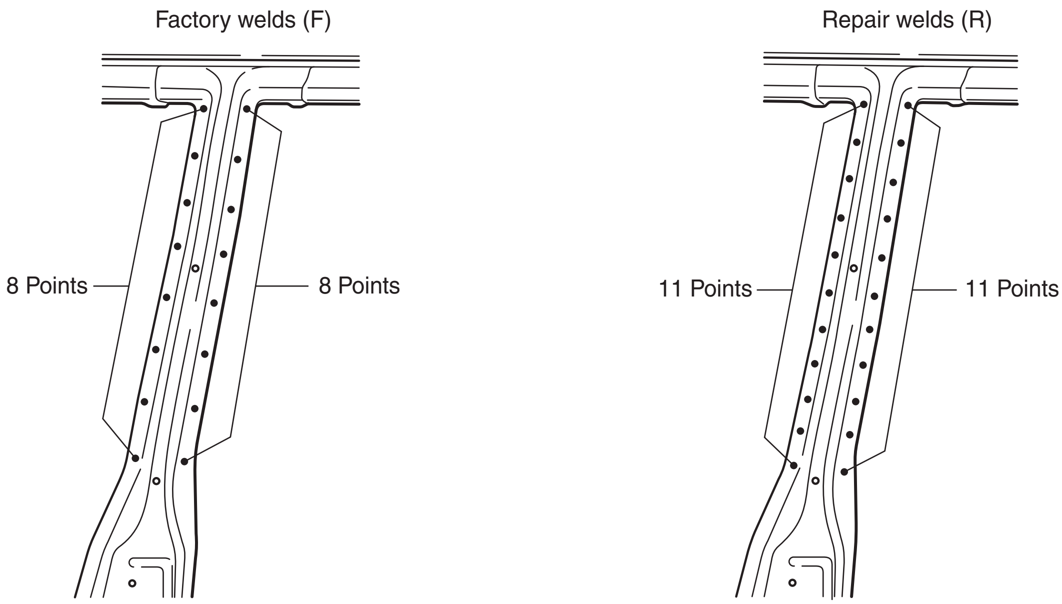
⚠ CAUTION

If the total thickness of the plates at the weld places is 3 mm (0.12 inch) or more, use plug welding, because spot welding will not provide sufficient welded strength.

Example

- Center pillar (outer): plate thickness 1.4 mm (0.06 inch), material SPCC
- Center pillar (inner): plate thickness 1.5 mm (0.06 inch), material SPCC

The number of weld points are as below when the outer and inner center pillars are repaired by welding.



As shown by the Welding Requirements table, the number of repair welds is as follows.
8 (points) × 130 (%) = 10.4 (points)
The number of weld points should, therefore, be ten or eleven.
If, however, a pitch of 26 mm (1.0 inch) or more cannot be maintained, the plug welding method (eight weld points) should be used.

AB200031AC

	PANEL THICKNESS* [mm (in)]	NUMBER OF REPAIR WELD (PERCENTAGE OF FACTORY WELD)
SAFETY EQUIPMENT AREA	1.0 (0.04) or less	100% Same number as factory welds
	1.2 (0.05)	150% Maintain pitch of at least 22 mm (0.9 inch); if not possible, plug weld.
	1.4 (0.06) or more	100% Same number as factory welds; plug welding
OTHER AREA	1.2 (0.05) or less	100% Same number as factory welds
	1.4 (0.06)	130% Maintain pitch of at least 26 mm (1.0 inch); if not possible, plug weld.
	1.6 (0.06) or more	100% Same number as factory welds; plug welding

*NOTE: *: For welding steel plates of different thickness, conform to the welding conditions for the thinner plate.*

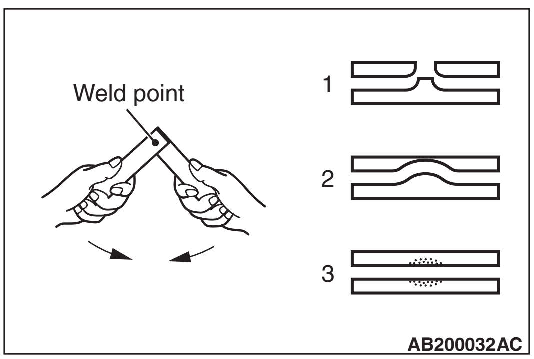
Galvanized steel plate (SECC)

⚠ CAUTION

If the total thickness of the plates at the weld places is 3 mm (0.1 inch) or more, use plug welding, because spot welding will not provide sufficient welded strength.

	PANEL THICKNESS* [mm (in)]	NUMBER OF REPAIR WELD (PERCENTAGE OF FACTORY WELD)
SAFETY EQUIPMENT AREA	0.9 (0.04) or less	100% Same number as factory welds
	1.0 (0.04)	200% Maintain pitch of at least 18 mm (0.7 inch); if not possible, plug weld.
	1.2 (0.05) or more	100% Same number as factory welds; plug welding
OTHER AREA	0.9 (0.04) or less	100% Same number as factory welds
	1.0 (0.04)	140% Maintain pitch of at least 18 mm (0.7 inch); if not possible, plug weld.
	1.2 (0.05) or more	100% Same number as factory welds; plug welding

*NOTE: *: For welding steel plates of different thicknesses, conform to the welding conditions for the thinner plate.*



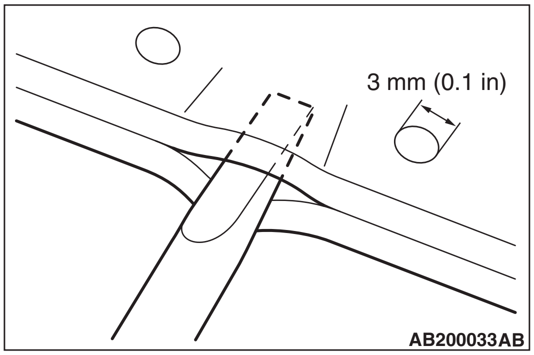
USING A TEST PIECE TO CHECK NUGGET FORMATION

Weld a test piece of the same type of steel plate as the panels to be welded. Try to twist the piece, and also check the nugget diameter.

Using the weld point as an axis, apply force in the direction indicated by the arrows in the illustration, and determine the strength of the weld.

1. Good (The welded part remains at one side).
2. and 3.
   The weld conditions are unsatisfactory; adjust the welding current, the current application time, and/or the applied pressure.

CHECKING NUGGET STRENGTH FOLLOWING SPOT WELDING



⚠ CAUTION

- **Stop wedging the tip or the chisel or flat-tipped screwdriver as soon as the size of the nuggets can be determined; do not wedge it in more than 30 mm (1.2 inches).**
- **After checking the nugget diameter, correct the place where the checking was done.**

Wedge the tip of a chisel or flat-tipped (-) screwdriver into the space between two weld points.

- The nuggets should not break apart.
- The nugget diameter should be 3 mm (0.1 inch) or more.

GAS SHIELD ARC WELDING

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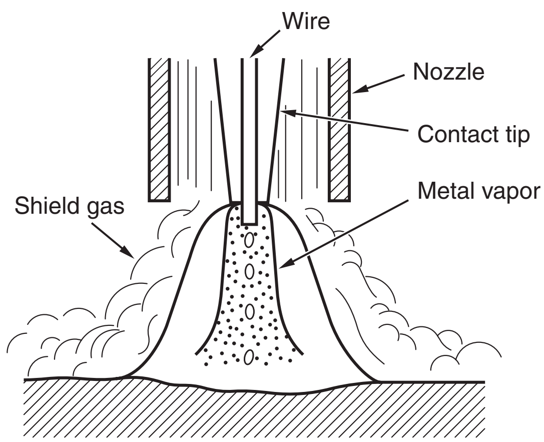
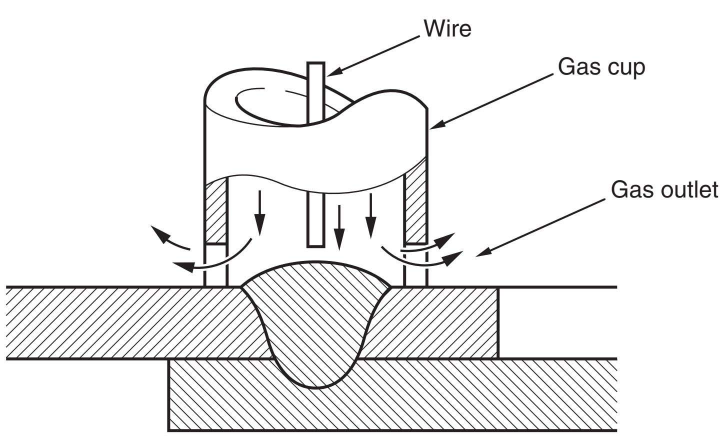


Gas shielded arc welding is one method of arc welding. In this method, while the area to be welded is shielded from the air by a layer of inert gas (such as argon) or carbon dioxide gas, the filler metal (wire) is fed from the torch nozzle at a constant rate and an electric arc is generated between the tip of the wire and the area being welded, thus generating heat to fuse the area. There are two types of gas shielded arc welding, classified according to the gas they use as the shield gas: carbon dioxide (CO_2) gas shielded arc welding, and MIG welding, which uses an inert gas (such as argon).
However, herein we will refer to all gas shielded arc welding as MIG welding.

MIG SPOT WELDING



This welding method is used in areas where regular spot welding cannot be done. The two panels are stacked together, the tip of the torch (one designed for use in MIG spot welding) is positioned on one side, an arc is generated for a short time, and a partial melting is done to obtain a spot weld.

Procedure

⚠ CAUTION

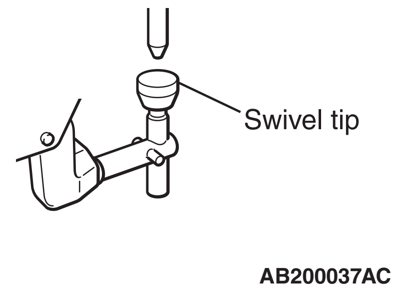
- **Make sure that the area to be welded is perfectly clean; remove oxidation film, scales, rust, dirt, etc.**
- **The two panels to be welded must be in perfect contact with each other.**
- **The number and pitch of the weld points should be approximately the same as for the factory welds.**

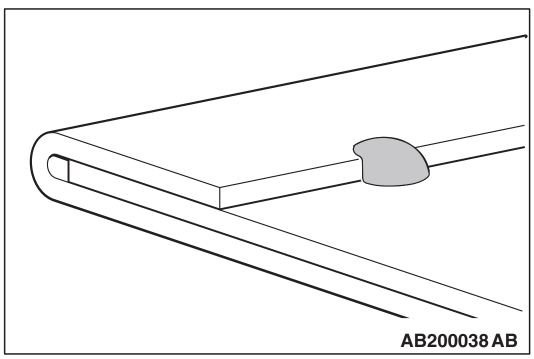
1. Position the tip of the nozzle at a right angle to the surface to be welded.
2. Being sure that the two prongs are not leaning to either side, set them in direct contact with the panel to the welded.
3. Welding will begin when the torch trigger is squeezed, and will stop automatically when the weld is complete.

FEATURES OF MIG SPOT WELDING

In comparison to resistance spot welding, MIG spot welding has the following advantages and disadvantages.

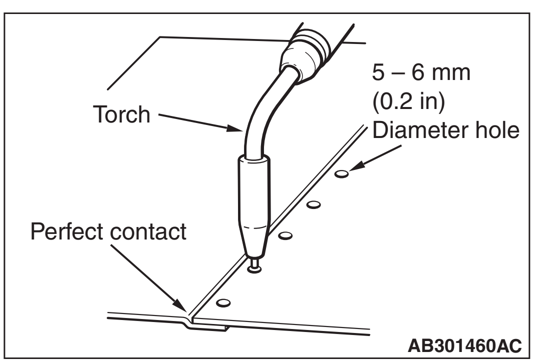
ITEM	MIG SPOT WELDING	ELECTRIC RESISTANCE SPOT WELDING
Working characteristics	• Light weight • Welding possible at various positions (no limit upon welding positions)	• Although the torch with separate transformer is lightweight, the torch combined with transformer type is heavy. • The arm must be exchanged to conform to the weld location.
Weld time/point	Slow (0.5 second or more)	Fast (0.5 second or less)
Treatment after welding	Necessary (grinding by grinder, etc.)	Unnecessary
Power	High voltage, low current (15 –30 V, 50 –200 A)	Low voltage, high current (2 –4 V, 4 –10 kA)
Flux material	• CO_2 (carbonic acid gas) • Weld wire	Unnecessary
Weld points/10 minutes (rate of use)	• 25 points or less • Arc instability and contact tip burn if rate of use is exceeded.	• 50 –60 points • Welding rod deformation and transformer overheating if rate of use is exceeded.
Distortion caused by welding	Occurs easily	Rare

ITEM	MIG SPOT WELDING	ELECTRIC RESISTANCE SPOT WELDING
Welding strength	Depends on strength of welding wire itself.	• Same as base material • Little oxidation • Uniform welding quality
Weld traces	Button head (slightly convex)	Slight concave (Almost no indentation if swivel tip used.) 
Re-repairability (cutting away welded area)	Difficult (Much welding trace High hardness of weld points)	Easy (Can be separated by spot cutter.)



The MIG welding done around the doors, wheelhouse arches, etc., to prevent the flanges from coming undone after hemming work is also called MIG spot welding.

PLUG WELDING

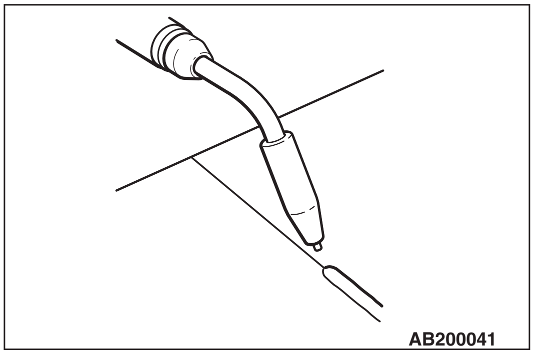


⚠ CAUTION

In order to prevent the formation of blowholes, fill in each hole completely in one pass.Be sure that the two panels are in perfect contact.Be sure that the penetration goes all the way to the bottom panel.

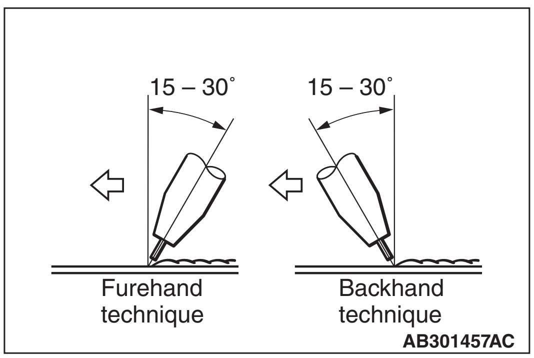
Plug welding is done by making holes 5 –6 mm (0.2 inch) in diameter in one of the panels to be welded together, positioning the torch at a right angle to the holes and then filling in the holes one at a time.

CONTINUOUS WELDING



There are several types of continuous welding: fillet (lap joint) welding, butt welding, T joint welding, gap welding, etc.; these are called short-circuit arc welding, and provide a stable arc at a relatively low current.

Torch angle and welding technique



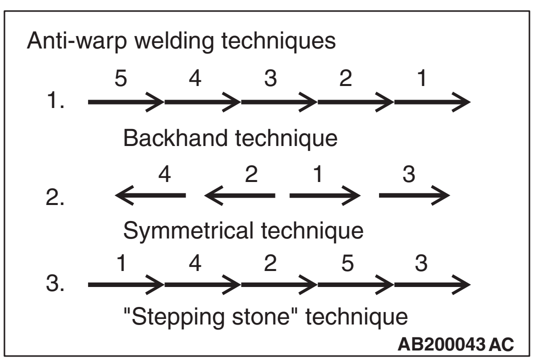
There are two welding techniques: forehand welding and backhand welding.

Forehand welding: Penetration is shallow and the bead is flat.

Backhand welding: Penetration is deep and the bead has a convex shape.

The angle of the torch should be 15 –30 degree angle for either technique, and the tip should be maintained at a distance of 6 – 10 mm (0.2 –0.4 inch) from the surface being welded.

Preventing warping



1. Backhand technique
   Because the direction for each weld pass and that for the fusion progression are opposite, the residual stress is evenly distributed.
2. Symmetrical technique
   Because the welds are made in symmetrical positions in relation to the center of the joint, the residual stress is also symmetrical.
3. "Stepping stone" technique
   Because the welds are made at random positions, the residual stress is the most evenly distributed; however, the possibility of flaws at the starting and stopping points is relatively high.

NOTES REGARDING MIG WELDING

Note the following notes regarding MIG welding.

1. The surface to be welded must be perfectly clean; be sure to remove any non-conductive paint.
2. If the end of the wire forms into a ball, it will adversely affect the formation of the arc; cut the end off with a pair of wire snips or a similar tool.
3. Select a welding current to match the thickness of the panels being welded.
4. For continuous welding, maintain a constant weld speed and keep both the height and the width of the bead constant.
   In addition, the tack welding pitch and the welding bead should be shorter as the thickness of the panels being welded decreases.

OTHER TYPES OF WELDING

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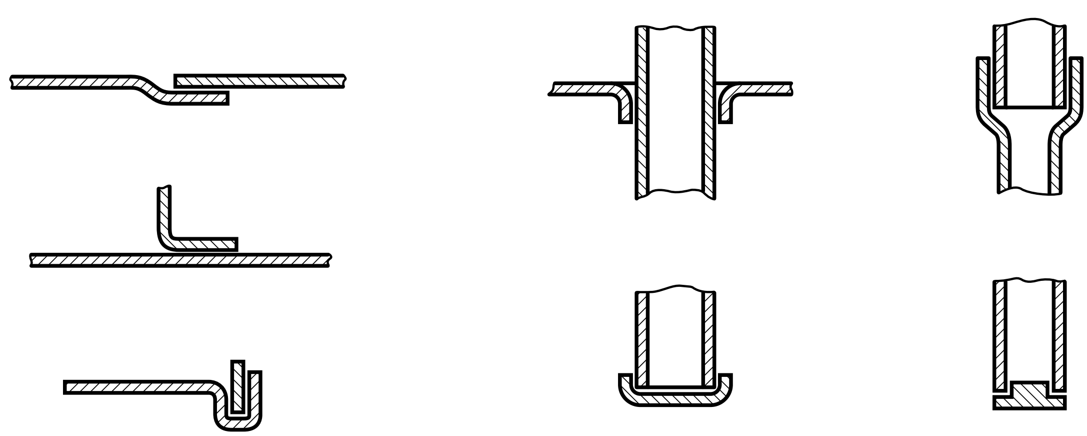
BRAZING

In brazing, a filler metal is melted into the joint of the panels to be welded at a comparatively low temperature to fuse them together without melting the panels themselves. In other words, through the aid of a flux and because of the capillarity phenomenon, the molten filler metal will flow into the joint between the two panels which are in contact with each other and spread along the metal surfaces. When this molten filler metal cools and solidifies, it will from a strong joint of the two panels. Note that, if two panels of different kinds of metal are brazed, the electrolysis generated between the two metals will cause moisture to from, which will result in corrosion.
Panels should not be connected together by brazing at any place except those places indicated. The following materials (filler metals) are usually used for brazing.

1. **Brass filler metal (brass solder)**
   Brass filler metal is an alloy consisting of 60% copper and 40% zinc with a melting temperature of approximately 850 –1,050° C (1,562 – 1,922° F), and it is the most commonly used brazing filler metal used for body repair.
   The filler metal itself is coated with flux to facilitate penetration between the panels to be joined.
2. **Silver alloy filler metal (silver solder)**
   Silver alloy filler metal consists of silver, copper, zinc or cadmium, nickel, and tin, or other metals. This filler metal is most applicable for the brazing of steel and non-ferrous alloy other than aluminum, magnesium, and others with low melting points.

Notes with regard to brazing work



Examples of brazed joints

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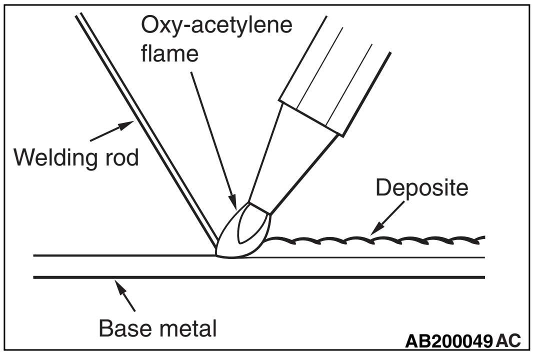
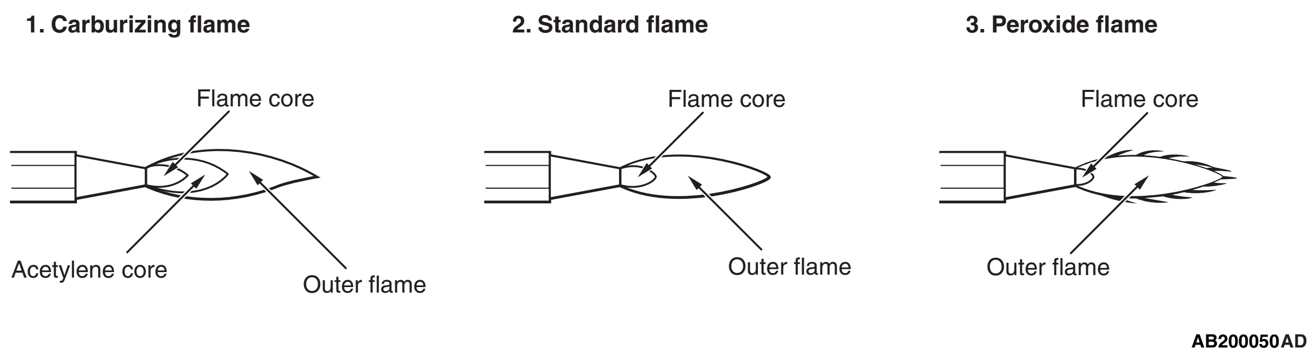
- Use a wire brush, sandpaper, file etc., to remove any oxide film grease, dirt, etc., from the surfaces of the panels to be brazed.
- When doing brass brazing, if the panels and the filler metal are heated excessively, a weak iron-copper alloy will form, which could crack easily. Be careful not to apply excessive heat.
- The joint of the panels must overlap as indicated in the illustration.

GAS WELDING



Gas welding is a method in which a high temperature flame is used to melt both a welding rod and the base metal (panels) to make a fused joint. Oxy-acetylene is the most common type of gas welding. However, because of the extremely high temperature of the fused joint, the strength of the steel plate deteriorates, and there is a higher possibility of warping. This method, therefore, is not very suitable for body repair.

The flame in gas welding can be classified according to the ratio of acetylene and oxygen.



1. **Carburizing flame (acetylene-rich flame)**
   This flame has an excess of acetylene or a deficiency of oxygen. The incomplete combustion gives off a black smoke, and two flame cores can be seen inside the deformed yellow flame. The flame itself is large, but the temperature is relatively low, making this flame unsuitable for welding.
2. **Standard flame (neutral-mixture flame)**
   This flame has approximately equal amounts of acetylene and oxygen. The length is shorter than that of the carburizing flame; the flame core is rounded; and it is clear and bright.
   The carbon in the acetylene is burned completely, resulting in the maximum obtainable temperature. This is the flame most commonly used for welding.
3. **Peroxide flame (oxygen-rich flame)**
   This flame has an excess of oxygen or a deficiency of acetylene. The flame core is shorter and sharper, and the entire flame has a blackish-purplish color. The combustion is unstable, and the flame flickers continuously.

Notes with regard to gas welding

1. Handle the oxygen and acetylene tanks carefully.
2. Adjust the flame in accordance with the type of metal being welded.
3. Select a nozzle to match the work to be done. Avoid overheating and adhesion of foreign matter (dirt, etc.)
4. The following points are particularly important when welding mild steel plate.
   - Melt a sufficient amount of welding rod, but be careful not to melt the base metal. Use the same amount of welding rod on both sides.
   - Use the correct amount of welding rod in accordance with the melting point of the base metal.
   - Avoid welding over places which have been welded before.
   - In order to avoid warping, do only the amount of tack welding that is absolutely required.

BODY REPAIR

STANDARD BODY REPAIR PROCEDURES

The following is an explanation of the standard repair procedures for the monocoque body and the frame-type body. Furthermore, please refer to the replacement of welded panels for the applicable model for information concerning the procedures for replacement of panels (as classified by position) for the various models.

NOTE: That reference should be made to page P.9-27 concerning repair procedures for the frame of frame-type vehicles.

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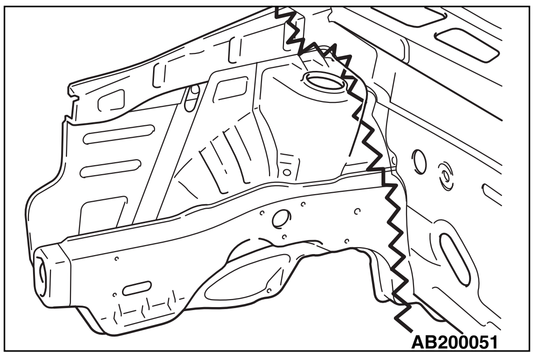
STANDARD PROCEDURES FOR REPLACEMENT OF WELDED PANELS

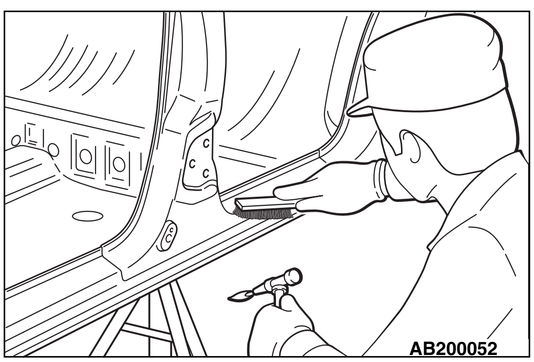
In order to maintain the proper levels of strength, rigidity, and precision when making welded panel replacements, it is essential to first gain a thorough understanding of the body structure, and then to perform all repair operations carefully and correctly. In addition, when performing the operations, be sure to use the proper protective equipment for each operation.



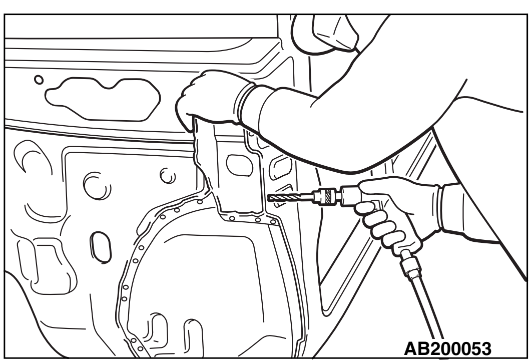
⚠ CAUTION

- **Select an appropriate location for the cutting operation, and perform the work carefully, so as not to cut into the reinforcements located inside the pillars, panels which are not be replaced, or any other such parts.**
- **There are harnesses, hoses, and other such parts routed inside the front pillar, the rear pillar, the fender shield, the side sill, etc.; perform the repair work only after any such material has been removed.**
- **For overlap cutting, allow an overlap of approximately 30 –50 mm (1.2 –2.0 inches) when performing the cutting operation.**

1. **Rough cutting of panels**
   First make a rough cutting of a portion of the panel to be replaced, and then remove that portion, thus making it easier to break the spot welds.



2. **Removal of the paint coat from spot-welded points**
   In order to clearly identify the spot-welded points, remove the paint coat from areas where it is difficult to determine the spot welds.

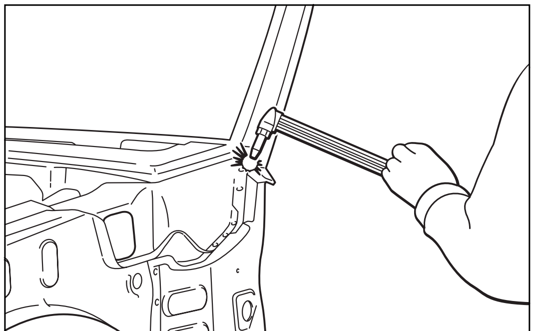


3. **Cutting and separation of spot-welded points**
   In order to perform cutting and separation of spot-welded points, use a spot weld cutter which is larger than the size of the nugget to make a hole only in the panels to be replaced.
   When cutting and separating spot-welded points in places where the surrounding panel or other parts interfere with the spot weld cutter, or if the operation is hampered by a lack of space, bend back the flanges in order to make the work easier.
   If a spot-weld cutter cannot be used at all, cut and separate the spot welds by using a chisel or similar tool.

NOTE: If a replacement panel is to be mounted by doing plug welding from the side of the panel remaining on the body, either a hole can be made in the panel on the body, or a hole can be made right through both the panel which is to remain on the body and the panel to be replaced.

⚠ CAUTION

When performing this operation, warping of the surrounding panels may occur if an excessive amount of heat is applied; therefore, be careful to avoid doing this.



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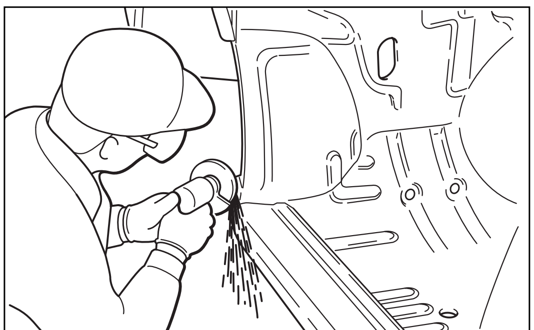
4. **Breaking of brazing and arc welds**

   Heat only the brazed or arc welded portion (such as the upper portion of pillars, etc.), and then separate by using a screwdriver while melting occurs.



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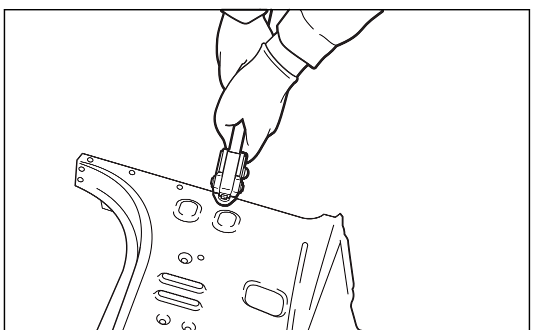
5. **Finishing work of spot welding**

   Grind and smooth any weld traces which might be left on the body surface by using an air grinder or similar tool, being careful not to damage any of the panels which is not to be replaced. When performing this operation, be sure to wear safety goggles (dust proof glasses).



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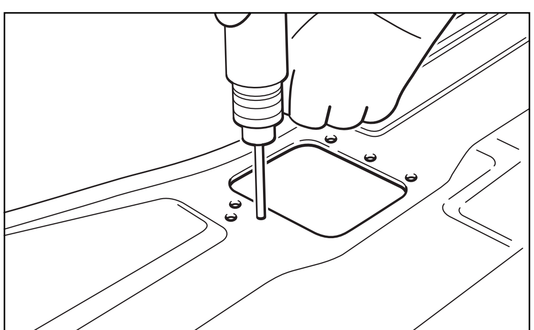
6. **Making of holes in new parts for MIG plug welding**

   Make holes approximately 5 –6 mm (0.2 inch) in diameter at points where plug welding is to be performed because spot welding is not possible.



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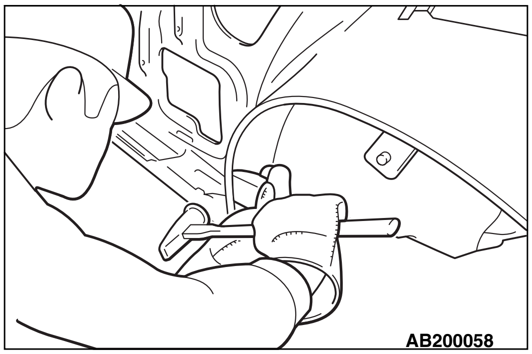
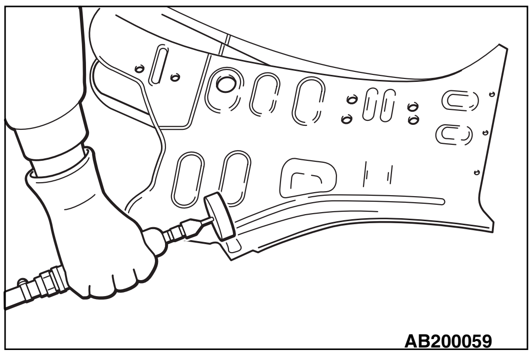


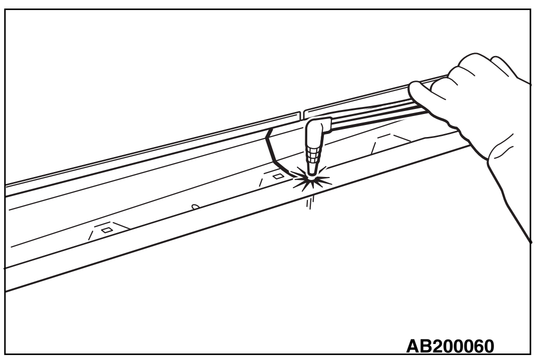
7. **Flange correction for spot weld traces**
   Correct any flanges that become bent or deformed when spot welds are broken or during other work.



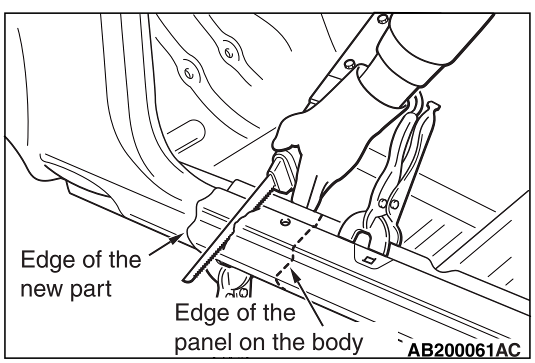
⚠ CAUTION

Do not use a flame for paint coat removal because doing so might damage the paint coat of panels which are not to be replaced, thus causing corrosion.

8. **Removal of the paint coat from new parts and from the vehicle body**
   In order to provide for the proper flow of electric current during spot welding operations, remove the paint coat from both sides of the new part and the body by using a polisher wheel or similar tool.



9. **Rough cutting of new parts**
   Cut off the unnecessary portions of new parts. Allow an overlap of approximately 30 –50 mm (1.2 –2.0 inches) when performing overlap cutting of the pillars, side sills, or other locations.



⚠ CAUTION

Carefully select the location for cutting, taking care not to cut a reinforcement at the inner side of a pillar, etc. or a panel that is not to be replaced.

10. **Overlap cutting of new parts**
    For locations in which butt welding is to be done, first temporarily attach the new parts to the body, and then cut the two panels simultaneously.

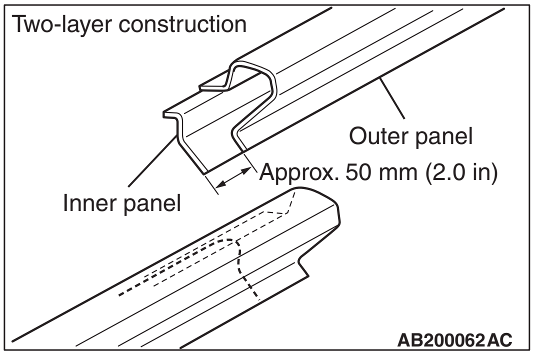
    NOTE: If a reinforcement or a panel which is not to be replaced is cut accidentally, first repair the mistake by welding before proceeding with the rest of the work.

⚠ CAUTION

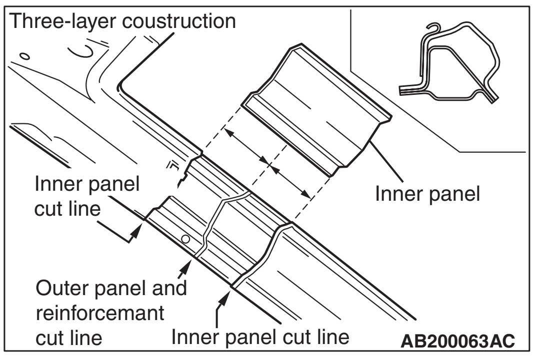
Perform the operations carefully so that the cut ends fit together properly.

11. **Cutting of new parts by using a measurement marking**

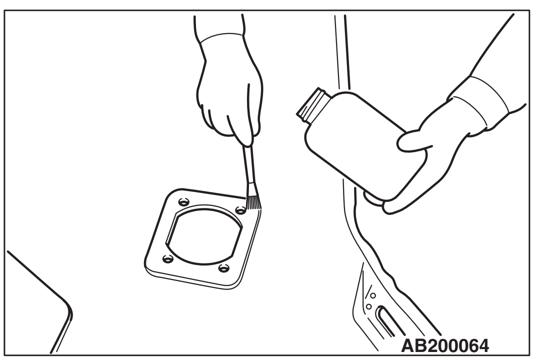
If overlap cutting is not possible in a place where butt welding is to be done, make a measurement marking on the new part at the exact same measurement which was used for the cutting of the body panel, and then cut the new part by using this measurement marking.



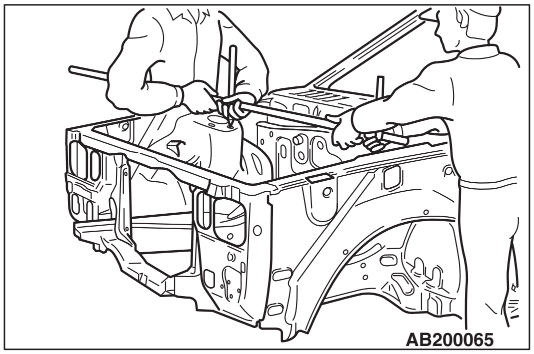
- Two-layer construction
  When cutting a front pillar or center pillar which has a two-layer construction but no reinforcement, make the cutting of the inner panel and that of the outer panel approximately 50 mm (2.0 inches) apart in order to obtain maximum strength.



- Three-layer construction
  When cutting a front pillar or center pillar which has a three-layer (including a reinforcement) construction (double-box construction), cut the outer panel and the reinforcement at the same position, and don't forget to butt weld the reinforcement. If the inner panel is an assembly replacement part, cut it at two places in order to provide ample working space for the butt welding of the reinforcement.



12. **Application of spot sealer to spot-welded points**
    Apply an electro-conductive spot sealer to the connecting surfaces of both the new parts and the vehicle body in order to provide corrosion protection.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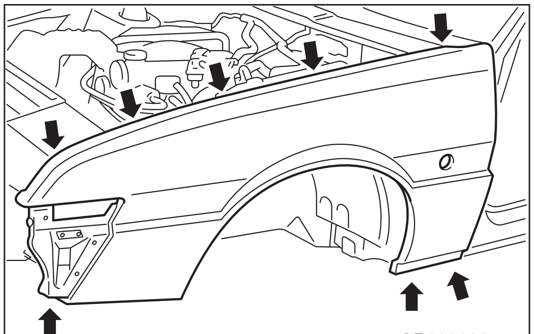
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⚠ CAUTION

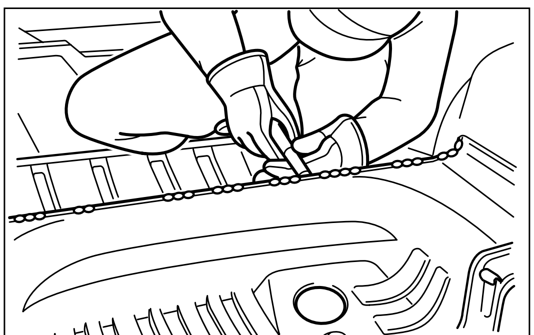
During temporary mounting, it is extremely important to obtain accurate measurements for each component. The mounting positions for the front and rear suspensions are especially crucial with regard to safety; therefore, it is necessary that all work concerning these areas be done carefully and correctly.

13.**Temporary mounting of new parts**

(1) In order to bring the new parts into the proper mounting position, measure each part carefully and make any corrections necessary in order to obtain agreement with the measurements.

(2) In addition, make temporary welds, and then check to confirm that the closing and fit of the doors, fenders, etc., are correct.

For parts which should be symmetrical to the body center, measure the distances from the body center point to both the left part and the right part, and confirm that the distances are the same.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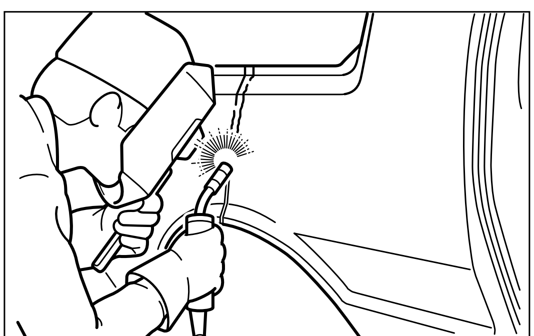
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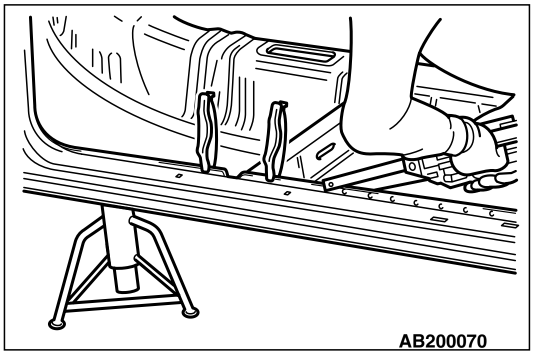
⚠ CAUTION

Weld completely so that there are no pinholes.

14.**Butt welding**

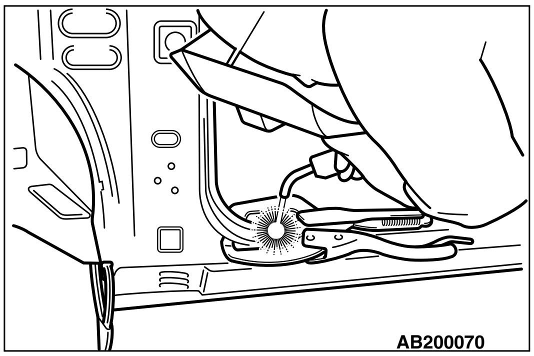
For burr welding, make a 10 –15 mm (0.4 –0.6 inch) MIG spot weld, and then, in order to prevent warping which might be caused by the welding heat, complete the welding by making welds of the specified width at alternate positions.



15.**Spot welding**

When doing spot welding, it is not only important to correctly position the electrode tips, but also to hold the two panels securely together with vise-grip pliers or some other type of clamps, being sure that they are in perfect contact with each other.

- Be sure that the force applied by the arm is sufficient.
- Use a test piece to check the secondary current and the current application time of the spot welder, and adjust the values as appropriate.

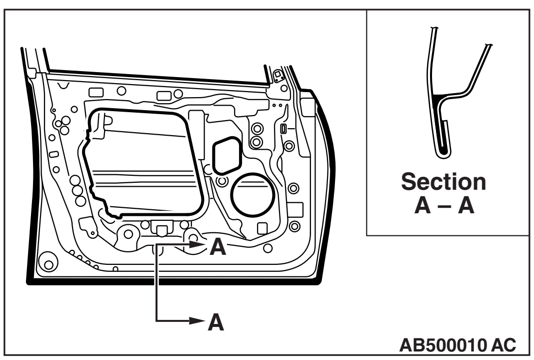


16.**Plug welding**

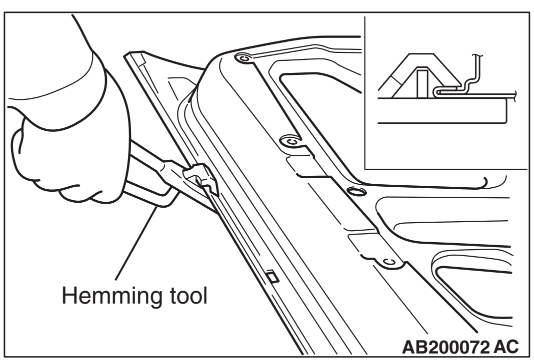
If spot welds cannot be made, make holes for plug welding in the new parts, and then MIG weld. Because the quality of the fusion varies according to the size of the holes, they should be about 5 –6 mm (0.2 inch) in diameter. In addition, be sure the two surfaces are in complete contact with each other by using vise-grip pliers to securely hold them.

NOTE: Depending on the working conditions, it might also be necessary to make holes in the panel remaining on the body

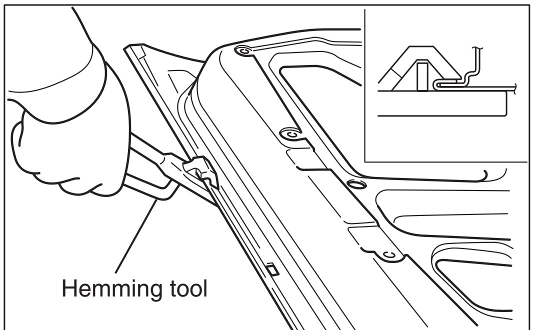
17.**Hemming (Adhesion type)**



(1) Apply an adhesive to the area to be hemmed of the door outer panel.



(2) For the area to be hemmed of the door outer panel, apply an adhesive and smooth the panel with a hammer and a dolly. Then, hem the panel with a hemming tool.



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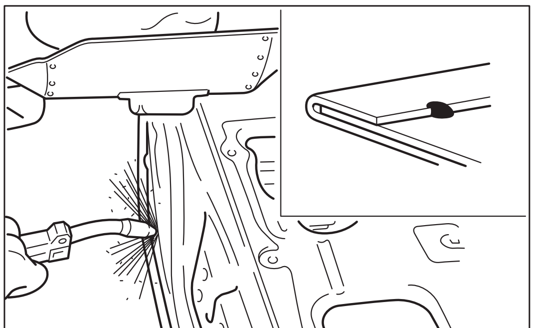
18. **Hemming (Welded type)**

(1) For the area to be hemmed of the door outer panel, etc., smooth the panel with a hammer and a dolly, and hem it with a hemming tool.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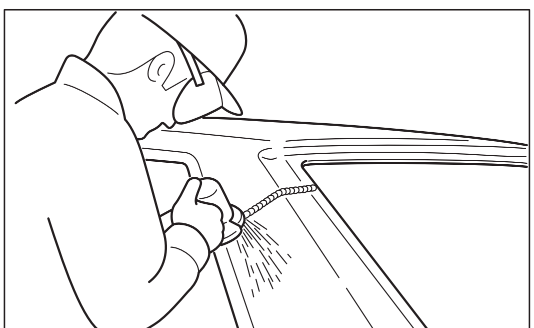
(2) After completing the hemming work, make MIG spot welds at 50 –60 mm (2.0 –2.4 inches) intervals on the inside.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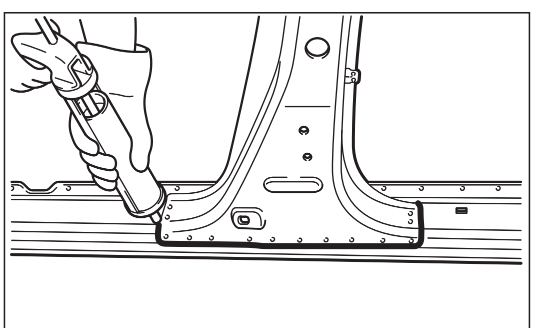
⚠ CAUTION

Be sure not to grind the panel down too much. Before welding the outer panel, be sure to apply an anticorrosion agent.

19. **Finishing work for butt welding and plug welding**

Do the finishing work to smooth the protruding weld traces. However, the butt joints of reinforcements and other internal parts will be stronger if the weld traces are not finished.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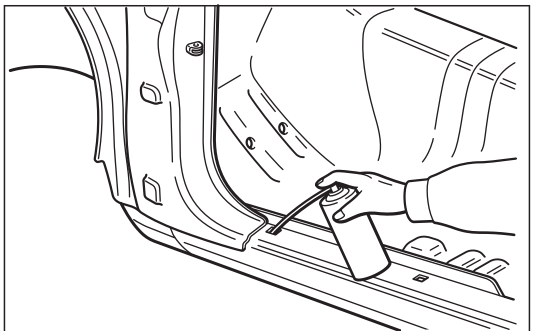
20. **Application of body sealant**

Apply a coating of sealant carefully, without breaks, as described in the section (of the manual corresponding to that model).

NOTE: After application has been made to any external surfaces, perform smooth-finishing work.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⚠ CAUTION

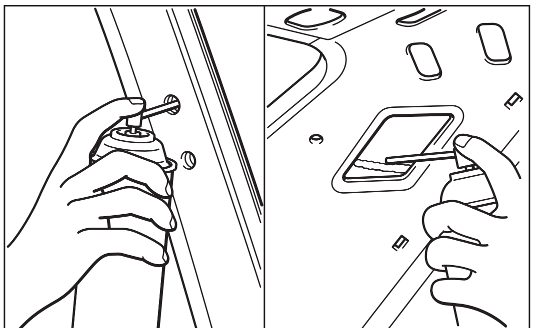
Wipe off any anticorrosion agent which oozes out onto surfaces to be painted later; the presence of such anticorrosion agent would prevent correct adhesion of the paint coat.

21. **Application of an anticorrosion agent**

Apply an ample amount of anticorrosion agent to any welded areas and to all surfaces from which the paint coat was removed.

The paint coat of welded areas will have been damaged by the heat; be sure to apply an anticorrosion agent to surfaces to be repaired.

Use an aerosol-type anticorrosion agent for application to the side sills, the pillars, and other similar parts which have a hollow construction, by utilizing the trim mounting holes, etc.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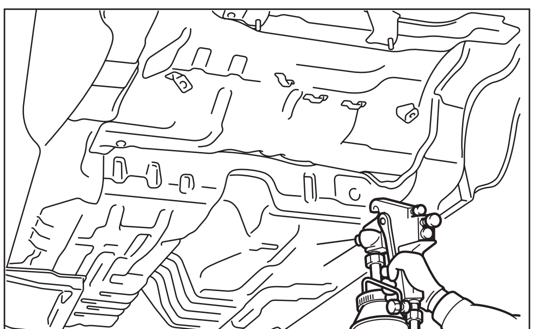
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22. **Application of undercoating**

If the underbody is repaired or replaced, carefully apply a coating of undercoating as described in the section (of the manual corresponding to that model).

CAUTIONS REGARDING BODY REPAIR

Because each component part of a single-unit construction body makes some contribution, more or less, to the overall strength of that body, it is necessary to sufficiently understand the actual function of any part to be repaired before attempting any repair or welding procedure.

STRENGTH AND RIGIDITY

1. The suspension installation part plays an important role, determining the wheel alignment. Wheel misalignment is of course potentially very dangerous because it can lead to driving instability, one-sided braking, abnormal tire wear, abnormal vibration, etc.

   At the time of repair, it is particularly necessary to take measurements at the components noted below, and to make all welds and installations with special care.
   - Front sidemember
   - Rear floor sidemember
   - Front wheelhouse (inner)
   - Rear wheelhouse (inner) (Independent rear suspension type)
2. Because the places where the floor panel and sidemember parts are joined have an important effect upon the rigidity of the entire body, welds in these places must be done with particular care.
3. After repairs have been completed, the wheel alignment, wheel base, tread, etc., must be carefully checked to be sure that there is no deviation.

SAFETY

1. Procedures related to the installation of any component related to safety must be done with particular care in order to assure full maintenance of safety.
   - Suspension installation parts
   - Fuel pipe
   - Brakes
   - Fuel tank installation parts, etc.
2. Because seat belts are directly related to driver and passenger safety, any welds of seat belt anchor points or reinforcements must be done with particular care in order to maintain strength.

PREVENTION OF CORROSION AND OF WATER OR DUST ENTRY

1. After any work is completed, it is important to completely remove any welding residue, particles or residue from cutting, and any other dirt, etc.
2. Corrosion-prevention material must without fail be applied at the following places:
   - At any place where paint has flaked off or peeled away.
   - At any surfaces that have been cut.
   - At the outer and inner side of every welded place.
   - Within any semi-enclosed structure or component (aerosol-type rust inhibitors are effective for difficult-to-reach places).
   - At the outer and inner side of any place subjected to heat.
3. Apply a coating of undercoating if the underbody is repaired.
4. Use spot sealer if spot welds are made.
5. Repair any scratches to panels made by moldings, sashes, etc.
6. Carefully apply body sealant to panel connection joints and other fitting places.
7. Tape over any unused holes in the panel inner side by using sealing tape.

VIBRATION AND NOISE

1. Prevent any decrease of tensional rigidity caused by welding distortion.
2. Carefully apply body sealant to panel connection joints and other fitting places.
3. Tape over any unused holes in the panel inner side by using sealing tape.

CONTACT AND ALIGNMENT

1. In order to maintain the precision of openings, make careful measurements as repairs are being made.
2. Make contact/alignment adjustments of door hinge, lid, and hood hinge installation parts.

THEFT PROTECTION

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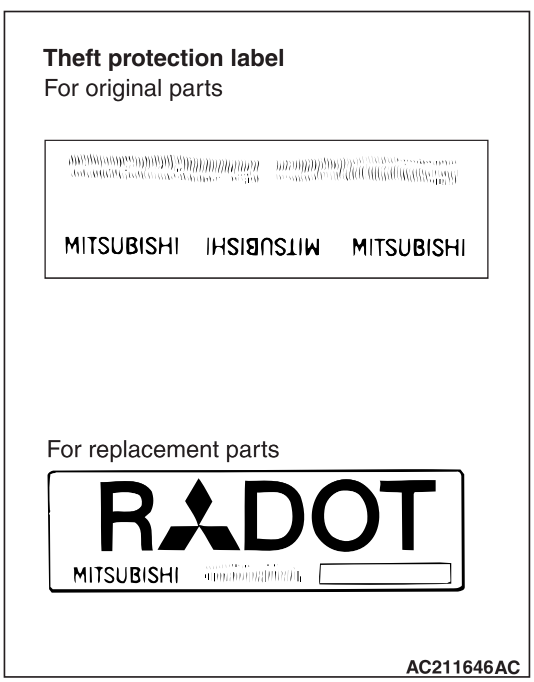


In order to prevent theft, following Vehicle Identification Number (VIN) has been engraved and attached, in the form of a label to the engine, transaxle, and main of the outer body:

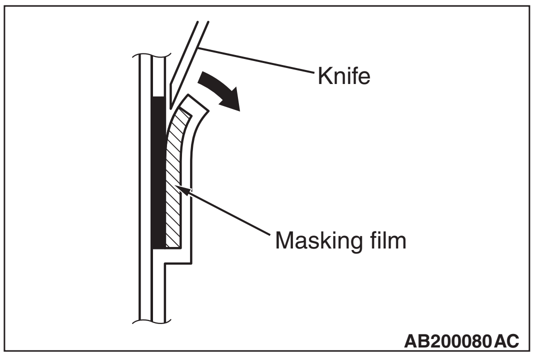
Engine cylinder block, Transaxle housing, Fender, Doors, Quarter panel, Hood, Liftgate, Trunk lid, Bumpers

Furthermore, supplementary parts for the main portions of the outer body have theft protection labels attached and the supplementary parts for the engine and the transaxle are engraved with the same details.

PANEL REPAIR CAUTION

1. Take care when respraying the original part to cover the theft protection label with masking tape prior to respraying. In addition, remember to peel off the masking tape after completion of the respray.
2. Because theft protection labels on the supplementary parts are covered with masking tape already, they can be resprayed just as they are.
3. Take care not to peel off the theft protection labels from either the original or the supplementary parts.

HOW TO PEEL OFF THE SURFACE MASKING FILM FROM THE THEFT-PROTECTION LABEL



⚠ CAUTION

Be careful not to damage the paint surface or the label itself.

1. Using a sharp knife at the corner of the label surface, lift up the masking film only.
2. Grasp the masking film and peel it all off.

NOTE: If the masking film tears, repeat from step 1. Use the knife, however, to lift the opposite corner of the label, rather than trying to continue peeling from the place where it tore.

ATTACHMENT OF SILENCERS

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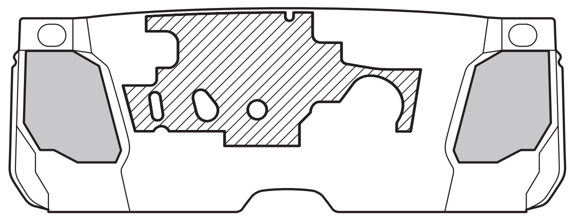
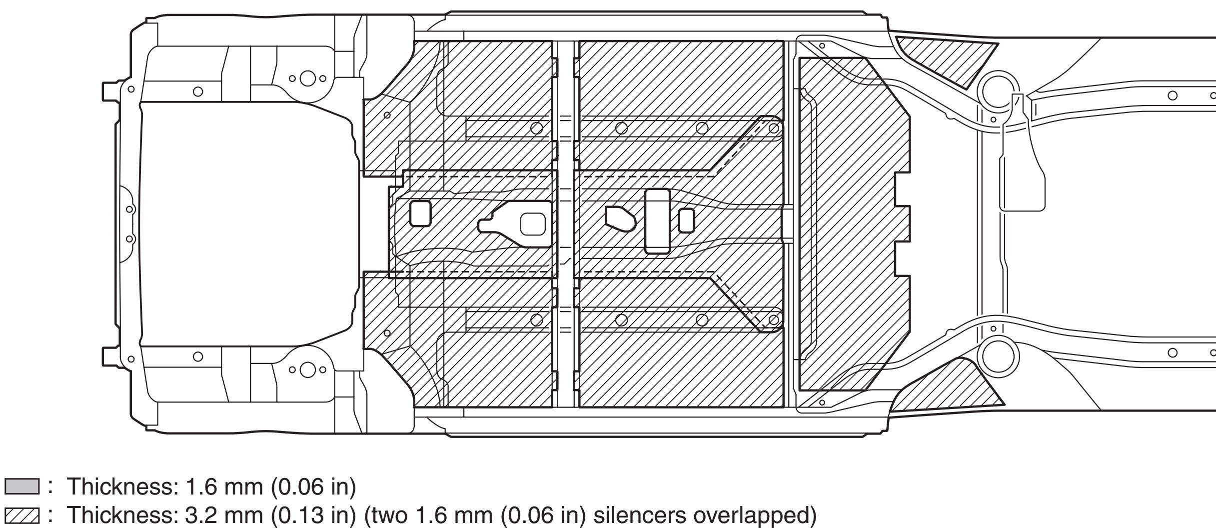
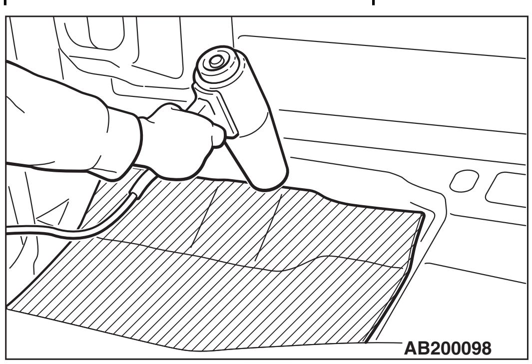


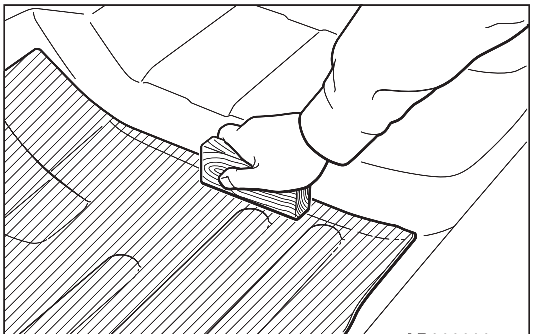
Dash panel interior side



Silencers (petroleum-asphalt sheets) are attached to the upper surface of the floor and at the interior side of the dash panel in order to absorb vibrations and shut out exhaust gas heat. If these silencers are peeled off in the course of replacement or repair of a welded panel, cut and attach replacement material (in the shape shown in the figure). For detailed information concerning the locations where silencers are to be attached for individual models, refer to the manual for that model.



1. Heat the "silencer layer" (petroleum-asphalt sheet) with a blow drier to soften it.



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2. Align the silencer layer in the position where it is to be installed, and then press it down with a roller or a block of wood so that it adheres well.

   NOTE: An infrared light can also be used to heat both the silencer layer and the body panels (be sure to wear gloves).

POSITIONING DIMENSIONS FOR OPENINGS

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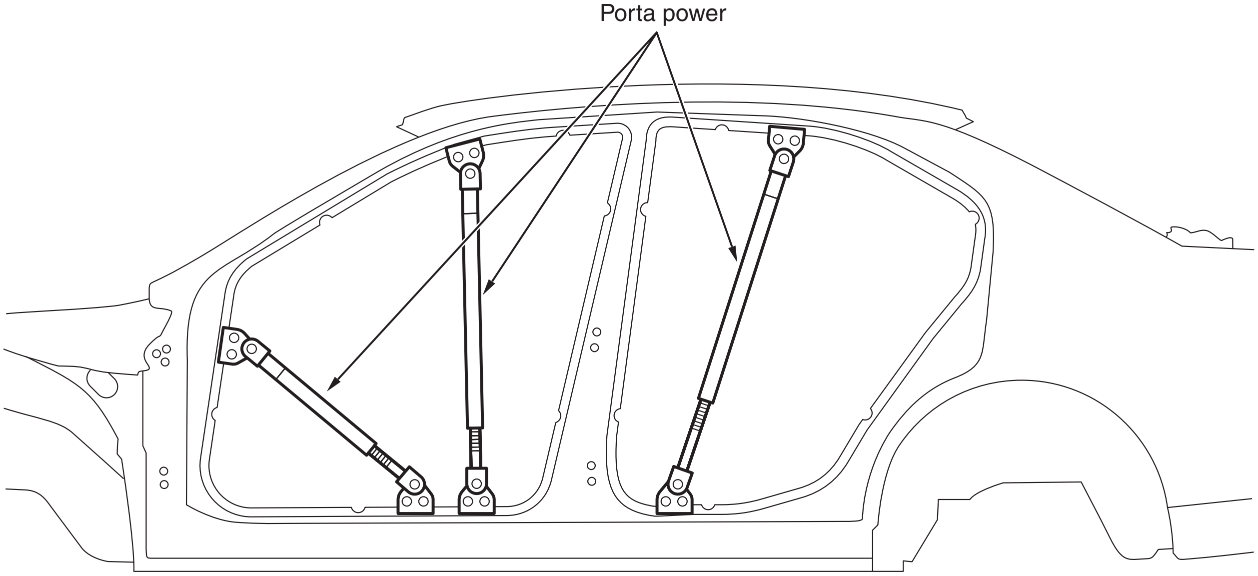

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When replacing the panel of the opening of the front pillar, center pillar and other openings, make a point to securely bite the poltapower, etc. so the position of the opening is not off-center. Upon assembling, adjust the opening dimensions to the standard specifications and then weld.

STANDARD PROCEDURES FOR SHEET METAL WORK

M4090012000029

REPAIRS USING A HAMMER AND DOLLY

It a damaged external panel, etc., can be reused, the usual way to repair it is by using a hammer and dolly to hammer out the damaged area. The following describes these repair procedures.

1. Check whether or not there is foreign material (mud, etc.) on the panel surface. If so, clean it away.

⚠ CAUTION

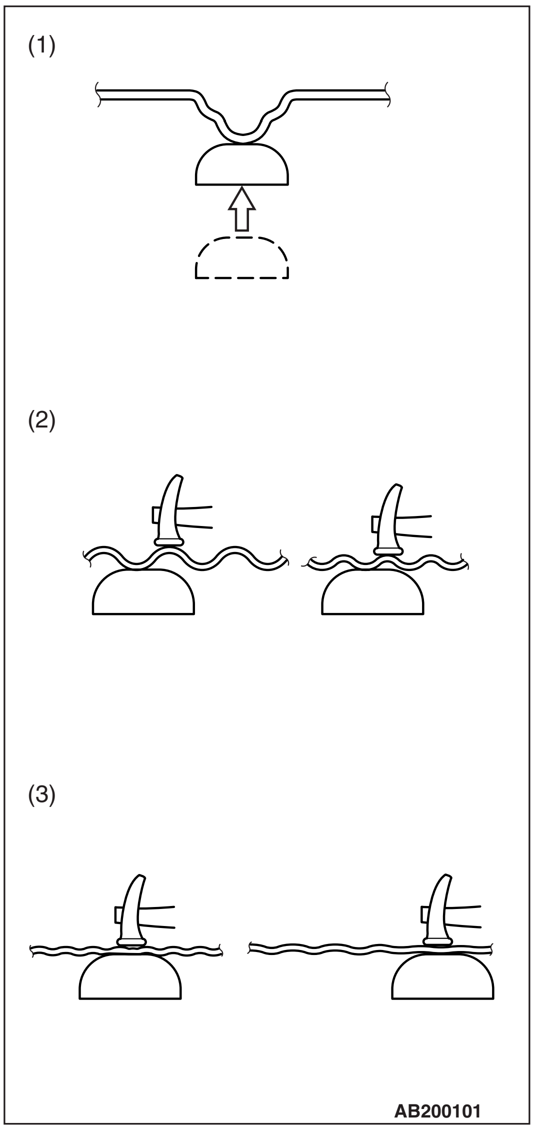
The surface of the hammer and dolly must be free of scars, etc.

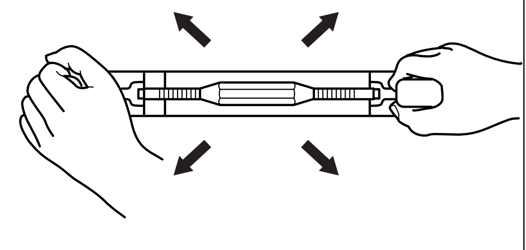
2. Select the appropriate hammer and dolly to be used the panel shape.

⚠ CAUTION

Care should be taken, as far as possible, not to permit the panel plates to become elongated.

3. Use the hammer and dolly to repair the dents and other uneven surfaces of the panel.
   (1) First repair the larger areas of damage so that they are as close as possible to the original condition before the damage occurred.
   (2) Next repair the areas of moderate damage.
   (3) Finally, smooth the surface out.





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⚠ CAUTION

- **Be careful not to file too much; this will reduce the strength and rigidity of the panel.**
- **Do not use the file in one direction only; alternate use in two directions diagonally opposite each other.**

4. Next, file the area so that convex and concave parts are no longer clearly visible, and at the same time remove small projections.
5. After once again smoothing the clearly visible dents and projections by using the hammer and dolly, follow step 4 above.
   Alternately repeat hammering and filing until there are file traces over the entire repair area.
6. Make a solder build-up at the repair.
7. Finally, finish up the solder build-up using a body file.

USING A FRAME STRAIGHTENER

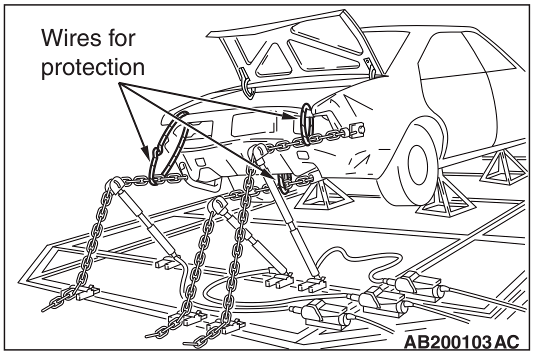
M4090013000033

For serious and extensive damage, when for example the damage extends to the frame of members, it is necessary to first use a frame straightener to make a rough, overall repair of the body, and then to proceed to careful repairs of each individual area of damage. When a frame straightener is used for body repairs, it is a fundamental principle that the pulling should be in the direction from which the impact was sustained, and from the opposite direction. If this is, in error, not done, previously undamaged components will be deformed, and repair may become impossible.
It is for that reason that it is important to decide upon the method of repair, especially regarding the initial overall repair, by following the steps below.

OVERALL ROUGH REPAIRS

1. First, analyze the impact. This means analysis and consideration of the point of collision, the speed at the time of collision, and the strength, weight and shape of the object hit.
2. Then get a complete understanding of the condition of the existing damage. In particular, if the damage extends to the suspension installation components, an inspection must be made to determine whether or not there is any deviation of the frame or body alignment.
3. Finally, determine what repair methods should be used.
   - To what extent will frame straightening and other overall repairs be necessary in order to restore the damaged areas to the way they were?
   - At what stage of the repairs should panels adjoining the components to be frame straightened, etc., be removed?
   - Decide upon the work steps and restoration methods to be followed after the rough, overall repairs are completed.

Select the frame straightener based upon the results of above, and use it to pull in the appropriate direction. More than one direction may be appropriate, depending upon the damage.
If the damage is of a moderate degree or less, it may be possible to do all that is necessary in one pull.
If, however, the damage is major, that is to say if repairs must be made to components of the passenger compartment such as the dash panel, etc., it may be necessary, after completing the first pull, to set up the frame straightener at a different position and use it again at that position.



FRAME STRAIGHTENING NOTES

- For safety, no one must be standing in the direction of the pull.
- Wires or chains should be used for protection in the event of an accident.
- For frame straightening of body with frame, care should be taken regarding the position (body mount) of installation to the frame. The reason for this is that usually mounting rubber pieces are used at the installation part in order to improve vibration prevention, and these mounting rubber pieces might be deformed if there is a deviation of the installation position.
- If the part to be pulled is made of high-tensile steel (which has a higher tensional strength and yield point than ordinary steel), the pulling must be done with care in order to avoid "over pull" and "spring back". It is particularly important for the pulling of sidemembers and other reinforcement components made of high-tensile steel that the pulling not be all done at one time; pull gradually while using a hammer to repair distorted areas as the pulling is done.

FRAME REPAIR PROCEDURES

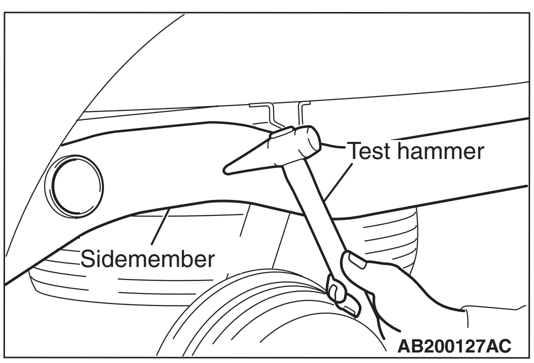
M4090014000036

The frame is subjected to the following types of loads.

- Vertical loads: Vertical loads may occur either while stopped or during travel.
- Lateral (horizontal) loads: This type of loads occurs during turning, start-off and braking.
- Torsional loads: Torsional loads occur while traveling on roads with poor surface conditions.

These various types of loads are compounded under various conditions, and are applied to the frame.

As a result, it is important, before attempting to repair the frame, to carefully observe the shape of the damaged part and to in that way fully understand the cause of the damage.



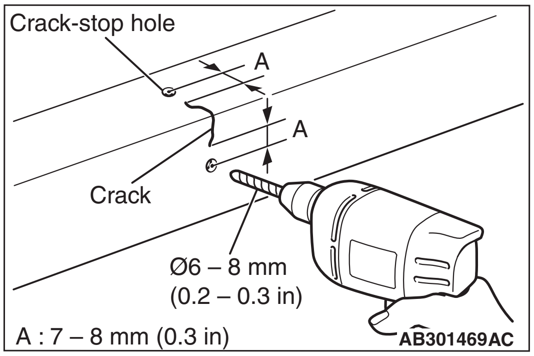
CHECKING FOR FRAME CRACKING OR FLAKING

Check, by using a test hammer, for flaking or cracking of the welded surface of the sidemembers, crossmembers and brackets.

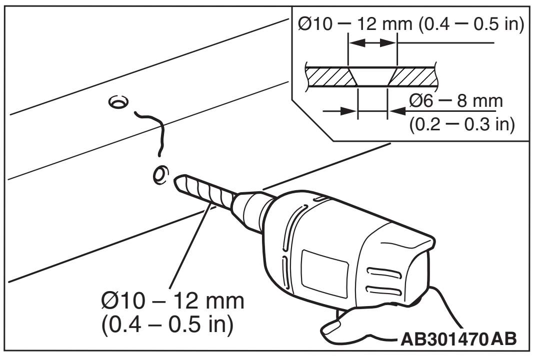
REPAIRING CRACKS

If the check reveals a crack(s) in the frame, repair as described bellow.

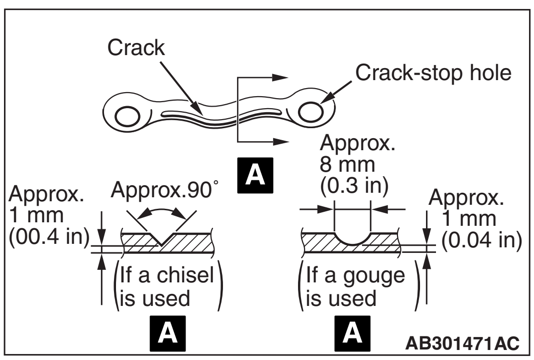
1. Remove the components near the crack.
2. Make ϕ 6 –8 mm (0.2 –0.3 inch) holes (to prevent further cracking), by using a drill, at points 7 –8 mm (0.3 inch) from the crack ends.

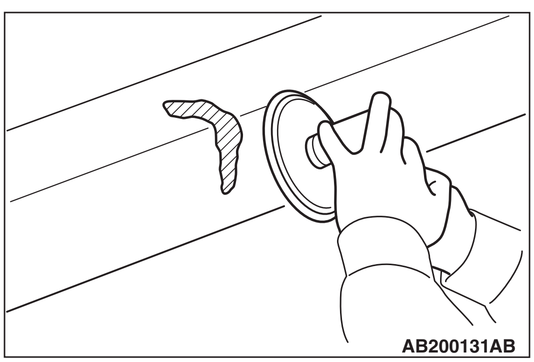


3. Use a ϕ 10 –12 mm (0.4 –0.5 inch) drill to bevel the hole openings.



4. Use a chisel or gouging tool to open up the crack and holes, and then fill the crack and holes by MIG welding.





⚠ **CAUTION**

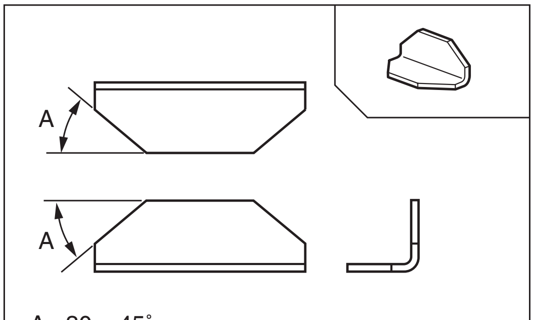
- **Gas welding should be avoided because it causes thermal distortion of the frame.**
- **When using a grinder for finishing, be careful not to grind the frame excessively.**

5. Using a grinder for finishing after welding.

⚠ CAUTION

- **The reinforcement plate should completely cover the cracked part.**
- **The reinforcement plate should be the same thickness and material as the frame.**

6. To avoid a concentration of stress, prepare a reinforcement plate that has been cut to 30 –45 degree angle at both ends.



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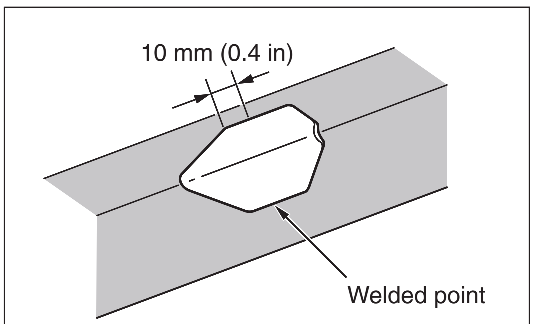
⚠ CAUTION

Be sure that the edges of the reinforcement plate are not near any place where a concentration of stress of the crossmember or spring hanger installation part, etc. could easily occur.

7. Attach the reinforcement plate to the repaired crack area by MIG welding. In order to avoid a concentration of stress at the time, weld the reinforcement plate at points about 10 mm (0.4 inch) from its edges.



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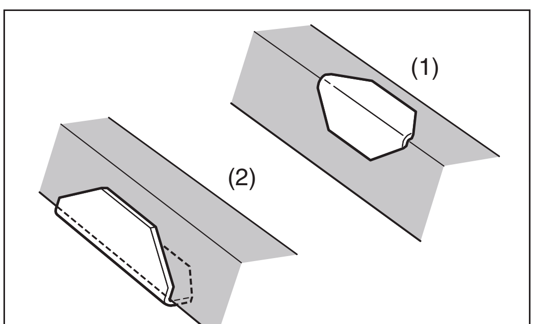

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NOTE: If the crack is at the upper side of the frame, attach the reinforcement plate facing downward, as shown in (1). If the crack is at the lower side, attach the reinforcement plate to face upward, as shown in (2).

8. Finally, apply a coating of chassis black to the repaired area and to any places where the coating has flaked off.

NOTES REGARDING REPAIR WORK

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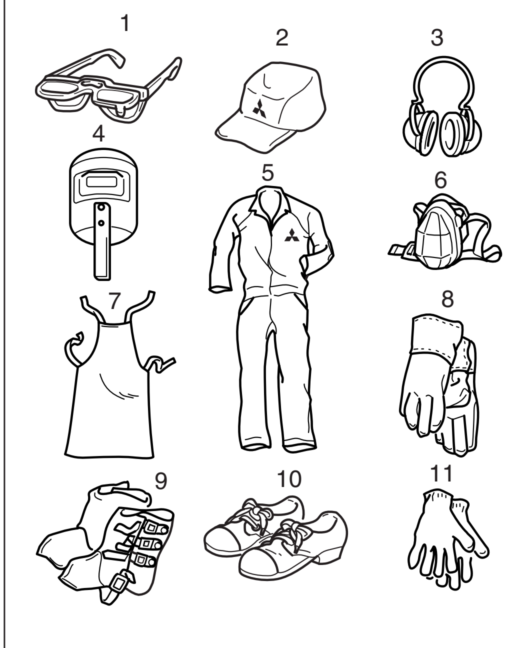
SAFETY MEASURES



PROTECTIVE GEAR

During body repair work, a work suit, a work cap, and safety shoes should be worn at all times. Depending on the work being done, safety glasses, gloves, ear protectors, a dustproof mask, etc., should also be worn as needed.

1. Safety glasses
2. Work cap
3. Ear protectors
4. Head protector
5. Work suit
6. Dustproof mask
7. Work apron
8. Welding gloves
9. Foot and ankle protectors
10. Safety shoes
11. Work gloves

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

1. Items to review when servicing SRS
   (1) Be sure to read Service Manual GROUP 52B, Supplemental Restraint System (SRS). For safe operation, please follow the directions and heed all warnings.
   (2) Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.
   (3) Warning labels must be heeded when servicing or handling SRS components.
   (4) Always use the designated special tools and test equipment.
   (5) Store components removed from the SRS in a clean and dry place. The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward.
   (6) Never attempt to disassemble or repair the SRS components (SRS-ECU, air bag module and clock spring). If there is a defect, replace the defective part.
   (7) Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system functions properly.
   (8) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag.
2. Observe the following when carrying out operations on places where SRS components are installed, including operations not directly related to the SRS air bag.
   (1) When removing or installing parts, do not allow any impact or shock to occur to the SRS components.
   (2) If heat damage may occur during paint work, remove the SRS-ECU, the air bag module, clock spring, the front impact sensor, the side impact sensor, and the seat belt pre-tensioner.

- SRS-ECU, air bag module, clock spring, front impact sensor, the side impact sensor: 93 °C (200 °F) or more
- Seat belt pre-tensioner: 90 °C (194 °F) or more

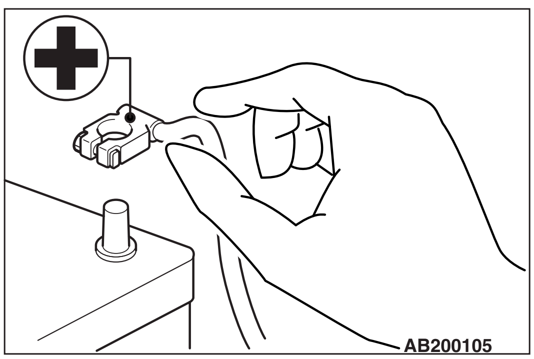
SECURING THE VEHICLE

If the vehicle is raised on a jack, be sure to always support it with jack stands positioned at the specified points.

CLEARING THE AREA OF FLAMMABLE MATERIALS

Because of the presence of many various kinds of flammable materials, organic solvents, etc., in the work area, there is always the possibility of a fire or explosion. It is, therefore, important to keep the work area as clear as possible of such dangerous materials.

HANDLING ELECTRONIC PARTS AND SEMICONDUCTORS



⚠ *WARNING*

Battery posts, terminals and related accessories contain lead and lead compounds. WASH HANDS AFTER HANDLING.

When the body is used as the ground during welding for body repairs, be absolutely sure to first disconnect the battery's positive (+) cable.

⚠ CAUTION

- **Be sure that both the ignition and lighting switches are "LOCK" (OFF) position before either disconnecting or reconnecting a battery cable. (If this is not done, equipment containing semiconductors could be damaged).**
- **Note that the memory of electronic equipment having a memory function will be cleared when the battery cable is disconnected.**

NOTE: Vehicles today include a great many electronic parts and components, and these are in general very susceptible to adverse effects caused by overcurrent, reverse current, electromagnetic waves, high temperature, high humidity, impacts, etc. In particular, such electronic components can be damaged if there is a large current flow during welding from the body side, etc.
This is because, for electronic components that incorporate a back-up circuit (for memory retention) that functions (by a trickle current) even when the ignition switch is at OFF, an electronic circuit is formed even when the switch is at OFF.

HANDLING COMBUSTIBLE MATERIALS

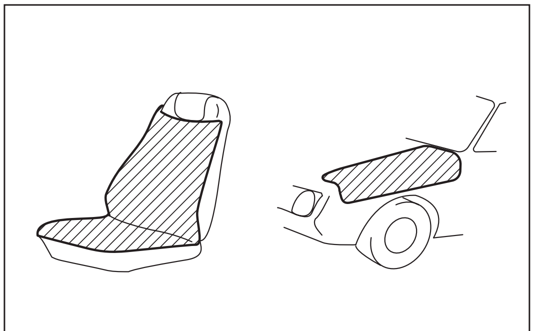
If welding work is to be done in the area of the fuel tank, the fuel tank must be removed to prevent the generation of flammable gases. Also be sure to cap the inlet port and the pipes of the fuel tank after removal to prevent the escape of any fuel or flammable gases.
Wipe up any fuel, oil, etc., spilled in the work area as soon as possible.
Only the amounts of paint to be used for the day's work should be in the work area; do not keep excessive amounts of paint, or paint which is not going to be used, in the work area.

HEALTH AND SANITATION PROCEDURES

The following points should be noted for employee health and sanitation.

- The work area should be well ventilated in order to prevent the inhalation of dust, organic solvent vapors, etc.
- All unused paint cans must be securely covered.
- Care should be taken to avoid exposure to the skin of adhesives, organic solvents, etc.
  If an unavoidable exposure occurs, the exposed area should be immediately washed with clean water.

VEHICLE PROTECTION



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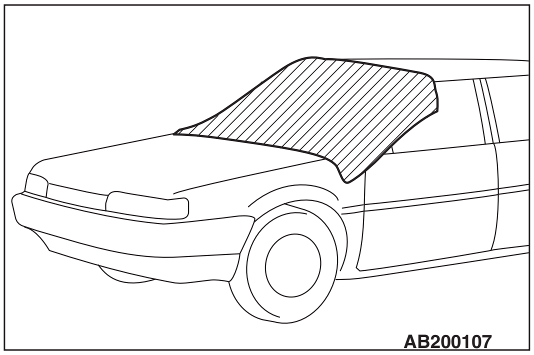
- Vehicle covers (fender covers, seat covers, etc.) and tape (if there is the possibility of damage by tools, equipment, etc.) should be used to protect painted surfaces, interior/exterior parts and components, etc., from staining and damage.



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- For welding operations, a heat-resistant protective cover should be used to protect glass, seats, instrument panel, carpeting, etc.

HEAT-WITHSTAND TEMPERATURES OF RESIN-PLASTIC PARTS

M4090016000032

Because resin-plastic parts are deformed by heat, they should be removed if the heat to be applied is high enough to cause deformation, as shown by the table below.

MATERIAL NAME	ABBREVIATION	HEAT-DEFORMATION TEMPERATURE °C (°F)	WHERE MAINLY USED
Acrylonitrile styrene acrylate	ASA	80 (176)	Door mirror, Pillar garnish, License garnish, Radiator grille
Acrylonitrile butadiene styrene	ABS	80 (176)	Air spoiler, Console box, Radiator grille, Rear garnish, Headlight bezel
Cellulose acetate	CA	50 –90 (122 –194)	-
Cellulose acetate butylate	CAB	60 –100 (140 –212)	Door trim molding
Polyamide	PA	140 –160 (284 –320)	Harness connector, Wheel cover, Cooling fan, Fuel strainer
Talc filled polyamide	PA-TD	190 –200 (374 –392)	Hood garnish, Door outside handle
Polybutylene terephthalate	PBT	120 (248)	Dome light lens, Headlight lens
Polyethylene	PE	100 (212)	Heater duct, Fender liner, Washer tank
High density polyethylene	PE-HD (HDPE)	70 –90 (158 –194)	Fuel tank, Splash shield
Phenole formaldehyde	PF	170 –190 (338 –374)	Ashtray
Polymethyl methacrylate	PMMA	80 –100 (176 –212)	Light lens
Polyacetal	POM	120 (248)	Door regulator handle, Ball joint seat
Polypropylene	PP	80 (176)	Glove compartment, Bumper face, Pillar trim, Steering wheel, Heater unit, Cooling fan
Polyphenylene ether	PPE (PPO)	130 –140 (266 –284)	Accelerator pedal pad, Wheel cover, Speaker garnish
Talc filled polypropylene	PP-TD (PPF)	100 (212)	Front deck garnish, Stone guard, Floor console, Instrument panel
Talc filled polypropylene (10%)	PP-TD10 (PPF)	110 –120 (230 –248)	Center pillar trim
Talc filled polypropylene (15%)	PP-TD15 (PPF)	110 –120 (230 –248)	Front pillar trim, Center pillar trim, Rear pillar trim
Talc filled polypropylene (20%)	PP-TD20 (PPF)	120 –130 (248 –266)	Beltline trim, Front deck garnish, Front pillar trim
Talc filled polypropylene (30%)	PP-TD30 (PPF)	130 –140 (266 –284)	Quarter trim, Rear side trim

MATERIAL NAME	ABBREVIATION	HEAT-DEFORMATION TEMPERATURE °C (°F)	WHERE MAINLY USED
Polyurethane	PUR	80 –100 (176 –212)	Bumper, Steering wheel
Polyurethane (formed)	PUR-E	80 –100 (176 –212)	Seat cushion, Arm rest, Door trim, Instrument panel
Glass fiber reinforced RIM urethane	PUR-GF [RIM]	100 –120 (212 –248)	Air dam panel
Polyvinyl alcohol	PVAL	*1	-
Polyvinyl butyral	PVB		-
Polyvinyl chloride	PVC	80 (176)	Steering wheel, Side protector molding, Shift lever cover, Window molding
Thermoplastic elastomer (olefine)	TPO (TEO)	80 (176)	Mud guard, Side air dam
Urea formaldehyde	UF	120 –145 (248 –293)	-
Glass fiber reinforced unsaturated polyester	UP-(GT + TD) [SMC], [BMC]	200 (392)	Rear air spoiler
Ethylene vinyl acetate	E/VAC (EVA)	60 (140)	Mud guard
Talc filled polypropylene	PP + E/P-TD [HMPP]	80 –100 (176 –212)	Bumper face, Side air dam, Side protector molding
Polyvinyl chloride, Polyurethane	PVC, PUR-E	*2	Instrument panel pad
Thermoplastic elastomer (styrene), Talc filled polypropylene	TES, PP-TD	100 –120 (212 –248)	Side splash
Polycarbonate + Acrylonitrile butadiene	PC + ABS	120 –125 (248 –257)	Door outside handle
Polycarbonate + Polyethylene terephthalate	PC + PET	120 (248)	Door outside handle
Polycarbonate + Polybutylene terephthalate	PC + PBT	130 –140 (266 –284)	Door outside handle
Polyphenylene ether + Polyamide 6	PPE (PPO) + PA6	150 –160 (302 –320)	Wheel cover
Polyphenylene ether + Polyamide 66	PPE (PPO) + PA66	160 –170 (320 –338)	Wheel cover
Polyphenylene ether + Polystyrene	PPE (PPO) + PS	120 –130 (248 –266)	Wheel cover

NOTE:

- *A slash (/) in the abbreviation indicates that two different materials make two-layer construction.*
  A plus sign (+) indicates that the two different materials mix each other.
- *If the new material symbols designated by the ISO differ form the old symbols, both are given, with the old symbol being enclosed in brackets. ISO: International Organization for Standardization*
- **1: Temperature differs depending on the ratio of the materials included.*
- **2: Impossible to fix the temperature due to the multi-layer and foam material structure.*
- *If an infra-red lamp is used for drying, use a heat-resistant cover, etc., to protect parts.*

HOW TO DISTINGUISH TYPES OF PLASTICS

M4090017000024

There are various methods that can be employed to determine types of plastics, among them (1) using a chemical solvent, etc., to check it chemically, (2) scratching the material to determine its make-up, (3) cutting of a small piece (where the scar can't be seen) and burning it to judge by the way it burns, etc. The following is an outline of the burning method, which is a relatively simple method.

PLASTIC NAME	ABBREVIATION	FLAME COLOR	COMBUSTION CONDITIONS	SELF-EXTINGUISHING	ODOR
Polyvinyl chloride	PVC	Yellow flame top Blue flame bottom	Burns to black residue	Yes	Irritating acid odor
Polyethylene	PE	Yellow flame top Blue flame bottom	Burns cleanly while melting	No	Candle-like odor
Polypropylene	PP	Yellow flame top Blue flame bottom	• Burns briskly and drips • Slight white smoke	No	Petroleum-like odor
Polyurethane	PUR	Orange	Crackles as burns; drips	No	Rubber odor
	TRUR	Orange			
Polycarbonate	PC	Yellow	Cinders remain	To some extent	Sweet odor
Polyamide (nylon)	PA	Yellow flame top Blue flame bottom	Melts and drips	Yes	Strong formic acid odor
Polyester resin	UP	Yellow	Ashes remain	No	Styrene odor
Glass-fiber-reinforced plastic	FRP	Yellow	Ashes with glass-fiber remnants remain	No	Differs according to plastic type
Phenol resin	PF	Yellow	Ashes remain	Yes	Formalin odor
ABS resin	ABS	Orange	Burns accompanied by foaming and black smoke	No	Rubber odor

CORROSION PROTECTION

ANTICORROSION TREATMENT AT THE FACTORY

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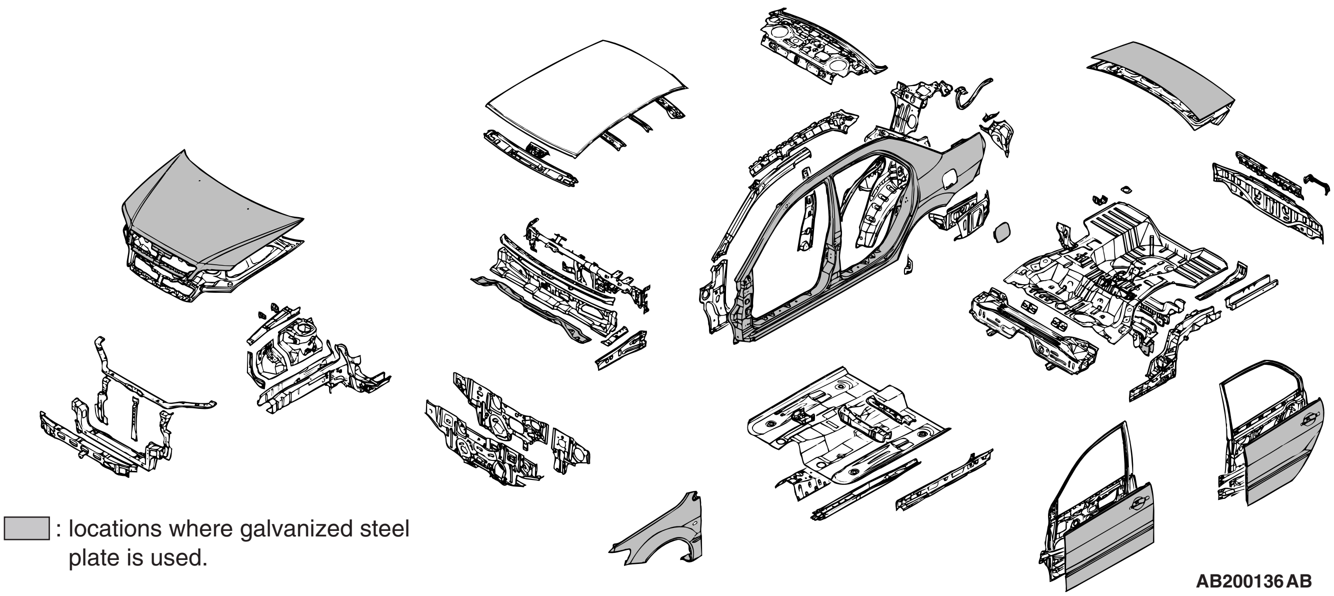
Anticorrosion treatment at the time of production includes the following measures.

THE USE OF GALVANIZED STEEL PLATE



: locations where galvanized steel plate is used.

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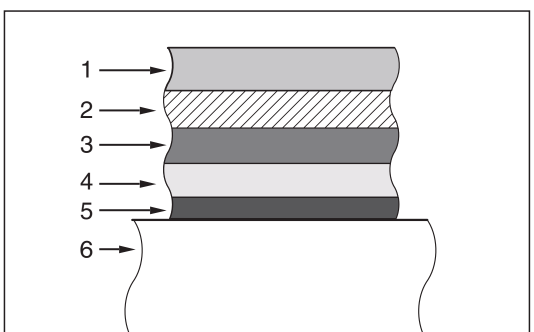
Because galvanized steel plate has excellent corrosion resistance, it is used in areas which have a high possibility of painting deficiency.

ZINC PHOSPHATE COATING



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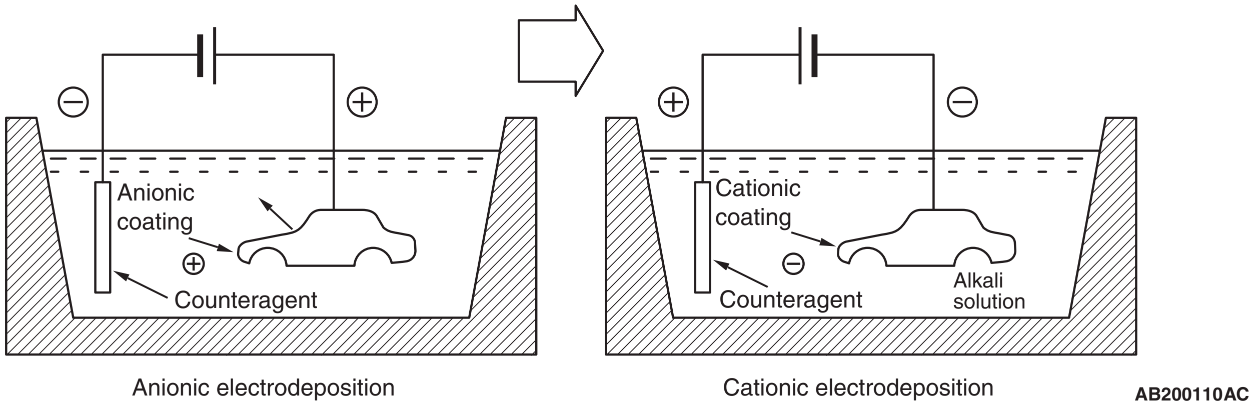
In order to improve the adhesive properties of the paint coat on the steel plate, and also to improve the finish of the paint coat, the entire body is coated with a film of zinc phosphate prior to undergoing the electrodeposition undercoating process.

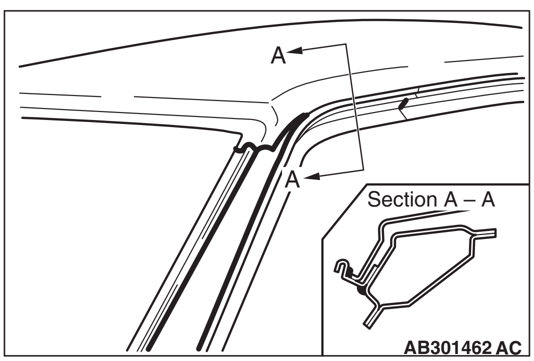
1. Final coat
2. Intermediate coat
3. Anticorrosion primer
4. Undercoat
5. Zinc phosphate film
6. Steel plate

CATIONIC ELECTRODEPOSITION UNDERCOATING



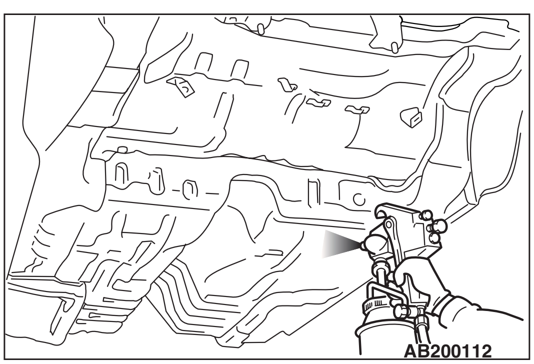
In the cationic electrodeposition method, the car body is the negative pole, thus preventing damage to the zinc plating of the galvanized body panels or to the chemically formed phosphate crystals. This method, therefore, maximizes the corrosion resistance and the results obtained are much better than those from conventional anionic electrodeposition.

BODY SEALING



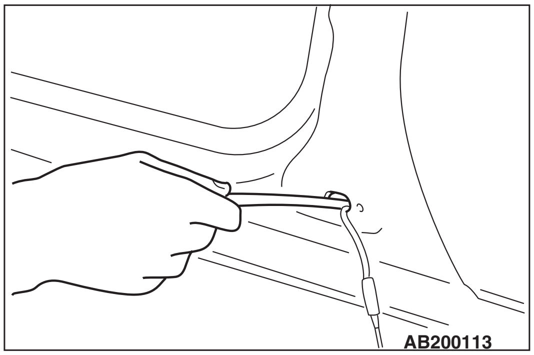
Sealant has been applied to all body panel joints and seams in order to provide resistance to water, dust, and corrosion.

UNDERBODY COATING



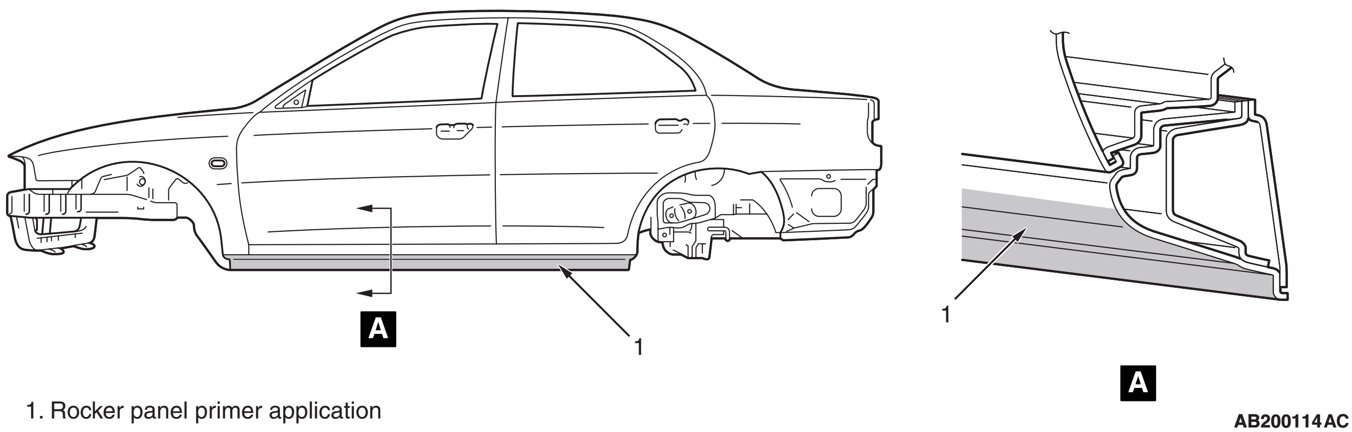
An underbody coating has been applied to the underside of the floor pans, the inside of the doors, etc., in order to provide resistance to vibration, corrosion, and wear.

WAX INJECTION



Wax injection is used at the lower part of the frame, side sill and hollow panels, etc., in order to obtain a better anticorrosion effect.

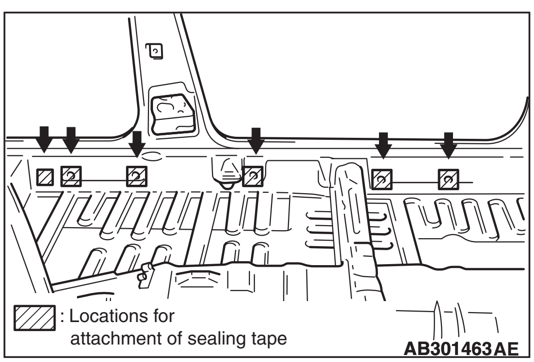
ANTICORROSION PRIMER



1. Rocker panel primer application

Anticorrosion primer is used at the side sill outer panels in order to prevent corrosion and to suppress vibration.

SEALING TAPE



Sealing tape is attached at unused holes, at the inner side of the panel, for waterproofing and anticorrosion protection.

ANTICORROSION TREATMENT AT THE TIME OF BODY REPAIR WORK

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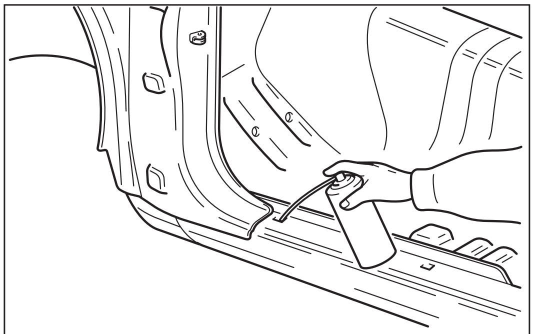
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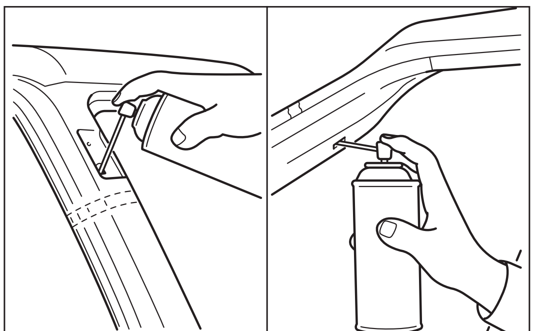
The following procedures should be followed for anticorrosion protection when making repairs.

CORROSION PROTECTION FOR HOLLOW PARTS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⚠ CAUTION

- **Wipe away any excess anticorrosion agent on the coated surface, because it can adversely affect the coating.**
- **When spraying the anticorrosion agent, use holes in different areas to ensure that all weld surfaces of the hollow structure are well coated.**

The insides of hollow parts (such as the side sill, pillars, etc.) which have been welded are more susceptible to corrosion. Spray an aerosol-type anticorrosion agent into these parts by using the trim mounting holes and other openings.

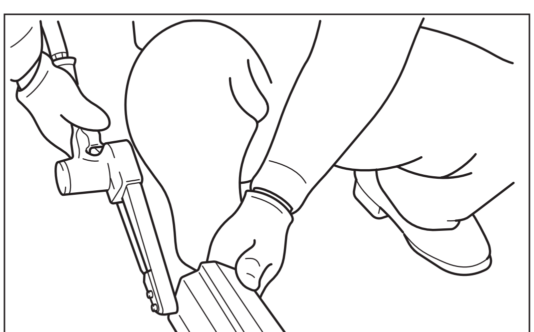
ANTICORROSION TREATMENT OF ROUGH CUTS

An anticorrosion agent should be applied to rough cuts made in the course of welding, because the surface film has been damaged by the heat of welding.

SPOT SEALER

In order to prevent corrosion from occurring at the contact surfaces of panels which are spot welded, apply an electroconductive spot sealer.

SPOT SEALER APPLICATION STEPS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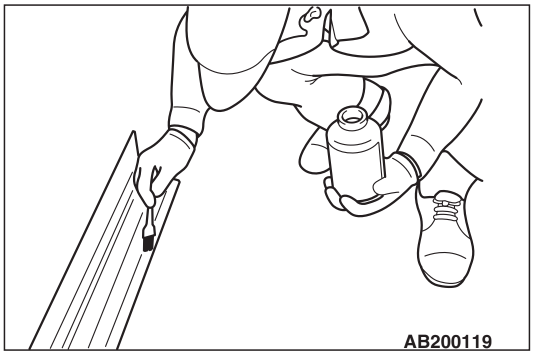
1. Remove all paint, etc., from the areas to be spot welded by using sandpaper or a pneumatic belt sander.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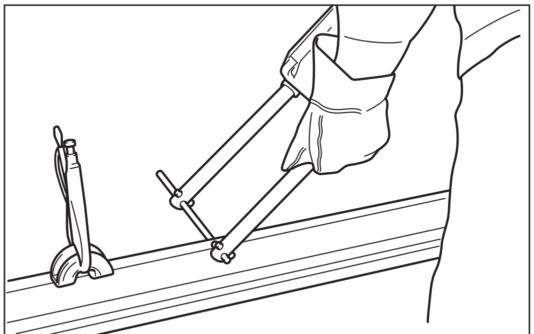
2. Use a brush to apply spot sealer to the contact surfaces of the panels (both the new panel and the panel remaining on the body) to be spot welded.


AB200120

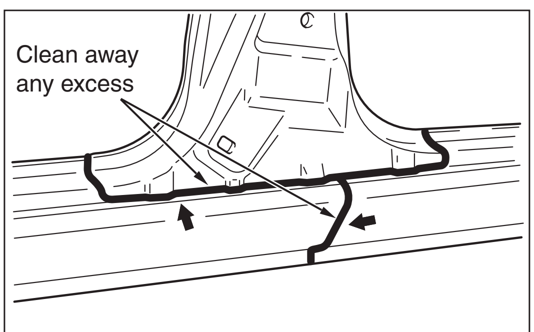
3. Do not spot welding.

   NOTE: The spot welding can be done as the spot sealer is dry to the touch.
   Dry to the touch: 30 minutes or less at 20°C (68°F)

BODY SEALING

Even if a car body is restored to the exact specified dimensions, the body repair work cannot be considered to be complete if an ample amount of sealant is not applied to each of the panel joints and seams. Insufficient sealant will result in water leakage, corrosion, etc.

NOTE: Use a piece of clean cloth dampened in lead-free gasoline or a similar material to clean parts and areas where sealant is applied.



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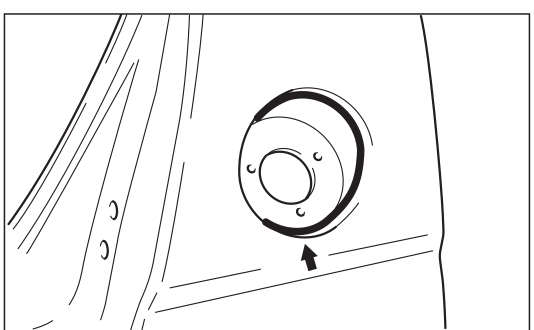
- When applying sealant to areas at which the external appearance is important (areas which can be seen or where the condition of the paint coat is important), be sure to apply the sealant so that it is perfectly level with the surrounding panels.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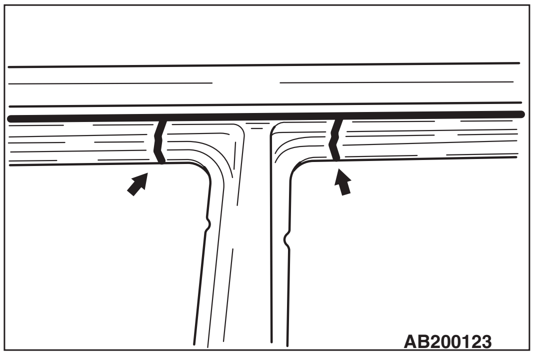
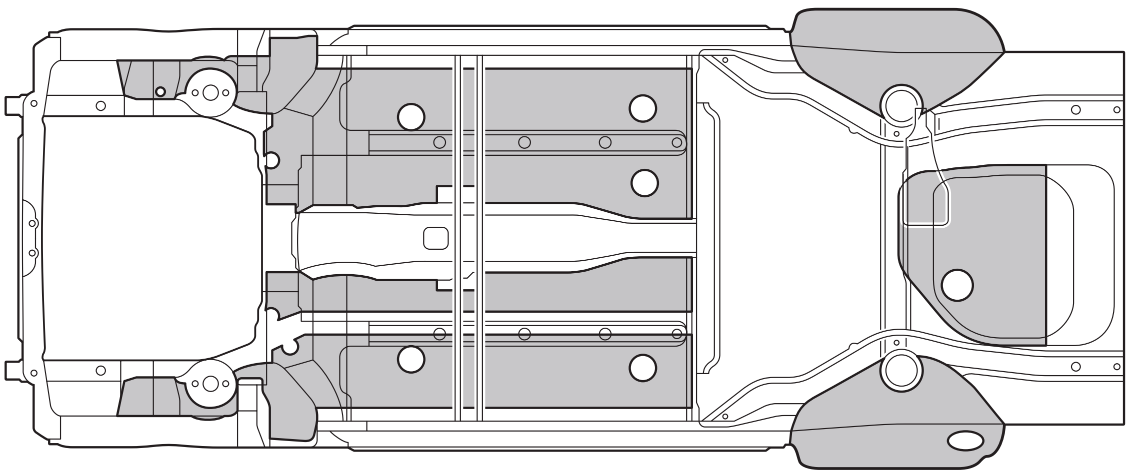
- Apply the sealant at the fuel port so that it is perfectly level with the surrounding panel so that drops of fuel will not collect.



AB200123

- After applying sealant to the door-stop, etc., clean away any excess so as to be sure that there is no interference with installed parts, etc.

UNDERCOATING



: Undercoating application locations

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- Be sure to mask any parts installation holes, and the area around the place where undercoating is to be applied, before applying it.
- Be sure not to apply the undercoating to tires or to the drive shaft and other drive components.

If the undercoating application inside the wheel housing, on the under body, etc., is insufficient, it can result in corrosion. Be sure, therefore, to apply a good coating of undercoating to such parts after repairs are completed.

REPAIR OF SYNTHETIC-RESIN PARTS

SYNTHETIC-RESIN PARTS REPAIR PROCEDURES

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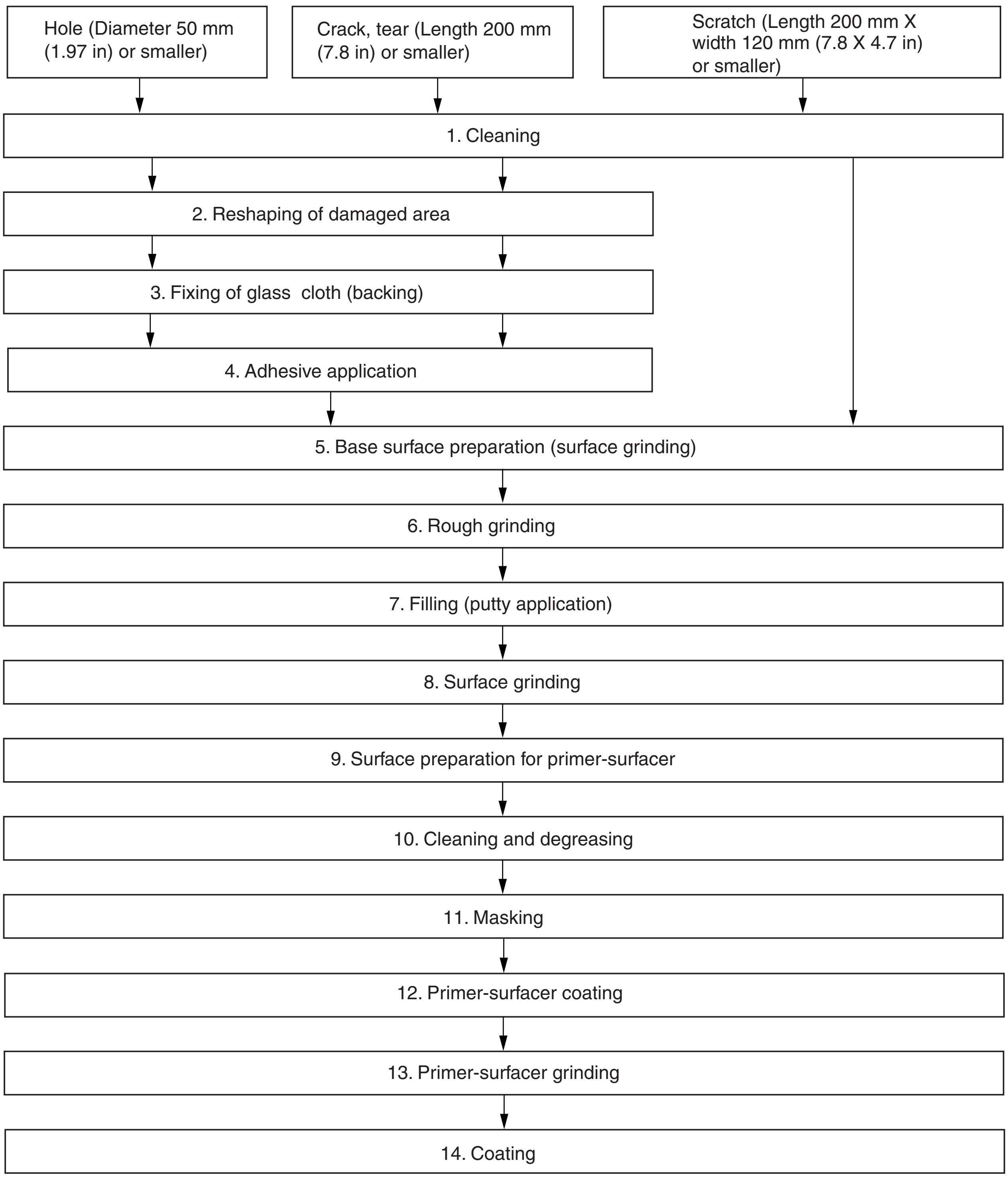
Bumper is taken as a repair work example for explanation.

FLOWCHART



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REPAIR JUDGMENT

REPAIRABLE AREA

- In case of a hole, the damaged area is reshaped to be a circle or ellipse for easier filling of the repair agent. The diameter or major diameter should be 50 mm (1.97 inches) or smaller.
- In case of a crack or tear, if the both ends of the crack or tear are not separated from the body, the length of the area should be 200 mm (7.8 inches) or smaller. If one of the ends reaches the bumper edge, the length of the damaged area should be 200 mm (7.8 inches) or smaller, and also the width should be a half or less of the bumper width.
- In case of a scratch, the area should be 200 x 120 mm (7.8 x 4.7 inches) or smaller.

UNREPAIRABLE COMPONENTS

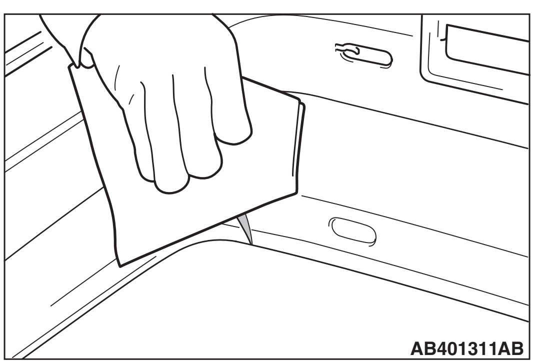
Black-base area is raw urethane base and repairable, however, its color does not match in color of the repair agent (ash gray). In this case, the replacement of the bumper is preferable.

BUMPER REMOVAL AND CLEANING

- The damage of holes, cracks, and tears requires a repair work from the rear surface. Remove the bumper to clean the whole surface, degrease the front and rear surfaces of the repair area using SU Silicone Off, and then repair, holding the bumper to avoid twisting.
- In case of a scratch, a softener is applied to the bumper as repair paint. The repair area cannot be polished after painting, and surface/gloss matching is difficult. Therefore, do not apply gradated topcoat painting, and paint the whole surface as a rule.

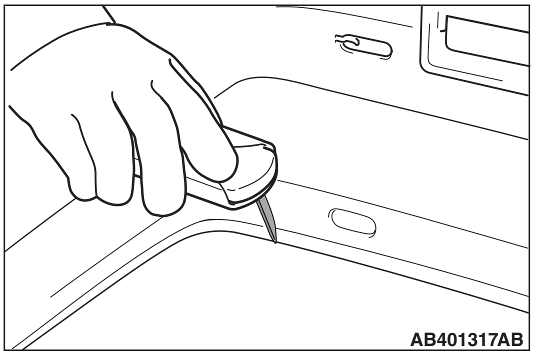
REPAIR PROCEDURE

1. CLEANING



Using SU Silicone Off, degrease the repair area, and then remove the wax and oil completely.

2. RESHAPING OF DAMAGED AREA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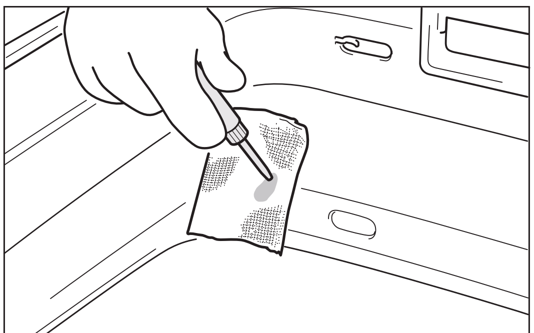
⚠ CAUTION

The grind surface area should be larger than the resin putty application area.

Remove burrs on the rear surface reinforcement point, and grind with a sandpaper #60 to #80, as a surface preparation for painting. When using a sander #80, grind at a low speed 6000 r/min. For PP, apply PP primer after grinding.

PRIMER : PP PRIMER
BRAND : 3M™ Automix Polyolefin Adhesion Promoter 5907 or equivalent

3. FIXING OF GLASS CLOTH (BACKING)


AB401293AB

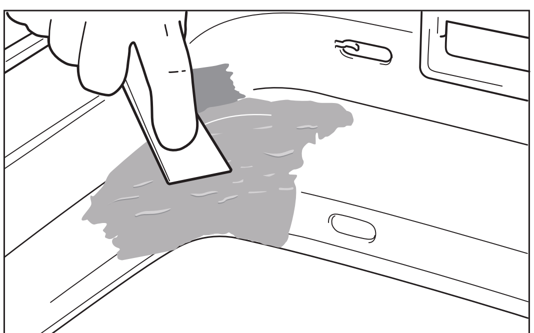
⚠ CAUTION

- **After applying the instant adhesive, fix the repair area.**
- **For PP, apply PP primer.**

Apply the adhesive to the glass cloth fixing area of the repair part in order to adhere the glass cloth.

- **TAPE: Glass cloth tape**
  BRAND: 3M™ Glass Cloth Tape 6400 or equivalent
- **ADHESIVE: Urethane adhesive**
  BRAND: 3M™ Duramix Plastic Repair Semi-rigid 4040 or equivalent

4. Adhesive application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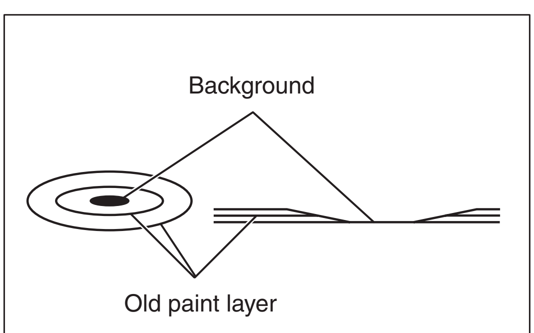
Apply a resin adhesive to cover the fixing glass cloth and its surrounding area. Then smooth it, using a spatula, and dry.

5. BASE SURFACE PREPARATION (SURFACE GRINDING)



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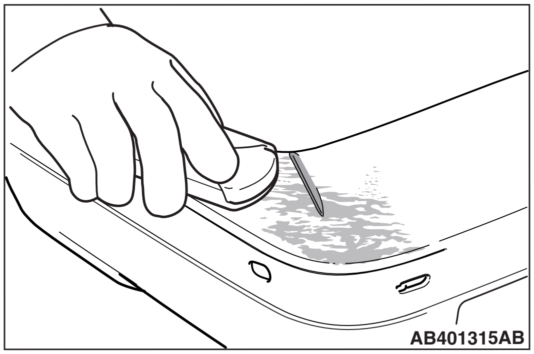
Remove burrs on the surface, and grind with a sandpaper #120 to make the repair area surface lower than the surrounding area. When using a sander #120, grind at a low speed 6000 r/min.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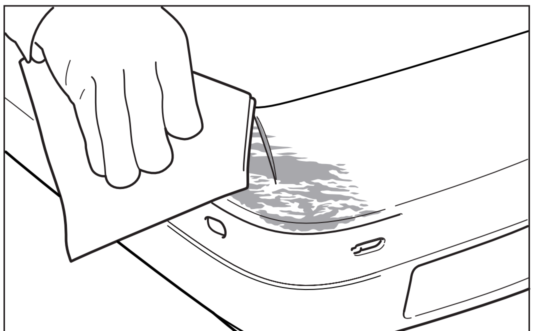
6. ROUGH GRINDING

Grind the base surface area with a sandpaper #80 as a surface preparation for painting.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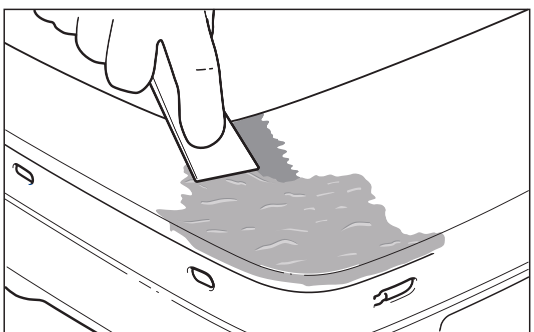
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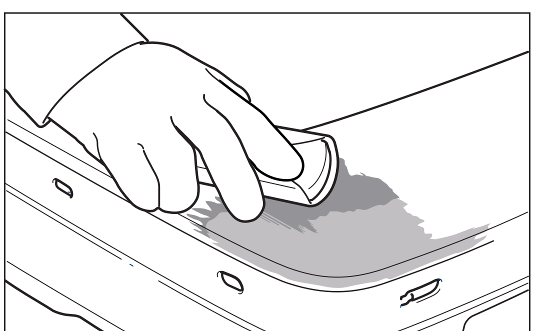
7. FILLING (PUTTY APPLICATION)

⚠ CAUTION

When mixing the two kinds of liquid, be sure that the air is not mixed in.

1. Using SU Silicone Off, degrease the repair area, and then remove the wax and oil completely.
2. For scrape, apply putty to the repair area.
   - **PUTTY: Epoxy resin putty**
     BRAND: 3M™ Automix EZ Sond Flexble Parts 5887 or equivalent
   - **PUTTY: Epoxy resin putty**
     BRAND: 3M™ Resin Putty No.1, 8120 or equivalent

NOTE:
- *The amount to be applied at a time is approximately 1.5 mm (0.06 inches). Therefore, recoat it as needed.*
- *For tear and scratch, apply putty after sanding the surface.*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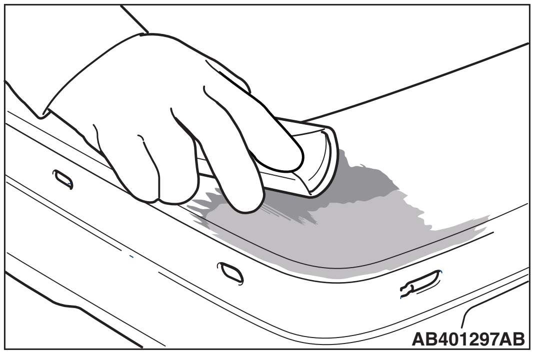
8. SURFACE GRINDING

After drying, grind with a sandpaper #120.

9. SURFACE PREPARATION FOR PRIMER-SURFACER

Grind with a sandpaper #180 to #240. Grind the primer-surfacer application area as a surface preparation for painting. In addition, remove the grind mark.



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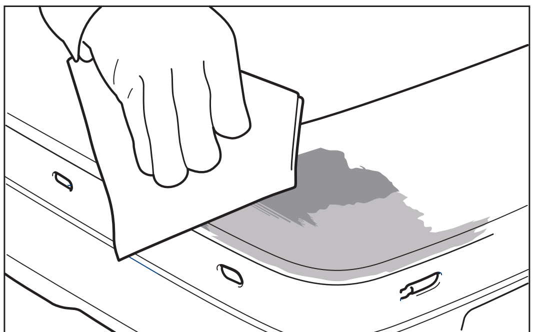
10. CLEANING AND DEGREASING

Using SU Silicone Off, degrease and wipe off completely.



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11. MASKING

To avoid splashing of primer-surfacer during the coating, apply masking.

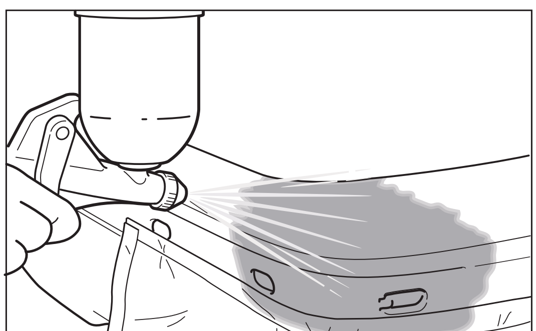
MASKING: Masking paper tape
BRAND: 3M™ Scotch Block Masking Paper or equivalent

12. PRIMER-SURFACER COATING

⚠ CAUTION

- **If an excessive amount is applied at a time, or force-dried in a short time, the coating film may crack.**
- **For color separation, use masking tape.**

While taking flash off time, apply 1 to 3 times of double coating, using a spray gun.



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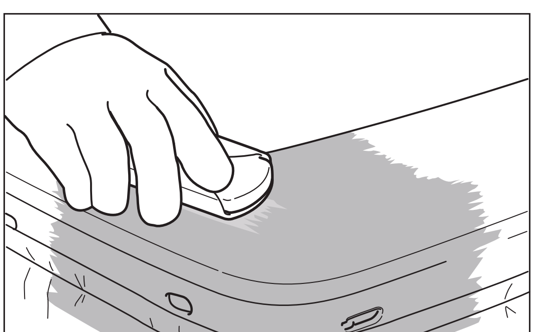
13. PRIMER-SURFACER GRINDING

1. Grind the base surface with a sandpaper #240 to #320.



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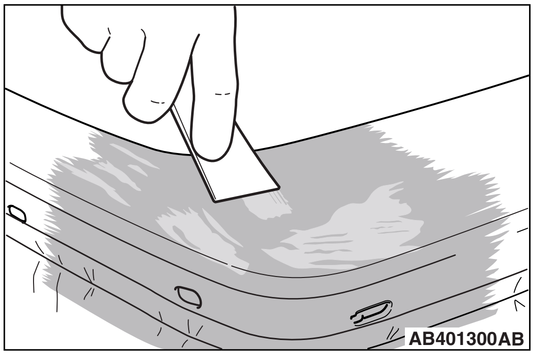
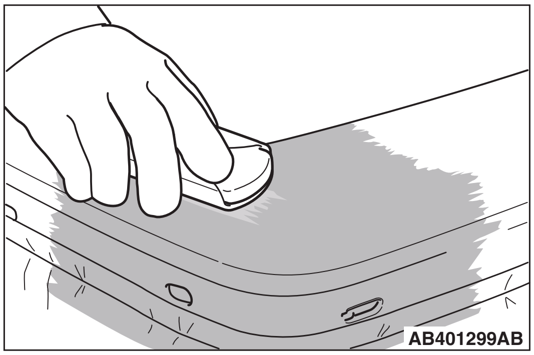
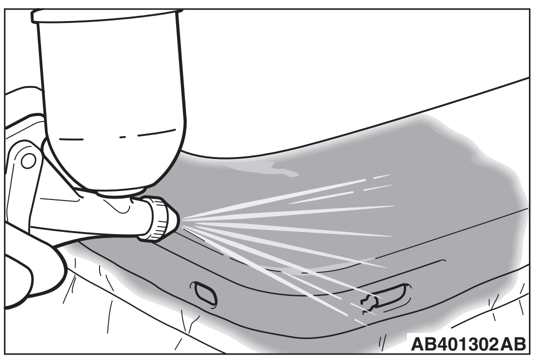


2. Apply the putty to cover pinholes, grind marks, and slight distortion. Do not apply an excessive amount at a time. Repeat application of small amount, taking a drying time.



3. Grind with a sandpaper #240 to #320. If the PP base surface is exposed, apply PP primer.

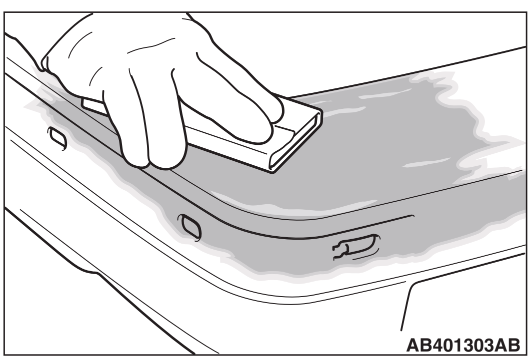
   PRIMER : PP PRIMER
   BRAND : 3M™ Automix Polyolefin Adhesion Promoter 5907 or equivalent



⚠ CAUTION

If an excessive amount is applied at a time, or force-dried in a short time, the coating film may crack.

4. While taking flash off time, apply 1 to 3 times of double coating, using a spray gun.



5. Dry sand with a sandpaper #240 to #300 or finer. Then, as a surface preparation for painting, grind lightly so as not to expose the base surface. Finally, use a sandpaper #600 (#800 for dark color coating) or finer to remove grind marks.

GROUP 90

CIRCUIT DIAGRAMS

CONTENTS

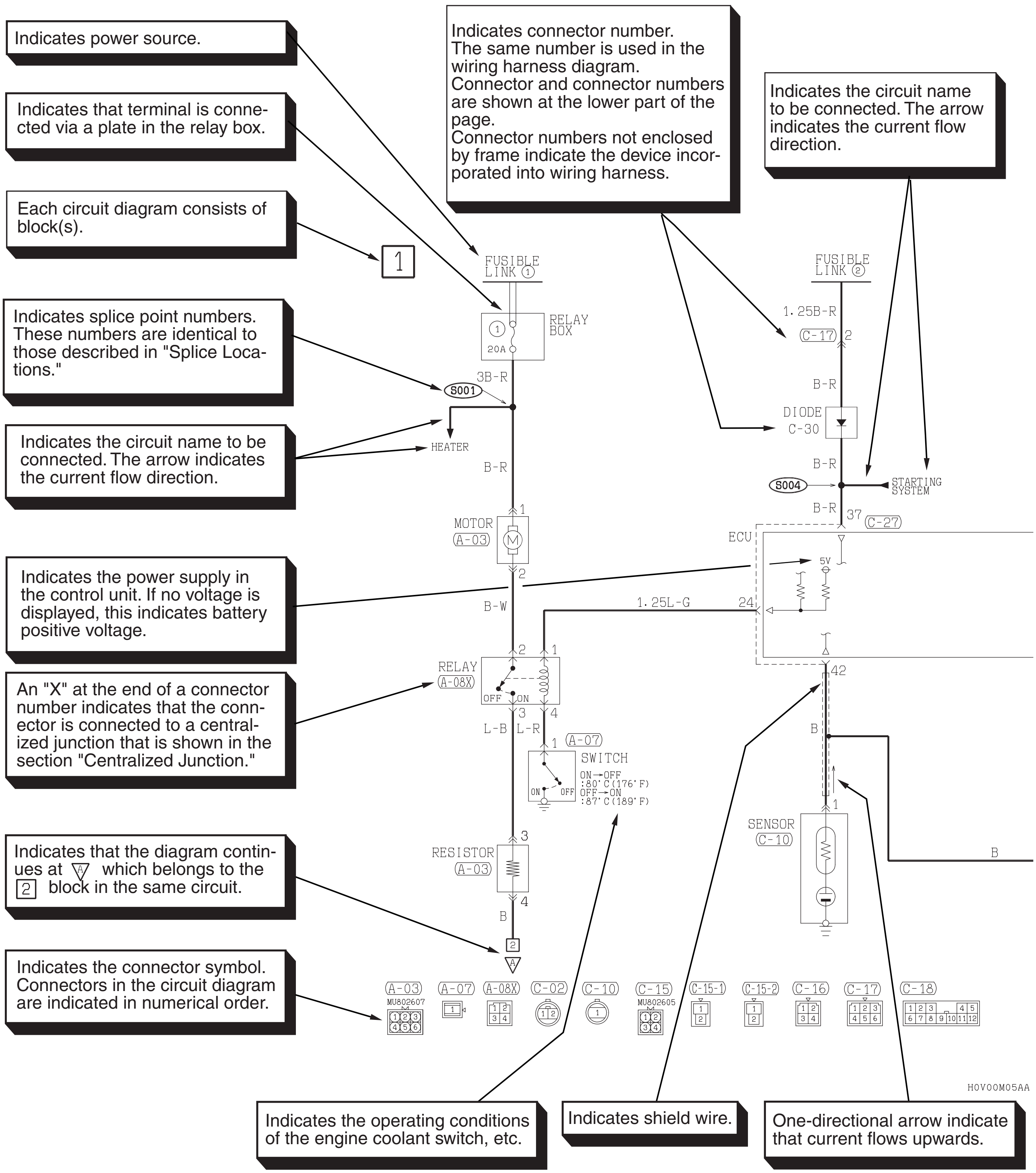
Continued on next page

NOTES

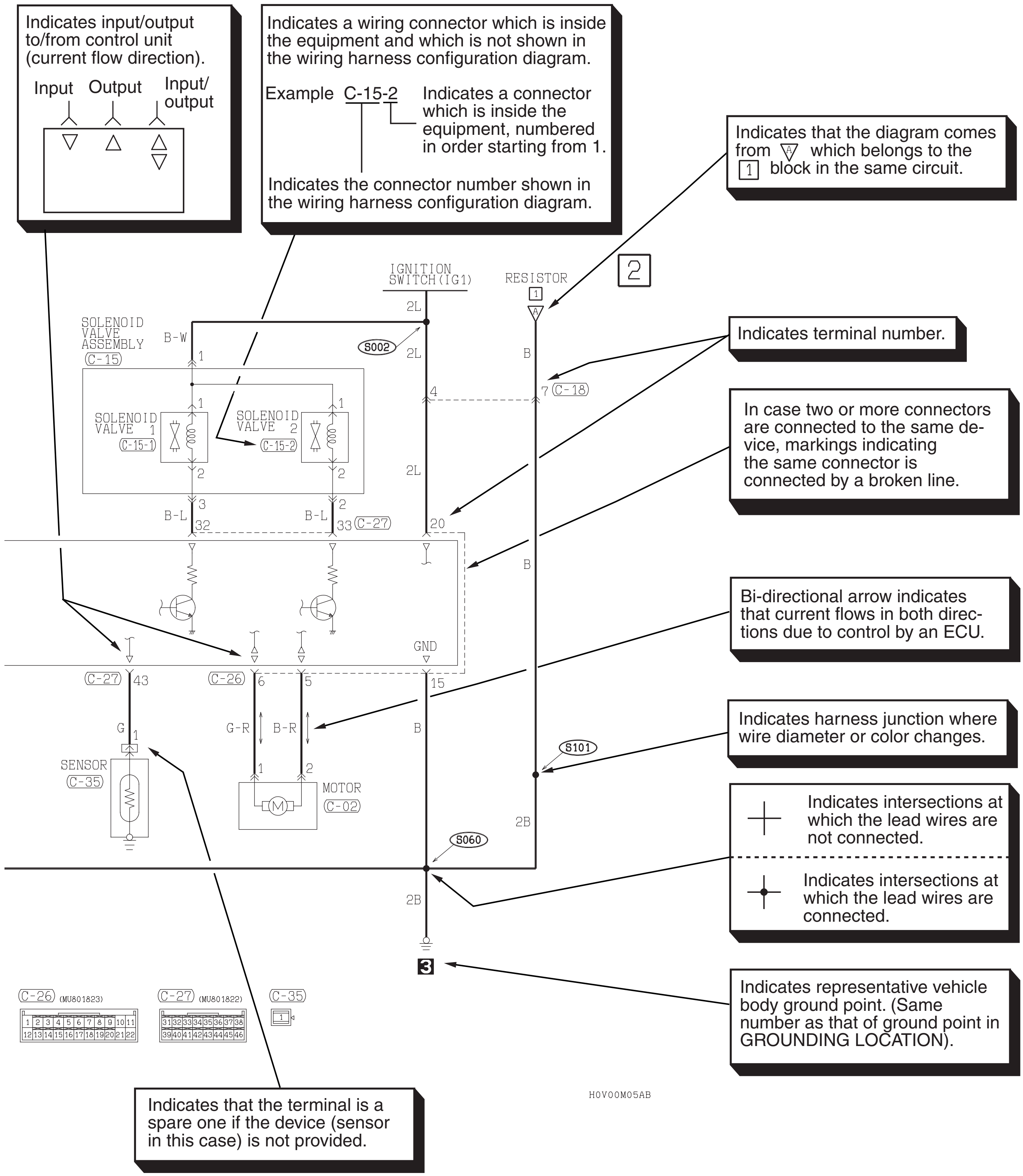
HOW TO READ CIRCUIT DIAGRAMS

M1901000100845

The circuit of each system from the fuse (or fusible link) to ground is shown. The power supply is shown at the top and the ground at the bottom to facilitate understanding of how the current flows. Some variations are included in one circuit diagram. Accordingly, some diagrams may not be applicable for individual vehicles.The circuit diagrams show the state when switches are operated.

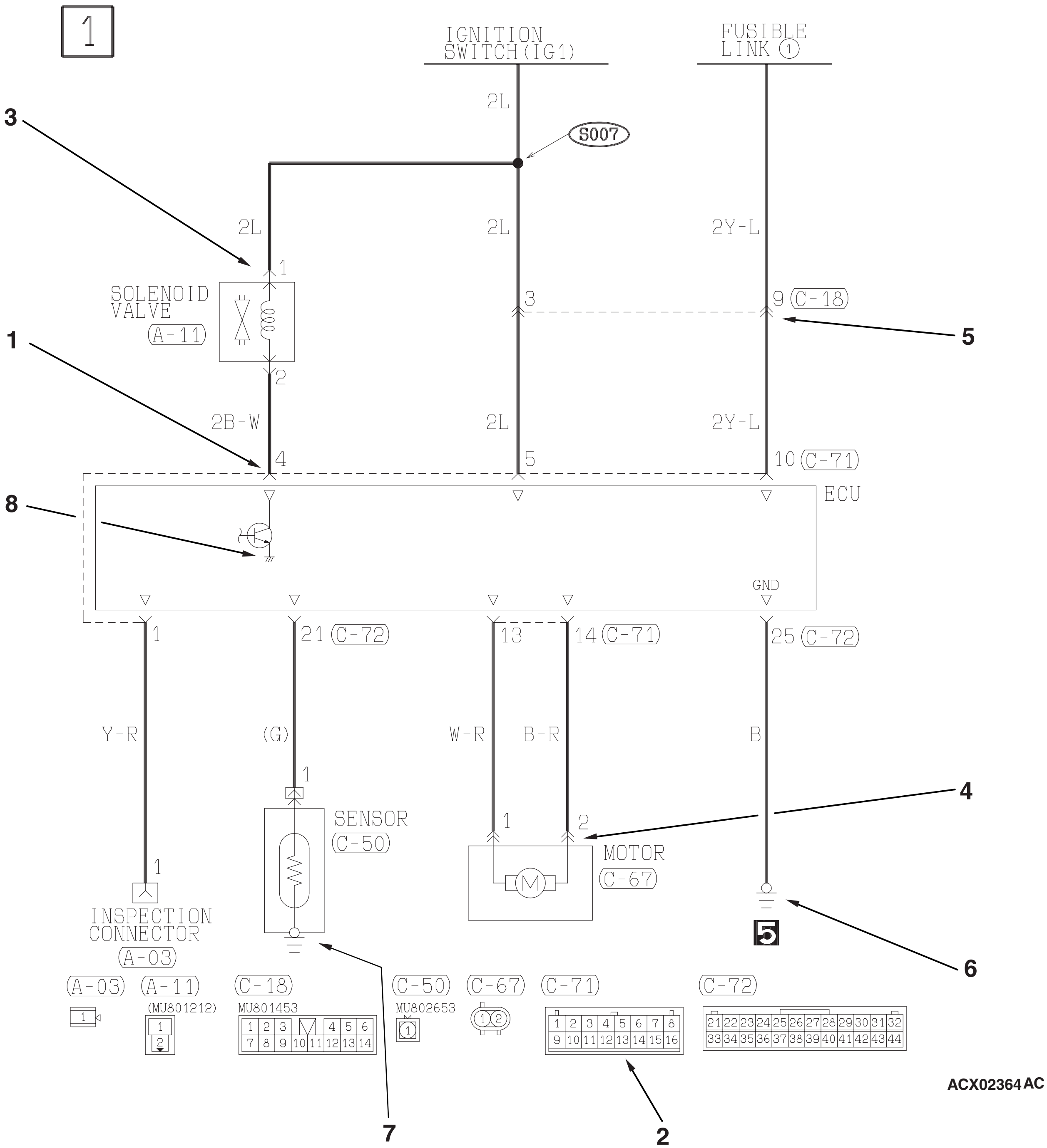


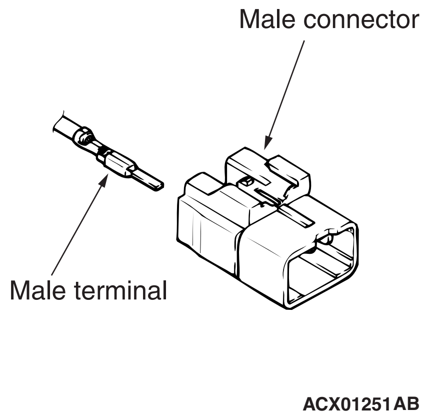
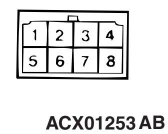
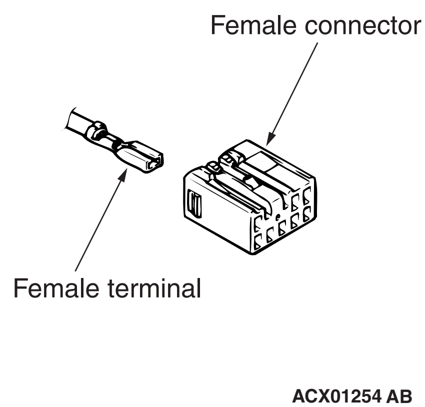
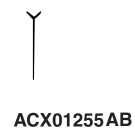
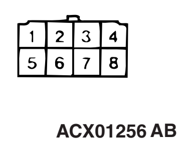
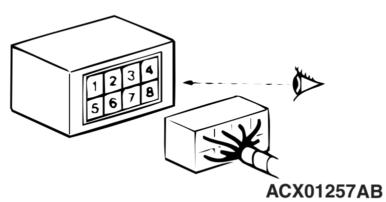
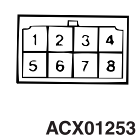
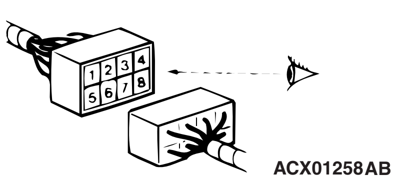
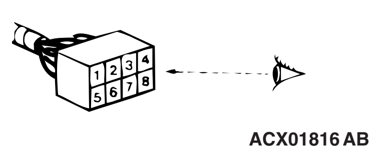
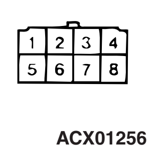
AC106603AG

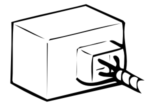
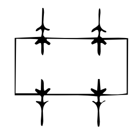
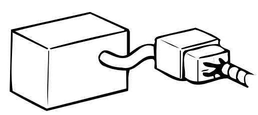
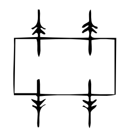
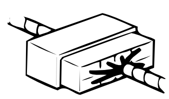
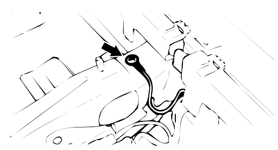
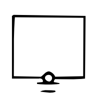
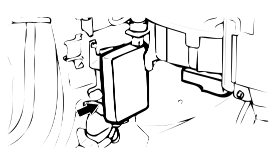

Indicates input/output to/from control unit (current flow direction).
Input
Output
Input/output
Indicates a wiring connector which is inside the equipment and which is not shown in the wiring harness configuration diagram.
Example C-15-2
Indicates a connector which is inside the equipment, numbered in order starting from 1.
Indicates the connector number shown in the wiring harness configuration diagram.
Indicates that the diagram comes from A which belongs to the 1 block in the same circuit.
Indicates terminal number.
In case two or more connectors are connected to the same device, markings indicating the same connector is connected by a broken line.
Bi-directional arrow indicates that current flows in both directions due to control by an ECU.
Indicates harness junction where wire diameter or color changes.
Indicates intersections at which the lead wires are not connected.
Indicates intersections at which the lead wires are connected.
Indicates representative vehicle body ground point. (Same number as that of ground point in GROUNDING LOCATION).
Indicates that the terminal is a spare one if the device (sensor in this case) is not provided.
IGNITION SWITCH(IG1)
RESISTOR
SOLENOID VALVE ASSEMBLY
C-15
SOLENOID VALVE 1
C-15-1
SOLENOID VALVE 2
C-15-2
B-W
2L
S002
B
C-18
B-L
C-27
GND
C-26
G
G-R
B-R
SENSOR
C-35
MOTOR
C-02
S101
2B
S060
(MU801823)
(MU801822)
H0V00M05AB

AC106604AE

CONNECTOR/GROUNDING INDICATIONS

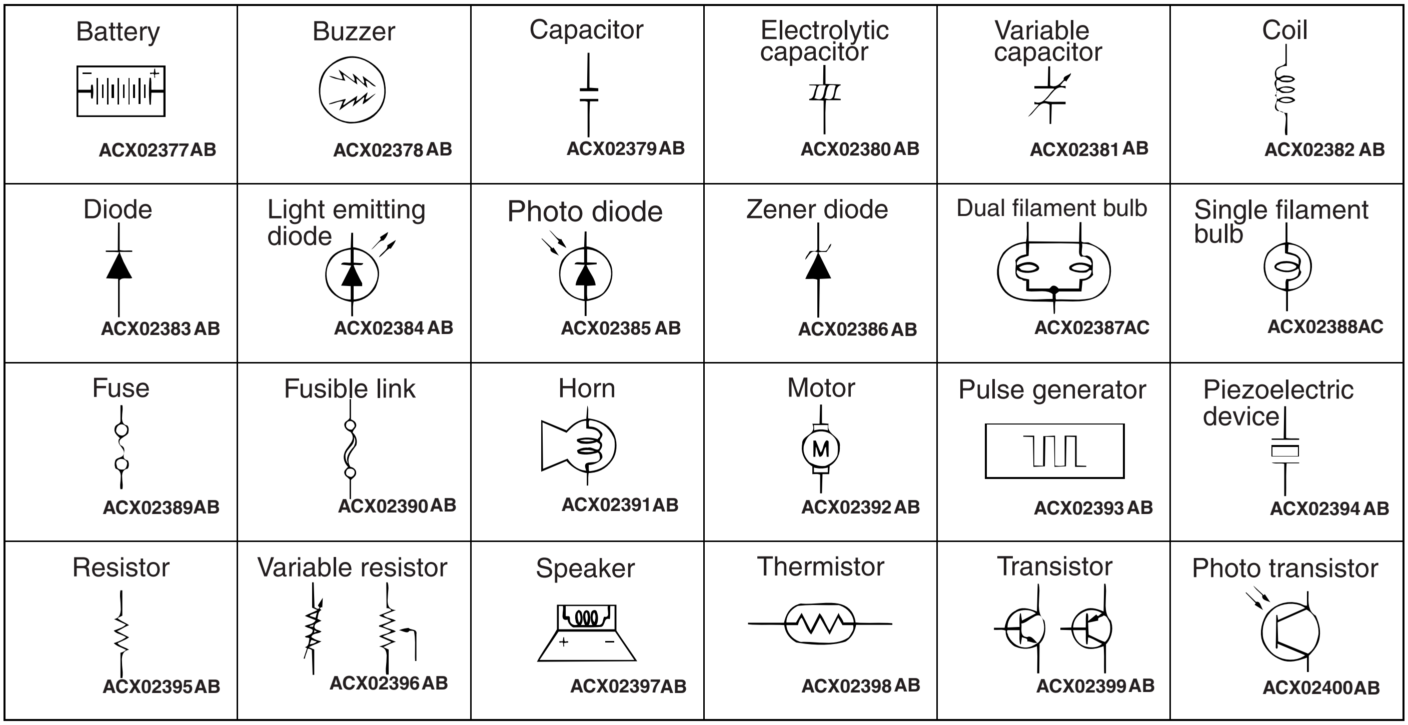


ITEM	NO.	CONNECTOR/ GROUNDING	SYMBOL	CONTENTS
Connector and terminal marking	1		Male terminal  Male connector 	The male and female terminals are indicated as shown. The connector with male terminal(s) is called as male connector and indicated by two connector contour lines, while the connector with female terminal(s) is called as female connector and indicated by single connector contour line.
			Female terminal  Female connector 	
Connector symbol marking	2	Device 		The symbol indicates the connector is viewed as shown. At a device connection, the connector symbol on the device side is shown. For an intermediate connector, the male connector symbol is shown. For spare connectors and check connectors, no device is connected, and so the harness-side connector symbol is shown for these connectors. However, a data link connector is exceptional.
		Intermediate connector 		
		Spare connector, check connector 		

ITEM	NO.	CONNECTOR/ GROUNDING	SYMBOL	CONTENTS
Connector connection marking	3	Direct connection type  ACX01260 AB	 ACX01261	Connection between a device and the harness is either by direct insertion in the device (direct connection type) or by connection with a harness connector furnished on the device side (harness connection type). The two types are indicated as illustrated.
	4	Harness connection type  ACX01262 AB	 ACX01263	
	5	Intermediate connector  ACX01264 AB	 ACX01265	
Ground marking	6	Body ground  ACX01273 AB	 ACX01274	Grounding is either by body ground, device ground or control unit interior ground. These are indicated as illustrated.
	7	Device ground  ACX01275 AB	 ACX01276	
	8	Ground in control unit  ACX01277AB	 ACX01278	

SYMBOLS (EXCEPT CONNECTOR AND GROUNDING)

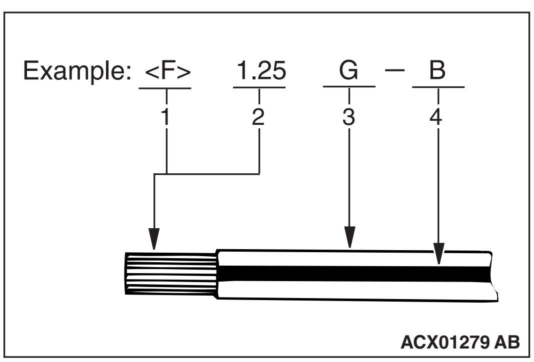
Devices appearing in circuit diagrams are indicated by the following symbols.



WIRE COLOR CODES

Wire colors are identified by the following color codes.

CODE	WIRE COLOR	CODE	WIRE COLOR	CODE	WIRE COLOR	CODE	WIRE COLOR
B	Black	L	Blue	PU	Purple	V	Violet
BR	Brown	LG	Light green	R	Red	W	White
G	Green	O	Orange	SB	Sky blue	Y	Yellow
GR	Gray	P	Pink	SI	Silver	–	–



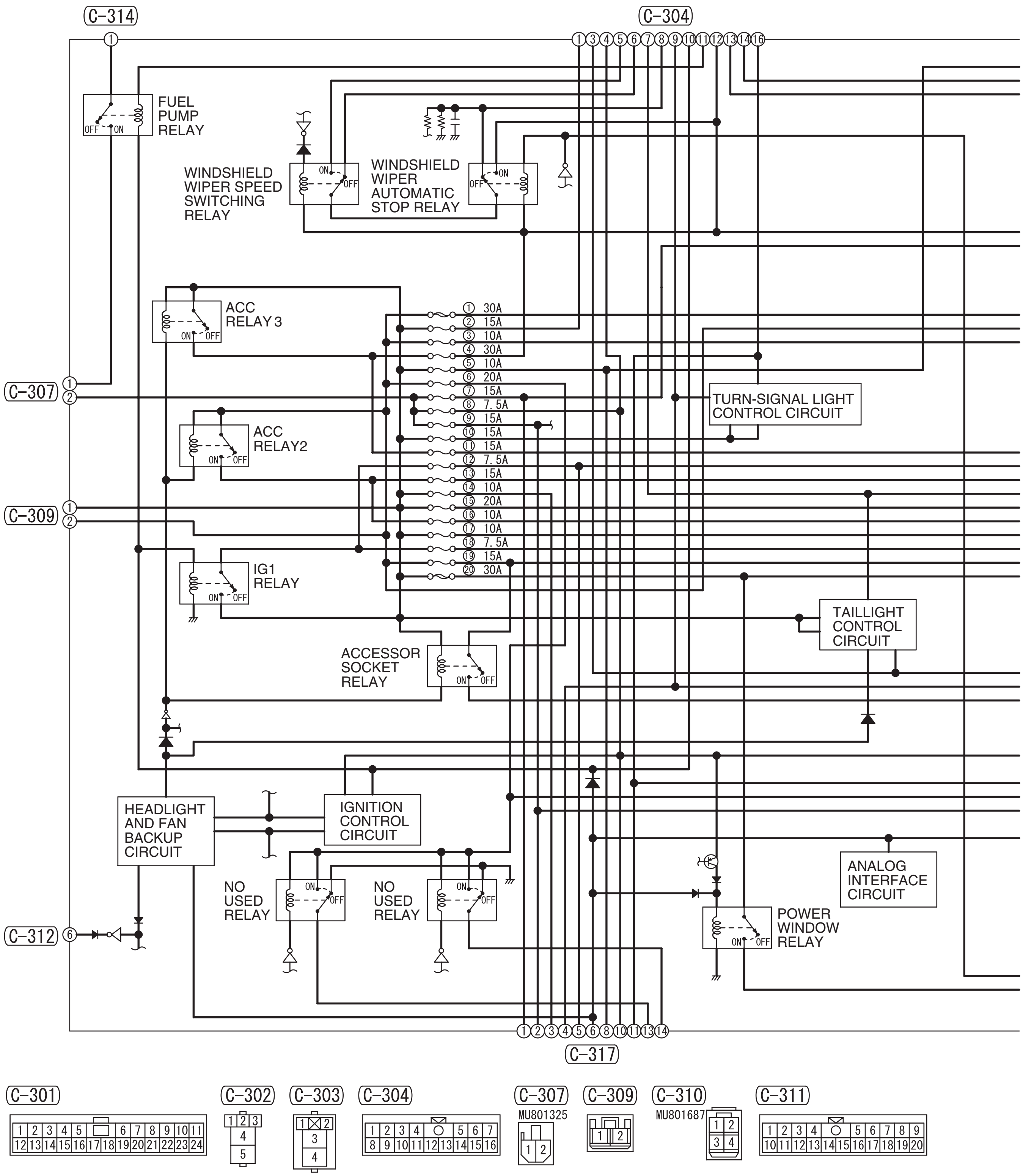
If a cable has two colors, the first of the two color code characters indicates the basic color (color of the cable coating) and the second indicates the marking (tracer) color.

NO.	MEANING
1	<F>: Flexible wire
	<T>: Twisted wire
2	Wire size (mm^2)*
3	Basic color (color of the cable coating)
4	Marking color

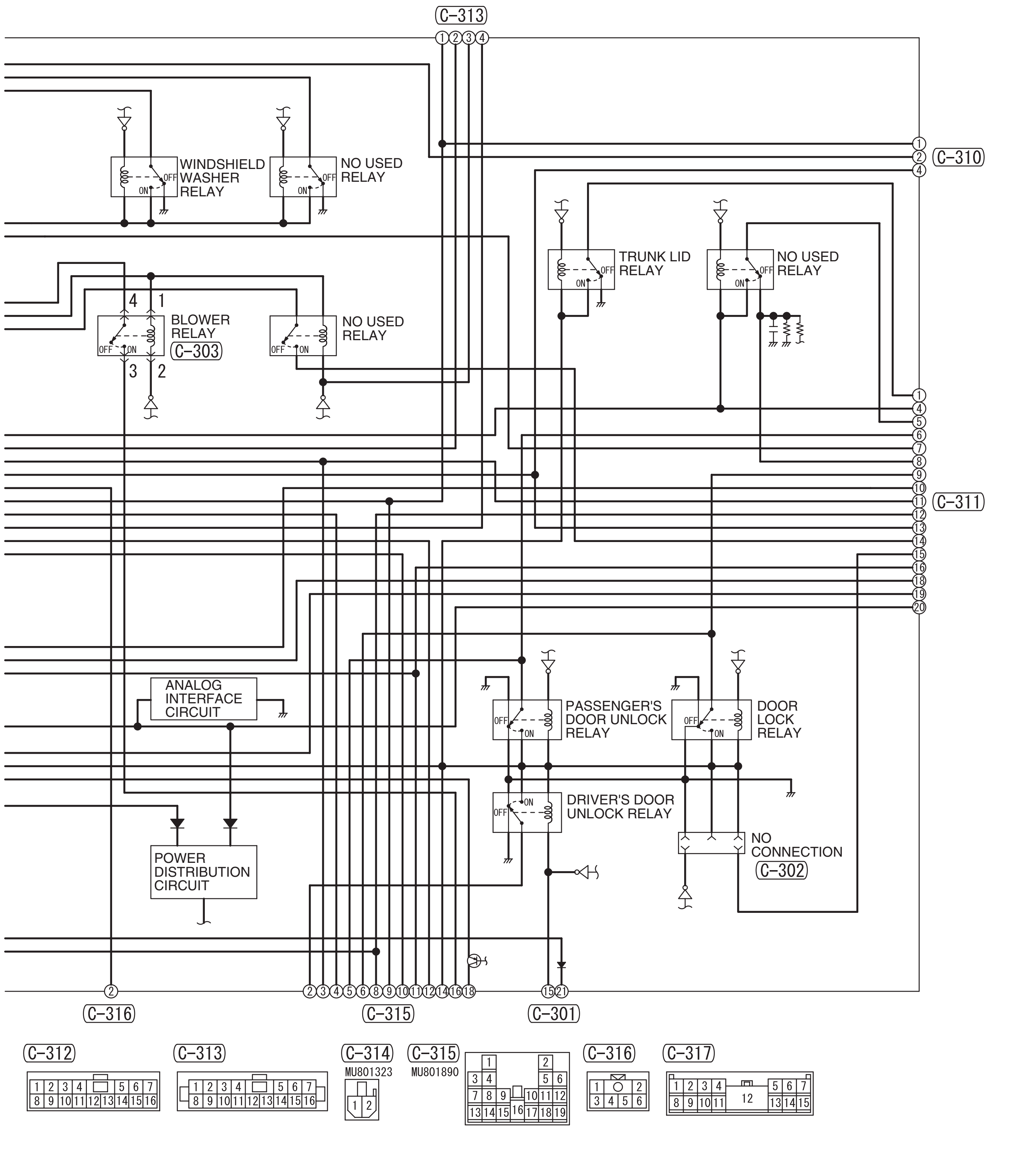
NOTE:
**: No code indicates 0.5 mm^2(0.0008 in^2). Cable color code in parentheses indicates 0.3 mm^2 (0.0005 in^2).*

ETACS-ECU

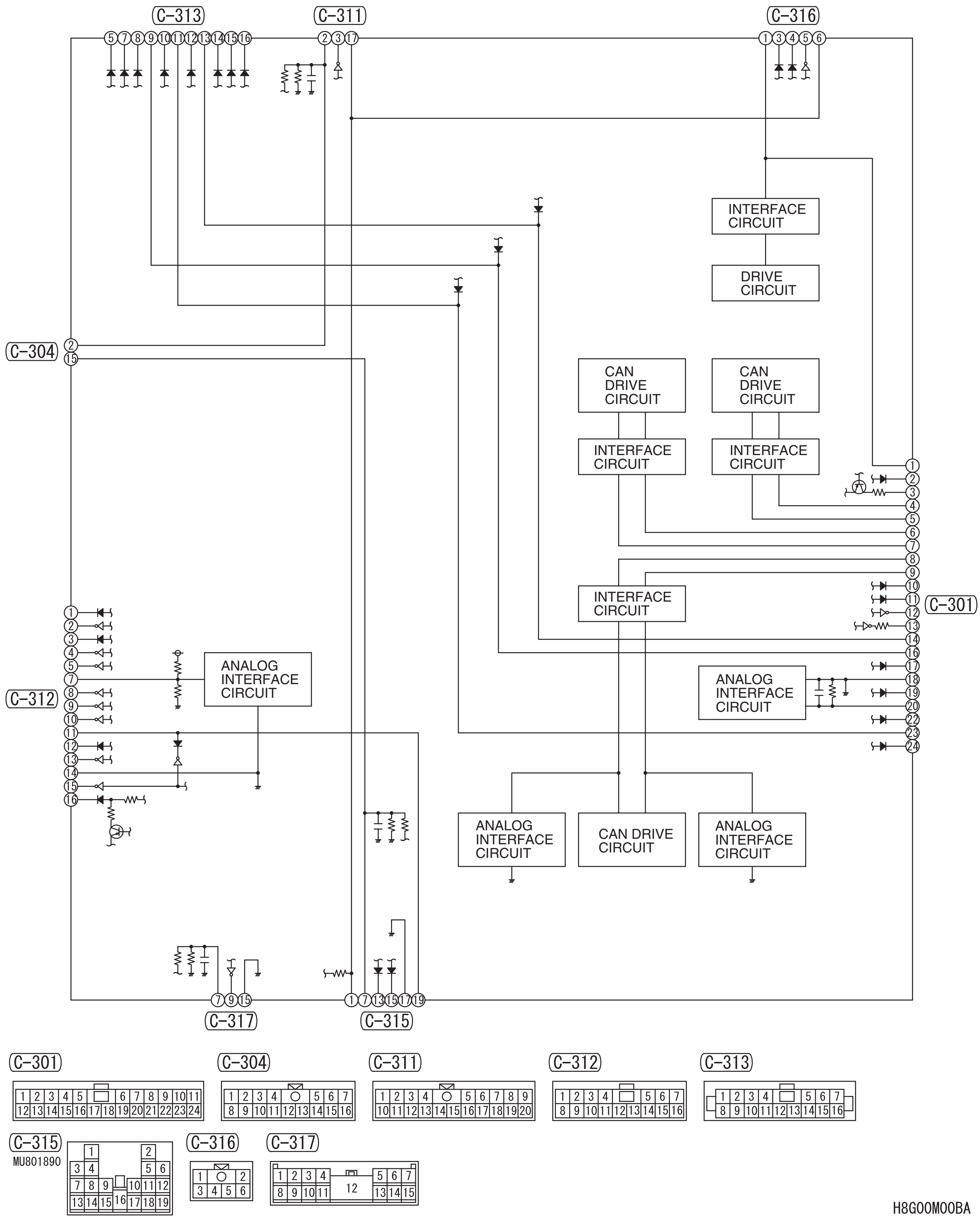
M1901026300106



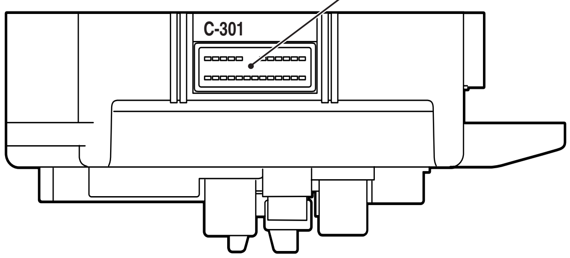
H8G00M00AA


C-313
WINDSHIELD WASHER RELAY
NO USED RELAY
C-310
TRUNK LID RELAY
NO USED RELAY
BLOWER RELAY
C-303
NO USED RELAY
C-311
ANALOG INTERFACE CIRCUIT
PASSENGER'S DOOR UNLOCK RELAY
DOOR LOCK RELAY
DRIVER'S DOOR UNLOCK RELAY
NO CONNECTION
C-302
POWER DISTRIBUTION CIRCUIT
C-316
C-315
C-301
C-312
C-313
C-314
MU801323
C-315
MU801890
C-316
C-317
H8G00M00AB

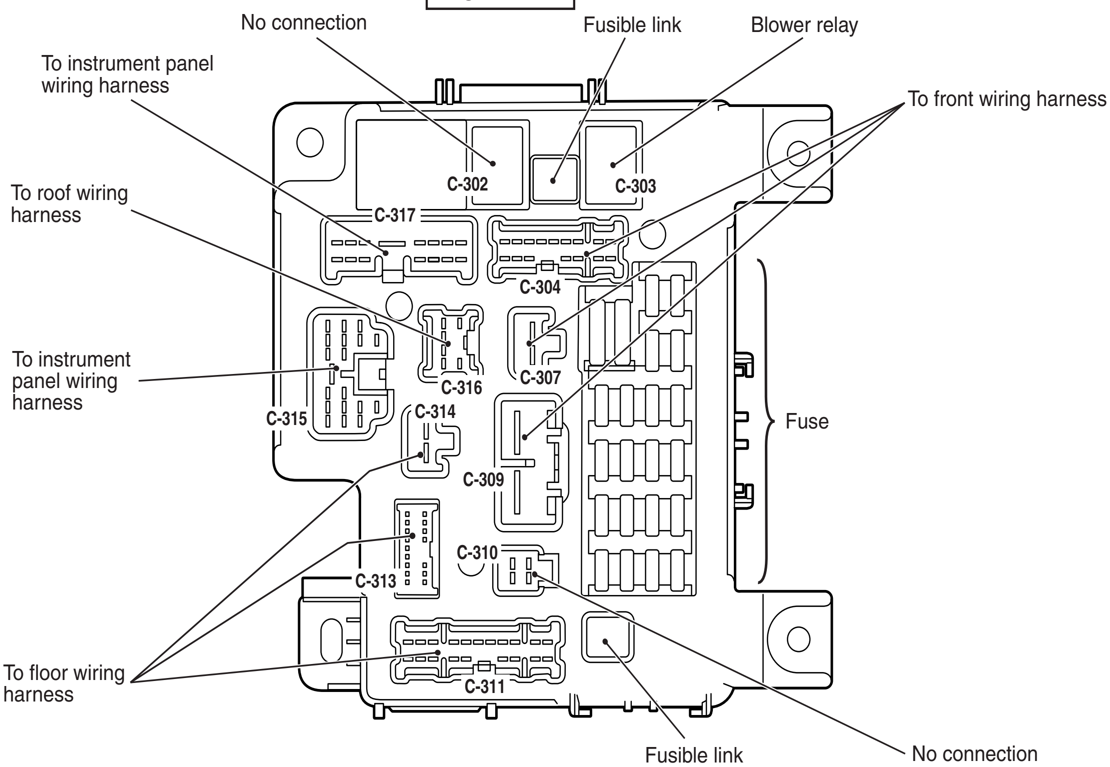
ETACS-ECU (CONTINUED)



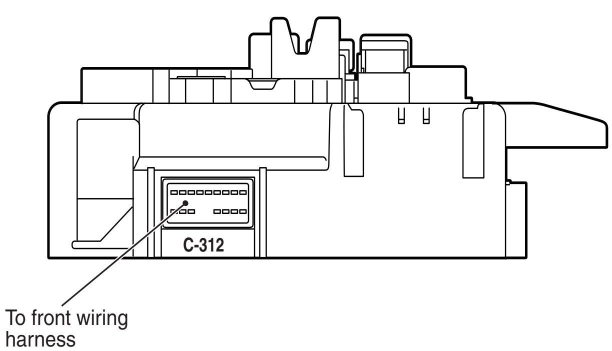
UPPER VIEW



FRONT VIEW



LOWER VIEW

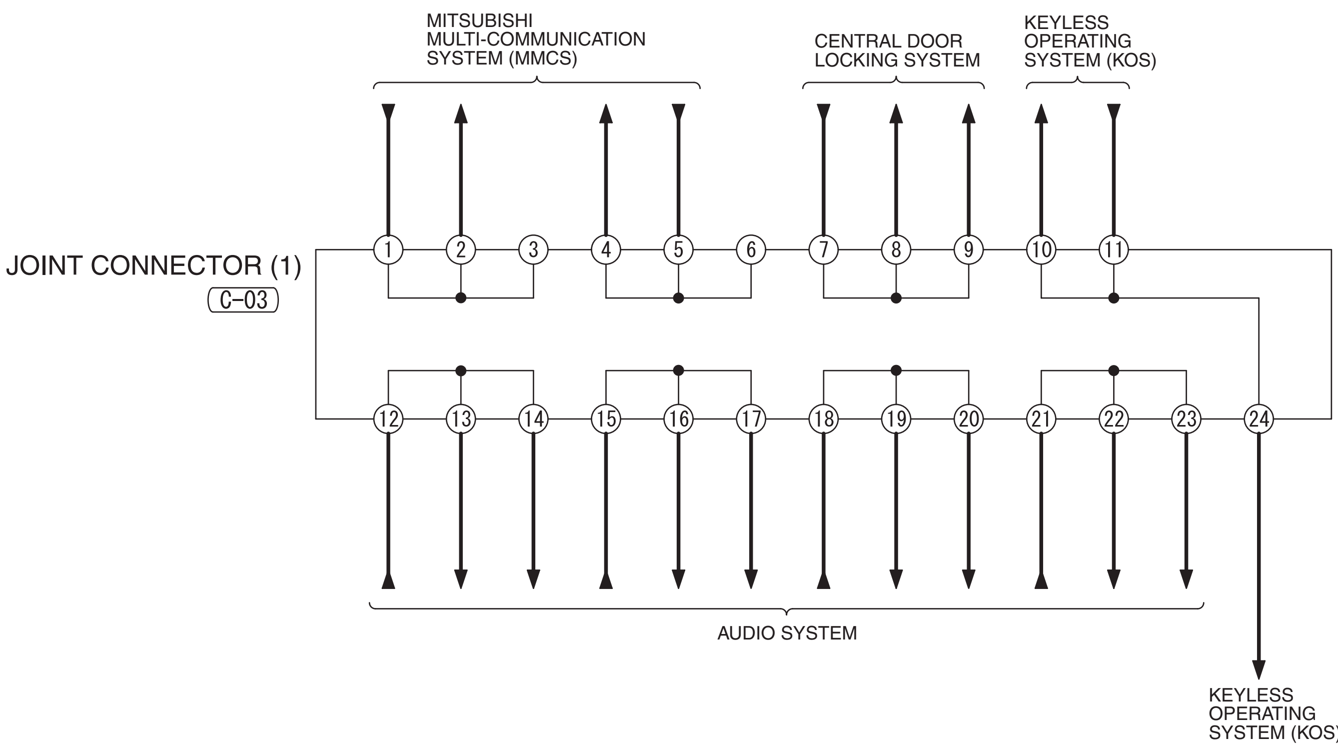


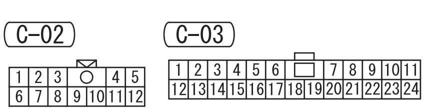
AC506599AE

JOINT CONNECTOR

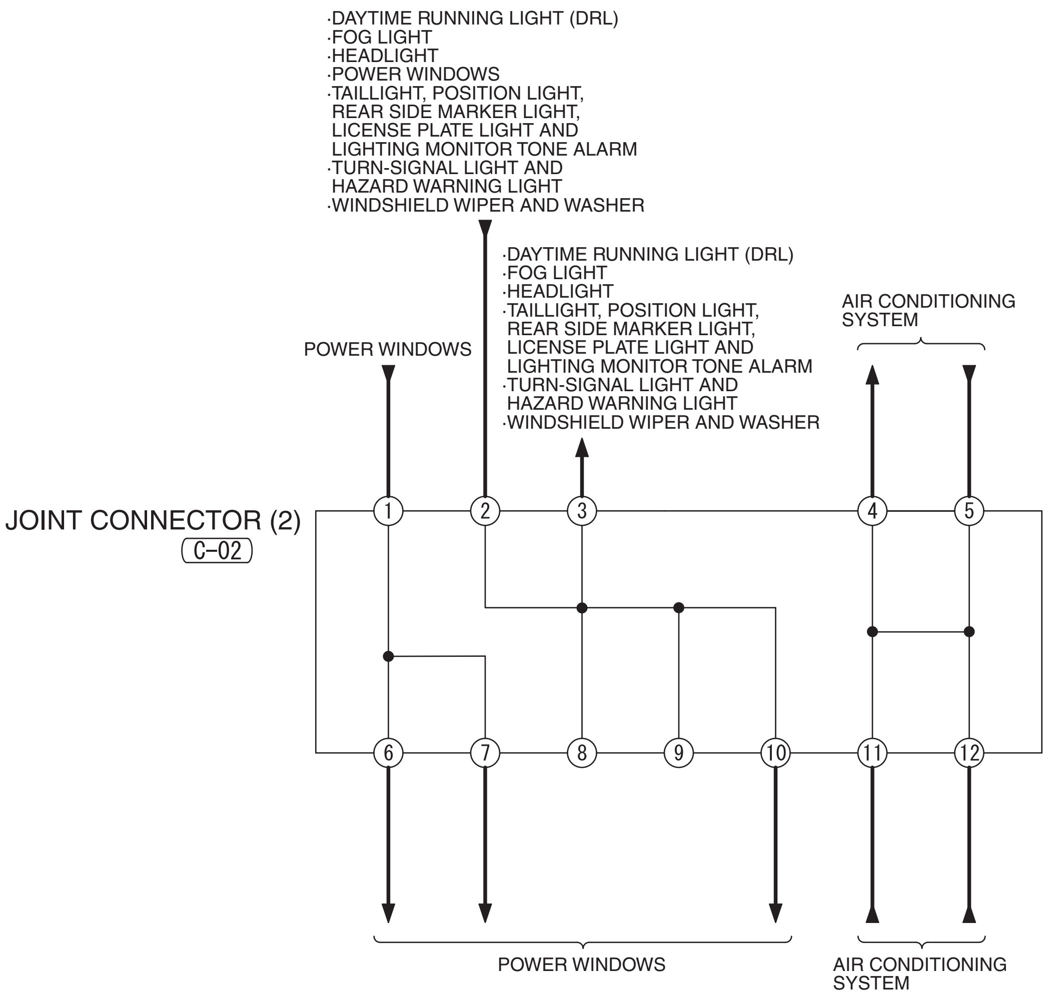
M1901014202573

NOTE: IN THE ACTUAL VEHICLES, SOME OF THE JOINT CONNECTOR TERMINALS IN THE SAME BUS ARE USED, SO IN SOME CASES, THE TERMINAL ARRANGEMENT INDICATED ON THE CIRCUIT DIAGRAMS DO NOT COINSIDE WITH THE ONES IN THE ACTUAL VEHICLES.

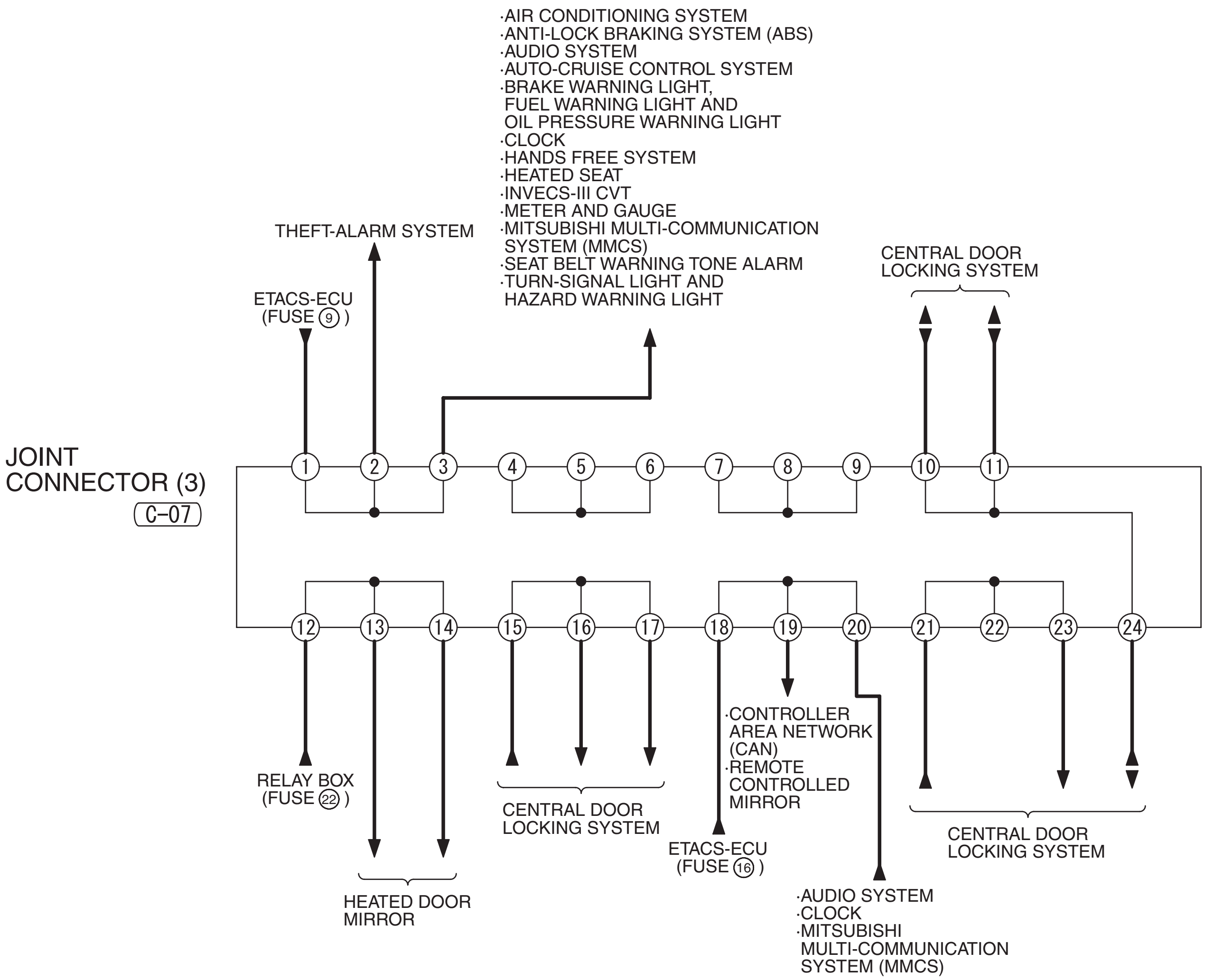


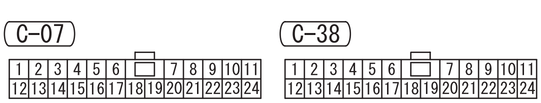


H8G00M01AA

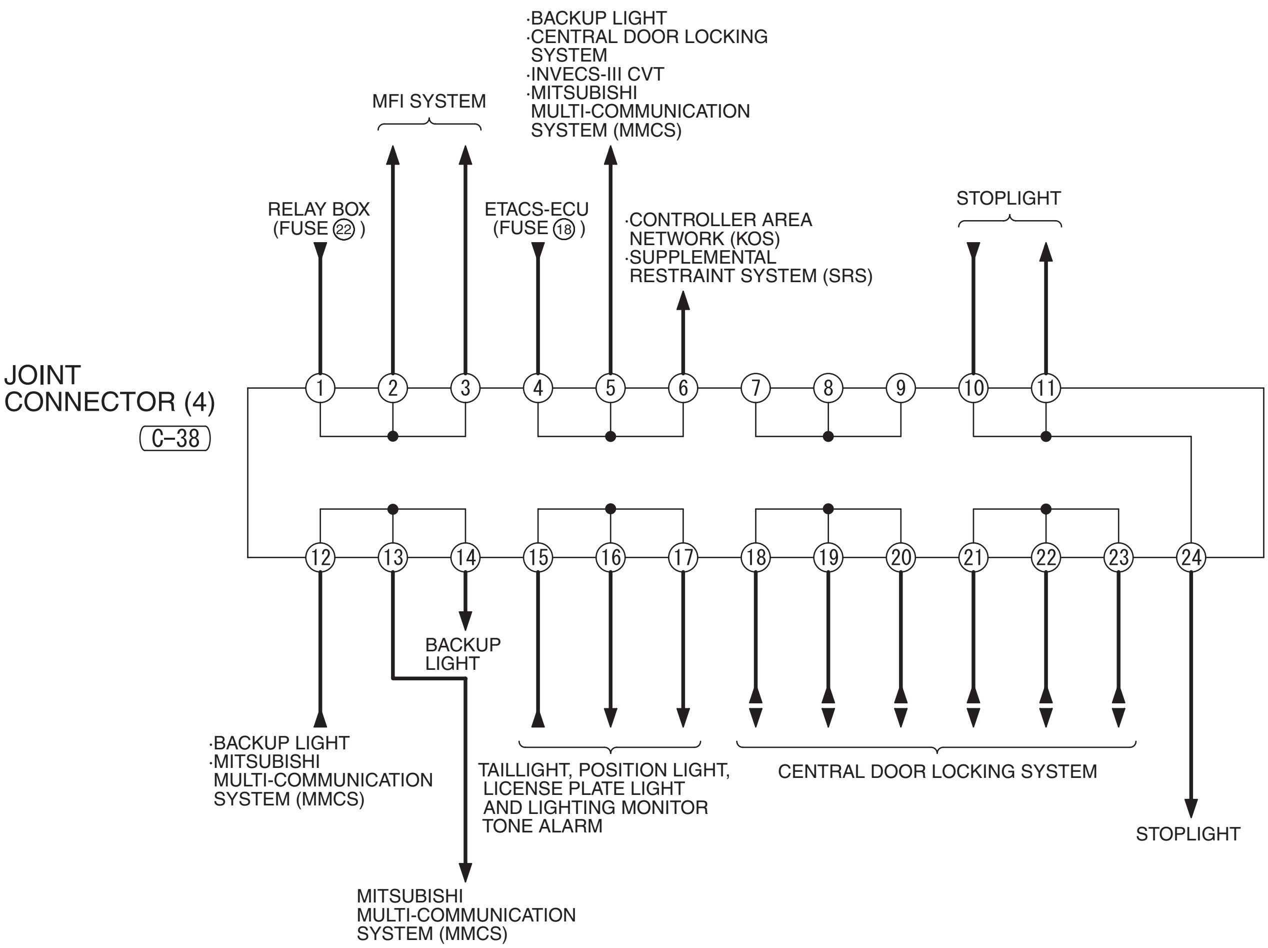

·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·POWER WINDOWS
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
AIR CONDITIONING SYSTEM
POWER WINDOWS
JOINT CONNECTOR (2)
C-02
1
2
3
4
5
6
7
8
9
10
11
12
POWER WINDOWS
AIR CONDITIONING SYSTEM
H8G00M01AB

JOINT CONNECTOR (CONTINUED)



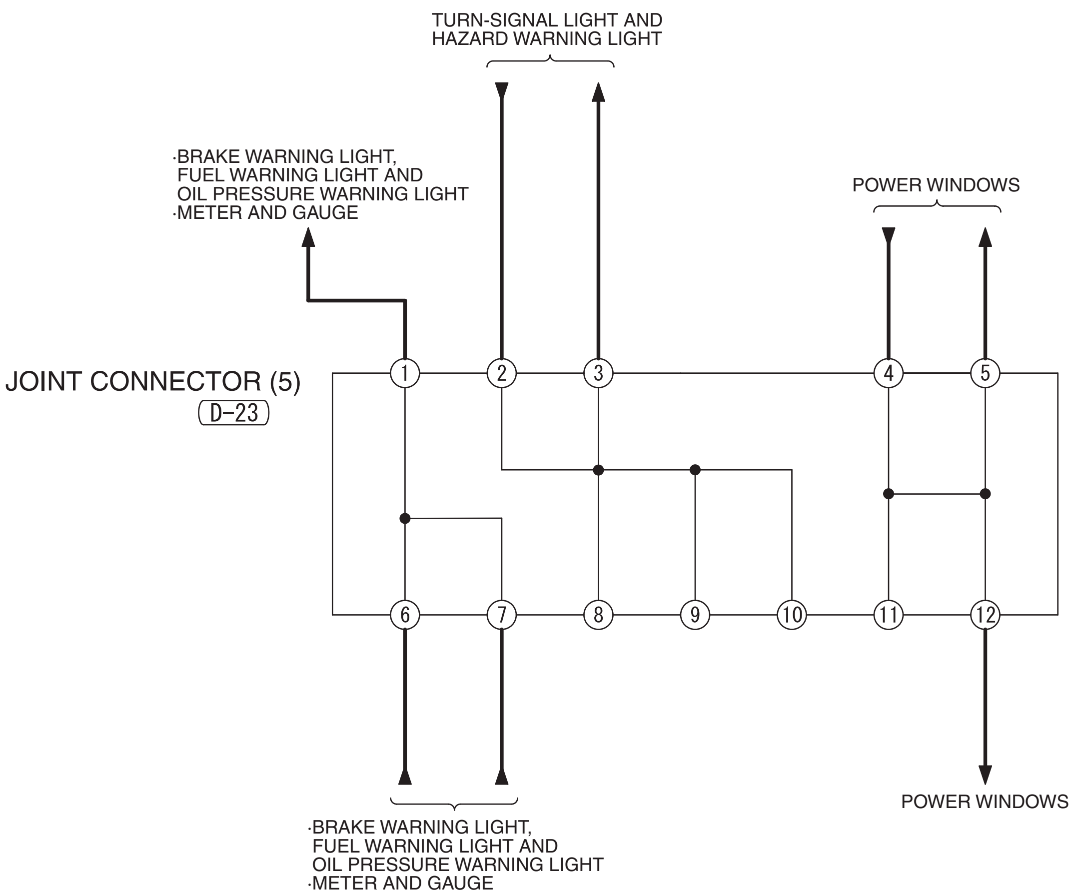


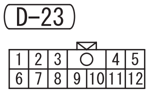
H8G00M01BA


·BACKUP LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·INVECS-III CVT
·MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)
MFI SYSTEM
RELAY BOX (FUSE 22)
ETACS-ECU (FUSE 18)
·CONTROLLER AREA NETWORK (KOS)
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
STOPLIGHT
JOINT CONNECTOR (4)
C-38
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
BACKUP LIGHT
·BACKUP LIGHT
·MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)
TAILLIGHT, POSITION LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
CENTRAL DOOR LOCKING SYSTEM
STOPLIGHT
MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)

H8G00M01BB

JOINT CONNECTOR (CONTINUED)





H8G00M01CA

CENTRALIZED JUNCTION

M1901000301950

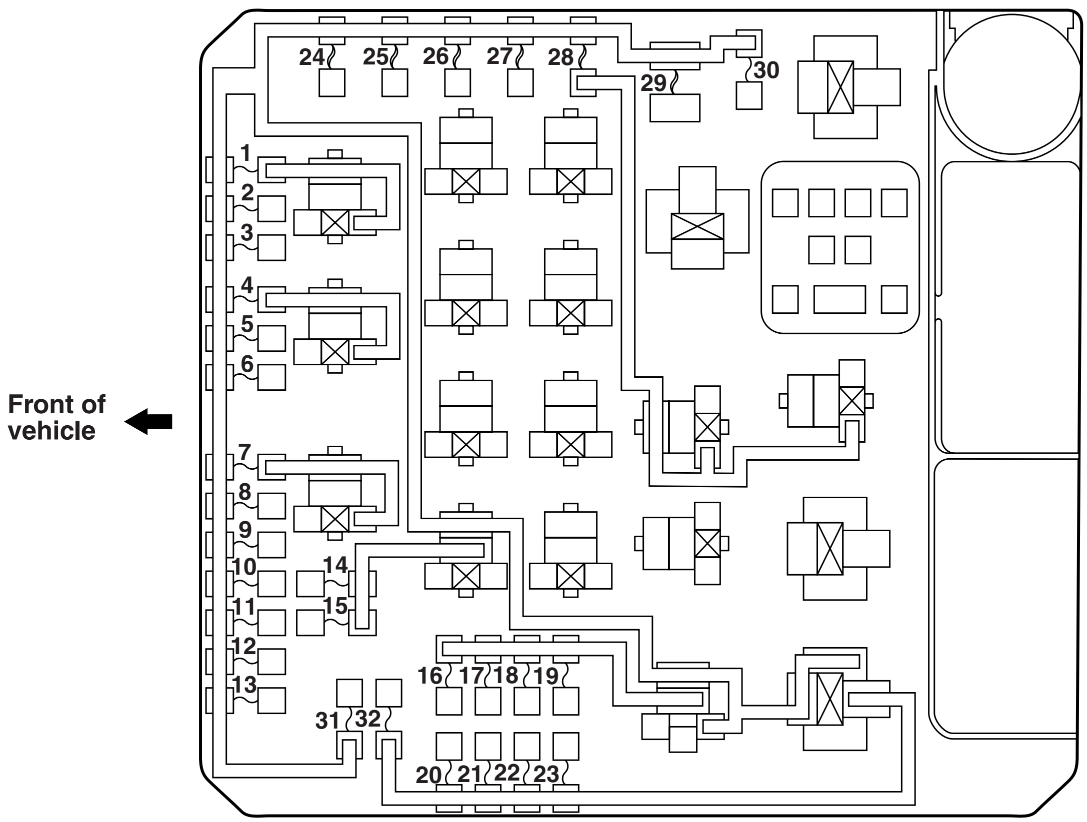
FUSIBLE LINK AND FUSE

ENGINE COMPARTMENT

No.	Power supply circuit	Name	Rated capacity (A)	Housing color	Load circuit
1	Fusible link No.36	Fuse	15	Blue	Fog light and fog light relay
2			7.5	Brown	Engine control module
3			20	Yellow	Primary pulley speed sensor <CVT>, secondary pulley speed sensor <CVT> and transaxle control module <CVT>
4			10	Red	Horn and horn relay
5			7.5	Brown	Generator
6			–	–	–
7			10	Red	A/C compressor assembly and A/C compressor clutch relay
8			15	Blue	Engine control module
9			–	–	–
10			–	–	–
11			–	–	–
12			–	–	–
13			10	Red	Daytime running light and daytime running light relay
14	Headlight relay (High)		10	Red	Headlight assembly (High: LH)
15			10	Red	Headlight assembly (High: RH)
16	Headlight relay (Low)		20	Yellow	–
17			20	Yellow	–
18			10	Red	Headlight assembly (Low: LH)
19			10	Red	Headlight assembly (Low: RH)
20	MFI relay		–	–	–
21			10	Red	Ignition coil No.1 to 4
22			20	Yellow	Center exhaust pipe heated oxygen sensor, engine control module, engine oil control valve, evaporative emission purge solenoid, evaporative emission ventilation solenoid, injector No.1 to 4, mass airflow sensor, heated oxygen sensor and vehicle speed sensor <M/T>
23			15	Blue	Fuel pump module

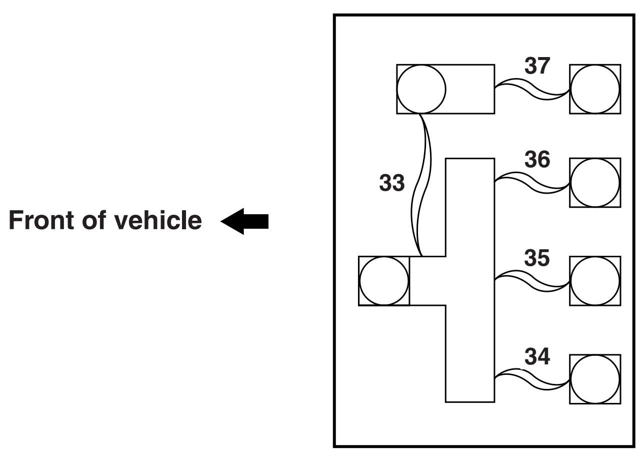
No.	Power supply circuit	Name	Rated capacity (A)	Housing color	Load circuit
24	Fusible link No.36	Fusible link	30	Pink	Starter
25			–	–	–
26			40	Green	ABS-ECU
27			30	Pink	ABS-ECU
28			30	Pink	Condenser fan motor, condenser fan relay and fan control relay
29			40	Green	Radiator fan motor and radiator fan relay
30		Fuse	30	Green	Fuse No.7 to 9 in passenger compartment
31			30	Green	Audio amplifier
32	MFI relay		–	–	–
33	Battery/Generator	Fusible link	120	–	Fusible link No.37/ Fusible link No.34 to 36
34	Battery/Fusible link No.33		80	–	Fuse Nos.2, 4, 5, 10, 11, 12, 14, 15, 17, 18, 20 and No.25 in passenger compartment
35			80	–	–
36			120	–	Fuse No.1 to 32 in engine compartment, headlight relay (High), headlight relay (Low) and MFI relay
37	Fusible link No.33/ Generator		80	–	Fusible link No.1 and 21, Fuse No. 3, 6, 13, 16, 19, and 22 in passenger compartment and ETACS-ECU(ACC relay 2 and blower relay)

Relay box



AC506808AI

Fusible link box connected directly to battery positive terminal



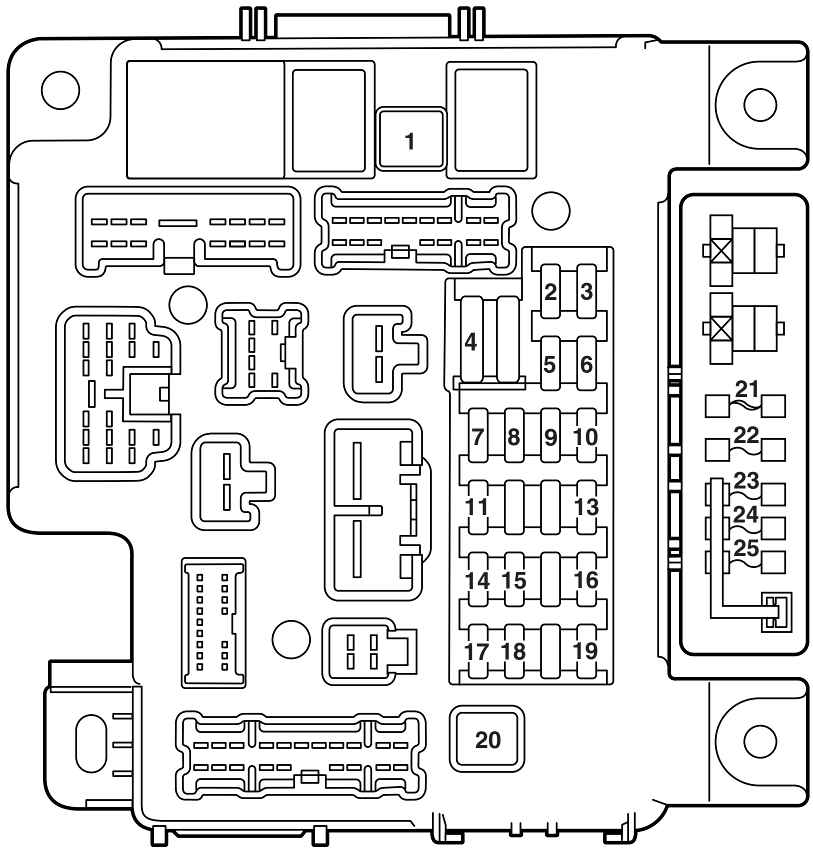
AC506810AD

PASSENGER COMPARTMENT

No.	Power supply circuit	Name	Rated capacity (A)	Housing color	Load circuit
1	Fusible link No.37	Fusible link	30	Pink	Blower motor
2	Fusible link No.34	Fuse	15	Blue	ETACS-ECU, high-mounted stoplight, rear combination light and shift switch assembly
3	Fusible link No.37		10	Red	–
4	ETACS-ECU (ACC relay 3)		30	Green	ETACS-ECU, washer motor and windshield wiper motor
5	Fusible link No.34		10	Red	Data link connector
6	Fusible link No.37		20	Yellow	ETACS-ECU, front door lock actuator, trunk lid actuator and switch and rear door lock actuator
7	Fusible link No.30		15	Blue	Audio visual navigation unit, CAN box unit, center panel unit, hands free module, radio and CD player or CD changer, rear display unit and satellite radio tuner
8			7.5	Brown	A/C-ECU, column switch, combination meter, ETACS-ECU, key reminder switch, KOS-ECU, power window relay, wireless control module <vehicles with KOS> and receiver antenna module <vehicles without KOS>
9			15	Blue	Audio visual navigation unit, center panel unit, combination meter and key reminder switch
10	Fusible link No.34		15	Blue	ETACS-ECU

No.	Power supply circuit	Name	Rated capacity (A)	Housing color	Load circuit
11	ETACS-ECU (ACC relay 3)	Fuse	–	–	–
12	ETACS-ECU (IG1 relay)		7.5	Brown	A/C control panel, A/C-ECU, CVT control relay, ABS-ECU, center panel unit, column switch, combination meter, heated seat relay, KOS-ECU, rear window defogger relay, shift switch assembly, SRS-ECU, sunroof motor assembly, wireless control module <vehicles without KOS> and receiver antenna module <vehicles with KOS>
13	ETACS-ECU (ACC relay 2)		15	Blue	Accessory socket (front floor console) and cigarette lighter
14	Fusible link No.34		10	Red	Ignition switch circuit
15			20	Yellow	Sunroof motor assembly
16	ETACS-ECU (ACC relay 2)		10	Red	Audio visual navigation unit, CAN box unit, door mirror assembly, radio and CD player or CD changer, rear display unit and remote controlled mirror switch
17	Fusible link No.34		10	Red	Occupant classification-ECU
18	ETACS-ECU (IG1 relay)		7.5	Brown	Audio visual navigation unit, backup light switch <M/T>, transaxle control module <CVT>, SRS-ECU and transmission range switch <CVT>
19	Fusible link No.37		15	Blue	Accessory socket (rear floor console)
20	Fusible link No.34	Fusible link	30	Pink	Front power window motor (RH), power window main switch and rear power window motor
21	Fusible link No.37		30	Pink	Rear window defogger
22	Rear window defogger relay	Fuse	7.5	Brown	Door mirror assembly
23	Fusible link No.34		–	–	–
24			–	–	–
25			30	Green	Heated seat

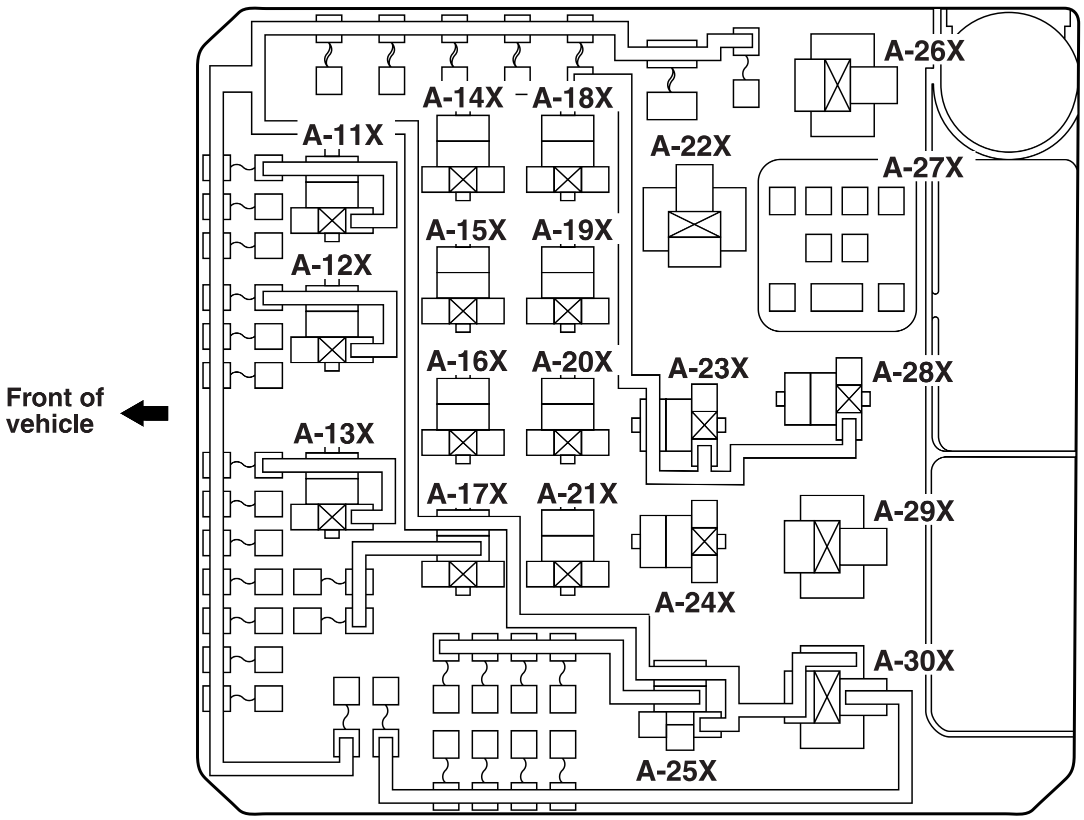
Fuse box in ETACS-ECU



CENTRALIZED RELAY

Connector No.	Name	Connector No.	Name
A-11X	Fog light relay	A-21X	Injector relay
A-12X	Horn relay	A-22X	–
A-13X	A/C compressor clutch relay	A-23X	Condenser fan relay
A-14X	–	A-24X	Stater relay
A-15X	CVT control relay	A-25X	Headlight relay (Low)
A-16X	–	A-26X	Radiator fan relay
A-17X	Headlight relay (High)	A-27X	–
A-18X	Throttle actuator control motor relay	A-28X	Fan control relay
A-19X	–	A-29X	–
A-20X	Daytime running light relay	A-30X	MFI relay

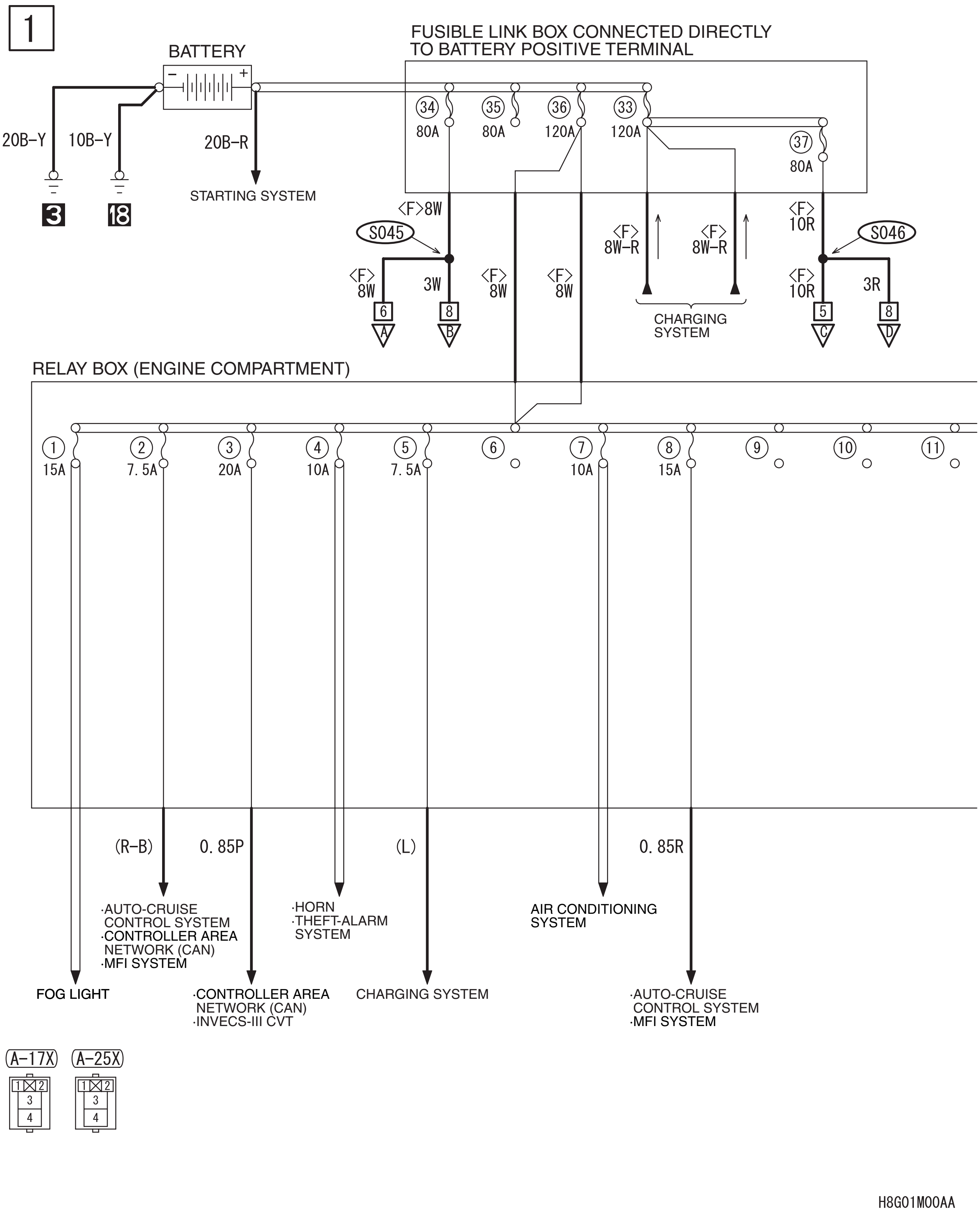
Relay box in engine room

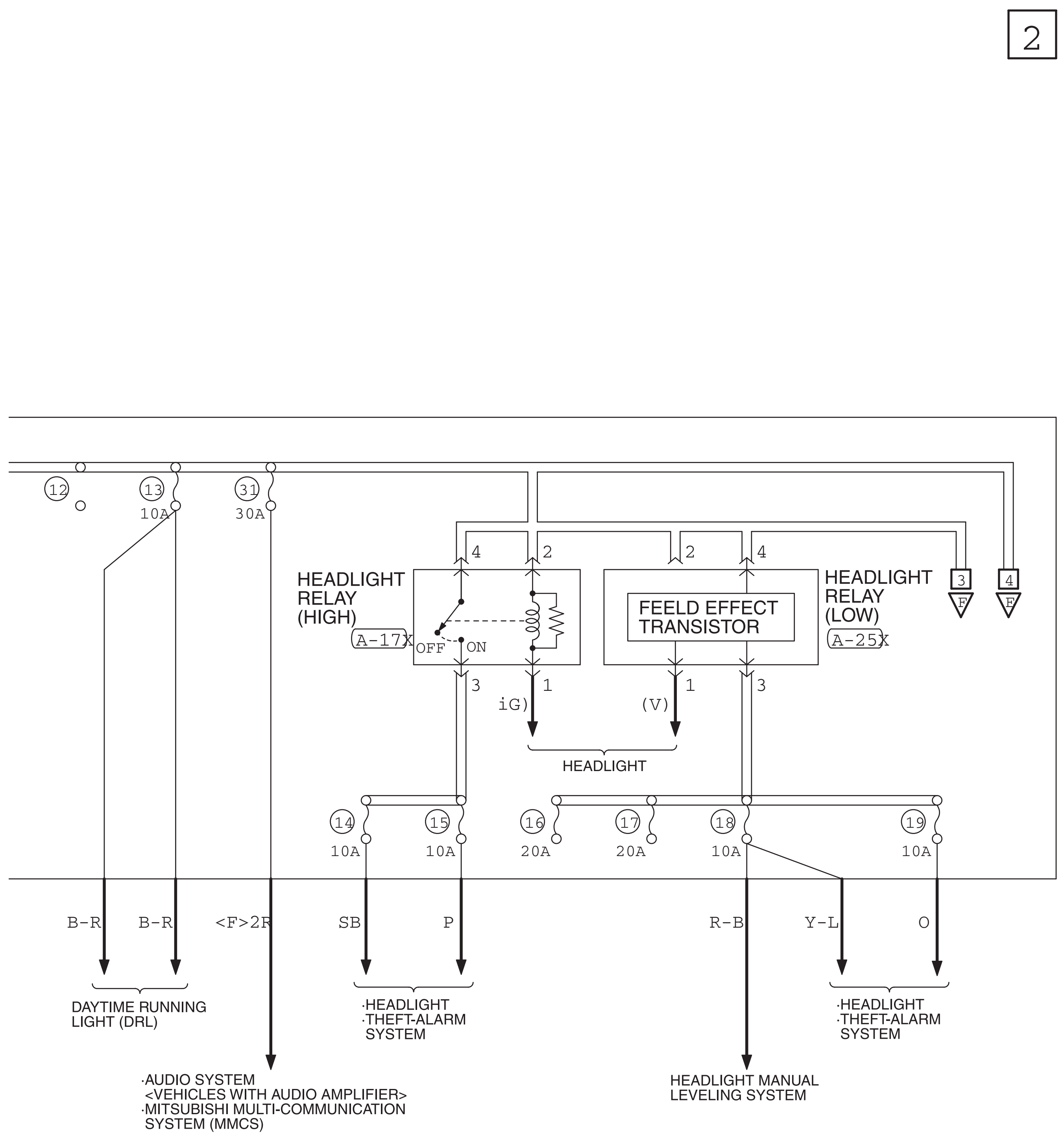


AC506808AH

POWER DISTRIBUTION SYSTEM

M1901000402723

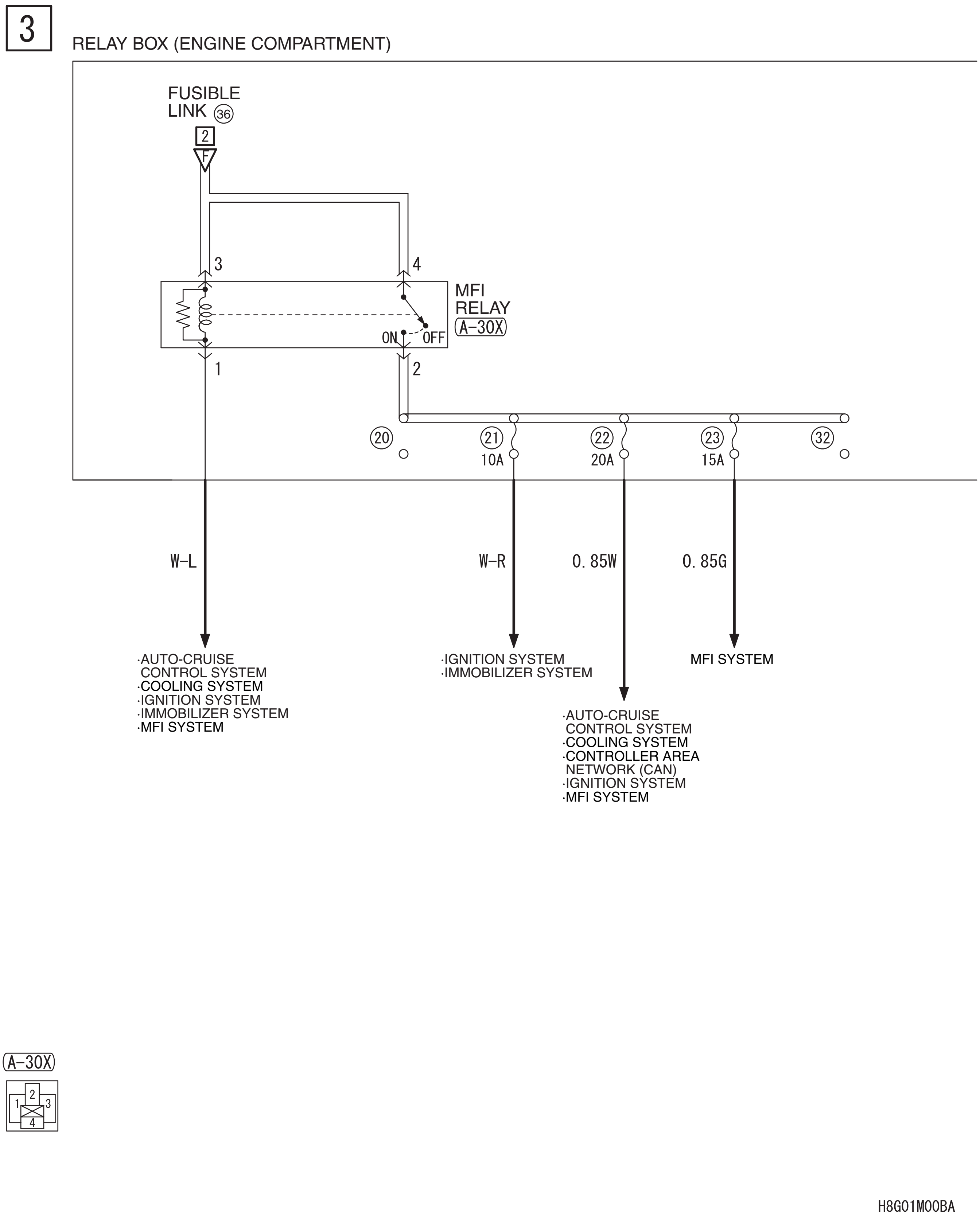


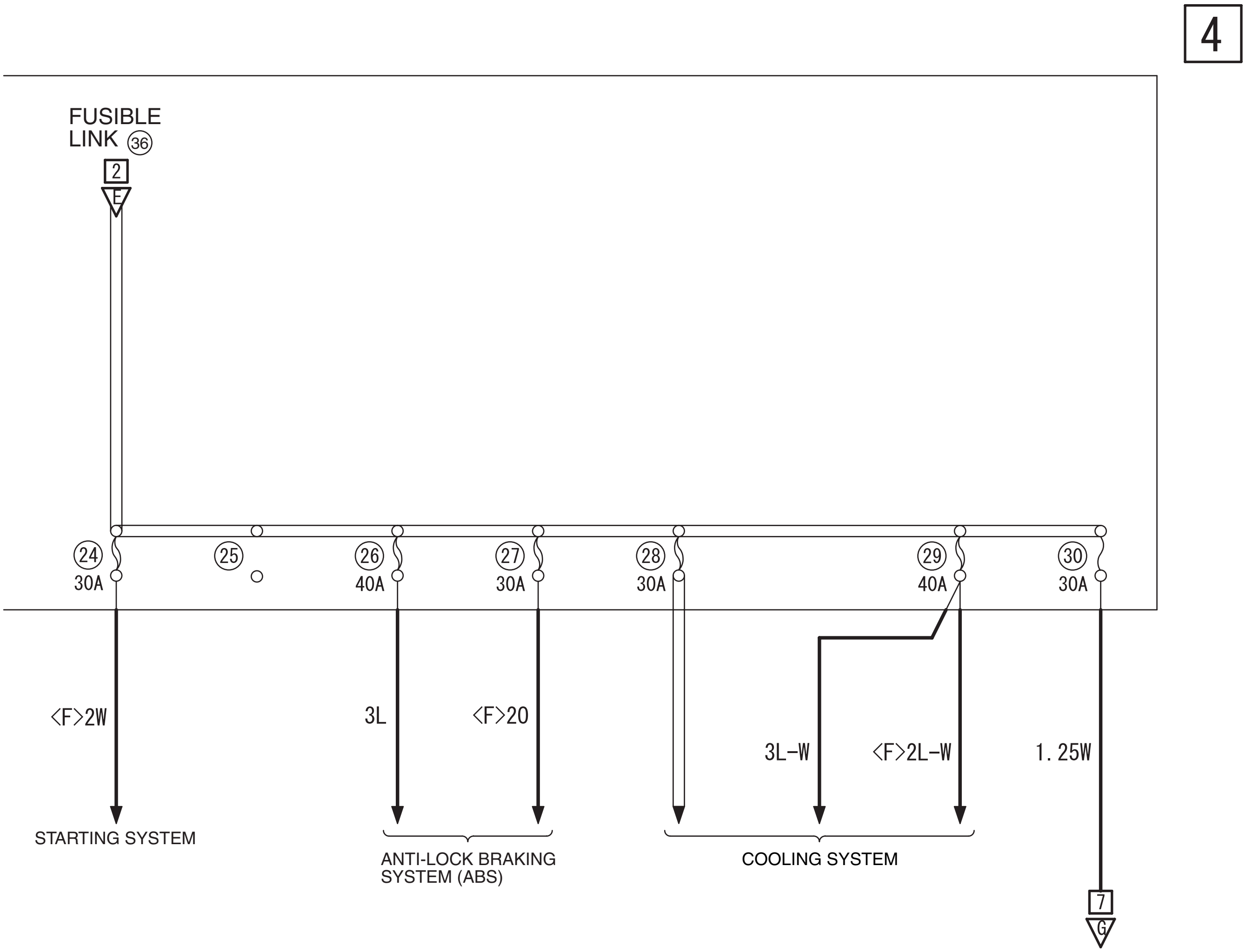


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G01M00AB

POWER DISTRIBUTION SYSTEM (CONTINUED)





WIRE COLOR CODE
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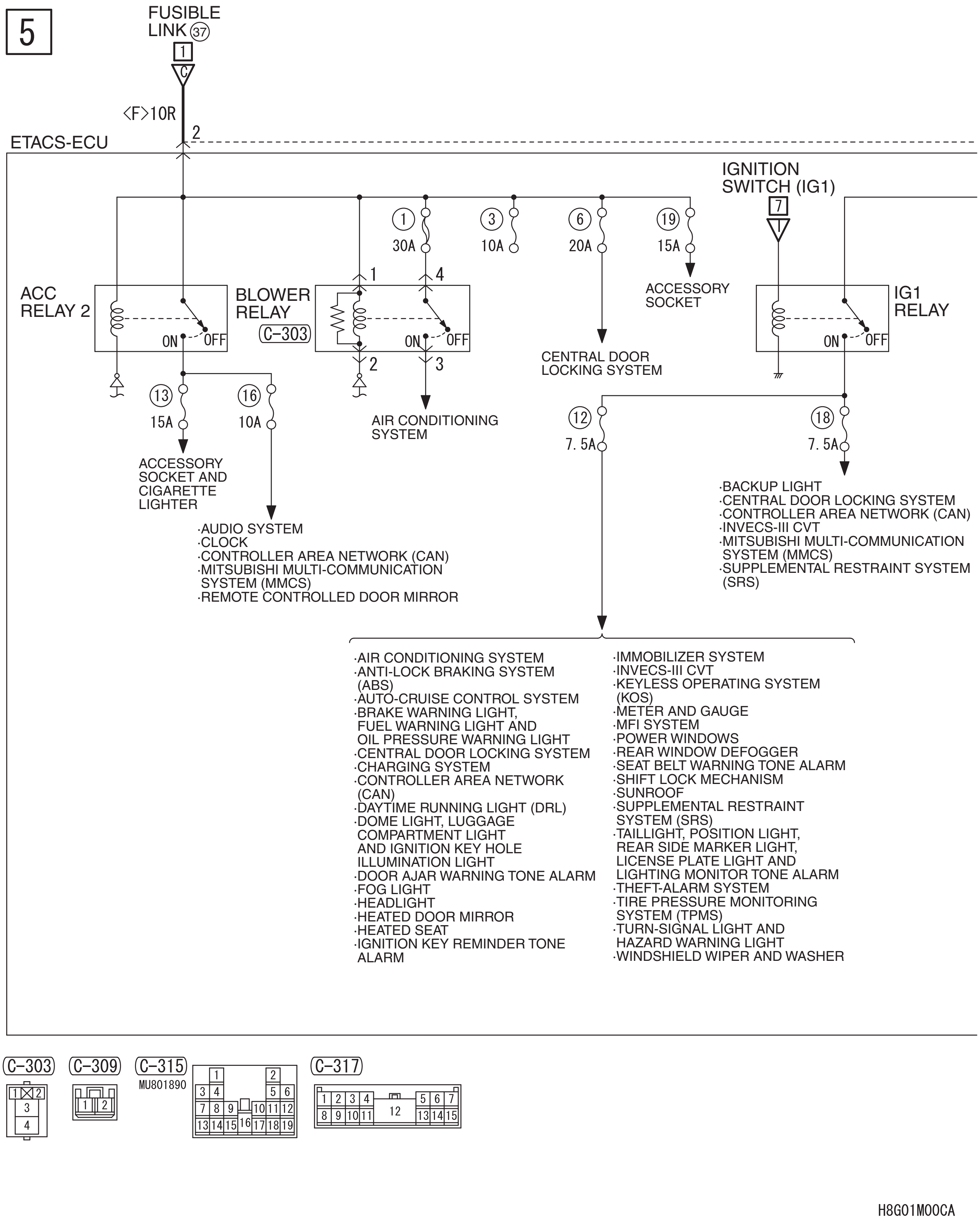
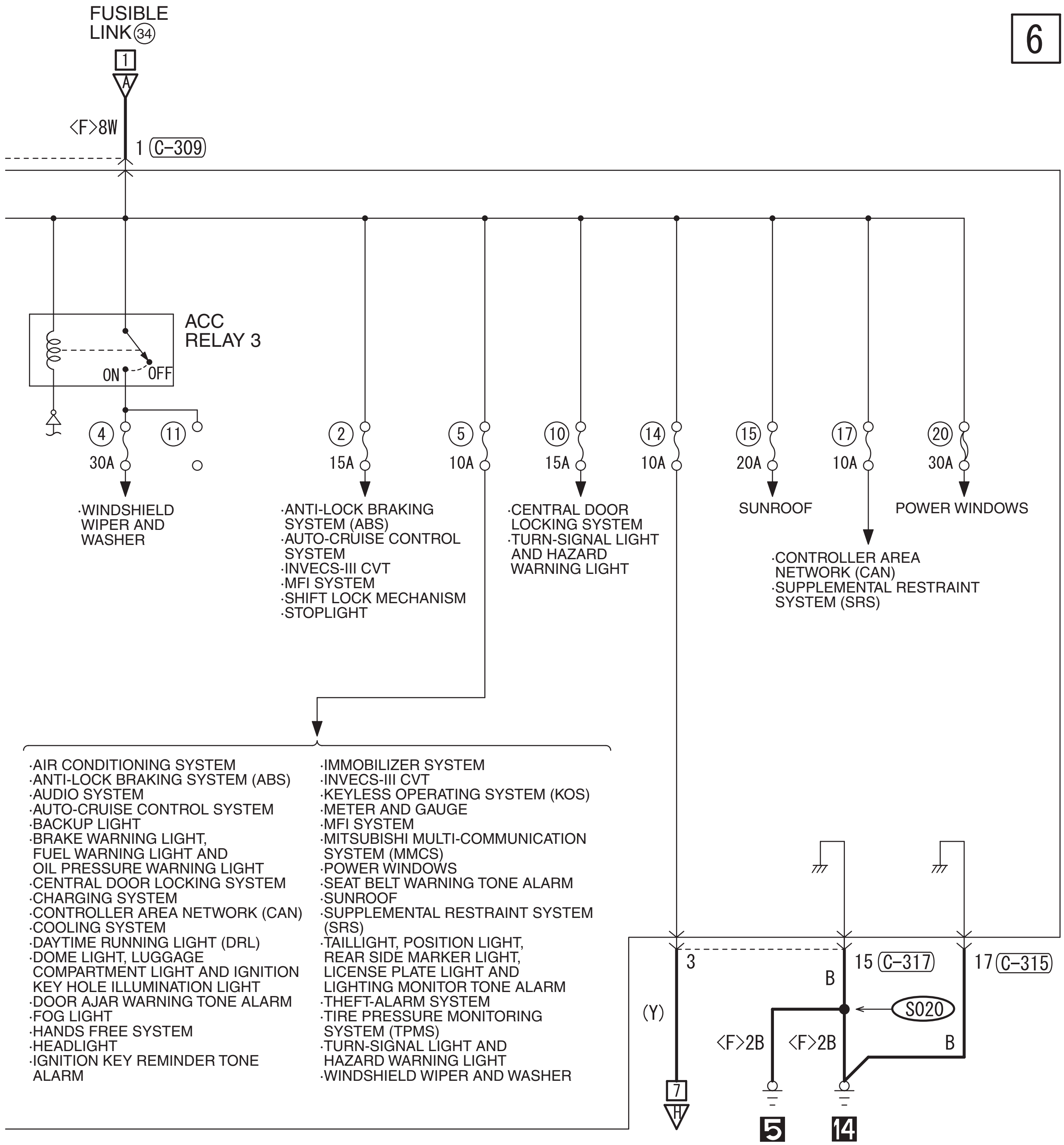
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G01M00BB

POWER DISTRIBUTION SYSTEM (CONTINUED)





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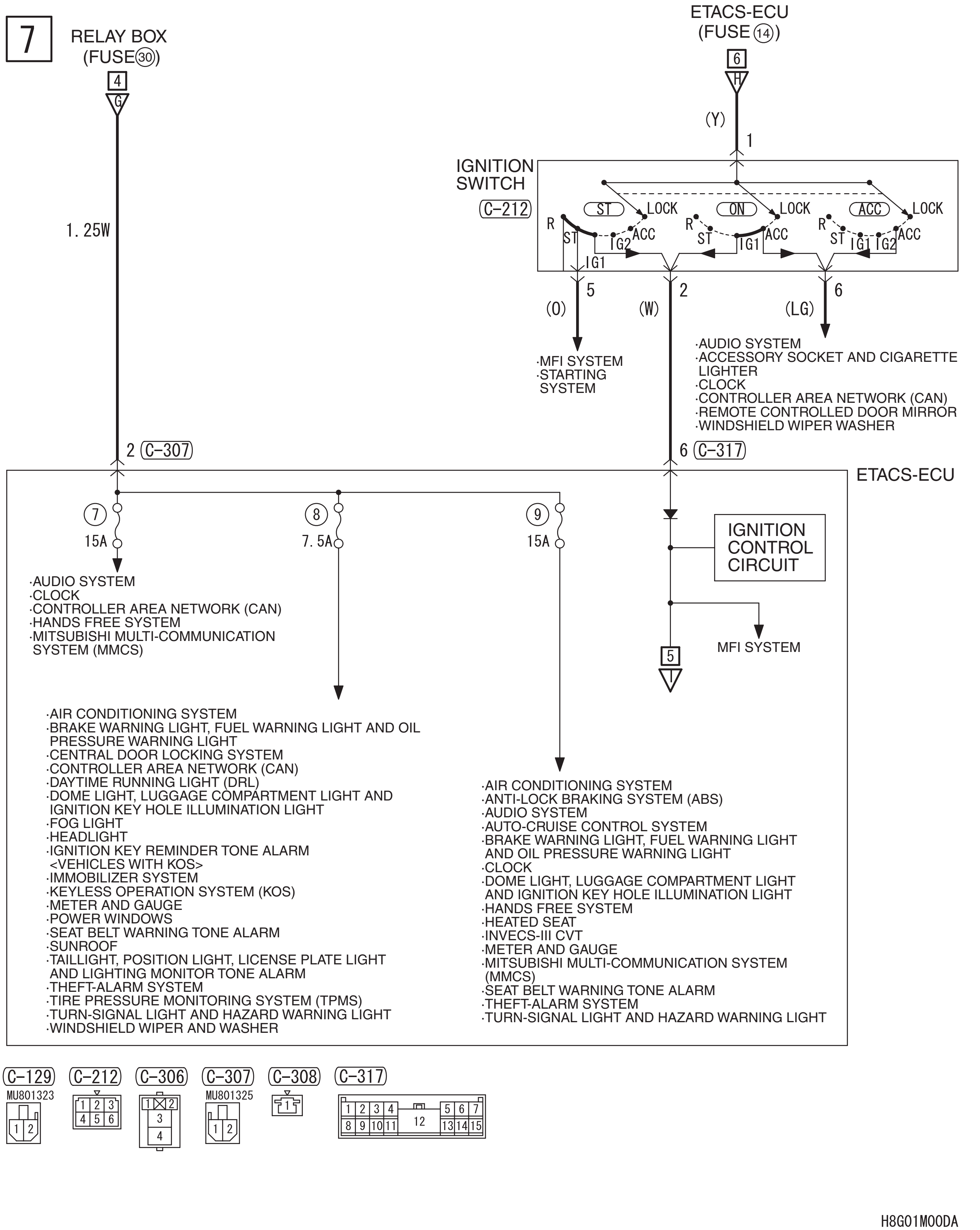
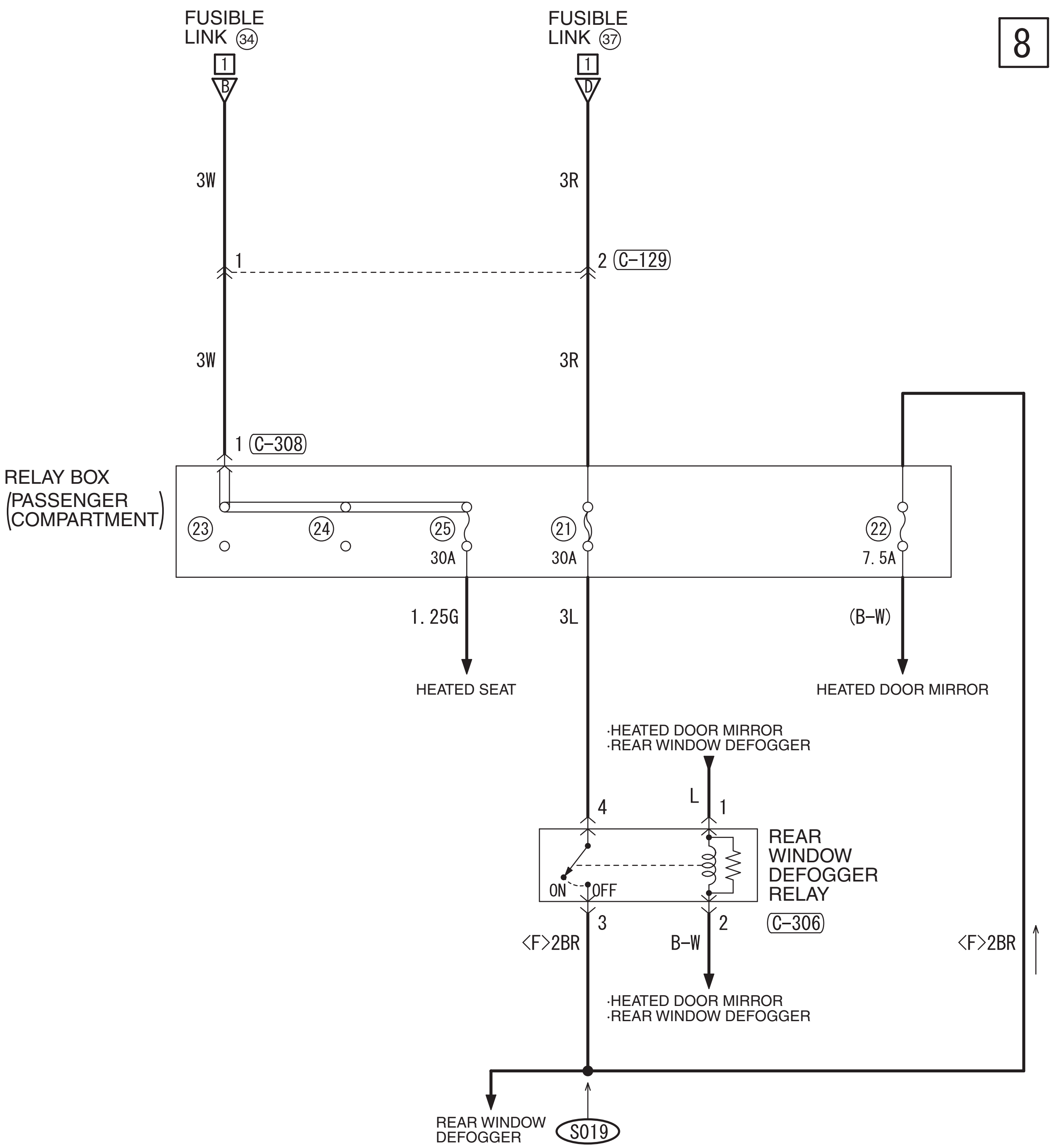
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G01M00CB

POWER DISTRIBUTION SYSTEM (CONTINUED)





WIRE COLOR CODE
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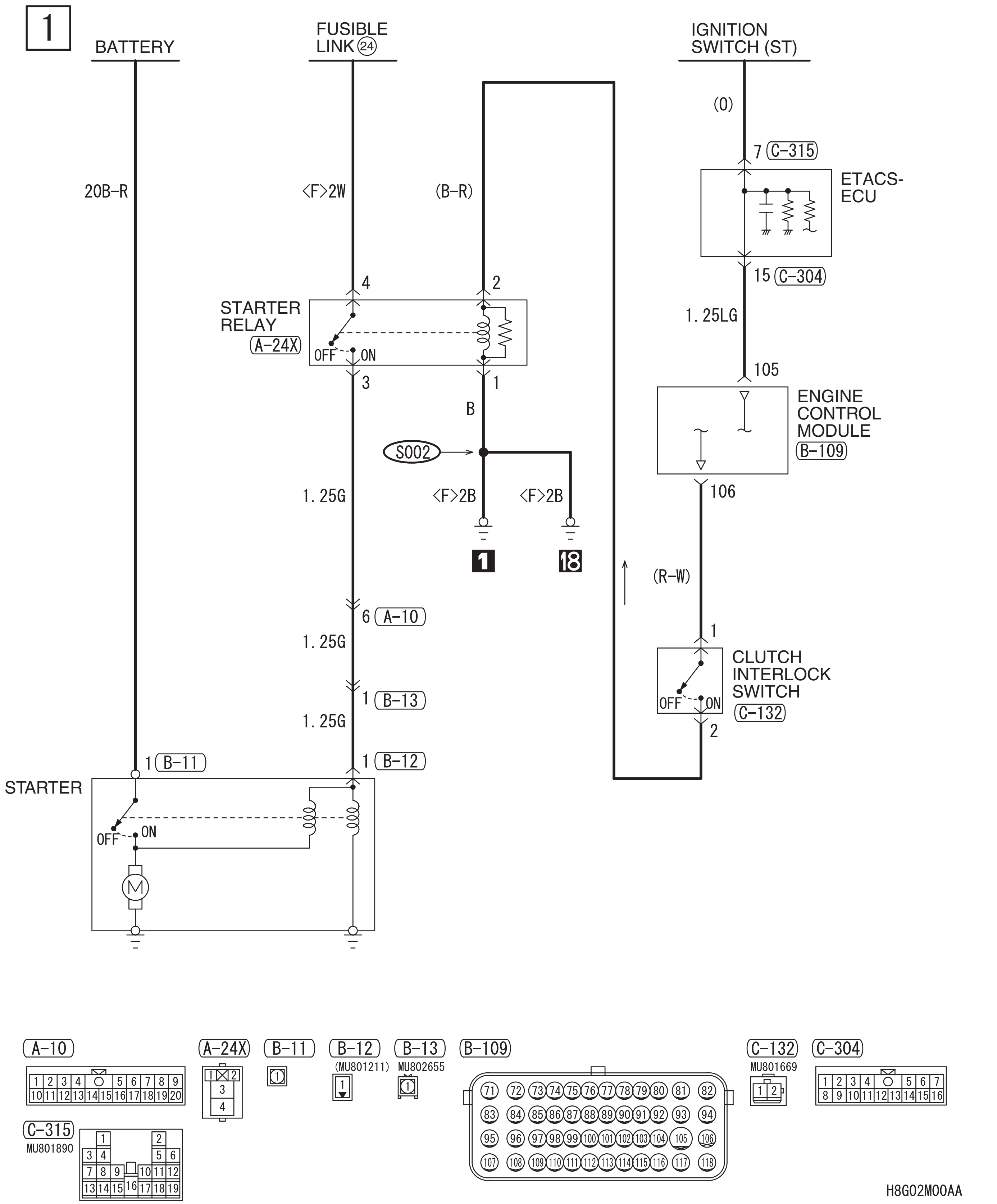
H8G01M00DB

STARTING SYSTEM <M/T>

M1901000502946



STARTING SYSTEM <CVT>

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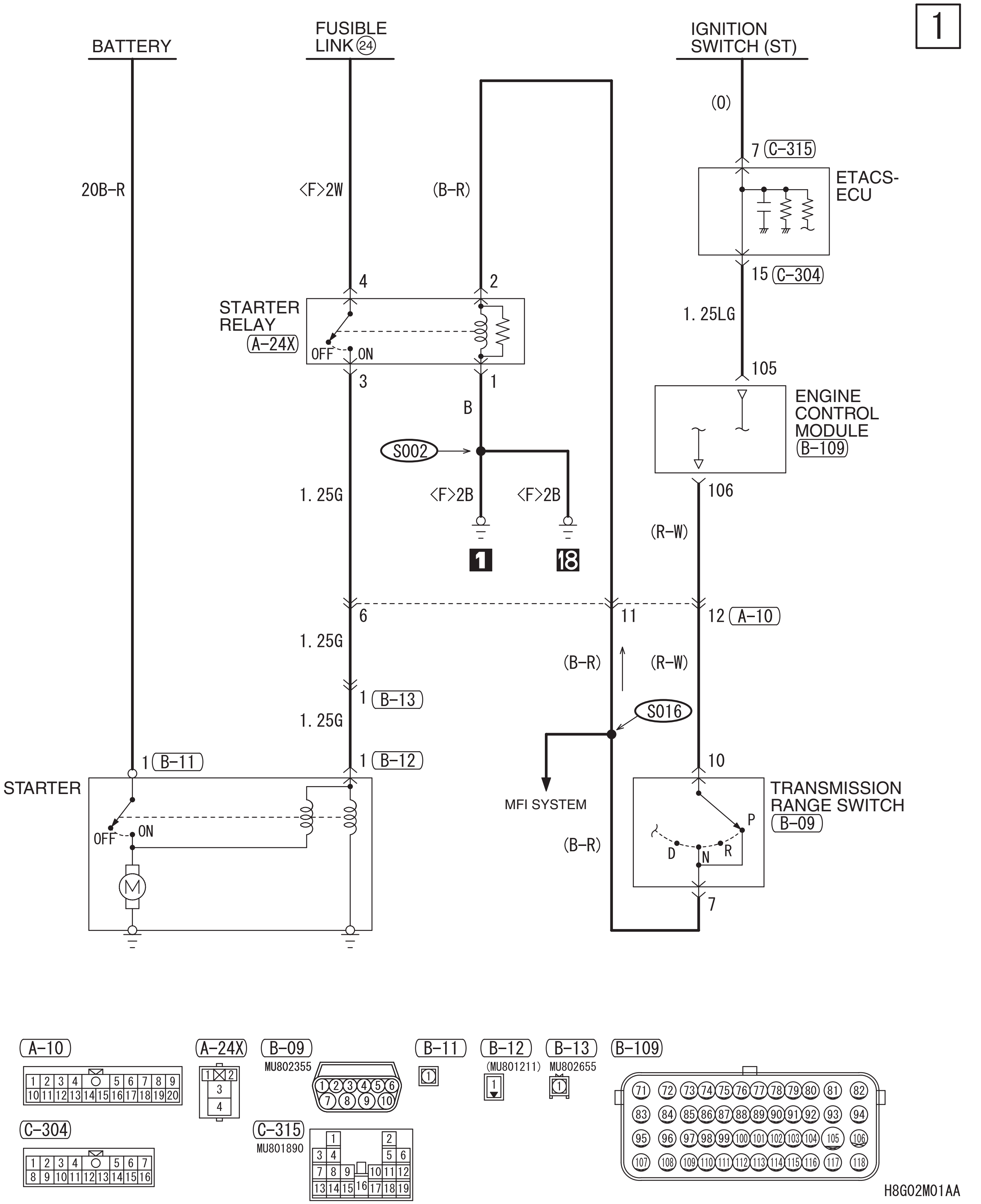
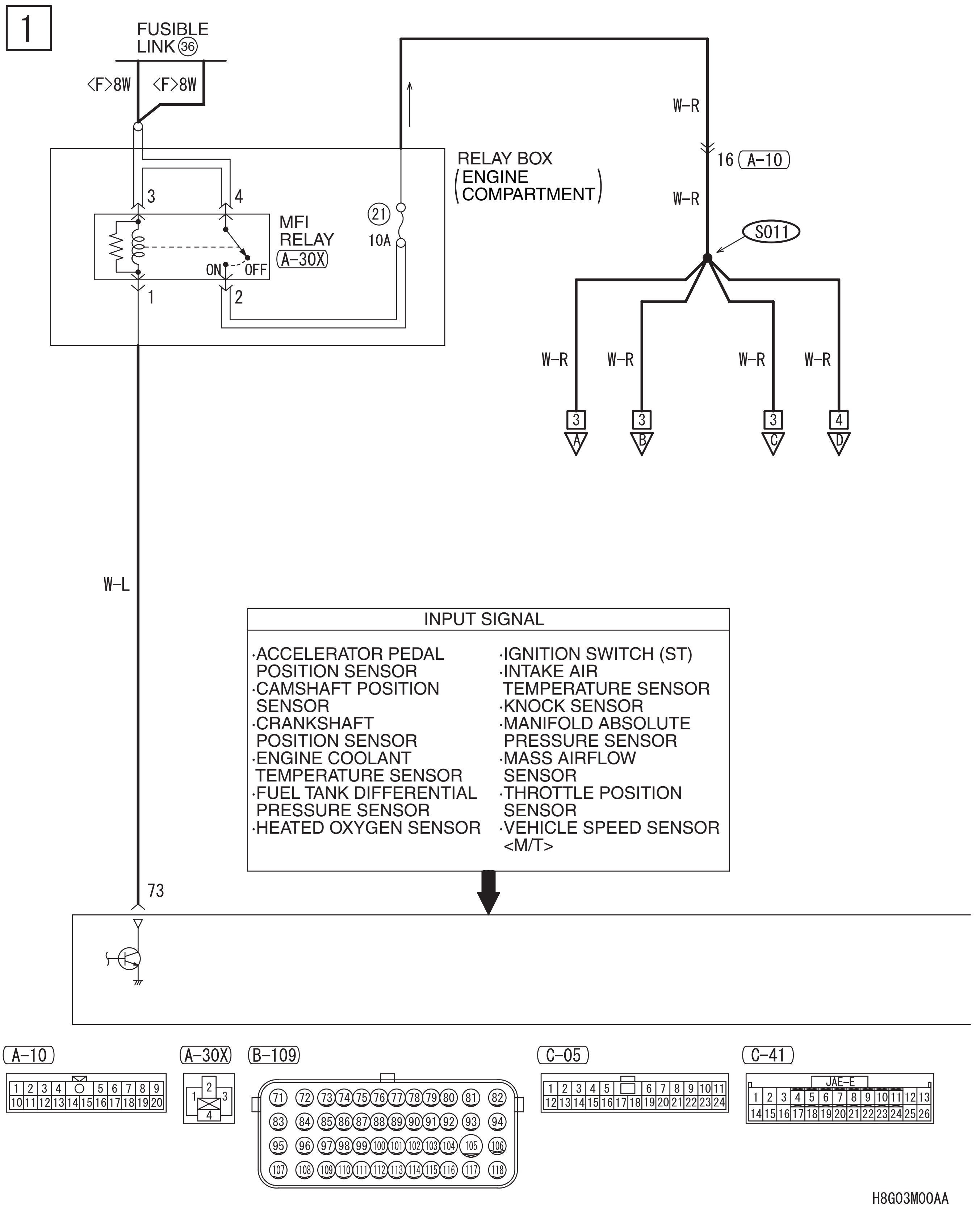
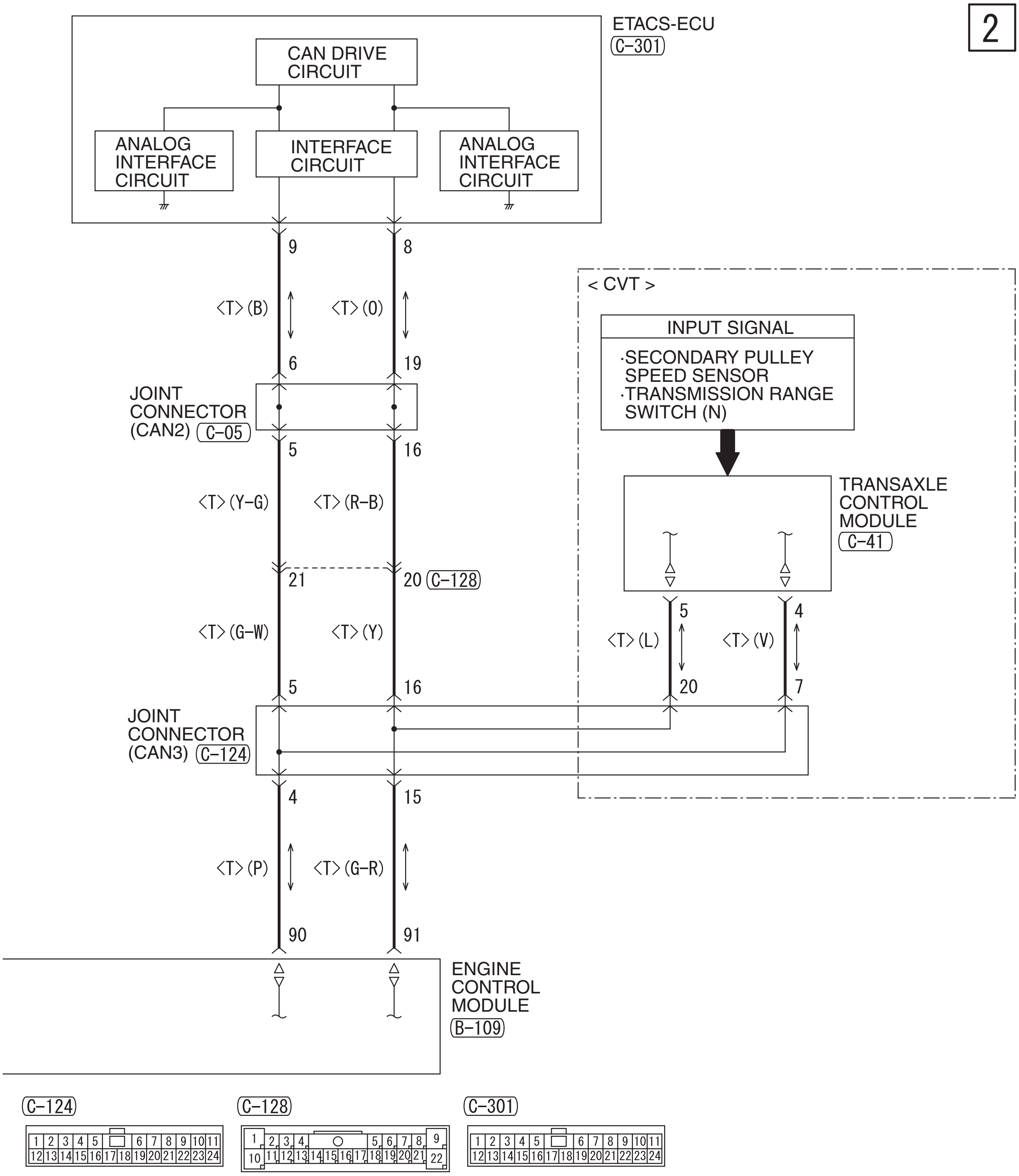


IGNITION SYSTEM

M1901000603849



TSB Revision



WIRE COLOR CODE
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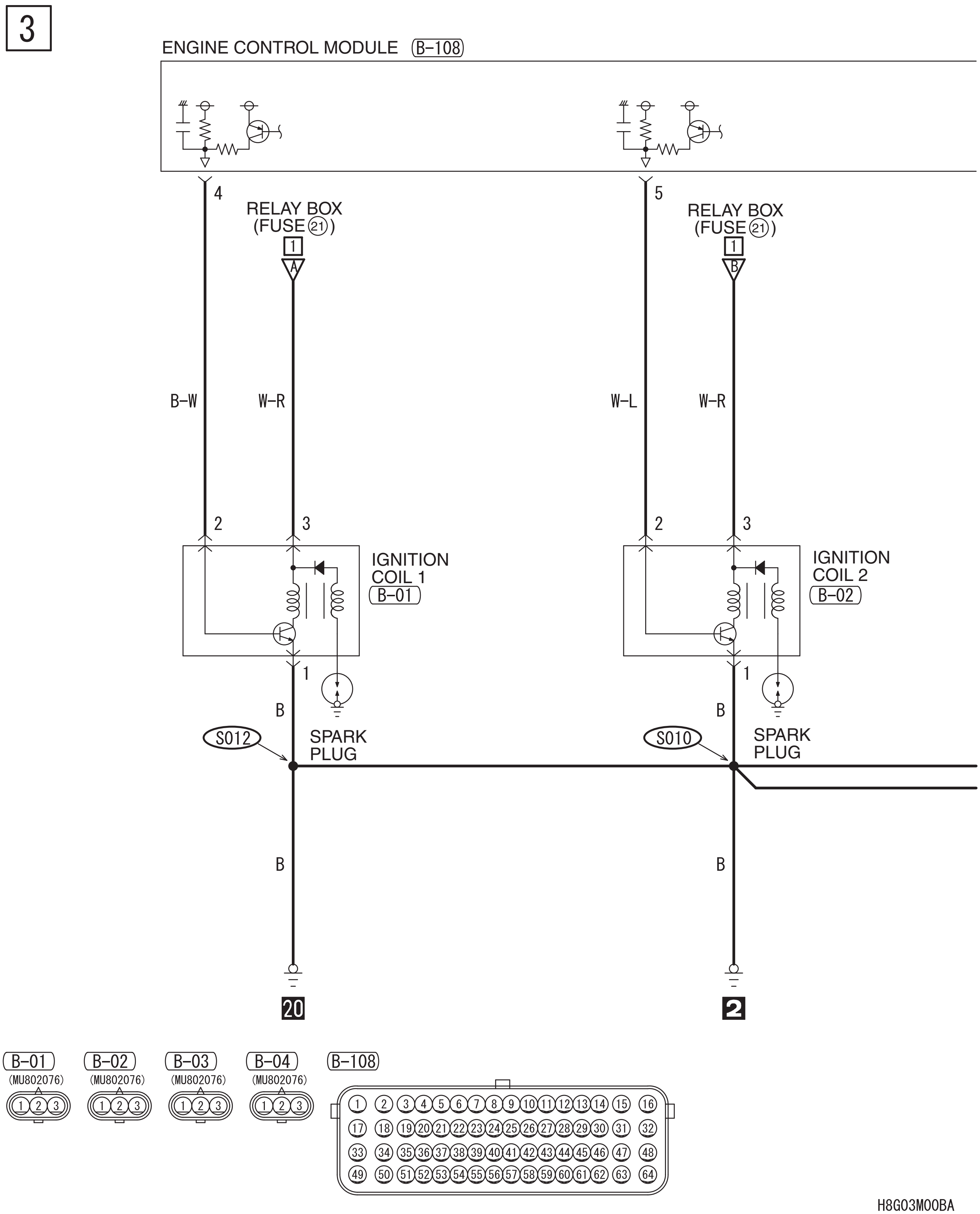
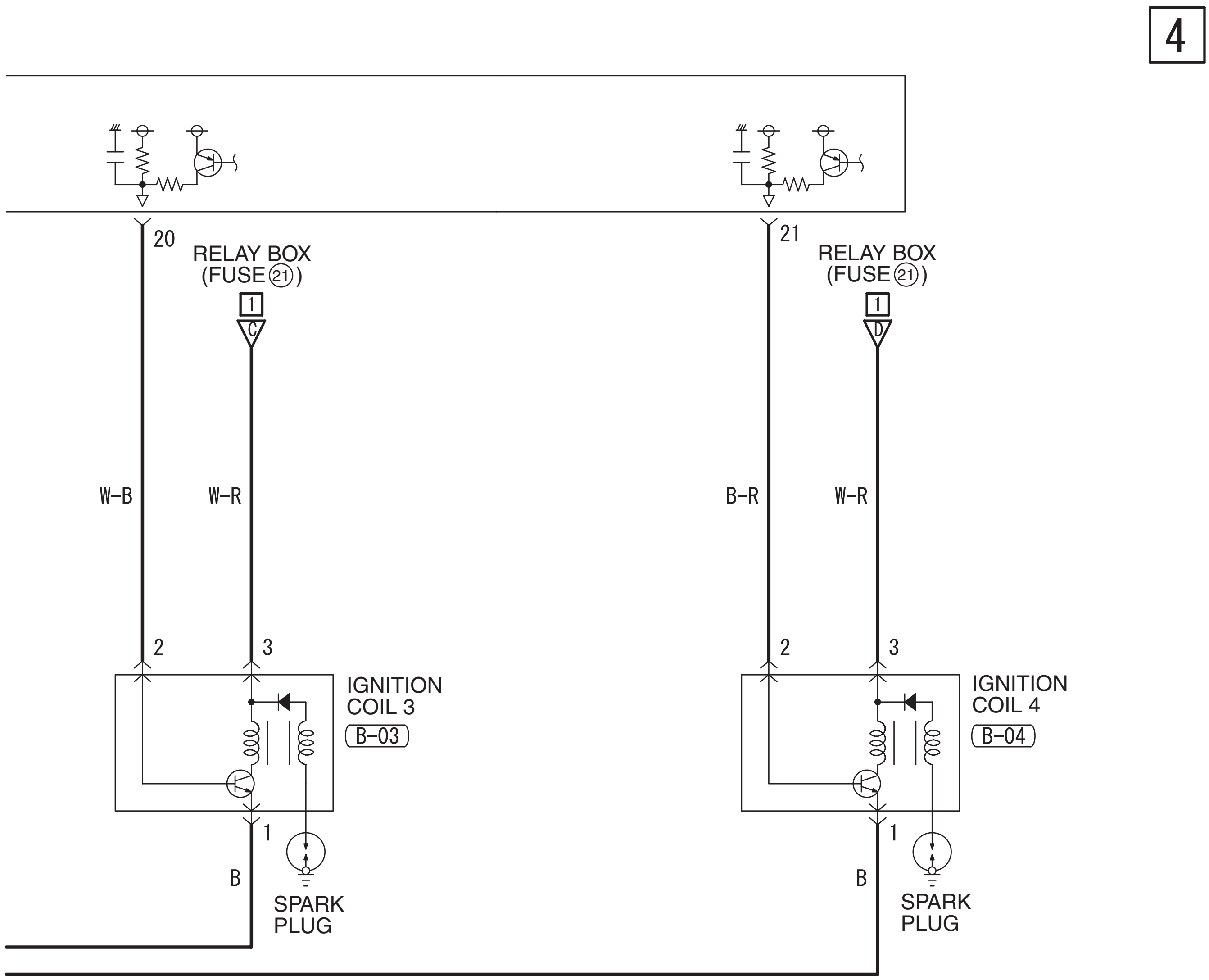
H8G03M00AB

IGNITION SYSTEM (CONTINUED)





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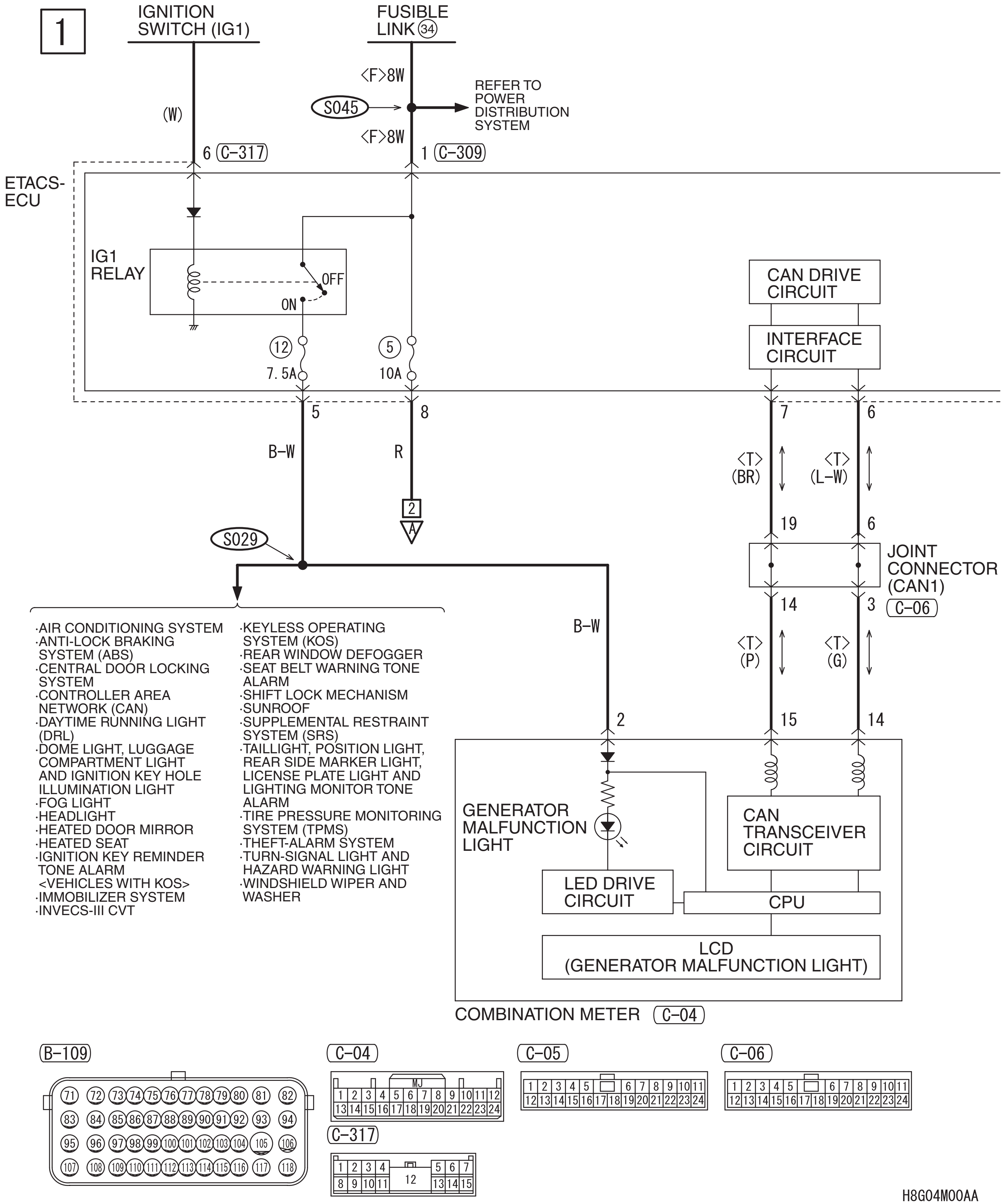
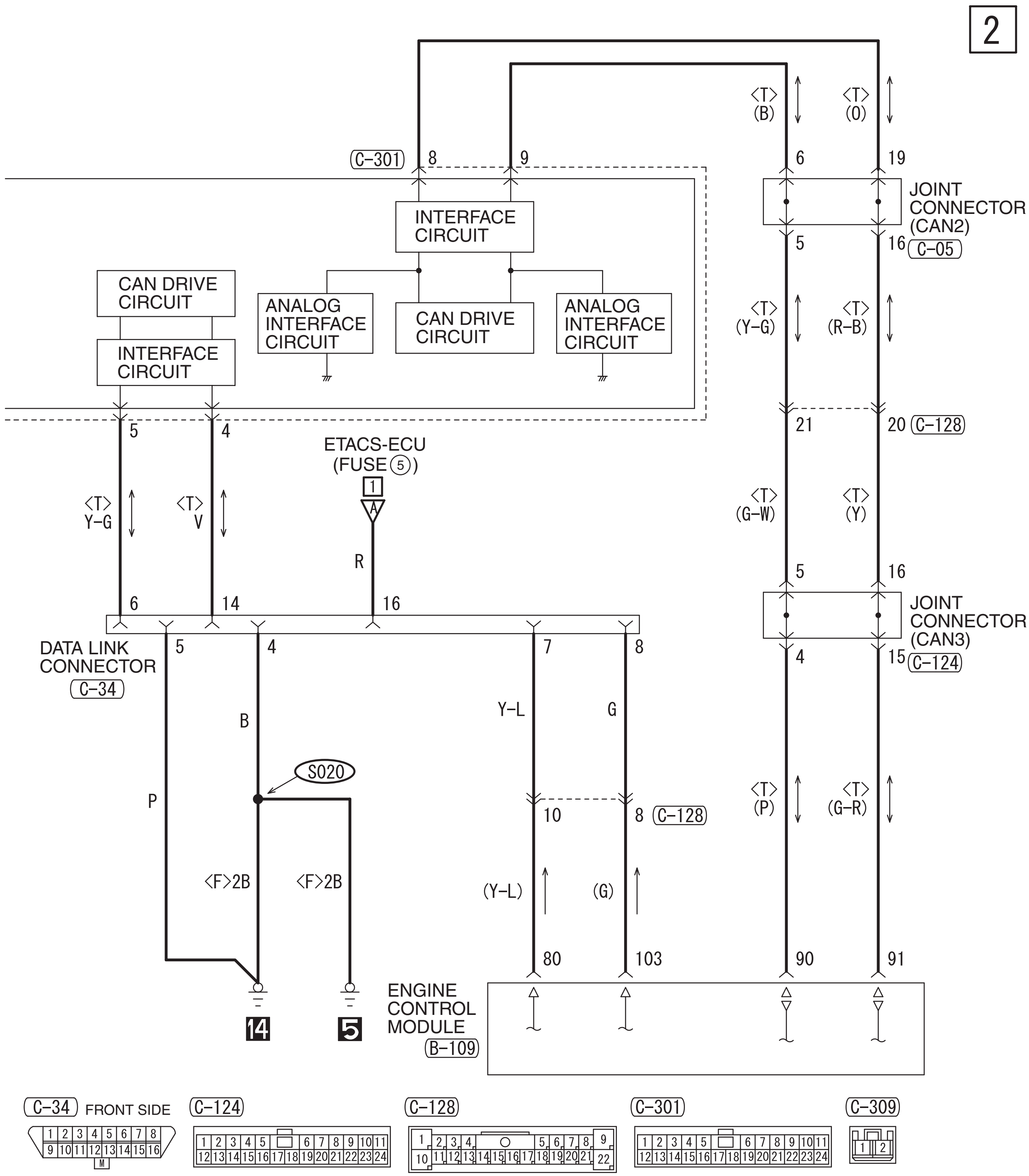
H8G03M00BB

CHARGING SYSTEM

M1901000703006





WIRE COLOR CODE
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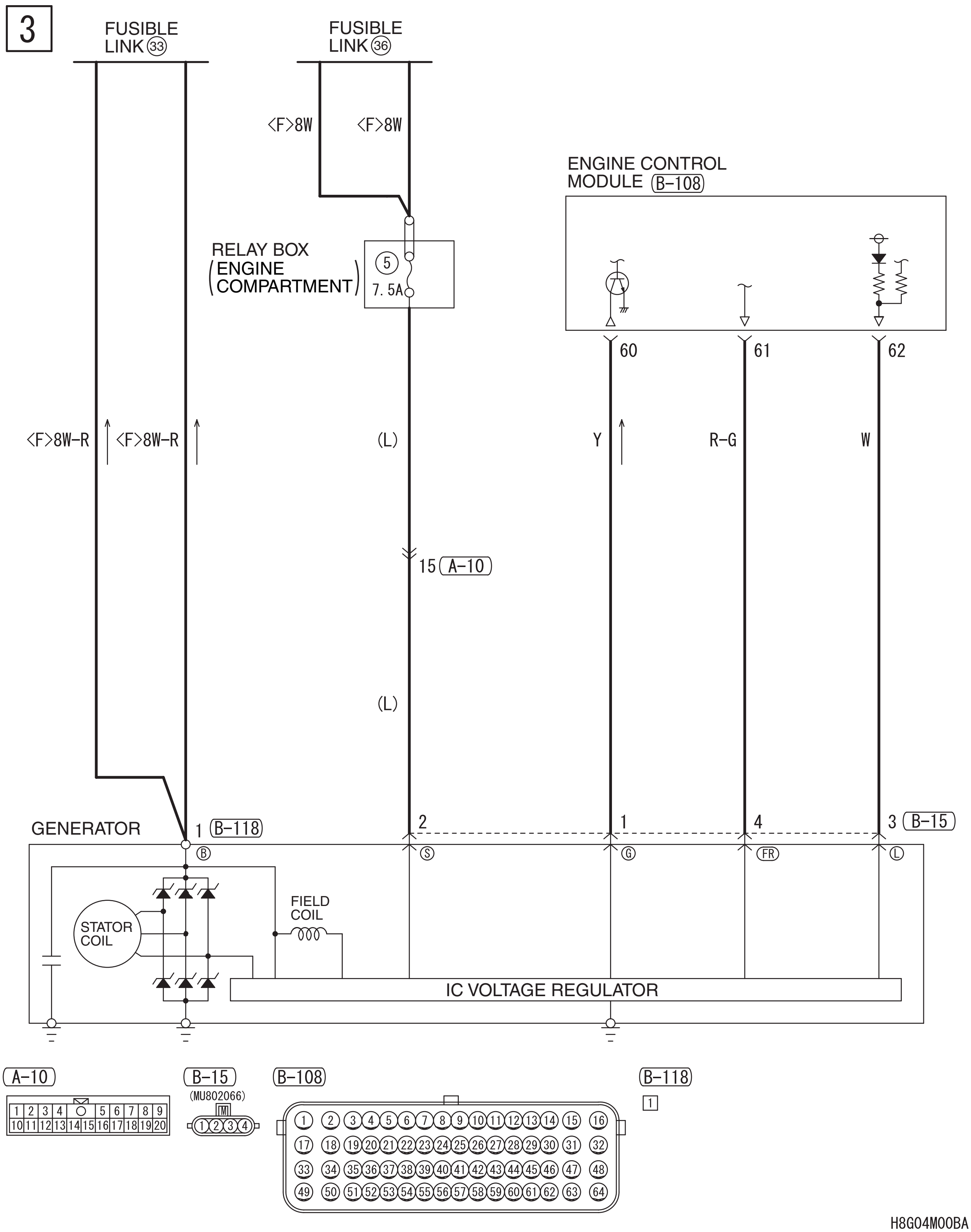
H8G04M00AB

CHARGING SYSTEM (CONTINUED)



NOTES

MFI SYSTEM

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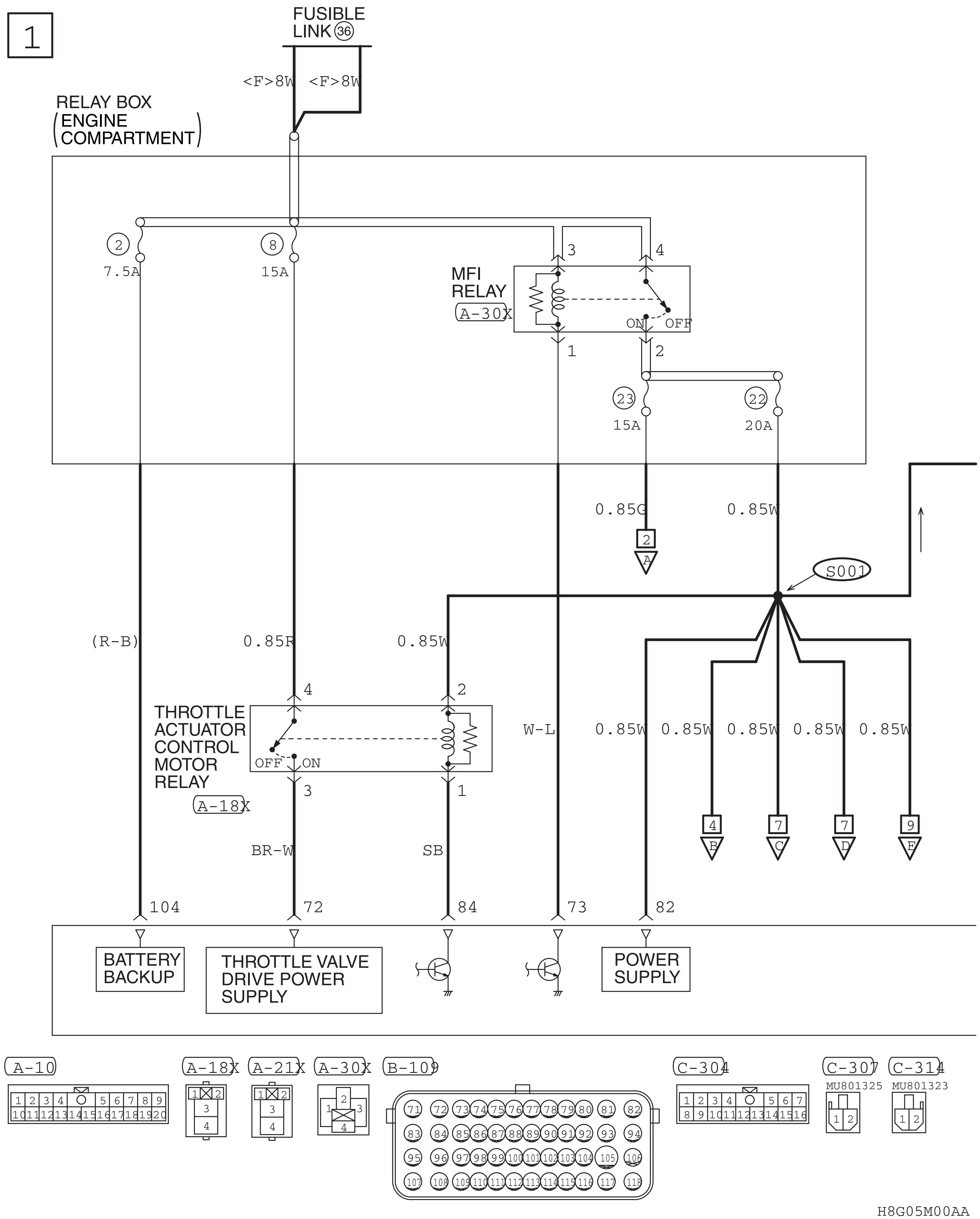
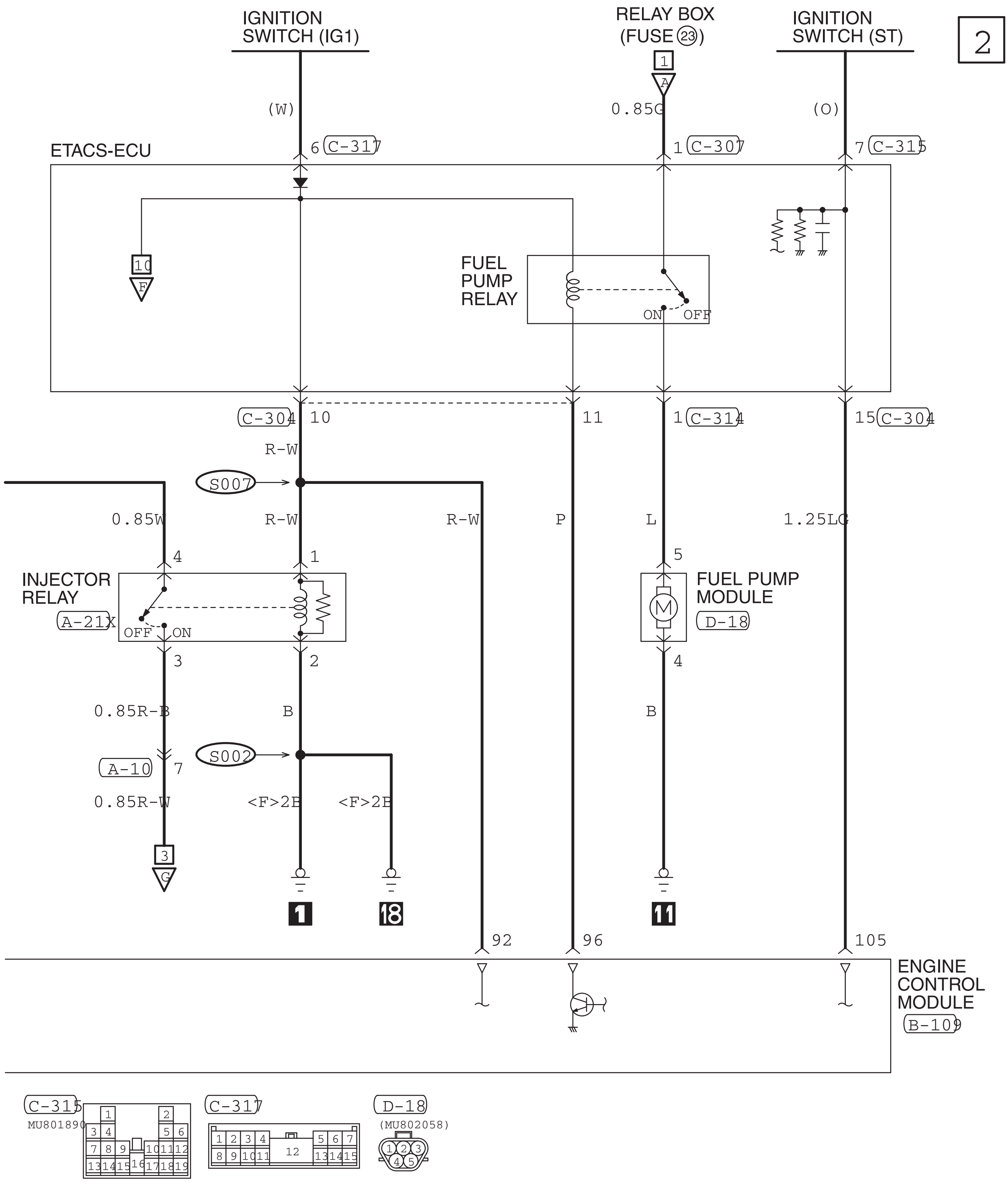
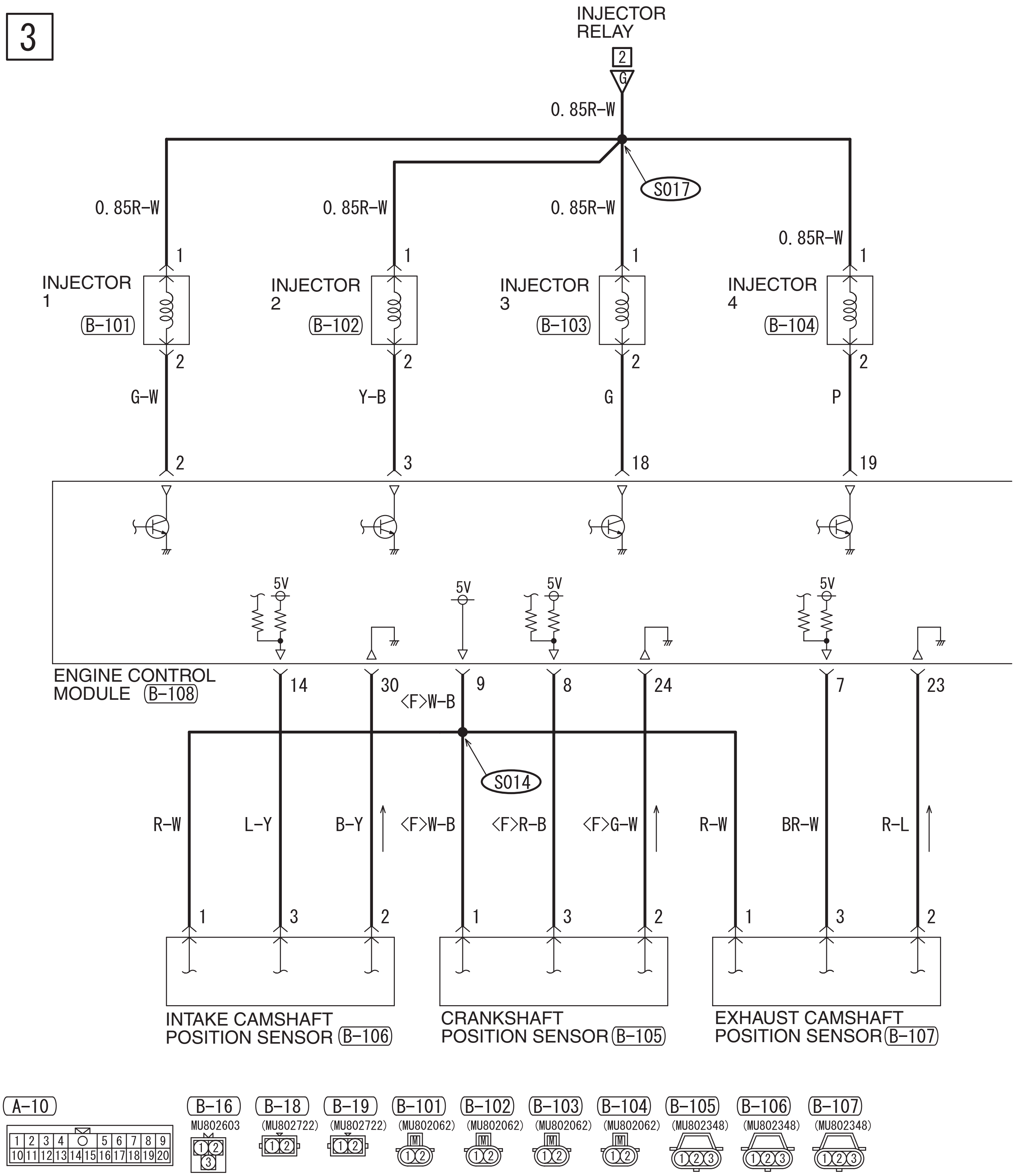




WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G05M00AB

MFI SYSTEM (CONTINUED)



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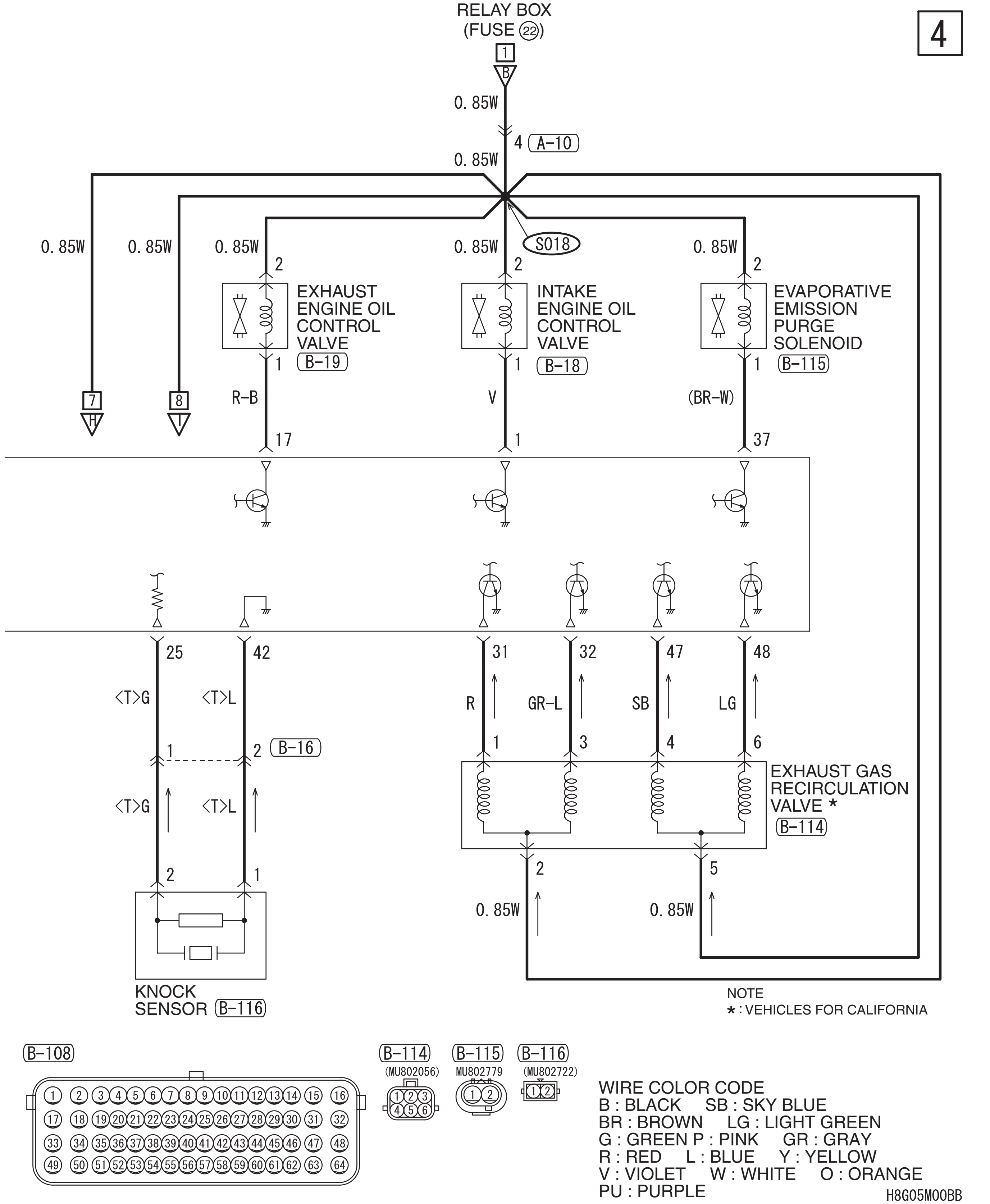
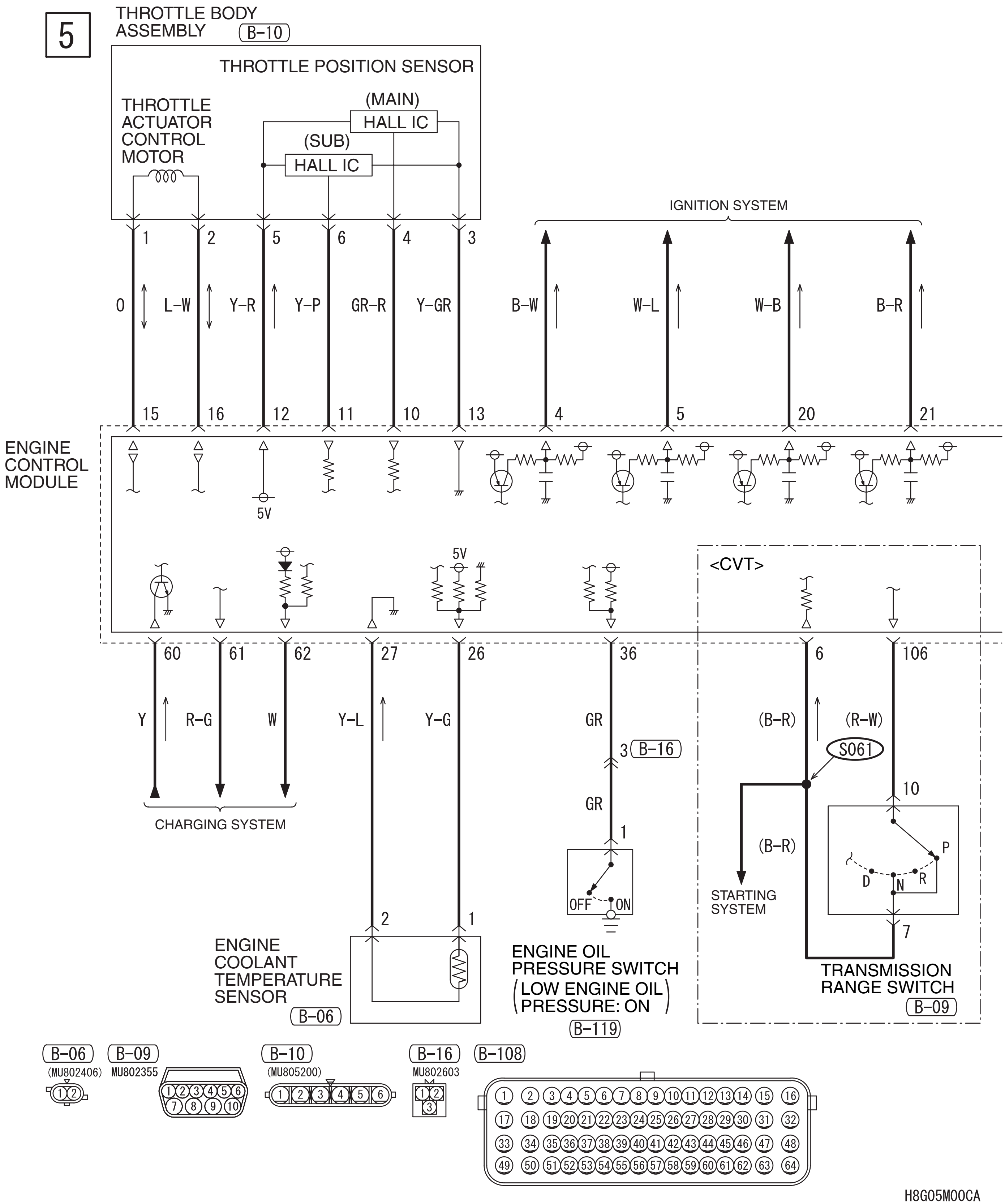
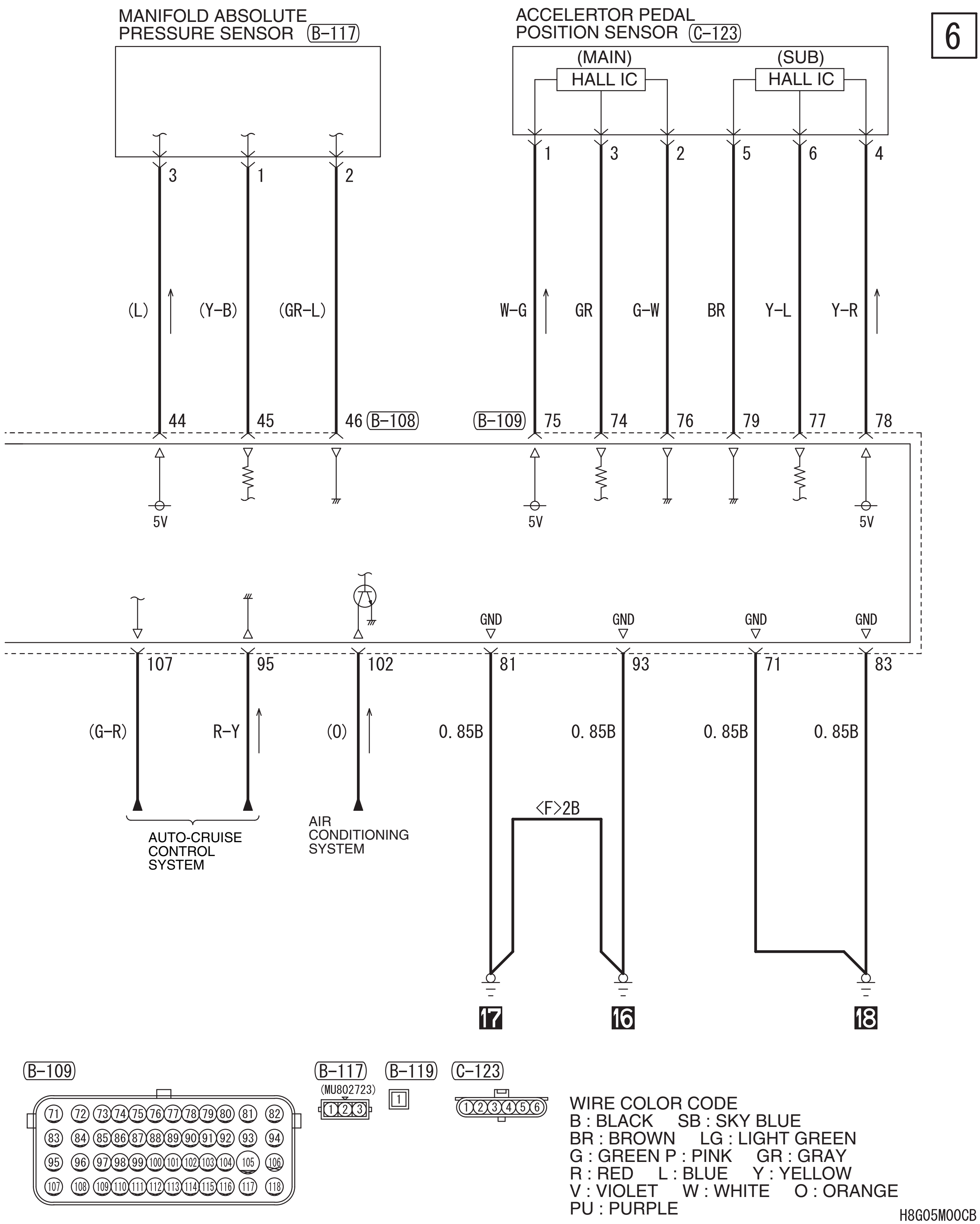
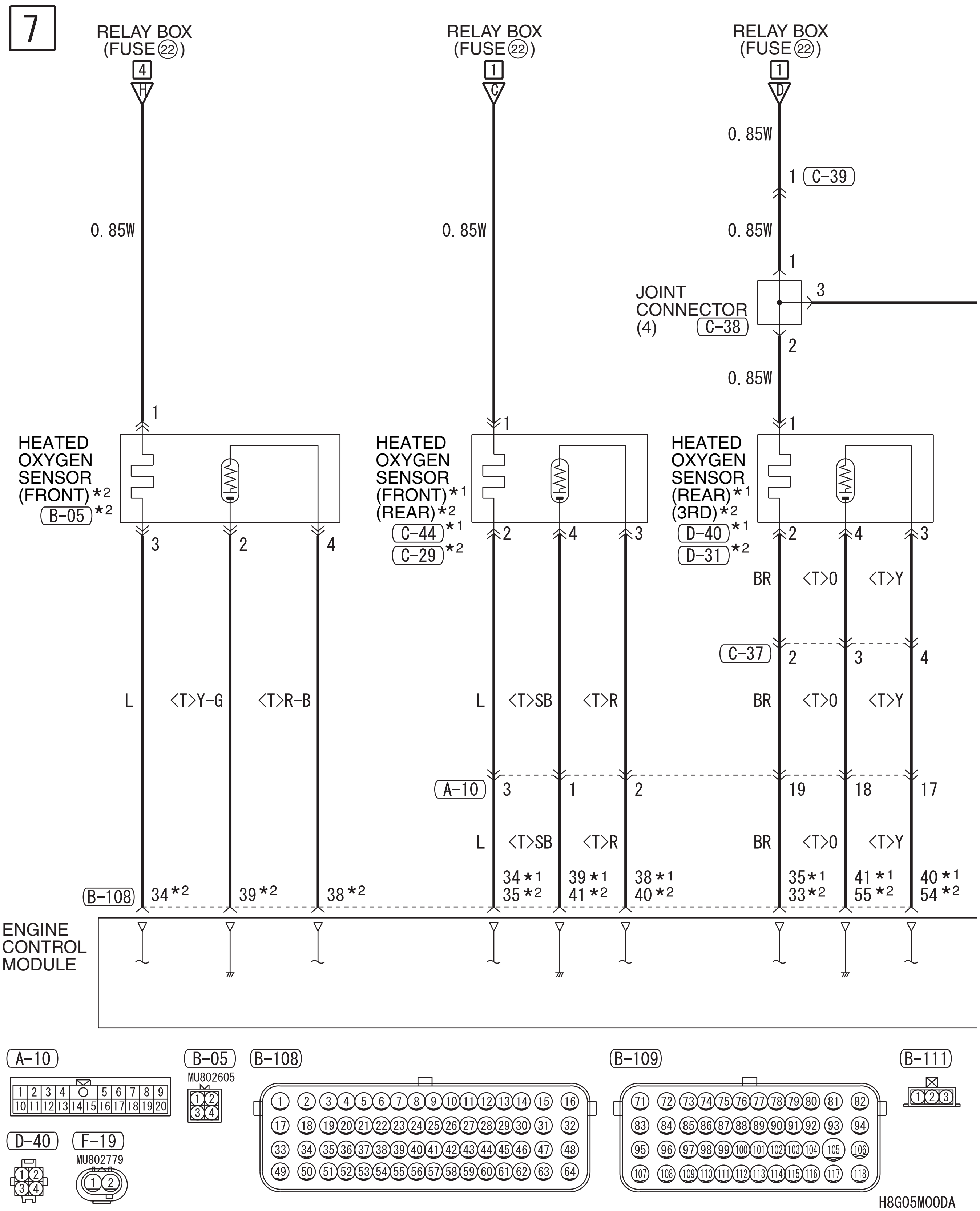

4
RELAY BOX
(FUSE 22)
1
B
0.85W
4 A-10
0.85W
0.85W
0.85W
0.85W
0.85W
S018
0.85W
2
EXHAUST
ENGINE OIL
CONTROL
VALVE
1 B-19
2
INTAKE
ENGINE OIL
CONTROL
VALVE
1 B-18
2
EVAPORATIVE
EMISSION
PURGE
SOLENOID
1 B-115
7
H
8
I
R-B
V
(BR-W)
17
1
37
25
42
31
32
47
48
<T>G
<T>L
R
GR-L
SB
LG
1
2 B-16
1
3
4
6
EXHAUST GAS
RECIRCULATION
VALVE *
B-114
<T>G
<T>L
2
5
2
1
0.85W
0.85W
KNOCK
SENSOR B-116
NOTE
*: VEHICLES FOR CALIFORNIA
B-108
B-114
(MU802056)
B-115
MU802779
B-116
(MU802722)
WIRE COLOR CODE
B : BLACK SB : SKY BLUE
BR : BROWN LG : LIGHT GREEN
G : GREEN P : PINK GR : GRAY
R : RED L : BLUE Y : YELLOW
V : VIOLET W : WHITE O : ORANGE
PU : PURPLE
H8G05M00BB

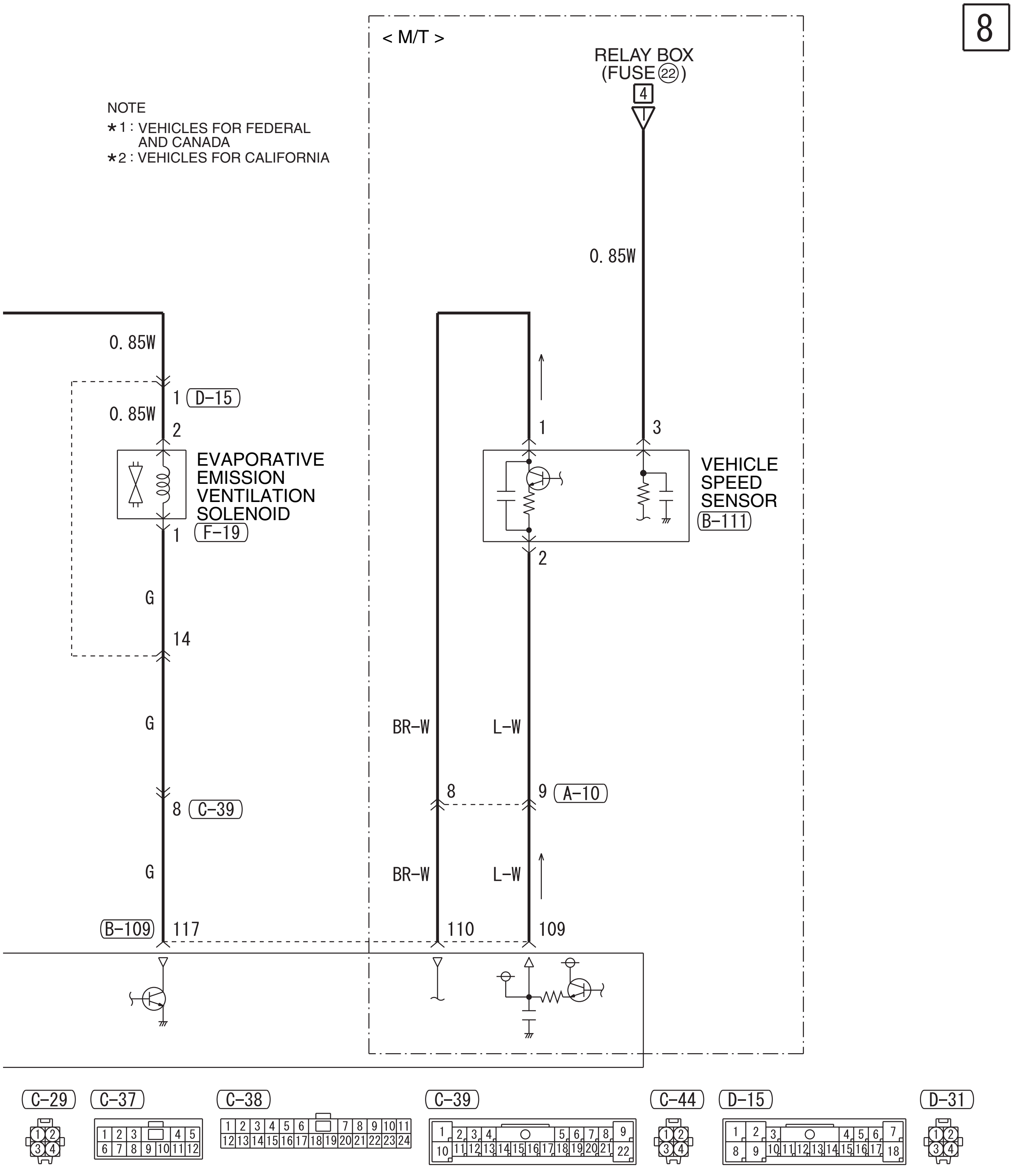
MFI SYSTEM (CONTINUED)




6
MANIFOLD ABSOLUTE PRESSURE SENSOR B-117
ACCELERTOR PEDAL POSITION SENSOR C-123
(MAIN)
HALL IC
(SUB)
HALL IC
3 1 2
1 3 2 5 6 4
(L) (Y-B) (GR-L)
W-G GR G-W BR Y-L Y-R
44 45 46 B-108
B-109 75 74 76 79 77 78
5V 5V 5V
GND GND GND GND
107 95 102 81 93 71 83
(G-R) R-Y (O) 0.85B 0.85B 0.85B 0.85B
<F>2B
AUTO-CRUISE CONTROL SYSTEM
AIR CONDITIONING SYSTEM
17 16 18
B-109
B-117 (MU802723)
B-119
C-123
WIRE COLOR CODE
B : BLACK SB : SKY BLUE
BR : BROWN LG : LIGHT GREEN
G : GREEN P : PINK GR : GRAY
R : RED L : BLUE Y : YELLOW
V : VIOLET W : WHITE O : ORANGE
PU : PURPLE
H8G05M00CB

MFI SYSTEM (CONTINUED)





WIRE COLOR CODE
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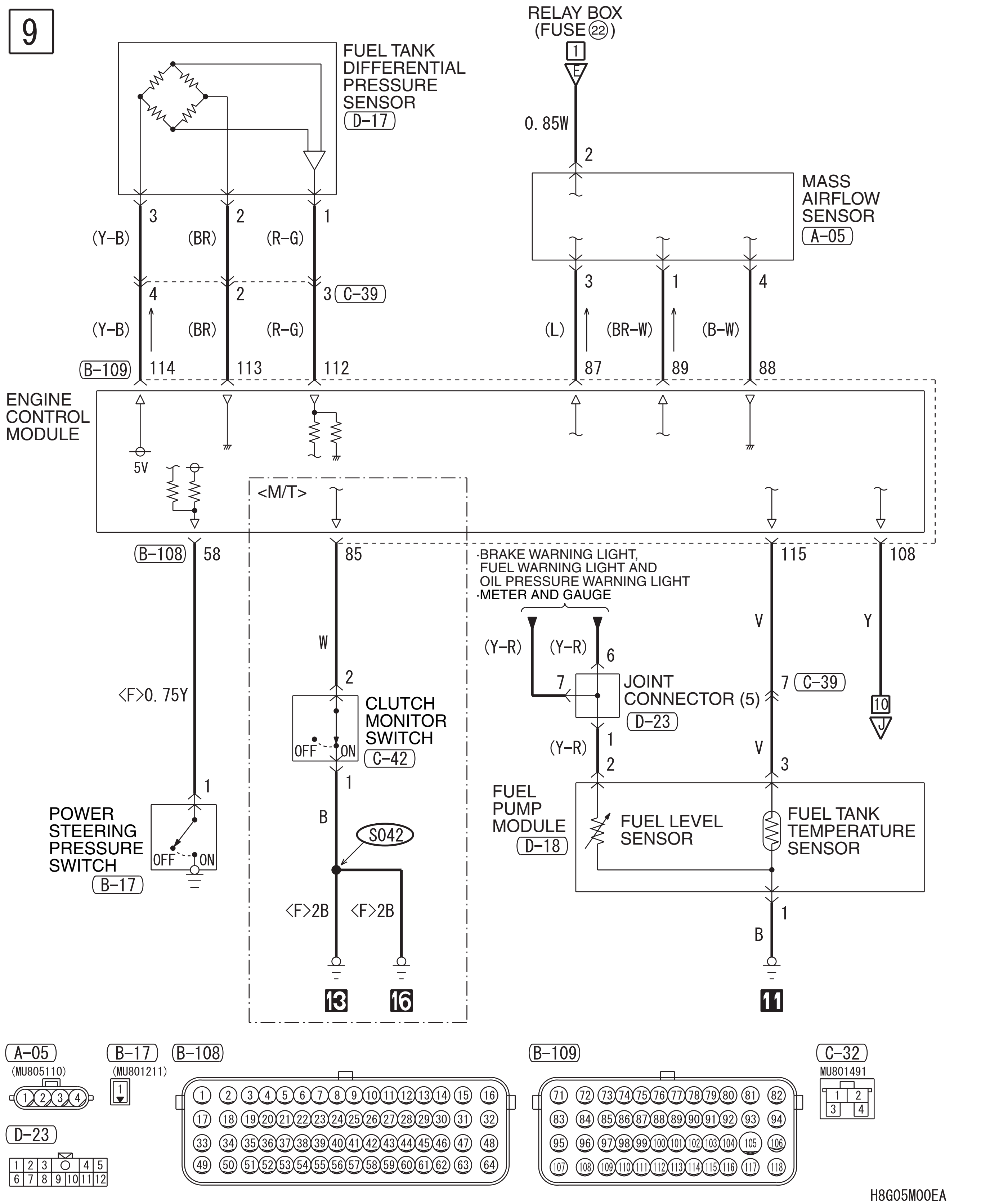
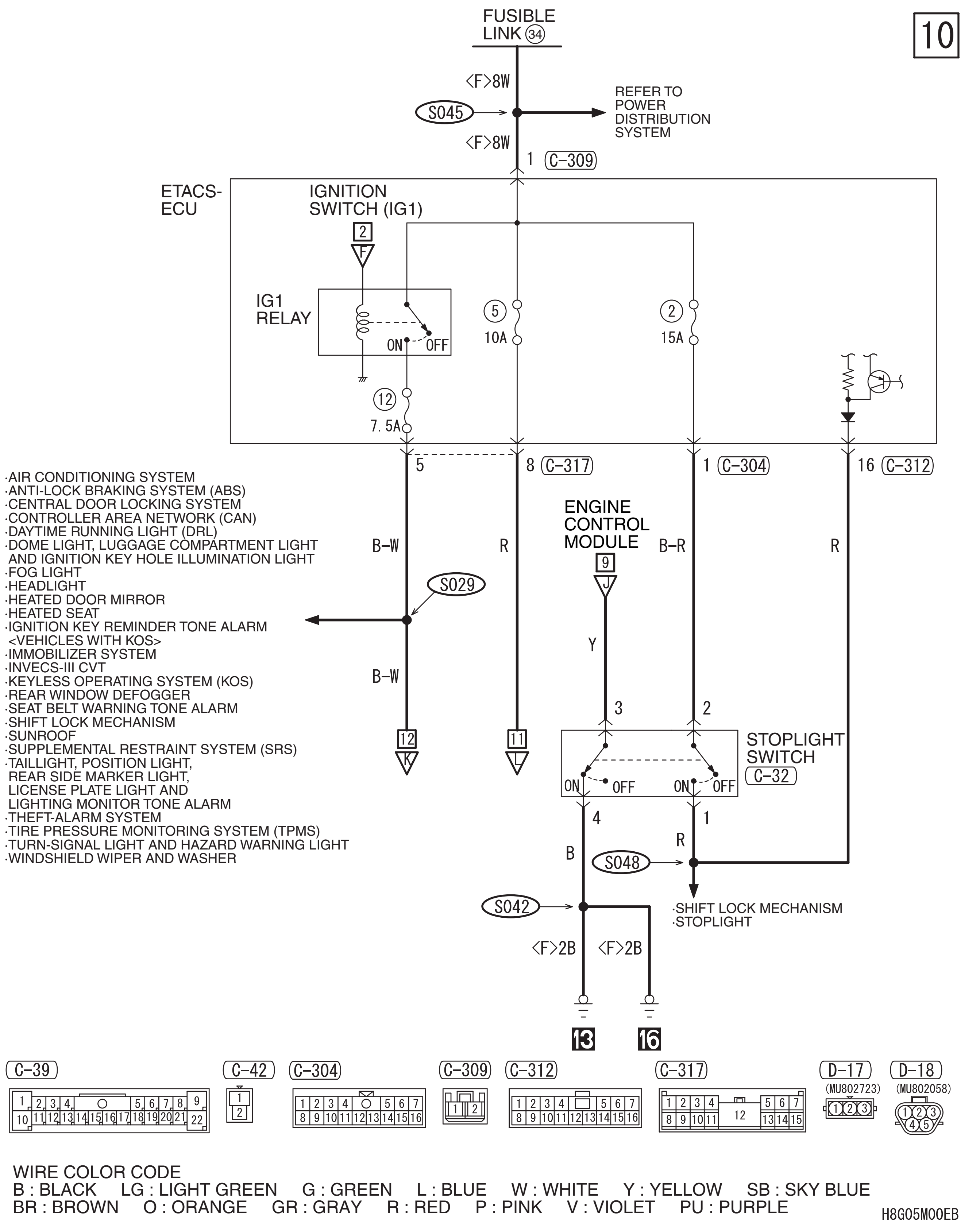
H8G05M00DB

MFI SYSTEM (CONTINUED)





WIRE COLOR CODE
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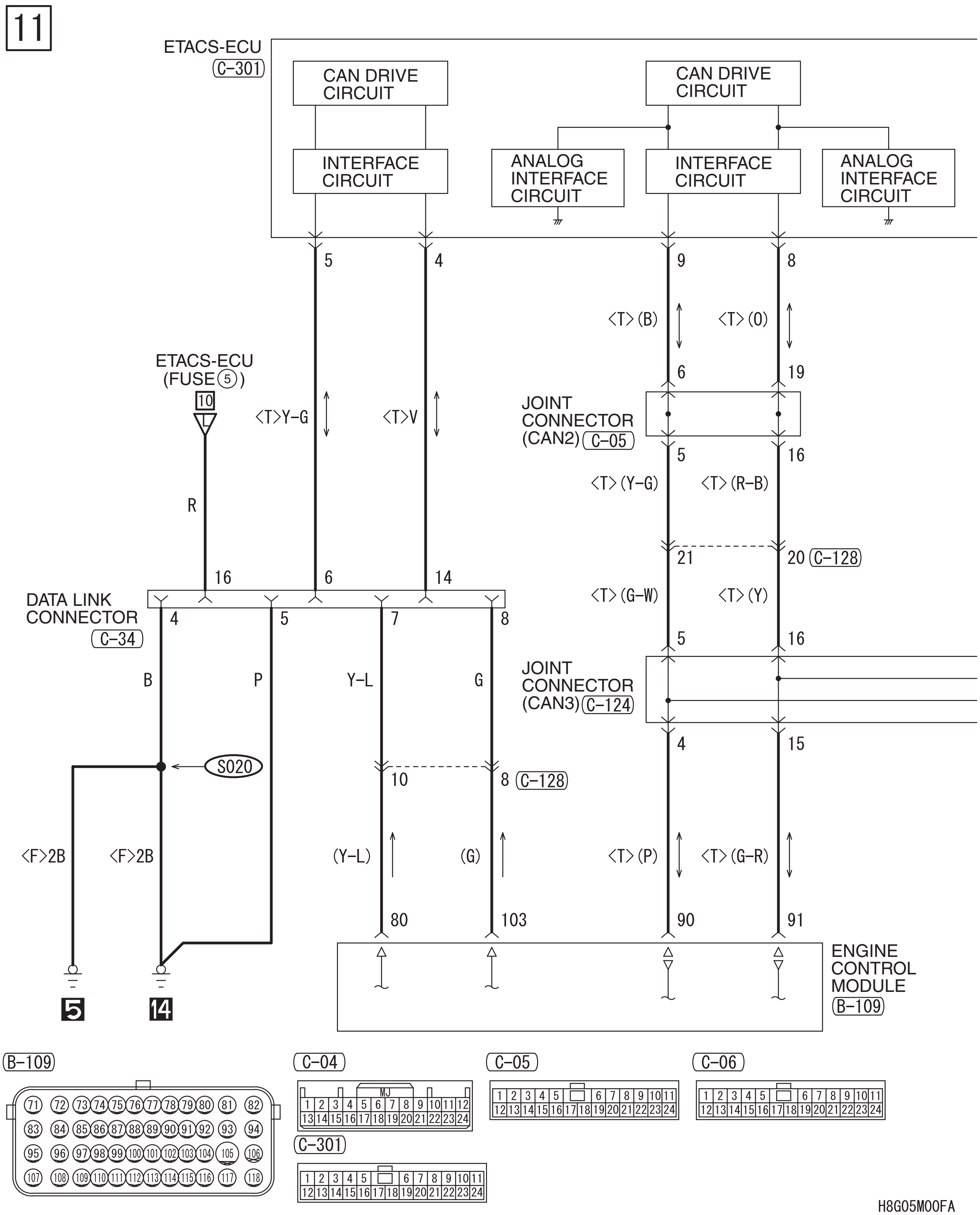
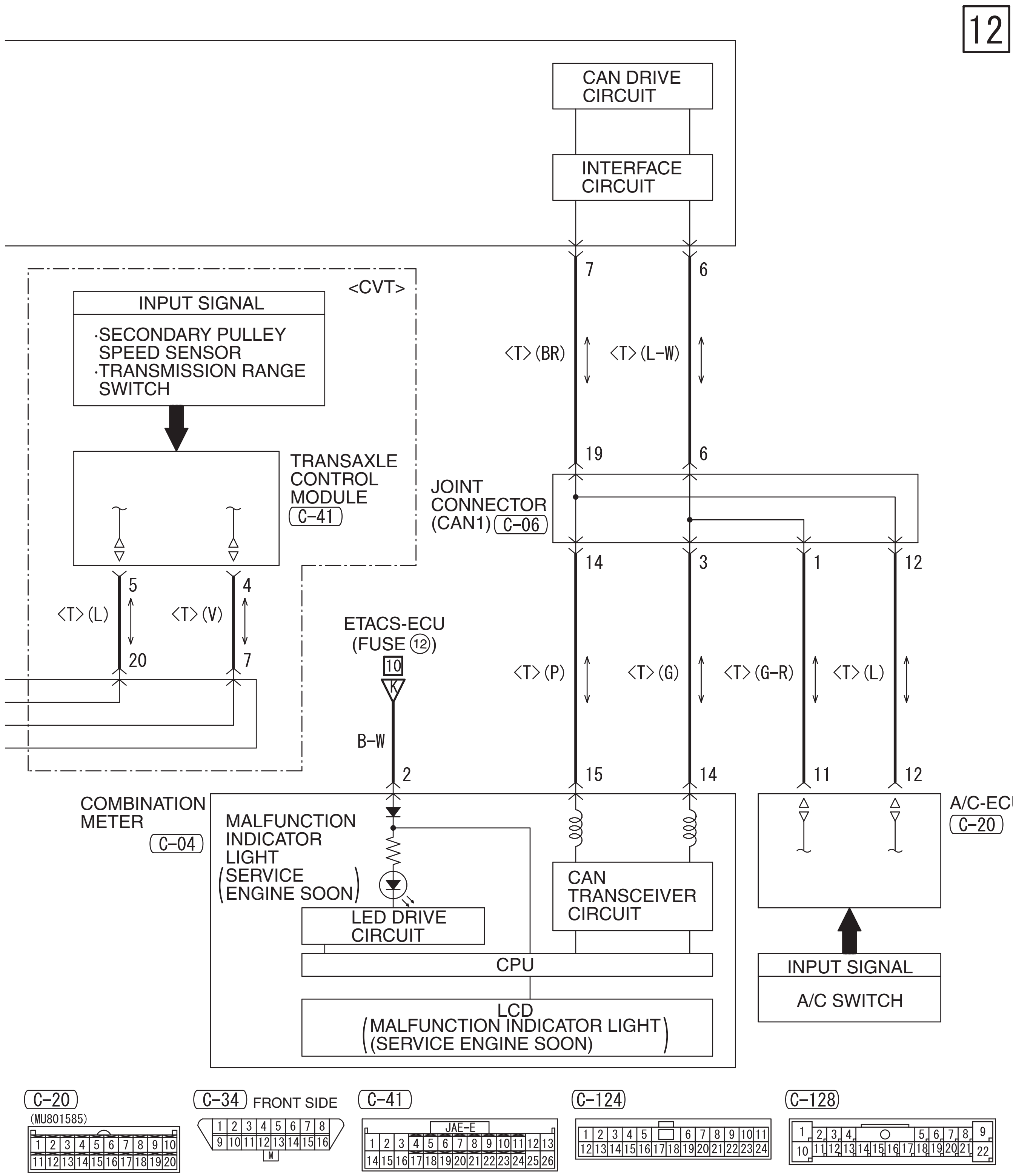
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

MFI SYSTEM (CONTINUED)



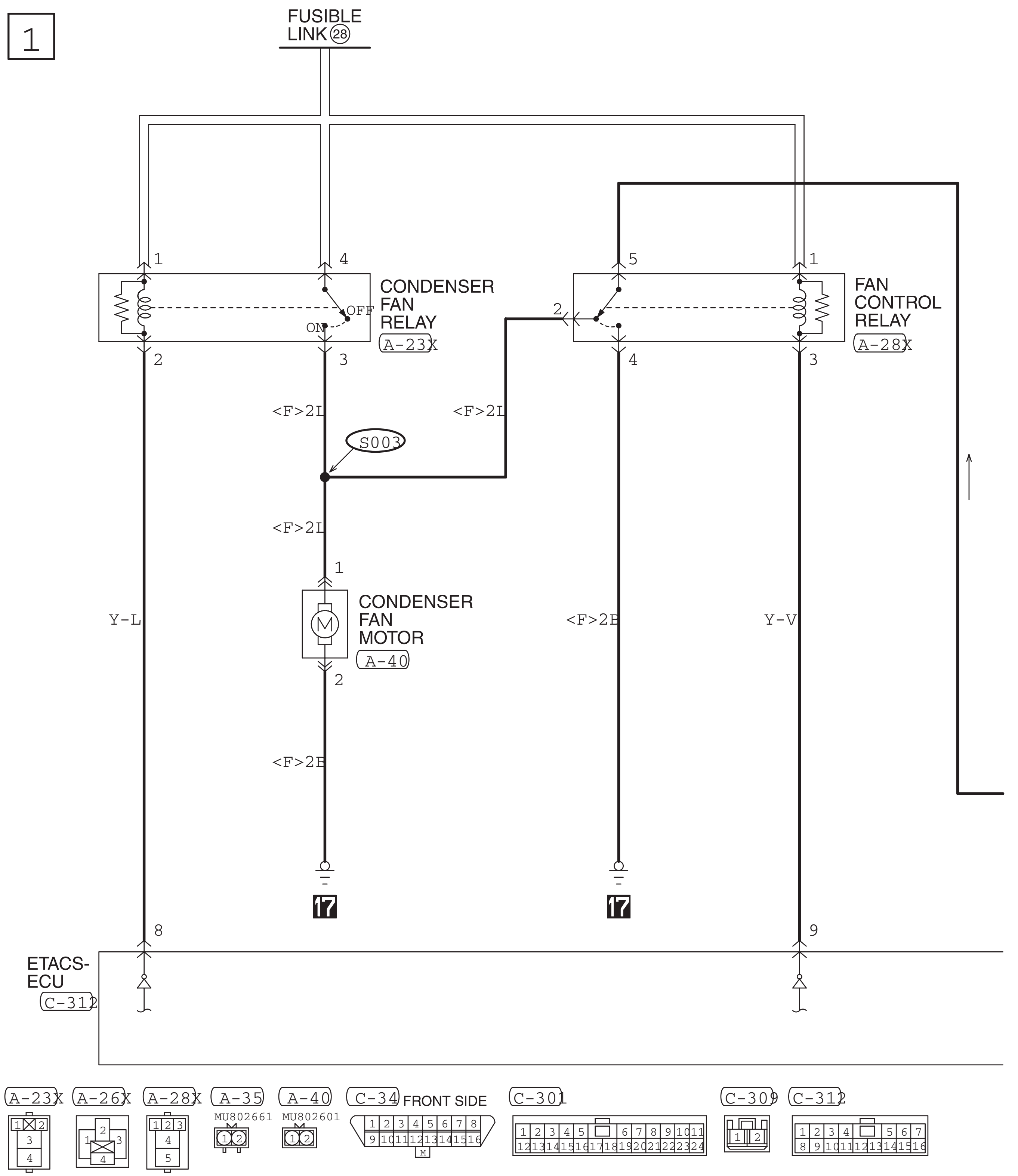


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

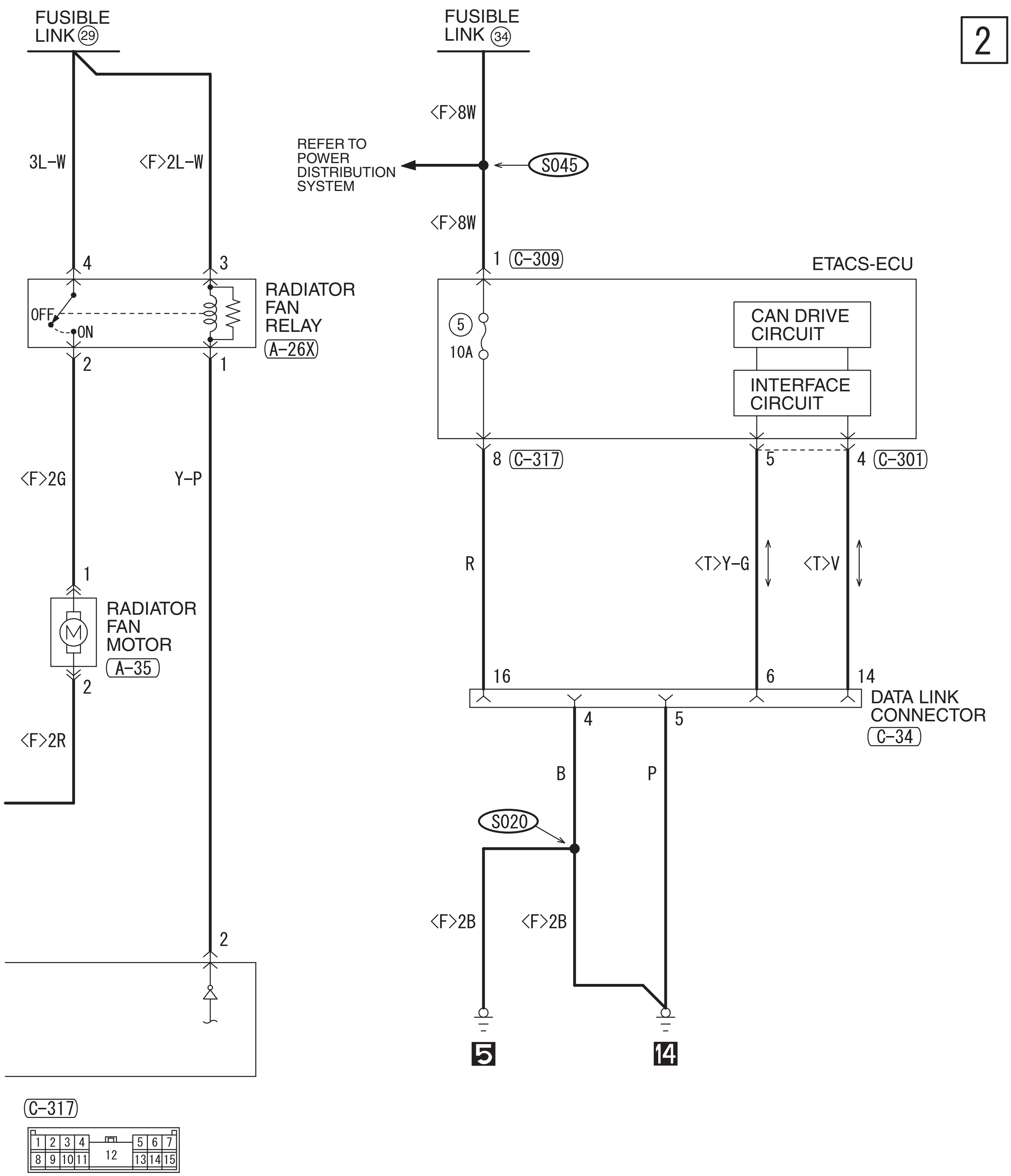
H8G05M00FB

COOLING SYSTEM

M1901001002308



H8G06M00AA



WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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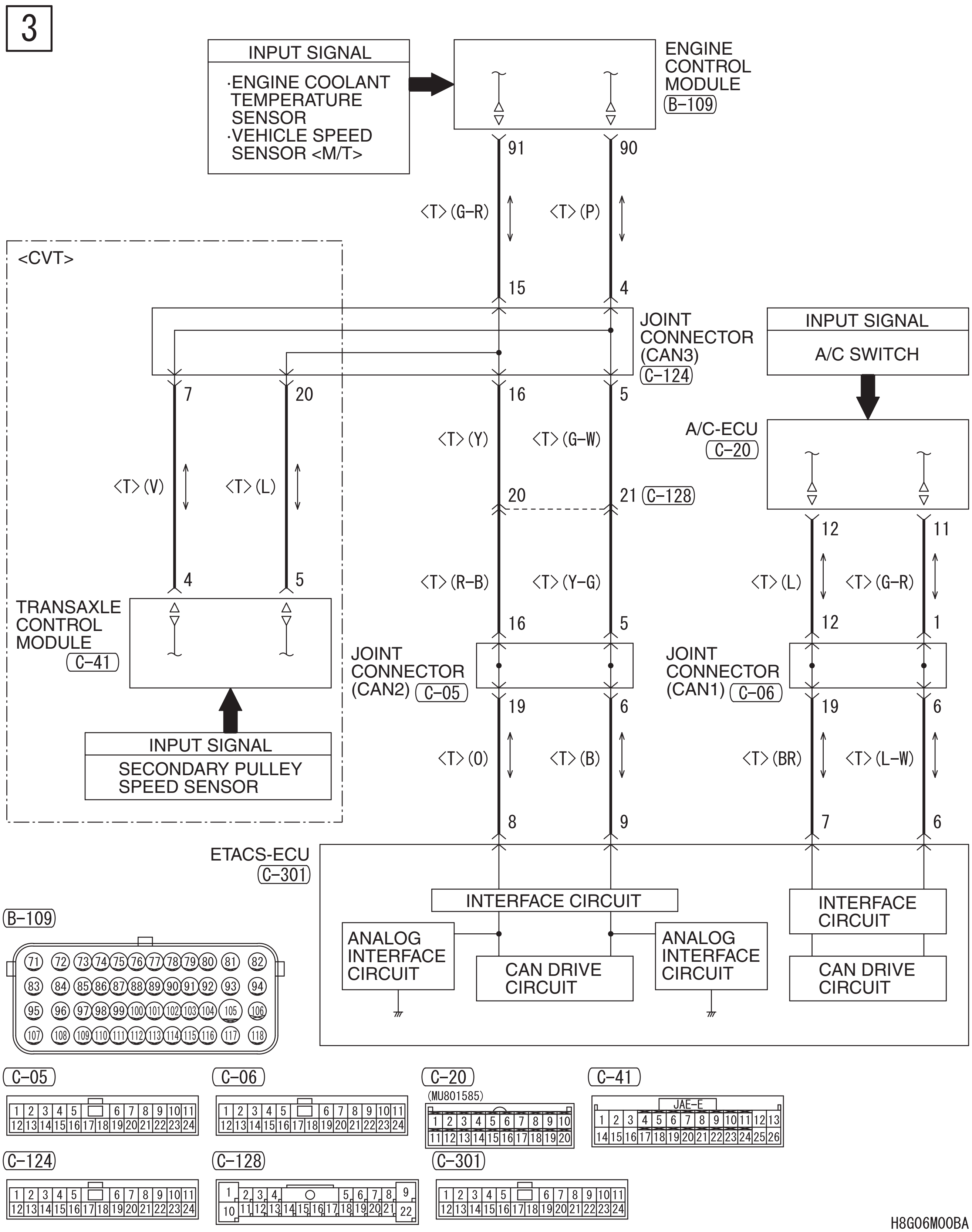
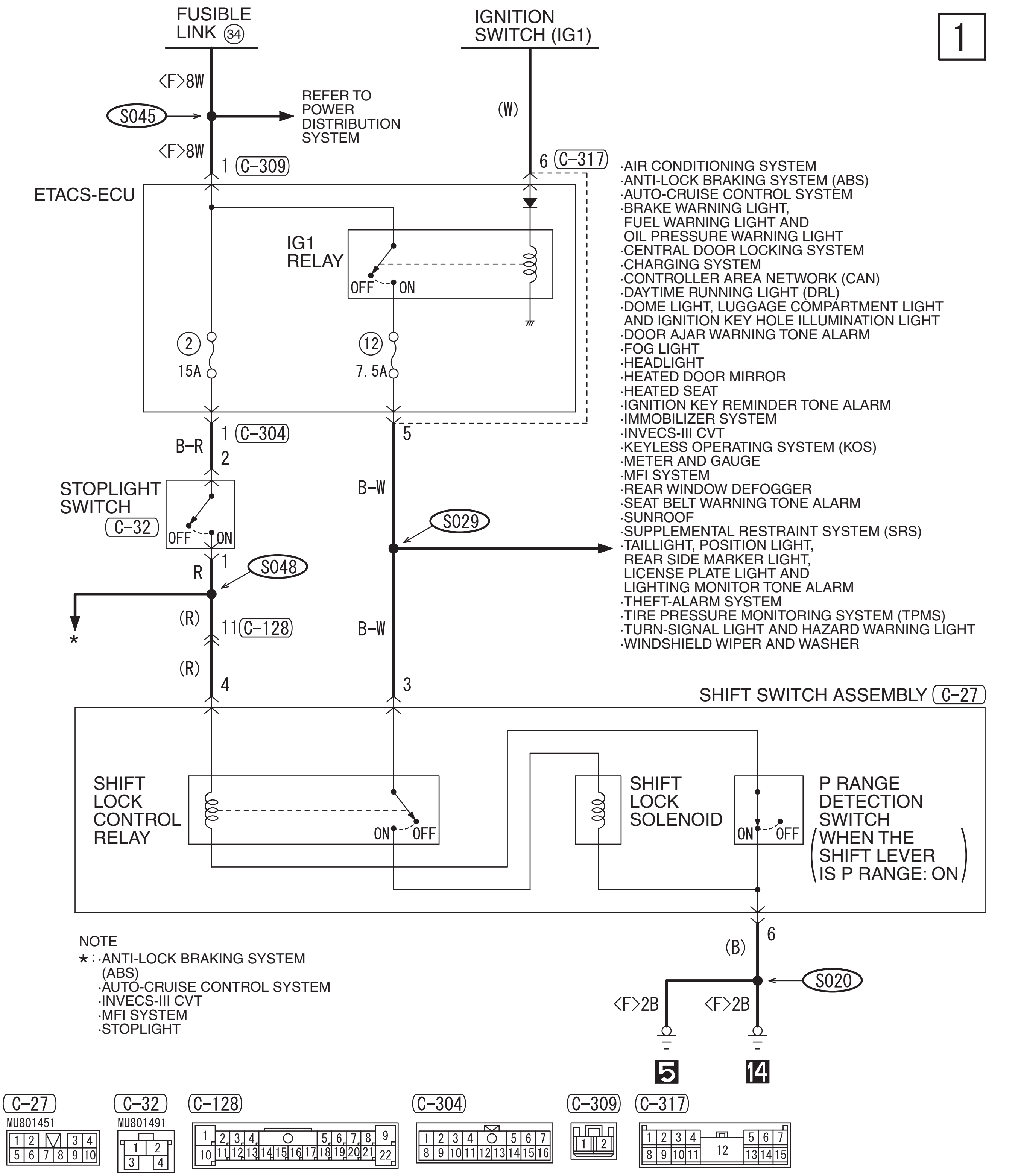
H8G06M00AB

COOLING SYSTEM (CONTINUED)



SHIFT LOCK MECHANISM

M1901026400084



WIRE COLOR CODE
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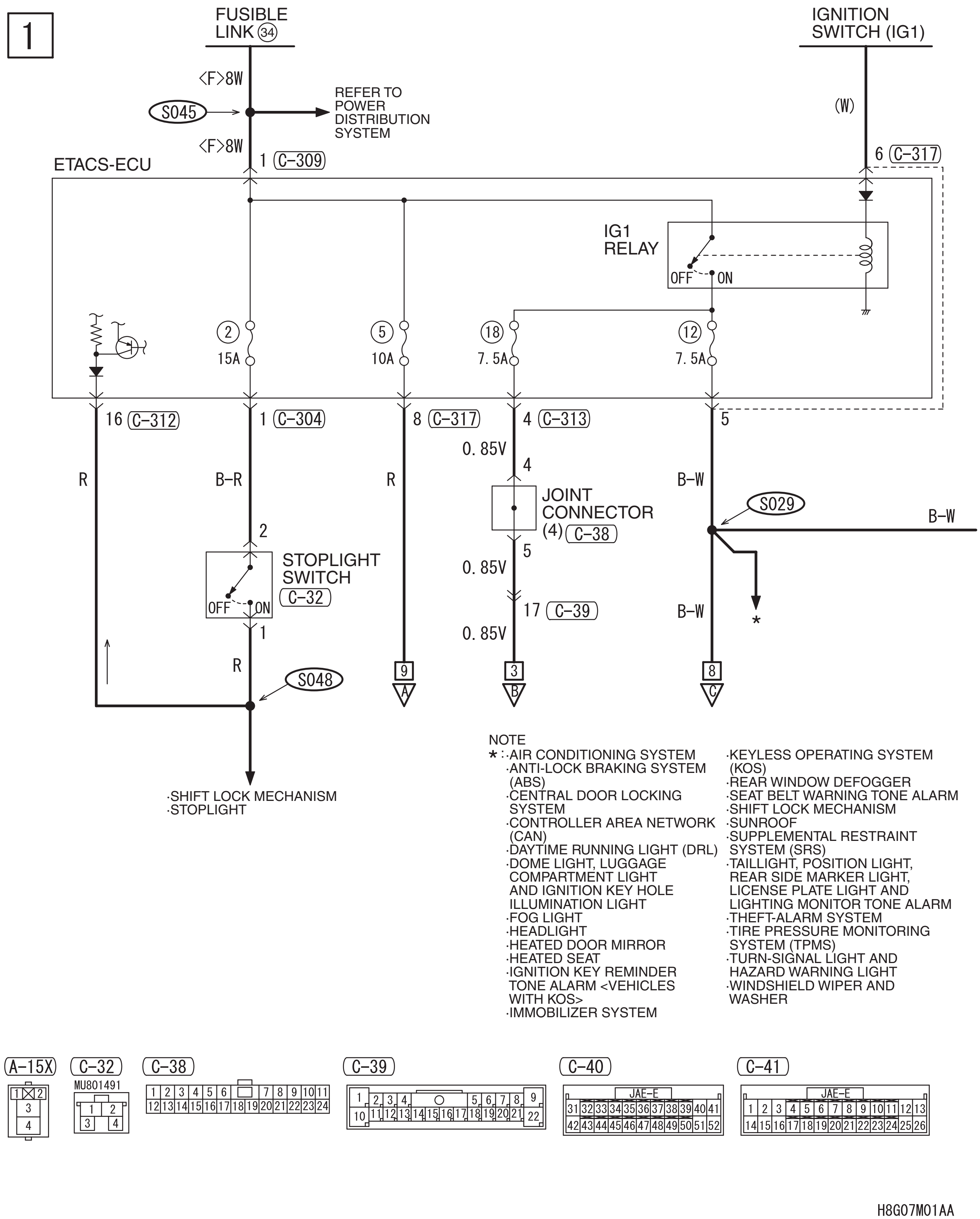
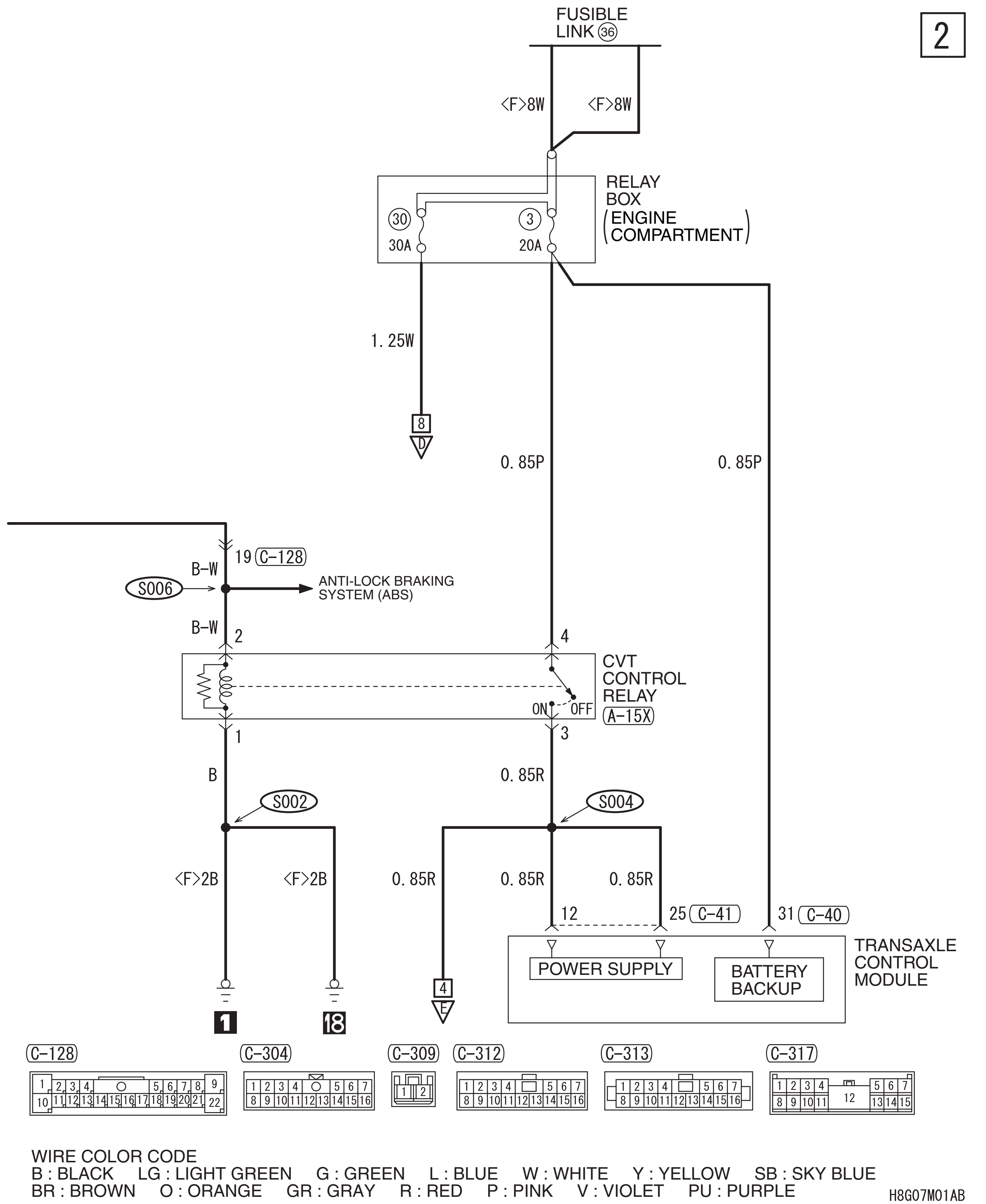
H8G07M00AA

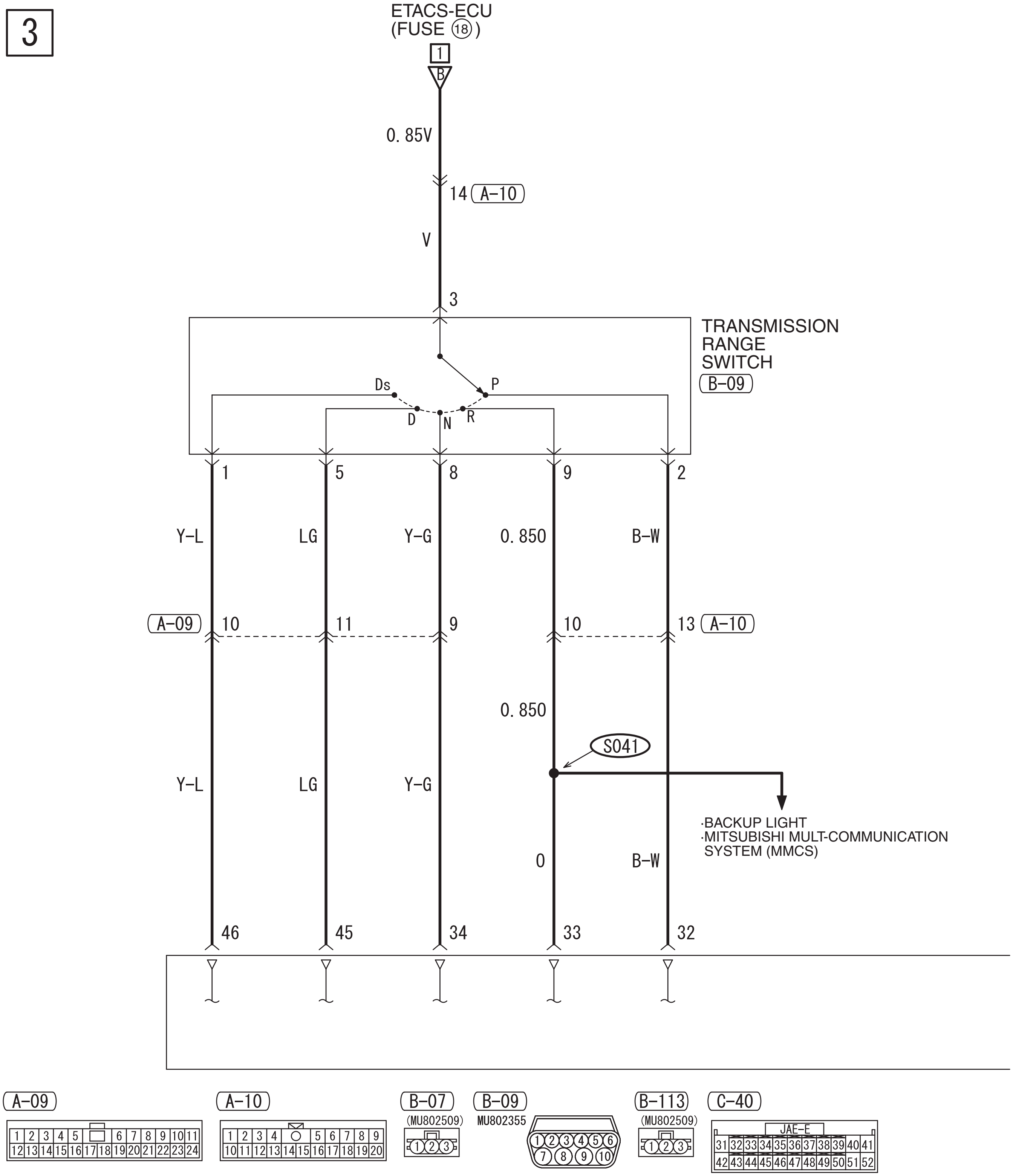
INVECS-III CVT

M1901023100211




2
FUSIBLE LINK 36
<F>8W
<F>8W
RELAY BOX (ENGINE COMPARTMENT)
30
30A
3
20A
1.25W
8
D
0.85P
0.85P
19 C-128
B-W
S006
ANTI-LOCK BRAKING SYSTEM (ABS)
B-W
2
4
CVT CONTROL RELAY
ON
OFF
A-15X
1
3
B
0.85R
S002
S004
<F>2B
<F>2B
0.85R
0.85R
0.85R
12
25 C-41
31 C-40
TRANSAXLE CONTROL MODULE
POWER SUPPLY
BATTERY BACKUP
1
18
4
E
C-128
C-304
C-309
C-312
C-313
C-317
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE
H8G07M01AB

INVECS-III CVT (CONTINUED)



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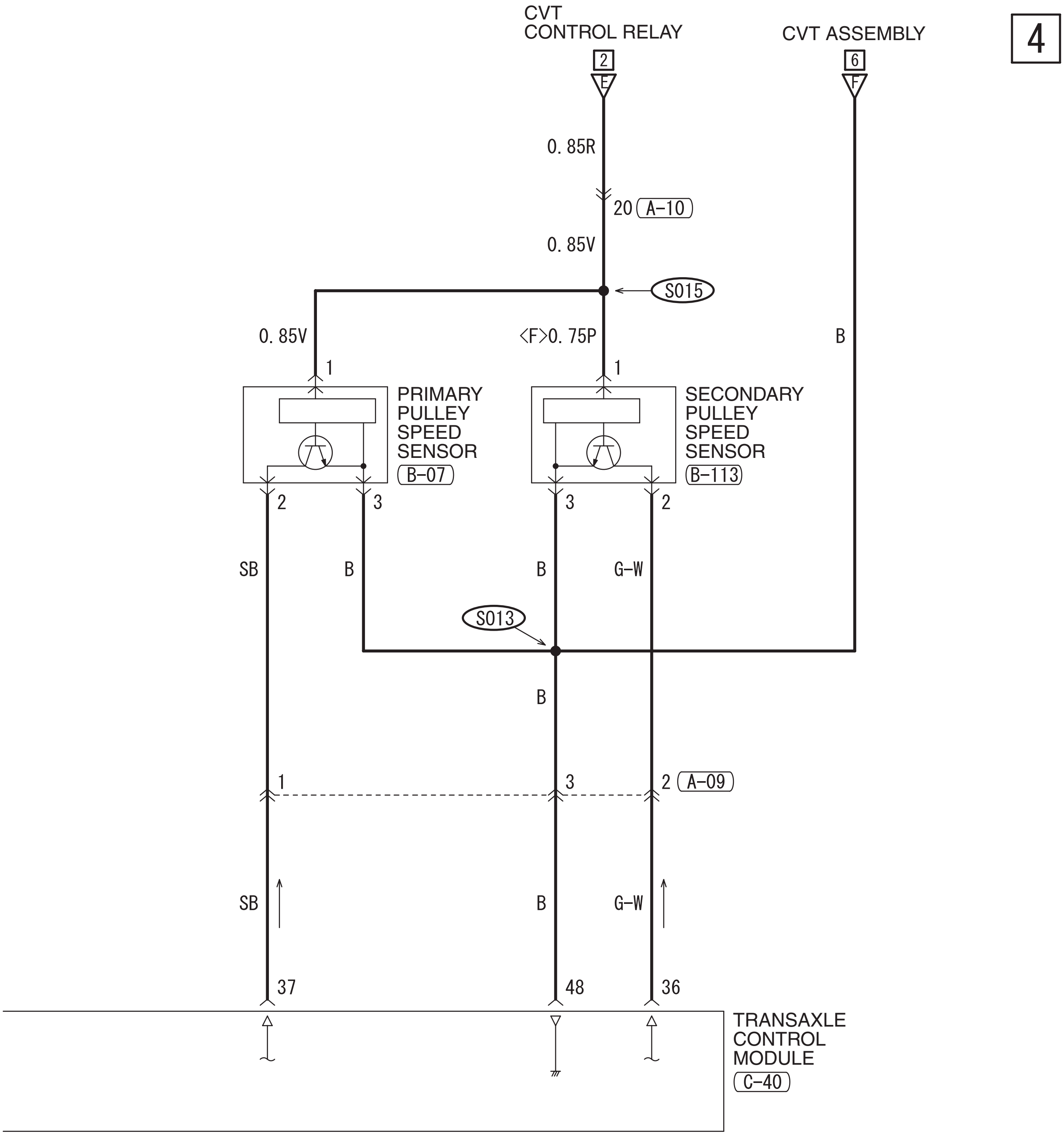

WIRE COLOR CODE
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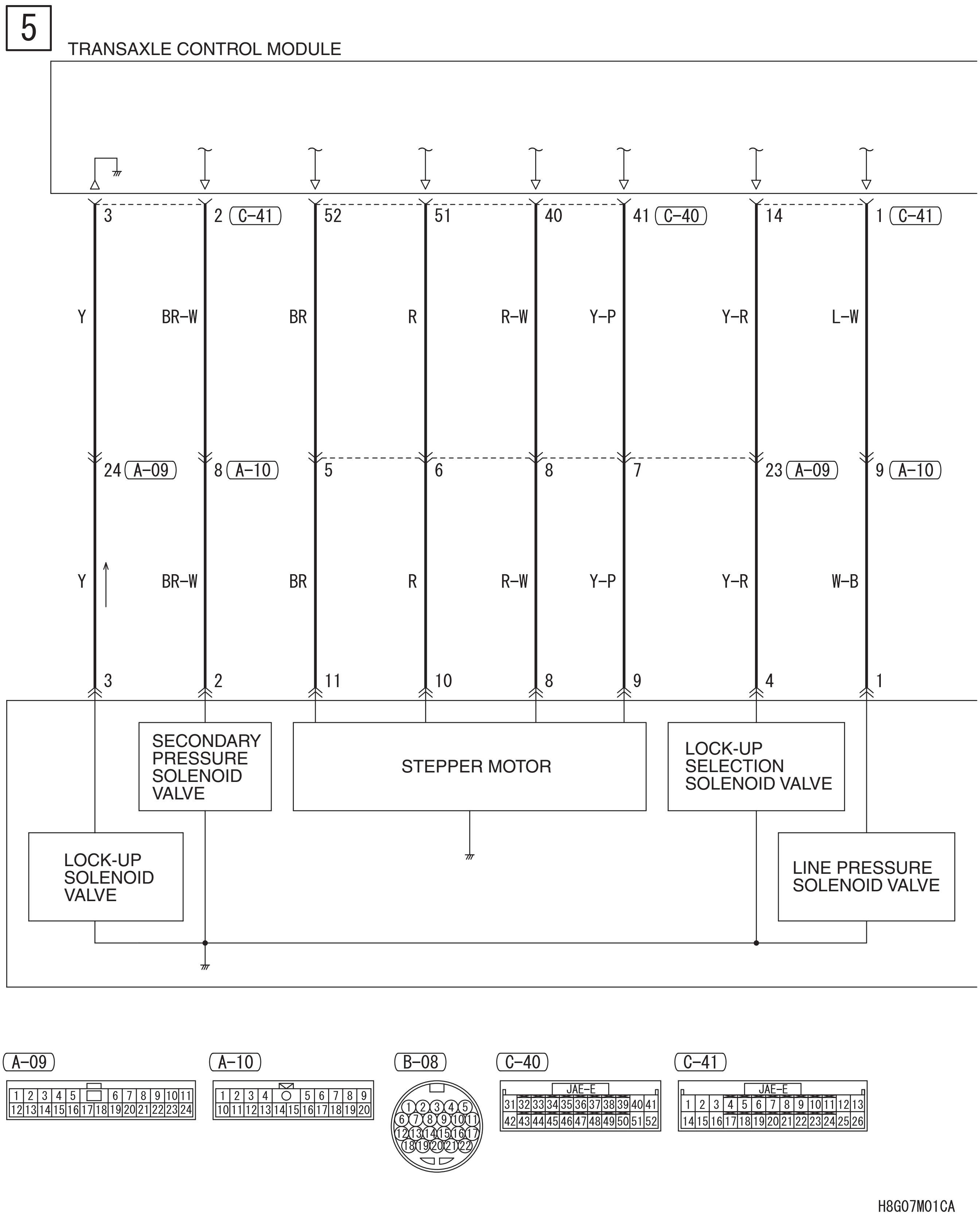
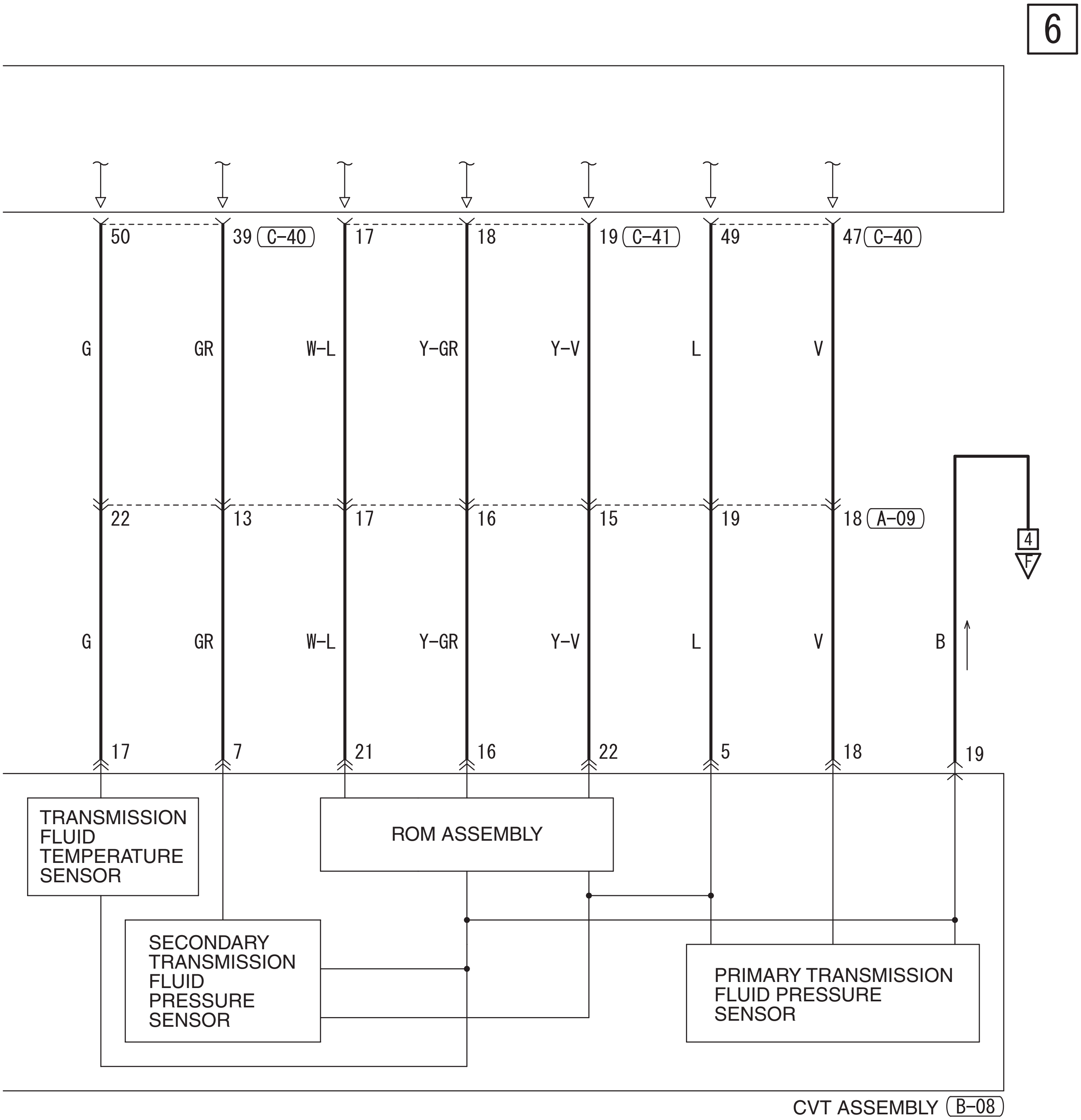
H8G07M01BB

INVECS-III CVT (CONTINUED)





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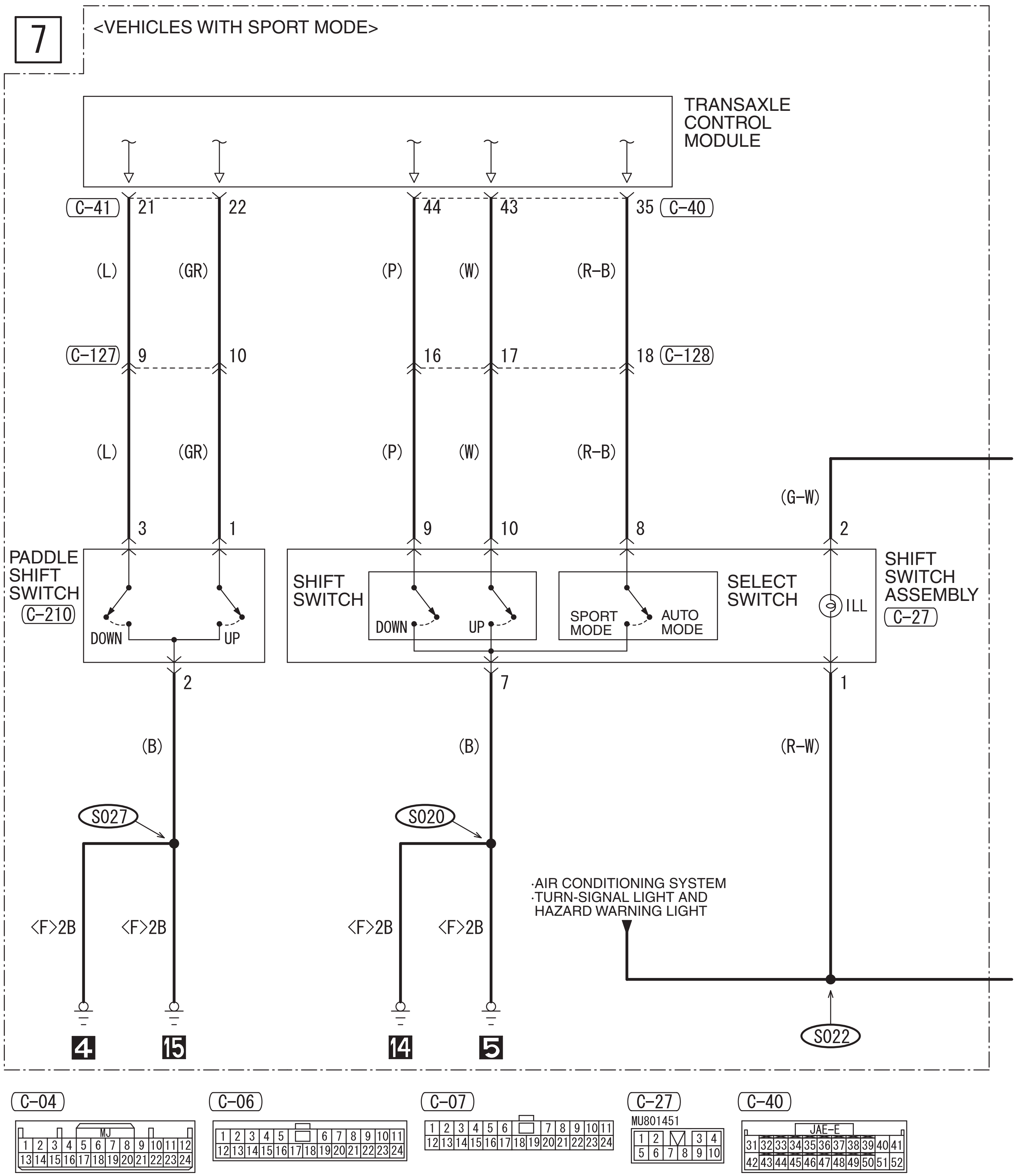
H8G07M01CB

INVECS-III CVT (CONTINUED)



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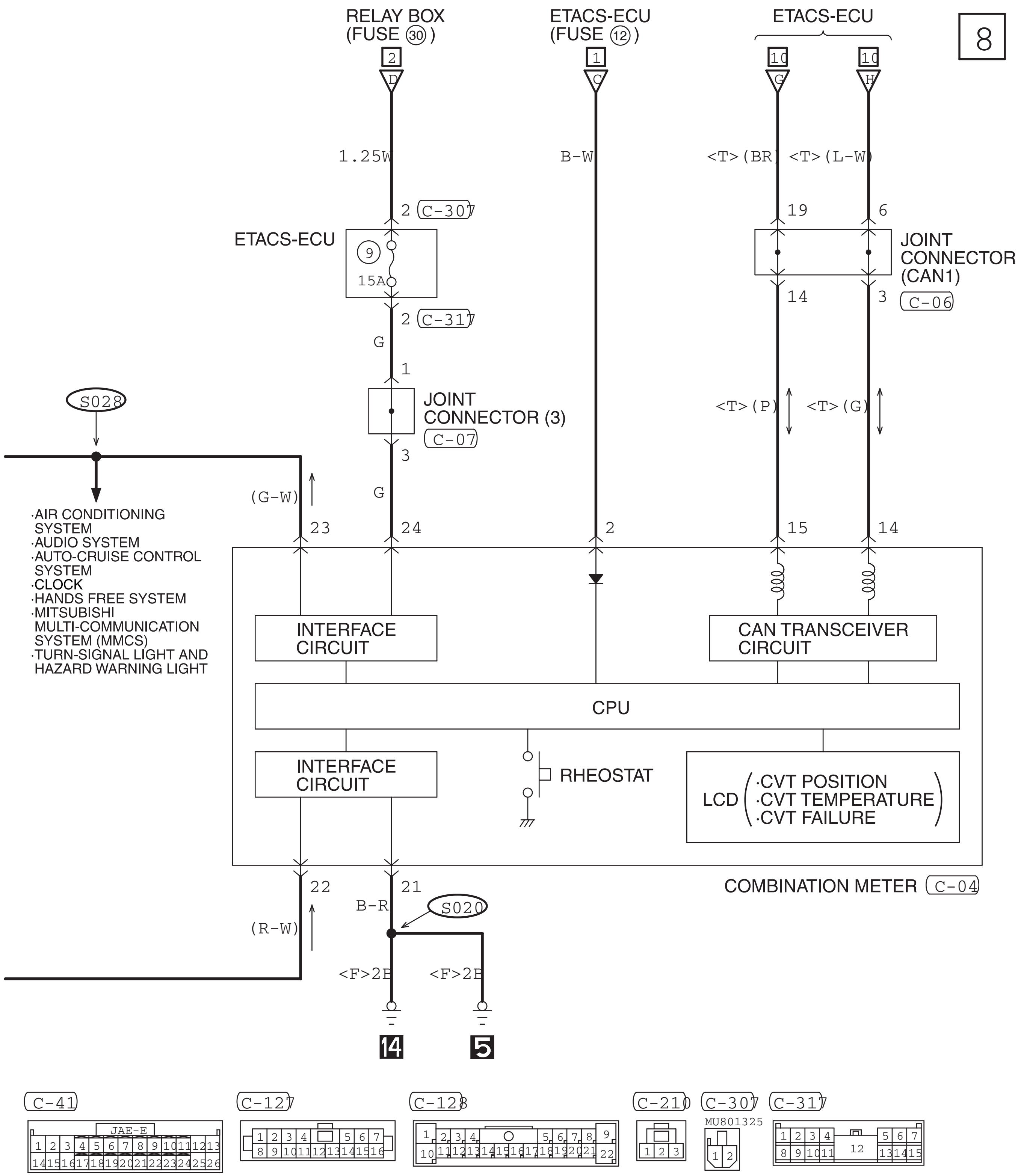

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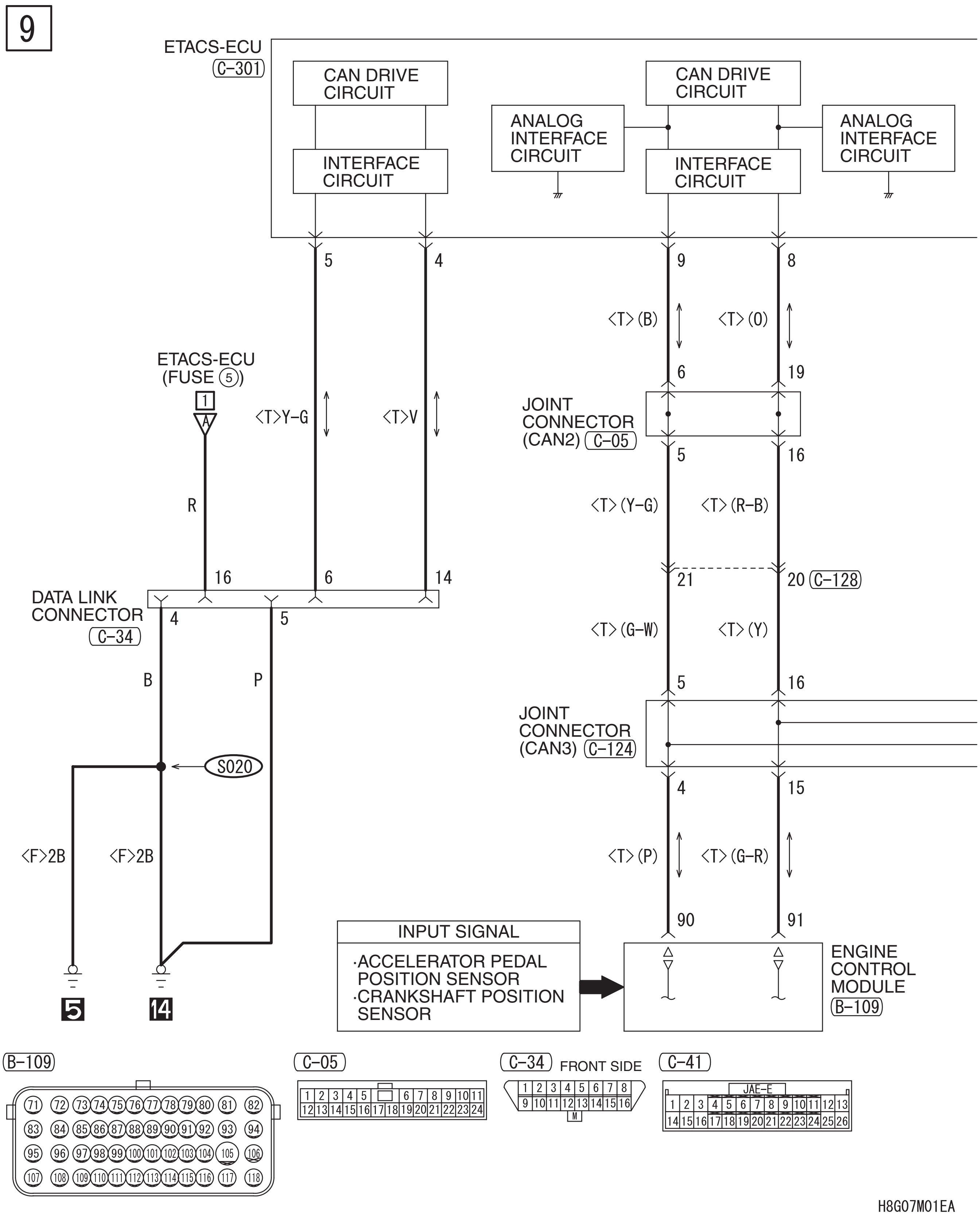
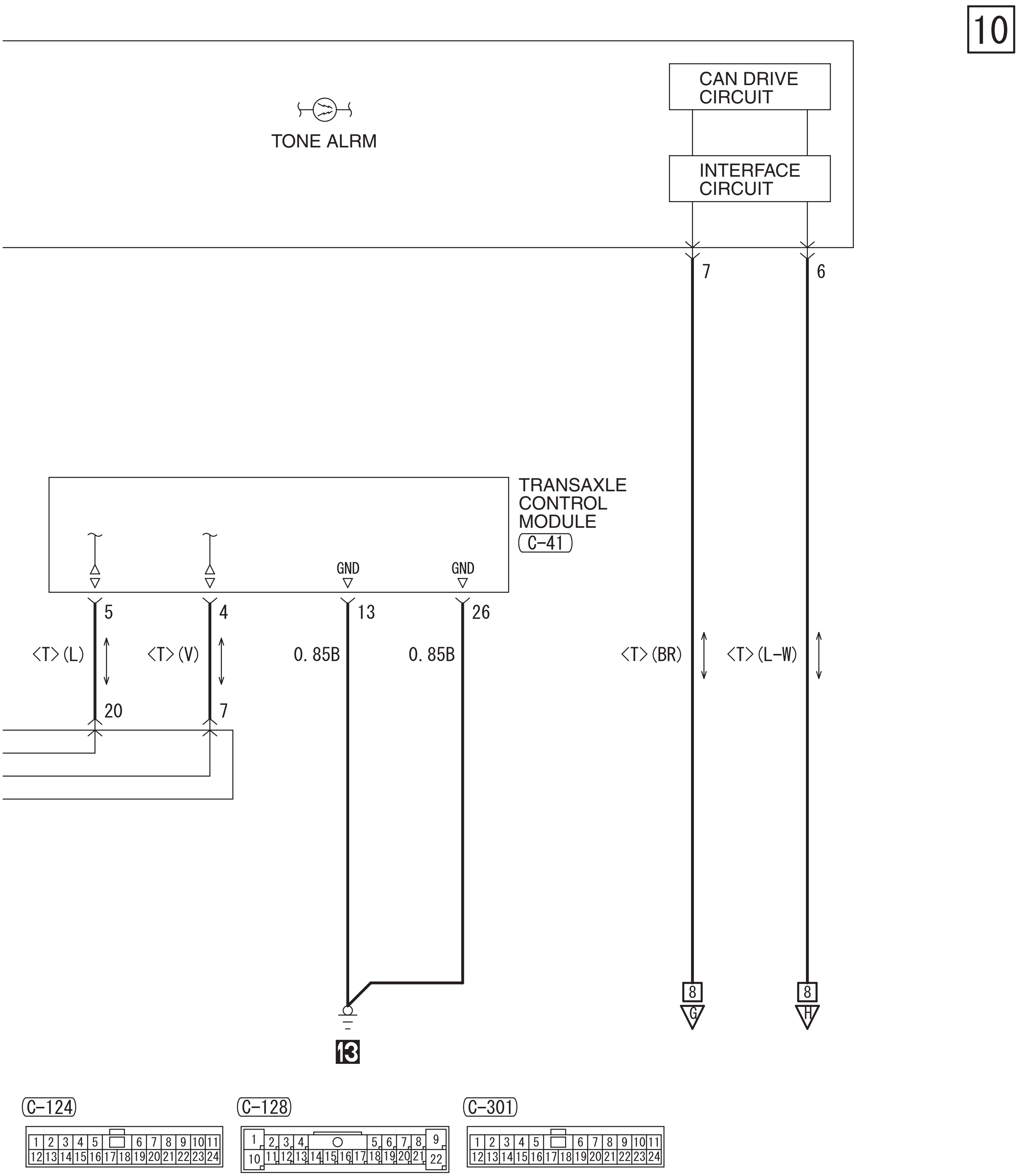
H8G07M01DB

INVECS-III CVT (CONTINUED)





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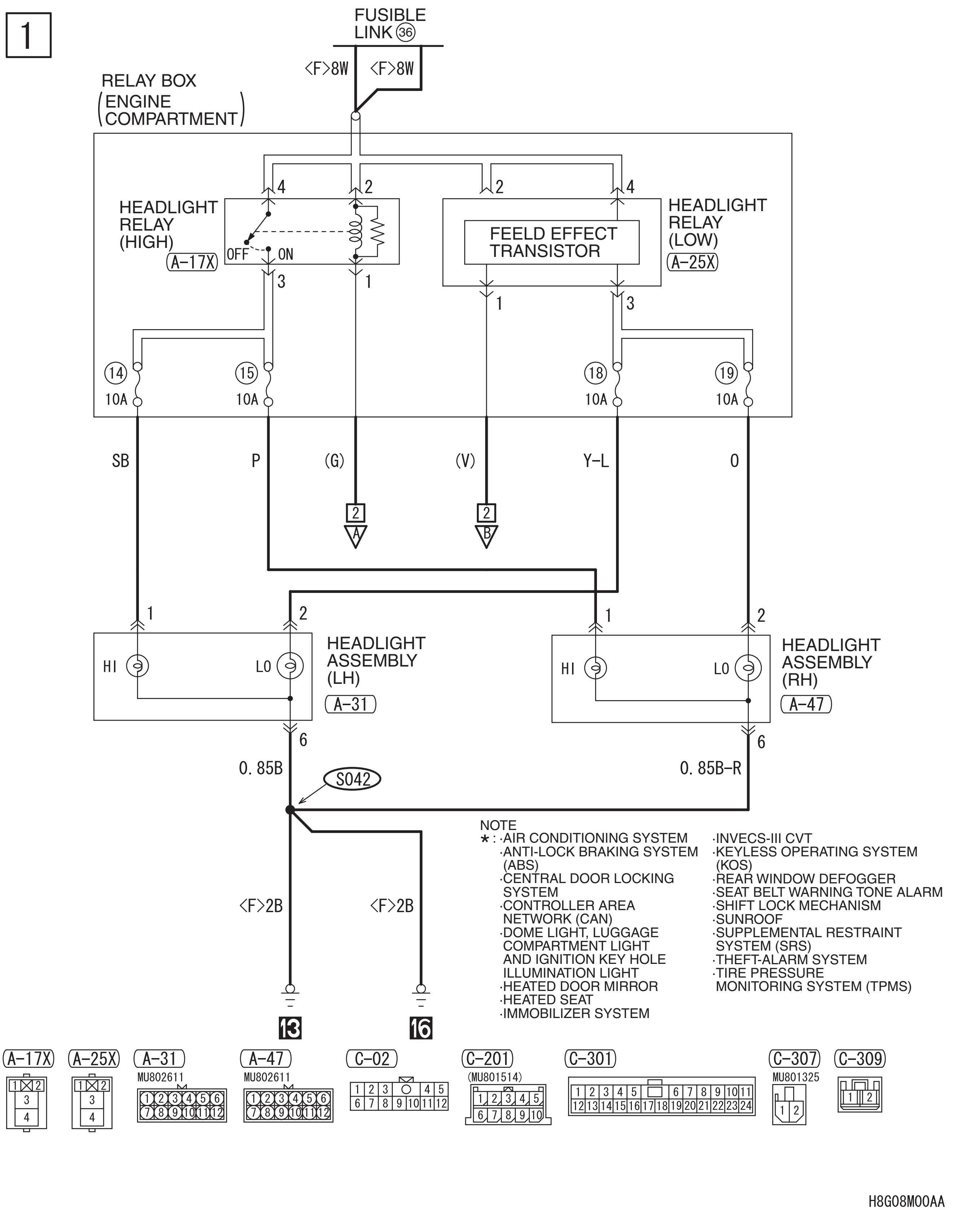
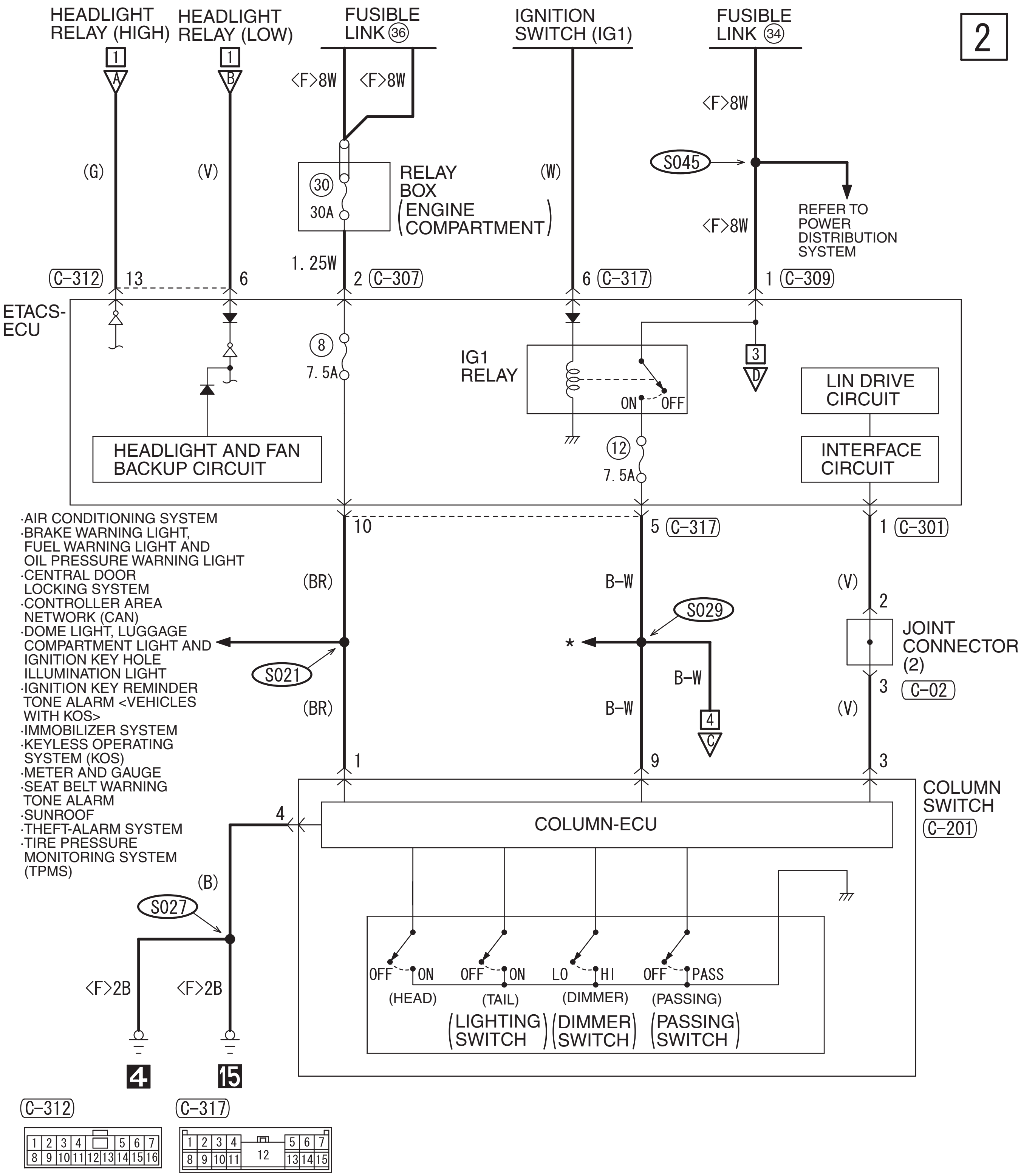
H8G07M01EB

HEADLIGHT

M1901001503168

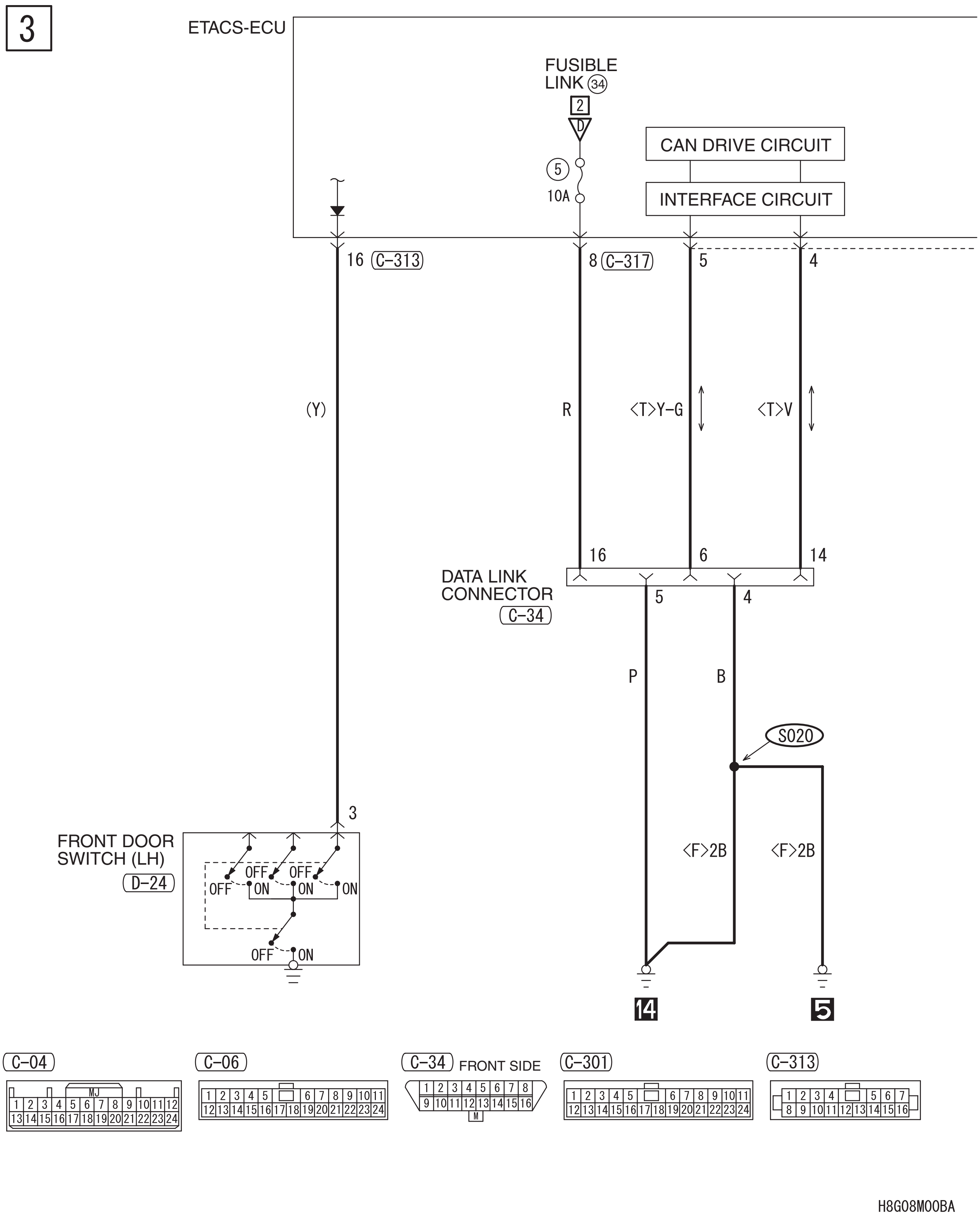


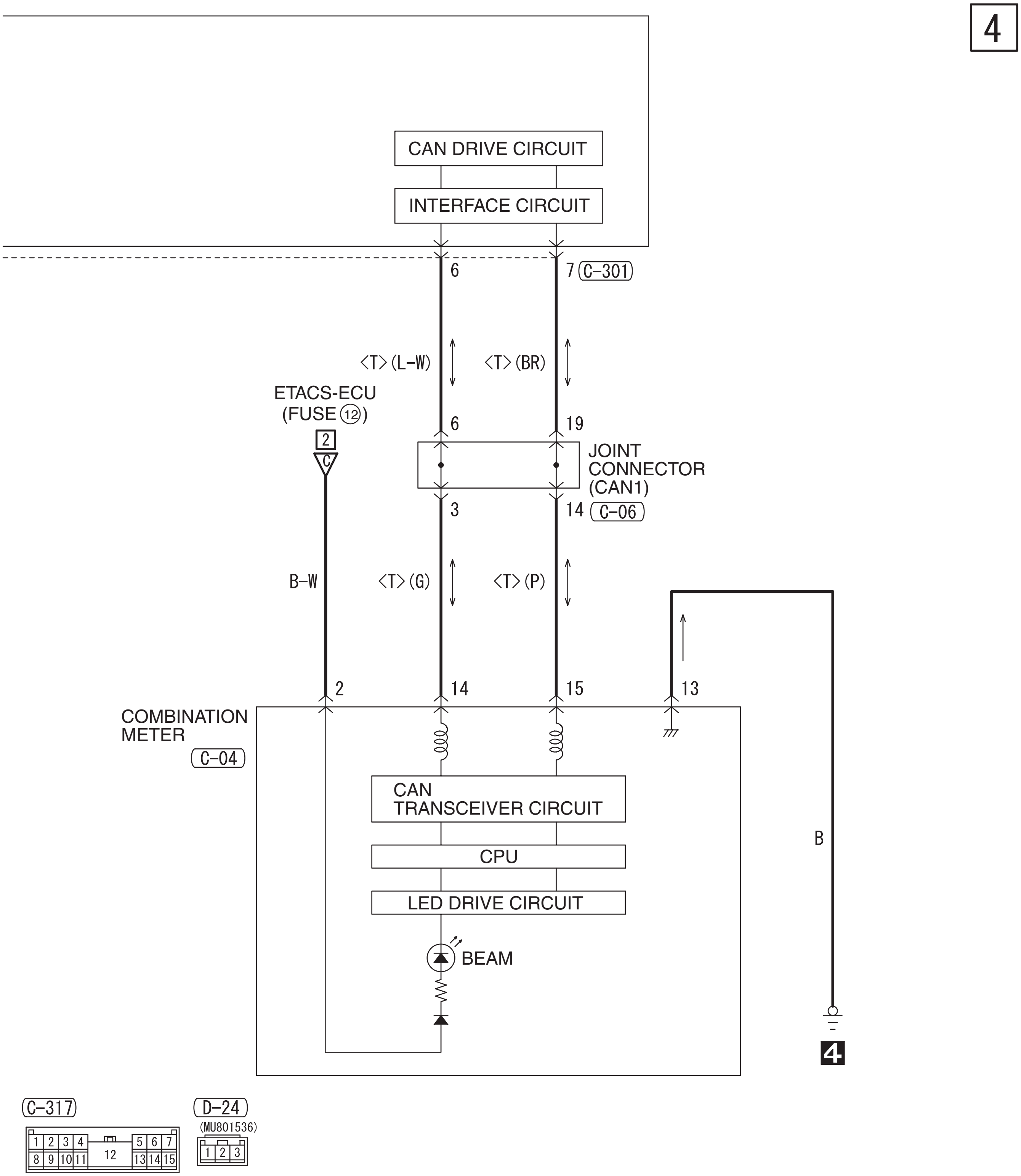


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M00AB

HEADLIGHT (CONTINUED)





WIRE COLOR CODE
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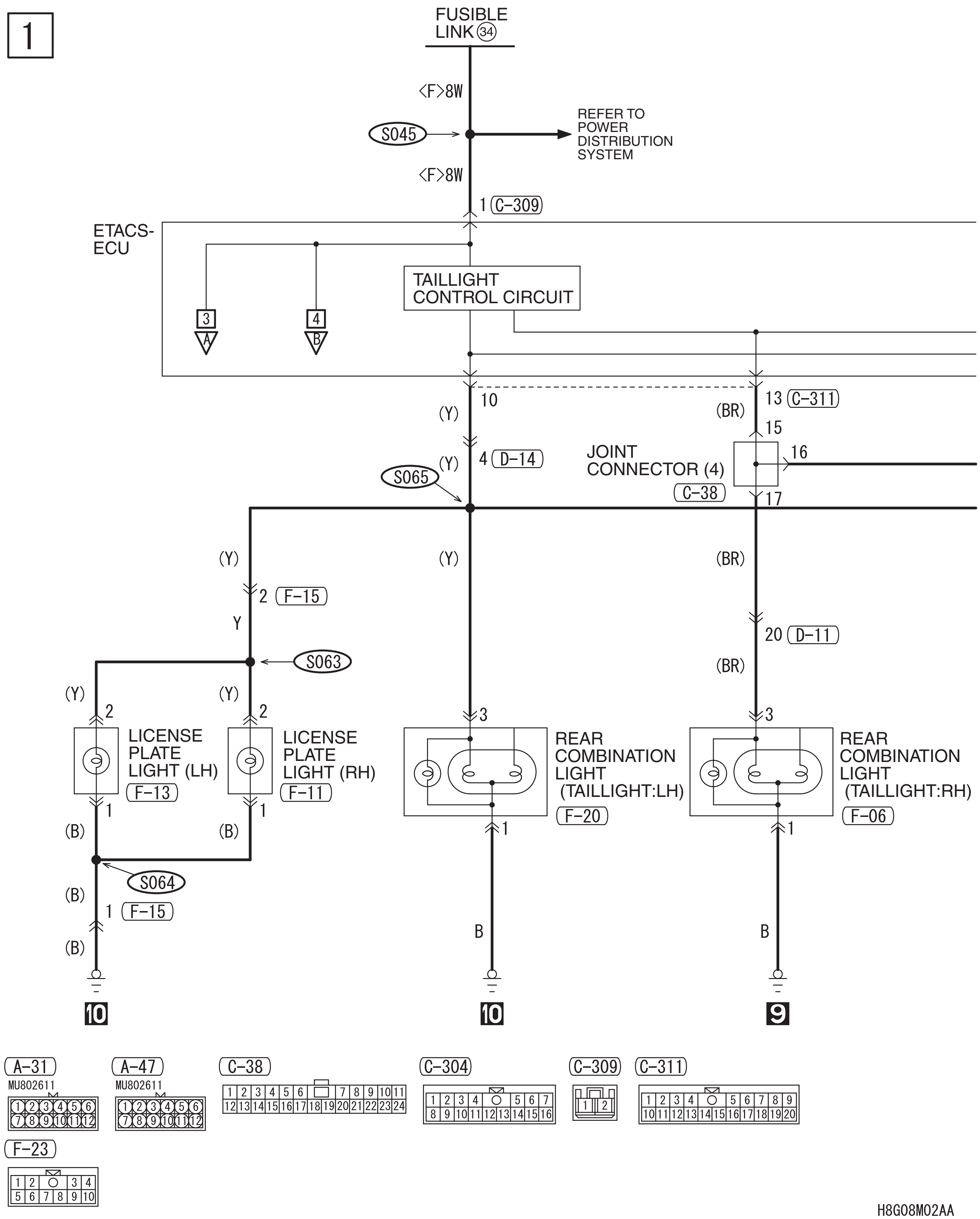
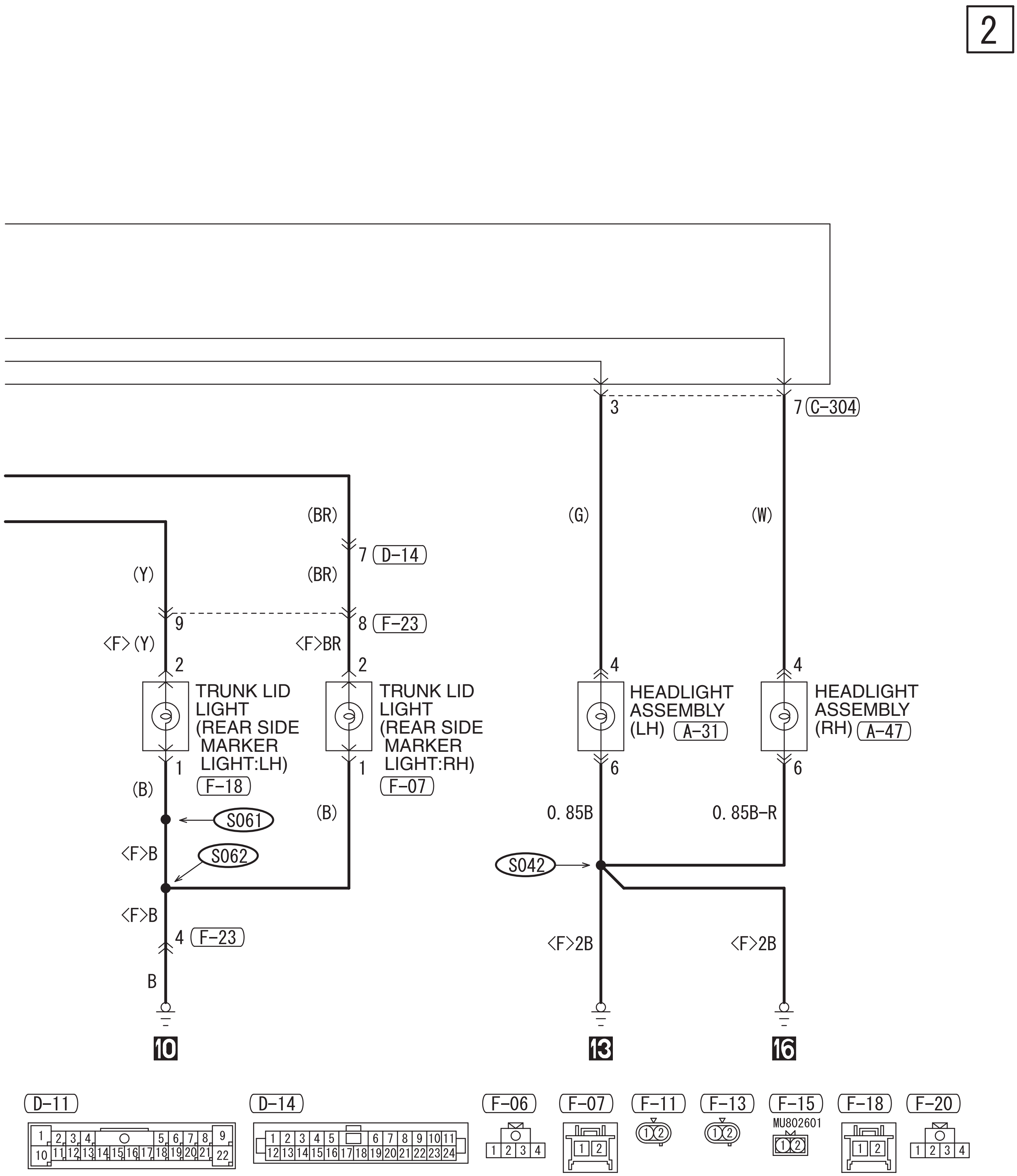
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M00BB

TAILLIGHT, POSITION LIGHT, REAR SIDE MAKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM

M1901030600025

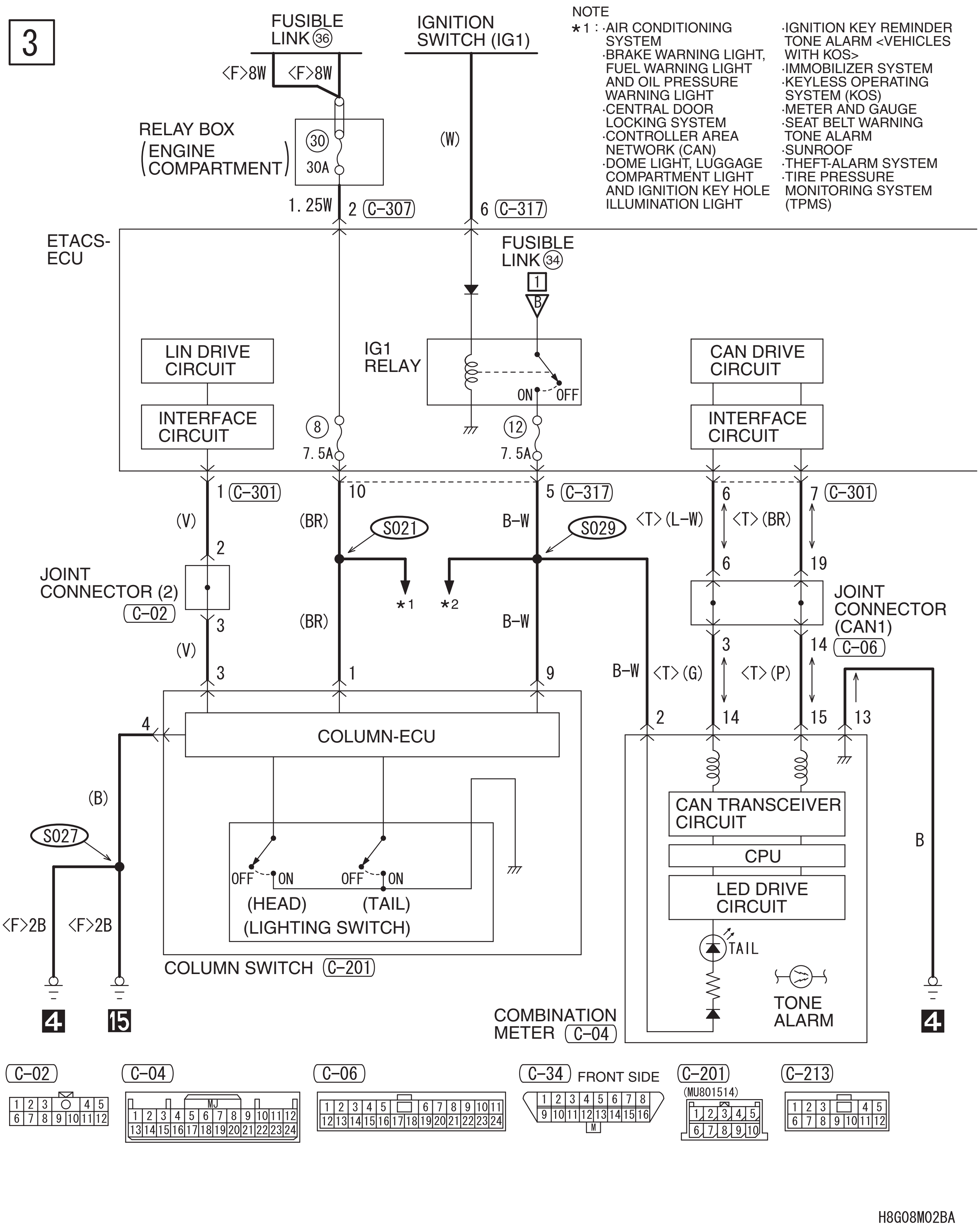




WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

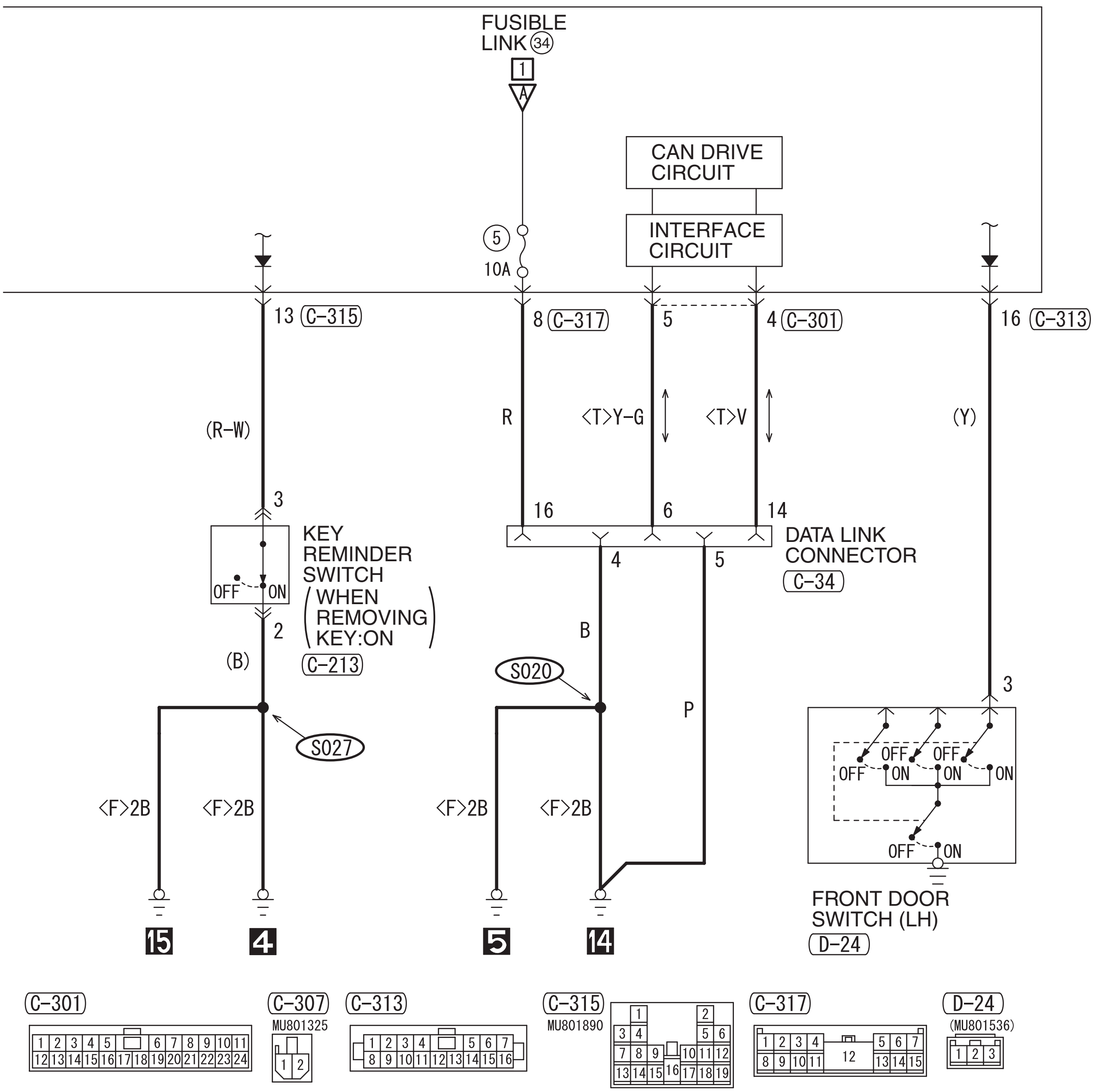
H8G08M02AB

TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM (CONTINUED)



4

*2 :
- ·AIR CONDITIONING SYSTEM
- ·ANTI-LOCK BRAKING SYSTEM (ABS)
- ·CENTRAL DOOR LOCKING SYSTEM
- ·CONTROLLER AREA NETWORK (CAN)
- ·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
- ·HEATED DOOR MIRROR
- ·HEATED SEAT
- ·IMMOBILIZER SYSTEM
- ·INVECS-III CVT
- ·KEYLESS OPERATING SYSTEM (KOS)
- ·REAR WINDOW DEFOGGER
- ·SEAT BELT WARNING TONE ALARM
- ·SHIFT LOCK MECHANISM
- ·SUNROOF
- ·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
- ·THEFT-ALARM SYSTEM
- ·TIRE PRESSURE MONITORING SYSTEM (TPMS)



WIRE COLOR CODE
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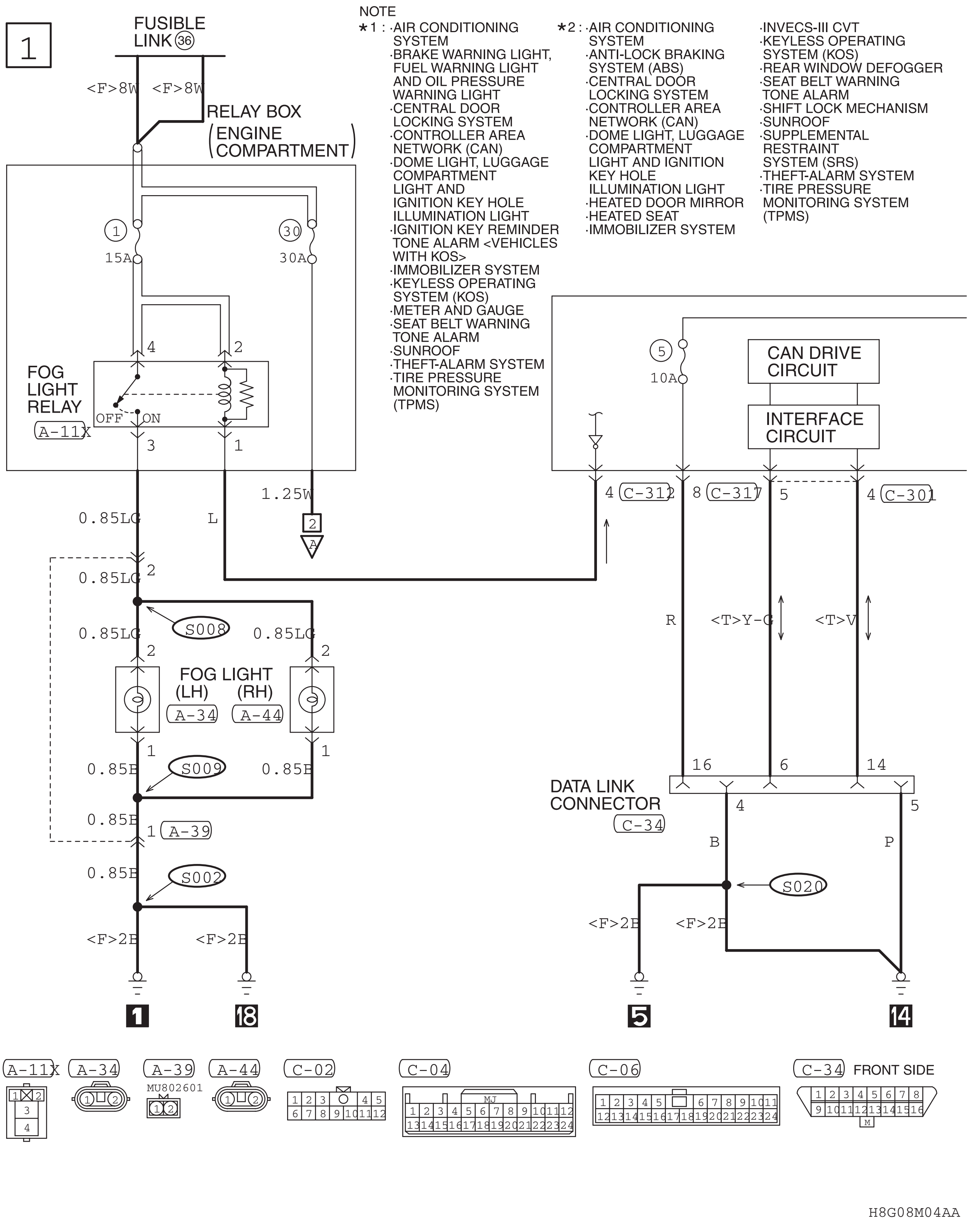
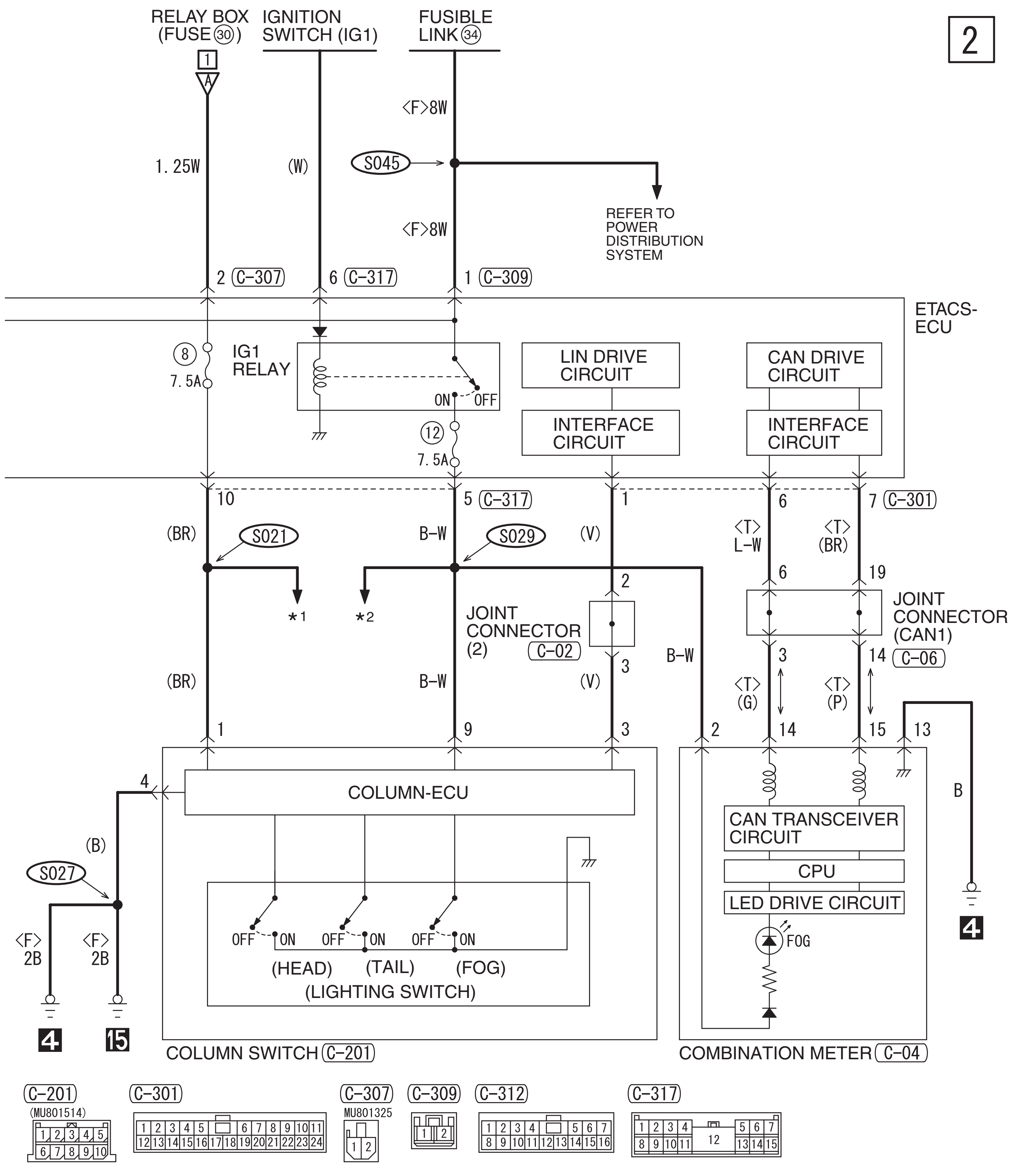
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M02BB

FOG LIGHT

M1901001801118





WIRE COLOR CODE
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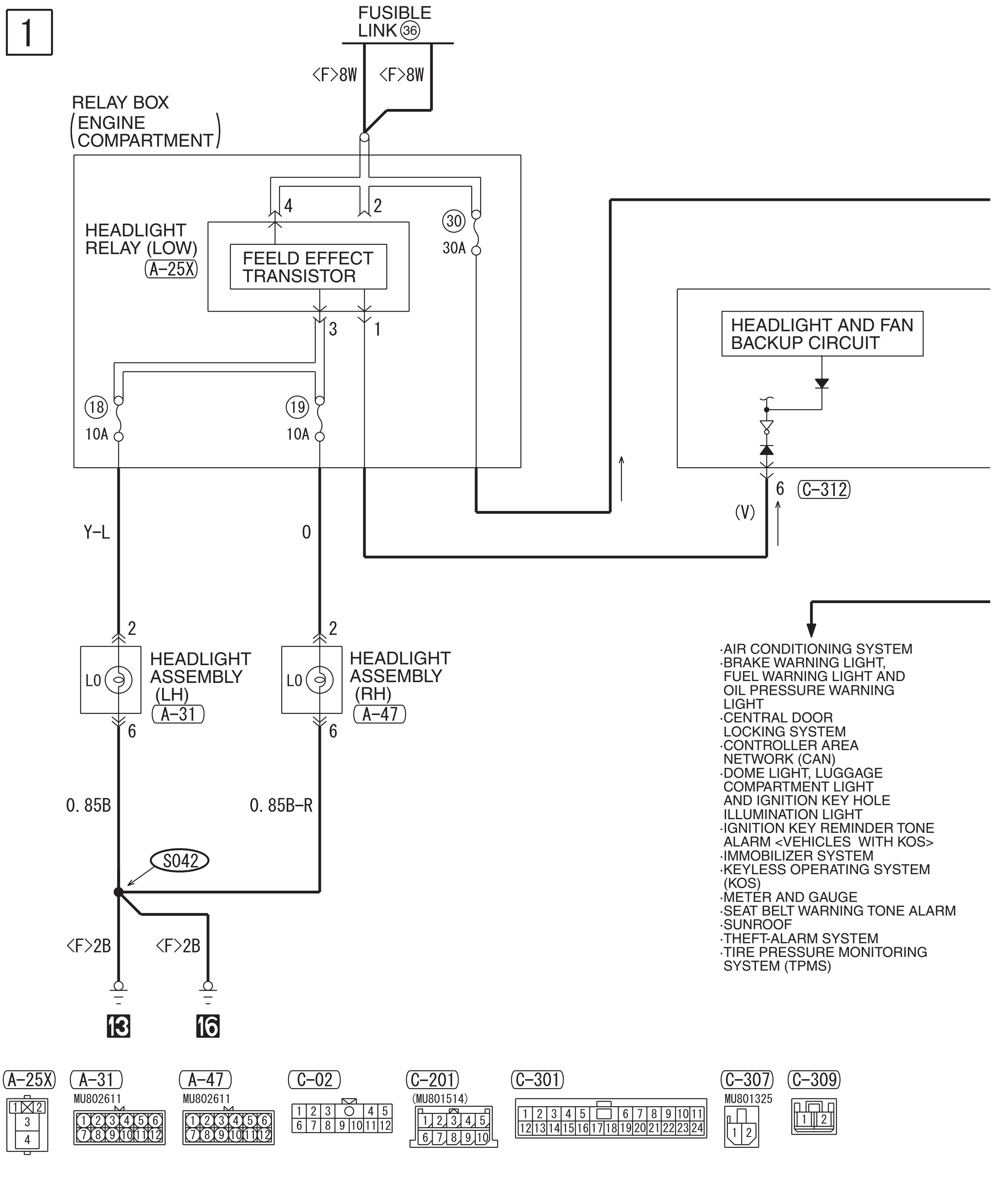
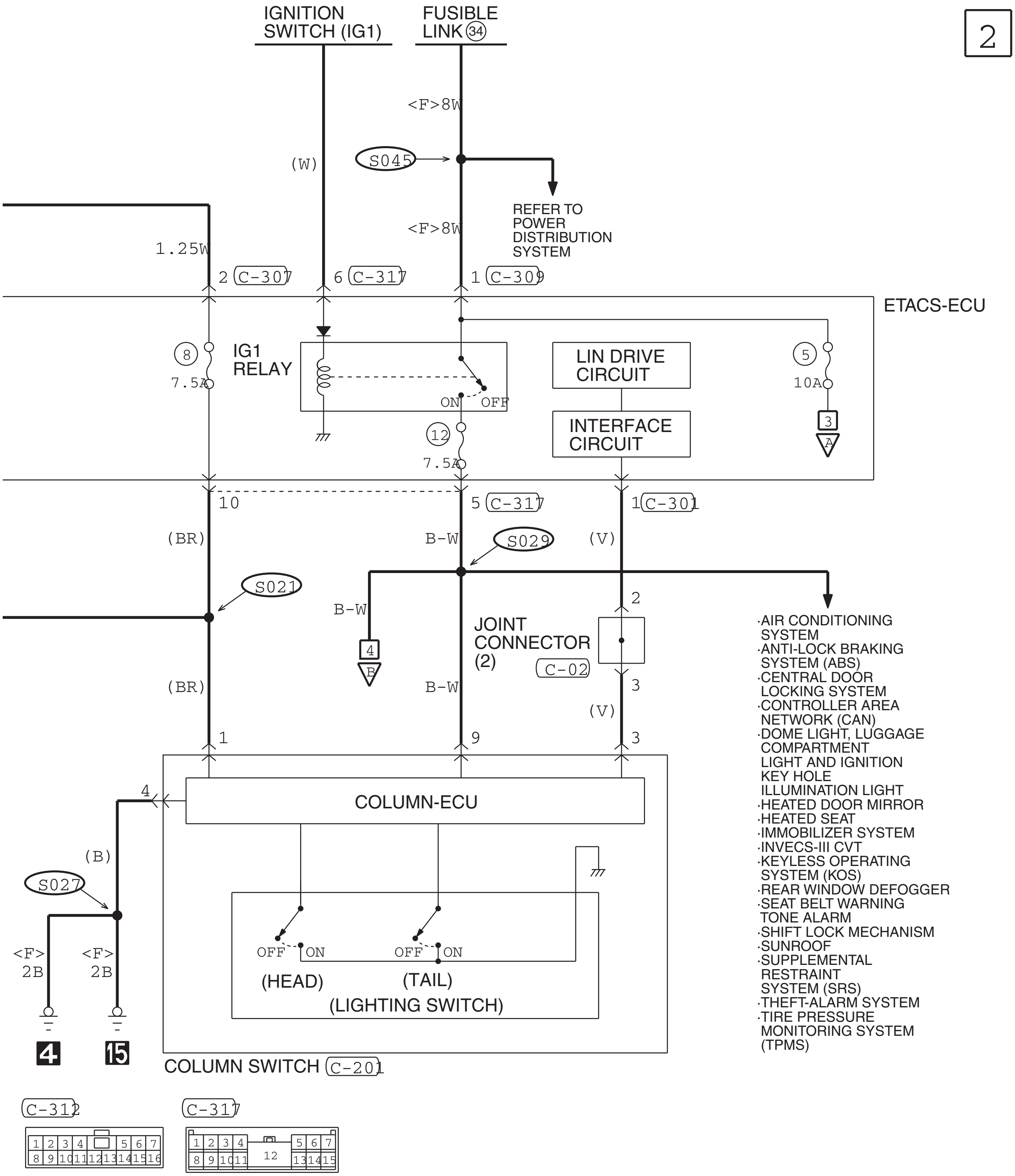
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M04AB

DAYTIME RUNNING LIGHT (DRL)

M1901030700033

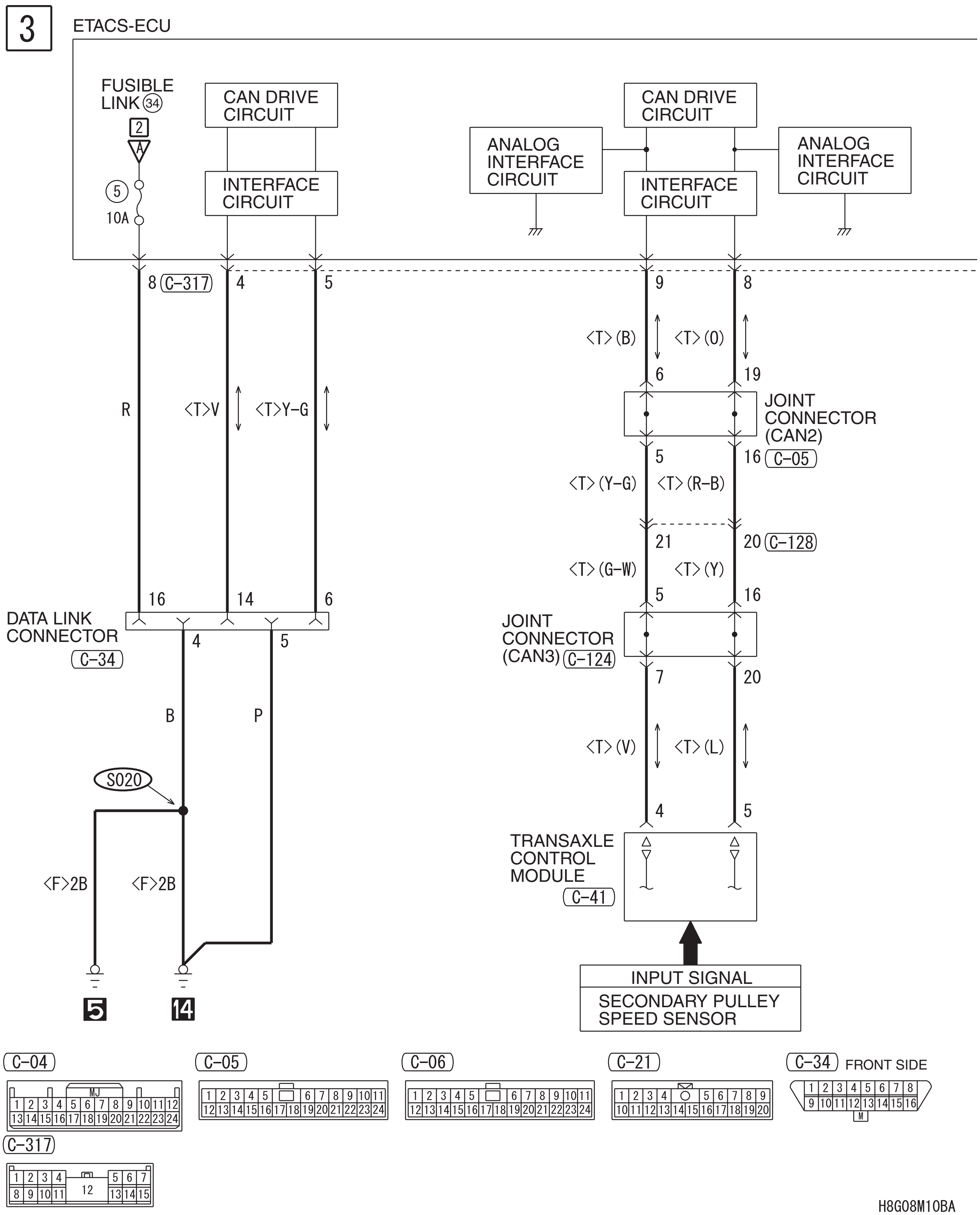


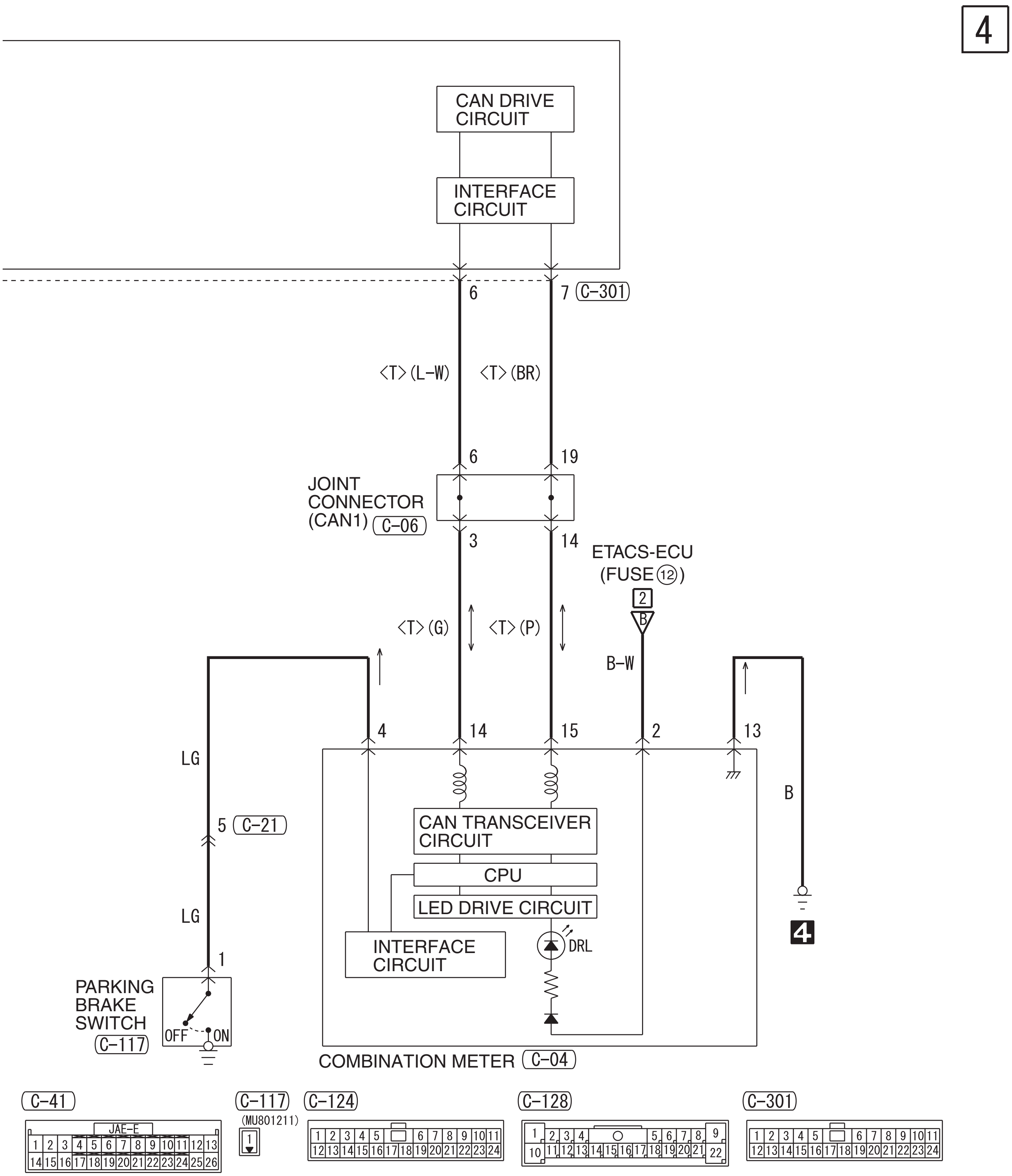


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M10AB

DAYTIME LUNNING LIGHT (DRL) (CONTINUED)





WIRE COLOR CODE
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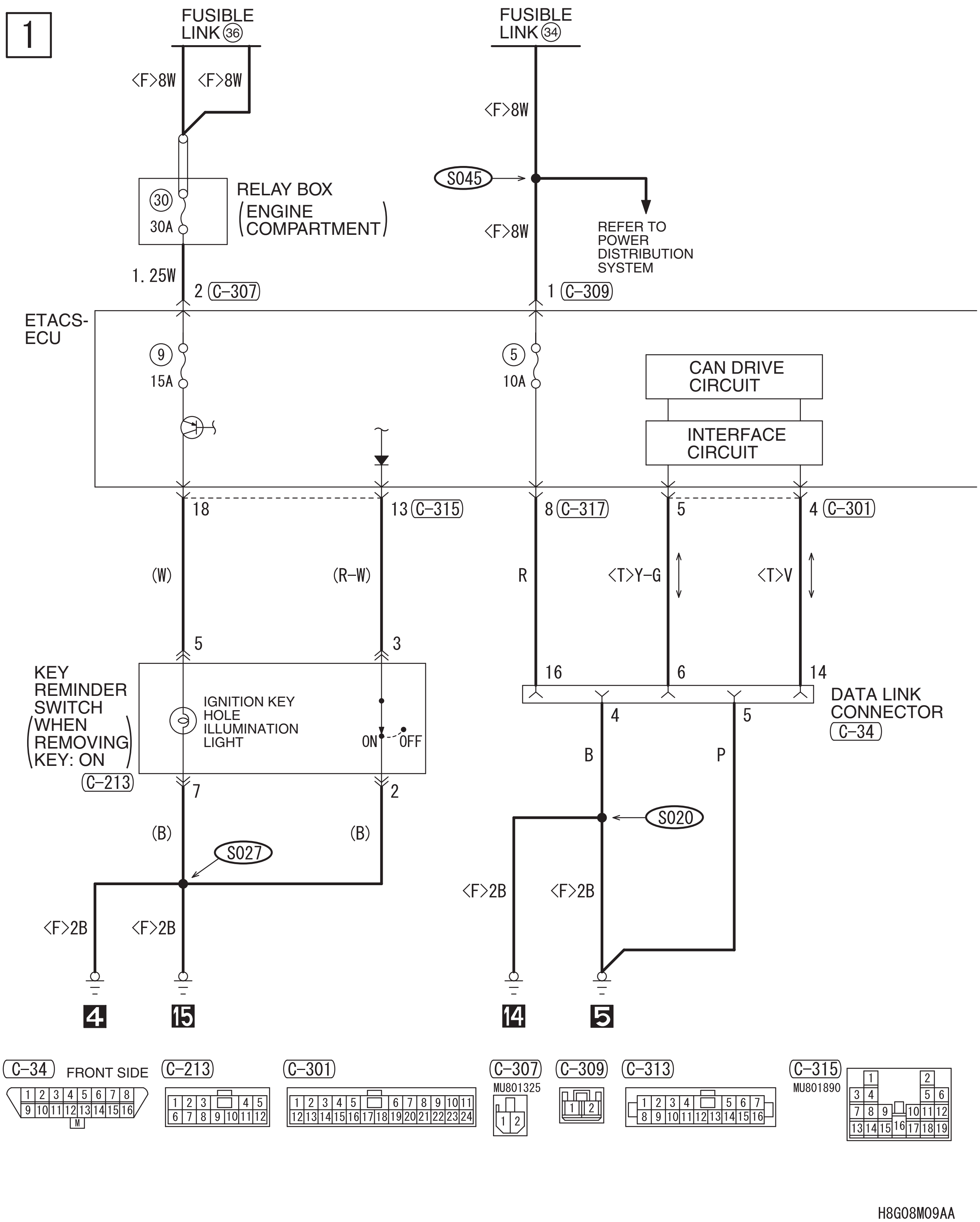
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

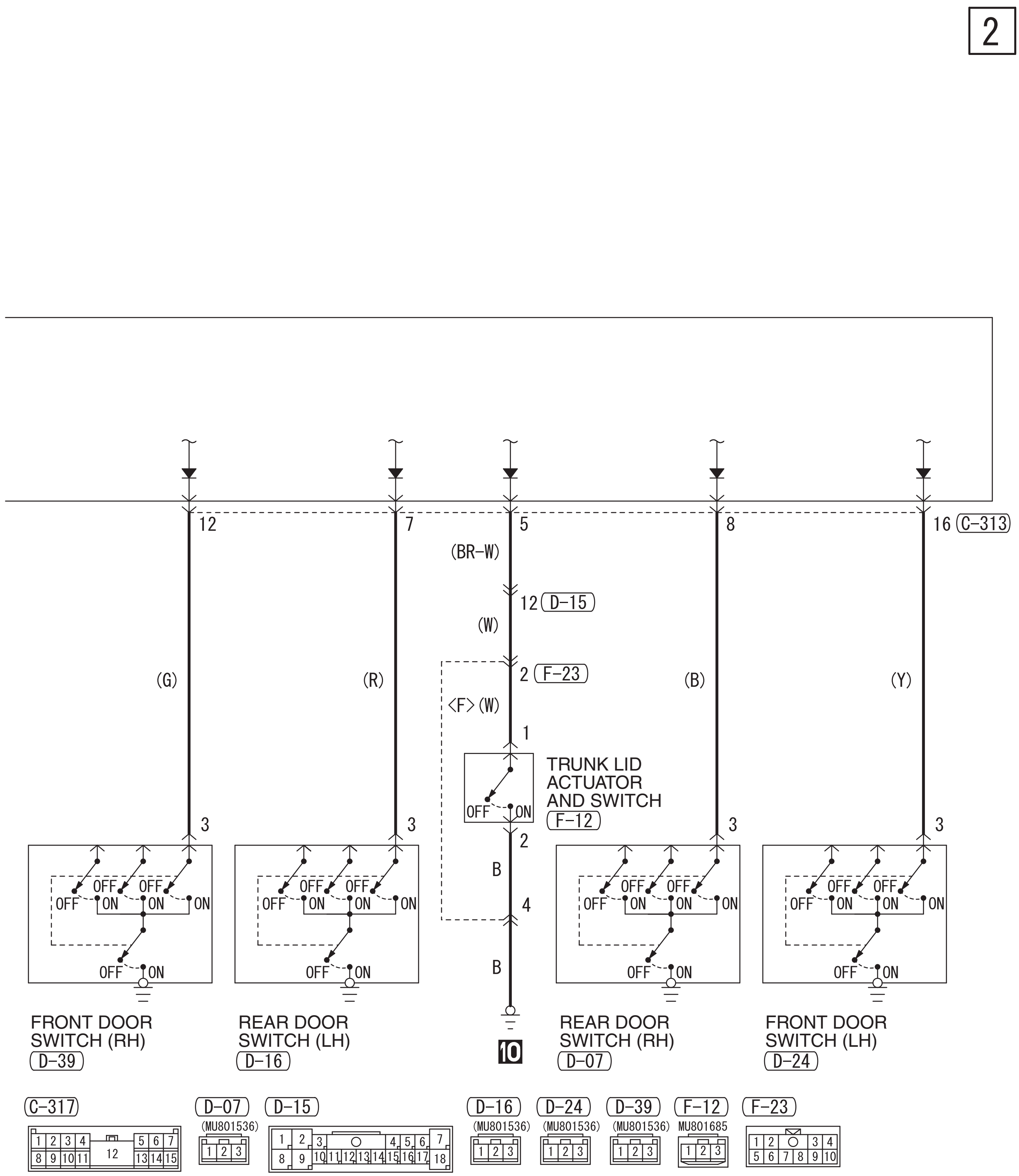
H8G08M10BB

DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLMINATION LIGHT

<VEHICLES WITHOUT KEYLESS ENTRY SYSTEM>

M1901030800030

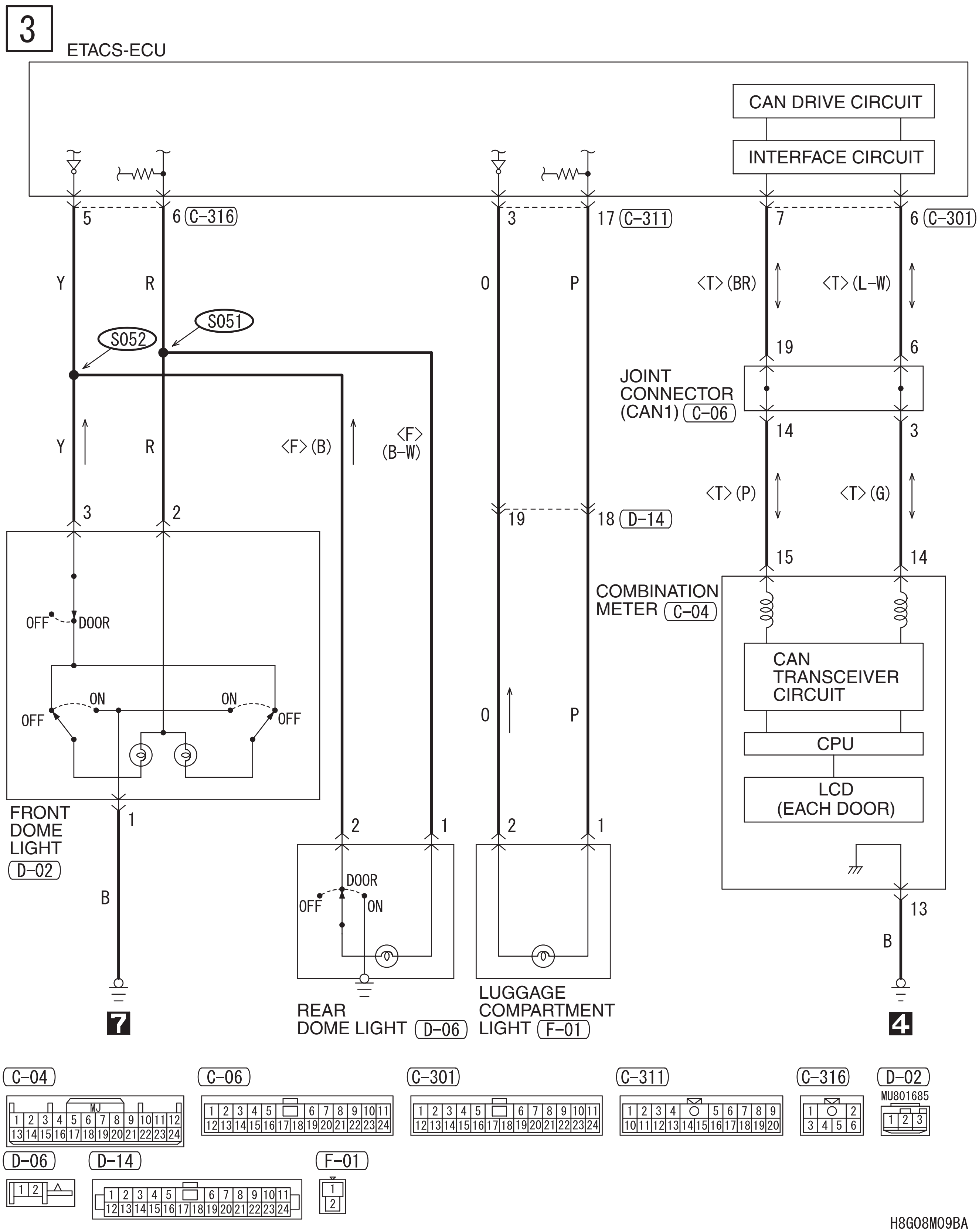




WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M09AB

DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT <VEHICLES WITHOUT KEYLESS ENTRY SYSTEM> (CONTINUED)

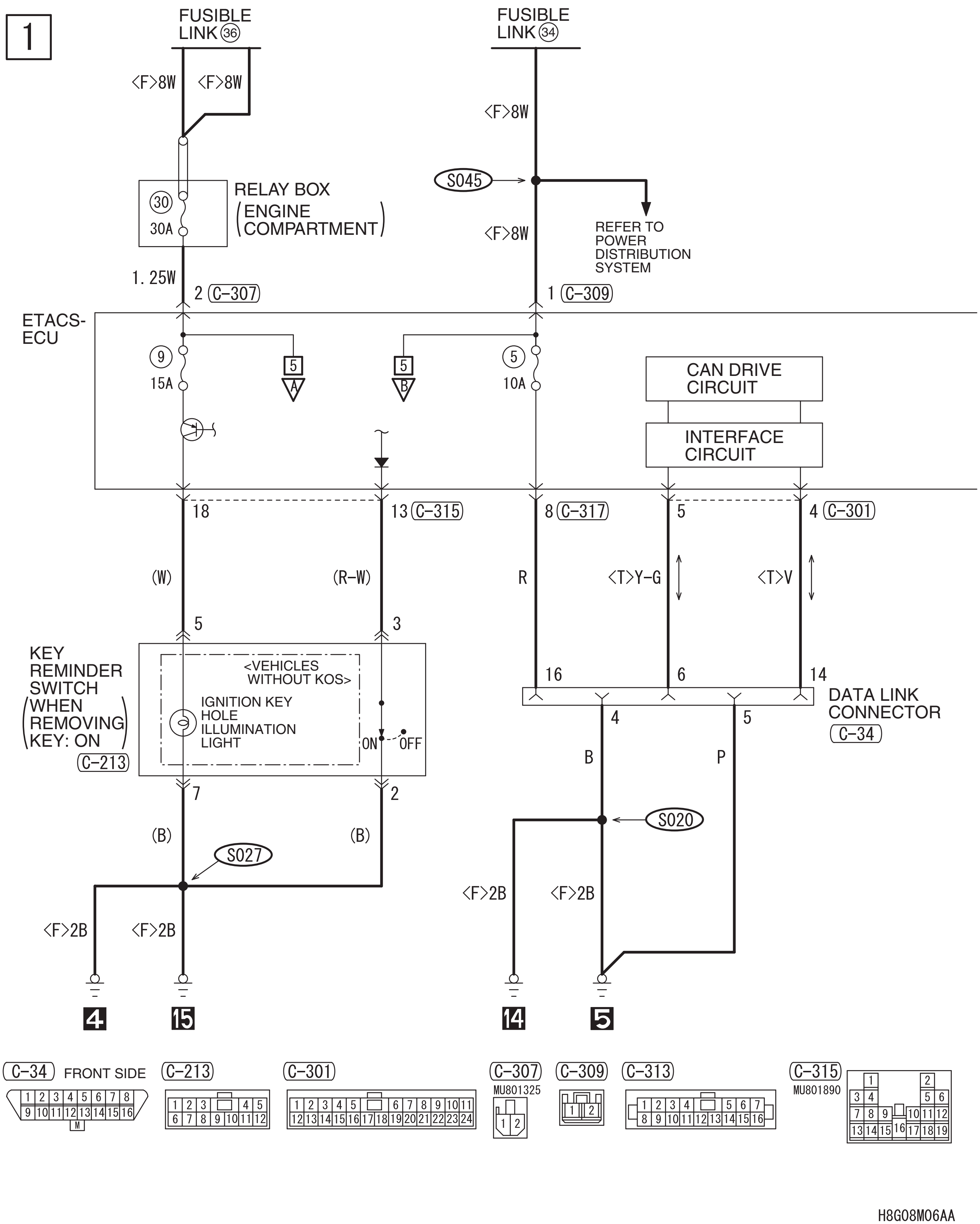


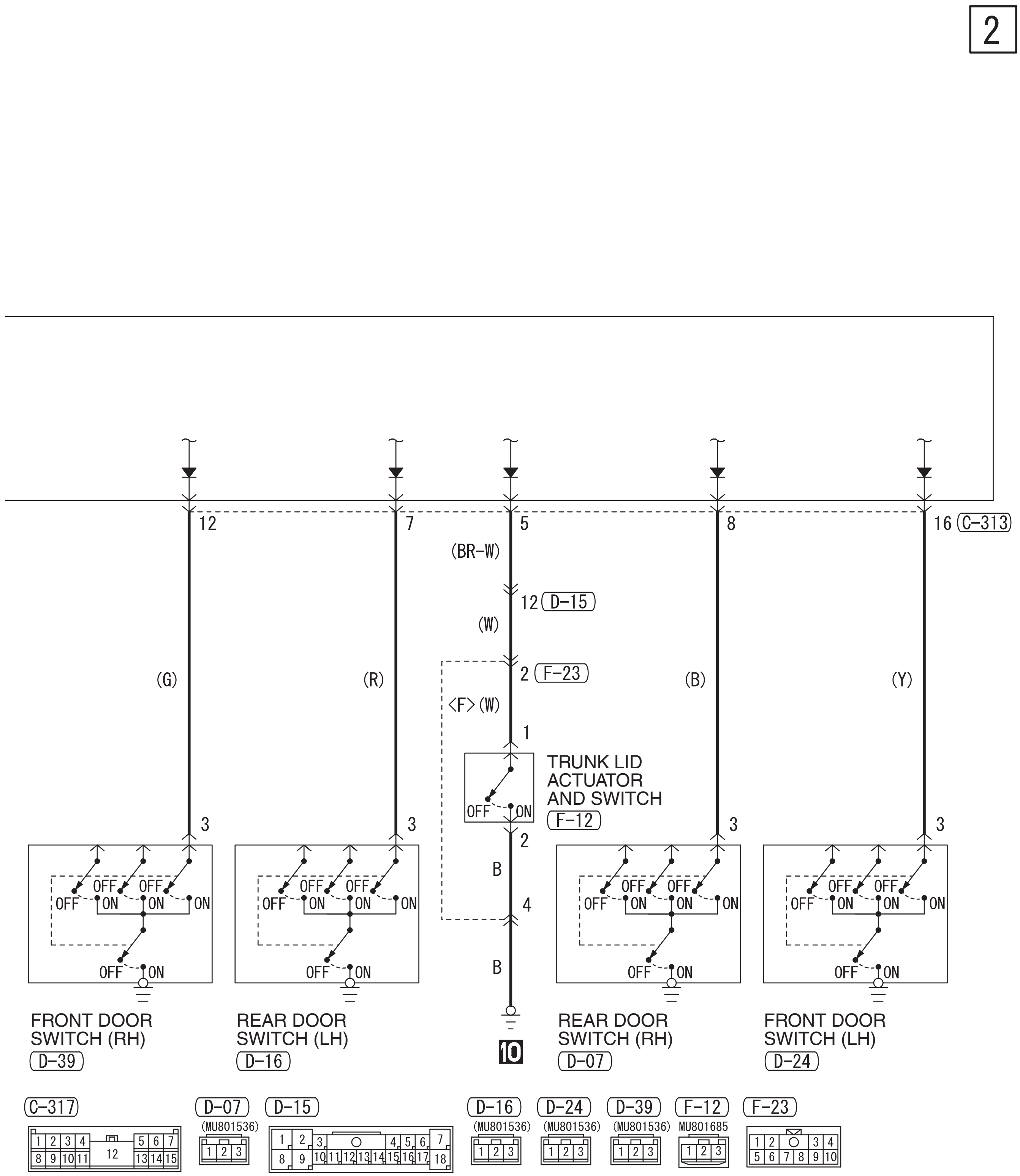
NOTES

DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLMINATION LIGHT

<VEHICLES WITH KEYLESS ENTRY SYSTEM>

M1901030800041

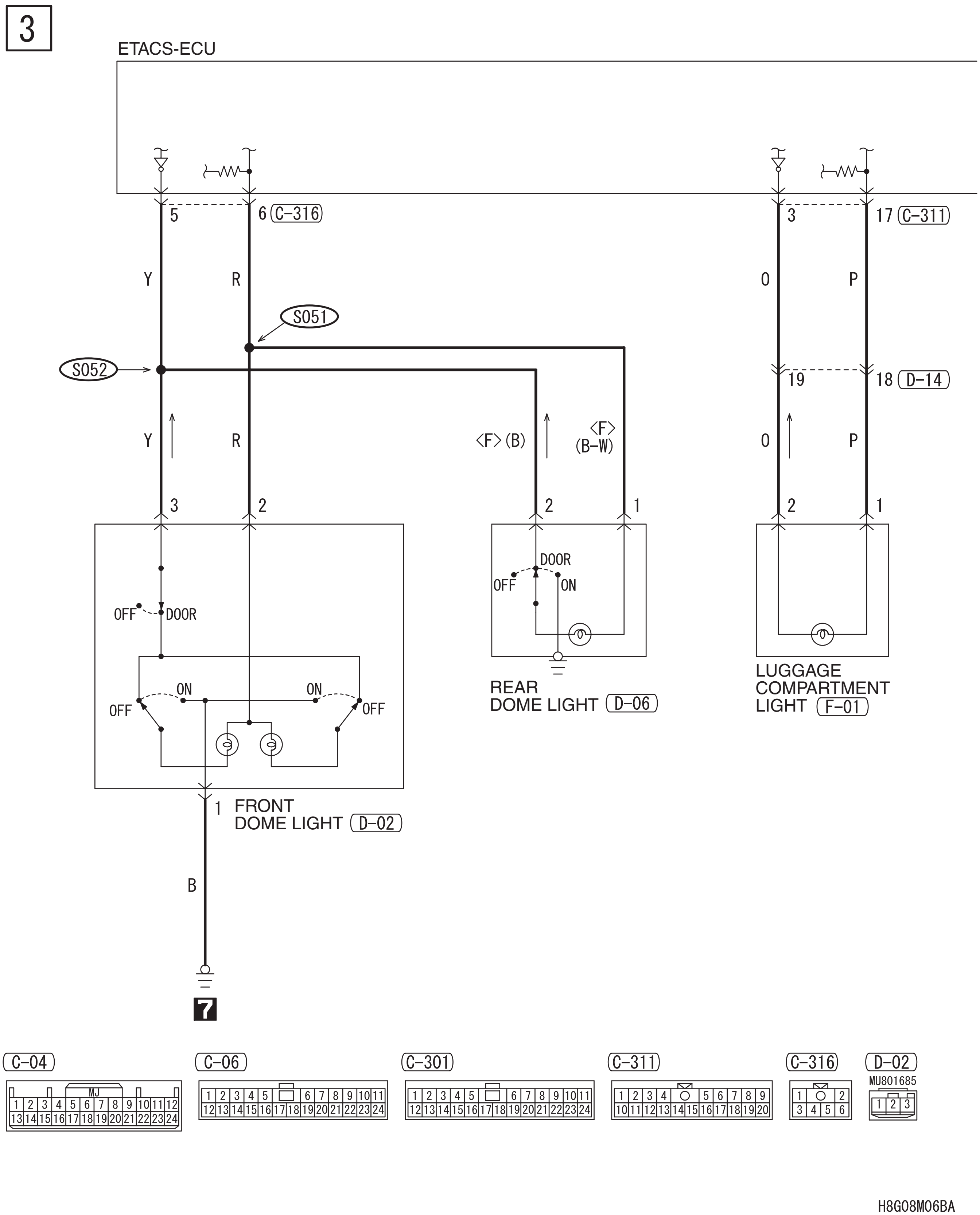


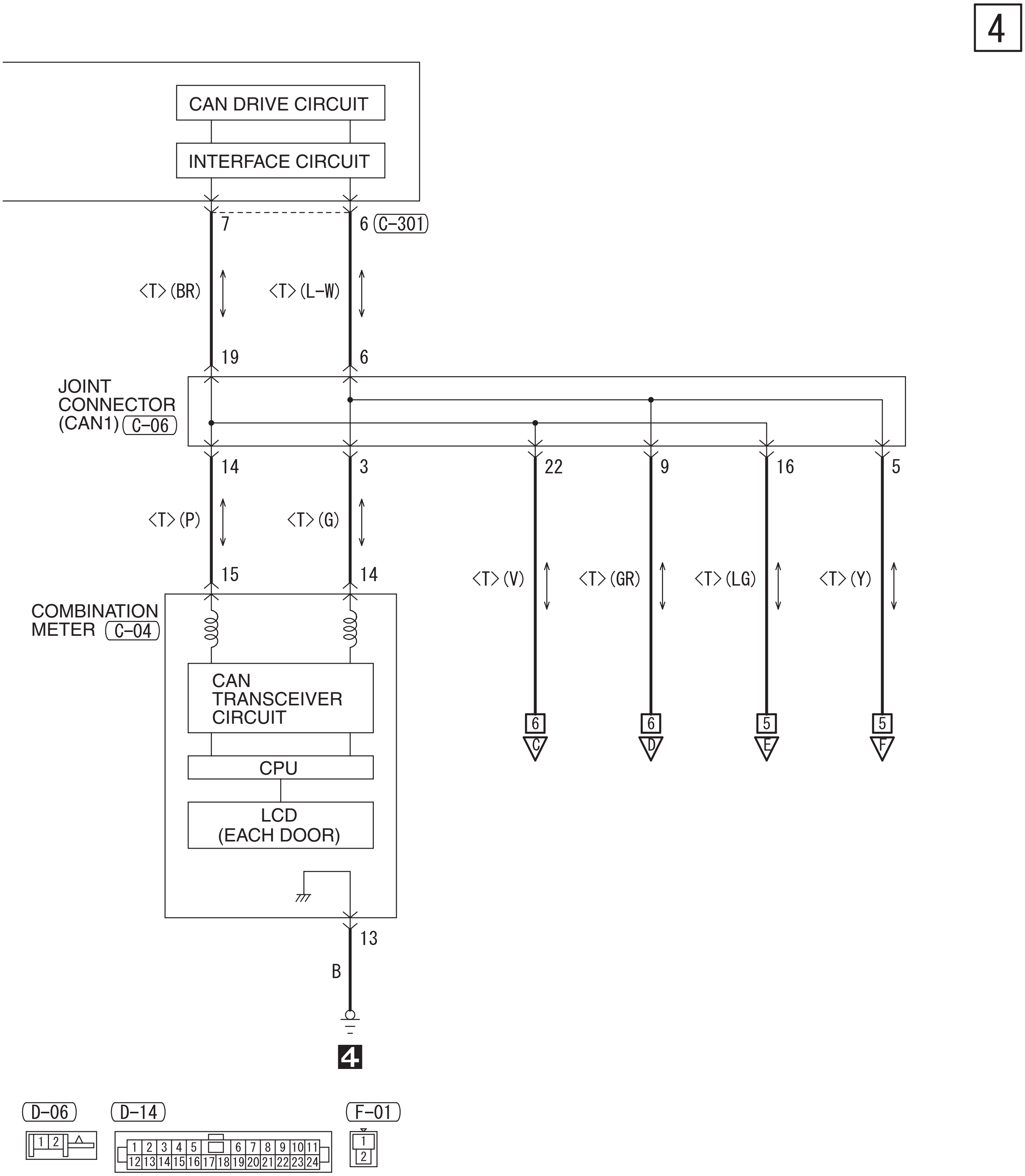


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M06AB

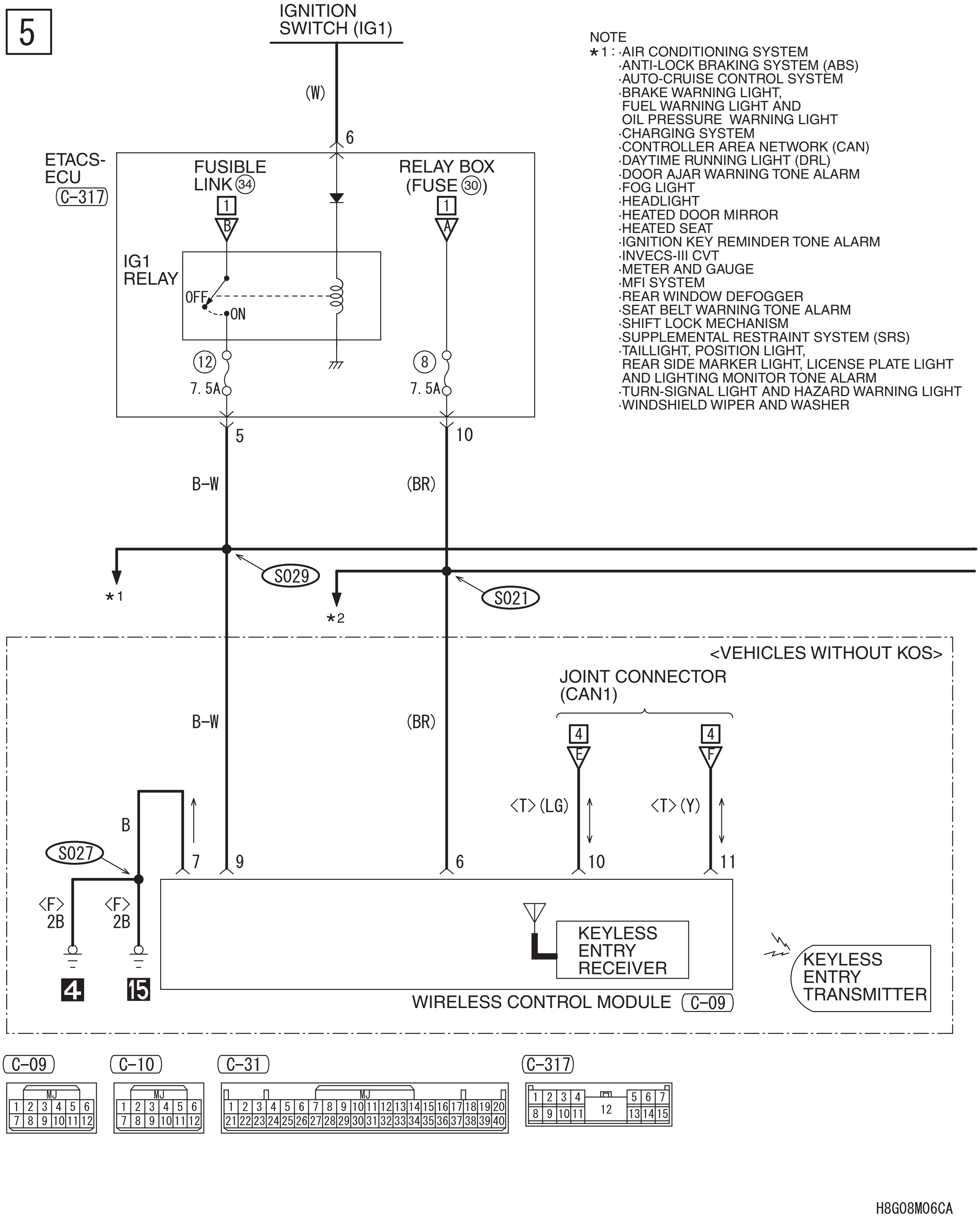
DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)





WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

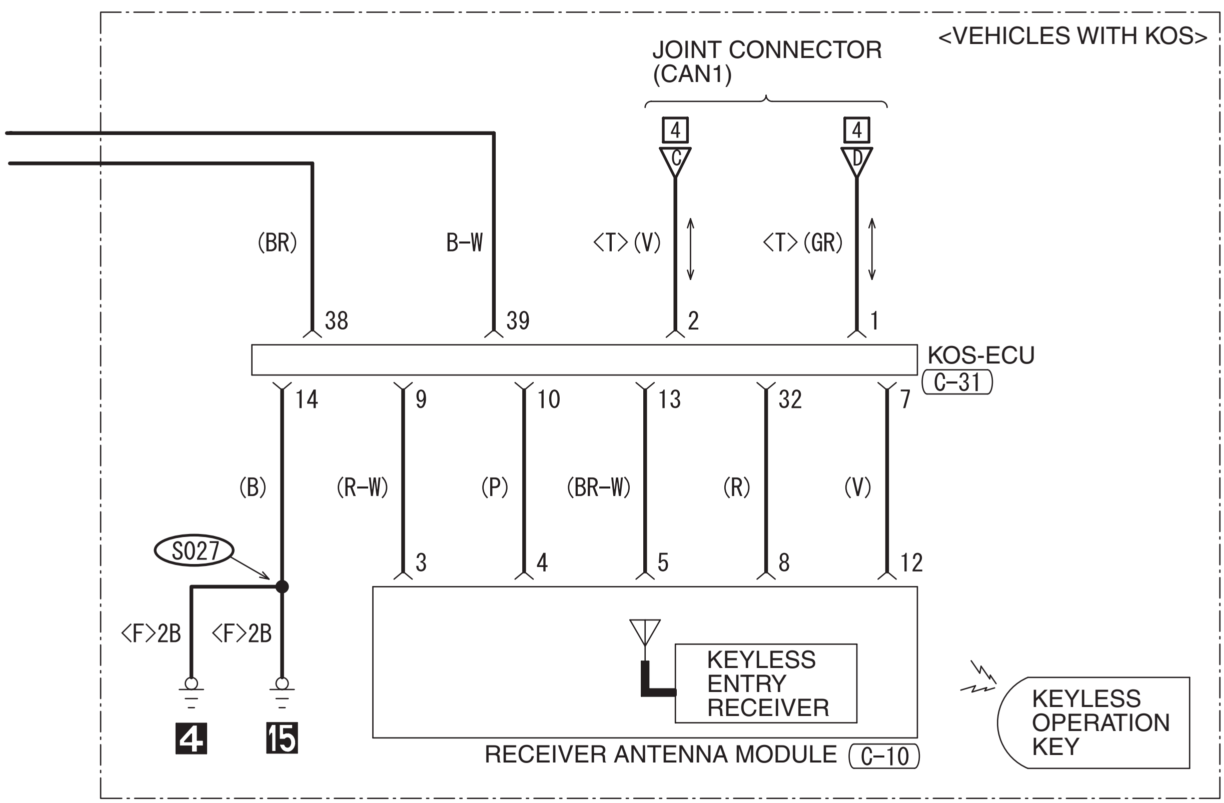
DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)



NOTE
*1 : ·AIR CONDITIONING SYSTEM
·ANTI-LOCK BRAKING SYSTEM (ABS)
·AUTO-CRUISE CONTROL SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CHARGING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOOR AJAR WARNING TONE ALARM
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·INVECS-III CVT
·METER AND GAUGE
·MFI SYSTEM
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

6

*2 : ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT,
FUEL WARNING LIGHT AND
OIL PRESSURE WARNING LIGHT
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·IGNITION KEY REMINDER TONE ALARM
<VEHICLES WITH KOS>
·METER AND GAUGE
·SEAT BELT WARNING TONE ALARM
·TAILLIGHT, POSITION LIGHT,
REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT
AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



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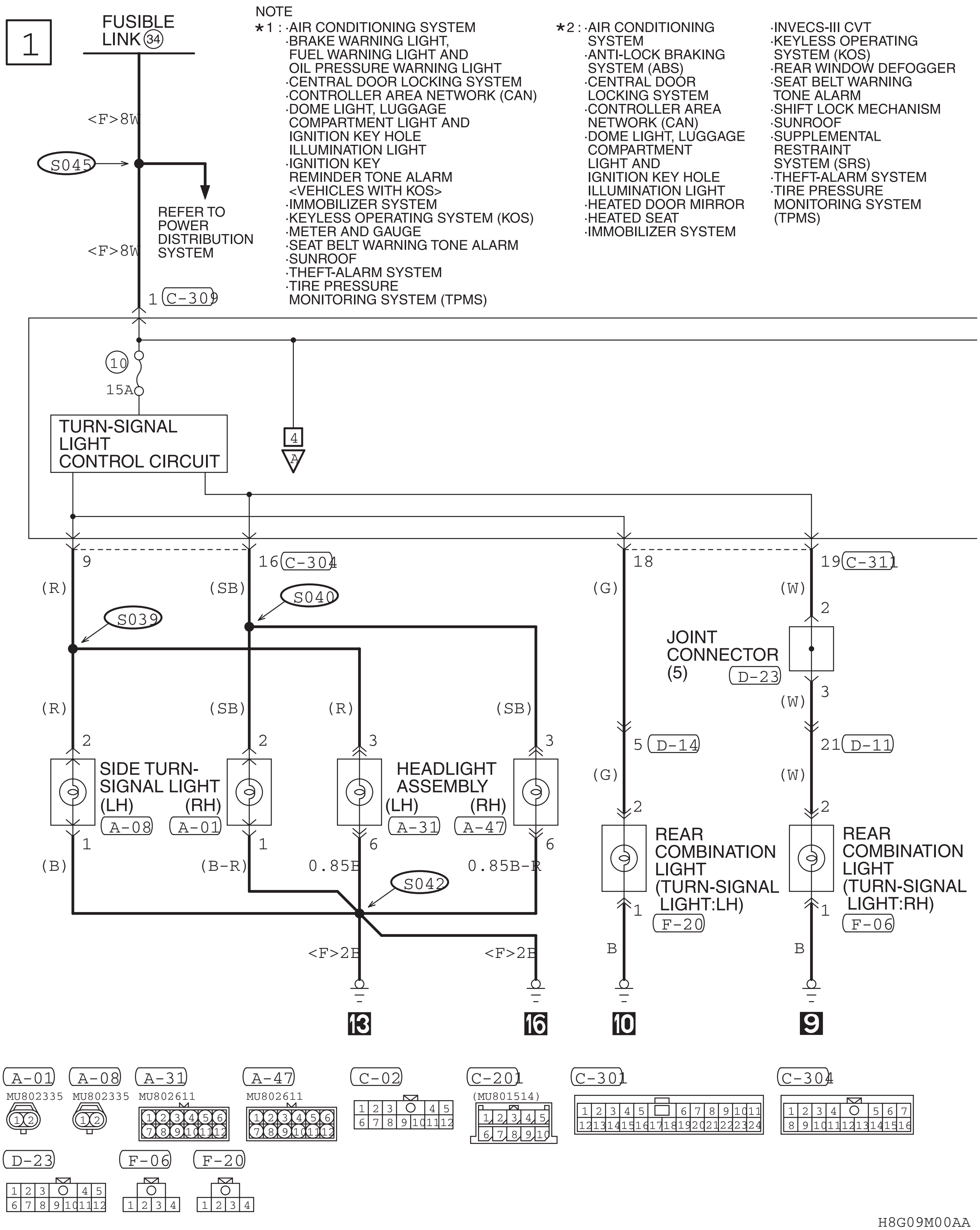
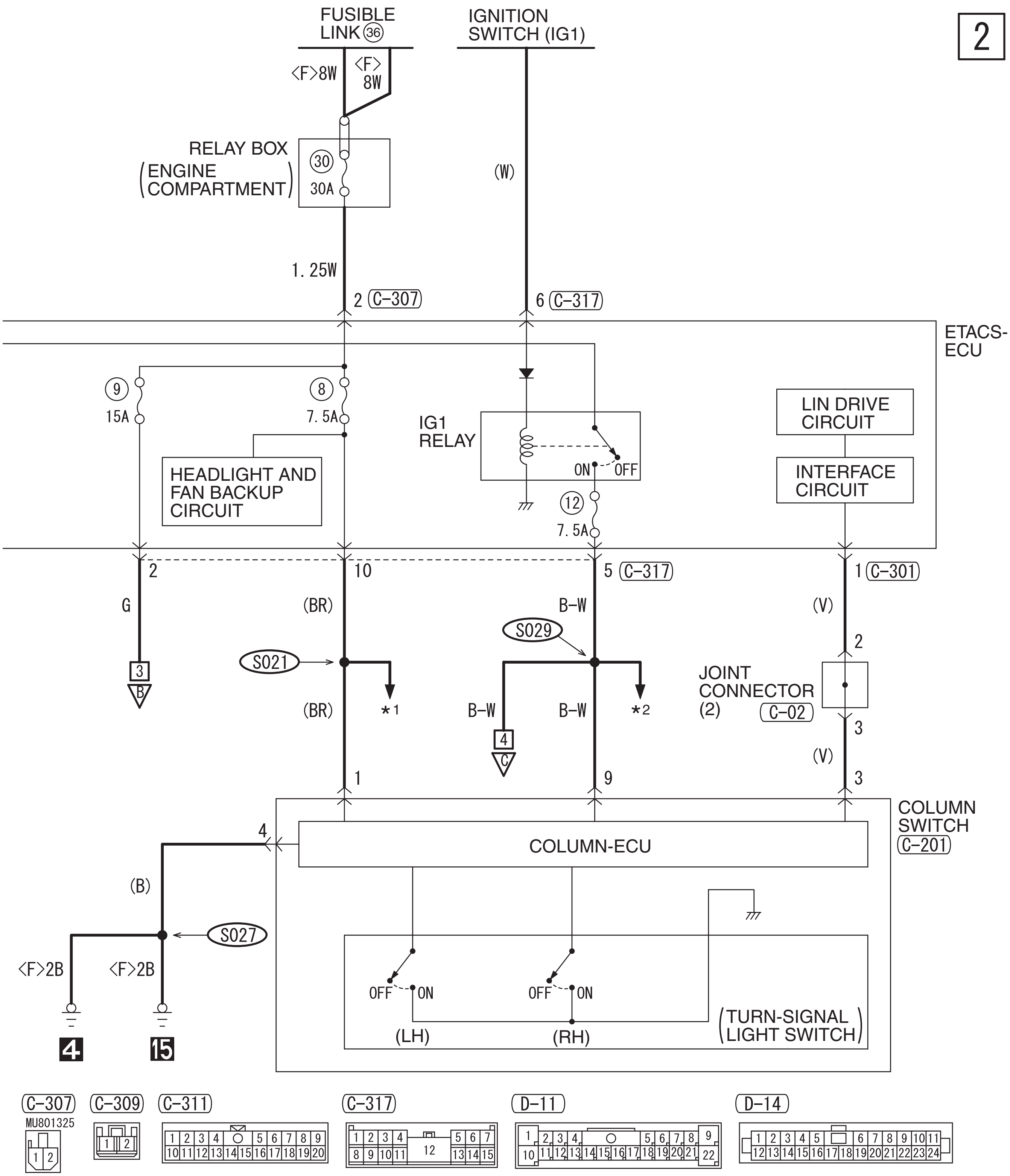
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G08M06CB

TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT

M1901002902348





WIRE COLOR CODE
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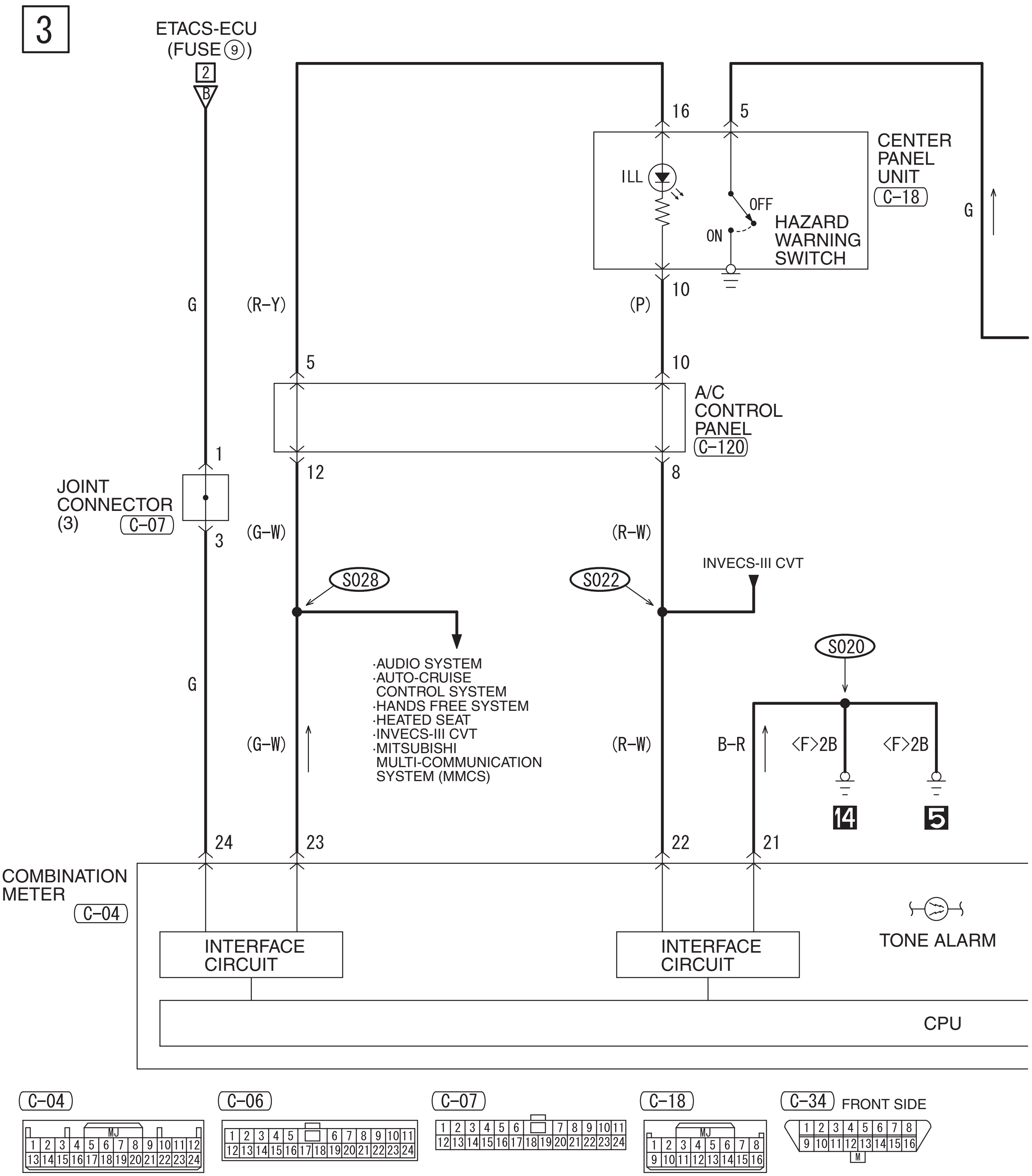
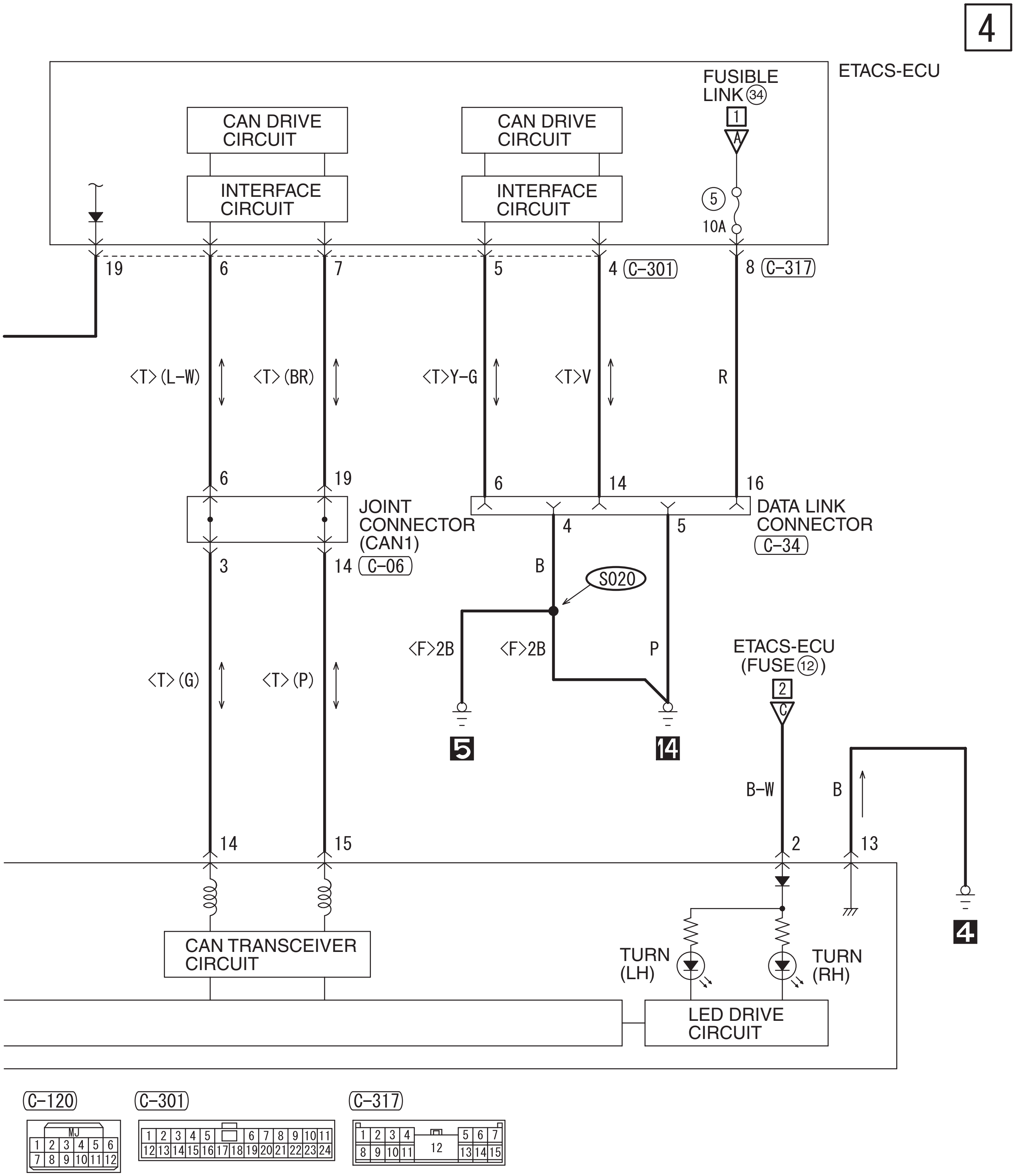
TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT (CONTINUED)





WIRE COLOR CODE
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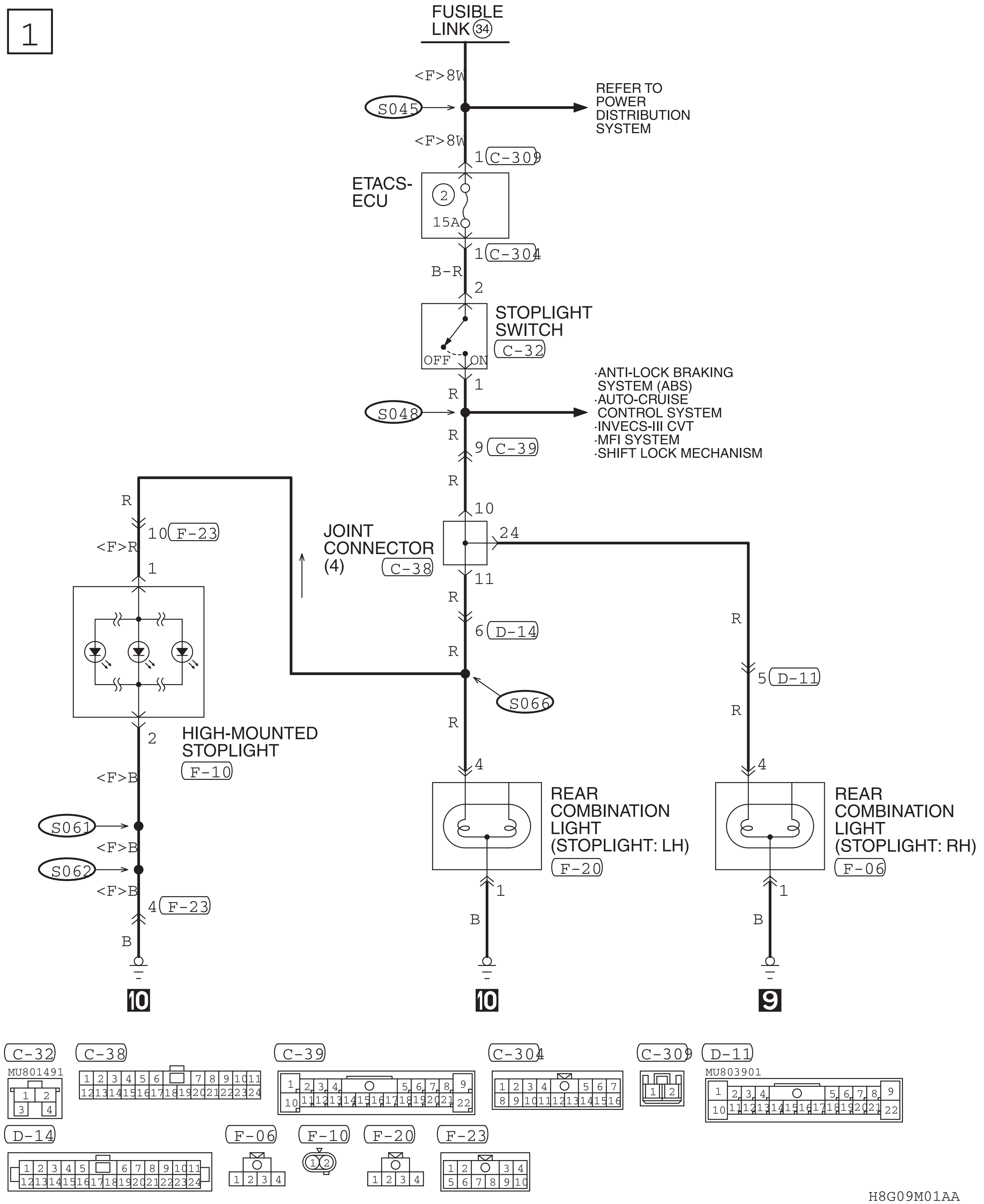
H8G09M00BB

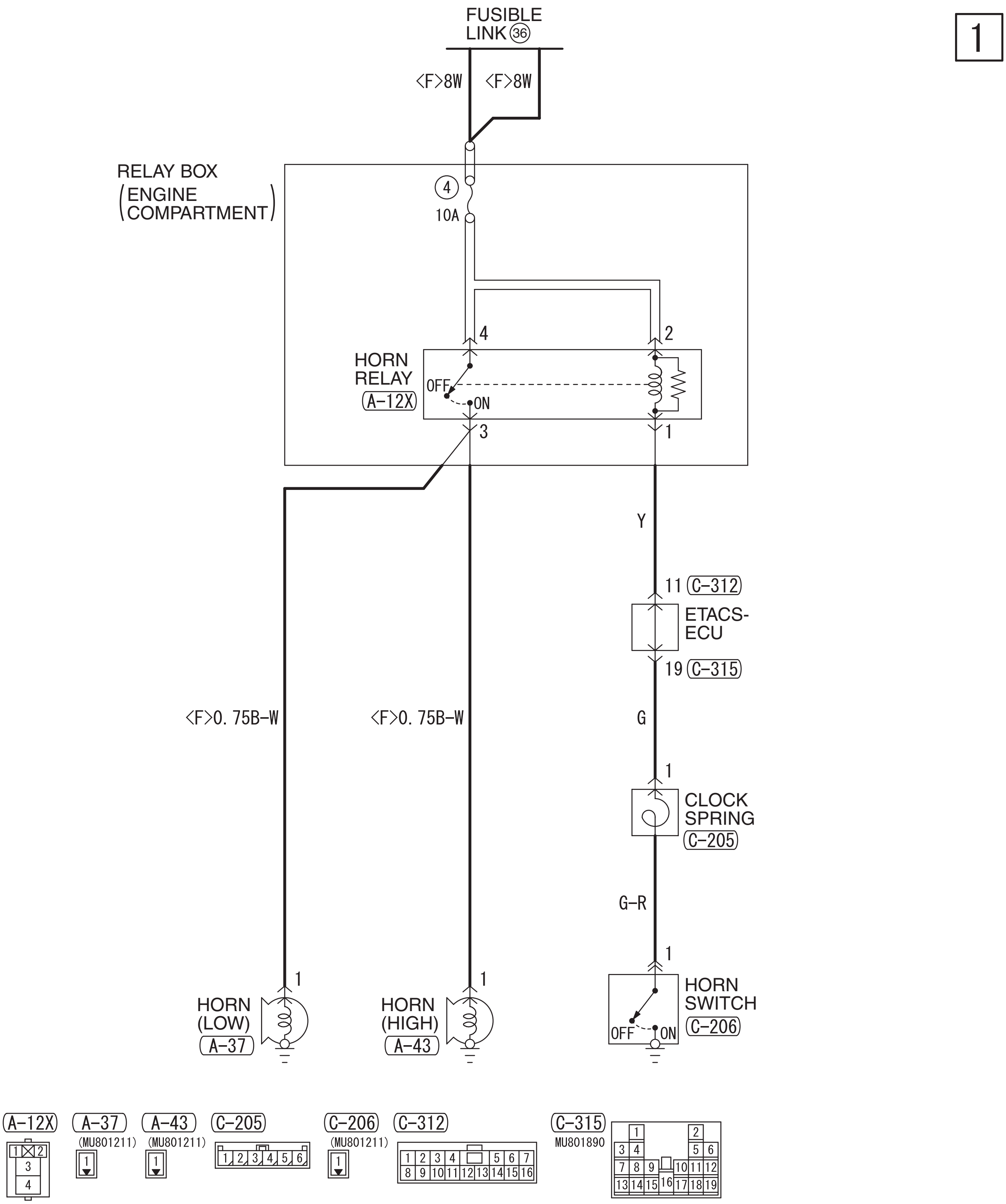
STOPLIGHT

M1901003002616



HORN

M1901003301896



WIRE COLOR CODE
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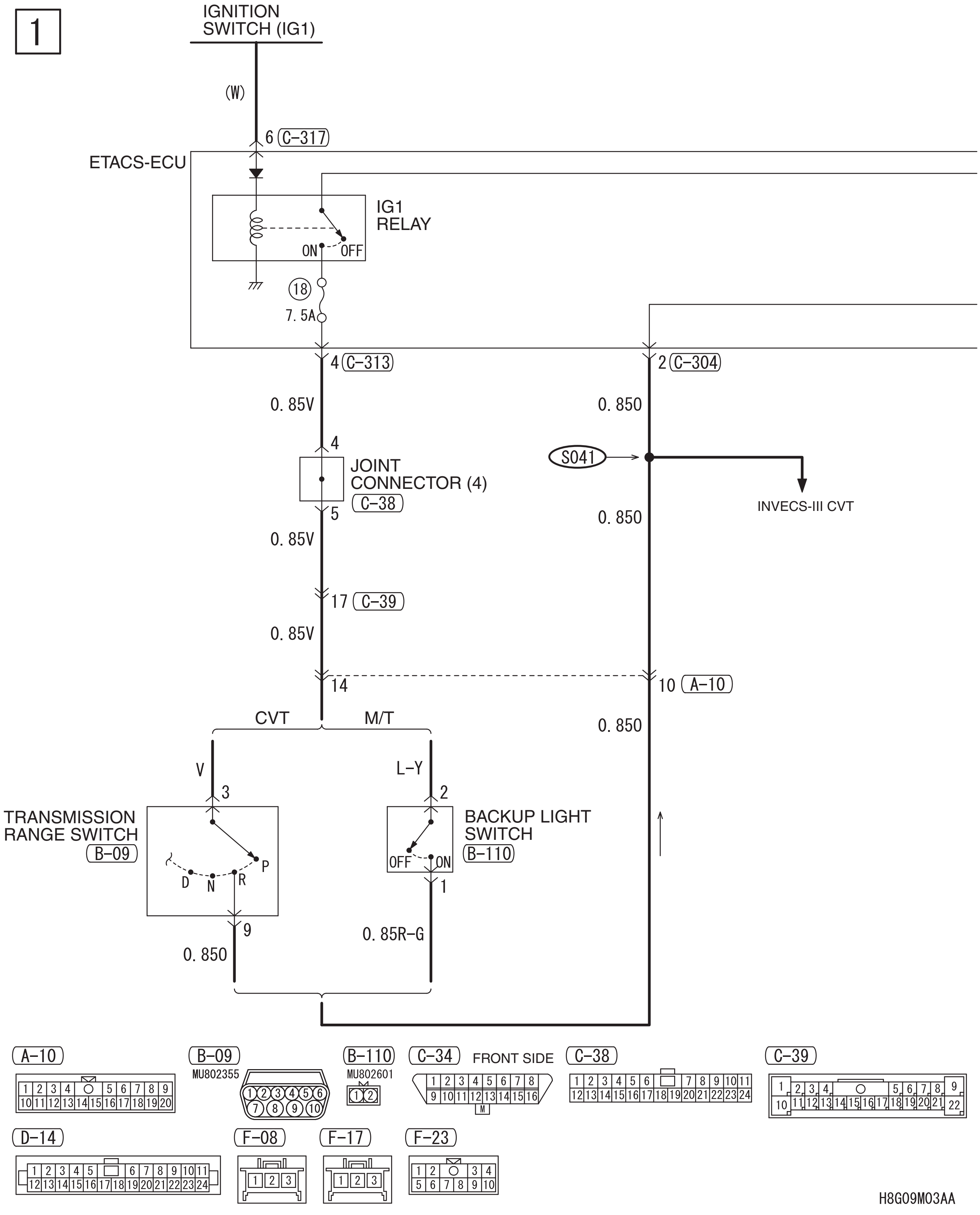
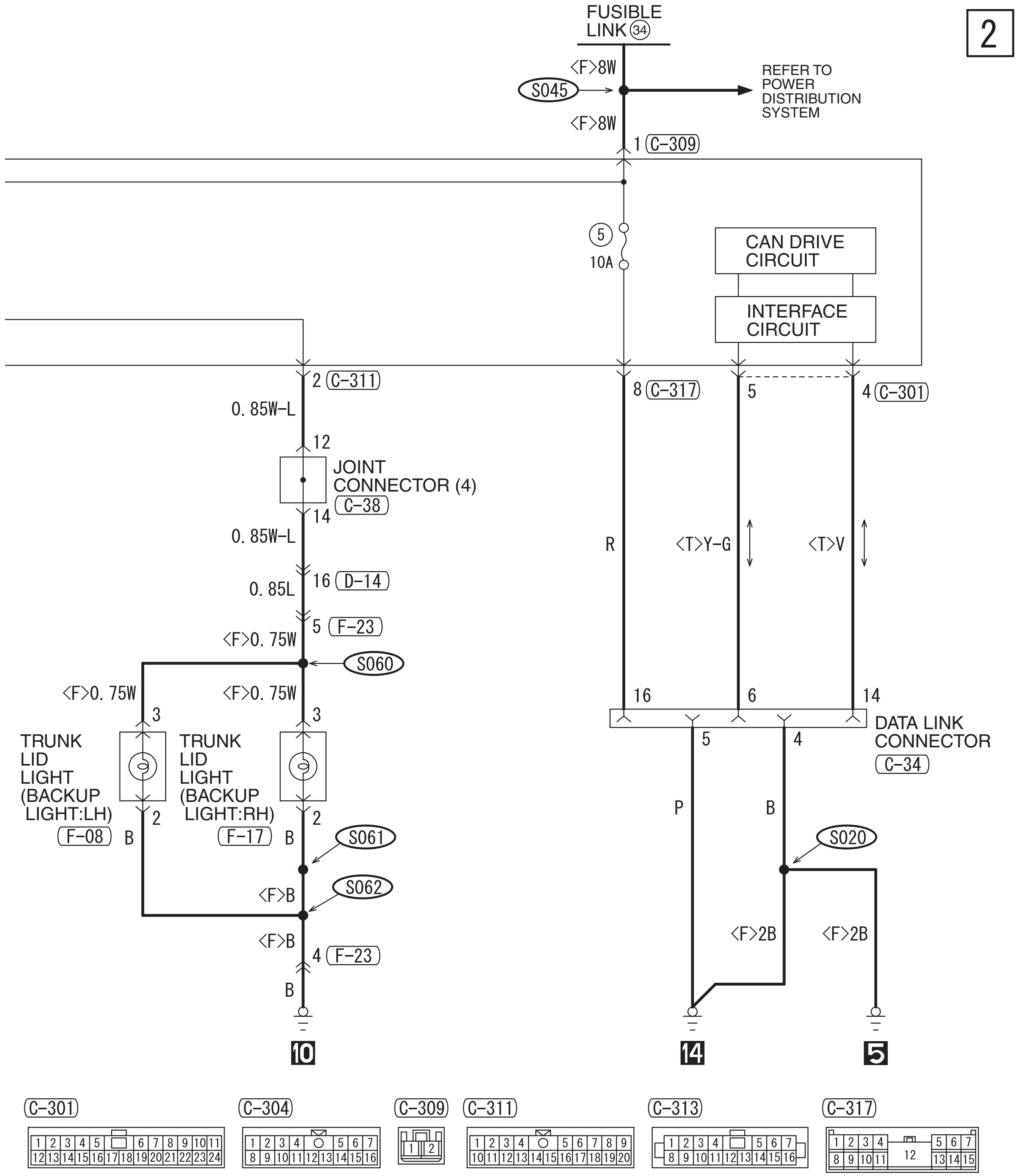
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G09M02AA

BACKUP LIGHT

M1901003102787





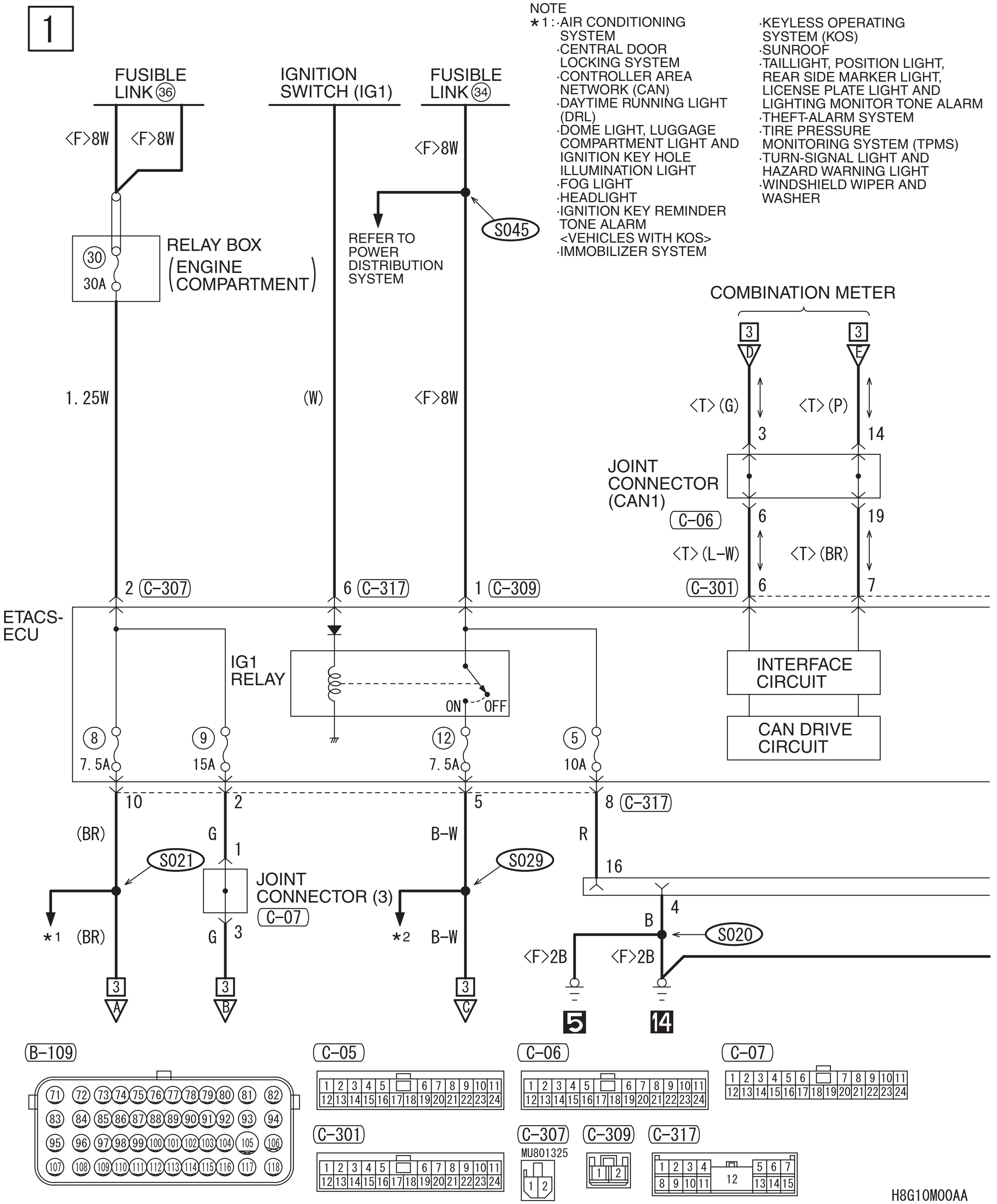
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G09M03AB

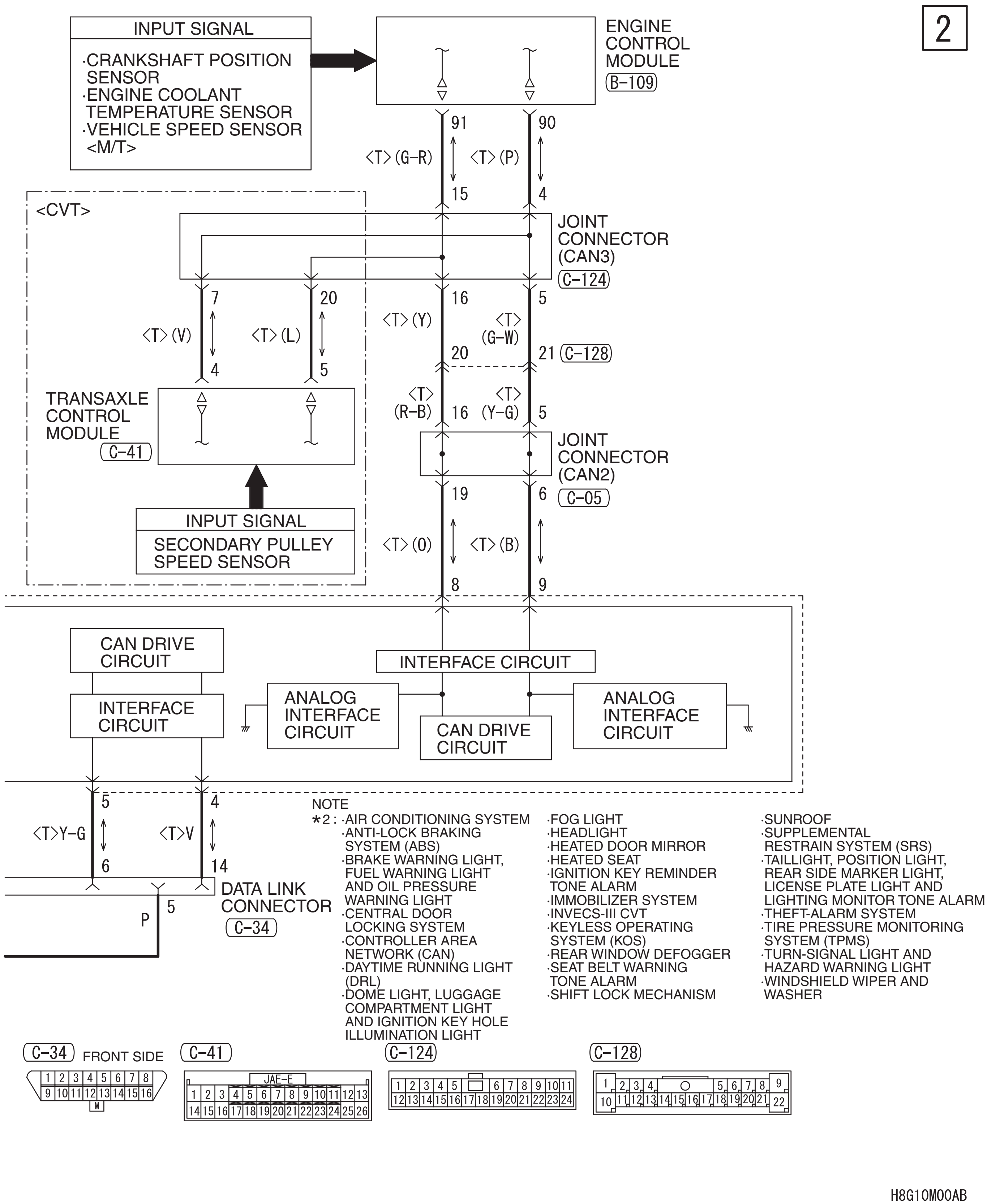
METER AND GAUGE

M1901003503142

NOTE
*1: ·AIR CONDITIONING SYSTEM
·CENTRAL DOOR LOCKING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
·IMMOBILIZER SYSTEM
·KEYLESS OPERATING SYSTEM (KOS)
·SUNROOF
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



TSB Revision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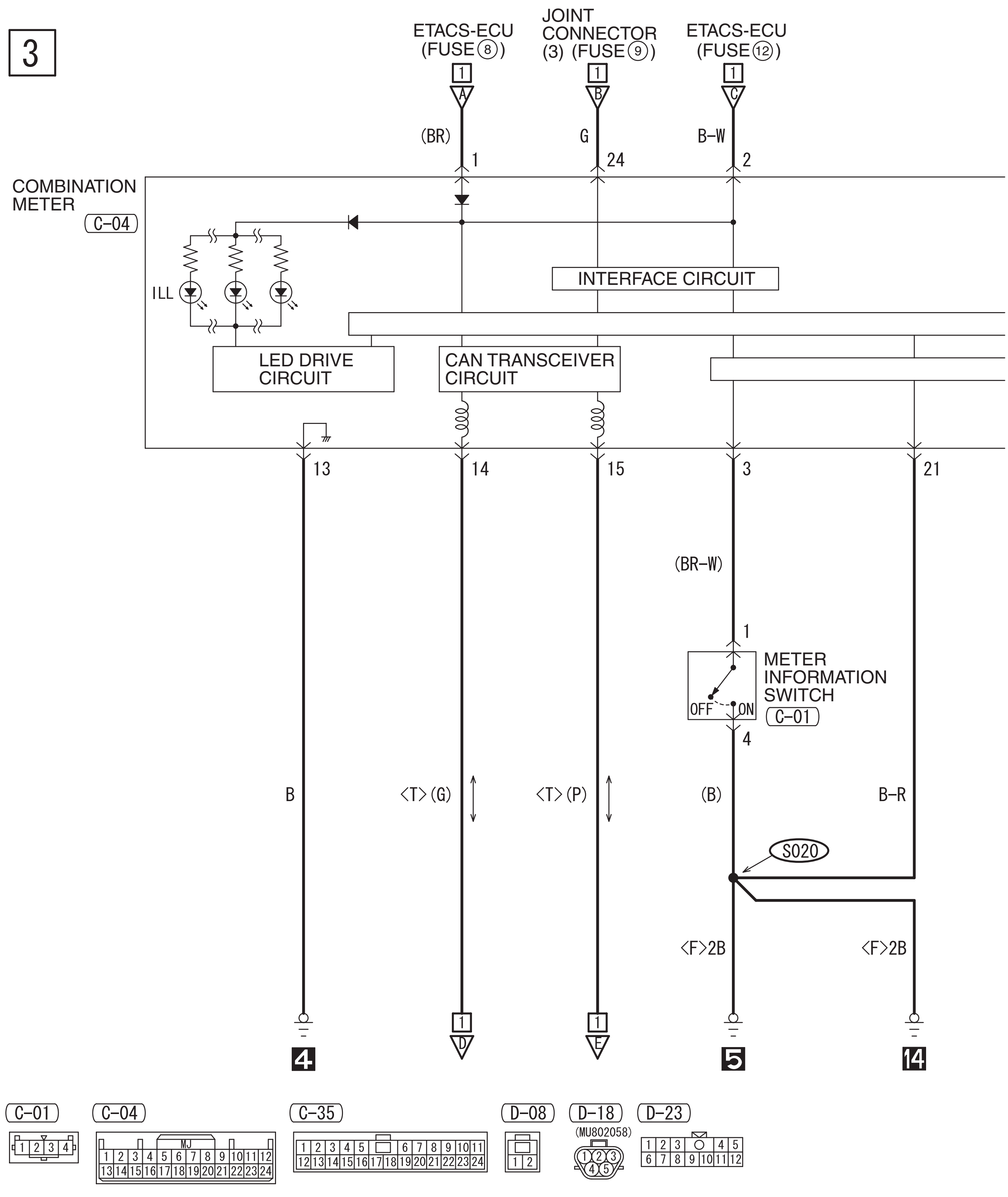
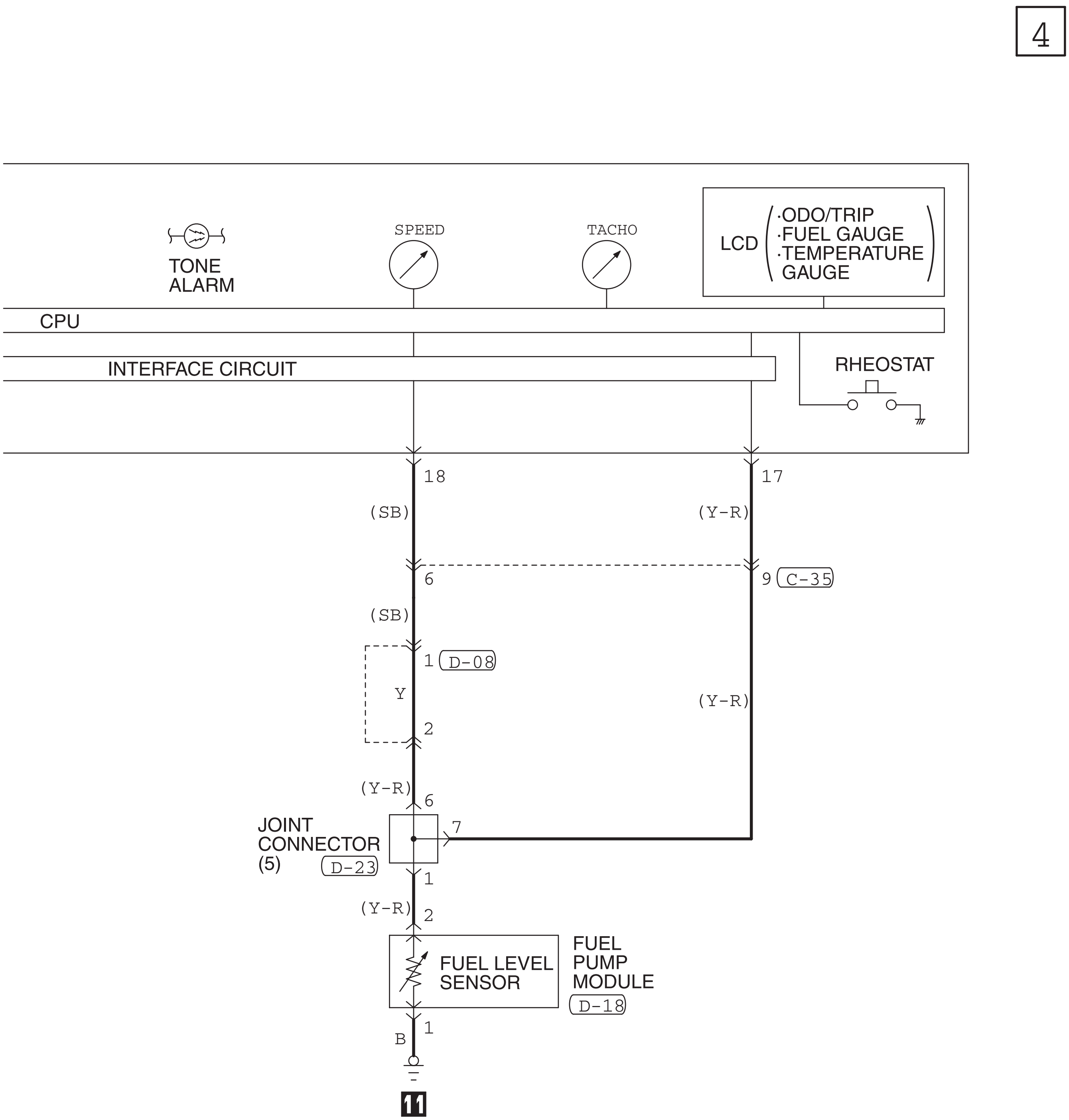
INPUT SIGNAL
·CRANKSHAFT POSITION SENSOR
·ENGINE COOLANT TEMPERATURE SENSOR
·VEHICLE SPEED SENSOR <M/T>
ENGINE CONTROL MODULE
B-109
91
90
<T>(G-R)
<T>(P)
15
4
<CVT>
JOINT CONNECTOR (CAN3)
C-124
7
20
16
5
<T>(V)
<T>(L)
<T>(Y)
<T> (G-W)
20
21
C-128
4
5
TRANSAXLE CONTROL MODULE
C-41
<T> (R-B)
16
<T> (Y-G)
5
JOINT CONNECTOR (CAN2)
19
6
C-05
INPUT SIGNAL
SECONDARY PULLEY SPEED SENSOR
<T>(O)
<T>(B)
8
9
CAN DRIVE CIRCUIT
INTERFACE CIRCUIT
INTERFACE CIRCUIT
ANALOG INTERFACE CIRCUIT
CAN DRIVE CIRCUIT
ANALOG INTERFACE CIRCUIT
5
4
<T>Y-G
<T>V
6
14
DATA LINK CONNECTOR
C-34
P
5
NOTE
*2 : ·AIR CONDITIONING SYSTEM
·ANTI-LOCK BRAKING SYSTEM (ABS)
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAIN SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
C-34 FRONT SIDE
C-41
JAE-E
C-124
C-128
H8G10M00AB

METER AND GAUGE (CONTINUED)



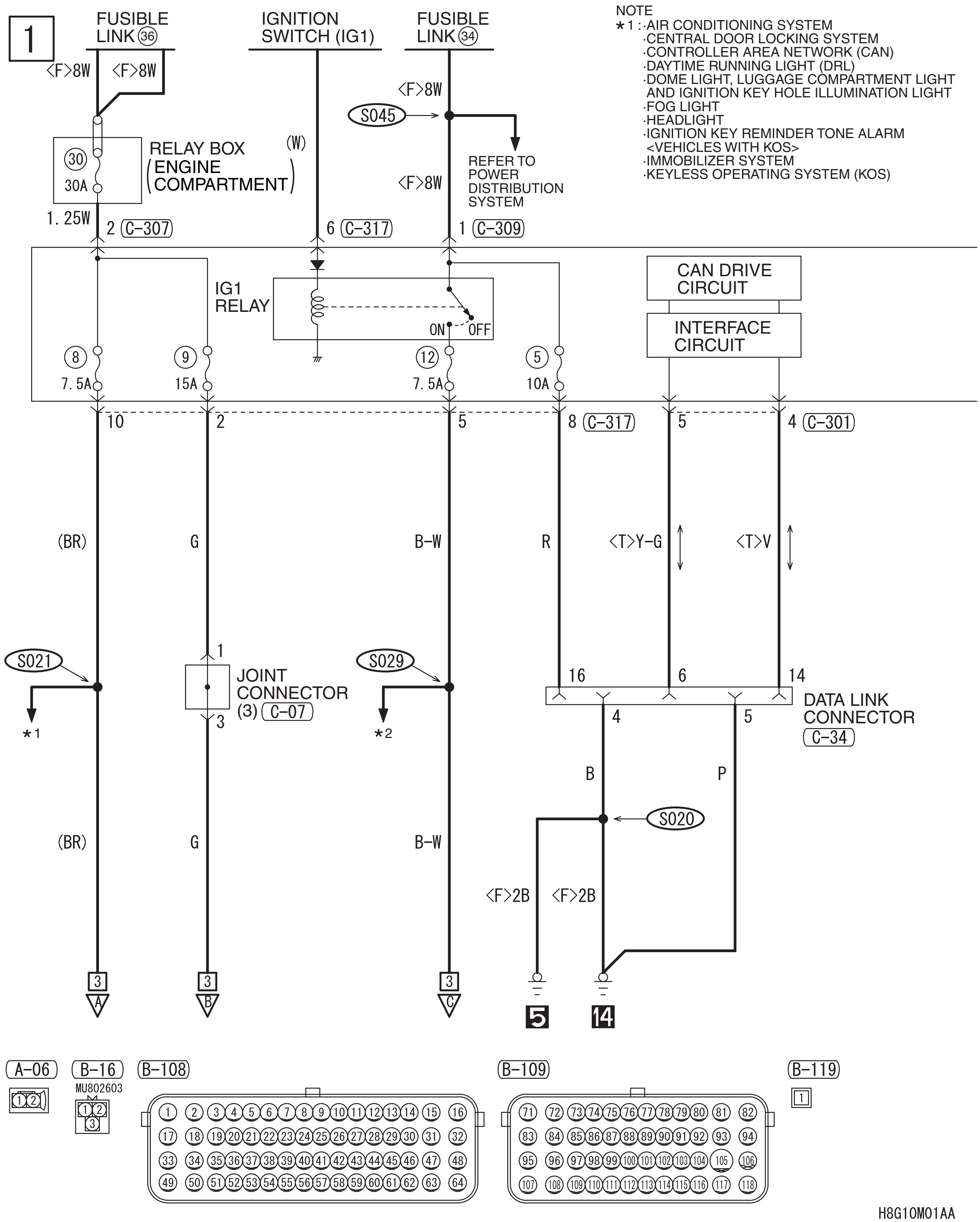


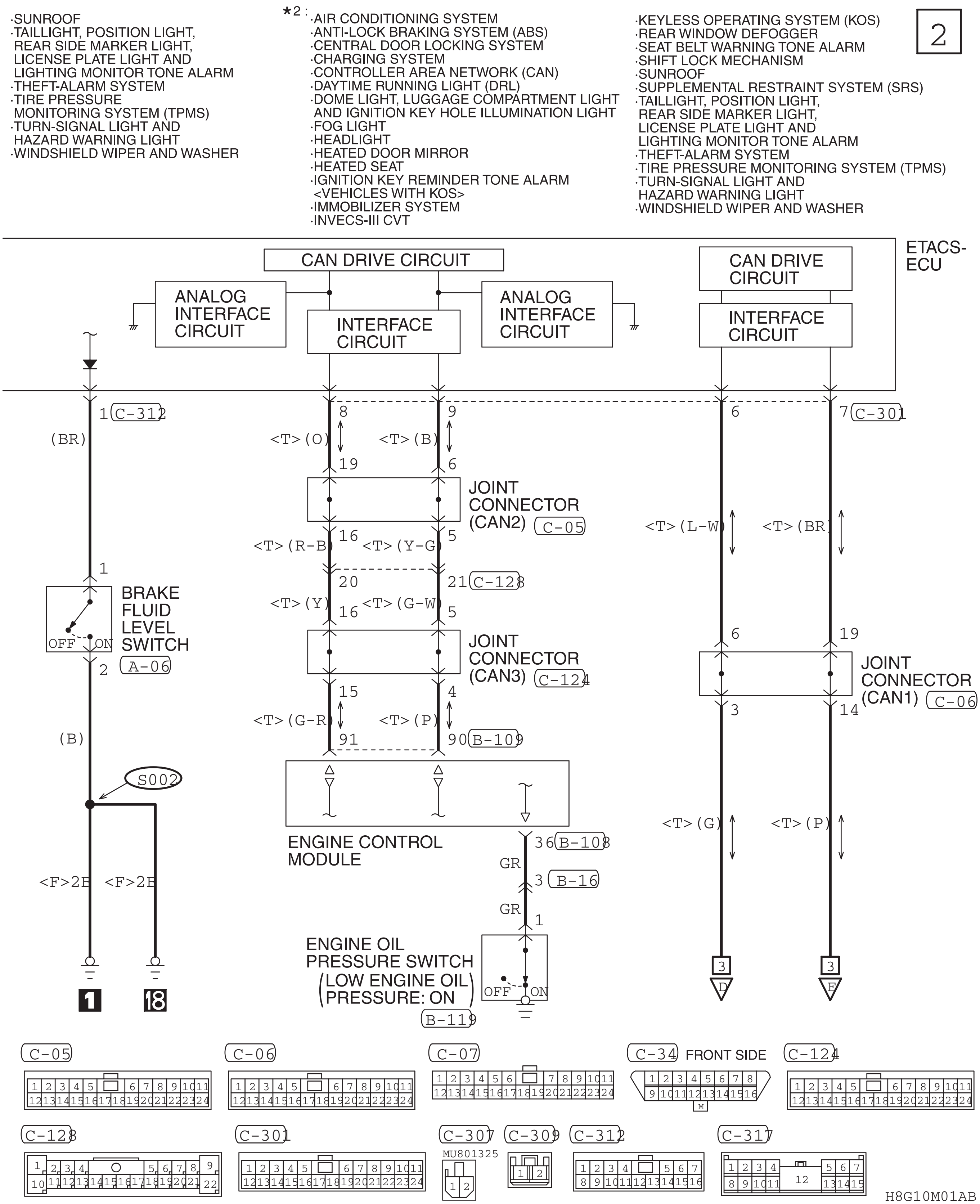
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G10M00BB

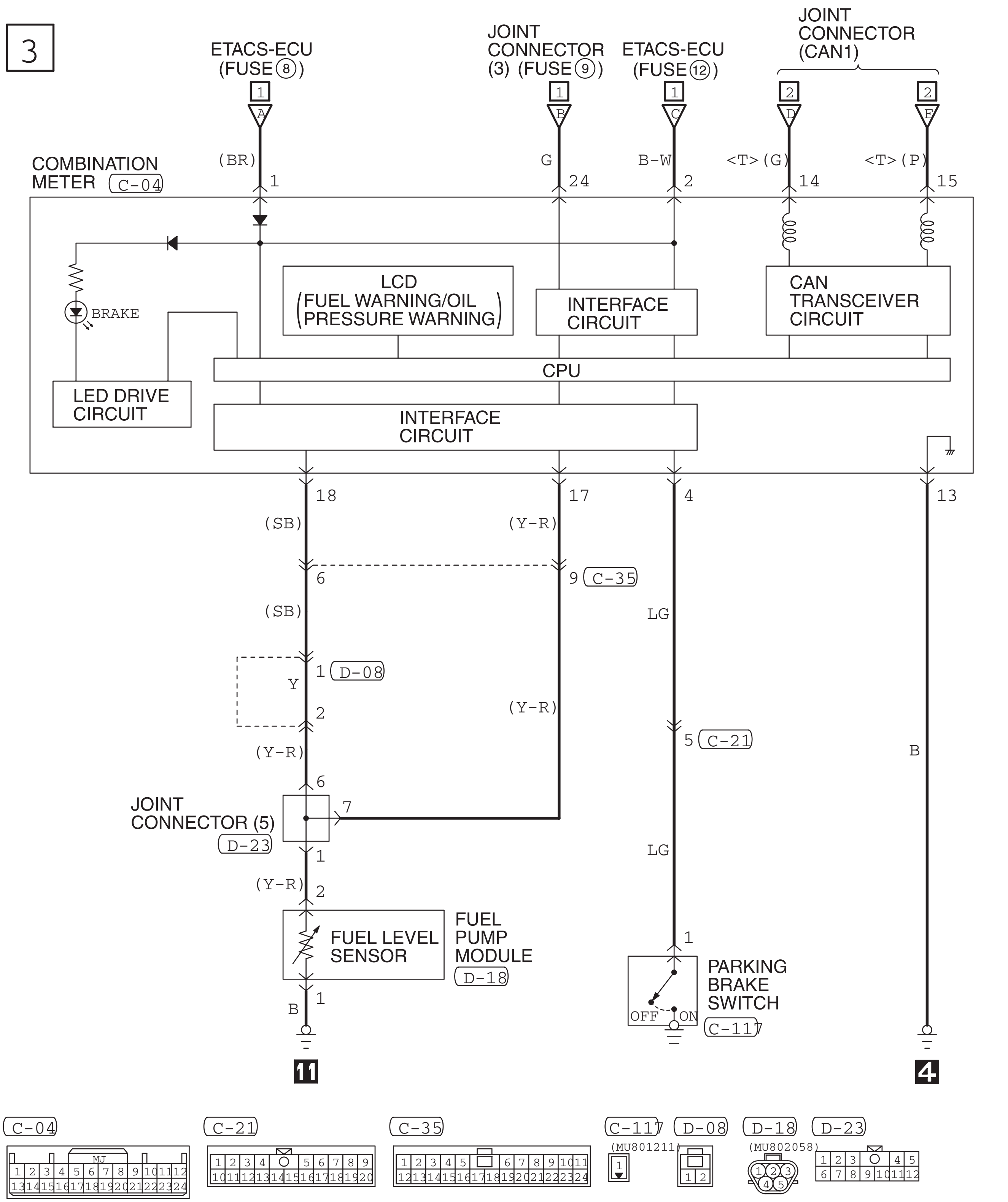
BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT

M1901020000088




·SUNROOF
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
*2 : ·AIR CONDITIONING SYSTEM
·ANTI-LOCK BRAKING SYSTEM (ABS)
·CENTRAL DOOR LOCKING SYSTEM
·CHARGING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
2
ETACS-ECU
CAN DRIVE CIRCUIT
ANALOG INTERFACE CIRCUIT
INTERFACE CIRCUIT
ANALOG INTERFACE CIRCUIT
CAN DRIVE CIRCUIT
INTERFACE CIRCUIT
1 C-312
(BR)
8 9
<T>(O) <T>(B)
19 6
JOINT CONNECTOR (CAN2) C-05
16 5
<T>(R-B) <T>(Y-G)
20 21 C-128
<T>(Y) <T>(G-W)
16 5
JOINT CONNECTOR (CAN3) C-124
15 4
<T>(G-R) <T>(P)
91 90 B-109
6 7 C-301
<T>(L-W) <T>(BR)
6 19
JOINT CONNECTOR (CAN1) C-06
3 14
1
BRAKE FLUID LEVEL SWITCH
OFF ON
2 A-06
(B)
S002
<F>2B <F>2B
1
18
ENGINE CONTROL MODULE
36 B-108
GR
3 B-16
GR
1
ENGINE OIL PRESSURE SWITCH (LOW ENGINE OIL PRESSURE: ON)
OFF ON
B-119
<T>(G) <T>(P)
3 D
3 E
C-05
C-06
C-07
C-34 FRONT SIDE
C-124
C-128
C-301
C-307
MU801325
C-309
C-312
C-317
H8G10M01AB

BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT (CONTINUED)



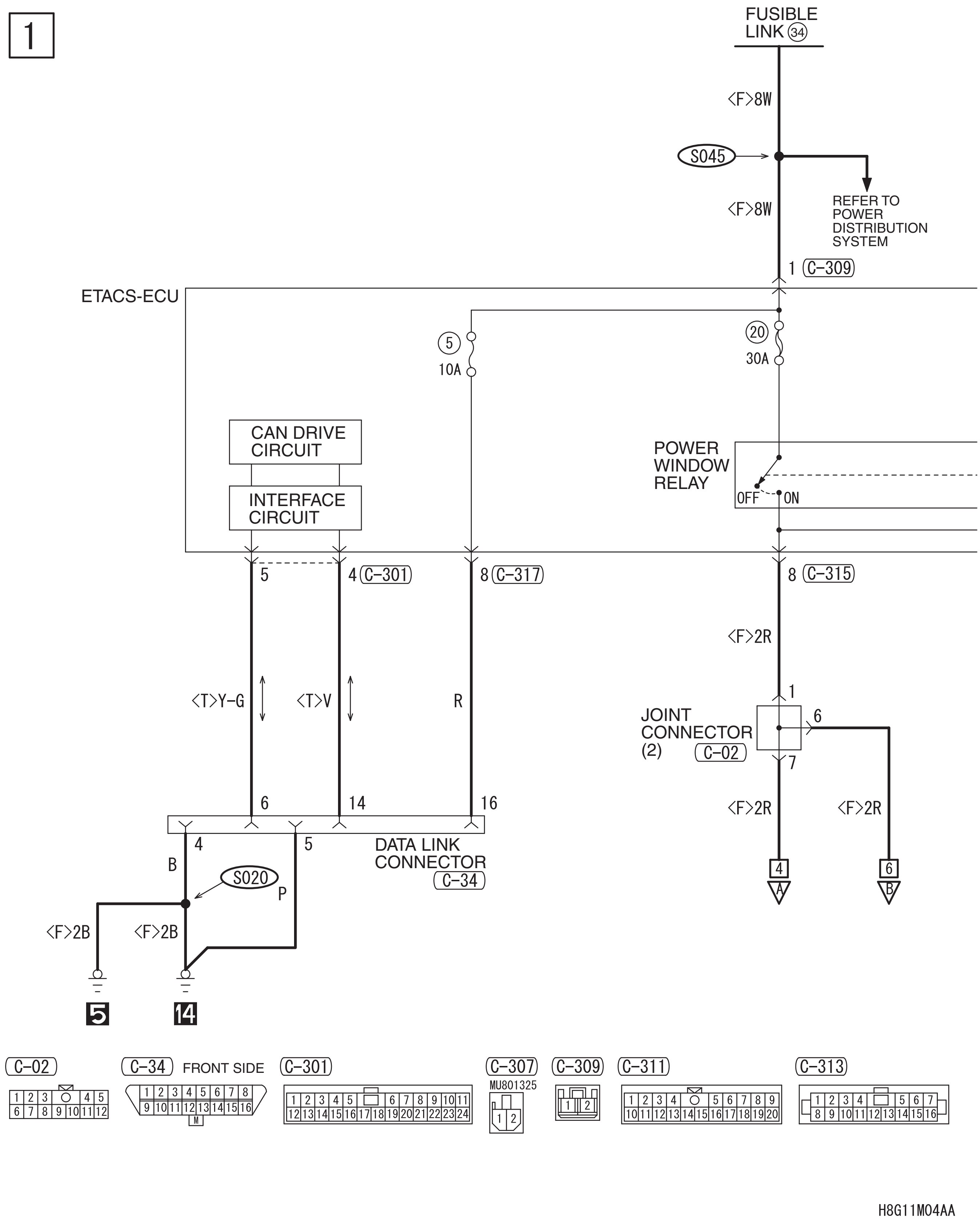
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

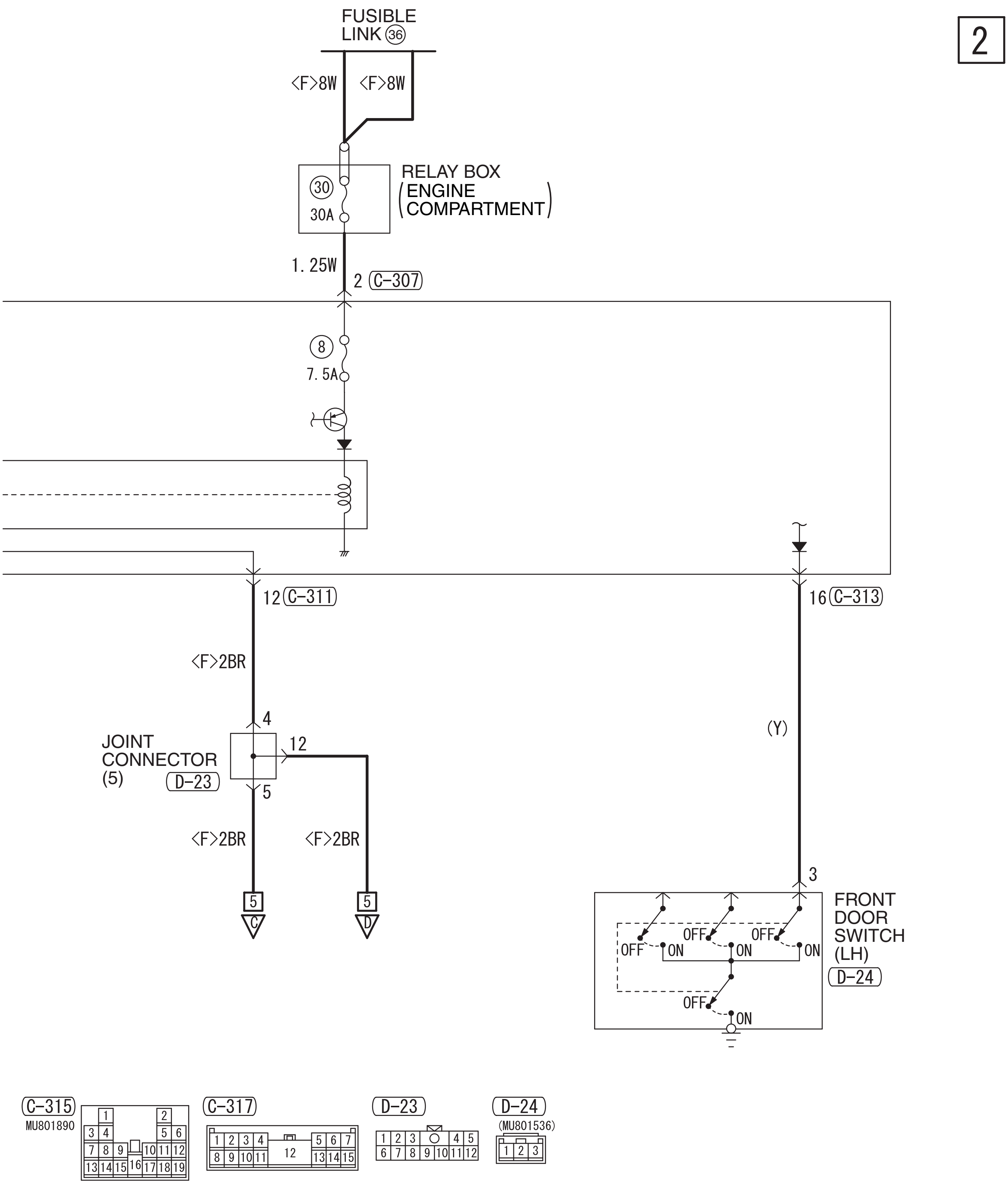
H8G10M01BA

NOTES

POWER WINDOWS <VEHICLES WITHOUT CENTRAL DOOR LOCKING SYSTEM>

M1901004602912





WIRE COLOR CODE
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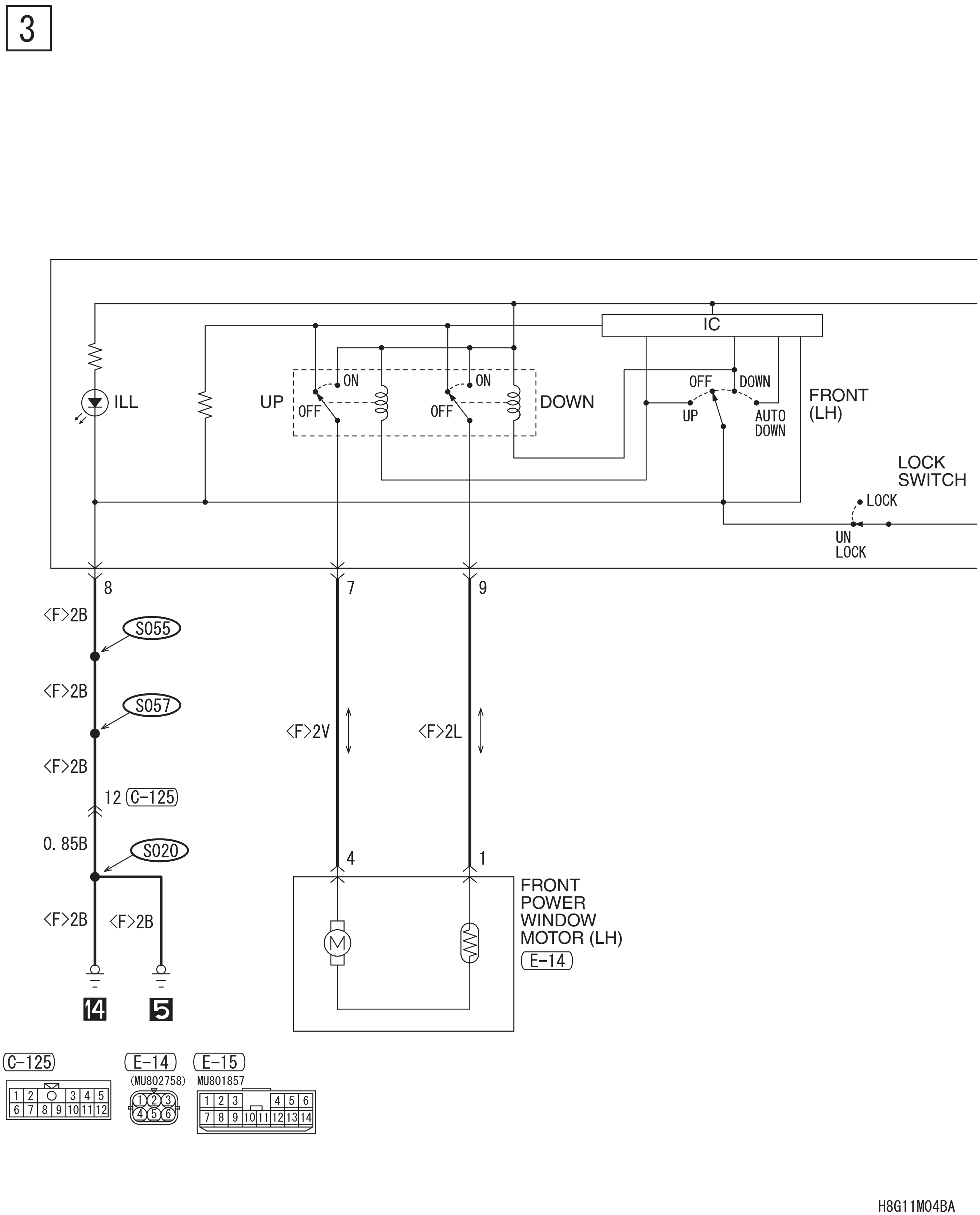
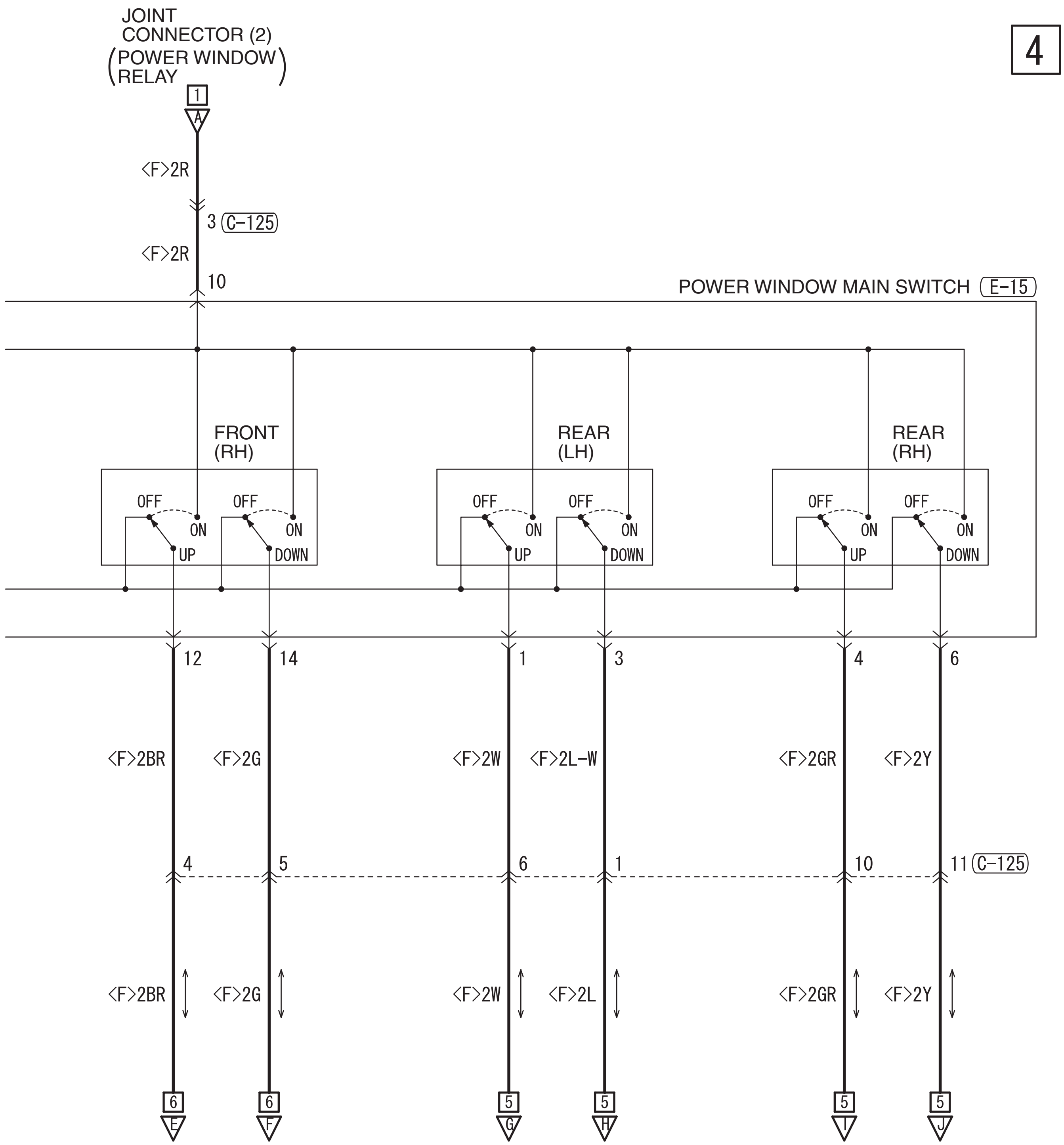
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G11M04AB

POWER WINDOWS <VEHICLES WITHOUT CENTRAL DOOR LOCKING SYSTEM> (CONTINUED)





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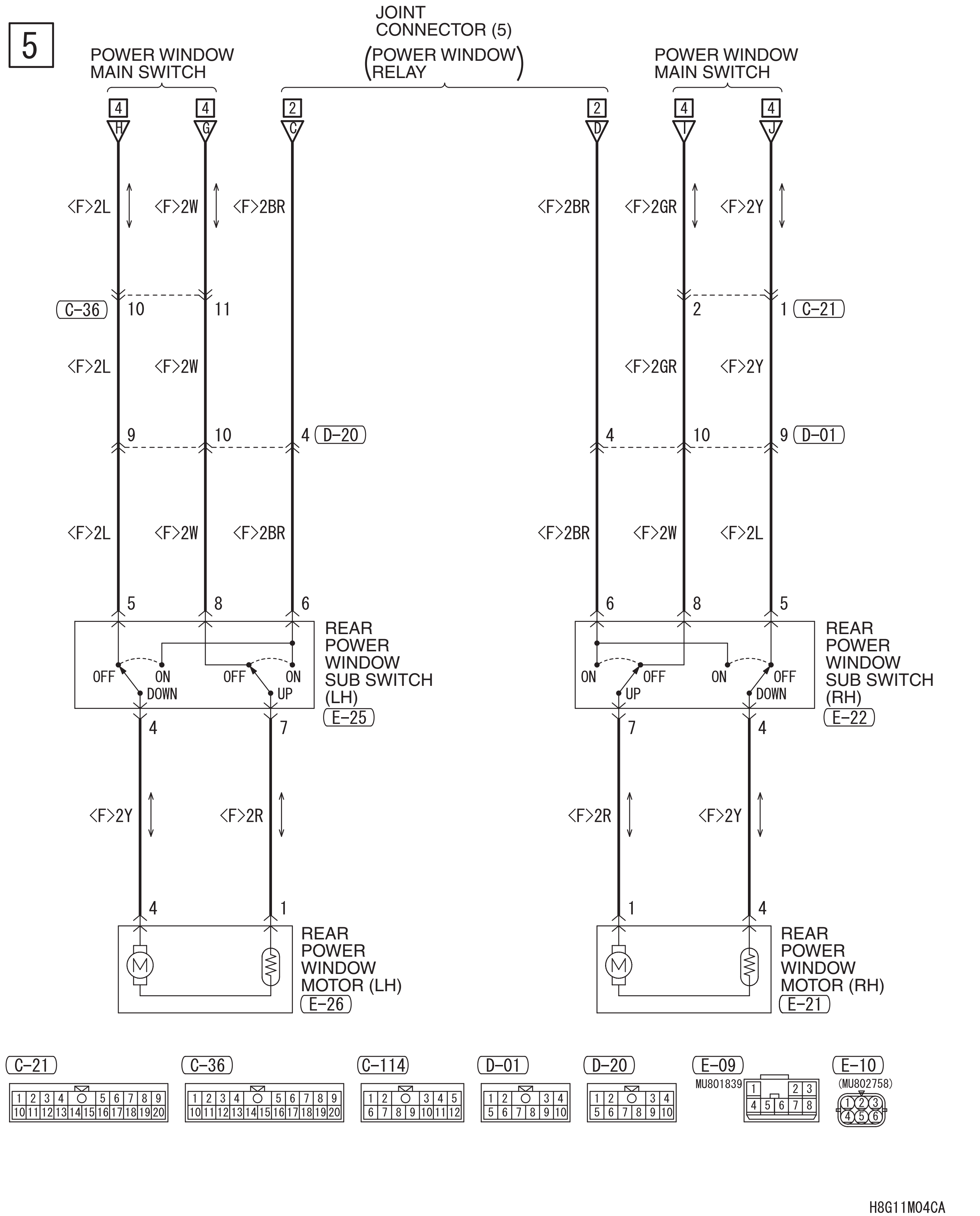
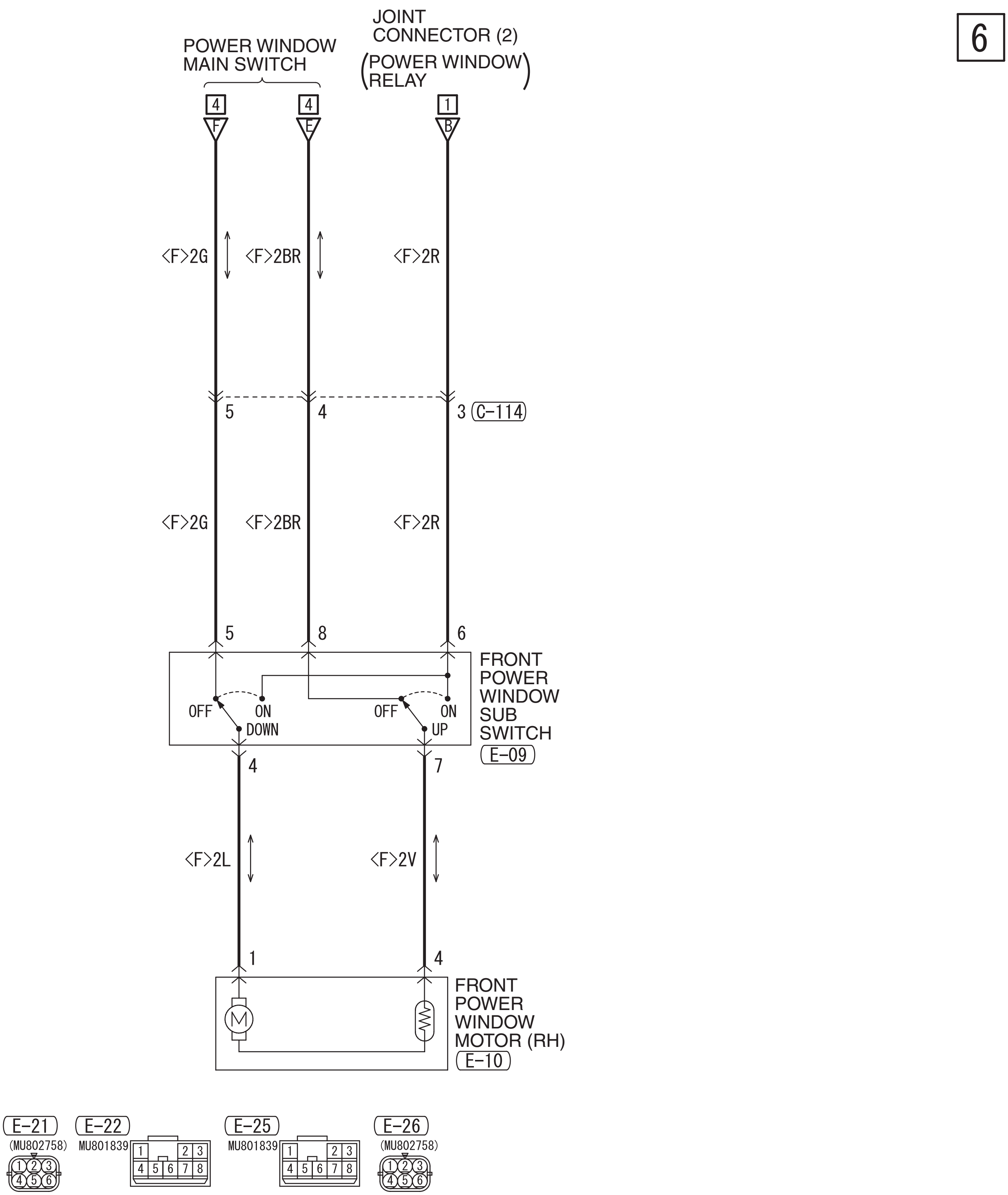
H8G11M04BB

POWER WINDOWS <VEHICLES WITHOUT CENTRAL DOOR LOCKING SYSTEM> (CONTINUED)





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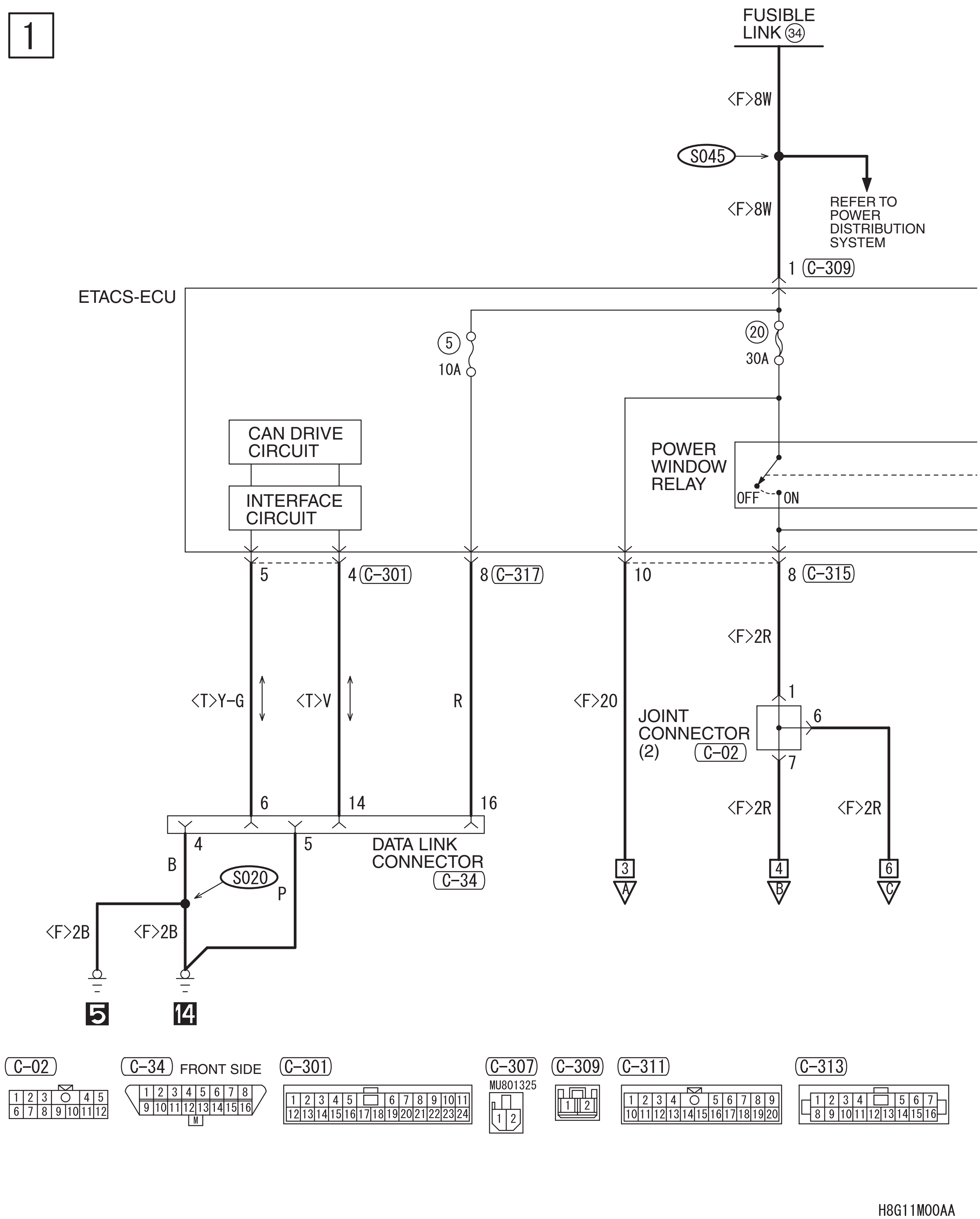
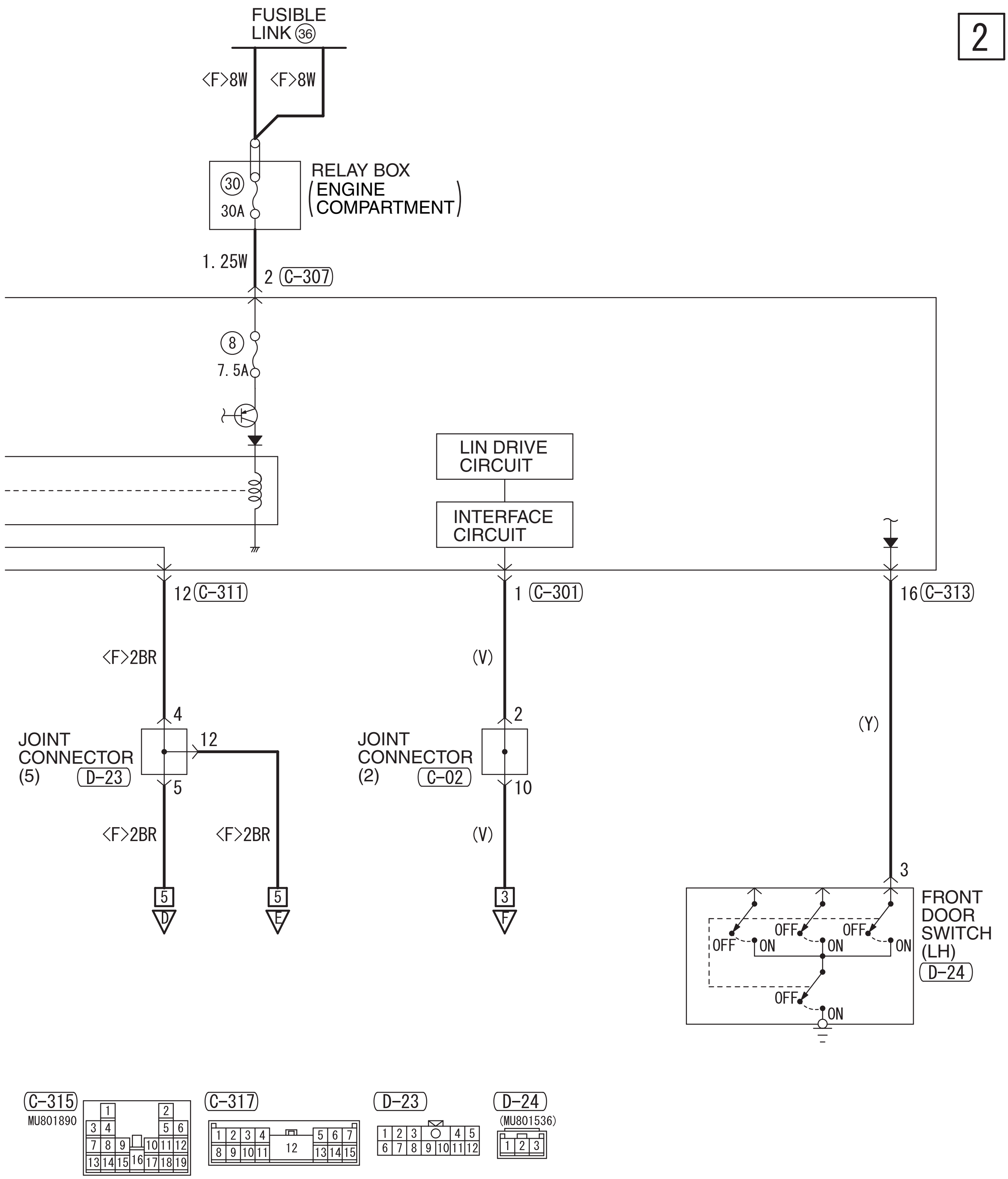
H8G11M04CB

POWER WINDOWS <VEHICLES WITH CENTRAL DOOR LOCKING SYSTEM>

M1901004602901





WIRE COLOR CODE
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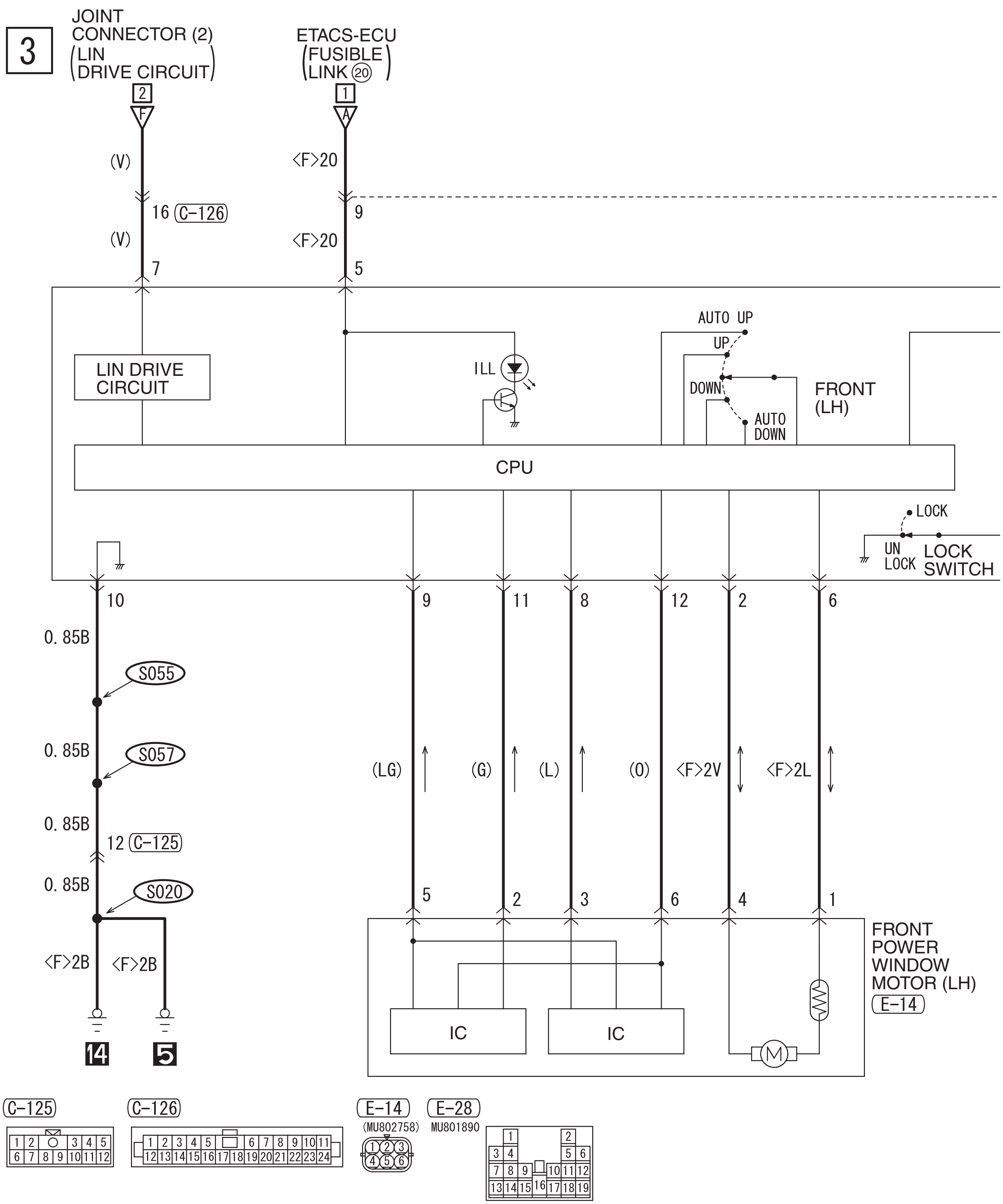
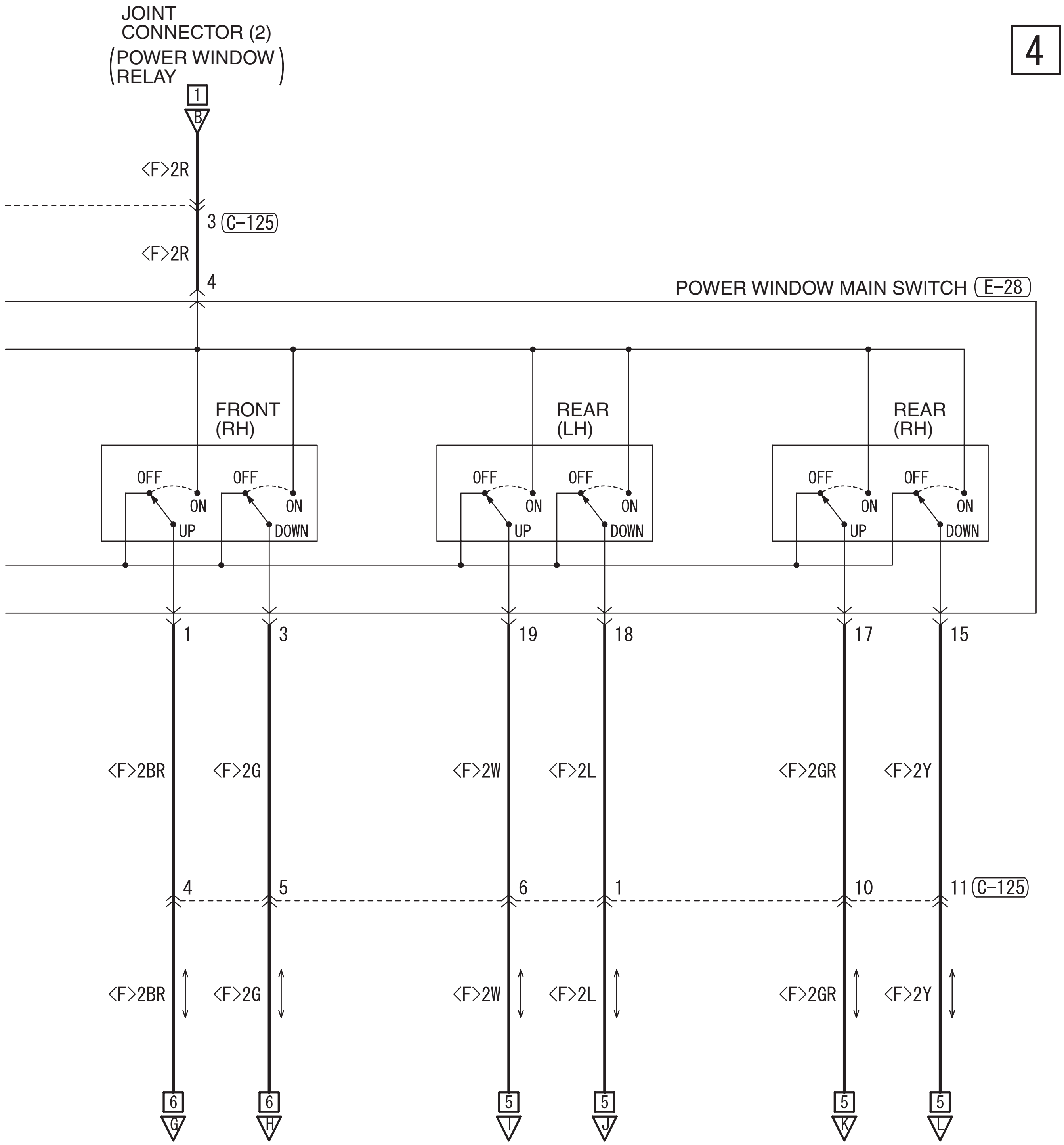
H8G11M00AB

POWER WINDOWS <VEHICLES WITH CENTRAL DOOR LOCKING SYSTEM> (CONTINUED)





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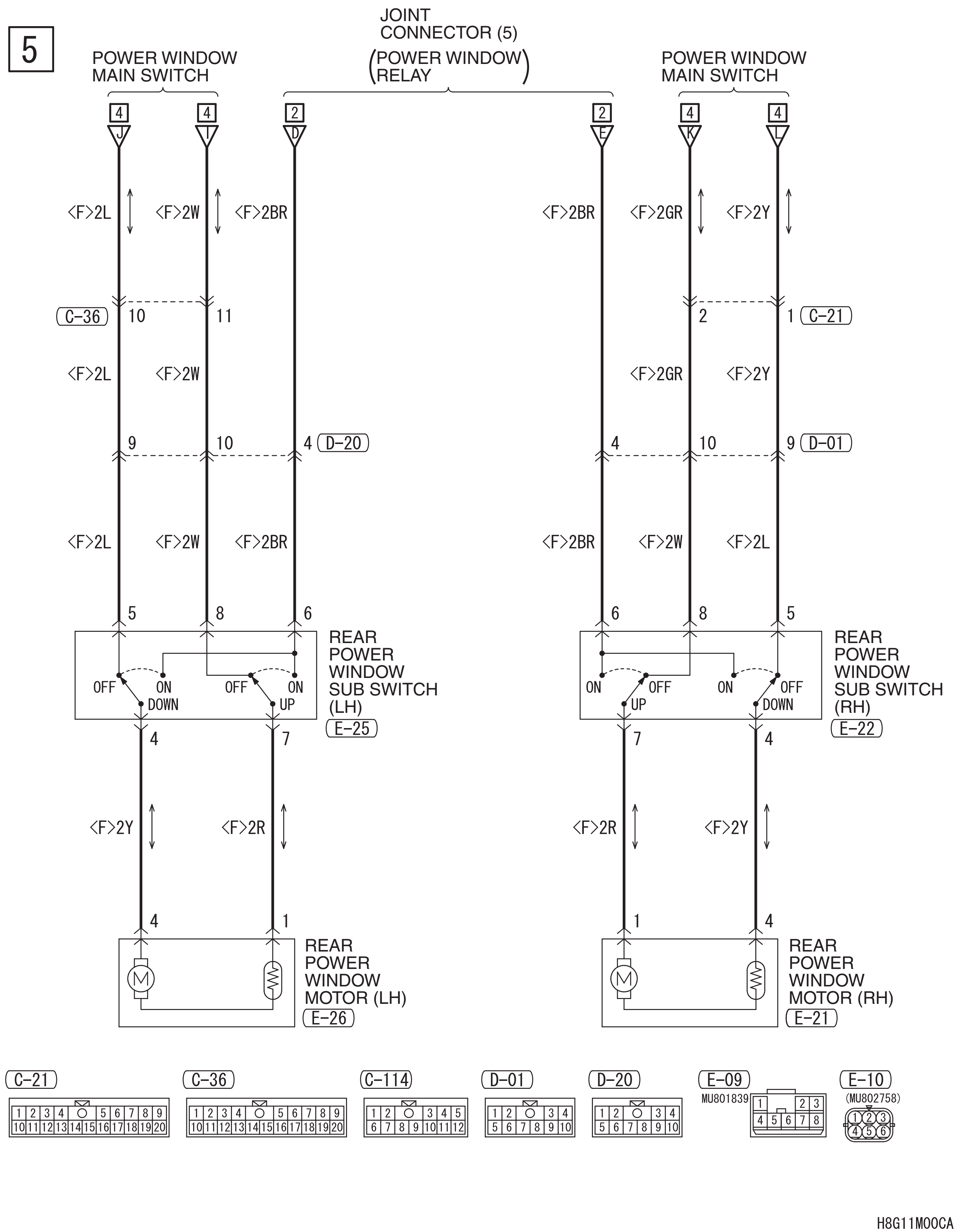
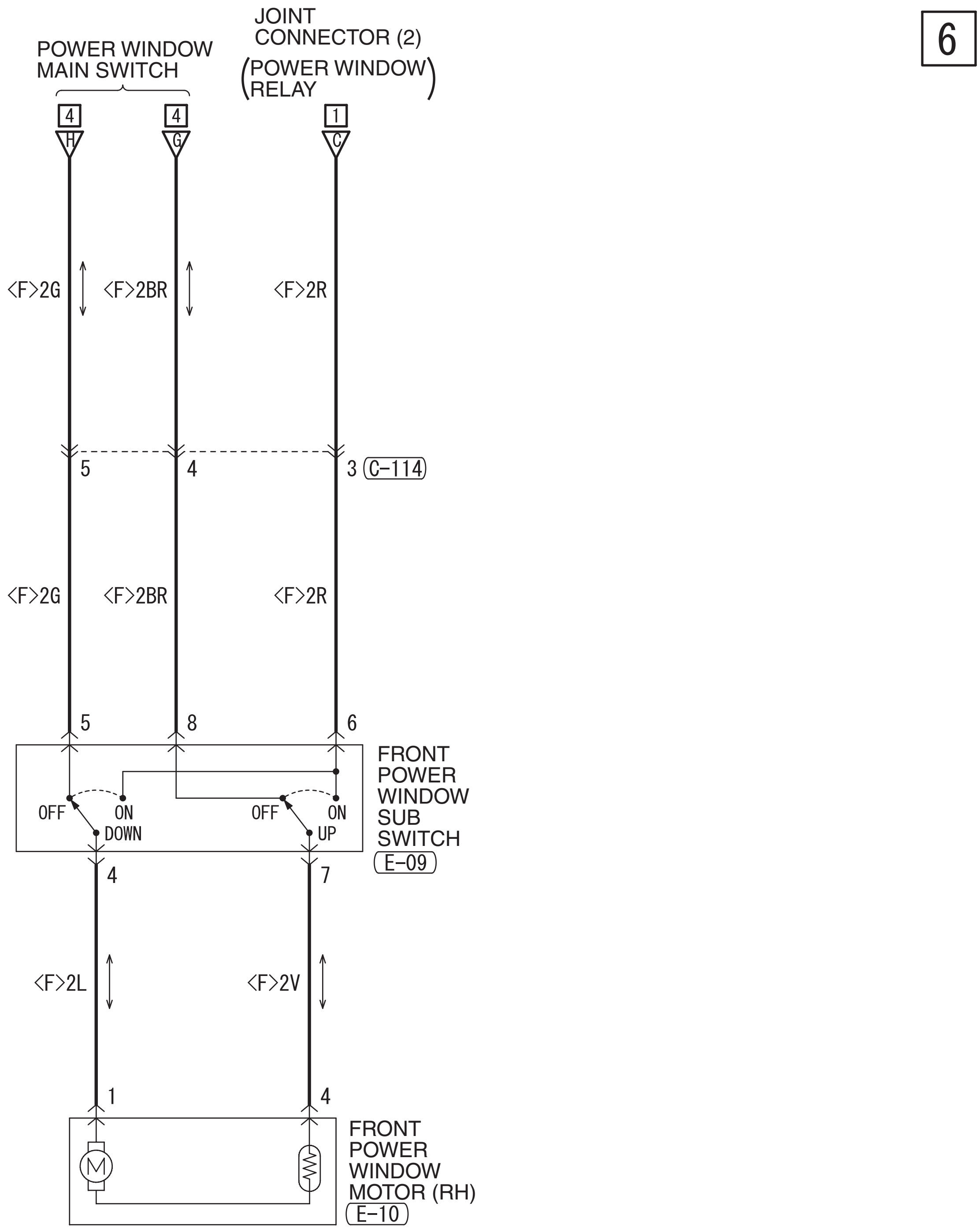
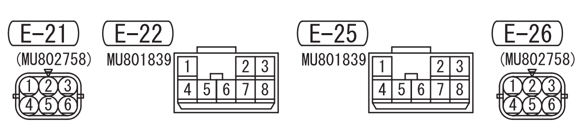
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G11M00BB

POWER WINDOWS <VEHICLES WITH CENTRAL DOOR LOCKING SYSTEM> (CONTINUED)







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H8G11M00CB

CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITHOUT KEYLESS ENTRY SYSTEM>

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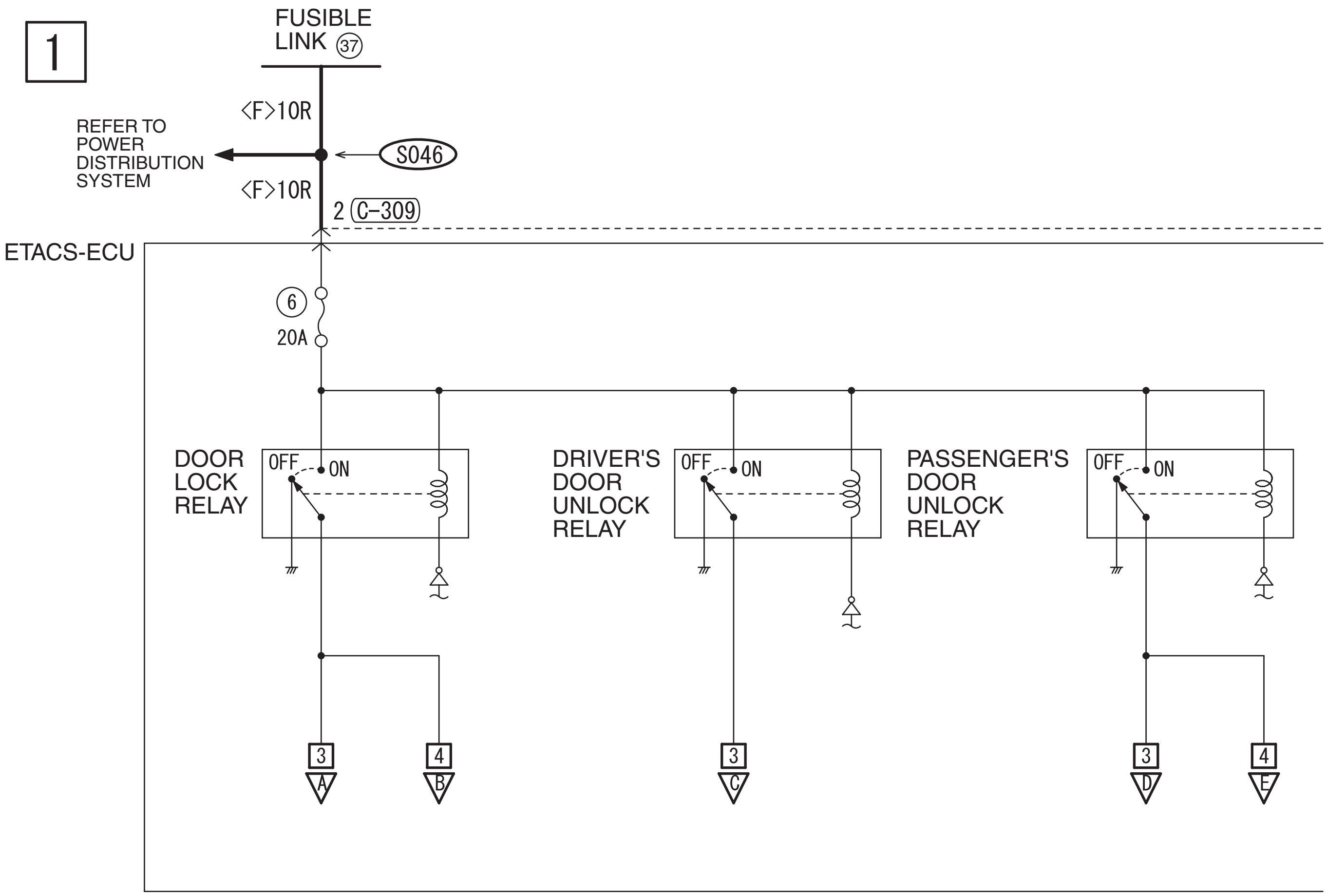
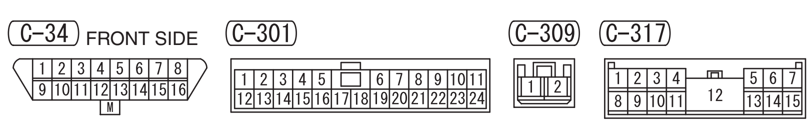
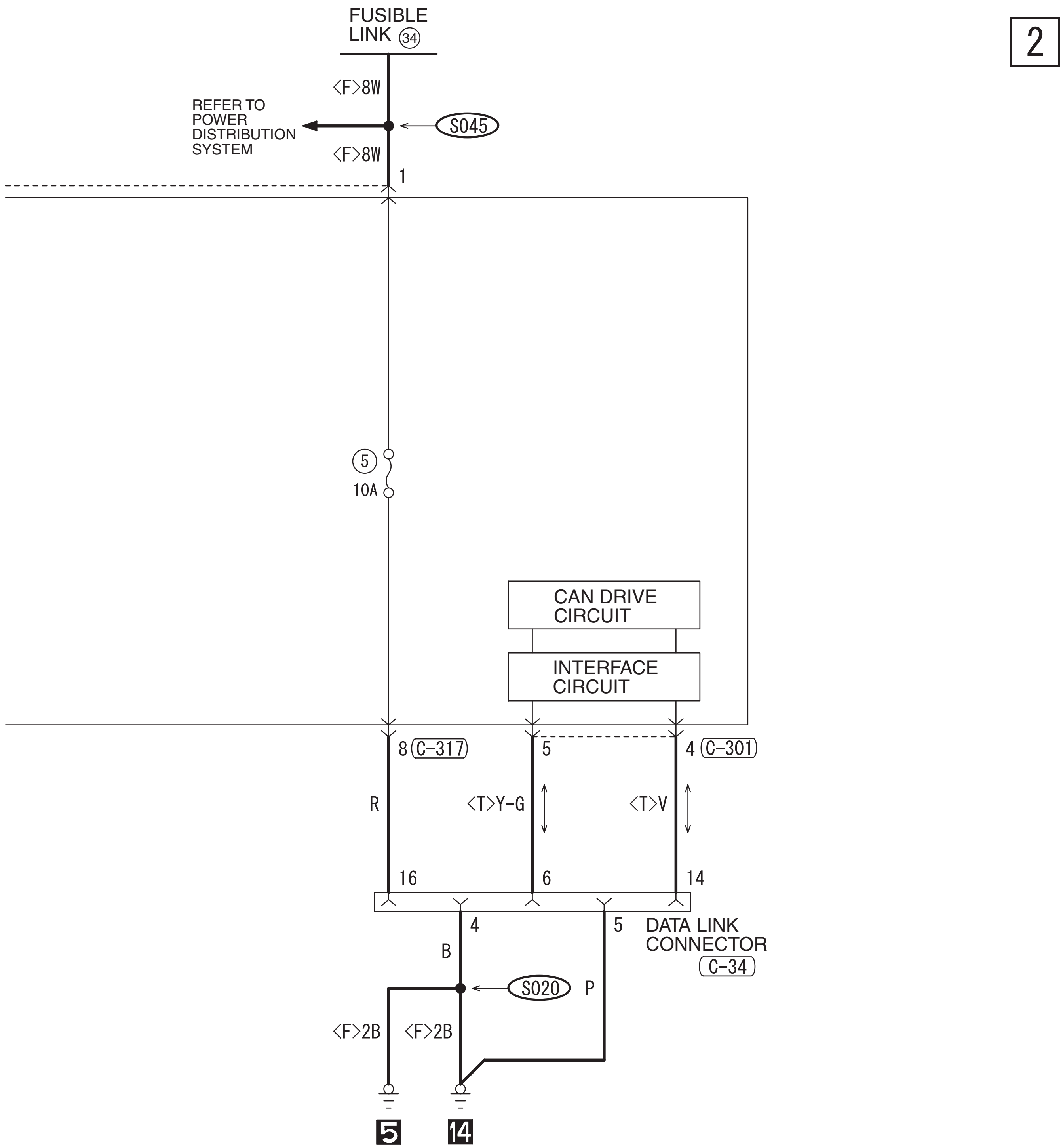




H8G11M03AA



WIRE COLOR CODE
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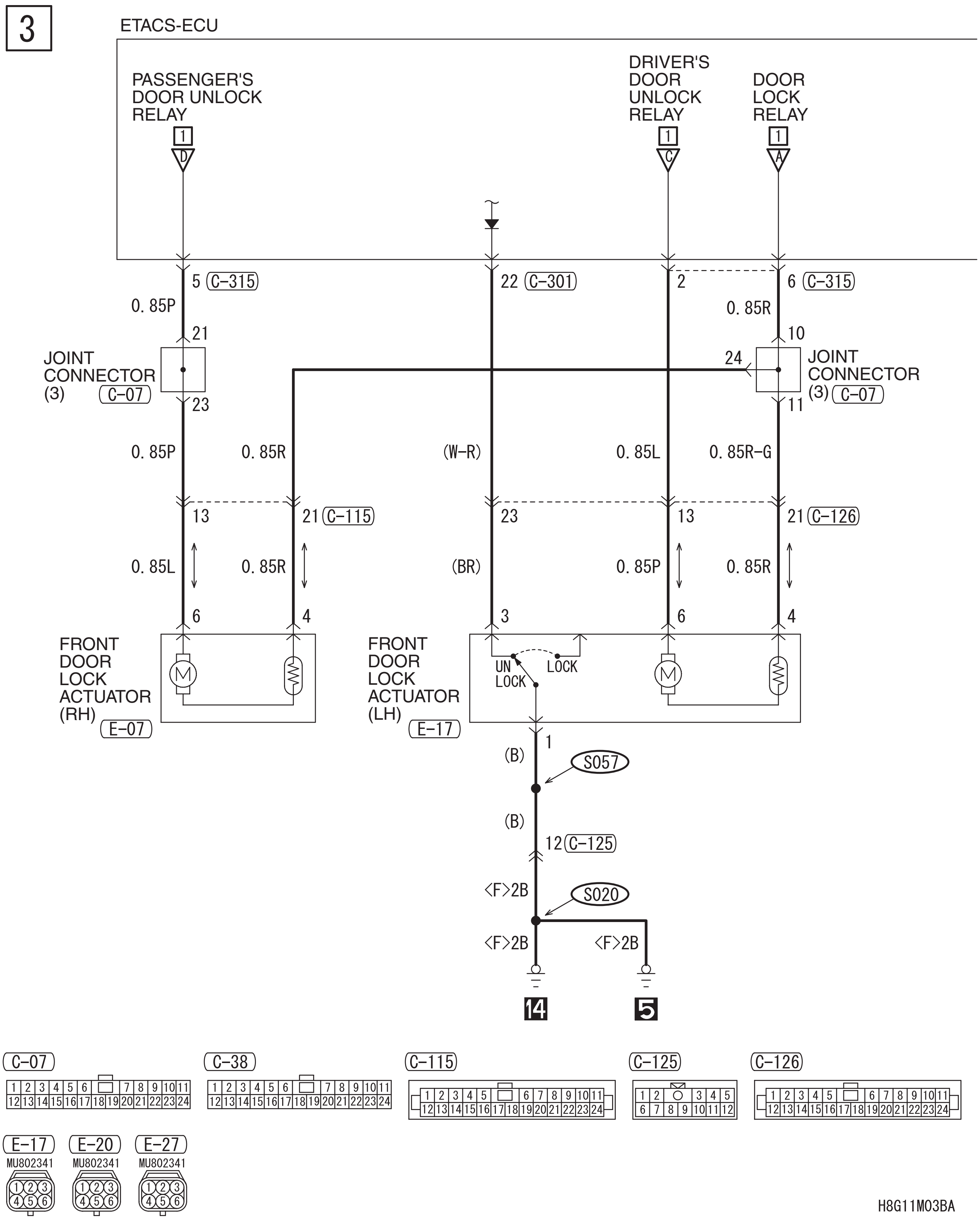
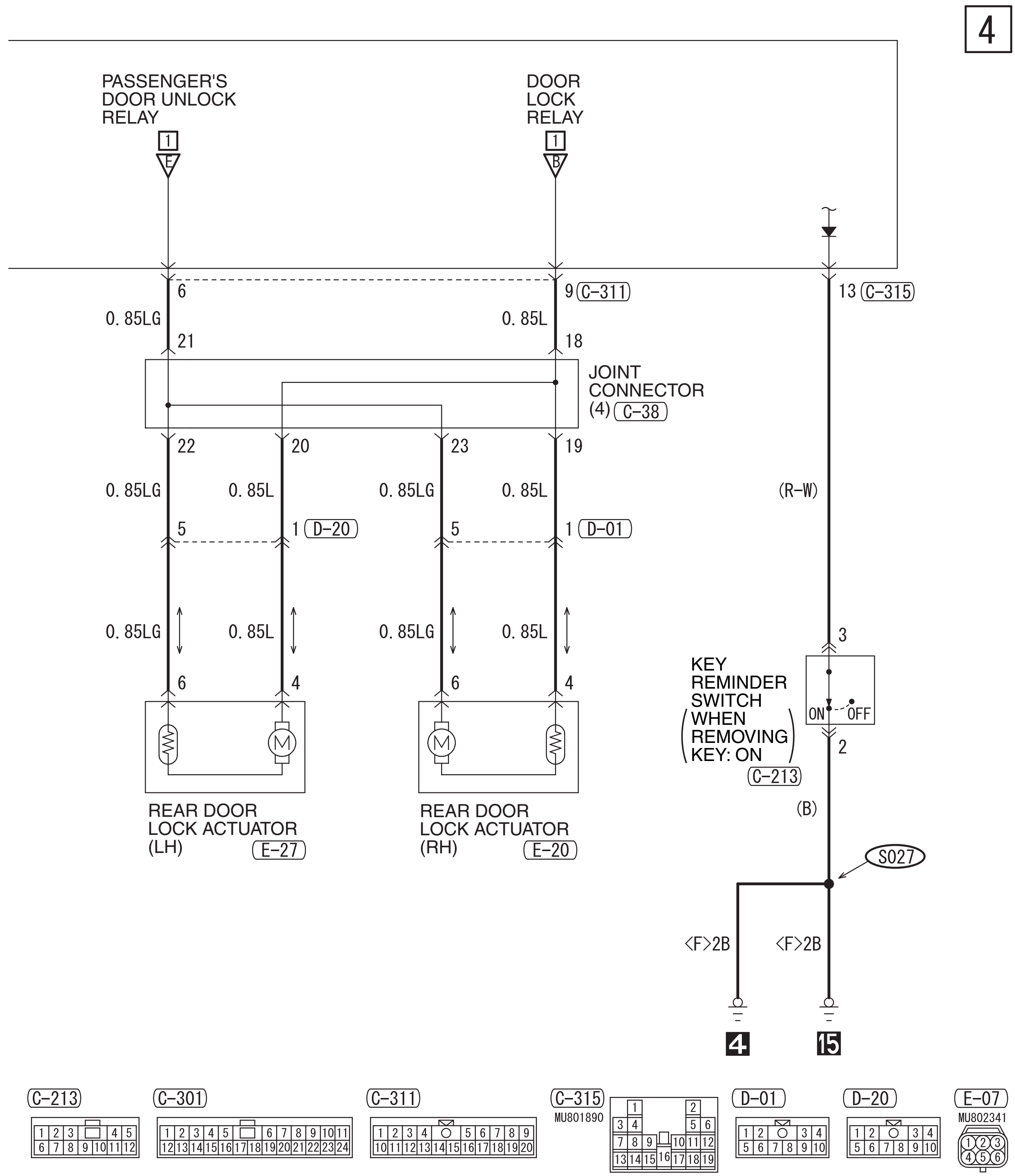
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G11M03AB

CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITHOUT KEYLESS ENTRY SYSTEM> (CONTINUED)





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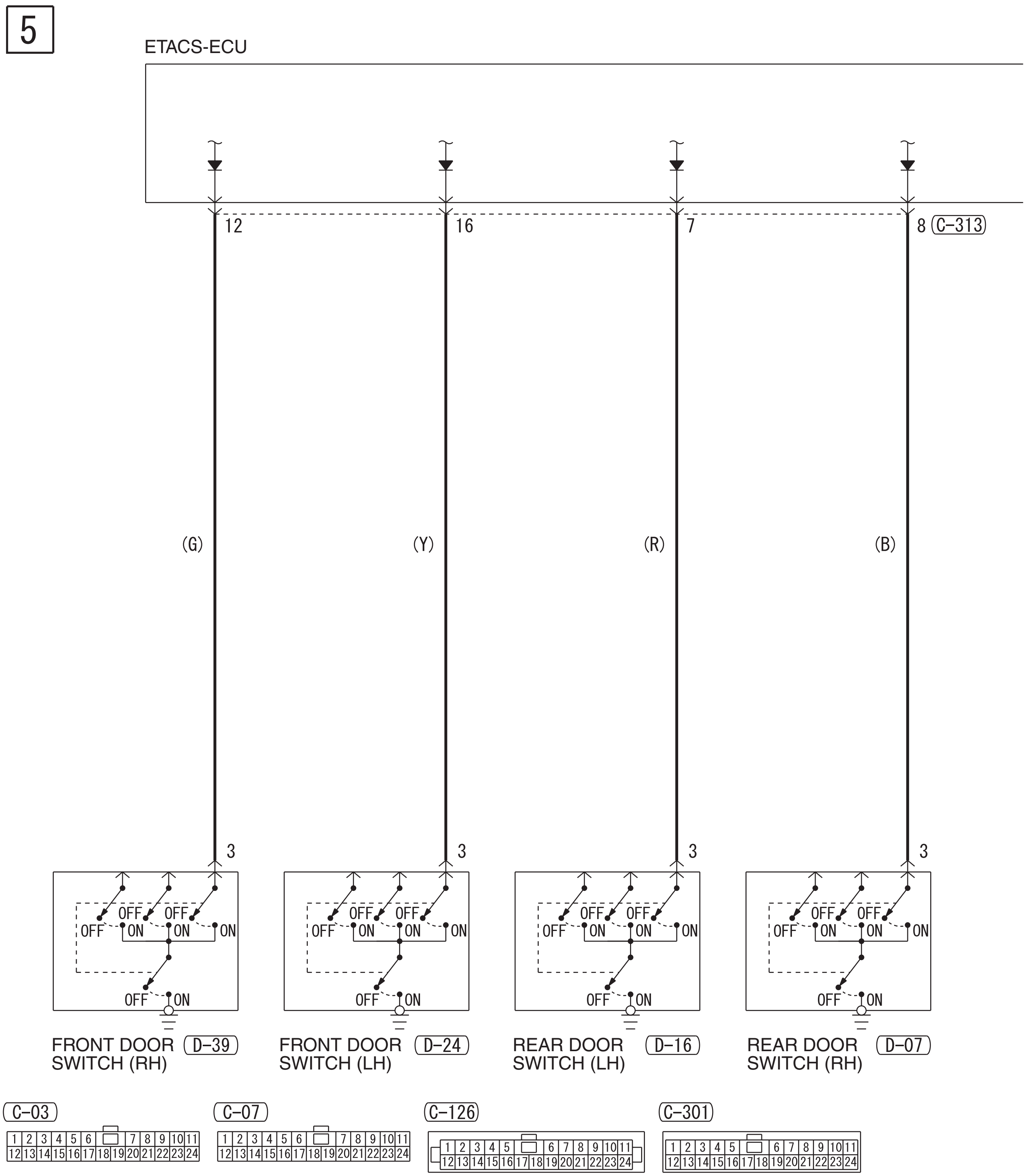
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G11M03BB

CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITHOUT KEYLESS ENTRY SYSTEM> (CONTINUED)



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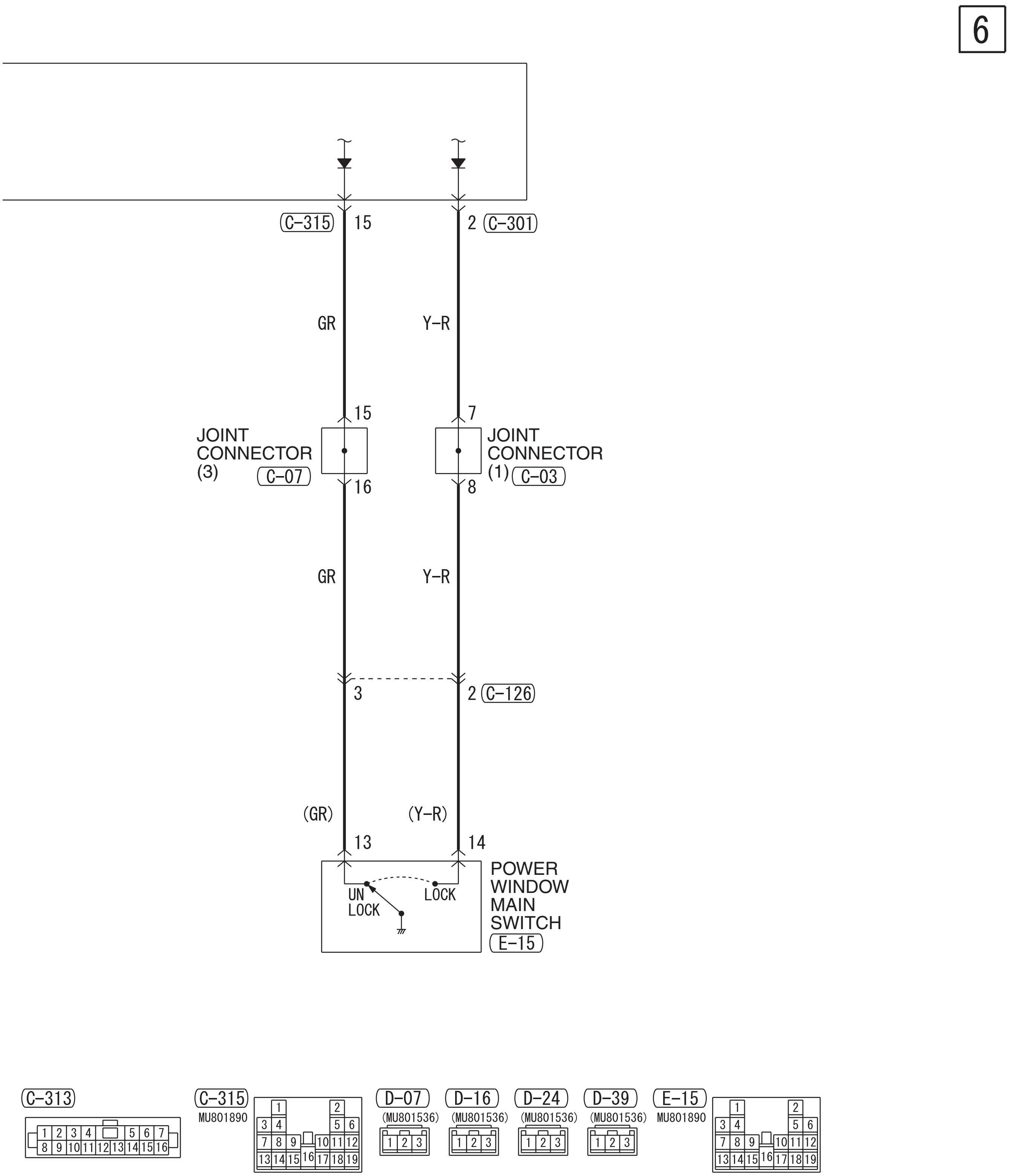

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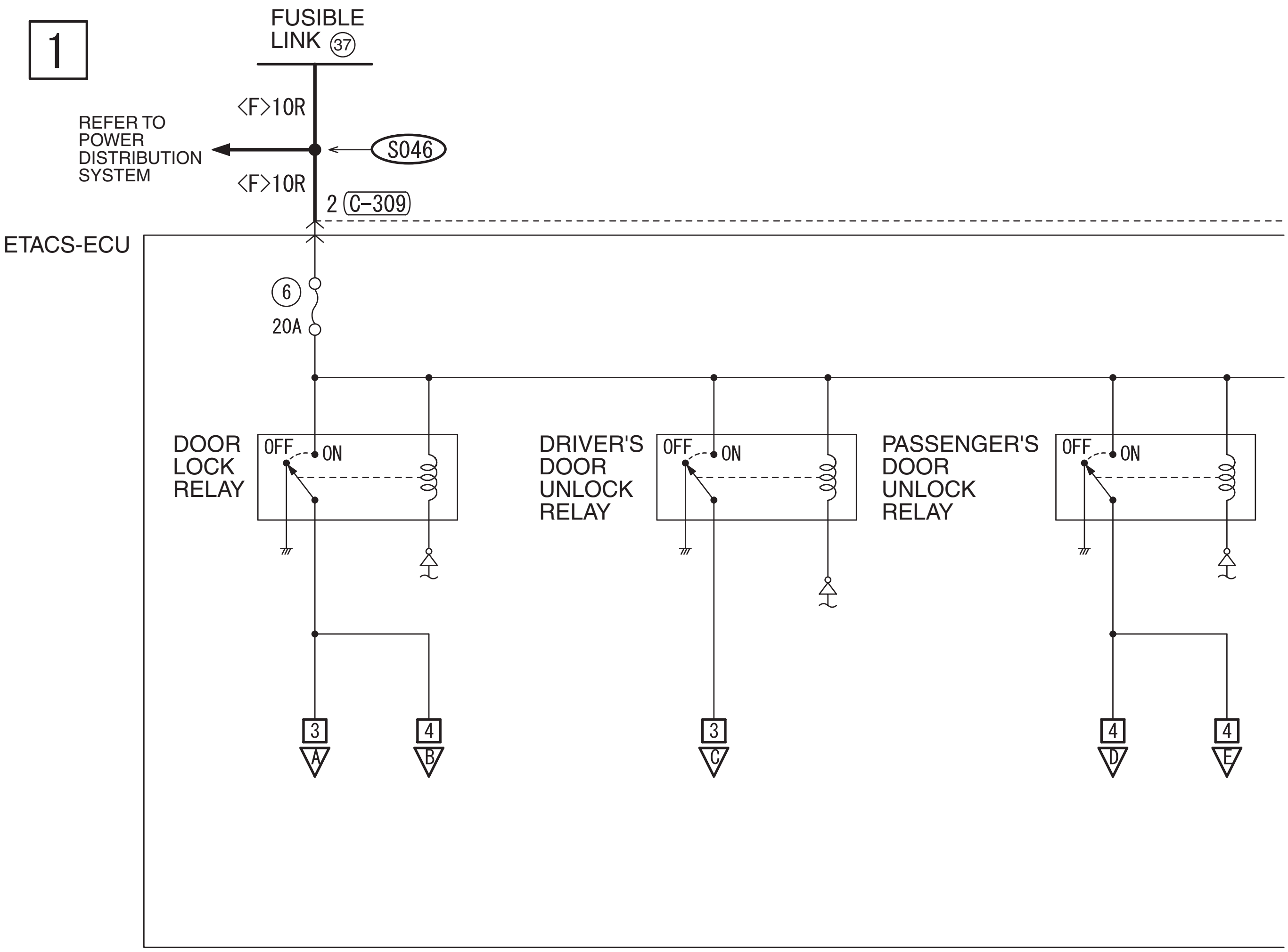
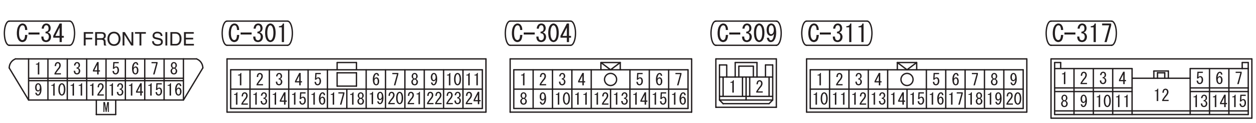
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G11M03CB

CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITH KEYLESS ENTRY SYSTEM>

M1901004704476





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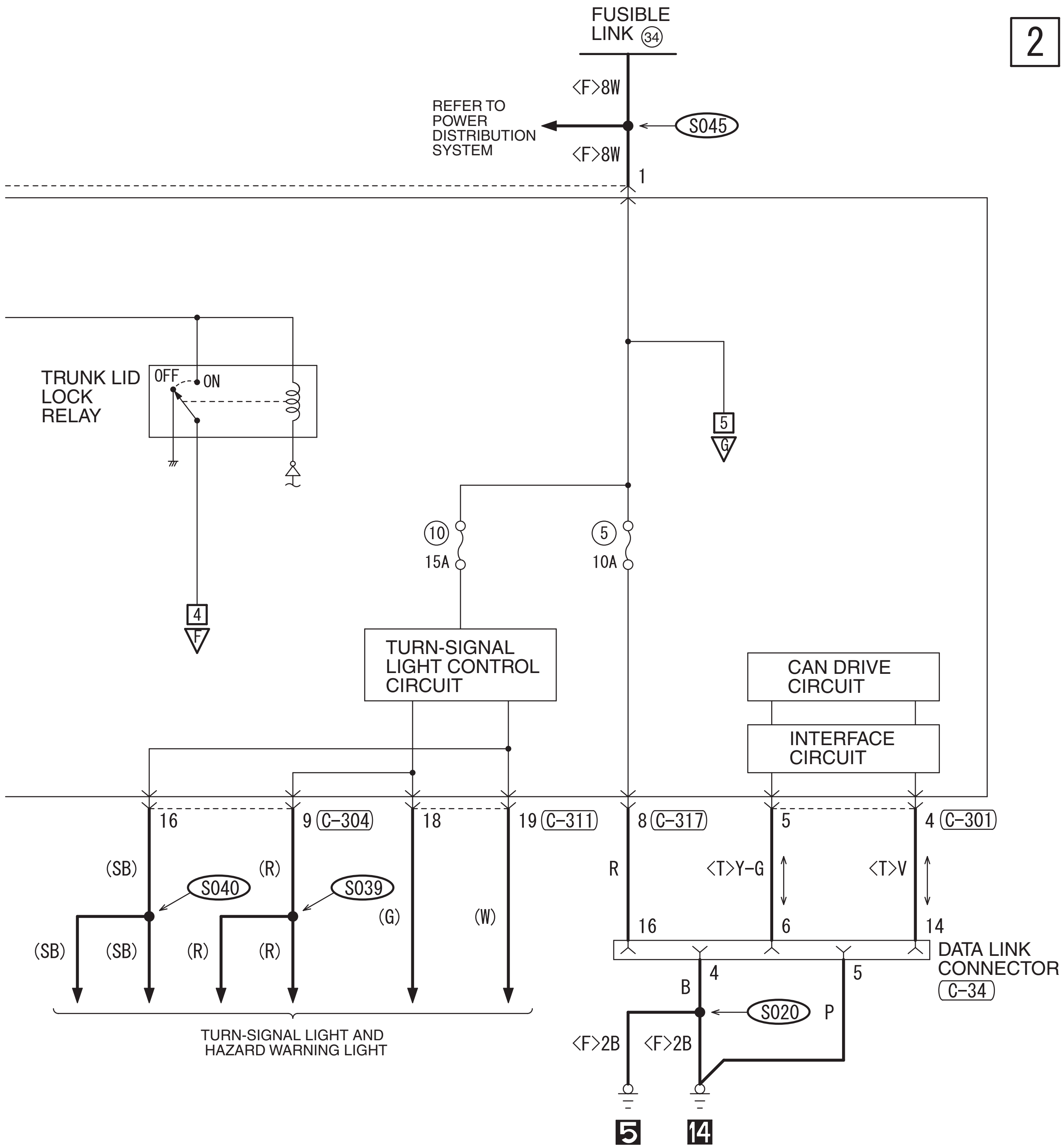

WIRE COLOR CODE
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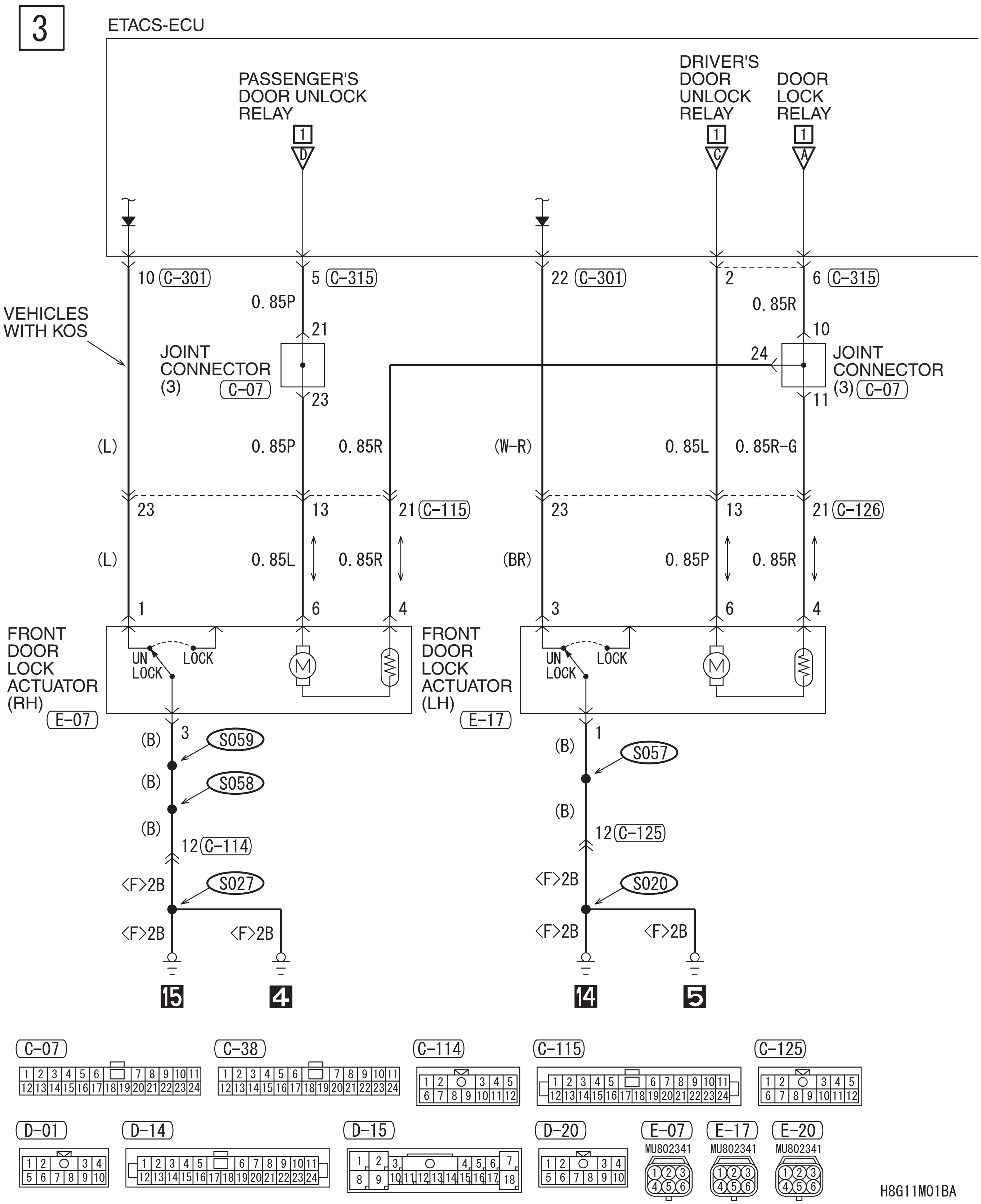
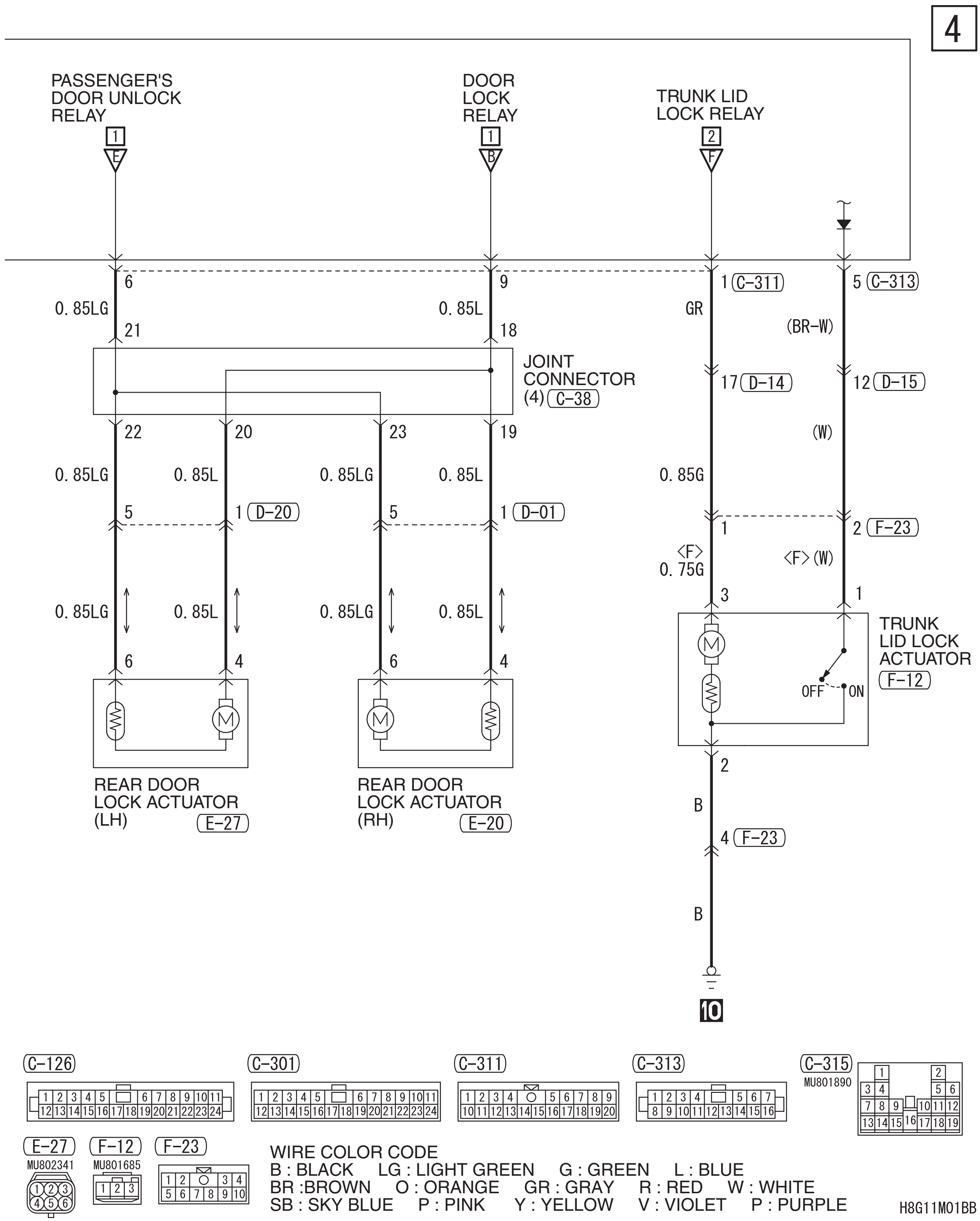
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

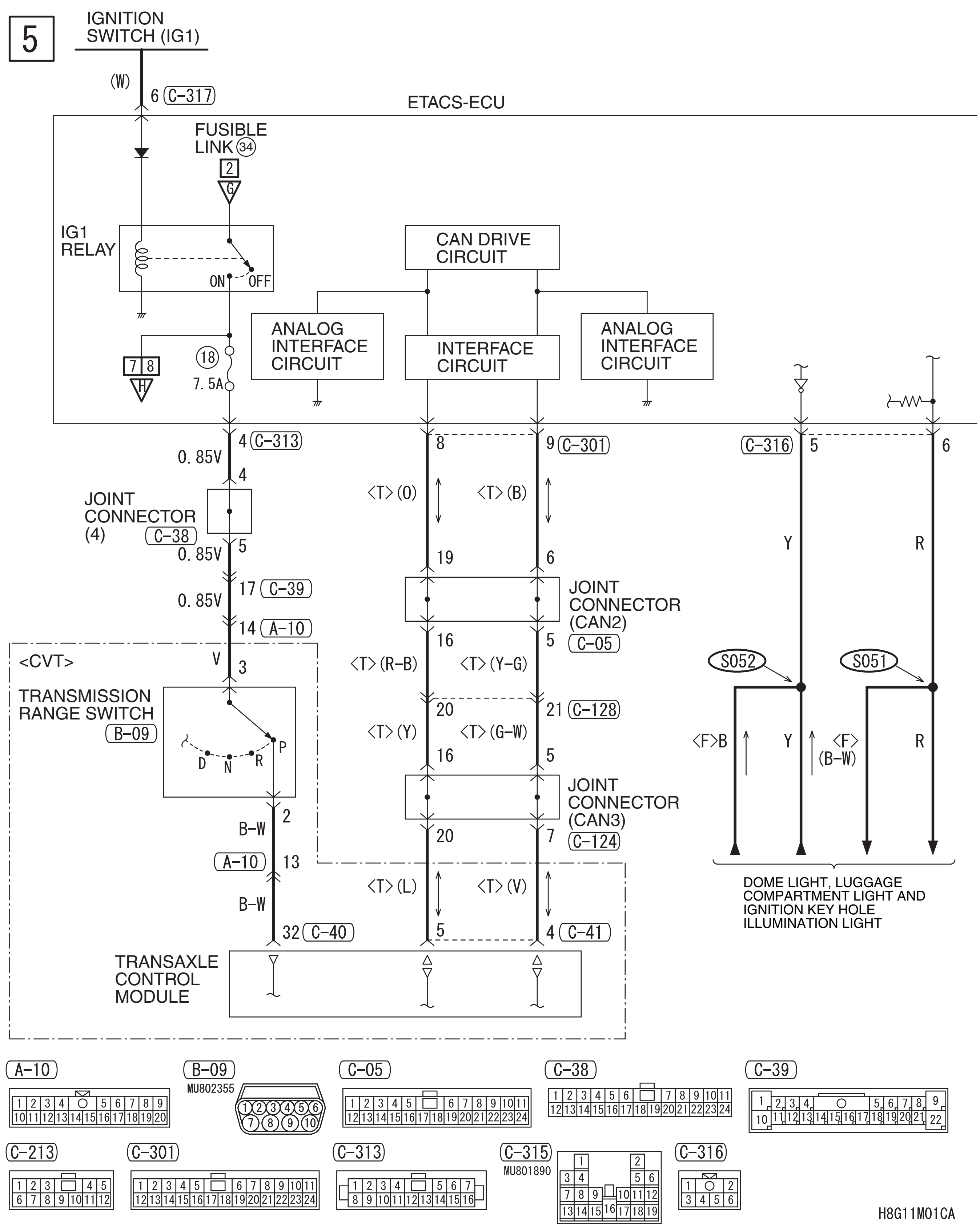
H8G11M01AB

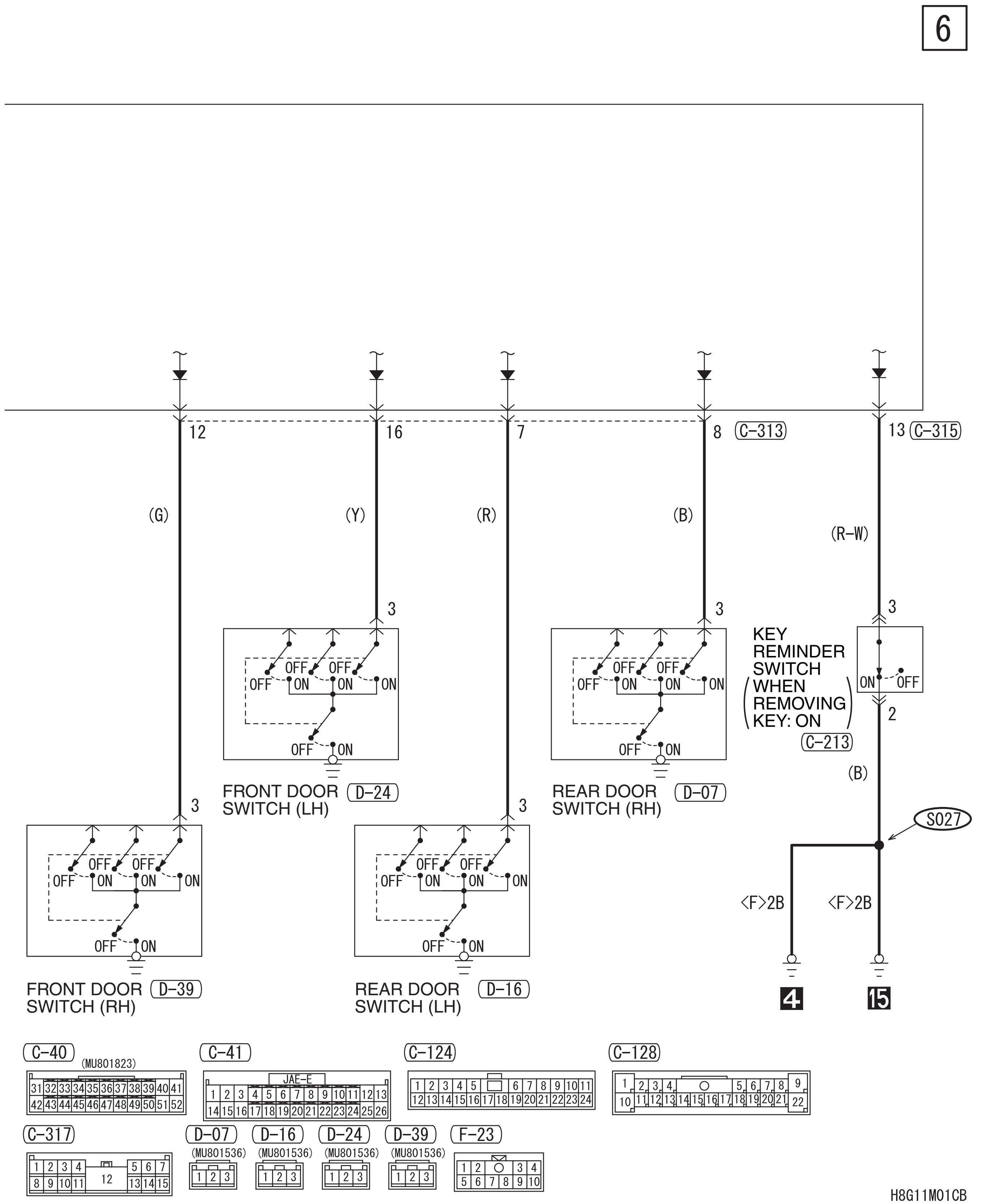
CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)



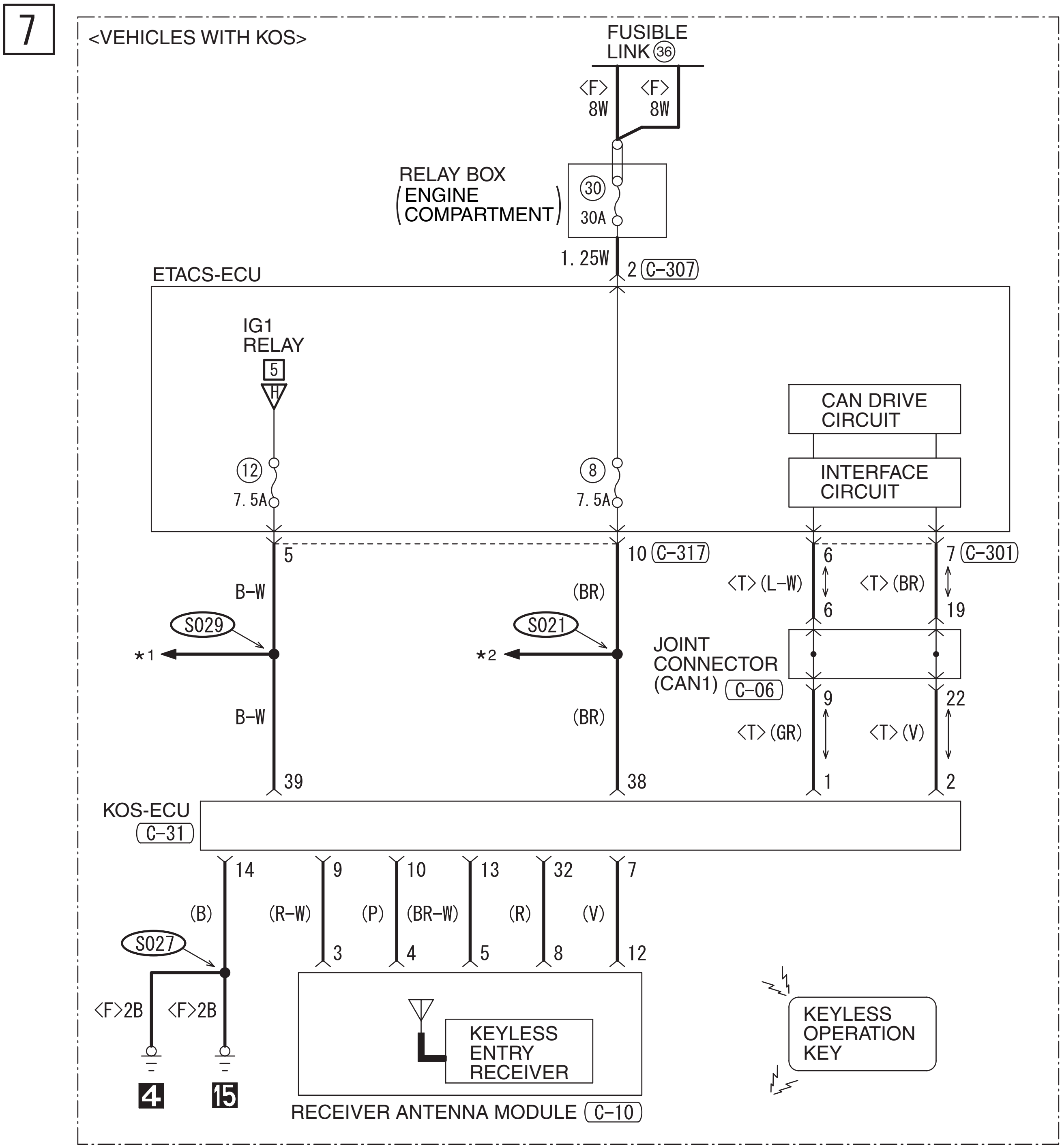

4
PASSENGER'S DOOR UNLOCK RELAY
1 E
DOOR LOCK RELAY
1 B
TRUNK LID LOCK RELAY
2 F
6
0.85LG
21
9
0.85L
18
1 C-311
GR
5 C-313
(BR-W)
JOINT CONNECTOR
(4) C-38
17 D-14
12 D-15
22
20
23
19
(W)
0.85LG
0.85L
0.85LG
0.85L
0.85G
5
1 D-20
5
1 D-01
1
2 F-23
<F>
0.75G
<F>(W)
0.85LG
0.85L
0.85LG
0.85L
3
1
6
4
6
4
TRUNK LID LOCK ACTUATOR
F-12
OFF
ON
REAR DOOR LOCK ACTUATOR (LH)
E-27
REAR DOOR LOCK ACTUATOR (RH)
E-20
2
B
4 F-23
B
10
C-126
C-301
C-311
C-313
C-315
MU801890
E-27
MU802341
F-12
MU801685
F-23
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE
BR :BROWN O : ORANGE GR : GRAY R : RED W : WHITE
SB : SKY BLUE P : PINK Y : YELLOW V : VIOLET P : PURPLE
H8G11M01BB

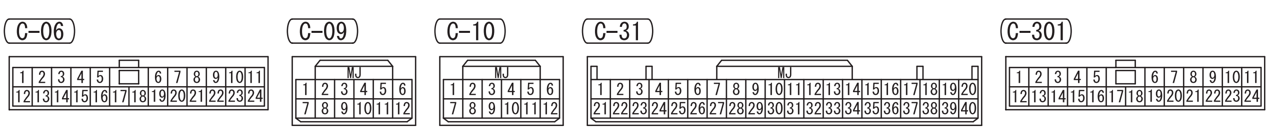
CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)




6
12
16
7
8
C-313
13
C-315
(G)
(Y)
(R)
(B)
(R-W)
3
KEY
REMINDER
SWITCH
(WHEN REMOVING KEY: ON)
C-213
ON
OFF
2
(B)
S027
<F>2B
<F>2B
4
15
FRONT DOOR SWITCH (LH)
D-24
REAR DOOR SWITCH (RH)
D-07
FRONT DOOR SWITCH (RH)
D-39
REAR DOOR SWITCH (LH)
D-16
C-40
(MU801823)
C-41
JAE-E
C-124
C-128
C-317
D-07
D-16
D-24
D-39
F-23
(MU801536)
H8G11M01CB

CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)





H8G11M01DA

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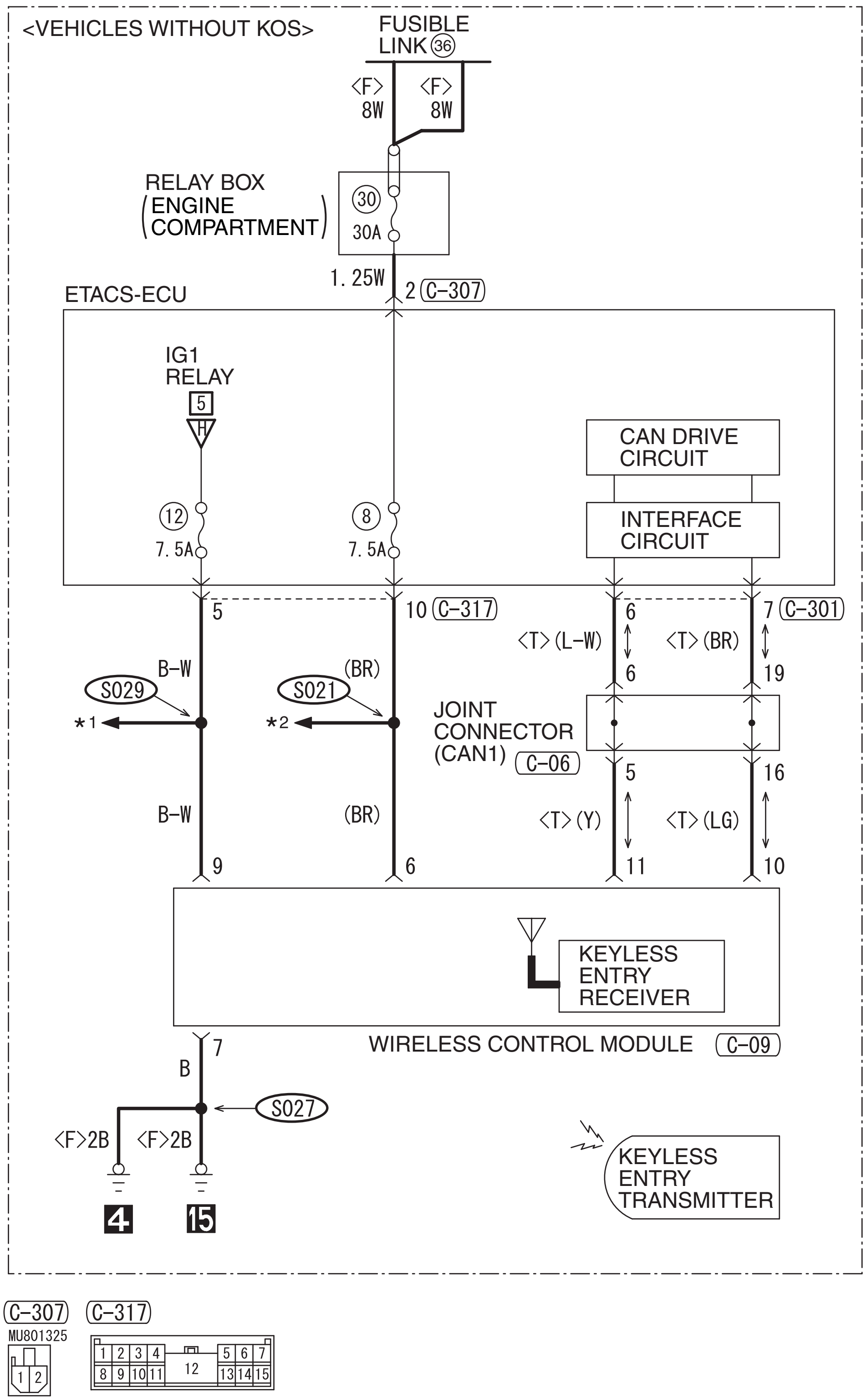

NOTE
*1 :
- AIR CONDITIONING SYSTEM
- ANTI-LOCK BRAKING SYSTEM (ABS)
- AUTO-CRUISE CONTROL SYSTEM
- BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
- CHARGING SYSTEM
- CONTROLLER AREA NETWORK (CAN)
- DAYTIME RUNNING LIGHT (DRL)
- DOOR AJAR WARNING TONE ALARM
- FOG LIGHT
- HEADLIGHT
- HEATED DOOR MIRROR
- HEATED SEAT
- IGNITION KEY REMINDER TONE ALARM
- INVECS-III CVT
- METER AND GAUGE
- MFI SYSTEM
- REAR WINDOW DEFOGGER
- SEAT BELT WARNING TONE ALARM
- SHIFT LOCK MECHANISM
- SUNROOF
- SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
- TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
- THEFT-ALARM SYSTEM
- TIRE PRESSURE MONITORING SYSTEM (TPMS)
- TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
- WINDSHIELD WIPER AND WASHER

*2 :
- AIR CONDITIONING SYSTEM
- BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
- CONTROLLER AREA NETWORK (CAN)
- DAYTIME RUNNING LIGHT (DRL)
- FOG LIGHT
- HEADLIGHT
- IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
- METER AND GAUGE
- SEAT BELT WARNING TONE ALARM
- TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
- TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
- WINDSHIELD WIPER AND WASHER

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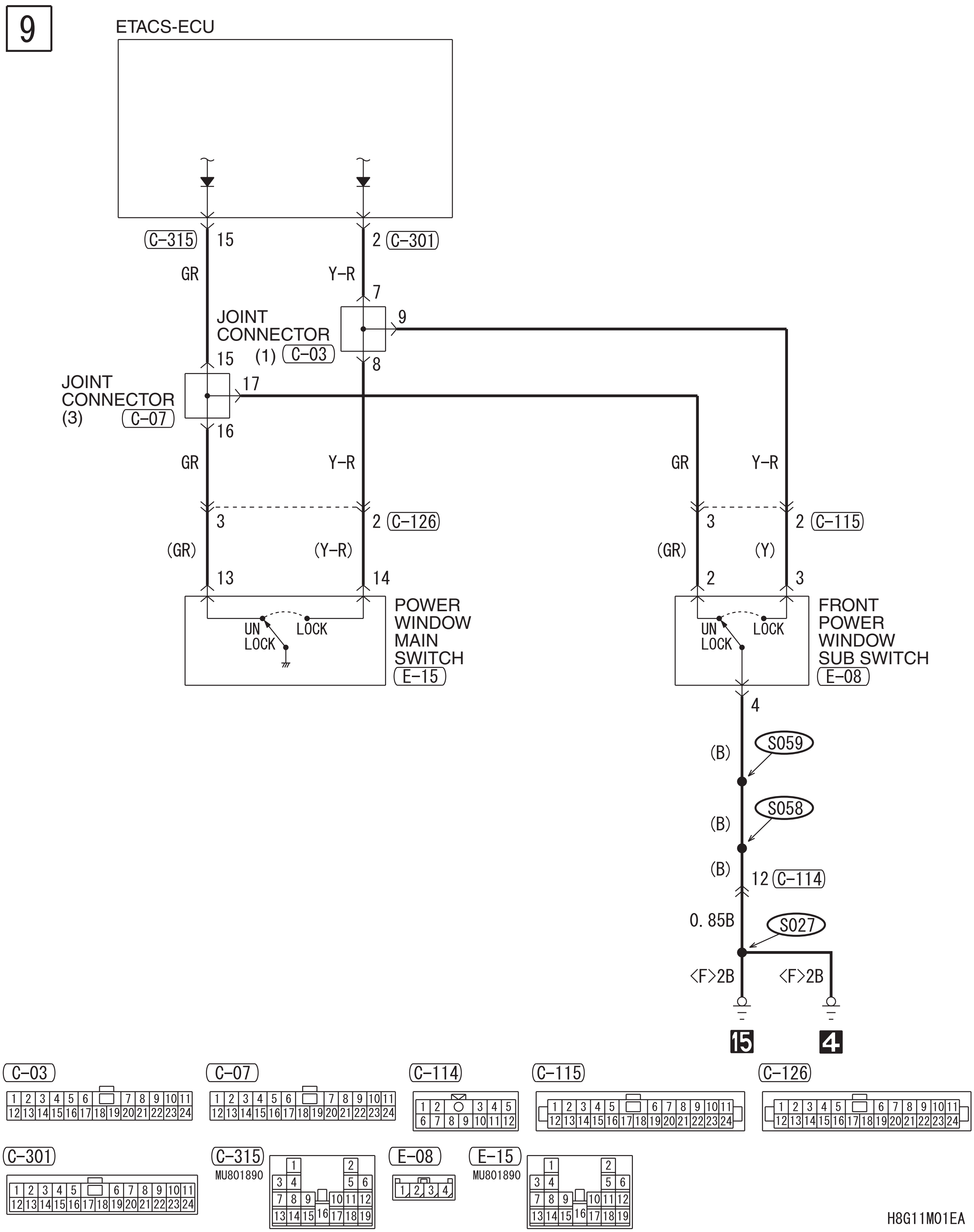
H8G11M01DB

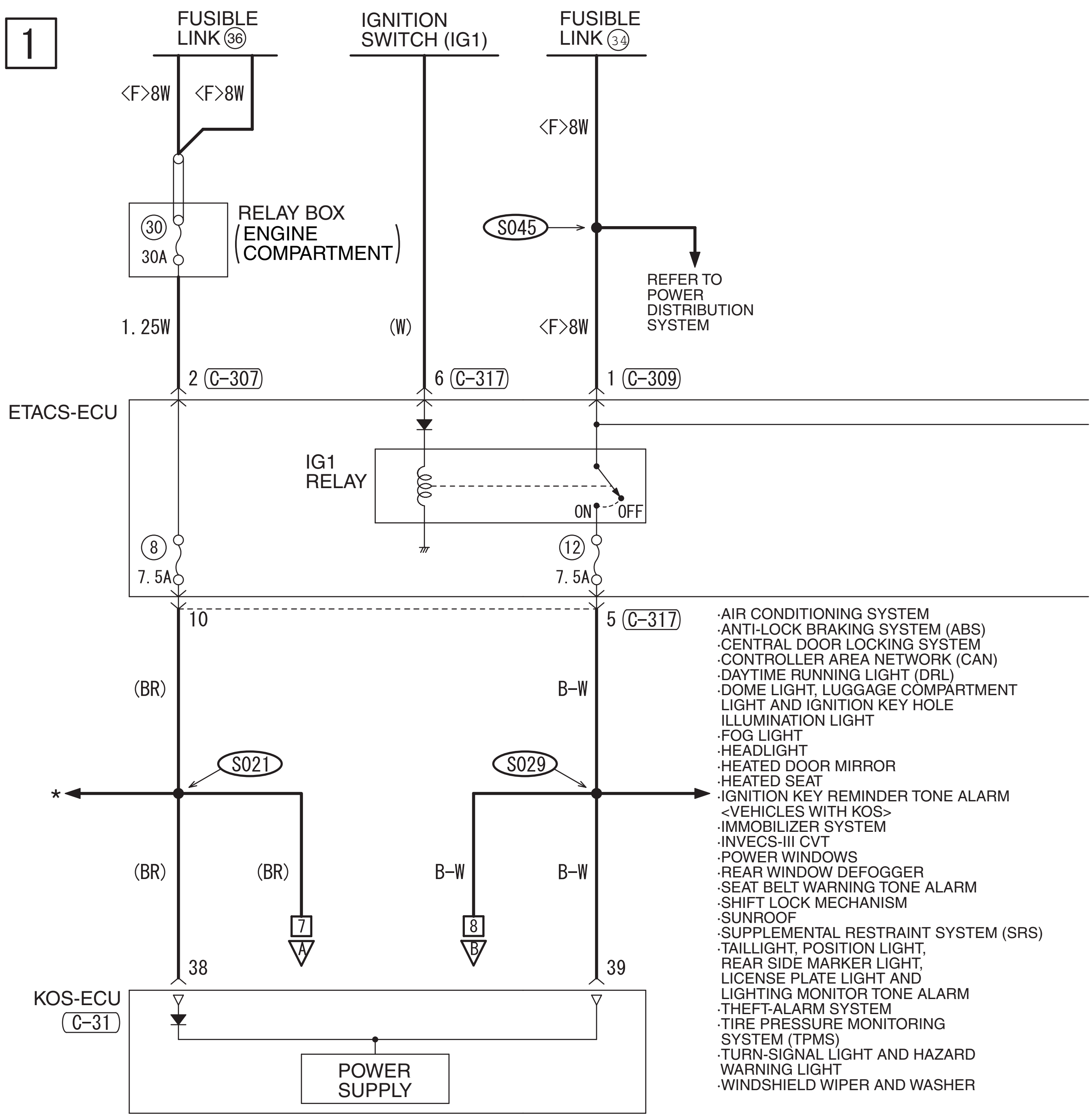
CENTRAL DOOR LOCKING SYSTEM <VEHICLES WITH KEYLESS ENTRY SYSTEM> (CONTINUED)

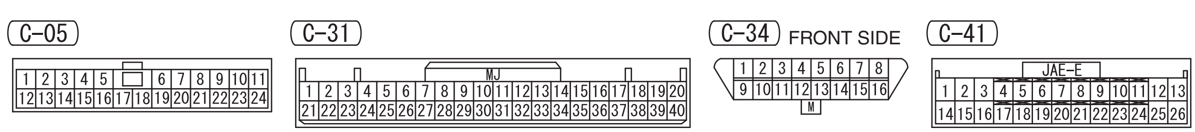


NOTES

KEYLESS OPERATING SYSTEM (KOS)

M1901025500107



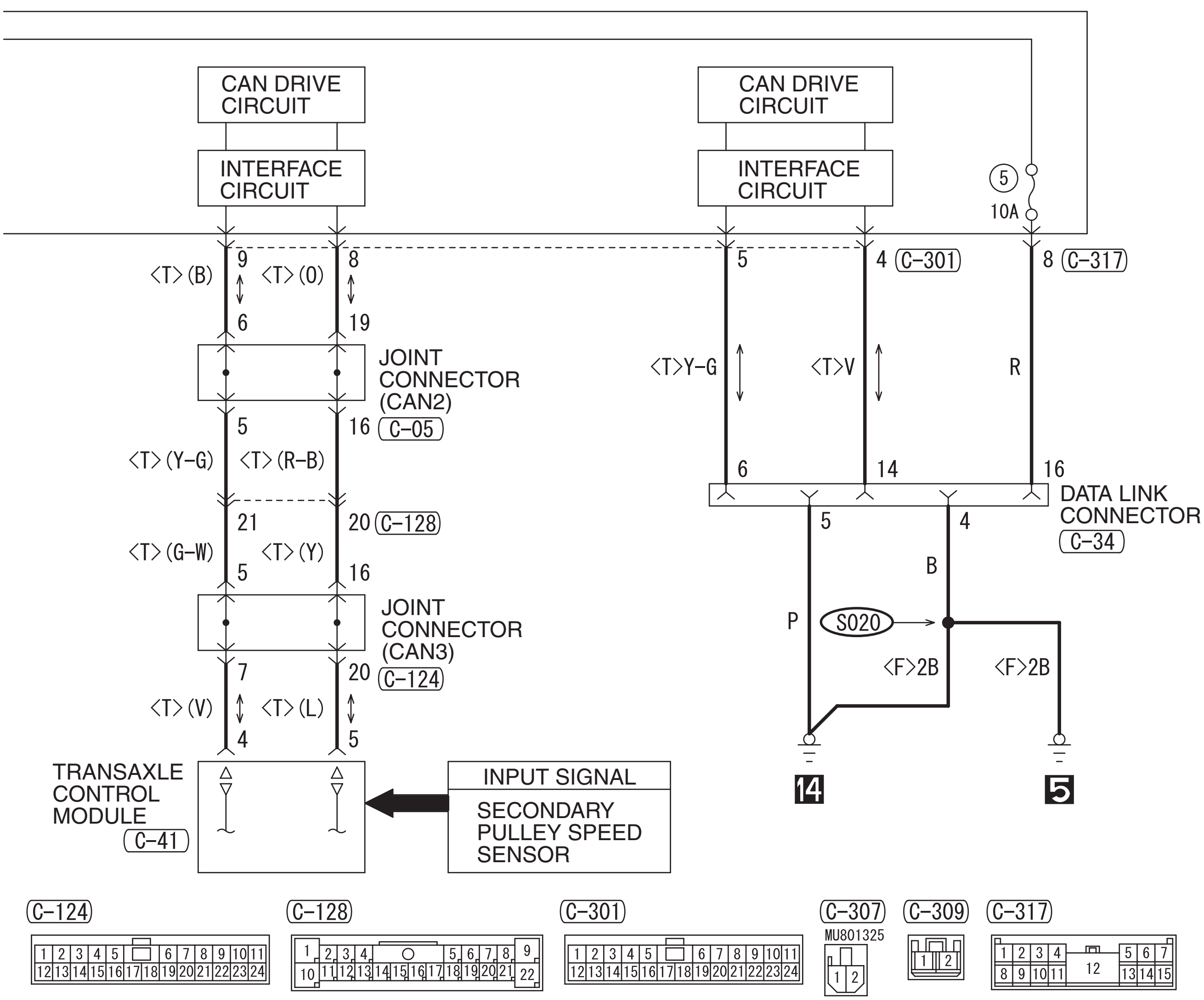


H8G11M02AA

2

NOTE

*: ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·METER AND GAUGE
·SEAT BELT WARNING TONE ALARM
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



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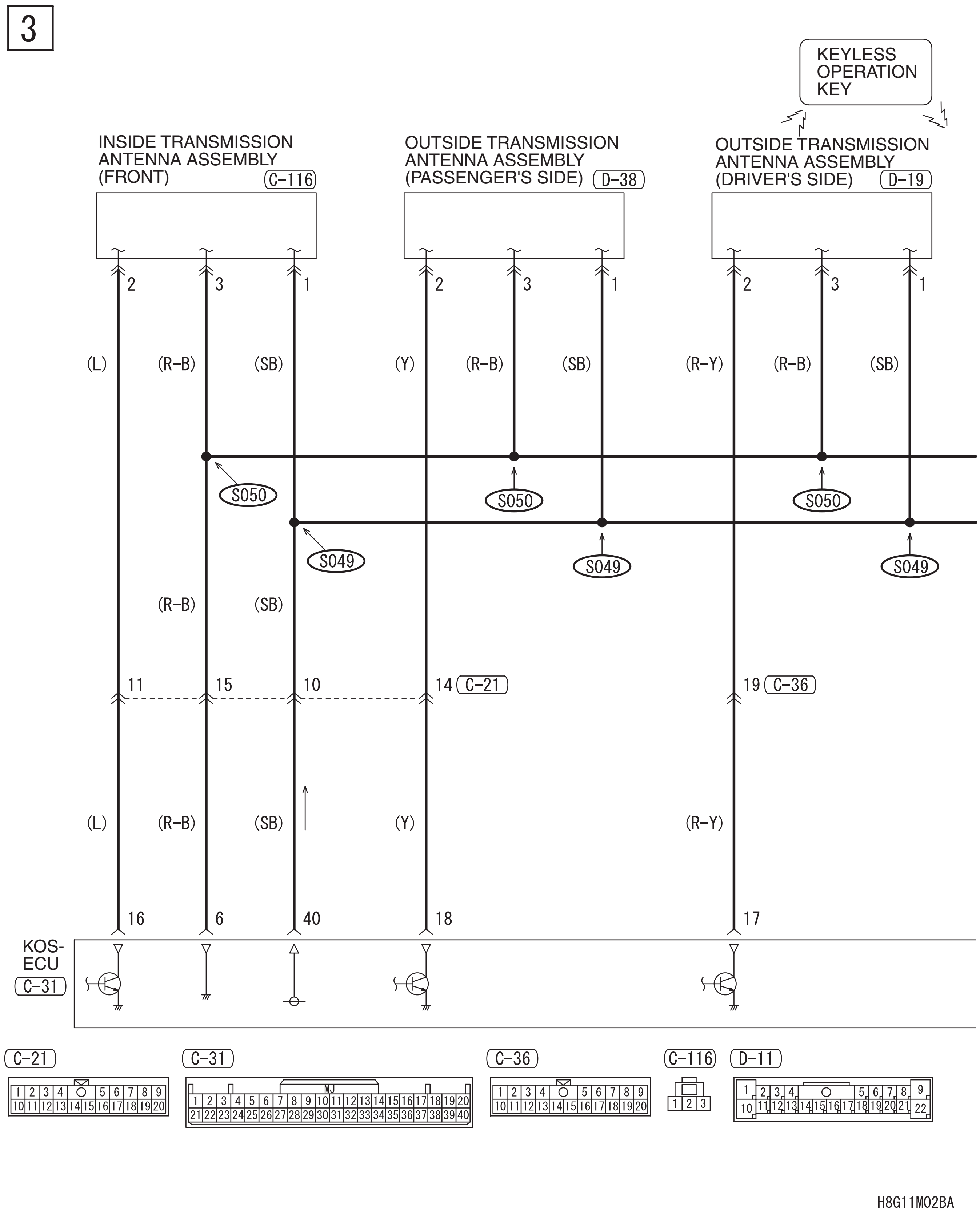
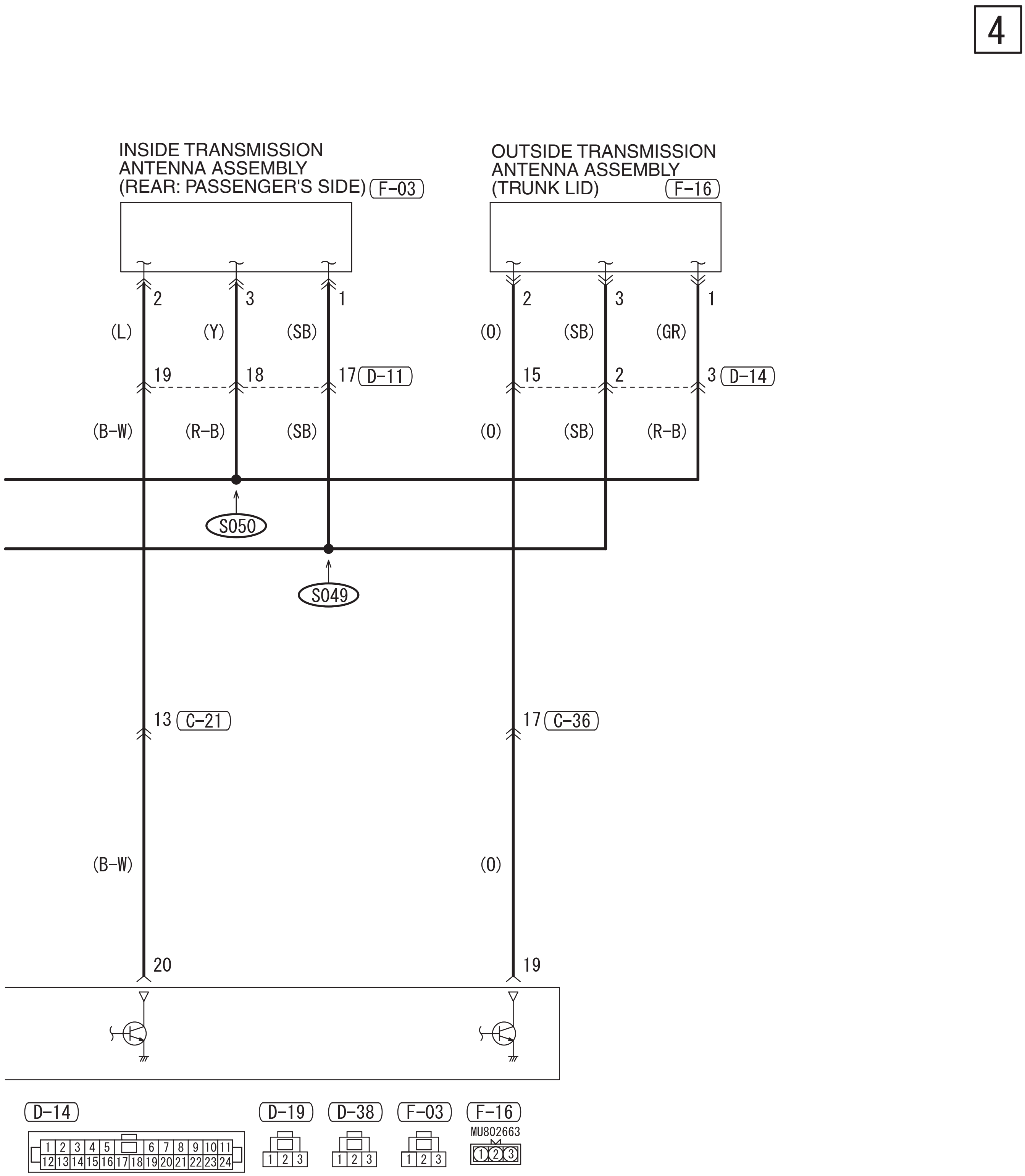
H8G11M02AB

KEYLESS OPERATING SYSTEM (KOS) (CONTINUED)





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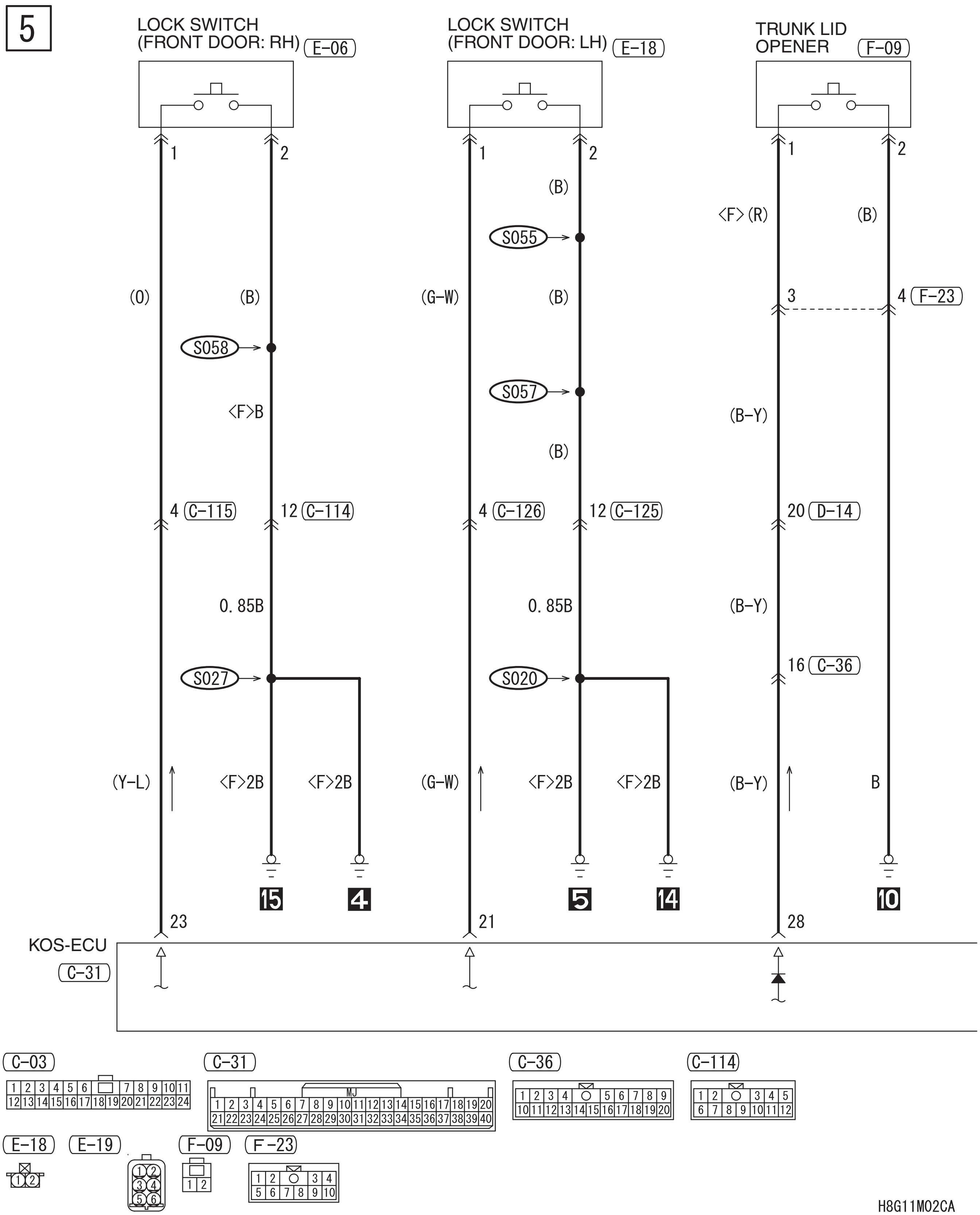
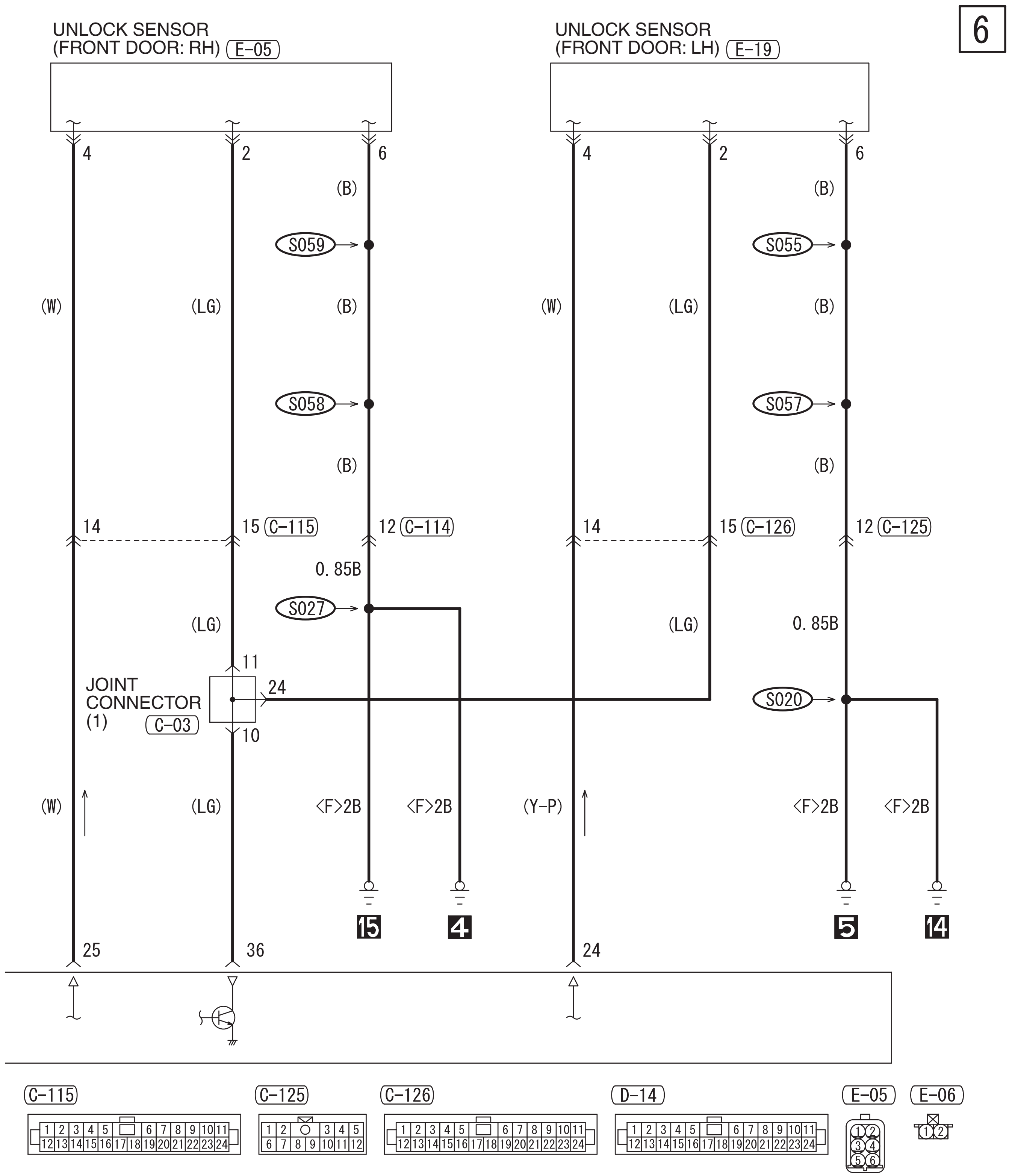
H8G11M02BB

KEYLESS OPERATING SYSTEM (KOS) (CONTINUED)





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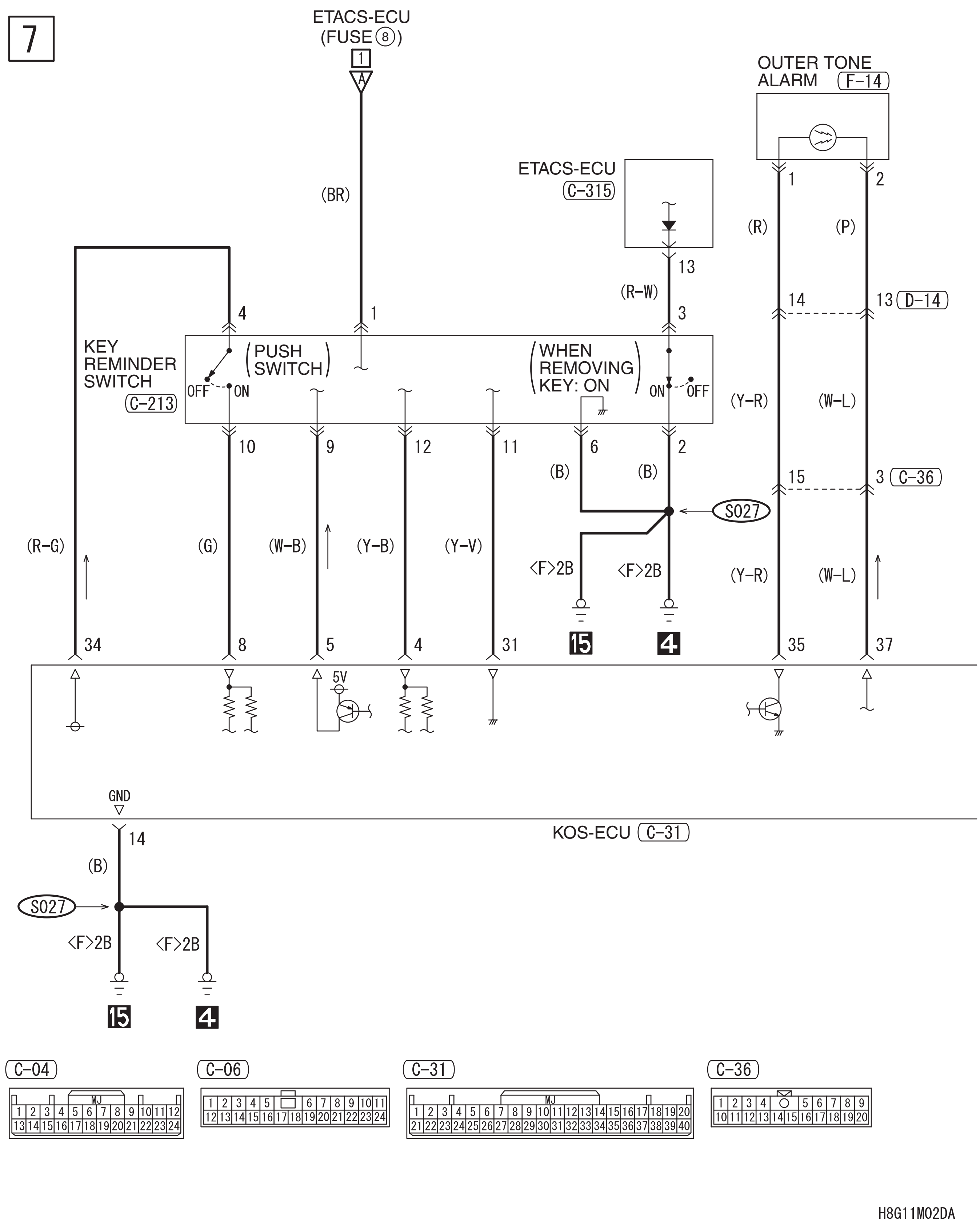
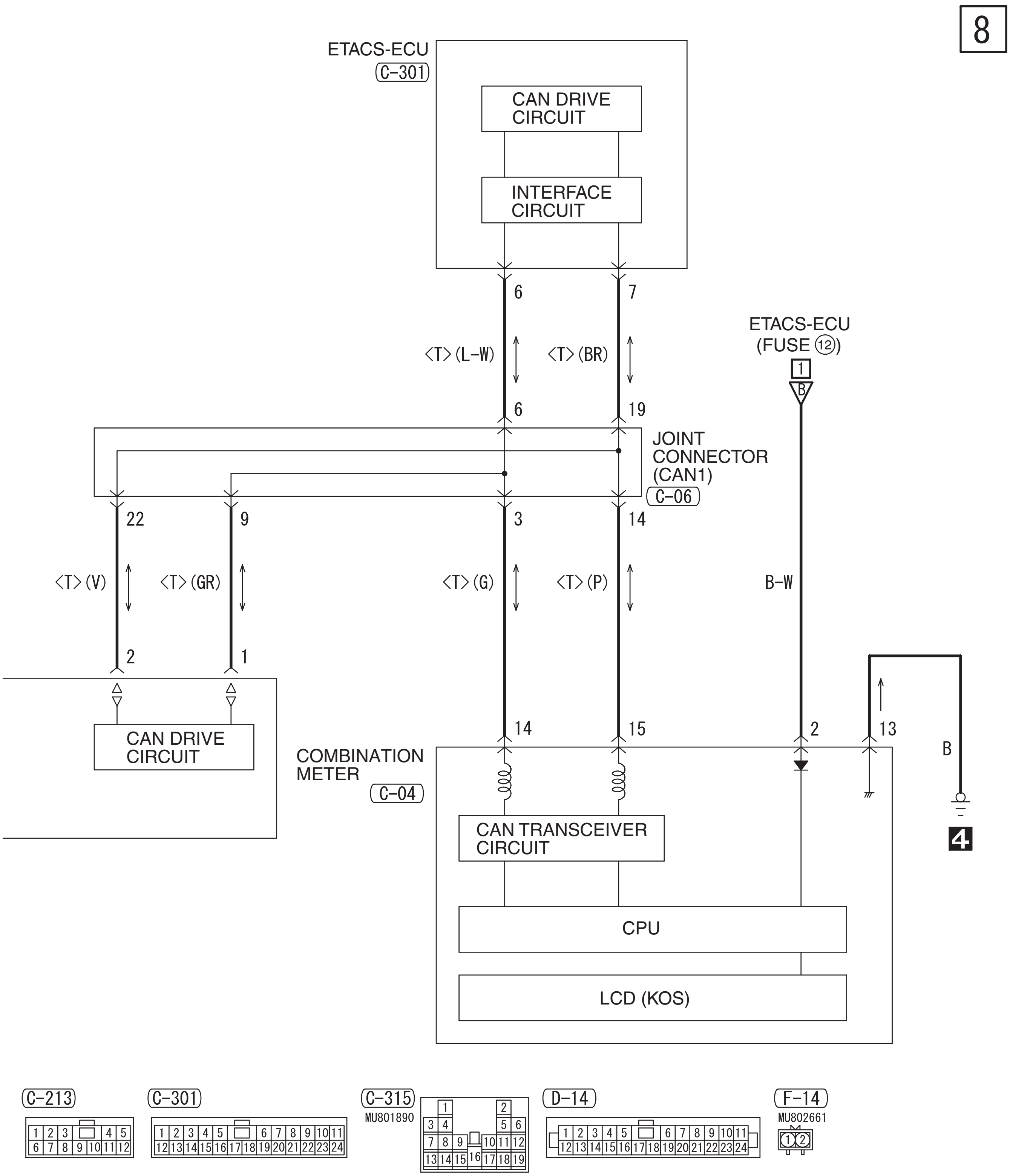
H8G11M02CB

KEYLESS OPERATING SYSTEM (KOS) (CONTINUED)





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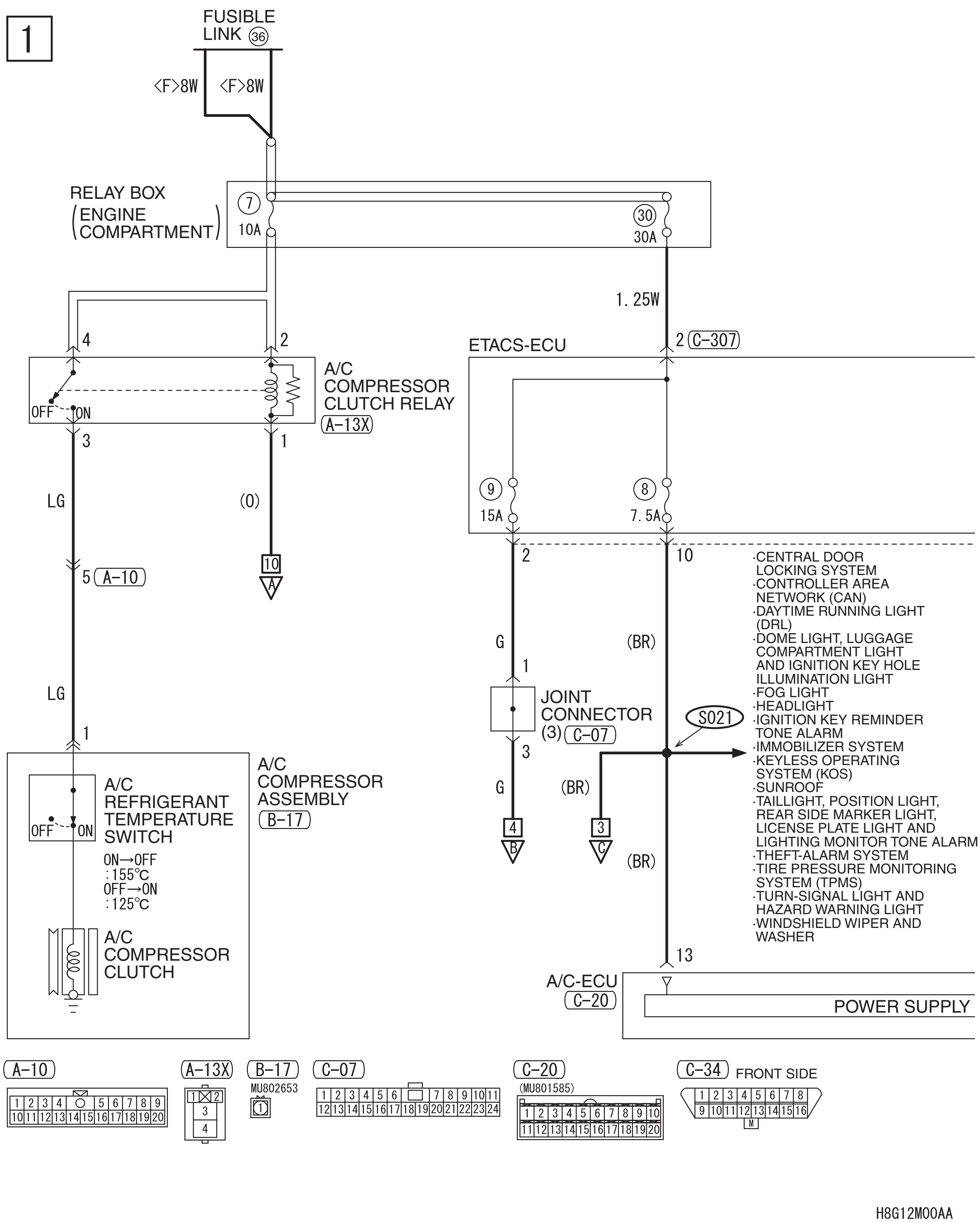
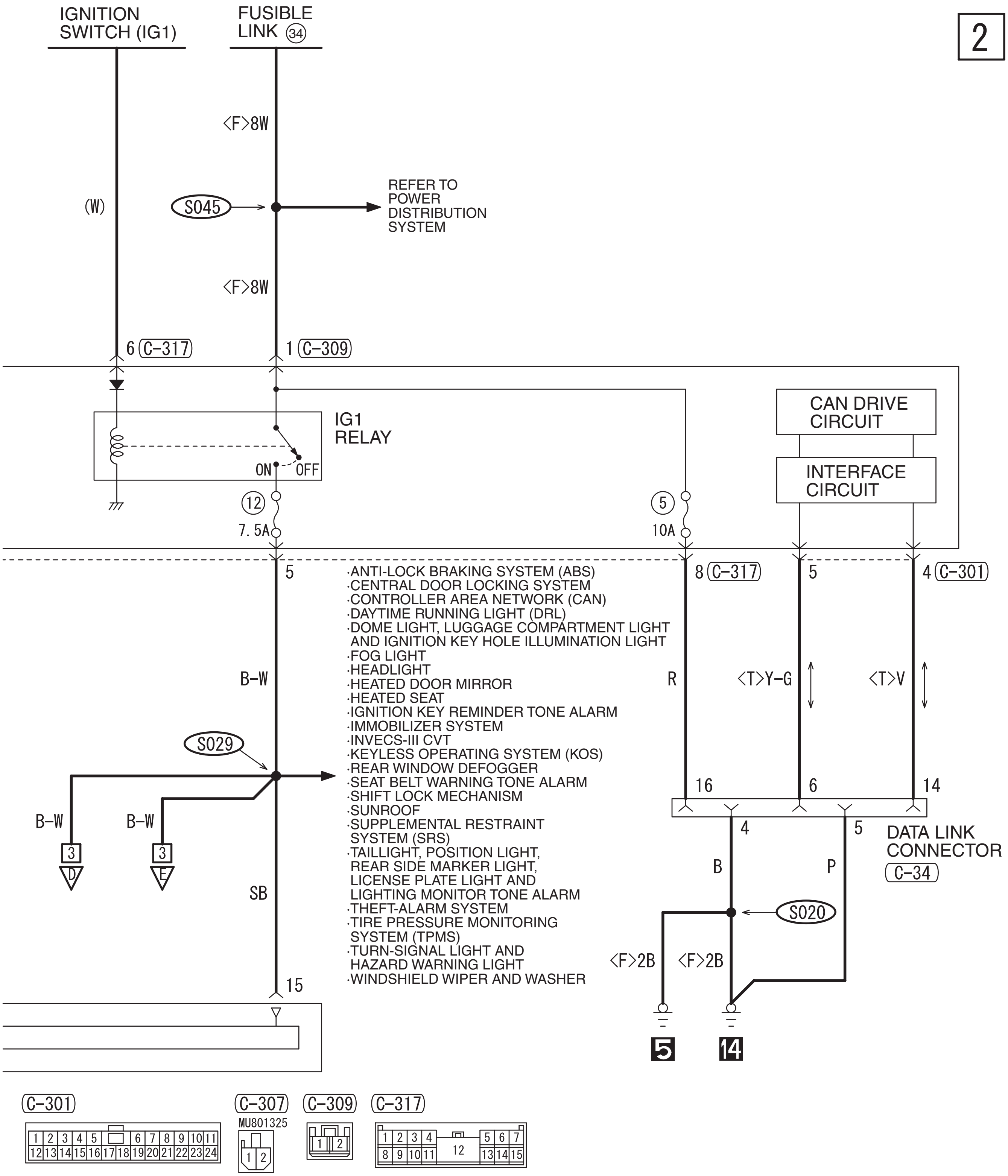
H8G11M02DB

AIR CONDITIONING SYSTEM

M1901005601570





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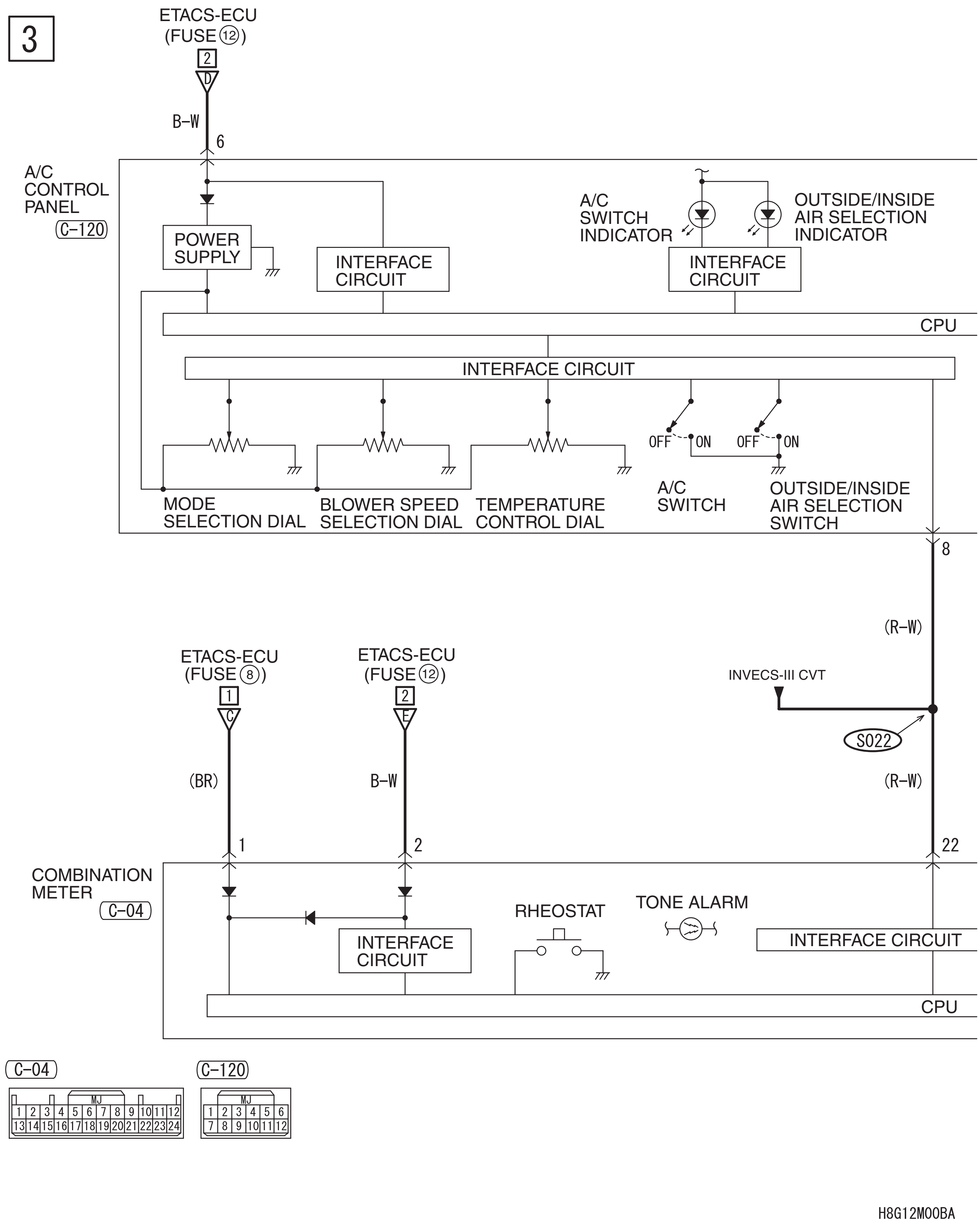
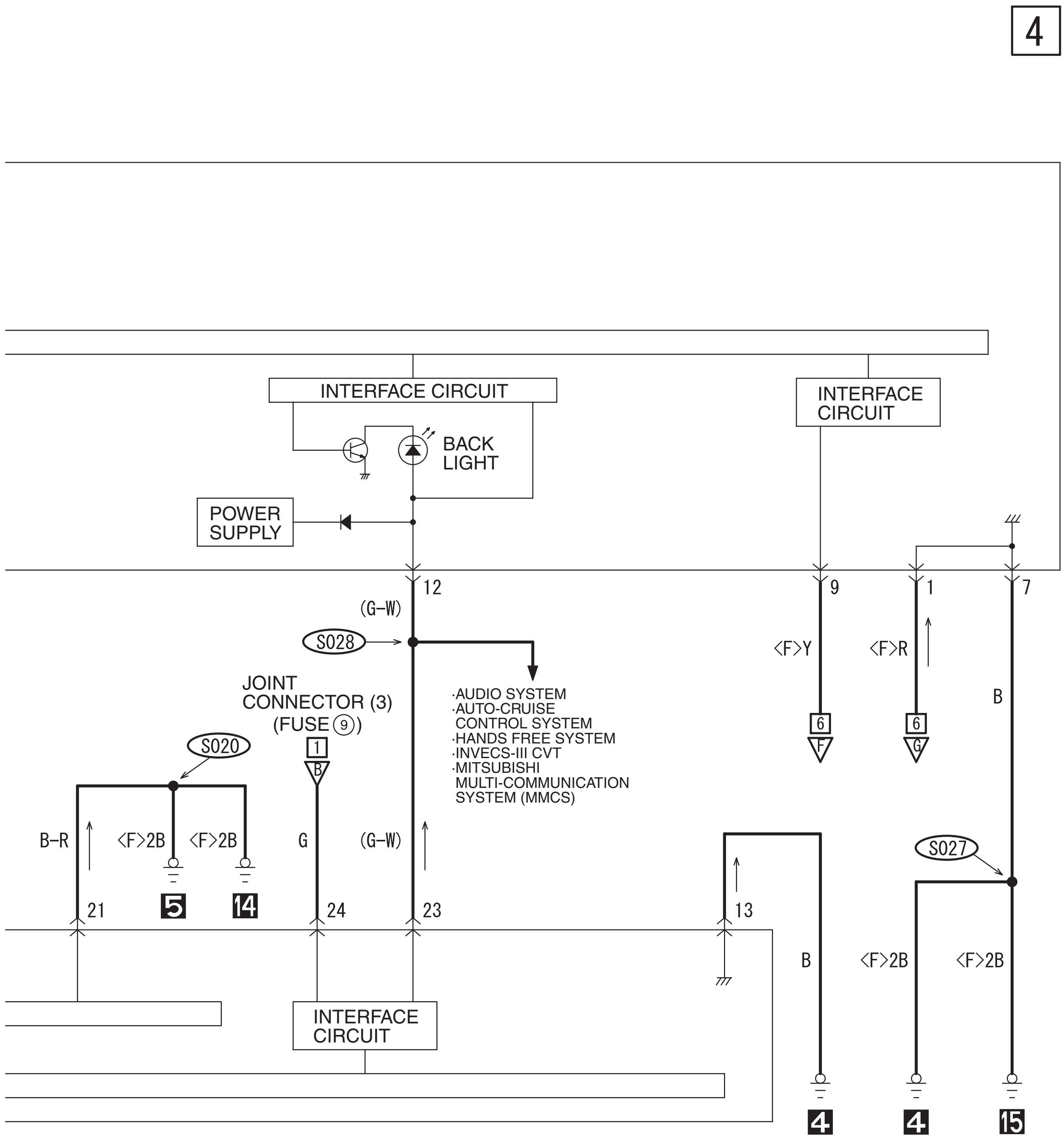
H8G12M00AB

AIR CONDITION SYSTEM (CONTINUED)

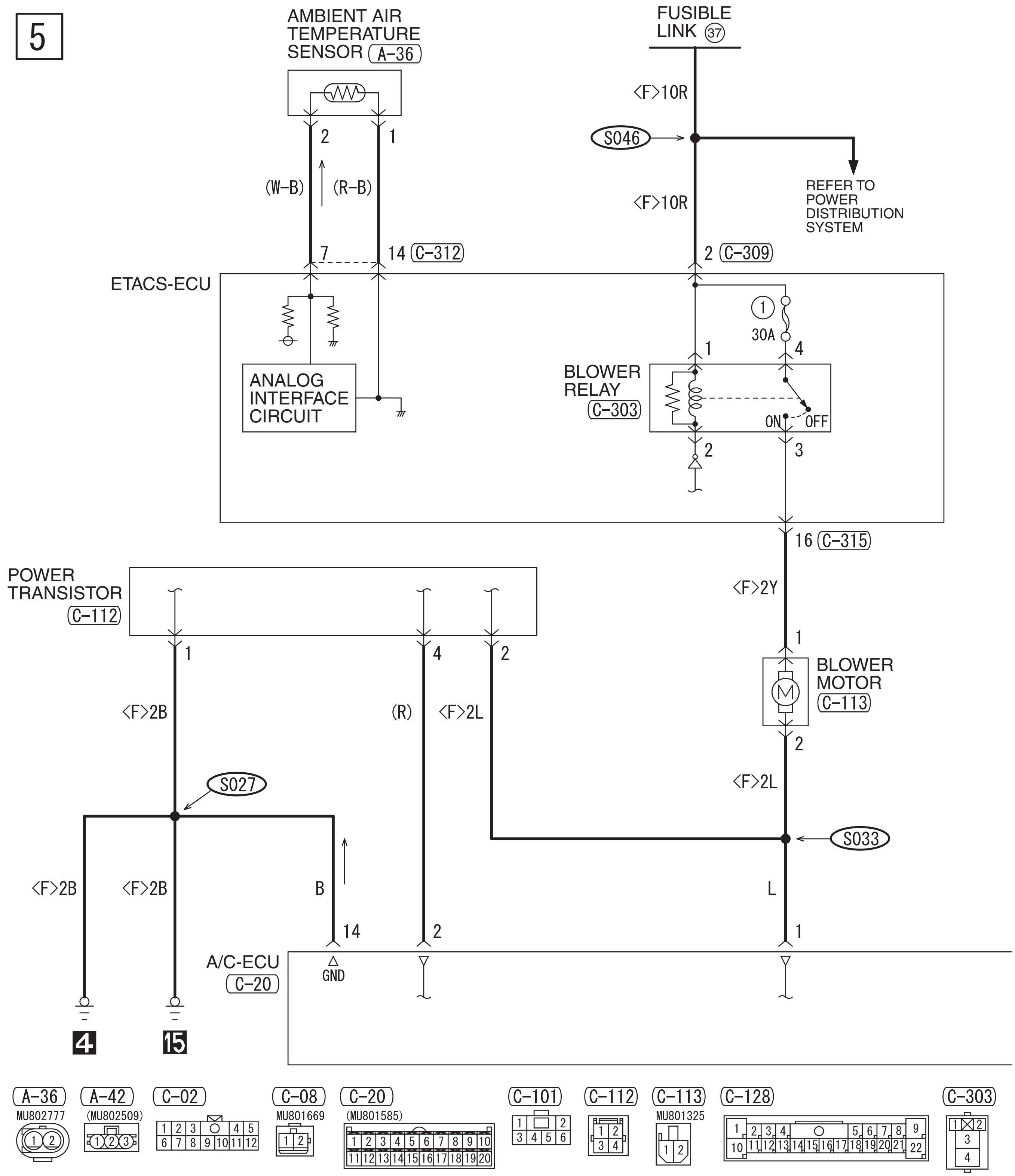




WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G12M00BB

AIR CONDITION SYSTEM (CONTINUED)



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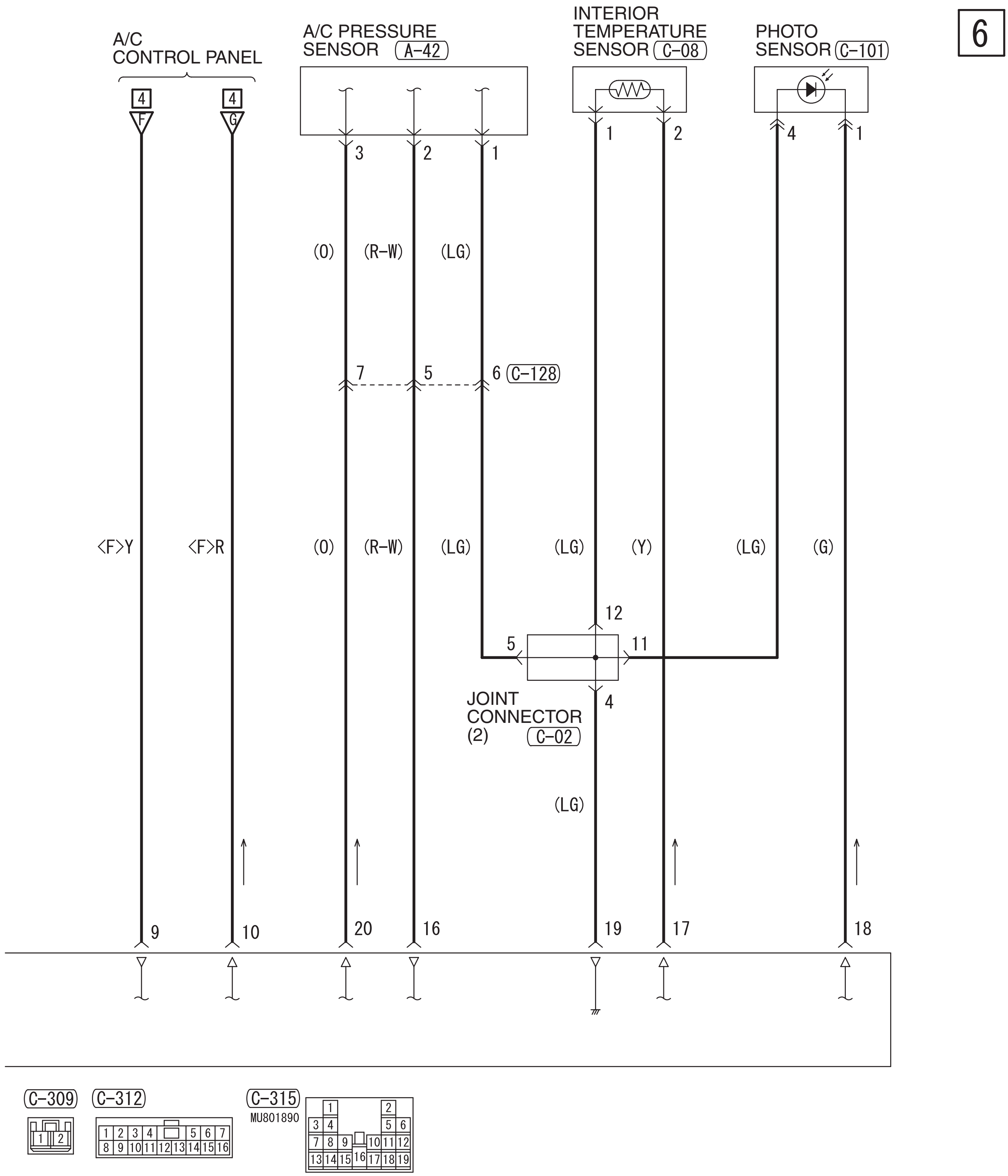

WIRE COLOR CODE
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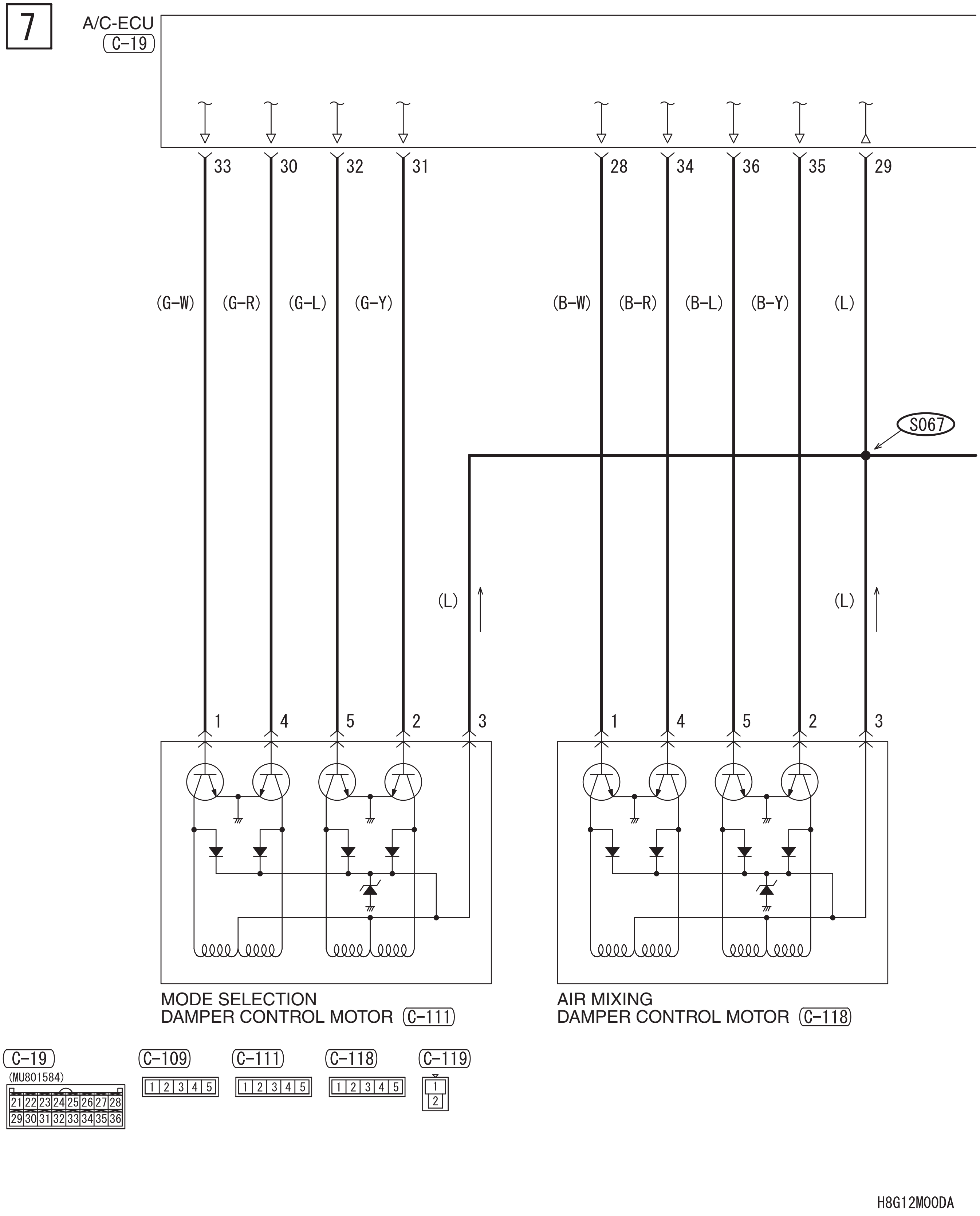
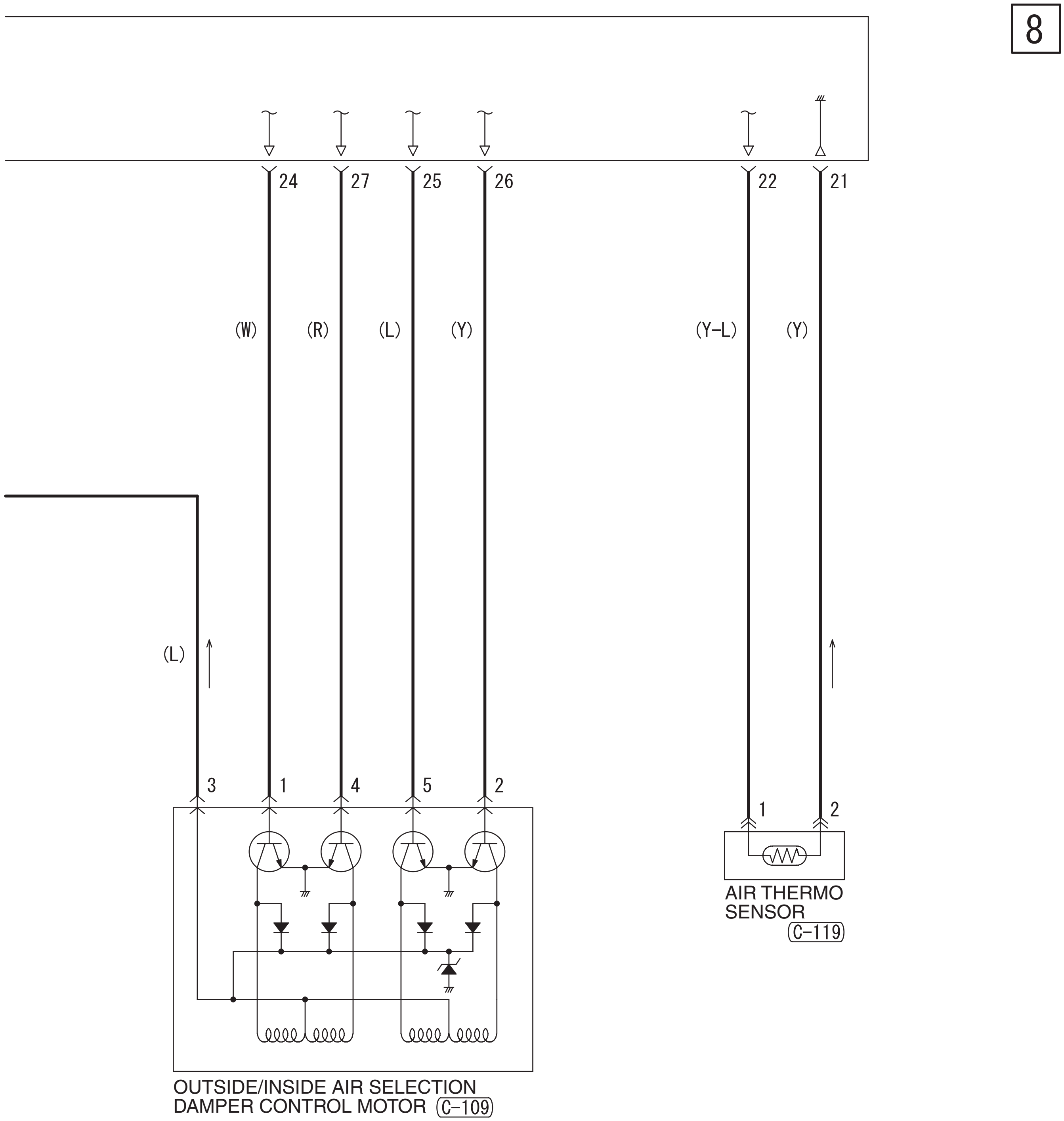
AIR CONDITION SYSTEM (CONTINUED)





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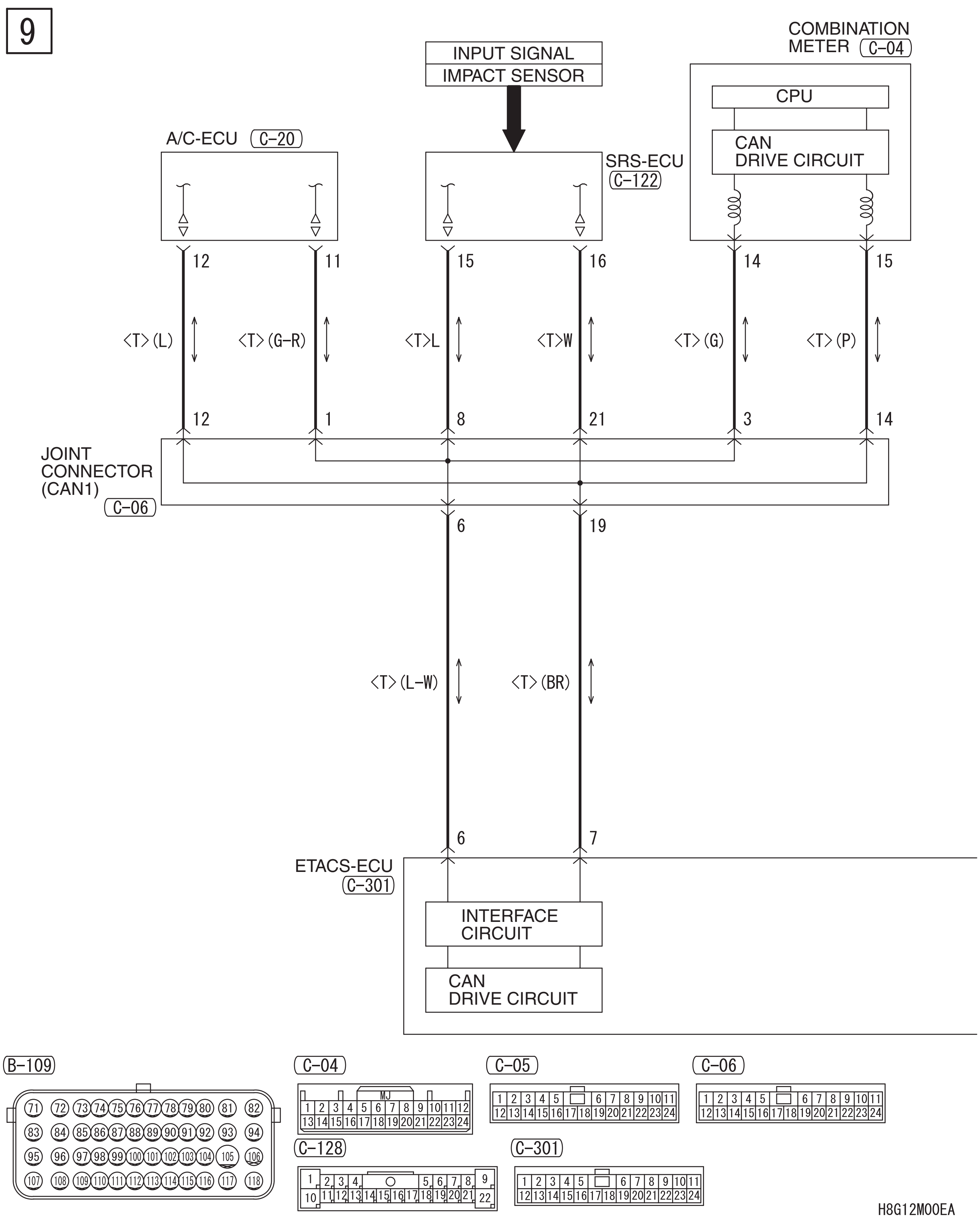
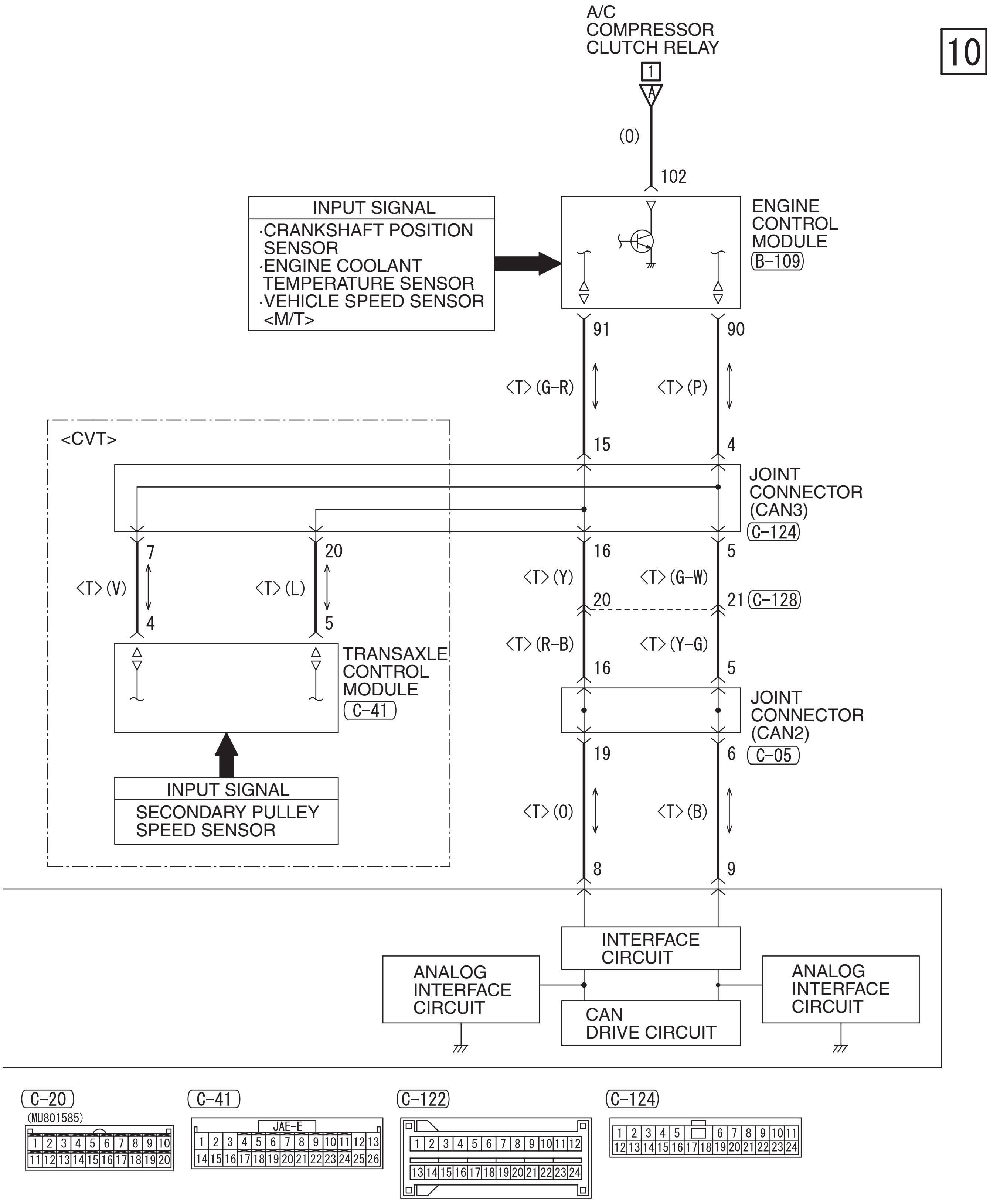
H8G12M00DB

AIR CONDITION SYSTEM (CONTINUED)





WIRE COLOR CODE
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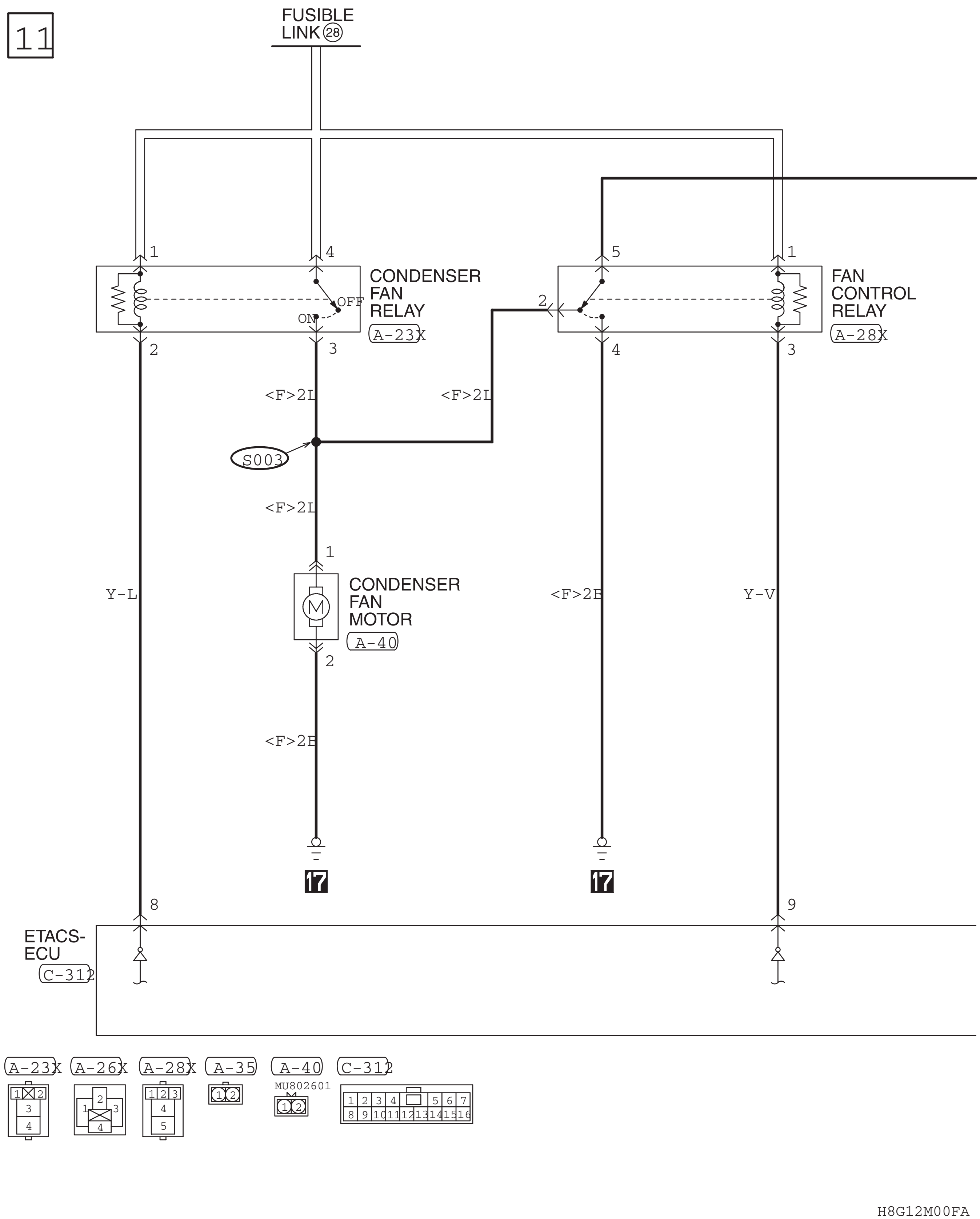
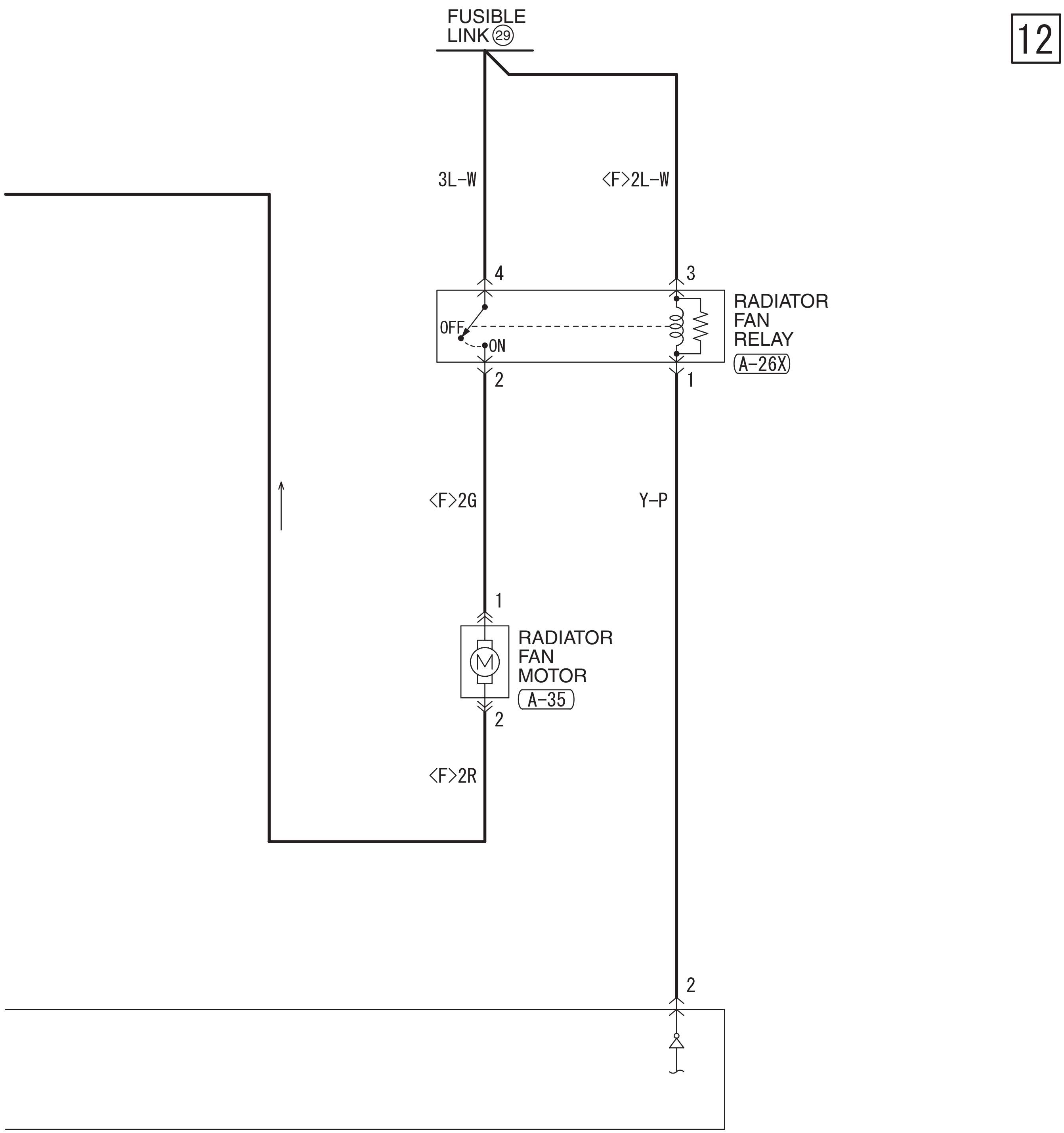
AIR CONDITION SYSTEM (CONTINUED)





WIRE COLOR CODE
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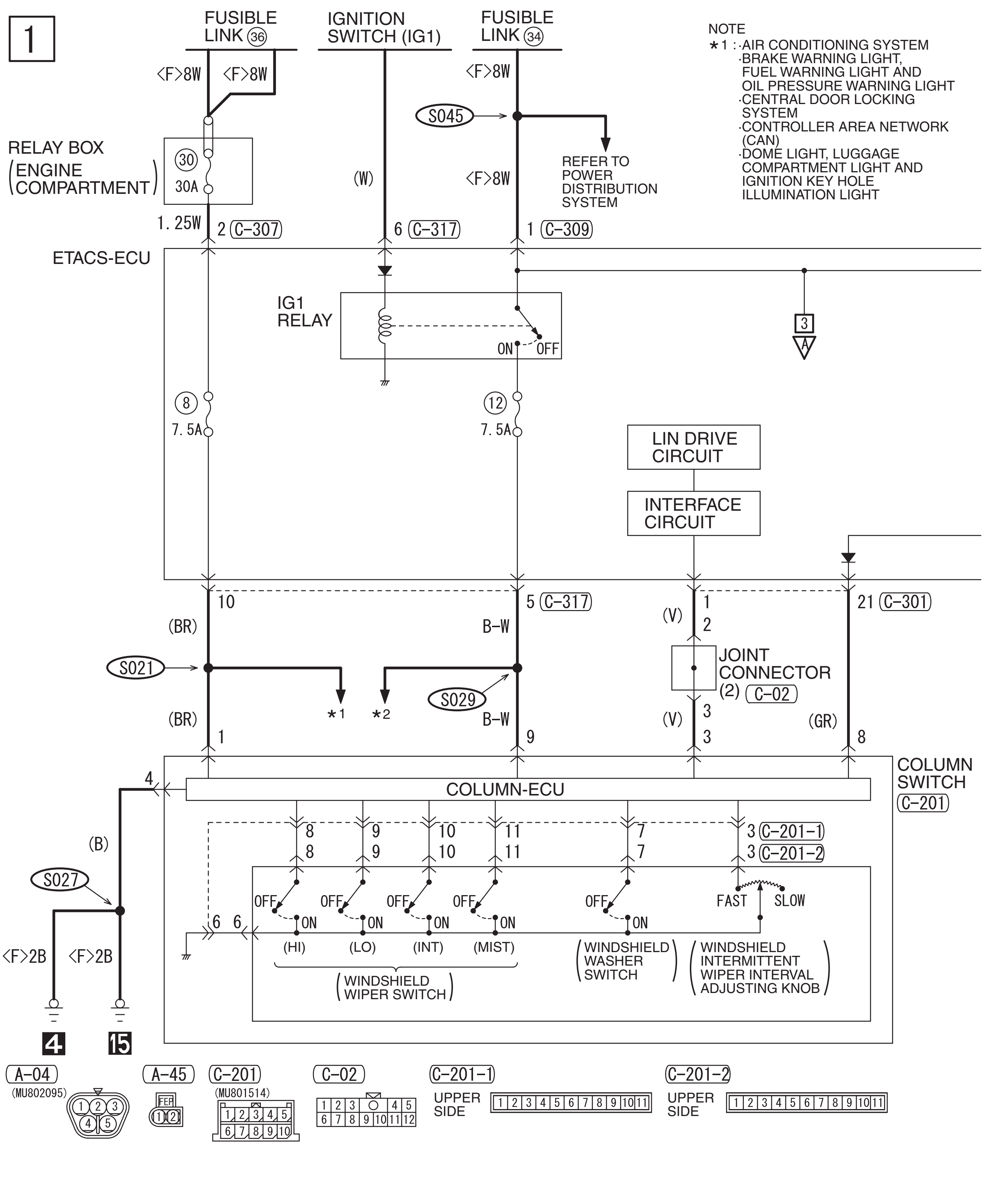
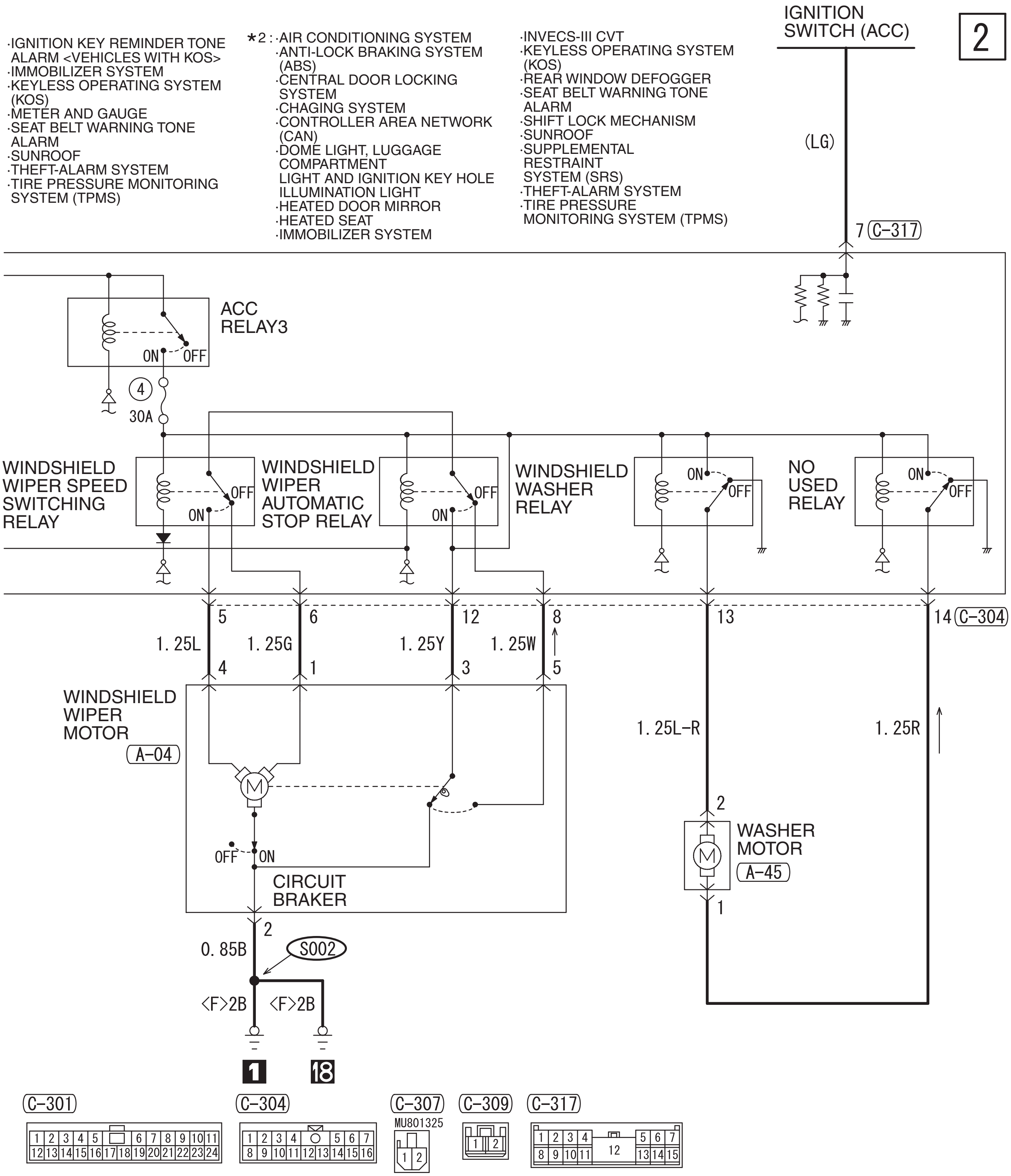
H8G12M00FB

WINDSHIELD WIPER AND WASHER

M1901006102894





WIRE COLOR CODE
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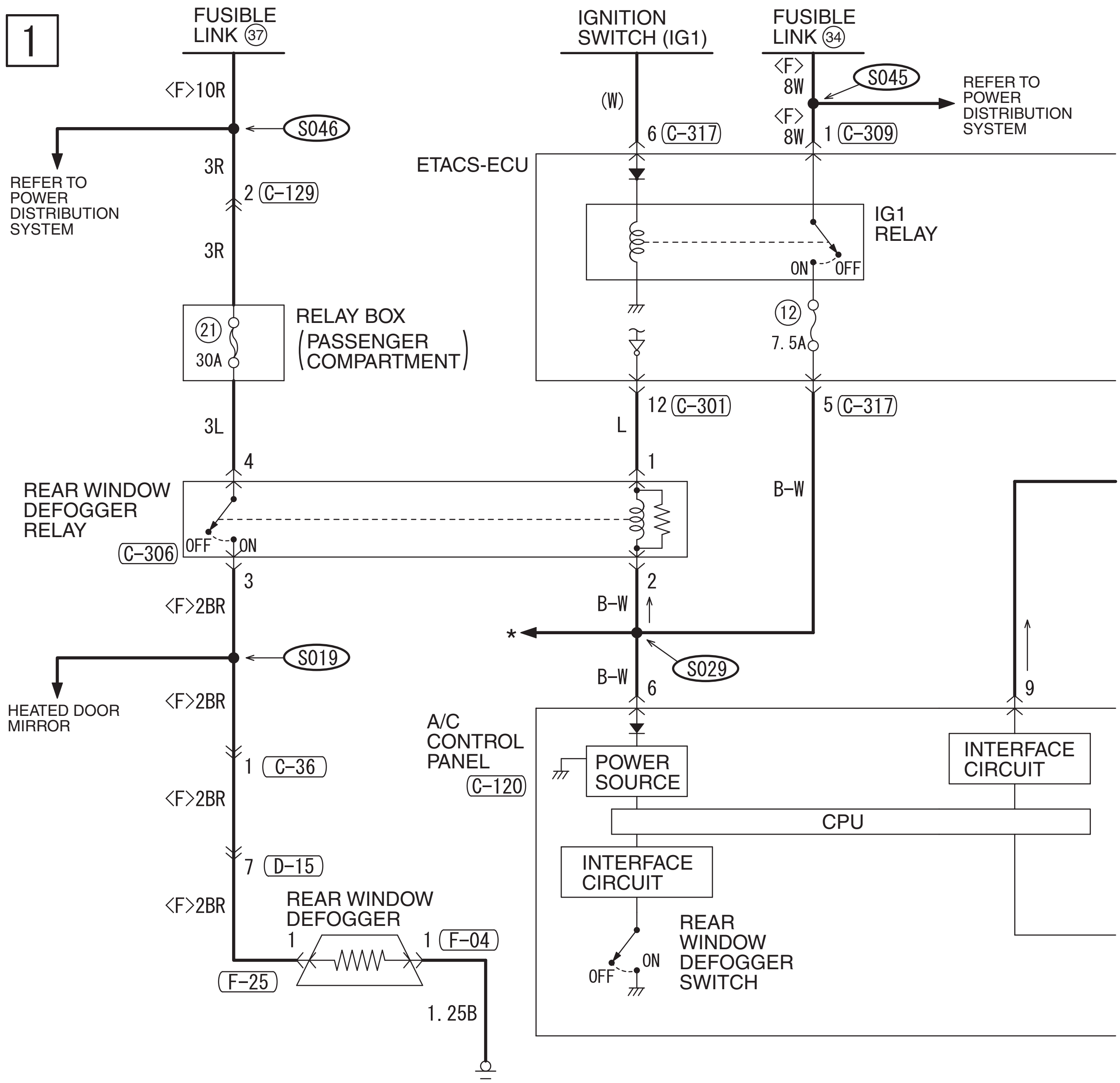
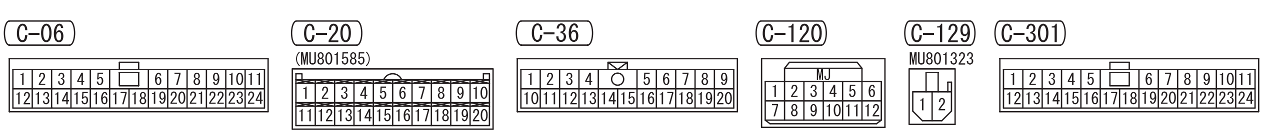
H8G13M00AB

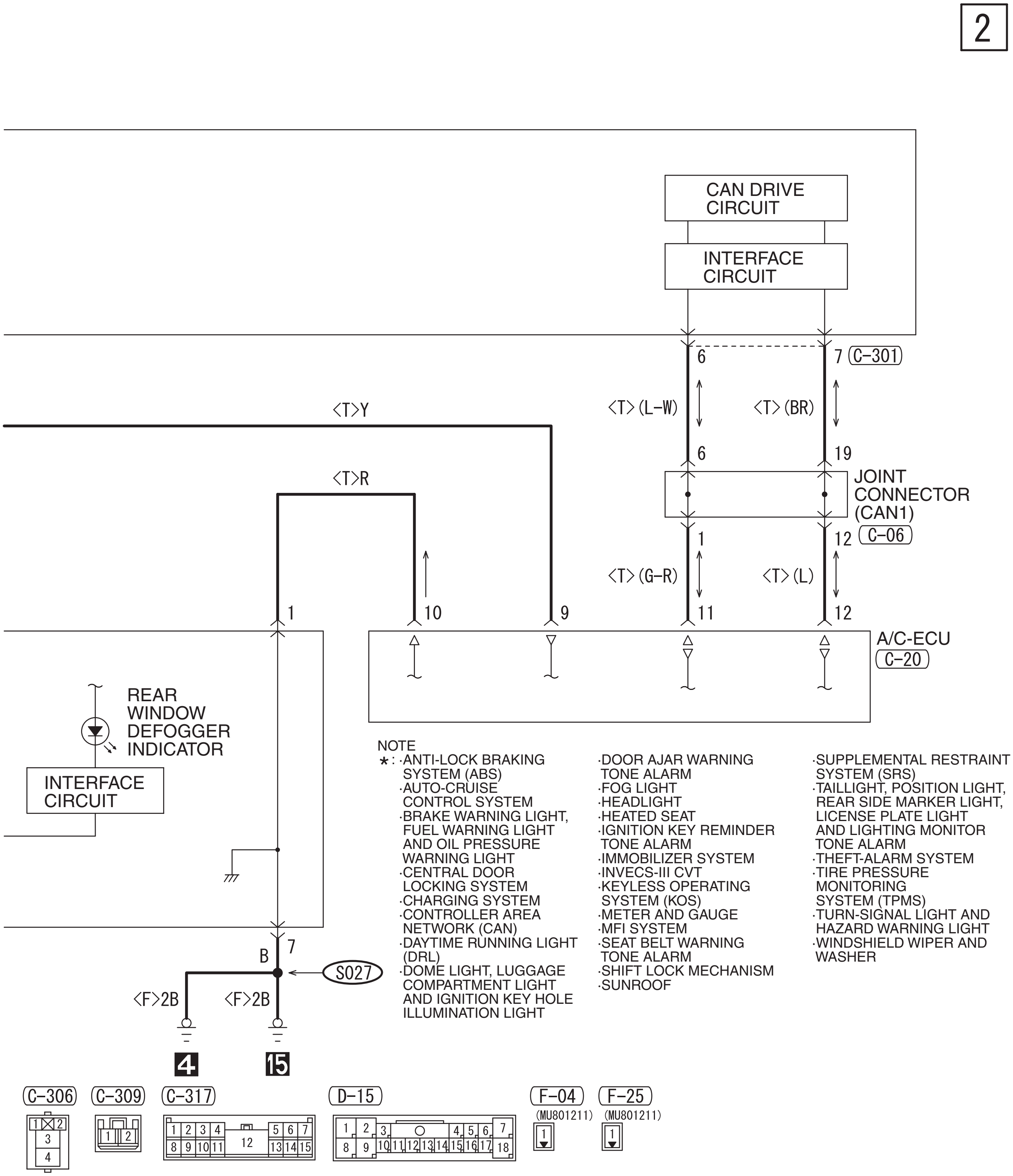
REAR WINDOW DEFOGGER

M1901006401676





H8G13M01AA



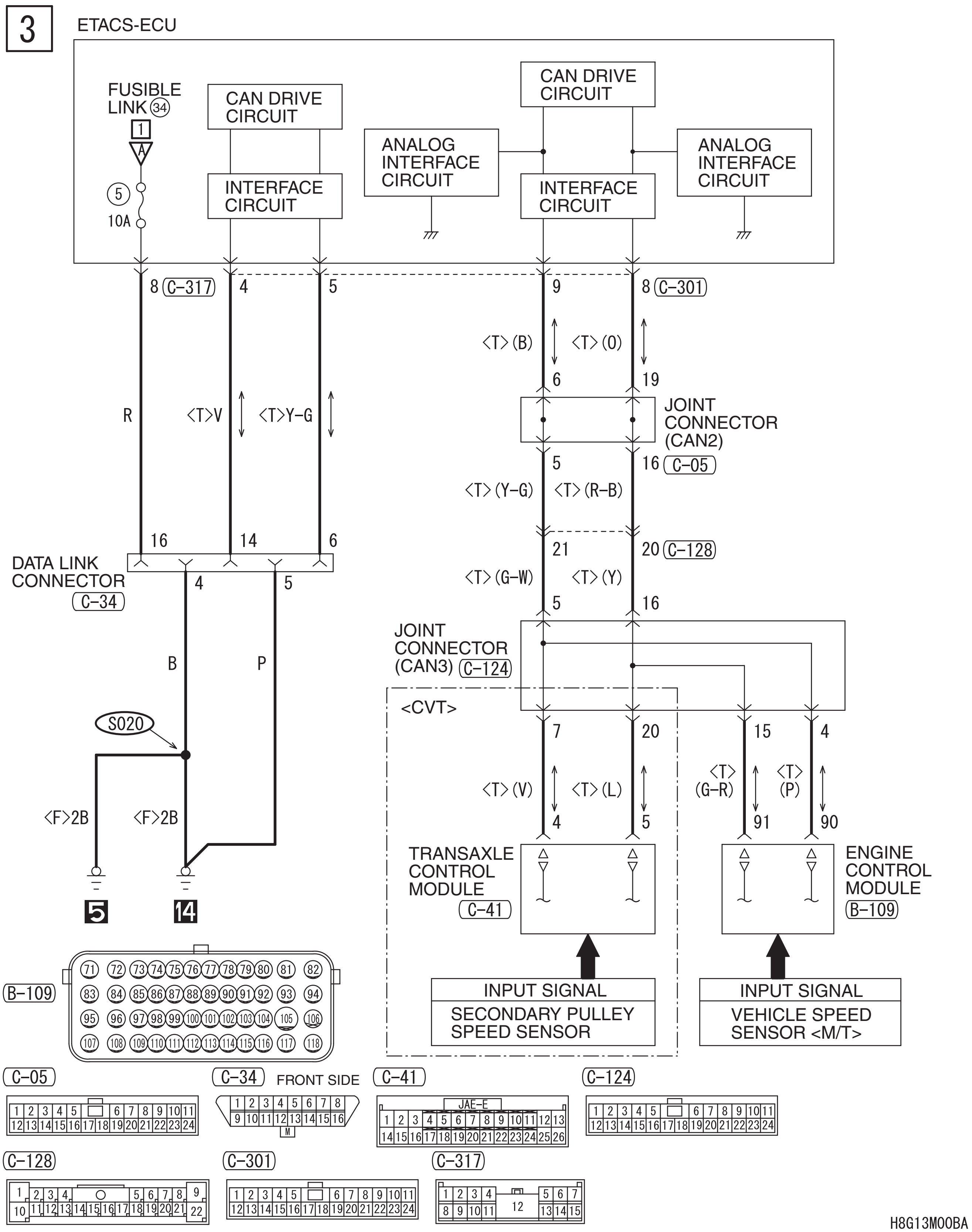
NOTE

*: ·ANTI-LOCK BRAKING SYSTEM (ABS)
·AUTO-CRUISE CONTROL SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CHARGING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·DOOR AJAR WARNING TONE ALARM
·FOG LIGHT
·HEADLIGHT
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·METER AND GAUGE
·MFI SYSTEM
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G13M01AB

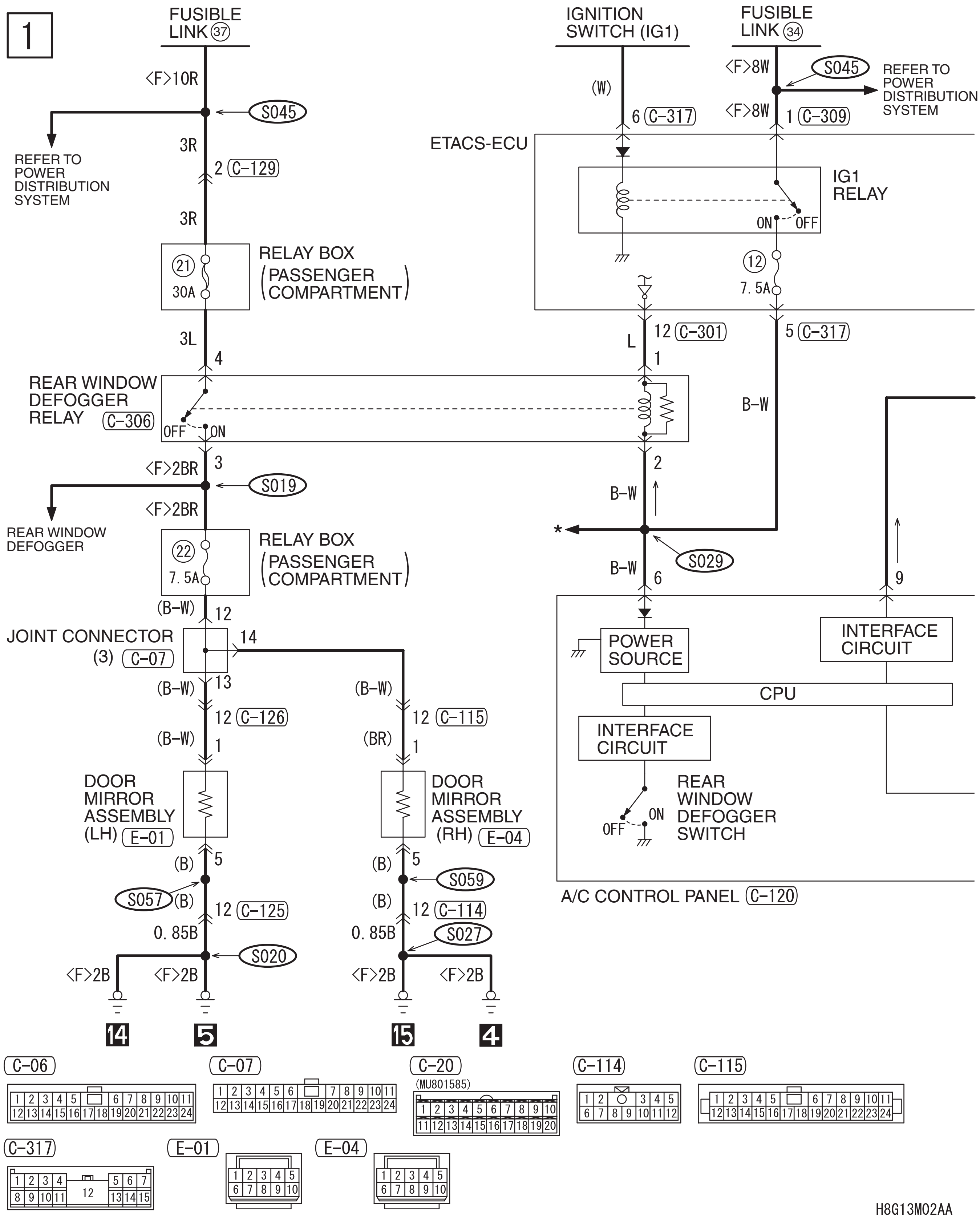
REAR WINDOW DEFOGGER (CONTINUED)

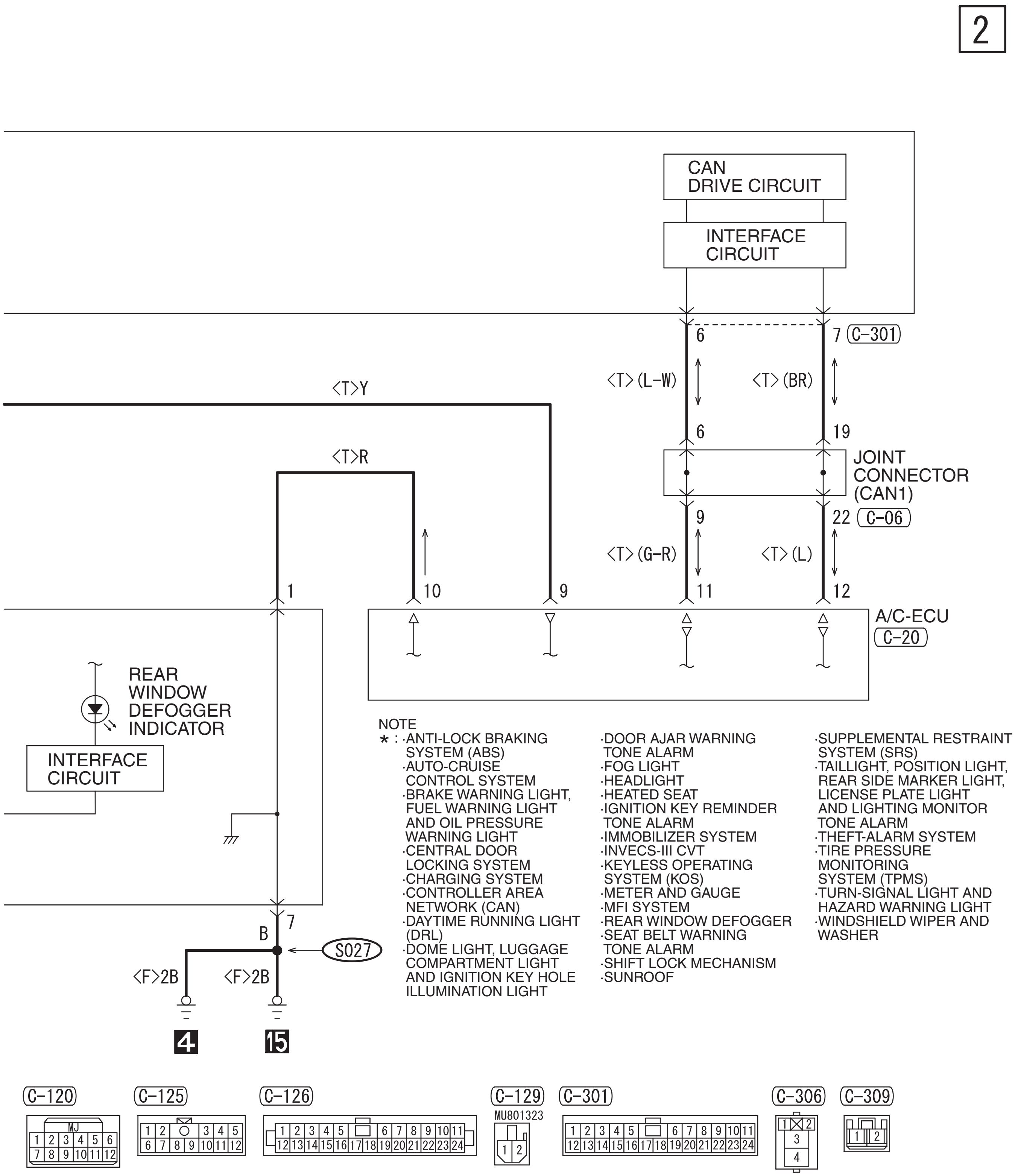


NOTES

HEATED DOOR MIRROR

M1901018300123





NOTE
* : ·ANTI-LOCK BRAKING SYSTEM (ABS)
·AUTO-CRUISE CONTROL SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CHARGING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·DOOR AJAR WARNING TONE ALARM
·FOG LIGHT
·HEADLIGHT
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·METER AND GAUGE
·MFI SYSTEM
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

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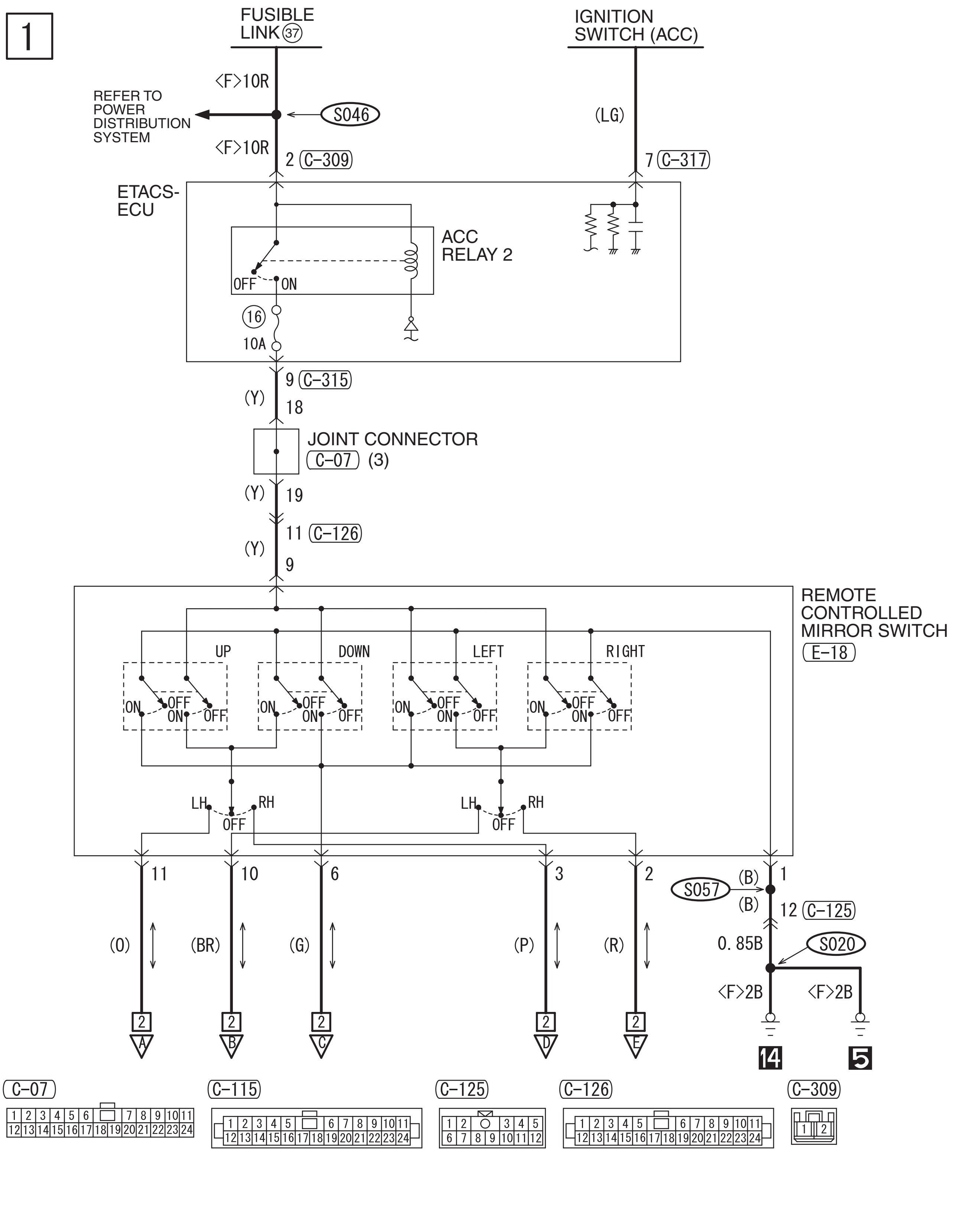
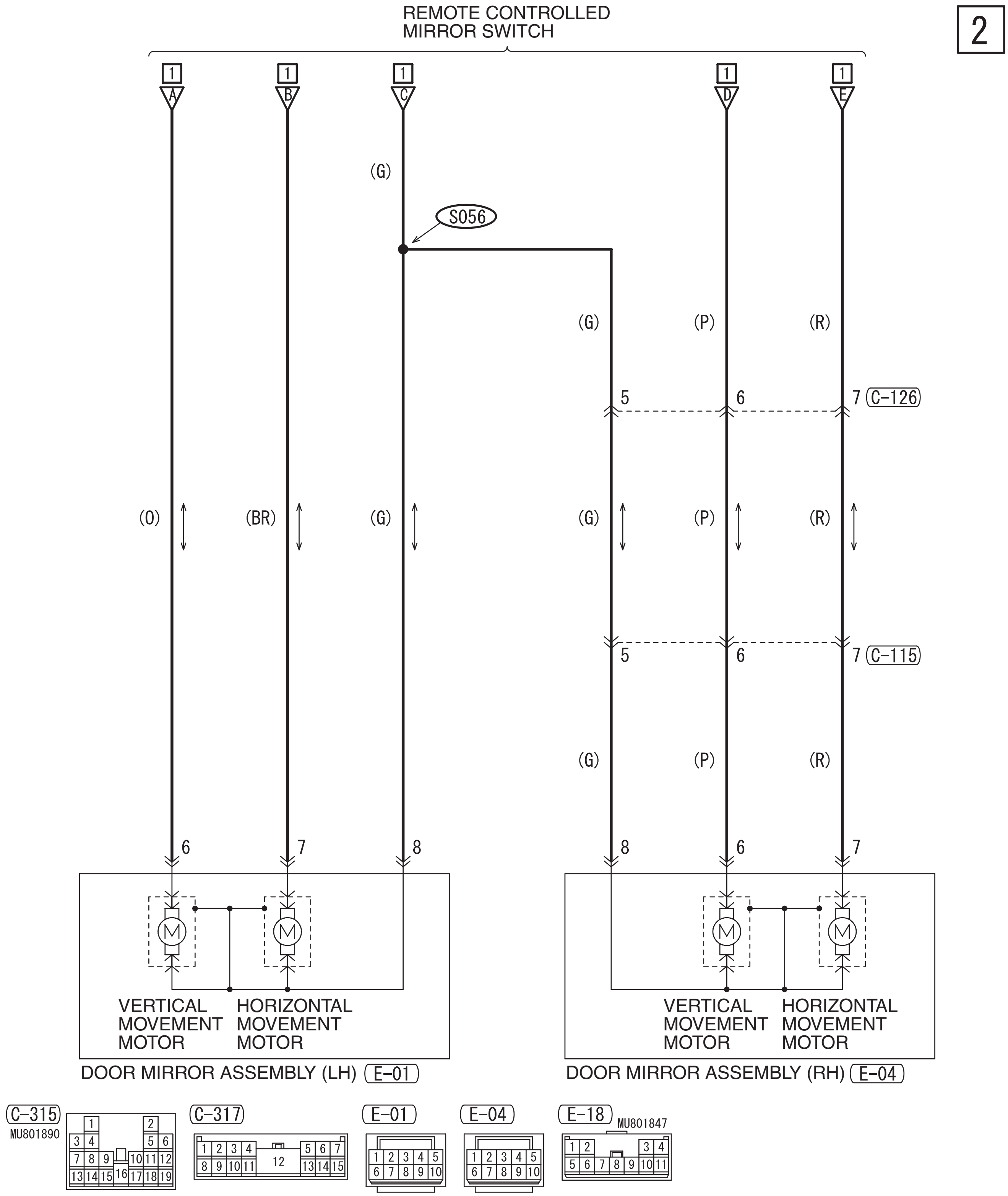
H8G13M02AB

REMOTE CONTROLLED DOOR MIRROR

M1901006502137





WIRE COLOR CODE
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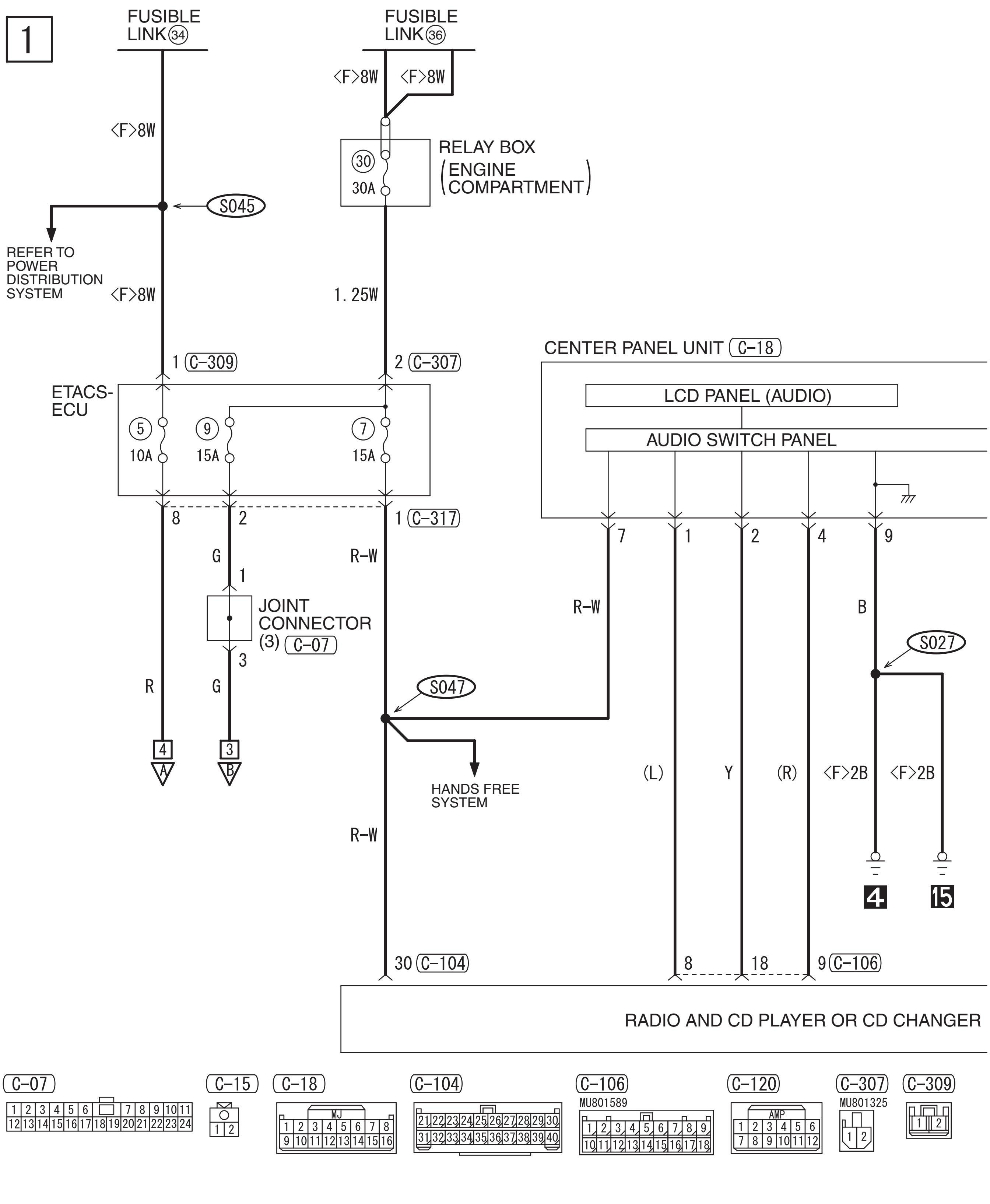
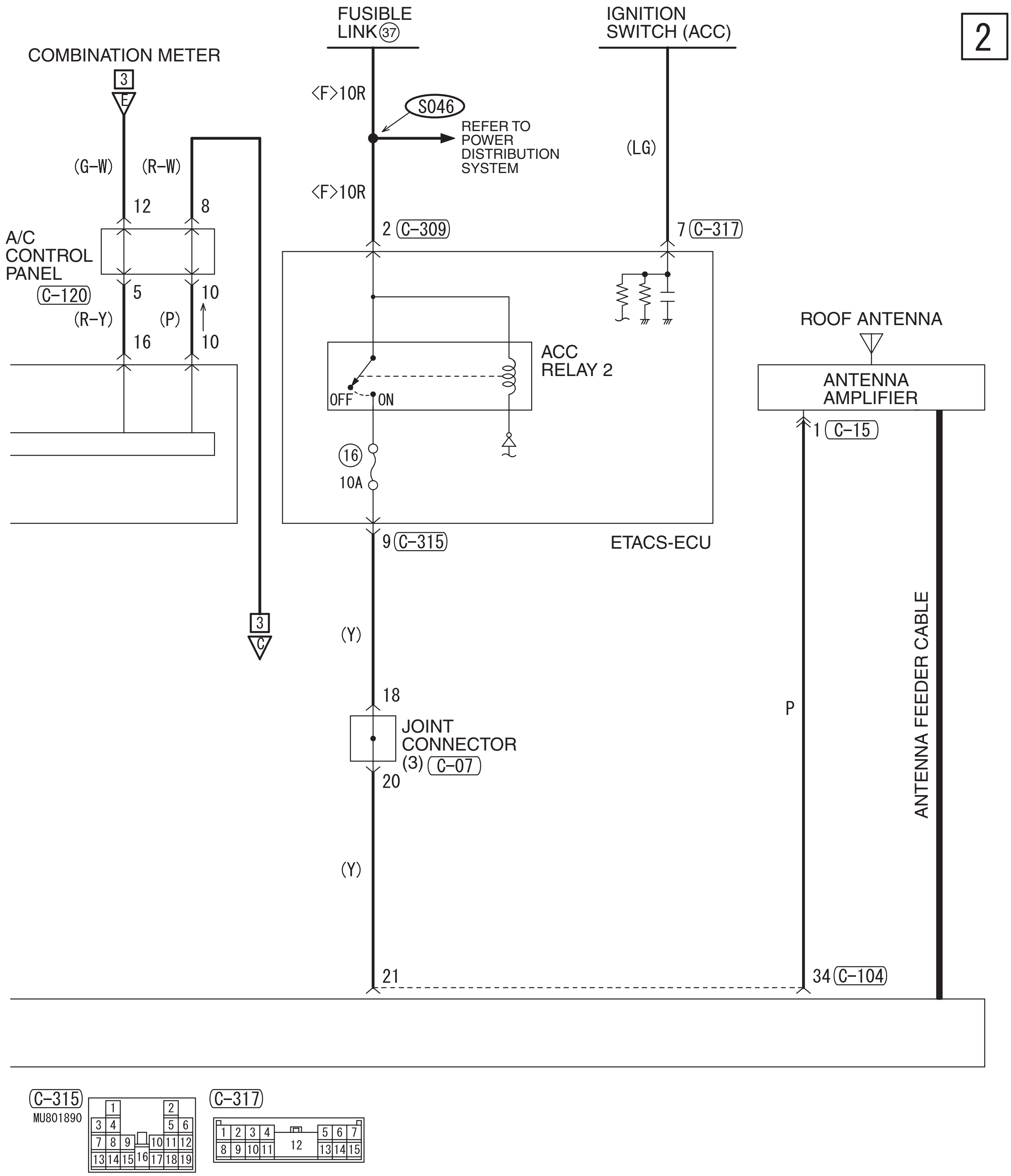
H8G13M03AB

AUDIO SYSTEM <VEHICLES WITHOUT AUDIO AMPLIFIER>

M1901015602949





WIRE COLOR CODE
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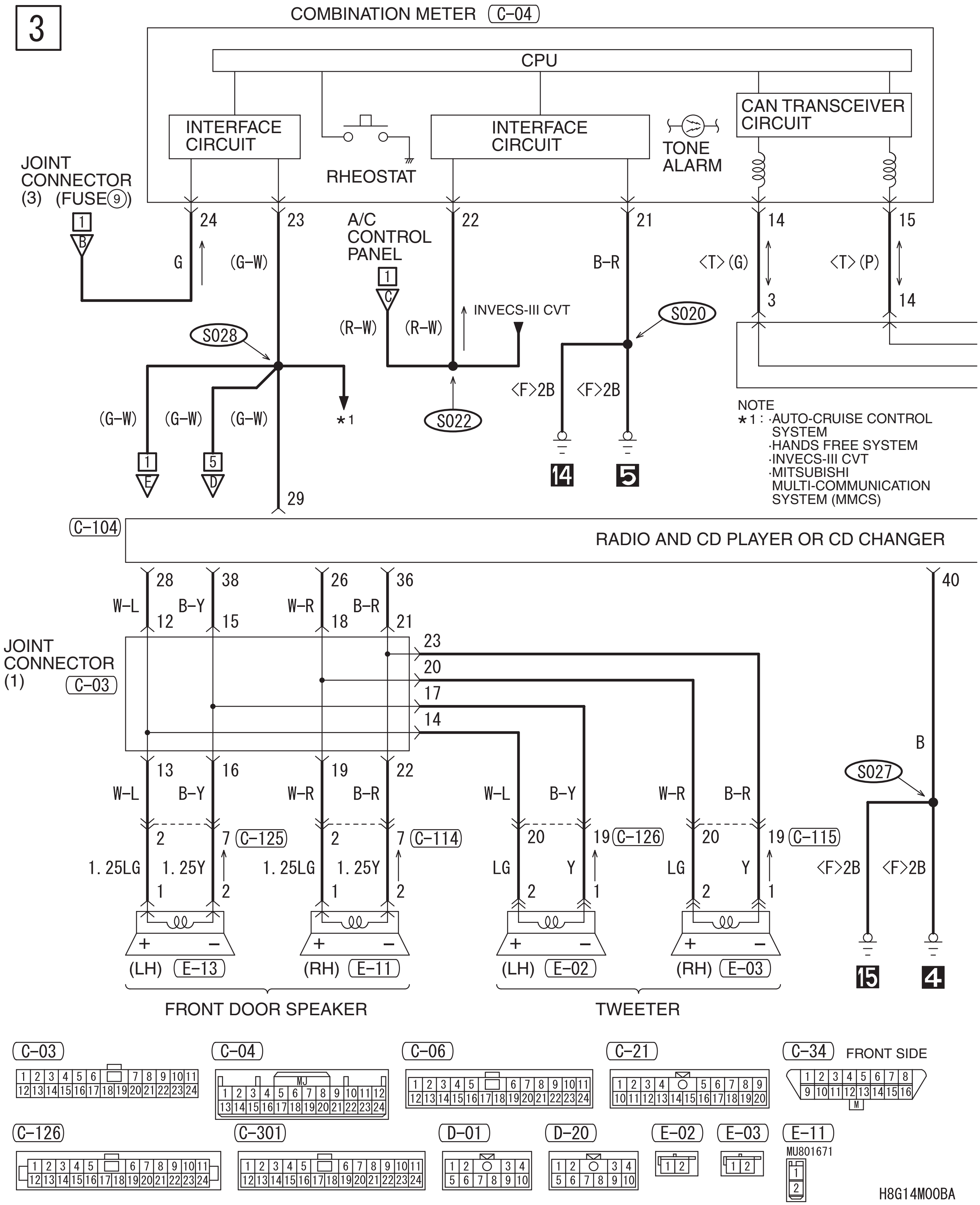
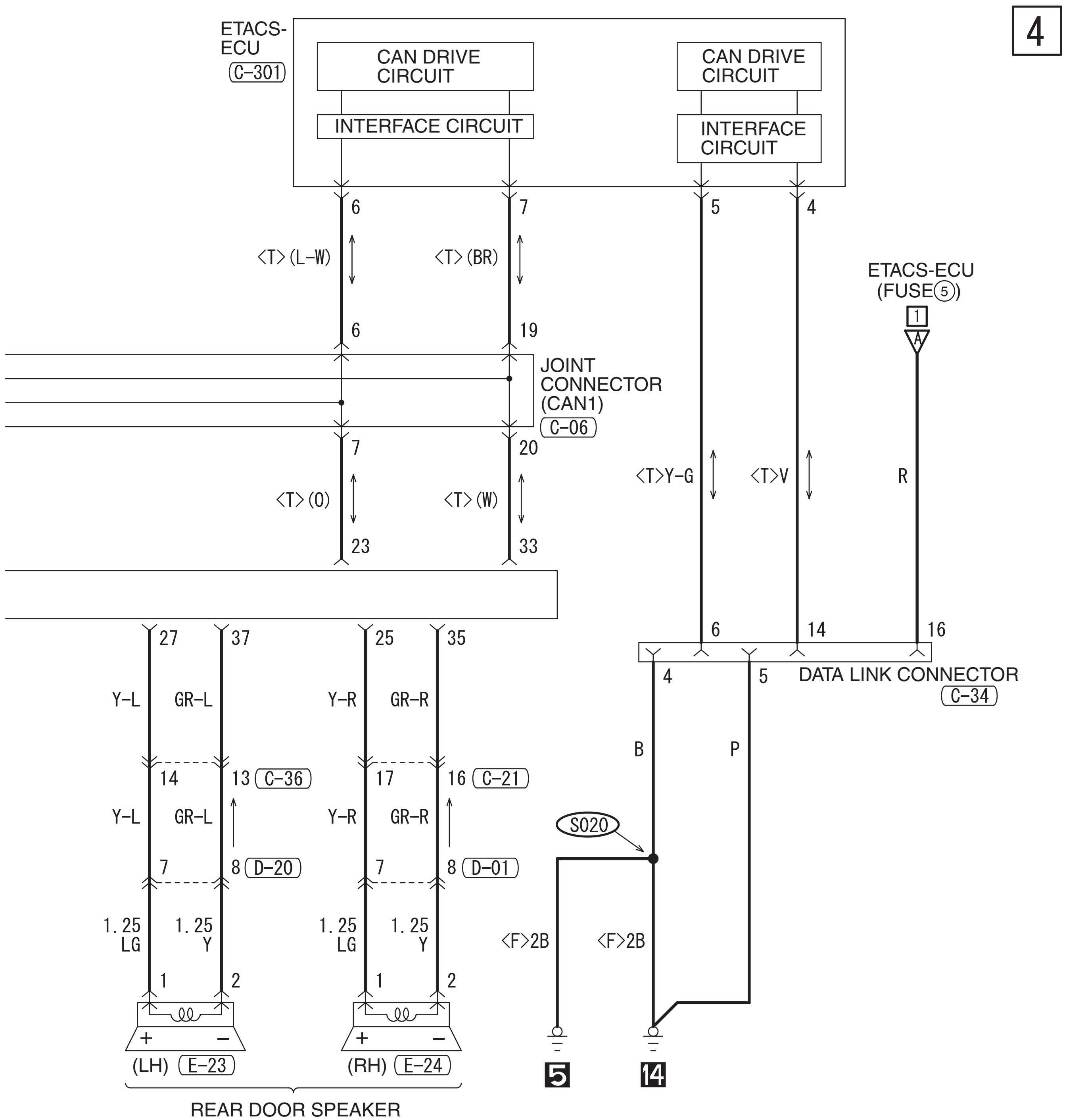
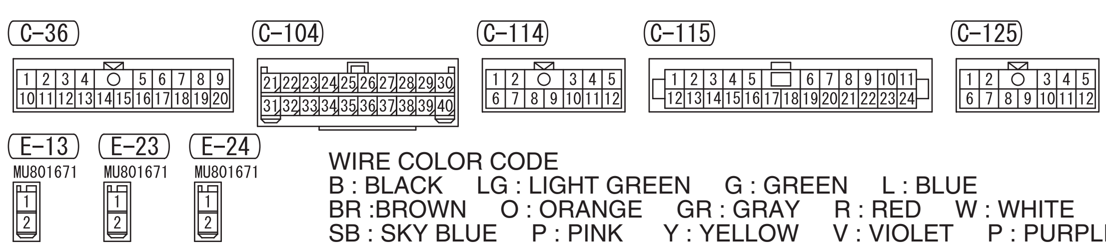
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G14M00AB

AUDIO SYSTEM <VEHICLES WITHOUT AUDIO AMPLIFIER> (CONTINUED)







WIRE COLOR CODE
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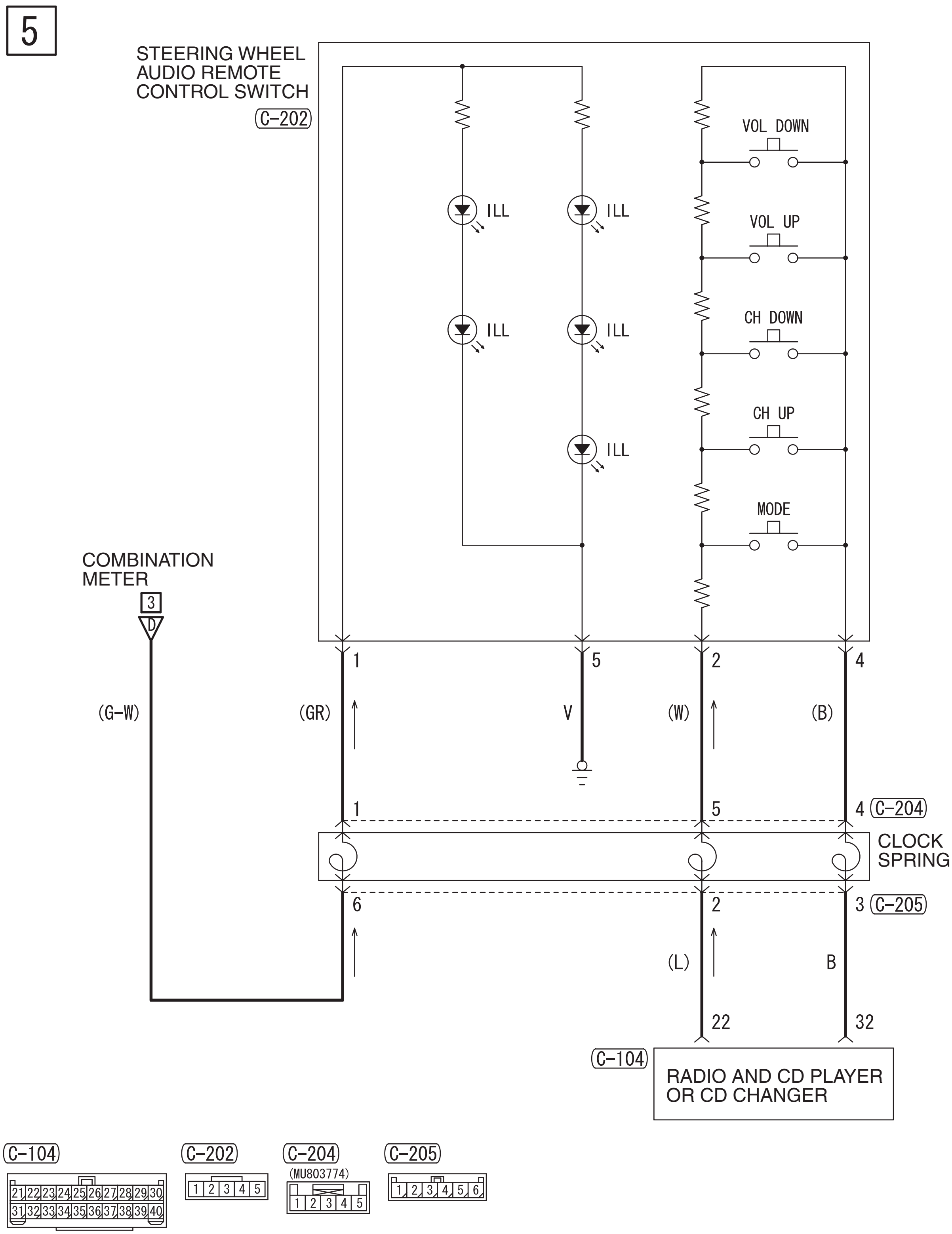
BR :BROWN O : ORANGE GR : GRAY R : RED W : WHITE
SB : SKY BLUE P : PINK Y : YELLOW V : VIOLET P : PURPLE

H8G14M00BB

TSB Revision

AUDIO SYSTEM <VEHICLES WITHOUT AUDIO AMPLIFIER> (CONTINUED)



WIRE COLOR CODE
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BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G14M00CA

NOTES

AUDIO SYSTEM <VEHICLES WITH AUDIO AMPLIFIER>

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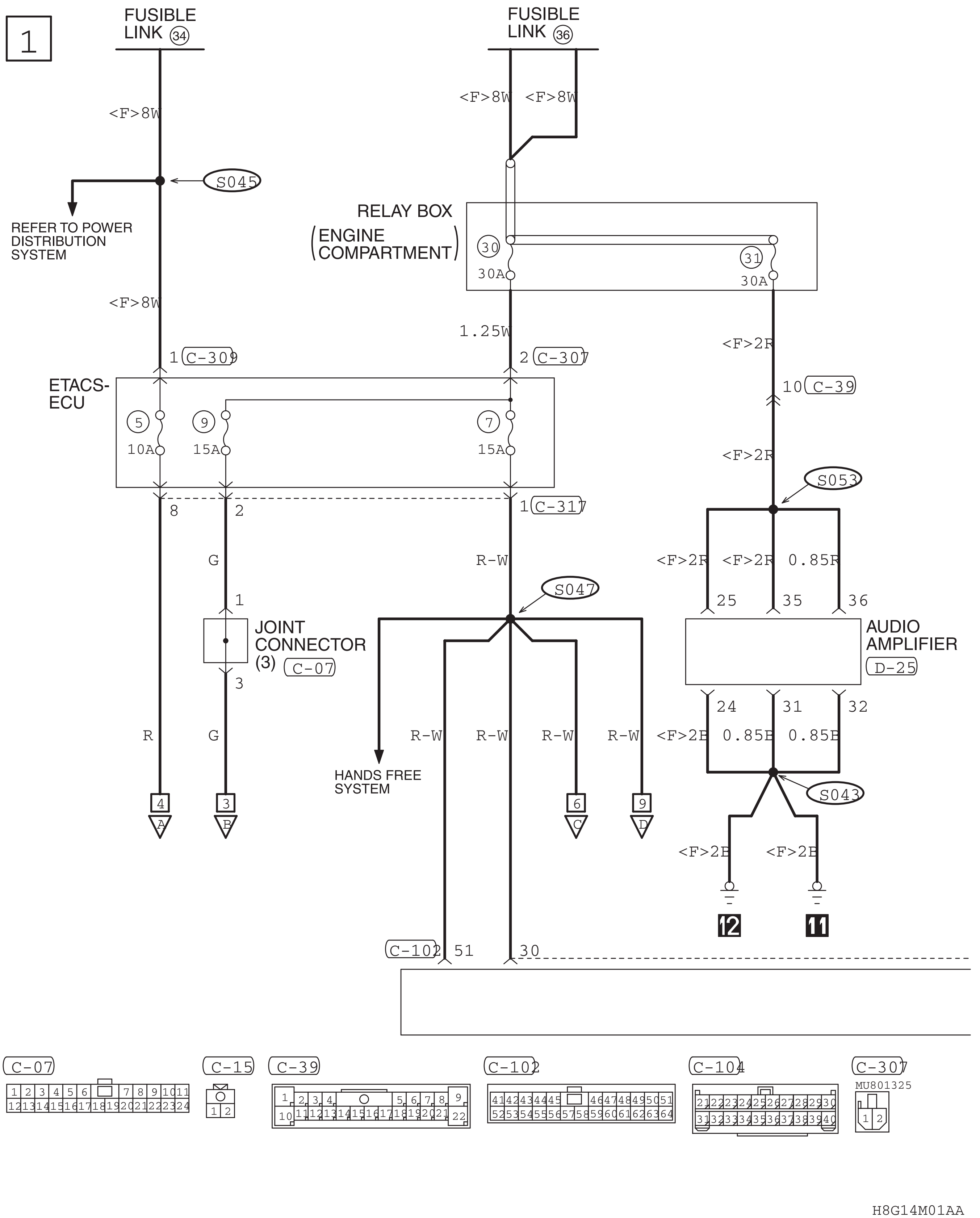

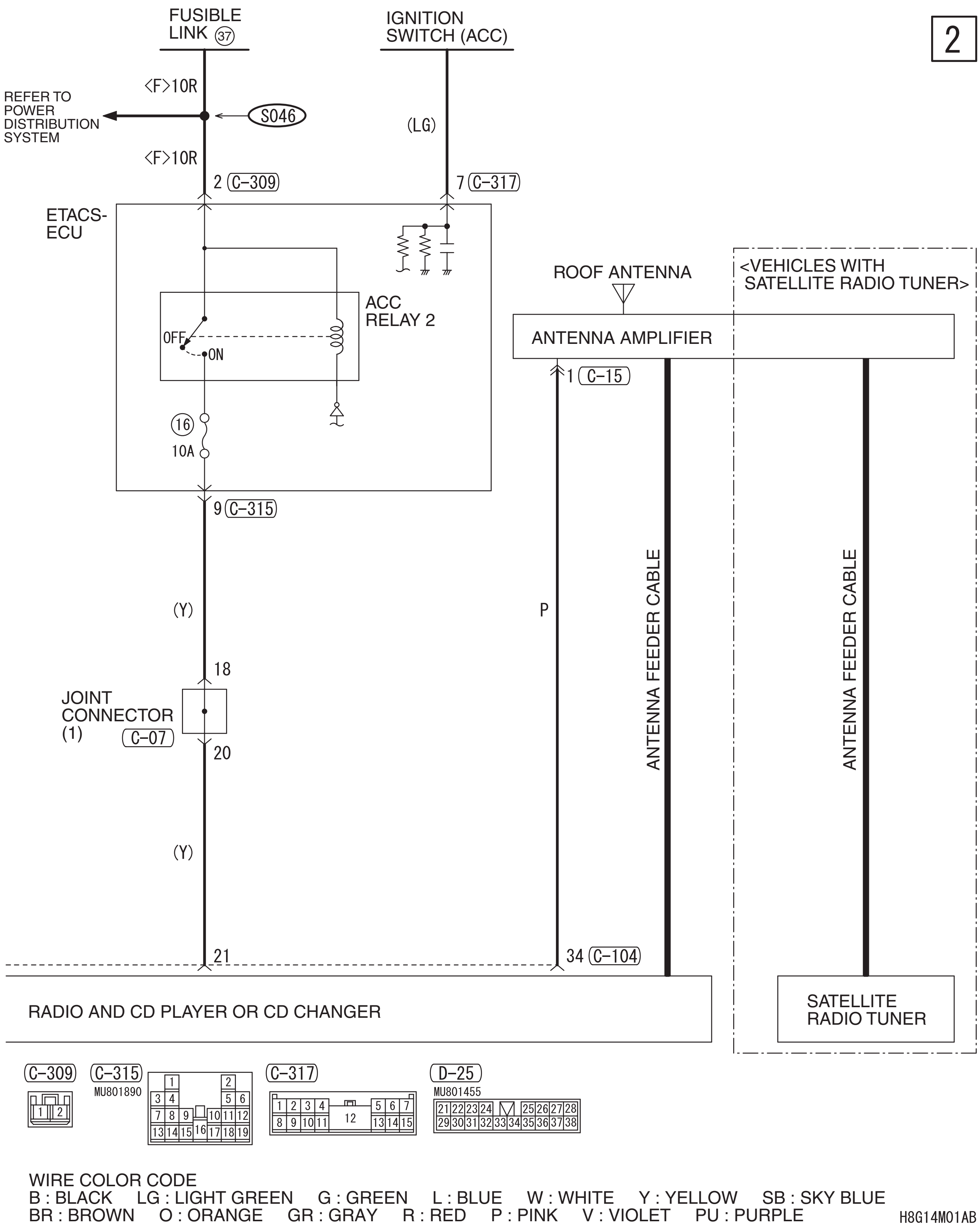

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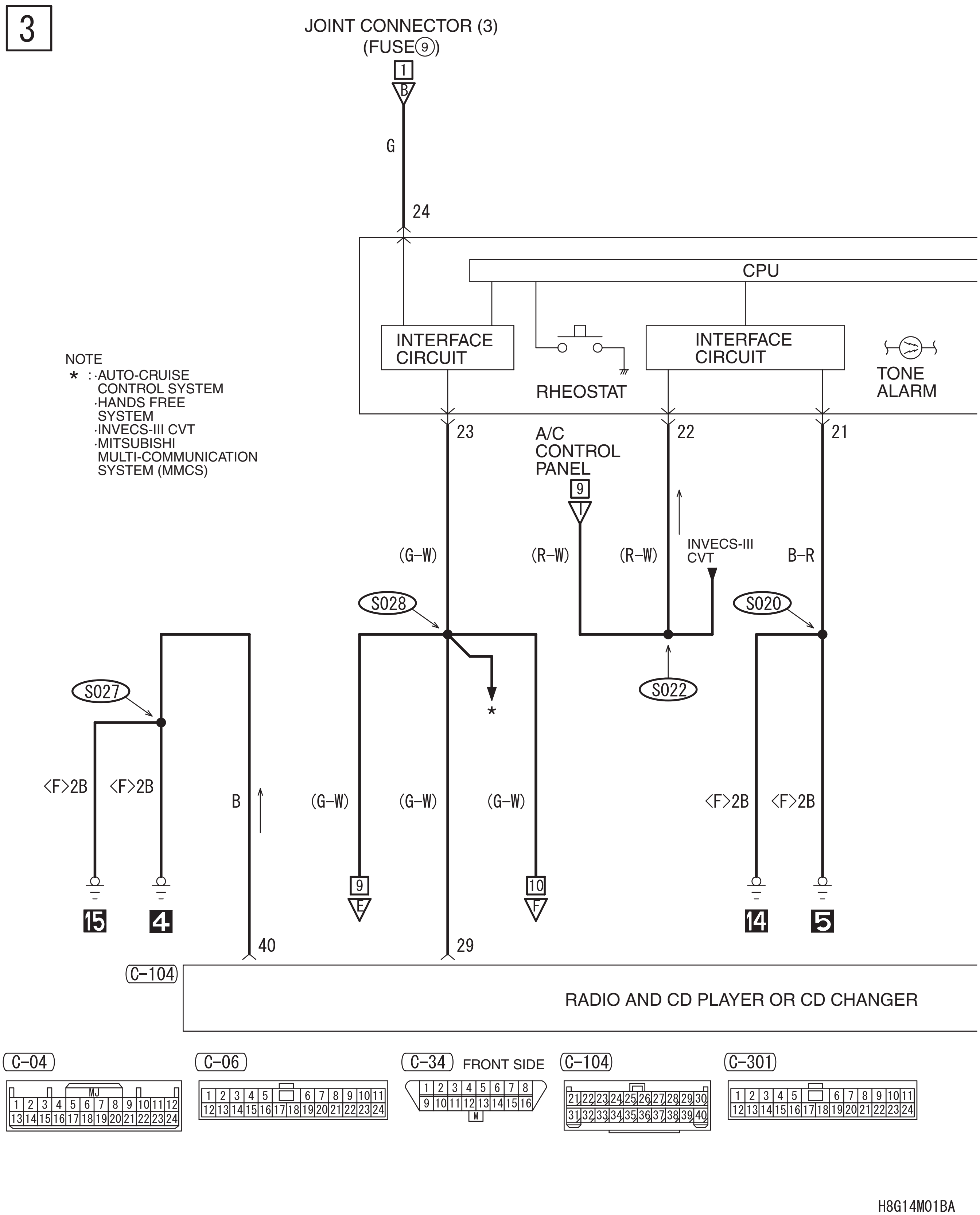
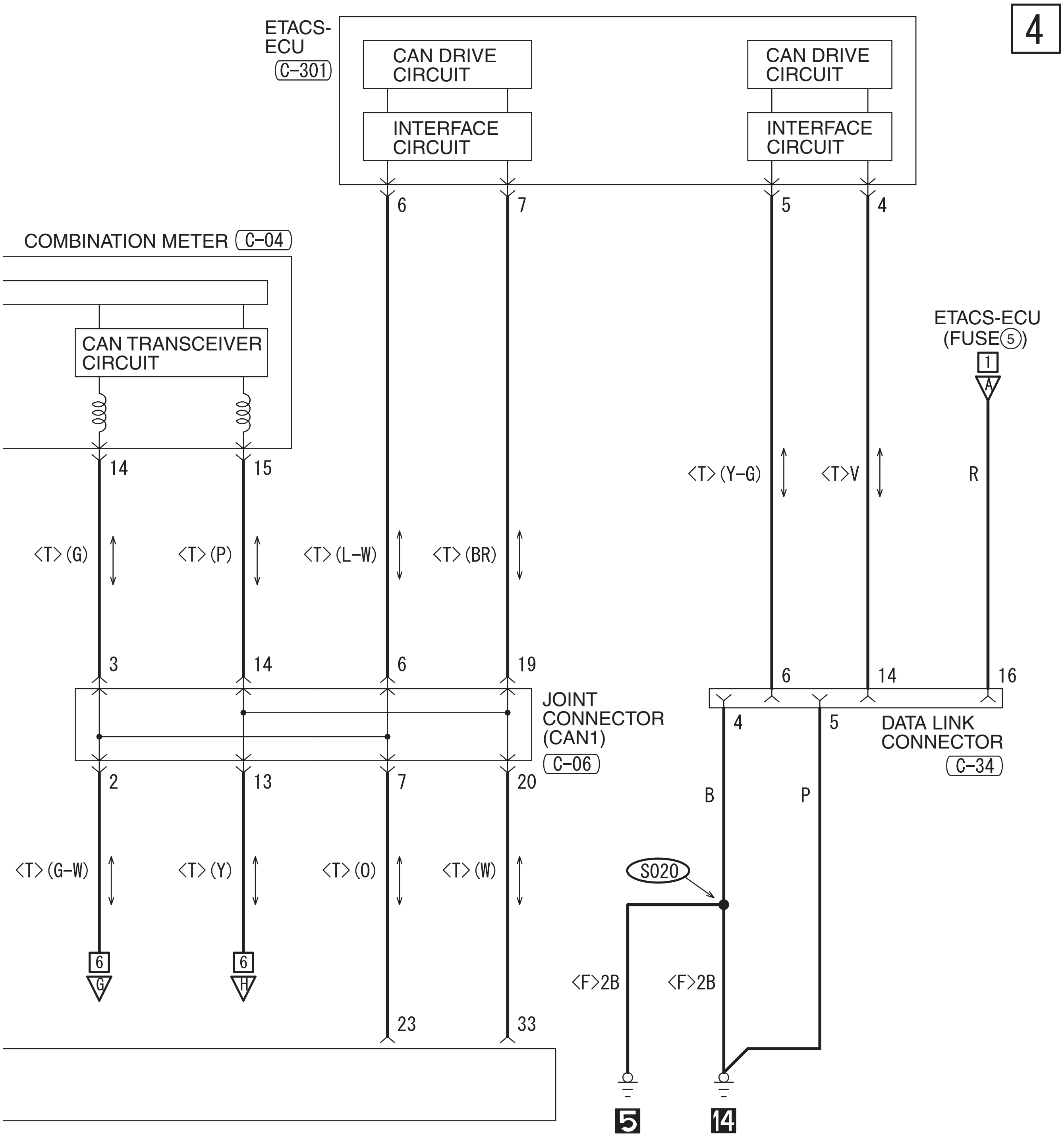
AUDIO SYSTEM <VEHICLES WITH AUDIO AMPLIFIER> (CONTINUED)





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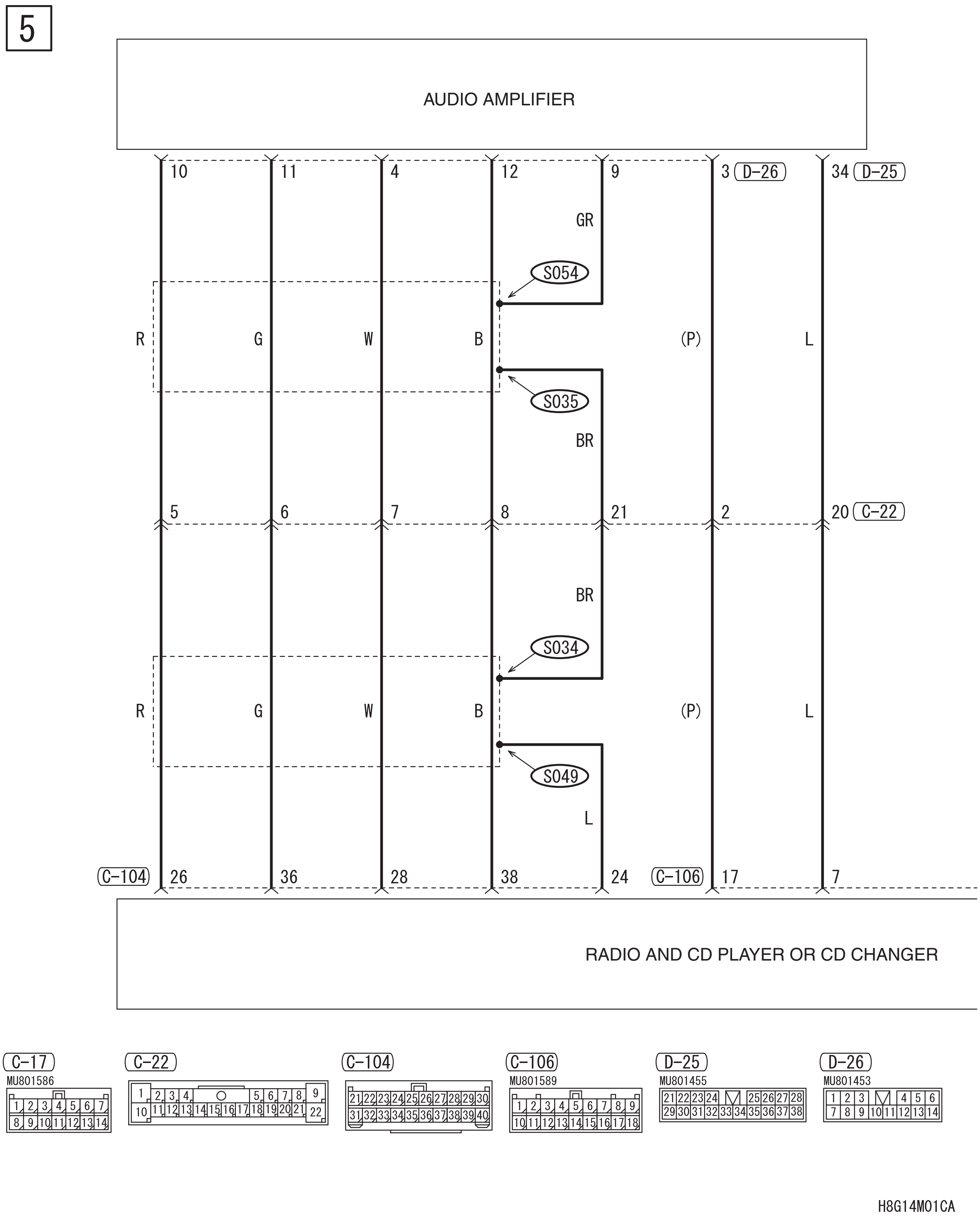
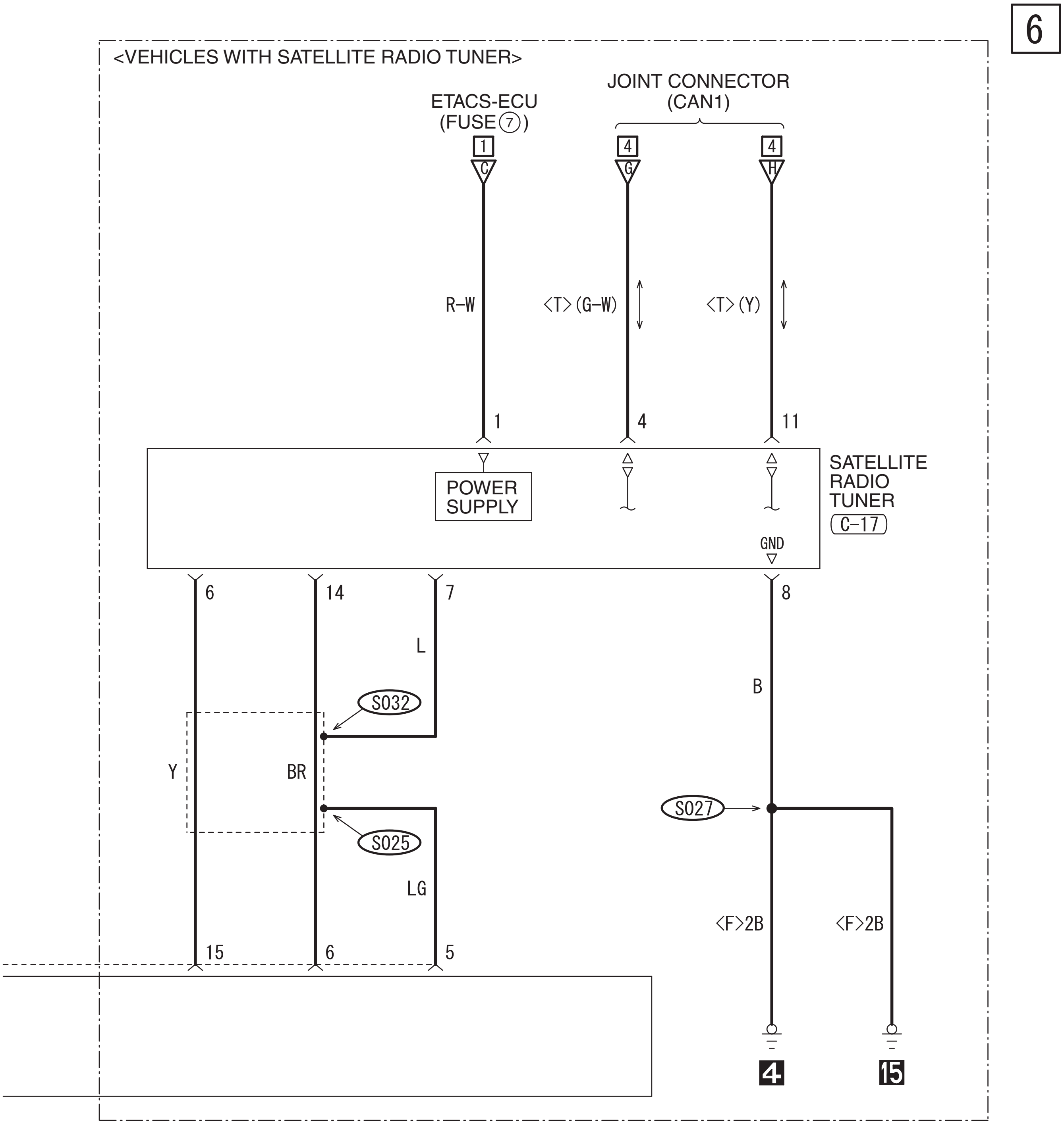
H8G14M01BB

AUDIO SYSTEM <VEHICLES WITH AUDIO AMPLIFIER> (CONTINUED)





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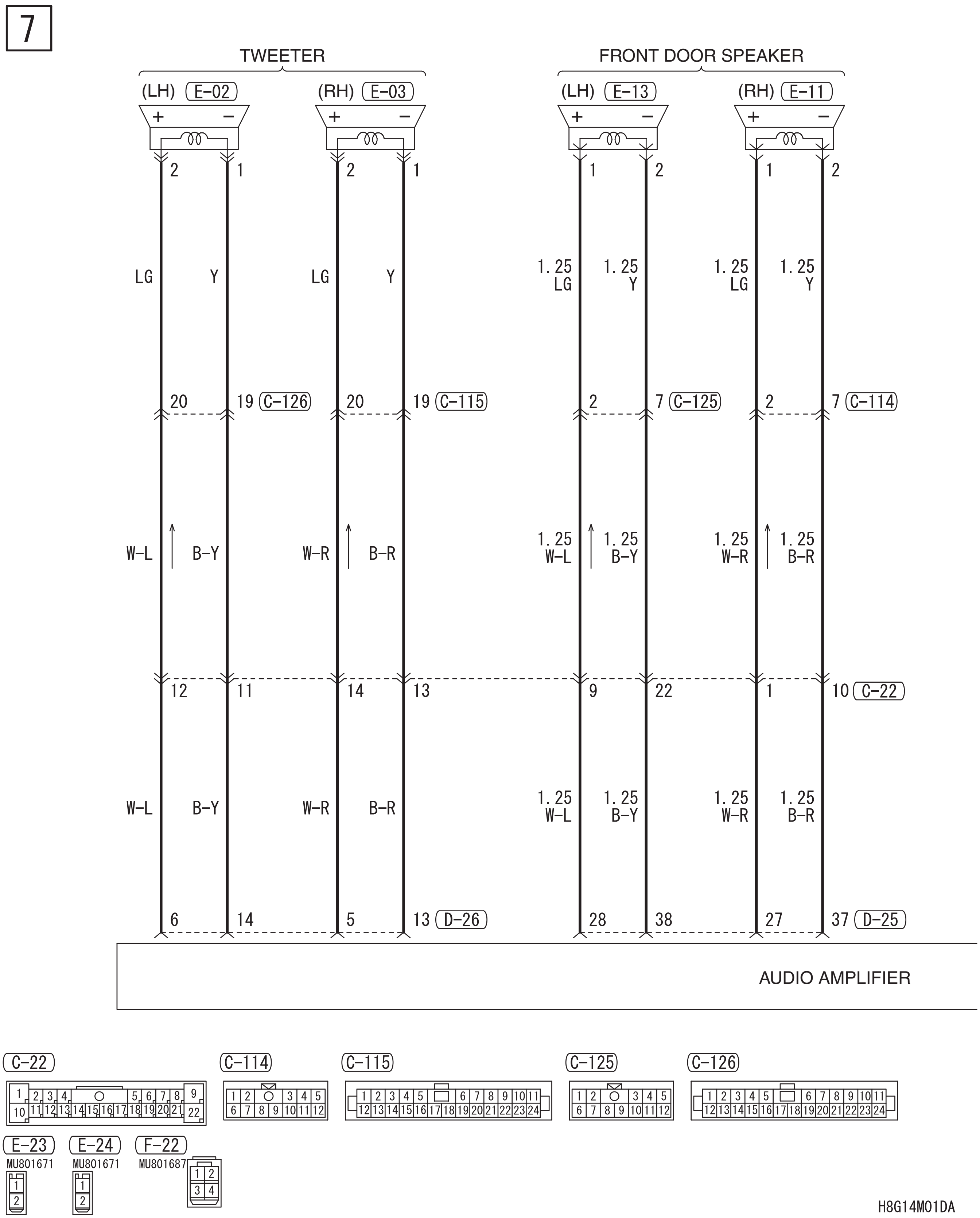
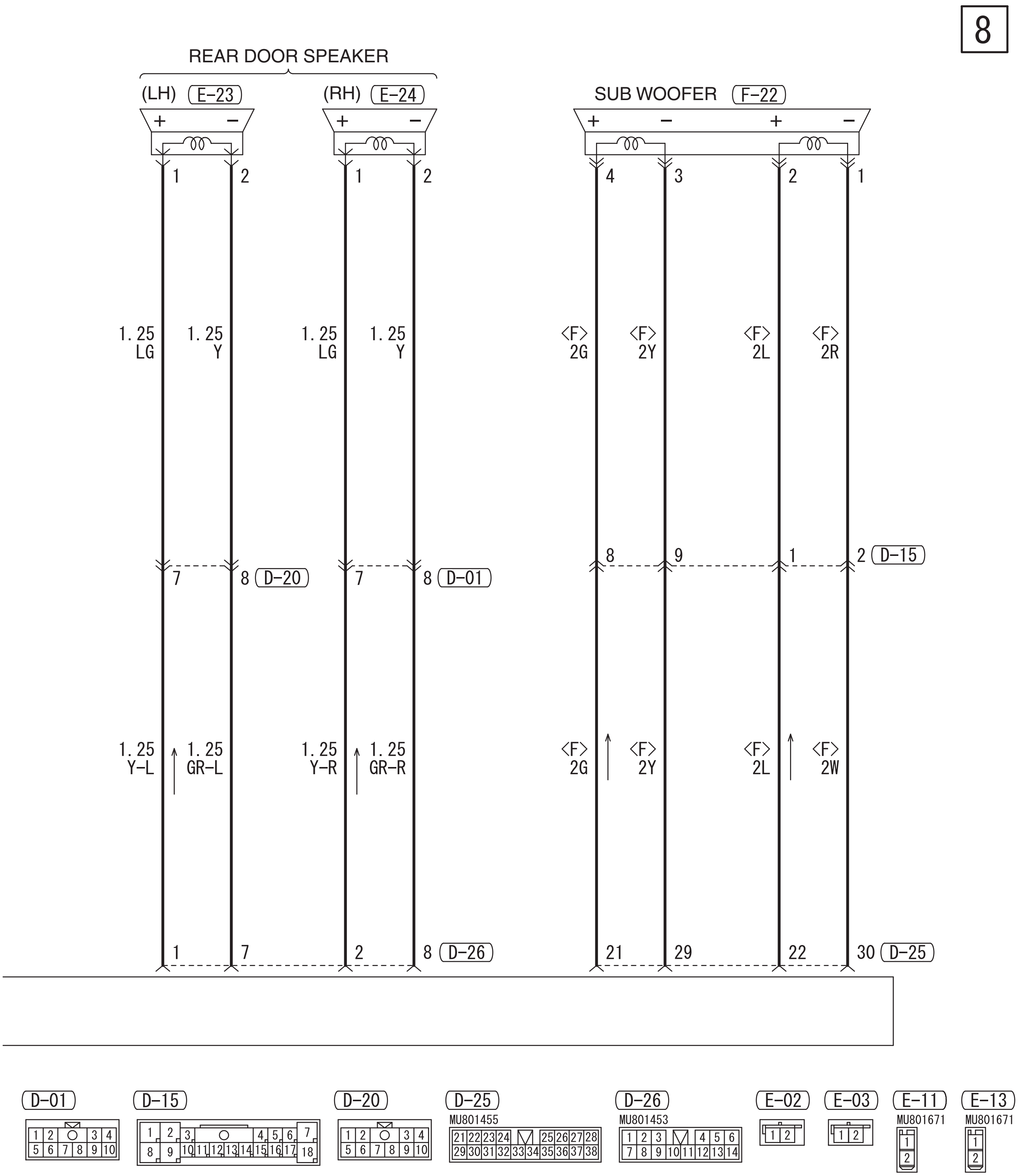
H8G14M01CB

AUDIO SYSTEM <VEHICLES WITH AUDIO AMPLIFIER> (CONTINUED)





WIRE COLOR CODE
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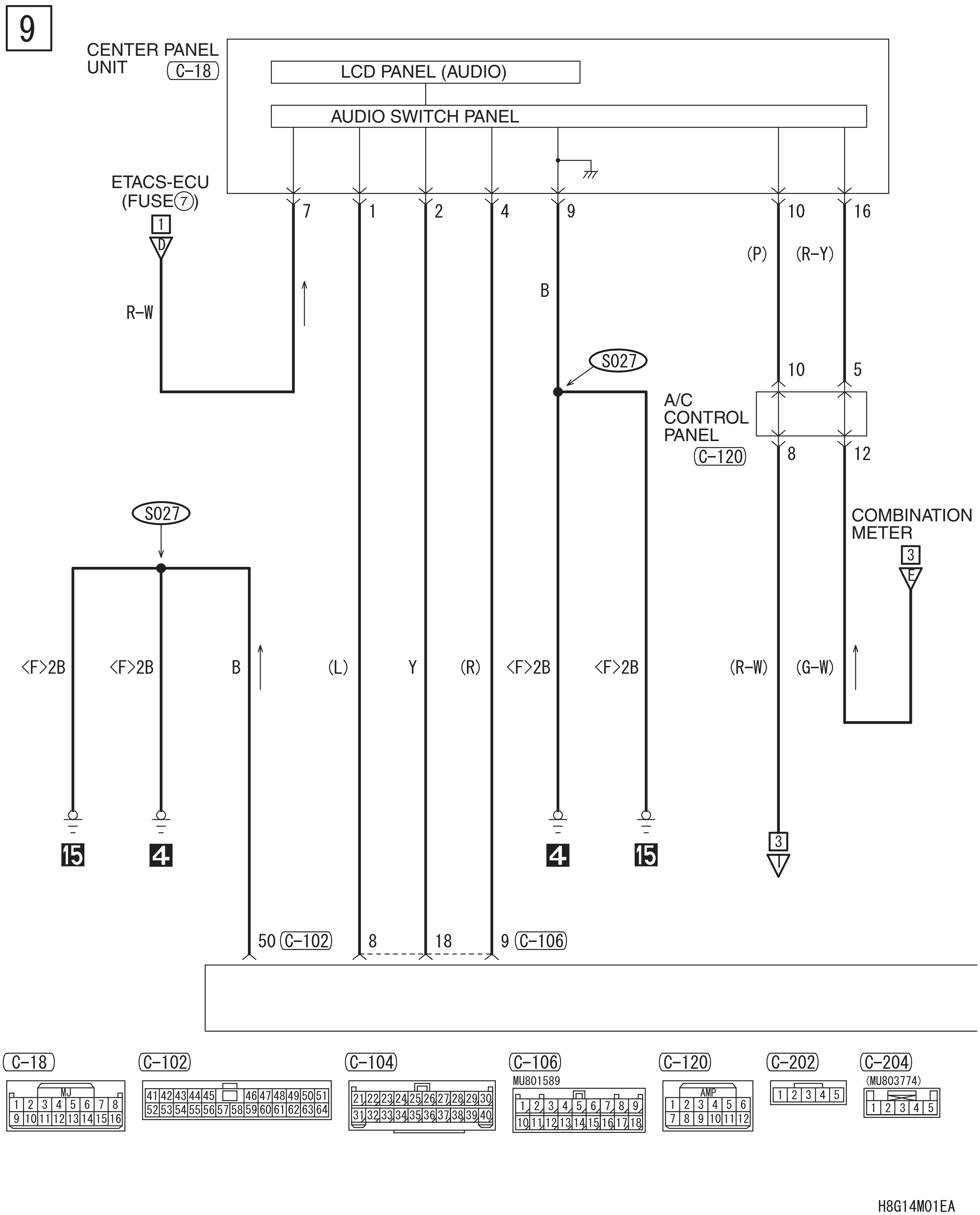
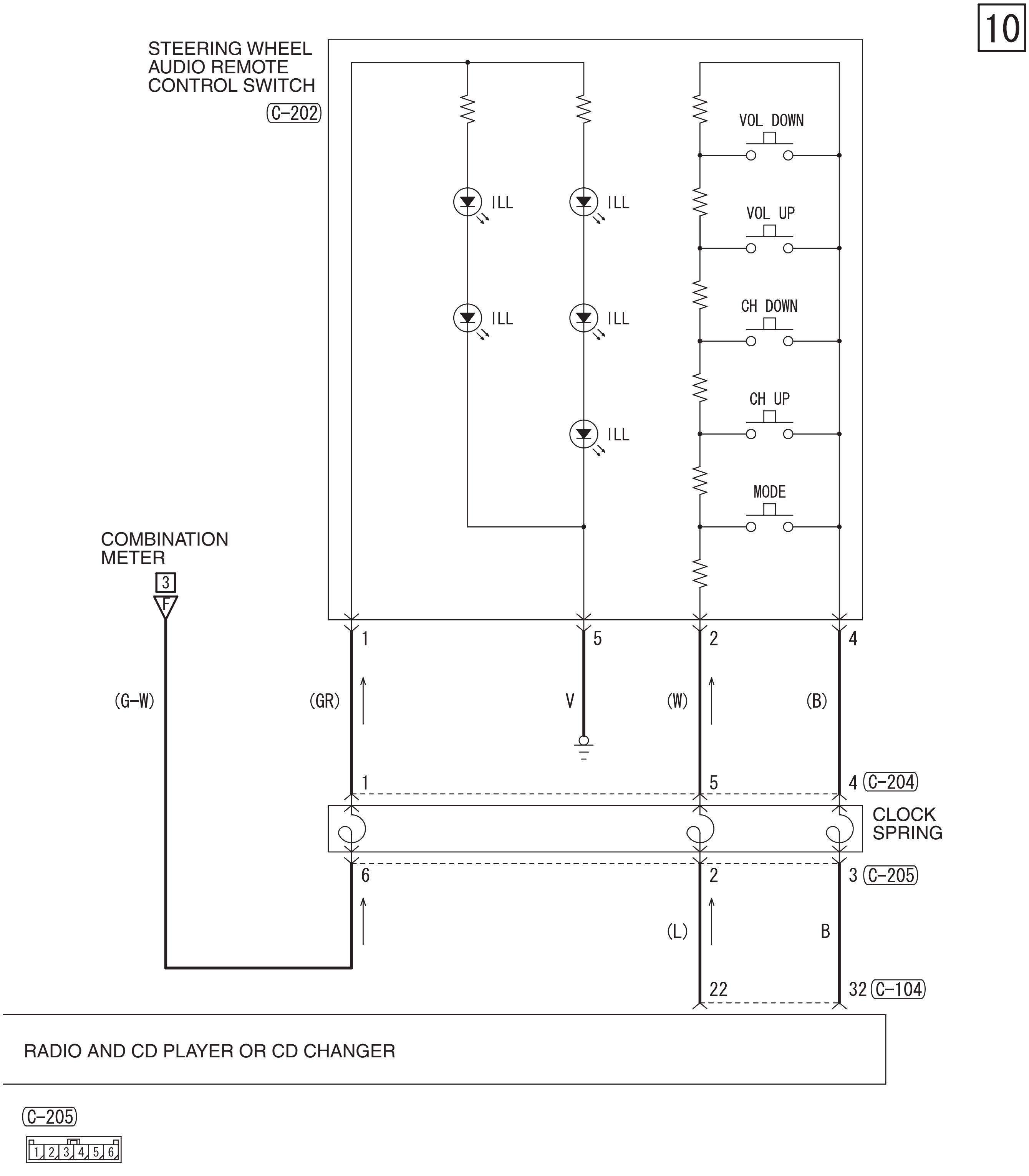
H8G14M01DB

AUDIO SYSTEM <VEHICLES WITH AUDIO AMPLIFIER> (CONTINUED)





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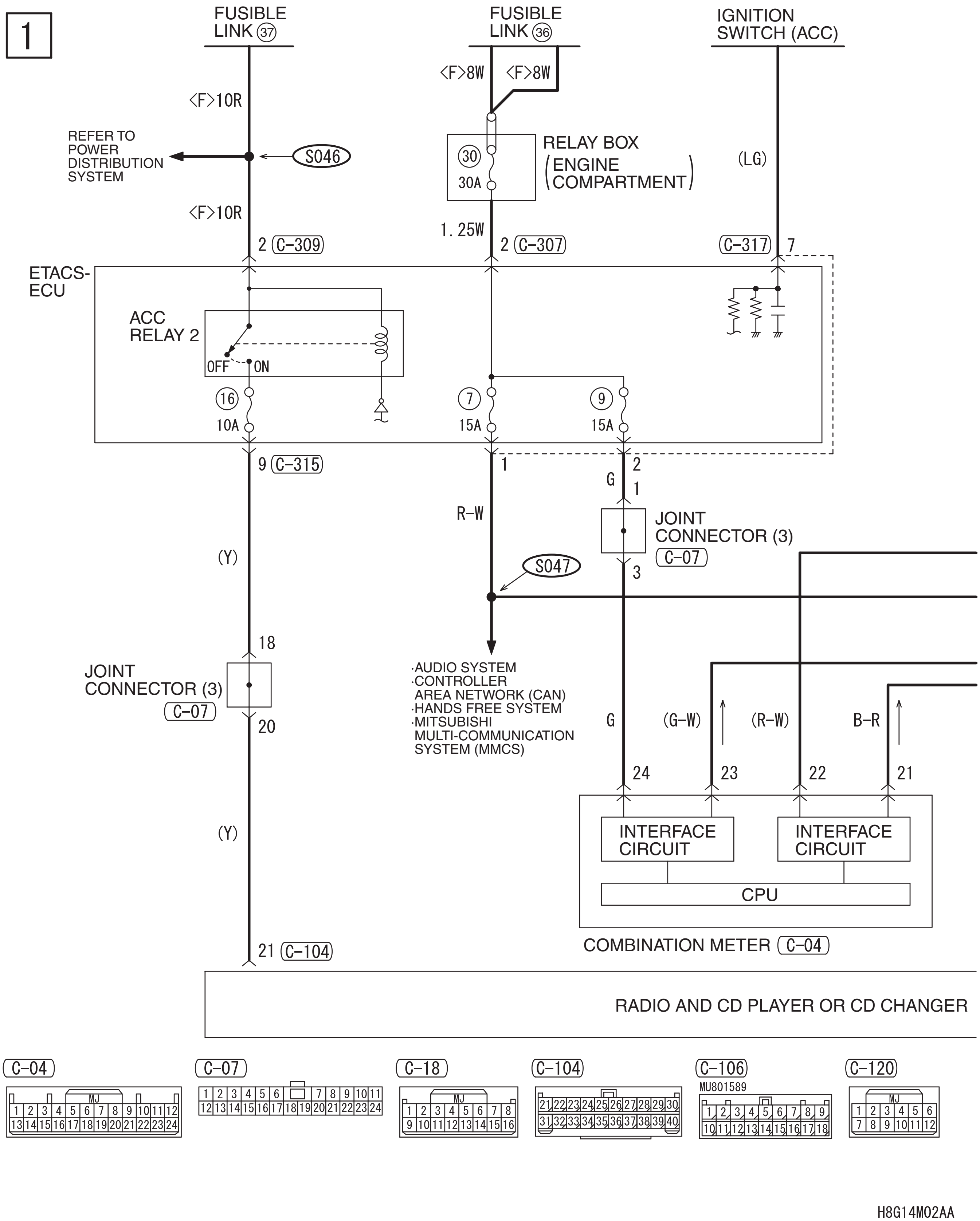
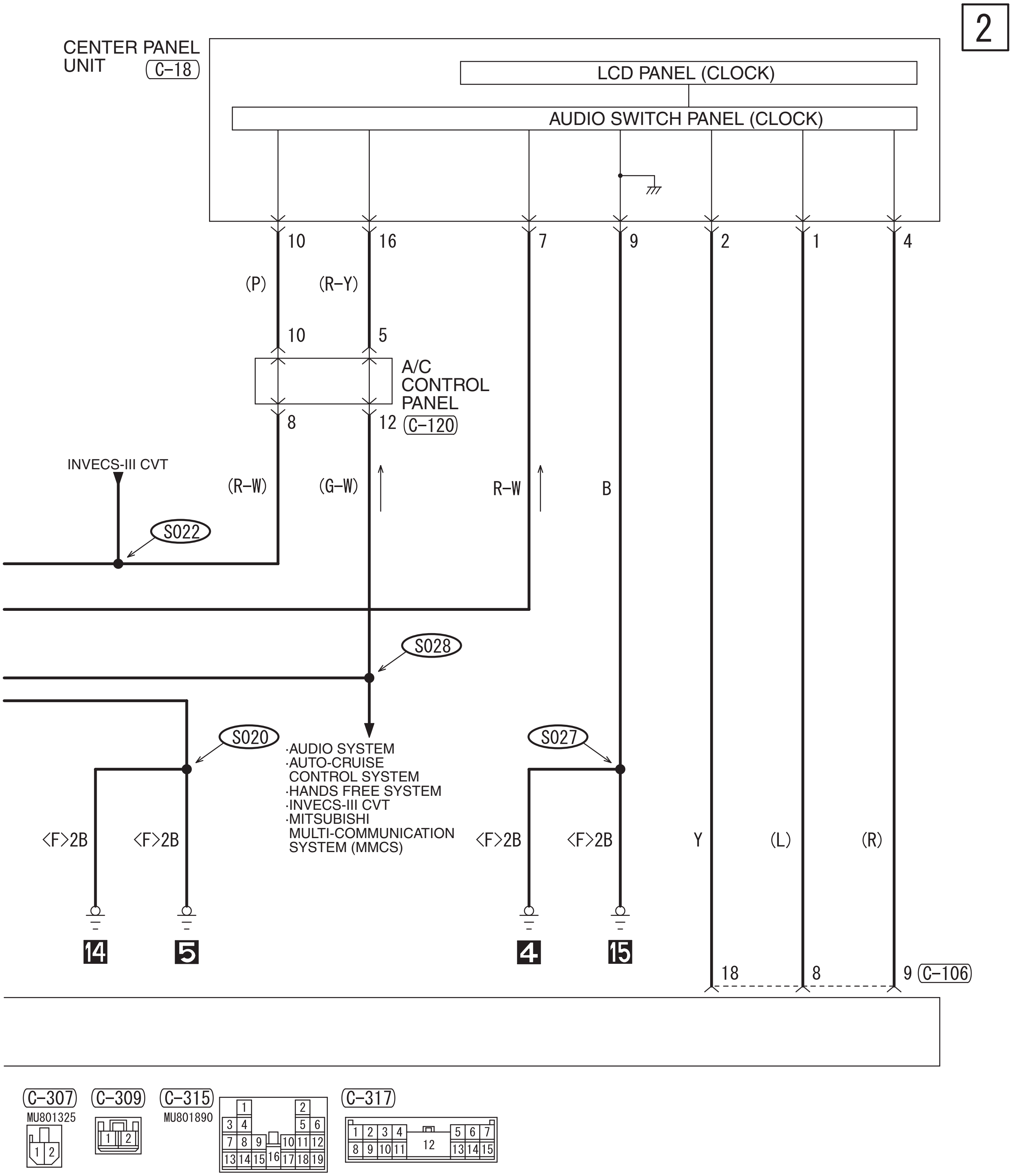
H8G14M01EB

CLOCK

M1901007701669





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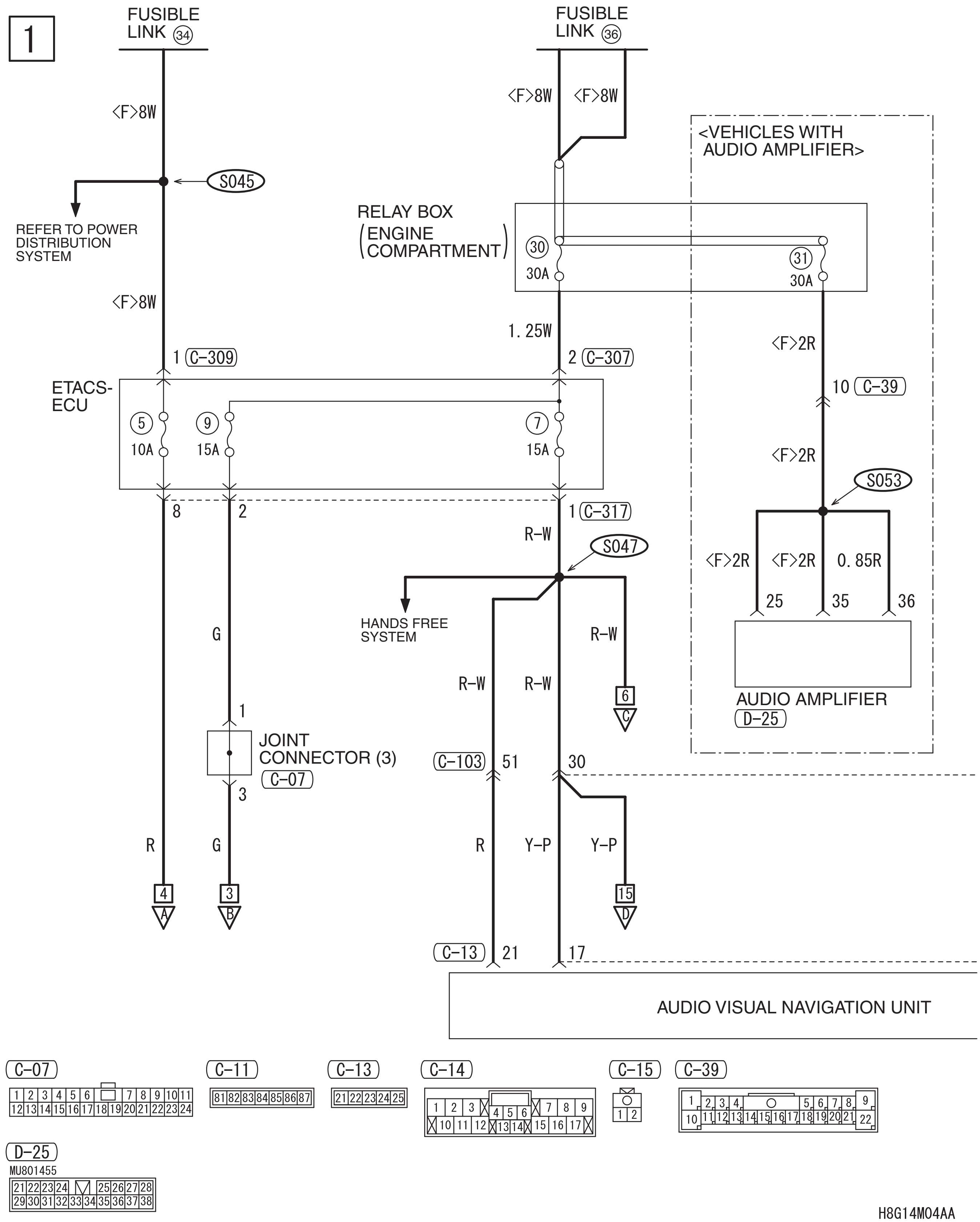
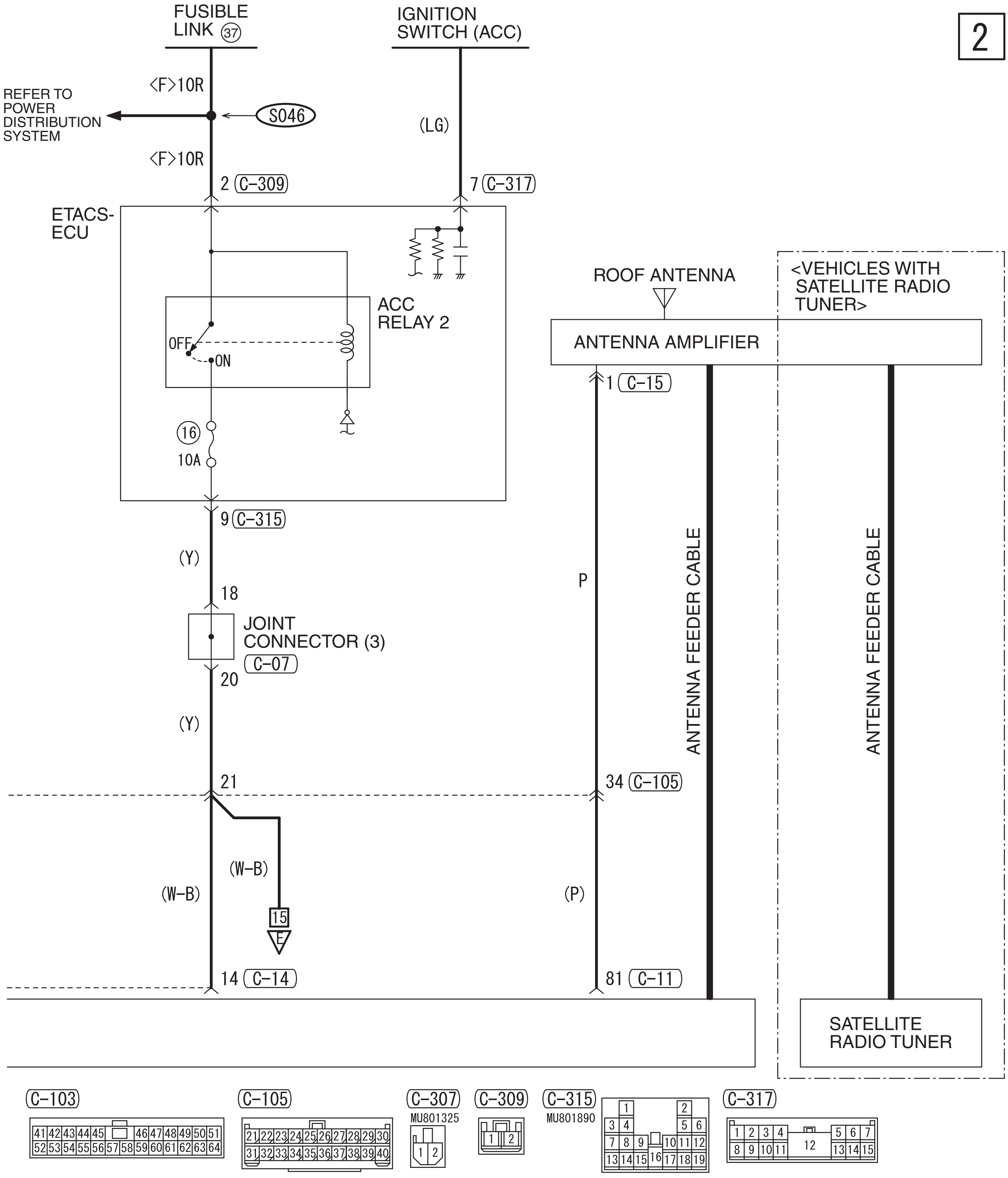
H8G14M02AB

MITSUBISHI MULTI COMMUNICATION SYSTEM (MMCS)

M1901007500123





WIRE COLOR CODE
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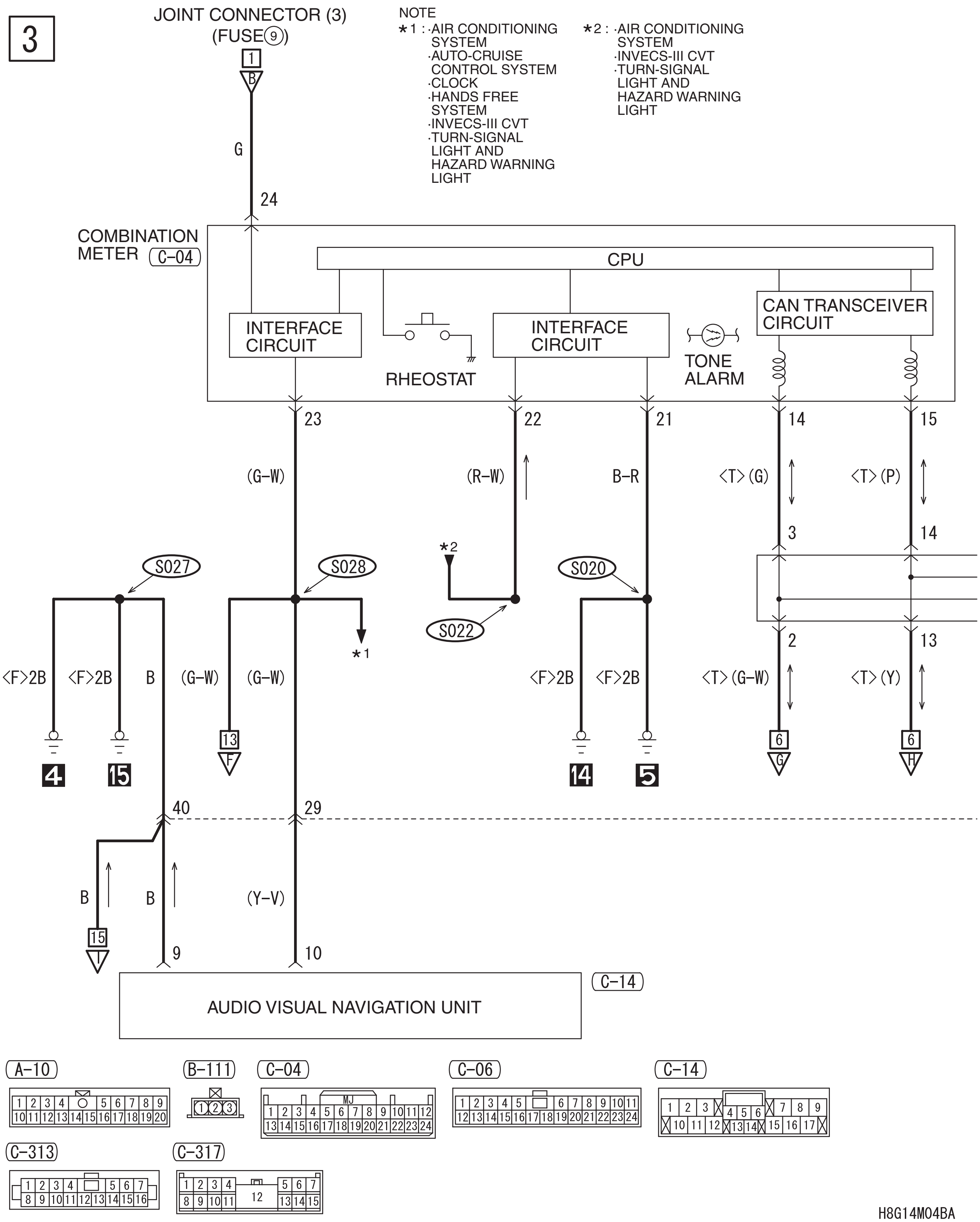
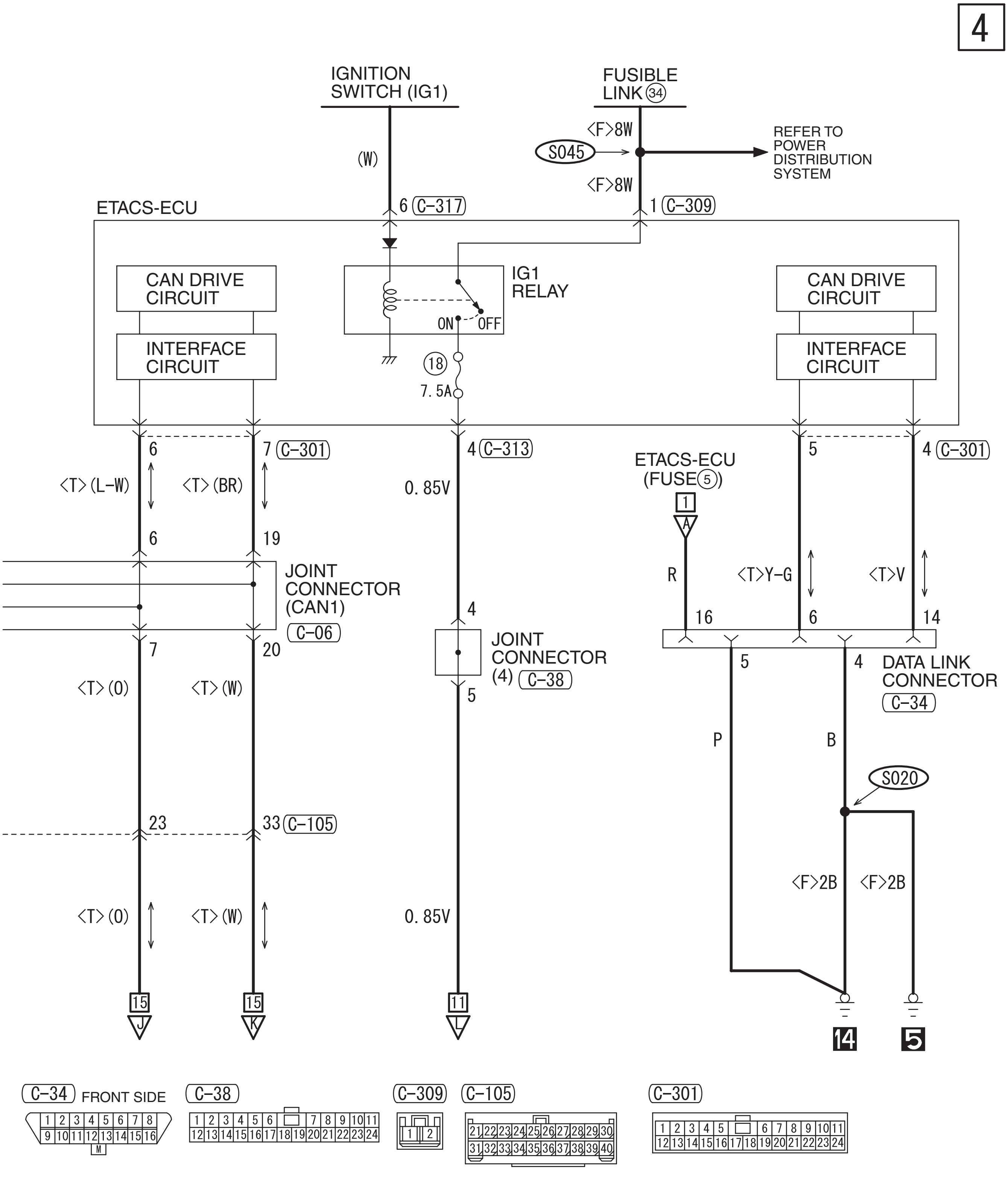
H8G14M04AB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)





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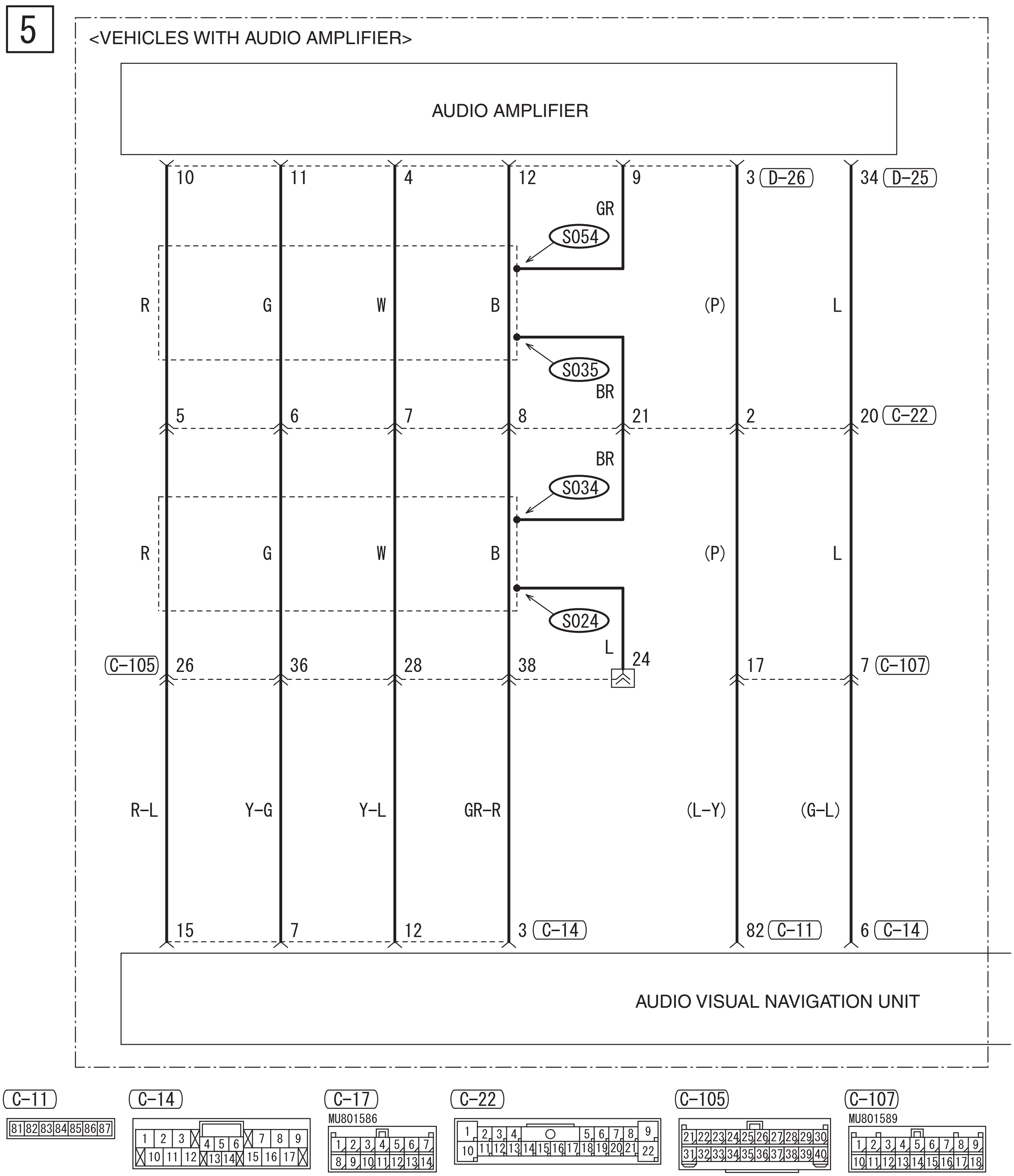
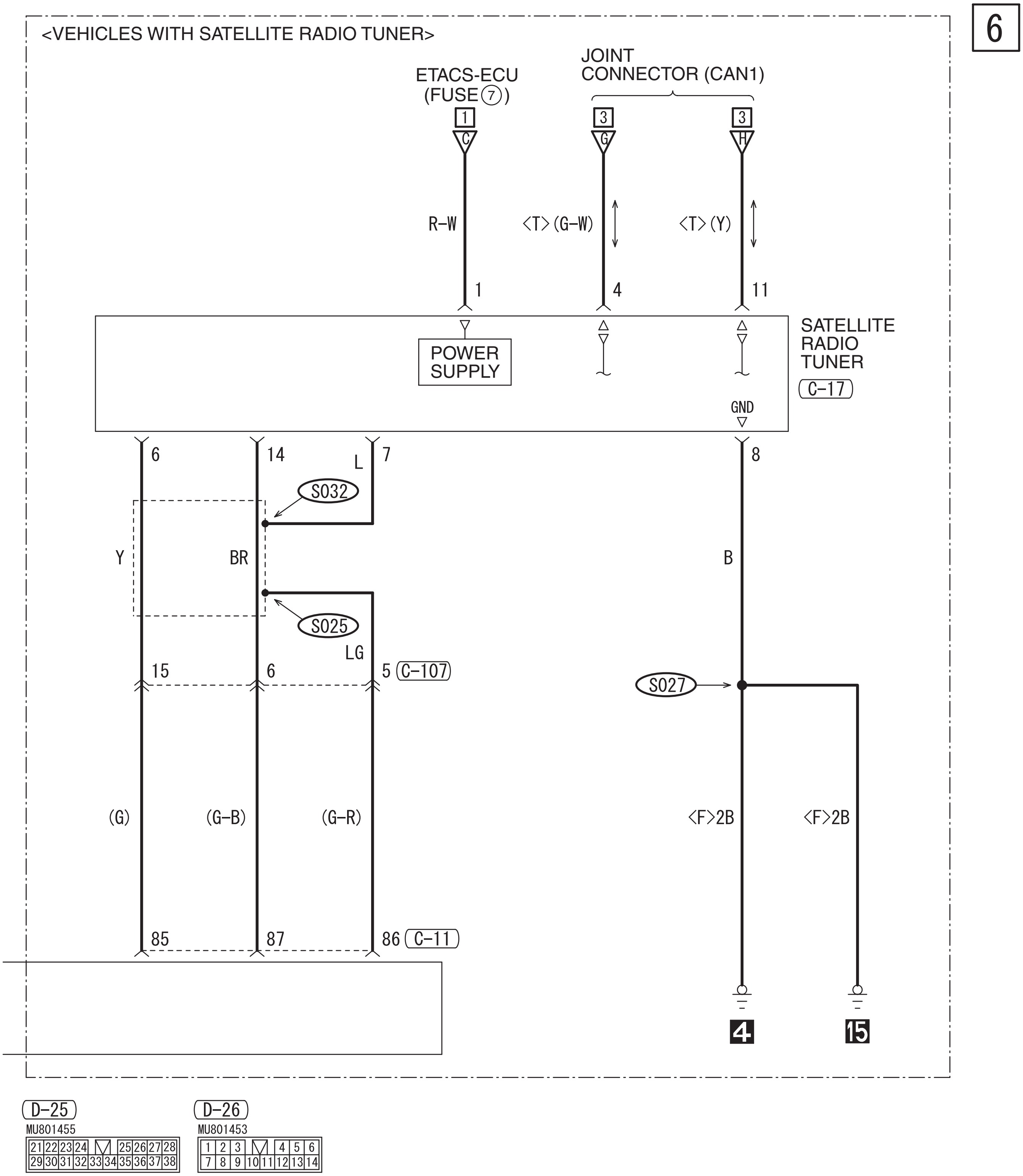
H8G14M04BB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)





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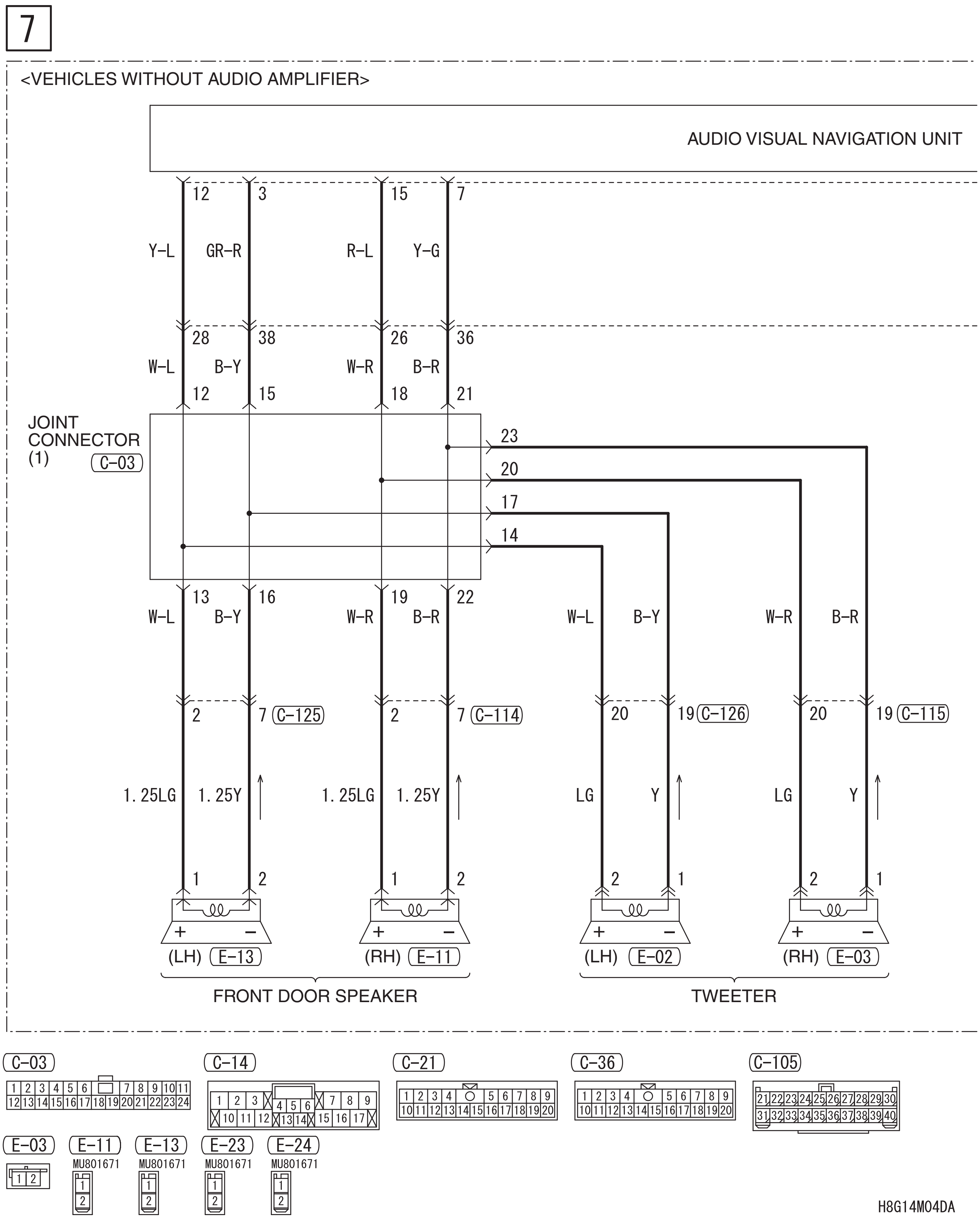
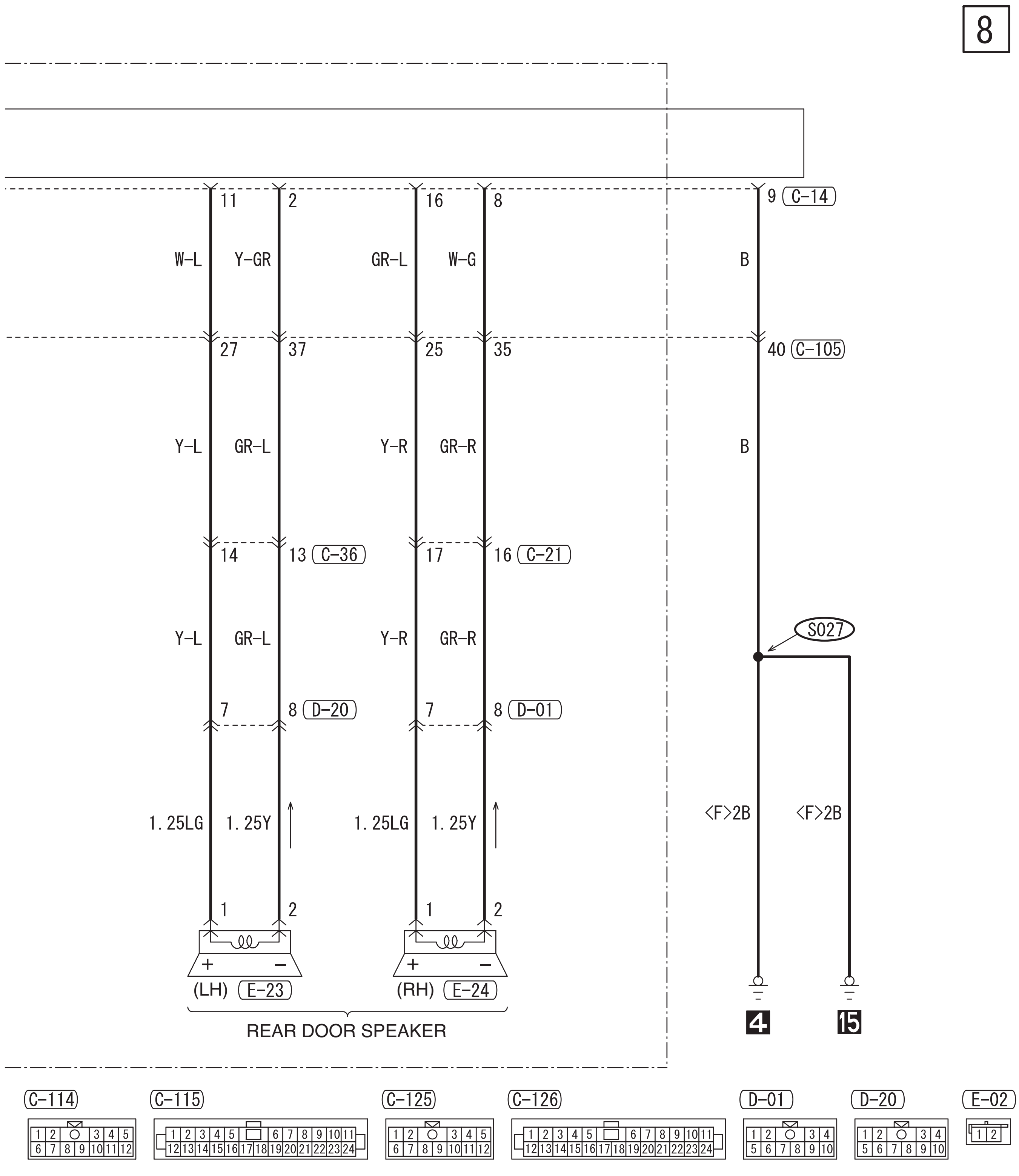
H8G14M04CB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)





WIRE COLOR CODE
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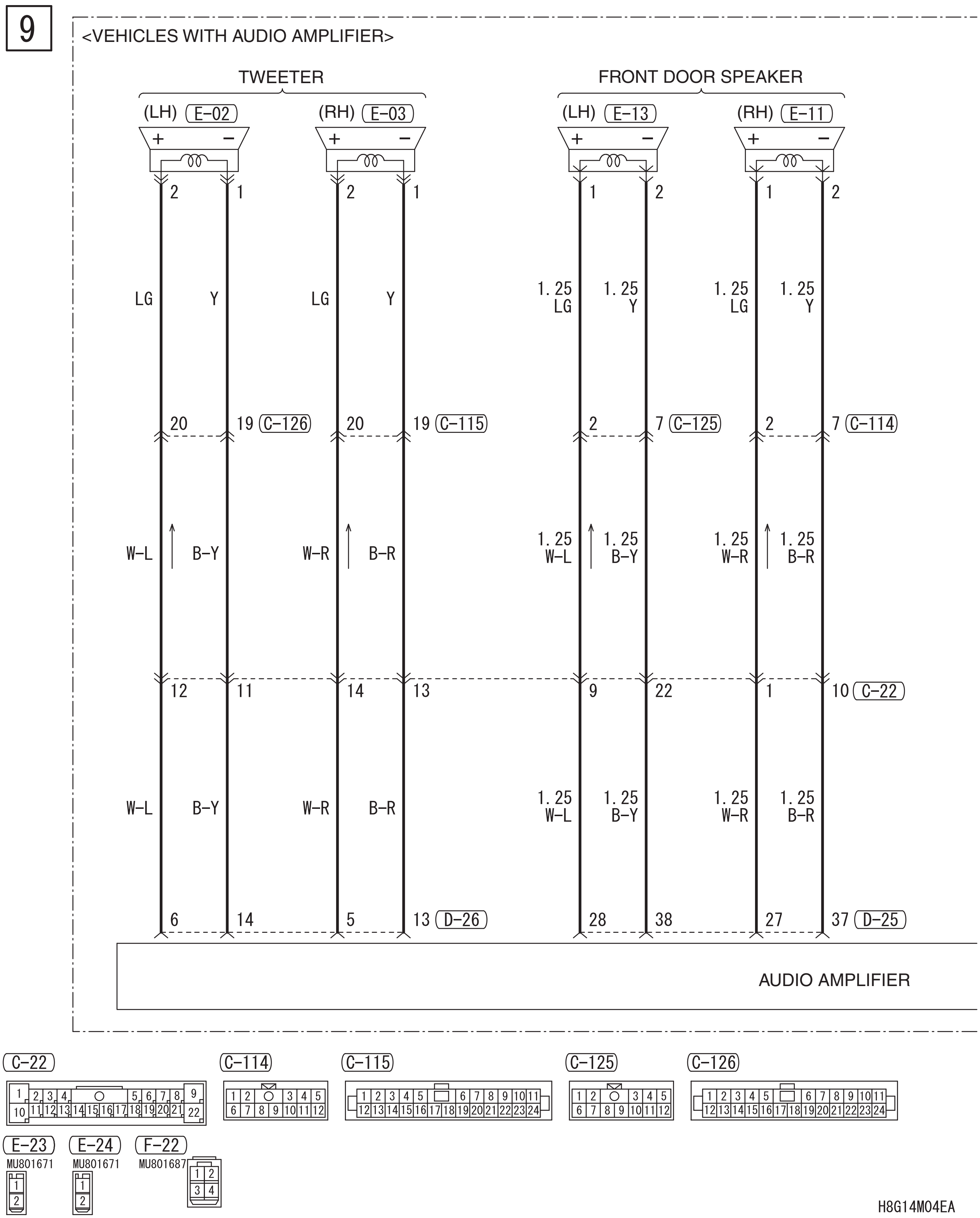
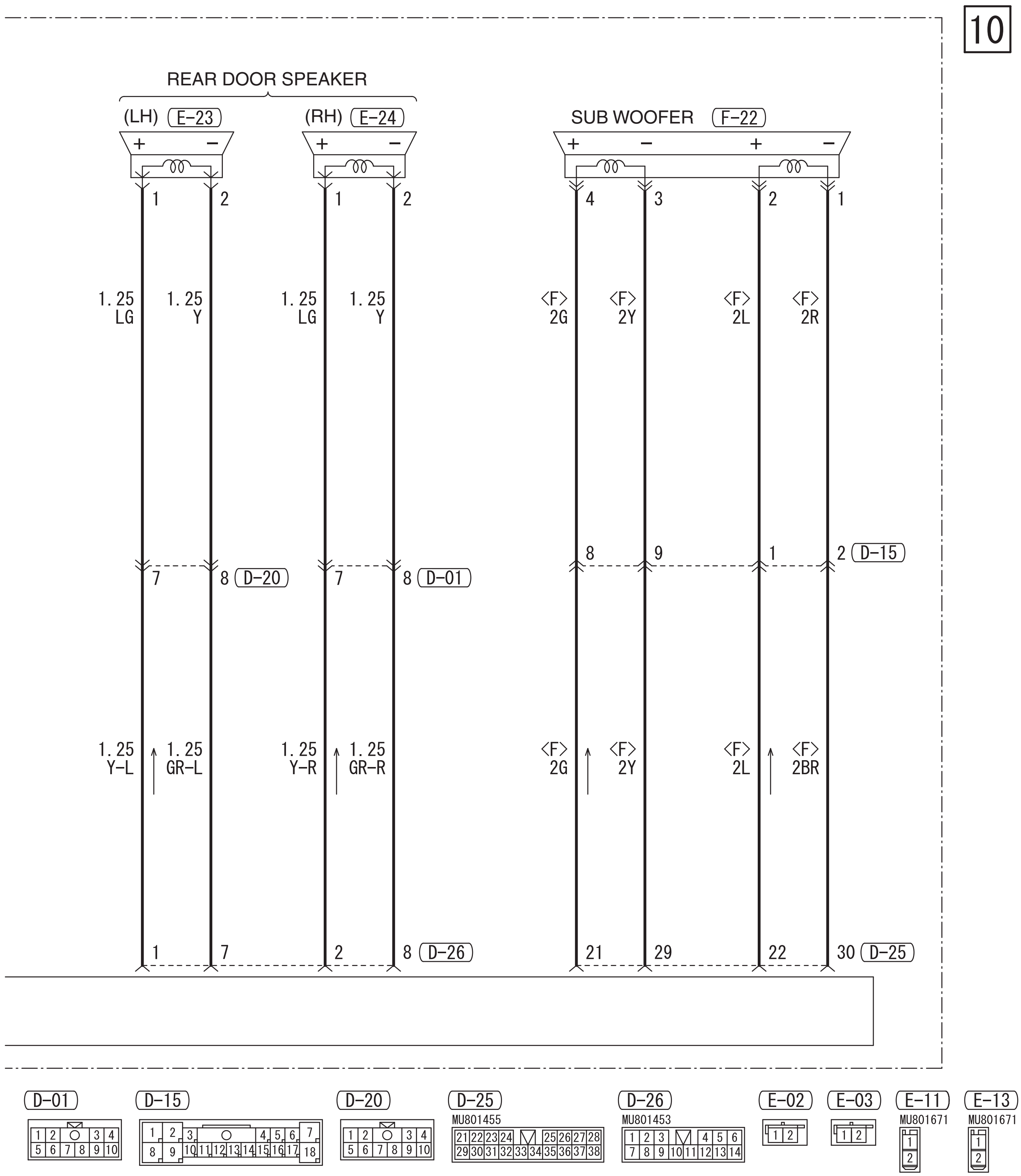
H8G14M04DB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)





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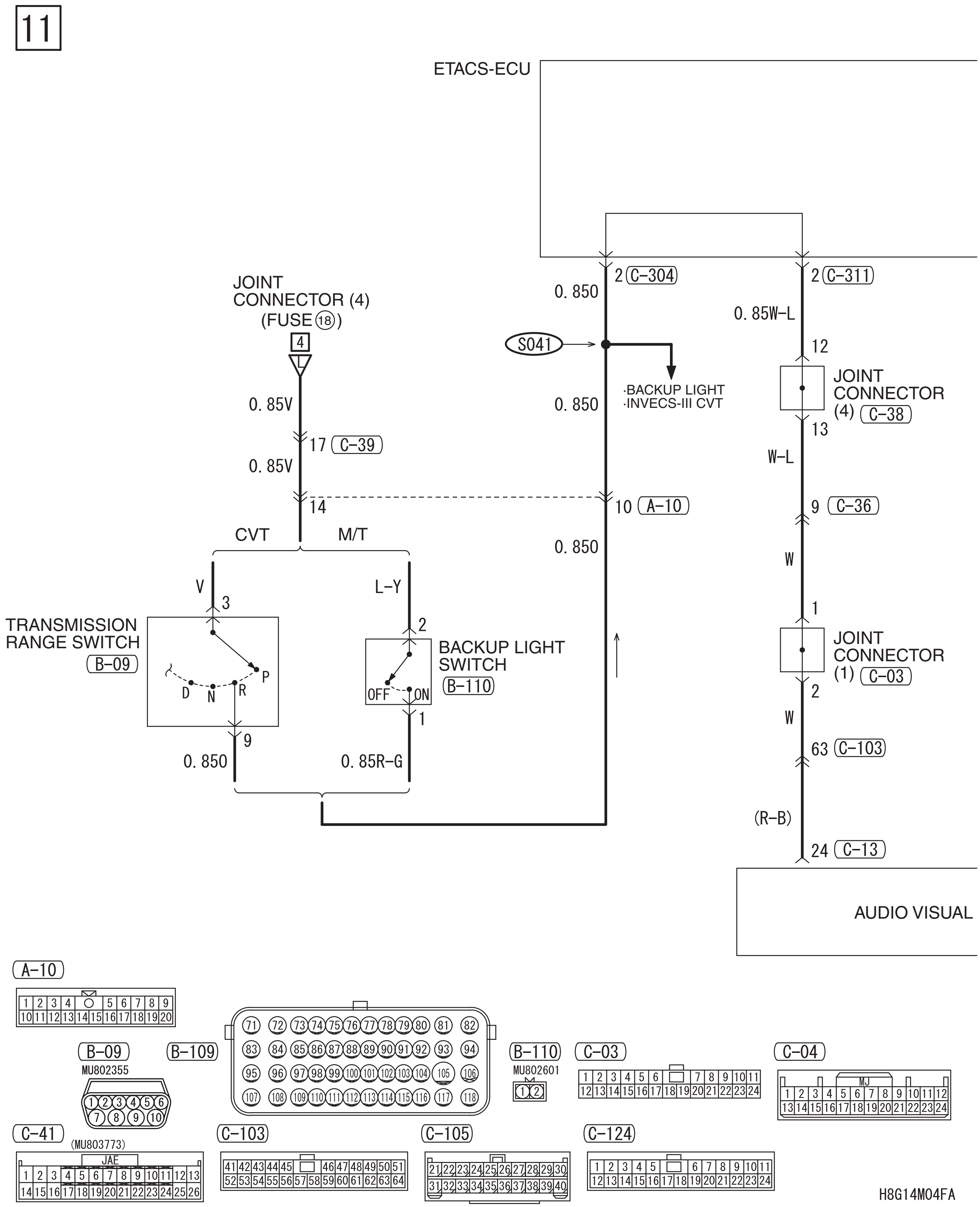
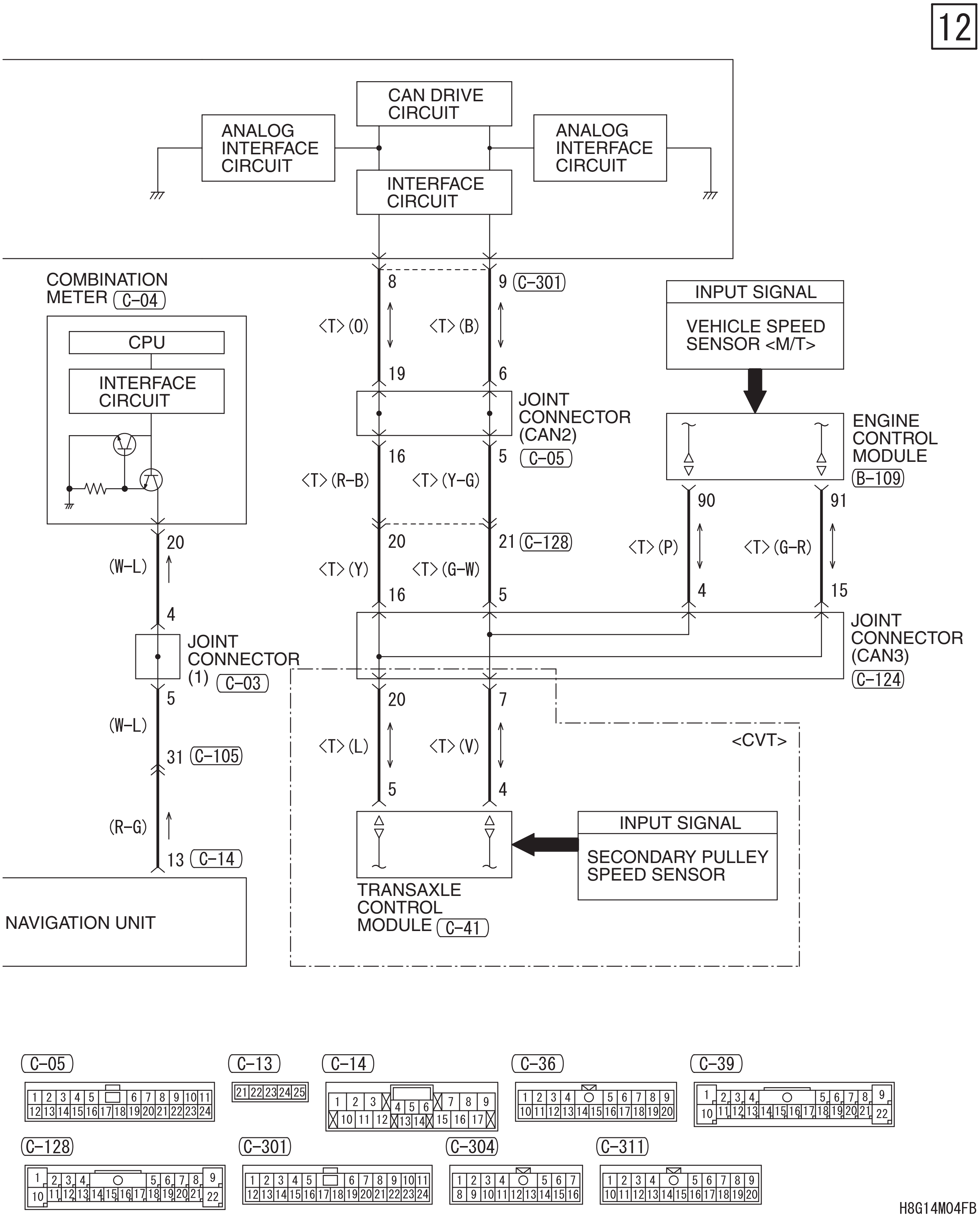
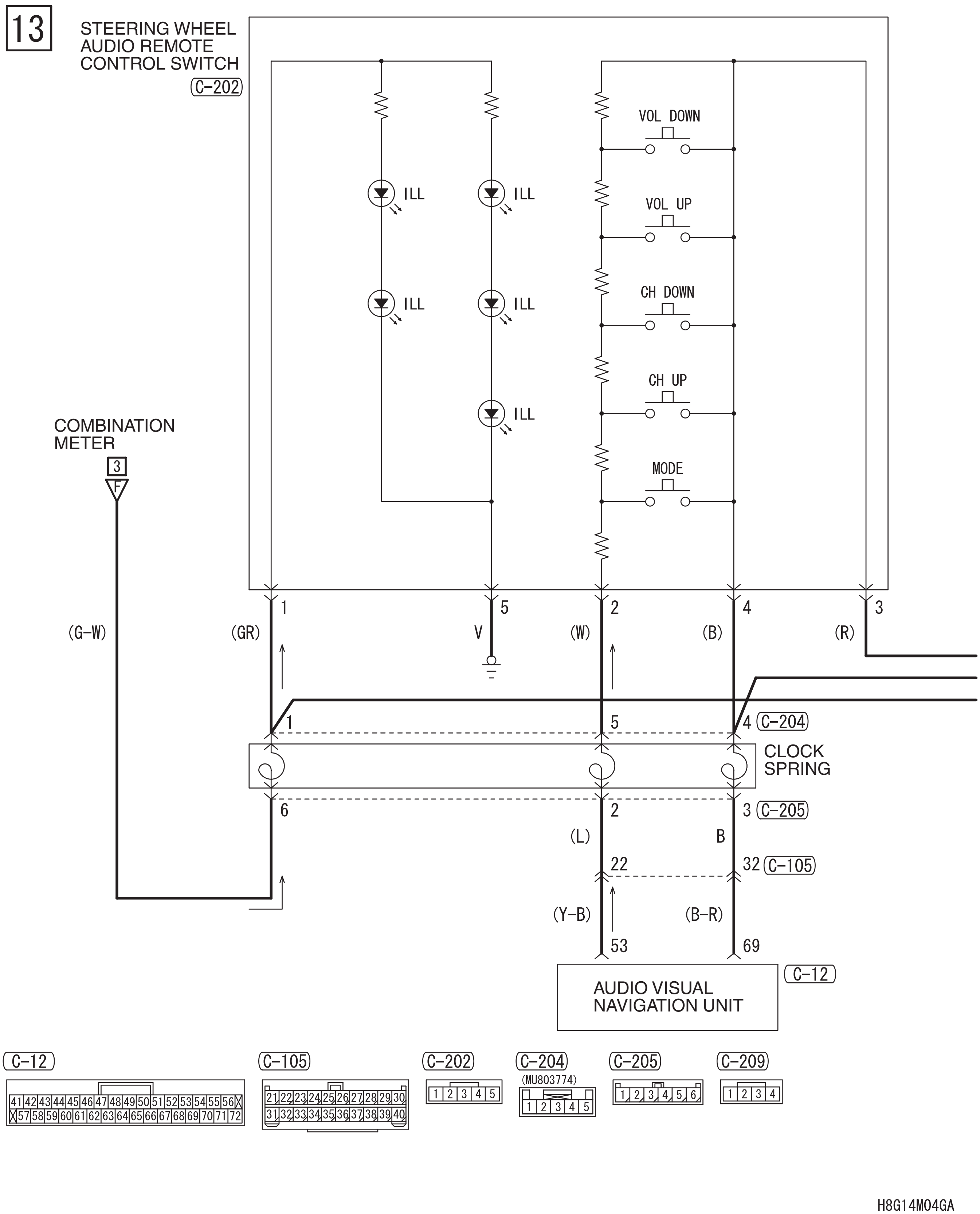
H8G14M04EB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)




12
CAN DRIVE CIRCUIT
ANALOG INTERFACE CIRCUIT
ANALOG INTERFACE CIRCUIT
INTERFACE CIRCUIT
COMBINATION METER C-04
CPU
INTERFACE CIRCUIT
8
9 C-301
<T>(O)
<T>(B)
19
6
JOINT CONNECTOR (CAN2) C-05
16
5
<T>(R-B)
<T>(Y-G)
20
21 C-128
<T>(Y)
<T>(G-W)
16
5
INPUT SIGNAL
VEHICLE SPEED SENSOR <M/T>
ENGINE CONTROL MODULE B-109
90
91
<T>(P)
<T>(G-R)
4
15
JOINT CONNECTOR (CAN3) C-124
20
(W-L)
4
JOINT CONNECTOR (1) C-03
5
(W-L)
31 C-105
(R-G)
13 C-14
NAVIGATION UNIT
20
7
<T>(L)
<T>(V)
5
4
<CVT>
INPUT SIGNAL
SECONDARY PULLEY SPEED SENSOR
TRANSAXLE CONTROL MODULE C-41
C-05
C-13
C-14
C-36
C-39
C-128
C-301
C-304
C-311
H8G14M04FB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)



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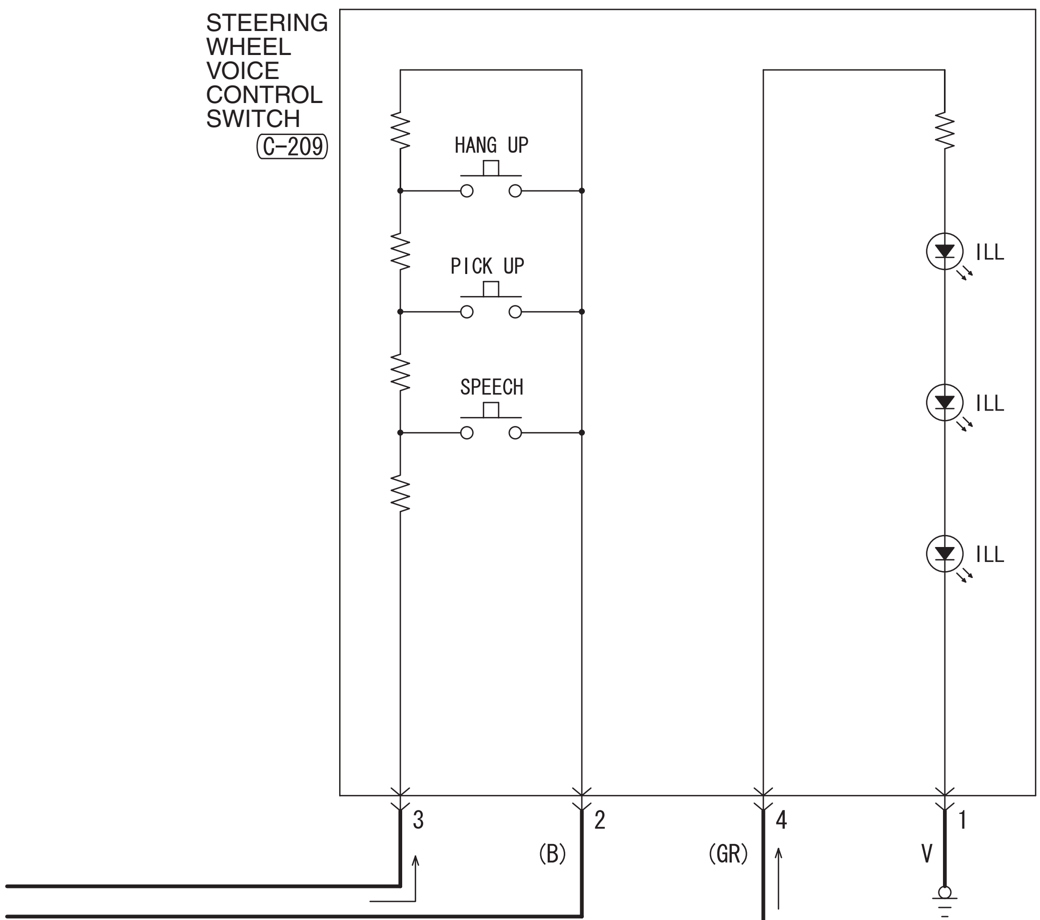

WIRE COLOR CODE
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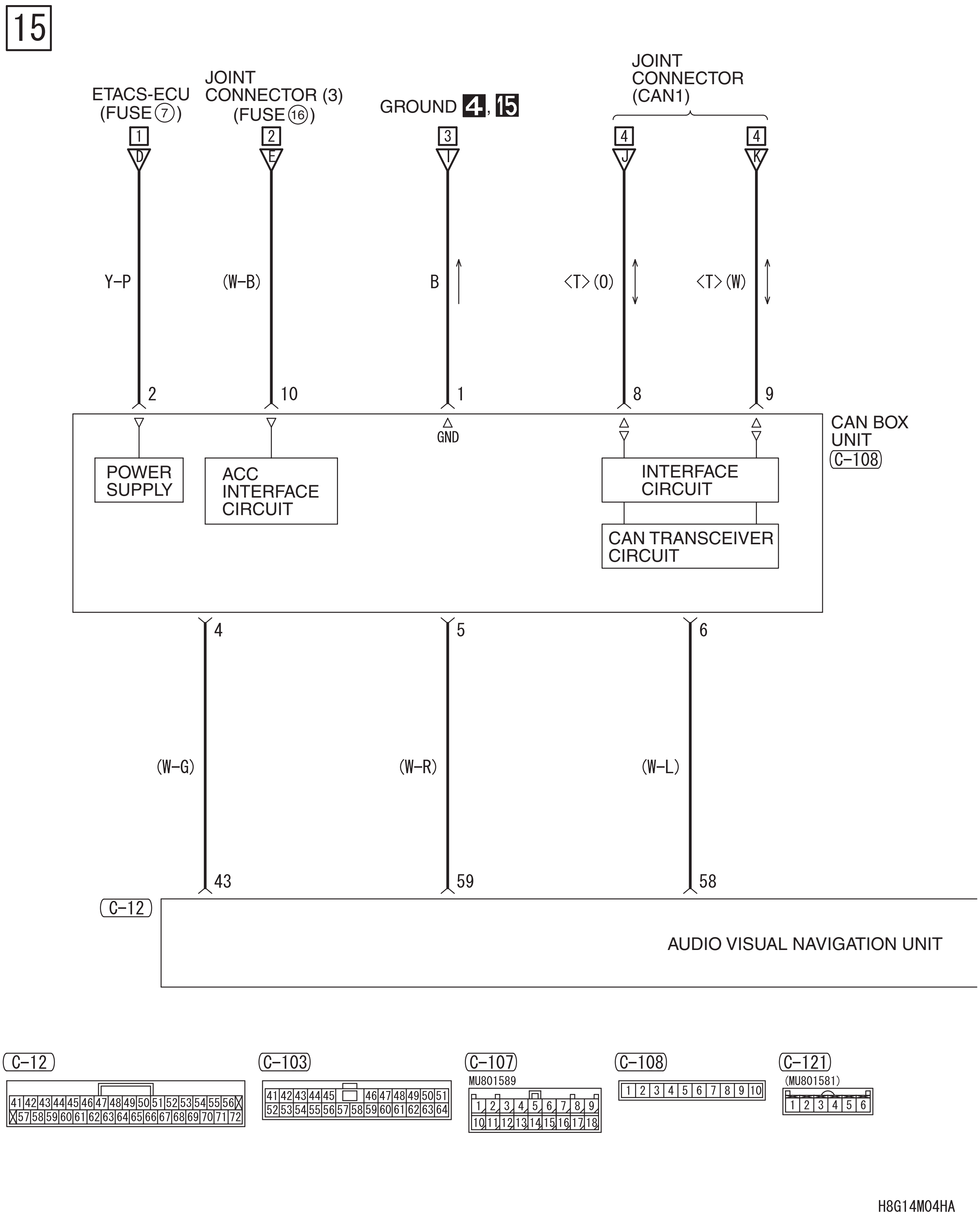
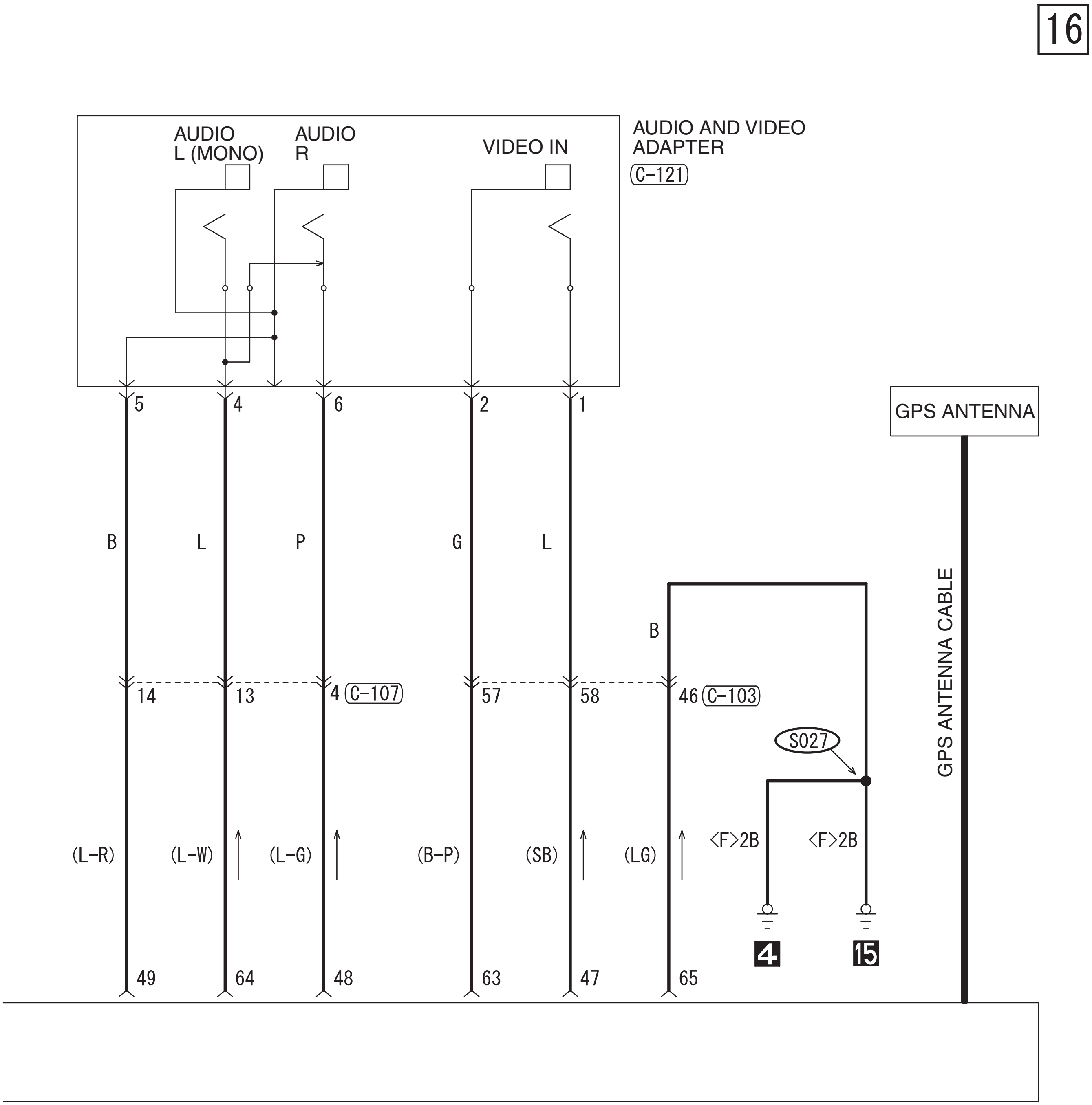
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G14M04GB

MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS) (CONTINUED)





WIRE COLOR CODE
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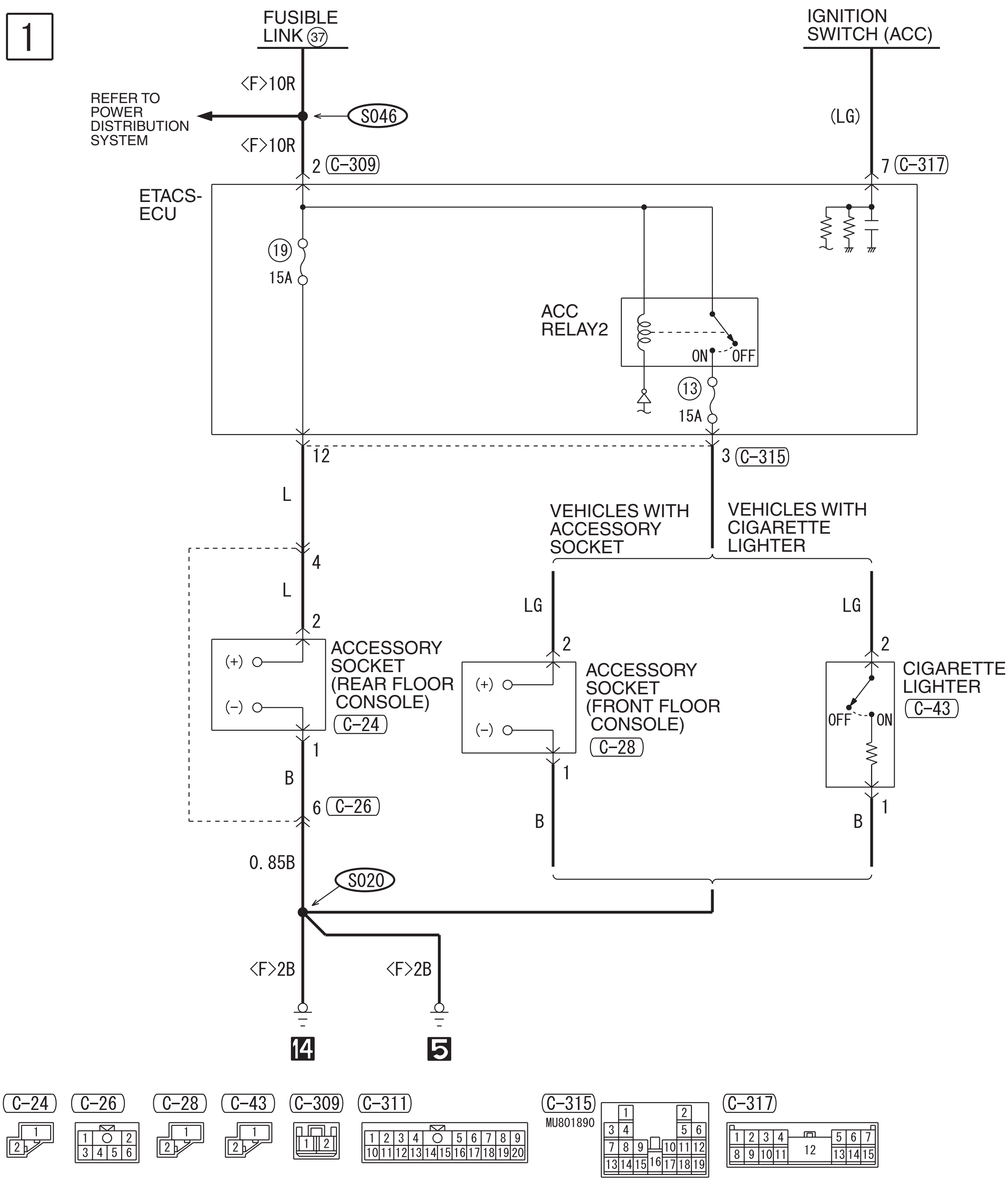
H8G14M04HB

ACCESSORY SOCKET AND CIGARETTE LIGHTER

M1901030900026



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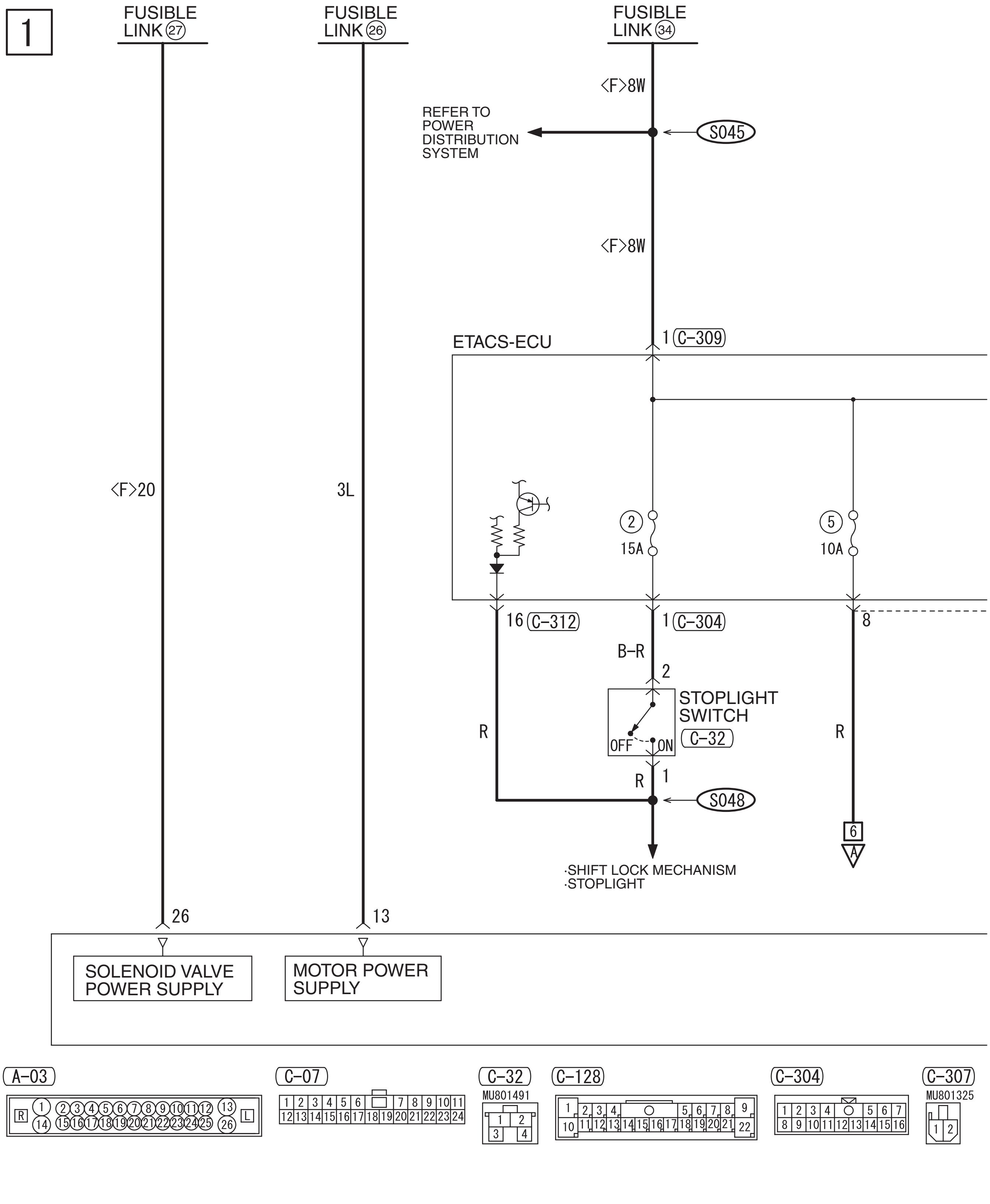
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

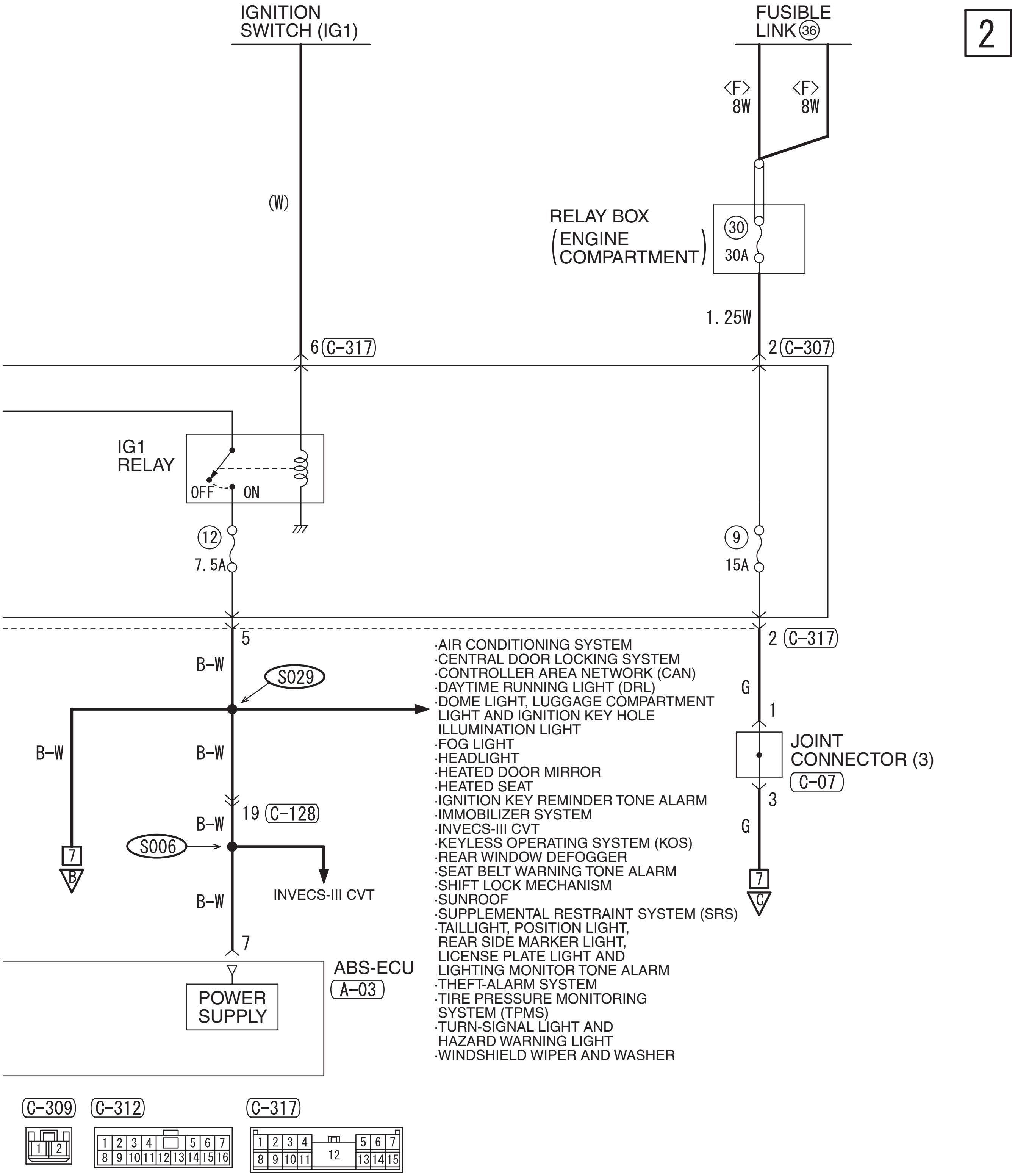
H8G14M03AA

NOTES

ANTI-LOCK BRAKING SYSTEM (ABS)

M1901008401564





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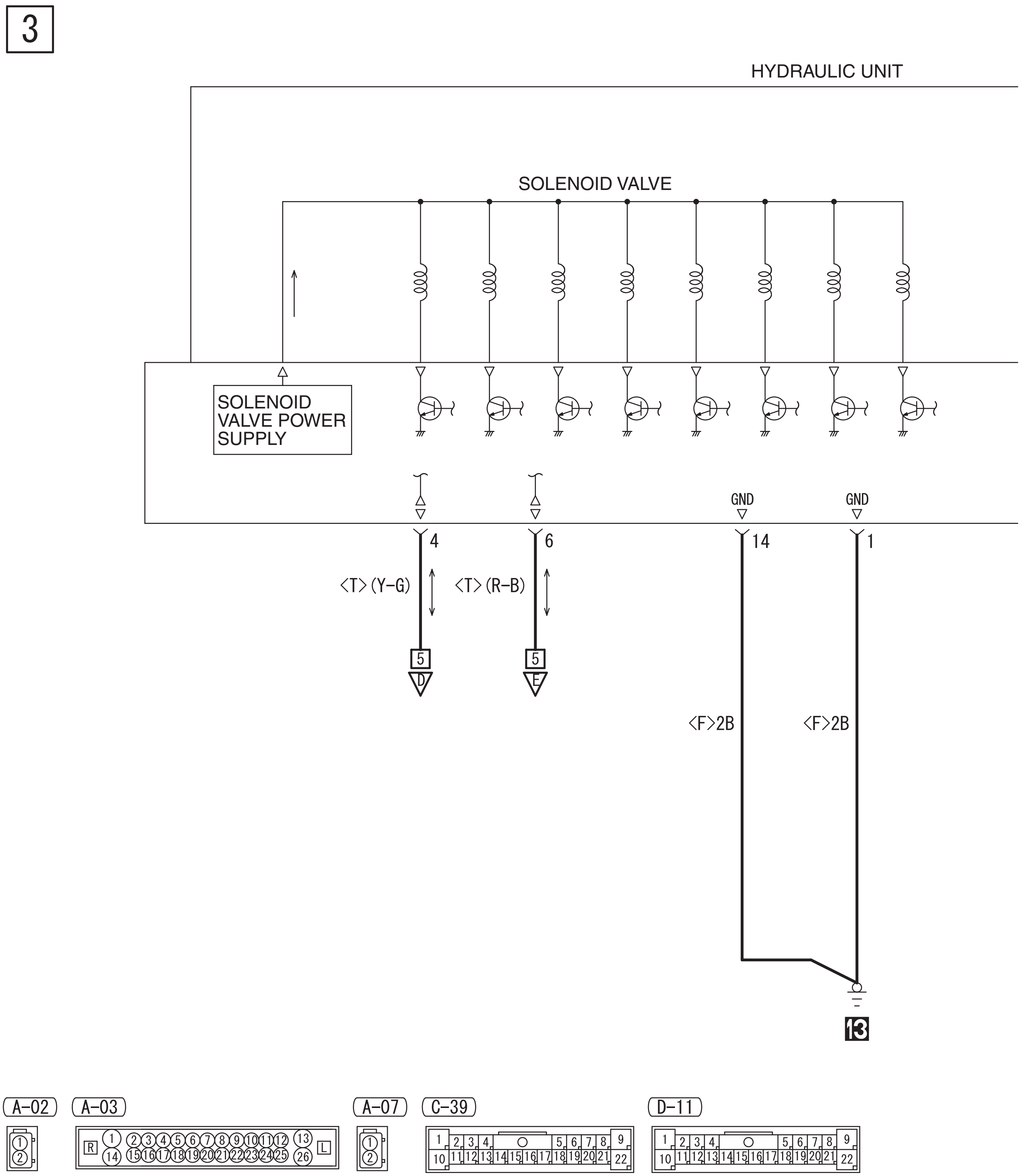
H8G15M00AB

ANTI-LOCK BRAKING SYSTEM (ABS) (CONTINUED)



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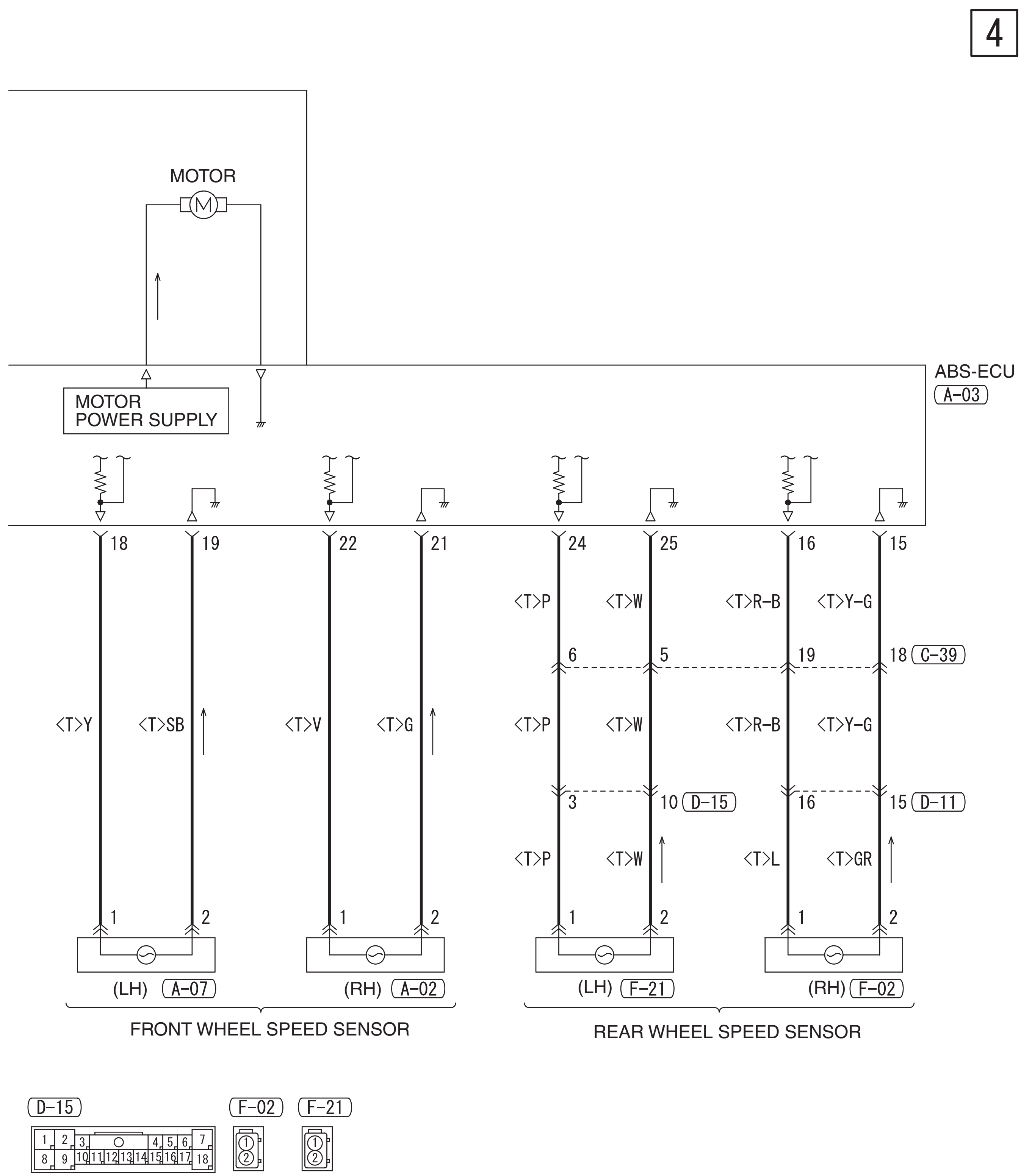

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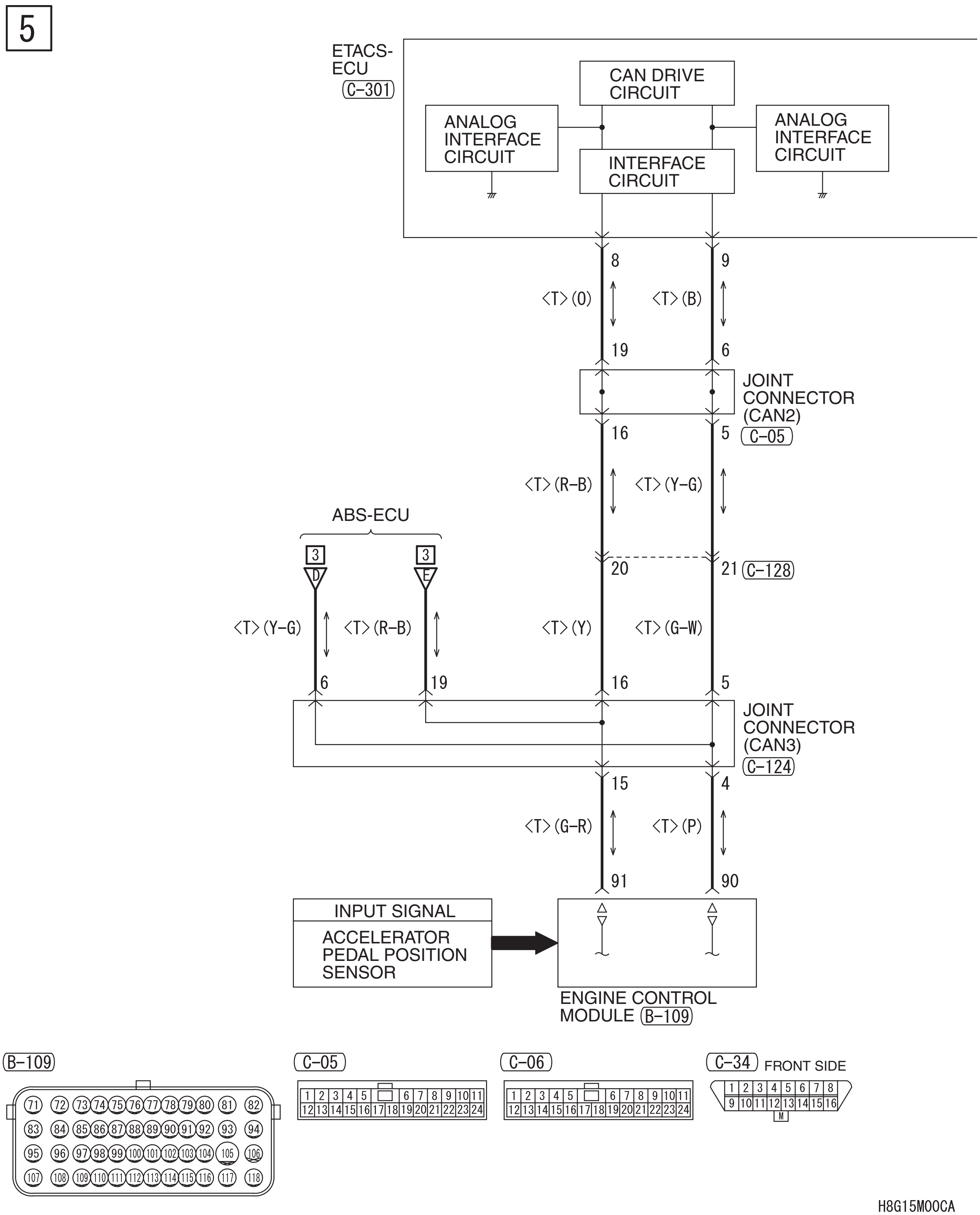
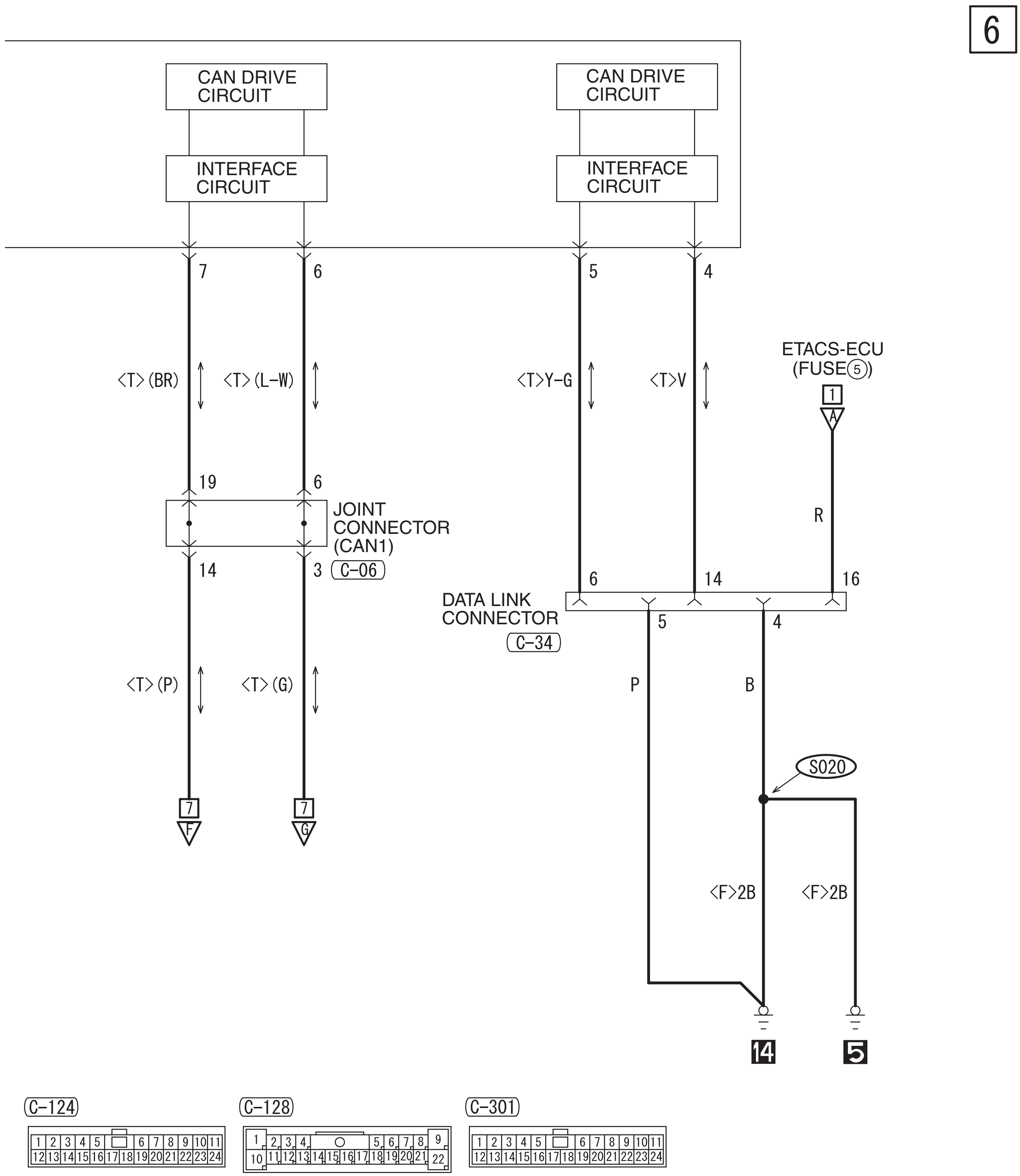
H8G15M00BB

ANTI-LOCK BRAKING SYSTEM (ABS) (CONTINUED)





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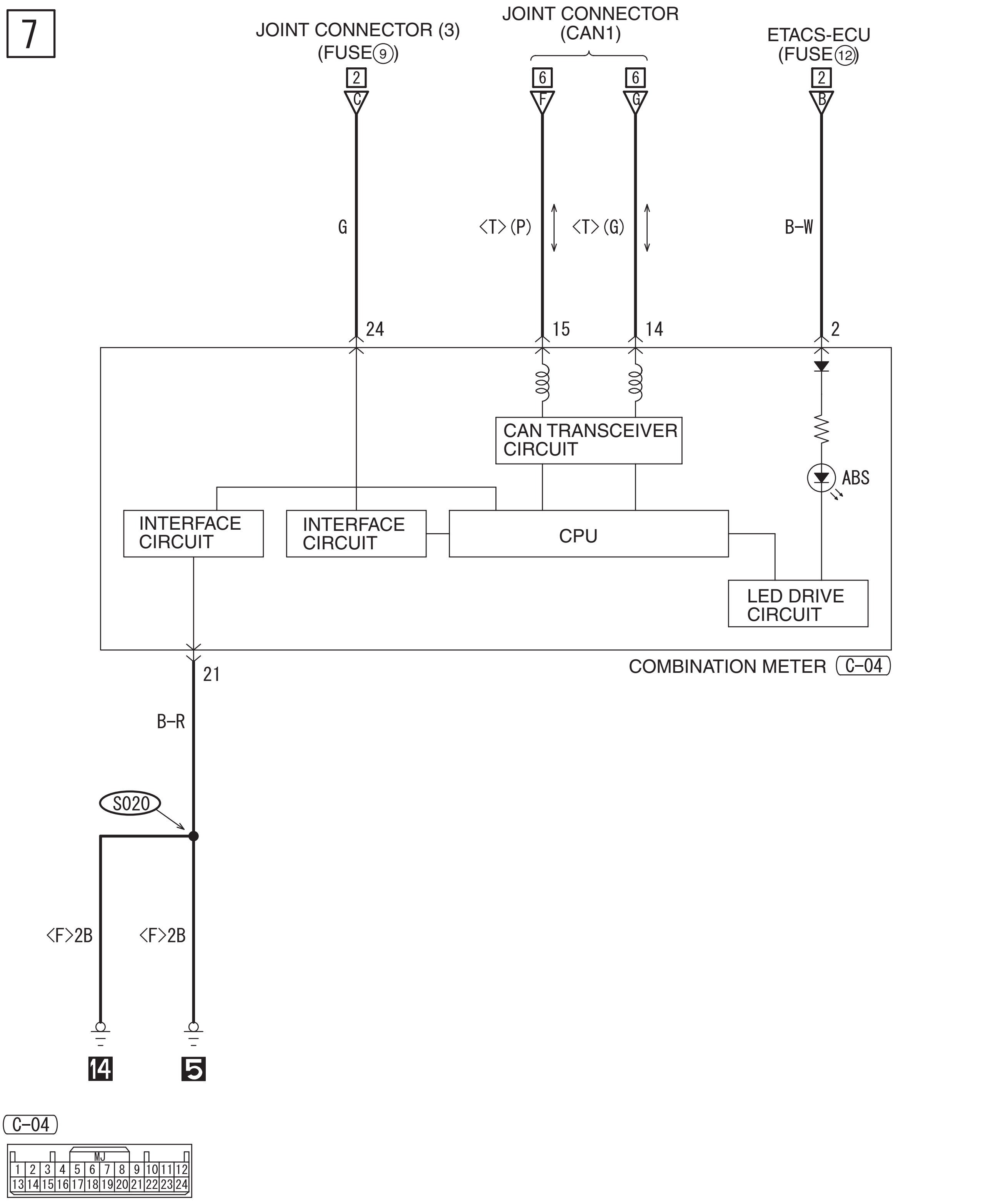
H8G15M00CB

ANTI-LOCK BRAKING SYSTEM (ABS) (CONTINUED)



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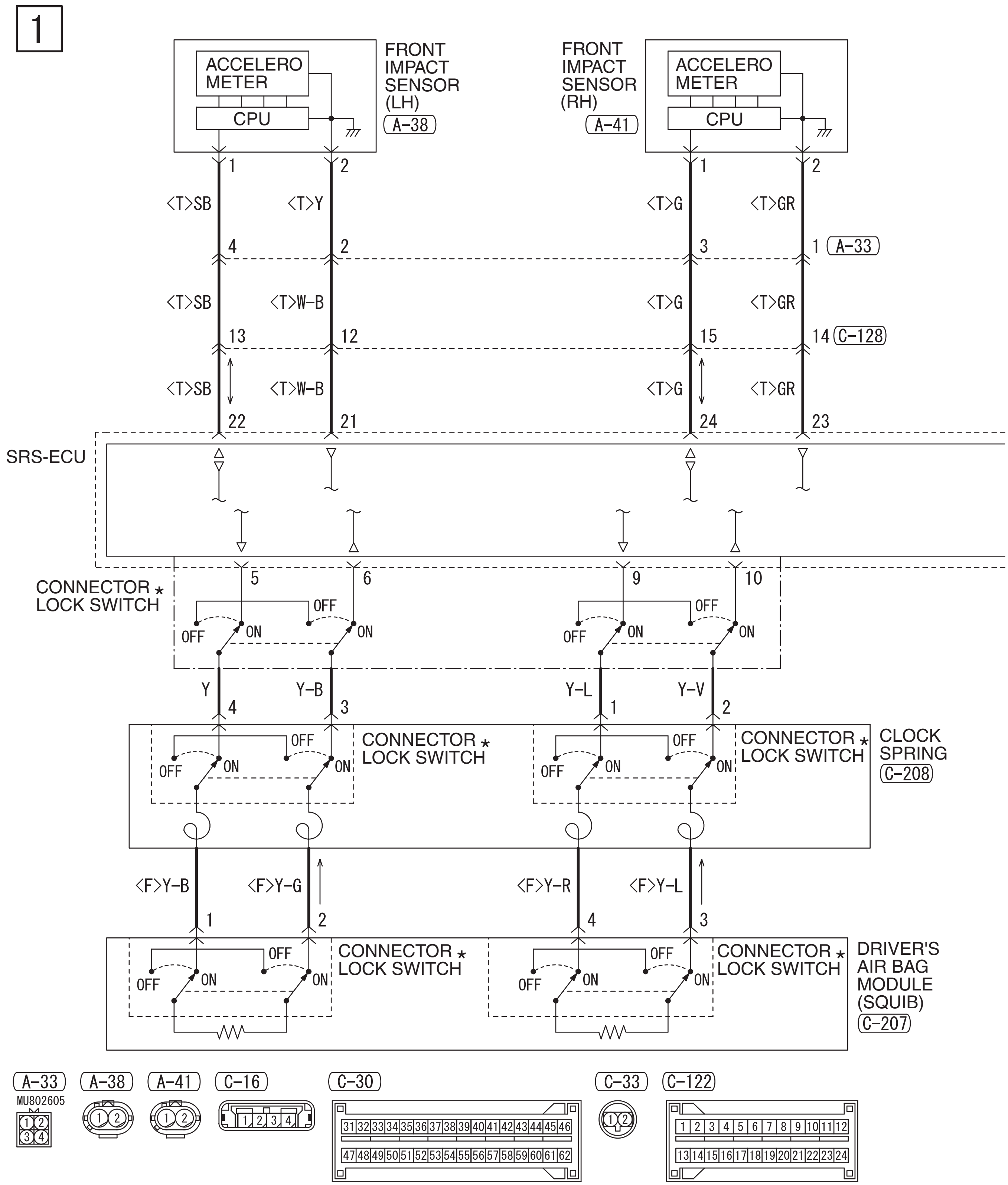
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M00DA

NOTES

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

M1901009702334



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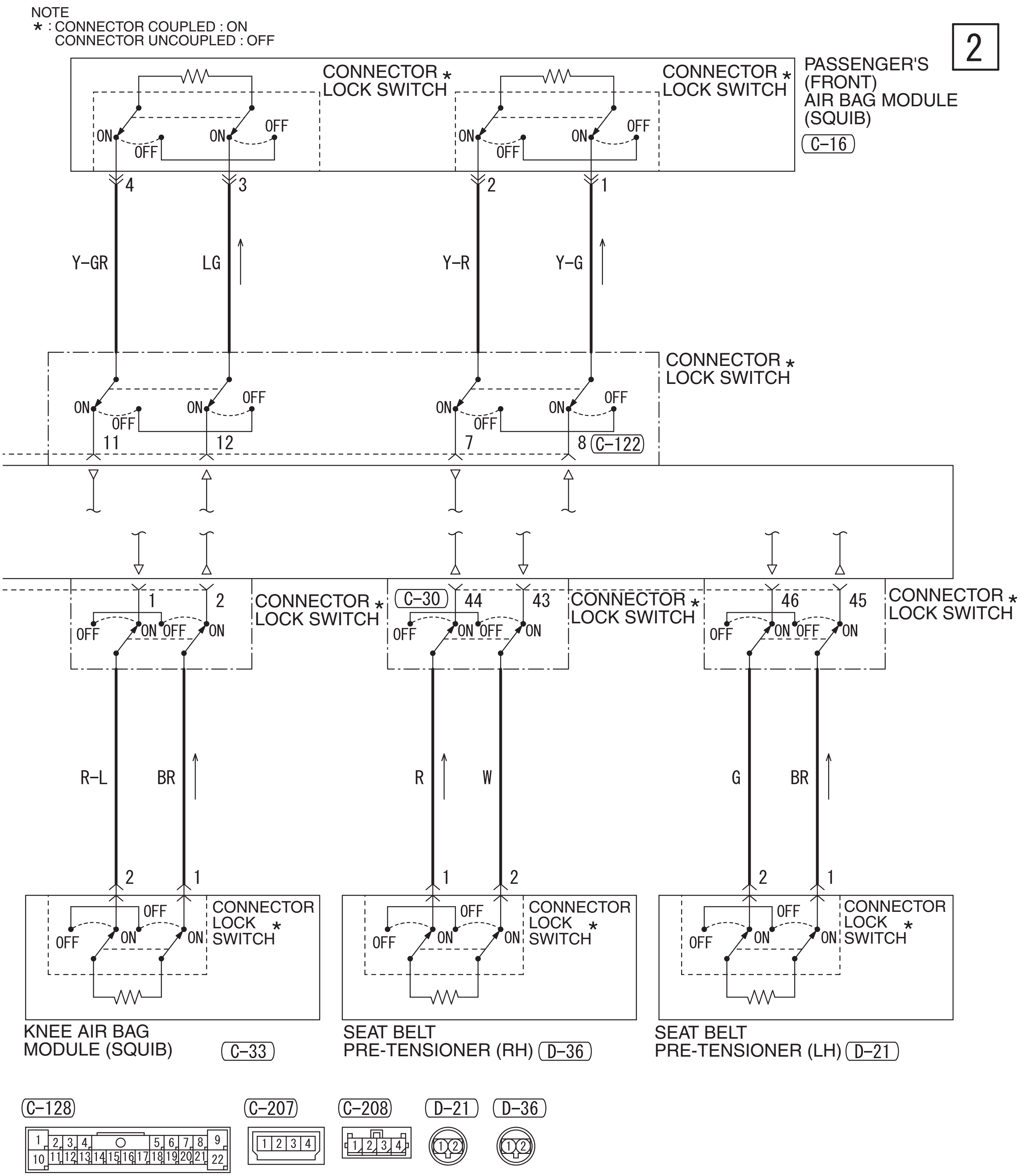

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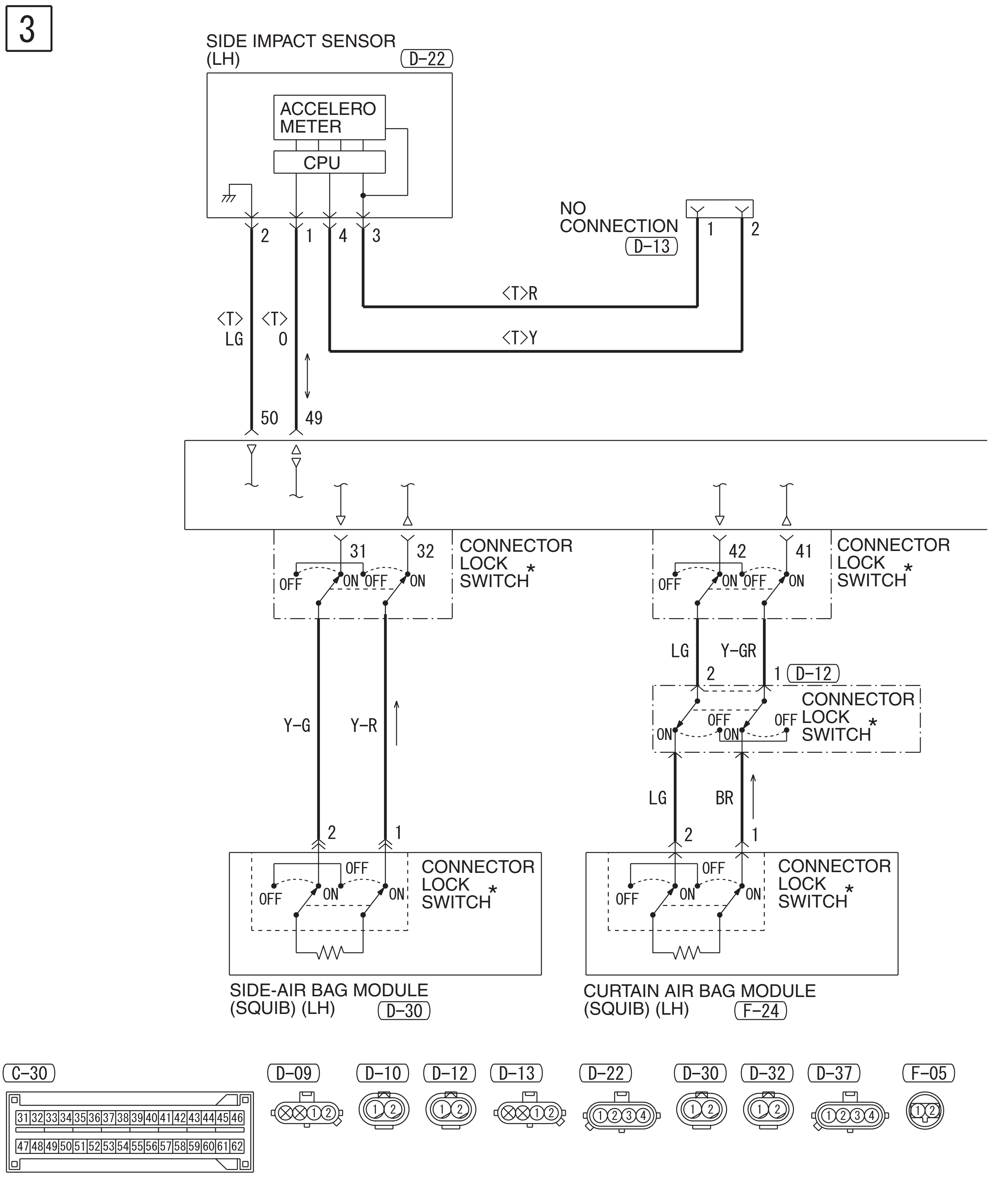
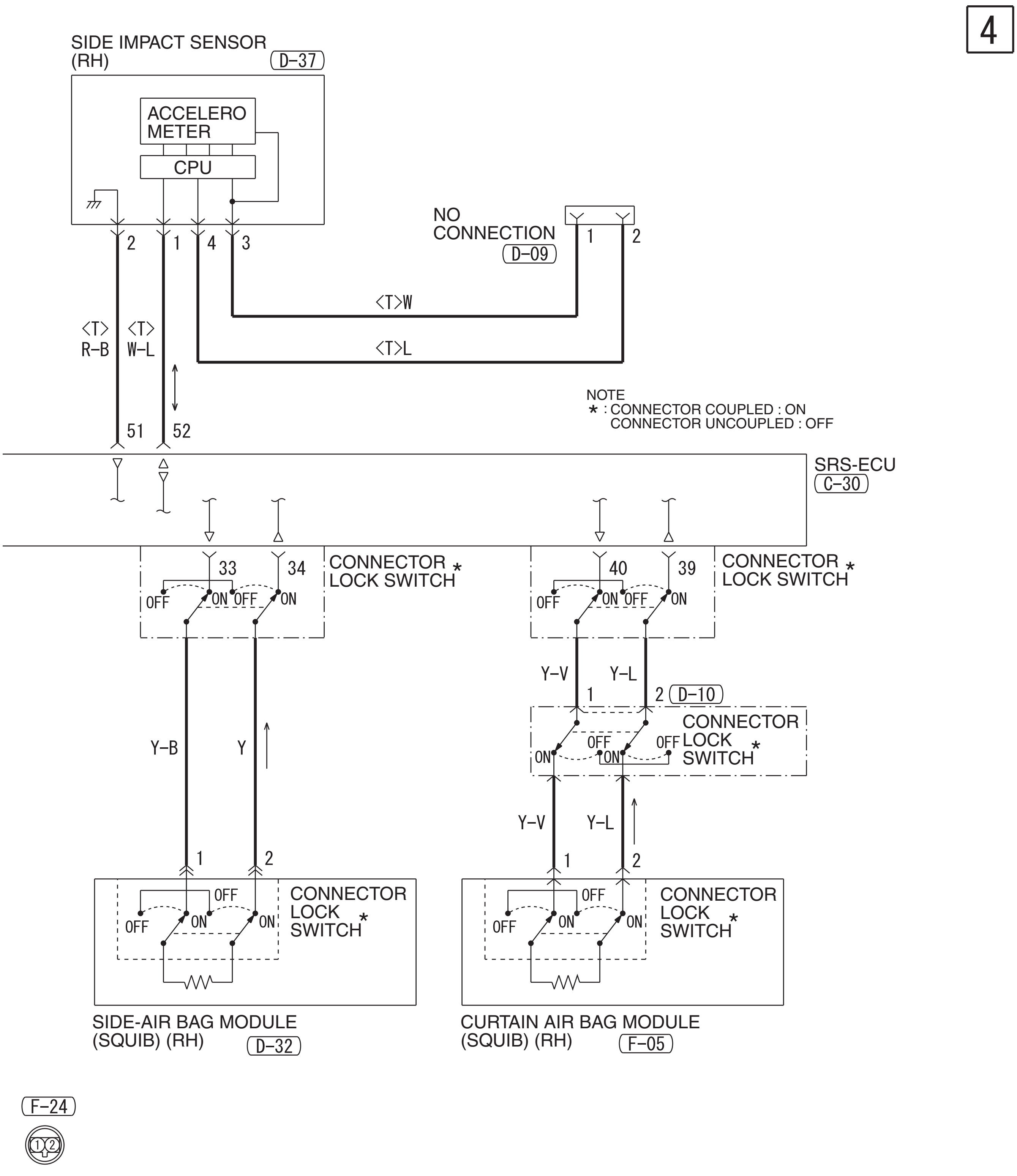
H8G15M01AB

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (CONTINUED)





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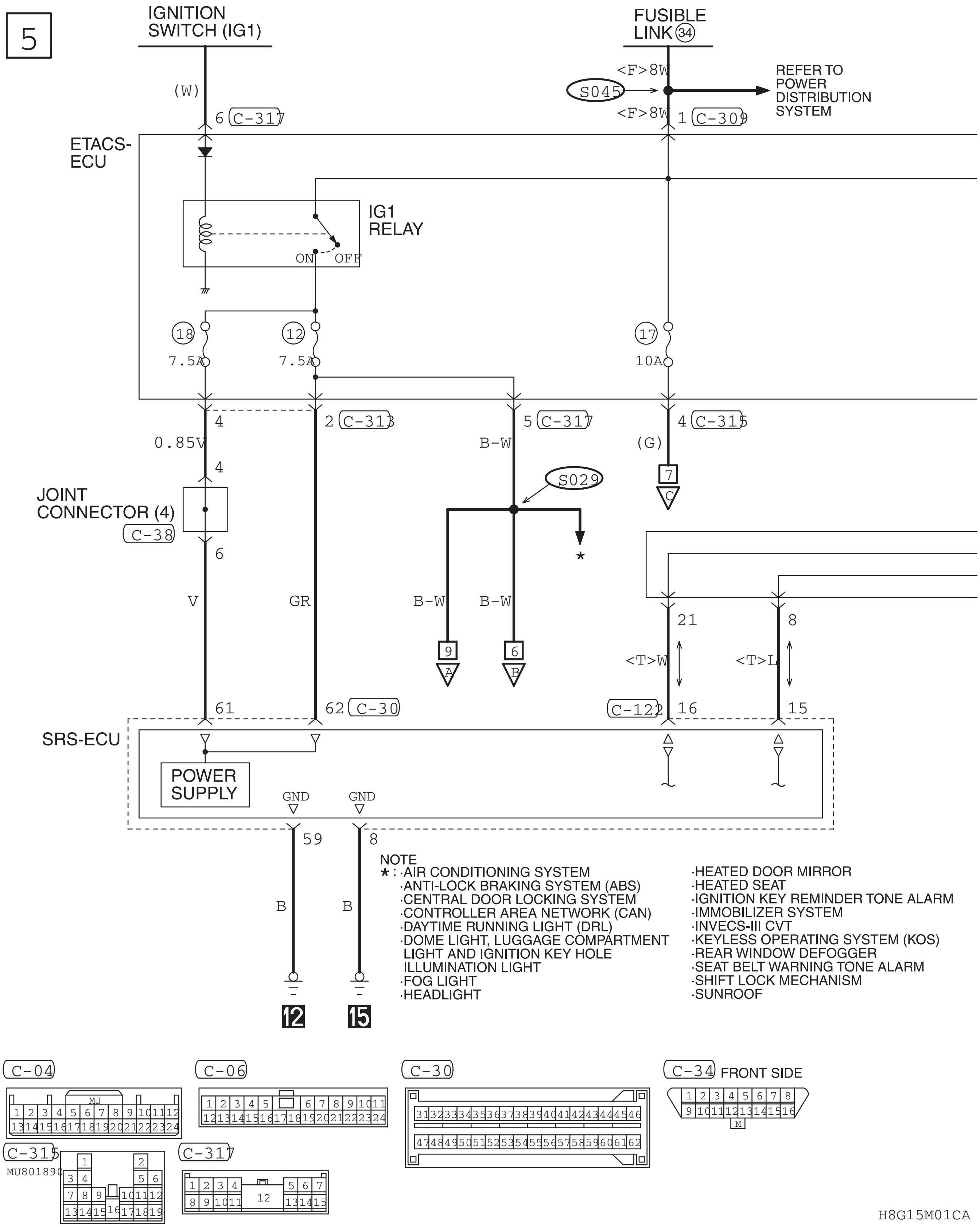
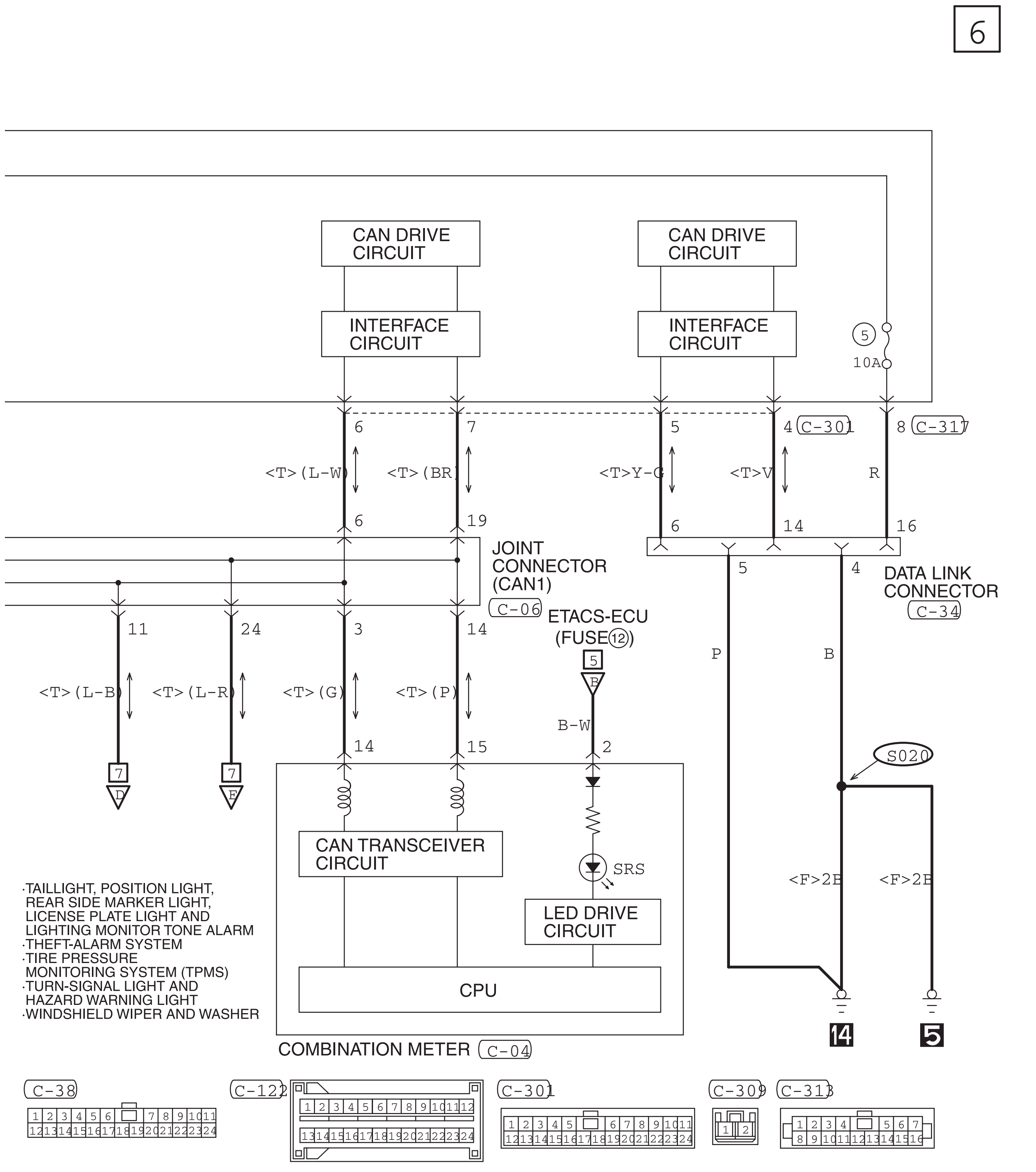
H8G15M01BB

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (CONTINUED)





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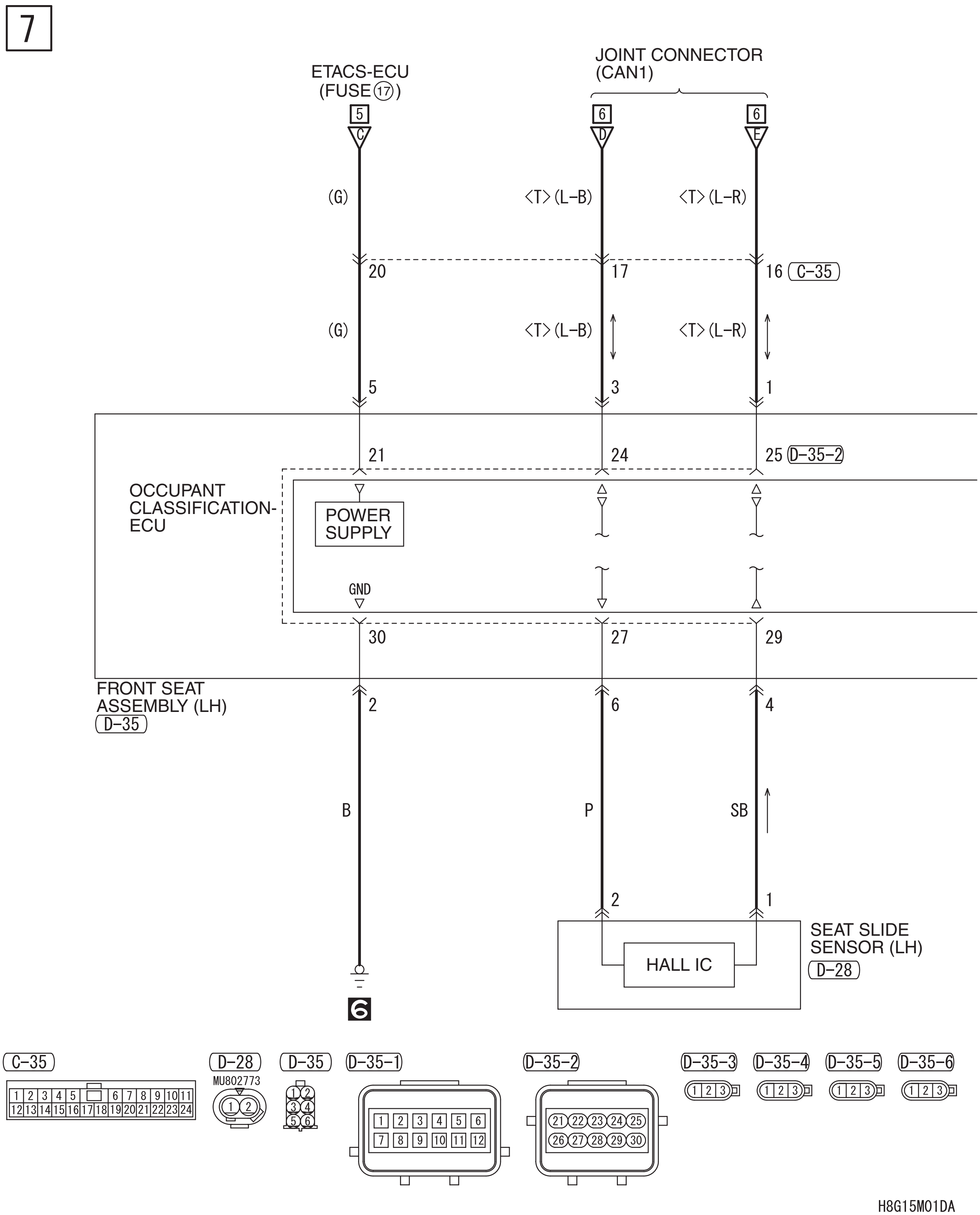
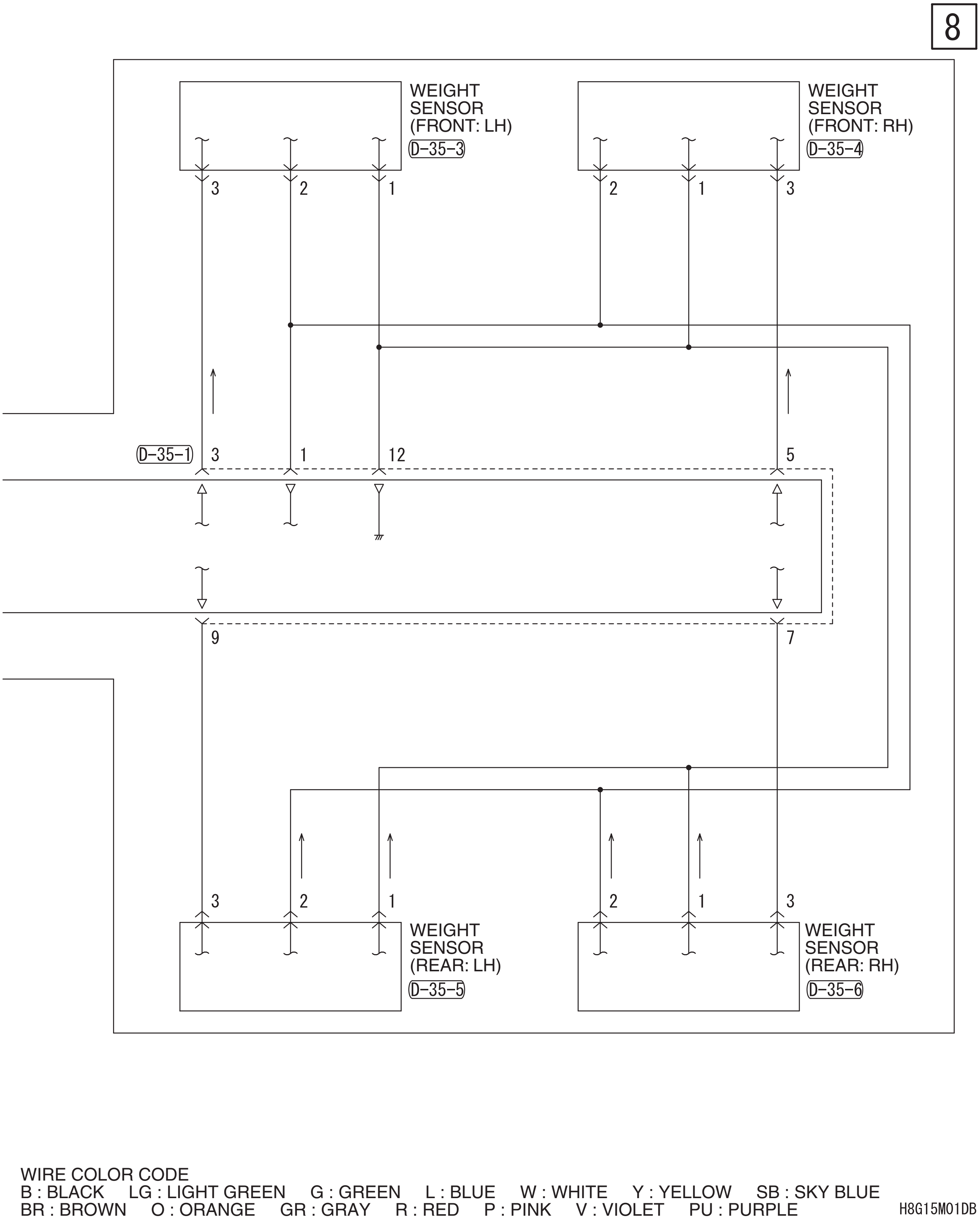
H8G15M01CB

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (CONTINUED)





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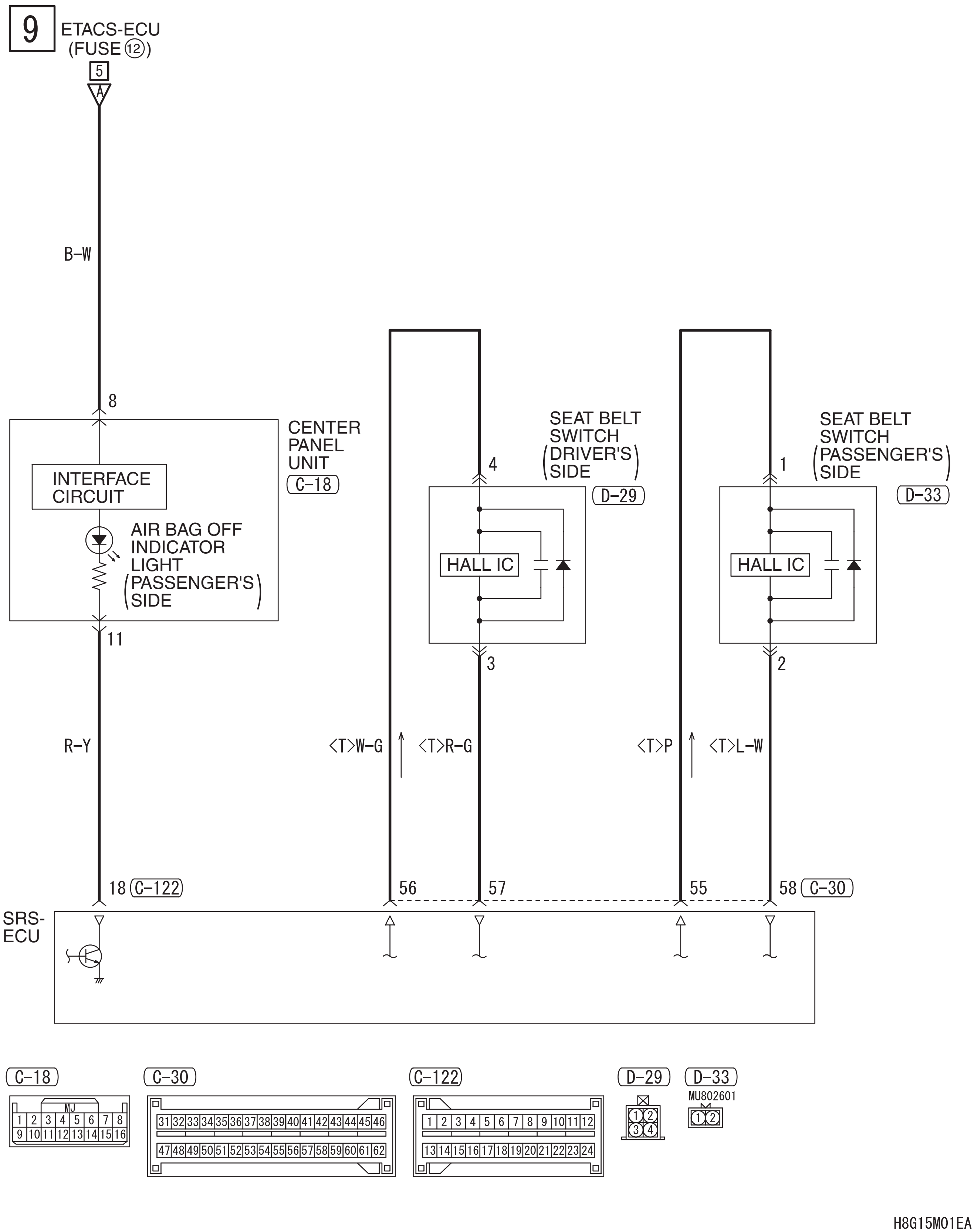
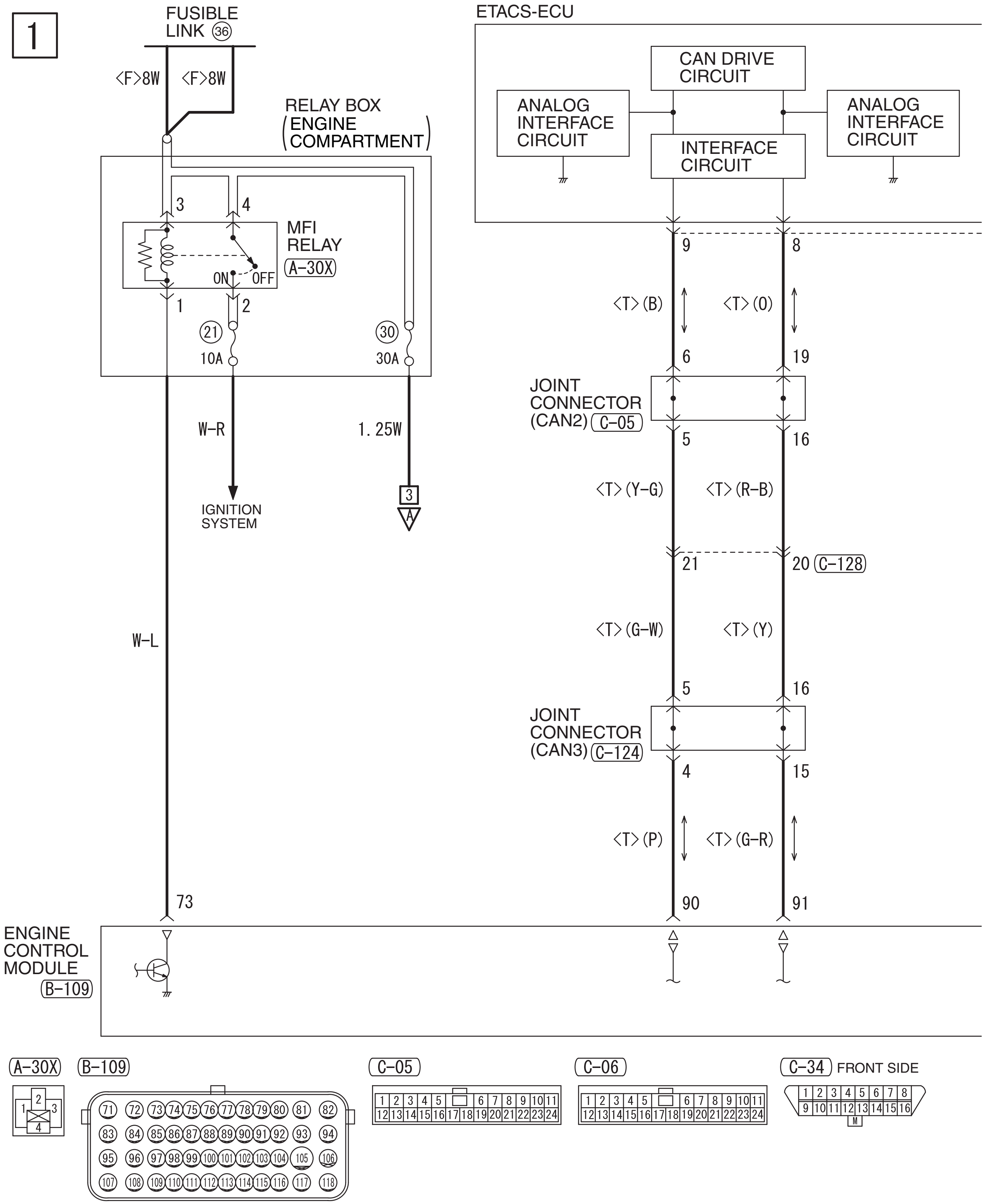
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (CONTINUED)



NOTES

IMMOBILIZER SYSTEM

M1901013602910



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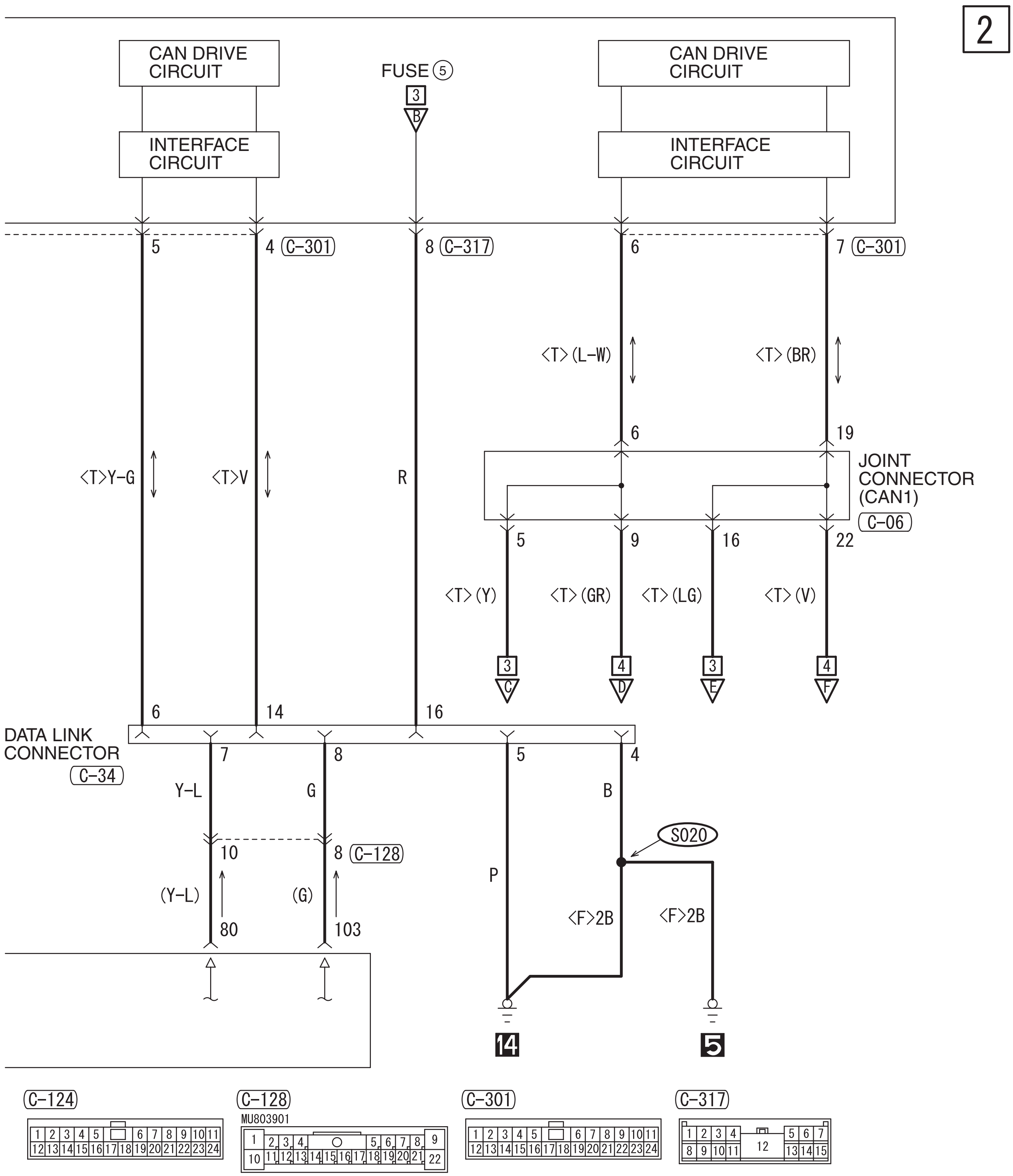

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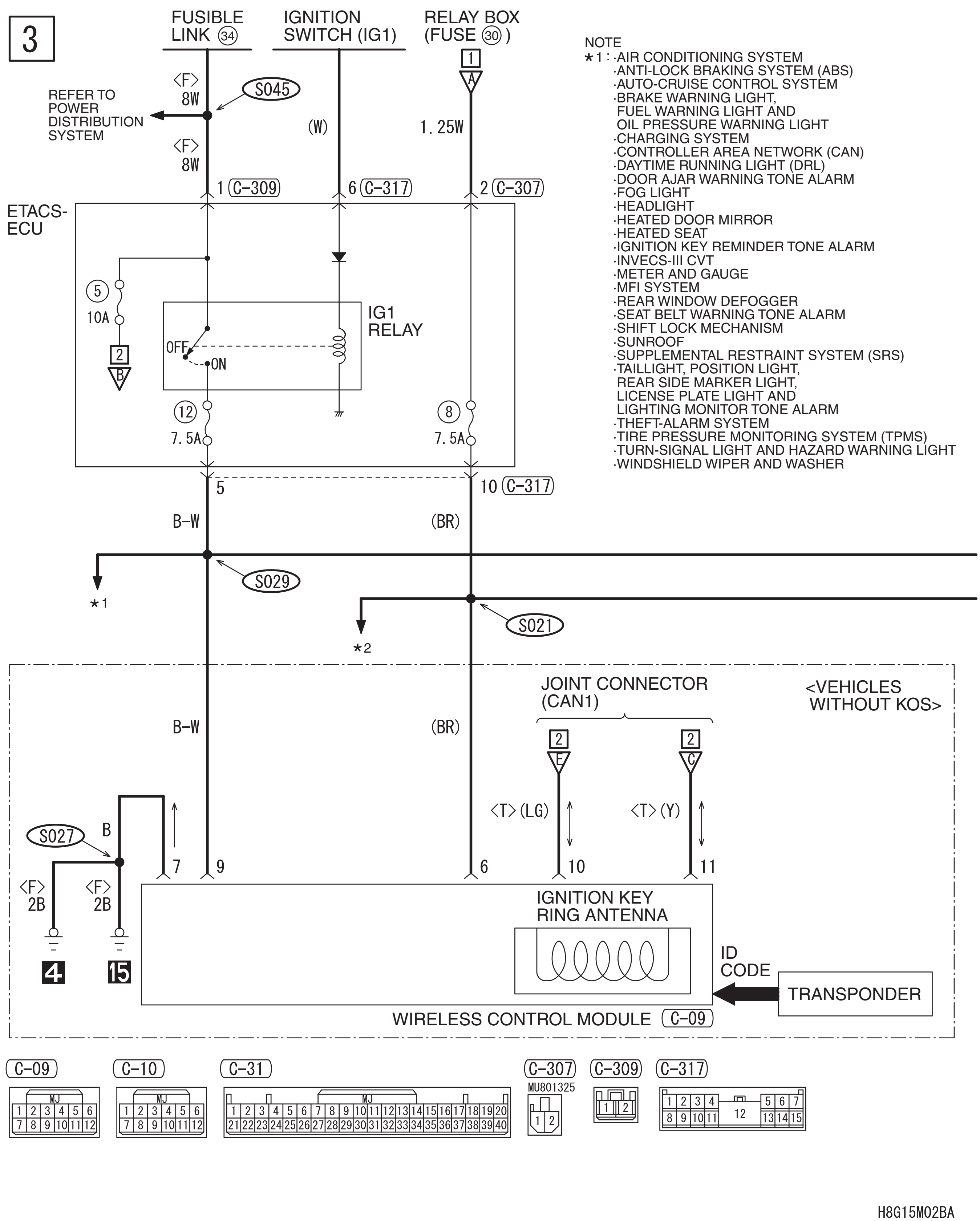
H8G15M02AB

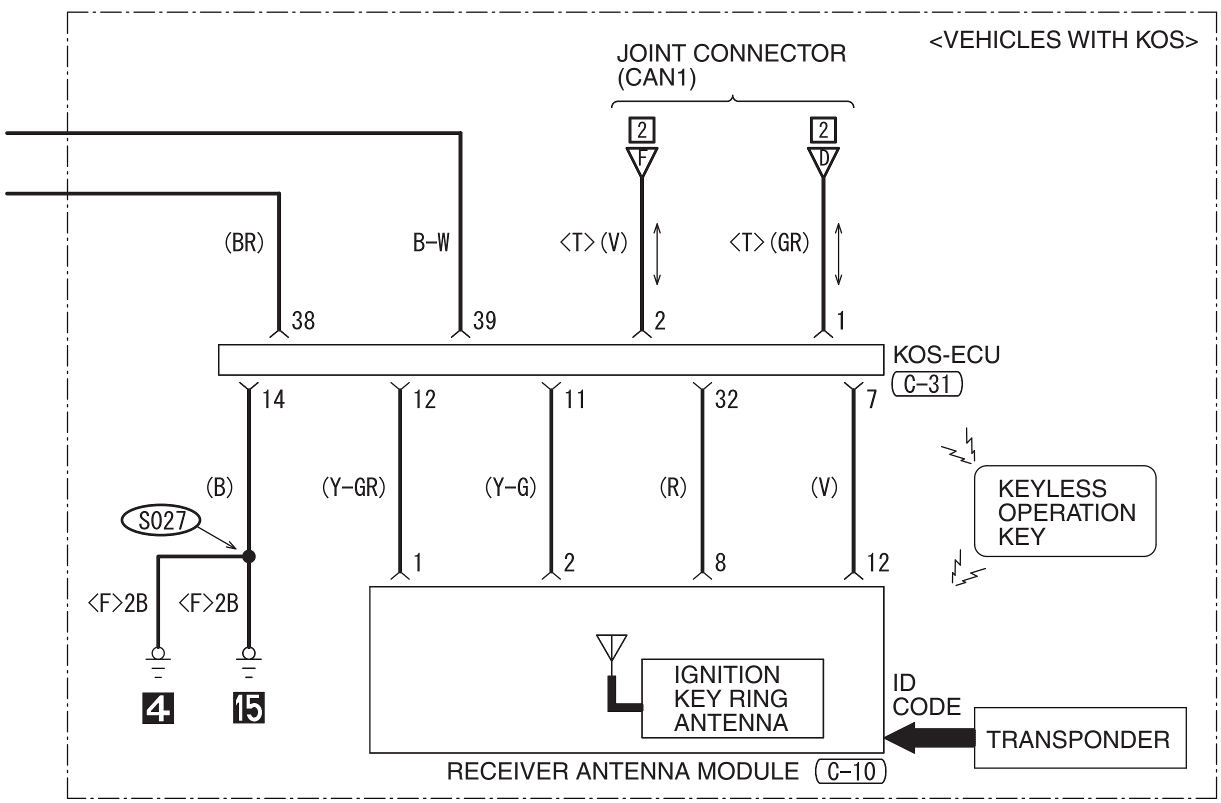
IMMOBILIZER SYSTEM (CONTINUED)



NOTE
*1 :
- AIR CONDITIONING SYSTEM
- ANTI-LOCK BRAKING SYSTEM (ABS)
- AUTO-CRUISE CONTROL SYSTEM
- BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
- CHARGING SYSTEM
- CONTROLLER AREA NETWORK (CAN)
- DAYTIME RUNNING LIGHT (DRL)
- DOOR AJAR WARNING TONE ALARM
- FOG LIGHT
- HEADLIGHT
- HEATED DOOR MIRROR
- HEATED SEAT
- IGNITION KEY REMINDER TONE ALARM
- INVECS-III CVT
- METER AND GAUGE
- MFI SYSTEM
- REAR WINDOW DEFOGGER
- SEAT BELT WARNING TONE ALARM
- SHIFT LOCK MECHANISM
- SUNROOF
- SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
- TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
- THEFT-ALARM SYSTEM
- TIRE PRESSURE MONITORING SYSTEM (TPMS)
- TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
- WINDSHIELD WIPER AND WASHER

4

*2 : ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
·METER AND GAUGE
·SEAT BELT WARNING TONE ALARM
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



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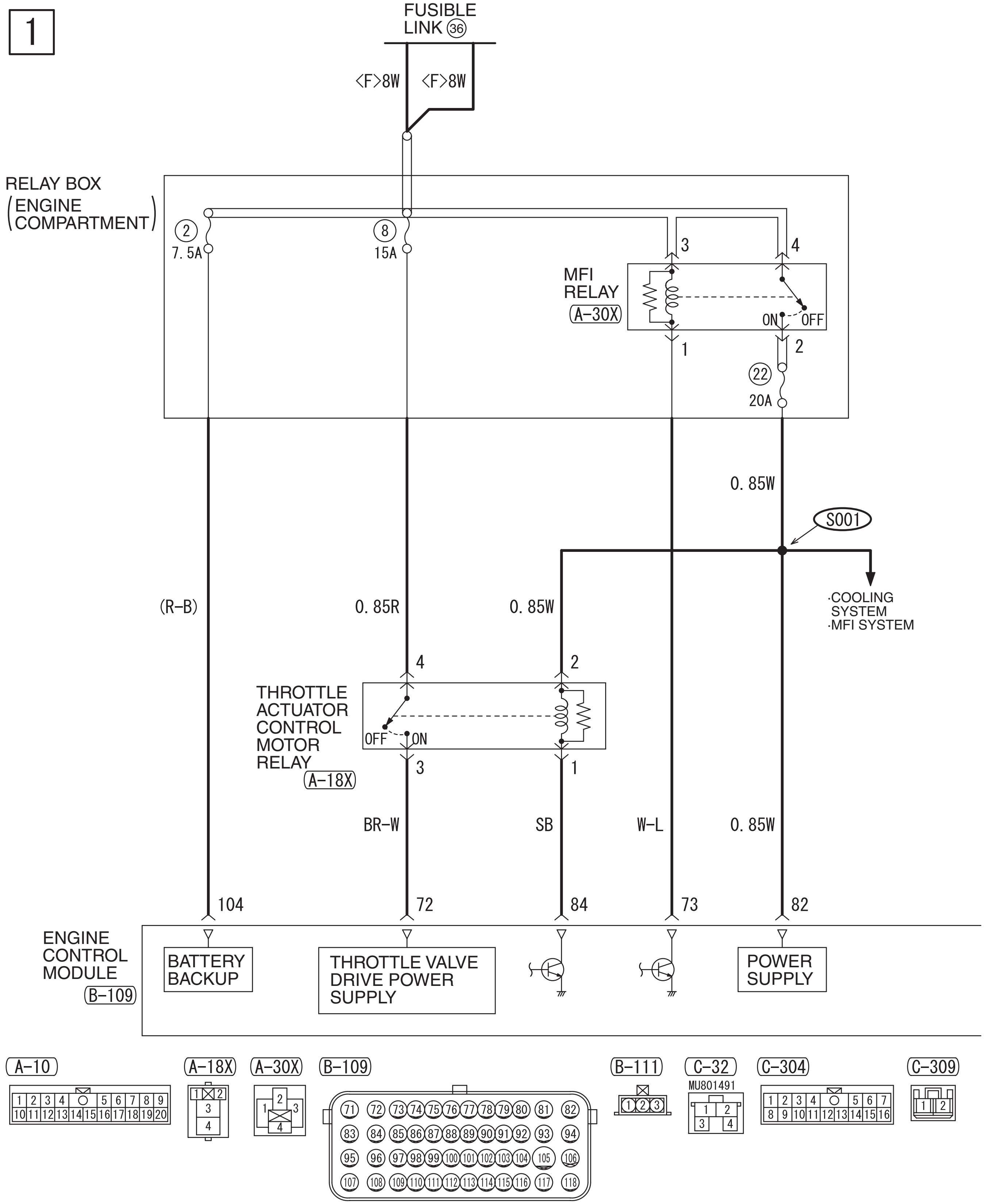
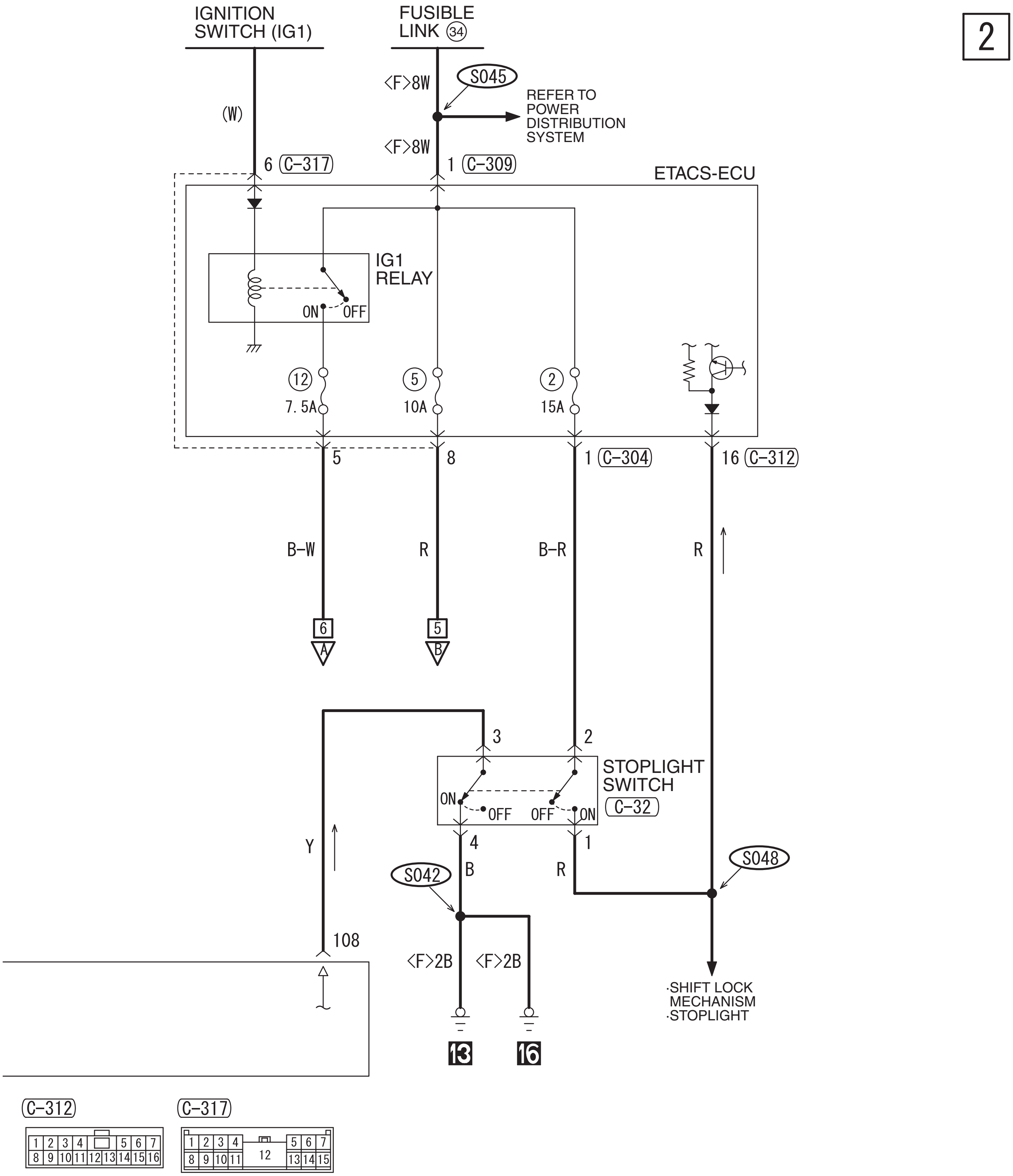
H8G15M02BB

AUTO-CRUISE CONTROL SYSTEM

M1901009302433





WIRE COLOR CODE
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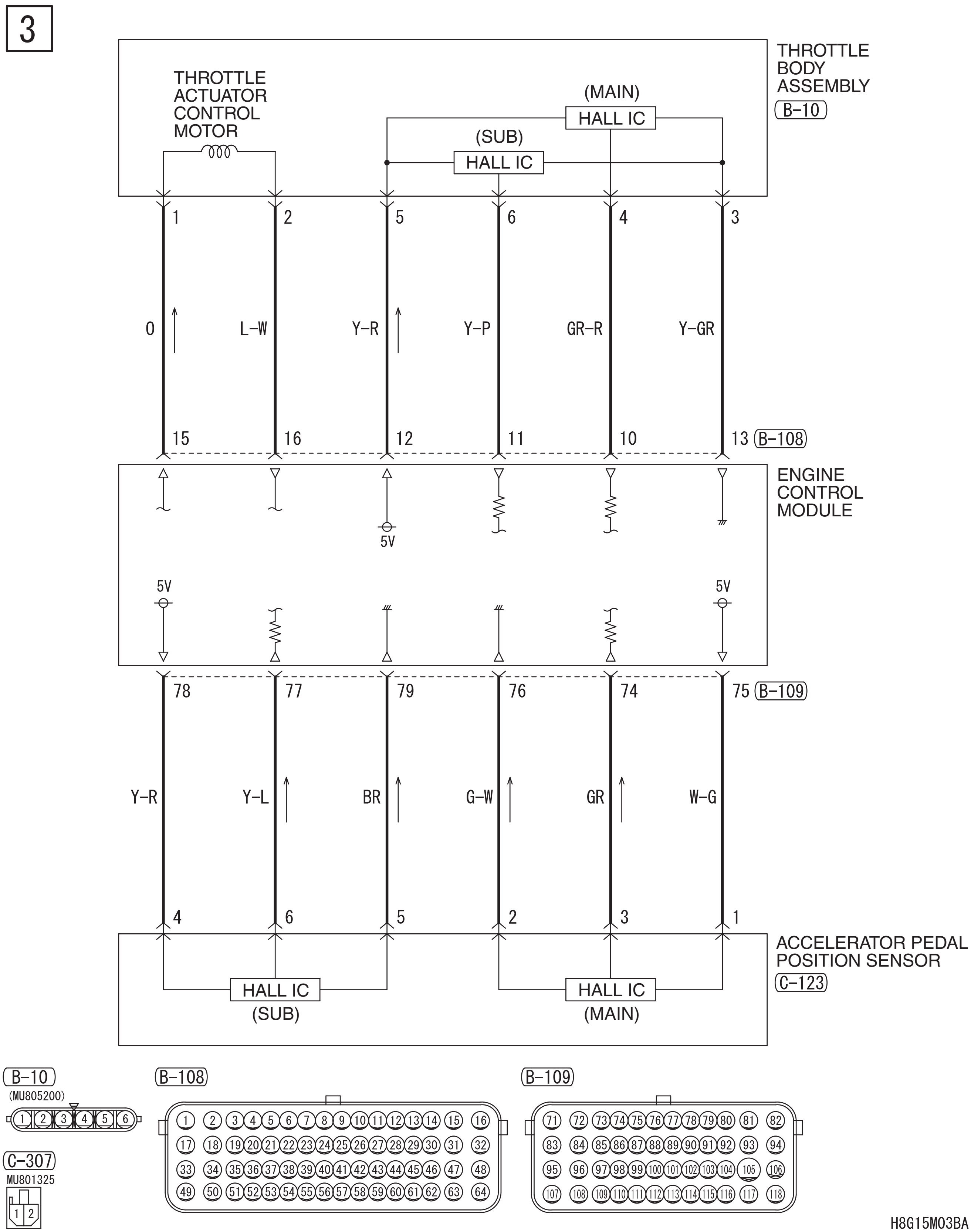
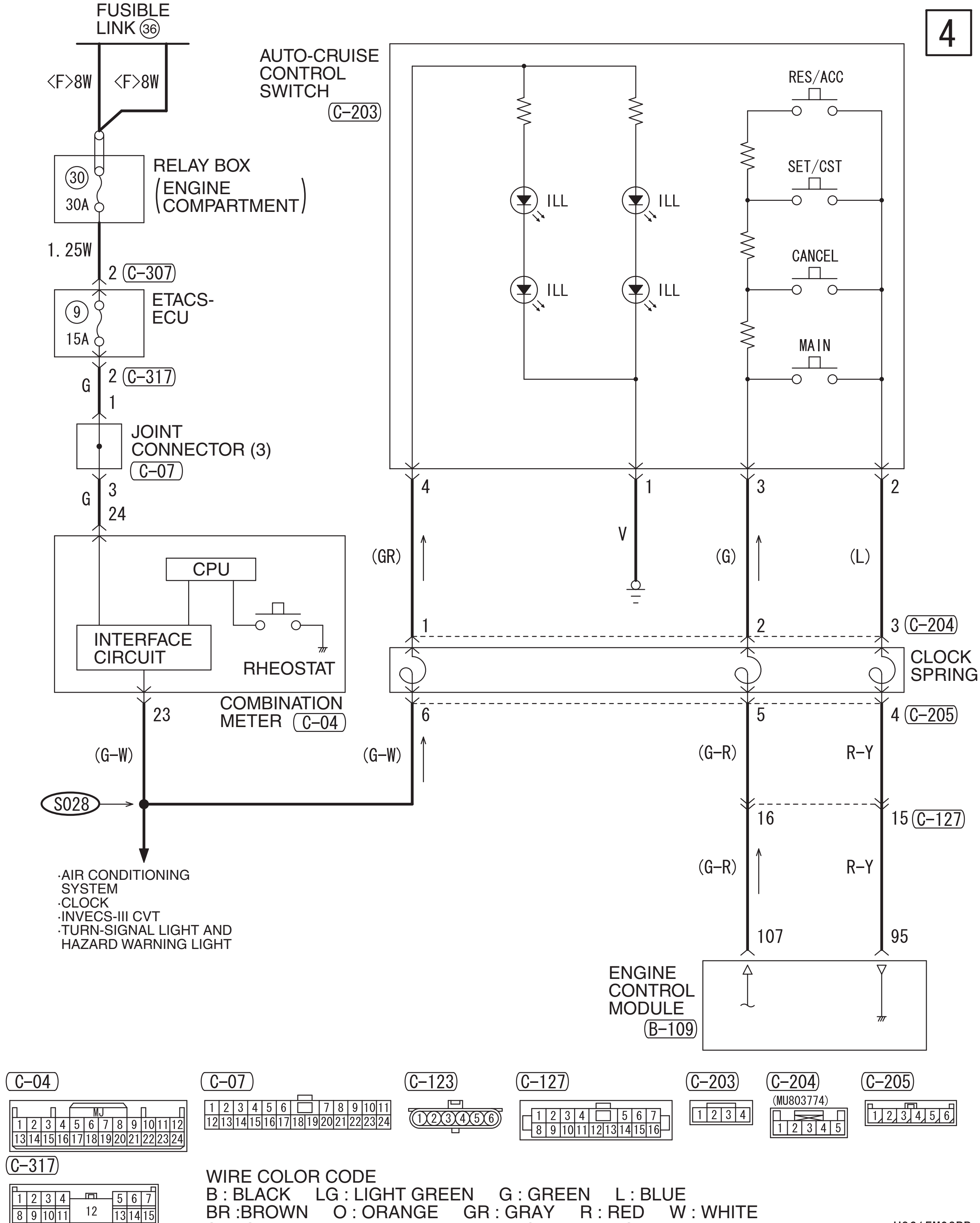
H8G15M03AB

AUTO-CRUISE CONTROL SYSTEM (CONTINUED)





WIRE COLOR CODE
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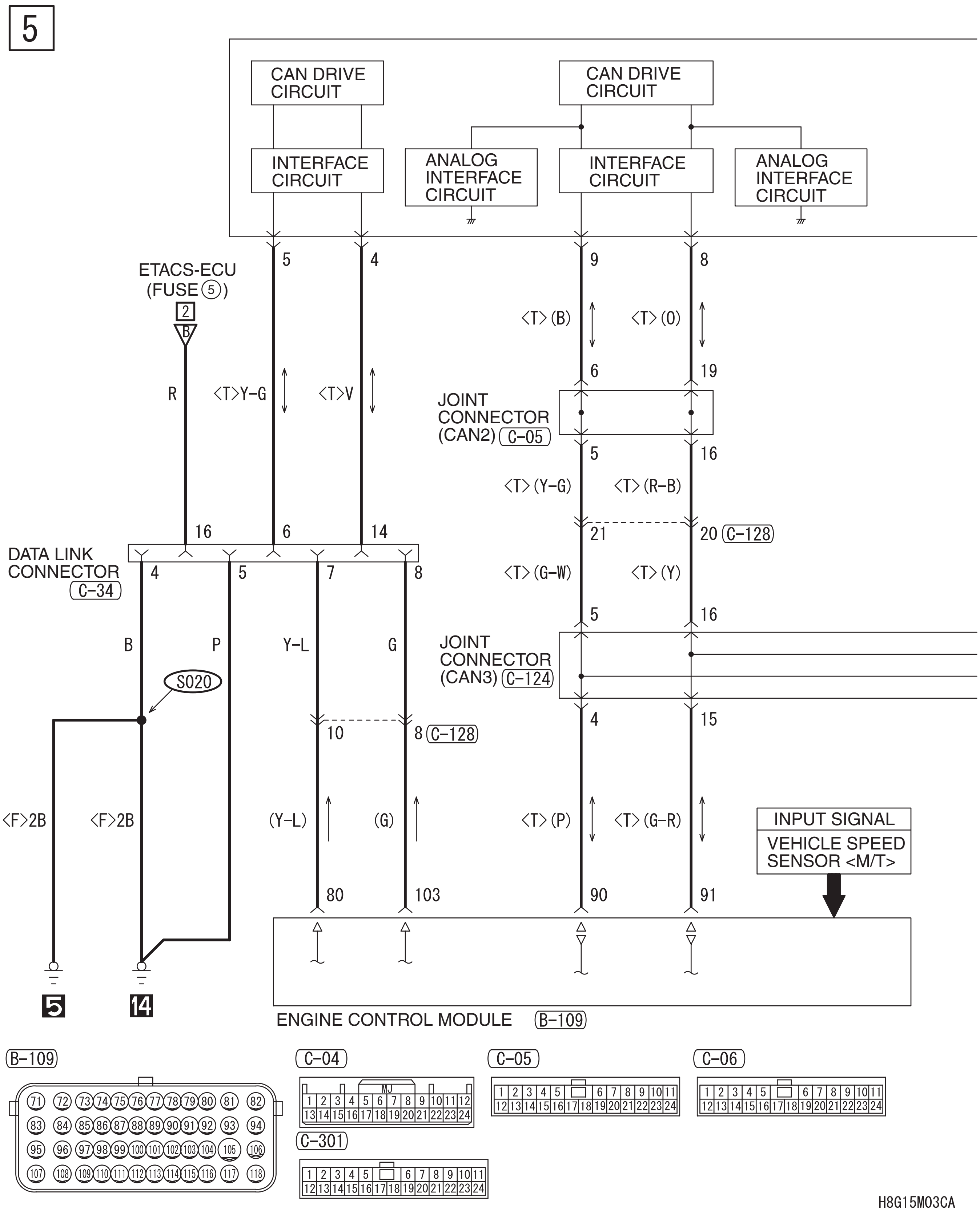
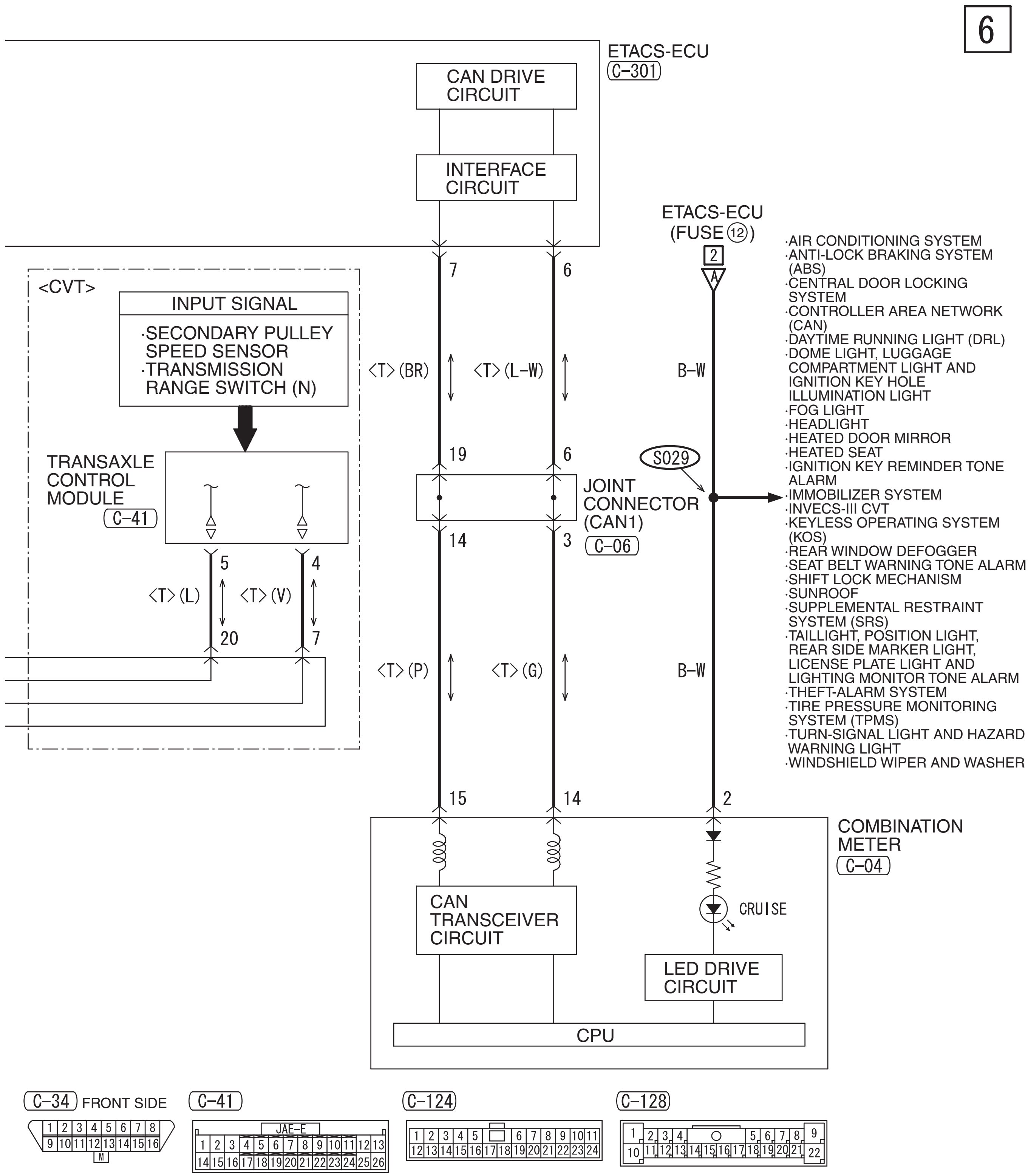
SB : SKY BLUE P : PINK Y : YELLOW V : VIOLET P : PURPLE

AUTO-CRUISE CONTROL SYSTEM (CONTINUED)





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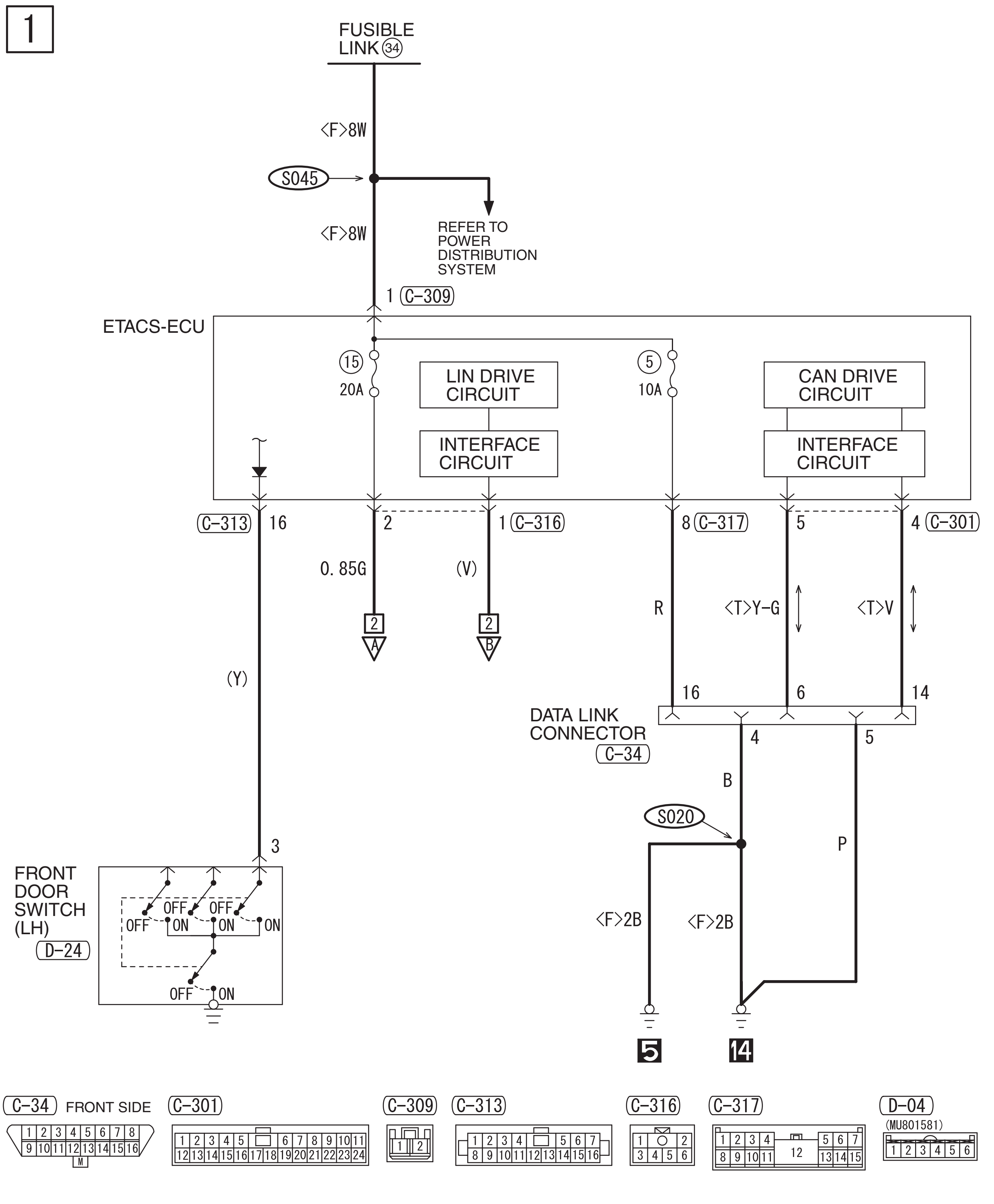
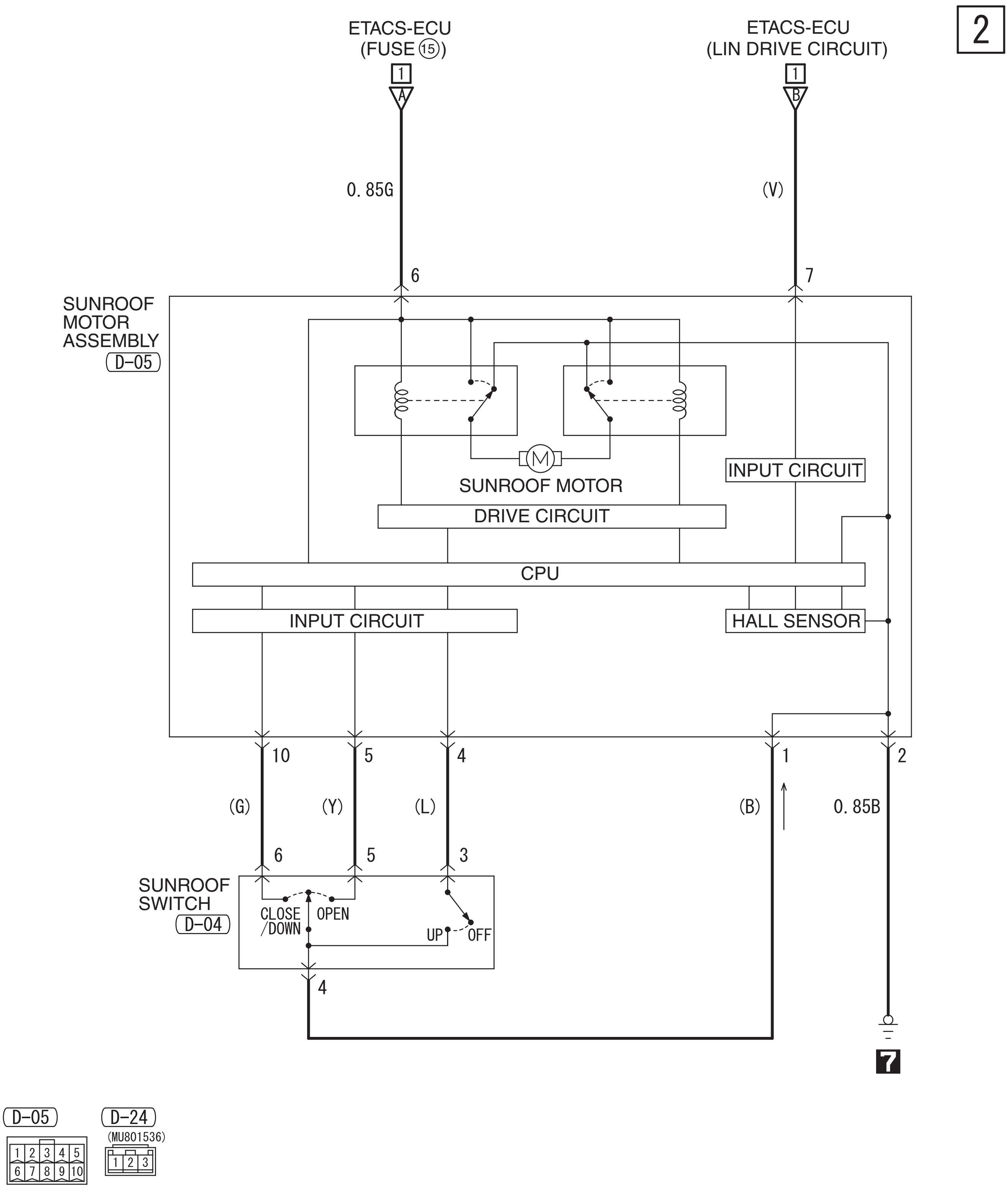
H8G15M03CB

SUNROOF

M1901009901896





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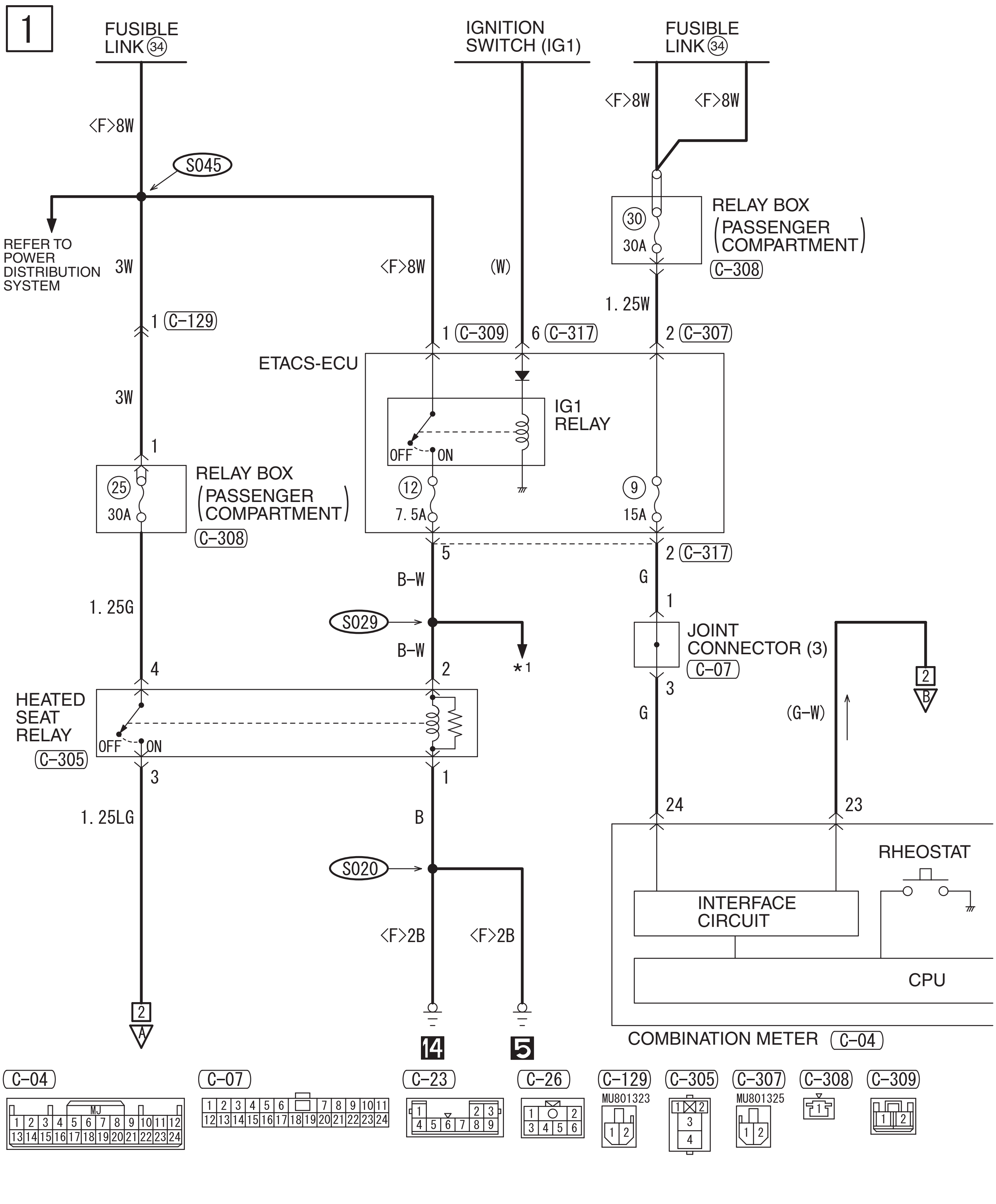
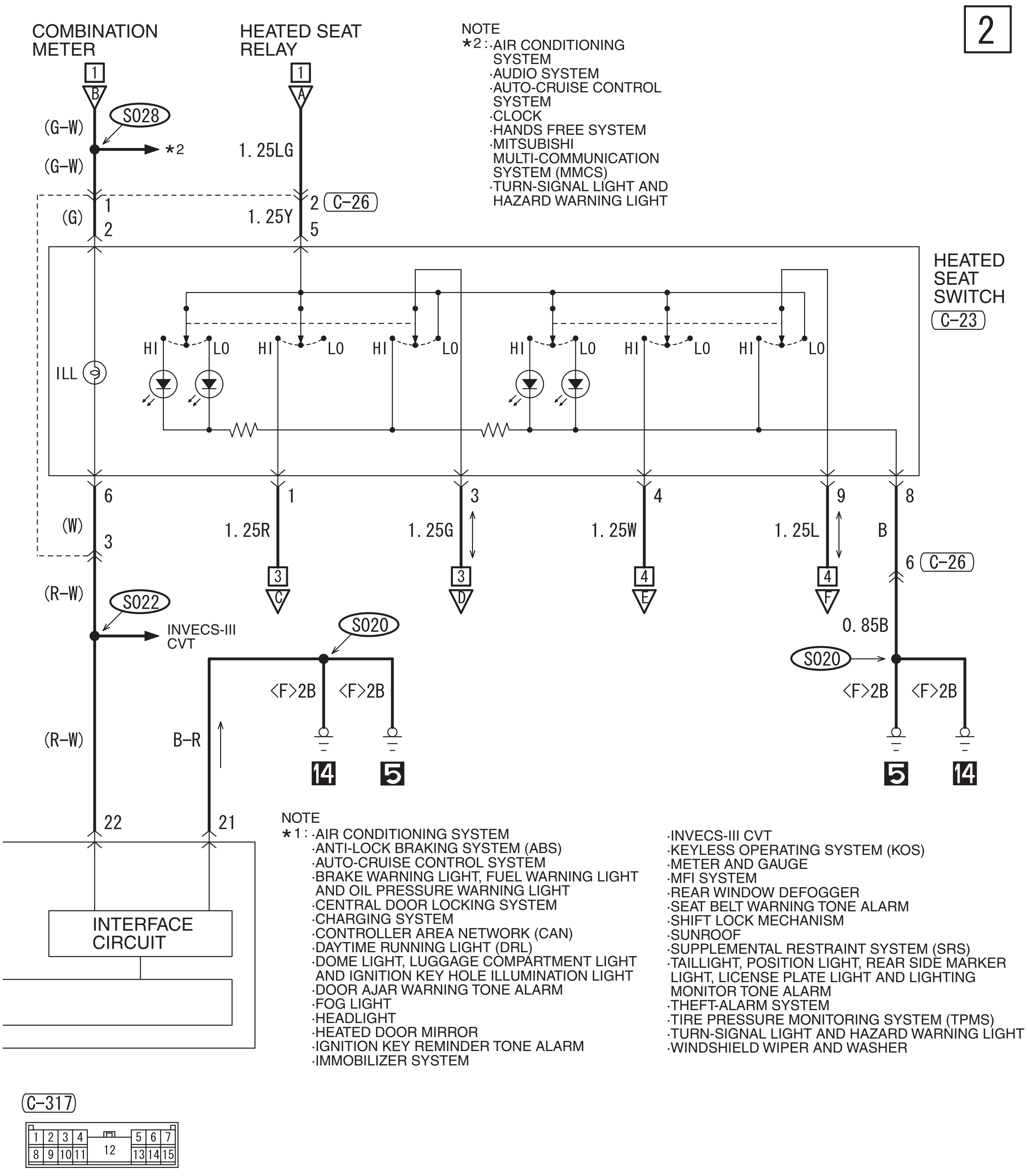
H8G15M04AB

HEATED SEAT

M1901010701089





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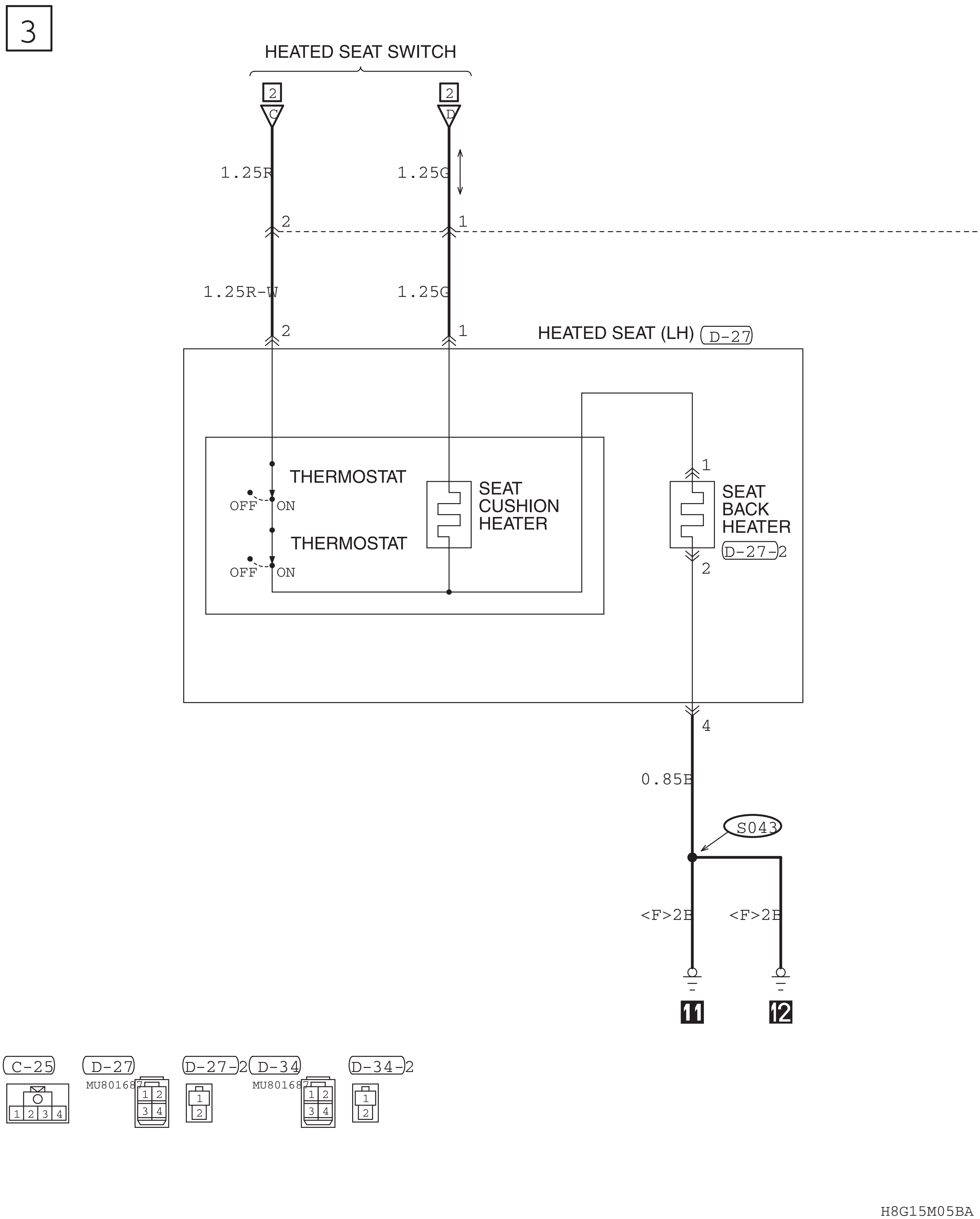
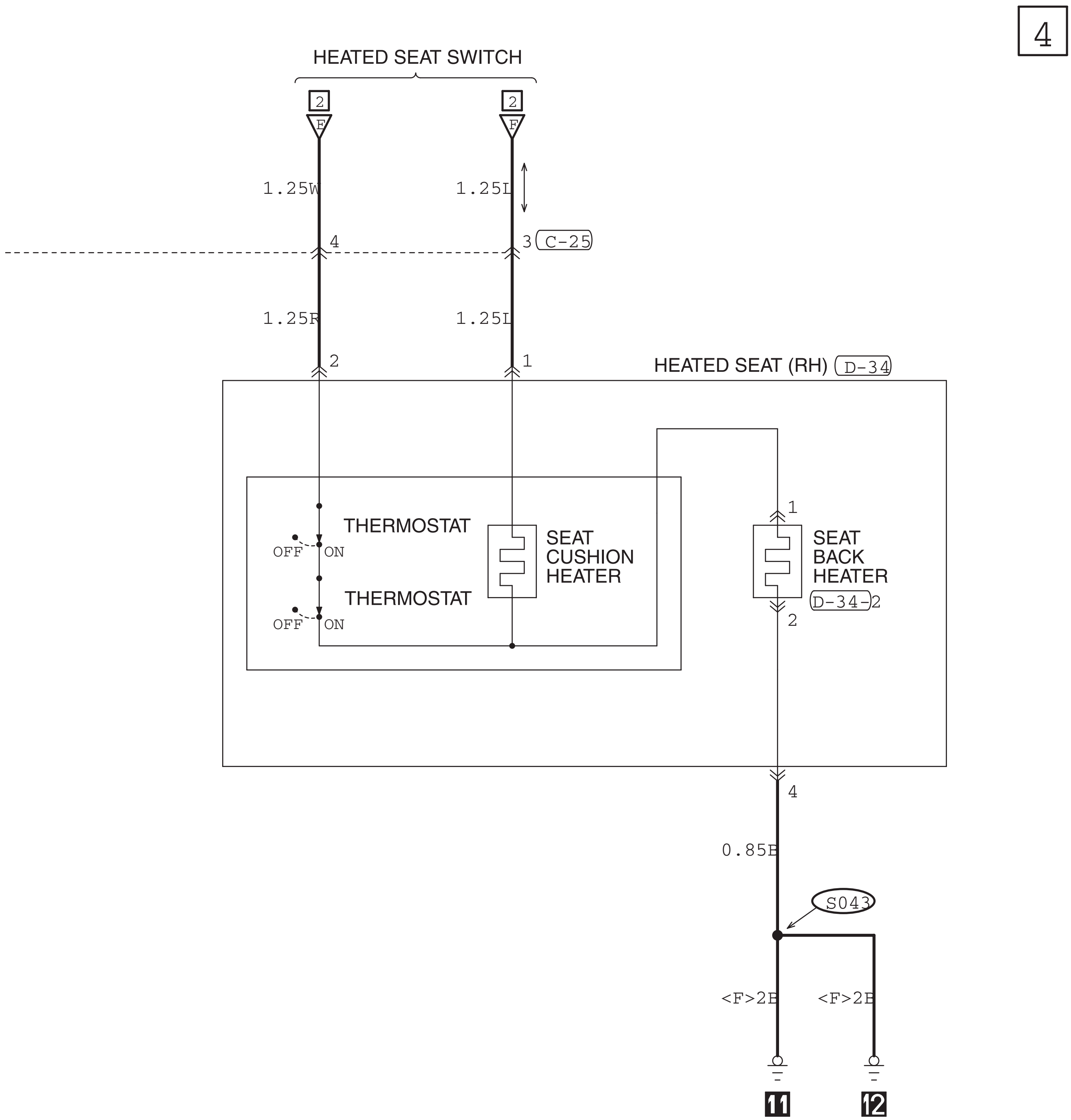
H8G15M05AB

HEATED SEAT (CONTINUED)





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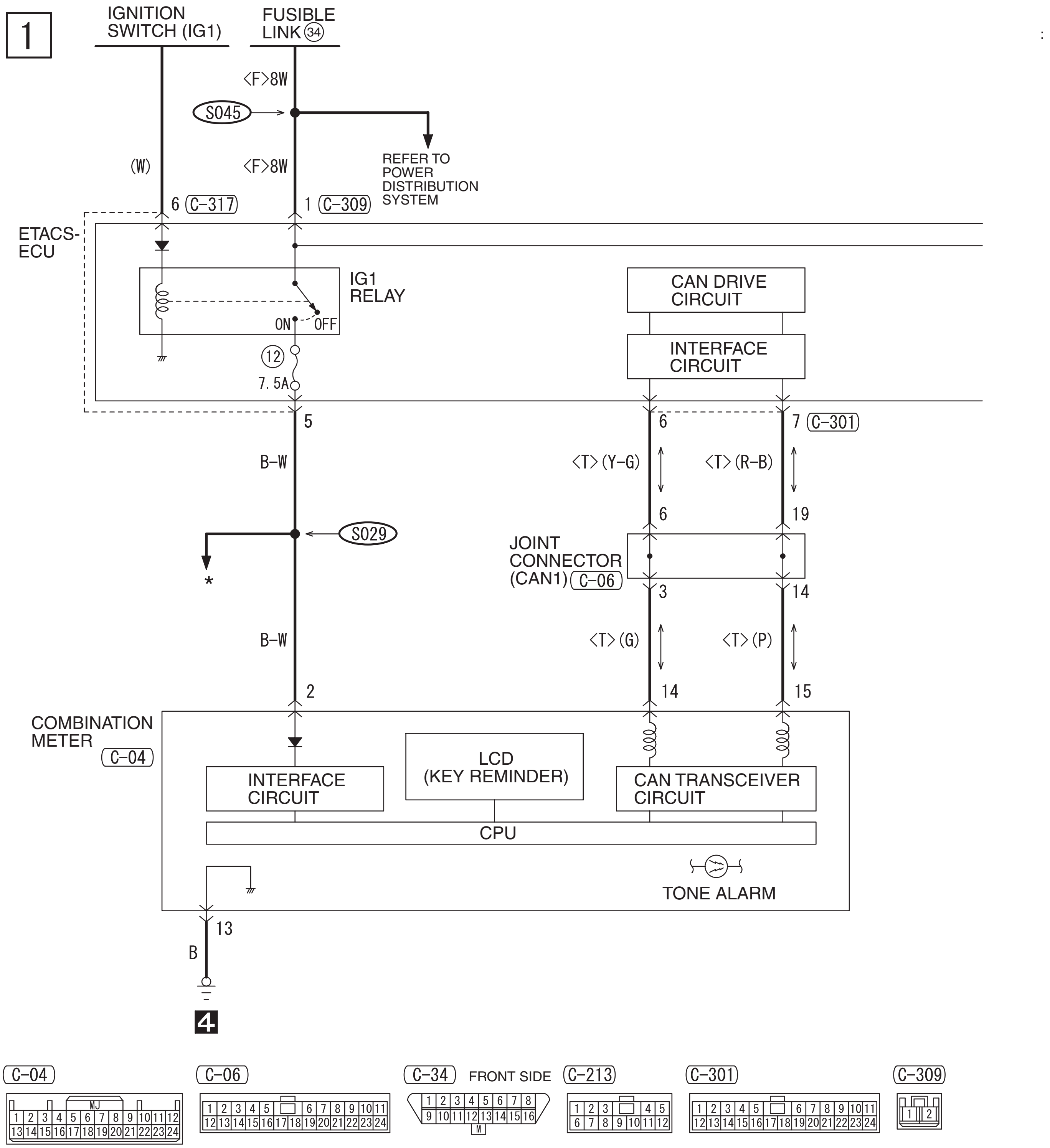
H8G15M05BB

IGNITION KEY REMINDER TONE ALARM <VEHICLES WITHOUT KOS>

M1901011301374

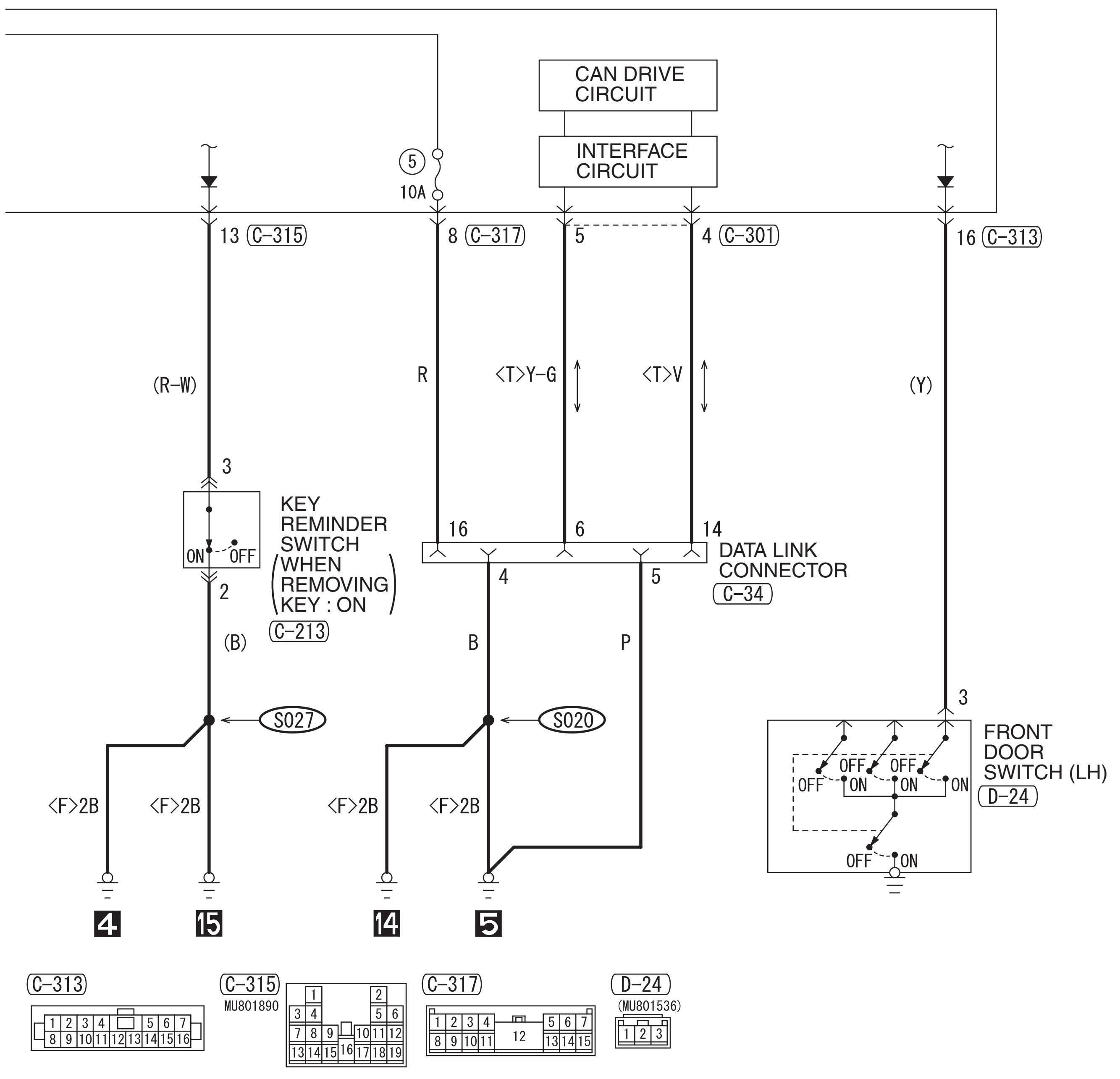


H8G15M06AA

2

NOTE

*: ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



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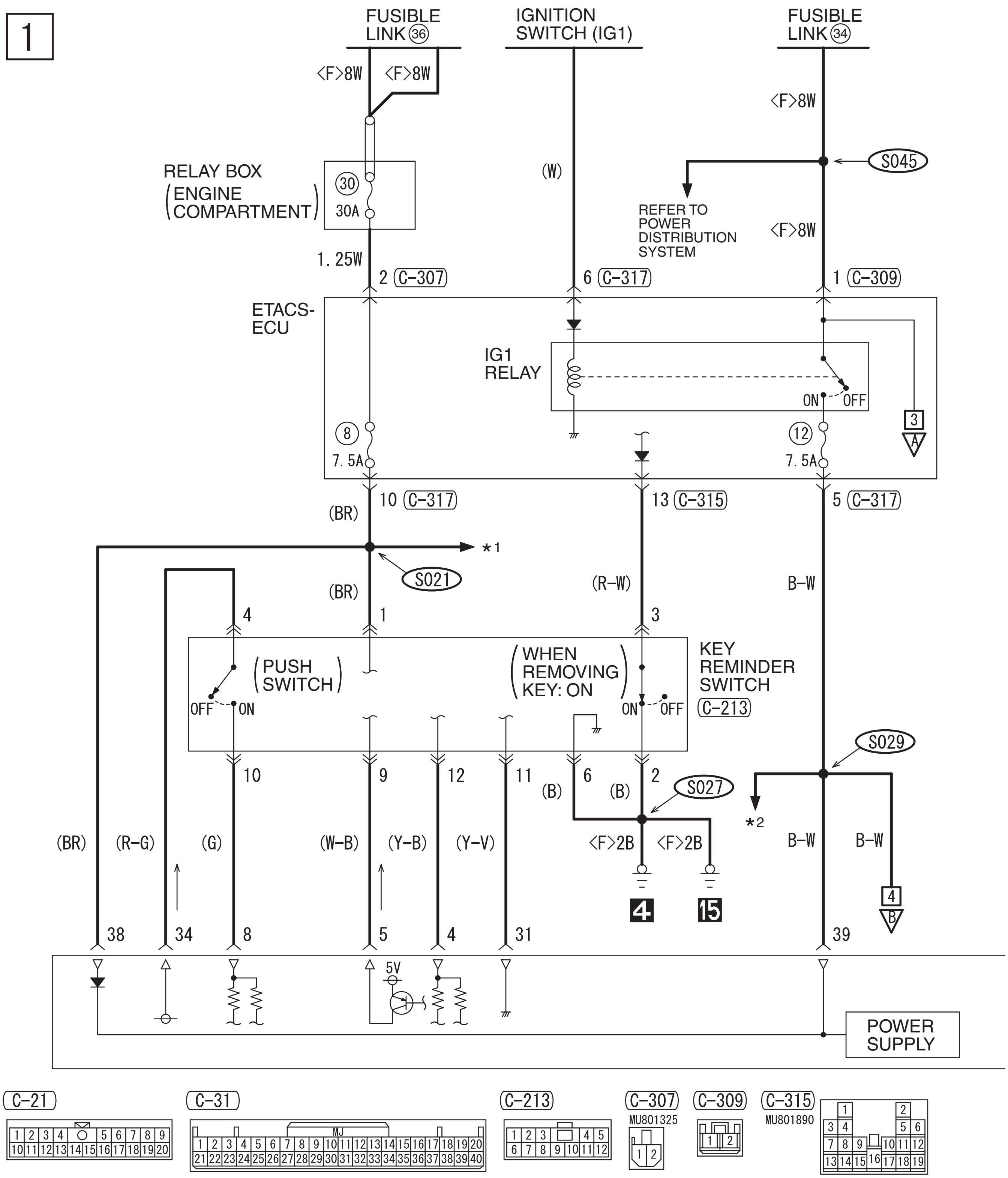
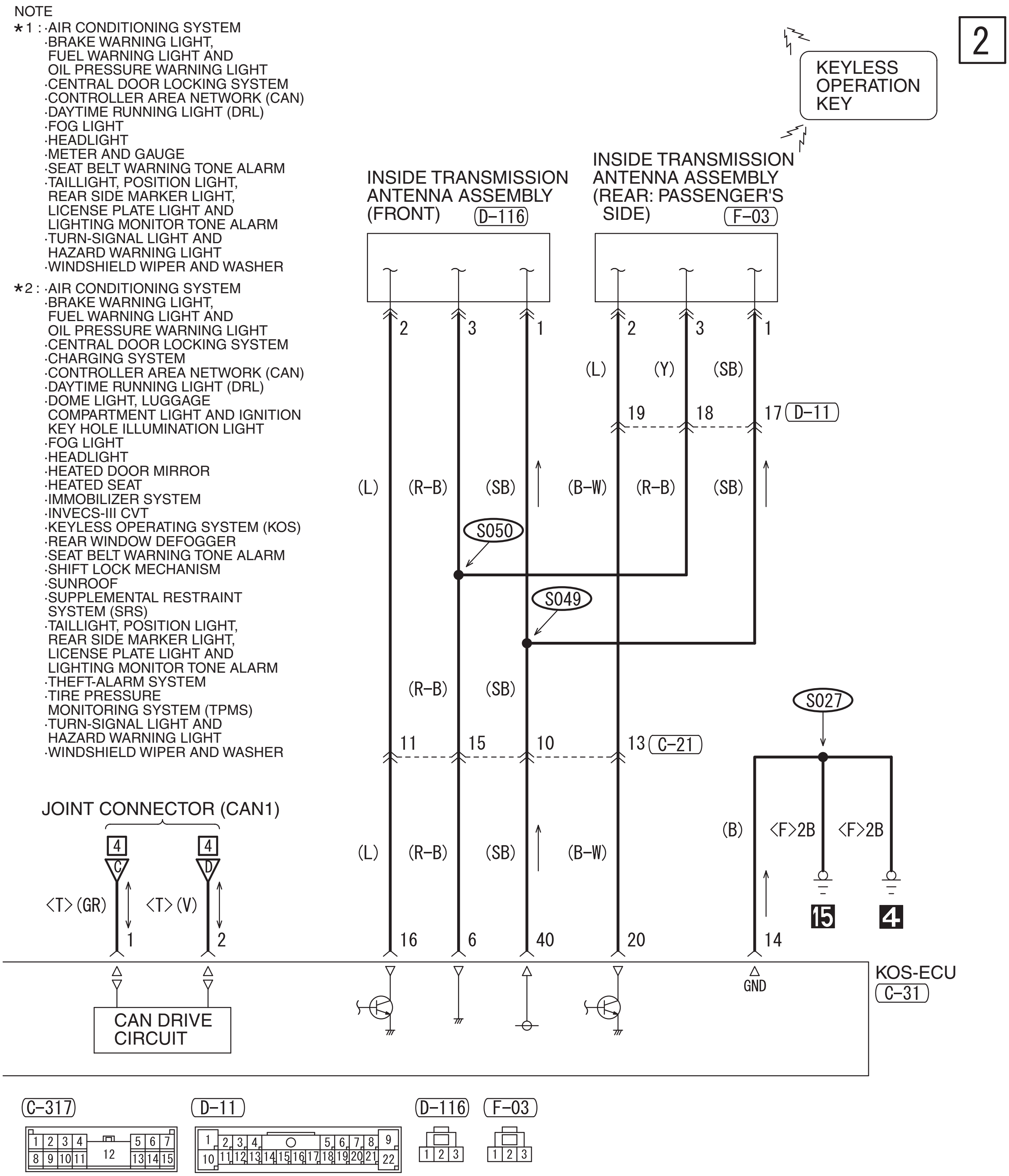
H8G15M06AB

IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>

M1901011301363





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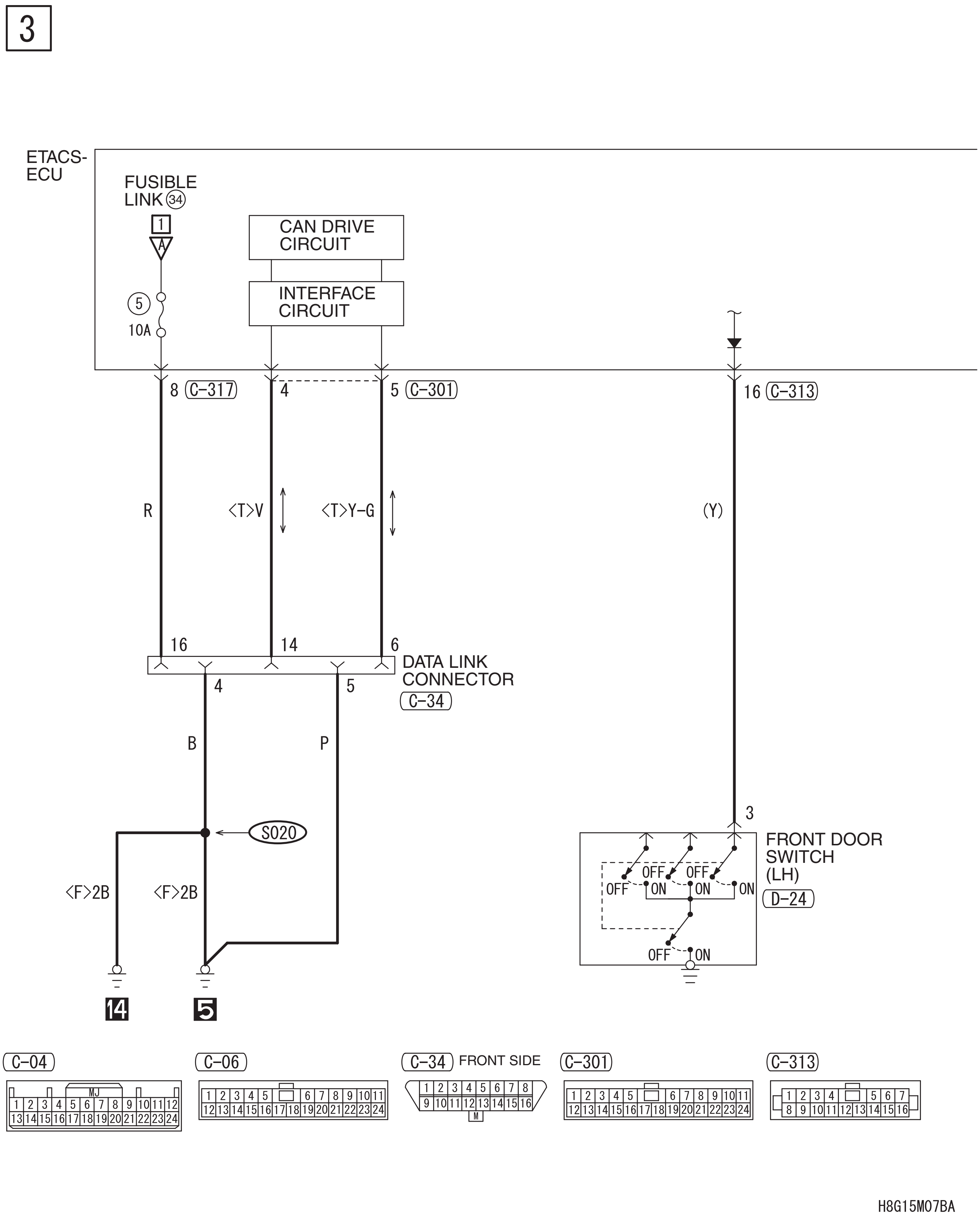
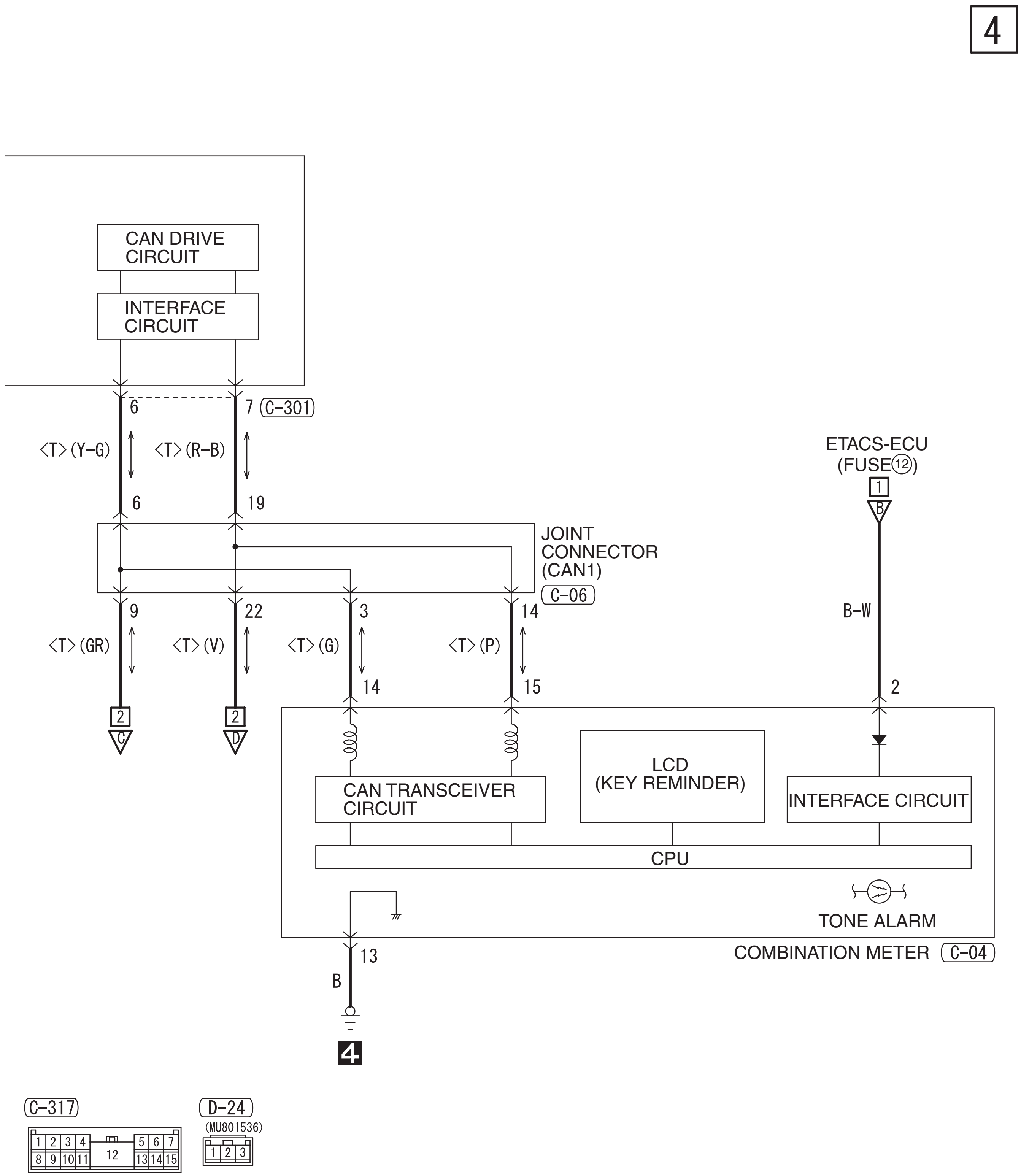
IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS> (CONTINUED)



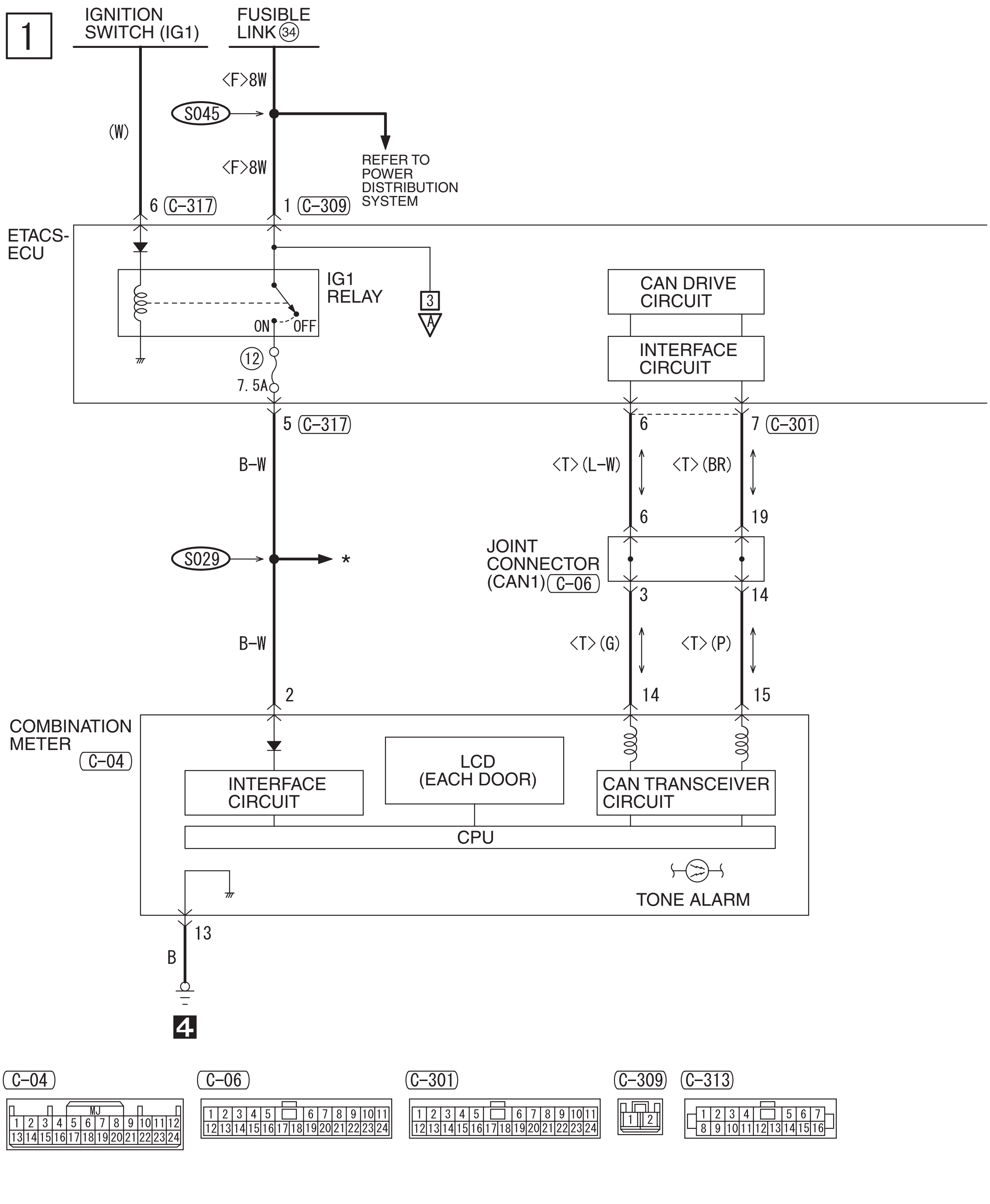


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

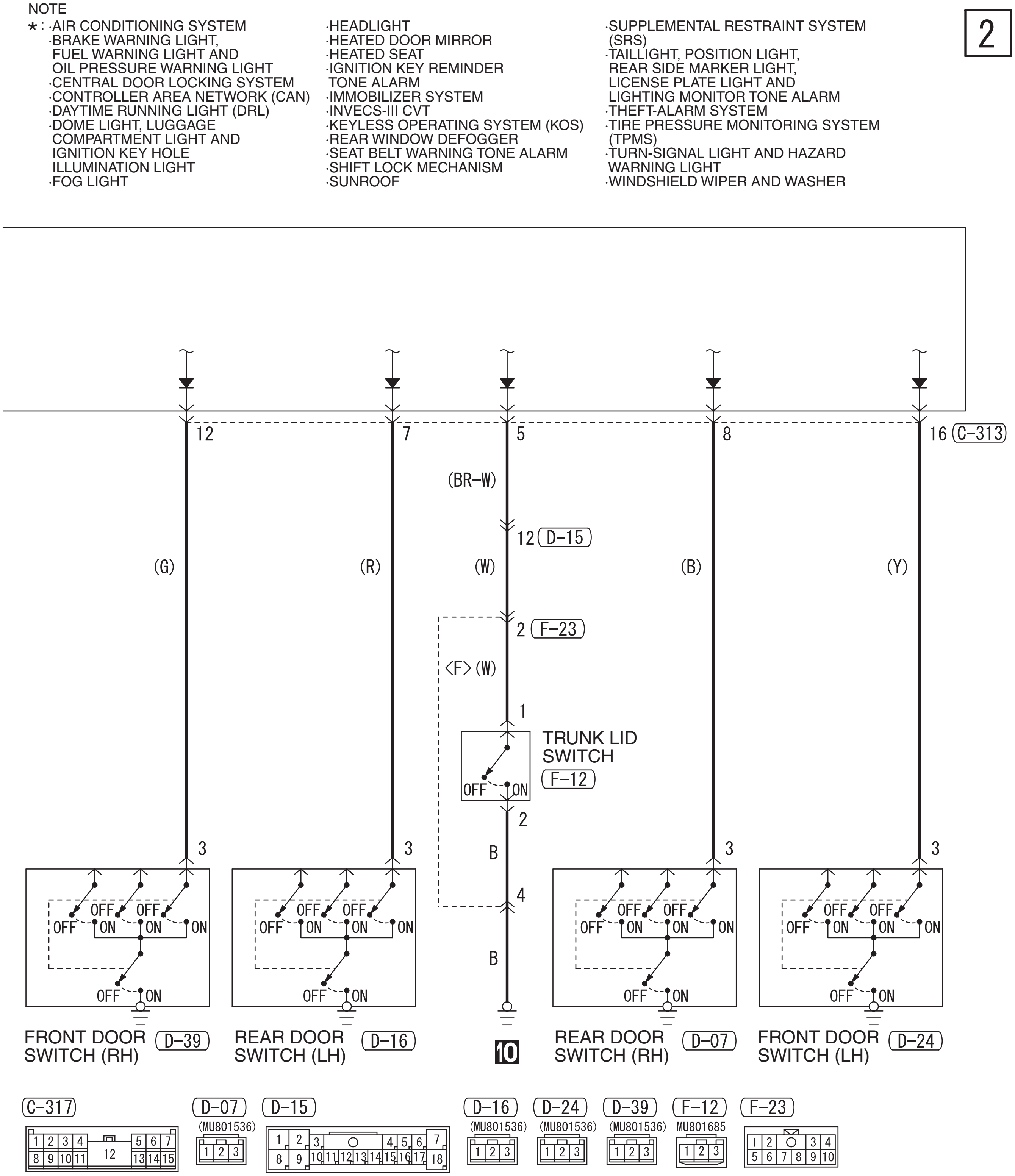
H8G15M07BB

DOOR AJAR WARNING TONE ALARM

M1901016601121



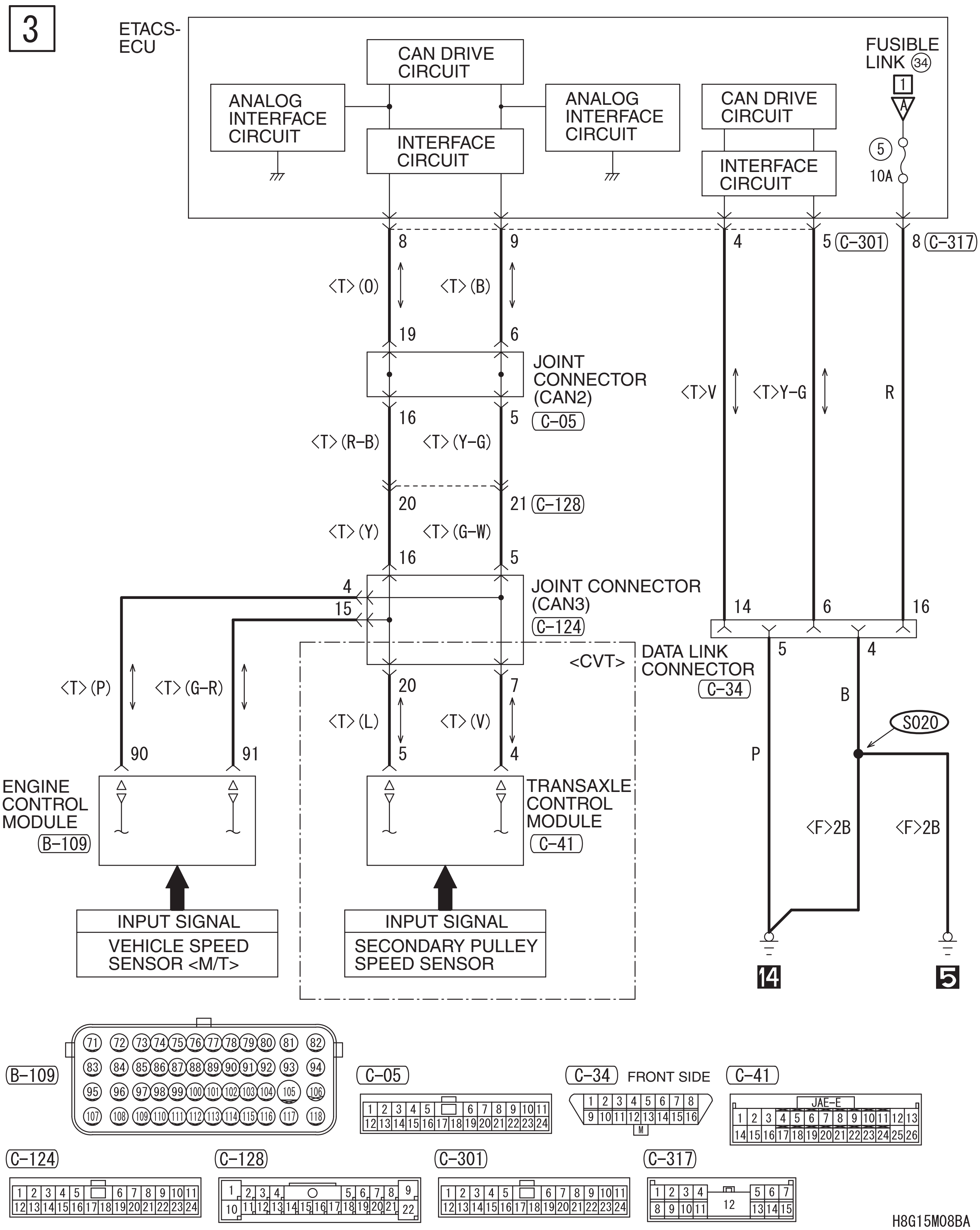
NOTE
*: ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M08AB

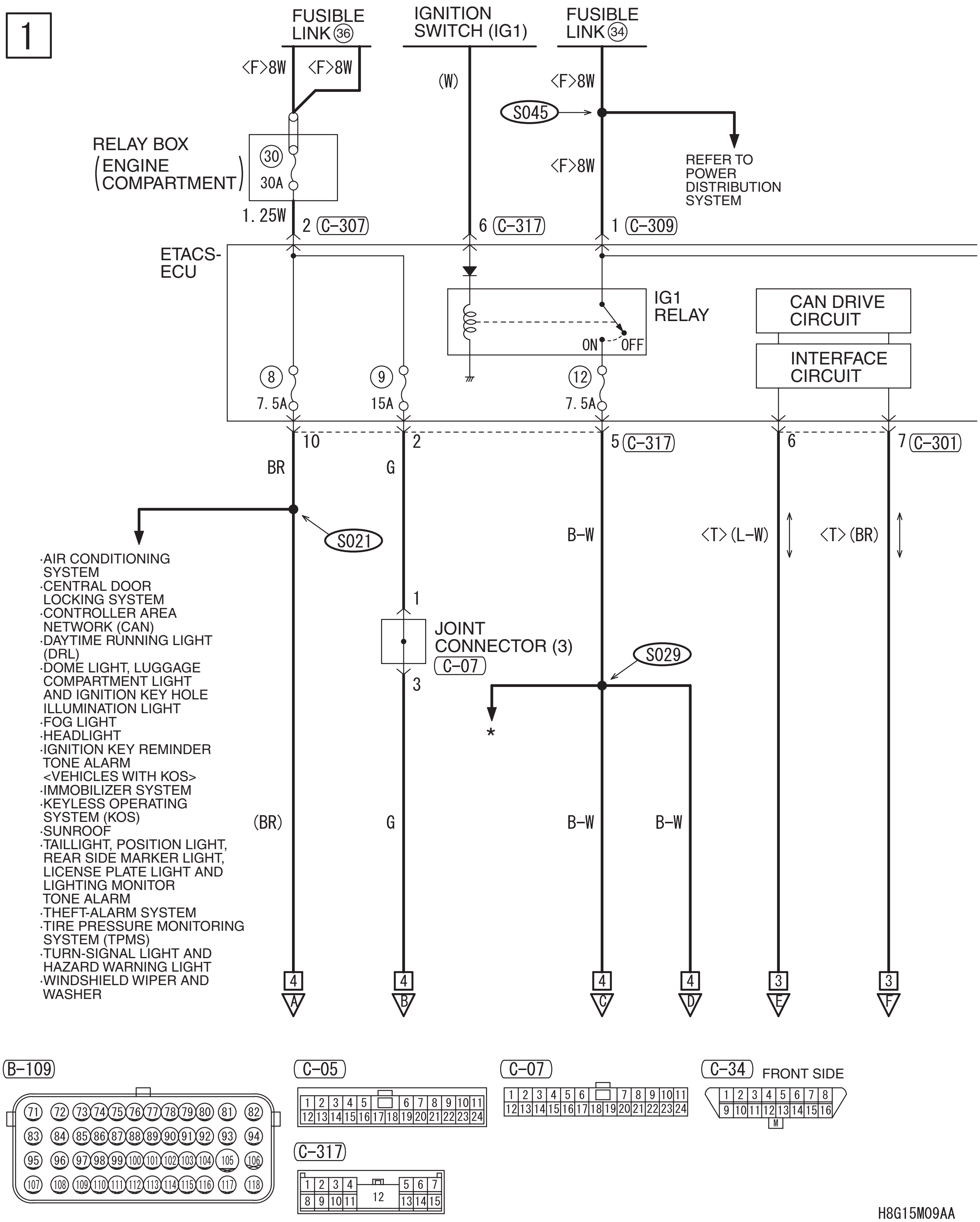
DOOR AJAR WARNING TONE ALARM (CONTINUED)



NOTES

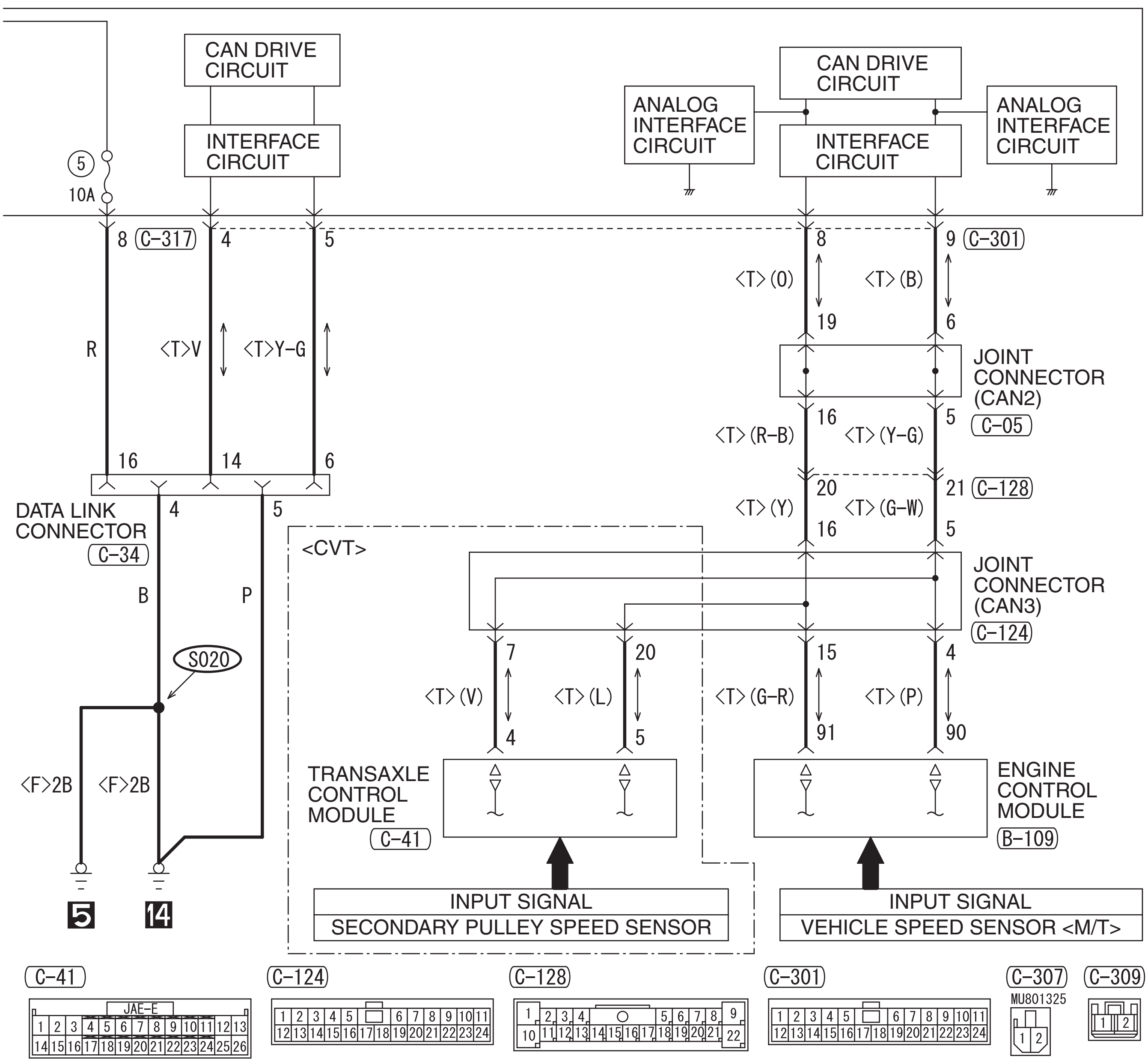
SEAT BELT WARNING TONE ALARM

M1901011201407



NOTE
* : ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT, LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·INVECS-III CVT
·KEYLESS OPERATING SYSTEM (KOS)
·REAR WINDOW DEFOGGER
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·THEFT-ALARM SYSTEM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

2



WIRE COLOR CODE
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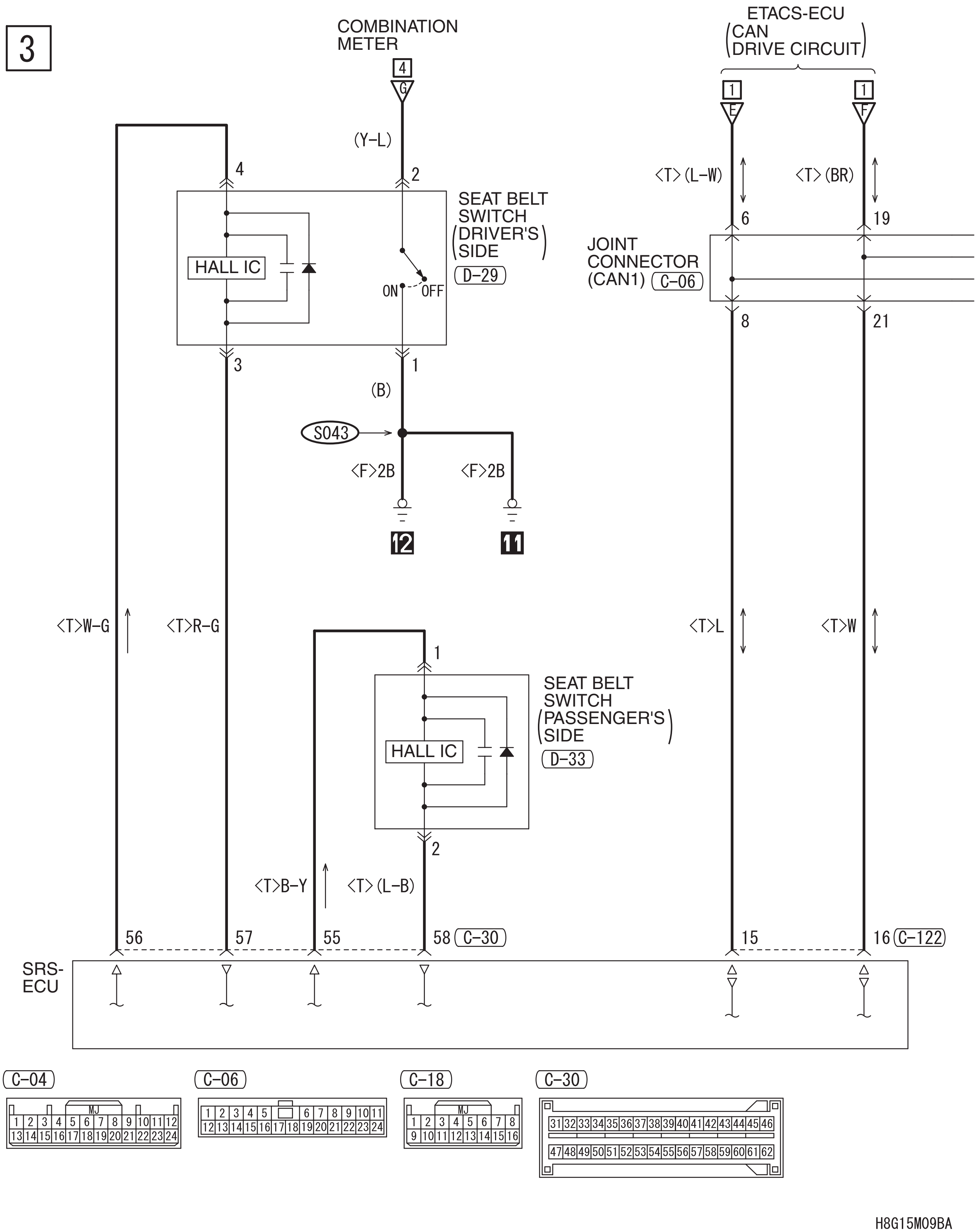
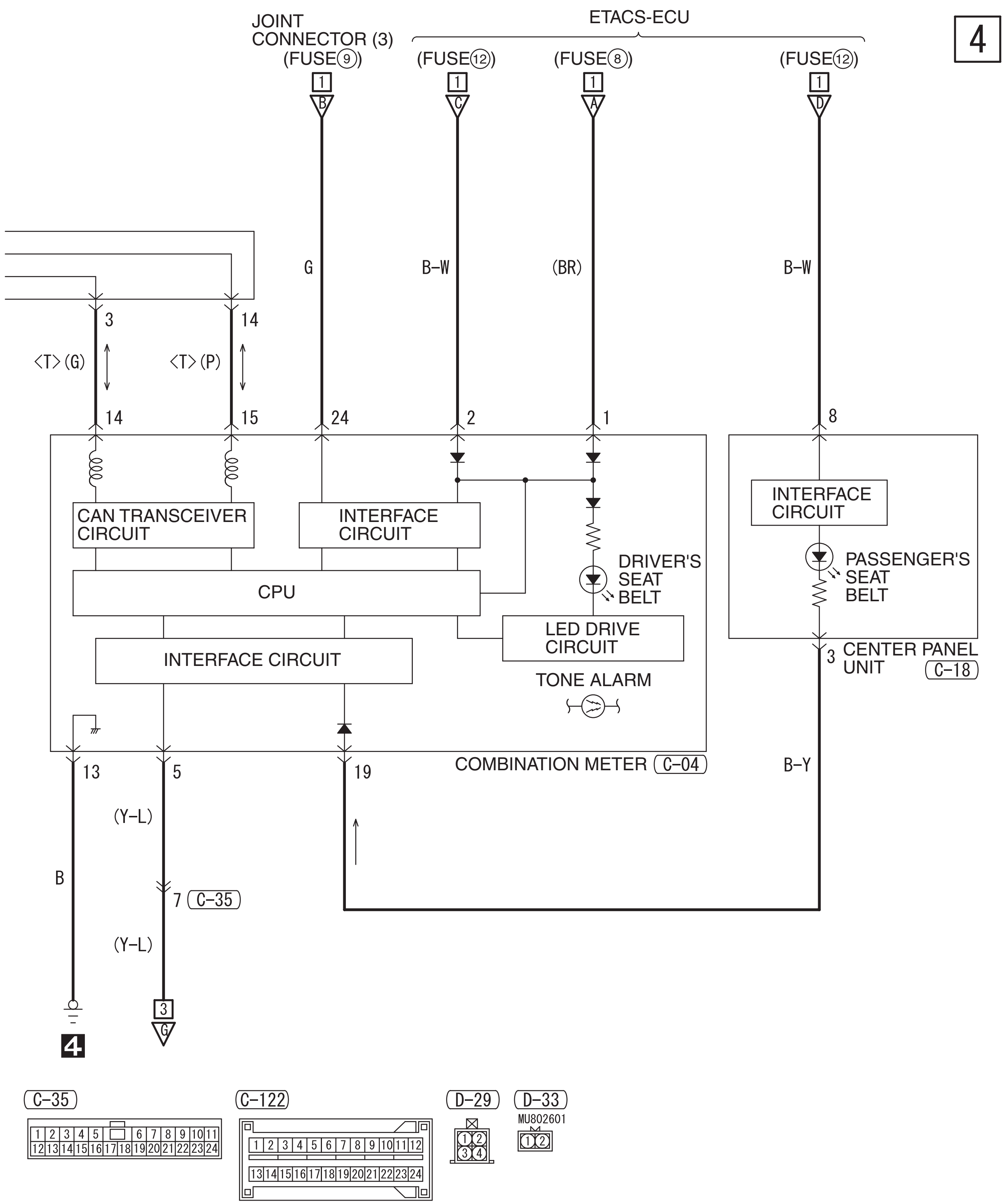
H8G15M09AB

SEAT BELT WARNING TONE ALARM (CONTINUED)



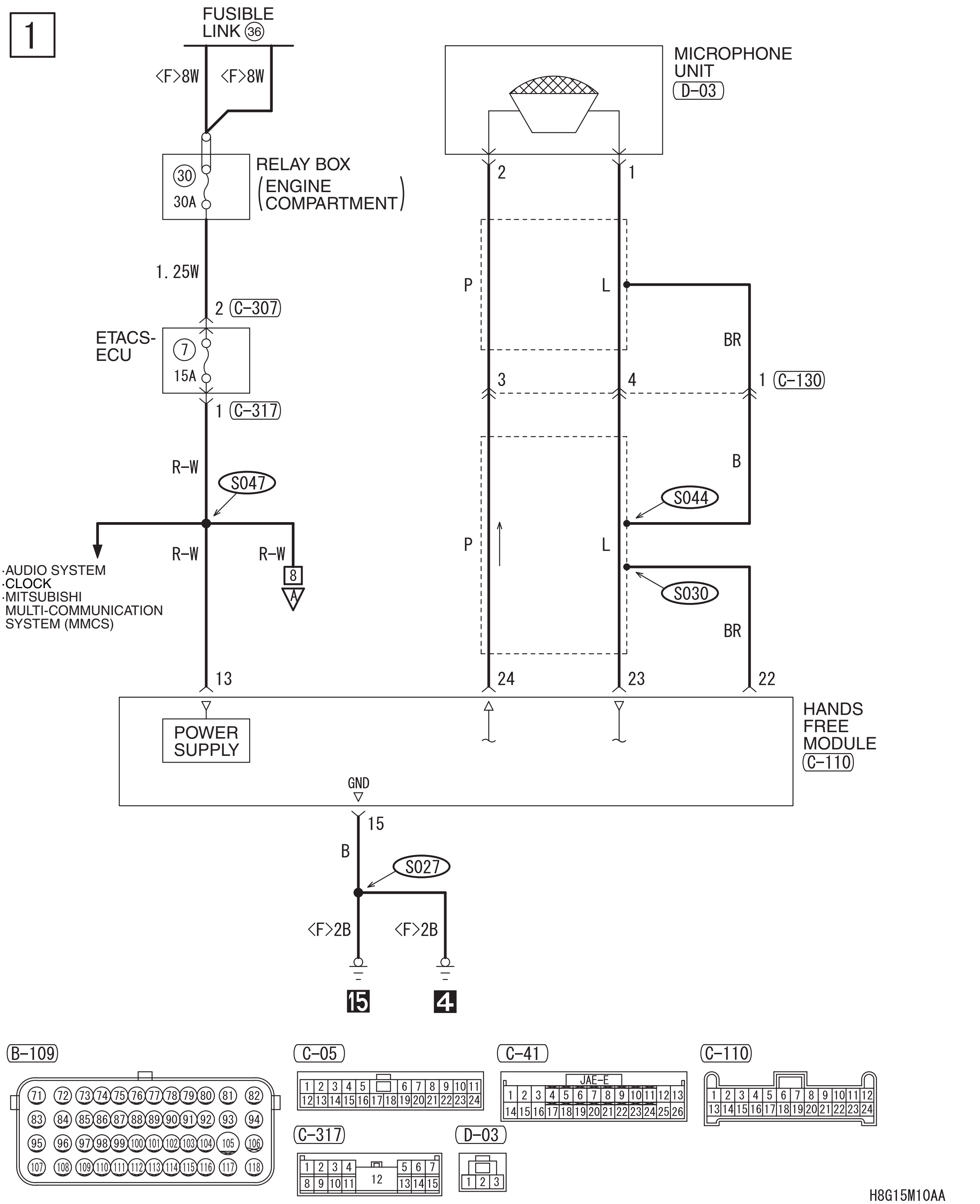


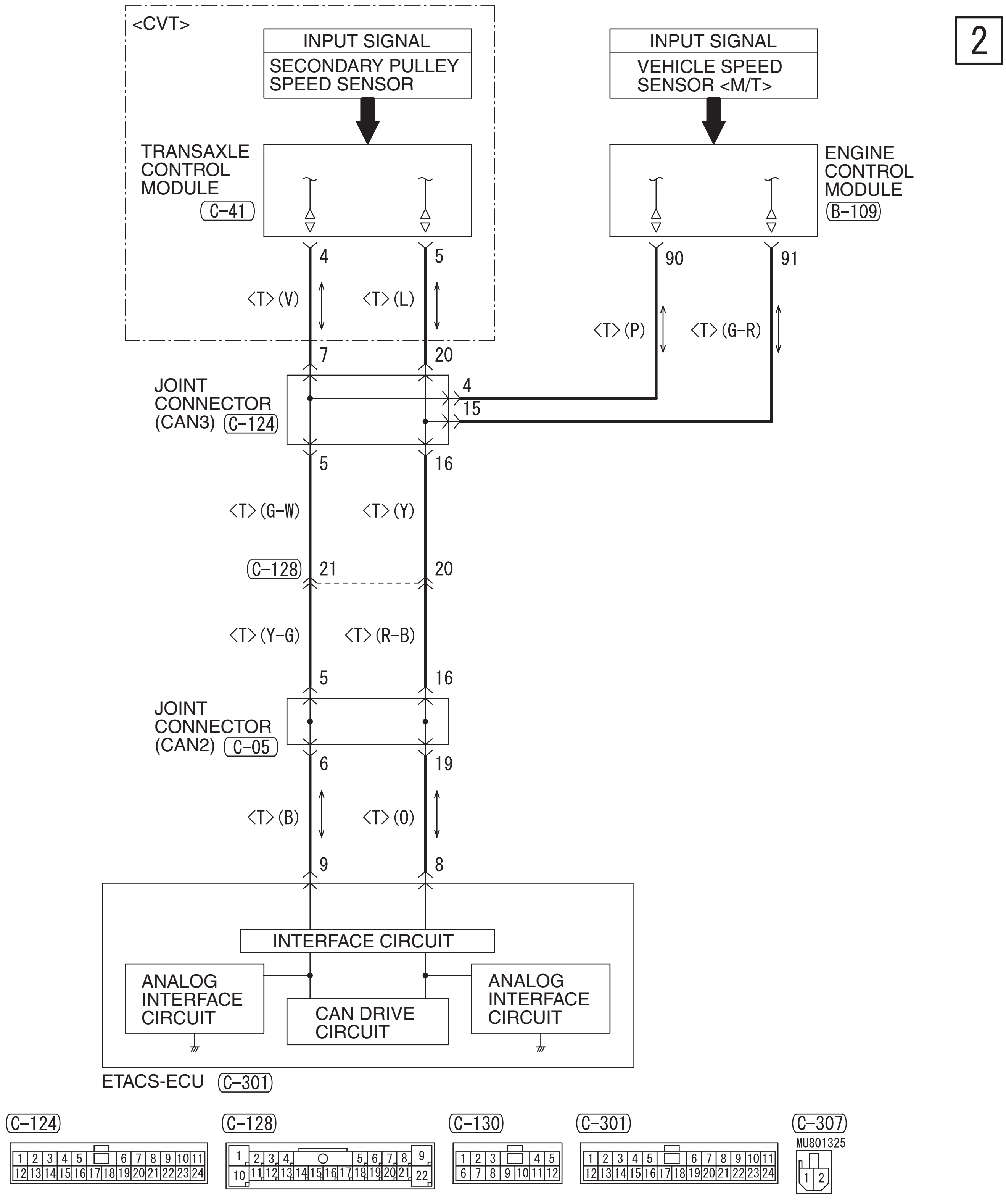
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M09BB

HANDS FREE SYSTEM

M1901028600040





WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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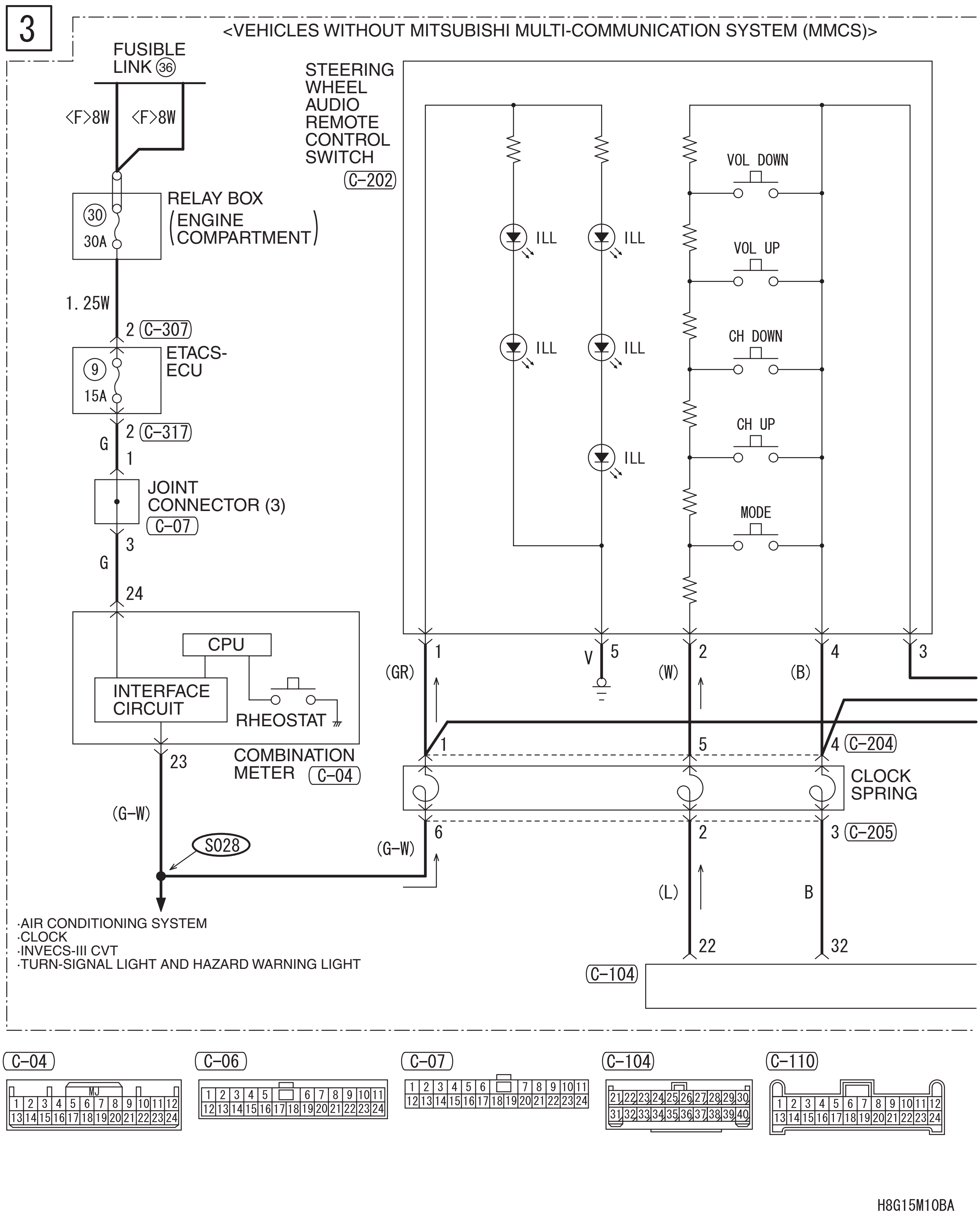
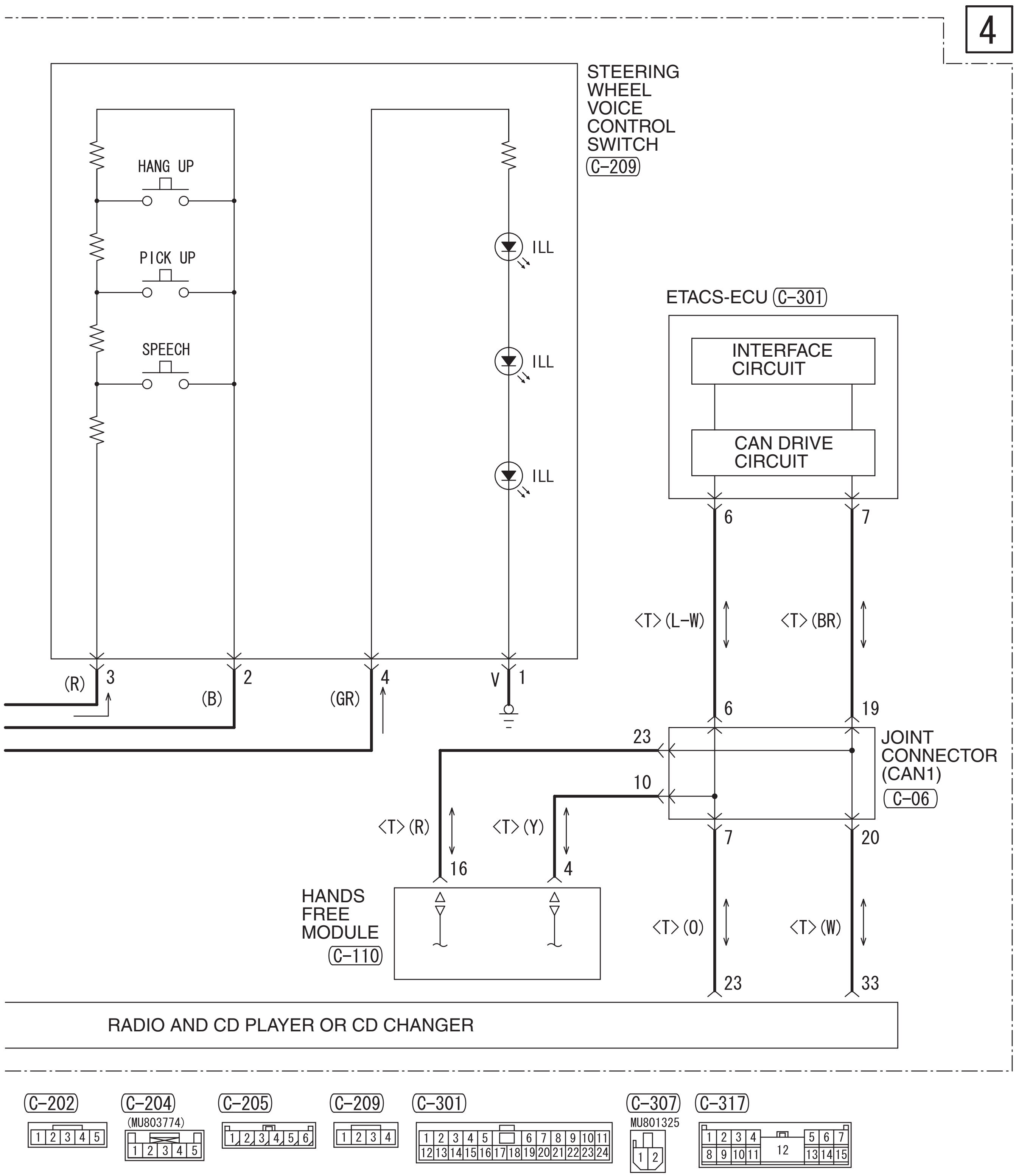
H8G15M10AB

HANDS FREE SYSTEM (CONTINUED)





WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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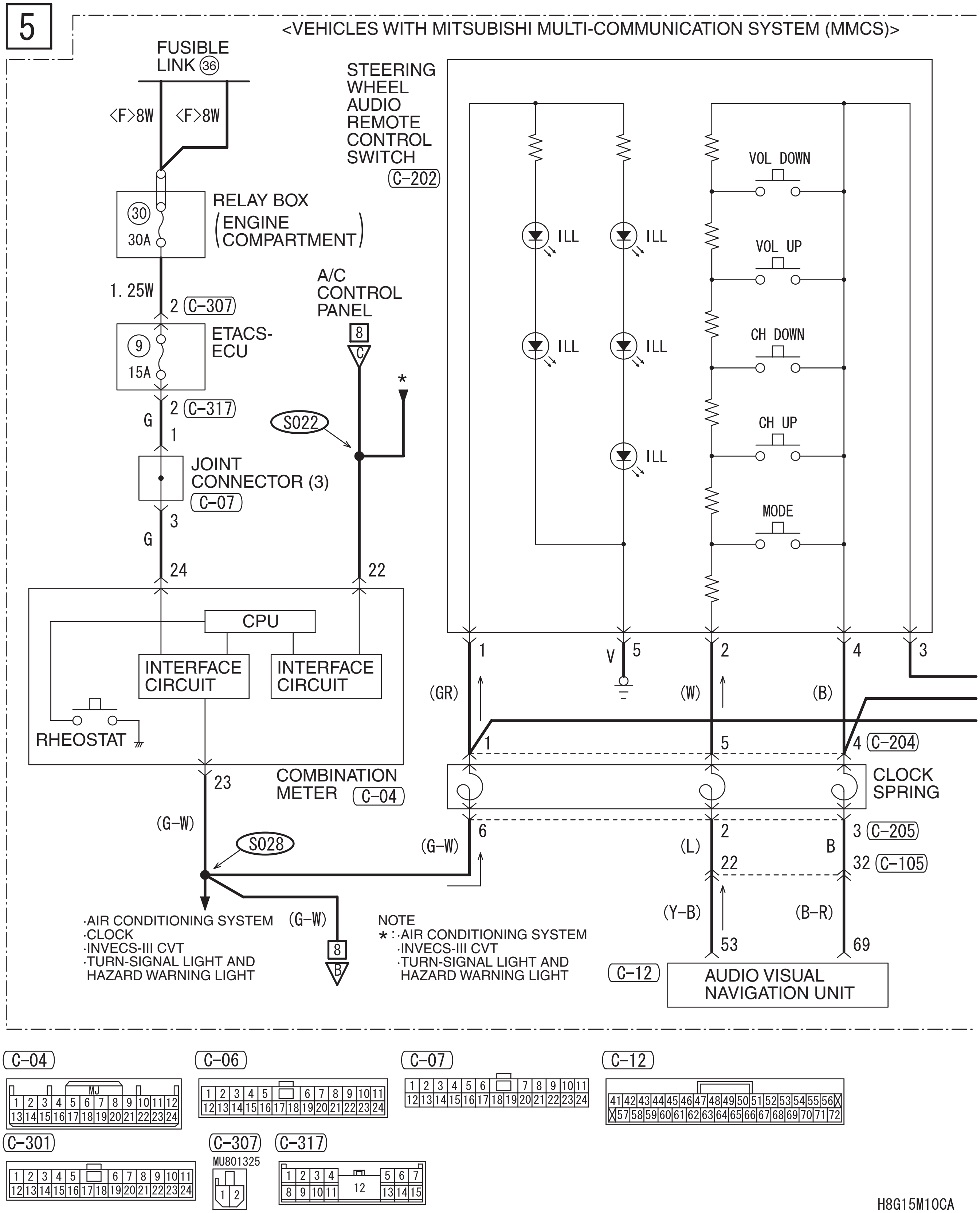
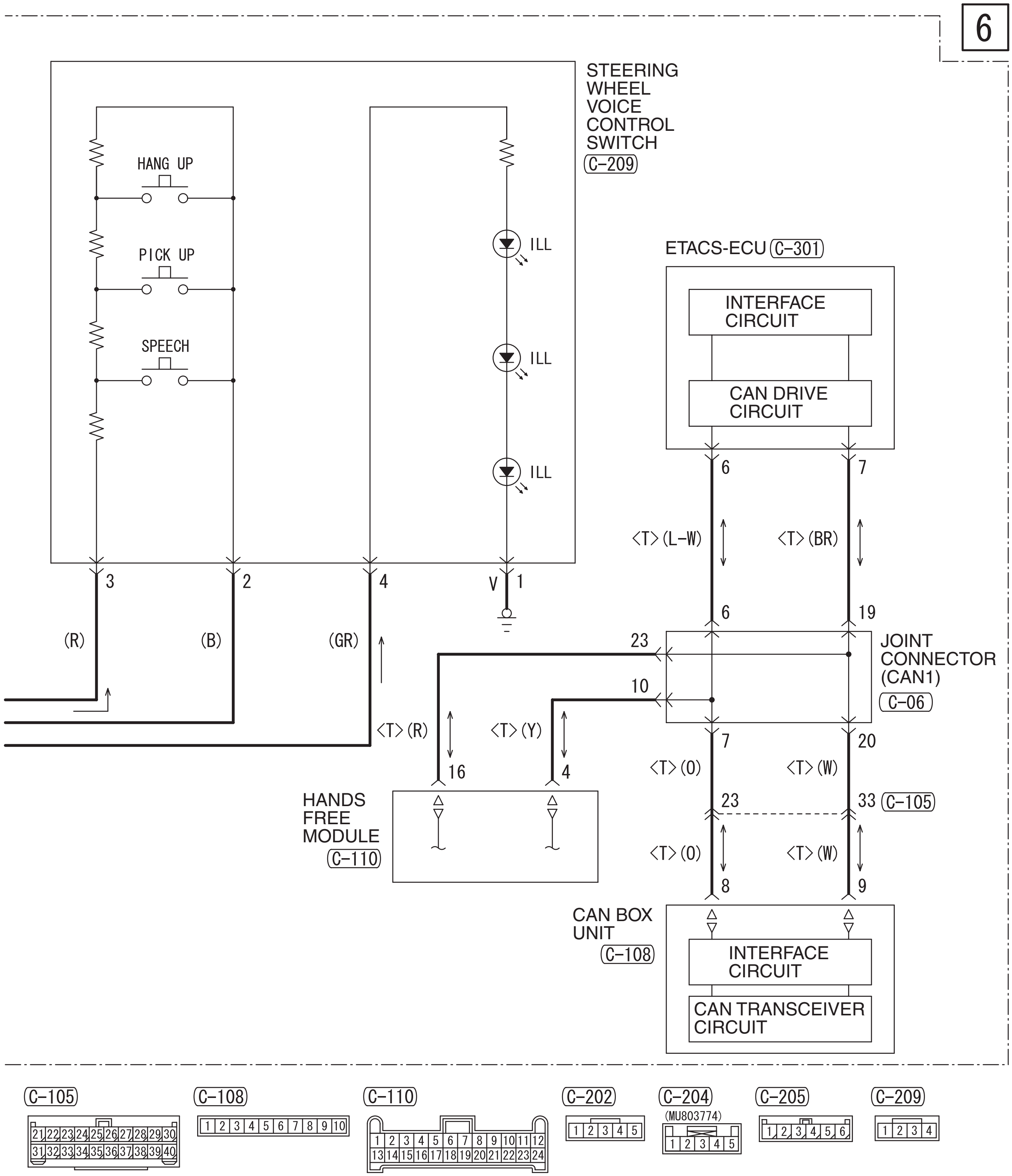
H8G15M10BB

HANDS FREE SYSTEM (CONTINUED)





WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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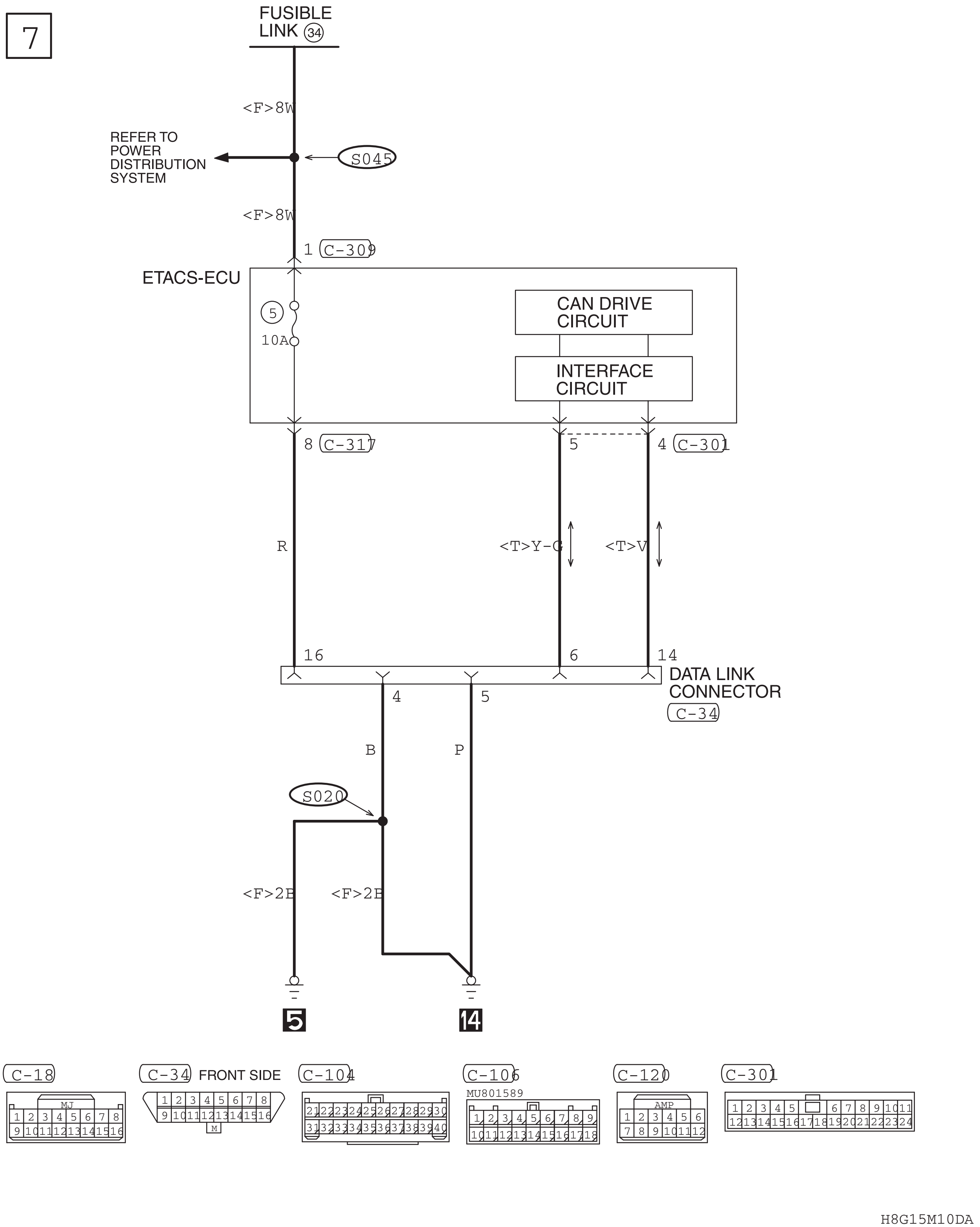
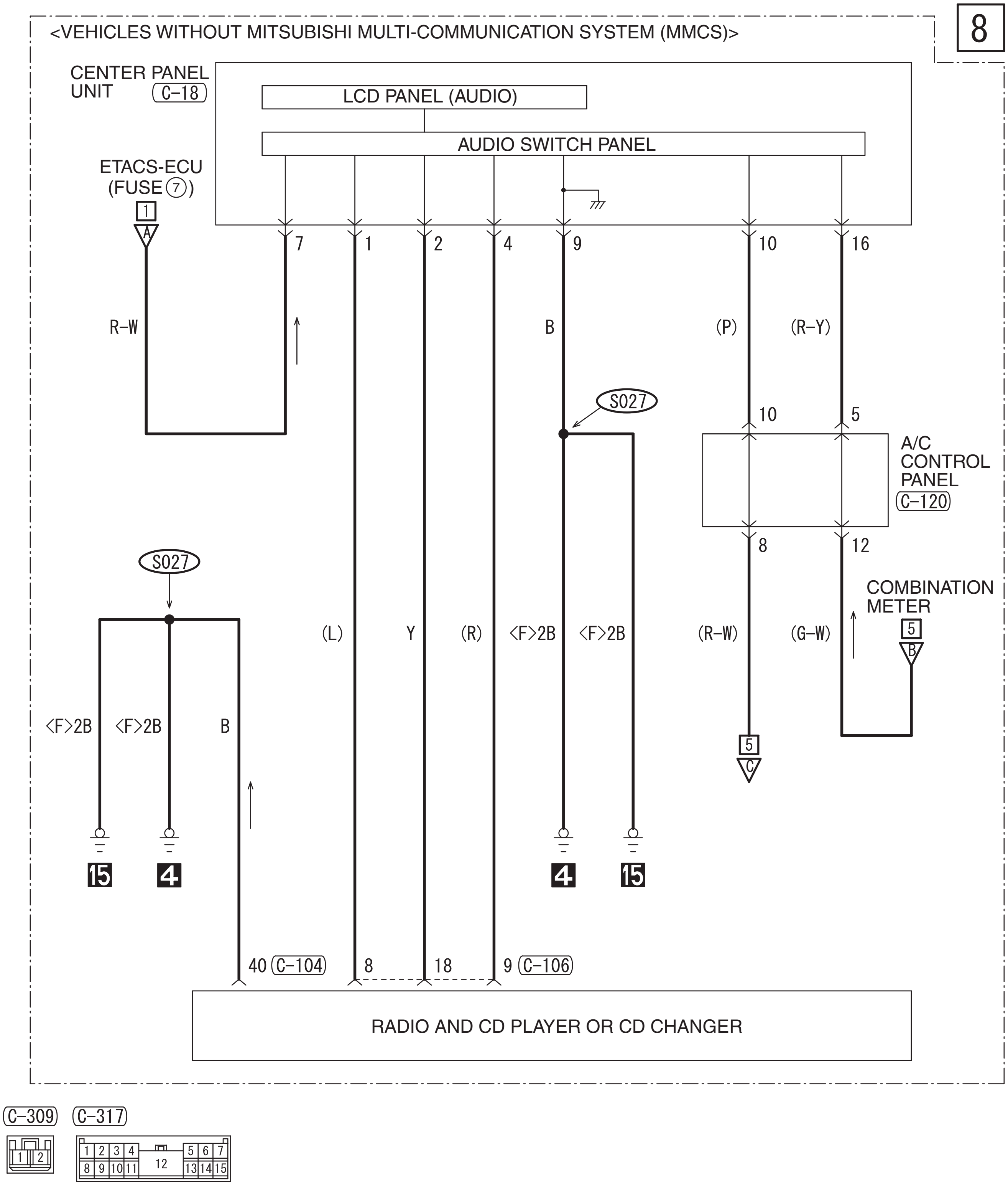
H8G15M10CB

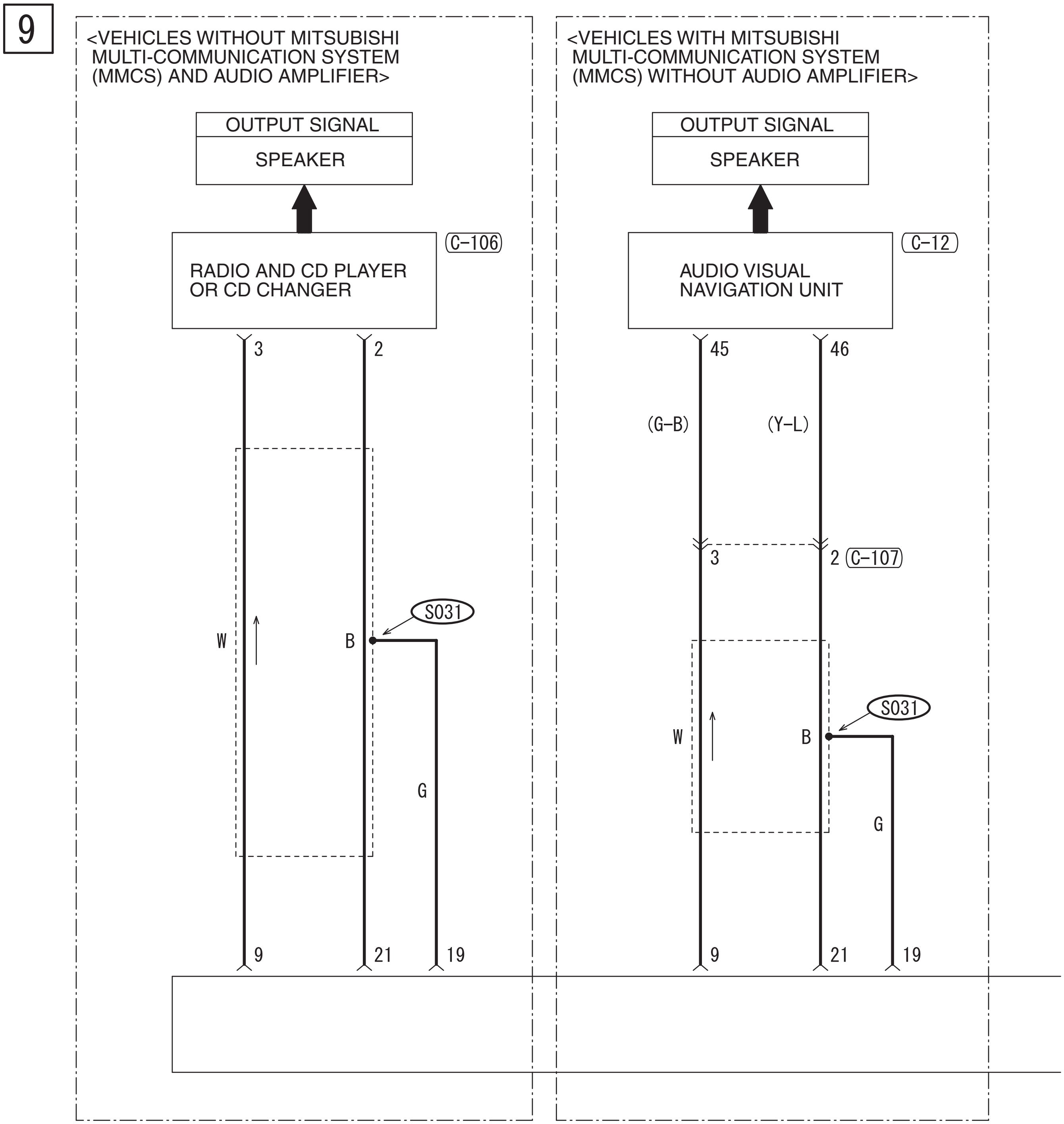
HANDS FREE SYSTEM (CONTINUED)

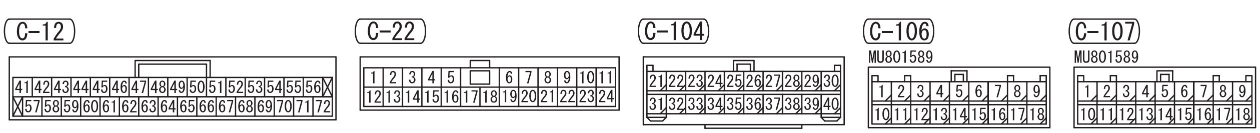




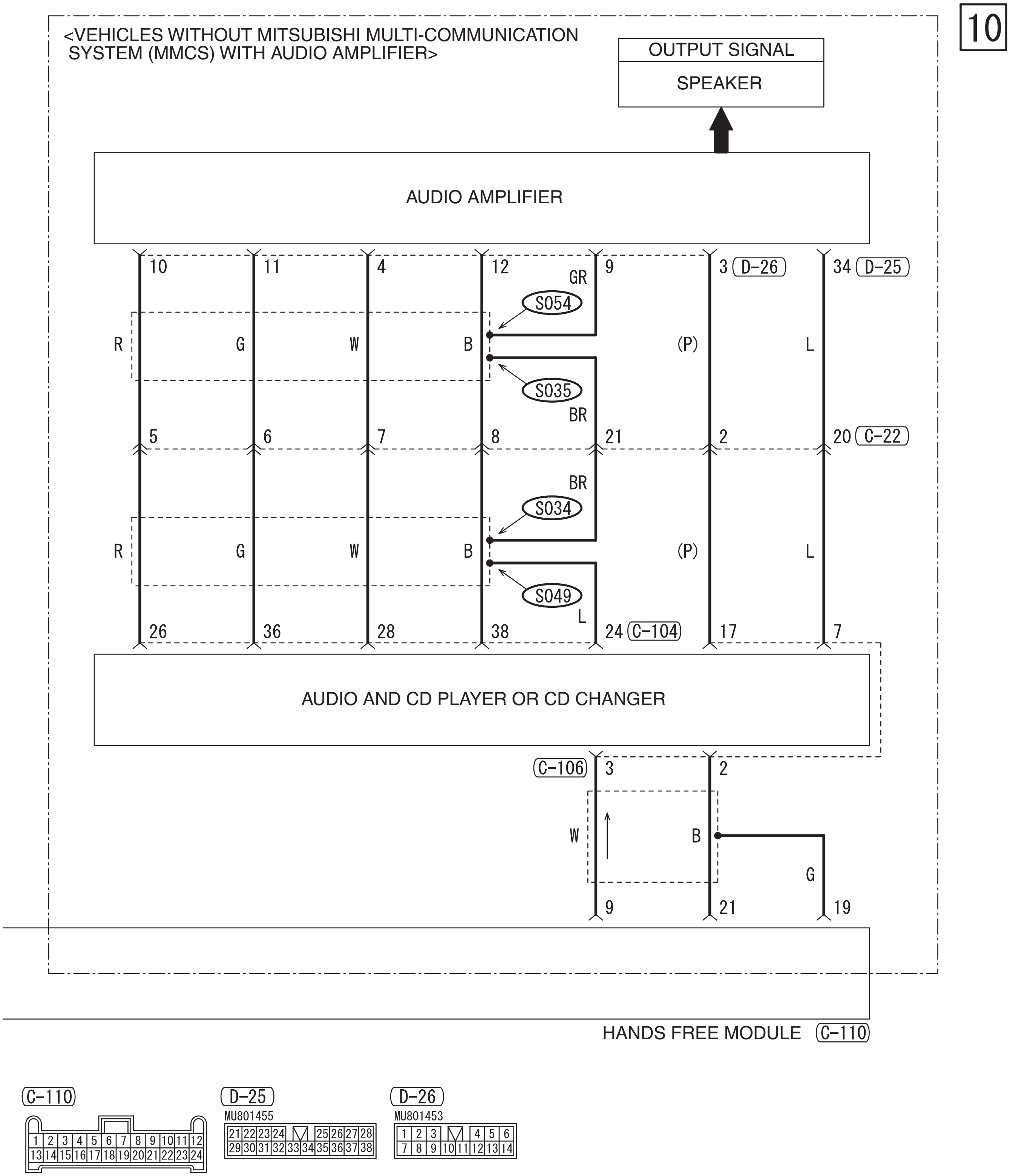
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

HANDS FREE SYSTEM (CONTINUED)





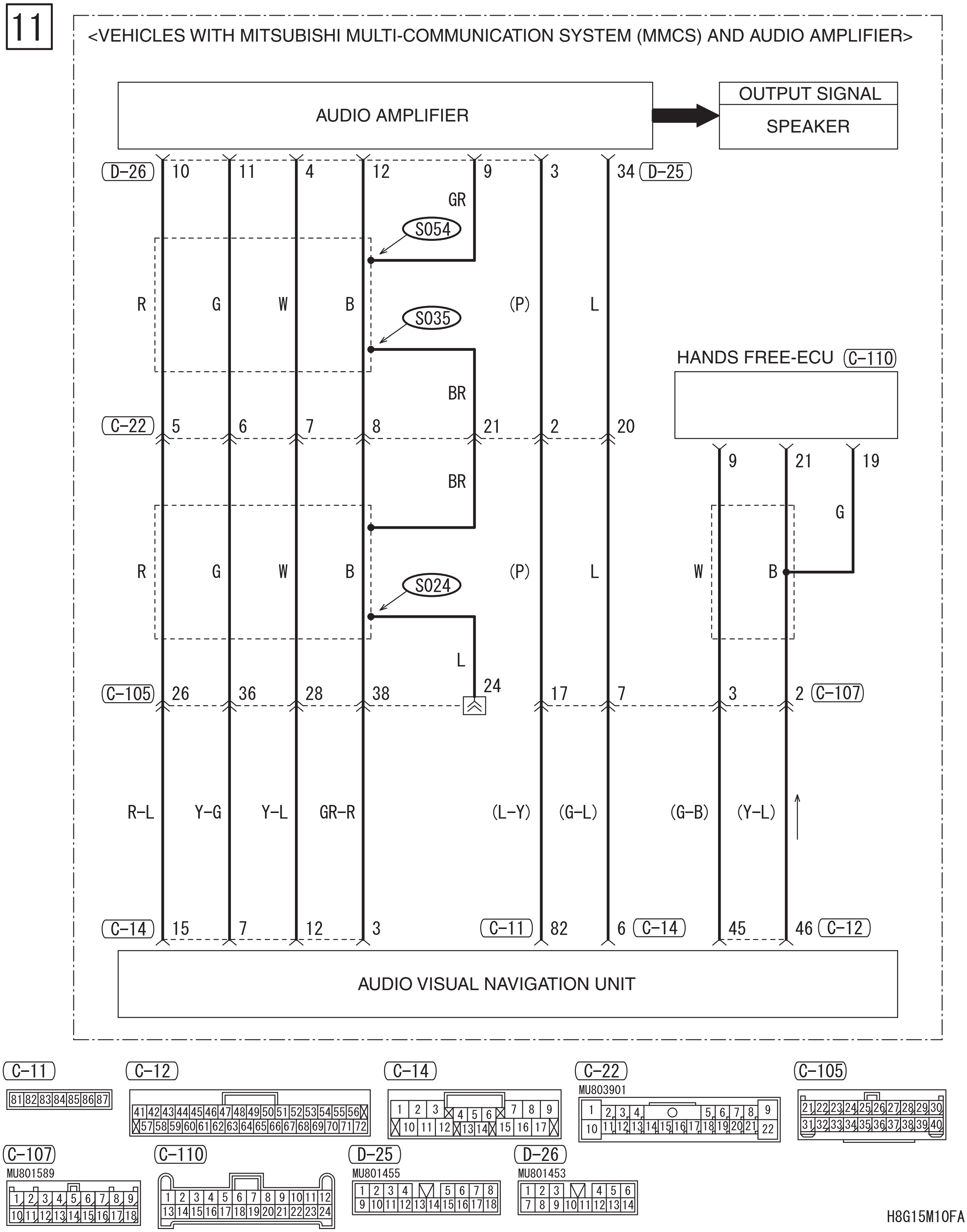
H8G15M10EA



WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M10EB

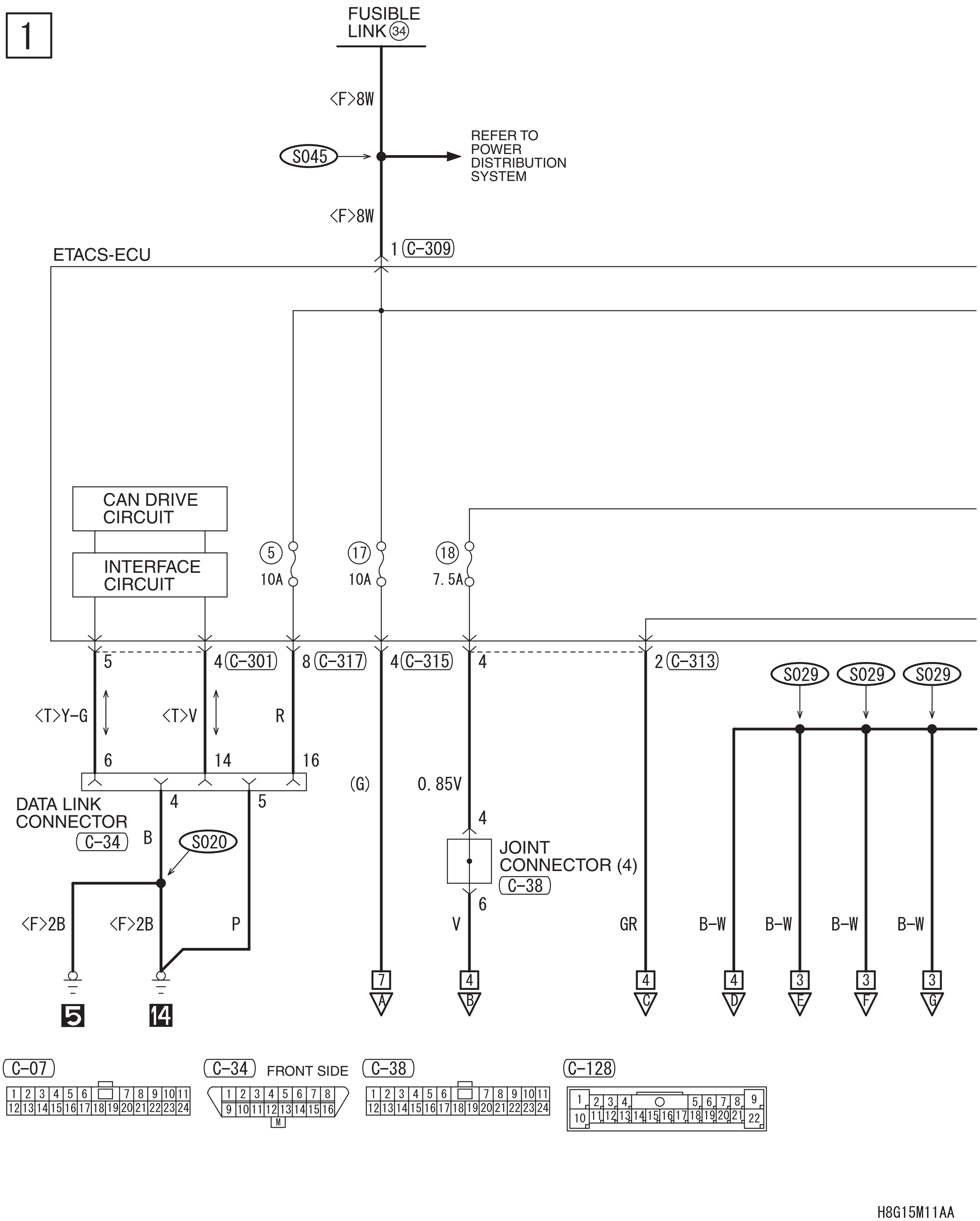
HANDS FREE SYSTEM (CONTINUED)

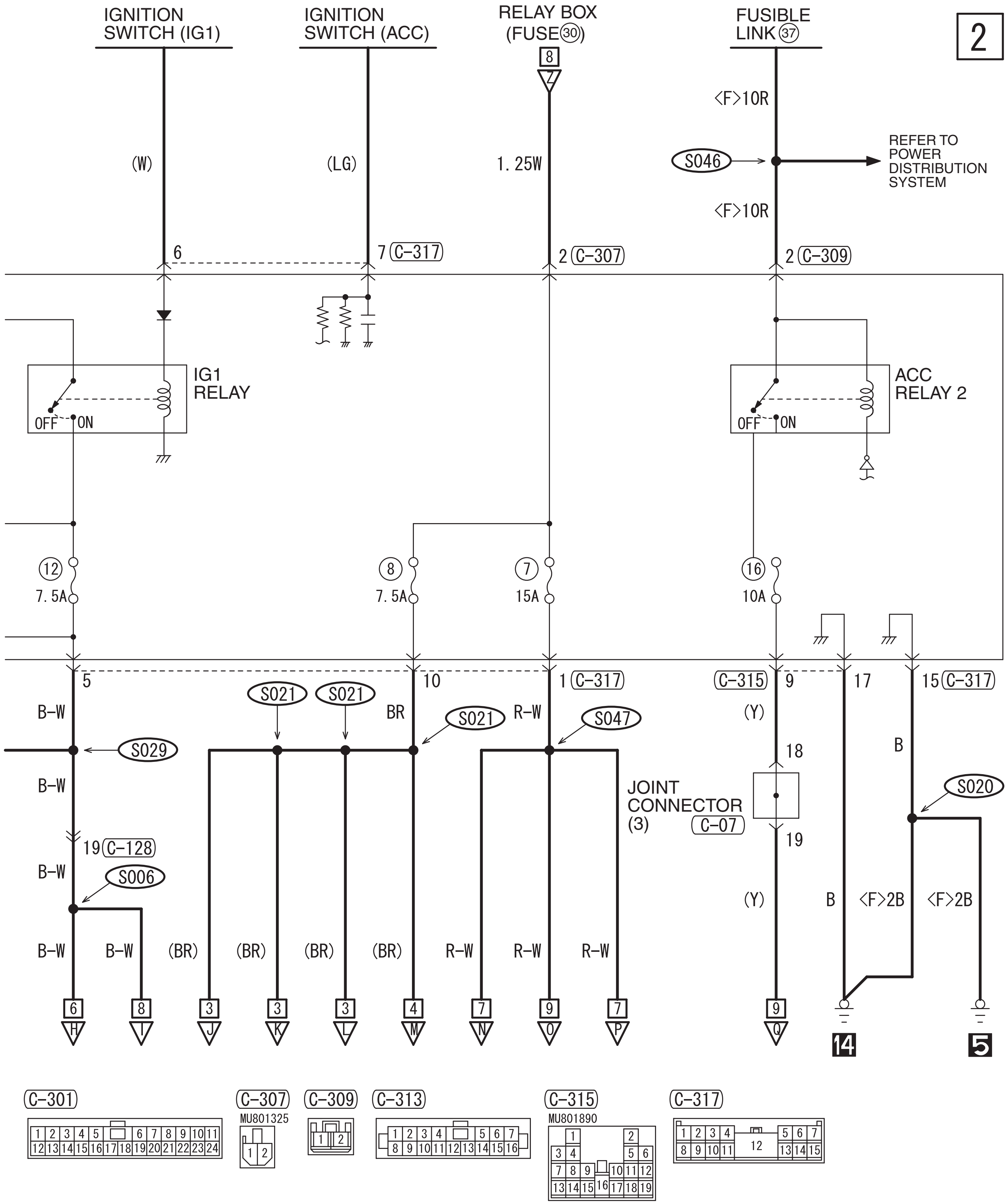


NOTES

CONTROLLER AREA NETWORK (CAN)

M1901004000390

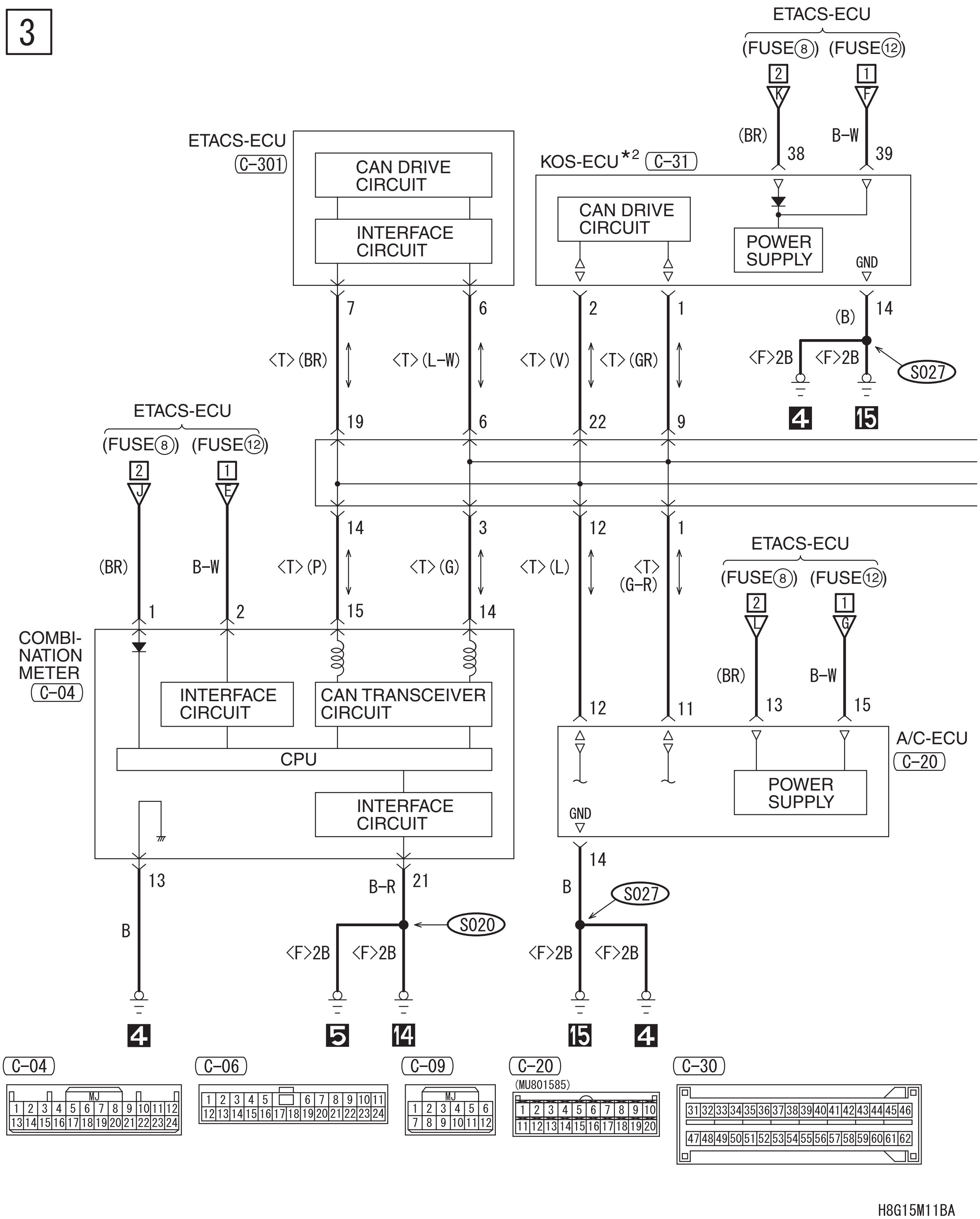


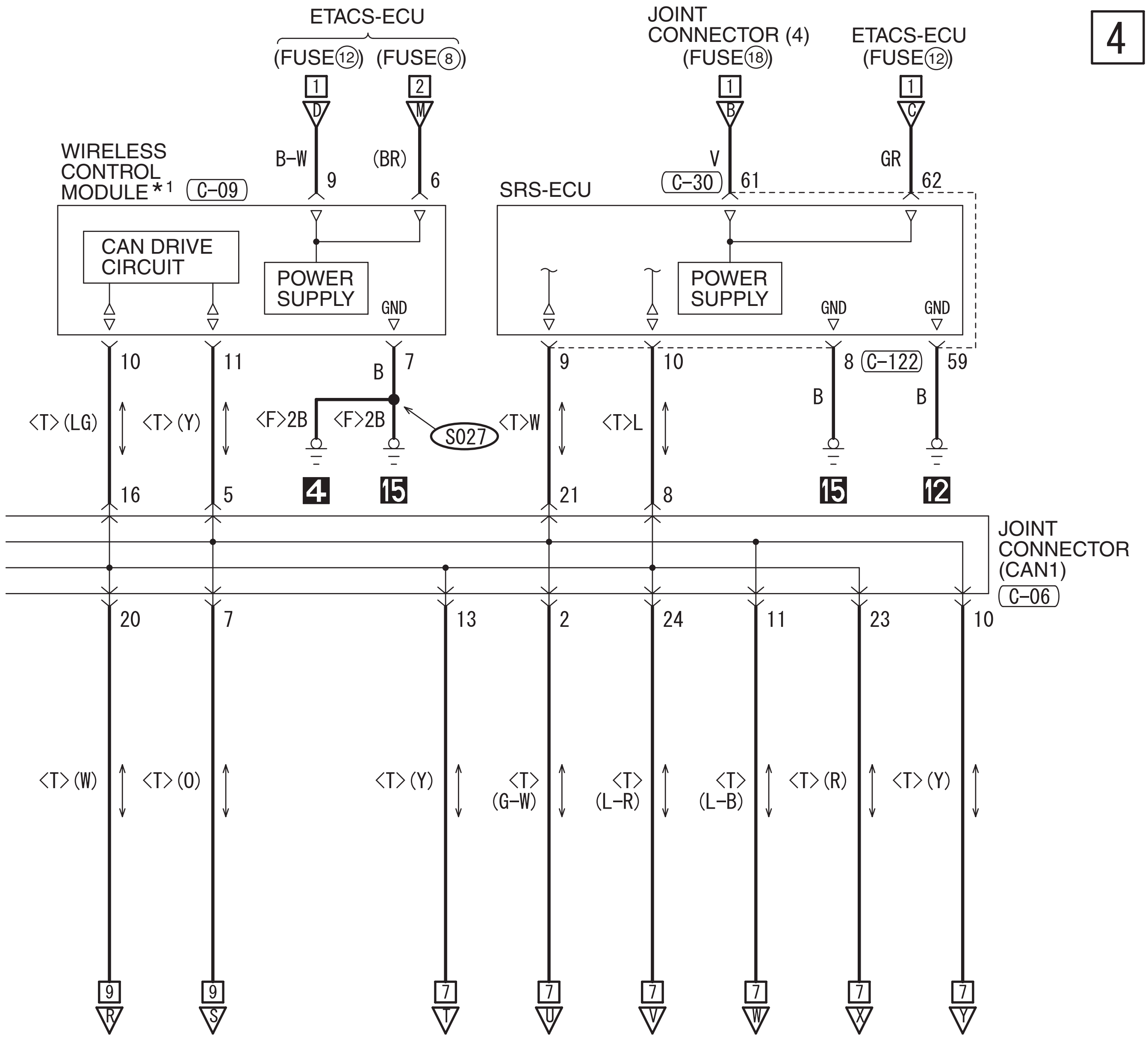


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

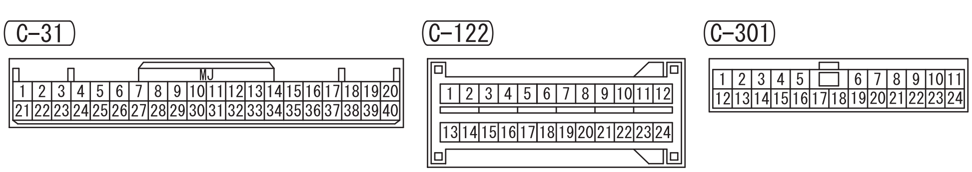
H8G15M11AB

CONTROLLER AREA NETWORK (CAN) (CONTINUED)





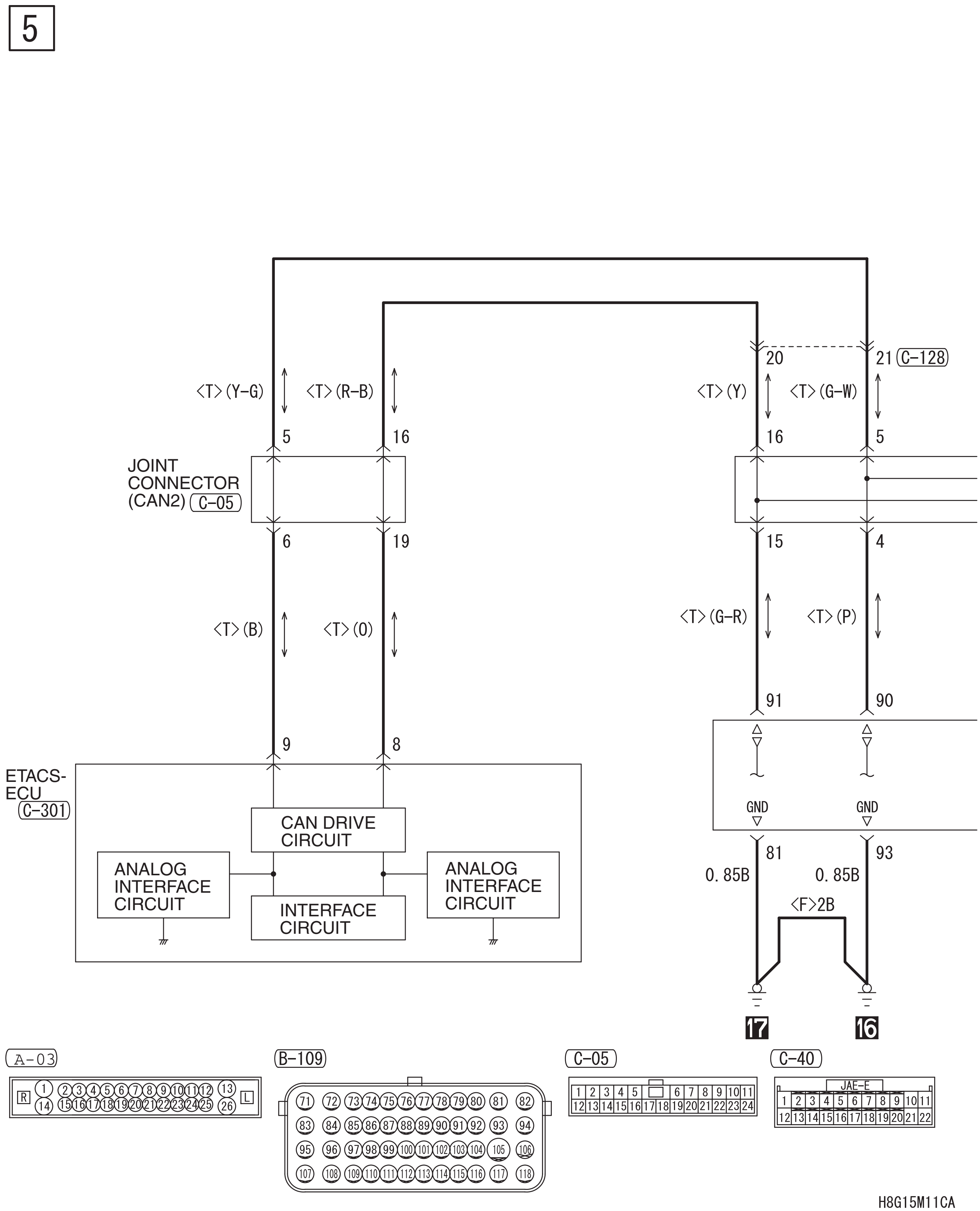
NOTE
*1 : VEHICLES WITHOUT KOS
*2 : VEHICLES WITH KOS

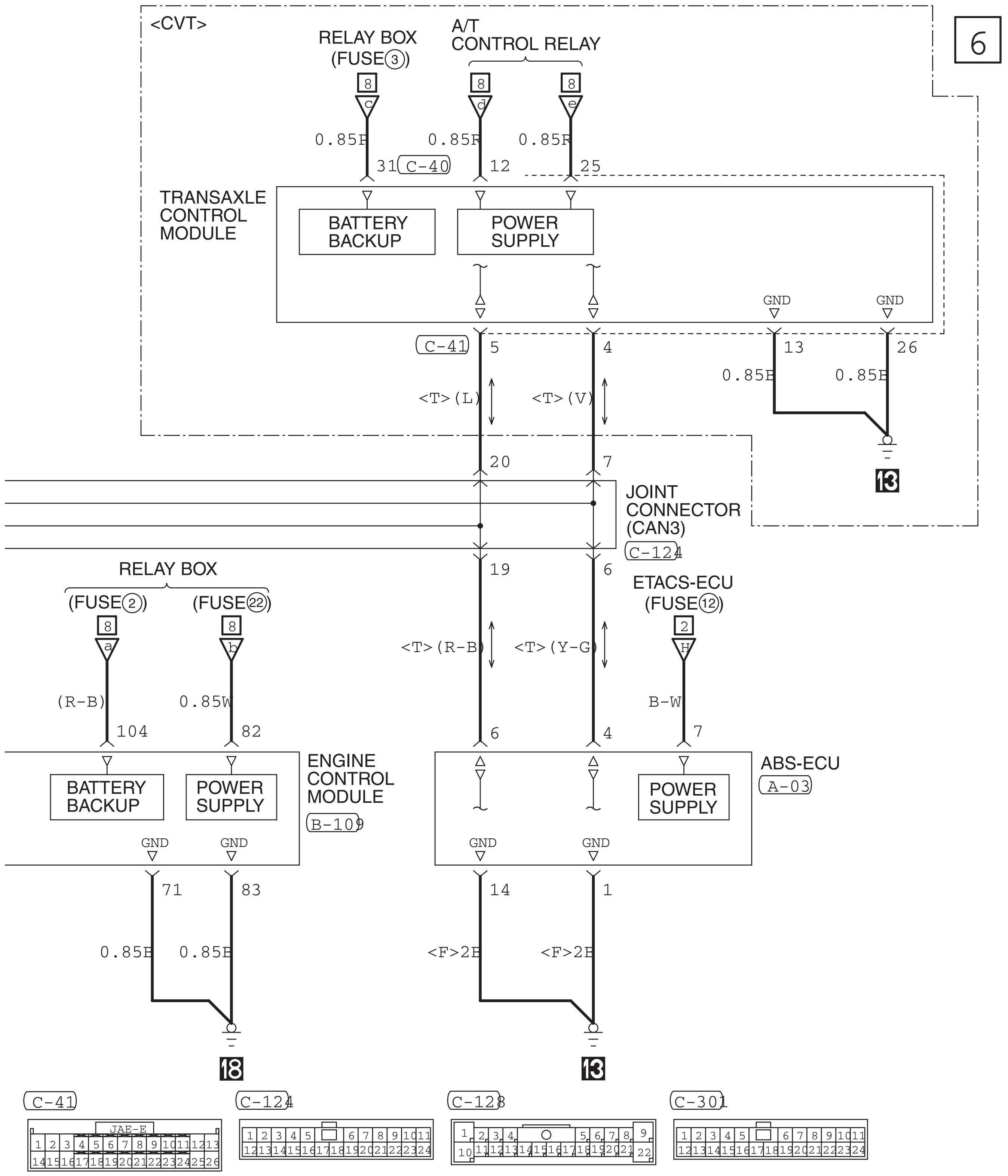


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M11BB

CONTROLLER AREA NETWORK (CAN) (CONTINUED)

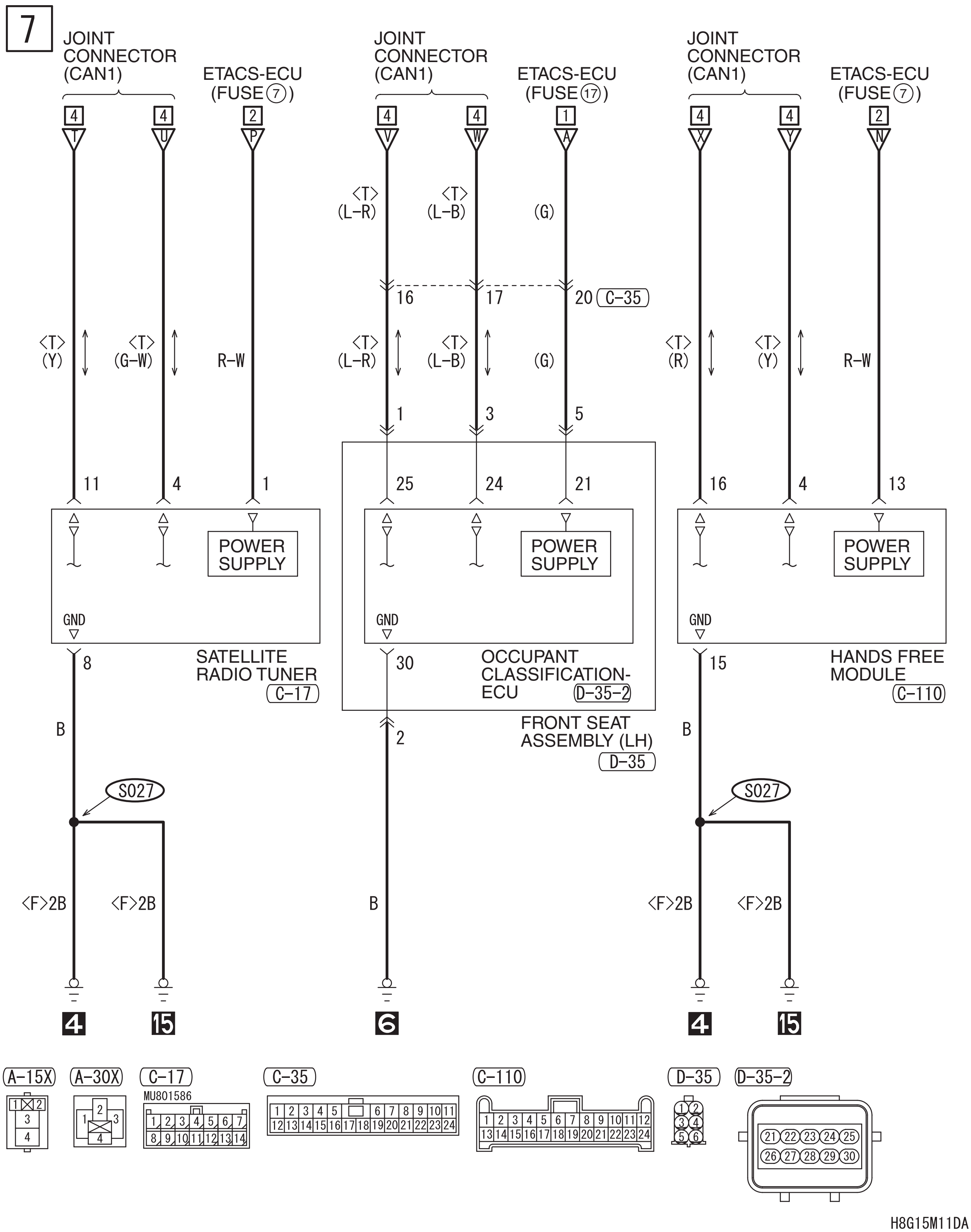


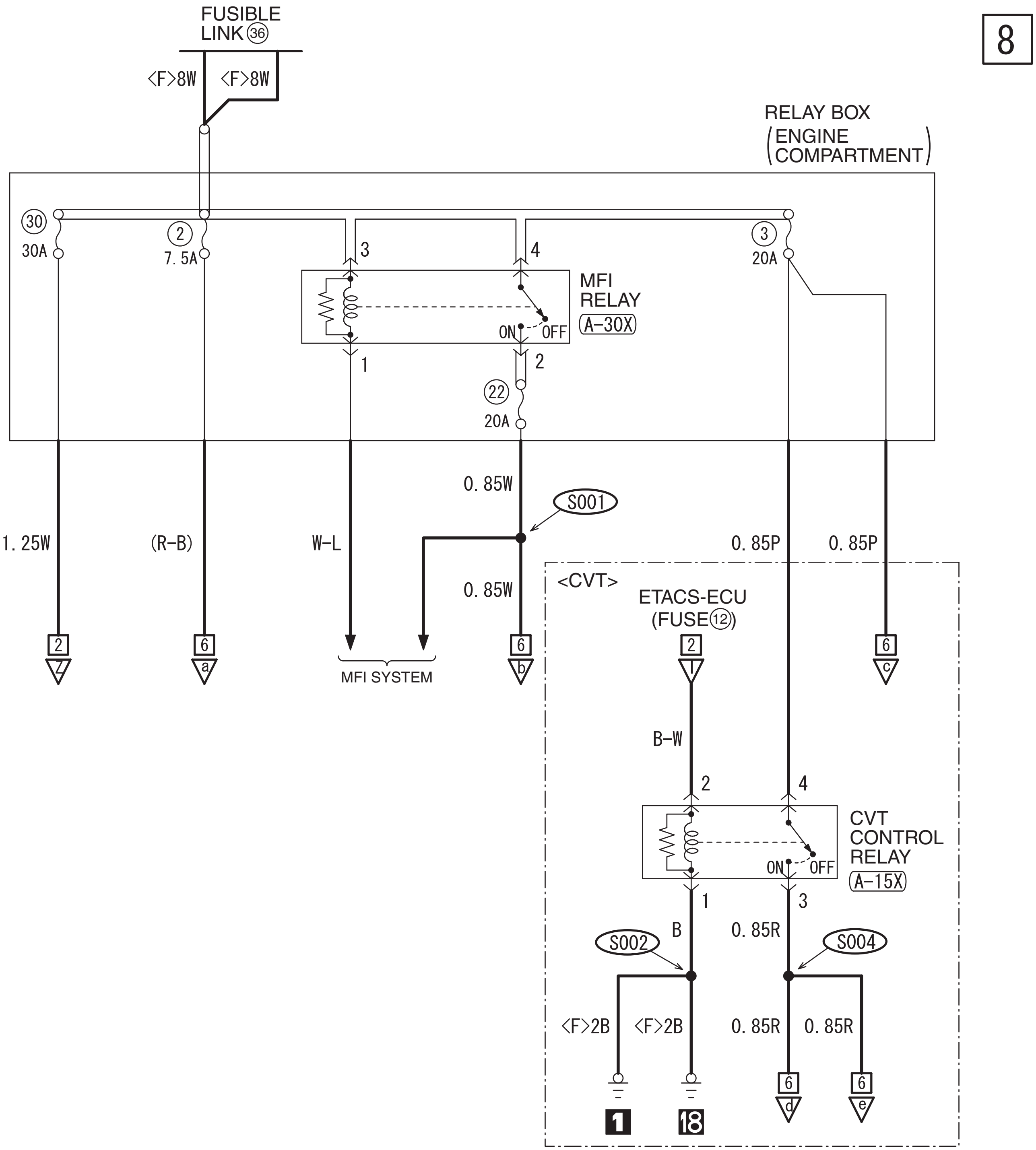


WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M11CB

CONTROLLER AREA NETWORK (CAN) (CONTINUED)





WIRE COLOR CODE
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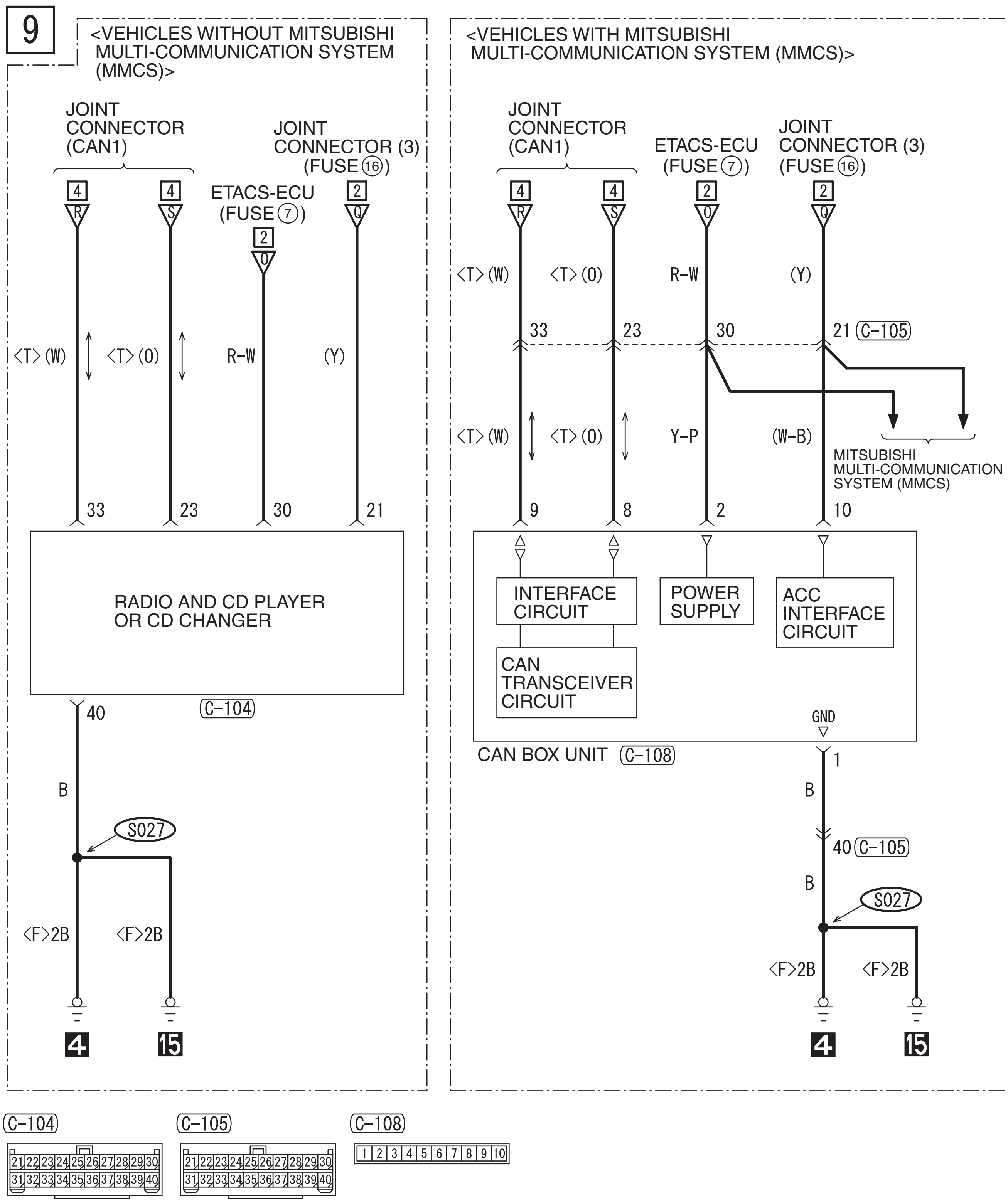
H8G15M11DB

CONTROLLER AREA NETWORK (CAN) (CONTINUED)



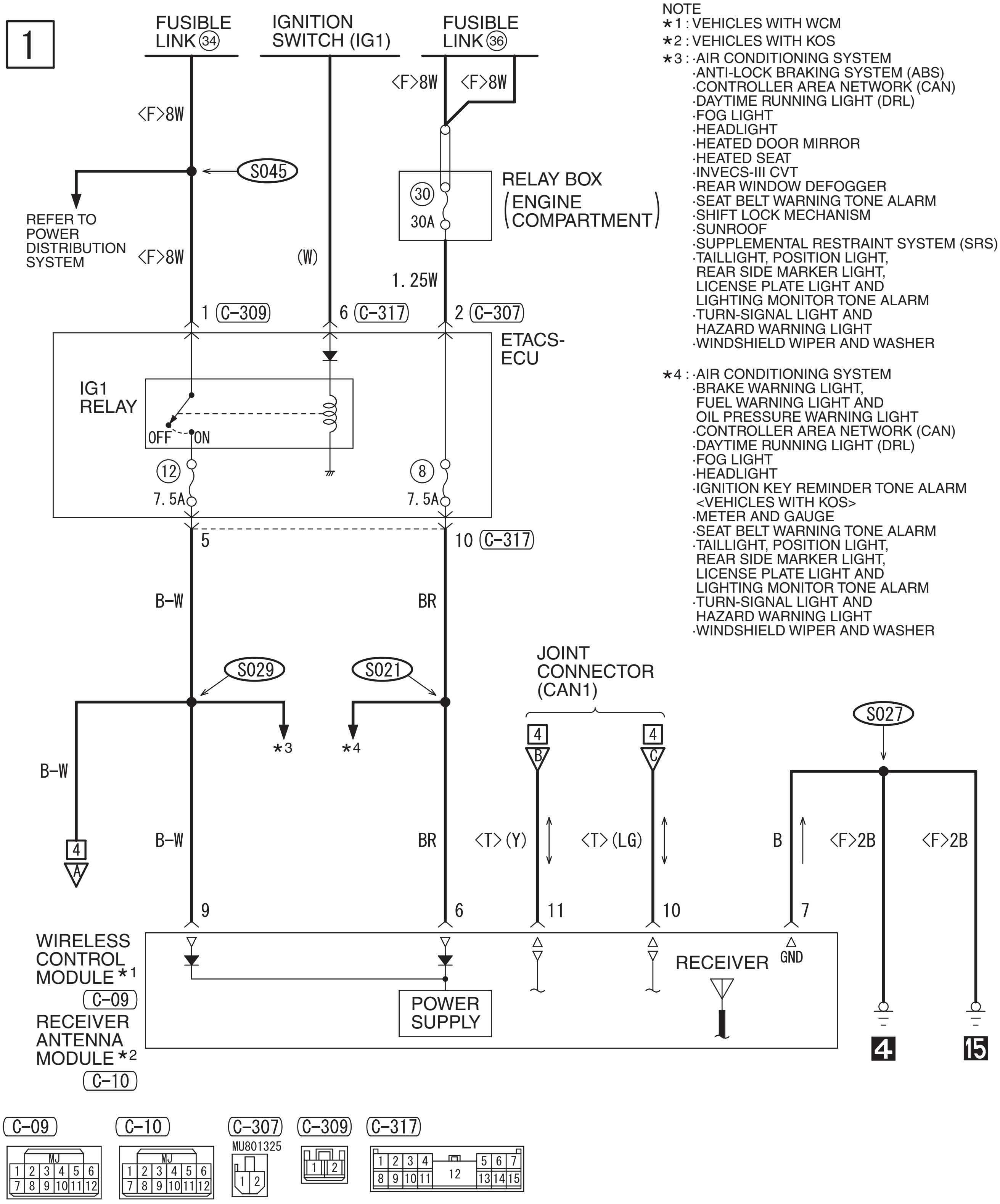
WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M11EA

NOTES

TIRE PRESSURE MONITORING SYSTEM (TPMS)

M1901003900271



NOTE
*1 : VEHICLES WITH WCM
*2 : VEHICLES WITH KOS
*3 : ·AIR CONDITIONING SYSTEM
·ANTI-LOCK BRAKING SYSTEM (ABS)
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·INVECS-III CVT
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER
*4 : ·AIR CONDITIONING SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·FOG LIGHT
·HEADLIGHT
·IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
·METER AND GAUGE
·SEAT BELT WARNING TONE ALARM
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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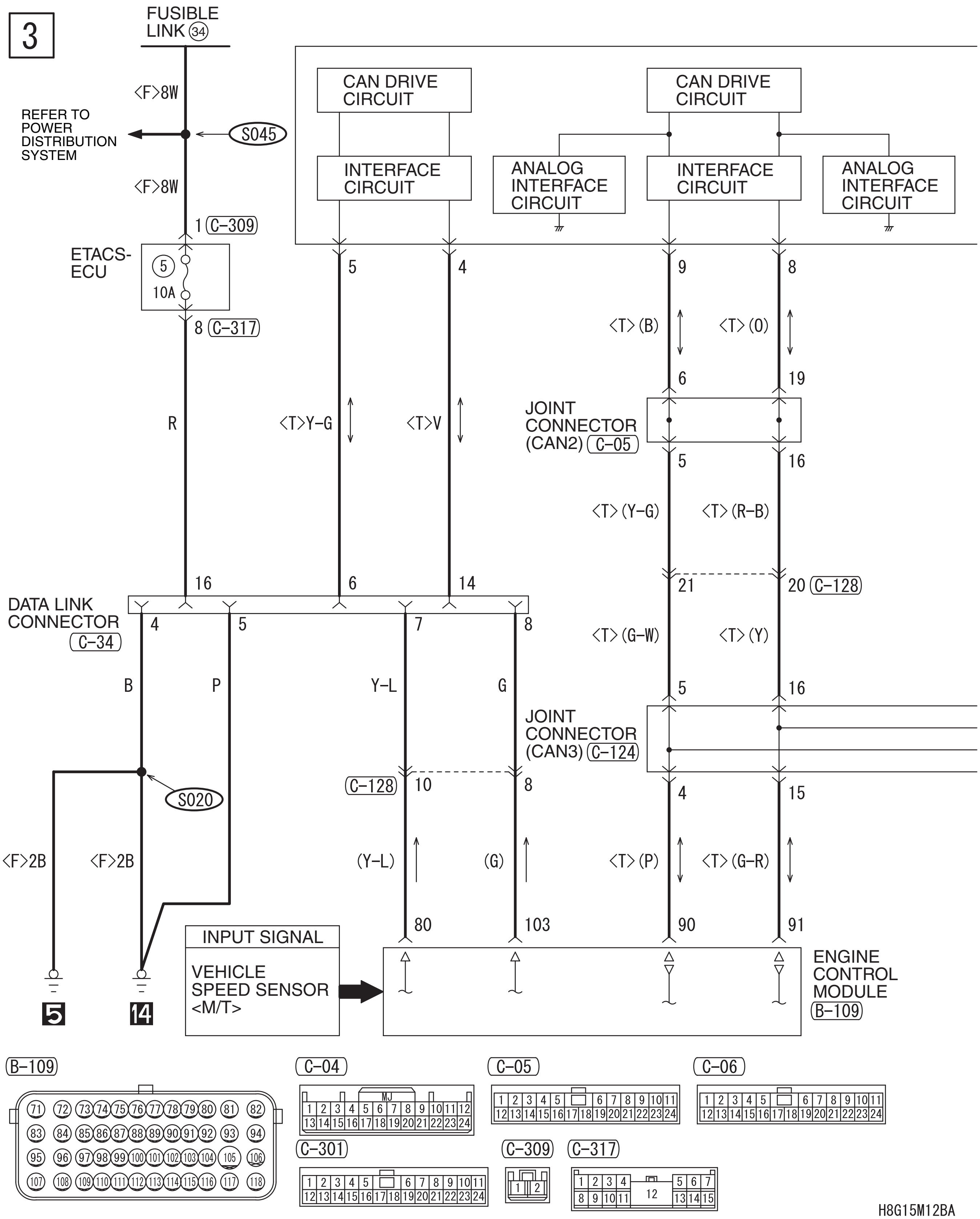
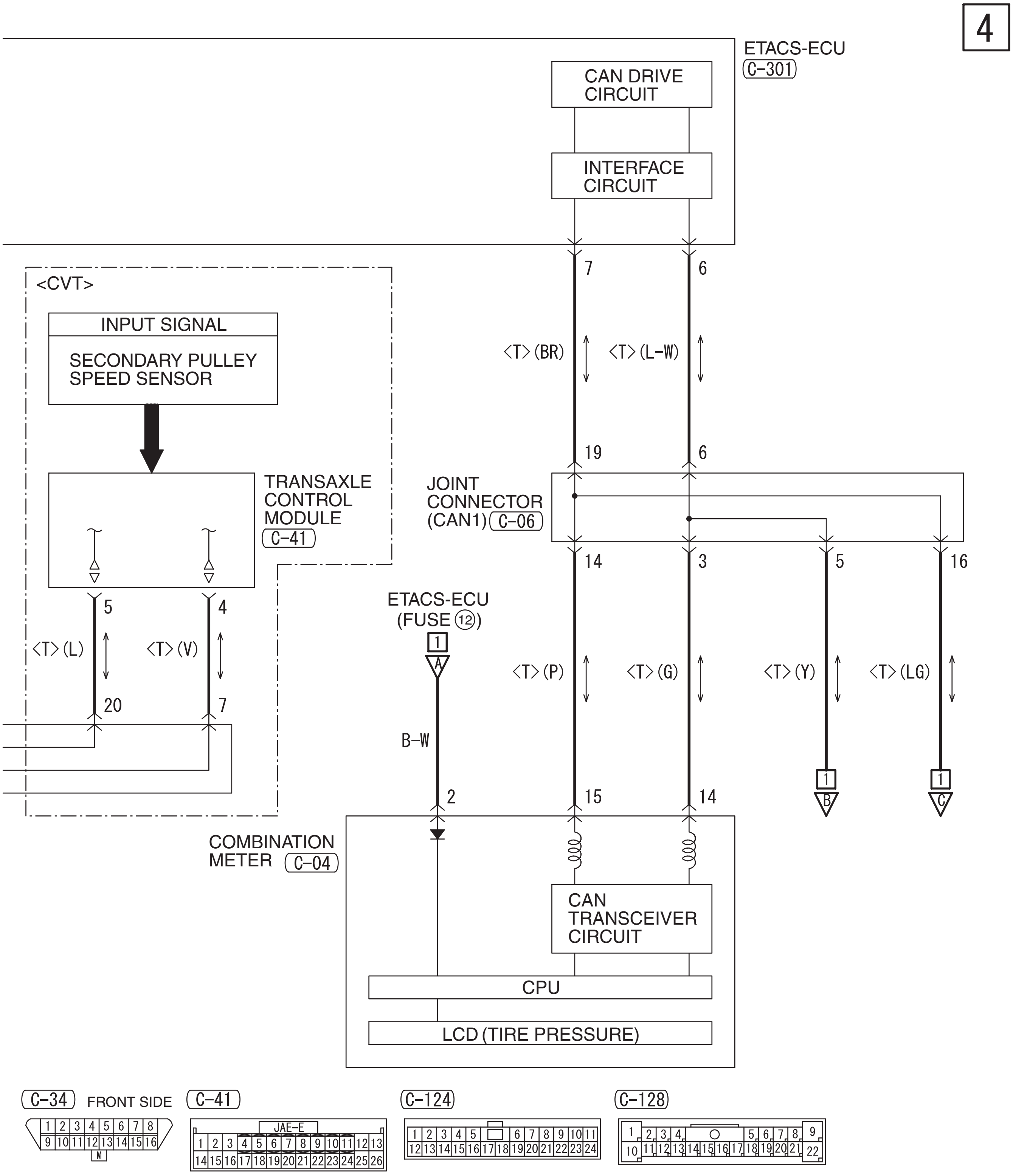
H8G15M12AB

TIRE PRESSURE MONITORING SYSTEM (CONTINUED)





WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
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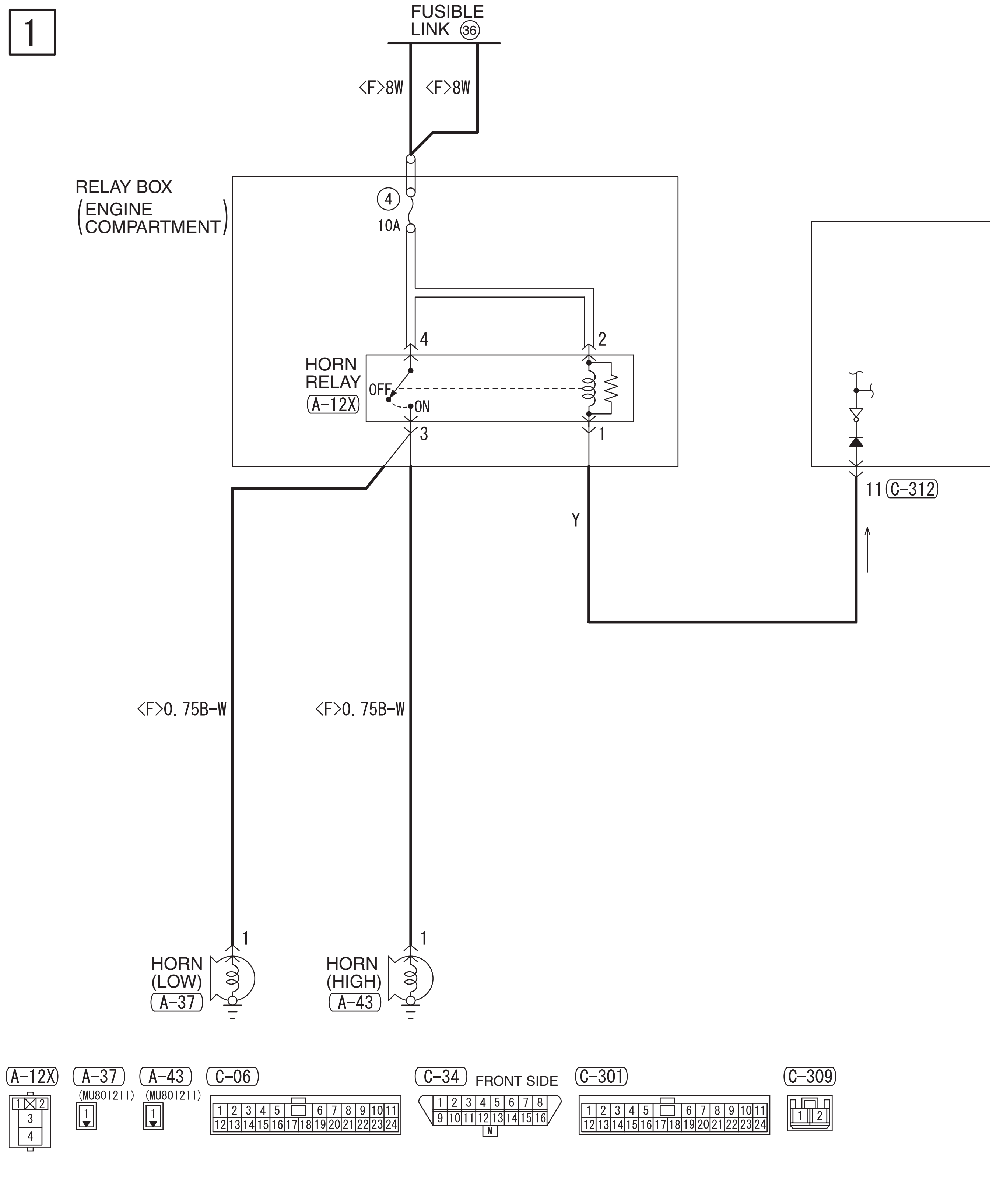
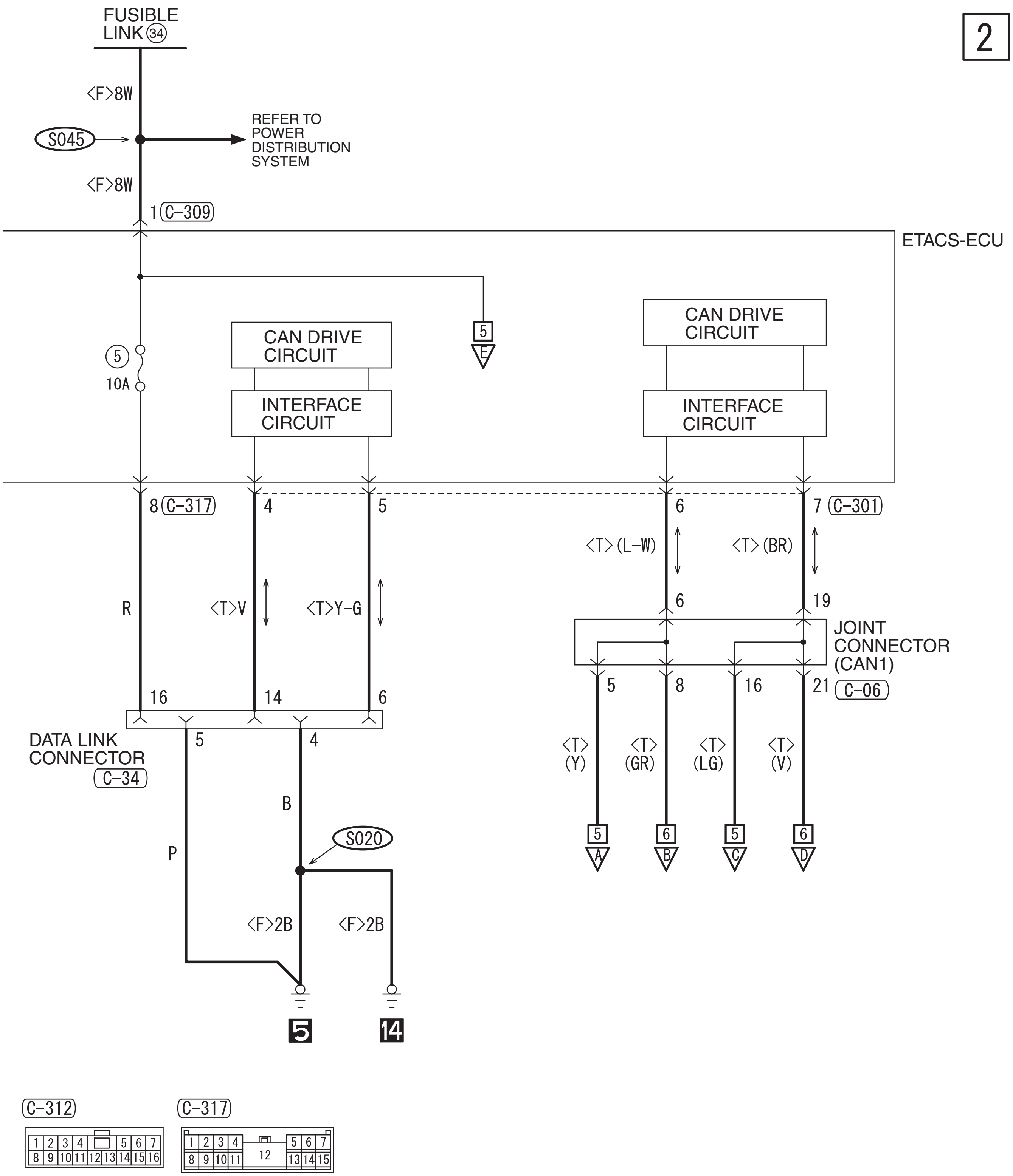
H8G15M12BB

THEFT-ALARM SYSTEM

M1901012400768





WIRE COLOR CODE
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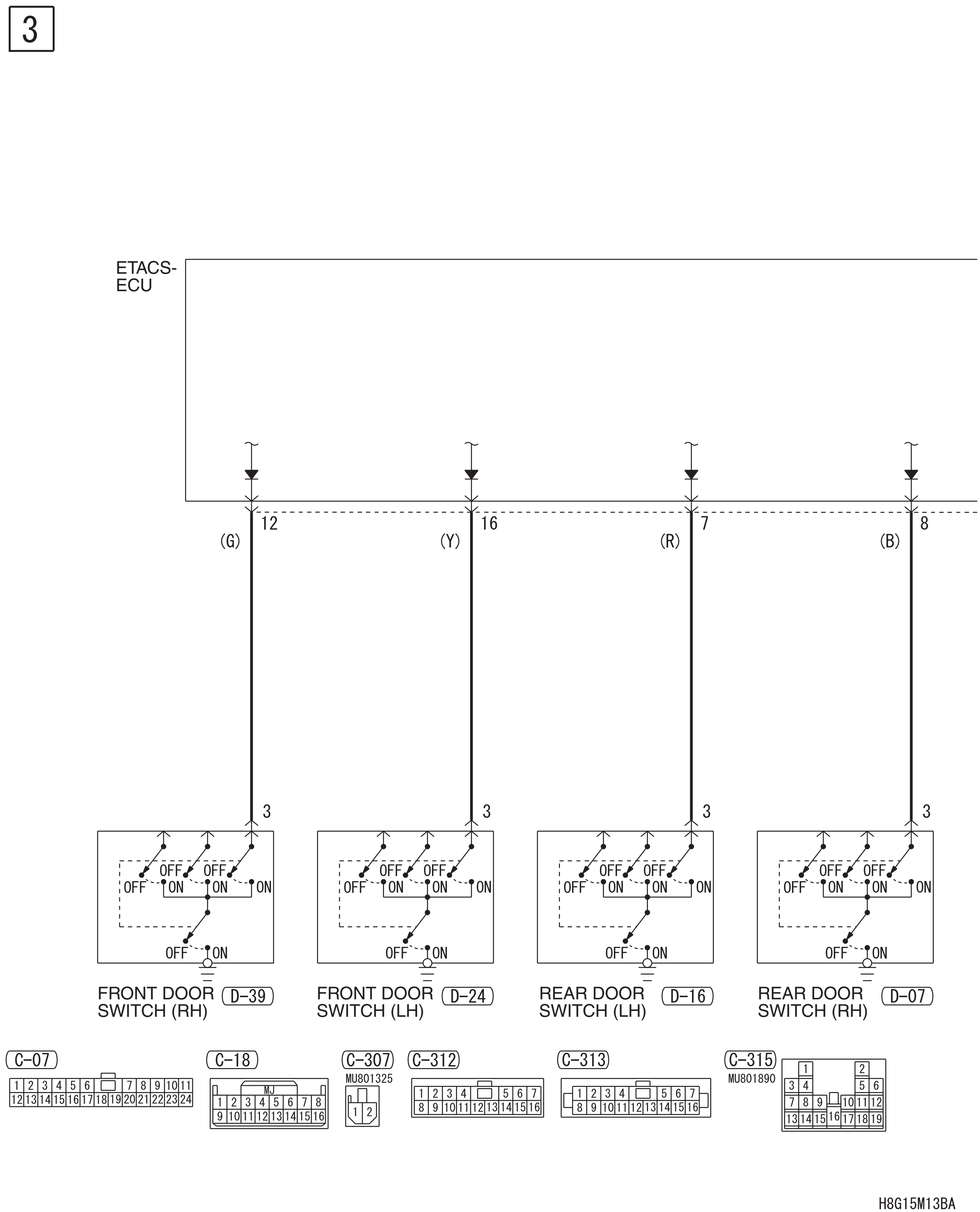
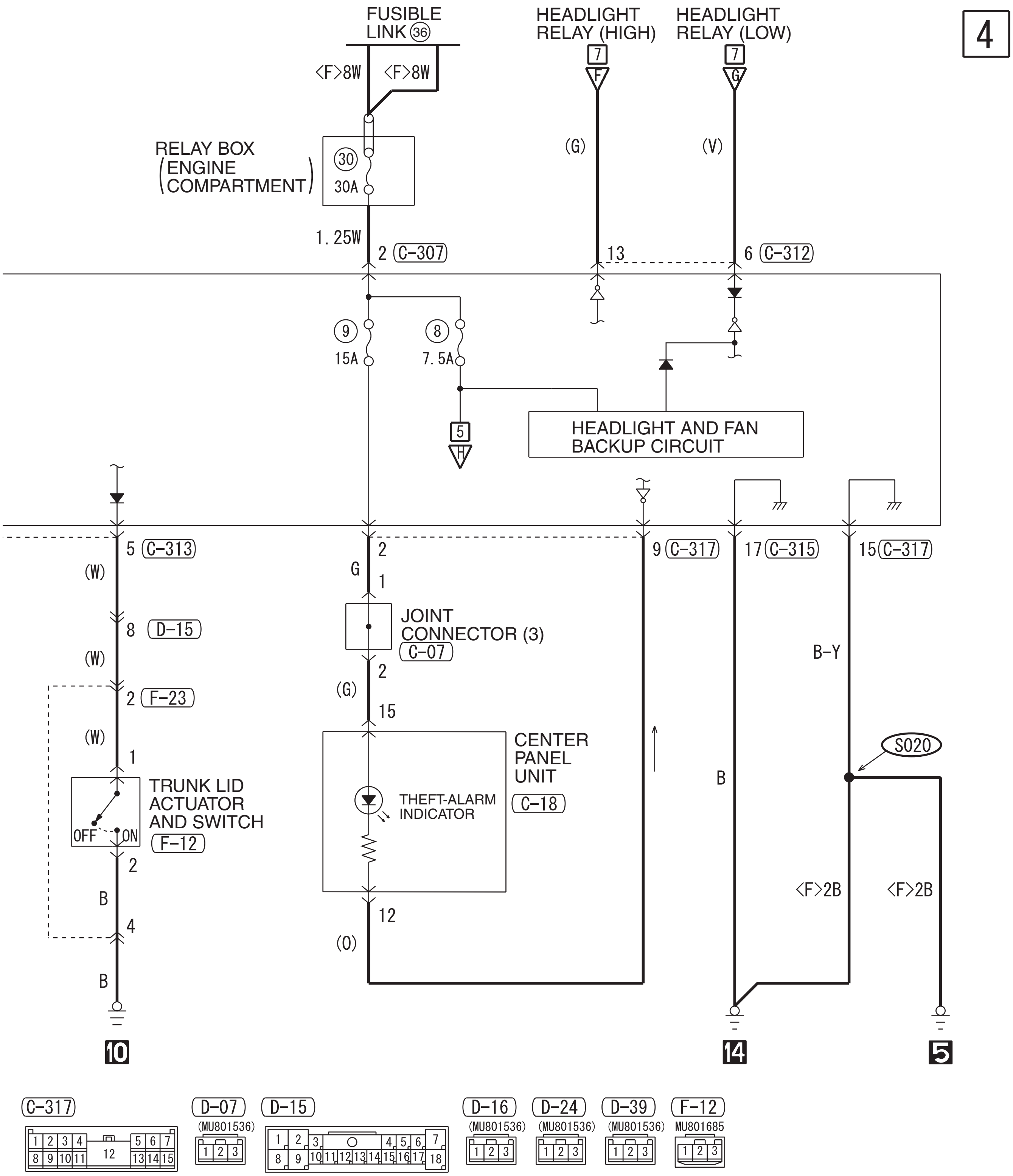
H8G15M13AB

THEFT-ALARM SYSTEM (CONTINUED)





WIRE COLOR CODE
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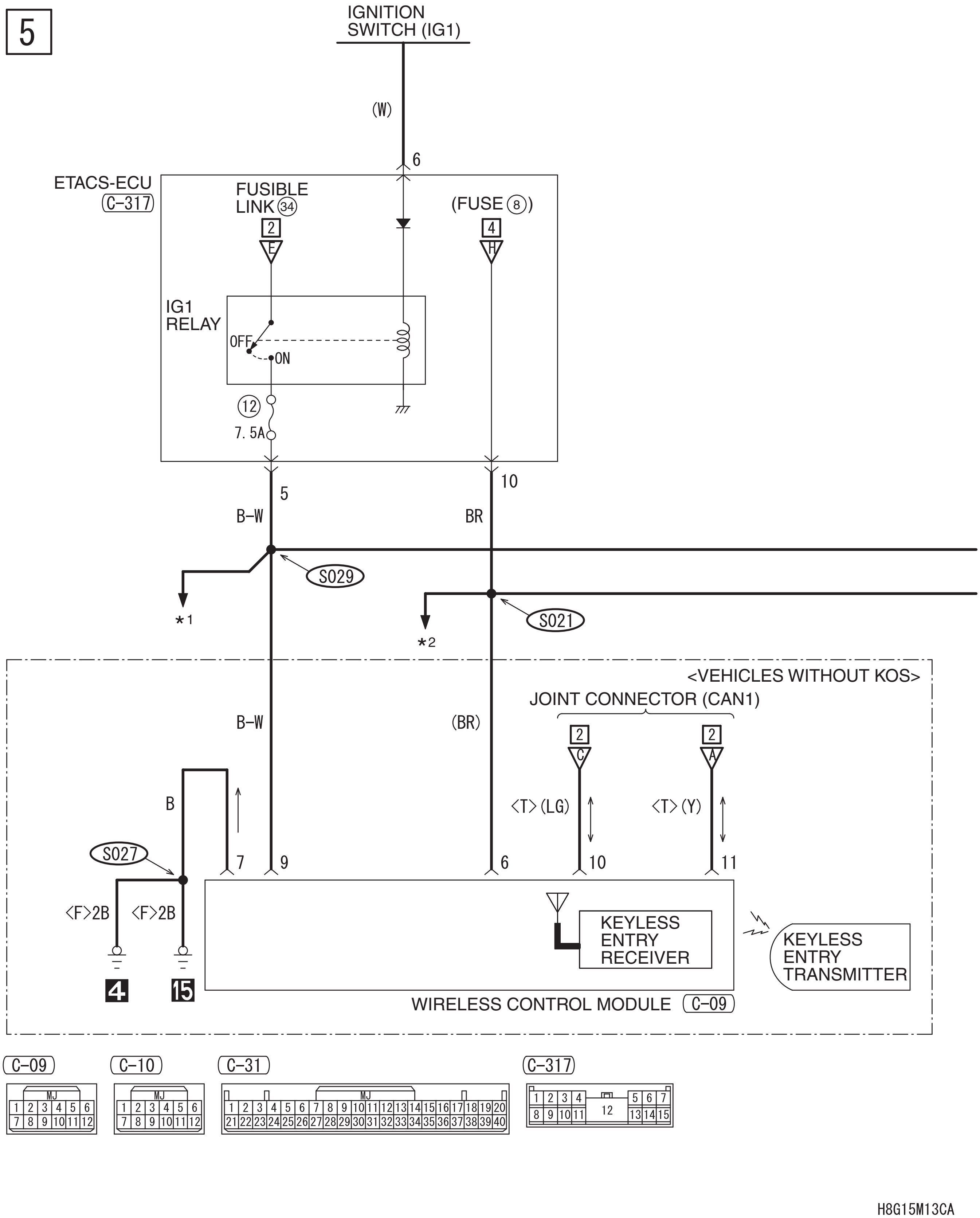
H8G15M13BB

THEFT-ALARM SYSTEM (CONTINUED)

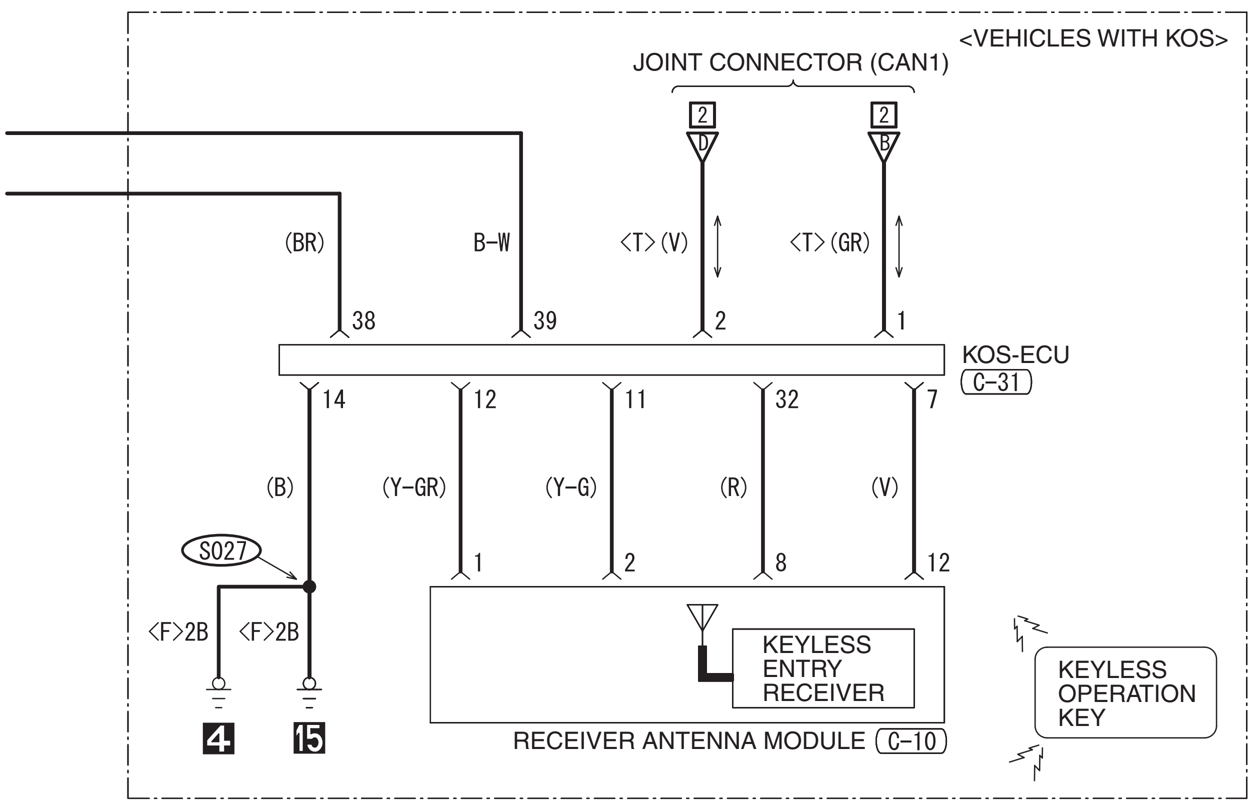


6

NOTE

*1 : ·AIR CONDITIONING SYSTEM
·ANTI-LOCK BRAKING SYSTEM (ABS)
·AUTO-CRUISE CONTROL SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·CHARGING SYSTEM
·CONTROLLER AREA NETWORK (CAN)
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT,LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·DOOR AJAR WARNING TONE ALARM
·FOG LIGHT
·HEADLIGHT
·HEATED DOOR MIRROR
·HEATED SEAT
·INVECS-III CVT
·IGNITION KEY REMINDER TONE ALARM
·IMMOBILIZER SYSTEM
·METER AND GAUGE
·MFI SYSTEM
·REAR WINDOW DEFOGGER
·SEAT BELT WARNING TONE ALARM
·SHIFT LOCK MECHANISM
·SUNROOF
·SUPPLEMENTAL RESTRAINT SYSTEM (SRS)
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER

*2 : ·AIR CONDITIONING SYSTEM
·AUDIO SYSTEM
·BRAKE WARNING LIGHT, FUEL WARNING LIGHT AND OIL PRESSURE WARNING LIGHT
·CENTRAL DOOR LOCKING SYSTEM
·DAYTIME RUNNING LIGHT (DRL)
·DOME LIGHT,LUGGAGE COMPARTMENT LIGHT AND IGNITION KEY HOLE ILLUMINATION LIGHT
·FOG LIGHT
·HEADLIGHT
·IGNITION KEY REMINDER TONE ALARM <VEHICLES WITH KOS>
·METER AND GAUGE
·SEAT BELT WARNING TONE ALARM
·SUNROOF
·TAILLIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND LIGHTING MONITOR TONE ALARM
·TIRE PRESSURE MONITORING SYSTEM (TPMS)
·TURN-SIGNAL LIGHT AND HAZARD WARNING LIGHT
·WINDSHIELD WIPER AND WASHER



WIRE COLOR CODE
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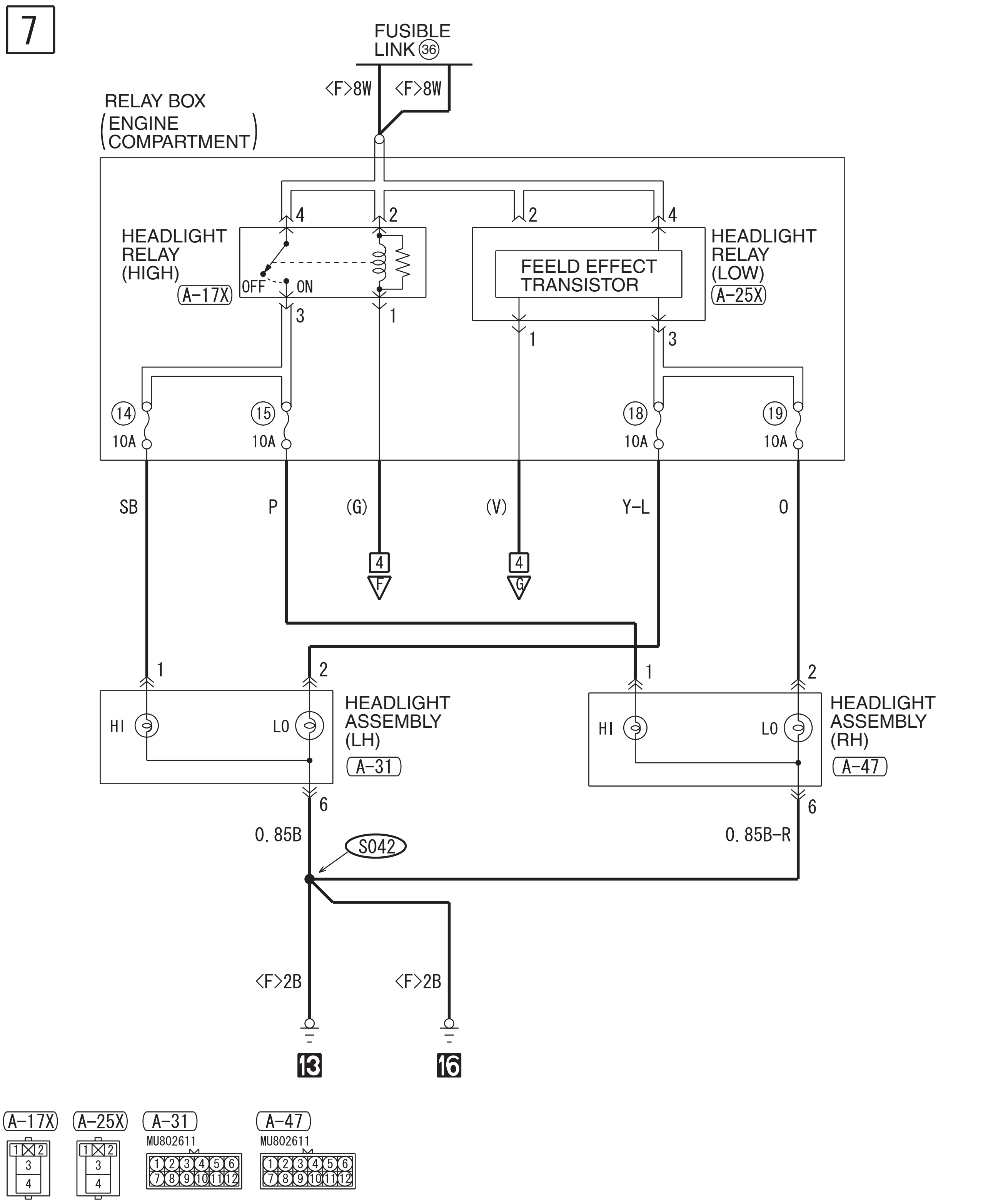
H8G15M13CB

THEFT-ALARM SYSTEM (CONTINUED)



WIRE COLOR CODE
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET PU : PURPLE

H8G15M13DA

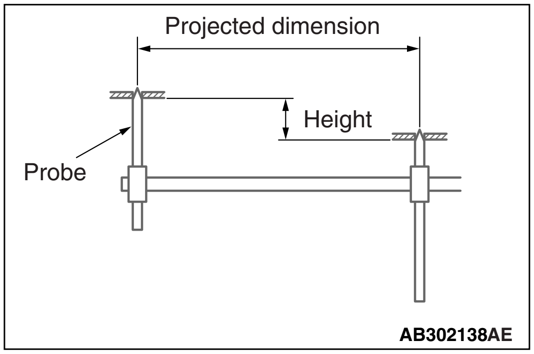
GROUP 2

BODY DIMENSIONS

CONTENTS

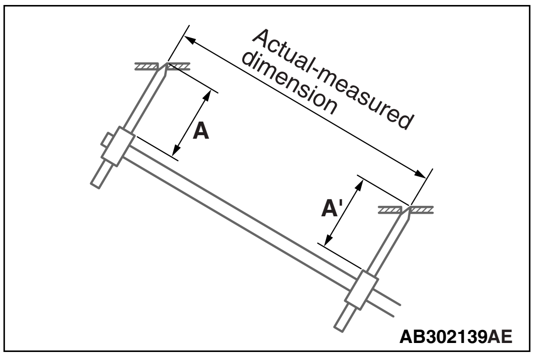
BODY DIMENSIONS AND MEASUREMENT METHODS

M4020001000448



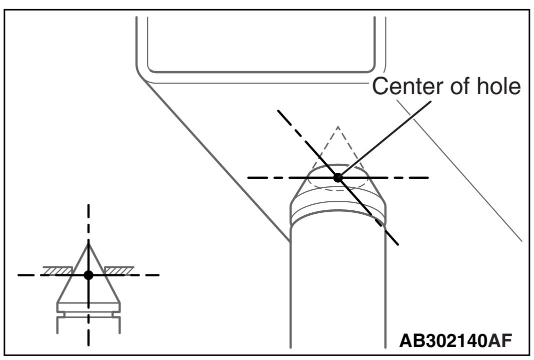
- Type A (projected dimensions) is the dimension when a measurement location is projected onto the plane.

  NOTE: The height indicates a distance from the assumed standard line established 100 mm below the lowest measurement point.

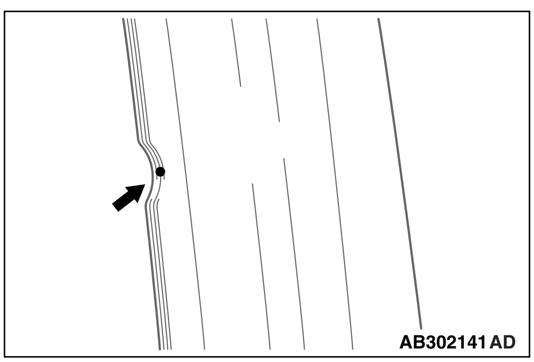


- Type B (actual-measurement dimensions) is the actual distance between the measurement points.Measure using a tracking gauge or a measuring tape, etc.

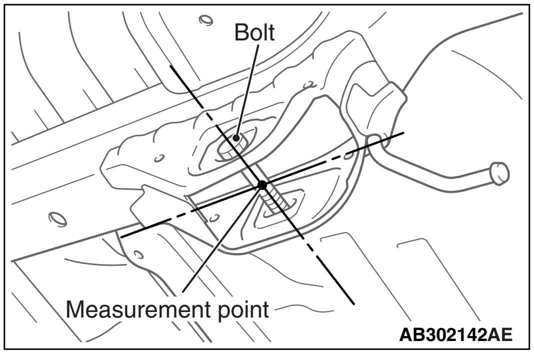
  NOTE:
  - *Make the lengths of the tracking gauge probes the same (A=A').*
  - *Do not bend or twist the measuring tape.*



- Insert the tracking gauge probes securely into the measurement holes.
- When the standard dimensions in the illustration are enclosed by rectangle, this indicates that the symmetrical left and right positions have the same dimensions.



- When using a notch for dimension measurement, set the measuring point at the center of the notch.



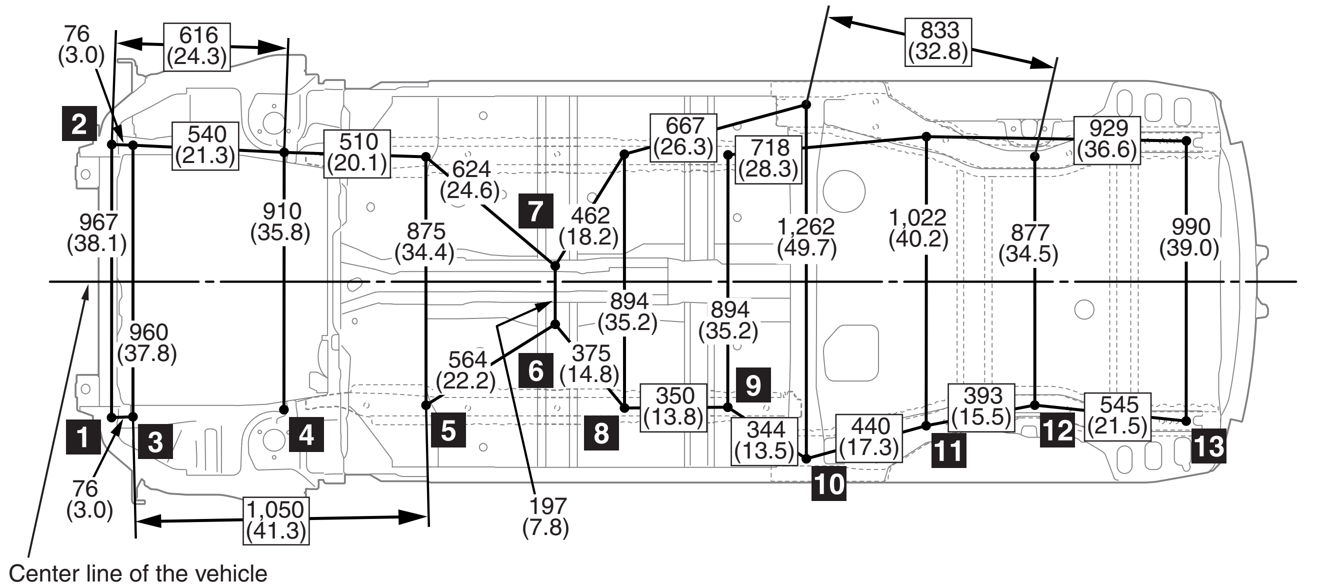
- When measuring the suspension mounting arm, or link mounting position, use the suspension mounting bolt, etc. (Type B only)
- The body center points are shown for the purpose of checking the position of the left and right symmetry location.

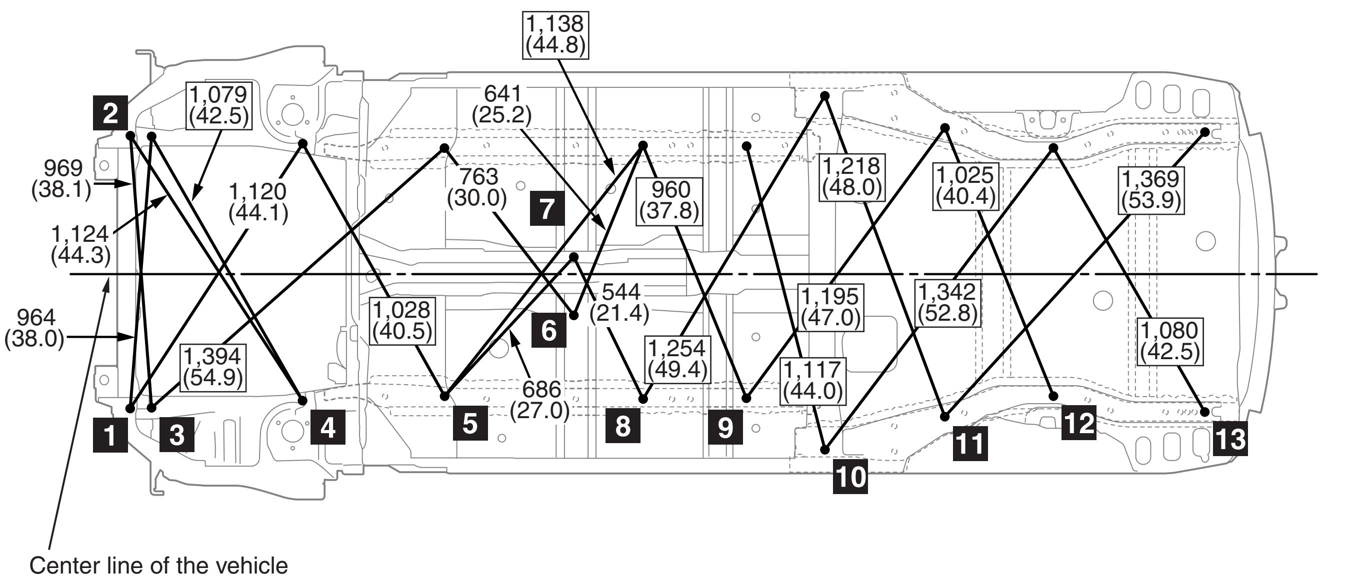
TYPE A (PROJECTED DIMENSIONS)

UNDER BODY

M4020005001636

mm (in)



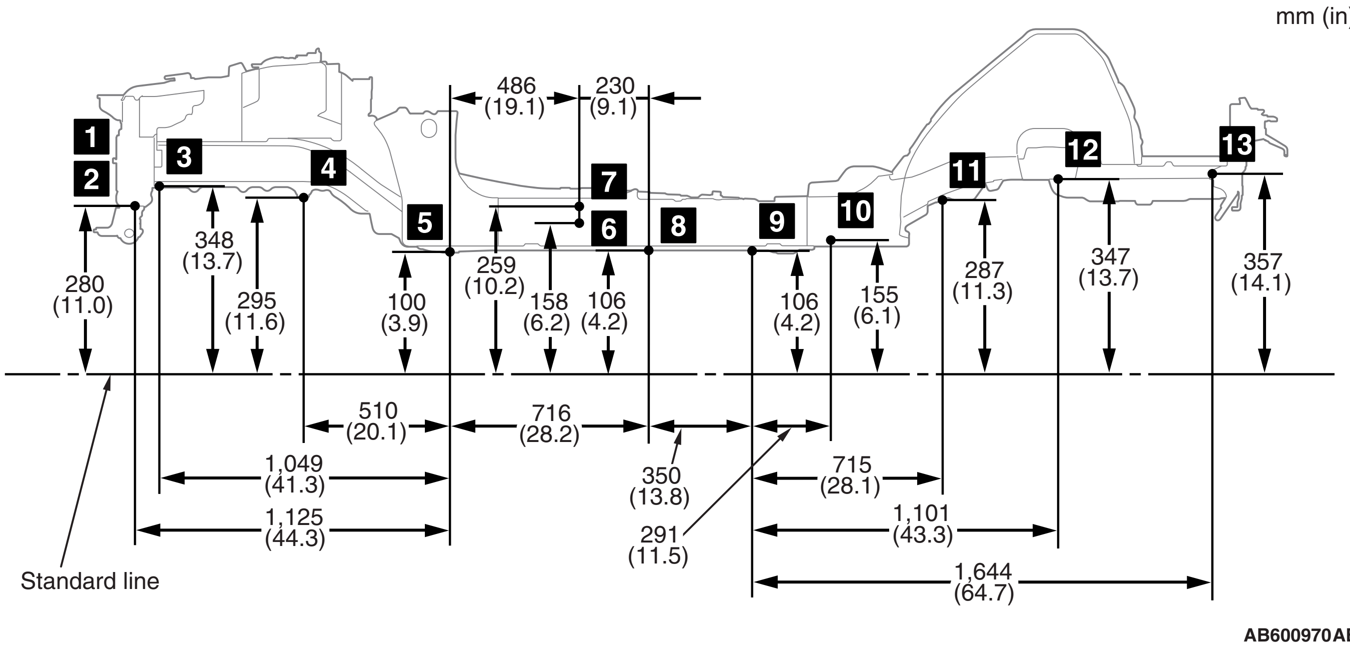


AB600969AB

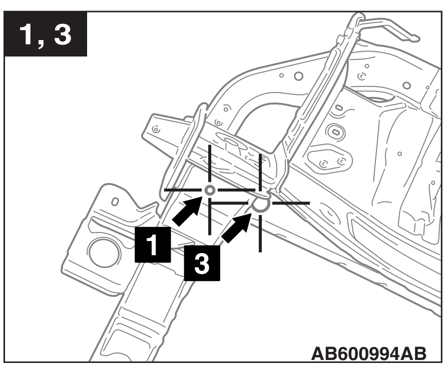
No.	Standard measurement point	Hole shape	Size mm (in)
1	Center of front end crossmember lower water draining hole (left side)	Round	8 (0.31)
2	Center of front end crossmember lower water draining hole (right side)	Round	8 (0.31)
3*	Center of front sidemember inner positioning hole	Round	25 (0.98)
4*	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
5*	Center of front sidemember rear water draining hole	Round	16 (0.63)
6	Center of center bearing mounting hole (left side)	Round	11 (0.43)
7	Center of center bearing mounting hole (right side)	Round	11 (0.43)
8*	Center of front floor sidemember front positioning hole	Round	16 (0.63)
9*	Center of front floor sidemember front positioning hole	Round	16 (0.63)

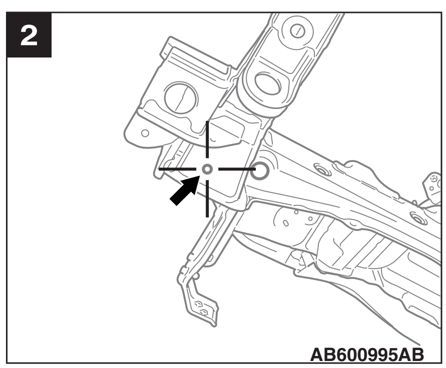
No.	Standard measurement point	Hole shape	Size mm (in)
10*	Center of rear floor sidemember lower positioning hole	Oblong	33.9× 18 (1.335× 0.71)
11*	Center of rear suspension bracket front water draining hole	Round	16 (0.63)
12*	Center of rear floor sidemember lower positioning hole	Round	25 (0.98)
13*	Center of rear floor extension sidemember water draining hole	Round	14 (0.55)

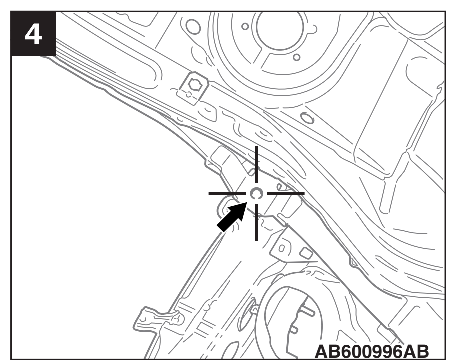
*NOTE: The * mark indicates the mounting position for the frame centering gauge.*

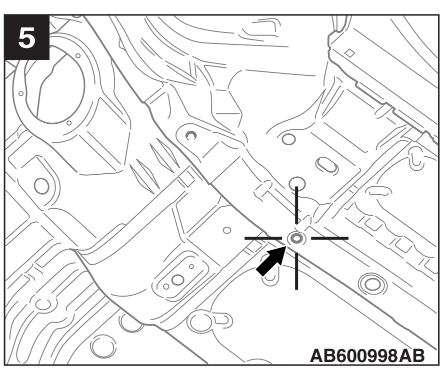


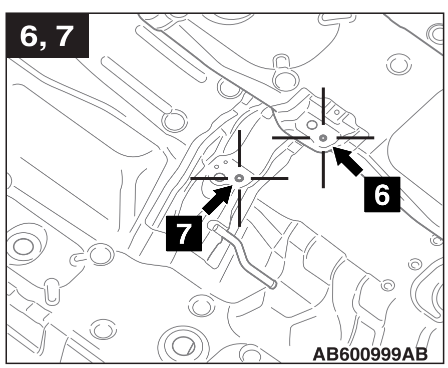
NOTE: The assumed standard line is established 100 mm (3.9in) below the measurement point No.5.

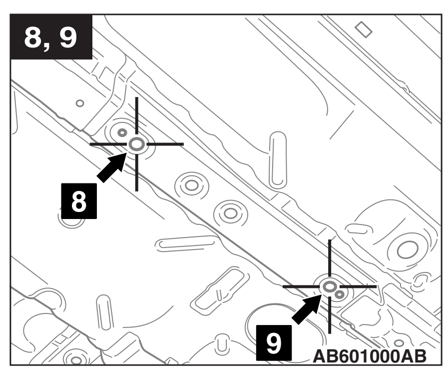


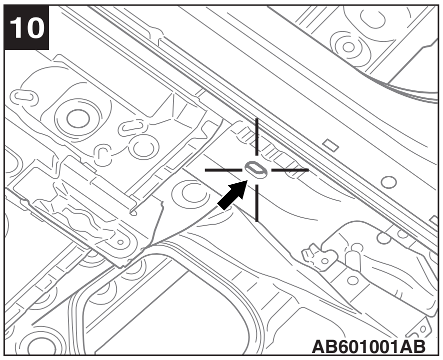








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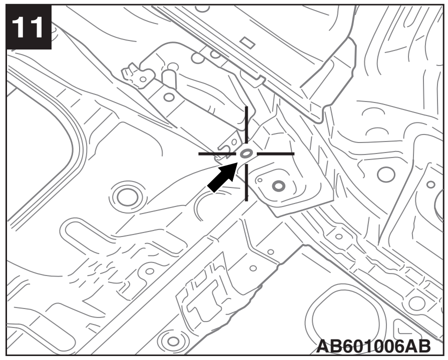
AB601001AB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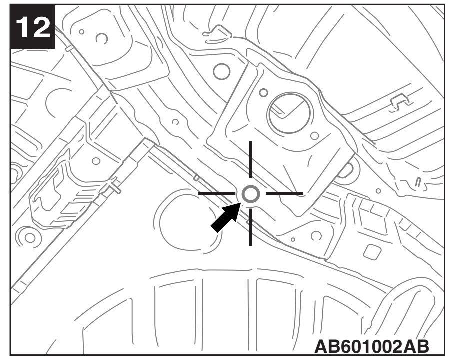
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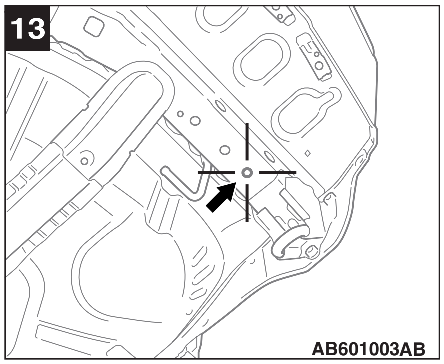
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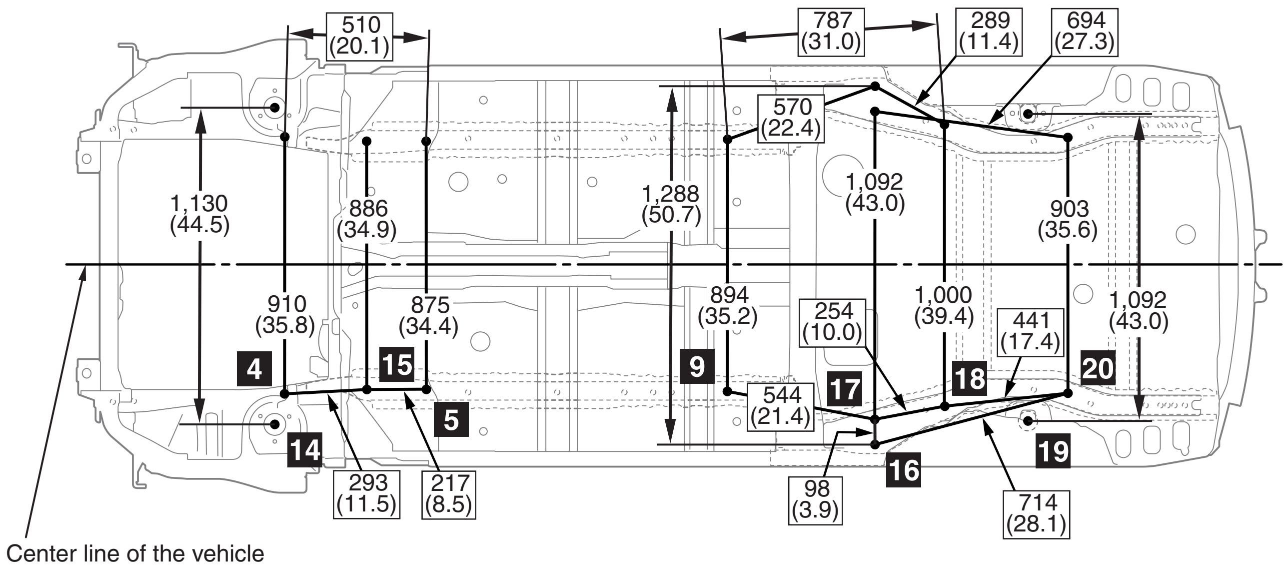
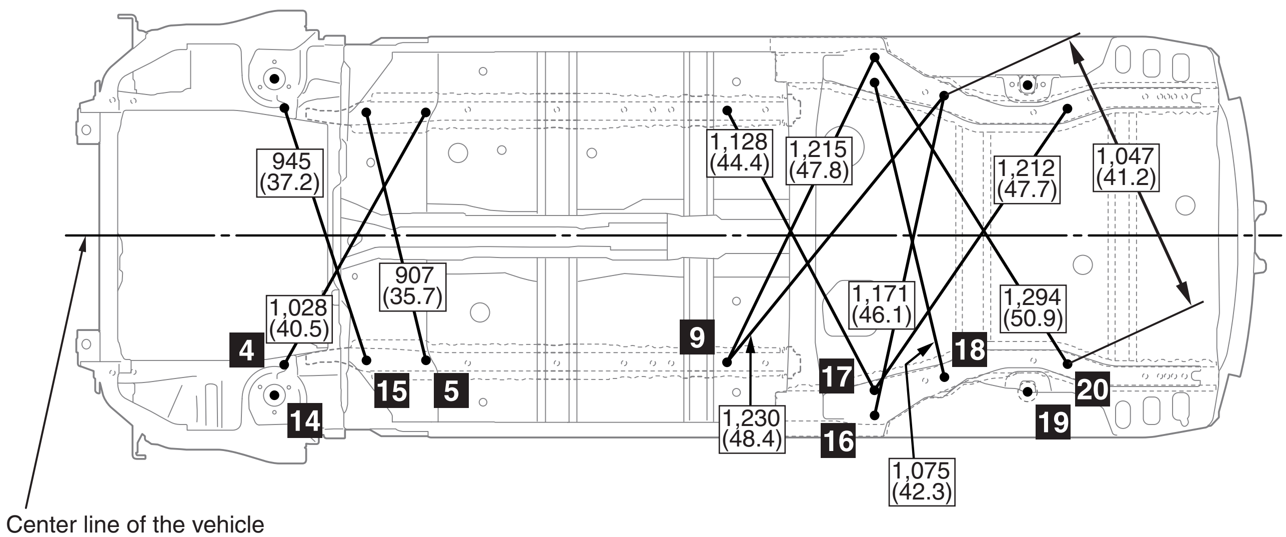
AB601003AB

SUSPENSION INSTALLATION DIMENSIONS

M4020013001222

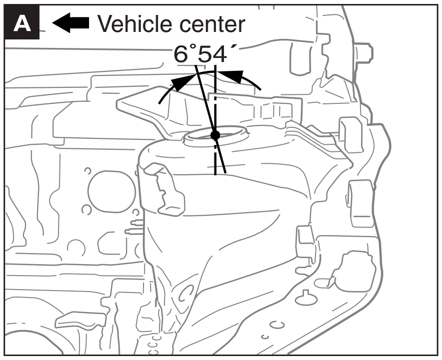
mm (in)

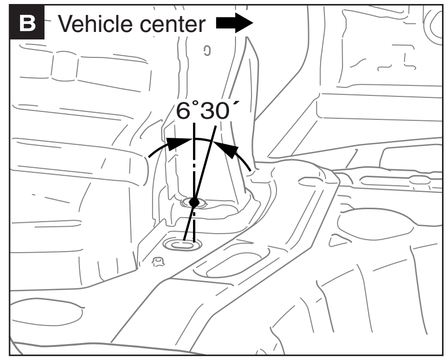


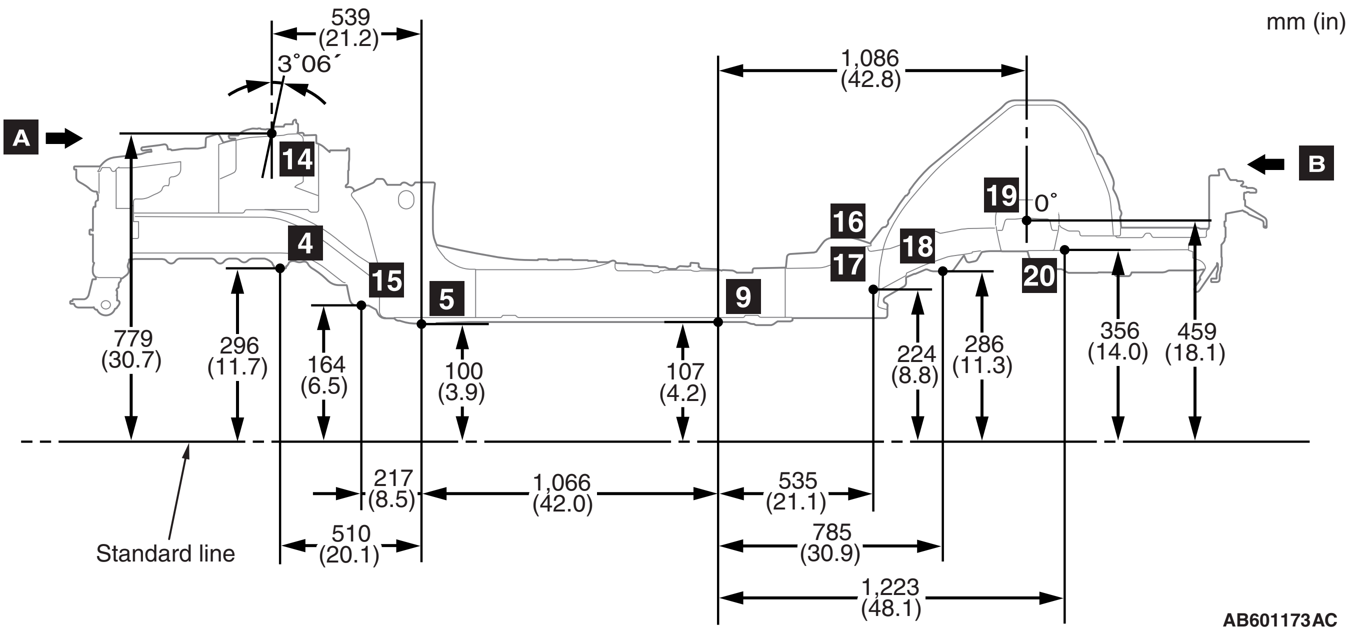


AB601172AB

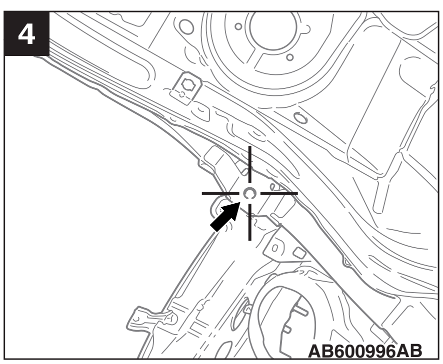
No.	Satndard measurement point	Hole shape	Size mm (in)
4	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
5	Center of front sidemember rear water draining hole	Round	16 (0.63)
9	Center of front floor sidemember front positioning hole	Round	16 (0.63)
14	Center of front shock absorber mounting hole	Round	80 (3.15)
15	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
16	Center of trailing arm mounting hole	Round	14 (0.55)
17	Center of trailing arm mounting hole	Round	14 (0.55)
18	Center of rear suspension crossmember mounting hole	Round	15 (0.59)
19	Center of rear shock absorber mounting hole	Round	64 (2.52)
20	Center of rear suspension crossmember mounting hole	Round	15 (0.59)

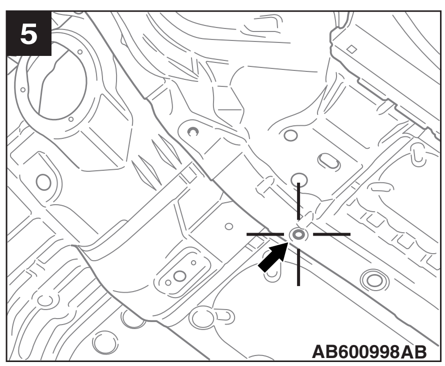


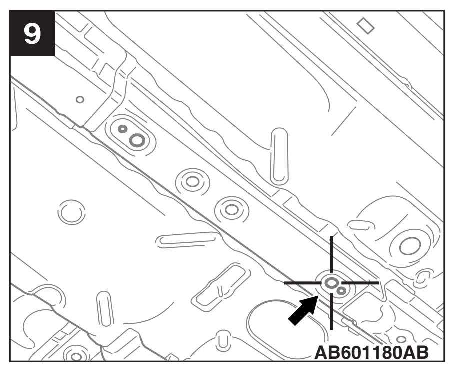


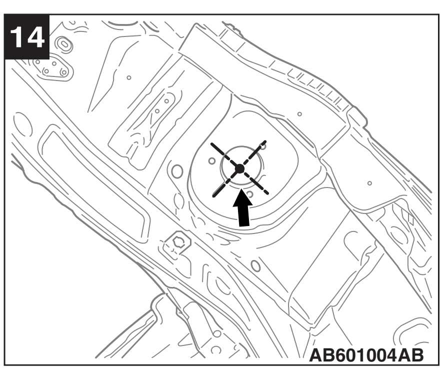


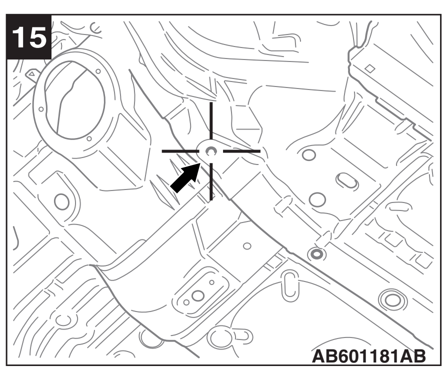
NOTE: The assumed standard line is established 100 mm (3.9in) below the measurement point No.5.

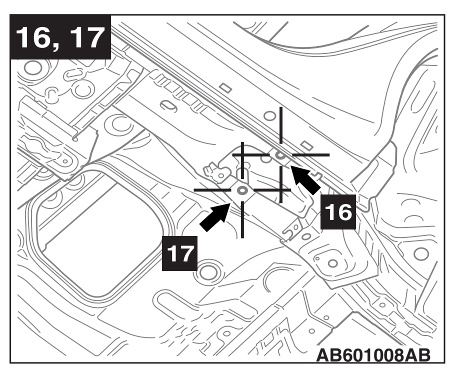


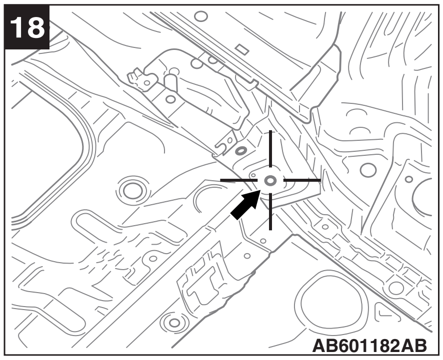








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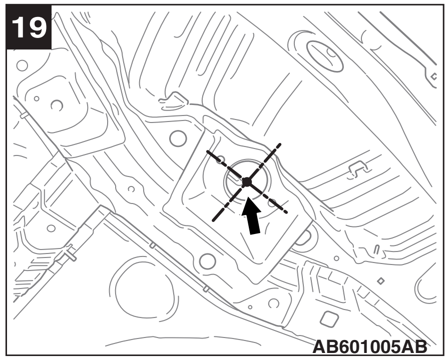
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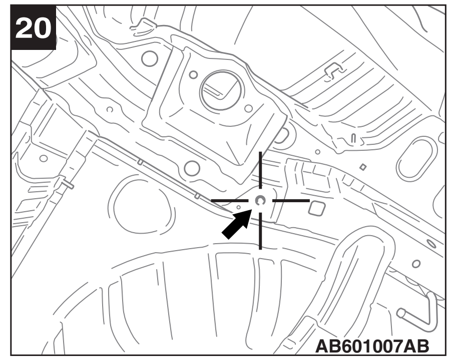
20
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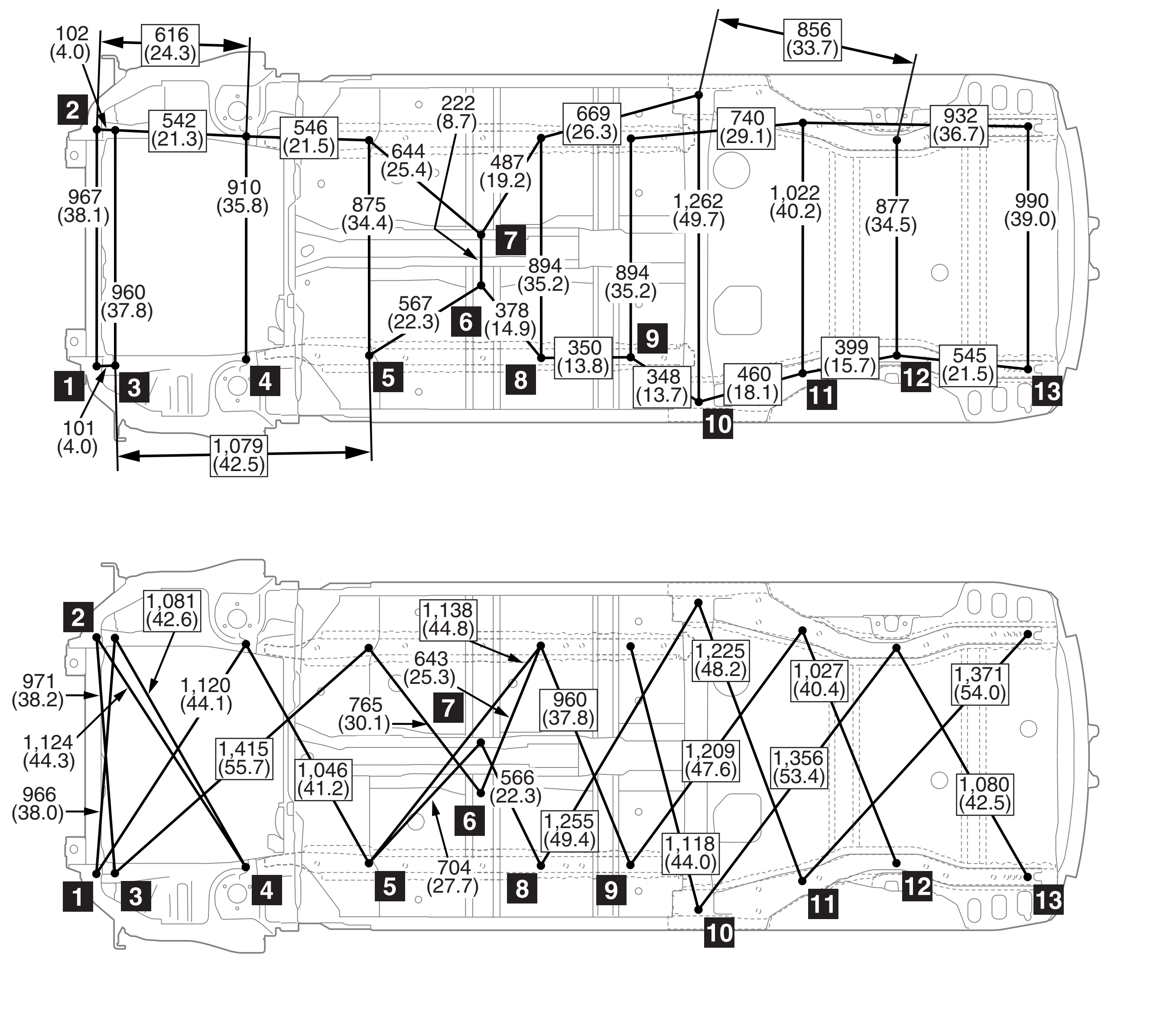
TYPE B (ACTUAL-MEASUREMENT DIMENSIONS)

UNDER BODY

M4020005001647

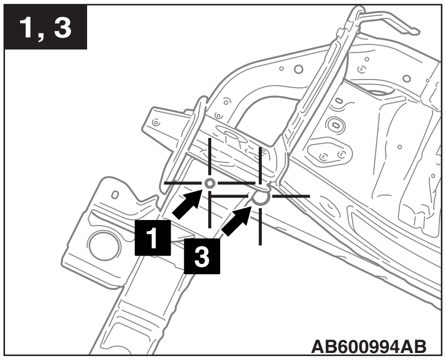
mm (in)

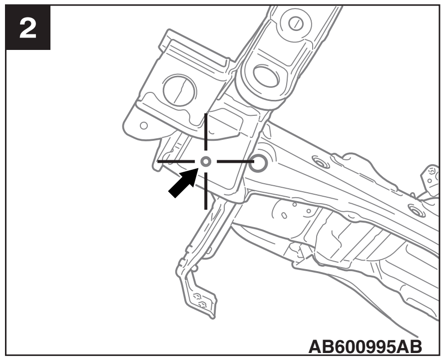


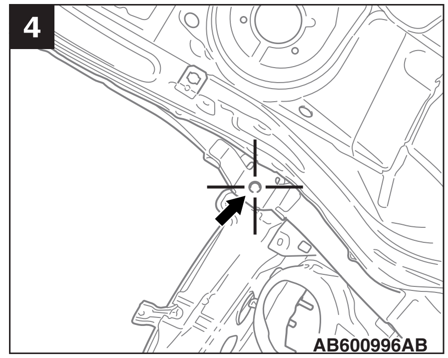
No.	Standard measurement point	Hole shape	Size mm (in)
1	Center of front end crossmember lower water draining hole (left side)	Round	8 (0.31)
2	Center of front end crossmember lower water draining hole (right side)	Round	8 (0.31)
3*	Center of front sidemember inner positioning hole	Round	25 (0.98)
4*	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
5*	Center of front sidemember rear water draining hole	Round	16 (0.63)
6	Center of center bearing mounting hole (left side)	Round	11 (0.43)
7	Center of center bearing mounting hole (right side)	Round	11 (0.43)
8*	Center of front floor sidemember front positioning hole	Round	16 (0.63)
9*	Center of front floor sidemember front positioning hole	Round	16 (0.63)

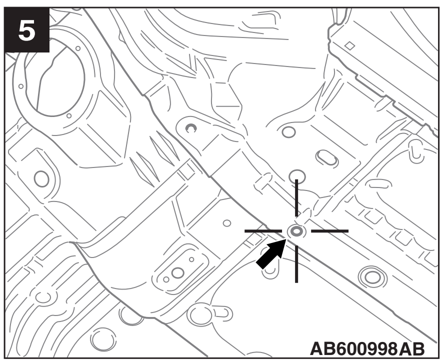
No.	Standard measurement point	Hole shape	Size mm (in)
10*	Center of rear floor sidemember lower positioning hole	Oblong	33.9×18 (1.335×0.71)
11*	Center of rear suspension bracket front water draining hole	Round	16 (0.63)
12*	Center of rear floor sidemember lower positioning hole	Round	25 (0.98)
13*	Center of rear floor extension sidemember water draining hole	Round	14 (0.55)

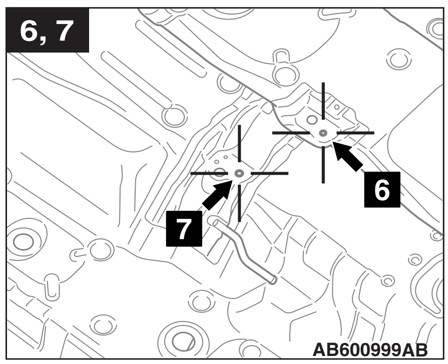
*NOTE: The * mark indicates the mounting position for the frame centering gauge.*

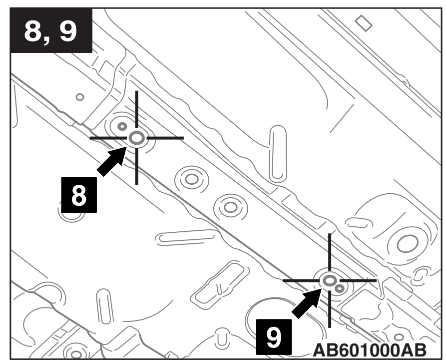


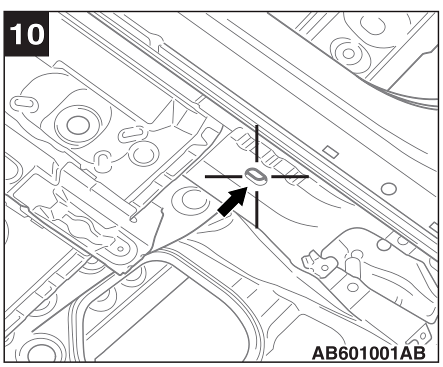


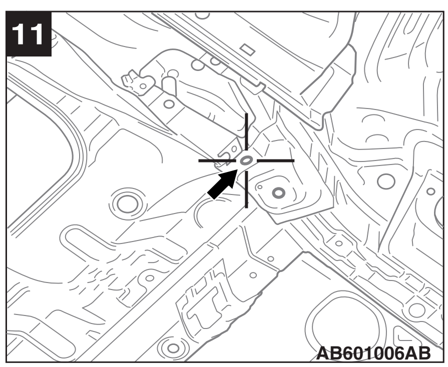


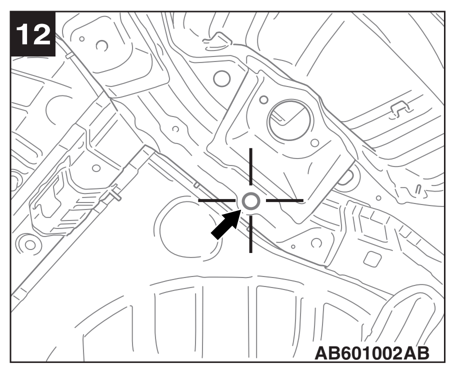


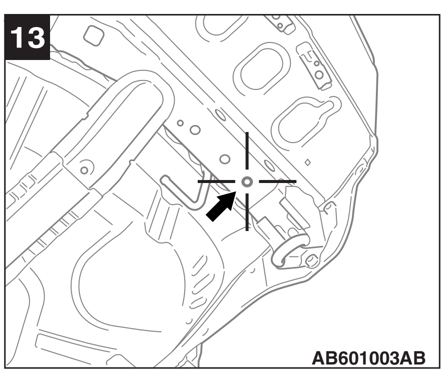








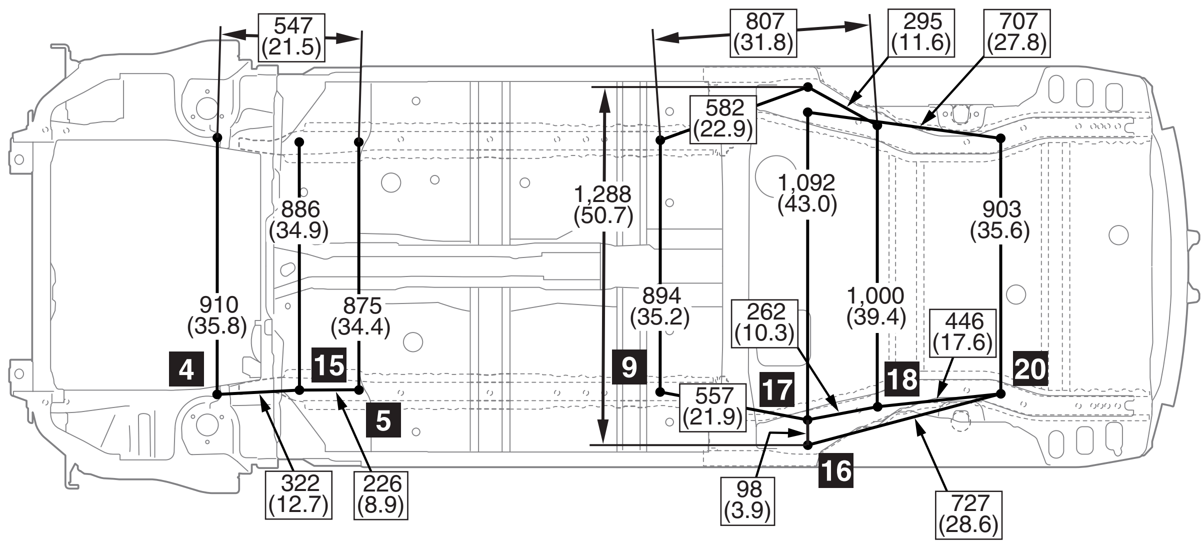


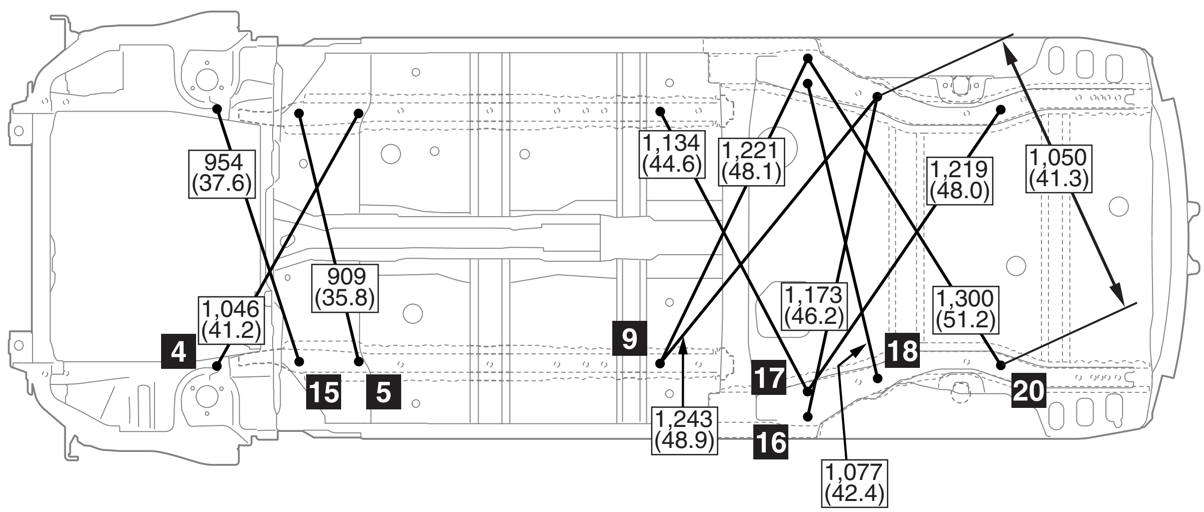


SUSPENSION INSTALLATION DIMENSIONS

M4020013001233

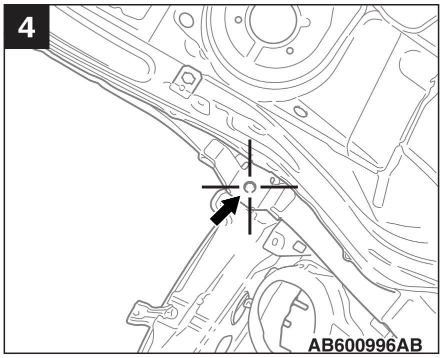
mm (in)





AB601190AB

No.	Standard measurement point	Hole shape	Size mm (in)
4	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
5	Center of front sidemember rear water draining hole	Round	16 (0.63)
9	Center of front floor sidemember front positioning hole	Round	16 (0.63)
15	Center of front suspension crossmember mounting hole	Round	15.5 (0.61)
16	Center of trailing arm mounting hole	Round	14 (0.55)
17	Center of trailing arm mounting hole	Round	14 (0.55)
18	Center of rear suspension crossmember mounting hole	Round	15 (0.59)
20	Center of rear suspension crossmember mounting hole	Round	15 (0.59)


4
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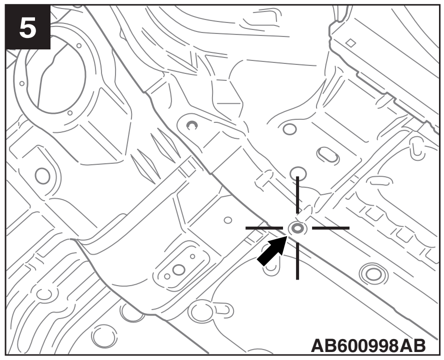
5
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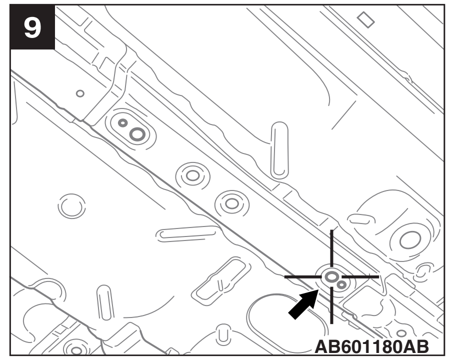
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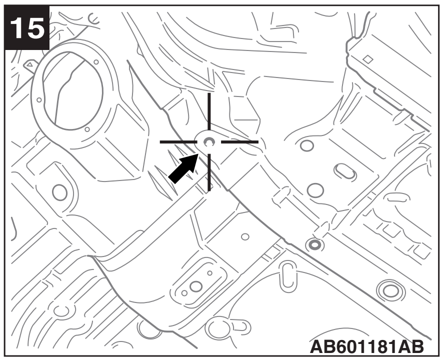
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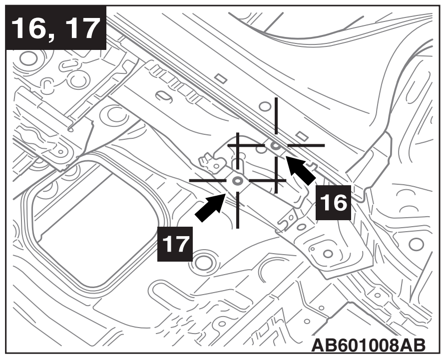
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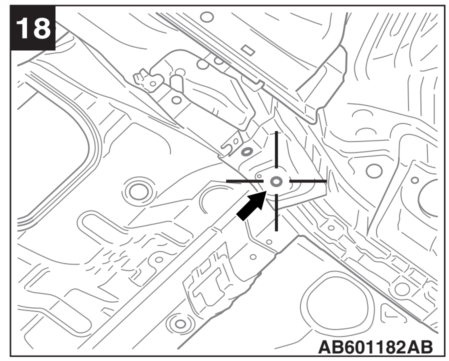
17
AB601008AB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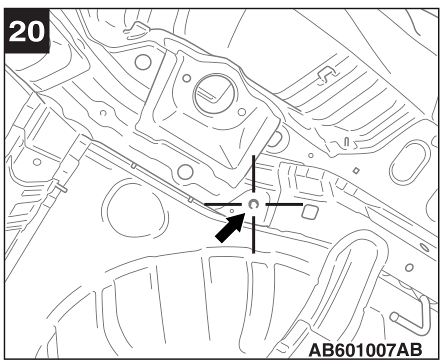
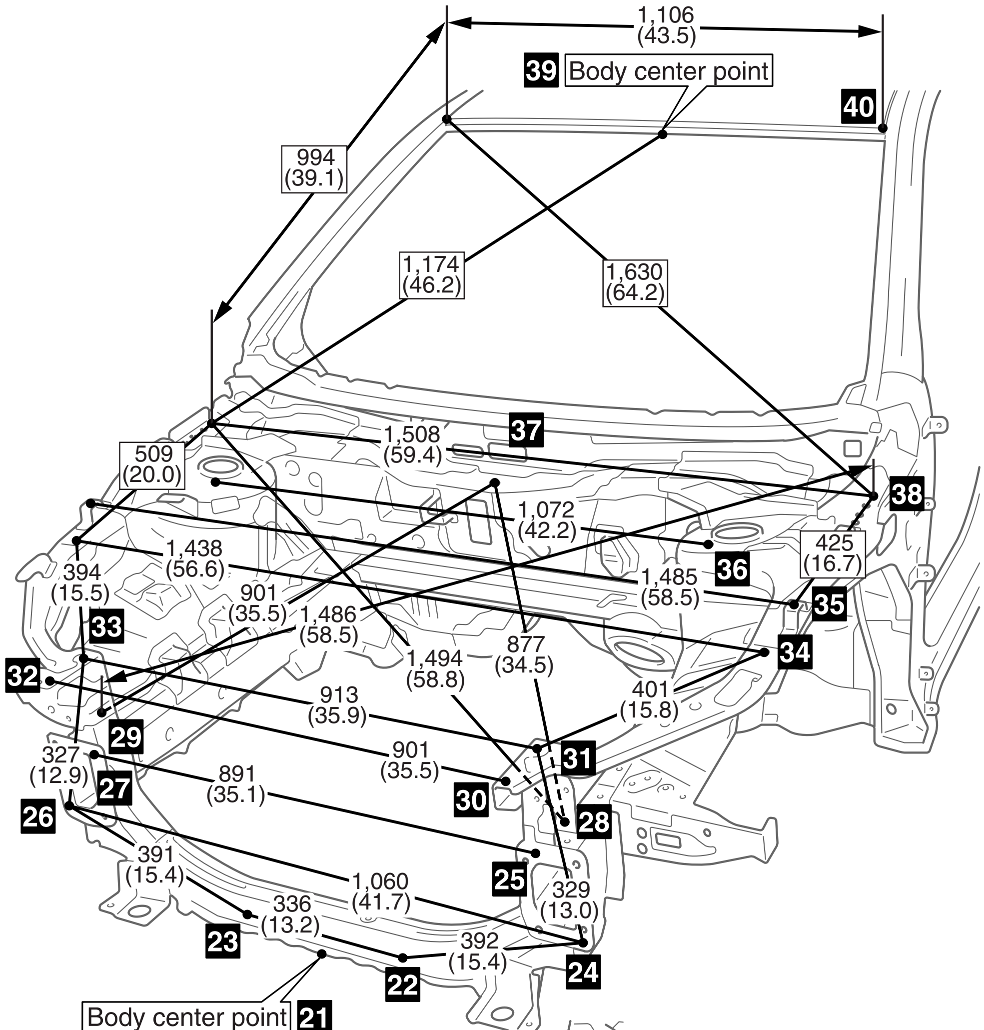
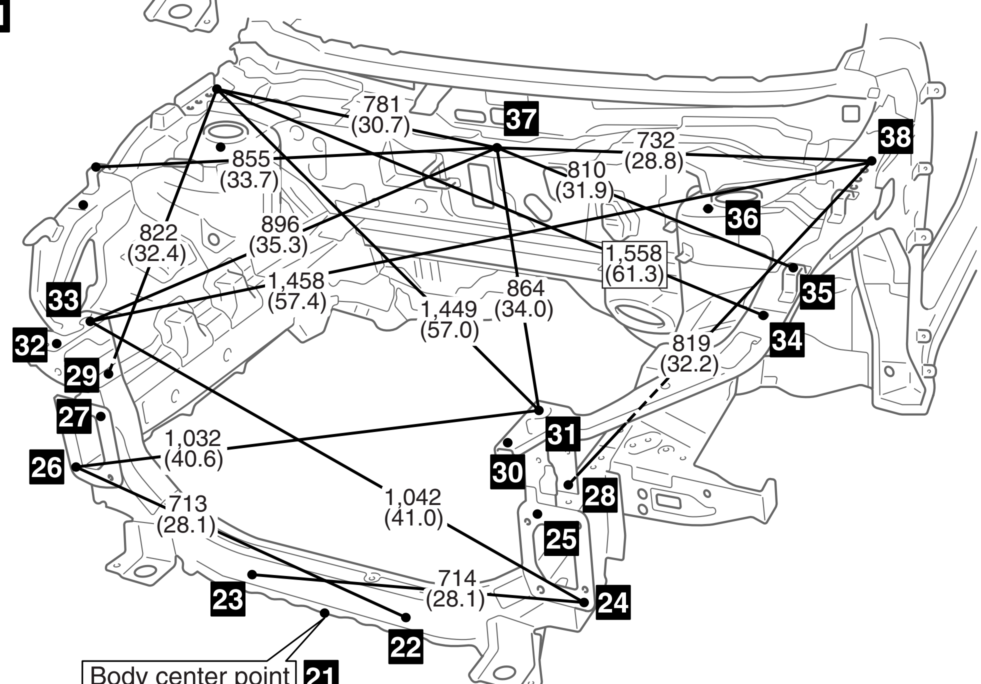

20
AB601007AB

FRONT BODY

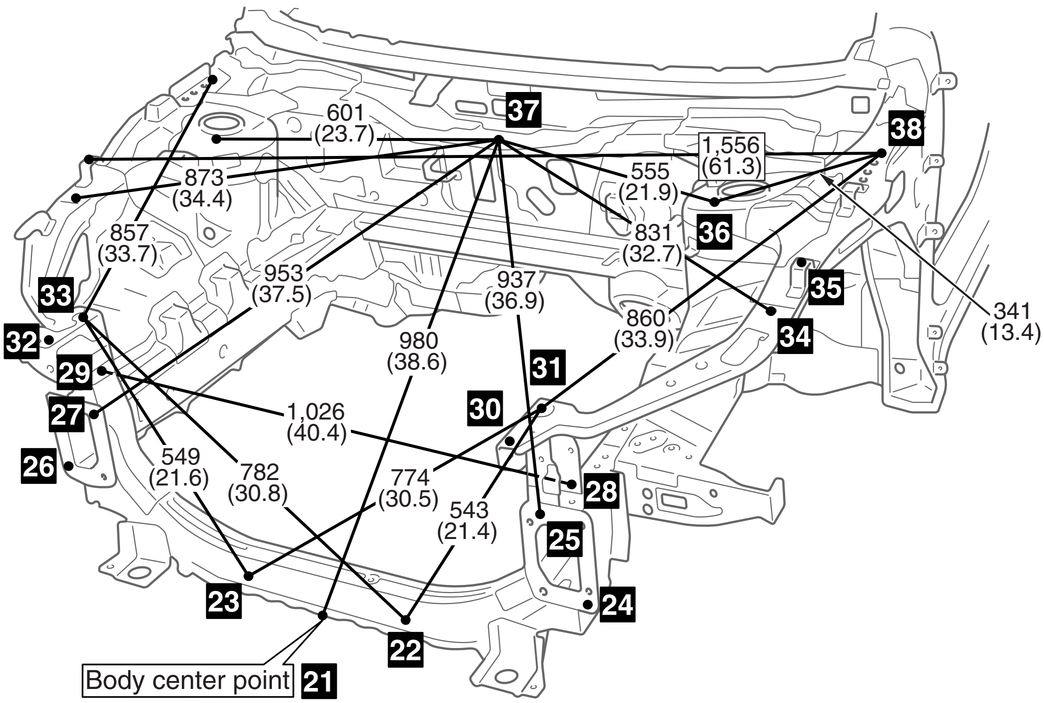
M4020006000829

mm (in)

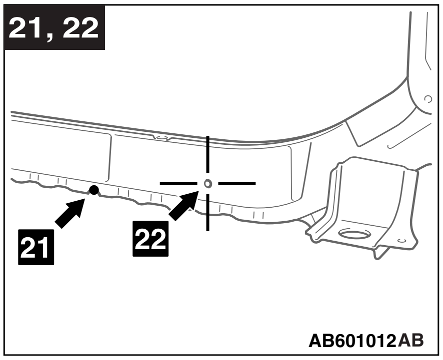




AB600979AB



No.	Standard measurement point	Hole shape	Size mm (in)
21	Center of front end crossmember positioning notch (Body center point)	–	–
22	Center of inter cooler bracket mounting hole	Round	9 (0.35)
23	Center of inter cooler bracket mounting hole	Round	9 (0.35)
24	Center of front bumper beam mounting hole	Round	9 (0.35)
25	Center of front bumper beam mounting hole	Round	9 (0.35)
26	Center of front bumper beam mounting hole	Round	9 (0.35)
27	Center of front bumper beam mounting hole	Round	9 (0.35)
28	Center of front sidemember inner positioning notch	–	–
29	Center of front sidemember inner positioning notch	–	–
30	Center of front end upper bar mounting hole	Round	6.6 (0.26)
31	Center of front end upper bar mounting hole	Round	6.6 (0.26)
32	Center of front end upper bar mounting hole	Round	6.6 (0.26)
33	Center of front end upper bar mounting hole	Round	6.6 (0.26)
34	Center of front end upper bar side positioning hole	Round	6 (0.24)
35	Center of front fender mounting hole	Round	6.6 (0.26)
36	Center of front strut mounting hole	Round	11.5 (0.45)
37	Center of cowl top lower panel front mounting hole	Round	6.6 (0.26)
38	Center of hood hinge mounting hole	Round	9 (0.35)
39	Center of roof panel positioning notch (Body center point)	–	–
40	Corner of roof panel	–	–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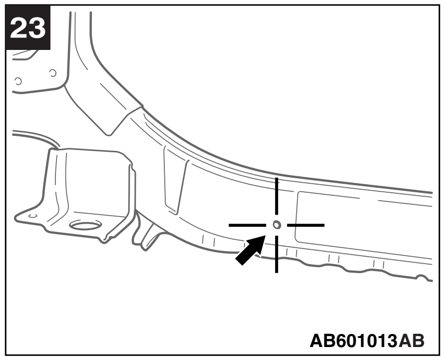
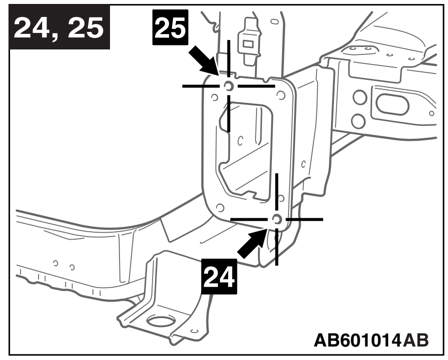
21
22
AB601012AB


23
AB601013AB


24, 25
25
24
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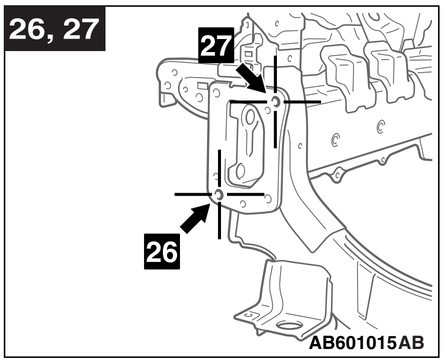
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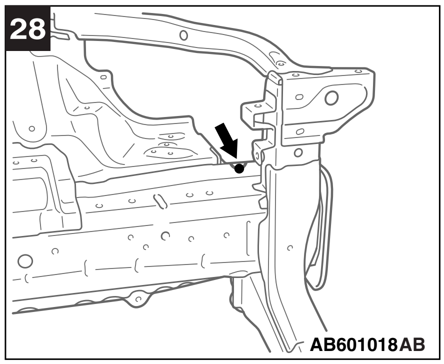
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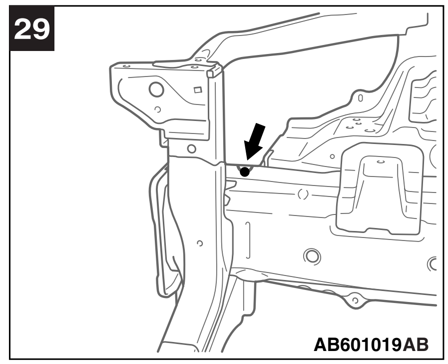
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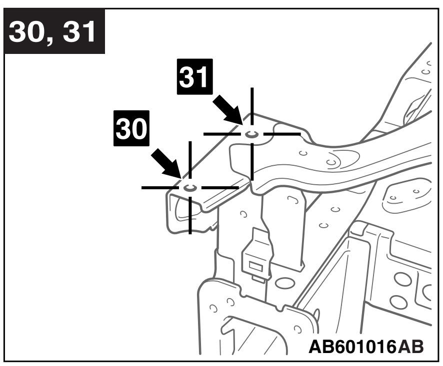
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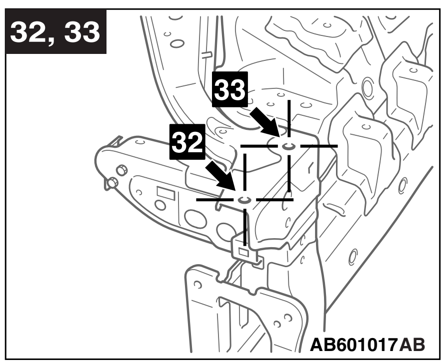
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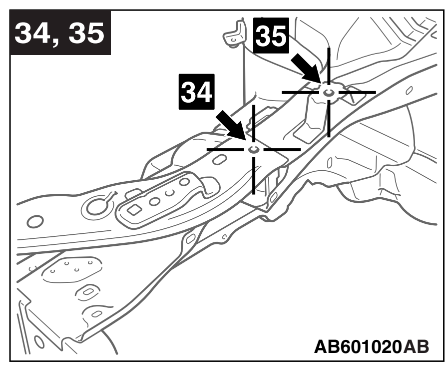
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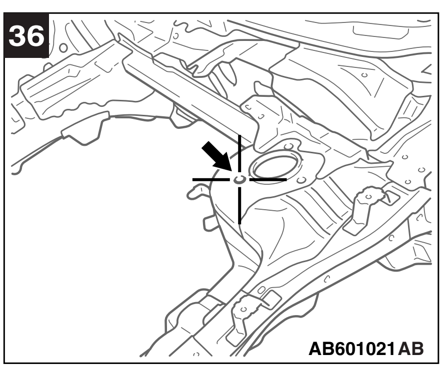
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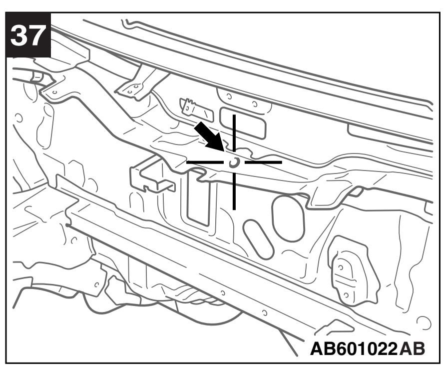
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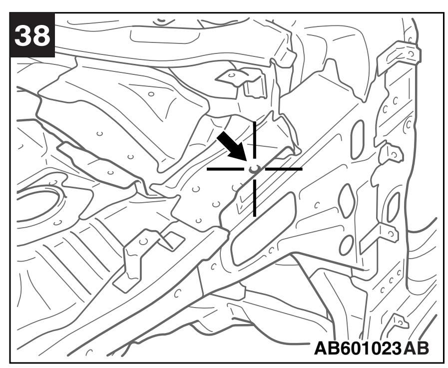
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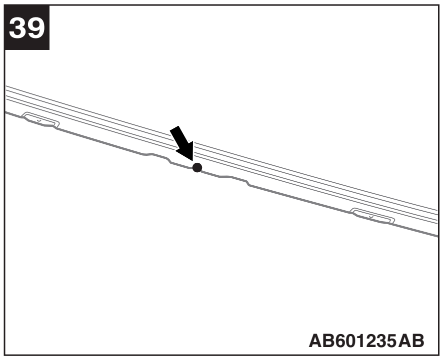
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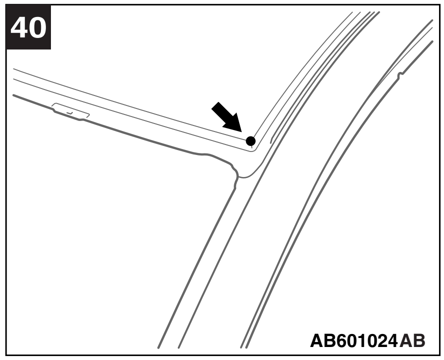
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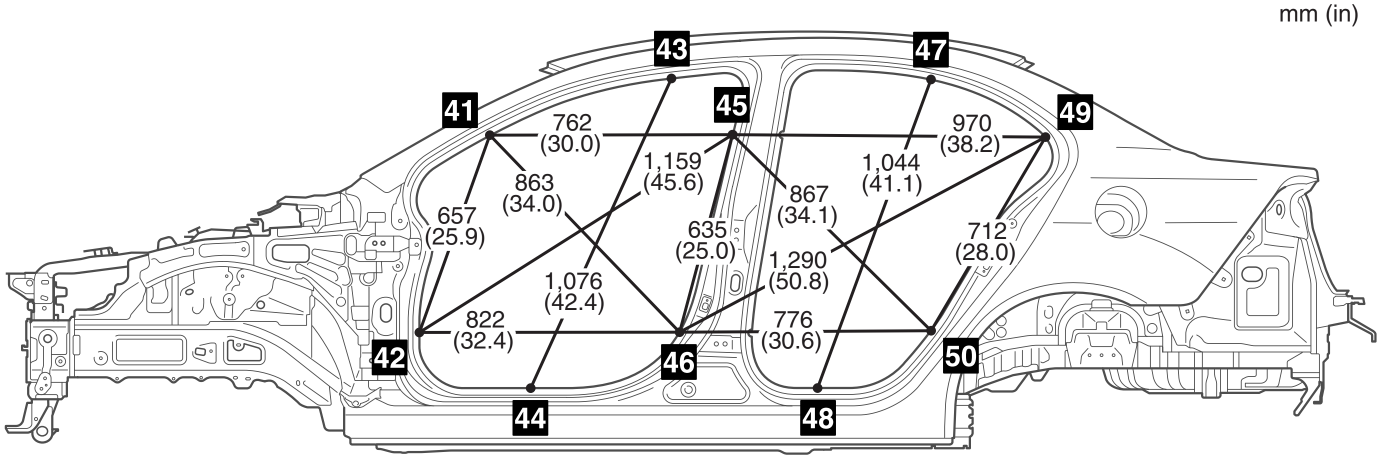
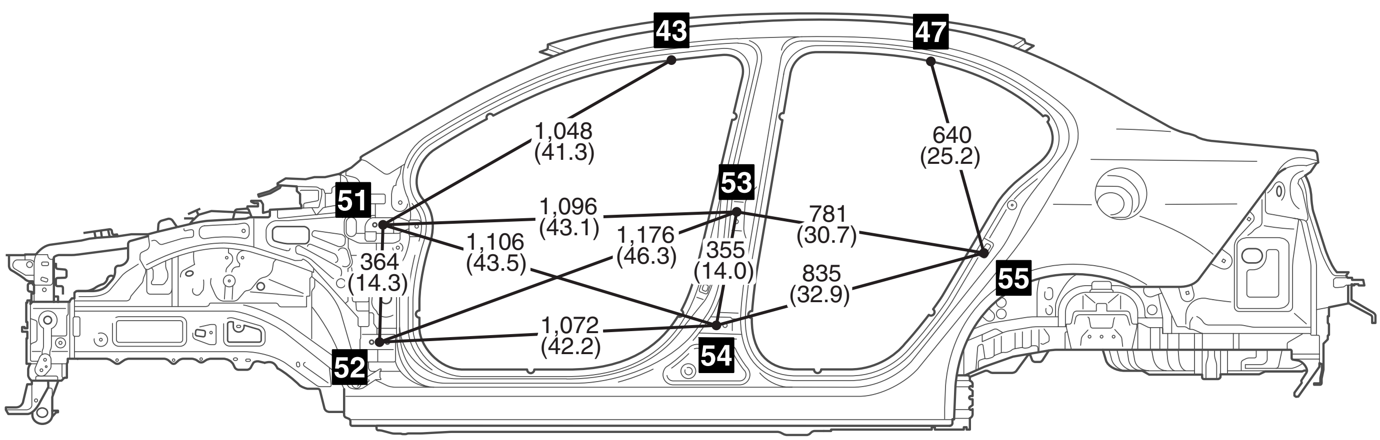
SIDE BODY

M4020007000769

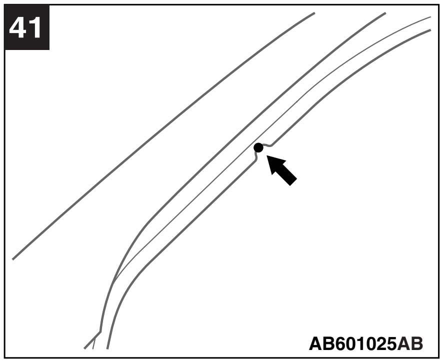
mm (in)





AB600980AB

No.	Standard measurement point	Hole shape	Size mm (in)
41	Front pillar positioning notch (upper)	–	–
42	Front pillar positioning notch (lower)	–	–
43	Side roof rail positioning notch (front)	–	–
44	Side sill positioning notch (front)	–	–
45	Center pillar positioning notch (upper)	–	–
46	Center pillar positioning notch (lower)	–	–
47	Side roof rail positioning notch (rear)	–	–
48	Side sill positioning notch (rear)	–	–
49	Quarter panel positioning notch (upper)	–	–
50	Quarter panel positioning notch (lower)	–	–
51	Center of front door hinge mounting hole (upper)	Round	11 (0.43)
52	Center of front door hinge mounting hole (lower)	Round	11 (0.43)
53	Center of rear door hinge mounting hole (upper)	Round	11 (0.43)
54	Center of rear door hinge mounting hole (lower)	Round	11 (0.43)
55	Center of rear door switch mounting hole	Round	5 (0.20)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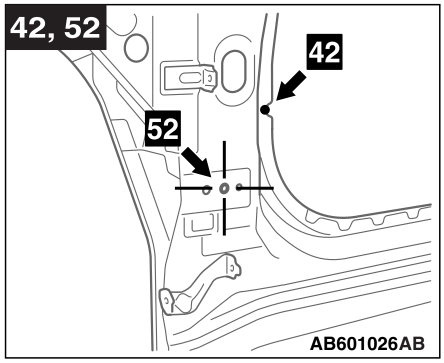
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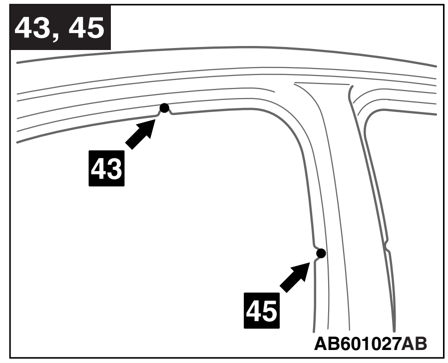
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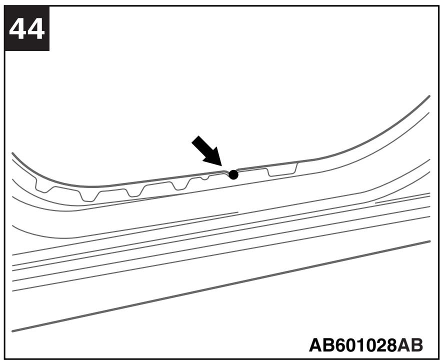
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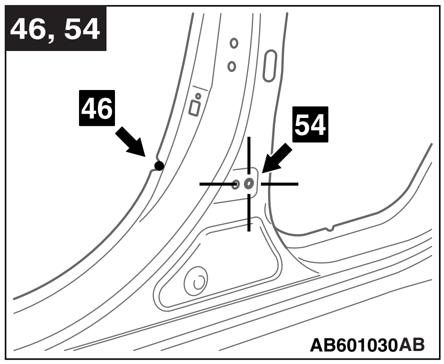
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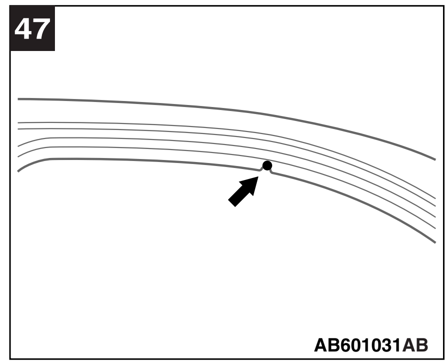
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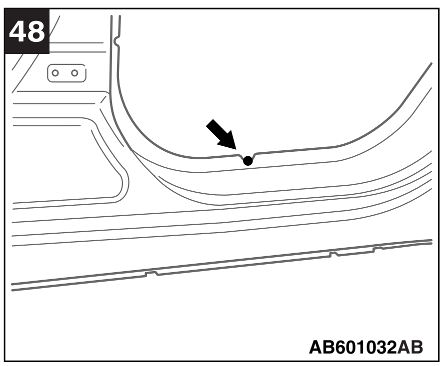
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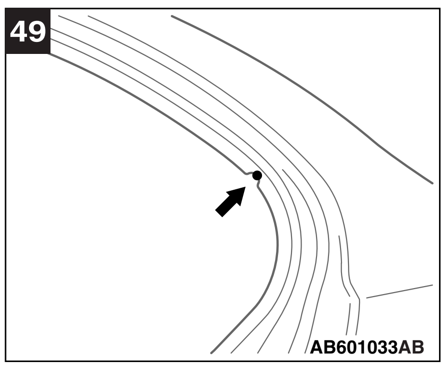
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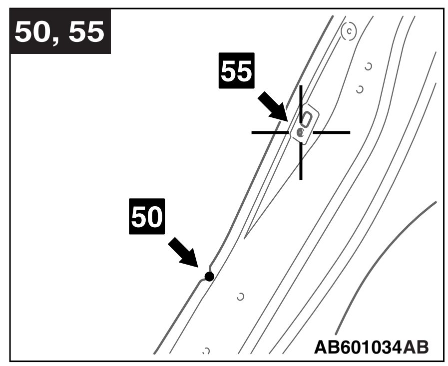
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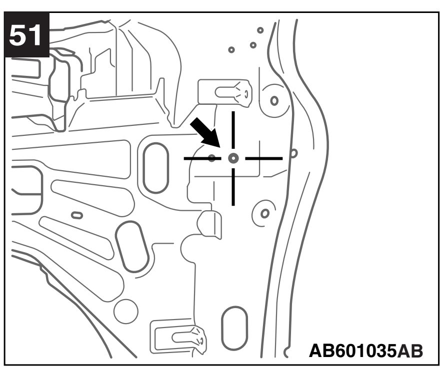
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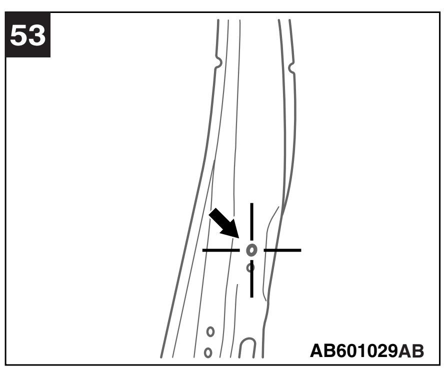
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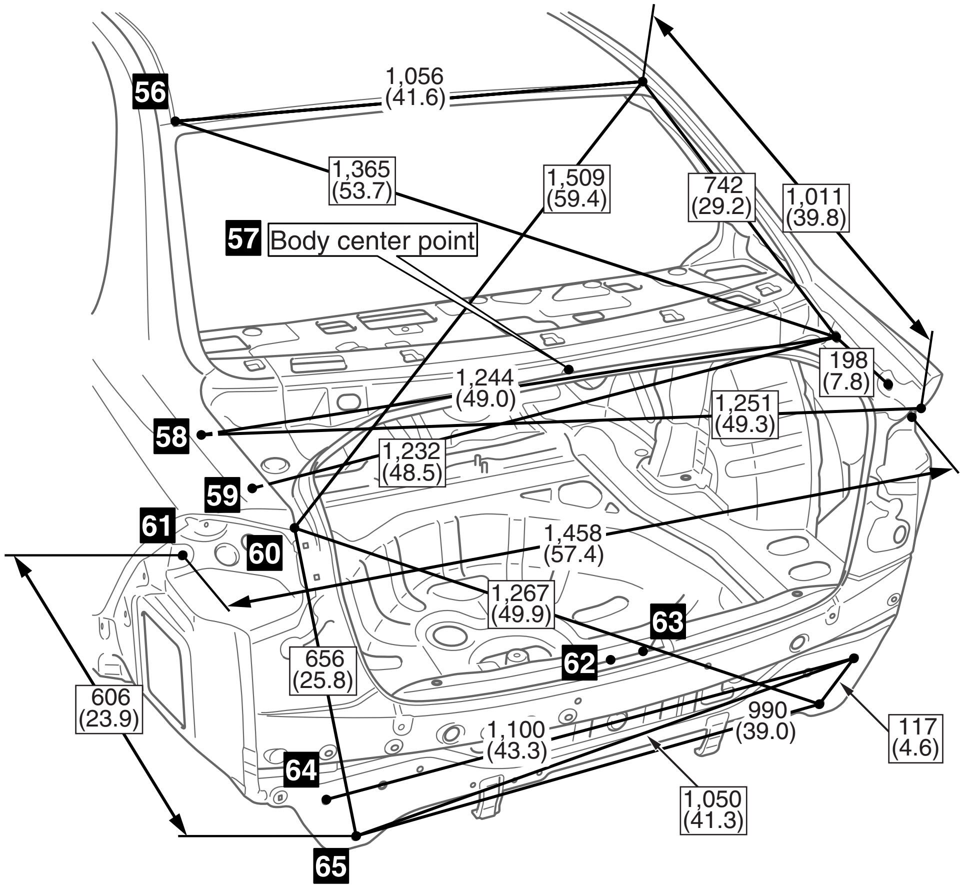
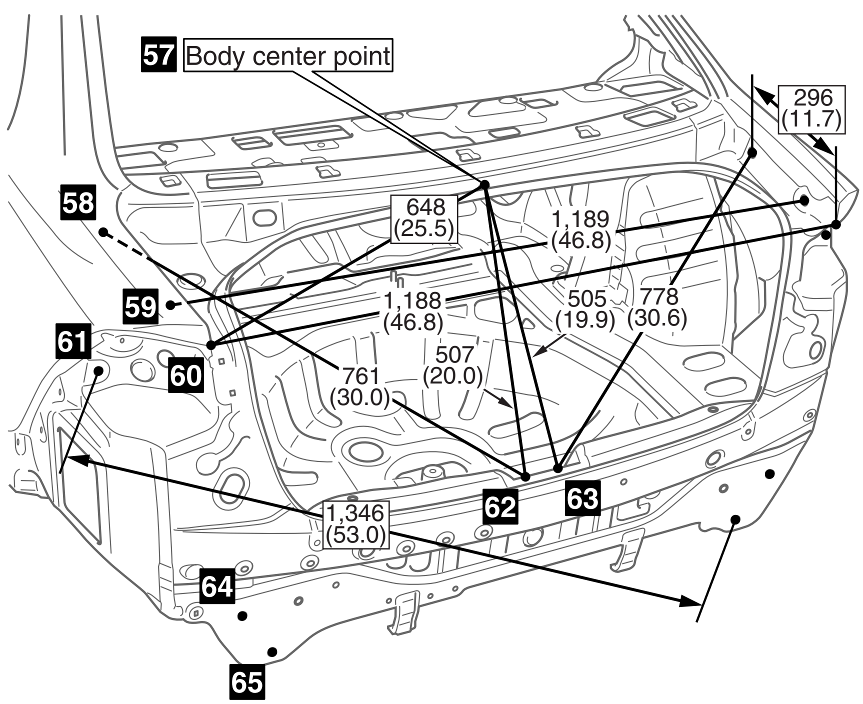
REAR BODY

M4020008000803

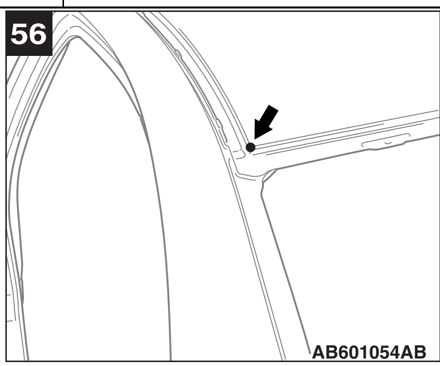
mm (in)

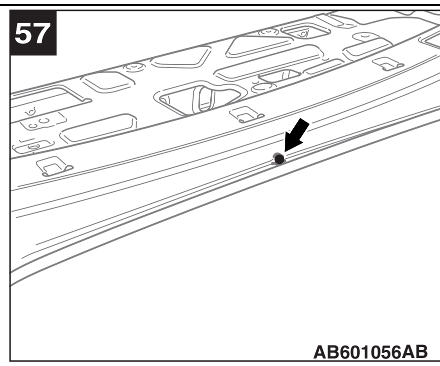


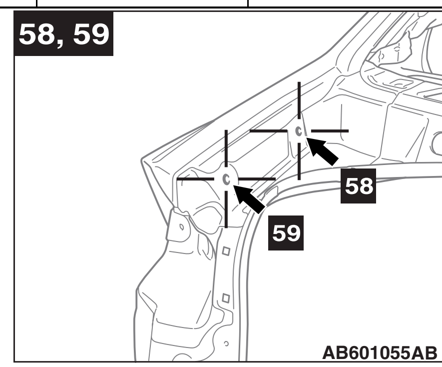


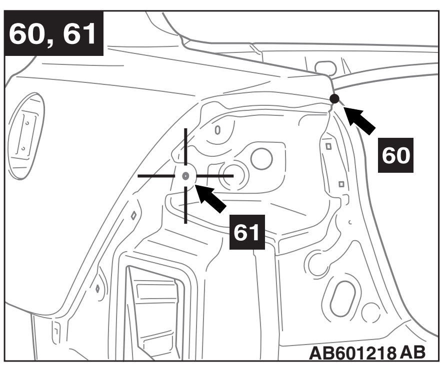
AB600983AC

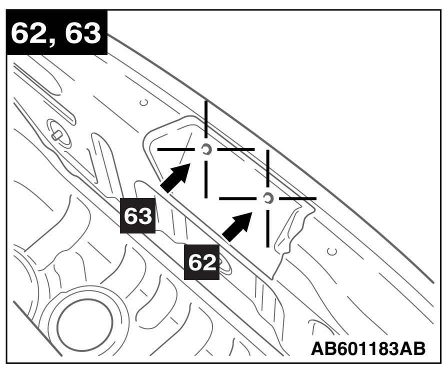
No.	Standard measurement point	Hole shape	Size mm (in)
56	Corner of roof panel	–	–
57	Body center point of rear shelf panel	–	–
58	Center of trunk lid hinge mounting hole	Round	9 (0.35)
59	Center of trunk lid hinge mounting hole	Round	9 (0.35)
60	Corner of side outer panel	–	–
61	Center of rear combination lamp mounting hole	Round	8 (0.31)
62	Center of striker mounting hole (left side)	Round	6.6 (026)
63	Center of striker mounting hole (right side)	Round	6.6 (026)
64	Center of rear bumper mounting hole	Round	15 (0.59)
65	Center of rear bumper mounting hole	Round	15 (0.59)

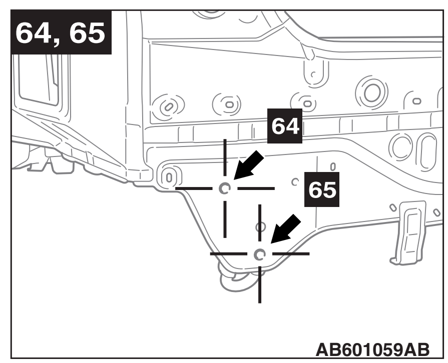








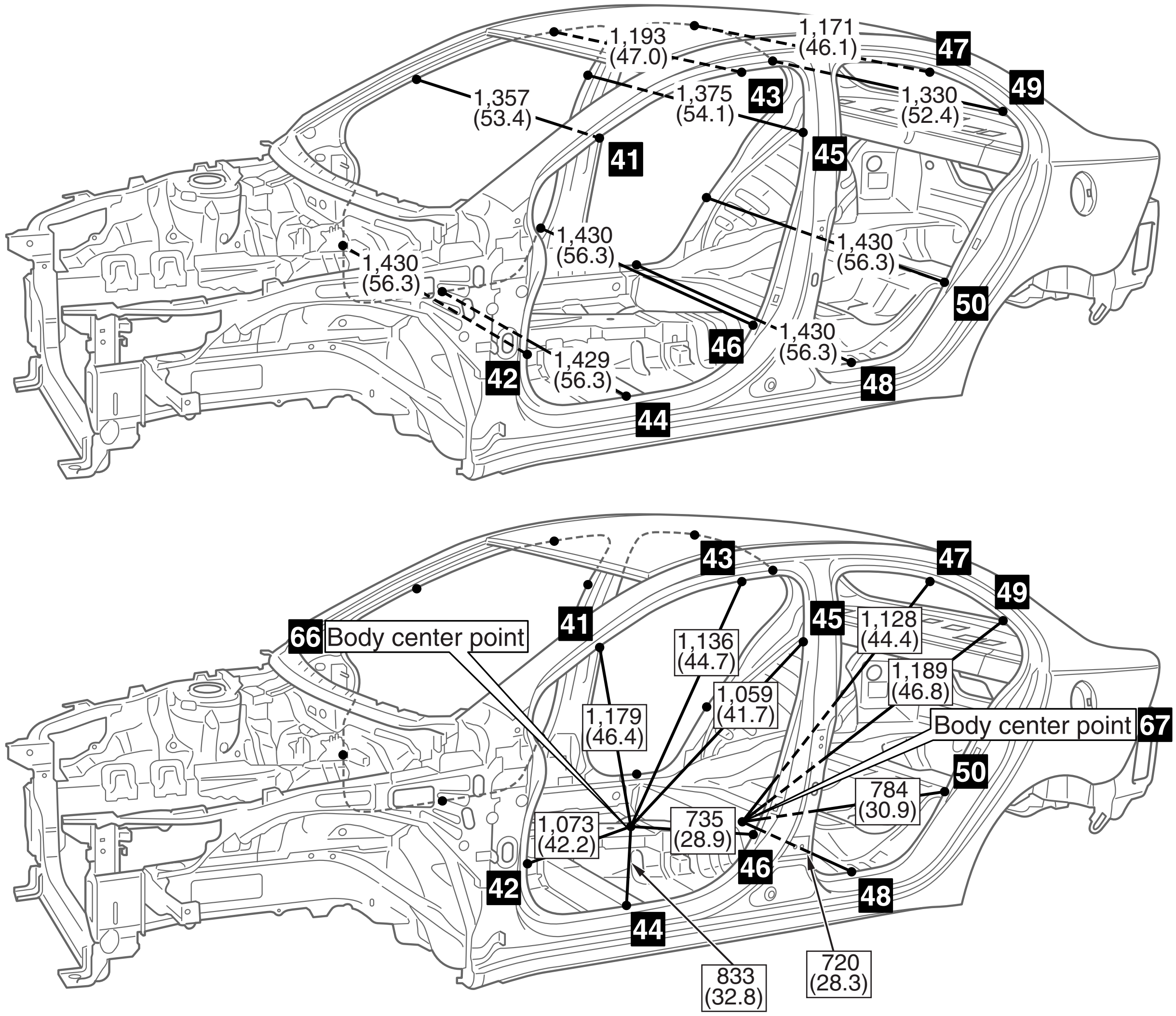




INTERIOR

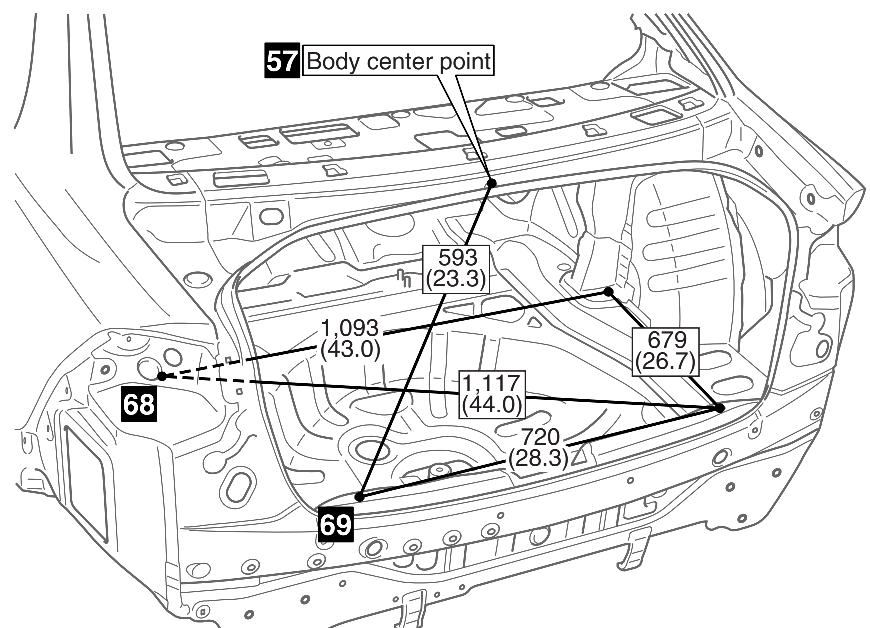
M4020009000873

mm (in)



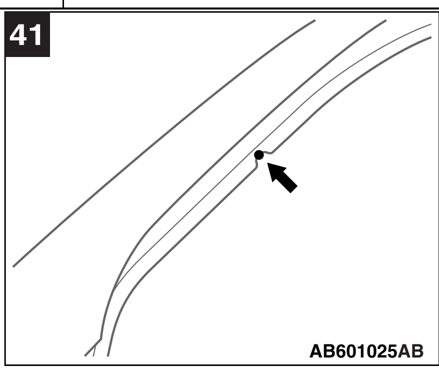
AB600982AB

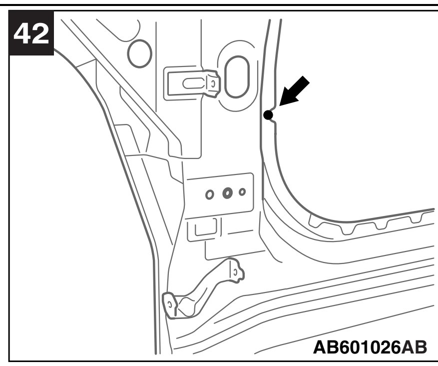
mm (in)

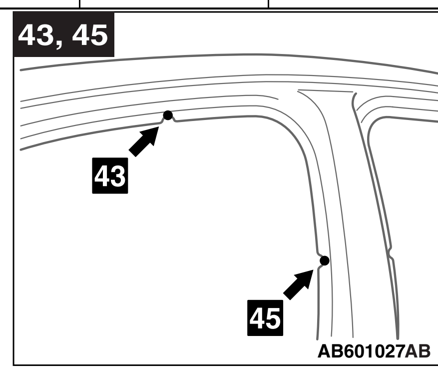


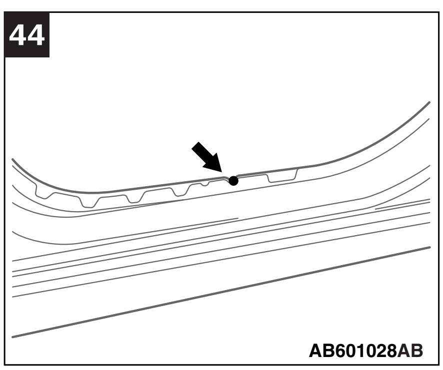
AB601145AB

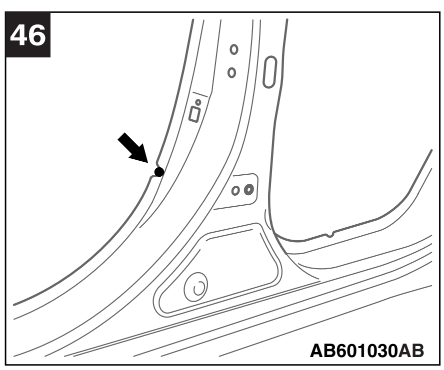
No.	Standard measurement point	Hole shape	Size mm (in)
41	Front pillar positioning notch (upper)	–	–
42	Front pillar positioning notch (lower)	–	–
43	Side roof rail positioning notch (front)	–	–
44	Side sill positioning notch (front)	–	–
45	Center pillar positioning notch (upper)	–	–
46	Center pillar positioning notch (lower)	–	–
47	Side roof rail positioning notch (rear)	–	–
48	Side sill positioning notch (rear)	–	–
49	Quarter panel positioning notch (upper)	–	–
50	Quarter panel positioning notch (lower)	–	–
57	Body center point of rear shelf panel	–	–
66	Center of backbone reinforcement positioning hole (Body center point)	Round	11 (0.43)
67	Body center point of rear floor pan front (Body center point)	–	–
68	Center of rear shock absorber mounting hole	Round	14 (0.55)
69	Center of rear end trim mounting hole	Round	8.5 (0.335)

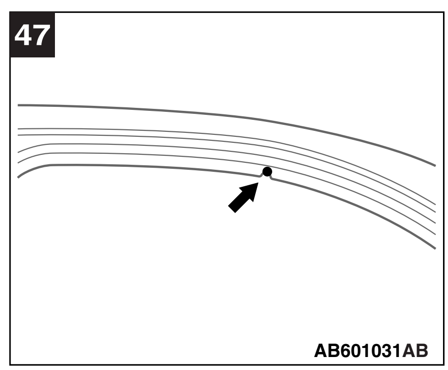


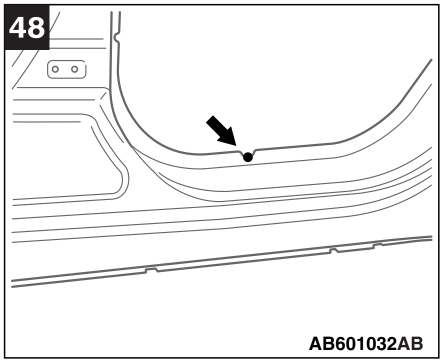


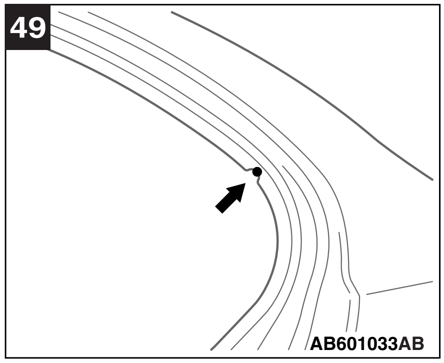


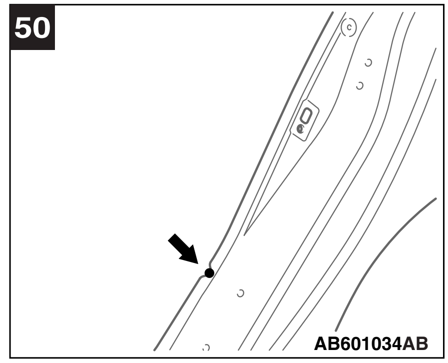


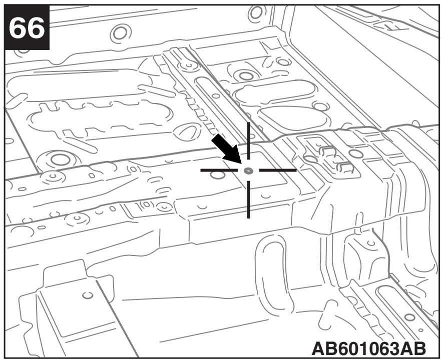


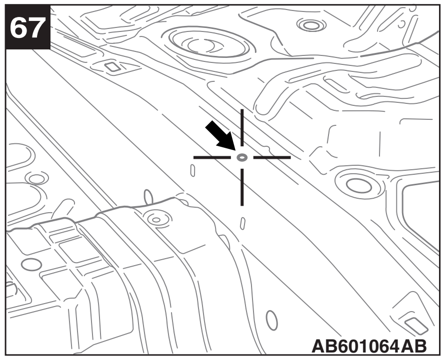


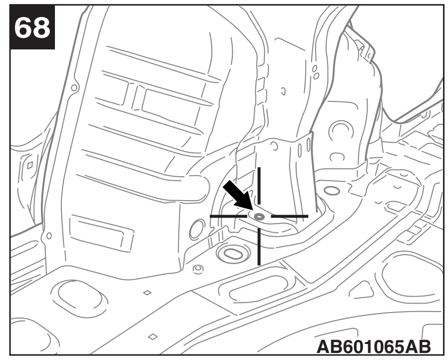


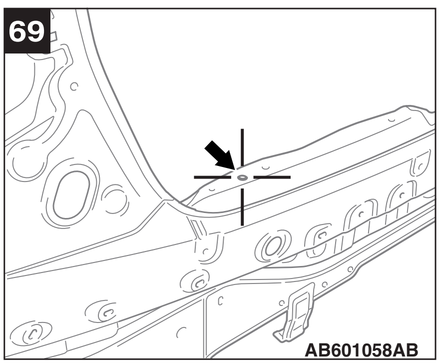


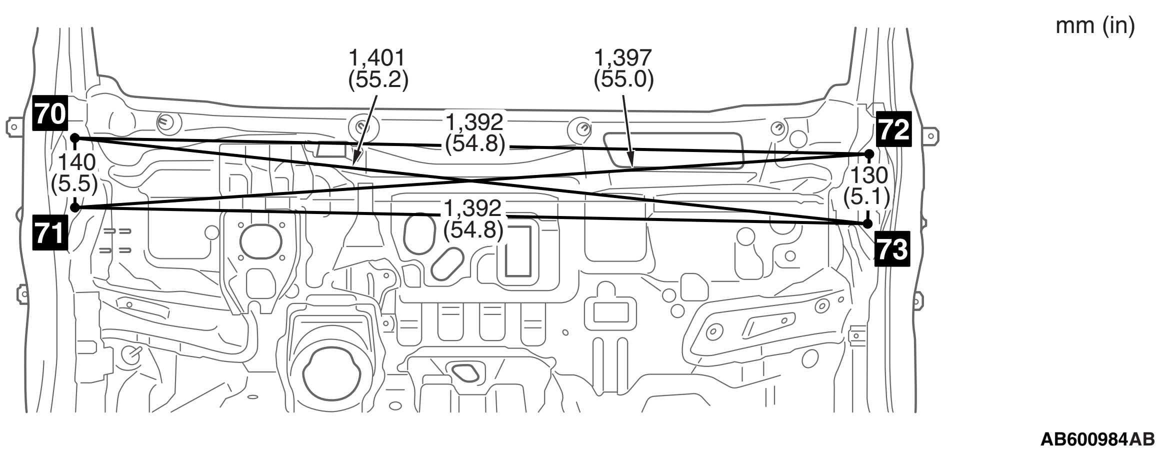




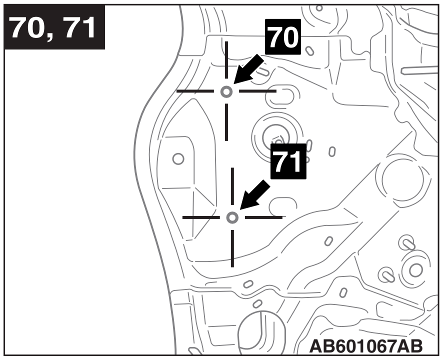








No.	Standard measurement point	Hole shape	Size mm (in)
70	Center of deck crossmember mounting hole (left-upper)	Round	13 (0.51)
71	Center of deck crossmember mounting hole (left-lower)	Round	13 (0.51)
72	Center of deck crossmember mounting hole (right-upper)	Round	9 (0.35)
73	Center of deck crossmember mounting hole (right-lower)	Round	9 (0.35)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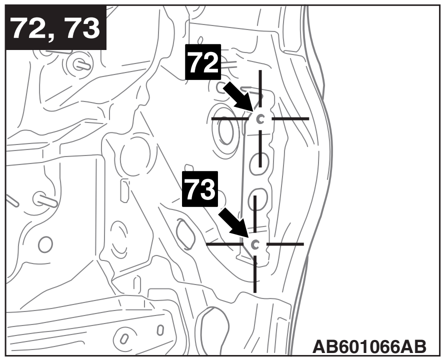
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NOTES

GROUP 27

REAR AXLE

CONTENTS

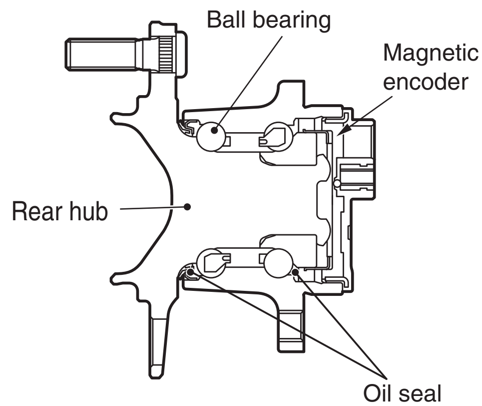
GENERAL INFORMATION

M1271000100694

The rear axle has the following features:

- The wheel bearing is a unit ball bearing (double-row angular contact ball bearing) which incorporates the oil seals and is highly resistant to a thrust load.
- The number of parts has been reduced by integrating the magnetic encoder for ABS wheel speed detection into the wheel bearing. <Vehicles with ABS>

CONSTRUCTION DIAGRAM



SPECIFICATIONS

SERVICE SPECIFICATIONS

M1271000300847

Item	Limit
Wheel bearing end play mm (in)	0.05 (0.002)
Rear hub rotary-sliding resistance N (lb)	19.2 (4.32)

REAR AXLE DIAGNOSIS

INTRODUCTION TO REAR AXLE DIAGNOSIS

M1271004100179

Noise from the rear axle may be caused by defects in the components.

REAR AXLE DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1271004200176

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a rear axle fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

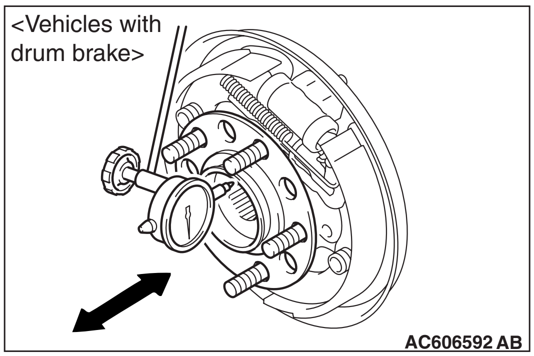
SYMPTOM CHART

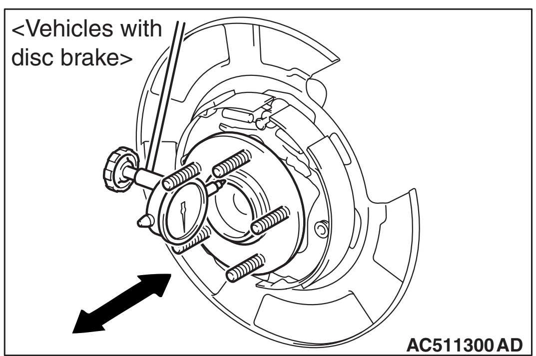
M1271004300333

Symptom	Inspection procedure	Reference page
Abnormal noise	1	P.27-3

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Abnormal Noise





DIAGNOSIS

STEP 1. Check the rear hub assembly installation bolts for looseness.

Q: Are the rear hub assembly installation bolts loosened?

YES : Tighten the rear hub assembly installation bolts to the specified torque 95 ± 14 N· m (70 ± 10 ft-lb). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check the wheel bearing end play.

(1) Remove the brake drum. <Vehicles with drum brake>
(2) Remove the caliper assembly, and suspend the caliper assembly with a wire and remove the brake disc. <Vehicles with disc brake>
(3) Check the bearing's end play. Place a dial gauge against the hub surface, then move the hub in the axial direction and check whether or not there is end play.

Limit: 0.05 mm (0.002 inch)

Q: Is the wheel bearing end play within the limit?

YES : Go to Step 3.

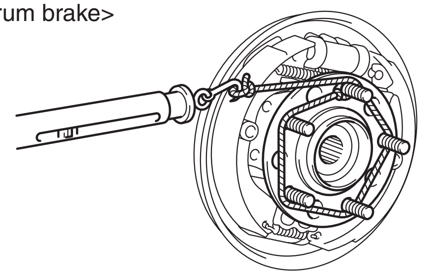
NO : Replace the rear hub assembly, then go to Step 4.

STEP 3. Check the rear hub rotary-sliding resistance.

(1) Remove the brake drum. <Vehicles with drum brake>
(2) Remove the caliper assembly, and suspend the caliper assembly with a wire and remove the brake disc. <Vehicles with disc brake>
(3) Turn the hub a few times to seat the bearing.
(4) Wind a rope around the hub bolt and turn the hub by pulling at a 90 degree angle with a spring balance. Measure to determine whether or not the rotary-sliding resistance of the rear hub is at the limit value.

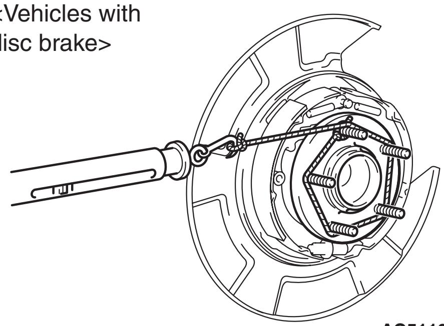
Limit: 19.2 N (4.32 lb)

<Vehicles with drum brake>



AC606593 AB

<Vehicles with disc brake>



AC511305 AC

Q: Is the rear hub rotary-sliding resistance within the limit?

YES : Go to Step 4.
NO : Replace the rear hub assembly if an adjustment cannot be made to within the limit. Then go to Step 4 .

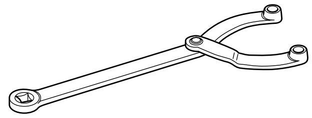
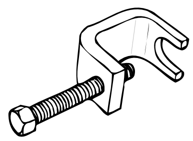
STEP 4. Retest the systems.

Q: Are abnormal noises generated?

YES : Return to Step 1.
NO : The procedure is complete.

SPECIAL TOOLS

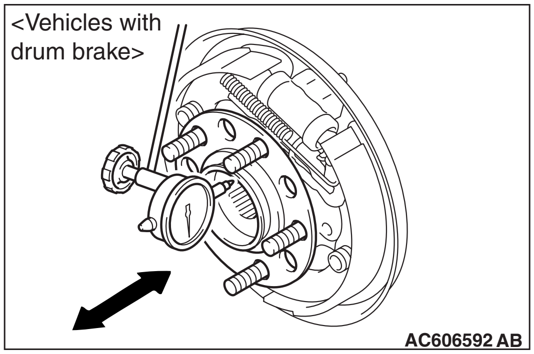
M1271000600804

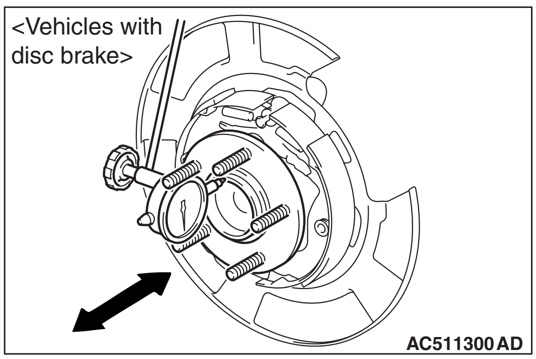
Tool	Tool number and name	Supersession	Application
 B990767	MB990767 Front hub and flange yoke holder	MB990767-01	Hub fixing
 MB991618	MB991618 Hub bolt remover	General service tool	Hub bolt removal

ON-VEHICLE SERVICE

WHEEL BEARING END PLAY CHECK

M1271000900805





1. Remove the brake drum. <Vehicles with drum brake>
2. Remove the caliper assembly, and suspend the caliper assembly with a wire and remove the brake disc. <Vehicles with disc brake>
3. Check the bearing's end play. Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is end play.

   Limit: 0.05 mm (0.002 inch)

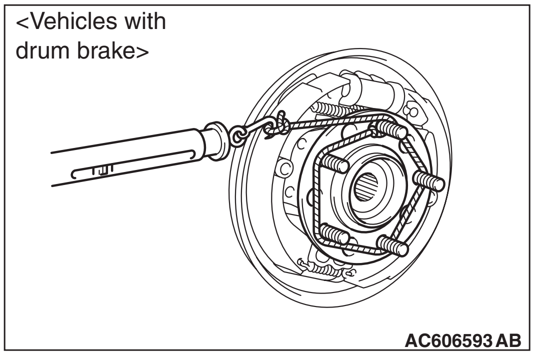
4. Replace the rear hub assembly if an adjustment cannot be made to within the limit.
5. After checking, install the brake disc and the caliper assembly, and tighten the caliper mounting bolt to the specified torque.

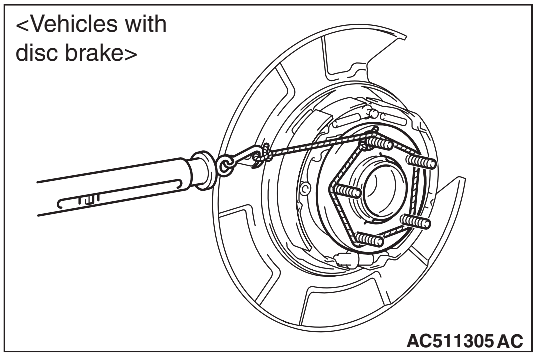
   Tightening torque: 55 ± 5 N· m (41 ± 3 ft-lb)

REAR HUB ROTARY-SLIDING RESISTANCE CHECK

M1271001100460

1. Remove the brake drum. <Vehicles with drum brake>
2. Remove the caliper assembly, and suspend the caliper assembly with a wire and remove the brake disc. <Vehicles with disc brake>
3. Turn the hub a few times to seat the bearing.





4. Wind a rope around the hub bolt and turn the hub by pulling at a 90 degree angle with a spring balance. Measure to determine whether or not the rotary-sliding resistance of the rear hub is at the limit value.

   Limit: 19.2 N (4.32 lb)

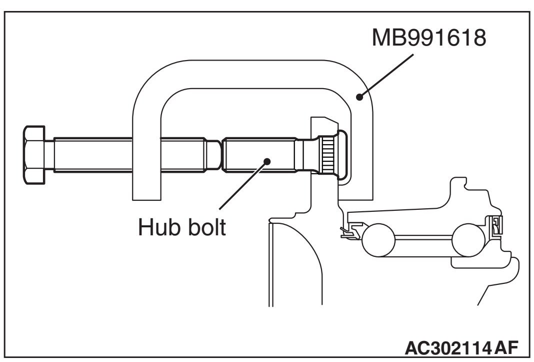
5. Replace the rear hub assembly if the rotary-sliding resistance cannot be made to within the limit.
6. After having finished the inspection, install the brake disc, caliper assembly and tighten the caliper assembly mounting bolts to the specified torque 55 ± 5 N· m (41 ± 3 ft-lb).

HUB BOLT REPLACEMENT

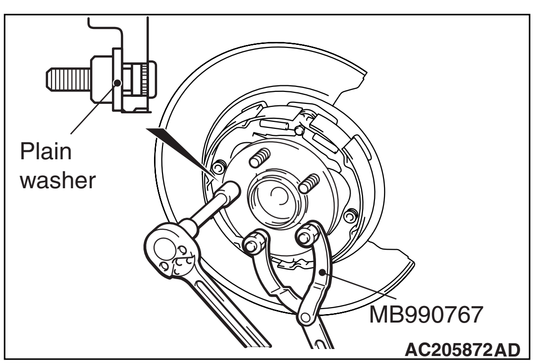
M1271001000474

Required Special Tools:
- MB990767: Front Hub and Flange Yoke Holder
- MB991618: Hub Bolt Remover

1. Remove the brake drum. <Vehicles with drum brake>
2. Remove the caliper assembly, and suspend the caliper assembly with a wire and remove the brake disc. <Vehicles with disc brake>



3. Use special tool MB991618 to remove the hub bolts.



4. Install the plain washer to the new hub bolt, and install the bolt with a nut while holding the hub with special tool MB990767.
5. Install the brake disc, caliper assembly and tighten the caliper assembly mounting bolts to the specified torque. <Vehicles with disc brake>

   Tightening torque: 55 ± 5 N· m (41 ± 3 ft-lb)

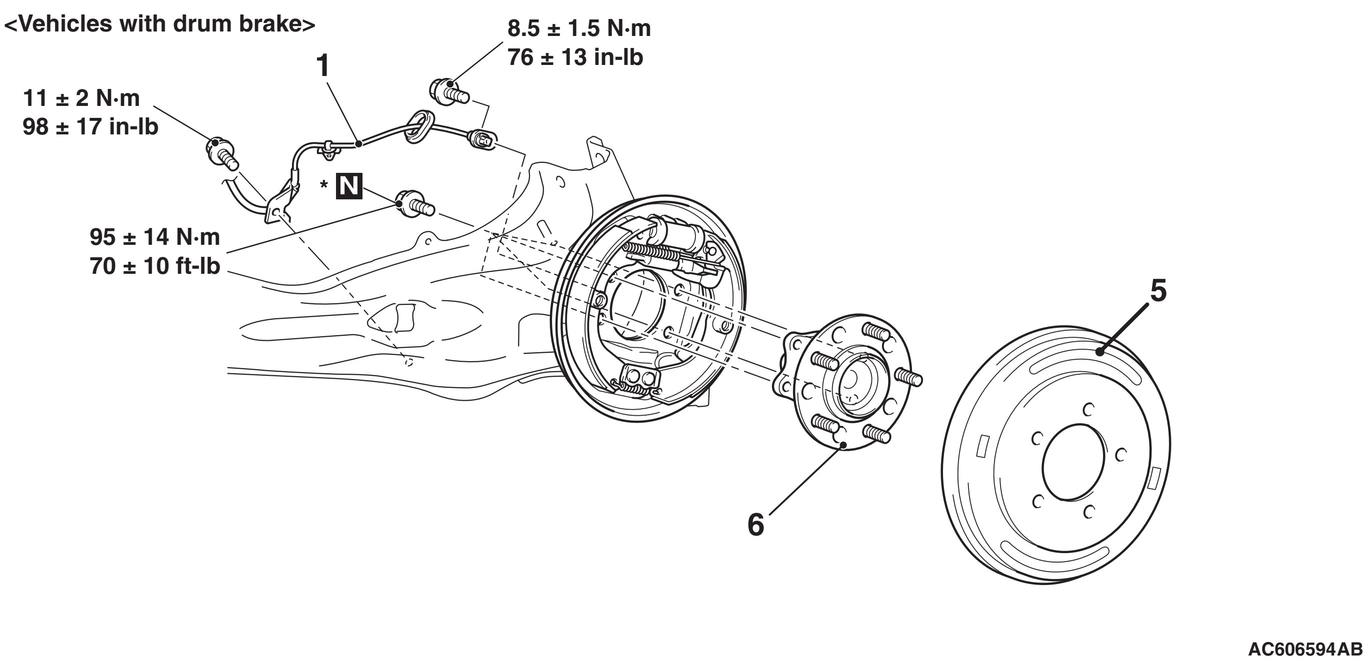
REAR AXLE HUB ASSEMBLY

REMOVAL AND INSTALLATION

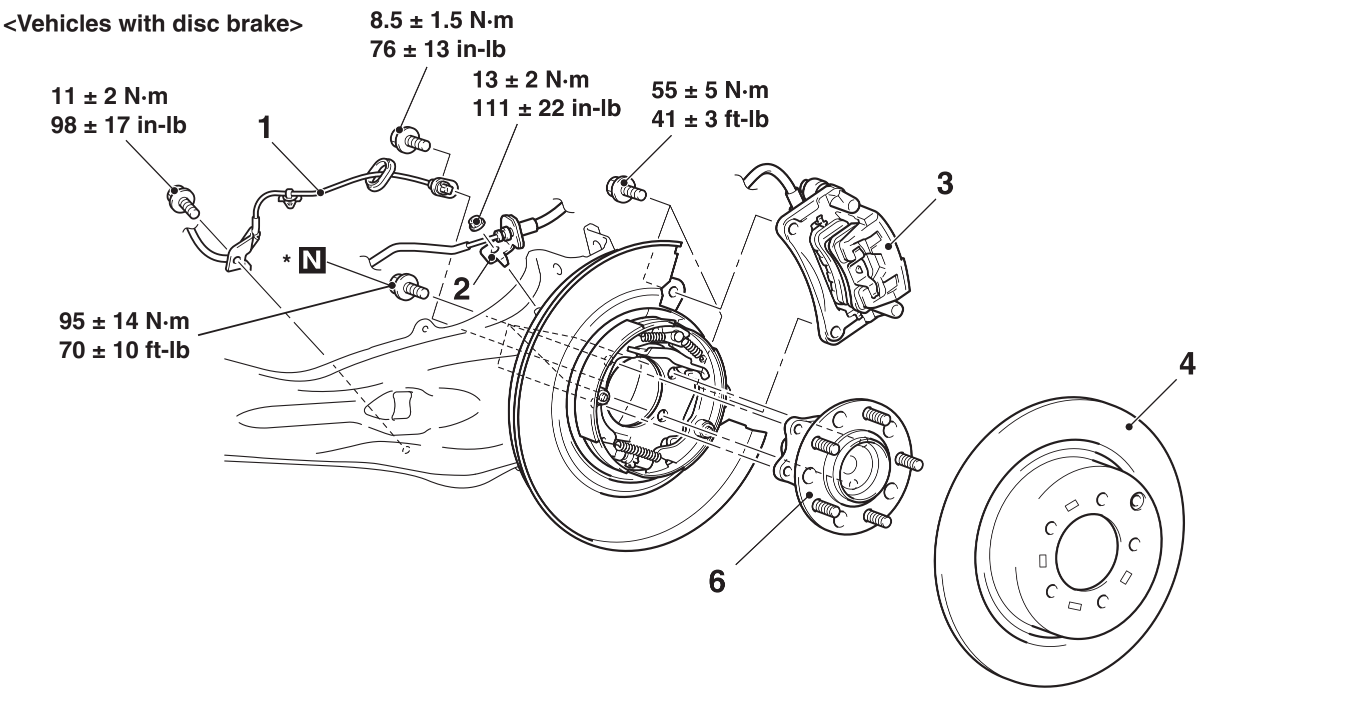
M1271002000842

⚠ CAUTION

- **Do not disassemble the rear wheel hub assembly.**
- **The magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it. <Vehicles with ABS>**
- **When the rear wheel hub assembly is removed/installed, make sure that the magnetic encoder (integrated with inner oil seal) does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **When removing and installing the rear wheel speed sensor, make sure that its pole piece at the end does not contact with surrounding parts to avoid damage. <Vehicles with ABS>**
- **The part indicated with * is the bolt with friction coefficient stabilizer. In removal, replace it with a new one.**



<Vehicles with disc brake>



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Removal steps

1. Rear wheel speed sensor <Vehicles with ABS>
2. Brake hose bracket <Vehicles with disc brake>
3. <<**A**>> Caliper assembly <Vehicles with disc brake>

Removal steps (Continued)

4. Brake disc <Vehicles with disc brake>
5. Rear brake drum <Vehicles with drum brake>
6. Rear wheel hub assembly

REMOVAL SERVICE POINT

<<A>> CALIPER ASSEMBLY REMOVAL

Secure the removed caliper assembly with wire, etc.

INSPECTION

M1271002100344

- Check the oil seal of the rear hub wheel bearing for crack or damage.
- Check the rear hub wheel bearing for wear or damage.

GROUP 33

FRONT SUSPENSION

CONTENTS

GENERAL INFORMATION

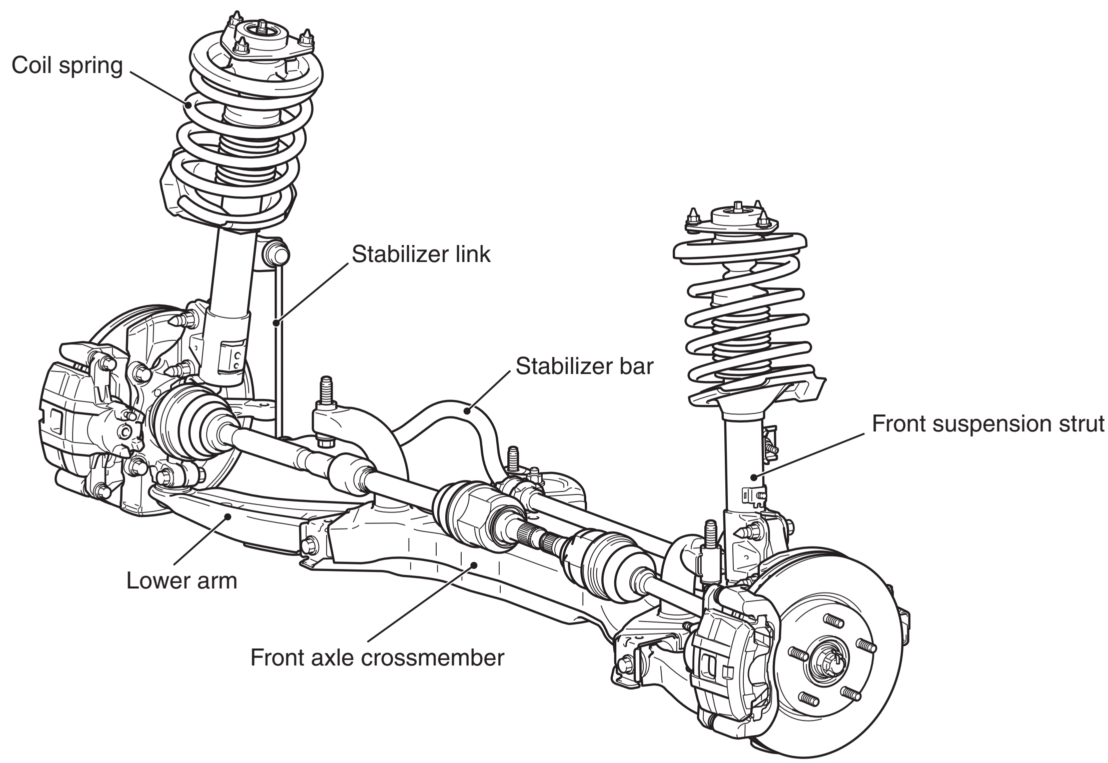
M2330000100965

The MacPherson strut type suspension is adopted.

MAIN FEATURES

- The wheel tread is increased to improve cornering ability.
- The roll center height is modified to improve the steering ability.
- Increased suspension stroke improves road holding quality, and secures good adhesion even on bumpy-rough roads to reduce shocks received when the vehicle negotiates bumps.
- The fully flattened crossmember improves the left/right direction rigidity of installation points of the lower arms for high steering ability.
- Tuning of the lower arm bushes improves the steering ability and riding comfort.
- The stabilizer bar is joined to the strut for high efficiency to secure the optimum rolling rigidity, and improves the steering ability.
- Total tuning of struts, springs, and bump rubbers improves the steering ability and riding comfort.

CONSTRUCTION DIAGRAM



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SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension type	MacPherson strut with coil spring

WHEEL ALIGNMENT

Item	Specification
Camber	-0° 05'

Item	Specification
Caster	2° 40'
Kingpin inclination	13° 30'
Toe-in mm (in)	1 (0.04)

COIL SPRING

Item		Specification	
		DE, ES	GTS
Wire diameter mm (in)		14 (0.6)	
Average outside diameter mm (in)		159 (6.3)	
Free length mm (in)	5MT	331 (13.0)	316 (12.4)
	CVT	338 (13.3)	322 (12.7)

NOTES

GROUP 1

BODY CONSTRUCTION

CONTENTS

BODY COMPONENTS

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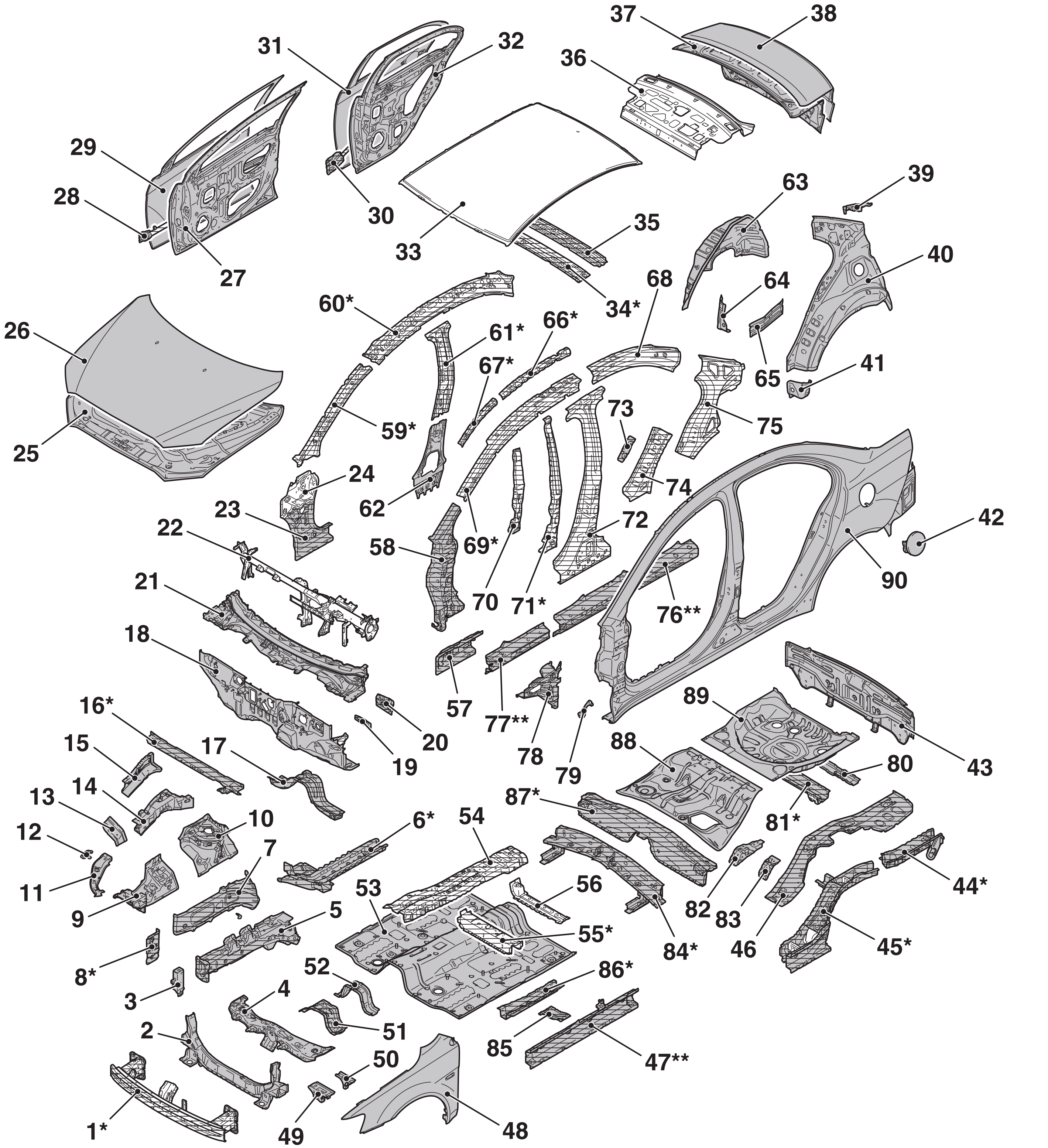

: Anti-corrosion steel panels

: High-tensile steel panels (*: Indicates 590MPa-high-tensile steel panels.)

(**: Indicates 980MPa-ultra-high-tensile steel panels.)

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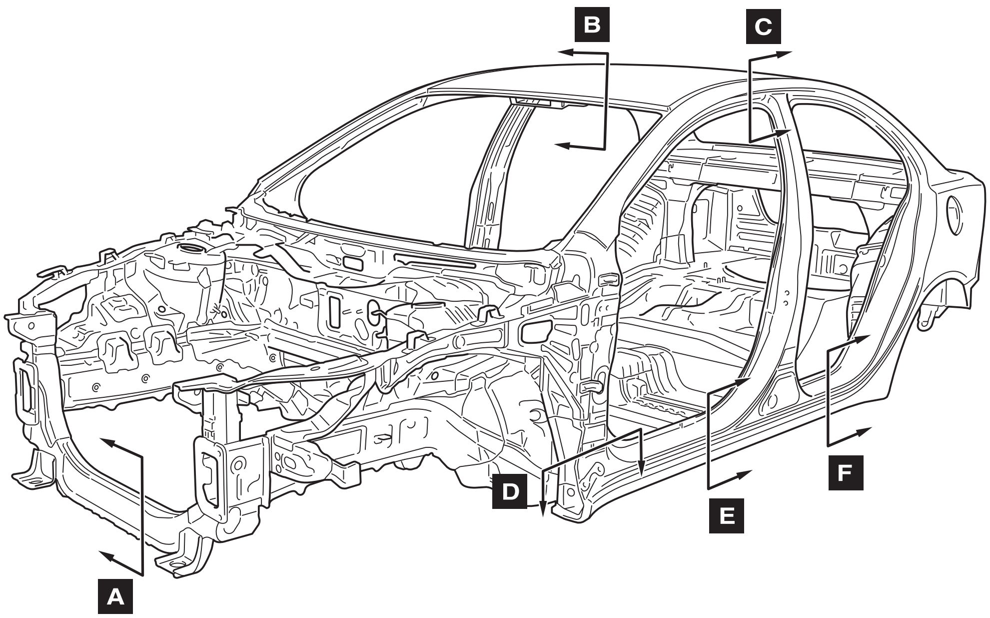
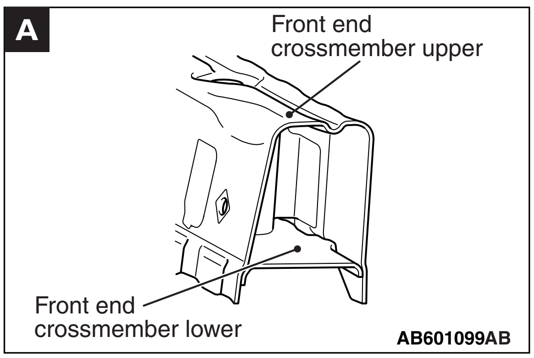
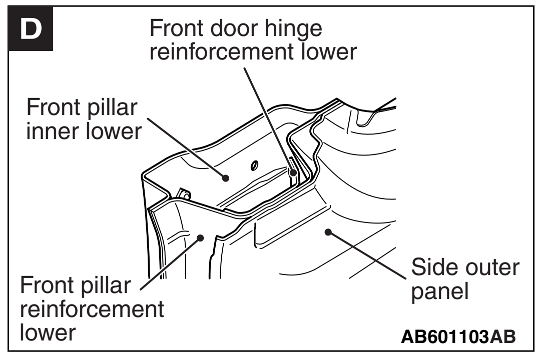
1. Front bumper back beam
2. Front end crossmember
3. Headlight support panel
4. Front end upper bar
5. Front sidemember inner
6. Front sidemember rear
7. Front sidemember outer
8. Front sidemember outer front
9. Front fender shield front
10. Front wheel house panel inner
11. Front end upper bar side
12. Front fender bracket upper front
13. Engine mounting gusset
14 Front upper frame inner
15 Front upper frame outer
16. Dash panel crossmember upper
17. Dash panel crossmember lower
18. Dash panel
19. Brake pedal support reinforcement
20. Brake pedal support bracket
21. Front deck
22. Front deck crossmember
23. Front pillar inner lower
24. Front pillar inner center
25. Hood inner panel
26. Hood outer panel
27. Front door inner panel
28. Front door side door beam
29. Front door outer panel
30. Rear door side door beam
31. Rear door outer panel
32. Rear door inner panel
33. Roof panel
34. Roof center bow lower
35. Roof center bow upper
36. Rear shelf panel
37. Trunk lid inner panel
38. Trunk lid outer panel
39. Curtain air bag bracket
40. Quarter inner panel
41. Quarter inner extension front
42. Fuel filler door panel
43. Rear end panel
44. Rear floor sidemember extension
45. Rear floor sidemember lower
46. Rear floor sidemember upper
47. Front floor side sill inner
48. Front fender
49. Battery bracket front
50. Battery bracket rear
51. Backbone crossmember front
52. Backbone crossmember rear
53. Front floor pan
54. Backbone reinforcement
55. Front floor crossmember front
56. Front floor crossmember rear
57. Side sill inner support front
58. Front pillar reinforcement lower
59. Front pillar inner upper
60. Roof side rail inner
61. Center pillar inner upper
62. Center pillar inner lower
63. Rear wheel house panel inner
64. Rear wheel house shield plate front
65. Rear quarter inner panel lower (Left side)
66. Roof side rail support
67. Front pillar support
68. Roof side rail reinforcement rear
69. Roof side rail reinforcement front
70. Rear door hinge reinforcement support
71. Rear door hinge reinforcement
72. Center pillar reinforcement
73. Rear door catch reinforcement
74. Rear pillar reinforcement lower
75. Rear pillar reinforcement
76. Side sill outer reinforcement rear
77. Side sill outer reinforcement front
78. Front upper frame outer rear
79. Front fender bracket lower
80. Rear floor crossmember rear
81. Rear floor crossmember front
82. Seat belt rear floor reinforcement (Right side)
83. Seat belt rear floor reinforcement (Left side)
84. Rear floor (rear seat) crossmember
85. Front floor reinforcement lower
86. Front floor sidemember front
87. Rear floor extension
88. Rear floor pan front
89. Rear floor pan rear
90. Side outer panel

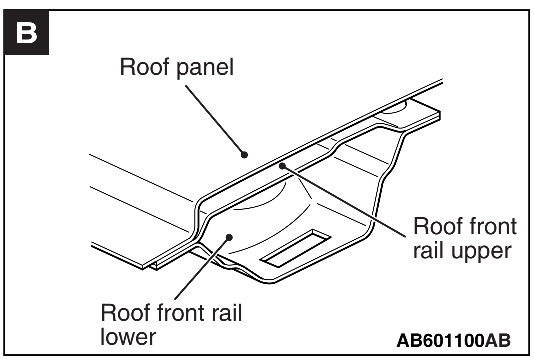
BODY MAIN CROSS-SECTIONAL VIEWS

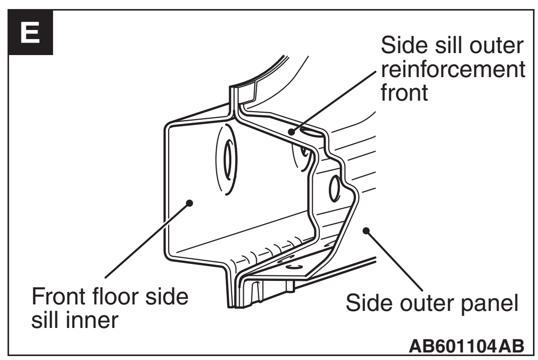
M4010002000785

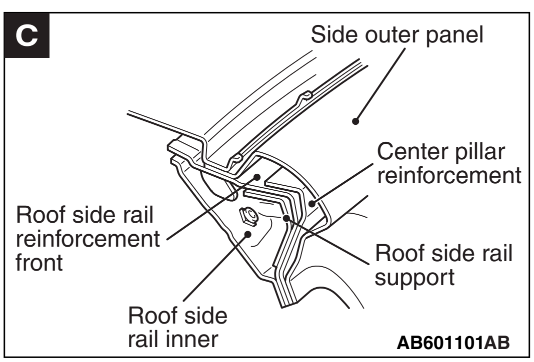


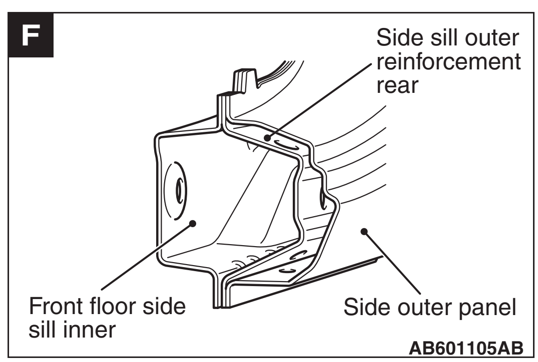


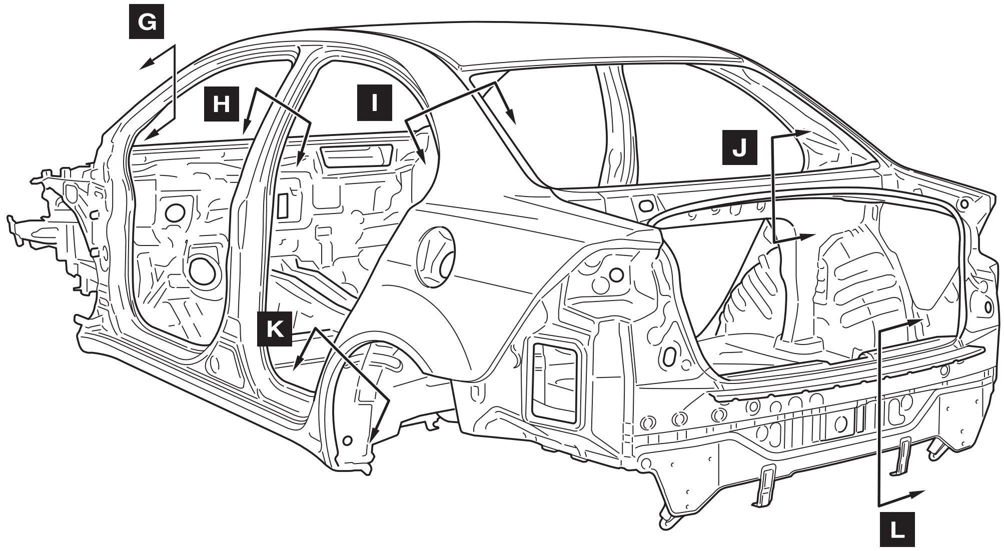












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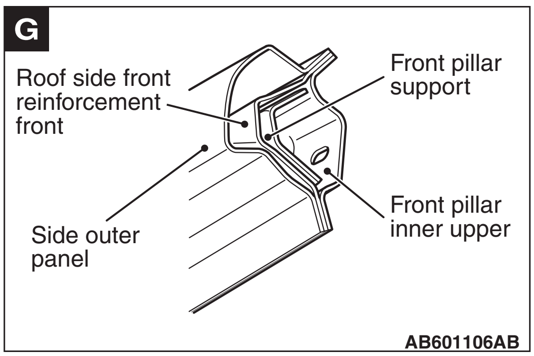

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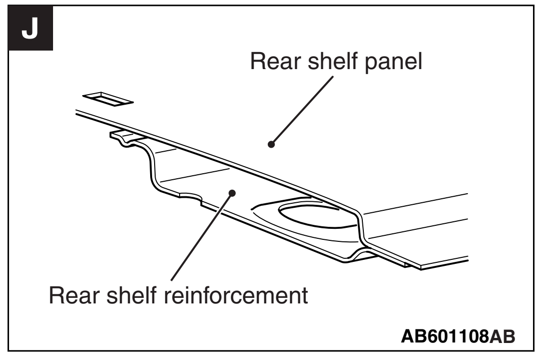

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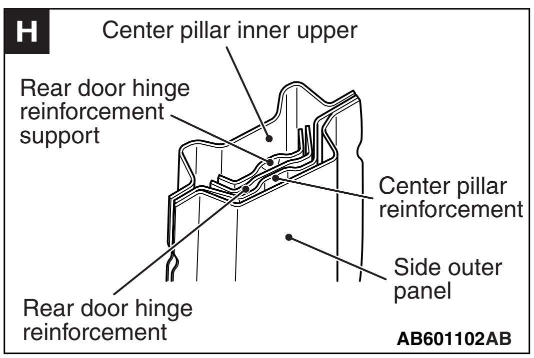

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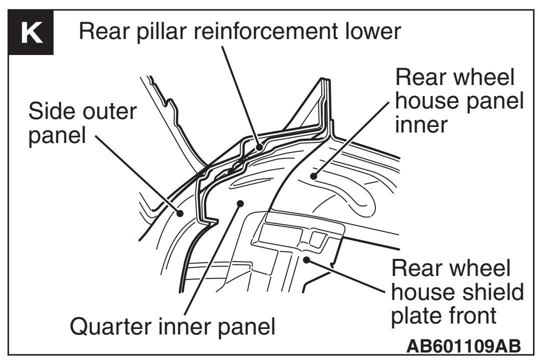

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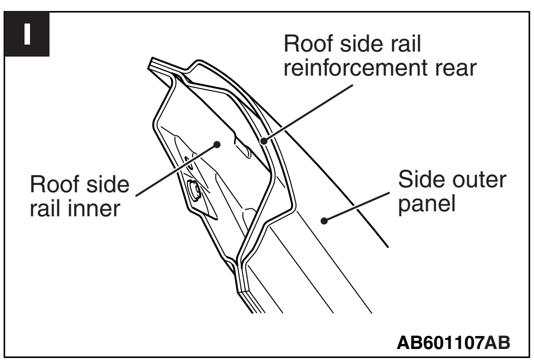

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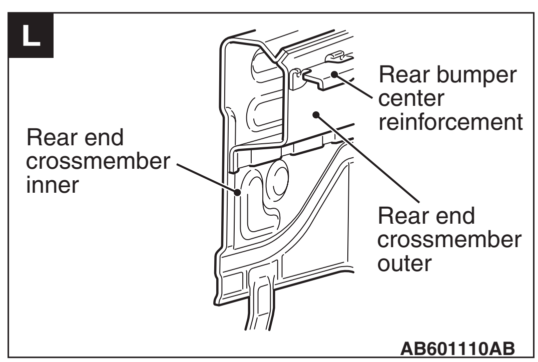

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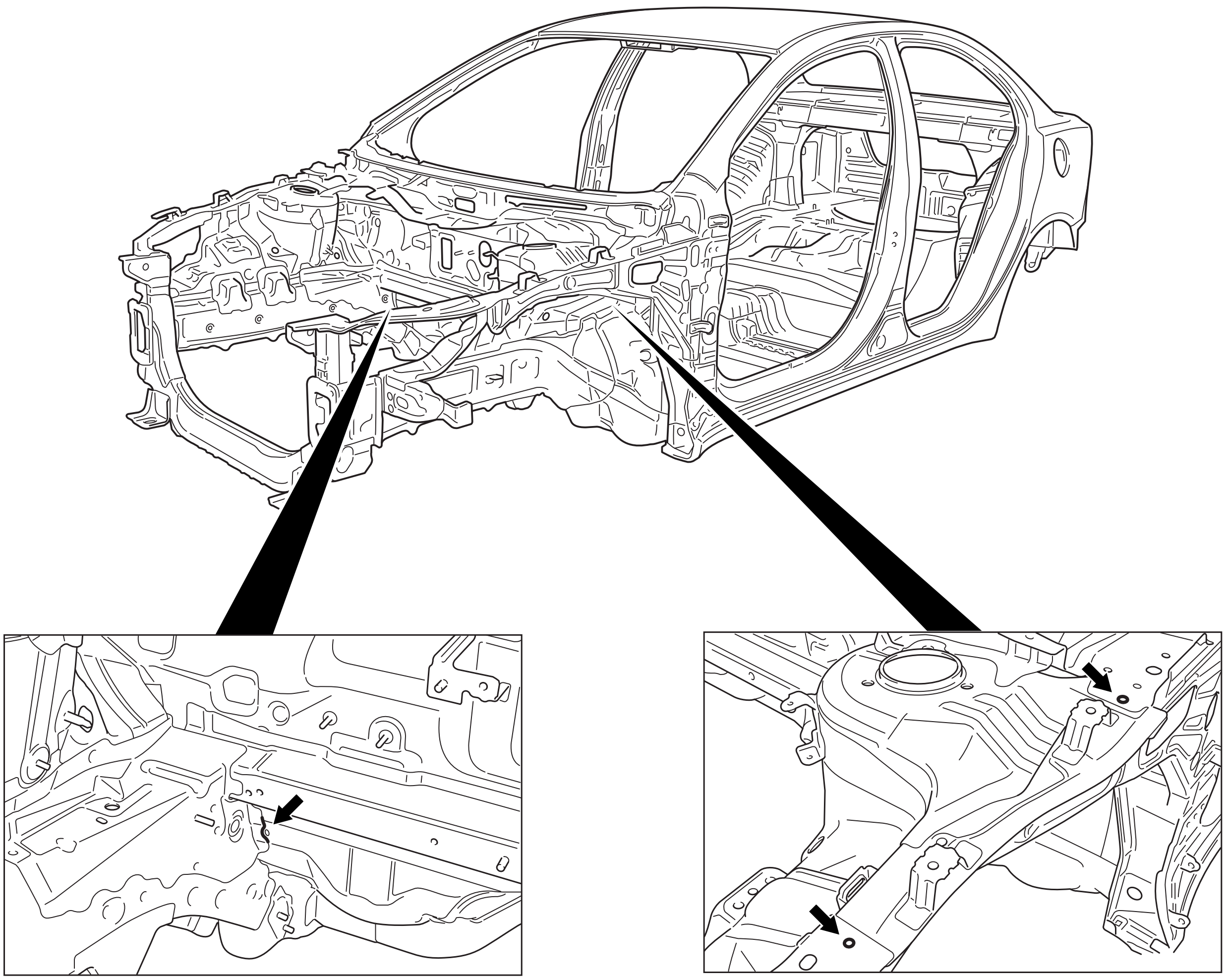
MAINTENANCE, SERVICEABILITY

M4010003000670

FENDER SHIELD

A positioning hole, lug, marking, and cut-out have been added on the front side member, front side member rear, and headlamp support panel to improve assembling workability during panel replacement.



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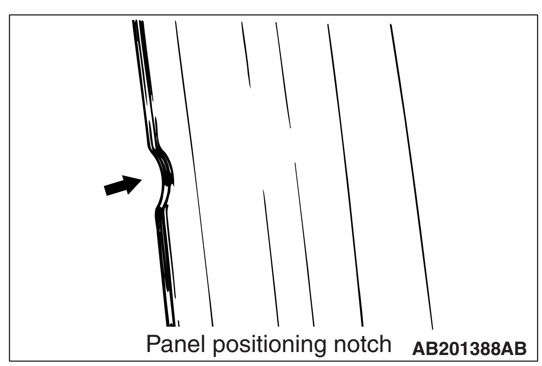
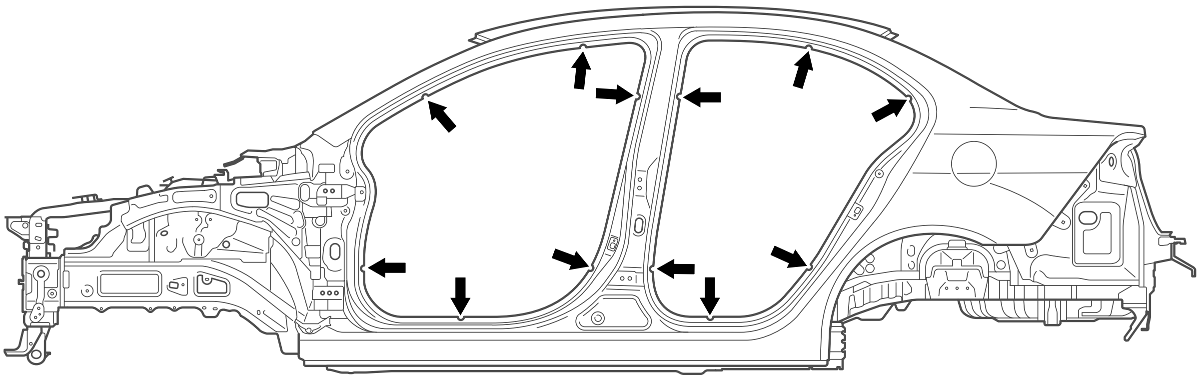
SIDE STRUCTURE

A panel positioning notch has been added on the door opening to improve assembling workability when replacing the panel.





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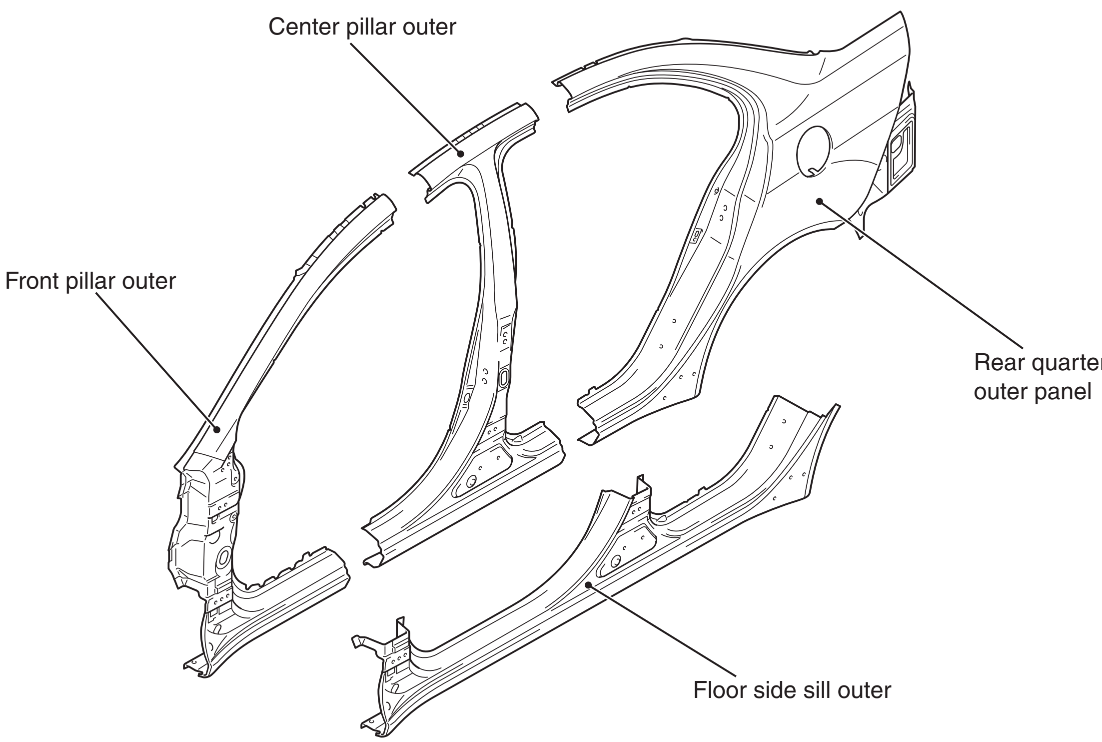
SIDE OUTER PANEL

The extra parts are supplied in 4 different cut forms as a result of employing the integrated side-frame side outer panel.



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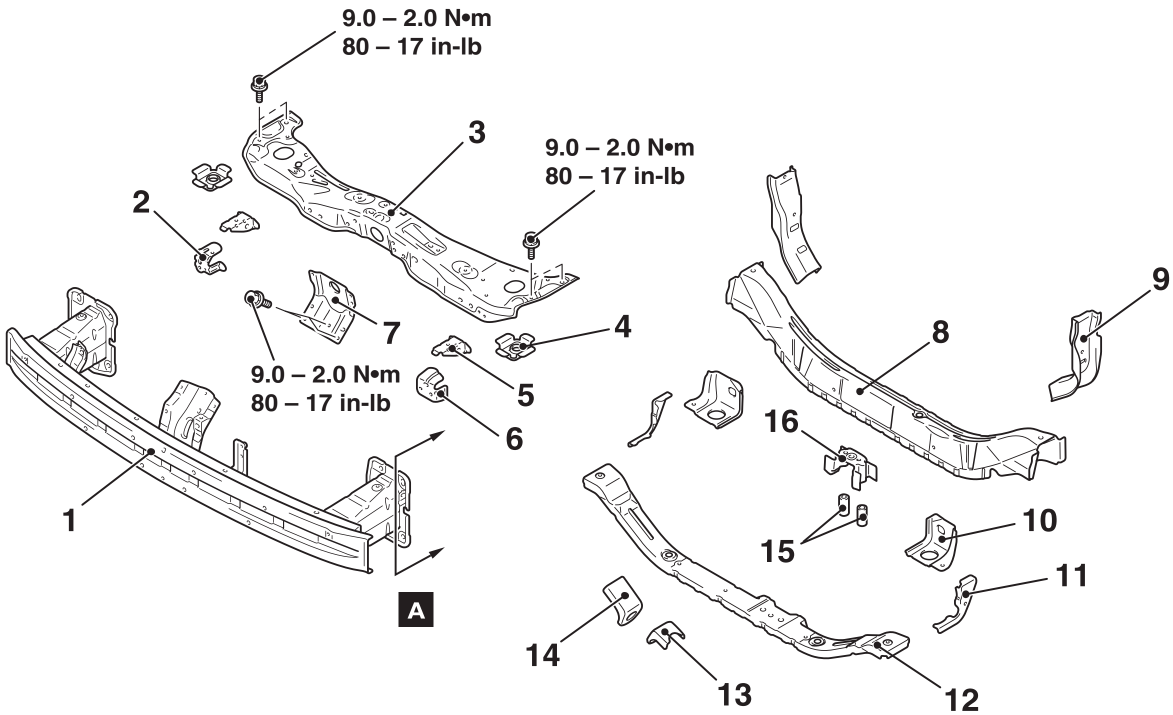
BODY CONSTRUCTION CHARACTERISTICS

FRONT BODY

M4010010000810

HEADLIGHT SUPPORT

- The crush box structure, which has an octagonal cross-section at the front end of the front side-member, has been adopted. This structure can effectively absorb energy upon frontal impact and reduces the vehicle repair cost caused by a light collision.
- The bolt-on hood lock stay, and bolt-on front end upper bar are used to improve maintainability.



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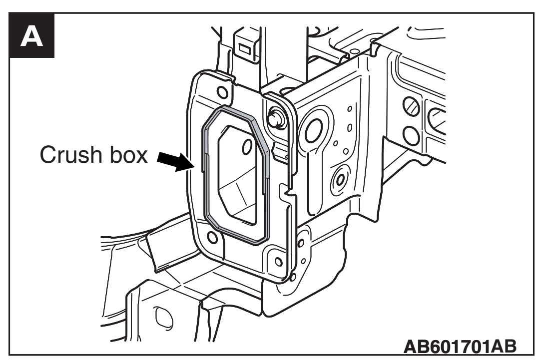
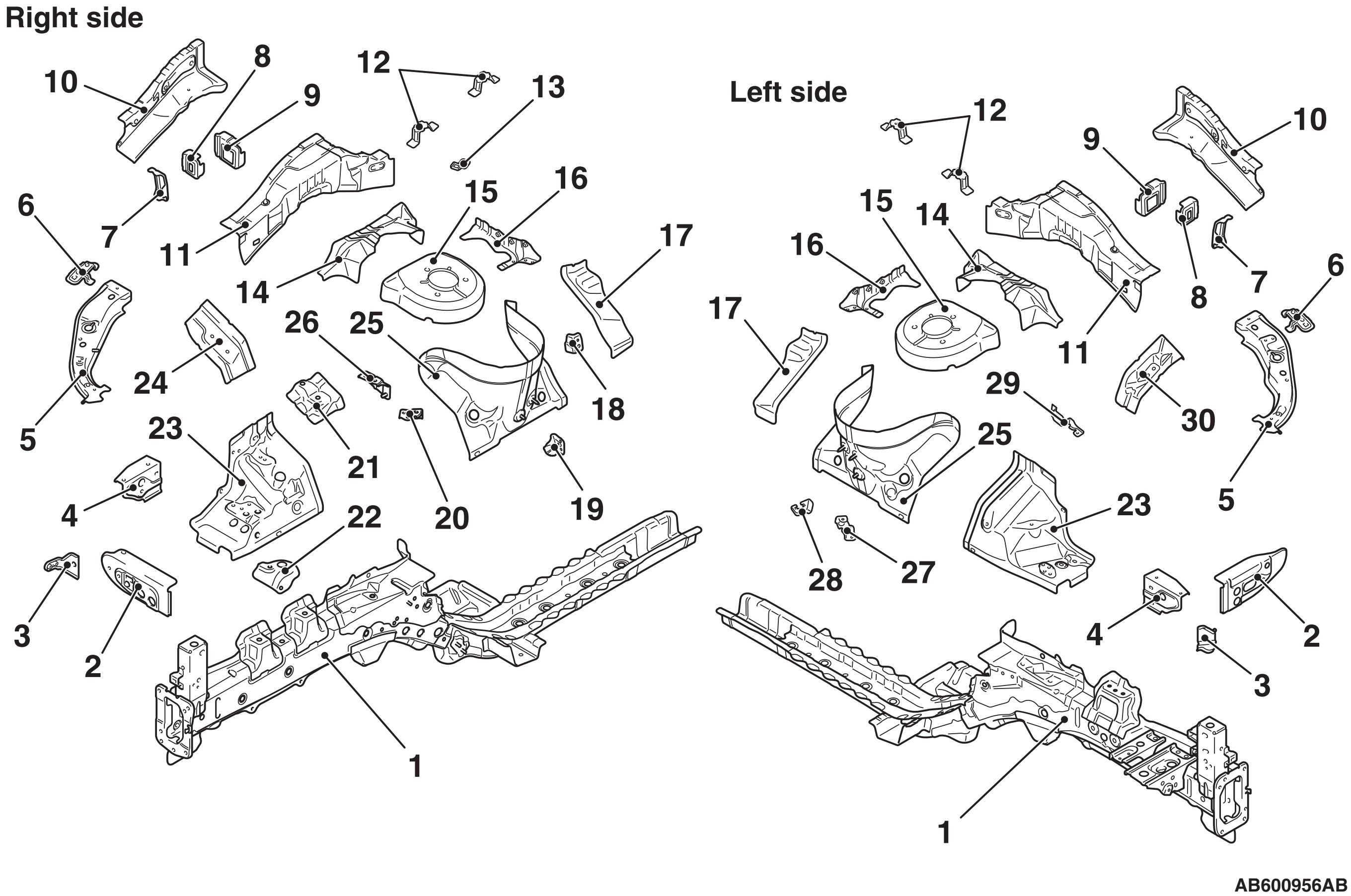
1. Front bumper back beam
2. Bumper support bracket side
3. Front end upper bar
4. Radiator bracket upper
5. Bumper support bracket center
6. Front sensor reinforcement
7. Hood lock stay
8. Front end crossmember upper
9. Front end crossmember gusset
10. Radiator bracket lower A
11. Radiator bracket lower B
12. Front end crossmember lower
13. Shipping reinforcement front
14. Shipping hook front
15. Front No. 2 crossmember pipe
16. Front end crossmember bulkhead



The crush box structure has been changed to straight type with an octagon cross-section so that the structure can effectively absorb energy from the impact at the time of collision.

FENDER SHIELD

- The front frame structure is supported in three directions by the dash crossmember center, dash crossmember lower and front sidemember rear in order to improve the frontal collision characteristics, and increase the vehicle body rigidity.
- The padding structure of the fender has been adopted to efficiently absorb energy upon impact and improve the pedestrian protection capability.

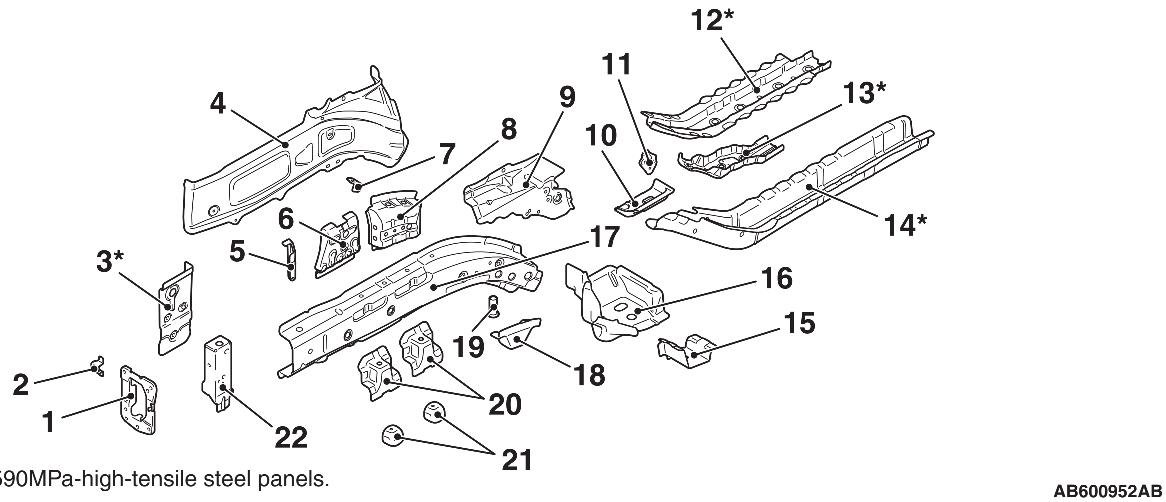


1. Front sidemember
2. Front fender gusset
3. Front fender lower bracket front inner
4. Upper side bar front
5. Front end upper bar side
6. Front fender bracket upper front
7. Upper frame bulkhead front
8. Upper frame bulkhead center
9. Upper frame bulkhead rear
10. Front upper frame outer
11. Front upper frame inner
12. Fender bracket upper center 2
13. Harness bracket
14. Spring house bracket reinforcement
15. Spring house bracket front
16. Spring house corner gusset
17. Spring house panel rear
18. Horn bracket
19. Spring house harness bracket
20. Suction hose bracket
21. Engine mounting bracket upper
22. Condense tank reinforcement
23. Front fender shield
24. Engine mounting gusset
25. Spring house panel
26. Power steering reservoir tank bracket
27. Engine-ECU bracket
28. Clutch tube bracket
29. Relay box bracket
30. Transmission mounting gusset

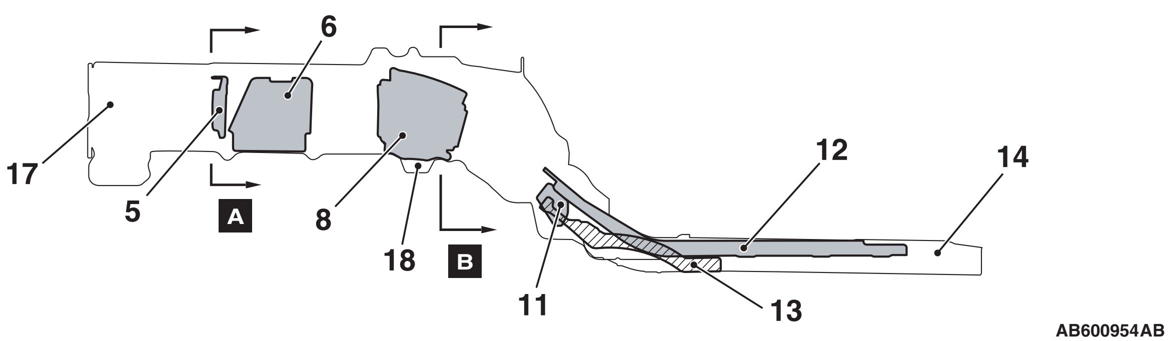
FRONT SIDEMEMBER REINFORCEMENT

The 590-MPa class high tensile strength steel panels have been adopted for the front sidemember outer front, front sidemember reinforcement rear lower, front sidemember rear bulkhead, and front sidemember rear to improve the body rigidity.

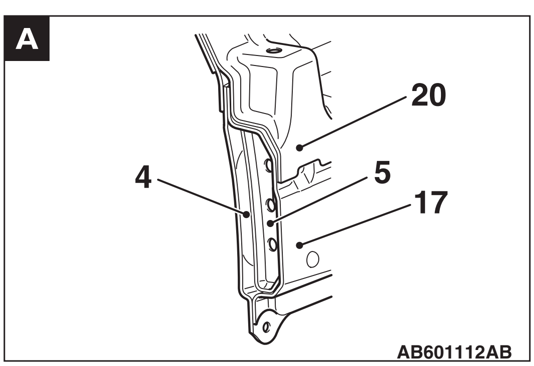
Right side

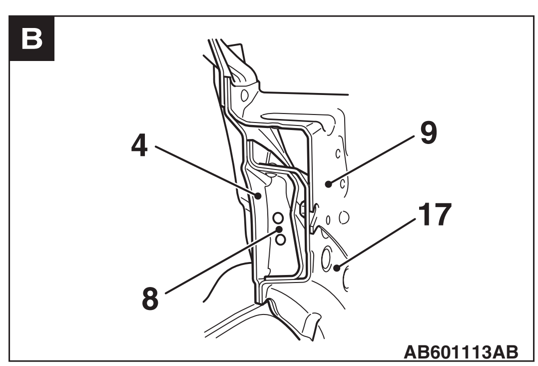


*: Indicates 590MPa-high-tensile steel panels.

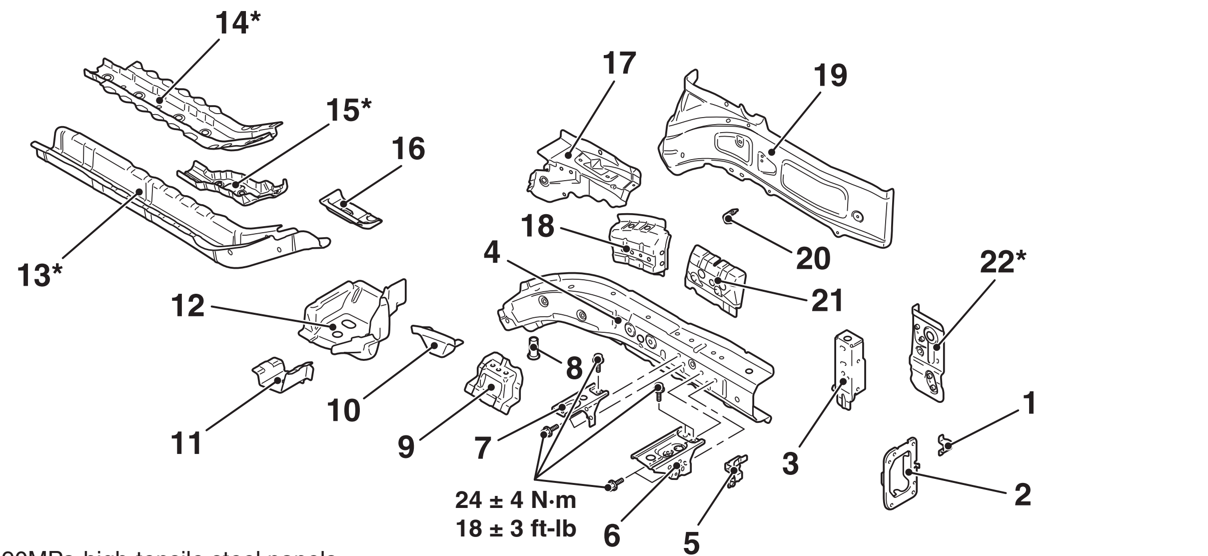


1. Front sidemember plate rear
2. Headlight bracket lower
3. Front sidemember outer front
4. Front sidemember outer
5. Front sidemember bulkhead front
6. Engine mounting bulkhead
7. Front brake hose bracket
8. Front suspension crossmember bulkhead
9. Front sidemember brace upper
10. Tie down reinforcement front
11. Height sensor bracket
12. Front sidemember reinforcement rear lower
13. Front sidemember rear bulkhead
14. Front sidemember rear
15. Dash crossmember extension lower
16. Front sidemember brace lower
17. Front sidemember inner
18. Front suspension crossmember bracket front
19. Pipe nut
20. Engine mount bracket
21. Engine mount reinforcement
22. Headlight support panel





Left side



*: Indicates 590MPa-high-tensile steel panels.

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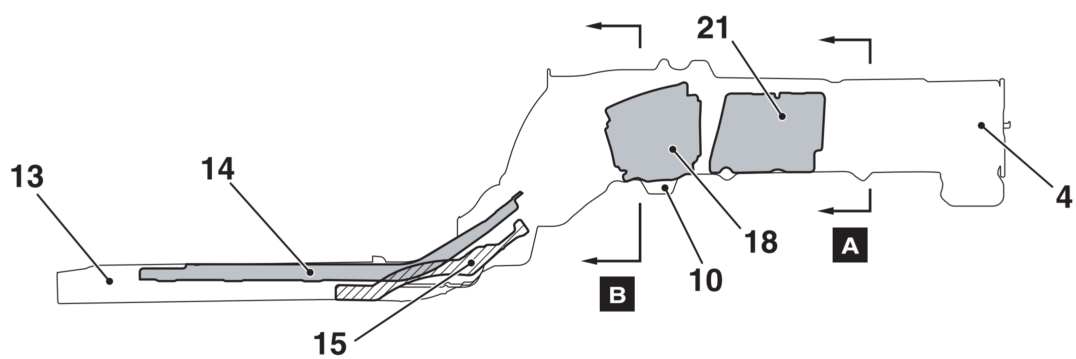
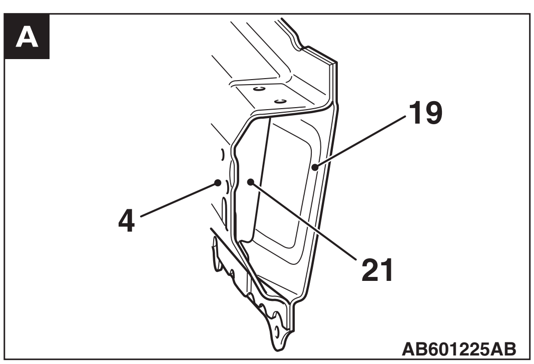


AB600955AB

1. Headlight bracket lower
2. Front sidemember plate rear
3. Headlight support panel
4. Front sidemember inner
5. Connecter bracket
6. Battery bracket front
7. Battery bracket rear
8. Pipe nut
9. Transmission mounting bracket
10. Front suspension crossmember bracket front
11. Dash crossmember extension lower
12. Front sidemember brace lower
13. Front sidemember rear
14. Front sidemember reinforcement rear lower
15. Front sidemember rear bulkhead
16. Tie down reinforcement front
17. Front sidemember brace upper
18. Front suspension crossmember bulkhead
19. Front sidemember outer
20. Front brake hose bracket
21. Transmission mounting bulkhead
22. Front sidemember outer front



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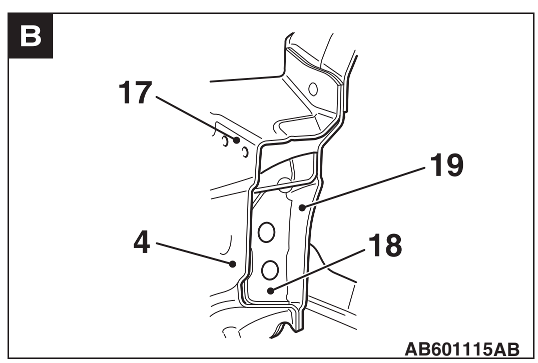

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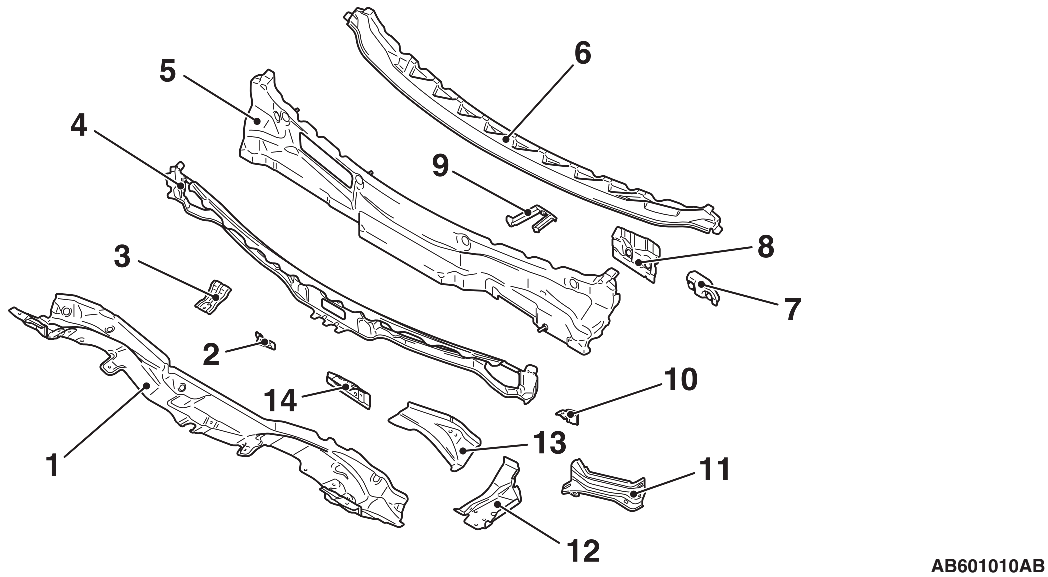
FRONT DECK

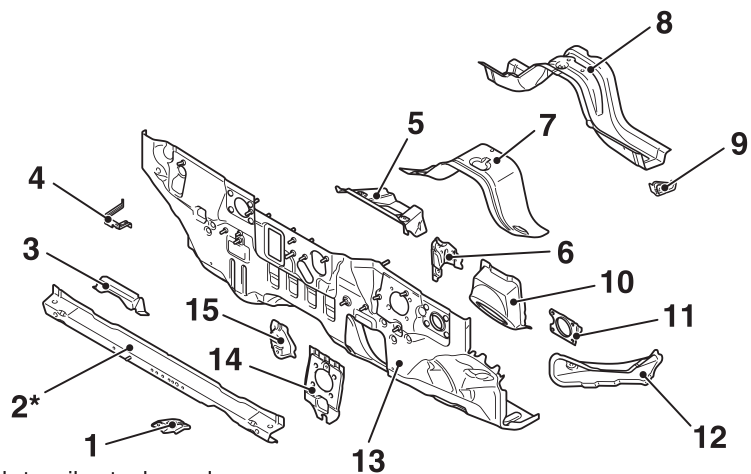
The impact absorbing opening on the cowl top outer reinforcement has been added to efficiently absorb energy upon impact and improve the pedestrian protection capability.



1. Cowl top panel lower
2. Wiper B bracket
3. Cowl top stay bracket rear
4. Cowl top outer reinforcement upper
5. Cowl top panel inner
6. Cowl top panel outer
7. Clutch pedal support bracket <M/T>
8. Brake pedal support bracket
9. Deck crossmember stay bracket
10. Fender bracket upper rear
11. Upper frame to front pillar brace
12. Upper frame extension inner
13. Cowl top outer reinforcement lower
14. Brake pedal support reinforcement

DASH PANEL

- The front frame structure is supported in three directions by the dash crossmember center, dash crossmember lower and front sidemember rear in order to improve the frontal collision characteristics and increase the vehicle body rigidity.
- The 590-MPa class high tensile strength steel panels have been adopted for the dash panel crossmember center to improve the body rigidity.



*: Indicates 590MPa-high-tensile steel panels.

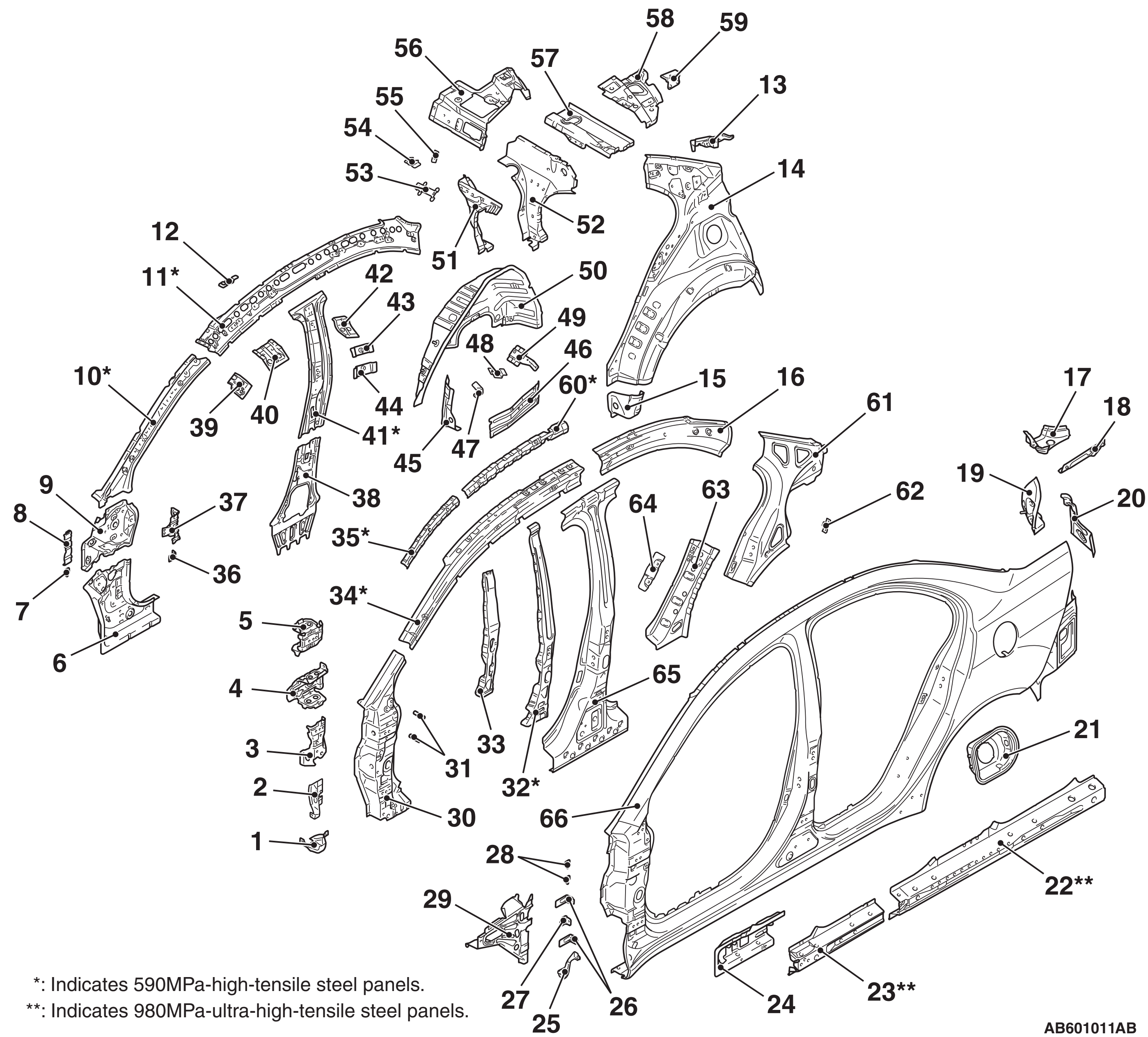
1. Brake tube bracket
2. Dash panel crossmember center
3. Dash crossmember extension
4. Dash heat protector bracket
5. Backbone reinforcement front
6. Accelerator pedal bracket
7. Dash panel lower
8. Dash crossmember lower
9. Dash crossmember lower bulkhead
10. Steering shaft bracket
11. Clutch pedal reinforcement lower <M/T>
12. Dash crossmember side
13. Dash panel
14. Dash panel reinforcement
15. Canister bracket

SIDE BODY

M4010011000705

SIDE STRUCTURE

The 590-MPa class high tensile strength steel panels or 980-MPa class ultra high tensile strength steel panels have been adopted for the front pillar, center pillar, side sill, and roof side rail to improve the body rigidity.

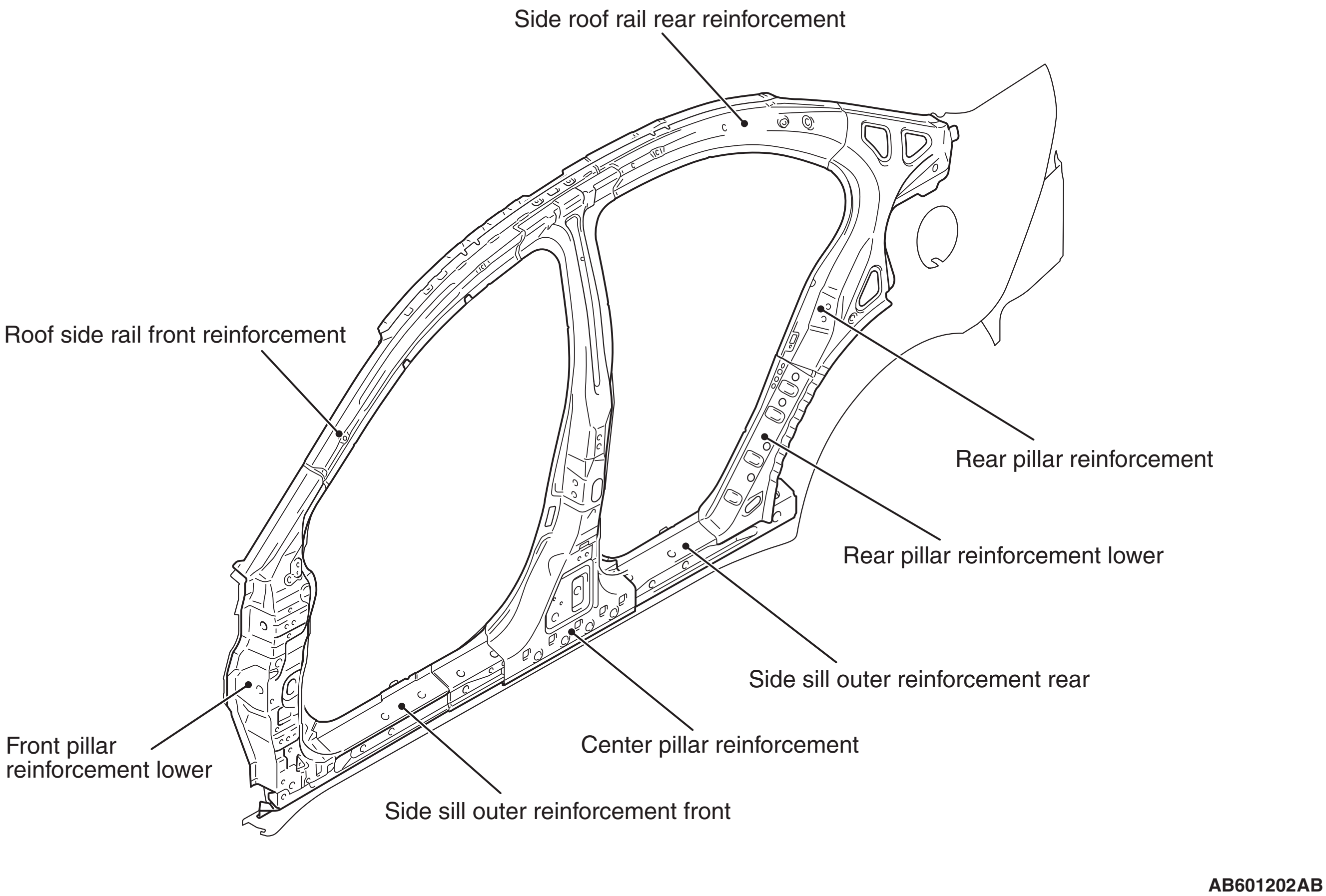


1. Front pillar outer extension lower
2. Front pillar outer extension upper
3. Front door hinge reinforcement lower
4. Front pillar reinforcement center bulkhead
5. Front door hinge reinforcement upper
6. Front pillar inner lower
7. Harness bracket
8. Deck crossmember bracket (Right side)
9. Front pillar inner center
10. Front pillar inner upper
11. Roof side rail inner
12. Bracket C
13. Curtain air bag bracket
14. Quarter inner panel
15. Quarter inner extension front
16. Roof side rail reinforcement rear
17. Quarter outer upper extension
18. Quarter outer upper side extension
19. Rear combination light housing
20. Quarter corner panel

21. Fuel filler neck bracket (Left side)
22. Side sill outer reinforcement rear
23. Side sill outer reinforcement front
24 Side sill inner support front
25. Front fender bracket lower
26. Cowl side trim bracket
27. Fender bracket
28. Fender bracket
29. Front upper frame outer rear
30. Front pillar reinforcement lower
31. Deck support pipe (Left side)
32. Rear door hinge reinforcement
33. Rear door hinge reinforcement support
34. Roof side rail reinforcement front
35. Front pillar support
36. Cowl side trim bracket (Right side)
37. Hood opener bracket
38. Center inner pillar lower
39. Roof rail front extension
40. Roof rail center extension
41. Center inner pillar upper
42. Roof rail rear extension
43. Center pillar seat belt reinforcement upper
44. Center pillar seat belt reinforcement lower
45. Rear wheel house shield plate front
46. Rear quarter inner panel lower (Left side)
47. Filler pipe MTG bracket (Left side)
48. Head restraint bracket (Left side)
49 Harness bracket (Right side)
50. Rear wheel house panel inner
51. Rear seat back brace front
52 Rear seat back brace rear
53. Harness bracket (Left side)
54. Plate rear seat back reinforcement
55. Rear seat hook A
56. Rear shelf upper brace
57. Brace rear seat back bulkhead
58. Rear seat belt reinforcement
59. Subwoofer upper bracket <GTS>
60. Roof side rail support
61. Rear pillar reinforcement
62. Nut plate
63. Rear pillar reinforcement lower
64. Rear door catch reinforcement
65. Center pillar reinforcement
66. Side outer panel

SIDE STRUCTURE REINFORCEMENT

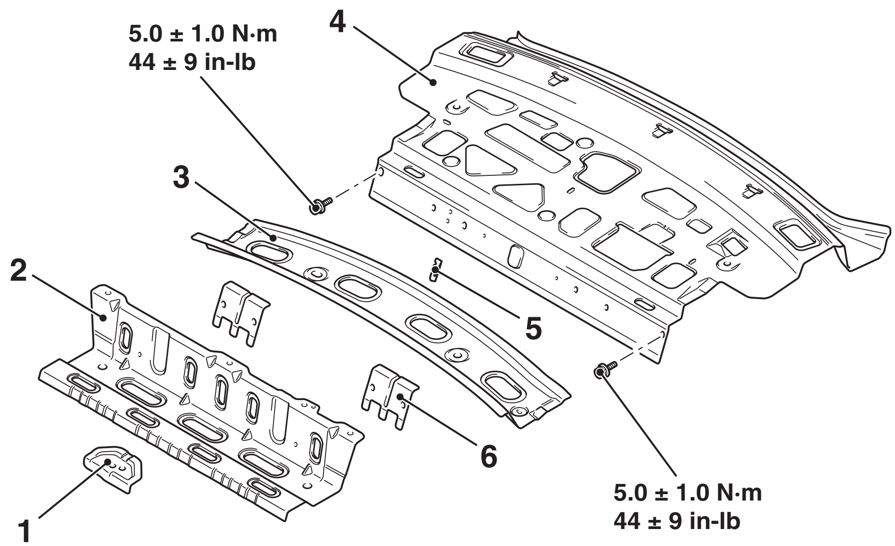
The ring structure of the side structure reinforcement has been adopted to improve the collision characteristics and the rigidity of the whole vehicle.



REAR BODY

M4010012000582

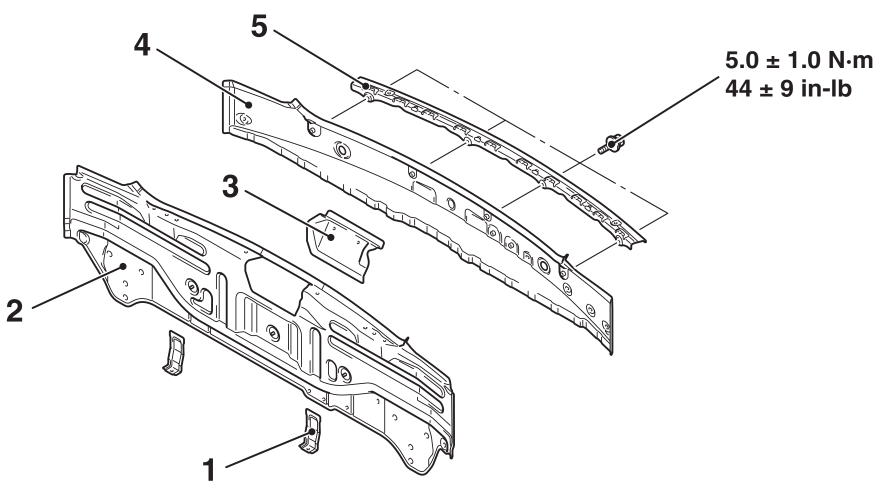
REAR DECK



AB601685AB

1. Seat belt reinforcement center
2. Rear shelf extension
3. Rear shelf reinforcement
4. Rear shelf panel
5. Rear seat hook A
6. Rear seat back reinforcement

REAR END CROSSMEMBER



AB601686AB

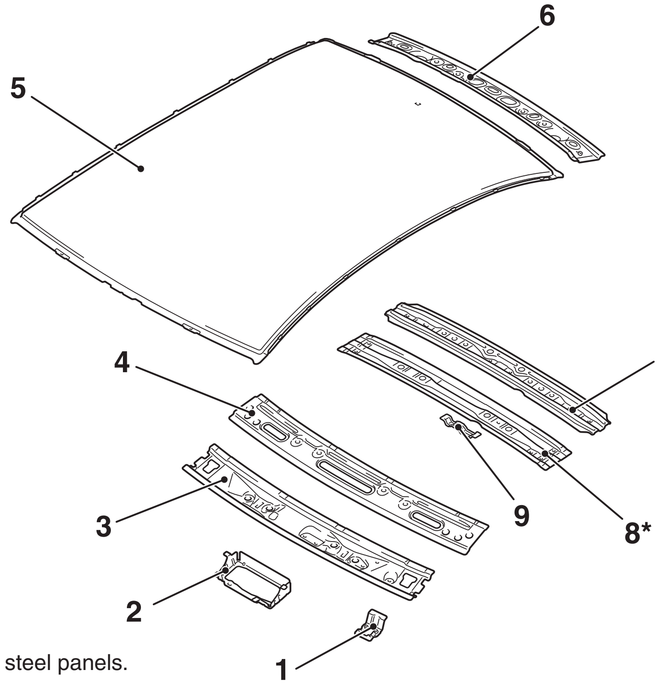
1. Rear bumper side bracket
2. Rear end crossmember inner
3. Trunk lid striker reinforcement
4. Rear end crossmember outer
5. Rear bumper center reinforcement

ROOF

M4010013000853

- The closed section structure has been adopted to the front roof rail, roof bow center and rear roof rail to reduce vibration and noise and to improve the rigidity.
- The 590-MPa class high tensile strength steel panels have been adopted for the roof center bow lower to improve the body rigidity.

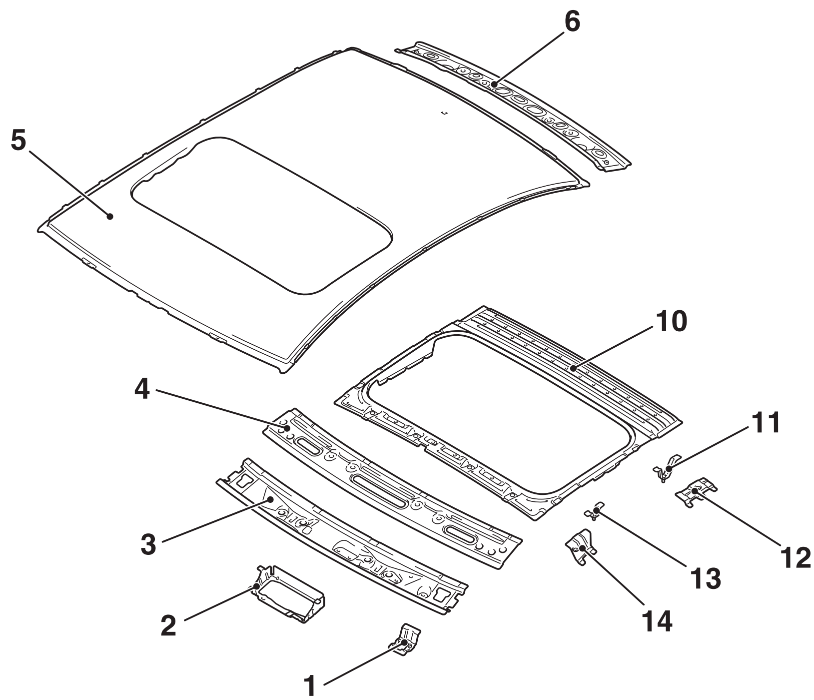
Without sunroof



*: Indicates 590MPa-high-tensile steel panels.

AB601687AB

Sunroof



AB601688AB

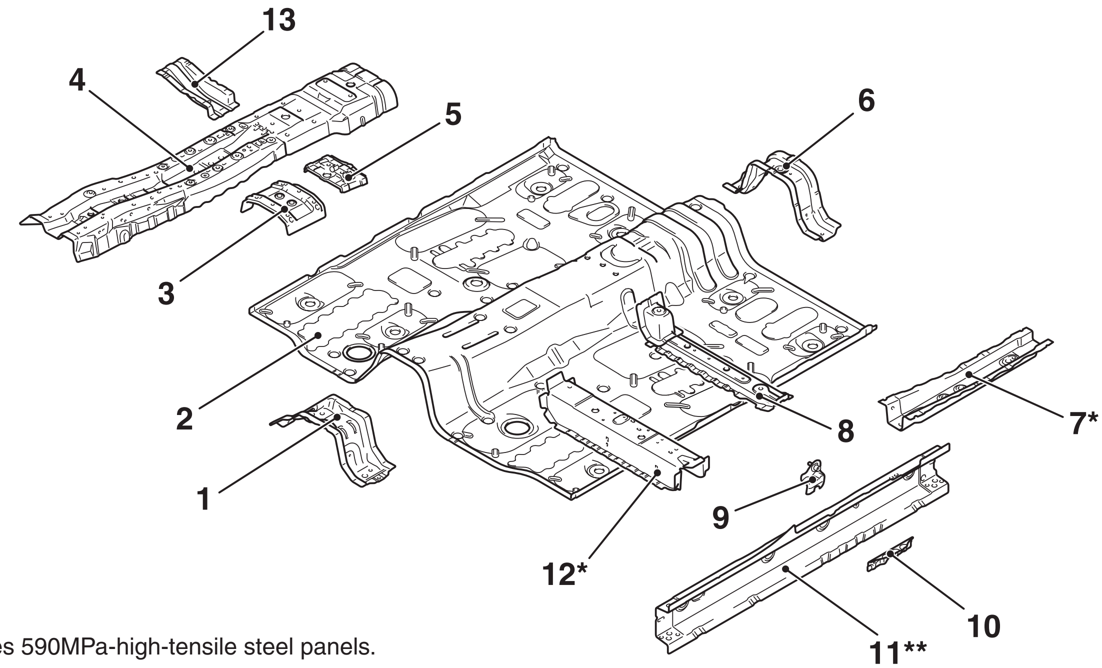
1. Sunvisor bracket
2. Maplamp bracket
3. Roof front rail lower
4. Roof front rail upper
5. Roof panel
6. Roof rear rail
7. Roof center bow upper
8. Roof center bow lower
9. Room light bracket
10. Roof panel reinforcement
11. Bracket A
12. Set rear bracket
13. Bracket B
14. Set front bracket

UNDER BODY

M4010014000812

FRONT FLOOR

The 590-MPa class high tensile strength steel panels have been adopted for the front floor sidemember front and front floor crossmember front, and the 980-MPa class ultra high tensile strength steel panels for the front floor sidemember front, to improve the body rigidity.



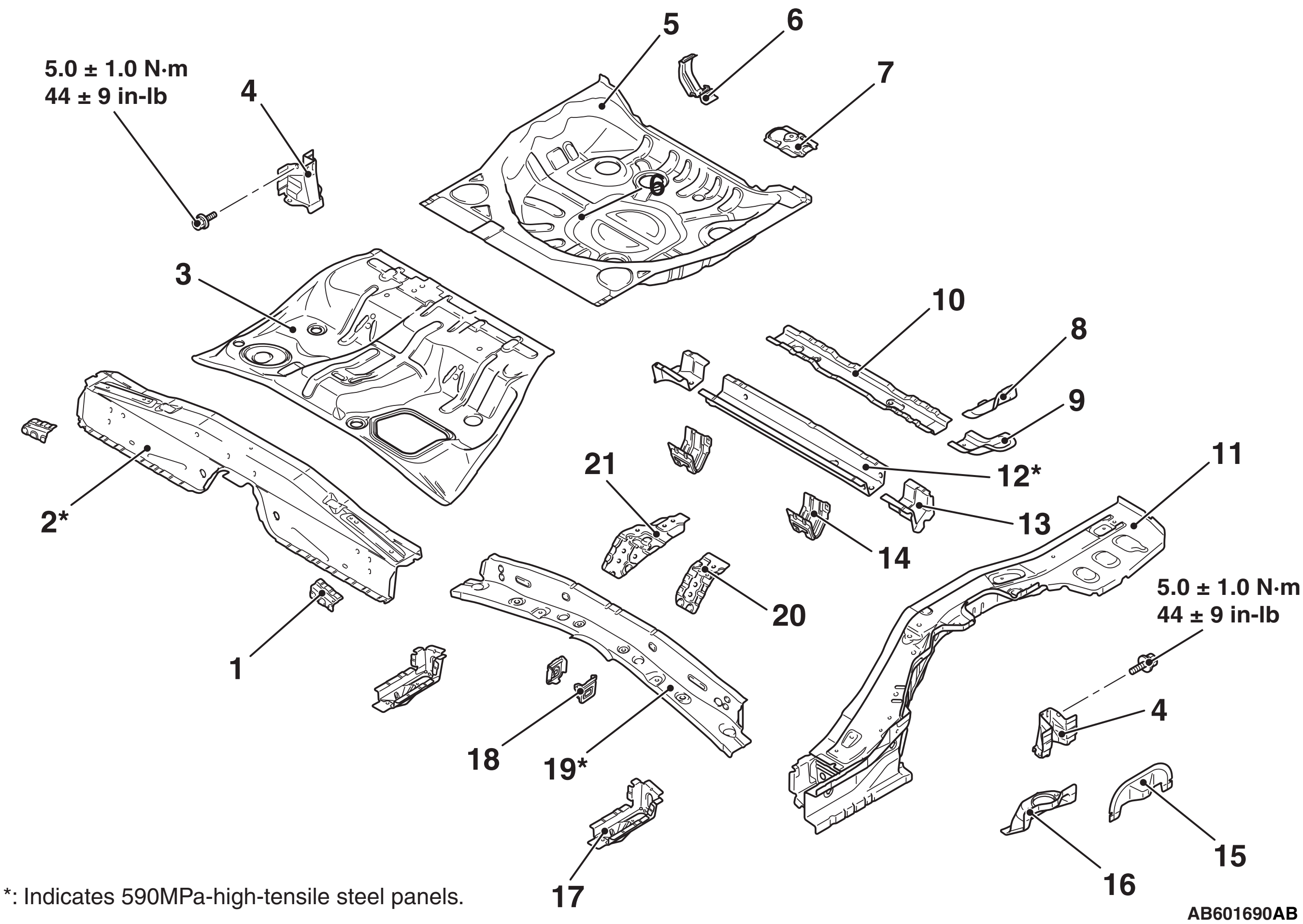
*: Indicates 590MPa-high-tensile steel panels.
**: Indicates 980MPa-ultra-high-tensile steel panels.

AB601689AB

1. Backbone crossmember front
2. Front floor pan
3. Parking brake lever reinforcement
4. Backbone reinforcement
5. Parking brake cable reinforcement
6. Backbone crossmember rear
7. Front floor sidemember front
8. Front floor crossmember rear
9. Seat belt reinforcement
10. Front floor side sill inner reinforcement center
11. Front floor side sill inner
12. Front floor crossmember front
13. Front floor reinforcement lower (Right side)

REAR FLOOR

The 590-MPa class high tensile strength steel panels have been adopted for the rear floor extension, rear floor crossmember front, and rear seat crossmember to improve the body rigidity.

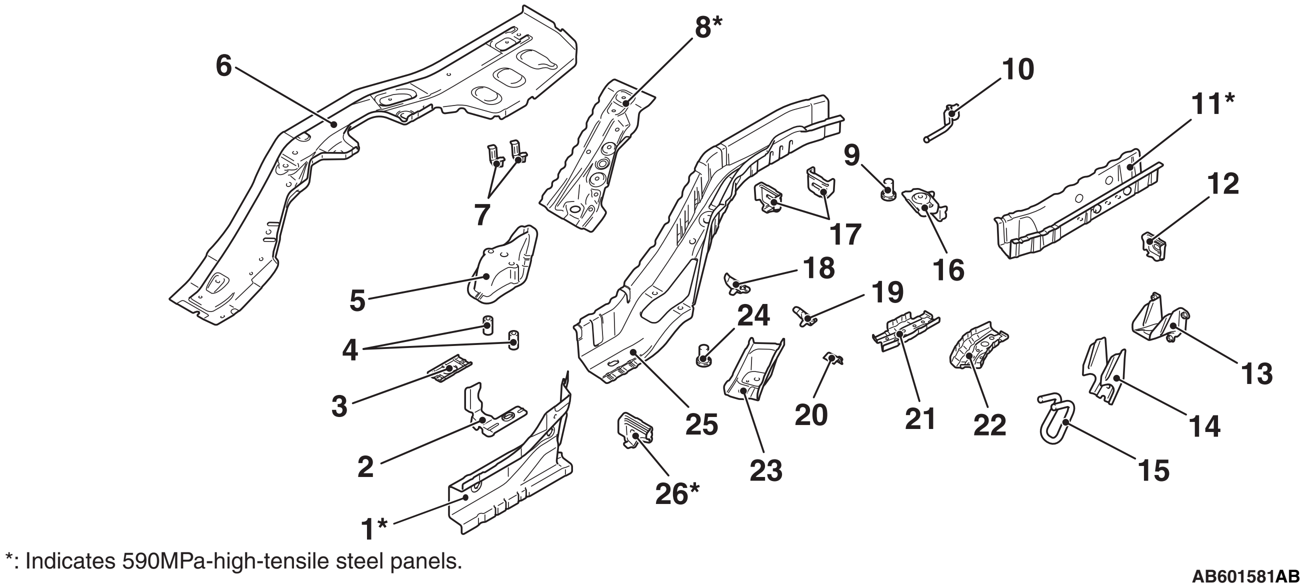


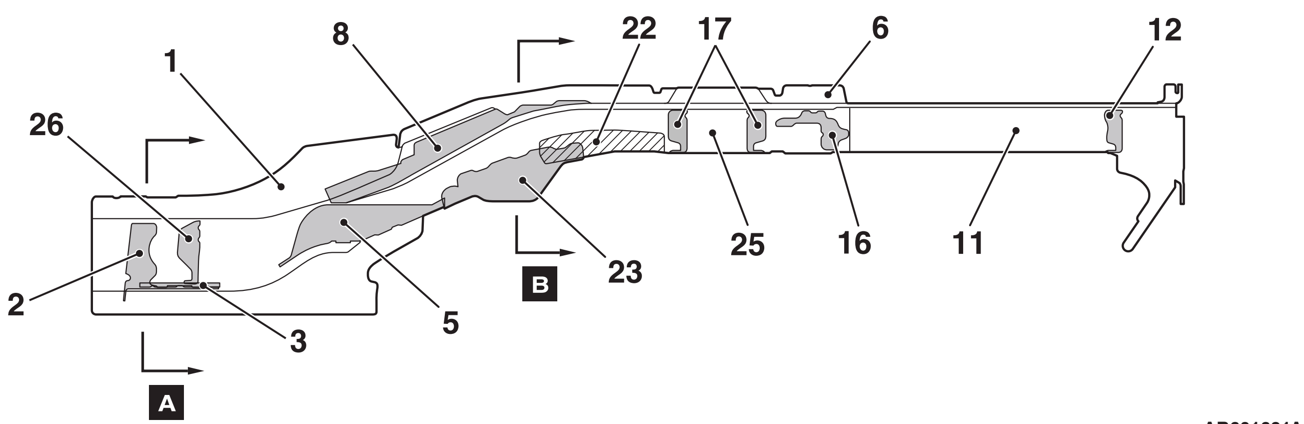
*: Indicates 590MPa-high-tensile steel panels.

1. Extension rear floor reinforcement side
2. Rear floor extension
3. Rear floor pan front
4. Rear spring house reinforcement
5. Rear floor pan rear
6. Jack bracket
7. Spare tire bracket
8. Rear floor crossmember extension rear upper
9. Rear floor crossmember extension rear
10. Rear floor crossmember rear
11. Rear floor sidemember
12. Rear floor crossmember front
13. Rear floor crossmember extension
14. Fuel tank rear bracket
15. Rear spring house panel
16. Rear spring house bracket
17. Sidemember front floor extension
18. Rear seat crossmember bulkhead inner
19. Rear seat crossmember
20. Seat belt rear floor reinforcement (Left side)
21. Seat belt rear floor reinforcement (Right side)

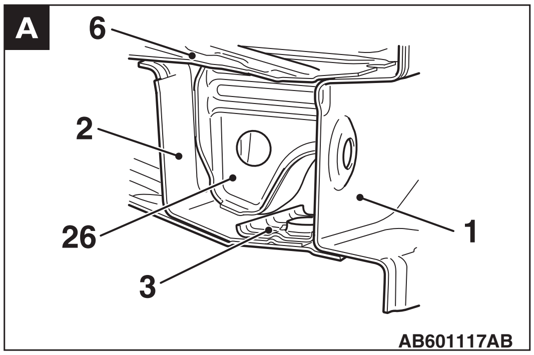
REAR FLOOR SIDEMEMBER REINFORCEMENT

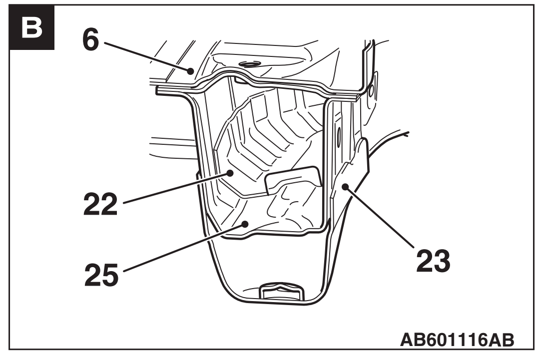
The 590-MPa class high tensile strength steel panels have been adopted for the rear floor side sill inner, rear floor sidemember reinforcement, rear floor sidemember extension, and rear floor sidemember bulkhead to improve the body rigidity.





1. Rear floor side sill inner
2. Rear floor sidemember extension front
3. Rear tie down plate
4. Front No. 2 crossmember pipe
5. Trailing arm bracket
6. Rear floor sidemember upper
7. Canister bracket
8. Rear floor sidemember reinforcement
9. Pipe nut
10. Muffler hanger rear
11. Rear floor sidemember extension
12. Rear floor sidemember extension bulkhead
13. Rear bumper support
14. Rear shipping hook reinforcement
15. Rear shipping hook
16. Rear suspension bracket rear
17. Rear floor sidemember bulkhead rear
18. Rear parking brake cable rear bracket (Right side)
19. Rear parking brake cable rear bracket (Left side)
20. Rear brake hose bracket
21. Rear floor sidemember rear reinforcement (Right side)
22. Rear floor sidemember rear reinforcement (Left side)
23. Rear suspension bracket front
24. Pipe nut
25. Rear floor sidemember lower
26. Rear floor sidemember bulkhead





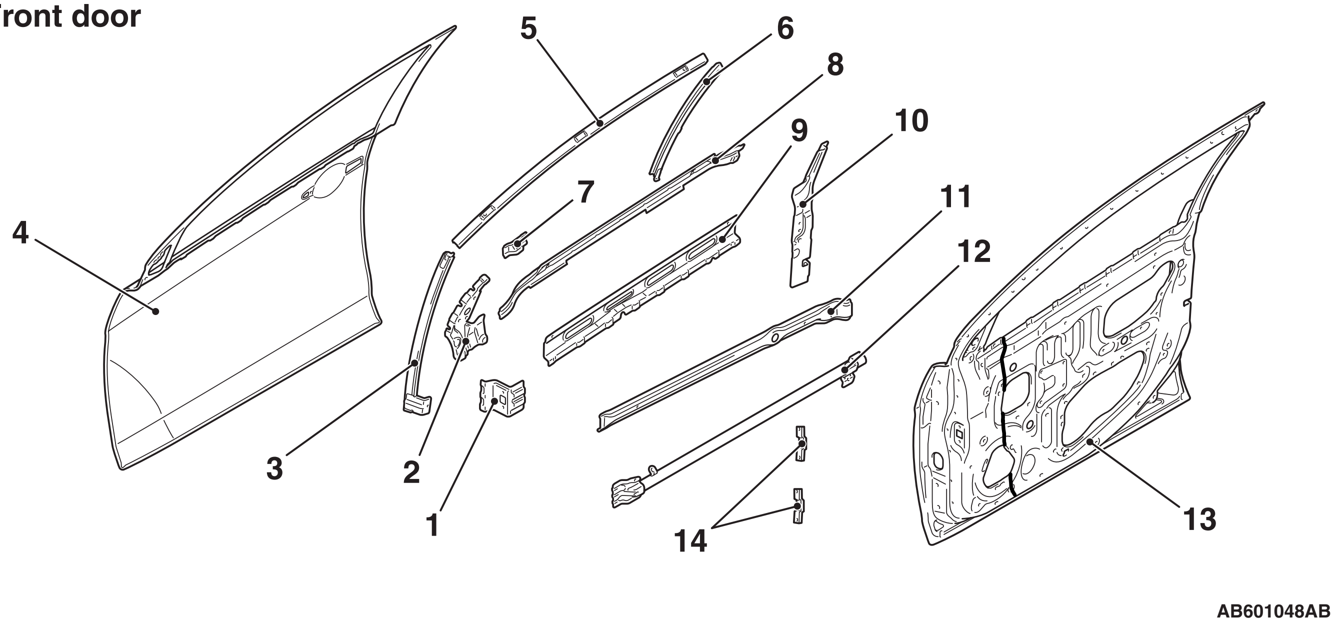
DOOR

M4010015000633

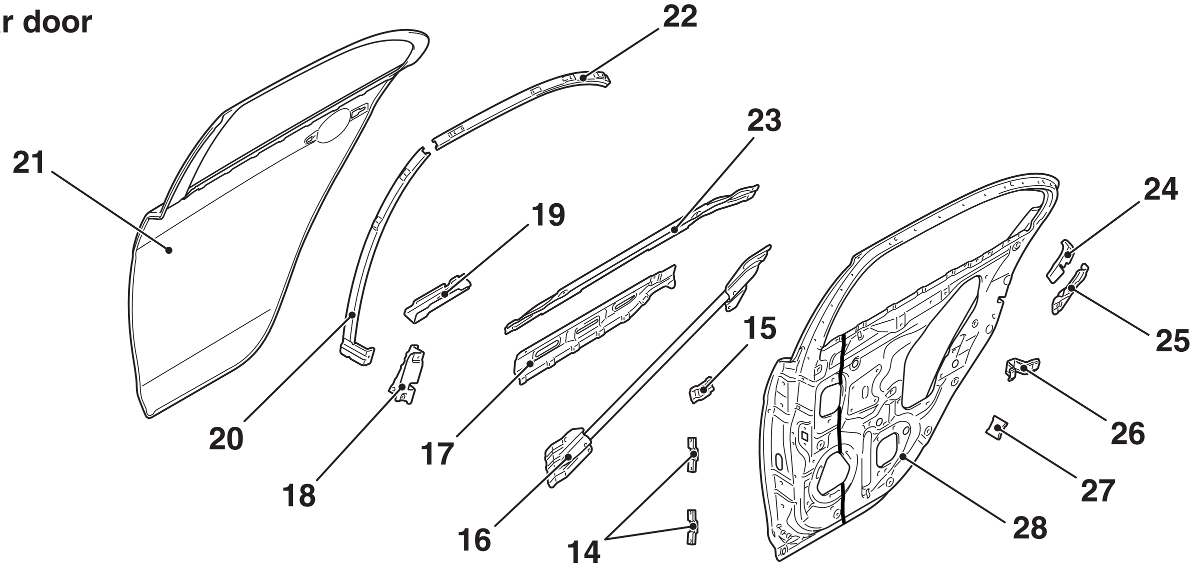
An uneven thickness steel sheet* has been used for the front and rear door inner panels to make the forward part of the vehicle thicker for reduction in vehicle weight and higher rigidity.

*NOTE: *: A steel sheet of varying thickness that is welded into one steel sheet.*

Front door



Rear door



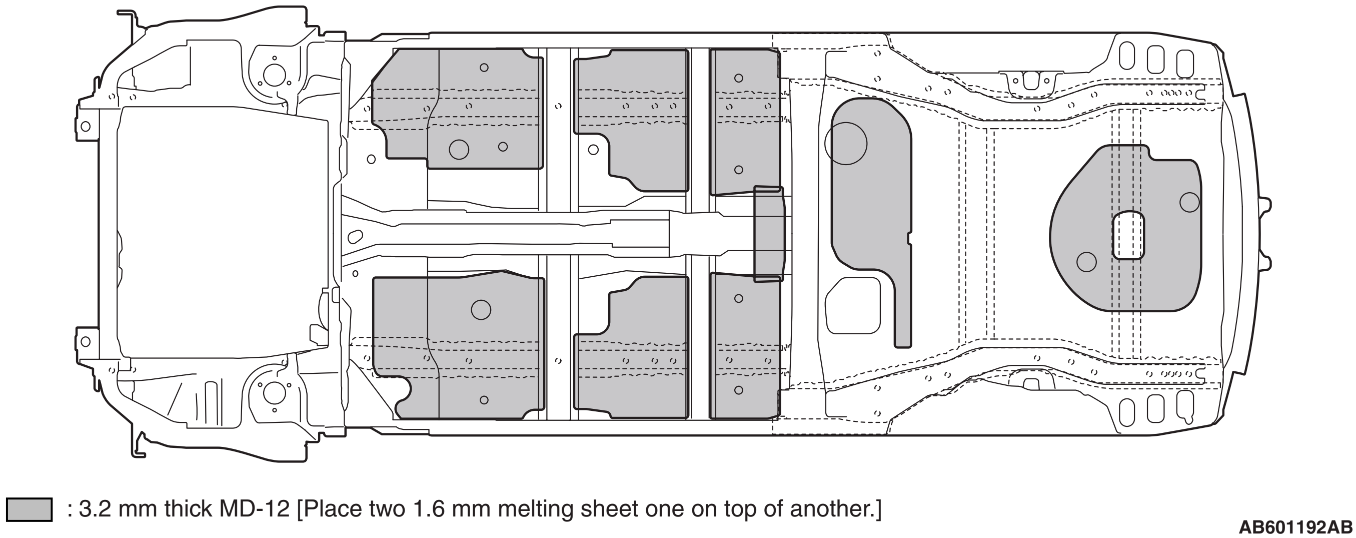
1. Front door checker reinforcement
2. Front door mirror reinforcement
3. Front door window sash front
4. Front door outer panel
5. Front door window sash upper
6. Front door window sash rear
7. Front door inside handle bracket
8. Front door beltline outer reinforcement
9. Front door beltline inner reinforcement
10. Front door latch reinforcement
11. Front door outer stiffner
12. Front door side door beam
13. Front door inner panel
14. Nut plate
15. Rear door inside handle bracket
16. Rear door side door beam
17. Rear door beltline inner reinforcement
18. Rear door latch reinforcement
19. Rear door beltline bracket
20. Rear door window sash front
21. Rear door outer panel
22. Rear door window sash upper
23. Rear door beltline outer reinforcement
24. Rear door stat corner bracket
25. Rear door sash reinforcement
26. Rear door window sash lower bracket
27. Nut plate
28. Rear door inner panel

SILENCER APPLICATION LOCATIONS

M4010005000836

A silencer (MD-12) has been affixed on the upper surface of the floor for vibration damping.

NOTE: MD-12 is a high-performance sheet made of asphalt, to which mica, heat cured resin, and so on are added to improve damping performance.



NOTE: ( ) indicates the number of melting sheets that are used for repair.

FOAMING MATERIAL USAGE LOCATIONS

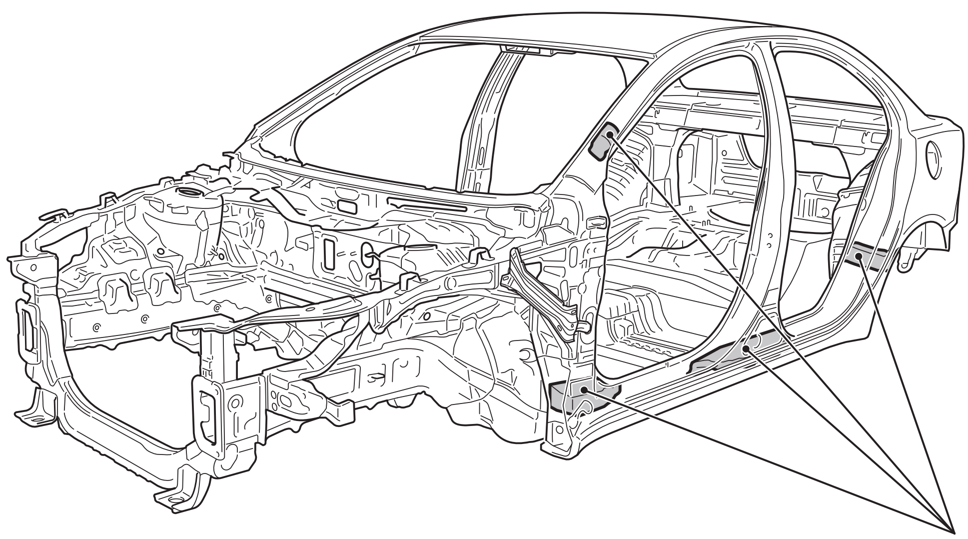
M4010006000099

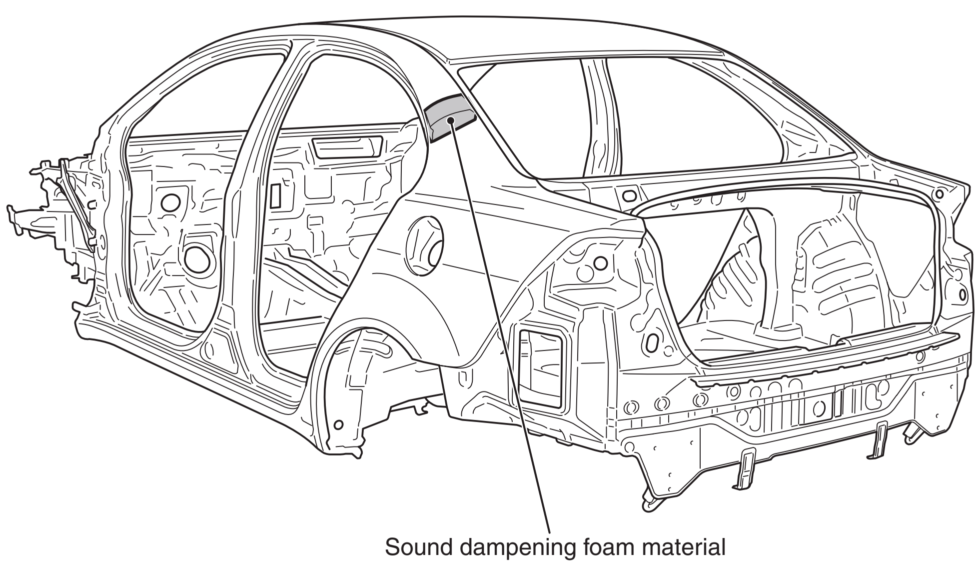
The sound dampening foam material have been adopted to the upper and lower sections of the front pillar, center pillar lower section, side roof rail and wheel house arch inside to shield from external noise.

⚠ CAUTION

The sound dampening foam material may burn when heated. Always observe the following instructions:

- **Never use a gas burner to burn the areas where sound dampening foam material are used.**
- **When cutting the parts which are provided with sound dampening foam material, ensure to use tools (air saw, etc.) that do not generate fire.**
- **If there are residual sound dampening foam material remaining on the cut section (body side), remove the sound dampening foam material from periphery of the welding area before welding work.**





NOTES

GROUP 37

POWER STEERING

CONTENTS

GENERAL INFORMATION

M2370000101003

FEATURES

A hydraulic power steering system has been adopted to all models.

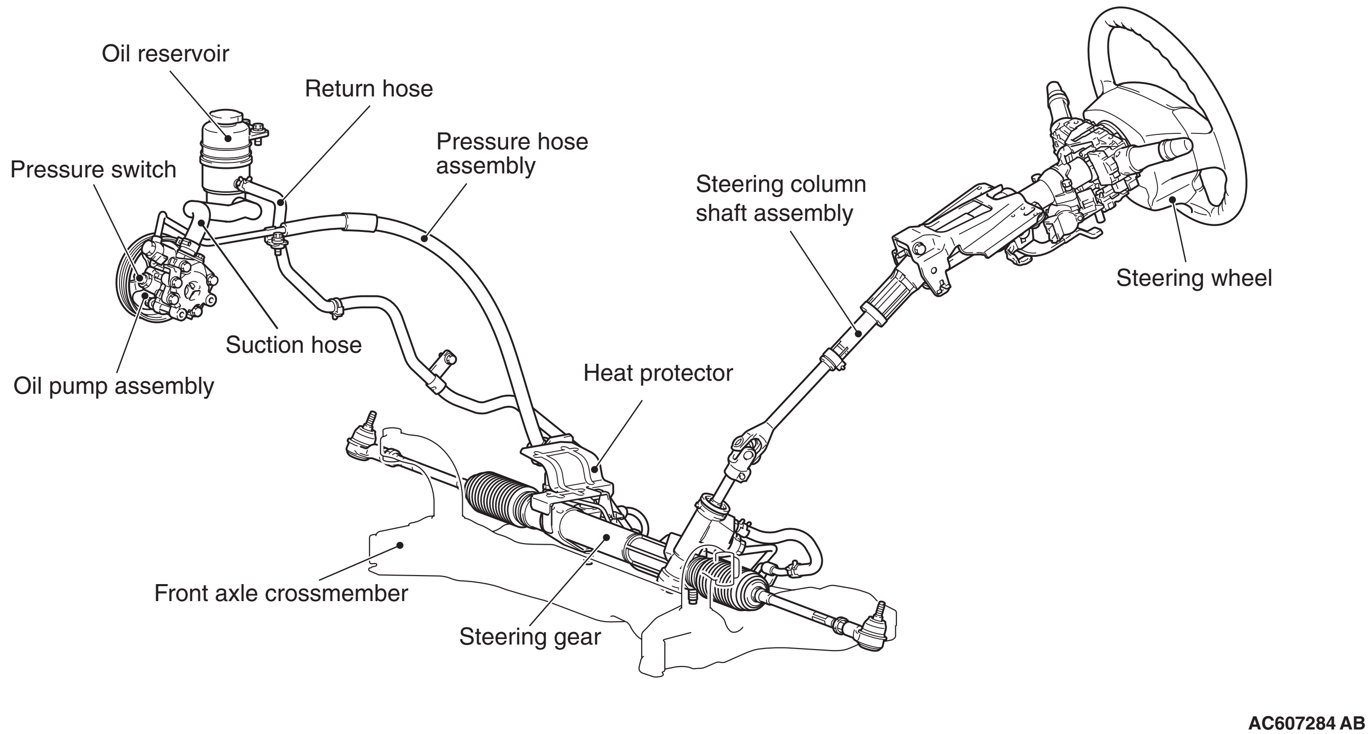
This steering system offers the following features:

- The support method of the steering gear to the crossmember is realised by the left and right internal bushings with inner cylinders. This support method achieves higher rigidity of the steering gear and improves the steering feeling.
- Configuring the optimum flow characteristics and gear valve feature improves the handling stability.
- Appropriate application of friction to the steering gear cuts off the disturbance from the road surface and improves the stability during the straight-ahead driving.
- Optimisation of the flexible tube in the high pressure hose reduces the pump noise.

SPECIFICATIONS

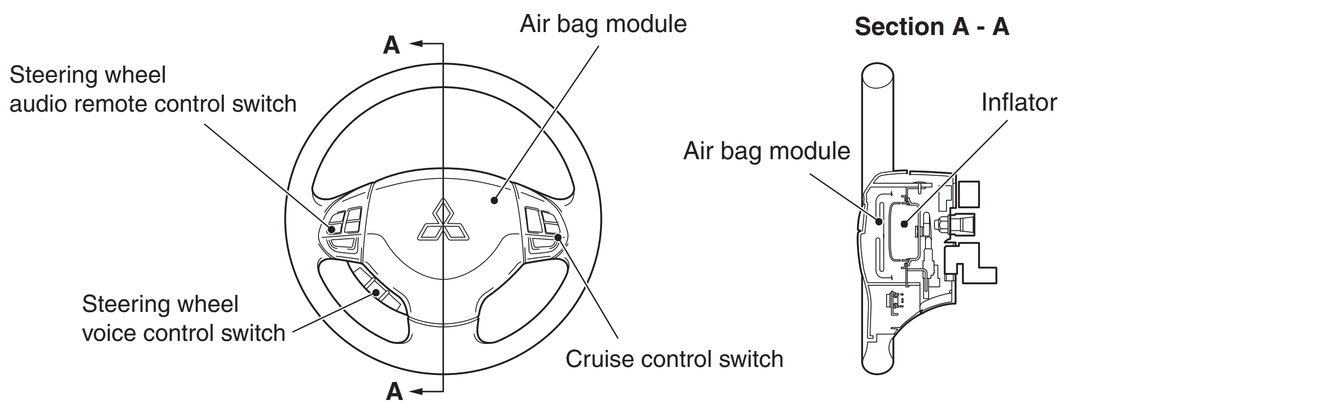
Items		Specifications
Steering wheel	Type	Three-spoke type
	Outside diameter mm (in)	375 (14.7)
	Maximum number of turns	3.16
Steering column	Column mechanism	Shock absorbing mechanism and Tilt steering mechanism
Power steering type		Integral type (Engine speed-dependent type)
Oil pump	Type	Vane type with fluid flow amount control system
	Basic discharge amount cm^3/rev. (cu in/rev)	8.1 (0.49)
	Relief pressure MPa (psi)	8.8 (1,276)
	Reservoir type	Separate type (Resin made)
Steering gear	Type	Rack and pinion type
	Stroke ratio (Rack stroke/Steering wheel Maximum turning radius) mm/rev (in/rev)	45.58 mm/rev (1.79 in/rev)
	Rack stroke mm (in)	144
Steering angle	Inner wheel	40° 50’
	Outer wheel	33° 50’
Power steering fluid	Specified lubricants	GENUINE MITSUBISHI POWER STEERING FLUID
	Quantity dm^3 (qt)	Approximately 1.0 (1.06)

CONSTRUCTION DIAGRAM



STEERING WHEEL

M2370001000761



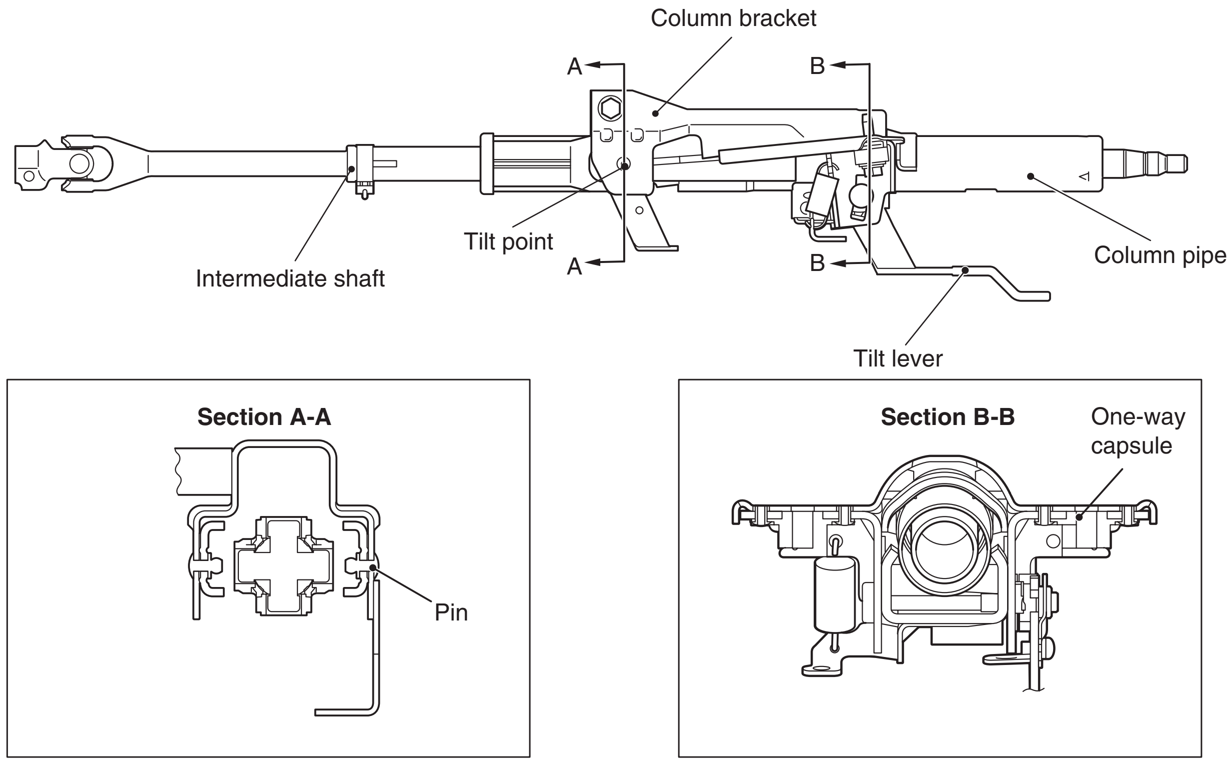
The steering wheel is designed to improve operability, safety and maintainability and has the following features:

- Newly designed Three-spoke type has been adopted. For DE and ES, the steering wheel made of urethane has been adopted. For GTS, the steering wheel made of genuine leather has been adopted.
- Audio remote control, voice control, and cruise control switches are available on some models.
- Sporty and thick type grip shape has been adopted.
- Rigid core metal reduces steering wheel vibration.
- It incorporates an SRS airbag to protect the driver in the event of a frontal collision.
- The airbag module is equipped with an inflator that does not contain sodium azide.
- Optimisation of the airbag specifications reduces the risk of injury to the passengers in a collision.

STEERING SHAFT AND COLUMN

M2370002000667

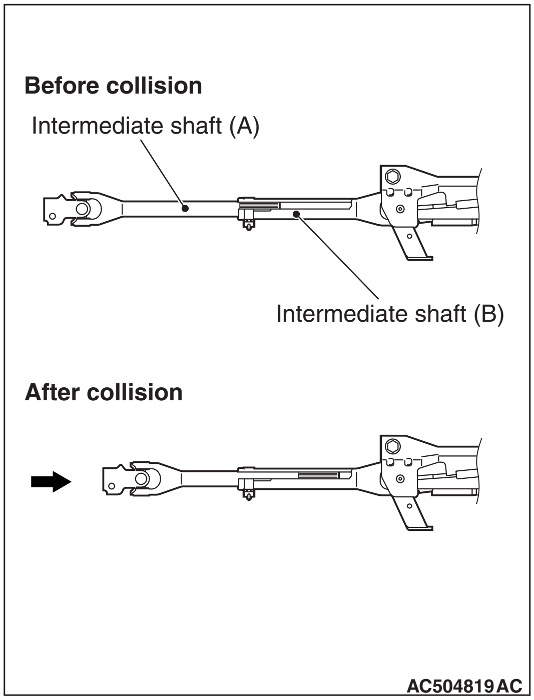
- To improve the feeling of steering (reduction of torque fluctuation) covering the whole tilting range, the steering column layout has been optimised by focusing the tilting function.
- Tilt steering mechanism that the desired driving position is obtained has been employed on all models (Tilt-up amount: 20mm/Tilt-down amount: 25mm).
- To reduce the separation load during a collision, the sliding resistance reduction member has been installed to the column bracket.



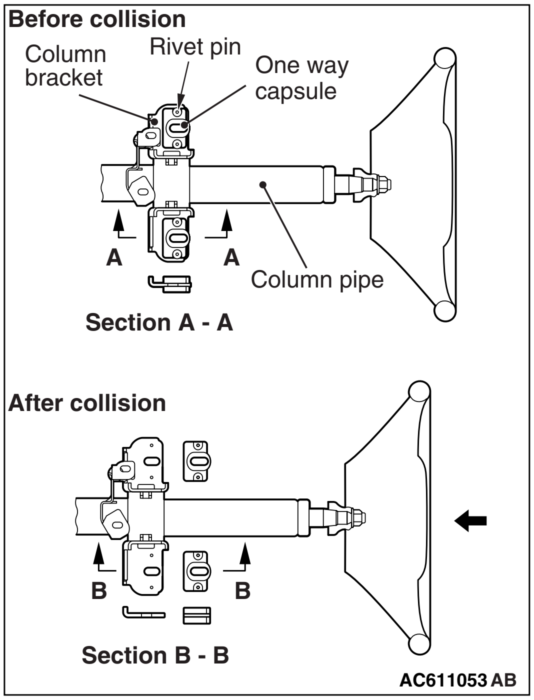
AC607286AB

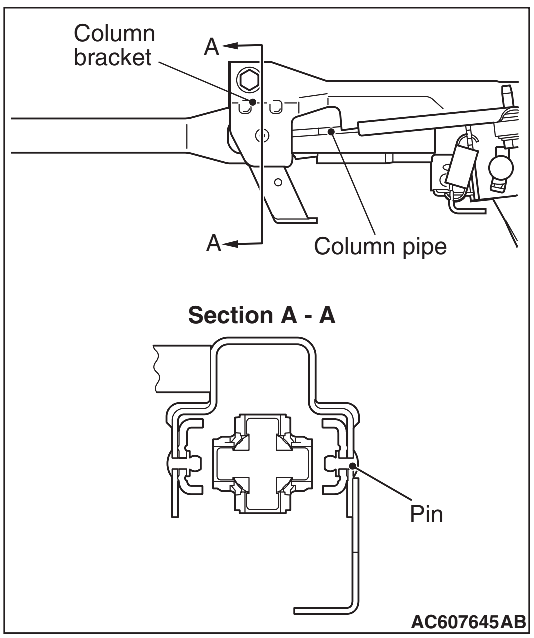
IMPACT-ABSORBING MECHANISM

Primary collision



If the vehicle is involved in a crash and impact energy is transmitted to the lower shaft from the gearbox side, the intermediate shaft (A) will be pushed into intermediate shaft (B) to absorb impact energy. Thus, the steering column will not be projected into the passenger compartment.





Secondary collision

When the driver's body falls against the steering wheel via the deployed air bag, the column bracket moves forward by deforming the rivet pin of the one-way capsule, and simultaneously the steering column assembly frees from the pin of column bracket to move forward and downwards.

OIL PUMP

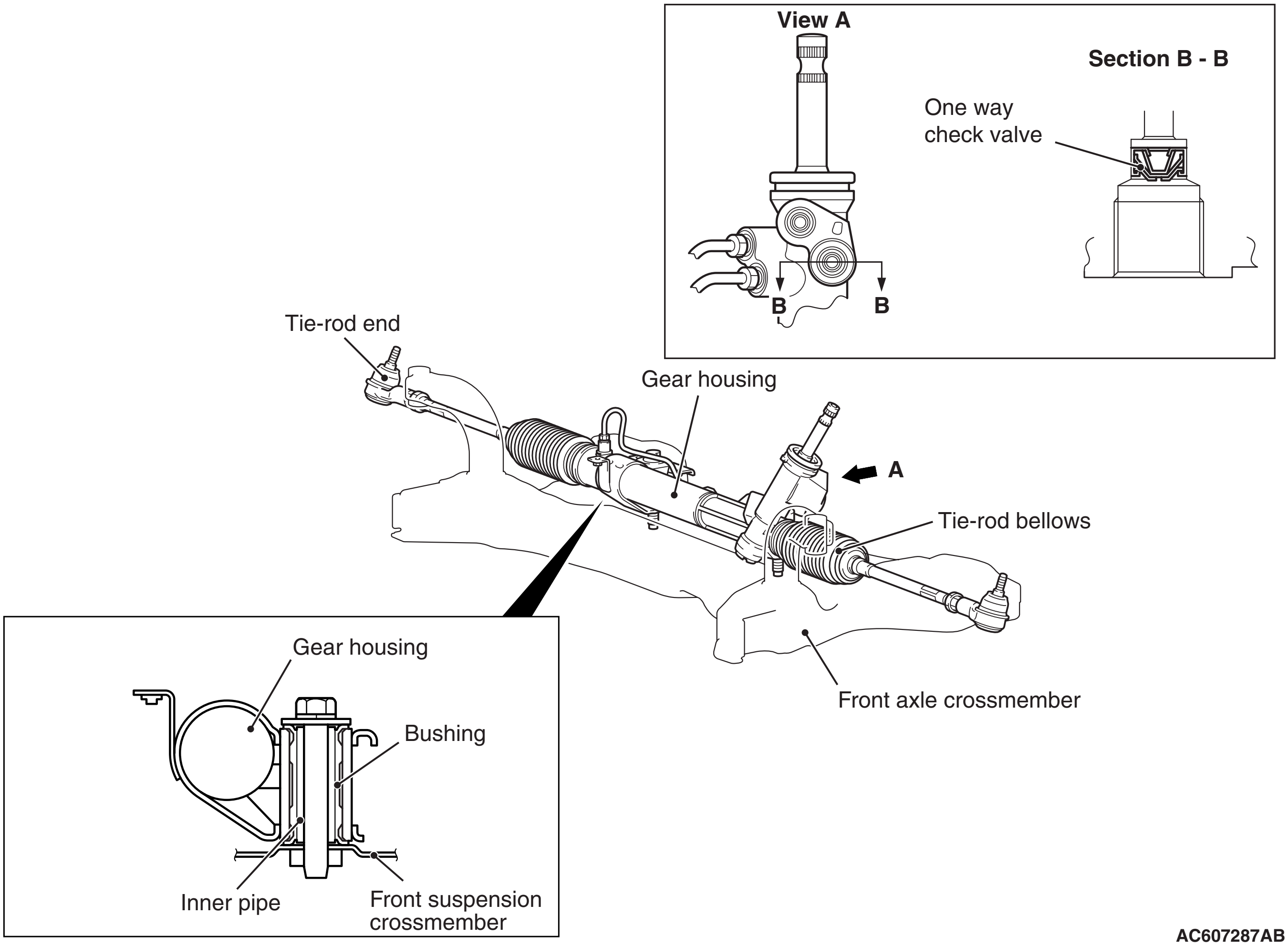
M2370004000373

The oil pump is a vane type with a fluid flow control system which functions so the steering wheel turning effort will be reduced at low engine speeds and increase at higher speeds.

The oil pump is essentially the same as the conventional one in construction.

STEERING GEAR

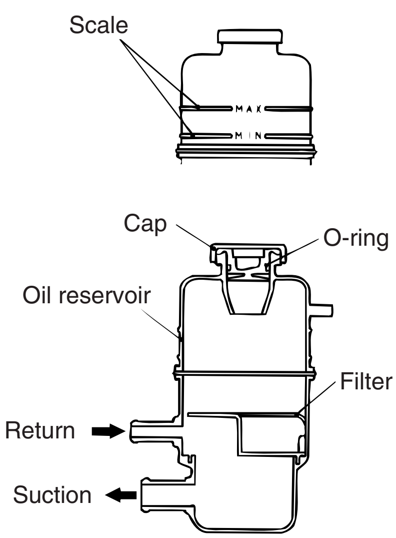
M2370003000499



- The steering gear and linkage is mounted on the suspension crossmember via two bushings with inner cylinders.
- The inner bushing with inner cylinder supports the steering gear and linkage in the vertical and fore-and-aft direction with high rigidity, improving the feeling of steering considerably.
- One-way check valve for the power steering fluid has been added in the steering gear. By reducing the kickback due to the disturbance from the uneven road surface, the handling stability has been improved.

OIL RESERVOIR

M2370005000376



AC200365AC

The resin oil reservoir is used to reduce weight. The oil reservoir is translucent and has fluid level marks (MAX and MIN lines), facilitating inspection.

GROUP 54C

CONTROLLER AREA NETWORK (CAN)

CONTENTS

GENERAL INFORMATION

M1548310000308

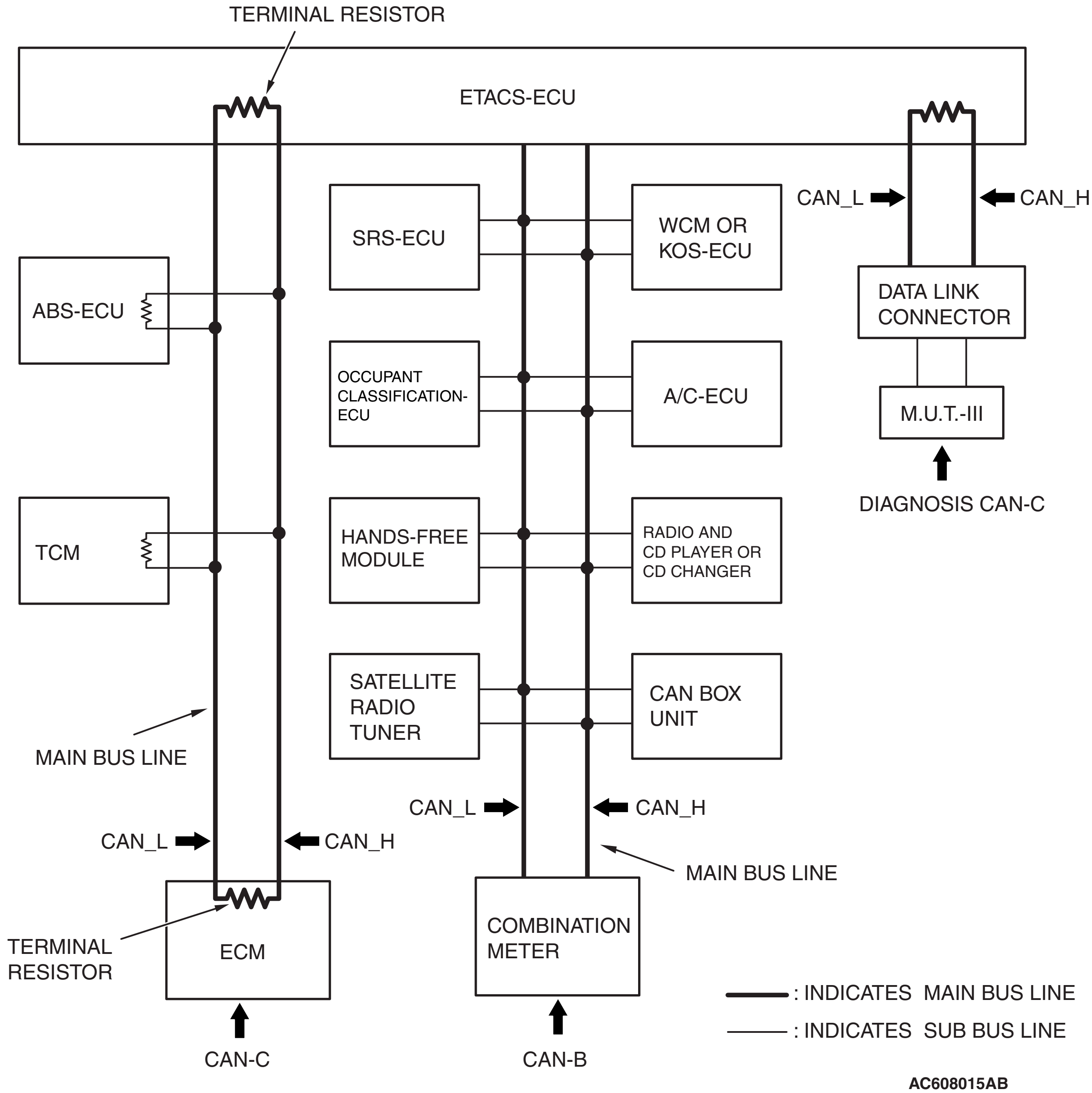
CAN, an abbreviation for Controller Area Network, is an ISO-certified international standard for a serial multiplex communication protocol*. A communication circuit employing the CAN protocol connects each electric control module (ECU), and sensor data can be shared among, which enables more reduction in wiring.

*NOTE: *: The regulations have been decided in detail, from software matters such as the necessary transmission rate for communication, the system, data format, and communication timing control method to hardware matters such as the harness type and length and the resistance values.*

CAN offers the following advantages.

- Transmission rates are much faster than those in conventional communication (up to 1 Mbps), allowing much more data to be sent.
- It is exceptionally immune to noise, and the data obtained from each error detection device is more reliable.
- Each ECU connected via the CAN communicates independently, therefore if the ECU enters damaged mode, communications can be continued in some cases.

STRUCTURE



- A gateway function has been integrated to ETACS-ECU as the network central ECU.
- The CAN system consists of the following three networks: CAN-B (middle-speed body network), CAN-C (high-speed power train network), and the diagnosis CAN-C (diagnosis exclusive network). Each ECU is connected to one of the networks depending on its functions.
- The CAN bus line consists of two lines, CAN_L and CAN_H (CAN Low and CAN High, respectively), as well as two terminal resistors (A twisted-pair cable, highly resistant to noise, is used for the communications line).
- The CAN bus line connecting two dominant ECUs is the main bus line, and the CAN bus line connecting each ECU is the sub-bus line.
- With CAN-C, the terminal resistors are incorporated in ECU. Resistors with approximately 120 ohms is used for the dominant ECU, and that with 4.7 kilo ohms is used for the non-dominant ECU.

NOTE:
- *Dominant ECU: ETACS-ECU and engine ECU*
- *Non-dominant ECU: ECU and sensor on CAN-C network, excluding ETACS-ECU and engine ECU*

- To the CAN bus line, ECU, sensor, and data link connector are connected as follows for each network.

CAN-B

- Wireless control module (WCM) <vehicles without KOS>
- KOS-ECU <vehicles with KOS>
- SRS-ECU
- Occupant classification-ECU
- A/C-ECU
- Radio and CD player or CD changer <vehicles without Mitsubishi Multi-Communication System (MMCS)>
- CAN box unit <vehicles with Mitsubishi Multi-Communication System (MMCS)>
- Hands-free module <vehicles with hands-free system>
- Satellite radio tuner <vehicles with satellite radio>
- Combination meter

CAN-C

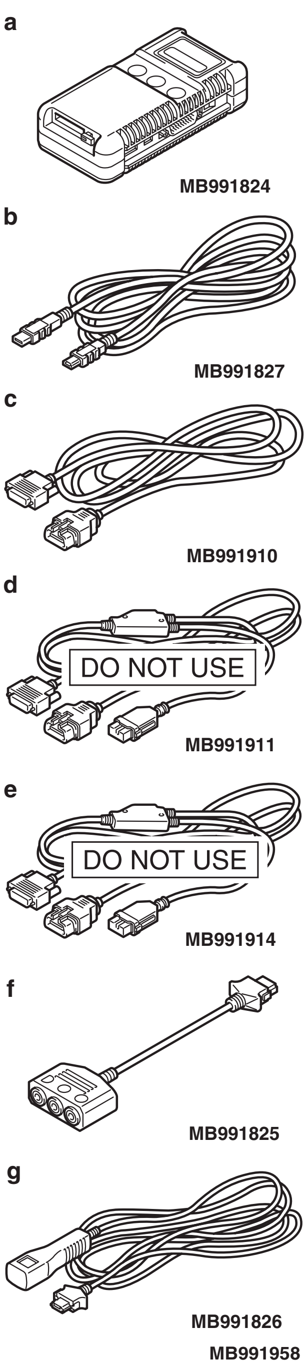
- ABS-ECU <vehicles with ABS>
- Transaxle control module (TCM)
- Engine control module (ECM)

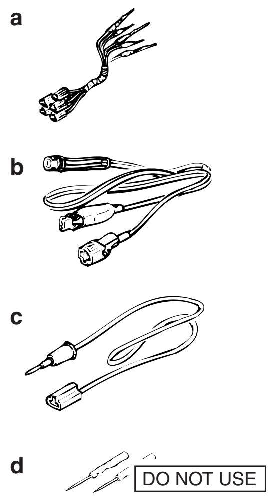
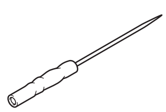
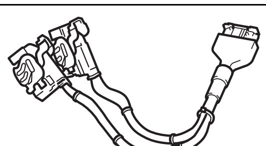
DIAGNOSIS CAN-C

- Data link connector

SPECIAL TOOL

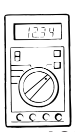
M1548304200392

Tool	Tool number and name	Supersession	Application
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** CAN bus diagnostics

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Test harness b. LED harness c. LED harness adaptor d. Probe	General service tools	Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector. a. Connector pin contact pressure inspection b. Power circuit inspection c. Power circuit inspection d. Commercial tester connection
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.
 MB991970	MB991970 ABS check harness	–	Measure the voltage and resistance at the ABS-ECU

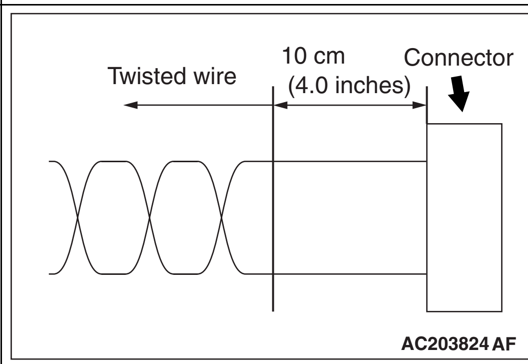
TEST EQUIPMENT

M1548304300258

Test equipment	Name	Use
 AC000019	Digital multimeter	Checking CAN bus circuit (for resistance and voltage measurements)

SERVICE PRECAUTIONS

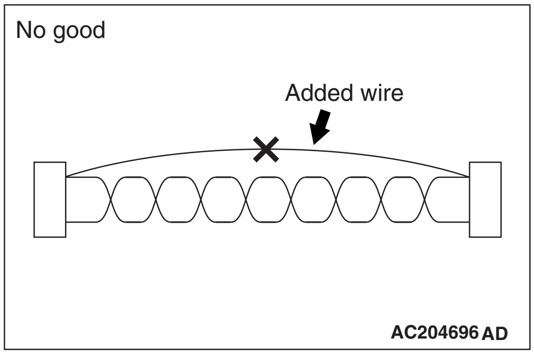
M1548302100258

Warnings in diagnosis section	Details regarding warnings
⚠ CAUTION When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.	–
⚠ CAUTION A digital multimeter should be used.	When measuring resistance value or voltage in CAN bus lines, use a digital multimeter. If not using a digital multimeter, the equipments, which are connected through the CAN communication lines, may be damaged.
⚠ CAUTION When measuring the resistance, disconnect the negative battery terminal.	Disconnect the negative battery terminal when measuring the resistance value in the CAN bus line. If you fail to do so, the equipments, which are connected through the CAN communication lines, may be damaged.
⚠ CAUTION The test wiring harness should be used.	Always use the test harness when measuring the voltage or resistance value at the female connector. If you fail to do so, connectors may be damaged.
⚠ CAUTION The strand end of the twist wire should be within 10 cm from the connector.	 If you repair the wire due to a defective connector or its terminal or harness wire, you should cut the wire so that the strand end of the twist wire should be within 10 cm (4 inches) from the connector as shown. If it exceeds 10 cm (4 inches), twist the wiring harness just like the original twisted wire. If the strand end exceeds 10 cm (4 inches), a communication error may be caused.
⚠ CAUTION Strictly observe the specified wiring harness repair procedure.	When you repair a CAN bus line, observe the precautions on how to repair the CAN bus line strictly. Refer to P.54C-8. If a new wire is added or a splice point is modified for the CAN_L or CAN_H line, an error in the CAN communication may be caused.

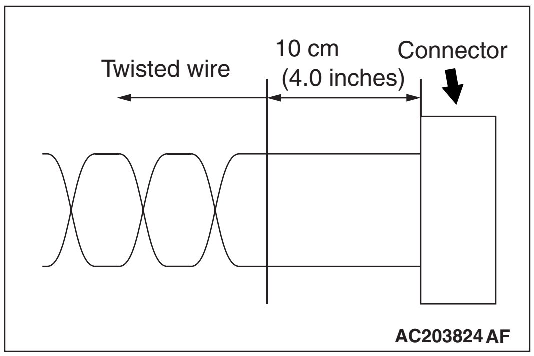
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES

M1548301900251

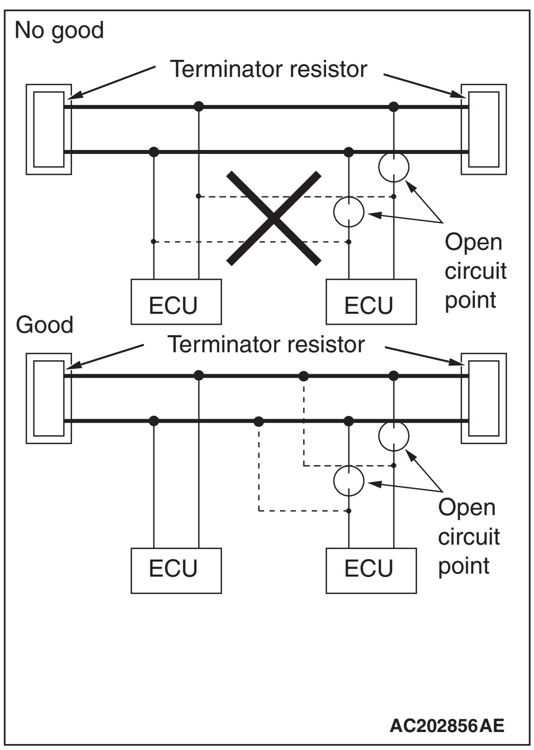
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES



- If the CAN bus line(s) are repaired, renew all the twisted wires between the end connectors. If the wiring harness is partially repaired, or only CAN_L or CAN_H line is repaired, noise suppression is deteriorated, causing a communication error.



- If the connector or wire on the main bus line or the sub-bus wire is replaced, the frayed end of the twisted wire should be within 10 cm (4 inches) from the connector. If it exceeds 10 cm (4 inches), twist the wiring harness just like the original twisted wire. If the frayed end exceeds 10 cm (4 inches), noise suppression is deteriorated, causing a communication error.



- If a sub-bus line is repaired, splice a new wire directly into the main bus line. If a new wire is spliced into the sub-bus line, which is connected to another device, the CAN communication will be disabled.

PRECAUTIONS ON HOW TO REPAIR THE TERMINATOR RESISTOR

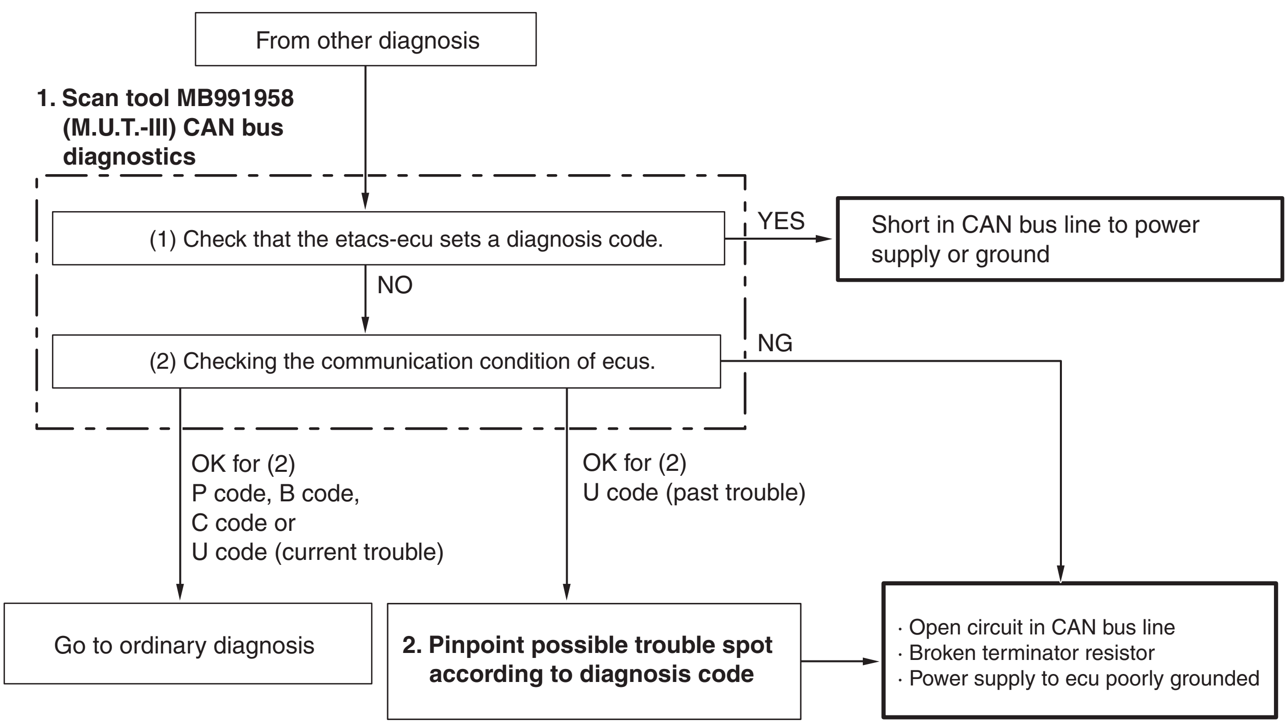
If one-side terminator resistor is broken, the CAN communication will continue although noise suppression is deteriorated. No diagnostic trouble code may be set even if the terminator resistor was broken. If a damage is found, replace the ECU which incorporates the defective terminator resistor.

EXPLANATION ABOUT THE SCAN TOOL (M.U.T.-III) CAN BUS DIAGNOSTICS

M1548300100412

Scan tool MB991958 CAN bus diagnostics carries out the two checks below automatically, and then displays current condition of the CAN bus lines according to the check results.

CAN BUS LINE DIAGNOSTIC FLOW



AC507612AB

1. Scan tool CAN bus diagnostics

   Scan tool MB991958 diagnoses CAN bus lines in accordance with the following strategy.

   NOTE: After you determine whether the CAN-C lines are in good condition, then determine whether the CAN-B lines are in good condition. Then confirm each judgement result on the scan tool screen.

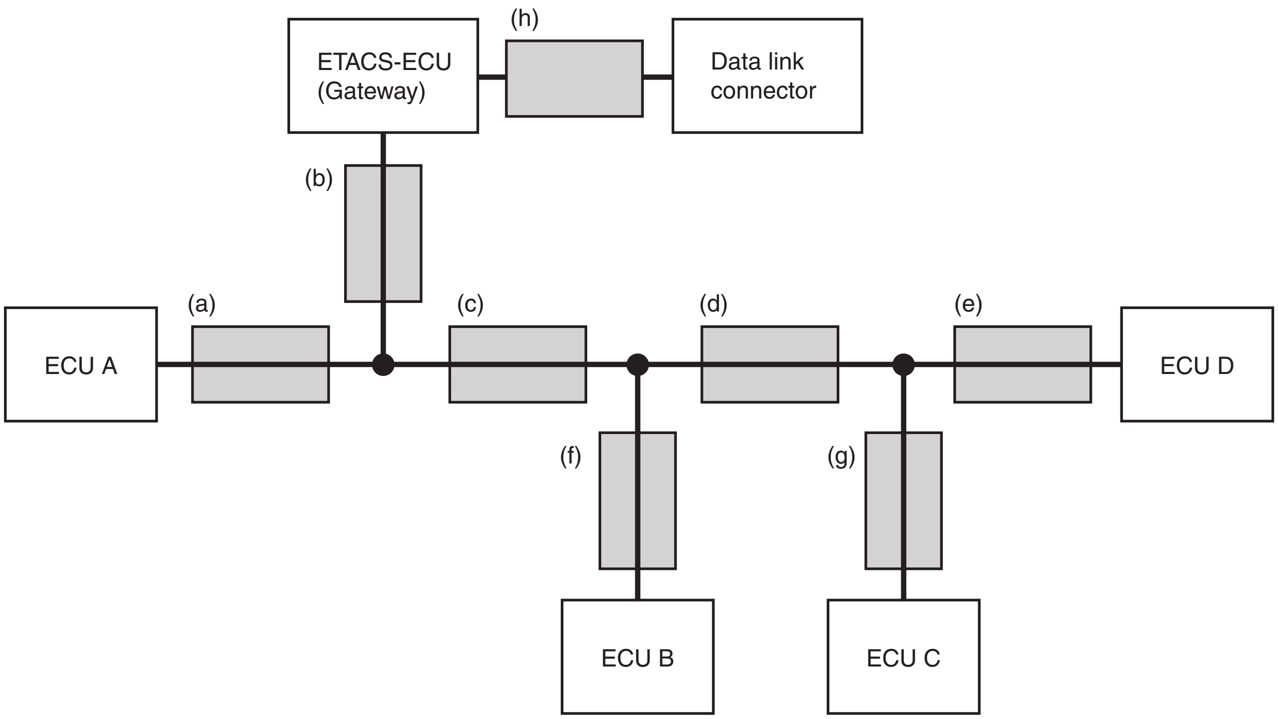
(1) Check that the ETACS-ECU sets a diagnostic trouble code.

You can narrow down the points to be diagnosed by confirming an ETACS-ECU diagnostic trouble code.

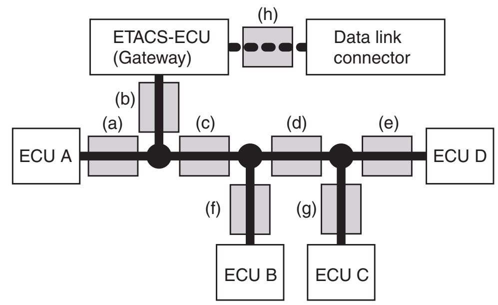
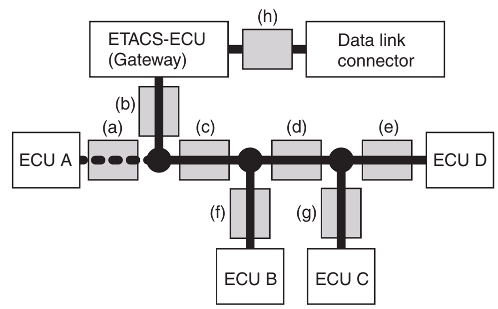
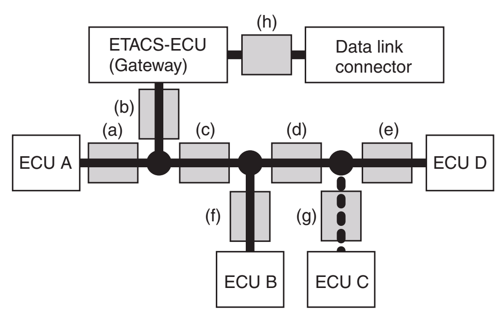
(2) Checking the communication condition of ECUs

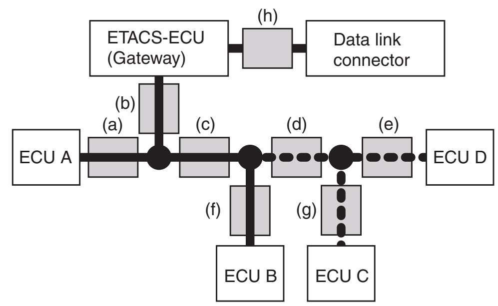
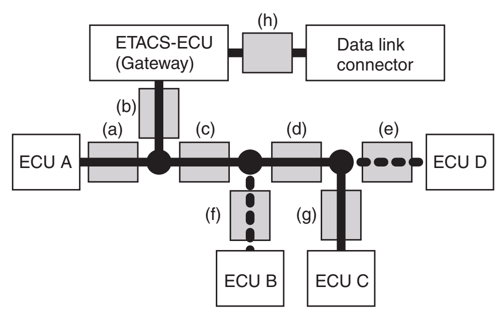
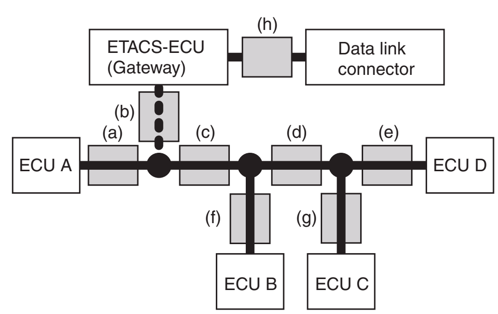
Scan tool MB991958 narrows down troubles in circuit by itself. Its strategies are as follows.

Reference circuit



AC204741AD

ECU which cannot communicate with the scan tool	Possible trouble spot	Logic for narrowing down trouble spot	
ETACS-ECU and all ECUs	CAN bus line (h) and power supply system to ETACS-ECU	The ETACS-ECU and the other ECUs use the CAN bus line (h) when they communicate with scan tool MB991958. Since none of the ETACS-ECU and the other ECUs can communicate with scan tool MB991958, CAN bus line (h) or the power supply circuit to the ETACS-ECU may be faulty.	 AC204742BO
ECU A	CAN bus line (a) and power supply system to ECU A	ECU A communicates with the scan tool MB991958 via CAN bus lines (a) and (b). Scan tool MB991958 judges that CAN bus line (b) is normal, because it can communicate with other ECUs. Possible trouble may be present in CAN bus line (a) or the power supply system to ECU A.	 AC204742BH
ECU C	CAN bus line (g) and power supply system to ECU C	The ECU C communicates with scan tool MB991958 via CAN bus lines (b), (c), (d) and (g). Scan tool MB991958 judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECUs B and D. Possible trouble may be present in CAN bus line (g) or the power supply system to ECU C. ECU C communicates with scan tool MB991958 via CAN bus lines (b), (c), (d) and (g). Scan tool MB991958 judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECUs B and D. Possible trouble may be present in CAN bus line (g) or the power supply system to ECU C.	 AC204742BI

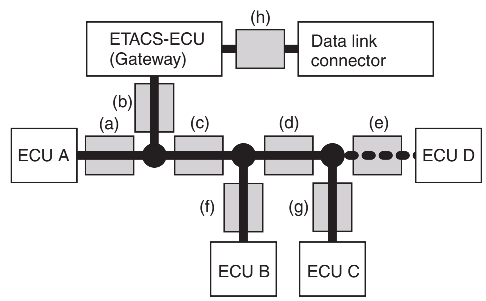
ECU which cannot communicate with the scan tool	Possible trouble spot	Logic for narrowing down trouble spot	
ECU C and ECU D	Trouble in CAN bus line (d)	ECUs C and D communicate with scan tool MB991958 via CAN bus lines (b), (c), (d), (e) and (g). Scan tool MB991958 judges that CAN bus lines (b) and (c) are normal, because it can communicate with ECU B. Possible trouble may be present in CAN bus line (d), (e) or (g) or the power supply system to ECU C and ECU D. CAN bus line (d) is shared by ECUs C and D when they communicate with scan tool MB991958, so CAN bus line (d) is suspected as ultimate cause. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.	 AC204742BJ
ECU B and ECU D	CAN bus line (e) or (f) or power supply system to ECU B or D	ECUs C and D communicate with scan tool MB991958 via CAN bus lines (b), (c), (d), (e) and (f). Scan tool MB991958 judges that CAN bus lines (b), (c) and (f) are normal, because it can communicate with ECU C. Possible trouble may be present in CAN bus line (f) or (e) or the power supply system to ECU D.	 AC204742BK
All ECU (except ETACS-ECU)	CAN bus line (b)	The other ECUs except the ETACS-ECU use CAN bus lines (b) and (h) when they communicate with scan tool MB991958. It must be assumed that CAN bus line (b) is defective since the ETACS-ECU can communicate with scan tool MB991958.	 AC204742BP

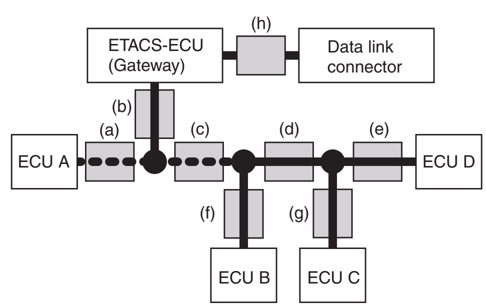
2. Pinpoint possible trouble spot according to diagnostic trouble code

   If diagnostic trouble code related to CAN communication is set as past trouble, isolate opens as described below.

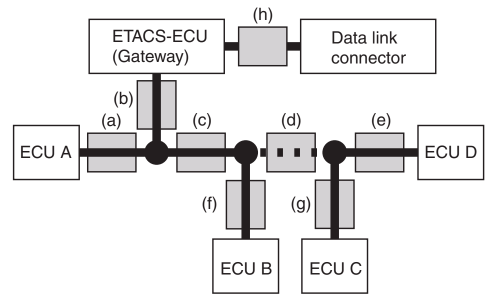
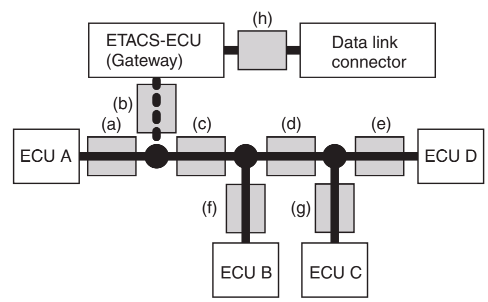
NOTE: If you pinpoint trouble spot according to diagnostic trouble code, you should use time-out diagnostic trouble code. Diagnostic trouble code related to failure information is set when the data to be set contains an error, so CAN bus line itself is probably normal.

NOTE: Time-out diagnostic trouble codes are stored in each ECU memory individually. Therefore, it is possible that these diagnostic trouble codes have not been set simultaneously. If the trouble spot cannot be found when you diagnose by judging from multiple diagnostic trouble codes, check the communication lines between each ECU.

<table>
<tr><th>Diagnostic trouble code to be set</th><th>Possible trouble spot</th><th colspan="2">Logic for narrowing down trouble spot</th></tr>
<tr><td>Time-out diagnostic trouble code associated with ECU D is stored in ECU A, ECU B and ECU C.</td><td rowspan="3">Trouble in CAN bus line (e) and power supply system to ECU D</td><td rowspan="3">When time-out diagnostic trouble code associated with ECU D is stored in ECU A, B and C, or time-out diagnostic trouble code associated with ECUs A, B and C is stored in ECU D, or "bus off" diagnostic trouble code is stored in ECU D, CAN bus line (e) is suspected. When diagnostic trouble code is not stored in ECU D, the power supply to ECU D is suspected.</td><td rowspan="3">

AC204742BL</td></tr>
<tr><td>Time-out diagnostic trouble code associated with ECUs A, B and C is stored in ECU D.</td></tr>
<tr><td>"Bus off" diagnostic trouble code is stored in ECU D.</td></tr>
<tr><td>Time-out diagnostic trouble code associated with ECU A is stored in ECUs B, C and D.</td><td rowspan="3">Trouble in CAN bus line (a) and power supply system to ECU A.</td><td rowspan="3">When time-out diagnostic trouble code associated with ECU A is stored in ECUs B, C and D, or time-out diagnostic trouble code associated with ECUs B, C and D is stored in ECU A, or "bus off" diagnostic trouble code is stored in ECU A, CAN bus line (a) or (c) is suspected. When diagnostic trouble code is not stored in ECU A, the power supply to ECU A is suspected.</td><td rowspan="3">

AC204742BM</td></tr>
<tr><td>Time-out diagnostic trouble code associated with ECUs B, C and D is stored in ECU A.</td></tr>
<tr><td>"Bus off" diagnostic trouble code is stored in ECU A.</td></tr>
</table>

Diagnostic trouble code to be set	Possible trouble spot	Logic for narrowing down trouble spot	
Time-out diagnostic trouble codes associated with ECUs C and D are stored in ECU A and ECU B. Time-out diagnostic trouble codes associated with ECUs A and B are stored in ECU C and ECU D.	Trouble in CAN bus line (d)	If time-out diagnostic trouble codes associated with ECUs C and D are stored in ECUs A and B, or time-out codes associated with ECUs A and B are stored in ECUs C and D, CAN bus line (d) is suspected. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.	 AC204742BN
Time-out diagnostic trouble codes associated with ECUs A, B, C and D are stored in ETACS-ECU. Time-out diagnostic trouble codes associated with ETACS-ECU is stored in ECU A, B, C and ECU D.	Trouble in CAN bus line (b)	It must be assumed that a fault was present in CAN bus line (b) when the ETACS-ECU has set a time-out diagnostic trouble code for ECU A, B, C or D.	 AC204742BP

DIAGNOSTIC TROUBLE CODE DIAGNOSIS

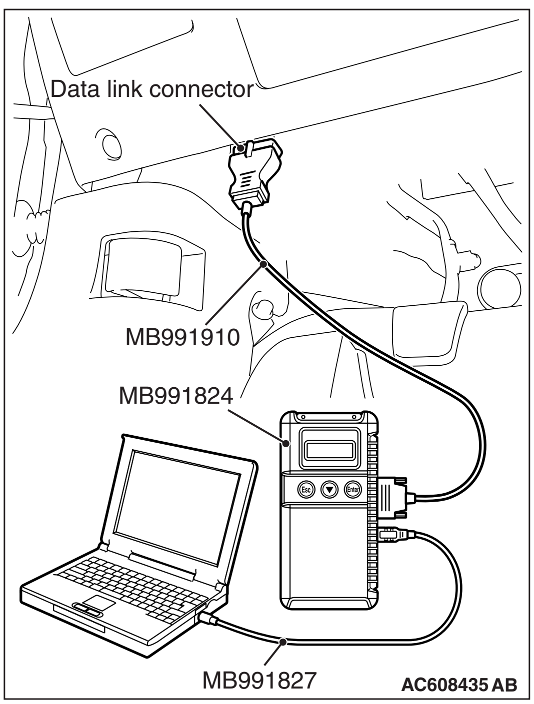
M1548304500111

ON-BOARD DIAGNOSTICS

The CAN is a communication method which the ECUs use in order to communicate each other. The CAN-related diagnostic trouble codes will be stored in the following ECUs, which use the CAN communication.

- ETACS-ECU
- ECM
- TCM
- ABS-ECU <vehicles without ASC> or ASC-ECU <vehicles with ASC>
- AWD-ECU
- Steering wheel sensor <vehicles with ASC>
- A/C-ECU
- SRS-ECU
- Occupant classification-ECU
- Hands free module <vehicles with hands free system>
- Radio and CD player or CD changer <vehicles without Mitsubishi Multi-Communication System (MMCS)> or CAN box unit <vehicles with Mitsubishi Multi-Communication System (MMCS)>
- Satellite radio tuner <vehicles satellite radio>
- WCM <vehicles without KOS> or KOS-ECU <vehicles with KOS>
- Combination meter

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)



Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

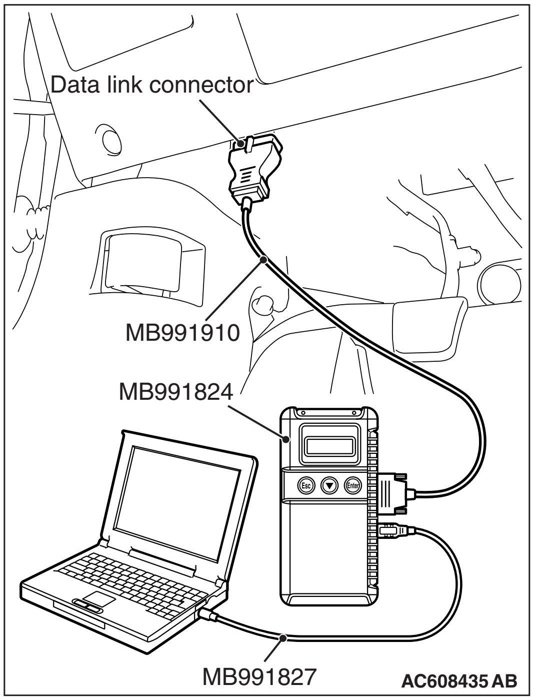
   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the scan tool system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO DIAGNOSE THE CAN BUS LINE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN Bus Diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle whose CAN bus lines will be diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle whose CAN bus lines will be diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

DIAGNOSIS

CAN BUS DIAGNOSTICS TABLE

M1548300200624

⚠ CAUTION

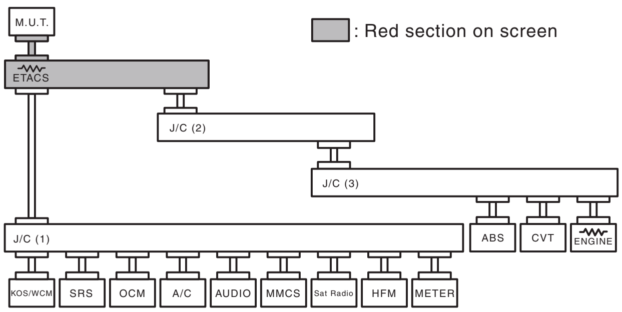
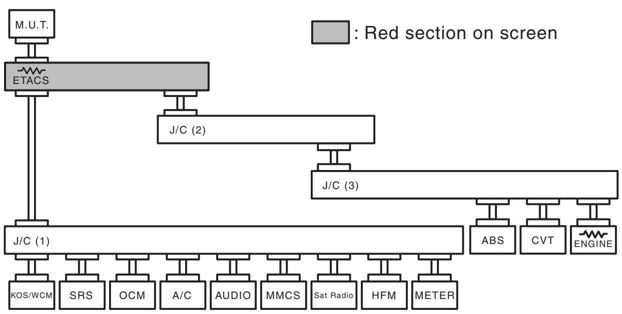
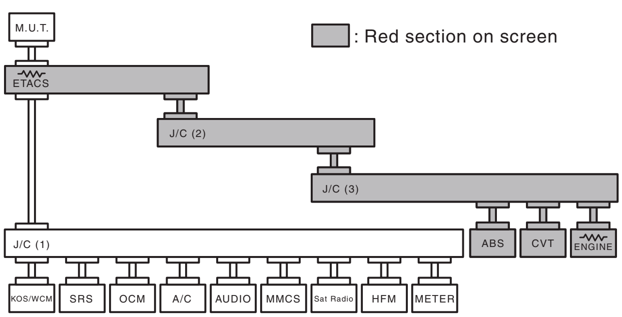
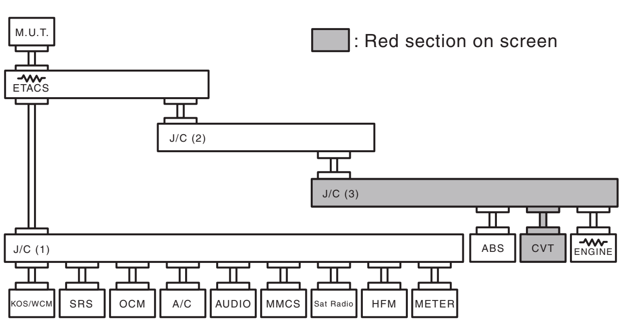
A diagnosis code may not also be set in the CAN-B lines under the conditions below. If no diagnosis code has been set due to electrical noise, confirm diagnosis item 23 P.54C-143.

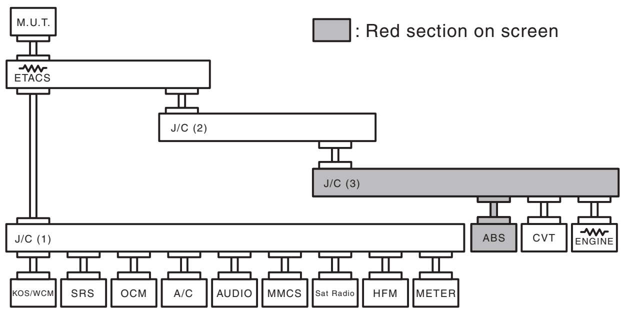
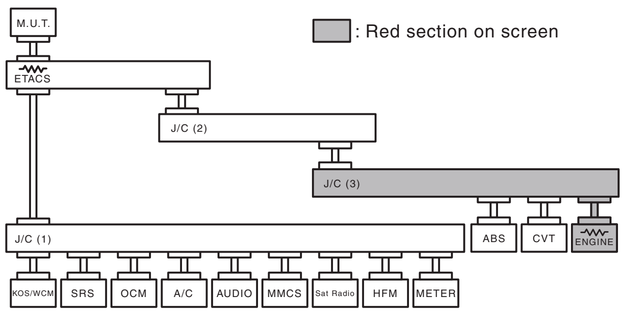
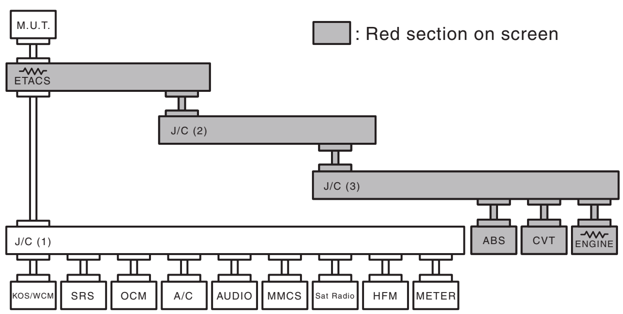
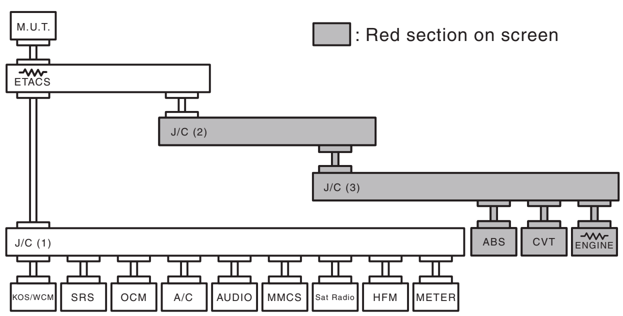
- **Open circuit at the CAN_H side of the CAN-B bus lines**
- **Open circuit at the CAN_L side of the CAN-B bus line**
- **Short to ground at the CAN_H side of the CAN-B bus line**

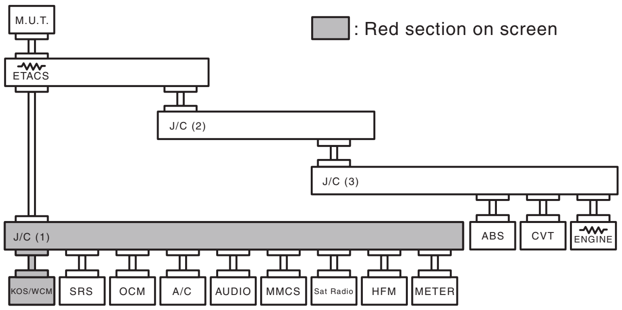
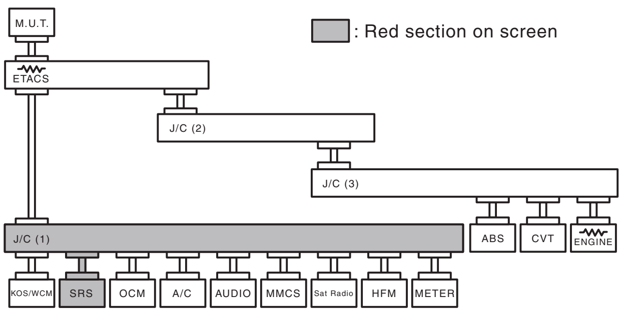
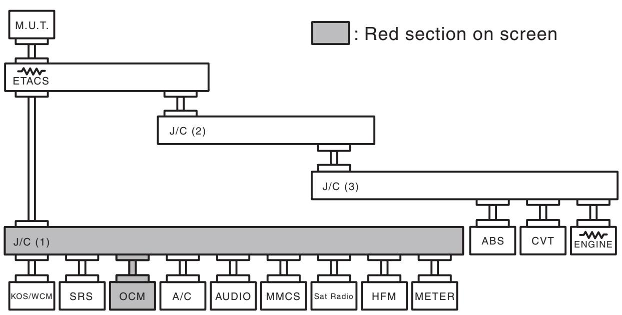
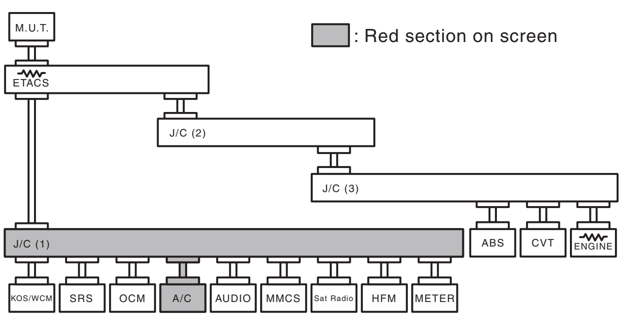
⚠ CAUTION

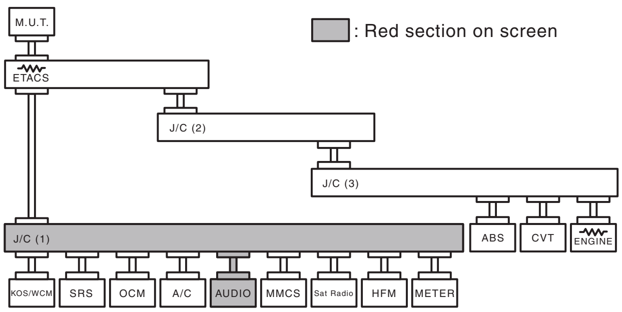
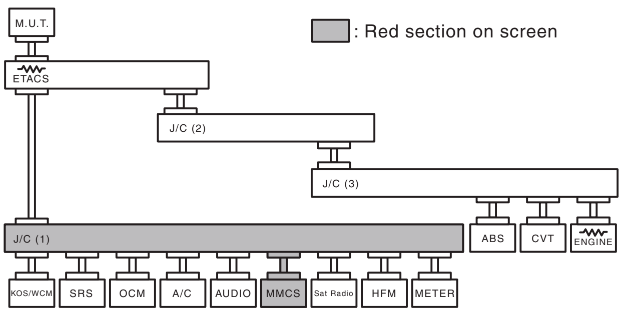
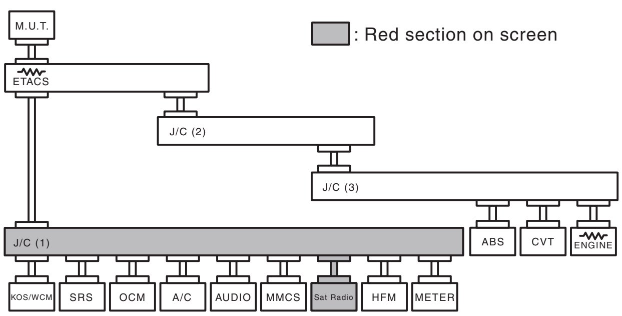
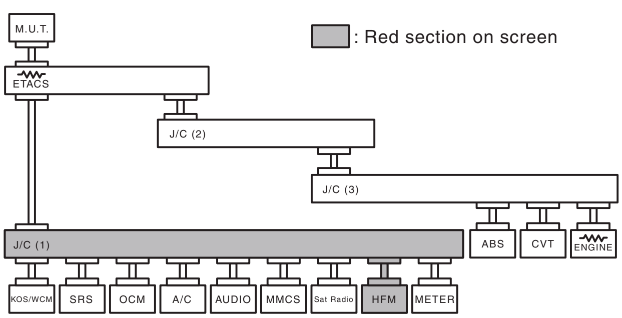
During diagnosis, a diagnosis code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. After completing the repair, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

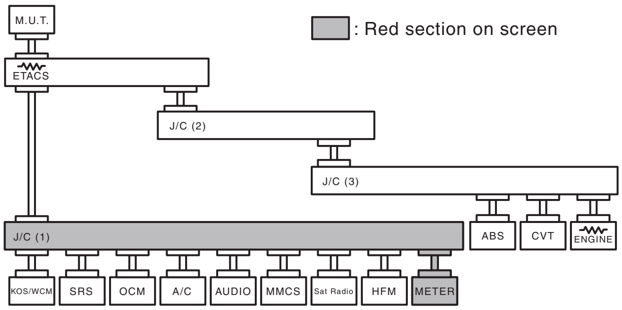
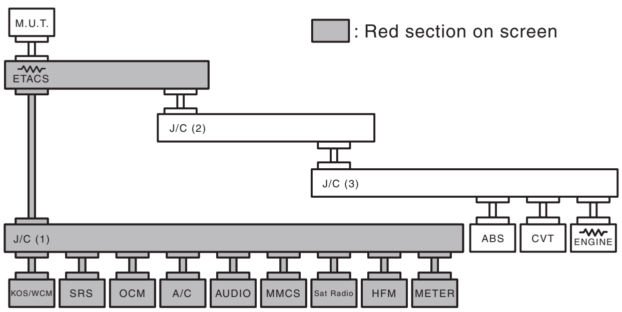
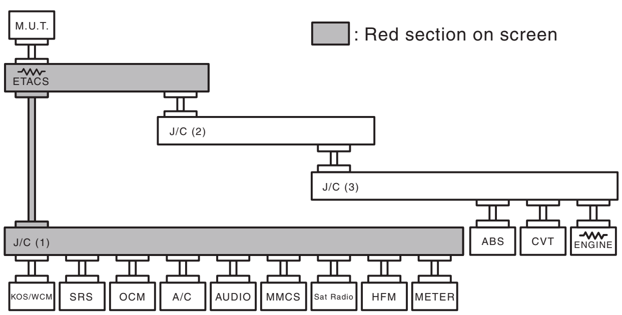
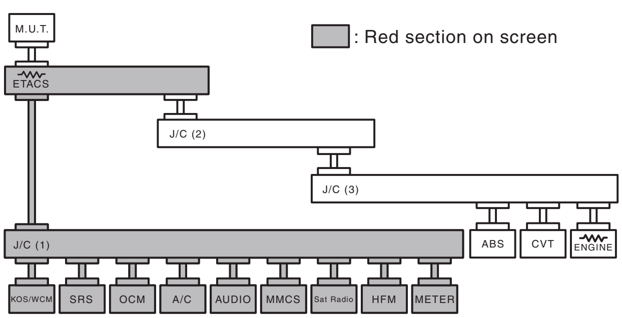
This diagnosis applies only to the CAN bus lines. If a different system is defective, proceed to the applicable diagnosis section for each system. Observe the diagnosis procedure below only when the CAN bus line is defective.

Scan tool screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC608016AB	Short circuit to battery in red displayed area is estimated.	Diagnosis Item 1 Diagnose when the scan tool cannot receive the data sent by ETACS-ECU.	P.54C-22
 AC608016AC	Grounding in red displayed area is estimated.	Diagnosis Item 2 Malfunction of the ETACS-ECU.	P.54C-27
 AC608016AD	CAN-C: A bus-off failure is present in the gateway ECU.	Diagnosis Item 3 Abnormal short between the CAN-C bus lines.	P.54C-28
	CAN-C: Grounding in red displayed area is estimated	Diagnosis Item 4 Diagnose shorts in the ground to CAN-C bus line.	P.54C-37
	CAN-C: Short circuit to battery in red displayed area is estimated	Diagnosis Item 5 Diagnose shorts in the power supply to CAN-C bus line.	P.54C-47
 AC608016AE	CAN-C: Disconnection in red displayed area is estimated.	Diagnosis Item 6 Diagnose when the scan tool cannot receive the data sent by TCM.	P.54C-57

Scan tool screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC608016AF	CAN-C: Disconnection in red displayed area is estimated.	Diagnosis Item 7 Diagnose when the scan tool cannot receive the data sent by ABS-ECU.	P.54C-59
 AC608016AG	CAN-C: Disconnection in red displayed area is estimated.	Diagnosis Item 8 Diagnose when the scan tool cannot receive the data sent by ECM.	P.54C-62
 AC608016AH	CAN-C: Disconnection in red displayed area is estimated.	Diagnosis Item 9 Diagnose the lines between the ETACS-ECU and joint connector (CAN2).	P.54C-65
 AC608016AI	CAN-C: Disconnection in red displayed area is estimated.	Diagnosis Item 10 Diagnose the lines between joint connector (CAN2) and joint connector (CAN3).	P.54C-69

<table>
<tr><th rowspan="2">Scan tool screen
(The ECUs that are not adopted are not displayed.)</th><th></th><th rowspan="2">Diagnosis detail</th><th rowspan="2">Reference page</th></tr>
<tr><th>Comment</th></tr>
<tr><td rowspan="2">
AC608016AJ</td><td rowspan="2">CAN-B: Disconnection in red displayed area is estimated.</td><td>Diagnosis Item 11
Diagnose when the scan tool cannot receive the data sent by KOS-ECU.</td><td>P.54C-72</td></tr>
<tr><td>Diagnosis Item 12
Diagnose when the scan tool cannot receive the data sent by WCM.</td><td>P.54C-75</td></tr>
<tr><td>
AC608016AK</td><td>CAN-B: Disconnection in red displayed area is estimated.</td><td>Diagnosis Item 13
Diagnose when the scan tool cannot receive the data sent by SRS-ECU.</td><td>P.54C-78</td></tr>
<tr><td>
AC608016AL</td><td>CAN-B: Disconnection in red displayed area is estimated.</td><td>Diagnosis Item 14
Diagnose when the scan tool cannot receive the data sent by occupant classification-ECU.</td><td>P.54C-81</td></tr>
<tr><td>
AC608016AM</td><td>CAN-B: Disconnection in red displayed area is estimated.</td><td>Diagnosis Item 15
Diagnose when the scan tool cannot receive the data sent by A/C-ECU.</td><td>P.54C-84</td></tr>
</table>

Scan tool screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC608016AN	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 16 Diagnose when the scan tool cannot receive the data sent by radio and CD player or CD changer.	P.54C-87
 AC608016AO	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 17 Diagnose when the scan tool cannot receive the data sent by CAN box unit.	P.54C-90
 AC608016AP	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 18 Diagnose when the scan tool cannot receive the data sent by satellite radio tuner.	P.54C-93
 AC608016AQ	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 19 Diagnose when the scan tool cannot receive the data sent by hands-free module.	P.54C-96

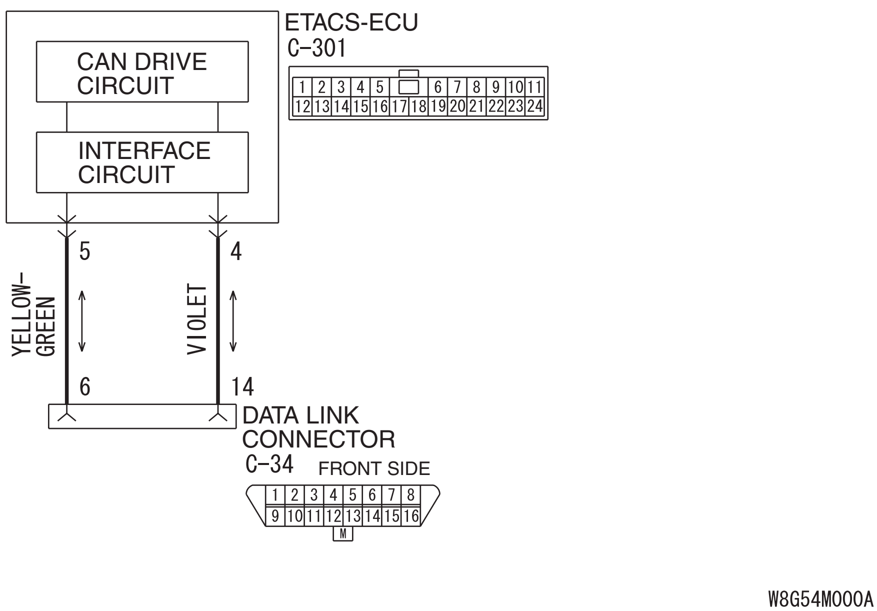
Scan tool screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC608016AR	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 20 Diagnose when the scan tool cannot receive the data sent by combination meter.	P.54C-99
 AC608016AS	CAN-B: A failure in the red section, or a bus-off failure is present in the gateway ECU.	Diagnosis Item 21 Short to power supply or ground in both CAN_H and CAN_L lines.	P.54C-102
 AC608016AT	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 22 Diagnose the ETACS-ECU, joint connector (CAN1) or lines between ETACS-ECU and joint connector (CAN1).	P.54C-139
 AC608016AS	CAN-B: Disconnection in red displayed area is estimated.	Diagnosis Item 23 Short to power supply or ground, open circuit or line-to-line short in the CAN-B bus lines.	P.54C-143

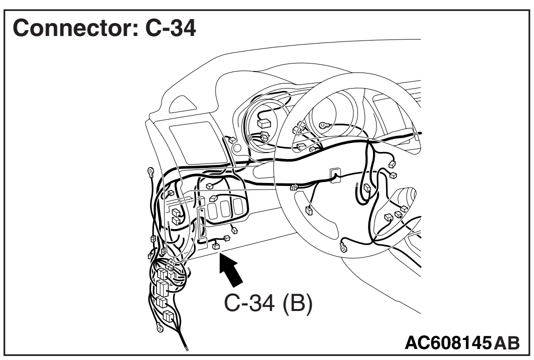
CAN BUS DIAGNOSTICS

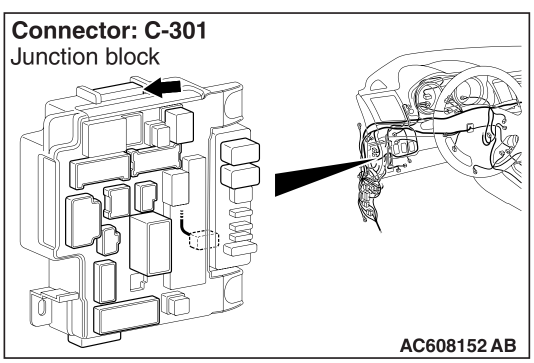
DIAGNOSTIC ITEM 1: Diagnose when the scan tool cannot receive the data sent by ETACS-ECU.

⚠ CAUTION
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

When the CAN bus diagnosis is carried out, the scan tool communicates with the ETACS-ECU. If a communication flag is not set for the ETACS-ECU, the ETACS-ECU will be diagnosed as a communication error.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the ETACS-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector (data link connector or ETACS-ECU connector improperly connected)
- Malfunction of the wiring harness (open circuit, short to ground, short to power supply between the data link connector and the ETACS-ECU connector, line-to-line short, or power supply to the ETACS-ECU)
- Malfunction of ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Check data link connector C-34 and ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are data link connector C-34 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 2.
NO : Repair the damaged parts.

STEP 2. Check the wiring harness between data link connector C-34 and ETACS-ECU connector C-301.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect the scan tool and ETACS-ECU connector C-301, and check the wiring harness.
(2) Check the wiring harness between data link connector C-34 (terminal 6) and ETACS-ECU connector C-301 (terminal 5) <CAN_H>
(3) Check the wiring harness between data link connector C-34 (terminal 14) and ETACS-ECU connector C-301 (terminal 4) <CAN_L>

Q: Is the wiring harness between data link connector C-34 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 3.
NO : Repair the wiring harness between data link connector C-34 and ETACS-ECU connector C-301.

STEP 3. Check the wiring harness between data link connector C-34 and ETACS-ECU connector C-301 for a short to ground. Measure the resistance at data link connector C-34.

⚠ CAUTION

Disconnect the negative battery terminal. For details refer to P.54C-7.

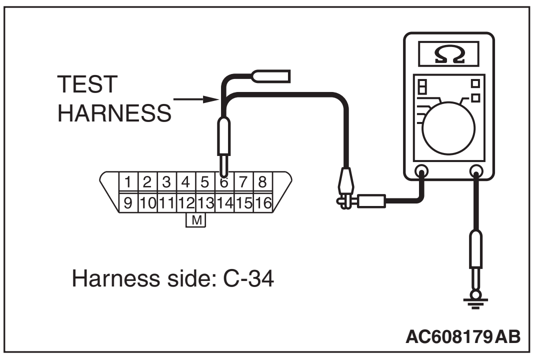
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

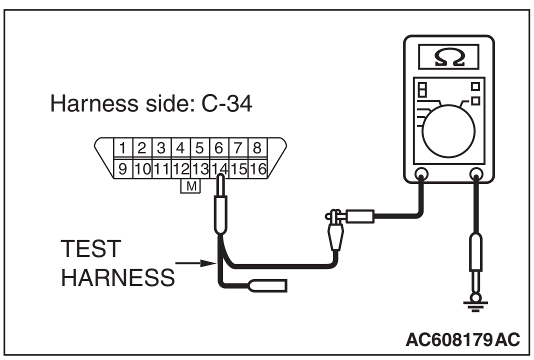
The test wiring harness should be used. For details refer to P.54C-7.

(1) Disconnect the scan tool and ETACS-ECU connector C-301, and measure the resistance at the wiring harness side of data link connector C-34.



(2) Measure the resistance between data link connector terminal 6 and body ground. <CAN_H>

OK: 1 kilo ohm or more



(3) Measure the resistance between data link connector terminal 14 and body ground. <CAN_L>

OK: 1 kilo ohm or more

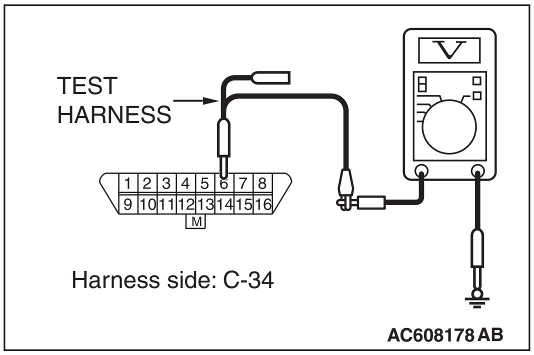
Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 4.

NO : Repair the wiring harness between data link connector C-34 and ETACS-ECU connector C-301.

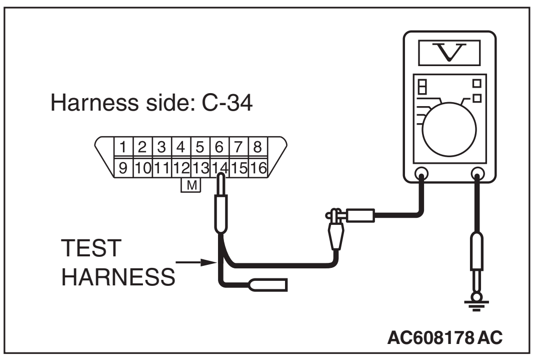
STEP 4. Check the wiring harness between data link connector C-34 and ETACS-ECU connector C-301 for a short to the power supply. Measure the voltage at data link connector C-34.

(1) Disconnect the scan tool and ETACS-ECU connector C-301, and measure the resistance at the wiring harness side of data link connector C-34.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between data link connector terminal 6 and body ground. <CAN_H>



OK: 5 volts or less

(4) Measure the voltage between data link connector terminal 14 and body ground. <CAN_L>



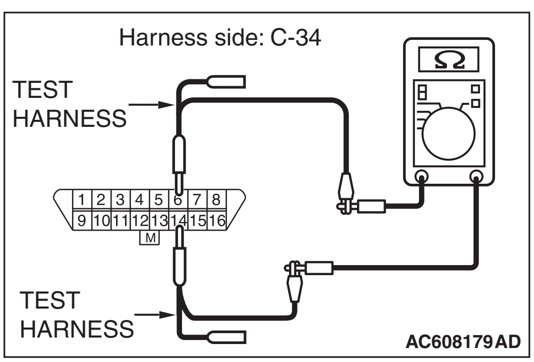
OK: 5 volts or less

Q: Do all the voltage measure 5 volts or less?

YES : Go to Step 5.
NO : Repair the wiring harness between data link connector C-34 and ETACS-ECU connector C-301.

STEP 5. Check the wiring harness between data link connector C-34 and ETACS-ECU connector C-301 for line-to-line short. Measure the resistance at data link connector C-34.

(1) Disconnect the scan tool and ETACS-ECU connector C-301, and measure the resistance at the wiring harness side of data link connector C-34.
(2) Measure the resistance between data link connector terminal 6 and 14.



OK: Continuity exists (2 ohm or less)

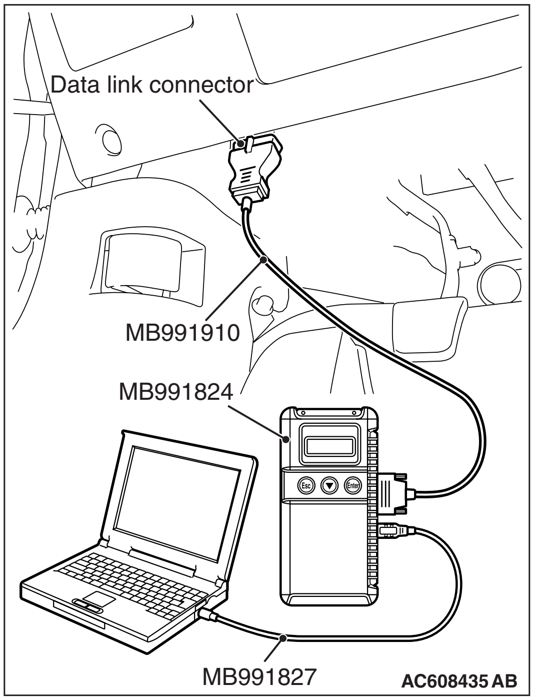
Q: Do the resistance measure 2 ohm or less?

YES : Go to Step 6.
NO : Repair the wiring harness between data link connector C-34 and ETACS-ECU connector C-301.

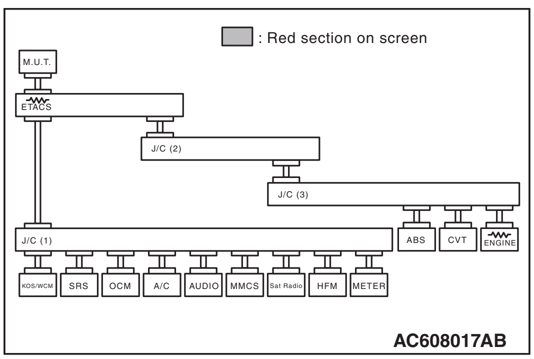
STEP 6. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



(3) Diagnose CAN bus lines, and check if the scan tool screen is as shown in the illustration.

Q: Does the scan tool screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

DIAGNOSTIC ITEM 2: Malfunction of the ETACS-ECU.

⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

FUNCTION

When the CAN bus diagnosis is carried out, the scan tool sets communication "OK" flags in the patch between the ETACS-ECU and active other ECUs. If a commutation "OK" flag is not set for the ECUs other than the ETACS-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If no communication flags are set for the ECUs (on the CAN-B or CAN-C lines) other than the ETACS-ECU, the ETACS-ECU determines that there is a failure.

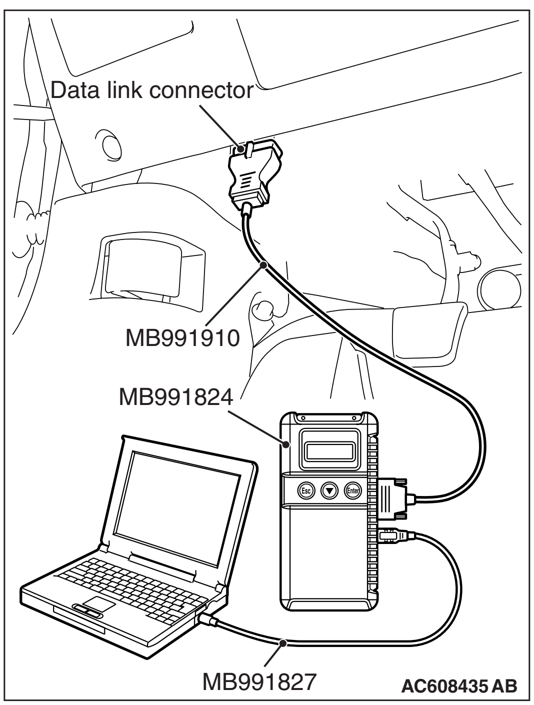
TROUBLESHOOTING HINT

Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



Recheck for other system diagnostic trouble code.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

Check whether ETACS-ECU-related DTC is set.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

The DTC other than the U code is set. : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, ETACS-ECU P.54A-482.

Only U-code DTC is set. : Check the power supply circuit of the ETACS-ECU. Refer to GROUP 54A, ETACS-ECU P.54A-524.

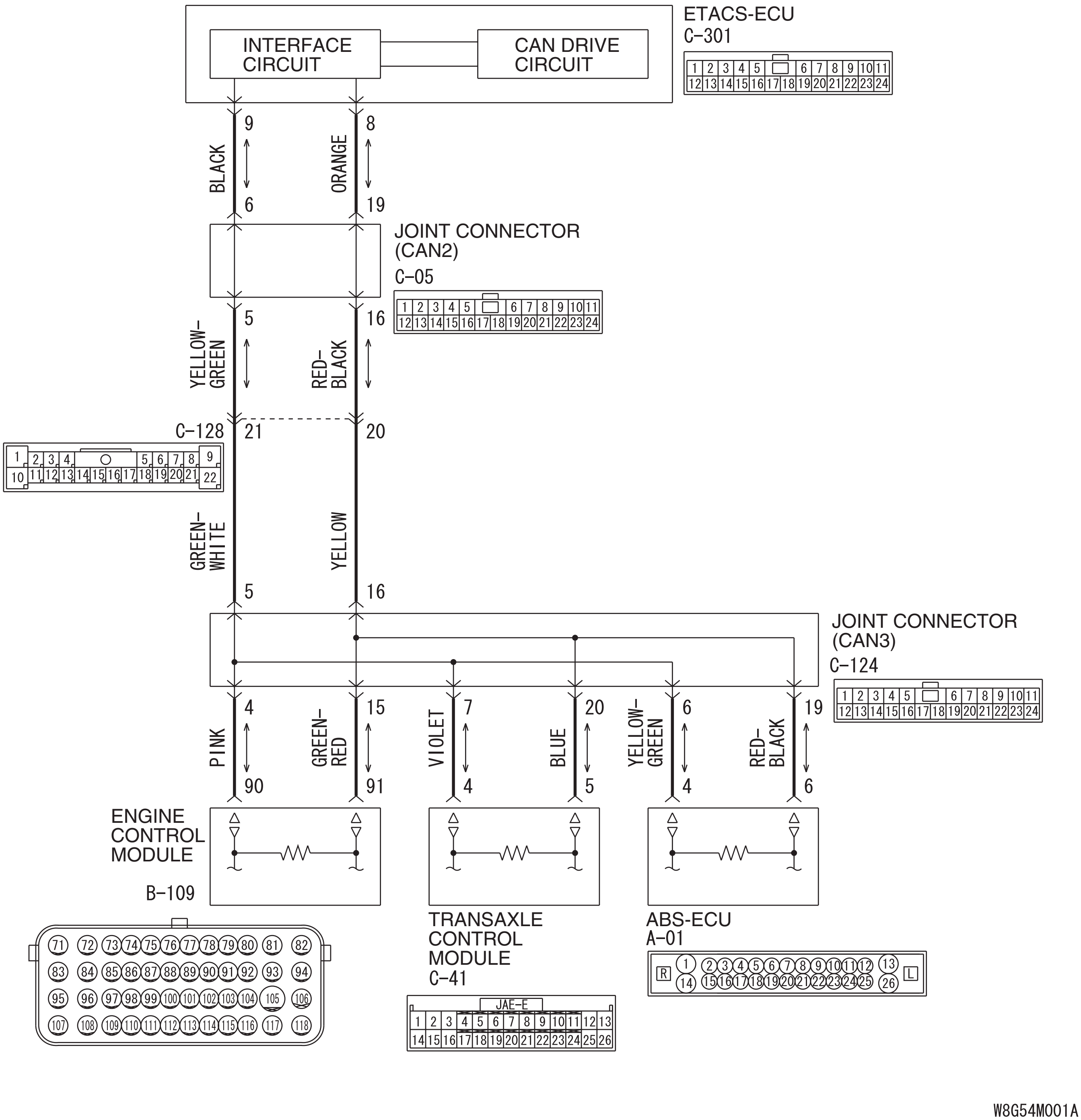
The DTC is not set. : Check the power supply circuit of the ETACS-ECU. Refer to GROUP 54A, ETACS-ECU P.54A-524.

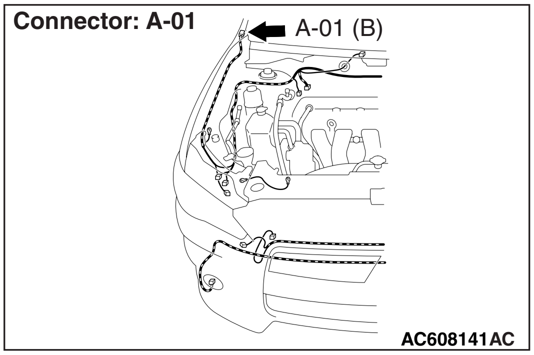
DIAGNOSTIC ITEM 3: Abnormal short between the CAN-C bus lines.

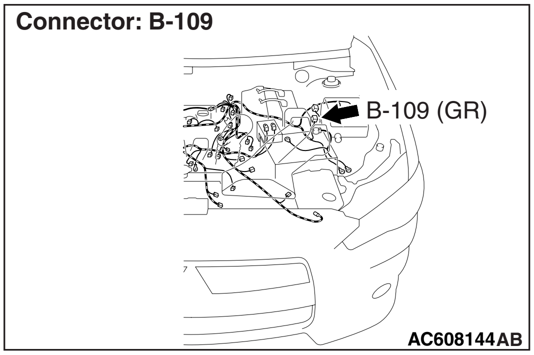
⚠ CAUTION

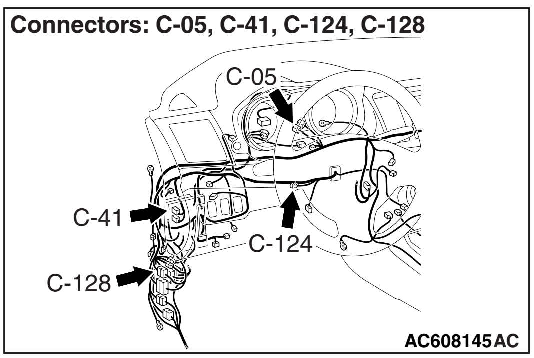
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

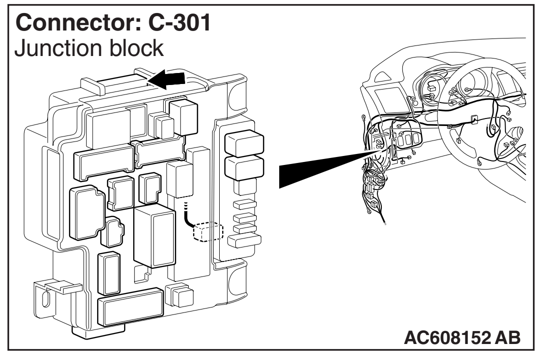
CAN Communication Circuit











FUNCTION

If a line-to-line short is present in the CAN-C lines, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If only diagnostic trouble code U0001 is set, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector (joint connectors or ECU connectors improperly connected)
- Malfunction of the wiring harness (line-to-line short in the CAN-C main or sub bus lines)
- Malfunction of the ECU (ECU on CAN-C lines failed)

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991970: ABS Check Harness

STEP 1. Check joint connector (CAN2) C-05 and joint connector (CAN3) C-124 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN2) C-05 and joint connector (CAN3) C-124 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109 for line-to-line short. Measure the resistance at joint connector (CAN3) C-124.

⚠ CAUTION

Disconnect the negative battery terminal. For details refer to P.54C-7.

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54C-7.

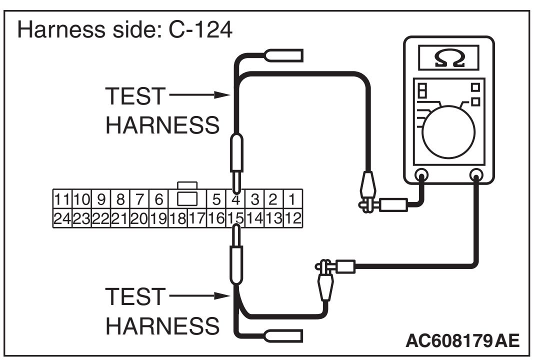
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN3), and check that there is continuity at the harness side of joint connector (CAN3).

(2) Check that there is continuity between joint connector (CAN3) terminals 4 and 15.

OK: No continuity

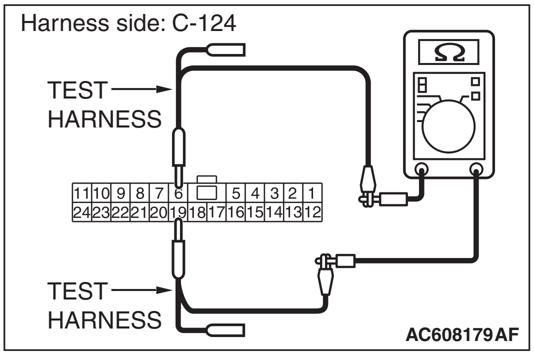


Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 6.

STEP 3. Check the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01 for line-to-line short. Measure the resistance at joint connector (CAN3) C-124.



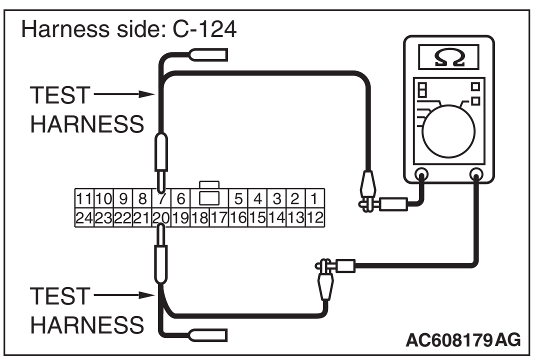
(1) Disconnect joint connector (CAN3), and check that there is continuity at the harness side of joint connector (CAN3).
(2) Check that there is continuity between joint connector (CAN3) terminals 6 and 19.

OK: No continuity

Q: Is the check result normal?

YES <M/T> : Go to Step 5.
YES <CVT> : Go to Step 4.
NO (the check result is not normal.) : Go to Step 7.

STEP 4. Check the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41 for line-to-line short. Measure the resistance at joint connector (CAN3) C-124.



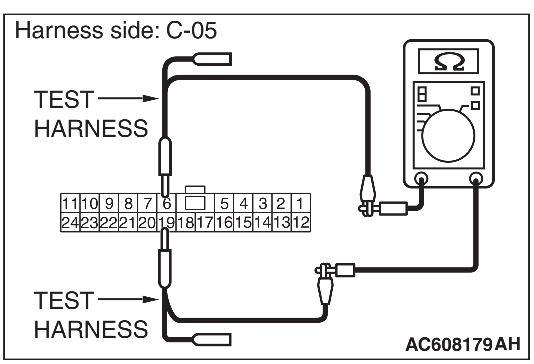
(1) Disconnect joint connector (CAN3), and check that there is continuity at the harness side of joint connector (CAN3).
(2) Check that there is continuity between joint connector (CAN3) terminals 7 and 20.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 5.
NO : Go to Step 8.

STEP 5. Check the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301 for line-to-line short. Measure the resistance at joint connector (CAN2) C-05.



(1) Disconnect joint connector (CAN2), and check that there is continuity at the harness side of joint connector (CAN2).
(2) Check that there is continuity between joint connector (CAN2) terminals 6 and 19.

OK: No continuity

Q: Is the check result normal?

YES : Check intermediate connector C-128, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.
NO : Go to Step 9.

STEP 6. Using scan tool MB991958, diagnose the CAN bus line. (checking the ECM for internal short)

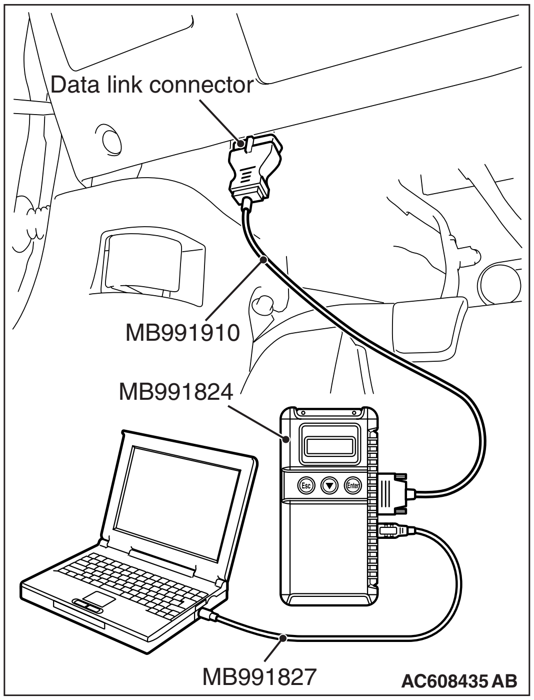
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

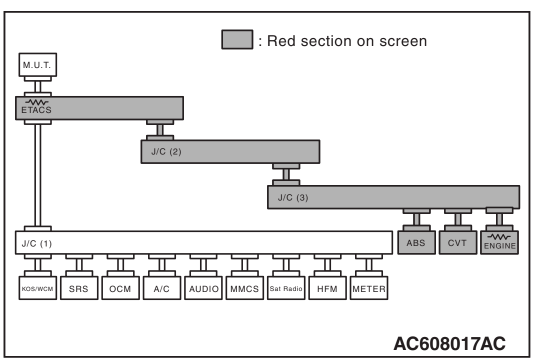
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ECM connector B-109.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ECM connector B-109 and joint connector (CAN3) C-124.

NO : Check ECM connector B-109, and repair if necessary. If the ECM connector is in good condition, replace the ECM.

STEP 7. Using scan tool MB991958, diagnose the CAN bus line. (checking the ABS-ECU for internal short)

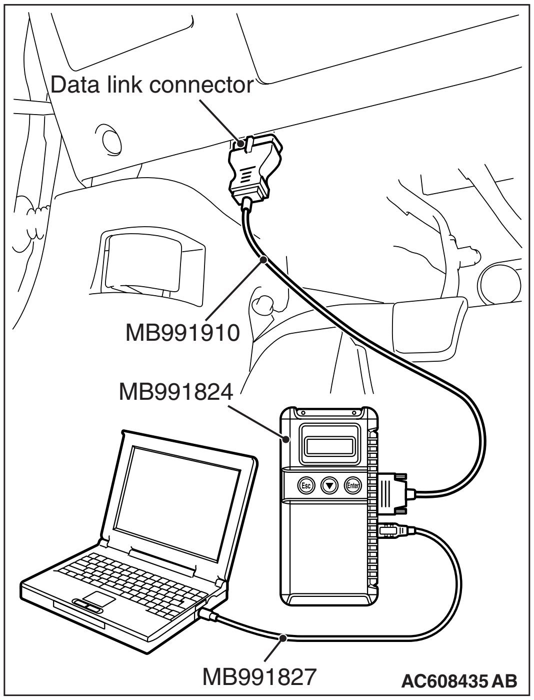
⚠ CAUTION

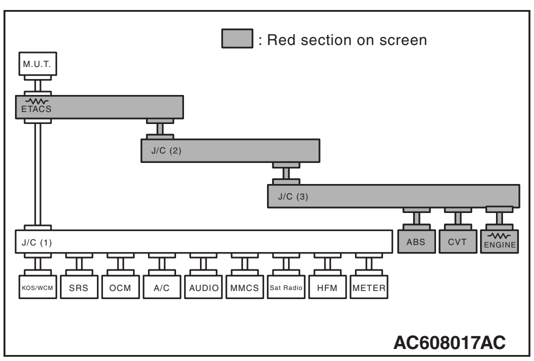
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ABS-ECU connector A-01.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ABS-ECU connector A-01 and joint connector (CAN3) C-124.

NO : Check ABS-ECU connector A-01, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

STEP 8. Using scan tool MB991958, diagnose the CAN bus line. (checking the TCM for internal short)

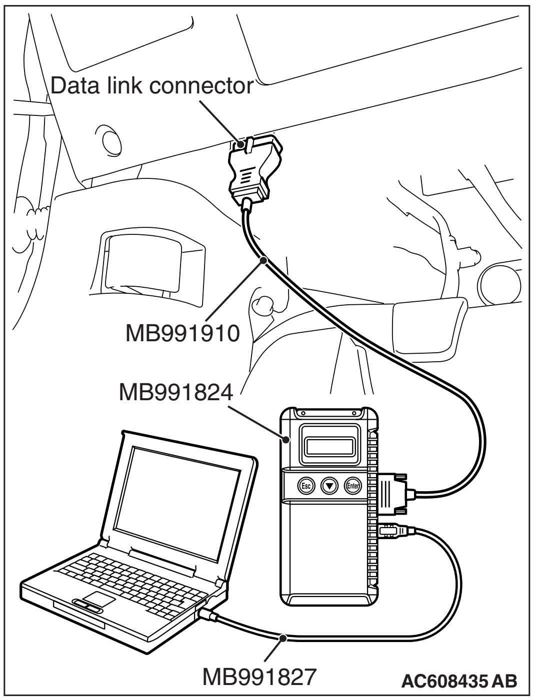
⚠ CAUTION

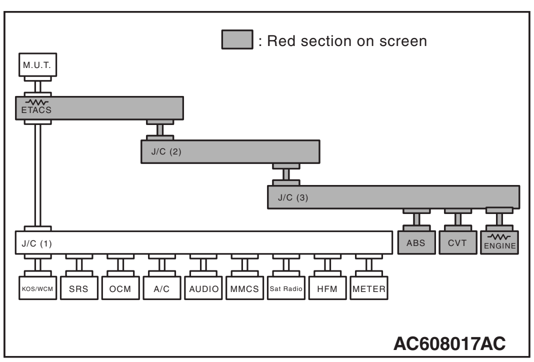
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect TCM connector C-41.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between TCM connector C-41 and joint connector (CAN3) C-124.

NO : Check TCM connector C-41, and repair if necessary. If the TCM connector is in good condition, replace the TCM.

STEP 9. Check the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301 for line-to-line short. Measure the resistance at joint connector (CAN2) C-05.

(1) Disconnect joint connector (CAN2) and ETACS-ECU connector, and check that there is continuity at the harness side of joint connector (CAN2).
(2) Check that there is continuity between joint connector (CAN2) terminals 6 and 19.

OK: No continuity

Q: Is the check result normal?

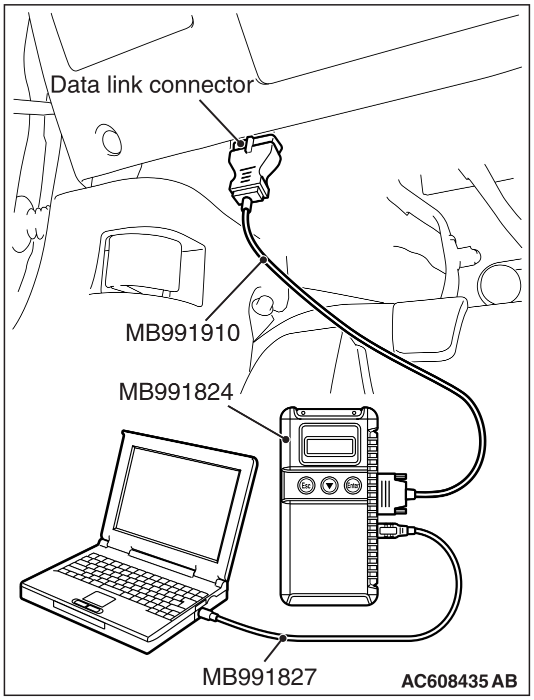
YES : Go to Step 10.
NO : Repair the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301.

STEP 10. Using scan tool MB991958, diagnose the CAN bus line.

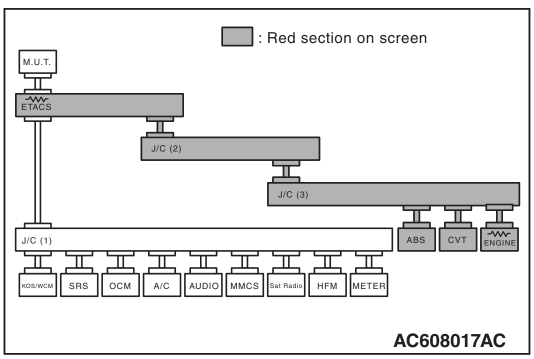
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



(3) Diagnose CAN bus lines, and check if the scan tool screen is as shown in the illustration.



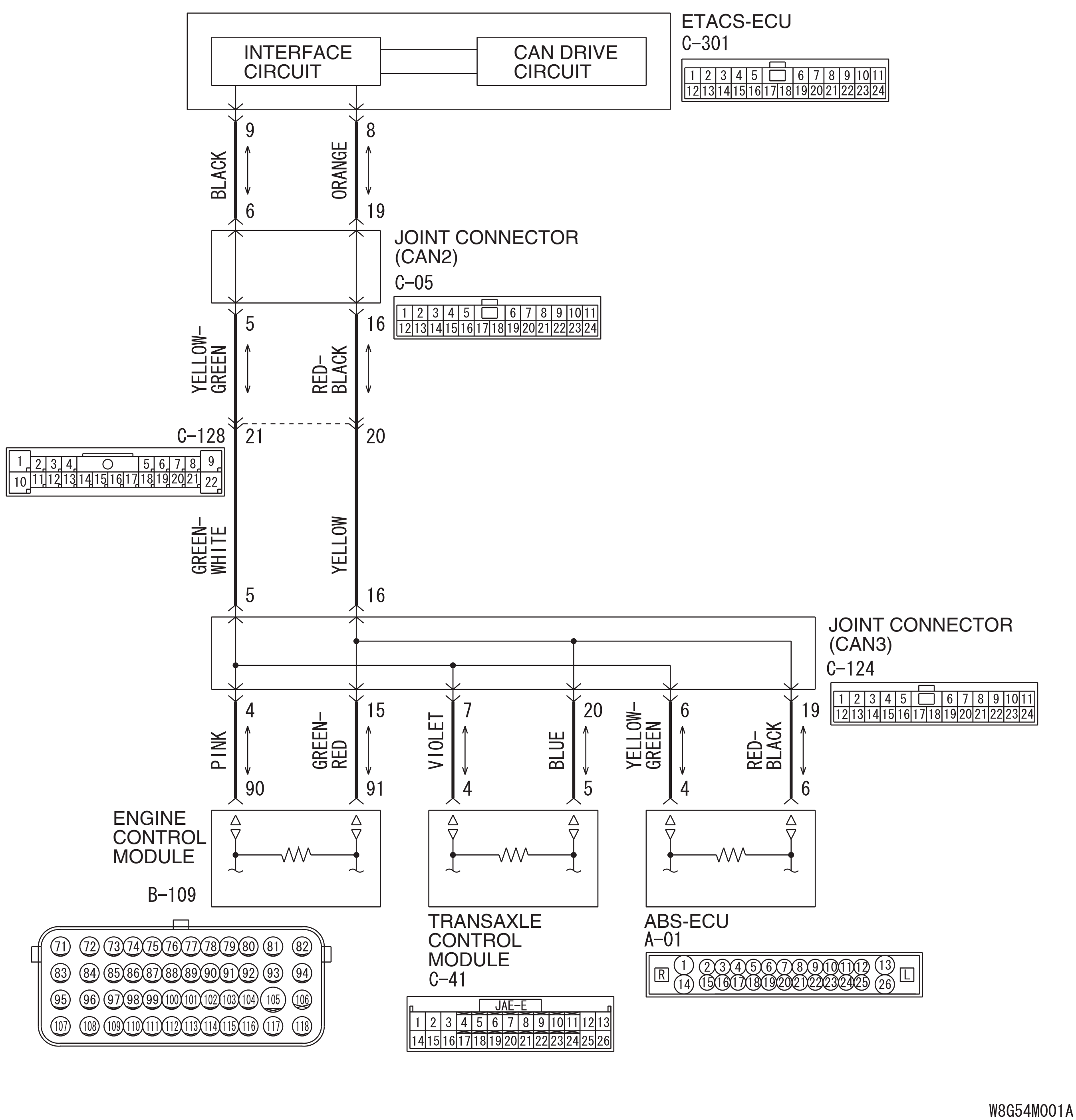
Q: Does the scan tool screen correspond to the illustration?

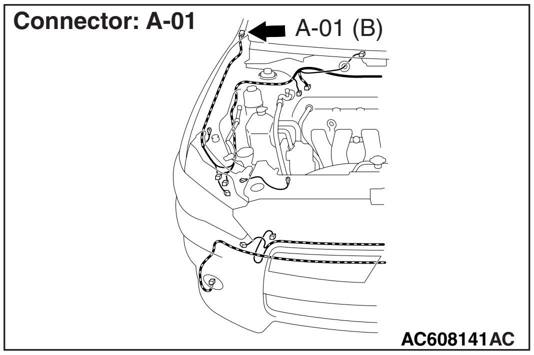
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

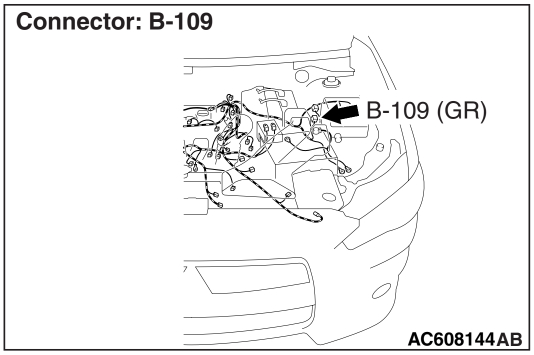
NO : Replace the ETACS-ECU.

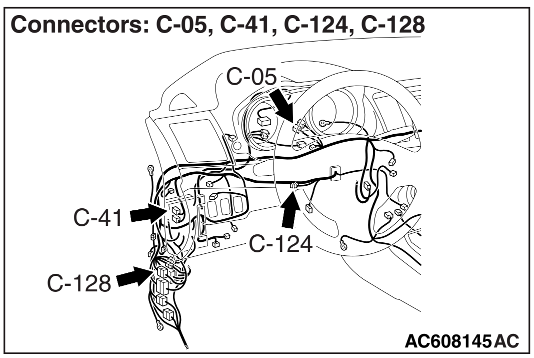
DIAGNOSTIC ITEM 4: Diagnose shorts in the ground to CAN-C bus line.

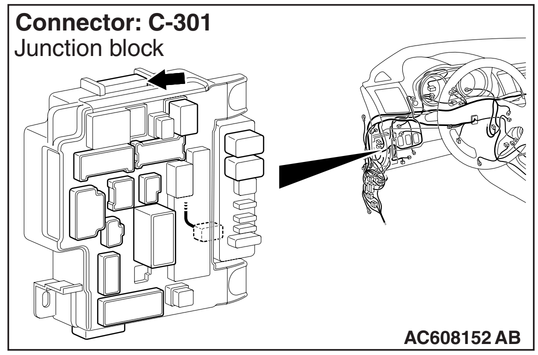
CAN Communication Circuit











FUNCTION

If a short to ground is present in the CAN-C lines, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If DTC U1120 is set, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector (short to ground inside connector)
- Malfunction of the wiring harness (short to ground in the CAN-C main or sub bus lines)
- Malfunction of the ECU (ETACS-ECU, or ECUs on CAN-C lines failed)

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301 for a short to ground. Measure the resistance at joint connector (CAN2) C-05.

⚠ CAUTION

Disconnect the negative battery terminal. For details refer to P.54C-7.

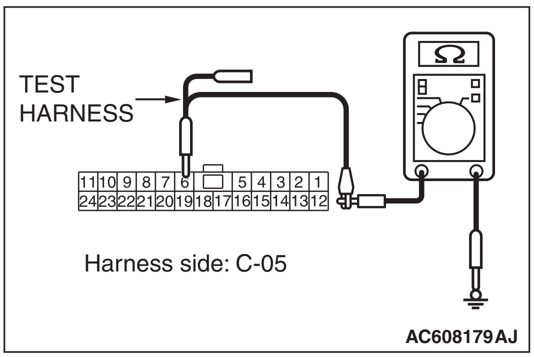
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

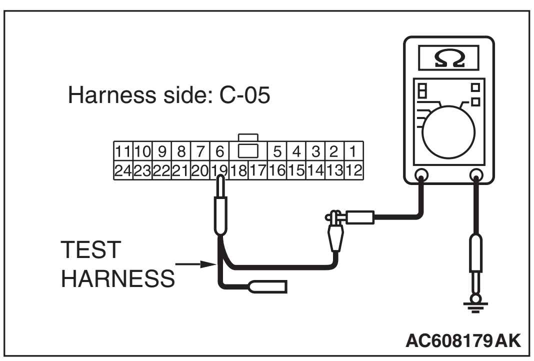
The test wiring harness should be used. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN2), and measure the resistance at the wiring harness side of joint connector (CAN2).



(2) Measure the resistance between joint connector (CAN2) terminal 6 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN2) terminal 19 and body ground.

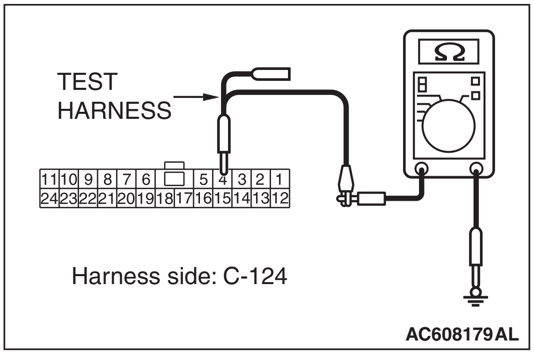
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 2.
NO : Go to Step 5.

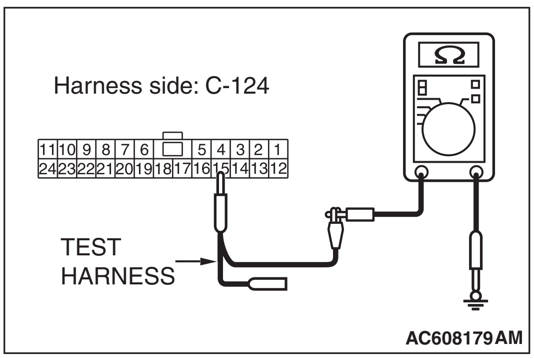
STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109 for a short to ground. Measure the resistance at joint connector (CAN3) C-124.

(1) Disconnect joint connector (CAN3), and measure the resistance at the wiring harness side of joint connector (CAN3).



(2) Measure the resistance between joint connector (CAN3) terminal 4 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN3) terminal 15 and body ground.

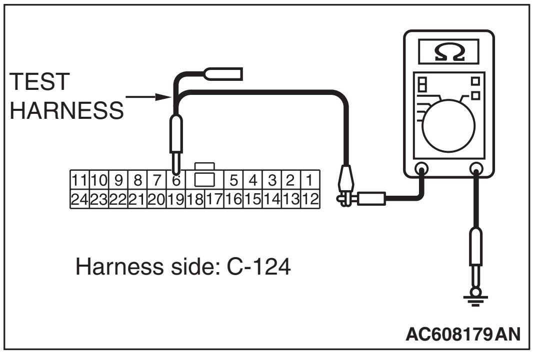
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 3.
NO : Go to Step 6.

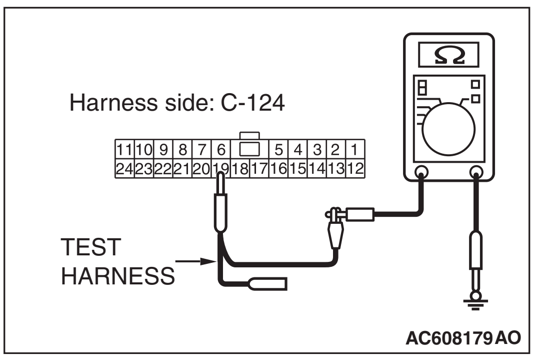
STEP 3. Check the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01 for a short to ground. Measure the resistance at joint connector (CAN3) C-124.

(1) Disconnect joint connector (CAN3), and measure the resistance at the wiring harness side of joint connector (CAN3).



(2) Measure the resistance between joint connector (CAN3) terminal 6 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN3) terminal 19 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

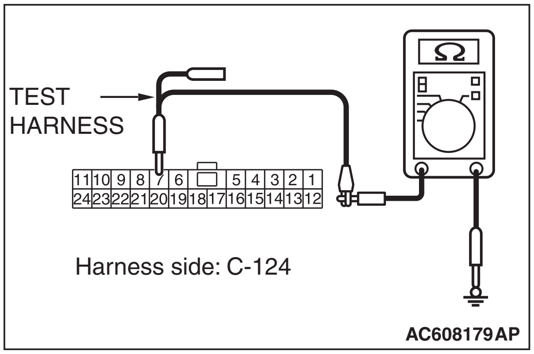
YES <M/T> : Check intermediate connector C-128, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

YES <CVT> : Go to Step 4.

NO (the check result is not normal.) : Go to Step 7.

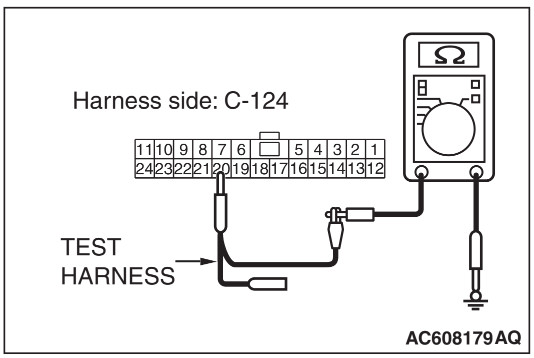
STEP 4. Check the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41 for a short to ground. Measure the resistance at joint connector (CAN3) C-124.

(1) Disconnect joint connector (CAN3), and measure the resistance at the wiring harness side of joint connector (CAN3).



(2) Measure the resistance between joint connector (CAN3) terminal 7 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN3) terminal 20 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Check intermediate connector C-128, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

NO : Go to Step 8.

STEP 5. Using scan tool MB991958, diagnose the CAN bus line. (checking the ETACS-ECU for internal short to ground)

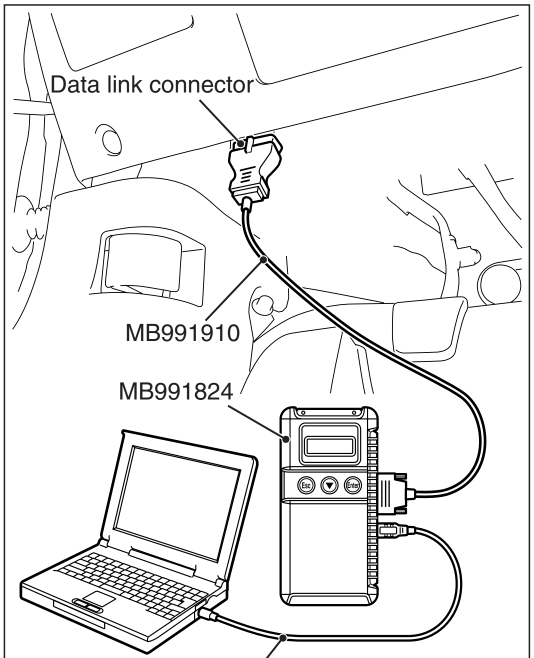
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ETACS-ECU connector C-301.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



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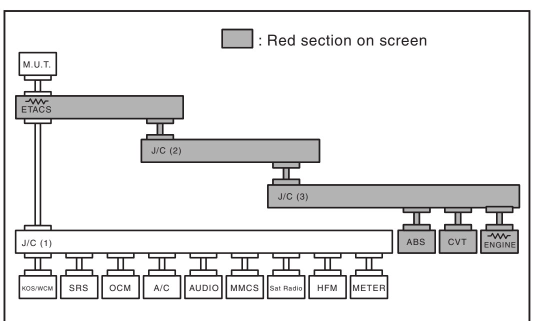
(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



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Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ETACS-ECU connector C-301 and joint connector (CAN2) C-05.

NO : Check ETACS-ECU connector C-128, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

STEP 6. Using scan tool MB991958, diagnose the CAN bus line. (checking the ECM for internal short to ground)

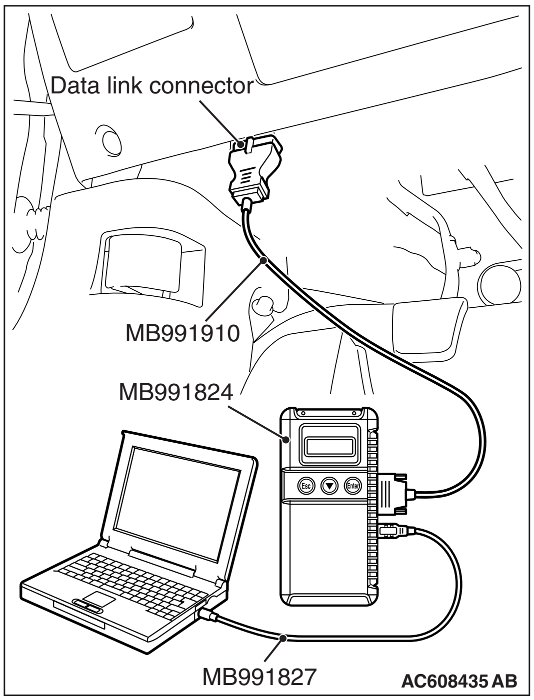
⚠ CAUTION

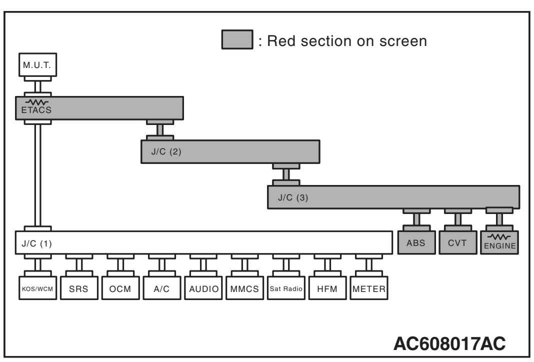
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ECM connector B-109.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ECM connector B-109 and joint connector (CAN3) C-124.

NO : Check ECM connector B-109, and repair if necessary. If the ECM connector is in good condition, replace the ECM.

STEP 7. Using scan tool MB991958, diagnose the CAN bus line. (checking the ABS-ECU for internal short to ground)

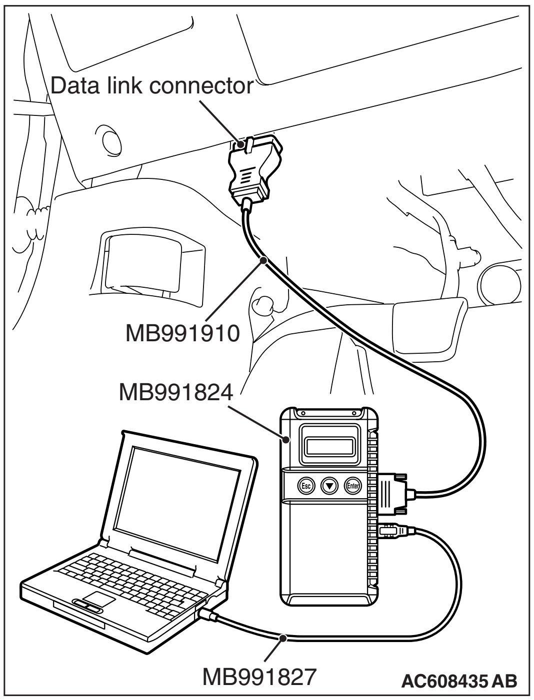
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

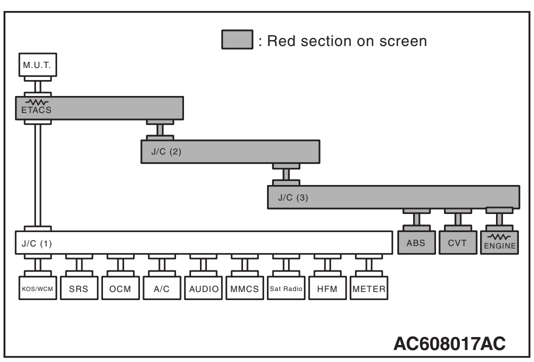
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ABS-ECU connector A-01.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ABS-ECU connector A-01 and joint connector (CAN3) C-124.

NO : Check ABS-ECU connector A-01, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

STEP 8. Using scan tool MB991958, diagnose the CAN bus line. (checking the TCM for internal short to ground)

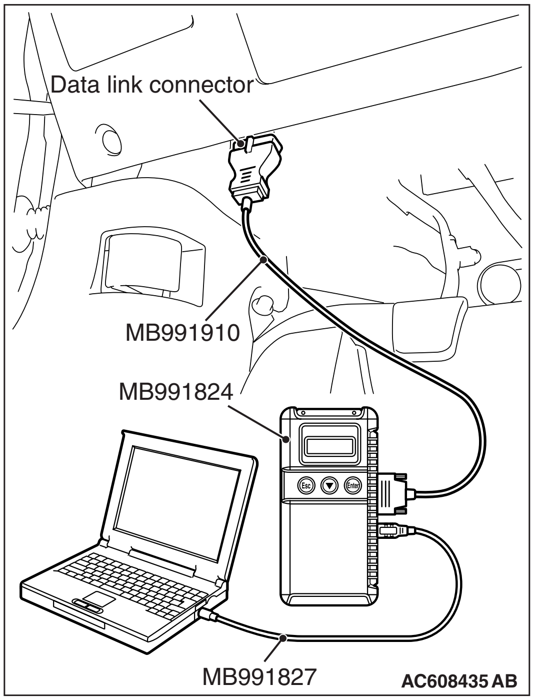
⚠ CAUTION

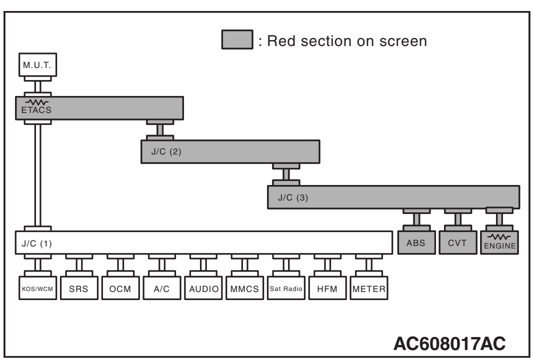
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect TCM connector C-41.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

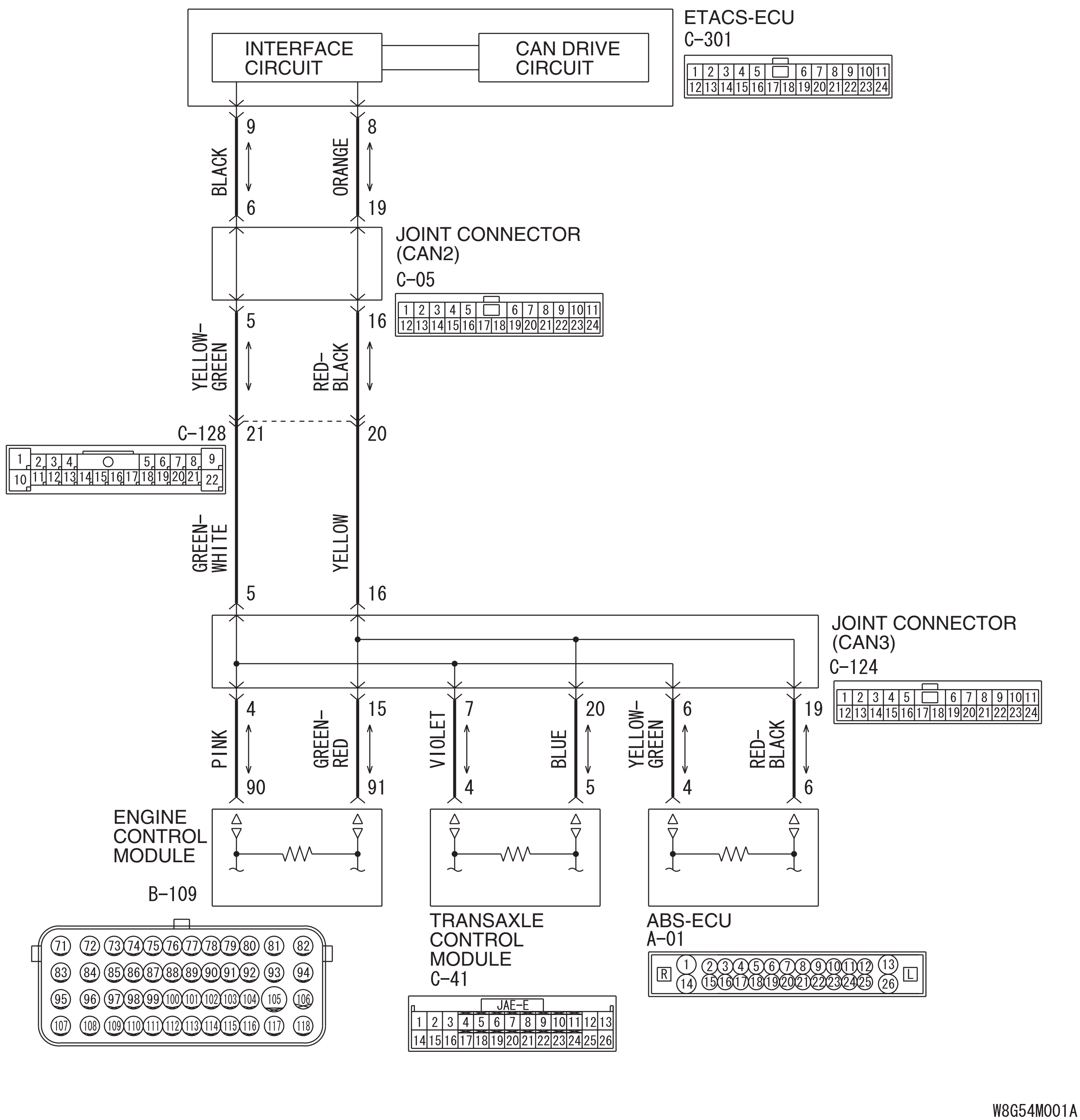
Q: Does scan tool MB991958 screen correspond to the illustration?

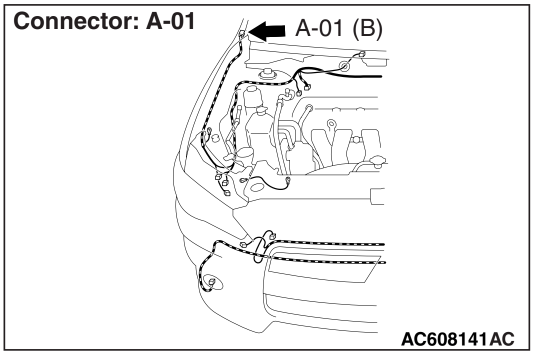
YES : Repair the wiring harness between TCM connector C-41 and joint connector (CAN3) C-124.

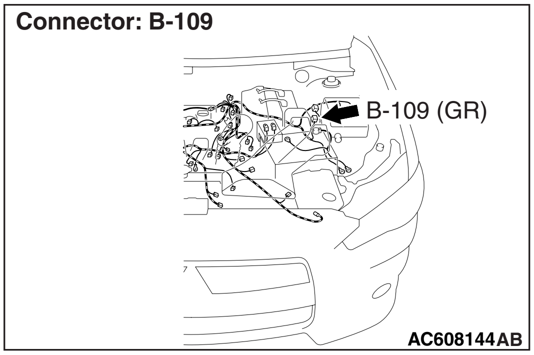
NO : Check TCM connector C-41, and repair if necessary. If the TCM connector is in good condition, replace the TCM.

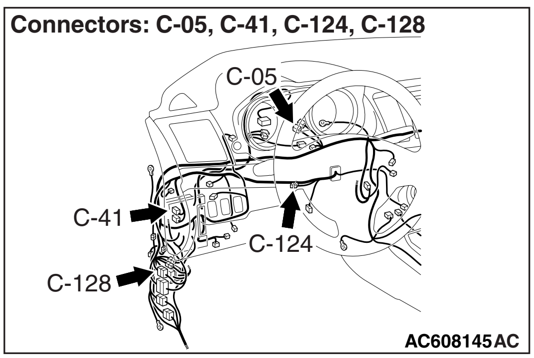
DIAGNOSTIC ITEM 5: Diagnose shorts in the power supply to CAN-C bus line.

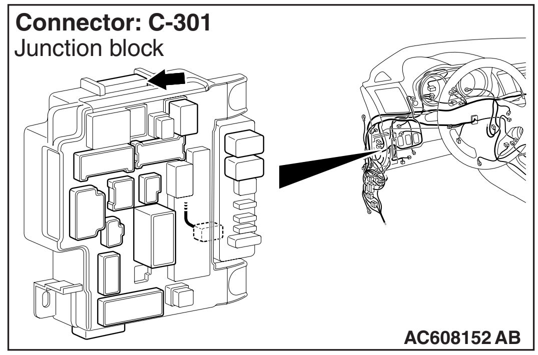
CAN Communication Circuit











FUNCTION

If a short to power supply is present in the CAN-C lines, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

The wiring harness wire or connectors may have loose, corroded, or damage terminals, or terminals pushed back in the connector, or an ECU may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the connector (short to power supply in connector)
- Malfunction of the wiring harness (short to power supply in the CAN-C main or sub bus lines)
- Malfunction of the ECU (ETACS-ECU, or ECUs on CAN-C lines failed)

DIAGNOSIS

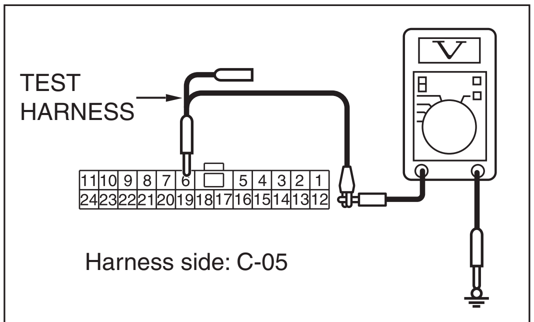
Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301 for a short to power supply. Measure the voltage at joint connector (CAN2) C-05.

(1) Disconnect joint connector (CAN2), and measure the voltage at the wiring harness side of joint connector (CAN2).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN2) terminal 6 and body ground.

OK: 4.7 volts or less



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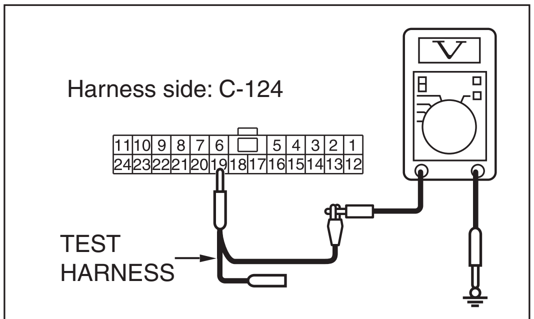

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(4) Measure the voltage between joint connector (CAN2) terminal 19 and body ground.

OK: 4.7 volts or less

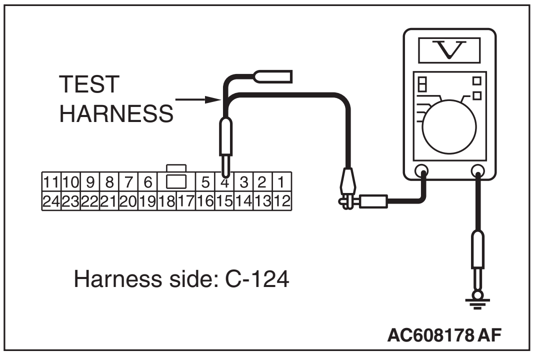
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 2.
NO : Go to Step 5.

STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109 for a short to power supply. Measure the voltage at joint connector (CAN3) C-124.

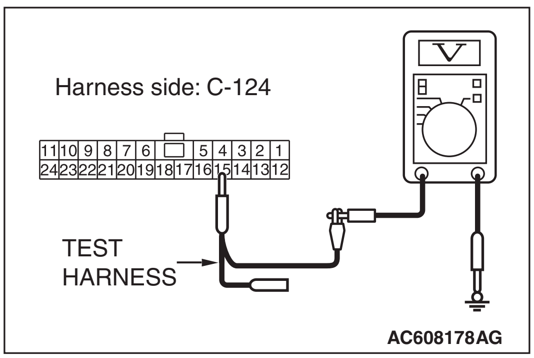
(1) Disconnect joint connector (CAN3), and measure the voltage at the wiring harness side of joint connector (CAN3).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN3) terminal 4 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN3) terminal 15 and body ground.

OK: 4.7 volts or less



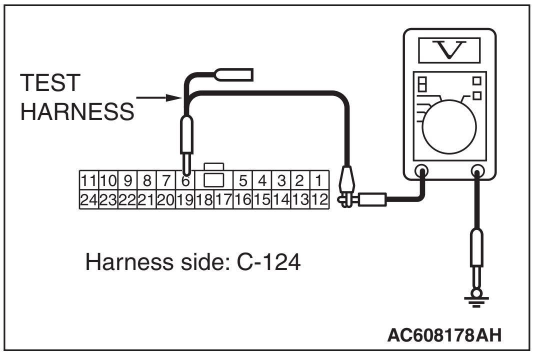
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 3.
NO : Go to Step 6.

STEP 3. Check the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01 for a short to power supply. Measure the voltage at joint connector (CAN3) C-124.

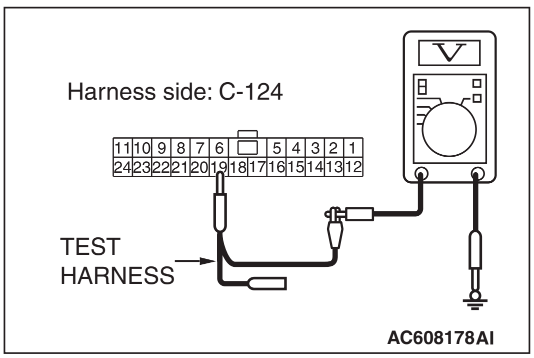
(1) Disconnect joint connector (CAN3), and measure the voltage at the wiring harness side of joint connector (CAN3).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN3) terminal 6 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN3) terminal 19 and body ground.

OK: 4.7 volts or less

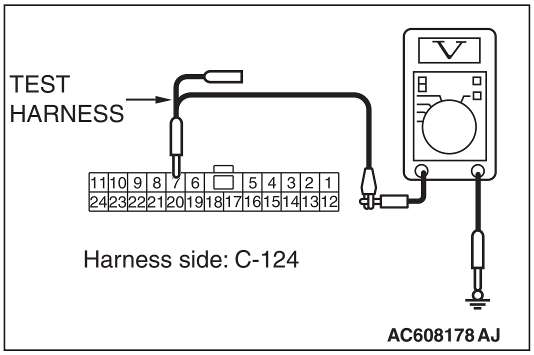


Q: Do all the voltages measure 4.7 volts or less?

YES <M/T> : Check intermediate connector C-128, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

YES <CVT> : Go to Step 4.

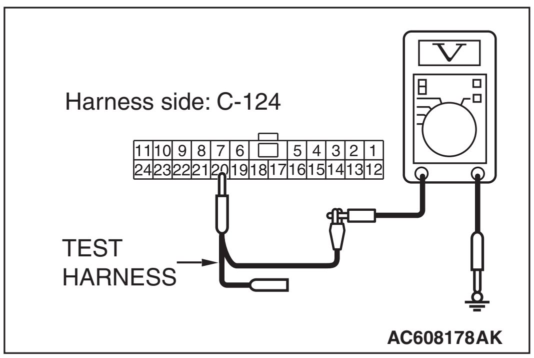
NO (the check result is not normal.) : Go to Step 7.



STEP 4. Check the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41 for a short to power supply. Measure the voltage at joint connector (CAN3) C-124.

(1) Disconnect joint connector (CAN3), and measure the voltage at the wiring harness side of joint connector (CAN3).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN3) terminal 7 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN3) terminal 20 and body ground.

OK: 4.7 volts or less

Q: Do all the voltages measure 4.7 volts or less?

YES : Check intermediate connector C-128, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

NO : Go to Step 8.

STEP 5. Using scan tool MB991958, diagnose the CAN bus line. (checking the ETACS-ECU for internal short to ground)

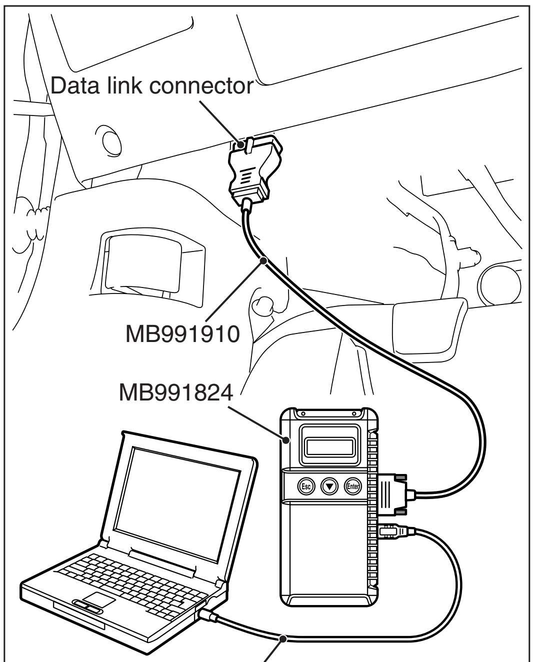
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

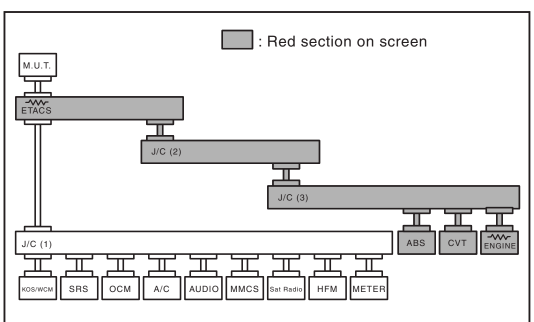
(1) Disconnect ETACS-ECU connector C-301.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



AC608435 AB

(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



AC608017AC

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ETACS-ECU connector C-301 and joint connector (CAN2) C-05.

NO : Check ETACS-ECU connector C-128, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

STEP 6. Using scan tool MB991958, diagnose the CAN bus line. (checking the ECM for internal short to ground)

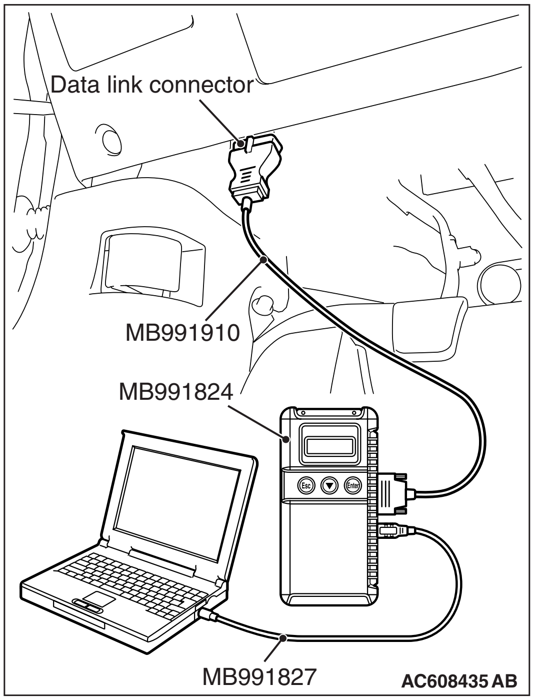
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

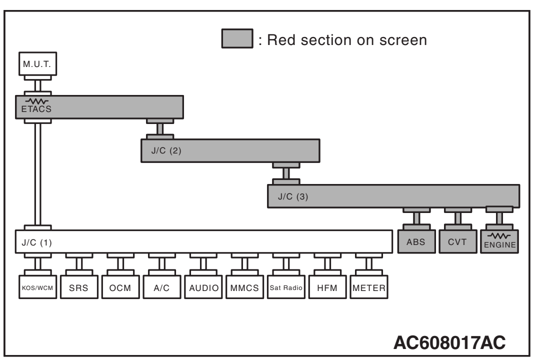
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ECM connector B-109.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ECM connector B-109 and joint connector (CAN3) C-124.

NO : Check ECM connector B-109, and repair if necessary. If the ECM connector is in good condition, replace the ECM.

STEP 7. Using scan tool MB991958, diagnose the CAN bus line. (checking the ABS-ECU for internal short to ground)

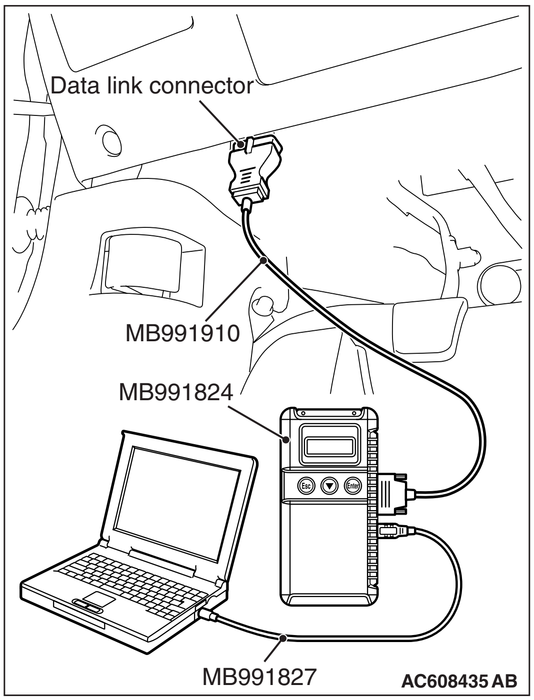
⚠ CAUTION

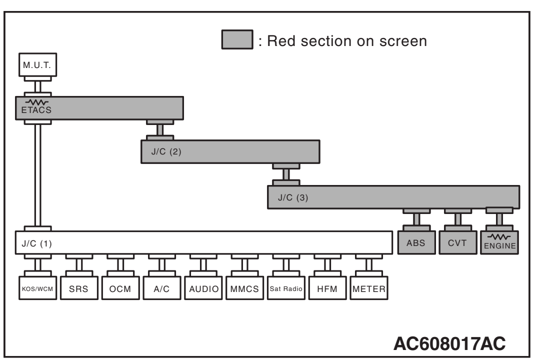
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect ABS-ECU connector A-01.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between ABS-ECU connector A-01 and joint connector (CAN3) C-124.

NO : Check ABS-ECU connector A-01, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

STEP 8. Using scan tool MB991958, diagnose the CAN bus line. (checking the TCM for internal short to ground)

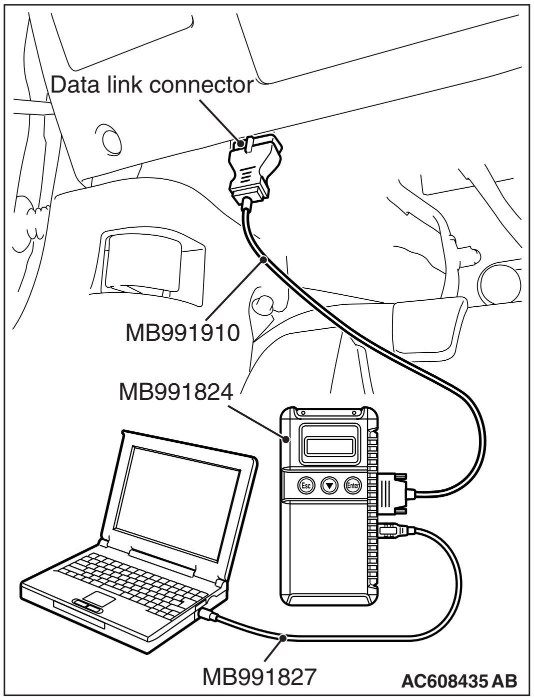
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to **P.54C-7****.**

⚠ CAUTION

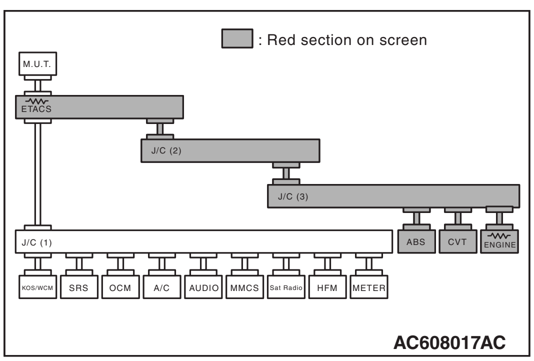
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect TCM connector C-41.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between TCM connector C-41 and joint connector (CAN3) C-124.

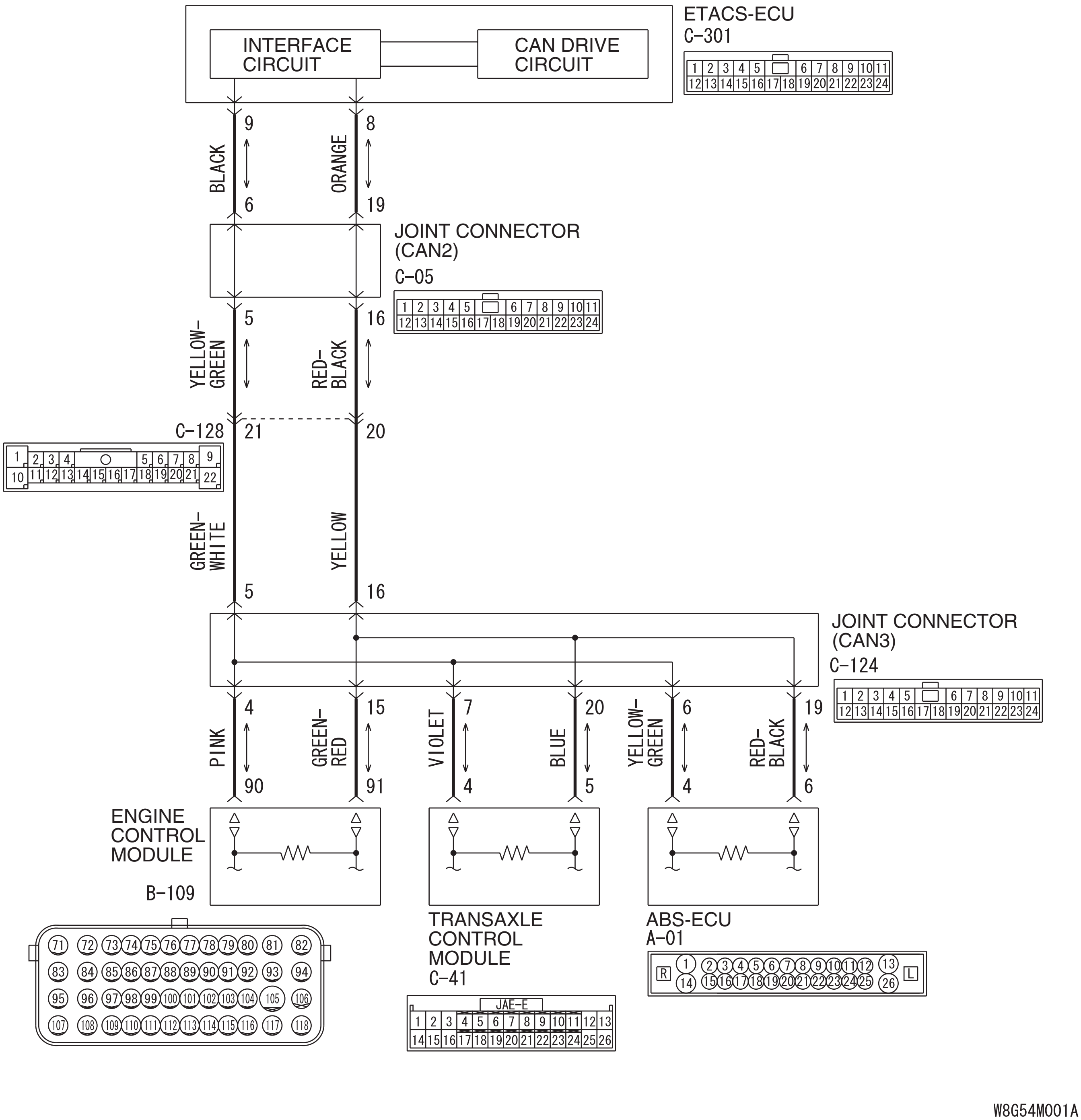
NO : Check TCM connector C-41, and repair if necessary. If the TCM connector is in good condition, replace the TCM.

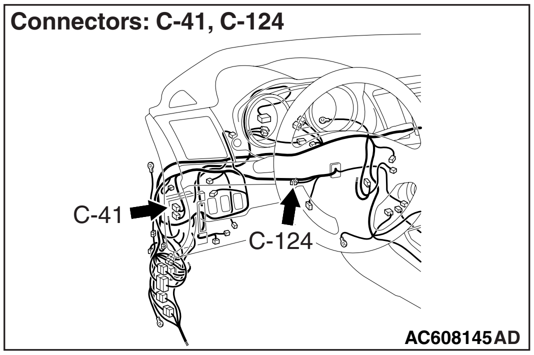
DIAGNOSTIC ITEM 6: Diagnose when the scan tool cannot receive the data sent by TCM.

⚠ **CAUTION**

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit





FUNCTION

If the scan tool MB991958 cannot communicate with the TCM, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the TCM, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN3) or TCM connector improperly connected]
- Malfunction of the wiring harness [open circuit between the TCM and the joint connector (CAN3), power supply circuit to the TCM]
- Malfunction of the TCM

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN3) C-124 and TCM connector C-41 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN3) C-124 and TCM connector C-41 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN3) C-124 and TCM connector C-41, and check the wiring harness.

(2) Check the wiring harness between joint connector (CAN3) C-124 (terminal 7) and TCM connector C-41 (terminal 4)

(3) Check the wiring harness between joint connector (CAN3) C-124 (terminal 20) and TCM connector C-41 (terminal 5)

Q: Is the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41 in good condition?

YES : Check the power supply circuit of the TCM. Refer to GROUP 23A, Troubleshooting P.23A-30.

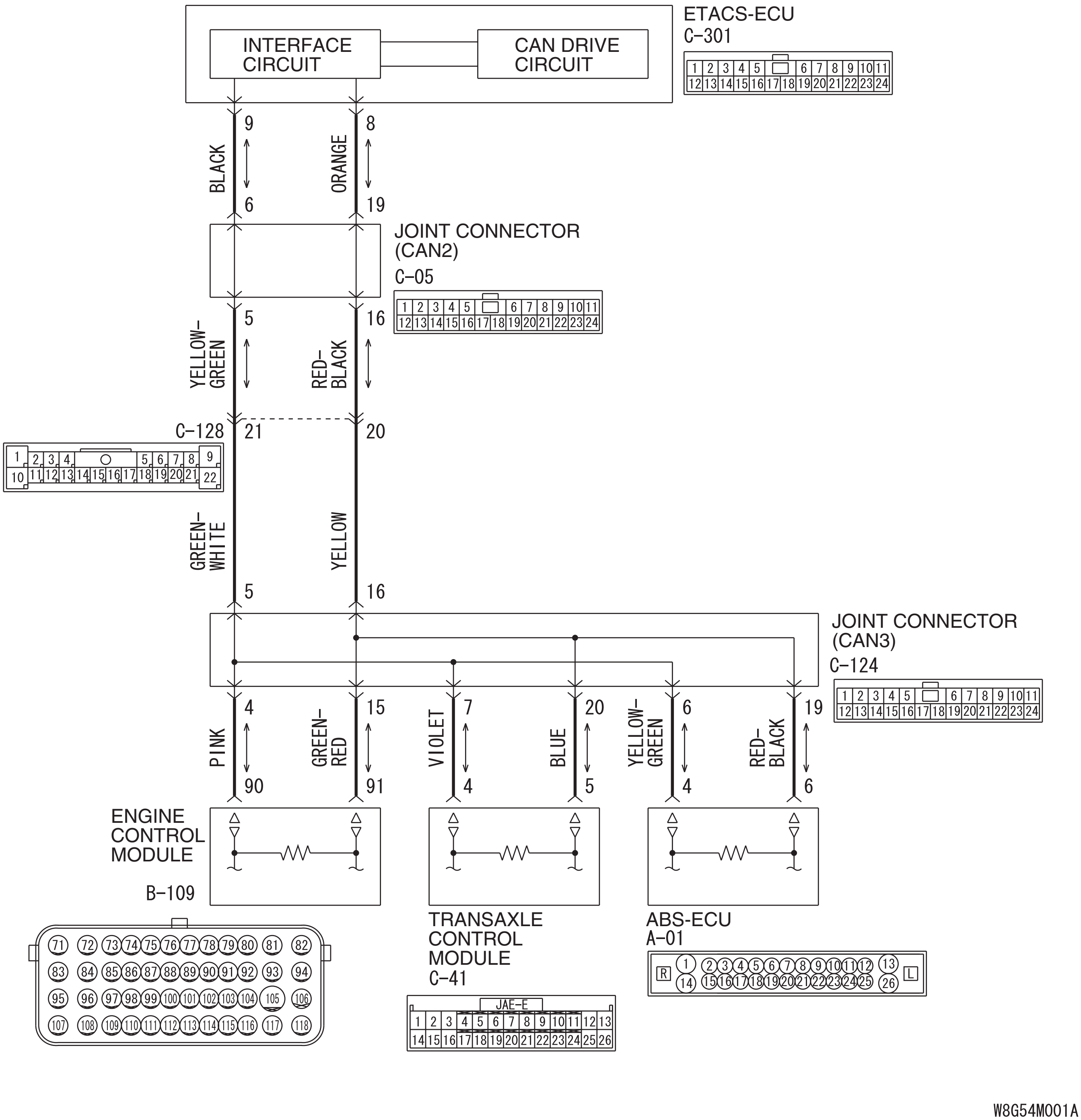
NO : Repair the wiring harness between joint connector (CAN3) C-124 and TCM connector C-41.

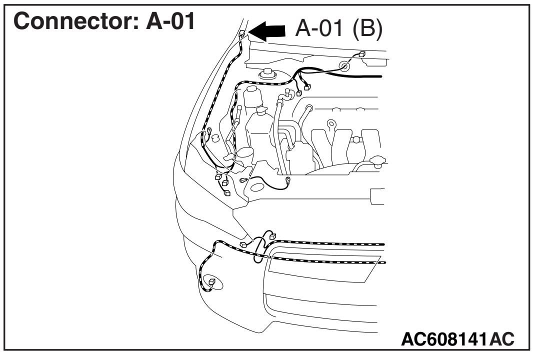
DIAGNOSTIC ITEM 7: Diagnose when the scan tool cannot receive the data sent by ABS-ECU.

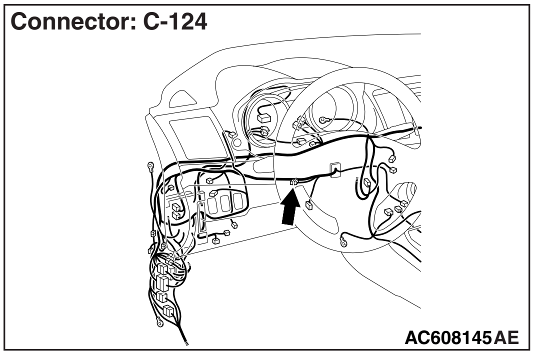
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the ABS-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the ABS-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN3) or ABS-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the ABS-ECU and the joint connector (CAN3), power supply circuit to the ABS-ECU]
- Malfunction of the ABS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN3) C-124 and ABS-ECU connector A-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN3) C-124 and ABS-ECU connector A-01 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN3) C-124 and ABS-ECU connector A-01, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN3) C-124 (terminal 6) and ABS-ECU connector A-01 (terminal 4)
(3) Check the wiring harness between joint connector (CAN3) C-124 (terminal 19) and ABS-ECU connector A-01 (terminal 6)

Q: Is the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01 in good condition?

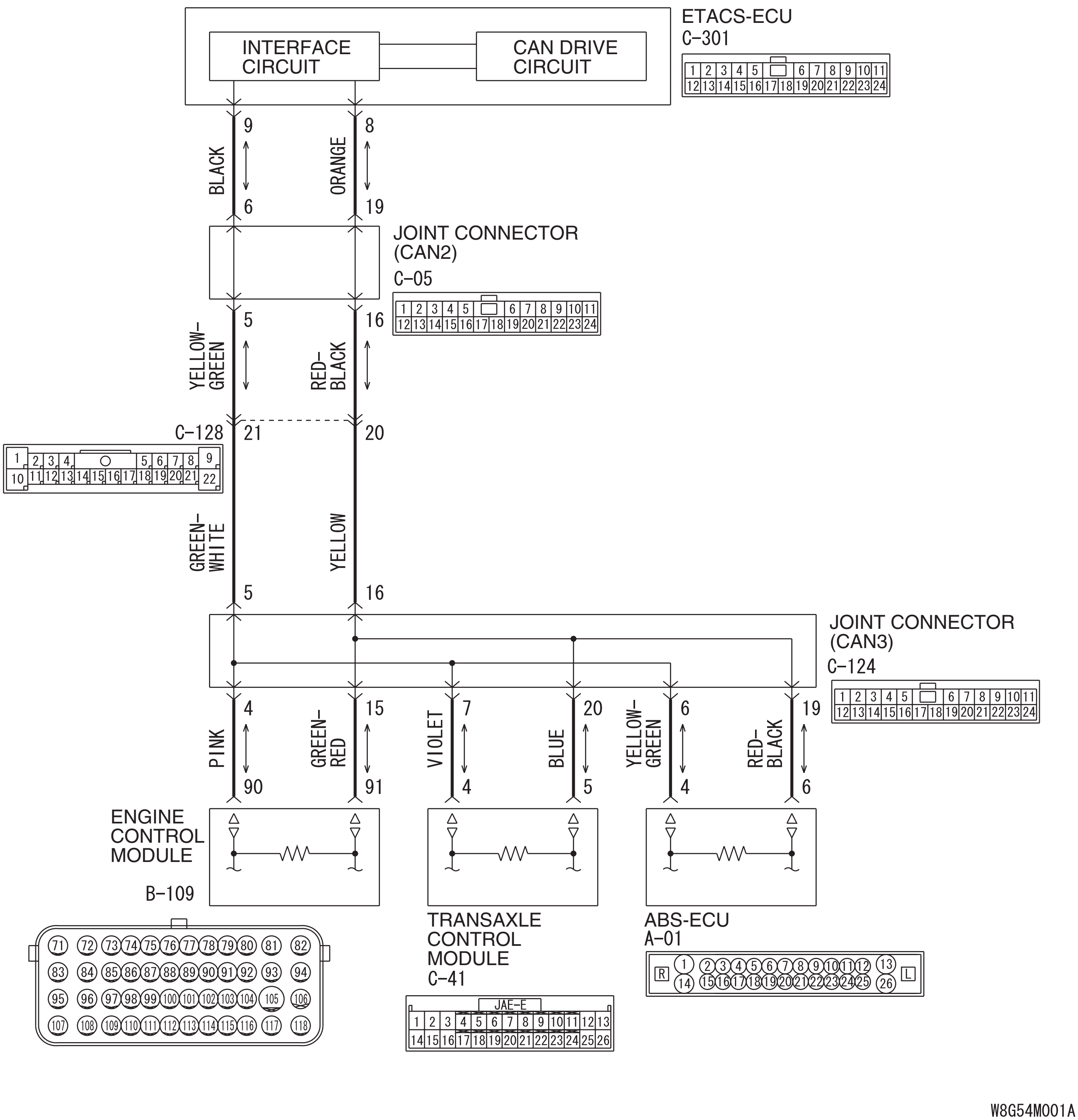
YES : Check the power supply circuit of the ABS-ECU. Refer to GROUP 35B, Troubleshooting P.35B-146.
NO : Repair the wiring harness between joint connector (CAN3) C-124 and ABS-ECU connector A-01.

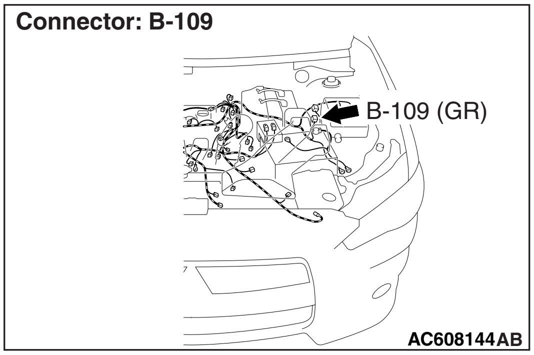
DIAGNOSTIC ITEM 8: Diagnose when the scan tool cannot receive the data sent by ECM.

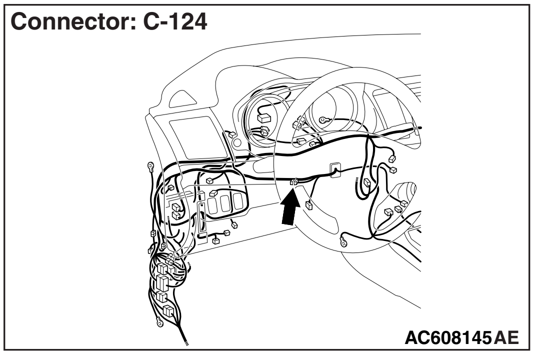
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the ECM, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the ECM, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN3) or ECM connector improperly connected]
- Malfunction of the wiring harness [open circuit between the ECM and the joint connector (CAN3), power supply circuit to the ECM]
- Malfunction of the ECM

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN3) C-124 and ECM connector B-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN3) C-124 and ECM connector B-109 in good condition?

YES : Go to Step 2.
NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN3) C-124 and ECM connector B-109, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN3) C-124 (terminal 4) and ECM connector B-109 (terminal 90)
(3) Check the wiring harness between joint connector (CAN3) C-124 (terminal 15) and ECM connector B-109 (terminal 91)

Q: Is the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109 in good condition?

YES : Check the power supply circuit of the ECM. Refer to GROUP 13A, Troubleshooting P.13A-51.

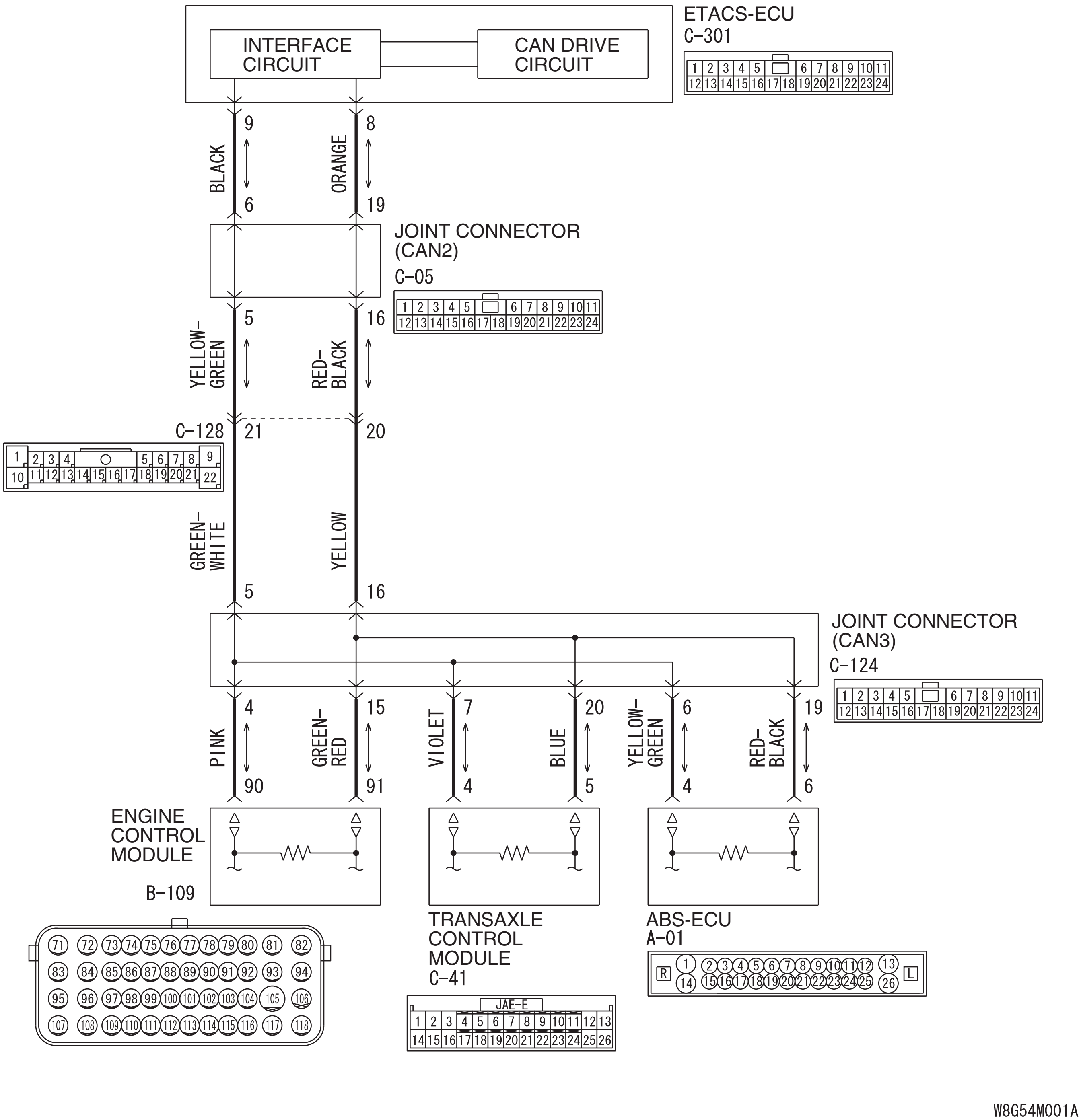
NO : Repair the wiring harness between joint connector (CAN3) C-124 and ECM connector B-109.

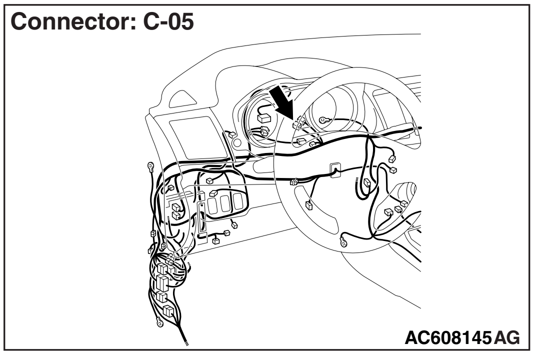
DIAGNOSTIC ITEM 9: Diagnose the lines between the ETACS-ECU and joint connector (CAN2).

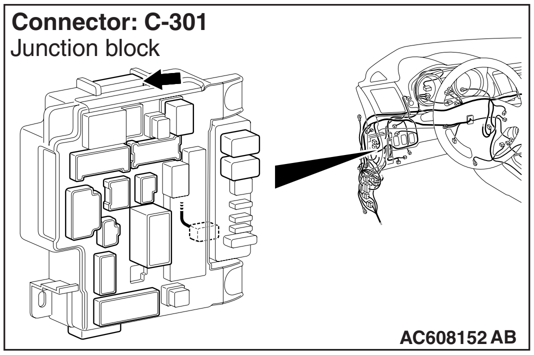
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If a failure is present in the wiring harness between the ETACS-ECU connector and the joint connector (CAN2), this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for some of the ECUs on the CAN-C line, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN2) or ETACS-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the ETACS-ECU connector and the joint connector (CAN2), power supply circuit to the ECM]
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN2) C-05 and ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN2) C-05 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN2) C-05 and ETACS-ECU connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN2) C-05 (terminal 6) and ETACS-ECU connector C-301 (terminal 9)
(3) Check the wiring harness between joint connector (CAN2) C-05 (terminal 19) and ETACS-ECU connector C-301 (terminal 8)

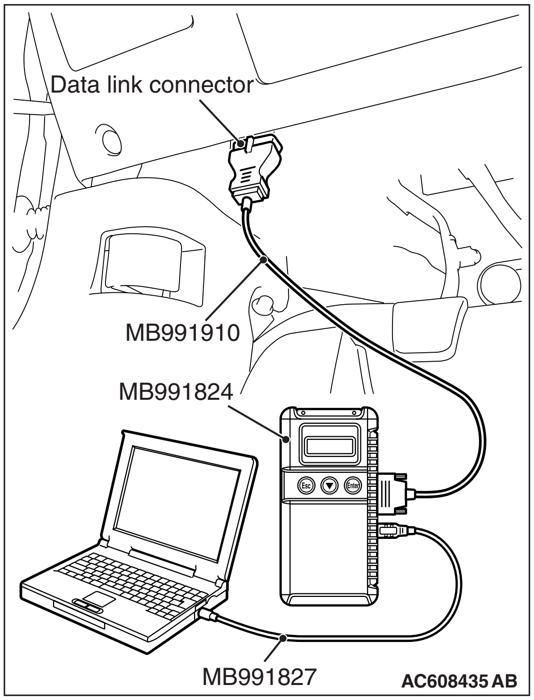
Q: Is the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 3.
NO : Repair the wiring harness between joint connector (CAN2) C-05 and ETACS-ECU connector C-301.

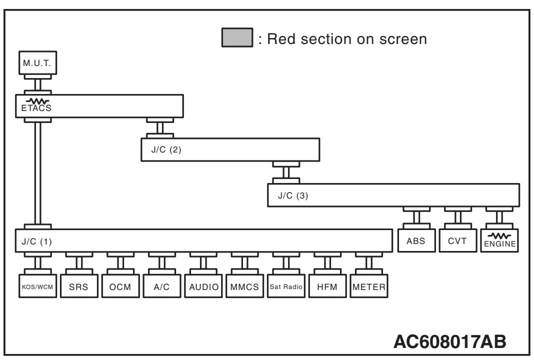
STEP 3. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



(3) Diagnose CAN bus lines, and check if the scan tool screen is as shown in the illustration.

Q: Does the scan tool screen correspond to the illustration?

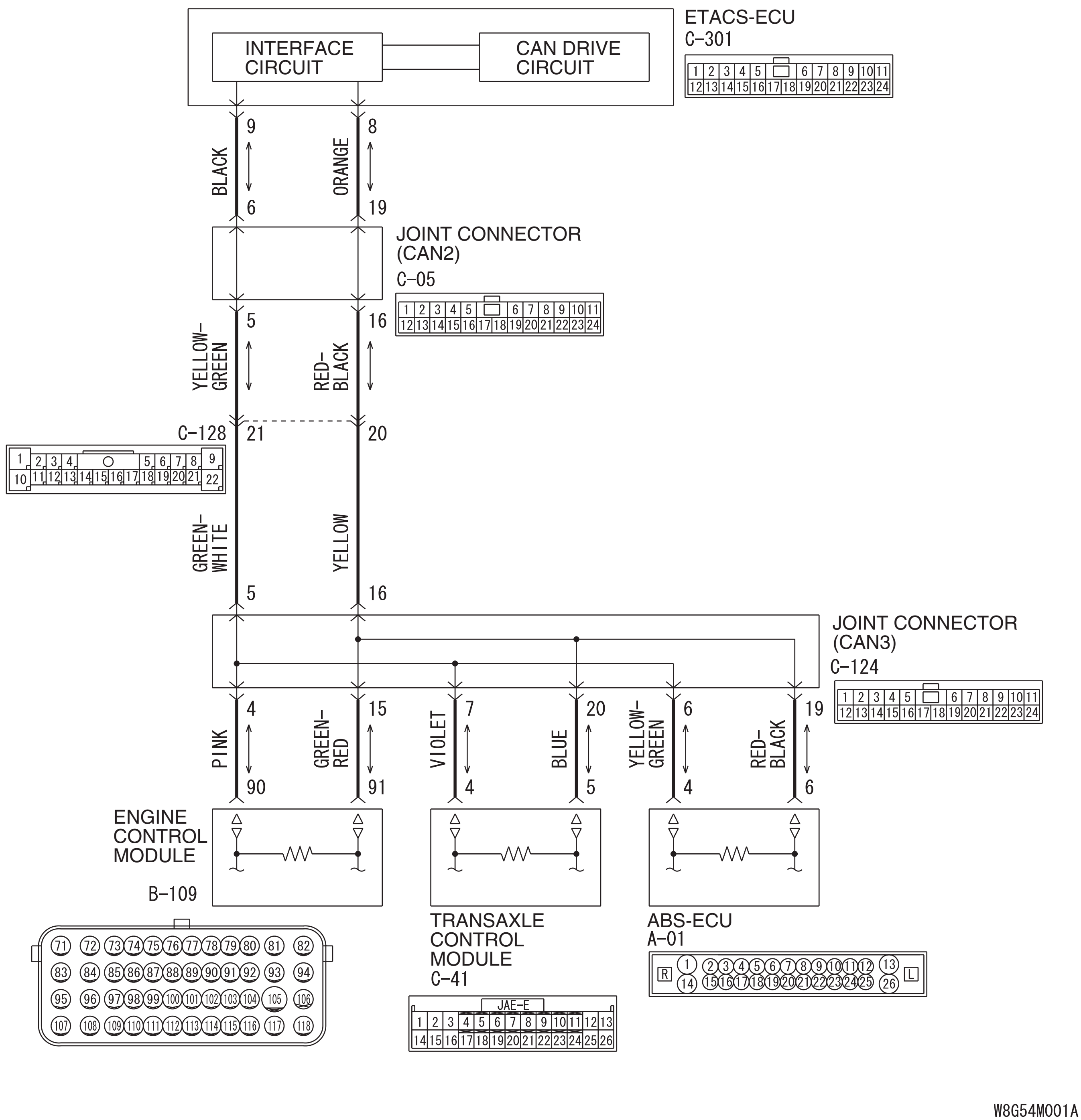
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

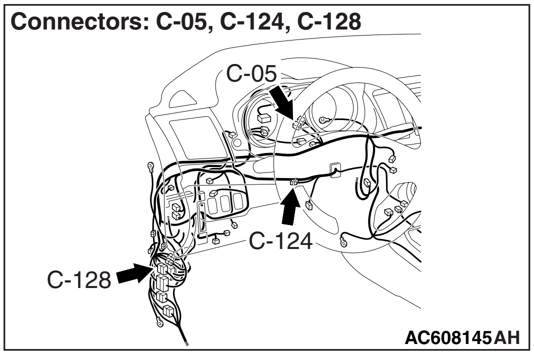
NO : Replace the ETACS-ECU.

DIAGNOSTIC ITEM 10: Diagnose the lines between joint connector (CAN2) and joint connector (CAN3).

⚠ CAUTION
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit





FUNCTION

If a failure is present in the wiring harness between the joint connector (CAN2) and the joint connector (CAN3), this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for some of the ECUs on the CAN-C line, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN2), joint connector (CAN3) or intermediate connector failed]
- Malfunction of the wiring harness [open circuit between joint connector (CAN2) and joint connector (CAN3)]

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN2) C-05, joint connector (CAN3) C-124 and intermediate connector C-128 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN2) C-05, joint connector (CAN3) C-124 and intermediate connector C-128 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN2) C-05 and joint connector (CAN3) C-124, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN2) C-05 (terminal 5) and joint connector (CAN3) C-124 (terminal 5)
(3) Check the wiring harness between joint connector (CAN2) C-05 (terminal 16) and joint connector (CAN3) C-124 (terminal 16)

Q: Is the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124 in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

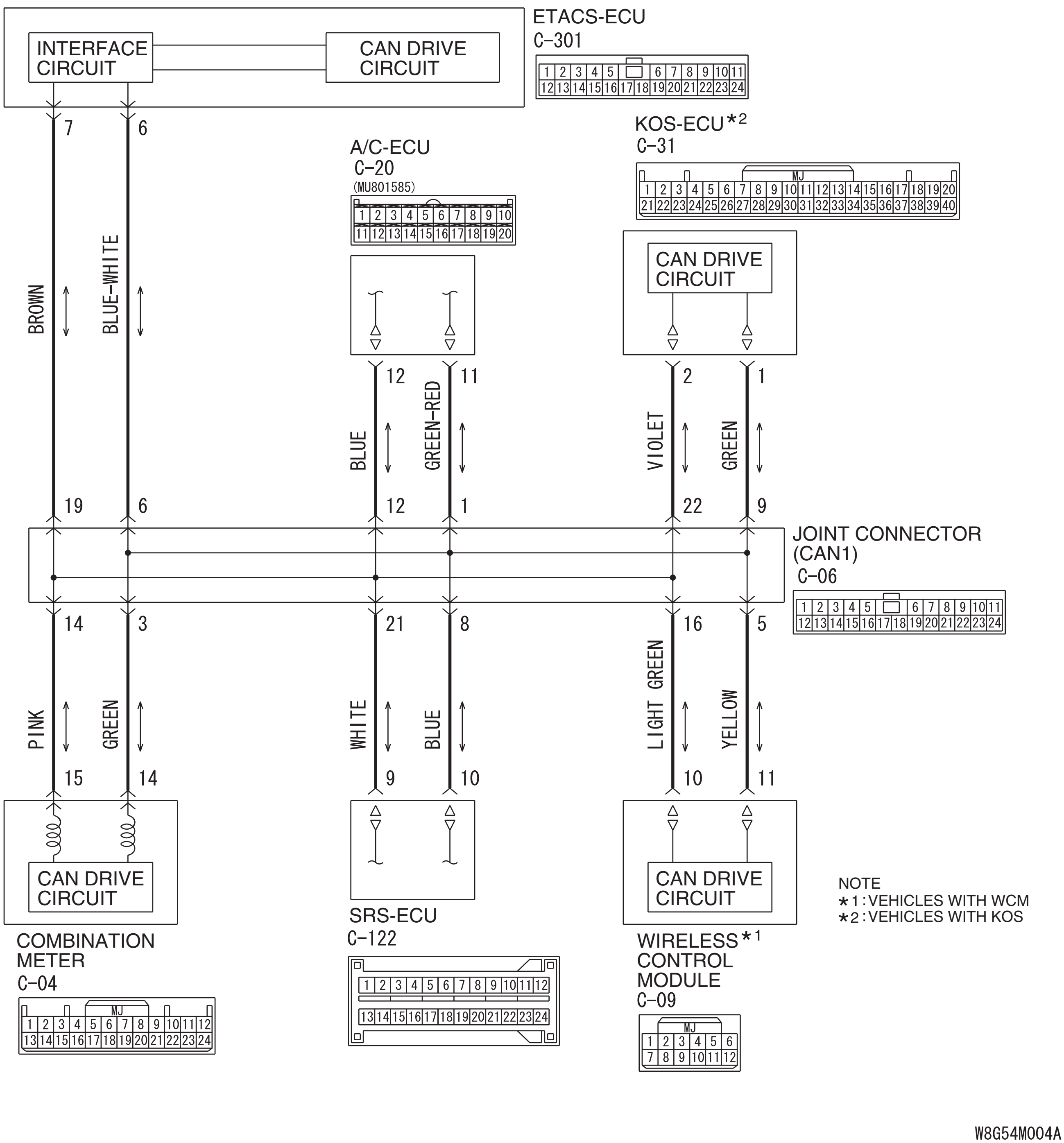
NO : Repair the wiring harness between joint connector (CAN2) C-05 and joint connector (CAN3) C-124.

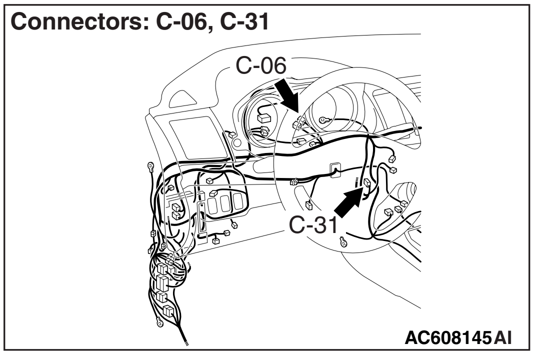
DIAGNOSTIC ITEM 11: Diagnose when the scan tool cannot receive the data sent by KOS-ECU.

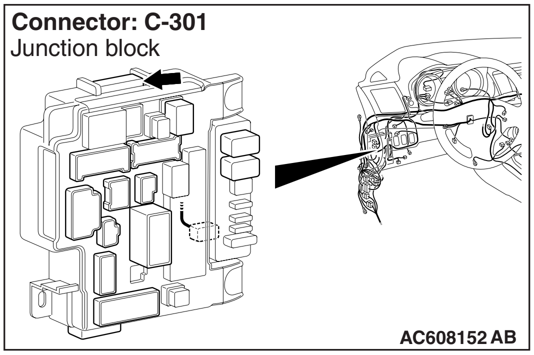
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the KOS-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the KOS-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), KOS-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the KOS-ECU connector and the joint connector (CAN1), power supply circuit to the KOS-ECU]
- Malfunction of the KOS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and KOS-ECU connector C-31 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and KOS-ECU connector C-31 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and KOS-ECU connector C-301, and check the wiring harness.

(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 9) and KOS-ECU connector C-31 (terminal 1)

(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 22) and KOS-ECU connector C-31 (terminal 2)

Q: Is the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 in good condition?

YES : Check the power supply circuit of the KOS-ECU. Refer to GROUP 42B, KOS-ECU –Diagnosis P.42B-120.

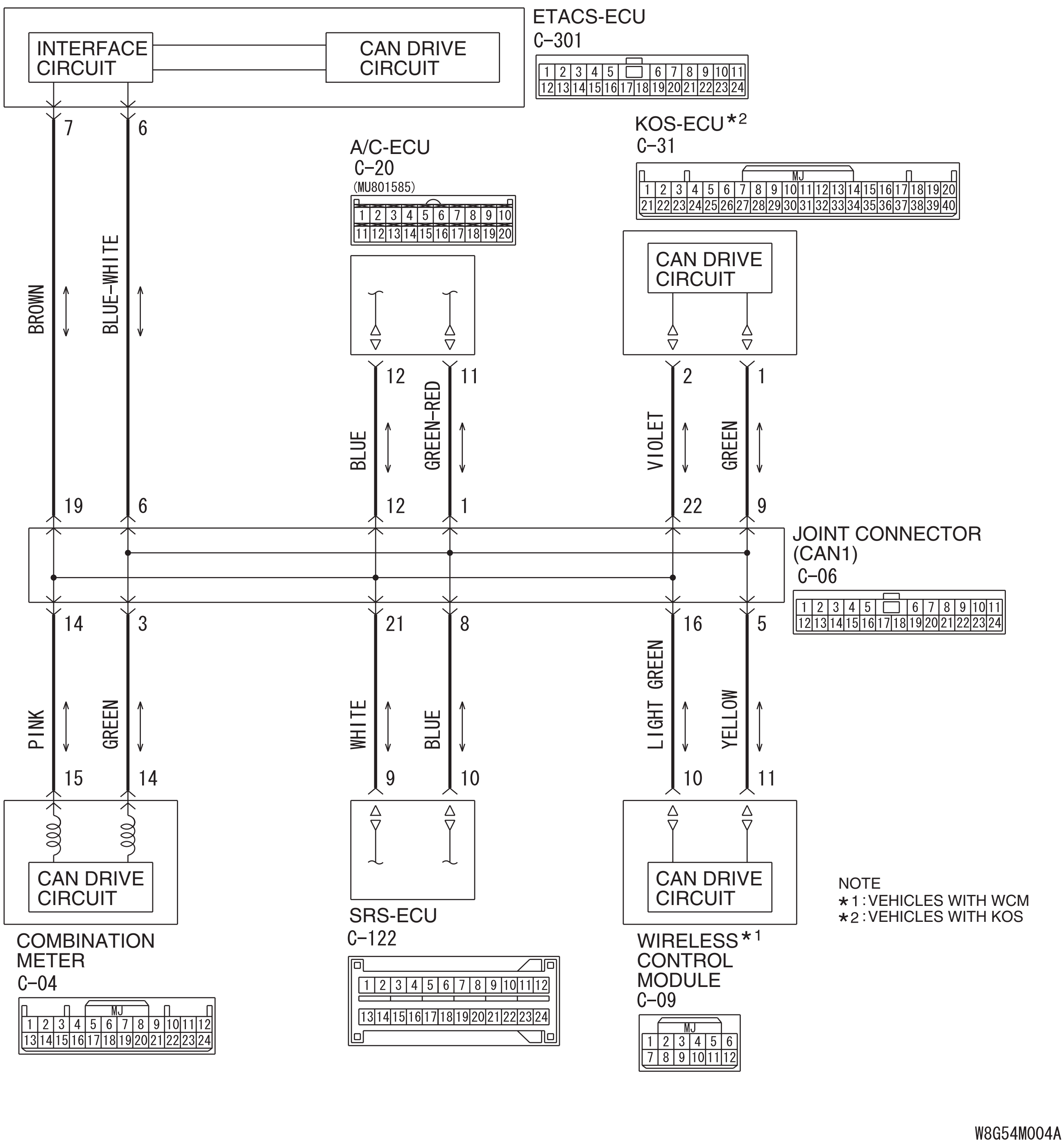
NO : Repair the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31.

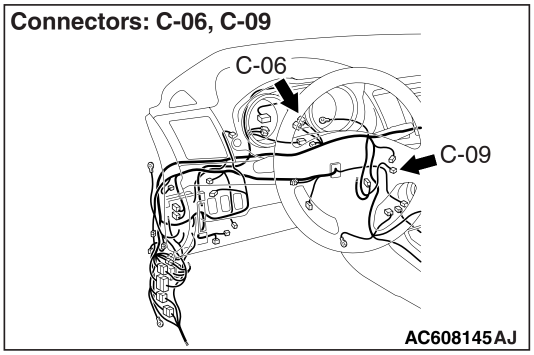
DIAGNOSTIC ITEM 12: Diagnose when the scan tool cannot receive the data sent by WCM.

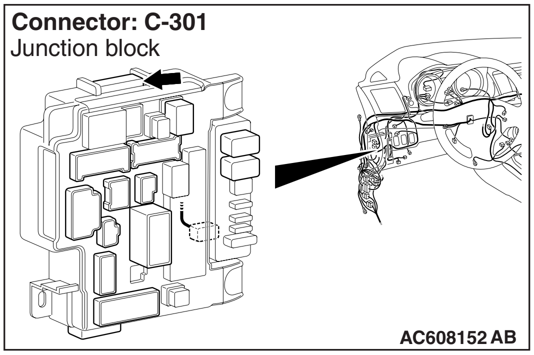
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the WCM, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the WCM, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), WCM connector improperly connected]
- Malfunction of the wiring harness [open circuit between the WCM connector and the joint connector (CAN1), power supply circuit to the WCM]
- Malfunction of the WCM

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and WCM connector C-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and WCM connector C-09 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and WCM connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 5) and WCM connector C-09 (terminal 11)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 16) and WCM connector C-09 (terminal 10)

Q: Is the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 in good condition?

YES : Check the power supply circuit of the WCM. Refer to GROUP 42C, WCM –Diagnosis P.42C-74.

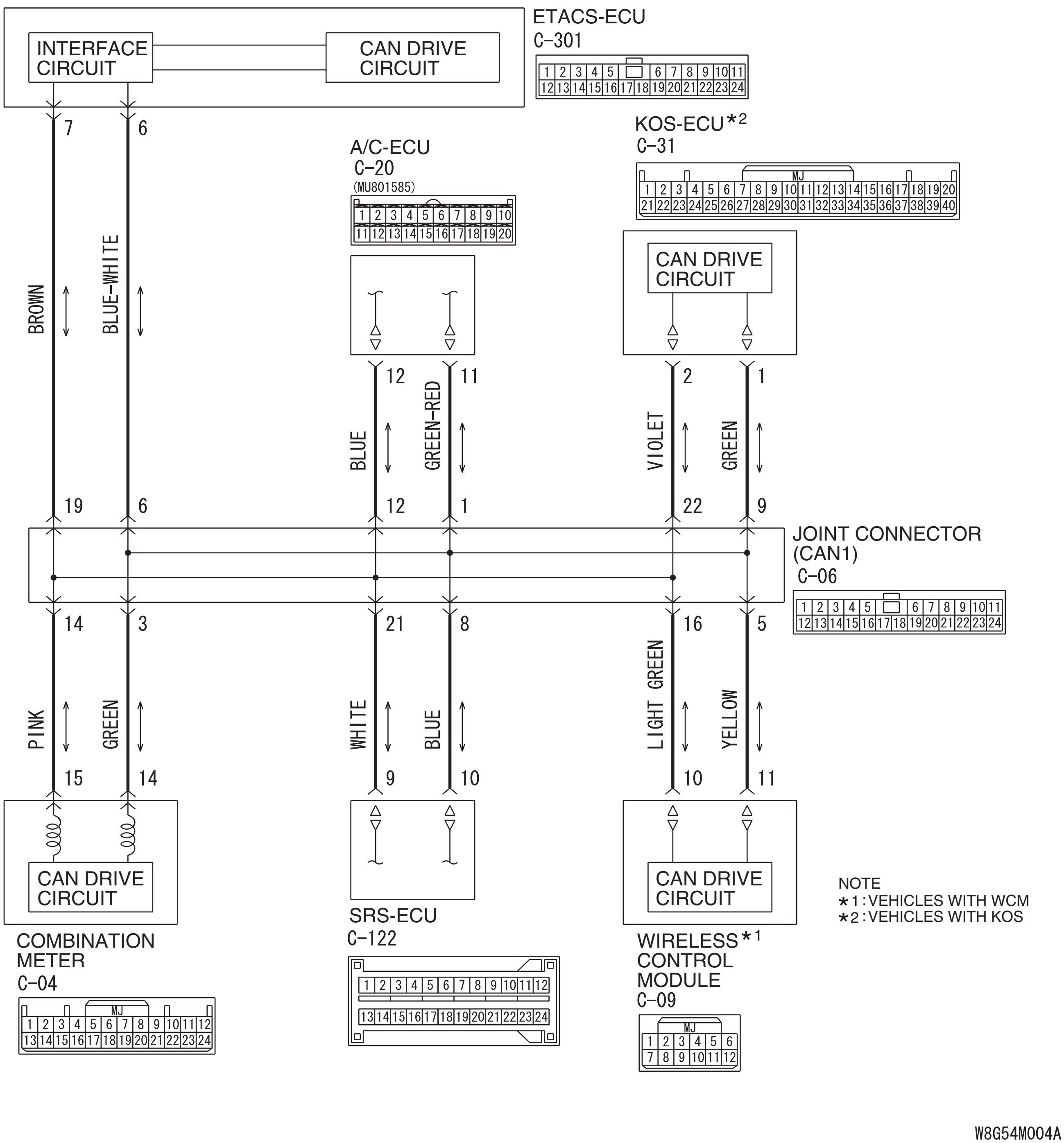
NO : Repair the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09.

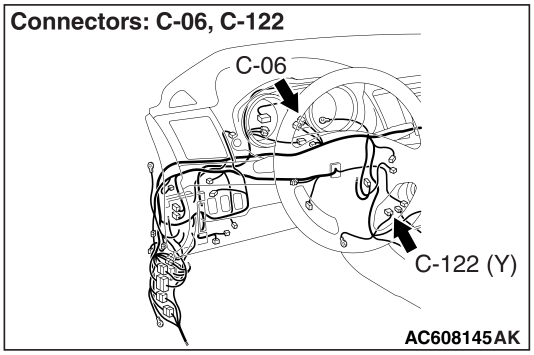
DIAGNOSTIC ITEM 13: Diagnose when the scan tool cannot receive the data sent by SRS-ECU.

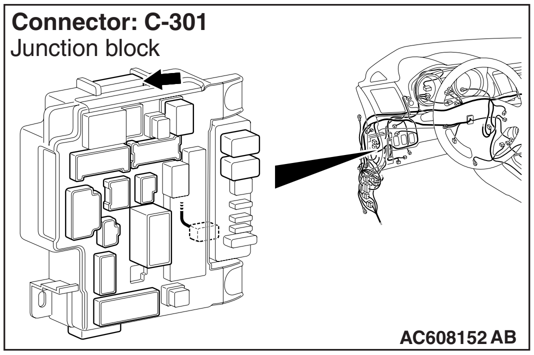
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the SRS-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the SRS-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), SRS-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the SRS-ECU connector and the joint connector (CAN1), power supply circuit to the SRS-ECU]
- Malfunction of the SRS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and SRS-ECU connector C-122 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and SRS-ECU connector C-122 in good condition?

YES : Go to Step 2.
NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and SRS-ECU connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 8) and SRS-ECU connector C-122 (terminal 10)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 21) and SRS-ECU connector C-122 (terminal 9)

Q: Is the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 in good condition?

YES : Check the power supply circuit of the SRS-ECU. Refer to GROUP 52B, SRS –Troubleshooting P.52B-339.

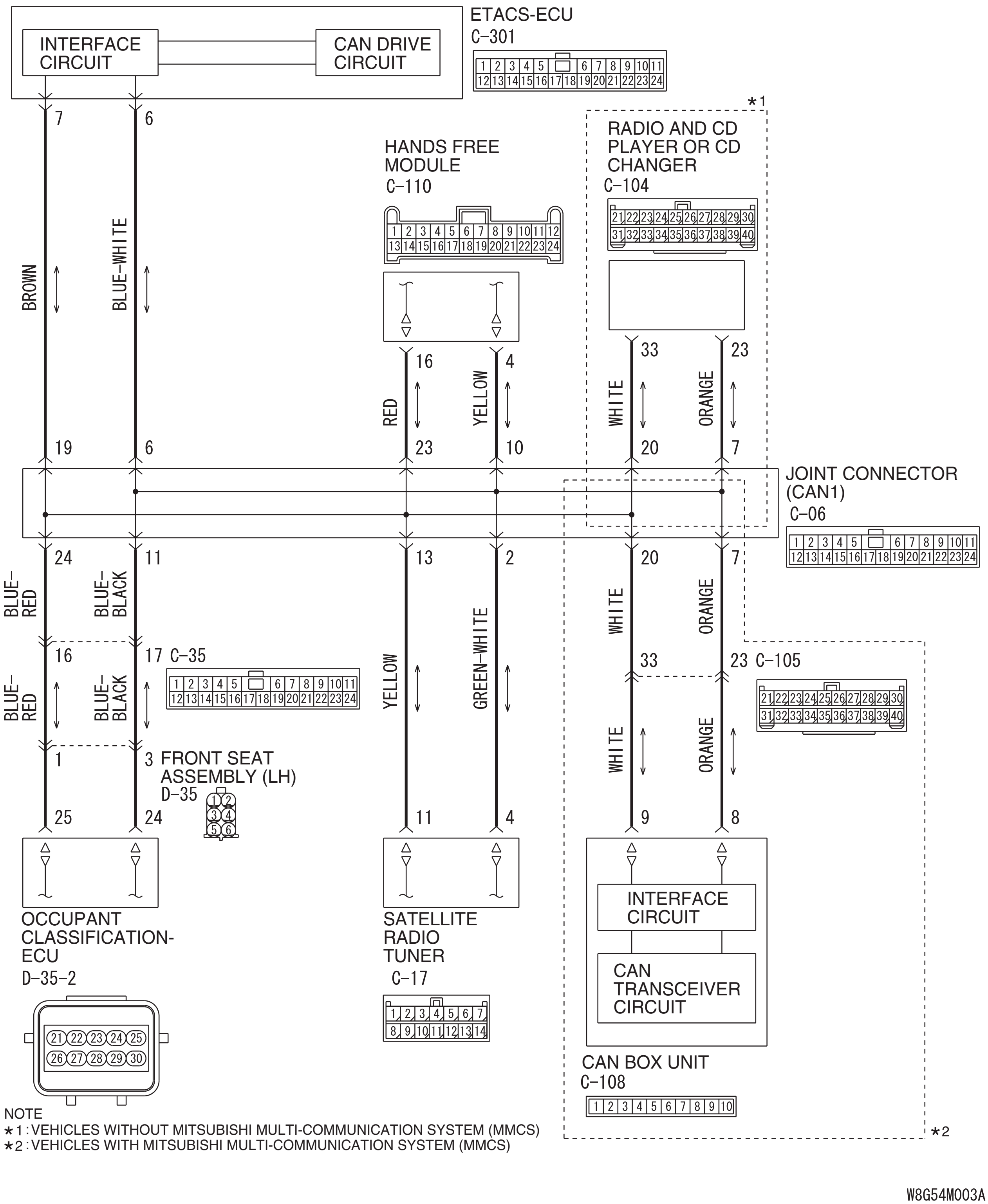
NO : Repair the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122.

DIAGNOSTIC ITEM 14: Diagnose when the scan tool cannot receive the data sent by occupant classification-ECU.

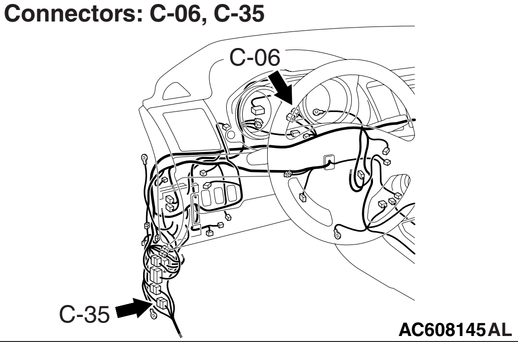
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

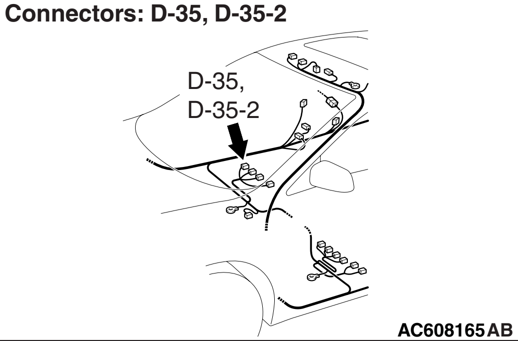
CAN Communication Circuit



Connectors: C-06, C-35



Connectors: D-35, D-35-2



FUNCTION

If the scan tool MB991958 cannot communicate with the occupant classification-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the occupant classification-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), occupant classification-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the occupant classification-ECU connector and the joint connector (CAN1), power supply circuit to the occupant classification-ECU]
- Malfunction of the occupant classification-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06, occupant classification-ECU connector D-35, D-35-2 and intermediate connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06, occupant classification-ECU connector D-35, D-35-2 and intermediate connector C-35 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 11) and occupant classification-ECU connector D-35-2 (terminal 24)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 24) and occupant classification-ECU connector D-35-2 (terminal 25)

Q: Is the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 in good condition?

YES : Check the power supply circuit of the occupant classification-ECU. Refer to GROUP 52B, SRS air bag Diagnosis P.52B-339.

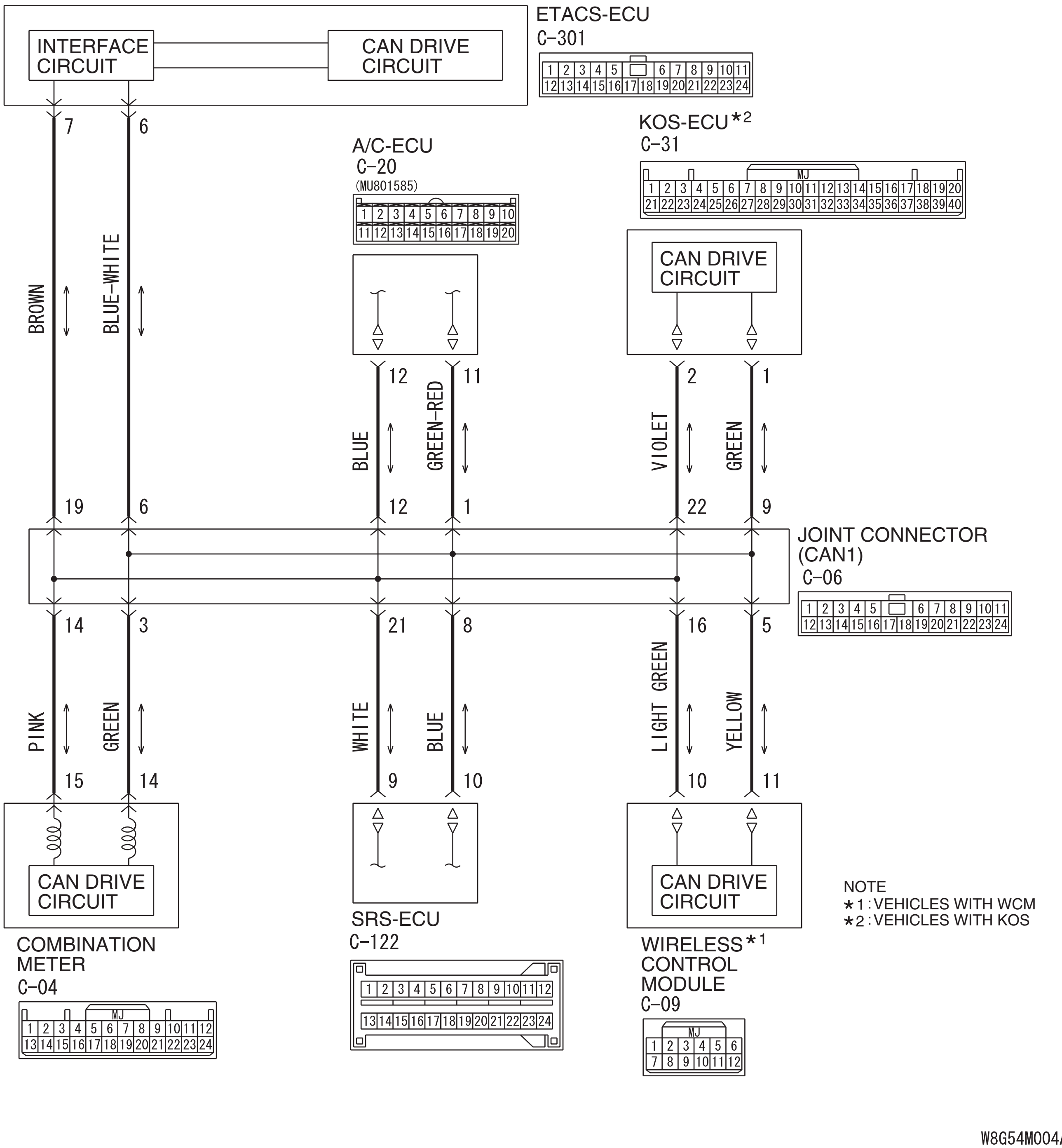
NO : Repair the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2.

DIAGNOSTIC ITEM 15: Diagnose when the scan tool cannot receive the data sent by A/C-ECU.

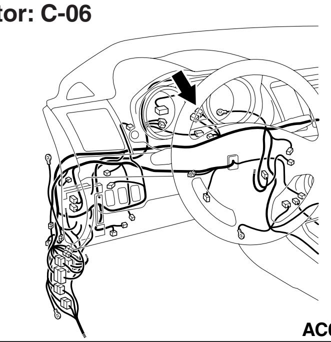
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit

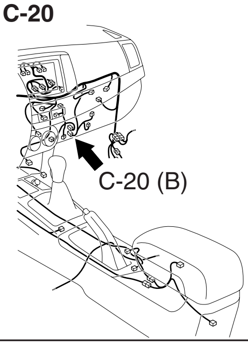


Connector: C-06



AC608145AM

Connector: C-20



AC608146AB

FUNCTION

If the scan tool MB991958 cannot communicate with the A/C-ECU, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the A/C-ECU, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), A/C-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the A/C-ECU connector and the joint connector (CAN1), power supply circuit to the A/C-ECU]
- Malfunction of the A/C-ECU

DIAGNOSIS

Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and A/C-ECU connector C-20, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 1) and A/C-ECU connector C-20 (terminal 11)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 12) and A/C-ECU connector C-20 (terminal 12)

Q: Is the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 in good condition?

YES : Check the power supply circuit of the A/C-ECU. Refer to GROUP 55A, Diagnosis P.55A-64.

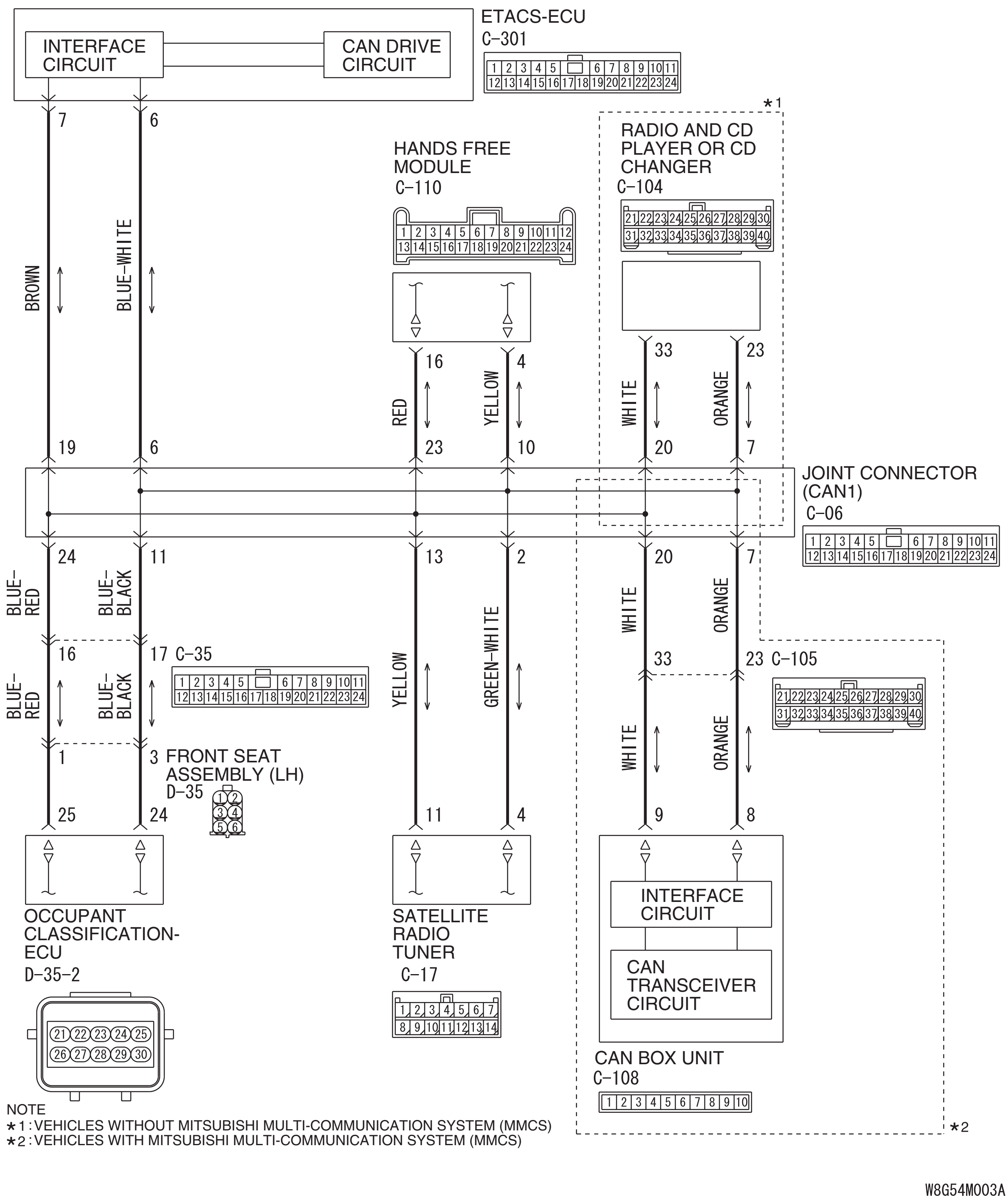
NO : Repair the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20.

DIAGNOSTIC ITEM 16: Diagnose when the scan tool cannot receive the data sent by radio and CD player or CD changer.

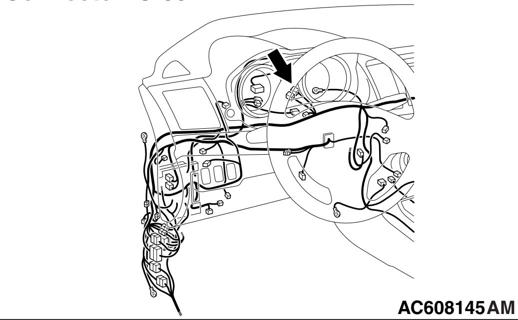
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit

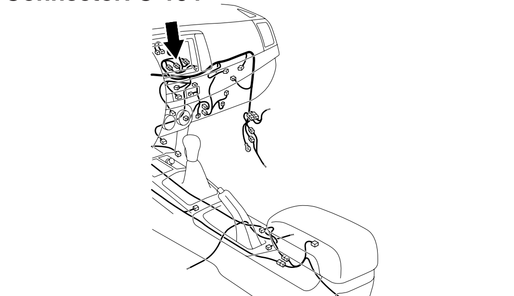


Connector: C-06



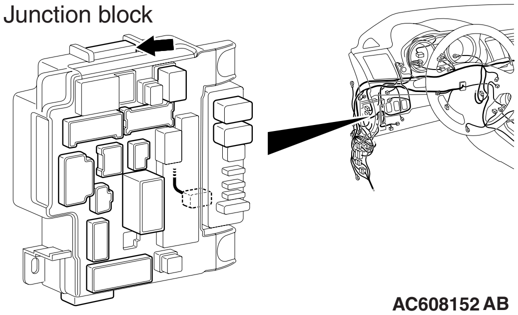
AC608145AM

Connector: C-104



AC608146AC

Connector: C-301
Junction block



AC608152 AB

FUNCTION

If the scan tool MB991958 cannot communicate with the radio and CD player or CD changer, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the radio and CD player or CD changer, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), radio and CD player or CD changer connector improperly connected]
- Malfunction of the wiring harness [open circuit between the radio and CD player or CD changer connector and the joint connector (CAN1), power supply circuit to the radio and CD player or CD changer]
- Malfunction of the radio and CD player or CD changer

DIAGNOSIS

Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 in good condition?

YES : Go to Step 2.
NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-301, and check the wiring harness.

(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 7) and radio and CD player or CD changer connector C-104 (terminal 23)

(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 20) and radio and CD player or CD changer connector C-104 (terminal 33)

Q: Is the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 in good condition?

YES : Check the power supply circuit of the radio and CD player or CD changer. Refer to GROUP 54A, radio and CD player –Diagnosis <radio and CD player> P.54A-267.

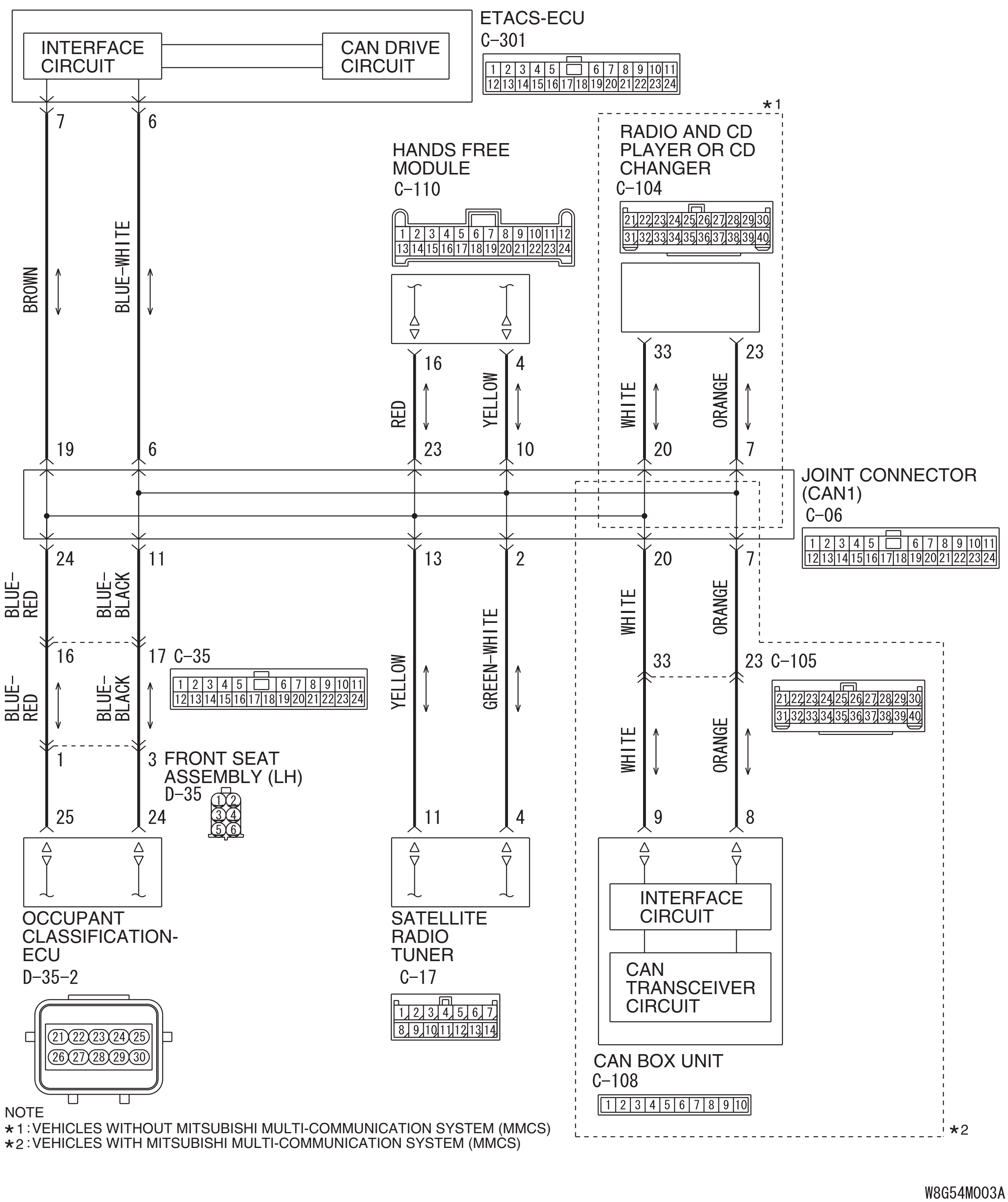
NO : Repair the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104.

DIAGNOSTIC ITEM 17: Diagnose when the scan tool cannot receive the data sent by CAN box unit.

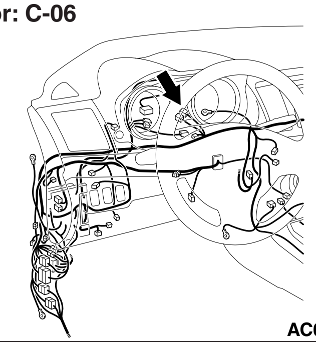
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit

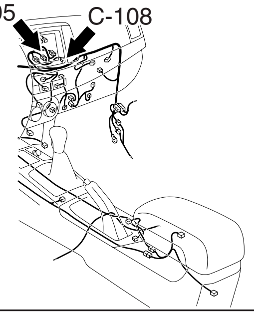


Connector: C-06



AC608145AM

Connectors: C-105, C-108



AC608146AD

FUNCTION

If the scan tool MB991958 cannot communicate with the CAN box unit, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the CAN box unit, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), CAN box unit connector improperly connected]
- Malfunction of the wiring harness [open circuit between the CAN box unit connector and the joint connector (CAN1), power supply circuit to the CAN box unit]
- Malfunction of the CAN box unit

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06, CAN box unit connector C-108 and intermediate connector C-105 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06, CAN box unit connector C-108 and intermediate connector C-105 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and CAN box unit connector C-108, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 7) and CAN box unit connector C-108 (terminal 8)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 20) and CAN box unit connector C-108 (terminal 9)

Q: Is the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 in good condition?

YES : Check the power supply circuit of the CAN box unit. Refer to GROUP 54A, Diagnosis <MMCS> P.54A-350.

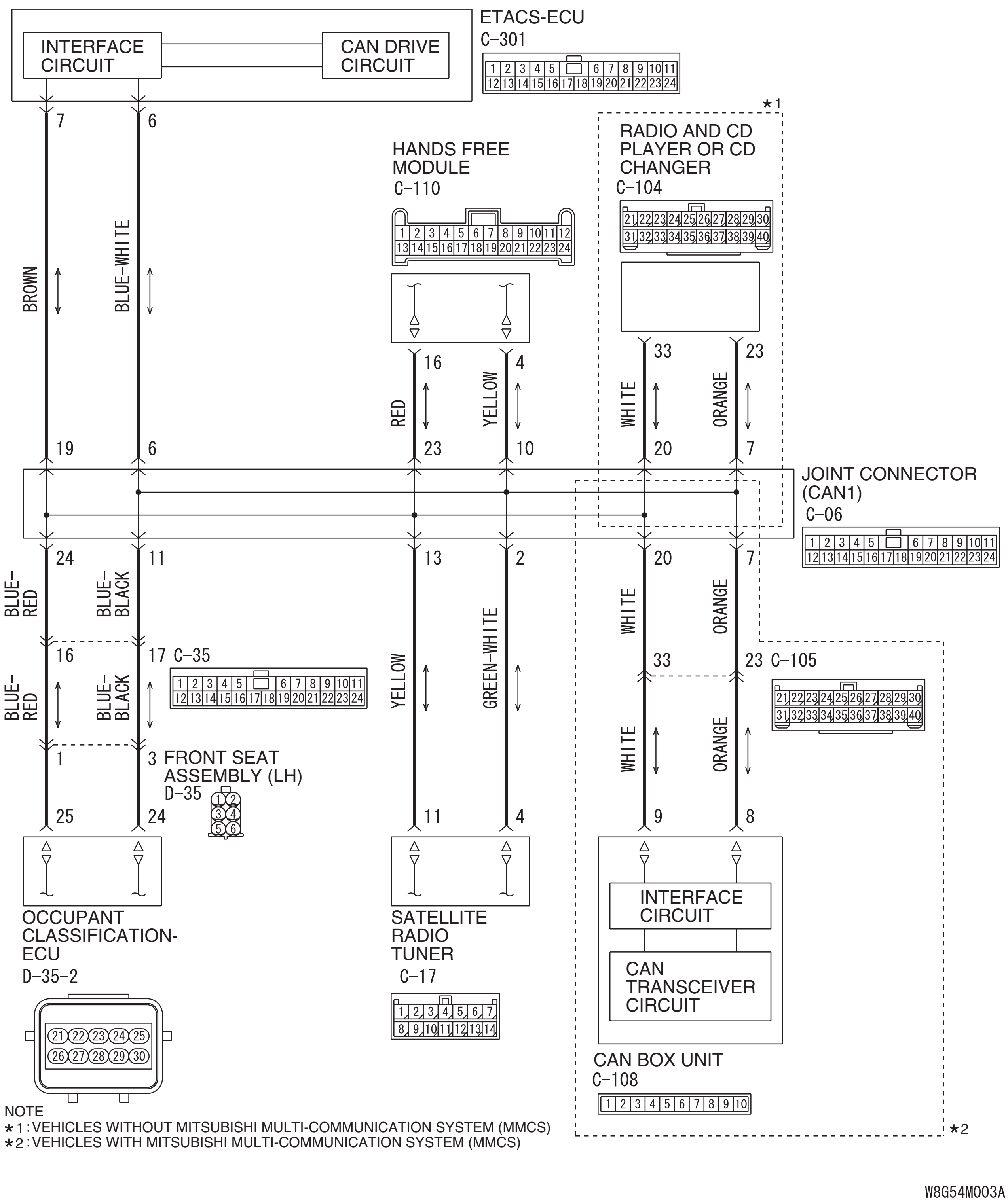
NO : Repair the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108.

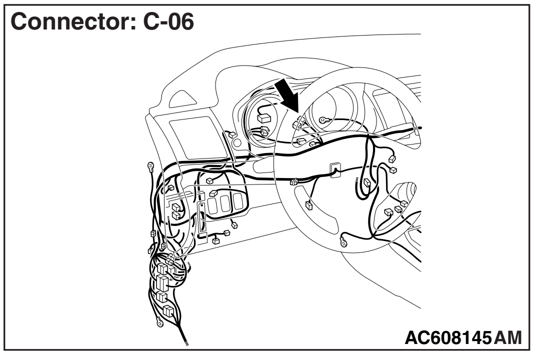
DIAGNOSTIC ITEM 18: Diagnose when the scan tool cannot receive the data sent by satellite radio tuner.

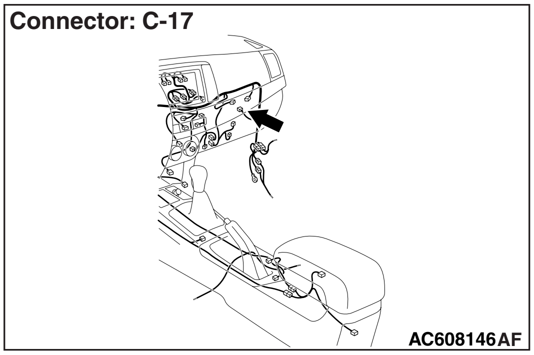
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit







FUNCTION

If the scan tool MB991958 cannot communicate with the satellite radio tuner, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the satellite radio tuner, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), satellite radio tuner connector improperly connected]
- Malfunction of the wiring harness [open circuit between the satellite radio tuner connector and the joint connector (CAN1), power supply circuit to the satellite radio tuner]
- Malfunction of the satellite radio tuner

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and satellite radio tuner connector C-17 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and satellite radio tuner connector C-17, and check the wiring harness.

(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 2) and satellite radio tuner connector C-17 (terminal 4)

(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 13) and satellite radio tuner connector C-17 (terminal 11)

Q: Is the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 in good condition?

YES : Check the power supply circuit of the satellite radio tuner. Refer to GROUP 54A, Diagnosis <Satellite radio tuner> P.54A-468.

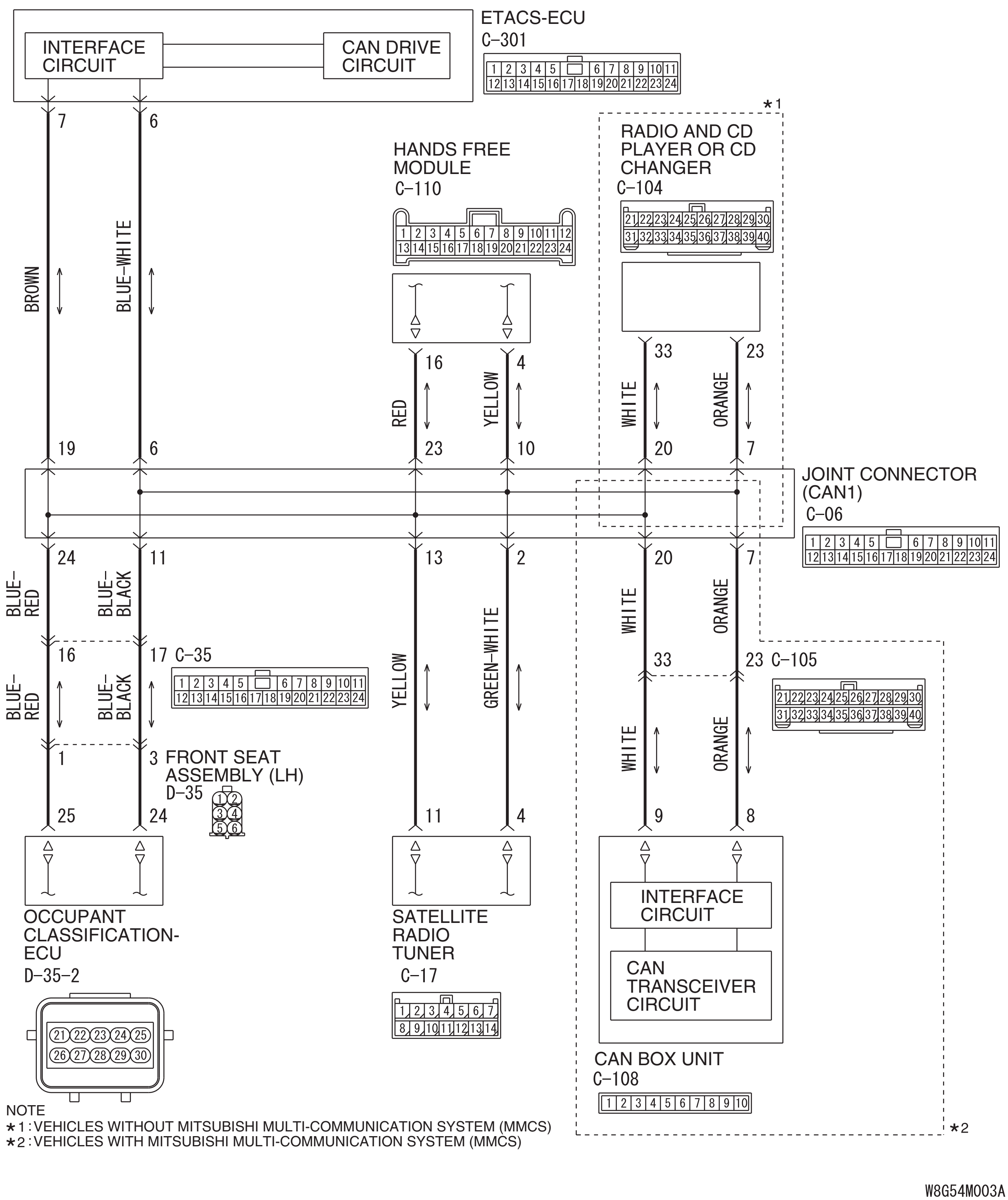
NO : Repair the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17.

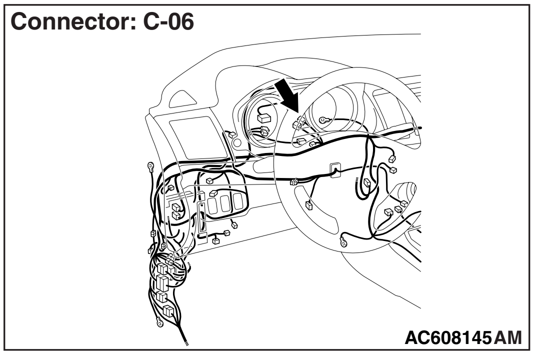
DIAGNOSTIC ITEM 19: Diagnose when the scan tool cannot receive the data sent by hands free module.

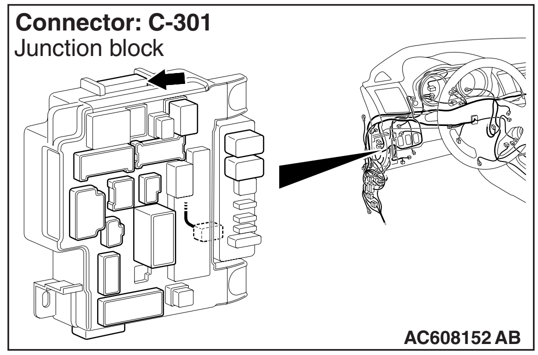
⚠ CAUTION

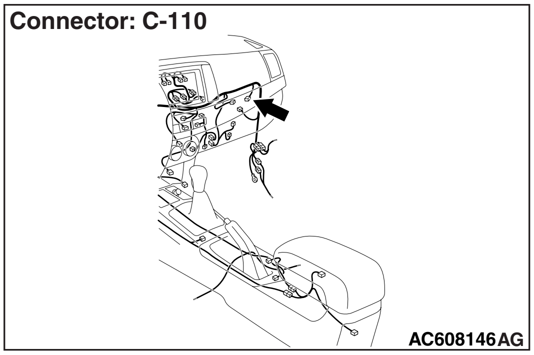
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit









FUNCTION

If the scan tool MB991958 cannot communicate with the hands free module, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the hands free module, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), hands free module connector improperly connected]
- Malfunction of the wiring harness [open circuit between the hands free module connector and the joint connector (CAN1), power supply circuit to the hands free module]
- Malfunction of the hands free module

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and hands free module connector C-110 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and hands free module connector C-110 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to **P.54C-7****.**

(1) Disconnect joint connector (CAN1) C-06 and hands free module connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 7) and hands free module connector C-110 (terminal 4)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 20) and hands free module connector C-110 (terminal 16)

Q: Is the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 in good condition?

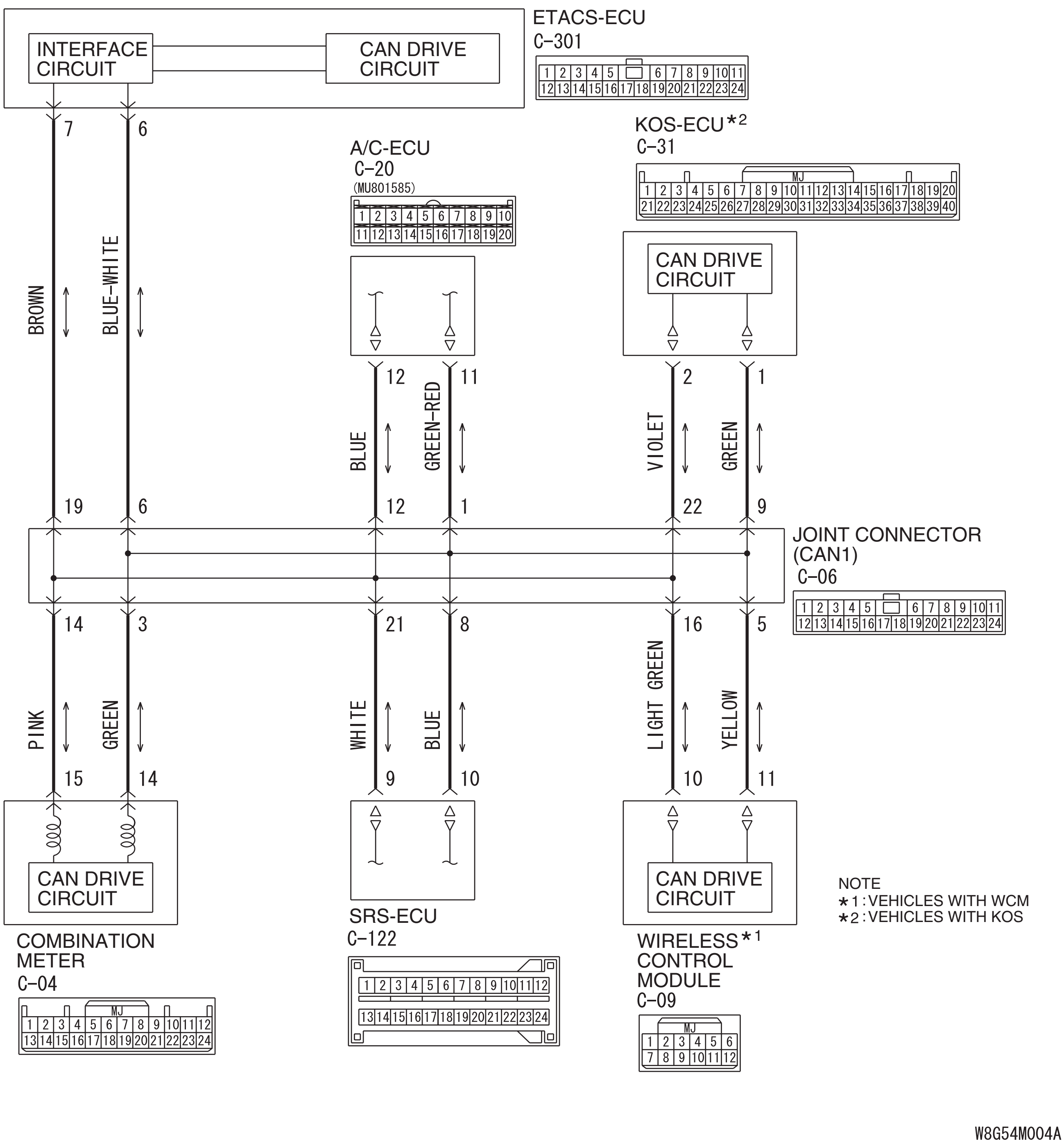
YES : Check the power supply circuit of the hands free module. Refer to GROUP 54A, Hands-free cellular phone system –Diagnosis <Hands-free cellular phone system> P.54A-409.

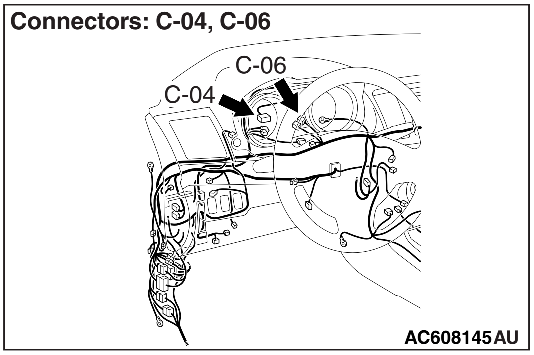
NO : Repair the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110.

DIAGNOSTIC ITEM 20: Diagnose when the scan tool cannot receive the data sent by combination meter.

⚠ CAUTION
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

CAN Communication Circuit





FUNCTION

If the scan tool MB991958 cannot communicate with the combination meter, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is not set for the combination meter, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1), combination meter connector improperly connected]
- Malfunction of the wiring harness [open circuit between the combination meter connector and the joint connector (CAN1), power supply circuit to the combination meter]
- Malfunction of the combination meter

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and combination meter connector C-04 in good condition?

YES : Go to Step 2.

NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and combination meter connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 3) and combination meter connector C-04 (terminal 14)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 14) and combination meter connector C-04 (terminal 15)

Q: Is the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 in good condition?

YES : Check the power supply circuit of the combination meter. Refer to GROUP 54A, combination meter – Diagnosis P.54A-53.

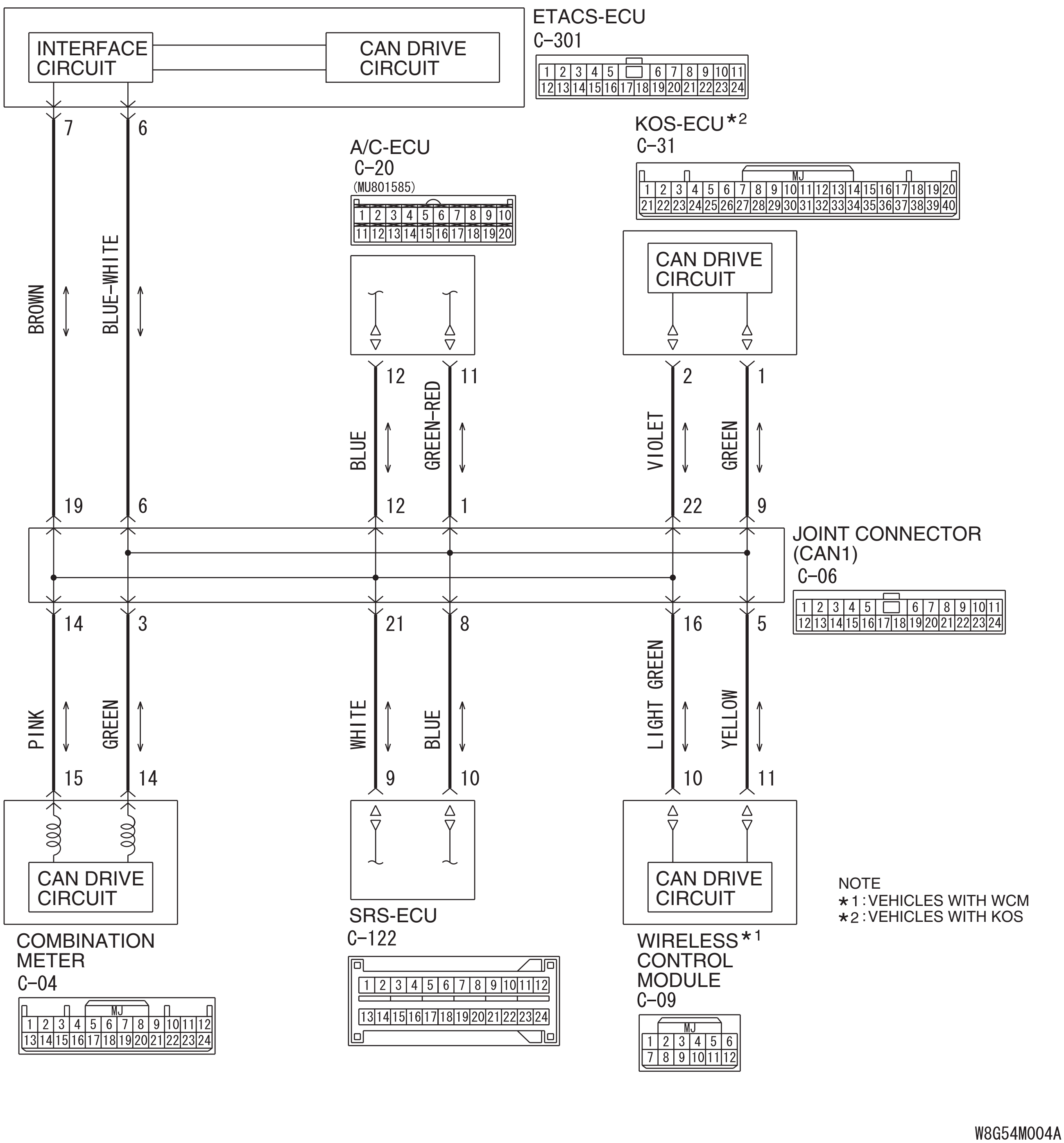
NO : Repair the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04.

DIAGNOSTIC ITEM 21: Short to power supply or ground in both CAN_H and CAN_L lines.

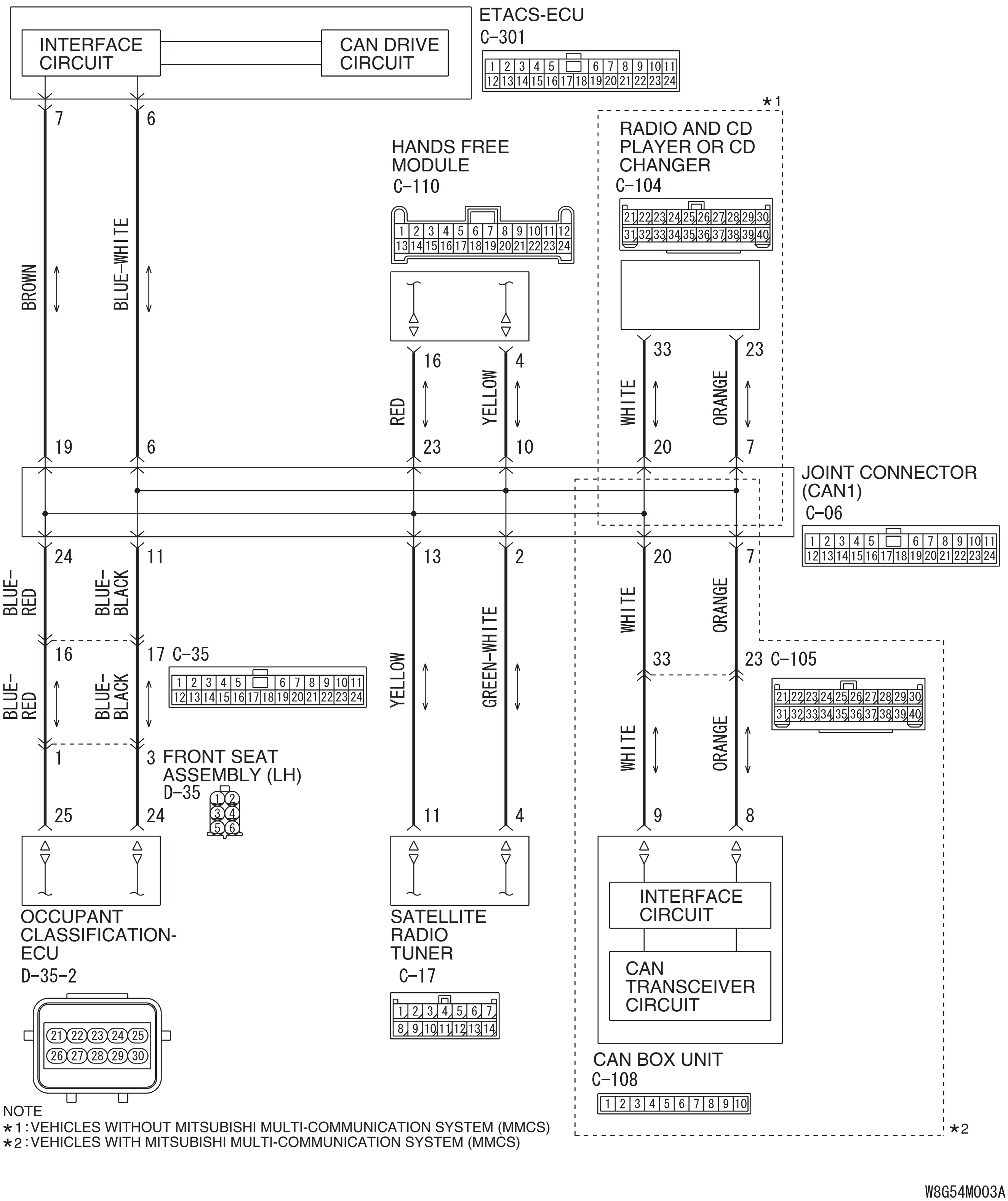
⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

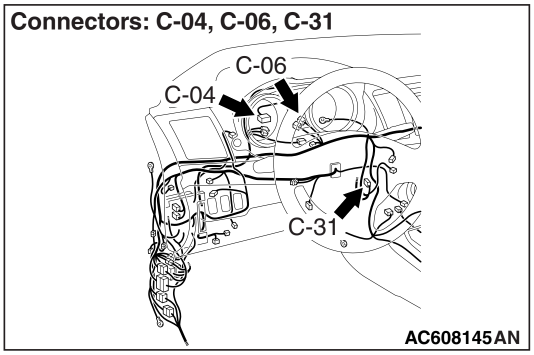
CAN Communication Circuit

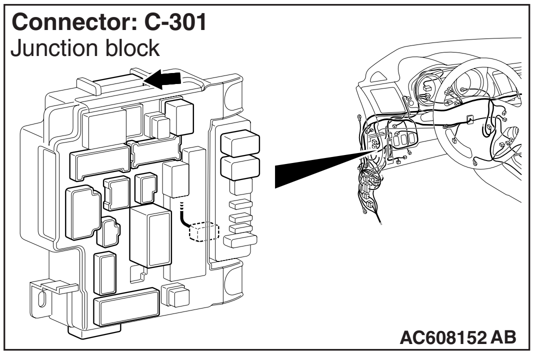


CAN Communication Circuit



NOTE
*1 : VEHICLES WITHOUT MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)
*2 : VEHICLES WITH MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)





FUNCTION

If a short to power supply or ground is present in both CAN_H and CAN_L lines, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is set for the ETACS-ECU, no communication is present through the CAN-B line, and diagnostic trouble code U0019 is set, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector (ETACS-ECU connector improperly connected)
- Malfunction of the wiring harness (CAN_H and CAN_L lines are short to power supply or ground on the CAN-B line.)
- Malfunction of ECUs

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check the wiring harness between ETACS-ECU connector C-301 and body ground for a short to power supply. Measure the voltage at ETACS-ECU connector C-301.

⚠ CAUTION

A digital multimeter should be used. For details refer to **P.54C-7****.**

⚠ CAUTION

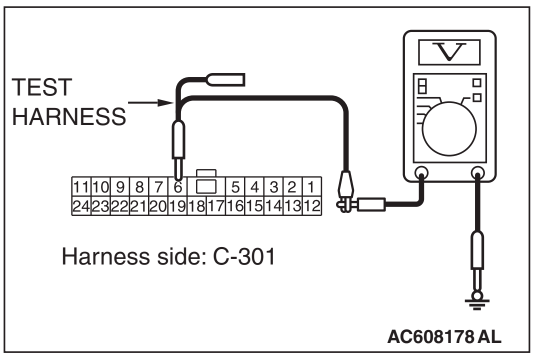
The test wiring harness should be used. For details refer to **P.54C-7****.**

(1) Disconnect ETACS-ECU connector C-301, and measure the voltage at the wiring harness side of ETACS-ECU connector.

(2) Turn the ignition switch to the ON position.

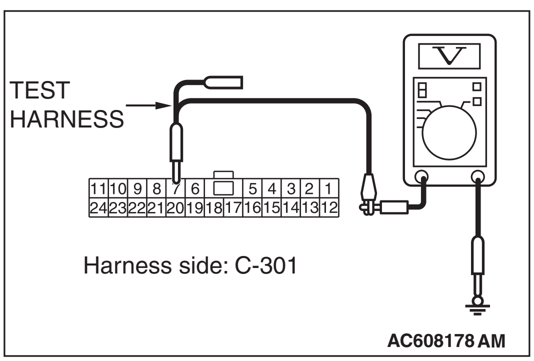
(3) Measure the voltage between ETACS-ECU connector terminal 6 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between ETACS-ECU connector terminal 7 and body ground.

OK: 4.7 volts or less



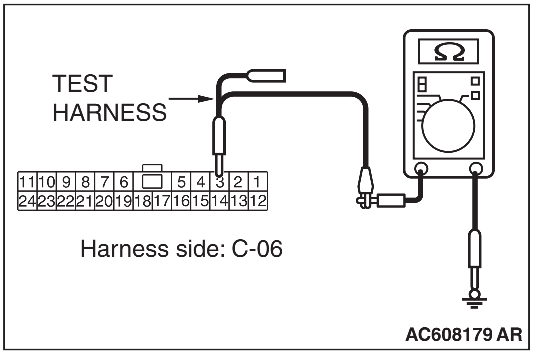
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 2.

NO : Go to Step 13.

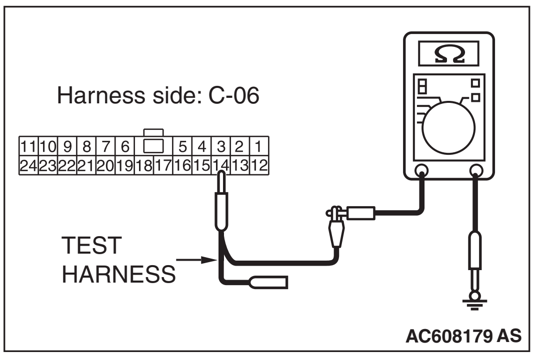
STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 3 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 14 and body ground.

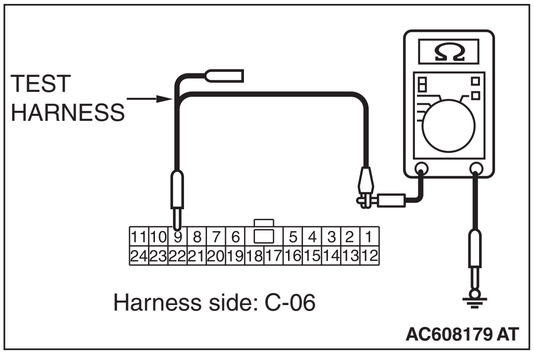
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES <vehicles with KOS> : Go to Step 3.
YES <vehicles with WCM> : Go to Step 4.
NO (vehicles with KOS or WCM) : Go to Step 24.

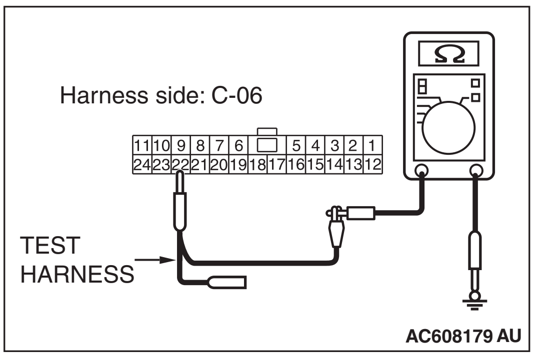
STEP 3. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 9 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 22 and body ground.

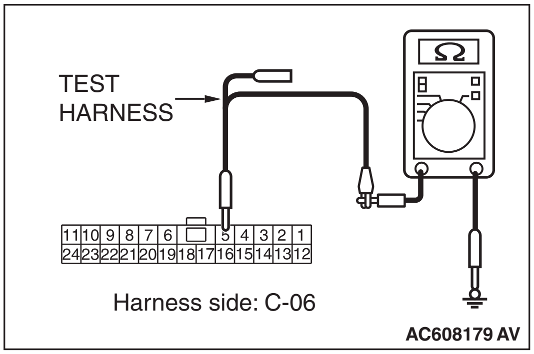
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 5.
NO : Go to Step 25.

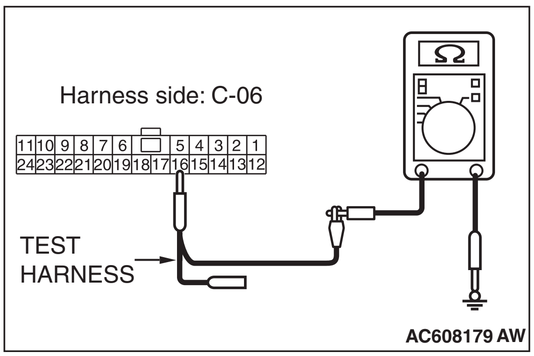
STEP 4. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 5 and body ground.

OK: 1 kilo ohm or more



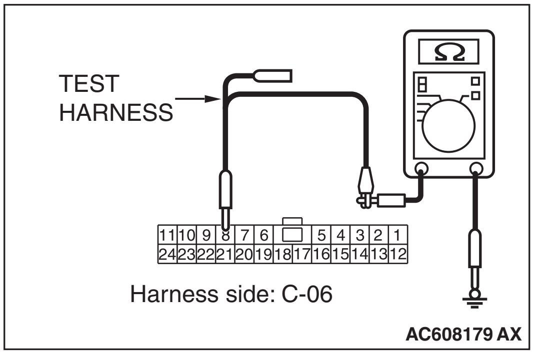
(3) Measure the resistance between joint connector (CAN1) terminal 16 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 5.
NO : Go to Step 26.

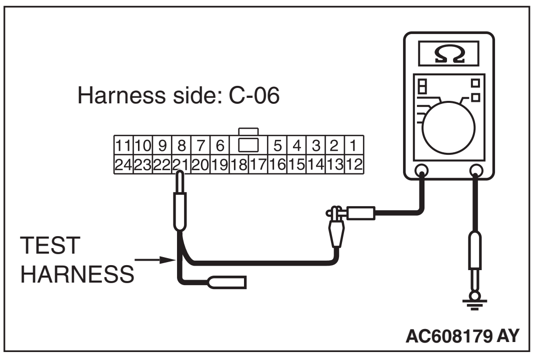
STEP 5. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).

(2) Measure the resistance between joint connector (CAN1) terminal 8 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 21 and body ground.

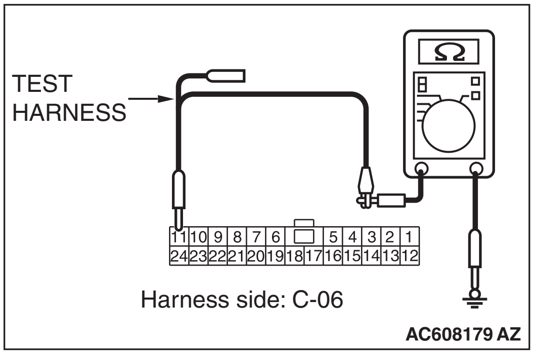
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 6.
NO : Go to Step 27.

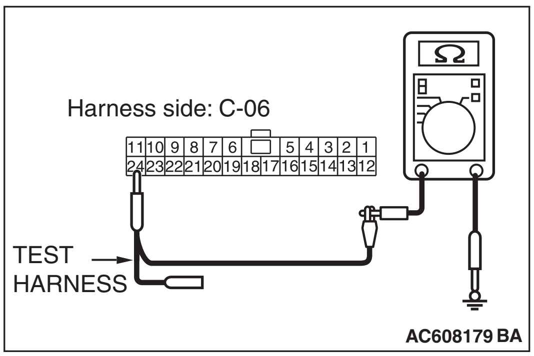
STEP 6. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 11 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 24 and body ground.

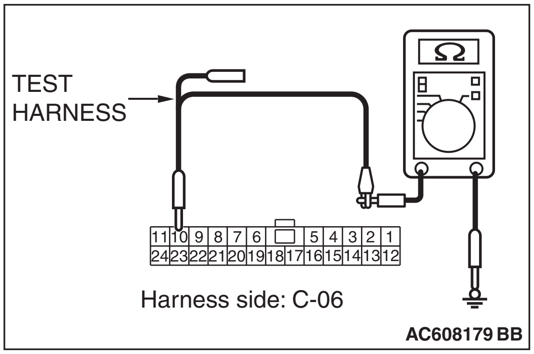
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without hands free system) : Go to Step 8.
YES (vehicles with hands free system) : Go to Step 7.
NO : Go to Step 28.

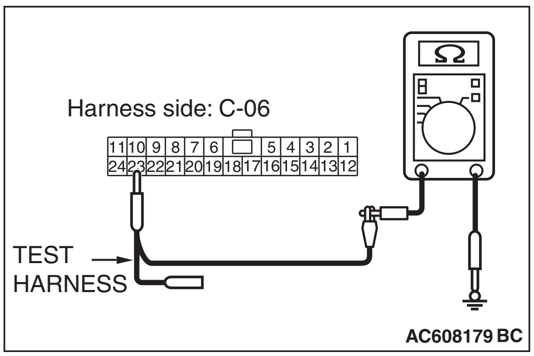
STEP 7. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 10 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 23 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

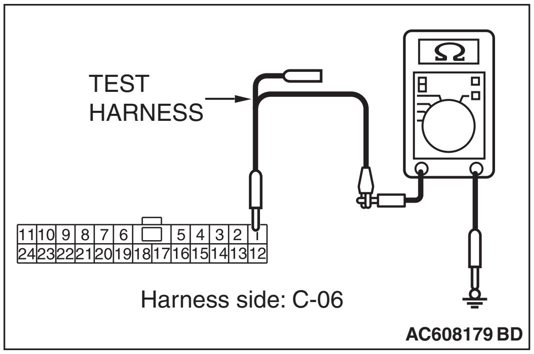
YES : Go to Step 8.
NO : Go to Step 29.

STEP 8. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).

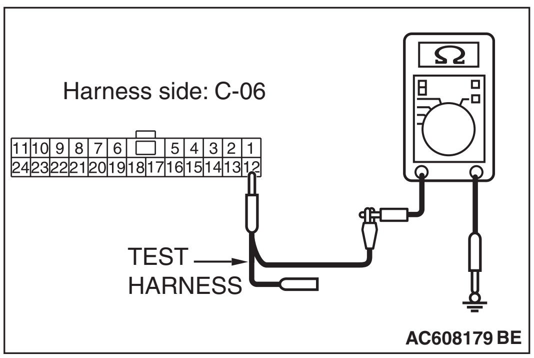
(2) Measure the resistance between joint connector (CAN1) terminal 1 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 12 and body ground.

OK: 1 kilo ohm or more



Q: Do all the resistances measure 1 kilo ohm or more?

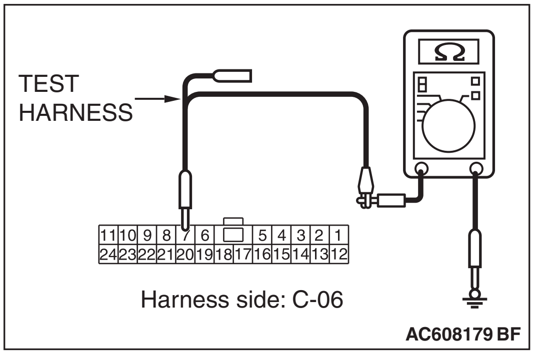
YES (vehicles without MMCS) : Go to Step 9.
YES (vehicles with MMCS) : Go to Step 10.
NO : Go to Step 30.

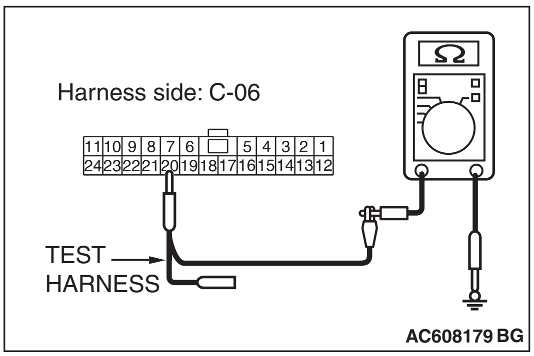
STEP 9. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).

(2) Measure the resistance between joint connector (CAN1) terminal 7 and body ground.

OK: 1 kilo ohm or more





(3) Measure the resistance between joint connector (CAN1) terminal 20 and body ground.

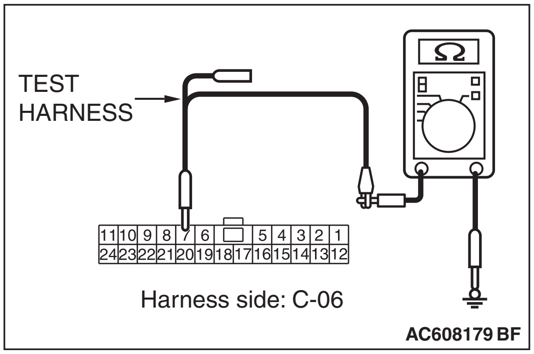
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES <vehicles without satellite radio> : Go to Step 12.
YES <vehicles with satellite radio> : Go to Step 11.
NO : Go to Step 31.

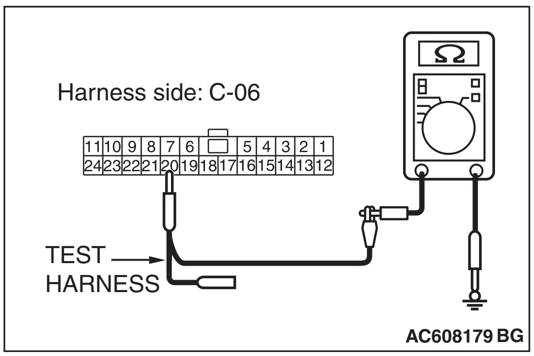
STEP 10. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 7 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 20 and body ground.

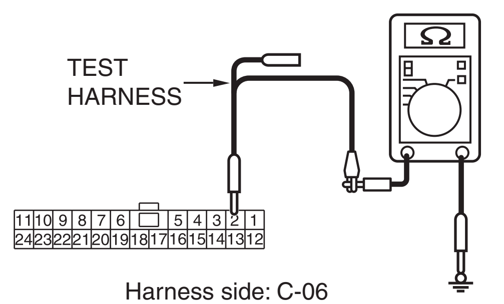
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without satellite radio) : Go to Step 12.
YES (vehicles with satellite radio) : Go to Step 11.
NO : Go to Step 32.

STEP 11. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

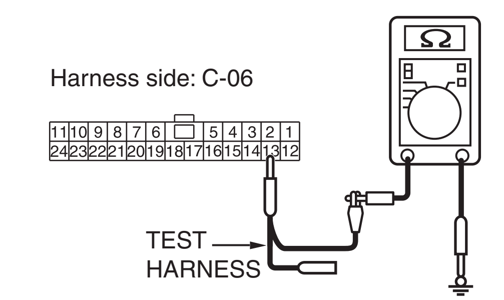
(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



AC608179 BH

(2) Measure the resistance between joint connector (CAN1) terminal 2 and body ground.

OK: 1 kilo ohm or more



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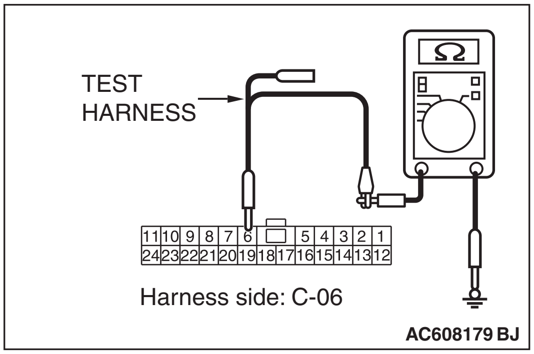
(3) Measure the resistance between joint connector (CAN1) terminal 13 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 12.
NO : Go to Step 33.

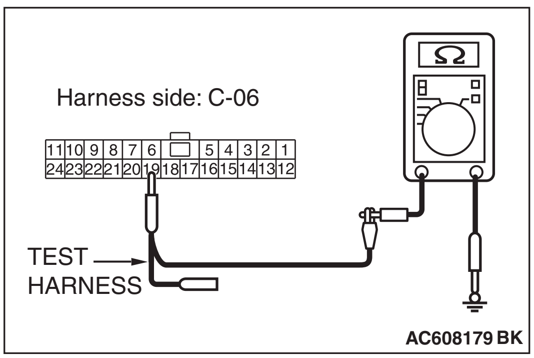
STEP 12. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1) and ETACS-ECU connector C-301, and measure the resistance at the wiring harness side of joint connector (CAN1).

(2) Measure the resistance between joint connector (CAN1) terminal 6 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 19 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 34.

NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

STEP 13. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

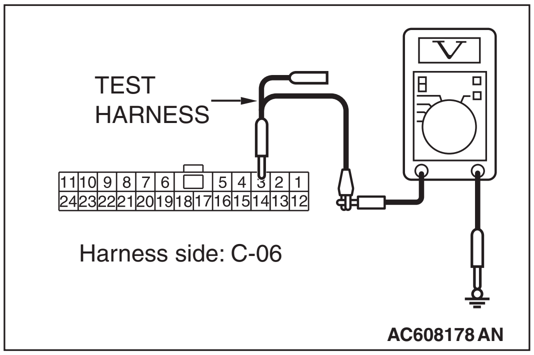
A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

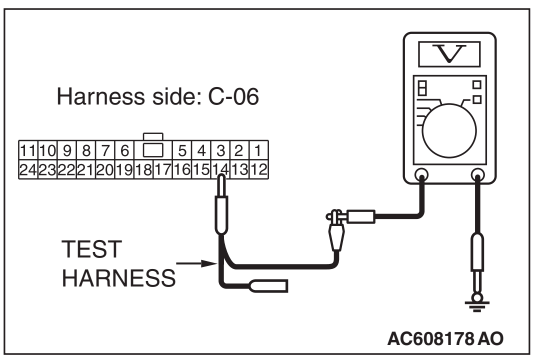
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 3 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 14 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles with KOS) : Go to Step 14.
YES (vehicles with WCM) : Go to Step 15.
NO (vehicles with KOS and WCM) : Go to Step 24.

STEP 14. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

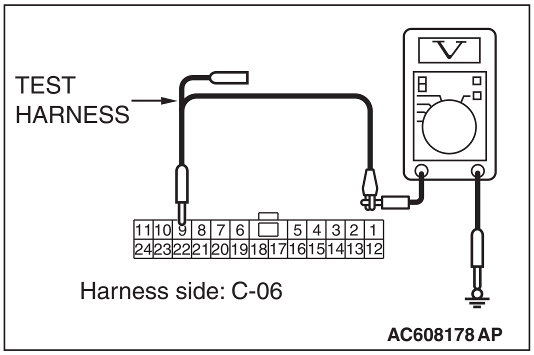
A digital multimeter should be used. For details refer to **P.54C-7****.**

⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7****.**

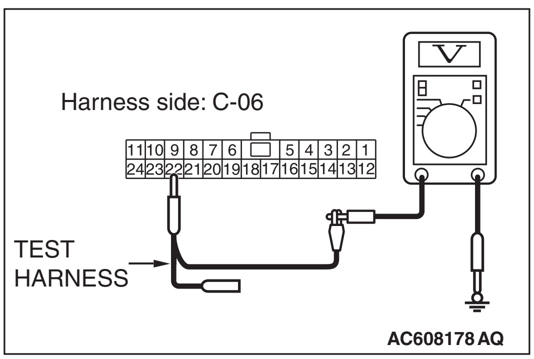
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 9 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 22 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 16.
NO : Go to Step 25.

STEP 15. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

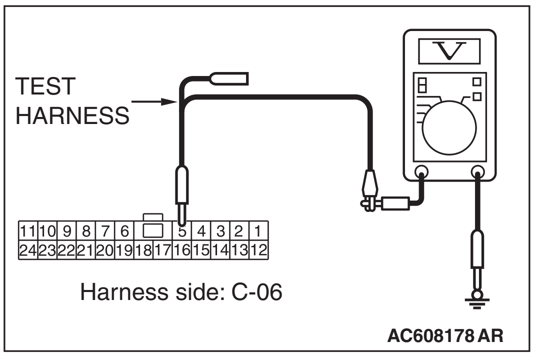
A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

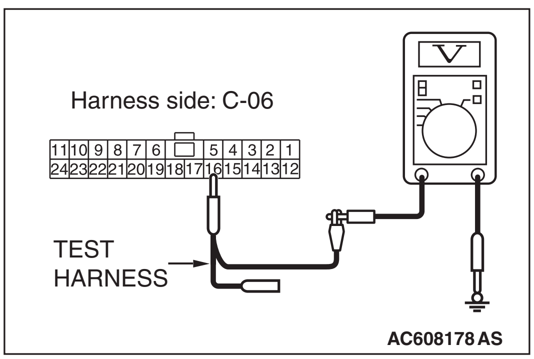
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 5 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 16 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 16.
NO : Go to Step 26.

STEP 16. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

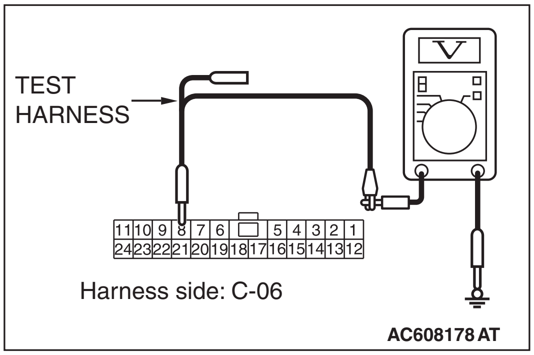
A digital multimeter should be used. For details refer to **P.54C-7****.**

⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7****.**

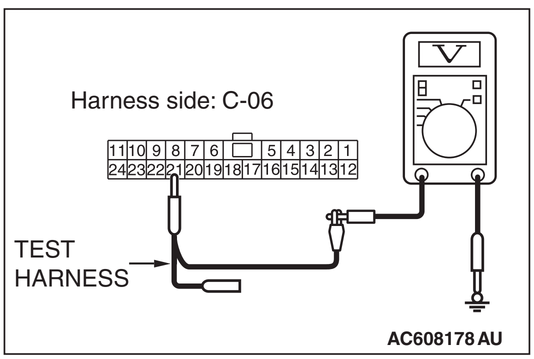
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 8 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 21 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 17.
NO : Go to Step 27.

STEP 17. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

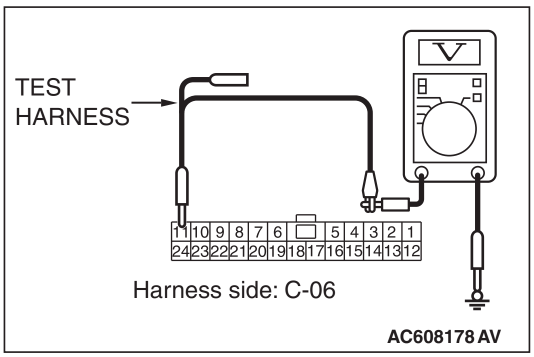
A digital multimeter should be used. For details refer to **P.54C-7****.**

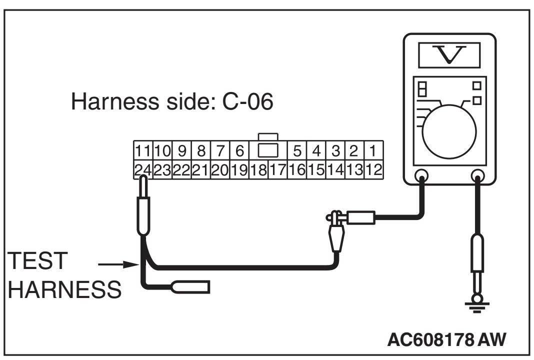
⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7****.**

(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 11 and body ground.

OK: 4.7 volts or less





(4) Measure the voltage between joint connector (CAN1) terminal 24 and body ground.

OK: 4.7 volts or less

Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without hands free system) : Go to Step 19.
YES (vehicles with hands free system) : Go to Step 18.
NO : Go to Step 28.

STEP 18. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

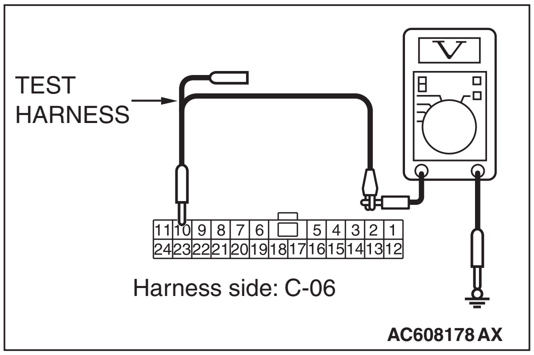
A digital multimeter should be used. For details refer to **P.54C-7.**

⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7.**

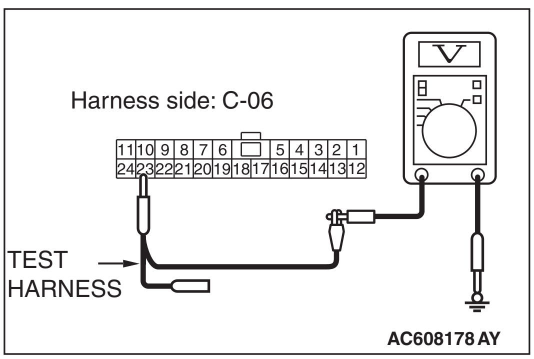
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 10 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 23 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 19.
NO : Go to Step 29.

STEP 19. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

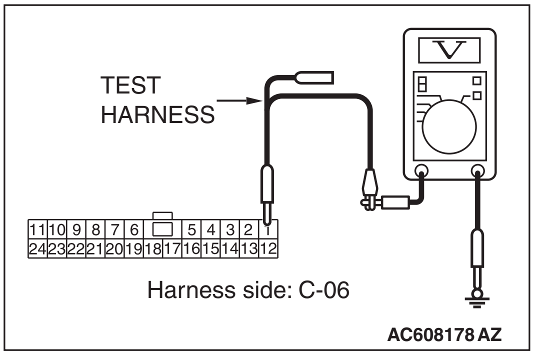
A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

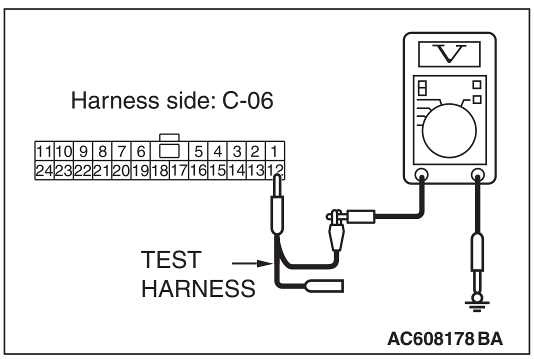
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 1 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 12 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without MMCS) : Go to Step 20.
YES (vehicles with MMCS) : Go to Step 21.
NO : Go to Step 30.

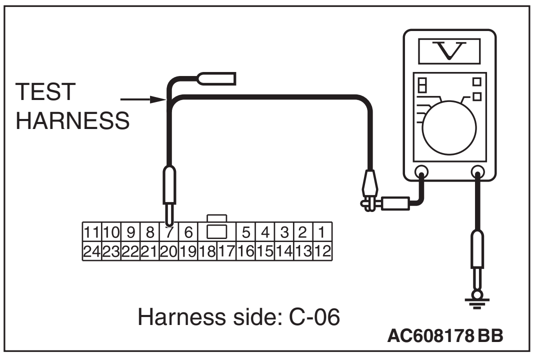
STEP 20. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

A digital multimeter should be used. For details refer to **P.54C-7****.**

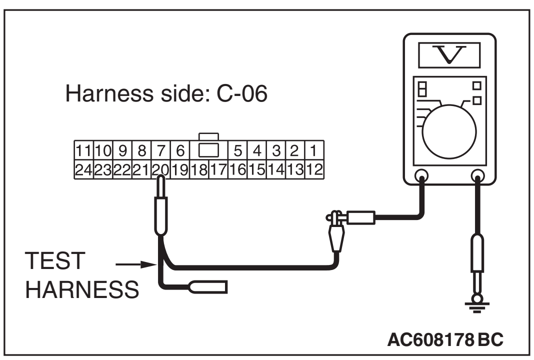
⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7****.**



(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 7 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 20 and body ground.

OK: 4.7 volts or less

Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without satellite radio) : Go to Step 23.
YES (vehicles with satellite radio) : Go to Step 22.
NO : Go to Step 31.

STEP 21. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

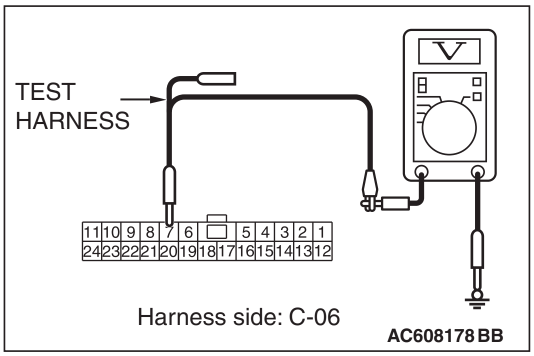
A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

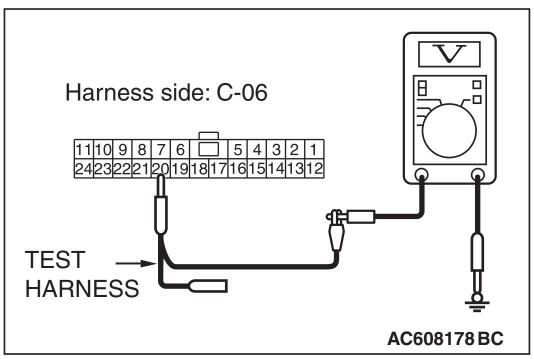
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 7 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 20 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without satellite radio) : Go to Step 23.
YES (vehicles with satellite radio) : Go to Step 22.
NO : Go to Step 32.

STEP 22. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

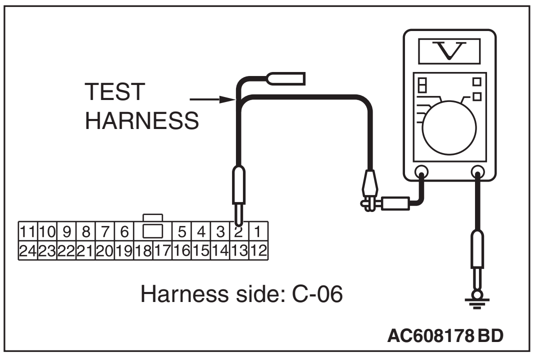
A digital multimeter should be used. For details refer to **P.54C-7.**

⚠ CAUTION

The test wiring harness should be used. For details refer to **P.54C-7.**

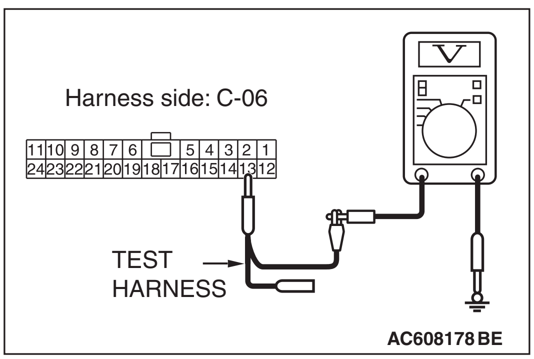
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 2 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 13 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 23.
NO : Go to Step 33.

STEP 23. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

⚠ CAUTION

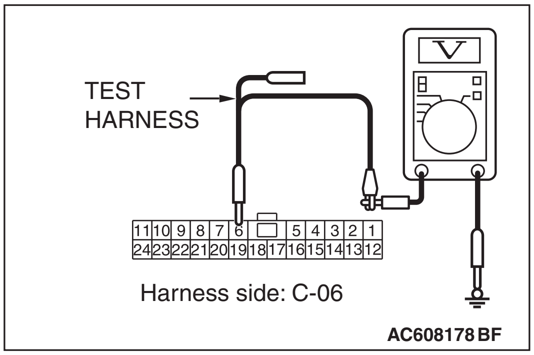
A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54C-7.

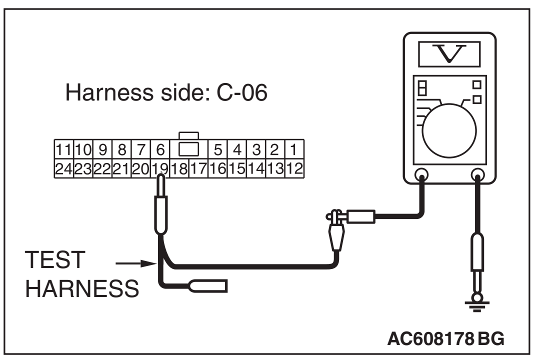
(1) Disconnect joint connector (CAN1) and ETACS-ECU connector C-301, and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 6 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 19 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 34.
NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

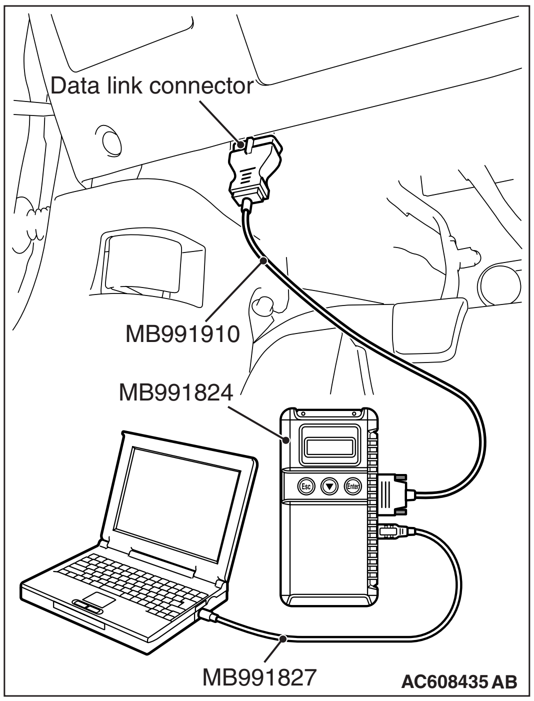
STEP 24. Using scan tool MB991958, diagnose the CAN bus line. (checking the combination meter for internal failure)

⚠ CAUTION

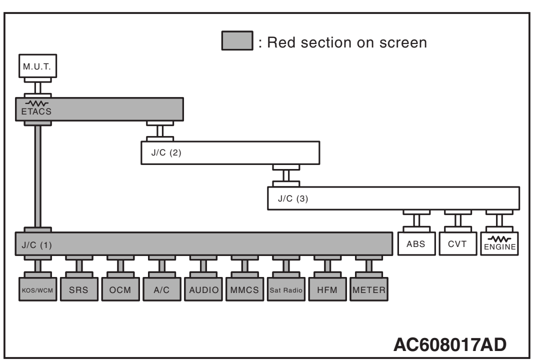
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Disconnect combination meter connector C-04.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04.

NO : Check combination meter connector C-04, and repair if necessary. If the combination meter connector is in good condition, replace the combination meter.

STEP 25. Using scan tool MB991958, diagnose the CAN bus line. (checking the KOS-ECU for internal failure)

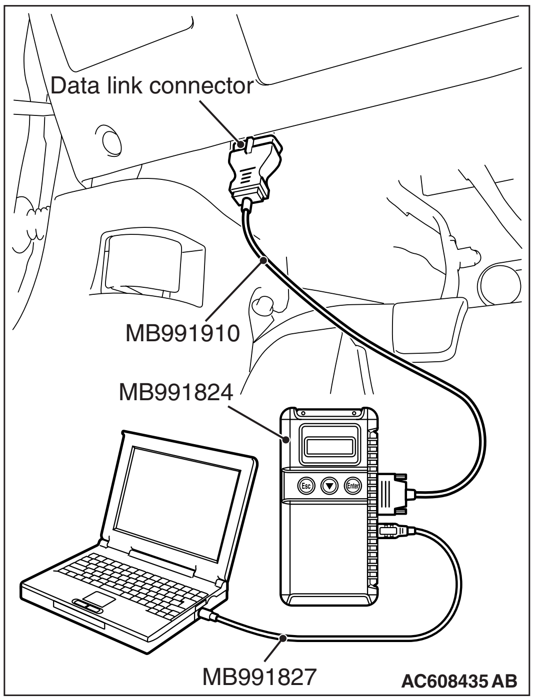
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

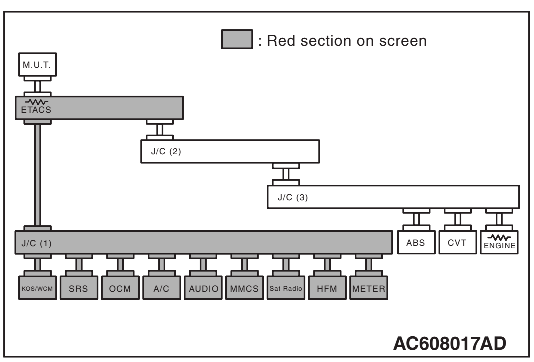
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect KOS-ECU connector C-31.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31.

NO : Check KOS-ECU connector C-31, and repair if necessary. If the KOS-ECU connector is in good condition, replace the KOS-ECU.

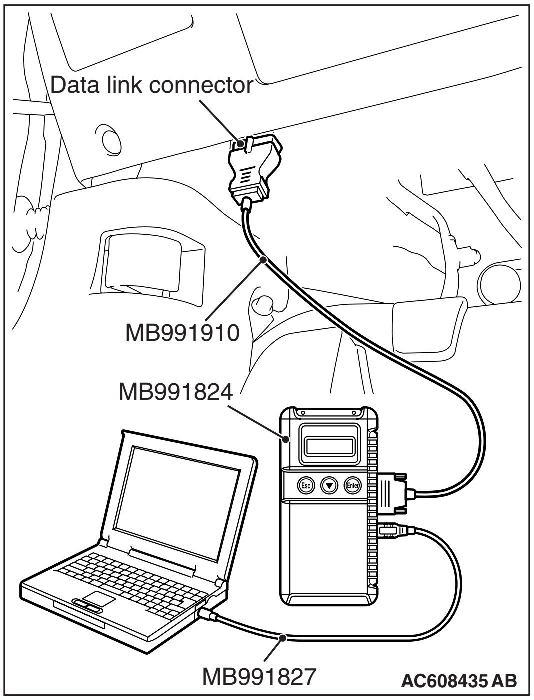
STEP 26. Using scan tool MB991958, diagnose the CAN bus line. (checking the WCM for internal failure)

⚠ CAUTION

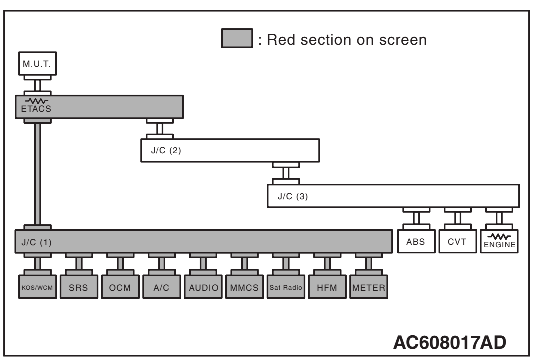
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Disconnect WCM connector C-09.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09.

NO : Check WCM connector C-09, and repair if necessary. If the WCM connector is in good condition, replace the WCM.

STEP 27. Using scan tool MB991958, diagnose the CAN bus line. (checking the SRS-ECU for internal failure)

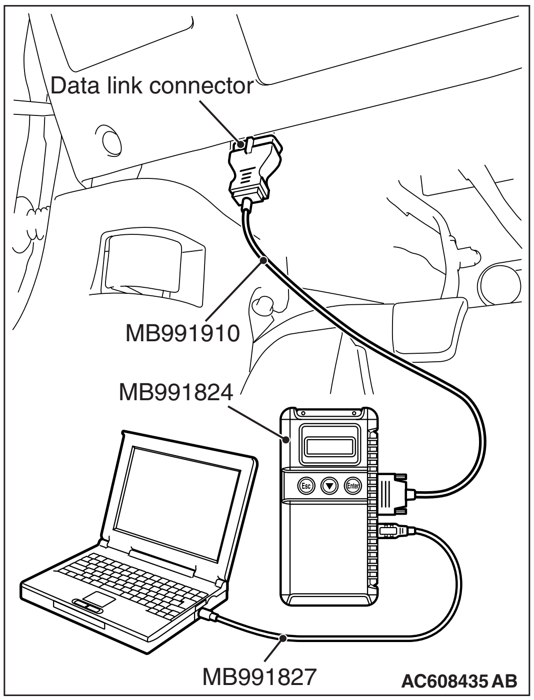
⚠ CAUTION

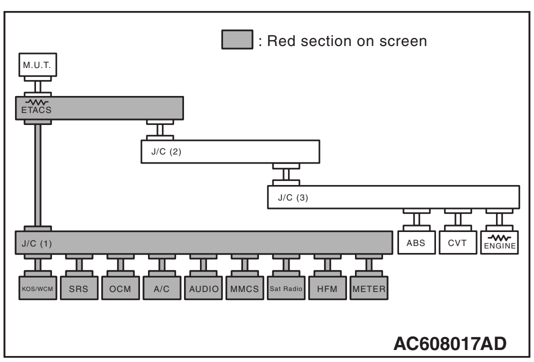
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect SRS-ECU connector C-122.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122.

NO : Check SRS-ECU connector C-122, and repair if necessary. If the SRS-ECU connector is in good condition, replace the SRS-ECU.

STEP 28. Using scan tool MB991958, diagnose the CAN bus line. (checking the occupant classification-ECU for internal failure)

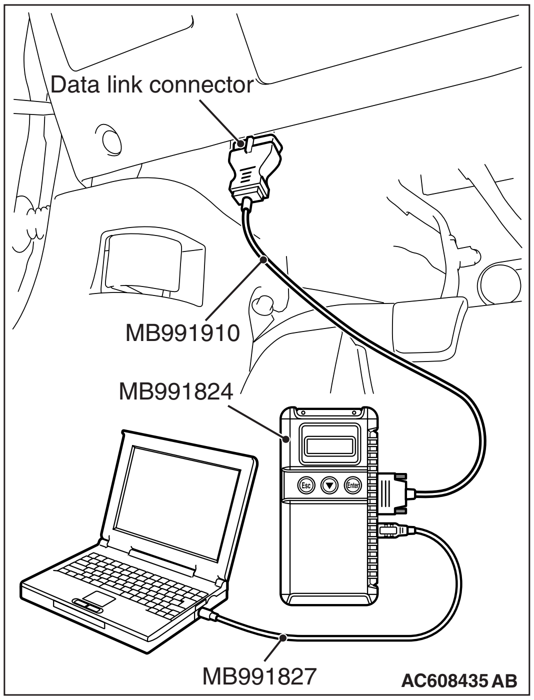
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

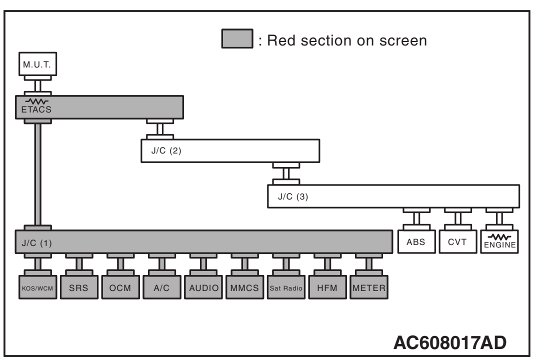
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect occupant classification-ECU connector D-35-2.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2.

NO : Check occupant classification-ECU connector D-35-2, and repair if necessary. If the occupant classification-ECU connector is in good condition, replace the occupant classification-ECU.

STEP 29. Using scan tool MB991958, diagnose the CAN bus line. (checking the hands free module for internal failure)

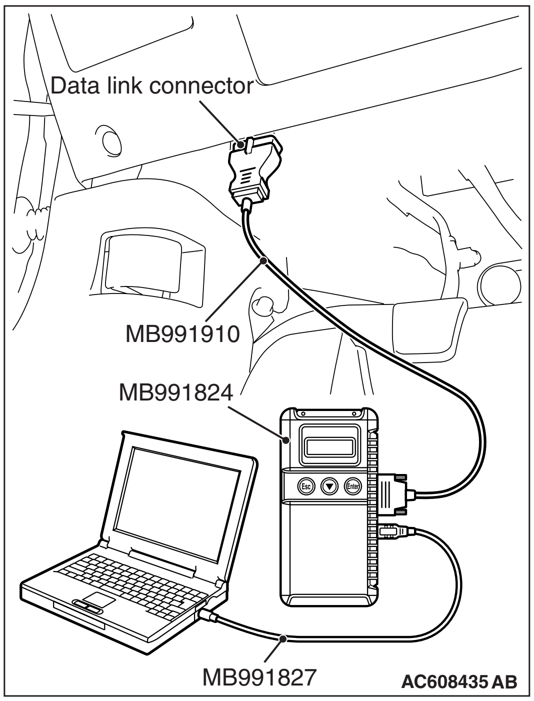
⚠ CAUTION

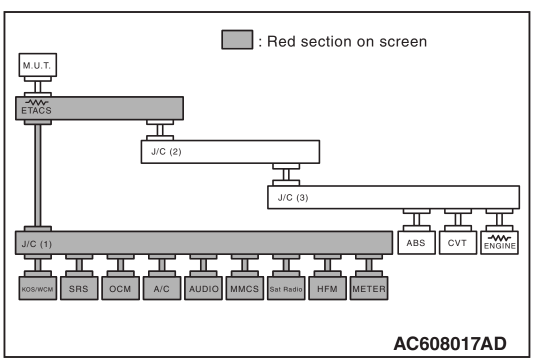
Strictly observe the specified wiring harness repair procedure. For details refer to **P.54C-7****.**

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect hands free module connector C-110.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110.

NO : Check hands free module connector C-110, and repair if necessary. If the hands free module connector is in good condition, replace the hands free module.

STEP 30. Using scan tool MB991958, diagnose the CAN bus line. (checking the A/C-ECU for internal failure)

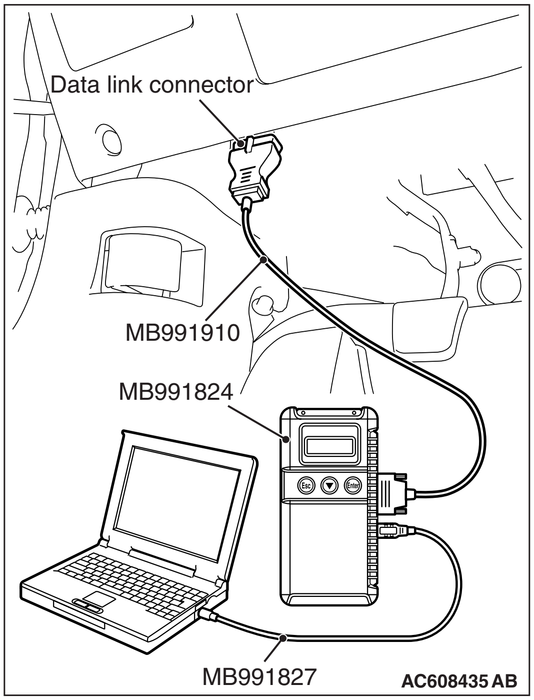
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

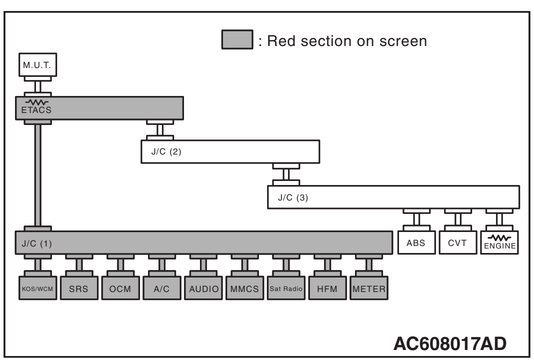
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect A/C-ECU connector C-20.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20.

NO : Check A/C-ECU connector C-20, and repair if necessary. If the A/C-ECU connector is in good condition, replace the A/C-ECU.

STEP 31. Using scan tool MB991958, diagnose the CAN bus line. (checking the radio and CD player or CD changer for internal failure)

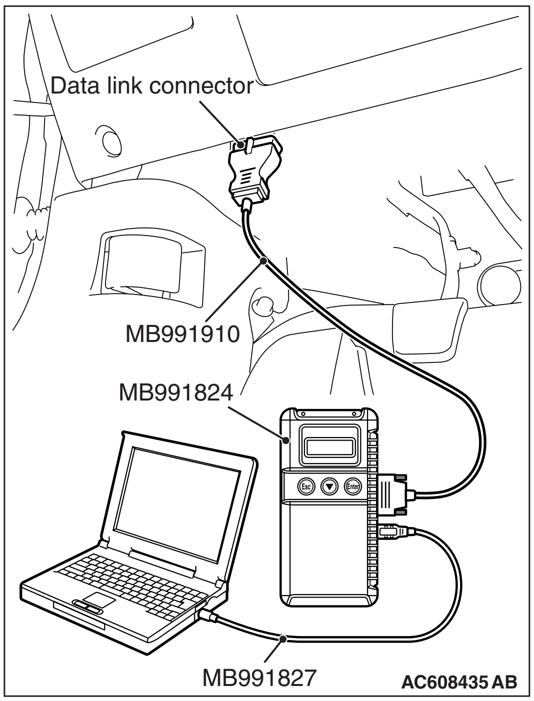
⚠ CAUTION

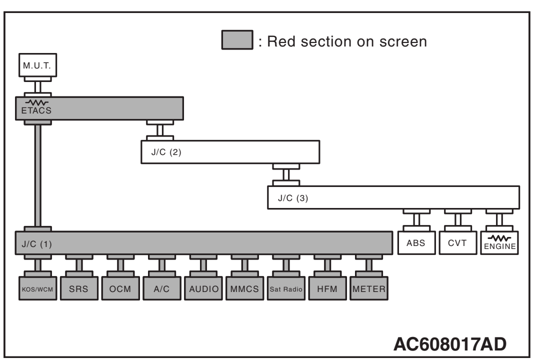
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect radio and CD player or CD changer connector C-104.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104.

NO : Check radio and CD player or CD changer connector C-104, and repair if necessary. If the radio and CD player or CD changer connector is in good condition, replace the radio and CD player or CD changer.

STEP 32. Using scan tool MB991958, diagnose the CAN bus line. (checking the CAN box unit for internal failure)

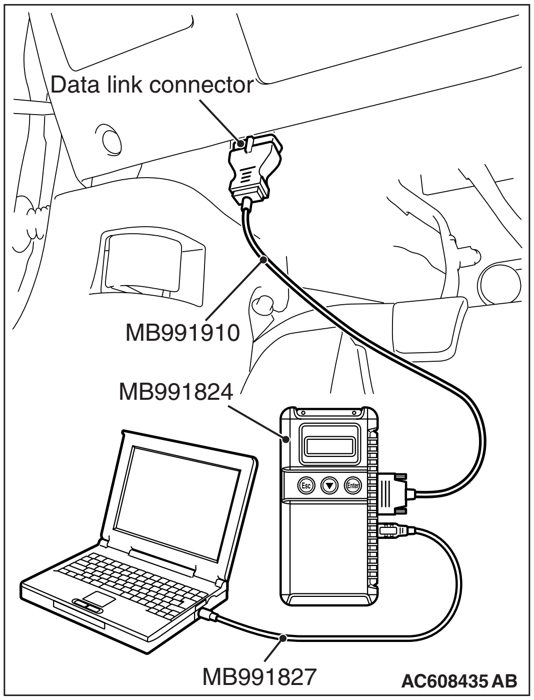
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

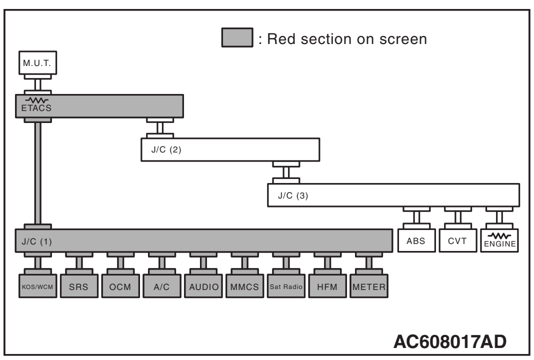
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect CAN box unit connector C-108.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108.

NO : Check CAN box unit connector C-108, and repair if necessary. If the CAN box unit connector is in good condition, replace the CAN box unit.

STEP 33. Using scan tool MB991958, diagnose the CAN bus line. (checking the satellite radio tuner for internal failure)

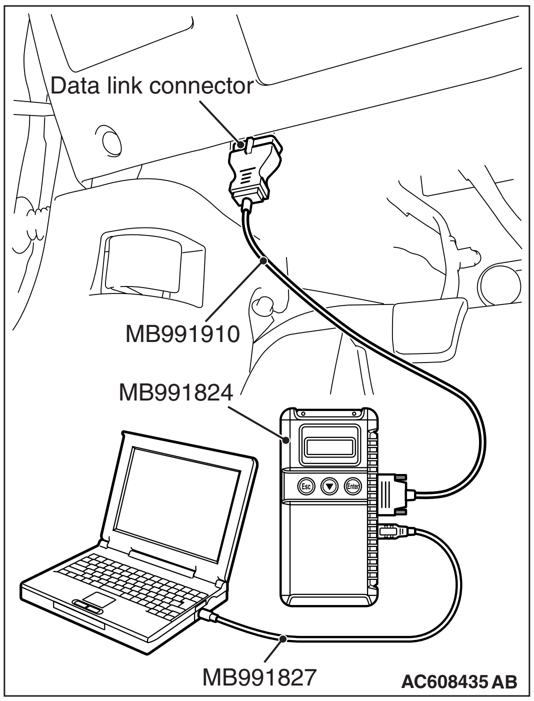
⚠ CAUTION

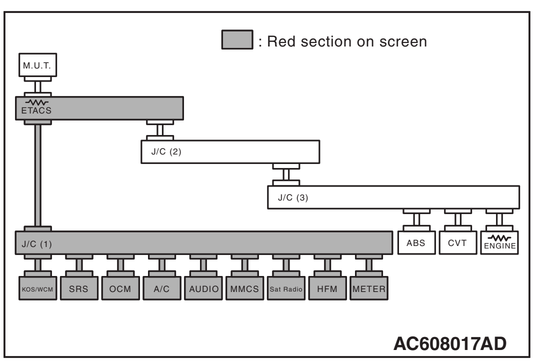
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect satellite radio tuner connector C-17.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17.

NO : Check satellite radio tuner connector C-17, and repair if necessary. If the satellite radio tuner connector is in good condition, replace the satellite radio tuner.

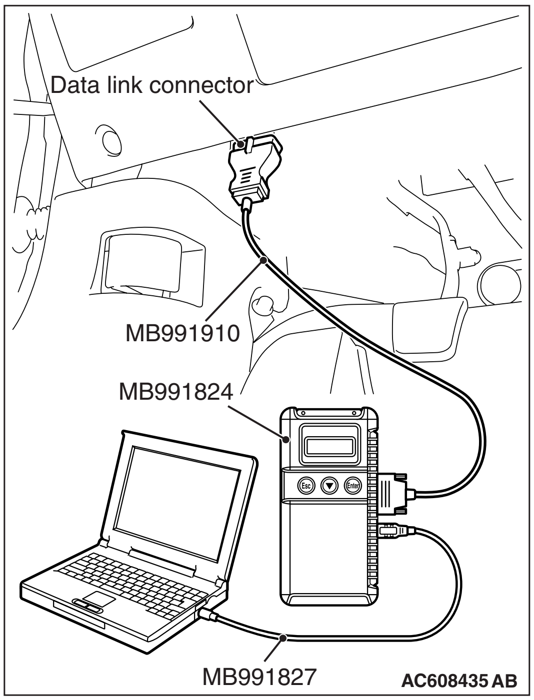
STEP 34. Using scan tool MB991958, diagnose the CAN bus line. (trouble symptom check)

⚠ CAUTION

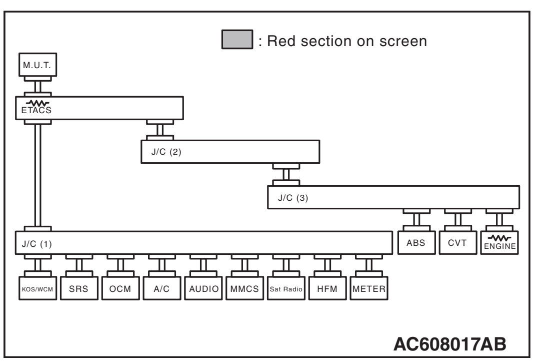
Strictly observe the specified wiring harness repair procedure. For details refer to **P.54C-7****.**

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



(3) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

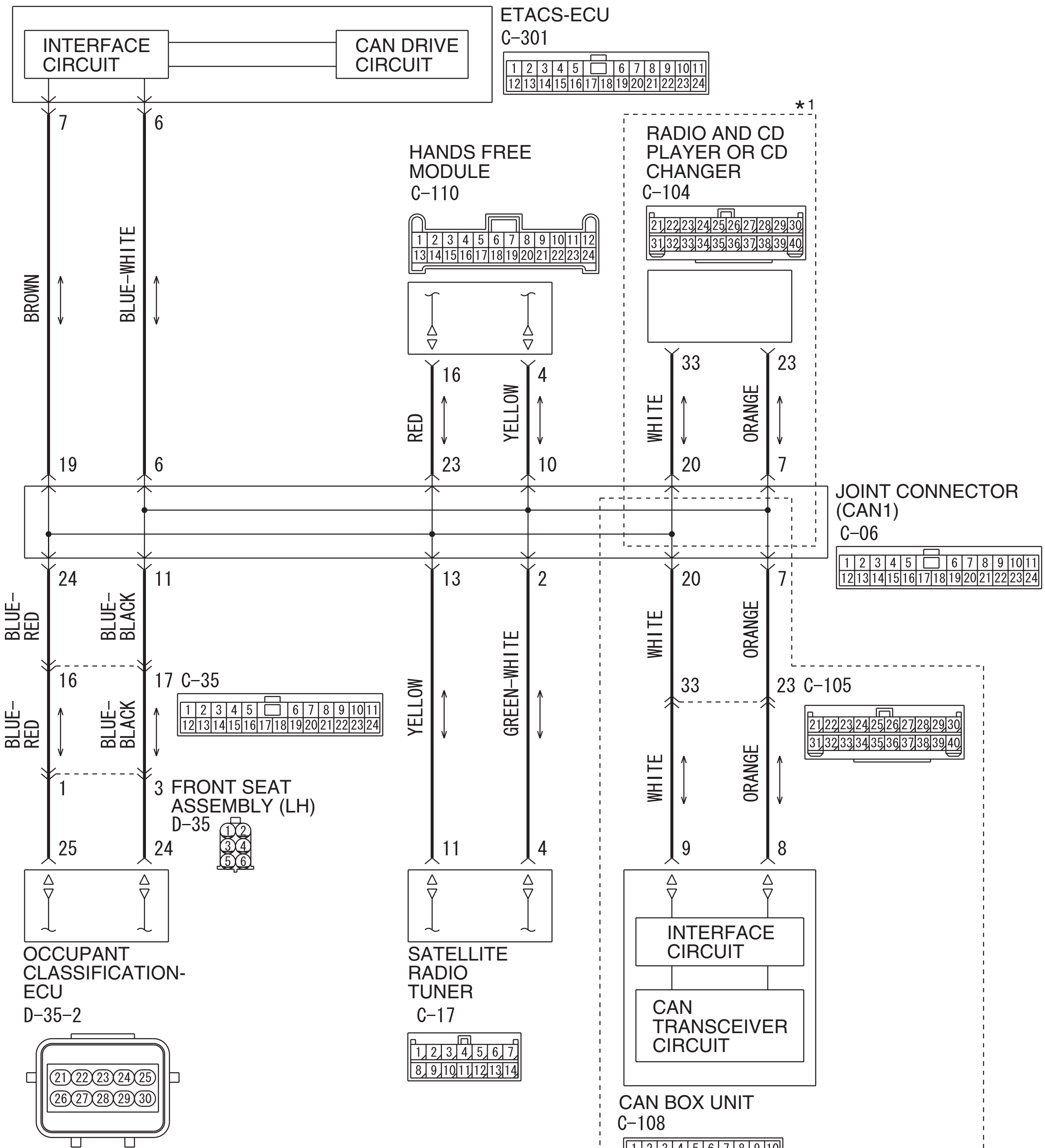
NO : Check the ETACS-ECU connector C-301, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

DIAGNOSTIC ITEM 22: Diagnose the ETACS-ECU, joint connector (CAN1) or lines between ETACS-ECU and joint connector (CAN1).

⚠ CAUTION

When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

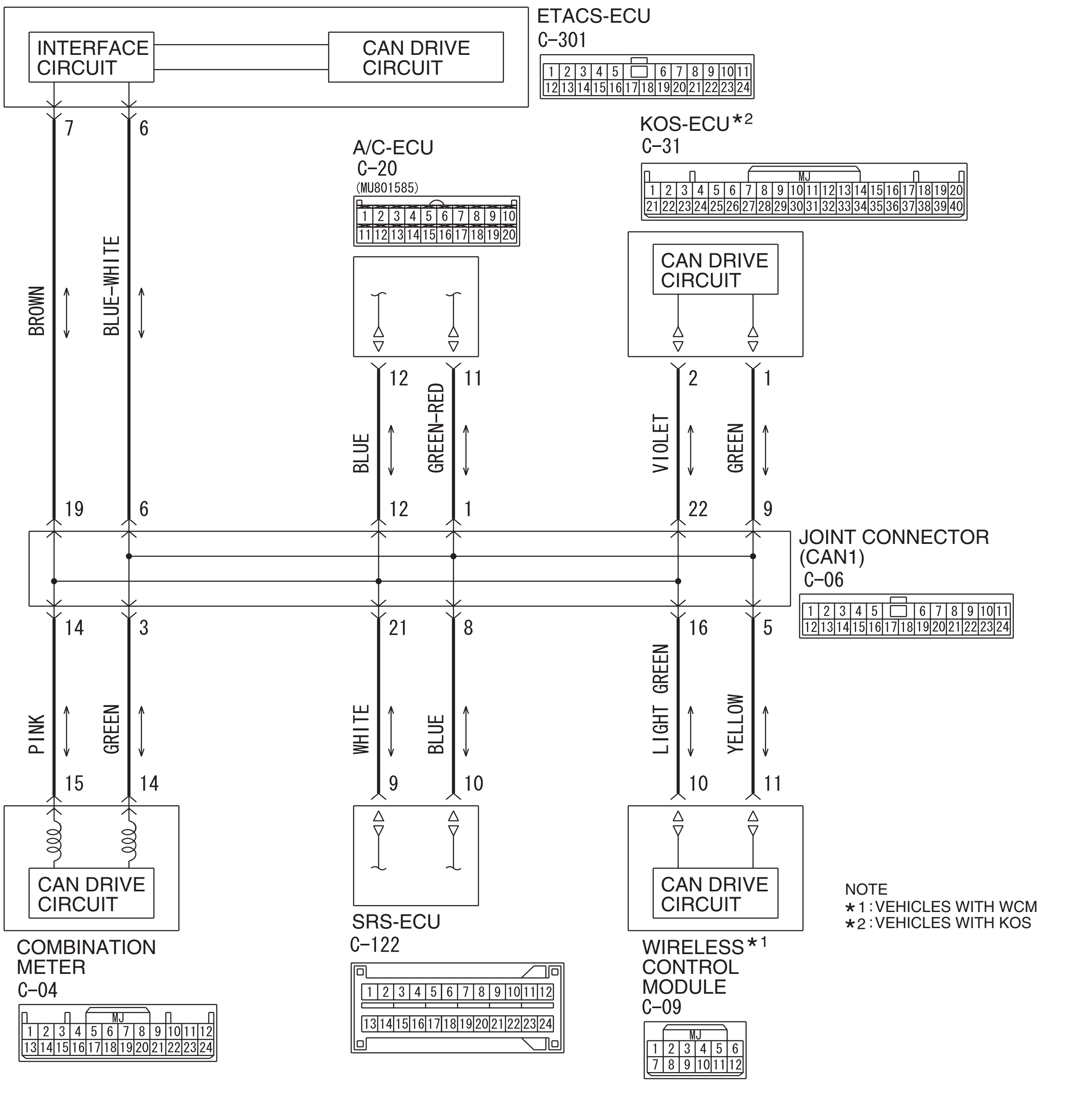
CAN Communication Circuit



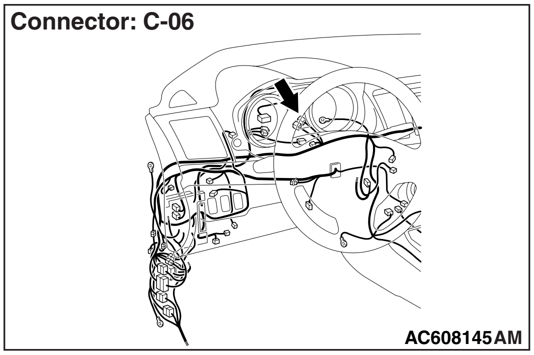
NOTE
*1 : VEHICLES WITHOUT MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)
*2 : VEHICLES WITH MITSUBISHI MULTI-COMMUNICATION SYSTEM (MMCS)

W8G54M003A

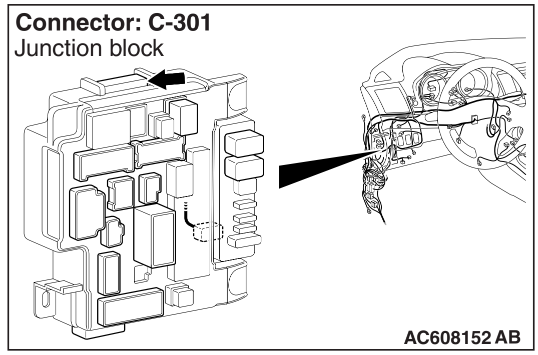
CAN Communication Circuit



Connector: C-06



Connector: C-301
Junction block



FUNCTION

If a failure is present in the wiring harness wires between the ETACS-ECU connector, the joint connector (CAN1), the ETACS-ECU connector and the joint connector (CAN1), this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

If a communication flag is set for none of the ECUs on the CAN-B line, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector [joint connector (CAN1) or ETACS-ECU connector improperly connected]
- Malfunction of the wiring harness [open circuit between the ETACS-ECU connector and the joint connector (CAN1)]
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check joint connector (CAN1) C-06 and EATCS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

⚠ CAUTION

The strand end of the twisted wire should be within 10 cm (4 inches) from the connector. For details refer to P.54C-7.

Q: Are joint connector (CAN1) C-06 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 2.
NO : Repair the damaged parts.

STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

(1) Disconnect joint connector (CAN1) C-06 and ETACS-ECU connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 6) and ETACS-ECU connector C-301 (terminal 6)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 19) and ETACS-ECU connector C-301 (terminal 7)

Q: Is the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 3.
NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

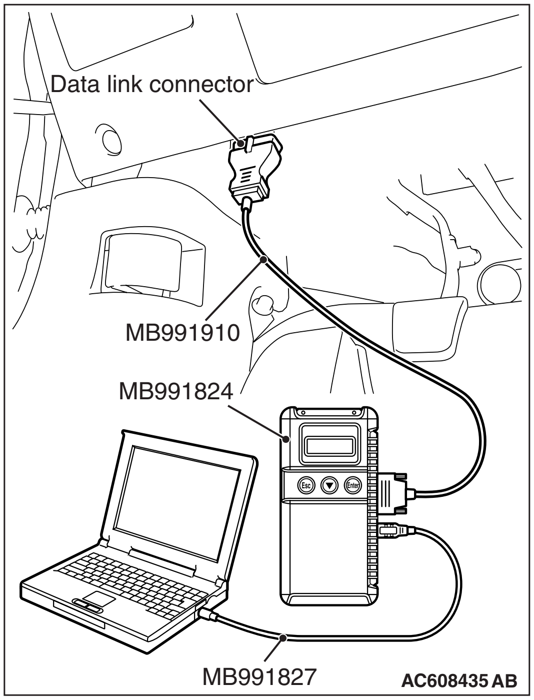
STEP 3. Using scan tool MB991958, diagnose the CAN bus line. (trouble symptom check)

⚠ CAUTION

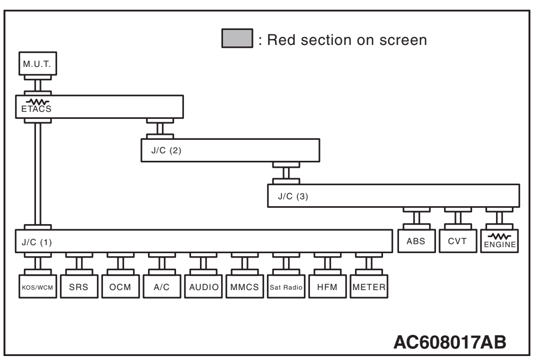
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



(3) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

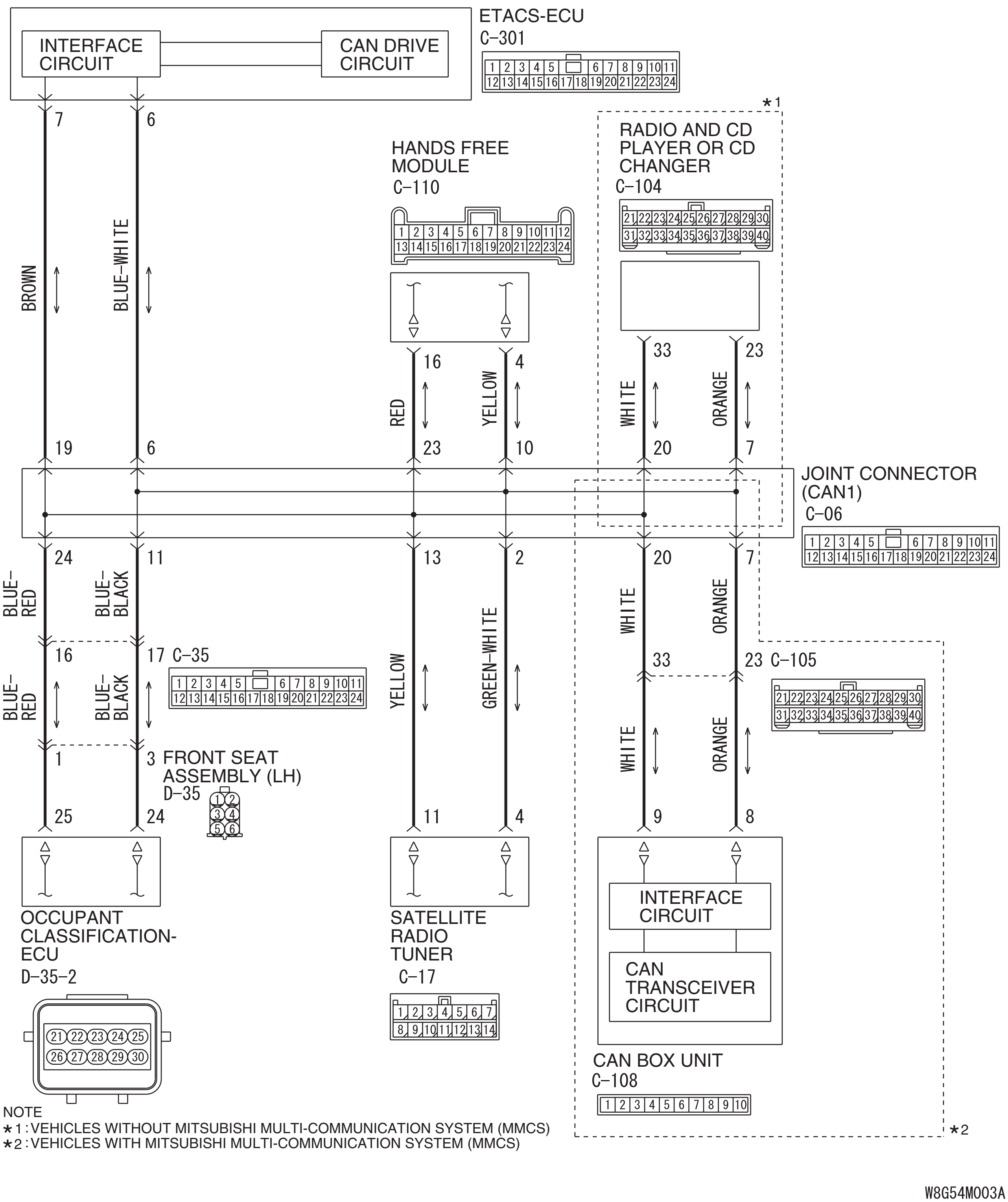
NO : Replace the ETACS-ECU.

DIAGNOSTIC ITEM 23: Short to power supply or ground, open circuit or line-to-line short in the CAN-B bus lines.

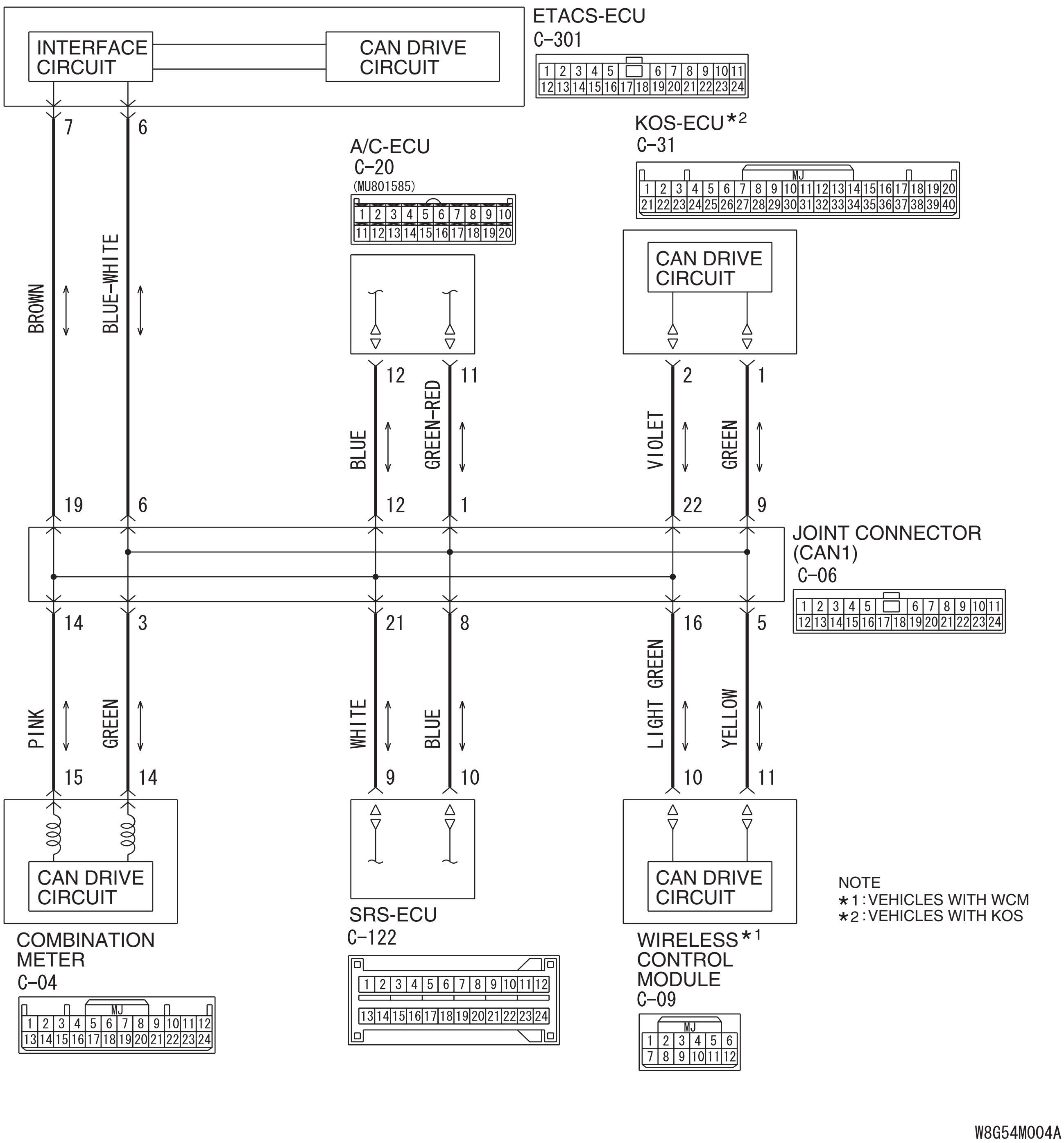
⚠ CAUTION

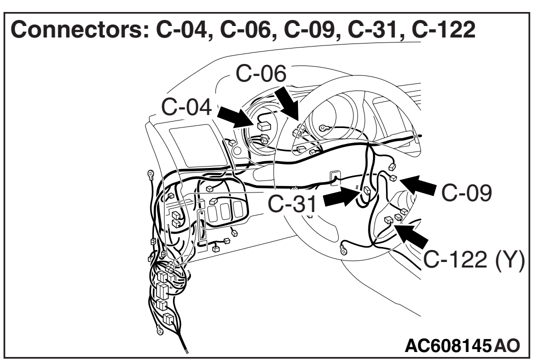
When servicing a CAN bus line, ground yourself by touching a metal object such as an unpainted water pipe. If you fail to do so, a component connected to the CAN bus line may be damaged.

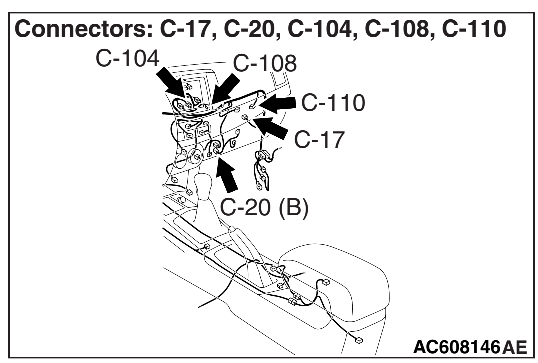
CAN Communication Circuit



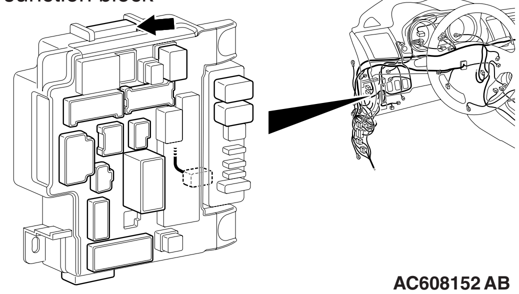
CAN Communication Circuit





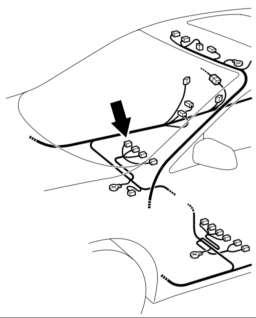


Connector: C-301
Junction block



AC608152 AB

Connector: D-35-2



AC608165 AC

FUNCTION

If a short to power supply or ground, open circuit or line-to-line short is present at either CAN_H or CAN_L side on the CAN-B lines, this diagnosis result will be set.

TROUBLE JUDGEMENT CONDITIONS

When CAN-B lines communication is normal, and diagnostic trouble code U0019 is set, the ETACS-ECU determines that there is a failure.

TROUBLESHOOTING HINTS

- Malfunction of the connector (short to power supply or ground in connector or improperly connected)
- Malfunction of the wiring harness (short to power supply or ground, open circuit or line-to-line short in CAN bus lines)
- Faulty ECU(s) (internal short to power supply or ground)

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check the wiring harness between ETACS-ECU connector C-301 and body ground for a short to ground. Measure the resistance at ETACS-ECU connector C-301.

⚠ CAUTION

Disconnect the negative battery terminal. For details refer to P.54C-7.

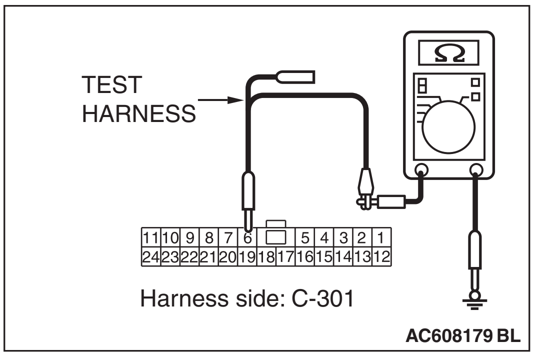
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54C-7.

⚠ CAUTION

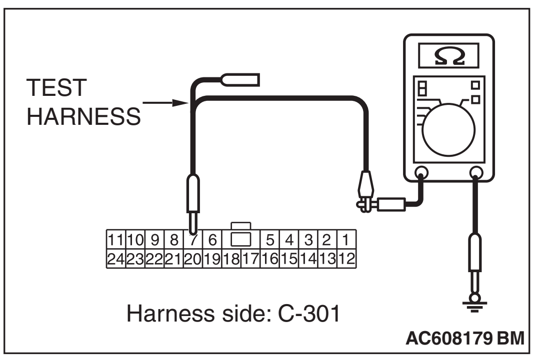
The test wiring harness should be used. For details refer to P.54C-7.

(1) Disconnect ETACS-ECU connector C-301, and measure the voltage at the wiring harness side of ETACS-ECU connector.



(2) Measure the resistance between ETACS-ECU connector terminal 6 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between ETACS-ECU connector terminal 7 and body ground.

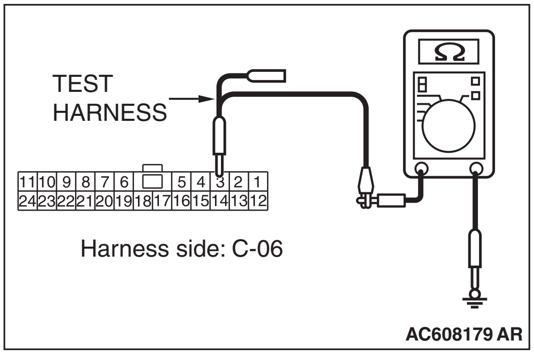
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 2.
NO : Go to Step 13.

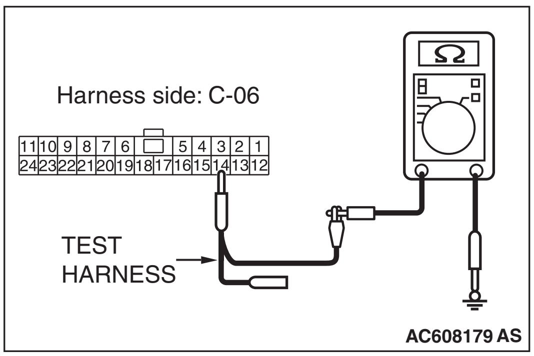
STEP 2. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 3 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 14 and body ground.

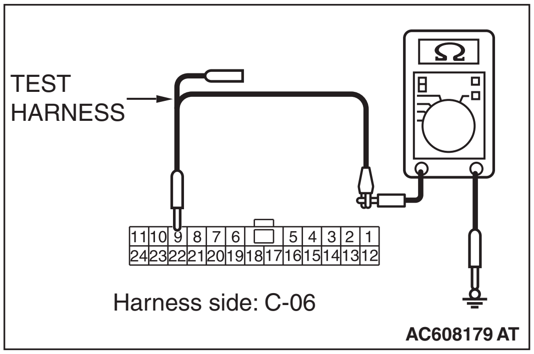
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles with KOS) : Go to Step 3.
YES (vehicles with WCM) : Go to Step 4.
NO (vehicles with KOS or WCM) : Go to Step 48.

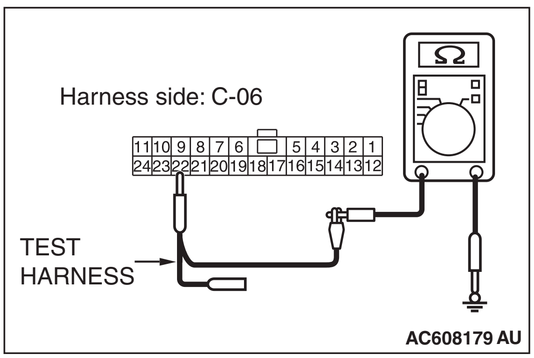
STEP 3. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 9 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 22 and body ground.

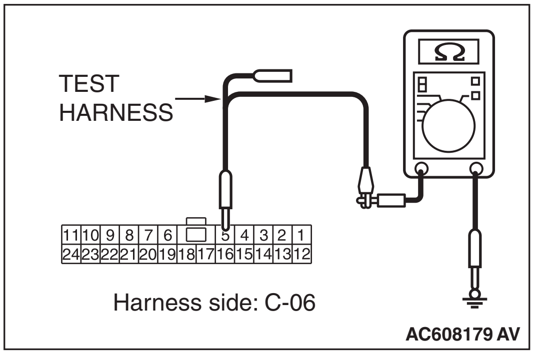
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 5.
NO : Go to Step 49.

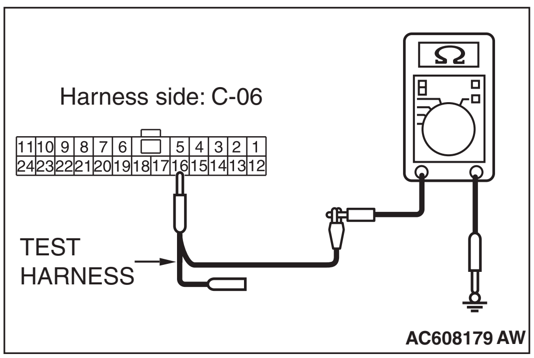
STEP 4. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 5 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 16 and body ground.

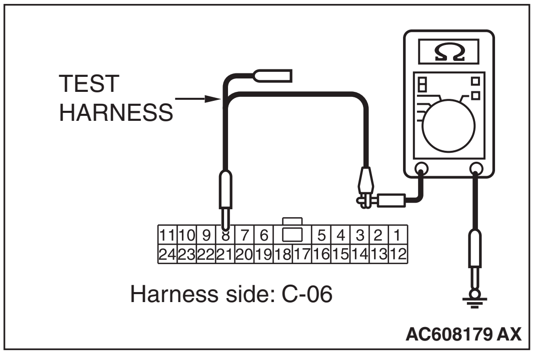
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 5.
NO : Go to Step 50.

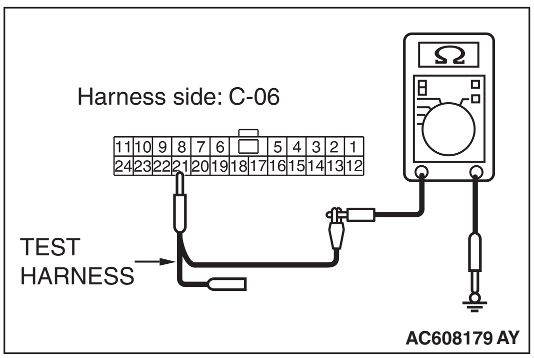
STEP 5. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 8 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 21 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

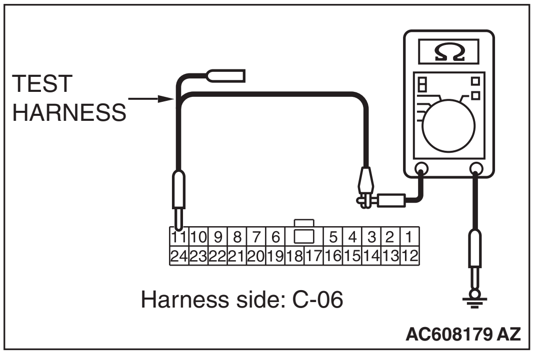
YES : Go to Step 6.

NO : Go to Step 51.

STEP 6. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

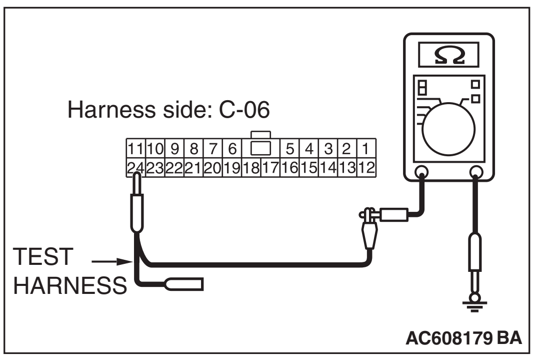
(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).

(2) Measure the resistance between joint connector (CAN1) terminal 11 and body ground.



OK: 1 kilo ohm or more

(3) Measure the resistance between joint connector (CAN1) terminal 24 and body ground.



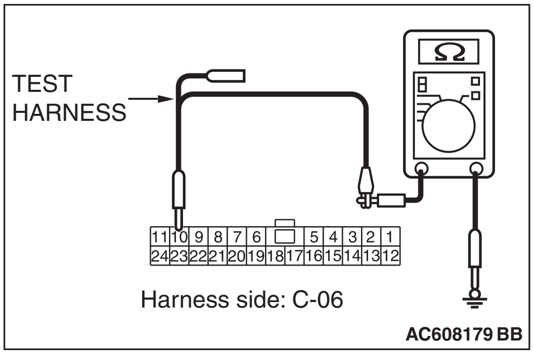
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without hands free system) : Go to Step 8.
YES (vehicles with hands free system) : Go to Step 7.
NO : Go to Step 52.

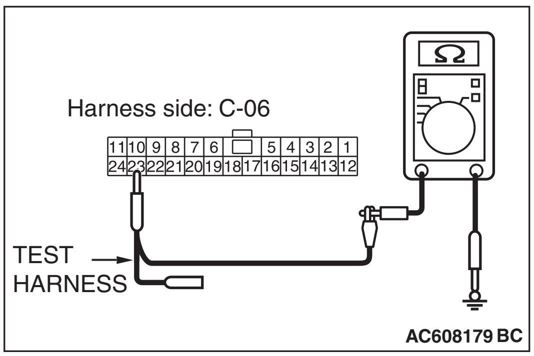
STEP 7. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 10 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 23 and body ground.

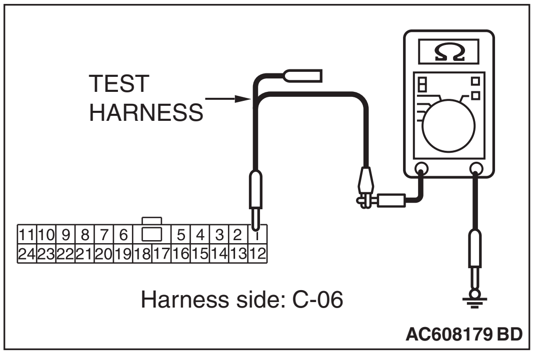
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 8.
NO : Go to Step 53.

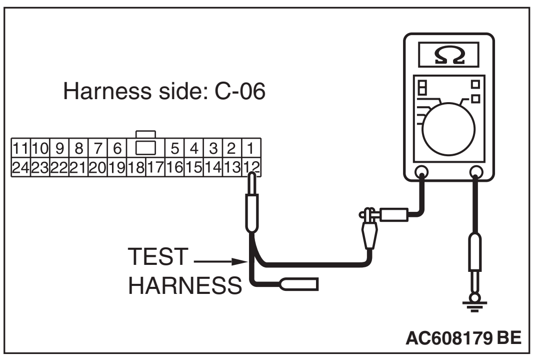
STEP 8. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 1 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 12 and body ground.

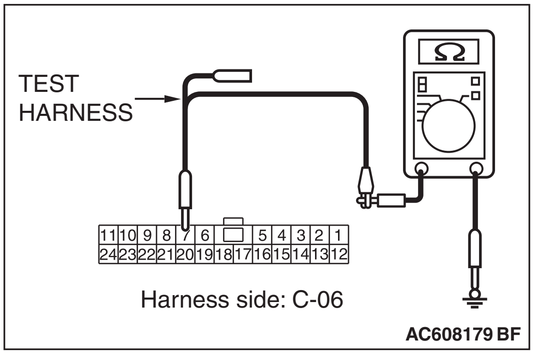
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without MMCS) : Go to Step 9.
YES (vehicles with MMCS) : Go to Step 10.
NO : Go to Step 54.

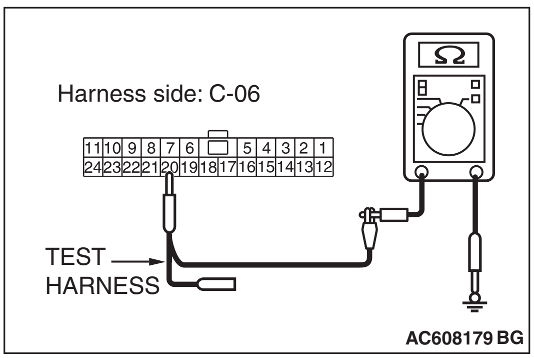
STEP 9. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 7 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 20 and body ground.

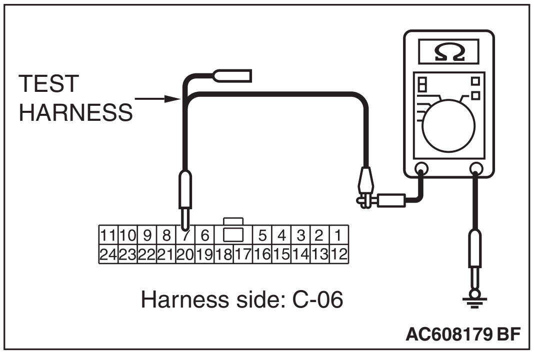
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without satellite radio) : Go to Step 12.
YES (vehicles with satellite radio) : Go to Step 11.
NO : Go to Step 55.

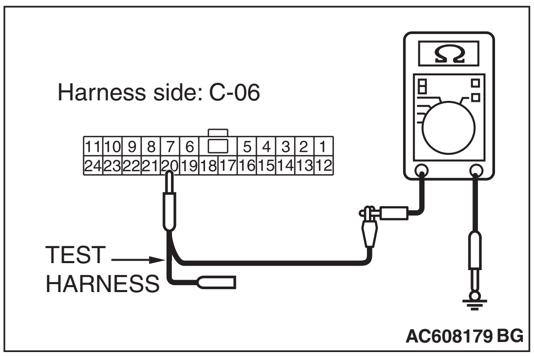
STEP 10. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 7 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 20 and body ground.

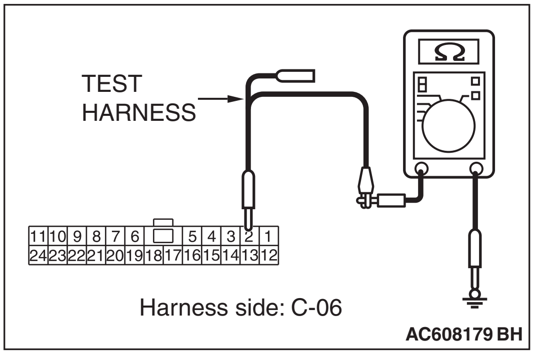
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES (vehicles without satellite radio) : Go to Step 12.
YES (vehicles with satellite radio) : Go to Step 11.
NO : Go to Step 56.

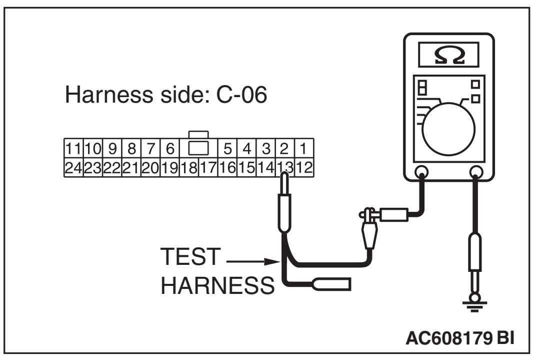
STEP 11. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 2 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 13 and body ground.

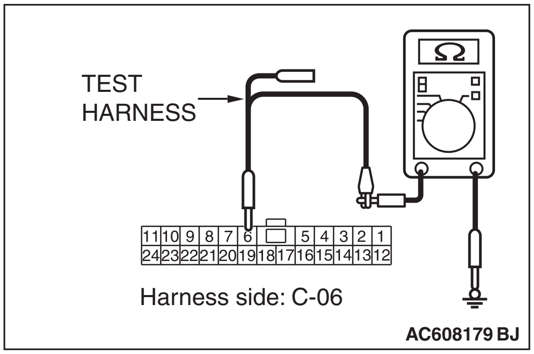
OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

YES : Go to Step 12.
NO : Go to Step 57.

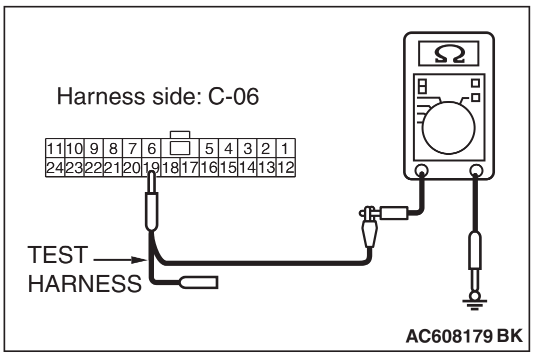
STEP 12. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 for a short to ground. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1) and ETACS-ECU connector C-301, and measure the resistance at the wiring harness side of joint connector (CAN1).



(2) Measure the resistance between joint connector (CAN1) terminal 6 and body ground.

OK: 1 kilo ohm or more



(3) Measure the resistance between joint connector (CAN1) terminal 19 and body ground.

OK: 1 kilo ohm or more

Q: Do all the resistances measure 1 kilo ohm or more?

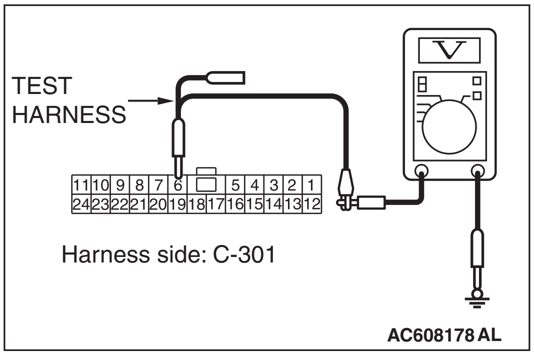
YES : Go to Step 58.

NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

STEP 13. Check the wiring harness between ETACS-ECU connector C-301 and body ground for a short to power supply. Measure the voltage at ETACS-ECU connector C-301.

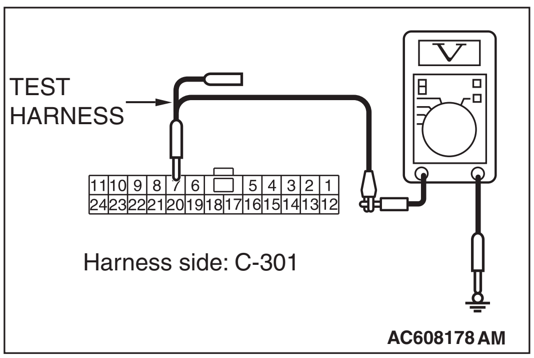
(1) Disconnect ETACS-ECU connector C-301, and measure the voltage at the wiring harness side of ETACS-ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between ETACS-ECU connector terminal 6 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between ETACS-ECU connector terminal 7 and body ground.

OK: 4.7 volts or less



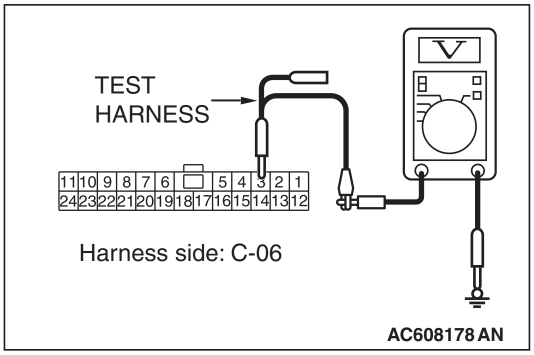
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 25.
NO : Go to Step 14.

STEP 14. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

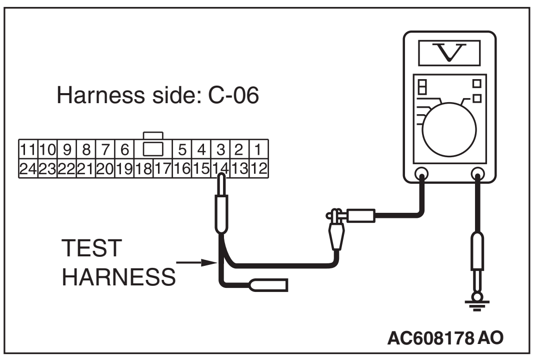
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Connect the negative battery terminal.
(3) Turn the ignition switch to the ON position.
(4) Measure the voltage between joint connector (CAN1) terminal 3 and body ground.

OK: 4.7 volts or less



(5) Measure the voltage between joint connector (CAN1) terminal 14 and body ground.

OK: 4.7 volts or less



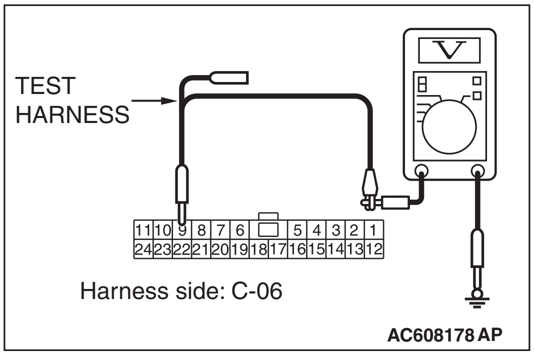
Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles with KOS) : Go to Step 15.
YES (vehicles with WCM) : Go to Step 16.
NO (vehicles with KOS and WCM) : Go to Step 48.

STEP 15. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

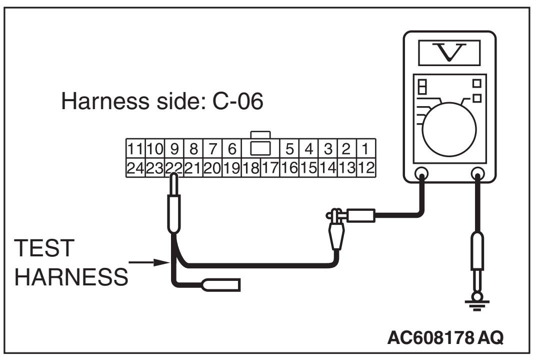
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 9 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 22 and body ground.

OK: 4.7 volts or less



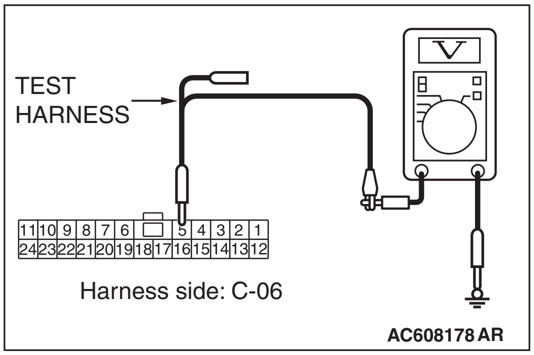
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 17.
NO : Go to Step 49.

STEP 16. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

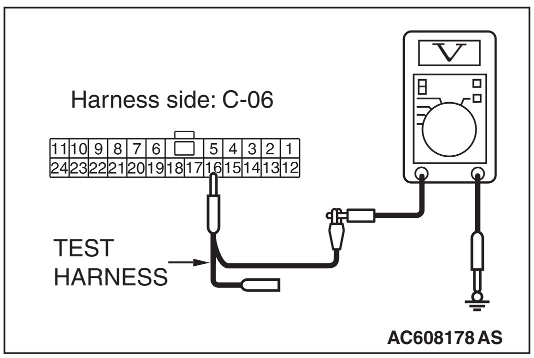
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 5 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 16 and body ground.

OK: 4.7 volts or less



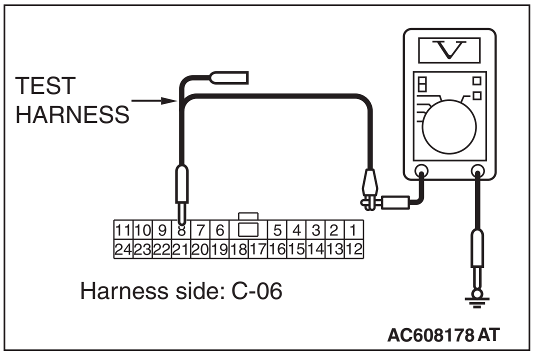
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 17.
NO : Go to Step 50.

STEP 17. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

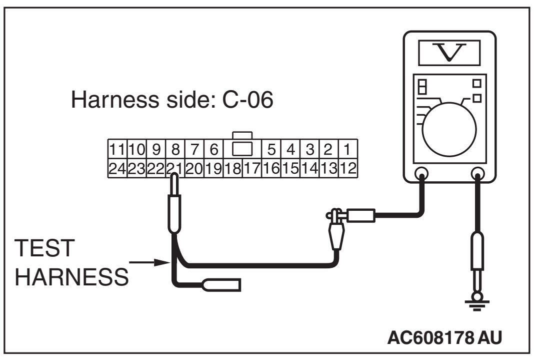
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 8 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 21 and body ground.

OK: 4.7 volts or less



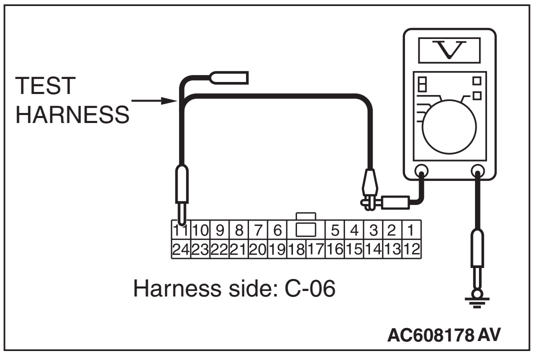
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 18.
NO : Go to Step 51.

STEP 18. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

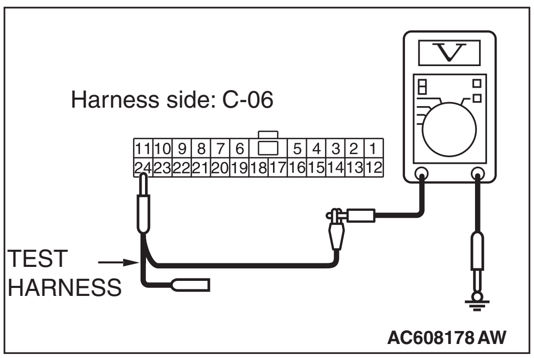
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 11 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 24 and body ground.

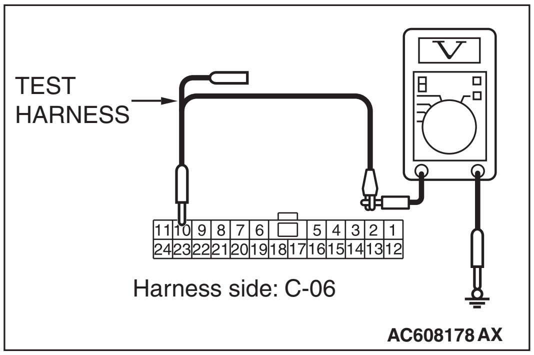
OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

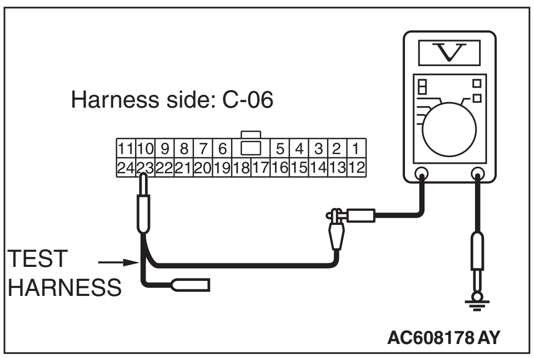
YES (vehicles without hands free system) : Go to Step 20.
YES (vehicles with hands free system) : Go to Step 19.
NO : Go to Step 52.

STEP 19. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 10 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 23 and body ground.

OK: 4.7 volts or less

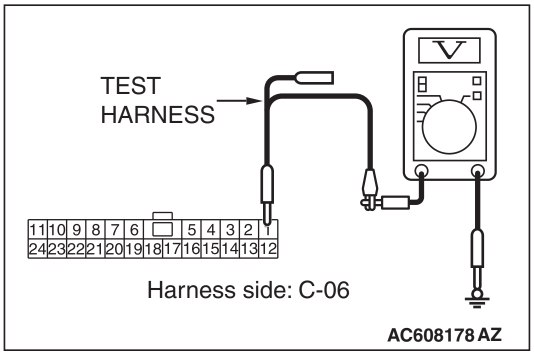
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 20.
NO : Go to Step 53.

STEP 20. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

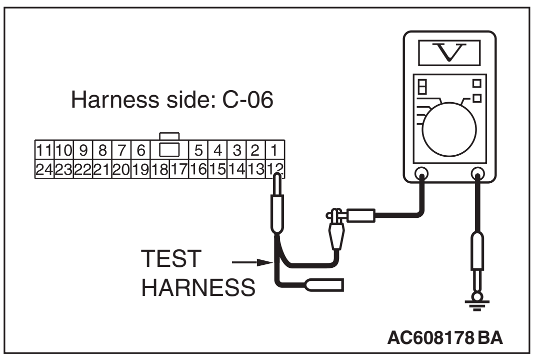
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 1 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 12 and body ground.

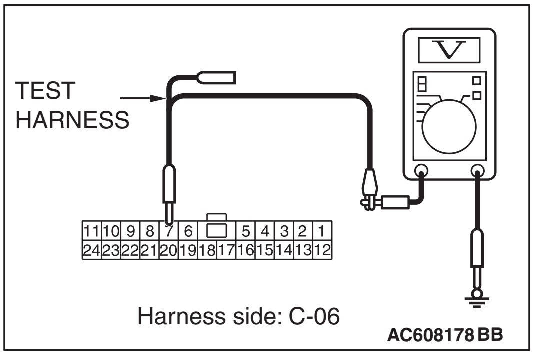
OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

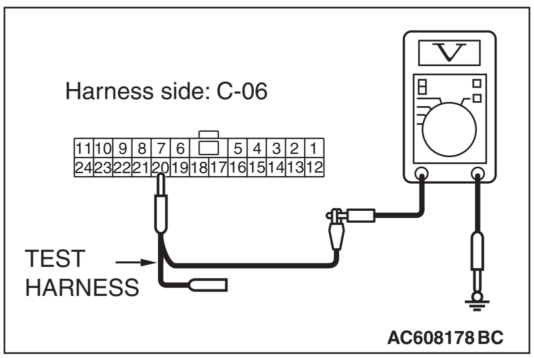
YES (vehicles without MMCS) : Go to Step 21.
YES (vehicles with MMCS) : Go to Step 22.
NO : Go to Step 54.

STEP 21. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 7 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 20 and body ground.

OK: 4.7 volts or less

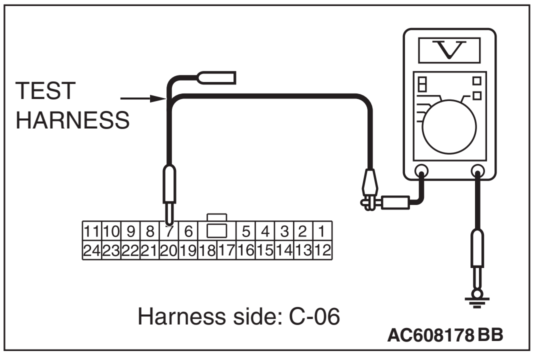
Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without satellite radio) : Go to Step 24.
YES (vehicles with satellite radio) : Go to Step 23.
NO : Go to Step 55.

STEP 22. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

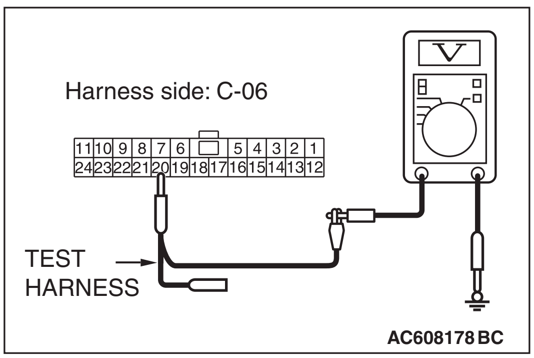
(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 7 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 20 and body ground.

OK: 4.7 volts or less



Q: Do all the voltages measure 4.7 volts or less?

YES (vehicles without satellite radio) : Go to Step 24.
YES (vehicles with satellite radio) : Go to Step 23.
NO : Go to Step 56.

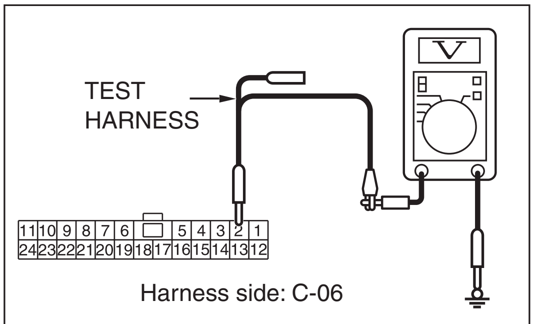
STEP 23. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and measure the voltage at the wiring harness side of joint connector (CAN1).

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between joint connector (CAN1) terminal 2 and body ground.

OK: 4.7 volts or less



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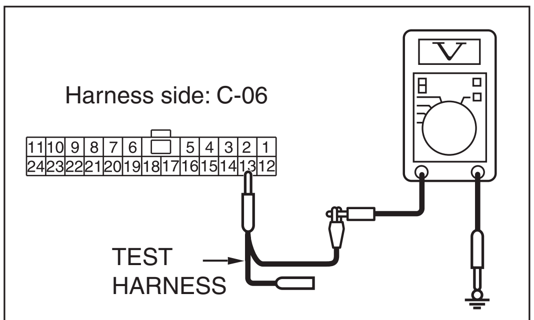

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(4) Measure the voltage between joint connector (CAN1) terminal 13 and body ground.

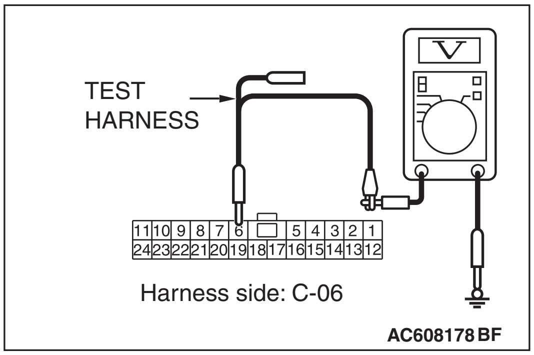
OK: 4.7 volts or less

Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 24.

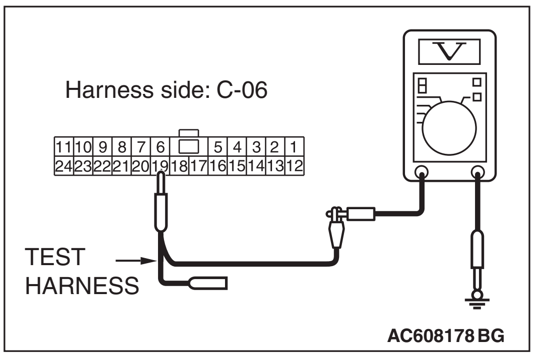
NO : Go to Step 57.

STEP 24. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 for a short to power supply. Measure the voltage at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1) and ETACS-ECU connector C-301, and measure the voltage at the wiring harness side of joint connector (CAN1).
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between joint connector (CAN1) terminal 6 and body ground.

OK: 4.7 volts or less



(4) Measure the voltage between joint connector (CAN1) terminal 19 and body ground.

OK: 4.7 volts or less

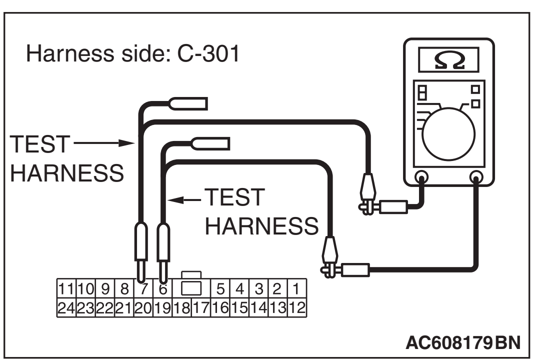
Q: Do all the voltages measure 4.7 volts or less?

YES : Go to Step 58.
NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

STEP 25. Check the wiring harness for line-to-line short. Measure the resistance at ETACS-ECU connector C-301

⚠ CAUTION

Disconnect the negative battery terminal. For details refer to **P.54C-7****.**

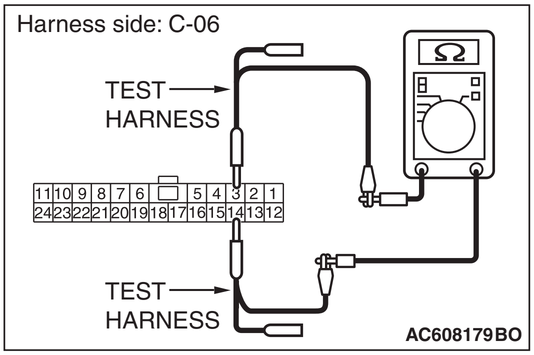


(1) Disconnect ETACS-ECU connector C-301, and check that there is continuity at the harness side of ETACS-ECU.
(2) Check that there is continuity between ETACS-ECU connector terminals 6 and 7.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 37.
NO : Go to Step 26.



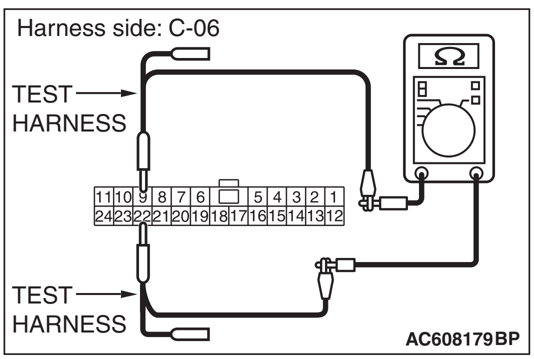
STEP 26. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 3 and 14.

OK: No continuity

Q: Is the check result normal?

YES (vehicles with KOS) : Go to Step 27.
YES (vehicles with WCM) : Go to Step 28.
NO (vehicles with KOS or WCM) : Go to Step 48.



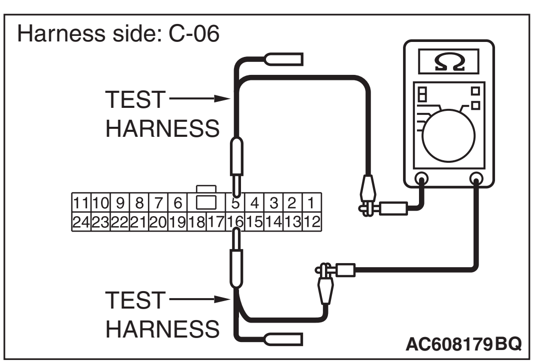
STEP 27. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 9 and 22.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 29.
NO : Go to Step 49.



STEP 28. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

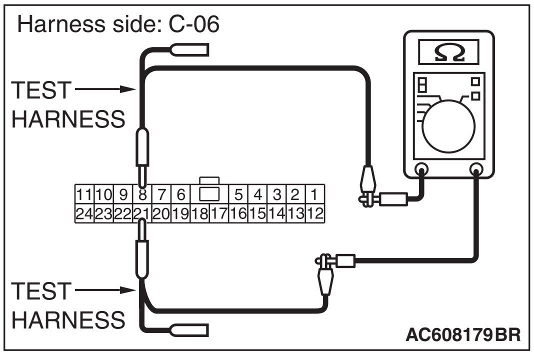
(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 5 and 16.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 29.
NO : Go to Step 50.

STEP 29. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.



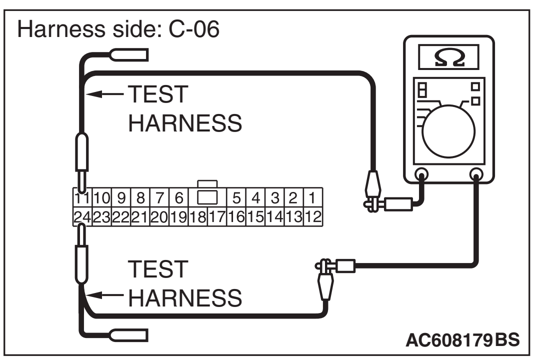
(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 8 and 21.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 30.
NO : Go to Step 51.

STEP 30. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.



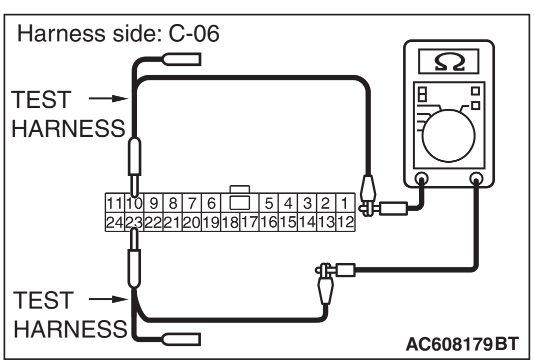
(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 11 and 24.

OK: No continuity

Q: Is the check result normal?

YES (vehicles without hands free system) : Go to Step 32.
YES (vehicles with hands free system) : Go to Step 31.
NO : Go to Step 52.

STEP 31. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

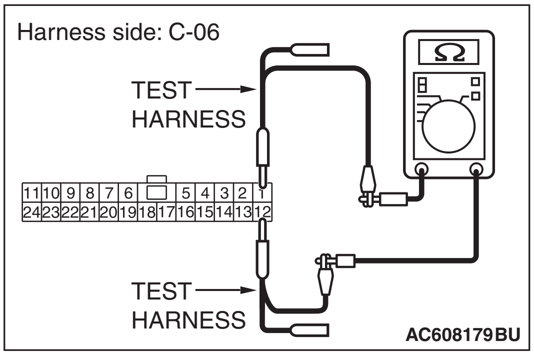


(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 10 and 23.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 32.
NO : Go to Step 53.



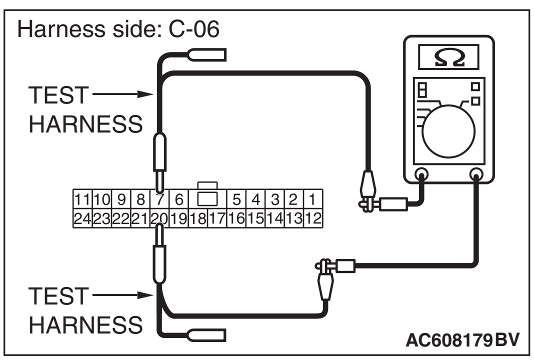
STEP 32. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 1 and 12.

OK: No continuity

Q: Is the check result normal?

YES (vehicles without MMCS) : Go to Step 33.
YES (vehicles with MMCS) : Go to Step 34.
NO : Go to Step 54.



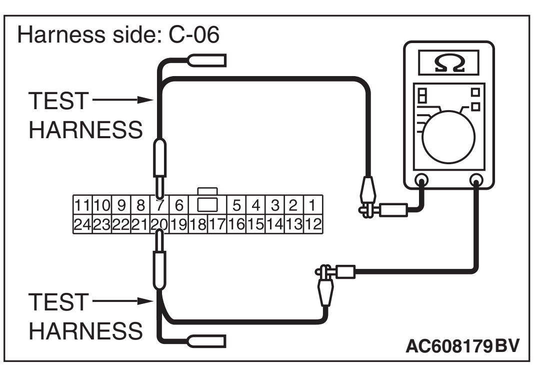
STEP 33. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 7 and 20.

OK: No continuity

Q: Is the check result normal?

YES (vehicles without satellite radio) : Go to Step 36.
YES (vehicles with satellite radio) : Go to Step 35.
NO : Go to Step 55.



STEP 34. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.

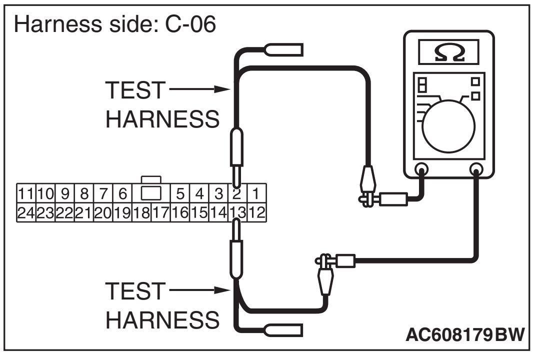
(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 7 and 20.

OK: No continuity

Q: Is the check result normal?

YES (vehicles without satellite radio) : Go to Step 36.
YES (vehicles with satellite radio) : Go to Step 35.
NO : Go to Step 56.

STEP 35. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.



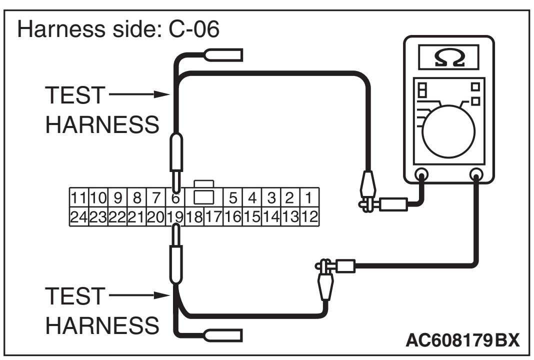
(1) Disconnect joint connector (CAN1), and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 2 and 13.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 36.
NO : Go to Step 57.

STEP 36. Check the wiring harness between joint connector (CAN1) C-06 and EATCS-ECU connector C-301 for line-to-line short. Measure the resistance at joint connector (CAN1) C-06.



(1) Disconnect joint connector (CAN1) and ETACS-ECU connector C-301, and check that there is continuity at the harness side of joint connector (CAN1).
(2) Check that there is continuity between joint connector (CAN1) terminals 6 and 19.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 58.
NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

STEP 37. Check the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to **P.54C-7****.**

(1) Disconnect joint connector (CAN1) C-06 and combination meter connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 3) and combination meter connector C-04 (terminal 14)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 14) and combination meter connector C-04 (terminal 15)

Q: Is the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04 in good condition?

YES (vehicles with KOS) : Go to Step 38.
YES (vehicles with WCM) : Go to Step 39.
NO ((vehicles with KOS or WCM) : Go to Step 48.

STEP 38. Check the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31.

(1) Disconnect joint connector (CAN1) C-06 and KOS-ECU connector C-31, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 9) and KOS-ECU connector C-31 (terminal 1)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 22) and KOS-ECU connector C-31 (terminal 2)

Q: Is the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31 in good condition?

YES : Go to Step 40.
NO : Go to Step 49.

STEP 39. Check the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09.

(1) Disconnect joint connector (CAN1) C-06 and WCM connector C-09, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 5) and WCM connector C-09 (terminal 11)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 16) and WCM connector C-09 (terminal 10)

Q: Is the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09 in good condition?

YES : Go to Step 40.
NO : Go to Step 50.

STEP 40. Check the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122.

(1) Disconnect joint connector (CAN1) C-06 and SRS-ECU connector C-122, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 8) and SRS-ECU connector C-122 (terminal 10)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 21) and SRS-ECU connector C-122 (terminal 9)

Q: Is the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122 in good condition?

YES : Go to Step 41.
NO : Go to Step 51.

STEP 41. Check the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2.

(1) Disconnect joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 11) and occupant classification-ECU connector D-35-2 (terminal 24)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 24) and occupant classification-ECU connector D-35-2 (terminal 25)

Q: Is the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2 in good condition?

YES (vehicles without hands free system) : Go to Step 43.
YES (vehicles with hands free system) : Go to Step 42.
NO : Go to Step 52.

STEP 42. Check the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110.

(1) Disconnect joint connector (CAN1) C-06 and occupant hands free module connector C-110, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 10) and hands free module connector C-110 (terminal 4)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 23) and hands free module connector C-110 (terminal 16)

Q: Is the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110 in good condition?

YES : Go to Step 43.
NO : Go to Step 53.

STEP 43. Check the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20.

(1) Disconnect joint connector (CAN1) C-06 and A/C-ECU connector C-20, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 1) and A/C-ECU connector C-20 (terminal 11)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 12) and A/C-ECU connector C-20 (terminal 12)

Q: Is the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20 in good condition?

YES (vehicles without MMCS) : Go to Step 44.
YES (vehicles with MMCS) : Go to Step 45.
NO : Go to Step 54.

STEP 44. Check the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104.

(1) Disconnect joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 7) and radio and CD player or CD changer connector C-104 (terminal 23)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 20) and radio and CD player or CD changer connector C-104 (terminal 33)

Q: Is the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104 in good condition?

YES (vehicles without satellite radio) : Go to Step 47.
YES (vehicles with satellite radio) : Go to Step 46.
NO : Go to Step 55.

STEP 45. Check the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108.

(1) Disconnect joint connector (CAN1) C-06 and CAN box unit connector C-108, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 7) and CAN box unit connector C-108 (terminal 8)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 20) and CAN box unit connector C-108 (terminal 9)

Q: Is the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108 in good condition?

YES (vehicles without satellite radio) : Go to Step 47.
YES (vehicles with satellite radio) : Go to Step 46.
NO : Go to Step 56.

STEP 46. Check the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17.

(1) Disconnect joint connector (CAN1) C-06 and satellite radio tuner connector C-17, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 2) and satellite radio tuner connector C-17 (terminal 4)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 13) and satellite radio tuner connector C-17 (terminal 11)

Q: Is the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17 in good condition?

YES : Go to Step 47.
NO : Go to Step 57.

STEP 47. Check the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

(1) Disconnect joint connector (CAN1) C-06 and ETACS-ECU connector C-301, and check the wiring harness.
(2) Check the wiring harness between joint connector (CAN1) C-06 (terminal 6) and ETACS-ECU connector C-301 (terminal 6)
(3) Check the wiring harness between joint connector (CAN1) C-06 (terminal 19) and ETACS-ECU connector C-301 (terminal 7)

Q: Is the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301 in good condition?

YES : Go to Step 58.
NO : Repair the wiring harness between joint connector (CAN1) C-06 and ETACS-ECU connector C-301.

STEP 48. Using scan tool MB991958, diagnose the CAN bus line. (checking the combination meter for internal failure)

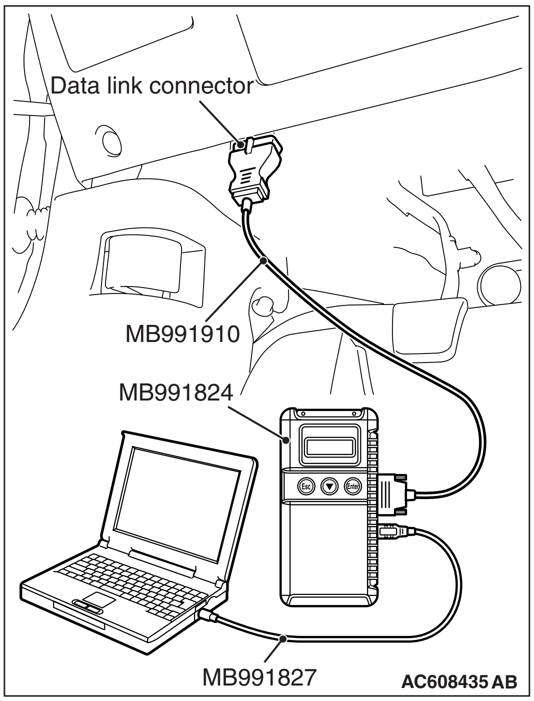
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

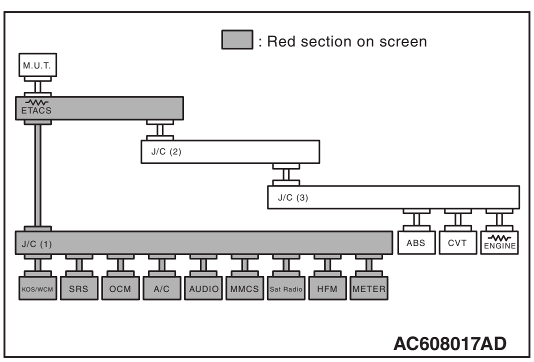
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect combination meter connector C-04.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and combination meter connector C-04.

NO : Check combination meter connector C-04, and repair if necessary. If the combination meter connector is in good condition, replace the combination meter.

STEP 49. Using scan tool MB991958, diagnose the CAN bus line. (checking the KOS-ECU for internal failure)

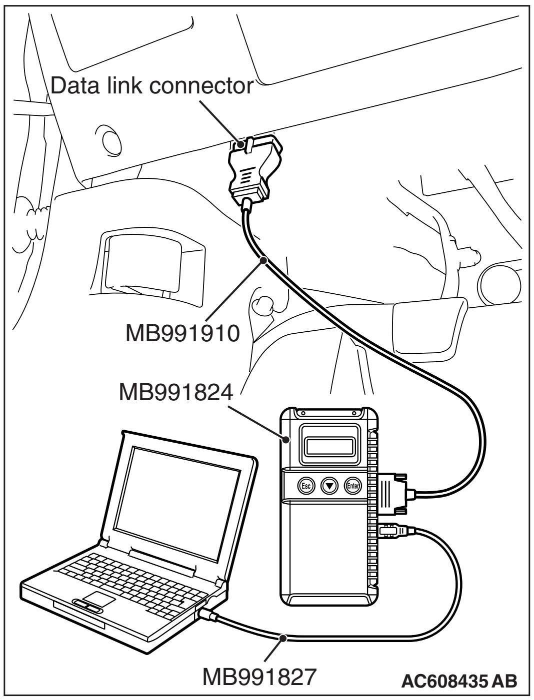
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

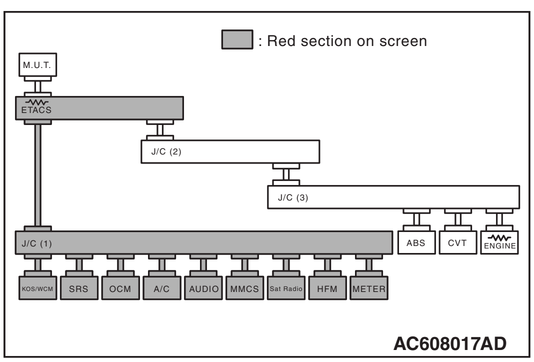
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect KOS-ECU connector C-31.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and KOS-ECU connector C-31.

NO : Check KOS-ECU connector C-31, and repair if necessary. If the KOS-ECU connector is in good condition, replace the KOS-ECU.

STEP 50. Using scan tool MB991958, diagnose the CAN bus line. (checking the WCM for internal failure)

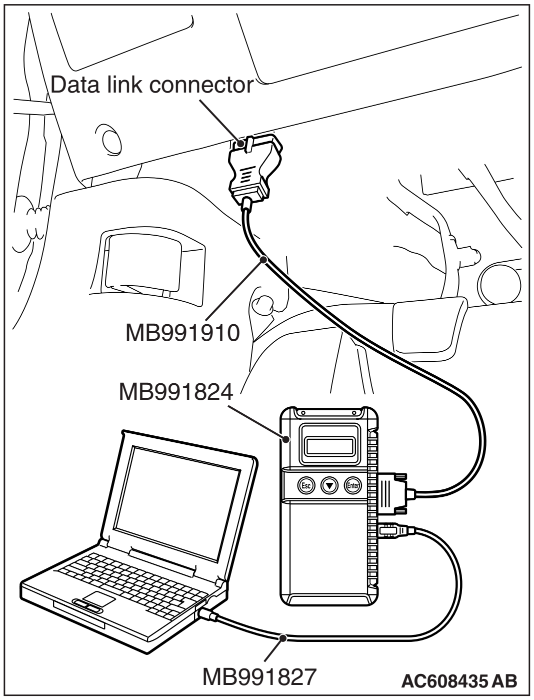
⚠ CAUTION

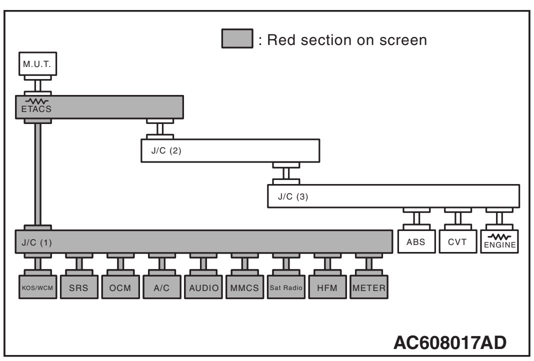
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect WCM connector C-09.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and WCM connector C-09.

NO : Check WCM connector C-09, and repair if necessary. If the WCM connector is in good condition, replace the WCM.

STEP 51. Using scan tool MB991958, diagnose the CAN bus line. (checking the SRS-ECU for internal failure)

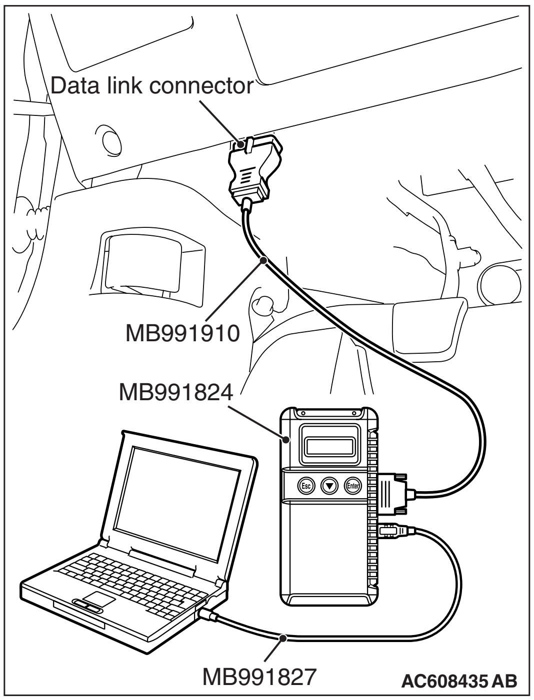
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

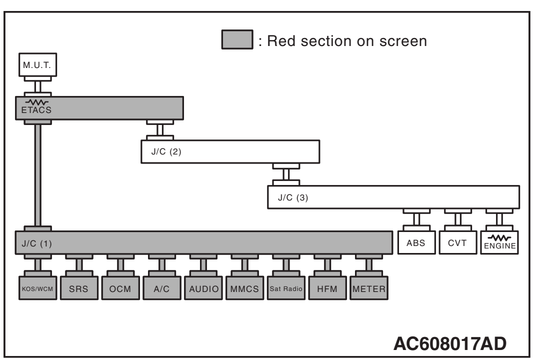
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect SRS-ECU connector C-122.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and SRS-ECU connector C-122.

NO : Check SRS-ECU connector C-122, and repair if necessary. If the SRS-ECU connector is in good condition, replace the SRS-ECU.

STEP 52. Using scan tool MB991958, diagnose the CAN bus line. (checking the occupant classification-ECU for internal failure)

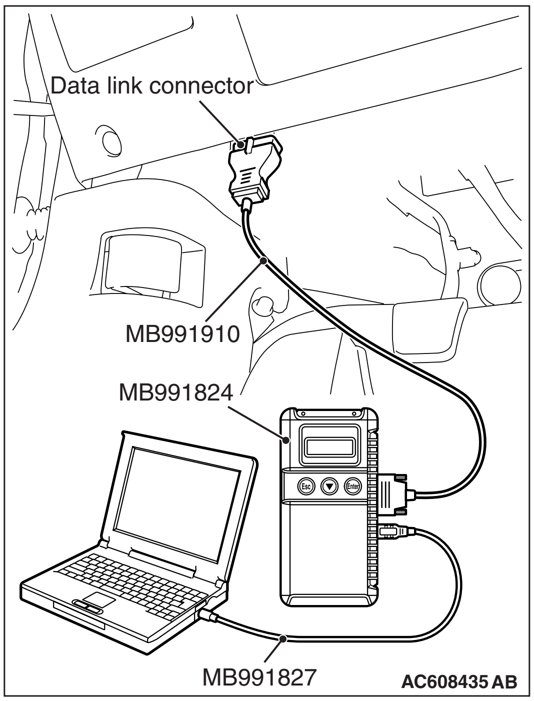
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

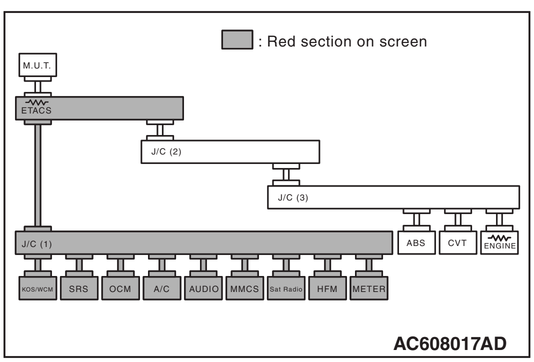
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect occupant classification-ECU connector D-35-2.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and occupant classification-ECU connector D-35-2.

NO : Check occupant classification-ECU connector D-35-2, and repair if necessary. If the occupant classification-ECU connector is in good condition, replace the occupant classification-ECU.

STEP 53. Using scan tool MB991958, diagnose the CAN bus line. (checking the hands free module for internal failure)

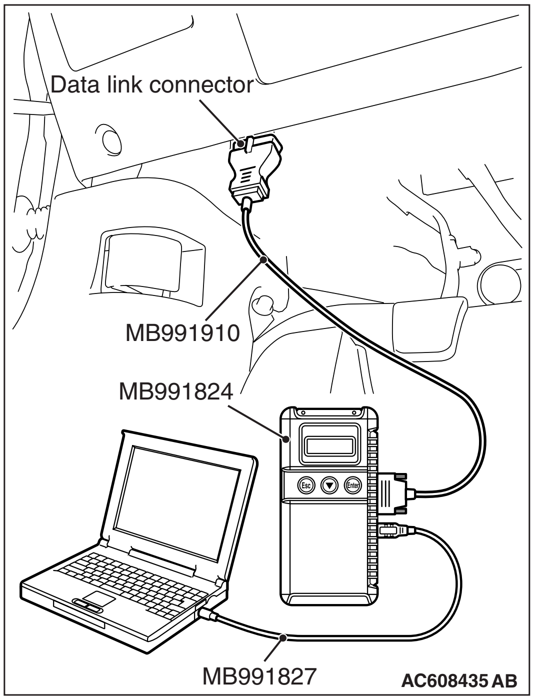
⚠ CAUTION

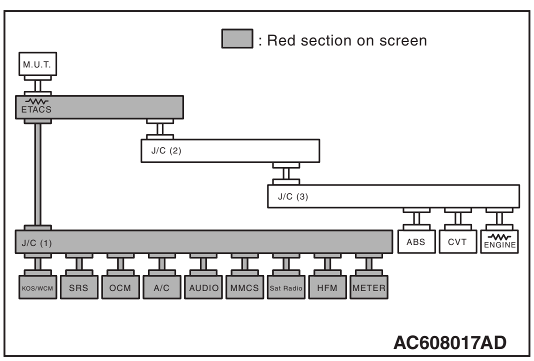
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect hands free module connector C-110.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.





(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and hands free module connector C-110.

NO : Check hands free module connector C-110, and repair if necessary. If the hands free module connector is in good condition, replace the hands free module.

STEP 54. Using scan tool MB991958, diagnose the CAN bus line. (checking the A/C-ECU for internal failure)

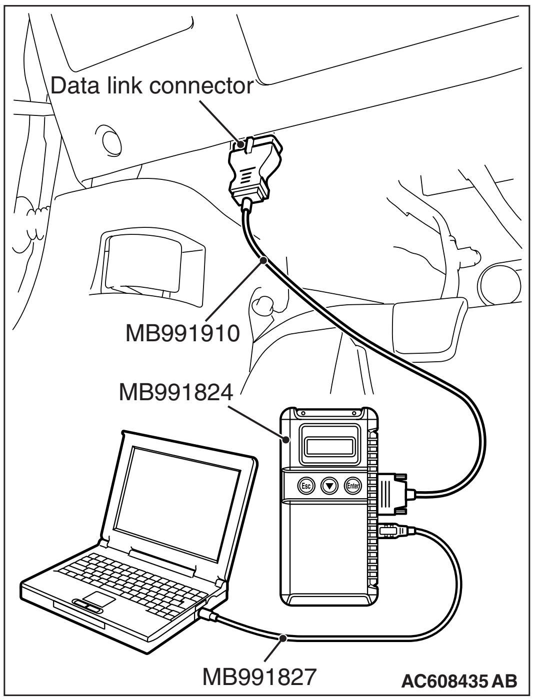
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

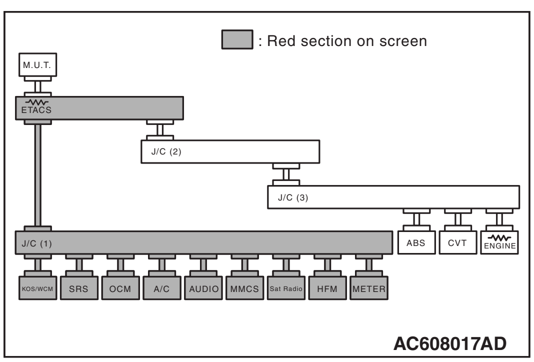
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect A/C-ECU connector C-20.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and A/C-ECU connector C-20.

NO : Check A/C-ECU connector C-20, and repair if necessary. If the A/C-ECU connector is in good condition, replace the A/C-ECU.

STEP 55. Using scan tool MB991958, diagnose the CAN bus line. (checking the radio and CD player or CD changer for internal failure)

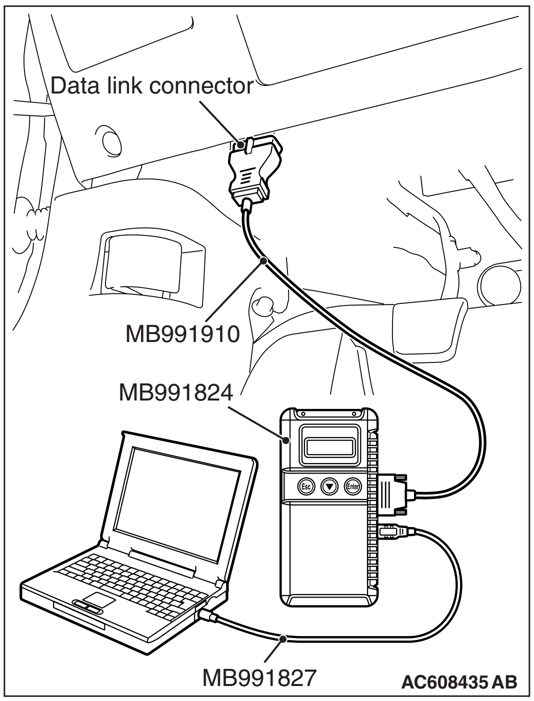
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

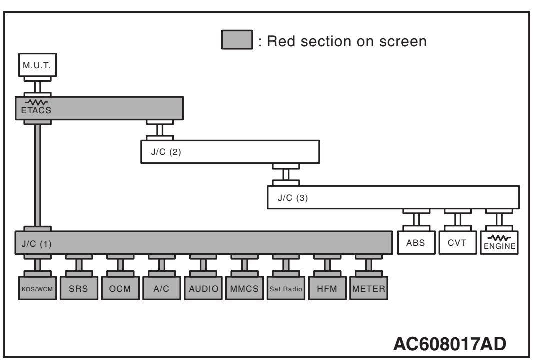
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect radio and CD player or CD changer connector C-104.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and radio and CD player or CD changer connector C-104.

NO : Check radio and CD player or CD changer connector C-104, and repair if necessary. If the radio and CD player or CD changer connector is in good condition, replace the radio and CD player or CD changer.

STEP 56. Using scan tool MB991958, diagnose the CAN bus line. (checking the CAN box unit for internal failure)

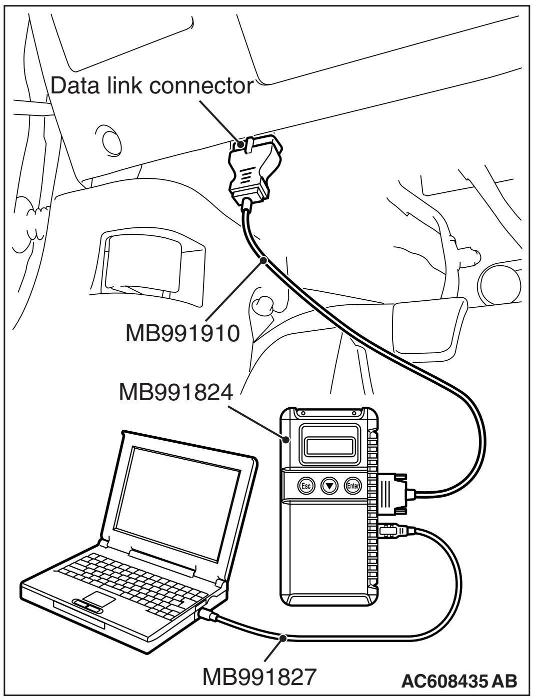
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

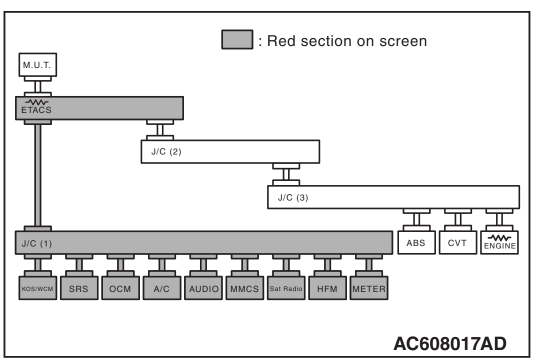
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect CAN box unit connector C-108.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and CAN box unit connector C-108.

NO : Check CAN box unit connector C-108, and repair if necessary. If the CAN box unit connector is in good condition, replace the CAN box unit.

STEP 57. Using scan tool MB991958, diagnose the CAN bus line. (checking the satellite radio tuner for internal failure)

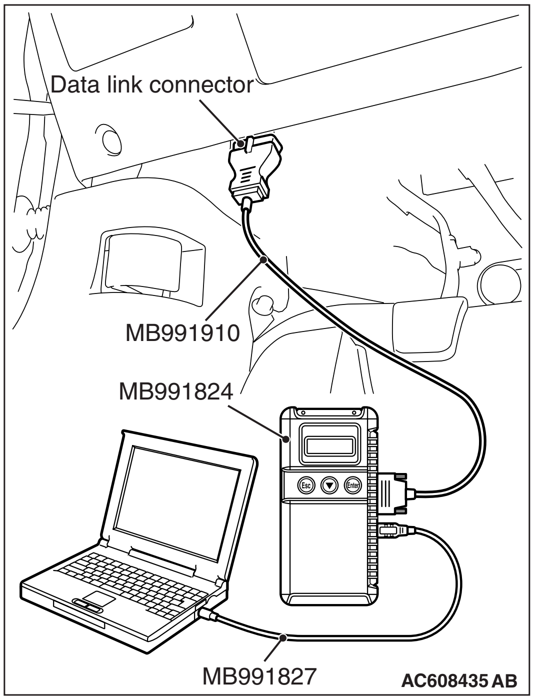
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

⚠ CAUTION

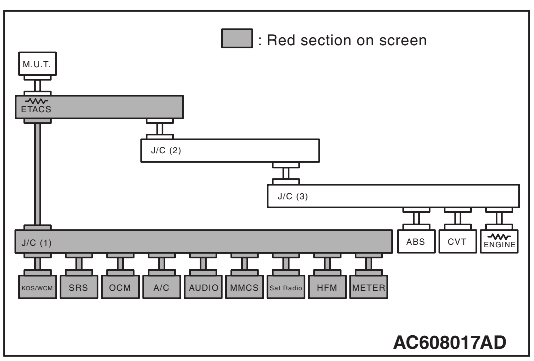
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Disconnect satellite radio tuner connector C-17.
(2) Connect scan tool MB991958 to the data link connector.
(3) Turn the ignition switch to the "ON" position.



(4) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.



Q: Does scan tool MB991958 screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) C-06 and satellite radio tuner connector C-17.

NO : Check satellite radio tuner connector C-17, and repair if necessary. If the satellite radio tuner connector is in good condition, replace the satellite radio tuner.

STEP 58. Using scan tool MB991958, diagnose the CAN bus line. (trouble symptom check)

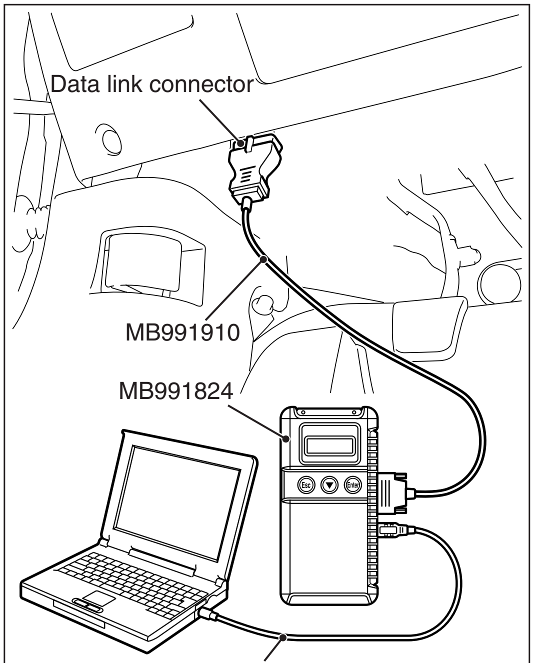
⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-7.

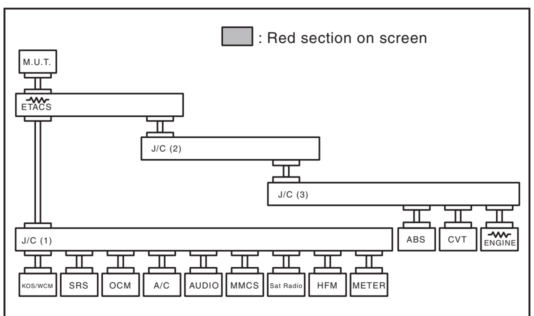
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.



AC608435 AB



AC608017AB

(3) Diagnose CAN bus lines, and check if the scan tool MB991958 screen is as shown in the figure.

OK: The display of the scan tool MB991958 is as shown in the figure.

Q: Does scan tool MB991958 screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Check the ETACS-ECU connector C-301, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

CAN COMMUNICATION-RELATED DTC (U-CODE) TABLE

M1548300300546

Code No.	Diagnostic item	Output ECU	Action
U0001	Bus Off (CAN-C)	ECM, TCM, ABS-ECU, ETACS-ECU	CAN main bus line diagnostics
U0019	Bus Off (CAN-B)	KOS-ECU or WCM, SRS-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0020	CAN-B Bus off performance	Occupant classification-ECU	
U0021	CAN-B Bus(+) circuit open		
U0022	CAN-B Bus(+) shorted to circuit ground		
U0023	CAN-B Bus(+) shorted to circuit Power Supply		
U0024	CAN-B Bus(-) circuit Open		
U0025	CAN-B Bus(-) shorted to circuit ground		
U0026	CAN-B Bus(-) shorted to circuit Power Supply		
U0100	Engine time-out	TCM, ABS-ECU, Combination meter, ETACS-ECU	
U0101	CVT time-out	ECM, ETACS-ECU	
U0121	ABS-ECU time-out	ECM, TCM, ETACS-ECU	
U0141	ETACS-ECU time-out	ECM, TCM, ABS-ECU, KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, Combination meter, CAN box unit, Satellite radio tuner, A/C-ECU	
U0151	SRS time-out	KOS-ECU or WCM, Occupant classification-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0154	Occupant Classification-ECU time-out	KOS-ECU or WCM, SRS-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0155	Meter time-out	KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0164	A/C time-out	KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU	

Code No.	Diagnostic item	Output ECU	Action
U0167	CAN immobilizer (communication)	ECM	CAN main bus line diagnostics
U0168	WCM/KOS time-out	SRS-ECU, Occupant classification-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0184	Audio unit time-out	KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, Combination meter, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0195	Satellite radio tuner time-out	KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, radio and CD player or CD changer, CAN box unit, ETACS-ECU, A/C-ECU	
U0197	Hands free module time-out	KOS-ECU or WCM, SRS-ECU, Occupant classification-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, Satellite radio tuner, ETACS-ECU, A/C-ECU	
U0245	Audio visual navigation unit time-out	KOS-ECU or WCM, Occupant classification-ECU, Combination meter, ETACS-ECU	
U1180	Combination meter time-out	ECM	
U1108	Excess CAN-B ECU detection	ETACS-ECU	Diagnose CAN main bus lines and confirm input signals.
U1120	Bus line (CAN-C) low input		
U1121	Bus line (CAN-C) high input		
U1412	Implausible vehicle speed signal received	KOS-ECU or WCM	
U1414	Defective coding data	SRS-ECU	
U1415	Coding not completed/Data fail	ABS-ECU, KOS-ECU or WCM, SRS-ECU, Combination meter, radio and CD player or CD changer, CAN box unit, A/C-ECU	
U1417	Implausible coding data	ABS-ECU, KOS-ECU or WCM, CAN box unit	

GROUP 80B

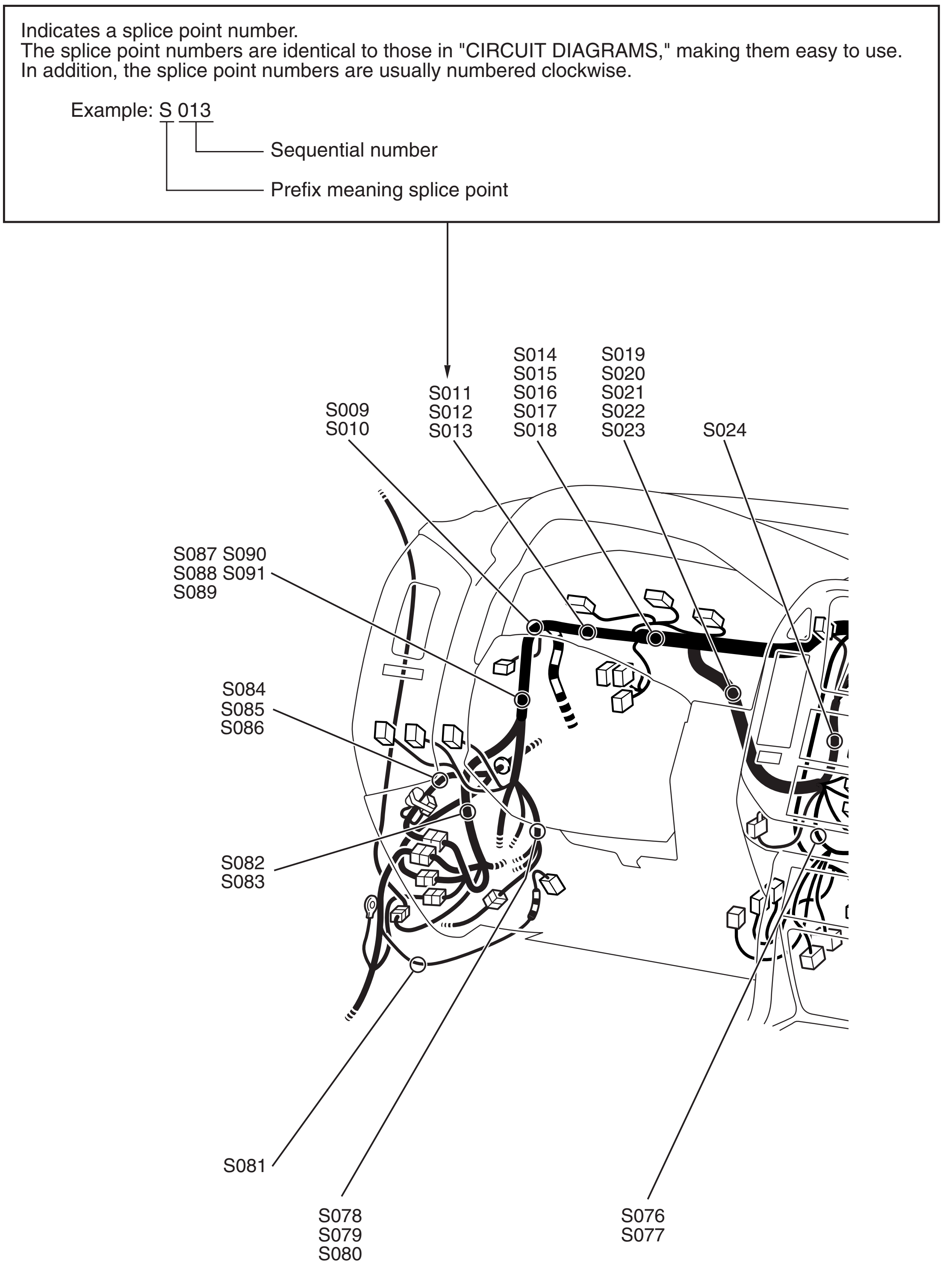
SPLICE LOCATIONS

CONTENTS

HOW TO READ SPLICE LOCATIONS

M1802000100454

"Splice locations" describes splice points of each wiring harness on an actual vehicle. Some variations are included in one splice location. Accordingly, some locations may not be applicable for individual vehicles.



ACX02177 AC

INDEX

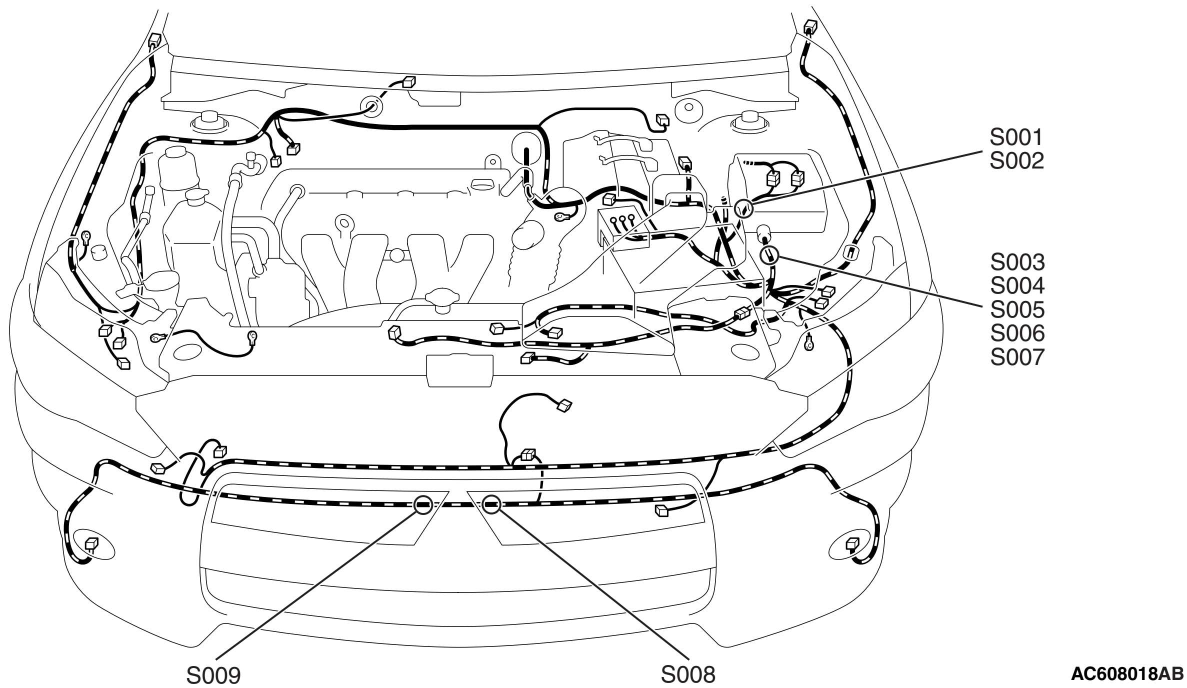
M1802000901259

This index shows the page numbers where the splice locations are.

SPLICE LOCATION NO.	PAGE	SPLICE LOCATION NO.	PAGE	SPLICE LOCATION NO.	PAGE	SPLICE LOCATION NO.	PAGE
S001	P.80B-4	S002	P.80B-4	S003	P.80B-4	S004	P.80B-4
S005	P.80B-4	S006	P.80B-4	S007	P.80B-4	S008	P.80B-4
S009	P.80B-4	S010	P.80B-4	S011	P.80B-4	S012	P.80B-4
S013	P.80B-4	S014	P.80B-4	S015	P.80B-4	S016	P.80B-4
S017	P.80B-4	S018	P.80B-4	S019	P.80B-5	S020	P.80B-5
S021	P.80B-5	S022	P.80B-5	S024	P.80B-5	S025	P.80B-5
S027	P.80B-5	S028	P.80B-5	S029	P.80B-5	S030	P.80B-5
S031	P.80B-5	S032	P.80B-5	S033	P.80B-5	S034	P.80B-5
S035	P.80B-5	S038	P.80B-5	S039	P.80B-5	S040	P.80B-5
S041	P.80B-5	S042	P.80B-5	S043	P.80B-5	S044	P.80B-5
S045	P.80B-5	S046	P.80B-5	S047	P.80B-5	S048	P.80B-5
S049	P.80B-6	S050	P.80B-6	S051	P.80B-6	S052	P.80B-6
S053	P.80B-6	S054	P.80B-6	S055	P.80B-7	S056	P.80B-7
S057	P.80B-7	S058	P.80B-7	S059	P.80B-7	S060	P.80B-7
S061	P.80B-7	S062	P.80B-7	S063	P.80B-7	S064	P.80B-7
S065	P.80B-7	S066	P.80B-7	S067	P.80B-5		

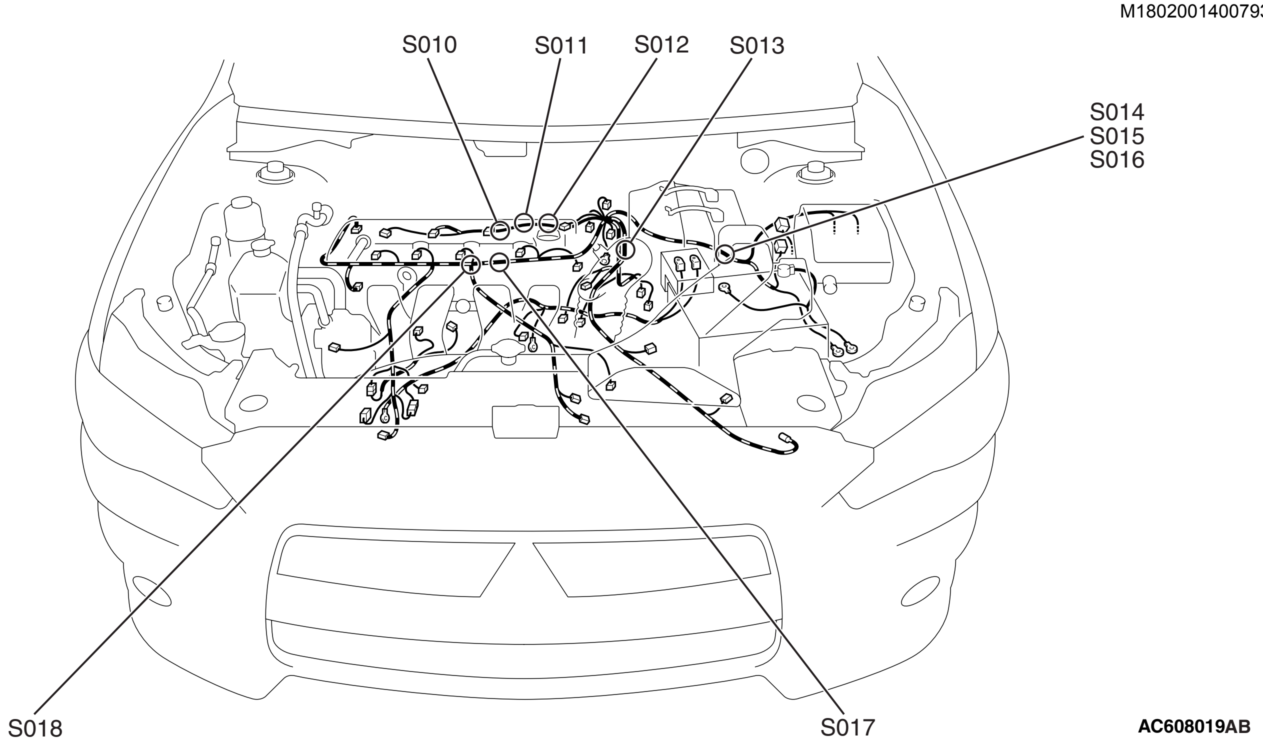
ENGINE COMPARTMENT

M1802000200860



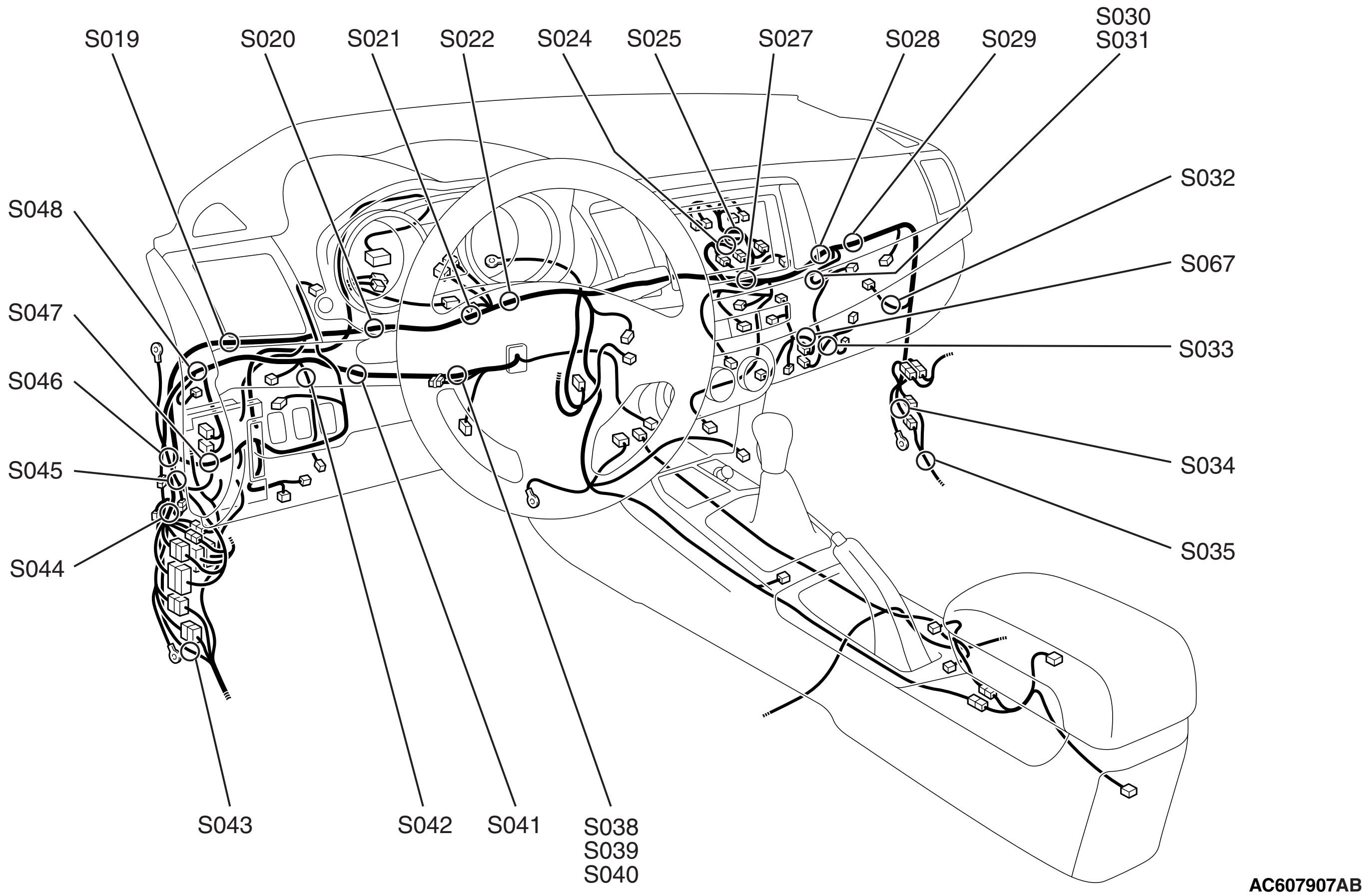
ENGINE AND TRANSAXLE

M1802001400793



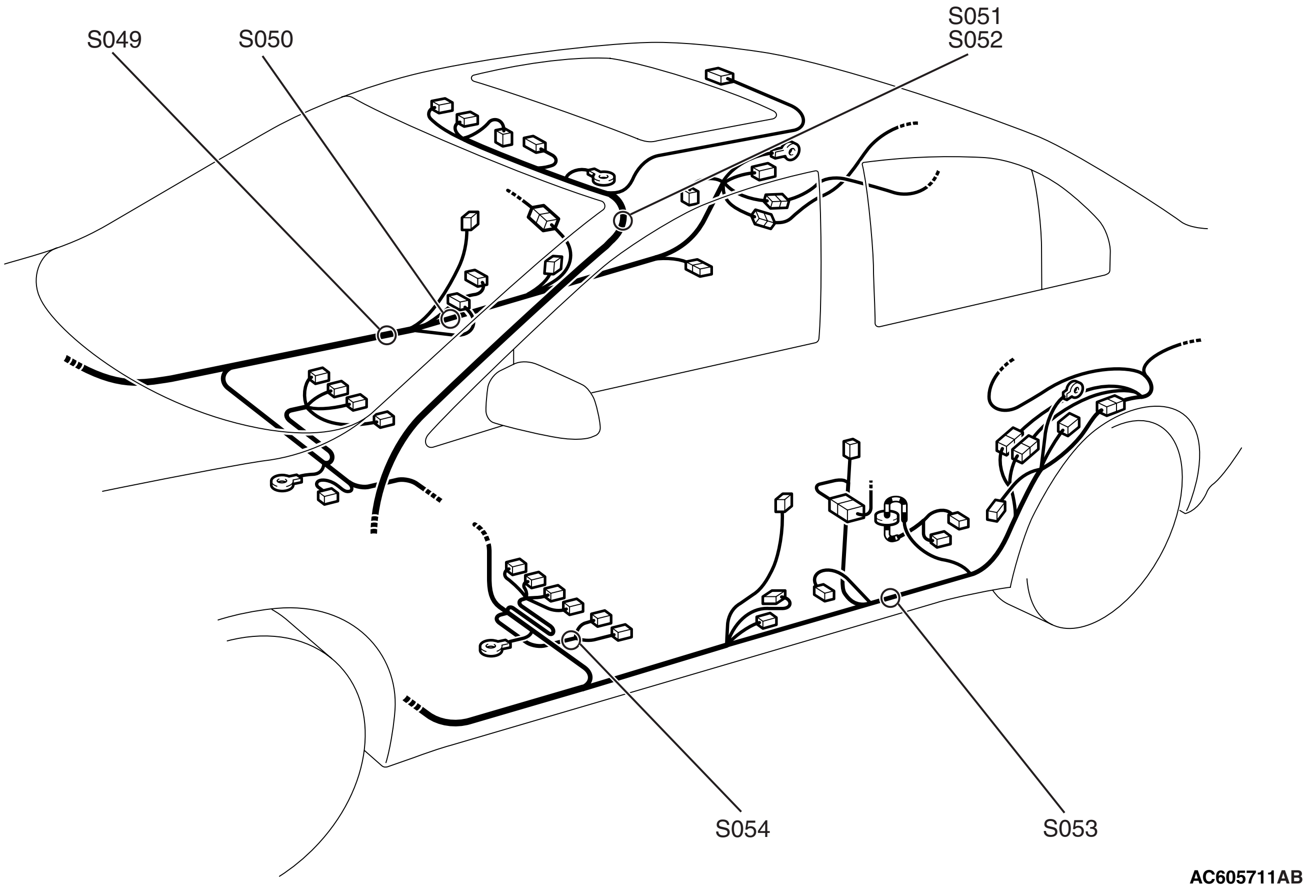
DASH PANEL

M1802000301086



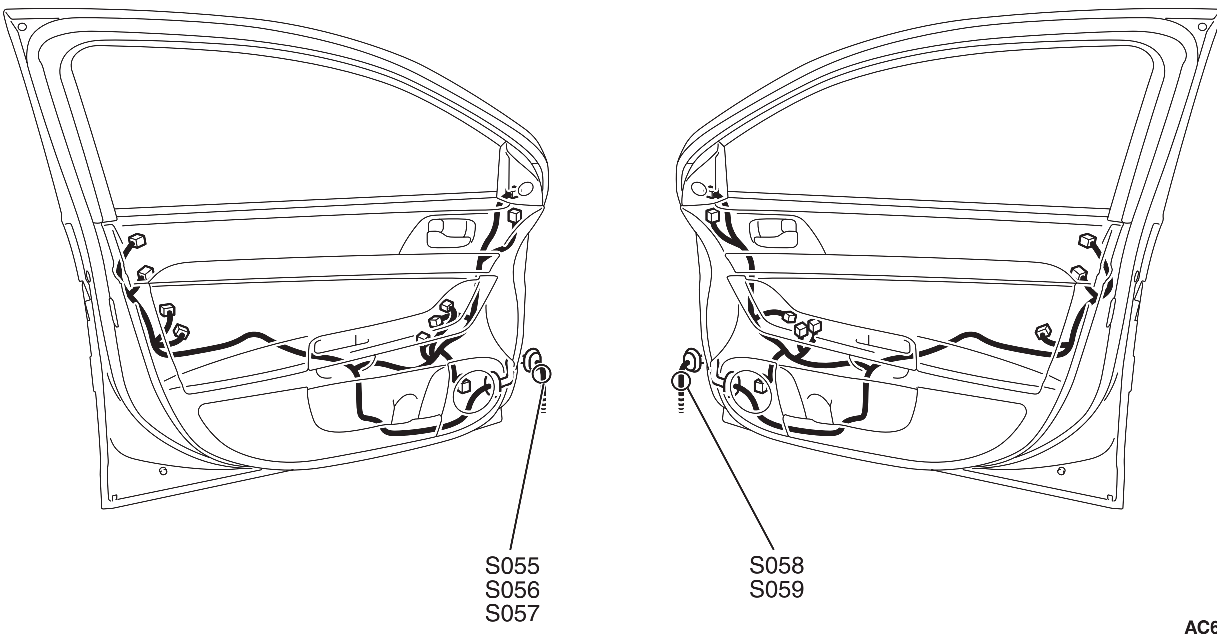
FLOOR AND ROOF

M1802001200818



DOOR

M1802000800710



LUGGAGE COMPARTMENT

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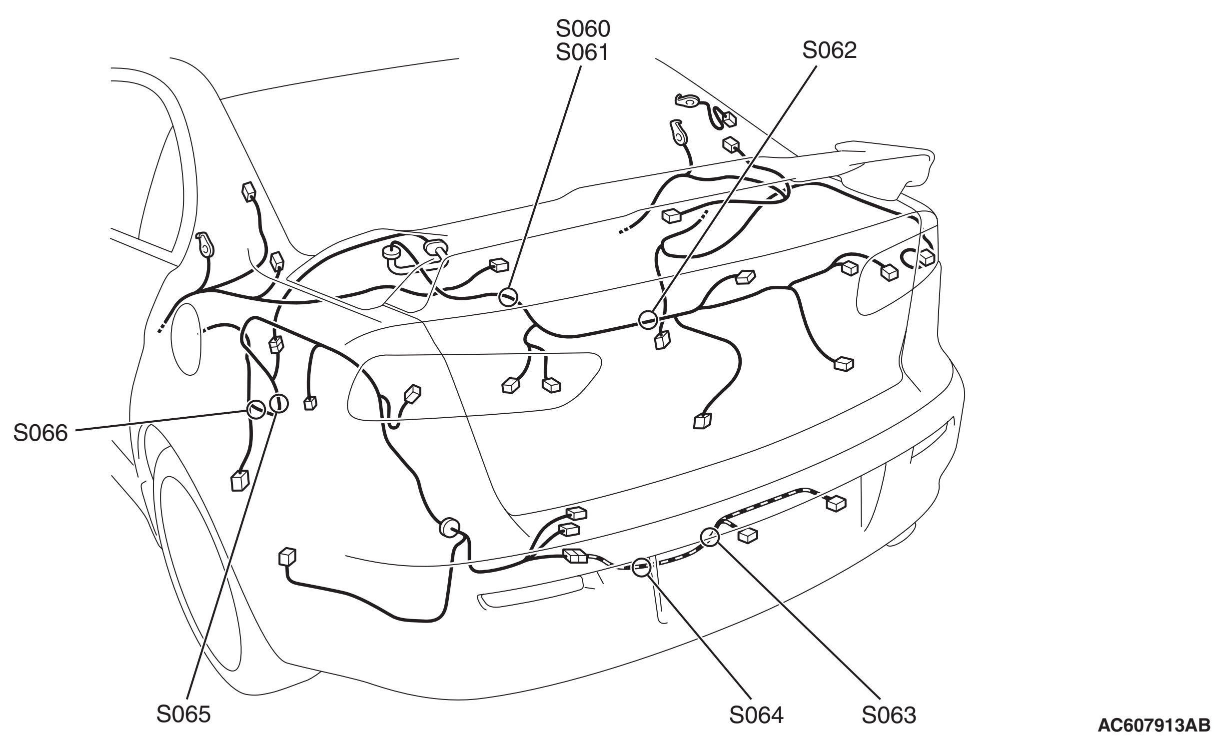


NOTES

GROUP 3

WELDED PANEL REPLACEMENT

CONTENTS

ULTRA HIGH STRENGTH STEEL PLATE

M4030002800073

ADVANTAGES OF ULTRA HIGH STRENGTH STEEL PLATE

The ultra high strength steel plate has the following advantages as compared with conventional high strength steel plate.

- It has tensile strength approximately 1.7 times higher than the conventional high strength steel sheet.
- It has a higher yielding point and yielding ratio (yielding point/tensile strength).

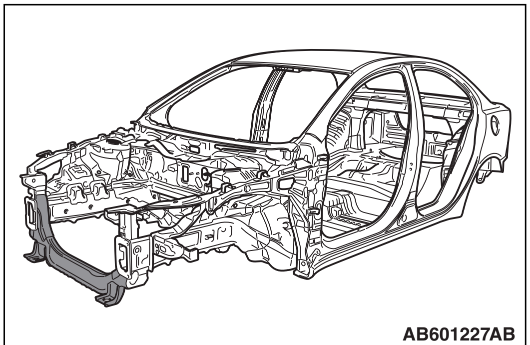
These advantages allow thinner and lighter plates and better fuel efficiency than the high strength steel plate.

PRECAUTION UPON MAINTENANCE OF ULTRA HIGH STRENGTH STEEL PLATE

- Use a spot cutter for ultra high strength steel plate to ensure that the spot-welded area is cut off.
- For the part in which the ultra high strength steel plate is used, do not repair it by cutting and bonding to avoid the reduction in strength by heat. Instead, replace the whole assembly including the part.
- Be careful with rough extending work, because the ultra high strength steel plate has higher tensile strength and a higher yielding point than high strength steel plate and general steel plate. Careless work will cause symptom such as over-pulling and springback. Do not extend it completely at a time. Do it gradually while removing the distortion by sheet metal processing with a hammer.
- Plug welding of ϕ 8 mm (0.31 inch) diameter plug for repair ensures the strength equivalent to spot welding for 2 steel sheets. For 3 sheets, weld 2 sheets each time instead of welding from one side to give sufficient welding strength.

FRONT END CROSSMEMBER

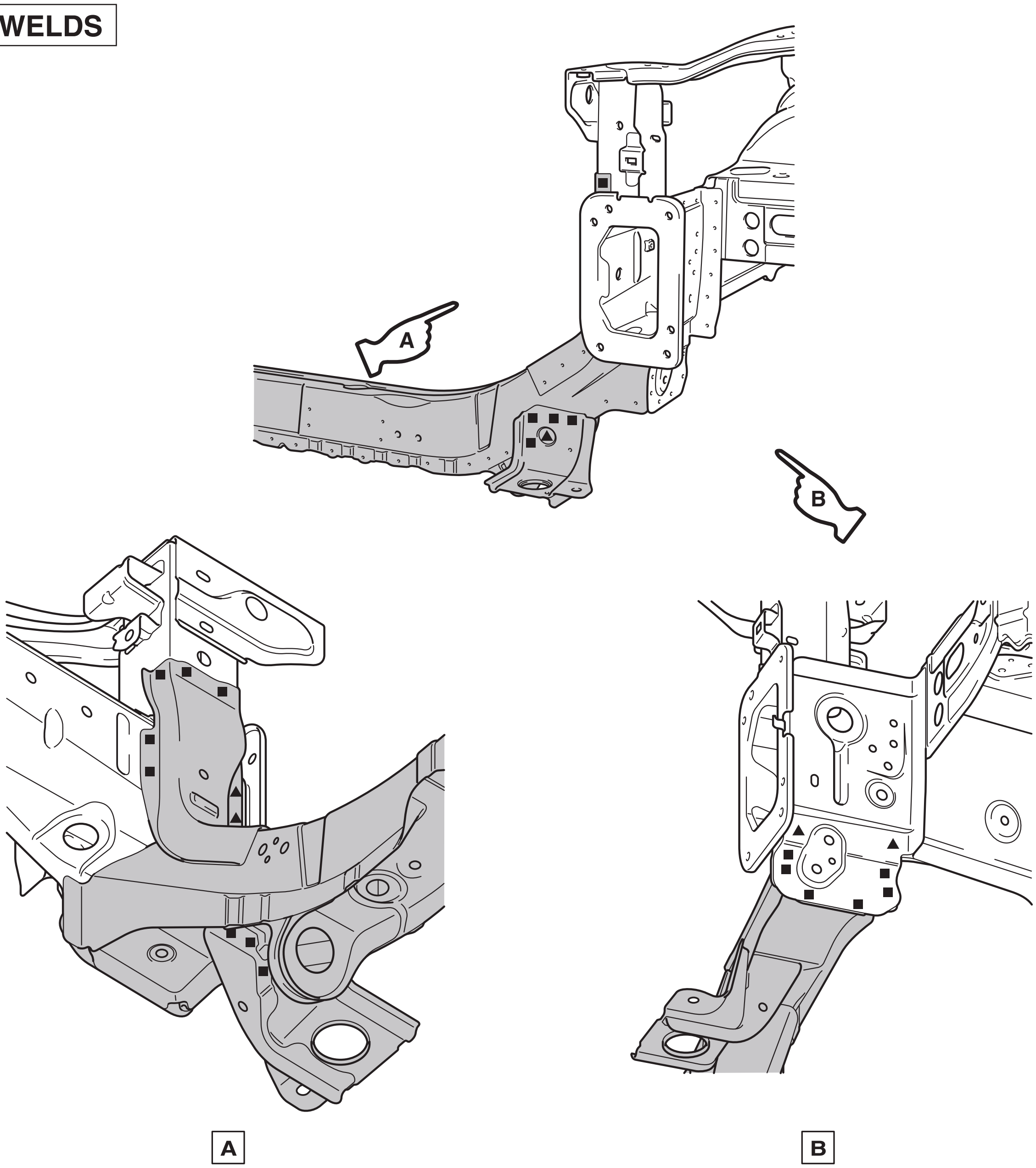
M4030003100022



AB601227AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
[Anti-corrosion symbol]	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

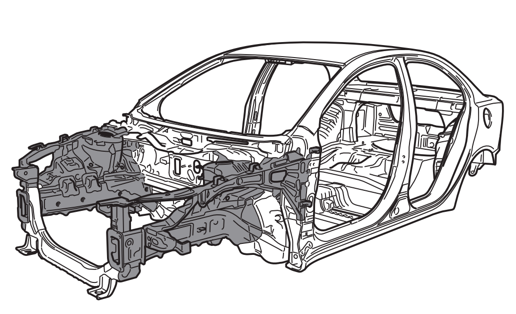
REPAIR WELDS



AB601317AB

FENDER SHIELD

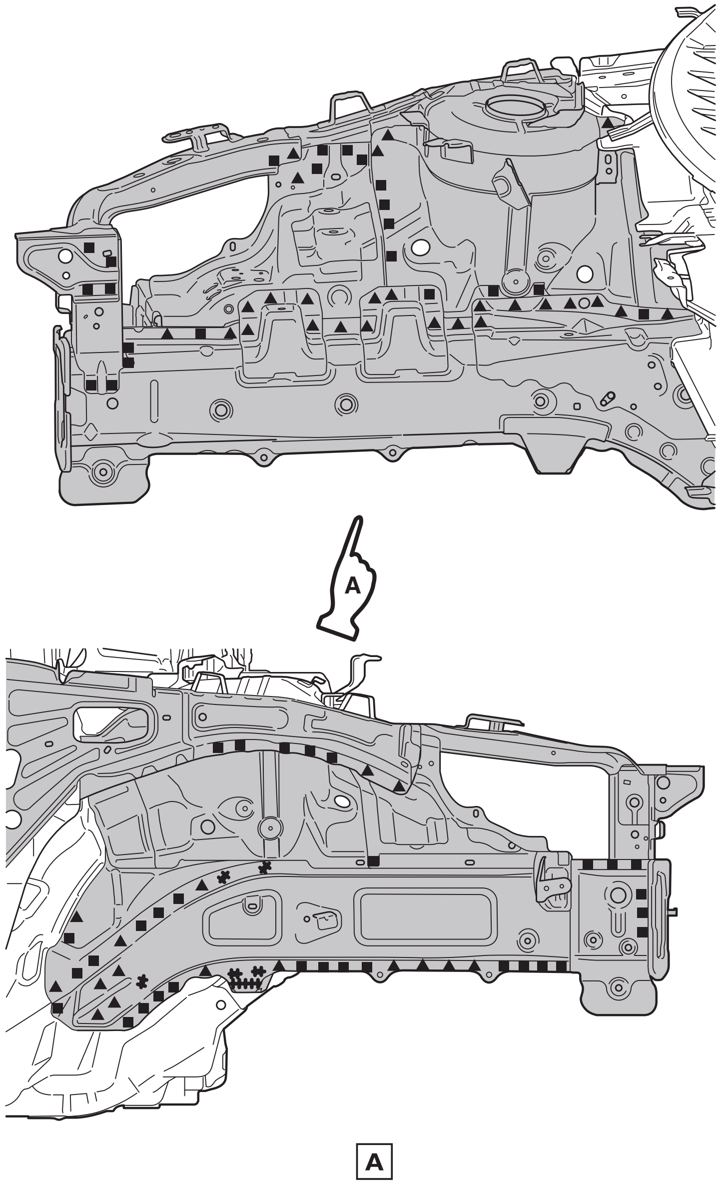
M4030004000761



AB601228AB

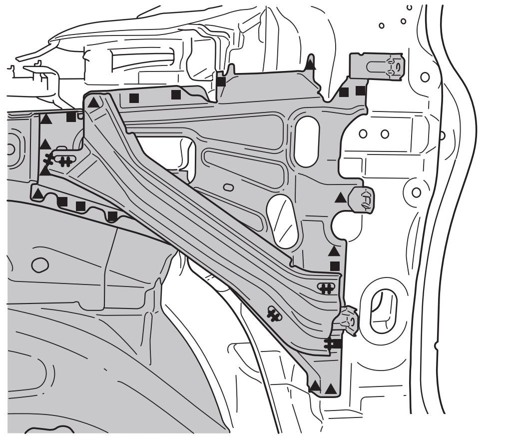
SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded; ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
(anti-corrosion agent symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



AB601427AB

NOTE: Refer to the Front End Crossmember section on P.3-3 for the welding point with front end crossmember.



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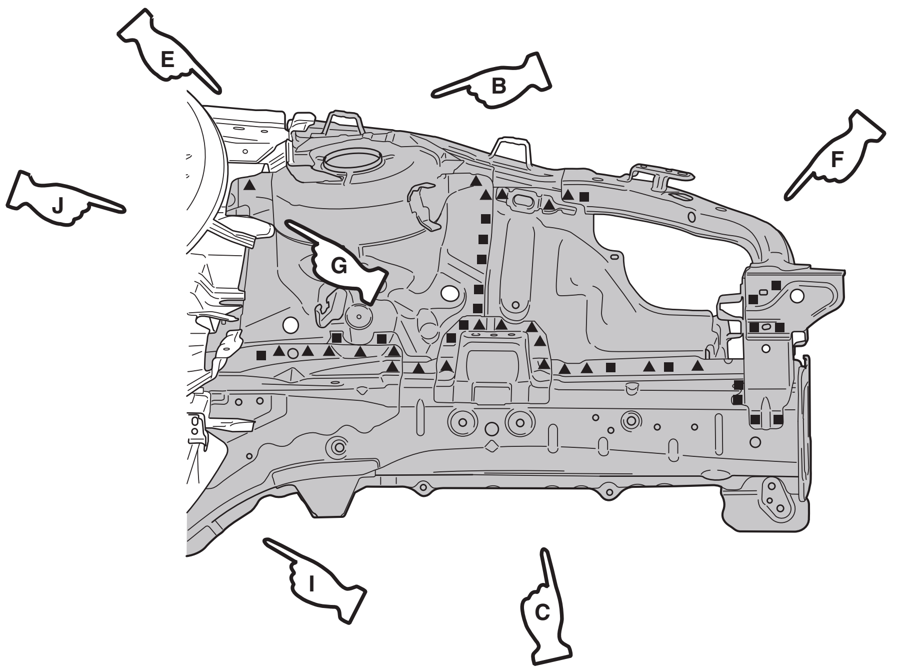
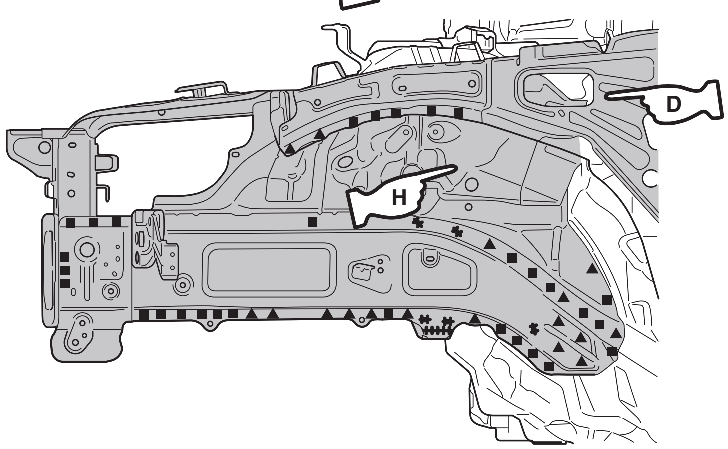
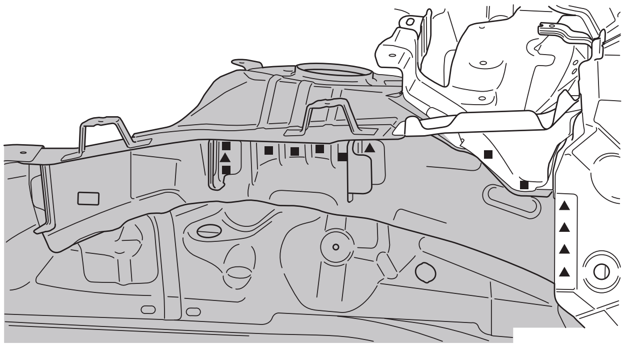


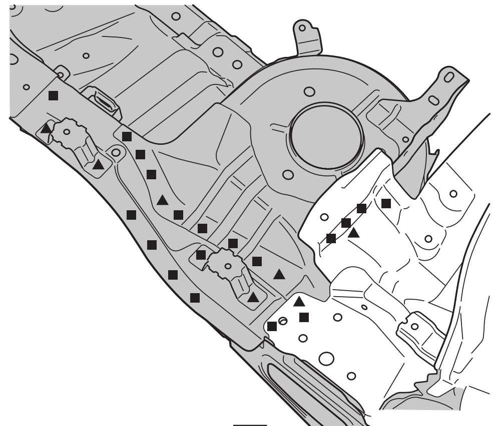


C

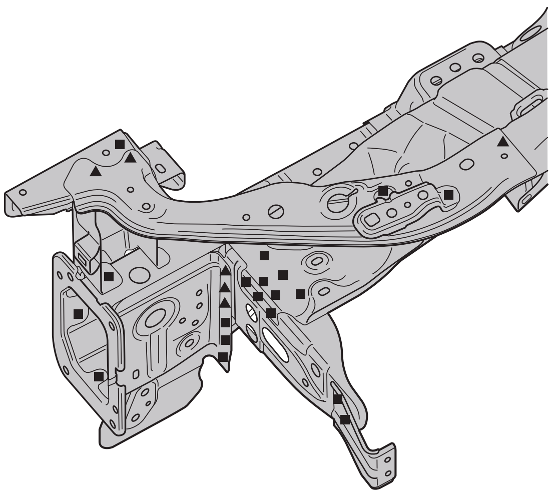
AB601428AC



D
(With the front upper frame outer removed)



E



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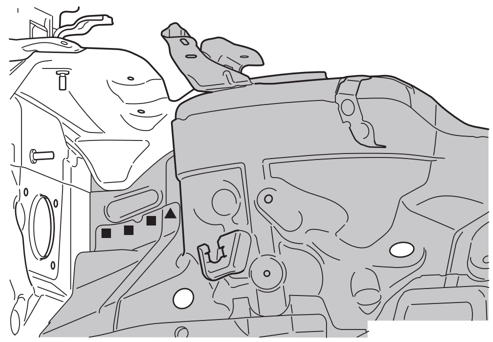

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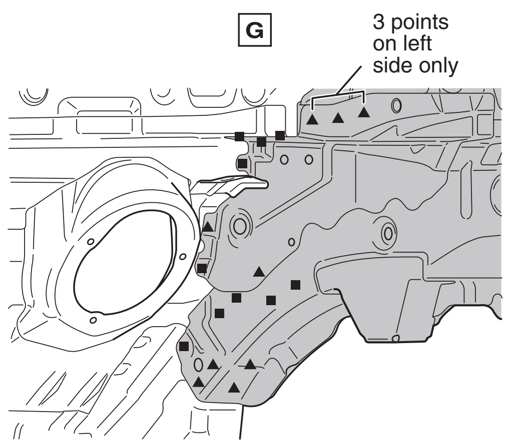

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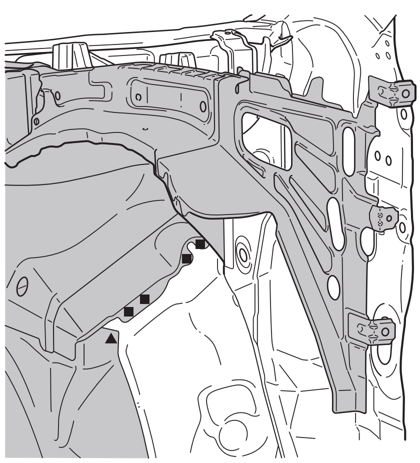

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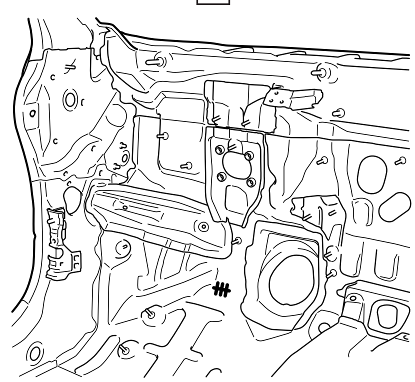
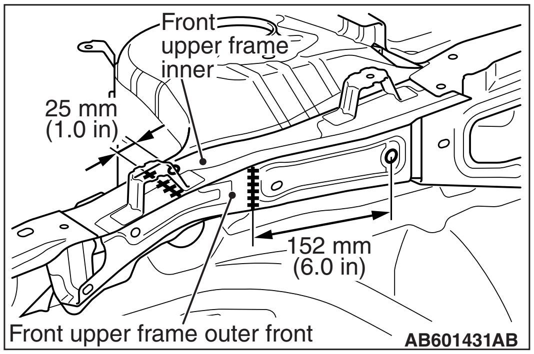


J

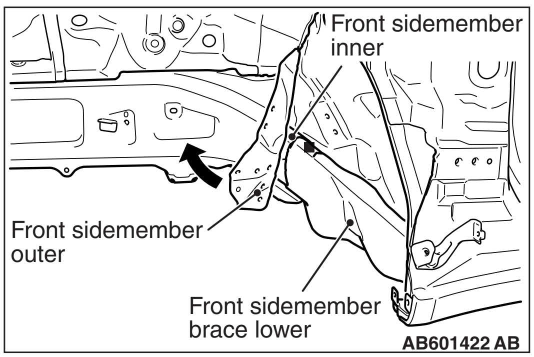
AB601429AB



NOTE: Partial replacement of the front upper frame is possible depending on the range of damage. When performing partial replacement, cut the front upper frame outer front 152 mm (6.0 inches) forward of the positioning hole center, and cut the front upper frame inner 25 mm (1.0 inches) forward of the positioning hole center.

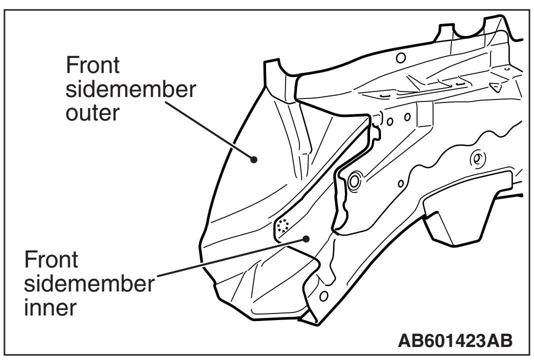
NOTE ON REPAIR WORK

REMOVAL



Turn up the front sidemember outer as shown to cut off the welded point between the front sidemember inner and the front sidemember brace lower.

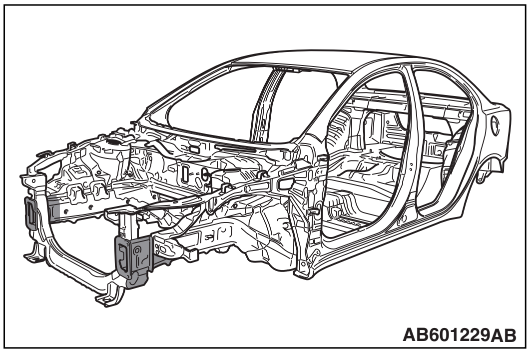
INSTALLATION



1. When installing the new front sidemember, align the hole of the front sidemember brace lower with the front sidemember outer to make a hole because the front sidemember outer prevents the front sidemember inner and front sidemember brace lower from being welded.Then, weld the front sidemember outer, front sidemember inner, and front sidemember brace lower.

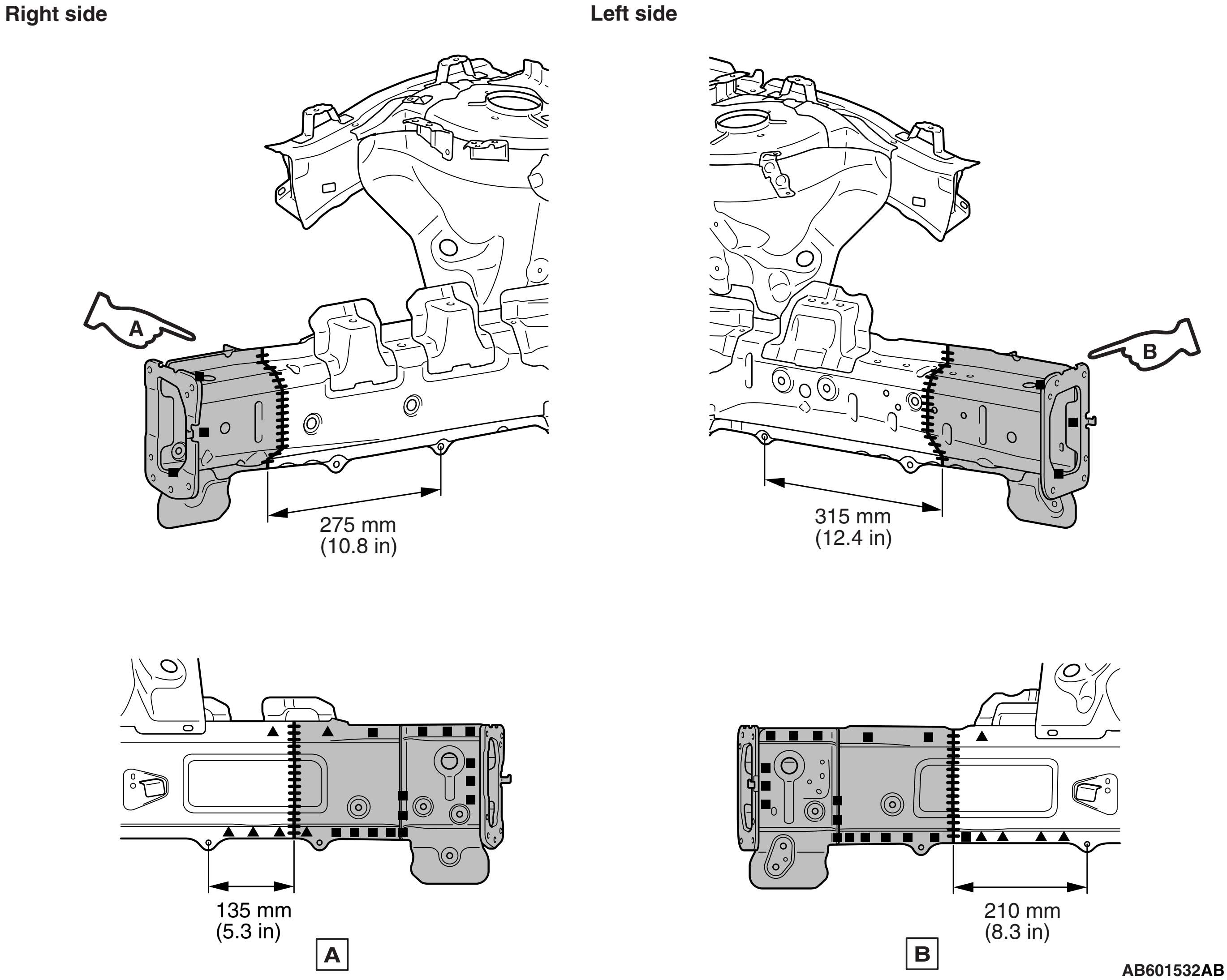
FRONT SIDEMEMBER (PARTIAL REPLACEMENT)

M4030000100454



SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
⧺⧺⧺⧺	MIG arc welding (continuous)
∞∞∞∞	Braze welding
(spray can symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



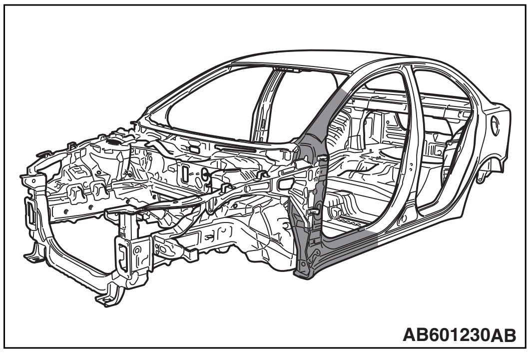
NOTE:

- *Refer to the Front End Crossmember section on P.3-3 for the welding point with front end crossmember.*
- *Refer to the Fender Shield section on P.3-4 for the welding points with the front fender Shield front.*

NOTES

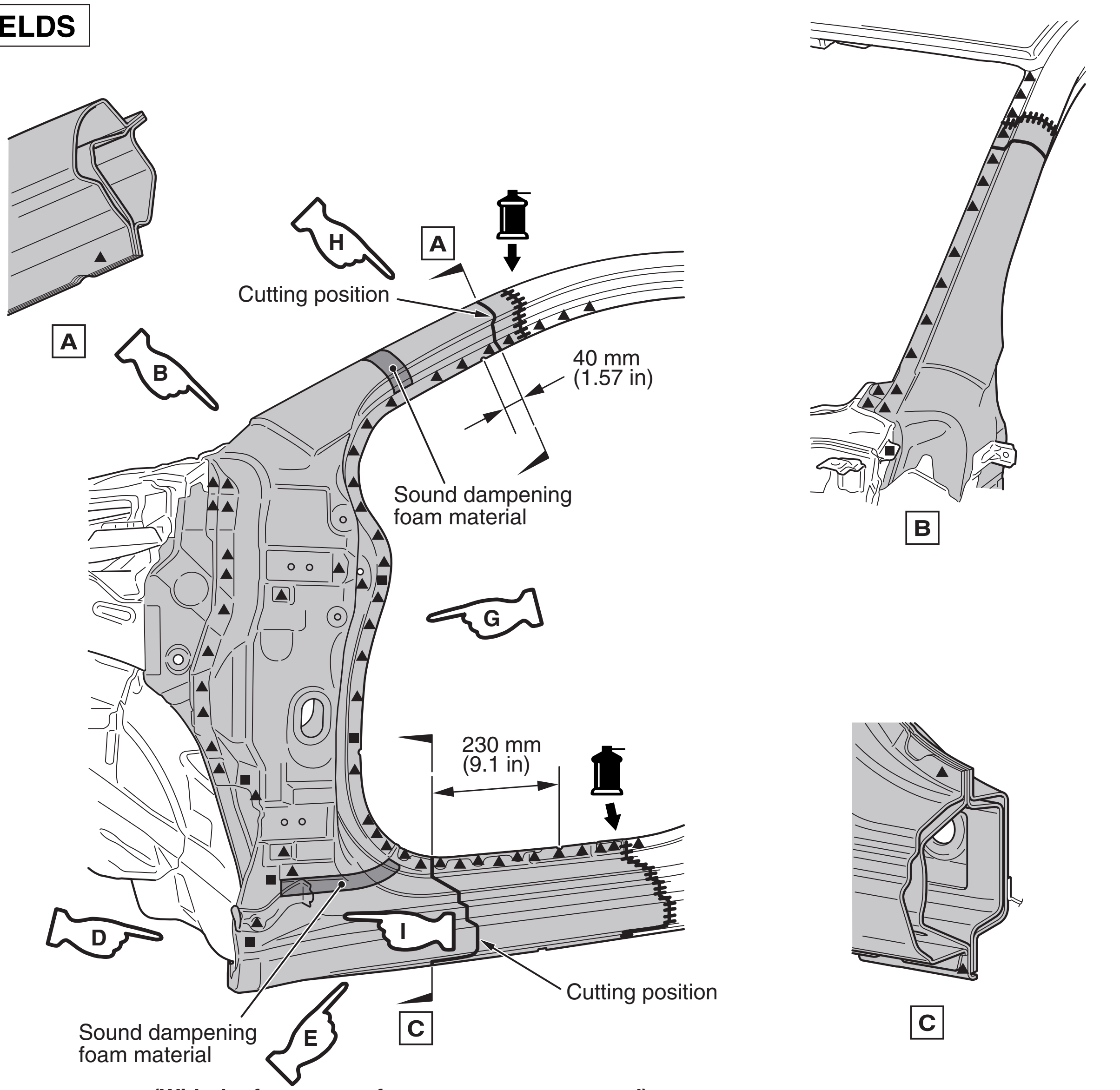
FRONT PILLAR

M4030005001165



SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

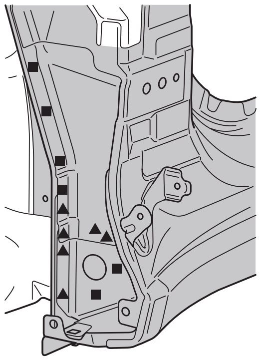


(With the front upper frame outer rear removed)

⚠ **CAUTION**

When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

NOTE: Refer to the Fender Shield section on P.3-4 for the welding points with the front upper frame outer rear.



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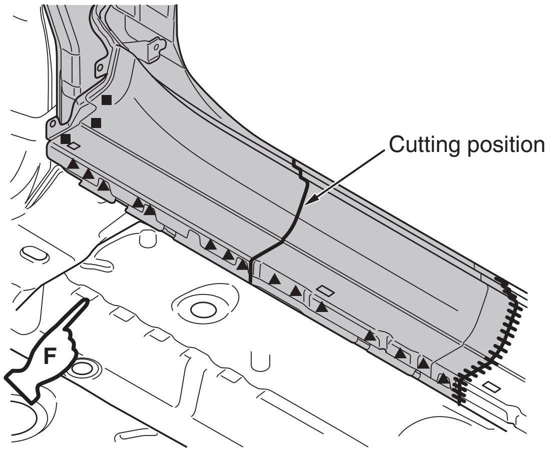

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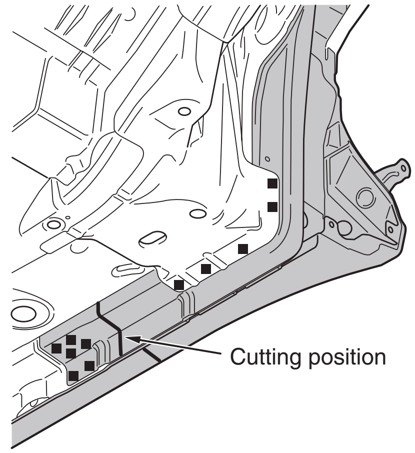

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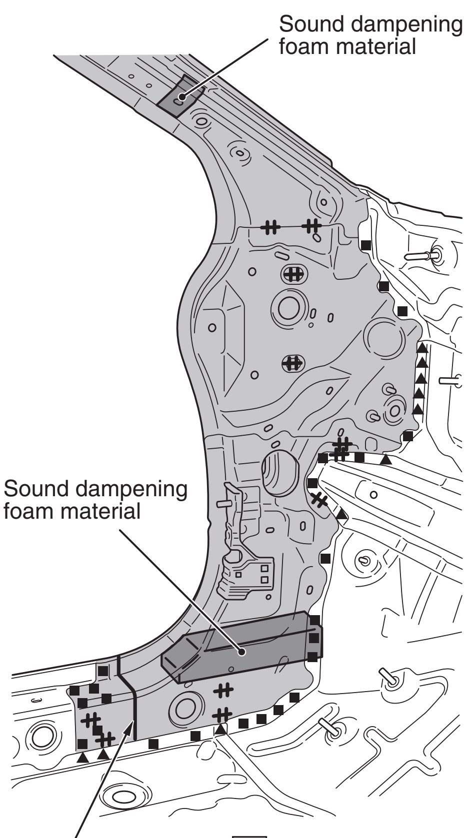

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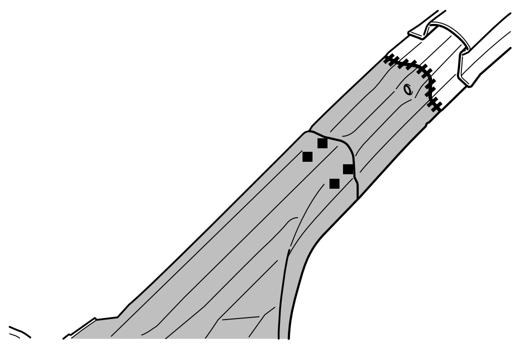
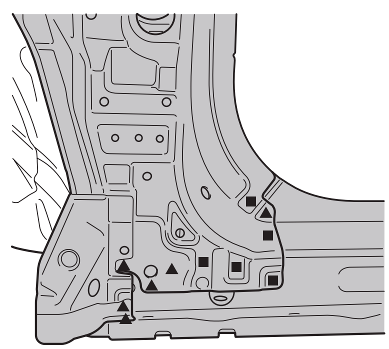


H

(With the side outer panel removed)



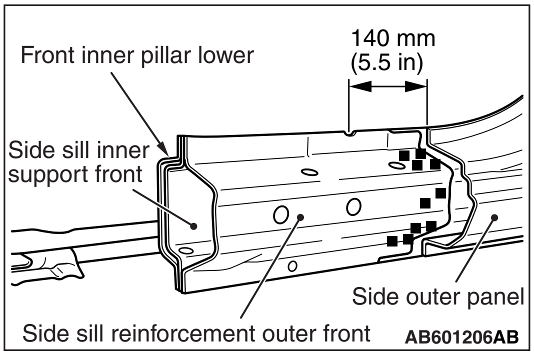
I

(With the side outer panel removed)

AB601388AB

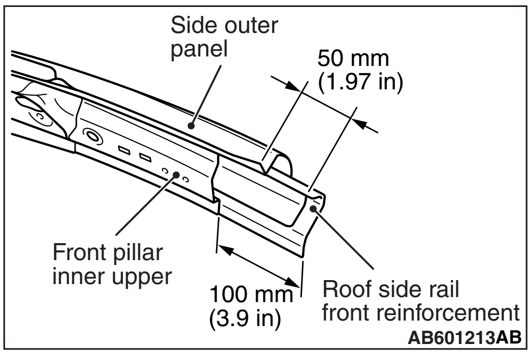
NOTE ON REPAIR WORK

REMOVAL

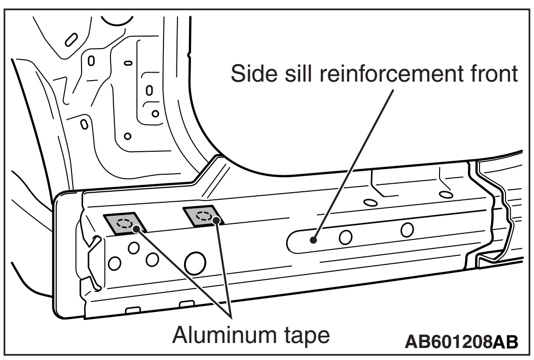


After removing the front pillar, cut the side outer panel 140 mm (5.5 inches) behind the positioning notch to remove the side sill reinforcement outer front, side sill inner support front, and front inner pillar lower remaining on the body side.

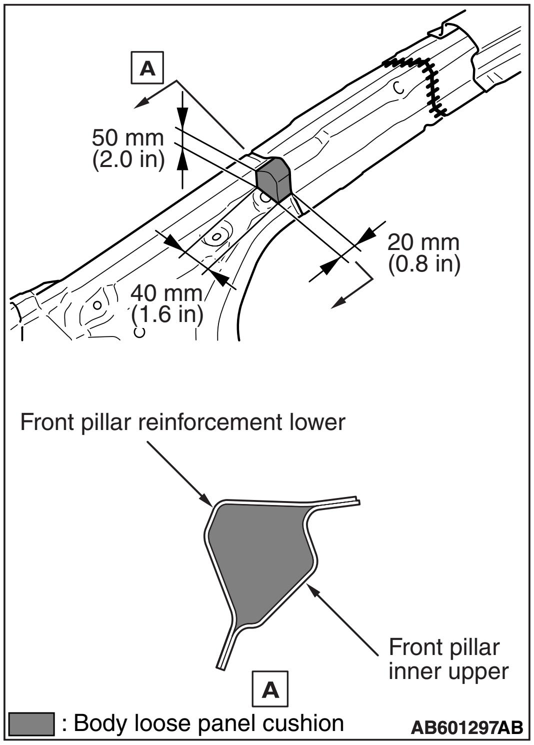
INSTALLATION



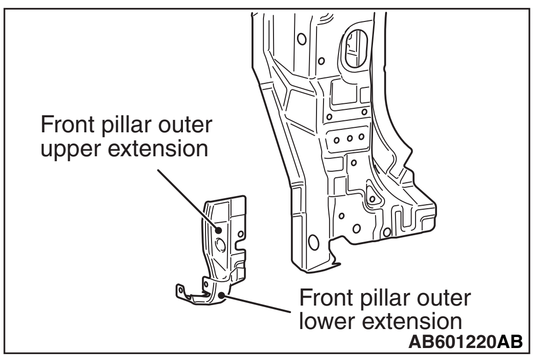
1. To reinforce the strength in the front pillar cut area, cut the side outer panel 100 mm (3.9 inches) above the cut area and cut the front inner pillar upper 50 mm (1.97 inches) above the cut area.
2. Assemble the new front pillar inner lower parts.
3. Assemble the new front pillar inner upper part.



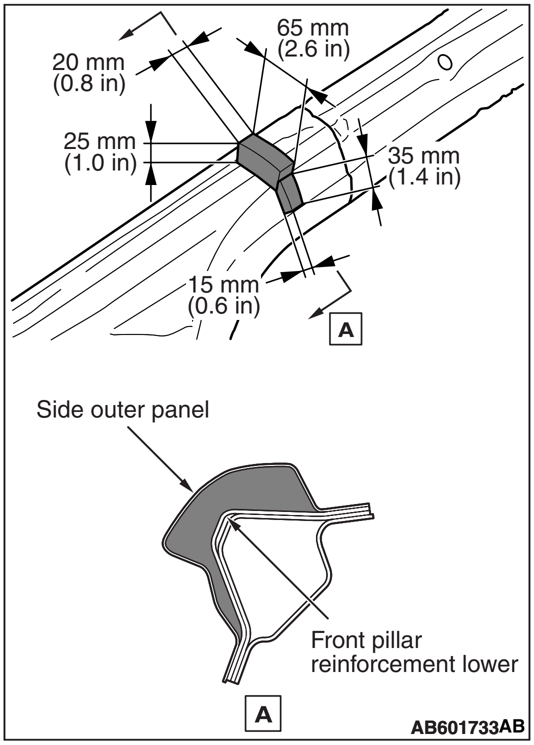
4. Assemble the new side sill reinforcement front parts. After that, cover the hole with aluminum tape to prevent the sound dampening foam material from dropping when the material is filled into the front pillar in the next process.



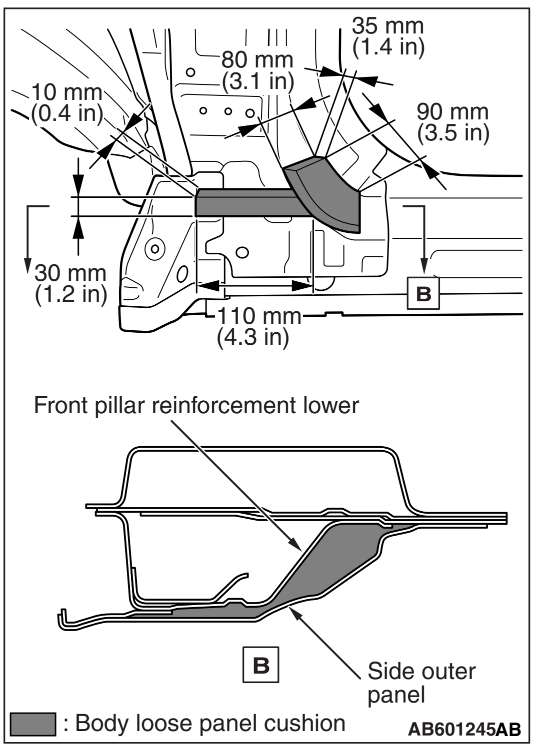
5. Align the new roof side rail reinforcement to the body side to cut and install.After that, machine the body loose panel cushion (MR535301 or MR435765) as shown and apply it to the body side to prevent the sound dampening foam material from dropping when the material is filled into the front pillar in the next process.



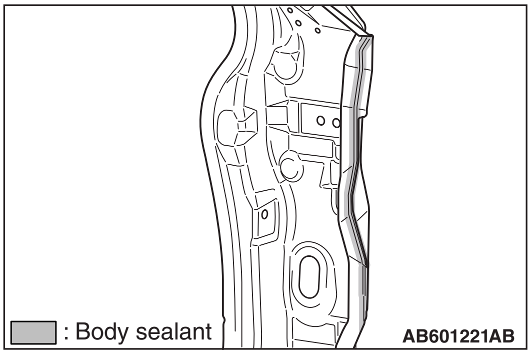
6. When installing the new front pillar lower reinforcement is installed, remove the front pillar outer lower extension and front pillar outer upper extension in advance, and install the front pillar lower reinforcement because there are some points which cannot be welded on the body side.After that, install the front pillar outer lower extension and front pillar outer upper extension.



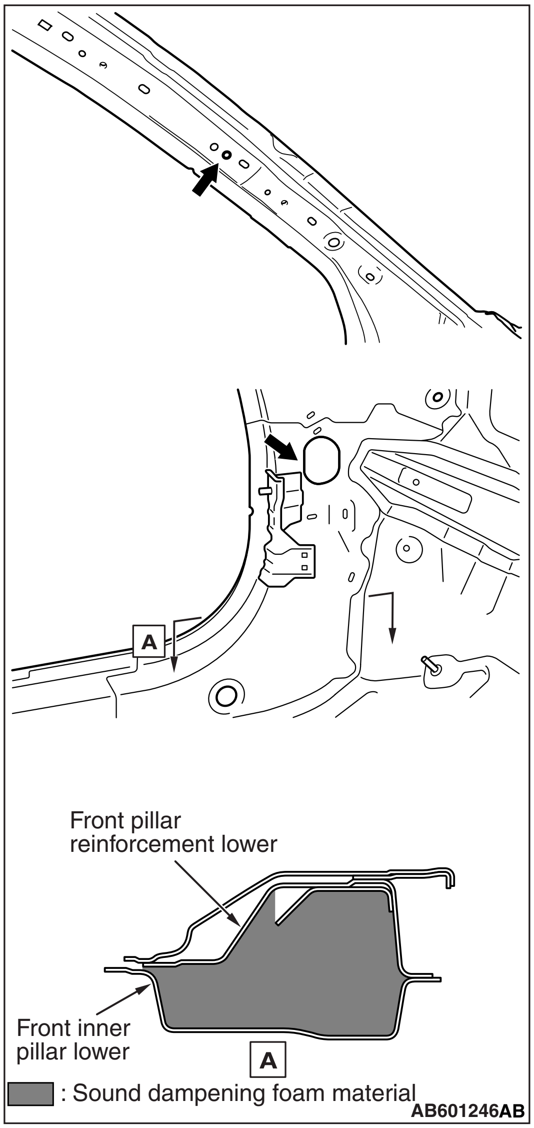
7. When installing the new front pillar outer, machine the body loose panel cushion (MR535301 or MR435765) as shown and apply it to the body side to prevent the sound dampening foam material from dropping when the material is filled into the front pillar upper in the next process (for front pillar upper).



8. When installing the new front pillar outer, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material is filled into the front pillar (for front pillar lower).

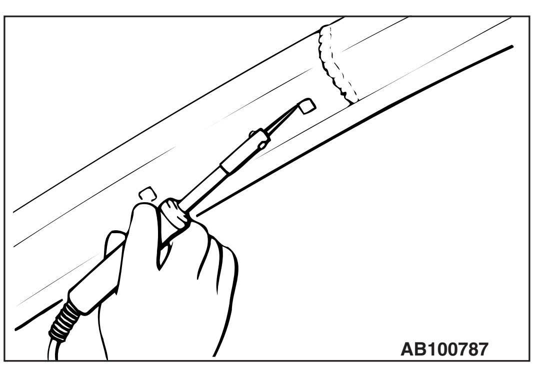


9. When installing the new front pillar outer, apply the body sealant to the areas as shown in advance.



10. Assemble the front pillar outer, bolt and tape the hole and flange with aluminum tape, then fill the hole with sound dampening foam material as shown in the figure of the instructions.

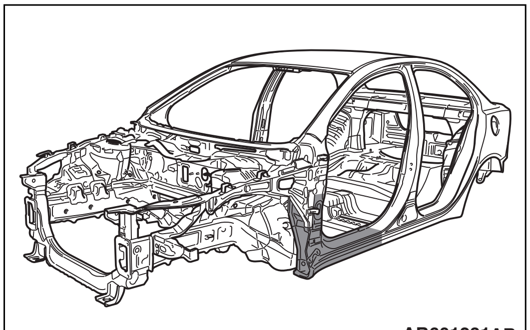
    SOUND DAMPENING FOAM MATERIAL: 3M™ AAD ULTRAPRO Panel foam-Yellow



11. Wait 2 hours after filling the sound dampening foam material to remove the bolt and aluminum tape, then melt the sound dampening foam material with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with sound dampening foam material.

FRONT PILLAR (PARTIAL REPLACEMENT)

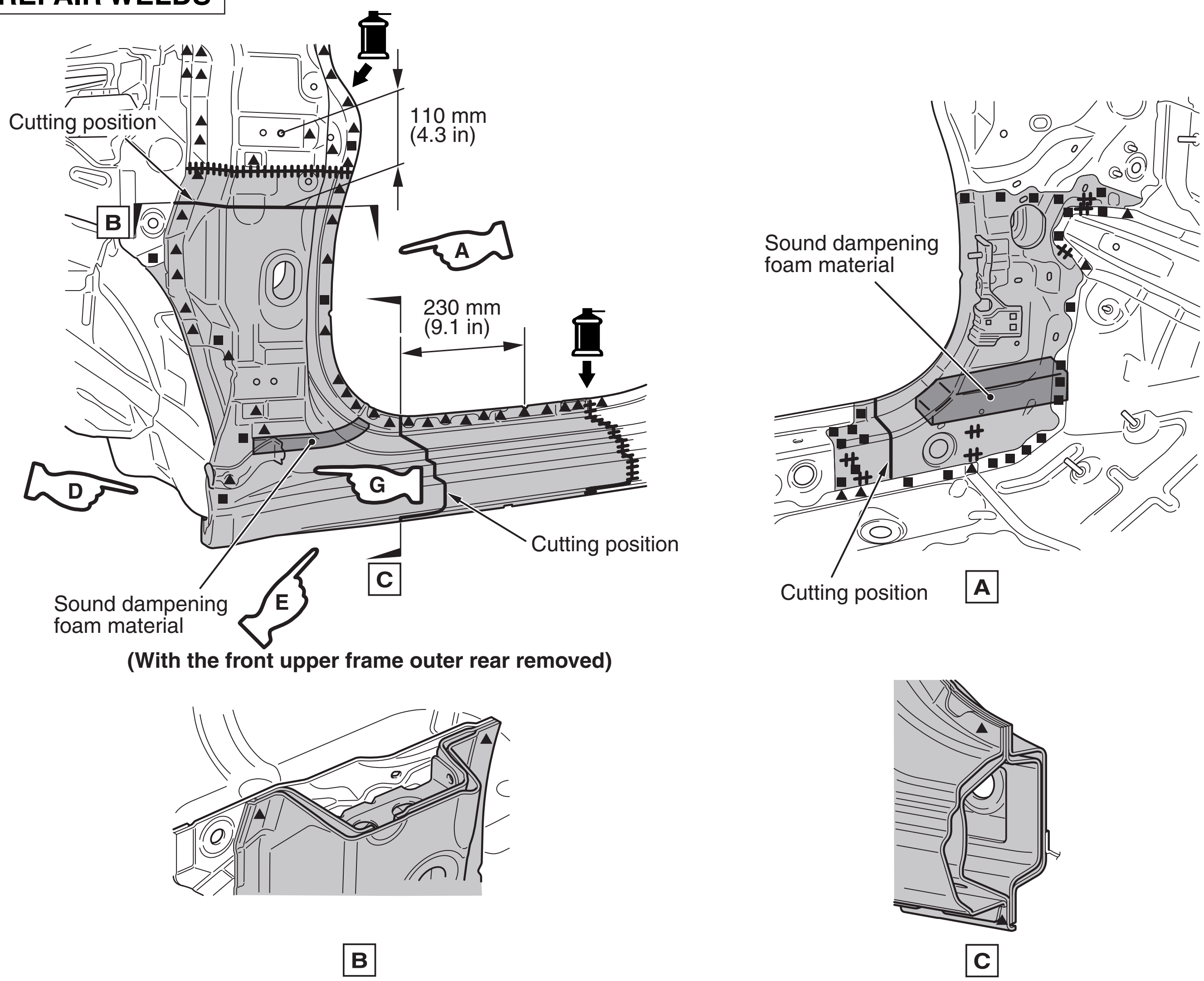
M4030001200045



AB601231AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
++++++++++	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

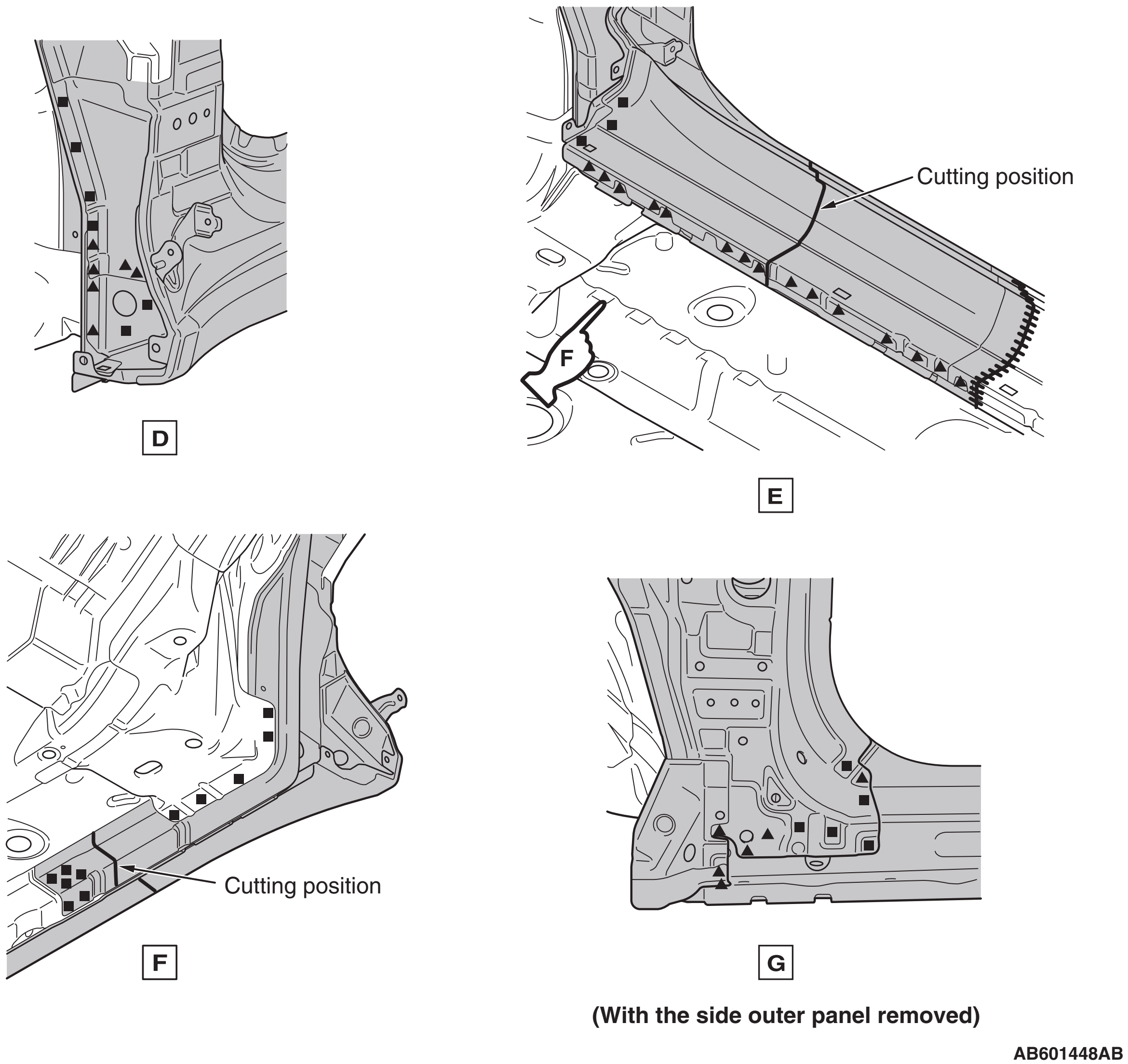


AB601401AC

⚠ CAUTION

When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

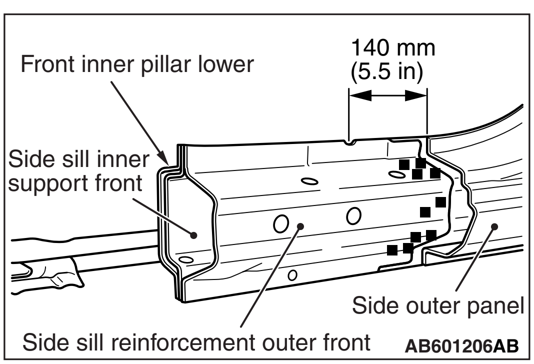
NOTE: Refer to the Fender Shield section on P.3-4 for the welding points with the front upper frame outer rear.



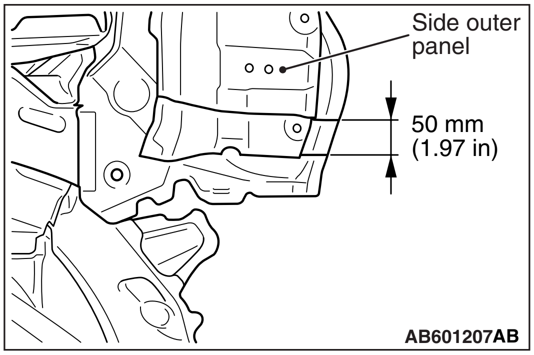
NOTE ON REPAIR WORK

REMOVAL

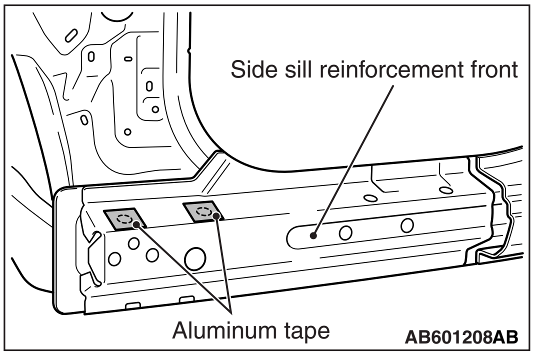
After removing the front pillar, cut the side outer panel 140 mm (5.5 inches) behind the positioning notch to remove the side sill reinforcement outer front, side sill inner support front, and front inner pillar lower remaining on the body side.



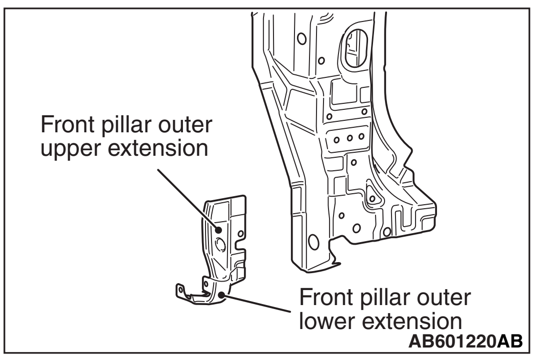
INSTALLATION



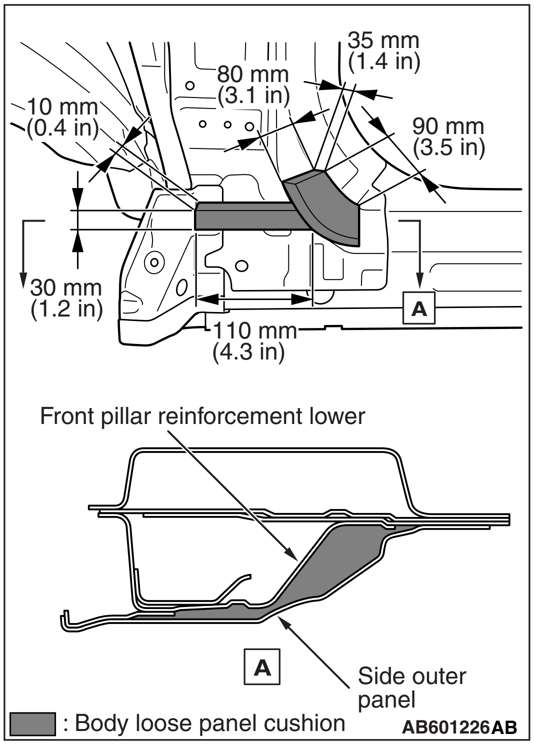
1. To reinforce the strength in the front pillar cut area, cut the side outer panel 50 mm (1.97 inches) above the cut area.
2. Assemble the new front pillar inner lower parts.



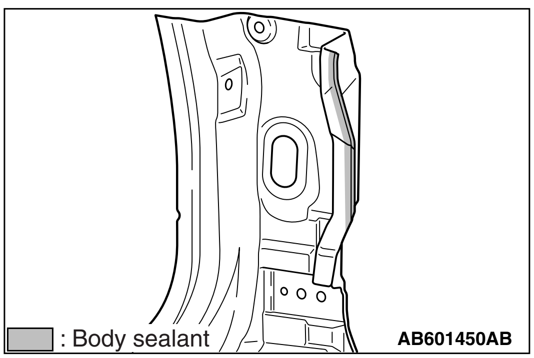
3. Assemble the new side sill reinforcement front parts. After that, cover the hole with aluminum tape to prevent the sound dampening foam material from dropping when the material is filled into the front pillar in the next process.



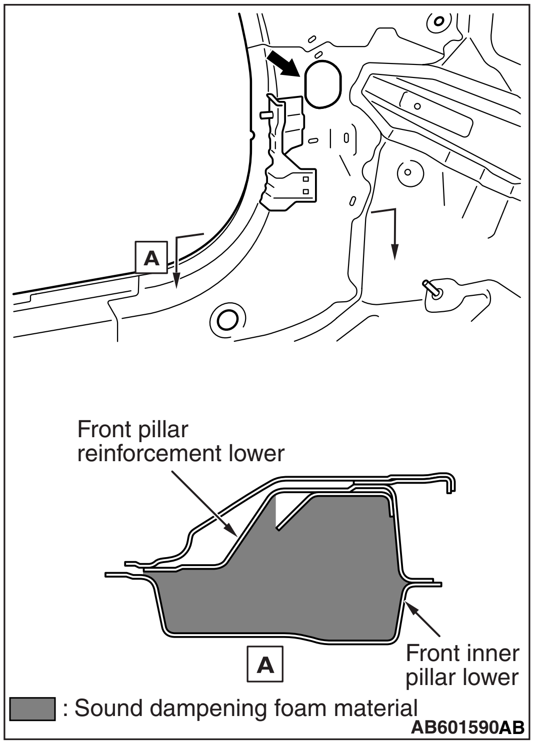
4. When installing the new front pillar lower reinforcement is installed, remove the front pillar outer lower extension and front pillar outer upper extension in advance, and install the front pillar lower reinforcement because there are some points which cannot be welded on the body side.After that, install the front pillar outer lower extension and front pillar outer upper extension.



5. When installing the new front pillar outer, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the front pillar.

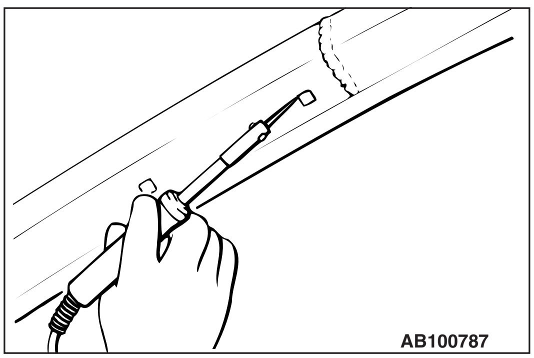


6. When installing the new front pillar outer, apply the body sealant to the areas as shown in advance.



7. Assemble the front pillar outer, bolt and tape the hole and flange with aluminum tape, then fill the hole with sound dampening foam material as shown in the figure of the instructions.

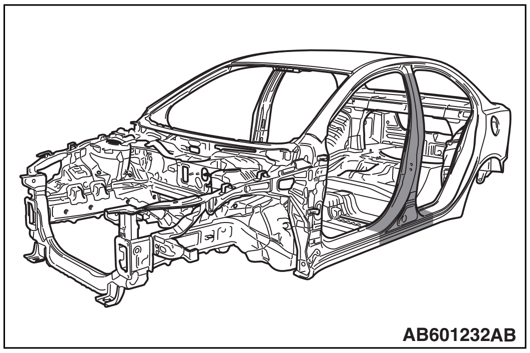
   SOUND DAMPENING FOAM MATERIAL: 3M™ AAD ULTRAPRO Panel foam-Yellow



8. Wait 2 hours after filling the sound dampening foam material to remove the bolt and aluminum tape, then melt the sound dampening foam material with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with sound dampening foam material.

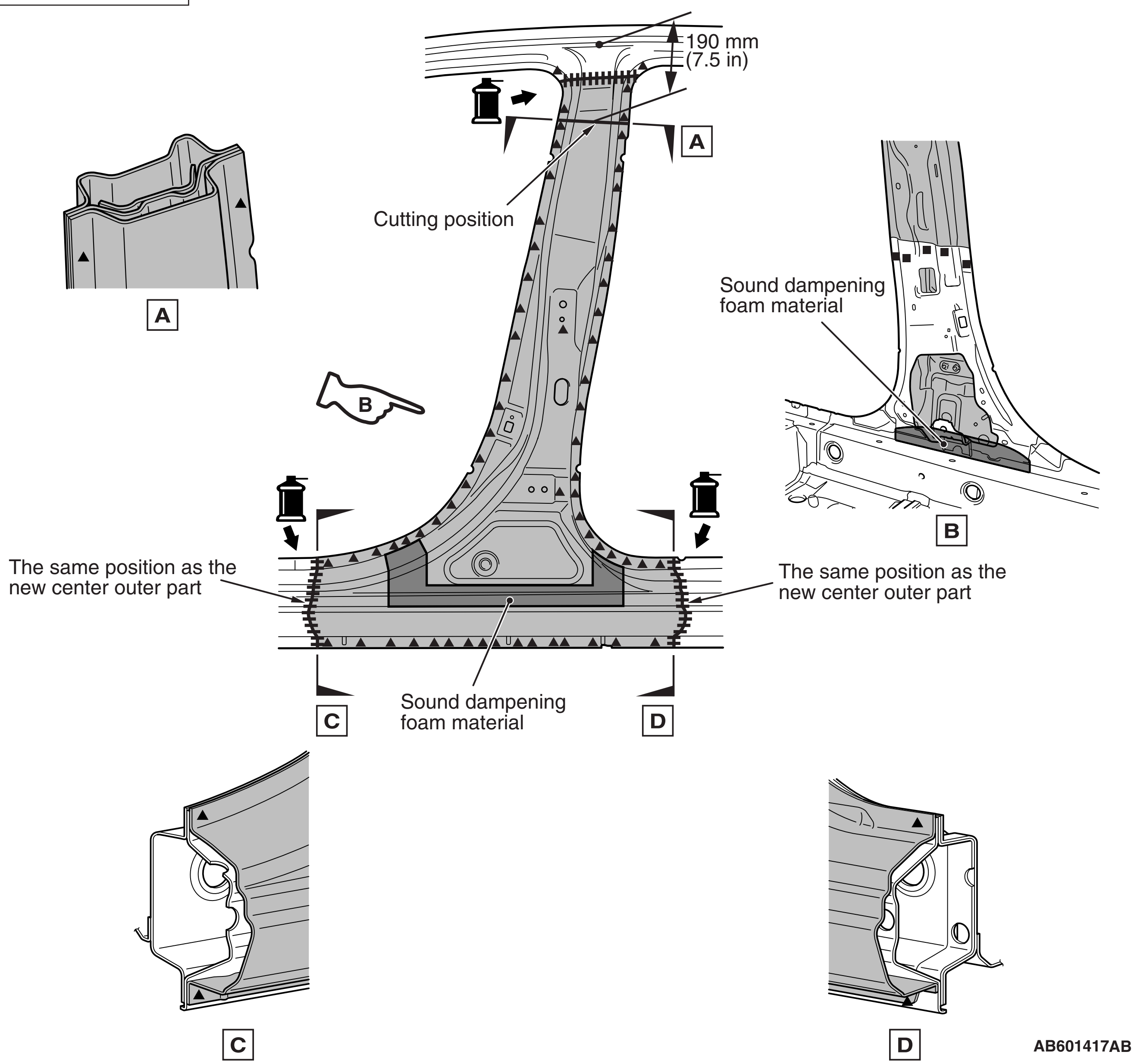
CENTER PILLAR

M4030006000693



SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
(anti-corrosion agent symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

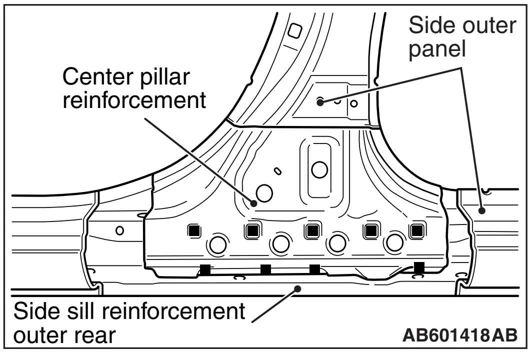


⚠ CAUTION

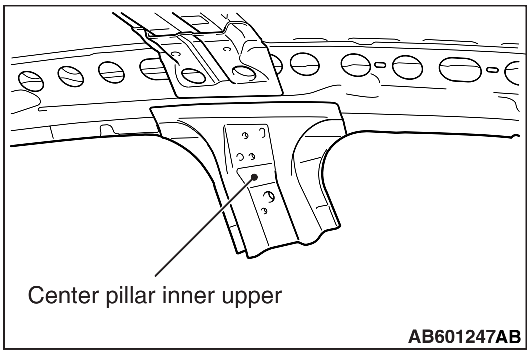
When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

NOTE ON REPAIR WORK

REMOVAL

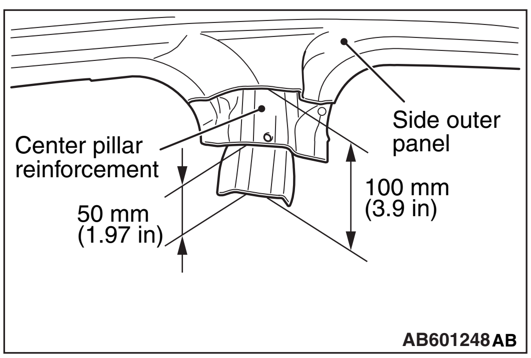


1. To cut the welding points between the side sill center pillar reinforcement and side sill reinforcement outer rear, cut the side outer panel as shown.

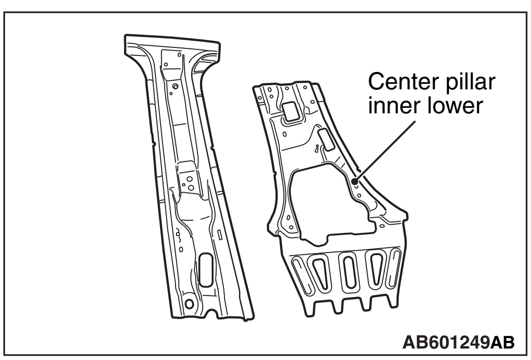


2. After removing the center pillar, remove the center pillar inner upper left on the body side.

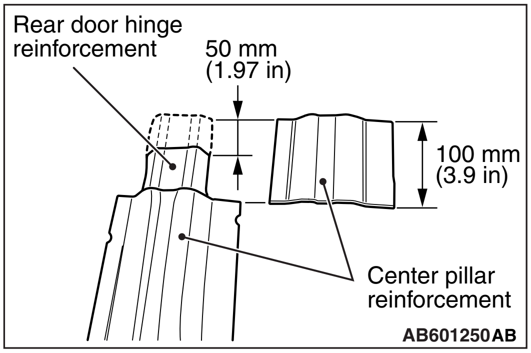
INSTALLATION



1. To reinforce the strength in the center pillar cut area, cut the side outer panel 100 mm (3.9 inches) above the cut area and cut the center pillar reinforcement 50 mm (1.97 inches) above the cut area.



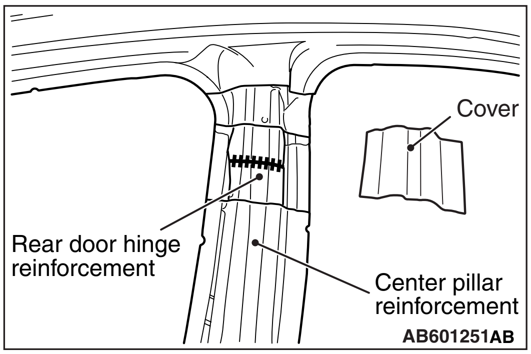
2. Remove the center pillar inner lower from the new center inner pillar, and install the center inner pillar to the body.



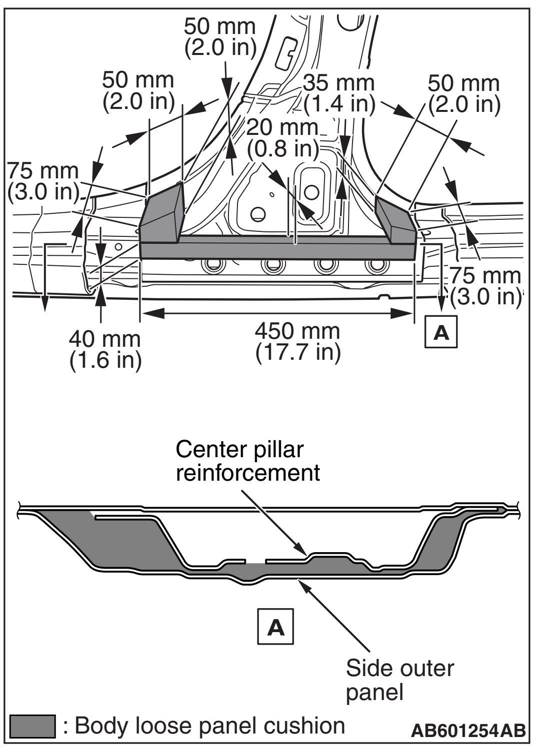
⚠ CAUTION

Weld and repair if the rear door hinge reinforcement is damaged.

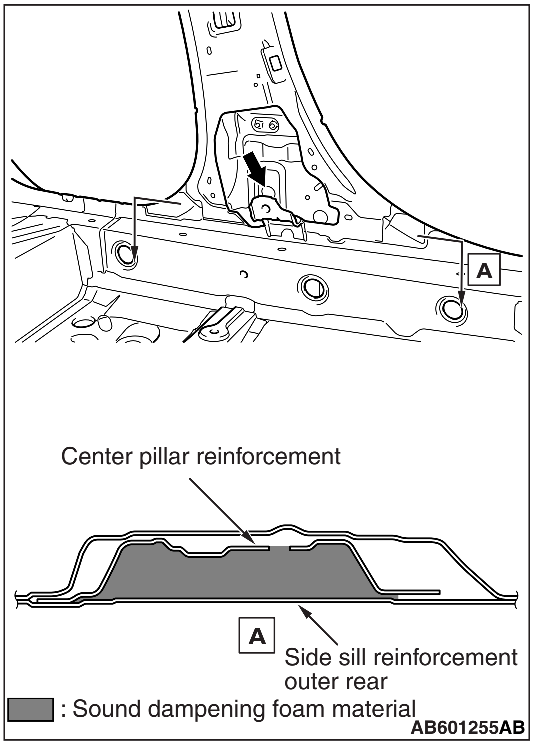
3. Cut the new center pillar reinforcement parts by aligning them with the cut area of center pillar reinforcement in the body-side. Then, cut only the center pillar reinforcement 100 mm (3.9 inches) below from the cut area to create a cover, and then cut the rear door hinge reinforcement 50 mm (1.97 inches) below from the cut area.



4. Weld the rear door hinge reinforcement then weld the cover of the center pillar reinforcement.

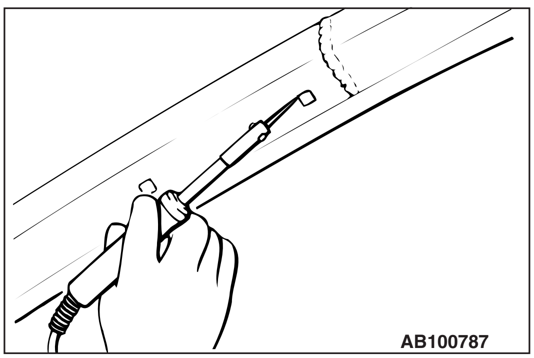


5. When installing the new center pillar outer, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the front pillar.



6. Assemble the center pillar outer, bolt and tape the hole and flange with aluminum tape, then fill the hole with sound dampening foam material as shown in the figure of the instructions.

   SOUND DAMPENING FOAM MATERIAL: 3M™ AAD ULTRAPRO Panel foam-Yellow

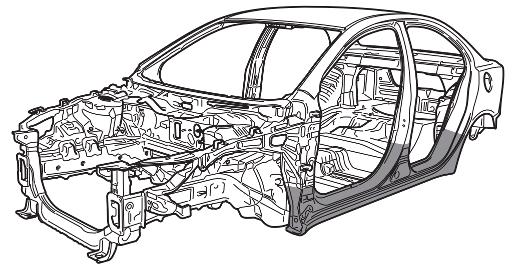


7. Wait 2 hours after filling the sound dampening foam material to remove the bolt and aluminum tape, then melt the sound dampening foam material with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with sound dampening foam material.

NOTES

SIDE SILL

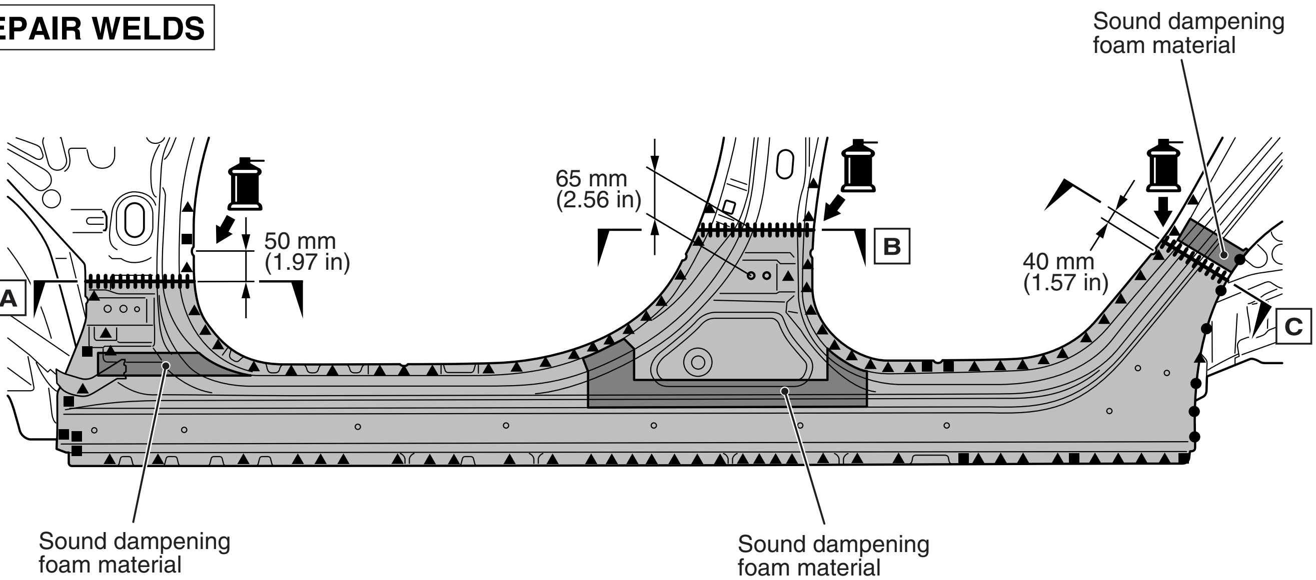
M4030007000878

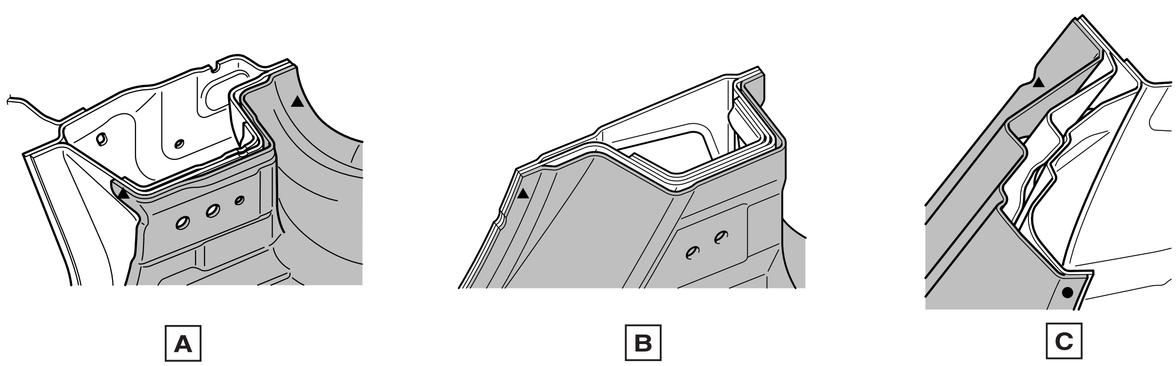


AB601233AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
ǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

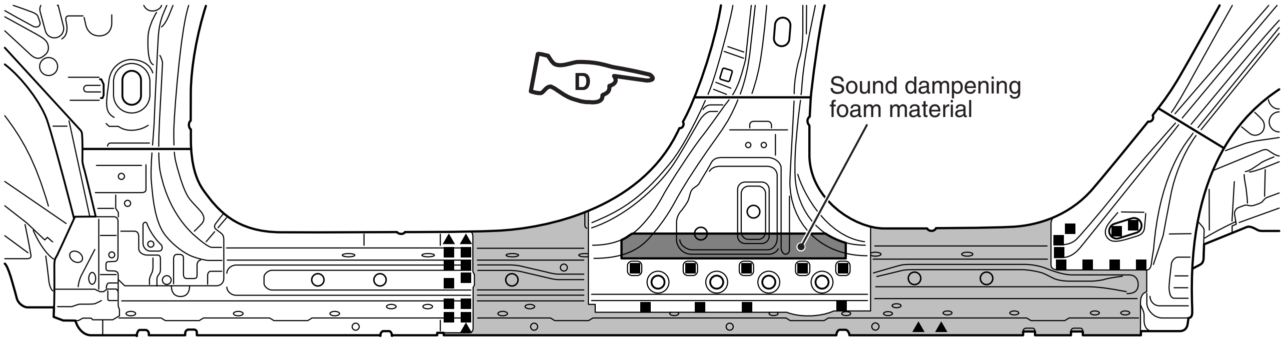




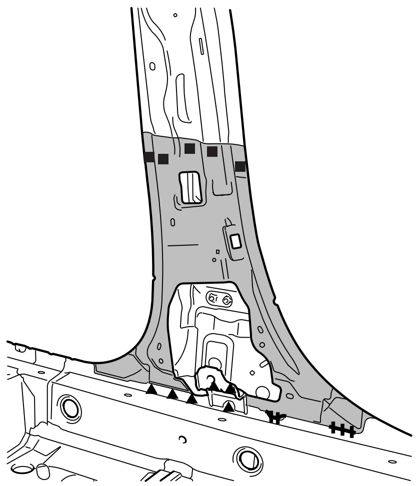
AB601516AB

⚠ CAUTION

When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

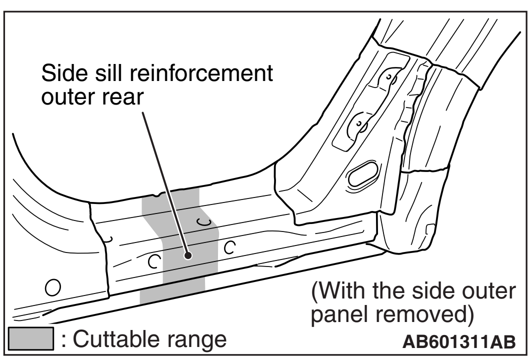


(With the side outer panel removed)



D

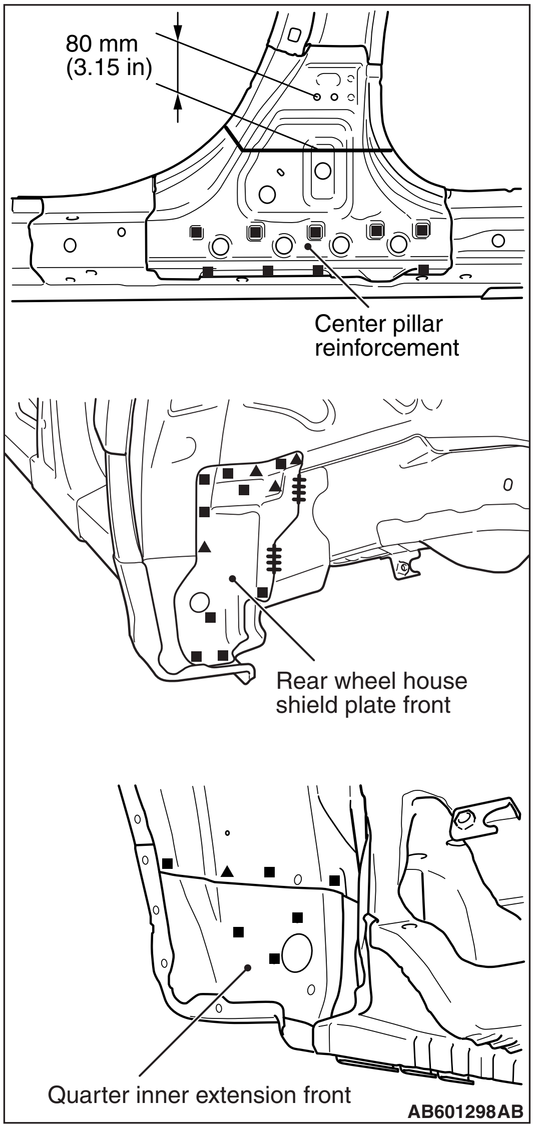
AB601517AB



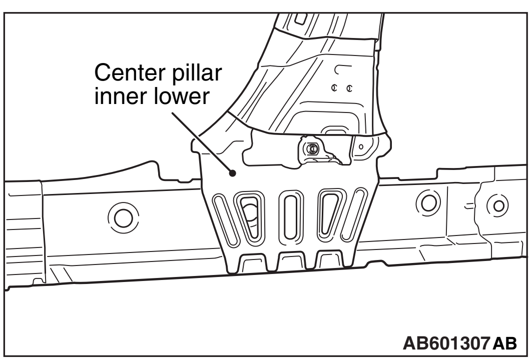
NOTE: Partial replacement is possible depending on the range of damage. Cut the side sill reinforcement outer rear 50 mm (1.97 inches) away from the cut area of the side outer panel.

NOTE ON REPAIR WORK

REMOVAL

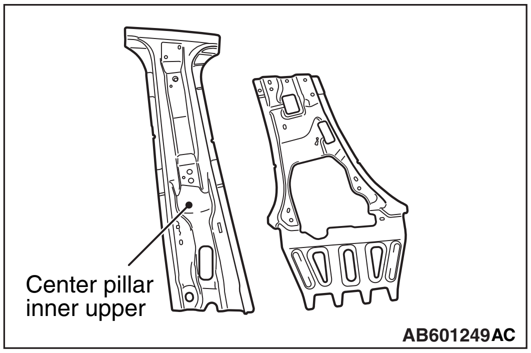


1. When installing the side sill reinforcement outer rear, cut the center pillar reinforcement 80 mm (3.15 inches) downward from the installation hole of the rear door hinge because the center pillar reinforcement interferes with it.For the rear wheel house, remove the rear wheel house shield plate front and quarter inner extension front because the quarter inner extension front interferes with the rear wheel house shield plate front.

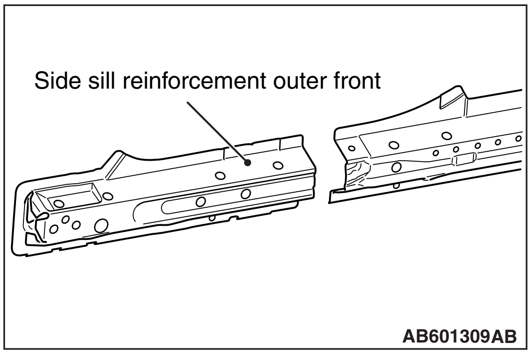


2. After removing the side sill reinforcement outer rear, remove the center pillar inner lower.

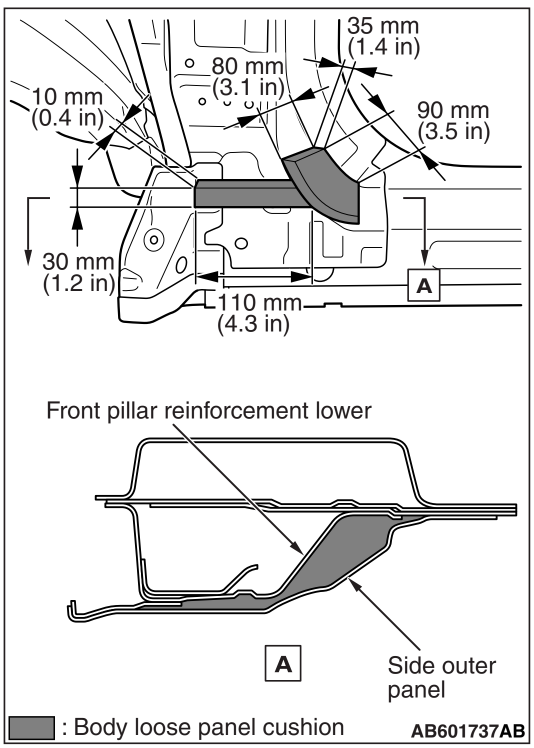
INSTALLATION



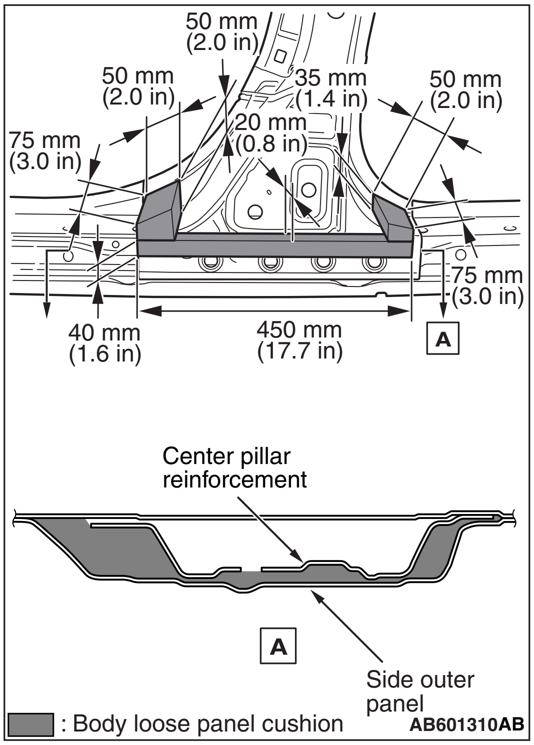
1. Remove the center pillar inner upper from the new center inner pillar, and install the center inner pillar to the body.



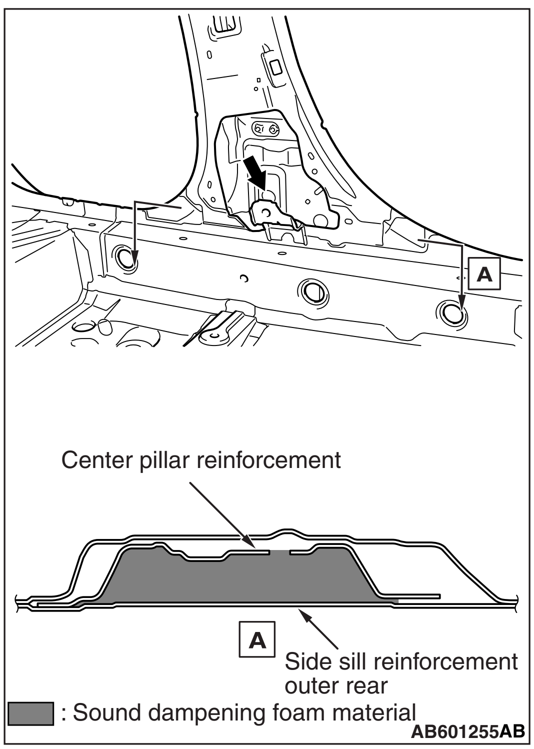
2. Remove the side sill reinforcement outer front from the new side sill reinforcement, and install the side sill reinforcement to the body.



3. When installing the new floor side sill outer, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the front pillar.

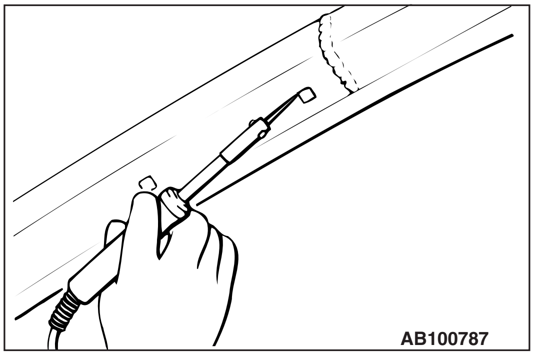


4. When installing the new floor side sill outer, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the center pillar.



5. Assemble the floor side sill outer, bolt and tape the hole and flange with aluminum tape, then fill the hole with sound dampening foam material as shown in the figure of the instructions.

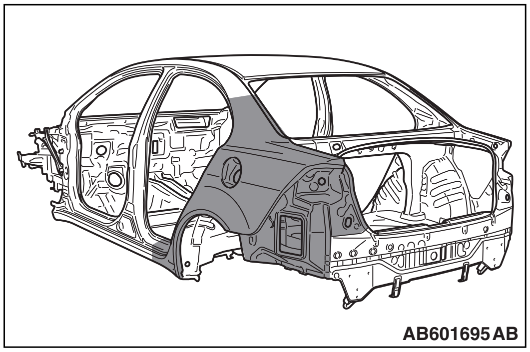
SOUND DAMPENING FOAM MATERIAL: 3M™ AAD ULTRAPRO Panel foam-Yellow



6. Wait 2 hours after filling the sound dampening foam material to remove the bolt and aluminum tape, then melt the sound dampening foam material with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with sound dampening foam material.

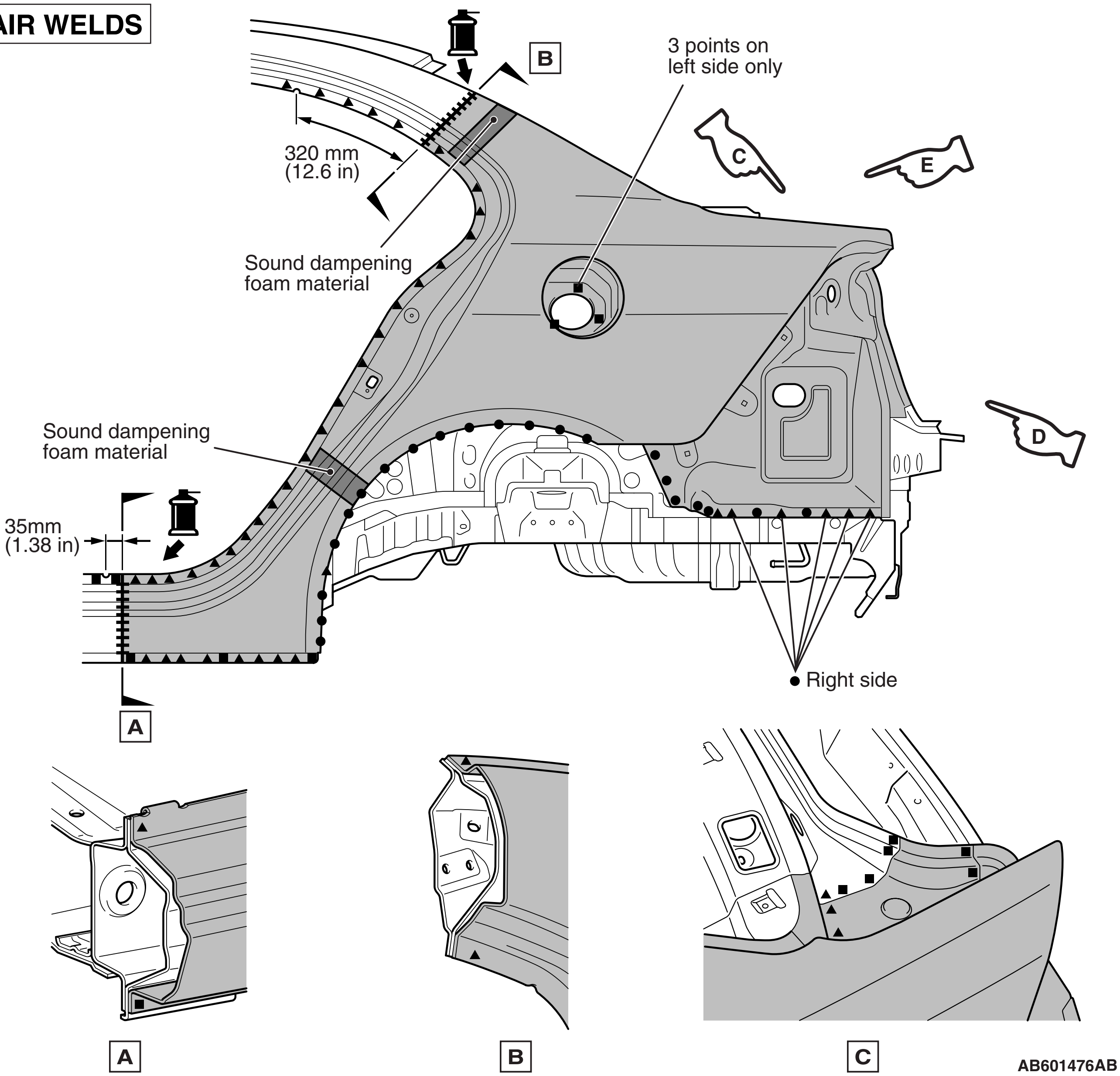
QUARTER OUTER

M4030008000718



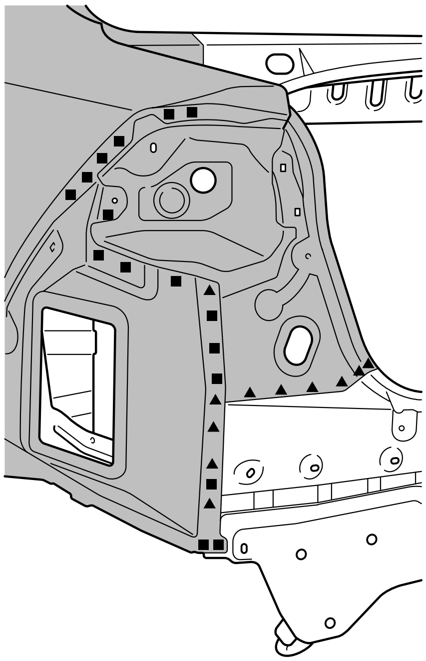
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded; ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
○○○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

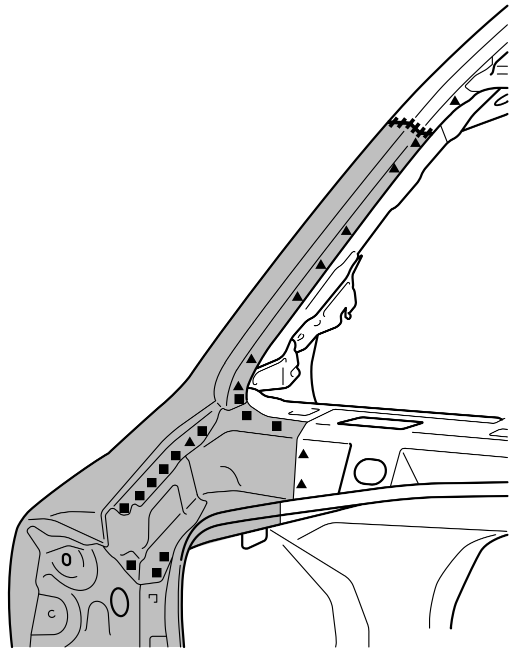


⚠ CAUTION

When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

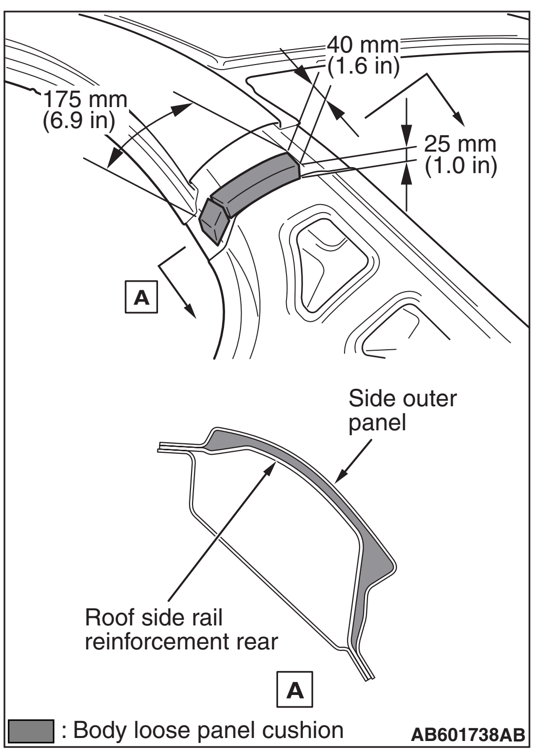


D



E

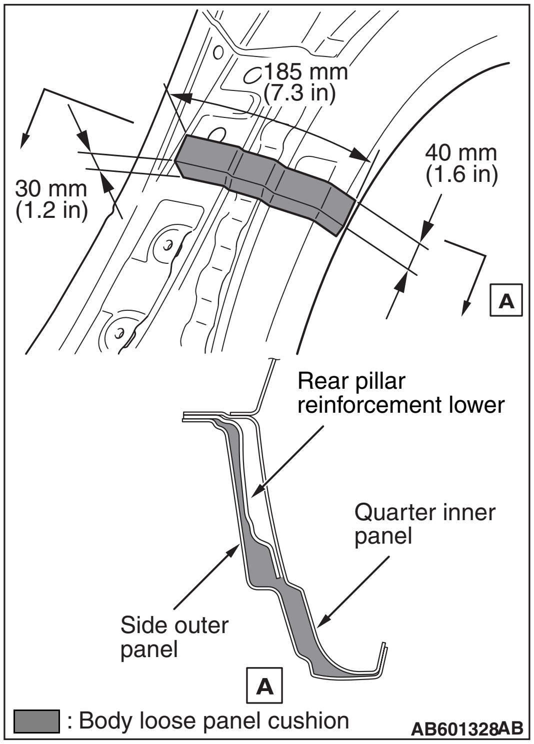
AB601477AB



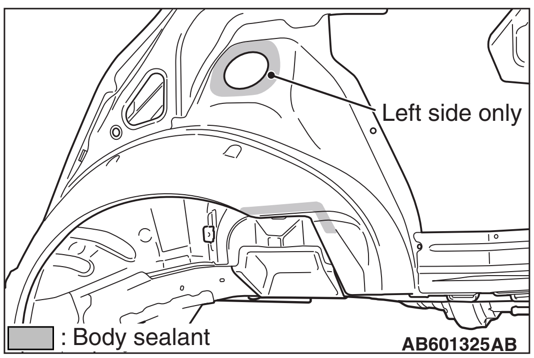
NOTE ON REPAIR WORK

INSTALLATION

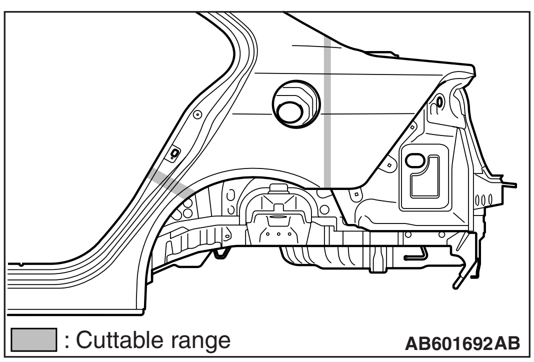
1. When installing the new rear quarter outer panel, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the wheel arch.



2. When installing the new rear quarter outer panel, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the wheel arch.



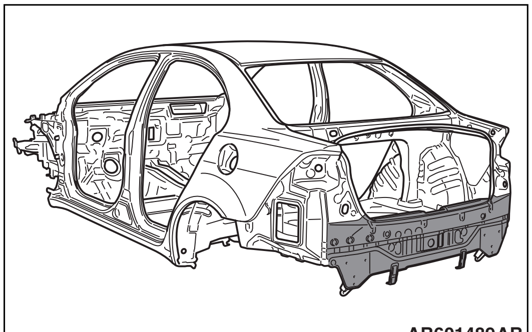
3. When installing the new rear quarter outer panel, apply the body sealant in advance to the areas as shown.



NOTE: Partial replacement is possible depending on the range of damage.

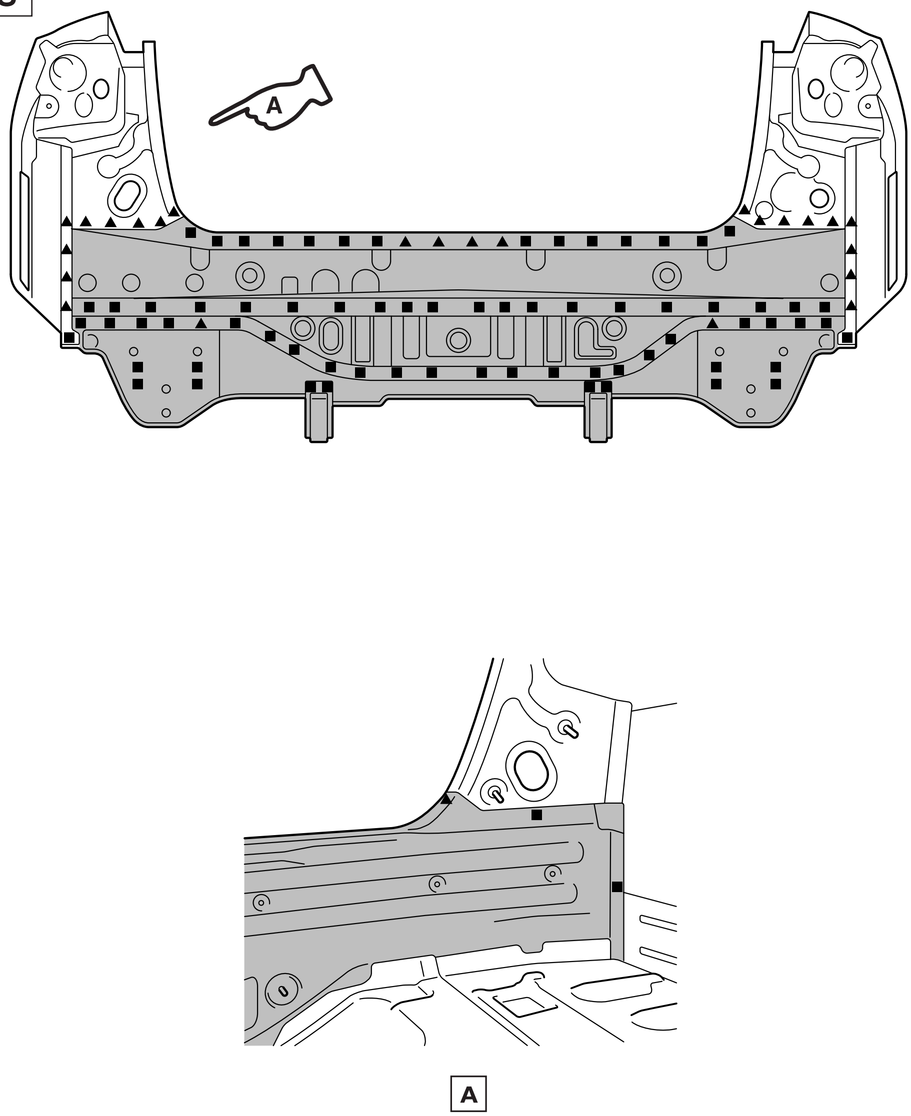
REAR END PANEL

M4030009000302


AB601489AB

Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

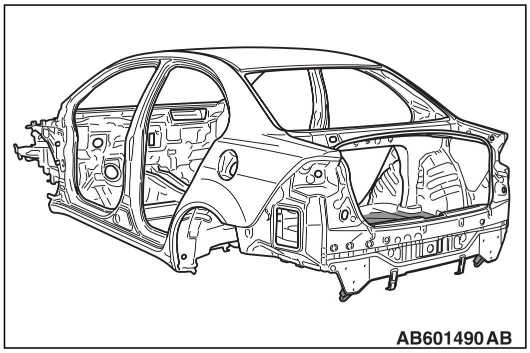
REPAIR WELDS



AB601442AB

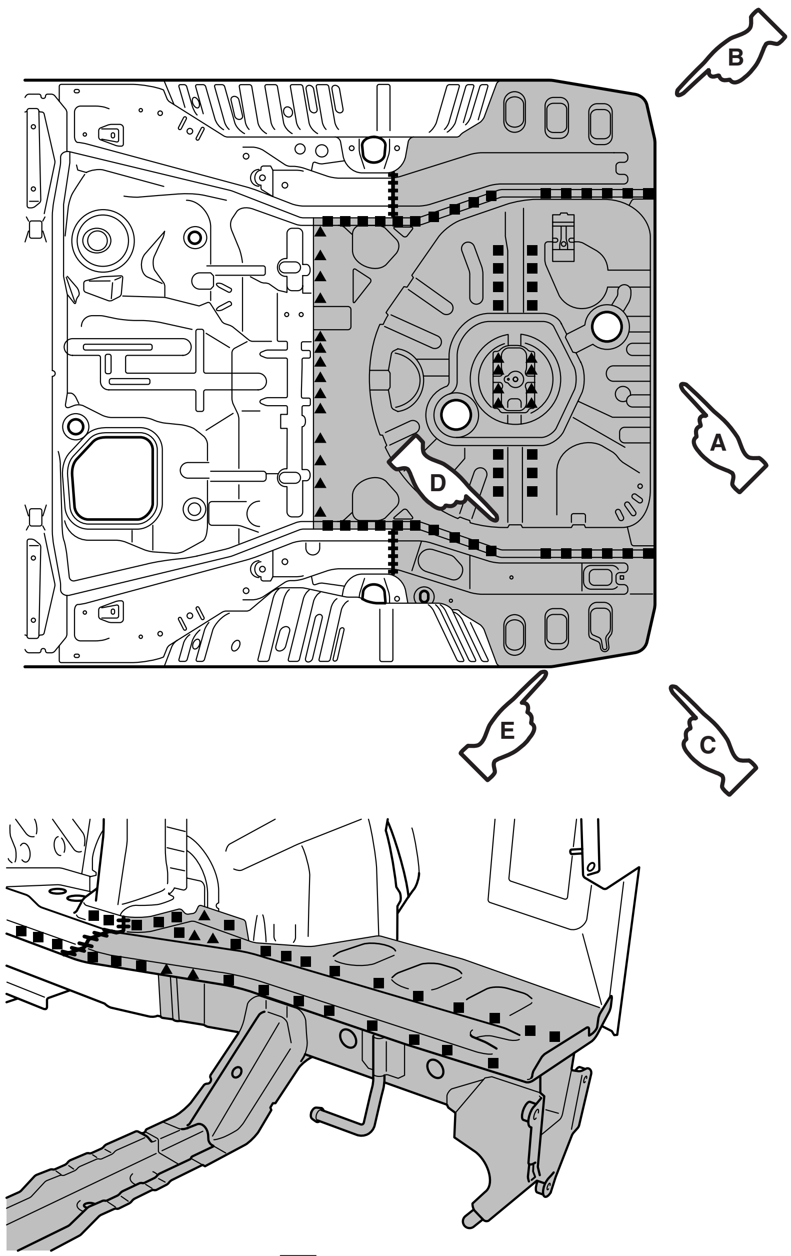
REAR FLOOR

M4030010000782



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded; ▲: indicates three panels to be welded)
++++	MIG spot welding
╫╫╫╫╫╫	MIG arc welding (continuous)
∞∞∞∞	Braze welding
(anti-corrosion agent symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

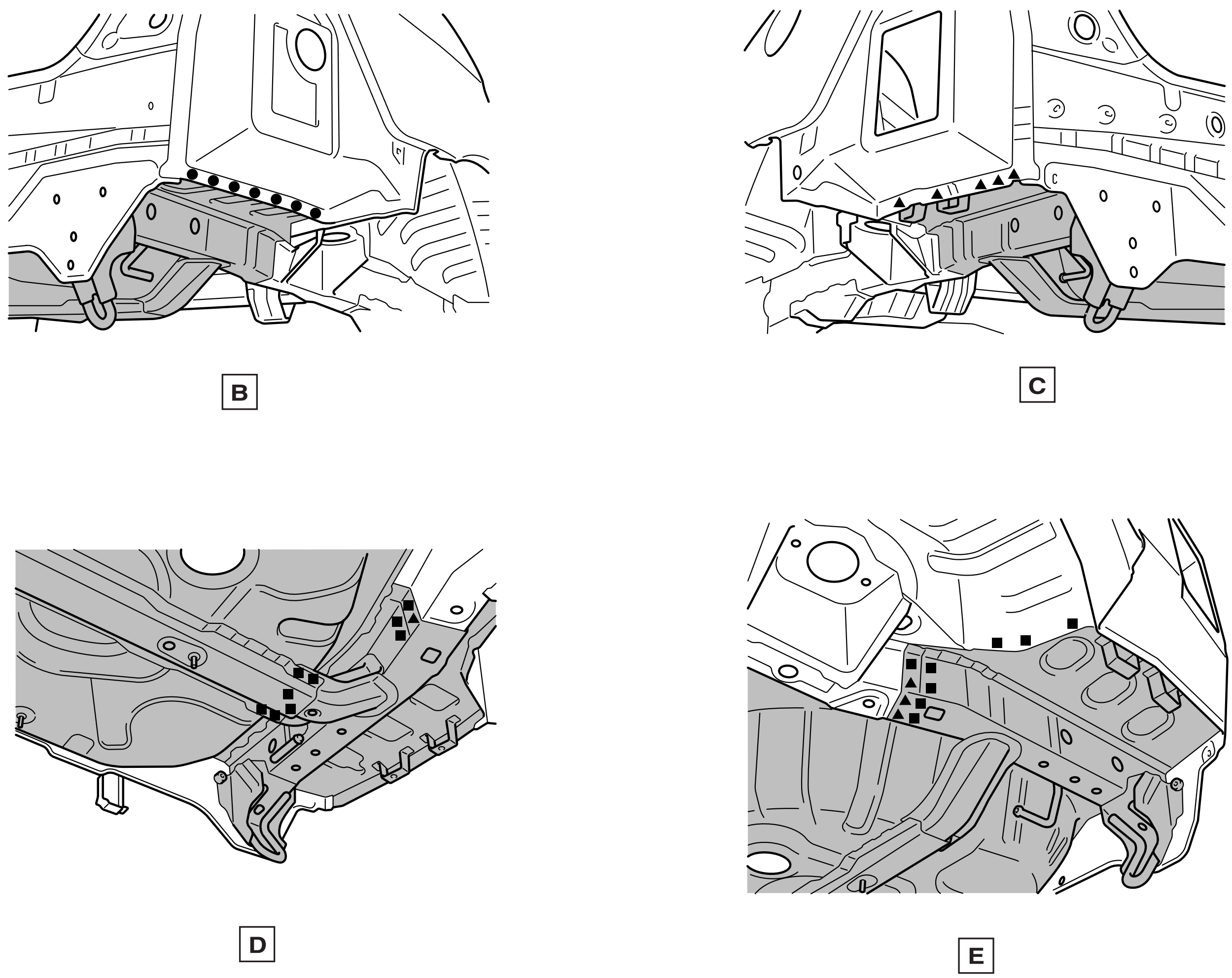
REPAIR WELDS



(With the rear floor pan rear removed)

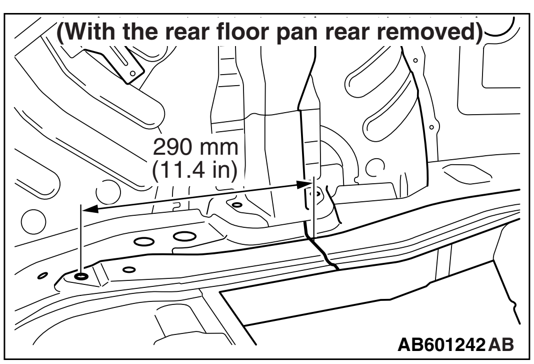
AB601443AB

NOTE: Refer to the Rear End Panel section on P.3-35 for the welding points with the rear end panel.



NOTE ON REPAIR WORK

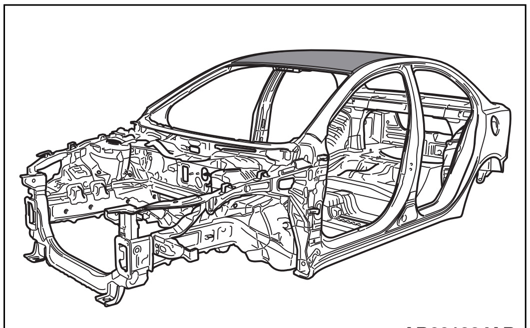
REMOVAL



1. When removing the rear floor sidemember upper, cut it 290 mm (11.4 inches) behind the installation hole of the child restraint bracket.

ROOF

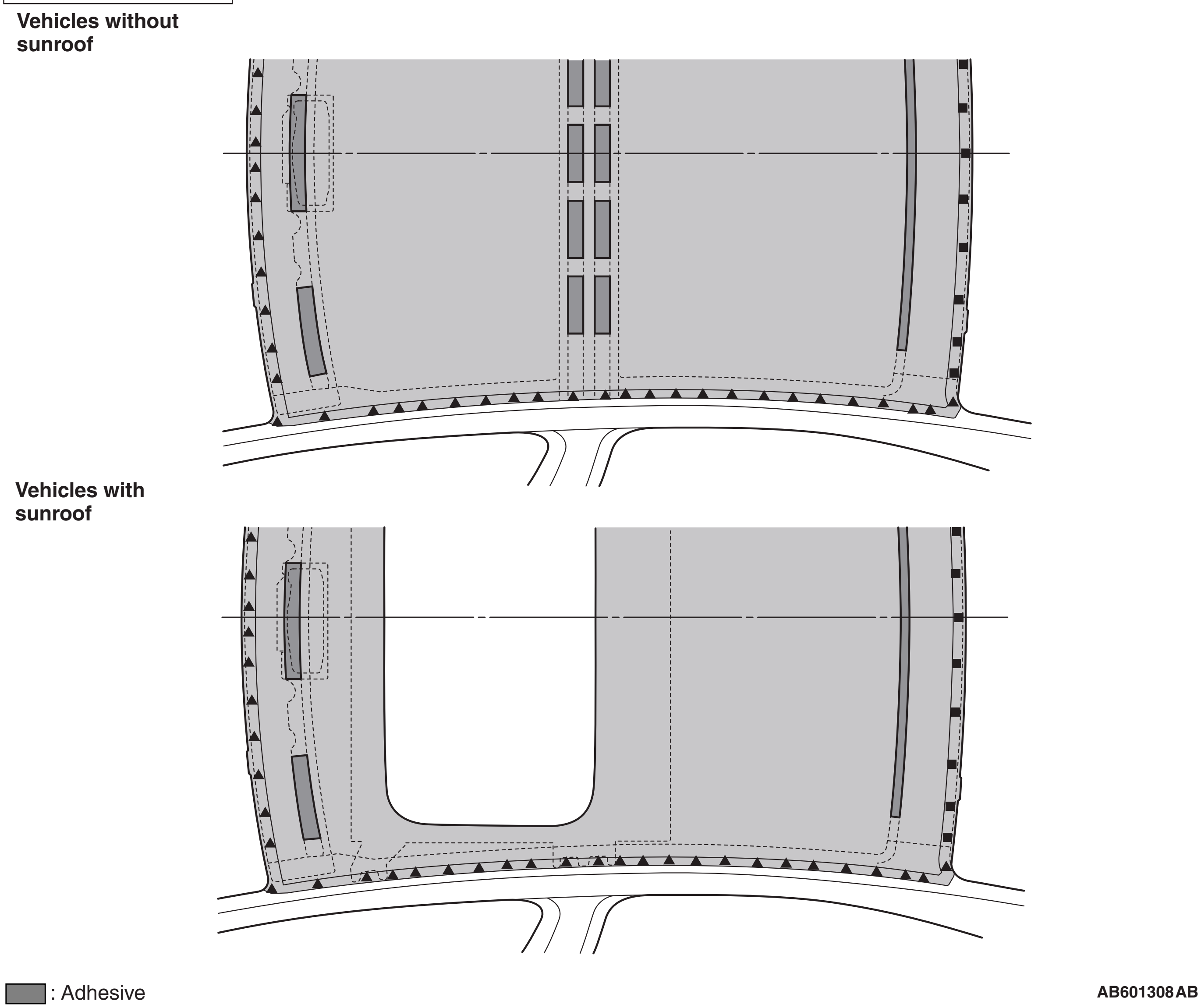
M4030011000871



AB601234AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
(anti-corrosion agent symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



AB601308AB

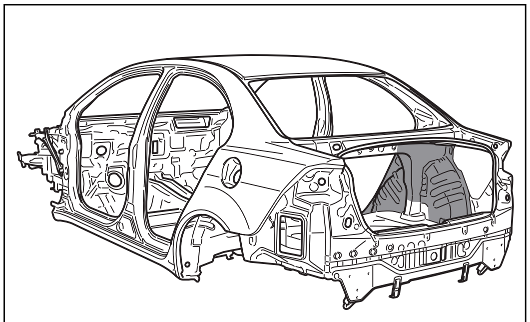
ADHESIVE: Urethane body sealer

BRAND: 3M™ AAD Part No.8542 or equivalent

NOTES

QUARTER INNER

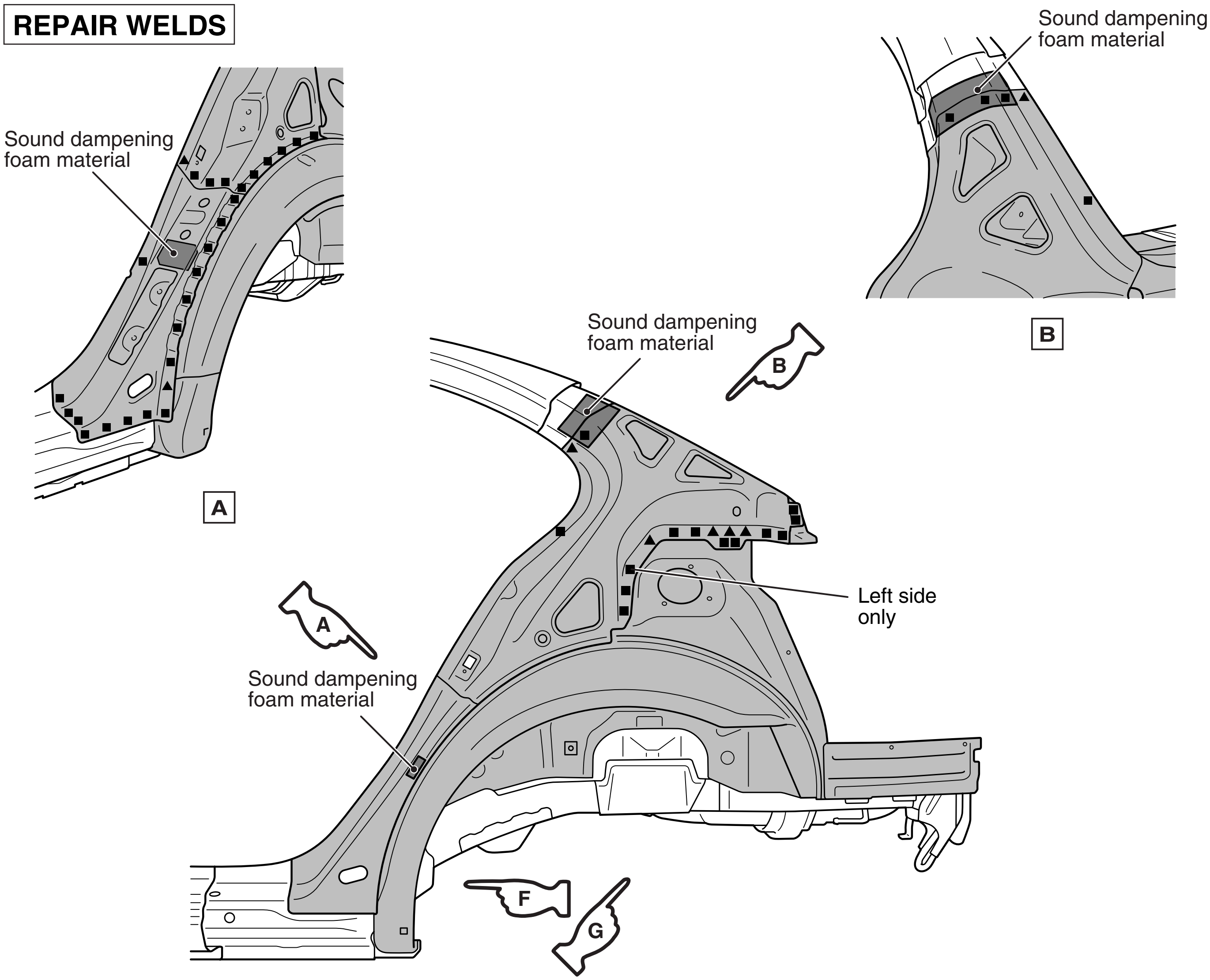
M4030012000733



AB601696AB

Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
○○○○○○○○○	Braze welding
(spray can symbol)	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



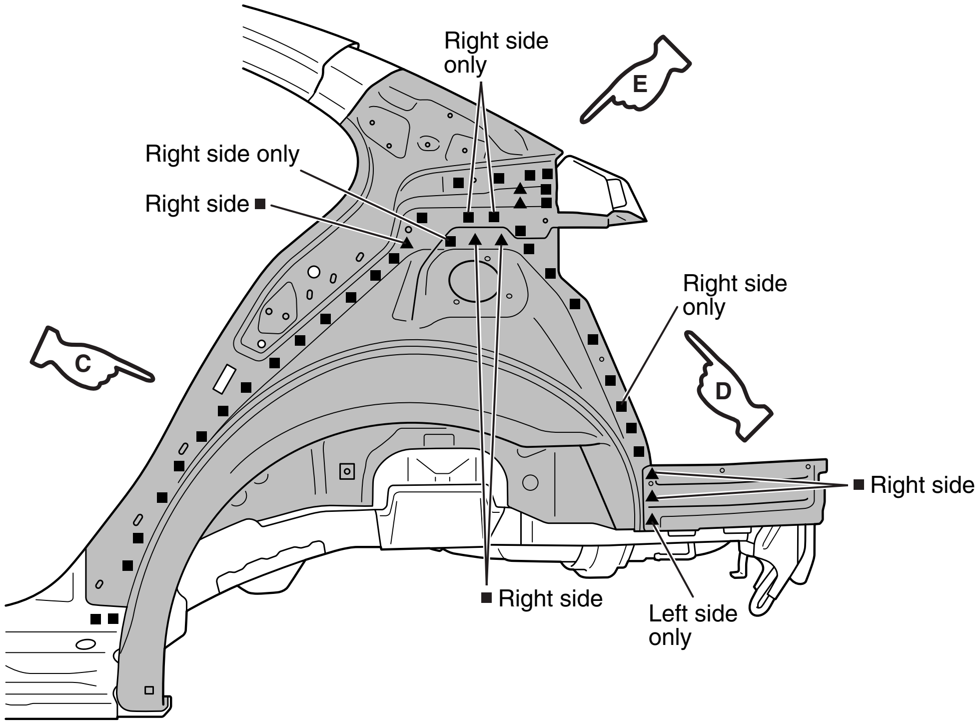
(With the quarter outer removed)

AB601518AB

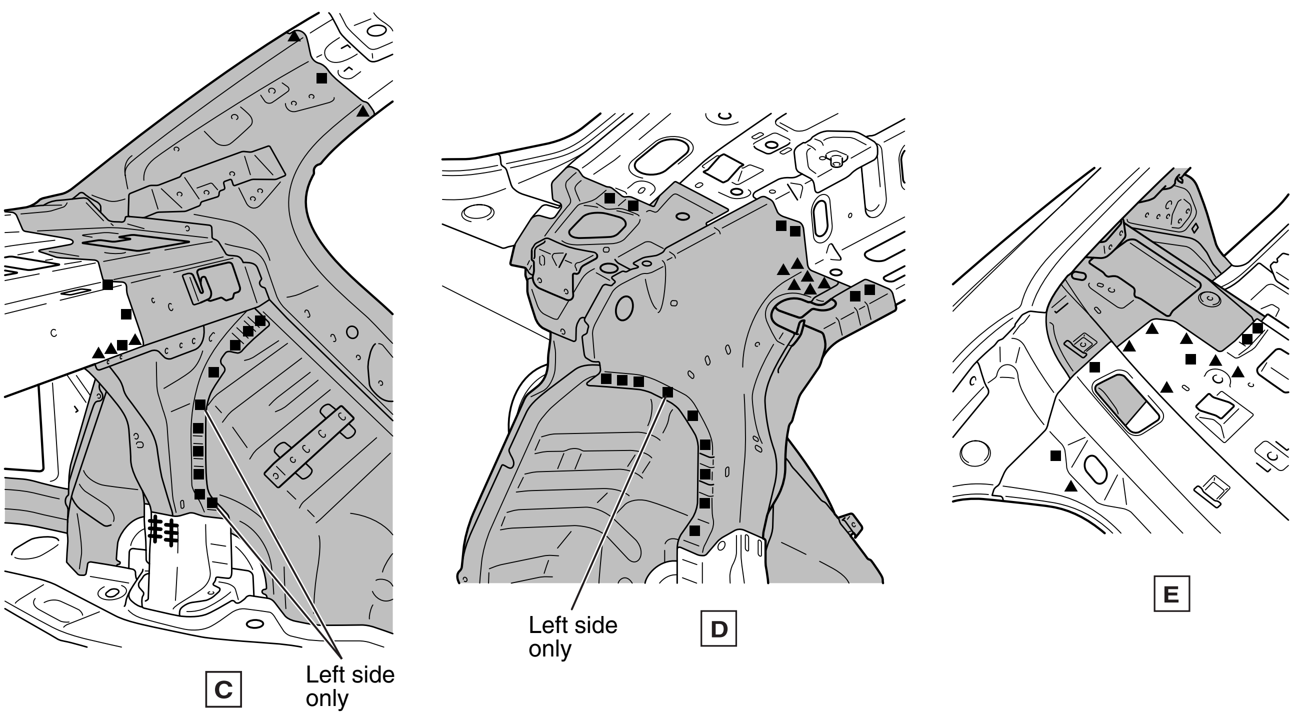
⚠ CAUTION

When repairing the area using sound dampening foam material do not use firing tools since the sound dampening foam material may burn.

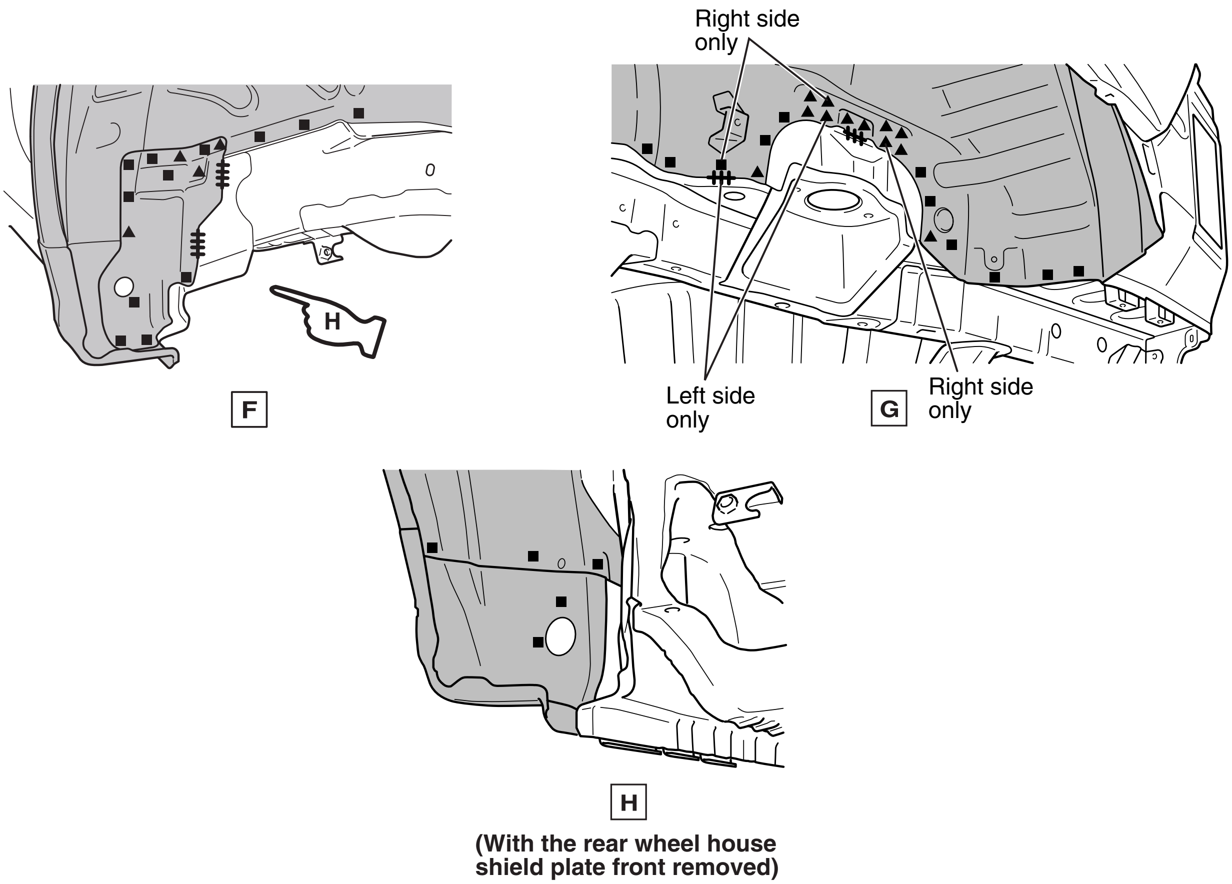
NOTE: Refer to the Quarter Outer section on P.3-32 for the welding points with the quarter outer.



(With the rear pillar reinforcement and the rear pillar reinforcement lower removed)



AB601519AB

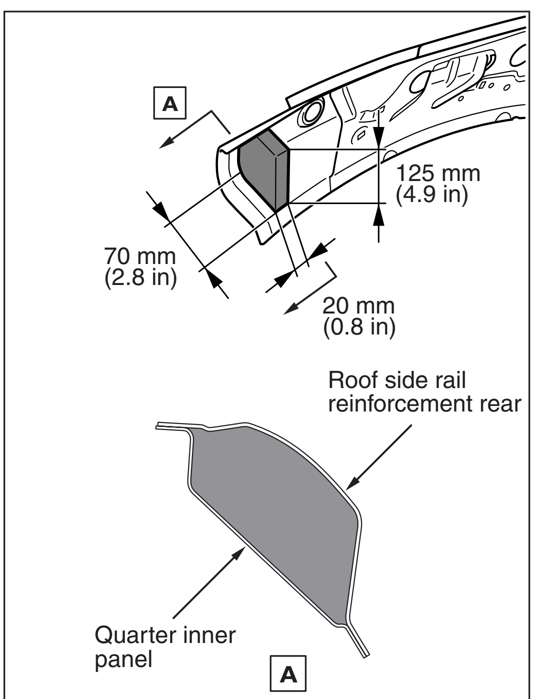


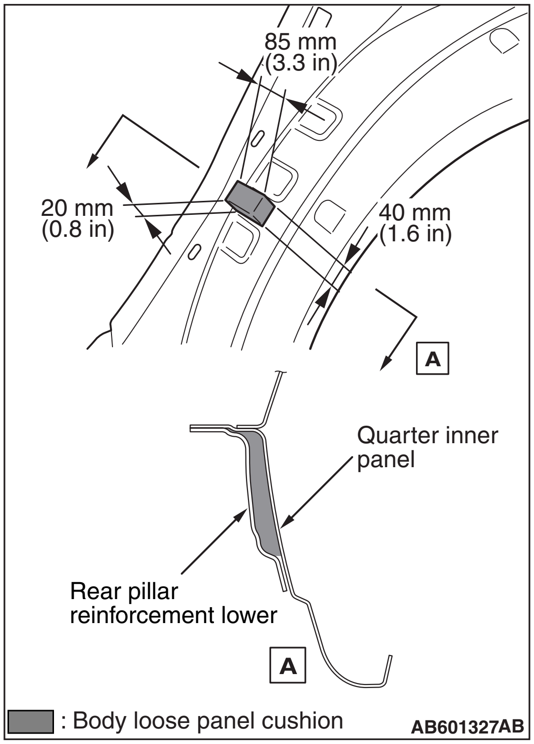
AB601591AB

NOTE ON REPAIR WORK

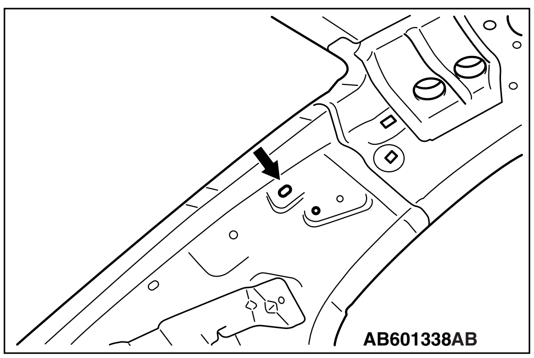
INSTALLATION

1. When installing the new rear quarter inner panel, machine the body loose panel cushion (MR535301 or MR435765) as shown and apply it to the body side to prevent the sound dampening foam material from dropping when the material is filled into the rear pillar in the next process.



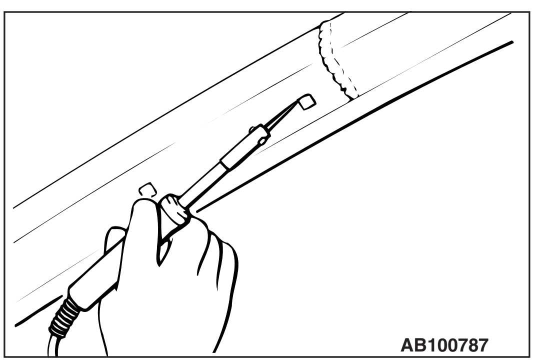


2. When installing the new rear pillar reinforcement lower, machine the body loose panel cushion (MR535301 or MR435765) for replacement as shown and apply it to the body side because the sound dampening foam material cannot be filled into the rear pillar reinforcement lower.



3. Assemble the rear quarter inner panel, bolt and tape the hole and flange with aluminum tape, then fill the hole with sound dampening foam material as shown in the figure of the instructions.

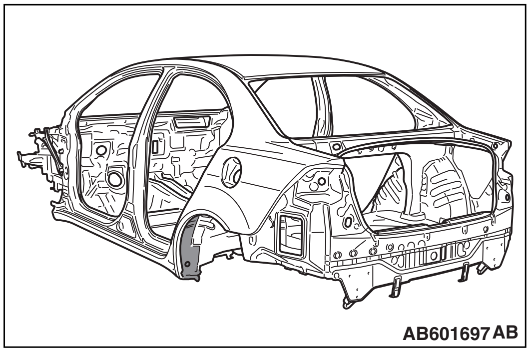
   SOUND DAMPENING FOAM MATERIAL: 3M™ AAD ULTRAPRO Panel foam-Yellow



4. Wait 2 hours after filling the sound dampening foam material to remove the bolt and aluminum tape, then melt the sound dampening foam material with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with sound dampening foam material.

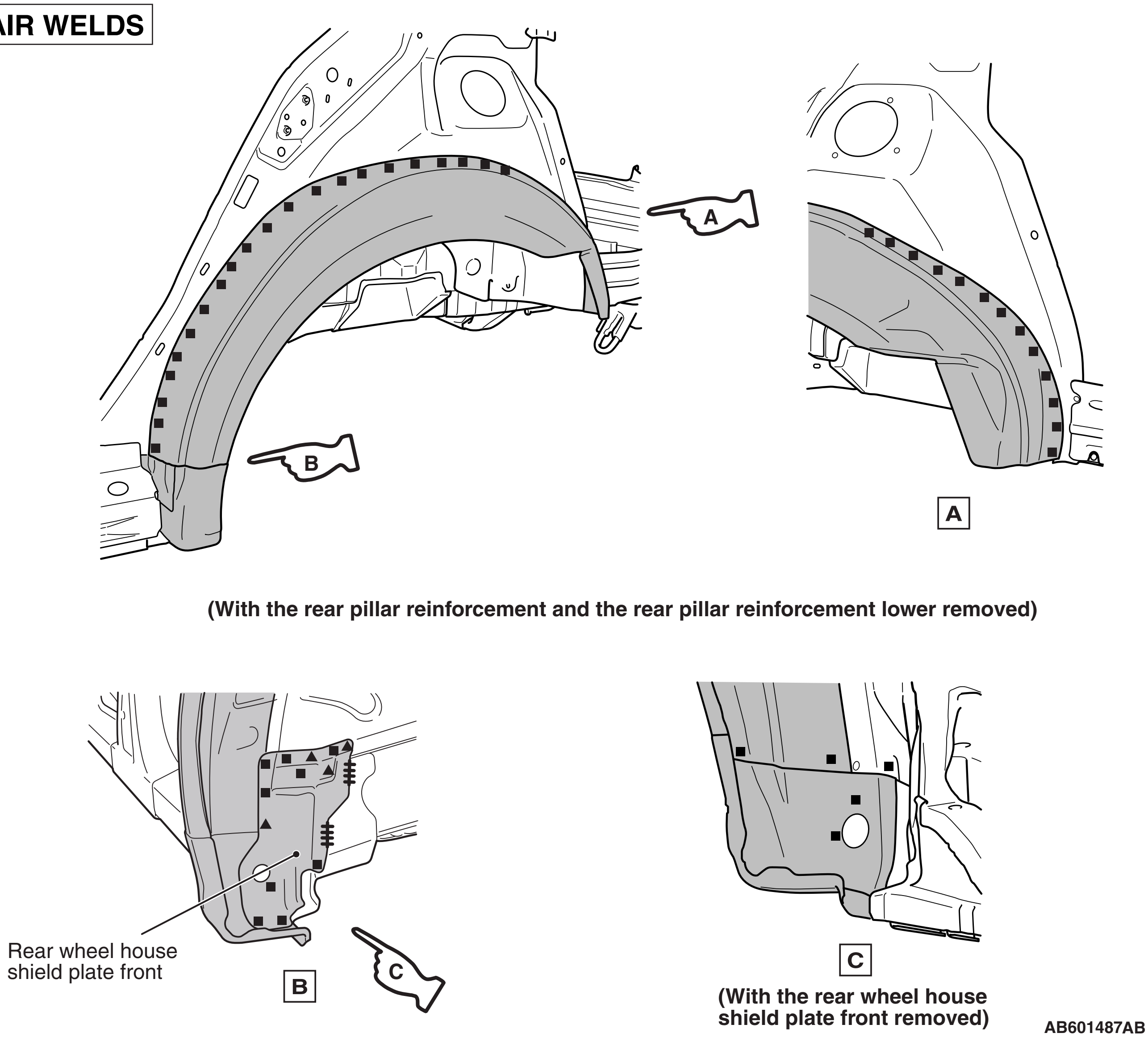
QUARTER INNER (PARTIAL REPLACEMENT)

M4030000200097



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded / ▲: indicates three panels to be welded)
++++	MIG spot welding
ǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
∞∞∞∞∞	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

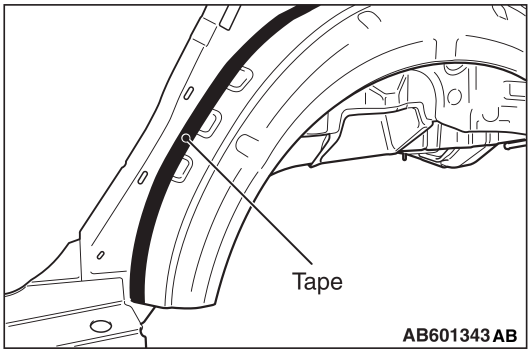
REPAIR WELDS



NOTE:
- *Refer to the Quarter Outer Section on P.3-32 for the welding points with the quarter outer.*
- *Refer to the Quarter Inner Section on P.3-40 for the welding points with the rear pillar reinforcement and the rear pillar reinforcement lower.*

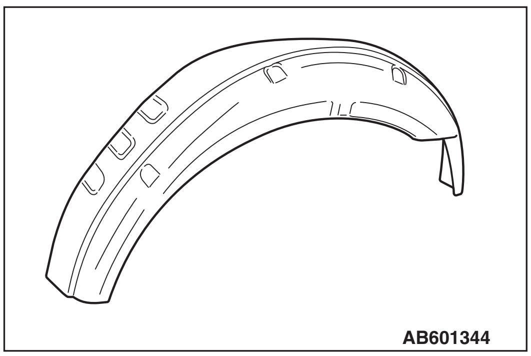
NOTE ON REPAIR WORK

REMOVAL

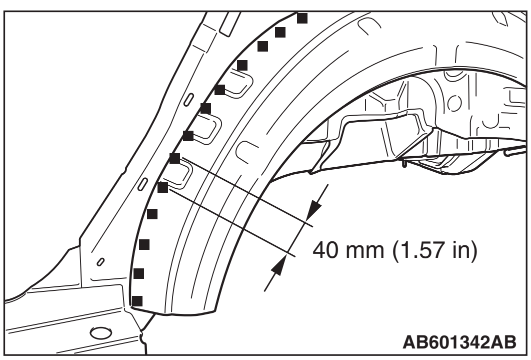


1. Adhere tape along the wheel arch of the quarter inner panel as shown in the figure of the instructions, use the tape as a guide so about 20 mm (0.79 inch) of the flange remains, then cut and remove.

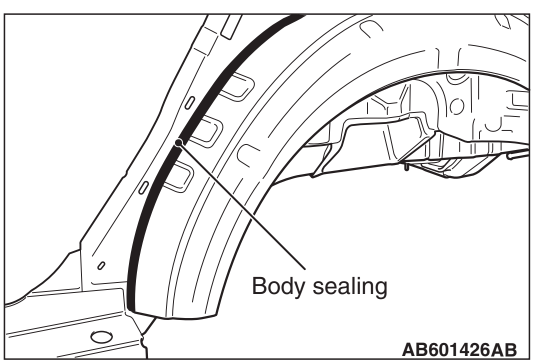
INSTALLATION



1. For the new rear quarter inner panel parts, cut the wheel arch end are so that it overlaps with the flange on the body-side.



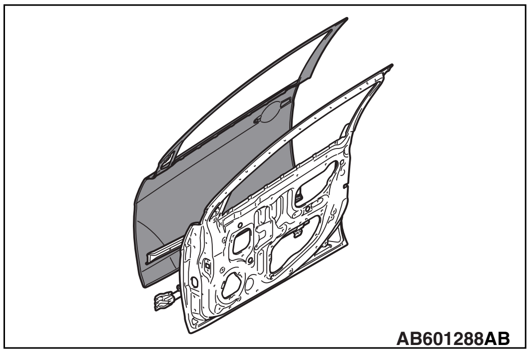
2. Overlap, assemble and weld the rear quarter inner panel with the body-side flange. Weld at a pitch of 40 mm (1.57 inches).



3. Weld the rear quarter inner panel then apply a body sealing in the area shown in the figure of the instructions.

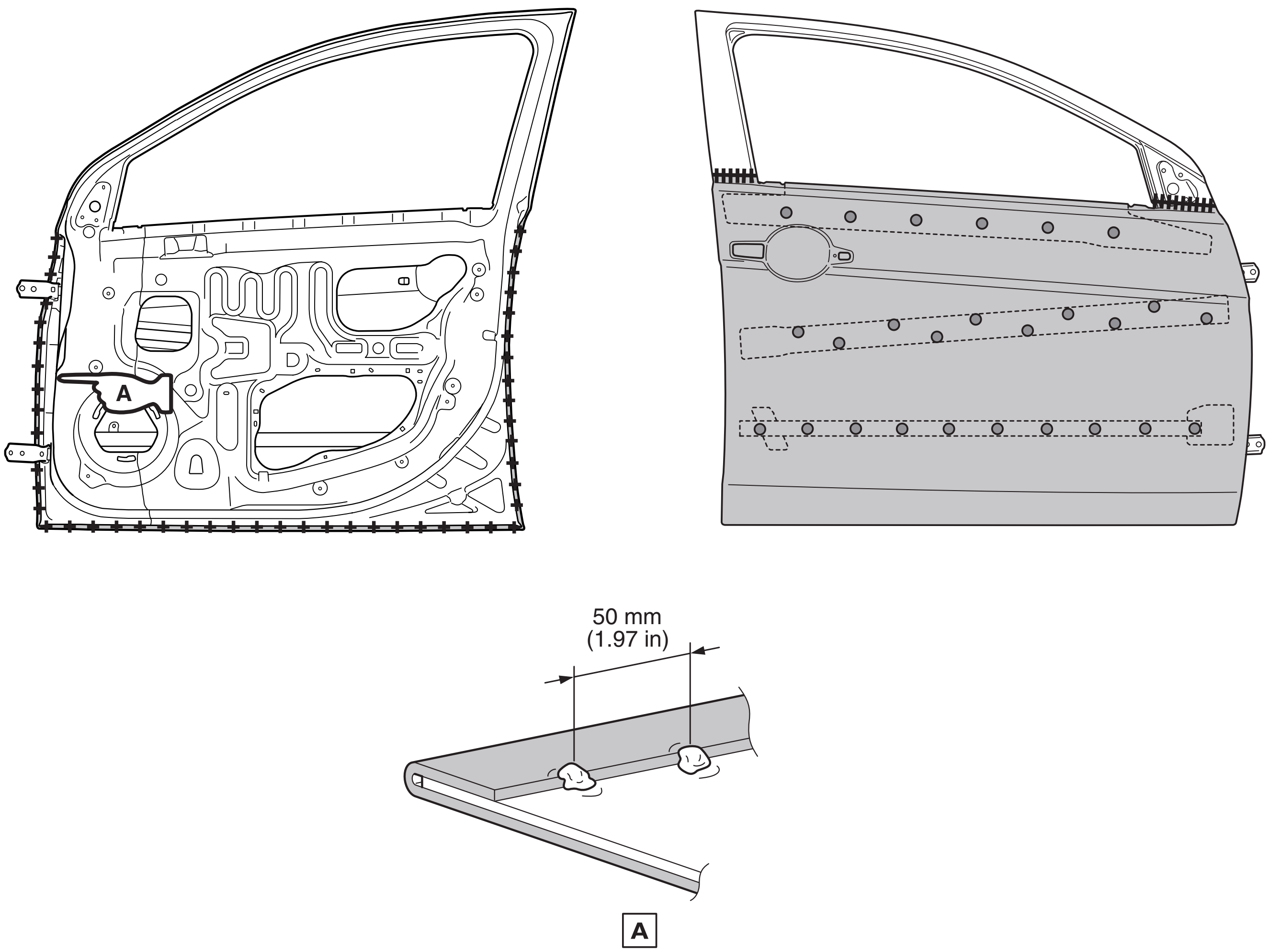
FRONT DOOR OUTER PANEL (WELDED TYPE)

M4030001500239



SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
‡‡‡‡‡‡‡‡	MIG arc welding (continuous)
∞∞∞∞	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



: Adhesive

AB601280AB

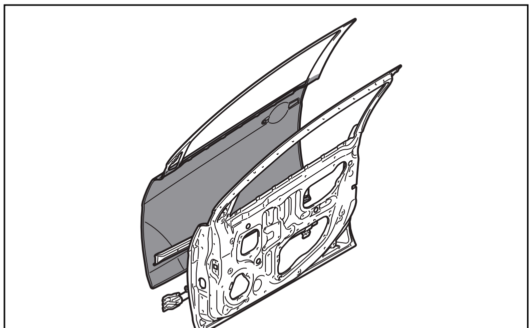
ADHESIVE: Urethane body sealer

BRAND: 3M™ AAD Part No.8542 or equivalent

NOTE: After hemming the front door outer panel, MIG spot weld the flange overlap section at a pitch of 50 mm (1.97 inches).

FRONT DOOR OUTER PANEL (ADHESION TYPE)

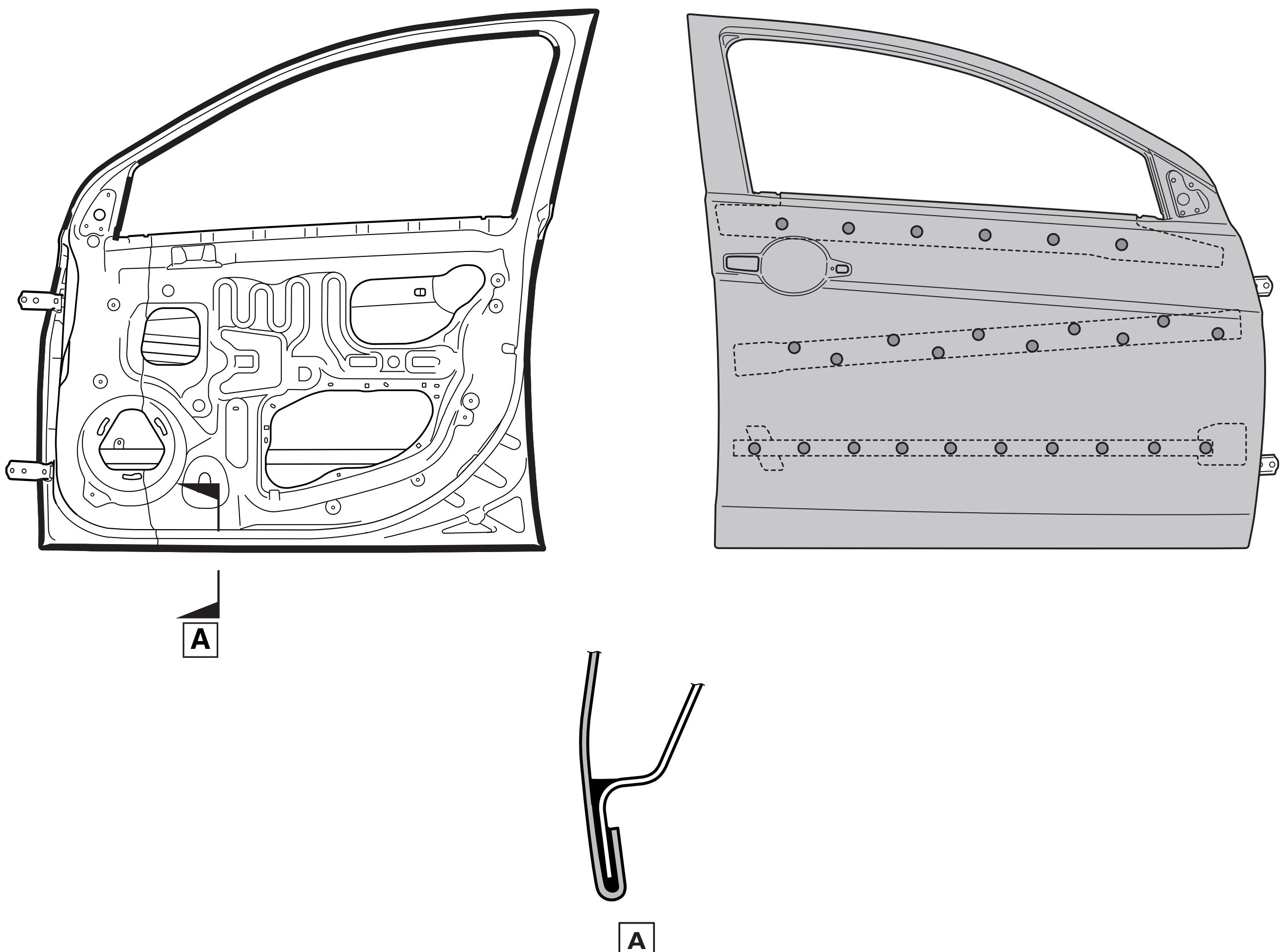
M4030001700233



AB601289AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
┼┼┼┼┼┼┼┼┼	MIG arc welding (continuous)
○○○○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



: Adhesive 1
: Adhesive 2

AB601281AB

- **ADHESIVE 1: Urethane body sealer BRAND: 3M™ AAD Part No.8542 or equivalent**
- **ADHESIVE 2: Epoxyayresin adhesive BRAND: 3M™ AAD Part No.8115 or equivalent**

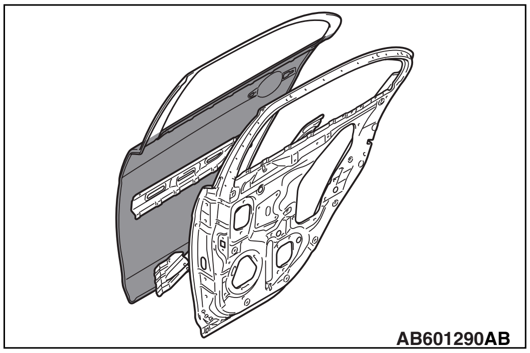
NOTE ON REPAIR WORK

INSTALLATION

1. When installing the front door outer panel, grind the bonding surface and remove the paint to improve adhesion. Then, degrease the front door outer panel.
2. Install the front door outer panel and hem it. Then, wipe off the adhesive that squeezed out.

REAR DOOR OUTER PANEL (WELDED TYPE)

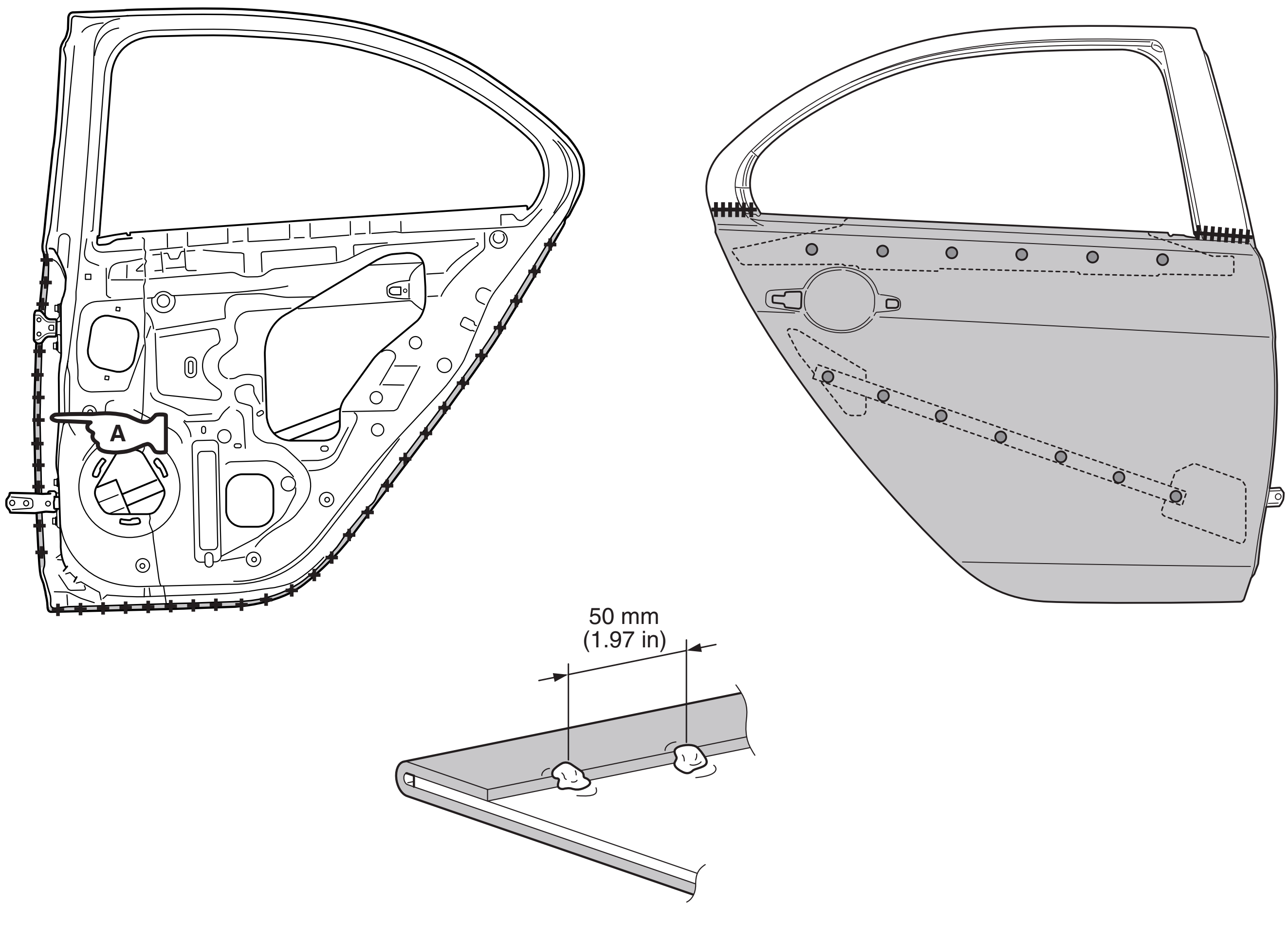
M4030001600184



AB601290AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
ǂǂǂǂǂǂǂǂǂǂ	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



A

: Adhesive

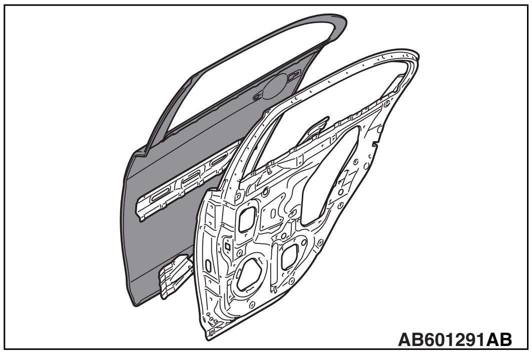
AB601282AB

ADHESIVE: Urethane body sealer **BRAND: 3M ATD Part No.8542 or equivalent**

NOTE: After hemming the rear door outer panel, MIG spot weld the flange overlap section at a pitch of 50 mm (1.97 inches).

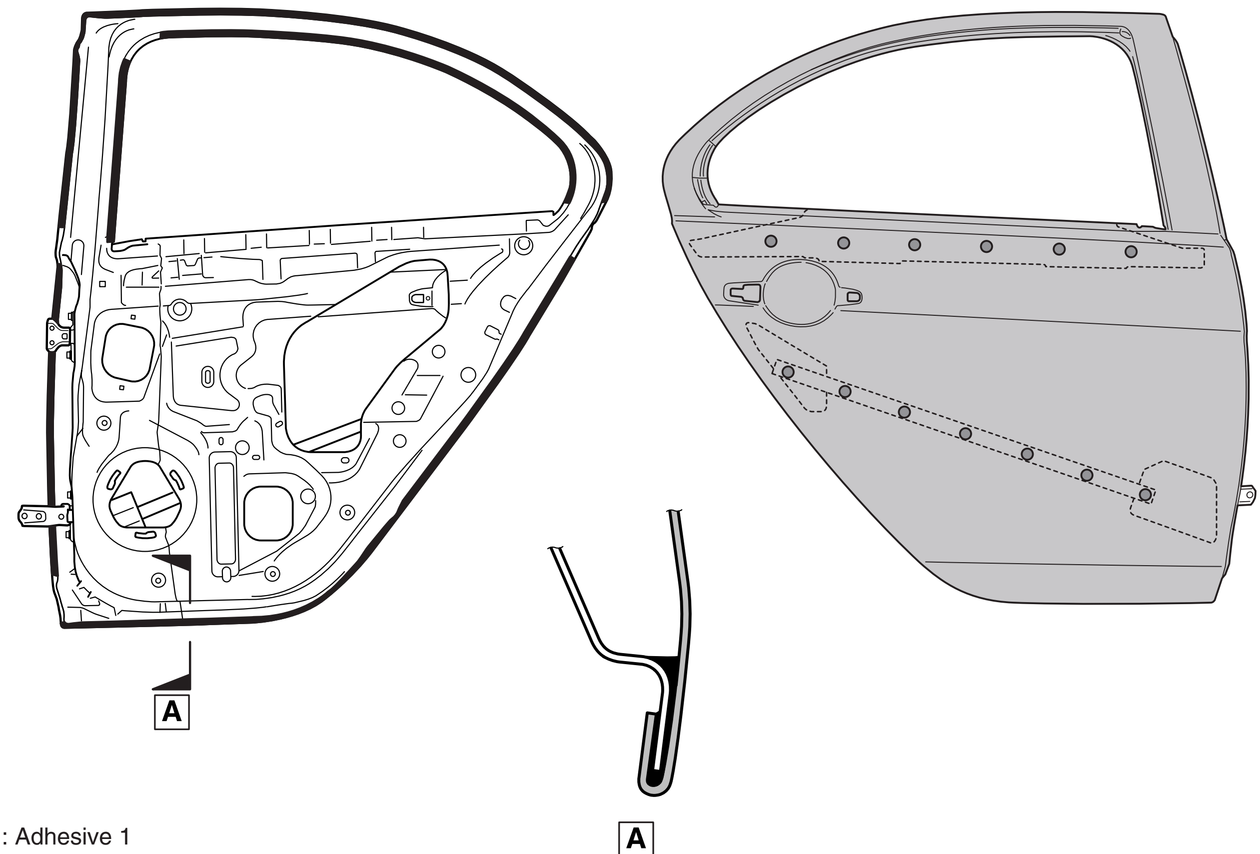
REAR DOOR OUTER PANEL (ADHESION TYPE)

M4030001800188


AB601291AB

SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
[MIG arc welding symbol]	MIG arc welding (continuous)
[braze welding symbol]	Braze welding
[anti-corrosion symbol]	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



AB601283AB

ADHESIVE 1: Urethane body sealer
BRAND: 3M ATD Part No.8542 or equivalent
ADHESIVE 2: Epoxyayresin adhesive
BRAND: 3M ATD Part No.8115 or equivalent

NOTE ON REPAIR WORK

INSTALLATION

1. When installing the rear door outer panel, grind and remove the paint, etc. from the bonded surface of the outer panel to ensure the bonding strength. After the removal, degrease it.
2. Install the outer panel and hem it. Wipe off the excessive adhesive and finish it.

NOTES

GROUP 35B

FOUR-WHEEL ANTI-LOCK BRAKE SYSTEM (4ABS)

CONTENTS

GENERAL INFORMATION

M2351000100830

The ABS that ensures directional stability and controllability during hard braking. ABS is standard equippment on the ES and GTS models but is optional.

This ABS uses a 4-sensor system that controls all four wheels independently of each other, and has the following features:

- EBD *1 (Electronic Brake-force Distribution system) control that can obtain ideal rear wheel brake force has been employed.
- The magnetic encoder for detecting the wheel speed has been installed instead of the rotor as the wheel speed sensor.
- For wiring harness saving and secure data communication, CAN *2 bus has been adopted as a tool of communication with other ECUs.

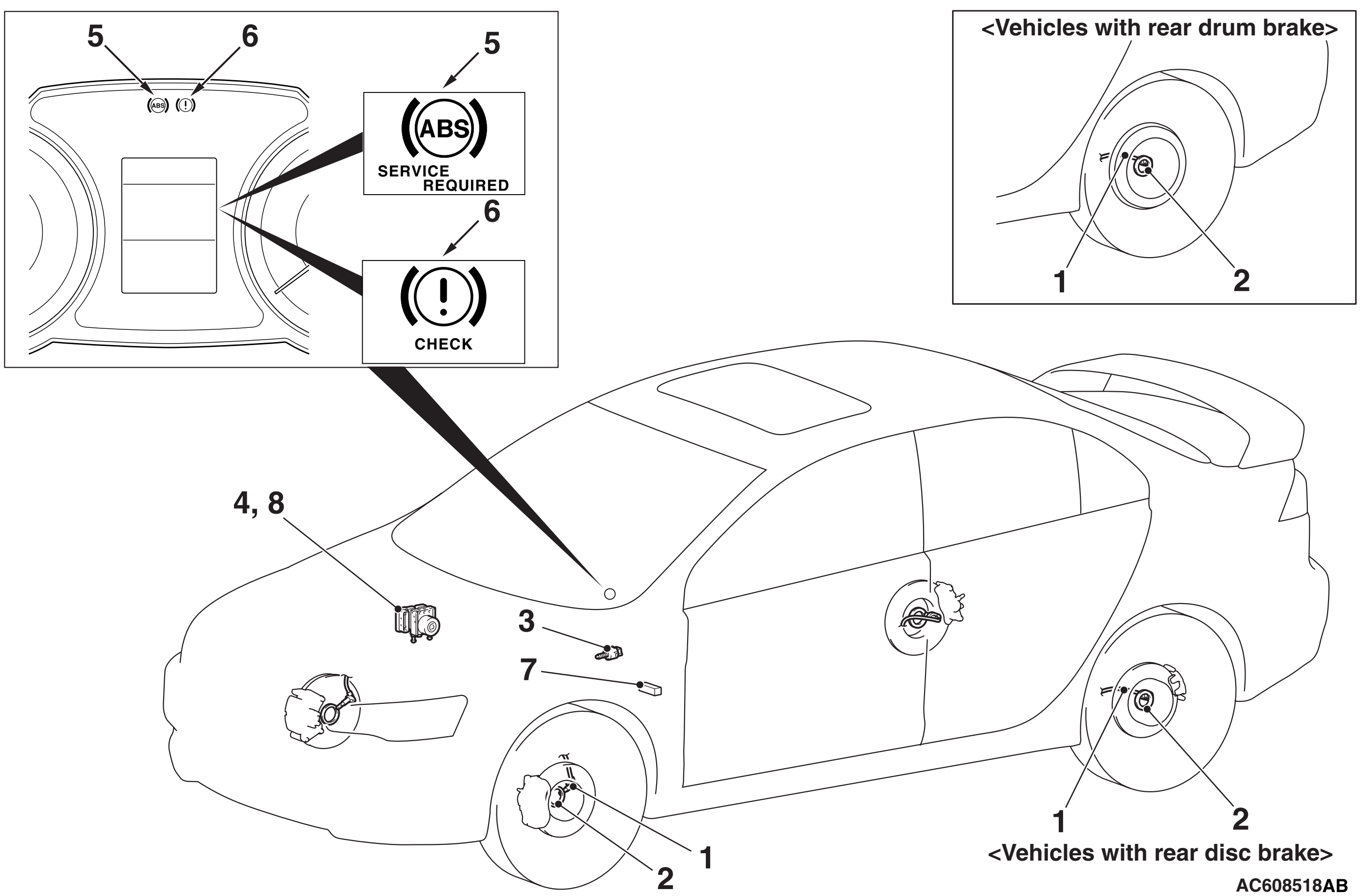
NOTE:

- **1: EBD (Electronic Brake-force Distribution)*
- **2: For more information about CAN (Controller Area Network), refer to GROUP 54C* *P.54C-2**.*

SPECIFICATIONS

Item			Specifications
ABS control type			4 sensors
Wheel speed sensor	Magnetic encoder	Front	86 (N pole: 43, S pole: 43)
		Rear	86 (N pole: 43, S pole: 43)
	Type		Semiconductor

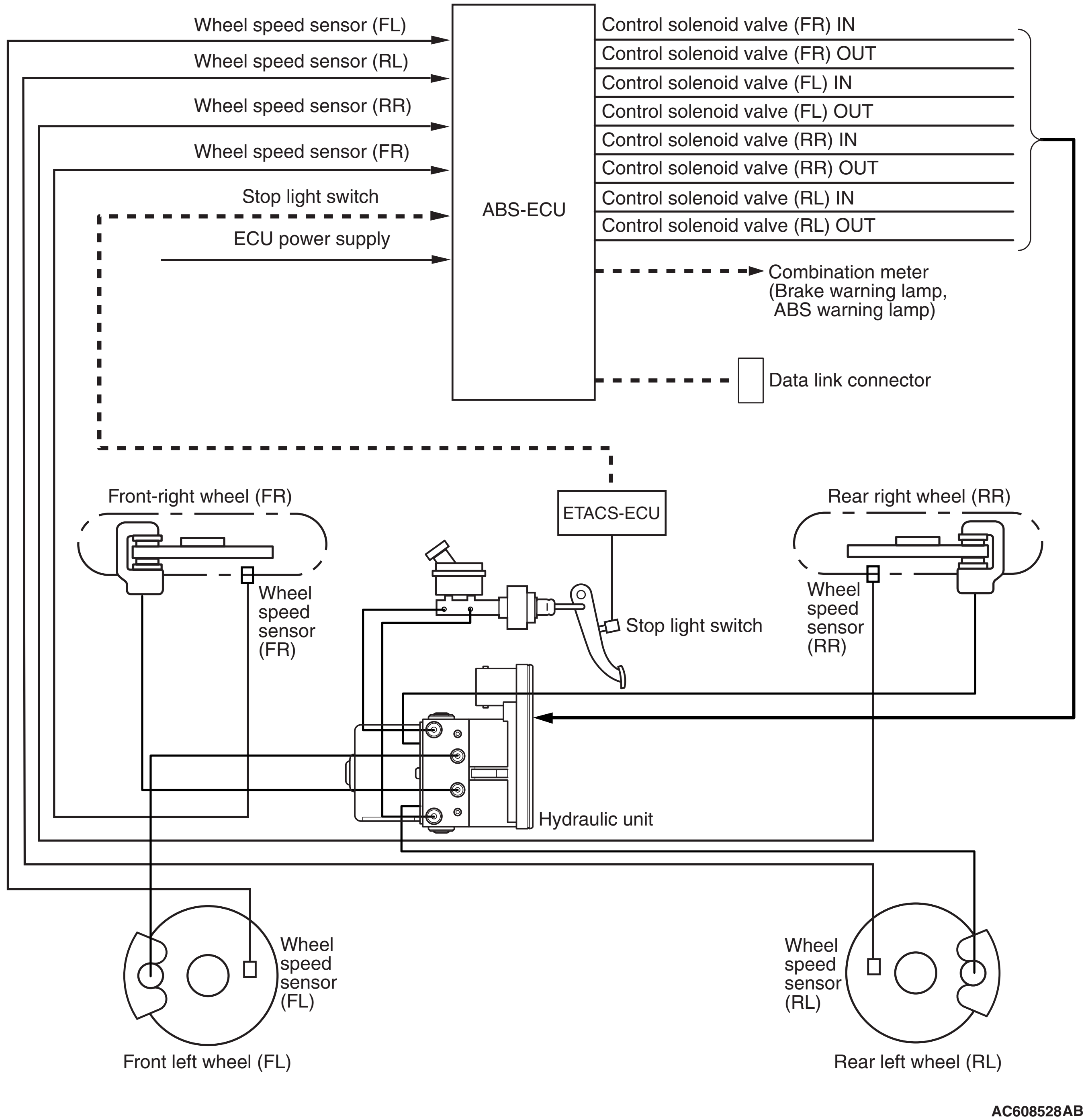
CONSTRUCTION DIAGRAM



MAIN COMPONENTS AND FUNCTIONS

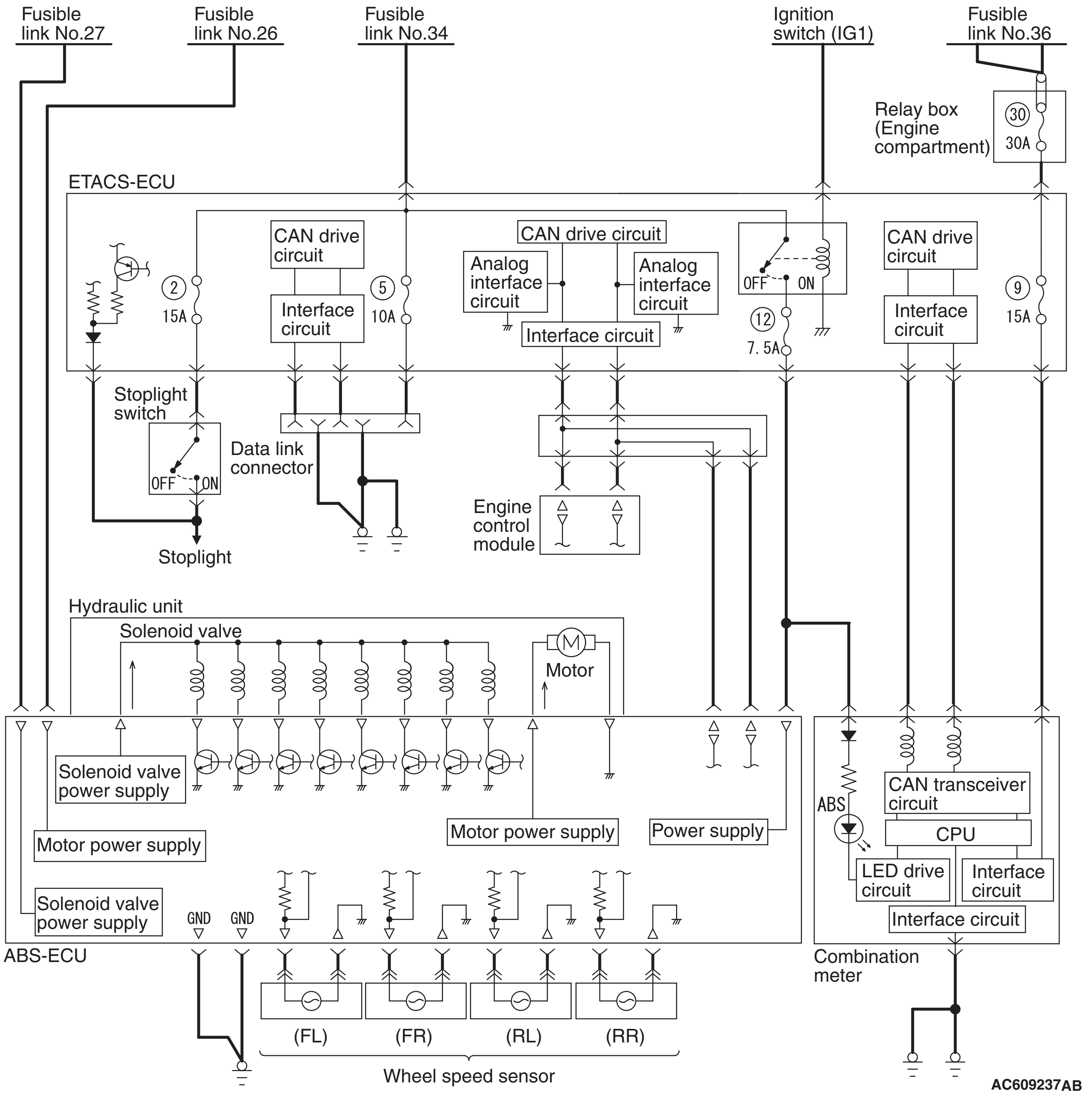
Parts name		No.	Functional description
Sensor	Wheel speed sensor	1	Outputs the frequency signal in proportion to the rotation speed of each wheel to ABS-ECU.
	Magnetic encoder for wheel speed detection	2	The wheel speed sensor is a pulse generator. When the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) rotates, it outputs frequency pulse signal in proportion to each wheel speed.
	Stop light switch	3	Outputs the signal indicating whether the brake pedal is depressed or not through ETACS-ECU to ABS-ECU via the CAN line.
Actuator	Hydraulic unit	4	Drives the solenoid valve using the signal from ABS-ECU, and controls the brake fluid pressure for each wheel.
	ABS warning light	5	Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ABS-ECU.
	Brake warning light	6	Used as the warning light for the parking brake, brake fluid level, and EBD control. Informs the driver of the system status by illuminating or turning off the warning light according to the signal from ABS-ECU, ETACS or combination meter.
Data link connector		7	Establishes the communication with scan tool.
ABS control unit (ABS-ECU)		8	Controls the actuators (described above) based on the signals coming from each sensors.
			Controls the self-diagnostic functions and fail-safe functions.
			Controls diagnostic function (Compatible with scan tool).

SYSTEM CONFIGURATION



NOTE: Dashed lines indicate the CAN bus communication lines.

ABS ELECTRICAL DIAGRAM

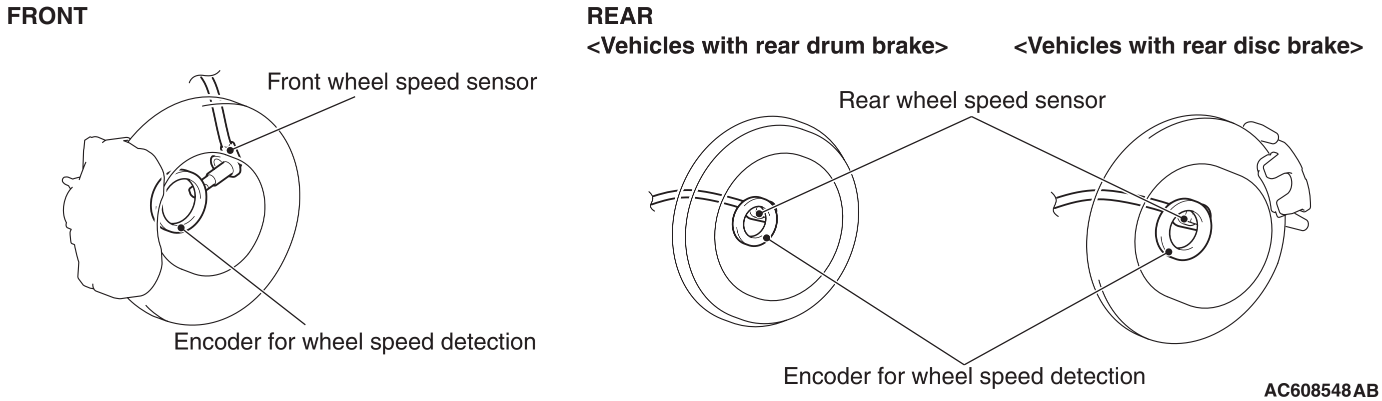


CONSTRUCTION DESCRIPTION

SENSOR

M2351001000494

Wheel speed sensor



The wheel speed sensor is a kind of a pulse generator. It consists of the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) which rotates at the same speed of the wheel and the wheel speed sensor (semiconductor sensor). This sensor outputs frequency pulse signals in proportion to the wheel speed.

The front wheel speed sensor consists of the front wheel speed sensor mounted on the knuckle and the magnetic encoder for wheel speed detection which is press-fitted together with the oil seal to the front wheel bearing. The rear wheel speed sensor consists of the rear wheel speed sensor mounted on the trailing arm assembly and the magnetic encoder for wheel speed detection which is press-fitted together with the oil seal to the rear wheel bearing.

ACTUATORS

M2351002000356

ABS warning light, Brake warning light

The ABS system informs the driver of the ABS system status by illuminating, extinguishing, or flashing the ABS warning light and brake warning light as follows.

ABS warning light

- Turns ON when a system malfunction occurs.

Brake warning light

- Turns ON when an EBD system malfunction occurs.

  NOTE:
  - *Turns ON when the brake fluid level in the reservoir tank becomes the specified value or lower.*
  - *Turns ON when the parking brake lever is pulled and the brake is activated.*

ABS warning light and brake warning light illumination or flashing pattern

State		ABS warning light	Brake warning light
Normal	Correct	–	–
Faulty	ABS failure	Illuminates	–
	EBD failure	Illuminates	Illuminates
When scan tool is connected	Actuator not operated	–	–
	Actuator operated	Flash (2Hz)	–
	After actuator operated*	Illuminates*	Illuminates*

*NOTE: *:ABS and brake warning lights remain illuminated until the ignition is switched off.*

ABS-ECU

M2351003000520

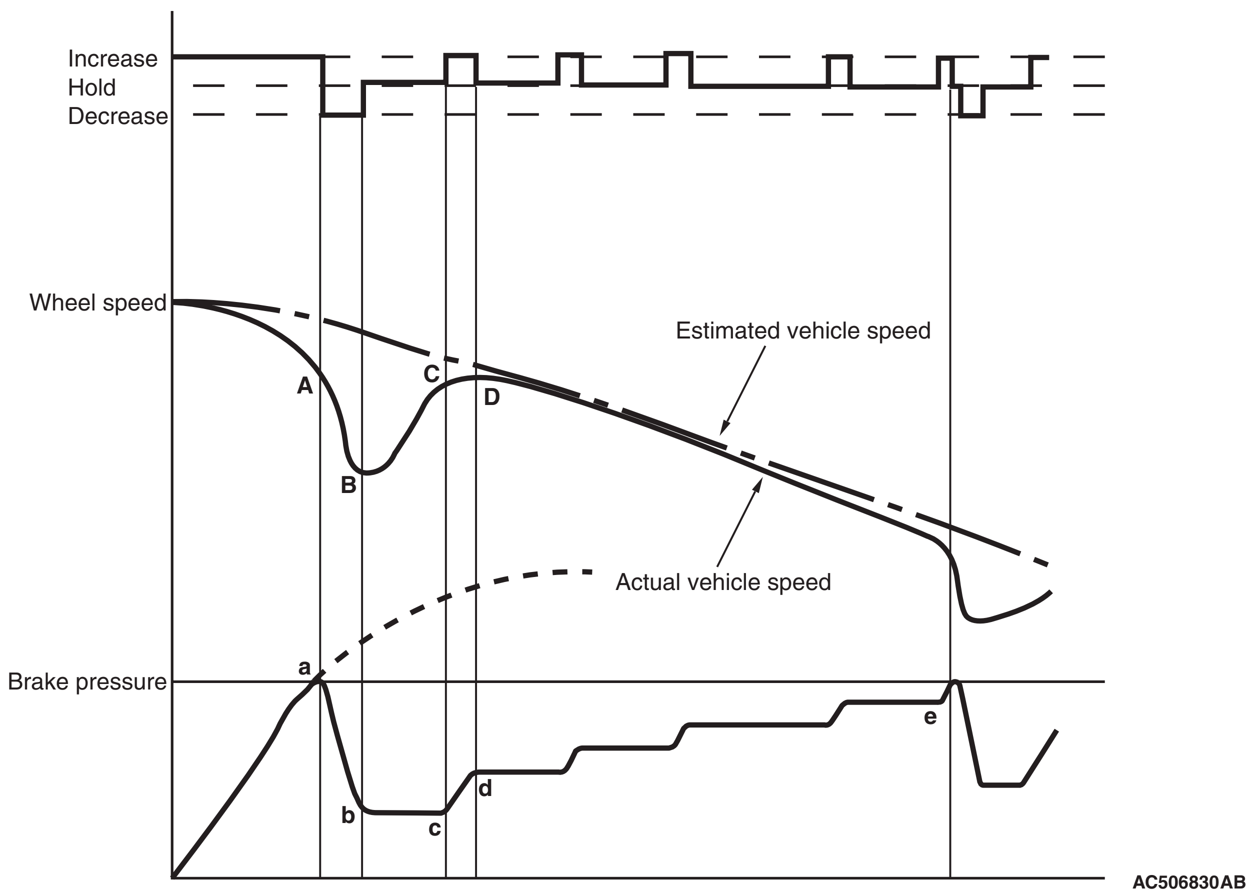
- By integrating ABS-ECU into the hydraulic unit, no wiring harness for sending drive signal of the solenoid valve and pump motor is required, assuring higher reliability.
- Self-diagnostic and memory functions are integrated into ABS-ECU. If any malfunction is detected by the self-diagnostic function, ABS-ECU activates a fail-safe function and illuminates the ABS warning light and brake warning light*.

*NOTE: *: The brake warning light is used as the EBD control warning light.*

- ABS-ECU detects vehicle speed from the signals of the wheel speed sensor and its recognizes the wheel rotation status, estimates the wheel slip condition based on the preprogrammed algorithm, and then controls the solenoid valve in the hydraulic unit so that the wheels do not lock.

ABS hydraulic pressure control

ABS control cycle



1. The ABS-ECU calculates the speed and deceleration of each wheel based on the signals from the four wheel speed sensors, and estimates the vehicle speed at that time.
2. When the brake pedal is depressed, the brake fluid pressure applied to the wheel cylinder increases, and the wheel speed decreases. When the difference between the wheel speed and vehicle speed increases, and the vehicle deceleration goes below the specified value (Point A), ECU determines that the wheels are about to be locked. At this time, ECU reduces the brake fluid pressure by outputting the pressure decrease signal to the solenoid valves (IN, OUT). (between a and b)
3. When the vehicle deceleration and wheel speed begin recovery, and the vehicle speed reaches the point B, ECU outputs the pressure hold signal to maintain the wheel cylinder fluid pressure. (between b and c)

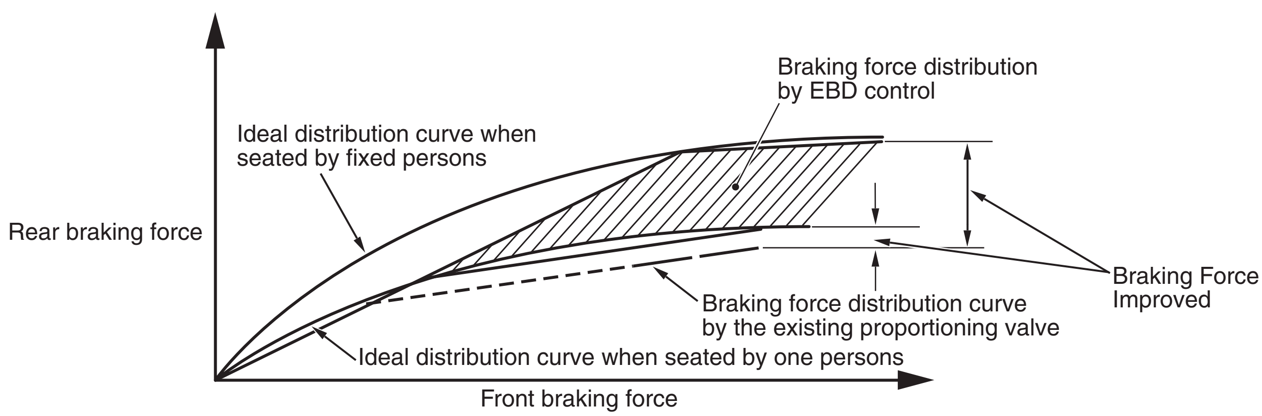
4. When the wheel speed deceleration is further recovered and overpasses the point C, ECU determines that the wheel lock possibility has been eliminated and increases the brake fluid pressure by outputting the pressure increase signal again. (between c and d)
5. Brake fluid pressure is controlled by repeating the increase and hold of the pressure. (between d and e)
6. When the wheel deceleration goes below the threshold again, ABS-ECU controls the brake fluid pressure by repeating the cycle (Step 2 to 5).

Four-wheel control

ABS fluid pressure is controlled independently for four wheels.

EBD fluid pressure control

EBD operating conceptual design



AC208548AB

EBD control is activated in a range with lower slip ratio where ABS is disabled. EBD calculates vehicle deceleration and slip amount of the four wheels based on the wheel speed sensor signal. If the rear wheel speed differs from the vehicle speed by a certain level or more, EBD increases, holds, and decreases the pressure at the rear wheel control solenoid valve in the hydraulic unit, and then adjusts rear wheel brake fluid pressure fairly close to an ideal distribution curve.

INITIAL CHECK

ABS-ECU performs the following initial checks using the diagnostic functions. ABS-ECU illuminates the ABS warning light for 3 seconds (including the initial check) * after the ignition switch is turned ON. If any malfunction is detected, ABS-ECU continues illuminating the ABS warning light and disables ABS control.

*NOTE: *: The ABS warning light may stay on after the ignition switch is turned ON until the startup vehicle speed reaches approximately 10 km/h (6 mph). As the ABS-ECU memorizes any diagnostic trouble code related to the wheel speed sensor malfunction recorded during the previous ignition ON status, ABS-ECU continues illuminating the ABS warning light until it verifies that the malfunction for that code is resolved (startup check).*

INITIAL CHECK

Performs self-diagnosis in ABS-ECU.

STARTUP CHECK

When the startup vehicle speed reaches approximately 10 km/h (6 mph), ABS-ECU performs the following checks.

1. Motor, solenoid valve check (Initial startup* only)

   Turns ON the motor relay in ECU, and checks the pump motor operation. At the same time, ABS-ECU sequentially energizes each solenoid valve in a very short period and checks the valve operation.

   *NOTE: *: Initial startup indicates a first startup after the system has started.*

2. Wheel speed sensor check

   ABS-ECU checks for any wheels that have not received wheel speed sensor signal from the startup.

CONSTANT CHECK

ABS-ECU constantly checks the following items.

1. ABS-ECU

   Performs self-diagnosis in ECU.

2. ECU power supply

   Checks if ECU power supply voltage stays within the operational range.

3. Wheel speed sensor

   (1) Monitors the output voltage of the sensor signal wiring harness and checks for abnormal output voltage (open/short circuit).

   (2) Checks for any wheels that do not send pulse signal while the vehicle is in motion.

   (3) Checks if wheel speed which is abnormally higher or lower than the vehicle speed is input.

4. Pump motor, solenoid valve

   Checks that the ABS-ECU output signal and the operating conditions of the pump motor and solenoid valve agree with each other.

CAN COMMUNICATION

ABS-ECU outputs the ABS warning light and the EBD warning light* illumination request signals to the combination meter through CAN communication.

*NOTE: *: The brake warning light is used as EBD control warning light.*

FAIL-SAFE FUNCTION

If any malfunction is detected by the self-diagnostic function, ABS-ECU illuminates the ABS warning light and brake warning light*, and it disables ABS and EBD control.

*NOTE: *: The brake warning light is used as EBD control warning light.*

DTC No.	Item	Countermeasures for failure			
		EBD control	**ABS control**	**Brake warning light**	**ABS warning light**
C100A	Abnormality in FL wheel speed sensor circuit	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1015	Abnormality in FR wheel speed sensor circuit				
C1020	Abnormality in RL wheel speed sensor circuit				
C102B	Abnormality in RR wheel speed sensor circuit				
C1011	Abnormality in FL wheel speed sensor signal	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C101C	Abnormality in FR wheel speed sensor signal				
C1027	Abnormality in RL wheel speed sensor signal				
C1032	Abnormality in RR wheel speed sensor signal				

DTC No.	Item	Countermeasures for failure			
		EBD control	ABS control	Brake warning light	ABS warning light
C1014	Mutual monitoring of FL wheel speed sensor	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C101F	Mutual monitoring of FR wheel speed sensor				
C102A	Mutual monitoring of RL wheel speed sensor				
C1035	Mutual monitoring of RR wheel speed sensor				
C1041	Abnormality in periodical signal for FL wheel speed sensor	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1042	Abnormality in periodical signal for FR wheel speed sensor				
C1043	Abnormality in periodical signal for RL wheel speed sensor				
C1044	Abnormality in periodical signal for RR wheel speed sensor				
C1046	FL wheel speed sensor control phase time exceeded	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1047	FR wheel speed sensor control phase time exceeded				
C1048	RL wheel speed sensor control phase time exceeded				
C1049	RR wheel speed sensor control phase time exceeded				
C104B	Abnormality in FL wheel inlet valve system	Prohibited	Prohibited	Illuminates	Illuminates
C104F	Abnormality in FR wheel inlet valve system				
C1053	Abnormality in RL wheel inlet valve system				
C1057	Abnormality in RR wheel inlet valve system				
C105F	Abnormality in FL wheel outlet valve system	Prohibited	Prohibited	Illuminates	Illuminates
C1063	Abnormality in FR wheel outlet valve system				
C1067	Abnormality in RL wheel outlet valve system				
C105B	Abnormality in RR wheel outlet valve system				
C2104	Malfunction of valve power supply circuit	Prohibited	Prohibited	Illuminates	Illuminates
C1073	Malfunction of motor drive circuit	Executed	Prohibited	Extinguished	Illuminated*3

DTC No.	Item		Countermeasures for failure			
			EBD control	ABS control	Brake warning light	ABS warning light
C2116	Abnormality in pump motor power supply voltage		Executed	Prohibited	Extinguished	Illuminated*3
C1000	Abnormality in stop light switch circuit		Executed	Executed	Extinguished	Extinguished
C2200	Abnormality in ABS-ECU		Prohibited	Prohibited	Illuminates	Illuminates
C2100	Battery voltage problem (low voltage)	9.7 ± 0.3 V or less*1	Executed	Prohibited	Extinguished	Illuminates
		8.0 ± 0.5 V or less *1	Prohibited	Prohibited	Illuminates	Illuminates
C2101	Battery voltage problem (high voltage)	18.0 ± 1.0 V or more	Prohibited	Prohibited	Illuminates	Illuminates
C1395	Brake fluid filling not completed		Executed	Executed	Extinguished	Flashes (1 Hz)
C2203	VIN not written		Executed	Executed	Extinguished	Illuminates
C1608	Implausible diagnosis data		Executed	Executed	Extinguished	Extinguished
U0001	Bus off		Executed	Executed	Extinguished	Extinguished
U0100	Engine time-out error		Executed	Executed	Extinguished	Extinguished
U0141	ETACS time-out error		Executed	Executed	Extinguished	Extinguished
U1415	Variant coding not implemented		Executed	Prohibited	Extinguished	Illuminates
U1417	Invalid variant coding value (including wrong assembly)		Executed	Prohibited	Extinguished	Illuminates

NOTE:
- **1 This diagnostic trouble code is not set within the vehicle speed of 20 km/h (12 mph) or less.*
- **2 Turns ON when two or more wheels are faulty.*
- **3 Stays ON until the vehicle speed reaches 10 km/h (6 mph) when the ignition switch is turned to ON next time.*

DIAGNOSTIC FUNCTION

ABS-ECU has the following functions for easier system checks. The following items can be diagnosed using scan tool.

- Diagnostic trouble code set
- Service data output
- Actuator test

DIAGNOSTIC TROUBLE CODE SET

There are 43 diagnosis items. Since all the diagnostic results are recorded in volatile memory (EEPROM*), they are stored in the memory even though the battery terminals are disconnected.

NOTE:
- **EEPROM (Electrical Erasable & Programmable ROM): Special type of memory that can be programmed or erased electrically*
- *For each diagnosis item, refer to Service Manual.*

SERVICE DATA OUTPUT

Using scan tool, the input data sent from the sensors and switches can be read.

NOTE: For service data items, refer to Service Manual.

ACTUATOR TEST

Using scan tool, the actuators can be forcibly operated.

NOTE:

- *When ABS-ECU is disabled, the actuator test cannot be performed.*
- *The actuator test can be performed only when the vehicle is stationary. When the vehicle speed reaches 10 km/h (6 mph), the forcible actuator operation is disabled.*
- *During actuator test, the ABS warning light flashes in 2Hz, and ABS control is prohibited.*
- *For the actuator test specification, refer to Service Manual.*

GROUP 54

CHASSIS ELECTRICAL

CONTENTS

NOTES

GROUP 55

HEATER, AIR CONDITIONING AND VENTILATION

CONTENTS

GENERAL DESCRIPTION

M2551001500040

The blower, heater, and evaporator have been integrated with the heater and A/C system to achieve a greater fan power and noise reduction.

FEATURES

ENHANCEMENTS IN COMFORT

- With the adoption of fully-automatic A/C, the outside/inside air circulation switching, air outlet, and outlet air temperature are automatically controlled according to the ambient temperature, solar radiation, and passenger compartment temperature so that the optimum air conditioner is achieved. <Automatic A/C>
- By the adoption of clean air filter, the air quality inside the passenger compartment has been enhanced.

ENHANCEMENTS IN OPERATION PERFORMANCE

- Operability has been enhanced by the adoption of large triple dial.
- Customise function has been added for the enhanced convenience.

ENHANCEMENTS IN FUEL ECONOMY

- The high efficiency compressor with a 2-step profile oil separator has been installed, thus enhancing the fuel economy.
- The idle-up speed is controlled in two steps to secure the air cooling performance during summer and to enhance the fuel economy in the seasons with moderate temperature.
- Enhancement of fuel economy by the cooling fan control depending on the refrigerant pressure and vehicle speed.

ENHANCEMENT IN SAFETY

- A/C system is stopped when the air bags are deployed.
- Crushable space has been adopted to heater unit to reduce the risk of passenger injuries in case of a collision.

GLOBAL ENVIRONMENT PROTECTION

- New refrigerant system (HFC134a) has been adopted.
- By the optimisation of A/C system, the refrigerant charging amount has been reduced.
- Clean air filter media and its cover are separated to reduce waste materials.

ENHANCEMENTS IN SERVICE QUALITY

- Reduction of refrigerant gas leakage and enhancement in serviceability by incorporating condenser and receiver
- Clean air filter is installed to the backside of glove box to facilitate the filter replacement.

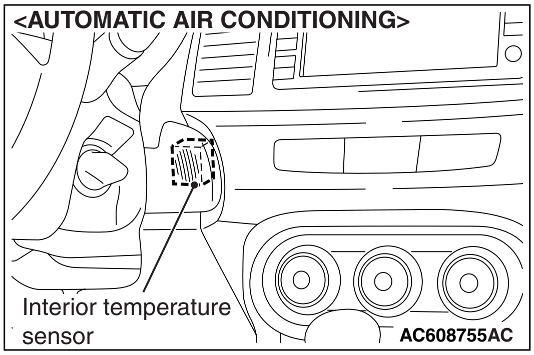
ENHANCEMENTS IN RESPONSIBILITY

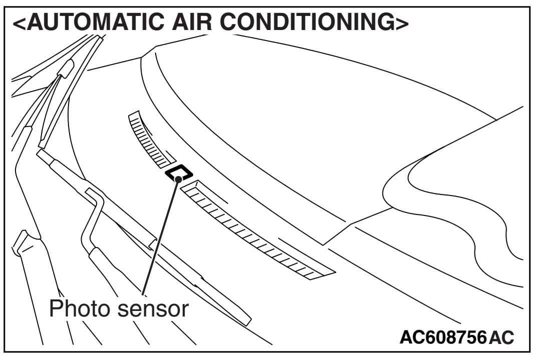
Reliable information transmission is achieved by connecting A/C-ECU and each ECU via CAN communication.

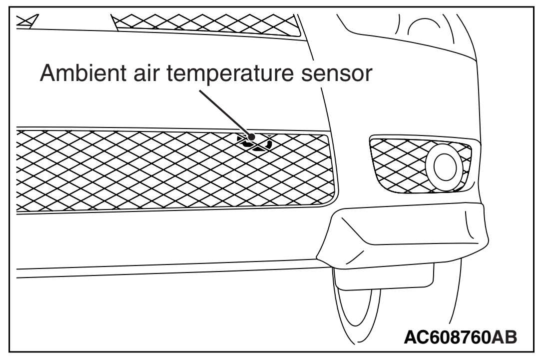
SPECIFICATIONS

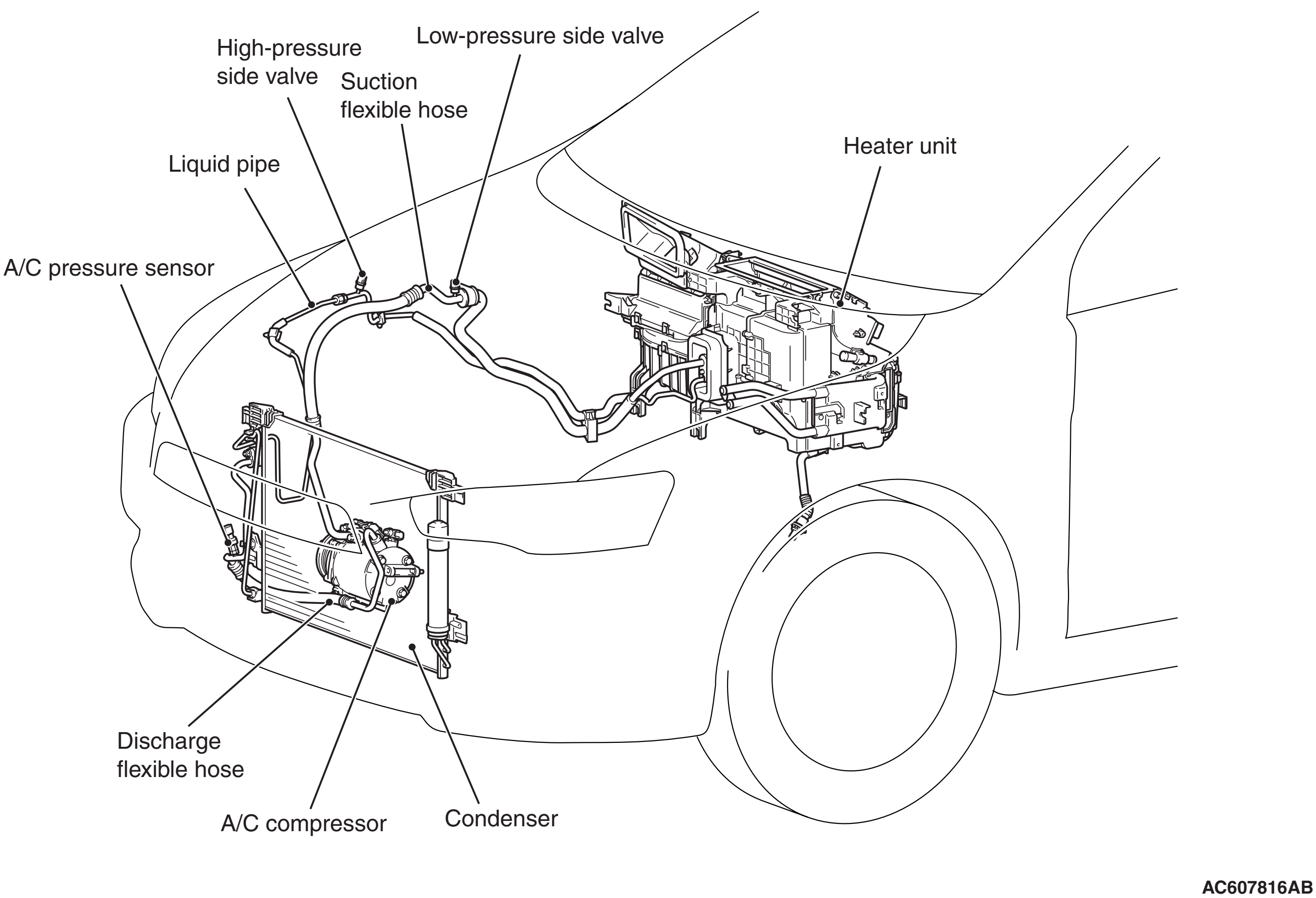
ITEM		SPECIFICATION
Air conditioning switch type		Rotary type
Compressor type		MSC90CAS
Cooling output		5.5 kw
Heating output		5.7 kw
Refrigerant	Type	R134a (HFC-134a)
	Charge quantity g (oz.)	480 - 520 (16.9 - 18.3)

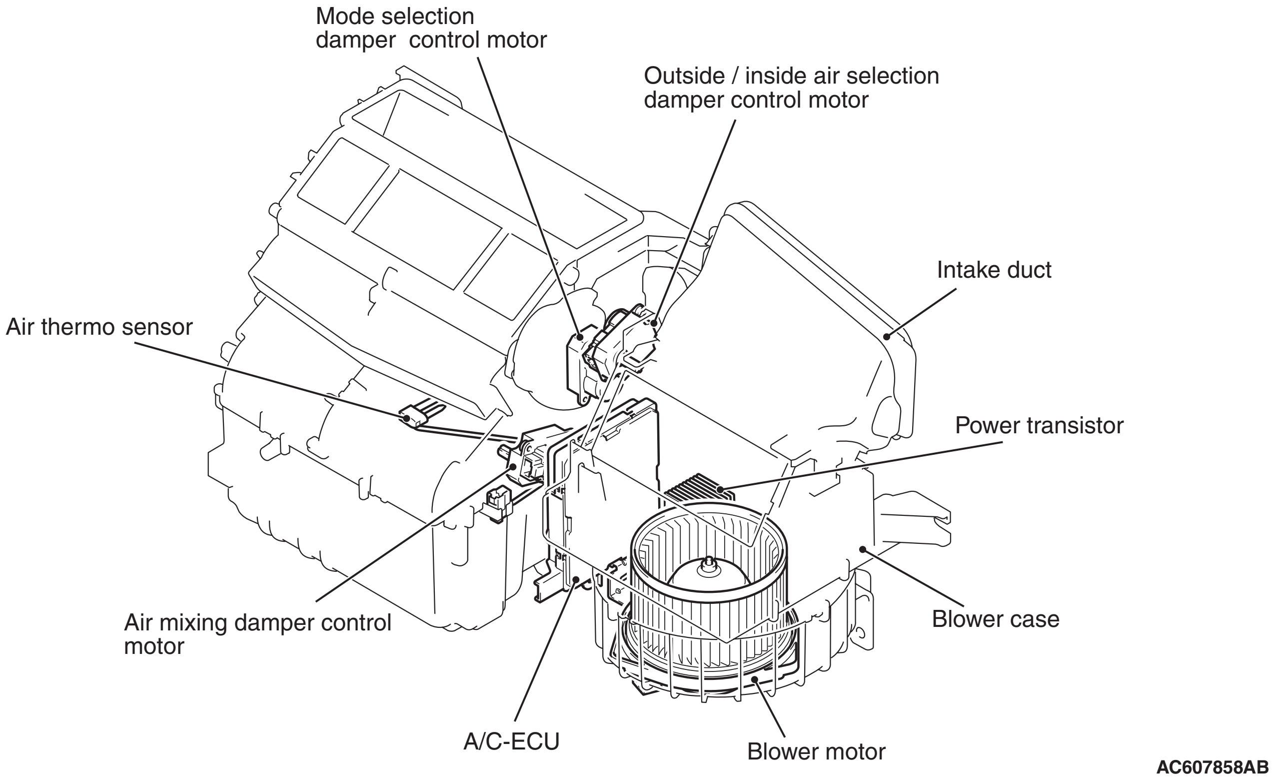
CONSTRUCTION DIAGRAM







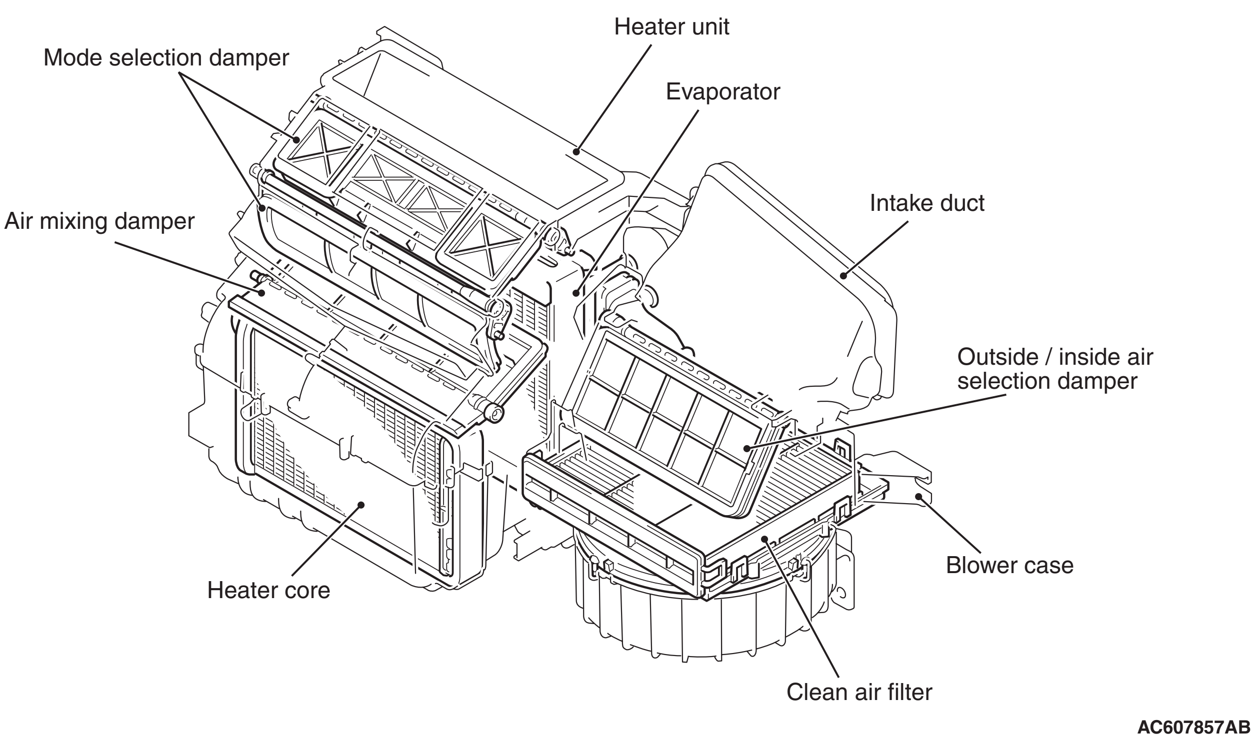




HEATER AND AIR CONDITIONING SYSTEM

M2551001000614

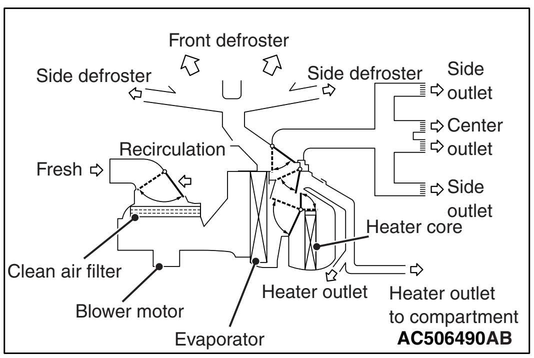
HEATER UNIT ASSEMBLY



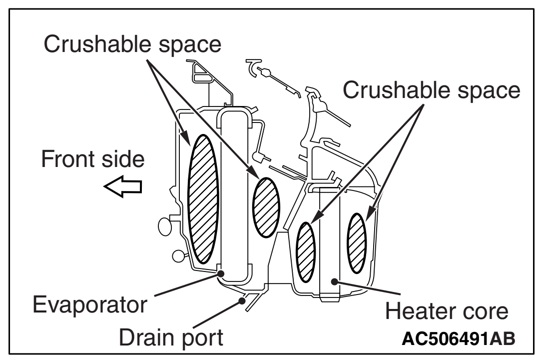
The following new unit integrated blower, heater and evaporator to increase the air flow, reduce noise, and enhanced cooler and heater performance;:

- Integrated heater/cooling unit has been adopted for large air flows and low noise.
- Crushable space has been secured to reduce the risk of passenger injuries.
- Air mix damper that is also used as a reheating prevention damper has been adopted to enhance the air cooling performance.
- The A/C condensate water outlet (drain port) has been installed to behind the evaporator to restrain the clogging of drain by foreign materials.
- The outlet air temperature of the defroster has been set lower than that of foot to prevent over-heating the driver's face.
- Fin thermo sensor to directly measure evaporator temperature reduces occurrence risk of an evaporator freeze which will lead to the compressor lock.
- Clean air filter has been introduced as standard to protect the unit from the intrusion of foreign materials (fallen leaves and others). and, it removes the pollen and dust, and enhances the air quality inside the passenger compartment.
- Clean air filter media and cover have been separated to reduce the waste material amount generated during the filter replacement.
- The installation position of clean air filter has been set to the backside of glove box to facilitate the filter replacement operation. And, the one-touch tab structure has been adopted for the cover installation to enable the replacement operation without tools.

OPERATION



CRUSHABLE SPACE

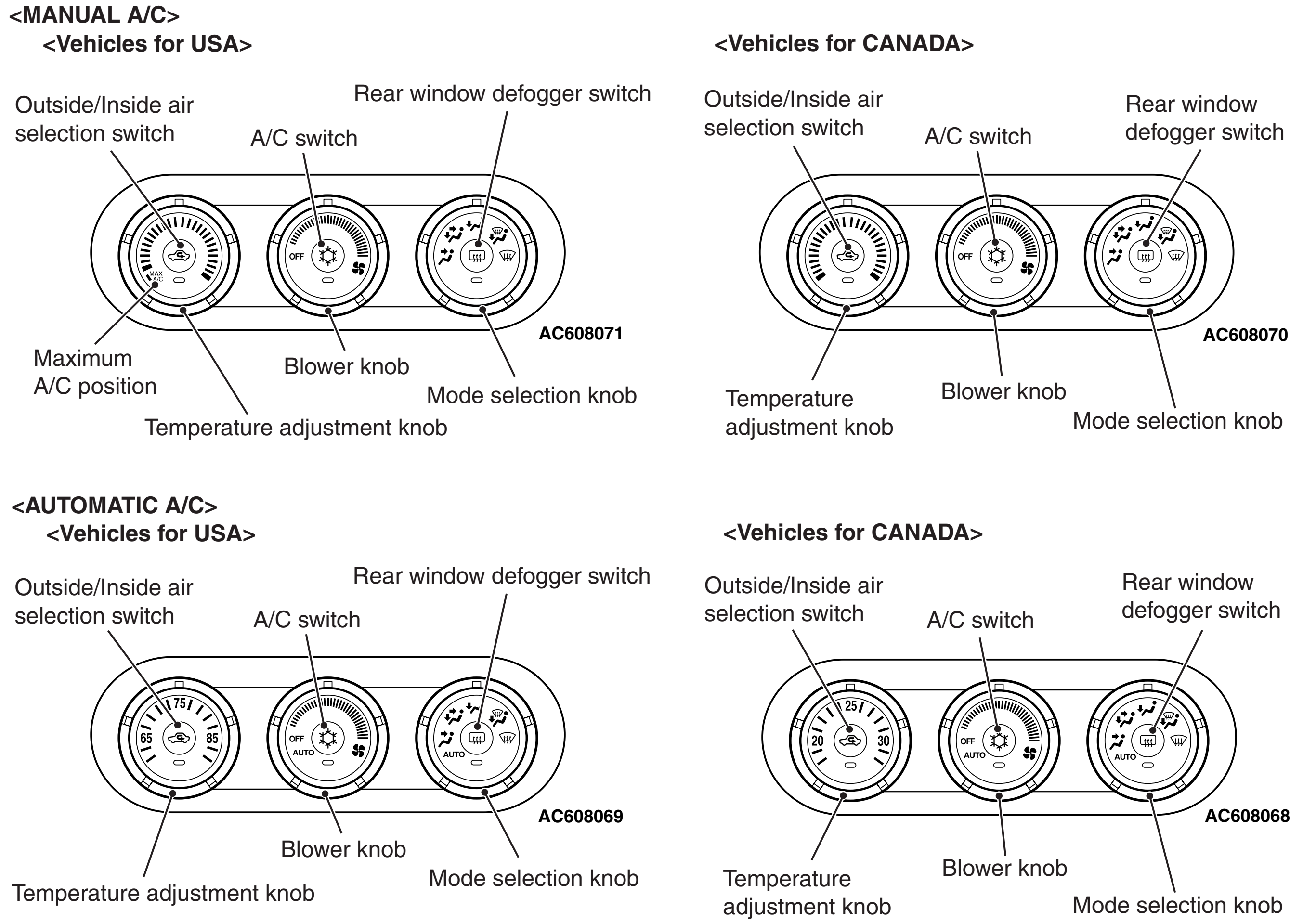


The evaporator and heater core has been longitudinally installed in the vehicle length, and the crushable space has been adopted so that the structure absorbs the impact in case of a collision and reduces the risk of passenger injuries.

HEATER CONTROL

M2551000900421

HEATER CONTROLLER



AC608329AB

The features of the heater controller described below have been designed for better appearance, easier operation, and enhanced visibility.

- Each dial for the air outlet switching, fan volume control, and temperature adjustment has been enlarged to enhance operability.
- Ring lights have been adopted to inside the dials to enhance appearance during nighttime. <Vehicles with automatic A/C>
- AUTO and OFF positions of the fan volume control dial have been exchenged with one another. This change prevents the dial to pass the AUTO position when the fan volume control is turned OFF, and eliminates the necessity of manual reselection when switching the inside/outside air selection manually, thus enhancing the operability. <Vehicles with automatic A/C>
- When the air outlet switching dial and fan volume control dial are turned to the AUTO position, the A/C switch has been made to automatically turn ON to enhance convenience. (Using the customize function, this function can be cancelled. Refer to P.55-7.) <Vehicles with automatic A/C>

A/C-ECU

M2551001200265

CONTROL

FORCED DEF CONTROL

When air outlet position is switched to DEF, A/C is automatically turned ON, and outside/inside air selection damper is set to the fresh air position to quickly defrost the windshield screen.

MAX A/C CONTROL <MANUAL A/C>

When the temperature adjustment knob is turned to the maximum A/C position with the blower knob at position other than OFF, the following controls are made by the A/C-ECU.

Subject to control	MAX COOL
Air mix damper	MAX COOL position
Air outlet mode	Selected position
Air volume	Selected position
Outside/inside air selection damper	Air recirculation position*
Air conditioner switch	ON*

NOTE: "" Manual operation is disabled during max A/C control.*

MAX COOL, MAX HOT CONTROL <AUTOMATIC A/C>

When the set temperature is at 18.0 °C <61° F> (MAX COOL) or at 32.0 °C <89° F> (MAX HOT) with the air outlet and air volume at the AUTO positions, the following controls are made automatically by the A/C-ECU.

Subject to control	MAX COOL	MAX HOT
Air mix damper	MAX COOL position	MAX HOT position
Air outlet mode	FACE position	FOOT position
Air volume	Maximum	Maximum
Outside/inside air selection damper	Air recirculation position*	Fresh air position*
Air conditioner switch	ON*	OFF*

NOTE: "" indicates that when the automatic control is not cancelled using the customise function, the manual operation is disabled.*

REAR WINDOW DEFOGGER TIMER CONTROL

In order to prevent battery consumption, the defogger is automatically turned OFF, 20 minutes after it is turned ON.

IDLE-UP CONTROL

A/C-ECU and the engine ECU communicate with each other through the CAN communication. The idle-up speed of the engine is controlled in two steps depending on the A/C load to secure the air cooling performance during summer and to enhance fuel economy in seasons with moderate temperature.

DETECTION CONTROL FOR REFRIGERANT LEAKS

A/C-ECU determines if the refrigerant amount is less than specified or refrigerant pressure is abnormal by using the ambient temperature (ambient temperature sensor to measure refrigerant inflation rate) and refrigerant pressure (measured by the A/C pressure sensor). When refrigerant amount or refrigerant pressure is judged abnormal, the compressor is cut-off to protect the A/C system.

NOTE: When abnormality occurs, the A/C indicator flashes.

PROTECTION CONTROL AT AIR BAG DEPLOYMENT (DURING COLLISION)

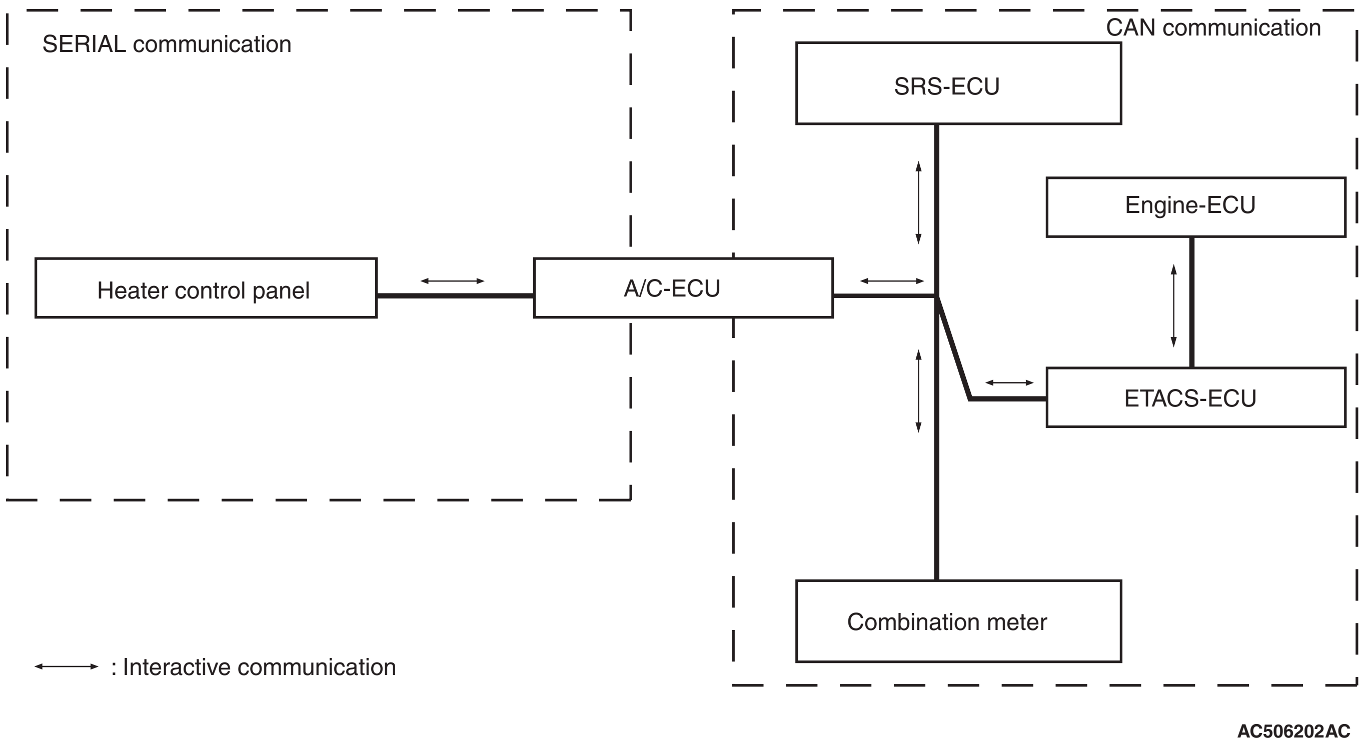
When the air bag deployment is detected, the A/C system is stopped.

CUSTOMISE FUNCTION

Depending on the user's preference, the following functions can be selected. The programmed information is held even when the battery is disconnected.

- Automatic control for inside/outside air selection
  Press and hold (approximately for 10 seconds) the inside/outside air selection switch to cancel the automatic control for inside/outside air selection.
- A/C automatic control
  Press and hold (approximately for 10 seconds) the A/C switch to cancel the A/C automatic control.

COMMUNICATION



A/C-ECU performs the signal transmission and reception with each ECU via CAN (Controller Area Network)*[1]. Also, with the heater control panel, it transmits and receives signals via serial communication.

NOTE: : For details of CAN communication, refer to GROUP 54C –Controller Area Network P.54C-2.

CAN COMMUNICATION INPUT SIGNALS TABLE

Signal	Transmitter ECU
Engine coolant temperature signal	ENGINE-ECU
Vehicle speed signal	
Engine speed signal	
Ambient temperature signal	ETACS-ECU
Wiper signal	
Ignition key signal	
Average ambient temperature signal	COMBINATION METER

DIAGNOSTIC FUNCTION

A/C-ECU has the following functions for easier system checks.

- DIAGNOSTIC FUNCTION
- Service data output
- Actuator test

NOTE: For each item, refer to the Workshop Manual.

A/C COMPRESSOR

M2551001100268

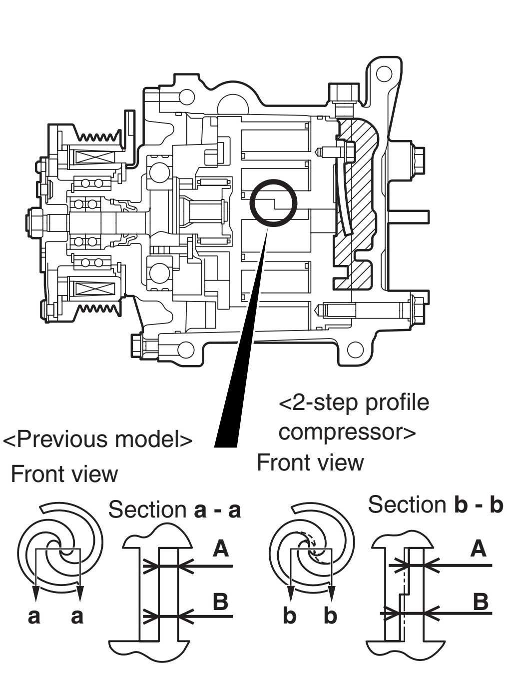
HIGH EFFICIENCY COMPRESSOR WITH INTEGRATED OIL SEPARATOR

High efficiency compressor with integrated oil separator has been adopted to enhance fuel economy by reducing the A/C operating rate.

MAGNETIC CLUTCH WITH THERMAL FUSE

At the compressor lock, the thermal fuse integrated in the magnet clutch is blown due to the frictional heat against the compressor in order to reduce risk of the drive belt breakage. The thermal fuse, together with the coil, is coated with resin to enhance resistance to corrosion.

2-STEP PROFILE COMPRESSOR

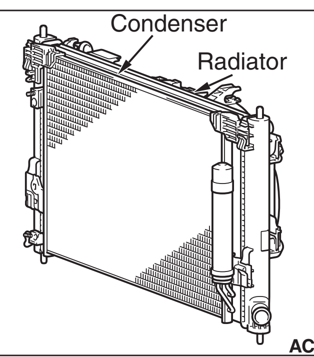


AC507301AC

The centre area of the scroll in the compressor provides 2-step profile, and thickness of area "B" shown in the figure has been increased to enhance strength. With this feature, thickness of area "A" shown where lesser load is applied is reduced, thus compressor performance is enhanced by compressing refrigerant even in central area, comparing to the previous model.

CONDENSER

M2551001400140



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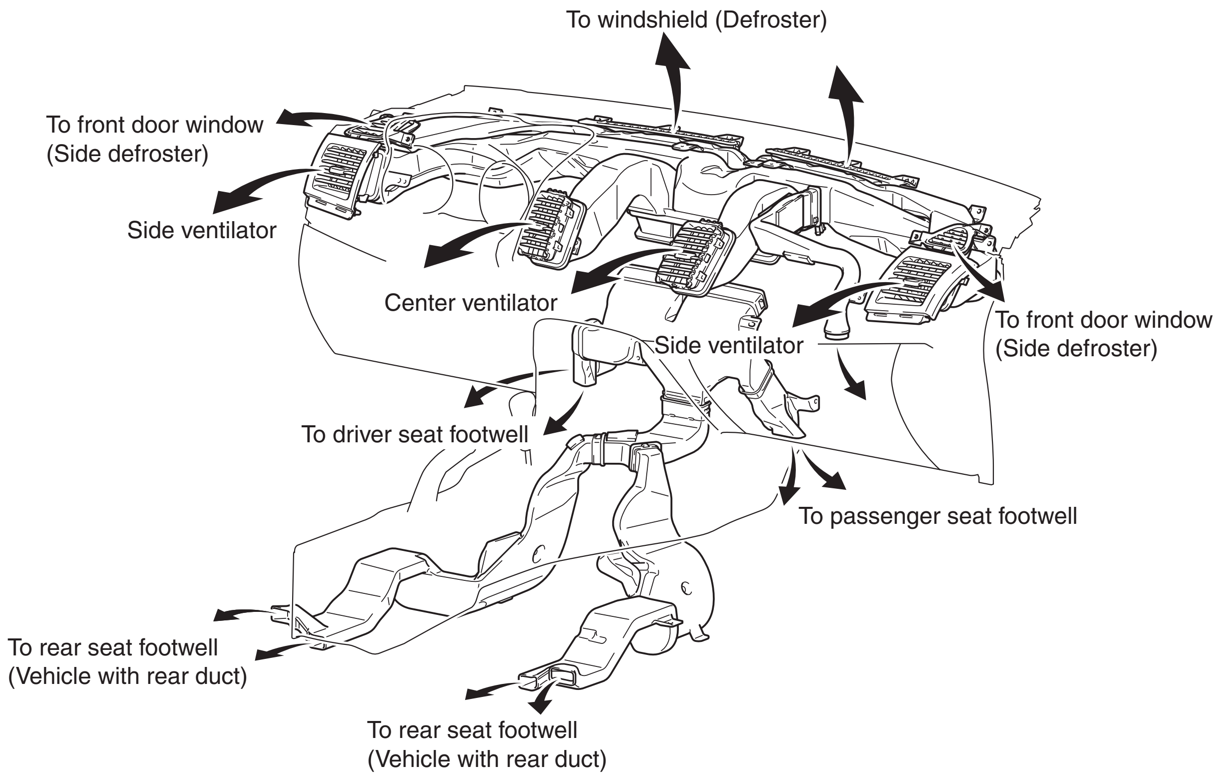
The condenser has been integrated with the radiator (cooling module) to optimise ventilation and reduce weight.

DUCT

M2551001300358



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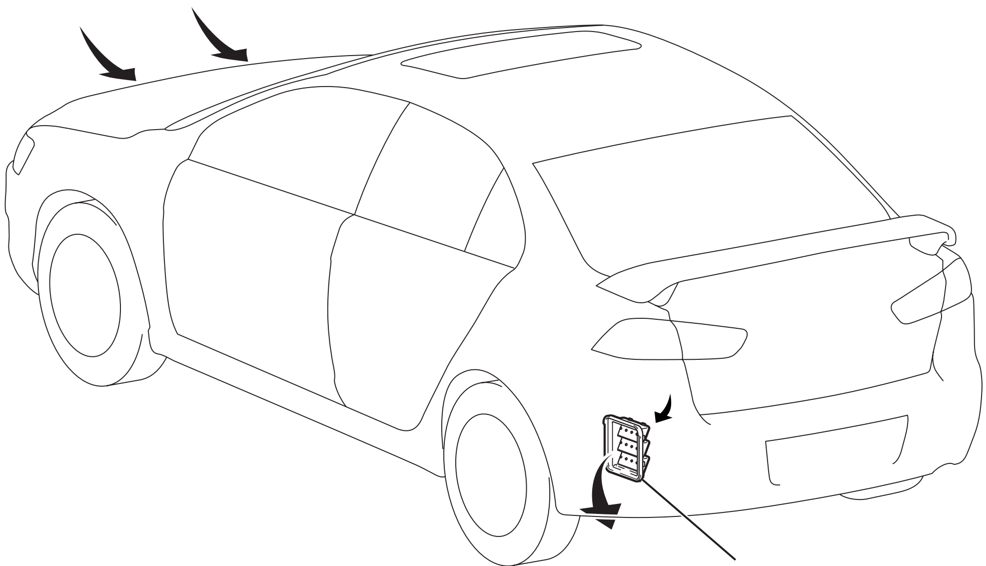
The rear heater duct has been introduced, and the air distribution ratio to front and rear seats has been optimised in order to enhance the air heating performance for the rear seats, and to prevent the circulation of cooled air back to the front seats. <Vehicles with rear duct>

VENTILATION SYSTEM

M2551002000554



Fresh air is sucked from the front deck and exhausted through the air outlet behind the rear bumper. Optimizing areas of the outside air induction hole and the air outlet enhances ventilated air amount, reducing noise.

NOTES

GROUP 70

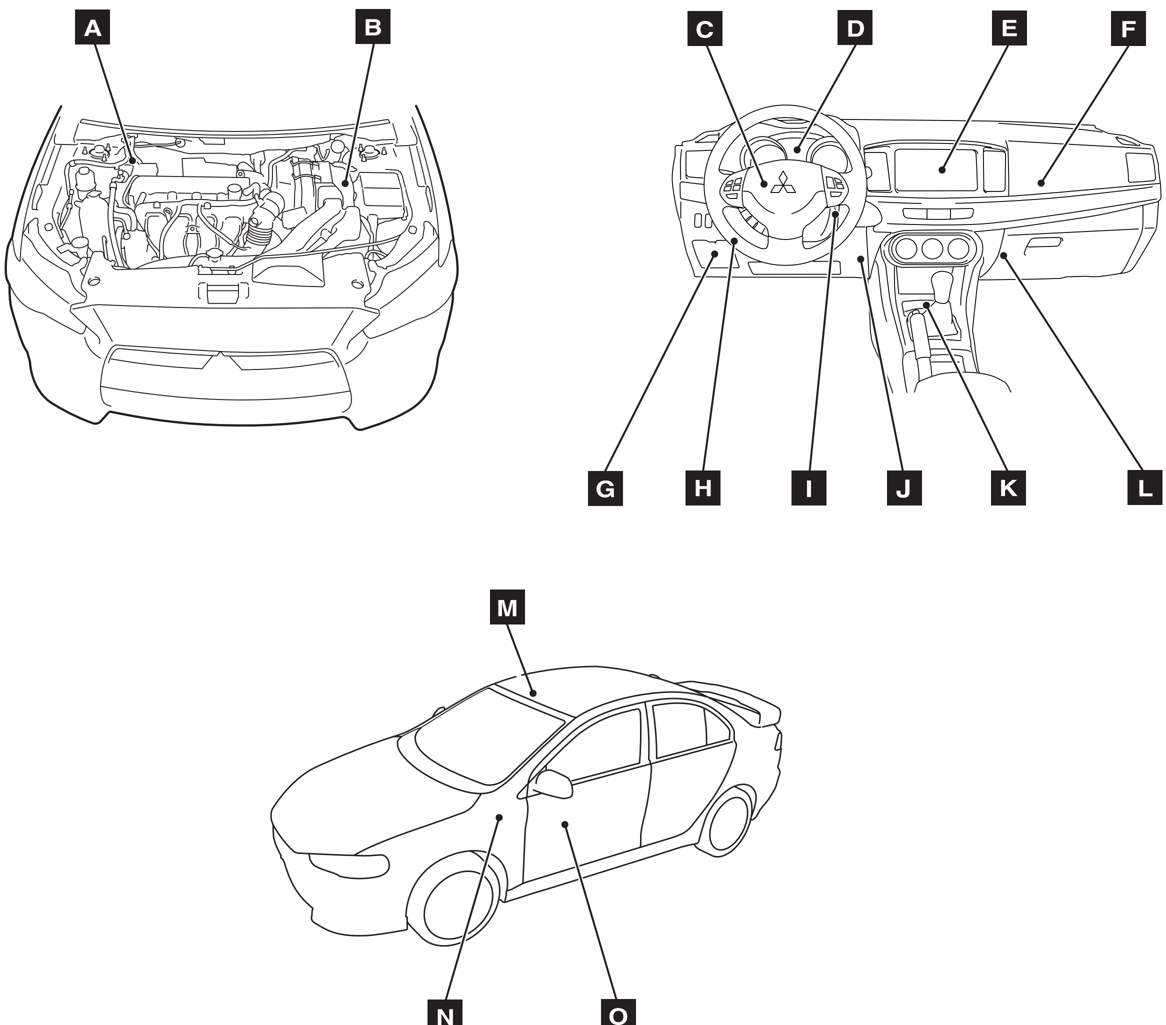
COMPONENT LOCATIONS

CONTENTS

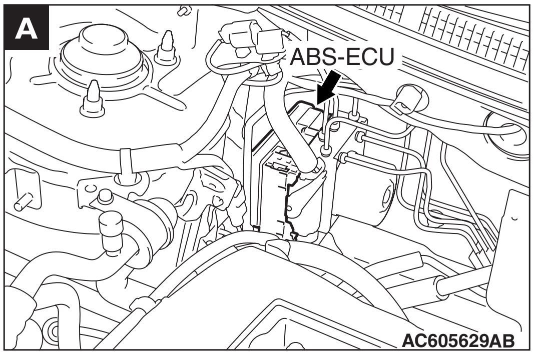
CONTROL UNIT

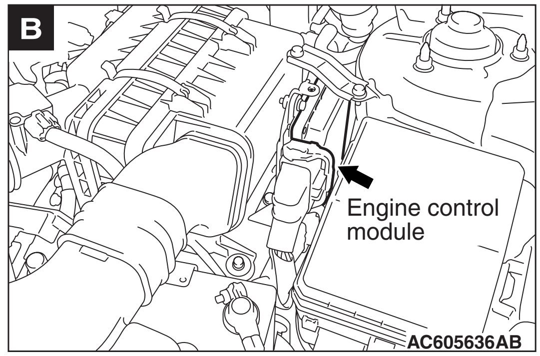
M1701000700650

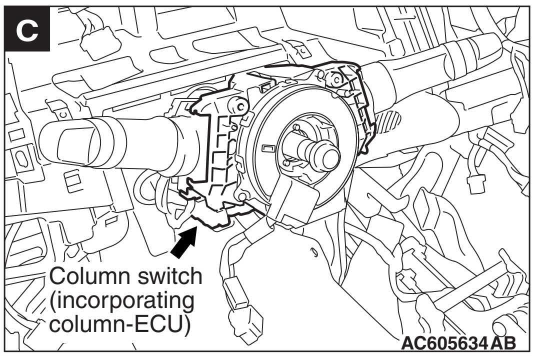
NAME	SYMBOL	NAME	SYMBOL
A/C-ECU	L	Hands free module	F
ABS-ECU	A	KOS-ECU	J
Audio visual navigation unit	E	Power window main switch (incorporating CPU)	O
CAN box unit	E		
Column switch (incorporating column-ECU)	C	Receiver antenna module <vehicles with KOS>	I
Combination meter (incorporating CPU)	D	SRS-ECU	K
Engine control module	B	Sunroof assembly (incorporating sunroof-ECU)	M
ETACS-ECU	G	Transaxle control module <CVT>	H
Front seat assembly (LH) (incorporating occupant classification-ECU)	N	Wireless control module <vehicles without KOS>	I

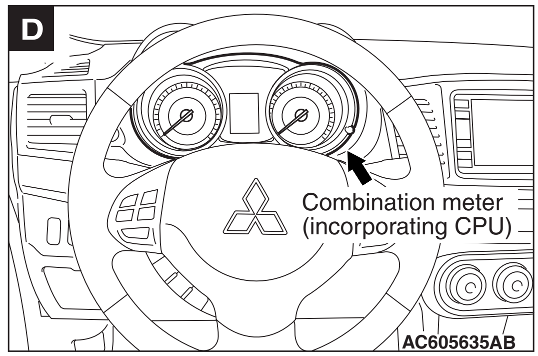


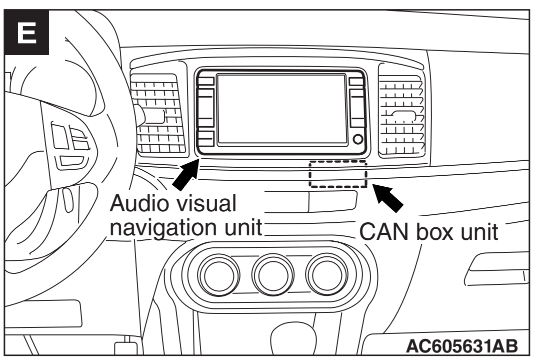
AC607488AB

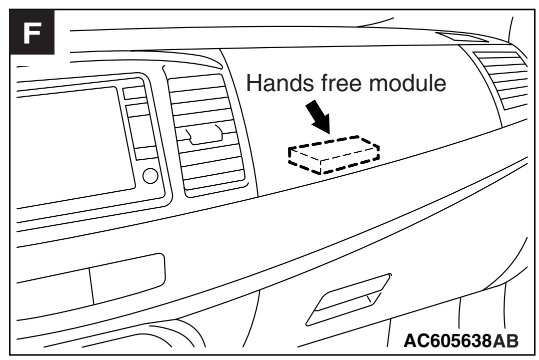

A
ABS-ECU
AC605629AB


B
Engine control module
AC605636AB


C
Column switch (incorporating column-ECU)
AC605634AB


D
Combination meter (incorporating CPU)
AC605635AB


E
Audio visual navigation unit
CAN box unit
AC605631AB


F
Hands free module
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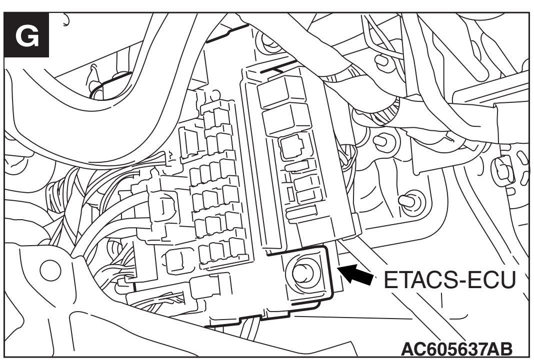
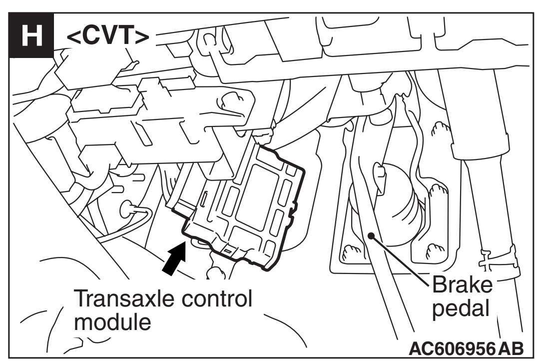

G
ETACS-ECU
AC605637AB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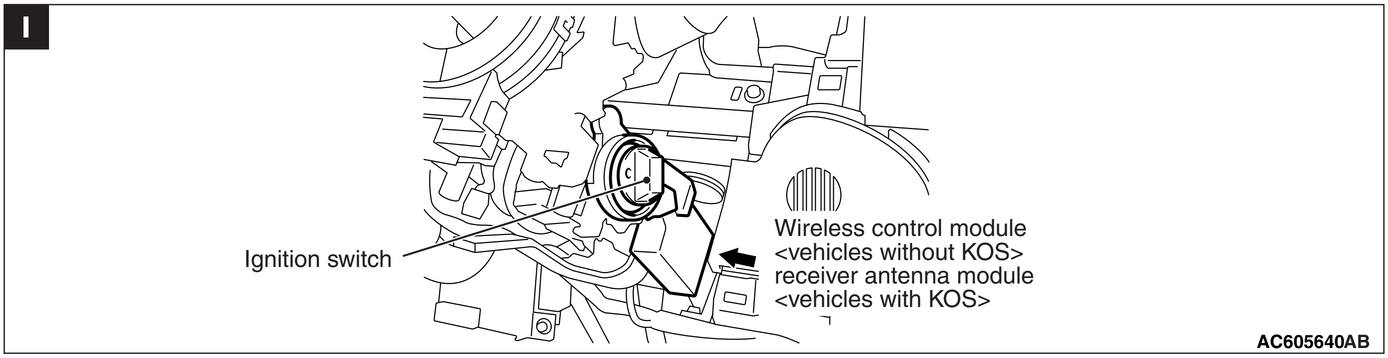
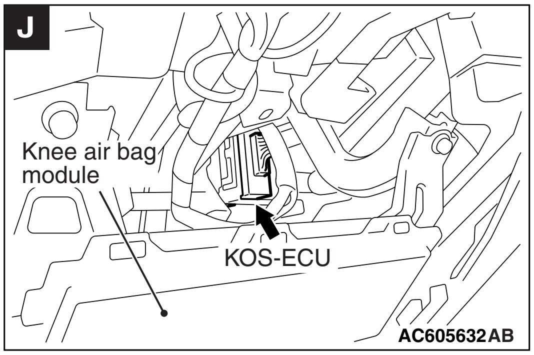
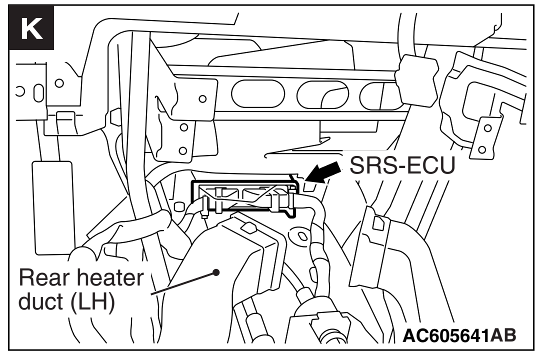
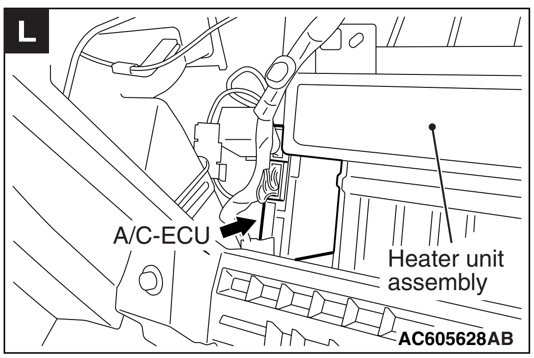
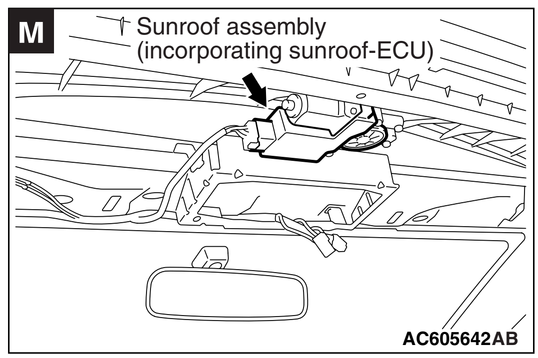
<CVT>
Transaxle control module
Brake pedal
AC606956AB

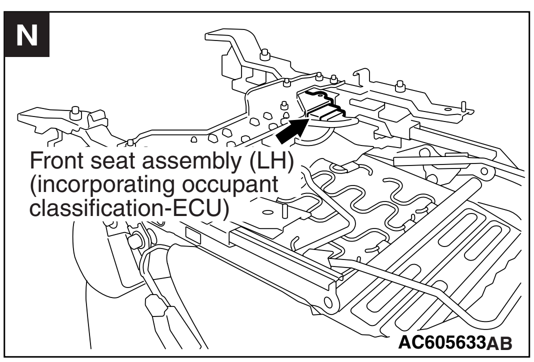

I
Ignition switch
Wireless control module
<vehicles without KOS>
receiver antenna module
<vehicles with KOS>
AC605640AB

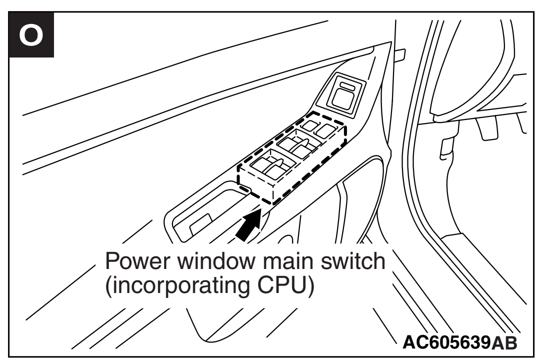

J
Knee air bag
module
KOS-ECU
AC605632AB


K
SRS-ECU
Rear heater
duct (LH)
AC605641AB


L
A/C-ECU
Heater unit
assembly
AC605628AB


M
Sunroof assembly
(incorporating sunroof-ECU)
AC605642AB

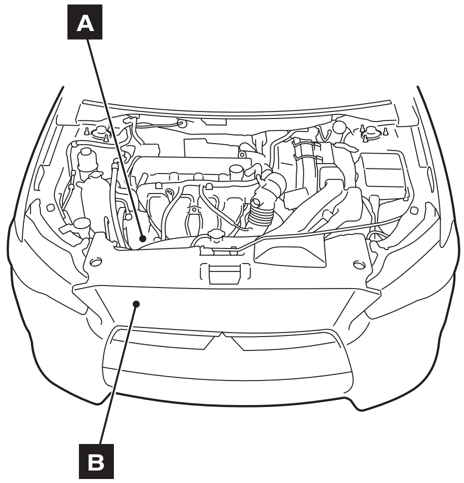

N
Front seat assembly (LH)
(incorporating occupant
classification-ECU)
AC605633AB


O
Power window main switch
(incorporating CPU)
AC605639AB

OTHER DEVICES

M1701005600476

NAME	SYMBOL	NAME	SYMBOL
A/C compressor assembly (incorporating A/C refrigerant temperature switch)	B	Power steering oil pressure switch	A



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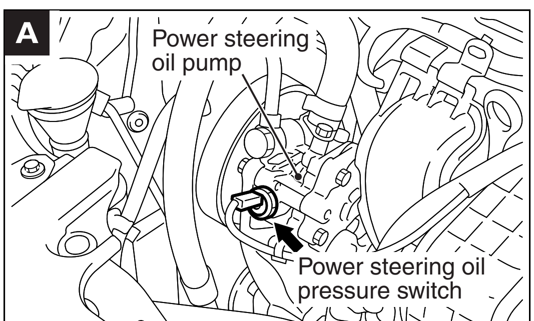

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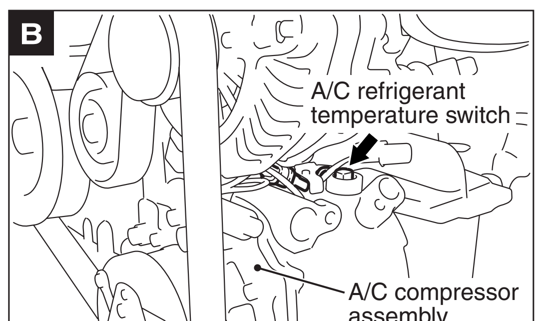
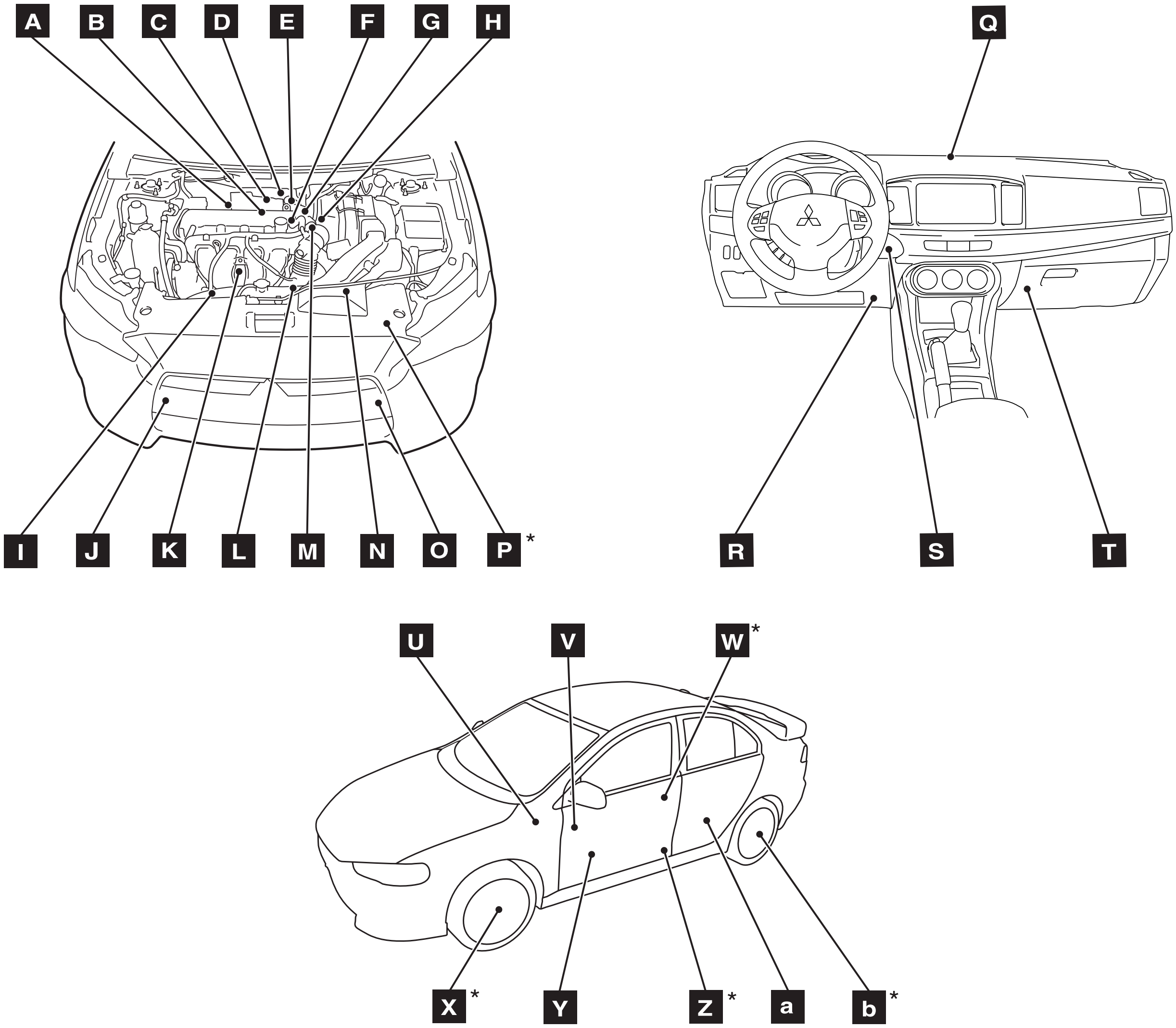


AC606957AB

SENSOR

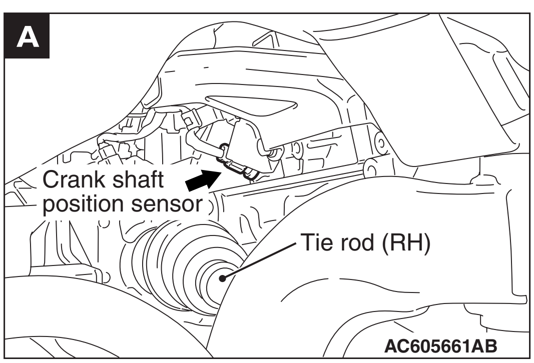
M1701000601270

NAME	SYMBOL	NAME	SYMBOL
A/C pressure sensor	J	Photo sensor	Q
Accelerator pedal position sensor	R	Primary pulley speed sensor <CVT>	B
Air thermo sensor	T	Rear wheel speed sensor	b
Ambient temperature sensor	O	Heated oxygen sensor (3rd) <vehicles for California>	V
Crankshaft position sensor	A		
Engine coolant temperature sensor	G	Heated oxygen sensor (front) <except for California>	C
Exhaust camshaft position sensor	E		
Front impact sensor	P	Heated oxygen sensor (front) <vehicles for California>	D
Front wheel speed sensor	X		
Front passenger's seat (incorporating weight sensor)	U	Heated oxygen sensor (rear) <except for California>	V
Fuel pump module (incorporating fuel level sensor (main) and fuel tank temperature sensor)	a	Heated oxygen sensor (rear) <vehicles for California>	C
		Seat slide sensor	Y
Fuel tank differential pressure sensor	a	Secondary pulley speed sensor <CVT>	N
Intake camshaft position sensor	F	Side impact sensor	Z
Interior temperature sensor	S	Throttle body assembly (incorporating throttle position sensor)	L
Knock sensor	K		
Manifold absolute pressure sensor	I	Unlock sensor	W
Mass airflow sensor	M	Vehicle speed sensor <M/T>	H



AC607488AC

*NOTE: The * symbols indicate equipped at both sides.*



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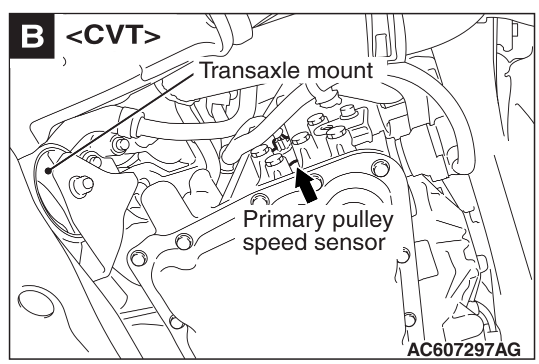
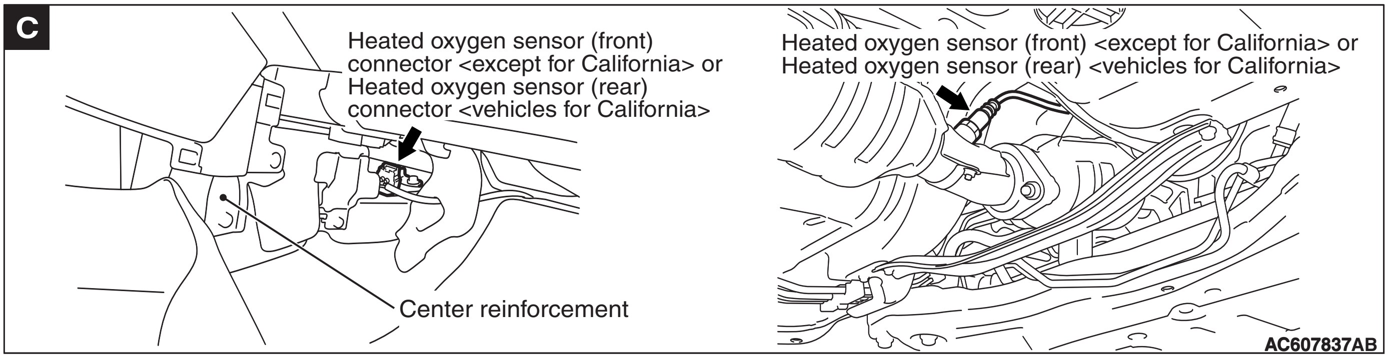
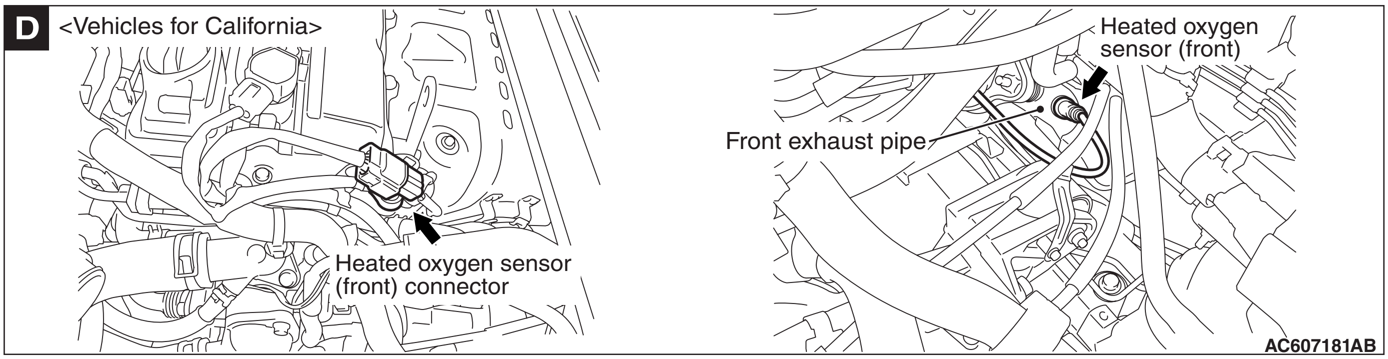
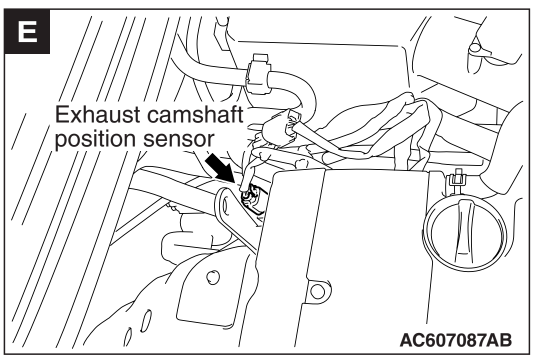
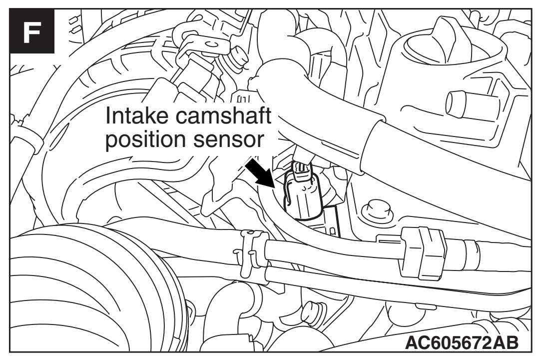


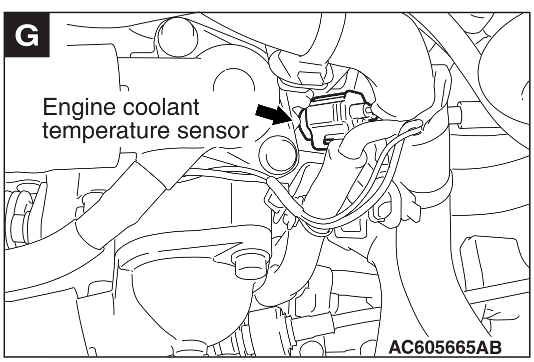
AC607297AG

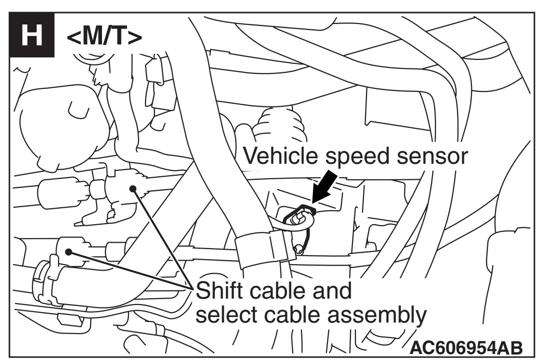

C
Heated oxygen sensor (front) connector <except for California> or Heated oxygen sensor (rear) connector <vehicles for California>
Center reinforcement
Heated oxygen sensor (front) <except for California> or Heated oxygen sensor (rear) <vehicles for California>
AC607837AB

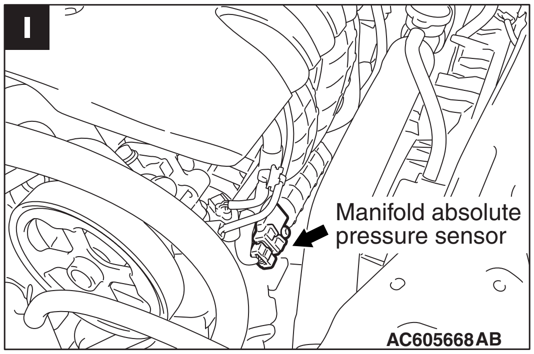

D
<Vehicles for California>
Heated oxygen sensor (front) connector
Heated oxygen sensor (front)
Front exhaust pipe
AC607181AB

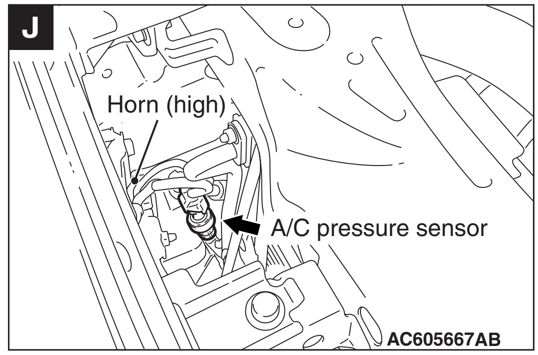

E
Exhaust camshaft position sensor
AC607087AB

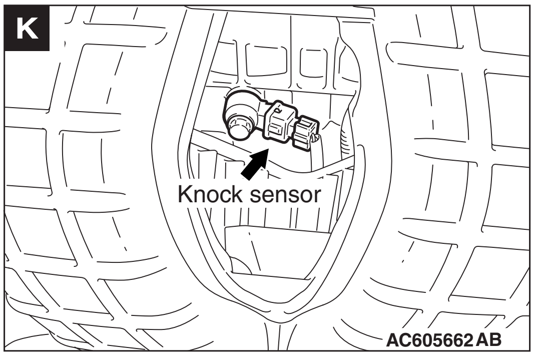

F
Intake camshaft position sensor
AC605672AB

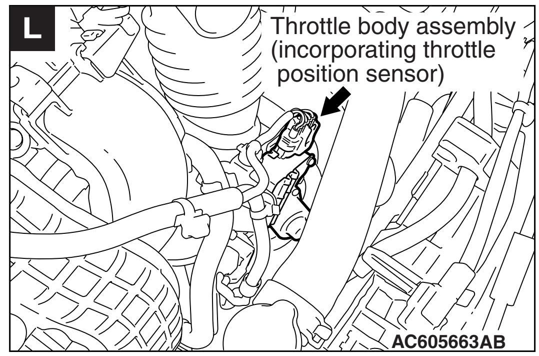

G
Engine coolant temperature sensor
AC605665AB

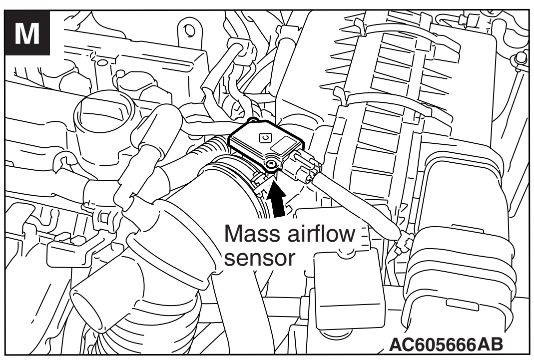

H
<M/T>
Vehicle speed sensor
Shift cable and select cable assembly
AC606954AB

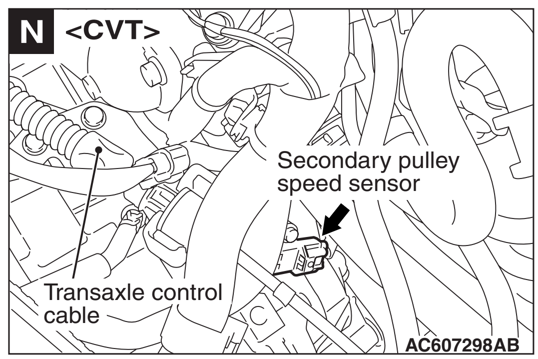

I
Manifold absolute pressure sensor
AC605668AB

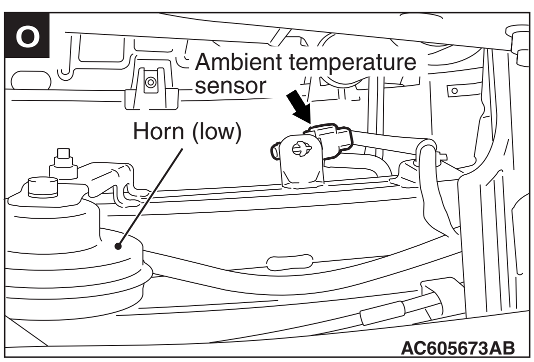

J
Horn (high)
A/C pressure sensor
AC605667AB

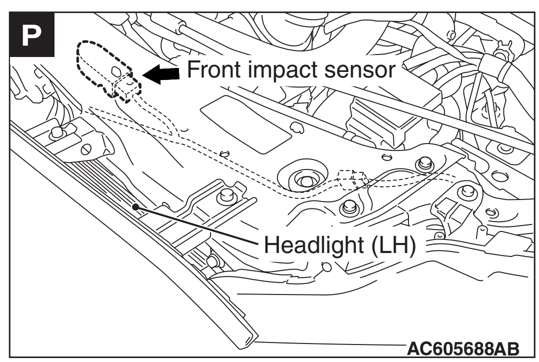

K
Knock sensor
AC605662AB

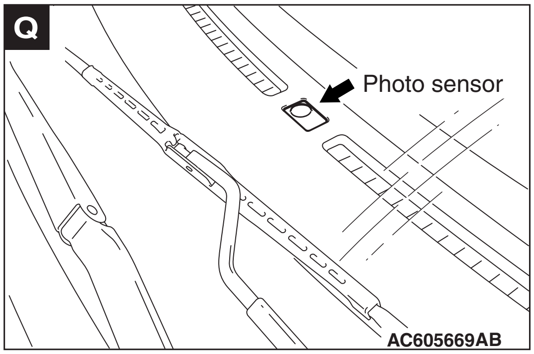

L
Throttle body assembly (incorporating throttle position sensor)
AC605663AB

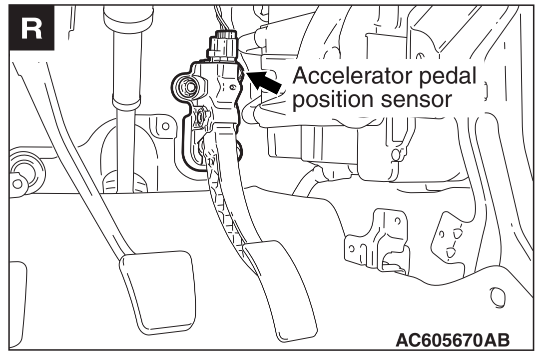

M
Mass airflow sensor
AC605666AB

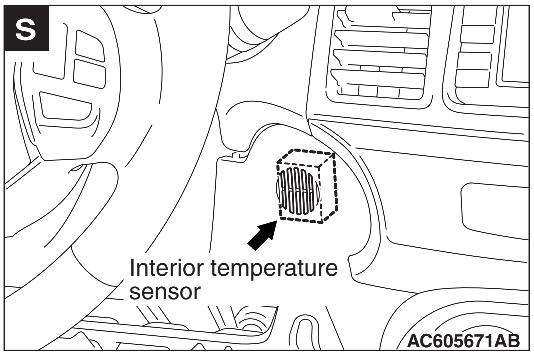

N
<CVT>
Secondary pulley speed sensor
Transaxle control cable
AC607298AB

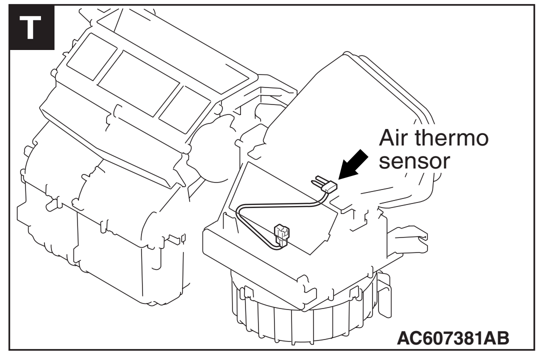

O
Ambient temperature sensor
Horn (low)
AC605673AB

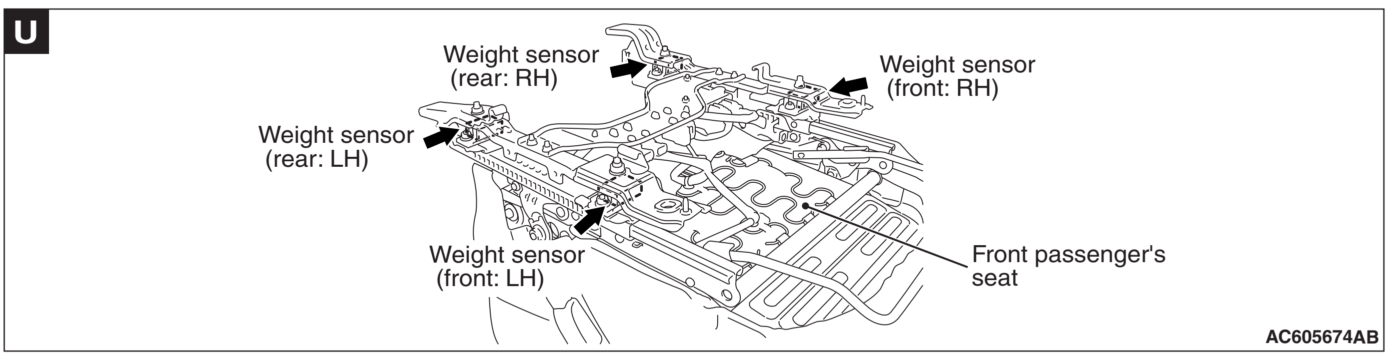

P
Front impact sensor
Headlight (LH)
AC605688AB

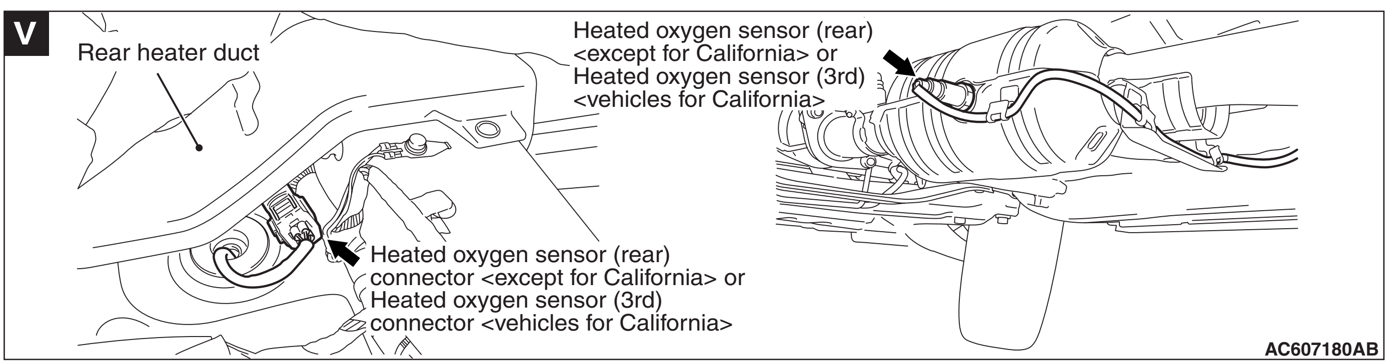

Q
Photo sensor
AC605669AB

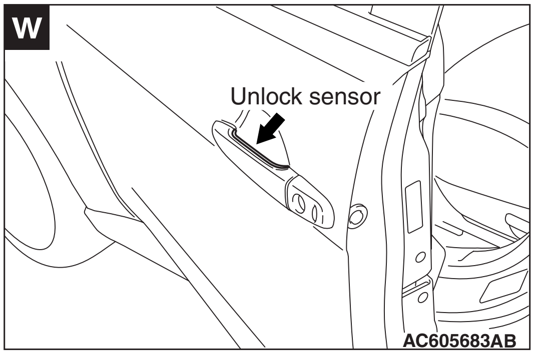

R
Accelerator pedal position sensor
AC605670AB

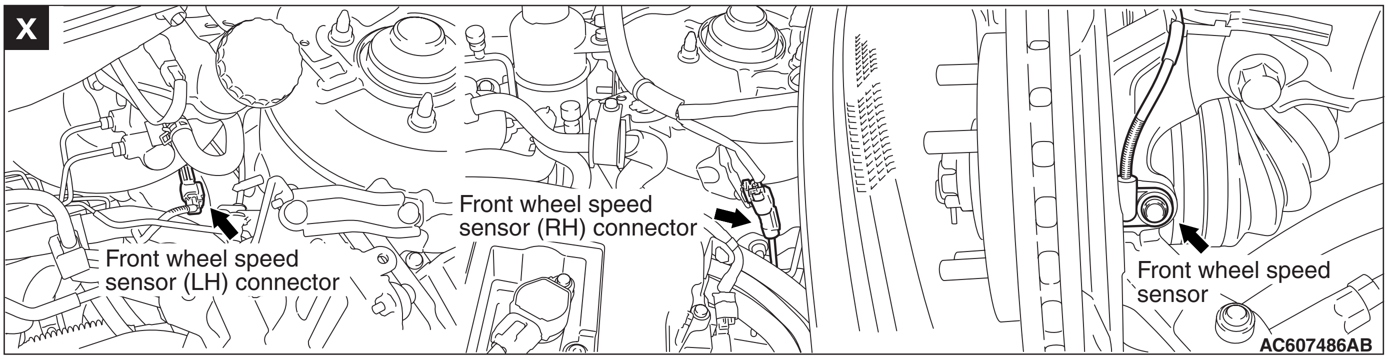

S
Interior temperature sensor
AC605671AB

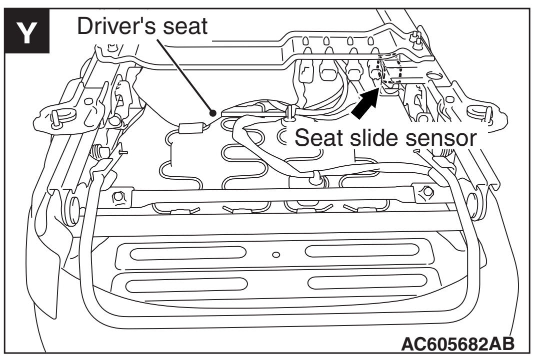

T
Air thermo sensor
AC607381AB

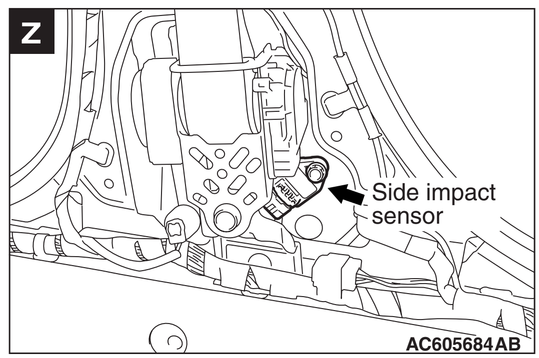

U
Weight sensor (rear: RH)
Weight sensor (front: RH)
Weight sensor (rear: LH)
Weight sensor (front: LH)
Front passenger's seat
AC605674AB

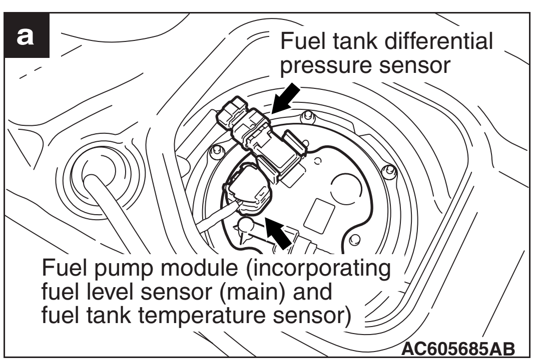

V
Rear heater duct
Heated oxygen sensor (rear) <except for California> or Heated oxygen sensor (3rd) <vehicles for California>
Heated oxygen sensor (rear) connector <except for California> or Heated oxygen sensor (3rd) connector <vehicles for California>
AC607180AB

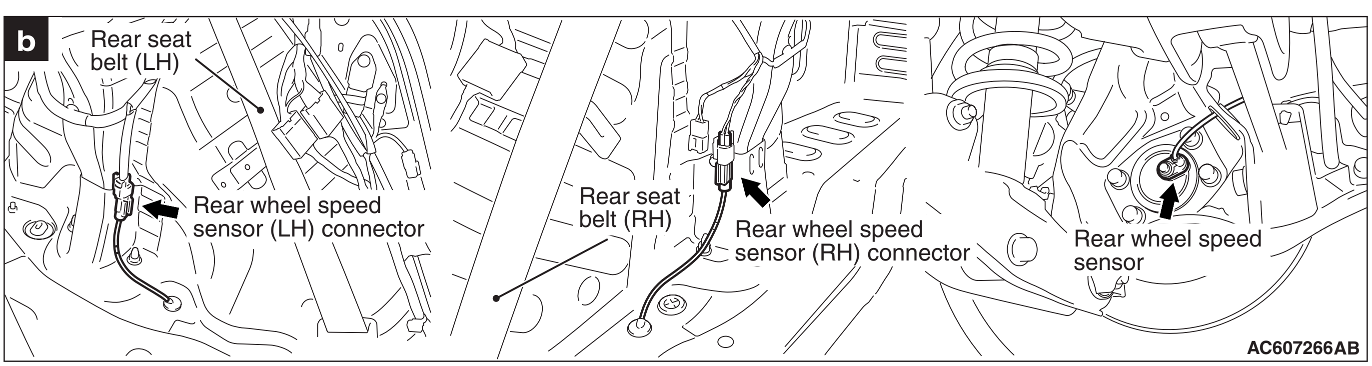

W
Unlock sensor
AC605683AB


X
Front wheel speed sensor (LH) connector
Front wheel speed sensor (RH) connector
Front wheel speed sensor
AC607486AB


Y
Driver's seat
Seat slide sensor
AC605682AB


Z
Side impact sensor
AC605684AB

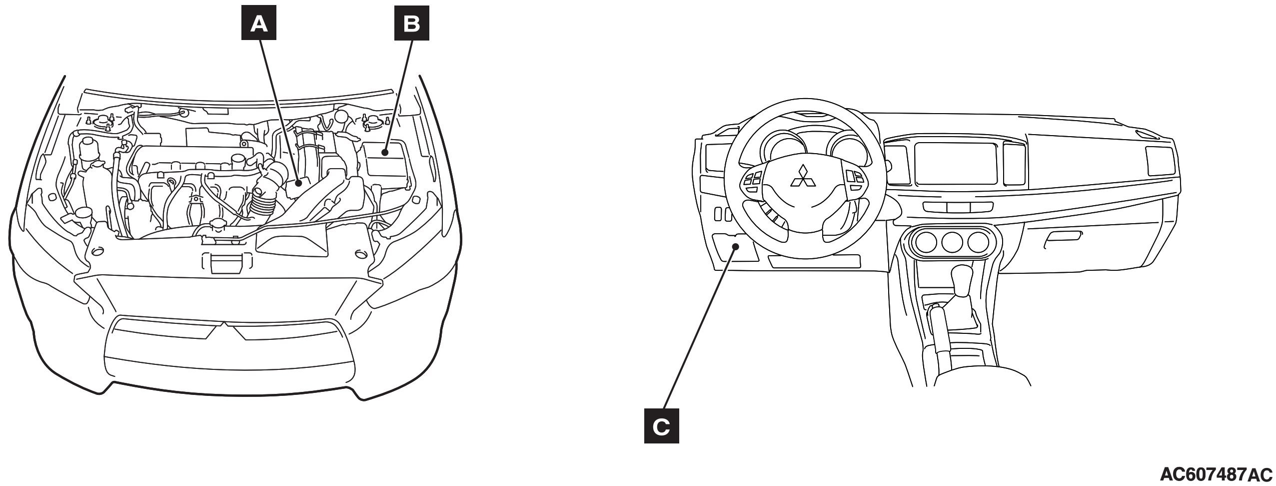

a
Fuel tank differential pressure sensor
Fuel pump module (incorporating fuel level sensor (main) and fuel tank temperature sensor)
AC605685AB

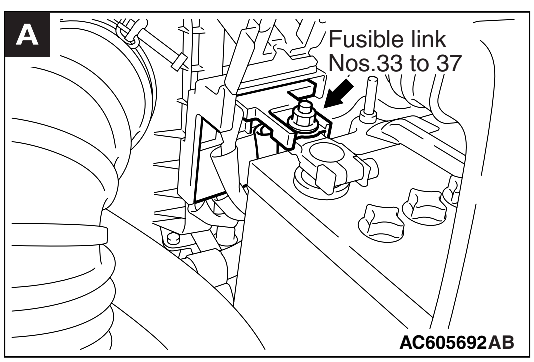

b
Rear seat belt (LH)
Rear wheel speed sensor (LH) connector
Rear seat belt (RH)
Rear wheel speed sensor (RH) connector
Rear wheel speed sensor
AC607266AB

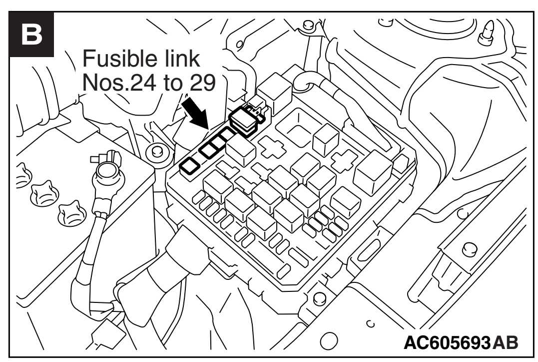
FUSIBLE LINK, FUSE AND IOD OR STORAGE CONNECTOR

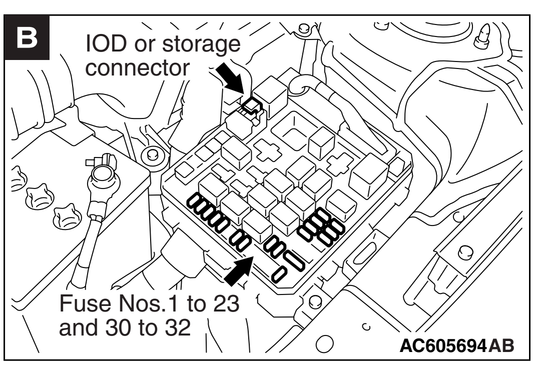
M1701000100993

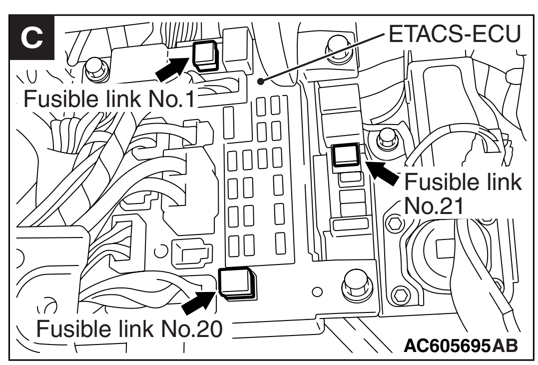
NAME	SYMBOL	NAME	SYMBOL
Fuse Nos.1 to 23 and No.30 to 32 (Engine compartment relay box)	B	Fusible link No. 21 (Passenger's compartment relay box)	C
Fuse Nos.2 to 19 (ETACS-ECU)	C	Fusible link Nos.24 to 29 (Engine compartment relay box)	B
Fuse Nos.22 to 25 (Passenger's compartment relay box)	C	Fusible link Nos.33 to 37 (Connected directly to battery positive terminal)	A
Fusible link Nos.1 and No.20 (ETACS-ECU)	C	IOD or storage connector	B

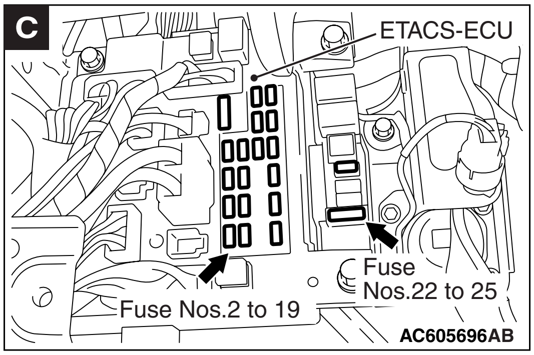






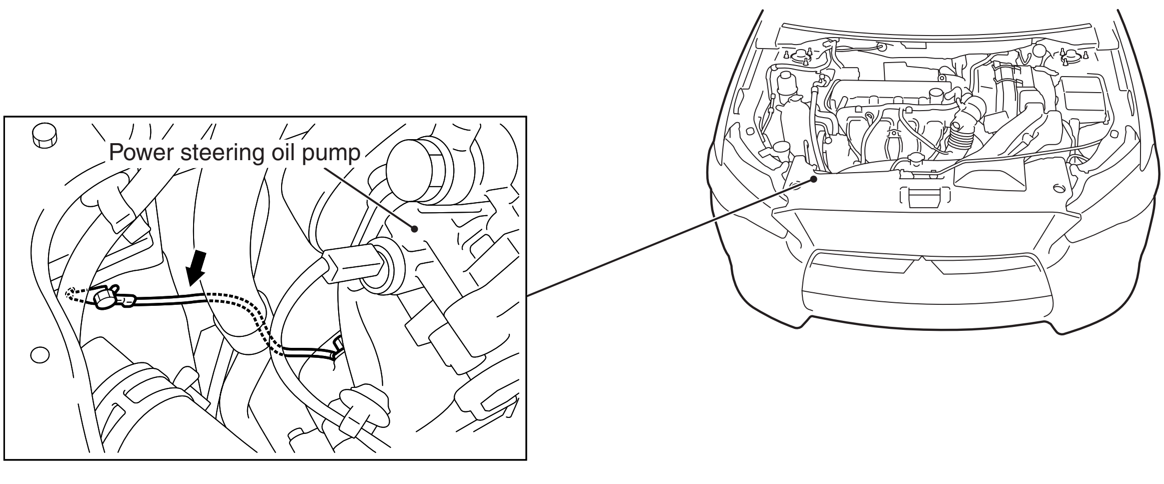






GROUNDING CABLE

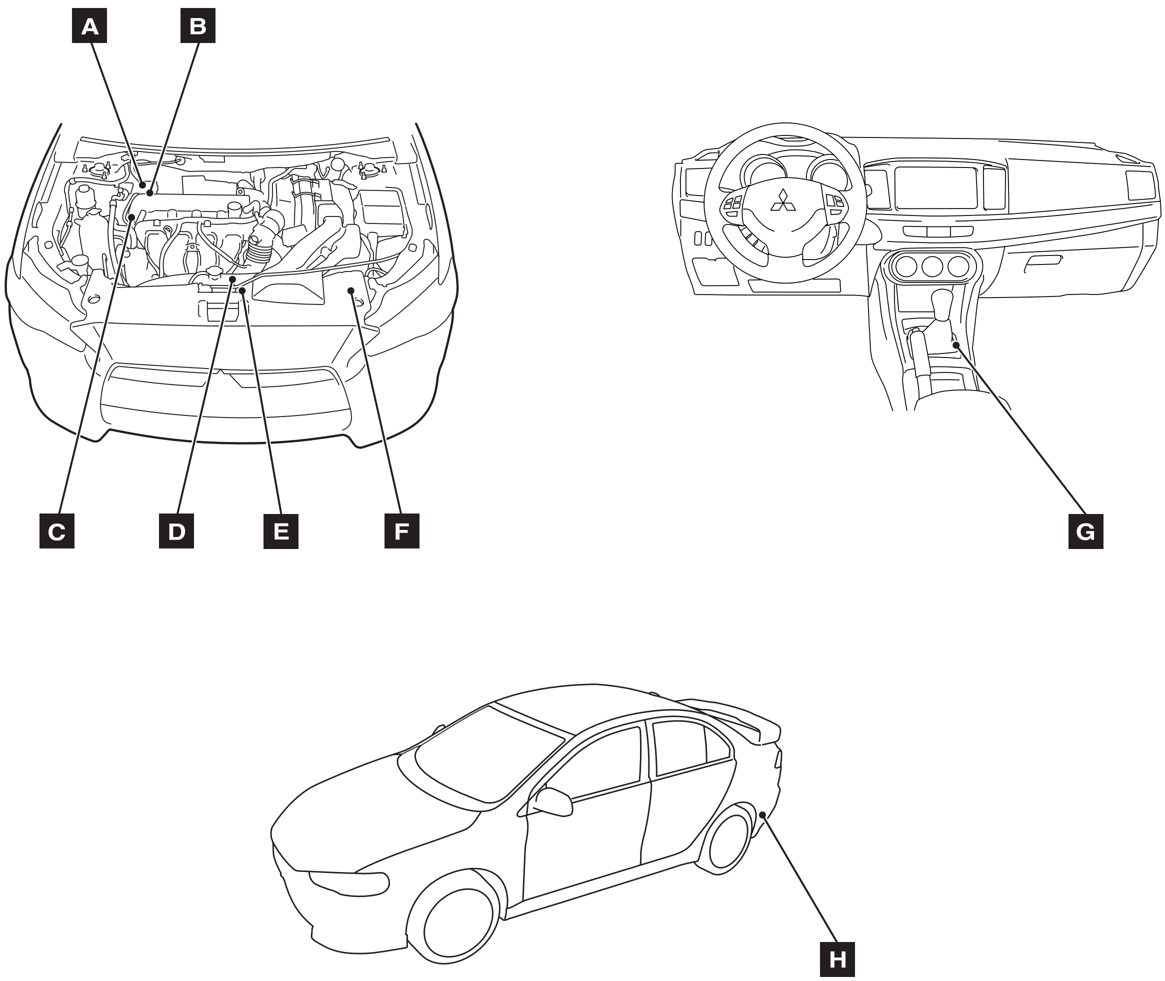
M1701001000795



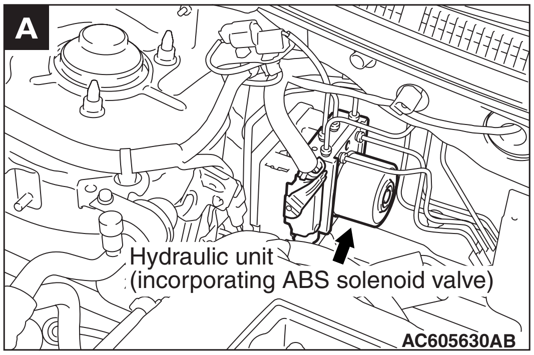
SOLENOID AND SOLENOID VALVE

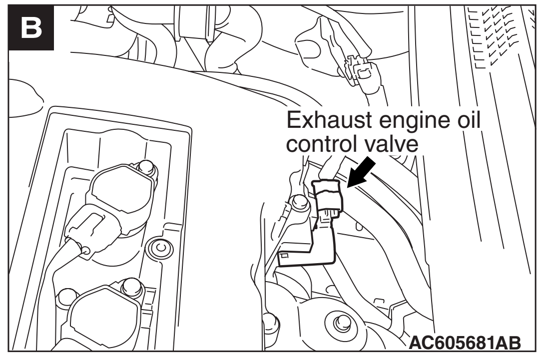
M1701000801025

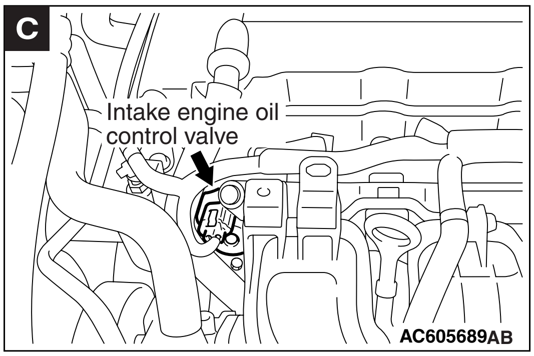
NAME	SYMBOL	NAME	SYMBOL
CVT assembly <CVT>	F	Exhaust gas recirculation valve	E
Evaporative emission purge solenoid	D	Hydraulic unit (incorporating ABS solenoid valve)	A
Evaporative emission ventilation solenoid	H	Intake engine oil control valve (for intake side)	C
Exhaust engine oil control valve (for exhaust side)	B	Selector switch assembly <CVT> (incorporating shift lock solenoid)	G

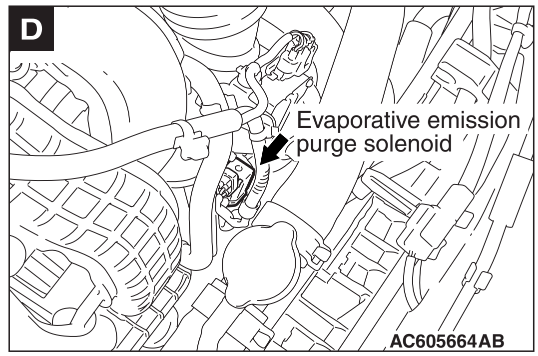


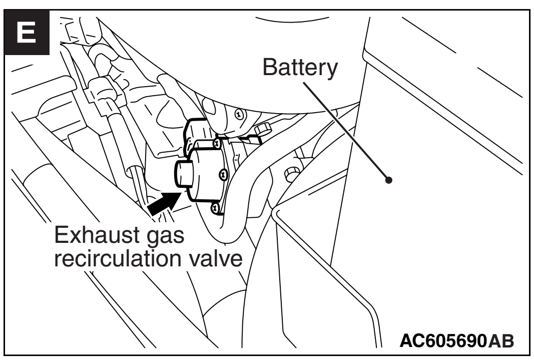
AC607488AD

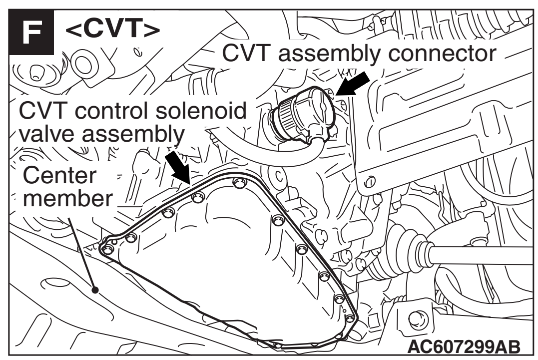

A
Hydraulic unit
(incorporating ABS solenoid valve)
AC605630AB

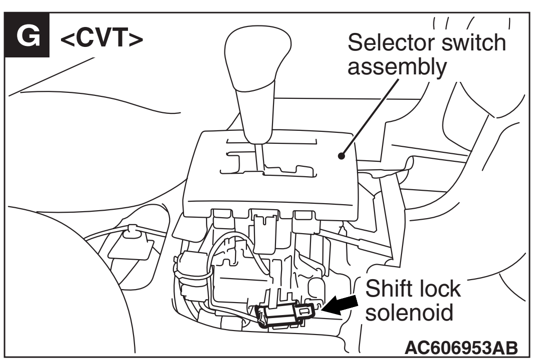

B
Exhaust engine oil
control valve
AC605681AB

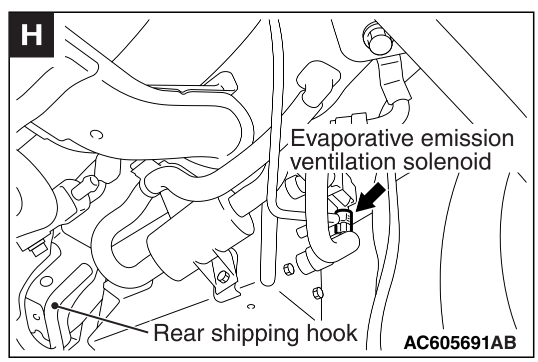

C
Intake engine oil
control valve
AC605689AB


D
Evaporative emission
purge solenoid
AC605664AB


E
Battery
Exhaust gas
recirculation valve
AC605690AB


F
<CVT>
CVT assembly connector
CVT control solenoid
valve assembly
Center
member
AC607299AB

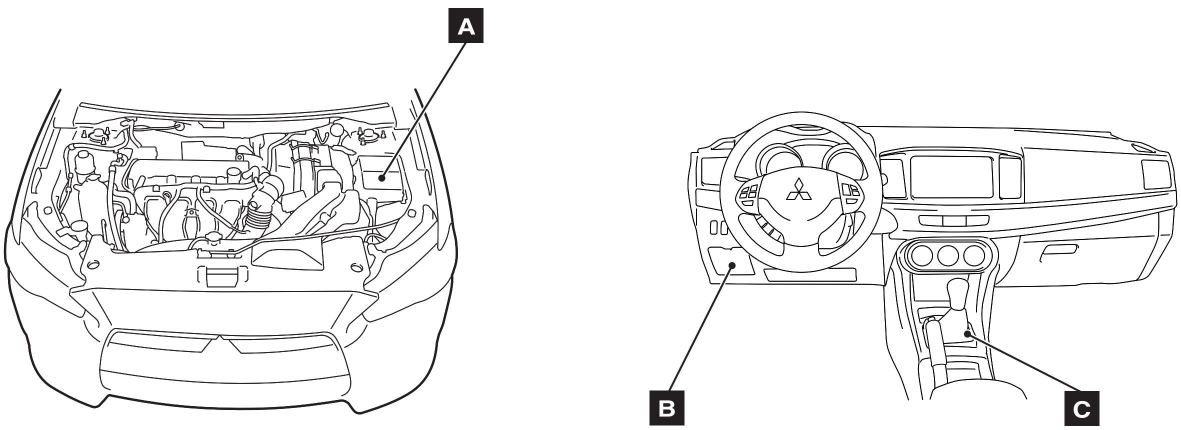

G
<CVT>
Selector switch
assembly
Shift lock
solenoid
AC606953AB


H
Evaporative emission
ventilation solenoid
Rear shipping hook
AC605691AB

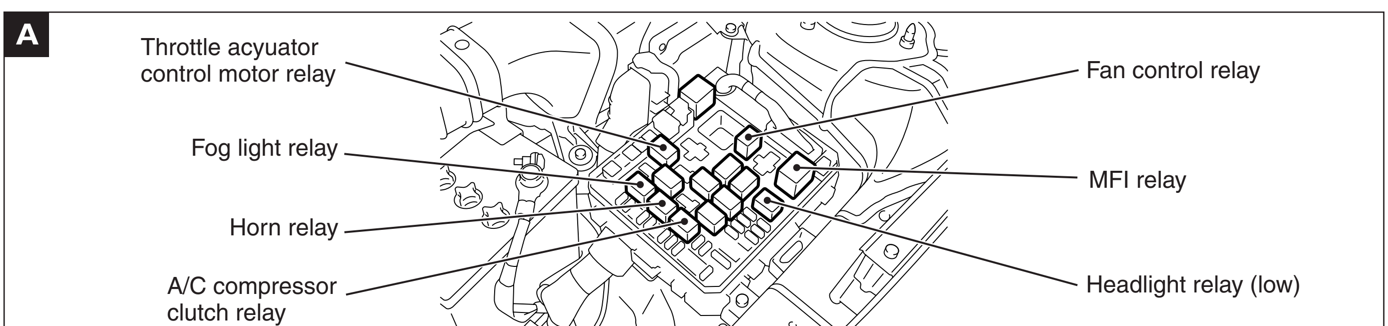
RELAY

M1701000401113

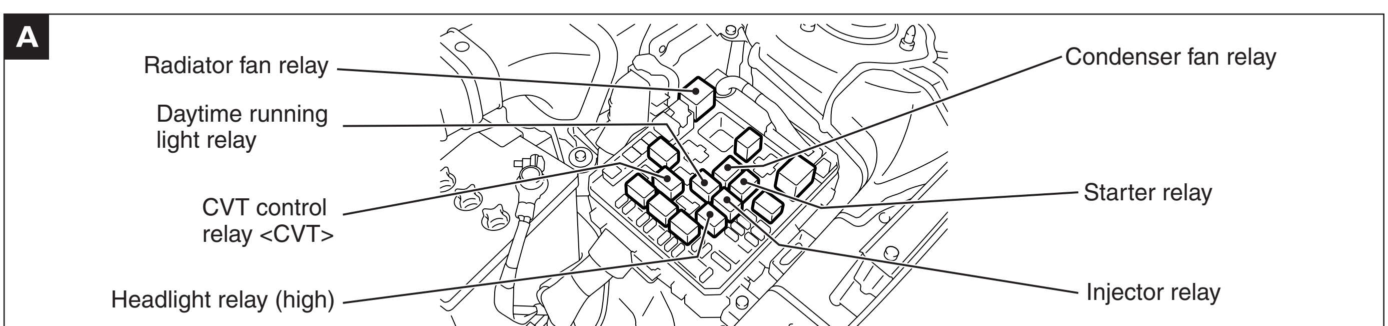
NAME	SYMBOL	NAME	SYMBOL
A/C compressor clutch relay	A	Heated seat relay	B
CVT control relay <CVT>	A	Horn relay	A
Blower relay	B	Injector relay	A
Condenser fan relay	A	MFI relay	A
Daytime running light relay	A	Radiator fan relay	A
Fan control relay	A	Rear window defogger relay	B
Fog light relay	A	Selector switch assembly (incorporating shift lock control relay) <CVT>	C
Headlight relay (high)	A	Starter relay	A
Headlight relay (low)	A	Throttle actuator control motor relay	A



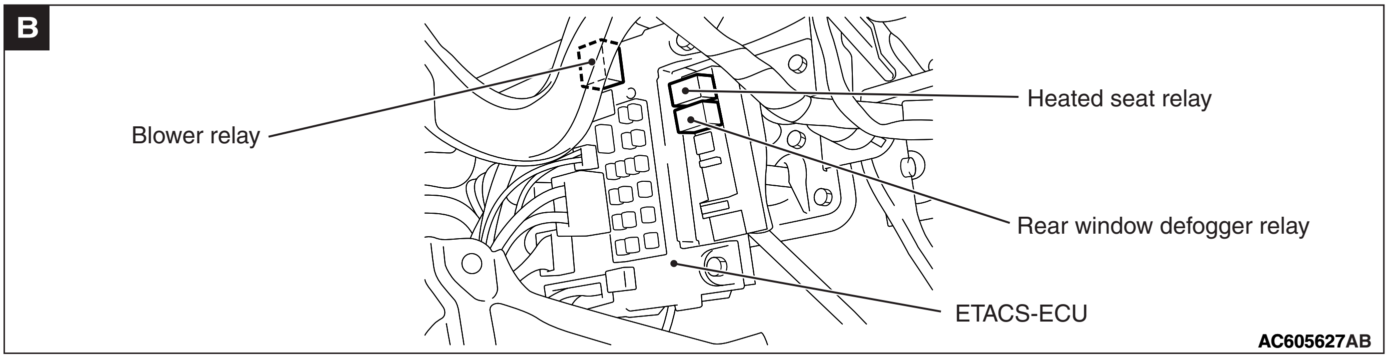
AC607487AB

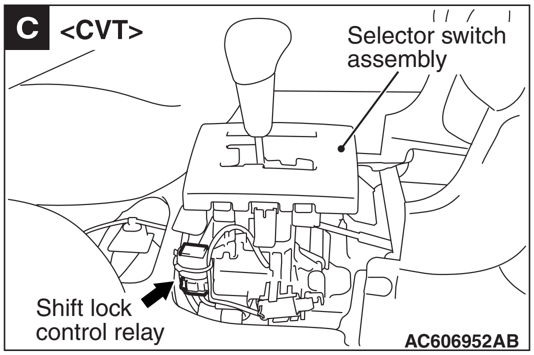


AC605626AB



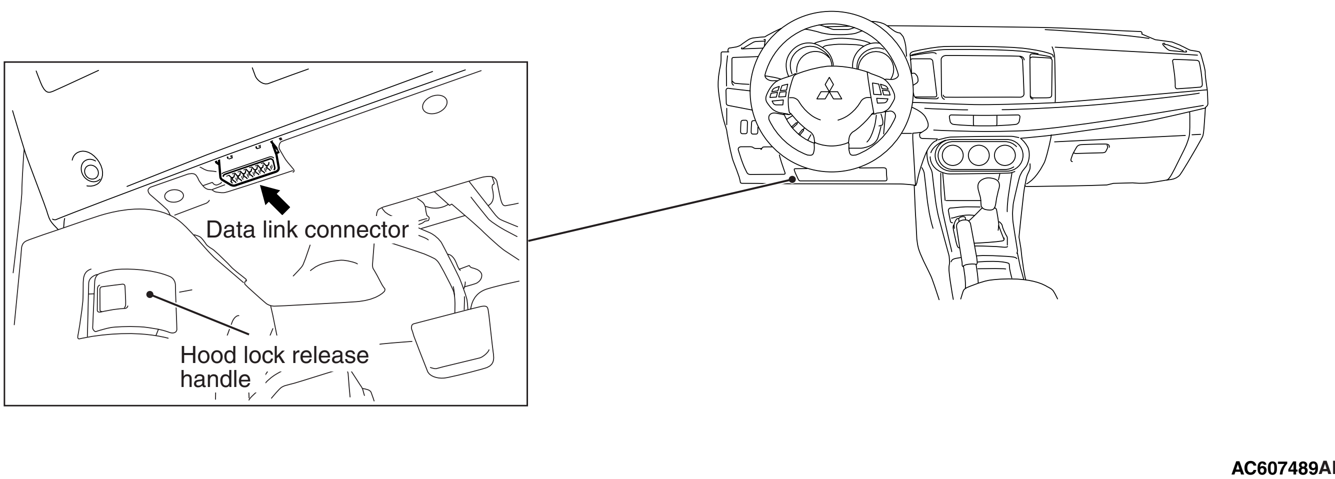
AC605626AC





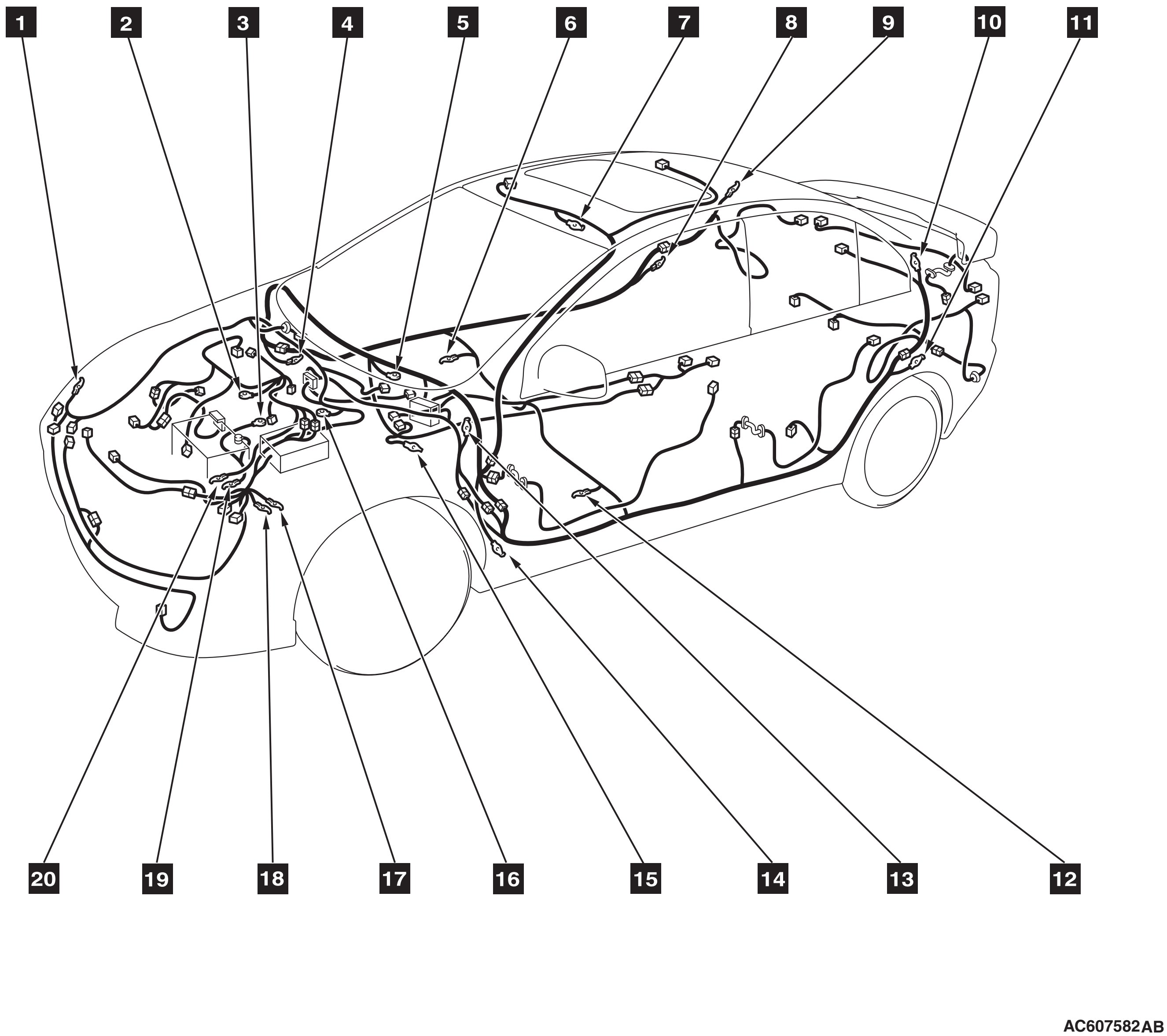
INSPECTION TERMINAL

M1701000200848

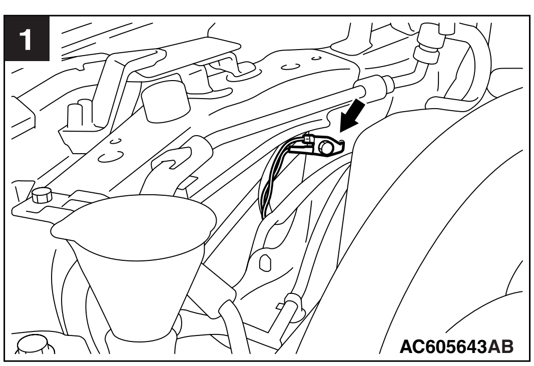


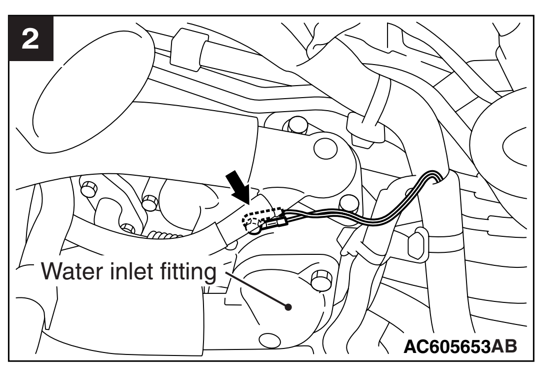
GROUNDING

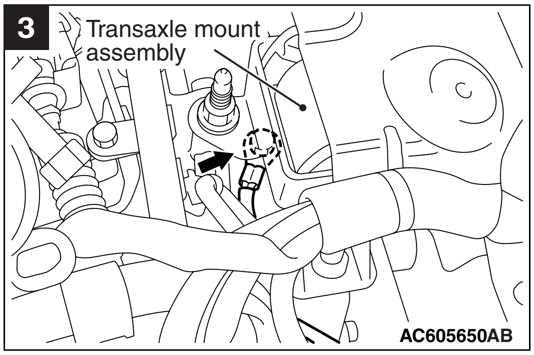
M1701000301053

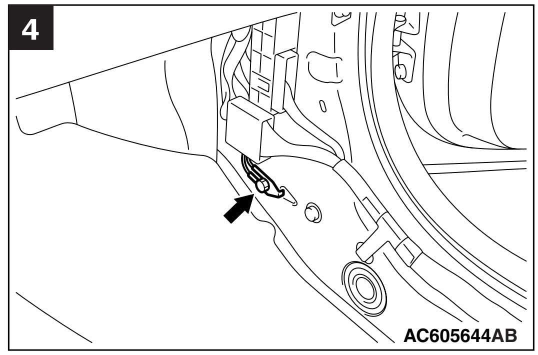


NOTE: 1 to 20 numbers correspond to the body ground point numbers in CIRCUIT DIAGRAMS.






3
Transaxle mount
assembly
AC605650AB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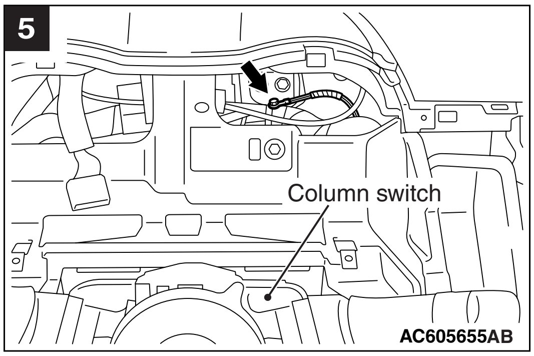
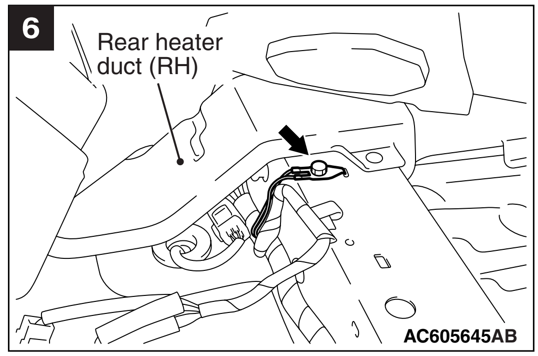
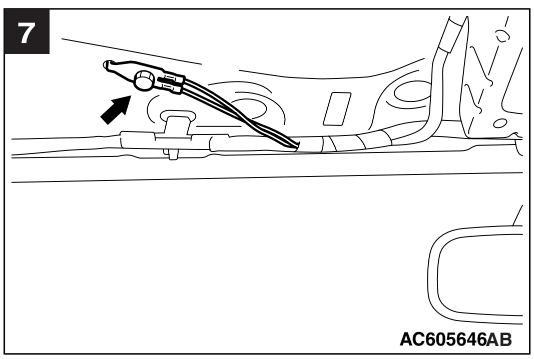
AC605644AB


5
Column switch
AC605655AB


6
Rear heater
duct (RH)
AC605645AB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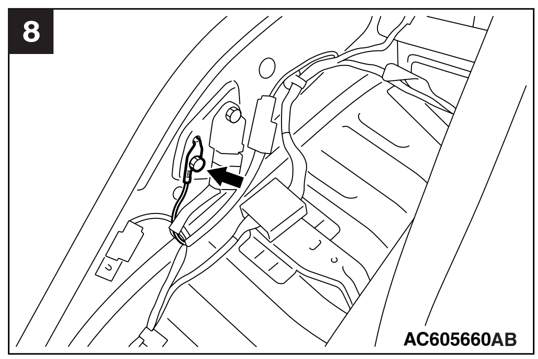
AC605646AB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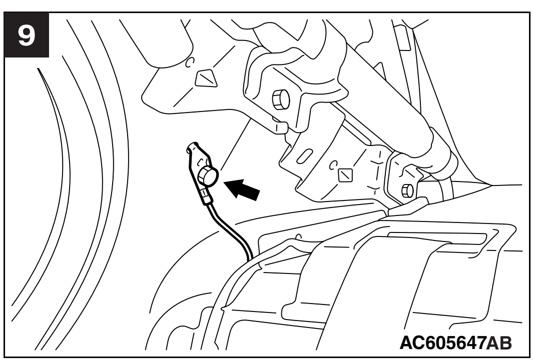
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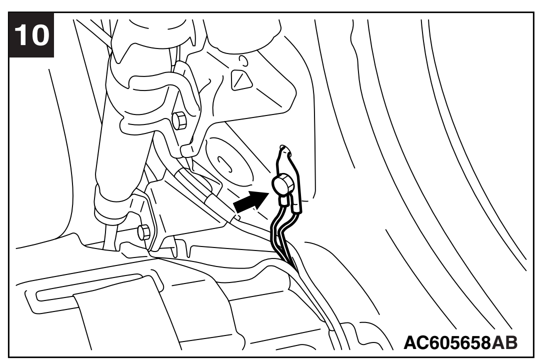
AC605647AB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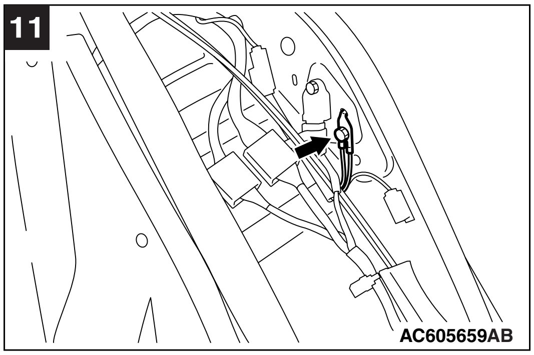
AC605658AB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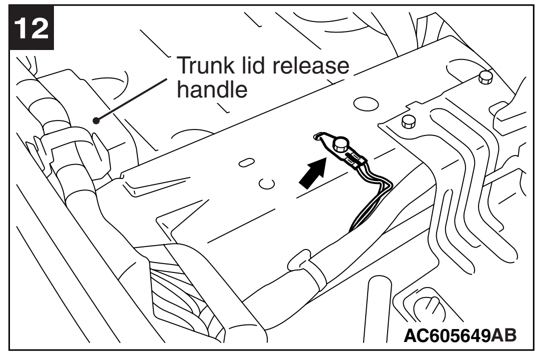
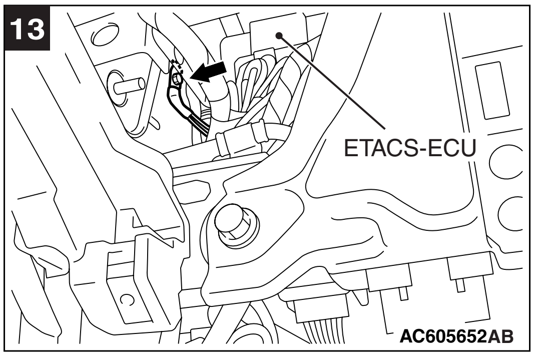
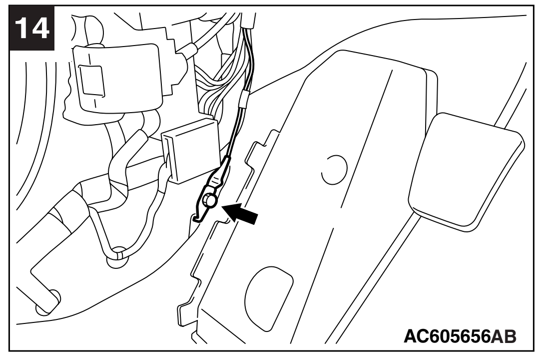
AC605659AB


12
Trunk lid release handle
AC605649AB


13
ETACS-ECU
AC605652AB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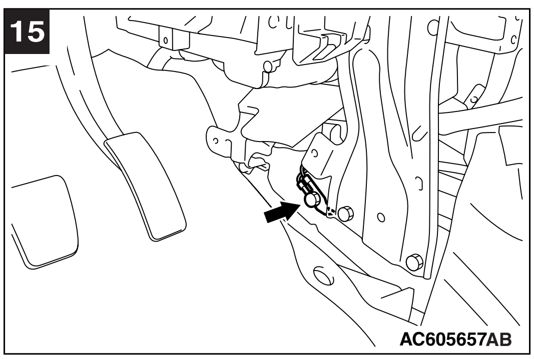
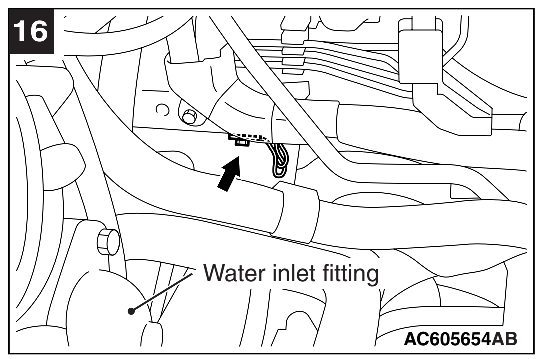
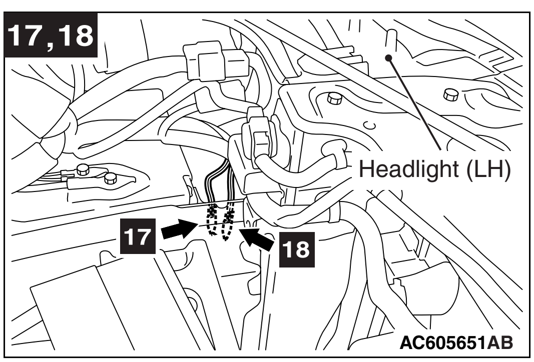
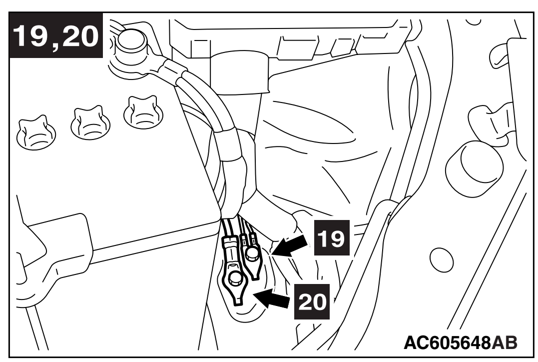
AC605656AB


15
AC605657AB


16
Water inlet fitting
AC605654AB


17,18
Headlight (LH)
17
18
AC605651AB


19,20
19
20
AC605648AB

GROUP 51

EXTERIOR

CONTENTS

GENERAL INFORAMATION

M2510000101799

Taking over previous model heritages;

- Advanced, aggressive styling with sophisticated surfacing
- Highly competitive body size in the current sporty sedan market
- Impressive front face as the next generation vehicle of Mitsubishi identity
- High-positioned beltline creates a speedy atmosphere
- Solid and rigid construction with simple and clean surface

FEATURES

BETTER APPEARANCE

1. Radiator grille integrated front bumper
2. Side air dams <GTS: Standard, ES: Optional>
3. Rear spoiler <GTS: Standard, ES: Optional>

BETTER AERODYNAMIC CHARACTERISTICS

4. Aerodynamic front bumper
5. Air dam skirt panels <GTS: Standard, ES: Optional>
6. Engine room under cover with bulges at left and right (Refer to P.51-3)
7. Side air dams <GTS: Standard, ES: Optional>
8. Rear spoiler <GTS: Standard, ES: Optional>
9. Aerodynamic rear bumper

BETTER USER-FRIENDLINESS

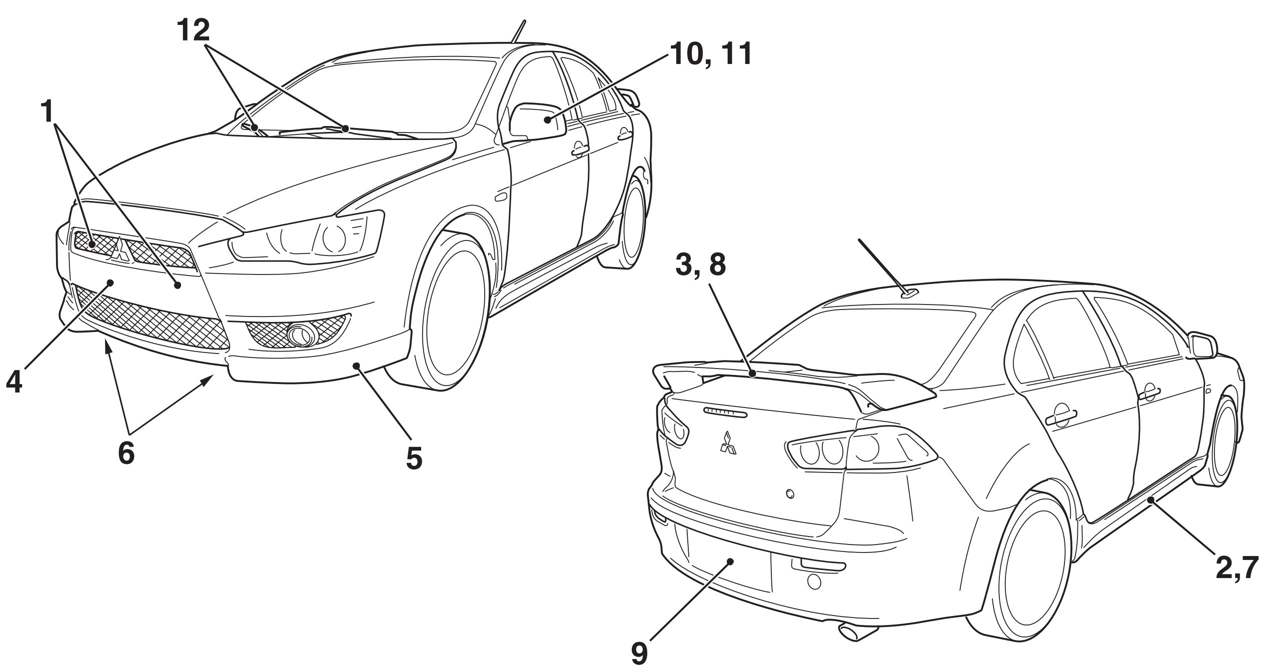
10. Electric remote-controlled door mirrors
11. Heated door mirrors <Vehicles for Canada>

BETTER PRODUCT PACKAGE

12. Vehicle speed sensitive intermittent time variable windshield wiper

SUPPORT RECYCLING OF RESOURCES

Uses PP (polypropylene) materials that are easy to recycle and easy to stamp material symbols on the plastic (resin) parts.

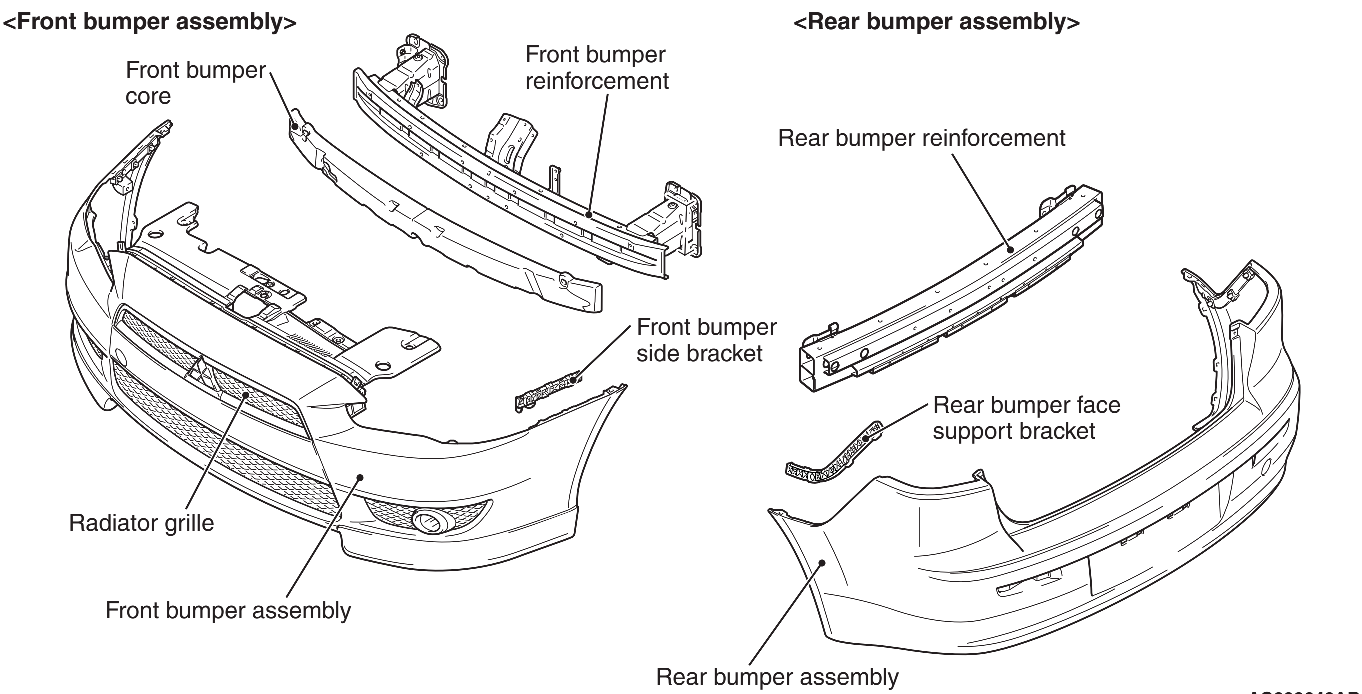


AC607908AC

BUMPER AND RADIATOR GRILLE

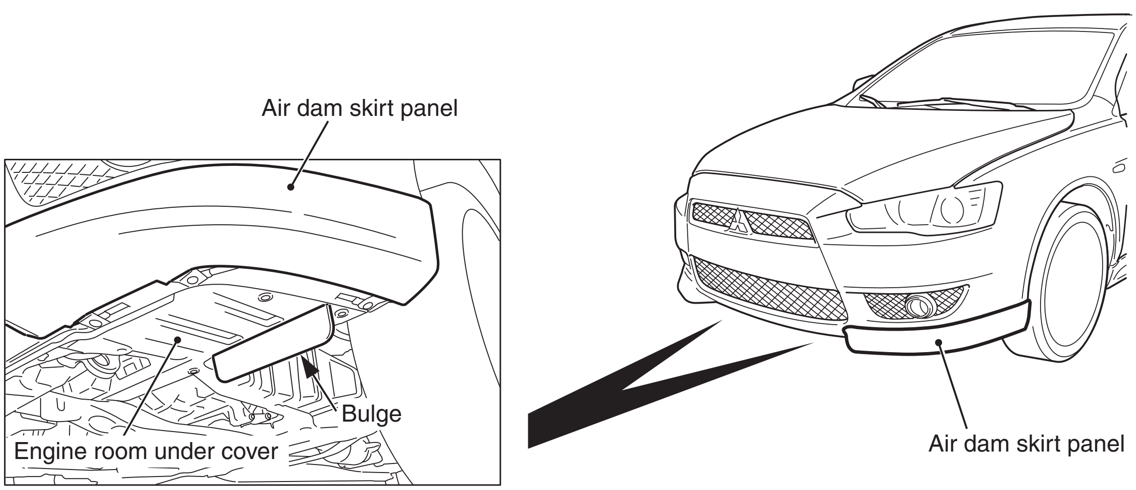
M2510001300113

CONSTRUCTION DIAGRAM



AC608649AB

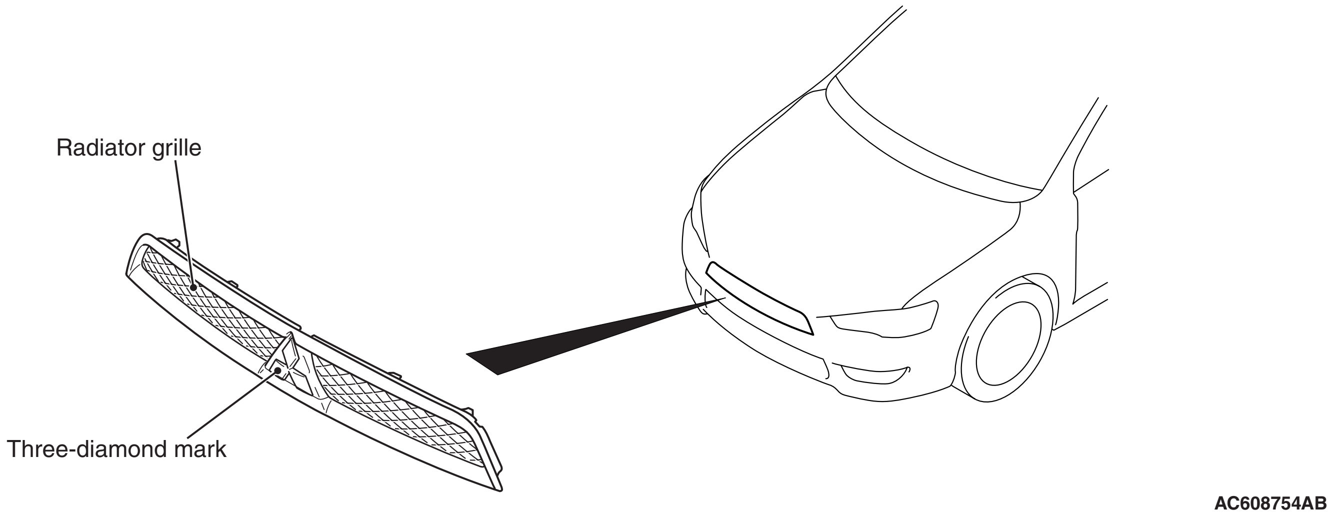
- The front bumper has an opening at the center lower to guide air to the condenser and radiator.
- The front and rear bumpers incorporate highly rigid bumper reinforcements and bumper core (front bumper) for excellent energy-absorption to reduce chassis deformation upon impact.
- With the bumper reinforcements and bumper core (front bumper) remaining on the body, the front/rear bumper can be removed as a unit.
- Resin-made front bumper side brackets and rear bumper face support brackets have been adopted to improve the alignment with the body.
- The rear bumper which is detachable from the body has been abolished to improve maintainability and convertibility.



AC608737AB

- Air dam skirt panels and overhung front bumper corners at the right and left located in front of tires have been adopted to suppress the airflow against the tires and smoothen the airflow along the bumper sides.

- End of the engine room under cover at the right and left is bulged to the bottom for covering front area of tires so that it works as the front air dam. With this, the wind blown in airflow coming to under the bumper to induce negative pressure underneath the body, increasing the down force to the front tires.

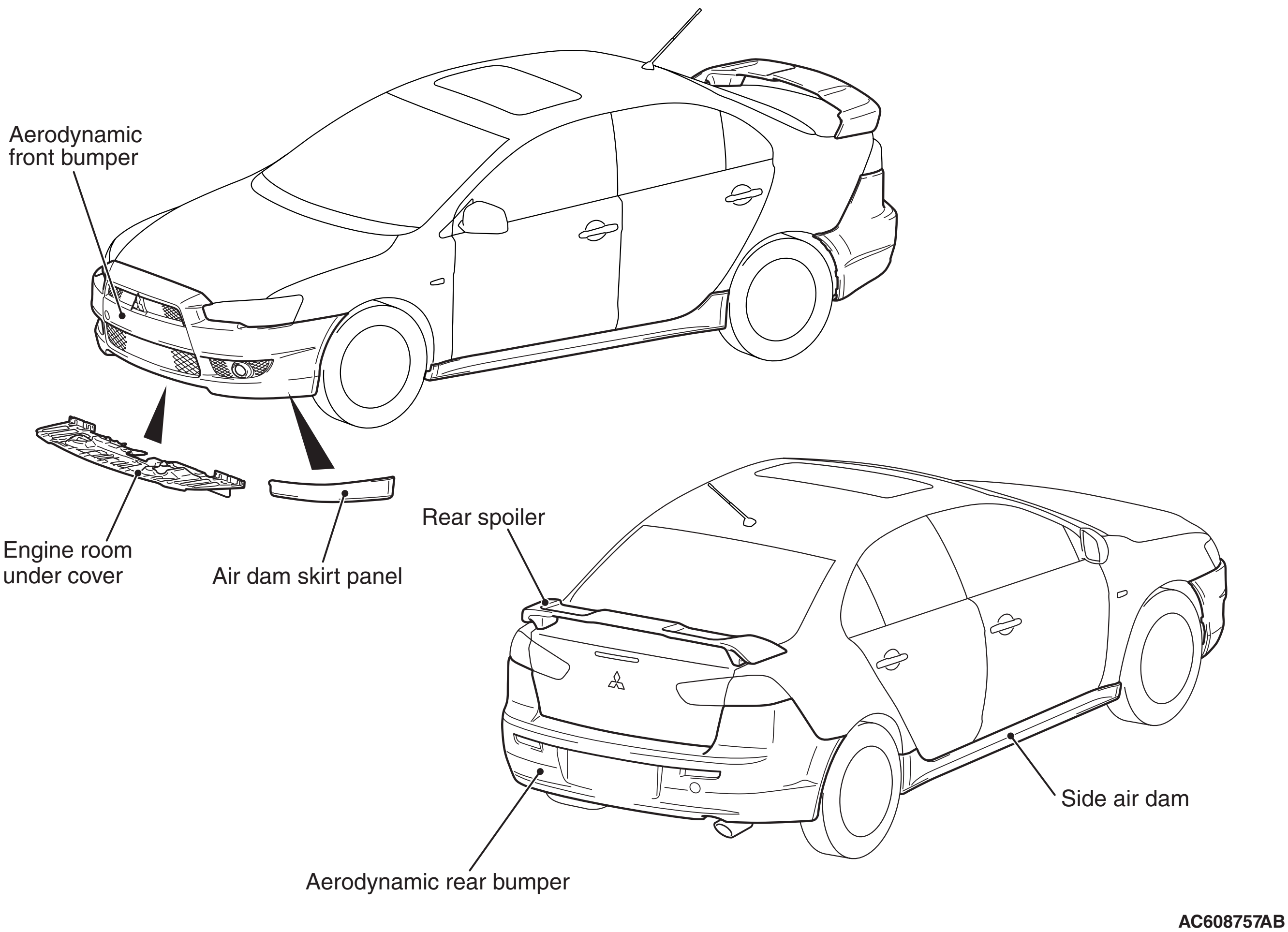


- Radiator grille is integrated with the front bumper.
- Mesh type radiator grille gives a sleek front mask and sporty image.
- The three-diamond mark is protruded from the installation surface of the radiator grille to improve the brand appeal.

AERO PARTS

M2510003000679

CONSTRUCTION DIAGRAM



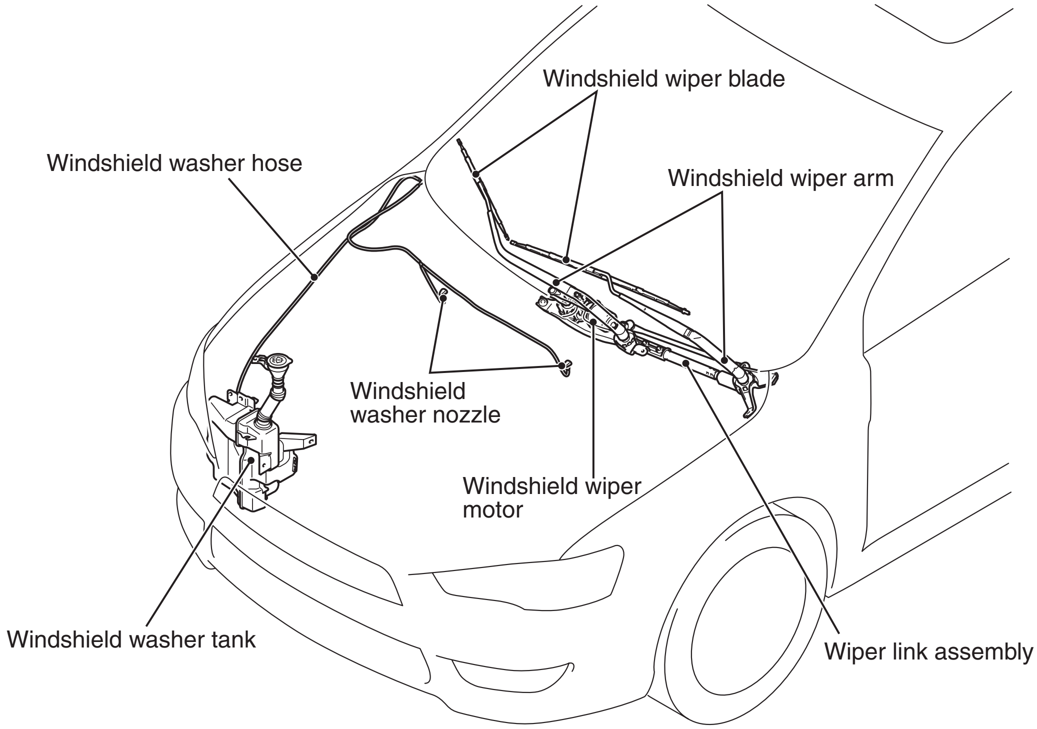
The following aero parts provide better aerodynamic performance and an appealing look.

- Body and under floor:
  The body shape has been optimized to improve aerodynamic characteristic, and the under covers have been adopted to achieve the rectification effect, smoothing the under floor airflow. With this modification, the air resistance has been reduced to improve fuel economy and driving stability while driving at high speed.
- Aerodynamic front bumper: Refer to BUMPER AND RADIATOR GRILLE P.51-3.
- Engine room under cover front: Refer to BUMPER AND RADIATOR GRILLE P.51-3.
- Air dam skirt panels: Refer to BUMPER AND RADIATOR GRILLE P.51-3.
- Side air dams:
  Smoothens the airflow under the floor and around the wheels to decrease the air resistance and lifting force.
- Aerodynamic rear bumper:
  The rear bumper is set to the optimum height to decrease the air resistance and lifting force.
- Rear spoiler:
  Separates the air vortex induced at the rear of the vehicle to smoothen the airflow. In addition, the rear spoiler horizontal wing has been enlarged and the helix angle has been optimized to reduce the air resistance and to generate the down force, and thus, the road holding quality of rear wheel has been increased to improve the driving stability while driving at high speed.

WINDSHIELD WIPER AND WASHER

M2510007000604

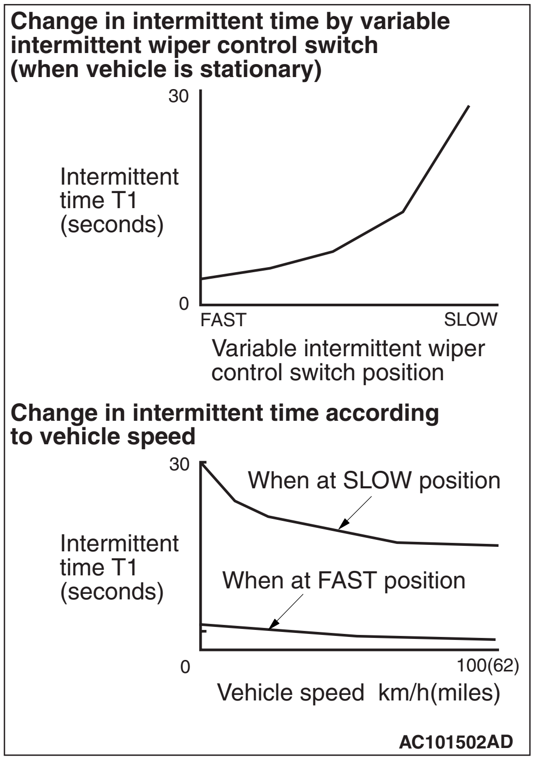
CONSTRUCTION DIAGRAM



- 2-speed (low/high speed) windshield wiper has been adopted.
- The intermittent wiper features a vehicle speed-dependent variable intermittent time system*.
- The mist wiper is turned ON by operating the mist switch in the opposite direction of the wiper switch for easy operation. The mist wiper is equipped with the function that quickly wipes raindrops away at high speed when the mist switch is ON, and when the mist switch is OFF, at low speed until the stop position is reached. When the mist switch is briefly turned ON, the wiper operates once at low speed.
- Wiper motor torque has been increased to improve the wiping performance while driving at high speed.
- Mist type 2-nozzle has been adpopted for the windshield washer.
- The mist type washer nozzle has been adopted. The washer fluid is injected to a large area, improving the wiping performance.
- Washer-linked wiper function* has been adopted. The washer fluid can be injected without operating the wiper. When the ignition switch is turned ON while the washer switch is ON, the washer motor operates but the wiper does not.

*NOTE: *: Using the customisation function, the vehicle speed-dependent variable intermittent time system and the washer-linked wiper function can be adjusted (Refer to P.51-10).*

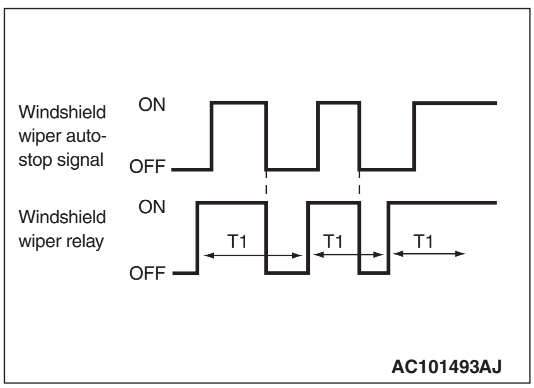
DESCRIPTION OF CONSTRUCTION AND OPERATION



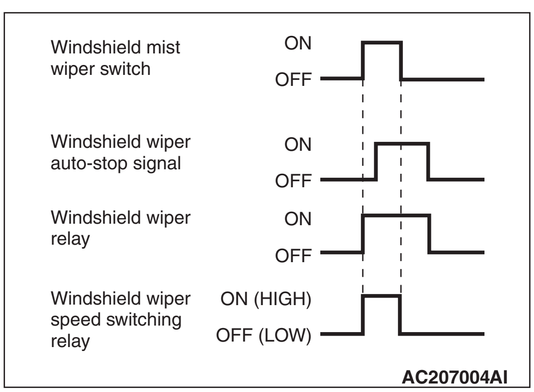
Intermittent control (Vehicle speed-dependent variable type) <Initial condition: with function>

1. ETACS calculates the windshield intermittent wiper interval T1 from the position of the windshield intermittent wiper switch on the column switch and the vehicle speed signal (sent from the combination meter to ETACS via CAN communication).

   NOTE: Using the customisation function, the vehicle speed-dependent intermittent function can be invalidated (Refer to P.51-10).



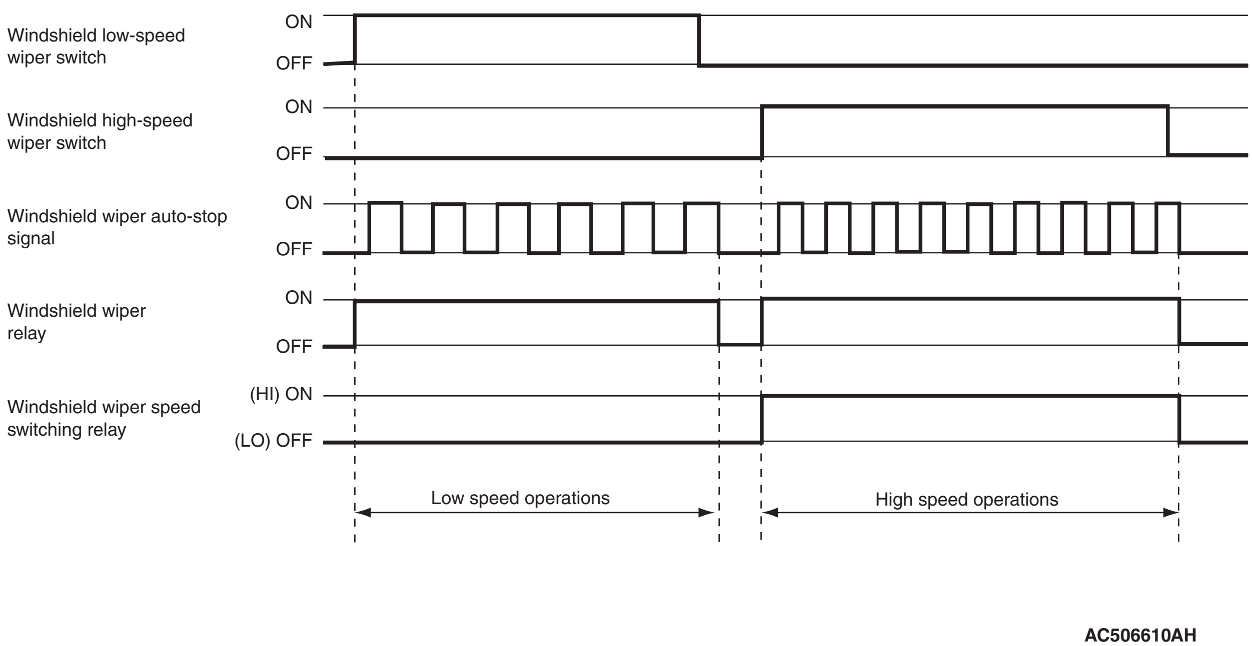
2. When ETACS receives the ON signal of the windshield intermittent wiper switch, it turns the windshield wiper relay ON. When the wiper reaches the stop position, the windshield wiper auto-stop signal turns OFF, and the windshield wiper relay turns OFF.
   When the intermittent time T1 calculated by step 1 has elapsed after the windshield wiper relay ON, the windshield wiper relay turns ON again, and the above-mentioned operation is repeated.



Mist wiper control

When the windshield wiper mist switch on the column switch is turned ON while the ignition switch is in ACC or ON position, the column switch turns the windshield wiper relay ON. At the same time, the wiper speed switching relay turns ON (HI). When the windshield mist wiper switch is ON, the windshield wiper operates at high speed.

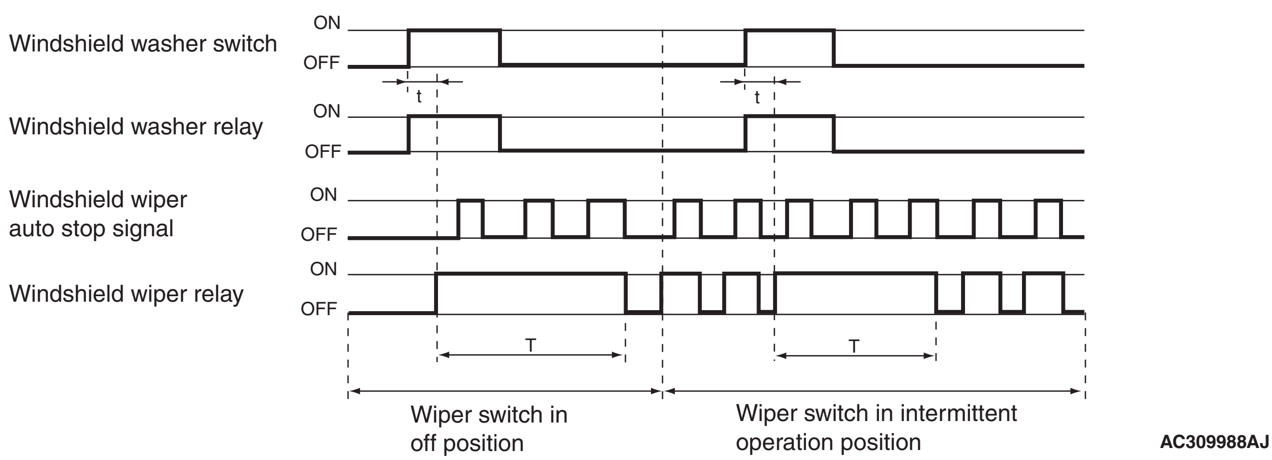
Low speed wiper and high speed wiper control



When the windshield low speed wiper switch on the column switch is turned ON while the ignition switch is in ACC or ON position, the column switch turns the windshield wiper relay ON. Also, the wiper speed switching relay turns OFF (LO), and the windshield wiper operates at low speed.

When the windshield high speed wiper switch is turned ON, the windshield wiper relay turns ON. Also, the wiper speed switching relay turns ON (HI), and the windshield wiper operates at high speed.

Windshield wiper linked with washer function <Initial condition: with function, with windshield washer check valve>



t: 0.3 second
T: Intermittent wiper intermittent time

Wiper switch	OFF position			Intermittent operation position				Low-speed or high-speed operation position
Washer switch ON time	0.3 second or less	0.3 to 0.5 second	0.5 second or more	0.2 second or less	0.2 to 0.4 second	0.4 to 0.6 second	0.6 second or more	-
Intermittent wiper time (T)	0 second	2 seconds	3 seconds	0 second	1 second	2 seconds	3 seconds	3 seconds

When the windshield washer switch on the column switch is turned ON while the ignition switch is in ACC or ON position, ETACS turns the windshield washer relay ON.
When the windshield washer switch is kept ON for 0.3 seconds or longer, the windshield wiper relay (the wiper relay output time varies depending on the conditions. For details, see the table.) is turned ON, and the windshield wiper operates at high speed. The windshield wiper is turned OFF with 3 seconds delay after the windshield washer switch is turned OFF.
Even when the windshield washer switch is turned ON while the windshield wiper is operating intermittently, the intermittent action starts again after the linked operation is finished.

If the ignition switch is turned to ACC position while the windshield washer switch is ON, the windshield washer relay turns ON, but the windshield wiper does not perform the linked operation. When the windshield washer switch is turned OFF and then ON, the windshield wiper starts the linked operation.

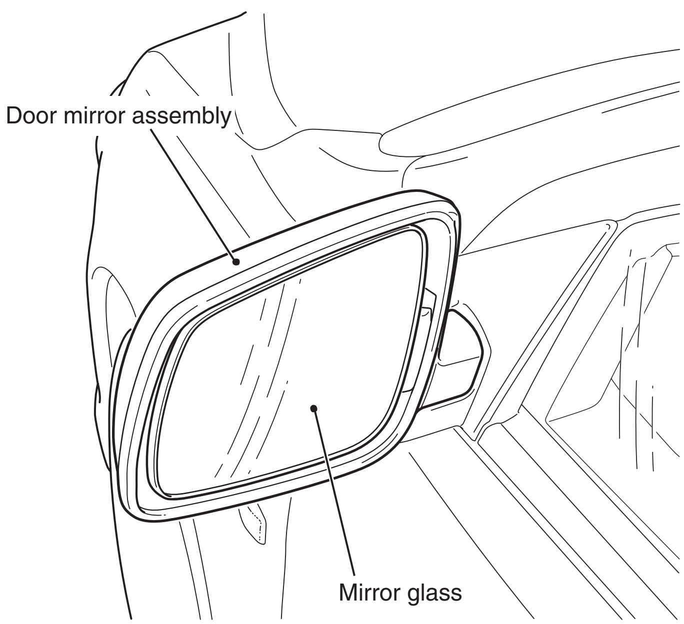
NOTE:

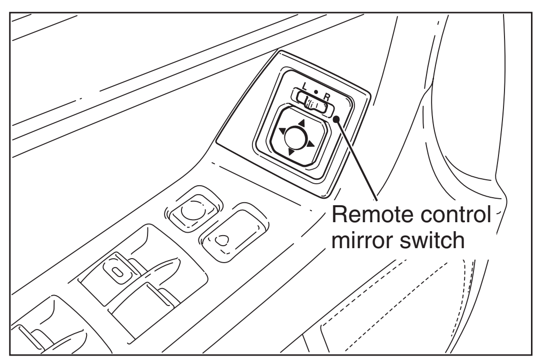
- *Using the customisation function, the washer linked windshield wiper function can be invalidated (Refer to P.51-10).*
- *Using the customisation function, when the washer linked windshield wiper function is invalidated, only the washer operates. It is useful to melt down the ices of the frozen windshield.*

DOOR MIRRORS

M2510008100336

CONSTRUCTION DIAGRAM





AC607910AC

The outside mirror (door mirror) is a folded type and has the following characteristics.

- Aerodynamic door mirror shape reduces wind noises, and the door glasses and mirrors do not easily get wet while driving in a rainy day.
- Electric remote-controlled door mirrors
- Heated door mirror (works with the defogger) <Vehicles for Canada>

CONFIGURATION FUNCTION

M2510001400091

Using the M.U.T.-III, the following functions can be programmed. The programmed information is held even when the battery is disconnected.

Adjustment item (M.U.T.-III display)	Adjustment item	Adjusting contents (M.U.T.-III display)	Adjusting contents
Front wiper operation	Adjustment of the intermittent windshield wiper operation	Normal INT	Intermittent wiper interval is fixed to 4 seconds.
		Variable INT	Intermittent wiper interval is calculated only by the wiper volume control.
		Speed sensitive	Intermittent wiper interval is calculated according to the intermittent wiper volume control and vehicle speed (default).
Front wiper washer	Disabling or enabling washer-linked wiper function	Only washer	No function
		Washer and wiper	With function (default)

GROUP 23

CONTINUOUSLY VARIABLE TRANSAXLE (CVT)

CONTENTS

CVT

GENERAL INFORMATION

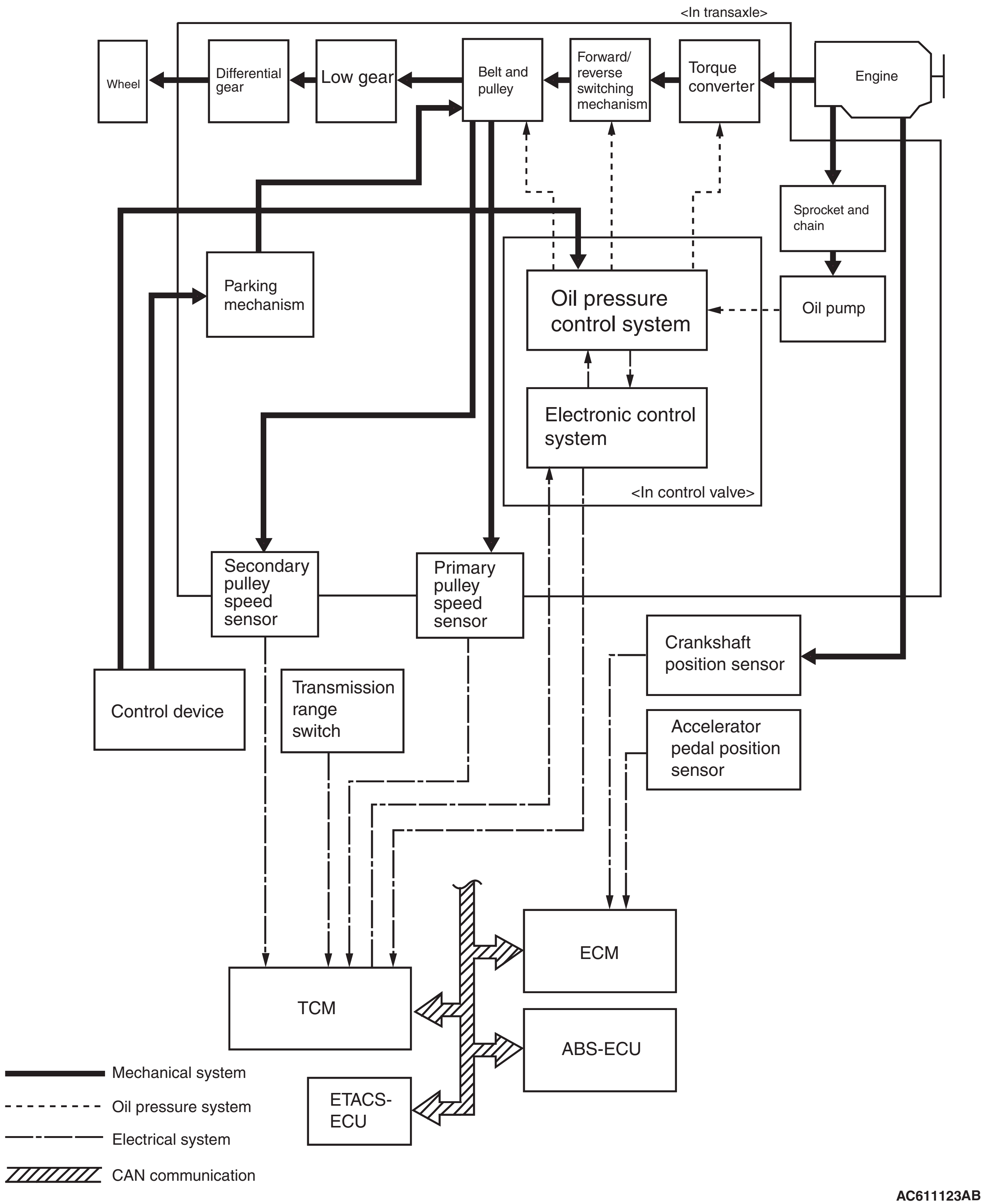
M2231000100132

The new CVT has been developed to achieve excellent fuel economy, further easy driving, and fun to drive. This CVT has achieved a quick and smooth acceleration feel suitable for LANCER, when the vehicle accelerates from any speeds. The CVT combines "torque converter" and "continuously variable transaxle mechanism by steel belt and pulley" to achieve "high driving performance" and "better fuel economy." Depending on the driving conditions, the comfortable pulley ratio is automatically and continuously selected from low to overdrive, ensuring driver-intended smooth driving without shift shocks due to acceleration pedal operation.

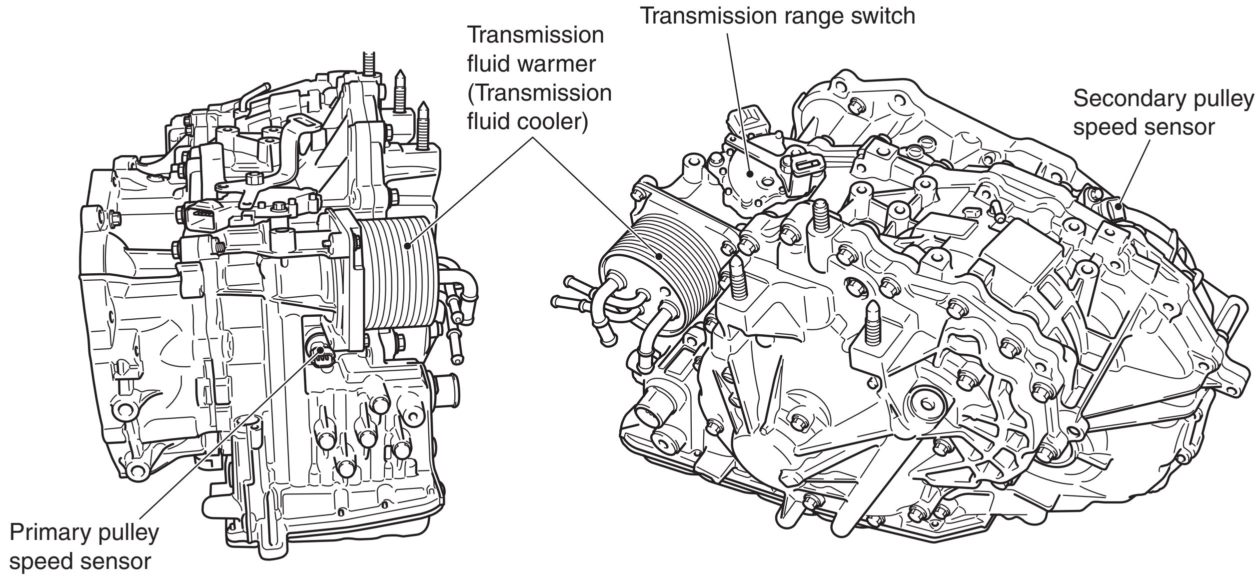
SPECIFICATIONS

Item		Standard value
Transaxle model		F1CJA
Torque converter	Model	3-element, 1-stage, 2-phase
	Stall torque ratio	1.99
	Lock-up	Present
Transaxle type		Forward automatic continuously variable (steel belt-driven), reverse 1 speed
Pulley ratio	Forward	2.349 –0.394
	Reverse	1.750
Shift position		P-R-N-D-L or P-R-N-D+6-speed sport mode (with paddle shift)
Final reduction gear ratio		6.120
Control type		Electronically-controlled
Function	Shift control	Present
	Line pressure control	Present
	Select control	Present
	Lock-up control	Present
	Self-diagnosis function	Present
	Fail-safe function	Present
Speedometer gear		–(detected by the ABS sensor rotor)
Oil pump	Model	Vane-type pump
	Drive type	Driven by the engine, sprocket, and chain
Transmission fluid	Brand name	DIA QUEEN CVTF-J1
	Capacity dm3 (qt)	Approximately 7.8 (8.2)

SYSTEM CONFIGURATION



OVERVIEW



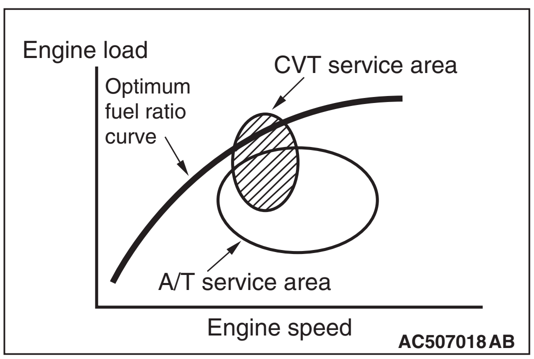
AC610077AB

PRINCIPLE OF IMPROVEMENTS IN FUEL ECONOMY AND PERFORMANCE WITH CVT

M2231001000031

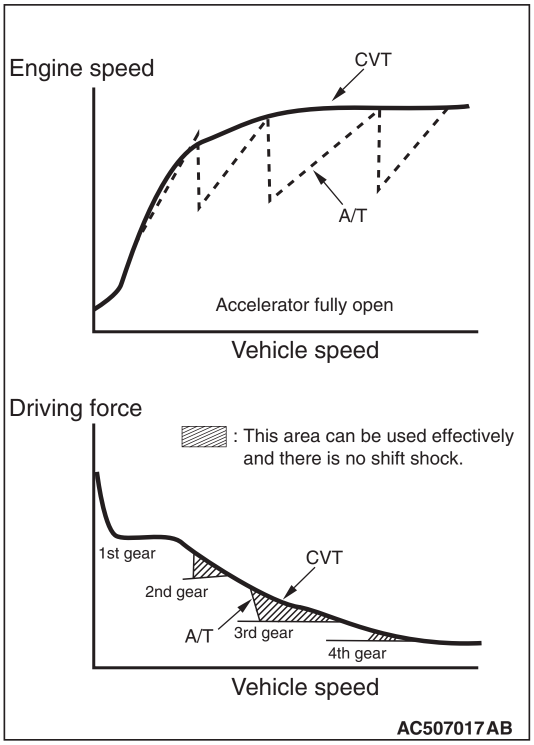
The general concept of CVT is described as follows:

PRINCIPLE OF IMPROVEMENTS IN FUEL ECONOMY



CVT can continuously vary the pulley ratio, so the vehicle can be driven in the high engine fuel efficiency range all the time, resulting in excellent fuel economy.

PRINCIPLE OF IMPROVEMENTS IN POWER PERFORMANCE

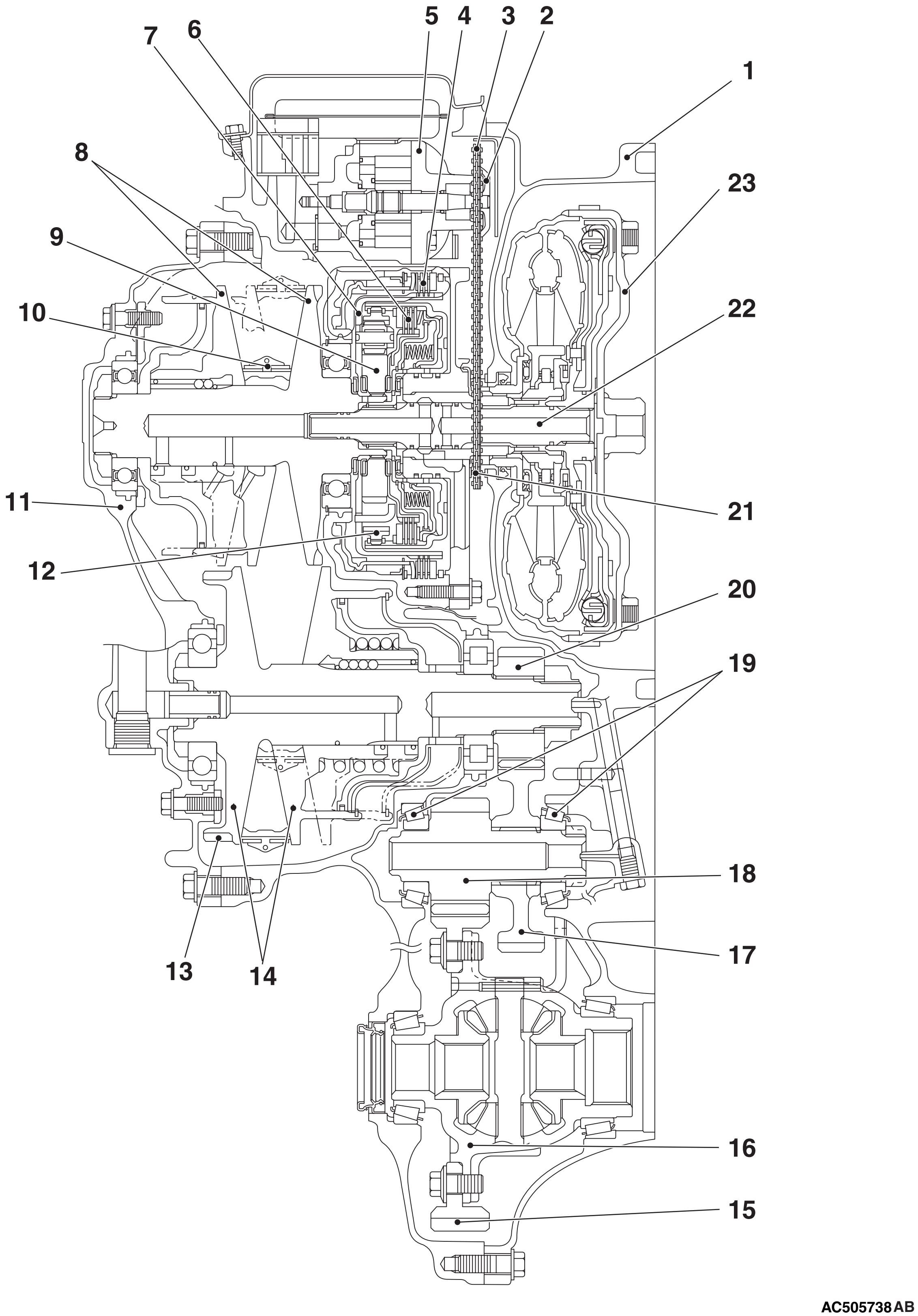


The figure shows the maximum driving force diagram representing the power performance. The comparison with A/T shows that when the throttle is fully open, A/T causes a step change in driving force due to a step shift, but CVT changes driving force smoothly because it can accelerate with the engine kept in the high output range. Therefore, CVT provides more smooth and shockless driving without driving loss as much as the shaded area in the figure shown.

DESCRIPTION OF STRUCTURE AND OPERATION

SECTIONAL VIEW

M2231000400014



1. Converter housing
2. Driven sprocket
3. Chain
4. Reverse brake
5. Oil pump
6. Forward clutch

7. Planet carrier
8. Primary pulley
9. Sun gear
10. Steel belt
11. Side cover
12. Internal gear
13. Parking gear
14. Secondary pulley
15. Final gear
16. Differential case
17. Idler gear
18. Reduction gear
19. Taper roller bearing
20. Output gear
21. Drive sprocket
22. Input shaft
23. Torque converter

TORQUE CONVERTER

M2231000200010

The torque converter with the "3-element, 1-stage, 2-phase" lock-up mechanism has been adopted.

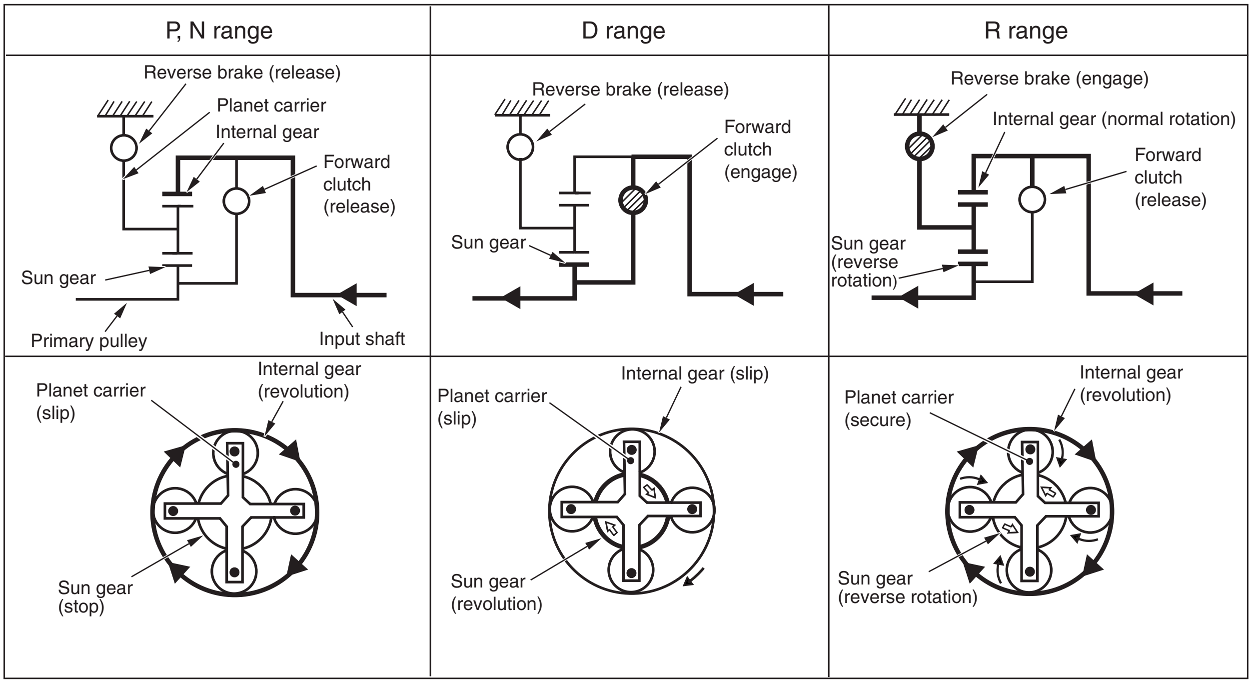
OIL PUMP

M2231000500011

The vane-type oil pump driven by the engine via the oil pump drive chain has been adopted to increase efficiency of the pump discharge amount at low engine speed and optimise the pump discharge amount at high engine speed. The oil discharged from the oil pump flows to the control valve, and is used as operating fluid for the primary and secondary pulleys, operating fluid for the clutch, and lubricant for each part.

FORWARD/REVERSE SWITCHING MECHANISM

M2231000600018

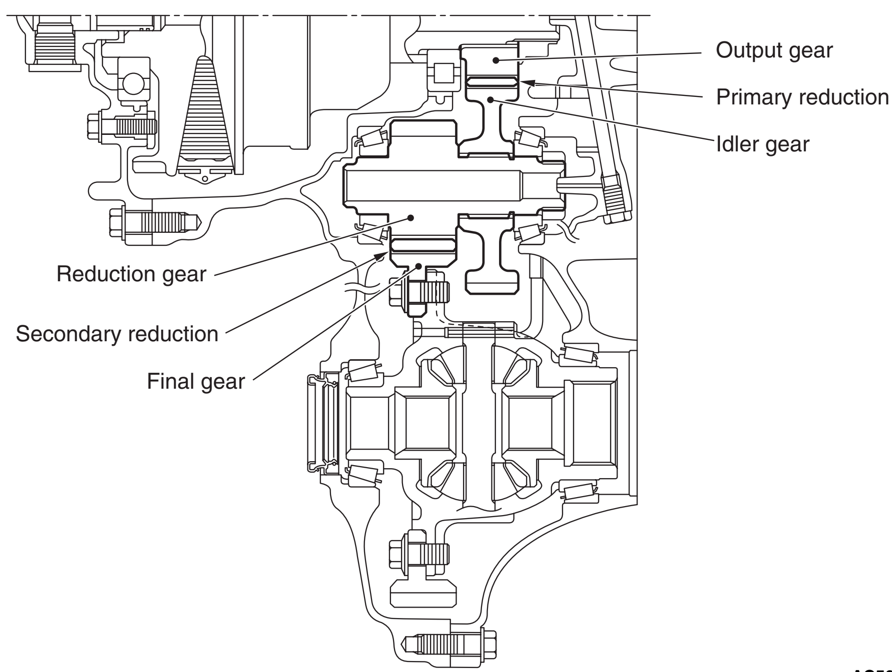


AC504691AB

- The planetary gear type forward/reverse switching mechanism has been installed between the torque converter and primary pulley.
- The power is input from the torque converter via the input shaft and hydraulically activates the wet multi-disc device to switch between forward and reverse gears.

FINAL DRIVE AND DIFFERENTIAL

M2231000700015

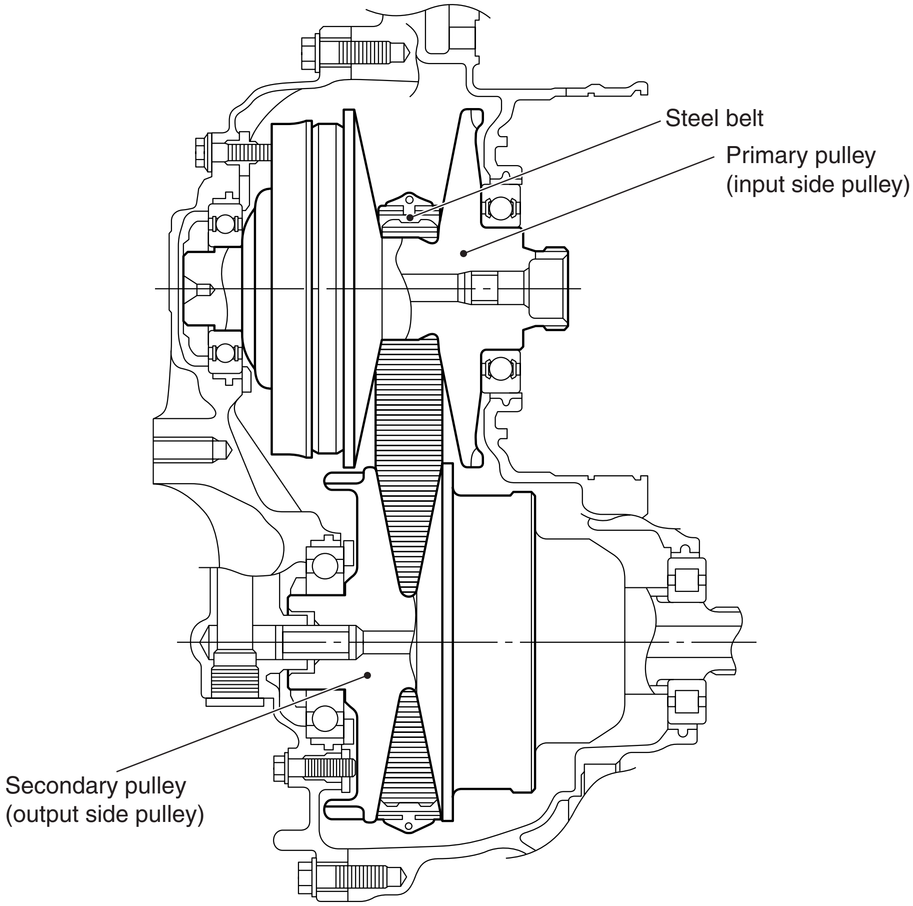


AC506402 AB

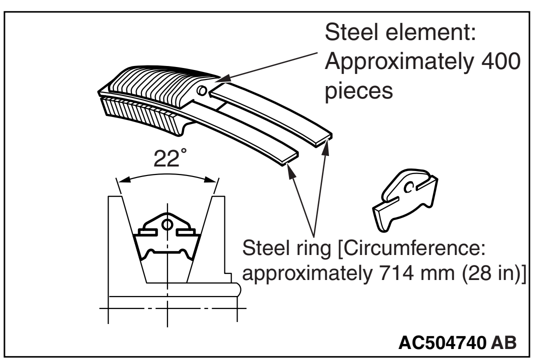
- The reduction gear is a 2-stage composition, the primary reduction (a pair of the output gear and idler gear) and secondary reduction (a pair of the reduction gear and final gear). All the gears are helical.
- The transmission fluid (Mitsubishi genuine Dia-Queen CVTF-J1) which lubricates the entire transaxle is also used as lubricant.

PULLEY AND STEEL BELT

M2231000800012



This unit is comprised of a pair of pulleys of which groove width can be changed freely in the axial direction, and a steel belt made of a continuous series of steel elements guided by multilayer steel rings on the both sides. This groove width is hydraulically controlled by the primary and secondary pulleys, varying continuously from the low status (pulley ratio: 2.349) to the overdrive status (pulley ratio: 0.394) depending on the winding radius of the steel belt on the pulley.

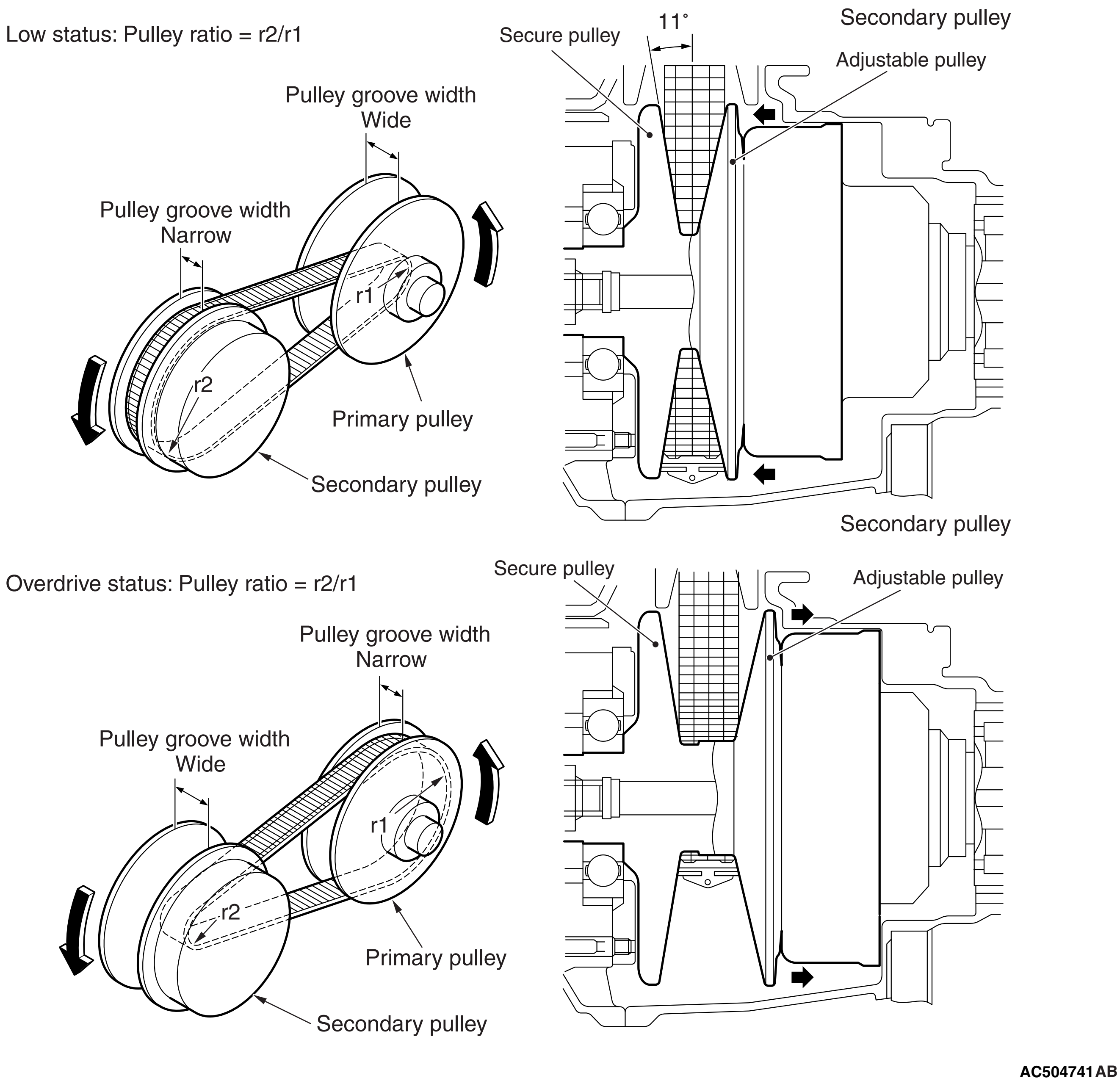


STEEL BELT

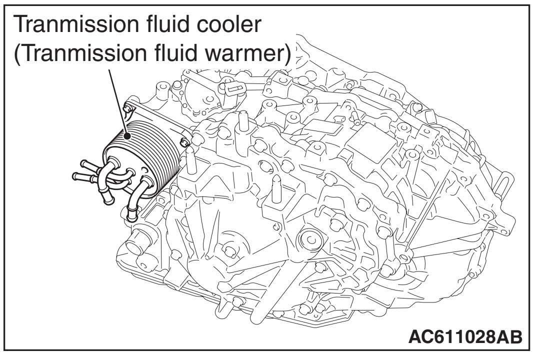
This is composed of approximately 400 steel elements and two 12-layer steel rings. The steel belt has the following features. Other belts such as a rubber belt transfer driving force by their pulling effect. On the other hand, the steel belt transfers driving force by compression effect of the steel elements. The steel elements require a friction force with the pulley slope to transfer driving force. The mechanism is as follows:

The secondary pulley hydraulically activates to pinch the elements. → The elements are pressed outwards to expand. → The steel rings hold out against the force. →Tension is generated at the steel rings. →The elements on the primary pulley side are pinched between the pulleys. →Friction force is generated between the steel belt and pulley. This means that the steel elements which transfer the driving force by compression and the steel rings which maintain the required friction force share the roles. Then, the tension of the steel rings is distributed over the entire unit with little stress variation, resulting in excellent durability.

PULLEY



The primary and secondary pulleys are both comprised of the fixed pulley with 11-degree slope and movable pulley. Each has a hydraulic chamber (the primary or secondary chamber) behind the movable pulley. The movable pulley can slide along the axis with a ball spline to change the groove width of the pulley. The groove width of the pulley is controlled by changing the operating pressure at the primary and secondary pulleys using the engine load (accelerator angle), primary pulley speed, and secondary pulley speed (vehicle speed) as input signals.



TRANSMISSION FLUID WARMER (TRANSMISSION FLUID COOLER)

M2231000900019

The water-cooled transmission fluid warmer (transmission fluid cooler) has been adopted. The transmission fluid warmer (transmission fluid cooler) has been installed directly to the front of the transaxle to shorten the fluid passage.
The transmission fluid warmer (transmission fluid cooler) warms the transmission fluid up to an optimum temperature [70 –80° C (158 –176° F)] quickly for transaxle performance right after engine start. Once the transmission fluid has reached the optimum temperature, the warmer starts cooling down the fluid to stabilize the temperature.

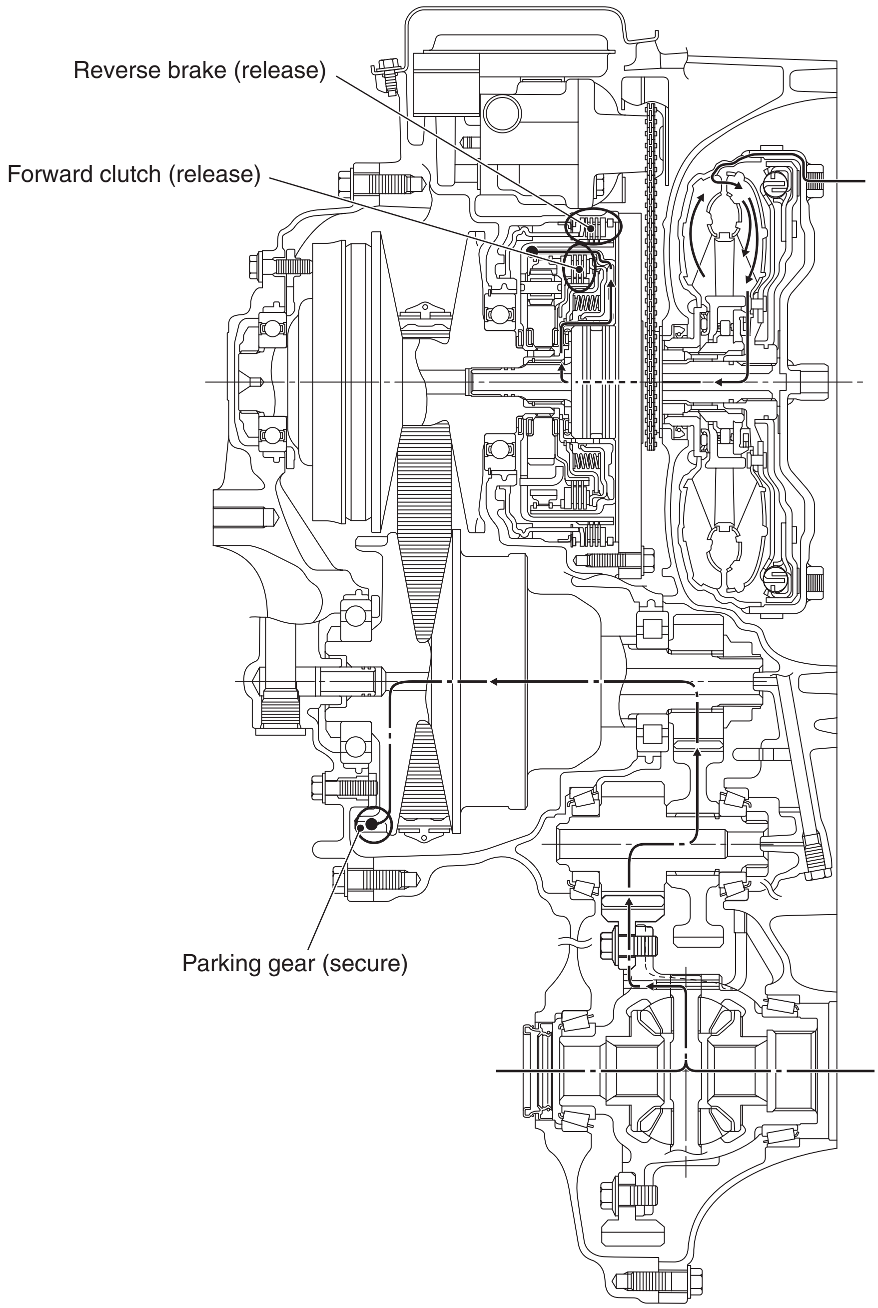
TRANSMISSION FLUID FILTER

The transmission fluid filter integrated in the transaxle assembly has been adopted. Any impurity in the transmission fluid has been removed to increase operational reliability of the transaxle assembly.

POWER FLOW

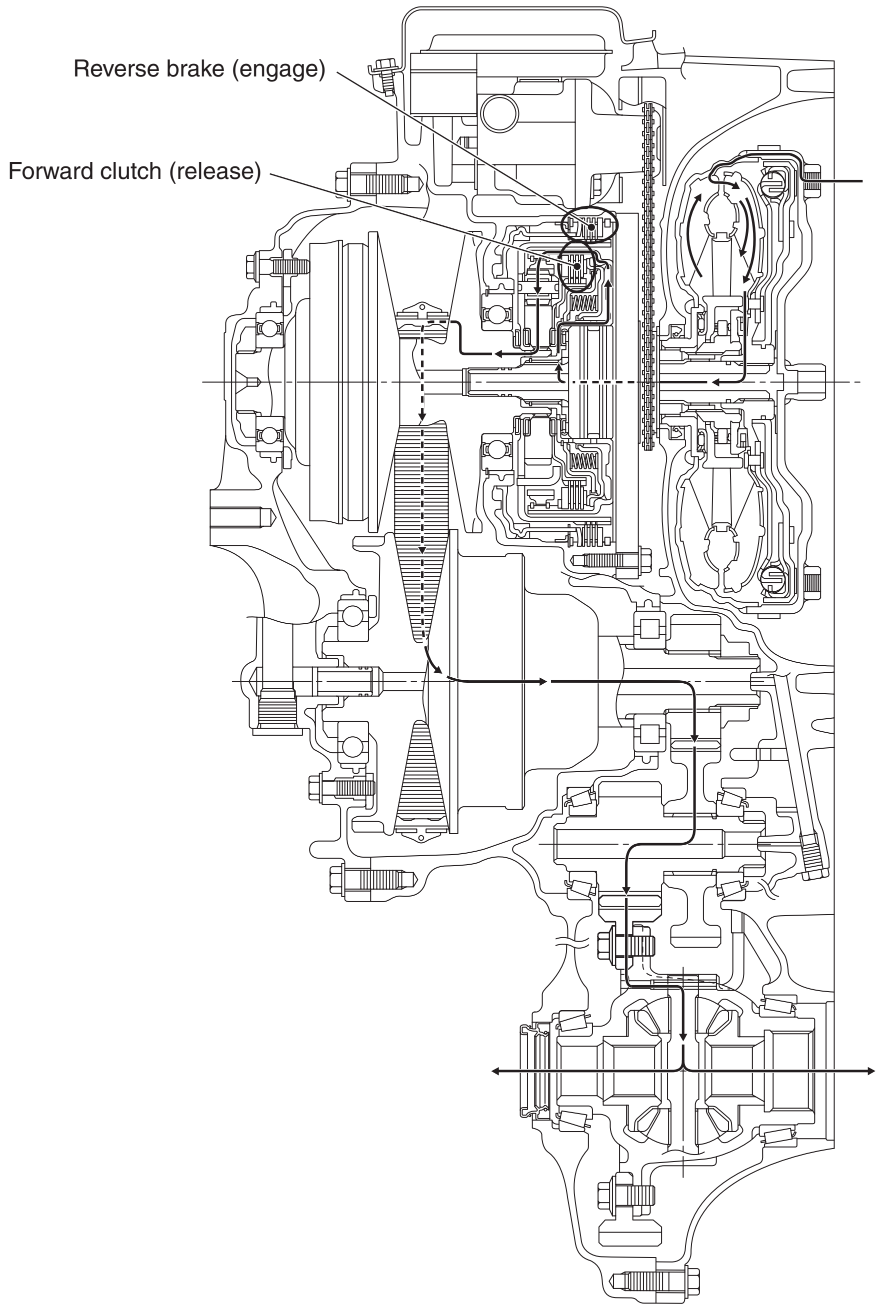
M2231001100016

P RANGE



- The driving force from the engine is not transferred to the primary pulley because the forward clutch and reverse brake are released.
- The torque from the tires is not transferred to the components upstream of the secondary pulley because the parking gear is fixed.

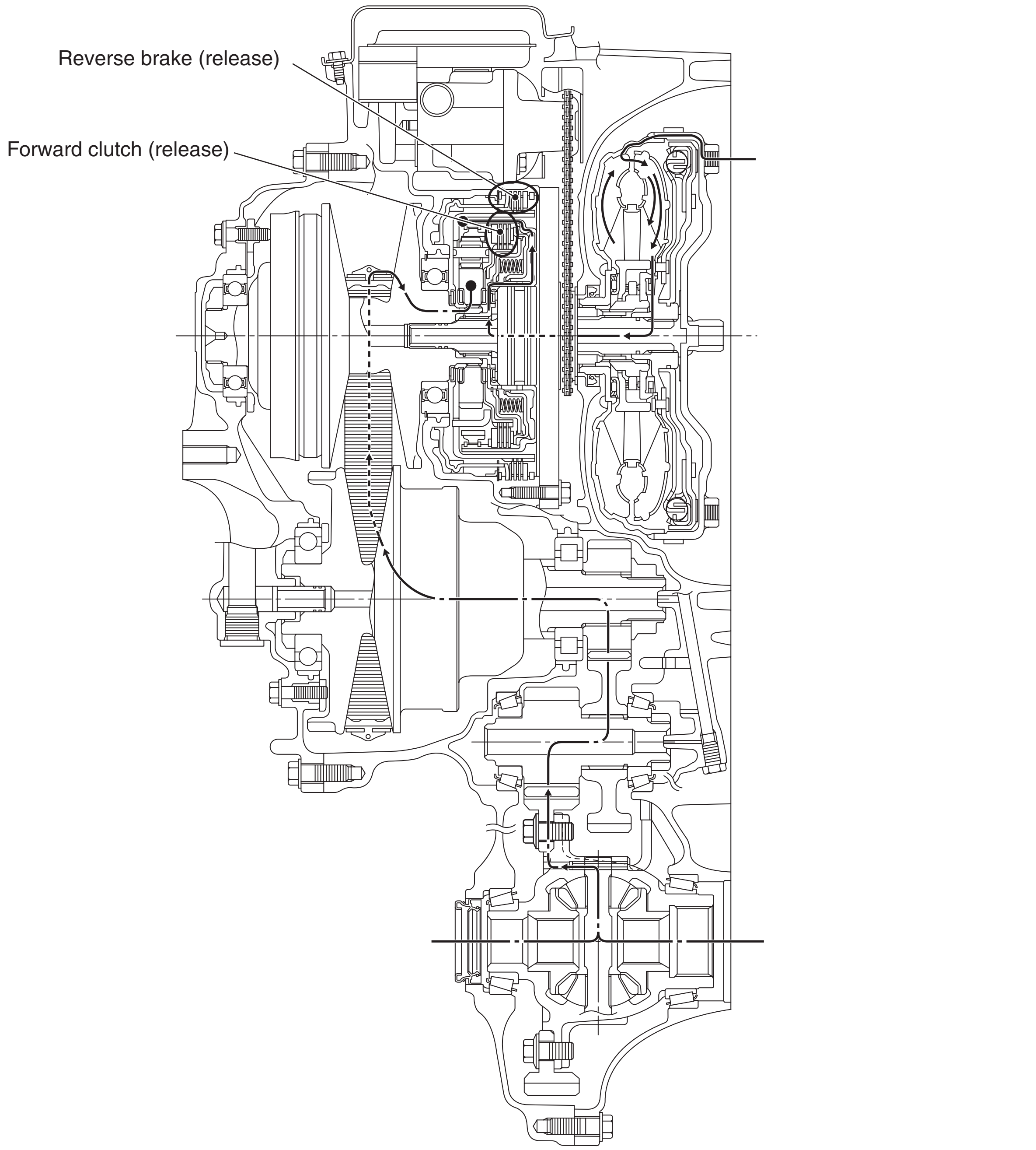
R RANGE



AC507026 AB

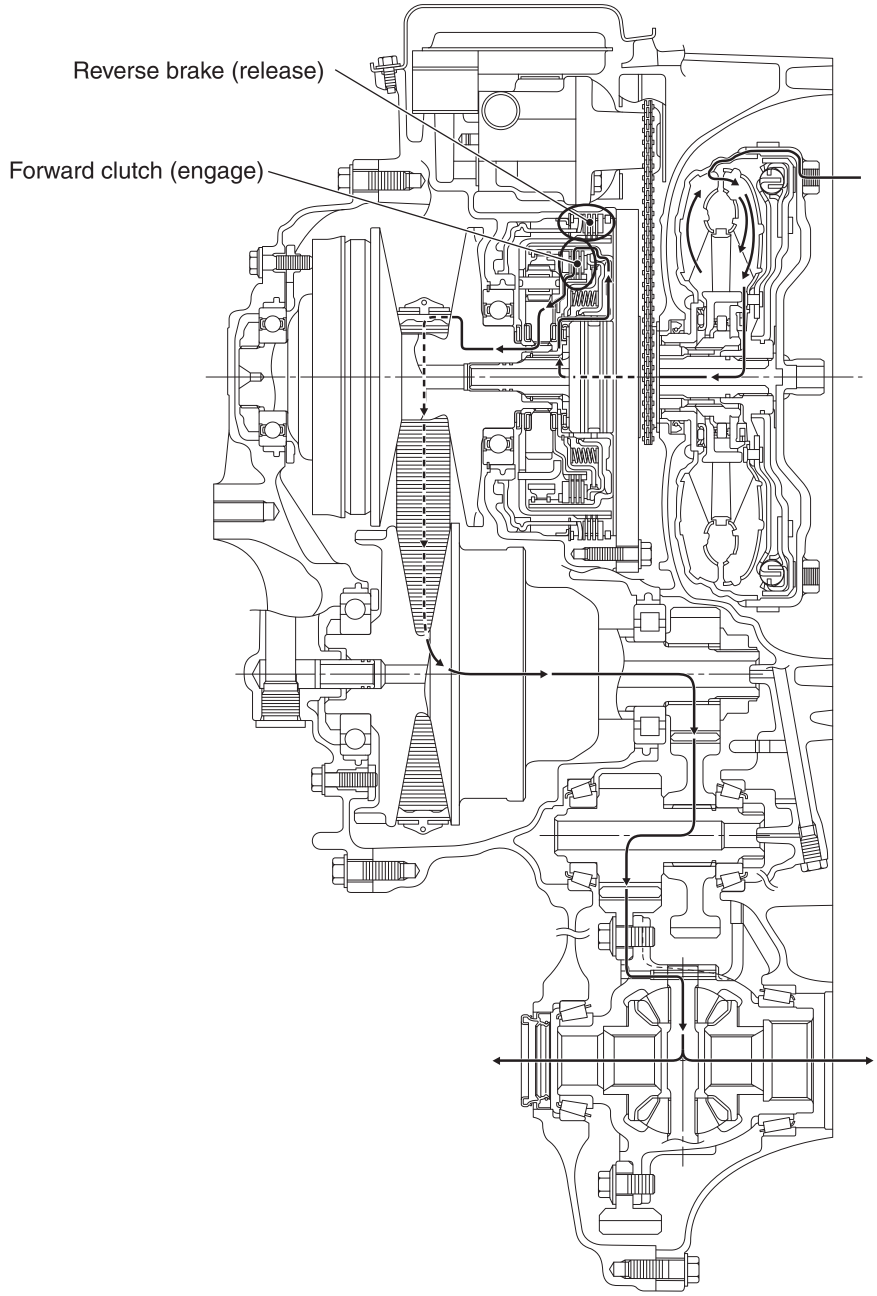
- The driving force from the engine rotates the sun gear in the reverse direction because the reverse brake is engaged and the planet carrier is fixed.
- For this reason, the primary pulley rotates in the reverse direction, thus the driving force is output in the reversed state.

N RANGE



- The driving force from the engine is not transferred to the primary pulley because the forward clutch and reverse brake are released.
- The torque from the tires is not transferred because the forward clutch and reverse brake are released, thus the planet carrier rotates independently.

D RANGE



- The driving force from the engine rotates the sun gear in the normal direction via the forward clutch because the forward clutch is engaged.
- For this reason, the primary pulley rotates in the normal direction, thus the driving force is output in the normal state.

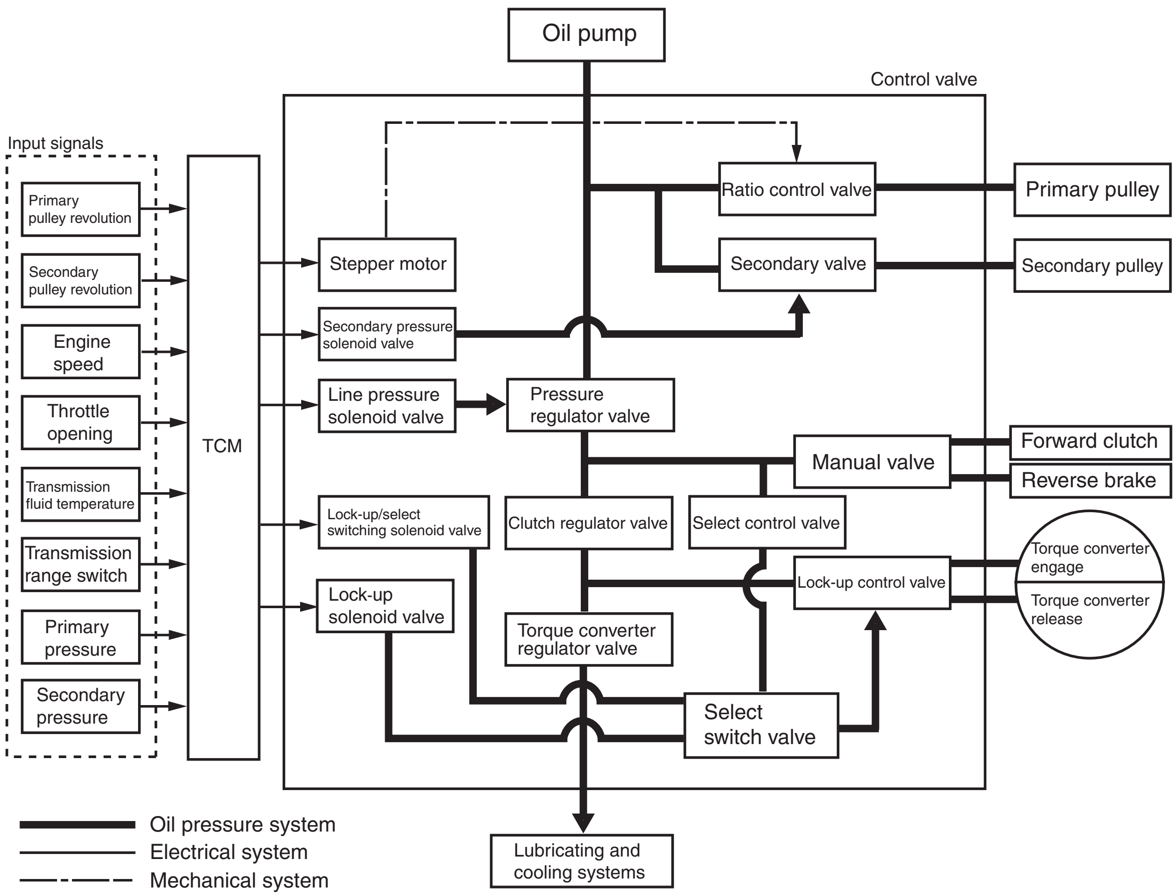
OIL PRESSURE CONTROL SYSTEM

CONTROL DESCRIPTION

M2231005000033

HYDRAULIC CONTROL

The hydraulic control mechanism is comprised of the vane-type oil pump driven by the engine via the oil pump drive chain, the hydraulic control valve which controls the line pressure and shift change, and the input signal system.



AC504662 AB

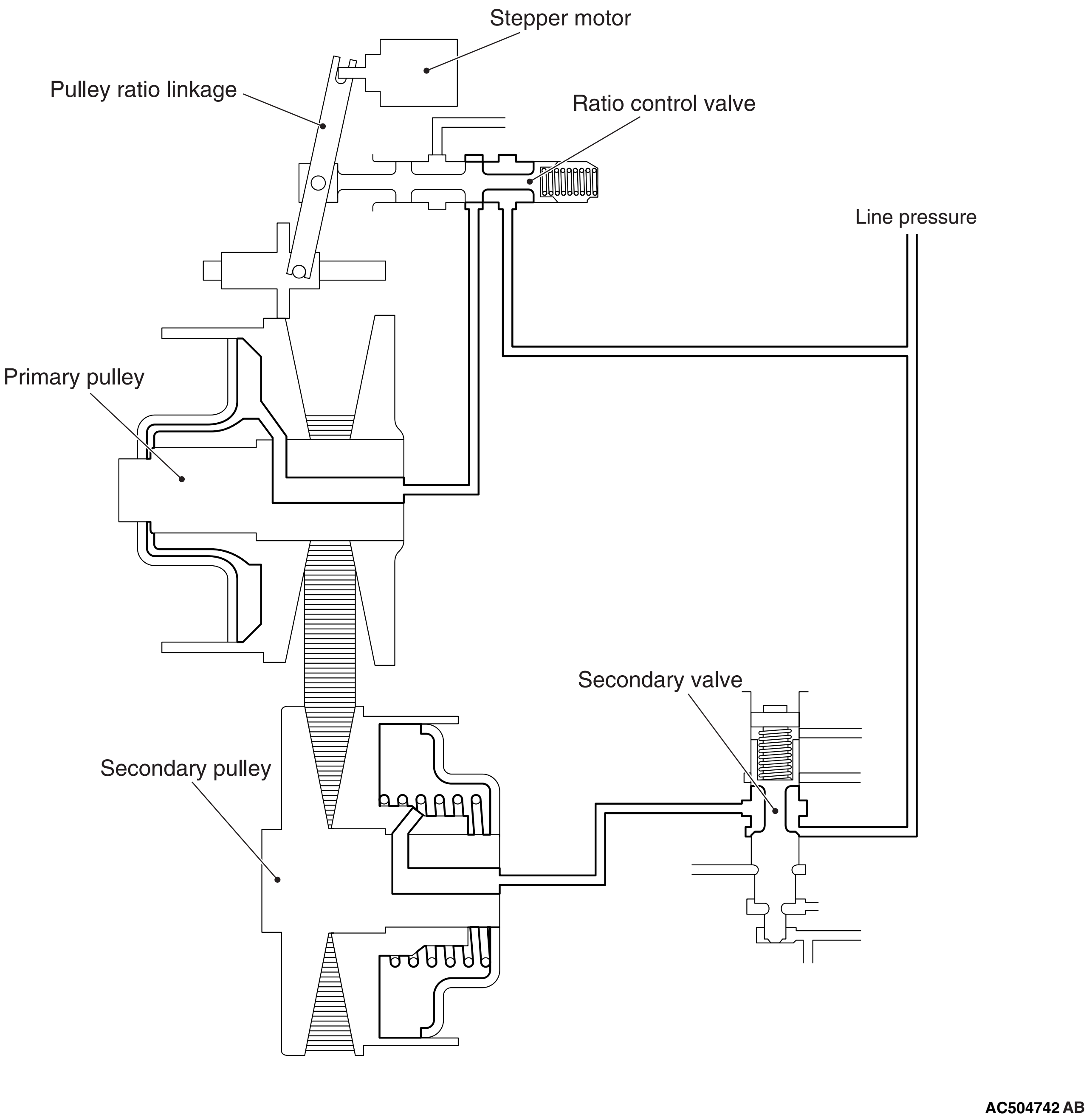
GENERAL INFORMATION REGARDING THE MAIN COMPONENTS

<table>
<tr><th>Component</th><th>Function</th></tr>
<tr><td>Manual valve</td><td>Distributes the clutch operating pressure to each circuit, depending on each shift position.</td></tr>
<tr><td>Torque converter regulator valve</td><td>Regulates the supply pressure to the torque converter to optimal pressure for the driving conditions.</td></tr>
<tr><td>Clutch regulator valve</td><td>Regulates the clutch operating pressure depending on the driving conditions.</td></tr>
<tr><td>Pressure regulator valve</td><td>Regulates the discharge pressure from the oil pump to optimal pressure (line pressure) for the driving conditions.</td></tr>
<tr><td>Ratio control valve</td><td>Controls in/out flow of line pressure to/from the primary pulley depending on the stroke difference between the stepper motor and primary pulley.</td></tr>
<tr><td>Lock-up/select switching solenoid valve</td><td rowspan="2">Controls switching of lock-up solenoid valve control pressure between when lock-up engagement/disengagement is performed and when forward/reverse clutch (forward clutch and reverse brake) engagement/disengagement is performed.</td></tr>
<tr><td>Select switch valve</td></tr>
<tr><td>Line pressure solenoid valve</td><td>Controls the pressure regulator valve.</td></tr>
<tr><td>Lock-up solenoid valve</td><td>Controls the lock-up control valve.</td></tr>
<tr><td>Lock-up/select switching solenoid valve</td><td>Controls the select switch valve.</td></tr>
<tr><td>Stepper motor</td><td>Controls the pulley ratio.</td></tr>
<tr><td>Secondary valve</td><td>Reduces the line pressure to regulate the secondary pressure.</td></tr>
<tr><td>Select control valve</td><td>Engages when select. Regulates the forward clutch pressure and reverse brake pressure.</td></tr>
<tr><td>Lock-up control valve</td><td>Regulates the engagement pressure and disengagement pressure of the torque converter.</td></tr>
<tr><td>Secondary pressure solenoid valve</td><td>Controls in/out flow of the line pressure to/from the secondary pulley depending on the driving conditions.</td></tr>
</table>

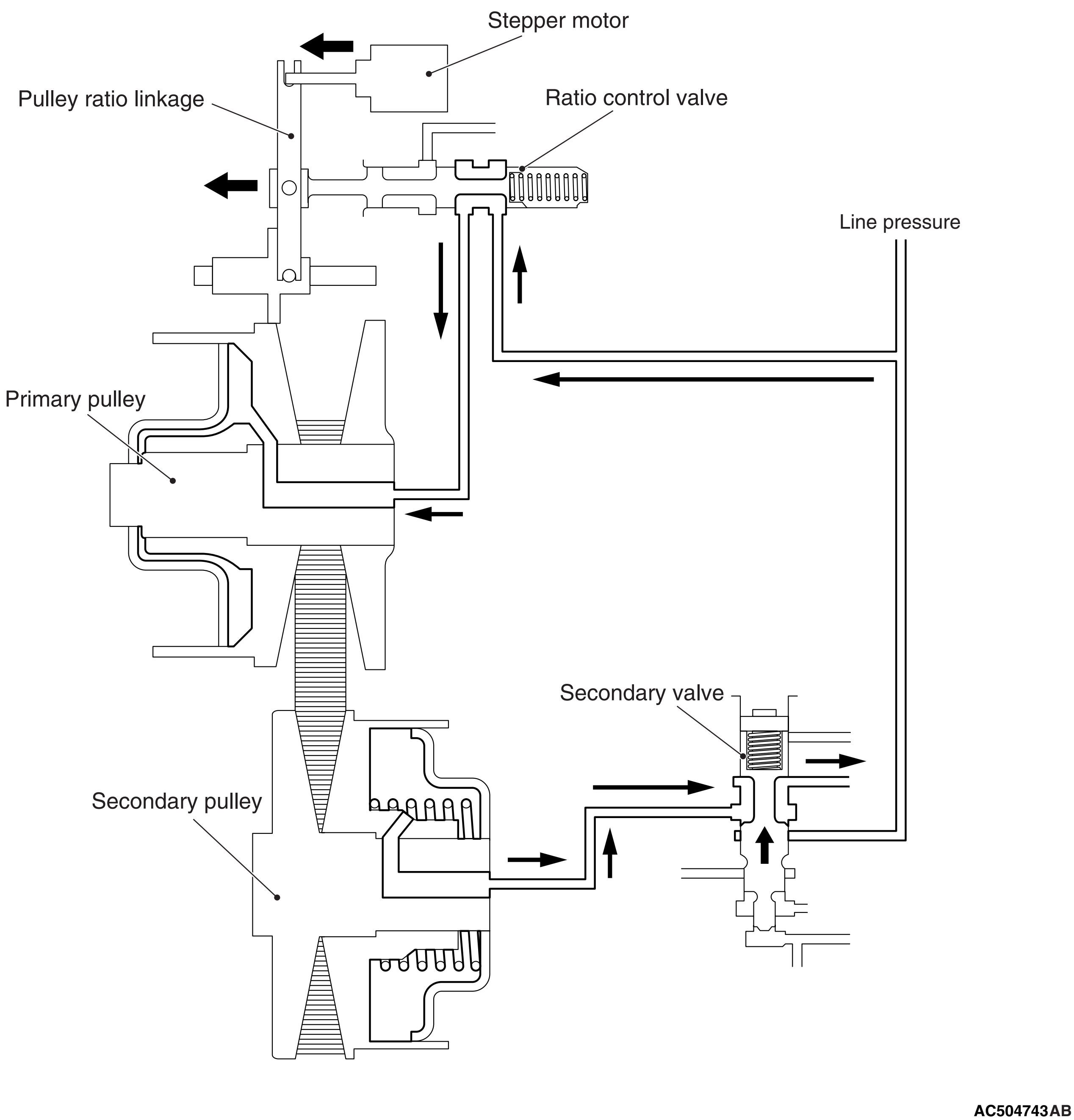
SHIFT MECHANISM

M2231001200013

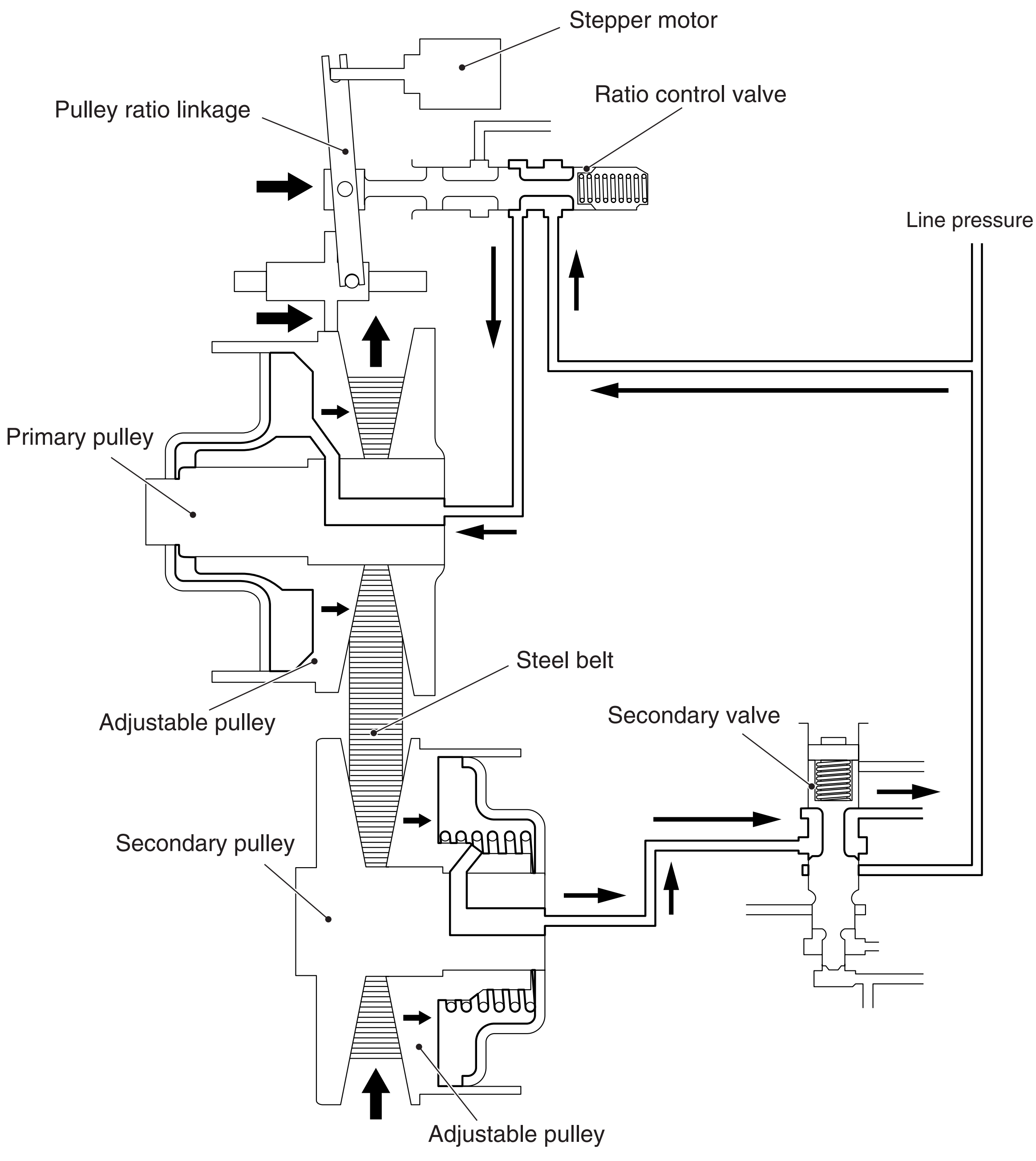
SHIFTING FROM LOW TO HIGH



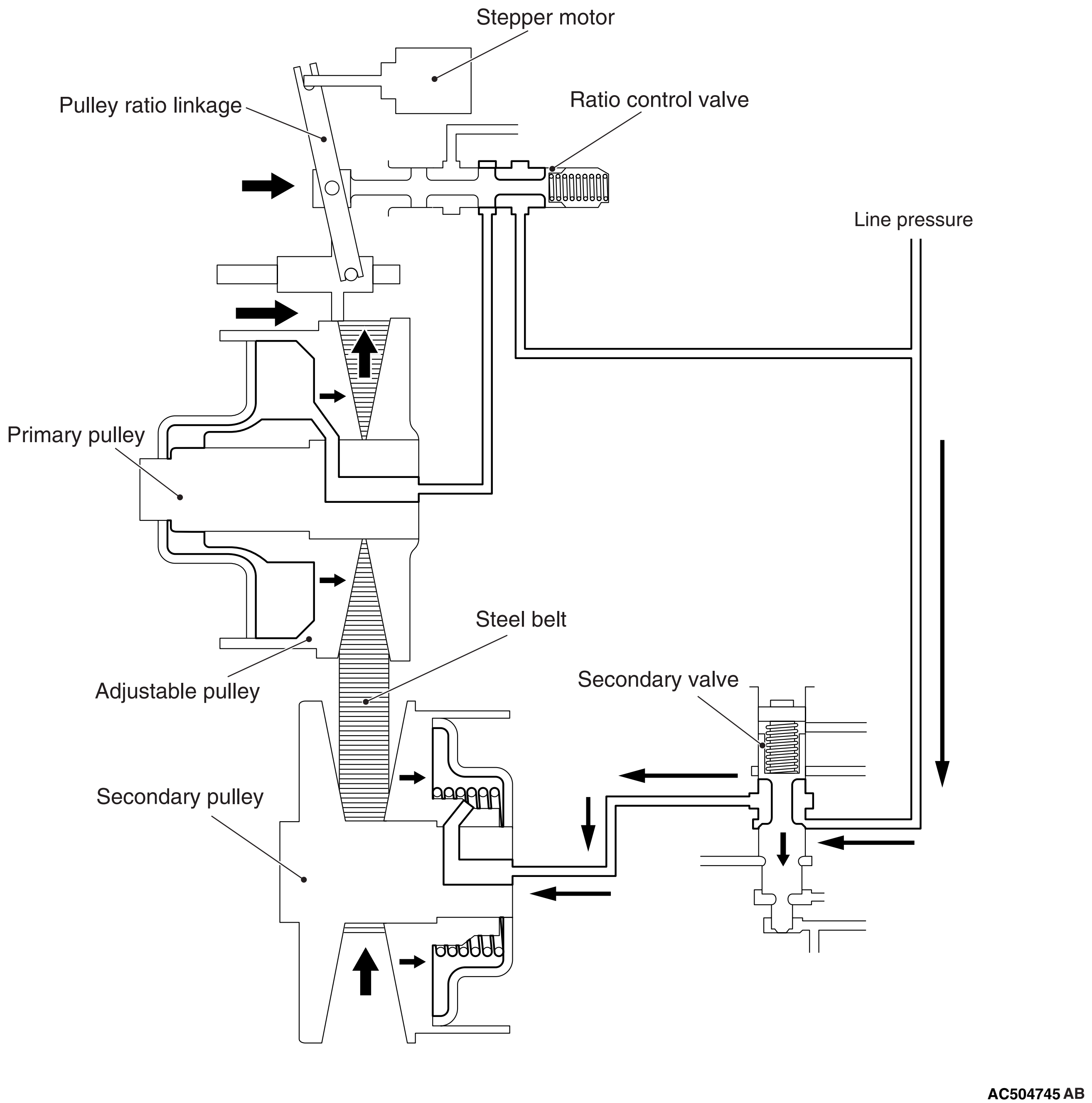
- No line pressure is applied to the primary pulley because the line pressure circuit is closed by the ratio control valve.
- The line pressure is applied to the secondary pulley because the secondary valve has moved downwards.



- The pulley ratio linkage moves to the left by the stepper motor. This moves the ratio control valve linked to the pulley ratio linkage to open the line pressure circuit, and then the line pressure is applied to the primary pulley.
- The secondary valve moves upwards to drain the fluid in the secondary pulley.

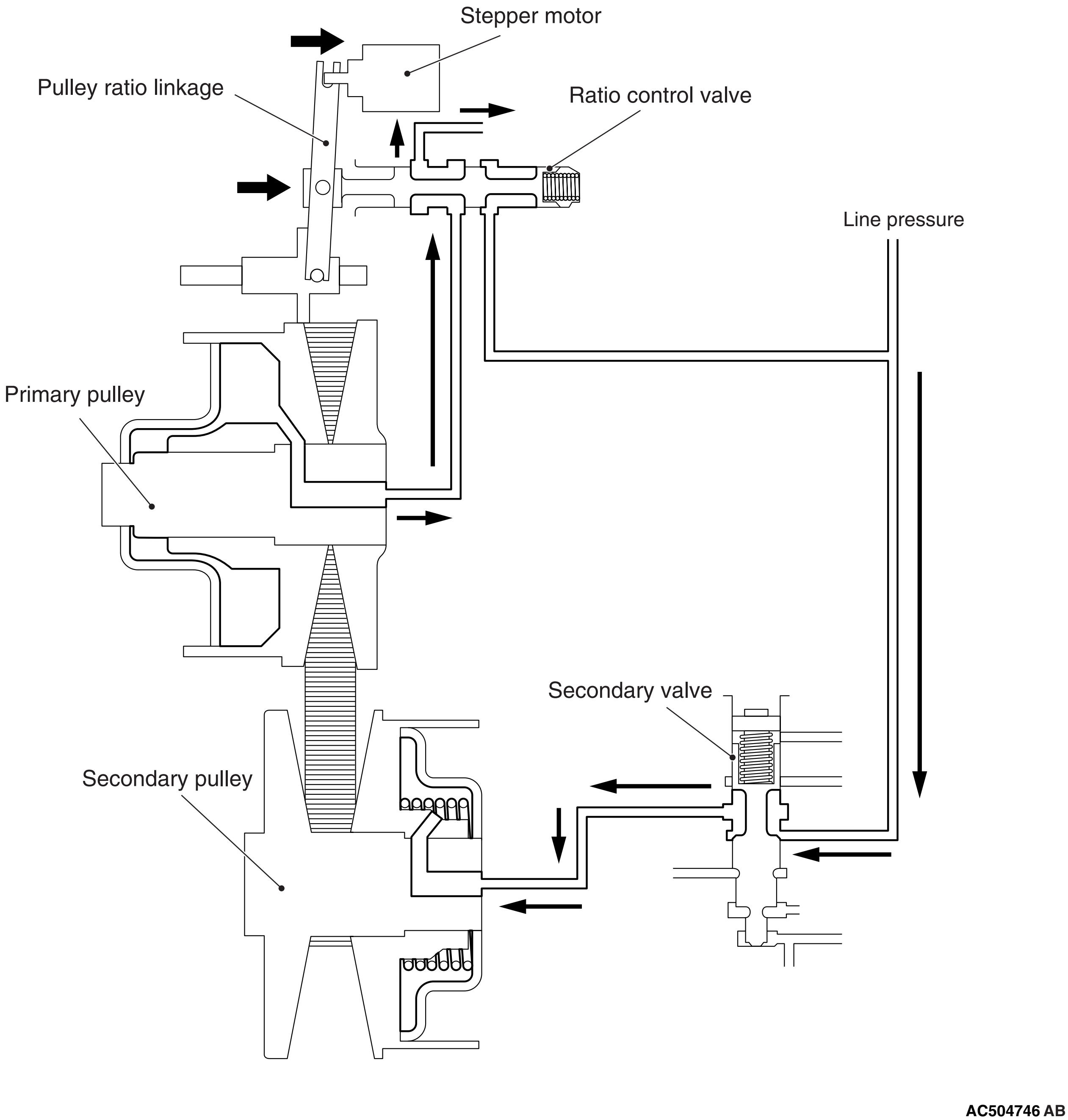


- The line pressure applied to the primary pulley moves the movable pulley to the right, pressing the steel belt outwards to expand.
- When the movable pulley of the primary pulley moves to the right, the ratio control valve starts moving to the right via the pulley ratio linkage linked to the movable pulley.
- The steel belt is pulled toward the primary pulley side to move the movable pulley of the secondary pulley to the right.

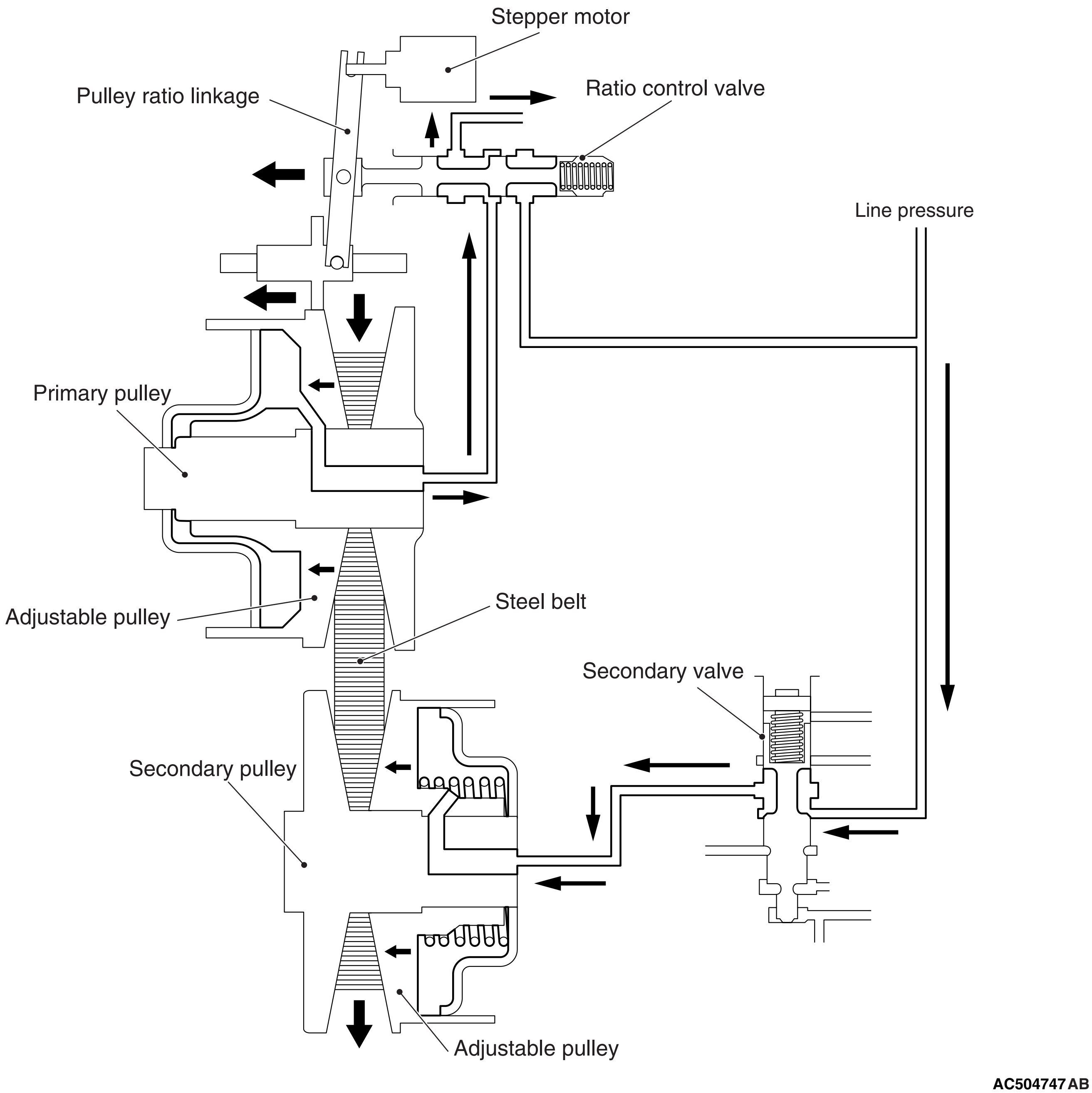


- When the movable pulley of the secondary pulley moves to the right, the ratio control valve also moves to the right to close the line pressure circuit. This completes the shift change process.
- The secondary valve moves downwards to apply the line pressure to the secondary pulley, clamping the steel belt.

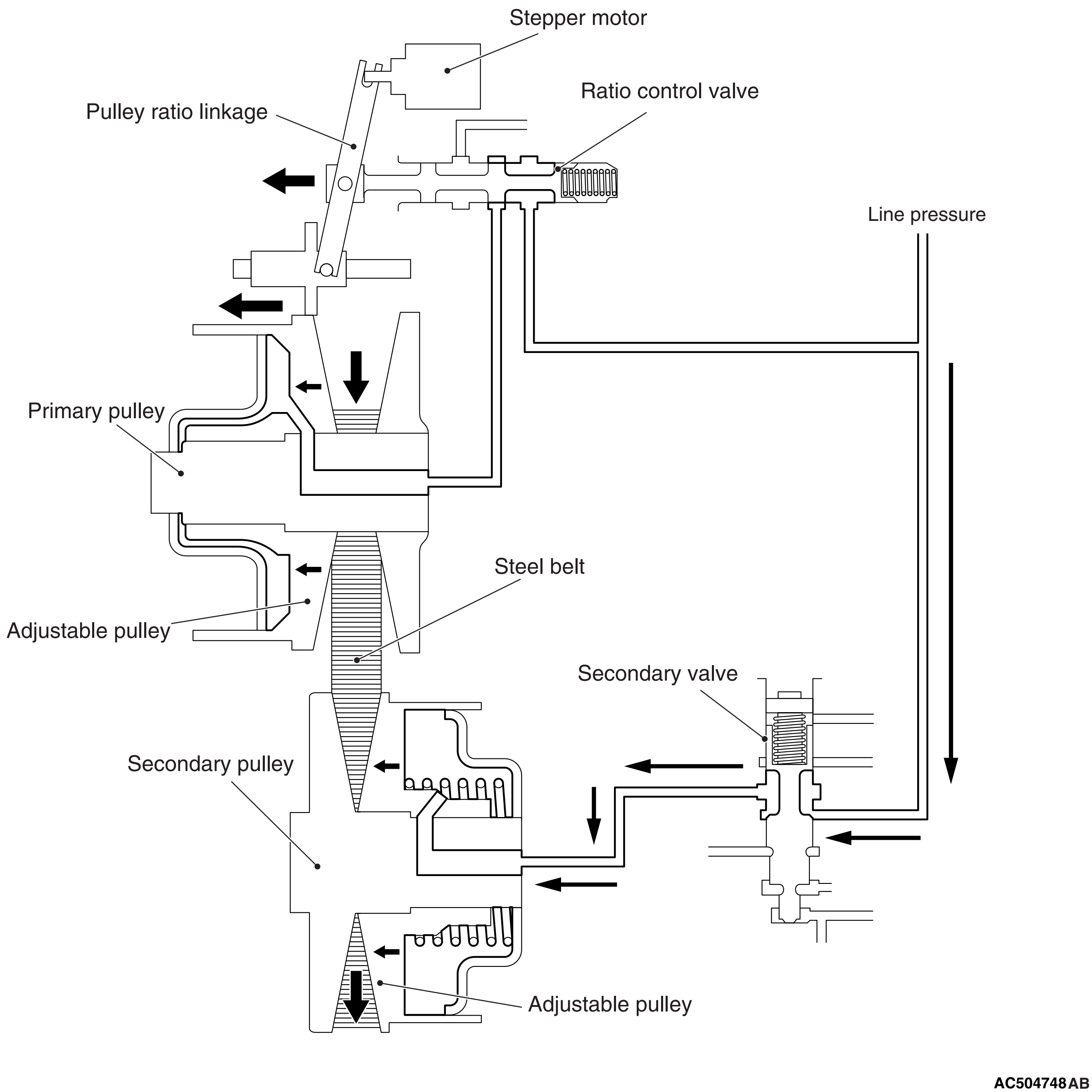
SHIFTING FROM HIGH TO LOW



- The pulley ratio linkage moves to the right by the stepper motor. This moves the ratio control valve linked to the pulley ratio linkage to drain the fluid in the primary pulley.
- The line pressure is applied to the secondary pulley because the secondary valve has moved downwards.



- The line pressure applied to the secondary pulley moves the movable pulley to the left, pressing the steel belt outwards to expand.
- The steel belt is pulled toward the secondary pulley side to move the movable pulley of the primary pulley to the left.
- When the movable pulley of the primary pulley moves to the left, the ratio control valve starts moving to the left via the pulley ratio linkage linked to the movable pulley.



- When the movable pulley of the secondary pulley moves to the left to press the steel belt outwards to expand, the movable pulley of the primary pulley moves further to the left accordingly.
- When the movable pulley of the primary pulley moves to the left, the ratio control valve also moves to the left to close the drain circuit. This completes the shift change process.

ELECTRONIC CONTROL SYSTEM

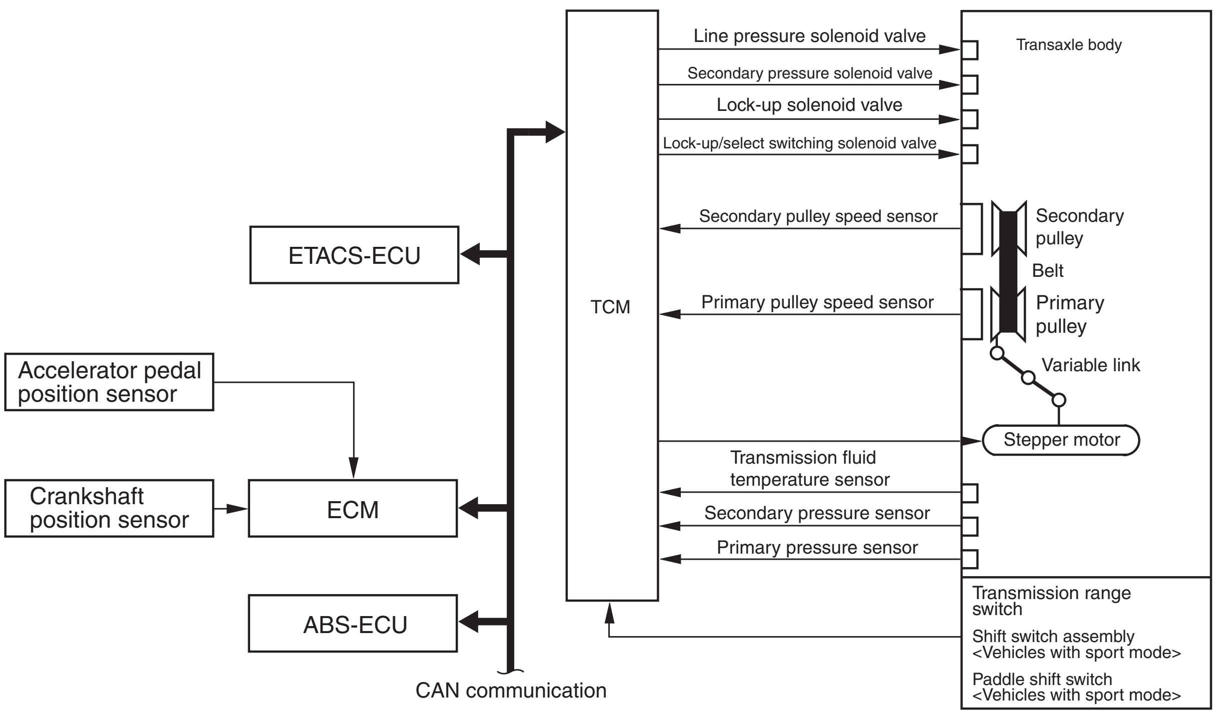
CONTROL DESCRIPTION

M2231005000044

The electronic control mechanism is comprised of various sensors, actuators, and TCM which controls them.
TCM calculates the vehicle status from various sensor information and drives each solenoid valve to perform the following controls:

- Shift control (INVECS-III, sport mode <Vehicles without sport mode>)
- Line pressure control
- Control between N (P) and D (R)
- Direct control
- Engine and CVT integrated control (CAN communication)
- Self-diagnosis function

CONTROL SYSTEM DIAGRAM



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SENSOR LIST

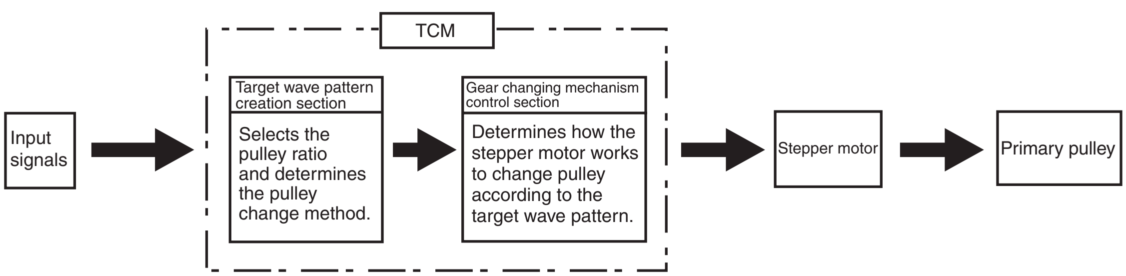
Name		Function
Sensor	Primary pulley speed sensor	Outputs the primary pulley (input shaft) speed as a pulse signal to TCM.
	Secondary pulley speed sensor	Outputs the secondary pulley (output shaft) speed as a pulse signal to TCM. The pulse signal is converted to the vehicle speed by TCM.
	Transmission fluid temperature sensor	Detects the transmission fluid temperature.
	Primary pressure sensor	Detects the pressure applied to the primary pulley.
	Secondary pressure sensor	Detects the pressure applied to the secondary pulley.
	Transmission range switch	Detects the selector lever position by the contact-type switch.
	Shift switch assembly <Vehicles with sport mode>	Detects the request in the sport mode by the contact-type switch at the selector lever.
	Paddle shift switch <Vehicles with sport mode>	Detects the operation status of the paddle shift switch.

CVT CONTROL

M2231001400017

INVECS-III

INVECS-III has been newly developed based on INVECS-II utilizing continuous variable characteristics of CVT.



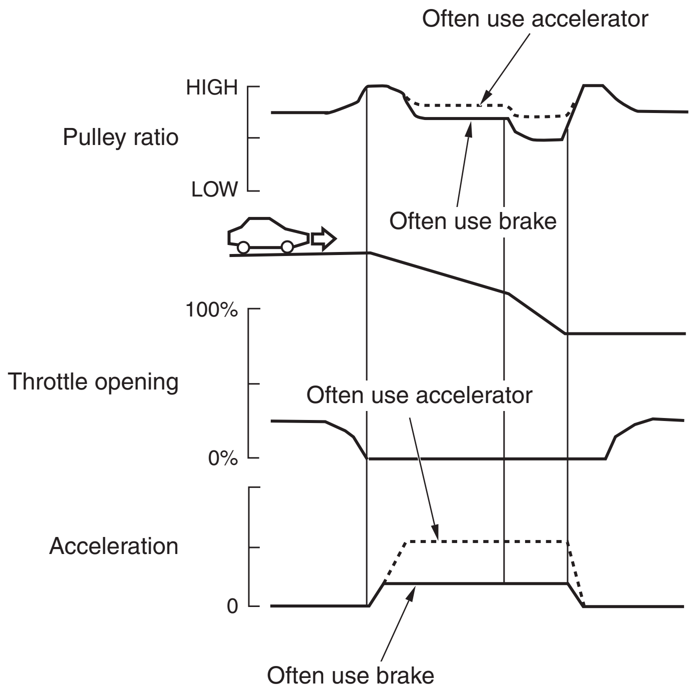
AC504721AB

To select the pulley ratio which can provide the driving force corresponding to the driver's intention and vehicle conditions. TCM selects the optimal pulley ratio and determines the shift strategy to obtain it by detecting the vehicle driving conditions such as the vehicle speed, accelerator angle. Then, it outputs the command to the stepper motor, controls in/out flow of the line pressure to/from the primary pulley, positions the movable pulley of the primary pulley, and controls the pulley ratio.

Engine brake feature on the descending slope

Pulley ratio is controlled to obtain the engine brake suitable for the driver’s feelings.

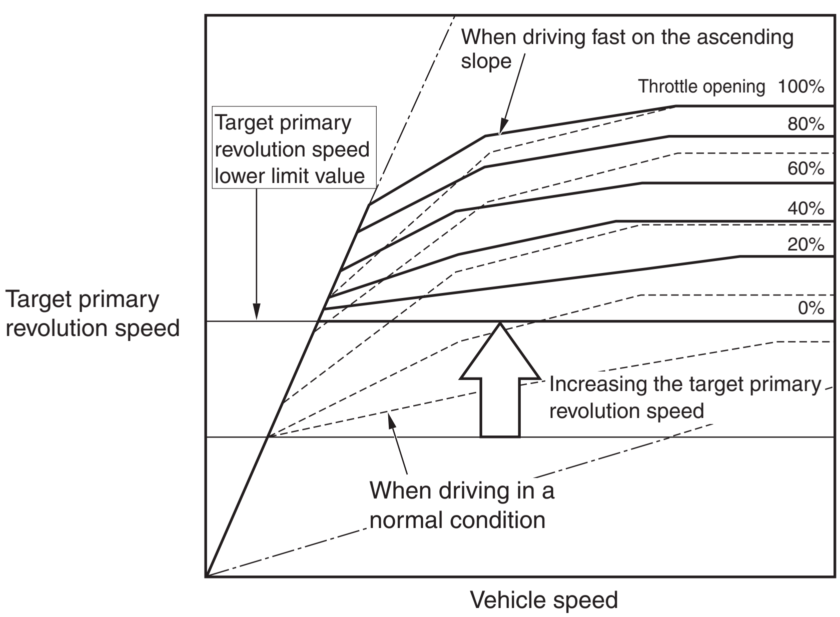
Engine brake learning feature on the descending slope



AC610382 AB

Learning compensation is made to meet the tastes of a driver by judging the amount of the engine brake from the application of the accelerator or the brake.

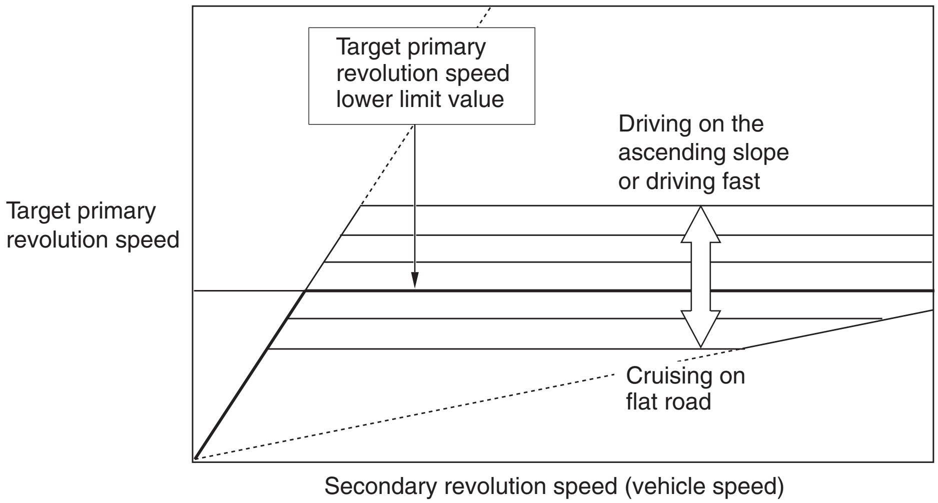
Driving feature on the ascending slope



AC610384 AB

If the foot leaves the accelerator pedal during driving on the ascending slope (called lift foot), driving capability is secured by preventing excessive upshifting.

Learning feature corresponding to tastes and habits of drivers



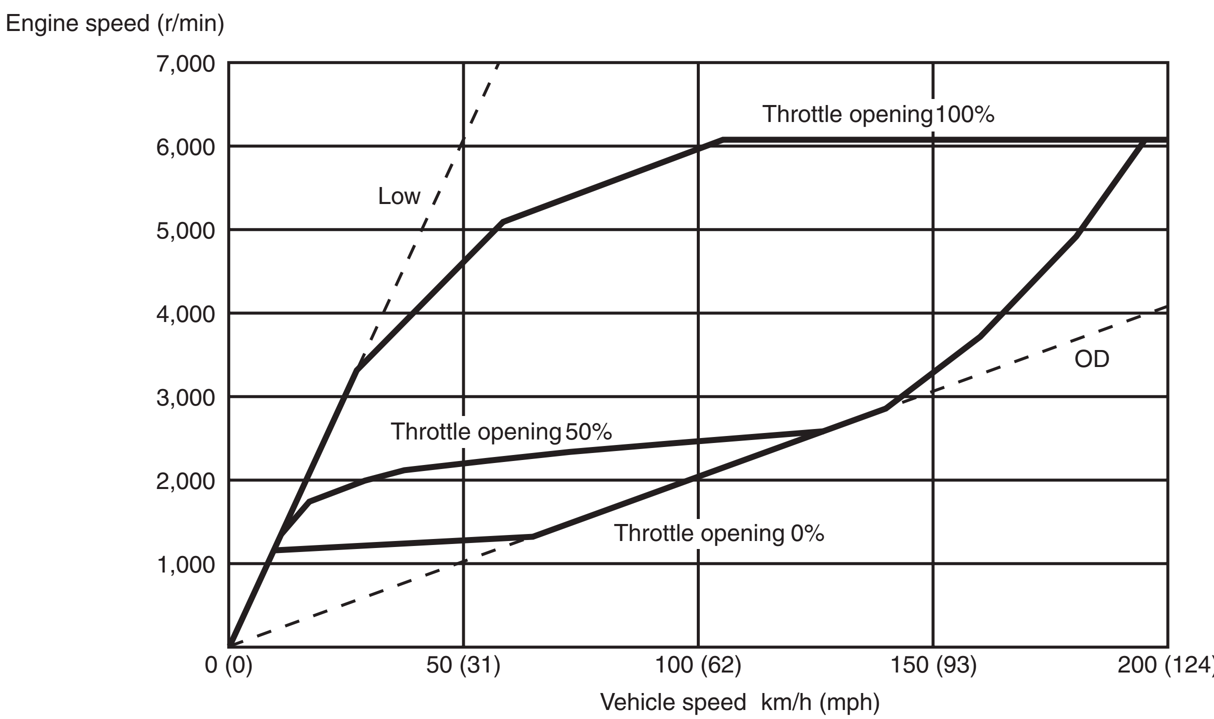
AC610398 AB

Ratio patterns are continuously switched according to the driving method of the driver.

RATIO PATTERN

The pulley ratio is controlled based on the ratio pattern for each predetermined range to achieve the optimal pulley ratio.

<D RANGE>



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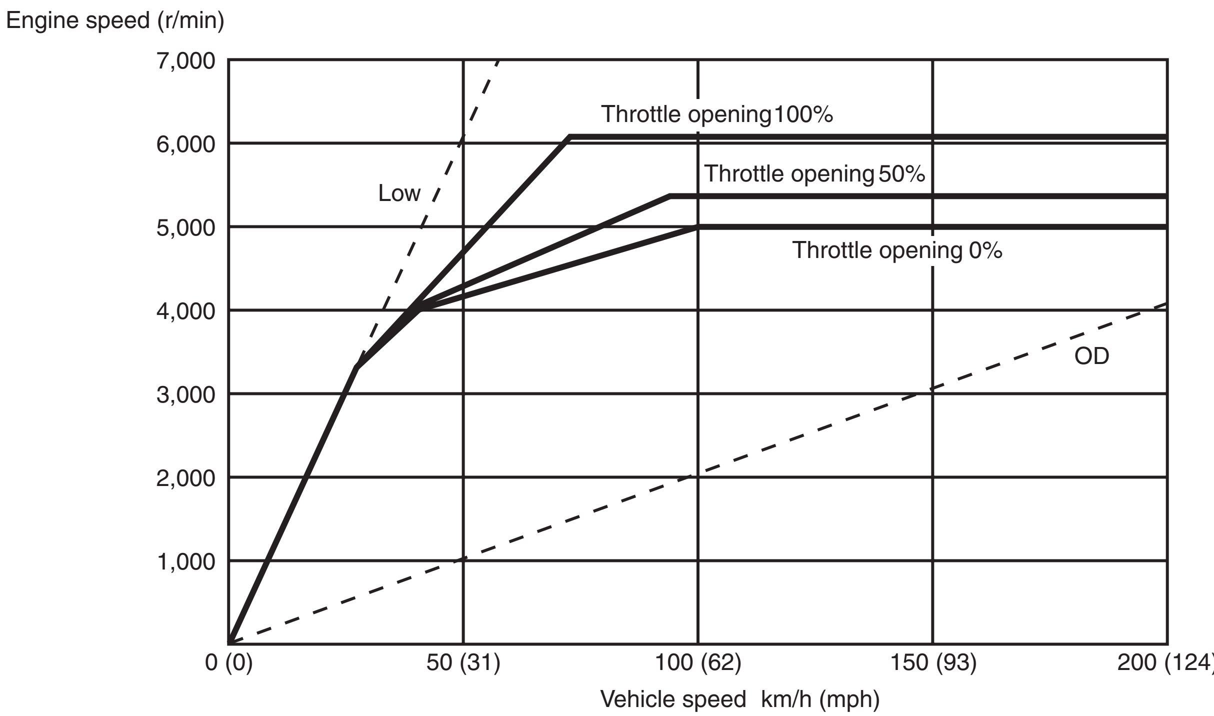
The shift change is performed in the entire shift range from the lowest to the highest pulley ratio.

<L RANGE (VEHICLES WITHOUT SPORT MODE)>



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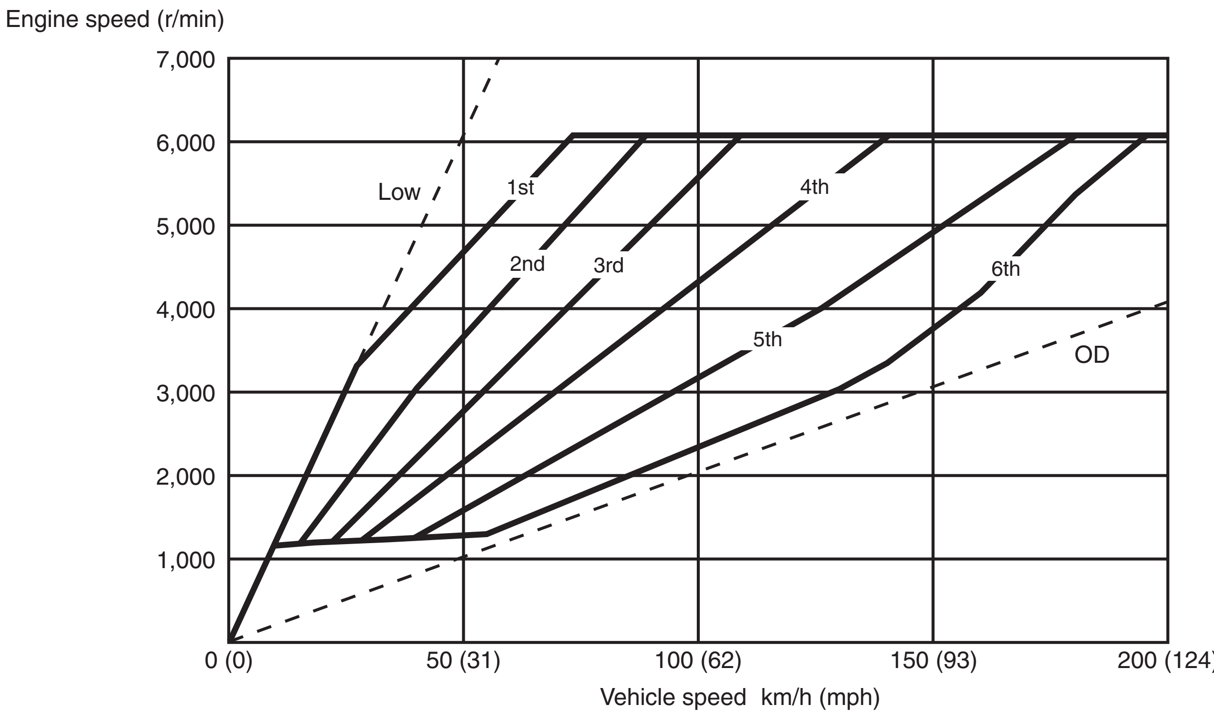
By limiting the shift range to the area around the lowest pulley ratio, the powerful driving force and engine brake is secured.

<SPORT MODE (VEHICLES WITH SPORT MODE)>



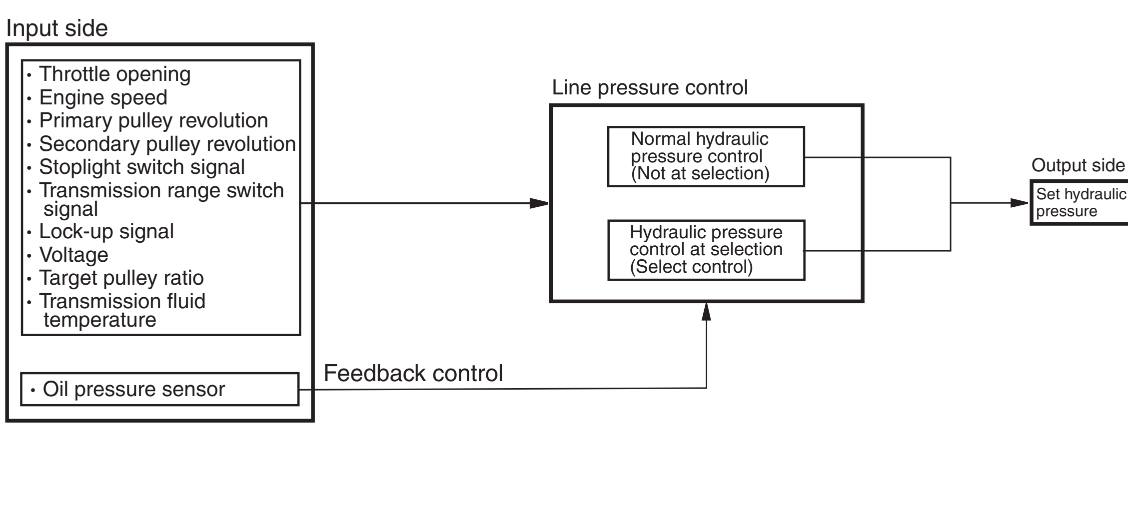
AC611607AB

When the sport mode is switched ON with the selector lever or paddle shift, the fixed shifting line is determined. The upshift/downshift operation enables to shift in steps according to the predetermined shifting line, providing M/T-like shifting. The 6-speed transmission which is suitable for sporty driving is adopted.

LINE PRESSURE CONTROL

M2231001300010

The high-precision line pressure control and secondary pressure control have reduced the friction for better fuel economy.



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NORMAL HYDRAULIC CONTROL

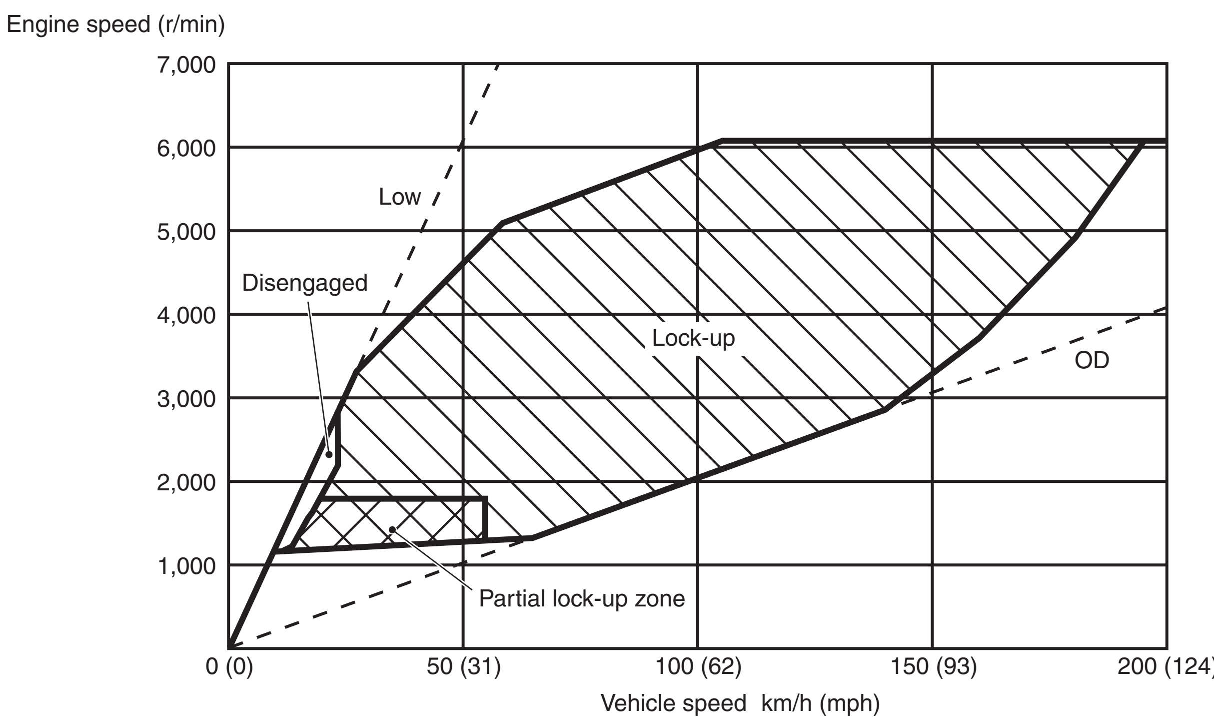
The optimal line pressure and secondary pressure are determined by the accelerator angle, engine speed, primary pulley (input) speed, secondary pulley (output) speed, stoplight switch signal, transmission range switch signal, lock-up signal, voltage, target pulley ratio, fluid temperature, and oil pressure, depending on driving conditions.

SECONDARY PRESSURE FEEDBACK CONTROL

In the normal hydraulic control or select hydraulic control, the more precise secondary pressure has been set by detecting the secondary pressure with an oil pressure sensor, and by performing the feedback control.

DIRECT CONTROL (TORQUE CONVERTER CLUTCH CONTROL)

M2231007000039



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By carefully controlling the direct operating pressure depending on the driving conditions, the shock-free direct operation from low speed has been achieved.

CONTROL BETWEEN N (P) AND D (R)

M2231001500014

When operation between N (P) and D (R) ranges is performed, the optimal operating pressure is determined by the accelerator angle, engine speed, and secondary pulley (output) speed to reduce the shock caused by selecting.

CONTROLLER AREA NETWORK (CAN) COMMUNICATION

M2231017000030

The information transaxle between each control unit has been ensured via the CAN communication. For further details on CAN, refer to GROUP 54C, CAN P.54C-2.

ENGINE AND CVT INTEGRATED CONTROL (CAN COMMUNICATION CONTROL)

- To control better shift feeling and preventing the engine speed from dropping, the ECM and TCM communicate each other to exchange the engine output control signal to provide the real-time linkage control depending on the vehicle driving conditions.
- TCM transmits information such as the rapid deceleration signal, lock-up in progress signal, torque down request signal to the ECM. It also receives information such as the torque down permission/prohibition signal, lock-up permission/prohibition signal, accelerator angle.

SELF-DIAGNOSIS FUNCTION

M2231001600011

DIAGNOSTIC FUNCTION

TCM is equipped with the diagnostic function to monitor the input signals from each sensor and output signals from the actuators. If abnormality occurs in the signal system, the diagnostic function memorises the abnormal symptoms and outputs a diagnosis code via M.U.T.-III.

FAIL-SAFE FUNCTION

If abnormality occurs in signals from various sensors, switches, or solenoids, this function allows controlling them with the minimum adverse effect to the driving performance. The following shows the fail-safe controls when an abnormal signal is input to TCM from each sensor.

Item	Control content
Secondary pulley speed sensor	Performs the shift control depending on the accelerator angle. Also, prohibits the sport mode and controls as the D range <Vehicles with sport mode>.
Primary pulley speed sensor	Performs the shift control depending on the accelerator angle and secondary pulley rotation (vehicle speed). Also, prohibits the sport mode and controls as the D range <Vehicles with sport mode>.
Transmission range switch	Controls as the D range.
Transmission fluid temperature sensor	Controls using the fixed value for the fail-safe function.
Secondary pressure sensor	Stops the secondary pressure feedback control and controls the line pressure using the fixed value for the fail-safe function. Also, suppresses the engine torque.
Primary pressure sensor	Stops the primary pressure feedback control and controls the line pressure using the fixed value for the fail-safe function. Also, suppresses the engine torque.
Line pressure solenoid valve	Switches the line pressure solenoid valve OFF to achieve the maximum line pressure.

Item	Control content
Secondary pressure solenoid valve	Switches the secondary pressure solenoid valve OFF to achieve the maximum secondary pressure.
Lock-up solenoid valve	Switches the lock-up solenoid valve OFF to release lock-up.
Stepper motor	Switches all the coils A to D of the stepper motor OFF to retain the pulley ratio just before the abnormality occurs.
Lock-up/select switching solenoid valve	Switches the lock-up/select switching solenoid valve OFF to release lock-up.
Back-up power supply	If the control memory back-up power supply from the battery is not supplied to TCM, limits the engine torque to protect the transmission main body. After the normal power is supplied, turning the key switch from OFF to ON once resumes the normal status.
Paddle shift switch <Vehicles with sport mode>	Prohibits the paddle shift operation.
Shift switch assembly <Vehicles with sport mode>	Prohibits the sport mode operation.

TRANSAXLE CONTROL

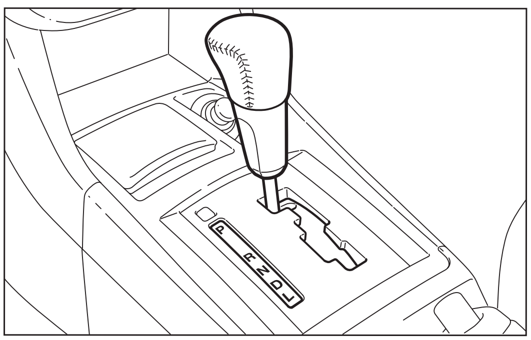
GENERAL INFORMATION

M2232000600011

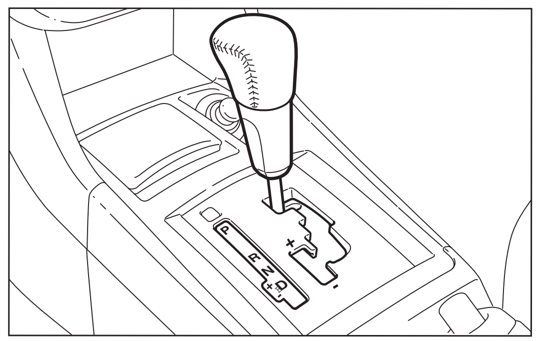
The selector lever with the gate-type has been adopted. For vehicles with sport mode, in addition to the manual gate of selector lever, the paddle shift has been equipped around the steering wheel to achieve "Fun to Drive." The selector lever has the following features:

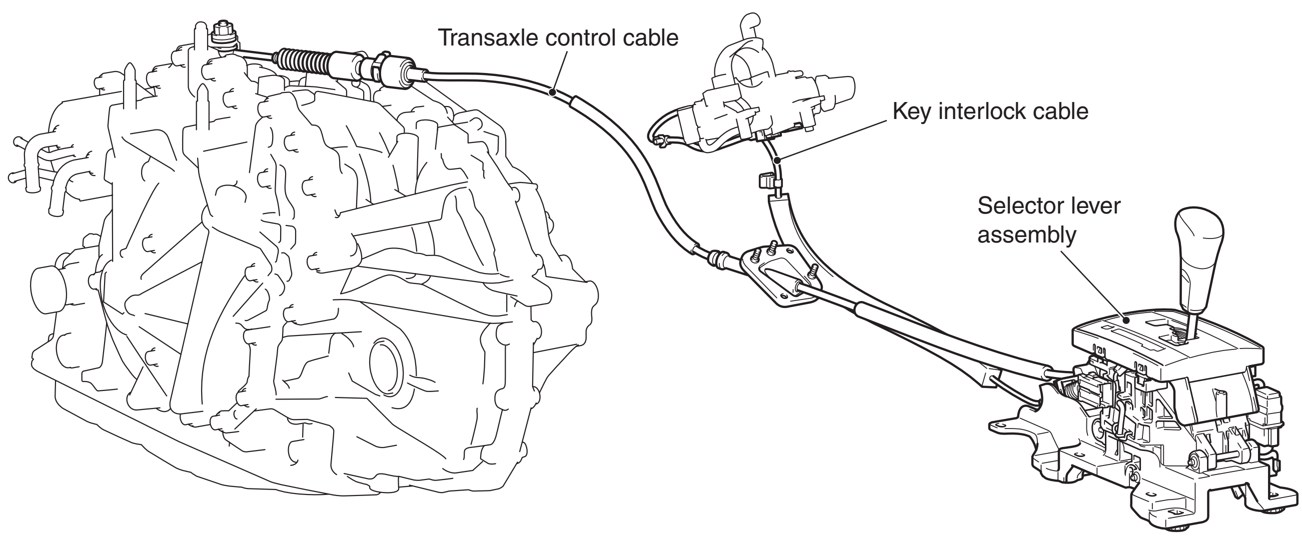
- The shift gate configuration and the operating power at each shift position have been properly tuned, ensuring the firm and smooth operation feel.
- The sport mode (6-speed) has been installed to allow the driver to shift manually according to his/her intention. <Vehicles with sport mode>
- The shift knob painted in metallic silver with a high-grade appearance has been adopted, and for higher level specifications, the genuine-leather shift knob has been provided.
- The main components have been made of resin to reduce weight and number of components.
- The electrical control-type shift lock mechanism with the solenoid to facilitate the tuning work in assembly.
- The cable control-type key interlock mechanism which is field proven has been adopted.

<Vehicles without sport mode>



<Vehicles with sport mode>





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SELECTOR LEVER ASSEMBLY

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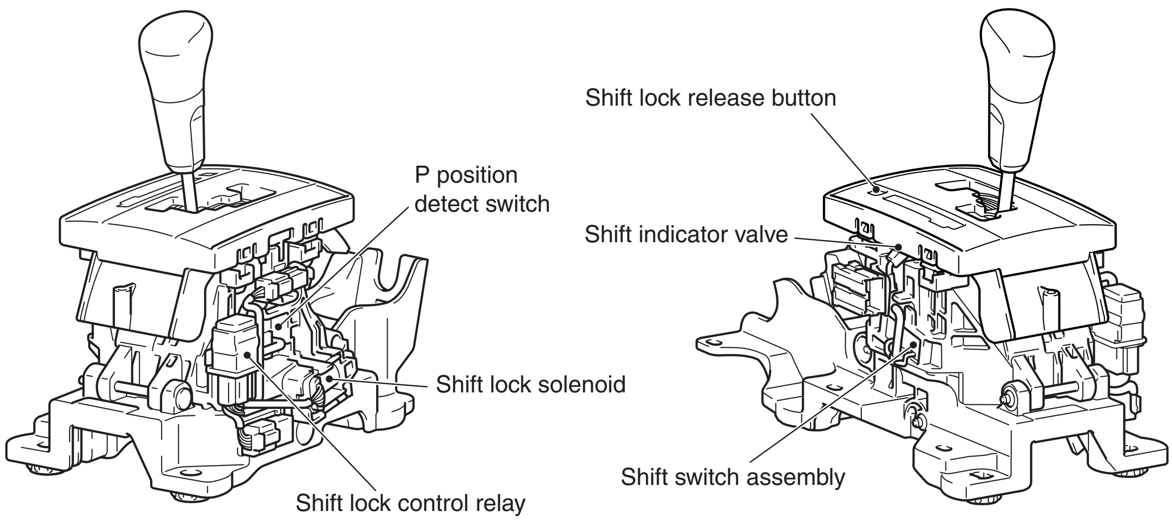


The electrical control-type shift lock (the shift lever is locked in the "P" position if the brake pedal is not depressed) mechanism has been adopted for the selector lever assembly. The functions of each switch are as follows:

Name	Function
Shift lock release button	If the shift lock system has failed, remove the cover and press the shift lock release button to release the shift lock forcibly (mechanically).
Shift indicator bulb	Illuminates the present selector lever position in the shift indicator.
Shift switch assembly <Vehicles with sport mode>	Detects the selector lever activation in sport mode.
Shift lock solenoid	Switches the shift lock mechanism ON/OFF.
Shift lock control relay	Switches the shift lock solenoid power supply circuit ON/OFF.
P position detection switch	Detects the "P" position.

CVT ERRONEOUS OPERATION PREVENTION MECHANISMS

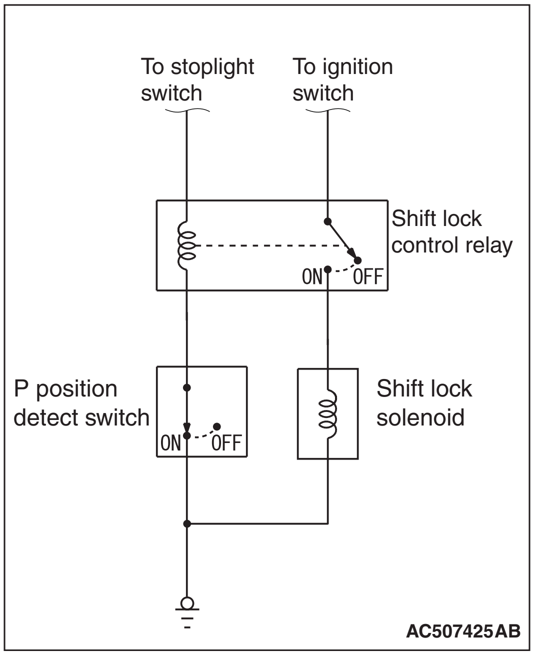
SHIFT LOCK MECHANISM

M2232000400017

STRUCTURE OF SHIFT LOCK SYSTEM

This system is comprised of the following components.

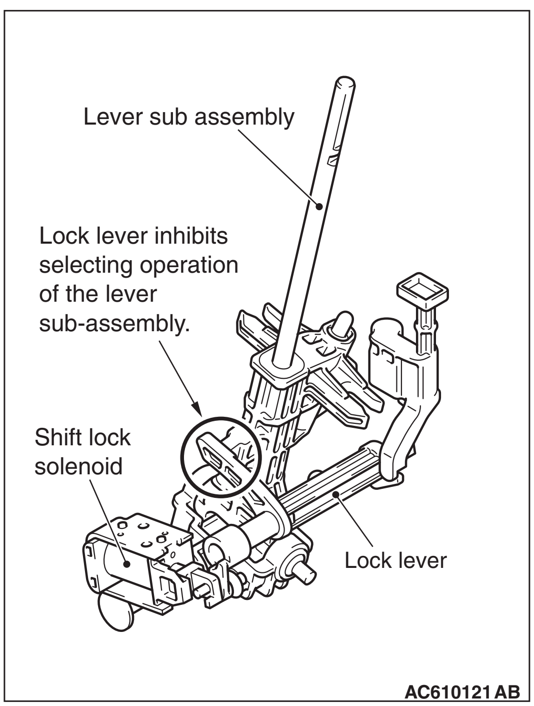
- Lock lever
- Shift lock solenoid
- Shift lock control relay
- P position detection switch



SHIFT LOCK CIRCUIT

When all of the following conditions are true, the shift lock solenoid is energised, allowing the selector lever to move from the P position to another position.

- Ignition switch: ON
- P position detection switch: ON (the selector lever is in the P position)
- Stoplight switch: ON (brake pedal is depressed)

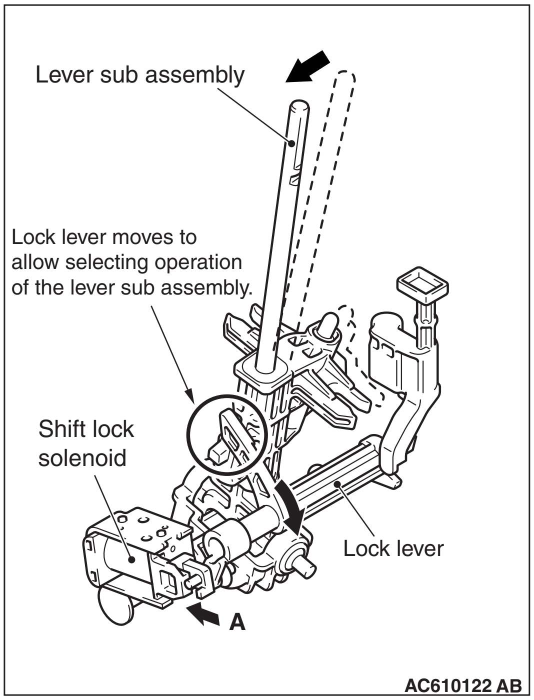


OPERATIONAL DESCRIPTION

SHIFT LOCK STATUS

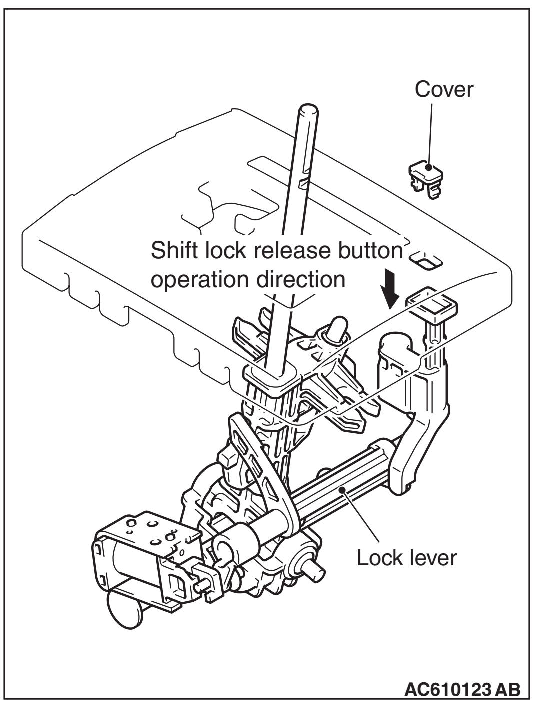
With the shift lock status, the shift lock solenoid is not energized, so when the select operation of the selector lever is attempted, no select operation is possible because the lock lever blocks the lever assembly path.

SHIFT LOCK RELEASE STATUS



When the ignition switch is ON, the selector lever is in the P position, and the brake pedal is depressed, the shift lock solenoid is energized to move the shift lock solenoid toward the direction A shown in the figure. Then the lock lever linked to the shift lock solenoid moves as shown in the figure, and no longer blocks the lever sub assembly path when the select operation is performed, enabling the operation.

RELEASE USING THE SHIFT LOCK RELEASE BUTTON



If the shift lock no longer operates properly due to a dead battery or the like, remove the cover and press the shift lock release button to enable shift operation from the P position. Pressing the shift lock release button moves the lock lever to the position shown in the figure, enabling shift operation.

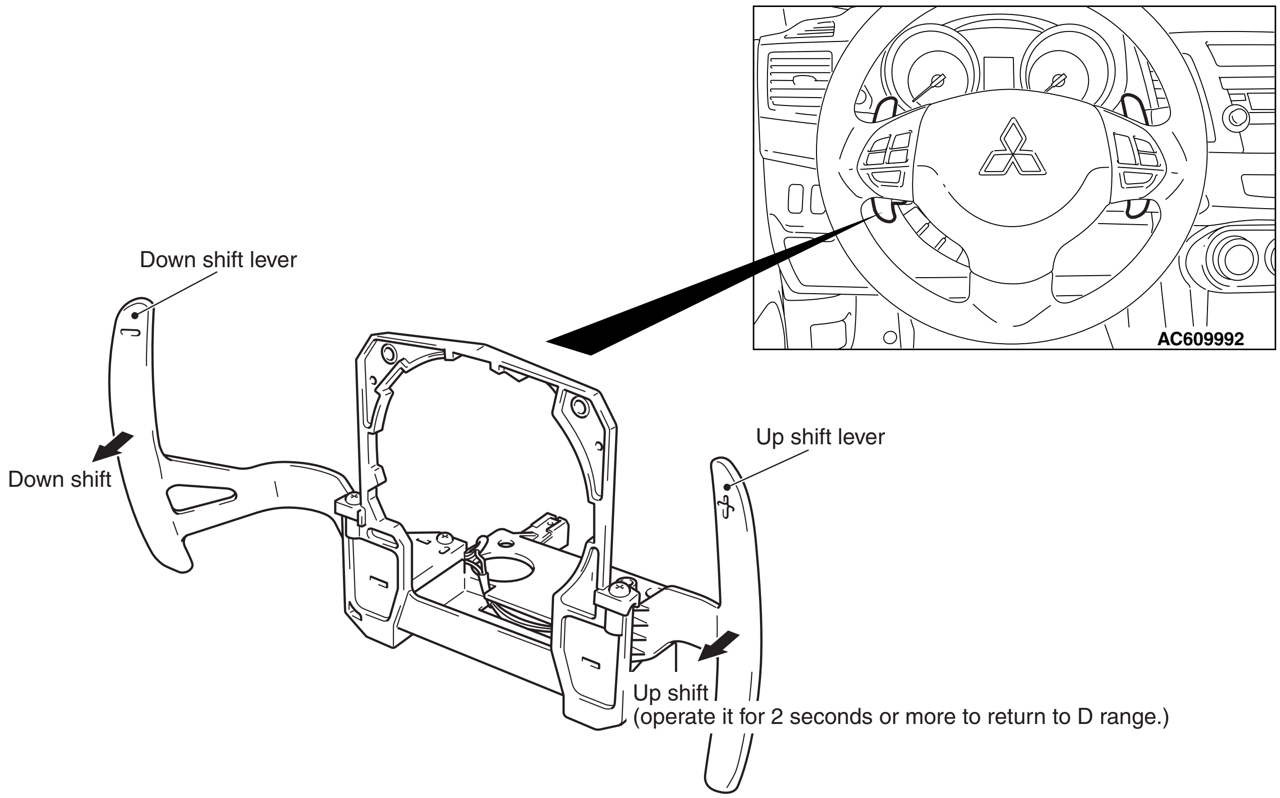
KEY LOCK MECHANISM

M2232000500014

This mechanism is basically same as that used for OUTLANDER.

PADDLE SHIFT <VEHICLES WITH SPORT MODE>

M2232000300021



The paddle-shaped upshift/downshift lever has been fitted near the steering wheel to allow the driver to operate upshift or downshift with his/her hands kept on the steering wheel. The paddle shift has the following features:

- The lever on the right of the vehicle is for upshift and that on the left is for downshift.
- As the paddle shift is fixed on the steering column to maintain the certain position regardless of the steering wheel angle, the proper operation can be performed without possibility of improper up/down position even when the steering wheel is fully turned.
- The paddle shift can perform the upshift/downshift operation whether the selector lever is in the sport mode or automatic shifting to provide a rapid shift operation.

NOTE: When the mode is changed to the sport mode using the paddle shift during automatic gear shifting, the sport mode is cancelled under the following conditions.

- *The upshift lever is pulled for 2 seconds or more.*
- *The vehicle is stopped.*
- *No operation is carried out for 4 minutes and 25 seconds.*

- The main components have been made of magnesium alloy to achieve the considerable weight reduction and pursue a sporty impression.

GROUP 54C

CONTROLLER AREA NETWORK (CAN)

CONTENTS

GENERAL INFORMATION

M2542000100308

CAN, an abbreviation for Controller Area Network, is an ISO-certified international standard for a serial multiplex communication protocol*. A communication circuit employing the CAN protocol connects each ECU, and sensor data can be shared among, which enables more reduction in wiring.

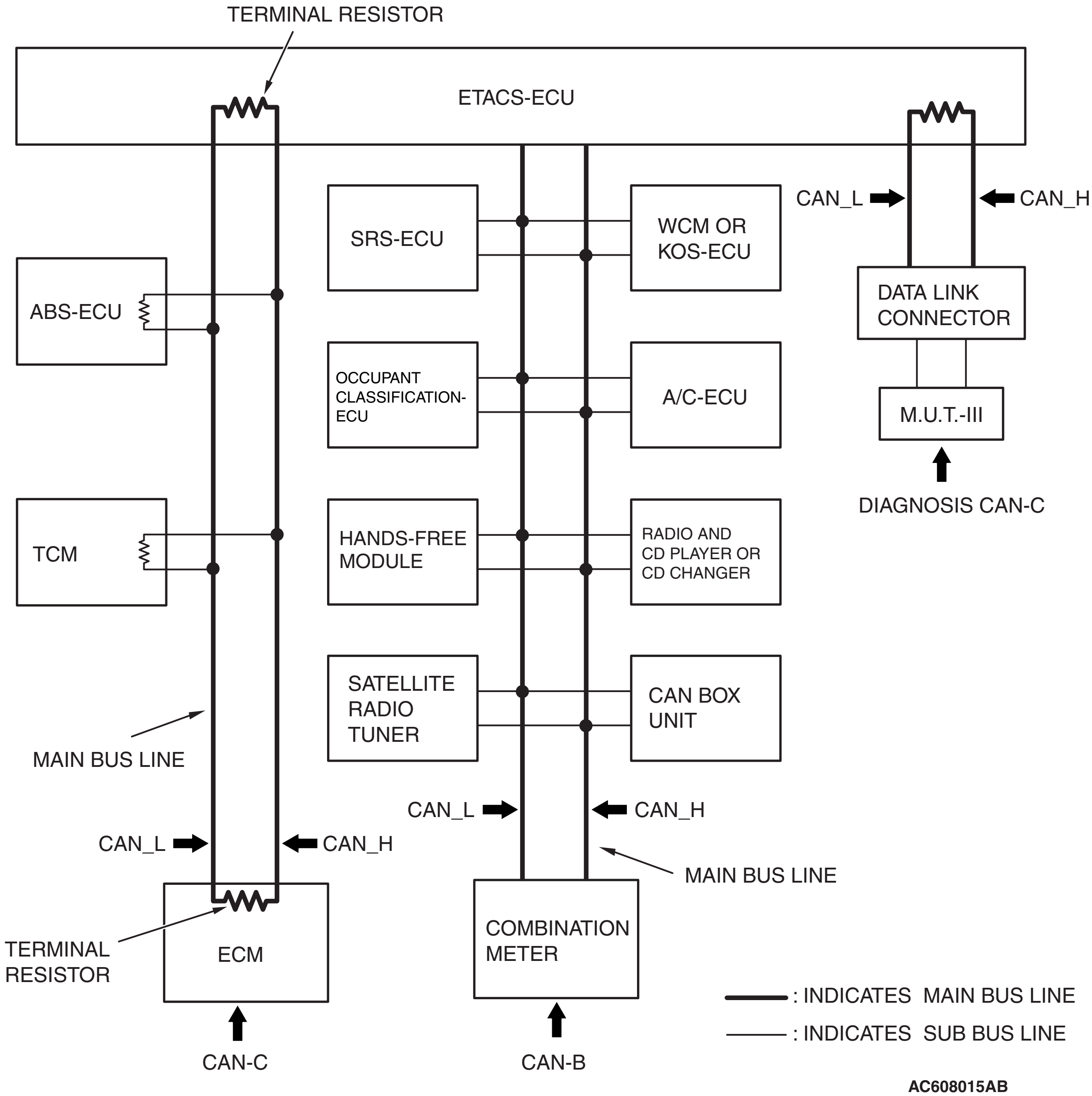
*NOTE: *: The regulations have been decided in detail, from software matters such as the necessary transmission rate for communication, the system, data format, and communication timing control method to hardware matters such as the harness type and length and the resistance values.*

CAN offers the following advantages.

- Transmission rates are much faster than those in conventional communication (up to 1 Mbps), allowing much more data to be sent.
- It is exceptionally immune to noise, and the data obtained from each error detection device is more reliable.
- Each ECU connected via the CAN communicates independently, therefore if the ECU enters damaged mode, communications can be continued in some cases.

STRUCTURE

M2542000200479



- A gateway function has been integrated to ETACS-ECU as the network central ECU. (Refer to GROUP 54A, ETACS-ECU P.54A-31.)
- The CAN system consists of the following three networks: CAN-B (middle-speed body network), CAN-C (high-speed power train network), and the diagnosis CAN-C (diagnosis exclusive network). Each ECU is connected to one of the networks depending on its functions.
- The CAN bus line consists of two lines, CAN_L and CAN_H (CAN Low and CAN High, respectively), as well as two terminal resistors (A twisted-pair cable, highly resistant to noise, is used for the communications line).
- The CAN bus line connecting two dominant ECUs is the main bus line, and the CAN bus line connecting each ECU is the sub-bus line.
- With CAN-C, the terminal resistors are incorporated in ECU. Resistors with approximately 120 ohms is used for the dominant ECU, and that with 4.7 kiloohms is used for the non-dominant ECU.

NOTE:

- *Dominant ECU: ETACS-ECU and engine ECU*
- *Non-dominant ECU: ECU and sensor on CAN-C network, excluding ETACS-ECU and engine ECU*

- To the CAN bus line, ECU, sensor, and data link connector are connected as follows for each network.

CAN-B

- Wireless control module (WCM) <vehicles without KOS>
- KOS-ECU <vehicles with KOS>
- SRS-ECU
- Occupant classification-ECU
- A/C-ECU
- Radio and CD player or CD changer <vehicles without Mitsubishi Multi-Communication System (MMCS)>
- CAN box unit <vehicles with Mitsubishi Multi-Communication System (MMCS)>
- Hands-free module <vehicles with hands-free system>
- Satellite radio tuner <vehicles with satellite radio>
- Combination meter

CAN-C

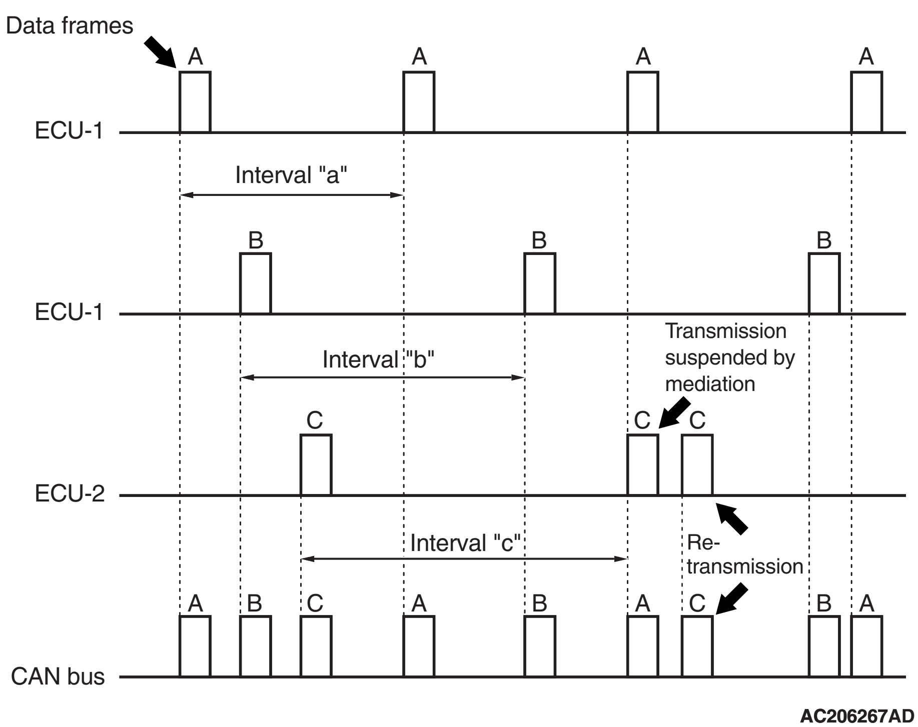
- ABS-ECU <vehicles with ABS>
- Transaxle control module (TCM)
- Engine control module (ECM)

DIAGNOSIS CAN-C

- Data link connector

SYSTEM OPERATION

M2542000300272



The CAN communication system is described below.

- Each ECU communicating with CAN periodically sends several sensors' information on CAN bus as data frame (called periodical sending data). For further details, consult the data frame section.
- ECUs requiring data on CAN bus can receive data frames sent from each ECU simultaneously.
- The data sent from each ECU conducting CAN communication is transmitted at 10-1000 msec interval depending on necessity of data.

  NOTE: In the figure above, the data frame A is transmitted in "a" intervals, while the data frames B and C are transmitted at intervals "b" and "c," respectively.
- A single ECU transmits multiple data frames.
- When data frames conflict with one another (when plural ECUs transmit signals simultaneously), data is prioritised for transmission by mediation, therefore, plural data frames are not sent simultaneously. For further details, consult the mediation section.
- Data is transmitted not by the conventional voltage-using method but by voltage potential difference. For further details, consult the section on CAN bus voltage transformation .

- Reliability of each ECU transmitting signals via CAN communication is secured by several error detection and recovery processes. For further details, consult the sections on error detection and system recovery.
- For major communication signals (transmitting signals) among ECUs.

MEDIATION

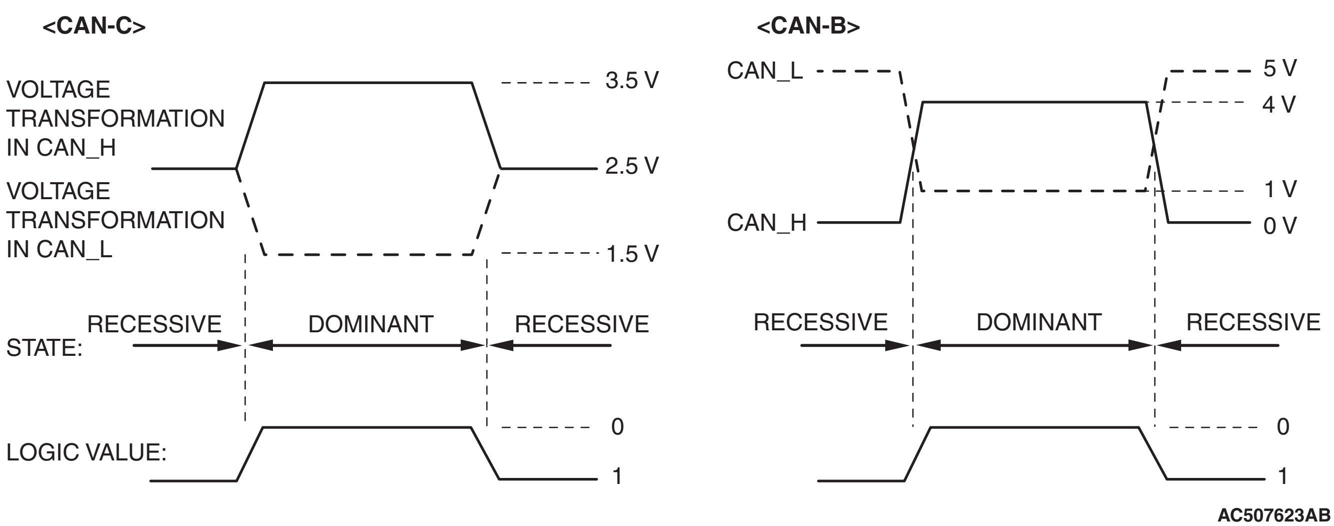
Because each ECU transmits data independently on the CAN bus, there are cases of data collision when multiple data frames that ECUs attempt to transmit simultaneously (if multiple ECUs transmit at nearly the same moment). At this moment, processing of the ECUs attempting transmission is performed in the following way.

1. Data frame with high priority is transmitted first according to ID codes memorized in data frames.
2. Transmission of low-priority data (data frames) is suspended by the issuing ECUs until the bus clears (when no transmission data exists on the CAN bus).

   NOTE: If the suspended state continues for a specific time, new data (data frame content) is created and sent.
3. ECU containing suspended data frames transmits the data when the bus becomes available.

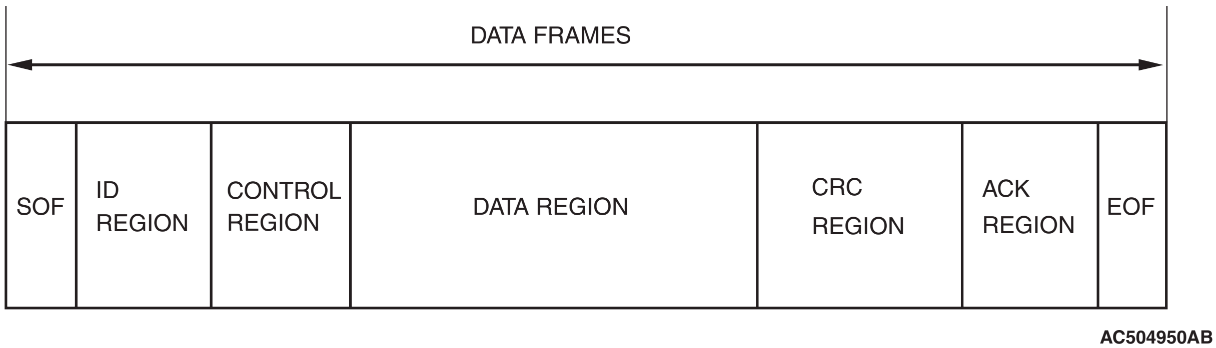
NOTE: There is enough capacity on the CAN bus, which never prevents data frames from being sent.

VOLTAGE TRANSFORMATION ON THE CAN-B BUS and CAN-C BUS



The voltage transformation (output signal) when the data frame is sent to the CAN-C bus line has a distinctive CAN-C profile. The transmitting ECU through the CAN_H and CAN_L bus lines sends 2.5 to 3.5 V signals to the CAN_H side and 2.5 to 1.5 V signals to the CAN_L side. The receiving ECU reads the data from the CAN_H and CAN_L potential difference. "Recessive" refers to the state where both CAN_H and CAN_L are under the 2.5-V state, and "Dominant" refers to the state where CAN_H is under the 3.5-V state and CAN_L is under the 1.5-V state. On the other hand, the voltage transformation (output signal) when the data frame is sent to the CAN-B bus line has a distinctive CAN-B profile. The transmitting ECU through the CAN_H and CAN_L bus lines sends 0 to 4 V signals to the CAN_H side, and 1 to 5 V signals to the CAN_L side. "Recessive" is a state in which CAN_H is at 0 V and CAN_L is at 5 V, and "Dominant" is a state in which CAN_H is at 4 V and CAN_L is at 1 V. By transformation mainly to 2.5 V, even in cases when voltage is rendered 0 from faulty grounding or the like (causing a problem of an approximate 0.5 V increase on the communications line), communication can be continued uninterrupted. Employing dual communications lines improves reliability to prevent the presence of noise, compared to the conventional communication method.

DATA FRAMES



SOF (Start of Frame)
- Indicates the start of the frame

ID (Identifier) region
- Identifies the data content while specifying priority rank in case of mediation

Control region
- Specifies the frame type, data length, etc.

Data region
- Values used for data control, etc.

Cyclic Redundancy Check (CRC) region
- Region where to check for errors in sent data. The transmitting ECU calculates data regions by applying prescribed operations and stores the results. The receiving ECU detects erroneous communication by comparing the CRC region with the data region.

ACK (Acknowledge) region
- Region where to conform the reception of sent data

EOF (End of Frame)
- Indicates the end of the frame

ERROR DETECTION AND RECOVERY

CAN protocol secures its reliability of communication by providing several error detection function such as CRC shown in data frame, and the recovery function (recovery is performed by resending, from abnormal state such as transmission errors). If an error is detected but it is not resolved even after recovery, communication is stopped. This state is called "Bus Off."

SELF-DIAGNOSIS

M2542000400235

- CAN self-diagnosis is performed by each ECU connected to the CAN bus.
- diagnosis codes related to communication are named with the capital letter U, and are called "U-codes."
- A summary of the CAN self-diagnosis system is presented below. For further details on each diagnosis code stored by the ECUs.

TIME-OUT

Each ECU transmits data frames periodically. If the data frame is not received within the specified period, the intended receiving ECU transmits a diagnosis code indicating communication time-out for the ECU that failed to transmit.

BUS OFF

Related to a communication error that persists even after the transmitting ECU attempts recovery for a specified number of attempts or that persists for a specified period after recovery. Communication is stopped and this diagnostic code is issued.

CAN BUS DIAGNOSTICS

M2542000500254

As ECUs are connected via CAN bus (including M.U.T.-III), always diagnose CAN bus to confirm its normality when inspecting. Simply by performing M.U.T.-III screen operations, the following inspections can be performed automatically, and the result can be used to verify the CAN bus status.

- Confirmation of diagnosis code of ETACS-ECU
- Confirmation of communication of all ECUs

NOTES

GROUP 54

CHASSIS ELECTRICAL

CONTENTS

NOTES

GROUP 00

GENERAL

CONTENTS

NOTES

GROUP 42

BODY

CONTENTS

NOTES

GROUP 00E

GENERAL <ELECTRICAL>

CONTENTS

HARNESS CONNECTOR INSPECTION

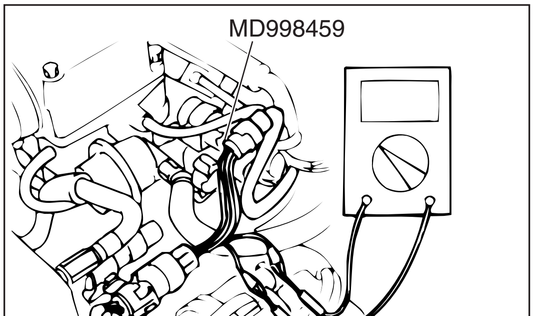
M1001003900201

CONNECTOR CONTINUITY AND VOLTAGE TEST

Required Special Tools:

- MB991219: Test Harness Set
- MD998459: Test Harness

Follow the steps below to avoid causing poor connector contact and/or reduced waterproof performance of connectors when checking continuity and/or voltage at waterproof connectors.

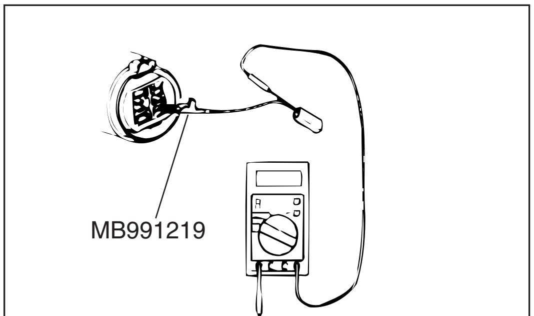


AC000014 AB

⚠ CAUTION

Never backprobe a waterproof connector. Backprobing a connector may cause the terminals to corrode, deteriorating circuit performance.

1. If the circuit to be checked is a closed state, use a special tool like MD998459.



AC000015 AB

⚠ CAUTION

Forcing the probe into the terminal may open the terminal, causing intermittent or poor contact and creating an open circuit.

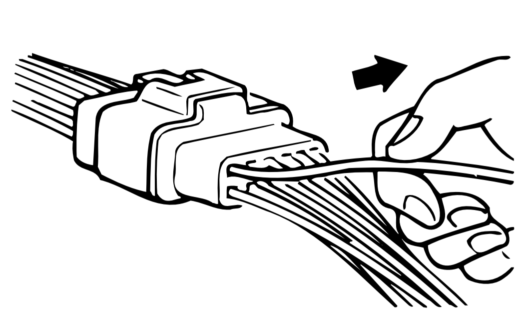
2. If the connector is disconnected for checking and the facing part is the female pin side, use an appropriate male terminal for checking the contact pressure of connector pins (like MB991219).

⚠ CAUTION

Do not simultaneously contact more than one terminal with the probe. Contacting two or more terminals at the same time may damage a circuit, possibly to the point of starting an electrical fire.

3. If the facing part is the male pin side, either carefully touch the probe to the pin so it does not accidently contact other pins, or use an appropriate female terminal.

IMPROPER TERMINAL ENGAGEMENT CHECK

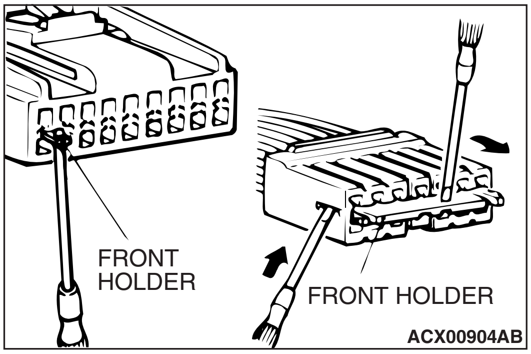

AC000016

Terminals inside a connector may not engage properly even if the connectors engage. Make sure that each terminal does not come out of the connector when gently pulling each harness wire. If it does, repair or replace the terminal and/or connector.

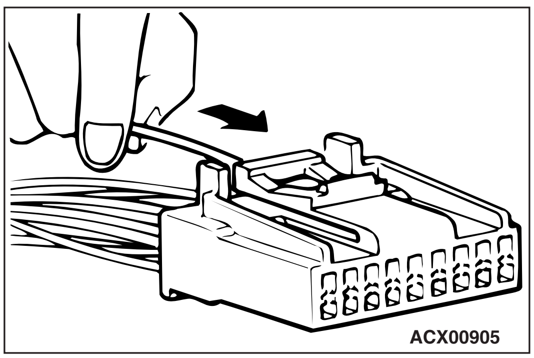
CONNECTOR TERMINAL ENGAGEMENT AND DISENGAGEMENT

Loosely engaged terminals can be repaired by removing the female terminal from the connector housing and raising its lance to establish better engagement. Removal of the connector terminal used for MFI and INVECS-II A/T control circuit can be done in the following manner.

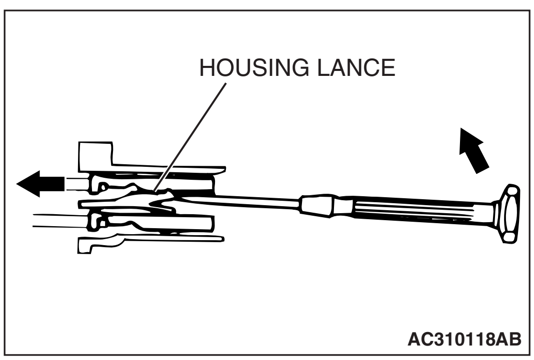
COMPUTER CONNECTOR



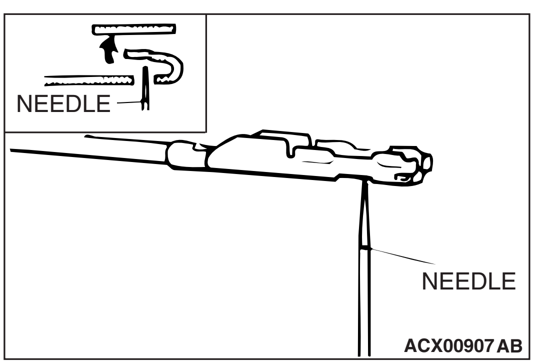
1. Insert a screwdriver [1.4 mm (0.06 inch) width] as shown in the figure, disengage the front holder, and remove it.



2. Push the harness wire of the terminal to be repaired deep into the connector from the harness side and hold it there.

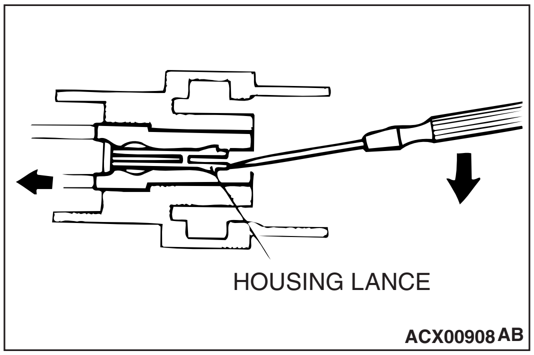


3. Insert the tip of the screwdriver [1.4 mm (0.06 inch) width] into the connector as shown in the figure, gently push the housing lance down with the tip, and pull out the terminal.

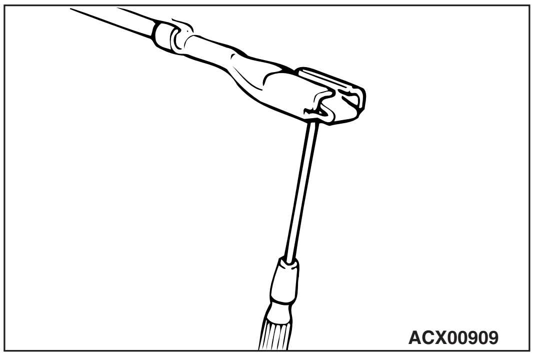


4. Insert a needle through the hole provided on the terminal and raise the contact point. Lightly squeeze the outer edge so the flats are parallel with the bottom.

ROUND WATERPROOF CONNECTOR

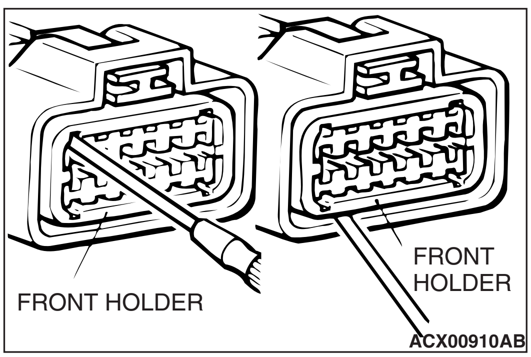


1. Remove the waterproof cap by using a screwdriver.
2. Insert the tip of the screwdriver [1.4 mm (0.06 inch) or 2.0 mm (0.08 inch) width] into the connector as shown in the figure, raise the housing lance slightly with the tip, and pull out the terminal.

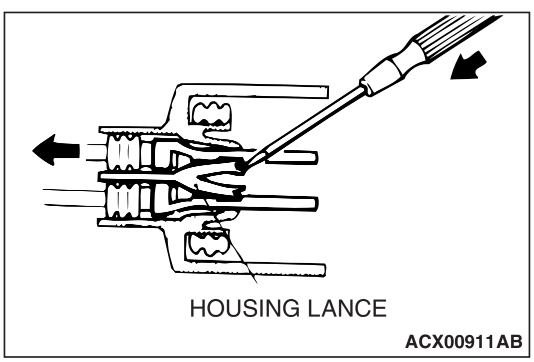


3. Insert a screwdriver through the hole provided on the terminal and raise the contact point. Lightly squeeze the outer edge so the flats are parallel with the bottom.

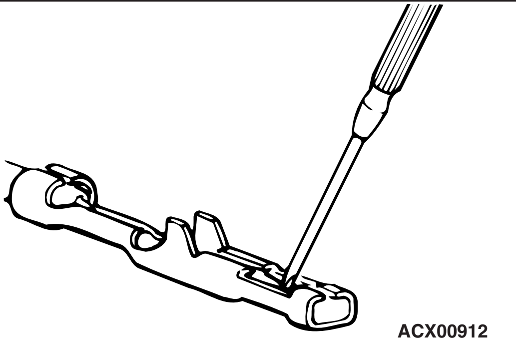
RECTANGULAR WATERPROOF CONNECTOR



1. Disengage the front holder with a screwdriver and remove it.



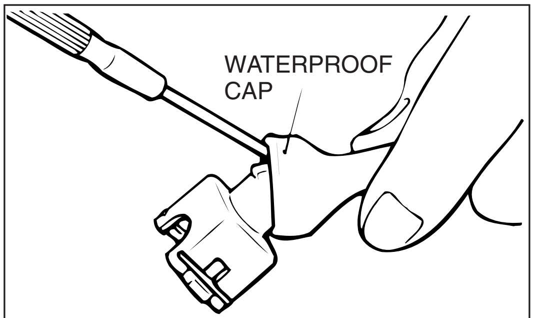
2. Insert the tip of a screwdriver [0.8 mm (0.03 inch) width] into the connector as shown in the figure, push it lightly to raise the housing lance, and pull out the terminal.



ACX00912

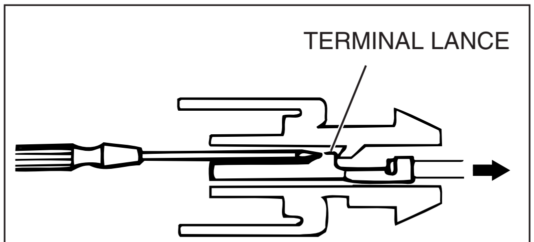
3. Press the contact point to the male terminal down by holding a screwdriver [1.4 mm (0.06 inch) width] as shown in the figure. Lightly squeeze the outer edge so the flats are parallel with the bottom.

INJECTOR CONNECTOR



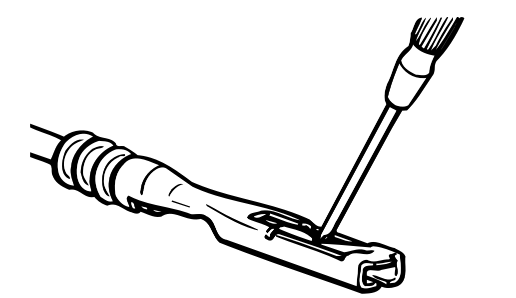
ACX00913AB

1. Remove the waterproof cap.



AC310304AB

2. Insert the tip of a screwdriver [1.4 mm (0.06 inch) width] into the connector as shown in the figure, press in the terminal lance, and pull out the terminal.



AC310313

⚠ CAUTION

Make sure the lance is pressed in before the terminal is inserted into the connector.

3. Press the contact point to the male terminal down by holding a screwdriver [1.4 mm (0.06 inch) width] as shown in the figure.

HOW TO DIAGNOSE

HOW TO DIAGNOSE

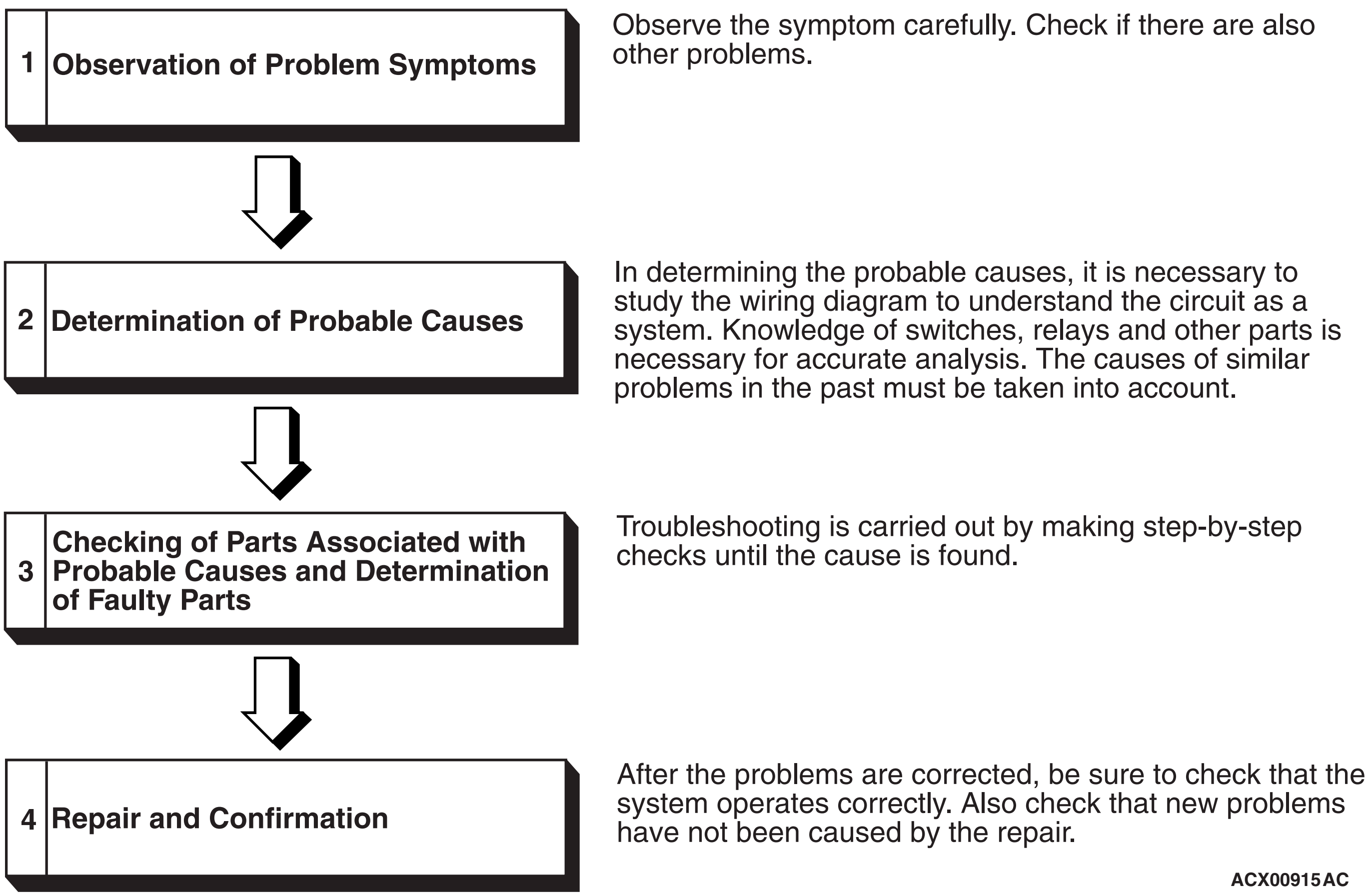
M1001004300086

The most important point in troubleshooting is to determine "Probable Cause." Once the probable causes are determined, parts to be checked can be limited to those associated with such probable causes. The determination of the probable causes must be based on a theory and be supported by facts and must not be based on intuition only.

TROUBLESHOOTING STEPS

M1001004400049

If an attempt is made to solve a problem without going through correct steps for troubleshooting, the symptoms could become more complicated, resulting in failure to determine the causes correctly and making incorrect repairs. The four steps below should be followed in troubleshooting.



INFORMATION FOR DIAGNOSIS

M1001004500132

This manual contains the harness diagrams as well as the individual circuit drawings, operational explanations, and troubleshooting hints for each component. The information is presented in the following manner:

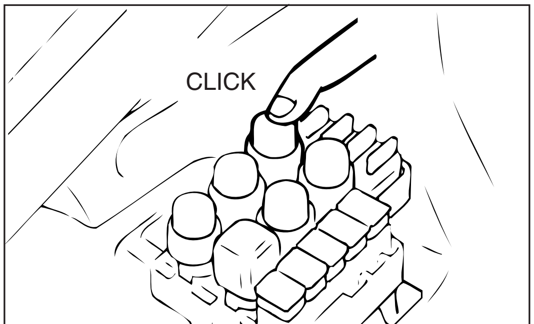
1. Connector diagrams show the connector positions, etc., on the actual vehicle as well as the harness path.
2. Circuit diagrams show the configuration of the circuit with all switches in their normal positions.
3. Operational explanations include circuit drawings of current flow when the switch is operated and how the component reacts.

4. Troubleshooting hints include numerous examples of problems which might occur, traced backward in a common-sense manner to the origin of the trouble. Problems whose origins may not be found in this manner are pursued through the various system circuits.

NOTE: Components of MFI, ETACS, etc. with ECU do not include 3 and 4 above. For this information, refer to a relevant group which includes details of these components.

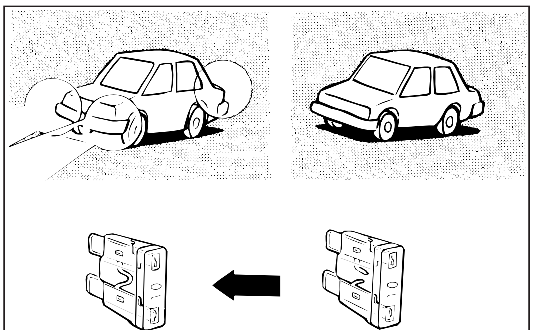
INSPECTION

M1001004600139

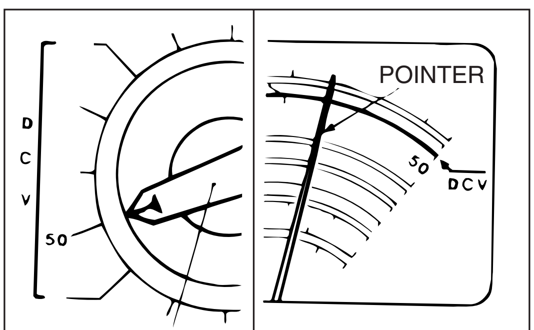


ACX00936 AB

1. Sight and sound checks
   Check relay operation, blower motor rotation, light illumination, etc. Listen for a "click" when some relay covers are pushed down.


ACX00937

2. Simple checks
   For example, if a headlight does not come on and a faulty fuse or poor grounding is suspected, replace the fuse with a new one. Or use a jumper wire to ground the light to the body. Determine which part(s) is/are responsible for the problem.



ACX00938AB

3. Checking with instruments
   Use an appropriate instrument in an adequate range and read the indication correctly.

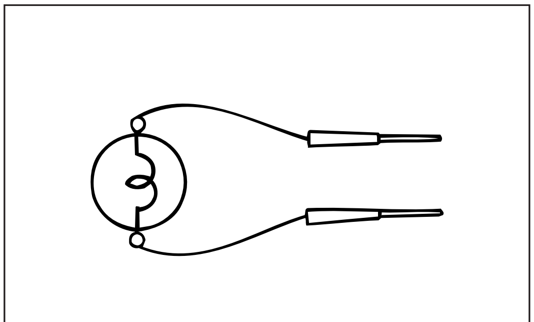
INSPECTION INSTRUMENTS

M1001004700040

For inspection, use the following instruments:

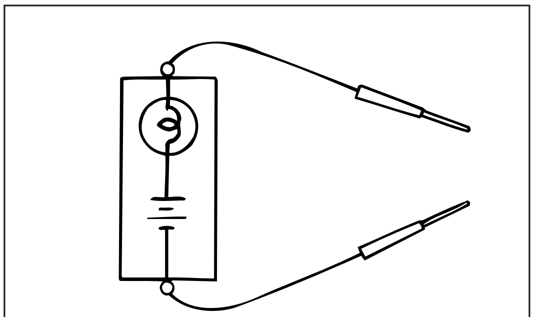
⚠ CAUTION

Never use a test light for checking ECU-related circuits or ECUs.



ACX00939

1. Test light
   A test light consists of a 12V bulb and lead wires. It is used to check voltages or short circuits.

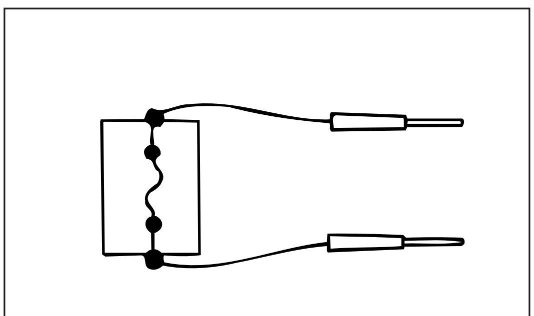


ACX00940

2. Self-powered test light
   A self-powered test light consists of a bulb, battery and lead wires connected in series. It is used to check continuity or grounding.

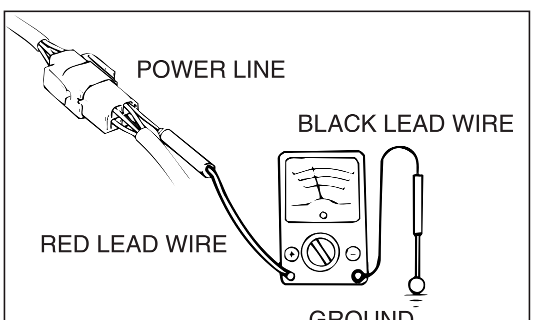
⚠ CAUTION

Never use a jumper wire to connect a power supply directly to a load.



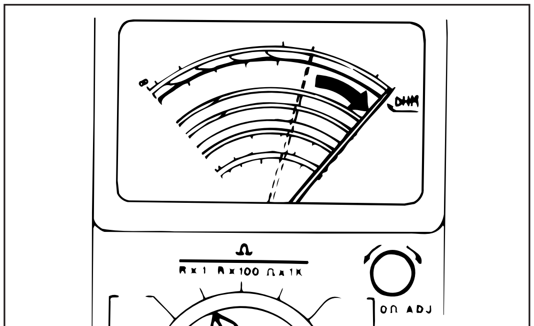
ACX00941

3. Jumper wire
   A jumper wire is used to close an open circuit.



ACX00942 AB

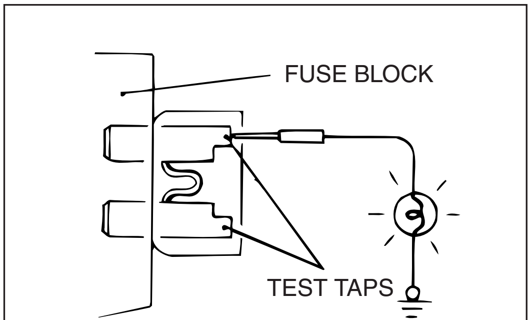
4. Voltmeter
   A voltmeter is used to measure the circuit voltage. Normally, the positive (red lead) probe is applied to the point of voltage measurement and the negative (black lead) probe to the body ground. Use a digital voltmeter to check for voltage drop before or after a component.


ACX00943

5. Ohmmeter
   An ohmmeter is used to check continuity or measure resistance of a switch or coil. If the measuring range has been changed, the zero point must be adjusted before measurement.

CHECKING FUSES

M1001005000141

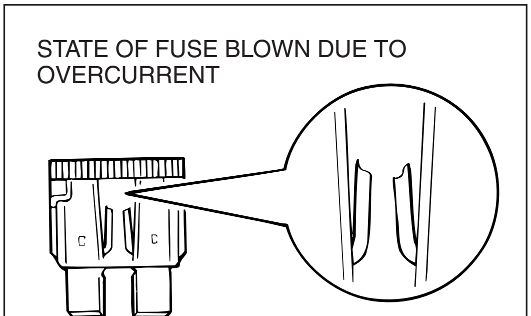


ACX00951 AB

A blade type fuse has test taps provided to allow checking of the fuse itself without removing it from the fuse block. The fuse is okay if the test light comes on when its one lead is connected to the test taps (one at a time) and the other lead is grounded. Remember to turn the ignition switch to ON to ensure all circuits are live.

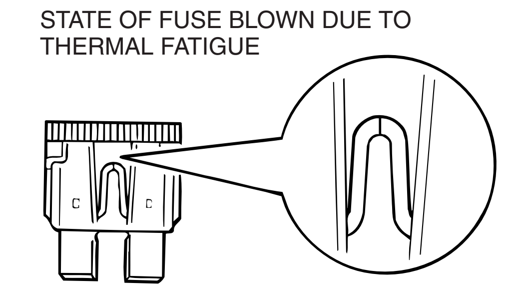
CAUTIONS IN EVENT OF BLOWN FUSE

When a fuse is blown, there are two probable causes. One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of the two causes is responsible can be easily determined by visual check as described below.



ACX00952 AB

1. Fuse blown due to current exceeding rating
   The illustration shows the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one hastily since a current heavy enough to blow the fuse has flowed through it. First, check the circuit for shorts and check for abnormal electric parts. After correcting shorts or replacing parts, use only a fuse of the same capacity as a replacement. Never use a fuse of larger capacity than the original fuse. If a larger capacity fuse is used, electric parts or wiring could be damaged, or could start a fire.

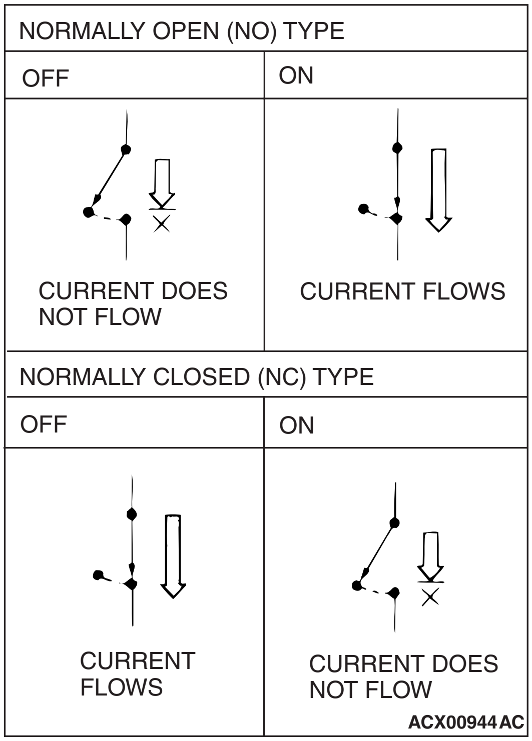


ACX00953 AB

2. Fuse blown due to repeated turning current on and off
   The illustration shows the state of a fuse blown due to repeated current on/off. Normally, this type of problem occurs after a fairly long period of use and is less frequent than above. In this case, simply replace with a new fuse of the same capacity.

CHECKING SWITCHES

M1001004800177

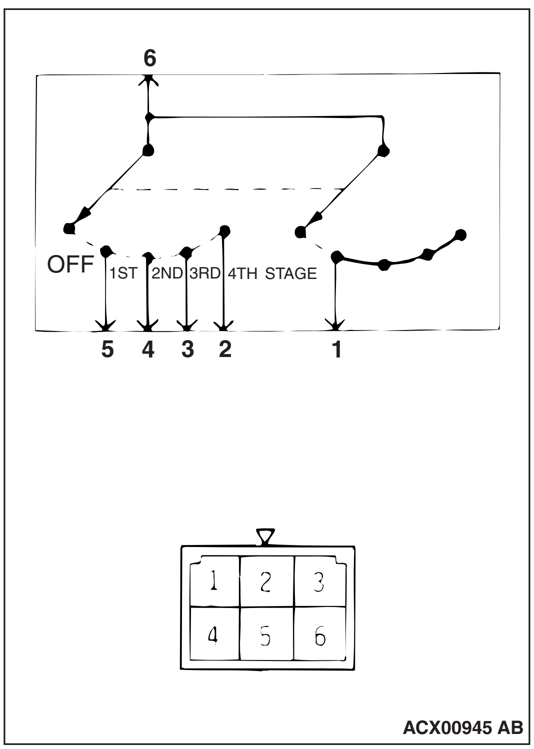


In a circuit diagram, a switch is shown in the idle state.

1. Normally open or normally closed switch

   Switches are classified into those which open the circuit and those which close the circuit when off.

   Switches are shown in their normal state unless specified otherwise.



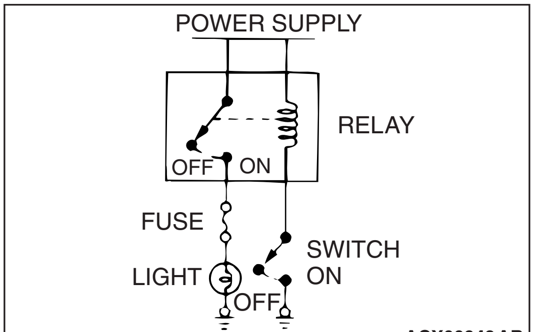
2. Switch connection

   This figure illustrates a complex switch. The continuity between terminals at each position is as indicated in the table below.

SWITCH POSITION	TESTER CONNECTION	SPECIFIED CONDITION
OFF	–	–
1st stage	1-5-6	Continuity
2nd stage	1-4-6	Continuity
3rd stage	1-3-6	Continuity
4th stage	1-2-6	Continuity

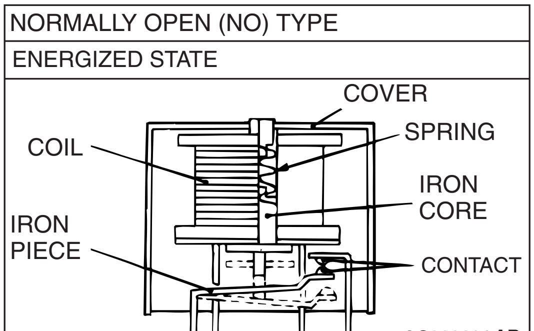
CHECKING RELAYS

M1001004900152



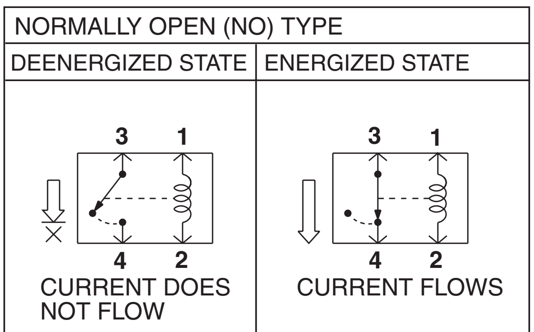
ACX00948 AB

1. By using a relay, a heavy current can be turned on and off by a switch using much less current. For example, in the circuit shown here, when the switch is turned on (closed), current flows to the coil of the relay. Then, its contact is turned on (closed) and the light comes on. The current flowing through the switch is much less than that for the light.

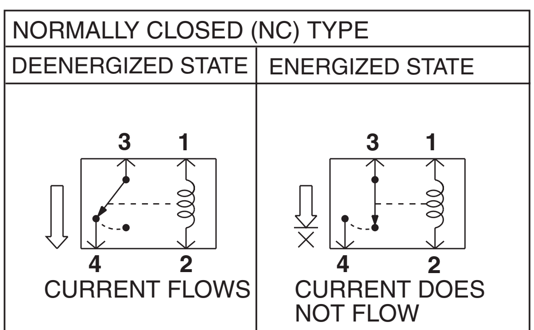


AC308621 AB

2. When current flows through the coil of a relay, its core is magnetized to attract the iron piece, closing (ON) the contact at the tip of the iron piece. When the coil current is turned off, the iron piece returns to its original position by a spring, opening the contact (OFF).



AC310636 AB



AC310637 AB

3. Relays may be classified as the normally open-type or the normally closed-type, depending on their contact construction.

   NOTE: The deenergized state means that no current is flowing through the coil. The energized state means that current is flowing through the coil.

   (1) The normally open-type

   When a normally open relay as illustrated here is checked, there should be no continuity between terminals 3 and 4 when the relay is deenergized. There should be continuity between terminals 3 and 4 when battery voltage and ground are applied to terminals 1 and 2. The relay condition is determined by this check.

   NOTE: Check the relay in both situation which is energized and is not energized.

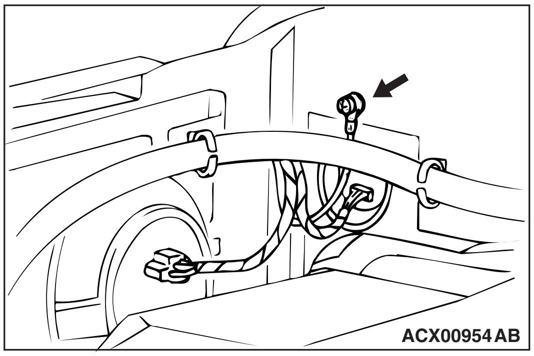
   (2) The normally closed-type

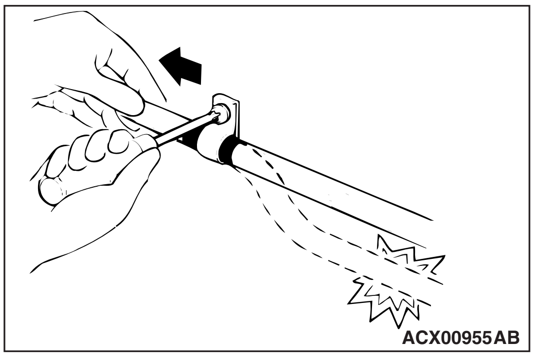
   When a normally closed relay as illustrated here is checked, there should be continuity between terminals 3 and 4 when the relay is deenergized. There should be no continuity between terminals 3 and 4 when battery voltage and ground are applied to terminals 1 and 2. The relay condition is determined by this check.

   NOTE: Check the relay in both situation which is energized and is not energized.

CABLES AND WIRES CHECK

M1001005100041

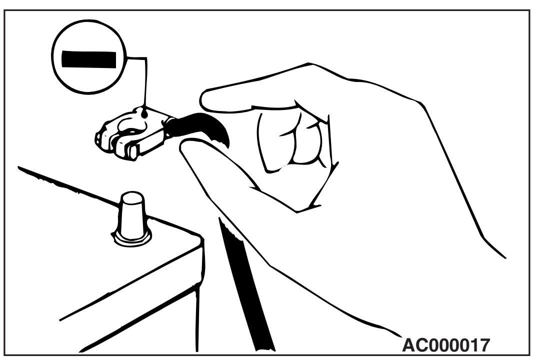

ACX00954AB


ACX00955AB

1. Check connections for looseness, rust, and stains.
2. Check terminals and wires for corrosion.
3. Check terminals and wires for open circuit or impending open circuit.
4. Check wire insulation and coating for damage, cracks, and wear.
5. Check conductive parts of terminals for contact with other metallic parts (vehicle body and other parts).
6. Check grounding parts to verify that there is complete continuity between attaching bolt(s) and vehicle body.
7. Check for incorrect wiring.
8. Check that harnesses are secured to prevent contact with sharp edges and corners or hot parts (exhaust manifold, pipe, etc.).
9. Check that harnesses are secured firmly to provide enough clearance from the fan pulley, fan belt, and other rotating or moving parts.
10. Check that the harnesses between fixed parts (such as the vehicle body) and vibrating parts (such as the engine) are long enough to allow for vibration and movement.

BATTERY HANDLING

M1001005200048


AC000017

⚠ ***WARNING***

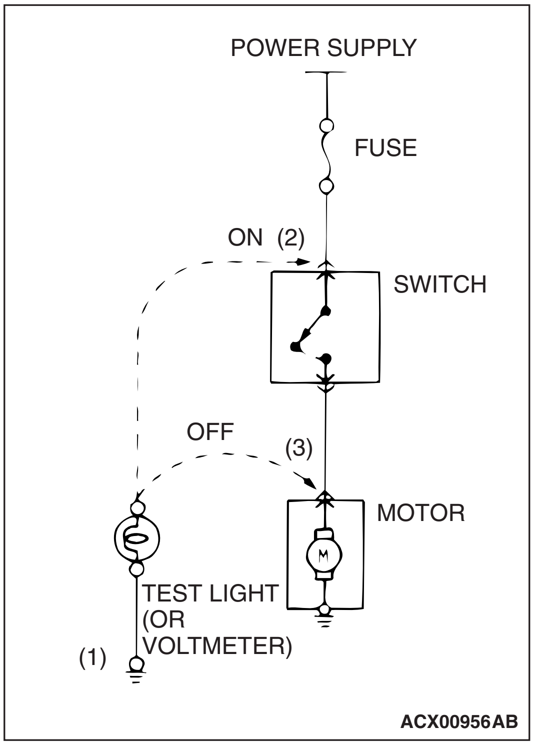
Battery posts, terminals and related accessories contain lead and lead compounds. WASH HANDS AFTER HANDLING.

When checking or servicing does not require power from the vehicle battery, be sure to disconnect the cable from the battery (–) terminal. This will prevent problems that could be caused by a short circuit. Disconnect the (–) battery terminal first and reconnect it last.

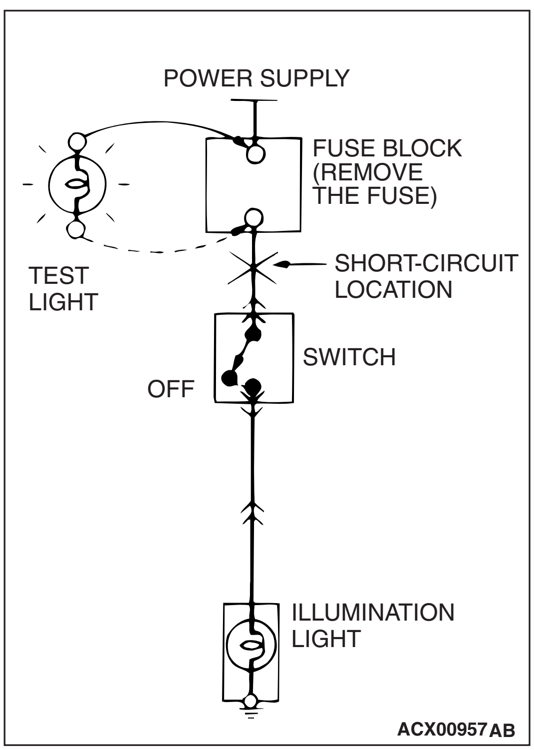
GENERAL ELECTRICAL SYSTEM CHECK

M1001005300045

A circuit consists of the power supply, switch, relay, load, ground, etc. There are various methods to check a circuit including an overall check, voltage check, short-circuit check, and continuity check. Each of the methods briefly described below applies only to circuits similar to the illustration.



1. VOLTAGE CHECK
   (1) Ground one lead wire of the test light. If a voltmeter is used instead of the test light, ground the grounding side lead wire.
   (2) Connect the other lead wire of the test light to the power side terminal of the switch connector. The test light should come on or the voltmeter should indicate a voltage.
   (3) Then, connect the test light or voltmeter to the motor connector. The test light should not come on, or the voltmeter should indicate no voltage. When the switch is turned ON in this state, the test light should come on, or the voltmeter should indicate a voltage, with the motor starting to run.
   (4) The circuit illustrated here is normal. If there is any problem, such as the motor failing to run, check voltages beginning at the connector nearest to the motor until the faulty part is identified.
2. SHORT-CIRCUIT CHECK
   Because the fuse has blown, it is probable that there is a short circuit. Follow the procedures below to narrow down the short-circuit location.

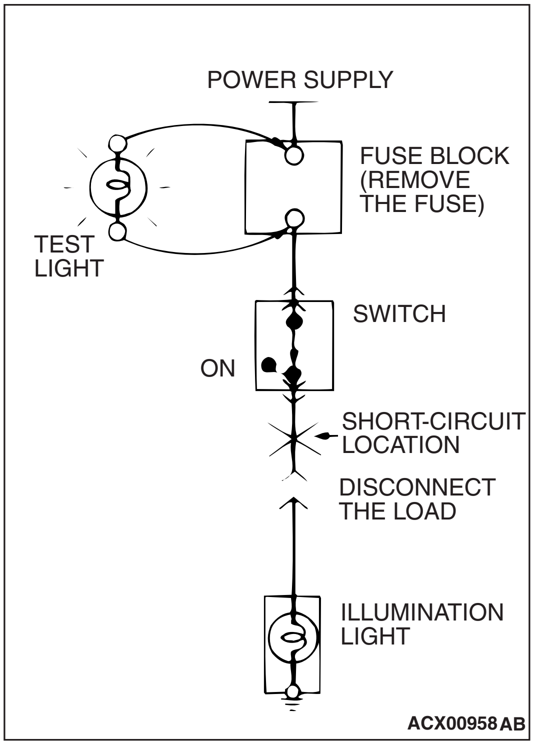


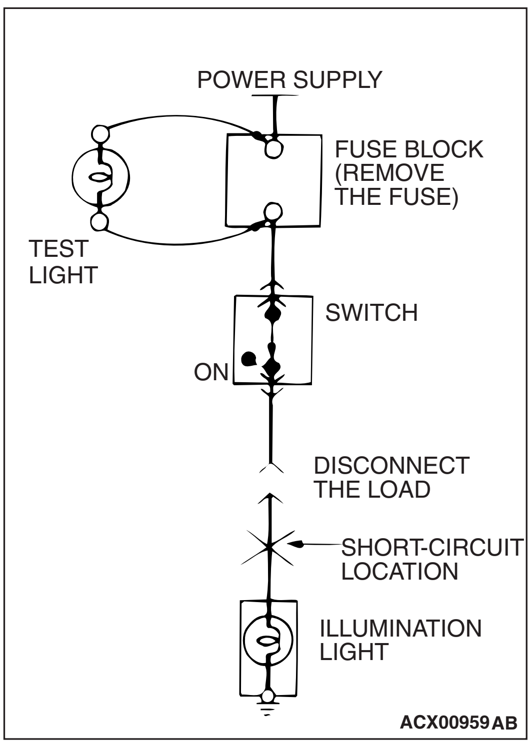
STEP 1. Remove the blown fuse and connect the test light across the fuse terminals (Circuit switch: OFF).

Q: Does the test light illuminate?

YES : Short-circuit exists between the fuse block and the switch. Repair the harness between the fuse block and the switch.

NO : Go to Step 2.



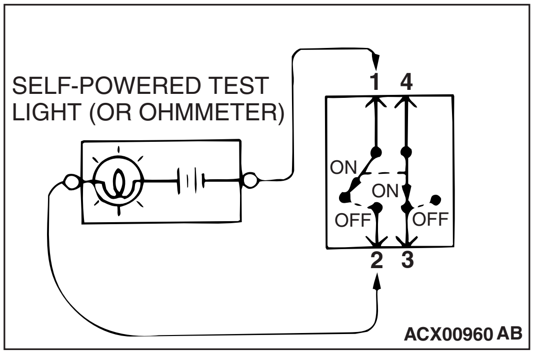


STEP 2. Turn the switch ON and disconnect the illumination light connector.

Q: Does the test light illuminate?

YES : Short-circuit exists between the switch and the connector. Repair the harness between the switch and the connector.

NO : Short-circuit exists between the connector and the illumination light. Repair the harness between the connector and the illumination light.



3. CONTINUITY CHECK
   (1) When the switch is in the "OFF" position and the contact points of terminals 1 and 2 are connected, the self-powered test light should illuminate or the ohmmeter should read 0 ohm.
   (2) When the switch is the "ON" position and the contact points of terminals 3 and 4 are connected, the self-powered test light should come on or the ohmmeter should read 0 ohm.

NOTES

GROUP 42A

BODY

CONTENTS

GENERAL DESCRIPTION

M2420000100949

FEATURES

LIGHT WEIGHT, HIGH RIGIDITY, ANTI-CORROSIVE

- The application ranges of high-tensile steel panels, and anti-corrosion steel panels have been expanded.
- The ring structure for the side structure reinforcement has been adopted.
- The 3-way support structure for the front frame has been adopted.
- The strut tower bar has been installed.<GTS>
- The front floor backbone brace has been installed.
- The upper frame to front pillar brace has been installed.

REDUCTION IN VIBRATION AND NOISE

- More sound absorption/insulator and styrene foam filler have been adopted.
- Adoption of closed section roof bow and roof rail

IMPROVEMENT IN SAFETY

- The one-touch power window (operative after ignition switch is turned OFF) with safety mechanism has been installed. <Vehicles with auto down and auto up mechanism (Driver's seat only)>
- The direct combination key cylinder and inside lock cables for the front doors have been adopted to improve door opening operation upon impact.
- RISE (Reinforced Impact Safety Evolution) has been adopted for the main body.
- The side door beam has been adopted.
- The crush box structure has been adopted to the side member front end.
- The shock absorbing hole has been adopted to the cowl top outer reinforcement.
- The fender padding structure has been adopted.

IMPROVEMENTS IN OPERATION PERFORMANCE

- The central door locking system which can lock/unlock all the doors has been adopted. <Vehicles with power window (auto down and auto up mechanism)>
- The override function which allows to open the driver's door by pulling the driver's inside handle when all the doors are locked has been adopted.
- The power window (operative after ignition switch is turned OFF) has been installed. <Vehicles with auto down mechanism (Driver's seat only)>

IMPROVEMENTS IN MARKETABILITY AND APPEARANCE

- By improving the clicking sound when the door latch and striker are engaged, the door locking sound quality has been enhanced.
- The high rigidity pressed door has been adopted to improve the rigidity of the door sash bottom section.
- The protector film has been adopted onto the side sill. <Vehicles without side air dams>
- The sunroof with safety mechanism has been installed as an option. <ES, GTS>

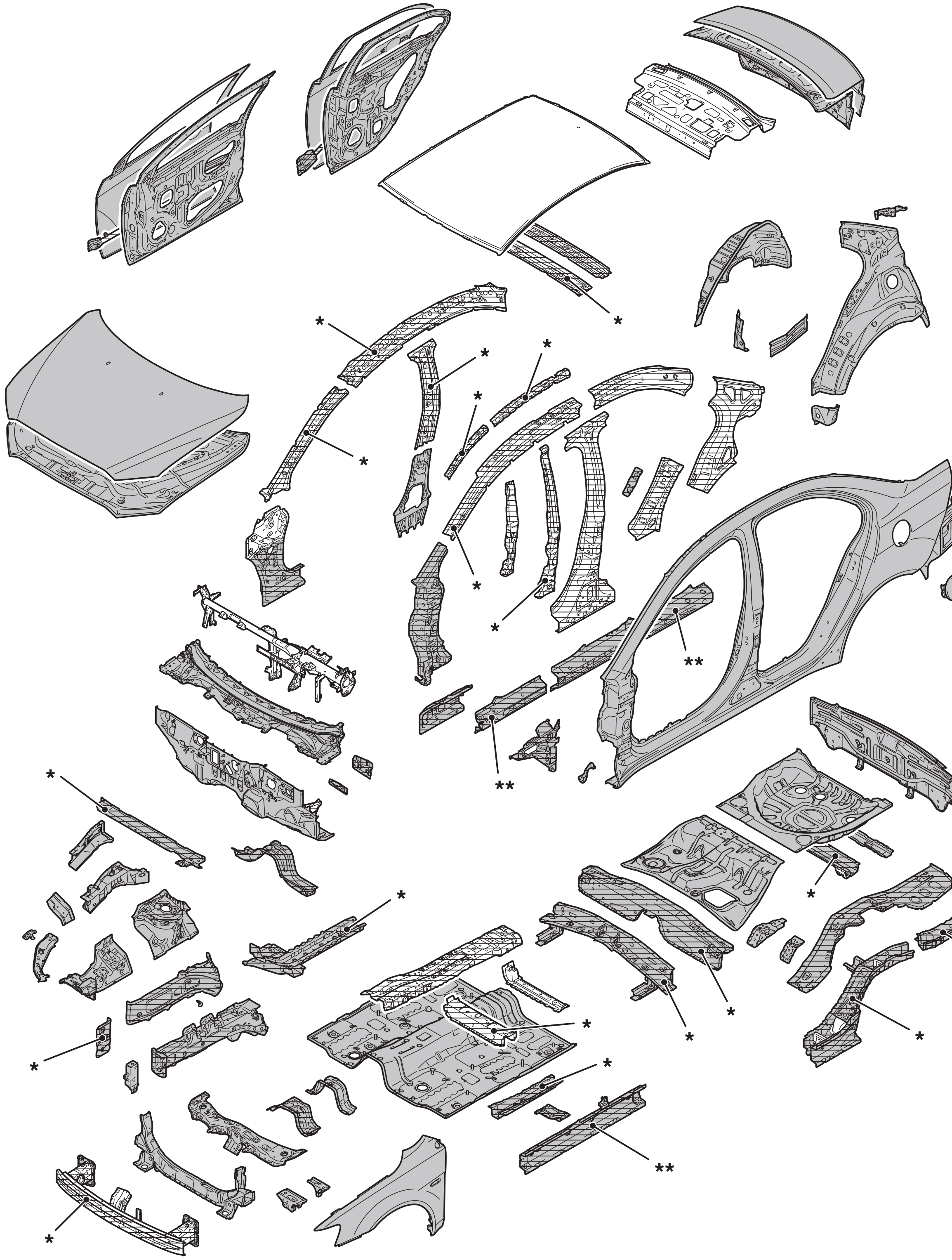
IMPROVEMENTS IN FUNCTIONALITY

- A fuel filler cap holder has been installed to the fuel door in order to prevent the fuel cap from being left open.
- The selector "P" position-linked door unlocking function has been introduced to the central door locking system.

MAIN BODY

BODY PANELING

M2420002000788



: Anti-corrosion steel panels

: High-tensile steel panels (*: Indicates 590MPa-high-tensile steel panels.)

(**: Indicates 980MPa-ultra-high-tensile steel panels.)

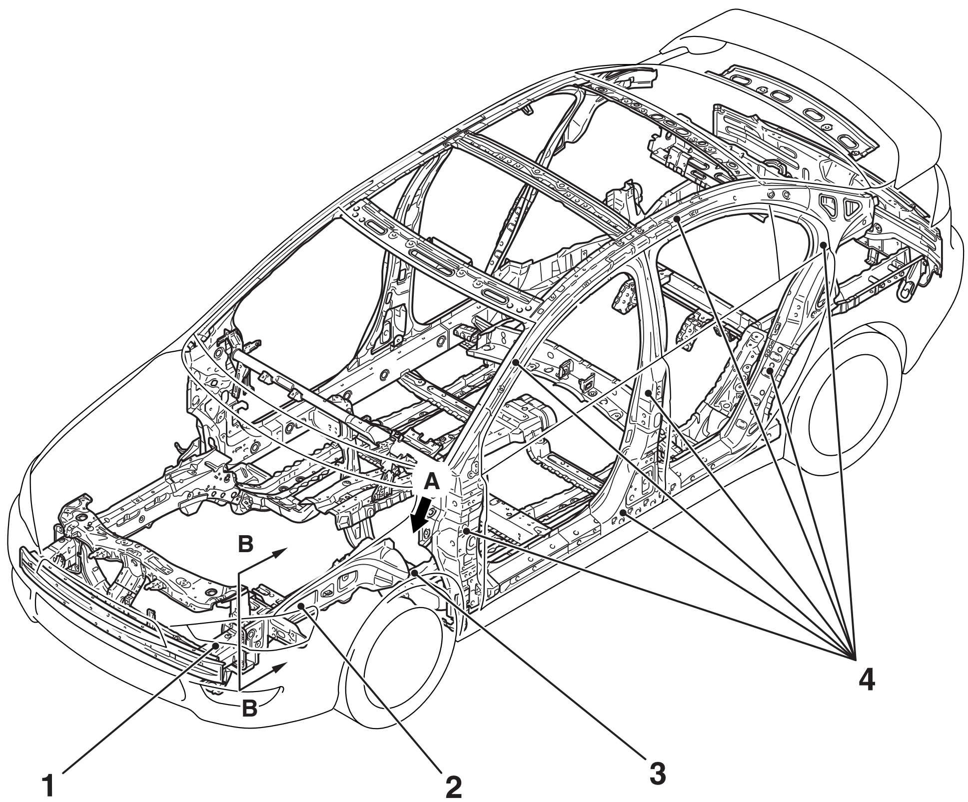
AB601700AC

- RISE (Reinforced Impact Safety Evolution) has been adopted for the main body in order to improve all-round impact safety at high level.
- The applications of anti-corrosion steel plates have been expanded to the hood, doors, inner panel of the trunk lid and reinforcements to improve the anti-corrosive properties of the main body.
- High-tensile steel panels of 590MPa-grade and 980MPa-grade have been used for some panels to improve collision safety and reduce weight.

BODY SHELL

M2420003000758

IMPACT SAFETY BODY RISE (REINFORCED IMPACT SAFETY EVOLUTION)



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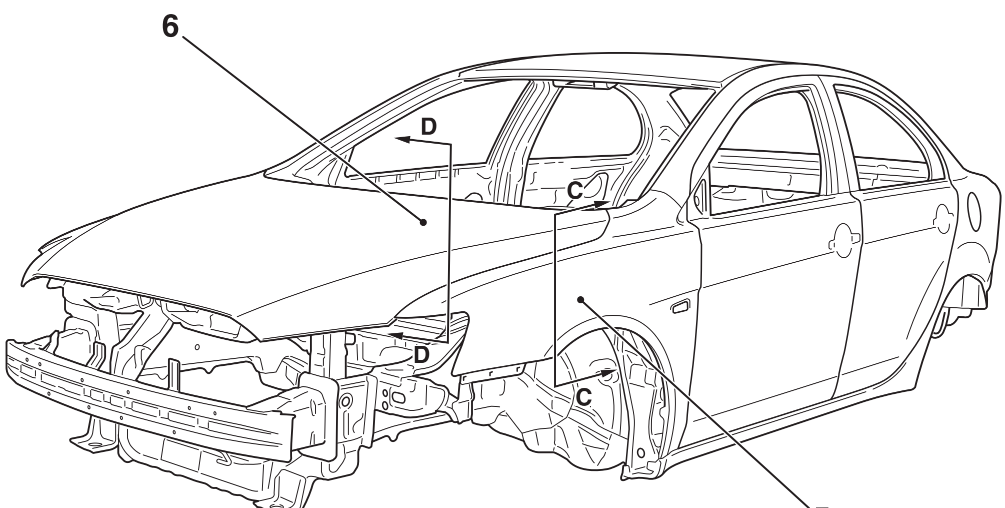

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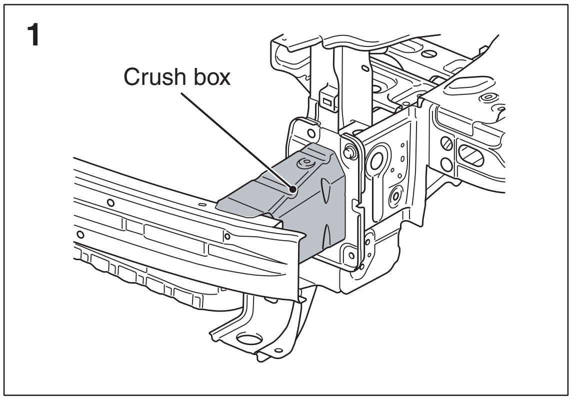
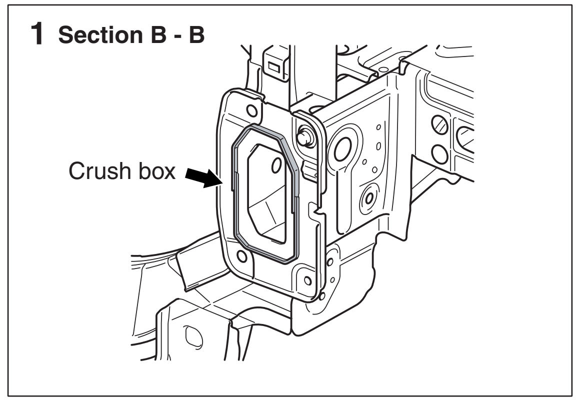
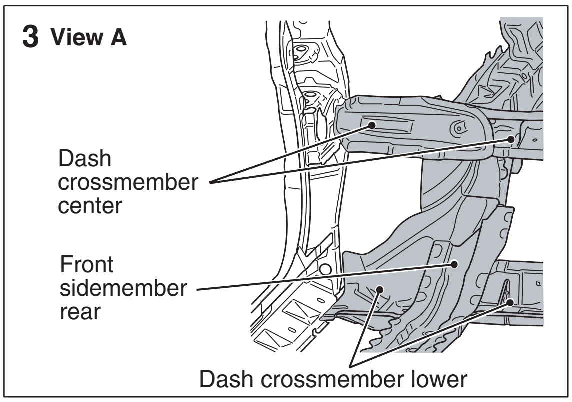
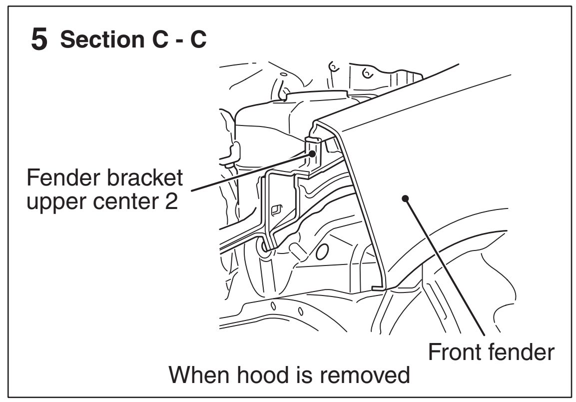
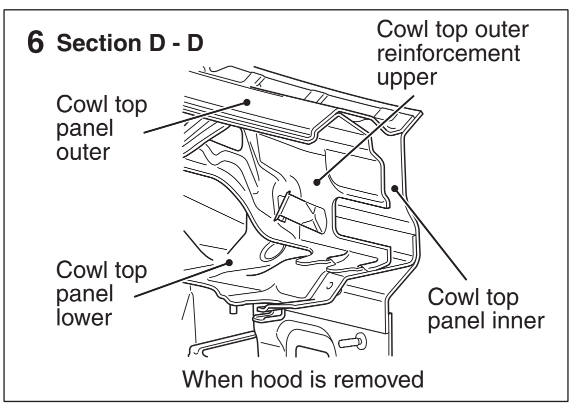








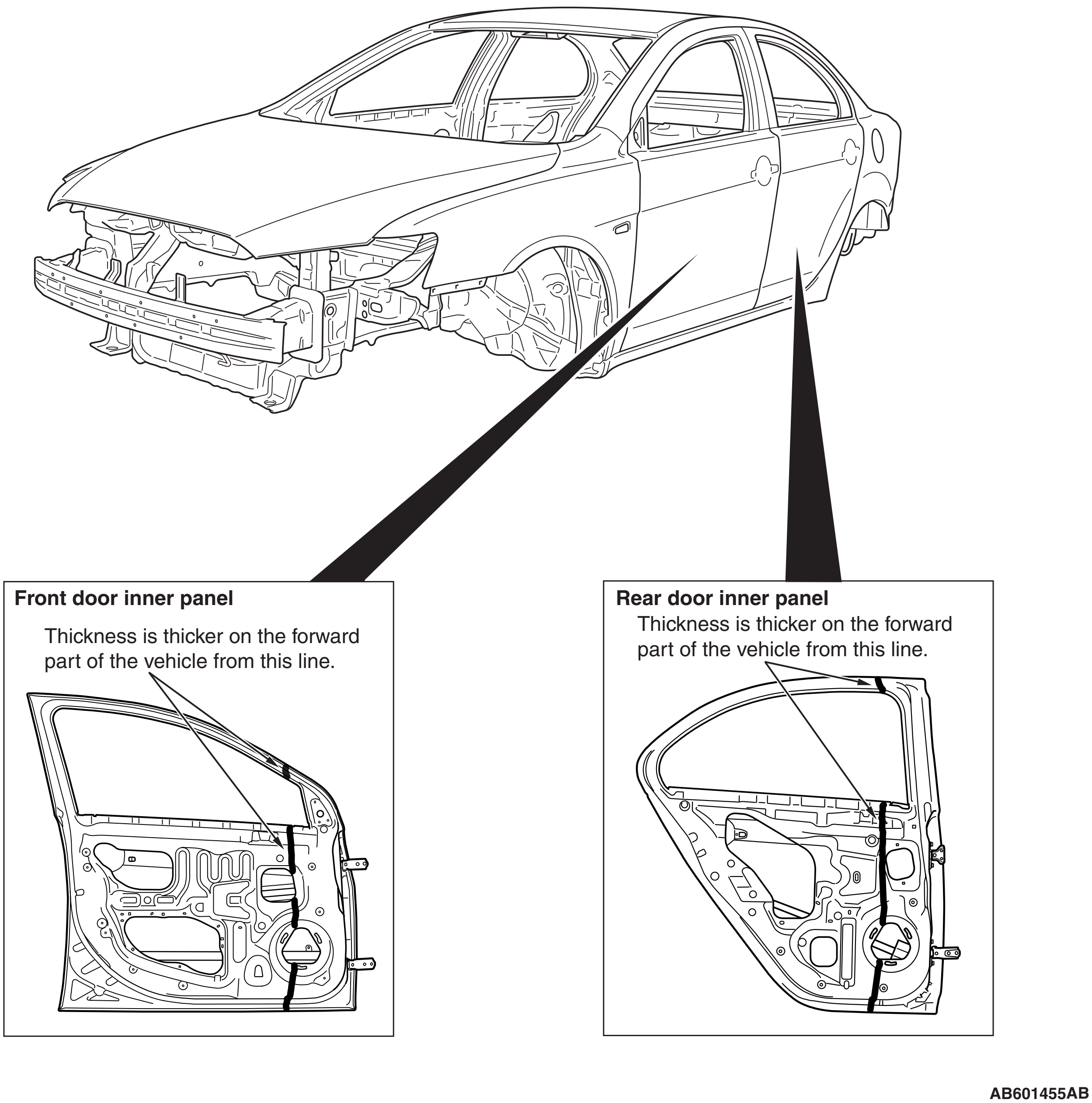


AB601678AB

The front and rear structures to absorb high energy, and the highly tough cabin structure is adopted to reduce the risk of passenger injuries at front-, rear-, and side-impact collisions, secure the space for life protection, and facilitate rescuing passengers. The structures also have the following features:

1. The crush box structure, which has an octagonal cross-section at the front end of the front sidemember, has been adopted. This structure can effectively absorb energy upon frontal impact and reduces the vehicle repair cost caused by a light collision.
2. The straight frame structure has been adopted for the front sidemember to improve performance upon frontal impact.
3. The front frame structure is supported in three directions by the dash crossmember center, dash crossmember lower, and front sidemember rear in order to improve the frontal collision characteristics, and increase the vehicle body rigidity.
4. An annular construction has been used for the side structure reinforcement to improve collision safety and vehicle body rigidity.
5. The padding structure of the fender has been adopted to efficiently absorb energy upon impact and improve the pedestrian protection capability.
6. The impact absorbing opening on the cowl top outer reinforcement has been added to efficiently absorb energy upon impact and improve the pedestrian protection capability.

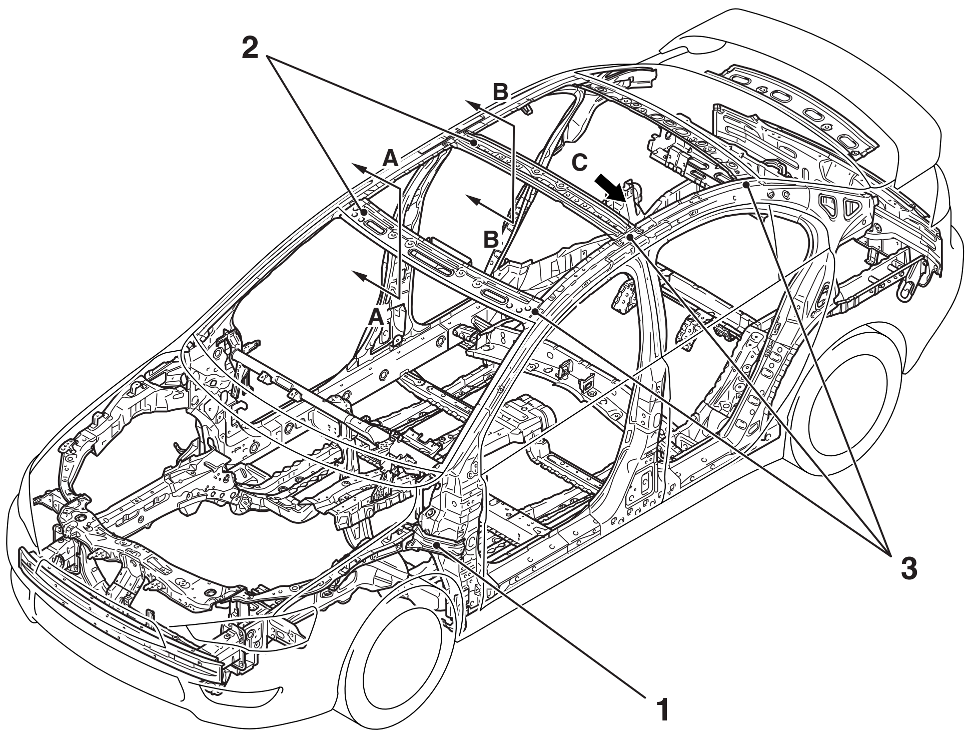
STEEL PLATE WITH UNEVEN THICKNESS



The uneven thickness steel panels* (in uneven thickness integrated structure) have been adopted for the parts shown in the figure to improve safety upon impact and reduce weight.

*NOTE: *: A steel sheet of varying thickness that is welded into one steel sheet.*

STEERING ABILITY



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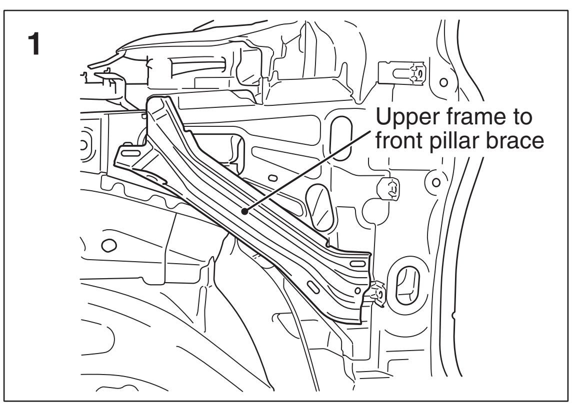
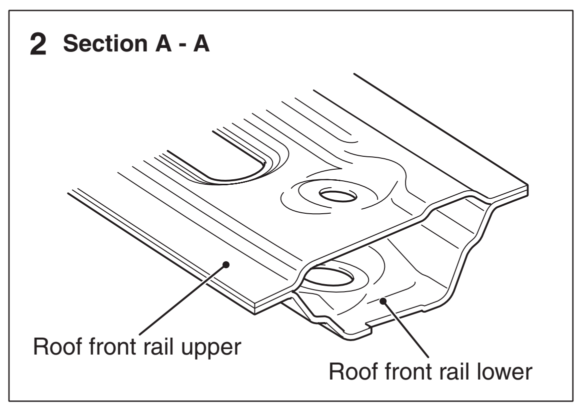
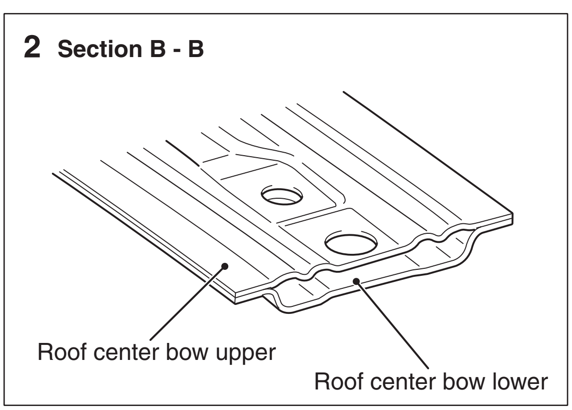
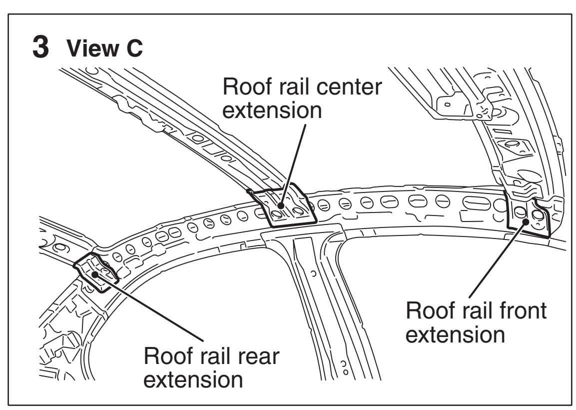








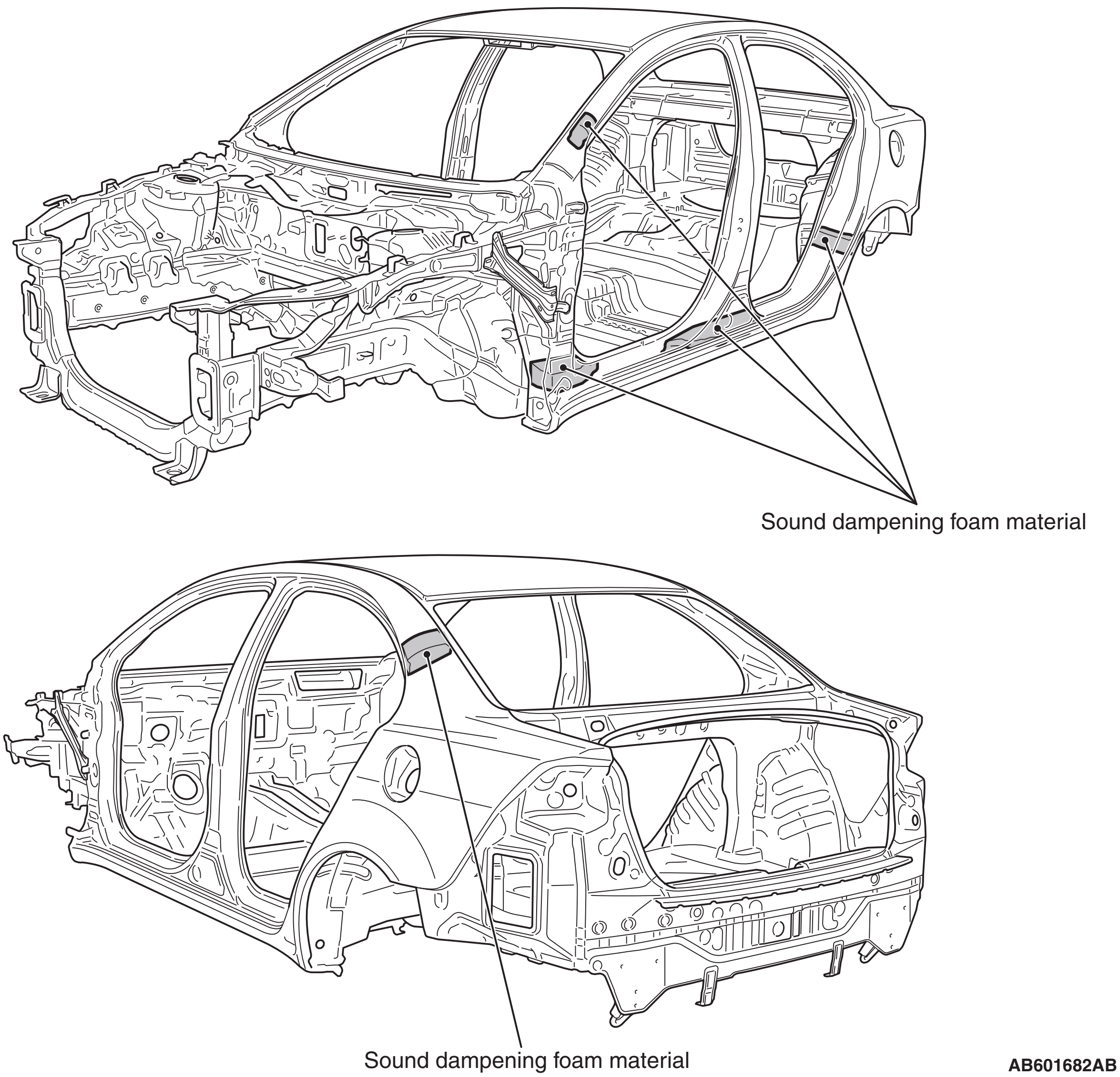
AB601770AB

1. Rigidity was heightened and driving stability was improved by bonding the front upper frame outer and front pillar by the upper frame to front pillar brace.

2. The closed section structure has been adopted for the roof bow and roof rail to heighten rigidity, improve driving stability, and to reduce vibration and noise.
3. Rigidity was heightened and driving stability was improved by bonding the roof bow and roof rail and the side outer panel by the brace.

QUIETNESS

M2420004000568



The front pillar upper and lower, center pillar lower, side roof rail and the rear wheel house front have been filled with the sound dampening foam material to reduce noise.

BODY COLOR CHARTS

M2420005001360

Check the vehicle's body color code, and then use this body color chart to determine the refinishing paint supplier from which the color can be purchased.

Color	Color code	Color number	Color name (Previous name)	Composition of film
SILVER	A31	CMA10031	Cool Silver Metallic	Metallic
MEDIUM PURPLISH GRAY	A39	CMA10039	Medium Purplish Gray Mica	Metallic + Interferenced Pearl
GREENISH SILVER	A86	CMA10086	Greenish Silver Metallic	Metallic + Interferenced Pearl
BLUE	T70	CMT10070	Blue Mica	Pearl
BEIGE	S18	CMS10018	Platinum Beige Metallic	Metallic + Interferenced Pearl
BLACK	X42	AC11342	Black Mica (Amethyst Black)	Interferenced Pearl
WHITE	W37	CMW10037	White Solid	Solid
RED	P26	CMP10026	Red Metallic	Metallic

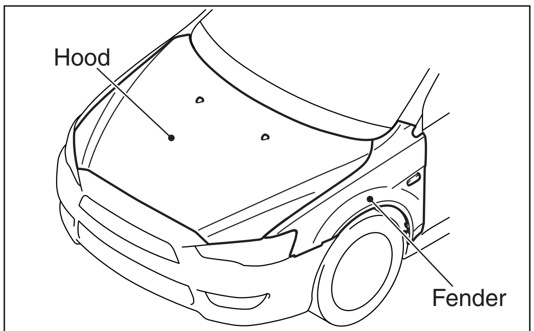
NOTE:

- *It is a solid, but clear coating is applied.*
- *For painting, inner panel colors should be similar to the outer panel colors.*

HOOD AND FENDER

M2420001400125

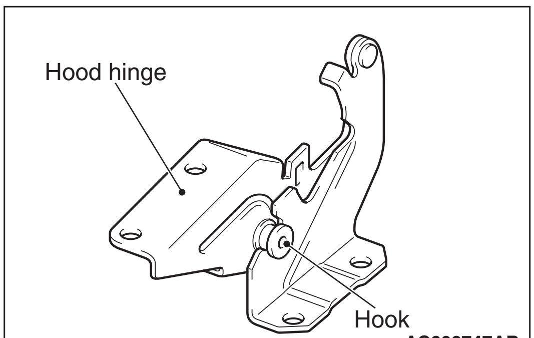
PANEL



AC608745AB

A shock absorbing structure has been adopted for the insertion in between hood and the engine room and the frame between the fender and the body to secure the space for shock absorbing, reducing a risk of injury to a pedestrian's head area during a collision.

HOOD HINGE

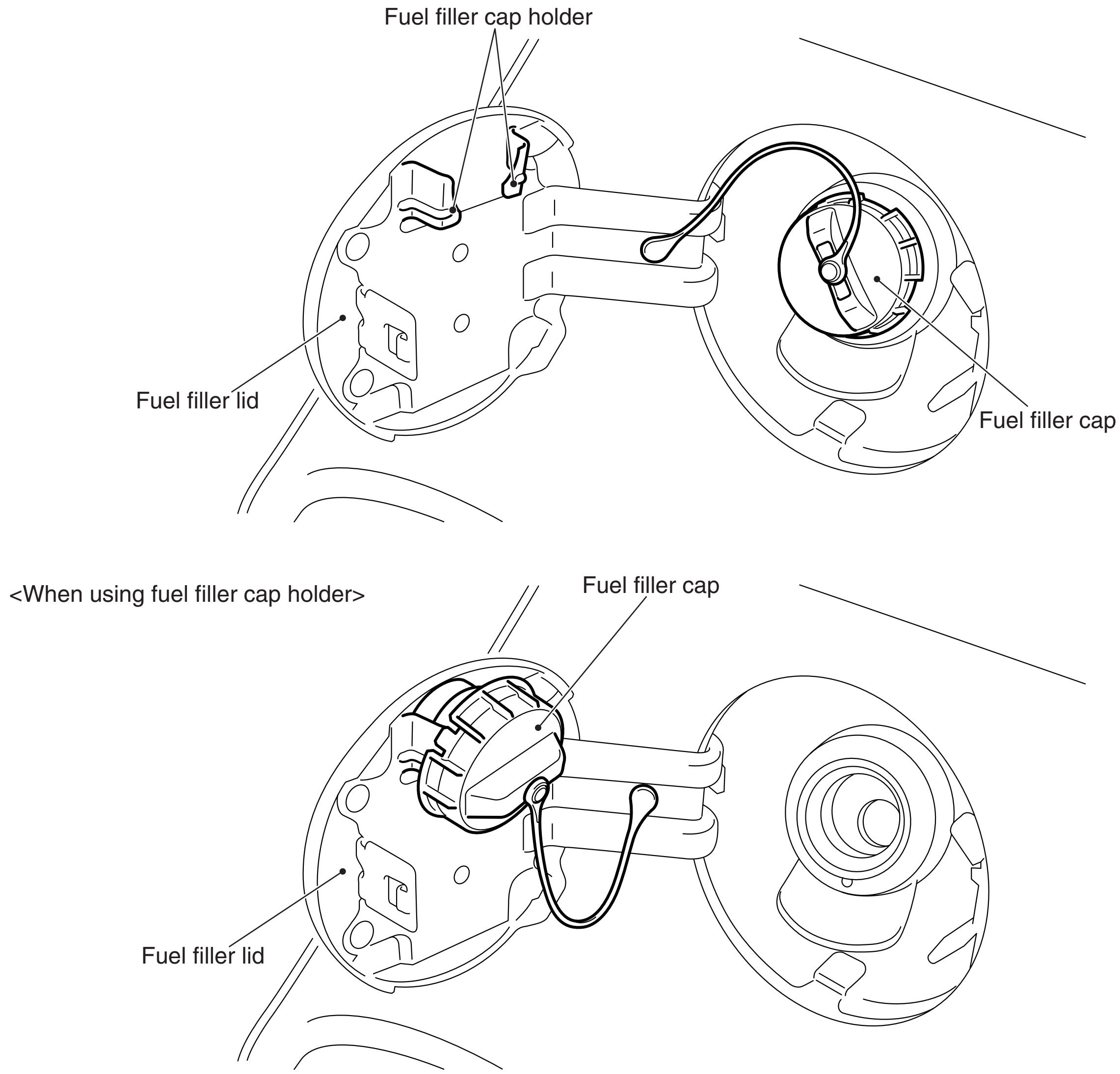


AC608747AB

The bolt type hook has been adopted for the hood hinge to suppress cabin deformation and improve safety upon impact.

FUEL FILLER LID

M2420014000257

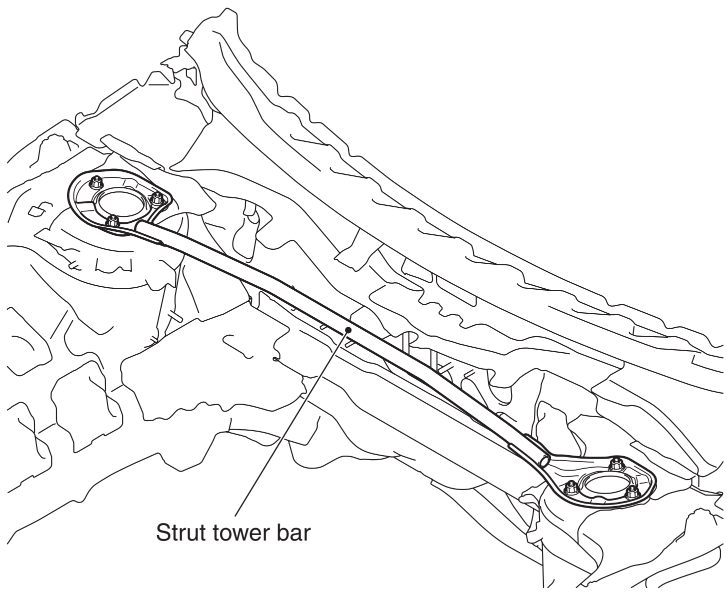


AC608385AB

The fuel filler cap holder has been installed to the fuel lid, holding the removed cap in refueling to prevent the fuel cap from being left open.

STRUT TOWER BAR <GTS>

M2420001300236



AC608384AC

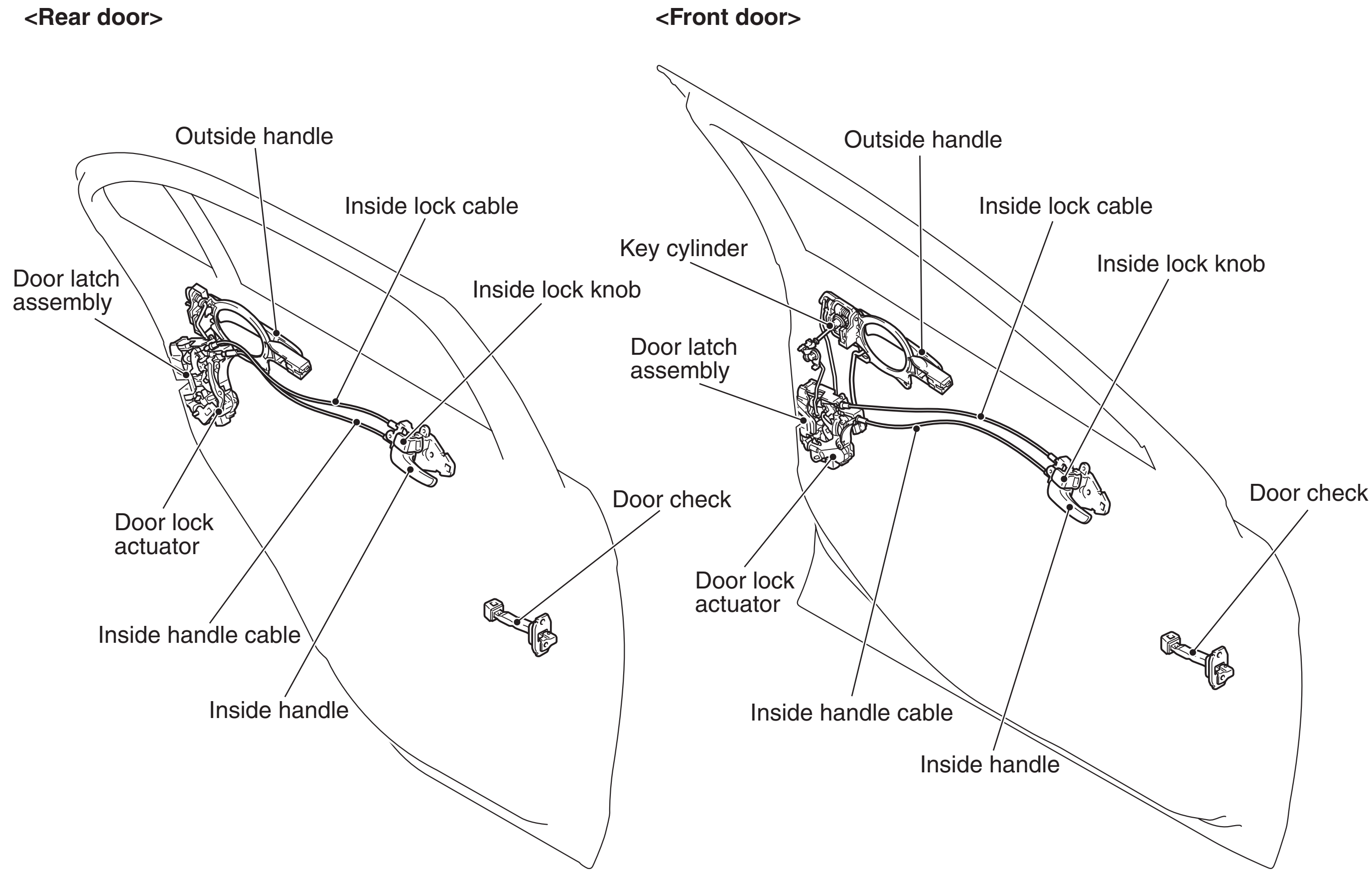
The strut tower bar has been adopted to the strut attachment point to improve steering ability

DOOR

DOOR LOCK

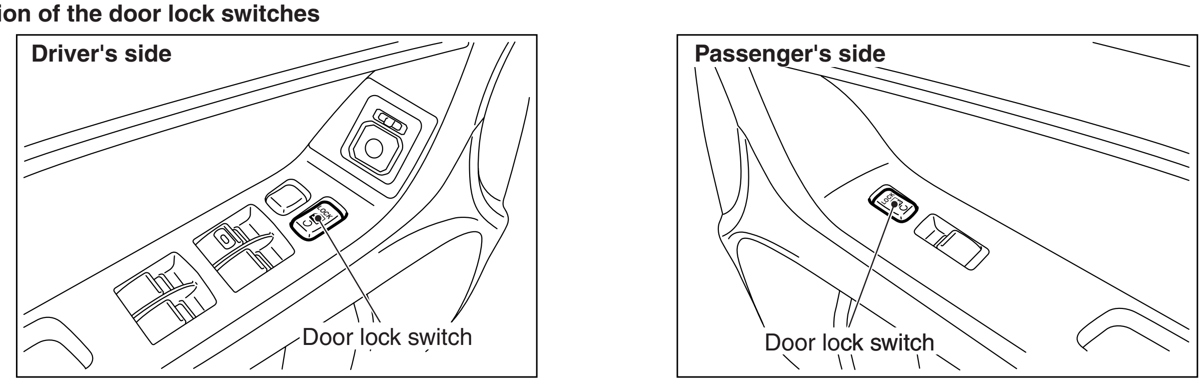
M2420009000660

CENTRAL DOOR LOCKING <Except DE>



AC608386AB

Location of the door lock switches



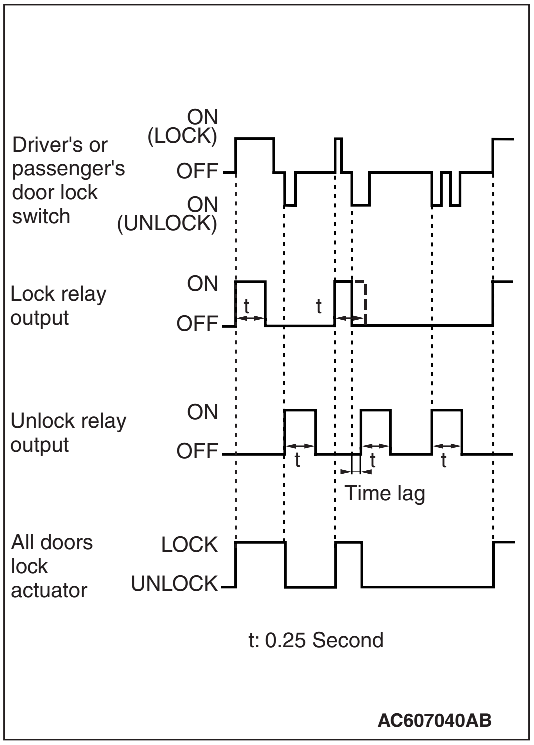
AC608439AB

- The central door locking system that locks/unlocks all the doors using the door lock switch has been installed.
- The child protection function has been introduced to prevent the rear doors from being opened accidentally during driving.
- The key-in prevention function has been introduced.
- The selector "P" position-linked door unlocking function has been introduced.
- The direct combination key cylinder mechanism has been adopted.

DESCRIPTION OF CONSTRUCTION AND OPERATION

CENTRAL DOOR LOCKING

- All the doors can be locked/unlocked, using the driver’s side door lock switch or the passenger’s side door lock switch.
- The function that allows the driver's door to be opened by pulling the driver's door inside handle even when the driver's door inside lock knob is in the lock position is called "override function".

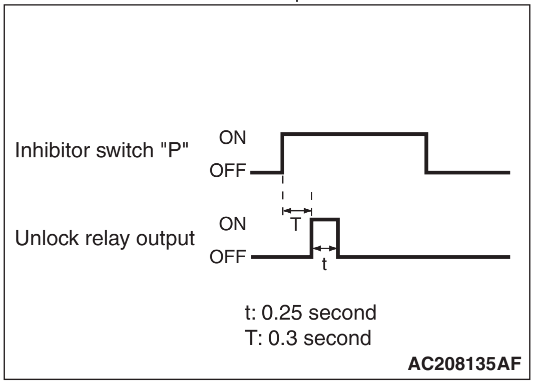


When the door is locked by the driver’s or passenger’s door lock switch, the ETACS-ECU operates its door lock relay and passes a current through the door lock actuators of all the doors for 0.25 second to lock all the doors.
When the door is unlocked by the driver’s or passenger's door lock switch, the ETACS-ECU operates its door unlock relay and passes a current through the door lock actuators of all the doors for 0.25 second to unlock all the doors.

When the door is locked and unlocked by driver’s or passenger's door lock switch consecutively, the ETACS-ECU operates its door lock relay and passes a current through the door lock actuators of all the doors for 0.25 second to lock all the doors. Then, the ETACS-ECU operates its door unlock relay and passes a current through the door lock actuators of all the doors for 0.25 second to unlock all the doors. Due to this, there may be a time lag between the driver’s or passenger's door lock switch actuation and the time when all the doors are unlocked.

SELECTOR "P" POSITION-LINKED DOOR UNLOCKING FUNCTION

- When the selector lever is shifted to the "P" (parking) position with the ignition switch turned ON, all the doors will be unlocked automatically, improving passengers' convenience for getting out. Using a customization feature, the selector "P" position-linked door unlocking function can be switched (Refer to P.42A-24).

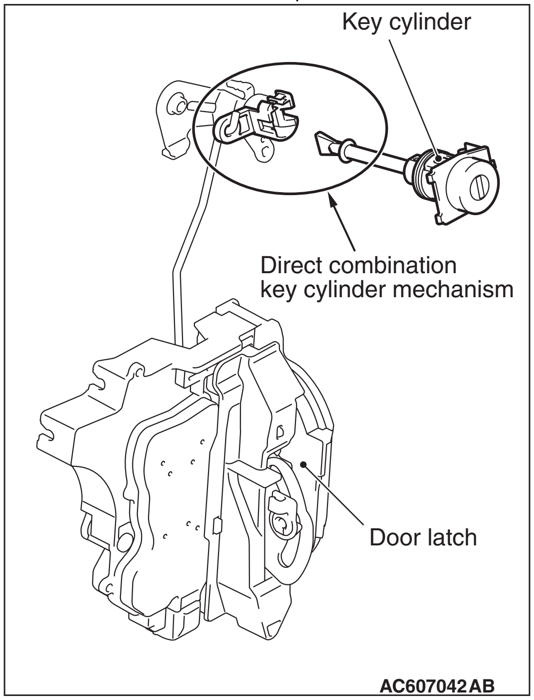


When the selector lever is shifted to the P position with the ignition switch turned ON, the inhibitor switch "P" turns ON, ETACS-ECU turns the unlock relay output ON for 0.25 seconds to unlock all the doors.

KEY-IN PREVENTION FUNCTION

When the driver's door inside lock knob is operated to the lock position with the driver's door opened, the driver's door cannot be locked, preventing it from being locked with the key inside the vehicle.

DIRECT COMBINATION KEY CYLINDER MECHANISM



The impact of a side collision is not easily transferred to the door latch with the doors unlocked (to prevent passengers from falling out of the vehicle).
Even if any door key cylinder is attempted to be tampered with the doors locked, the tampering force is not easily transferred to the door latch, to deter thieves.

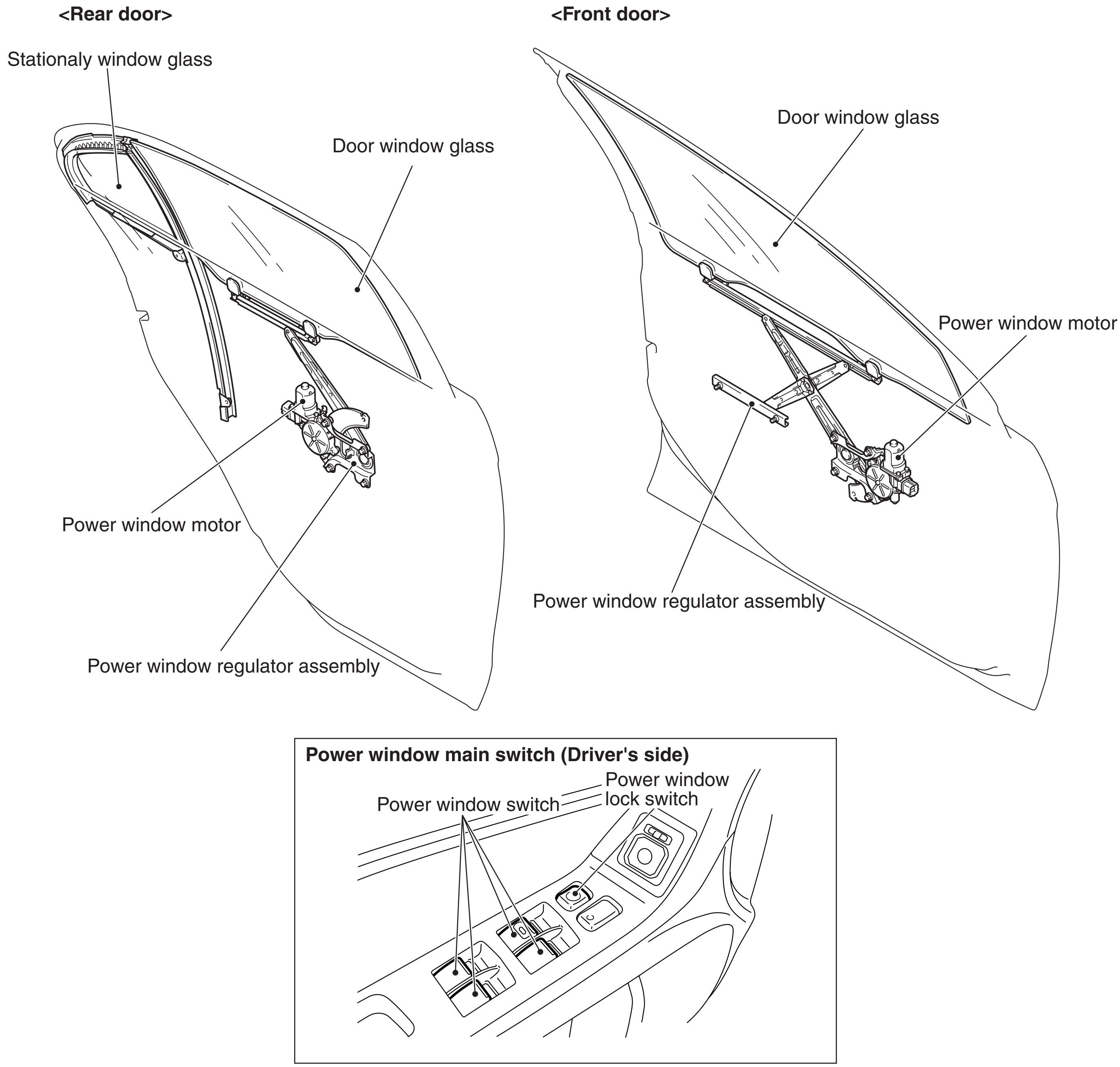
CENTRAL DOOR LOCKING SYSTEM

DOOR LOCK OPERATION TABLE

Operation			Driver's side door	Passenger's side door	Rear door	Trunk lid
Door lock key cylinder	Driver's side door	Lock	Lock			
		Unlock	Unlock			
	Passenger's side door <Vehicles with WCM (without keyless entry system)>	Lock		Lock		
		Unlock		Unlock		
Trunk lid lock key cylinder <Vehicles with WCM (without keyless entry system)>		Lock				Lock
		Unlock				Unlock
Door lock switch	Driver's side door	Lock	Lock	Lock	Lock	
		Unlock	Unlock	Unlock	Unlock	
	Passenger's side door	Lock	Lock	Lock	Lock	
		Unlock	Unlock	Unlock	Unlock	

POWER WINDOW

M2420022000274



AC608387AB

The power window has the following features:

- Safety mechanism <Vehicles with auto down and auto up mechanism (Driver's door only)>
- Power window timer function
- Power window lock switch

DESCRIPTION OF CONSTRUCTION AND OPERATION

POWER WINDOW SYSTEM <Vehicles with auto down and auto up mechanism>

The power window main switch has a waterproofing structure which prevents water (such as rain drops) from entering from above. Should water enter, it is drained through the hole located on the lower area of the switch, and no water may be accumulated.

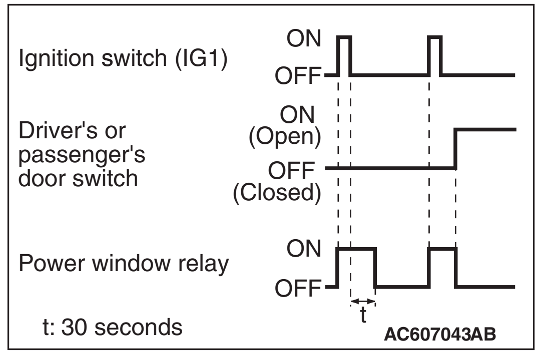
POWER WINDOW SWITCH

The power window switch has a push-pull operation method to enhance safety. To open a door window glass, press in the switch knob; and to close, pull it up.

SAFETY MECHANISM <Vehicles with auto down and auto up mechanism (Driver's door only)>

- The power window with the safety mechanism has been adopted to enhance safety. If any obstacle such as a hand or a head is detected to be pinched during a door window glass closing operation, the door window glass is opened by approximately 150 mm (6.0 inches). The safety mechanism is activated when the power window switch is operated by one-touch closing operation (the status when the hand is released from the switch knob after one-touch closing operation).
- To prevent anyone from intruding into the vehicle, by performing the manual-closing operation of the power window switch, or by continuing the one-touch closing operation (keep pulling up the switch knob), the door window glass can be forcibly closed without safety mechanism activation even when the obstacle is detected to be pinched.
- When the power window switch manual-closing or one-touch closing operation is performed accidentally, and an obstacle is detected, the power window switch manual-closing and one-touch closing operations are prohibited for 3 seconds after the obstacle has been detected to be pinched, and activates the safety mechanism.

POWER WINDOW TIMER FUNCTION



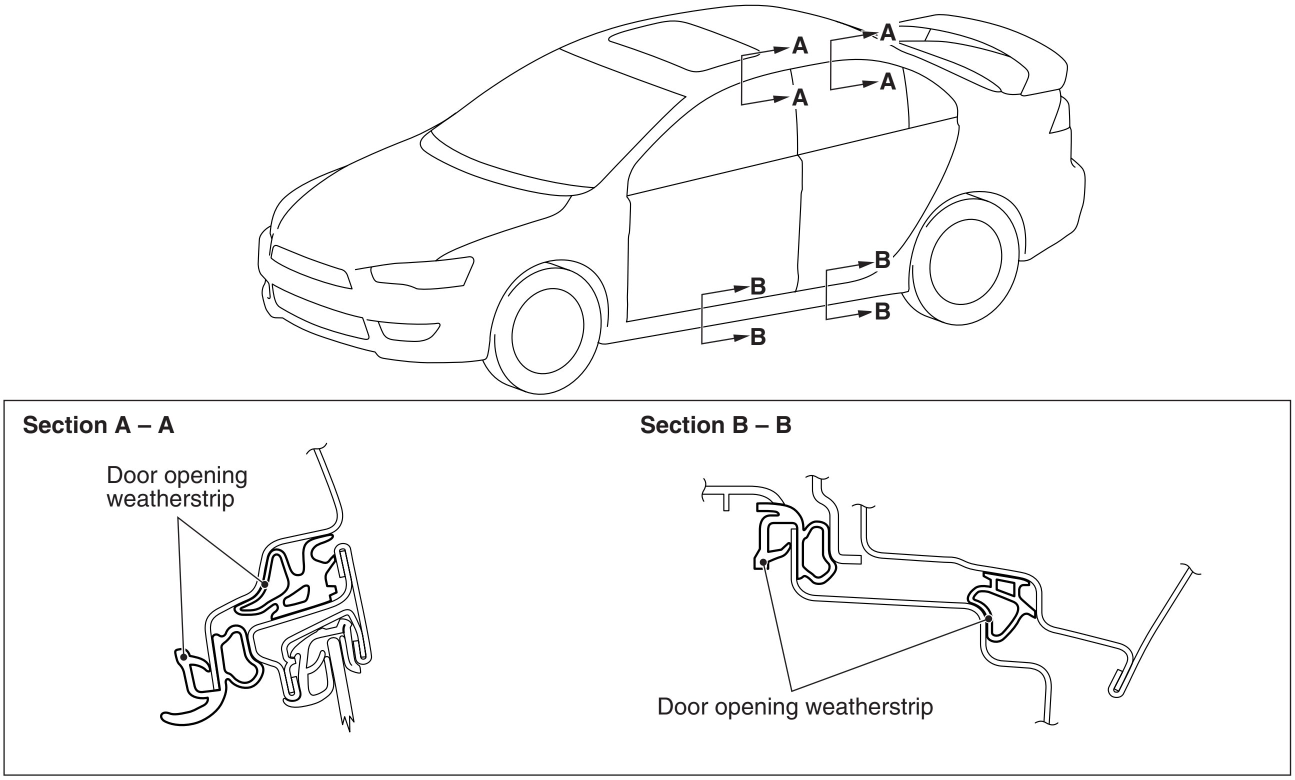
Even after the ignition is switched off, the ETACS-ECU keeps the power window relay activated for approximately 30 seconds, enabling raising or lowering of the power windows by using the power window switches. After approximately 30 seconds, the power window relay is deactivated.
During this timed operation, if the driver’s or passenger’s doors are opened, the power window relay is deactivated from that moment.

POWER WINDOW LOCK SWITCH

The driver power window switch is equipped with the lock switch. This switch disables the opening/closing operation of the door window glass using each passenger's power window switch and rear power window switch.

WEATHERSTRIP

M2420020000320

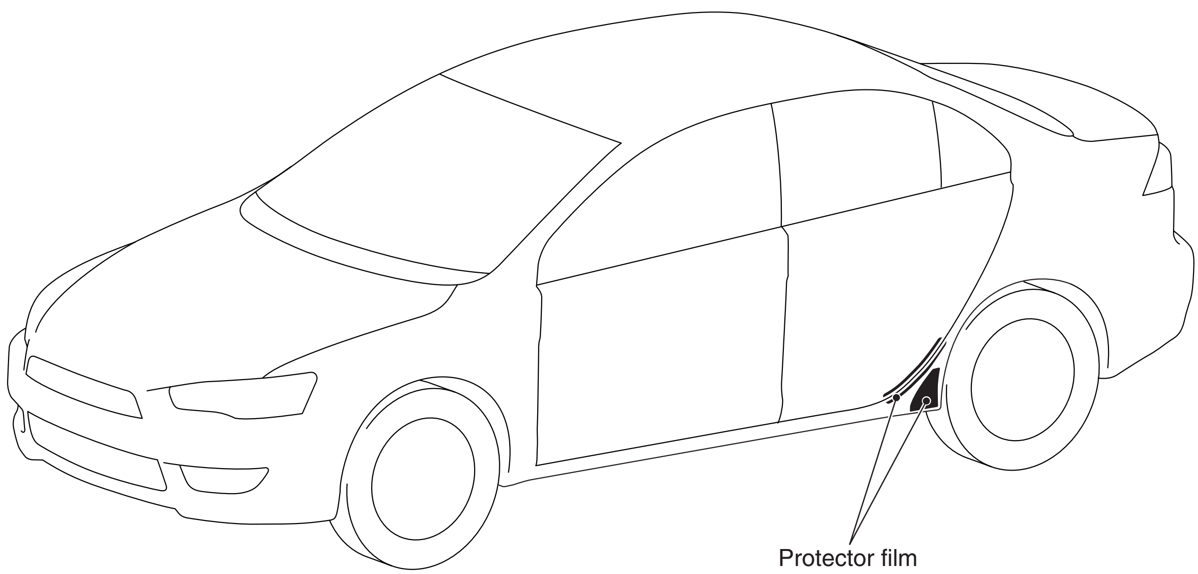


AC607044AB

The double weather strips have been installed along the perimeter of the door window to improve the sound-proof and water-proof performances.

PROTECTOR FILM <Vehicles without side air dam>

M2420021000226

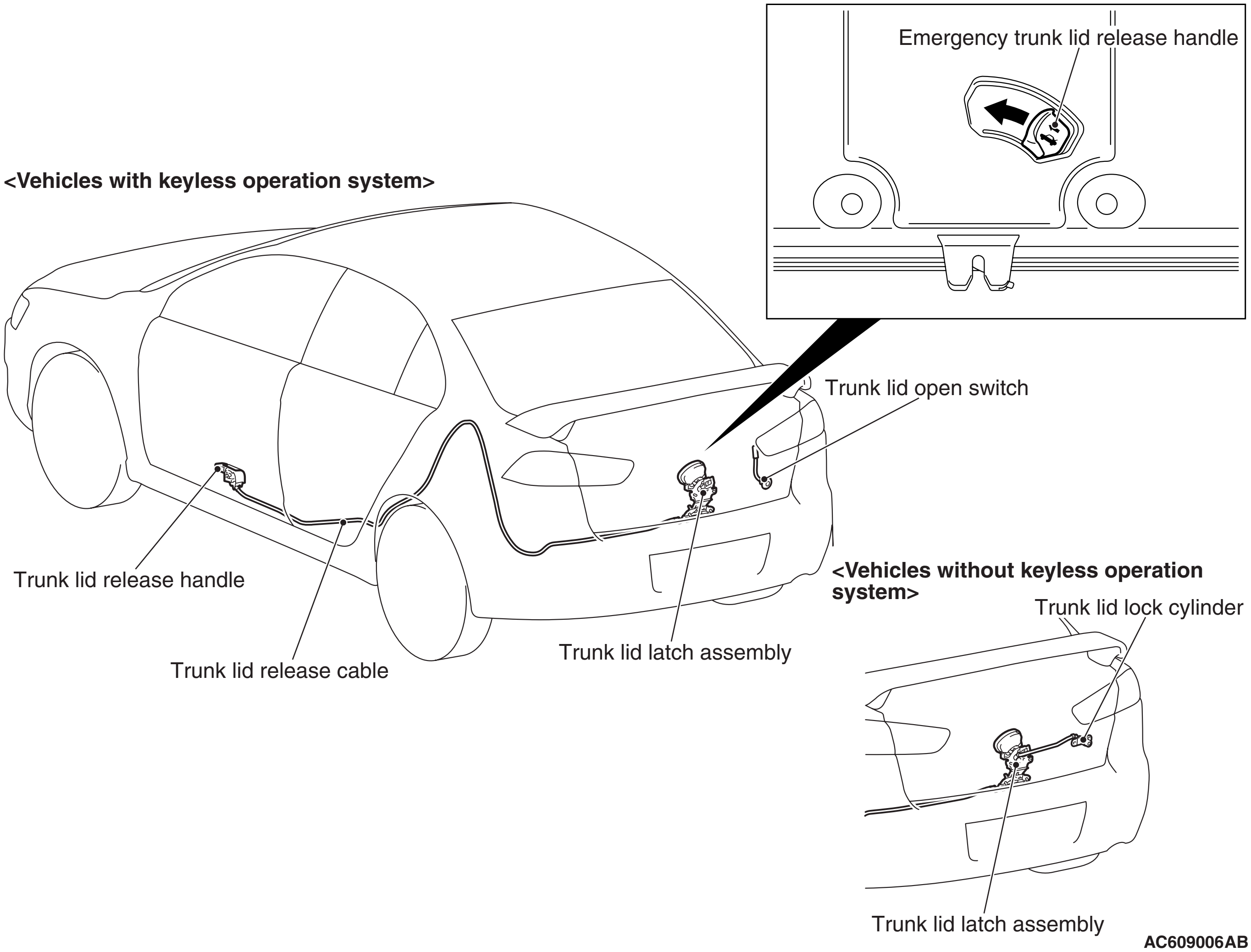


The lower parts of the side sill are equipped with a protector film to prevent paint chipping and scratches caused by stone chips.

TRUNK LID

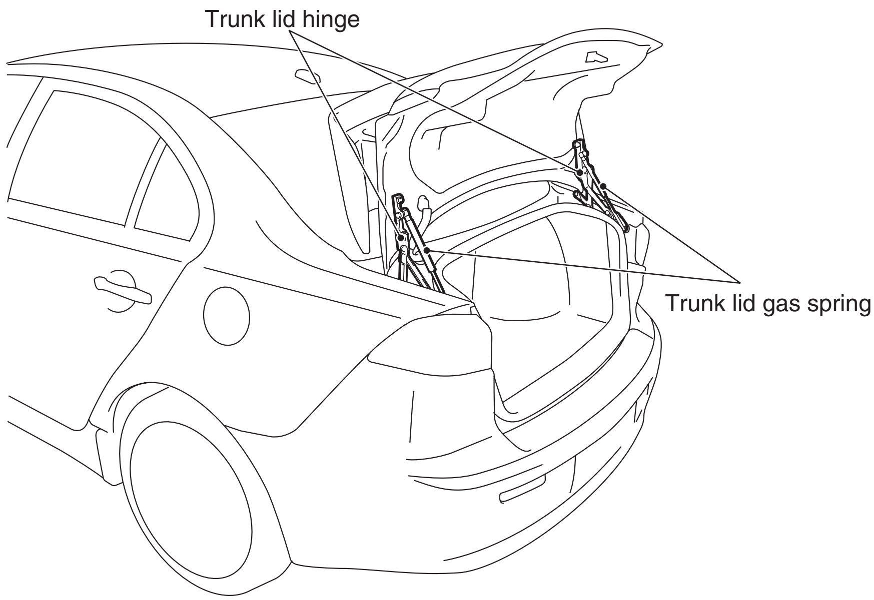
M2420013000135

TRUNK LID LATCH



- The trunk lid latch prevents a person from being confined in the luggage compartment in an accident.
  You can open the trunk lid by pulling an emergency trunk lid release handle to the arrow direction when you are confined in the luggage compartment in an accident.
- The emergency trunk lid release handle glows by absorbing light, so you can operate the handle even in a dark luggage compartment.
  NOTE: The glow time depends on the amount of light absorption, but the handle will glow four hours maximum when exposed to sunlight for 30 seconds or more. The glow performance depends on environmental conditions.

TRUNK LID GAS SPRING AND HINGE



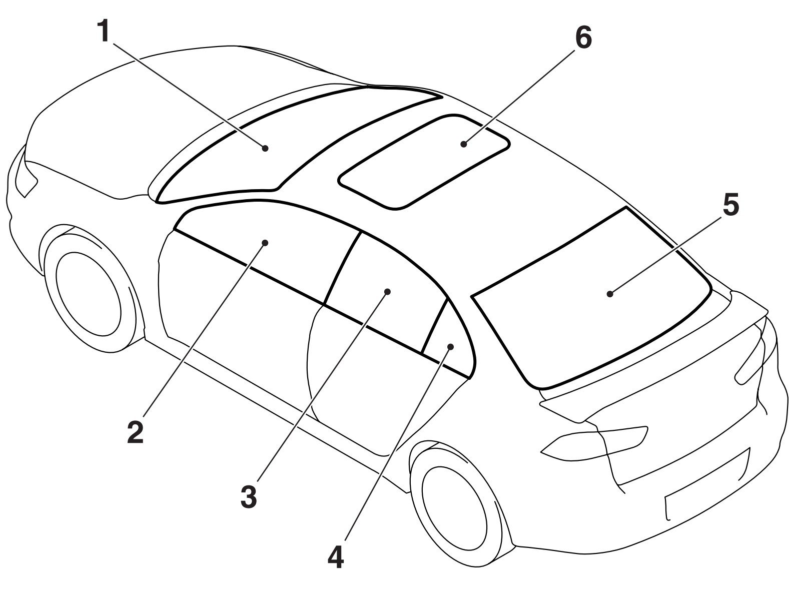
AC608743AB

- The gas springs allow the customer to open or close the trunk lid easily.
- The link type hinge has been adopted to control the backward protrusion on opening/closing the trunk lid and to eliminate the protrusion on closing the trunk lid, for retractility

WINDOW GLASS

M2420015000926

VISIBLE RAY TRANSMISSIVITY RATE FOR WINDOW GLASS



AC608392AB

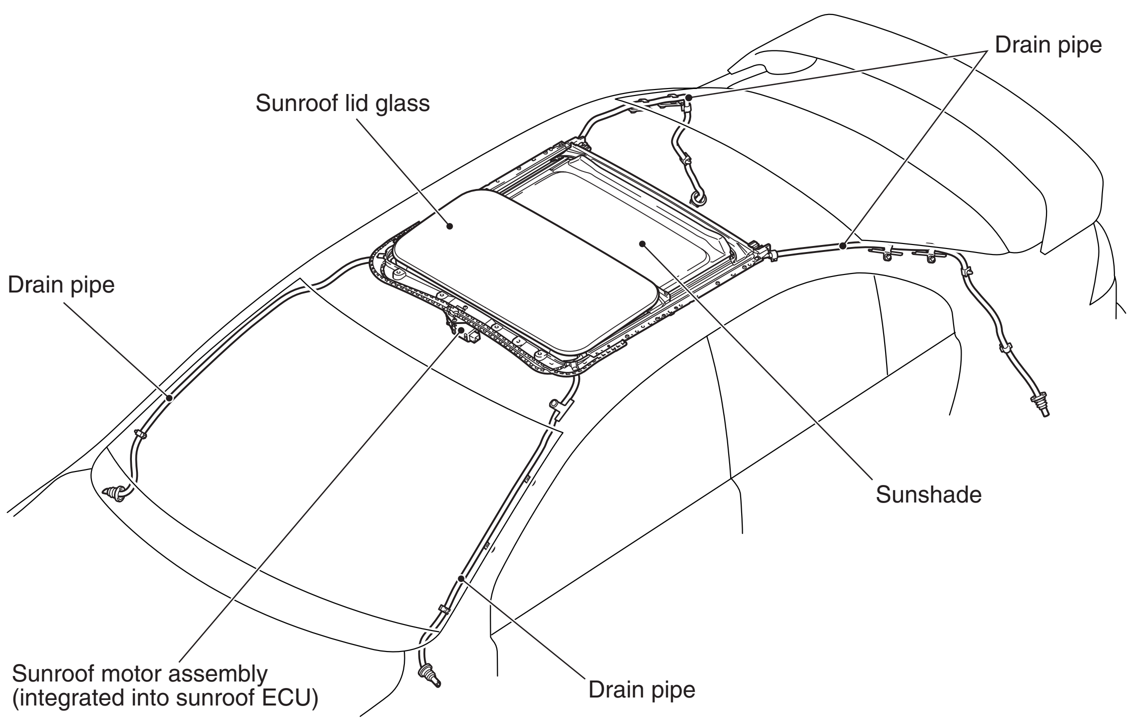
No.	Name	Type	Thickness mm (inch)	Color	Visible ray transmissivity rate (%)
1	Windshield	Laminated glass	4.7 (0.185)	Green	79
2	Front door window glass	Tempered glass	3.5 (0.138)	Green	81
3	Rear door window glass		3.1 (0.122)	Green	82
4	Rear stationary window glass		3.1 (0.122)	Green	82
5	Rear window glass		3.1 (0.122)	Green	82
6	Sunroof lid glass		3.5 (0.138)	Dark gray	18

NOTE: The visible ray transmissivity rate (%) is a reference value.

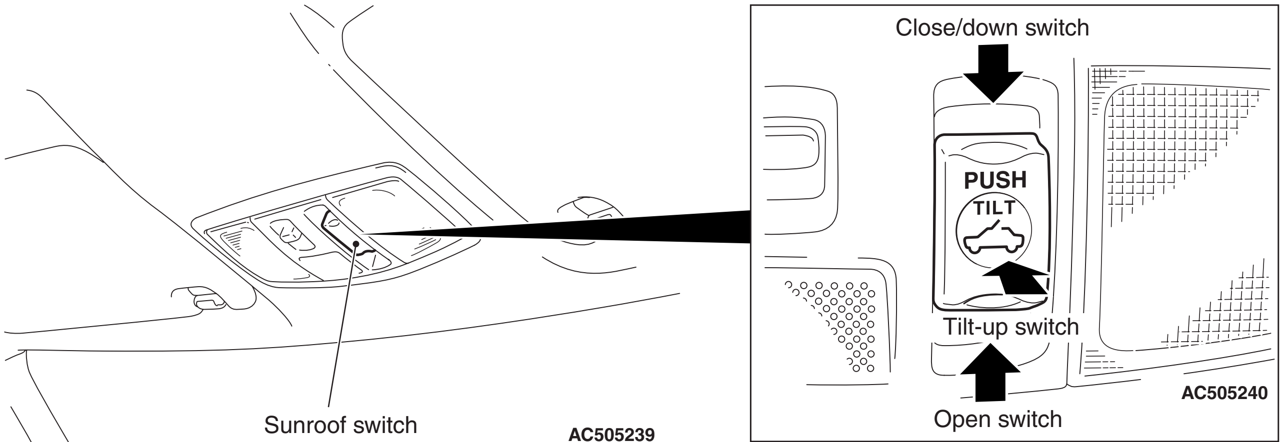
The laminated glass has been adopted for the windshield, and the reinforced glass has been adopted for other windows.

SUNROOF

M2420016000491



AC608393AB



AC506511AC

The electric sliding glass sunroof with tilt-up mechanism has been adopted as an option. This sunroof has the following characteristics:

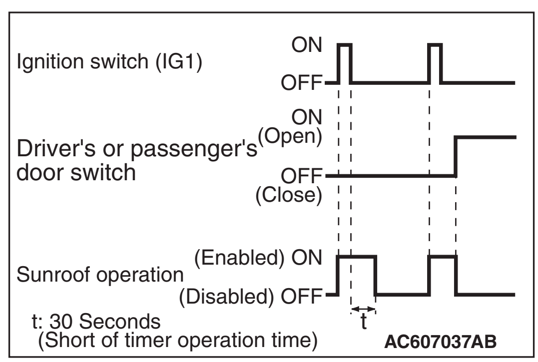
- A lightweight sunroof has been adopted.
- The sunroof tilts up for approximately 30 mm (1.2 inches) to improve ventilation.
- The integrated switch for the sunroof allows for all slide open/close, tilt up/down and stop operations. Operations other than open are available at one touch. When the open switch is operated, the sunroof lid glass stops approximately 30 mm (1.2 inches) before the fully-open position. This position is called comfort position. The sunroof lid glass can be fully opened by operating the open switch again.
- If external force is applied during slide closing or tilt down operations that obstructs operations, the sunroof lid glass will move in the reverse direction.
- By turning ON the sunroof window lock switch (integrated in the power window main switches) of the driver's power window switch, the sunroof operation is prevented.

DESCRIPTION OF CONSTRUCTION AND OPERATION

SAFETY MECHANISM

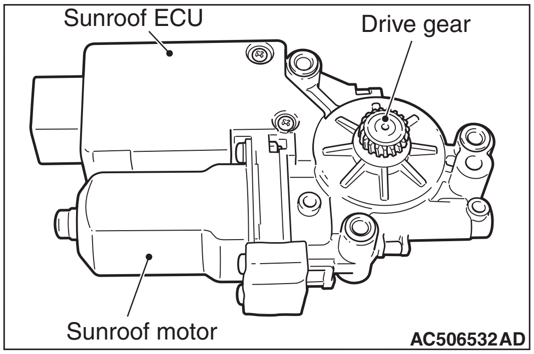
- If any obstacle such as a hand or a head is detected to be pinched during a sunroof lid glass closing operation, the sunroof lid glass is opened by approximately 200 mm (7.9 inches) or more.
- During the sunroof lid glass closing operation, by continuing the sunroof close switch operation, the sunroof can be forcibly closed without activating the safety mechanism even when the obstacle is detected to be pinched.
- During the safety mechanism activation, when the sunroof close switch is operated, the sunroof lid glass stops. By continuing the close switch operation, the sunroof lid glass can be forcibly closed without activating the safety mechanism even when the obstacle is detected to be pinched.

SUNROOF TIMER FUNCTION



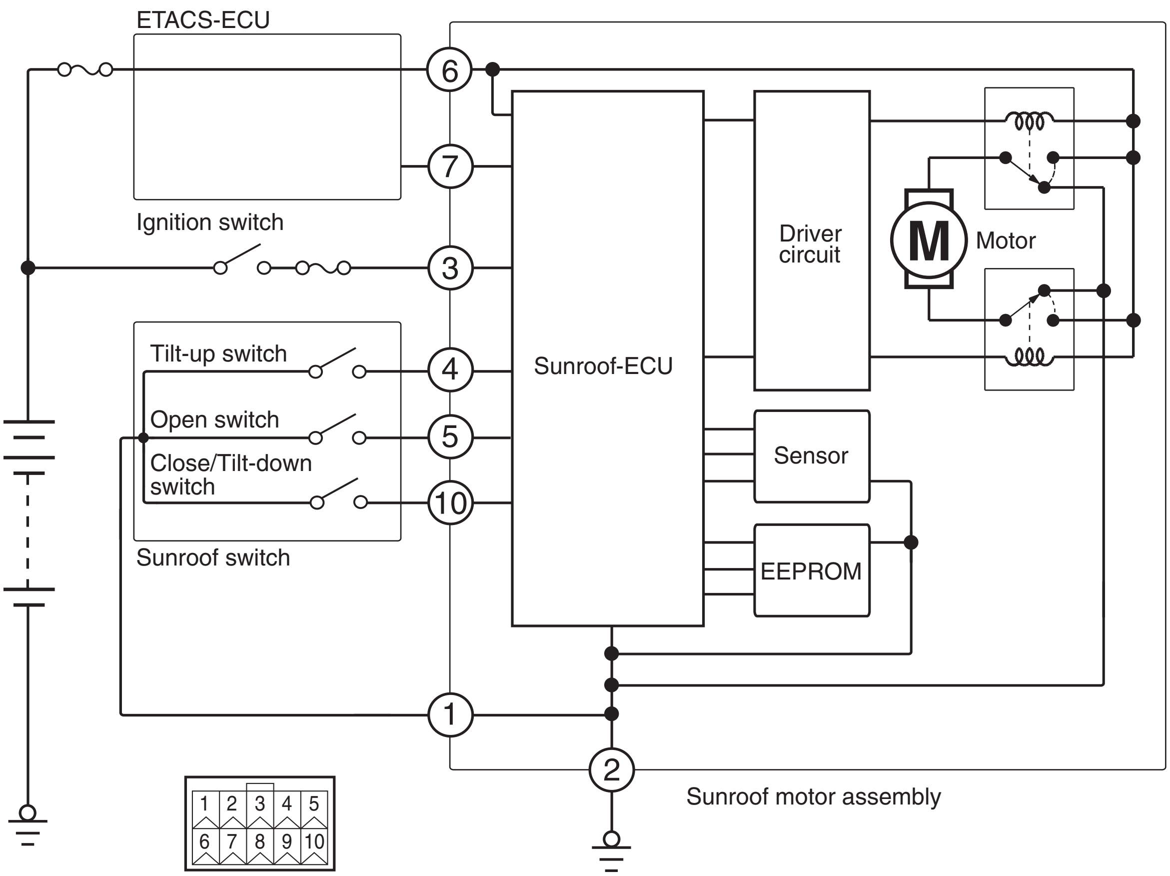
The sunroof ECU (integrated into the sunroof motor assembly) receives the ignition switch (IG1) signal transmitted by ETACS-ECU. If the ignition switch (IG1) signal turns OFF, the sunroof ECU allows the sunroof switch to open/close (timer activation) the sunroof for approximately 30 seconds. During the timer operation, if the driver’s or passenger’s door open is detected from the door switch signal transmitted by ETACS-ECU, the sunroof timer function stops at this time.

SUNROOF MOTOR ASSEMBLY



The sunroof motor assembly, which consists of the motor main body, drive gear, and sunroof ECU, is installed in front of the housing.

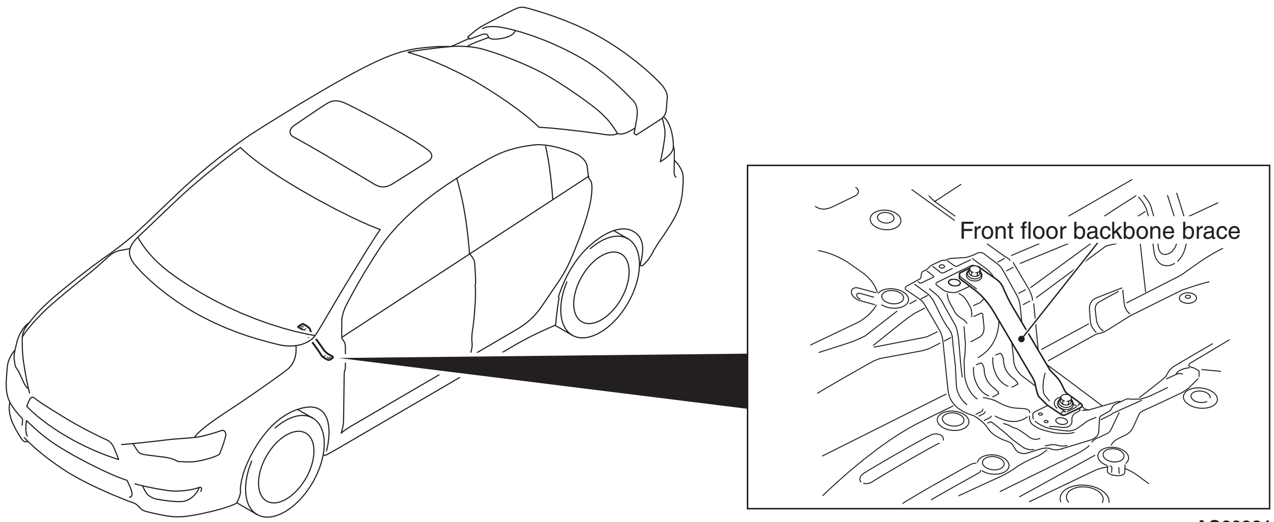
SUNROOF ECU



The sunroof ECU incorporates a microcomputer and controls motor operations with the sunroof switch signals, depending on various conditions.

LOOSE PANELS

M2420000200195



AC609216AB

The front floor backbone brace has been installed to improve the body rigidity.

CUSTOMIZATION FUNCTION

M2420002500169

With the scan tool MB991958 (M.U.T.-III sub assembly) operation, the following functions can be programmed. The programmed information is kept in memory even when the battery is disconnected.

Adjustment item (scan tool MB991958 M.U.T.-III display)	Adjustment item	Adjusting contents (scan tool MB991958 display)	Adjusting contents
Auto door unlock by P position	Auto door unlock by P position function <Vehicles with central door locking system>	Disable	No function (default)
		Always enabled	Always with function

GROUP 31

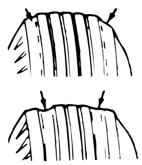
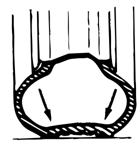
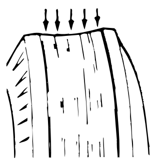
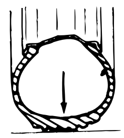
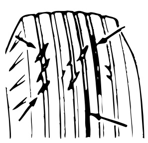
WHEEL AND TIRE

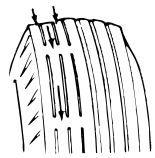
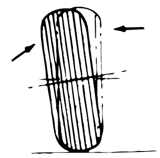
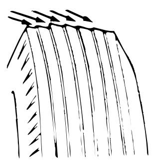
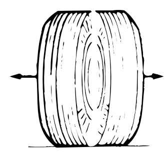
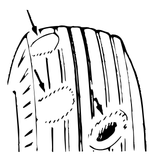
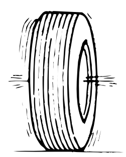
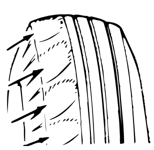
CONTENTS

WHEEL AND TIRE DIAGNOSIS

DIAGNOSIS

M1311000700794

Symptom		Probable cause		Remedy	Reference page
Rapid wear at shoulders	 ACX00923AB	Under-inflation or lack of rotation	 ACX00924AE	Adjust the tire pressure.	For tire inflation pressure, refer to the label on the driver's side center pillar.
Rapid wear at center	 ACX00925AE	Over-inflation or lack of rotation	 ACX00926AI		
Cracked treads	 ACX00927AB	Under-inflation		Adjust the tire pressure.	For tire inflation pressure, refer to the label on the driver's side center pillar.

Symptom		Probable cause		Remedy	Reference page
Wear on one side	 ACX00928AB	Excessive camber	 ACX00929AE	Check the camber.	Refer to GROUP 33, On-vehicle service –Front wheel alignment check and adjustment P.33-8.
Feathered edge	 ACX00930AB	Incorrect toe-in	 ACX00931AE	Adjust the toe-in.	
Bald spots	 ACX00932AB	Unbalanced wheel	 ACX00933AB	Balance the wheels.	–
Scalloped wear	 ACX00934	Lack of rotation of tires or worn or out-of-alignment suspension		Rotate the tires, and check the front suspension alignment.	Refer to GROUP 33, On-vehicle service –Front wheel alignment check and adjustment P.33-8.

WHEEL BALANCE ACCURACY

M1311001700656

PURPOSE

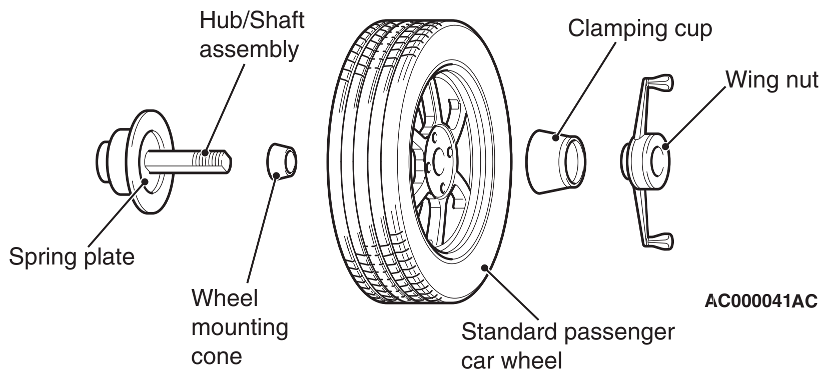
This section contains tips and procedures for achieving accurate wheel balance. Steering wheel vibration and/or body shake can result if any of these procedures are not carefully observed.

1. Wheels and tires must be properly mounted on a balancer in order to achieve correct balance. Centering the wheel on the shaft of the balancer is essential for proper mounting.
2. Off-the-car wheel balancers must be calibrated periodically to ensure good balancing results. An inaccurately calibrated balancer could cause unnecessary replacement of tires, shocks, suspension components, or steering components.

Check your balancer's calibration approximately every 100 balances. Your wheel balancer's instruction manual should include calibration procedures. If the calibration procedures specifically for your balancer are missing, use the generic steps in this section for zero calibration, static balance, and dynamic balance checks. The wheel balancer calibration checks are also described in the flowchart. (Refer to P.31-6.)

PROCEDURE <Balancing Tips>

1. Confirm that the balancer's cone and the wheel mounting cone are undamaged and free of dirt and rust.
2. On this vehicle, the wheel's center hole on the hub side has a chamfered edge. Use a back-mounting cone on your wheel balancer to center the wheel on the balancer shaft.
3. Install a wheel mounting cone. The appropriate size cone for this vehicle is 67.0 mm (2.64 inches).
4. Before balancing the wheel, remove any wheel weights from both sides. Also check both sides for any damage.
5. When installing wheel weights, hammer them at a straight (not diagonal) angle.



<Confirming Proper Balance>

1. After balancing the wheel, loosen the wing nut and turn the wheel 180 degree angle against the balancer's hub. Then re-tighten the wing nut and check the balance again. Repeat wheel balance if necessary.
2. Turn the wheel again 180 degree angle against the balancer's hub. If the wheel becomes out-of-balance each time it is turned against the balancer's hub, the wheel balancer may require calibration.

<Wheel Balancer Calibration Checks>

1. Mount an undamaged original-equipment alloy rim and tire assembly (wheel) onto your off-the-car wheel balancer. Balance the wheel.
2. <<Zero Calibration Check>>

   Loosen the balancer wing nut, rotate the wheel a half-turn (180 degree angle), and retighten the nut. Recheck the balance.
   - If the imbalance is 5 g (0.18 ounce) or less, the zero calibration is OK. Rebalance the wheel, then go to Step 4 to check static balance.
   - If the imbalance is more than 5 g (0.18 ounce), go to Step 3.
3. Loosen the balancer wing nut, rotate the wheel 1/4 turn (90 degree angle), and retighten the nut. Recheck the wheel balance.
   - If the imbalance is 5 g (0.18 ounce) or less, the wheel may not be centered on the balancer, or the balancing cones, the cup, and/or wing nut are damaged, dirty, or inappropriate for the wheel. You may need to refer to the balancer manufacturer's instructions to verify the correct attachments. After making the necessary corrections, recheck the wheel balance. If OK, then go to Step 4.
   - If the imbalance is more than 5 g (0.18 ounce), the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.
4. <<Static Balance Check>>

   Attach a 5 g (0.18 ounce) weight to the outer rim. Recheck the balancer. The balancer should detect 5 $\pm$2 g (0.18 $\pm$0.06 ounce) of imbalance 170 to 190 degree angle away from the 5 g (0.18 ounce) weight.
   - If the imbalance is within specification, the static balance calibration is correct. Go to Step 5 to check the dynamic balance.

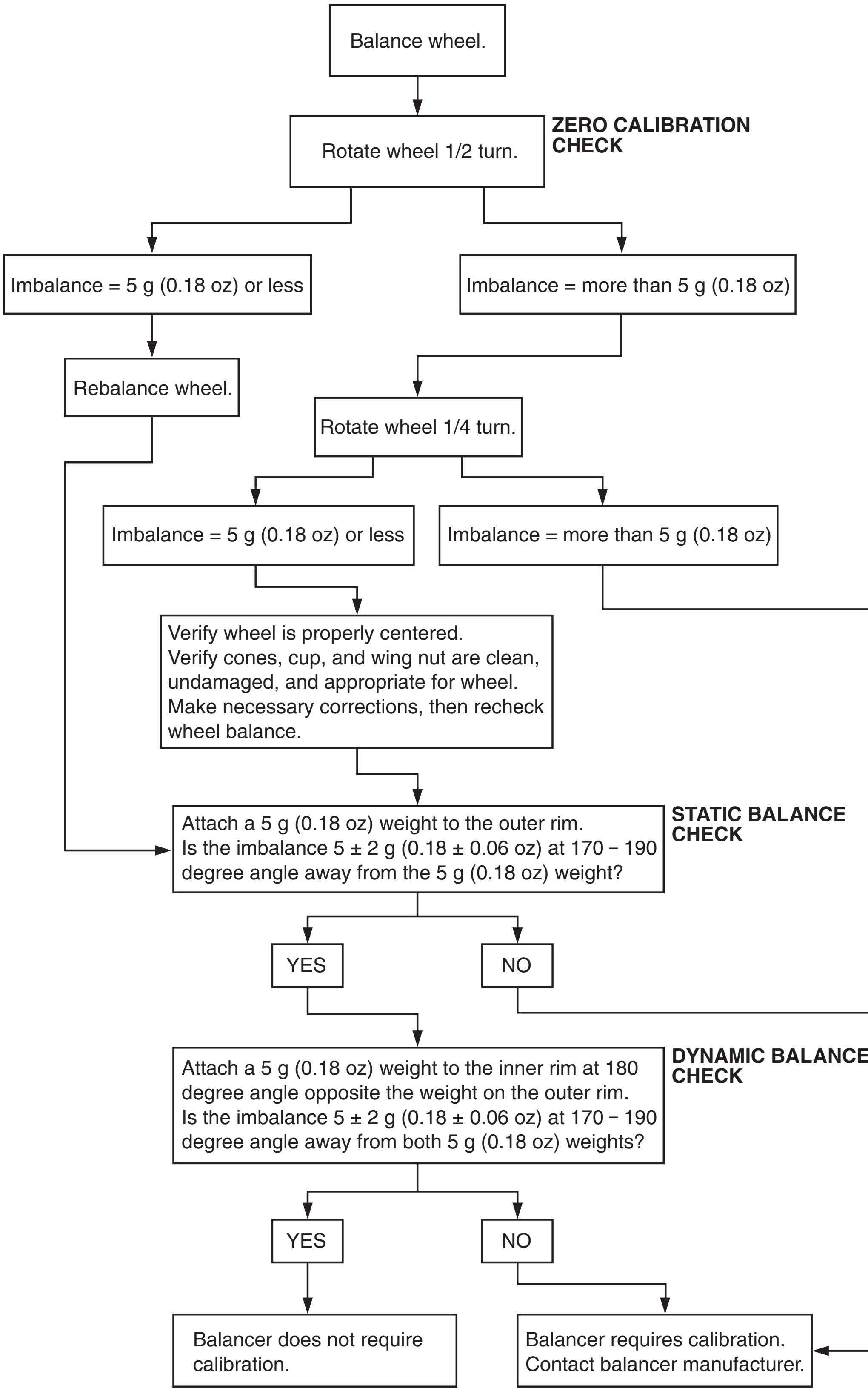
- If the imbalance is out of specification, the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.

5. <<Dynamic Balance Check>>

   Attach a 5 g (0.18 ounce) weight to the inner rim at 180 degree angle opposite the 5 g (0.18 ounce) weight that was added in Step 4. Recheck the balance. The balancer should detect 5 ± 2 g (0.18 ± 0.06 ounce) of imbalance 170 to 190 degree angle away from both the inner and outer 5 g (0.18 ounce) weights.

- If the imbalance is within specification, the dynamic balance calibration is correct. The balancer calibration checks are complete.
- If the imbalance is out of specification, the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.

WHEEL BALANCER CALIBRATION CHECKING FLOW CHART



AC403557AC

ON-VEHICLE SERVICE

TIRE INFLATION PRESSURE CHECK

M1311000900668

NOTE: For information on tire inflation pressure, refer to the label attached to the center pillar on the driver's side.

TIRE WEAR CHECK

M1311001000721

Measure the tread depth of the tires.

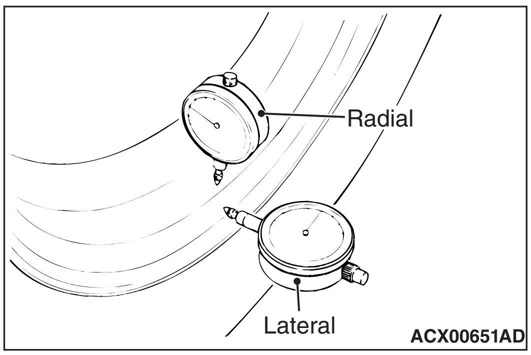
Minimum limit: 1.6 mm (0.06 inch)

If the remaining tread depth is less than the minimum limit, replace the tire.

NOTE: When the tread depth of the tires is reduced to 1.6 mm (0.06 inch) or less, wear indicators will appear.

WHEEL RUNOUT CHECK

M1311001100740



Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit:

Items	Steel wheel	Aluminum wheel
Radial runout	1.2 mm (0.05 inch) or less	1.0 mm (0.04 inch) or less
Lateral runout	1.2 mm (0.05 inch) or less	1.0 mm (0.04 inch) or less

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TIRE

INSTALLATION SERVICE POINT

M1311001300573

Tighten the wheel nuts to the specified torque.

Tightening torque: 98 ± 10 N· m (73 ± 7 ft-lb)

TIRE PRESSURE MONITORING SYSTEM (TPMS)

REMOVAL AND INSTALLATION

M1311003800109

Refer to GROUP 42B –Keyless Operation System (KOS) P.42B-206 or GROUP 42C –Wireless Control Module (WCM) P.42C-115.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATION

M1311001600400

Item	Specification
Wheel nut	98 ± 10 N· m (73 ± 7 ft-lb)

GENERAL SPECIFICATIONS

M1311000200506

ROAD WHEEL AND TIRE

Item		DE	ES	GTS
Wheel	Type	Steel type or Aluminium type*	Aluminum type	Aluminum type
	Size	16 × 6 1/2JJ	16 × 6 1/2JJ	18 × 7JJ
	Amount of wheel offset mm (in)	46 (1.8)	46 (1.8)	46 (1.8)
	PCD mm (in)	114.3 (4.50)	114.3 (4.50)	114.3 (4.50)
Tire	Size	P205/60R16 91H	P205/60R16 91H	P215/45R18 89V

SPARE WHEEL AND TIRE

Item		Specification
Wheel	Type	Steel type
	Size	16 × 4T
	Amount of wheel offset mm (in)	40 (1.6)
	PCD mm (in)	114.3 (4.50)
Tire	Size	T125/70D16 96M

NOTE:

- *The * mark indicates optional item.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

SERVICE SPECIFICATIONS

M1311000300774

Item		Limit
Tread depth of tire mm (in)		Minimum 1.6 (0.06)
Wheel runout <Aluminum wheel>	Radial runout mm (in)	1.0 (0.04) or less
	Lateral runout mm (in)	1.0 (0.04) or less
Wheel runout <Steel wheel>	Radial runout mm (in)	1.2 (0.05) or less
	Lateral runout mm (in)	1.2 (0.05) or less

GROUP 51

EXTERIOR

CONTENTS

SPECIFICATIONS

SERVICE SPECIFICATIONS

M1511000300949

Item	Standard value
Set position of windshield wiper arm/blade assembly mm (in)	Ceramic end line ±5.0(0.20)
Heated door mirror resistance value ohm	8.4 ±1.2 at 25 °C (77°F)

LUBRICANT

M1511000400098

Item		Specified lubricant	Quantity
Wiper motor link rod	Contact joint between link rod and wiper motor link plate	Multipurpose grease SAE J310, NLGI No.2 or equivalent	As required

ADHESIVE

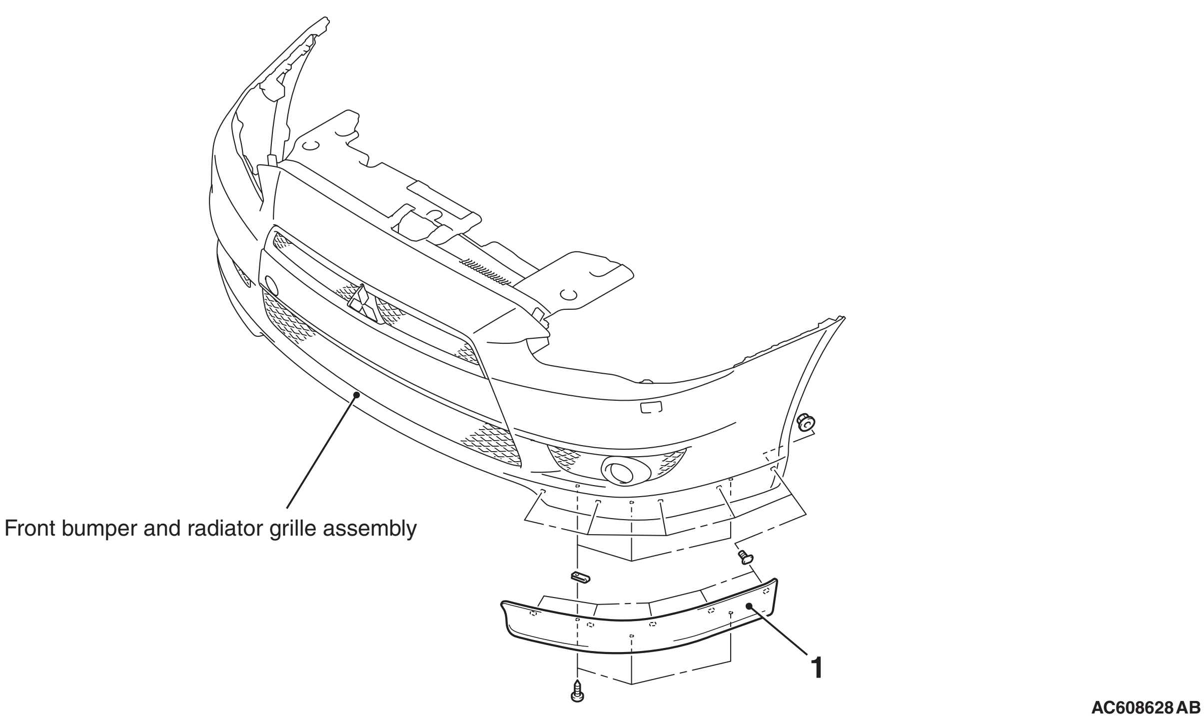
M1511000501656

ITEM	SPECIFICATION
Front three-diamond mark	Adhesive tape: Double-sided tape 0.6 mm (0.02 inch) thickness
Side air dam	Adhesive tape: Double-sided tape (a): 4 mm (0.16 in) width and 1.2 mm (0.05 in) thickness (b): 8 mm (0.32 in) width and 1.2 mm (0.05 in) thickness Adhesive tape remover: 3M™ AAD Part number 8906 or equivalent

AERO PARTS

REMOVAL AND INSTALLATION

M1511005000051



Removal step

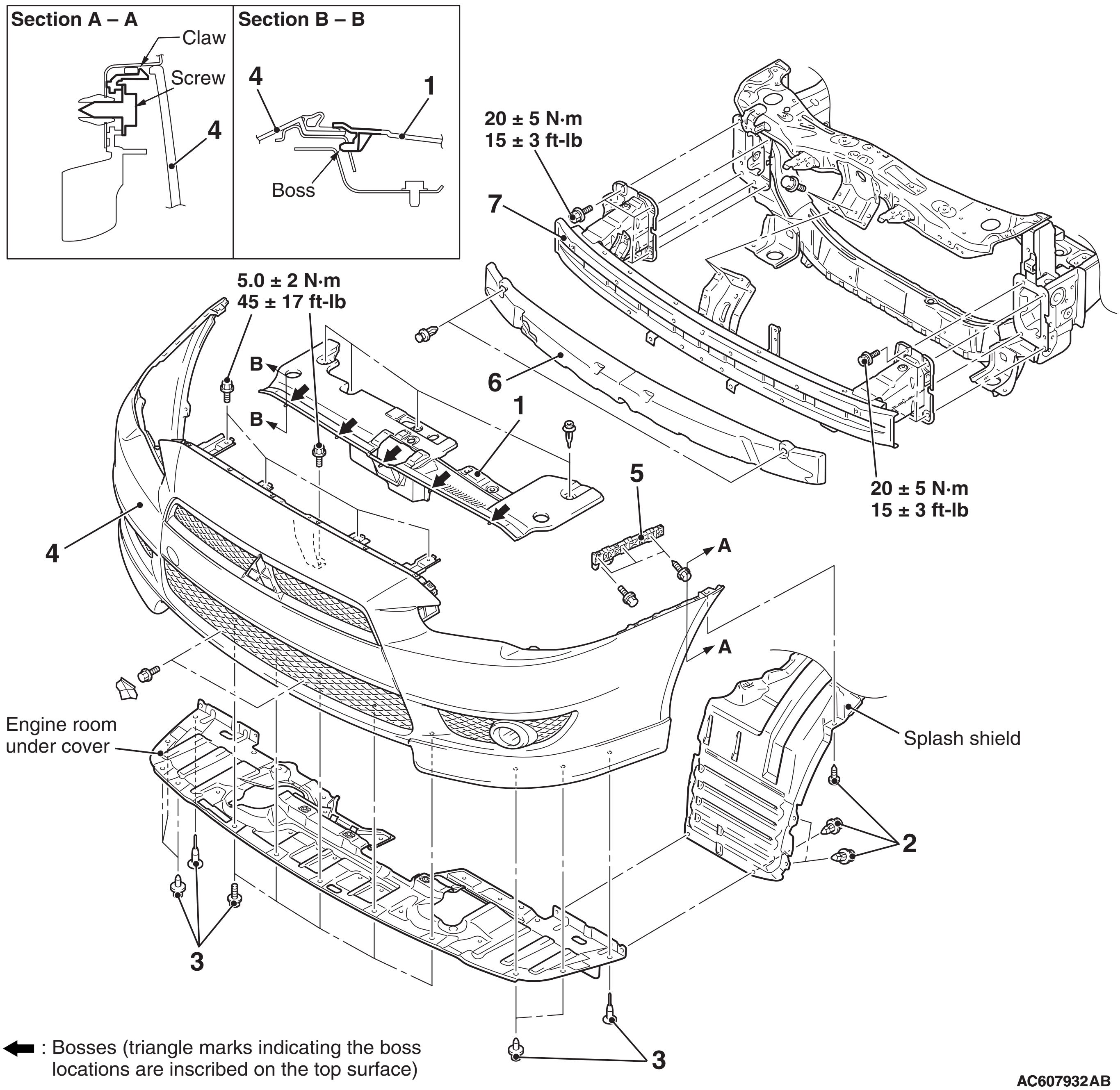
- Under cover(Refer to P.51-16)

1. Air dam skirt panel

FRONT BUMPER ASSEMBLY AND RADIATOR GRILLE

REMOVAL AND INSTALLATION

M1511025400211



Removal steps

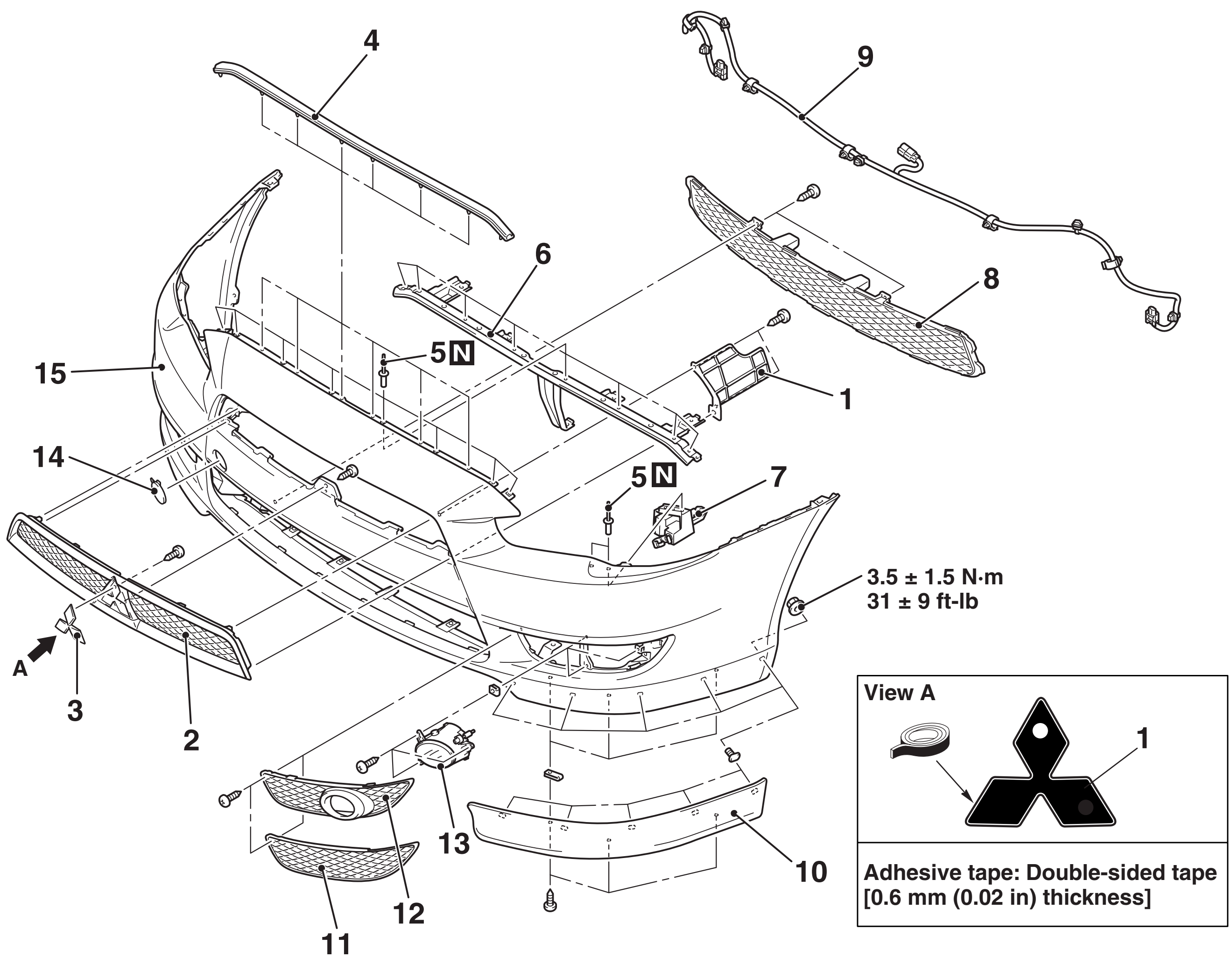
- Air cleaner intake duct (Refer to GROUP 15, Air cleaner P.15-4)
1. Headlamp support panel cover
2. Splash shield mounting clips and screws
3. Engine room under cover mounting clips and bolts
- Front bumper harness connector connection

Removal steps (Continued)

4. Front bumper and radiator grille assembly
5. Front bumper side bracket
6. Front bumper core
- Horn (Refer to GROUP 54A, Horn P.54A-222)
- Ambient temperature sensor (Refer to GROUP 55A, Ambient temperature sensor P.55A-126)
7. Front bumper reinforcement

DISASSEMBLY AND ASSEMBLY

M1511025500177



Disassembly steps

1. Front grille side cover
2. Radiator grille
3. Front three-diamond mark
4. Hood weatherstrip front

<<A>> >>A<< 5. Rivet

6. Front bumper reinforcement
7. Front bumper support
8. Front bumper grille

- Front fog light connector connection

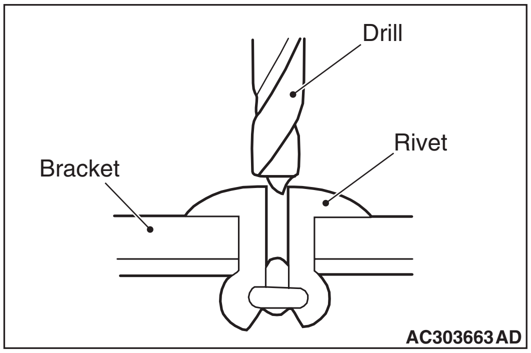
9. Front bumper harness

Disassembly steps (Continued)

10. Air dam skirt panel
11. Air intake bezel <Vehicles without front fog lights>
12. Front fog light bezel <Vehicles with front fog lights>
13. Front fog light <Vehicles with front fog lights>
14. Front bumper cover
15. Front bumper face

DISASSEMBLY SERVICE POINT

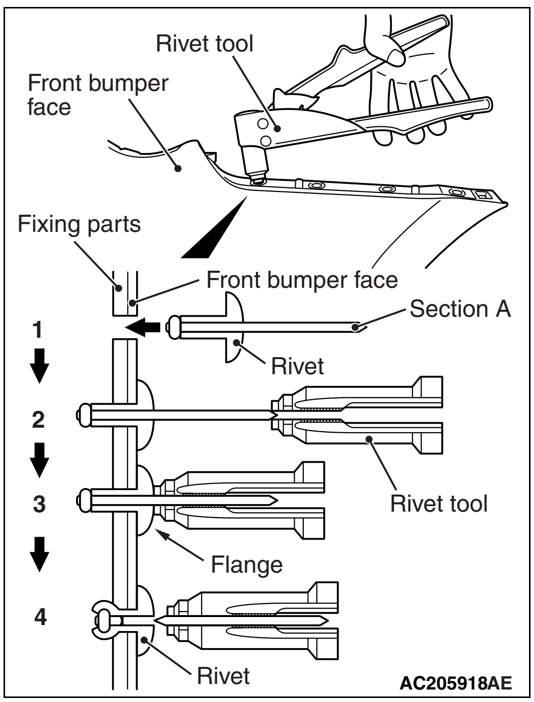
<<A>> RIVETS REMOVAL



Use a drill (ϕ4.0 mm) to make a hole in the rivet to break it, and remove the rivet.

REASSEMBLY SERVICE POINT

>>A<< RIVETS INSTALLATION



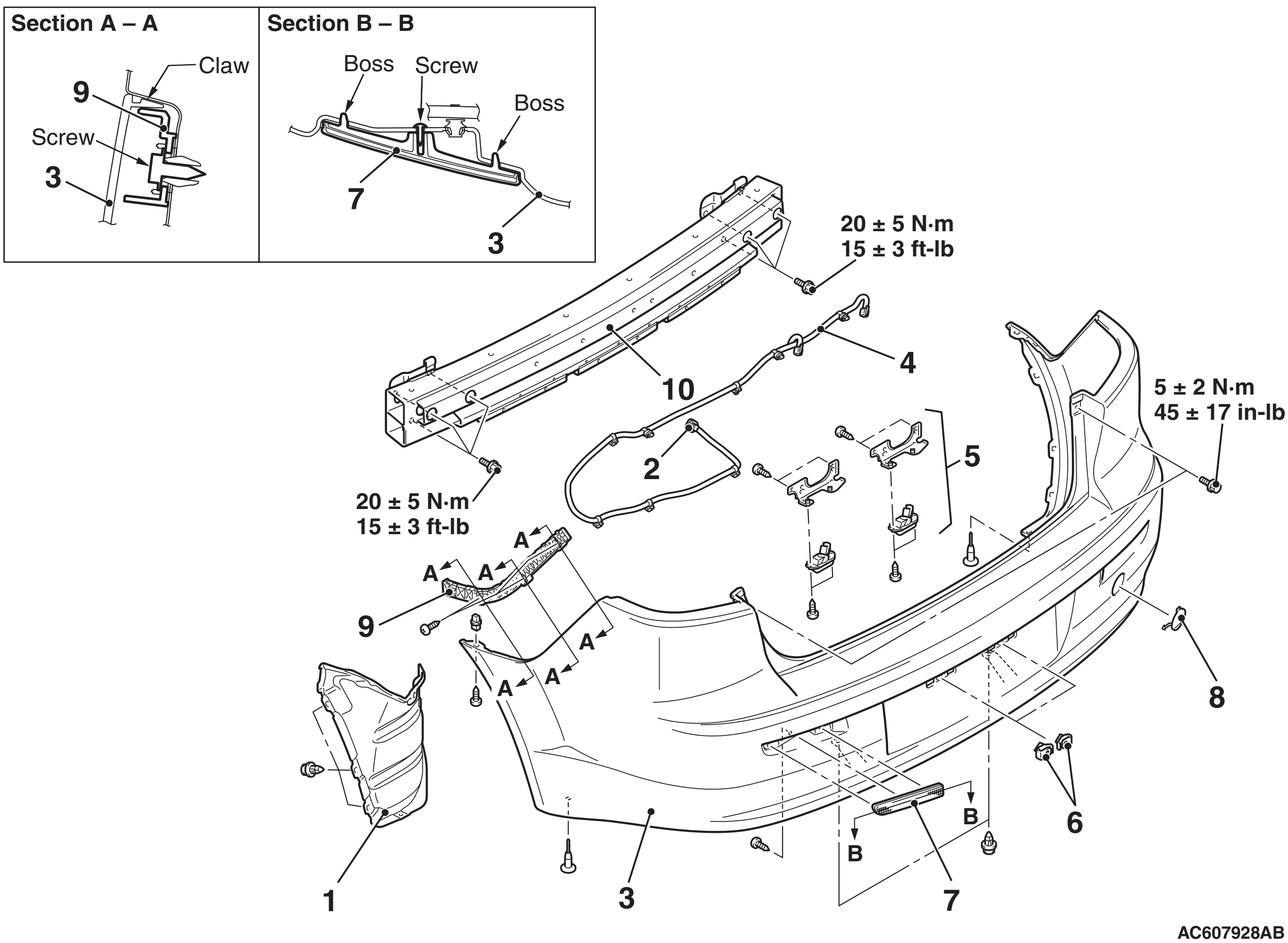
Use a rivet tool shown in the illustration to connect the parts with rivets by the following procedures.

1. Insert the rivet into a corresponding location.
2. Set the rivet tool at a section A of rivet.
3. While pushing the flange surface of the rivet onto parts to be fixed with the rivet tool, press the handle of the tool.
4. Thin part of section A of the rivet will be cut off and the parts is fixed in position.

REAR BUMPER ASSEMBLY

REMOVAL AND INSTALLATION

M1511001901431



Removal steps

1. Rear splash shield
- Rear combination light (Refer to GROUP 54A, Rear combination light P.54A-172)
2. Rear bumper harness connector connection
3. Rear bumper face
- License plate light connector connection

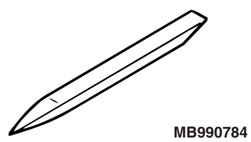
Removal steps (Continued)

4. Rear bumper harness
5. License plate light and bracket assembly
6. Bracket
7. Reflector
8. Rear bumper cover
9. Rear bumper face support bracket
10. Rear bumper reinforcement

GARNISHES AND MOLDINGS

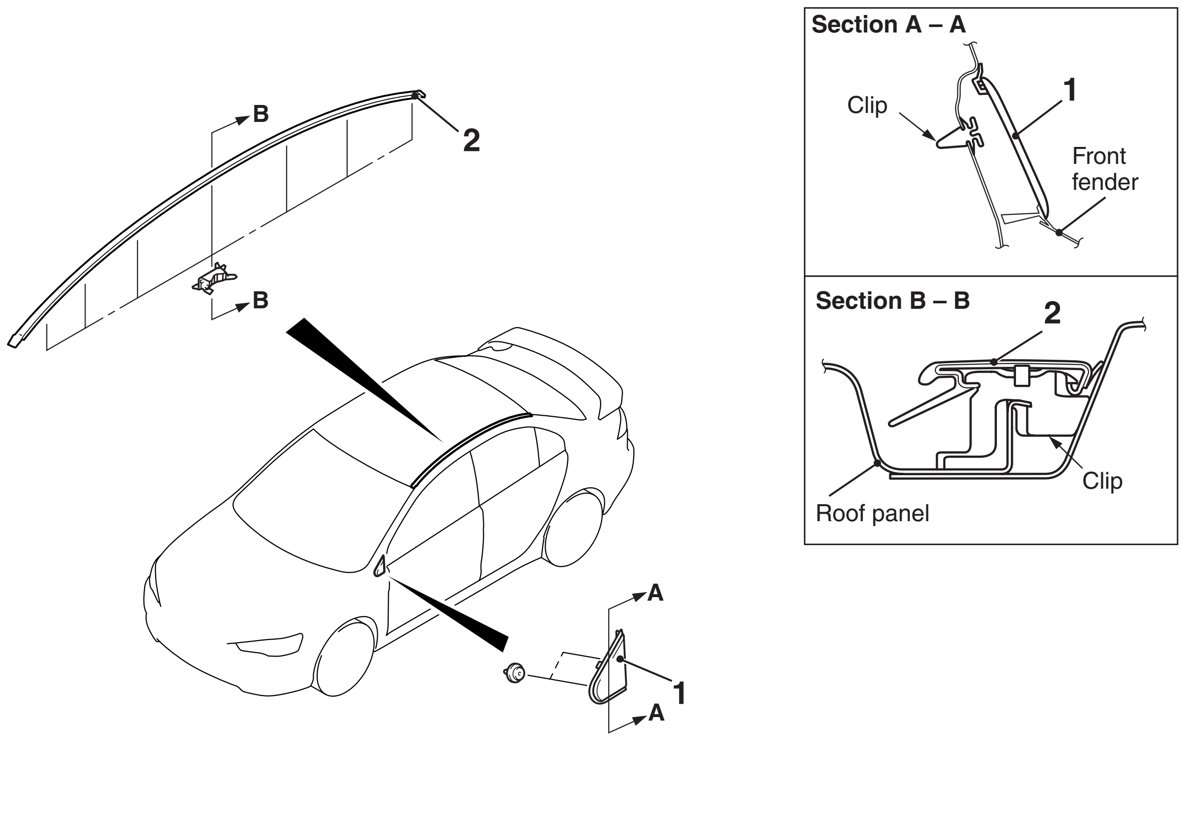
SPECIAL TOOL

M1511000602065

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990784 Ornament remover	General service tool	Removal of front delta garnish

REMOVAL AND INSTALLATION

M1511004700789



AC607963AB

Removal

Front delta garnish removal

1. Front delta garnish

Roof drip molding removal

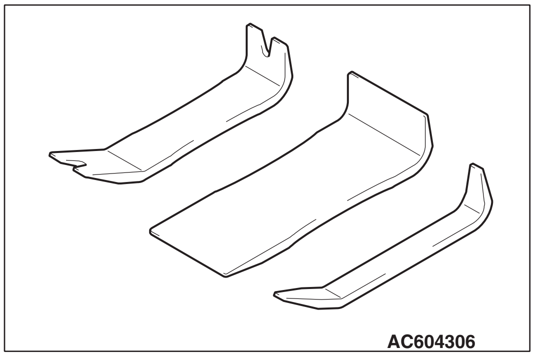
<<A>> 2. Roof drip molding

Required Special Tool:

- MB990528: Stripe Tape Spatula

REMOVAL SERVICE POINT

<<A>> ROOF DRIP MOULDING REMOVAL

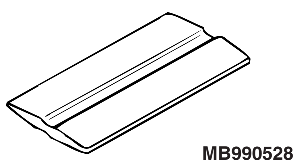


NOTE: Use a commercial available ornament remover (resin-made) as shown to pry out the roof drip moulding.

DOOR SASH TAPE

SPECIAL TOOL

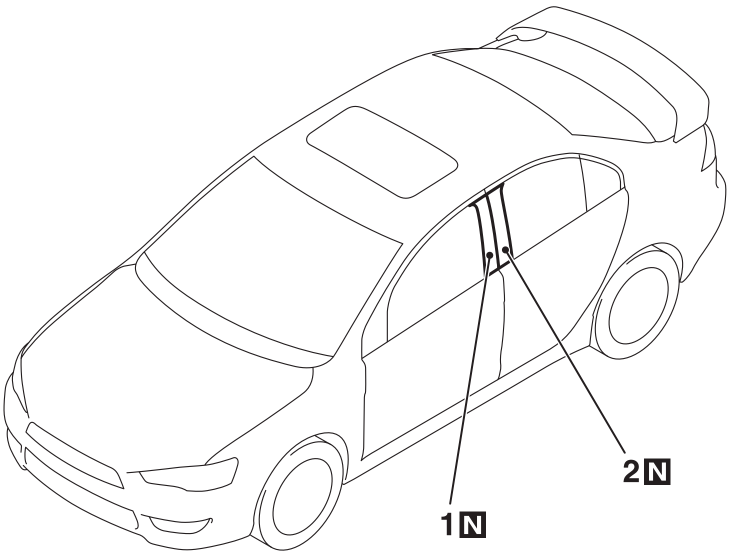
M1511000601716

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990528 Stripe tape spatula	General service tool	Installation of door sash tape

REMOVAL AND INSTALLATION

M1511024100422

Pre-removal and post-installation operation
- Door Window Glass Runchannel Removal and Installation (Refer to GROUP 42 –Window Glass Runchannel and Door Opening Weatherstrip P.42A-164).
- Door Beltline Moulding Removal and Installation (Refer to GROUP 42 –Window Glass Runchannel and Door Opening Weatherstrip P.42A-164).



AC607959AB

Removal steps

<<**A**>>	>>**A**<<	1.	Front door sash tape, rear
<<**A**>>	>>A<<	2.	Rear door sash tape, front

Required Special Tool:
- MB990528: Stripe Tape Spatula

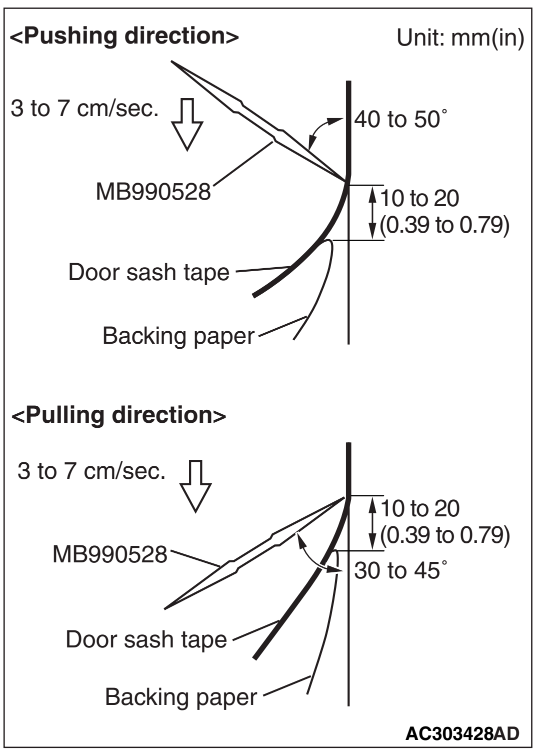
REMOVAL SERVICE POINT

<<A>> DOOR SASH TAPES REMOVAL

⚠ **CAUTION**

Pay attention to keep from getting burned by hot door panel or tapes.

1. Use a hair drier to warm the tape.
2. Peel the tip of the tape with your finger, and then peel off the tape in parallel with the application surface.



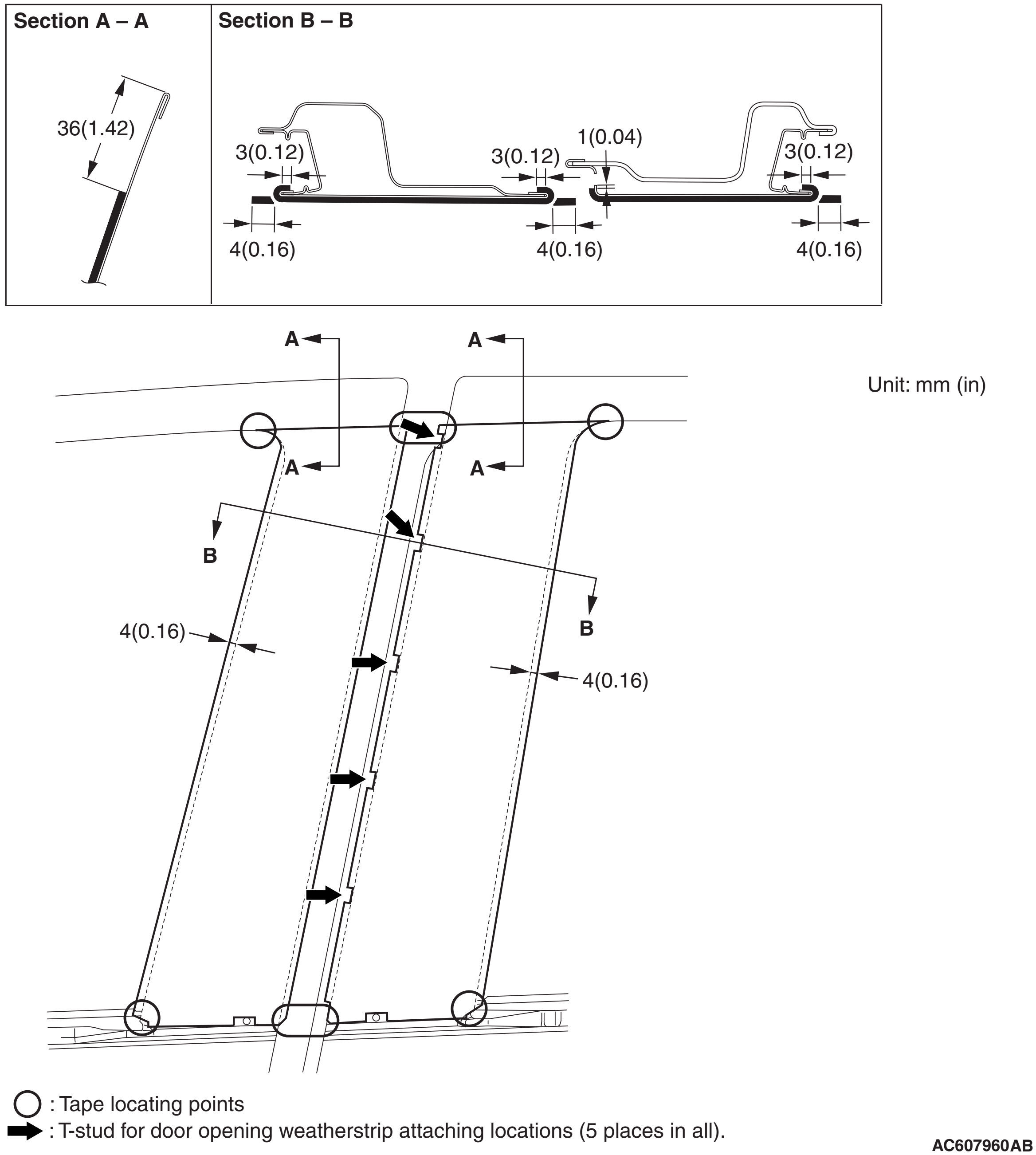
INSTALLATION SERVICE POINT

>>A<< DOOR SASH TAPES INSTALLATION

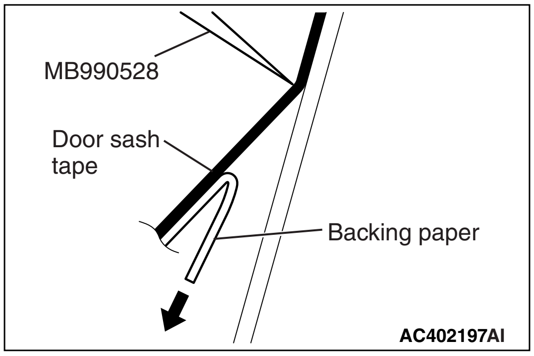
⚠ CAUTION

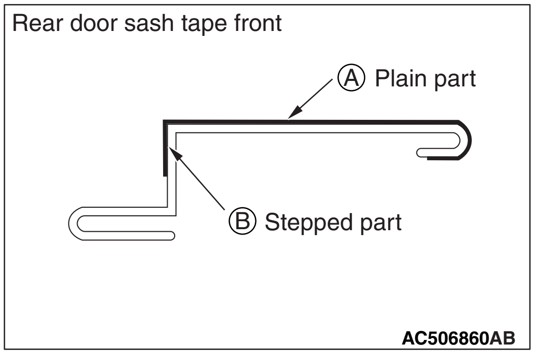
- **The ambient temperature should be 20(68) to 30° C(86° F). Ensure that the working area is clean. Ideally, the tape application should be done at ambient temperature of 25° C(77° F).**
- **If ambient temperature is less than 15° C(59° F), heat the tape and application surface to a temperature of 20(68) to 30° C(86° F). If ambient temperature is 35° C(95° F) or higher, cool down them. The adhesive property of the tape is deteriorated at low temperature, so the tape may come loose easily. Meanwhile, it gets softened at hot temperature.**
- **When beginning to apply the tape, pay particular attention. If the end of the tape cannot be applied to the specified position with an accuracy of less than 1 mm(0.04 in), it may cause the poor appearance or adhesion.**
- **Use the special tool MB990528 to apply the tape with a steady pace and pressure. If you do not apply the tape with a steady pace or pressure, or abort the application, a shallow groove (lateral groove called as "Shock line") may be present on the tape surface. Meanwhile, if you apply it too quickly, air bubbles may be formed under the tape.**

1. Wrap a soft cloth (synthetic fibre) around the tip of the special tool.
2. Use white gasoline to degrease the tape application surface.
3. Wipe away dirt from the tape.

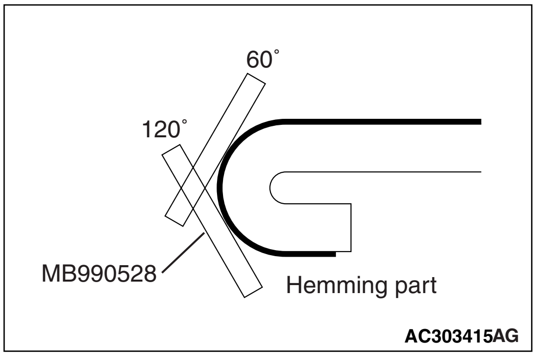


4. Apply the door sash tape according to the procedure below.
   (1) Position the tape at the upper and lower locating points.
   (2) Peel of backing strip from the top of the tape and attach it temporarily.
   (3) Peel off the backing strip to the half length of the tape.
   (4) Apply the tape using the special tool while peeling off the remaining backing strip.





(5) For the rear door sash tape, apply it to plain surface (A). Then apply it to stepped surface (B).

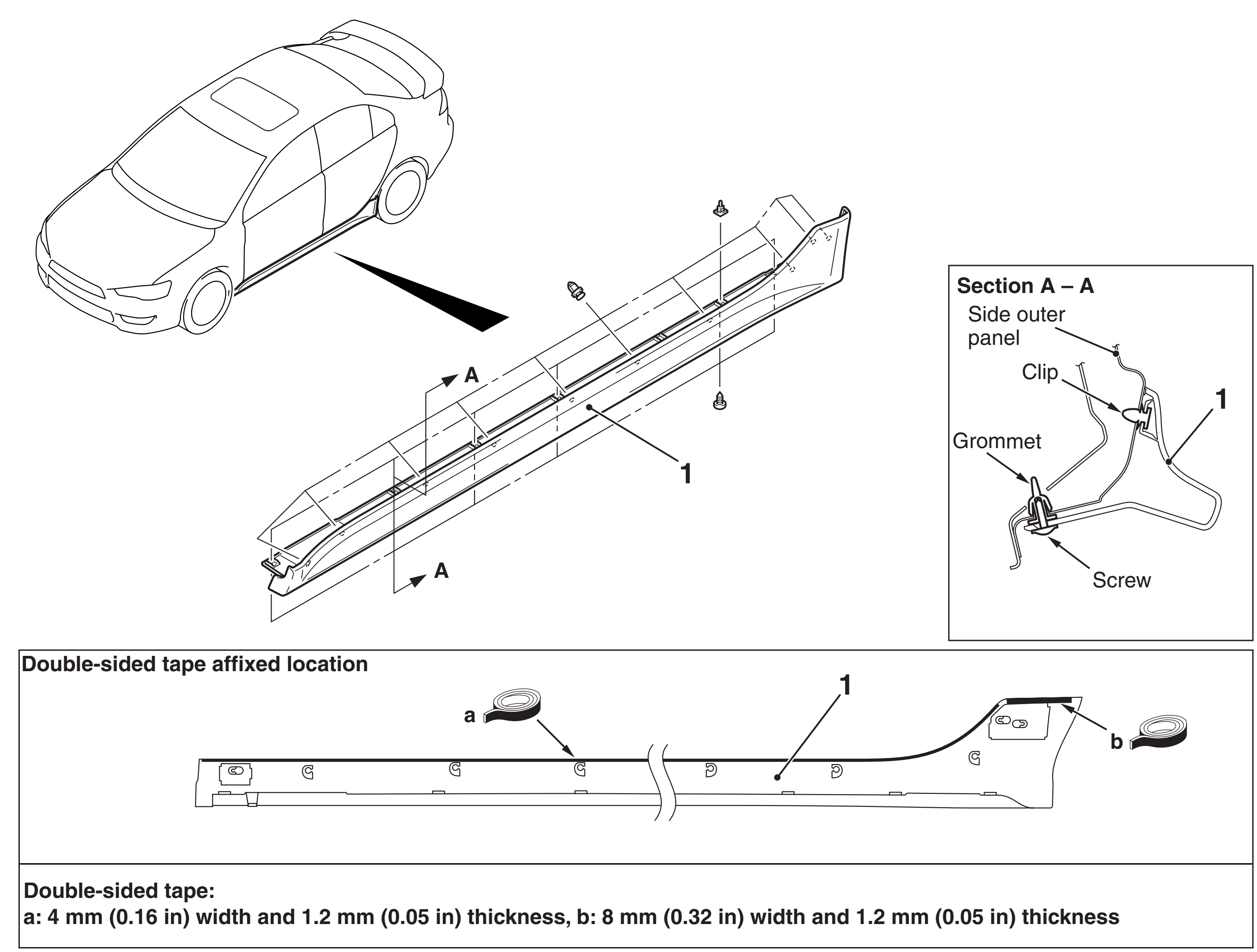


(6) Press the folded area of the tape by three stages (60 degrees, 120 degrees, and holding), rolling in toward the vehicle inside direction.

SIDE AIR DAM

REMOVAL AND INSTALLATION

M1511005500506



AC607961AB

Removal

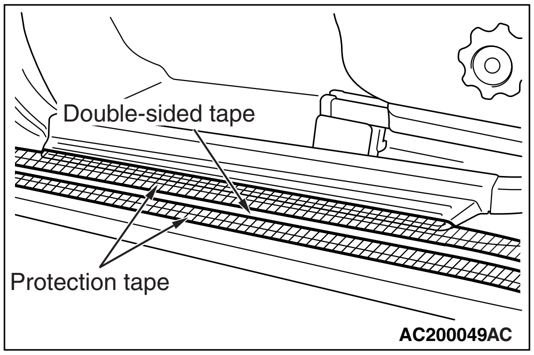
<<**A**>> >>**A**<< 1. Side air dam

REMOVAL SERVICE POINT

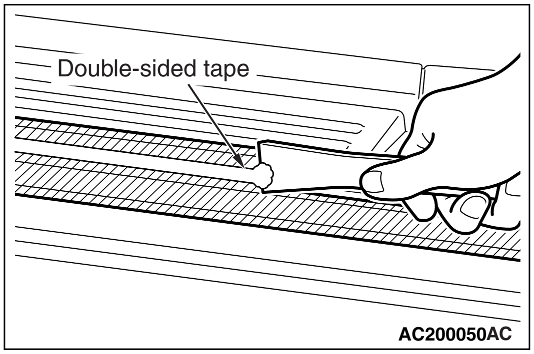
<<A>> SIDE AIR DAM REMOVAL

Gently lift and remove the side air dam. If there is any double-sided tape remaining on the side air dam, remove according to the following instructions.

1. Remove double-sided tape remaining on the body surface

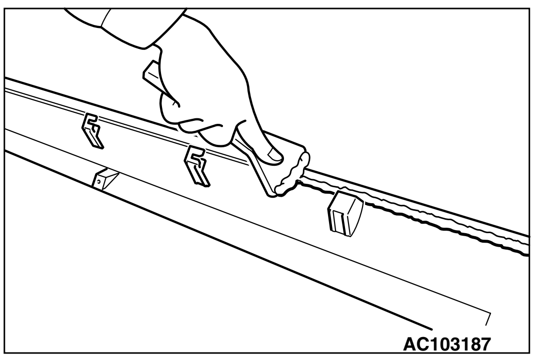


(1) Attach protection tape all the way along the edges of the double-sided tape which is still adhering to the body.



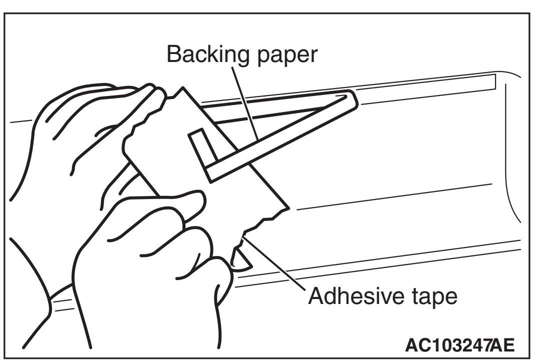
(2) Scrape off the double-sided tape with a resin spatula as possible.
(3) Peel off the protection tape.
(4) Use a shop towel moistened with 3M™ AAD Part number 8906 or equivalent to wipe the body.

2. Remove double-sided tape remaining on side air dam and adhere double-sided tape (when re-using side air dam)
   (1) Scrape off the double-sided tape on the side air dam with a resin spatula as much as possible.
   (2) Wipe the side air dam surface and clean it with a rag moistened with isopropyl alcohol.
   (3) Remove only a small amount of the residual adhesive.
   (4) Apply the primer as specified on the residual adhesive.
   (5) Adhere the double-sided tape as specified on the side air dam.



INSTALLATION SERVICE POINT

>>A<< SIDE AIR DAM INSTALLATION



1. Tear off the double-sided tape backing paper.

   NOTE: Attach the adhesive tape to the edge of the backing paper makes the backing paper tear off easier.

2. Install the side air dam.

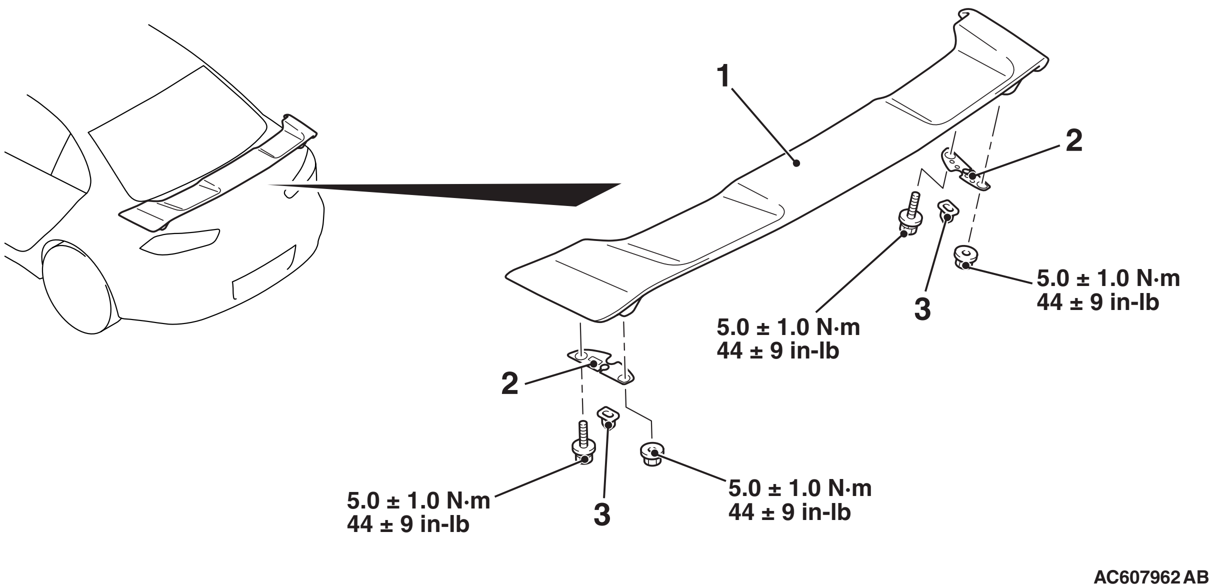
   NOTE: If the double-sided tape is difficult to affix in cold temperature, etc., warm the bonding surfaces of the body and side air dam to about 40 –60°C (104 –140°F) before affixing the tape.

3. Firmly press in the side air dam.

REAR SPOILER

REMOVAL AND INSTALLATION

M1511006100299



Removal steps

1. Rear spoiler assembly

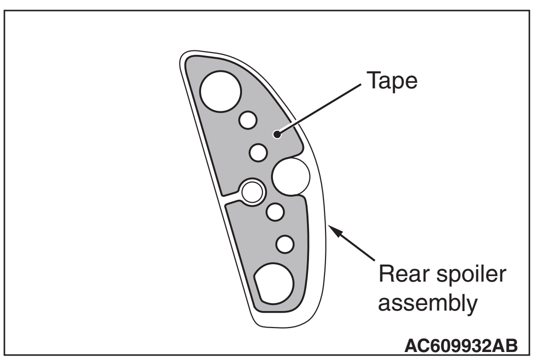
Removal steps (Continued)

>>A<< 2. Tape

3. Grommet

INSTALLATION SERVICE POINT

>>A<< TAPE INSTALLATION



1. Installation position

⚠ CAUTION

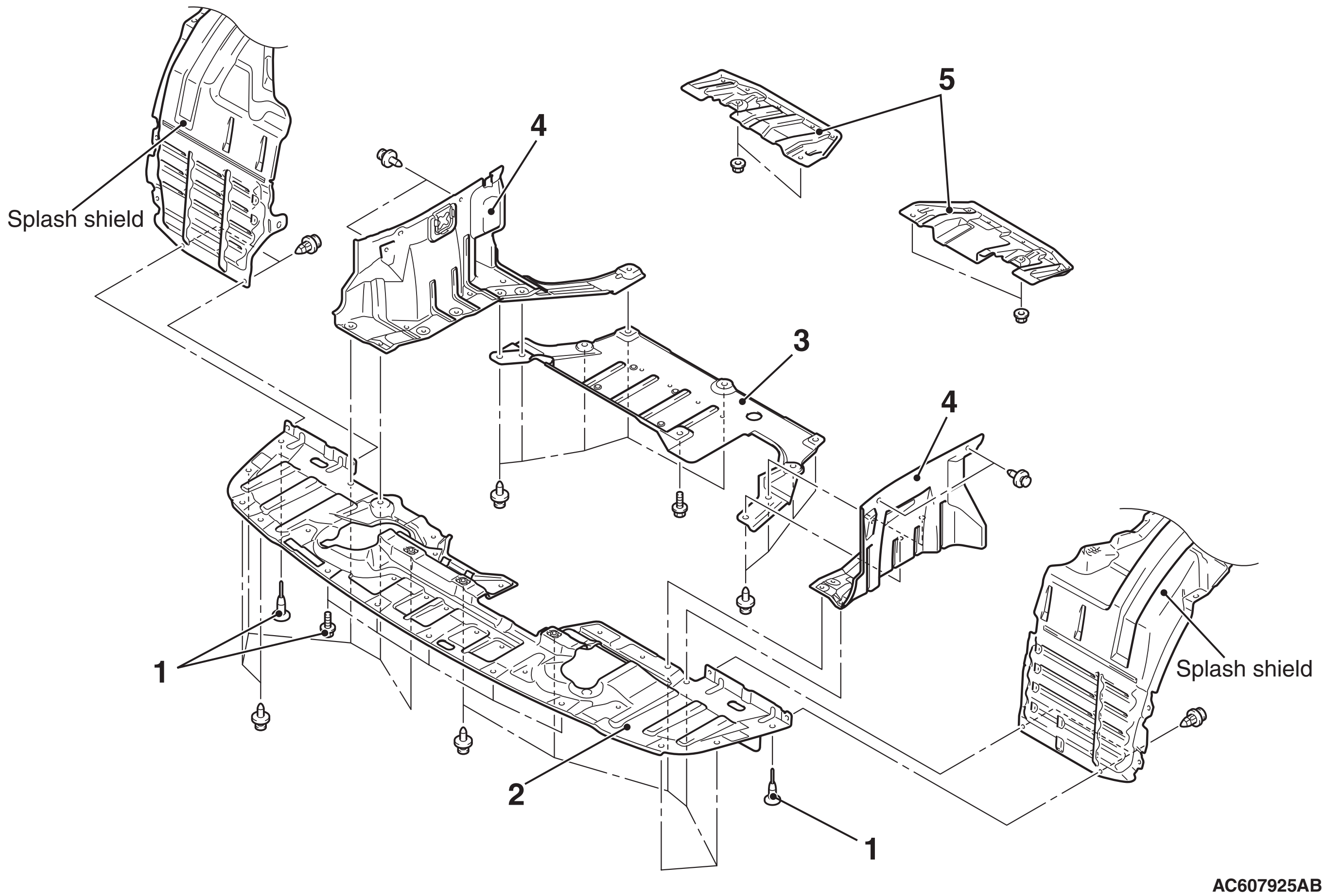
- **The ambient temperature should be 15 (59) to 40° C(104° F). Ensure that the working area is clean.**
- **If ambient temperature is less than 15° C (59° F), heat the tape and application surface to a temperature of 15 (59) to 40° C (104° F).**
- **Be careful that air bubbles are not formed under the tape.**

2. Installation procedure
   (1) Wipe the tape application surface and clean it with a rag moistened with isopropyl alcohol.
   (2) Remove backing paper from the tape, and apply it to the rear spoiler assembly.

UNDER COVER

REMOVAL AND INSTALLATION

M1511019600313



Removal steps

1. Front bumper mounting clips and bolts
2. Engine room under cover front A

Removal steps (Continued)

3. Engine room under cover front B
4. Engine room side cover
5. Front floor panel rear

WINDSHIELD WIPER AND WASHER

GENERAL INFORMATION

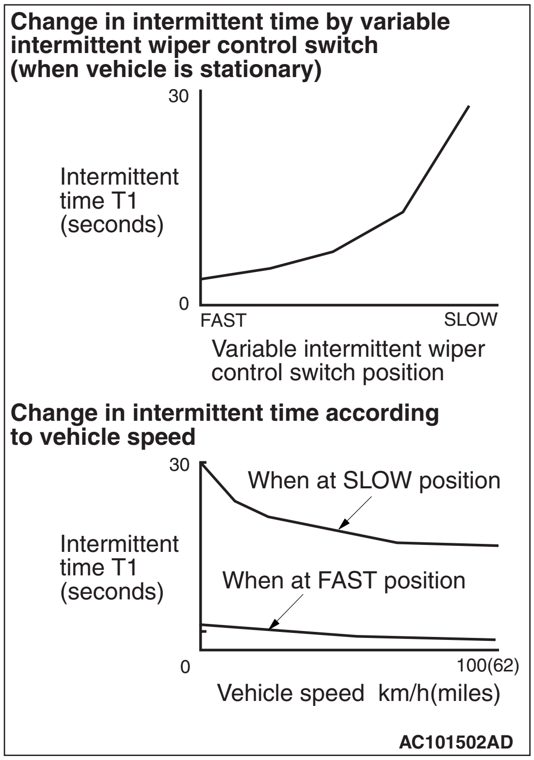
M1511000101249

WINDSHIELD WIPER AND WASHER OPERATION

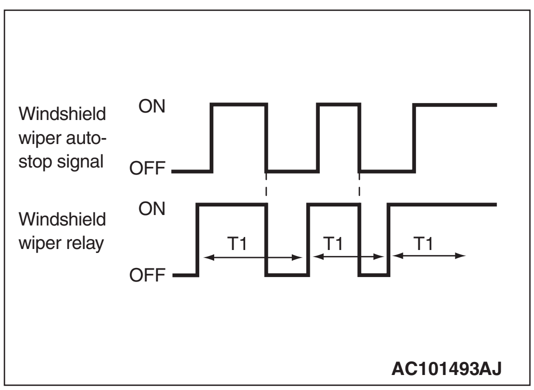
Intermittent control (Vehicle speed-dependent variable type) <Initial condition: with function>

1. ETACS calculates the windshield intermittent wiper interval T1 from the position of the windshield intermittent wiper switch on the column switch and the vehicle speed signal (sent from the combination meter to ETACS via CAN communication).

   NOTE: Using the configuration function, the vehicle speed-dependent intermittent function can be invalidated (Refer to P.51-46).

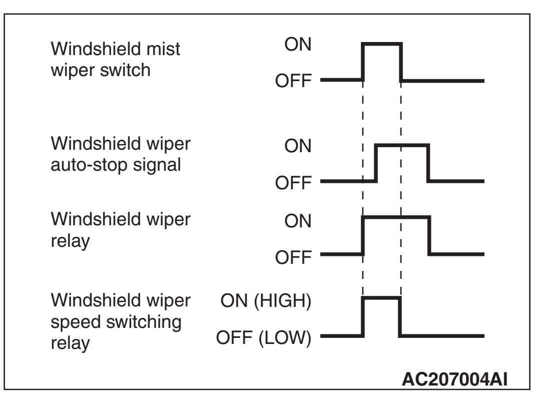


2. When ETACS receives the ON signal of the windshield intermittent wiper switch, it turns the windshield wiper relay ON. When the wiper reaches the stop position, the windshield wiper auto-stop signal turns OFF, and the windshield wiper relay turns OFF.
   When the intermittent time T1 calculated by step 1 has elapsed after the windshield wiper relay ON, the windshield wiper relay turns ON again, and the above-mentioned operation is repeated.

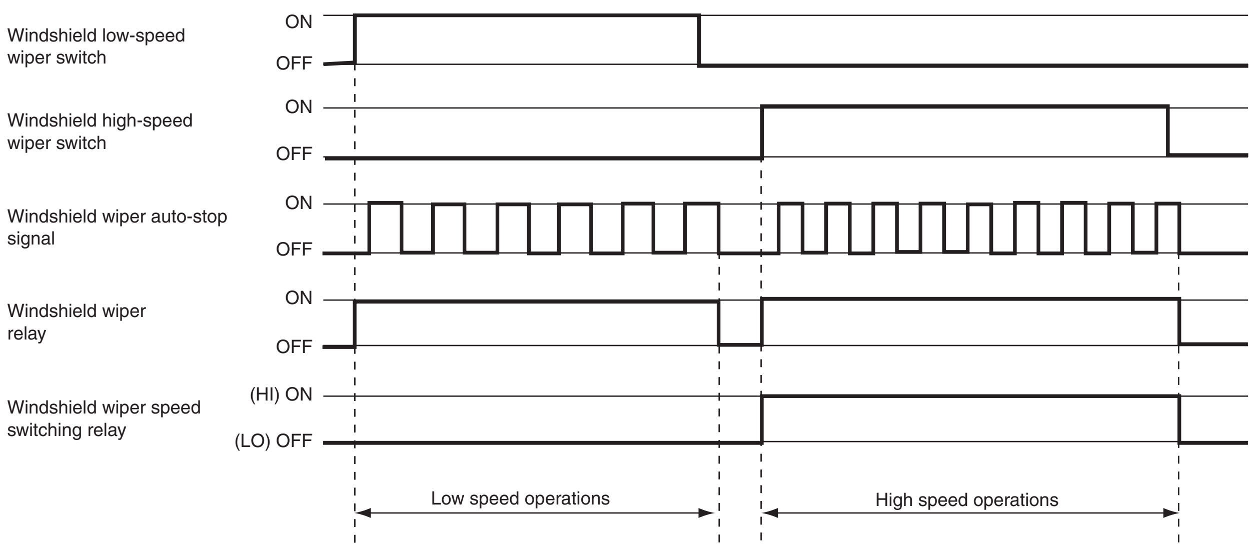


Mist wiper control

When the windshield wiper mist switch on the column switch is turned ON while the ignition switch is in ACC or ON position, the column switch turns the windshield wiper relay ON. At the same time, the wiper speed switching relay turns ON (HI). When the windshield mist wiper switch is ON, the windshield wiper operates at high speed.



Low speed wiper and high speed wiper control

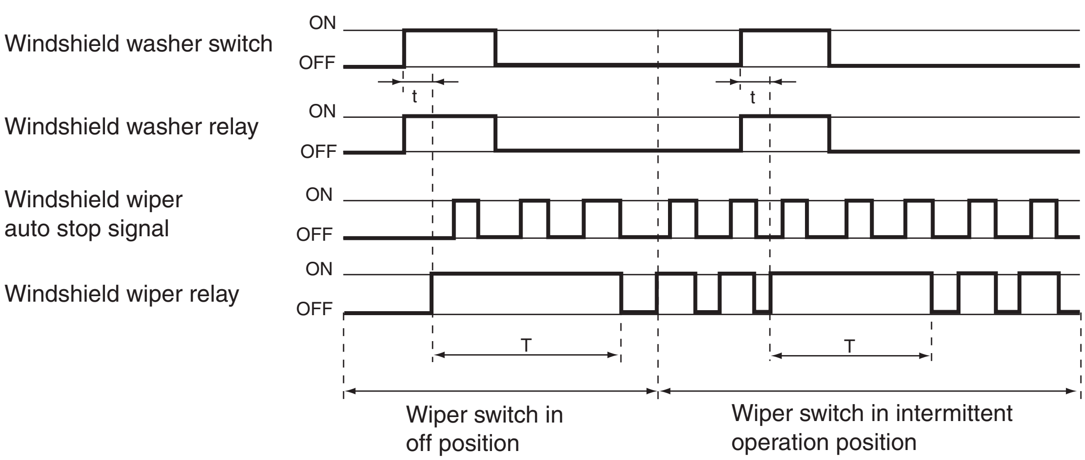


AC506610AH

When the windshield low speed wiper switch on the column switch is turned ON while the ignition switch is in ACC or ON position, the column switch turns the windshield wiper relay ON. Also, the wiper speed switching relay turns OFF (LO), and the windshield wiper operates at low speed.

When the windshield high speed wiper switch is turned ON, the windshield wiper relay turns ON. Also, the wiper speed switching relay turns ON (HI), and the windshield wiper operates at high speed.

Windshield wiper linked with washer function <Initial condition: with function, with windshield washer check valve>



AC309988AJ

t: 0.3 second
T: Intermittent wiper intermittent time

Wiper switch	OFF position			Intermittent operation position				Low-speed or high-speed operation position
Washer switch ON time	0.3 second or less	0.3 to 0.5 second	0.5 second or more	0.2 second or less	0.2 to 0.4 second	0.4 to 0.6 second	0.6 second or more	-
Intermittent wiper time (T)	0 second	2 seconds	3 seconds	0 second	1 second	2 seconds	3 seconds	3 seconds

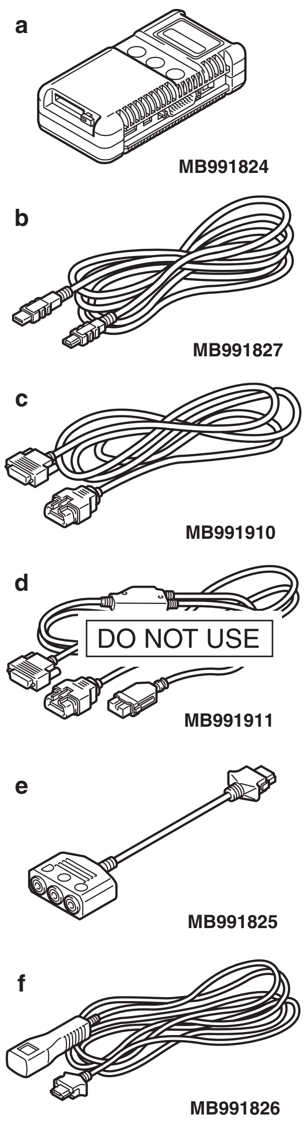
When the windshield washer switch on the column switch is turned ON while the ignition switch is in ACC or ON position, ETACS turns the windshield washer relay ON.
When the windshield washer switch is kept ON for 0.3 seconds or longer, the windshield wiper relay (the wiper relay output time varies depending on the conditions. For details, see the table.) is turned ON, and the windshield wiper operates at high speed. The windshield wiper is turned OFF with 3 seconds delay after the windshield washer switch is turned OFF.
Even when the windshield washer switch is turned ON while the windshield wiper is operating intermittently, the intermittent action starts again after the linked operation is finished.

If the ignition switch is turned to ACC position while the windshield washer switch is ON, the windshield washer relay turns ON, but the windshield wiper does not perform the linked operation. When the windshield washer switch is turned OFF and then ON, the windshield wiper starts the linked operation.

NOTE:
- *Using the configuration function, the washer linked windshield wiper function can be invalidated (Refer to P.51-46).*
- *Using the configuration function, when the washer linked windshield wiper function is invalidated, only the washer operates. It is useful to melt ice from a frozen windshield.*

SPECIAL TOOLS

M1511000602076

Tool	Number	Name	Use
 MB991955	MB991955 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991825 f. MB991826	M.U.T.-III sub-assembly a. Vehicle Communication Interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III measure adapter f. M.U.T.-III trigger harness	⚠ CAUTION **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.** Windshield intermittent wiper check

WINDSHIELD WIPER AND WASHER DIAGNOSIS

TROUBLESHOOTING STRATEGY

M1511014600534

Diagnosis should be carried out by the following procedures.

1. Gather the information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by the following Symptom Chart.
4. Verify the malfunction is eliminated.

TROUBLE SYMPTOM CHART

M1511015000687

TROUBLE SYMPTOM	Inspection procedure No.	Reference page
Windshield wipers do not work at all	1	P.51-23
Windshield wipers do not work when wiper switch is at "INT", "Washer" or "Mist" position. However, wipers work at low speed when switch is at "Lo" or "Hi" position	2	P.51-29
Windshield wipers do not stop at specified park position	3	P.51-31
Windshield wipers do not work normally	4	P.51-34
Windshield intermittent wiper interval cannot be adjusted by operating windshield intermittent wiper volume control switch	5	P.51-37
Windshield intermittent wiper interval is not changed according to vehicle speed	6	P.51-39
Windshield washer does not work normally	7	P.51-42

NOTE: Even when the ETACS-ECU has failed, the windshield wipers can work at low speed as fail-safe mode.

SYMPTOM PROCEDURES

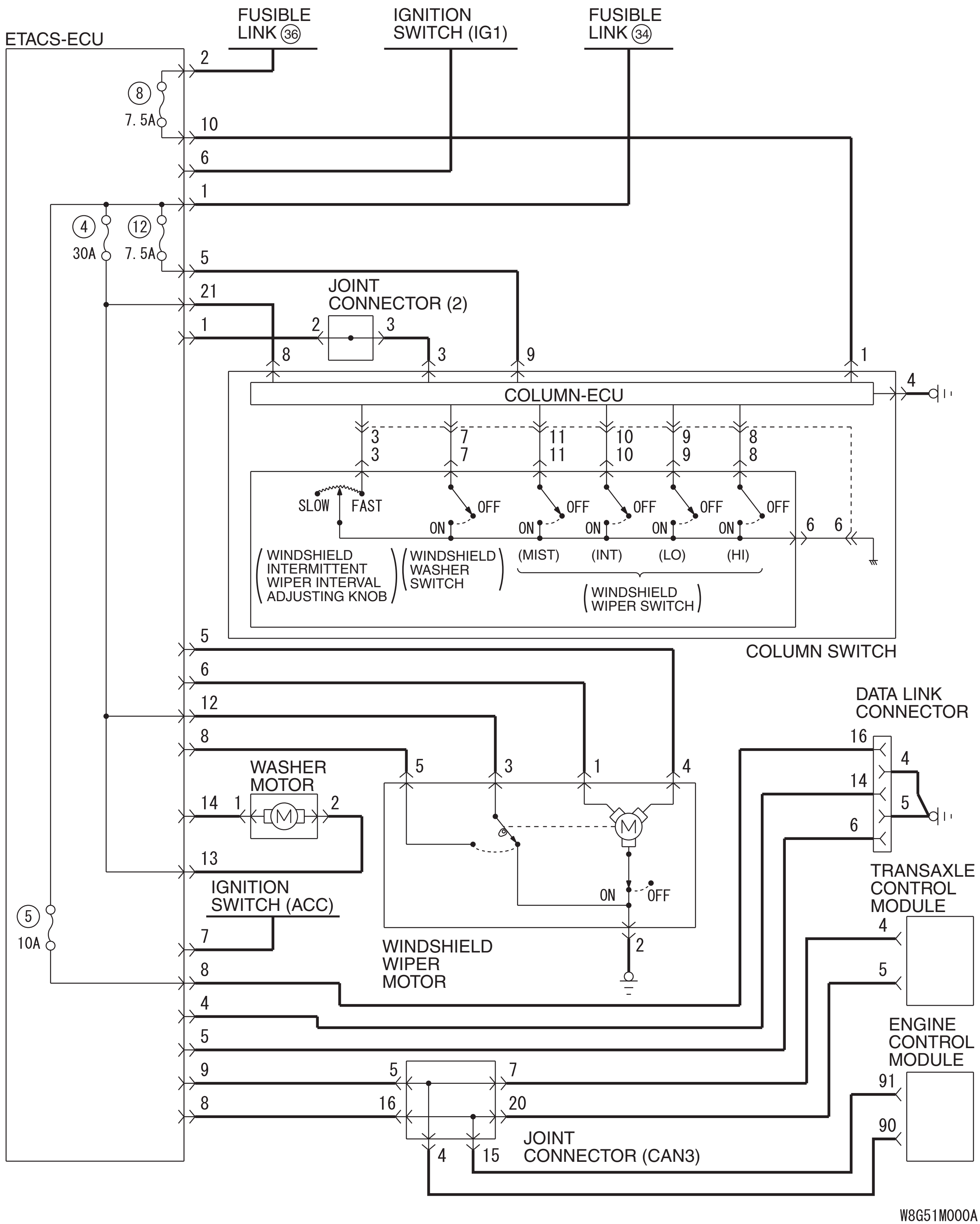
GENERAL DESCRIPTION CONCERNING THE WINDSHIELD WIPER AND WASHER

M1511000101272

The following ECUs affect the functions and control of the windshield wiper and washer.

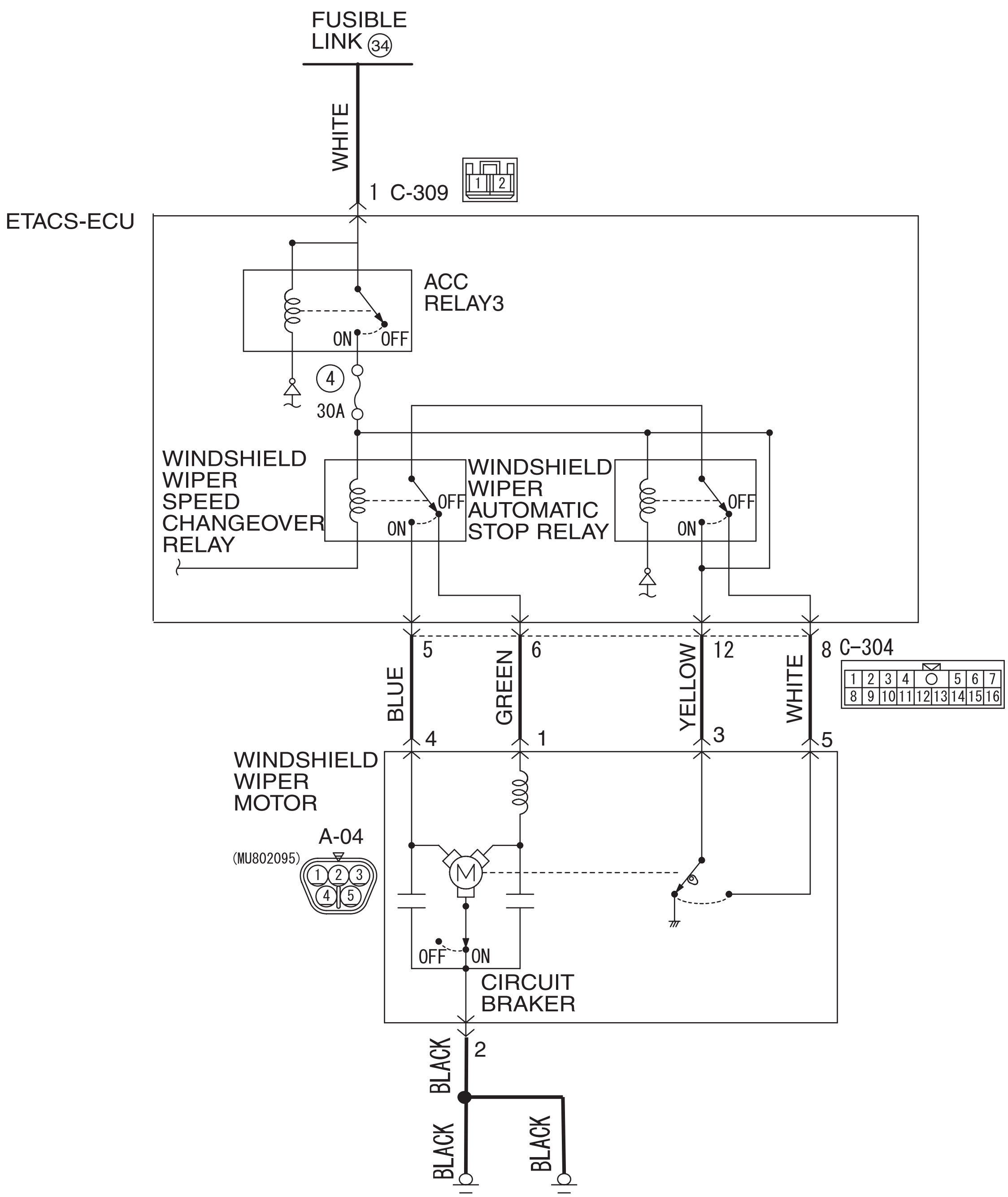
FUNCTION		CONTROL ECU
Windshield wiper and washer control function	Intermittent control (Vehicle speed-dependent variable type)	ETACS-ECU, column switch
	Mist wiper control	ETACS-ECU, column switch
	Low speed wiper and high speed wiper control	ETACS-ECU, column switch
	Washer control	ETACS-ECU, column switch

GENERAL CIRCUIT DIAGRAM FOR THE WINDSHIELD WIPER AND WASHER



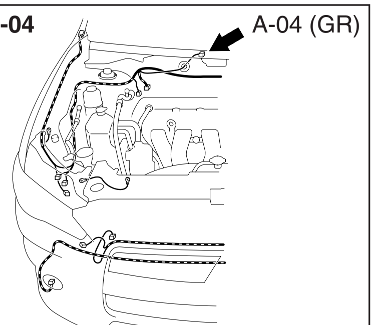
INSPECTION PROCEDURE 1: The windshield wipers do not work at all.

Windshield Wiper Power Supply Circuit



AC609136AB

Connector: A-04



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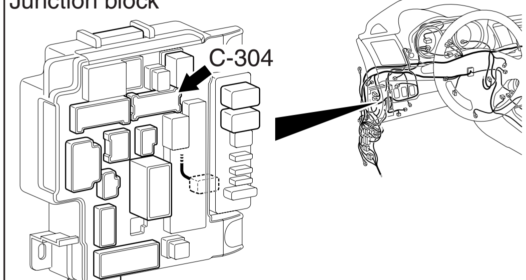
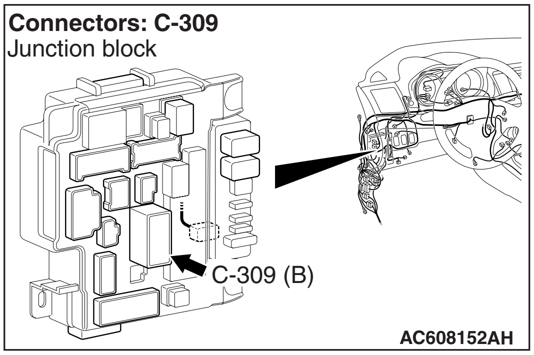
Connectors: C-304
Junction block



AC608152AG



CIRCUIT OPERATION

- The windshield wiper and washer switch sends a signal through the column-ECU (incorporated in the column switch) to the ETACS-ECU. If the column-ECU sends a windshield wiper and washer switch "ON" signal to the ETACS-ECU, the ETACS-ECU turns on the relay (incorporated in the ETACS-ECU), thus causing the windshield wiper and washer motor to be turned on.
- If the LIN communication line is defective, the ETACS-ECU operates windshield wiper motor by using the other communication lines (wiper backup circuit) instead of that line. In this case, the windshield wiper works at low speed regardless of the windshield wiper and washer switch positions ("LO" or "HIGH").

TECHNICAL DESCRIPTION (COMMENT)

If the windshield wiper does not work at all, the windshield wiper motor, column switch (windshield wiper and washer switch) or the ETACS-ECU may be defective.

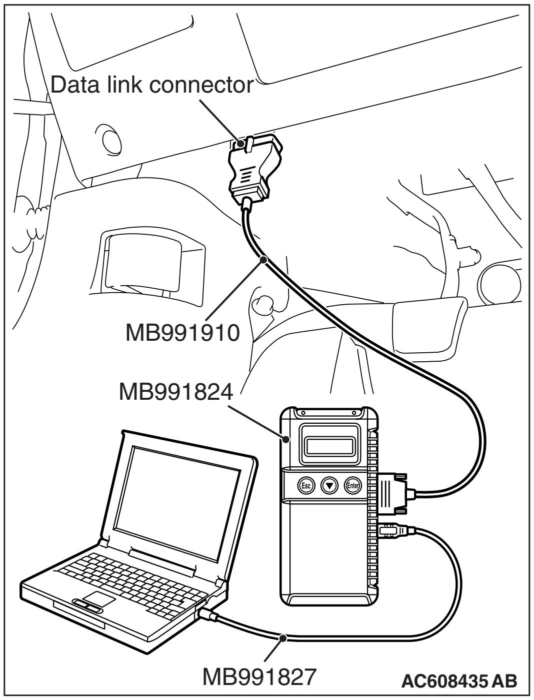
TROUBLESHOOTING HINTS

- Trouble in input signal system
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The wiper motor may be defective
- The column switch may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Use the scan tool MB991958 to check if an ETACS-related diagnostic trouble code is set.

Connect the scan tool. Refer to GROUP 54A ETACS, "How to connect the scan tool (M.U.T.-III) P.54A-479."

Q: Is the diagnostic trouble code set?

YES : Diagnose the ETACS-ECU. Refer to GROUP 54A ETACS, "Diagnostic trouble code chart P.54A-482."

NO : Go to Step 2.

STEP 2. Check the input signal related to the windshield wiper operation.

- Ignition switch: ACC

Item No.	Item name	Normal condition
Item 288	ACC switch	ON
Item 235	Front wiper ACT	ON

OK: Normal condition is displayed.

Q: Is the check result normal?

NO : Go to Step 3.

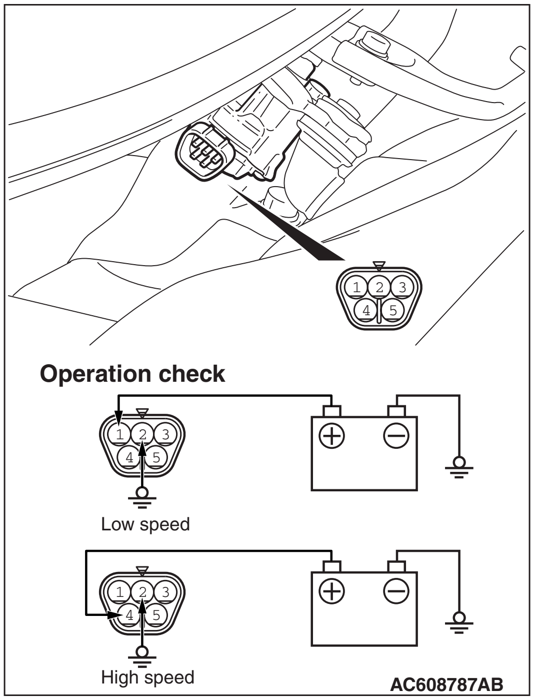
YES : Refer to GROUP 54A –ETACS, Input signal chart P.54A-528.

STEP 3. Check windshield wiper motor connector A-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is windshield wiper motor connector A-04 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper works normally.

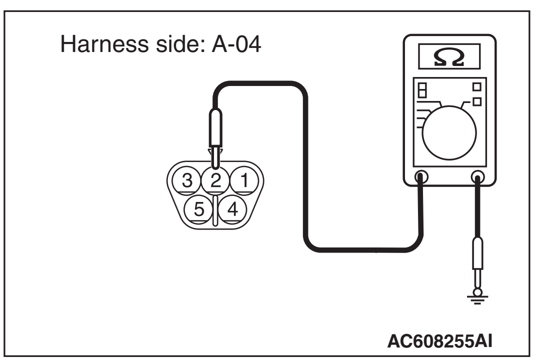


STEP 4. Check the windshield wiper motor.

(1) Disconnect windshield wiper motor connector A-04.
(2) Connect a battery to the windshield wiper motor as shown. Then check that the windshield wiper motor operates normally at high and low speeds.

Q: Does the windshield wiper motor operate normally?

YES : Go to Step 5.
NO : Replace the windshield wiper motor. Verify that the windshield wiper works normally.



STEP 5. Check the ground circuit to the windshield wiper motor. Measure the resistance at the windshield wiper motor connector A-04.

(1) Disconnect windshield wiper motor connector A-04 and measure the resistance available at the wiring harness side of the connector.
(2) Measure the resistance value between terminal 2 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the wiring harness between windshield wiper motor connector A-04 (terminal 2) and ground.

Q: Is the wiring harness between windshield wiper motor connector A-04 (terminal 2) and ground in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify the windshield wiper works normally.

STEP 7. Check ETACS-ECU connector C-304 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-304 in good condition?

YES : Go to Step 8.

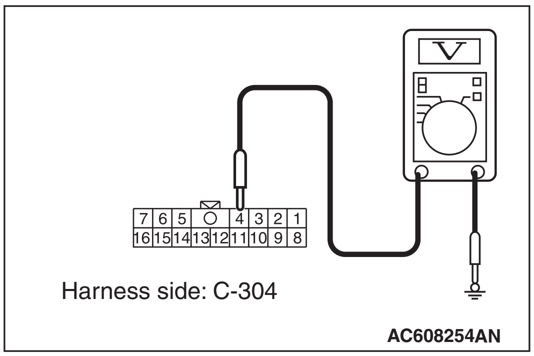
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper works normally.

STEP 8. Measure the voltage at ETACS-ECU connector C-304.

(1) Disconnect ETACS-ECU connector C-304 and measure the resistance available at the wiring harness side of the connector.

(2) Measure the voltage between terminal 4 and ground.

- The voltage should measure approximately 12 volts (battery positive voltage).



Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 10.

NO : Go to Step 9.

STEP 9. Check the wiring harness between ETACS-ECU connector C-309 (terminal 1) and the fusible link (34).

- Check the power supply line for open circuits.

Q: Is the wiring harness between ETACS-ECU connector C-309 (terminal 1) and the fusible link (34) in good condition?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

STEP 10. Check the wiring harness between ETACS-ECU connector C-304 (terminals 5, 6) and windshield wiper motor connector A-04 (terminals 4, 1).

- Check the input and output lines for open or short ciruit.

Q: Is the wiring harness between ETACS-ECU connector C-304 (terminals 5, 6) and windshield wiper motor connector A-04 (terminals 4, 1) in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

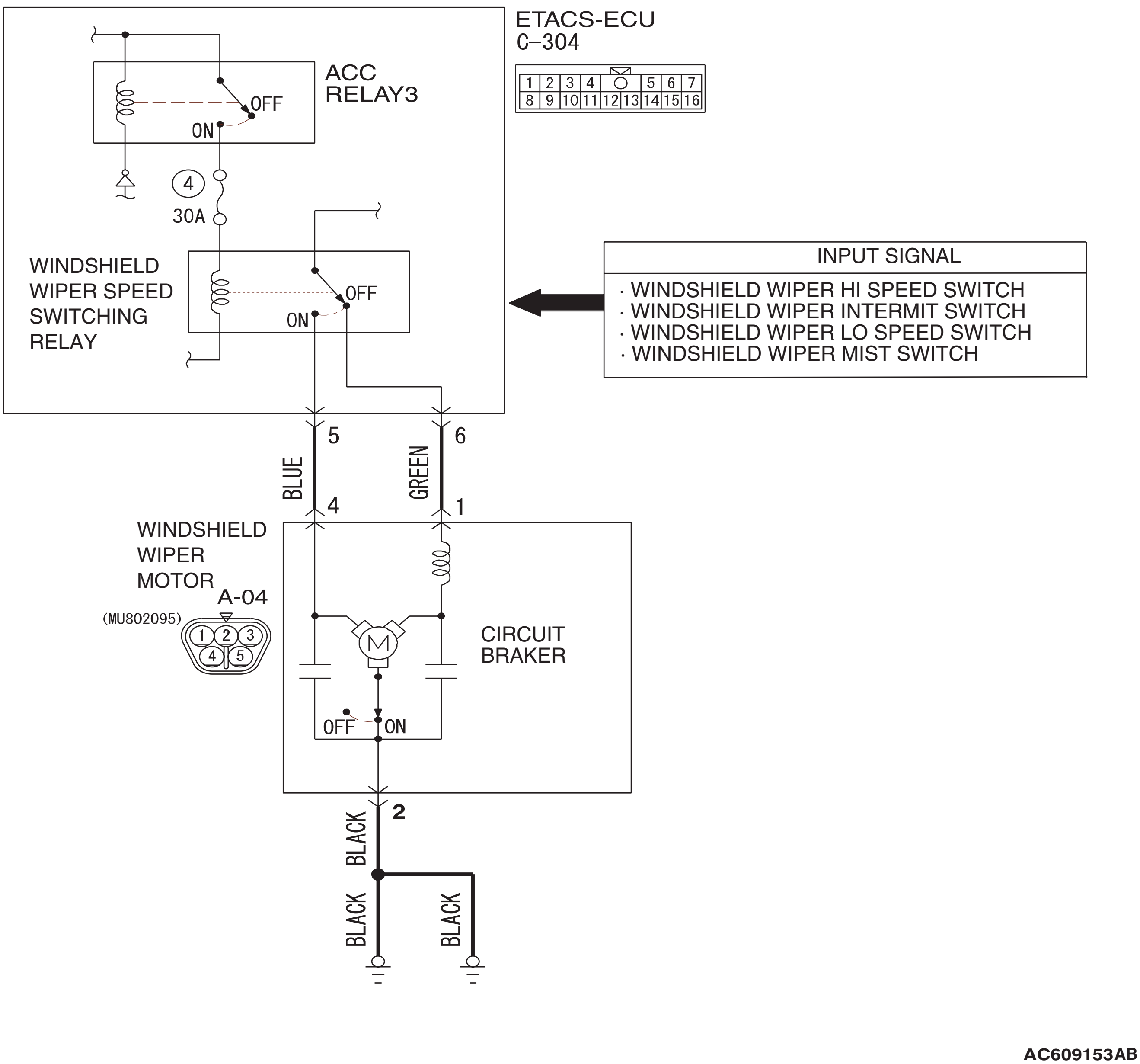
STEP 11. Retest the system.
Check that the windshield wipers work normally.

Q: Is the check result normal?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.
NO : Replace the ETACS-ECU.

INSPECTION PROCEDURE 2: The windshield wipers do not work when the wiper switch is at the "INT", "Washer" or "Mist" position. However, the wipers work at low speed when the switch is at the "Lo" or "Hi" position.

Windshield Wiper Motor Circuit



TECHNICAL DESCRIPTION (COMMENT)

This system may be at fail-safe mode if the LIN communication line is defective.

If the system cannot receive any signal from the column switch (windshield wiper and washer switch) due to a open circuit in the LIN communication line or other reasons, the system will enter the fail-safe mode when the ignition switch is at the "ACC" position.

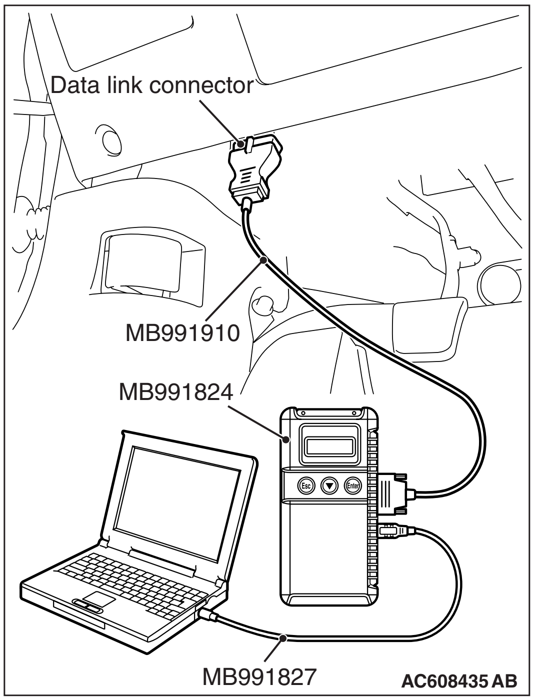
TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The column switch may be defective
- The ETACS-ECU may be defective
- The LIN bus line may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Use the scan tool MB991958 to check if an ETACS-related diagnostic trouble code is set.

Connect the scan tool. Refer to GROUP 54A ETACS, "How to connect the scan tool (M.U.T.-III) P.54A-479."

Q: Is the diagnostic trouble code set?

YES : Diagnose the ETACS-ECU. Refer to GROUP 54A ETACS, "Diagnostic trouble code chart P.54A-482."

NO : Go to Step 2.

STEP 2. Retest the system.

Check that the windshield wipers work normally.

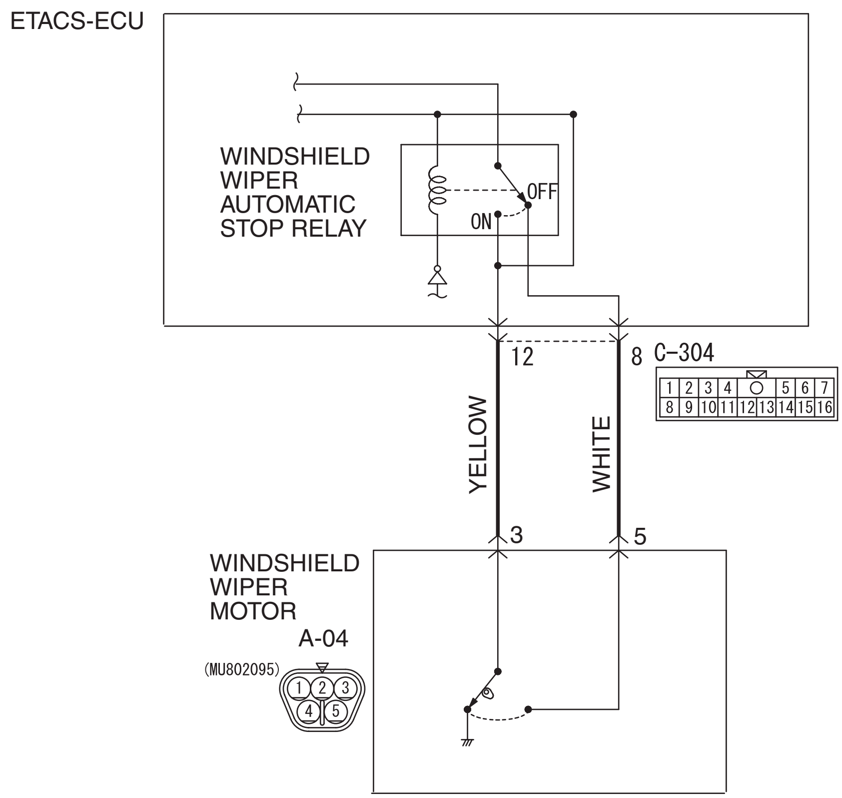
Q: Is the check result normal?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.

NO : Replace the ETACS-ECU.

INSPECTION PROCEDURE 3: Windshield wipers do not stop at the specified park position.

Windshield Wiper Automatic Stop Relay Circuit



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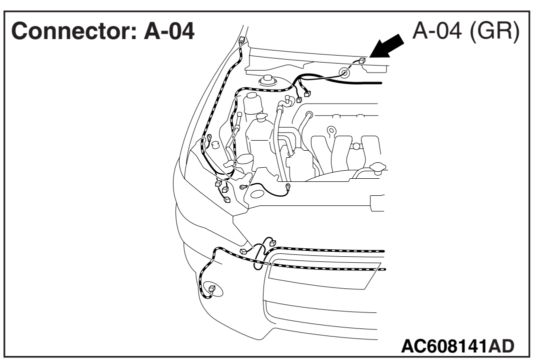
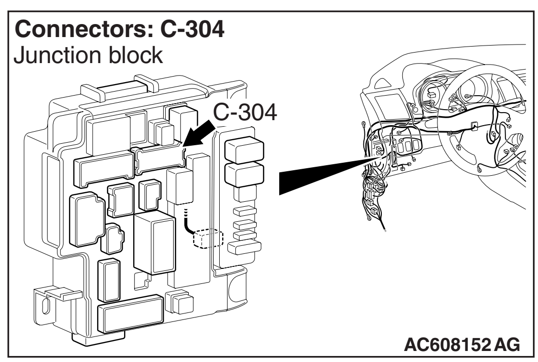




TECHNICAL DESCRIPTION (COMMENT)

If the windshield wipers do not stop at predetermined park position, the windshield wiper motor or the ETACS-ECU may be defective.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The windshield wiper motor may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP1. Check windshield wiper motor connector A-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

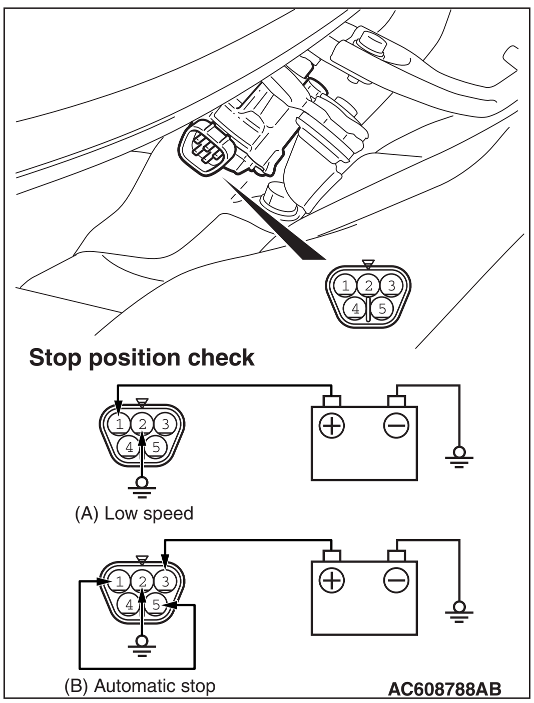
Q: Is windshield wiper motor connector A-04 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper works normally.

STEP 2. Check the windshield wiper motor.

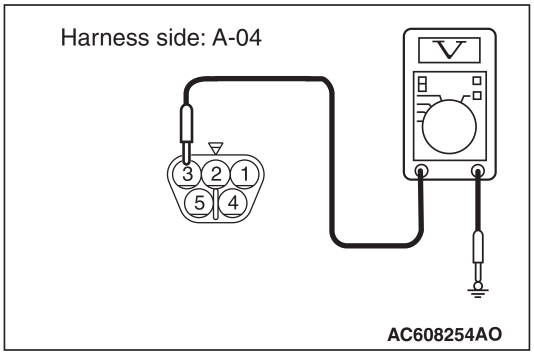
(1) Disconnect windshield wiper motor connector A-04.
(2) Connect the vehicle battery to the windshield wiper motor connector as shown, and operate the windshield wiper at low speed. While the windshield wiper is working, disconnect the battery at positions other than the specified park position to stop the windshield wiper motor.
(3) When the battery is connected as shown, the motor should run at low speed, and then stop at the specified park position.



Q: Does the windshield wiper motor operate normally?

YES : Go to Step 3.

NO : Replace the windshield wiper motor. The windshield wiper should now stop at the specified park position.



STEP 3. Check the fusible link (34) circuit to the windshield wiper motor. Measure the voltage at windshield wiper motor connector A-04.

(1) Disconnect windshield wiper motor connector A-04 and measure the voltage available at the wiring harness side of the connector.
(2) Turn the ignition switch to the "ACC" position.
(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between windshield wiper motor connector A-04 (terminal 3) and the fusible link (34).

- Check the power supply line for open circuits.

Q: Is the wiring harness between windshield wiper motor connector A-04 (terminal 3) and the fusible link (34) in good condition?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

STEP 5. Check ETACS-ECU connector C-304 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-304 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the wiring harness between ETACS-ECU connector C-304 (terminals 8, 12) and windshield wiper motor connector A-04 (terminals 3, 5).

- Check the output lines for open or short circuits.

Q: Is the wiring harness between ETACS-ECU connector C-304 (terminals 8, 12) and windshield wiper motor connector A-04 (terminals 3, 5) in good condition?

YES : Go to Step 7.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

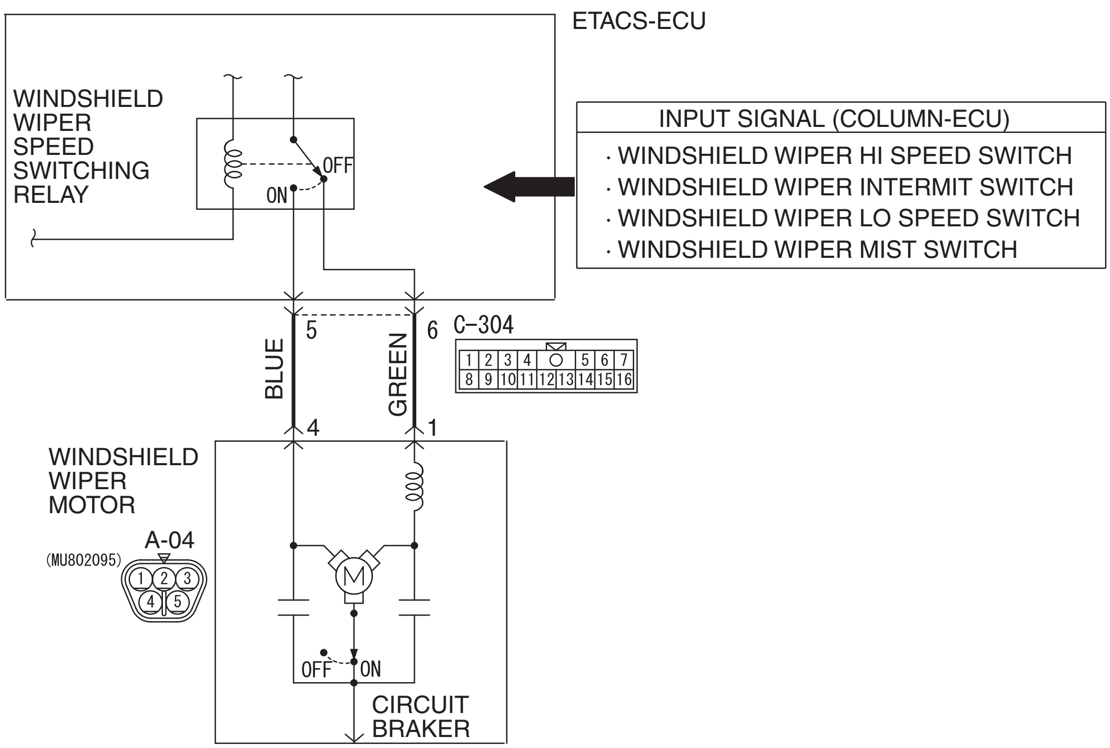
STEP 7. Retest the system.
Check that the windshield wipers stops at the specified park position.

Q: Is the check result normal?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.
NO : Replace the ETACS-ECU.

INSPECTION PROCEDURE 4: Windshield Wipers do not work normally.

Windshield Wiper Motor Drive Circuit



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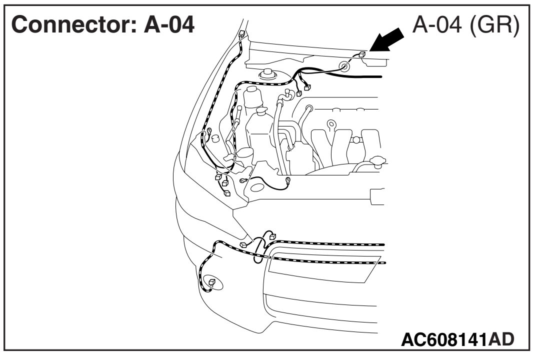

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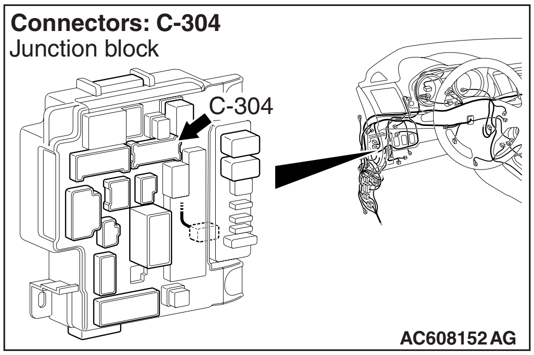

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TECHNICAL DESCRIPTION (COMMENT)

If either of the windshield wiper switch positions is defective, the windshield wiper motor, column switch (windshield wiper and washer switch) or the ETACS-ECU may be defective.

TROUBLESHOOTING HINTS

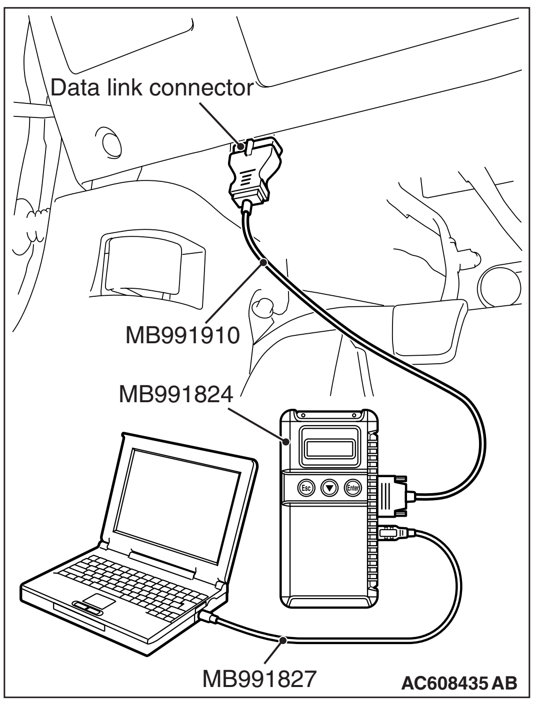
- Trouble in input signal system
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The wiper motor may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Use the scan tool MB991958 to check if an ETACS-related diagnostic trouble code is set.



Connect the scan tool. Refer to "How to connect the scan tool (M.U.T.-III) P.54B-4."

Q: Is the diagnostic trouble code set?

YES : Diagnose the ETACS-ECU. Refer to Diagnostic trouble code chart P.54A-482."

NO : Go to Step 2.

STEP 2. Check the input signal related to the windshield wiper operation.

- Ignition switch: ACC

Item No.	Item name	Normal condition
Item 235	Front wiper ACT	ON
Item 236	Front wiper Lo/Hi	ON

OK: Normal condition is displayed.

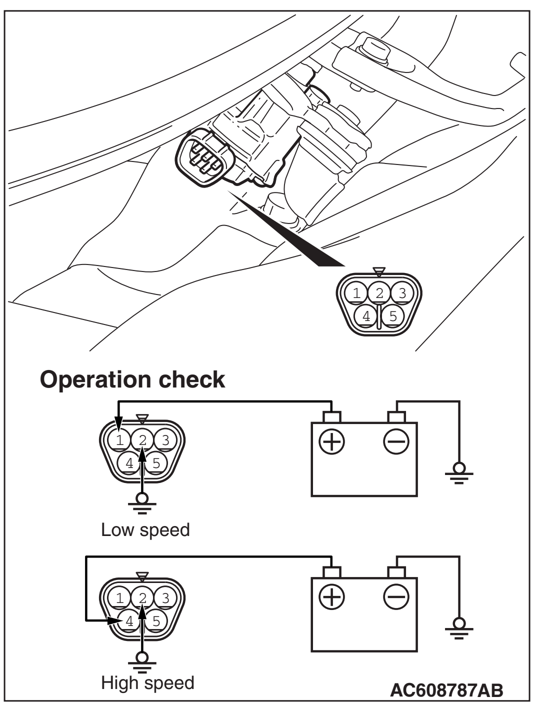
Q: Is the check result normal?

NO : Go to Step 3.
YES : Refer to GROUP 54A –ETACS, Input signal chart P.54A-528.

STEP 3. Check windshield wiper motor connector A-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is windshield wiper motor connector A-04 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper operates normally when the windshield wiper switch is moved to each position.



STEP 4. Check the windshield wiper motor.

(1) Disconnect windshield wiper motor connector A-04.
(2) Connect a battery to the windshield wiper motor as shown. Then check if the windshield wiper motor operates normally at high and low speeds.

Q: Does the windshield wiper motor operate normally?

YES : Go to Step 5.
NO : Replace the windshield wiper motor. Verify that the windshield wiper operates normally when the windshield wiper switch is moved to each position.

STEP 5. Check ETACS-ECU connector C-304 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-304 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper operates normally when the windshield wiper switch is moved to each position.

STEP 6. Check the wiring harness between windshield wiper motor connector A-04 (terminals 4 and 1) and ETACS-ECU connector C-304 (terminals 5 and 6).

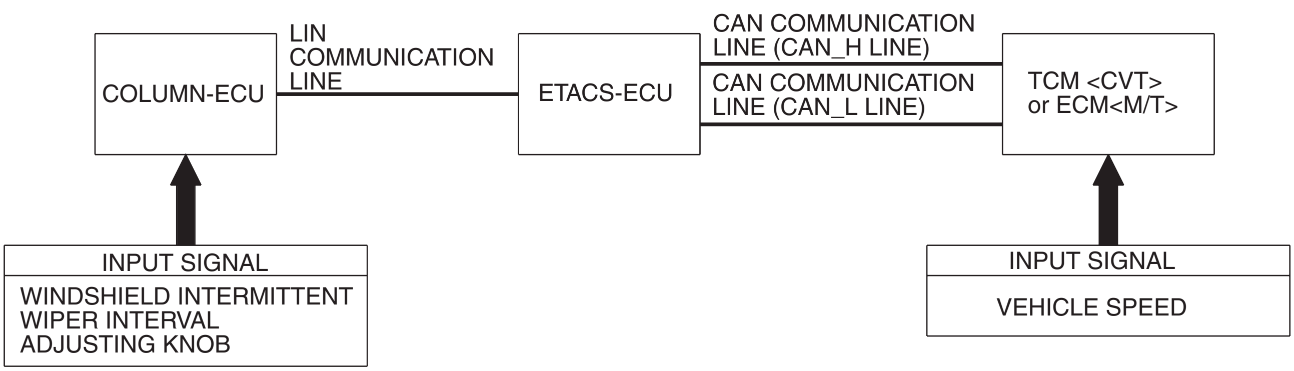
Q: Is the wiring harness between windshield wiper motor connector A-04 (terminals 4 and 1) and ETACS-ECU connector C-304 (terminals 5 and 6) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the windshield wiper operates normally when the windshield wiper switch is moved to each position.

INSPECTION PROCEDURE 5: The windshield intermittent wiper interval cannot be adjusted by operating the windshield intermittent wiper interval control switch.

Windshield Intermittent Wiper Control Circuit



AC609166AC

TECHNICAL DESCRIPTION (COMMENT)

If the windshield intermittent wiper interval is not changed by operating the windshield intermittent wiper interval adjusting knob or according to the vehicle speed, the column switch or the ETACS-ECU may be defective.

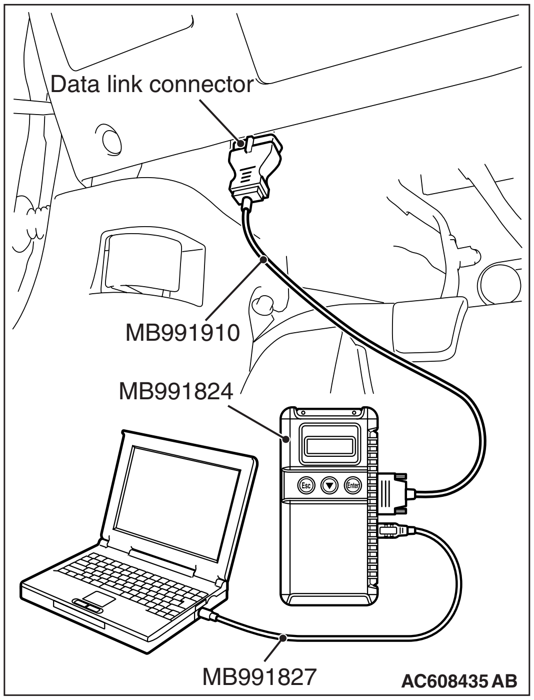
TROUBLESHOOTING HINTS

- Trouble in input signal system
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Use the scan tool MB991958 to check if an ETACS-related diagnostic trouble code is set.

Connect the scan tool. Refer to GROUP 54A ETACS, "How to connect the scan tool (M.U.T.-III) P.54A-479."

Q: Is the diagnostic trouble code set?

YES : Diagnose the ETACS-ECU. Refer to GROUP 54A ETACS, "Diagnostic trouble code chart P.54A-482."

NO : Go to Step 2.

STEP 2. Check the ETACS configuration function.

Use the ETACS configuration function to check that "Front wiper operation" is set to "Variable INT" or "Speed sensitive".

Q: Is the check result normal?

YES : Go to Step 3.

NO : Use the ETACS configuration function to set "Front wiper operation" to "variable INT" or "Speed sensitive". (Refer to P.51-46.)

STEP 3. Retest the system.

Check that the windshield wiper interval changes when the windshield wiper interval control is rotated.

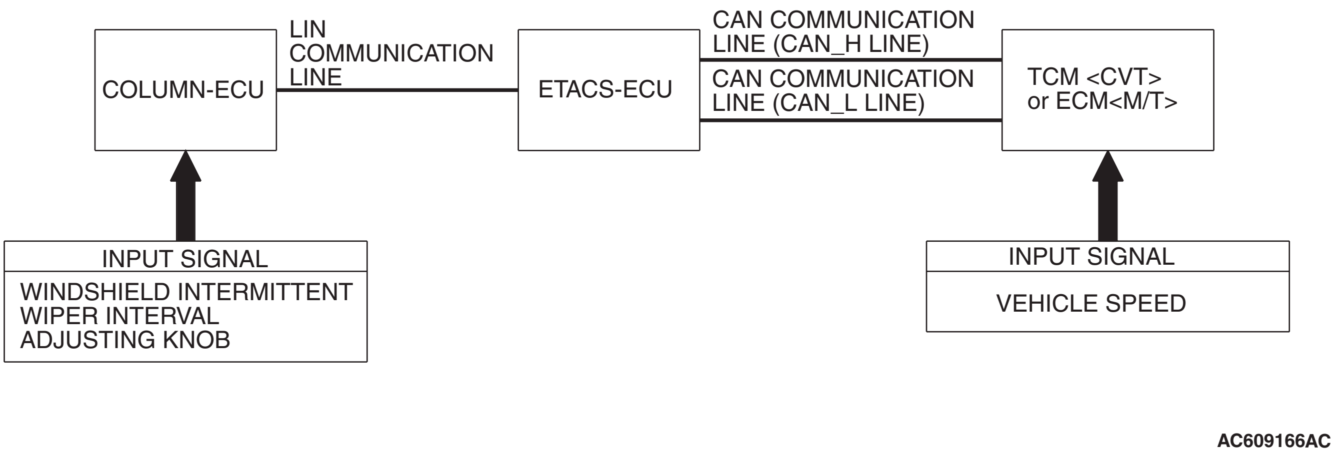
Q: Is the check result normal?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.

NO : Replace the ETACS-ECU.

INSPECTION PROCEDURE 6: The windshield intermittent wiper interval is not changed according to the vehicle speed.

Windshield Intermittent Wiper Control Circuit



TECHNICAL DESCRIPTION (COMMENT)

If the intermittent wiper interval does not depend on the vehicle speed, the input circuit of the vehicle speed signal and the ETACS-ECU may be defective. Alternatively, the vehicle speed-dependent wiper may be set to "disabled" by using the configuration function.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The CAN bus line may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Retest the system.

Check that the windshield intermittent wiper interval can be adjusted by operating the windshield intermittent wiper interval control switch.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to Inspection Procedure 5 "The windshield intermittent wiper interval cannot be adjusted by operating the windshield intermittent wiper interval control switch" P.51-37.

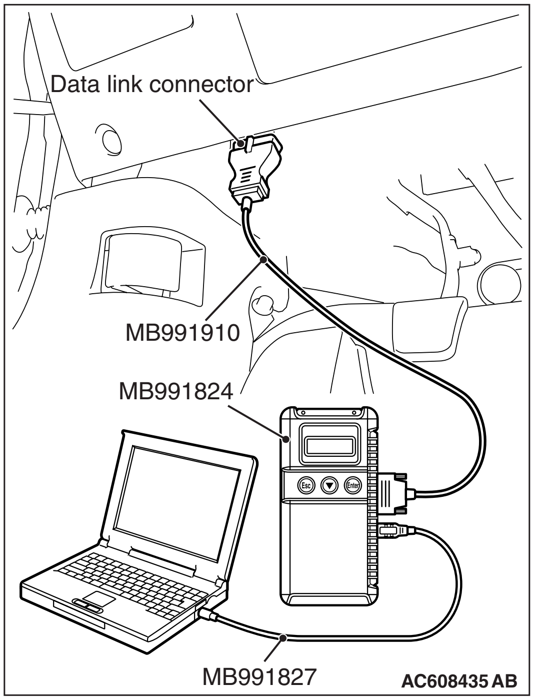
STEP 2. Check the ETACS configuration function.

Use the ETACS configuration function to check that "Front wiper operation" is set to "Variable INT" or "Speed sensitive".

Q: Is the check result normal?

YES : Go to Step 3.

NO : Use the ETACS configuration function to set "Front wiper operation" to "variable INT" or "Speed sensitive". (Refer to P.51-46.)



STEP 3. Use the scan tool MB991958 to diagnose the CAN bus lines.

Connect the scan tool. Refer to GROUP 54A ETACS, "How to connect the scan tool (M.U.T.-III) P.54A-479."

Q: Is the check result normal?

YES <CVT> : Go to Step 4.

YES <M/T> : Go to Step 5.

NO : Repair the CAN bus line (Refer to GROUP 54C –CAN bus diagnosis chart P.54C-16).

STEP 4. Use the scan tool MB991958 to diagnose other system diagnostic trouble code

Connect the scan tool. Refer to GROUP 54A ETACS, "Diagnostic function P.54A-479."

Check that the TCM sets a diagnostic trouble code.

Q: Is the diagnostic trouble code set?

YES : Diagnose the TCM (Refer to GROUP 23 –Diagnostic trouble code chart P.23A-29).

NO : Go to Step 6.

STEP 5. Use the scan tool MB991958 to diagnose other system diagnostic trouble code

Connect the scan tool. Refer to GROUP 54A ETACS, "Diagnostic function P.54A-479."

Check that the ECM sets a diagnostic trouble code.

Q: Is the diagnostic trouble code set?

YES : Diagnose the ECM (Refer to GROUP 13A – Diagnostic trouble code chart P.13A-46).

NO : Go to Step 6.

STEP 6. Retest the system.

Check that the intermittent wiper interval depends on the vehicle speed.

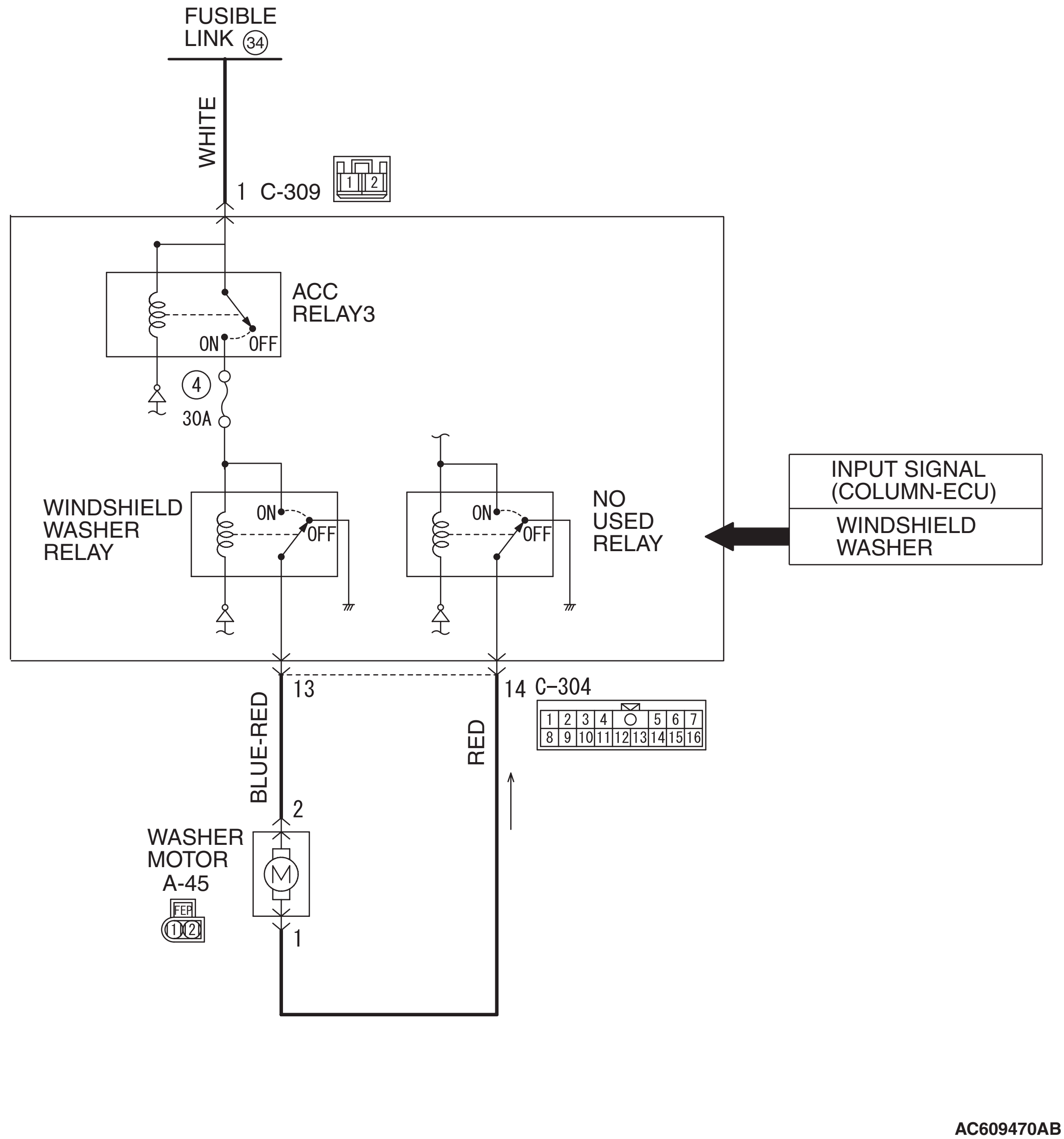
Q: Is the check result normal?

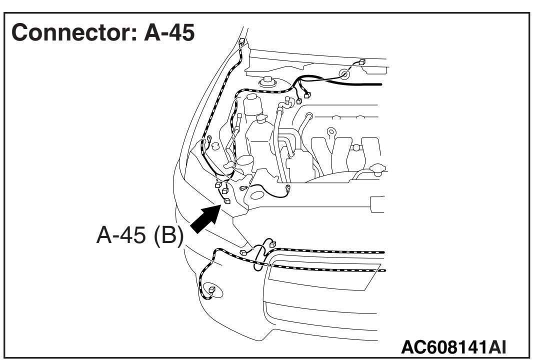
YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.

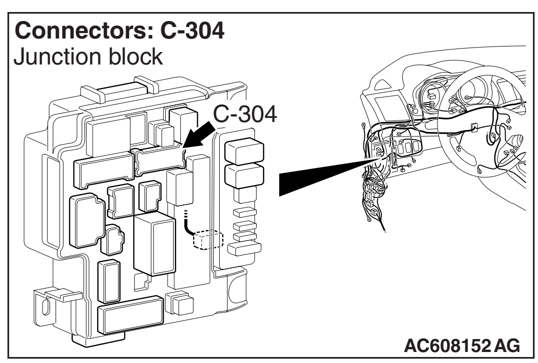
NO : Replace the ETACS-ECU.

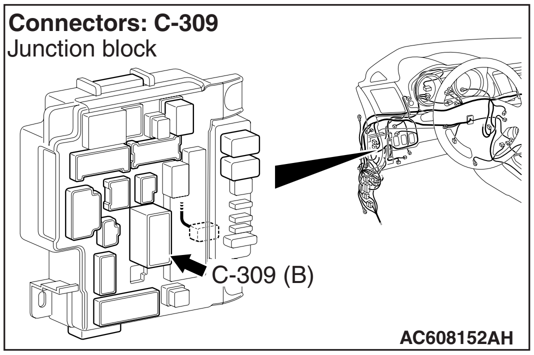
INSPECTION PROCEDURE 7: The windshield washer does not work normally.

Windshield Washer Motor Circuit









CIRCUIT OPERATION

The windshield washer switch sends a signal through the column-ECU (incorporated in the column switch) to the ETACS-ECU. If the column-ECU sends a windshield washer switch "ON" signal to the ETACS-ECU, the ETACS-ECU turns on the relay (incorporated in the ETACS-ECU), thus causing the washer motor to be turned on.

TECHNICAL DESCRIPTION (COMMENT)

If the windshield washer does not work normally, the washer motor, the column switch (windshield wiper and washer switch) or the ETACS-ECU may be defective.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The washer motor may be defective
- The column switch may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

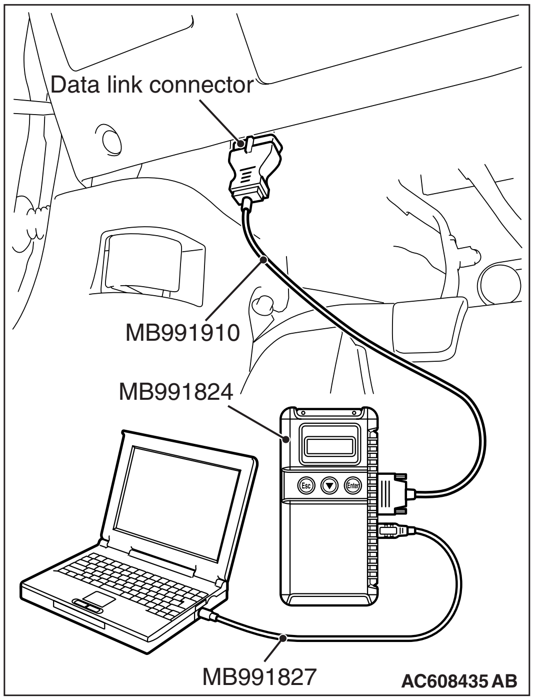
Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Verify the windshield wiper operation.

Q: Does the windshield wiper operate normally?

YES : Go to Step 2.
NO : Refer to Inspection Procedure 1 "The windshield wipers do not work at all P.51-23."



STEP 2. Use the scan tool MB991958 to check if an ETACS-related diagnostic trouble code is set.

Connect the scan tool. Refer to GROUP 54A ETACS, "How to connect the scan tool (M.U.T.-III) P.54A-479."

Q: Is the diagnostic trouble code set?

YES : Diagnose the ETACS-ECU. Refer to GROUP 54A ETACS, "Diagnostic trouble code chart P.54A-482."
NO : Go to Step 3.

STEP 3. Check the input signal related to the windshield washer operation.

- Ignition switch: ACC
- Windshield washer switch: ON

Item No.	Item name	Normal condition
Item 237	Front washer	ON

OK: Normal condition is displayed.

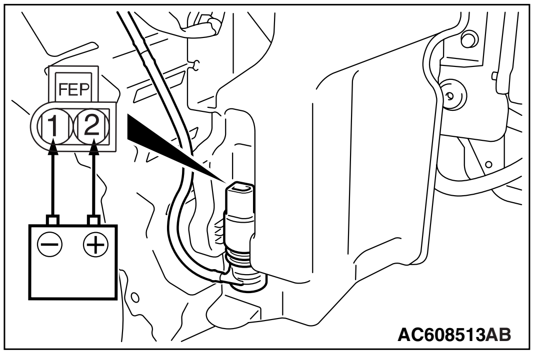
Q: Is the check result normal?

NO : Go to Step 4.
YES : Refer to GROUP 54A –ETACS, Input signal chart P.54A-528.

STEP 4. Check windshield washer motor connector A-45 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is windshield washer motor connector A-45 in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield wiper works normally.



STEP 5. Check the operation of windshield washer motor.

(1) Disconnect windshield washer motor connector A-45 and check at windshield washer motor connector side.
(2) Fill the windshield washer tank with washer fluid.
(3) When battery voltage is applied between terminals 1 and 2, washer fluid should spray out.

Q: Does the washer motor operate normally?

YES : Go to Step 6.
NO : Replace the washer motor. Verify that the windshield washer works normally.

STEP 6. Check ETACS-ECU connector C-304 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-304 in good condition?

YES : Go to Step 7.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Verify that the windshield washer works normally.

STEP 7. Check the wiring harness between windshield washer motor connector A-45 (terminal 2) and ETACS-ECU connector C-304 (terminal 13).

- Check the input lines for open or short ciruit.

Q: Is the wiring harness between windshield washer motor connector A-45 (terminal 2) and ETACS-ECU connector C-304 (terminal 13)in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

STEP 8. Check the wiring harness between windshield washer motor connector A-45 (terminal 1) and ETACS-ECU connector C-304 (terminal 14).

- Check the input lines for open or short ciruit.

Q: Is the wiring harness between windshield washer motor connector A-45 (terminal 1) and ETACS-ECU connector C-304 (terminal 14)in good condition?

YES : Go to Step 9.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Cables and wire check P.00E-12.

STEP 9. Retest the system.
Check that the windshield washers work normally.

Q: Is the check result normal?

YES : Intermittent malfunction. Refer to GROUP 00, How to cope with intermittent malfunction P.00-13.
NO : Replace the ETACS-ECU.

ON-VEHICLE SERVICE

WINDSHIELD INTERMITTENT WIPER INTERVAL CHECK

M1511018900087

1. Check that the intermittent wiper interval is changed as the windshield intermittent wiper interval control is operated.
2. Turn the windshield intermittent wiper switch to the intermittent operation position. Use the M.U.T.-III to set a simulated vehicle speed with the wiper volume held. The intermittent wiper interval should be changed as the simulated vehicle speed is changed.
3. If either of above is defective, carry out the troubleshooting. (Refer to P.51-37)

CONFIGURATION FUNCTION

M1511027400217

Using the M.U.T.-III, the following functions can be programmed. The programmed information is held even when the battery is disconnected.

Adjustment item (M.U.T.-III display)	Adjustment item	Adjusting contents (M.U.T.-III display)	Adjusting contents
Front wiper operation	Adjustment of the intermittent windshield wiper operation	Normal INT	Intermittent wiper interval is fixed to 4 seconds.
		Variable INT	Intermittent wiper interval is calculated only by the wiper interval control.
		Speed sensitive	Intermittent wiper interval is calculated according to the intermittent wiper interval control and vehicle speed (default).
Front wiper washer	Disabling or enabling washer-linked wiper function	Only washer	No function
		Washer and wiper	With function (default)

WINDSHIELD WIPER

REMOVAL AND INSTALLATION

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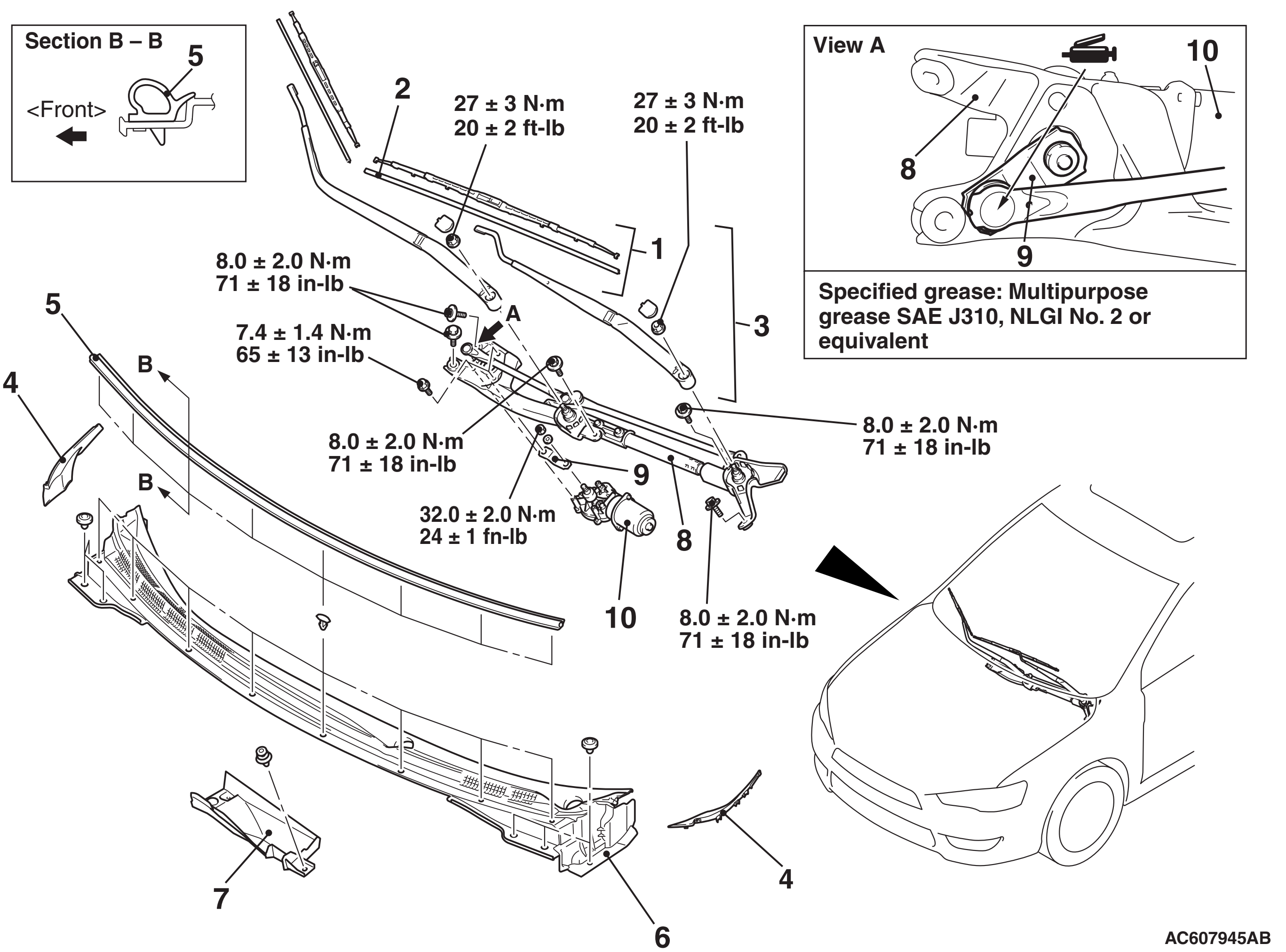

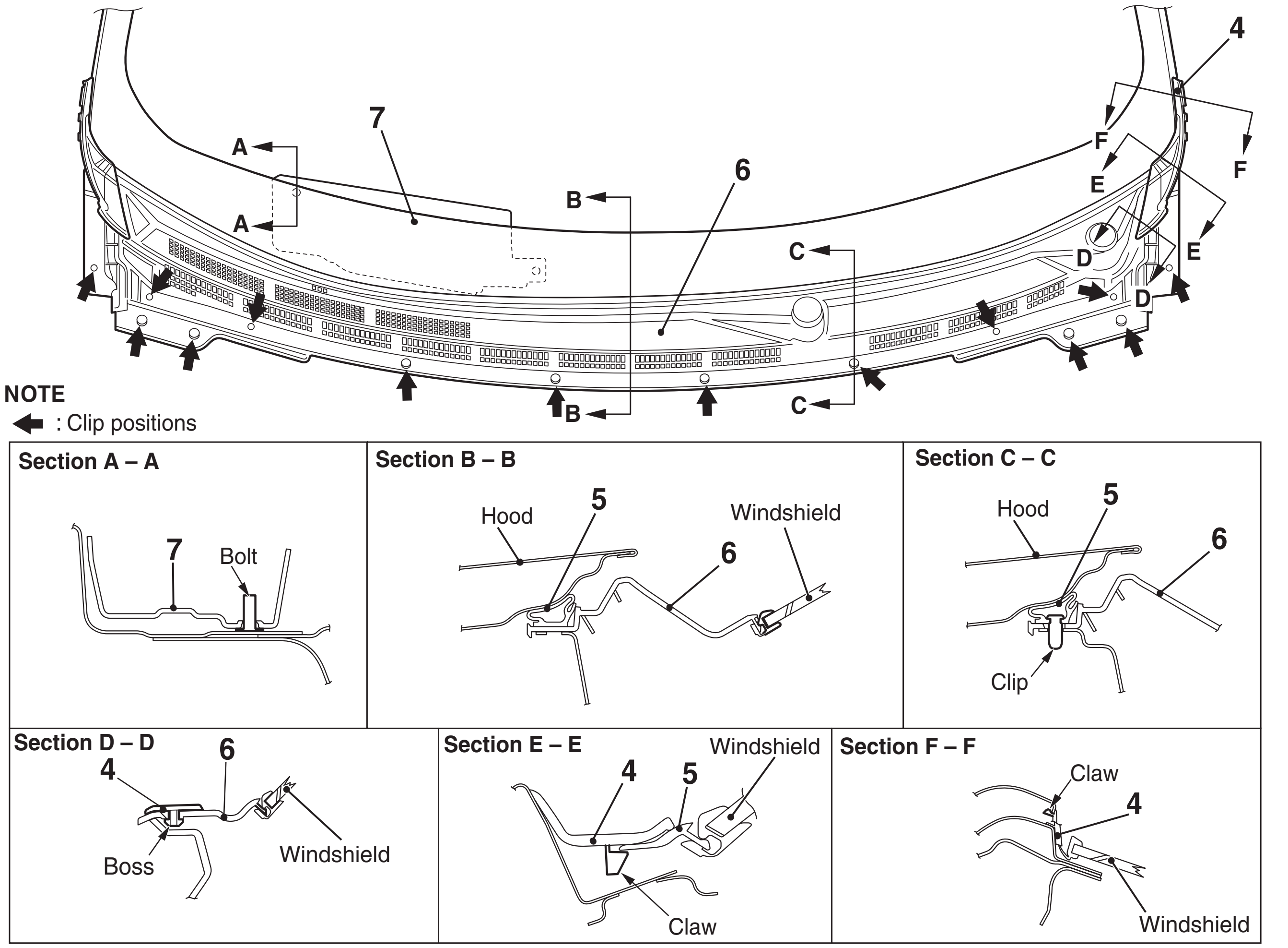

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Wiper blade removal steps

	1.	Wiper blade assembly
>>**A**<<	2.	Wiper blade

Windshield wiper motor and wiper link assembly removal steps

>>**C**<<	3.	Wiper arm and blade assembly
	4.	Front deck garnish cover
	5.	Hood weatherstrip
	6.	Front deck garnish

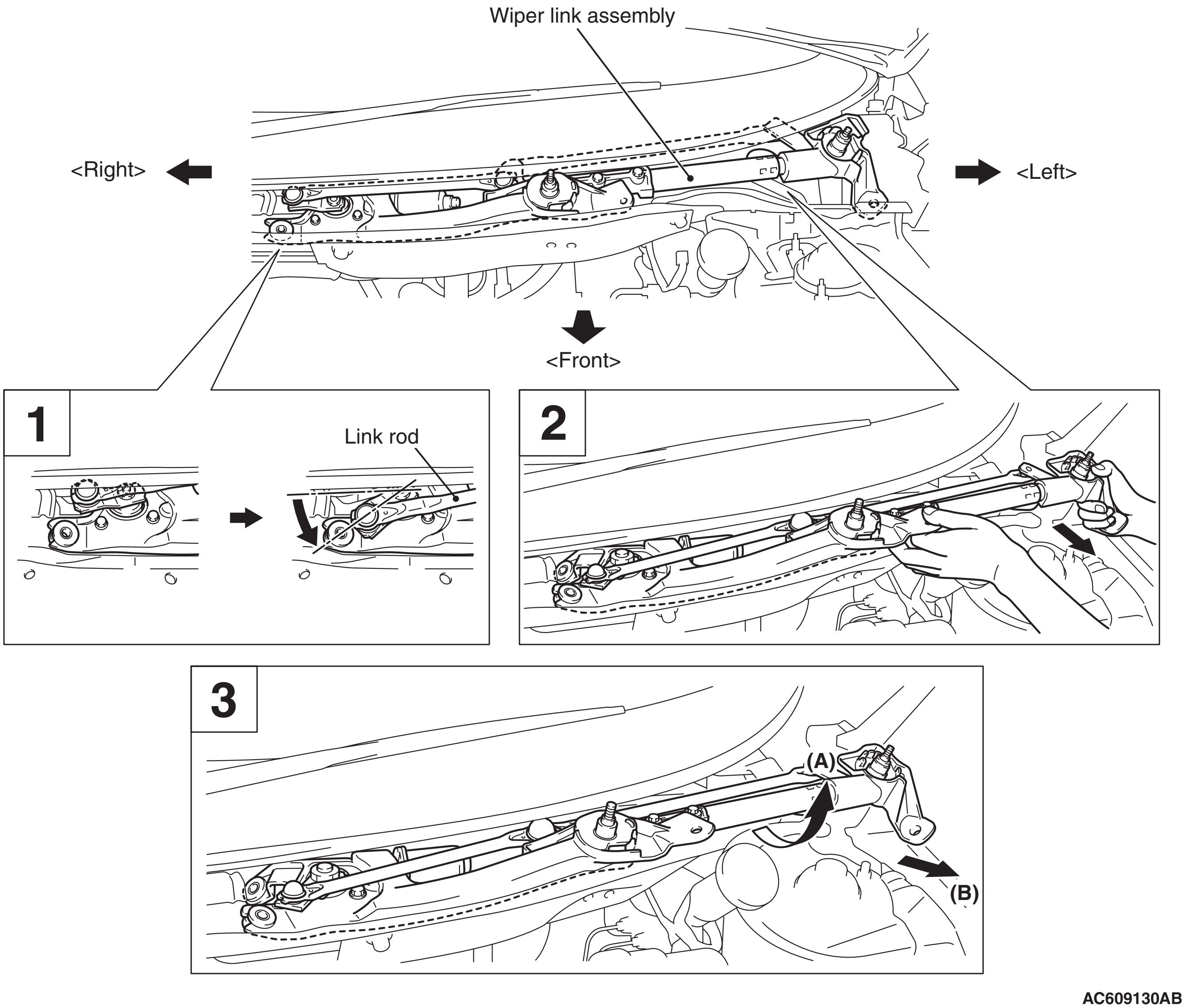
Windshield wiper motor and wiper link assembly removal steps (Continued)

		7.	Front deck cover
<<**A**>>	>>**B**<<	8.	Wiper link assembly
<<**B**>>		9.	Wiper motor link plate
<<**B**>>		10.	Windshield wiper motor

NOTE: For removal and installation of the wiper and washer switch, refer to GROUP 54A, Column switch P.54A-230.

REMOVAL SERVICE POINTS

<<A>> WIPER LINK ASSEMBLY REMOVAL



1. Manually turn the link rod at the right of the wiper link assembly forward to the position indicated in the figure.

⚠ CAUTION

Another mechanic fully pushes up the hood so that the left side of link assembly is pulled out easily.

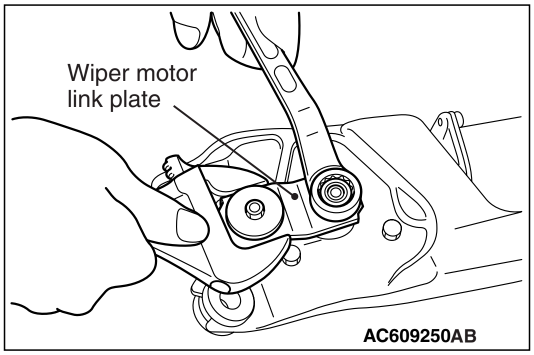
2. Pull out the attachment section of the left side of link assembly forward.

⚠ CAUTION

When pulling out the link assembly forward, be careful not to make a contact with the windshield glass.

3. While turning the link assembly upward (A), pull out the entire link assembly diagonally forward left (B).

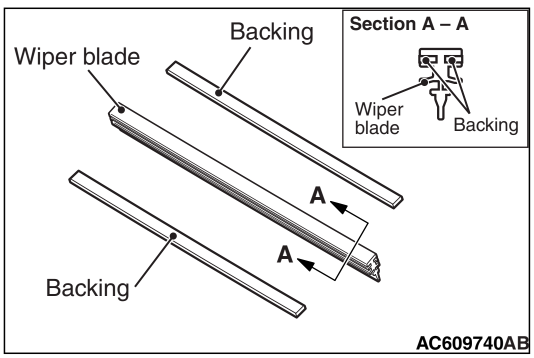
<<B>> WIPER MOTOR LINK PLATE/WINDSHIELD WIPER MOTOR REMOVAL



1. To disconnect the wiper motor link plate from the wiper motor shaft, use an appropriate tool to counter-hold the plate to prevent it from turning.
2. Remove the wiper motor from the wiper link assembly.

INSTALLATION SERVICE POINTS

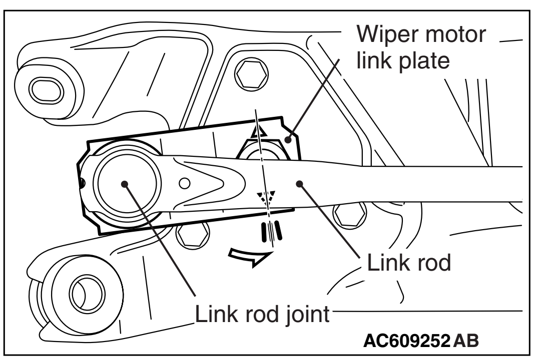
>>A<< WIPER BLADE INSTALLATION



⚠ CAUTION

For good windshield wiper wiping performance, use windshield wipers without a curve in the backing of the wiper blade.

>>B<< WIPER LINK ASSEMBLY/WIPER MOTOR LINK PLATE/WINDSHIELD WIPER MOTOR INSTALLATION



1. Confirm that the wiper motor has set to automatic stop position (Refer to P.51-51).

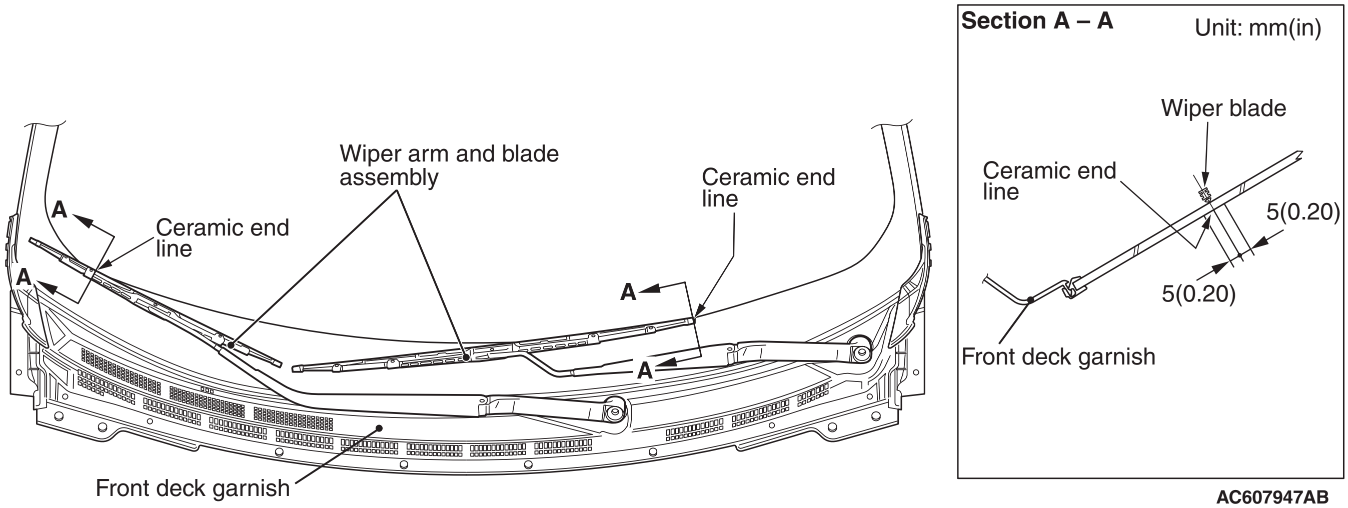
⚠ CAUTION

Always replace the wiper motor link plate with new one.

2. Set the wiper motor link plate onto the wiper motor shaft; aligning the triangle mark on the plate to the center line (of 3 lines) on the wiper link assembly as shown in the illustration.
3. Tighten the attaching nut of wiper motor link plate and wiper motor shaft. Use an appropriate tool to counter-hold the plate to prevent it from turning.
4. Apply grease to the inside of link rod joint (as required) and connect the link rod to wiper motor link plate.

   Specified grease: Multipurpose grease SAE J310, NLGI No.2 or equivalent

>>C<< WIPER ARM AND BLADE ASSEMBLY INSTALLATION



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Set the wiper arm and blade assembly at the specified positions.

(A): Ceramic end line ±5.0 mm(0.20 in)

INSPECTION

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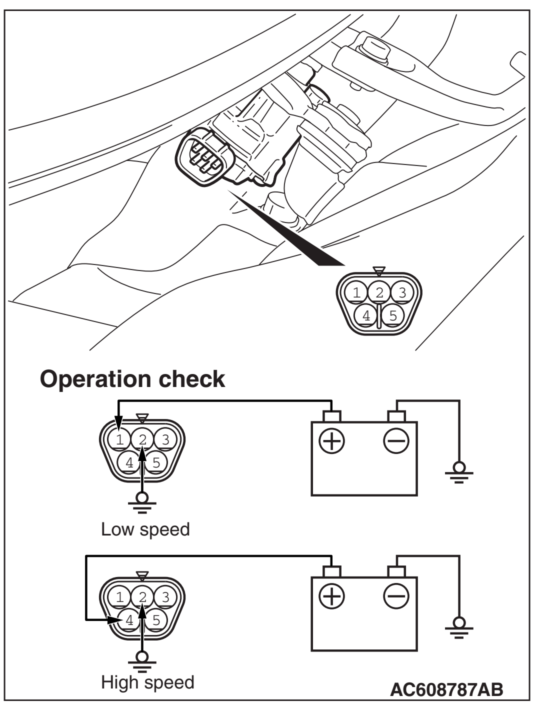
WINDSHIELD WIPER MOTOR CHECK

The windshield wiper motor assembly should be installed to the vehicle body and the harness connector should be disconnected when checking the wiper motor.

WINDSHIELD WIPER MOTOR AT LOW OR HIGH SPEED OPERATION

Connect the battery to the windshield wiper motor to inspect the operation of motor rotation at low or high speed.



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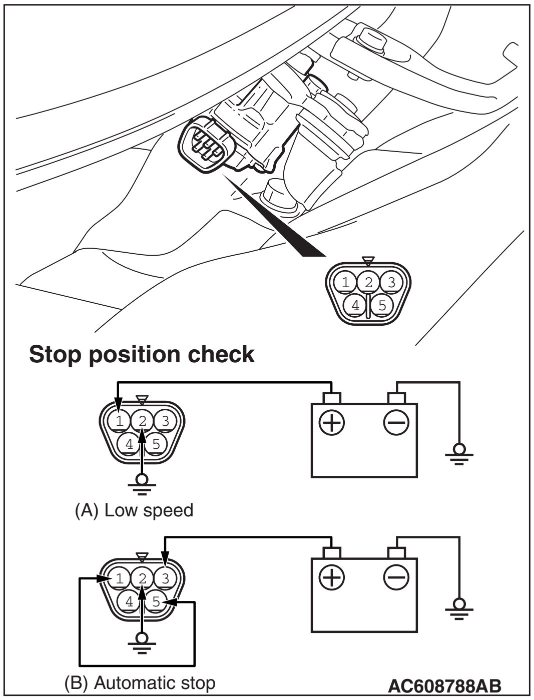
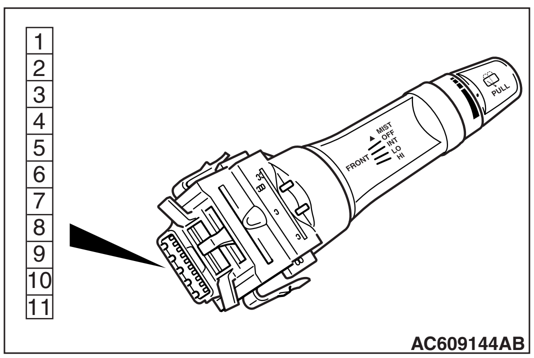


WINDSHIELD WIPER MOTOR AT STOP POSITION OPERATION

1. Connect the battery to the windshield wiper motor as shown in the illustration (A).
2. Run the windshield wiper motor at low speed, then disconnect the battery in the middle of the motor rotation and check to see that the motor stops.
3. Connect the battery to the windshield wiper motor as shown in the illustration (B).
4. Connect the terminals of the windshield wiper motor connector as shown in the illustration (B).
5. Check to see that the windshield wiper motor runs at low speed and then stops at the automatic stop position.

WINDSHIELD WIPER SWITCH CHECK



Check continuity between the switch terminals.

Switch position	Tester connection	Specified condition
OFF	6 –11, 6 –10, 6 –9, 6 –8	Open circuit
Windshield mist wiper switch	6 –11	Continuity (Less than 2 ohms)
Windshield intermittent wiper switch	6 –10	
Windshield low-speed wiper switch	6 –9	
Windshield high-speed wiper switch	6 –8	

WINDSHIELD WASHER

REMOVAL AND INSTALLATION

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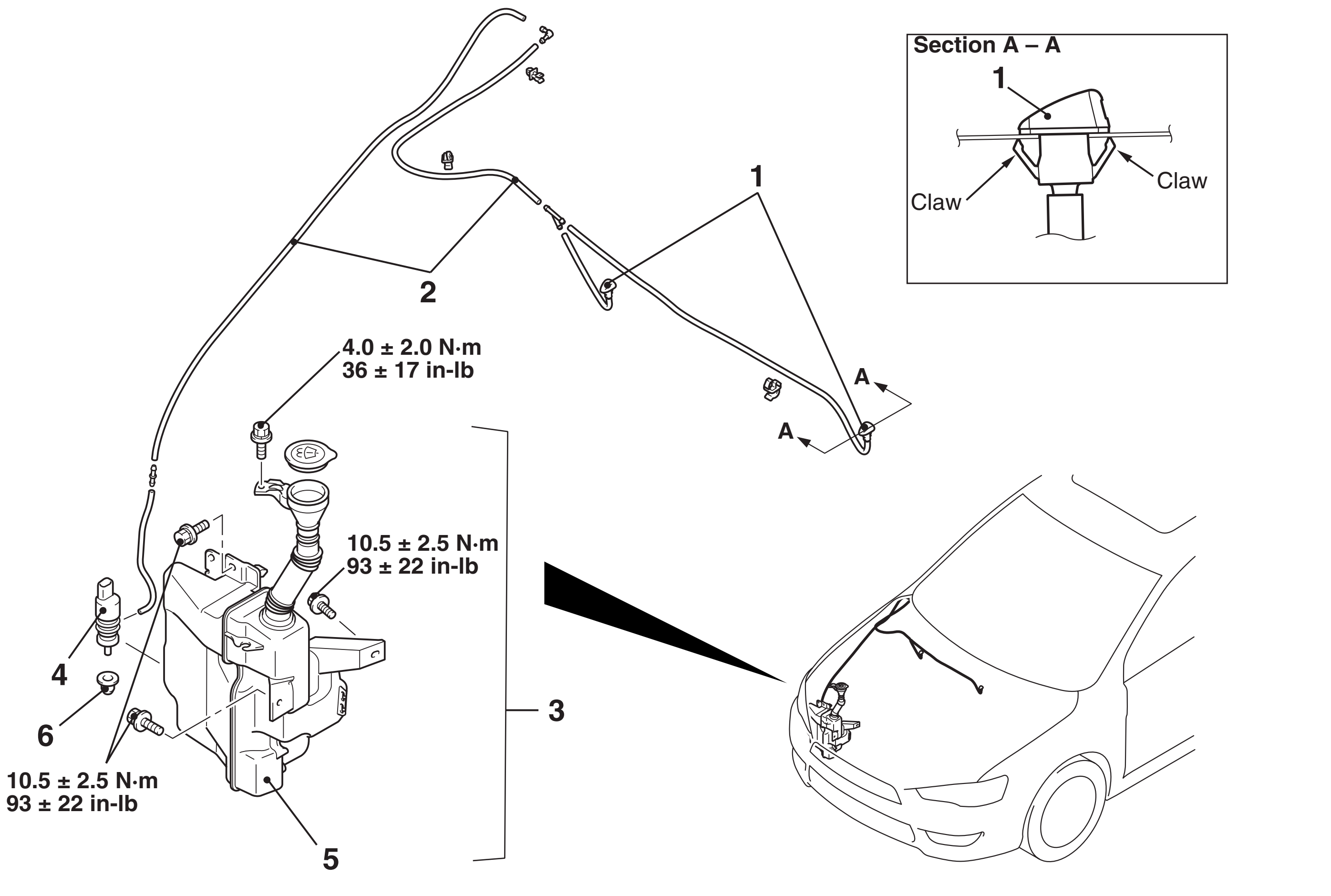

- Front bumper and radiator grille assembly (Refer to P.51-3)

Windshield washer nozzle removal steps

- Connection of windshield washer hose

1. Windshield washer nozzle

Washer hose removal steps

- Front bumper and radiator grille assembly (Refer to P.51-3)
- Connection of washer nozzle/washer motor

2. Windshield washer hose

Washer tank removal steps

- Front bumper and radiator grille assembly (Refer to P.51-3)
- Connection of windshield washer hose

Washer tank removal steps

3. Windshield washer tank assembly
4. Windshield washer motor
5. Windshield washer tank

Washer motor removal steps

- Front bumper and radiator grille assembly (Refer to P.51-3)
- Connection of windshield washer hose

4. Windshield washer motor
6. Grommet

NOTE: For removal and installation of the wiper and washer switch, refer to GROUP 54A, Column switch P.54A-230.

INSPECTION

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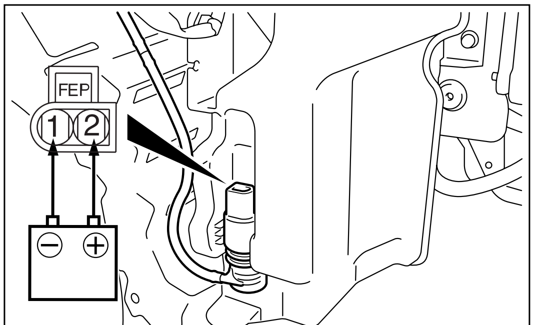
WINDSHIELD WASHER MOTOR CHECK



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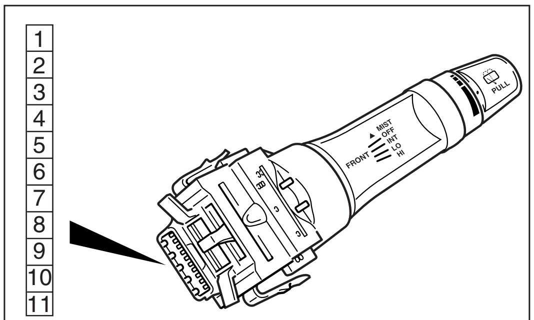
1. Remove the washer tank assembly with the washer hose attached. Then fill the washer tank with water.
2. Check to see that the water is vigorously sprayed when connecting the positive battery terminal to terminal number 2 and terminal number 1 to ground.

WINDSHIELD WASHER SWITCH CHECK



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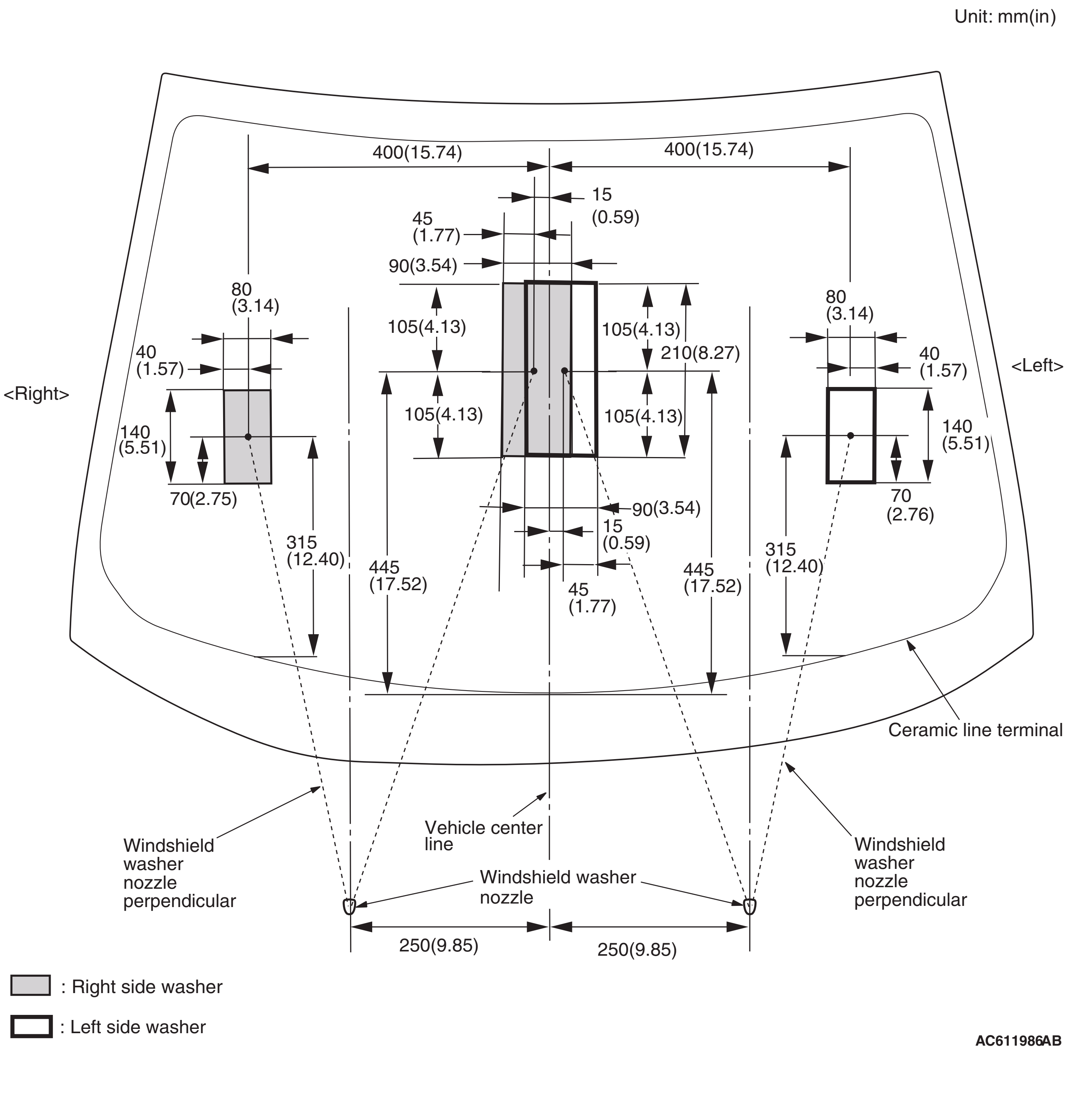
SWITCH POSITION	TESTER CONNECTION	SPECIFIED CONDITION
OFF	6 –7	Open circuit
Windshield washer switch ON	6 –7	Continuity (Less than 2 ohms

WINDSHIELD WASHER FLUID EJECTION CHECK

Move the nozzle to adjust the position so that the spray is in area shown in the area shown in the illustration.



MARK

REMOVAL AND INSTALLATION

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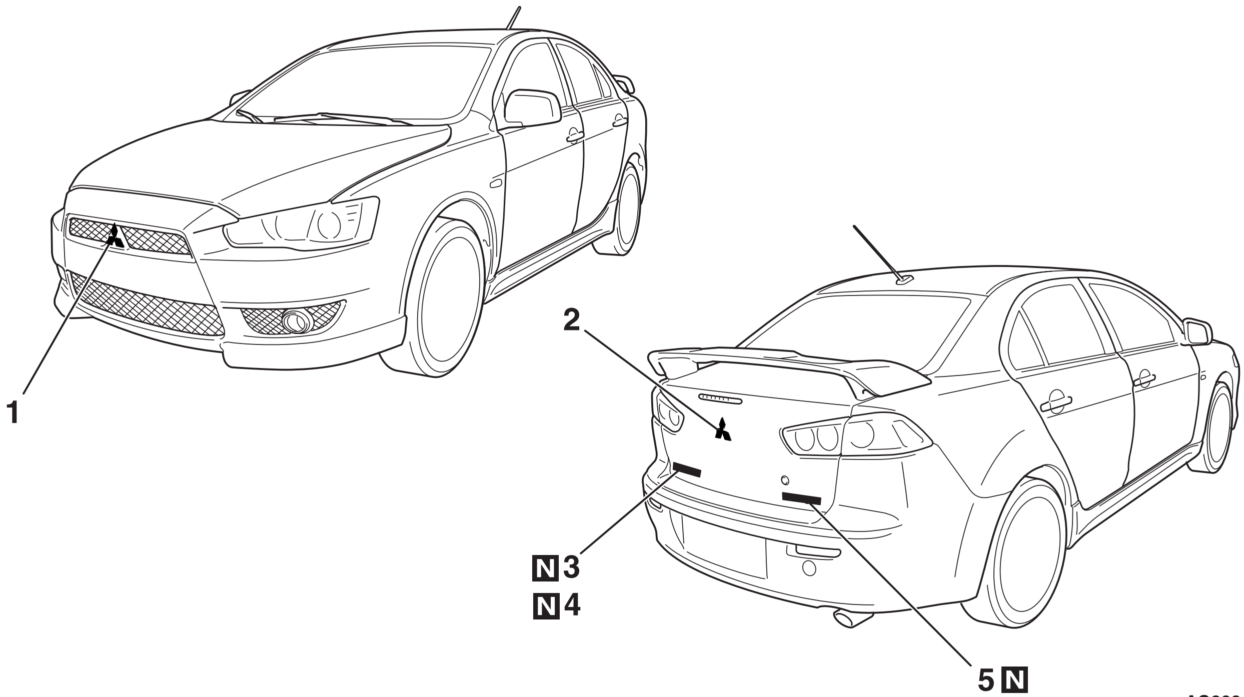


1. Front three-diamond mark (Refer to P.51-4.)

>>A<< 2. Rear three-diamond mark

>>A<< 3. MITSUBISHI mark <Vehicles for USA and Canada>

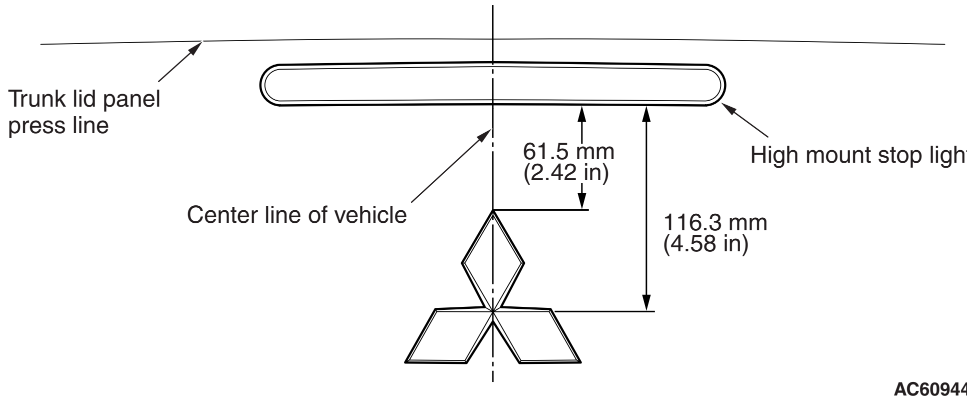
>>A<< 4. LANCER mark <Vehicles for Puerto Rico>

>>A<< 5. LANCER mark <Vehicles for USA and Canada>

INSTALLATION SERVICE POINT

>>A<< MARK INSTALLATION

2. Rear three-diamond mark



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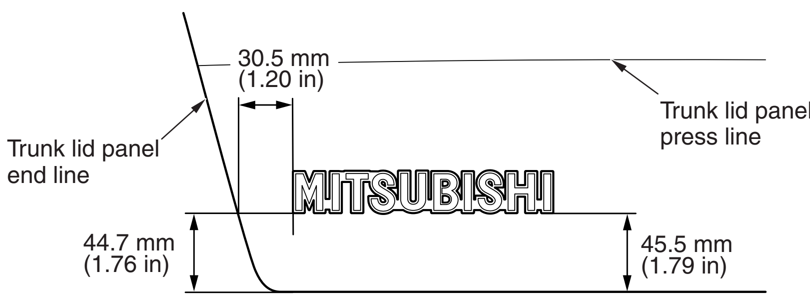
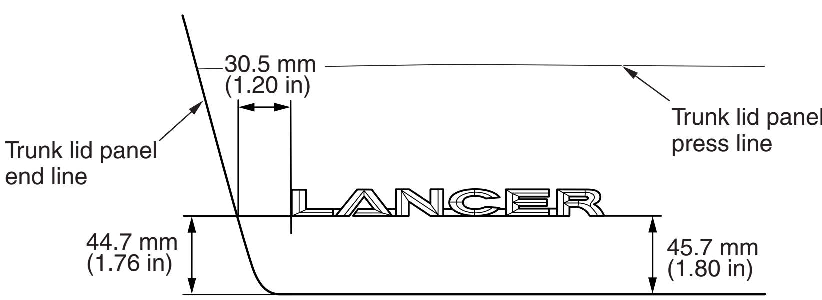
3. MITSUBISHI mark <Vehicles for USA and Canada>



AC609134 AB

4. LANCER mark <Vehicles for Puerto Rico>



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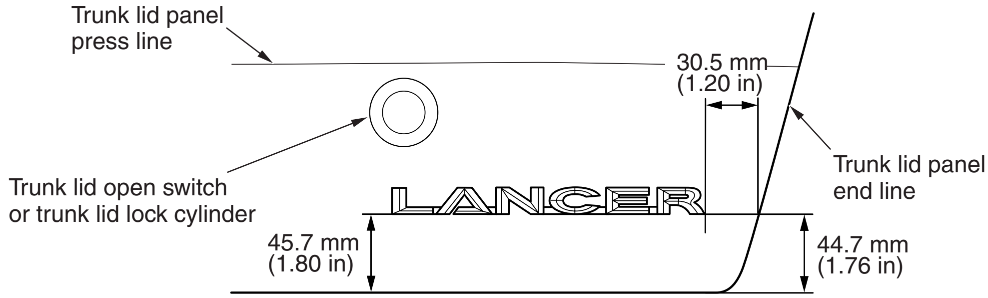
6. **LANCER mark <Vehicles for USA and Canada>**



1. Installation position
   Attach each mark to the position shown in the illustration.
2. Installation procedure
   (1) Use 3M™ AAD Part number 8906 or equivalent to clean the mark installation surfaces on the body.

⚠ CAUTION

When attaching the marks, the ambient temperature should be 20 –38° C (68 –100° F) and the air should be completely free of dust. If the ambient temperature is lower than 20° C (60° F), the marks and the places on the vehicle body where the marks are to be attached should be heated to 20 –30° C (68 –86° F).

   (2) Peel off the protection sheet on the back of the marks to affix it in position.

DOOR MIRROR

GENERAL INFORMATION

M1511000101250

DOOR MIRROR OPERATION

Remote Controlled Mirror Operation

- The mirror on the door mirror moves up/down and left/right by operating the remote controlled door mirror switch when the ignition switch is at the "ON" or "ACC" position.

Heated Door Mirror Operation

- The rear window defogger relay switch is activated (ON) by turning on the A/C-ECU built-in rear window defogger switch when the ignition switch is in the "ON" position. When the rear window defogger relay is turned ON, power is supplied to the rear window defogger, and the heater of the door mirror (heated door mirror) starts operation. The rear window defogger comes with a timer function and will automatically turn OFF the switch approximately 20 minutes after the rear window defogger switch is turned ON. The heated door mirror operations are also terminated along with the rear window defogger, at this time.

HEATED DOOR MIRROR DIAGNOSIS

TROUBLESHOOTING STRATEGY

M1511014600523

Diagnosis should be carried out by the following procedures.

1. Gather the information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by the following Symptom Chart.
4. Verify the malfunction is eliminated.

SYMPTOM CHART

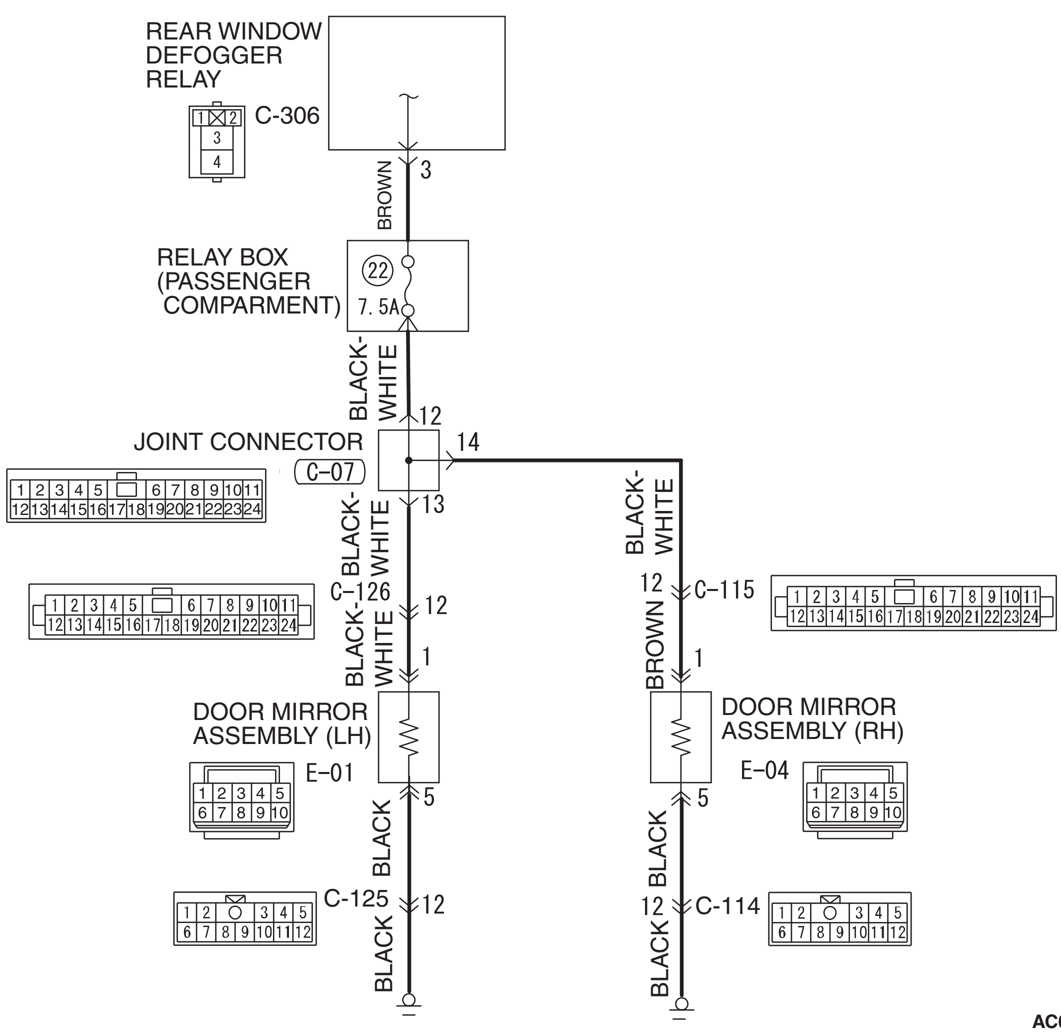
M1511015000665

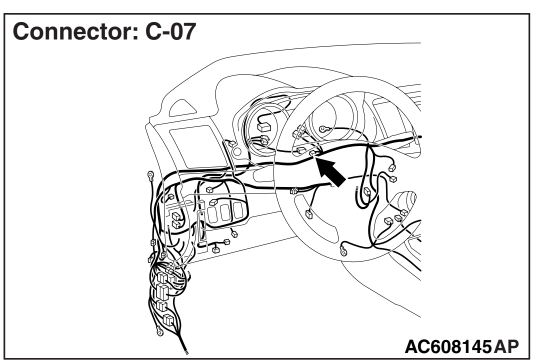
SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
All heated door mirrors do not operate	1	P.51-60
The right or left heated door mirror does not operate	2	P.51-63

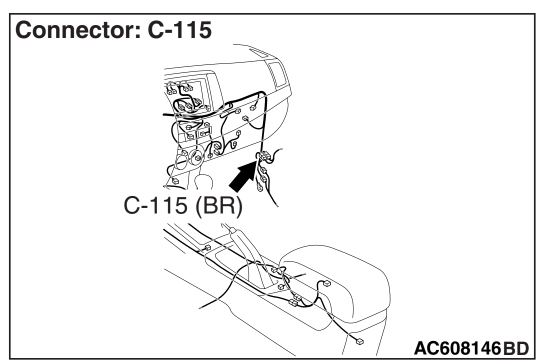
SYMPTOM PROCEDURES

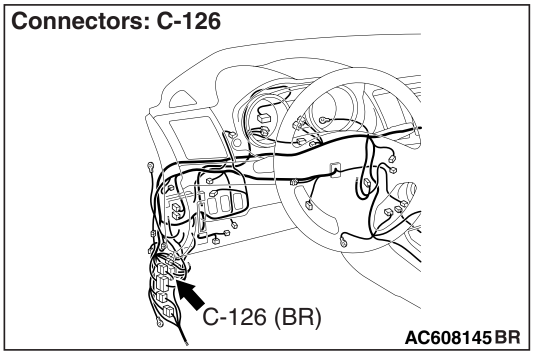
INSPECTION PROCEDURE 1: All Heated Door Mirrors do not Operate

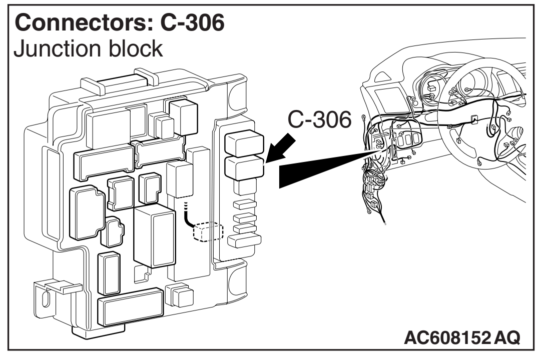
Door Mirror Relay Circuit

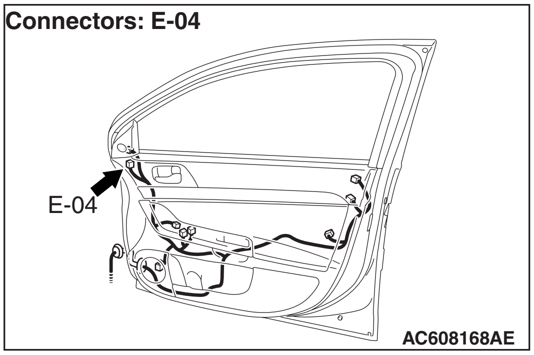


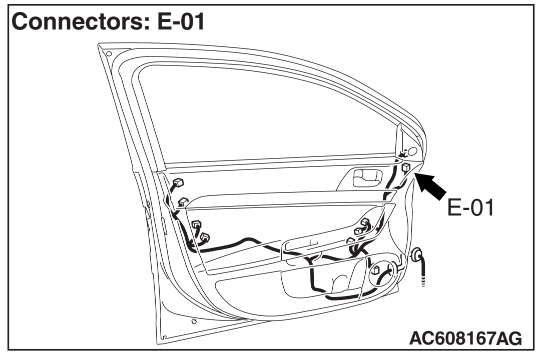












CIRCUIT OPERATION

If both of the door mirror heaters do not operate normally it may be due to a malfunction in the rear window defogger system.

TROUBLESHOOTING HINTS

- Malfunction of the rear window defogger system
- The wiring harness or connectors may have loose, corroded or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

- MB991223: Test Harness Set

STEP 1. Check the rear window defogger.

Check that the rear window defogger works normally as follows.

(1) Turn the ignition switch to the "ON" position.

(2) Push the rear window defogger switch to operate the defogger.

Q: Does the defogger work normally?

YES : Go to Step 2.

NO : Because of malfunction of the rear window defogger, carry out the troubleshooting (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8).

STEP 2. Check the door mirror (RH) connector E-04and rear window defogger relay connector C-306 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the door mirror (RH) connector E-04 and rear window defogger relay connector C-306 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check if the door mirrors works normally.

STEP 3. Check the wiring harness between the door mirror (RH) connector E-04 (terminal 1) and rear window defogger relay connector C-306 (terminal 3).

NOTE: Also check joint connector C-07 and intermediate connector C-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-115 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between door mirror (RH) connector E-04 (terminal 1) and rear window defogger relay connector C-306 (terminal 3) in good condition?

YES : Go to step 4.

NO : Repair the wiring harness as necessary. Check if all heated door mirrors work normally.

STEP 4. Check door mirror (LH) connector E-01.

Q: Is the door mirror (LH) connector E-01 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Check if all heated door mirrors work normally.

STEP 5. Check the wiring harness between door mirror (LH) connector E-01 (terminal 1) and rear window defogger relay connector C-306 (terminal 3).

NOTE: Also check joint connector C-07 and intermediate connector C-126 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-126 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

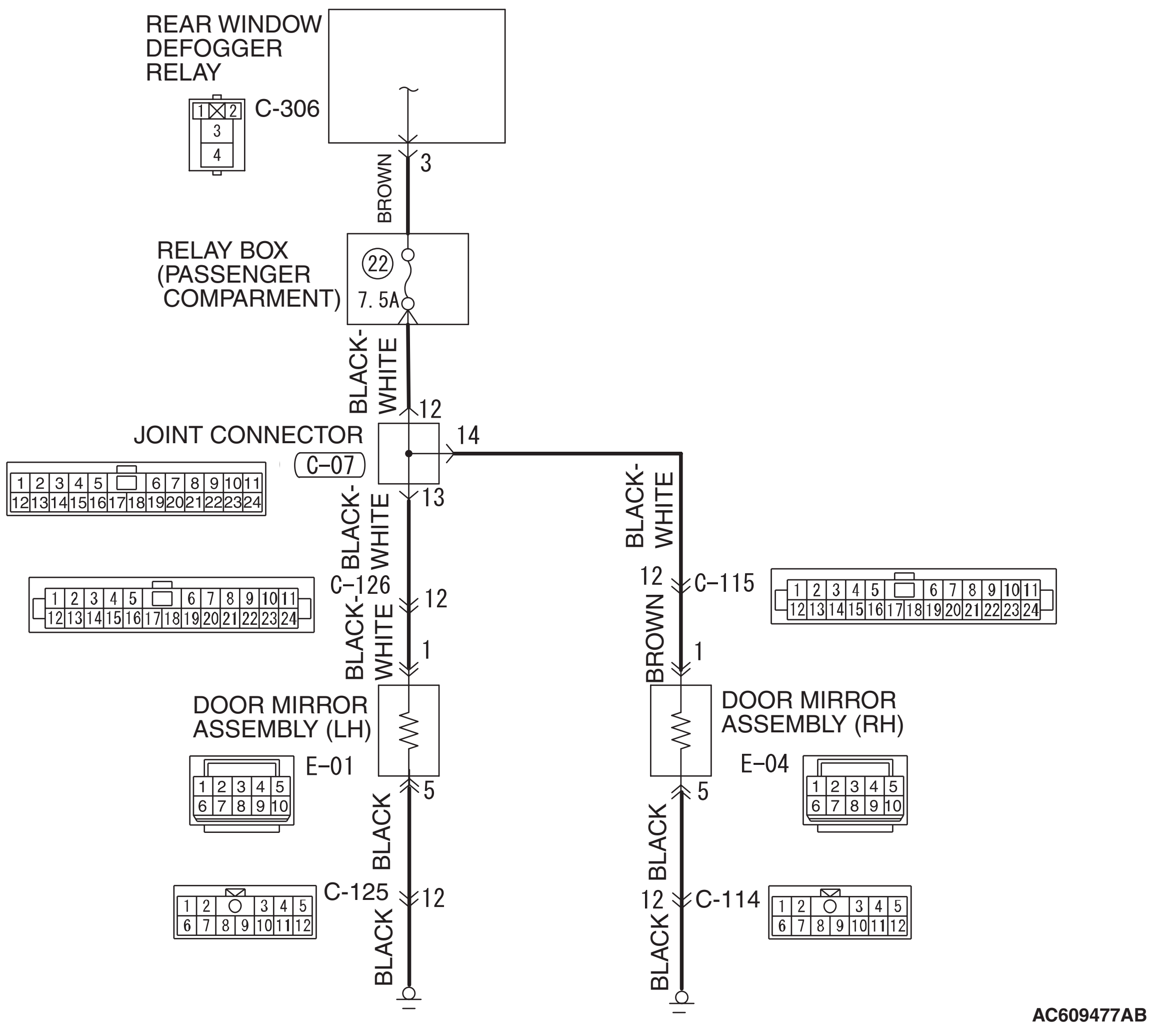
Q: Is the wiring harness between door mirror (LH) connector E-01 (terminal 1) and rear window defogger relay connector C-306 (terminal 3) in good condition?

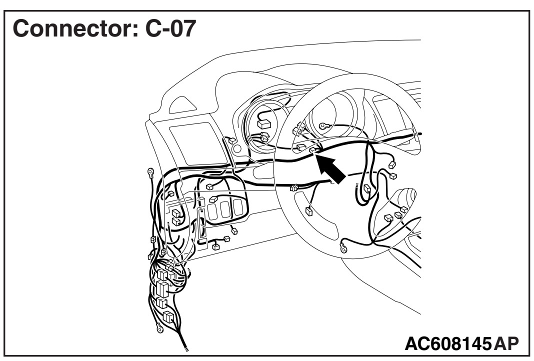
YES : The procedure is complete.

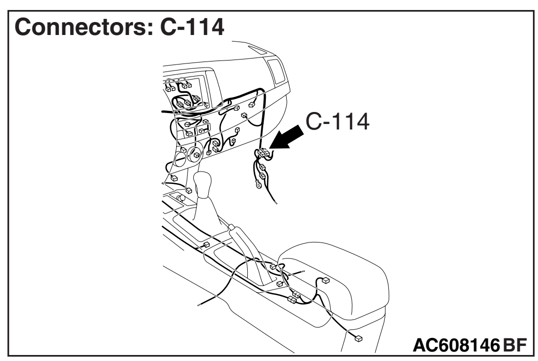
NO : Repair the wiring harness as necessary. Check if the all heated door mirrors work normally.

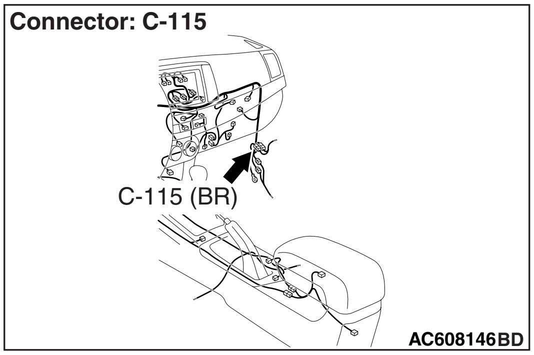
INSPECTION PROCEDURE 2: The Right or Left Heated Door Mirror does not Operate

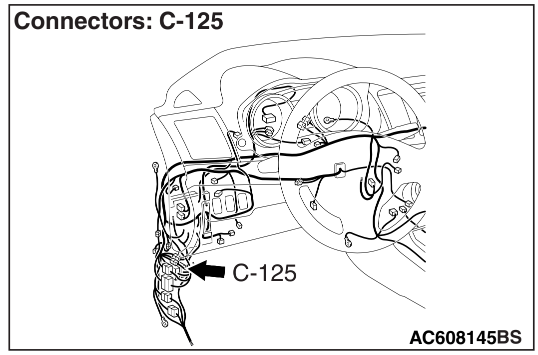
Door Mirror Relay Circuit

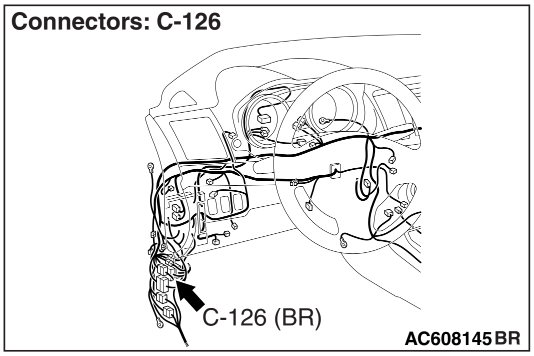


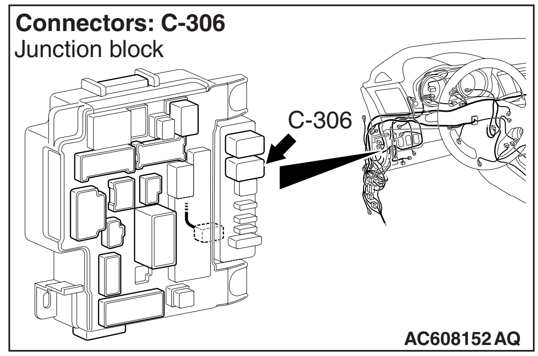


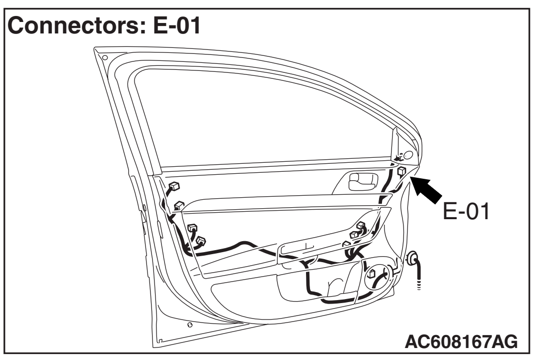


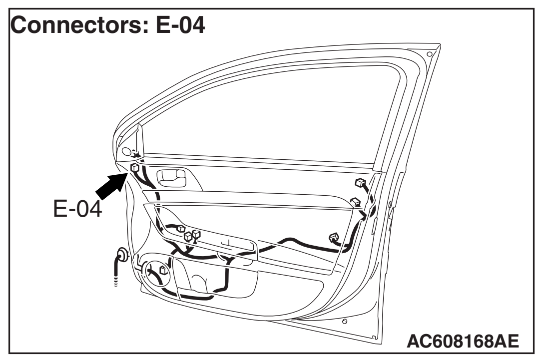












CIRCUIT OPERATION

If either of the heated door mirror do not operate normally, it may be due to malfunctions in the heated door mirror circuit or door mirror.

TROUBLESHOOTING HINTS

- Malfunction of the heated door mirror circuit
- Malfunction of the door mirror
- The wiring harness or connectors may have loose, corroded or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

- MB991223: Test Harness Set

STEP 1. Verify the operation of each heated door mirror.

Q: Which door mirror does not heat?

Door mirror (LH) : Go to Step 2.
Door mirror (RH) : Go to Step 8.

STEP 2. Check door mirror (LH) connector E-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is door mirror (LH) connector E-01 in good condition?

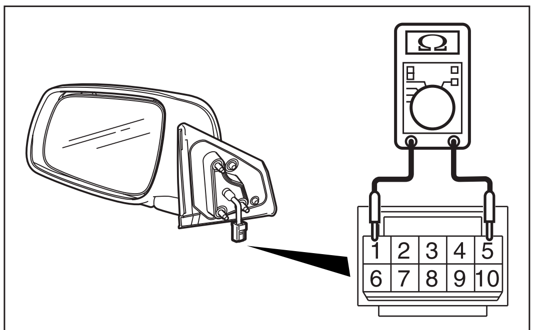
YES : Go to Step 3.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. And then check to see that the heater function of the door mirror (LH) operates normally.

STEP 3. Check the heater of the door mirror (LH).

⚠ CAUTION

When relocating the car between locations of extremely different temperatures (warm and cold), leave the car in a location for a while to adapt to the temperature prior to checking it.



AC609133AB

Check to see that the resistance between terminal 1 and 5 of the door mirror (LH) connector E-01.

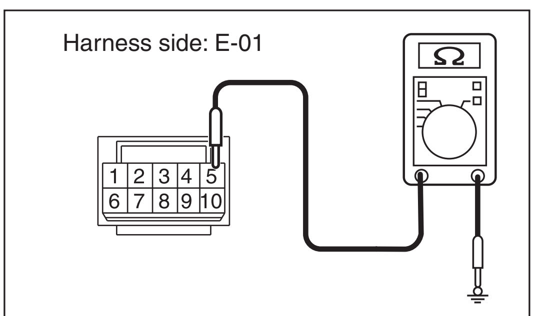
- The resistance should be 8.4 ± 1.2 Ω at 25° C (77° F).

Q: Is the resistance normal?

YES : Go to Step 4.

NO : Replace the door mirror (LH). And then check to see that the heater function of the door mirror (LH) is operating normally.

STEP 4. Check the ground circuit between door mirror (LH) connector E-01 and ground for open circuit. Measure the resistance at door mirror (LH) connector E-01.



AC608255AJ

(1) Disconnect door mirror (LH) connector E-01 and check at the wiring harness side connector.
(2) Measure the resistance value between terminal 5 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between door mirror (LH) connector E-01 (terminal 5) and ground.

NOTE: Also check joint connector C-07 and intermediate connector C-125 and C-126 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-125 and C-126 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between door mirror (LH) connector E-01 (terminal 5) and ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged. Repair the wiring harness as necessary. And then check to see that the heater function of the door mirror (LH) operates normally.

STEP 6. Check rear window defogger relay connector C-306 for loose, corroded or damaged terminal, or terminals pushed back in the connector.

Q: Is rear window defogger relay connector C-306 in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. And then check to see that the heater function of the door mirror (LH) operates normally.

STEP 7. Check the wiring harness between door mirror (LH) connector E-01 (terminal 1) and rear window defogger relay connector C-306 (terminal 3).

NOTE: Also check joint connector C-07 and intermediate connector C-126 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-126 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between door mirror (LH) connector E-01 (terminal 1) and rear window defogger relay connector C-306 (terminal 3) in good condition?

YES : No action is necessary and testing is complete.

NO : Repair the wiring harness as necessary. And then check to see that the heater function of the door mirror (LH) operates normally.

STEP 8. Check the door mirror (RH) connector E-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the door mirror (RH) connector E-04 in good condition?

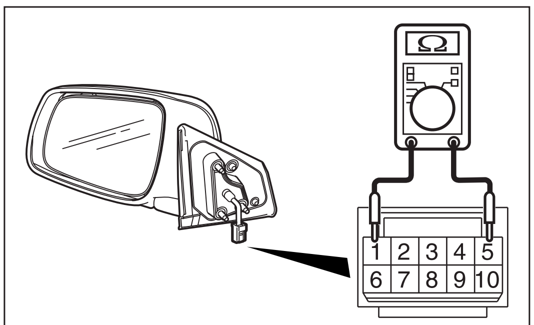
YES : Go to Step 9.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. And then check to see that the heater function of the door mirror (RH) operates normally.

STEP 9. Check the heater function of the door mirror (RH).

⚠ CAUTION

When relocating the car between locations of extremely different temperatures (warm and cold), leave the car in a location for a while to adapt to the temperature prior to checking it.



AC609133AB

Check to see that the resistance between terminal 1 and 5 of the door mirror (RH) connector E-04.

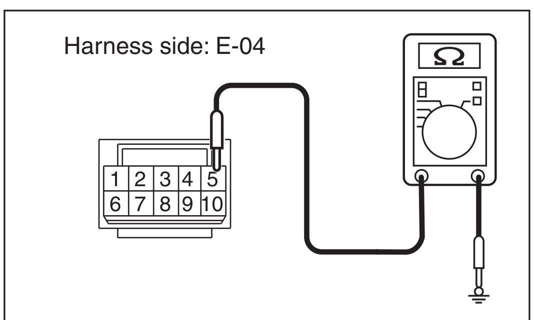
- The resistance should be 8.4 ± 1.2 Ω at 25° C (77° F).

Q: Is the resistance normal?

YES : Go to Step 10.

NO : Replace the door mirror (RH). And then check to see that the heater function of the door mirror (RH) operates normally.

STEP 10. Check the ground circuit between door mirror (RH) connector E-04 and ground for open circuit. Measure the resistance at door mirror (RH) connector E-04.



AC608255AK

(1) Disconnect door mirror (RH) connector E-04, and check at the wiring harness side connector.

(2) Measure the resistance value between terminal 5 and ground.

- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 12.

NO : Go to Step 11.

STEP 11. Check the wiring harness between door mirror (RH) connector E-04 (terminal 5) and ground.

NOTE: Also check joint connector C-07 and intermediate connector C-114 and C-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-114 and C-115 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between door mirror (RH) connector E-04 (terminal 5) and ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged. Repair the wiring harness as necessary. And then check to see that the heater function of the door mirror (RH) operates normally.

STEP 12. Check rear window defogger relay connector C-306 for loose, corroded or damaged terminal, or terminals pushed back in the connector.

Q: Is rear window defogger relay connector C-306 in good condition?

YES : Go to Step 13.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. And then check to see that the heater function of the door mirror (RH) operates normally.

STEP 13. Check the wiring harness between door mirror (RH) connector E-04 (terminal 1) and rear window defogger relay connector C-306 (terminal 3).

NOTE: Also check joint connector C-07 and intermediate connector C-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 and intermediate connector C-115 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between door mirror (RH) connector E-04 (terminal 1) and rear window defogger relay connector C-306 (terminal 3) in good condition?

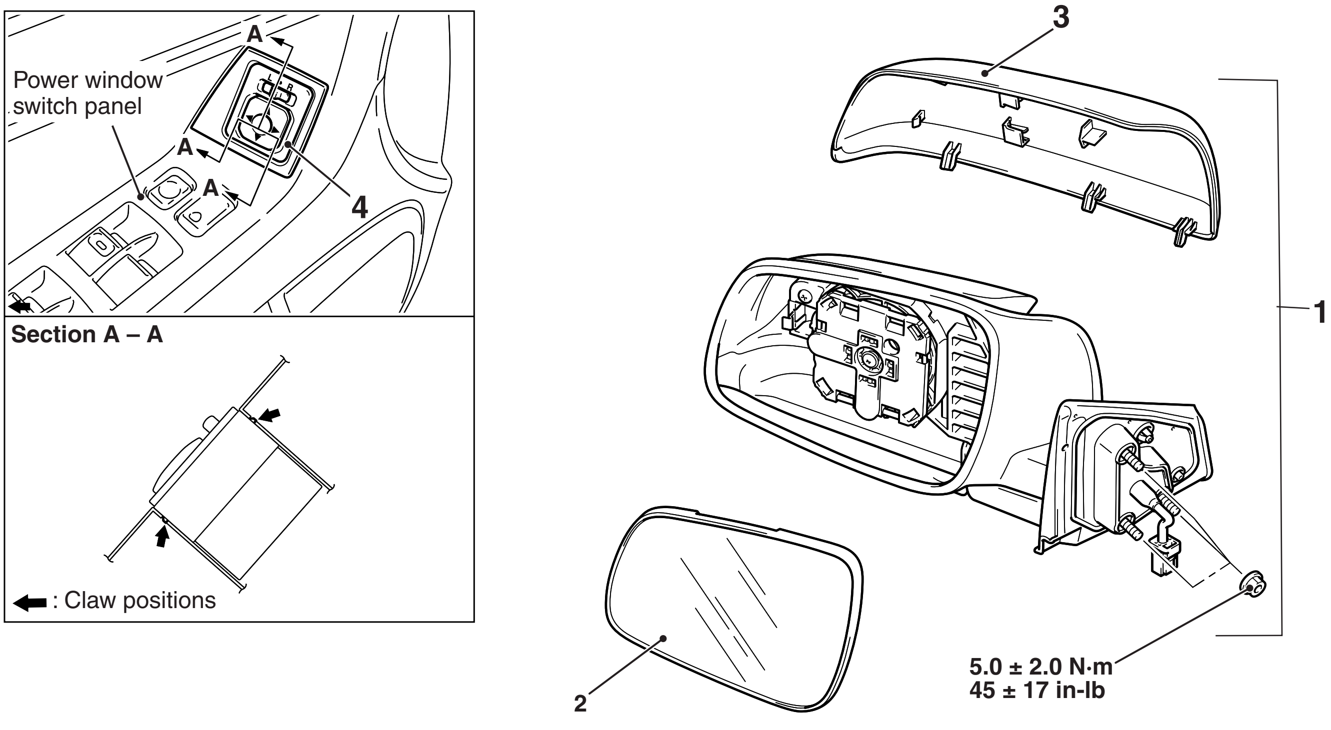
YES : No action is necessary and testing is complete.

NO : Repair the wiring harness as necessary. And then check to see that the heater function of the door mirror (RH) operates normally.

DOOR MIRROR

REMOVAL AND INSTALLATION

M1511006400870



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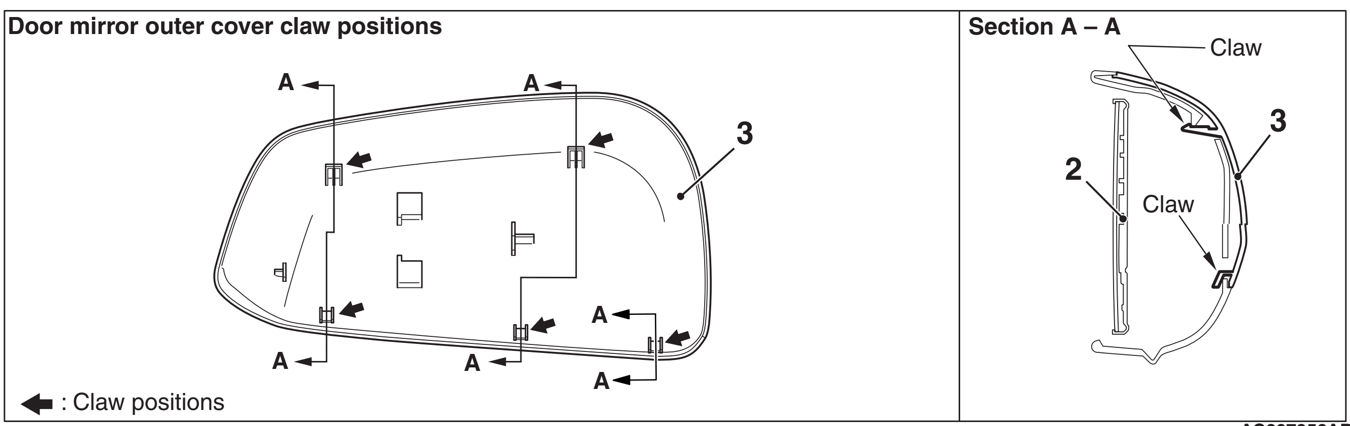


AC607956AB

Door mirror assembly removal steps

- Tweeter (Refer to GROUP 54A, Speaker P.54A-443)
- Door mirror connector connection
1. Door mirror assembly

Door mirror outer cover removal steps

2. Mirror
<<A>> >>A<< 3. Door mirror outer cover

Remote controlled mirror switch removal steps

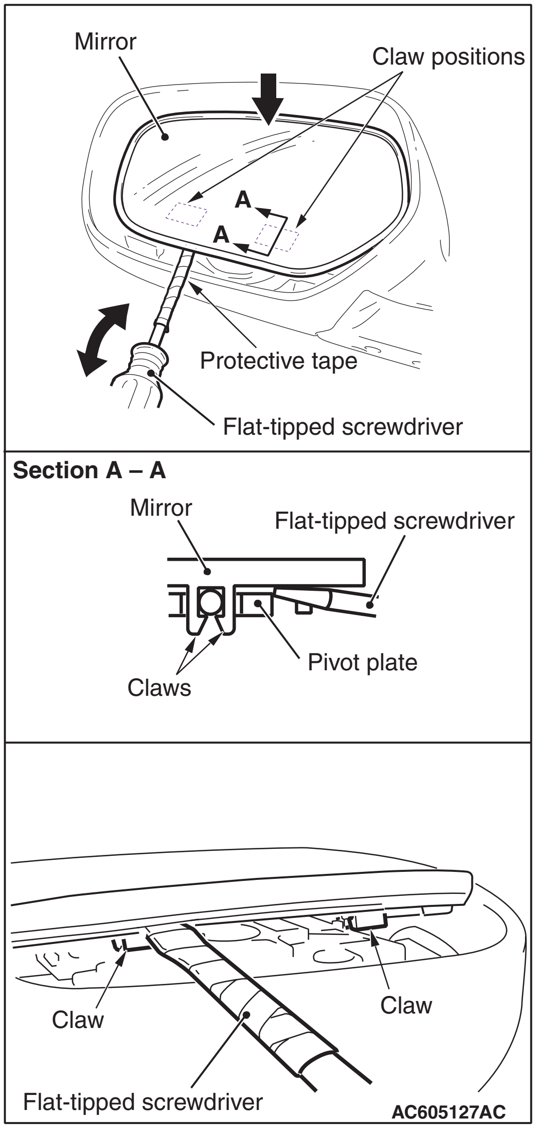
- Front door trim (Refer to GROUP 52A, Door Trim P.52A-13)
4. Remote controlled mirror switch

REMOVAL SERVICE POINT

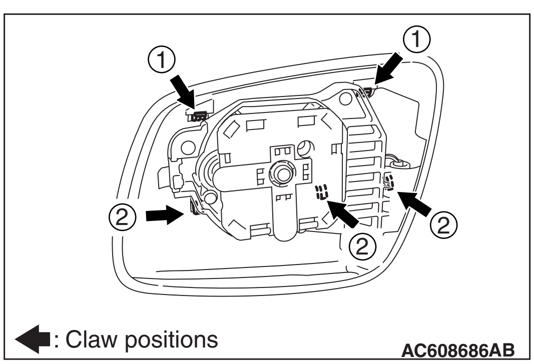
<<A>> DOOR MIRROR OUTER COVER REMOVAL

⚠ CAUTION

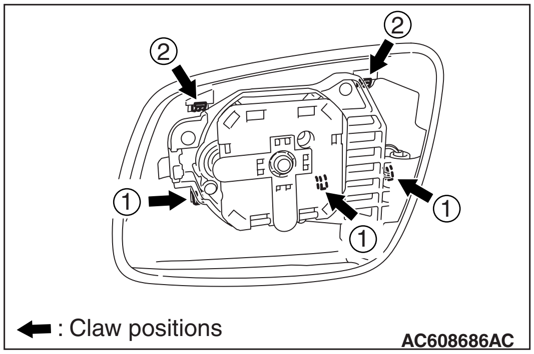
The tab of the mirror is prone to breakage when working in cold temperatures. Always use a hair drier or the like to warm up the mirror tab and its periphery to 20° C or higher prior to works. When the mirror is heated too quickly from its cold state, it may be broken.



1. Slant the mirror upward with your hands. Then insert a flat-tipped screwdriver wrapped with protective tape between the pivot plate and mirror through the cut-out from behind the mirror. Now pry off the mirror tab and release the lower side of the mirror as shown in the illustration.
2. Release the upper side of the mirror from the tab as shown while pulling out the mirror.
3. Disconnect the connectors of the heated mirror.



4. Remove the door mirror outer cover by disengaging the claws in the numerical order of the illustration from the mirror body side.



INSTALLATION SERVICE POINT

>>A<< DOOR MIRROR OUTER COVER INSTALLATION

⚠ CAUTION

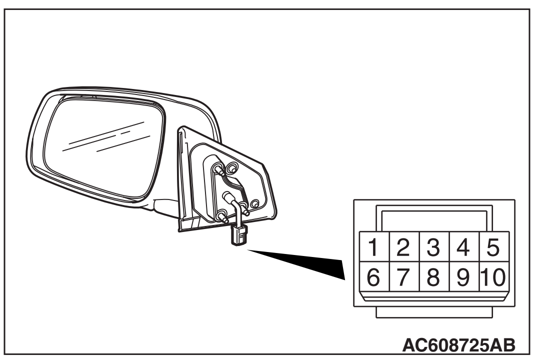
Tap the claw positions securely to confirm that they are engaged securely.

Install the door mirror outer cover by engaging the claws in the numerical order of the illustration.

INSPECTION

M1511006500510

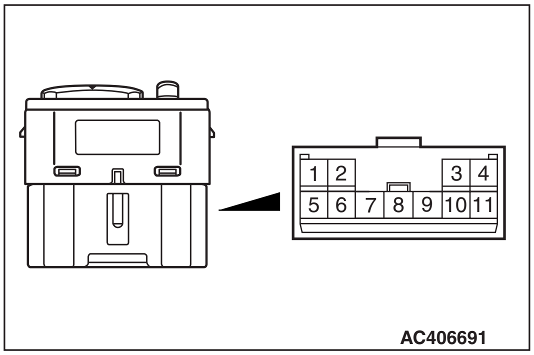
REMOTE CONTROLLED MIRROR OPERATION CHECK



Check that the mirror moves as described in the table when each terminal is connected to the battery.

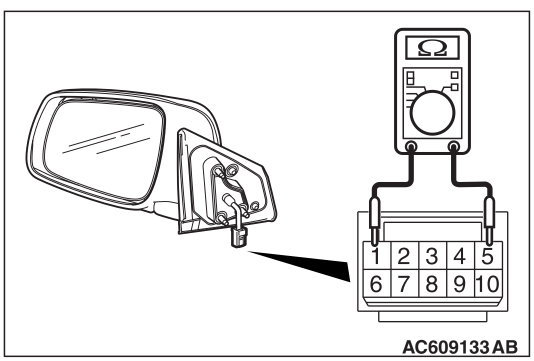
BATTERY CONNECTION	DIRECTION OPERATION
• Connect terminal 8 to the negative battery terminal. • Connect terminal 6 to the positive battery terminal.	Up
• Connect terminal 8 to the positive battery terminal. • Connect terminal 6 to the negative battery terminal.	Down
• Connect terminal 8 to the negative battery terminal. • Connect terminal 7 to the positive battery terminal.	Right
• Connect terminal 8 to the positive battery terminal. • Connect terminal 7 to the negative battery terminal.	Left

DOOR MIRROR CONTROL SWITCH CONTINUITY CHECK



SWITCH POSITION		TESTER CONNECTION	SPECIFIED CONDITION
OFF		9 –2, 9 –3, 9 –6, 9 –10, 9 –11, 1 –2,1 –3, 1 –6, 1 –10, 1 –11	Open circuit
Left side	OFF	9 –6, 9 –10, 9 –11, 1 –6, 1 –10, 1 –11	Open circuit
	Up	1 –6, 9 –11	Continuity (Less than 2 ohms)
	Down	1 –11, 6 –9	
	Right	1 –6, 9 –10	
	Left	1 –10, 6 –9	
Right side	OFF	9 –2, 9 –3, 9 –6, 1 –2, 1 –3, 1 –6	Open circuit
	Up	1 –6, 3 –9	Continuity (Less than 2 ohms)
	Down	1 –3, 6 –9	
	Right	1 –6, 2 –9	
	Left	1 –2, 6 –9	

HEATED DOOR MIRROR CHECK



⚠ CAUTION

When relocating the car between locations with extremely different temperatures (warm and cold), leave the car in the location for a while to adapt to the temperature prior to checking it.

Check that the resistance value between the connector terminals is at the standard value.

Standard value: 8.4 ± 1.2 Ω at 25° C(77° F)

GROUP 54A

CHASSIS ELECTRICAL

CONTENTS

Continued on next page

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ ***WARNING***

- ***Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).***
- ***Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.***
- ***MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.***

NOTE
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, driver's and passenger's (front) air bag modules, knee air bag module, side-airbag module, curtain air bag module, side impact sensors, seat belt pre-tensioners, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

Continued on next page

Continued on next page

BATTERY

ON-VEHICLE SERVICE

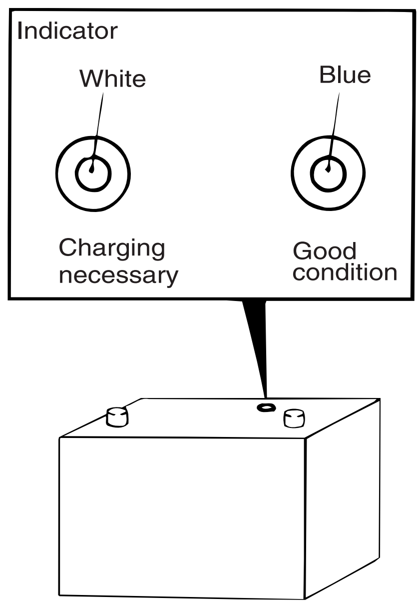
BATTERY CHECK

M1541001000591

⚠ WARNING

Battery posts, terminals and related accessories contain lead and lead compounds. WASH HANDS AFTER HANDLING.

BATTERY VISUAL INSPECTION (1)



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The battery contains a visual test indicator which gives a blue signal when an adequate charge level exists, and a white signal when charging is required.

BATTERY VISUAL INSPECTION (2)

Make sure the ignition switch is in "LOCK" (OFF) position and all battery fed accessories are OFF.

1. Disconnect the negative cable from battery before disconnecting the positive cable.

⚠ WARNING

Care should be taken in the event battery case is cracked or leaking to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing battery by hand.

2. Remove the battery from the vehicle.
3. Inspect the battery carrier for damage caused by loss of acid from battery. If acid damage is present, it is necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush. Wipe clean with a cloth moistened with ammonia or baking soda in water.
4. Clean the battery, especially the top, with the same solutions as described in step 3.
5. Inspect the battery case and cover for cracks. If cracks are present, battery must be replaced.
6. Clean the battery post with a suitable battery post cleaning tool.
7. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
8. Install the battery in the vehicle.
9. Connect the positive and negative cables to the battery in the order of mention.
10. Tighten the clamp nut securely.

BATTERY CHARGING

M1541001101193

⚠ **WARNING**

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at the terminals of the batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from the battery.

Battery electrolyte temperature may temporarily be allowed to rise to 55 °C (131 °F). Increase of electrolyte temperature above 55 °C (131 °F) is harmful to the battery, causing deformation of battery cell, decrease in life of battery, etc.

CHARGE RATE

If the test indicator is white, the battery should be charged as outlined below. When the dot appears or when maximum charge shown below is reached, charging should be stopped.

Charge Rate Chart

Battery	75D23L
Slow charging	5 amps 11 hours
	10 amps 6 hours
Fast charging	20 amps 3 hours
	30 amps 2 hours

BATTERY TEST

M1541001201242

BATTERY TESTING PROCEDURE

STEP 1. Check the battery cables.

Remove the negative cable, then the positive cable. Check for dirty or corroded connections.

Q: Are the battery cables dirty or have corroded connections?

YES : Clean the battery cables. Then go to Step 2.
NO : Go to Step 2.

STEP 2. Check the battery post.

Check for loose battery post.

Q: Are the battery posts faulty?

YES : Replace the battery. Then go to Step 4.
NO : Go to Step 3.

STEP 3. Check the battery case.

(1) Remove the hold-downs.
(2) Check for broken/cracked case.

Q: Is the battery case faulty?

YES : Replace the battery. Then go to Step 4.
NO : Go to Step 4.

STEP 4. Check the open circuit voltage.

(1) Turn headlights on for 15 seconds.
(2) Turn headlights off for two minutes to allow battery positive voltage to stabilize.
(3) Disconnect the battery cables.
(4) Read open circuit voltage.

Q: Is open circuit voltage 12.4 volts or more?

YES : Go to Step 5.
NO : Charge the battery at 5 amps for 10.4 hours. Then re-test.

STEP 5. Check the load test.

(1) Connect a load tester to the battery.
(2) Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds.
(3) Read voltage after 15 seconds, then remove load.
(4) Compare the measured value with the minimum voltage (See LOAD TEST CHART).

Q: Is the voltage higher than minimum voltage?

YES : The battery is normal.
NO : Replace the battery. Then go to Step 4.

LOAD TEST CHART

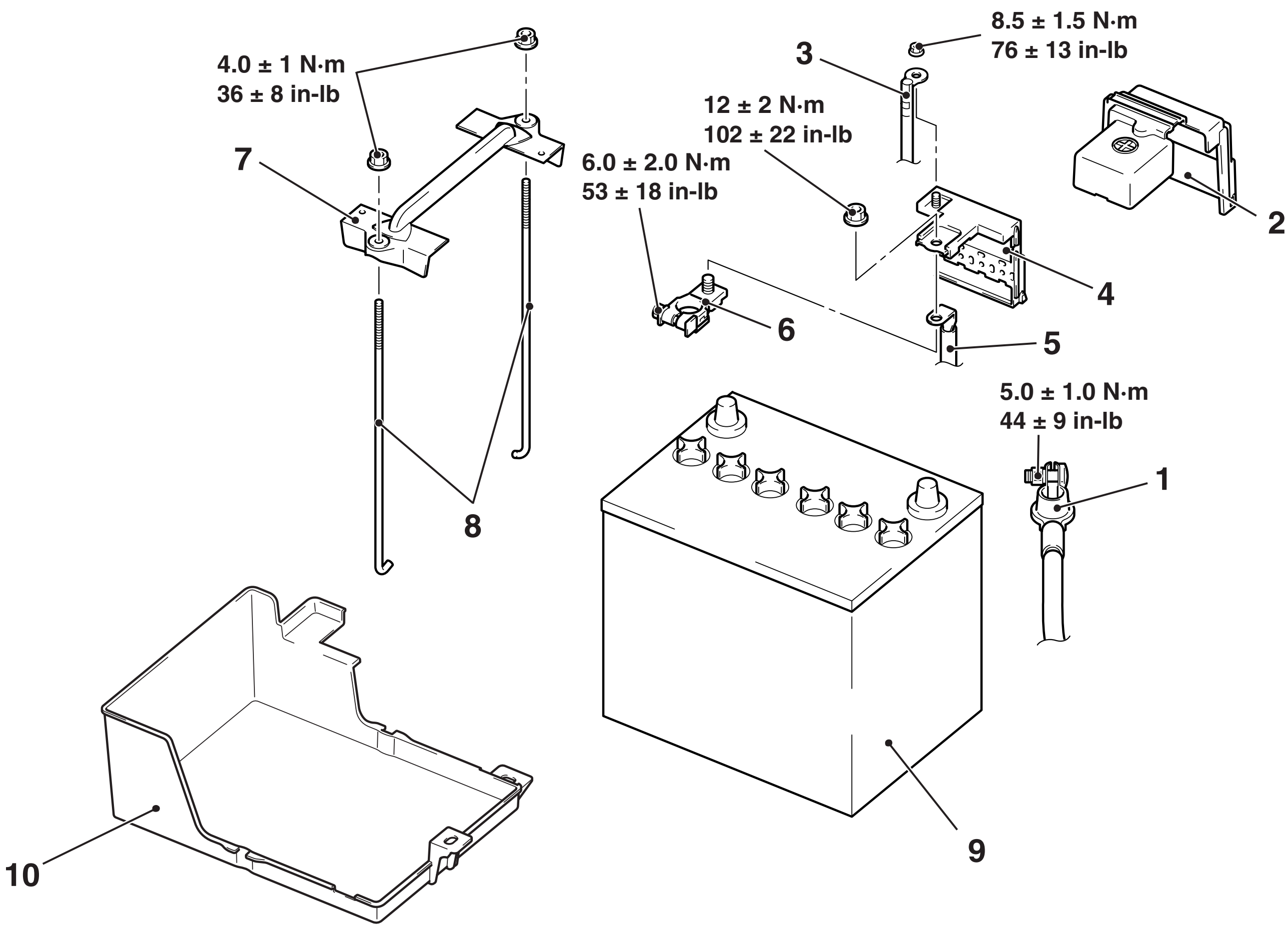
Temperature °C (°F)	**21 (70) and above**	**16 (60)**	**10 (50)**	**4 (40)**	**−1 (30)**	**−7 (20)**	**−12 (10)**	**−18 (0)**
Minimum voltage	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

LOAD TEST RATE CHART

Load test	**260 amps**
Cranking ratio [−18°C (0°F)]	520 amps
Reserve capacity	118 minutes
Application	75D23L

BATTERY REMOVAL AND INSTALLATION

M1541001300376



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Removal steps

1. Connection of the battery harness [negative battery terminal]
- Air cleaner intake duct (Refer to GROUP 15 –Air Cleaner P.15-4).
2. Fusible link box cover
3. Connection of the battery harness [positive battery terminal]
4. Connection of the fusible link block

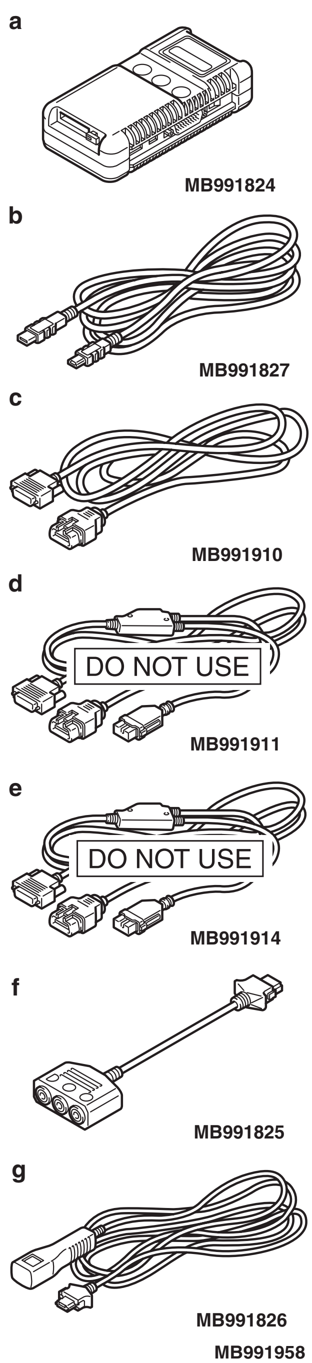
Removal steps (Continued)

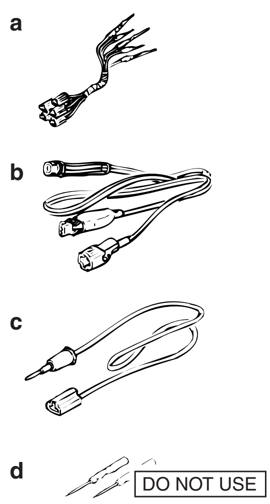
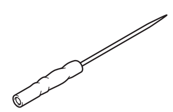
5. Connection of the battery harness [positive battery terminal]
6. Battery terminal assembly
7. Battery holder
8. Battery bolt
9. Battery
10. Battery tray

IGNITION SWITCH

SPECIAL TOOLS

M1543000603432

Tool	Tool number and name	Supersession	Application
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** ETACS-ECU check (Diagnostic trouble code, service data)

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Test harness b. LED harness c. LED harness adaptor d. Probe	General service tools	Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector. a. Connector pin contact pressure inspection b. Power circuit inspection c. Power circuit inspection d. Commercial tester connection
 MB992006	MB992006 Extra fine probe	–	Making voltage and resistance measurement during troubleshooting

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLE SHOOTING

M1543006900937

Refer to Group 00 –Contents of troubleshooting P.00-6.

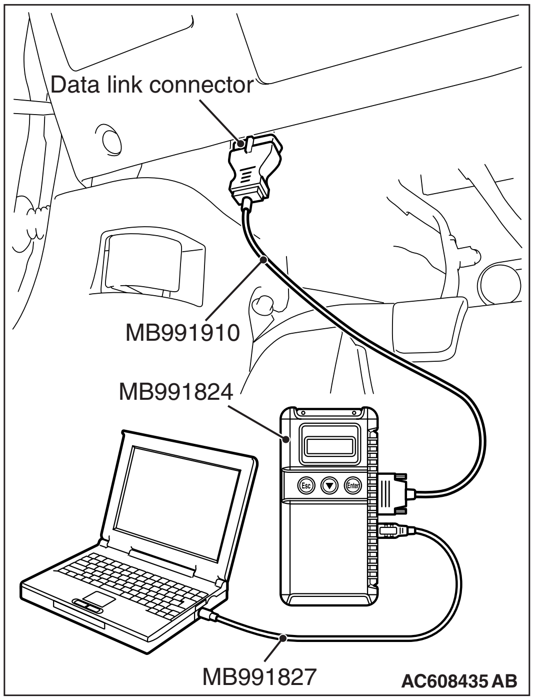
DIAGNOSIS FUNCTION

M1543007001093

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

TROUBLE SYMPTOM CHART

M1543007202454

Trouble symptom		Reference page
Ignition key cylinder illumination light does not illuminate/extinguish normally.	vehicles with WCM	P.54A-12

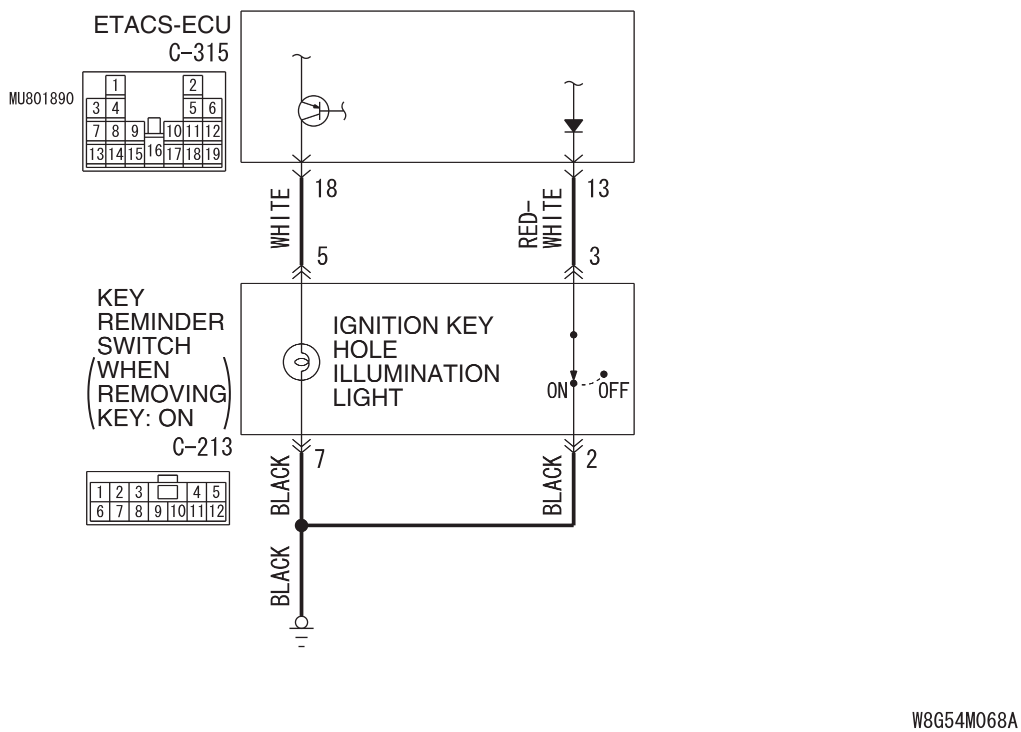
SYMPTOM PROCEDURES

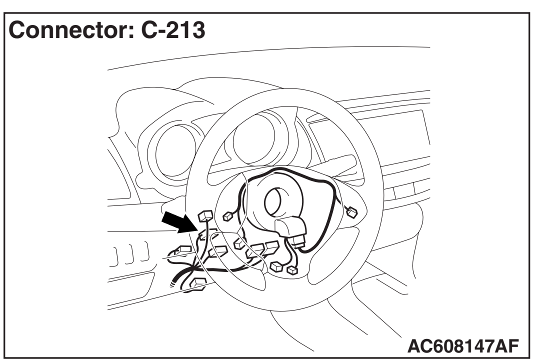
Ignition key cylinder illumination light does not illuminate/extinguish normally. <vehicles with WCM>

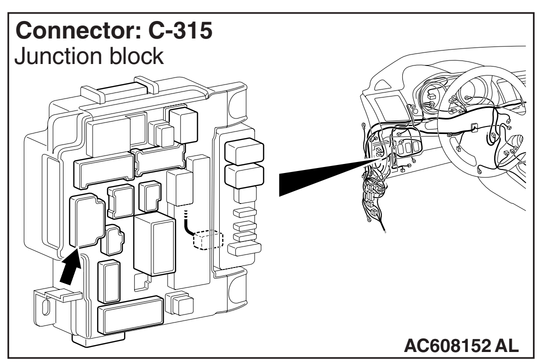
⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Ignition Key Cylinder Illumination Light Circuit <Vehicles with WCM>







OPERATION

The ETACS-ECU operates this function in accordance with the input signals below.

- Ignition switch (IG1)
- Key reminder switch
- Driver's door switch
- Driver's door lock actuator

TECHNICAL DESCRIPTION (COMMENT)

If this function does not work normally, these input signal circuit(s), the ignition key cylinder illumination light or the ETACS-ECU may be defective.

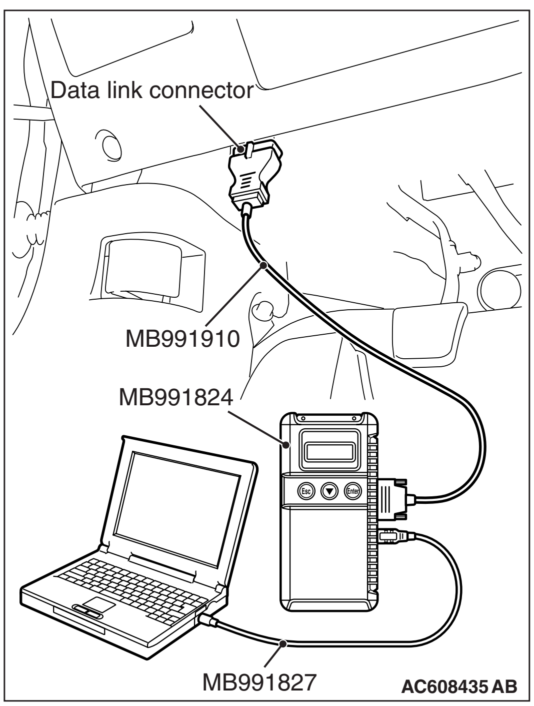
TROUBLESHOOTING HINTS

- The key reminder switch may be defective
- The driver's door switch may be defective
- The driver's door lock actuator may be defective
- The ignition key cylinder illumination light bulb may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-10."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to P.54A-564.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the ignition key cylinder illumination light function.

- Turn the ignition switch to the "LOCK" (OFF) position.
- Remove the ignition key from the ignition key cylinder.
- Open the driver's door.

Item No.	Item name	Normal conditions
Item 228	Dr door unlock	ON
Item 254	IG voltage	0 V
Item 256	Dr door ajar switch	Open
Item 264	Handle lock switch	Key in →Key out
Item 270	Dr door lock switch	Not lock
Item 271	Dr door unlock switch	Unlock

Q: Does scan tool MB991958 display the items "Dr door unlock", "Dr door ajar switch", and "Handle lock switch" as normal condition?

YES <Normal conditions are displayed for all the items.> : Go to Step 3.

NO <Normal condition is not displayed for item No. 228.> : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis - Inspection Procedure 4 "ETACS-ECU does not receive any signal from the front door lock actuator" P.54A-536.

NO <Normal condition is not displayed for item No. 254.> : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis - Inspection Procedure 2 "ETACS-ECU does not receive any signal from the ignition switch (IG1)" P.54A-531.

NO <Normal condition is not displayed for item No. 256.> : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis - Inspection Procedure 6 "ETACS-ECU does not receive any signal from the front the front door switch (RH)" P.54A-545.

NO <Normal condition is not displayed for item No. 264.> : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis - Inspection Procedure 3 "ETACS-ECU does not receive any signal from key reminder switch" P.54A-533.

NO <Normal condition is not displayed for item No. 270, 271.> : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis - Inspection Procedure 4 "ETACS-ECU does not receive any signal from front door lock actuator" P.54A-536.

STEP 3. Check key reminder switch connector C-213, ETACS-ECU connector C-315 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is key reminder switch connector C-213, ETACS-ECU connector C-315 in good condition?

YES : Go to Step 4.
NO : Repair the damaged parts.

STEP 4.Check the Wiring harness between key reminder switch connector C-213 (terminal No. 3,5) and ETACS-ECU connector C-315 (terminal No. 13,18).

- Check the input/output line for open circuit.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness between key reminder switch connector C-213 and ETACS-ECU connector C-315.

STEP 5. Check of ignition key cylinder illumination light bulb.

Q: Is the ignition key cylinder illumination light bulb in good condition?

YES : Go to Step 6.
NO : Replace the bulb of the ignition key cylinder illumination light.

STEP 6. Retest the system.

Q: Does the ignition key cylinder illumination light illuminate/extinguish in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

ON-VEHICLE SERVICE

CHECK OF IGNITION KEY REMINDER WARNING FUNCTION (STEERING LOCK REMINDER BUZZER BY KOS)

M1541200700085

1. Driver's door: Release the closed and steering wheel lock, or turn the ignition key <vehicles with WCM> or emergency key <vehicles with KOS> to the LOCK (OFF) position (key inserted).
2. Change the driver's door state from closed to open.
3. Check that the buzzer sounds normally.
4. If a malfunction is found, carry out the troubleshooting (Refer to P.54A-53).

REMOVAL AND INSTALLATION

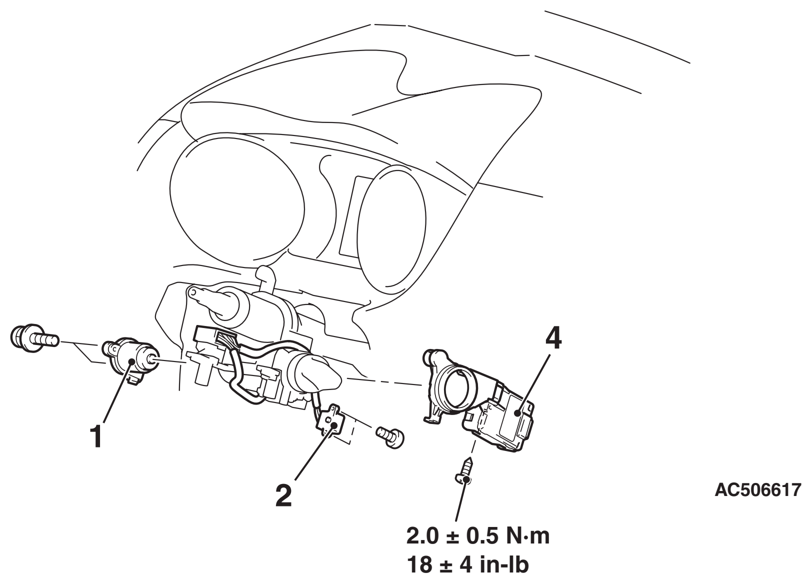
M1541200300128

⚠ CAUTION

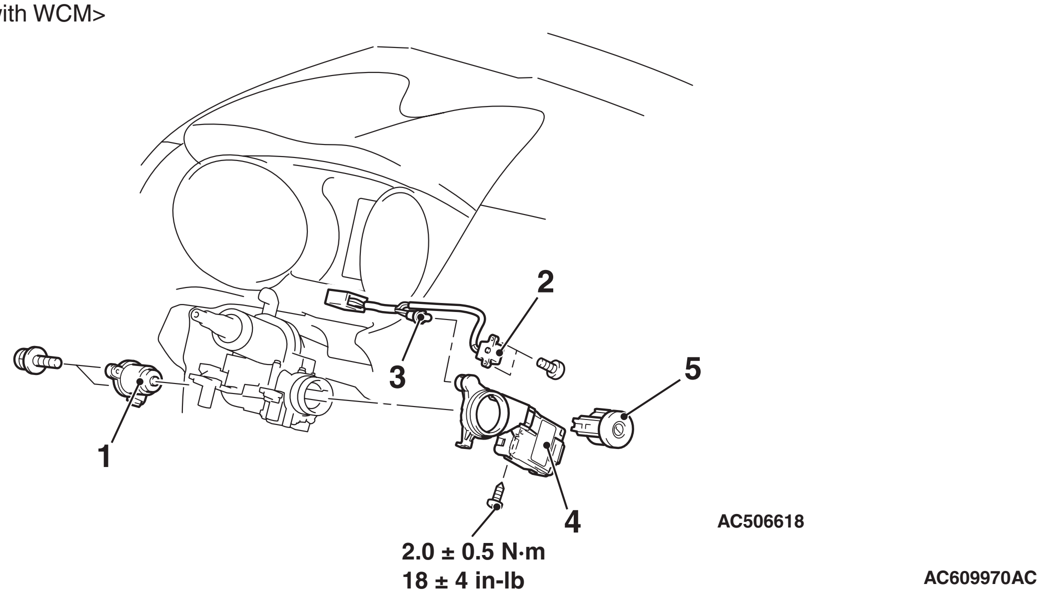
To remove the driver airbag module, refer to GROUP 52B –Service Precautions P.52B-24 and Air Bag Module(s) and Clock Spring P.52B-367.

Pre-removal Operation	Post-installation Operation
Removal of clock spring/column switch assembly [Refer to GROUP 37 –Steering Shaft P.37-25 and GROUP 52B –Air bag module(s) and clock spring P.52B-367].	Installation of clock spring/column switch assembly [Refer to GROUP 37 –Steering Shaft P.37-25 and GROUP 52B –Air bag module(s) and clock spring P.52B-367].

<Vehicles with KOS>



<Vehicles with WCM>



Removal Steps

1. Ignition switch
2. Key reminder switch
3. Key ring illumination light <Vehicles for WCM>

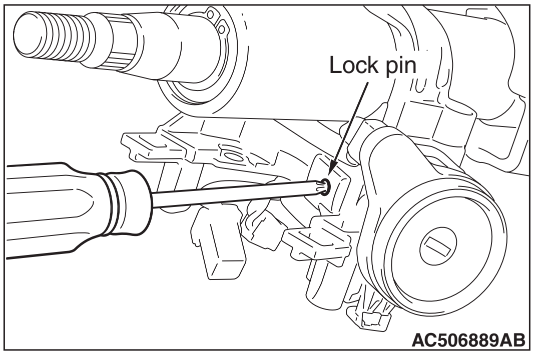
Removal Steps (Continued)

4. WCM <vehicles with WCM>/receiver antenna module <vehicles with KOS>

<<**A**>> 5. Steering lock cylinder <vehicles with WCM>

REMOVAL SERVICE POINTS

<<A>> STEERING LOCK CYLINDER REMOVAL <VEHICLES WITH WCM>

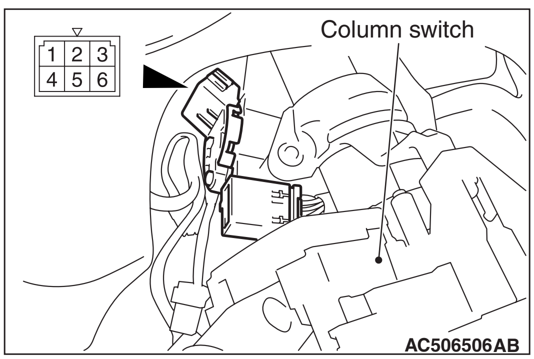


1. Insert the key into the steering lock cylinder, and turn the ignition key to the ACC position.
2. With using a cross-headed screw driver (small) or similar items to press in the lock pin, remove the ignition key, and then remove the steering lock cylinder.

INSPECTION

IGNITION SWITCH CONTINUITY CHECK

M1541200400095

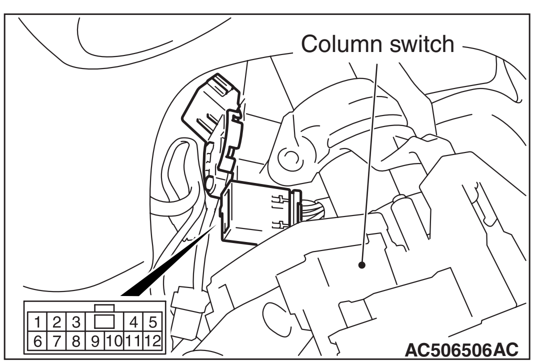


With the ignition switch mounted to the vehicle, disconnect and check the ignition switch connection connector.

Ignition key position	Terminal number	Normal condition
LOCK	1 –2, 1 –4, 1 –5, 1 –6	No continuity
ACC	1 –6	Continuity exists (2 ohms or less)
ON	1 –2 –4 –6	Continuity exists (2 ohms or less)
START	1 –2 –5	Continuity exists (2 ohms or less)

KEY REMINDER SWITCH INSPECTION

M1541200500092



With the key reminder switch mounted to the vehicle, disconnect the key reminder switch connection connector, and then perform the continuity check.

Key status	Terminal number	Normal condition
Key removed	2 –3	Continuity exists (2 ohms or less)
Key inserted	2 –3	No continuity

COMBINATION METER

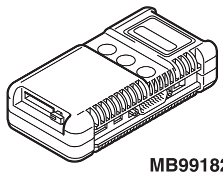
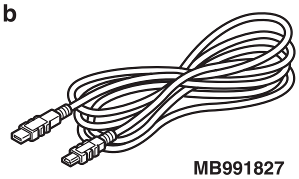
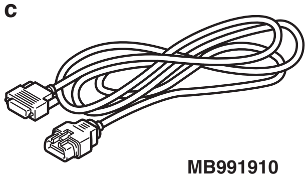
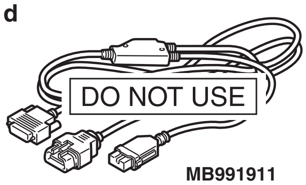
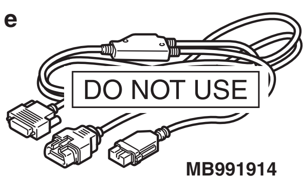
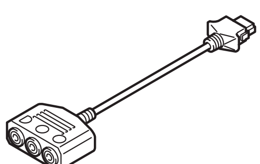
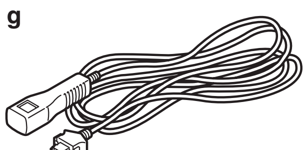
SERVICE SPECIFICATIONS

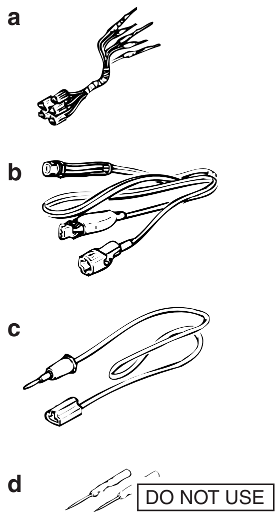
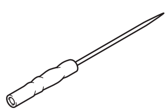
M1540200200214

Item		Standard Value
Speedometer indication tolerance {mph (km/h)} <Except vehicles for CANADA>	10 (16)	8.5 –11.5 (13.6 –18.4)
	25 (40)	23.5 –26.5 (37.6 –42.4)
	50 (80)	48.5 –51.5 (77.6 –82.4)
	75 (120)	73.5 –76.5 (117.6 –122.4)
	100 (161)	98.5 –102.5 (158.6 –165.0)
	125 (201)	123.5 –127.5 (198.6 –205.0)
Speedometer indication tolerance {km/h (mph)} <Vehicles for CANADA>	20 (12.4)	19 –24 (11.8 –14.9)
	40 (24.8)	40 –44 (24.8 –27.3)
	80 (49.7)	80 –85 (49.7 –52.8)
	120 (74.6)	120.5 –125.5 (74.9 –78.0)
	160 (99.4)	160.5 –165.5 (99.7 –102.8)
	200 (124.3)	200.5 –207.0 (124.6 –128.6)
Tachometer indication tolerance (r/min) (The value in parentheses is a reference value.)	600	550 –650
	(2,000)	(1,950 –2,050)
	3,000	2,950 –3,050
	(4,000)	(3,950 –4,050)
	5,000	4,950 –5,050
	6,000	5,950 –6,050
	(7,000)	(6,950 –7,050)
	(8,000)	(7,950 –8,050)
Fuel level sensor resistance (ohms)	Stopper position "F"	13.0 ± 1.0
	Stopper position "E"	120.0 ± 1.0
Fuel level sensor float height {mm (in)}	Stopper position "F"	181.5 (7.1)
	Stopper position "E"	26.7 (1.0)

SPECIAL TOOLS

M1540200300147

Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ **CAUTION** **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1540203800152

Refer to GROUP 00, Contents of troubleshooting P.00-6.

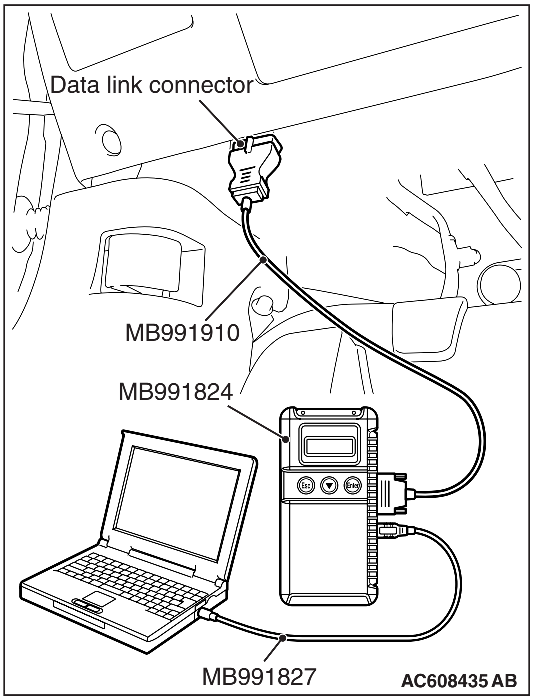
DIAGNOSIS FUNCTION

M1540200500077

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "Meter" from "System List," and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

CHECK OF FREEZE FRAME DATA

The freeze frame data can be checked by using the scan tool (GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

When detecting fault and storing the DTC, the ECU connected to CAN bus line obtains the data before the determination of the DTC and the data when the DTC is determined, and then stores the ECU status of that time. By analyzing each data from scan tool, the troubleshooting can be performed more efficiently. The displayed items are as the table below.

Display item list

Item No.	Item name	Data item	Unit
01	Odometer	Total driving distance after the diagnosis code is generated	km*
02	Ignition cycle	Number of times the ignition switch is turned "ON" or "LOCK (OFF)" after the past failure transition	Number of counts is displayed.
04	Current trouble accumulative time	Cumulative time for current malfunction of diagnosis code	min

*NOTE: *: If a failure occurs to both the ABS-ECU and ETACS-ECU, 0000 km or FFFF km is displayed on the scan tool MB991958.*

DIAGNOSTIC TROUBLE CODE CHART

M1540200600115

⚠ CAUTION

- **During troubleshooting, a DTC code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, check all systems for DTC code(s). If DTC code(s) are set, erase them all.**
- **When the combination meter is required to be replaced as a result of the troubleshooting, the current driving distance and number of elapsed days to be used for service reminder function must be entered into the meter after the replacement. Therefore, read "Integrated mileage for reminder," "Integrated days for reminder," "Mileage until Extra reminder," "Months until Extra reminder," and "Current Schedule" from the meter before the replacement using the special function of scan tool MB991958, and note them. For the operation method of scan tool MB991958, refer to P.54A-82. If "Integrated mileage for reminder" or "Integrated days for reminder" cannot be read by the scan tool MB991958, follow the method described below.**
  a. **For the driving distance for check warning, use the driving distance displayed on the multi information display.**
  b. **For the elapsed days for check warning, calculate the number of elapsed days from the delivery date to the customer (service remainder function start date) and current date.**

Diagnostic trouble code number	Diagnostic item	Reference page
B1200	Malfunction of odometer	P.54A-24
B1201	Abnormal fuel information	P.54A-25
B1208	Malfunction of LCD heater	P.54A-28
B1209	Test mode	P.54A-29
B2203	VIN not programmed	P.54A-29
B2463	The sticking of rheostat switch	P.54A-31
B2464	The sticking of meter information switch	P.54A-32
B2465	Ignition switch signal error	P.54A-35
U0019	Bus off (CAN-B)	P.54A-36
U0100	Engine control module CAN timeout	P.54A-38
U0141	ETACS CAN timeout	P.54A-39
U0151	SRS-ECU CAN timeout	P.54A-41
U0154	Occupant classification-ECU CAN timeout	P.54A-42
U0164	A/C-ECU CAN timeout	P.54A-44
U0168	KOS-ECU or WCM CAN timeout	P.54A-45
U0184	Audio CAN timeout	P.54A-47
U0197	Hands free module CAN timeout	P.54A-48
U0245	Audio visual navigation unit CAN timeout	P.54A-50
U1415	Coding not completed/Data fail	P.54A-51

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B1200: Malfunction of odometer

TROUBLE JUDGEMENT

If the odometer information, which is stored in the combination meter, is abnormal when the ignition switch at the ON position and the system voltage is 10 −16 volts (data from ETACS-ECU), DTC B1200 is stored.

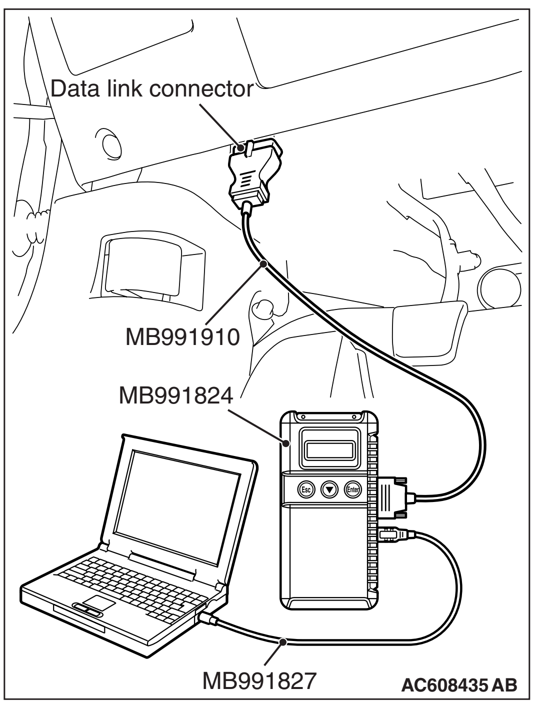
TROUBLESHOOTING HINTS

The combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if diagnosis code is set.

Q: Is the DTC set?

YES : Replace the combination meter, and then go to Step 2.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 2. Recheck for diagnostic trouble code.

Check if DTC is set to the combination meter.

(1) Erase the DTC.

(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.

(3) Check if diagnosis code is set.

Q: Is the DTC set?

YES : Go to Step 1.

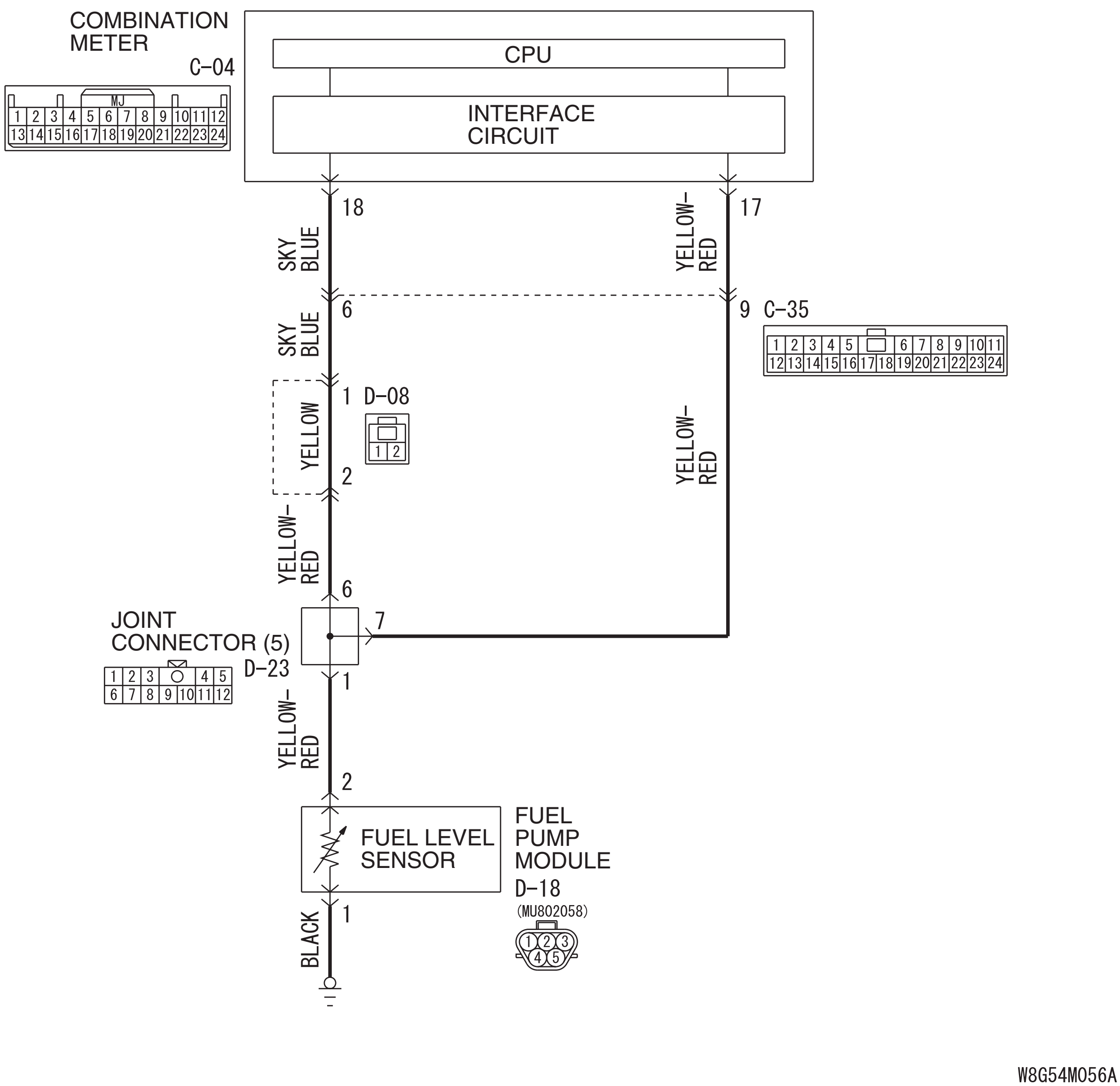
NO : The procedure is complete.

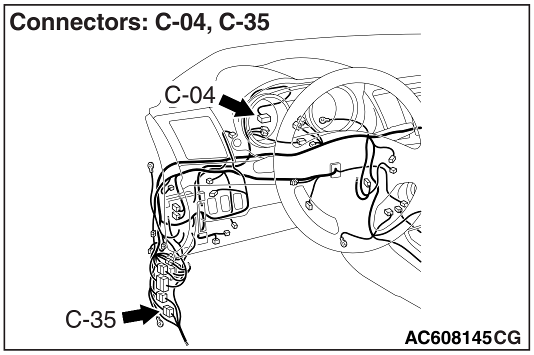
DTC B1201: Abnormal fuel information

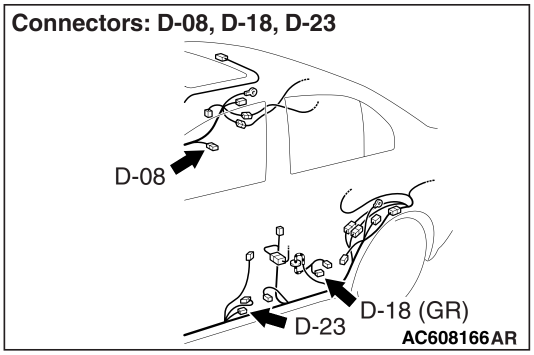
⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

Fuel Gauge Unit Circuit







TROUBLE JUDGEMENT

With the ignition switch at the ON position and the system voltage at 10 −16 volts (data from ETACS-ECU), if the combination meter detects the abnormal resistance of fuel level sensor circuit for 64 seconds continuously, DTC B1201 is stored.

TROUBLESHOOTING HINTS

- The fuel pump module [fuel level sensor] may be defective.
- The combination meter may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check fuel pump module connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is fuel pump module connector D-18 in good condition?

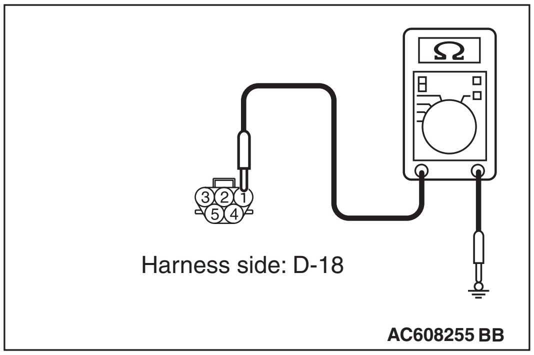
YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Check the fuel level sensor.

Check to see if the fuel level sensor is normal (Refer to P.54A-81).

Q: Is the check result normal?

YES : Go to Step 3.
NO : Replace the fuel level sensor.



STEP 3. Measure the resistance at fuel pump module connector D-18.

(1) Disconnect pump module connector D-18, and measure at the wiring harness side.

(2) Measure the resistance value between terminal 1 and ground.

- The measured value should be 2 ohm or less.

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wiring harness between fuel pump module connector D-18 (terminal 1) and ground.

Q: Is the wiring harness between fuel pump module connector D-18 (terminal 1) and ground in good condition?

YES : There is no action to be taken.

NO : Repair the wiring harness.

STEP 5. Check combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 in good condition?

YES : Go to Step 6.

NO : Repair the connector.

STEP 6. Check the wiring harness between fuel pump module connector D-18 (terminal 2) and combination meter connector C-04 (terminal 17 or 18).

NOTE: Also check intermediate connectors C-35, D-08 and joint connector D-23. If intermediate connectors C-35, D-08 and joint connector D-23 are damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the wiring harness between fuel pump module connector D-18 (terminal 2) and combination meter connector C-04 (terminal 17 or 18) in good condition?

YES : Go to Step 7.

NO : Repair the wiring harness. The fuel gauge should work normally.

STEP 7. Using scan tool MB991958, perform actuator test.

- Item 03: Fuel gauge (target value): 0 – 100%
  - Fuel gauge shows 100 %

Q: Is the check result normal?

YES : Go to Step 8.
NO : Replace the combination meter.

STEP 8. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The procedure is complete.

DTC B1208: Malfunction of LCD heater

TROUBLE JUDGEMENT

With the ignition switch at the ON position and the system voltage at 10 – 16 volts (data from ETACS-ECU), if the combination meter detects the LCD heater malfunction, the DTC B1208 is stored.

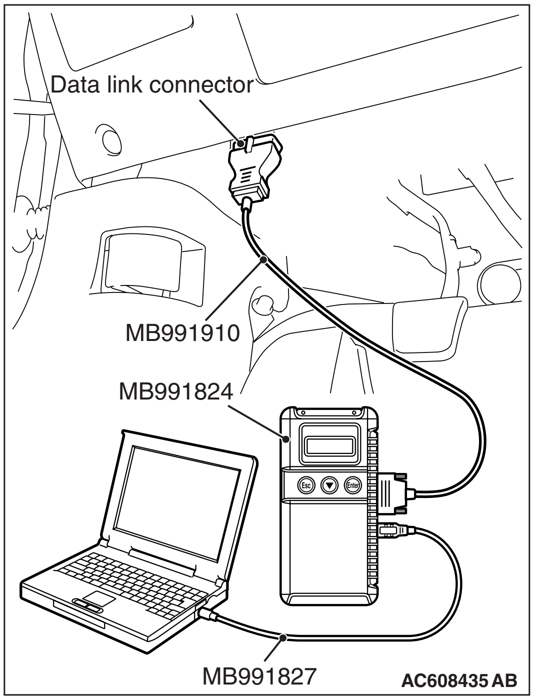
TROUBLESHOOTING HINTS

The combination meter may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.
Check again if the DTC is set to the combination meter.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?
YES : Replace the combination meter.
NO : The procedure is complete.

DTC B1209: Test mode

TROUBLE JUDGEMENT

When the mode is changed to the meter test mode (supplier mode), the combination meter stores the DTC B1209.

TROUBLESHOOTING HINTS

The combination meter may be defective

DIAGNOSIS

Replace the combination meter.

DTC B2203: VIN not programmed

TROUBLE JUDGEMENT

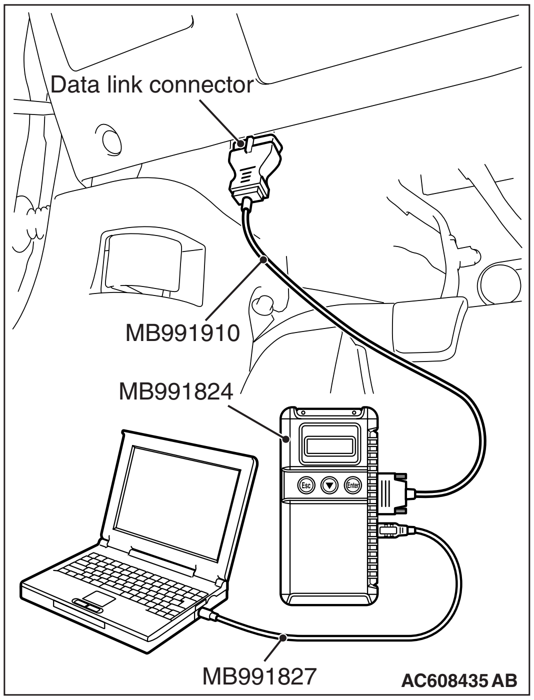
With the ignition switch at the ON position, if the VIN code is not written to the combination meter, DTC B2203 is stored.

TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The ETACS-ECU may be defective.
- The combination meter may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code

Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC B2463: Sticking of rheostat switch

TROUBLE JUDGEMENT

If the combination meter detects the rheostat switch pressed state for 60 seconds or more continuously, DTC B2463 is stored.

TROUBLESHOOTING HINTS

- The combination meter may be defective.
- The meter hood assembly (rheostat switch knob) may be defective.

DIAGNOSIS PROCEDURE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check the rheostat switch.

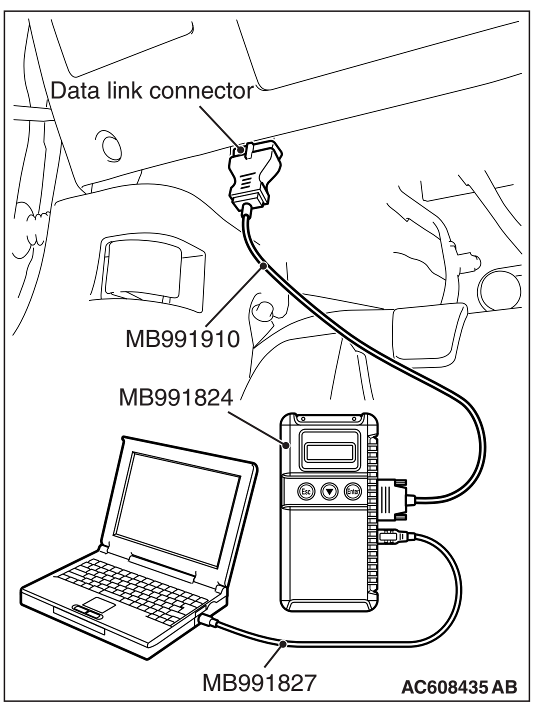
Check whether an abnormality is present to the combination meter and the rheostat switch knob attached to the meter hood assembly.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Replace the combination meter or meter hood assembly.

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if diagnosis code is set.

Q: Is the DTC set?

YES : Replace the combination meter, and then go to Step 3.
NO : The procedure is complete.

STEP 3. Recheck for diagnostic trouble code.

Check if DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if diagnosis code is set.

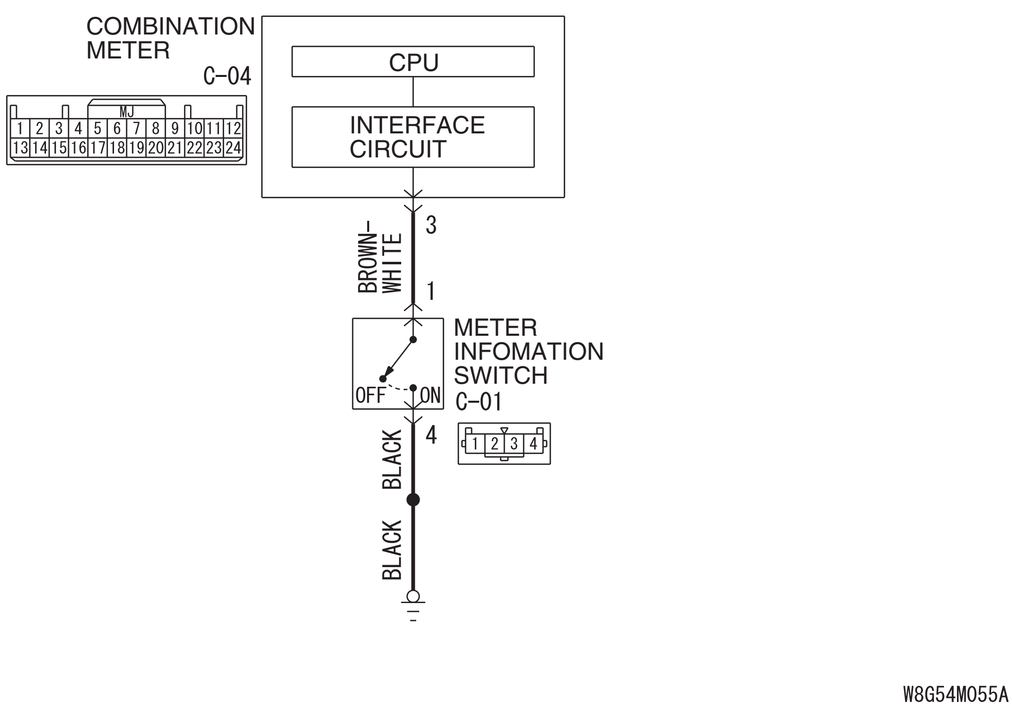
Q: Is the DTC set?

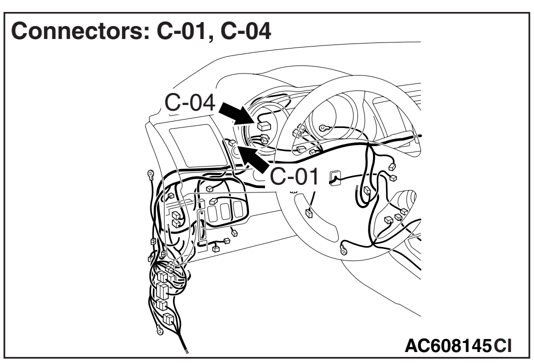
YES : Go to Step 1.
NO : The procedure is complete.

DTC B2464: The sticking of meter information switch

⚠ CAUTION
Whenever the ECU is replaced, ensure that the communication circuit is normal.

Meter Information Switch Circuit





TROUBLE JUDGEMENT

If the combination meter detects the meter information switch pressed state for 60 seconds or more continuously, DTC B2464 is stored.

TROUBLESHOOTING HINTS

- The meter information switch may be defective
- The combination meter may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check meter information switch connector C-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is meter information switch connector C-01 in good condition?

YES : Go to Step 2.
NO : Repair the connector.

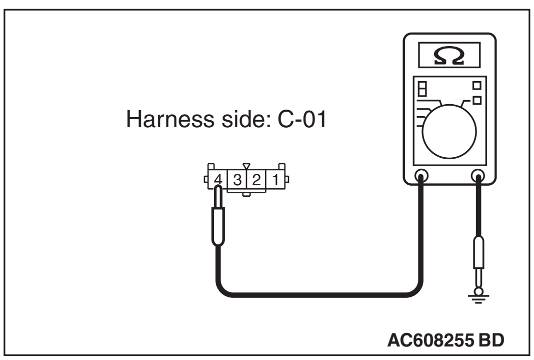
STEP 2. Check the meter information switch.
Check the meter information switch (Refer to P.54A-82).

Q: Is the check result normal?

YES : Go to Step 3.
NO : Replace the meter information switch.

STEP 3. Measure at meter information switch connector C-01 in order to the ground circuit to the meter information switch.

(1) Disconnect meter information switch connector C-01, and measure at the wiring harness side.
(2) Measure the resistance value between terminal 4 and ground.
- The measured value should be 2 ohm or less.



Q: Does the measured resistance value correspond with this range?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between meter information switch connector C-01 (terminal 4) and ground.

Q: Is the wiring harness between fuel meter information switch connector C-01 (terminal 4) and ground in good condition?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 5. Check combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 in good condition?

YES : Go to Step 6.
NO : Repair the connector.

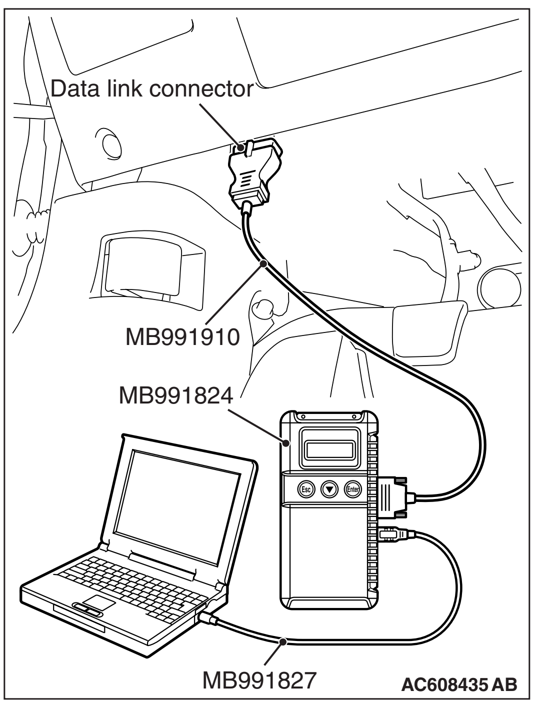
STEP 6. Check the wiring harness between meter information switch connector C-01 (terminal 1) and combination meter connector C-04 (terminal 3).

Q: Are the wiring harness between meter information switch connector C-01 (terminal 1) and combination meter connector C-04 (terminal 3) in good condition?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 7. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Go to Step 1.
NO : The procedure is complete.

DTC B2465: Ignition switch signal error

TROUBLE JUDGEMENT

If 5 seconds or more elapses with the ignition switch state and the data from the CAN communication contradicted, the combination meter stores the DTC B2465.

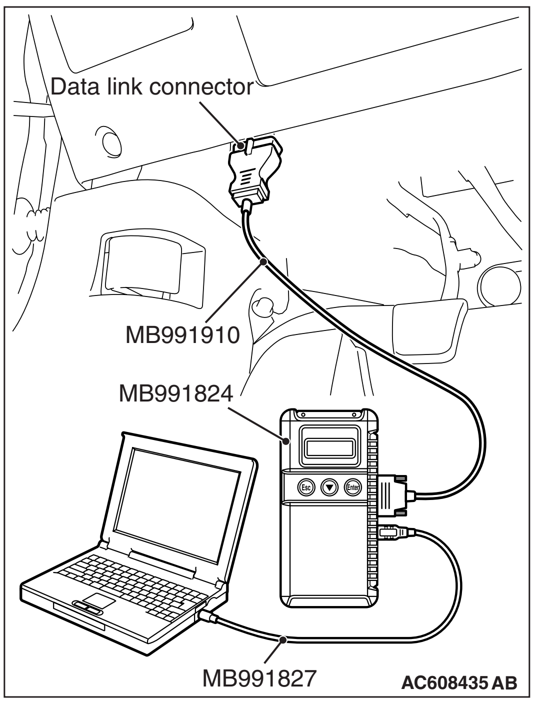
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The ETACS-ECU may be defective
- The combination meter may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code

Check if DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

(1) Turn the ignition switch to the "ON" position.
(2) Diagnose the CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Combination meter operation check

Check that the combination meter works normally.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Check the power supply circuit of combination meter (Refer to P.54A-54).

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0019: Bus off (CAN-B)

⚠ CAUTION

- **If DTC U0019 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the CAN-B circuit malfunction occurs, the combination meter sets DTC U0019.

JUDGEMENT CRITERIA

With the ignition switch at the ON position and the system voltage at 10 –16 volts (data from ETACS-ECU), if the combination meter becomes unable to transmit data normally due to the CAN-B bus circuit malfunction, the combination meter determines that a problem has occurred.

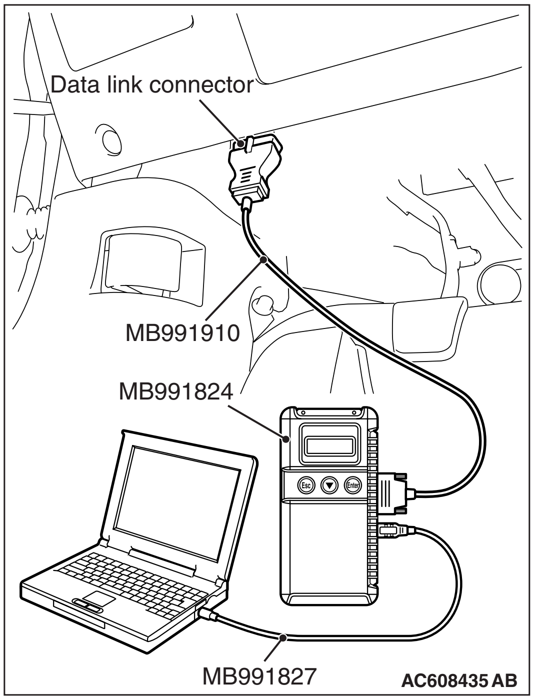
TROUBLESHOOTING HINTS

The CAN bus line may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1.Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 2.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

(1) Turn the ignition switch to the "ON" position.
(2) Diagnose the CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

DTC U0100: Engine control module CAN timeout

⚠ CAUTION

- **If DTC U0100 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

The combination meter sets DTC U0100 when it cannot receive "CHECK ENGINE" signals from the engine control module.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with engine control module cannot be established for 600 ms or more, the combination meter determines that a problem has occurred.

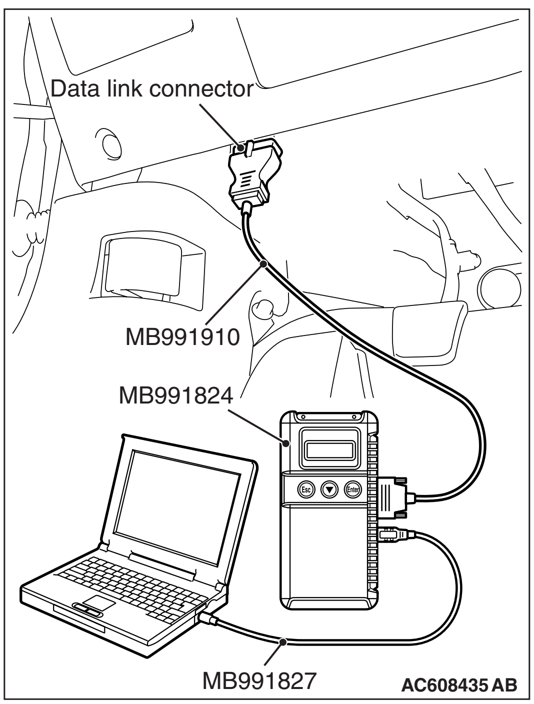
PROBABLE CAUSES

- The CAN bus line may be defective.
- The combination meter may be defective.
- The engine control module may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the MFI diagnostic trouble code

Check if DTC is set to the engine control module.

Q: Is the DTC set?

YES : Troubleshoot the MFI (Refer to GROUP 13A, Diagnosis Code Chart P.13A-46).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0141: ETACS CAN timeout

⚠ CAUTION

- **If DTC U0141 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from ETACS-ECU cannot be received, the combination meter sets the DTC U0141.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with ETACS-ECU cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

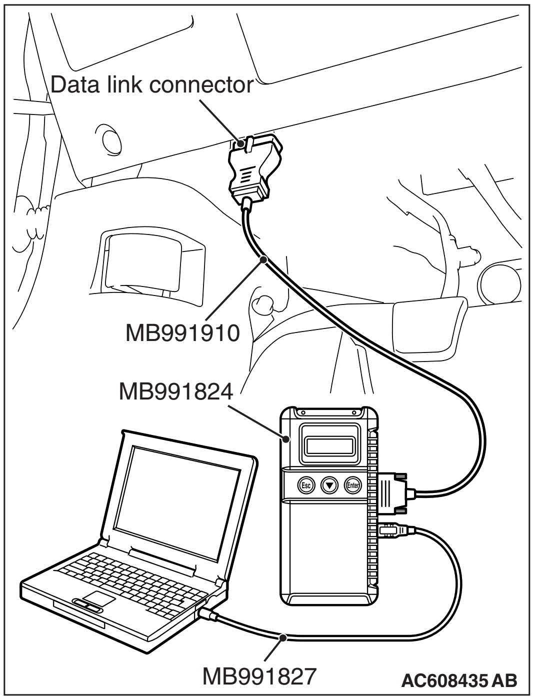
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The combination meter may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0151: SRS-ECU CAN timeout

⚠ CAUTION

- **If DTC U0151 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from SRS-ECU cannot be received, the combination meter sets DTC U0151.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10-16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with SRS-ECU cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

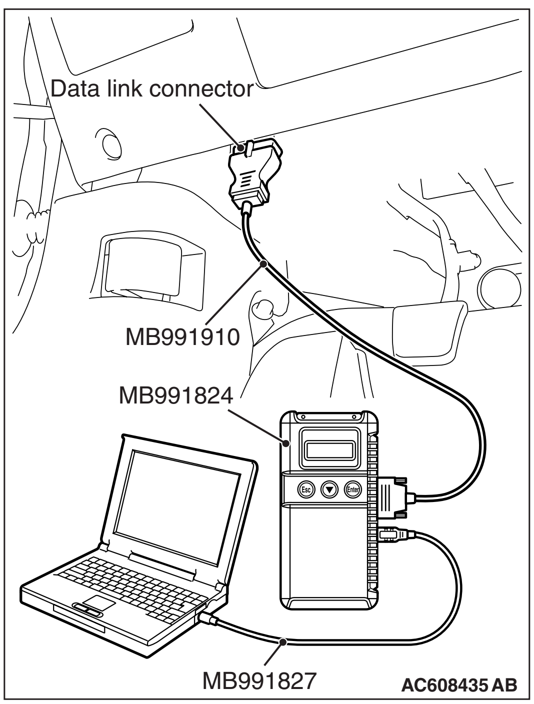
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The SRS-ECU may be defective
- The combination meter may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the SRS-ECU diagnostic trouble code

Check again if the DTC is set to the SRS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Troubleshooting P.52B-31).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0154: Occupant classification-ECU CAN timeout

⚠ CAUTION

- **If DTC U0154 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from occupant classification-ECU cannot be received, the combination meter sets DTC U0154.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

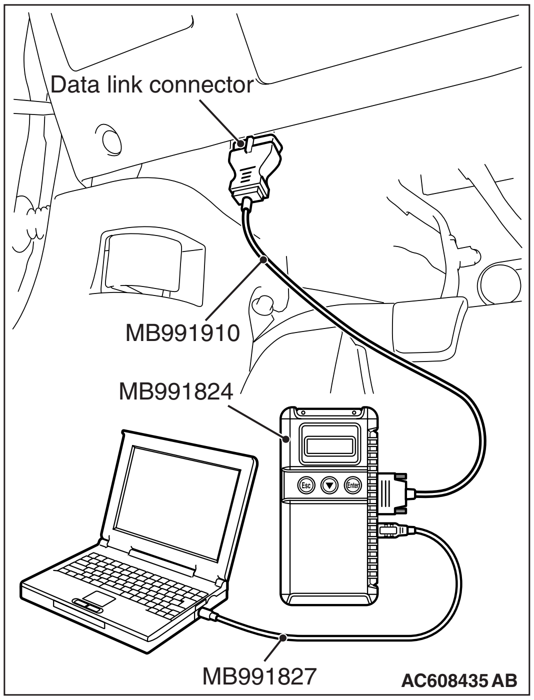
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The combination meter may be defective.
- The occupant classification-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the occupant classification-ECU diagnostic trouble code.

Check if DTC is set to the occupant classification-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-280).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0164: A/C-ECU CAN timeout

⚠ CAUTION

- **If DTC U0164 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from A/C-ECU cannot be received, the combination meter sets DTC U0164.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with A/C-ECU cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

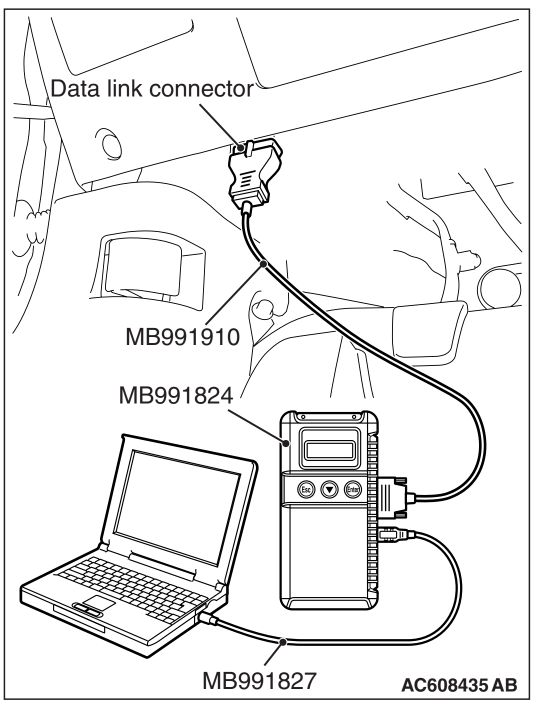
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The A/C-ECU may be defective.
- The combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the A/C diagnostic trouble code.

Check if DTC is set to the A/C-ECU.

Q: Is the DTC set?

YES : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 or GROUP 55B, Auto A/C Diagnosis P.55B-7).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0168: KOS-ECU or WCM CAN timeout

⚠ CAUTION

- **If DTC U0168 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from KOS-ECU or WCM cannot be received, the combination meter sets DTC U0168.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 V (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with KOS-ECU or WCM cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

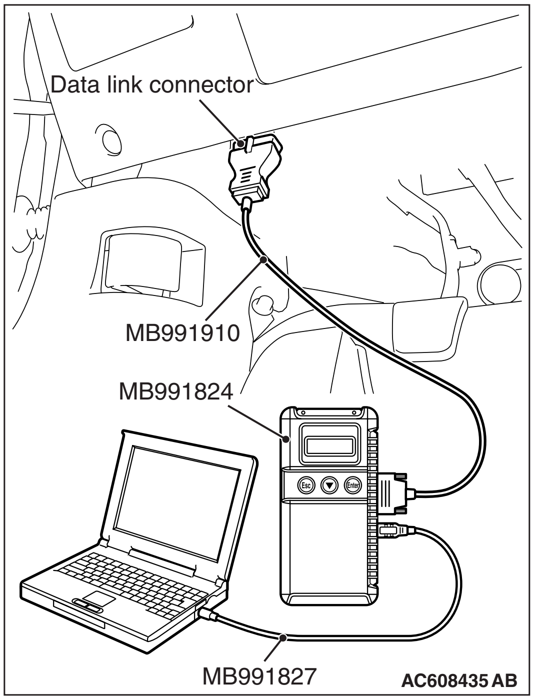
TROUBLESHOOTING HINTS

- Malfunction of CAN bus line may be defective.
- Malfunction of the KOS-ECU may be defective.
- Malfunction of the WCM may be defective.
- Malfunction of combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the KOS-ECU or WCM diagnostic trouble code.

Check again if the DTC is set to the KOS-ECU or WCM.

Q: Is the DTC set?

YES : Troubleshoot the KOS or WCM (Refer to GROUP 42B, Troubleshooting P.42B-20 <KOS> or 42C, Troubleshooting P.42C-14 <WCM>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0184: Audio CAN timeout

⚠ CAUTION

- **If DTC U0184 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from radio and CD player or CD changer cannot be received, the combination meter sets the DTC U0184.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with radio and CD player or CD changer cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

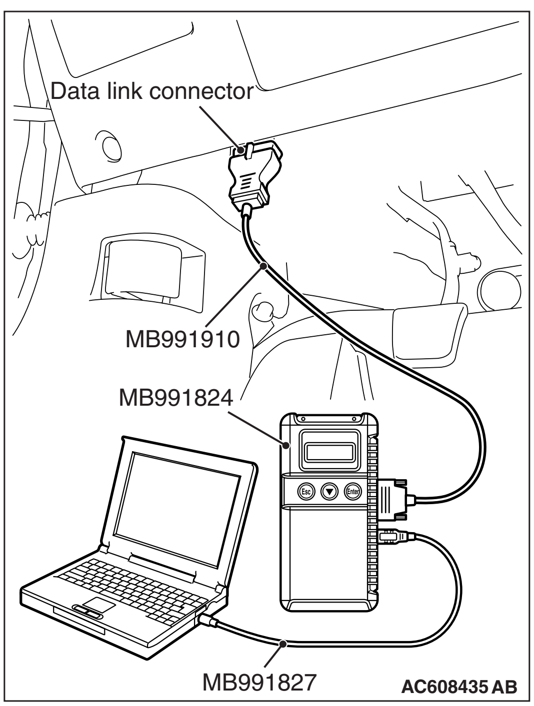
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The combination meter may be defective.
- The radio and CD player or CD changer may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the audio diagnostic trouble code.
Check again if the DTC is set to the audio.

Q: Is the DTC set?

YES : Troubleshoot the radio and CD player (Refer to P.54A-239).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.
Check again if the DTC is set to the combination meter.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0197: Hands free module CAN timeout

⚠ CAUTION

- **If DTC U0197 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from hands free module cannot be received, the combination meter sets DTC U0197.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with hands free module cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

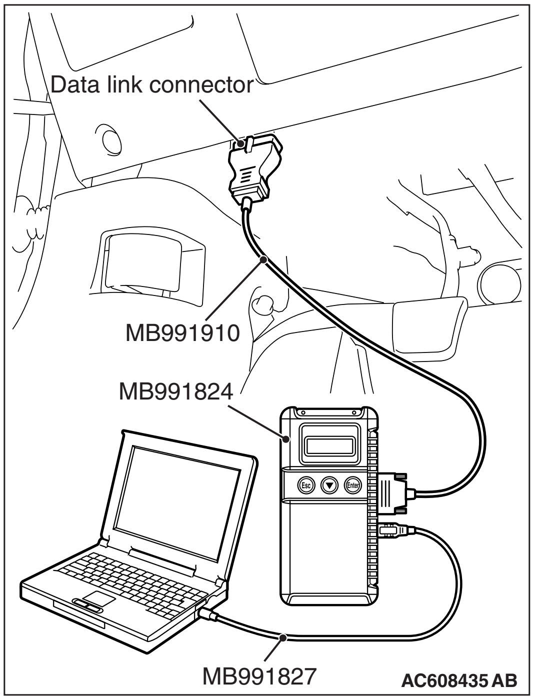
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The combination meter may be defective.
- The hands free module may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the hands free module diagnostic trouble code.

Check again if the DTC is set to the hands free module.

Q: Is the DTC set?

YES : Troubleshoot the hands-free cellular phone system.
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0245: Audio visual navigation unit CAN timeout

⚠ CAUTION

- **If DTC U0245 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from audio visual navigation unit cannot be received, the combination meter sets DTC U0245.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with audio visual navigation unit cannot be established for 2,500 ms or more, the combination meter determines that a problem has occurred.

TROUBLESHOOTING HINTS

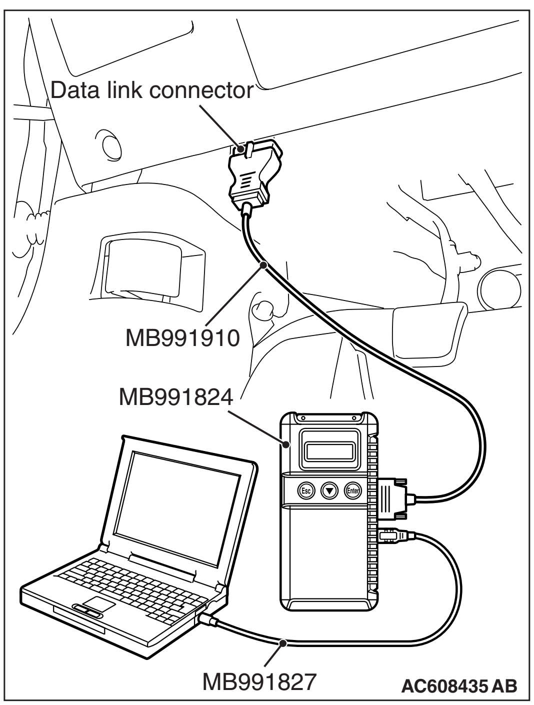
- The CAN bus line may be defective.
- The combination meter may be defective.
- The audio visual navigation unit may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the audio visual navigation unit diagnostic trouble code.

Check if DTC is set to the audio visual navigation unit.

Q: Is the DTC set?

YES : Troubleshoot the MMCS (Refer to P.54A-328).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U1415: Coding not completed/Data fail

⚠ CAUTION

- **If DTC U1415 is set, diagnose the CAN bus lines.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the vehicle information data is not registered to the combination meter, the combination meter sets DTC U1415.

JUDGEMENT CRITERIA

With the global coding counter value "0," if all the global coding data (vehicle information) are not stored, the combination meter determines that a problem has occurred.

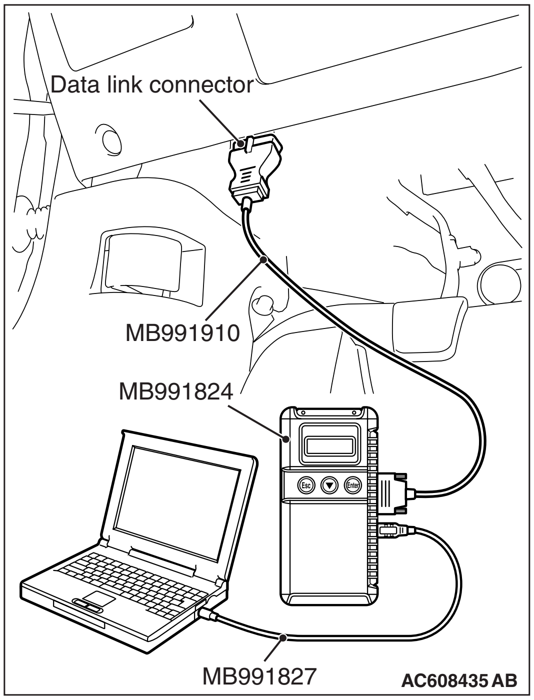
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The combination meter may be defective.
- The ETACS-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the combination meter.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

TROUBLE SYMPTOM CHART

M1540200800175

⚠ CAUTION

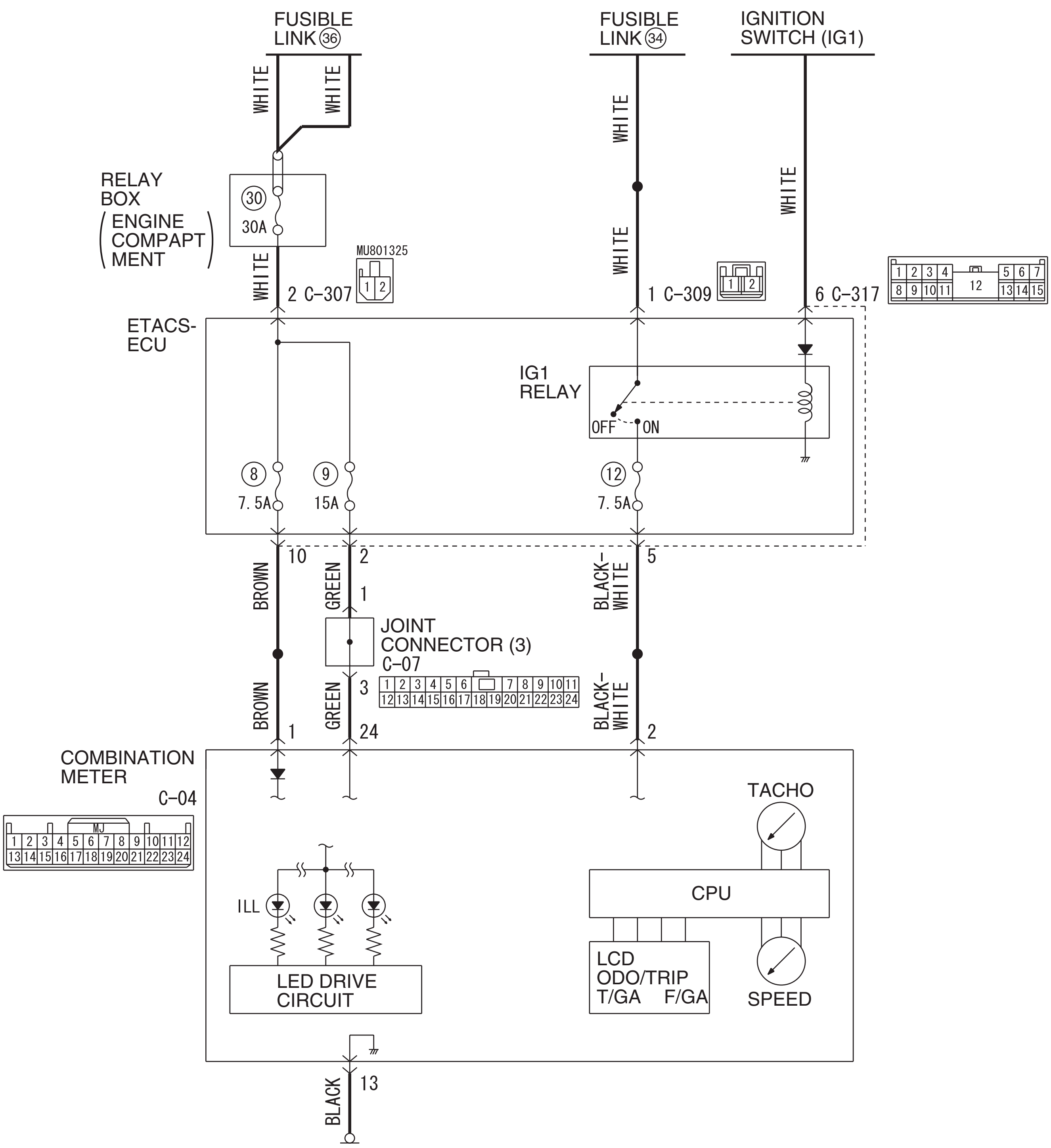
- **During troubleshooting, a DTC code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.**
- **When the combination meter is required to be replaced as a result of the troubleshooting, the current driving distance and number of elapsed days to be used for service reminder function must be entered into the meter after the replacement. Therefore, read "Integrated mileage for reminder," "Integrated days for reminder," "Mileage until Extra reminder," "Months until Extra reminder," and "Current Schedule" from the meter before the replacement using the special function of scan tool MB991958, and note them. For the operation method of scan tool MB991958, refer to P.54A-82. If "Integrated mileage for reminder" or "Integrated days for reminder" cannot be read by the scan tool MB991958, follow the method described below.**
    a. **For the driving distance for check warning, use the driving distance displayed on the multi information display.**
    b. **For the elapsed days for check warning, calculate the number of elapsed days from the delivery date to the customer (service remainder function start date) and current date.**

Trouble symptom	**Inspection Procedure No.**	**Reference page**
Power supply circuit check.	1	P.54A-54
The speedometer does not work (the other meters work).	2	P.54A-60
The tachometer does not work (the other meters work).	3	P.54A-62
Tone alarm does not sound normally.	4	P.54A-64
The combination meter light does not illuminate normally or the multi information display is not displayed normally.	5	P.54A-66
The multi information display screen cannot be changed with the operation of the meter information switch.	6	P.54A-69

SYMPTOM PROCEDURES

Inspection Procedure 1: Power supply circuit check.

Combination Meter Power Supply Circuit



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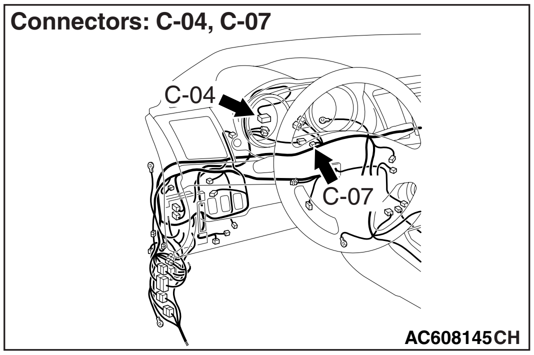
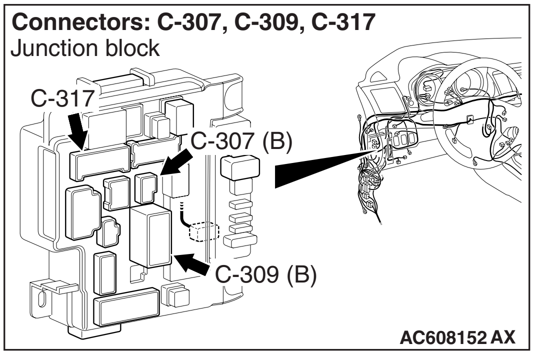




TECHNICAL DESCRIPTION (COMMENT)

If the odometer and tripmeter do not display or all the meter needles do not move, the power supply to the combination meter, or the combination meter itself may have a problem.

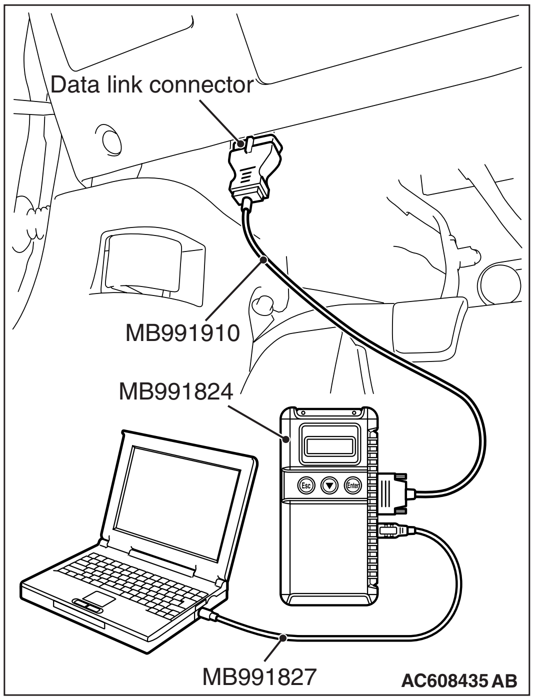
TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The combination meter may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

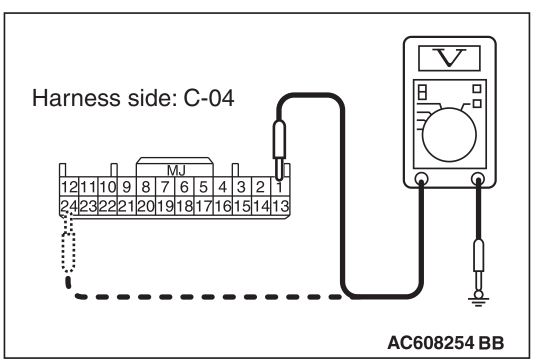
Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 2.

STEP 2. Check combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 in good condition?

YES : Go to Step 3.
NO : Repair the defective connector.



STEP 3. Check the battery power supply circuit to the combination meter. Measure the voltage at combination meter connector C-04.

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the LOCK (OFF) position.
(3) Measure the voltage between terminals 1, 24 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 4.

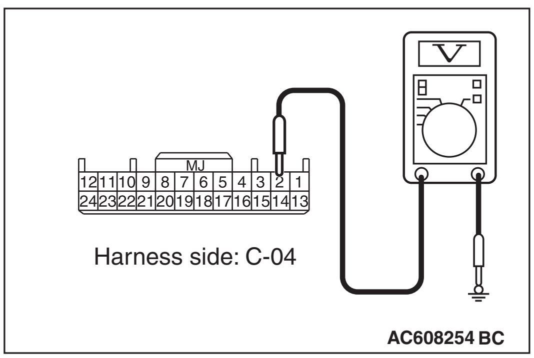
STEP 4. Check the wiring harness between combination meter connector C-04 (terminal 1, 24) and the fusible link (36).

NOTE: Also check ETACS-ECU connectors C-307, C-317 and joint connector C-07 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-307, C-317 or joint connector C-07 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between combination meter connector C-04 (terminal 1, 24 and the fusible link (36) in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

NO : Repair the wiring harness.



STEP 5. Check the battery power supply circuit to the combination meter. Measure the voltage at combination meter connector C-04.

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between terminals 2 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 8.

NO : Go to Step 6.

STEP 6. Using scan tool MB991958, check data list.

Check the input signal from the ignition switch (IG1) in the ETACS-ECU.

(1) Turn the ignition switch to the "ON" position.
(2) Check the ETACS data list.
- Turn the ignition switch to the "ON" position.

Item No.	Item name	Normal condition
Item 254	IG voltage	Approximately 12 volts (battery positive voltage)

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do the scan tool MB991958 display the item "IG voltage" is normal condition?

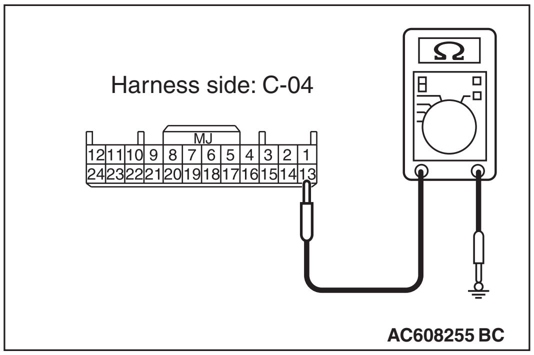
YES : Go to Step 7.
NO : Troubleshoot the ETACS-ECU. Refer to Inspection Procedure 2 "The ignition switch (IG1) signal is not received P.54A-531."

STEP 7. Check the wiring harness between combination meter connector C-04 (terminal 2) and the fusible link (34).

NOTE: Also check ETACS-ECU connectors C-309 and C-317 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-309 or C-317 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between combination meter connector C-04 (terminal 2) and the fusible link (34) in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness.



STEP 8. Check the ground circuit to the combination meter. Test at combination meter connector C-04.

(1) Disconnect combination meter connector C-04 and measure the resistance available at the wiring harness side of the connector.

(2) Measure the resistance value between terminal 13 and ground.

- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 10.

NO : Go to Step 9.

STEP 9. Check the wiring harness between combination meter connector C-04 (terminal 13) and ground.

Q: Is the wiring harness between combination meter connector C-04 (terminal 13) and ground in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Repair the wiring harness.

STEP 10. Retest the system.

Check that the combination meter works normally.

Q: Is the check result satisfactory?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the combination meter.

Inspection Procedure 2: The speedometer does not work (the other meters work).

TECHNICAL DESCRIPTION (COMMENT)

If only the speedometer does not operate, the transaxle control module and combination meter may have a problem.

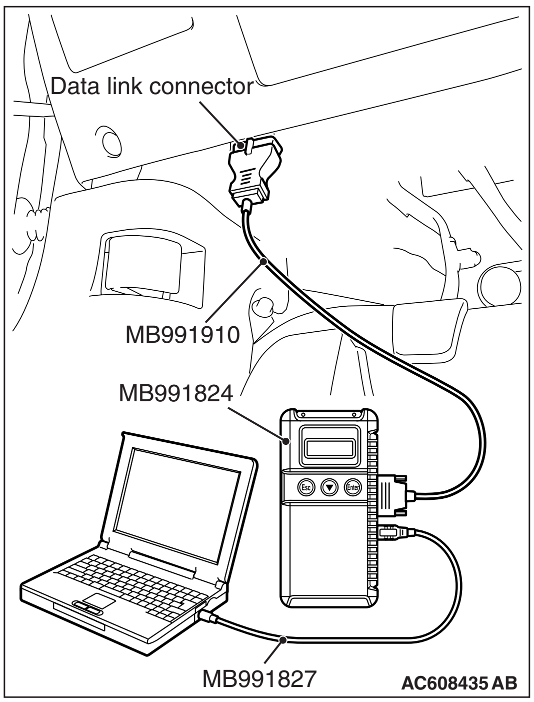
TROUBLESHOOTING HINTS

- The transaxle control module may be defective
- The combination meter may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the CVT diagnostic trouble code.

Check if diagnosis code is set to the CVT.

Q: Is the DTC set?

YES : Troubleshoot the CVT (Refer to GROUP 23A, Automatic Transaxle Diagnosis P.23A-29).

NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.

(2) Check the data list on the combination meter.

- Item 80: Speedometer
  - Should read vehicle speed.

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does it read vehicle speed?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Go to Step 5.

STEP 5. Check the speedometer

Use scan tool MB991958 to enter simulated vehicle speed.

(1) Turn the ignition switch to the "ON" position.

(2) Select "System select" from the start-up screen.

(3) Select "From 2006 MY" under "Model Year". Check that "Vehicle Information" contents are correct.

(4) Select "Meter" from "System List", and then press "OK" button.

NOTE: If "Loading Option Setup" list is shown, tick appropriate box.

(5) Select "Simulated vehicle Speed Output."

OK: The speedometer shows that simulated vehicle speed.

Q: Is the check result satisfactory?

YES : Go to Step 6.

NO : Replace the combination meter.

STEP 6. Retest the system.

Check that the speedometer works normally.

Q: Is the check result normal?

YES : The procedure is complete.

NO : Go to Step 1.

Inspection Procedure 3: The tachometer does not work (the other meters work).

TECHNICAL DESCRIPTION (COMMENT)

If only the tachometer does not operate, the ignition signal from the engine ECU may not be received or the combination meter may have a problem.

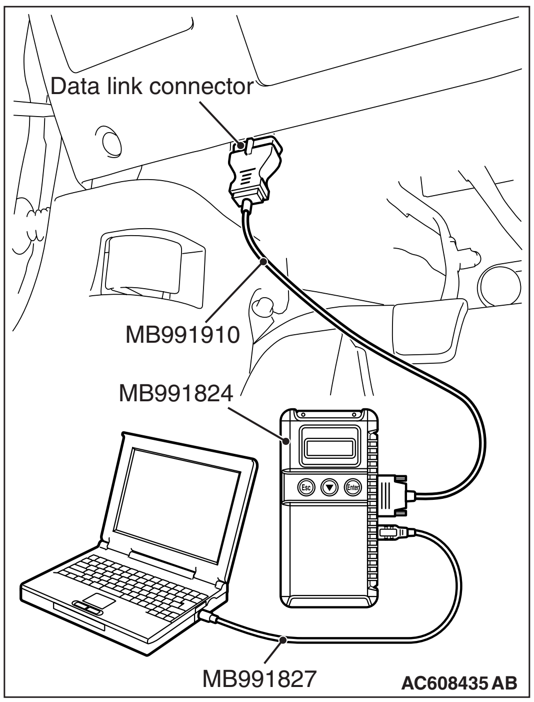
TROUBLESHOOTING HINTS

- The combination meter may be defective
- The engine control module may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the MFI diagnostic trouble code.

Check if DTC is set to the engine control module.

Q: Is the DTC set?

YES : Troubleshoot the MFI (Refer to GROUP 13A, Diagnosis P.13A-46).
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the data list on the combination meter.
- Item 87: Tachometer
  - Should read engine speed.

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does it read engine speed?

YES : Go to Step 5.
NO : Troubleshoot the MFI (Refer to GROUP 13A, Diagnosis P.13A-46). Complete the engine troubleshooting, and then go to Step 6.

STEP 5. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Conduct the actuator test of the combination meter.
- Item 2: Tachometer
  - The tachometer operates up to the set position.

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normally?

YES : Go to Step 6.
NO : Replace the combination meter.

STEP 6. Retest the system

Check that the tachometer works normally.

Q: Is the check result normal?

YES : The procedure is complete.
NO : Go to Step 1.

Inspection Procedure 4: Tone alarm does not sound normally.

⚠ CAUTION

Before replacing the combination meter, be sure to check that the power supply circuit, earth circuit, and communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

When the following signals are received via the CAN communication, the combination meter sounds the incorporated tone alarm according to the each pattern.

Seat belt reminder function
- Ignition switch ON signal
- Vehicle speed signal
- Driver's seat belt switch signal
- Front passenger's seat belt switch signal

Keyless operation key reminder tone alarm function (vehicles with KOS)
- Ignition switch OFF signal
- IG knob push switch ON signal
- Driver's door switch ON signal

Ignition key reminder tone alarm function (vehicles without KOS)
- Ignition switch OFF signal
- Key reminder switch OFF signal
- Driver's door switch ON signal

Light reminder tone alarm function
- Ignition switch OFF signal
- Lighting switch ON signal
- Driver's door switch ON signal

Door-ajar warning tone alarm function
- Ignition switch ON signal
- Any door switch or liftgate switch ON signal
- Vehicle speed signal

Freeze warning tone alarm
- Ignition switch ON signal
- Ambient temperature signal

Parking brake reminder tone alarm function
- Ignition switch ON signal
- Parking brake switch ON signal
- Vehicle speed signal
- Engine speed

Multi information display interrupt display tone alarm
- Display condition signal of information display from each warning (When there is a fixed tone alarm sounding pattern for each warning, that pattern has the priority.)

Meter information switch operation tone alarm
- ON signal for combination meter information switch

Turn-signal light tone alarm function
- Turn-signal light switch ON signal

Paddle shift cancel tone alarm, Theft-alarm function, ETACS-ECU function customise tone alarm, A/C operation tone alarm, audio operation tone alarm
- Sounding request signal from the ETACS-ECU

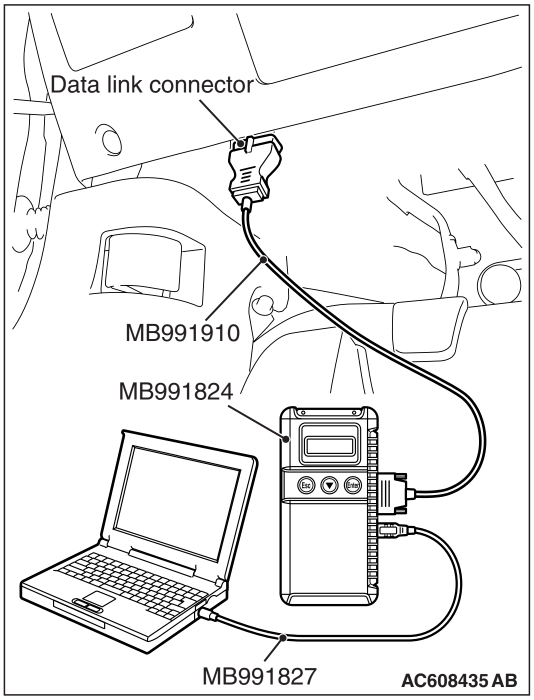
If the tone alarm does not sound normally, the connector(s) and wiring harness in the CAN bus lines, or each ECU or the combination meter may have a problem.

TROUBLESHOOTING HINTS

- The combination meter may be defective
- The each ECU may be defective

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read for any diagnostic trouble code.

Check if diagnosis code is set to the CVT, ETACS-ECU, WCM, KOS-ECU, audio and A/C-ECU.

Q: Is the DTC set to the any of the above?

YES <Set to the CVT.> : Troubleshoot the CVT (Refer to GROUP 23A, Diagnosis P.23A-29).
YES <Set to the ETACS.> : Troubleshoot the ETACS (Refer to P.54A-482).
YES <Set to the WCM.> : Troubleshoot the WCM (Refer to GROUP 42C, diagnosis P.42C-14).
YES <Set to the KOS.> : Troubleshoot the KOS (Refer to GROUP 42B, Diagnosis P.42B-20).
YES <Set to the audio.> : Troubleshoot the audio (Refer to P.54A-239).
YES <Set to the A/C.> : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 or GROUP 55B, Automatic A/C Diagnosis P.55B-7).
NO <The diagnosis code is not set.> : Go to Step 4.

STEP 4. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Conduct the actuator test of the combination meter.

- Item 12: Buzzer
  - The tone alarms sound normally.

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the combination meter.

STEP 5. Retest the system

Check that the tone alarm normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the combination meter.

Inspection Procedure 5: The combination meter light does not illuminate normally or the multi information display is not displayed normally.

⚠ CAUTION

Before replacing the combination meter, be sure to check that the power supply circuit, earth circuit, and communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

When the signal from each ECU is received via the CAN communication, the combination meter illuminates the corresponding display light or warning light, or has the multi information display to display corresponding information.

If the lights do not illuminate or the multi information display does not display normally, the wiring harness and connector(s) in the CAN bus lines, or the each ECU or the combination meter may have a problem.

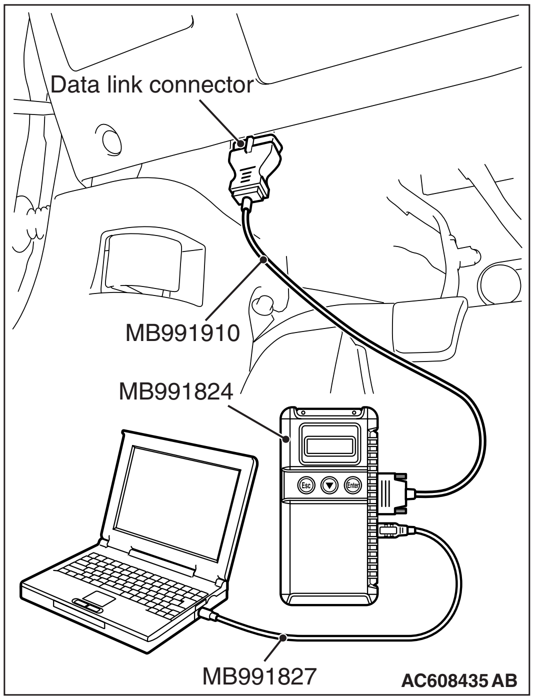
TROUBLESHOOTING HINTS

- The combination meter may be defective
- The each ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check again if the DTC is set to the combination meter.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read for any diagnostic trouble code.

Check again if the DTC is set to the MFI,CVT, WCM, KOS, ABS, SRS, ETACS and A/C.

Q: Is the DTC set to the any of the above?

YES <Set to the MFI.> : Troubleshoot the MFI (Refer to GROUP 13A, Diagnosis P.13A-46).
YES <Set to the CVT.> : Troubleshoot the CVT (Refer to GROUP 23A, Diagnosis P.23A-29).
YES <Set to the ABS.> : Troubleshoot the ABS (Refer to GROUP 35B, Diagnosis P.35B-8).
YES <Set to the WCM.> : Troubleshoot the WCM (Refer to GROUP 42C, diagnosis P.42C-14).
YES <Set to the KOS.> : Troubleshoot the KOS (Refer to GROUP 42B, Diagnosis P.42B-20).
YES <Set to the SRS.> : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-31).
YES <Set to the ETACS.> : Troubleshoot the ETACS (Refer to P.54A-482).
YES <Set to the A/C.> : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 or GROUP 55B, Automatic A/C Diagnosis P.55B-7).
NO <The diagnosis code is not set.> : Go to Step 4.

STEP 4. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Conduct the actuator test of the combination meter.
- Item 7: Indicator1
- Item 8: Indicator2
- Item 9: Indicator3
- Item 10: Indicator4
- Item 11: Shift indicator
  - Perform the actuator test, and check that display lights or warning lights are illuminated normally, or multi information display is displayed normally.

(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the combination meter.

STEP 5. Retest the system.

Check that display lights or warning lights are illuminated normally, or multi information display is displayed normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the combination meter.

Inspection Procedure 6: The multi information display screen cannot be changed with the operation of the meter information switch.

⚠ CAUTION

Before replacing the combination meter, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

When the signal from the meter information switch is received, the combination meter switches the multi information display screen. If the multi information display screen does not switch normally, the meter information switch, wiring harness, connector(s), or combination meter may have a problem.

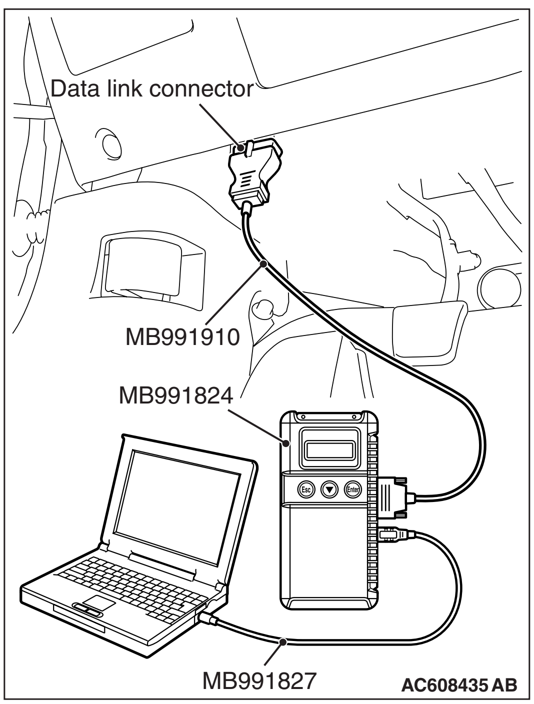
TROUBLESHOOTING HINTS

- The meter information switch may be defective
- The combination meter may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(4) Check if DTC is set.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).
NO : Go to Step 2.

STEP 2. Retest the system.

Check that the multi information display screen switches normally when the meter information switch is operated.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the combination meter.

SERVICE DATA

M1540201000097

Item No.	Scan tool display	Check condition	Normal condition
1	Illumination	When the meter illumination is illuminated	ON
2	Outside temperature	Always	–30 –+50 °C
3	Frost warning indicator	When the freeze warning light is illuminated	ON
4	Engine coolant temp. light (HOT)	When the high coolant temperature warning light is illuminated	ON
6	Oil level indicator	When the oil level warning light is illuminated	ON
23	A/T failure indicator (Symbol)	When the A/T malfunction warning light is illuminated	ON
26	Key reminder indicator	When the key reminder warning light is illuminated	ON
27	Headlight reminder indicator	When the headlight reminder warning light is illuminated	ON
28	Brake reminder indicator	When the brake reminder warning light is illuminated	ON
29	F.A.S.T. indicator1 (Low battery)	When the malfunction occurs to keyless operation system	ON
30	F.A.S.T. indicator2 (No key)		ON
31	F.A.S.T. indicator3 (IG knob)		ON
32	F.A.S.T. indicator4 (Take out key)		ON
33	F.A.S.T. indicator5 (Take out key)		ON
34	F.A.S.T. indicator6 (Lock disable)		ON
35	F.A.S.T. indicator7 (Lock disable)		ON
36	F.A.S.T. indicator8 (Lock disable)		ON
37	F.A.S.T. indicator9 (System error)		ON
40	Buzzer (cutting into LCD display)	When the standard LCD interrupt buzzer becomes active	ON
42	ETACS answer back buzzer	When the ETACS setting response buzzer becomes active	ON
44	BEEP(A/C)1	A/C operation	ON
45	BEEP(A/C)2		ON
46	BEEP(A/C)3		ON
47	BEEP(AUDIO)1	Audio operation	ON
48	BEEP(AUDIO)2		ON
49	BEEP(AUDIO)3		ON
51	BEEP (AUDIO)4		ON
52	BEEP (AUDIO)5		ON
50	Seatbelt reminder buzzer	When the seat belt reminder buzzer becomes active	ON
65	Meter SW push buzzer	Meter information switch: ON	ON

Item No.	Scan tool display	Check condition	Normal condition
66	Turn signal buzzer	When turn-signal buzzer becomes active.	ON
67	Shift cancel buzzer	When the AT shift cancel buzzer becomes active	ON
68	Meter SW long push buzzer	Meter information switch: ON (press and hold)	ON
69	Security alarm buzzer	When the security alarm becomes active	ON
70	Presecurity alarm buzzer		ON
71	Rest reminder buzzer1	When the rest sign buzzer becomes active	ON
72	Rest reminder buzzer2		ON
74	Parking brake reminder buzzer	When the brake reminder buzzer becomes active	ON
75	IG knob reminder buzzer	When the insufficient IG knob return buzzer becomes active	ON
76	Key reminder buzzer	When the key reminder buzzer becomes active	ON
77	Headlight reminder buzzer	When the headlight reminder buzzer becomes active	ON
78	Door ajar warning buzzer	When the door ajar warning buzzer becomes active	ON
79	Frost warning buzzer	When the freeze warning buzzer becomes active	ON
80	Speed meter	Perform a test run of the vehicle.	Speedometer displayed value and scan tool displayed value agree with each other.
87	Tachometer	Start the engine.	Tachometer displayed value and scan tool displayed value agree with each other.
89	Fuel gauge	Ignition switch: ON	Fuel gauge unit resistance value and scan tool displayed value agree with each other.
8A	Fuel gauge (Target)	Ignition switch: ON	Fuel gauge and scan tool displayed values agree with each other.
8C	Engine coolant temperature gauge	Ignition switch: ON	Coolant temperature and scan tool displayed values agree with each other.
90	Odometer	Ignition switch: ON	Odometer displayed value and scan tool displayed value agree with each other.

Item No.	Scan tool display	Check condition	Normal condition
91	Rheostat	Ignition switch: ON	Lighting change by rheostat switch operation and scan tool displayed change agree with each other.
92	Trip meter A	Ignition switch: ON	Tripmeter displayed value and scan tool displayed value agree with each other.
93	Trip meter B		
94	Power source voltage	Always	0 –20 V
A1	SRS warning light	When the SRS warning light is illuminated	ON
A2	ABS warning light	When the ABS warning light is illuminated	ON
A3	Oil pressure indicator	When the hydraulic pressure warning light is illuminated	ON
A4	Charge indicator	When the charging warning light is illuminated	ON
A5	Engine malfunction indicator	When the engine warning light is illuminated	ON
A6	Fuel Warning (step1)	When the fuel remaining amount warning light (first step) is illuminated	ON
A7	Brake warning light	When the brake warning light is illuminated	ON
A8	Driver seatbelt indicator	When the driver's seat belt warning light is illuminated	ON
B1	Turn signal indicator (Right)	Turn-signal light switch (RH): ON	ON
B2	Turn signal indicator (Left)	Turn-signal light switch (LH): ON	ON
B3	Front fog light indicator	Front fog light switch: ON	ON
B4	High beam indicator	Dimmer switch: ON	ON
B5	Door indicator (Front Left)	When the driver's door is opened	ON
B6	Door indicator (Front Right)	When the front passenger's door is opened	ON
B7	Door indicator (Rear Left)	When the rear left door is opened	ON
B8	Door indicator (Rear Right)	When the rear right door is opened	ON
B9	Door indicator (Tailgate)	When the trunk is opened	ON
D8	Car symbol	When the vehicle mark is illuminated	ON
E2	A/T Oil TEMP.indicator	When the A/T oil temperature indicator is illuminated	ON
E6	Rest reminder indicator	When the rest sign indicator is illuminated	ON

Item No.	Scan tool display	Check condition	Normal condition
E7	Service reminder indicator	When the service reminder indicator is illuminated	ON
F2	FL corner sensor indicator	When each corner sensor responds	ON
F3	FR corner sensor indicator		ON
F4	RL corner sensor indicator		ON
F5	RR corner sensor indicator		ON
F7	Cruise control indicator	When the cruise control indicator is illuminated	ON
100	Distance to empty	Ignition switch: ON	Displayed values and scan tool displayed values agree with each other.
102	Average fuel consumption		
103	Instant fuel consumption		
104	Average speed		
108	Fuel Warning (step2)	When fuel remaining amount warning light (second step) is illuminated.	ON
113	Rest reminder time (Hour)	Ignition switch: ON	Displayed values and scan tool displayed values agree with each other.
114	Rest reminder time (Minute)		

ACTUATOR TEST TABLE

M1540201100094

Item No.	Item name	Test item	Value
1*	Speedometer	Pointer position setting (km/h or mph)	km/h or mph
2	Tachometer	Pointer position setting (r/min)	r/min
3	Fuel gauge(Target)	Status setting (%)	%
4	Water Temperature gauge	Status setting (°F)	°F
5	Meter illumination	Status setting (%)	%
6	Outside temperature	Status setting (°F)	°F
7	Indicator1	By turning ON/OFF the item values, indicators can be illuminated/extinguished and buzzers can be sounded.	OFF/ON
8	Indicator2		OFF/ON
9	Indicator3		OFF/ON
10	Indicator4 for Japan		OFF/ON
11	Shift indicator		OFF/ON
12	Buzzer		OFF/ON
13	Indicator4 for US		OFF/ON

*NOTE: *: Depending on the main scale of the speedometer, the unit that can be tested changes. Unit is displayed as "-" on the scan tool MB991958 screen.*

CHECK PROCEDURE FOR EACH MULTI INFORMATION DISPLAY SCREEN

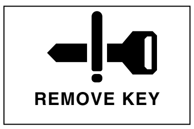
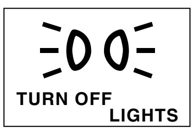
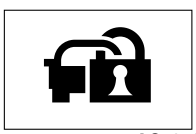
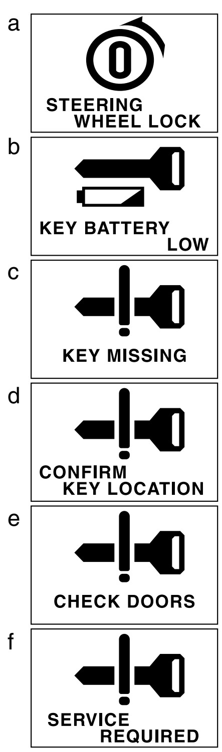
M1540201900078

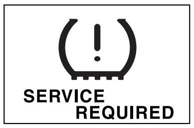
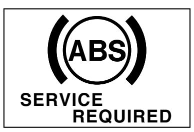
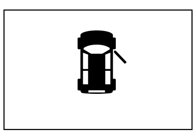
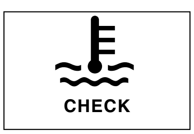
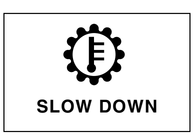
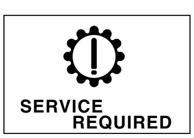
⚠ CAUTION

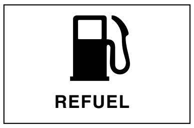
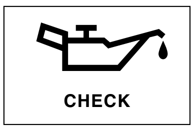
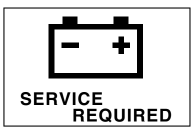
When there are TV towers, substations, or broadcasting stations which emit strong radio waves in proximity, on rare occasions, a warning is displayed on the multi information screen for a few seconds. This is caused by the reception of strong radio waves, and there is no functional problem.

WARNING SCREEN

When malfunctions occur to the vehicle, the following warning screens are displayed. If these screens are not displayed normally or if they continue to be displayed even after the factor is eliminated, take measures according to the action procedure.

Display content	Factor	Action procedure
 AC509825	Displayed with the sounding of tone alarm when the driver's door is opened with the key inserted in the ignition switch key cylinder.	If the ignition key reminder warning tone alarm is not being sounded, perform the troubleshooting for the ignition key reminder warning tone alarm (Refer to P.54A-64).
 AC509826	Displayed with the sounding of buzzer when the driver's door is opened with the ignition switch at the LOCK (OFF) position and the lighting switch at the tail or head position.	If the lighting monitor warning buzzer is not being sounded, perform the troubleshooting for the lighting monitor warning buzzer (Refer to P.54A-64).
 AC505679	Displayed while the theft alarm is in operation.	If the warning screen is not displayed normally or if the screen continues to be displayed, carry out the troubleshooting for the theft alarm (Refer to P.54A-575).
 AC606877AB	Displayed when a malfunction occurs to KOS. Refer to GROUP 42B –Diagnosis . a. Displayed when an IG knob return failure occurs or the door lock does not operate. b. Displayed when the KOS key battery is running low. c. Displayed if carrying a KOS key with different ID code or the KOS key is outside the operative range. d. Displayed when the KOS key removal monitoring function or KOS key confinement prevention function is in operation. e. Displayed when the door ajar prevention function is in operation. f. Displayed when there is a malfunction to KOS.	If the warning screen is not displayed normally or if the screen continues to be displayed, perform the troubleshooting for the KOS (Refer to GROUP 42B –Diagnosis code chart P.42B-20).

Display content	Factor	Action procedure
a  AC609827AB b  AC609828AB	a. Displayed when the tire air pressure is an abnormality. b. Displayed when the TPMS is an abnormality.	If the warning screen is not displayed normally or erased, carry out the troubleshooting for the TPMS (Refer to GROUP 42B, Diagnosis P.42B-20).
a  AC509829AB b  AC509830AB	a. Displayed when the brake fluid amount is insufficient or a malfunction occurs to the brake device. b. Displayed if vehicle is driven with the parking brake engaged.	If the warning screen is not displayed normally or if the screen continues to be displayed, take the following measures for each displayed item. a. Check the brake fluid or brake device. b. Check the parking brake.
 AC509831	Displayed when a malfunction occurs to the anti-skid braking system (ABS).	If the warning screen is not displayed normally or if the screen continues to be displayed, perform the troubleshooting for the ABS (Refer to GROUP 35B –Trouble symptom chart P.35B-146).
 AC610018	If any of the doors or tailgate is not closed completely, the location of the ajar door is displayed with the sounding of buzzer.	If the door ajar warning buzzer does not sound, perform the troubleshooting for the door ajar warning buzzer (Refer to P.54A-64).
 AC509834	Displayed when overheated.	If the warning screen is not displayed normally or if the screen continues to be displayed, perform the troubleshooting for the engine (Refer to GROUP 13A –Trouble symptom chart P.13A-51).
a  AC509835AB b  AC509836AB	a. Displayed when the transmission oil temperature becomes high. b. Displayed when there is a malfunction to the CVT.	If the warning screen is not displayed normally or if the screen continues to be displayed, check the CVT diagnosis code (Refer to GROUP 23A, Diagnosis P.23A-29).

Display content	Factor	Action procedure
 AC509837	Displayed when the ignition switch is turned ON without the driver's seat belt fastened.	If the warning screen is not displayed normally or if the screen continues to be displayed, perform the troubleshooting for the seat belt reminder warning lamp (Refer to P.54A-66).
 AC509839	Displayed when the remaining fuel amount is small.	If the warning screen is not displayed normally or if the screen continues to be displayed, check the combination meter diagnosis code (Refer to P.54A-66).
 AC509840	Displayed when there is a malfunction to the engine oil circulation system.	If the warning screen is not displayed normally or if the screen continues to be displayed, check the engine oil amount.
 AC509841	Displayed when there is a malfunction to the charging system.	If the warning screen is not displayed normally or if the screen continues to be displayed, check the battery.
 AC509842	Displayed when there is a malfunction to the SRS air bag or to the pre-tensioner mechanism.	If the warning screen is not displayed normally or if the screen continues to be displayed, perform the troubleshooting for the SRS air bag/pre-tensioner mechanism warning lamp (Refer to GROUP 52B – Trouble symptom chart P.52B-339).
 AC509848	Displayed with the sounding of buzzer when the ambient temperature is 0° C or less.	If the freeze warning buzzer does not sound with the ambient temperature of 0° C or less, perform the troubleshooting for the freeze warning buzzer (Refer to P.54A-64).

OTHER SCREENS

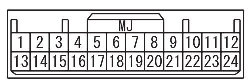
The screen displays the operation state of each system, periodic checkup timing, or timing for taking a rest during driving. If the screen display differs from the actual system operation state or if the screen is not displayed at the set timing, take measures according to the action procedure.

Display content	System operation state	Action procedure
 AC509849	Displayed when the set period elapses.	–
 AC509850	Displayed when the set time elapses.	–

CHECK AT ECU TERMINALS

M1540201200165

Connector: C-04



AC606907 AD

Terminal No.	Check item	Check condition	Normal condition
1	ECU power supply (battery)	Always	Battery voltage
2	ECU power supply (Ignition switch: IG1)	Ignition switch: ON	Battery voltage
		Ignition switch: OFF	0 V
3	Meter information switch input	Meter information switch: ON	0 V
		Meter information switch: OFF	Approximately 5 V
4	Parking brake switch input	Parking brake switch: ON	0 V
		Parking brake switch: OFF	Approximately 5 V
5	Seat belt switch (driver’s side) input	Seat belt switch (driver’s side): ON	0 V
		Seat belt switch (driver’s side): OFF	Approximately 5 V
6	Headlamp leveling	During headlamp leveling warning display	0 V
		Without headlamp leveling warning display	Approximately 5 V
7 to 12	–	–	–
13	Earth (sensor)	Always	0 V
14, 15	–	–	–
16	Seat belt switch (passenger’s side) input	Seat belt switch (passenger’s side): ON	0 V
		Seat belt switch (passenger’s side): OFF	Approximately 5 V
17	Fuel level sensor input	Fuel: FULL	Approximately 1 V
		Fuel: EMPTY	Approximately 4 V

Terminal No.	Check item	Check condition	Normal condition
18	Fuel level sensor input	Fuel: FULL	Approximately 1 V
		Fuel: EMPTY	Approximately 4 V
19	–	–	–
20	Vehicle speed signal output	Vehicle speed: Approximately 40 km/h	Approximately 28 Hz
		Vehicle speed change	In accordance with the vehicle speed, a pulse is generated.
21	Earth (ECU)	Always	0 V
22	Illumination (–) output	With daytime lighting control	0 V
		With nighttime lighting control	In accordance with the rheostat switch operation, a pulse is generated.
23	Illumination (+) output	With lighting control	Battery voltage
24	Illumination (power supply)	Always	Battery voltage

ON-VEHICLE SERVICE

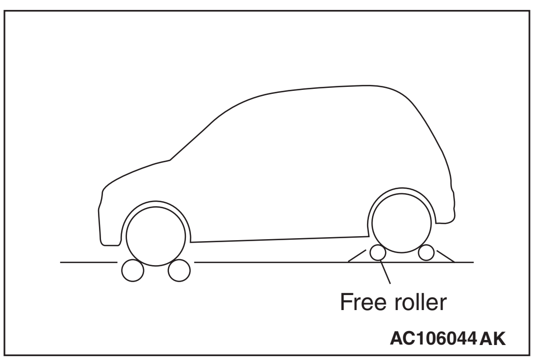
SPEEDOMETER CHECK

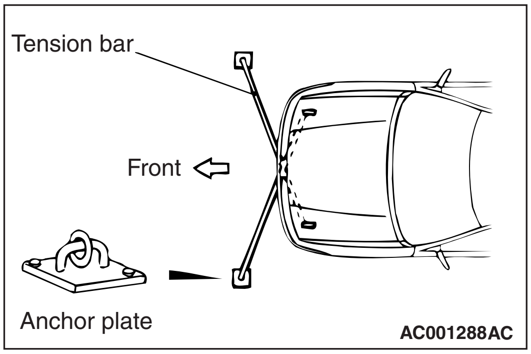
M1540201400181

1. Adjust the pressure of tires to the specified level (Refer to GROUP 31, On-vehicle Service P.31-7).
2. Where applicable, ensure that the TPMS warning light is not illuminating or flashing.

⚠ CAUTION
Do not accelerate or decelerate suddenly during servicing work.

3. For FWD vehicles, set the vehicle onto a speedometer tester and use wheel chocks to hold the rear wheels.





4. To prevent the front wheel from moving from side to side, attach tension bars to the tie-down hook, and secure both ends to anchor plates.
5. To prevent the vehicle from moving, attach a chain or wire to the rear retraction hook, and make sure the end of the chain or wire is secured.
6. Check if the speedometer indicator range is within the standard values.

Standard value <Except vehicles for CANADA>:

Standard indication {mph (km/h)}	Allowance range {mph (km/h)}
10 (16)	8.5 –11.5 (13.6 –18.4)
25 (40)	23.5 –26.5 (37.6 –42.4)
50 (80)	48.5 –51.5 (77.6 –82.4)
75 (120)	73.5 –76.5 (117.6 –122.4)
100 (161)	98.5 –102.5 (158.6 –165.0)
125 (201)	123.5 –127.5 (198.6 –205.0)

Standard value <Vehicles for CANADA>:

standard indication {km/h (mph)}	Allowance range {km/h (mph)}
20 (12.4)	19 –24 (11.8 –14.9)
40 (24.8)	40 –44 (24.8 –27.3)
80 (49.7)	80 –85 (49.7 –52.8)
120 (74.6)	120.5 –125.5 (74.9 –78.0)
160 (99.4)	160.5 –165.5 (99.7 –102.8)
200 (124.3)	200.5 –207.0 (124.6 –128.6)

7. If not within the standard value, check the tire size. If an incorrect size of tire is used, replace it and check again. If the tire size is correct, a defect may be present in components and circuit between the output shaft speed sensor and the combination meter. Check the following items.

- output shaft speed sensor (Refer to GROUP23A, Diagnosis P.23A-29).
- Combination meter (refer to P.54A-23).

TACHOMETER CHECK

M1540201500177

When the actuator tests (item No.2) are performed using scan tool MB991958, check that the tachometer indication error is within the standard value.

NOTE: Values in ( ) indicates the reference value.

Standard value:

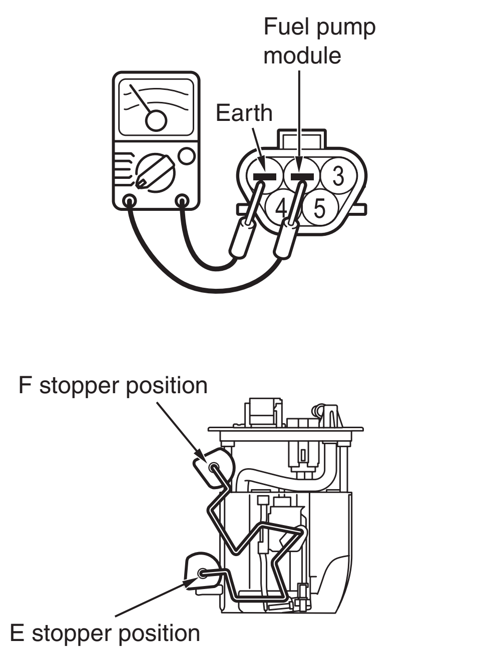
Engine speed (r/min)	Tachometer indicating error (r/min)
600	550 –650
(2,000)	(1,950 –2,050)
3,000	2,950 –3,050
(4,000)	(3,950 –4,050)
5,000	4,950 –5,050
6,000	5,950 –6,050
(7,000)	(6,950 –7,050)
(8,000)	(7,950 –8,050)

FUEL LEVEL SENSOR CHECK

M1540201600185

1. Remove the rear seat (Refer to GROUP 52A –Rear Seat Assembly P.52A-23).
2. Remove the floor inspection lid, and then remove the fuel pump module (Refer to GROUP 13B –Fuel Tank P.13B-9).

NOMINAL RESISTANCE OF THE FUEL LEVEL SENSOR



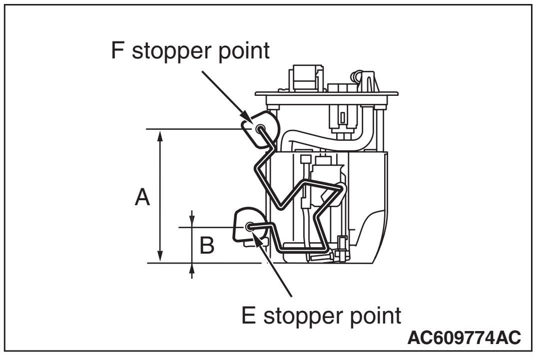
AC609773AB

When float of the fuel level sensor is in stopper positions F and E, ensure that resistance between the fuel level sensor terminal and earth terminal is within the standard value.

Standard value:

Float position	Gauge resistance value (ohms)
Stopper position "F"	13.0 $\pm$ 1.0
Stopper position "E"	120.0 $\pm$ 1.0

When the float is moved slowly between stopper positions "F" and "E", ensure that the resistance is smoothly changing.



FUEL LEVEL SENSOR FLOAT HEIGHT

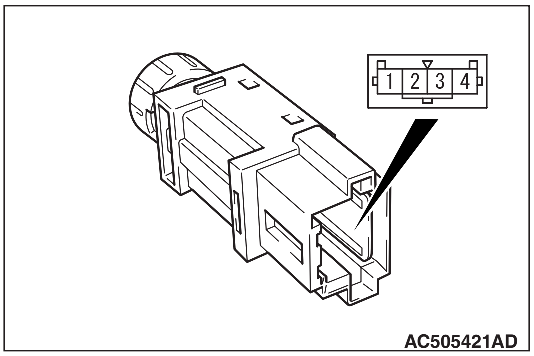
When float is moved to contact the float arm on the stopper, ensure that stopper positions "F" (height A) and "E" (height B) are within the standard value.

Standard value:

Float position	Float height {mm (in)}
Stopper position "F" (height A)	181.5 (7.1)
Stopper position "E" (height B)	26.7 (1.0)

METER INFORMATION SWITCH CHECK

M1540202000067



Switch position	Tester connection	Specified condition
Pressed	1-4	Continuity exists (2 ohms or less)
Released	1-4	Open circuit

SERVICE REMINDER FUNCTION SET

M1540208200155

HOW TO SET BY OPERATING THE SCAN TOOL MB991958

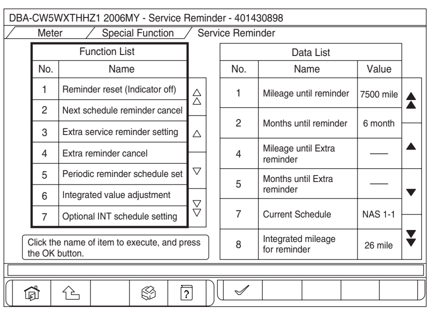
⚠ CAUTION

- **If the combination meter needs to be replaced, the current driving distance and elapsed days must be entered into the meter after the replacement in order to be used for service reminder function. Therefore, read "Integrated mileage for reminder," "Integrated days for reminder," "Mileage until Extra reminder," "Months until Extra reminder," and "Current schedule" from the meter before the replacement using the special function of the scan tool MB991958, and note them. If "Integrated mileage for reminder" or "Integrated days for reminder" cannot be read from the meter using the scan tool MB991958, use the following method.**
  a. **As for the driving distance for check warning, use the driving distance displayed on the multi information display.**
  b. **As for the elapsed days for check warning, calculate the number of elapsed days from the delivery date to the customer (service reminder function start date) and current date.**
- **After the service reminder function has started, when the elapsed days for check warning is reset for the vehicle whose battery is removed for a long period (15 days or more), calculate the elapsed days from the delivery date to the customer (service reminder function start date) and the current date, and then input it.**

Using the scan tool MB991958, the following service reminder functions can be set. Before setting, check the current status (schedule, driving distance and elapsed days).

1. Reminder reset (Indicator off)
2. Next schedule reminder cancel
3. Extra reminder setting
4. Extra reminder cancel
5. Periodic reminder schedule set
6. Integrated value adjustment
7. Optional INT schedule setting

HOW TO OPERATE THE SCAN TOOL MB991958



AC602555AE

⚠ CAUTION

Before setting, if the combination meter does not start measuring the elapsed time, turn the ignition switch to the ON position while pressing the meter information switch to start a measurement.

1. Connect the scan tool MB991958 to the data link connector.
2. Start the M.U.T.-III system on the PC and turn the ignition switch to the "ON" position.
3. Select "Meter" on the "System Select" screen, and press the "OK" button.
4. Select "Special Function" on the next screen.
5. Select "Service Reminder" on the "Special function" screen.
6. Select the function to be executed from "Function List."
   - 1 Reminder reset (Indicator off) (Refer to P.54A-83).
   - 2 Next schedule reminder cancel (Refer to P.54A-84).
   - 3 Extra reminder setting (Refer to P.54A-84).
   - 4 Extra reminder cancel (Refer to P.54A-85).
   - 5 Periodic reminder schedule set (Refer to P.54A-85).
   - 6 Integrated value adjustment (Refer to P.54A-86).
   - 7 Optional INT schedule setting (Refer to P.54A-87).

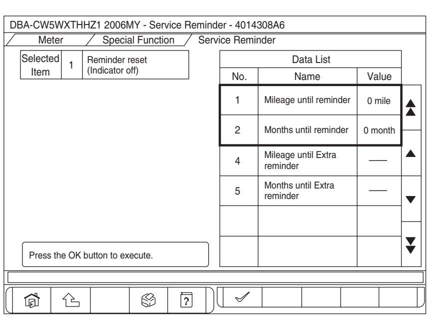
1. REMINDER RESET (INDICATOR OFF)

⚠ CAUTION

- **Be careful not to execute "1 Reminder reset (Indicator off)" again after erasing the service reminder warning indicator which is currently output, because the next warning period will be cancelled.**
- **If the next warning period is cancelled by mistake, the cancelled warning period can be restored by executing "5 Periodic reminder schedule set" to set a schedule different from the current one once, and then returning it to the previous schedule.**

The service reminder warning indicator which is currently output can be cancelled.

NOTE: In addition to the operation of the scan tool MB991958, the service reminder warning indicator can be cancelled by operating the meter information switch on the combination meter. Refer to P.54A-88.

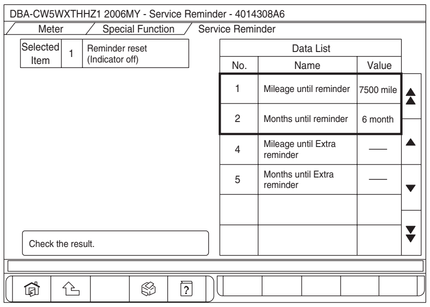


AC602558AV

1. On the "Service Reminder" screen, select "1 Reminder reset (Indicator off)."

   NOTE: The screen indicates that the warning period (Nos. 1 and 2 in the data list) is "0 mile." and "0 month."

2. Press the "OK" button.



AC602558AW

3. The current warning indicator is cancelled, and the next warning period is displayed.

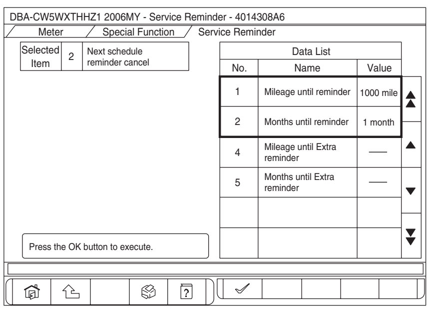
   NOTE: The screen indicates that the warning period (Nos. 1 and 2 in the data list) is "7,500 km" and "6 month."

2. NEXT SCHEDULE REMINDER CANCEL

⚠ CAUTION

If the next warning period is cancelled by mistake, the cancelled warning period can be restored by executing "5 Periodic reminder schedule set" to set a schedule different from the current one once, and then returning it to the previous schedule.

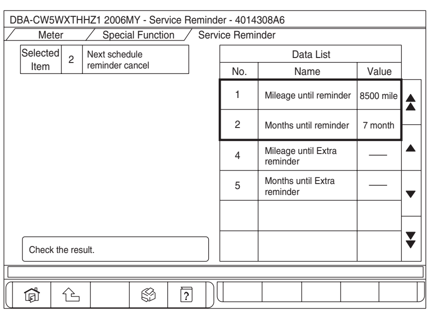
The next warning period is cancelled, and its following warning period can be set.



AC602558AX

1. On the "Service Reminder" screen, select "2 Next schedule reminder cancel."

   NOTE: The screen indicates that the warning period (Nos. 1 and 2 in the data list) is "1,000 mile" and "1 month."
2. Press the "OK" button.



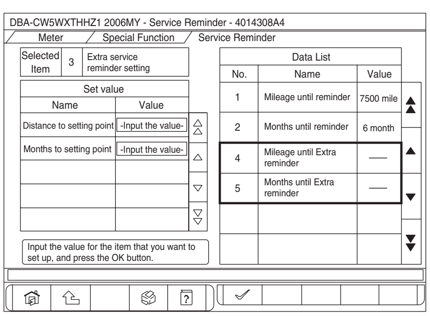
AC602558AY

3. The next warning period is cancelled, and its following warning period is set.

   NOTE: The screen indicates that the warning period (Nos. 1 and 2 in the data list) is changed to "8,500 km" and "7 month."

3. EXTRA REMINDER SETTING

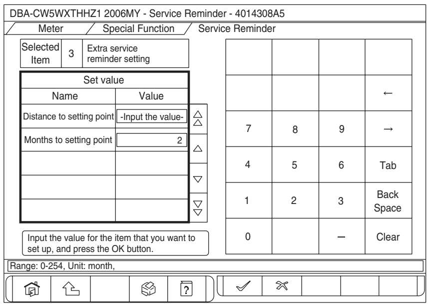
In addition to the current warning period, the temporary service reminder warning period can be set.



AC602556AG

1. On the "Service Reminder" screen, select "3 Extra reminder setting."

   NOTE: The screen indicates that the temporary warning period (Nos. 4 and 5 in the data list) has not been set.

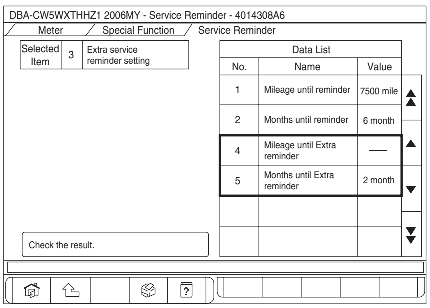


AC602557AE

2. Set the temporary warning period (distance or month) of the "Set value."

   NOTE: Either input of distance or month can execute the setting.

3. Press the "OK" button.



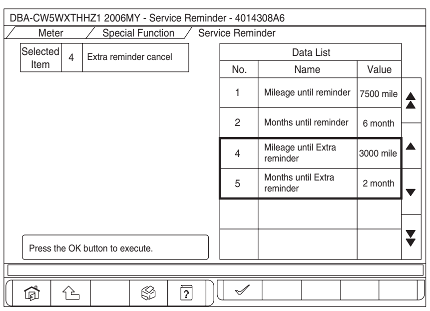
AC602558AO

4. The temporary warning period is set.

   NOTE: The screen indicates that "2 month" has been added to the temporary warning period (No. 5 in the data list). (The distance of No. 4 in the data list has not been set).

4. EXTRA REMINDER CANCEL

The temporary service reminder warning period which has been set can be cancelled.

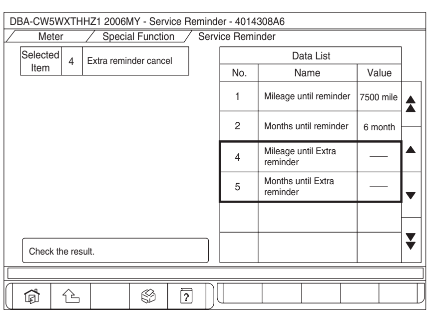


AC602558AP

1. On the "Service Reminder" screen, select "4 Extra reminder cancel."

   NOTE: The screen indicates that "3000 mile" and "2 month" have been set to the temporary warning period (Nos. 4 and 5 in the data list).

2. Press the "OK" button.



AC602558AQ

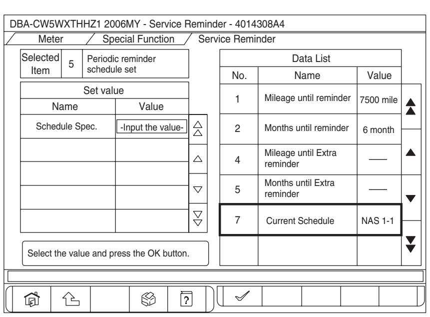
3. The temporary warning period is cancelled.

   NOTE: The screen indicates that the temporary warning period (Nos. 4 and 5 in the data list) has been cancelled.

5. PERIODIC REMINDER SCHEDULE SET

The service reminder schedule can be changed.

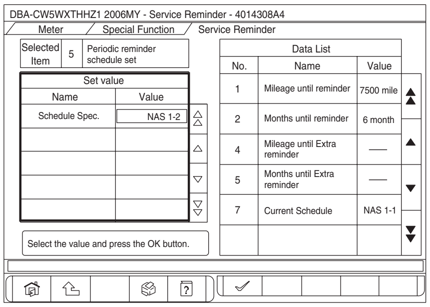
NOTE: In addition to the operation of the scan tool MB991958, the schedule can be changed by operating the meter information switch on the combination meter. Refer to P.54A-88.



AC602556AN

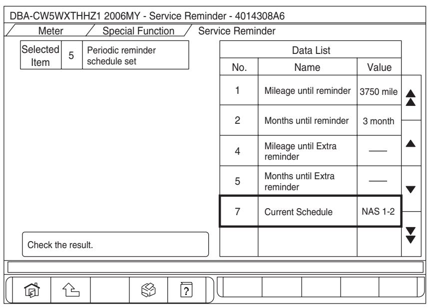
1. On the "Service Reminder" screen, select "5 Periodic reminder schedule set."

   NOTE: The screen indicates that the current schedule (No. 7 in the data list) has been set to "NAS 1-1."



AC602556AO

2. Set the schedule to be changed from "Set value."
3. Press the "OK" button.



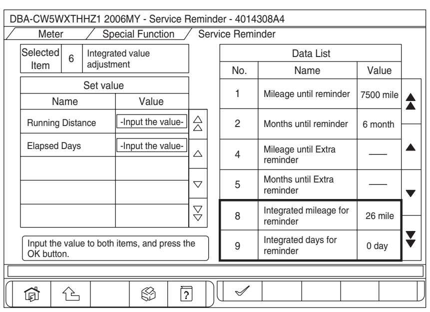
AC602558AZ

4. The schedule is changed.

   NOTE: The screen indicates that the current schedule (No. 7 in the data list) has been changed to "NAS 1-2."

6. INTEGRATED VALUE ADJUSTMENT

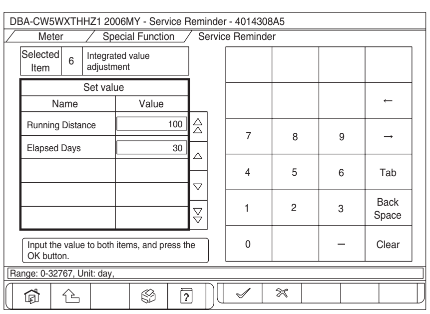
At the combination meter replacement or for the vehicle with its battery being removed for a long period (15 days or more), this adjustment is used to reset the mileage and elapsed days for check warning.



AC602556AP

1. On the "Service Reminder" screen, select "6 Integrated value adjustment."

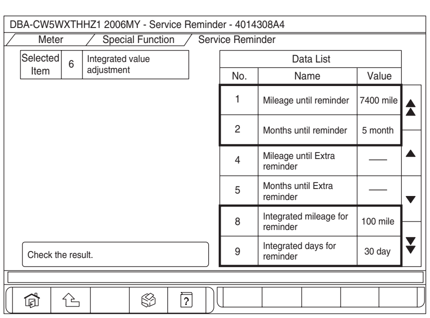
   NOTE: The screen indicates that the current mileage and elapsed days (Nos. 8 and 9 in the data list) are "26 mile" and "0 day."



AC602557AF

2. To "Set value," input the mileage and elapsed days to be reset.

   NOTE: Always input both the mileage and elapsed days.
3. Press the "OK" button.



AC602558BA

4. The mileage and elapsed days are changed. The combination meter automatically recalculates the distance and days to the nearest next check from the settings of mileage and elapsed days for check warning, and then displays them in "Data List."

   NOTE:
   - *The screen indicates that the current mileage and elapsed days (Nos. 8 and 9 in the data list) have been changed to "100 mile" and "30 day."*

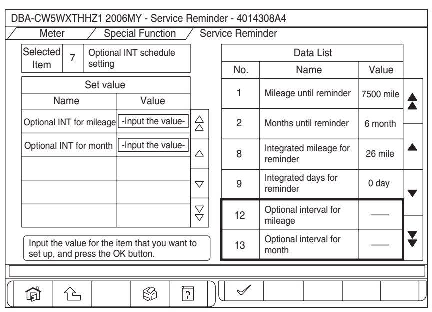
- *Set the elapsed days for check warning to "0 day" by the above resetting method, thereby the timer is reset indirectly.*

7. OPTIONAL INT SCHEDULE SETTING

⚠ CAUTION

If the current schedule is set to the "Optional INT" by executing "5. Periodic reminder schedule set," the "set value" cannot be input. Therefore, set it to the schedule other than the "Optional INT" once, and then execute "7. Optional INT schedule setting."

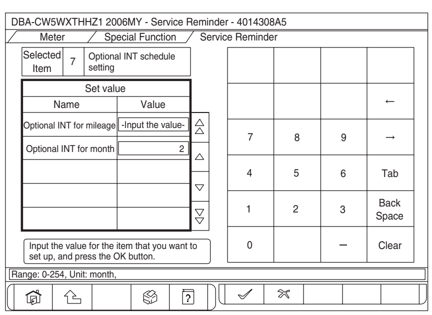
In addition to the existing schedule, the optional service reminder schedule can be set.



AC602556AK

1. On the "Service Reminder" screen, select "7 Optional INT schedule setting."

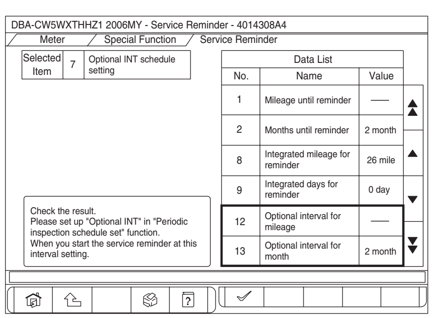
   NOTE: The screen indicates that the optional schedule (Nos. 12 and 13 in the data list) has not been set.



AC602557AG

2. Set the optional schedule (distance or month) of the "Set value."

   NOTE: Either input of distance or month can execute the setting.
3. Press the "OK" button.



AC604401AC

4. The optional schedule is set. The set schedule becomes effective by executing "5 Periodic reminder schedule set" and setting the schedule to "Optional INT."

   NOTE: The screen indicates that "2 month" has been added to the optional schedule (No. 13 in the data list). (The distance of No. 12 in the data list has not been set).

Relationship between the elapsed months and the elapsed days which are used by the service reminder function

Number of months	Number of days	Number of months	Number of days	Number of months	Number of days	Number of months	Number of days
1	30 –60	13	396 –425	25	761 –790	37	1,126 –1,156
2	61 –90	14	426 –456	26	791 –821	38	1,157 –1,186
3	91 –121	15	457 –486	27	822 –851	39	1,187 –1,217
4	122 –151	16	487 –516	28	852 –882	40	1,218 –1,247
5	152 –182	17	517 –547	29	883 –912	41	1,248 –1,277
6	183 –212	18	548 –577	30	913 –943	42	1,278 –1,308
7	213 –243	19	578 –608	31	944 –973	43	1,309 –1,338
8	244 –273	20	609 –638	32	974 –1,003	44	1,339 –1,369
9	274 –303	21	639 –669	33	1,004 –1,034	45	1,370 –1,399
10	304 –334	22	670 –699	34	1,035 –1,064	46	1,400 –1,430
11	335 –364	23	700 –730	35	1,065 –1,095	47	1,431 –1,460
12	365 –395	24	731 –760	36	1,096 –1,125	48	1,461 –1,491

NOTE:

- *When the number of elapsed days is 0 to 29, the number of elapsed months is 0.*
- *The combination meter performs calculation using 365.25 days for one year and 30.4375 days for one month.*

HOW TO SET BY SPECIAL OPERATION OF SWITCH

By operating the meter information switch of the combination meter, the service reminder warning cancellation and the schedule setting can be performed.

HOW TO CANCEL THE SERVICE REMINDER WARNING

⚠ CAUTION

- **Be careful not to execute the service reminder warning cancellation by operating the switch again after erasing the service reminder warning indicator which is currently output, because the next warning period will be cancelled.**
- **If the next warning period is cancelled by mistake, the cancelled warning period can be restored by setting a schedule different from the current one once, and then returning it to the previous schedule.**

1. Turn the ignition switch to the "OFF" position.
2. By operating the meter information switch, the warning period is displayed on the multi information display.
3. Press the meter information switch once for 1.2 seconds or longer.
4. The service reminder indicator flashes.
5. While the service reminder indicator flashes, press the meter information switch once for less than 1.2 seconds.
6. The service reminder indicator is turned ON, and "CLEAR" is displayed on the multi information display for 3 seconds.
7. After "CLEAR" is displayed for 3 seconds, the warning period to the next time is displayed.

HOW TO SET THE SCHEDULE

1. Turn the ignition switch to the "OFF" position.
2. By operating the meter information switch, the warning period is displayed on the multi information display.
3. Press the meter information switch once for 1.2 seconds or longer.
4. The service reminder indicator flashes.
5. While the service reminder indicator flashes, press the meter information switch for 1.2 seconds or longer and 3 times consecutively.
6. The service reminder indicator is turned ON, and the current schedule is displayed on the multi information display.
7. While the current schedule is displayed, press the meter information switch for less than 1.2 seconds and 3 times consecutively.

8. The multi information display is shifted to the schedule selection mode.
9. When the meter information switch is pressed for less than 1.2 seconds, the schedule is shifted, and when the meter information switch is pressed for 1.2 seconds or longer, the displayed schedule is set.

   NOTE: For schedule, "JPN", "GCC/EXP", "EU" and "AUS" can also be selected. However, the setting shall be for "NAS" only.
10. The schedule set in Step 9 is displayed for 3 seconds, and the warning period to the next time is displayed.

SCHEDULE TABLE

Schedule	**Contents of schedule**	
NAS 10 (initial setting)	Elapsed time (month)	Every 6 elapsed months
	Driving distance (miles)	Every 7,500 miles of driving distance
	Driving distance (km)	Every 12,000 km of driving distance
NAS 11	Elapsed time (month)	Every 3 elapsed months
	Driving distance (miles)	Every 3,750 miles of driving distance
	Driving distance (km)	Every 6,000 km of driving distance
NAS 20	Elapsed time (month)	Every 5 elapsed months
	Driving distance (miles)	Every 5,000 miles of driving distance
	Driving distance (km)	Every 8,000 km of driving distance
NAS 21	Elapsed time (month)	Every 4 elapsed months
	Driving distance (miles)	Every 3,750 miles of driving distance
	Driving distance (km)	Every 6,000 km of driving distance
Optional INT	The optional schedule can be set. (Only M.U.T.-III can be set.)	
OFF Display	Without function. "OFF" is displayed on the multi information display.	
Function OFF	Without function (Only M.U.T.-III can be set.)	

NOTE: For schedule, "JPN", "GCC/EXP", "EU" and "AUS" can also be selected. However, the setting shall be for "NAS" only.

HOW TO INACTIVATE THE SERVICE REMINDER FUNCTION

By setting to "OFF Display" or "Function OFF" when the schedule is set, the service reminder function can be inactivated.

When "OFF Display" is selected

- Even if the service reminder screen is displayed by operating the meter information switch, "OFF" is displayed.

When "Function OFF" is selected

- Even when the check warning period is reached, the service reminder display is not displayed.
- Even with the meter information switch operation, the service reminder screen is not displayed.

COMBINATION METER

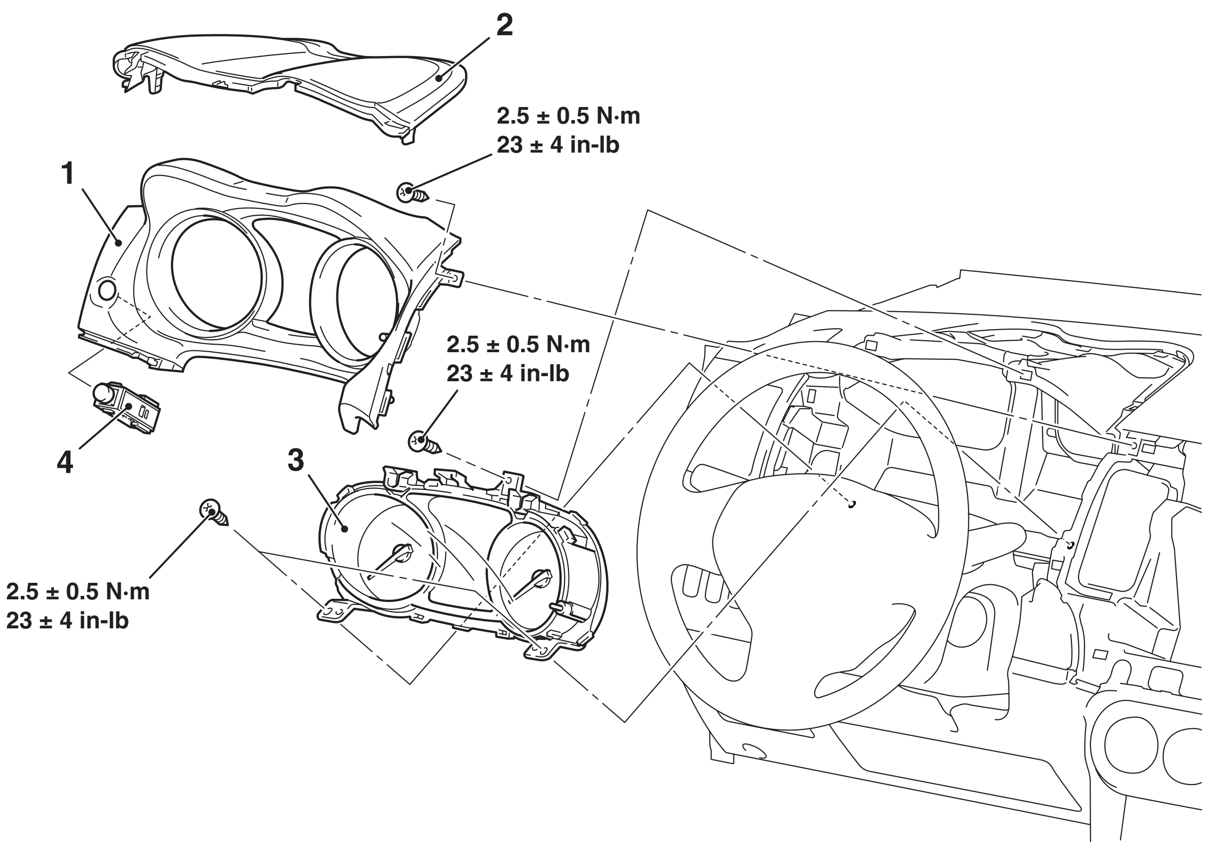
REMOVAL AND INSTALLATION

M1540201700160

⚠ CAUTION

When the combination meter is required to be replaced, the current driving distance and number of elapsed days must be entered into the meter after the replacement in order to be used for service reminder function. Therefore, read "Integrated mileage for reminder," "Integrated days for reminder," "Mileage until Extra reminder," "Months until Extra reminder," and "Current Schedule" from the meter before the replacement using the special function of scan tool MB991958, and note them. For the operation method of scan tool MB991958, refer to P.54A-82. If "Integrated mileage for reminder" or "Integrated days for reminder" cannot be read by the scan tool MB991958, follow the method described below.

- **For the driving distance for check warning, use the driving distance displayed on the multi information display.**
- **For the elapsed days for check warning, calculate the number of elapsed days from the delivery date to the customer (service remainder function start date) and current date.**



AC609711AB

Removal Steps

- Glove box side panel (Refer to GROUP 52A, Glove box P.52A-5).
- Instrument center panel (Refer to GROUP 52A, Instrument Center Panel P.52A-6).

Removal Steps (Continued)

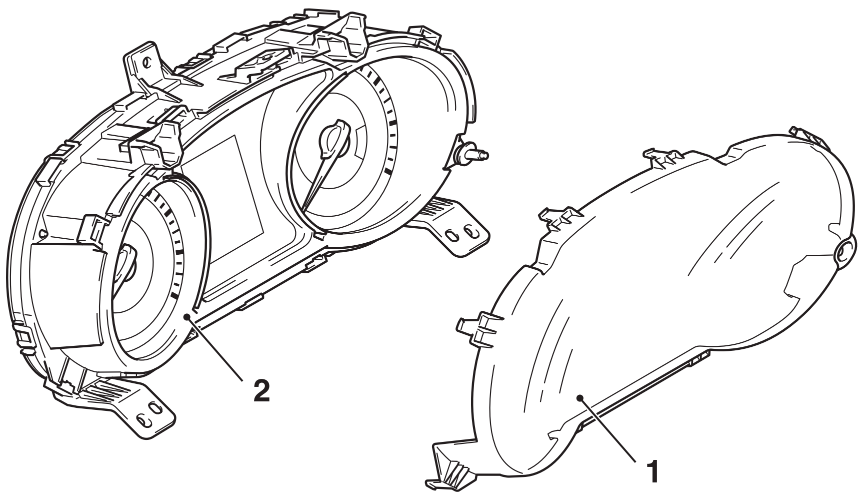
- Instrument panel air outlet garnish lower (Left side) (Refer to GROUP 52A, Instrument lower Panel P.52A-7).
- Connection of meter information switch connector

1. Combination meter bezel
2. Instrument meter cluster panel

Removal Steps (Continued)
3. Combination meter assembly
4. Meter information switch

DISASSEMBLY AND ASSEMBLY

M1540201800123



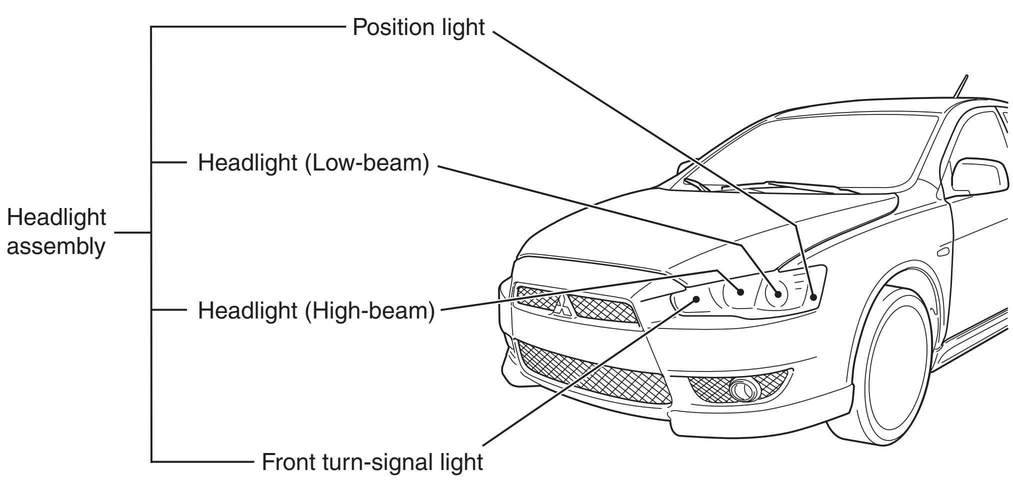
AC506448 AB

Disassembly steps
1. Combination meter glass
2. Combination meter

HEADLIGHT

GENERAL INFORMATION

M1542000100316



AC608726AC

For the headlight assembly, the four-headlight incorporating the front turn-signal light and the position light has been adopted. Also, the low-beam dimmer daytime running light has been equipped as a standard.

SERVICE SPECIFICATIONS

M1540100200109

Item			Standard value	Limit
Headlight aiming [at 7.62 m (25.0 ft)]	Low-beam	Vertical direction	Horizontal line (H) ±50.5 mm (±2.0 inches) (±0.38 degrees angle)	–
		Horizontal direction	±126.4 mm (±5.0 inches) (±0.95 degrees angle) from the axis, which is 266.1 mm (10.5 inches) (2 degrees angle) rightward from the vertical line (V)	–
Headlight intensity cd (at high-beam)			–	40,000 or more {when a screen is set 18.3m(60 ft) ahead of the vehicle}

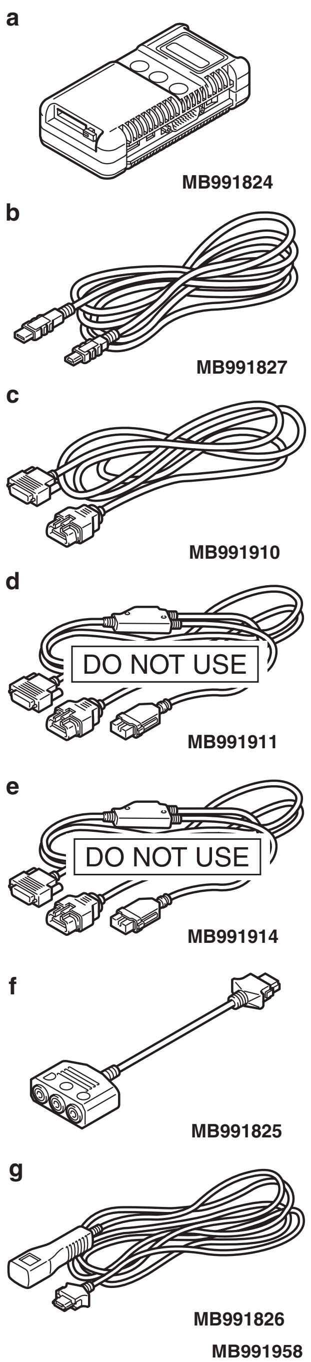
PRECAUTIONS ON HOW TO USE THE HEADLIGHT ASSEMBLY

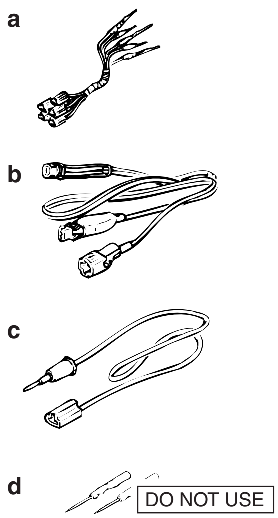
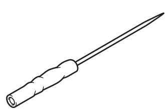
Be careful with the following items as resin lenses are used in the headlight assembly.

- Don't illuminate the headlight for three minutes or more when the headlight is covered with scratch protector.
- Don't tape the outer lens.
- Don't scratch the outer lens surface with a sharp edged special tool.
- Use the specified wax remover and rinse the wax off cleanly.
- Use the specified genuine bulb.

SPECIAL TOOLS

M1540104400116

Tool	Tool number and name	Supersession	Application
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1540104200167

Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, Troubleshooting Contents P.00-6.

DIAGNOSTIC FUNCTION

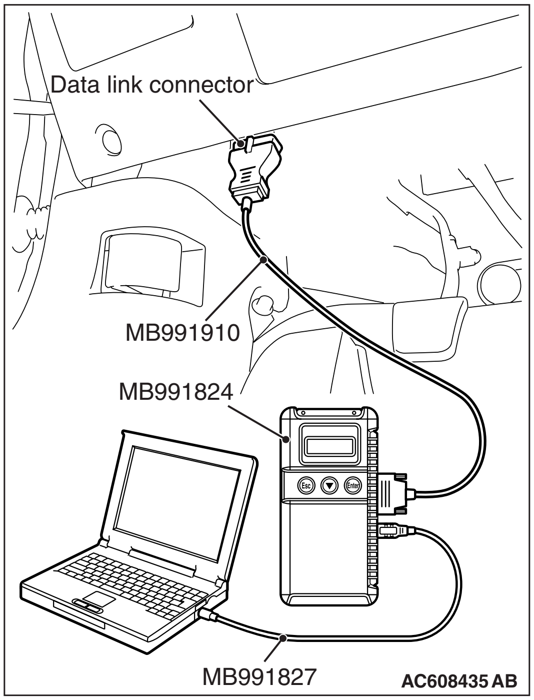
M1540104300090

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.

8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSTIC TROUBLE CODE CHART

M1540101400065

⚠ CAUTION

On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnostic trouble code(s) associated with other system may be set. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

Diagnostic trouble code No.	Diagnostic item	Reference page
B16A2	Blown turn-signal light (LH) bulb	P.54A-96
B16A3	Turn-signal light (LH) short circuit	P.54A-98
B16A4	Blown turn-signal light (RH) bulb	P.54A-102
B16A5	Turn-signal light (RH) short circuit	P.54A-104

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B16A2: Blown turn-signal light (LH) bulb

TROUBLE JUDGEMENT

When the left bulb of turn-signal light is blown, the ETACS-ECU sets DTC B16A2.

TECHNICAL DESCRIPTION (COMMENT)

The ETACS-ECU sets DTC B16A2 under the following conditions.

- If there is a malfunction to the left turn-signal light bulb, the blown left bulb counter counts once when the illumination of hazard or turn-signal light (left side) is attempted.
- After the bulb counter reaches "3," DTC B16A2 is set.

TROUBLESHOOTING HINTS

- Malfunction of turn-signal light bulb (left)
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

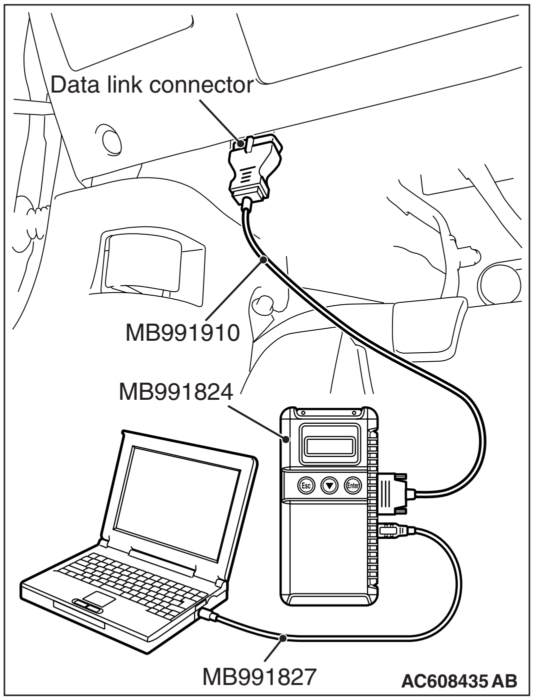
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Bulb check.

Check whether the left turn-signal light illuminates normally.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Replace the bulb of turn-signal light which does not illuminate.



STEP 2. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

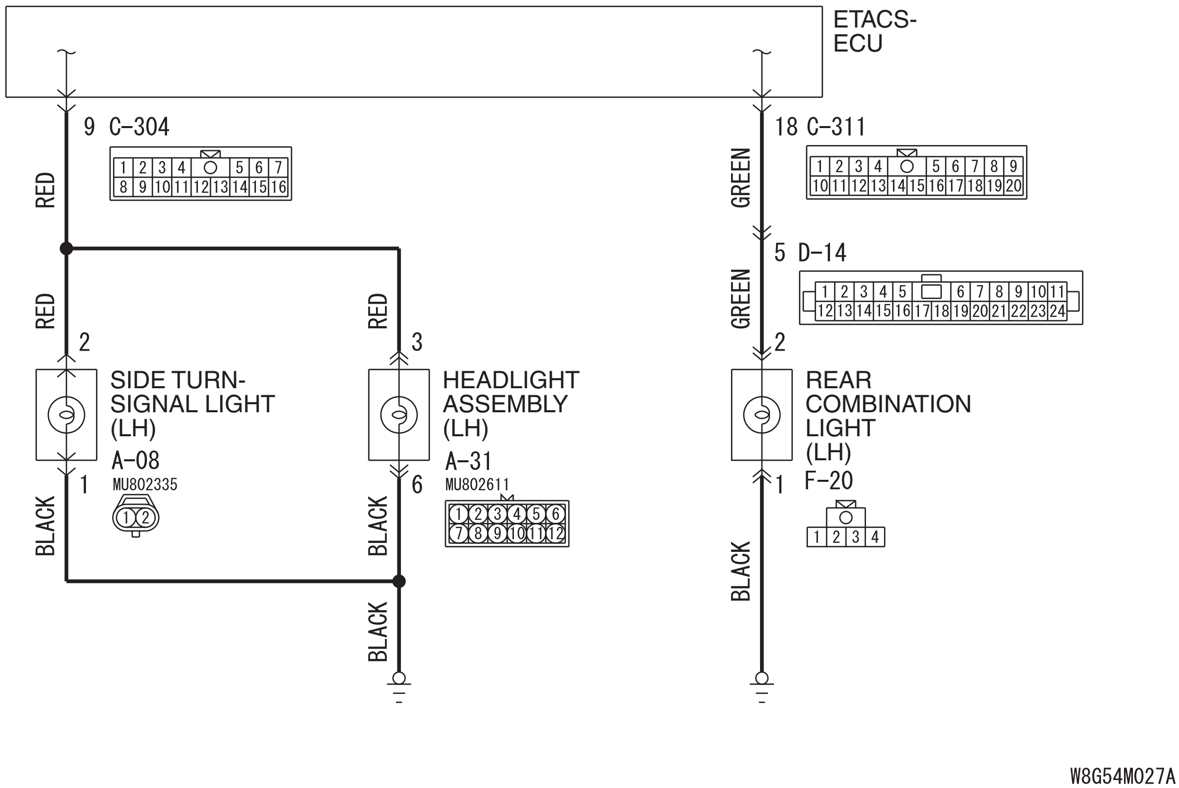
(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check whether the ETACS-ECU DTC is set.

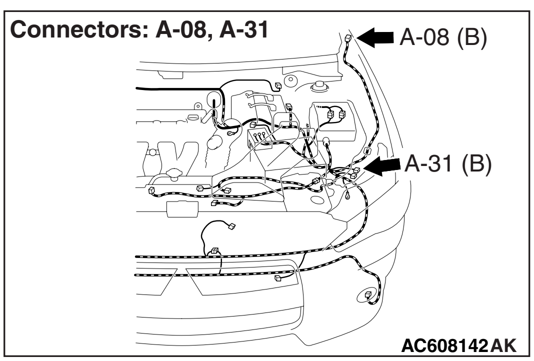
Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

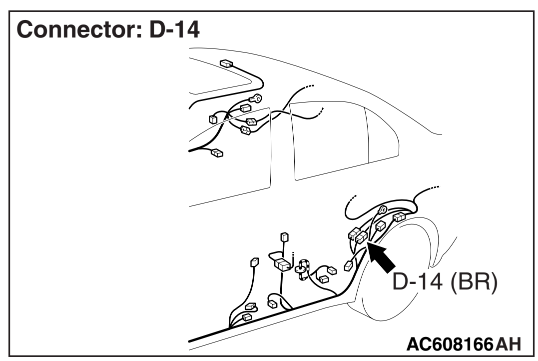
DTC B16A3: Turn-signal light (LH) short circuit

Turn-Signal Lights (LH) Circuit

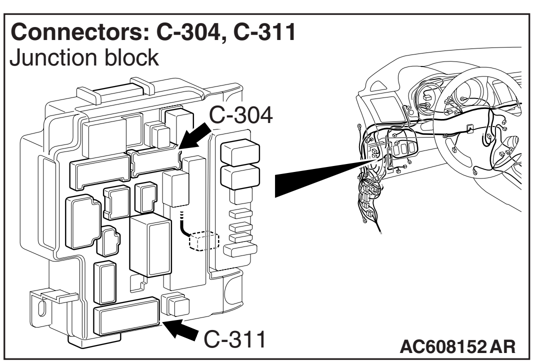




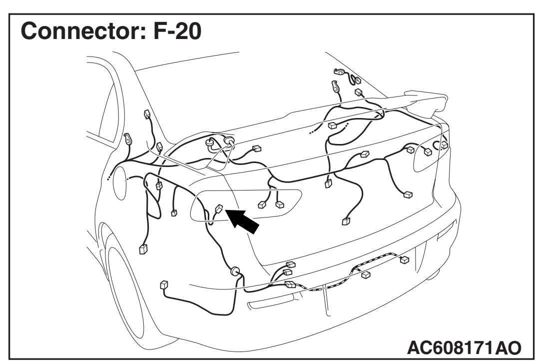
Connectors: A-08, A-31



Connector: D-14



Connectors: C-304, C-311
Junction block



Connector: F-20

TROUBLE JUDGMENT

When the left wiring harness of turn-signal light is short circuited, the ETACS-ECU sets DTC B16A3.

TECHNICAL DESCRIPTION (COMMENT)

When the short circuit is detected three times consecutively, the ETACS-ECU sets the DTC B16A3.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check headlight assembly (LH) connector A-31 <front>, side turn-signal light (LH) connector A-08 <side>, rear combination light (LH) connector F-20 <rear> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are headlight assembly (LH) connector A-31 <front>, side turn-signal light (LH) connector A-08 <side>, rear combination light (LH) connector F-20 <rear> in good condition?

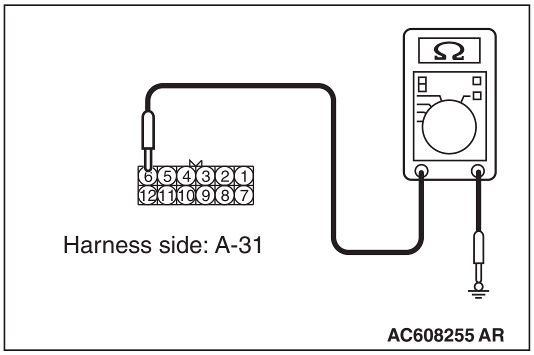
YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

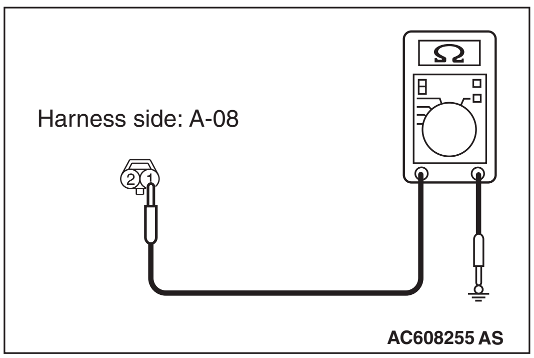
STEP 2. Resistance measurement at headlight assembly (LH) connector A-31 <front>, side turn-signal light (LH) connector A-08 <side>, and rear combination light (LH) connector F-20 <rear>.

(1) Disconnect the connector, and measure at the wiring harness side.

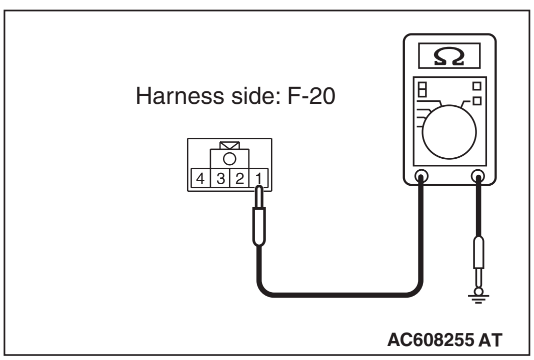
(2) Measure the resistance between the connector terminal of light which does not illuminate and ground.



- Measure the resistance between the headlight assembly (LH) connector A-31 (terminal 6) and body ground. <Front>



- Measure the resistance between side turn-signal light (LH) connector A-08 (terminal 1) and body ground. <Side>



- Measure the resistance between rear combination light (LH) connector F-20 (terminal 1) and body ground. <Rear>

OK: The measured value should be 2 Ω or less.

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 6) <front>, side turn-signal light (LH) connector A-08 (terminal 1) <side>, rear combination light (LH) connector F-20 (terminal 1) <rear> and ground.

- Check the ground wires for open circuit.

Q: Are the wiring harness between headlight assembly (LH) connector A-31 (terminal 6) <front>, side turn-signal light (LH) connector A-08 (terminal 1) <side>, rear combination light (LH) connector F-20 (terminal 1) <rear> and ground in good condition?

YES : Go to Step 6.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the headlights illuminate normally.

STEP 4. Check ETACS-ECU connectors C-304 and C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connectors C-304 <front or side> and C-310 <rear> in good condition?

YES : Go to Step 5.

NO : Replace the bulb(s) of the light that does not illuminate.

STEP 5. Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 3) <front>, side turn-signal light (LH) connector A-08 (terminal 2) <side>, rear combination light (LH) connector F-20 (terminal 2) <rear> and ETACS-ECU connector C-304 (terminal 9) <front or side> or C-311 (terminal 18) <rear>.

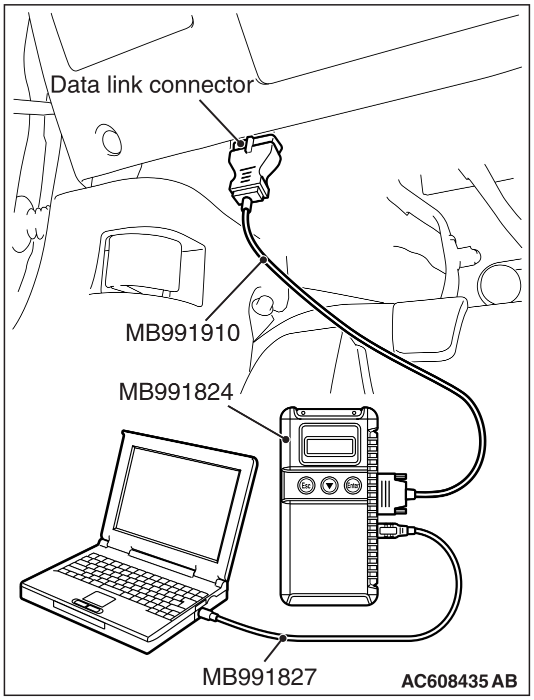
NOTE: Also check intermediate connector D-14 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the communication line for open circuit.

Q: Are the wiring harness between headlight assembly (LH) connector A-31 (terminal 3) <front>, side turn-signal light (LH) connector A-08 (terminal 2) <side>, rear combination light (LH) connector F-20 (terminal 2) <rear> and ETACS-ECU connector C-304 (terminal 9) <front or side> or C-311 (terminal 18) <rear> in good condition?

YES : Go to Step 6.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the headlights illuminate normally.



STEP 6. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

DTC B16A4: Blown turn-signal light (RH) bulb

DIAGNOSTIC FUNCTION

When the right bulb of turn-signal light is blown, the ETACS-ECU sets DTC B16A4.

TECHNICAL DESCRIPTION (COMMENT)

The ETACS-ECU sets DTC B16A4 under the following conditions.

- If there is a malfunction to the right turn-signal light bulb, the blown right bulb counter counts once when the illumination of hazard or turn-signal light (right side) is attempted.
- If the blown right bulb counter reaches "3," the DTC B16A4 is set.

TROUBLESHOOTING HINTS

- Malfunction of turn-signal light bulb (right side)
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

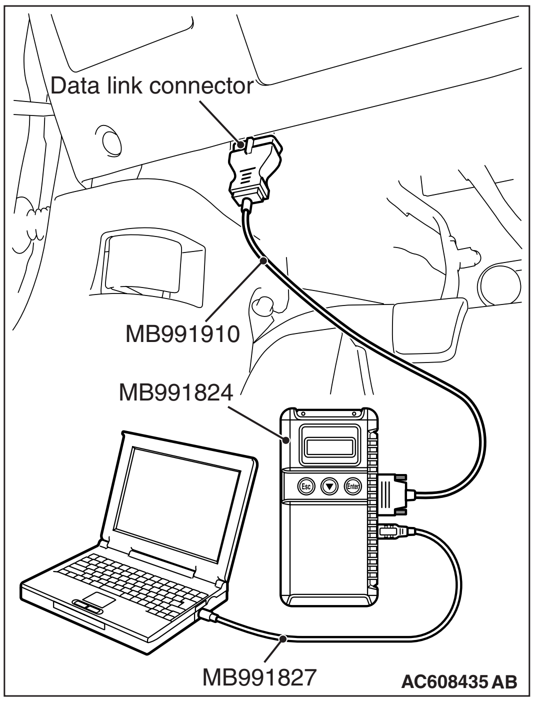
STEP 1. Bulb check.

Check whether the bulb of turn-signal light which does not illuminate is normal.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Replace the bulb of turn-signal light which does not illuminate.

STEP 2. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

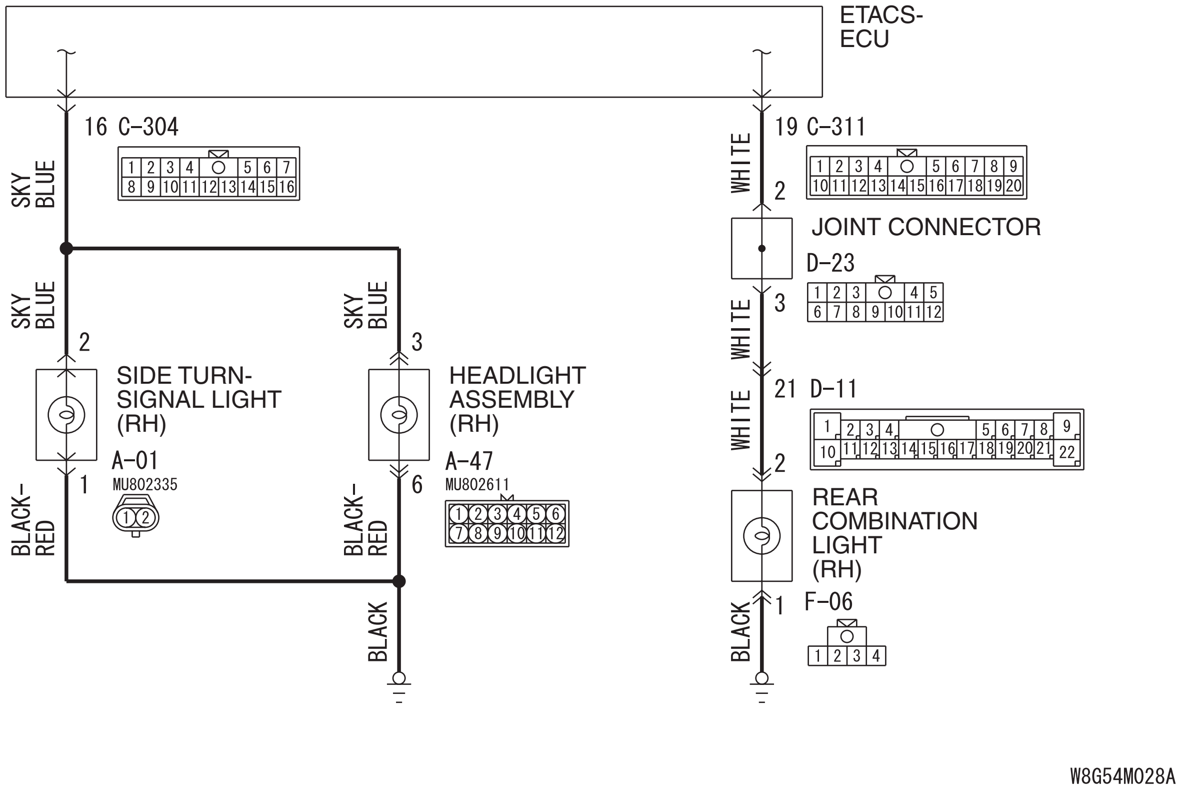
(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

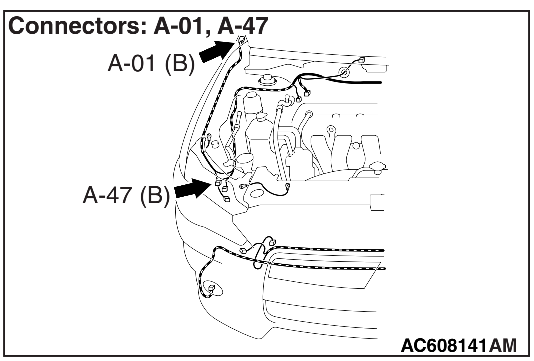
Q: Is the DTC set?

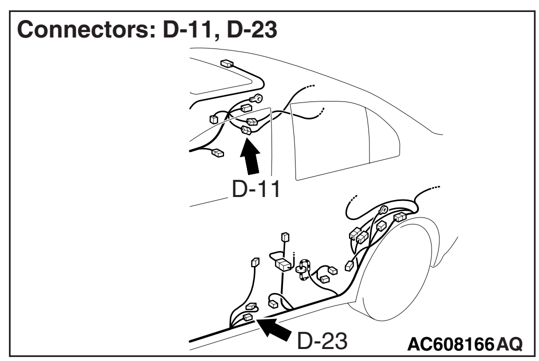
YES : Replace the ETACS-ECU.
NO : The procedure is complete.

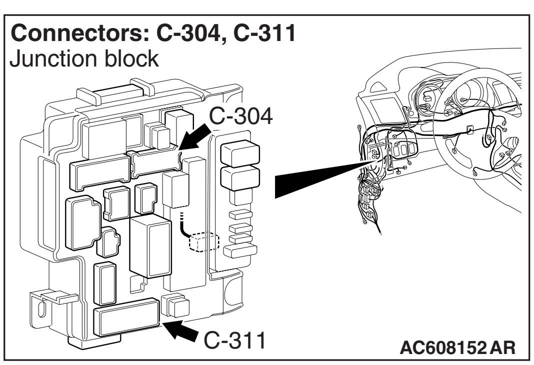
DTC B16A5: Turn-signal light (RH) short circuit

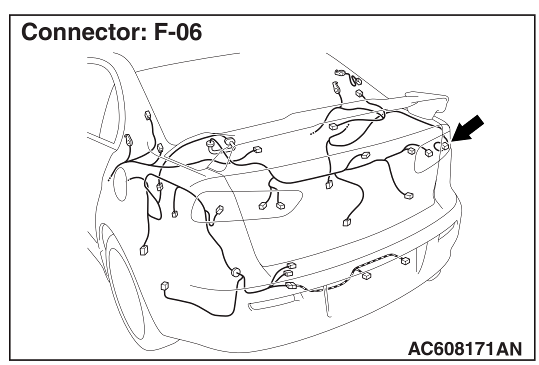
Turn-Signal Lights (RH) Circuit











TROUBLE JUDGEMENT

When the right wiring harness of turn-signal light is short circuited, the ETACS-ECU sets DTC B16A5.

TECHNICAL DESCRIPTION (COMMENT)

When the short circuit is detected three times consecutively, the ETACS-ECU sets the DTC B16A5.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check headlight assembly (RH) connector A-47 <front>, side turn-signal light (LH) connector A-01 <side>, rear combination light (LH) connector F-06 <rear> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are headlight assembly (RH) connector A-47 <front>, side turn-signal light (RH) connector A-01 <side>, rear combination light (LH) connector F-06 <rear> in good condition?

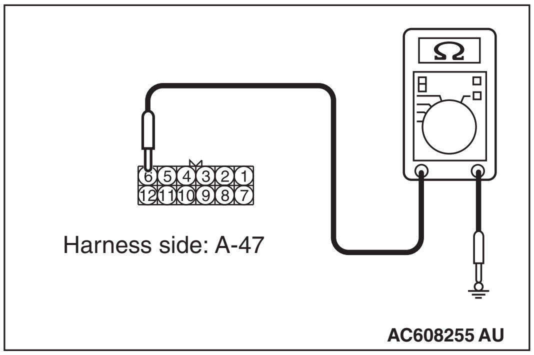
YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

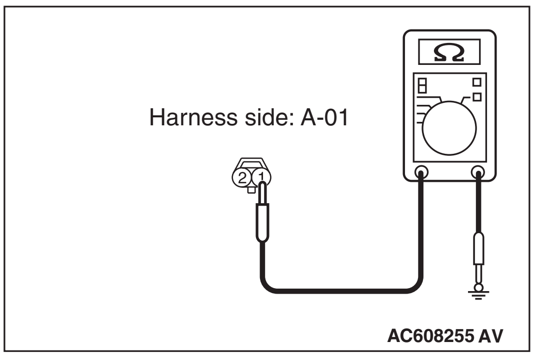
STEP 2. Resistance measurement at headlight assembly (RH) connector A-47 <front>, side turn-signal light (RH) connector A-01 <side>, and rear combination light (RH) connector F-06 <rear>.

(1) Disconnect the connector, and measure at the wiring harness side.

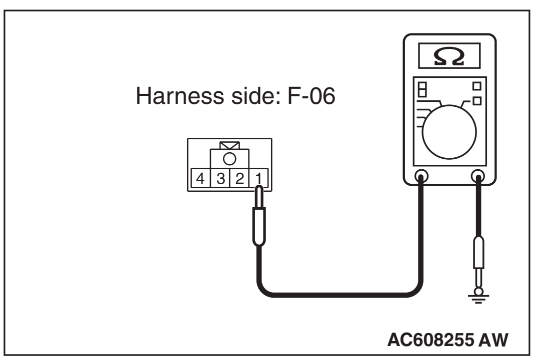
(2) Measure the resistance between the connector terminal of light which does not illuminate and body ground.



- Measure the resistance between the headlight assembly (RH) connector A-47 (terminal 6) and body ground. <Front>



- Measure the resistance between the side turn-signal light (RH) connector A-01 (terminal 1) and body ground. <side>



- Measure the resistance between the rear combination light (RH) connector F-06 (terminal 1) and body ground. <Rear>

OK: The measured value should be continuity exists (2 ohm or less).

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 6) <front>, side turn-signal light (RH) connector A-01 (terminal 1) <side>, rear combination light (LH) connector F-06 (terminal 1) <rear> and ground.

- Check the ground wires for open circuit.

Q: Are the wiring harness between headlight assembly (RH) connector A-47 (terminal 6) <front>, side turn-signal light (RH) connector A-01 (terminal 1) <side>, rear combination light (RH) connector F-06 (terminal 1) <rear> and ground in good condition?

YES : Go to Step 6.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check ETACS-ECU connectors C-304 and C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connectors C-304 and C-311 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 3) <front>, side turn-signal light (RH) connector A-01 (terminal 2) <side>, rear combination light (RH) connector F-06 (terminal 2) <rear> and ETACS-ECU connector C-304 (terminal 16) <front or side> or C-311 (terminal 19) <rear>.

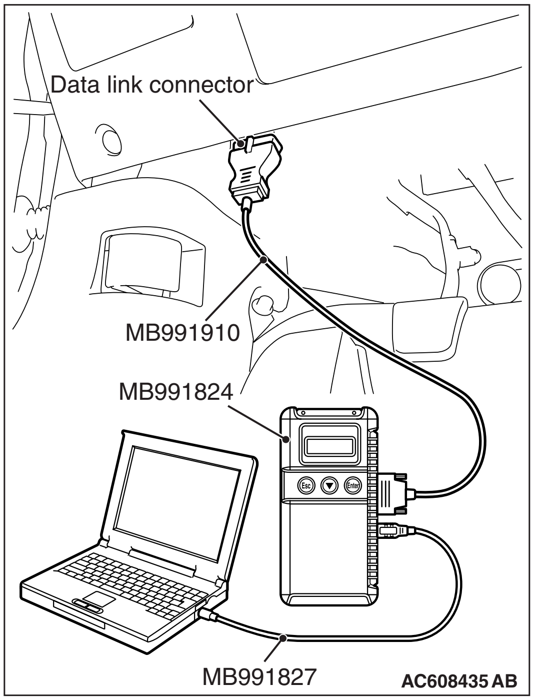
NOTE: Also check intermediate connector D-11 and joint connector D-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-11 or joint connector D-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

- Check the communication line for open circuit.

Q: Are the wiring harness between headlight assembly (RH) connector A-47 (terminal 3) <front>, side turn-signal light (RH) connector A-01 (terminal 2) <side>, rear combination light (RH) connector F-06 (terminal 2) <rear> and ETACS-ECU connector C-304 (terminal 16) <front or side> or C-311 (terminal 19) <rear> in good condition?

YES : Go to Step 6.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 6. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

TROUBLE SYMPTOM CHART

M1540102100090

Inspection Procedure No.	Trouble symptom		Reference page
1	Headlight and taillight	Headlights (low-beam) do not illuminate..	P.54A-111
2		Headlights (high-beam) do not illuminate..	P.54A-115
3		The headlights do not illuminate when the lighting switch is at the "PASSING" position, but the low-beam illuminates (high-beam and low-beam cannot be changed) with the switch at the "HEAD" position.	P.54A-118
4		Headlights do not illuminate when the passing switch is operated.	P.54A-120
5		The headlight(s) do not illuminate.	P.54A-122
6		High-beam indicator light does not illuminate normally.	P.54A-125
7		The headlight automatic shutdown function does not work normally.	P.54A-127
8		Daytime running light function does not work normally.	P.54A-130
9		Any of position light, side marker lights or the license plate light do not illuminate.	P.54A-133
10	Turn-signal light	The turn-signal lights do not illuminate.	P.54A-140
11		The comfort flashing function does not work normally.	P.54A-142
12		The turn-signal indicator lights do not illuminate.	P.54A-144

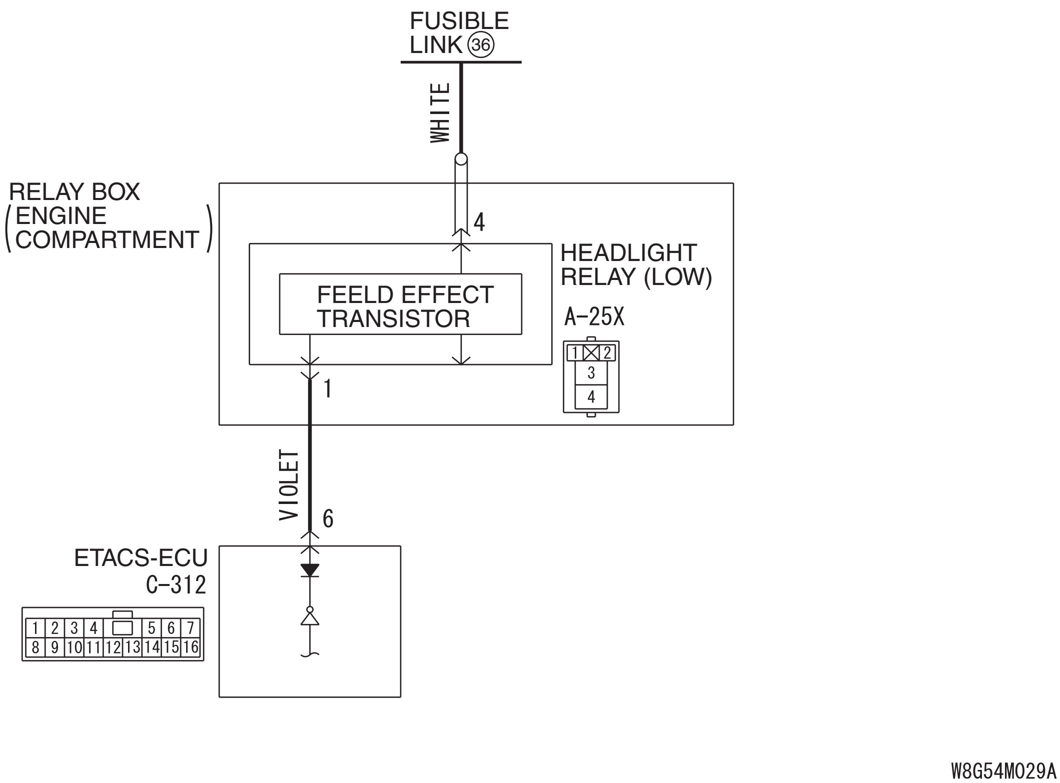
SYMPTOM PROCEDURES

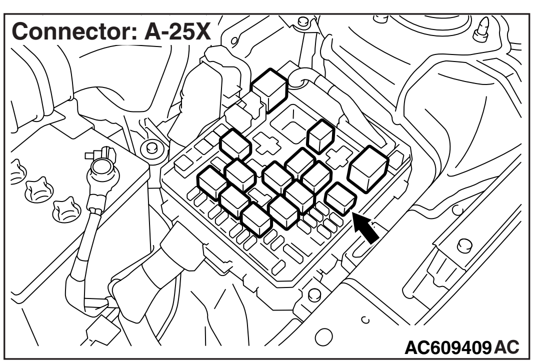
Inspection Procedure 1: Headlights (low-beam) do not illuminate.

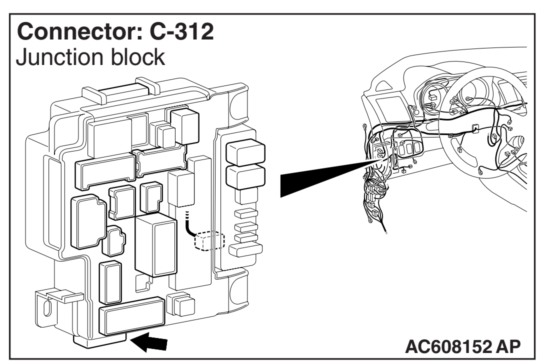
⚠ **CAUTION**

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Headlight Relay (Low-Beam) Circuit







TECHNICAL DESCRIPTION (COMMENT)

If both headlights (low-beam) do not illuminate normally, the headlight switch input circuit, headlight relay (LOW), or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

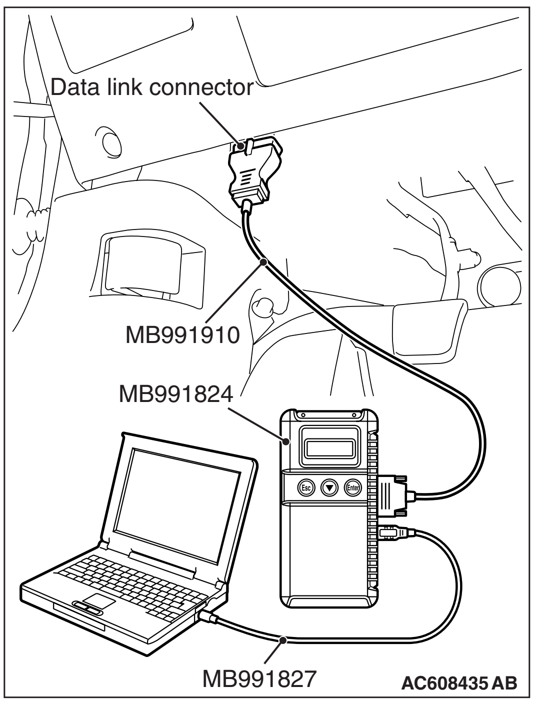
- Malfunction of column switch
- Malfunction of headlight relay (LOW)
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 2.

STEP 2. Check headlight relay (LOW) connector A-25X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is headlight relay (LOW) connector A-25X in good condition?

YES : Go to Step 3.
NO : Repair the damaged parts.

STEP 3. Check of headlight relay (LOW).
Refer to P.54A-152.

Q: Is the headlight relay (LOW) in good condition?

YES : Go to Step 4.
NO : Replace the headlight relay (LOW). Verify that the low-beam headlights illuminate normally.

STEP 4. Check the battery power supply circuit to the headlight relay (LOW). Measure the voltage at headlight relay (LOW) connector A-25X.

⚠ CAUTION
The top and bottom of the headlight relay (LOW) are difficult to identify. Prior to inspection, confirm the triangle mark on the relay box.

(1) Disconnect headlight relay (LOW) connector A-25X and measure the voltage available at the relay box side of the connector.
(2) Measure the voltage between terminal 4 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 7.

STEP 5. Check ETACS-ECU connector C-312 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-312 in good condition?

YES : Go to Step 6.
NO : Repair the damaged parts.

STEP 6. Check the wiring harness between headlight relay (LOW) connector A-25X (terminal 1) and ETACS-ECU connector C-312 (terminal 6).

- Check the ground wires for open circuit.

Q: Is the wiring harness between headlight relay (LOW) connector A-25X (terminal 1) and ETACS-ECU connector C-312 (terminal 6) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the low-beam headlights illuminate normally.

STEP 7. Check the wiring harness between headlight relay (LOW) connector A-25X (terminal 4) and the fusible link (36).

- Check the power supply line for open circuit.

Q: Is the wiring harness between headlight relay (LOW) connector A-25X (terminal 4) and fusible link (36) in good condition?

YES : Go to Step 8.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the low-beam headlights illuminate normally.

STEP 8. Check the column switch (switch body).

Refer to Column switch, Inspection P.54A-231.

Q: Is the column switch (switch body) in good condition?

YES : Go to Step 9.

NO : Replace the column switch. Verify that the low-beam headlights illuminate normally.

STEP 9. Retest the system

Q: Does the headlights (low-beam) do not illuminate in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

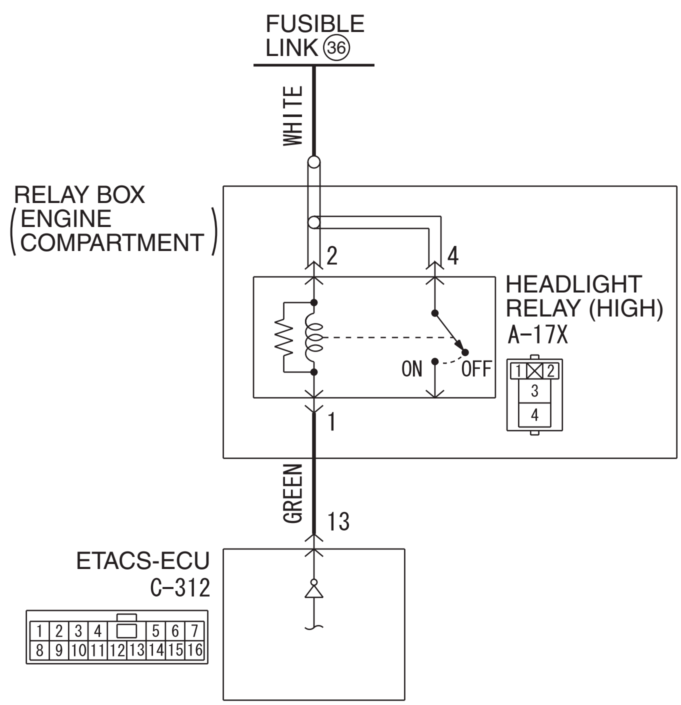
NO : Replace the ETACS-ECU.

Inspection Procedure 2: Headlights (high-beam) do not illuminate.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Headlight Relay (High-Beam) Circuit



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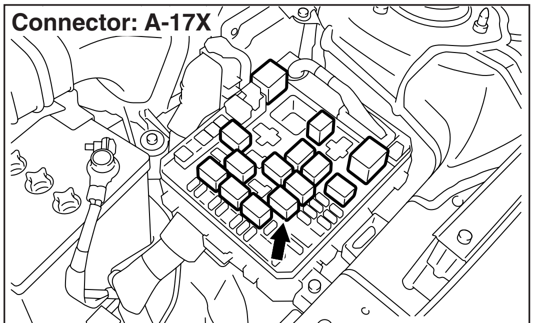

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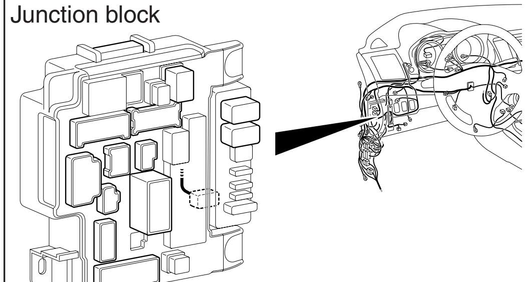


AC608152 AP

TECHNICAL DESCRIPTION (COMMENT)

If both headlights (high-beam) do not illuminate normally, the headlight switch input circuit, headlight relay (HIGH), or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

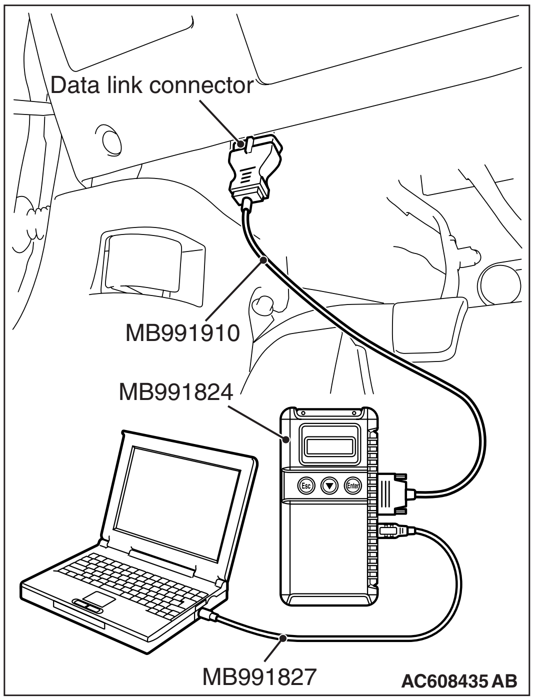
- Malfunction of column switch
- Malfunction of headlight relay (HIGH)
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 2.

STEP 2. Check headlight relay (HIGH) connector A-17X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is headlight relay (HIGH) connector A-17X in good condition?

YES : Go to Step 3.
NO : Repair the damaged parts.

STEP 3. Check of headlight relay (HIGH)

Refer toP.54A-152.

Q: Is the headlight relay (HIGH) in good condition?

YES : Go to Step 4.
NO : Replace the headlight relay (HIGH). Verify that the high-beam headlights illuminate normally.

STEP 4. Check the battery power supply circuit to the headlight relay (HIGH). Measure the voltage at headlight relay (HIGH) connector A-17X

⚠ CAUTION

The top and bottom of the headlight relay (HIGH) are difficult to identify. Prior to inspection, confirm the triangle mark on the relay box.

(1) Disconnect headlight relay (HIGH) connector A-17X and measure the voltage available at the relay box side of the connector.
(2) Measure the voltage between terminal 2 or 4 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 7.

STEP 5. Check ETACS-ECU connector C-312 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-312 in good condition?

YES : Go to Step 6.
NO : Repair the damaged parts.

STEP 6. Check the wiring harness between headlight relay (HIGH) connector A-17X (terminal 1) and ETACS-ECU connector C-312 (terminal 13).

- Check the ground wires for open circuit.

Q: Is the wiring harness between headlight relay (HIGH) connector A-17X (terminal 1) and ETACS-ECU connector C-312 (terminal 13) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the high-beam headlights illuminate normally.

STEP 7. Check the wiring harness between headlight relay (HIGH) connector A-17X (terminal 4) and the fusible link (36).

- Check the power supply line for open circuit.

Q: Is the wiring harness between headlight relay (HIGH) connector A-17X (terminal 4) and fusible link (36) in good condition?

YES : Go to Step 8.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the high-beam headlights illuminate normally.

STEP 8. Check the column switch (switch body).

Refer to Column switch, Inspection P.54A-231.

Q: Is the column switch (switch body) in good condition?

YES : Go to Step 9.

NO : Replace the column switch. Verify that the high-beam headlights illuminate normally.

STEP 9. Retest the system

Q: Does the headlights (high-beam) do not illuminate in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

Inspection Procedure 3: The headlights do not illuminate when the lighting switch is at the "PASSING" position, but the low-beam illuminates (high-beam and low-beam cannot be changed) with the switch at the "HEAD" position.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If the headlights illuminate only at low-beam regardless of the lighting switch position, the headlight fail-safe function may be active.

TROUBLESHOOTING HINTS

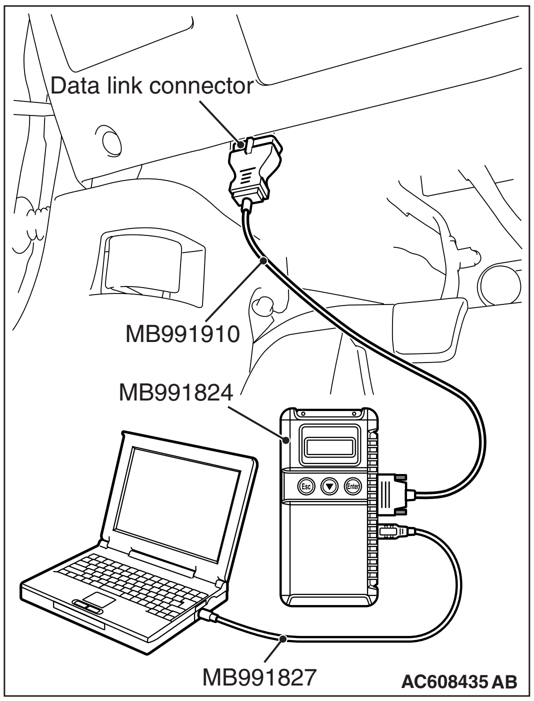
- Malfunction of column switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 2.

STEP 2. Retest the system

Q: Do the headlights illuminate normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

Inspection Procedure 4: Headlights do not illuminate when the passing switch is operated.

⚠ **CAUTION**
Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If both headlights (low-beam and high-beam) do not illuminate, the passing switch input circuit or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of column switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

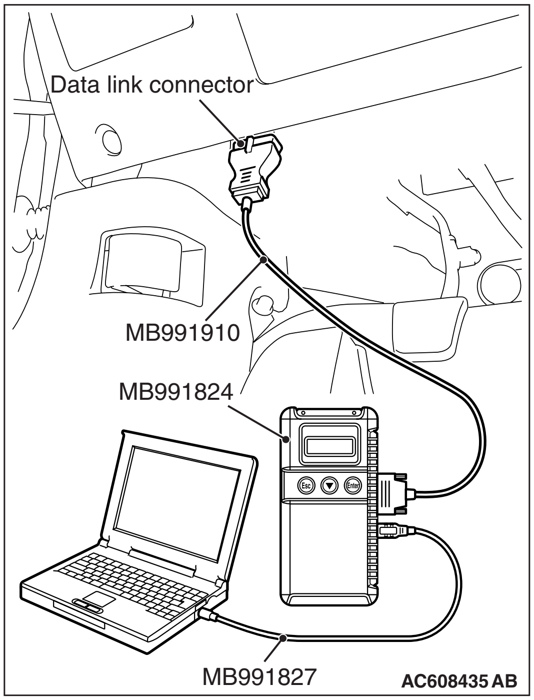
STEP 1. Check that the headlights operate.

Check that the low-beam and high-beam headlights illuminate normally.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Refer to Inspection Procedure 1 "Headlights (low-beam) do not illuminate." P.54A-111 and Inspection Procedure 2 "Headlights (high-beam) do not illuminate." P.54A-115.

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 3.

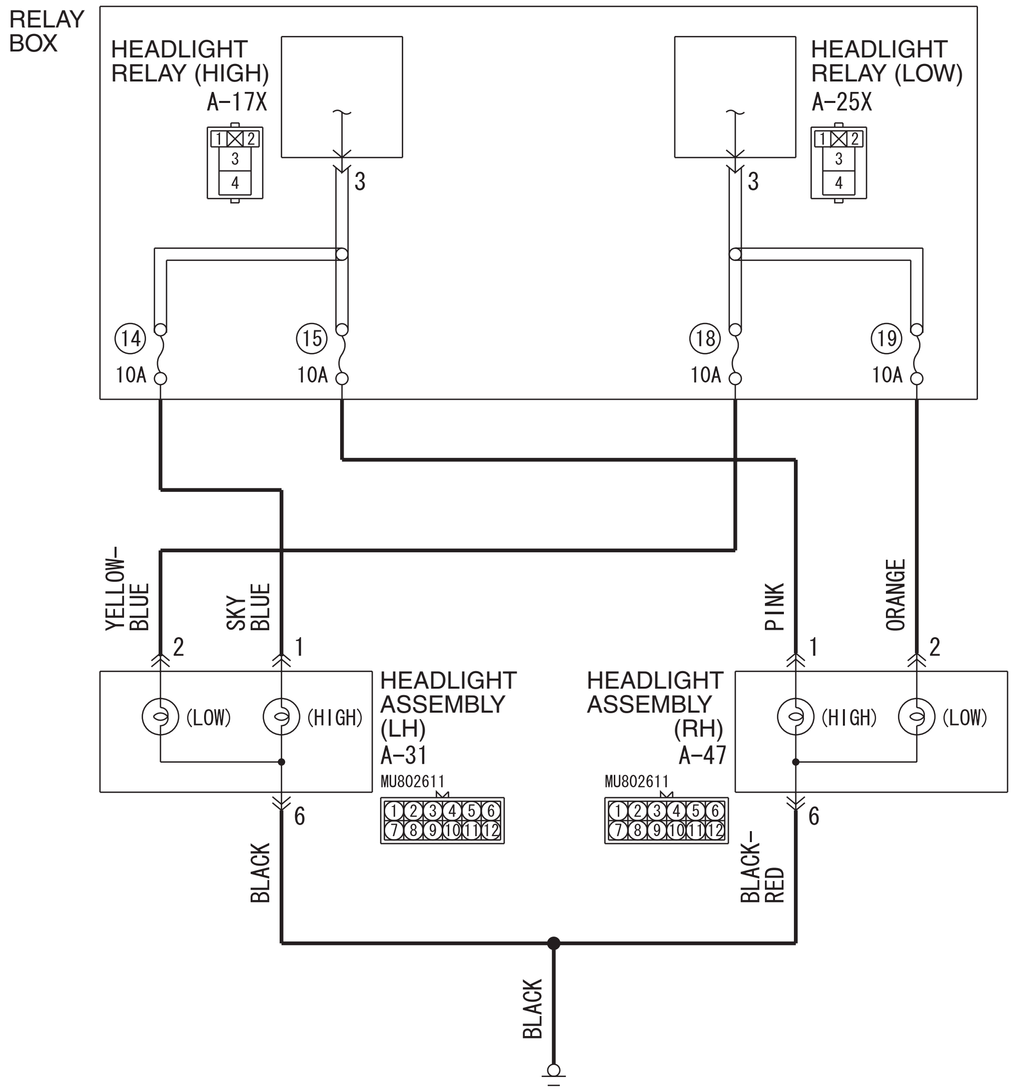
STEP 3. Retest the system

Q: Do the headlights (low-beam and high-beam) illuminate normally when turning ON the passing switch?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

Inspection Procedure 5: The headlight(s) do not illuminate.

Headlights Circuit



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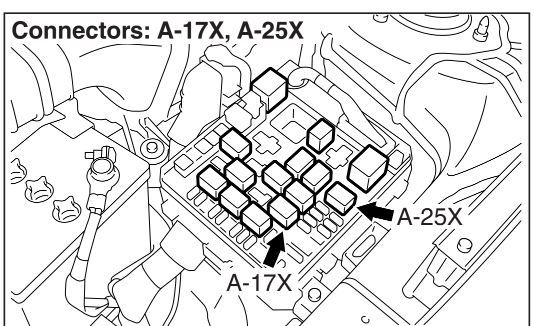

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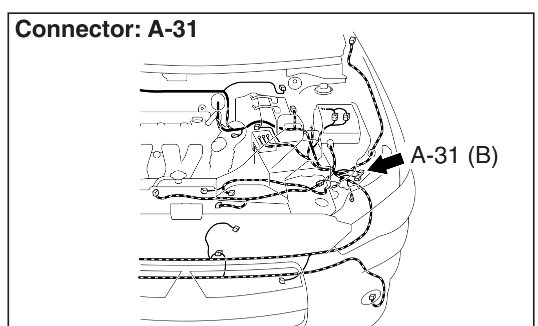

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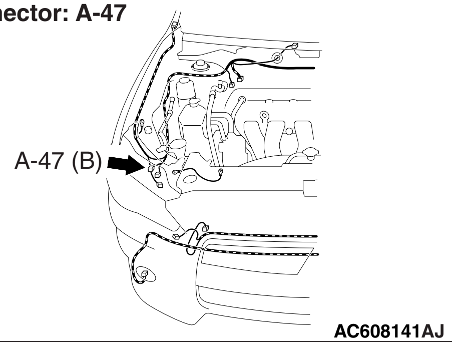
Connector: A-47



TROUBLESHOOTING HINTS

- Malfunction of the headlight bulbs
- Malfunction of the headlight assembly
- Damaged harness wires and connectors

TECHNICAL DESCRIPTION (COMMENT)

If any of the headlights do not illuminate, the wiring harness, connector(s), or the bulb may have a problem, or the fuse may be burned out.

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set

STEP 1. Check headlight assembly connector A-31 <LH> or A-47 <RH>, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is headlight assembly connector A-31 <LH> or A-47 <RH> in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 2. Check bulb.

Check the bulb(s) of headlight that does not illuminate.

NOTE: If discharge-type lower beam headlights do not illuminate, their bulbs cannot be inspected. In this case, assume the bulbs to be normal and proceed with steps.

Q: Is the bulb in good condition?

YES : Go to Step 3.

NO : Replace the bulb(s) of the light that does not illuminate.

STEP 3. Check the wiring harness between headlight assembly connector and headlight relay connector.

Check the power supply line for open circuit.

- Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 2) and headlight relay (LOW) connector A-25X (terminal 3). <LH-LOW>
- Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 1) and headlight relay (HIGH) connector A-17X (terminal 3). <LH-HIGH>
- Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 6) and ground. <LH-LOW and HIGH>
- Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 2) and headlight relay (LOW) connector A-25X (terminal 3). <RH-LOW>
- Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 1) and headlight relay (HIGH) connector A-17X (terminal 3). <RH-HIGH>
- Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 6) and ground. <RH-LOW and HIGH>

Q: Is the wiring harness between headlight assembly connector and headlight relay connector in good condition?

YES : Replace the headlight assembly that does not illuminate.

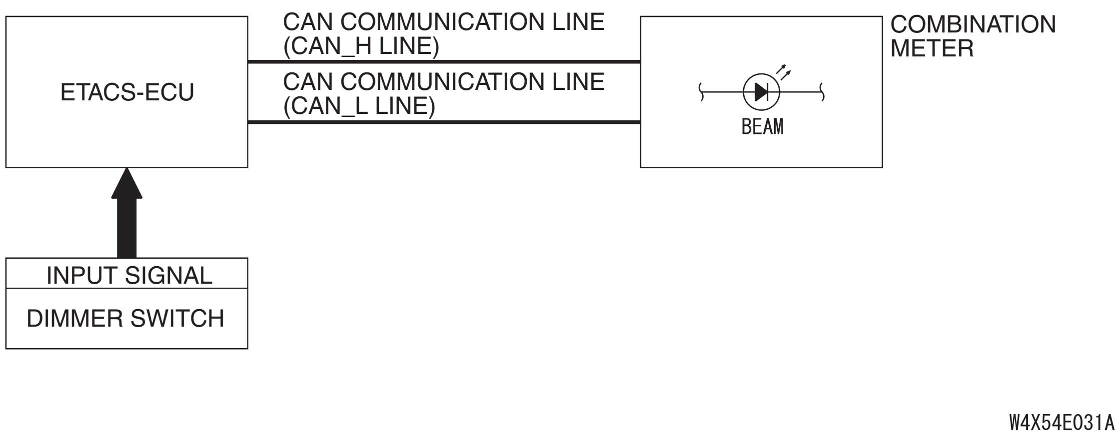
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Verify that the headlights illuminate normally.

Inspection Procedure 6: High-beam indicator light does not illuminate normally.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

High-Beam Indicator Light Circuit



TECHNICAL DESCRIPTION (COMMENT)

If the high-beam indicator does not illuminate normally, the harness in the CAN bus lines, connector(s), ETACS-ECU, or combination meter may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of the ETACS-ECU
- Malfunction of combination meter
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

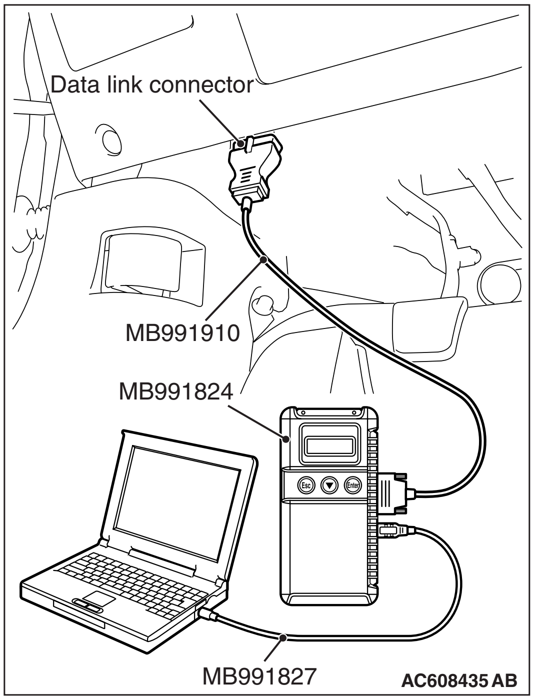
STEP 1. Check of headlight (high-beam).

Check that the headlights (high-beam) illuminate/extinguish normally when the lighting switch is operated.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to Inspection Procedure 2 "Headlights (high-beam) do not illuminate P.54A-115."



STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Perform the actuator test for the combination meter, and check that the high-beam indicator light illuminates (Refer to combination meter P.54A-74).
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Replace the ETACS-ECU.
NO : Replace the combination meter.

Inspection Procedure 7: The headlight automatic shutdown function does not work normally.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

OPERATION

The ETACS-ECU operates this function in accordance with the input signals from column switch (lighting switch), ignition switch (IG1), and front door switch (LH).

TECHNICAL DESCRIPTION (COMMENT)

If the headlight automatic shutdown function does not work normally, the above described input circuits or ETACS-ECU may have a problem. Also, it may be possible that the headlight automatic shutdown function is set to "Disable" through configuration function.

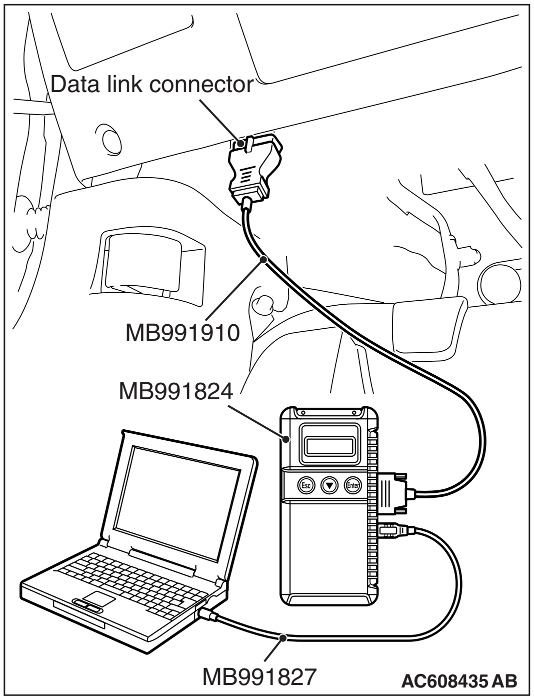
TROUBLESHOOTING HINTS

- Malfunction of front door switch (LH)
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, Check the configuration function.

Use the ETACS-ECU configuration function to check that the "Head light auto cut customize" is set to "A-spec." or "D-spec."

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the scan tool (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Use the ETACS-ECU configuration function to check that the "Headlight auto cut customize" is set to "A-spec." or "D-spec".
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Use the ETACS-ECU configuration function to set the "Headlight auto cut customize" to "A-spec." or "D-spec." (Refer to P.54A-561).

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.

(1) Turn the ignition switch to the "ON" position.
(2) Check whether the ETACS-ECU related DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to ETACS, Diagnosis P.54A-482).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list.

Use the ETACS-ECU service data to check the signals related to the operation of headlight automatic shutdown function.

- Turn the ignition switch to the LOCK (OFF) position.
- Illuminate the headlights.

Item No.	Item name	Normal condition
Item 206	Head light LO ON duty	100%
Item 254	IG voltage	Battery voltage

- Open the driver's door.

Item No.	Item name	Normal condition
Item 256	Dr door ajar switch	Open

Q: Does scan tool MB991958 display the items "Head light LO ON duty", "IG voltage" and "Dr door ajar switch" as normal condition?

YES : Go to Step 4.
NO : Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-528.

STEP 4. Retest the system

Check that the headlight automatic shutdown function works normally.

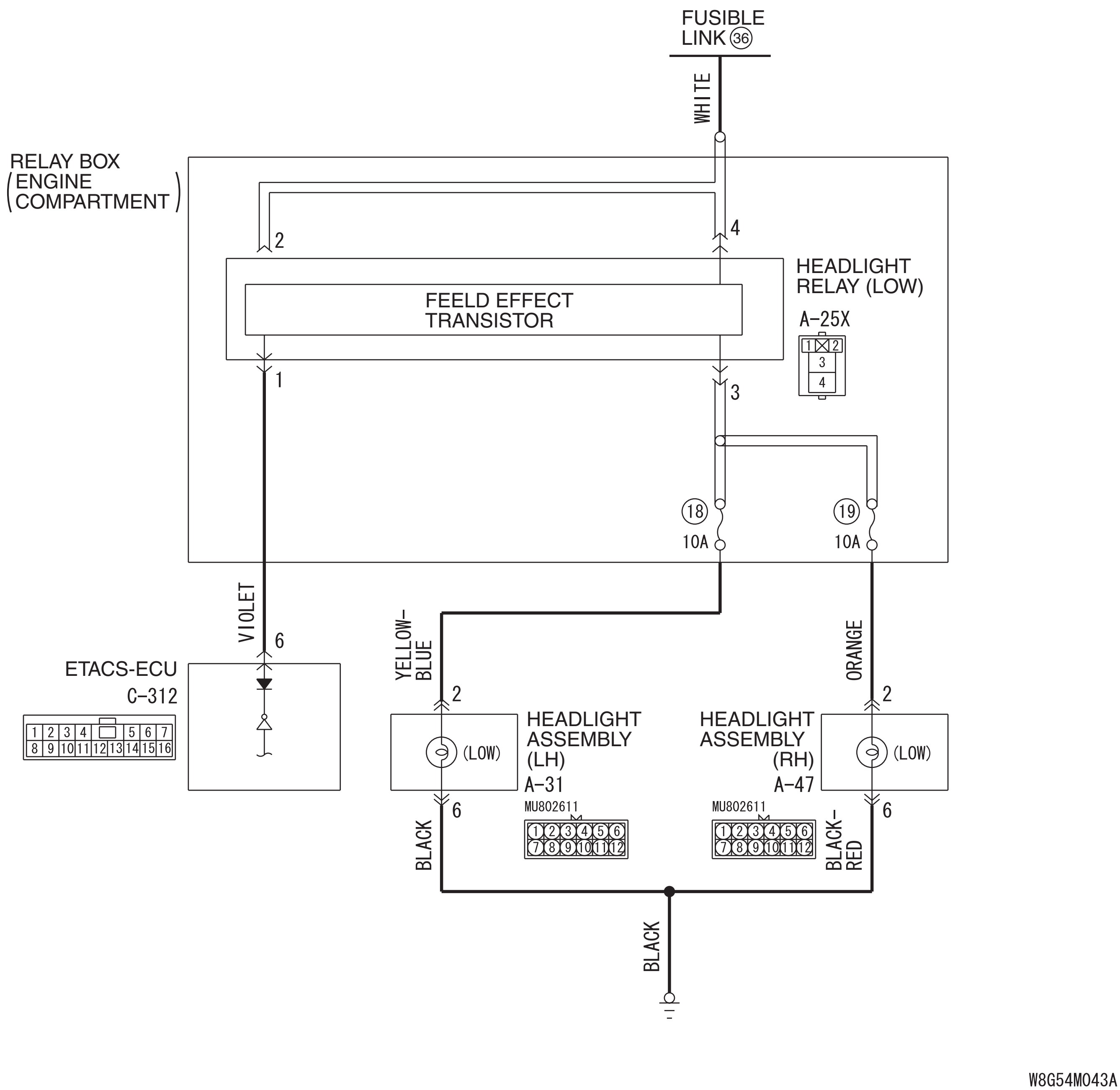
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

Inspection Procedure 8: Daytime running light function does not work normally.

⚠ CAUTION
Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Daytime Running Light Circuit



TECHNICAL DESCRIPTION (COMMENT)

If the daytime running light function does not work, connector(s), wiring harness in the CAN bus lines, the engine control module, the combination meter, the ETACS-ECU or the input signal circuit may be defective.

TROUBLESHOOTING HINTS

- Trouble in input signal system
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

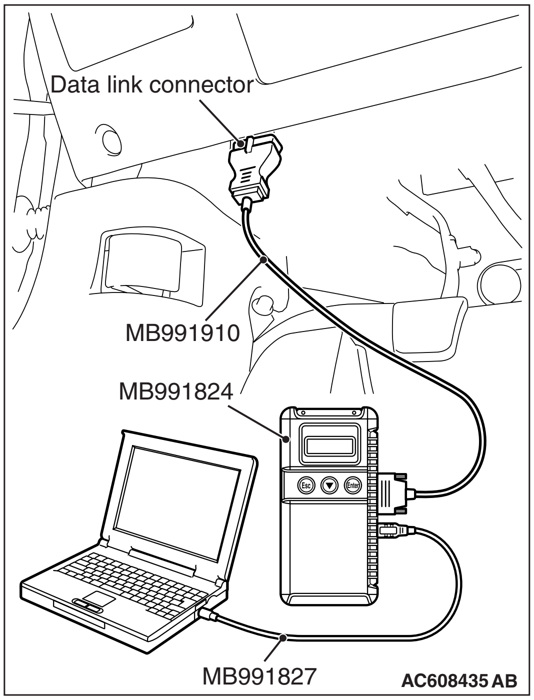
Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Verify the headlight (low-beam) operation.
Check to see that the headlight (low-beam) lights up properly when operating the dimmer switch while the headlight switch is ON.

Q: Do the headlights (low-beam) illuminate normally?

YES : Go to Step 2.
NO : Refer to Inspection Procedure 1 "Headlights (low-beam) do not illuminate normally P.54A-111."

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.



⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check whether ETACS-ECU DTCs are set.

(1) Turn the ignition switch to the "ON" position.
(2) Check for ETACS-ECU DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.

NO : Go to Step 4.

STEP 4. Using scan tool MB991958, read the MFI system diagnostic trouble code.

Check whether engine control module DTCs are set or not.

(1) Turn the ignition switch to the "ON" position.
(2) Check for engine control module DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the MFI system. Refer to GROUP 13A, Diagnosis P.13A-46.

NO : Go to Step 5.

STEP 5. Check the parking brake switch.

Check the input signals from the parking brake switch.

(1) Turn the ignition switch to the "ON" position.
(2) Check that the brake warning light on the combination meter goes off when the parking brake lever is released.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

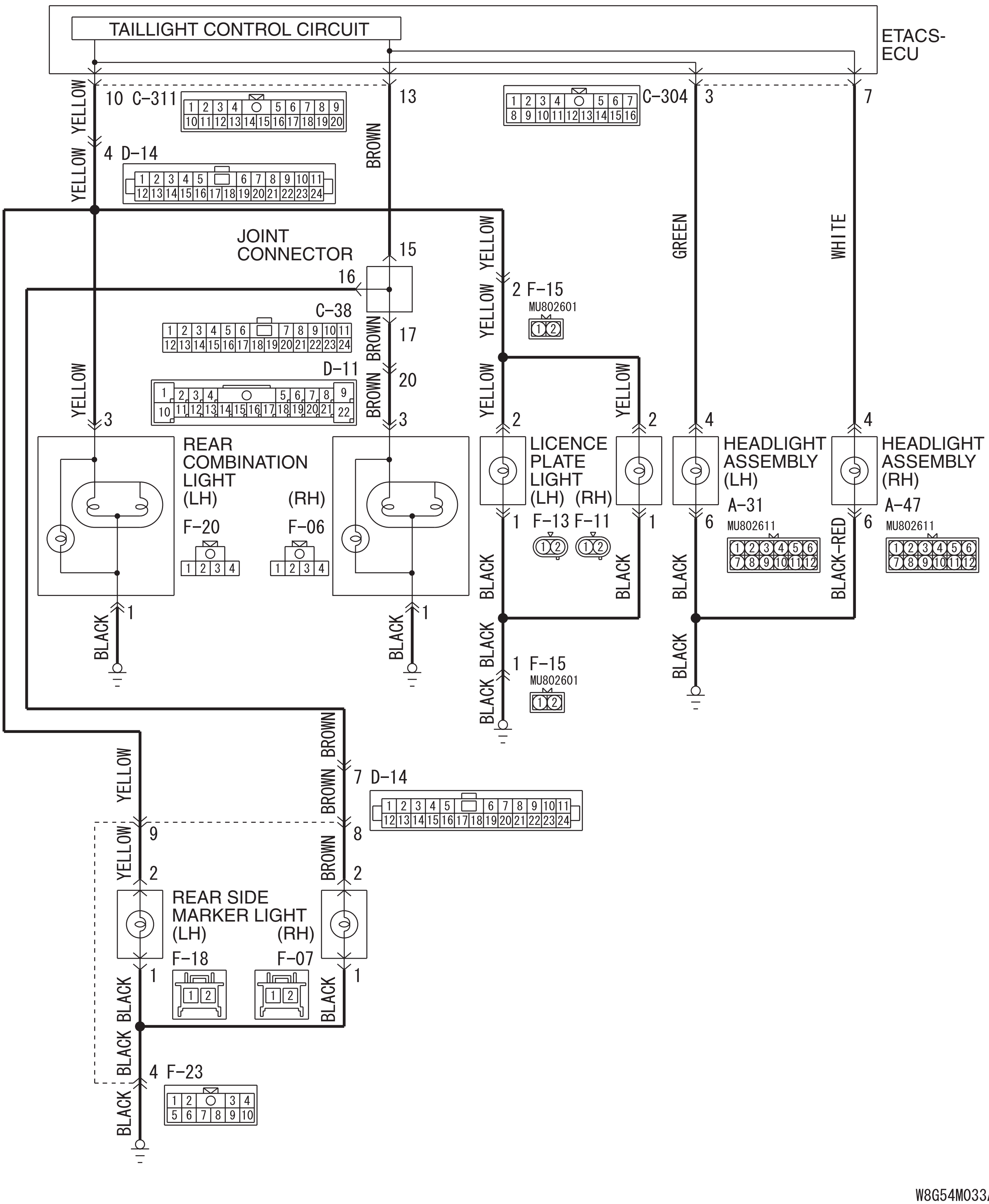
Q: Does the brake warning light go off?

YES : Replace the ETACS-ECU. Verify that the daytime running light function does not work normally.

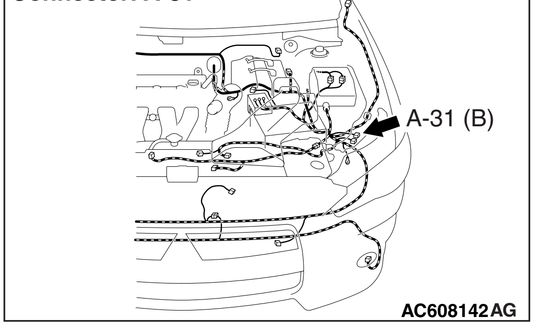
NO : Refer to GROUP 36, Diagnosis, Inspection Procedure 3 P.36-7. Verify that the daytime running light function does not work normally.

Inspection Procedure 9: Any of position light, side marker lights or the license plate light do not illuminate.

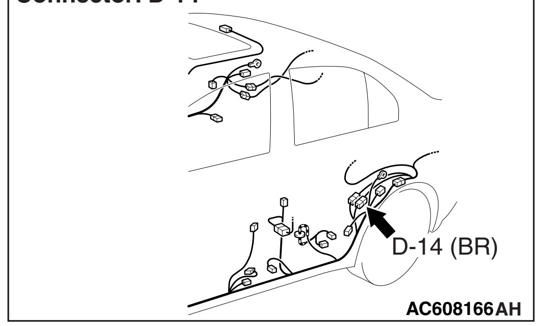
Position Lights, License Plate Lights and Rear Side Marker Lights Circuit



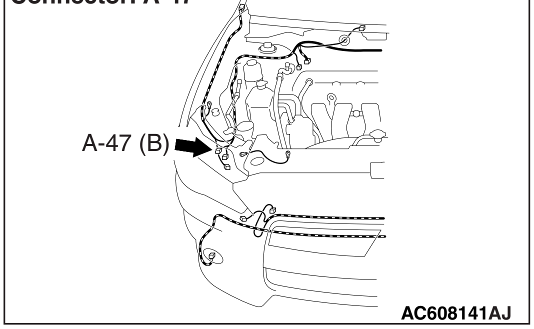
Connector: A-31



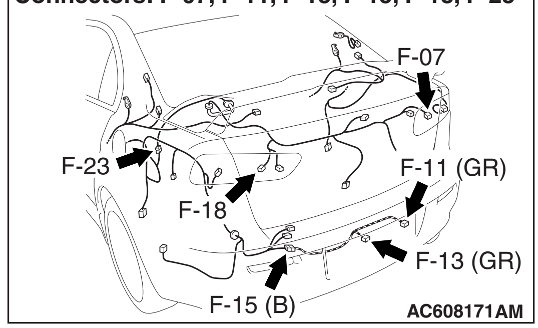
Connector: D-14



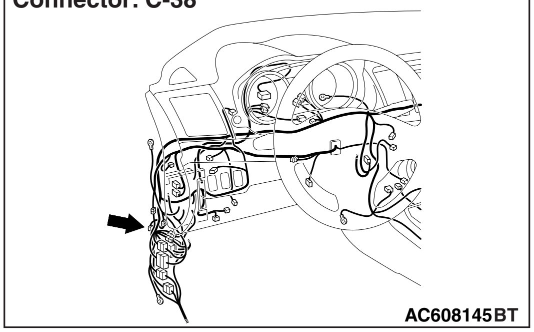
Connector: A-47



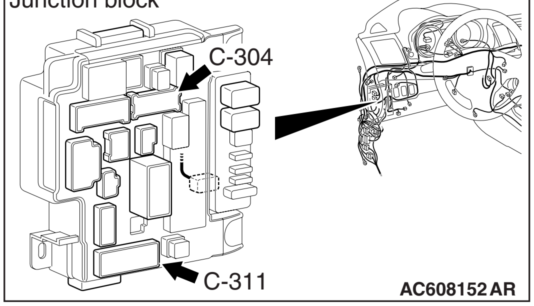
Connectors: F-07, F-11, F-13, F-15, F-18, F-23



Connector: C-38



Connectors: C-304, C-311
Junction block



TECHNICAL DESCRIPTION (COMMENT)

If any position light, side marker light or license plate light do not illuminate normally, the harness, connector(s), or bulb(s) may have a problem, or the fuse may be burned out.

TROUBLESHOOTING HINTS

- Malfunction of bulbs
- Malfunction of rear combination light
- Malfunction of rear combination light harness
- Malfunction of license plate light
- Malfunction of headlight
- Malfunction of rear side maker light
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set

STEP 1. Rear combination light (taillight) check.

Q: Does the rear combination light (taillight) illuminate normally?

YES : Go to Step 2.
NO : Refer to P.54A-165.

STEP 2. Check headlight assembly connector A-31 (position light-LH) or A-47 (position light-RH), rear side marker light connector F-18 (LH) or F-07 (RH) or license plate light connector F-13 (LH) or F-11 (RH) for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is headlight assembly connector A-31 (position light-LH) or A-47 (position light-RH), rear side marker light connector F-18 (LH) or F-07 (RH) or license plate light connector F-13 (LH) or F-11 (RH) in good condition?

YES : Go to Step 3.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 3. Bulb check.
Check the bulb(s) of the light that does not illuminate.

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace the bulb(s) of the light that does not illuminate.

STEP 4. Resistance measurement at headlight assembly connector A-31 (position light-LH) or A-47 (position light-RH), rear side marker light connector F-18 (LH) or F-07 (RH) or license plate light connector F-13 (LH) or F-11 (RH) .

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Measure the resistance between the connector of light which does not illuminate and the body ground.
- Measure the resistance between headlight assembly connector A-31 (LH) or A-47 (RH) (terminal 6) and body ground.
- Measure the resistance between rear side marker light connector F-18 (LH) or F-07 (RH) (terminal 1) and body ground.
- Measure the resistance between license plate light connector F-13 (LH) or F-11 (RH) (terminal 1) and body ground.

OK: The measured value should be continuity exists (2 Ω or less).

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Check the wiring harness between headlight assembly connector, rear side marker light connector or license plate light connector and the body ground.

Check the ground line for open circuit.

- Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 6) and the body ground. <position light-LH>
- Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 6) and the body ground. <position light-RH>
- Check the wiring harness between rear side marker light (LH) connector F-18 (terminal 1) and the body ground. <rear side marker light-LH>

  NOTE: Also check intermediate connector F-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between rear side marker light (RH) connector F-07 (terminal 1) and the body ground. <rear side marker light-RH>

  NOTE: Also check intermediate connector F-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between license plate light (LH) connector F-13 (terminal 1) and the body ground. <license plate light-LH>

  NOTE: Also check intermediate connector F-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between license plate light (RH) connector F-11 (terminal 1) and the body ground. <license plate light-RH>

  NOTE: Also check intermediate connector F-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between headlight assembly connector, rear side marker light connector or license plate light connector and the body ground in good condition?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 6. Check ETACS-ECU connector C-304 <position light> or C-311 <rear side marker light or license plate light> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-304 <position light> or C-311 <rear side marker light or license plate light> in good condition?

YES : Go to Step 7.
NO : Repair the damaged parts.

STEP 7. Check wiring harness between headlight assembly connector, rear side marker light connector or license plate light connector and ETACS-ECU connector.
Check the ground line for open circuit.

- Check the wiring harness between headlight assembly (LH) connector A-31 (terminal 4) and ETACS-ECU connector C-304 (terminal 3). <position light-LH>
- Check the wiring harness between headlight assembly (RH) connector A-47 (terminal 4) and ETACS-ECU connector C-304 (terminal 7). <position light-RH>
- Check the wiring harness between rear side marker light (LH) connector F-18 (terminal 2) and ETACS-ECU connector C-311 (terminal 10). <rear side marker light-LH>

  NOTE: Also check intermediate connectors D-14 and F-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 or F-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between rear side marker light (RH) connector F-07 (terminal 2) and ETACS-ECU connector C-311 (terminal 13). <rear side marker light-RH>

  NOTE: Also check intermediate connectors D-14 and F-23 and joint connector C-38 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 or F-23 or joint connector C-38 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between license plate light (LH) connector F-13 (terminal 2) and ETACS-ECU connector C-311 (terminal 10). <license plate light-LH>

  NOTE: Also check intermediate connectors D-14 and F-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 or F-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- Check the wiring harness between license plate light (RH) connector F-11 (terminal 2) and ETACS-ECU connector C-311 (terminal 13). <license plate light-RH>

  NOTE: Also check intermediate connectors D-14 and F-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 or F-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between headlight assembly connector, rear side marker light connector or license plate light connector and ETACS-ECU connector in good condition?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Retest the system.

Check that the position light, rear side marker light, or license plate light illuminate normally.

Q: Do the position light, rear side marker light, or license plate light work normally?

YES (The light illuminate normally at both high and low beams.) : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO <When the position light does not illuminate> : Replace the position light socket.

NO <When the license plate light does not illuminate> : Replace the license plate light socket.

NO <When the rear side marker lights do not illuminate> : Replace the rear side maker light socket.

Inspection Procedure 10: The turn-signal lights do not illuminate.

TECHNICAL DESCRIPTION (COMMENT)

If all the turn-signal lights do not illuminate, the ignition switch (IG1), the turn-signal light switch input circuit or the ETACS-ECU may have a problem.

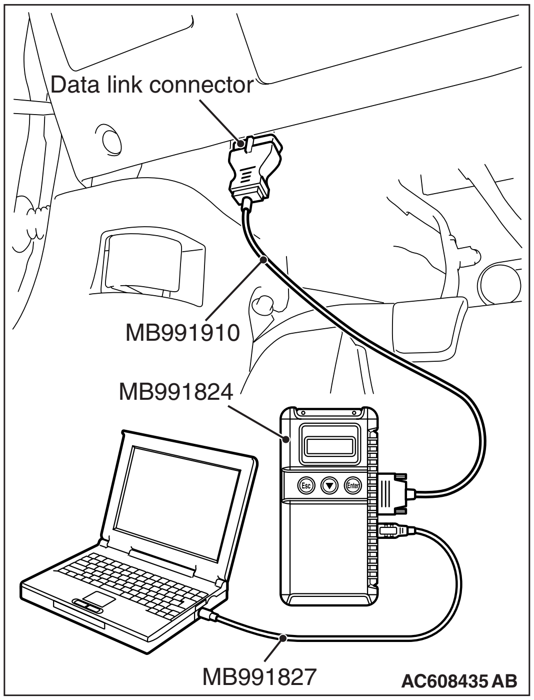
TROUBLESHOOTING HINTS

- Malfunction of column switch
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to ETACS, Diagnosis P.54A-482).
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list.

Using the ETACS-ECU service data, check the signals related to the illumination of turn-signal light.

- Turn the ignition switch to the "ON" position.

Item No.	Item name	Normal conditions
Item 254	IG voltage	Battery voltage

Q: Does scan tool MB991958 display the item "IG voltage" as normal condition?

YES : Go to Step 3.
NO : Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis - Inspection Procedure 2 "ETACS-ECU does not receive any signal from the ignition switch (IG1)" P.54A-528.

STEP 3. Retest the system.
Check that turn-signal lights illuminate.

Q: Do turn-signal lights work normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

Inspection Procedure 11: The comfort flashing function does not work normally.

TECHNICAL DESCRIPTION (COMMENT)

If the comfort flashing function does not work normally, the turn-signal light switch input circuit(s) and ETACS-ECU may have a problem.

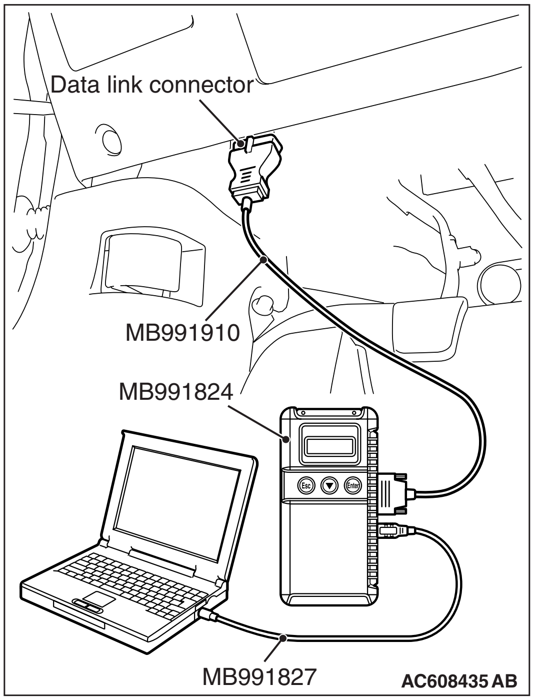
TROUBLESHOOTING HINTS

- Malfunction of column switch
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, Check the configuration function.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Use the ETACS-ECU configuration function to check that the "Comfort flasher" is set to "Enable".
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the "Comfort flasher" set to "Enable"?

YES : Go to Step 2.
NO : Use the ETACS-ECU customize function to set the "Comfort flasher" to "Enable" (Refer to P.54A-561).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

(1) Turn the ignition switch to the "ON" position.
(2) Check whether the ETACS-ECU DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to ETACS, Diagnosis P.54A-482).
NO : Go to Step 3.

STEP 3. Check that the turn-signal light operate.

Check that the turn-signal light work normally when the ignition switch is in the "ON" position.

Q: Do turn-signal lights work normally?

YES : Go to Step 4.
NO : Refer to Inspection Procedure 10 "The turn-signal lights do not illuminate" P.54A-140.

STEP 4. Retest the system
Check that the comfort flashing function works normally.

Q: Does comfort flashing function works normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

Inspection Procedure 12: The turn-signal indicator light do not illuminate.

⚠ CAUTION
Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If the turn-signal light indicator does not illuminate normally, the harness in the CAN bus lines, connector(s), ETACS-ECU, or combination meter may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of the ETACS-ECU
- Malfunction of combination meter
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

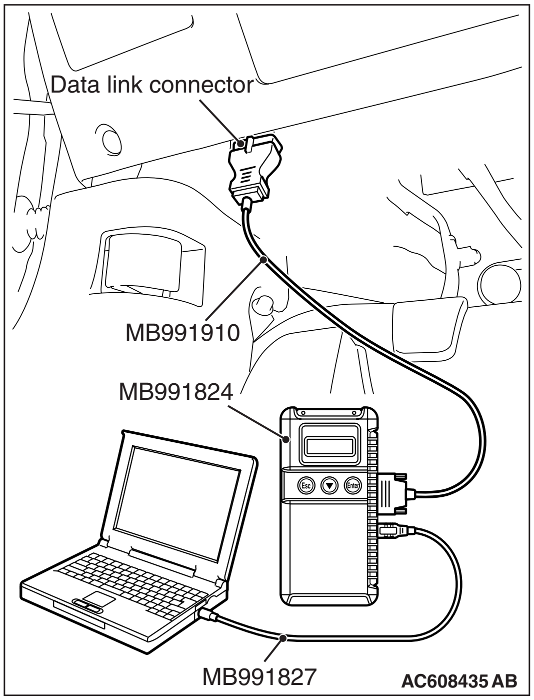
Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check turn-signal light.
Check that the turn-signal light flashes normally when the turn-signal switch is operated.

Q: Do Turn-signal light work normally?

YES : Go to Step 2.
NO : Refer to Inspection Procedure 10 "The turn-signal lights do not illuminate" P.54A-140.



STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-94."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Using scan tool MB991958, read the diagnostic trouble code.

Check if diagnostic trouble code is set to the ETACS-ECU.
(1) Turn the ignition switch to the "ON" position.
(2) Check whether the ETACS-ECU related DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check actuator test.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 7: Indicator1

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Replace the ETACS-ECU.
NO : Replace the combination meter.

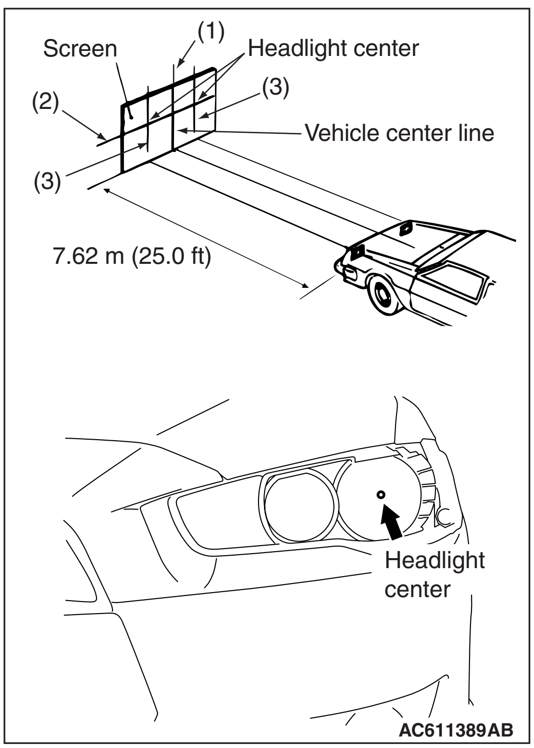
ON-VEHICLE SERVICE

HEADLIGHT AIMING

M1540100500155

PRE-AIMING INSTRUCTIONS (LOW-BEAM)

1. Inspect for rusted or faulty headlight assemblies.
2. These conditions must be corrected before a satisfactory adjustment can be made.
3. Inspect tire inflation, and adjust if necessary.
4. If the fuel tank is not full, place a weight in the trunk of the vehicle to simulate weight of a full tank [3 kg (6.6 pounds) per gallon].
5. There should be no other load in the vehicle other than driver or substituted weight of approximately 68 kg (150 pounds) placed in driver's position.
6. Thoroughly clean headlight lenses.
7. Place the vehicle on a level floor, perpendicular to a flat screen 7.62 m (25.0 ft) away from the bulb center-marks on the headlight lens.
8. Rock vehicle sideways to allow vehicle to assume its normal position.
9. Bounce the front suspension through three (3) oscillations by applying the body weight to hood or bumper.

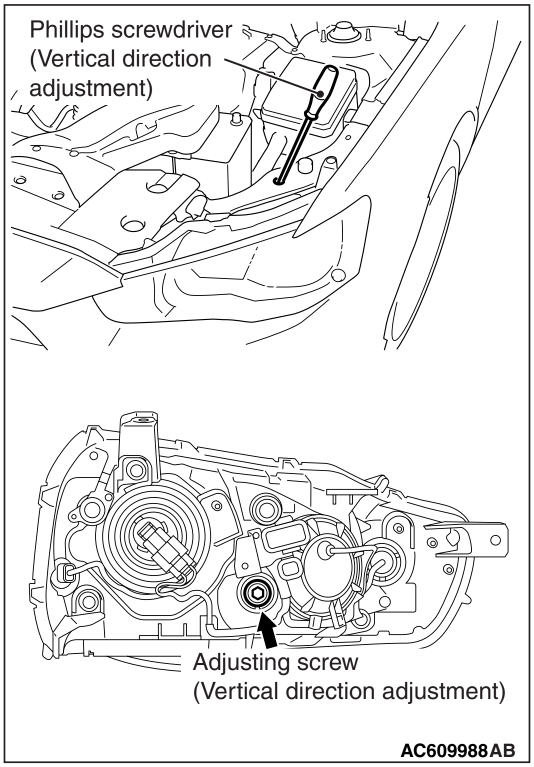


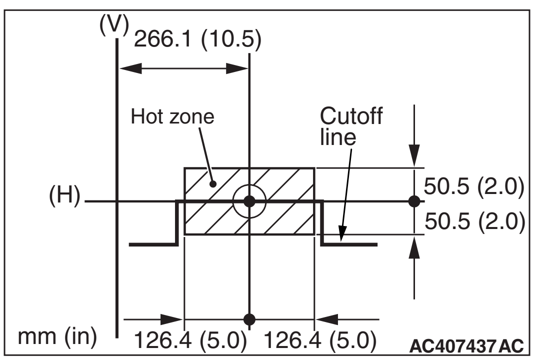
10. Set the distance between the screen and the bulb center marks of the headlight as shown in the illustration.
11. Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
    (1) Position a vertical tape or mark so that it is aligned with the vehicle center line.
    (2) Measure the distance from the center-marks on the headlight lens to the floor [reference value: 679.5 mm (26.75 inches)]. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
    (3) Measure the distance from the center line of the vehicle to the center of each headlight. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the center line of each headlight bulb.

HEADLIGHT ADJUSTMENT (LOW-BEAM)

NOTE: When adjusting headlight, disconnect the other headlight harness.

1. The low-beam headlight will project on the screen upper edge of the beam (cut-off).
2. Turn the adjusting screw to achieve the specified low-beam cut-off location on the aiming screen.





Standard value:

(Vertical direction) Horizontal line (H) ±50.5 mm (±2.0 inches) (±0.38 degrees angle)

(Horizontal direction): ±126.4 mm (±5.0 inches) (±0.95 degrees angle) from the axis, which is 266.1 mm (10.5 inches) (2 degrees angle) rightward from the vertical line (V)

⚠ CAUTION

Do not cover a headlight for more than three minutes to prevent the plastic headlight lens deformation.

NOTE: High-beam pattern should be correct when the low-beams are adjusted properly.

LUMINOUS INTENSITY MEASUREMENT

M1540100600129

1. Set the headlights to high-beam.
2. Using a photometer, and following its manufacturer's instruction manual, measure the headlight center intensity and check to be sure that the limit value is satisfied.

   Limit: 40,000 cd or more {When a screen is set 18.3m (60 feet) ahead of the vehicle}

NOTE: When measuring the intensity, maintain an engine speed of 2,000 r/min, with the battery fully charged.
There may be special local regulations pertaining to headlight intensity. Be sure to make any adjustments necessary to satisfy such regulations.
If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

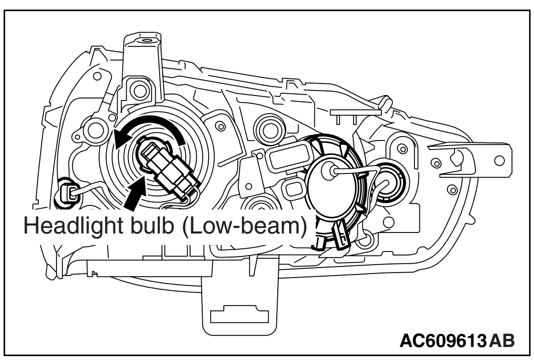
$I = E \times r^2$

- I = intensity (cd)
- E = illumination (lux)
- r = distance (m) from headlights to illuminometer

REPLACE THE BULB

M1540100700159

HEADLIGHT BULB (LOW-BEAM) REPLACEMENT

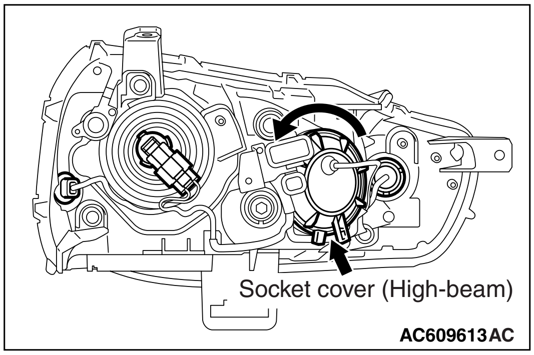


⚠ CAUTION

Do not touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, immediately clean it with alcohol or thinner. After drying completely, install the bulb.

Disconnect the connector, and twist the headlight bulb (low-beam) to remove.

HEADLIGHT BULB (HIGH-BEAM) REPLACEMENT

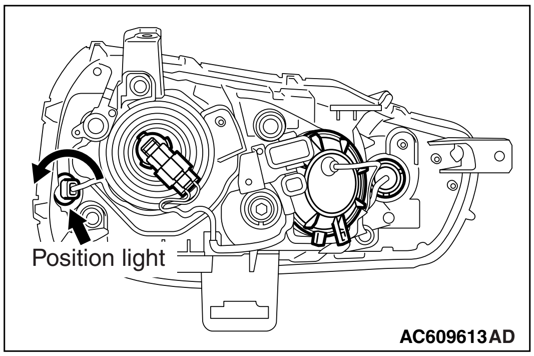


⚠ CAUTION

Do not touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, immediately clean it with alcohol or thinner. After drying completely, install the bulb.

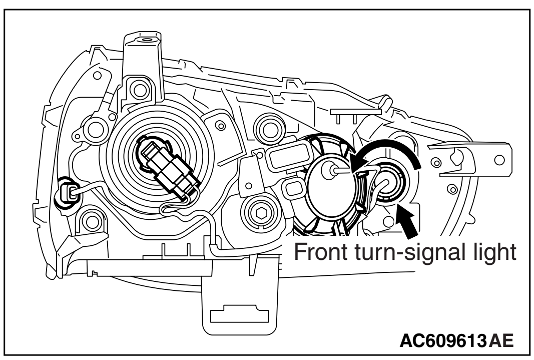
1. Twist the socket cover to remove.
2. Disconnect the connector, and twist the headlight bulb (high-beam) to remove.

POSITION LIGHT BULB REPLACEMENT



Disconnect the connector, and twist the position light socket to remove it.

FRONT TURN-SIGNAL LIGHT BULB REPLACEMENT



Disconnect the connector, and twist the front turn-signal light socket to remove it.

HEADLIGHT AUTOMATIC-SHUTDOWN FUNCTION CHECK

M1540100800101

Confirm that the headlights turn OFF in one second if the driver's door is opened when the ignition switch is OFF and the lighting switch is ON (HEAD position). If there is a malfunction, perform the troubleshooting (Refer to P.54A-150).

CONFIGURATION FUNCTION

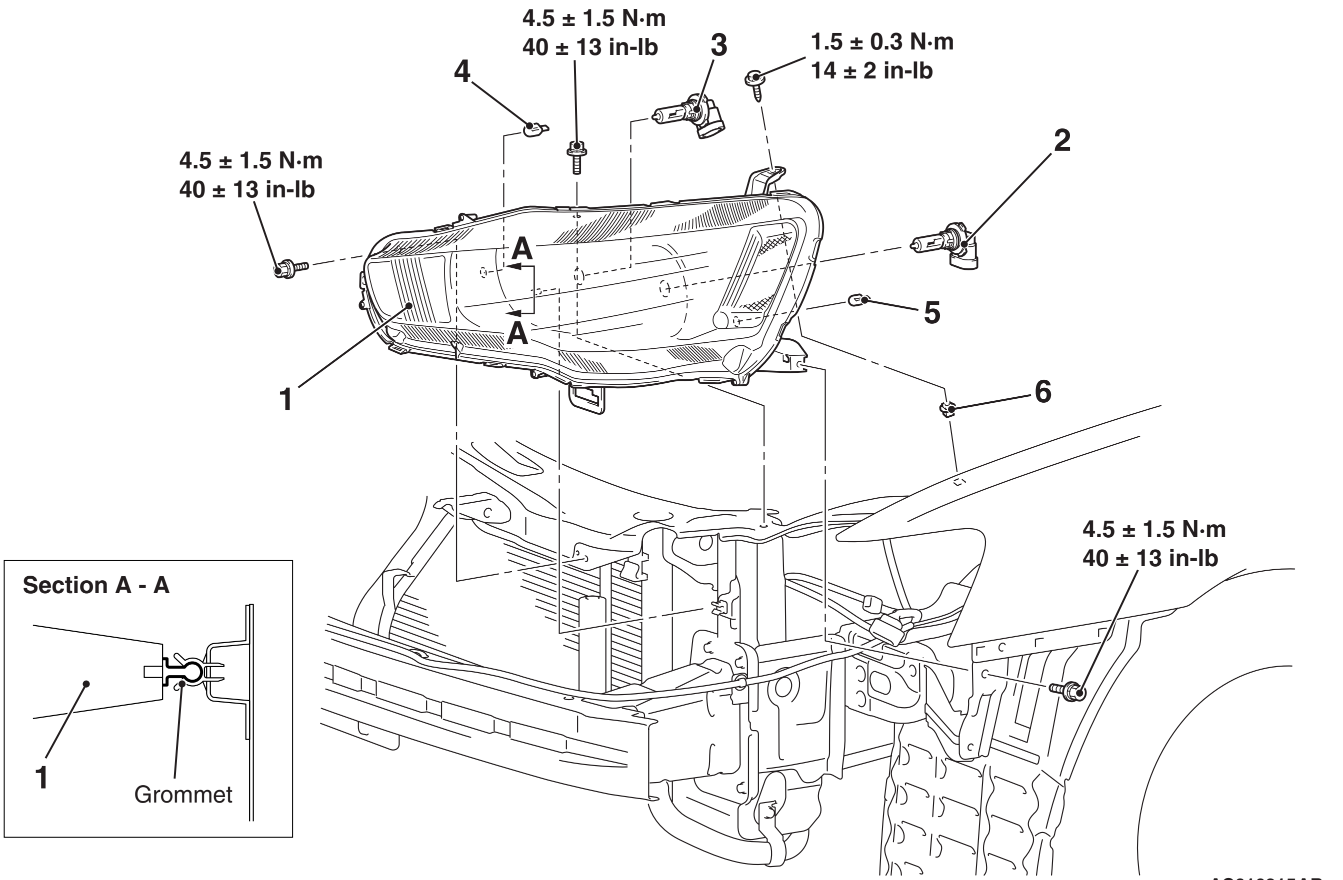
M1540103700158

Use scan tool MB991958 to adjust the following functions. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
ACC power auto cut	Time to ACC power cut-off when the ignition switch is in the ACC position	Disable	No function (default)
		30 min	30 minutes
		60 min	60 minutes
Turn power source	Adjustment of turn-signal light operation condition	ACC or IG1	Operable with ACC or ON position
		IG1	Operable with ON position (default)
Comfort flasher	With/without comfort flasher function	Disable	No function
		Enable	With function (default)
Comfort flasher switch time	Switch operation time to activate the comfort flasher function	Normal	0.4 seconds (default)
		Long	0.8 seconds
Hazard answer back	Adjustment of the number of keyless hazard warning light answer back flashes	Lock:1, Unlock:2	LOCK: Flashes once, UNLOCK: Flashes twice (default)
		Lock:1, Unlock:0	LOCK: Flashes once, UNLOCK: No flash
		Lock:0, Unlock:2	LOCK: No flash, UNLOCK: Flash twice
		Lock:2, Unlock:1	LOCK: Flash twice, UNLOCK: Flash once
		Lock:2, Unlock:0	LOCK: Flash twice, UNLOCK: No flash
		Lock:0, Unlock:1	LOCK: No flash, UNLOCK: Flash once
		Lock:0, Unlock:0	No function
Headlight auto cut customize	Adjustment of headlight automatic shutdown function	Disable	No function
		Enable (C-spec.)	With function (default)

REMOVAL AND INSTALLATION

M1540101000153



Removal Steps

- Front bumper assembly (Refer to GROUP 51 –Front Bumper Assembly P.51-3).

1. Headlight assembly
2. Headlight bulb (low-beam)

Removal Steps (Continued)

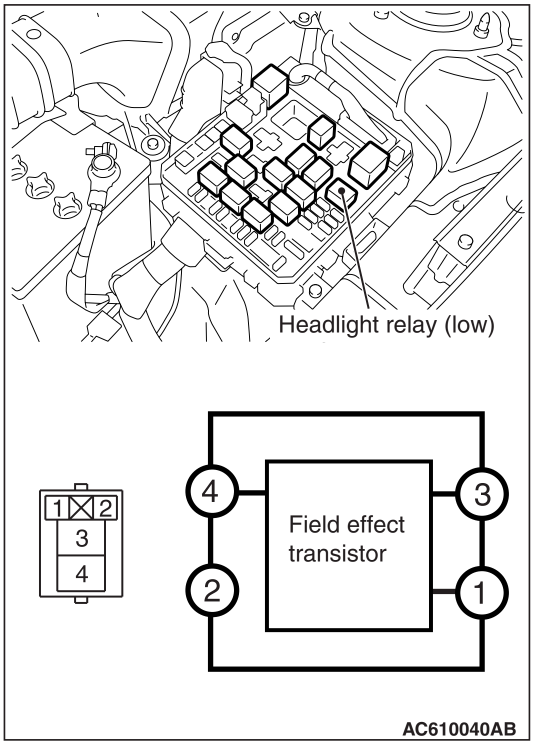
3. Headlight bulb (high-beam)
4. Front turn-signal light bulb
5. Position light bulb
6. Grommet

INSPECTION

HEADLIGHT RELAY CHECK

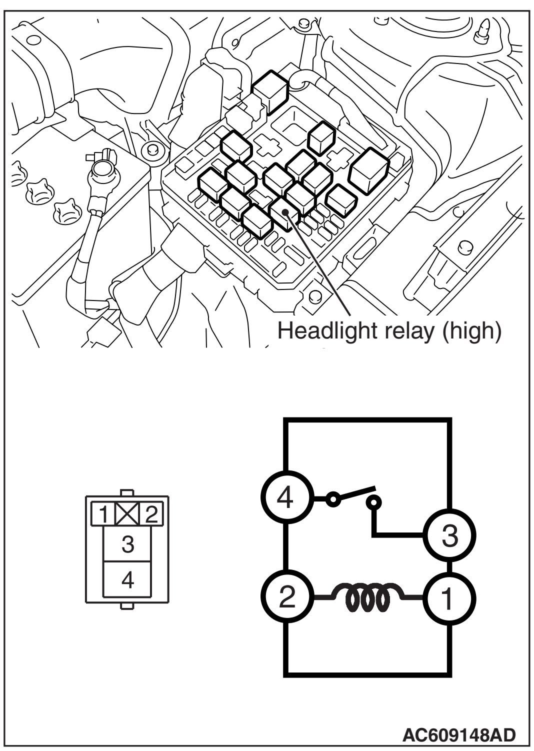
M1540104000141

HEADLIGHT RELAY (LOW) CHECK



Battery voltage	Terminal number	Normal conditions
Not energized	3 –4	No continuity
With current supply [terminal 4 (+), terminal 1 (–)]		Continuity exists (2 ohms or less)

HEADLIGHT RELAY (HIGH) CHECK

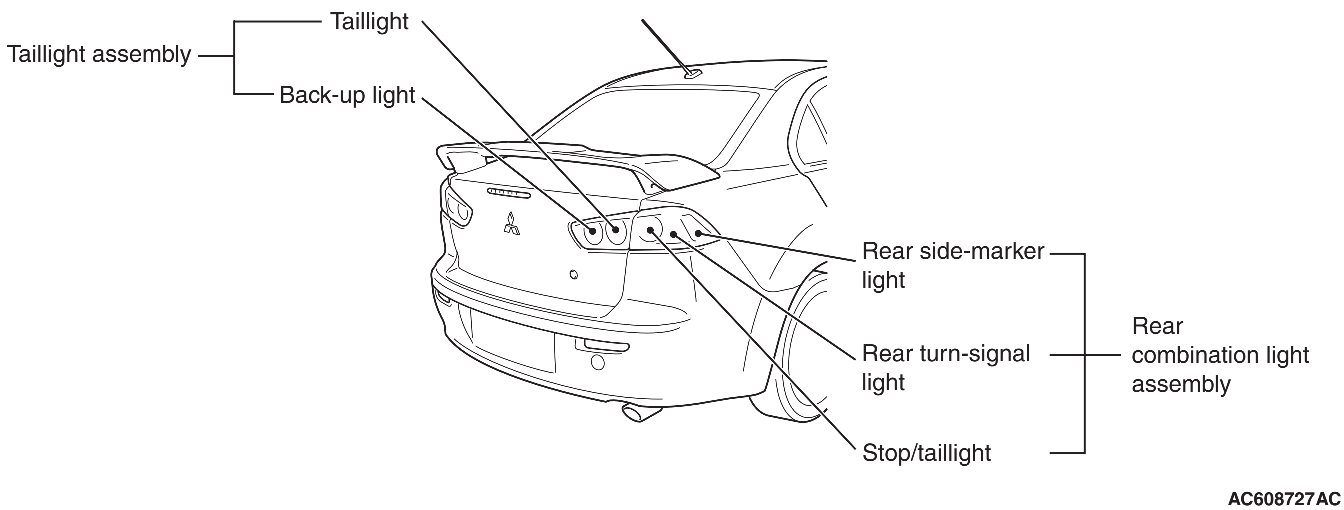


Battery voltage	Terminal number	Normal conditions
Not energized	3 –4	No continuity
With current supply [terminal 1 (+), terminal 2 (–)]		Continuity exists (2 ohms or less)

REAR COMBINATION LIGHT

GENERAL INFORMATION

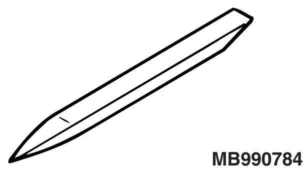
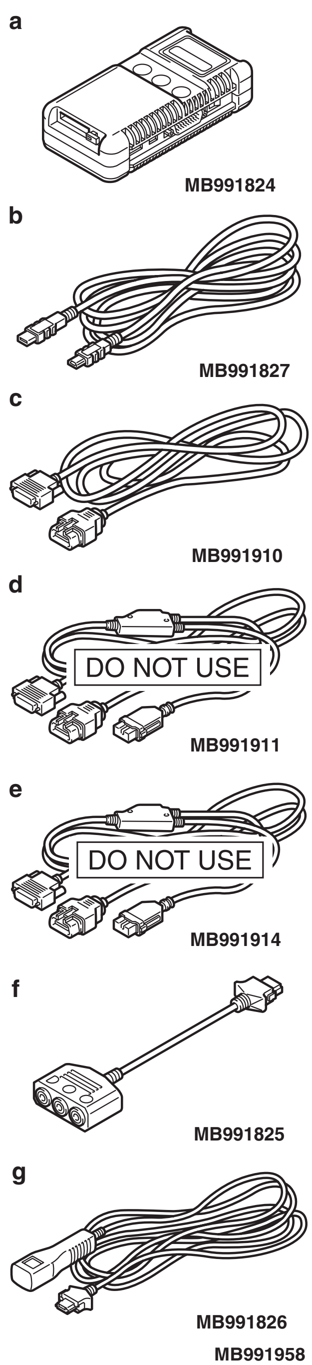
M1542000100327

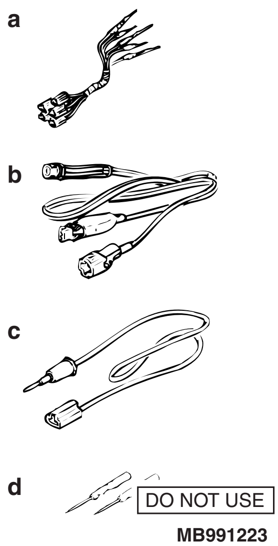
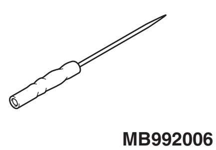


- The rear combination light assembly are integrated with the stop/taillight, rear turn-signal light and rear side-marker light.
- The taillight assembly are integrated with the taillight and back-up light.

SPECIAL TOOLS

M1541400100087

Tool	Tool number and name	Supersession	Application
	MB990784 Ornament remover	General service tool	Removal of trunk lid trim, rear combination light assembly, taillight assembly
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1541402500081

Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, Troubleshooting Contents P.00-6.

DIAGNOSTIC FUNCTION

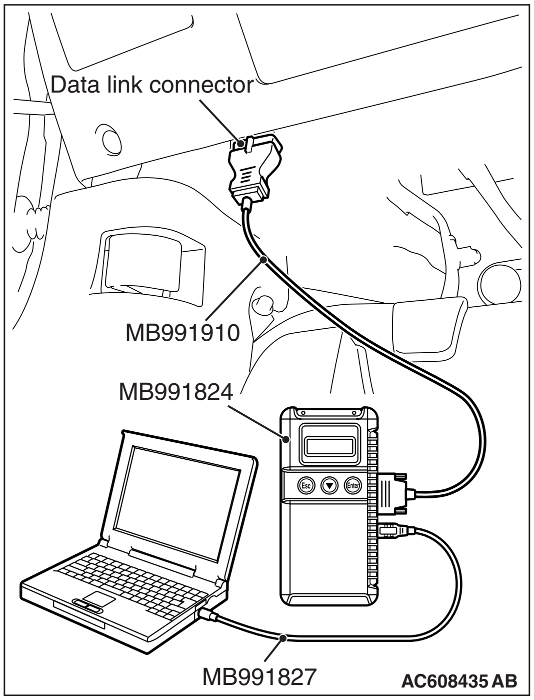
M1541400900038

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.

8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSTIC TROUBLE CODE CHART

M1541400200028

⚠ CAUTION

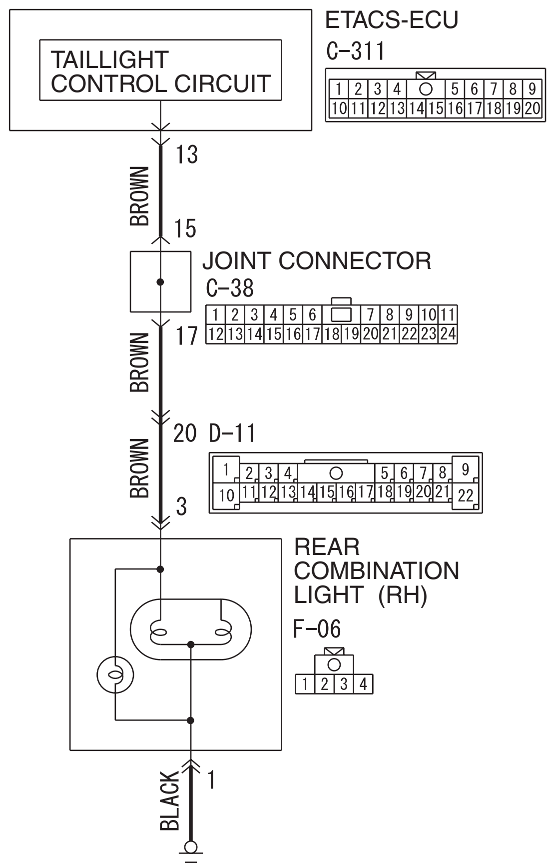
On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnostic trouble code(s) associated with other system may be set. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

Diagnostic trouble code No.	Diagnostic item	Reference page
B16A0	Taillight (RH) circuit open	P.54A-158
B16A7	Taillight (RH) circuit short	
B16A1	Taillight (LH) circuit open	P.54A-162
B16A8	Taillight (LH) circuit short	

DIAGNOSTIC TROUBLE CODE PROCEDURES

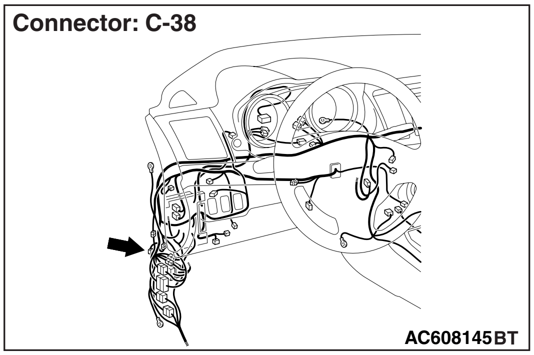
DTC B16A0: Taillight (RH) circuit open
DTC B16A7: Taillight (RH) circuit short

Taillight (RH) Circuit



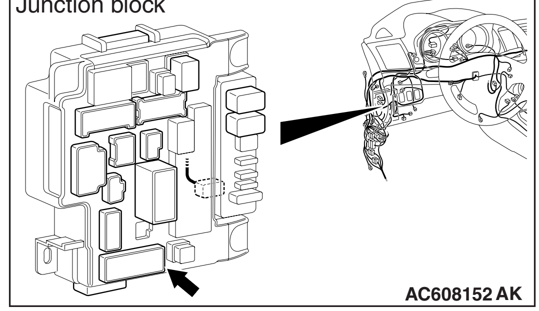
W8G54M034A

Connector: C-38



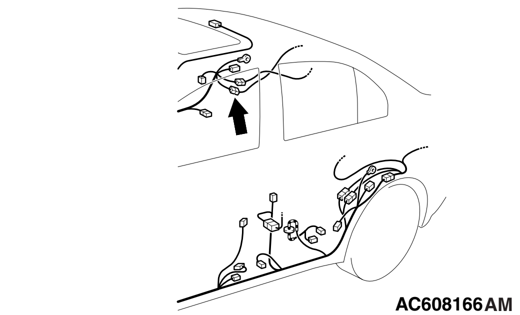
AC608145BT

Connector: C-311
Junction block

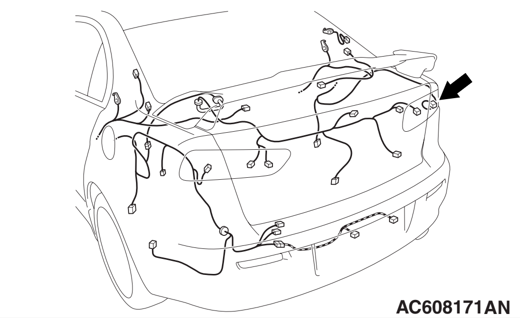


AC608152AK

Connector: D-11



Connector: F-06



TROUBLE JUDGEMENT

When an open circuit is detected in the taillight circuit, the ETACS-ECU sets DTC B16A0. If a short circuit is detected, DTC B16A7 is set.

TECHNICAL DESCRIPTION (COMMENT)

The problem detection of taillight is made based on the digital feed back signal (input signal to ETACS-ECU) which operates the taillight. When the ignition switch is "ON", the ETACS-ECU determines the taillight circuit state from the load placed on the line. After 100 ms has elapsed since the start of the check, the ETACS-ECU performs a sampling with each 10 ms. If an abnormality is detected, it increases the counter by 2, and when no abnormality is detected, it decreases the counter by 1. Once the counter reaches "10", the ETACS-ECU sets the DTC B16A0 if the load is detected on the line, and sets the DTC B16A7 if no load is detected.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

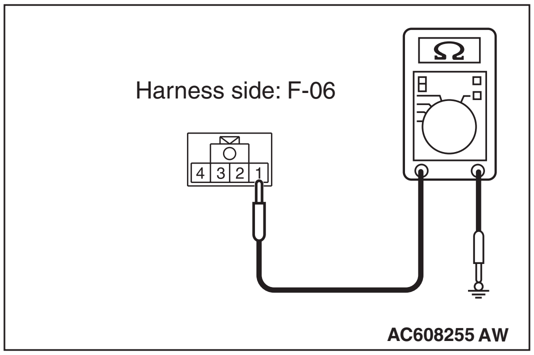
- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check rear combination light (RH) connector F-06 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination light (RH) connector F-06 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 2. Resistance measurement at rear combination light (RH) connector F-06.

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Measure the resistance between rear combination light (RH) connector F-06 (terminal 1) and the body ground.

OK: The measured value should be continuity exists (2 ohms or less).

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between rear combination light (RH) connector F-06 (terminal 1) and ground.

Q: Is the wiring harness between rear combination light (RH) connector F-06 (terminal 1) and ground in good condition?

YES : Go to Step 6.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check ETACS-ECU connectors C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-311 in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Check the wiring harness between rear combination light (RH) F-06 connector (terminal 3) and ETACS-ECU connector C-311 (terminal 13).

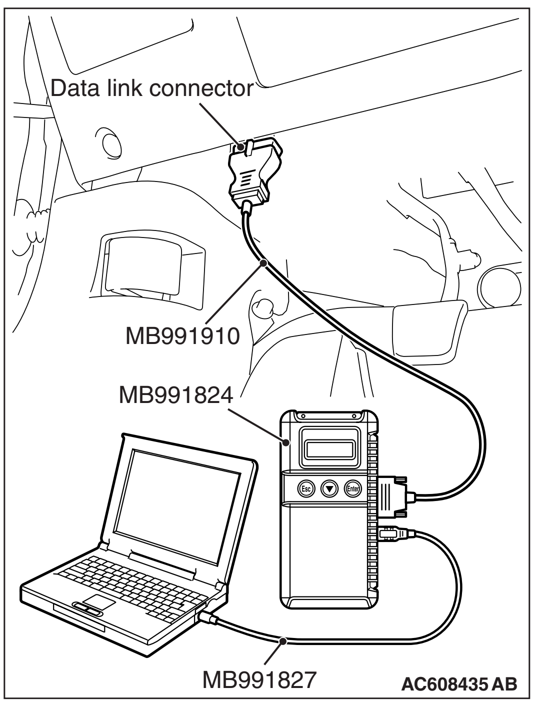
NOTE: Also check joint connector C-38 and intermediate connector D-11 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-38 or intermediate connector D-11 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the communication line for open circuit.

Q: Is the wiring harness between rear combination light (RH) F-06 connector (terminal 3) and ETACS-ECU connector C-311 (terminal No. 13) in good condition?

YES : Go to Step 6.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 6. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

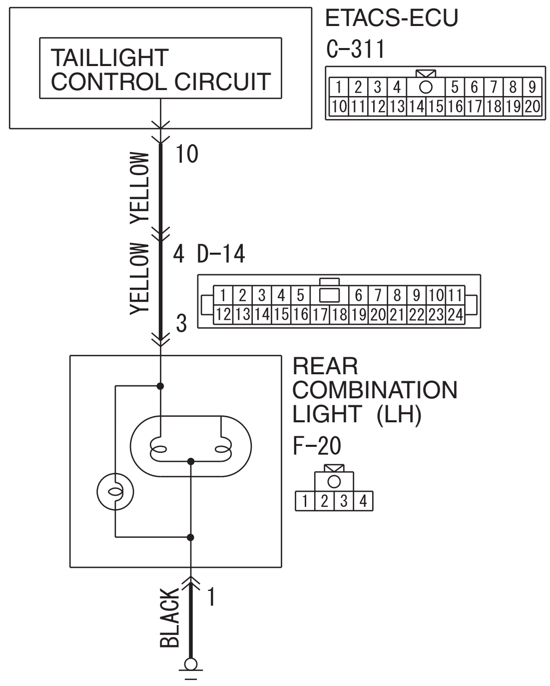
(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

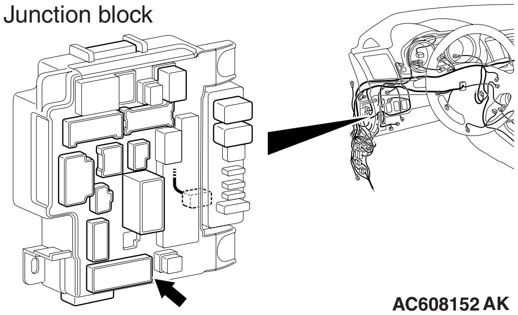
DTC B16A1: Taillight (LH) circuit open
DTC B16A8: Taillight (LH) circuit short

Taillight (LH) Circuit

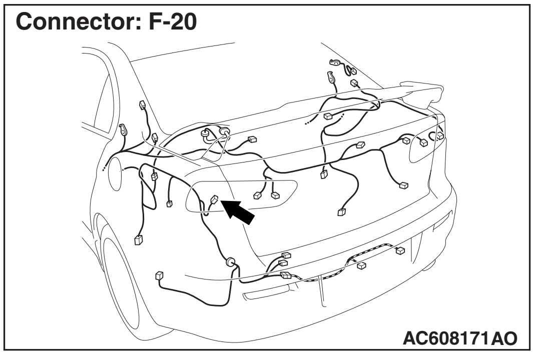


W8G54M035A

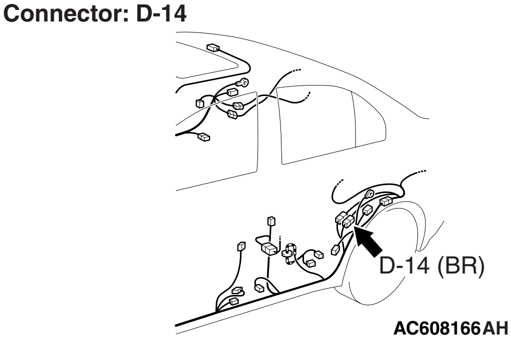
Connector: C-311
Junction block



Connector: F-20



Connector: D-14



TROUBLE JUDGEMENT

When an open circuit is detected in the taillight circuit, the ETACS-ECU sets DTC B16A1. If a short circuit is detected, DTC B16A8 is set.

TECHNICAL DESCRIPTION (COMMENT)

The problem detection of taillight is made based on the digital feed back signal (input signal to ETACS-ECU) which operates the taillight. When the ignition switch is "ON", the ETACS-ECU determines the taillight circuit state from the load placed on the line. After 100 ms has elapsed since the start of the check, the ETACS-ECU performs a sampling with each 10 ms. If an abnormality is detected, it increases the counter by 2, and when no abnormality is detected, it decreases the counter by 1. Once the counter reaches "10", the ETACS-ECU sets the DTC B16A1 if the load is detected on the line, and sets the DTC B16A8 if no load is detected.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

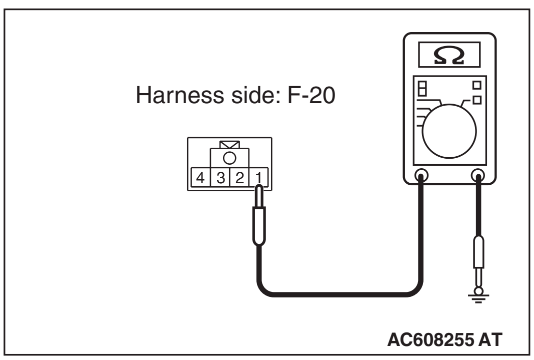
- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check rear combination light (LH) connector F-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination light (RH) connector F-20 in good condition?

YES : Go to Step 2.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 2. Resistance measurement at rear combination light (LH) connector F-20.



(1) Disconnect the connector, and measure at the wiring harness side.
(2) Measure the resistance between the rear combination light (LH) connector F-20 (terminal 1) and the body ground.

OK: The measured value should be continuity exists (2 ohms or less).

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between rear combination light (LH) connector F-20 (terminal 1) and ground.

Q: Is the wiring harness between rear combination light (LH) connector F-20 (terminal 1) and ground in good condition?

YES : Go to Step 6.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check ETACS-ECU connectors C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-311 in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

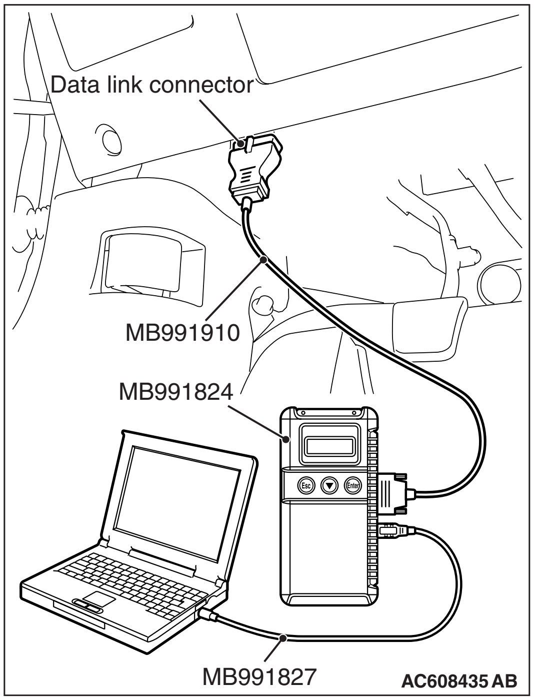
STEP 5. Check the wiring harness between rear combination light (LH) F-20 connector (terminal 3) and ETACS-ECU connector C-311 (terminal 10).

NOTE: Also check intermediate connector D-14 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

- Check the communication line for open circuit.

Q: Is the wiring harness between rear combination light (LH) F-20 connector (terminal 3) and ETACS-ECU connector C-311 (terminal 10) in good condition?

YES : Go to Step 6.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 6. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

TROUBLE SYMPTOM CHART

M1541401000072

Inspection Procedure No.	Trouble symptom	Reference page
1	The taillights do not illuminate.	P.54A-165
2	Any of the taillights does not illuminate.	P.54A-168

SYMPTOM PROCEDURES

Inspection Procedure 1: The Taillights do not Illuminate.

⚠ **CAUTION**

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If all the taillights do not illuminate normally, the taillight switch input circuit or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of column switch
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

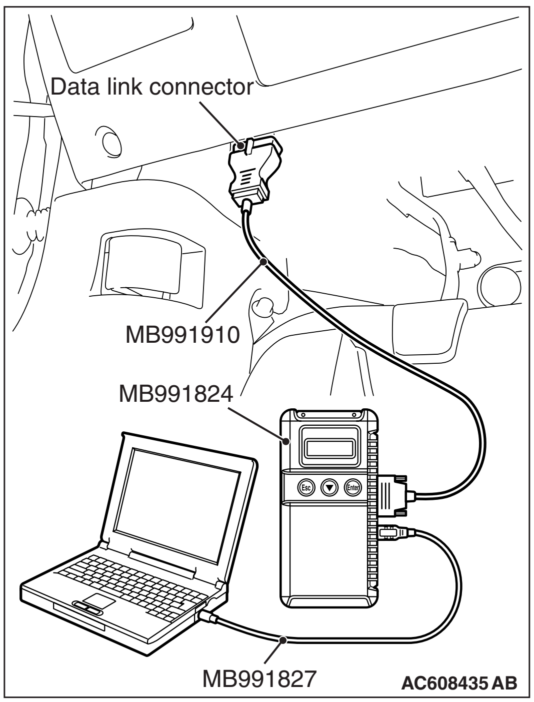
STEP 1. License plate light operation check

Check that the license plate light illuminates normally.

Q: Does license plate light work normally?

YES : Go to Step 2.
NO : Replace the ETACS-ECU.

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the taillight illumination.

- Turn the ignition switch to the "ACC" position.
- Turn the taillight switch to the "ON" position.

Item No.	Item name	Normal conditions
Item 218	Taillight	ON

Q: Does scan tool MB991958 display the items "Taillight" as normal condition?

YES : Go to Step 4.

NO : Troubleshoot the ETACS-ECU (Refer to P.54A-528).

STEP 4. Retest the system

Check that the taillight illuminates normally.

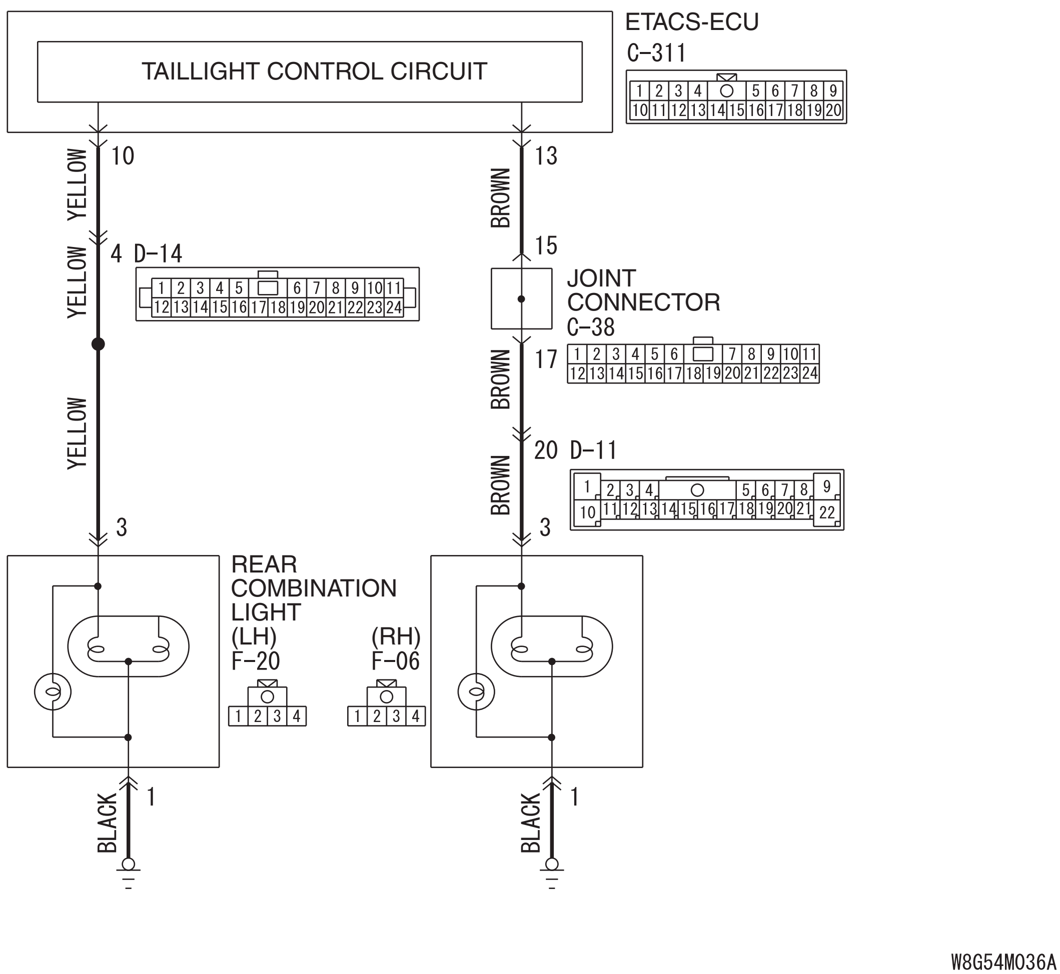
Q: Does the taillight work normally?

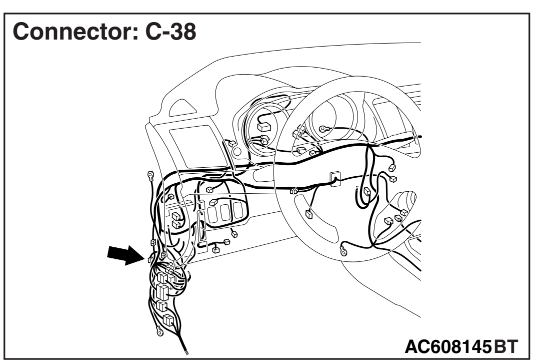
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

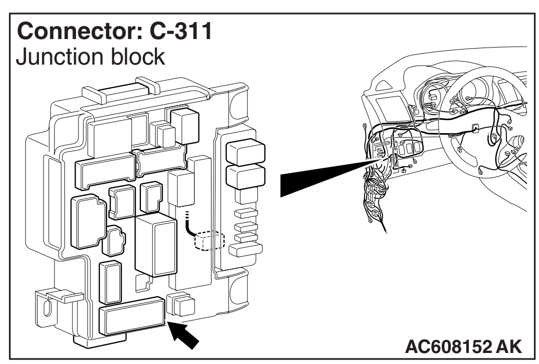
NO : Replace the ETACS-ECU.

Inspection Procedure 2: Any of the Taillights does not Illuminate.

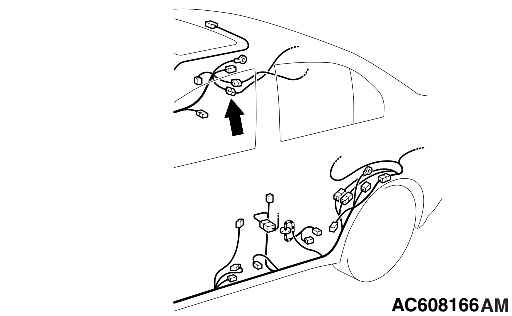
Taillight Circuit





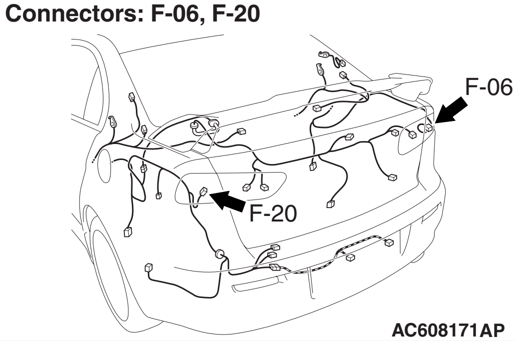


Connector: D-11



AC608166AM

Connectors: F-06, F-20



AC608171AP

TECHNICAL DESCRIPTION (COMMENT)

If any of the taillights do not illuminate, the wiring harness, connector(s), or rear combination light unit may have a problem, or the fuse may be burned out.

TROUBLESHOOTING HINTS

- Malfunction of rear combination light unit
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check rear combination light connector F-20 (LH) or F-06 (RH) for loose, corroded or damaged terminals, or terminals pushed back in the connector.

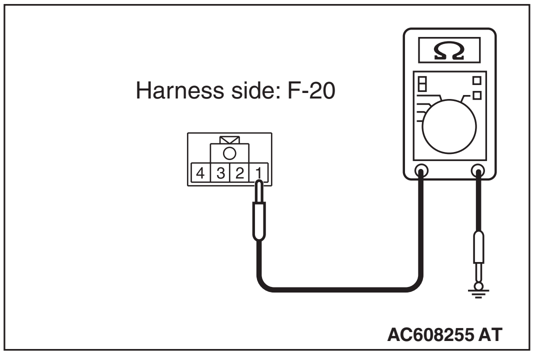
Q: Is rear combination light connector F-20 (RH) or F-06 (LH) in good condition?

YES : Go to Step 2.

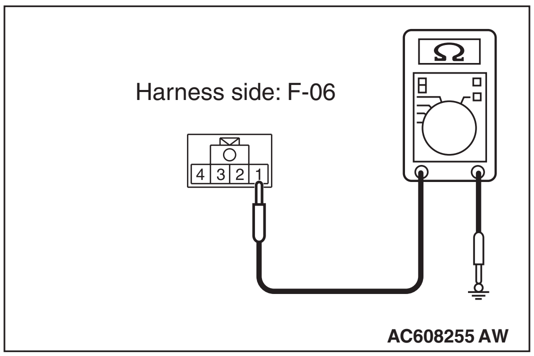
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 2. Resistance measurement at rear combination light connector F-20 (LH) or F-06 (RH).

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Measure the resistance between the connector of light which does not illuminate and body ground.



- Measure the resistance between rear combination light (LH) connector F-20 (terminal 1) and body ground.



- Measure the resistance between rear combination light (RH) connector F-06 (terminal 1) and body ground.

OK: The measured value should be continuity exists (2 ohms or less).

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between rear combination light connectors F-20 (LH) or F-06 (RH) (terminal 1) and ground.

Q: Is the wiring harness between rear combination light connectors F-20 (LH) or F-06 (RH) (terminal 1) and ground in good condition?

YES : Go to Step 6.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check ETACS-ECU connectors C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-311 in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Check the wiring harness between rear combination light connector and ETACS-ECU connector.

Check the communication line for open circuit.

- Check the wiring harness between rear combination light (LH) connector F-20 (terminal 3) and ETACS-ECU connector C-311 (terminal 10). <LH>
- Check the wiring harness between rear combination light (RH) connector F-06 (terminal 3) and ETACS-ECU connector C-311 (terminal 13). <RH>

NOTE: Also check joint connector C-38 and intermediate connector D-11 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-38 or intermediate connector D-11 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between rear combination light connector and ETACS-ECU connector in good condition?

YES : Go to Step 6.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 6. Retest the system.

Check that the taillight illuminates normally.

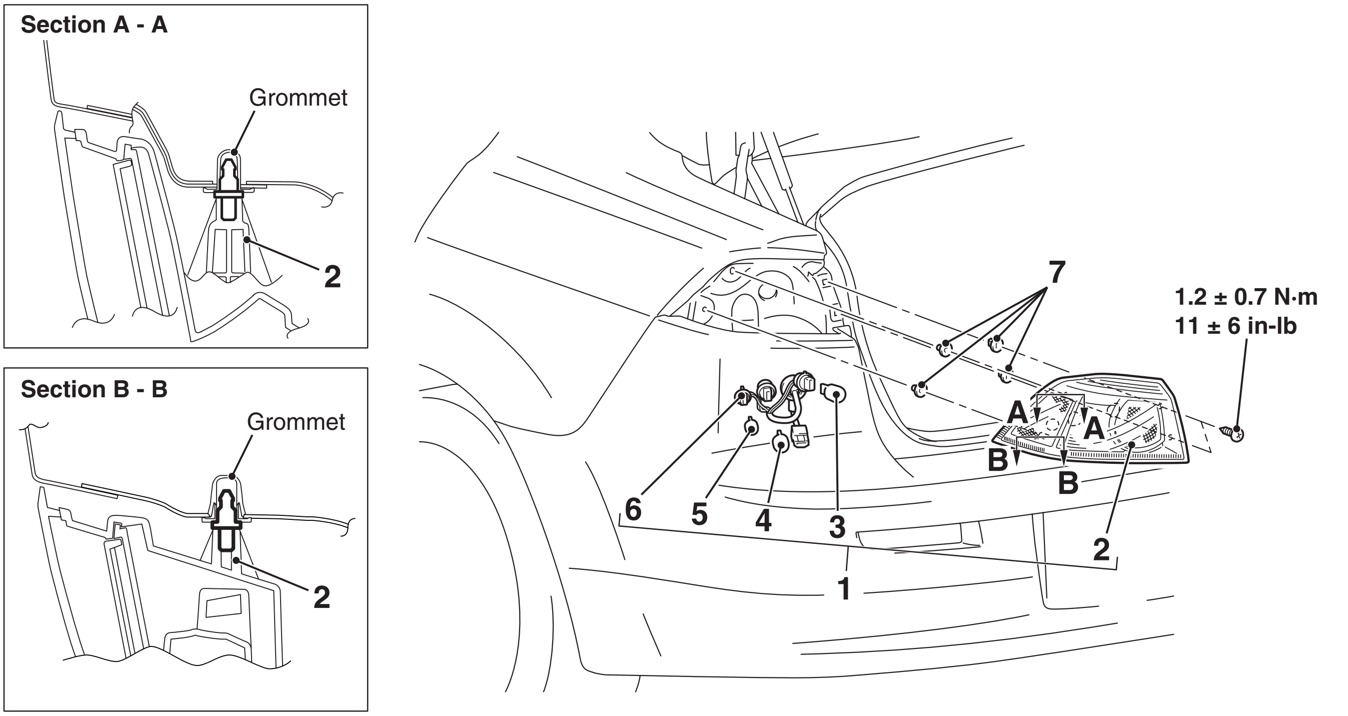
Q: Does the taillight work normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the rear combination light unit.

REAR COMBINATION LIGHT REMOVAL AND INSTALLATION

M1541402200154



AC610314AB

Removal Steps

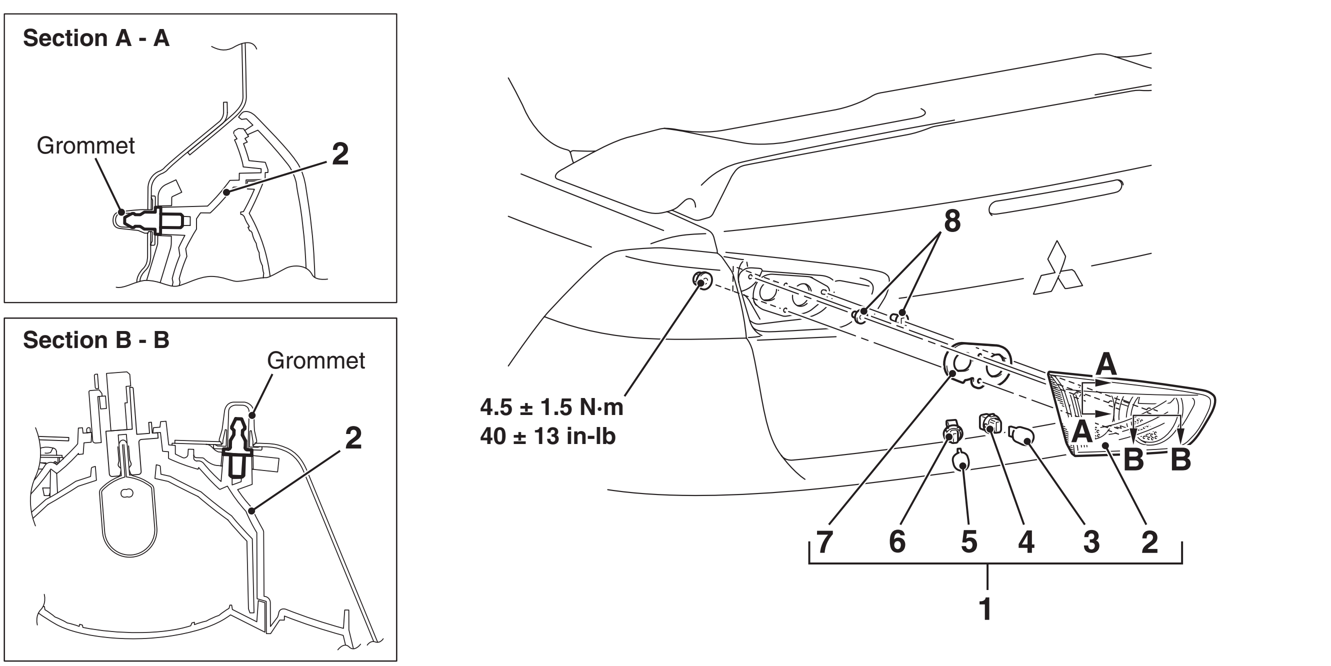
1. Rear combination light assembly
2. Rear combination light unit
3. Stop/taillight bulb
4. Rear turn-signal light bulb

Removal Steps (Continued)

5. Rear side-marker light bulb
6. Socket
7. Grommet

TAILLIGHT REMOVAL AND INSTALLATION

M1541402600022



AC610486AB

Removal Steps

- Trunk lid trim
1. Taillight assembly
2. Taillight unit
3. Back-up light bulb

Removal Steps (Continued)

4. Socket
5. Taillight bulb
6. Socket
7. Gasket
8. Grommet

FOG LIGHT

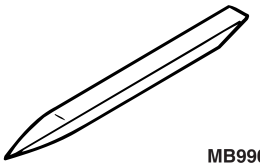
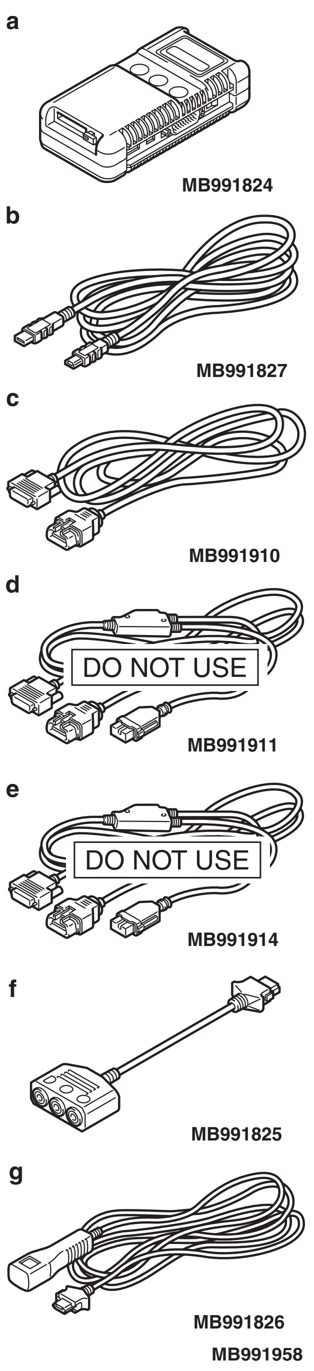
SERVICE SPECIFICATIONS

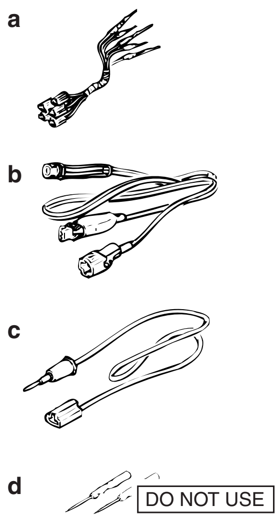
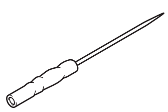
M1540400900091

Item	Standard value	Limit
Fog light aiming (cutoff line direction) [at 7.62 m (25.0 ft)]	The horizontal line 153.0 mm (6.02 inches) (1.15 degrees angle) below the horizontal line (H)	–
Fog light aiming (vertical direction) [at 7.62 m (25.0 ft)]	–	Area from 53.2 mm (2.09 inches) (0.4 degrees angle) above the cutoff line to 99.8 mm (3.93 inches) (0.75 degrees angle) below the cutoff line
Fog light aiming (horizontal direction) [at 7.62 m (25.0 ft)]	–	Vertical line (V) ±599.7 mm (± 23.6 inches) (±4.5 degrees angle).

SPECIAL TOOLS

M1540401800075

Tool	Tool number and name	Supersession	Application
 MB990784	MB990784 Ornament remover	General service tool	Removal of front fog light bezel
 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1540401700012

Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, Troubleshooting Contents P.00-6.

TROUBLE SYMPTOM CHART

M1540401000109

Inspection Procedure No.	Trouble symptom	Reference page
1	Fog lights do not illuminate normally.	P.54A-176
2	The right or left fog light does not illuminate.	P.54A-183
3	Fog light indicator does not illuminate/go out normally.	P.54A-187

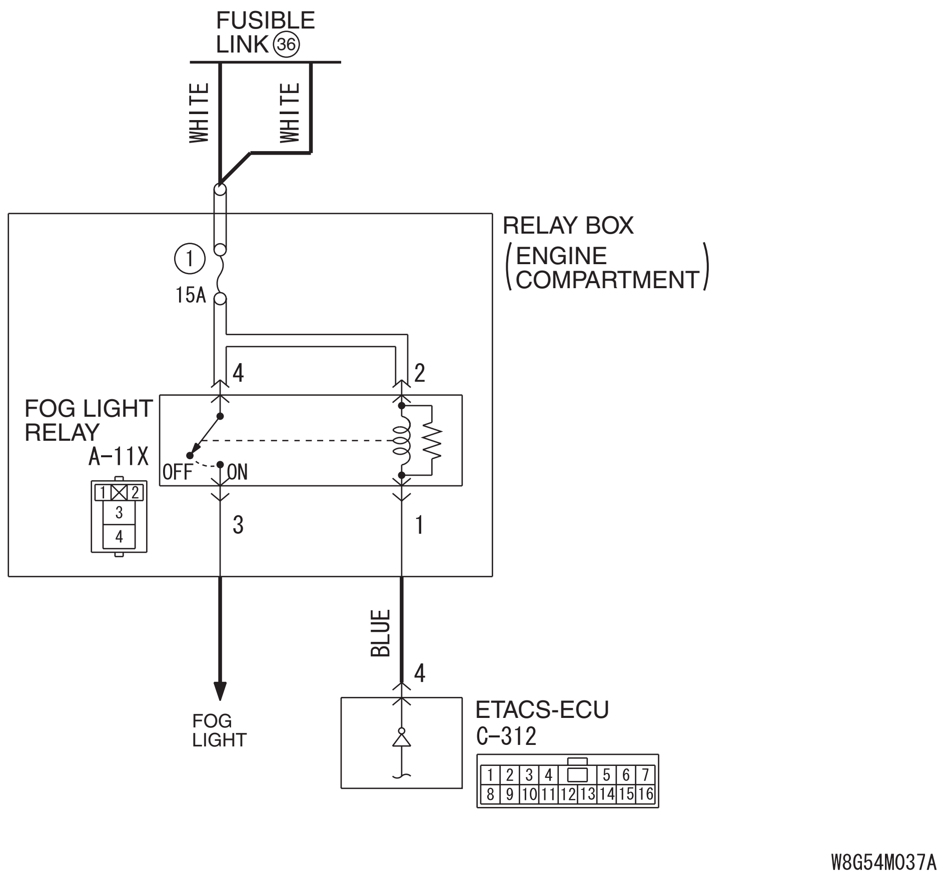
SYMPTOM PROCEDURES

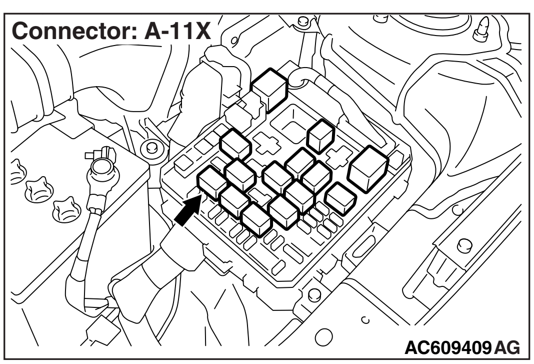
Inspection Procedure 1: The front fog lights do not illuminate normally.

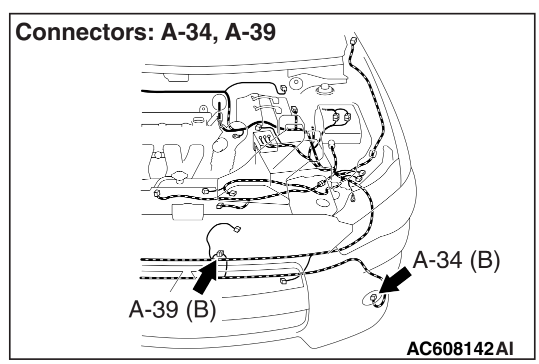
⚠ CAUTION

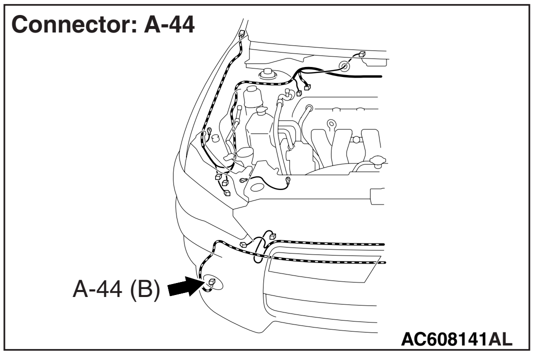
Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

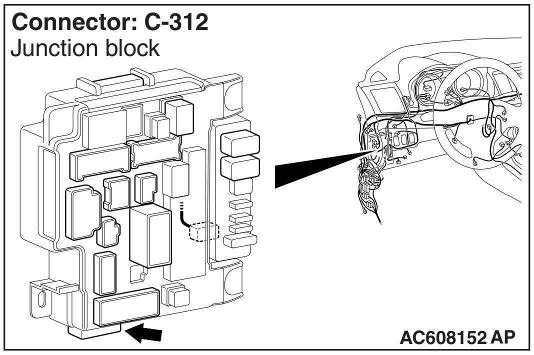
Fog Light and ETACS-ECU Communication Circuit











CIRCUIT OPERATION

If the fog lights do not illuminate normally, the input signal circuit(s) below or the ETACS-ECU may be defective.

- Tail light switch
- Headlight switch
- Fog light switch
- Option coding information

TECHNICAL DESCRIPTION (COMMENT)

When the fog lights do not illuminate normally, the mentioned input signal circuit(s) or ETACS-ECU may be defective.

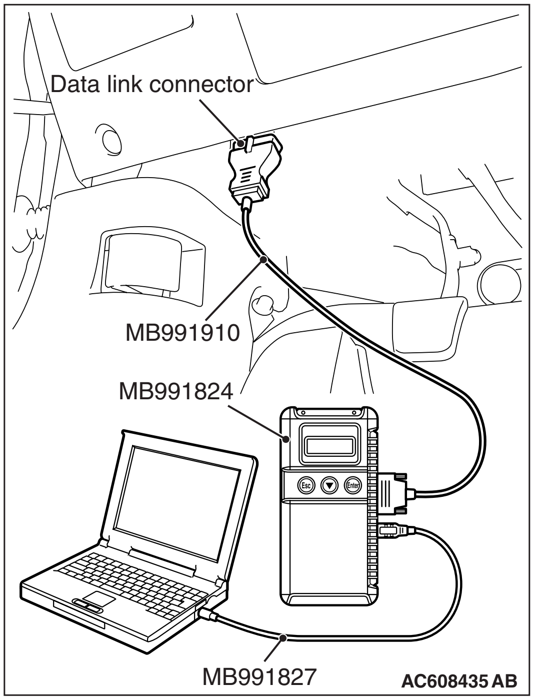
TROUBLESHOOTING HINTS

- Malfunction of the column switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. ETACS-ECU coding data check.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Read out the option coding information in ETACS-ECU (Refer to GROUP 00, Precautions before service, Coding Table P.00-35).
(4) Check that the "Front fog light" is set to "YES."
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the ETACS-ECU coding data normal?

YES : Go to Step 2.
NO : Operate scan tool MB991958 to set the option coding "Front fog light" to "Yes," and check the trouble symptom.

STEP 2. Check that the tail/stop lights and headlights operate.

Check that the tail/stop lights and headlights illuminate normally.

Q: Do the tail/stop lights and headlights operate normally?

YES : Go to Step 3.
NO : Check the tail/stop lights and the headlights (Refer to trouble symptom chart P.54A-110).

STEP 3. Using scan tool MB991958, read the other system diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.

(1) Turn the ignition switch to the "ON" position.
(2) Check whether the ETACS-ECU related DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to ETACS, Diagnosis P.54A-482).
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check data list.
Use the ETACS-ECU data list to check the signals related to the fog light function.

- Turn the ignition switch to the "ACC" position.
- Turn the fog light switch to ON.

Item No.	Item name	Normal condition
Item 212	Front fog light	ON

Q: Does scan tool MB991958 display the items "Front fog light" as normal condition?

YES : Go to Step 5.
NO : Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis - Inspection Procedure 12 "ETACS-ECU does not receive any signal from the column switch signal." P.54A-528.

STEP 5. Check fog light relay connector A-11X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is fog light relay connector A-11X in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the fog light relay.
Refer to P.54A-191.

Q: Is the fog light relay in good condition?

YES : Go to Step 7.
NO : Replace the fog light relay.

STEP 7. Check the battery power supply circuit to the fog light relay. Measure the voltage at fog light relay connector A-11X.

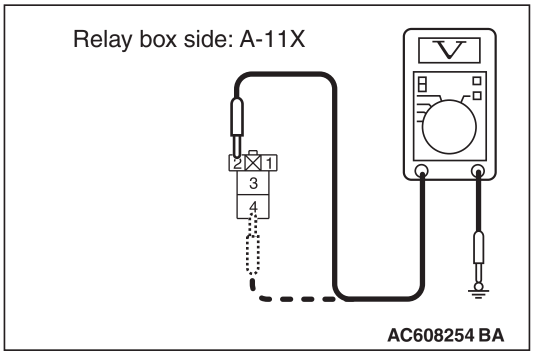
⚠ **CAUTION**

The top and bottom of the fog light relay are difficult to identify. Prior to inspection, confirm the triangle mark on the relay box.

(1) Disconnect fog light relay connector A-11X and measure the voltage available at the relay box side of the connector.

(2) Measure the voltage between terminal 2 and ground, and between terminal 4 and ground.

- The voltage should measure approximately 12 volts (battery positive voltage).



Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 9.

NO : Go to Step 8.

STEP 8. Check the wiring harness between fog light relay connector A-11X (terminal 2 and 4) and fusible link (36).

- Check the power supply line for open circuit.

Q: Is the wiring harness between fog light relay connector A-11X (terminal 2 and 4) and fusible link (36) in good condition?

YES : Go to Step 13.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Check ETACS-ECU connector C-312 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-312 in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 10. Check the wiring harness between fog light relay connector A-11X (terminal 1) and ETACS-ECU connector C-312 (terminal 4).

Q: Is the wiring harness between fog light relay connector A-11X (terminal 1) and ETACS-ECU connector C-312 (terminal 4) in good condition?

YES : Go to Step 11.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 11. Check the wiring harness between fog light relay connector A-11X (terminal 3) and fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 2).

NOTE: Also check intermediate connector A-39 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector A-39 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the power supply line for open circuit.

Q: Is the wiring harness between fog light relay connector A-11X (terminal 3) and fog light (LH) connector A-28 (terminal 2) or fog light (RH) connector A-38 in good condition?

YES : Go to Step 12.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 12. Check the wiring harness between fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 1) and ground.

NOTE: Also check intermediate connector A-39 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector A-39 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the ground wires for open circuit.

Q: Is the wiring harness between fog light (LH) connector A-28 or fog light (RH) connector A-38 (terminal 1) and ground in good condition?

YES : Go to Step 13.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 13. Retest the system.

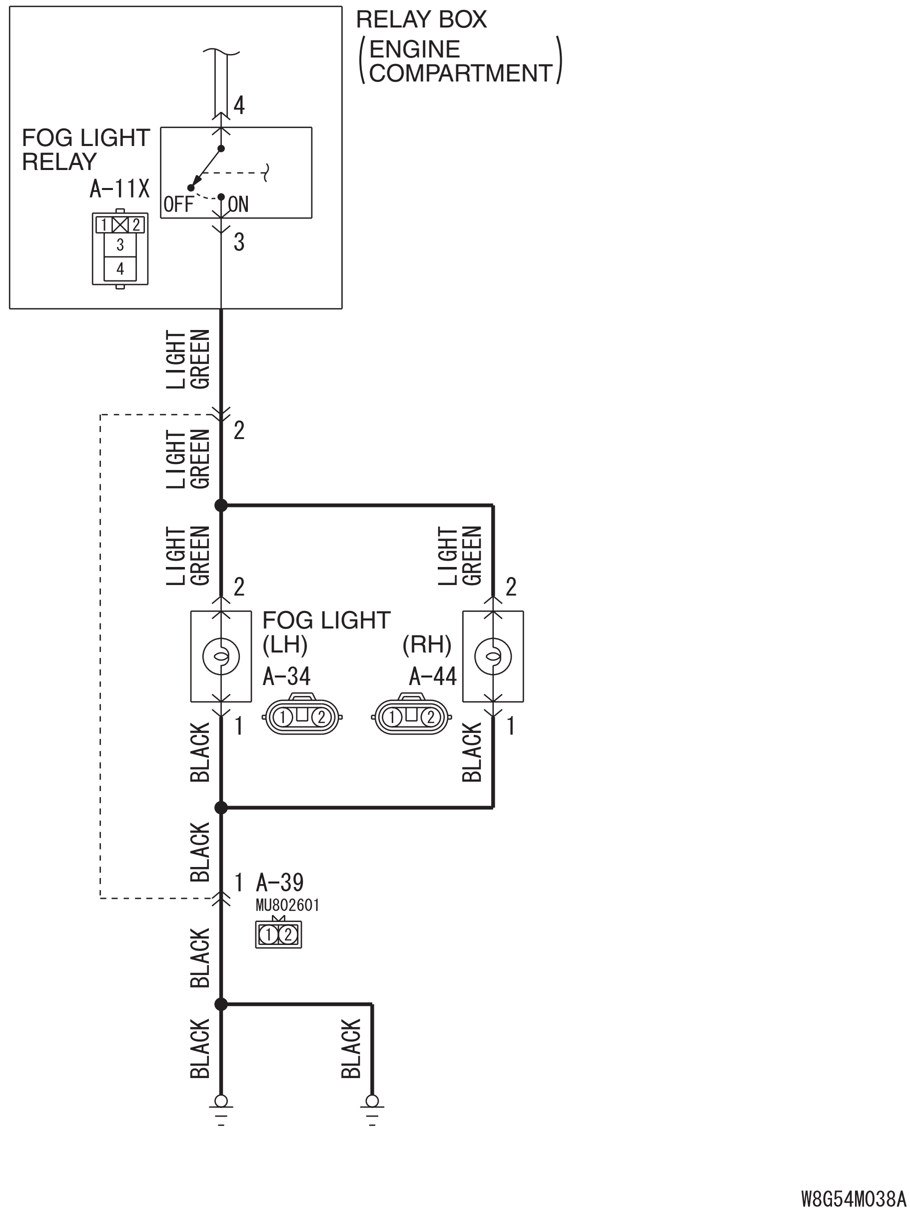
Q: Does the fog lights illuminate in good condition?

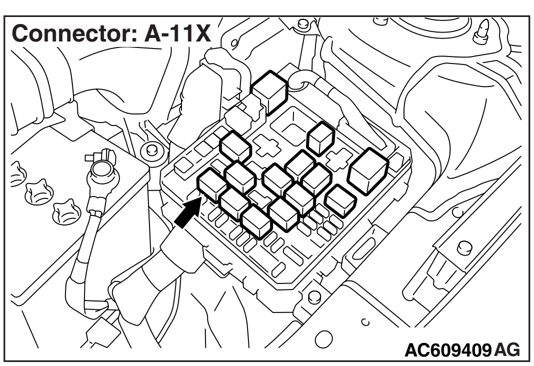
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

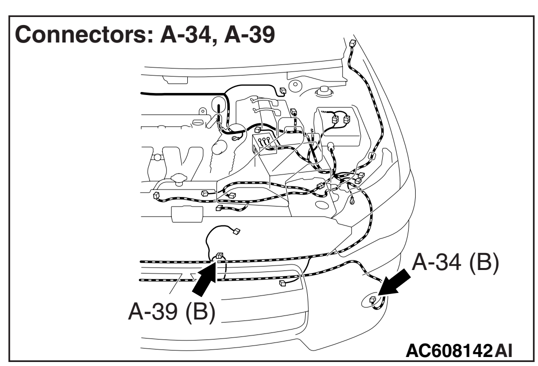
NO : Replace the ETACS-ECU.

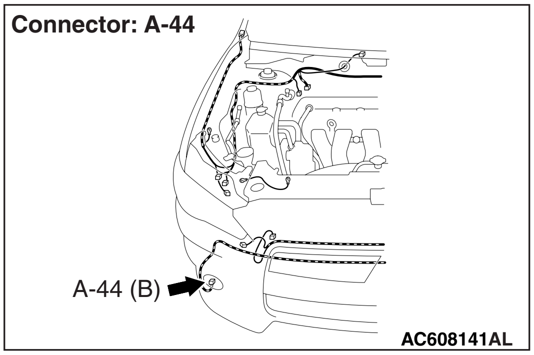
Inspection Procedure 2: Any of the front fog lights does not illuminate normally.

Fog Light Circuit









TECHNICAL DESCRIPTION (COMMENT)

If any of the fog lights do not illuminate, the wiring harness connector(s), the bulb or the fuse may be defective or burned out.

TROUBLESHOOTING HINTS

- Burned-out fog light bulb
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set

STEP 1. Check fog light (LH) connector A-34 or fog light (RH) A-44 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is fog light (LH) connector A-34 or fog light (RH) A-44 in good condition?

YES : Go to Step 2.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 2. Check the fog light bulb.

(1) Remove the fog light bulb.
(2) Verify that the fog light bulb is not damaged or burned out.

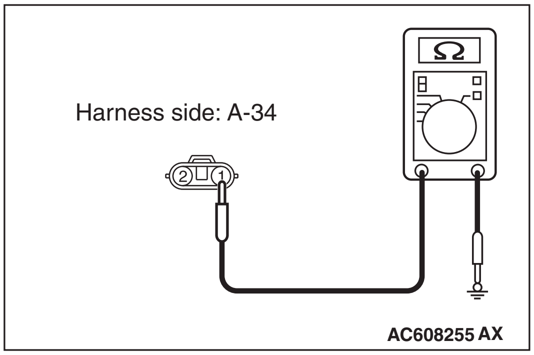
Q: Is the fog light bulb in good condition?

YES : Go to Step 3.
NO : Replace the fog light bulb.

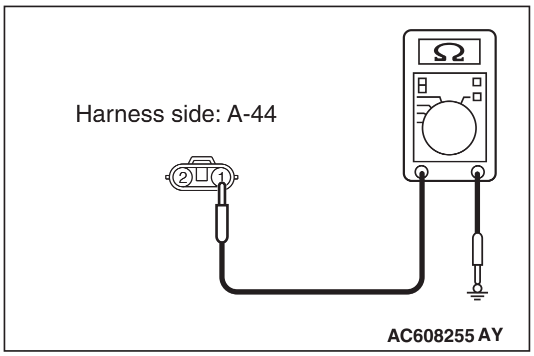
Step 3. Check the ground circuit to the fog light (LH) or fog light (RH). Measure the resistance at fog light (LH) connector A-34 or fog light (RH) connector A-44.

(1) Disconnect the connector, and measure at the wiring harness side.

(2) Check the resistance between the fog light connector and ground.



- Resistance between A-34 fog light (LH) connector terminal No.1 and ground



- Resistance between A-44 front fog light (RH) connector terminal No.1 and ground

OK: The resistance should be 2 ohm or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 5.
NO : Go to Step 4.

Step 4. Check the wiring harness between fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 1) and ground.

NOTE: Also check intermediate connector A-39 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector A-39 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the ground wires for open circuit.

Q: Is the wiring harness between fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 1) and ground in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Check fog light relay connector A-11X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is fog light relay connector A-11X in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the wiring harness between fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 2) and fog light relay connector A-11X (terminal 3).

NOTE: Also check intermediate connector A-39 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector A-39 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the power supply line for open circuit.

Q: Is the wiring harness between fog light (LH) connector A-34 or fog light (RH) connector A-44 (terminal 2) and fog light relay connector A-11X (terminal 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Retest the system.

Q: Does the right or left fog light does not illuminate in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

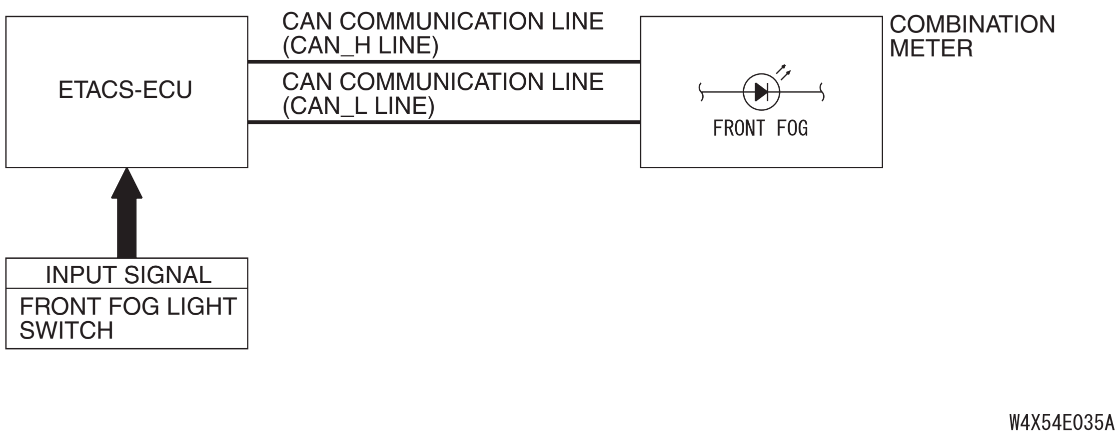
NO : Replace the fog light(s).

Inspection Procedure 3: The front fog light indicator does not illuminate normally.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Front Fog Light Indicator Light Circuit



TECHNICAL DESCRIPTION (COMMENT)

If the fog light indicator does not illuminate normally, connector(s), wiring harness in the CAN bus lines, the ETACS-ECU or the combination meter may be defective.

TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective
- The combination meter may be defective
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

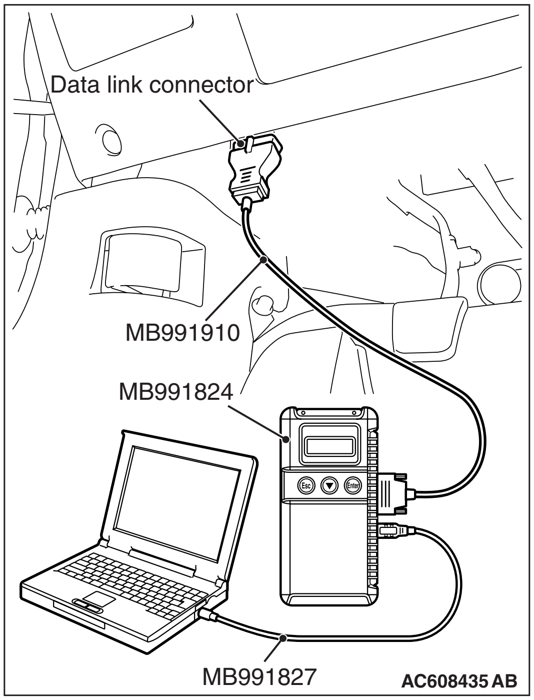
STEP 1. Check the fog lights.

When the fog light switch is operated, check that the fog lights illuminate and go off normally.

Q: Is the fog lights normal?

YES : Go to Step 2.

NO : First, repair the front fog lights. Refer to Inspection Procedure 2 "The right or left fog light does not illuminate P.54A-183."



STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Using scan tool MB991958, read the combination meter diagnostic trouble code.

(1) Check whether a combination meter-related DTC is set.
(2) Turn the ignition switch to the "ON" position. Check whether the combination meter-related DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the combination meter (Refer to combination meter, Diagnosis P.54A-23).
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Perform the actuator test for the combination meter, and check that the fog light indicator illuminates (Refer to combination meter, Diagnosis P.54A-53).
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Replace the ETACS-ECU.
NO : Replace the combination meter.

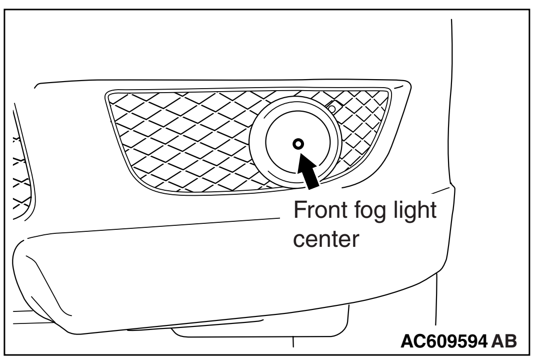
ON-VEHICLE SERVICE

FRONT FOG LIGHT AIMING

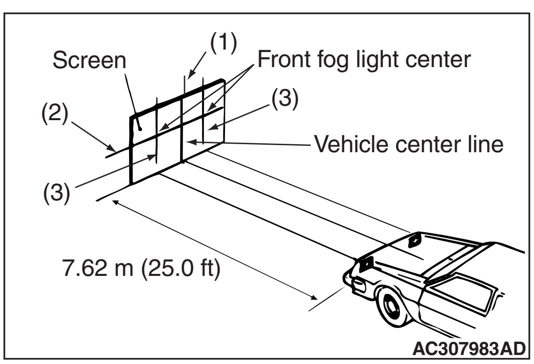
M1540400300141

PRE-AIMING INSTRUCTIONS

1. Inspect for rusted or faulty front fog light assemblies.
2. These conditions must be corrected before a satisfactory adjustment can be made.
3. Inspect tire inflation, and adjust if necessary.
4. If the fuel tank is not full, place a weight in the trunk of the vehicle to simulate weight of a full tank [3 kg (6.5 pounds) per gallon].
5. There should be no other load in the vehicle other than driver or substituted weight of approximately 68 kg (150 pounds) placed in driver's position.
6. Thoroughly clean the front fog light lenses.
7. Place the vehicle on a level floor, perpendicular to a flat screen 7.62 meters (25.0 ft) away from the bulb center-marks on the fog light lens.
8. Rock the vehicle sideways to allow the vehicle to assume its normal position.
9. Bounce the front suspension through three (3) oscillations by applying the body weight to the hood or bumper.

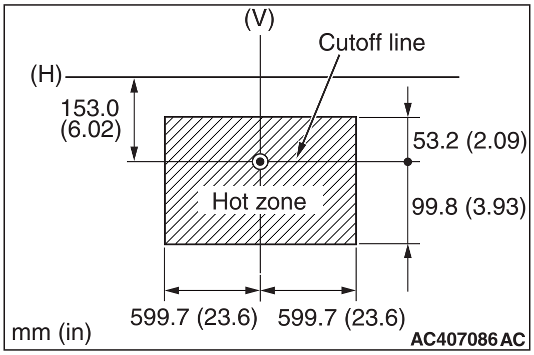


10. Measure the center of the front fog lights as shown in the illustration.



11. Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
    (1) Position a vertical tape or mark so that it is aligned with the vehicle center line.
    (2) Measure the distance from the center of the front fog light lens to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
    (3) Measure the distance from the center line of the vehicle to the center of each front fog light. Transfer the measurement to the screen. Vertical tape or mark on the screen is for reference to the center line of each front fog light.

FOG LIGHT ADJUSTMENT



1. Check if the beam shining onto the screen is at the standard value.

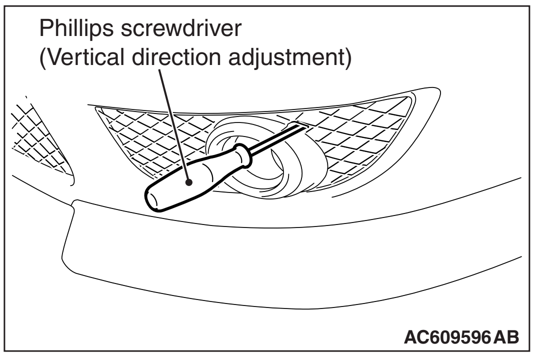
   Standard value:

   (Cutoff line direction): The horizontal line 153.0 mm (6.02 inches) (1.15 degrees angle) below the horizontal line (H)

   Limit:

   (Vertical direction): Area from 53.2 mm (2.09 inches) (0.4 degrees angle) above the cutoff line to 99.8 mm (3.93 inches) (0.75 degrees angle) below the cutoff line

   (Horizontal direction): Vertical line (V) ±599.7 mm (±23.6 inches) (±4.5 degrees angle)



2. If it is not within the standard value range, adjust by turning the adjusting screw.

NOTE: The horizontal direction is non-adjustable. If deviation of the light beam axis exceeds the standard value, check that the mounting location or some other points are not faulty.

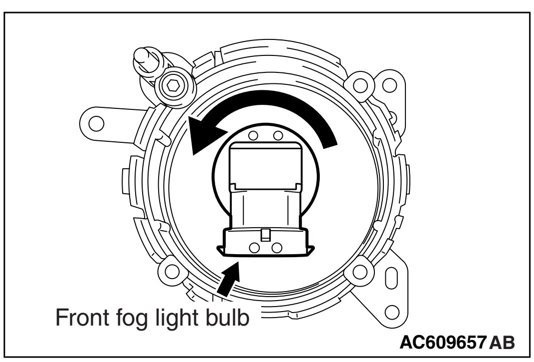
BULB REPLACEMENT

M1540400400148

1. Remove the front fog light bezel and the front fog light assembly. (Refer to P.54A-191.)

⚠ CAUTION

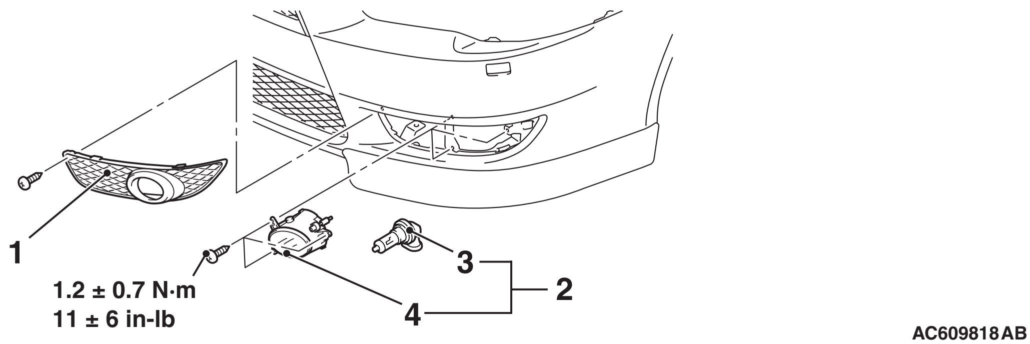
Don't touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, clean it with alcohol or thinner immediately and dry well, and then install it.



2. Disconnect the connector and withdraw the bulb.
3. Replace the bulb, and connect securely the connector.

REMOVAL AND INSTALLATION

M1540400500093



Removal steps

1. Front fog light bezel
2. Fog light assembly

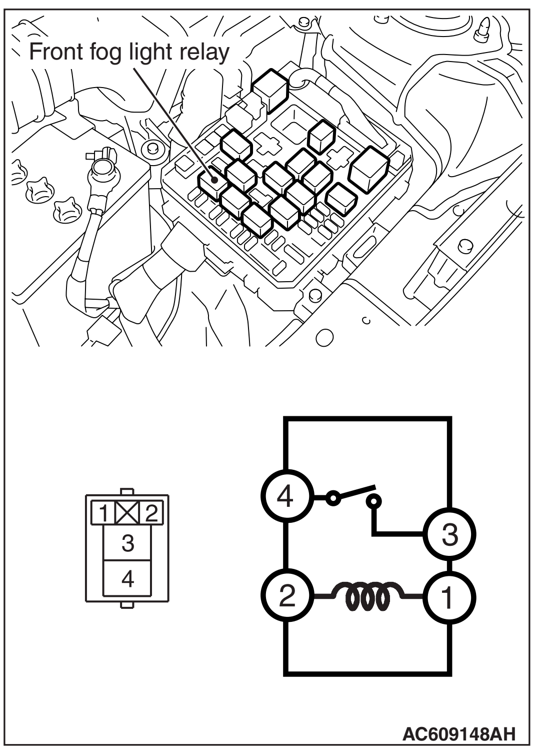
Removal steps (Continued)

3. Front fog light bulb
4. Front fog light unit

INSPECTION

FRONT FOG LIGHT RELAY CHECK

M1540400700075

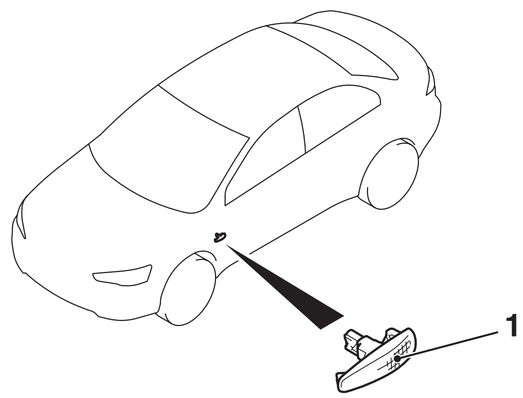


Battery voltage	Terminal number	Normal conditions
Not energized	3 –4	No continuity
With current supply [terminal 1 (+), terminal 2 (–)]		Continuity exists (2 ohms or less)

SIDE TURN-SIGNAL LIGHT

REMOVAL AND INSTALLATION

M1541800200145

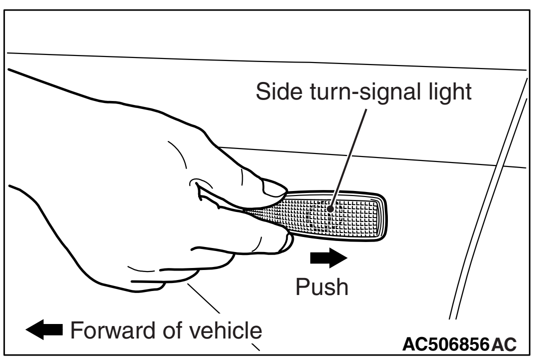


Removal step

<<**A**>> >>**A**<< 1. Side turn-signal light assembly

REMOVAL SERVICE POINT

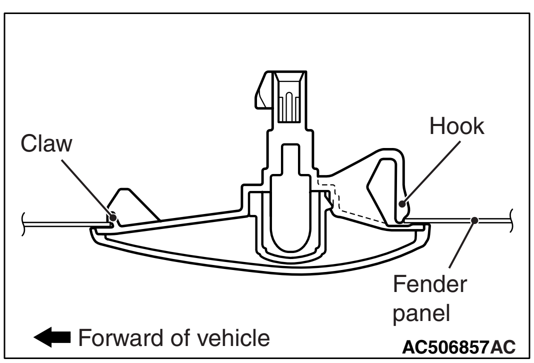
<<A>> SIDE TURN-SIGNAL LIGHT REMOVAL



Push the side turn-signal light toward the vehicle rear to bend the hook, and then remove by disengaging the tab from the fender panel.

INSTALLATION SERVICE POINT

>>A<< SIDE TURN-SIGNAL LIGHT INSTALLATION

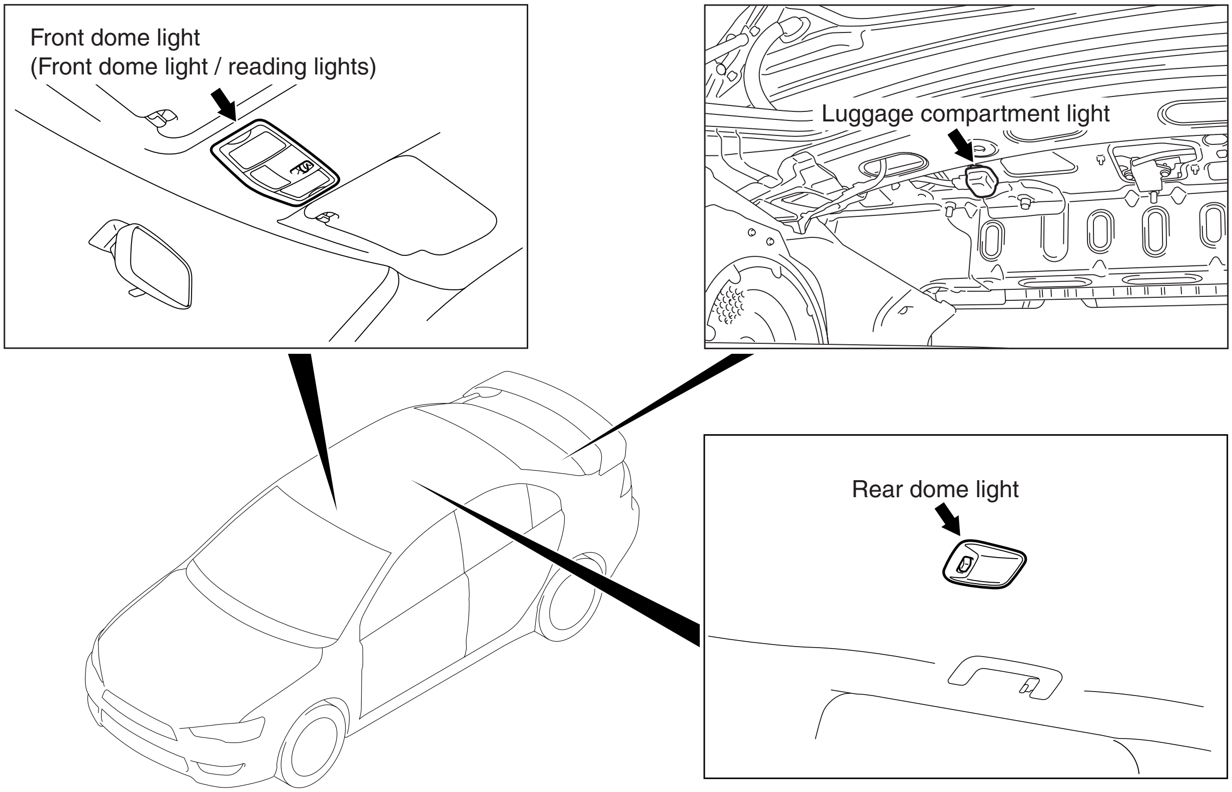


Engage the claw to the fender panel to install the side turn signal light.

DOME LIGHT

GENERAL INFORMATION

M1542000100338

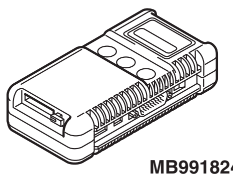
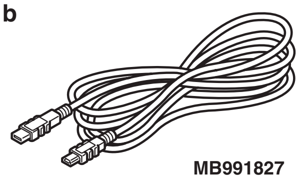
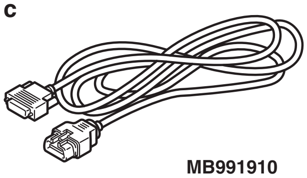
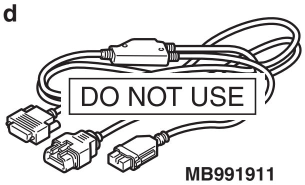
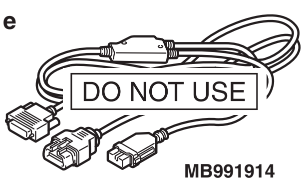
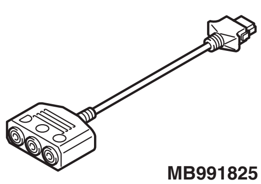
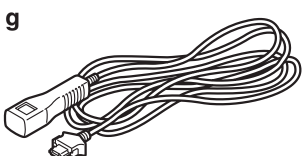


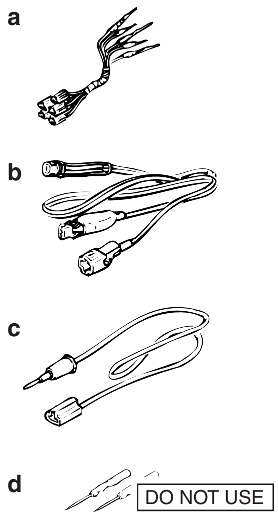
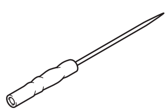
AC608728AB

- A front dome light, installed to the front part of the roof, has been equipped with the lens-push type map and dome light which can be operated easily from the driver's and front passenger's seat, offering excellent operability for turning on and off the light. <ES, GTS>
- The rear dome light, which illuminates the rear passenger's seat, is installed above the rear seat. <Vehicle without sunroof>
- The luggage compartment light is installed to the upper part of the luggage compartment.

SPECIAL TOOLS

M1541301600088

Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1541301500081

Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, Troubleshooting Contents P.00-6.

DIAGNOSTIC FUNCTION

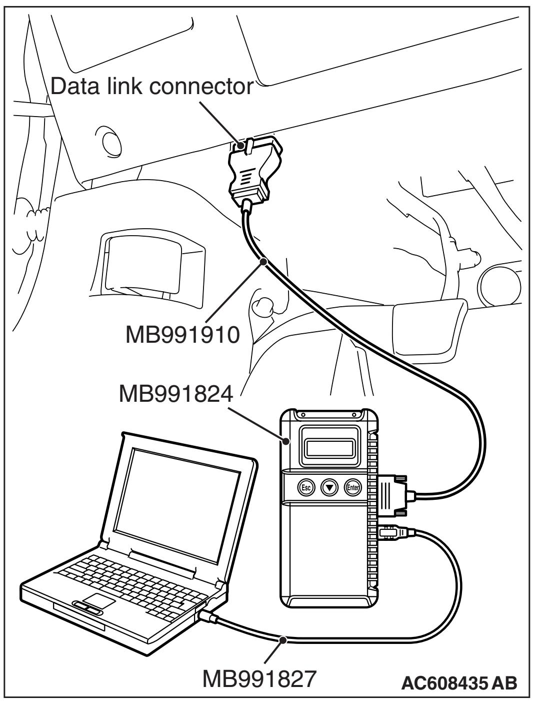
M1541302100020

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

TROUBLE SYMPTOM CHART

M1541300200139

Inspection Procedure No.	Trouble symptom	Reference page
1	The front dome light does not illuminate normally.	P.54A-198
2	The rear dome light does not illuminate normally.	P.54A-202
3	The luggage compartment light does not illuminate normally.	P.54A-206
4	The interior light auto-cut function does not operate correctly.	P.54A-209

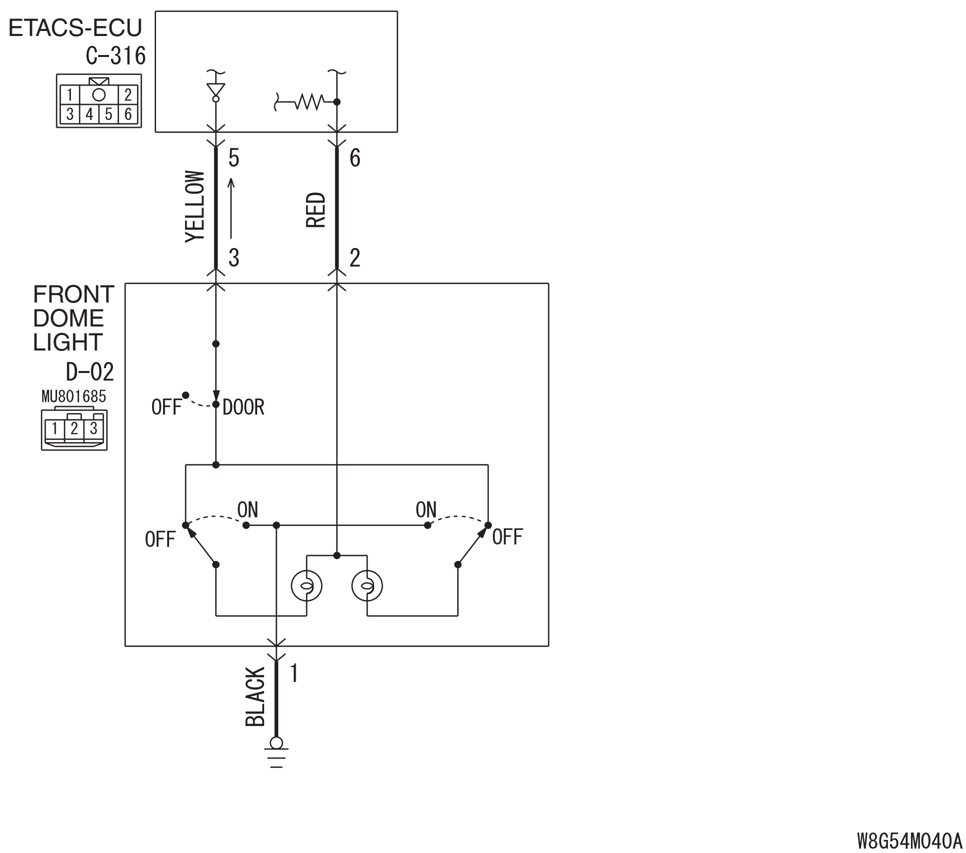
SYMPTOM PROCEDURES

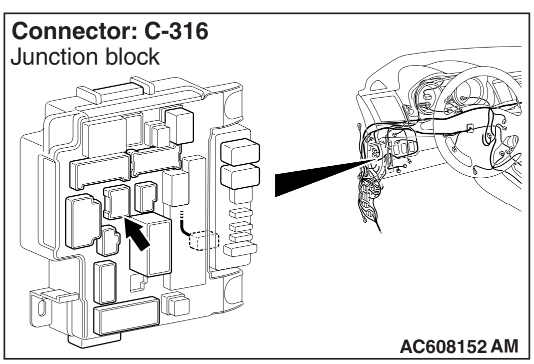
Inspection Procedure 1: The front dome light does not illuminate normally.

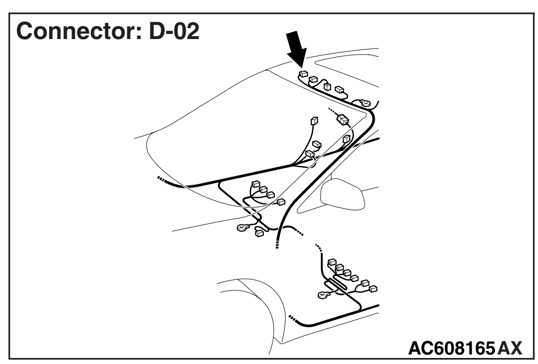
⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Front Dome Light Circuit







TROUBLE JUDGEMENT

The ETACS-ECU illuminates and extinguishes the front room light in accordance with the input signals below.

- Ignition switch (IG1)
- Key reminder switch

- Door switches
- Front door lock actuator

TECHNICAL DESCRIPTION (COMMENT)

If this does not work normally, the above switch input circuit(s), front dome light, or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of the key reminder switch
- Malfunction of door switch
- Malfunction of the front door lock actuator switch
- Malfunction of front dome light
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

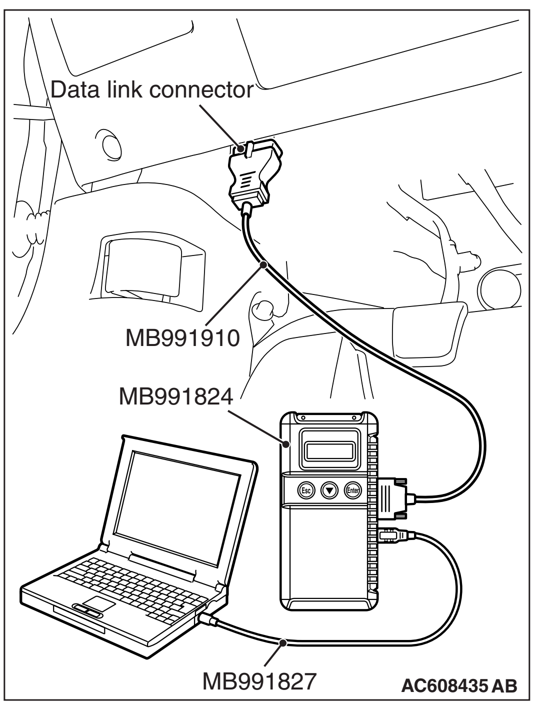
STEP 1. Rear dome light operation check.

Check that the rear dome light illuminates and extinguishes normally.

Q: Does rear dome light work normally?

YES : Go to Step 2.
NO : Replace the ETACS-ECU.

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the front dome light.

- Turn the ignition switch to the "LOCK" (OFF) position.
- Remove the ignition key from the ignition key cylinder.
- Open each door.

Item No.	Item name	Normal condition
Item 228	Dr door unlock	ON
Item 254	IG voltage	Battery voltage
Item 256	Dr door ajar switch	Open
Item 257	As door ajar switch	Open
Item 258	RR door ajar switch	Open
Item 259	RL door ajar switch	Open
Item 264	Handle lock switch	Key in → Key out

Q: Does scan tool MB991958 display the items "Dr door unlock", "IG voltage", "Dr door ajar switch", "As door ajar switch", "RR door ajar switch", "RL door ajar switch" and "Handle lock switch" as normal condition?

YES : (Normal conditions are displayed for all items.) Go to Step 4.

NO : (Normal condition is not displayed.) Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis, Input signal chart P.54A-528.

STEP 4. Check front dome light connector D-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front dome light connector D-02 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Front dome light bulb check

Check that the front dome light bulb is normal.

Q: Is front dome light bulb normal?

YES : Go to Step 6.

NO : Replace the front dome light bulb.

STEP 6. Check ETACS-ECU connector C-316 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-316 in good condition?

YES : Go to Step 7.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 7. Check the wiring harness between front dome light connector D-02 (terminal 2, 3) and ETACS-ECU connector C-316 (terminal 6, 5)

Q: Are wiring harness between front dome light connector D-02 (terminal 2, 3) and ETACS-ECU connector C-316 (terminal 6, 5) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 8. Check front dome light connector D-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front dome light connector D-02 in good condition?

YES : Go to Step 9.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 9. Check the wiring harness between front dome light connector D-02 (terminal 1) and body ground.

Q: Is wiring harness between front dome light connector D-02 (terminal 1) and body ground in good condition?

YES : Replace the front dome light, and then go to Step 10.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 10. Retest the system

Check that the front dome light illuminates and extinguishes normally.

Q: Do the front dome light work normal?

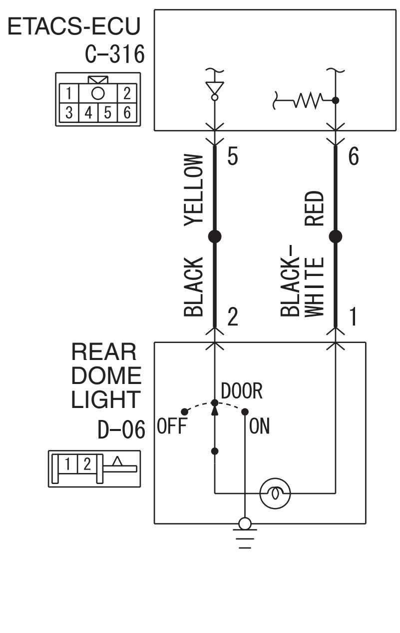
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

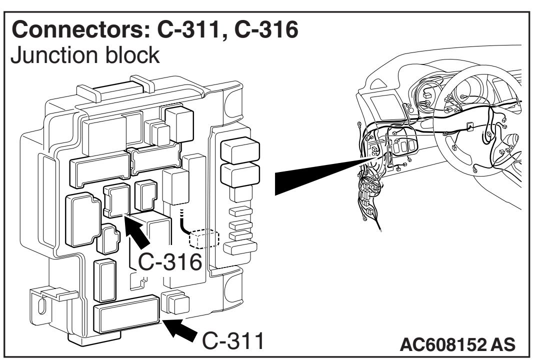
Inspection Procedure 2: The rear dome light does not illuminate normally.

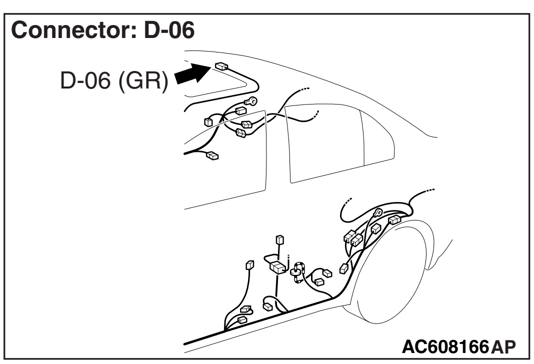
⚠ CAUTION

Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Rear Dome Light Circuit







TROUBLE JUDGEMENT

The ETACS-ECU illuminates and extinguishes the rear dome light in accordance with the input signals below.

- Ignition switch (IG1)
- Key reminder switch
- Door switches
- Front door lock actuator

TECHNICAL DESCRIPTION (COMMENT)

If this does not work normally, the above switch input circuit(s), rear dome light, or ETACS-ECU may have a problem.

PROBABLE CAUSES

- Malfunction of the key reminder switch
- Malfunction of door switch
- Malfunction of the front door lock actuator (RH)
- Malfunction of rear dome light
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

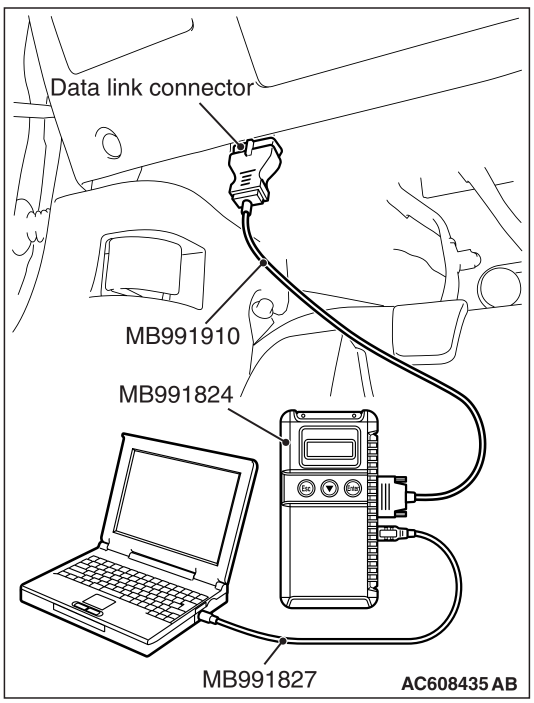
STEP 1. Front dome light operation check

Check that the front dome light illuminates and extinguishes normally.

Q: Does rear dome light work normally?

YES : Go to Step 2.
NO : Replace the ETACS-ECU.

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the rear dome light.

- Turn the ignition switch to the "LOCK" (OFF) position.
- Remove the ignition key from the ignition key cylinder.
- Open each door.

Item No.	Item name	Normal condition
Item 228	Dr door unlock	ON
Item 254	IG voltage	Battery voltage
Item 256	Dr door ajar switch	Open
Item 257	As door ajar switch	Open
Item 258	RR door ajar switch	Open
Item 259	RL door ajar switch	Open
Item 264	Handle lock switch	Key in →Key out

Q: Does scan tool MB991958 display the items "Dr door unlock", "IG voltage", "Dr door ajar switch", "As door ajar switch", "RR door ajar switch", "RL door ajar switch" and "Handle lock switch" as normal condition?

YES : (Normal conditions are displayed for all items.) Go to Step 4.

NO : (Normal condition is not displayed.) Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis, Input signal chart P.54A-528.

STEP 4. Check rear dome light connector D-06 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is rear dome light connector D-06 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Rear dome light bulb check

Check that the rear dome light bulb is normal.

Q: Is rear dome light bulb normal?

YES : Go to Step 6.

NO : Replace the rear dome light bulb.

STEP 6. Check ETACS-ECU connector C-316 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-311 in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 7. Check the wiring harness between rear dome light D-06 connector (terminal 1, 2) and ETACS-ECU connector C-316 (terminal 6, 5)

Q: Is wiring harness between rear dome light D-06 connector (terminal 1, 2) and ETACS-ECU connector C-316 (terminal 6, 5) in good condition?

YES : Go to Step 8.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 8. Retest the system

Check that the rear dome light illuminates and extinguishes normally.

Q: Does rear dome light work normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

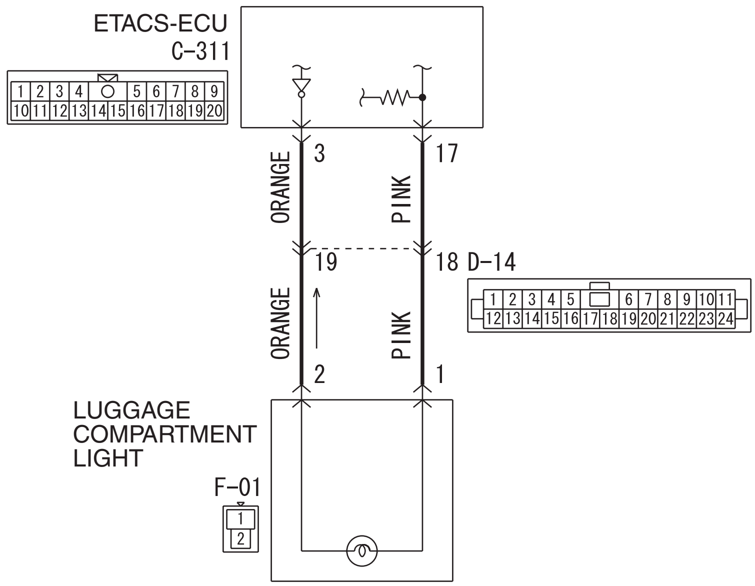
NO : Replace the ETACS-ECU.

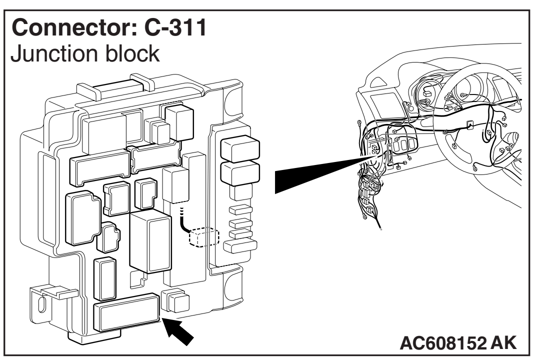
Inspection Procedure 3: The luggage compartment light does not illuminate normally.

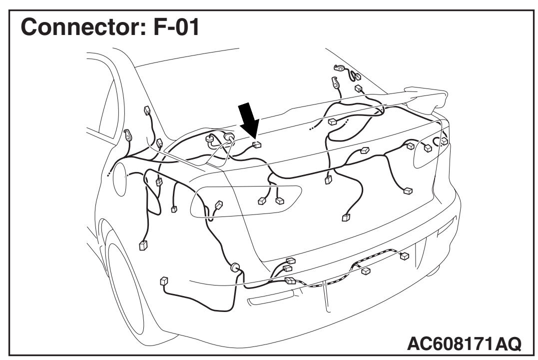
⚠ CAUTION

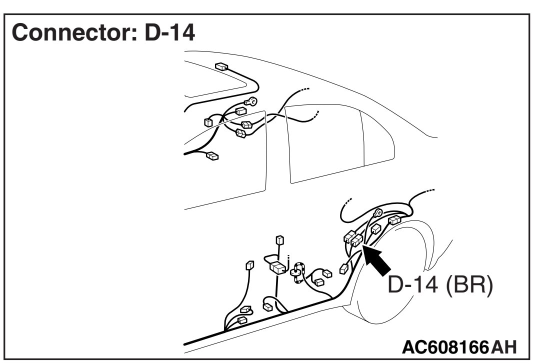
Whenever the ECU is replaced, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Luggage Compartment Light Circuit









TROUBLE JUDGEMENT

The ETACS-ECU illuminates and extinguishes the luggage compartment light in accordance with the input signals from trunk lid actuator and switch.

TECHNICAL DESCRIPTION (COMMENT)

If this does not work normally, the trunk lid actuator and switch input circuit, luggage compartment light, or ETACS-ECU may have a problem.

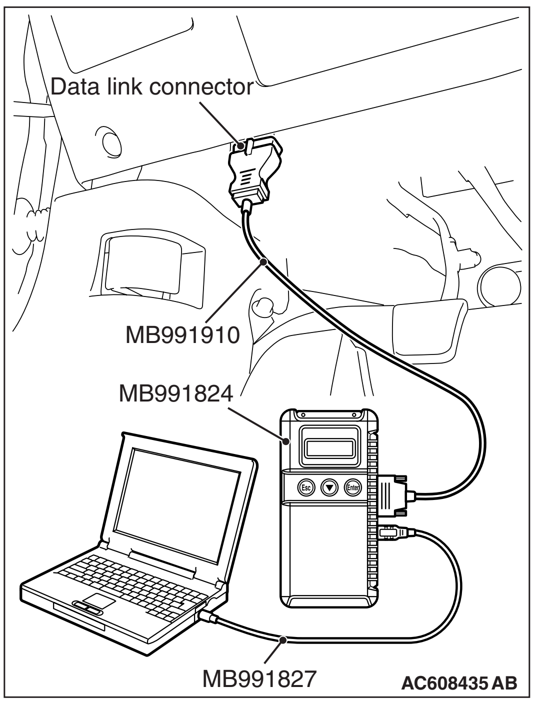
TROUBLESHOOTING HINTS

- Malfunction of trunk lid actuator and switch
- Malfunction of luggage compartment light
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the diagnostic trouble code.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list.

Use the ETACS-ECU service data to check the signal related to the operation of luggage compartment light.

- Open the trunk lid.

Item No.	Item name	Normal condition
Item 260	Trunk/gate trunk ajar switch	Open

Q: Does scan tool MB991958 display the item "Trunk/gate trunk ajar switch" as normal condition?

YES : (Normal condition is displayed.) Go to Step 3.
NO : (Normal condition is not displayed.) Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis, Input signal chart P.54A-528.

STEP 3. Check luggage compartment light connector F-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is luggage compartment light connector F-01 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Luggage compartment light bulb check

Check that the luggage compartment light bulb is normal.

Q: Is luggage compartment light bulb normal?

YES : Go to Step 5.
NO : Replace the luggage compartment light bulb.

STEP 5. Check ETACS-ECU connector C-311 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-311 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the wiring harness between luggage compartment light connector F-01 (terminal 1, 2) and ETACS-ECU connector C-311 (terminal 17, 3).

NOTE: Also check intermediate connector D-14 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-14 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is wiring harness between luggage compartment light connector F-01 (terminal 1, 2) and ETACS-ECU connector C-311 (terminal 17, 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Retest the system

Check that the luggage compartment light illuminates and extinguishes normally.

Q: Do the trunk room work normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

Inspection Procedure 4: The interior light auto-cut function does not operate correctly.

TECHNICAL DESCRIPTION (COMMENT)

The ETACS-ECU operates the interior light auto-cut function in accordance with the input signals below.

- Ignition switch (ACC)
- Ignition switch (IG1)
- Door switches

If this function does not work normally, these input signal circuit(s) or the ETACS-ECU may have a problem. Also, "Interior light auto cut timer" may be set to "0min" through customization.

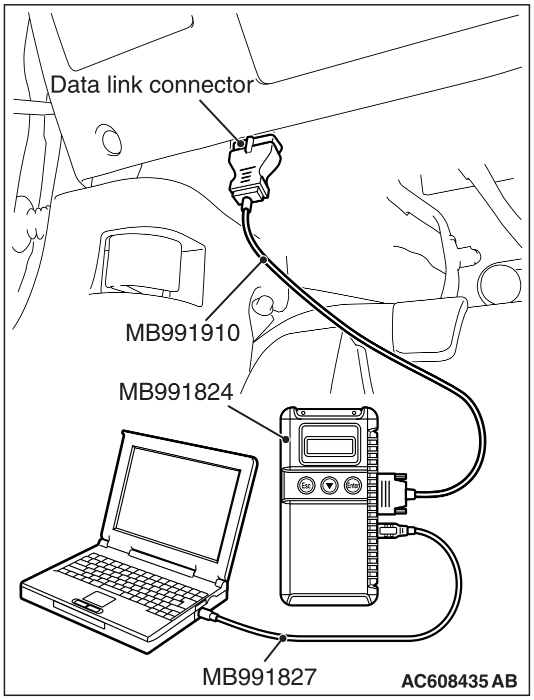
TROUBLESHOOTING HINTS

- Malfunction of door switch
- Malfunction of the dome light
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, Check the configuration function.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-196."
(2) Turn the ignition switch to the "ON" position.
(3) Use the ETACS-ECU customize function to check to see which of the followings other than "0min" the "Interior light auto cut timer" is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Use the ETACS-ECU configuration function to set the "Interior light auto cut timer" to other than "0min" (Refer to P.54A-561).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.
(1) Turn the ignition switch to the "ON" position.
(2) Check whether the ETACS-ECU DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to ETACS, Diagnosis P.54A-482.
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list.
Use the ETACS-ECU data list to check the signals related to the interior light auto-cut function.

- Turn the ignition switch to the "ACC" position.
- Turn the ignition switch to the "LOCK" (OFF) position.
- Open each door.

Item No.	Item name	Normal condition
Item 254	IG voltage	Battery voltage
Item 288	ACC switch	OFF
Item 256	Dr door ajar switch	Open
Item 257	As door ajar switch	Open
Item 258	RR door ajar switch	Open
Item 259	RL door ajar switch	Open

Q: Does scan tool MB991958 display the items "IG voltage", "ACC switch", "As door ajar switch", "RR door ajar switch", and "RL door ajar switch" as normal condition?

YES : (Normal conditions are displayed for all items.) Go to Step 4.
NO : (Normal condition is not displayed.) Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis, Input signal chart P.54A-528.

STEP 4. Retest the system.
Check that the interior light automatic shutdown function works normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

ON-VEHICLE SERVICE

CONFIGURATION FUNCTION

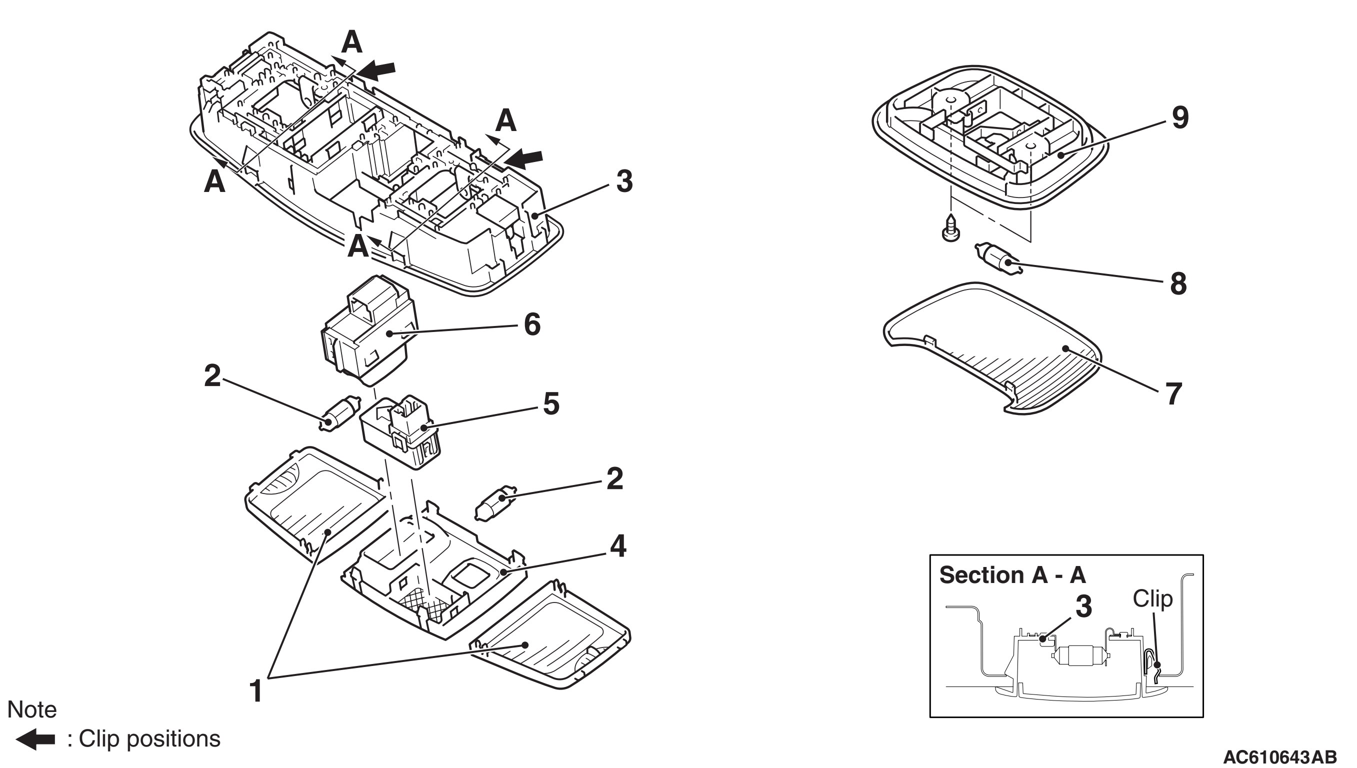
M1541301200132

Use scan tool MB991958 to adjust the following functions. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
Dome light delay timer with door	Adjustment of interior light delay shutdown time	0 sec	0 second (no delay shutdown time) (default <Vehicles without central door locking system>)
		7.5 sec	7.5 seconds
		15 sec	15 seconds
		30 sec	30 seconds (default <Vehicles with central door locking system>)
		60 sec	60 seconds
		120 sec	120 seconds
		180 sec	180 seconds
Interior light auto cut timer	Adjustment of interior light automatic shutdown function operation time	Disable	No function
		3 min	3 minutes
		30 min	30 minutes (default)
		60 min	60 minutes

DOME LIGHT REMOVAL AND INSTALLATION

M1541302700011

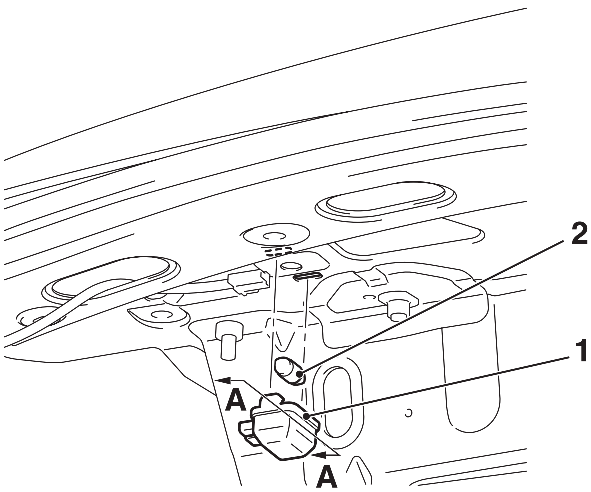


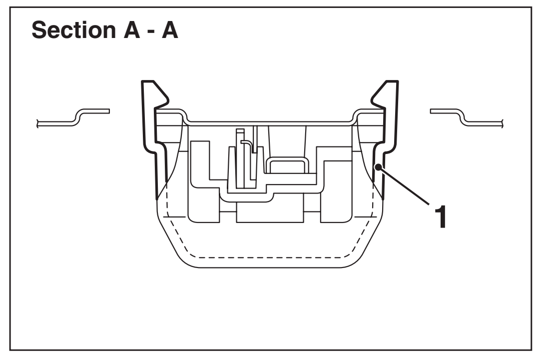
Removal Steps
1. Front dome light lens
2. Dome light bulb
3. Front dome light
4. Front dome light cover
5. Microphone unit <Vehicles with hands-free cellular phone system>

Removal Steps (Continued)
6. Sunroof switch <Vehicles with sunroof>
7. Rear dome light lens
8. Dome light bulb
9. Rear dome light

LUGGAGE COMPARTMENT LIGHT REMOVAL AND INSTALLATION

M1541302600014





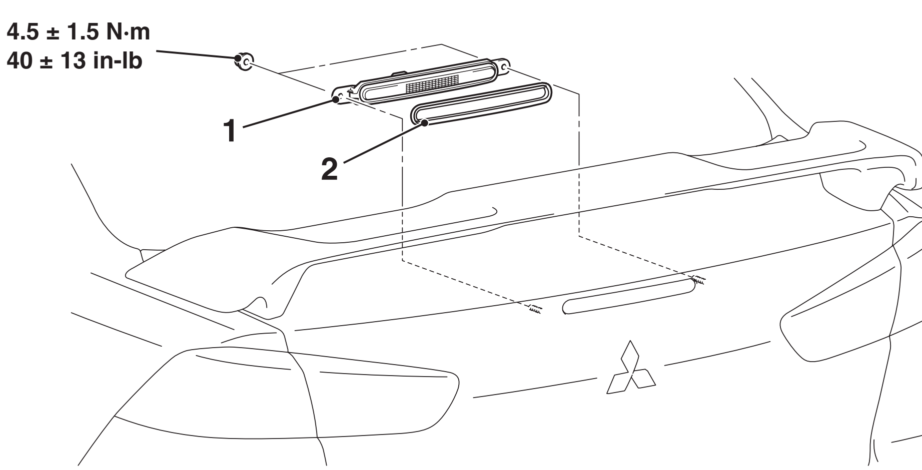
AC610327AB

Removal Steps
1. Luggage compartment light lens
2. Luggage compartment light bulb

HIGH-MOUNTED STOPLIGHT

REMOVAL AND INSTALLATION

M1541700200159



AC609978AB

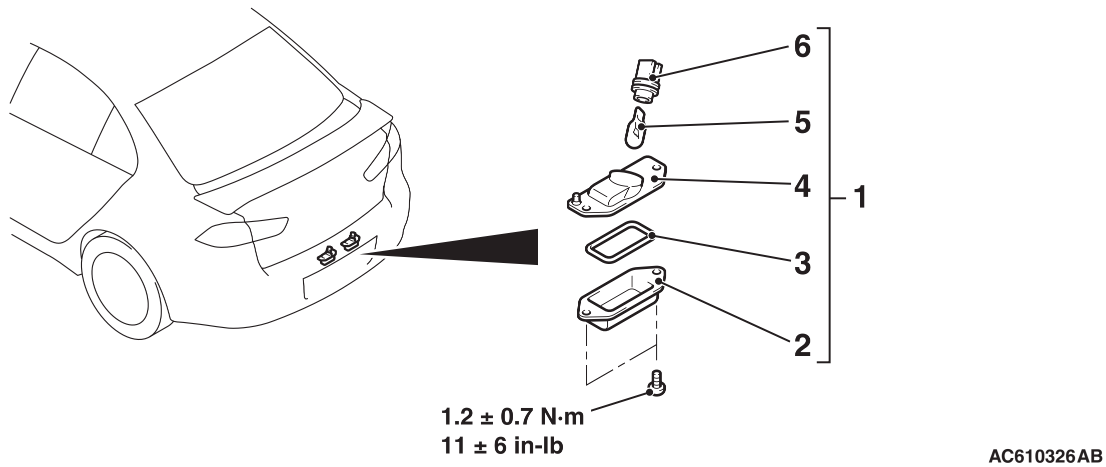
Removal Steps
- Trunk lid trim

Removal Steps (Continued)
1. High-mounted stoplight assembly
2. Gasket

LICENSE PLATE LIGHT

REMOVAL AND INSTALLATION

M1541900200175



Removal Steps

1. License plate light assembly
2. Lens
3. Gasket

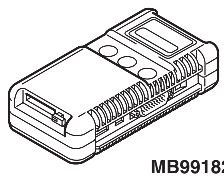
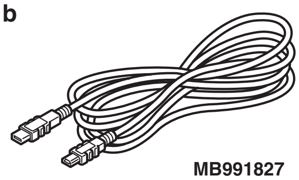
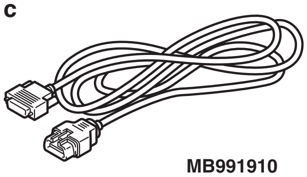
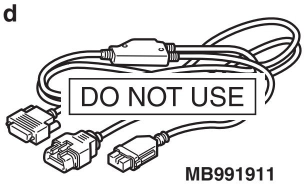
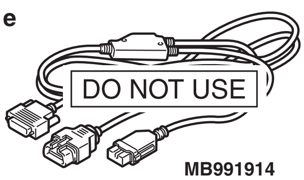
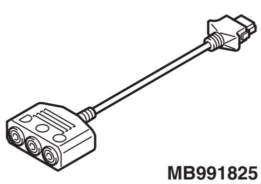
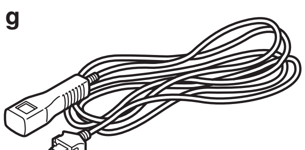
Removal Steps (Continued)

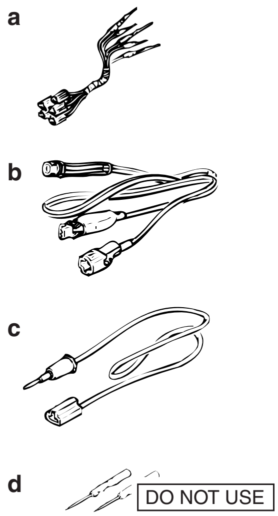
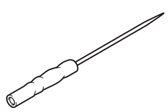
4. Body
5. Bulb
6. Socket

HAZARD WARNING LIGHT SWITCH

SPECIAL TOOLS

M1541500100084

Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1541501400088

Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, Troubleshooting Contents P.00-6.

DIAGNOSTIC FUNCTION

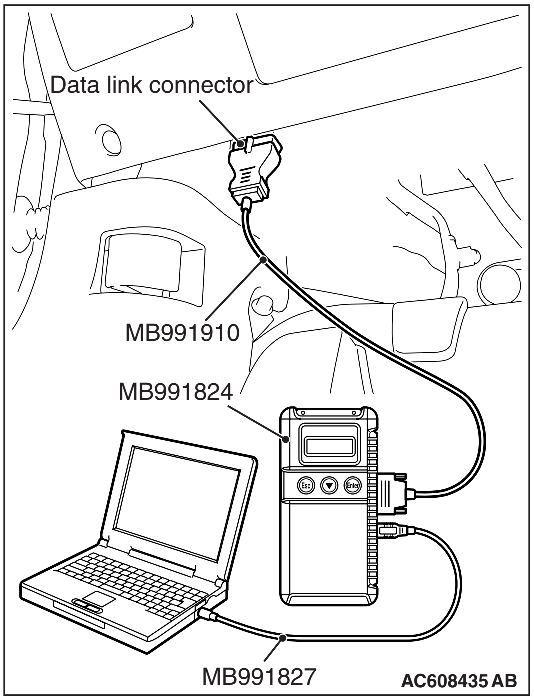
M1541500600034

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.

8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSTIC TROUBLE CODE CHART

M1541500200025

⚠ CAUTION

On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnostic trouble code(s) associated with other system may be set. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

Diagnostic trouble code No.	Diagnostic item	Reference page
B16A6	Turn-signal fuse blown	P.54A-218

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B16A6: Turn-signal fuse blown

TROUBLE JUDGEMENT

When the hazard warning light fuse is blown, the ETACS-ECU sets the DTC B16A6.

TECHNICAL DESCRIPTION (COMMENT)

With the DTC not set, when the blown fuse of hazard warning light is detected three times consecutively, the ETACS-ECU sets the DTC B16A3.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- Malfunction of the ETACS-ECU

DIAGNOSIS

Required Special Tools:

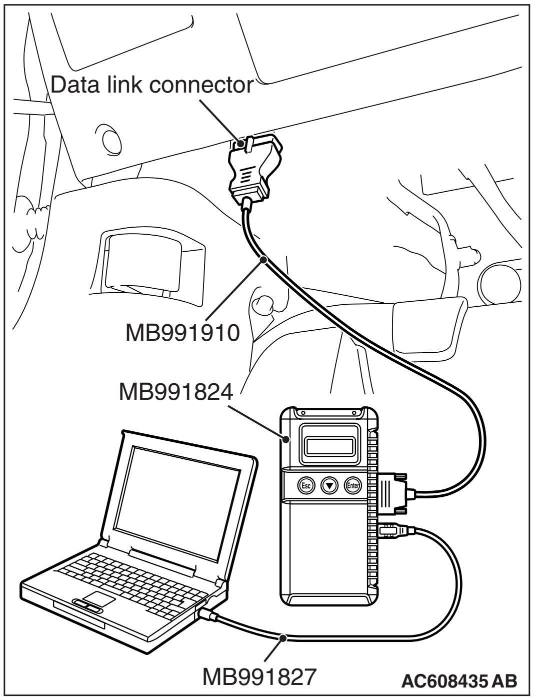
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Fuse check

Check if the turn-signal light fuse is normal.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Replace the turn-signal light fuse.



STEP 2. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-216."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The procedure is complete.

TROUBLE SYMPTOM CHART

M1541500700075

Inspection Procedure No.	Trouble symptom	Reference page
1	The hazard warning lights do not illuminate.	P.54A-219

SYMPTOM PROCEDURES

Inspection Procedure 1: The hazard warning lights do not illuminate.

⚠ **CAUTION**

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If the hazard warning light does not illuminate, the hazard warning light switch input circuit in center panel unit or the ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- Malfunction of center panel unit
- Malfunction of the ETACS-ECU
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check that the turn-signal light operate.

Check that the turn-signal lights illuminate normally.

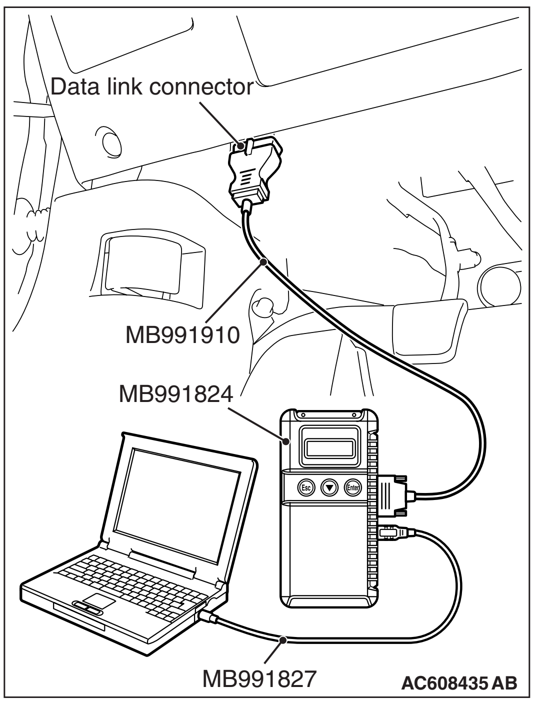
Q: Does turn-signal light work normally?

YES : Go to Step 2.

NO : Diagnose the headlights. Refer to Inspection Procedure 10 "The turn-signal lights do not illuminate" P.54A-140.

STEP 2. Using scan tool MB991958, check data list.

Using the ETACS-ECU service data, check the hazard warning light signal.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1.Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-216."

2.Turn the ignition switch to the "ACC" position.

3.Turn "ON" the hazard light switch.

Item No.	Item name	Normal conditions
Item 265	Hazard switch	ON

Q: Does scan tool MB991958 display the items "Hazard switch" as normal condition?

YES : (Normal condition is displayed for item) Go to Step 3.

NO : (Normal condition is not displayed for item No. 265.) Troubleshoot the ETACS-ECU. Refer to ETACS, Diagnosis - Inspection Procedure 11 "ETACS-ECU does not receive any signal from the hazard warning light switch" P.54A-557.

STEP 3. Retest the system

Check that the hazard warning light illuminate normally.

Q: Does the taillight work normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

REMOVAL AND INSTALLATION

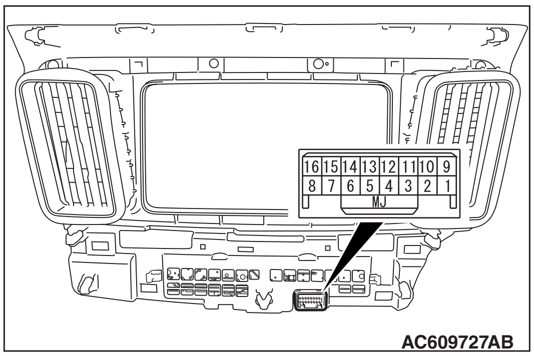
M1541501000154

Refer to GROUP 52A –Instrument Center Panel P.52A-6.

INSPECTION

HAZARD WARNING LIGHT SWITCH CHECK

M1541501100128

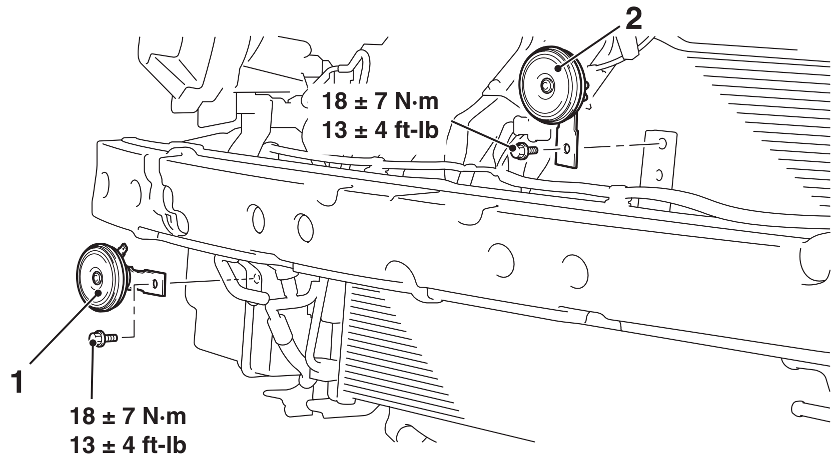


Switch position	Terminal number	Normal conditions
OFF	5 –9	No continuity
ON		Continuity exists (2 ohms or less)

HORN

REMOVAL AND INSTALLATION

M1542100200172



AC608781AB

Removal Steps

- Front bumper assembly (Refer to GROUP 51 –Front Bumper Assembly P.51-3).

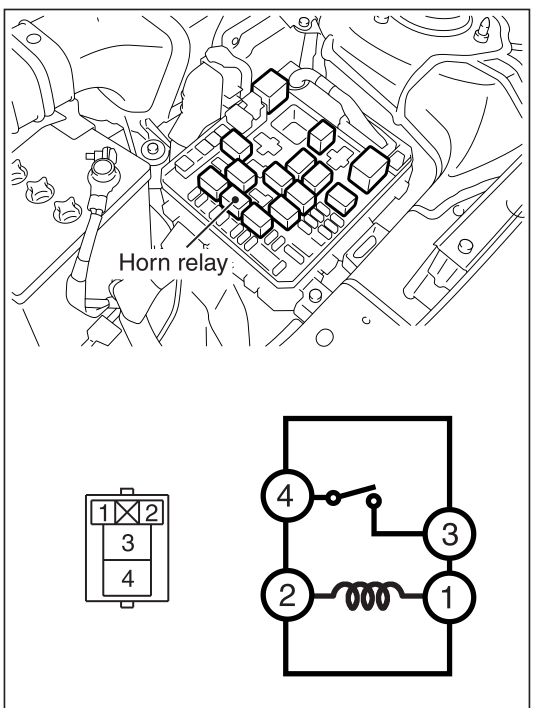
Removal Steps (Continued)

1. Horn (HIGH)
2. Horn (LOW)

INSPECTION

HORN RELAY CHECK

M1542100400143



AC609148AB

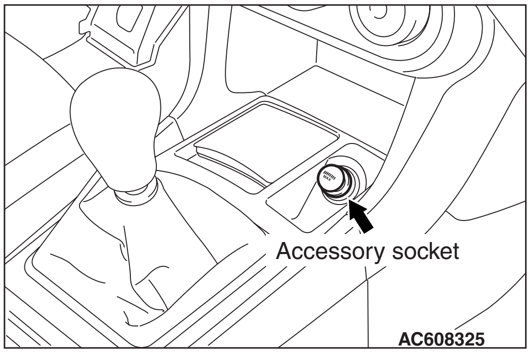
Battery voltage	Terminal number	Normal condition
At no energization	3 –4	No continuity
With current supply [terminal 1 (+), terminal 2 (–)]		Continuity exists (2 ohms or less)

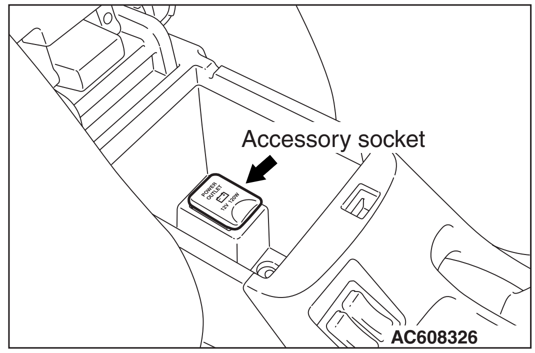
ACCESSORY SOCKET

GENERAL INFORMATION

M1542300500047

The plug-in type accessory socket has been installed for the convenient use of accessories.



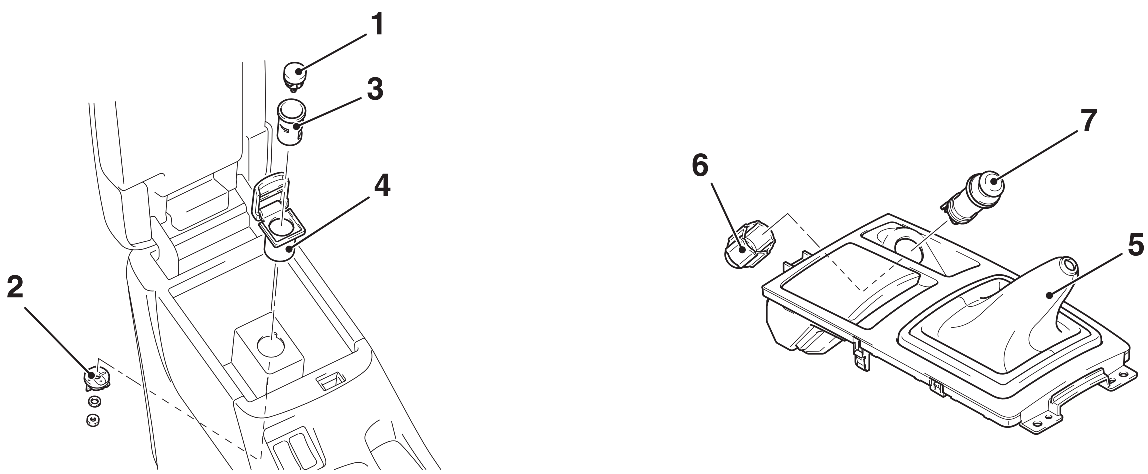


AC608567

- Accessory socket has been added to the front floor console. This accessory socket can be replaced to the cigar lighter as an option.
- Accessory sockets have been added to the rear floor console. <Standard equipment: ES,GTS>
- The maximum load is 120 W when a single accessory socket is used. When two accessory sockets are used simultaneously, the combined maximum load for two sockets is 120 W.

REMOVAL AND INSTALLATION

M1542300200176



AC609358AB

Removal Steps <Rear Floor Console>

- Floor console panel assembly (Refer to GROUP 52A –Floor Console Assembly P.52A-8).

1. Positive terminal assembly
2. Negative terminal assembly

<<A>> 3. Accessory socket
4. Accessory socket cover

Removal Steps <Front Floor Console>

5. Floor console box cup holder (Refer to GROUP 52A –Front Floor Console Assembly P.52A-8).
6. Accessory socket case
7. Accessory socket and cap

REMOVAL SERVICE POINT

<<A>> REMOVAL OF ACCESSORY SOCKET <REAR FLOOR CONSOLE>

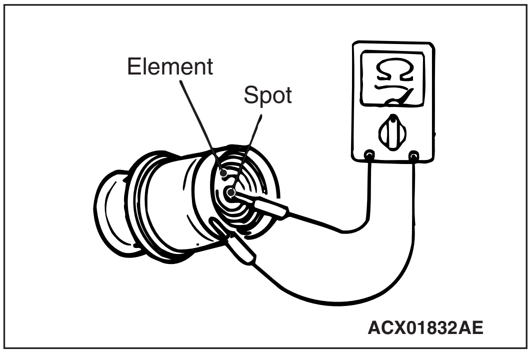
Disassemble, and remove.

CIGARETTE LIGHTER

INSPECTION

M1543019502979

CIGARETTE LIGHTER CHECK



- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Using an ohmmeter, check that the element resistance value is 1.7 ohms.

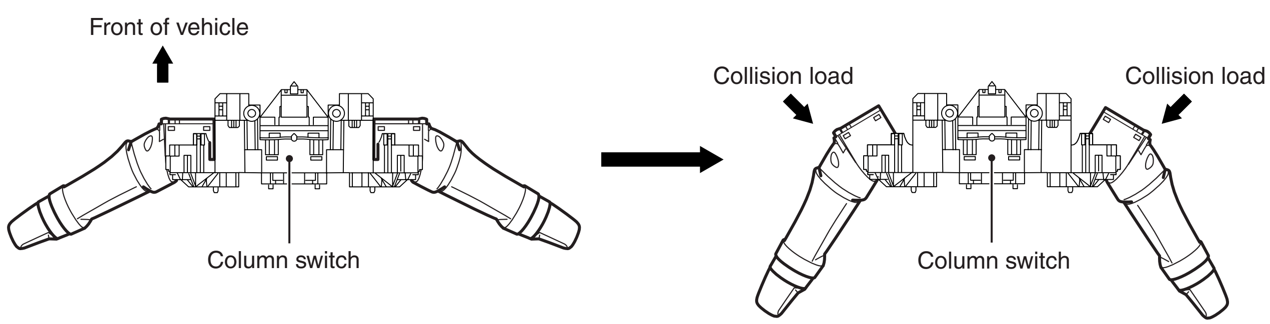
COLUMN SWITCH

GENERAL INFORMATION

M1543101800017

Column switch has a function to ensure the driver's safety during frontal collision of vehicle.

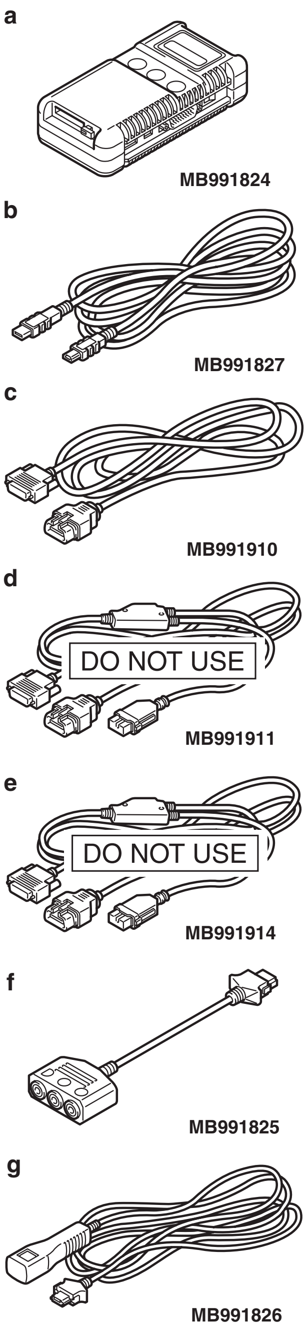
Function

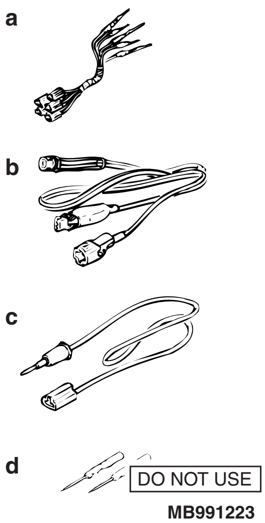
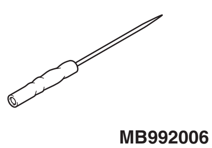


If the column switch is moved to the front of the vehicle and hit on the instrument panel or meter bezel by the frontal collision of vehicle, the steering wheel is moved to the front of the vehicle because the right and left levers fall down, ensuring the driver's safety. In addition, the column switch secures the rigidity that the levers do not fall down by the normal operation, however, it cannot be reused after the deformation.

SPECIAL TOOLS

M1543100200175

Tool	Tool number and name	Supersession	Application
 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** Diagnostic code and service data check.

Tool	Tool number and name	Supersession	Application
	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1543101200112

Refer to GROUP 00 –Contents of troubleshooting P.00-6.

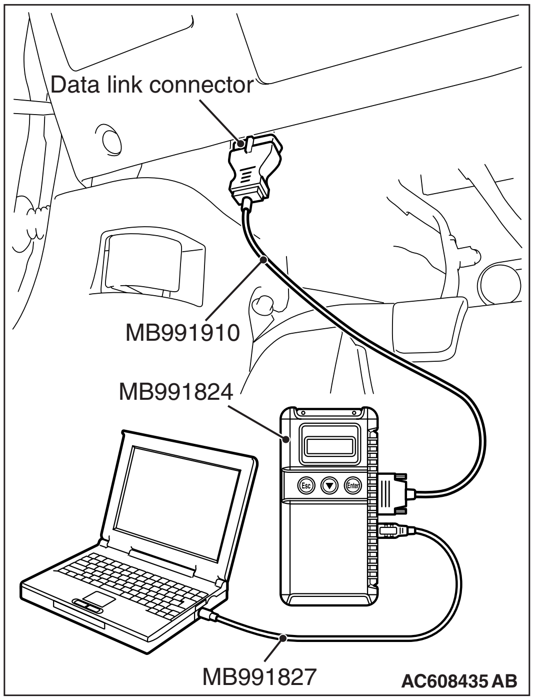
DIAGNOSTIC FUNCTION

M1543101300090

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSTIC TROUBLE CODE TABLE

M1543100300105

Diagnostic trouble code No.	Diagnostic item	Reference page
B2350	Malfunction of lighting switch	P.54A-228
B2351	Malfunction of wiper/washer switch	

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B2350: Malfunction of lighting switch,
DTC B2351: Malfunction of wiper/washer switch

TROUBLE JUDGEMENT

The ETACS-ECU receives the signals related to lighting and wiper/washer from the column switch. If the fail information data is included in the signal from column switch, DTC B2350 (malfunction of lighting switch) or B2351 (malfunction of wiper/washer switch) is stored.

TECHNICAL DESCRIPTION (COMMENT)

The column switch or the ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- Column switch may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

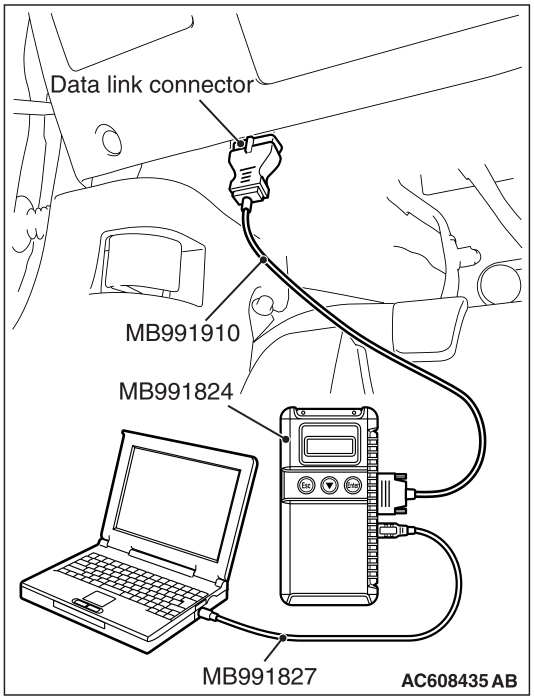
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958. Refer to "How to connect scan tool P.54A-226".
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if the DTC B2350 or B2351 is set.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

DTC B2351 is set. : Go to Step 2.
DTC B2350 is set. : Go to Step 3.
No DTC is set. : The trouble can be an intermittent malfunction (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

STEP 2. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

Check again if the DTC is set to the ETACS-ECU.

(1) Replace the wiper/washer switch.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 3.
NO : The procedure is complete.

STEP 3. Using scan tool MB991958, Check whether the diagnostic trouble code is reset.

Check again if the DTC is set to the ETACS-ECU.

(1) Replace the lighting switch.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

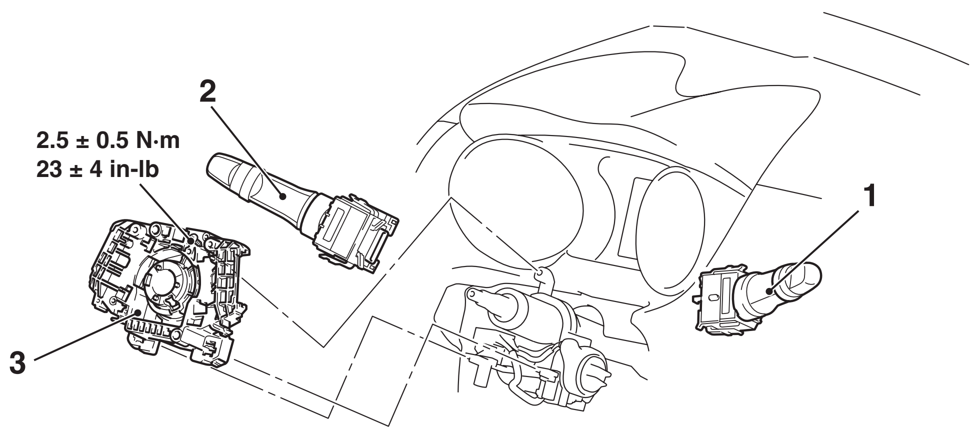
YES : Replace the ETACS-ECU.
NO : The procedure is complete.

REMOVAL AND INSTALLATION

M1543100700158

⚠ CAUTION

- **To remove the driver airbag module, refer to GROUP 52B –Service Precautions P.52B-24 and Driver/Front Passenger's Air Bag Module and Clock Spring P.52B-367.**



AC609141AB

Removal Steps

- Lower, upper Steering column cover (Refer to GROUP 37 Steering Column shaft assembly P.37-25).
1. Wiper/washer switch
2. Lighting switch

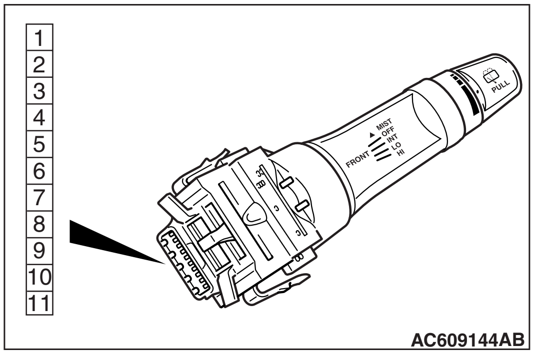
Removal Steps (Continued)

- Steering wheel assembly (Refer to GROUP 52B - Driver’s Front Passenger's Air Bag Module and Clock Spring P.52B-367).
- Clock spring (Refer to GROUP 52B - Driver’s Front Passenger's Air Bag Module and Clock Spring P.52B-367).
3. Column switch body

INSPECTION

WIPER/WASHER SWITCH CONTINUITY CHECK

M1543101700043

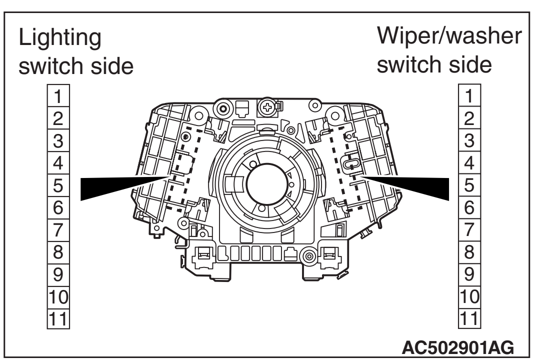


Switch position		Tester connection	Specified condition
OFF		–	Open circuit
Windshield intermittent wiper interval adjusting knob		6 –3	Operating the adjusting knob changes the resistance.
Windshield washer switch		6 –7	Continuity exists (2 ohms or less)
Windshield wiper switch	Hi	6 –8	Continuity exists (2 ohms or less)
	Lo	6 –9	Continuity exists (2 ohms or less)
	Int	6 –10	Continuity exists (2 ohms or less)
	Mist	6 –11	Continuity exists (2 ohms or less)

COLUMN SWITCH (SWITCH BODY PART) CONTINUITY CHECK

M1543100800058

1. Remove the lighting switch and wiper/washer switch.
2. Check that the continuity is present for the same terminal numbers of the column switch body connectors that remain on the steering column.

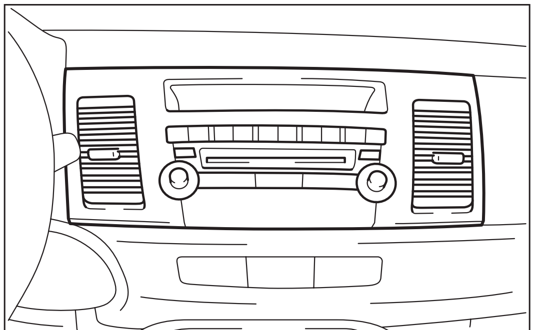


Column switch body	Terminal number	Normal condition
Lighting switch side connector Wiper/washer switch side connector	3 –3 6 –6 7 –7 8 –8 9 –9 10 –10 11 –11	Continuity exists (2 ohms or less)

RADIO AND CD PLAYER

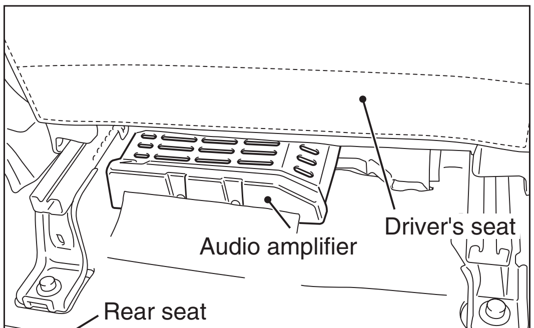
GENERAL INFORMATION

M1544000100237



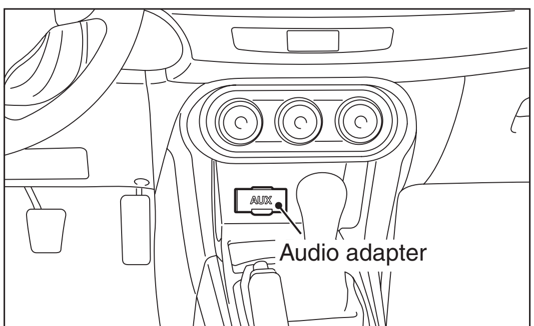
AC608345AB

- Two types of audio, CD player with radio or 6-disk CD changer with radio, have been established. The audio has designed to fit uniformally into the instrument panel. Also, a new function automatically corrects the sound quality and volume during driving.



AC608321AB

- For the vehicles with Rockford Fosgate ® premium sound system, the 8-ch high-power audio amplifier with integrated DSP (total maximum output of 650 W) has been established under the driver's seat. The clear treble without distortion is available.



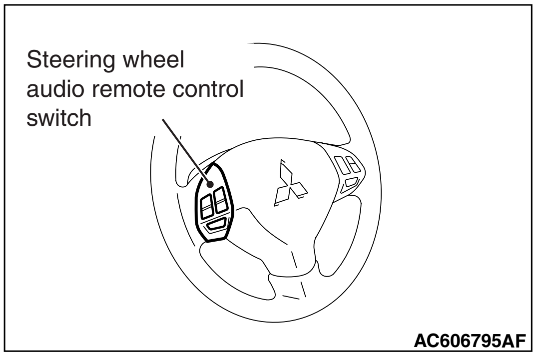
AC608417AB

- For the vehicles with Rockford Fosgate ® premium sound system, the audio adapter has been established onto the center tray. With this modification, portable music player can be connected. <Vehicles without MMCS>

Item	**CD player with radio**	**6-disk CD changer with radio <Option>**
Electronic tuning radio	Equipped	Equipped
SIRIUS satellite radio <Option: ES, GTS>	–	Equipped (Only the vehicles with the satellite radio tuner)
CD player*1 (compatible with MP3*2)	Equipped	Equipped
6-disk CD autochanger*1 (compatible with MP3*2)	–	Equipped
Audio integrated 4-ch power amplifier <vehicles with 4 speakers, 6 speakers>	General 140 W	General 140 W
Audio amplifier-integrated 8-ch power amplifier and digital signal processor (DSP) <Rockford Fosgate® premium sound system>	–	General 650 W (maximum)

NOTE:
- **1: CD-R/CD-RW may not be played.*
- **2: Some may not be played.*

STEERING WHEEL AUDIO REMOTE CONTROL SWITCH



The concentrated switch has been established onto the steering wheel spoke for allowing the remote control of audio. <ES, GTS>

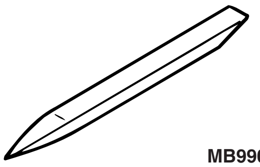
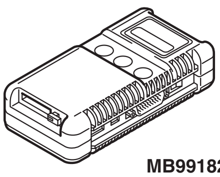
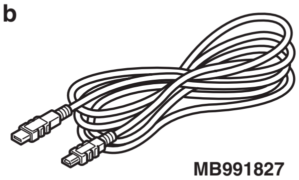
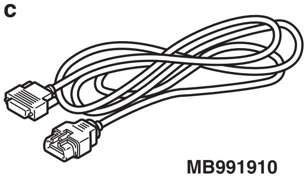
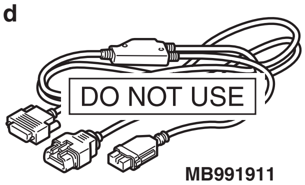
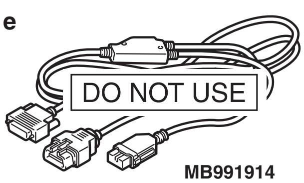
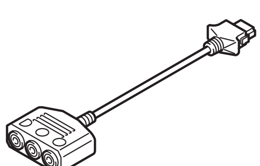
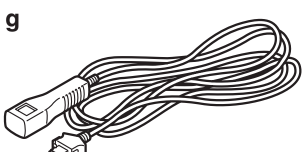
AUDIO OPERATION TONE ALARM

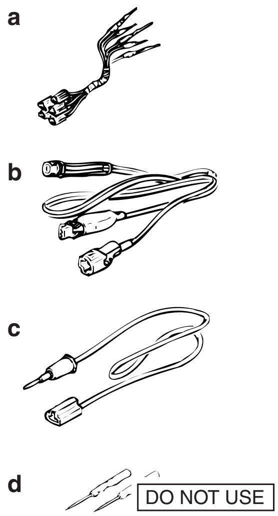
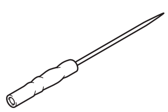
To prevent an audio operational error, the audio operation tone alarm confirms the audio operation which sounds a tone alarm in the combination meter when the audio is operated. The details are as described in the following table:

Usage category	**Confirmation tone alarm sounding condition (with conditions below, tone alarm sounds for 0.08 seconds)**
Radio use	Press and hold "1", "2", "3", "4", "5" or "6" button.
	Press and hold "SCAN" button.
CD use	Press and hold the "LOAD" button.
	Press and hold the "DISC" button.
	Press and hold the "RPT" button.
	Press and hold the "RDM" button.
	Press and hold the CD eject button
Audio adjustment	With "BASS", "MID", "TREBLE", "BALANCE", or "FADER" selected, adjust the adjustment level to zero.
	Select "NORMAL" of "SOUND FIELD".
	Select "NORMAL" of "MUSIC TYPE".
Others	Press and hold the "TUNE" knob.
	Press and hold the "MODE" switch of steering remote control switch.

SPECIAL TOOLS

M1542000602146

Tool	Tool number and name	Supersession	Application
 MB990784	MB990784 Ornament remover	General service tool	Removal of center air outlet, center panel and center cover
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC and data list.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1544004800409

Refer to GROUP 00, Troubleshooting contents P.00-6.

TROUBLESHOOTING FOR NOISE

RADIO AND CD PLAYER OR CD CHANGER

The noise is generated during the engine run.

M1544009800181

⚠ CAUTION

Check that no noise of external origin is present. Because the signal reception becomes poor indoors, check in the open air. If this check is neglected, the source of noise cannot be determined, resulting in a false recognition. Therefore, be sure to perform this check.

⚠ CAUTION

When implementing the noise prevention, start the prevention from the object causing the strongest noise.

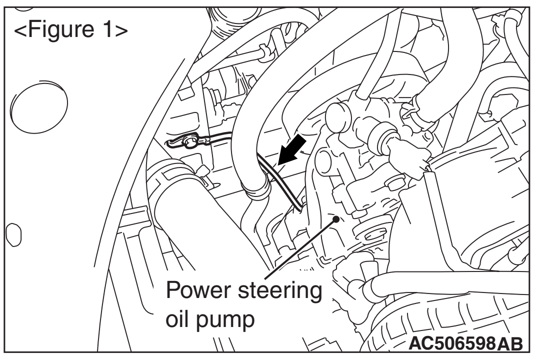
⚠ CAUTION

Check that the audio main body and others are securely grounded.

Noise types ( ) indicates the sound type.	Situation	Cause	Countermeasure
AM, FM: (Crack, tapping, rattle, plash)	• When the engine speed is increased, the scratch noise becomes faster and the sound volume decreases. • When the ignition switch is turned to ACC, the noise disappears.	• Radiation noise caused mainly by the spark plug • Noise wraparound	Check or replace the ground cable ground bolt. (Refer to Figure 1).
AM, FM: Wiper motor noise (hum, distorted hum)	Synchronized with the wiper movement, and also becomes faster when wiper movement is sped up. When the wiper is stopped, the noise also stops.	Caused by the sparks generated by the wiper motor brush.	Replace the wiper motor.

Noise types ( ) indicates the sound type.	Situation	Cause	Countermeasure
Noise from other electrical equipment	–	The noise may be generated when the electrical equipment become old.	Repair or replace the electrical equipment.
Static electricity (cracking, popping)	No noise is generated when the vehicle comes to a complete stop.	The parts or wiring move for some reason, and cause the noise by contacting against the body metal parts.	Return the parts and wiring to the normal positions.
	Various types of noise are generated in various parts of the body.	Caused by the looseness between the body and the hood, liftgate, bumper, exhaust pipe and muffler, suspension, or others.	Securely tighten the mounting bolts of each part.

NOTE: For trouble symptoms other than the noise, perform the following troubleshooting procedures. Refer to P.54A-267.



DATA LIST REFERENCE TABLE

M1544014100047

Item No.	Check item (scan tool display)	Check condition	Normal condition
01	RADIO remote SW (SEEK-)	SEEK (-) switch: ON	ON
02	RADIO remote SW (SEEK+)	SEEK (+) switch: ON	ON
03	RADIO remote SW (MODE)	MODE switch: ON	ON
04	RADIO remote SW (VOL-)	VOL (-) switch: ON	ON
05	RADIO remote SW (VOL+)	VOL (+) switch: ON	ON

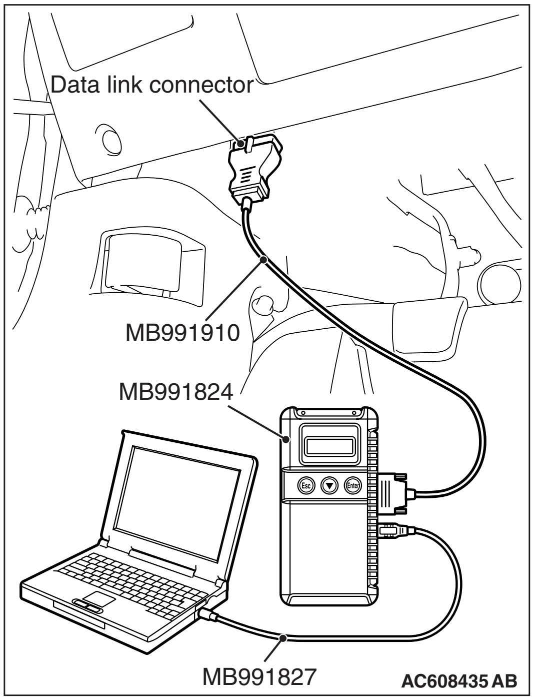
DIAGNOSIS FUNCTION

M1544013200018

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "Meter" from "System List," and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSIS CODE CHART

M1544012900047

⚠ CAUTION

On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnostic trouble code(s) associated with other system may be set. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

DTC No.	Description	Reference page
U0019	Bus off (CAN-B)	P.54A-239
U0141	ETACS CAN timeout	P.54A-242
U0151	SRS-ECU CAN timeout	P.54A-243
U0154	Occupant classification-ECU CAN timeout	P.54A-245
U0155	Combination meter CAN timeout	P.54A-246
U0164	A/C-ECU CAN timeout	P.54A-248
U0168	WCM or KOS-ECU CAN timeout	P.54A-249
U0195	Satellite radio tuner CAN timeout	P.54A-251
U0197	Hands free module CAN timeout	P.54A-253
U1415	Coding not completed/Data fail	P.54A-254
B2420	Power integrated circuit	P.54A-256
B2421	Radio tuner	P.54A-258
B2423	6-disc CD player error	P.54A-260
B2424	CD player error	P.54A-261
B2450	Switch panel communication	P.54A-263
B2451	Audio panel type error	P.54A-265

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC U0019: Bus off (CAN-B)

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD player or CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

When the radio and CD player or CD changer is returned from the bus off state, or when the bus error is indicated to the radio and CD player or CD changer state, the DTC U0019 (CAN-B) is set.

COMMENTS ON TROUBLE SYMPTOM

The radio and CD player or CD changer, power supply for the radio and CD player or CD changer, ground circuit, or CAN bus line may have a problem.

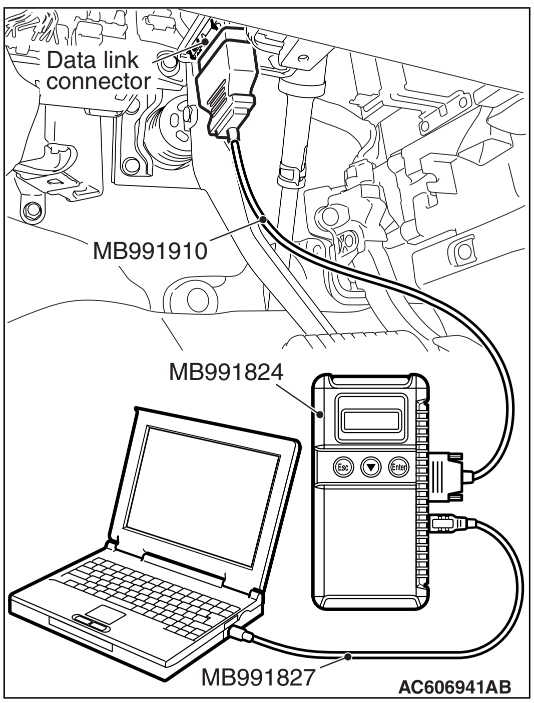
PROBABLE CAUSES

- Malfunctions of radio and CD player or CD changer
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16.) On completion, go to Step 2.

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC U0141: ETACS CAN timeout

⚠ CAUTION

If DTC U0141 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the signal from ETACS-ECU cannot be received, the radio and CD player or CD changer sets the DTC U0141.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with ETACS-ECU cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

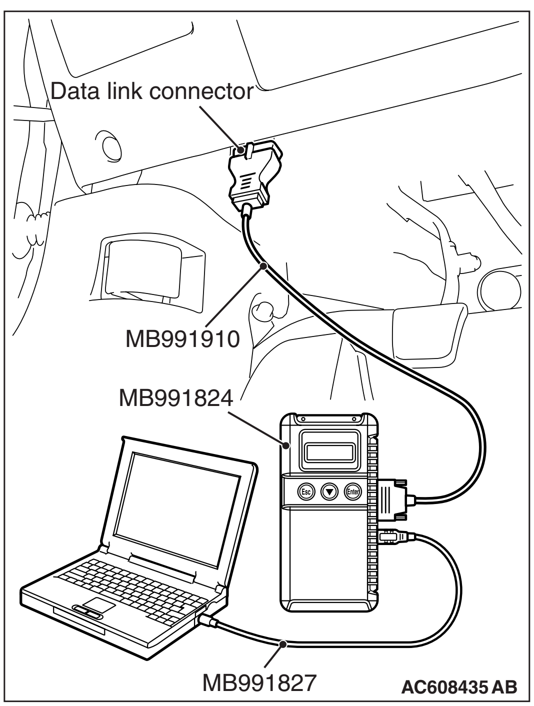
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The radio and CD player or CD changer may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0151: SRS-ECU CAN timeout

⚠ CAUTION

- **If DTC U0151 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from SRS-ECU cannot be received, the radio and CD player or CD changer sets DTC U0151.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with SRS-ECU cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

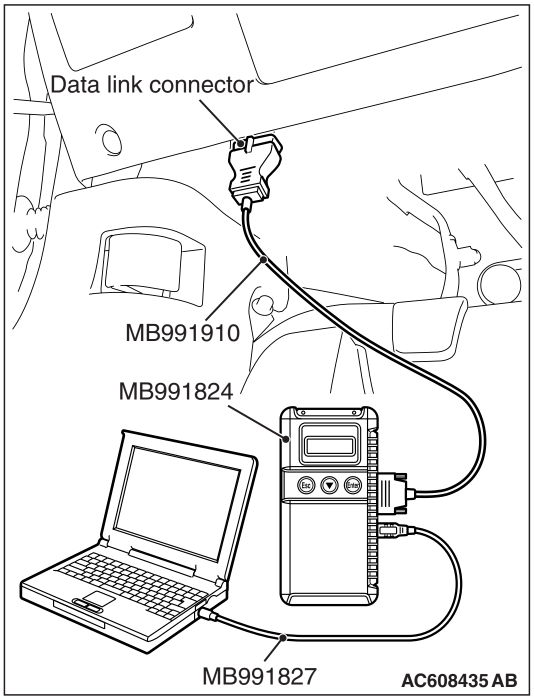
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The radio and CD player or CD changer may be defective
- The SRS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the SRS-ECU diagnostic trouble code

Check again if the DTC is set to the SRS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Troubleshooting P.52B-31).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0154: Occupant classification-ECU CAN timeout

⚠ CAUTION

If DTC U0154 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from occupant classification-ECU cannot be received, the radio and CD player or CD changer sets DTC U0154.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

TROUBLESHOOTING HINTS

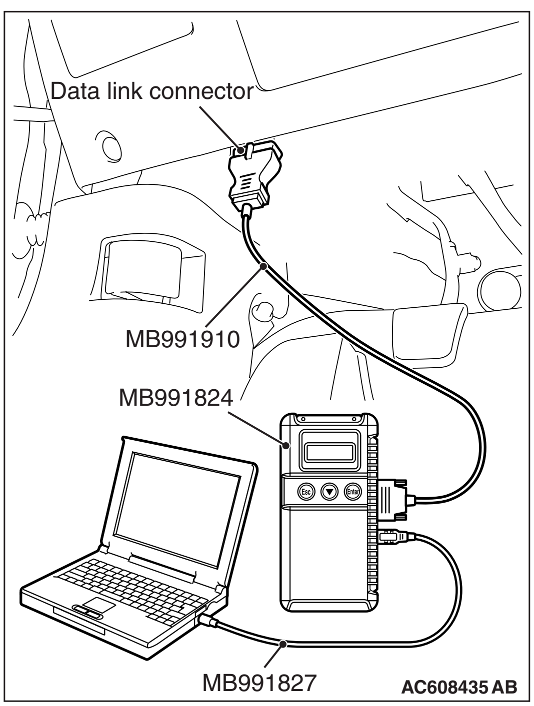
- The CAN bus line may be defective.
- The radio and CD player or CD changer may be defective.
- The occupant classification-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the occupant classification-ECU diagnostic trouble code.

Check if DTC is set to the occupant classification-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-280).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0155: Combination meter CAN timeout

⚠ CAUTION

If DTC U0155 is set in the radio and CD player or CD changer, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from combination meter cannot be received, the radio and CD player or CD changer sets DTC U0155.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

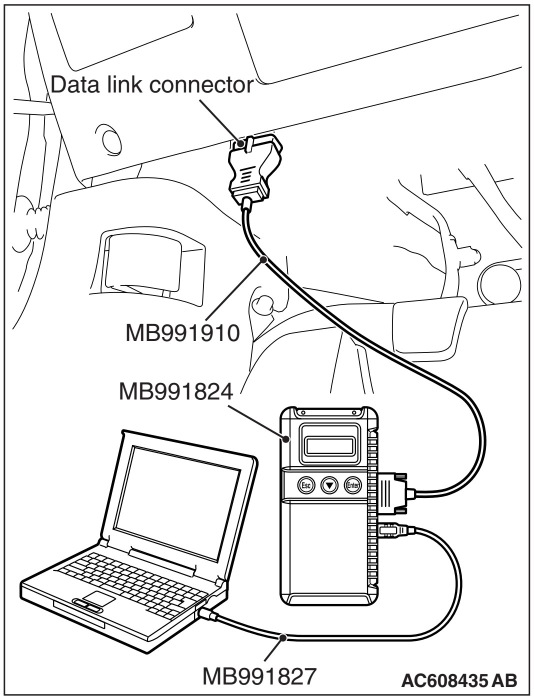
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The radio and CD player or CD changer may be defective.
- The combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ **CAUTION**
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the combination meter diagnostic trouble code.

Check whether a combination meter DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for combination meter DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Diagnose the combination meter (Refer to combination meter, Diagnosis P.54A-23).

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0164: A/C-ECU CAN timeout

⚠ CAUTION
- **If DTC U0164 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from A/C-ECU cannot be received, the radio and CD player or CD changer sets DTC U0164.

JUDGMENT CRITERIA

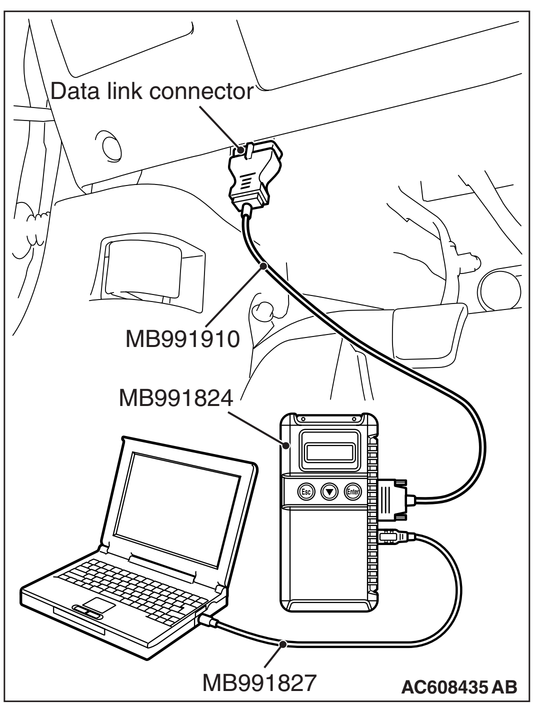
With the ignition switch in the ON position, system voltage between 10−16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with A/C-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The A/C-ECU may be defective.
- The radio and CD player or CD changer may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-328."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the A/C diagnostic trouble code.
Check if DTC is set to the A/C-ECU.

Q: Is the DTC set?

YES : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 <vehicles with manual A/C> or GROUP 55B, Automatic A/C Diagnosis P.55B-7 <vehicles with automatic A/C>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.
Check again if the DTC is set to the satellite radio tuner.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0168: WCM or KOS-ECU CAN timeout

⚠ CAUTION

- **If DTC U0168 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be received, the radio and CD player or CD changer sets DTC U0168.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 V (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

TROUBLESHOOTING HINTS

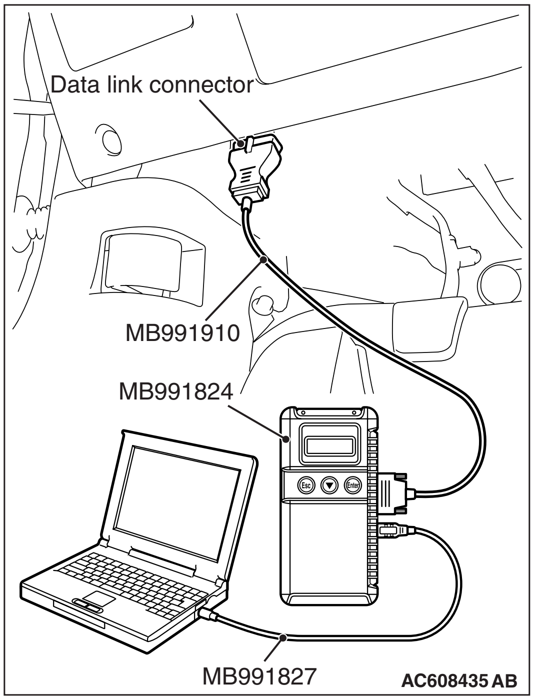
- Malfunction of CAN bus line may be defective.
- Malfunction of the KOS-ECU may be defective. <vehicles with KOS>
- Malfunction of the WCM may be defective. <vehicles with WCM>
- Malfunction of radio and CD player or CD changer may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)

- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> diagnostic trouble code.

Check again if the DTC is set to the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM>.

Q: Is the DTC set?

YES : Troubleshoot the KOS or WCM (Refer to GROUP 42B, Diagnosis P.42B-20 <KOS> or GROUP 42C, Diagnosis P.42C-14 <WCM>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0195: Satellite radio tuner CAN timeout

⚠ CAUTION

If DTC U0195 is set in the radio and CD player or CD changer, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from satellite radio tuner cannot be received, the radio and CD player or CD changer sets DTC U0195.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

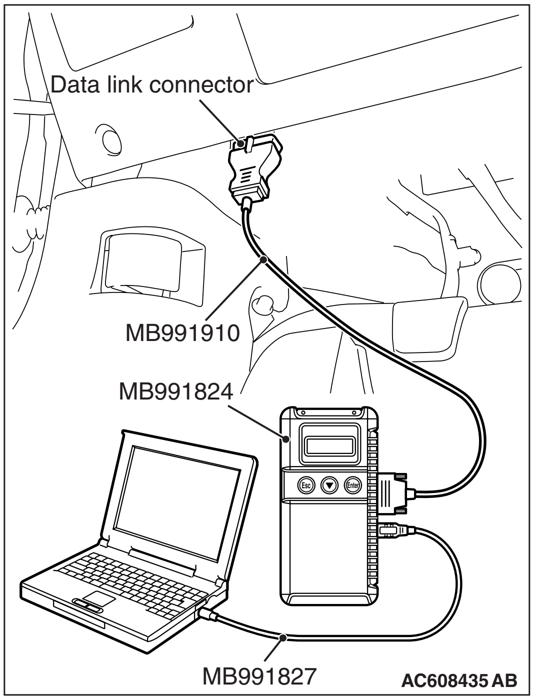
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The radio and CD player or CD changer may be defective.
- The satellite radio tuner may be defective.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the satellite radio tuner diagnostic trouble code.

Check whether a satellite radio tuner DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for satellite radio tuner DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Diagnose the satellite radio tuner.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0197: Hands free module CAN timeout

⚠ CAUTION

- **If DTC U0197 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from hands free module cannot be received, the radio and CD player or CD changer sets DTC U0197.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with hands free module cannot be established for 2,500 ms or more, the radio and CD player or CD changer determines that a problem has occurred.

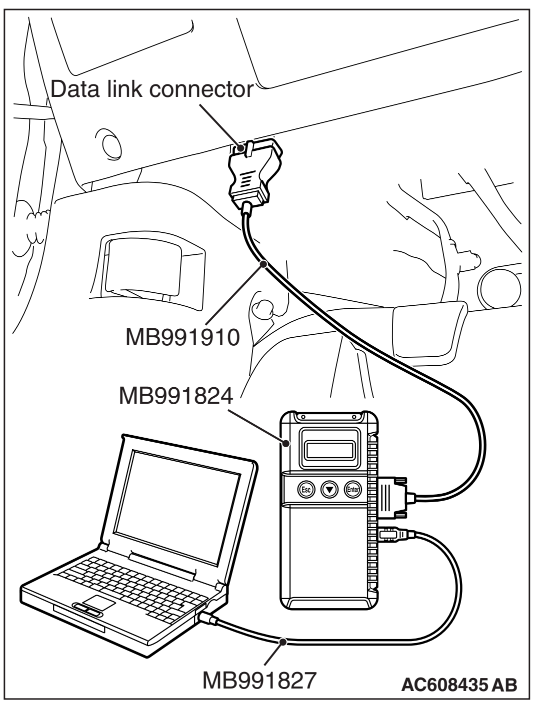
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The radio and CD player or CD changer may be defective.
- The hands free module may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the hands free module diagnostic trouble code.

Check again if the DTC is set to the hands free module.

Q: Is the DTC set?

YES : Troubleshoot the hands-free cellular phone system.
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U1415: Coding not completed/Data fail

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD player or CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

When the vehicle information data is not registered to the audio unit, the radio and CD player or CD changer sets the diagnosis code No.U1415.

COMMENTS ON TROUBLE SYMPTOM

The audio unit, ETACS-ECU, or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunctions of audio unit
- Malfunction of the ETACS-ECU
- Malfunction of CAN bus line wiring harness and connector

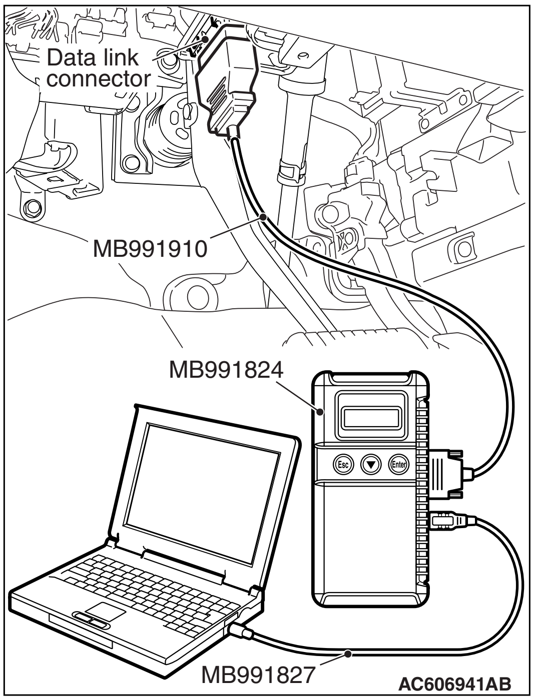
DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16.) On completion, go to Step 2.

STEP 2. Using scan tool MB991958, read the other system DTC.

Check if DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to GROUP 54A, ETACS-ECU, Diagnosis P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC B2420: Power integrated circuit

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD player or CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

If the radio and CD player or CD changer continuously apply the voltage of two volts or more to the speakers for one minute or more, it is determined that the offset voltage is exceeded, and then the diagnostic trouble code is set.

COMMENTS ON TROUBLE SYMPTOM

The radio and CD player or CD changer or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunctions of radio and CD player or CD changer
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS

Required Special Tools:

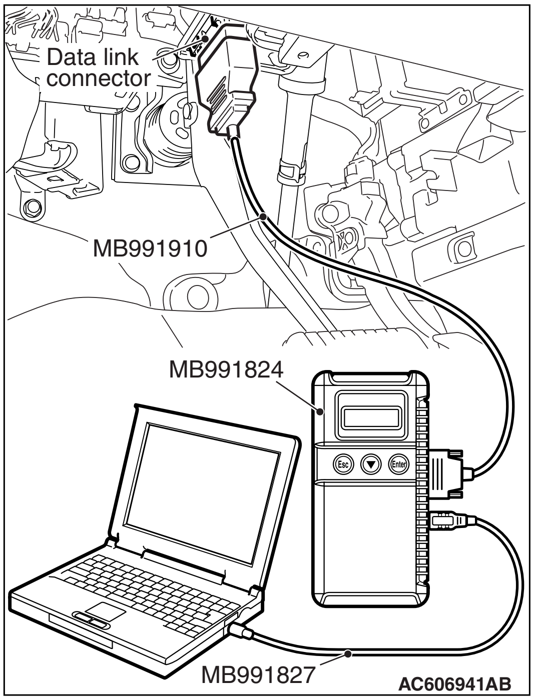
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16.) On completion, go to Step 2.

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the diagnostic trouble code set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC B2421: Radio tuner

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD player or CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

If the communication cannot be established consecutively for 10 times between the incorporated tuner of radio and CD player or CD changer and the microcomputer, the diagnostic trouble code is set.

COMMENTS ON TROUBLE SYMPTOM

The radio and CD player or CD changer or CAN bus line may have a problem.

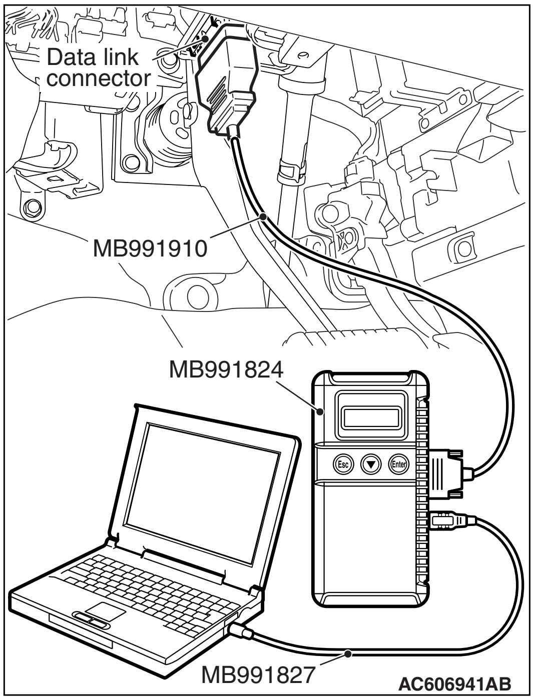
PROBABLE CAUSES

- Malfunctions of radio and CD player or CD changer
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16.) On completion, go to Step 2.

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC B2423: 6-disc CD player error

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

During the use of the CD changer of radio and CD changer, if any of the ERROR01, ERROR02, ERROR03, or ERROR HOT continues for 1 minute, the diagnostic trouble code is set.

COMMENTS ON TROUBLE SYMPTOM

The radio and CD changer or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunctions of radio and CD changer
- Malfunction of CAN bus line wiring harness and connector

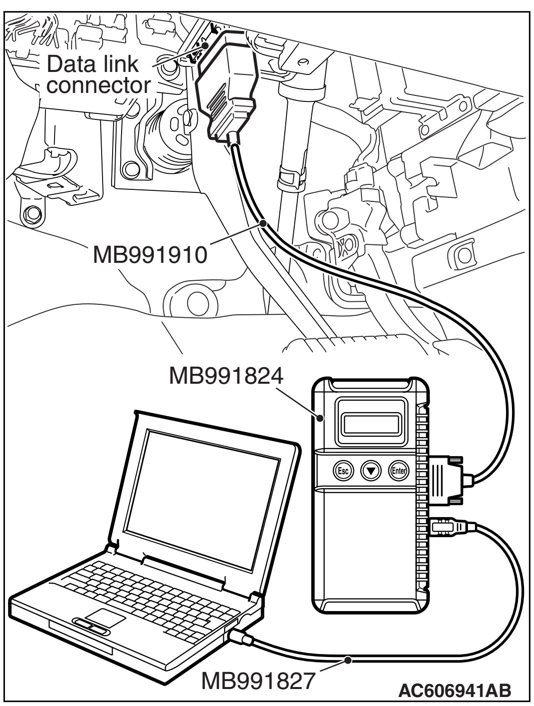
DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. CD check

Playback a clean and unscratched CD for one minute, and recheck if the diagnostic trouble code is set to the radio and CD changer.

(1) Erase the diagnostic trouble code.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Playback the clean, unscratched CD for one minute.
(4) Check if diagnostic trouble code is set.

Q: Is the diagnostic trouble code set?

YES : Go to Step 3.
NO : Clean the CD, use a CD without scratches and burrs, or remove the CD burrs, and then reinsert the CD.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC B2424: CD player error

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGMENT

During the use of the CD player of radio and CD player, if any of the ERROR01, ERROR02, ERROR03, or ERROR HOT continues for 1 minute, the diagnostic trouble code is set.

COMMENTS ON TROUBLE SYMPTOM

The radio and CD player or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunctions of radio and CD player
- Malfunction of CAN bus line wiring harness and connector

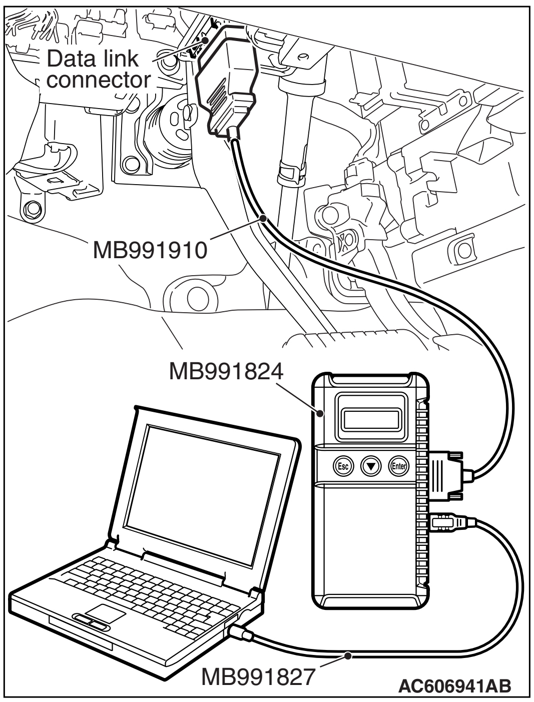
DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. CD check

Playback a clean and unscratched CD for one minute, and recheck if the diagnostic trouble code is set to the radio and CD player.

(1) Erase the diagnostic trouble code.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Playback the clean, unscratched CD for one minute.
(4) Check if diagnostic trouble code is set.

Q: Is the diagnostic trouble code set?

YES : Go to Step 3.
NO : Clean the CD, use a CD without scratches and burrs, or remove the CD burrs, and then reinsert the CD.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC B2450: Switch panel communication

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the radio and CD player or CD changer, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGEMENT

If the radio and CD player or CD changer cannot establish the communication with center panel assembly for 1 minute or more, the diagnostic trouble code is set.

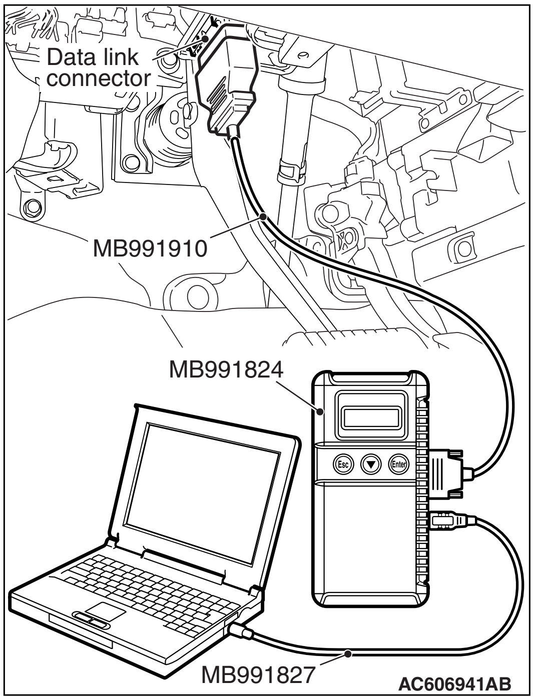
COMMENTS ON TROUBLE SYMPTOM

The radio and CD player or CD changer, center panel assembly, or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunctions of radio and CD player or CD changer
- Malfunction of center panel assembly
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Connection status check of radio and CD player or CD changer with center panel assembly

Check that the radio and CD player or CD changer are connected to the center panel assembly without any problem.

Q: Is the connection established?

YES : Go to Step 3.
NO : Securely connect the radio and CD player or CD changer with the center panel assembly.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC B2451: Audio panel type error

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

TROUBLE JUDGEMENT

If the radio and CD player or CD changer consecutively receive the display trouble signal from the center panel assembly for 1 minute, the diagnostic trouble code is set.

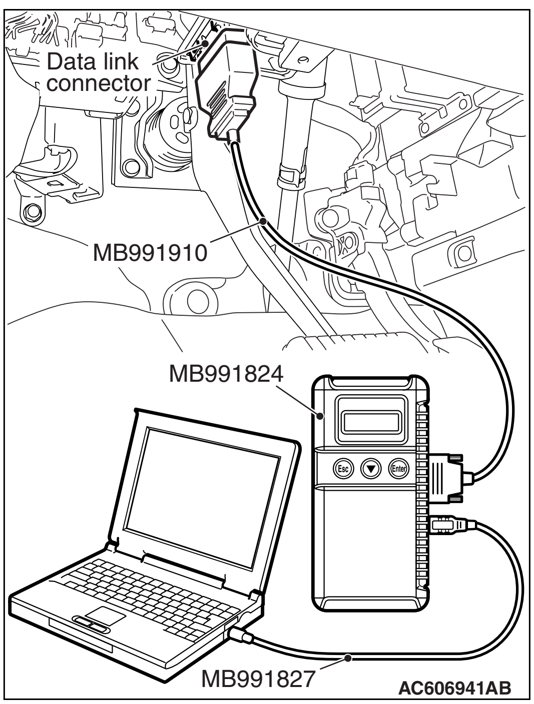
COMMENTS ON TROUBLE SYMPTOM

The center panel assembly or CAN bus line may have a problem.

PROBABLE CAUSES

- Malfunction of center panel assembly
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the radio and CD player or CD changer.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

TROUBLE SYMPTOM CHART

M1544004900815

Inspection Procedure No.	Trouble symptom		Reference page
1	Power is not turned ON when the power switch is turned ON.		P.54A-268
2	No sound is heard. <Vehicles with audio amplifier>		P.54A-274
3	No sound is heard from one of the speakers.	<Vehicles without audio amplifier>	P.54A-279
		<Vehicles with audio amplifier>	P.54A-285
4	Noise	Noise is present while moving (AM).	P.54A-292
5		Noise is present while moving (FM).	P.54A-293
6		Sound mixed with noise, only at night (AM).	P.54A-294
7		Noise is overpowering both AM and FM.	P.54A-294
8		Excessive noise on AM and FM.	P.54A-295
9		Noise is detected with engine running.	P.54A-296
10		Noise appears during vibration or shocks.	P.54A-297
11		Noise is present while moving (FM).	P.54A-299
12		Constant noise.	P.54A-300
13	Radio	No reception (AM).	P.54A-300
14		Poor reception.	P.54A-301
15		Distortion on AM and/or FM.	P.54A-302
16		Distortion on FM only.	P.54A-302
17		Auto select function inoperative, too few automatic stations are selected.	P.54A-303
18		Preset stations are erased.	P.54A-304
19	CD player, CD changer	CD cannot be Inserted.	P.54A-304
20		No sound. (CD only).	P.54A-305
21		CD sound skips.	P.54A-305
22		Sound quality is poor.	P.54A-306
23		CD cannot be ejected.	P.54A-306

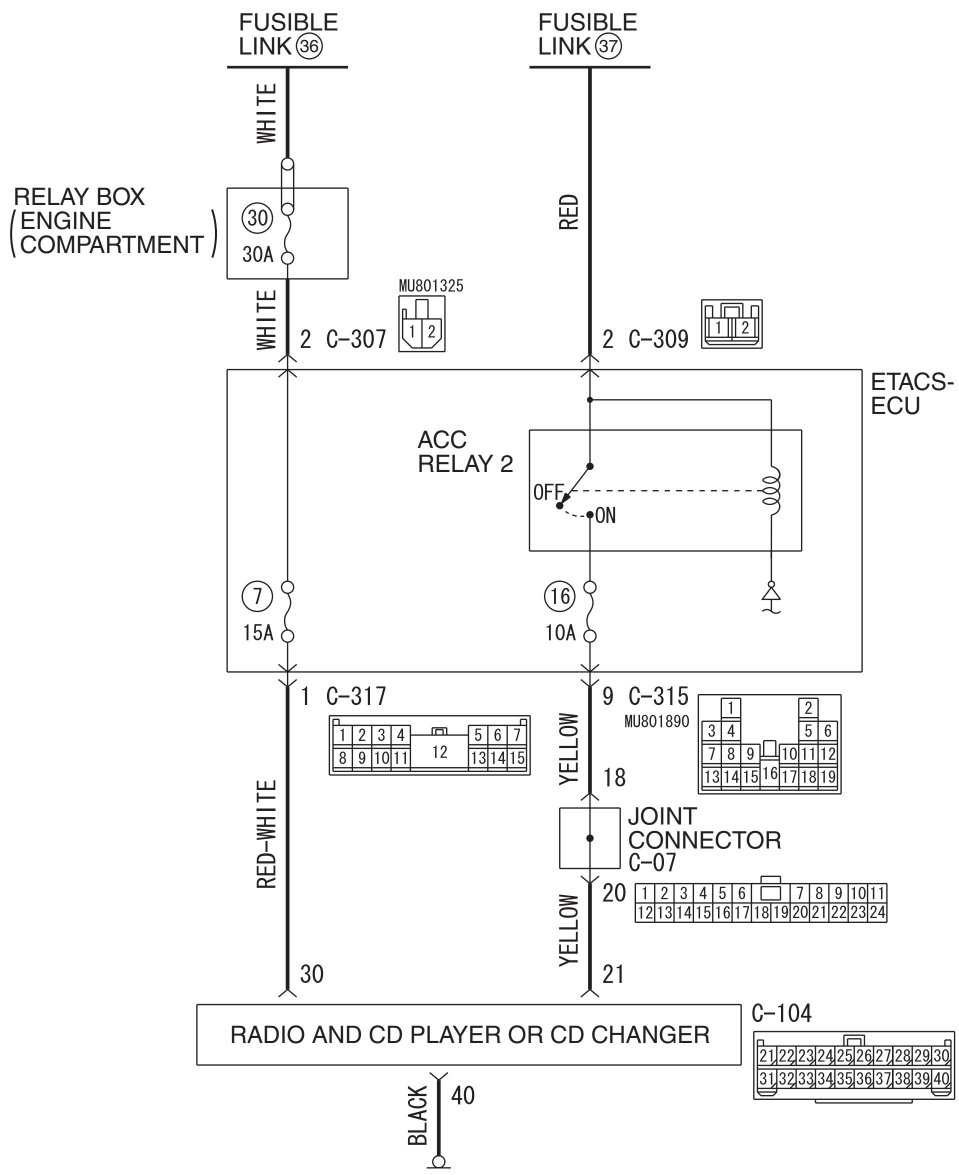
SYMPTOM PROCEDURES

Inspection Procedure 1: Power is not turned ON when the power switch is turned ON.

⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Radio and CD Player or CD Changer Power Supply Circuit



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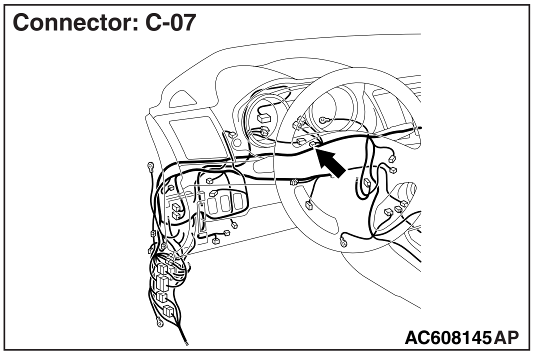
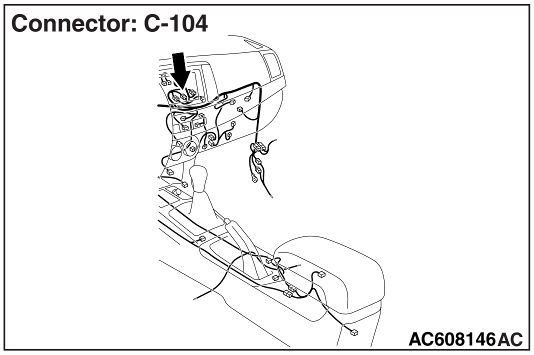
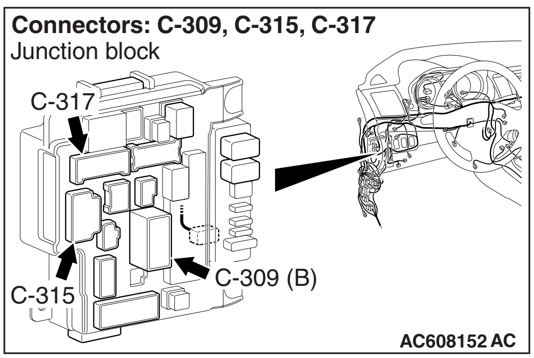






OPERATION

When the ignition switch is in the ON or ACC position, the radio and CD player or CD changer power can be turned ON. With the radio and CD player or CD changer power ON, when the ignition switch is turned to the OFF position, the power for radio and CD player or CD changer is also turned OFF.

COMMENTS ON TROUBLE SYMPTOM

Provided that the audio diagnostic trouble code is not set, if the power for radio and CD player or CD changer cannot be turned ON, the radio and CD player or CD changer, or power supply circuit for radio and CD player or CD changer may have a problem, or the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunctions of radio and CD player or CD changer
- Malfunction of the ETACS-ECU
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. ETACS-ECU coding data check.

(1) Operate scan tool MB991958 to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).

(2) Check that the "AUDIO" is set to "enabled."

Q: Is the check result normal?

YES : Go to Step 2.

NO : Operate scan tool MB991958 to set the option coding "AUDIO" to "enabled," and check the trouble symptom.

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if the diagnostic trouble code is set to the ETACS-ECU.

Q: Is the check result normal?

YES : Troubleshoot the ETACS-ECU (Refer to GROUP 54A, ETACS, Diagnosis P.54A-482).

NO : Go to Step 3.

STEP 3. Check ETACS-ECU connector C-317 and radio and CD player or CD changer connector C-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connector C-317 and radio and CD player or CD changer connector C-104 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 4. Check the wiring harness between ETACS-ECU connector C-317 (terminal 1) and radio and CD player or CD changer connector C-104 (terminal 30).

- Check the power supply lines (battery power supply) for open circuit.

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 1) and radio and CD player or CD changer connector C-104 (terminal 30) in good condition?

YES : Go to Step 5.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Using scan tool MB991958, check data list.

Check the input signal of ACC relay.

- Turn the ignition switch to the ACC position.

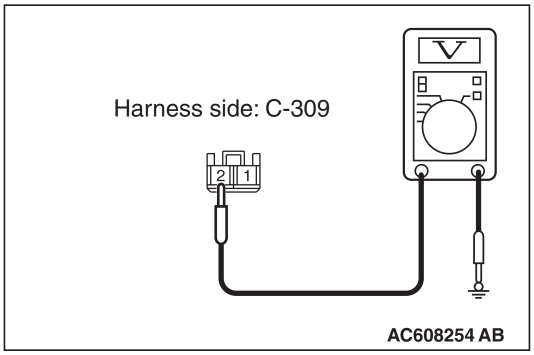
Item No.	Item name	Normal conditions
Item 288	ACC switch	ON

OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Refer to GROUP 54A, ETACS, Diagnosis –Inspection Procedure 1 "The ignition switch (ACC) signal is not received" P.54A-529.



STEP 6. Check the power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-309.

(1) Disconnect the connector, and measure at the wiring harness-side connector.
(2) Turn the ignition switch to the "ACC" position.
(3) Measure the voltage between terminal 2 and ground.

OK: Battery voltage

Q: Is the measured voltage battery voltage?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the wiring harness between ETACS-ECU connector C-309 (terminal 2) and fusible link (37)

- Check the power supply line for open circuit and short circuit.

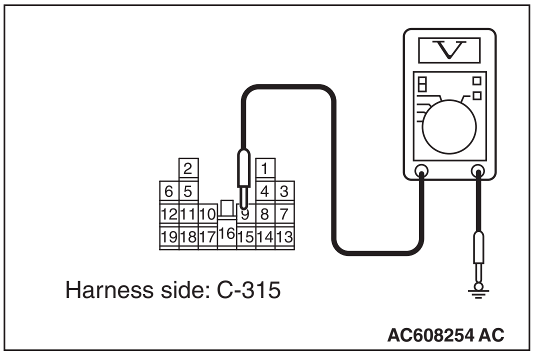
Q: Is the wiring harness between ETACS-ECU connector C-309 (terminal 2) and fusible link (37) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 8. Check ETACS-ECU connector C-315 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-315 in good condition?

YES : Go to Step 9.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.



STEP 9. Check the power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-315.

(1) Disconnect the connector, and measure at the ETACS-ECU side connector.
(2) Turn the ignition switch to the "ACC" position.
(3) Measure voltage between terminal 9 and ground.

OK: Battery voltage

Q: Is the measured voltage battery voltage?

YES : Go to Step 10.
NO : Replace the ETACS-ECU.

STEP 10. Check the wiring harness between radio and CD player or CD changer connector C-104 (terminal 21) and ETACS-ECU connector C-315 (terminal 9).

- Check the power supply line for open circuit.

NOTE: Also check joint connector C-07 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between radio and CD player or CD changer connector C-104 (terminal 21) and ETACS-ECU connector C-315 (terminal 9) in good condition?

YES : Go to Step 11.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

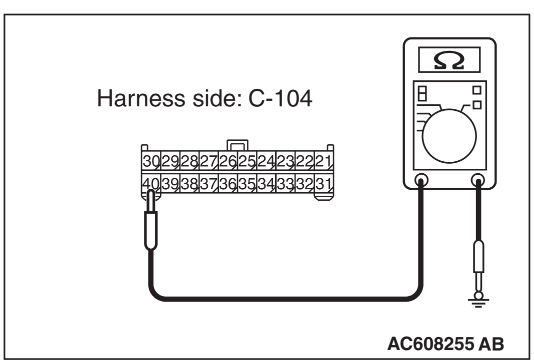
STEP 11. Check the ground circuit to the radio and CD player or CD changer. Measure the resistance at radio and CD player or CD changer connector C-104.

(1) Disconnect the connector, and measure at the wiring harness side.
(2) Measure resistance between terminal 40 and ground.

OK: The resistance should be 2 ohm or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 13.
NO : Go to Step 12.



STEP 12. Check the wiring harness between radio and CD player or CD changer connector C-104 (terminal 40) and ground.

- Check the ground wires for open circuit.

Q: Is the wiring harness between radio and CD player or CD changer connector C-104 (terminal 40) and ground in good condition?

YES : Check the trouble symptom.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 13. Retest the system

Check if the radio and CD player or CD changer power is turned ON.

Q: Is the check result normal?

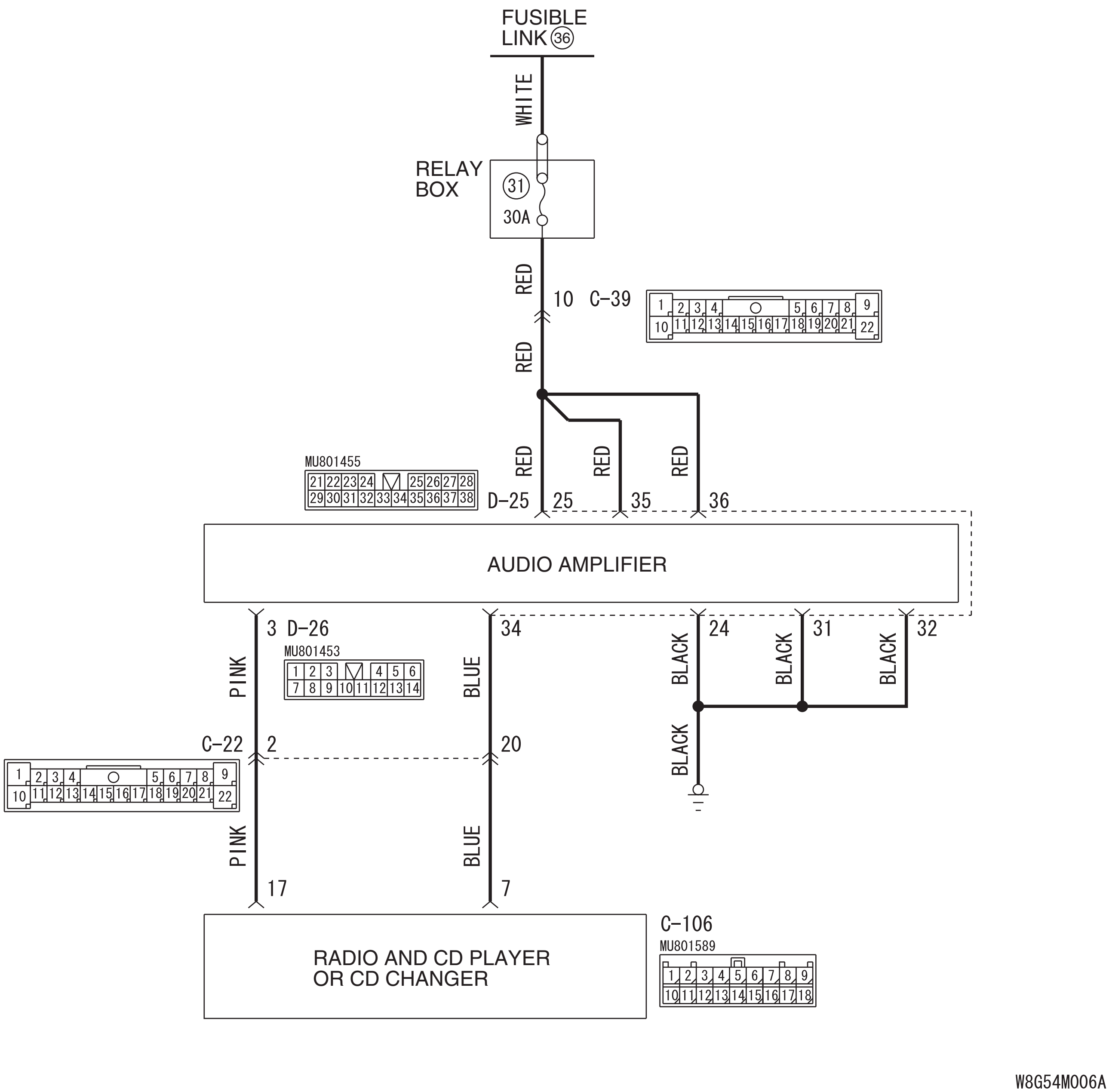
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the radio and CD player or CD changer.

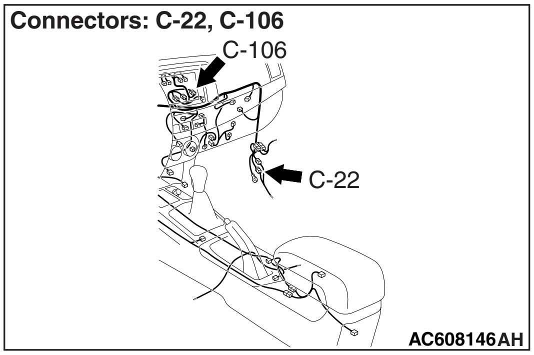
Inspection Procedure 2: No sound is heard. <Vehicles with audio amplifier>

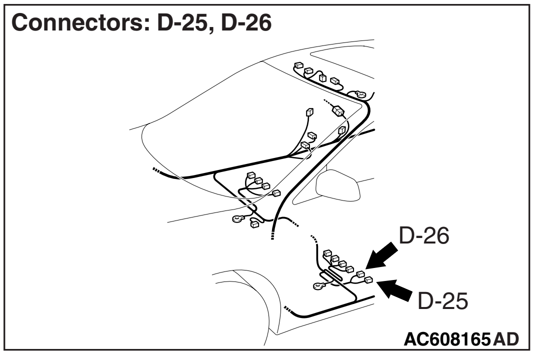
⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Audio System Circuit







COMMENTS ON TROUBLE SYMPTOM

If the audio sound is not output, the radio and CD changer, audio amplifier, or power supply circuit of audio amplifier may have a problem, or the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunctions of radio and CD changer
- Malfunction of audio amplifier
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the ETACS-ECU coding data.

(1) Operate the scan tool MB991958 to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).

(2) Check that the "Speaker" is set to "Premium."

Q: Is the check result normal?

YES : Go to Step 2.

NO : Operate scan tool MB991958 to set the option coding "Speaker" to "Premium," and check the trouble symptom.

STEP 2. Check audio amplifier connector D-25 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

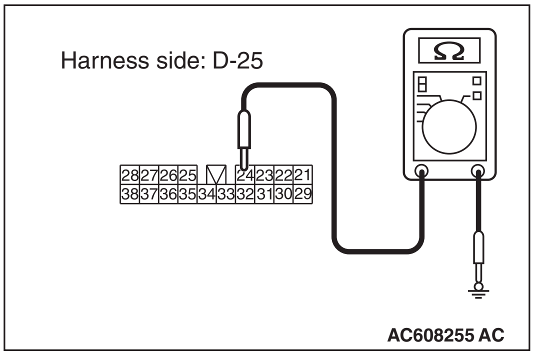
Q: Is audio amplifier connector D-25 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

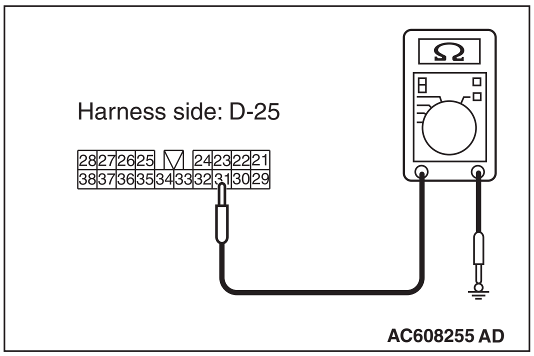
STEP 3. Check the ground circuit to the rear monitor. Measure the resistance at audio amplifier connector D-25.

(1) Disconnect audio amplifier connector D-25, and measure the resistance available at the wiring harness side of the connector.



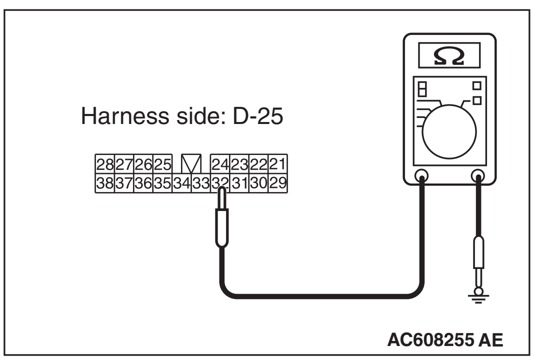
(2) Measure the resistance between terminal 24 and ground.

OK: The resistance should be 2 ohms or less



(3) Measure the resistance between terminal 31 and ground.

OK: The resistance should be 2 ohms or less



(4) Measure the resistance between terminal 32 and ground.

OK: The resistance should be 2 ohms or less

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between audio amplifier connector D-25 (terminal 24, 31, 32) and ground.

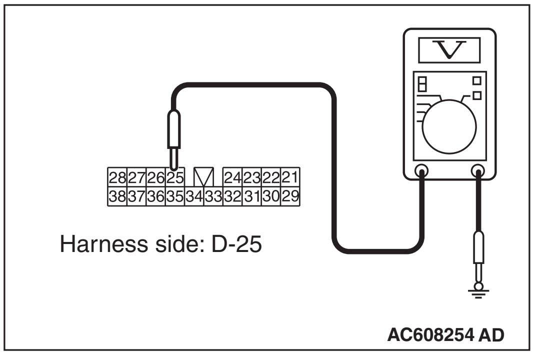
- Check the ground wires for open circuit.

Q: Is the wiring harness between audio amplifier connector D-25 (terminal 24, 31, 32) and ground in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

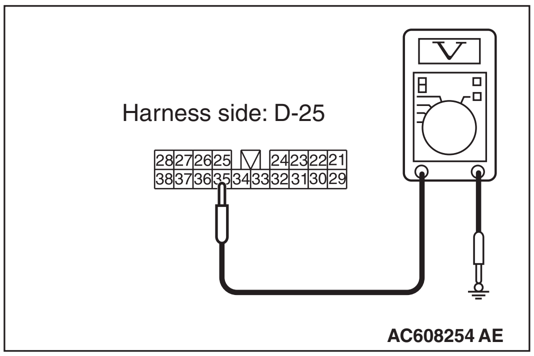
STEP 5. Check the power supply circuit to the ETACS-ECU. Measure the voltage at audio amplifier connector D-25.

(1) Disconnect audio amplifier connector D-25, and measure the voltage available at the wiring harness-side connector.



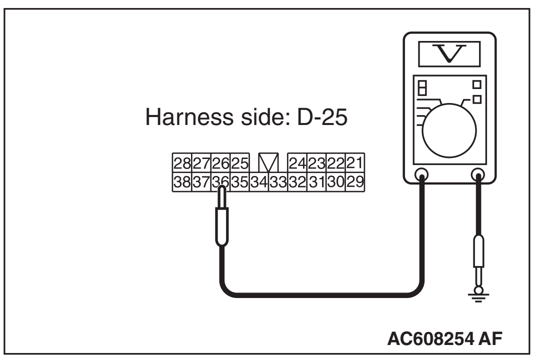
(2) Measure the voltage between terminal 25 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).



(3) Measure the voltage between terminal 35 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).



(4) Measure the voltage between terminal 36 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the wiring harness between audio amplifier connector D-25 (terminal 25, 35, 36) and fusible link (36).

- Check the power supply line for open circuit and short circuit.

Q: Is the wiring harness between audio amplifier connector D-25 (terminal 25, 35, 36) and fusible link (36) in good condition?

YES : Go to Step 7.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check radio and CD changer connector C-106 and audio amplifier connector D-26 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are radio and CD changer connector C-106 and audio amplifier D-26 in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 8. Check the wiring harness between radio and CD changer connector C-106 (terminal 17) and audio amplifier connector D-26 (terminal 3)

- Check the communication lines for open circuit.

NOTE: Also check intermediate connector C-22 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between radio and CD changer connector C-106 (terminal 17) and audio amplifier connector D-26 (terminal 3) in good condition?

YES : Go to Step 9.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Retest the system

Replace the audio amplifier, then check that the audio sound is output.

Q: Is the check result normal?

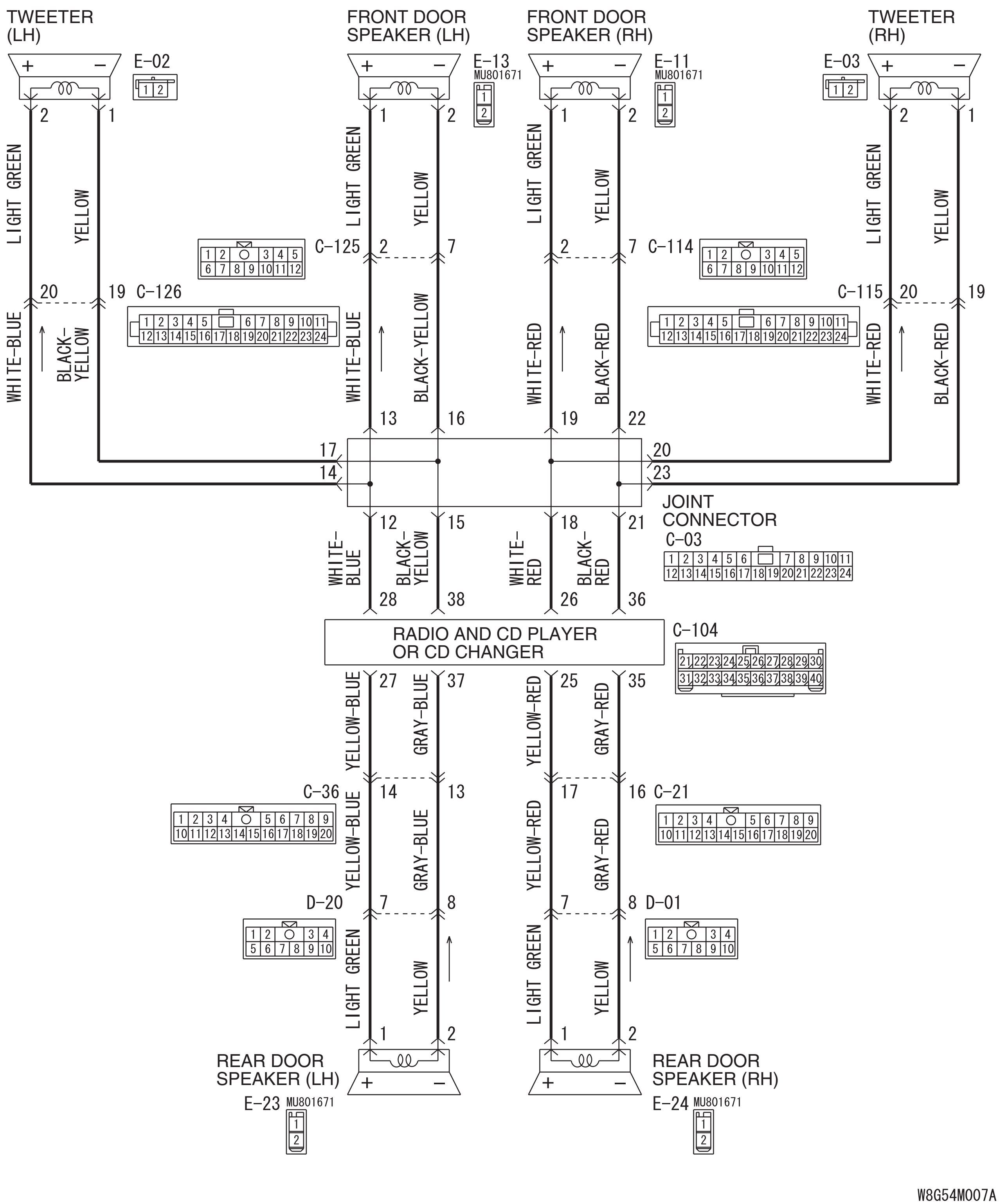
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the radio and CD changer.

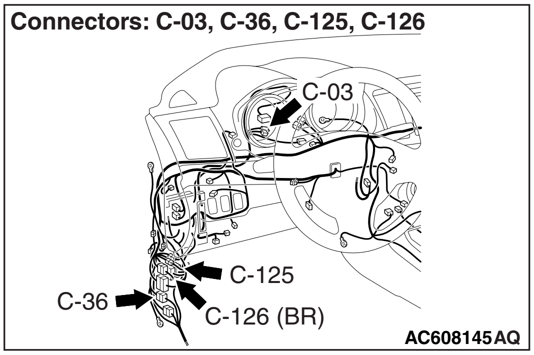
Inspection Procedure 3: No sound is heard from one of the speakers. <Vehicles without audio amplifier>

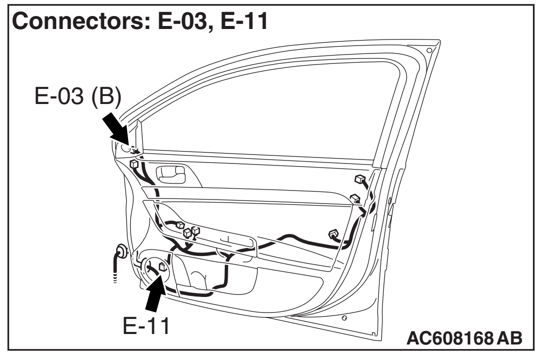
⚠ CAUTION

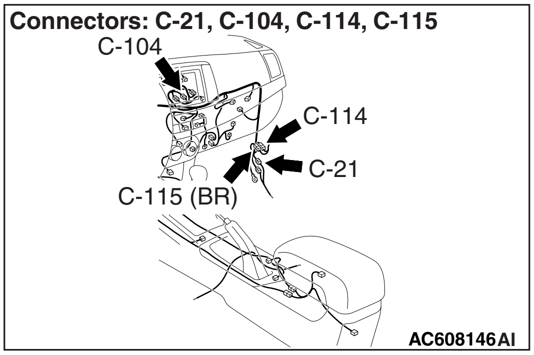
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

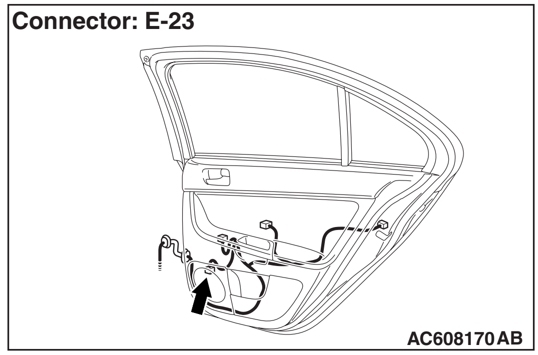
Speaker System Circuit

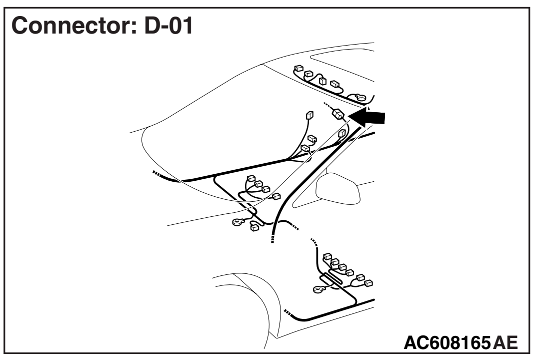


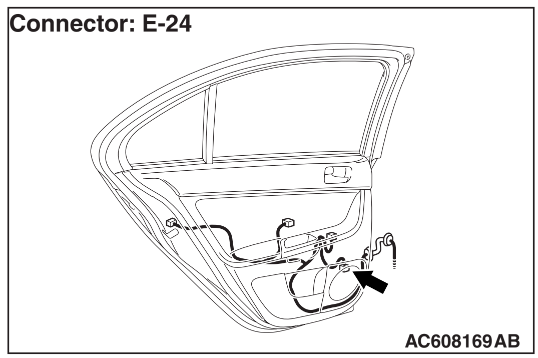


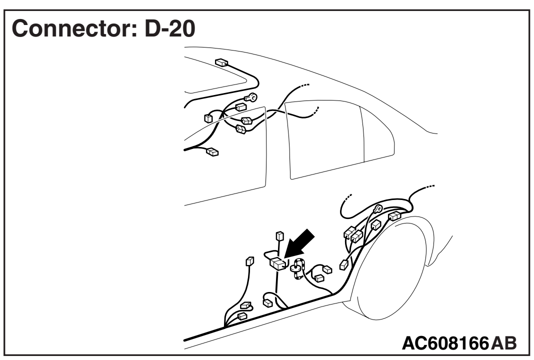


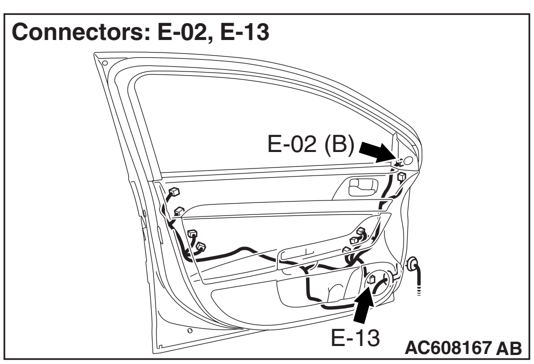












COMMENTS ON TROUBLE SYMPTOM

If the sound is not output from one of the speakers, the speaker, AM/FM radio and CD player, communication line from the AM/FM radio and CD player to the speakers may have a problem.

PROBABLE CAUSES

- Malfunction of speaker
- Malfunctions of radio and CD player or CD changer
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. ETACS-ECU coding data check.

(1) Operate the scan tool to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).
(2) Check that the "Speaker" is set to "6 speakers" or "4 speakers."

Q: Is the check result normal?

YES : Go to Step 2.
NO : Operate the scan tool to set the option coding "Speaker" to "6 speakers" or "4 speakers," and check the trouble symptom.

STEP 2. Checking with audio speaker check

Perform the audio speaker check, and check which speaker does not output the sound (Refer to P.54A-441).

NOTE: In the following procedure, check the speaker or tweeter that is abnormal.

Q: Is the check result normal?

YES (normal for all) : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO (abnormal for all) : Check the radio and CD player or CD changer power supply and ground circuit, and repair if necessary. If the radio and CD player or CD changer power supply and ground circuit is normal, replace the audiovisual navigation unit.
NO (Either a speaker is abnormal) : Go to Step 3.

STEP 3. Check door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH> in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 4. Check the speaker or tweeter.

(1) Remove the speaker or tweeter (Refer to P.54A-443).
(2) Check that the speaker or tweeter outputs the noise when the voltage of 5 V is applied to the speaker or tweeter connector terminal.

Q: Does the speaker or tweeter output the noise?

YES : Go to Step 5.
NO : Replace the speaker or tweeter.

STEP 5. Check radio and CD player or CD changer connector C-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is radio and CD player or CD changer connector C-104 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between the speaker or tweeter connector terminal and the radio and CD player or CD changer connector terminal.

Check the communication lines for open circuit.

- <Front door speaker (LH)> Check the wiring harness between front door speaker (LH) connector E-13 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 28, 38).

  NOTE: Also check joint connector C-03 and intermediate connector C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Front door speaker (RH)> Check the wiring harness between front door speaker (RH) connector E-11 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 26, 36).

  NOTE: Also check joint connector C-03 and intermediate connector C-114 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-114 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (LH)> Check the wiring harness between rear door speaker (LH) connector E-23 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 27, 37).

  NOTE: Also check intermediate connectors C-36 and D-20 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-36 or D-20 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (RH)> Check the wiring harness between rear door speaker (RH) connector E-24 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 25, 35).

  NOTE: Also check intermediate connectors C-21 and D-01 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-21 or D-01 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (LH)> Check the wiring harness between tweeter (LH) connector E-02 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 38, 28).

  NOTE: Also check joint connector C-03 and intermediate connector C-126 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-126 is damaged, repair or replace the connector as described in GROUP 00E, Har-

ness Connector Inspection P.00E-2.

- <Tweeter (RH)> Check the wiring harness between tweeter (RH) connector E-03 (terminal 1, 2) and radio and CD player or CD changer connector C-104 (terminal 36, 26).

  NOTE: Also check joint connector C-03 and intermediate connector C-115 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-115 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between the speaker or tweeter connector terminal and the radio and CD player or CD changer connector terminal in good condition?

YES : Replace the radio and CD player or CD changer.

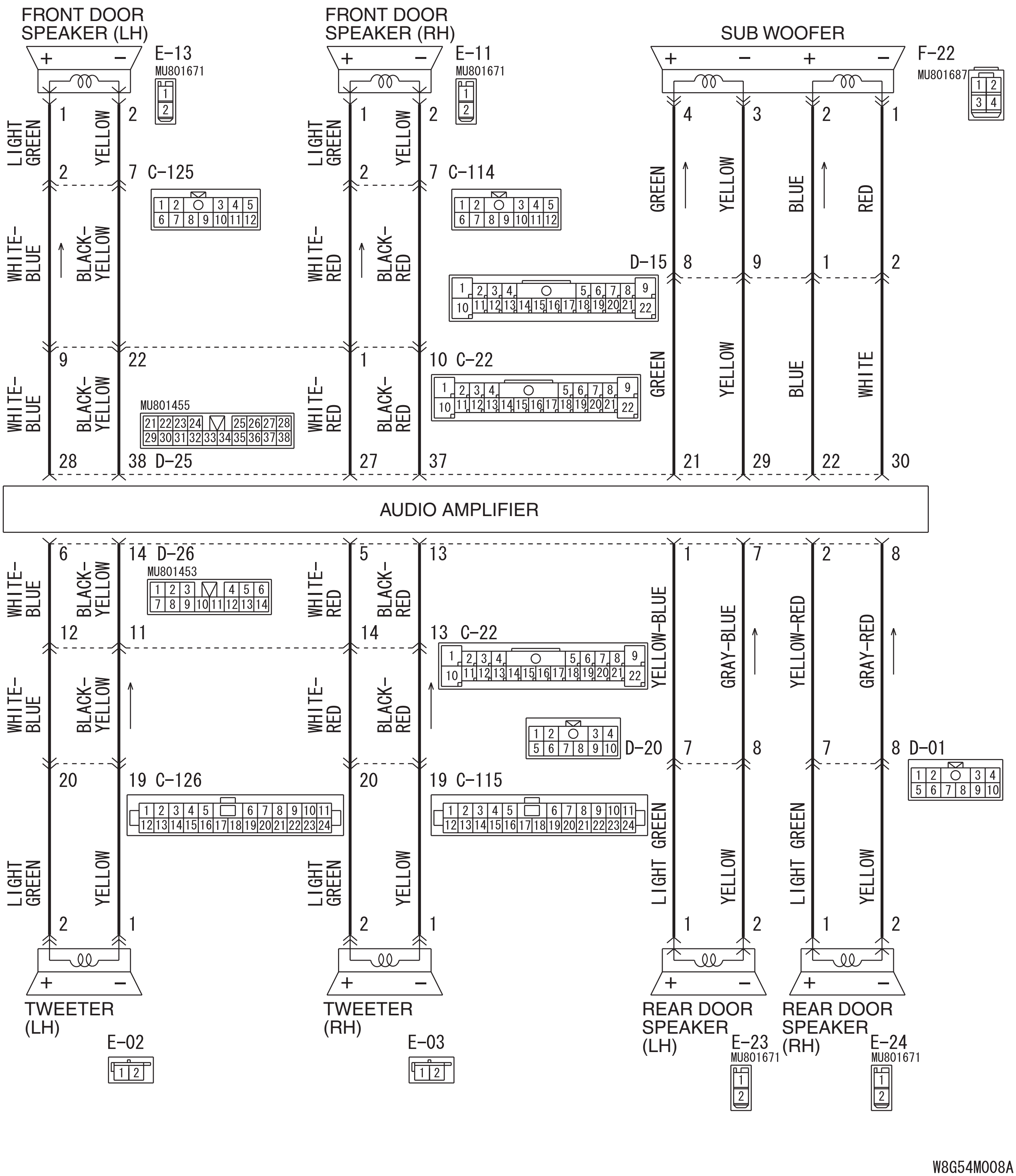
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

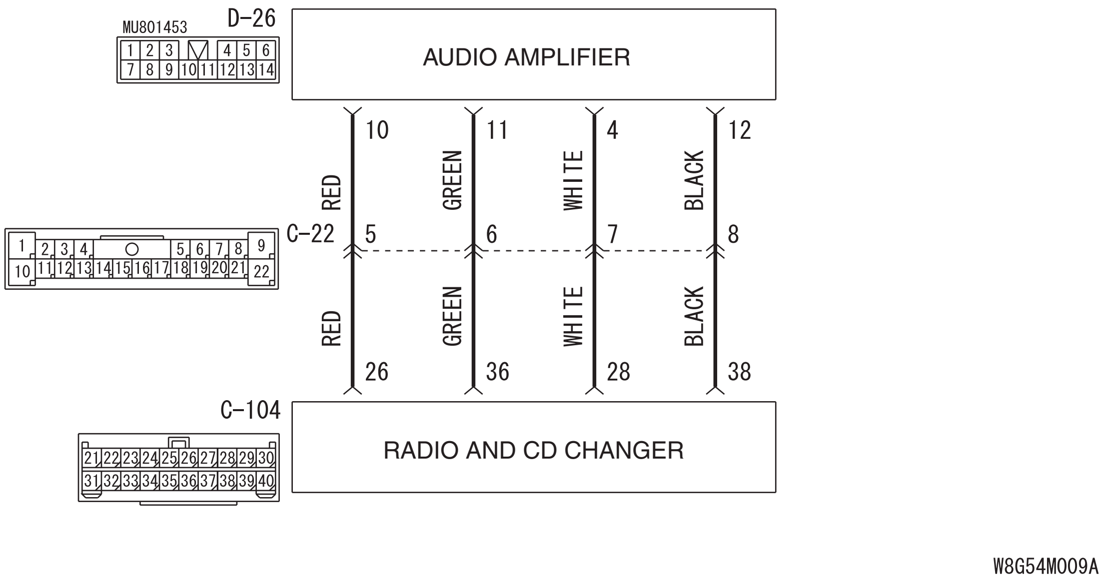
Inspection Procedure 3: No sound is heard from one of the speakers. <Vehicles with audio amplifier>

⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Speaker System Circuit




MU801453
D-26
AUDIO AMPLIFIER
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11
4
12
RED
GREEN
WHITE
BLACK
C-22
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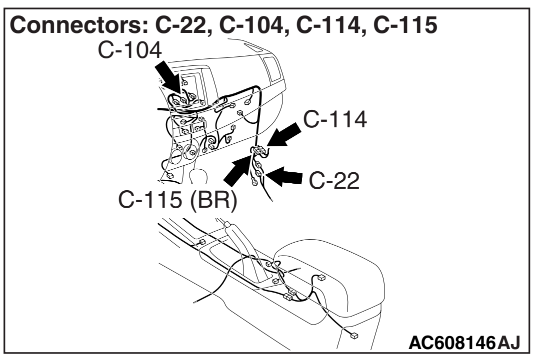
RED
GREEN
WHITE
BLACK
26
36
28
38
C-104
RADIO AND CD CHANGER
W8G54M009A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C-104
C-114
C-22
C-115 (BR)
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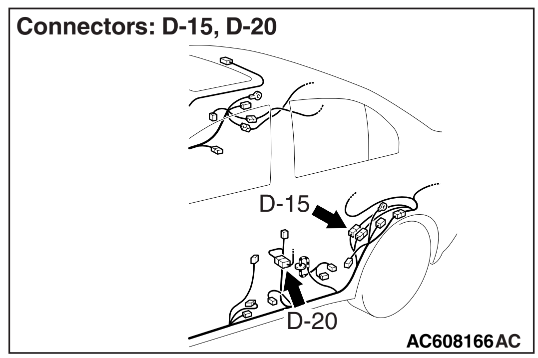
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D-15
D-20
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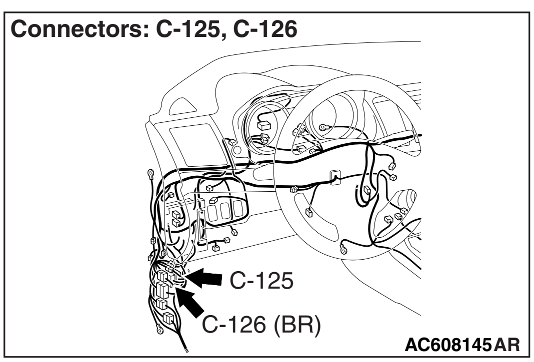
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C-125
C-126 (BR)
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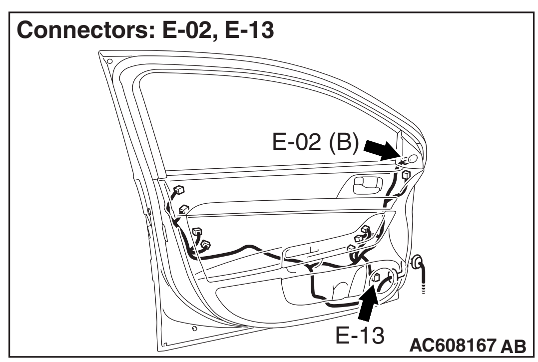
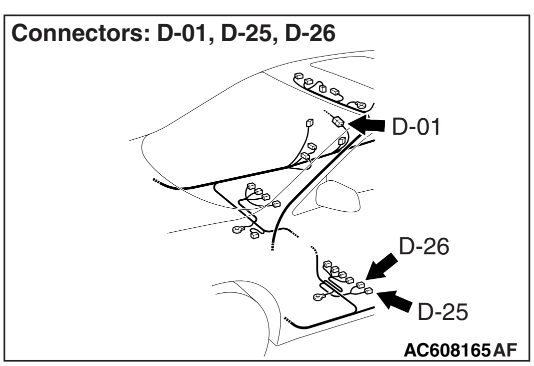
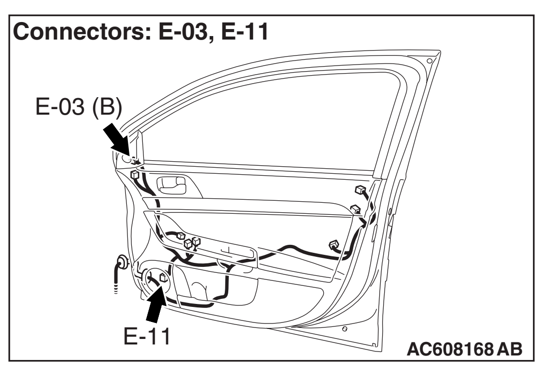

Connectors: E-02, E-13
E-02 (B)
E-13
AC608167AB


Connectors: D-01, D-25, D-26
D-01
D-26
D-25
AC608165AF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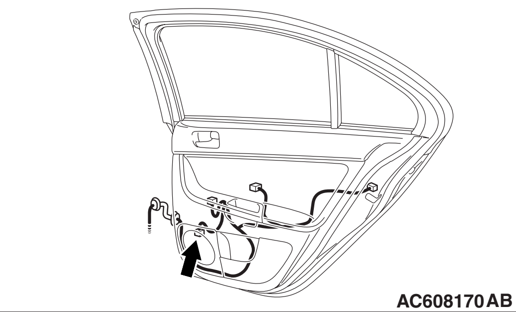
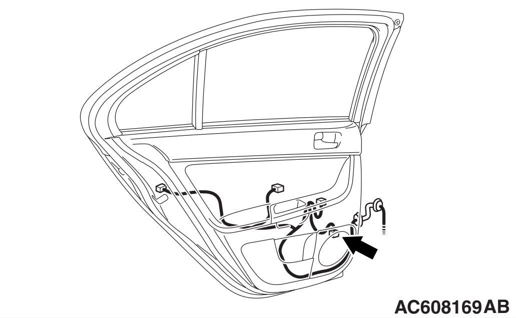
E-03 (B)
E-11
AC608168AB

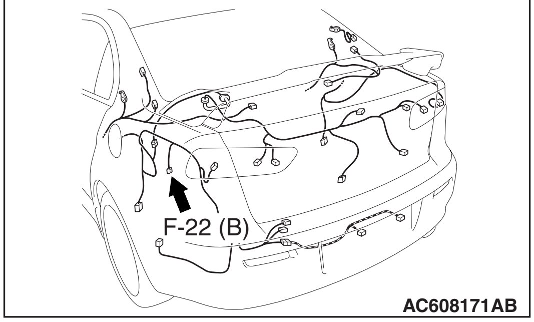
Connector: E-23



Connector: E-24



Connector: F-22



COMMENTS ON TROUBLE SYMPTOM

If the sound is not heard from one of the speakers, the speaker, radio and CD changer, audio amplifier, communication line from the radio and CD changer to the audio amplifier, or communication line from the audio amplifier to the speaker may have a problem. Also, the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunction of speaker
- Malfunctions of radio and CD changer
- Malfunction of audio amplifier
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. ETACS-ECU coding data check.

(1) Operate scan tool MB991958 to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).

(2) Check that the "Speaker" is set to "Premium."

Q: Is the check result normal?

YES : Go to Step 2.

NO : Operate scan tool MB991958 to set the option coding "Speaker" to "Premium," and check the trouble symptom.

STEP 2. Checking with audio speaker check

Perform the audio speaker check, and check which speaker does not output the sound (Refer to P.54A-441).

NOTE: In the following procedure, check the speaker or tweeter that is abnormal.

Q: Is the check result normal?

YES (normal for all) : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO (abnormal for all) : Check the radio and CD changer power supply and ground circuit, and repair if necessary. If the radio and CD changer power supply and ground circuit is normal, replace the audiovisual navigation unit.

NO (Either a speaker is abnormal) : Go to Step 3.

STEP 3. Check door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH>, or sub woofer connector F-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH>, or sub woofer connector F-22 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 4. Check the speaker, tweeter or subwoofer.

(1) Remove the speaker, tweeter or subwoofer (Refer to P.54A-443).

(2) Check that the speaker or tweeter outputs the noise when the voltage of 5 V is applied to the speaker or tweeter connector terminal. <speaker or tweeter>

(3) Check that the subwoofer outputs the noise when the voltage of 5 V is applied to the subwoofer connector terminal. <subwoofer>

Q: Is the check result normal?

YES : Go to Step 5.

NO : Replace the speaker, tweeter or subwoofer.

STEP 5. Check audio amplifier connector D-25 <front door speaker or sub woofer> or D-26 <rear door speaker or tweeter> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio amplifier connector D-25 <front door speaker or sub woofer> or D-26 <rear door speaker or tweeter> in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between the speaker, tweeter or sub woofer connector terminal and the audio amplifier connector terminal.

Check the communication lines for open circuit.

- <Front door speaker (LH)> Check the wiring harness between front door speaker (LH) connector E-13 (terminal 1, 2) and audio amplifier connector D-25 (terminal 28, 38).

  NOTE: Also check intermediate connectors C-22 and C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Front door speaker (RH)> Check the wiring harness between front door speaker (RH) connector E-11 (terminal 1, 2) and audio amplifier connector D-25 (terminal 27, 37).

  NOTE: Also check intermediate connectors C-22 and C-114 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-114 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (LH)> Check the wiring harness between rear door speaker (LH) connector E-23 (terminal 1, 2) and audio amplifier connector D-26 (terminal 1, 7).

  NOTE: Also check intermediate connector D-20 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-20 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (RH)> Check the wiring harness between rear door speaker (RH) connector E-24 (terminal 1, 2) and audio amplifier connector D-26 (terminal 2, 8).

  NOTE: Also check intermediate connector D-01 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-01 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (LH)> Check the wiring harness between tweeter (LH) connector E-02 (terminal 1, 2) and audio amplifier connector D-26 (terminal 14, 6).

  NOTE: Also check intermediate connectors C-22 and C-126 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-126 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (RH)> Check the wiring harness between tweeter (RH) connector E-02 (terminal 1, 2) and audio amplifier connector D-26 (terminal 13, 5).

  NOTE: Also check intermediate connectors C-22 and C-115 for loose, corroded, or damaged terminals, or terminals *pushed back in the connector. If intermediate connector C-22 or C-115 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.*

- <Subwoofer> Check the wiring harness between subwoofer connector F-22 (terminal 1, 2, 3, 4) and audio amplifier connector D-25 (terminal No.30, 22, 29, 21).

  NOTE: Also check intermediate connector D-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between the speaker, tweeter or sub woofer connector terminal and the audio amplifier connector terminal in good condition?

YES <front door speaker> : Go to Step 7.
YES <except front door speaker> : Go to Step 9.
NO (harness wire is abnormal) : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 7. Check radio and CD changer connector C-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is radio and CD changer connector C-104 in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 8. Check the harness wire between radio and CD changer connector C-104 (terminal 26, 28, 36, 38) and audio amplifier connector D-26 (terminal 10, 4, 11, 12).

- Check the communication lines for open circuit.

NOTE: Also check intermediate connector C-22 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between radio and CD changer connector C-104 (terminal 26, 28, 36, 38) and audio amplifier connector D-26 (terminal 10, 4, 11, 12) in good condition?

YES : Check the trouble symptom, go to Step 9.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 9. Replace the audio amplifier temporarily, and check the trouble symptom.

Replace the audio amplifier temporarily, and check that the sound is output from the speaker.

Q: Is the check result normal?

YES : Replace the audio amplifier.

NO : Replace the radio and CD changer.

INSPECTION PROCEDURE 8: Noise is Present while Moving (AM).

DIAGNOSIS

STEP 1. Ask the driver about the noise.

(1) Find out the following information from the owner.
(2) Place where the noise occurs.
(3) Locality conditions (valley, mountain, etc.)
(4) Name and frequency of stations affected by noise

Q: What type of noise is detected, vehicle noise or external noise?

Vehicle noise : It may not be possible to prevent noise if the signal is weak. Go to step 2.

External noise : In almost all cases, prevention on the receiver side is next to impossible when the signal is weak. Go to Step 4.

STEP 2. Ask the driver about the location where the noise occurs

Q: Does the noise occur when entering or near a particular structure (building, tunnel, mountain, etc.)?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check if the noise can be eliminated by adjusting the radio.

(1) Adjust the radio as follows.
(2) Change to a different station with a stronger signal. This will boost the systems resistance to outside interference.
(3) Suppress high tones to reduce noise.

Q: Has the noise been eliminated?

YES : The noise has now been eliminated. Inform the customer that it is normal to hear noise while receiving a weak station.

NO : Go to Step 4.

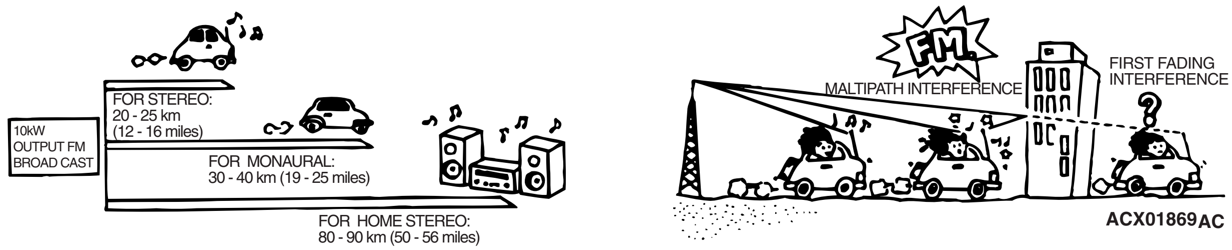
STEP 4. Check for the noise.

Q: Does noise still exist?

YES : If there is still more noise than on other similar radio’s find out the type of noise. Ask the owner for the name and frequency of the affected stations, and consult with the radio manufacturer service center.

NO : System is operating normally.

INSPECTION PROCEDURE 9: Noise is Present while Moving (FM).



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DIAGNOSIS

NOTE: FM waves have the same properties as light, and can be deflected and blocked. FM signal reception is severely degraded in the shadow of obstructions such as buildings or mountains. An FM receiver will then only receive a reflected signal.

1. The signal becomes weak as the distance from the station's transmission antenna increases. The signal strength received depends on the signal strength of the transmitting station and intervening obstructions such as buildings and hills. Generally speaking, the area of good reception is approximately 20 –25 km (12 –16 miles) for stereo reception, and 30 –40 km (19 –25 miles) for monaural reception.
2. The signal will becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the station transmitter and the vehicle), and noise will appear. <This is called first fading, and gives a steady buzzing noise.>
3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. When moving, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitive buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

After taking measures to prevent the noise, check that no noise occurs.

5. Change to a different station with a stronger wave to boost resistance to interference.
6. Suppress high tones to reduce noise.
7. Does vehicle have an antenna which extends? If not eliminate this step.

If there is noise, the following causes can be considered.

8. If due to vehicle noise: It may not be possible to prevent noise if the signal is weak.
9. If due to external noise: In almost all cases, prevention on the receiver side is not possible. Weak signals especially are susceptible to interference.

If there is more noise than on radios in other vehicles, find out the noise condition and the name and frequency of the receiving stations from the owner, and consult with the radio manufacturer's service center.

INSPECTION PROCEDURE 10: Sound mixed with Noise, Only at Night (AM).

The following can be considered as possible causes of noise appearing only at night.

1. It is significantly easier to receive long-distance signals at night. This means that even stations that are received without a problem during the day may experience problems at night. Remember that the weaker station is more susceptible to interference. The appearance of a beat sound may occur in the evening. A beat sound is created when two signals close in frequency interfere with each other. A common sign of this type of interference is a repetitious high-pitched sound that may over power the desired radio station. This sound is generated not only by sound signals but electrical waves as well.
2. The changing system may also be a source of noise. When diagnosing radio noise, do not over look the possibility of a problem with the vehicles generator.

DIAGNOSIS

STEP 1. Check the vehicles lighting system.

Q: Does the noise disappear when the vehicles headlights are turned "OFF"?
YES : Go to Step 2.
NO : Go to Step 3.

STEP 2. Check that the following actions disappear the noise.

Tune to a station with a stronger signal.

Q: Is there more noise than on radio in other vehicles?
YES : Consult the radio manufacturer's service center.
NO : Check that there is no noise.

STEP 3. Check that the noise fades away when the vehicle harness is moved away from the radio (if the harness is not in the proper position).

Q: Does the noise fade away when the vehicle harness is moved any from the radio (If the harness is not in the proper position)?
YES : Consult the radio manufacturer's service center.
NO : If there is more noise than other radios, consult the radio manufacturer's service center.

INSPECTION PROCEDURE 11: Noise is Overpowering both AM and FM.

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?
YES : Go to Step 2.
NO : Assemble the mast antenna. Check to see that the noise is gone.

STEP 2. Verify that the noise occur when the engine is stopped or the engine is running.

Q: Does noise occur when the engine is stopped or the engine is running?
When the engine is stopped : Go to Step 3.
When the engine is running : Check the vehicle's noise suppressor. (Refer to Inspection Procedure 11 P.54A-296).

STEP 3. Verify that the following actions disappear the noise.

(1) Tune to a station with a stronger wave.
(2) Extend the antenna completely (Mast antenna).
(3) Adjust the sound quality to suppress high tones.

Q: Is the noise eliminated?
YES : Consult the radio manufacturer's service center.
NO : Go to Step 4.

STEP 4. Verify that the radio is correctly grounded

The radio is connected to the ground with an assembling screw.

Q: Is the radio correctly grounded?

YES : Go to Step 5.

NO : Consult the radio manufacturer's service center.

STEP 5. Check the connection of the antenna plug and radio and CD player.

Q: Is the antenna plug thoroughly connected to the radio and CD player?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Verify that the noise is eliminated when the antenna plug is properly attached.

Q: Is the noise eliminated?

YES : Consult the radio manufacturer's service center.

NO : Go to Step 7.

STEP 7. Verify that the antenna is in good condition and is it properly mounted.

Q: Is the antenna in good condition and is it properly mounted?

YES : Consult the radio manufacturer's service center.

NO : Either repair or replace the antenna assembly. Check to see that the noise is gone.

INSPECTION PROCEDURE 12: Excessive Noise on AM and FM.

DIAGNOSIS

Radio reception can be affected by Radio Frequency (RF) emissions from a variety of sources. The disturbance is even greater if the station is weak or poorly tuned. FM reception is not as sensitive to disturbances as AM. AM reception is sensitive to electrical disturbances such as power lines, lightening and other types of similar electrical phenomena.

STEP 1. Check if the customer heard the noise under any of the following conditions.

- A motorcycle was passing.
- Lighting was flashing.
- Passed beneath a power line.
- Passed beneath a telephone line.
- Passed by a signal generator.
- Passed by any other sources of electrical noise.
- Passed under a bridge or through a tunnel.

Q: Did the noise occur during any of the circumstances listed above?

YES : The observed noise is normal.

NO : Go to Step 2.

STEP 2. Compare the customers radio to another identical model.

Operate the radio in a vehicle with a known good audio system of the same type as the customer's.

Q: Is there more noise on the customers radio?

YES : Check all power and ground connections. If all connections are in good condition, consult the radio manufacturers service center.

NO : The observed noise is normal.

INSPECTION PROCEDURE 13: Noise is Detected with Engine Running.

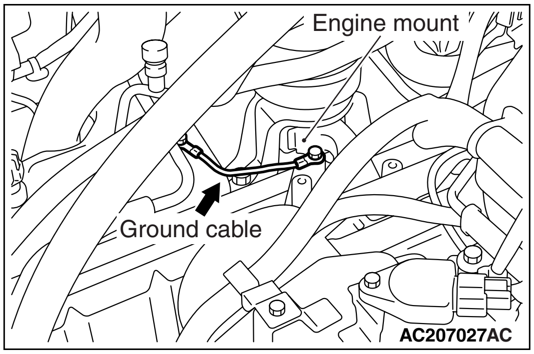
DIAGNOSIS

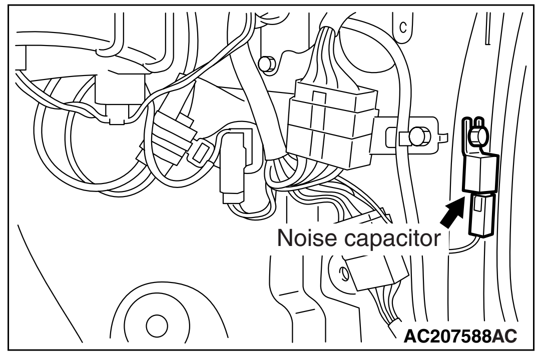
⚠ CAUTION

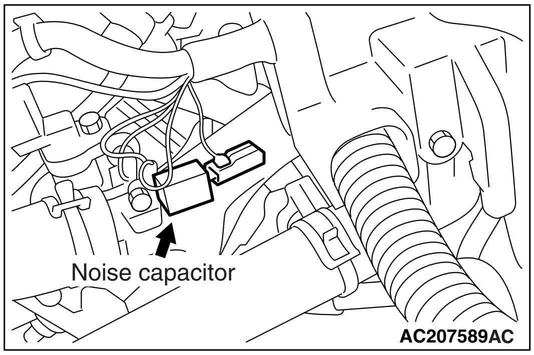
- **Never connect a noise filter to the high tension cable (spark plug wire). Spark plug wires incorporate resistors which have the effect of suppressing noise. If a spark plug wire is found to be causing noise, it must be replaced.**
- **Confirm that the noise is not from an external source.**
- **Noise prevention should be performed by suppressing strong sources of noise first.**

NOTE: Voltage surges can be induced in the electrical system by the collapse of a field (i.e. When power is removed from the coil in an A/C compressor clutch). This induced voltage surge will radiate a Radio Frequency (RF) signal that is picked up by the audio unit. In the case of the compressor clutch a "pop" will be heard through the speakers. The capacitor, installed on this vehicle, will store the excess voltage and prevent the production of RF noise. This is because the capacitor will charge and discharge as the voltage fluctuates. This has the effect of "attracting" noise and bleeding it to ground without interfering with the normal flow of current through the system.

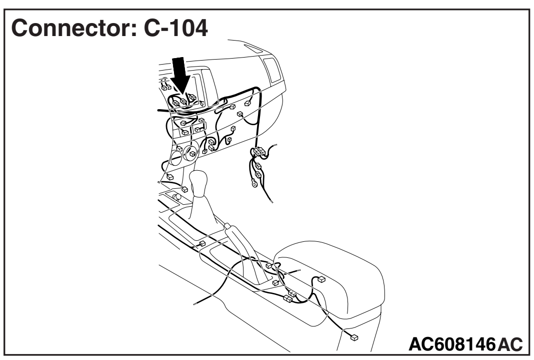
Description of noise	Condition	Cause	Solution
AM, FM: ignition noise (popping, snapping, cracking, buzzing)	• Increasing the engine speed causes the generator whine to speed up and the volume to decrease. • Disappears when the ignition switch turned to "ACC", and engine is off.	• Electrical interference from the spark plugs. • Engine noise.	• Check or replace the ground cable. • Check or replace spark plug wires. • Check or replace the noise capacitor.
Other electrical components	-	• Noise may intensify due to aging electrical components.	• Repair or replace the electrical components.
Static electricity (cracking, crinkling)	Noise disappears when the vehicle is completely stopped.	• Noise occurs when parts or wiring move and contact vehicle body.	• Return parts or wiring to their proper position.
Static electricity (cracking, crinkling)	• Various noises are produced depending on the body part of the vehicle.	• This may be due to the recent removal of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	• Properly ground parts. • Properly ground all body parts.

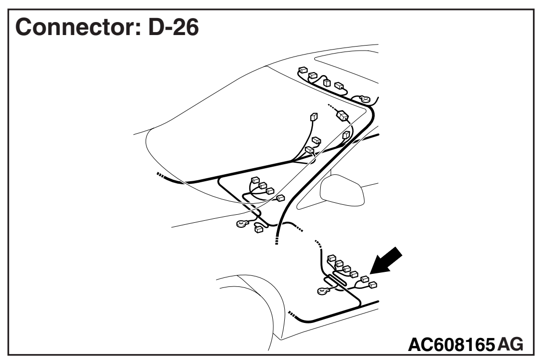






INSPECTION PROCEDURE 14: Noise Appears During Vibration or Shocks.





DIAGNOSIS

STEP 1. Check the fit of the mast antenna.

Q: Is the mast antenna base fitted securely?

YES : Go to Step 2.
NO : Install the mast antenna, and tighten the mounting nut (Refer to P.54A-447). Check that there is no noise.

STEP 2. Check the fit of antenna feeder cable.

Q: Is the antenna feeder cable fitted securely?

YES : Go to Step 3.
NO : Ensure that the antenna base and the radio and CD player are fitted securely. Check that there is no noise.

STEP 3. Check radio and CD player or CD changer connector C-104 and amplifier connector D-26 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are radio and CD player or CD changer connector C-104 and amplifier connector D-26 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that there is no noise.

STEP 4. Check that noise appears when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station.

NOTE: Body static electricity from the shock absorber rubber bushings used to prevent vibration, tires, etc. occurs because of separation from the ground, causing a buzzing noise. Since no measures can be taken to discharge the static electricity of the vehicle body. Check that there is no noise.

Q: Does noise appear when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station?

YES : Go to Step 5.
NO : It may be static electricity noise.

STEP 5. Verify that the radio is correctly grounded.
The radio is connected to the ground with an assembling screw.

Q: Is the radio correctly grounded?

YES : Go to Step 6.
NO : Tighten the screw securely. Check that there is no noise.

STEP 6. Check by replacing radio and CD player or radio, CD player and CD changer.

Q: Do the other radio and CD player or radio, CD player and CD changer work normally?

YES : Either repair or replace the original radio and CD player or radio, CD player and CD changer. Check that there is no noise.
NO : Either repair or replace the antenna assembly. Check that there is no noise.

INSPECTION PROCEDURE 15: Noise is Present While Moving (FM).

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?
YES : Go to Step 2.
NO : Assemble the mast antenna. Check that there is no noise.

STEP 2. Check the radio after adjusting it.

Q: Readjust the radio. Is the noise eliminated?
YES : Check that there is no noise.
NO : Go to Step 3.

STEP 3. Check with several broad casting.

NOTE: Multipath noise and fading noise: Because of the frequency of FM waves in extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- *Multipath noise*
  This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).
- *Fading noise*
  This is a buzzing noise that occurs when the broadcast signal is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

Q: Is the problem station or location specific?
YES : The effect of an electrical field condition (multipath noise, fading noise) could be the cause. Check that there is not noise.
NO : Go to Step 4.

STEP 4. Check that noise appears when the radio switch is turned on while the vehicle is stopped.

NOTE: Body static electricity from the shock absorber rubber bushings used to prevent vibration, tires, etc. occurs because of separation from the ground, causing a buzzing noise. There is no measures to discharge the static electricity of the vehicle body. Check that there is no noise.

Q: Does noise appear when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station?
YES : Go to Step 5.
NO : It may be static electricity noise.

STEP 5. Verify that the radio is correctly grounded.

The radio is connected to the ground with an assembling screw.

Q: Is the radio correctly grounded?
YES : Go to Step 6.
NO : Tighten the screw securely. Check that there is no noise.

STEP 6. Check by replacing radio and CD player or radio, CD player and CD changer.

Q: Do the other radio and CD player or radio, CD player and CD changer work normally?
YES : Either repair or replace the original radio and CD player or radio, CD player and CD changer. Check that there is no noise.
NO : Either repair or replace the antenna assembly. Check that there is no noise.

INSPECTION PROCEDURE 16: Constant Noise.

DIAGNOSIS

Use the Symptom Chart to diagnose the possible cause(s) of the noise. Noise is often created by the following factors:

- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

If there are still problems with noise, even after performing inspection procedures 8 to 15, obtain information on the factors listed above. Determine whether the problem occurs on AM or FM, the station names, frequencies, etc. and contact the radio manufacturer's service center.

INSPECTION PROCEDURE 17: No Reception (AM).

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?
YES : Go to Step 2.
NO : Assemble the mast antenna. The radio should sound normally.

STEP 2. Check to see if inspections are taking place is an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underground garage, inside a building, etc.)?
YES : Go to Step 3.
NO : Go to Step 4.

STEP 3. Move the vehicle and check the radio.
Move the vehicle to a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?
YES : There is no action to be taken.
NO : Go to Step 4.

STEP 4. Tune the radio, and then check it.

Q: Did the sensitivity improve after tuning?
YES : There is no action to be taken.
NO : Go to Step 5.

STEP 5. Check the connection of the antenna plug and radio and CD player or radio, CD player and CD changer.

Q: Is the antenna plug thoroughly connected to the radio and CD player or radio, CD player and CD changer?
YES : Go to Step 6.
NO : Thoroughly connect the antenna plug and the radio and CD player or radio, CD player and CD changer. The radio should sound normally.

STEP 6. Check by replacing radio and CD player or radio, CD player and CD changer.

Q: Do the other radio and CD player or radio, CD player and CD changer work normally?
YES : Either repair or replace the original radio and CD player or radio, CD player and CD changer. The radio should sound normally.
NO : Either repair or replace the antenna assembly. The radio should sound normally.

INSPECTION PROCEDURE 18: Poor Reception.

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?
YES : Go to Step 2.
NO : Assemble the mast antenna. Check that a poor reception is resolved.

STEP 2. Check to see if inspections are taking place is an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underground garage, inside a building, etc.)?
YES : Go to Step 3.
NO : Go to Step 4.

STEP 3. Move the vehicle and check the radio.

Move the vehicle to a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?
YES : Check that a poor reception is resolved.
NO : Go to Step 4.

STEP 4. Tune the radio, and then check it.

Q: Did the sensitivity improve after tuning?
YES : Check that a poor reception is resolved.
NO : Go to Step 5.

STEP 5. Check with several broadcasting stations.

NOTE: Two types of noise are addressed in this procedure, multipath and fading noise. The frequency of FM waves is extremely high. This makes them susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in many ways.

- *Multipath noise is the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).*
- *A fading or buzzing noise may occur when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates within a narrow range.*

Q: Is the abnormality in reception generated only within a certain range?
YES : Check that a poor reception is resolved.
NO : Go to Step 6.

STEP 6. Check the connection of the antenna plug and radio and CD player or radio, CD player and CD changer.

Q: Is the antenna plug thoroughly connected to the radio and CD player or radio, CD player and CD changer?
YES : Go to Step 7.
NO : Thoroughly connect the antenna plug and the radio and CD player or radio, CD player and CD changer. Check that a poor reception is resolved.

STEP 7. Check by replacing radio and CD player or radio, CD player and CD changer.

Q: Do the other radio and CD player or radio, CD player and CD changer work normally?
YES : Either repair or replace the original radio and CD player or radio, CD player and CD changer. Check that a poor reception is resolved.
NO : Either repair or replace the antenna assembly. Check that a poor reception is resolved.

INSPECTION PROCEDURE 19: Distortion on AM and/or FM.

DIAGNOSIS

STEP 1. Check the level of distortion.

Q: How much distortion is there?
Occasional distortion : Go to Step 2.
Constant distortion : Go to Step 3.

STEP 2. Check the location of the distortion.

Q: Is there distortion when the vehicle is near the radio station?
YES : The antenna is receiving too strong a signal.
NO : Go to Step 3.

STEP 3. Check the wires at each speaker.

Q: Are the speaker wires contacting the paper speaker cone?
YES : Move the speaker wires away from the paper speaker cone. The speaker should now be free of distortion.
NO : Go to Step 4.

STEP 4. Remove the speakers, and check the paper cone for foreign material or damage.

Q: Is there foreign material or damage on the paper cone of the speaker?
YES : Repair or replace the speakers. The speaker should now be free of distortion.
NO : Go to Step 5.

STEP 5. Check for distortion with the speaker installed.

Q: Does a distortion occur?
YES : Install the speaker securely. The speaker should now be free of distortion.
NO : Repair or replace the radio and CD player. The speaker should now be free of distortion.

INSPECTION PROCEDURE 20: Distortion on FM Only.

DIAGNOSIS

STEP 1. Check that the distortion is present when the radio is tuned to another station.

Q: Does the distortion persist when the radio is tuned to another station?
YES : Go to Step 2.
NO : The signal from that station is too weak.

STEP 2. Relocate the reception area and check the radio.

Q: When relocating the reception area does the distortion increase or decrease?
YES : The cause may be multipath or fading noise. Multipath noise is the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing). A fading or buzzing noise may occur when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates within a narrow range.
NO : Replace the radio and CD player. Check that a distortion is resolved.

INSPECTION PROCEDURE 21: Auto Select Function Inoperative, too Few Automatic Stations are Selected.

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.
NO : Assemble the mast antenna. The auto-select function should operate normally.

STEP 2. Check the number of radio stations.

Q: Are there sufficient numbers of radio stations within the area?

YES : Go to Step 3.
NO : Go to Step 4.

STEP 3. Check the distance from the transmission antenna.

Q: Is there a transmission antenna within a range of 2 miles?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. The check if there are not that many radio stations and when there is no transmission antenna in the vicinity.

Execute automatic selection and check to see that the strongest radio frequency is receivable within the area.

Q: Is reception of the strongest radio frequency possible within the area?

YES : There is no action to be taken.
NO : Go to Step 5.

STEP 5. Check to see if inspections are taking place is an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underground garage, inside a building, etc.)?

YES : Go to Step 6.
NO : Go to Step 7.

STEP 6. Relocate and check.

Automatically receive in a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?

YES : There is no action to be taken.
NO : Go to Step 7.

STEP 7. Check the connection of the antenna feeder cable and radio and CD player or radio, CD player and CD changer.

Q: Is the antenna feeder cable thoroughly connected to the radio and CD player or radio, CD player and CD changer?

YES : Repair or replace the radio and CD player or radio, CD player and CD changer. The auto-select function should operate normally.
NO : Thoroughly connect the antenna feeder cable and the radio and CD player or radio, CD player and CD changer. The auto-select function should operate normally.

INSPECTION PROCEDURE 22: Preset Stations are Erased.

CIRCUIT OPERATION

Power is continuously supplied to the radio and CD player or CD changer.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably a faulty radio and CD player or CD changer memory backup power supply system circuit.

TROUBLESHOOTING HINTS

- Damaged wiring harness or connector
- Malfunction of the radio and CD player or CD changer

DIAGNOSIS

Refer to Inspection Procedure 1P.54A-268.

INSPECTION PROCEDURE 23: CD can not be Inserted.

DIAGNOSIS

STEP 1. Check that a CD has been already loaded.

Q: Has a CD been already loaded?

YES : Take out the CD (If the CD can not be ejected, refer to INSPECTION PROCEDURE 27 P.54A-306). Check that a CD can be inserted.

NO : Go to Step 2.

STEP 2. Check how a CD is inserted.

Ensure that the ignition switch is at 'ACC' or 'ON'.

NOTE: If you try to load a CD when the ignition switch is at the positions other than 'ACC' or 'ON,' the CD will not be inserted completely and then rejected.

Q: If you try to load the CD, does the CD stops halfway and then rejected?

YES : Refer to INSPECTION PROCEDURE 27 P.54A-306.

NO : Go to Step 3.

STEP 3. Check after the CD is loaded.

NOTE: Even though the CD is loaded, 'E01' (vehicles with center display low type) or 'ERROR 01' (vehicles with center display middle type) sometimes displayed with the CD rejected because of vibration/shock or dew on the CD face or optical lens.

Q: Though the CD is inserted completely, is 'E01' (vehicles with center display low type) or 'ERROR 01' (vehicles with center display middle type) displayed and the CD ejected?

YES : Go to Step 4.

NO : There is no action to be taken.

STEP 4. Check the CD.

Check the CD for the conditions below:

- Is the CD loaded with its label facing down?
- Is the recorded face dirty or scratched?
- Is there dew on the recorded face?

Q: Is the CD in good condition?

YES : Go to Step 5.

NO : The original CD is defective. Check that a CD can be inserted.

STEP 5. Check again using a normal CD, which is not dirty or scratched.

- Load another normal CD.
- Check that the CD player recognizes and play the CD.

Q: When you substitute another normal CD, is the CD loaded correctly?

YES : The original CD is defective. Check that a CD can be inserted.

NO : Replace or repair the CD player. Check that a CD can be inserted.

INSPECTION PROCEDURE 24: No Sound. (CD Only)

DIAGNOSIS

STEP 1. Check again using another CD, which is not dirty or scratched.

Q: When you substitute another normal CD, is the CD played normally?

YES : The original CD is defective. The CD player should sound normally.

NO : Go to Step 2.

STEP 2. Check power supply to the CD player when the ignition switch is at "ACC" or "ON" position.

Q: Is the radio and CD player energized when the ignition switch is turned to the "ACC" or "ON" position?

YES : Replace the audio. The CD player should sound normally.

NO : Check the memory backup power supply circuit. Refer to Inspection Procedure 1 P.54A-268.

INSPECTION PROCEDURE 25: CD Sound Skips.

DIAGNOSIS

STEP 1. Check the state in which the sound on the CD jumps.

Q: Does the sound jump when the car is parked?

YES : Go to Step 2.

NO : Go to Step 4.

STEP 2. Check the surface of the CD.

Q: Are there any scratches or soiling on the CD?

YES : The CD is defective if there are any scratches. Clean the CD surface if it is dirty. Check that a CD sound skip is resolved.

NO : Go to Step 3.

STEP 3. Check when replacing with a CD that can be played normally without any scratches or soiling.

Q: Does the CD play normally when replaced with a CD that is not scratched or dirty and can play normally?

YES : Defective CD used. Check that a CD sound skip is resolved.

NO : Go to Step 4.

STEP 4. Check by tapping the radio and CD player or radio, CD player and CD changer.

NOTE: Check by using a known-good CD which is free from scratches, dirt or any other abnormality.

Q: Does the sound jump when tapping the radio and CD player or radio, CD player and CD changer?

YES : Securely mount the audio. Check that a CD sound skip is resolved.

NO : Either replace the audio system or take the following measures if a servicing shop is nearby.

1. Investigate in detail the conditions when the sound jumps while driving the car.
2. Describe these conditions to the service shop for consultation.
3. Either replace the audio according to the instructions of the service shop.

Check that a CD sound skip is resolved.

INSPECTION PROCEDURE 26: Sound Quality is Poor.

DIAGNOSIS

Check to see that the CD can be played normally and that it is free of any scratches or soiling.
Replace with better sound quality CD.

Q: Is the sound quality better replacing the CD with a clean CD without any scratches that can be played?
YES : The CD is defective. The sound quality should return to normal.
NO : Replace the audio. The sound quality should return to normal.

INSPECTION PROCEDURE 27: CD can not be Ejected.

DIAGNOSIS

Check the power of ignition switch "ACC".

Q: Does the radio and CD player or radio, CD player and CD changer power turn ON when the ignition switch is in the "ACC" or "ON" position?
YES : Either replace the audio. Check that a CD can be ejected normally.
NO : Check the memory backup power supply circuit. Refer to Inspection Procedure 1 P.54A-268.

ON-VEHICLE SERVICE

ADJUSTMENT OF VOLUME AND SOUND QUALITY AUTOMATIC CORRECTION FUNCTION

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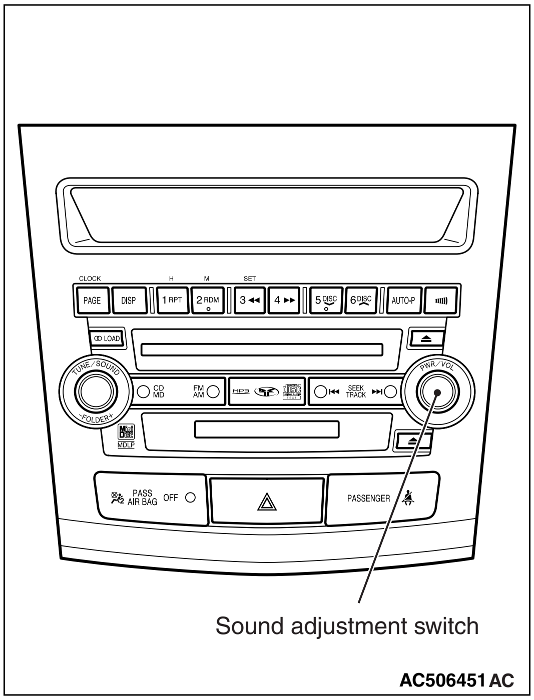
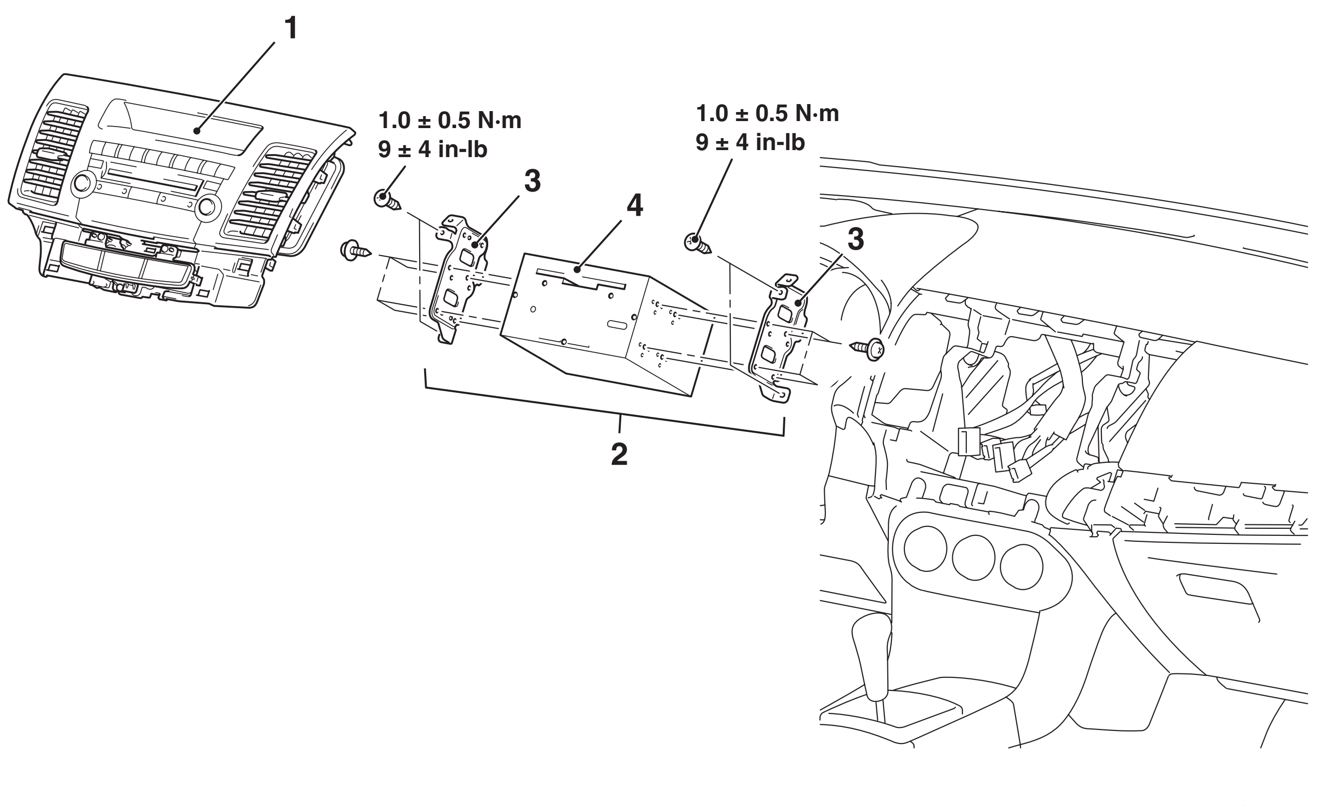


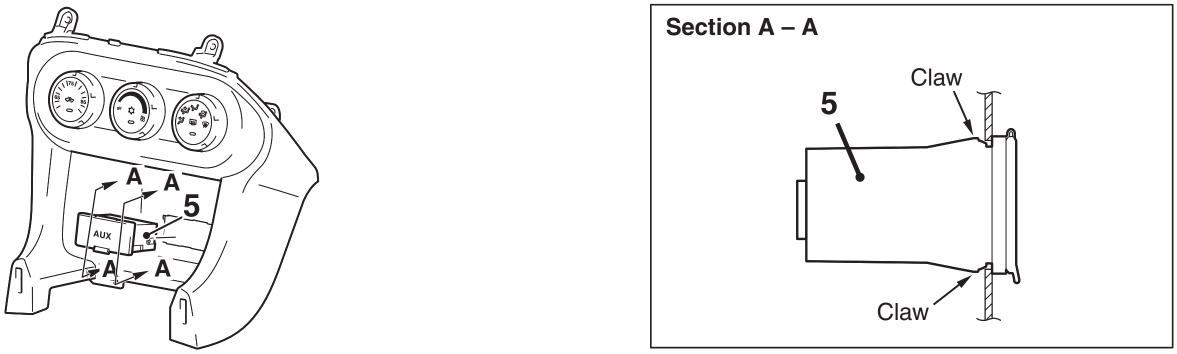
When the following operations are performed with the audio power ON, the sound volume during driving and the ON/OFF of sound quality automatic correction function are switched.

1. Press and hold (approximately 2 seconds) the sound adjustment switch.
2. "SCV" ON (when the automatic correction function is ON) or "SCV" OFF (when the automatic correction function is OFF) is displayed.
3. Turn the sound adjustment switch knob to switch between "SCV" ON and OFF.
4. Press the sound adjustment switch or leave as it is for 10 seconds or more.
5. Go back to the audio normal screen.

REMOVAL AND INSTALLATION

M1544010900126





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Audio Unit Removal Steps

1. Instrument center panel (Refer to GROUP 52A –Instrument Center Panel assembly P.52A-6).
2. Audio unit assembly
3. Audio unit bracket
4. Audio unit

Audio Adaptor Removal Steps

- Instrument console box (Refer to GROUP 52A –Instrument Center Panel assembly P.52A-6).

5. Audio adaptor <Vehicles with audio amplifier>

MMCS

GENERAL INFORMATION

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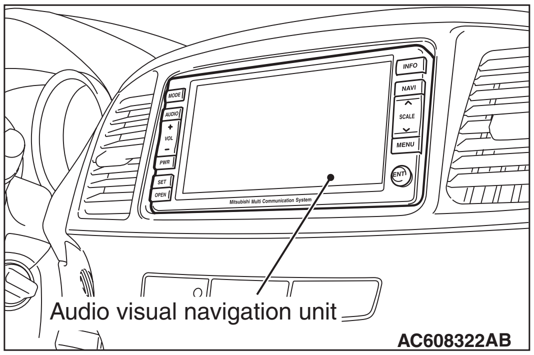
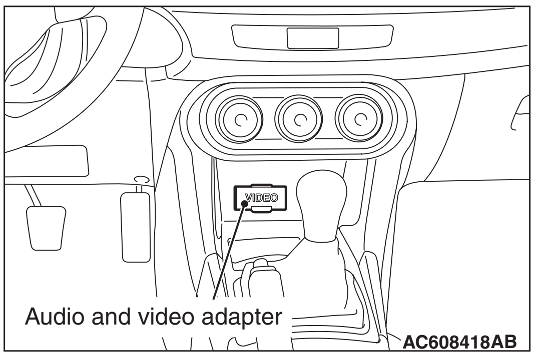
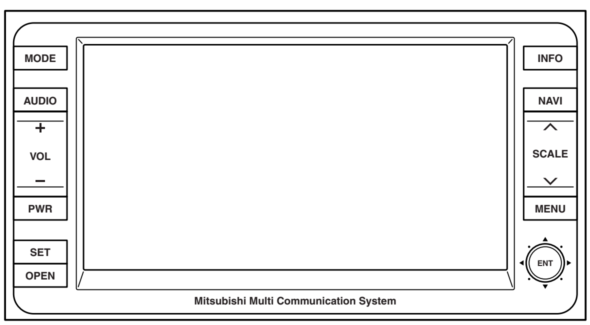


Mitsubishi multi-communication system (7-inch wide display HDD navigation) with built-in hard disk drive (30 gigabyte) has been installed. <Option> Also, a 7-inch liquid crystal display of wide 2 DIN size has been adopted.



The audio and video adapter has been established to the center lower tray in order to connect visual equipment such as game machine and video player. <Vehicles with MMCS>

Operation part



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Display (function)	Contents
Navigation screen	Displays the navigation functions including the map display, search, guidance, information search.
Vehicle position information screen	Displays the position information of current location. (Longitude and latitude, altitude, GPS reception status)
CD screen	Plays back the disc inserted to the CD drive (CD-R/CD-RW).
MP3/WMA screen	Plays back the MP3/WMA.
DVD screen	Plays back the disc inserted to the DVD drive.
Music server function	Plays back the music data on hard disk drive, and records the music CD.
Radio screen	Displays the receiving station information. Also, the operation of receiving channel can be performed.

Navigation function

The storage of very large map data is now possible, and the following contents have been adopted.

- Map type navigation
- NAVTEQ map database
- Map data stored in hard disc drive
- U.S. English, French, and Spanish are available to select.

Audio and visual function

There are the following functions in addition to the navigation function.

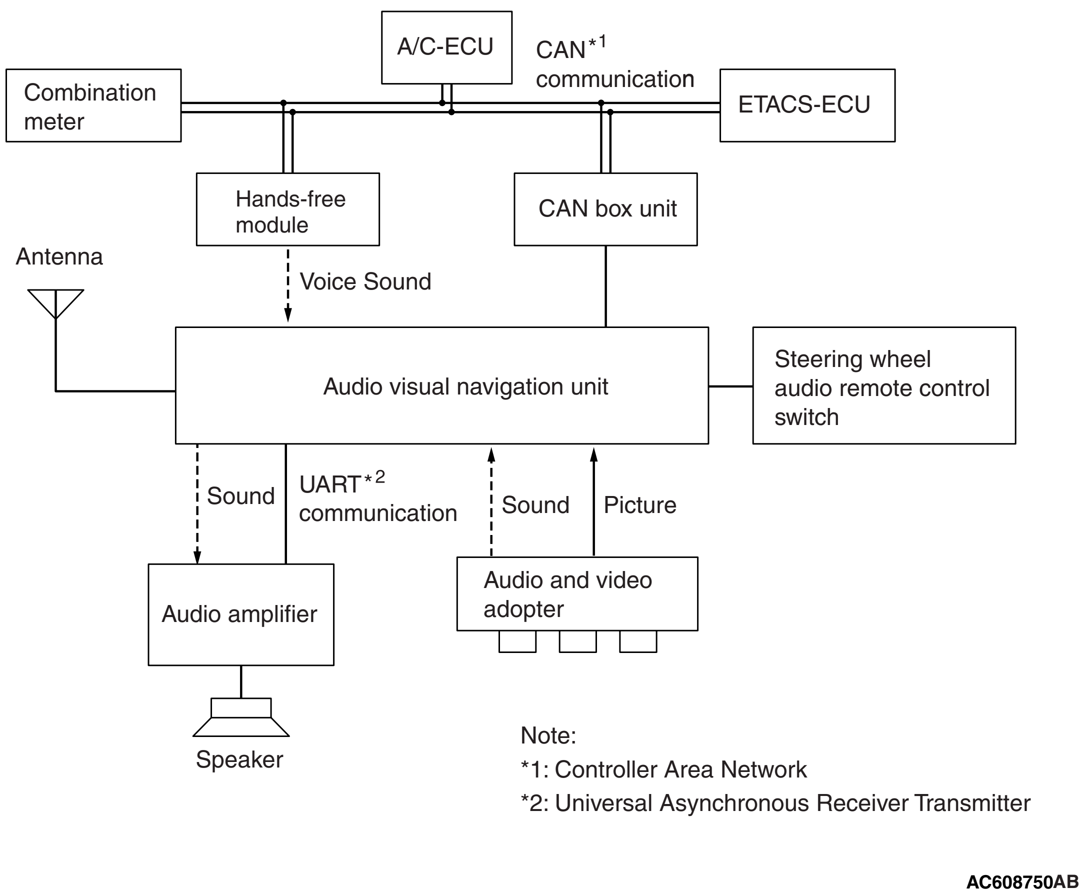
- Music server function
- DVD drive unit
- FM/AM radio
- MP3/WMA playback function
- Control by steering wheel audio remote control switch
- Integrated 4-ch power amplifier (MAX: 180 W)
- Correspond to Rockford Fosgate® premium sound system
- Output of DVD video 5.1 channel data
- Connect with satellite radio tuner

Other function

There are the following functions in addition to the navigation, audio and visual function.

- Clock display
- Connect with hands free unit
- A/C information display
- Outside temperature display
- Trip information display (Average fuel consumption etc.)
- Function customize

SYSTEM BLOCK DIAGRAM



SPECIAL TOOLS

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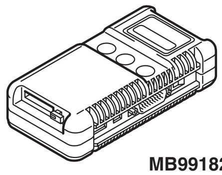
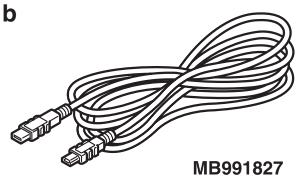
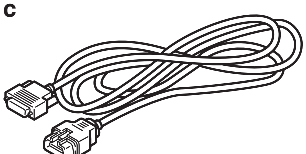
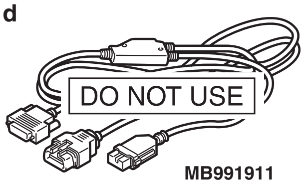
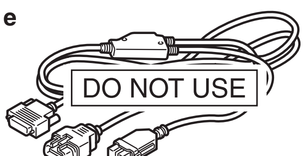
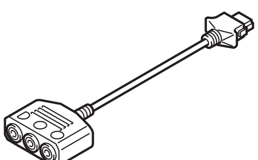
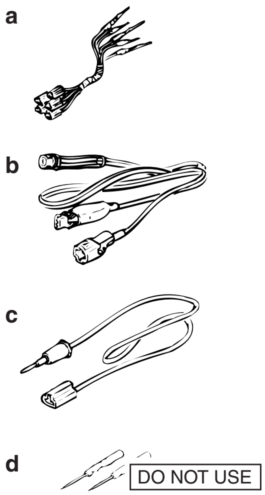
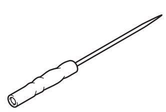
Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ **CAUTION** **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** CAN bus diagnostics or data list check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1546001500085

Refer to GROUP 00, Troubleshooting contents P.00-6.

Precautions on servicing MMCS

M1546003000105

Prior to disconnecting the vehicle battery

The MMCS stores a lot of information which your customer registers in its memory. All of this information will be cleared when the battery terminals are disconnected. Therefore, the preset channels must be stored before the vehicle battery is disconnected. Vehicle's current position and destinations must be stored if the vehicle battery remains disconnected for long periods.

Diagnosis tips concerning the entire system

1. If at least two system functions are defective at the same time, it is possible that communication between the system components is abnormal. Check the system using the communication and wire connection check in the service mode.
2. If an error is displayed, check that relevant wiring harness connectors are engaged correctly. If a failure is found, repair the connectors and check the trouble symptom again.
3. If the wiring harness connectors are engaged correctly, check the wiring harness. If the wiring harness is in good condition, replace relevant component(s). Now the error code and the service mode data must be stored.

NOTE: If a system communication related failure is suspected, diagnose the system.

Diagnosis tips concerning the navigation function

1. The precision of the GPS positioning is limited due to its operation principles. So, some of customer reports do not mean that the system is defective.

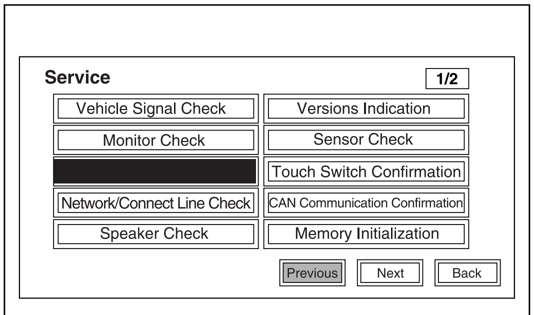
Prior to troubleshooting, question your customer about how the navigation system is used and where he/she drives. If you determine that the system is OK, explain to your customer about how the system works and how the customer should operate it.

2. If the system is not OK, diagnose the system according to the trouble symptom chart.

Service mode

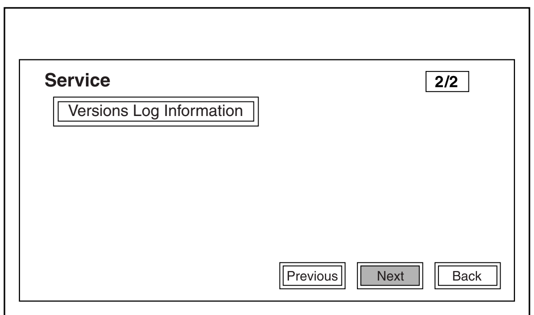
M1546016600066

How to initiate the service mode



AC611541AB

1. With the navigation system active, press and hold both the "NAVI" and "SET" buttons for 3.5 seconds.
2. The service mode will be initiated. Then "Service" screen will be displayed.



AC611544AB

How to terminate the service mode

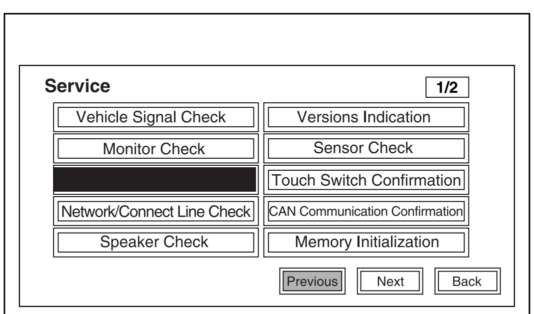
If the operations below are done, the service mode will be terminated.

- If "Back" button is selected on "Service" screen, the service mode will terminate and then return to the previous screen.
- If "NAVI" button is pressed with the service mode active, the service mode will terminate and change to the navigation screen.

NOTE: If "NAVI" button is pressed, the following functions of the service mode will terminate.

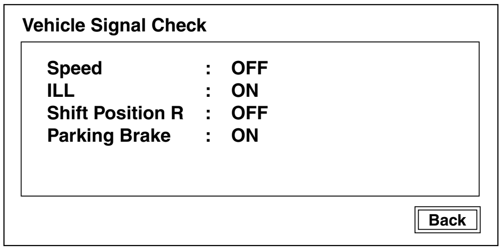
- *Vehicle Signal Check*
- *Monitor Check*
- *Network/Connect Line Check*
- *Speaker Check*
- *Versions Indication*
- *Sensor Check*
- *Touch Switch Confirmation*
- *CAN communication Confirmation*
- *Memory Initialization*
- *Versions Log Information*

VEHICLE SIGNAL CHECK



AC611541AB

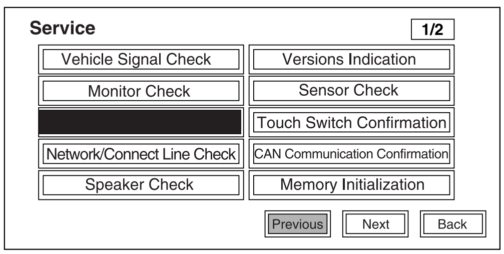
1. Select "Vehicle Signal Check" on "Service" screen.



AC606320

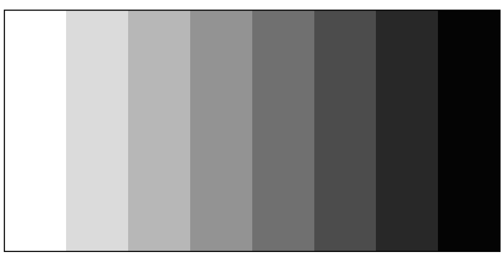
2. The check results will be displayed for the items below.
- "Speed": "ON" when the vehicle speed is 6 km/h or more, and "OFF" when the vehicle speed is 4 km/h or less.
- "ILL": "ON" when the lighting switch is on (headlight position), and "OFF" when they are off (except headlight position).
- "Shift Position R": "ON" when the selector lever is at R position, and "OFF" when it is at the other position.
- "Parking Brake": "ON" when the parking brake is pulled, and "OFF" when it is released.

MONITOR CHECK



AC611541AB

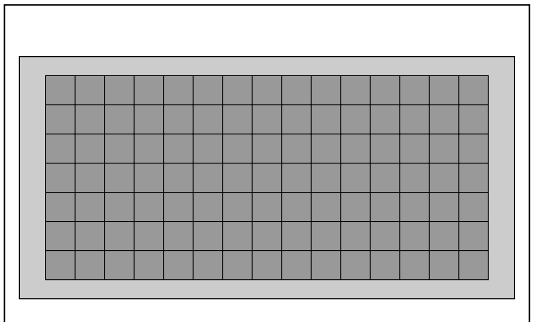
1. Select "Monitor Check" on "Service" screen.


AC611390

2. Eight color bars will be displayed.

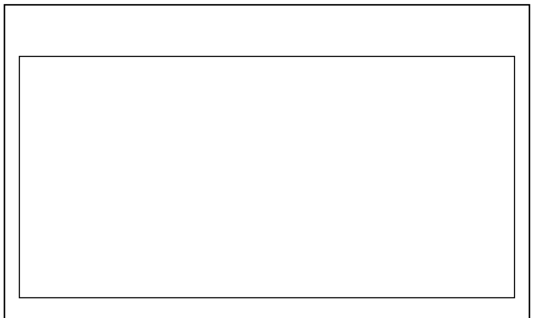

AC606321

3. When "Enter" is pressed on the navigation unit joystick while the eight color bars are shown, gray scale will be displayed with a 16-step gradation.



AC611391

4. When "Enter" is pressed while the gray scale is shown with a 16-step gradation, a crosshatch pattern will be displayed (Each cell should be square).



AC611392

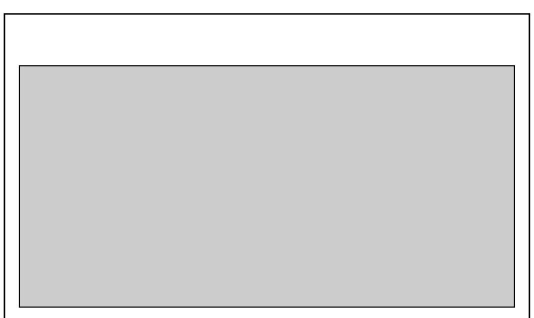
5. When "Enter" is pressed on the navigation unit joystick while the crosshatch pattern is shown, the screen will turn white.

AC611393

6. When "Enter" is pressed on the navigation unit joystick while the screen is white, it will turn black.

AC606322

7. When "Enter" is pressed on the navigation unit joystick while the screen is black, the screen will turn red.



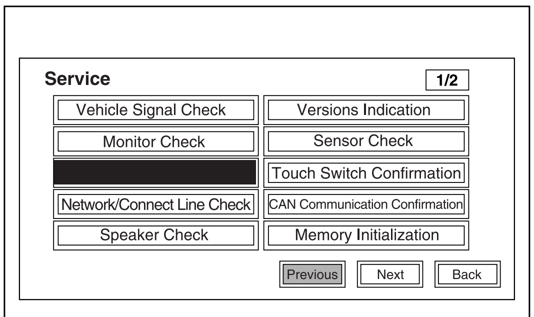
AC606323

8. When "Enter" is pressed on the navigation unit joystick while the screen is red, it will turn green.

AC606324

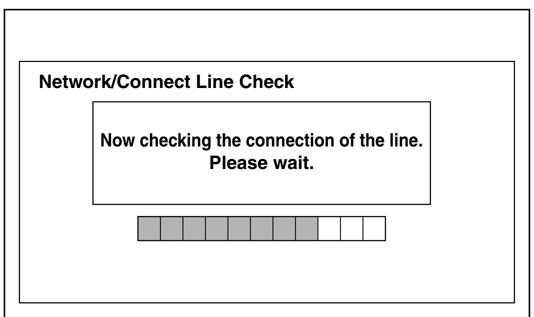
9. When "Enter" is pressed on the navigation unit joystick while the screen is green, it will turn blue.
10. When "Enter" is pressed on the navigation unit joystick while the screen is green, it will return to the "Service" screen.

NETWORK AND CONNECT LINE CHECK



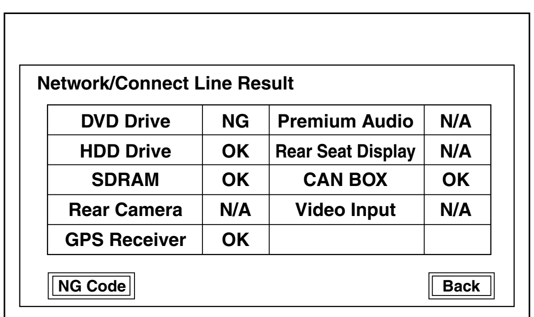
AC611541AB

1. Select "Network/Connect Line Check" on "Service" screen.



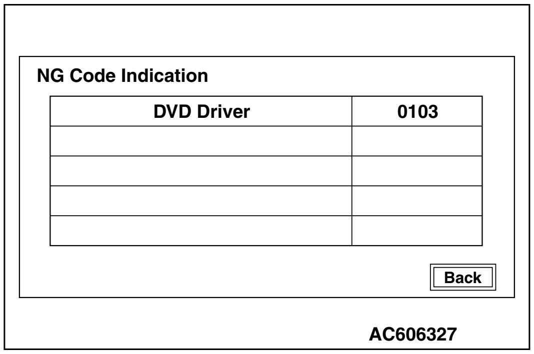
AC606325

2. A network and connect line check will be initiated. The "Network/Connect Line Check" screen will display how the check is in progress.



AC608174

3. When the network and connect line check is finished, the screen will change to "Network/Connect Line Result" to show the check results.

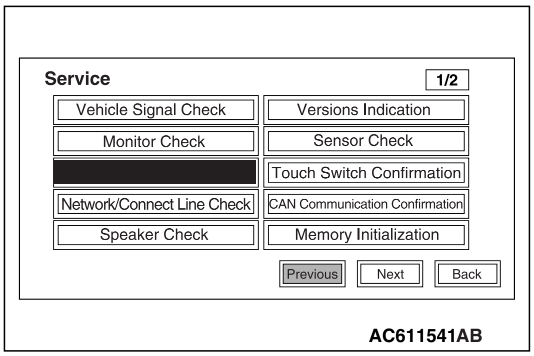


AC606327

NOTE: If there is "NG" or "N/A" as the check results, select "NG Code" on the "Network/Connect Line Result" screen. Then "NG code Indication" screen will show the NG code.

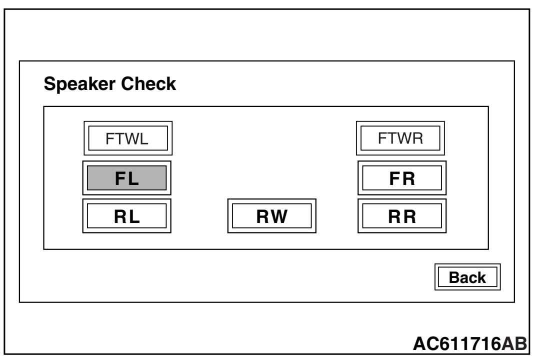
4. If "Back" is selected on "Network/Connect Line Result", the screen will return to "Service" screen.

SPEAKER CHECK



AC611541AB

1. Select "Speaker Check" on "Service" screen.



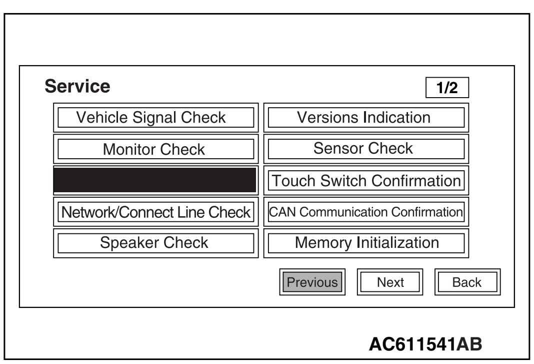
AC611716AB

2. Select a speaker to be checked, and play test tone through the speaker.

   NOTE:
   - *The number of the speakers being displayed depends on how many speakers are connected.*
   - *Volume cannot be adjusted while test tone is being played.*
   - *During the test, only the selected speaker sounds. If "Back" is selected during the test, the test tone will disappear.*

VERSIONS INDICATION

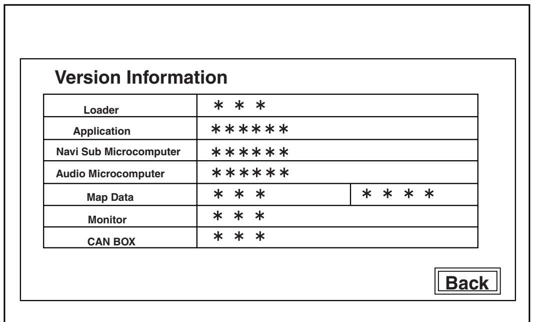
Displays versions indication (Loader, Application, Audio Microcomputer, Navi Sub Microcomputer, Map Data, Monitor, and CAN BOX).



AC611541AB

1. Select "Versions Indication" on "Service" screen.

2.3.Versions indication is displayed.

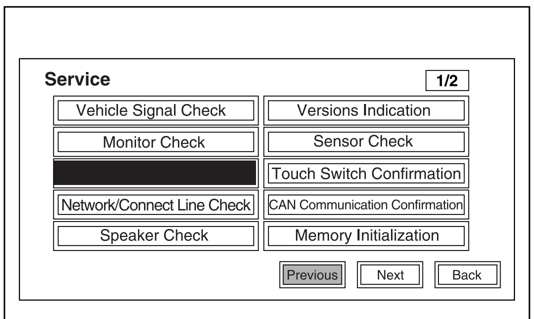


AC610673AB

SENSOR CHECK

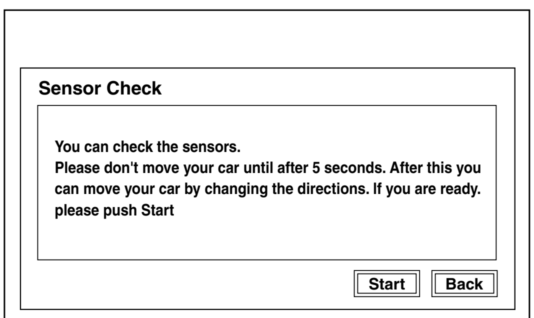
The speed sensor and gyro sensor will be checked, depending on the vehicle conditions such as driving condition, stationary condition and travel direction change.

1. Select "Sensor Check" on "Service" screen.

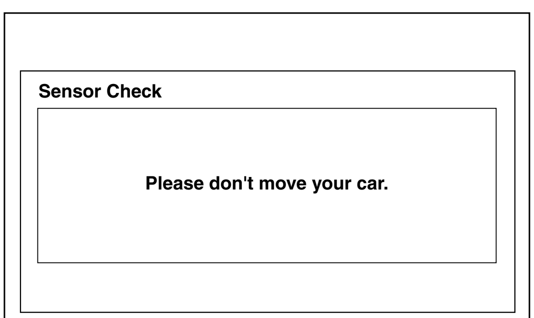


AC611541AB

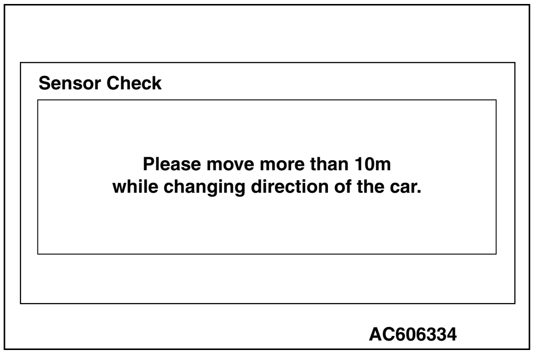
2. The sensor check with the vehicle stationary will be executed in accordance with the screen.



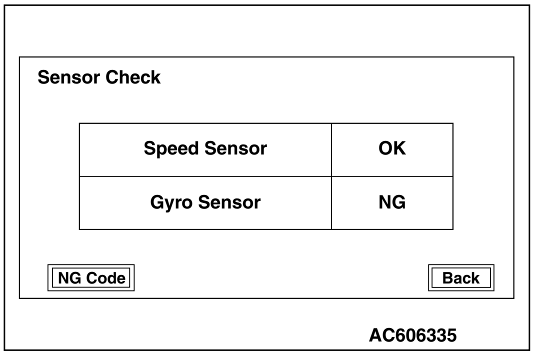
AC606311

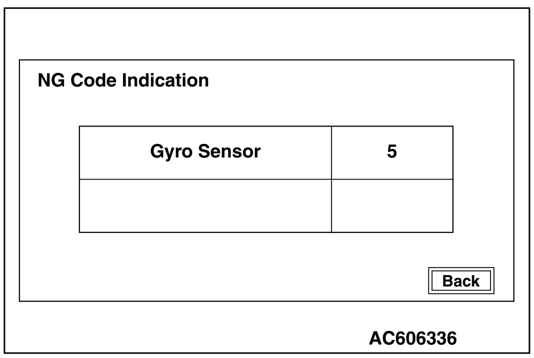


AC606332



3. The sensor check with the vehicle in motion will be executed in accordance with the screen.





4. When the sensor checks are complete, the screen will display the check results.

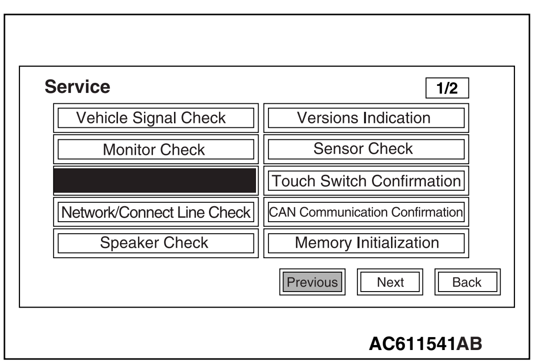
   NOTE:

   If there is "NG" or "N/A" as the check results, select "NG Code" on the "Sensor Check" screen. Then "NG code Indication" screen will show the NG code.

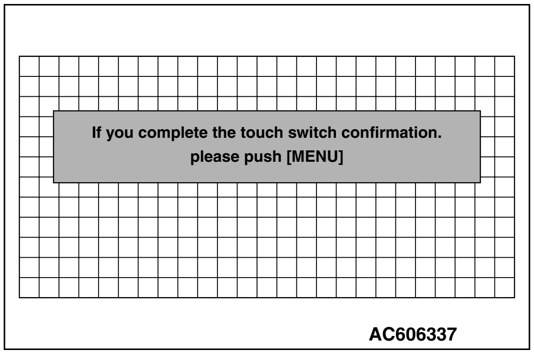
   NG code reference table for Sensor Check

Sensor classification	NG code No.	Error items
Gyro sensor	1	Offset error while the vehicle is stationary (lower limit error)
	2	Offset error while the vehicle is stationary (upper limit error)
	5	Output error during driving
Speed sensor	6	Output error while the vehicle is stationary

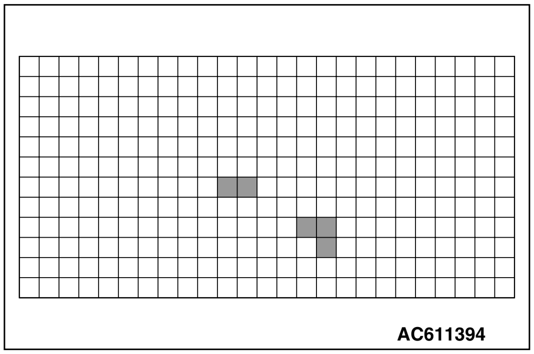
TOUCH SWITCH CONFIRMATION



1. Select "Touch Switch Confirmation" on "Service" screen.



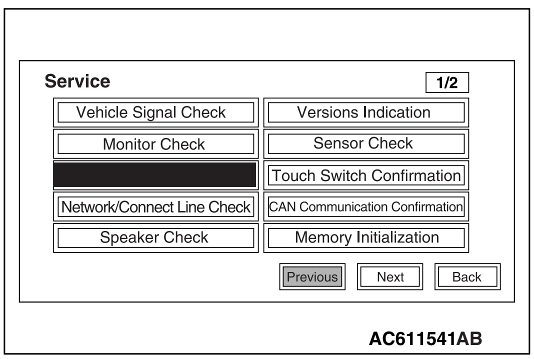
AC606337



AC611394

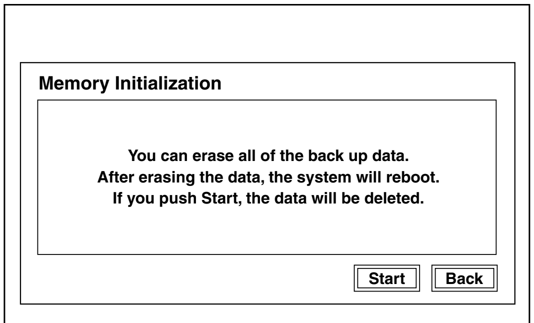
2. If you touch the screen, the color of the dotted coordinate at the touched area will be changed.

MEMORY INITIALIZATION

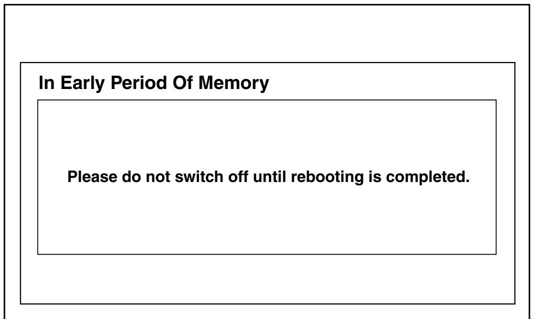


AC611541AB

1. Select "Memory Initialization" on "Service" screen.



AC606338

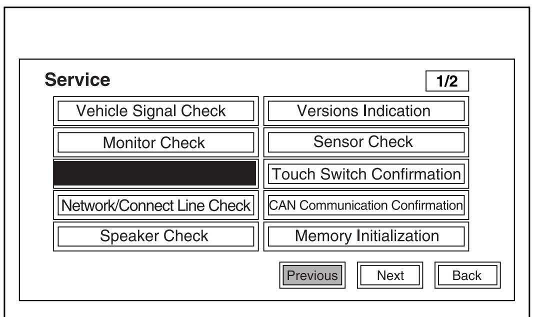


AC606339

2. If you select "Start" on "Memory Initialization" screen, the settings such as registered locations and music server will be erased (initialized) from the memory.

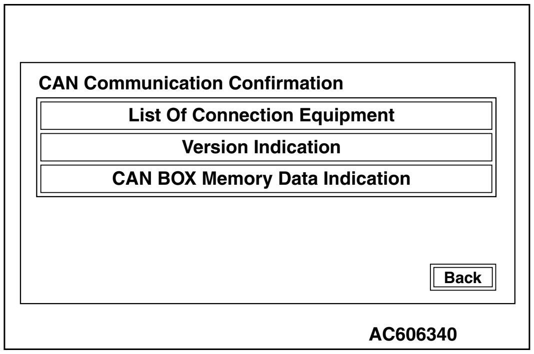
   NOTE: If the ignition switch is turned to "LOCK" (OFF) position during the initialization, the initialization will be suspended. If the ignition switch is turned to "ACC" or "ON" position, the initialization will be resumed.
3. After the memory initialization is complete, the navigation system will restart automatically.

CAN COMMUNICATION CONFIRMATION



AC611541AB

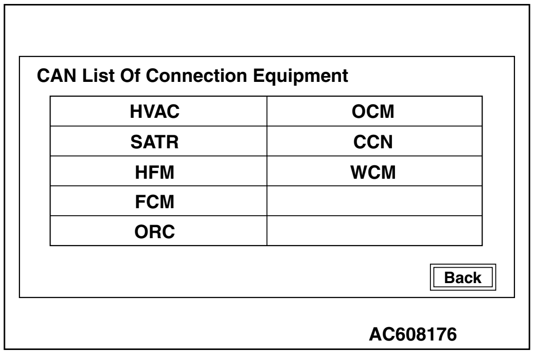
1. Select "CAN Communication Confirmation" on "Service" screen.



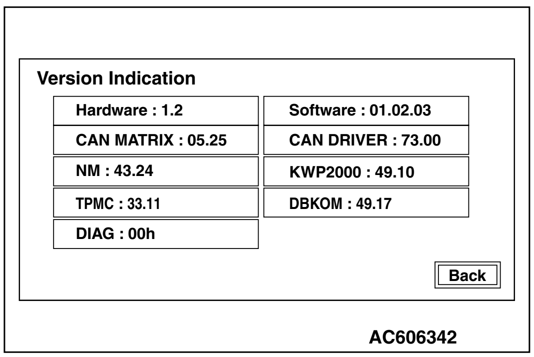
2. If "List Of Connection Equipment" is selected on "CAN Communication Confirmation" screen, the system will determine which equipment is installed according to the connected equipment reference table. Then the equipment which are connected to the CAN box unit will be displayed.

CAN box unit-connected equipment reference table

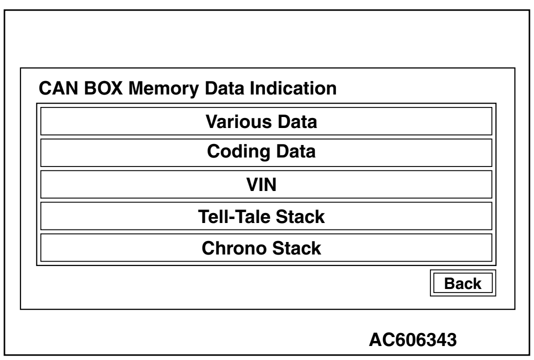
Screen indication	Equipment
HVAC	A/C-ECU
SATR	Satellite radio tuner
HFM	Hands free module
FCM	ETACS-ECU
ORC	SRS-ECU
OCM	Occupant classification-ECU
CNN	Combination meter
WCM	Wireless control module



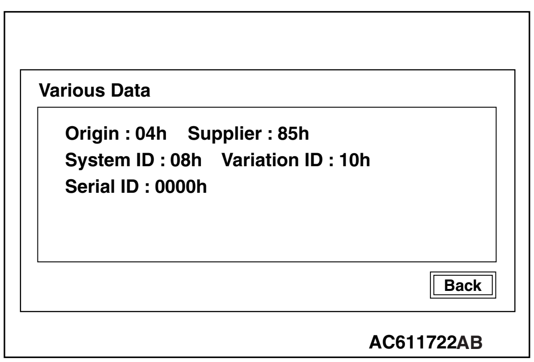
3. If "Version Indication" is selected on "CAN Communication Confirmation" screen, the version for each item is displayed.



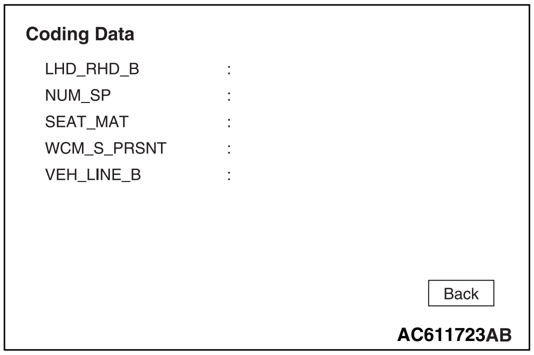
4. If "CAN BOX Memory Data Indication" is selected on "CAN Communication Confirmation" screen, "CAN BOX Memory Data Indication" will be displayed.
5. If any item is selected on "CAN BOX Memory Data Indication" screen, its relevant information is displayed.



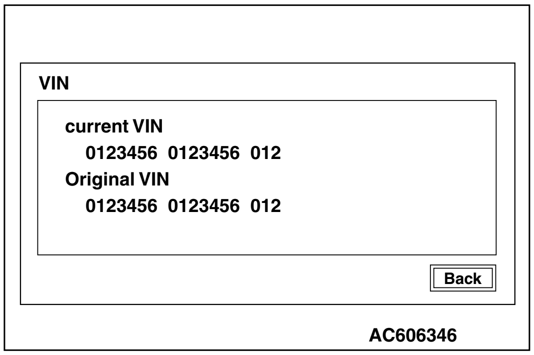
- Various Data



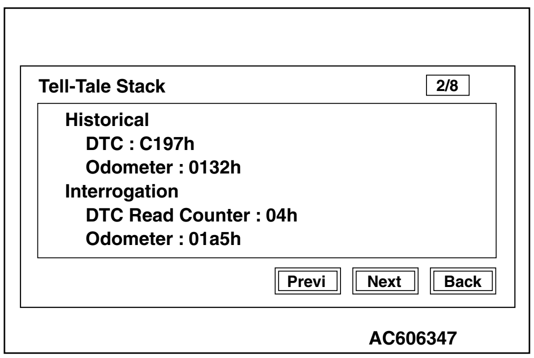
- Coding Data



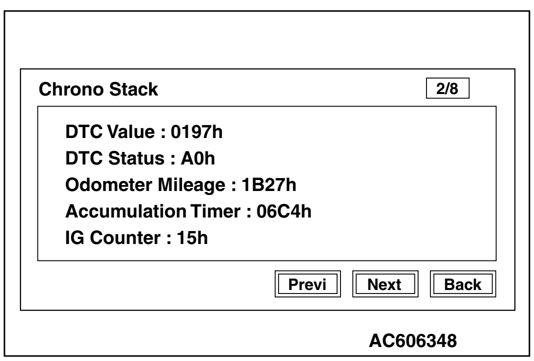
- VIN



- Tell-Tale Stack



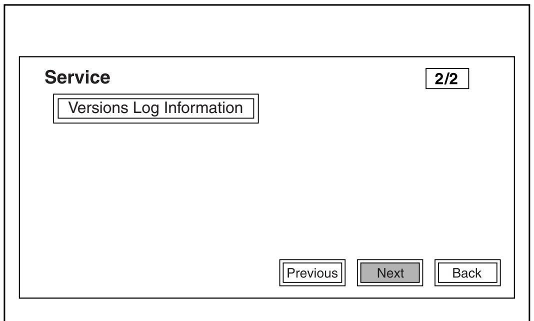
- Chrono Stack



VERSIONS LOG INFORMATION

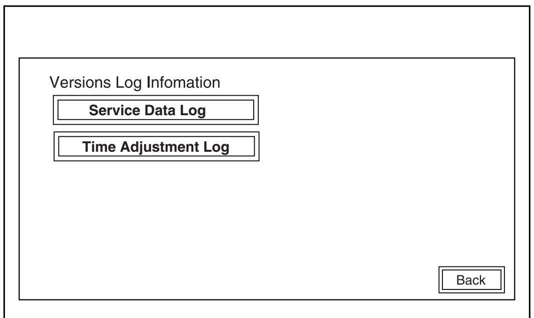
Displays logs for drive and HDD.

Service Data Log



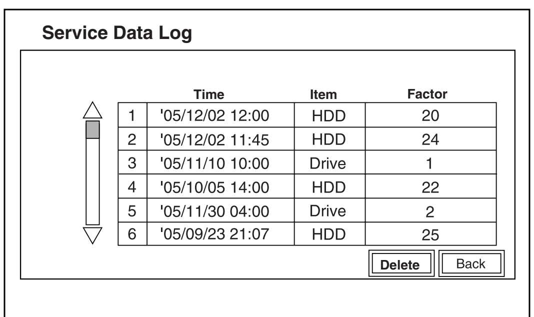
AC611544AB

1. Select "Versions Log Information" on "Service" screen.



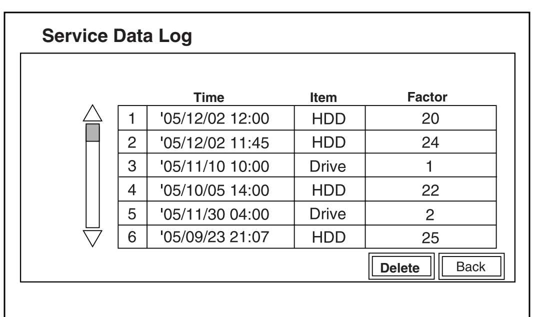
AC611719AB

2. Select "Service Data Log" on the "Versions Log Information" screen.



AC611721AB

3. The logs are displayed from the latest one.
4. The log data is erased by pressing "Delete."



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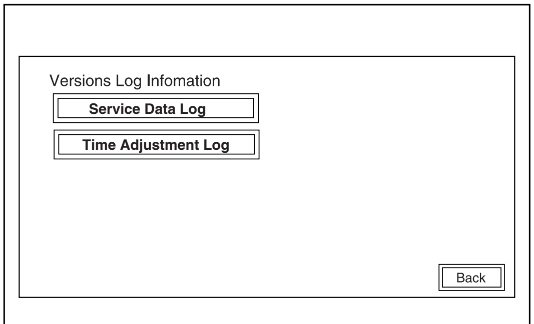

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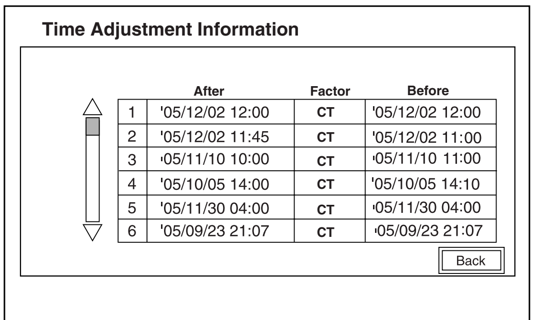
1. Select "Time Adjustment Log" on the "Versions Log Information" screen.



AC611720AB

2. The time adjustment logs are displayed.
   As for Factor, the following two types are displayed.
   CT: Automatic adjustment
   MAN: Manual adjustment

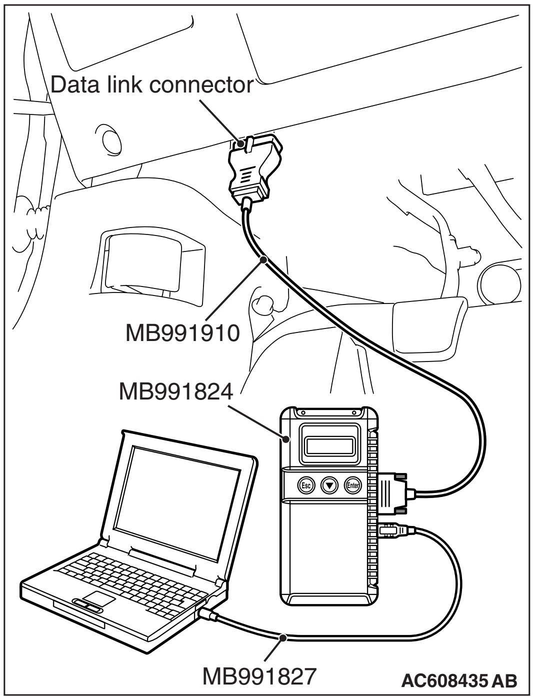
DIAGNOSIS FUNCTION

M1546001600060

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "Meter" from "System List," and press the "OK" button.

NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.

6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle being diagnosed.
    - If they match, go to step 8.
    - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle being diagnosed.
    - If they match, go to step 8.
    - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

DIAGNOSTIC TROUBLE CODE CHART

M1546001700089

⚠ CAUTION

On troubleshooting, if the ignition switch is turned ON while disconnecting connector(s), diagnostic trouble code(s) associated with other system may be set. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

DTC No.	Description	Reference page
B2226	Navigation unit service data	P.54A-329
B2240	Communication error between CAN box unit and navigation unit	P.54A-329
B2477	VIN writing has never been completed	P.54A-332
U0019	Bus off (CAN-B)	P.54A-333
U0141	ETACS CAN timeout	P.54A-335
U0151	SRS-ECU CAN timeout	P.54A-336
U0154	Occupant classification-ECU CAN timeout	P.54A-338
U0155	Combination meter CAN timeout	P.54A-339
U0164	A/C-ECU CAN timeout	P.54A-341
U0168	KOS-ECU or WCM CAN timeout	P.54A-342
U0195	Satellite radio tuner CAN timeout	P.54A-344
U0197	Hands free module CAN timeout	P.54A-345
U1415	Coding not completed/Data fail	P.54A-347
U1417	Implausible coding data	P.54A-348

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B2226: Navigation unit service data

TROUBLE JUDGEMENT

When the CAN box unit receives the signal from the audio visual navigation unit to indicate an abnormality occurred in the navigation unit, the CAN box unit sets DTC B2226.

TROUBLESHOOTING HINT

The audio visual navigation unit may be defective

DIAGNOSIS

Check that the audio visual navigation unit operate.
Check that the audio visual navigation unit work normally.

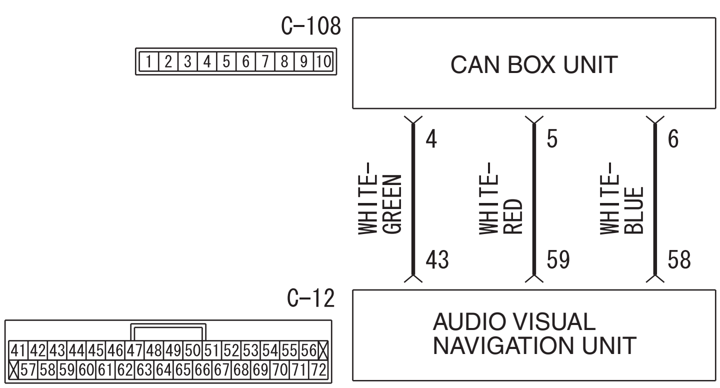
Q: Is audio visual navigation unit work normally?

YES : Intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction P.00-13.

NO : Diagnose the audio visual navigation unit (Refer to Trouble symptom chart P.54A-350).

DTC B2240: Communication error between CAN box unit and navigation unit

CAN Box Unit Communication Circuit



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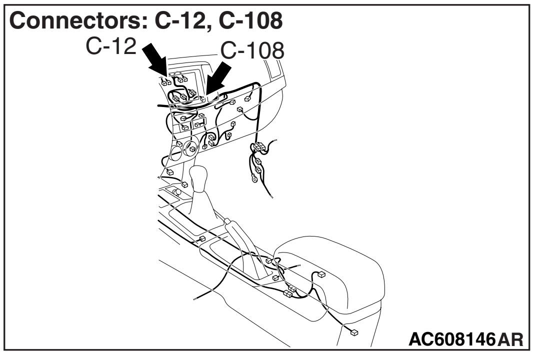


TROUBLE JUDGMENT

When the abnormality occurs in the transmission/reception data between the CAN box unit and audio visual navigation unit, the CAN box unit sets DTC B2240.

PROBABLE CAUSES

- Audio visual navigation unit malfunction
- CAN box unit malfunction
- Damaged wiring harness and connectors

DIAGNOSIS

Required Special Tools:
- MB991958 Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827 M.U.T.-III USB Cable
    - MB991910 M.U.T.-III Main Harness A (Vehicles with CAN communication system)
    - MB991223: Harness Set
    - MB992006: Extra Fine Probe

STEP 1. Perform "Network/Connect Line Check" of the MMCS service mode.

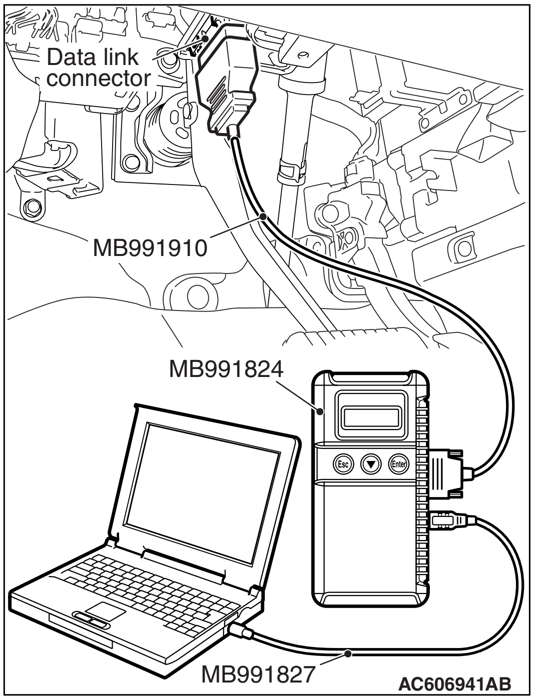
Perform "Network/Connect Line Check" of the MMCS service mode, and check that the communication between the CAN box unit and the audio visual navigation unit is normal. (Refer to P.54A-313.)

NOTE: When the communication between the CAN box unit and the audio visual navigation unit is normal, "CAN BOX" is displayed on the check result screen. However, if the communication is not possible, "CAN BOX" is not displayed.

Q: Is "CAN BOX" displayed?

YES : Go to Step 2.
NO : Go to Step 3.

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction P.00-13.

NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Check CAN box unit connector C-108 and audio visual navigation unit connector C-12 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are CAN box unit connector C-108 and audio visual navigation unit connector C-12 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 4. Check the wiring harness between CAN box unit connector C-108 (terminal 4, 5, 6) and audio visual navigation unit connector C-12 (terminal 43, 59, 58).

Q: Is the wiring harness between CAN box unit connector C-108 (terminal 4, 5, 6) and audio visual navigation unit connector C-12 (terminal 43, 59, 58) in good condition?

YES : Go to Step 5.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Substitute a known good CAN box unit, and check the trouble symptom.

Check whether scan tool MB991958 with CAN box unit normally.

Q: Is the check result normal?

YES : Replace the CAN box unit.
NO : Replace the audio visual navigation unit.

DTC B2477: VIN writing has never been completed.

TROUBLE JUDGEMENT

With the ignition switch at the ON position, if the VIN code is not written to the CAN box unit, DTC B2477 is stored.

TROUBLESHOOTING HINTS

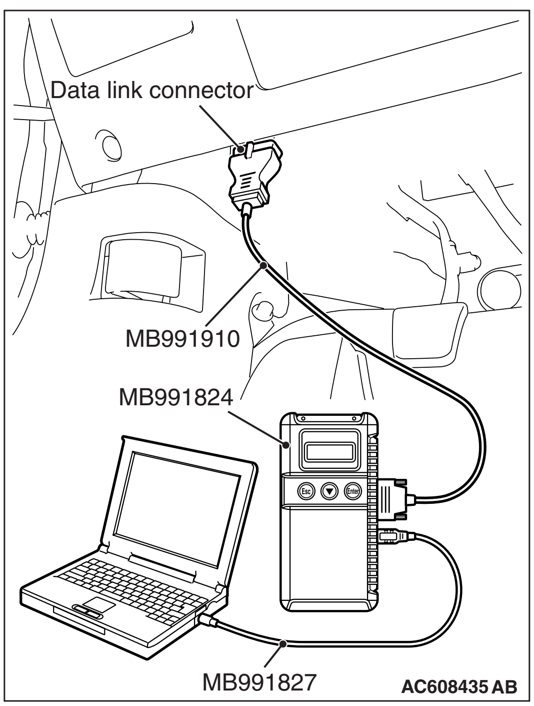
- The CAN bus line may be defective.
- The ETACS-ECU may be defective.
- The CAN box unit may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code

Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0019: Bus off (CAN-B)

⚠ CAUTION

If DTC U0019 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the CAN-B circuit malfunction occurs, the CAN box unit sets DTC U0019.

JUDGEMENT CRITERIA

With the ignition switch at the ON position and the system voltage at 10 –16 volts (data from ETACS-ECU), if the CAN box unit becomes unable to transmit data normally due to the CAN-B bus circuit malfunction, the CAN box unit determines that a problem has occurred.

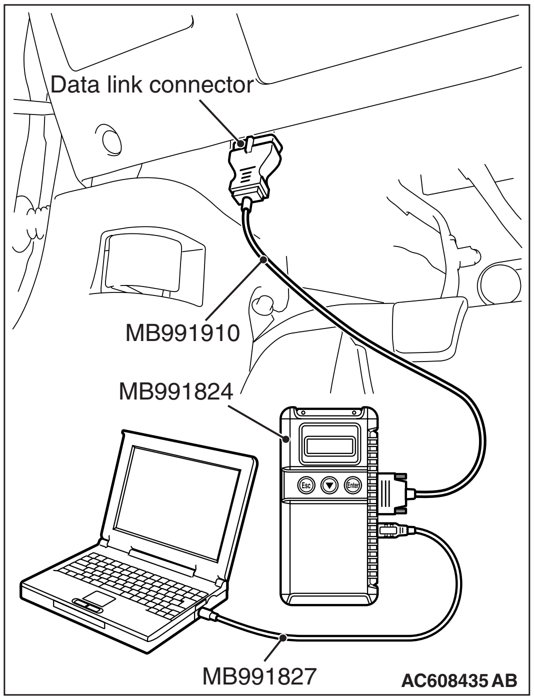
TROUBLESHOOTING HINTS

The CAN bus line may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Recheck for diagnostic trouble code.
Check again if the DTC is set to the CAN box unit.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.
(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?
YES : Go to Step 2.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.
(1) Turn the ignition switch to the "ON" position.
(2) Diagnose the CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

DTC U0141: ETACS CAN timeout

⚠ CAUTION

If DTC U0141 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the signal from ETACS-ECU cannot be received, the CAN box unit sets the DTC U0141.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with ETACS-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

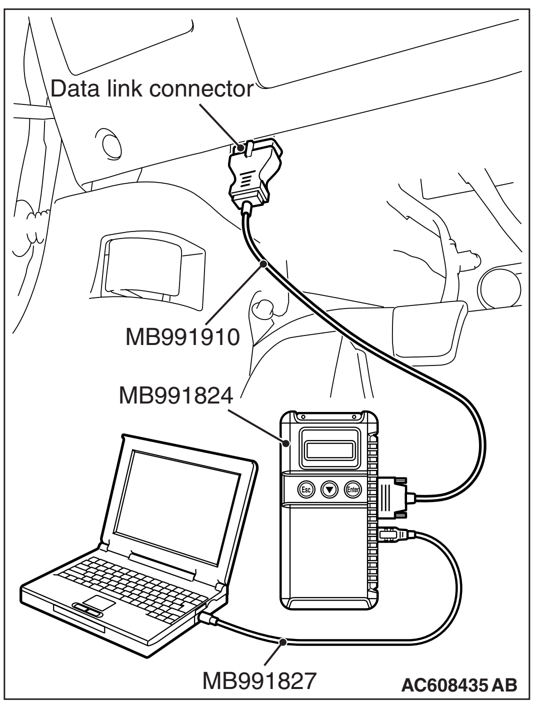
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The CAN box unit may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.
Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0151: SRS-ECU CAN timeout

⚠ CAUTION

- **If DTC U0151 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from SRS-ECU cannot be received, the CAN box unit sets DTC U0151.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with SRS-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

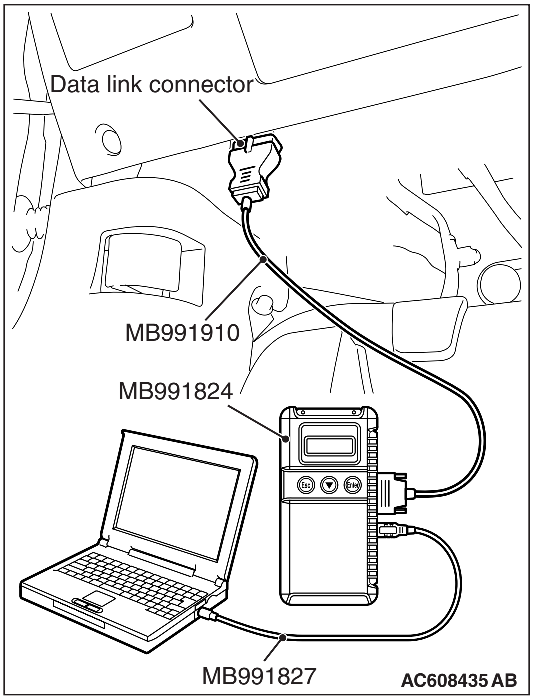
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The SRS-ECU may be defective
- The CAN box unit may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the SRS-ECU diagnostic trouble code

Check again if the DTC is set to the SRS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Troubleshooting P.52B-31).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0154: Occupant classification-ECU CAN timeout

⚠ CAUTION

If DTC U0154 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from occupant classification-ECU cannot be received, the CAN box unit sets DTC U0154.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

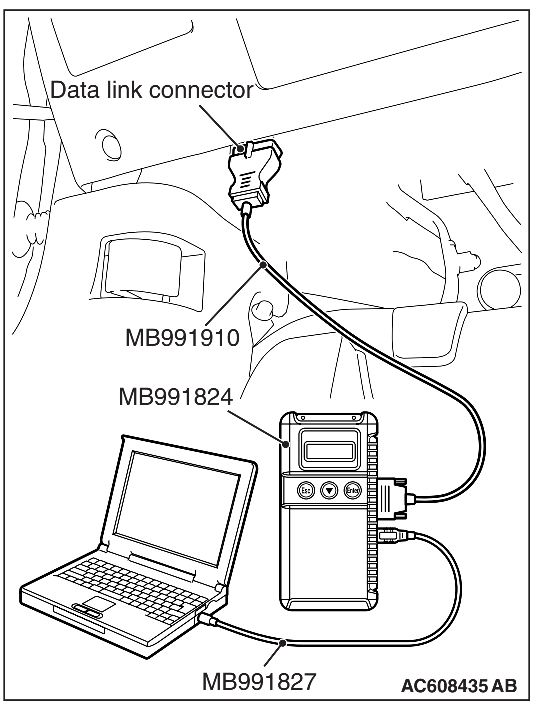
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The CAN box unit may be defective.
- The occupant classification-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the occupant classification-ECU diagnostic trouble code.

Check if DTC is set to the occupant classification-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-280).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0155: Combination meter CAN timeout

⚠ CAUTION

If DTC U0155 is set in the CAN box unit, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from combination meter cannot be received, the CAN box unit sets DTC U0155.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

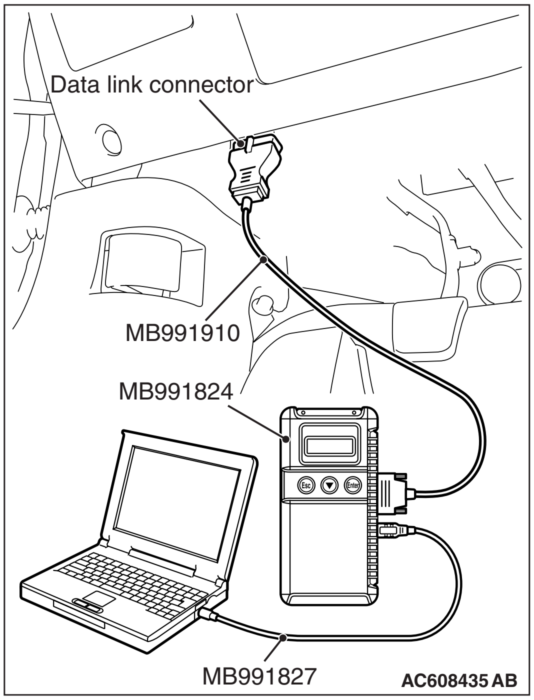
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The CAN box unit may be defective.
- The combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the combination meter diagnostic trouble code.

Check whether a combination meter DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for combination meter DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Diagnose the combination meter (Refer to combination meter, Diagnosis P.54A-23).

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0164: A/C-ECU CAN timeout

⚠ CAUTION
- **If DTC U0164 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from A/C-ECU cannot be received, the CAN box unit sets DTC U0164.

JUDGEMENT CRITERIA

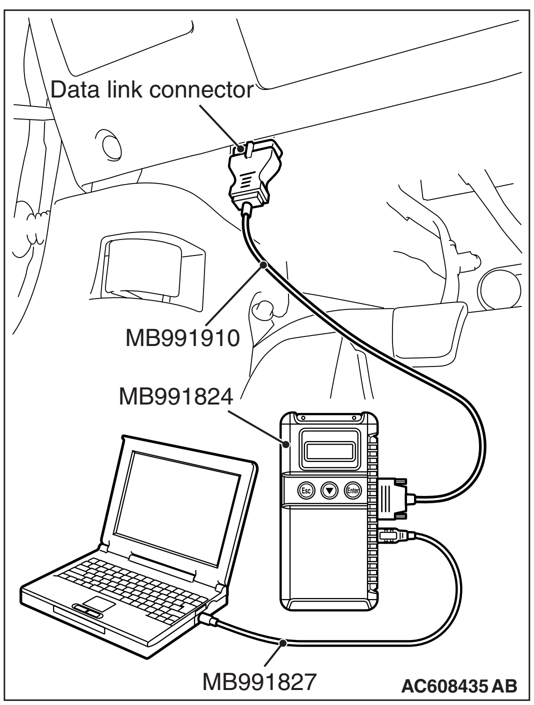
With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with A/C-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The A/C-ECU may be defective.
- The CAN box unit may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-328."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the A/C diagnostic trouble code.

Check if DTC is set to the A/C-ECU.

Q: Is the DTC set?

YES : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 <vehicles with manual A/C> or GROUP 55B, Automatic A/C Diagnosis P.55B-7 <vehicles with automatic A/C>).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0168: KOS-ECU or WCM CAN timeout

⚠ CAUTION

- **If DTC U0168 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be received, the CAN box unit sets DTC U0168.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 V (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

TROUBLESHOOTING HINTS

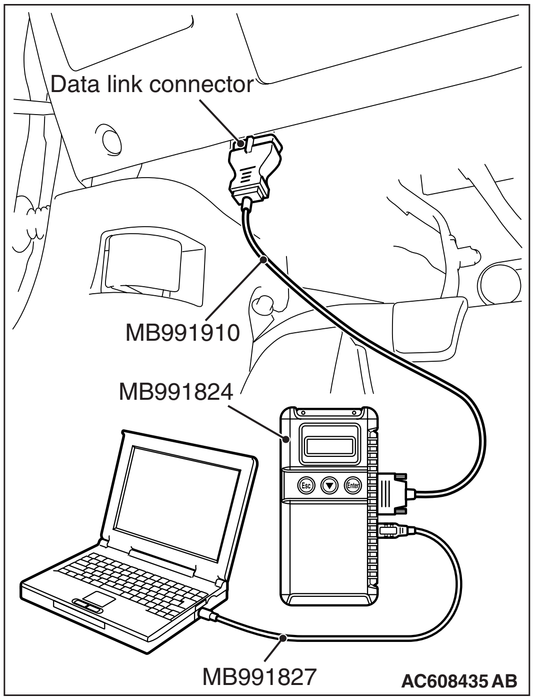
- Malfunction of CAN bus line may be defective.
- Malfunction of the KOS-ECU may be defective. <vehicles with KOS>
- Malfunction of the WCM may be defective. <vehicles with WCM>
- Malfunction of CAN box unit may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable

- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> diagnostic trouble code.

Check again if the DTC is set to the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM>.

Q: Is the DTC set?

YES : Troubleshoot the KOS or WCM (Refer to GROUP 42B, Diagnosis P.42B-20 <KOS> or GROUP 42C, Diagnosis P.42C-14 <WCM>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0195: Satellite radio tuner CAN timeout

⚠ CAUTION

If DTC U0195 is set in the CAN box unit, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from satellite radio tuner cannot be received, the CAN box unit sets DTC U0195.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

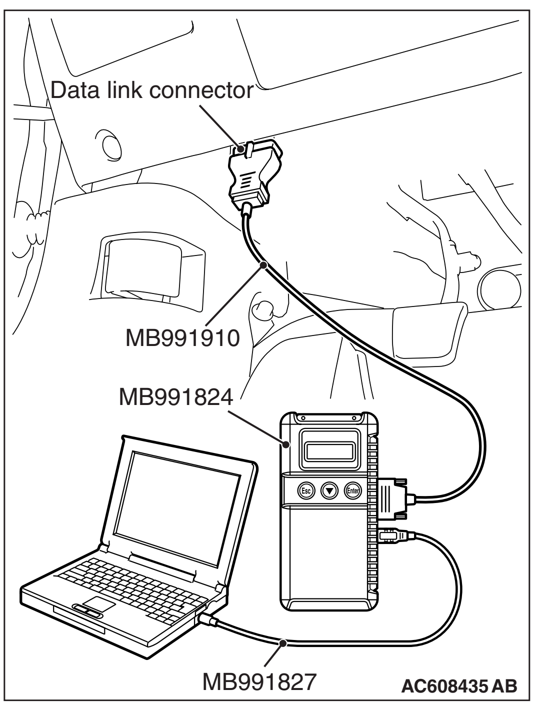
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The CAN box unit may be defective.
- The satellite radio tuner may be defective.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the satellite radio tuner diagnostic trouble code.

Check whether a satellite radio tuner DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for satellite radio tuner DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Diagnose the satellite radio tuner.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0197: Hands free module CAN timeout

⚠ CAUTION

- **If DTC U0197 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from hands free module cannot be received, the CAN box unit sets DTC U0197.

JUDGEMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with hands free module cannot be established for 2,500 ms or more, the CAN box unit determines that a problem has occurred.

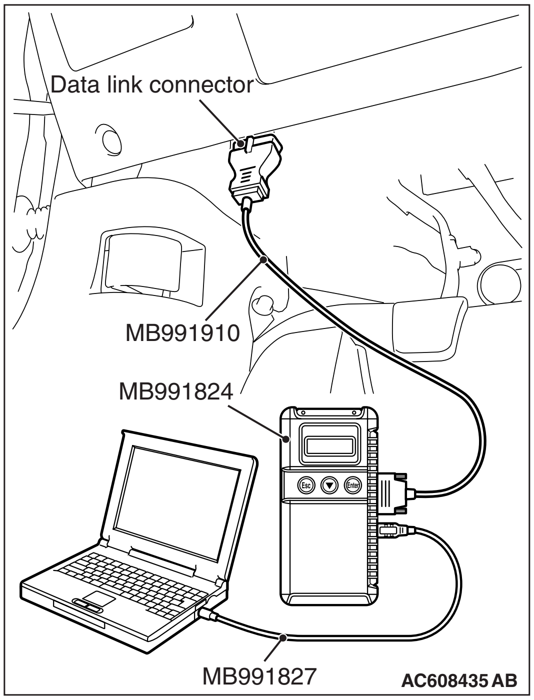
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The CAN box unit may be defective.
- The hands free module may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the hands free module diagnostic trouble code.

Check again if the DTC is set to the hands free module.

Q: Is the DTC set?

YES : Troubleshoot the hands-free cellular phone system.
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U1415: Coding not completed/Data fail

⚠ CAUTION
If DTC U1415 is set, diagnose the CAN bus lines.

⚠ CAUTION
When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the vehicle information data is not registered to the CAN box unit, the CAN box unit sets DTC U1415.

JUDGEMENT CRITERIA

With the global coding counter value "0," if all the global coding data (vehicle information) are not stored, the CAN box unit determines that a problem has occurred.

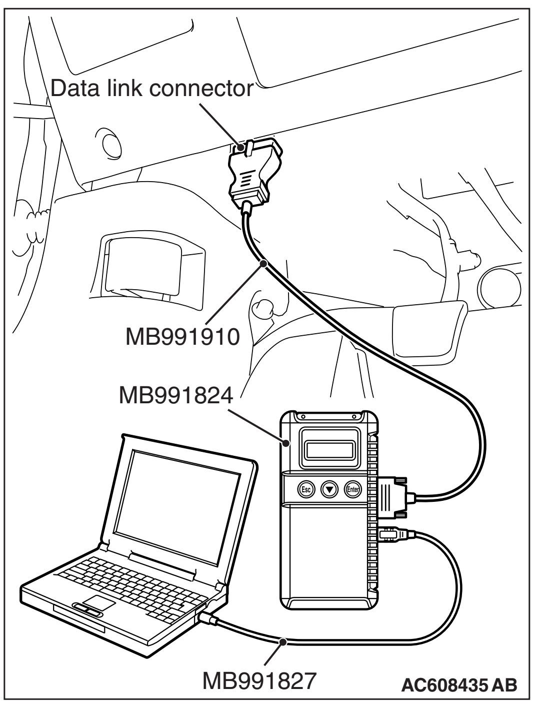
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The CAN box unit may be defective.
- The ETACS-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

Code No.U1417 Implausible coding data

⚠ CAUTION

- **If diagnostic trouble code U1417 is set in CAN box unit, always diagnose the CAN bus lines. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**
- **When the diagnostic trouble code U1417 is set in CAN box unit, the diagnostic trouble code may also be set in ETACS-ECU. When the diagnostic trouble code is set in ETACS-ECU, carry out the diagnosis of the diagnostic trouble code for ETACS-ECU first.**

CIRCUIT OPERATION

CAN box unit receives the vehicle information stored in the ETACS-ECU via CAN bus lines.

DTC SET CONDITIONS

CAN box unit communicates with ETACS-ECU via CAN bus lines. This diagnostic trouble code is set when the vehicle information received from the ETACS-ECU is invalid.

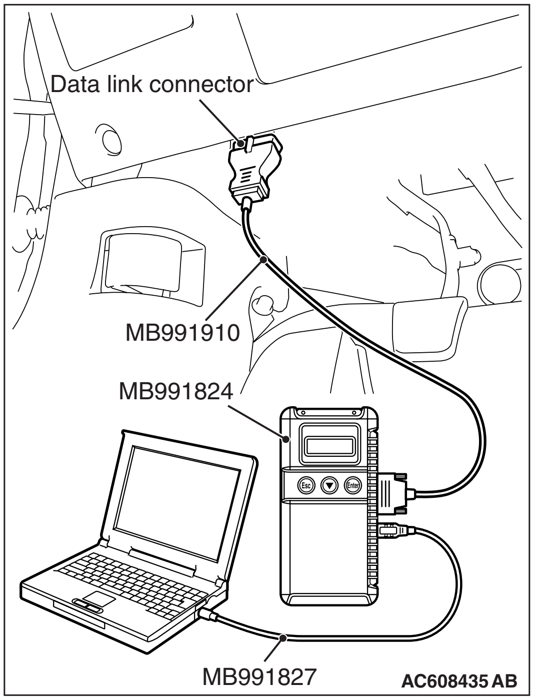
PROBABLE CAUSES

- Malfunction of ETACS-ECU
- Engine control module malfunction
- ETACS-ECUs have been interchanged between two vehicles.
- CAN box unit malfunction
- External noise interference

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the other system diagnostic trouble code.

Check if DTC is set to the ETACS-ECU or engine control module.

Q: Is the DTC set?

YES (DTC is set to ETACS-ECU.) : Troubleshoot the ETACS (Refer to ETACS, Diagnosis P.54A-482).
YES (DTC is set to the engine control module.) : Troubleshoot the MFI system (Refer to GROUP 13A, Diagnosis P.13A-46).
NO : Go to Step 3.

STEP 3. Check part number of ETACS-ECU.

Check the part number of ETACS-ECU.

OK: 8637A313

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace ETACS-ECU.

STEP 4. Check part number of CAN box unit.

Check the part number of CAN box unit.

OK: 8750A090

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace CAN box unit.

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the CAN box unit.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace CAN box unit.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

TROUBLE SYMPTOM CHART

M1546001800257

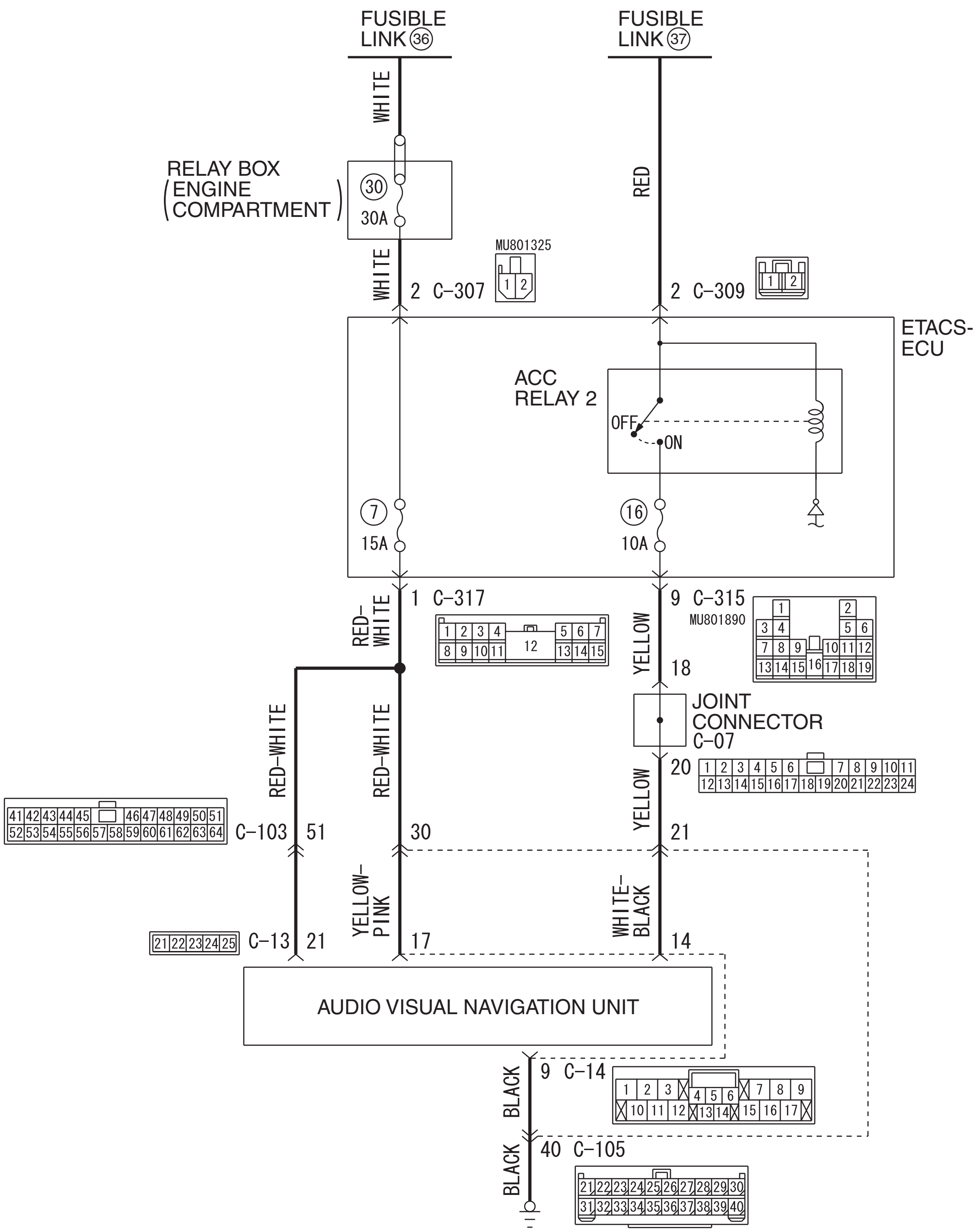
Inspection procedure No.	Trouble symptom		Reference page
1	No navigation screen is displayed.		P.54A-351
2	No sound is heard. <Vehicles with audio amplifier>		P.54A-358
3	No sound is heard from one of the speakers.	<vehicles without audio amplifier>	P.54A-363
		<vehicles with audio amplifier>	P.54A-369
4	The navigation system can be operated while the vehicle is driven.		P.54A-376
5	The screen is not normal in the navigation mode.		P.54A-379
6	Poor reception.		P.54A-381
7	GPS signal can not be received.		P.54A-382
8	No DVD (video disk) cannot be played.		P.54A-383
9	Image of a DVD (video disk) is played, but no sound is played.		P.54A-384
10	Sound of a DVD (video disk) can be played, but no image is played.		P.54A-385
11	The picture and sound of external input are not played.		P.54A-386
12	Check the CAN box unit power supply circuit.		P.54A-388

SYMPTOM PROCEDURES

Inspection Procedure 1: No Navigation Screen is Displayed.

⚠ CAUTION
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Audio Visual Navigation Unit Power Supply Circuit



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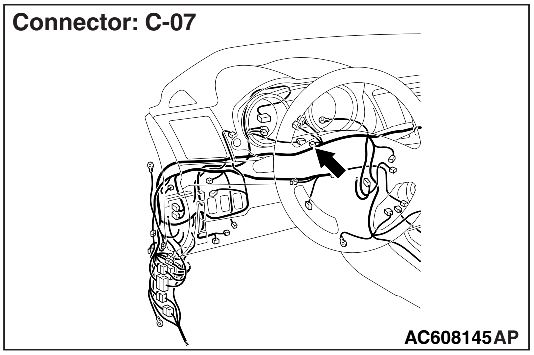
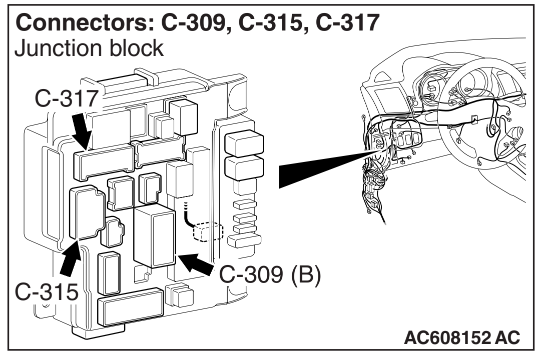
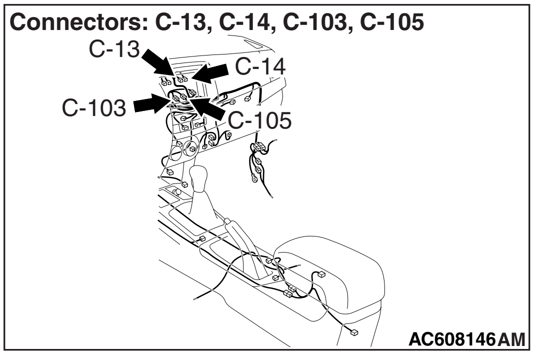






DIAGNOSIS

Required Special Tools:

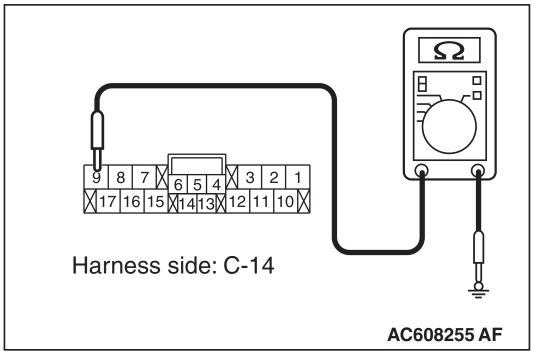
- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check audio visual navigation unit connector C-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector C-14 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 2. Check the ground circuit to the audio visual navigation unit connector. Measure the resistance at audio visual navigation unit connector C-14.

(1) Disconnect audio visual navigation unit connector C-14, and measure the resistance available at the wiring harness side of the connector.

(2) Measure the resistance between terminal 9 and ground.

OK: The resistance should be 2 ohms or less

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between audio visual navigation unit connector C-14 (terminal 9) and ground.

- Check the ground wires for open circuit.

NOTE: Also check intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between audio visual navigation unit connector C-14 (terminal 9) and ground in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if the diagnostic trouble code is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU. Refer to GROUP 54A, Diagnosis P.54A-482.
NO : Go to Step 5.

STEP 5. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the wiring harness between ETACS-ECU connector C-317 (terminal 1) and audio visual navigation unit connector C-14 (terminal 17).

- Check the power supply lines (battery supply) for open circuit.

NOTE: Also check intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 1) and audio visual navigation unit connector C-14 (terminal 17) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check audio visual navigation unit connector C-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector C-13 in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 8. Check the wiring harness between ETACS-ECU connector C-317 (terminal 1) and audio visual navigation unit connector C-13 (terminal 21).

- Check the power supply lines (battery supply) for open circuit.

NOTE: Also check intermediate connector C-103 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-103 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 1) and audio visual navigation unit connector C-13 (terminal 21) in good condition?

YES : Go to Step 9.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Using scan tool MB991958, check data list.

Check the input signal of ACC relay.

- Turn the ignition switch to the ACC position.

Item No.	Item name	Normal conditions
Item 288	ACC switch	ON

OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Refer to GROUP 54A, ETACS, Diagnosis –Inspection Procedure 1 "The ignition switch (ACC) signal is not received P.54A-529."

STEP 10. Check ETACS-ECU connector C-309 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-309 in good condition?

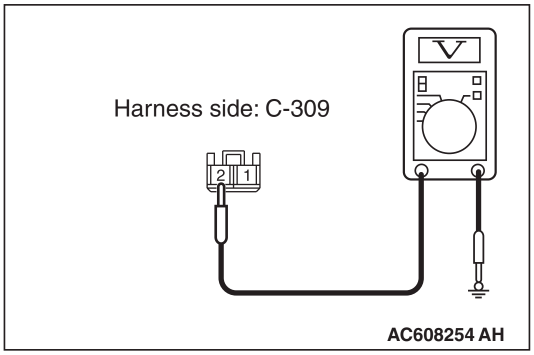
YES : Go to Step 11.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 11. Check the power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-309.

(1) Disconnect the connector, and measure at the wiring harness-side connector.
(2) Turn the ignition switch to the "ACC" position.
(3) Measure the voltage between terminal 2 and ground.

OK: Battery voltage



Q: Is the measured voltage battery voltage?

YES : Go to Step 13.
NO : Go to Step 12.

STEP 12. Check the wiring harness between ETACS-ECU connector C-309 (terminal 2) and fusible link (37)

- Check the power supply line for open circuit and short circuit.

Q: Is the wiring harness between ETACS-ECU connector C-309 (terminal 2) and fusible link (37) in good condition?

YES : Go to Step 13.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 13. Check ETACS-ECU connector C-315 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-315 in good condition?

YES : Go to Step 14.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 14. Check the wiring harness between audio visual navigation unit connector C-14 (terminal 14) and ETACS-ECU connector C-315 (terminal 9).

- Check the power supply line for open circuit.

NOTE: Also check joint connector C-07 and intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-07 or intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between audio visual navigation unit connector C-14 (terminal 14) and ETACS-ECU connector C-315 (terminal 9) in good condition?

YES : Go to Step 15.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 15. Retest the system

Check if the audio visual navigation unit power is turned ON.

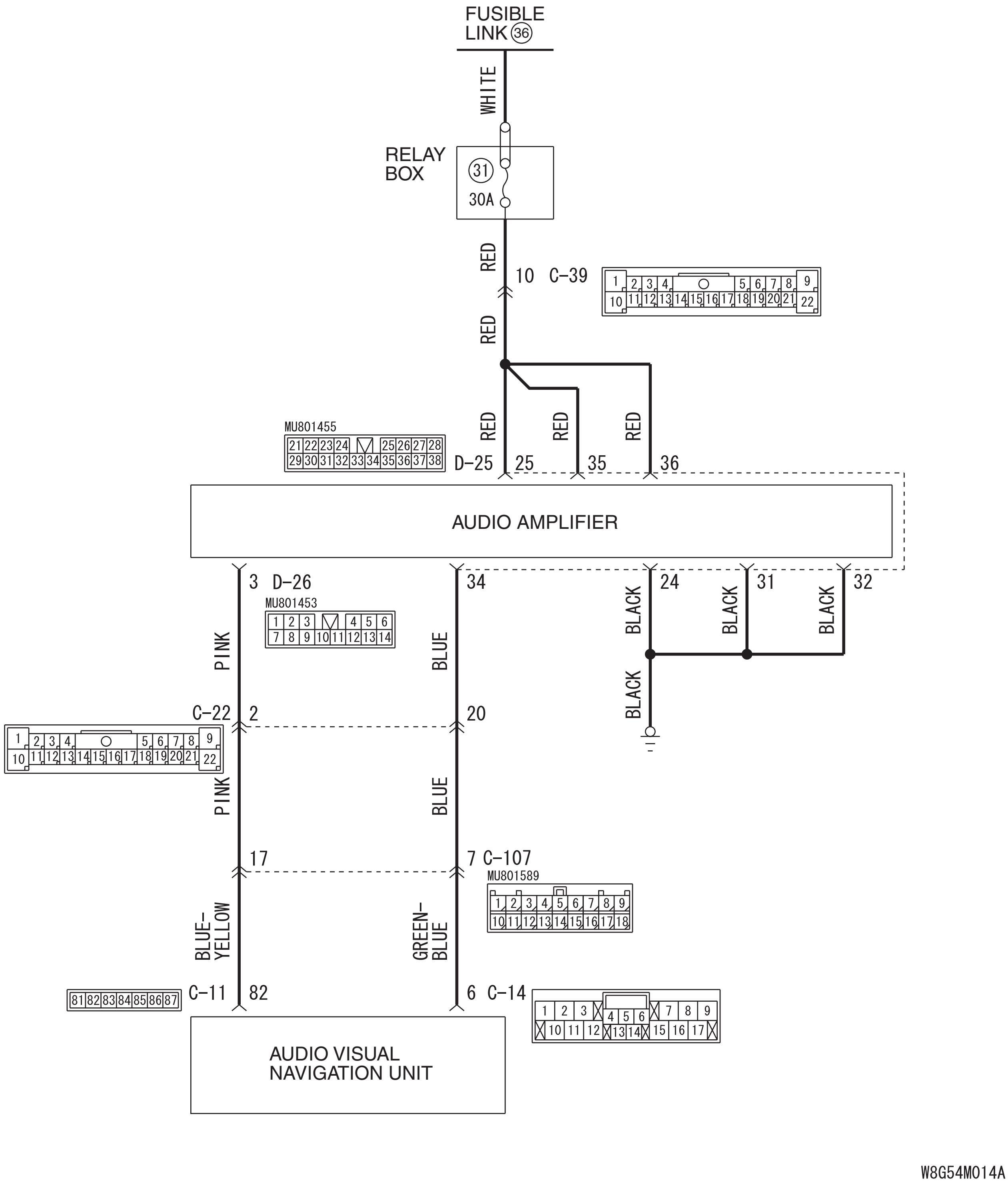
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

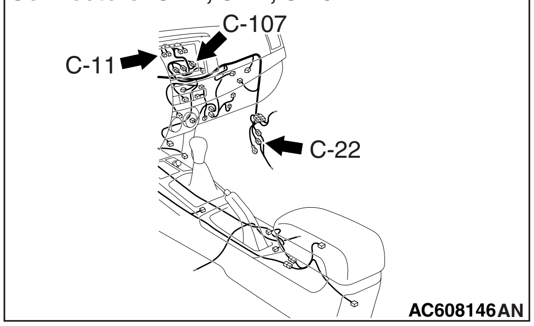
NO : Replace the audio visual navigation unit.

Inspection Procedure 2: No Sound is Heard. <Vehicles with Audio Amplifier>

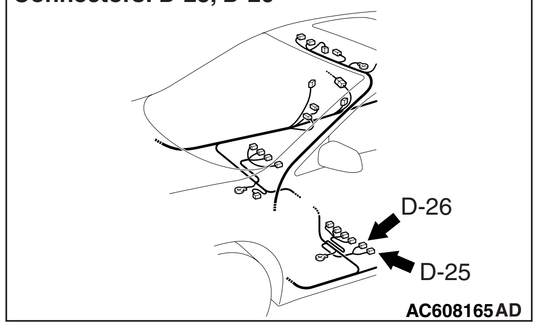
Audio Visual Navigation System Circuit



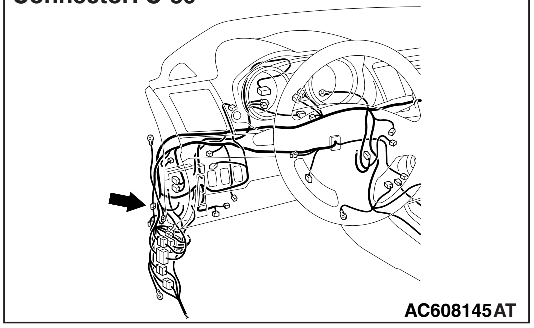
Connectors: C-11, C-22, C-107



Connectors: D-25, D-26



Connector: C-39



COMMENTS ON TROUBLE SYMPTOM

If the audio sound is not output, the audio visual navigation unit, audio amplifier, or power supply circuit of audio amplifier may have a problem, or the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunctions of audio visual navigation unit
- Malfunction of audio amplifier
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the ETACS-ECU coding data.

(1) Operate the scan tool MB991958 to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).

(2) Check that the "Speaker" is set to "Premium."

Q: Is the check result normal?

YES : Go to Step 2.

NO : Operate scan tool MB991958 to set the option coding "Speaker" to "Premium," and check the trouble symptom.

STEP 2. Check audio amplifier connector D-25 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio amplifier connector D-25 in good condition?

YES : Go to Step 3.

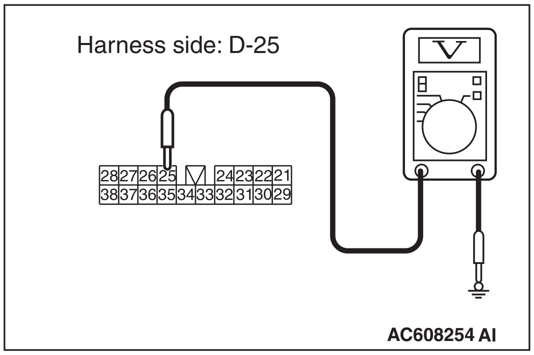
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 3. Check the power supply circuit to the ETACS-ECU. Measure the voltage at audio amplifier connector D-25.

(1) Disconnect audio amplifier connector D-25, and measure the voltage available at the wiring harness-side connector.

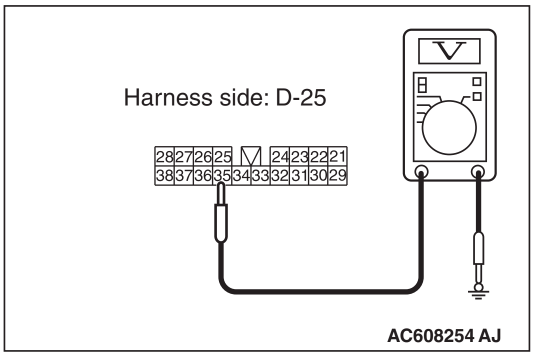
(2) Measure the voltage between terminal 25 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).



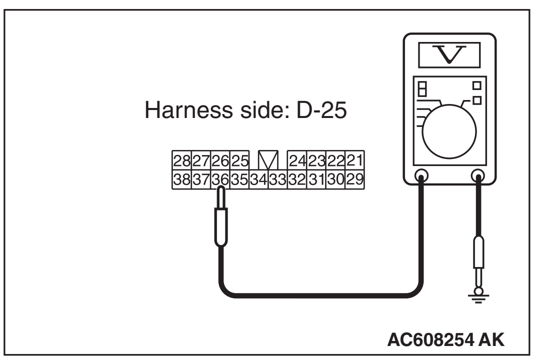
(3) Measure the voltage between terminal 35 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).



(4) Measure the voltage between terminal 36 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).



Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wiring harness between audio amplifier connector D-25 (terminal 25, 35, 36) and fusible link (36).

NOTE: Also check intermediate connector C-39 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-39 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

- Check the power supply line for open circuit and short circuit.

Q: Is the wiring harness between audio amplifier connector D-25 (terminal 25, 35, 36) and fusible link (36) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Check audio visual navigation unit connector C-11 and audio amplifier connector D-26 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector C-11 and audio amplifier connector D-26 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between audio visual navigation unit connector C-11 (terminal 82) and audio amplifier connector D-26 (terminal 3)

NOTE: Also check intermediate connectors C-22 and C-107 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-107 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

- Check the communication lines for open circuit.

Q: Is the wiring harness between audio visual navigation unit connector C-11 (terminal 82) and audio amplifier connector D-26 (terminal 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Retest the system

Replace the audio amplifier, then check that the audio sound is output.

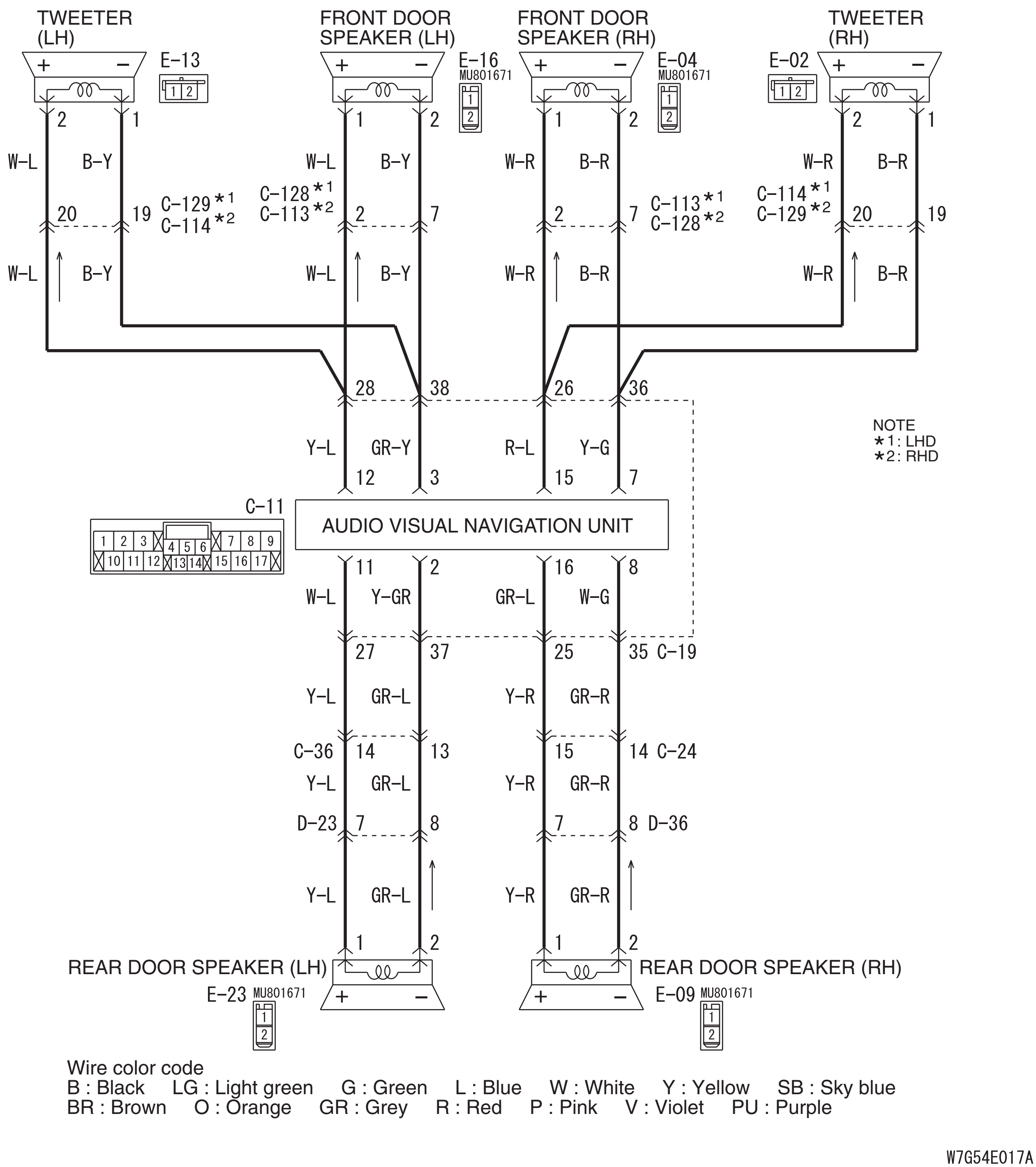
Q: Is the check result normal?

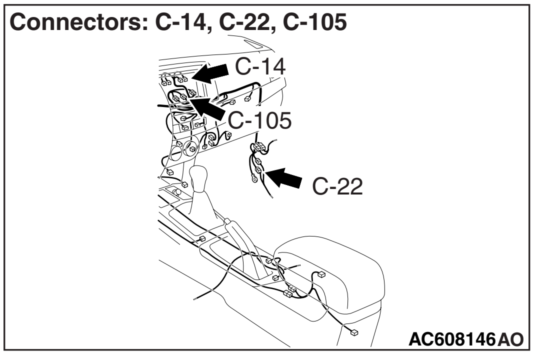
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

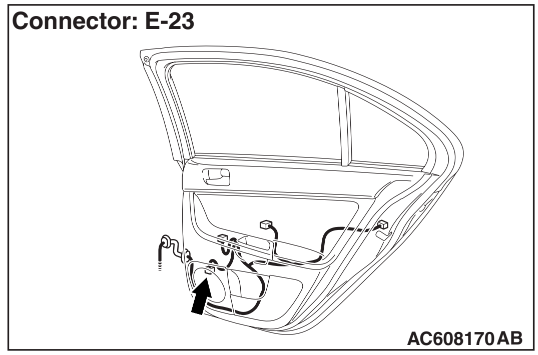
NO : Replace the audio visual navigation unit.

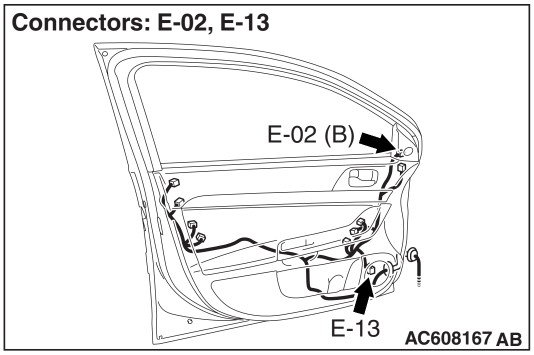
Inspection Procedure 3: No Sound is Heard from one of the Speakers. <Vehicles without Audio Amplifier>

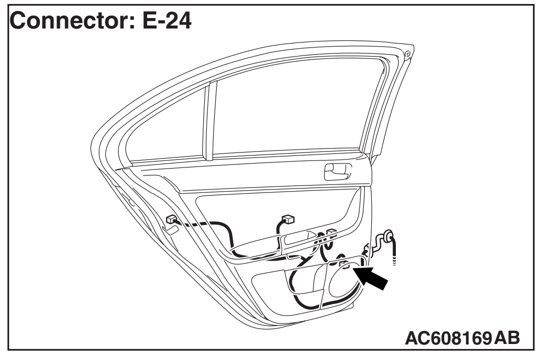
Speaker System Circuit

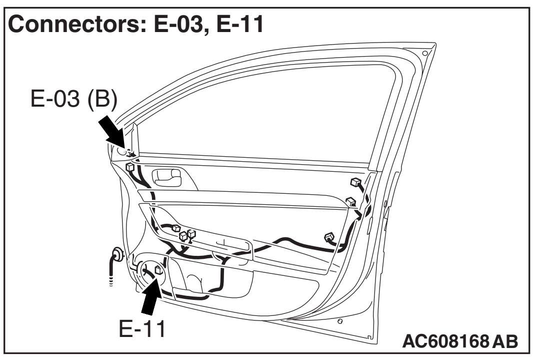












COMMENTS ON TROUBLE SYMPTOM

If the sound is not heard from one of the speakers, the speaker, audio visual navigation unit, communication line from the audio visual navigation unit to the speaker may have a problem. Also, the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunction of speaker
- Malfunctions of audio visual navigation unit
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. ETACS-ECU coding data check

(1) Operate scan tool MB991958 to read the ETACS-ECU option coding information. (Refer to GROUP 00, Coding Table P.00-35.)
(2) Check that the "Speaker" is set to "6 speakers".

Q: Is the check result normal?

YES : Go to Step 2.
NO : Operate scan tool MB991958 to set the option coding "Speaker" to "Premium," and check the trouble symptom.

STEP 2. Checking with audio speaker check

Perform the audio speaker check, and check which speaker does not output the sound (Refer to P.54A-313).

NOTE: In the following procedure, check the speaker or tweeter that is abnormal.

Q: Is the check result normal?

YES (normal for all) : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).
NO (abnormal for all) : Check the audio visual navigation unit power supply and ground circuit, and repair if necessary. If the audio visual navigation unit power supply and ground circuit is normal, replace the audiovisual navigation unit.
NO (Either a speaker is abnormal) : Go to Step 3.

STEP 3. Check door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH> in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 4. Check the speaker or tweeter.

(1) Remove the speaker or tweeter (Refer to P.54A-443).
(2) Check that the speaker or tweeter outputs the noise when the voltage of 5 V is applied to the speaker or tweeter connector terminal.

Q: Does the speaker or tweeter output the noise?

YES : Go to Step 5.
NO : Replace the speaker or tweeter.

STEP 5. Check audio visual navigation unit connector C-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector C-14 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between the speaker or tweeter connector terminal and the audio visual navigation unit connector terminal.

Check the communication lines for open circuit.

- <Front door speaker (LH)> Check the wiring harness between front door speaker (LH) connector E-13 (terminal 1, 2) and audio visual navigation unit connector C-14 (terminal 12, 3).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Front door speaker (RH)> Check the wiring harness between front door speaker (RH) connector E-11 (terminal 1, 2) and audio visual navigation unit connector C-14 (terminal 15, 7).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (LH)> Check the wiring harness between rear door speaker (LH) connector E-23 (terminal 1, 2) and audio visual navigation unit connector C-14 (terminal 11, 2).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (RH)> Check the wiring harness between rear door speaker (RH) connector E-24 (terminal 1, 2) and audio visual navigation unit connector C-14 (terminal 16, 8).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (LH)> Check the wiring harness between tweeter (LH) connector E-02 (terminal 2, 1) and audio visual navigation unit connector C-14 (terminal 12, 3).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connec-

tor Inspection P.00E-2.

- <Tweeter (RH)> Check the wiring harness between tweeter (RH) connector E-03 (terminal 2, 1) and audio visual navigation unit connector C-14 (terminal 15, 7).

  NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

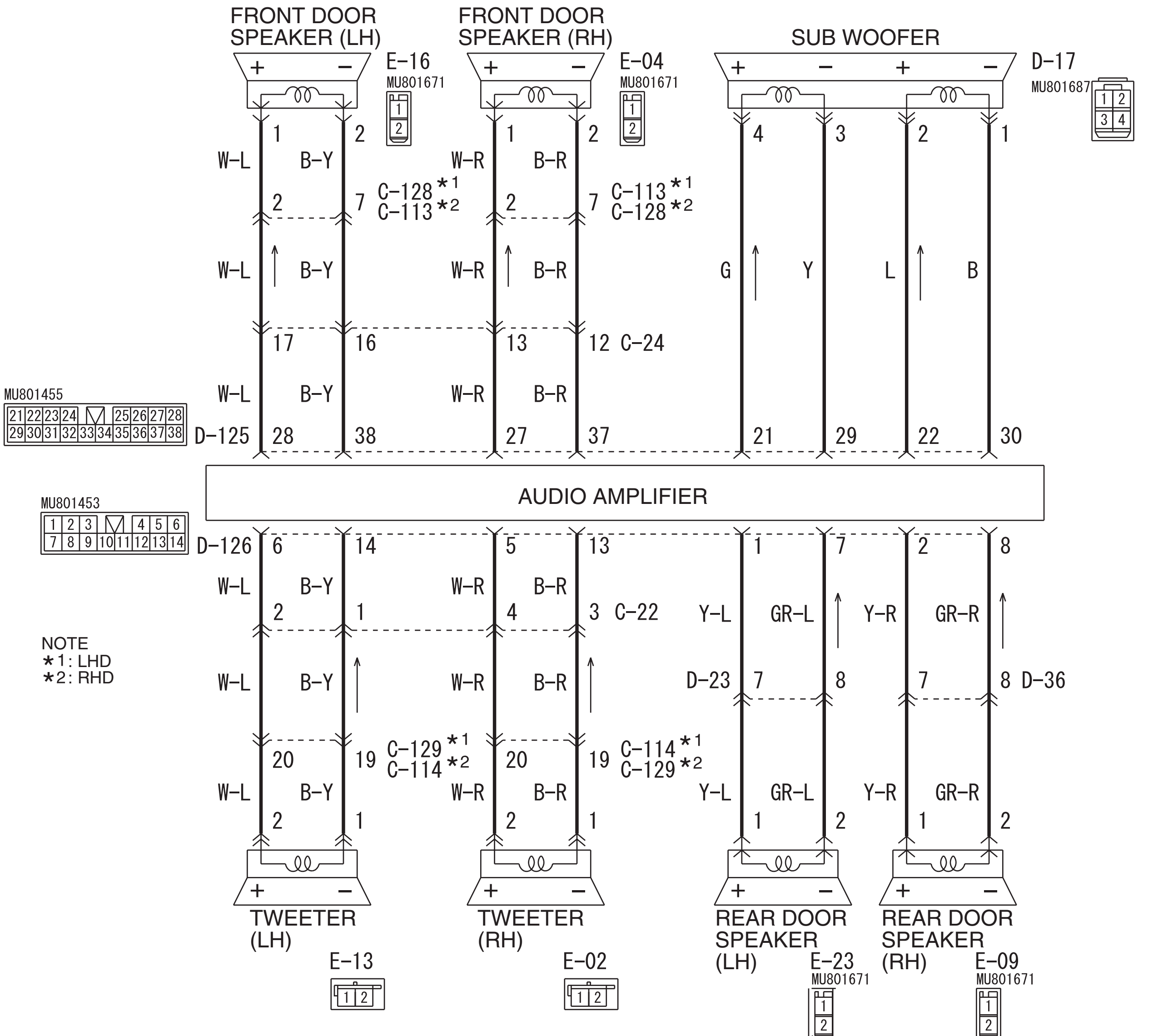
Q: Is the wiring harness between the speaker or tweeter connector terminal and the audio amplifier connector terminal in good condition?

YES : Replace the audio visual navigation unit.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

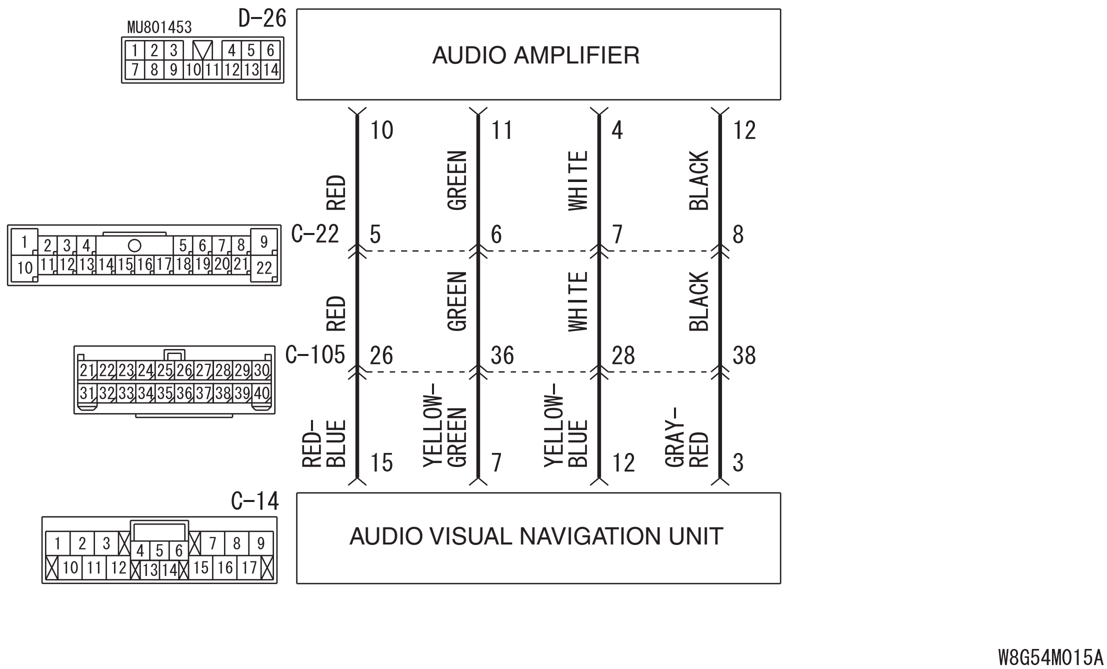
Inspection Procedure 3: No Sound is Heard from one of the Speakers. <Vehicles with Audio Amplifier>

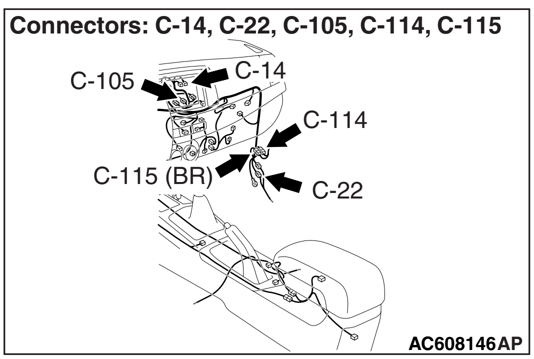
Speaker System Circuit

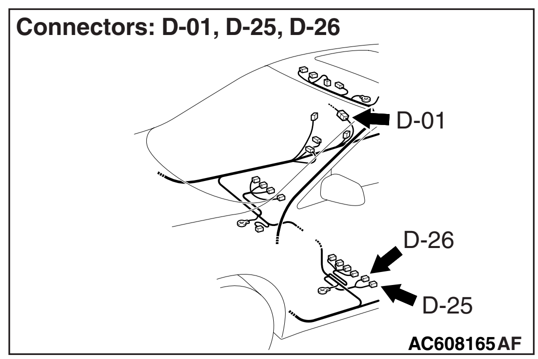


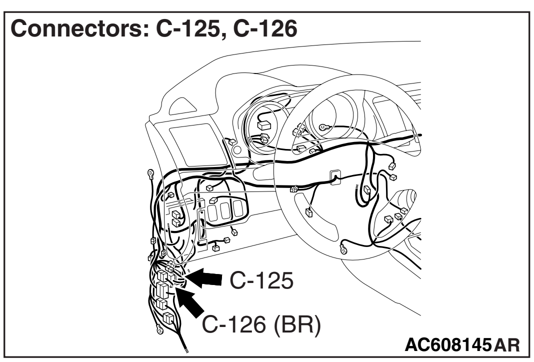
Wire color code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

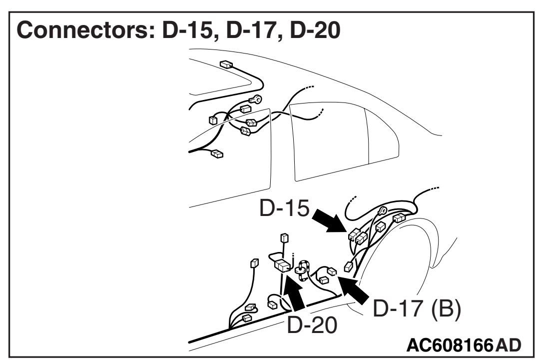
W7G54E013A


MU801453
D-26
AUDIO AMPLIFIER
10
11
4
12
RED
GREEN
WHITE
BLACK
C-22
5
6
7
8
RED
GREEN
WHITE
BLACK
C-105
26
36
28
38
RED-BLUE
YELLOW-GREEN
YELLOW-BLUE
GRAY-RED
15
7
12
3
C-14
AUDIO VISUAL NAVIGATION UNIT
W8G54M015A

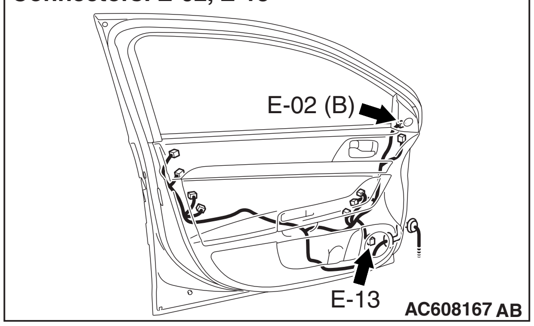

Connectors: C-14, C-22, C-105, C-114, C-115
C-105
C-14
C-114
C-115 (BR)
C-22
AC608146AP


Connectors: D-01, D-25, D-26
D-01
D-26
D-25
AC608165AF

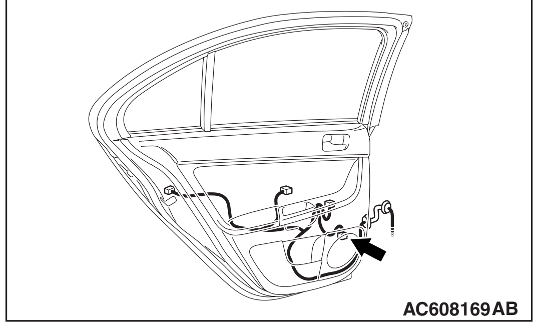

Connectors: C-125, C-126
C-125
C-126 (BR)
AC608145AR


Connectors: D-15, D-17, D-20
D-15
D-17 (B)
D-20
AC608166AD

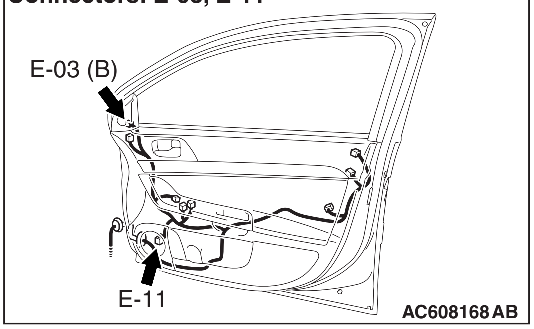
Connectors: E-02, E-13



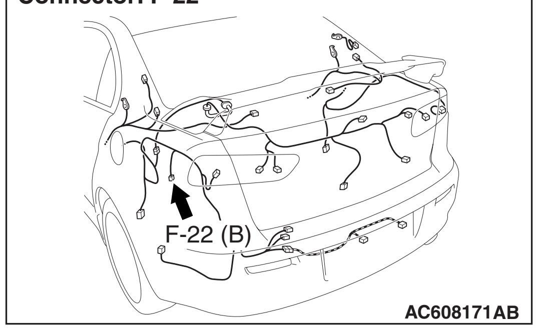
Connector: E-24



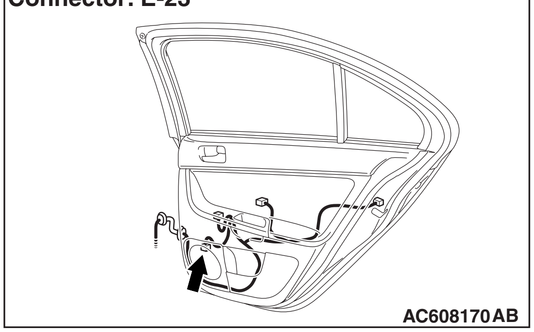
Connectors: E-03, E-11



Connector: F-22



Connector: E-23



COMMENTS ON TROUBLE SYMPTOM

If the sound is not heard from one of the speakers, the speaker, audio visual navigation unit, audio amplifier, communication line from the audio visual navigation unit to the audio amplifier, or communication line from the audio amplifier to the speaker may have a problem. Also, the option coding information may be inconsistent.

PROBABLE CAUSES

- Malfunction of speaker
- Malfunctions of audio visual navigation unit
- Malfunction of audio amplifier
- Option coding information inconsistency
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. ETACS-ECU coding data check

(1) Operate scan tool MB991958 to read the ETACS-ECU option coding information (Refer to GROUP 00, Coding Table P.00-35).
(2) Check that the "Speaker" is set to "Premium."

Q: Is the check result normal?

YES : Go to Step 2.
NO : Operate scan tool MB991958 to set the option coding "Speaker" to "Premium," and check the trouble symptom.

STEP 2. Checking with audio speaker check

Perform the audio speaker check, and check which speaker does not output the sound (Refer to P.54A-313).

NOTE: In the following procedure, check the speaker, tweeter or subwoofer that is abnormal.

Q: Is the check result normal?

YES (normal for all) : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).
NO (abnormal for all) : Refer to Inspection Procedure 2 "No sound is heard" P.54A-358.
NO (Either a speaker, a tweeter or a subwoofer is abnormal) : Go to Step 3.

STEP 3. Check door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH>, or subwoofer connector F-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is door speaker connector E-13 <front-LH>, E-11 <front-RH>, E-23 <rear-LH> or E-24 <rear-RH>, or tweeter connector E-02 <LH> or E-03 <RH>, or subwoofer connector F-22 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 4. Check the speaker, tweeter or subwoofer.

(1) Remove the speaker, tweeter or subwoofer (Refer to P.54A-443).
(2) Check that the speaker or tweeter outputs the noise when the voltage of 5 V is applied to the speaker or tweeter connector terminal. <speaker or tweeter>
(3) Check that the subwoofer outputs the noise when the voltage of 5 V is applied to the subwoofer connector terminal. <subwoofer>

Q: Does the speaker, tweeter or subwoofer output the noise?

YES : Go to Step 5.
NO : Replace the speaker, tweeter or subwoofer.

STEP 5. Check audio amplifier connector D-125 <front door speaker or sub woofer> or D-126 <tweeter or rear door speaker> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio amplifier connector D-125 <front door speaker or sub woofer> or D-126 <tweeter or rear door speaker> in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between the speaker or tweeter connector terminal and the audio amplifier connector terminal.

Check the communication lines for open circuit.

- <Front door speaker (LH)> Check the wiring harness between front door speaker (LH) connector E-13 (terminal 1, 2) and audio amplifier connector D-25 (terminal 28, 38).

  NOTE: Also check intermediate connectors C-22 and C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Front door speaker (RH)> Check the wiring harness between front door speaker (RH) connector E-11 (terminal 1, 2) and audio amplifier connector D-25 (terminal 27, 37).

  NOTE: Also check intermediate connectors C-22 and C-114 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-114 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (LH)> Check the wiring harness between rear door speaker (LH) connector E-23 (terminal 1, 2) and audio amplifier connector D-26 (terminal 1, 7).

  NOTE: Also check intermediate connector D-20 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-20 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Rear door speaker (RH)> Check the wiring harness between rear door speaker (RH) connector E-24 (terminal 1, 2) and audio amplifier connector D-26 (terminal 2, 8).

  NOTE: Also check intermediate connector D-01 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-01 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (LH)> Check the wiring harness between tweeter (LH) connector E-02 (terminal 1, 2) and audio amplifier connector D-26 (terminal 14, 6).

  NOTE: Also check intermediate connectors C-22 and C-126 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-126 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.
- <Tweeter (RH)> Check the wiring harness between tweeter (RH) connector E-03 (terminal 1, 2) and audio amplifier connector D-26 (terminal 13, 5).

  NOTE: Also check intermediate connectors C-22 and C-115 for loose, corroded, or damaged terminals, or terminals *pushed back in the connector. If intermediate connector C-22 or C-115 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.*

- <Subwoofer> Check the wiring harness between subwoofer connector F-22 (terminal 1, 2, 3, 4) and audio amplifier connector D-25 (terminal 30, 22, 29, 21).

  NOTE: Also check intermediate connector D-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between the speaker, tweeter or subwoofer connector terminal and the audio amplifier connector terminal in good condition?

YES <front door speaker> : Go to Step 7.
YES <except front door speaker> : Go to Step 9.
NO (harness wire is abnormal) : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check audio visual navigation unit connector D-26 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector D-26 in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 8. Check the wiring harness between audio visual navigation unit connector C-14 (terminal 3, 7, 12, 15) and audio amplifier connector D-26 (terminal 12, 11, 4, 15).

- Check the communication lines for open circuit.

NOTE: Also check intermediate connectors C-22 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-22 or C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between audio visual navigation unit connector C-14 (terminal 3, 7, 12, 15) and audio amplifier connector D-26 (terminal 12, 11, 4, 15) in good condition?

YES : Check the trouble symptom, go to Step 9.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Replace the audio amplifier temporarily, and check the trouble symptom.

Replace the audio amplifier temporarily, and check that the sound is output from the speaker.

Q: Is the check result normal?

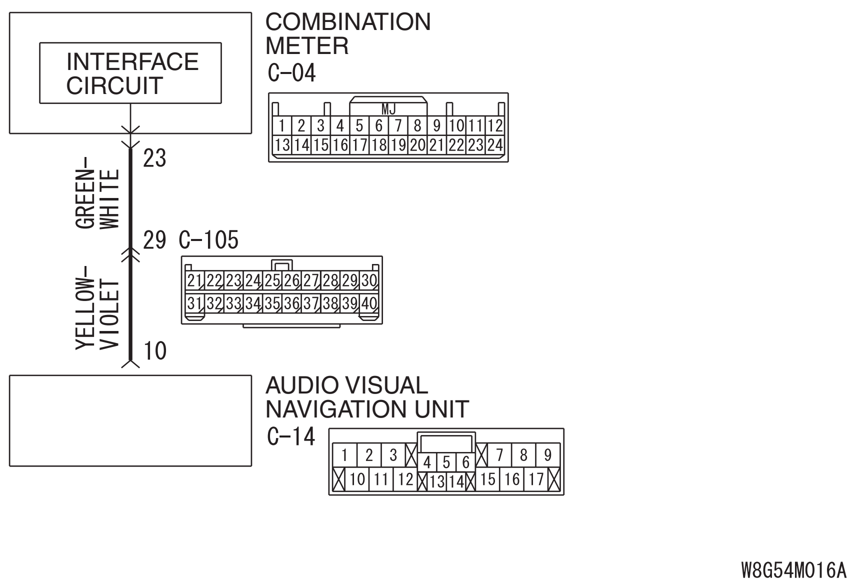
YES : Replace the audio amplifier.
NO : Replace the audio visual navigation unit.

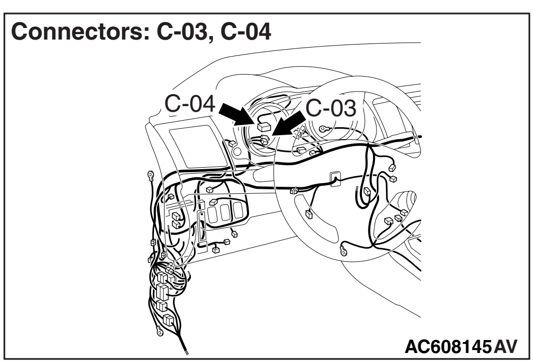
Inspection Procedure 4: The Navigation System can be Operated while the Vehicle is Driven.

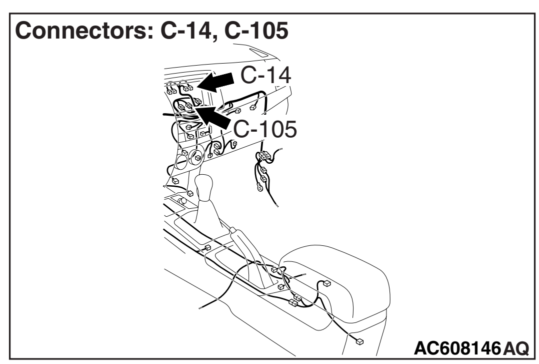
⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Audio Visual Navigation Unit Communication Circuit







COMMENTS ON TROUBLE SYMPTOM

There is a failure in the wiring harness between the combination meter and the audio visual navigation unit, the respective connector(s), the combination meter or the audio visual navigation unit.

PROBABLE CAUSES

- Malfunctions of combination meter
- Malfunctions of audio visual navigation unit
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Perform "Vehicle Signal Check" in the MMCS service mode.

Perform "Vehicle Signal Check" in the MMCS service mode to check whether vehicle speed signal is normal (Refer to P.54A-313).

Q: Is the vehicle speed signal transmitted normally?

YES : Replace the audio visual navigation unit.
NO : Go to Step 2.

STEP 2. Check the speedometer.

Check whether the speedometer works normally.

Q: Does the speedometer work normally?

YES : Go to Step 3.
NO : Diagnose the combination meter (Refer to Combination meter –Troubleshooting P.54A-53).

STEP 3. Check combination meter connector C-04 and audio visual navigation unit connector C-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 and audio visual navigation unit connector C-14 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 4. Check the wiring harness between combination meter connector C-04 (terminal 20) and audio visual navigation unit connector C-14 (terminal 13).

- Check the communication lines for open circuit.

NOTE: Also check joint connector C-03 and intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between combination meter connector C-04 (terminal 20) and audio visual navigation unit connector C-14 (terminal 13) in good condition?

YES : Go to Step 5.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Substitute a known good audio visual navigation unit, and check the trouble symptom.

Check that no menus are active during driving.

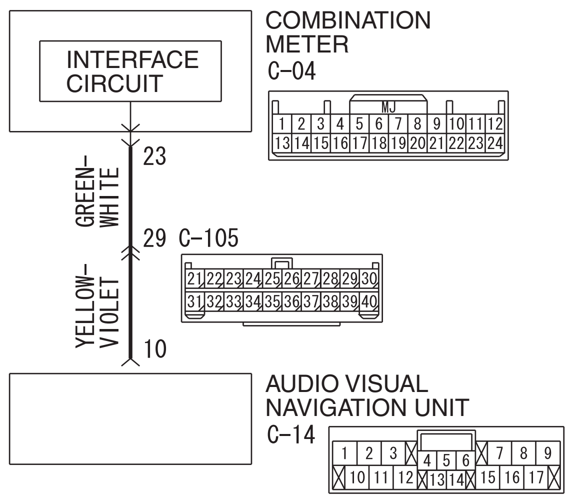
Q: Is the check result normal?

YES : Replace the audio visual navigation unit.
NO : Replace the combination meter.

Inspection Procedure 5: The Screen is not Normal in the Navigation Mode.

⚠ CAUTION
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Audio Visual Navigation Unit Communication Circuit



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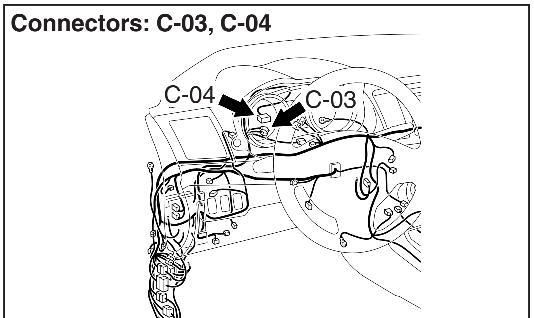
Connectors: C-03, C-04



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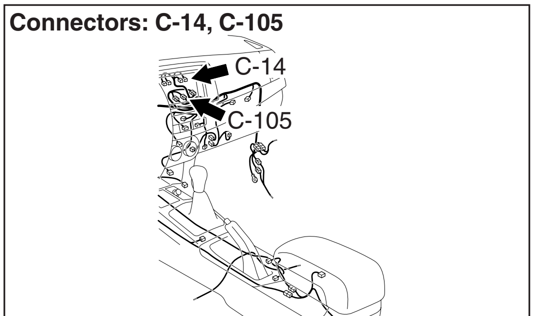
Connectors: C-14, C-105



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COMMENTS ON TROUBLE SYMPTOM

There is a failure in the wiring harness between the combination meter and the audio visual navigation unit, the GPS antenna, the respective connector(s), the combination meter or the audio visual navigation unit.

PROBABLE CAUSES

- Malfunctions of GPS antenna
- Malfunctions of combination meter
- Malfunctions of audio visual navigation unit
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Confirmation in MMCS service mode

Check the items below in the MMCS service mode. (Refer to P.54A-313.)

- Perform "Network/Connect Line Check" in the MMCS service mode to check that the communication and wire connection with the GPS are in good condition.
- Perform "Vehicle Signal Check", and then check the status of the vehicle speed signal.
- Perform "Sensor Check", and then check the status of the vehicle speed sensor and the gyro sensor.

Q: Is the check result normal?

YES (OK for all) : Go to Step 7.
NO <GPS is not OK> : Go to Step 2.
NO <The vehicle speed sensor is not OK, or vehicle speed pulse does not increase after starting from a standstill> : Go to Step 4.
NO <Gyro sensor is not OK> : Go to Step 7.

STEP 2. Check the fit of the GPS antenna cable.

Check whether the GPS antenna cable is connected properly.

Q: Is the GPS antenna cable connected properly?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Go to Step 3.

STEP 3. Substitute a known good GPS antenna, and then check whether it works normally.

Q: Is the check result normal?

YES : Replace the GPS antenna.
NO : Go to Step 7.

STEP 4. Check the speedometer.

Check whether the speedometer works normally.

Q: Does the speedometer work normally?

YES : Go to Step 5.
NO : Diagnose the combination meter (Refer to Combination meter –Diagnosis P.54A-53).

STEP 5. Check combination meter connector C-04 and audio visual navigation unit connector C-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 and audio visual navigation unit connector C-14 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 6. Check the wiring harness between combination meter connector C-04 (terminal 20) and audio visual navigation unit connector C-14 (terminal 13).

- Check the communication lines for open circuit.

NOTE: Also check joint connector C-03 and intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-03 or intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between combination meter connector C-04 (terminal 20) and audio visual navigation unit connector C-14 (terminal 13) in good condition?

YES : Go to Step 7.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Substitute a known good audio visual navigation unit, and check the trouble symptom.

Check whether the navigation screen is normal.

Q: Is the navigation screen normal?

YES : Replace the audio visual navigation unit.
NO : Replace the combination meter.

Inspection Procedure 6: Poor Reception.

DIAGNOSIS

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.
NO : Assemble the mast antenna. Check that a poor reception is resolved.

STEP 2. Check to see if inspections are taking place is an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underground garage, inside a building, etc.)?

YES : Go to Step 3.
NO : Go to Step 4.

STEP 3. Move the vehicle and check the radio.

Move the vehicle to a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?

YES : Check that a poor reception is resolved.
NO : Go to Step 4.

STEP 4. Tune the radio, and then check it.

Q: Did the sensitivity improve after tuning?

YES : Check that a poor reception is resolved.
NO : Go to Step 5.

STEP 5. Check with several broadcasting stations.

NOTE: Two types of noise are addressed in this procedure, multipath and fading noise. The frequency of FM waves is extremely high. This makes them susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in many ways.

- *Multipath noise is the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).*
- *A fading or buzzing noise may occur when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates within a narrow range.*

Q: Is the abnormality in reception generated only within a certain range?

YES : Check that a poor reception is resolved.
NO : Go to Step 6.

STEP 6. Check the connection of the antenna plug and radio and CD player or CD changer.

Q: Is the antenna plug thoroughly connected to the radio and CD player or CD changer?

YES : Go to Step 7.
NO : Thoroughly connect the antenna plug and the radio and CD player or CD changer. Check that a poor reception is resolved.

STEP 7. Check by replacing radio and CD player or CD changer.

Q: Do the other radio and CD player or CD changer work normally?

YES : Either repair or replace the original radio and CD player or CD changer. Check that a poor reception is resolved.
NO : Either repair or replace the antenna assembly. Check that a poor reception is resolved.

Inspection Procedure 7: GPS Signal can not be Received.

COMMENTS ON TROUBLE SYMPTOM

The GPS antenna or the audio visual navigation unit may be defective.

PROBABLE CAUSES

- Malfunctions of GPS antenna
- Malfunctions of audio visual navigation unit

DIAGNOSIS

STEP 1. Confirmation in MMCS service mode

Perform "Network/Connect Line Check" in the MMCS service mode to check that the communication and wire connection with the GPS antenna are OK. (Refer to P.54A-313.)

Q: Is the check result normal?

YES : Go to Step 2.
NO : Go to Step 4.

STEP 2. Check for the vehicle's current position.

Check that the vehicle is parked on a well-ventilated place.

Q: Is the vehicle parked on a well-ventilated place?

YES : Go to Step 3.
NO : Move the vehicle to a well-ventilated area.

STEP 3. Confirming GPS signal reception

(1) Turn the ignition switch to the "ACC" position.
(2) Wait for 15 minutes, and then check whether GPS signal can be received.

Q: Can GPS signal be received?

YES : The procedure is complete. (There is no failure)
NO : Go to Step 4.

STEP 4. Substitute a known good GPS antenna, and check the trouble symptom.

When a known good GPS antenna is substituted, check whether GPS signal can be received.

Q: Is the check result normal?

YES : Replace the GPS antenna.
NO : Replace the audio visual navigation unit.

Inspection Procedure 8: No DVD (Video Disk) cannot be Played.

COMMENTS ON TROUBLE SYMPTOM

The DVD (video disk) or the audio visual navigation unit may be defective.

PROBABLE CAUSES

- Defective DVD (video disk)
- Malfunctions of audio visual navigation unit

DIAGNOSIS

STEP 1. Confirmation in MMCS service mode

Perform "Network/Connect Line Check" in the MMCS service mode, and check whether "OK" is displayed under "DVD drive". (Refer to P.54A-313.)

Q: Is "OK" displayed under "DVD drive" item?

YES : Go to Step 2.
NO : Replace the audio visual navigation unit.

STEP 2. Check that a DVD's recorded surface faces down.

Check that a DVD's recorded surface faces down.

Q: Is the DVD inserted with its recorded surface facing down?

YES : Go to Step 3.
NO : Check the DVD's recorded surface, and insert the DVD again. (For a one-sided disk, its recorded surface should face down)

STEP 3. Check a DVD (video disk) to be inserted.

Check whether the DVD (video disk) is an authorized one.

Q: Is the DVD (video disk) an authorized one?

YES : Go to Step 4.
NO : Use an authorized DVD (video disk).

STEP 4. Check a DVD (video disk) to be inserted.
Check that there are no stains or scratches on the DVD (video disk).

Q: Are there any stains or scratches on the DVD (video disk)?
YES : Clean or deburr the disk, or use a scratch and burr-free disk. Then insert the disk again.
NO : Go to Step 5.

STEP 5. Substitute a known good DVD (video disk), and check the trouble symptom.
When a known good DVD (video disk) is loaded, check whether it is played normally.

Q: Is the check result normal?
YES : Replace the DVD (video disk).
NO : Go to Step 6.

STEP 6. Check the trouble symptom.
When a DVD (video disk) is loaded, check whether it is played normally.

Q: Is the DVD (video disk) played normally?
YES : The procedure is complete.
NO : Replace the audio visual navigation unit.

Inspection Procedure 9: Image of a DVD (Video Disk) is Played, but no Sound is Played.

COMMENTS ON TROUBLE SYMPTOM

The DVD (video disk) or the audio visual navigation unit may be defective.

PROBABLE CAUSES

- Defective DVD (video disk)
- Malfunctions of audio visual navigation unit

DIAGNOSIS

STEP 1. Check whether other sounds are emitted.
Check whether sound other than DVD (video disk) is emitted.

Q: Is sound other than DVD (video disk) emitted?
YES : Go to Step 2.
NO : Refer to "Inspection Procedure 2: No Sound is Head P.54A-358."

STEP 2. Check a DVD (video disk) to be inserted.
Check whether sound data is recorded in the DVD (video disk).

Q: Is sound data recorded in the DVD (video disk)?
YES : Go to Step 3.
NO : Use a DVD (video disk) containing sound data.

STEP 3. Confirmation in MMCS service mode
Perform "Network/Connect Line Check" in the MMCS service mode, and check whether "OK" is displayed under "DVD drive". (Refer to P.54A-313.)

Q: Is "OK" displayed under "DVD drive" item?
YES : Go to Step 4.
NO : Replace the audio visual navigation unit.

STEP 4. Check a scene to be played.
Check whether the scene accompanies sound.

Q: Does the scene accompany sound?
YES : Go to Step 5.
NO : Confirm by playing a sound-free scene.

STEP 5. Check how the DVD is played.
Check whether the disk was played at normal speed (not rewinded, fast-forwarded, slow, or pause).

Q: Was the disk played at normal speed (not rewind, fast-forward, slow, or pause)?
YES : Replace the audio visual navigation unit.
NO : Play the disk at normal speed.

Inspection Procedure 10: Sound of a DVD (Video Disk) can be Played, but no Image is Played.

COMMENTS ON TROUBLE SYMPTOM

The DVD (video disk) or the audio visual navigation unit may be defective.

PROBABLE CAUSES

- Defective DVD (video disk)
- Malfunctions of audio visual navigation unit

DIAGNOSIS

STEP 1. Confirmation in MMCS service mode
Perform "Network/Connect Line Check" in the MMCS service mode, and check whether "OK" is displayed under "DVD drive" (Refer to P.54A-313).

Q: Is "OK" displayed under "DVD drive" item?
YES : Go to Step 2.
NO : Replace the audio visual navigation unit.

STEP 2. Check DVD (video disk) to be inserted.
Check that there are no stains or scratches on the DVD (video disk).

Q: Are there any stains or scratches on the DVD (video disk)?
YES : Clean or deburr the disk, or use a scratch and burr-free disk. Then insert the disk again.
NO : Go to Step 3.

STEP 3. Substitute a known good DVD (video disk), and check the trouble symptom.

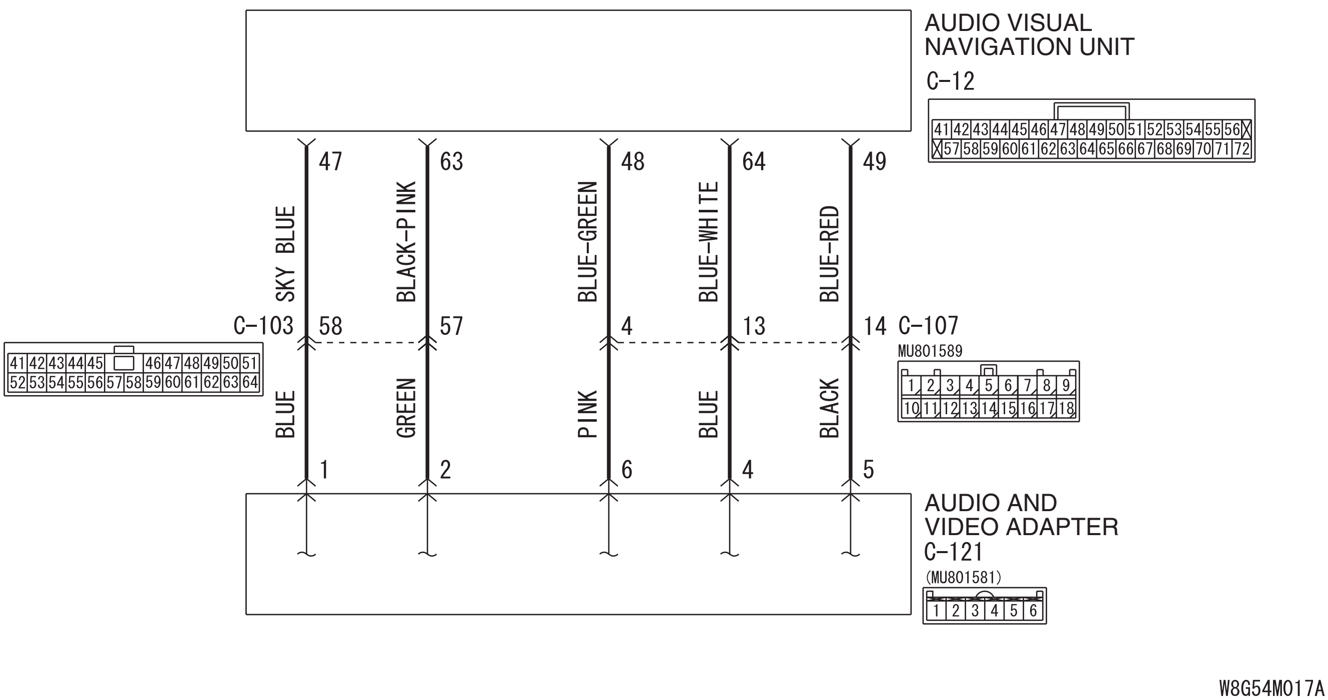
When a known good DVD (video disk) is loaded, check whether it is played normally.

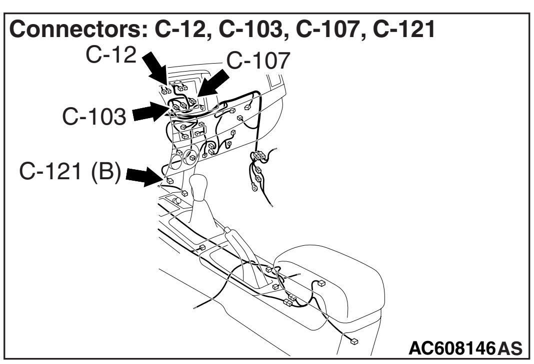
Q: Is the check result normal?

YES : Replace the DVD (video disk).
NO : Replace the audio visual navigation unit.

Inspection Procedure 11: The picture and sound of external input are not played.

Audio and Video Adapter Communication Circuit





DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check of DVD picture

Check that the DVD picture is displayed normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Perform the troubleshooting related to the MMCS (Refer to P.54A-350).

STEP 2. Check audio navigation unit connector C-12 and audio and video adaptor connector C-121 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are audio navigation unit connector C-12 and audio and video adaptor connector C-121 in good condition?

YES : Go to Step 3.

NO : Repair the connector concerned.

STEP 3. Check the wiring harness between audio visual navigation unit connector C-12 (terminal 47, 48, 49, 63, 64) and audio and video adaptor connector C-121 (terminal 1, 6, 5, 4, 2).

- Check the communication lines for open circuit.

NOTE: Also check intermediate connectors C-103 and C-107 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-103 or C-107 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between audio visual navigation unit connector C-12 (terminal 47, 48, 49, 63, 64) and audio and video adaptor connector C-121 (terminal 1, 6, 5, 4, 2) in good condition?

YES : Replace the audio and video adapter.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. The system should communicate with the CAN box unit normally.

STEP 4. Retest the system

Check that the external input is normal.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

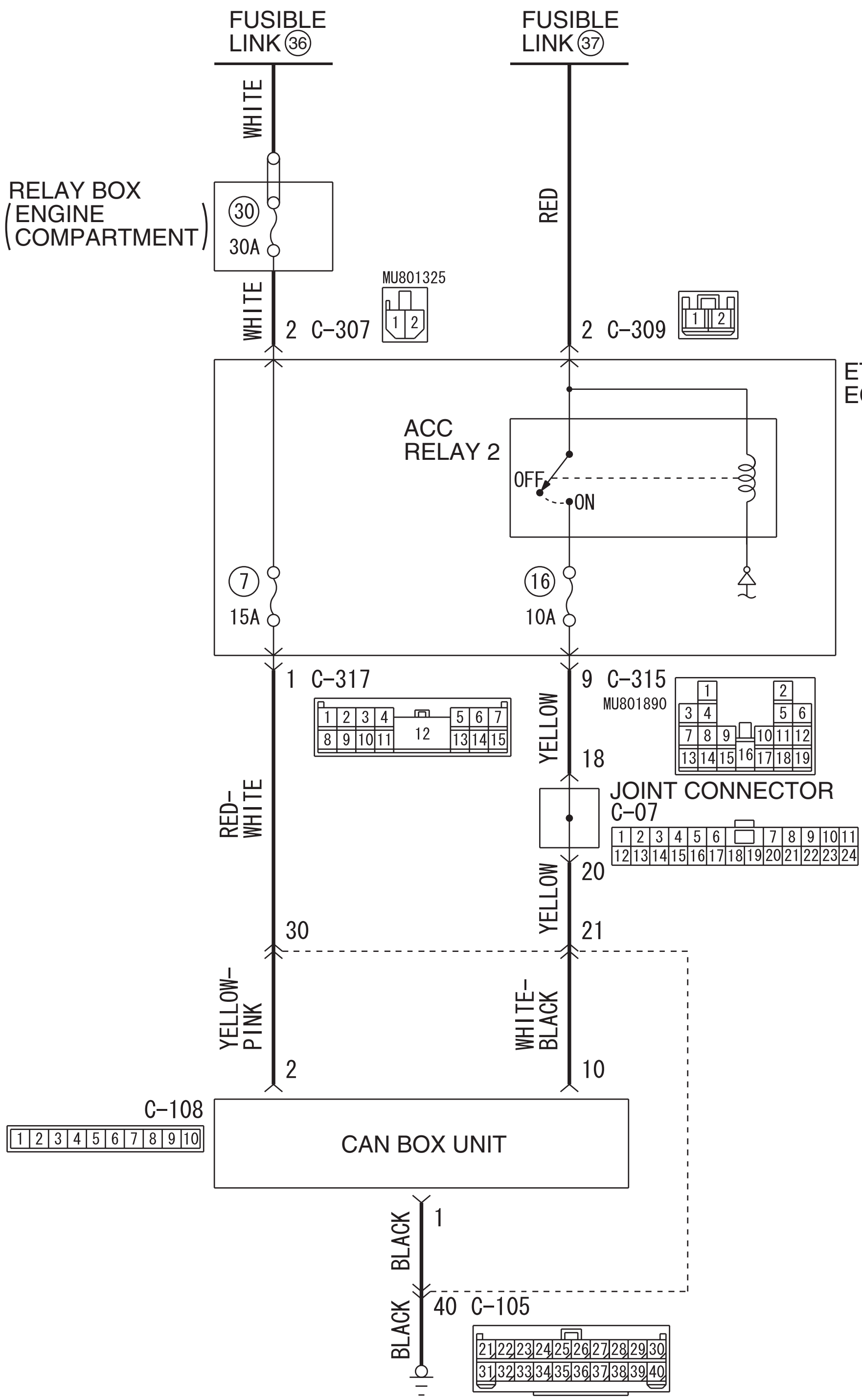
NO : Replace the rear display unit.

Inspection Procedure 12: Check the CAN box unit power supply circuit.

⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

CAN Box Unit Power Supply Circuit



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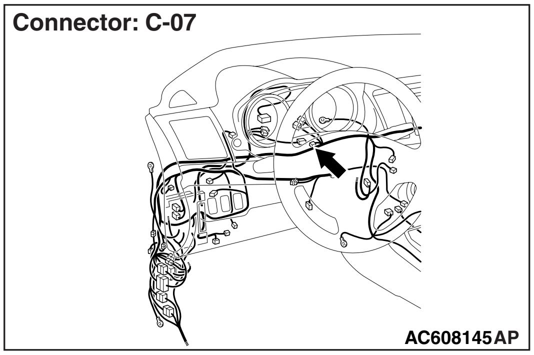
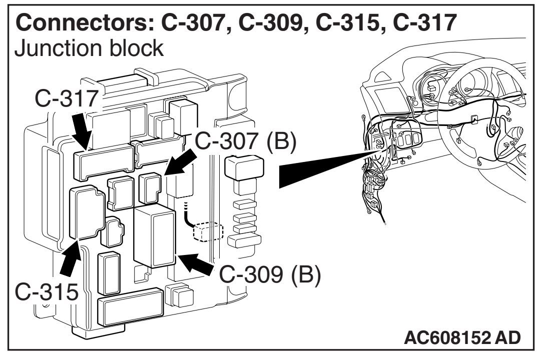
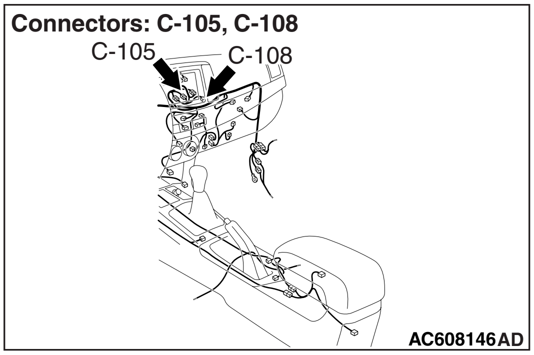






TECHNICAL DESCRIPTION (COMMENT)

If the CAN box unit functions do not work at all, the CAN box unit power supply system, ground system, or CAN box unit may have a problem.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The CAN box unit may be defective

DIAGNOSIS

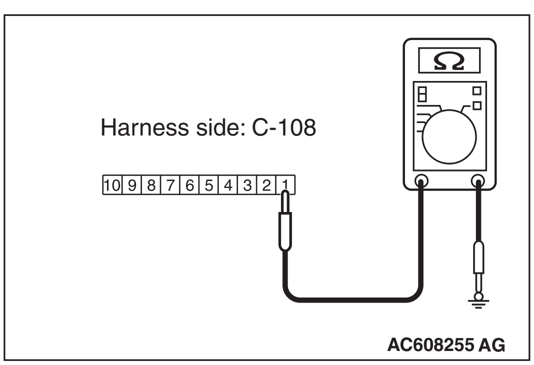
Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check CAN box unit connectors C-108 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is CAN box unit connectors C-108 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 2. Check the ground circuit to the CAN box unit. Measure the resistance at CAN box unit connector C-108.

(1) Disconnect CAN box unit connector C-108 and measure the resistance available at the wiring harness side of the connector.
(2) Measure the resistance value between CAN box unit connector C-108 terminal 1 and ground.

OK: The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.

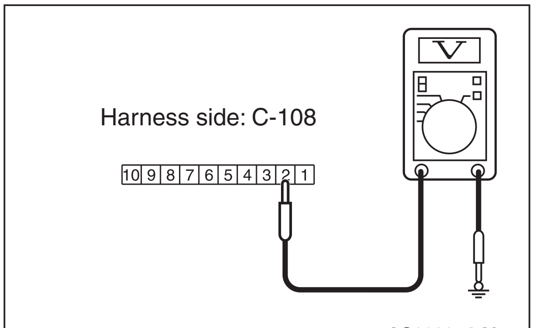
STEP 3. Check the wiring harness between CAN box unit connector C-108 (terminal 1) and the ground.

NOTE: Also check intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between CAN box unit connector C-108 (terminal 1) and the ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



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STEP 4. Check the battery power supply circuit to the CAN box unit. Measure the voltage at CAN box unit connectors C-108.

(1) Disconnect CAN box unit connectors C-108 measure the voltage available at the wiring harness side of the connector.
(2) Measure the voltage between CAN box unit connector C-108 terminal 2 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between CAN box unit connector C-108 (terminal 2) and fusible link (36).

NOTE: Also check intermediate connector C-105 and ETACS-ECU connectors C-307 and C-317 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-105 or ETACS-ECU connector C-307 or C-317 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between CAN box unit connector C-108 (terminal 2) and fusible link (36) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. The system should communicate with the CAN box unit normally.

STEP 6. Check the wiring harness between CAN box unit connector C-108 (terminal 10) and fusible link (37).

NOTE: Also check joint connector C-07, intermediate connector C-105 and ETACS-ECU connectors C-309 and C-315 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-07, intermediate connector C-105 or ETACS-ECU connectors C-309 or C-315 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

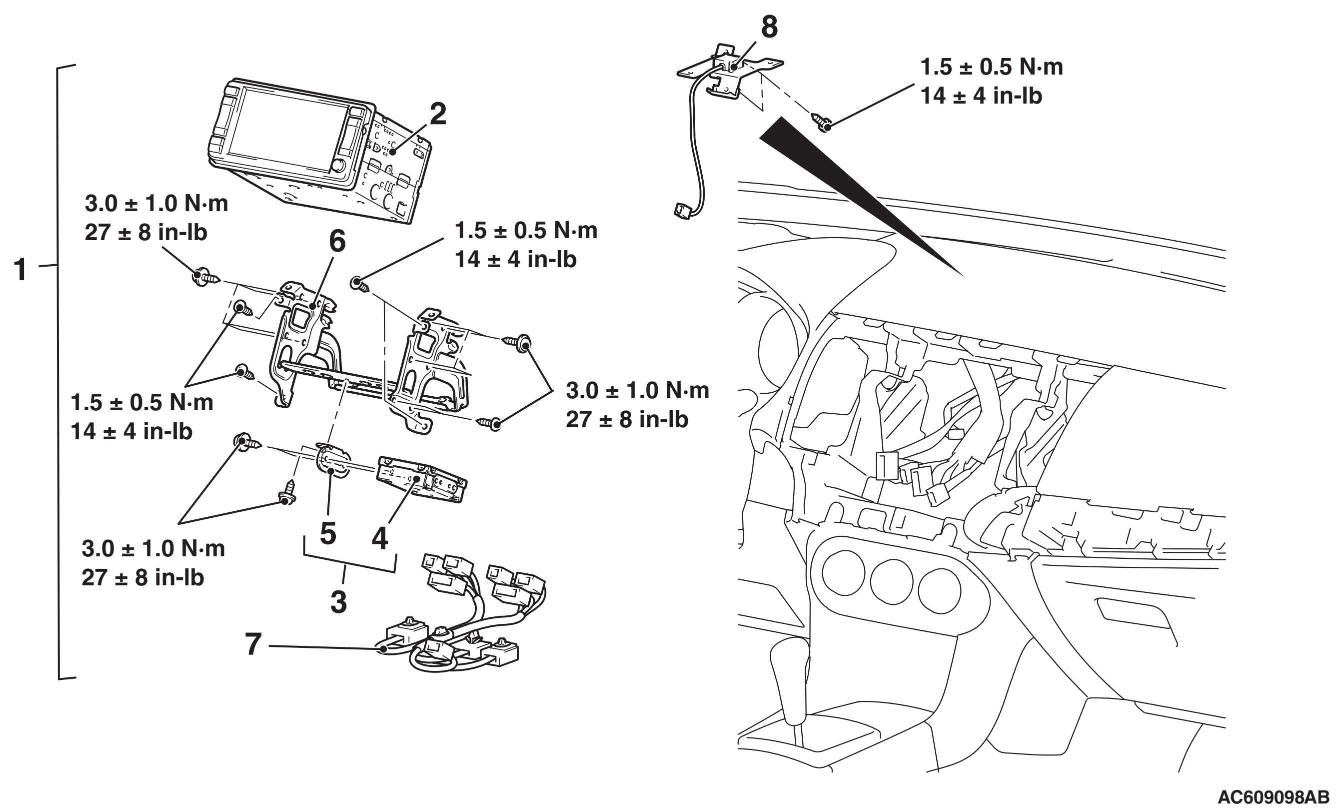
Q: Is the wiring harness between CAN box unit connector C-108 (terminal 10) and fusible link (37) in good condition?

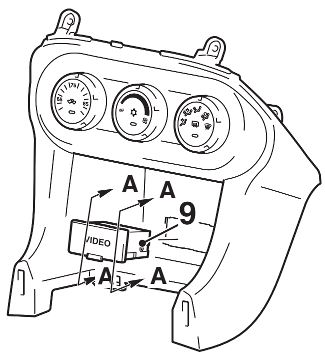
YES : No action is necessary and testing is complete.

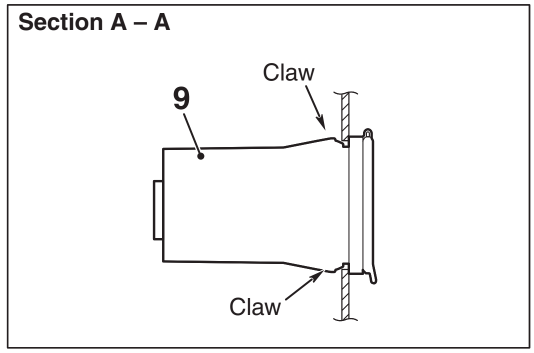
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. The system should communicate with the CAN box unit normally.

REMOVAL AND INSTALLATION

M1546001000121







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Audio Visual Navigation Unit Removal Steps

- Instrument center panel (Refer to GROUP 52A –Instrument Center Panel assembly P.52A-6).

1. Audio visual navigation unit assembly
2. Audio visual navigation unit
3. CAN box unit assembly
4. CAN box unit
5. CAN box unit bracket
6. Audio visual navigation unit bracket
7. Navigation harness

GPS Antenna Removal Steps

- Instrument panel assembly (Refer to GROUP 52A –Instrument Panel assembly P.52A-2).

8. GPS antenna

Audio and Video Adaptor Removal Steps

- Instrument console box (Refer to GROUP 52A –Instrument Center Panel assembly P.52A-6).

9. Audio and video adaptor

STEERING WHEEL AUDIO REMOTE CONTROL SWITCH

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1544004800584

Refer to GROUP 00, Troubleshooting contents P.00-6.

TROUBLE SYMPTOM CHART

M1544004900826

Inspection Procedure No.	Trouble symptom		Reference page
1	Steering wheel audio remote control switch does not function	<vehicles without MMCS>	P.54A-394
2		<vehicles with MMCS>	P.54A-398
3	Steering wheel audio remote control switch illumination does not come on.		P.54A-402

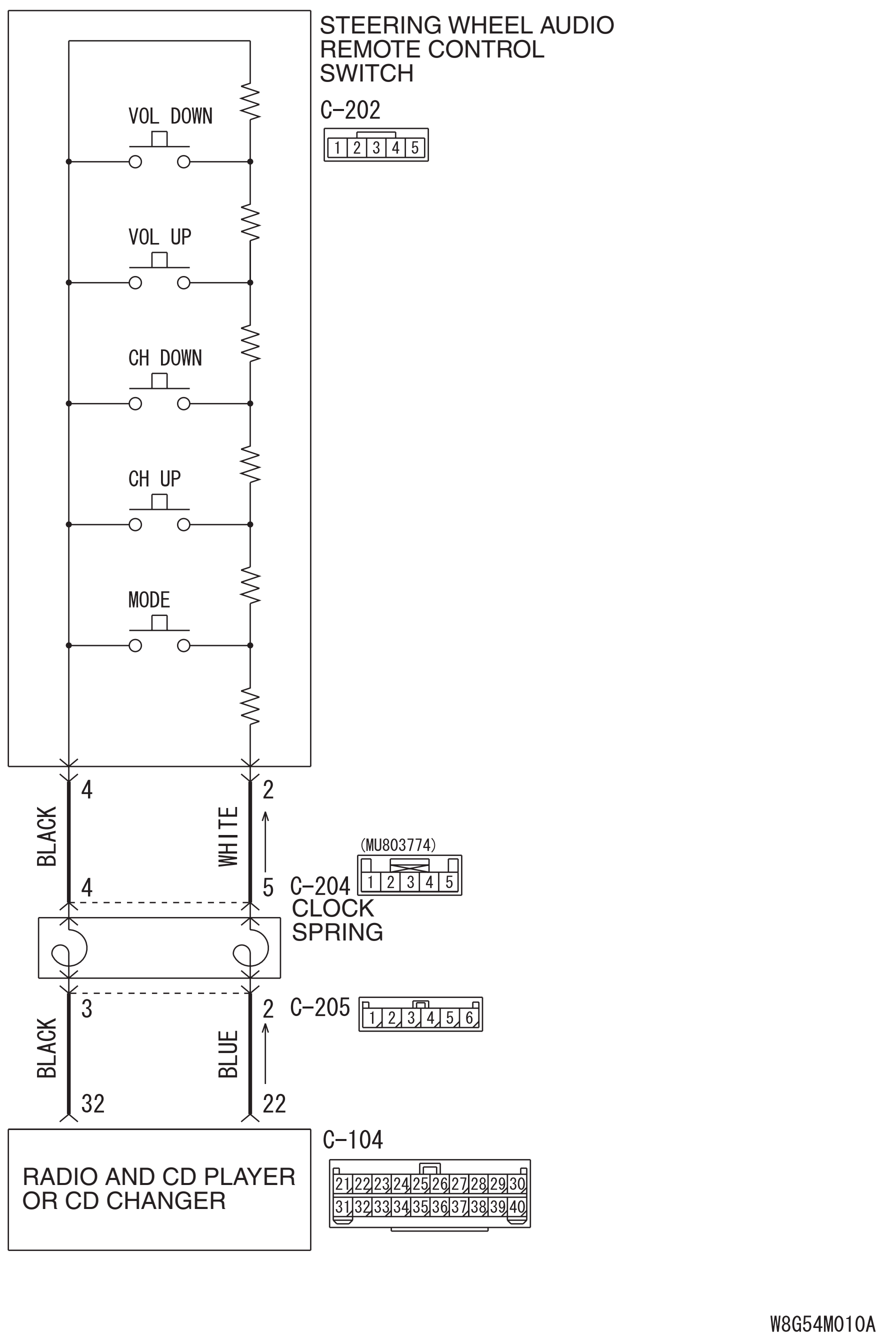
SYMPTOM PROCEDURES

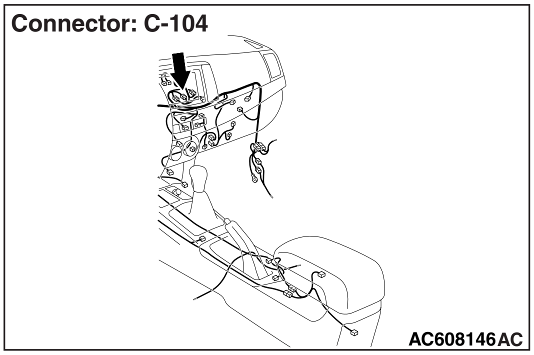
Inspection Procedure 1: Steering Wheel Audo Remote Control Switch does not Function. <Vehicles without MMCS>

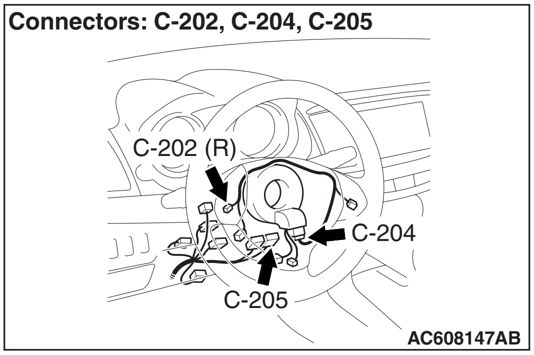
⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Steering Wheel Audio Remote Control Switch Circuit







TECHNICAL DESCRIPTION (COMMENT)

The power supply circuit to the steering remote control switch, the steering remote control switch, the radio and CD player or CD changer, or the clock spring may be defective.

TROUBLESHOOTING HINTS

- Malfunction of steering remote control switch
- Malfunctions of radio and CD player or CD changer
- Malfunction of the clock spring
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, check data list.

Check whether the service data below are normal.

(1) Turn the ignition switch to "ON" position.

(2) Operate each switch of the steering remote control. Check whether the normal conditions listed below are displayed.

Item No.	Item name	Normal condition
Item 1	RADIO remoto SW (SEEK-)	ON
Item 2	RADIO remoto SW (SEEK+)	ON
Item 3	RADIO remoto SW (MODE)	ON
Item 4	RADIO remoto SW (VOL-)	ON
Item 5	RADIO remoto SW (VOL+)	ON

OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Replace the radio and CD player or CD changer.

NO : Go to Step 2.

STEP 2. Check the remote controlled radio switch.
Remove the remote controlled radio switch. Then check continuity between the switch terminals.

Switch Position	Tester Connection	Measurement Value
No push	2 –3	Approximately 3.1 kΩ
	2 –4	Approximately 71 kΩ
Mode		Approximately 270 Ω
CH up		Approximately 740 Ω
CH down		Approximately 1.3 kΩ
VOL up		Approximately 2.1 kΩ
VOL down		Approximately 3.1 kΩ

Q: Is the remote controlled radio switch in good condition?

YES : Go to Step 3.
NO : Replace the remote controlled radio switch.

STEP 3. Check clock spring connector C-204 and C-205 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are clock spring connector C-204 and C-205 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 4. Check the clock spring.
Check whether the clock spring is in good condition (Refer to GROUP 52B, Air bag module and clock spring P.52B-375).

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the clock spring.

STEP 5. Check radio and CD player or CD changer connector C-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is radio and CD player or CD changer connector C-104 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 6. Check the wiring harness between radio and CD player or CD changer connector C-104 (terminal 22, 32) and clock spring connector C-205 (terminal 2, 3).

- Check the communication lines for open or short circuit.

Q: Is the wiring harness between radio and CD player or CD changer connector C-104 (terminal 22, 32) and clock spring connector C-205 (terminal 2, 3) in good condition?

YES : Go to Step 7.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check steering remote control switch connector C-202 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is steering remote control switch connector C-202 in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 8. Check the wiring harness between steering remote control switch connector C-202 (terminal 2, 4) and clock spring connector C-204 (terminal 5, 4).

- Check the communication lines for open or short circuit.

Q: Is the wiring harness between steering remote control switch connector C-202 (terminal 2, 4) and clock spring connector C-204 (terminal 5, 4) in good condition?

YES : Go to Step 9.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Retest the system

Check whether you can operate the radio and CD player or the CD changer by using the steering remote control.

Q: Is the check result normal?

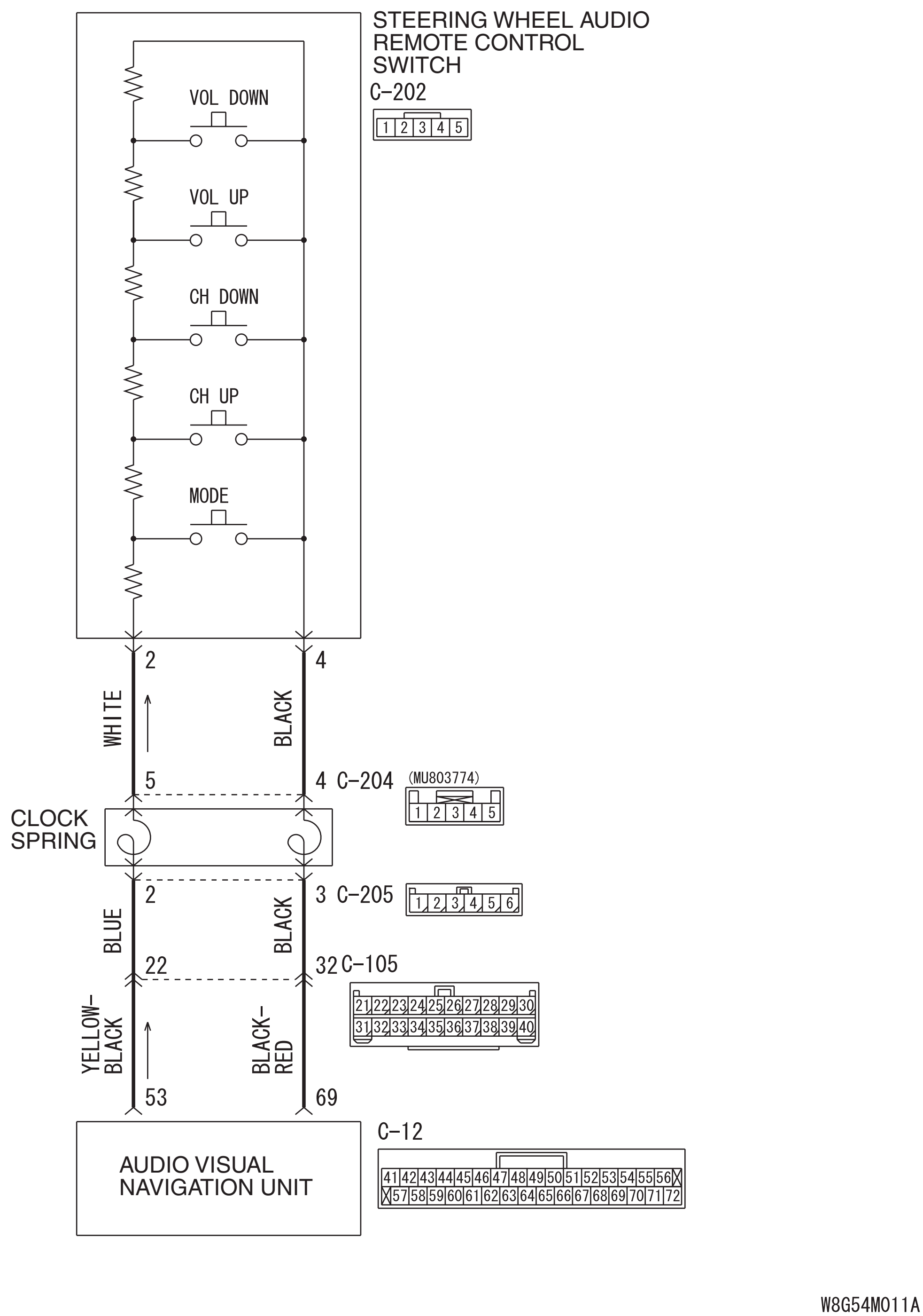
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00E-2).
NO : Replace the radio and CD player or CD changer.

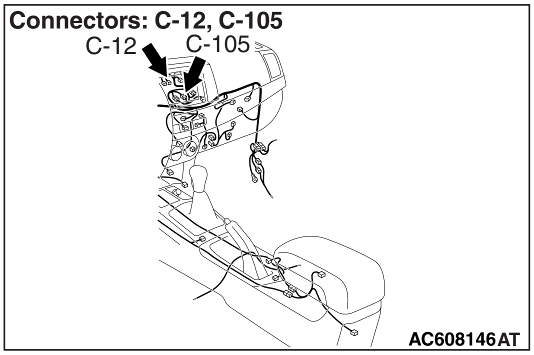
Inspection Procedure 2: Steering Wheel Audio Remote Control Switch does not Function. <Vehicles with MMCS>

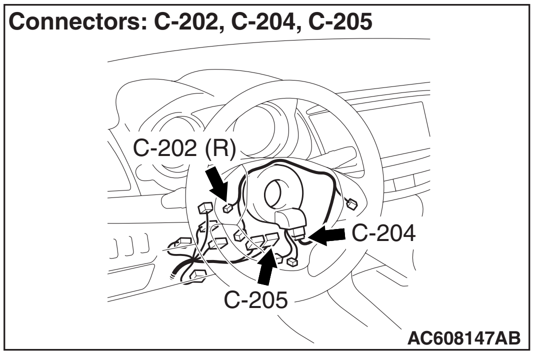
⚠ CAUTION

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Steering Wheel Audio Remote Control Switch Circuit







TECHNICAL DESCRIPTION (COMMENT)

The power supply circuit to the steering remote control switch, the steering remote control switch, the audio visual navigation unit, or the clock spring may be defective.

TROUBLESHOOTING HINTS

- Malfunction of steering remote control switch
- Malfunctions of audio visual navigation unit
- Malfunction of the clock spring
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, check data list.

Check whether the service data below are normal.

(1) Turn the ignition switch to "ON" position.

(2) Operate each switch of the steering remote control. Check whether the normal conditions listed below are displayed.

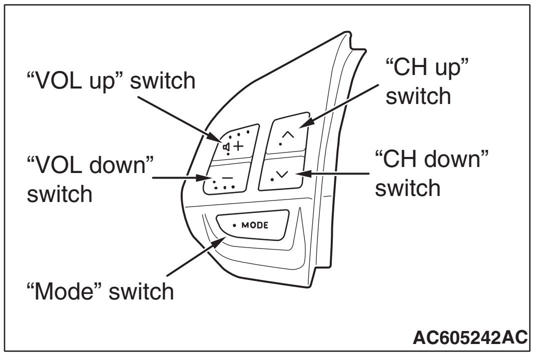
Item No.	Item name	Normal condition
Item 1	RADIO remoto SW (SEEK-)	ON
Item 2	RADIO remoto SW (SEEK+)	ON
Item 3	RADIO remoto SW (MODE)	ON
Item 4	RADIO remoto SW (VOL-)	ON
Item 5	RADIO remoto SW (VOL+)	ON

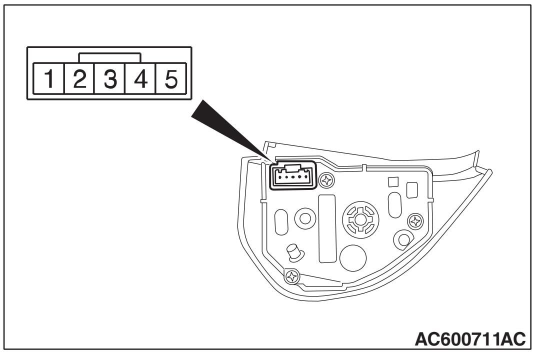
OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Replace the audio visual navigation unit.

NO : Go to Step 2.





STEP 2. Check the remote controlled radio switch.

Remove the remote controlled radio switch. Then check continuity between the switch terminals.

Switch Position	Tester Connection	Measurement Value
No push	2 –3	Approximately 3.1 kΩ
	2 –4	Approximately 71 kΩ
Mode		Approximately 270 Ω
CH up		Approximately 740 Ω
CH down		Approximately 1.3 kΩ
VOL up		Approximately 2.1 kΩ
VOL down		Approximately 3.1 kΩ

Q: Is the remote controlled radio switch in good condition?

YES : Go to Step 3.
NO : Replace the remote controlled radio switch.

STEP 3. Check clock spring connector C-204 and C-205 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are clock spring connector C-204 and C-205 in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 4. Check the clock spring.

Check whether the clock spring is in good condition (Refer to GROUP 52B, Air bag module and clock spring P.52B-375).

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the clock spring.

STEP 5. Check audio visual navigation unit connector C-12 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is audio visual navigation unit connector C-12 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 6. Check the wiring harness between audio visual navigation unit connector C-12 (terminal 53, 69) and clock spring connector C-205 (terminal 2, 3).

NOTE: Also check intermediate connector C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-105 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

- Check the communication lines for open or short circuit.

Q: Is the wiring harness between audio visual navigation unit connector C-12 (terminal 53, 69) and clock spring connector C-205 (terminal 2, 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check steering remote control switch connector C-202 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is steering remote control switch connector C-202 in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 8. Check the wiring harness between steering remote control switch connector C-202 (terminal 2, 4) and clock spring connector C-204 (terminal 5, 4).

- Check the communication lines for open or short circuit.

Q: Is the wiring harness between steering remote control switch connector C-202 (terminal 2, 4) and clock spring connector C-204 (terminal 5, 4) in good condition?

YES : Go to Step 9.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Retest the system

Check whether you can operate the audio visual navigation unit by using the steering remote control.

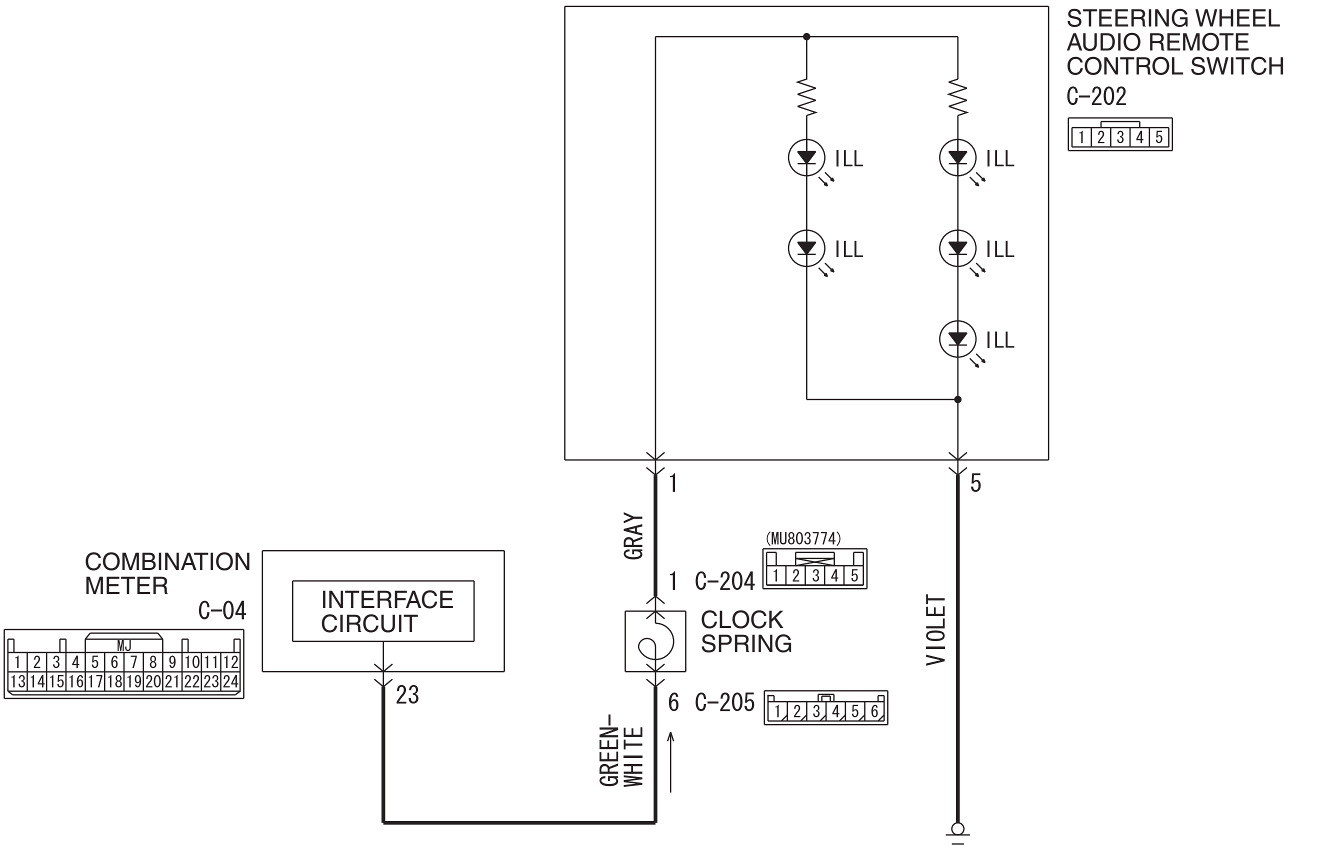
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the audio visual navigation unit.

Inspection Procedure 3: Steering wheel audio remote control switch illumination does not come on.

Steering Wheel Audio Remote Control Switch Illumination Circuit



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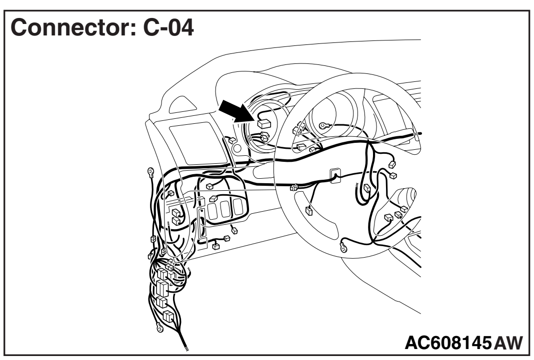
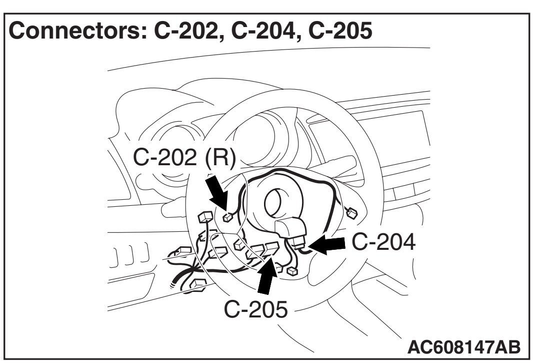




TECHNICAL DESCRIPTION (COMMENT)

The power supply circuit to the steering remote control switch, the steering remote control switch, the combination meter, or the clock spring may be defective.

TROUBLESHOOTING HINTS

- Malfunction of steering remote control switch
- Malfunctions of combination meter
- Malfunction of the clock spring
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the combination metre.

Check whether the combination meter works normally.

Q: Does the combination meter operate normally?

YES : Go to Step 2.

NO : Diagnose the combination meter (Refer to P.54A-23).

STEP 2. Check steering remote control switch connector C-202 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is steering remote control switch connector C-202 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 3. Check the wiring harness between steering remote control switch connector C-202 (terminal 5) and ground.

- Check the ground wire.

Q: Is the wiring harness between steering remote control switch connector C-202 (terminal 5) and ground in good condition?

YES : Go to Step 4.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check clock spring connectors C-204 and C-205 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are clock spring connectors C-204 and C-205 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 5. Check the clock spring.

Check whether the clock spring is in good condition (Refer to GROUP 52B, Air bag module and clock spring P.52B-375).

Q: Is the check result normal?

YES : Go to Step 6.
NO : Replace the clock spring.

STEP 6. Check the wiring harness between steering remote control switch connector C-202 (terminal 1) and clock spring connector C-204 (terminal 1).

- Check the power supply lines.

Q: Is the wiring harness between steering remote control switch connector C-202 (terminal 1) and clock spring connector C-204 (terminal 1) in good condition?

YES : Go to Step 7.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 8. Check the wiring harness between combination meter connector C-04 (terminal 23) and clock spring connector C-205 (terminal 6).

- Check the power supply lines.

Q: Is the wiring harness between combination meter connector C-04 (terminal 23) and clock spring connector C-205 (terminal 6) in good condition?

YES : Go to Step 9.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Retest the system

Check whether the illumination of the steering remote control switch comes on normally.

Q: Does the illumination of the steering remote control switch comes on normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the steering remote control switch.

REMOVAL AND INSTALLATION

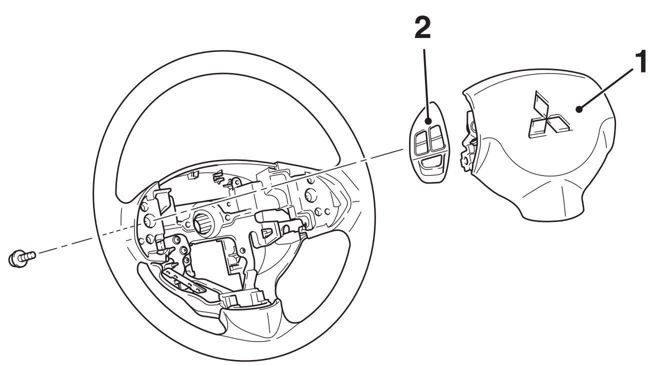
M1544015600023

⚠ WARNING

Before removing the air bag module, refer to GROUP 52B, Service Precautions P.52B-24 and Driver's Front Passenger's Air Bag Module and Clock Spring P.52B-367.

⚠ WARNING

When removing and installing the steering wheel, do not let it bump against the air bag module.



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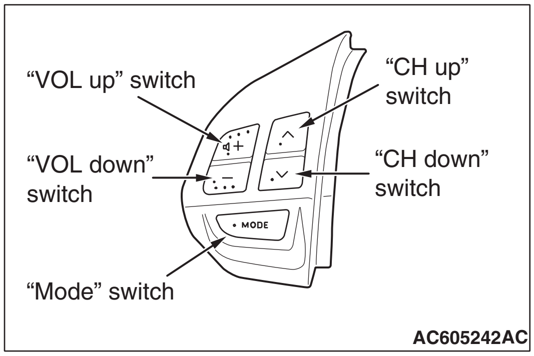
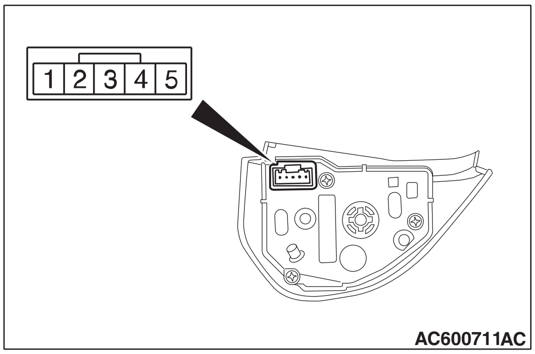
Removal Steps

1. Air bag module (Refer to GROUP 52B, Driver's Front Passenger's Air Bag Module and Clock Spring P.52B-367).
2. Steering wheel audio remote control switch





STREERING WHEEL AUDIO REMOTE CONTROL SWITCH INSPECTION

M1544015700020

Use an ohmmeter to measure the resistance value between the terminal.

Switch Position	Tester Connection	Measurement Value
No push	2 –3	Approximately 3.1 kΩ
	2 –4	Approximately 71 kΩ
"Mode" switch		Approximately 270 Ω
"CH up" switch		Approximately 740 Ω
"CH down" switch		Approximately 1.3 kΩ
"VOL up" switch		Approximately 2.1 kΩ
"VOL down" switch		Approximately 3.1 kΩ

HANDS-FREE CELLULAR PHONE SYSTEM

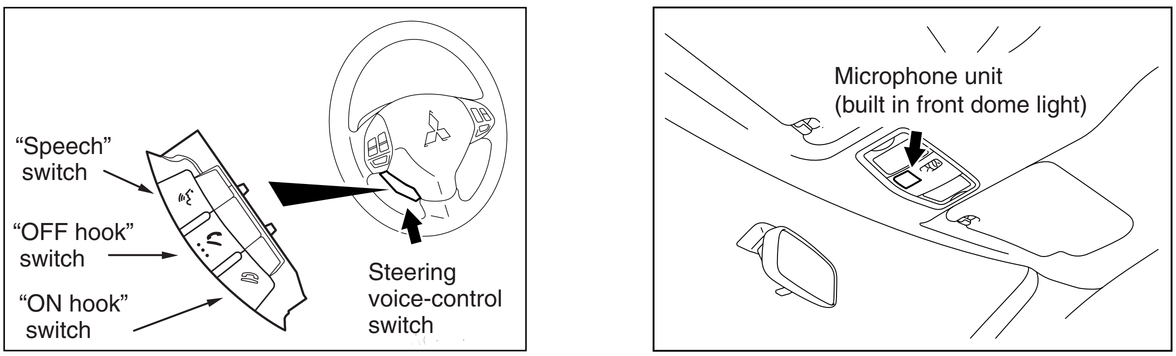
GENERAL INFORMATION

M1544401200019

With the hands-free cellular phone system <GTS: Standard, DE, ES: Option> by registering a cellular phone for Bluetooth™* with voice recognition to the hands free module, the telephone function becomes available without operating the cellular phone directly. The hands-free cellular phone system can be used without connecting the cellular phone to the vehicle via wiring cable.

*NOTE: *: Bluetooth™ is the short-distance digital wireless communication technology using 2.45 GHz frequency band. The communication effective area is within 10 m, and the feature is that the communication can be achieved even when an obstacle is present between the communicating devices.*

Construction diagram



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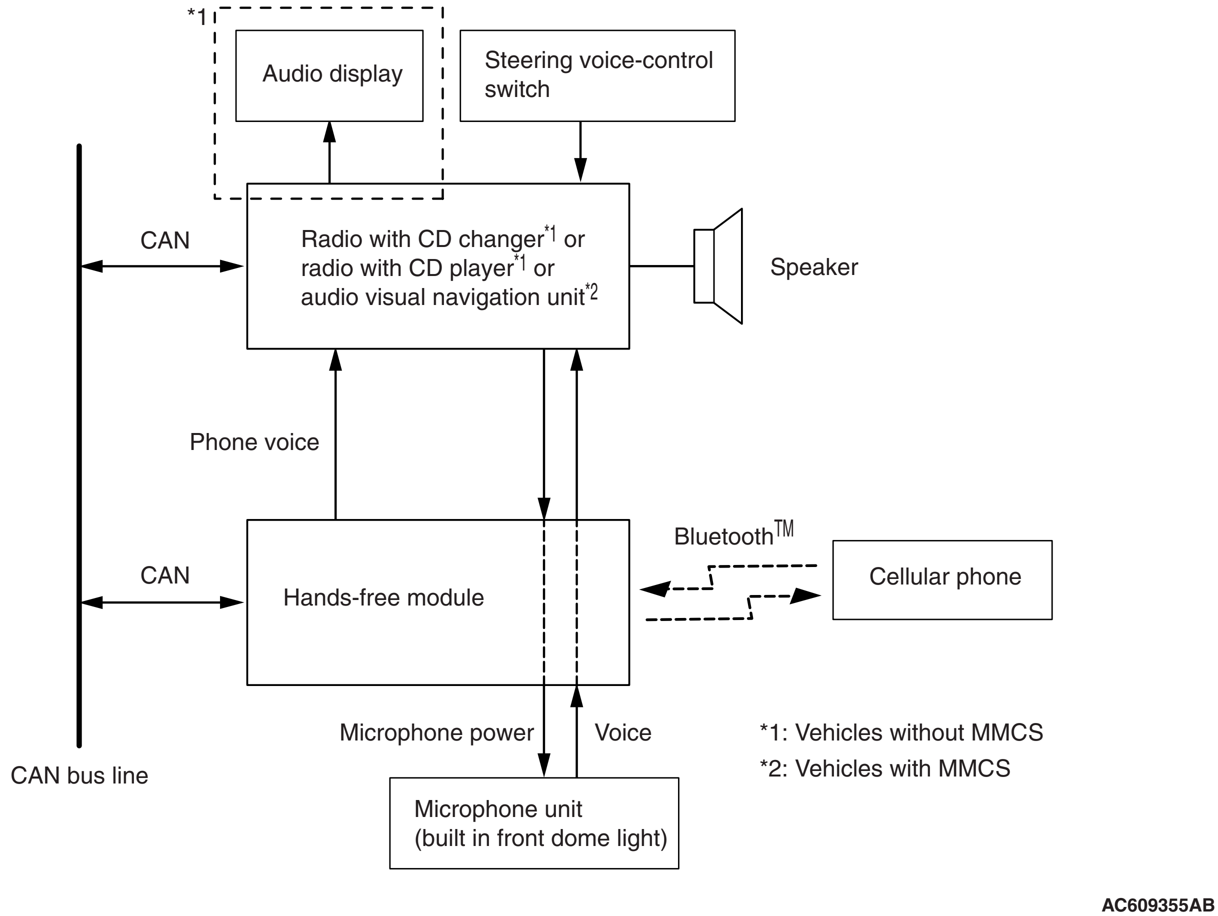
When the registered cellular phone is inside the vehicle, the hands-free cellular phone system operates as follows.

NOTE: The owner's manual contains details on pairing a cellular phone with the Bluetooth system, speaker enrollment, and other functions.

- When the cellular phone receives a call, the occupant can start conversation by pressing "OFF hook" in the steering voice-control switches on the steering wheel. When the conversation ends, the occupant can finish the call by pressing "ON hook" in the steering voice-control switches.
- To make a call, press "Speech" in the steering voice-control switches on the steering wheel, call up the registered receiver's information in the voice input mode, press "OFF hook". Then, the transmission starts to call the receiver. Also, when the conversation ends, the occupant can finish the call by pressing "ON hook" in the steering voice-control switches.
- The communication directly via a cellular phone can be switched to the communication via a handsfree device. Also, the communication via a handsfree device can be switched to the communication directly via a cellular phone.
- The voice input mode corresponds to the following languages: English, American Spanish, Canadian French.
- The voice of occupant is picked up by the microphone unit incorporated in the front dome light, and then transmitted to the cellular phone via hands-free module. Also, the receiver's voice is transmitted from the cellular phone to radio with CD player, radio with CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> via hands-free module, and then output from the vehicle-mounted speaker.
- Using the steering audio remote control switch, the volume can be adjusted.
- The reception state of the cellular phone is indicated on the display section of radio with CD player, radio with CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>.

System block diagram



DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1540203800011

Refer to GROUP 00 –Contents of troubleshooting P.00-6.

TROUBLE SYMPTOM CHART

M1546001800202

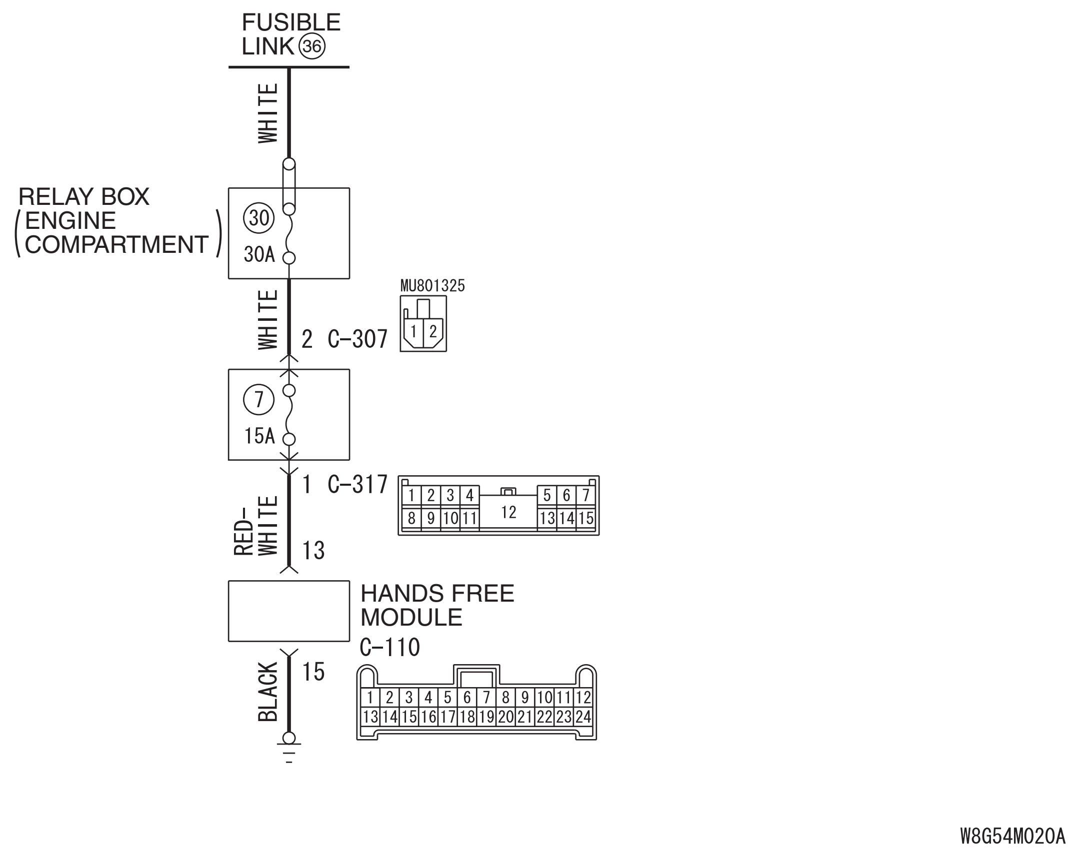
Inspection Procedure No.	Trouble symptom	Reference page
1	Hands-free cellular phone system does not work normally.	P.54A-410
2	During the conversation with the hands-free system, the speaker's voice cannot be heard by the other party.	P.54A-418
3	During the conversation with the hands-free system, the voice of other party cannot be heard.	P.54A-421
4	Even when the steering wheel voice-control switch is operated, the conversation is not possible.	P.54A-422
5	The cellular phone is not recognized or the connection cannot be established.	P.54A-427
6	Steering wheel voice-control switch illumination does not come on.	P.54A-429
7	Check the hands-free-ECU power supply circuit.	P.54A-433

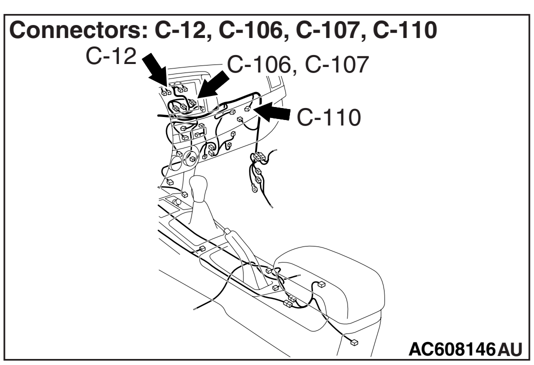
SYMPTOM PROCEDURES

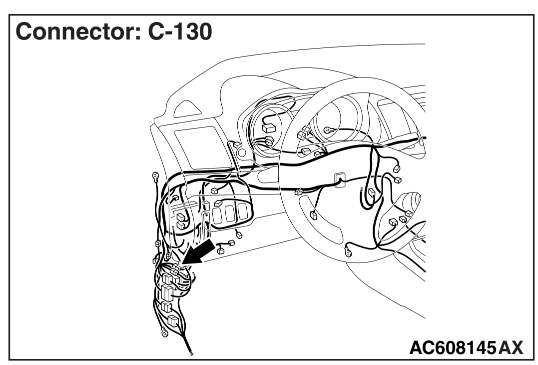
Inspection Procedure 1: Hands-free cellular phone system does not work normally.

⚠ CAUTION
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

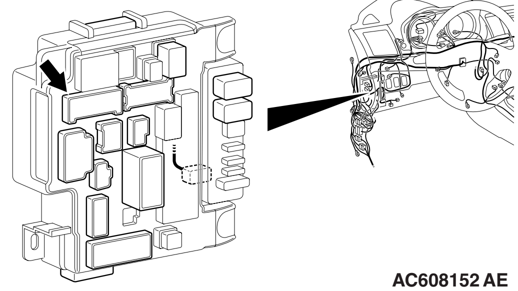
Hands Free Module Power Supply Circuit





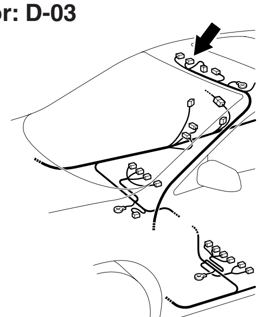


Connector: C-317
Junction block



AC608152 AE

Connector: D-03



AC608165 AH

FUNCTION

During the conversation with the hands-free system, the signal of speaker's voice is transmitted from the microphone unit to the hands-free module. Then the signal is transmitted from the hands-free module to the cellular phone. The voice of other party is transmitted from the cellular phone to the hands-free module. Then, the voice is transmitted from the hands-free module to the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>, and output from the speaker.

TROUBLE JUDGEMENT CONDITIONS

If the hands-free system cannot be used normally, the hands-free module, microphone unit, steering wheel voice-control switch, or radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the hands-free module
- Malfunction of the microphone unit
- Malfunction of the steering wheel voice-control switch
- Malfunction of the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check the cellular phone.

Check that the cellular phone can be used normally as a unit.

Q: Is it possible to use the cellular phone normally?

YES : Go to Step 2.
NO : Repair or replace the cellular phone.

STEP 2. Temporarily replace the cellular phone, and check the trouble symptom.

Temporarily register a separate Bluetooth™-supported cellular phone, and check that the hands-free cellular phone system operates normally.

Q: Is the normal conversation possible with the hands-free system?

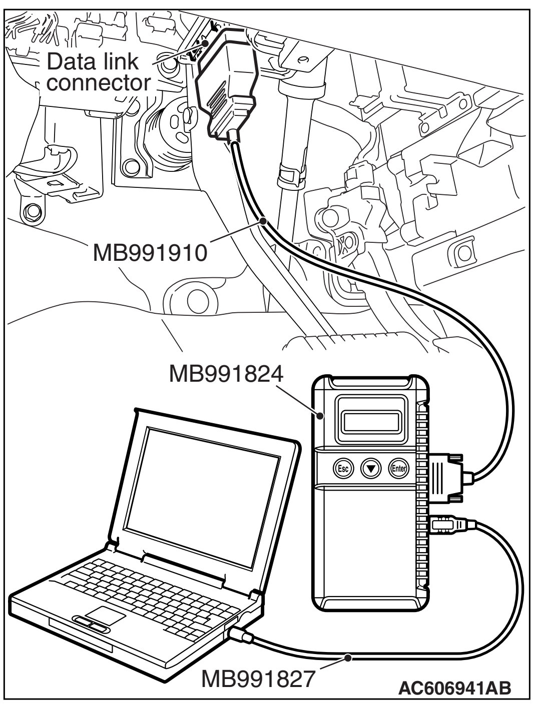
YES : Ask the customer to have the cellular phone repaired or replaced. Then, delete the temporarily registered cellular phone. Once the customer prepares the normally-working cellular phone, register the cellular phone to the hands-free module.

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 4.

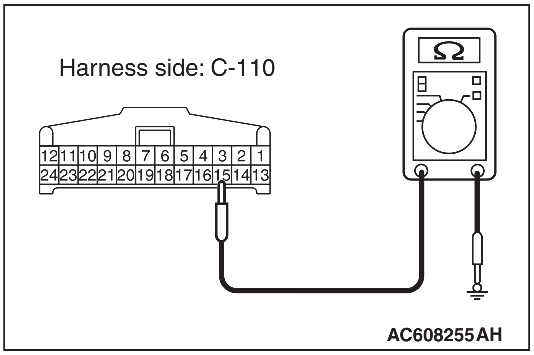
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 4. Check hands-free module connector C-110 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are hands-free module connector C-110 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 5. Check the ground circuit to the hands-free module. Measure the resistance at hands-free module connector C-110.

(1) Disconnect hands-free module connector C-110, and measure at the wiring harness side.
(2) Measure resistance between terminal 15 and ground.

OK: The resistance should be 2 ohm or less.

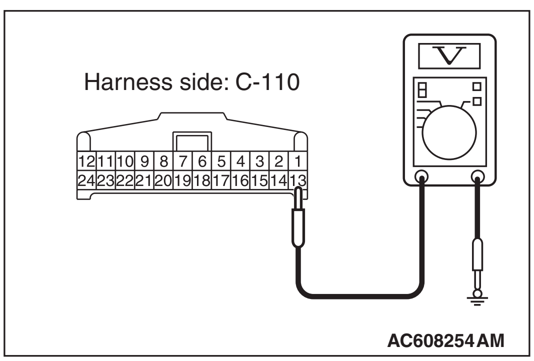
Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the wiring harness between hands-free module connector C-110 (terminal 15) and ground.

Q: Is the wiring harness between hands-free module connector C-110 (terminal 15) and ground in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 7. Check the power supply circuit to the hands-free module. Measure the voltage at hands-free module connector C-110.

(1) Disconnect hands-free module connector C-110, and measure the voltage available at the hands-free module side of the connector.
(2) Measure the voltage between terminal 13 and ground.

OK: The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 9.
NO : Go to Step 8.

STEP 8. Check the wiring harness between hands-free module connector C-110 (terminal 13) and ETACS-ECU connector C-317 (terminal 1).

Q: Is the wiring harness between hands-free module connector C-110 (terminal 13) and ETACS-ECU connector C-317 (terminal 1) in good condition?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Check microphone unit connector D-03 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is microphone unit connector D-03 in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 10. Check the wiring harness between hands-free module connector C-110 and microphone unit connector D-03.

(1) Disconnect hands-free module connector C-110 and microphone unit connector D-03, and check the wiring harness.

NOTE: Also check intermediate connector C-130 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-130 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

(2) Check the wiring harness between hands-free module connector C-110 (terminal 1) and microphone unit connector D-03 (terminal 22)

(3) Check the wiring harness between hands-free module connector C-110 (terminal 1) and microphone unit connector D-03 (terminal 23)

(4) Check the wiring harness between hands-free module connector C-110 (terminal 2) and microphone unit connector D-03 (terminal 24)

Q: Is the wiring harness between hands-free module connector C-110 and microphone unit connector D-03 in good condition?

YES : Go to Step 11.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 11. Check radio and CD player or CD changer connector C-106 <vehicles without MMCS> or audio visual navigation unit connector C-12 <vehicles with MMCS> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is radio and CD player or CD changer connector C-106 <vehicles without MMCS> or audio visual navigation unit connector C-12 <vehicles with MMCS> in good condition?

YES : Go to Step 12.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 12. Check the wiring harness between hands-free module connector C-110 and radio and CD player or CD changer connector C-106 <vehicles without MMCS> or audio visual navigation unit connector C-12 <vehicles with MMCS>.

(1) Disconnect hands-free module connector C-110 and radio and CD player or CD changer connector C-106 <vehicles without MMCS> or audio visual navigation unit connector C-12 <vehicles with MMCS>, and check the wiring harness.

NOTE: Also check intermediate connector C-107 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-107 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2. <vehicles with MMCS>

(2) Check the wiring harness between hands-free module connector C-110 (terminal 9) and radio and CD player or CD changer connector C-106 (terminal 3) <vehicles without MMCS>

(3) Check the wiring harness between hands-free module connector C-110 (terminal 19) and radio and CD player or CD changer connector C-106 (terminal 2) <vehicles without MMCS>

(4) Check the wiring harness between hands-free module connector C-110 (terminal 21) and radio and CD player or CD changer connector C-106 (terminal 2) <vehicles without MMCS>

(5) Check the wiring harness between hands-free module connector C-110 (terminal 9) and audio visual navigation unit connector C-12 (terminal 45) <vehicles without MMCS>

(6) Check the wiring harness between hands-free module connector C-110 (terminal 19) and audio visual navigation unit connector C-12 (terminal 46) <vehicles without MMCS>

(7) Check the wiring harness between hands-free module connector C-110 (terminal 21) and audio visual navigation unit connector C-12 (terminal 46) <vehicles without MMCS>

Q: Is the wiring harness between hands-free module connector C-110 and radio and CD player or CD changer connector C-106 <vehicles without MMCS> or audio visual navigation unit connector C-12 <vehicles with MMCS> in good condition?

YES : Go to Step 13.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 13. Temporarily replace the microphone unit, and check the trouble symptom.

Check that the normal conversation is possible with the hands-free system.

Q: Is the normal conversation possible with the hands-free system?

YES : Replace the microphone unit.
NO : Go to Step 14.

STEP 14. Temporarily replace the hands-free module, and check the trouble symptom.

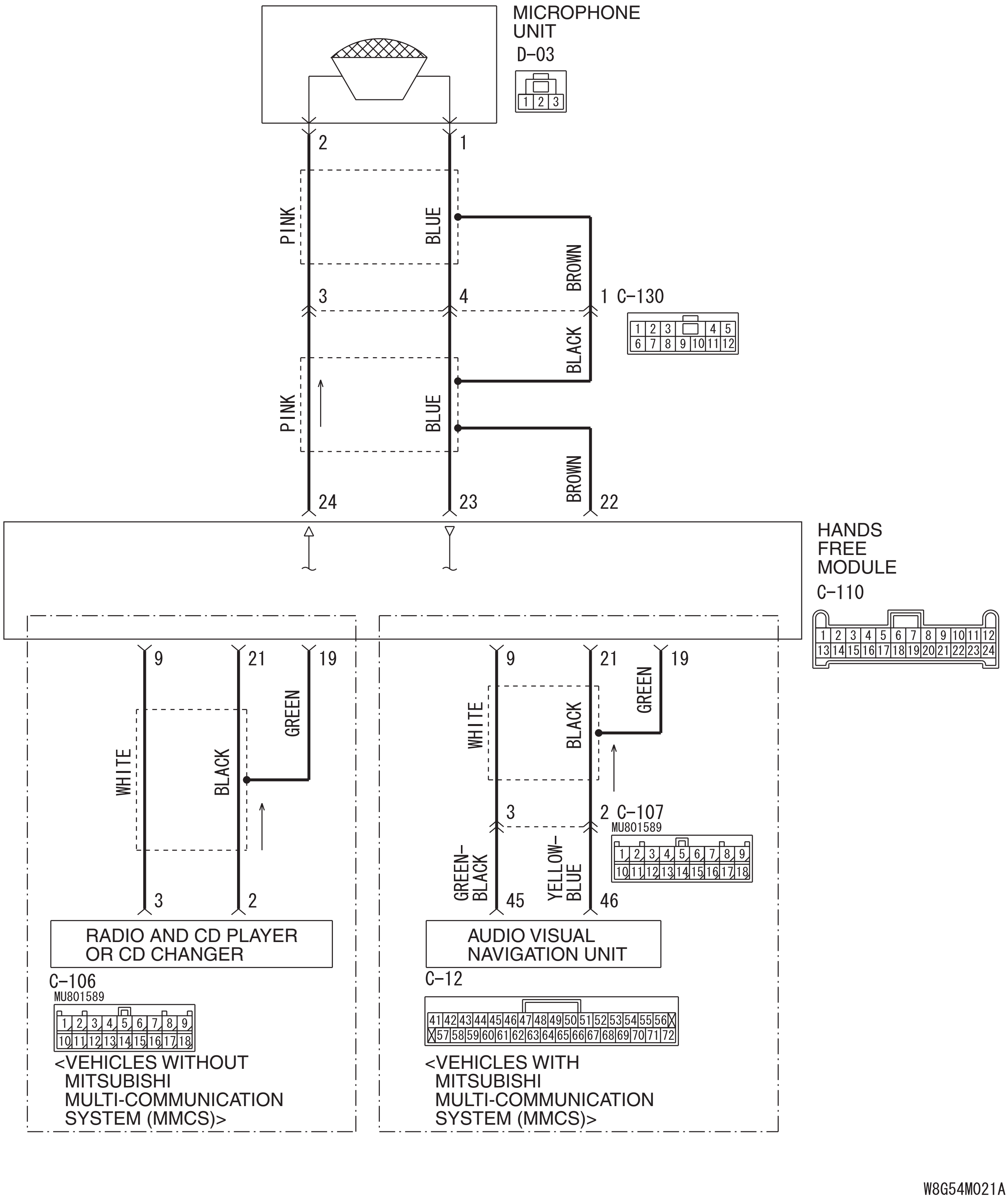
Check that the normal conversation is possible with the hands-free system.

Q: Is the normal conversation possible with the hands-free system?

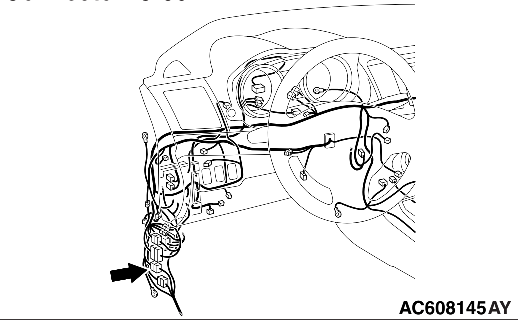
YES : Replace the hands-free module.
NO : Replace the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>.

Inspection Procedure 2: During the conversation with the hands-free system, the speaker's voice cannot be heard by the other party.

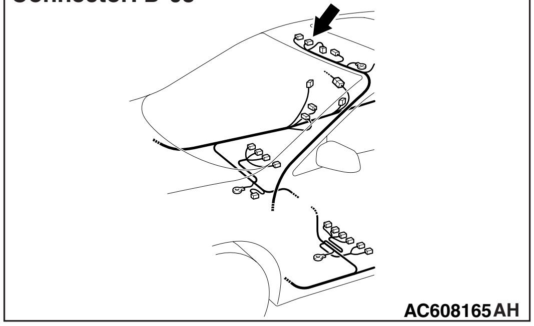
Hands Free Cellular Phone System Circuit



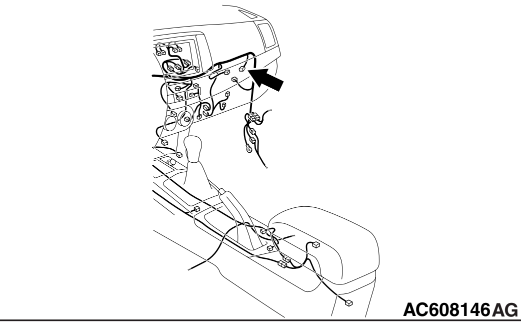
Connector: C-36



Connector: D-03



Connector: C-110



FUNCTION

During the conversation with the hands-free system, the signal of speaker's voice is transmitted from the microphone unit to the hands-free module. Then the signal is transmitted from the hands-free module to the cellular phone.

TROUBLE JUDGEMENT CONDITIONS

During the conversation with the hands-free system, if the speaker's voice cannot be heard by the other party, the hands-free module or microphone unit may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the hands-free module
- Malfunction of the microphone unit
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check the cellular phone.

Check that the cellular phone can be used normally as a unit.

Q: Is it possible to use the cellular phone normally?

YES : Go to Step 2.
NO : Repair or replace the cellular phone.

STEP 2. Check hands-free module connector C-110 and microphone unit connector D-03 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are hands-free module connector C-110 and microphone unit connector D-03 in good condition?

YES : Go to Step 3.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 3. Check the wiring harness between hands-free module connector C-110 and microphone unit connector D-03.

(1) Disconnect hands-free module connector C-110 and microphone unit connector D-03, and check the wiring harness.

NOTE: Also check intermediate connector C-36 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-36 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2.*

(2) Check the wiring harness between hands-free module connector C-110 (terminal 1) and microphone unit connector D-03 (terminal 22)

(3) Check the wiring harness between hands-free module connector C-110 (terminal 1) and microphone unit connector D-03 (terminal 23)

(4) Check the wiring harness between hands-free module connector C-110 (terminal 2) and microphone unit connector D-03 (terminal 24)

Q: Is the wiring harness between hands-free module connector C-110 and microphone unit connector D-03 in good condition?

YES : Go to Step 4.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Temporarily replace the microphone unit, and check the trouble symptom.

Check that the normal conversation is possible with the hands-free system.

Q: Is the normal conversation possible with the hands-free system?

YES : Replace the microphone unit.

NO : Replace the hands-free module.

Inspection Procedure 3: During the conversation with the hands-free system, the voice of other party cannot be heard.

FUNCTION

During the conversation with the hands-free system, the voice signal of other party is transmitted from the cellular phone to the hands-free module. Then, the signal is transmitted from the hands-free module to the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>, and then output from the speaker.

TROUBLE JUDGEMENT CONDITIONS

During the conversation with the hands-free system, if the voice of other party cannot be heard, the hands-free module, or the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the hands-free module
- Malfunction of the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>

DIAGNOSIS

STEP 1. Check the cellular phone.

Check that the cellular phone can be used normally as a unit.

Q: Is it possible to use the cellular phone normally?

YES : Go to Step 2.
NO : Repair or replace the cellular phone.

STEP 2. Check the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>.

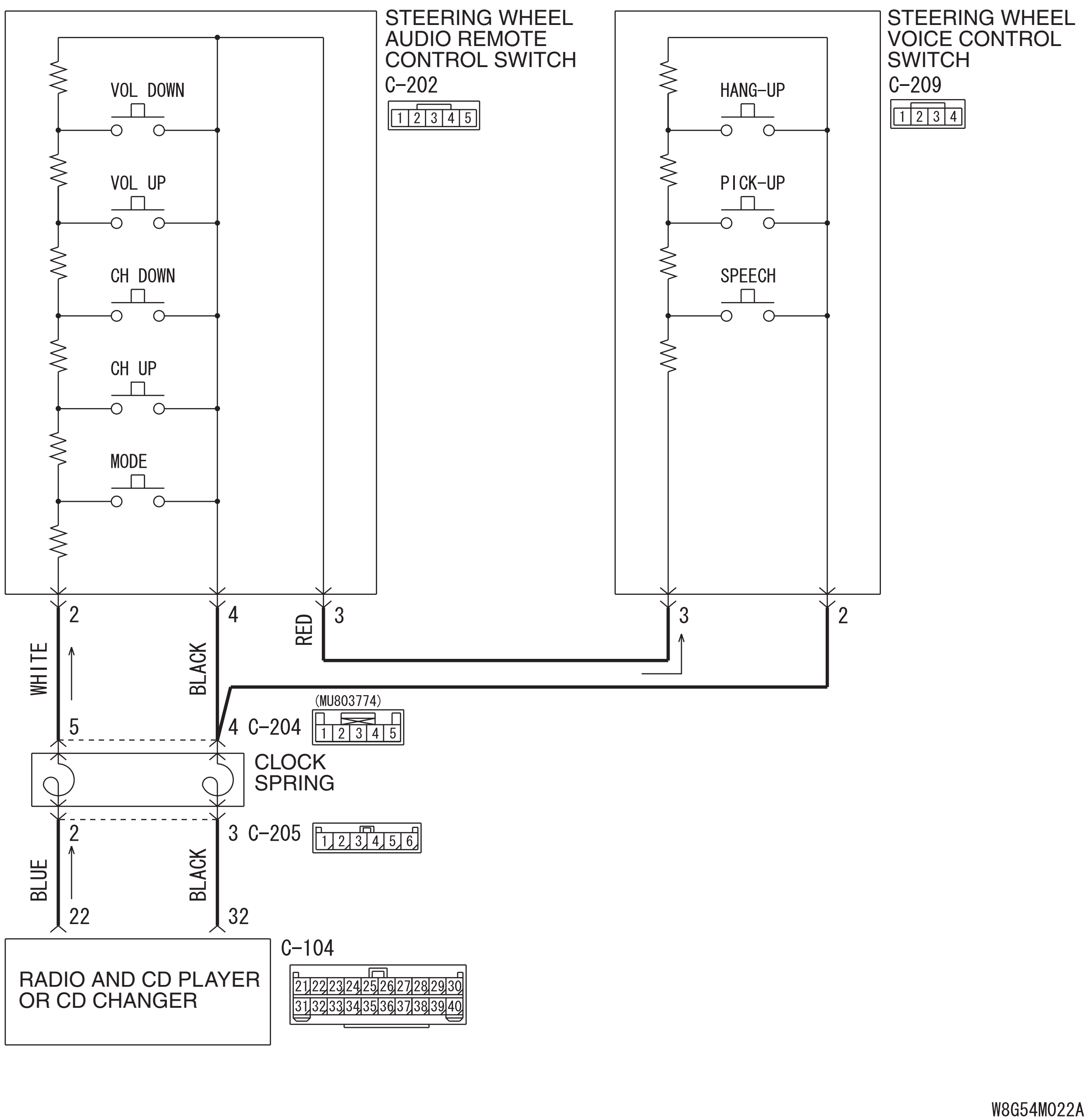
Check that the sound of radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> is output normally from the speaker.

Q: Is the sound of radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> output normally from the speaker?

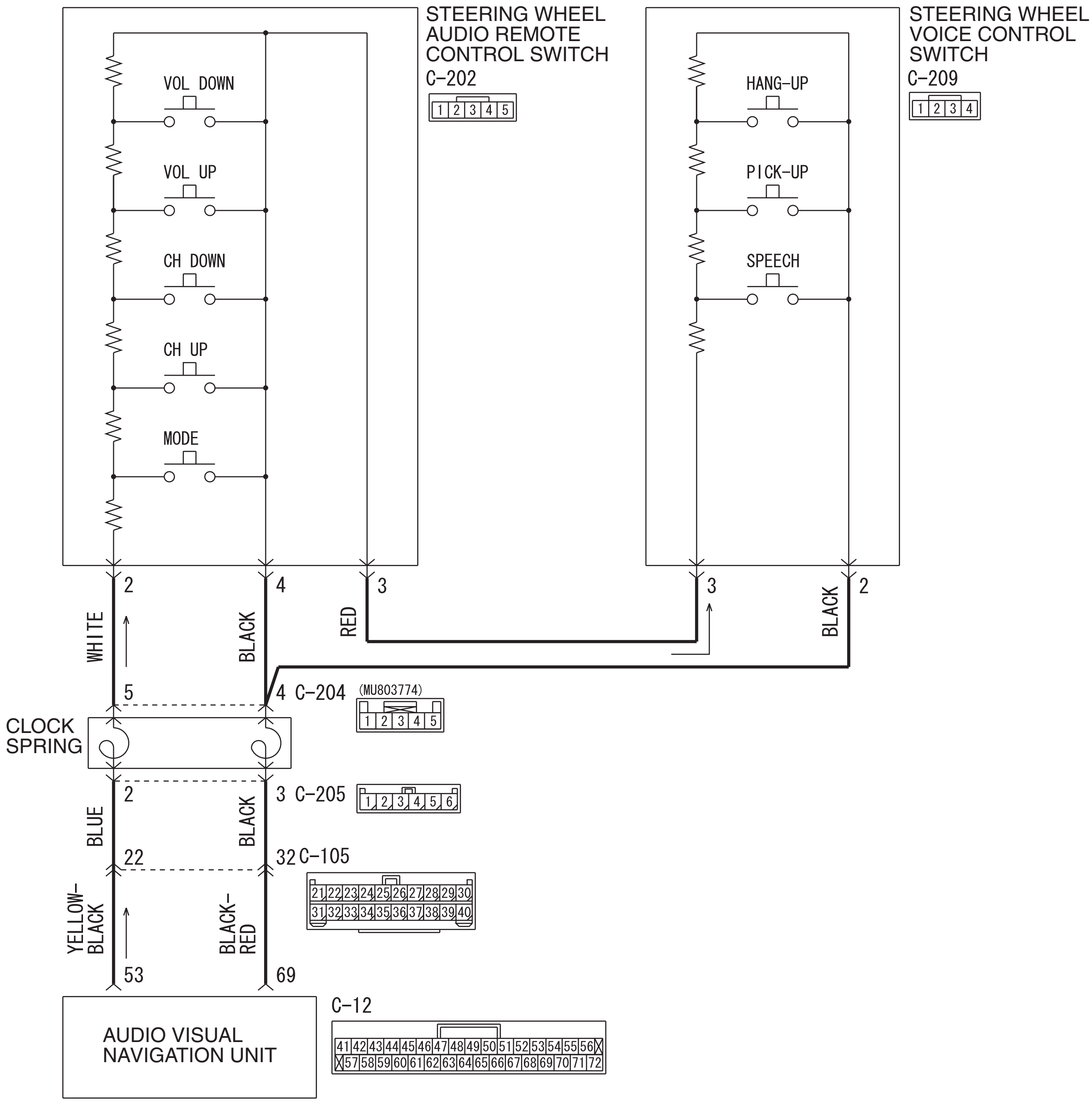
YES : Replace the hands-free module.
NO : Diagnose the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> (Refer to P.54A-393 <vehicles without MMCS> or P.54A-393 <vehicles with MMCS>).

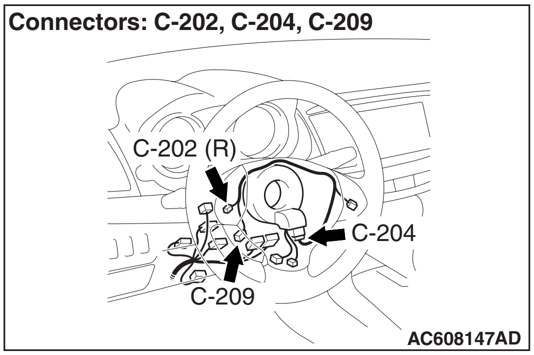
Inspection Procedure 4: Even when the steering wheel voice-control switch is operated, the conversation is not possible.

Steering Wheel Voice Control Switch Circuit



Steering Wheel Voice Control Switch Circuit





FUNCTION

When the steering wheel voice-control switch is operated, the switch signal is transmitted to the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>. Then, via the CAN communication, the signal is transmitted from the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> to the hands-free module.

TROUBLE JUDGEMENT CONDITIONS

If the conversation is not possible even when the steering wheel voice-control switch is operated, the steering wheel voice-control switch or radio and CD player or CD changer <vehicles without MMCS> or the audio visual navigation unit <vehicles with MMCS> may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the steering wheel voice-control switch
- Malfunction of the hands-free module
- Malfunction of the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe

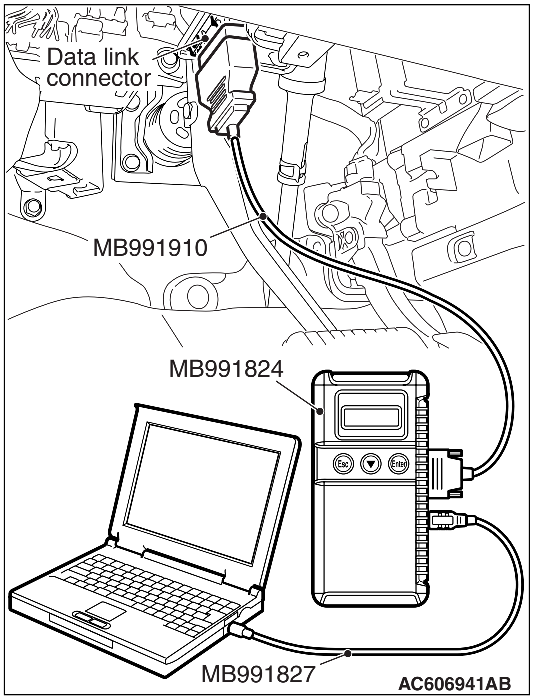
STEP 1. Check the steering wheel audio remote control switch.

Check that the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> can be operated normally using the steering wheel audio remote control switch.

Q: Is it possible to normally operate the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS> using the steering wheel audio remote control switch?

YES : Go to Step 2.

NO : Diagnose the steering wheel audio remote control switch (Refer to P.54A-393 <vehicles without MMCS> or P.54A-393 <vehicles with MMCS>.)



STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

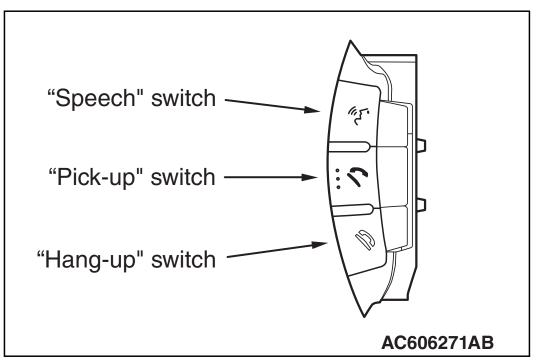
⚠ CAUTION

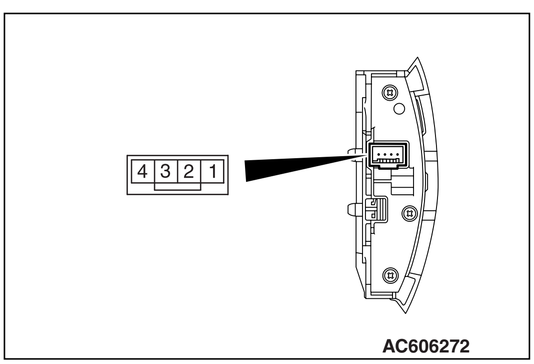
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).





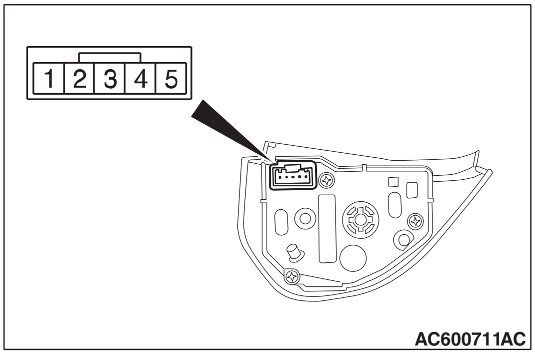
STEP 3. Check the steering wheel voice-control switch.

Remove the steering wheel voice-control switch. Then check continuity between the switch terminals.

Switch Position	Tester Connection	Measurement Value
No push	2 –3	Approximately 74 kΩ
"Speech" switch		Approximately 1.5 kΩ
"Pick-up" switch		Approximately 3.3 kΩ
"Hang-up" switch		Approximately 5.0 kΩ

Q: Is the steering wheel voice-control switch in good condition?

YES : Go to Step 4.
NO : Replace the steering wheel voice-control switch.



STEP 4. Check the steering wheel audio remote control switch.

Remove the steering wheel audio remote control switch. Then check continuity between the switch terminals.

Switch Position	Tester Connection	Measurement Value
No push	2 –3	Approximately 3.1 kΩ

Q: Is the steering wheel audio remote control switch in good condition?

YES : Go to Step 5.

NO : Replace the steering wheel audio remote control switch.

STEP 5. Check steering wheel voice-control switch connector C-209 and steering wheel audio remote control switch connector C-202 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are steering wheel voice-control switch connector C-209 and steering wheel audio remote control switch connector C-202 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The steering remote control switch should work normally.

STEP 6. Check the wiring harness between steering wheel voice-control switch connector C-209 (terminal 3) and steering wheel audio remote control switch connector C-202 (terminal 3).

- Check the communication lines for open circuit and short circuit.

Q: Is the wiring harness between steering wheel voice-control switch connector C-209 (terminal 3) and steering wheel audio remote control switch connector C-202 (terminal 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check the wiring harness between steering wheel voice-control switch connector C-209 (terminal 2) and clock spring connector C-204 (terminal 4).

- Check the communication lines for open circuit and short circuit.

Q: Is the wiring harness between steering wheel voice-control switch connector C-209 (terminal 2) and clock spring connector C-204 (terminal 4) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 8. Retest the system

Check that the hands-free cellular phone system works normally when the steering wheel voice-control switch is operated.

Q: Check that the hands-free cellular phone system works normally when the steering wheel voice-control switch is operated.

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the radio and CD player or CD changer <vehicles without MMCS> or audio visual navigation unit <vehicles with MMCS>.

Inspection Procedure 5: The cellular phone is not recognized or the connection cannot be established.

FUNCTION

With the hands-free cellular phone system, the cellular phone and hands-free module communicate with each other by using Bluetooth™.

TROUBLE JUDGEMENT CONDITIONS

When the cellular phone cannot be recognized or the communication cannot be established, the cellular phone or hands-free module may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the cellular phone
- Malfunction of the hands-free module

DIAGNOSIS

STEP 1. Check the cellular phone.

Check that the cellular phone can be used normally as a unit.

Q: Is it possible to use the cellular phone normally?

YES : Go to Step 2.
NO : Repair or replace the cellular phone.

STEP 2. Check the position of cellular phone.

Check that the function becomes normal when the cellular phone is moved closer to the hands-free module.

Q: Does the function become normal when the cellular phone is moved closer to the hands-free module?

YES : No action is necessary and testing is complete.

NO : Go to Step 3.

STEP 3. Check the registration method of cellular phone.

By referring to the operation manuals, check that the cellular phone was registered to the hands-free module by following the normal procedure.

Q: Was the cellular phone registered by following the normal procedure?

YES : Check the trouble symptom, and finish when it is normal. When the abnormality is present, go to Step 4.

NO : Register a cellular phone according to a regular procedure.

STEP 4. Temporarily replace the cellular phone, and check the trouble symptom.

Temporarily register a separate Bluetooth™-supported cellular phone, and check that the hands-free cellular phone system operates normally.

Q: Is the normal conversation possible with the hands-free system?

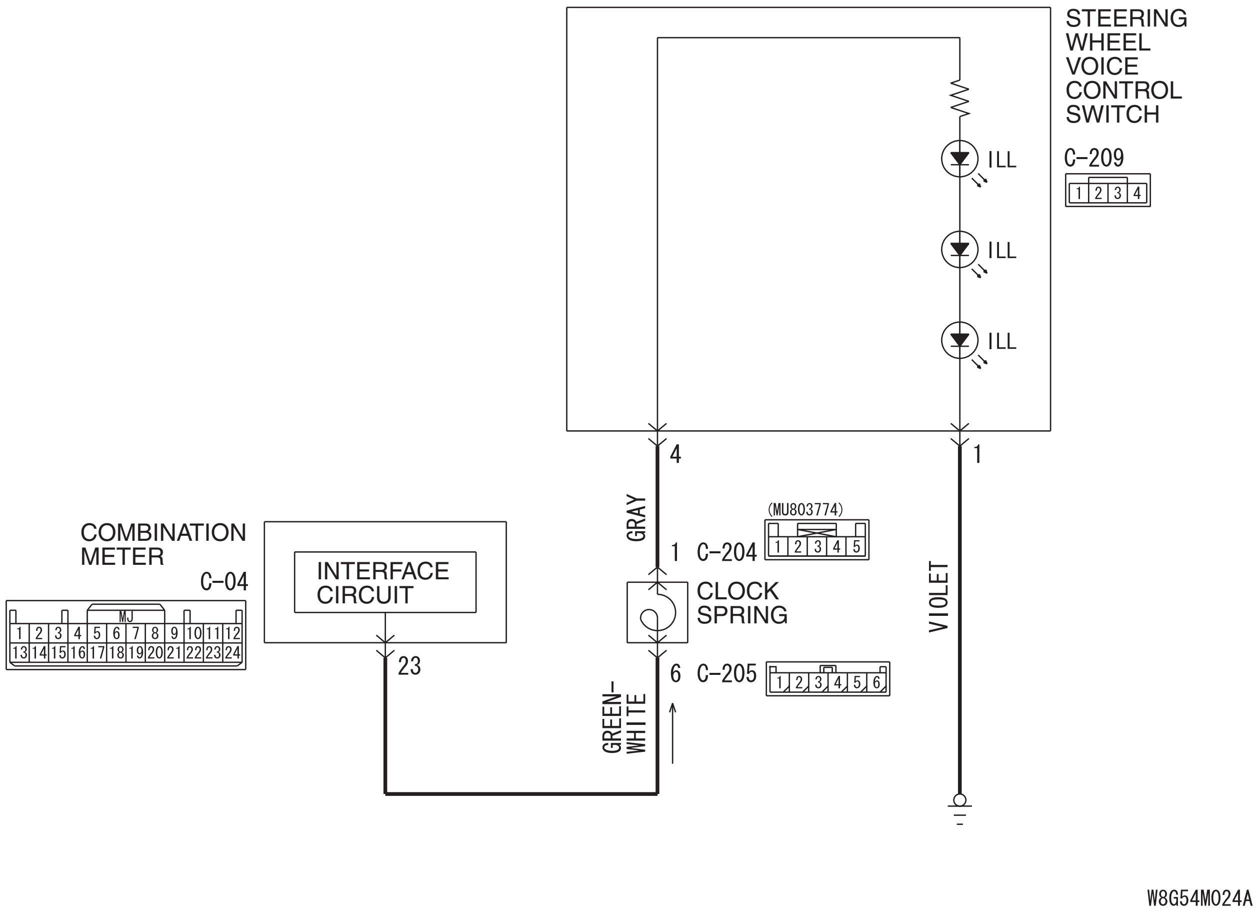
YES : Ask the customer to have the cellular phone repaired or replaced. Then, delete the temporarily registered cellular phone. Once the customer prepares the normally-working cellular phone, register the cellular phone to the hands-free module.

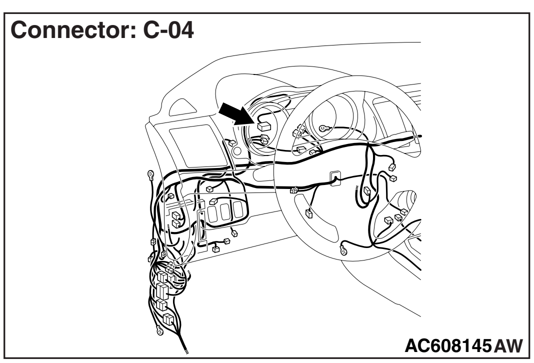
NO : Replace the hands-free module.

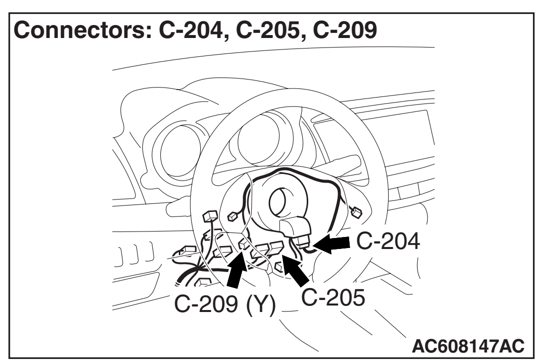
Inspection Procedure 6: Steering wheel voice-control switch illumination does not come on.

⚠ CAUTION
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Steering Wheel Voice Control Switch Illumination Circuit







TECHNICAL DESCRIPTION (COMMENT)

The power supply circuit to the steering wheel voice-control switch, the steering wheel voice-control switch, the combination meter, or the clock spring may be defective.

TROUBLESHOOTING HINTS

- Malfunction of steering wheel voice-control switch
- Malfunctions of combination meter
- Malfunction of the clock spring
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the combination meter.

Check whether the combination meter works normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Diagnose the combination meter (Refer to P.54A-23).

STEP 2. Check steering wheel voice-control switch connector C-209 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is steering wheel voice-control switch connector C-209 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 3. Check the wiring harness between steering wheel voice-control switch connector C-209 (terminal 1) and the ground.

- Check the ground wire.

Q: Is the wiring harness between steering wheel voice-control switch connector C-209 (terminal 1) and the ground in good condition?

YES : Go to Step 4.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check clock spring connectors C-204 and C-205 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are clock spring connectors C-204 and C-205 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 5. Check the clock spring.

Check whether the clock spring is in good condition (Refer to GROUP 52B –Air bag module and clock spring P.52B-375).

Q: Is the check result normal?

YES : Go to Step 6.

NO : Replace the clock spring.

STEP 6. Check the wiring harness between steering wheel voice-control switch connector C-209 (terminal 4) and clock spring connector C-204 (terminal 1).

- Check the power supply lines.

Q: Is the wiring harness between steering wheel voice-control switch connector C-209 (terminal 4) and clock spring connector C-204 (terminal 1) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Check combination meter connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-04 in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). The steering remote control switch should work normally.

STEP 8. Check the wiring harness between combination meter connector C-04 (terminal 23) and clock spring connector C-205 (terminal 6).

- Check the power supply lines.

Q: Is the wiring harness between combination meter connector C-04 (terminal 23) and clock spring connector C-205 (terminal 6) in good condition?

YES : Go to Step 9.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 9. Retest the system

Check whether the illumination of the steering remote control switch comes on normally.

Q: Doe the illumination of the steering remote control switch comes on normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

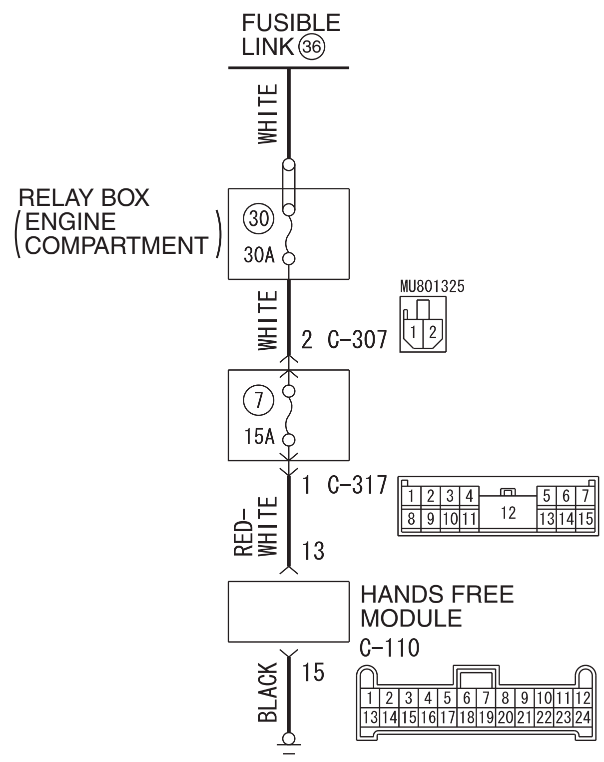
NO : Replace the steering wheel voice-control switch.

Inspection Procedure 7: Check the hands-free-ECU power supply circuit.

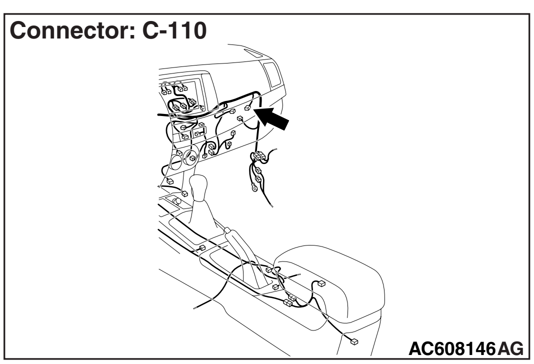
⚠ CAUTION

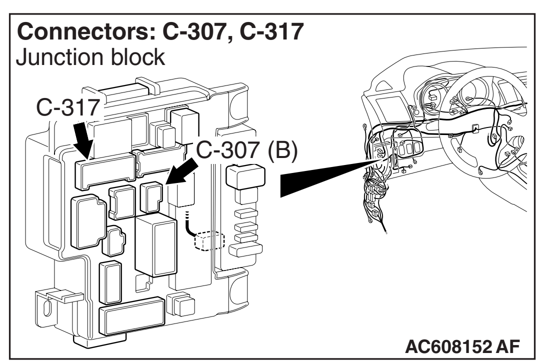
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Hands Free Module Power Supply Circuit



W8G54M020A





CIRCUIT OPERATION

- The power supply to the hands-free module is provided by the fusible link (36).
- If the power supply system from the battery is defective, the system operates by the power supply from the ignition switch (IG1).

TECHNICAL DESCRIPTION (COMMENT)

If the hands-free cellular phone system don't work, power supply and ground system to the hands-free module, or the hands-free module itself may be defective.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The hands-free module may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check hands-free module connector C-110 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is hands-free module connector C-110 in good condition?

YES : Go to Step 2.

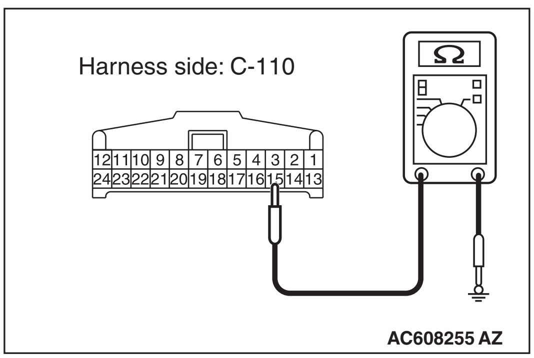
NO : Repair or replace the damaged component (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 2. Check the ground circuit to the hands-free module. Measure the resistance at hands-free module connector C-110.

(1) Disconnect hands-free module connector C-110, and measure at the wiring harness side.

(2) Measure the resistance value between terminal 15 and ground.

OK: The resistance should be 2 ohms or less.



Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.

STEP 3. Check the wiring harness between hands-free module connector C-110 (terminal 15) and ground.

Q: Is the wiring harness between hands-free module connector C-110 (terminal 15) and ground in good condition?

YES : Replace the hands-free module. The system should communicate with the hands-free module normally.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check the wiring harness between hands-free module connector C-110 (terminal 13) and fusible link (36).

NOTE: Also check ETACS-ECU connectors C-307 and C-317 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-307 or C-317 is damaged, repair or replace the damaged component(s) as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between hands-free module connector C-110 (terminal 13) and fusible link (36) in good condition?

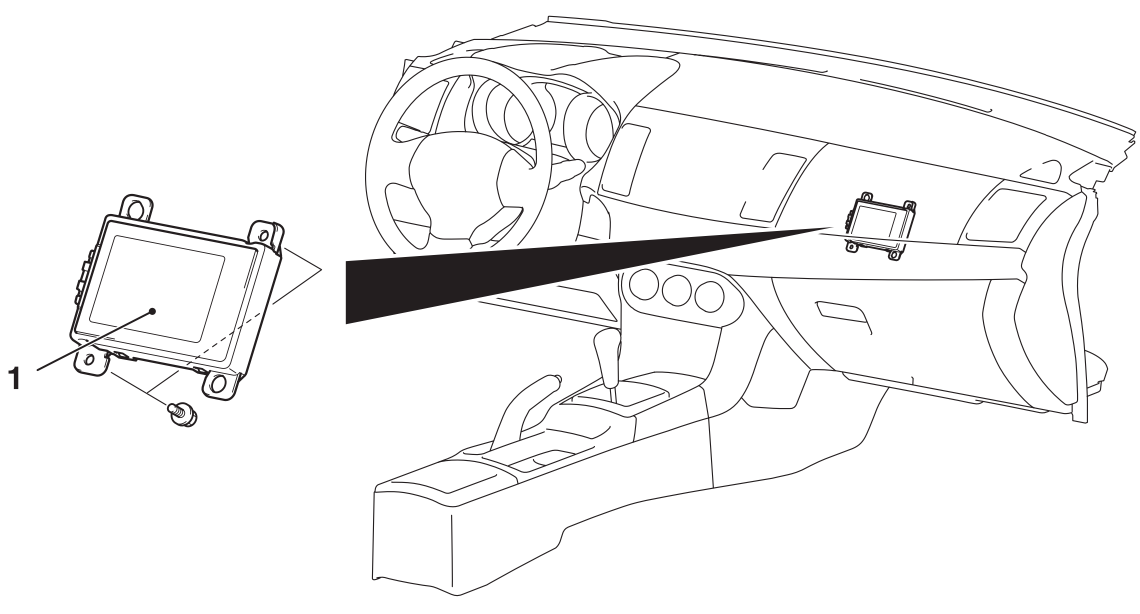
YES : Replace the hands-free module. The system should communicate with the hands-free module normally.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

REMOVAL AND INSTALLATION

M1544401000015

HANDS FREE MODULE

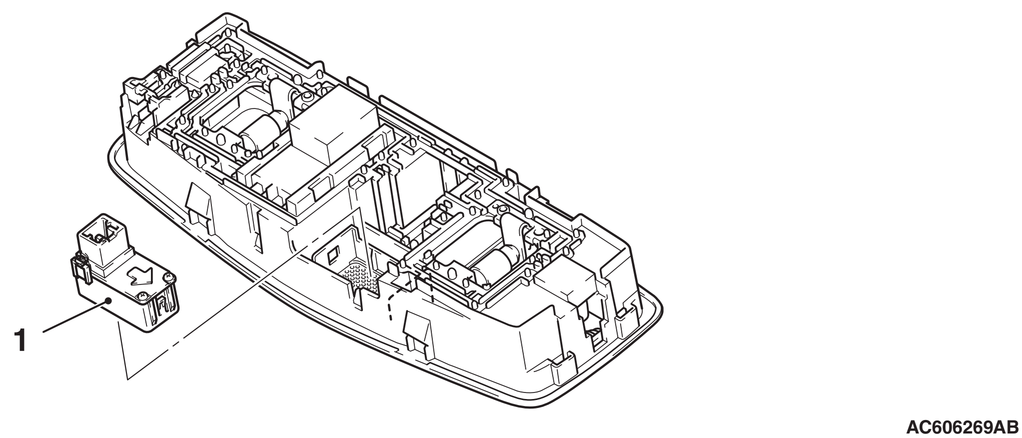


Hands Free Module Removal Steps

- Grove box cover (Refer to GROUP 52A –Grovebox Assembly P.52A-5).

1. Hands free module

MICROPHONE UNIT

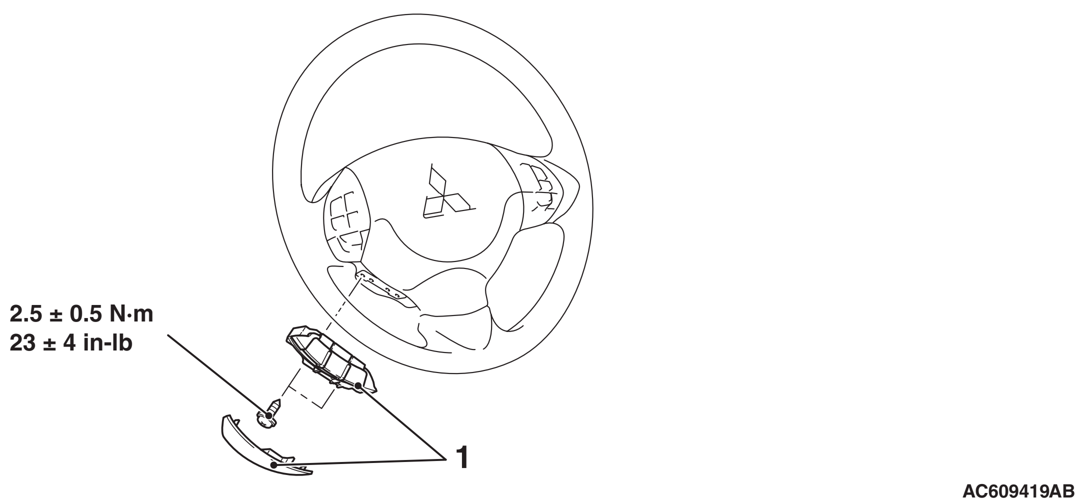


Microphone Unit Removal Steps

- Front dome light assembly (Refer to GROUP 52A –Headlining P.52A-15).

1. Microphone unit

STEERING VOICE CONTROL SWITCH



Steering Voice Control Switch Removal Step

<<A>> 1. Steering voice control switch

REMOVAL SERVICE POINT

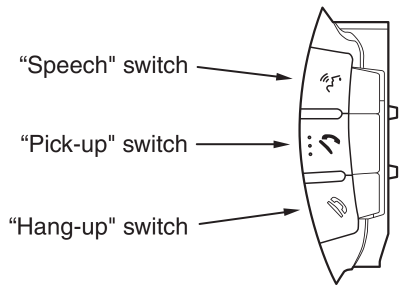
<<A>> STEERING VOICE CONTROL SWITCH REMOVAL

Remove the cover first, and then remove the screw that is used to fix the switch body part.

STEERING WHEEL VOICE-CONTROL SWITCH CONTINUITY CHECK

M1544401100012

Use an ohmmeter to measure the resistance value between the terminal.



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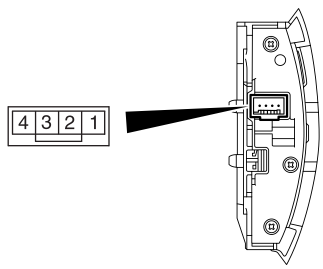


AC606272

Switch position	Tester connection	Measurement value
No push	2 –3	Approximately 74 kΩ
"Speech" switch		Approximately 1.5 kΩ
"Pick-up" switch		Approximately 3.3 kΩ
"Hang-up" switch		Approximately 5.0 kΩ

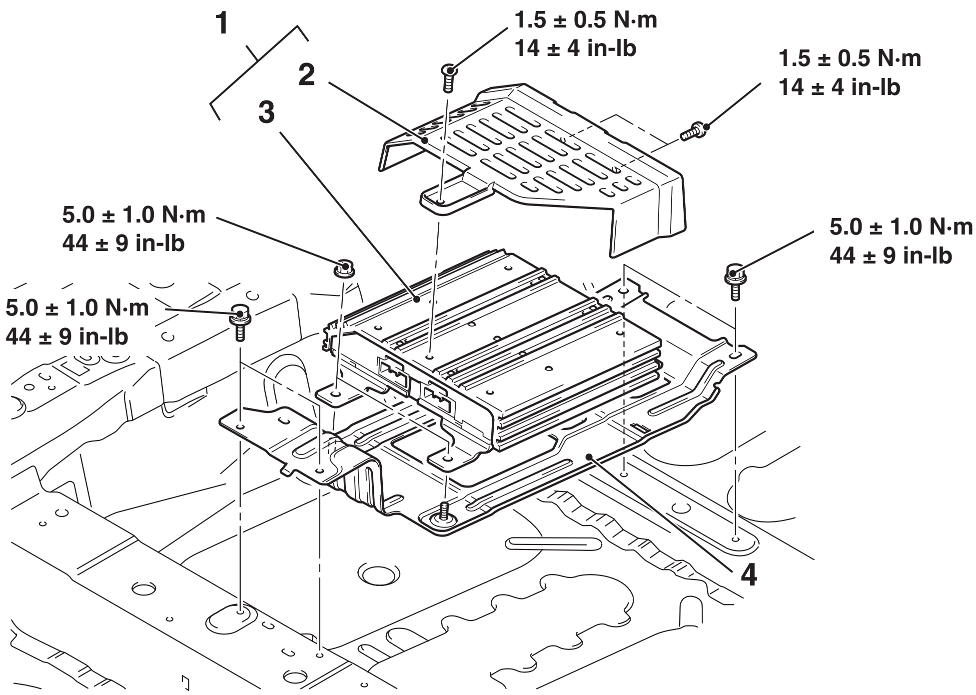
AMPLIFIER

REMOVAL AND INSTALLATION

M1544004100422

⚠ CAUTION

To remove the front seat assembly of vehicle with side air bag, refer to GROUP 52B –Service Precautions P.52B-24 and Air Bag Module(S) And Clock Spring P.52B-367.



AC608802 AB

Removal Steps

- Front (driver's) seat assembly (Refer to GROUP 52A –Front Seat Assembly P.52A-17).

1. Audio amplifier assembly

Removal Steps (Continued)

2. Audio amplifier cover
3. Audio amplifier
4. <<**A**>> Audio amplifier box bracket

REMOVAL SERVICE POINT

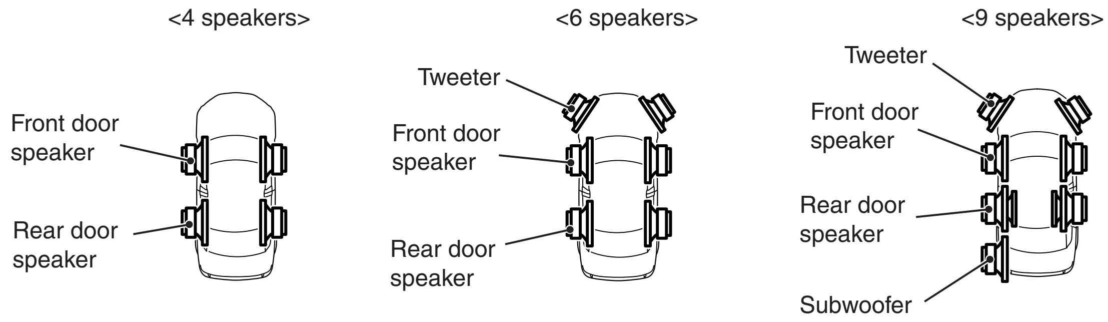
<<A>> REMOVAL OF AUDIO AMPLIFIER BOX BRACKET

Turn up and remove the carpet.

SPEAKER

GENERAL INFORMATION

M1544101000014

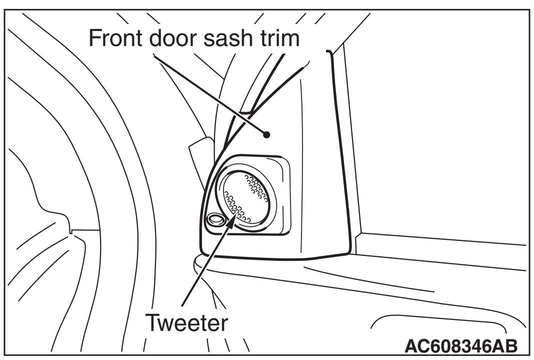


AC608693AB

The following three types of speakers are available.

- 4 speakers (Front door: 16 cm, rear door: 16 cm)
- 6 speakers (tweeter: 3.5 cm, front door: 16 cm, rear door: 16 cm)
- 9 speakers (tweeter: 3.5 cm, front door: 16 cm, rear door: 2-way coaxial 16 cm, subwoofer: 25 cm) <Rockford Fosgate® premium sound system>

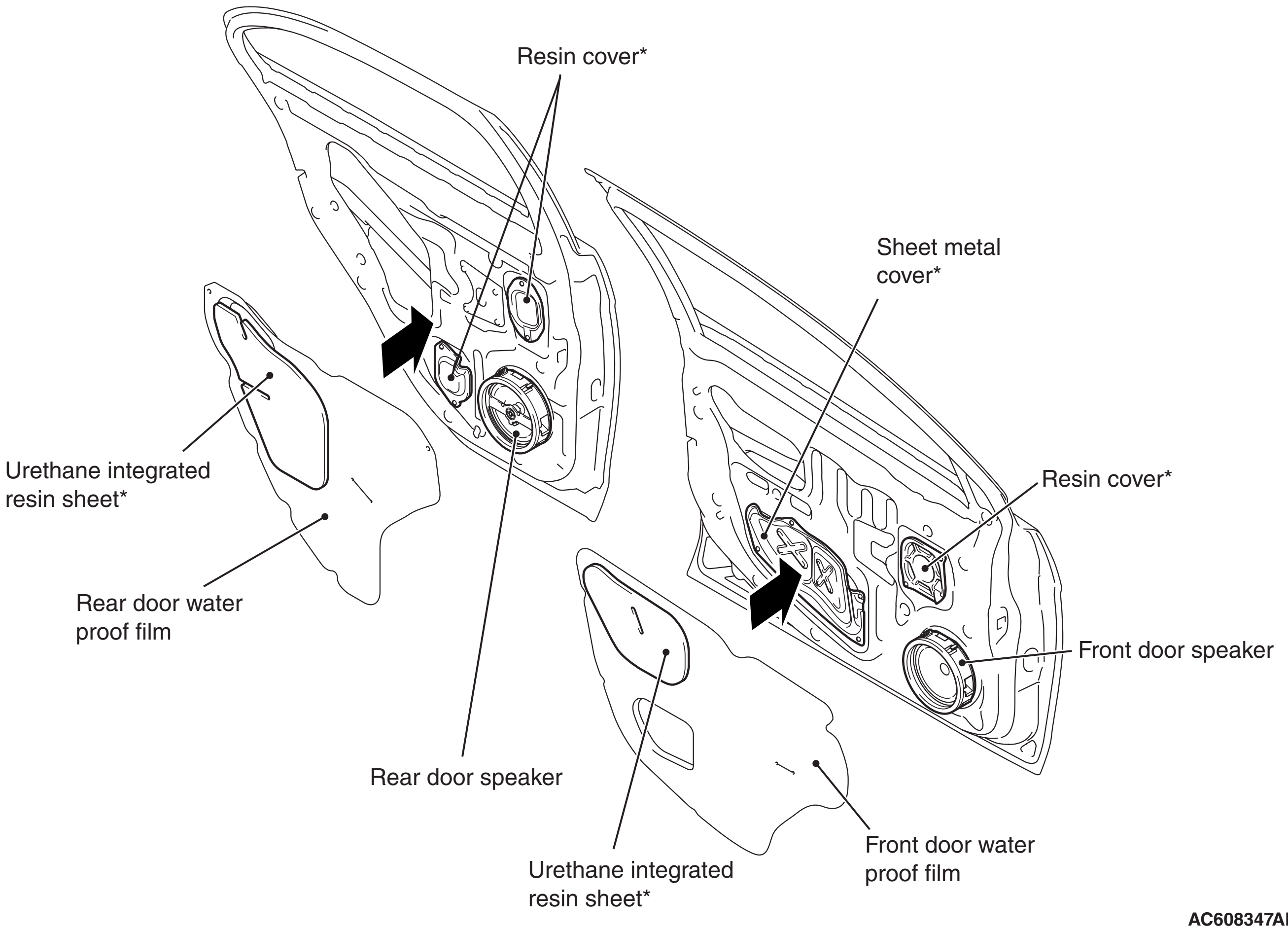
TWEETER



AC608346AB

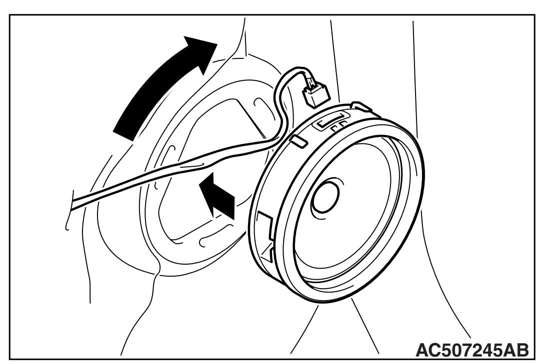
For the front sash trim, two types of tweeters, the balance dome tweeter <Vehicles with 6 speakers> and soft dome tweeter <Vehicles with 9 speakers (Rockford Fosgate ® premium sound system)>, have been established. The soft dome tweeter can play clearer treble with less distortion compared to the balance dome tweeter. For better treble, two types of front sash garnish, resin type <Vehicles with 6 speakers> and punching metal type <Rockford Fosgate ® premium sound system>, has been established. With the punching metal type, the metal has been adopted for the punching part to enlarge the punching opening, enabling the playback of cleaner treble.

DOOR SPEAKER



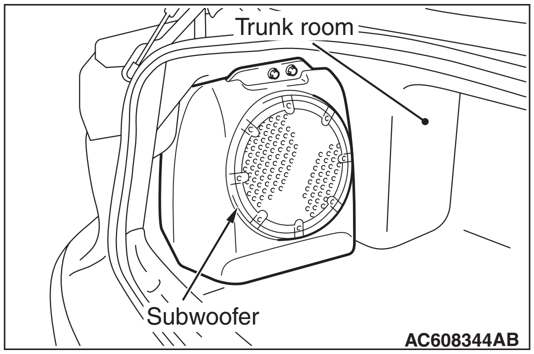
NOTE: The parts with "" are installed exclusively to the vehicles with Rockford Fosgate® premium sound system.*

For the front door speaker, two types of speakers, 16 cm paper cone speaker <vehicles with 4 speakers, 6 speakers> and PP (polypropylene) cone speaker <Rockford Fosgate® premium sound system>, are available. For the rear door speaker, two types of speakers, 16 cm paper cone speaker <Vehicles with 4 speakers, 6 speakers> and PP (polypropylene) cone 2-way coaxial speaker <Vehicles with 9 speakers (Rockford Fosgate® premium sound system)>, are available. Compared to the paper cone speakers, the PP (polypropylene) cone speakers can playback crisper bass. The door opening of the vehicles with 9 speaker (Rockford Fosgate® premium sound system) is blocked by using the sheet metal cover and the urethane integrated resin sheet (resin cover and water proof film) to make the door into a speaker box, thus improving the sound quality. As an advantage of the sheet metal cover, the rigidity of the areas around the speaker has been increased, and the higher sound pressure, suppression of high harmonic, and suppression of dumping are achieved to improve sound quality.



The one-touch installable speaker (with 3 tabs, fixed by rotating) has been adopted to improve serviceability.

SUBWOOFER <VEHICLES WITH Rockford Fosgate® PREMIUM SOUND SYSTEM>



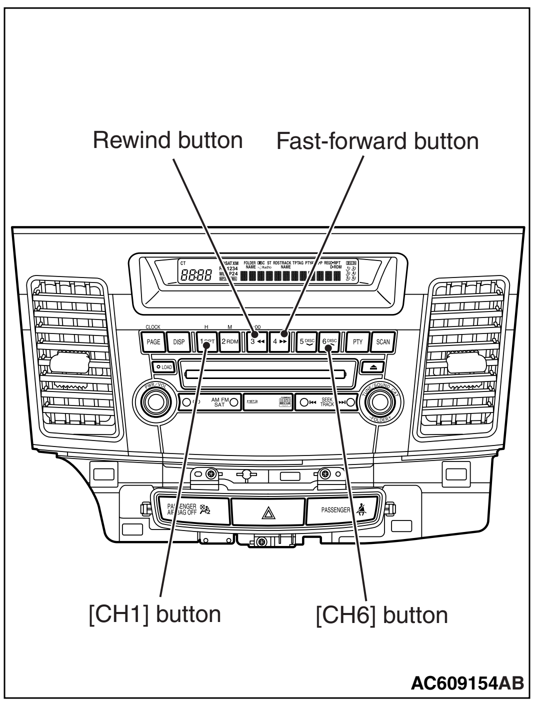
The 25 cm dual voice coil subwoofer has been installed to the trunk room, enabling the playback of dynamic deep bass.

ON-VEHICLE SERVICE

SPEAKER TEST

M1544100500049

HOW TO START SPEAKER CHECK MODE



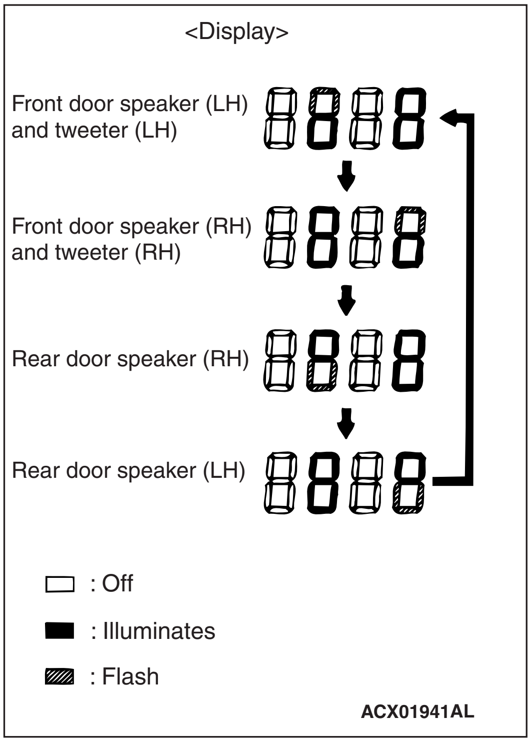
With the ignition switch at the ACC position and the audio power OFF, press the button in the following order.

1. Press the [CH1] button.
2. Press the fast rewind button.
3. Press the fast forward button.
4. Press the [CH6] button.

NOTE: To start the speaker check mode, perform the button operations above within 60 seconds since turning OFF the audio power.

SPEAKER CONNECTION CHECK MODE

With the speaker connection check mode, the connection status of each speaker can be checked based on the sound output from each speaker. The procedure is as follows.



1. At the same time with the start of speaker check mode, the sound for speaker connection check is output from the front door speaker (LH). Check the speaker connection of front door speaker (LH) based on this sound output.
2. Press the [CH6] button to switch the sound output for speaker check from the front door speaker (LH) to the front door speaker (RH). Check the speaker connection of front door speaker (RH) based on the output of speaker connection check sound from the front door speaker (RH).
3. Press the [CH6] button again to switch the sound output for speaker check from the front door speaker (RH) to the rear door speaker (LH). Check the speaker connection of rear door speaker (LH) based on the output of speaker connection check sound from the rear door speaker (LH).
4. Press the [CH6] button again to switch the sound output for speaker check from the rear door speaker (LH) to the rear door speaker (RH). Check the speaker connection of rear door speaker (RH) based on the output of speaker connection check sound from the rear door speaker (RH).

CHATTERING CHECK MODE

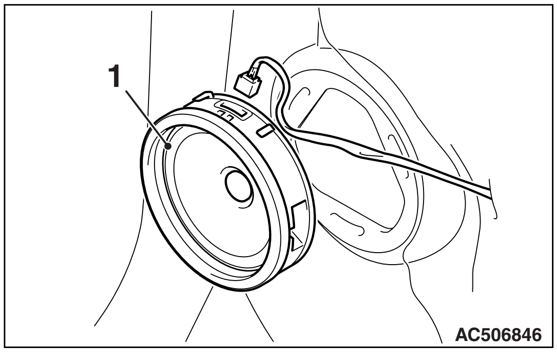
Inserting a CD during the speaker connection check mode shifts the mode to the chattering check mode, and the chattering sound of each speaker can be checked.
As with the speaker connection check mode, press the [CH6] button to switch the output speaker of the chattering check sound.
Check that the chattering sound is output from the output speaker of chattering check sound.

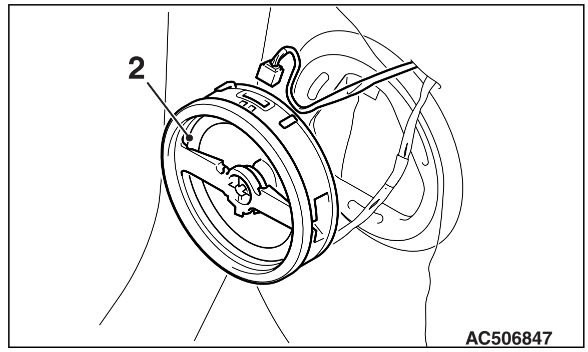
REMOVAL AND INSTALLATION

M1544100300119

DOOR SPEAKER

Pre-removal Operation
Learning of the power window fully closed position (Refer to GROUP 42A –Door, On-vehicle service P.42A-144).





AC507216 AB

Front Door Speaker Removal Steps

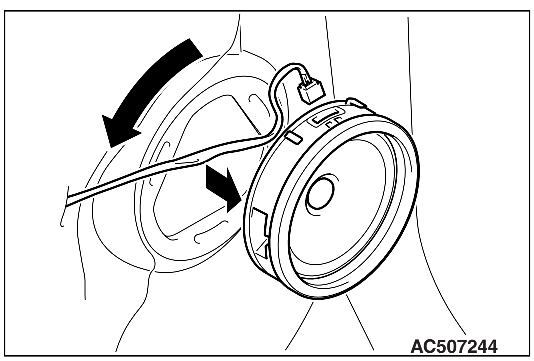
- • Front door trim (Refer to GROUP 52A –Door Trim P.52A-13).
- <<**A**>> 1. Front door speaker

Rear Door Speaker Removal Steps

- • Rear door trim (Refer to GROUP 52A –Door Trim P.52A-13).
- <<**A**>> 2. Rear door speaker

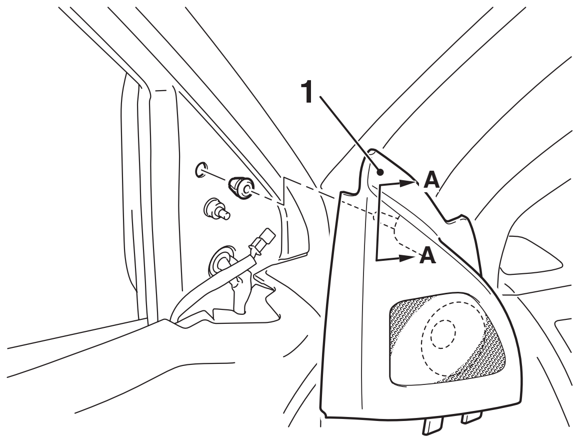
REMOVAL SERVICE POINT

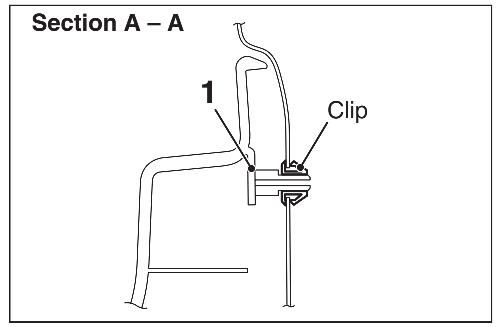
<<A>> REMOVAL OF FRONT DOOR SPEAKER AND REAR DOOR SPEAKER



Disconnect the connector, and remove by twisting as shown in the figure.

TWEETER





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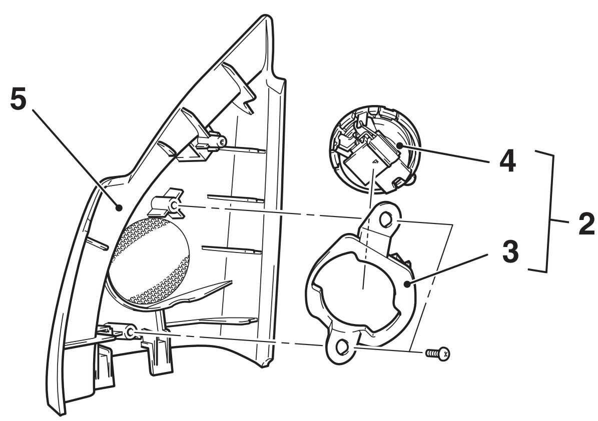


AC608782AB

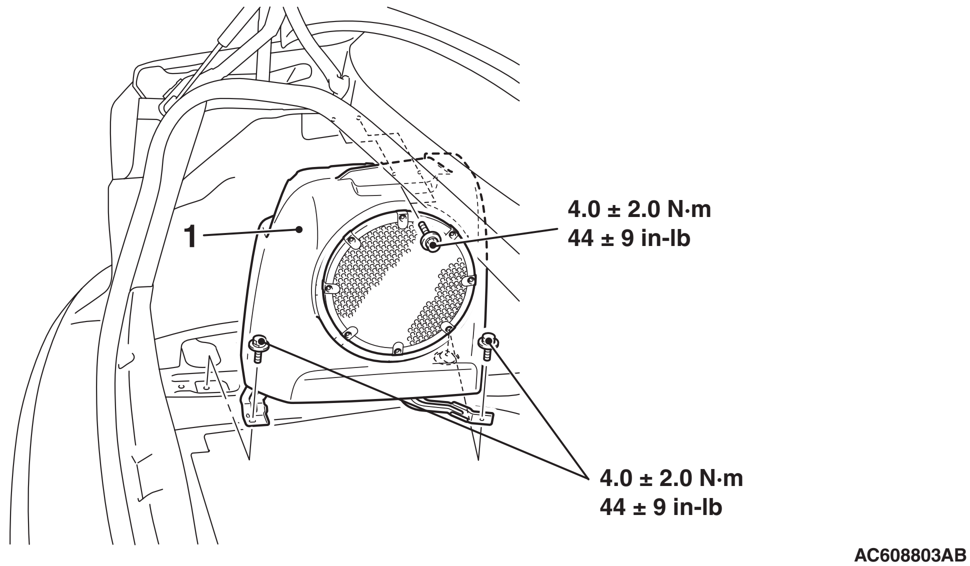
Removal Steps

1. Front door sash trim assembly
2. Tweeter bracket and Tweeter
3. Tweeter bracket

Removal Steps (Continued)

4. Tweeter
5. Front door sash trim

SUBWOOFER



Removal Steps

1. Rear speaker box assembly
2. Rear speaker garnish

Removal Steps (Continued)

3. Rear speaker
4. Rear speaker box

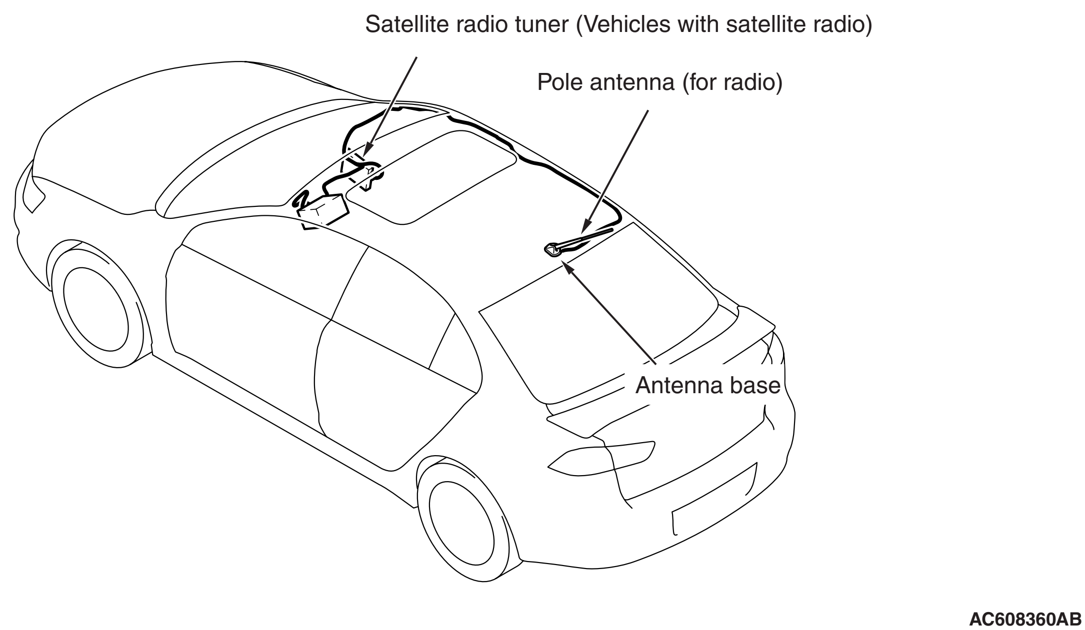
ANTENNA

GENERAL INFORMATION

M1544200500013

The pole antenna has been adopted for the radio. The antenna base incorporates the radio amplifier. When the satellite radio tuner is installed, the antenna base that also corresponds to the satellite radio is installed.

CONSTRUCTION DIAGRAM



REMOVAL AND INSTALLATION

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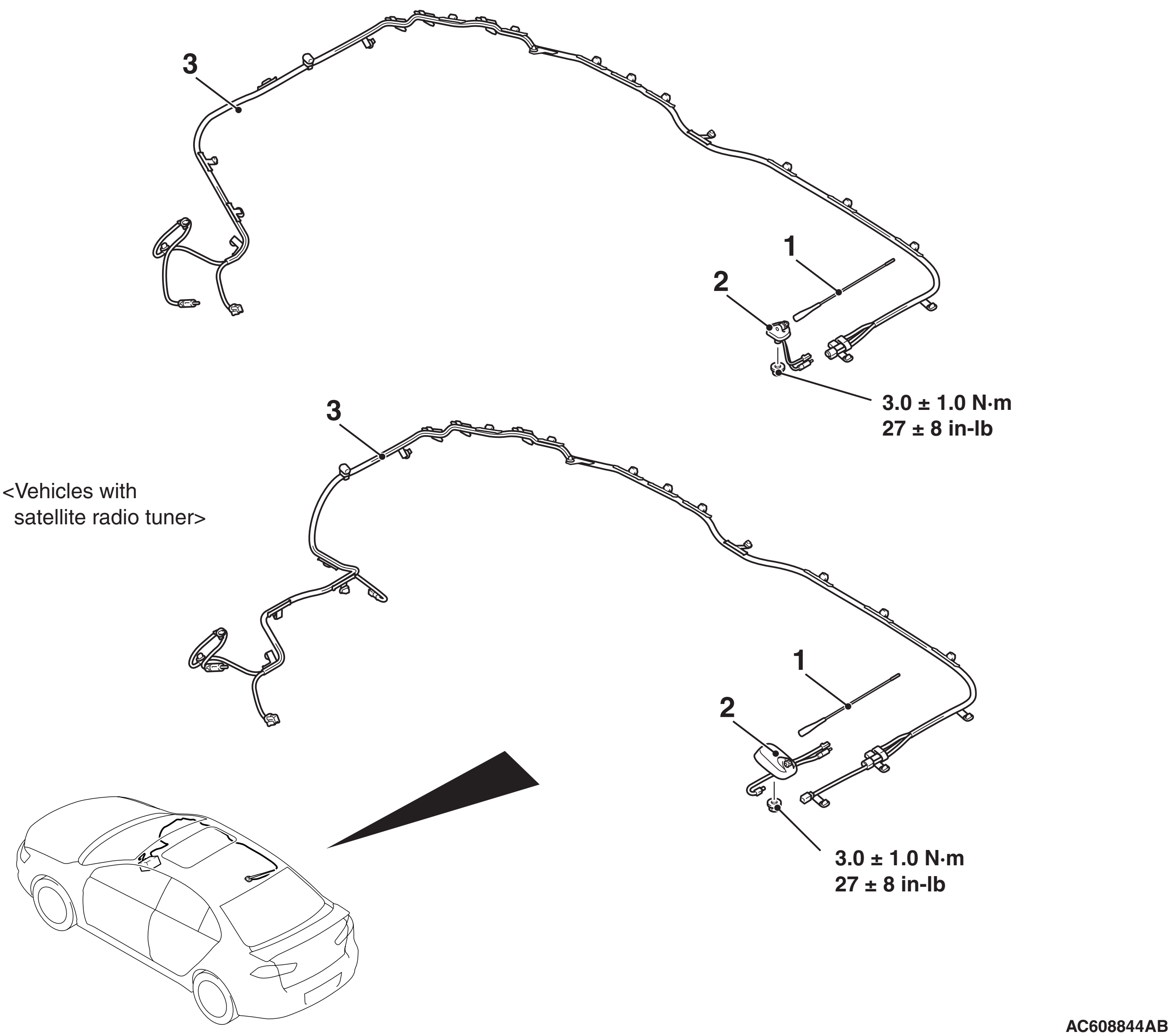


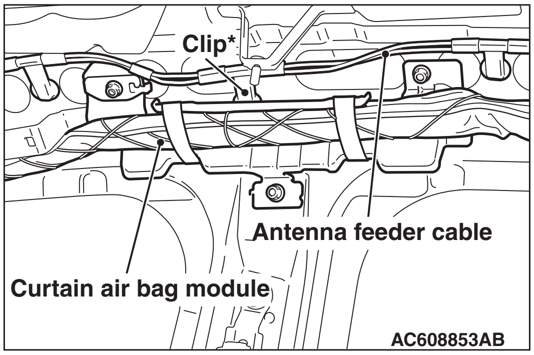
Removal Steps

1. Antenna rod
- Headlining (Refer to GROUP 52A –Headlining P.52A-15).
2. Antenna base
- Audio unit (Refer to P.54A-307). <Vehicles with Audio unit>
- Audio visual navigation unit assembly (Refer to P.54A-307). <Vehicles with MMCS>

Removal Steps (Continued)

- Grove box cover (Refer to GROUP 52A –Grove box P.52A-5).
- Rear side roof energy absorption box (RH) <Vehicle with sunroof>(Refer to GROUP 52A –Headlining P.52A-15).

<<**A**>> 3. Antenna feeder



REMOVAL SERVICE POINT

<<A>> REMOVAL OF ANTENNA FEEDER

Remove a part of the curtain airbag module, and remove the clip* of antenna feeder. <Vehicles with sun roof>

SATELLITE RADIO TUNER

DIAGNOSIS

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1544016500018

Refer to GROUP 00, Troubleshooting contents P.00-6.

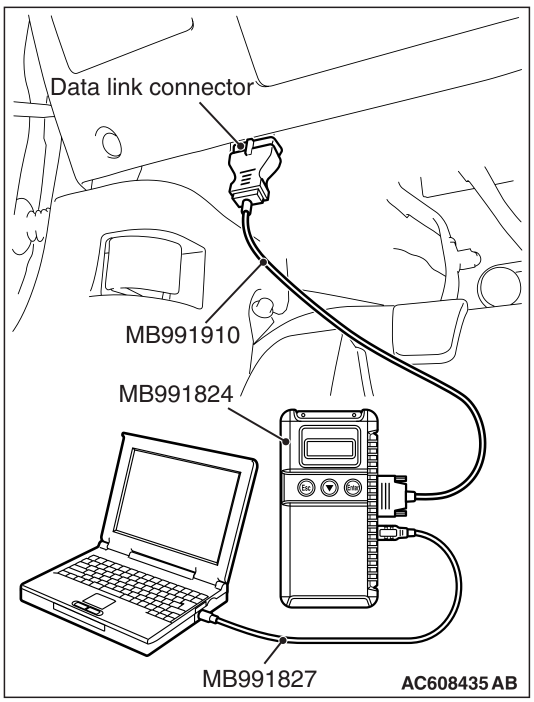
DIAGNOSIS FUNCTION

M1544013200052

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "Meter" from "System List," and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

DIAGNOSTIC TROUBLE CODE CHART

M1544012900058

Diagnostic trouble code number	Trouble content	Reference page
B2222	Radio receiver internal fail	P.54A-452
U0019	Bus off (CAN-B)	P.54A-454
U0141	ETACS CAN timeout	P.54A-455
U0151	SRS-ECU CAN timeout	P.54A-457
U0154	Occupant classification-ECU CAN timeout	P.54A-458
U0155	Combination meter CAN timeout	P.54A-460
U0164	A/C-ECU CAN timeout	P.54A-461
U0168	WCM or KOS-ECU CAN timeout	P.54A-463
U0184	Audio CAN timeout	P.54A-465
U0197	Hands free module CAN timeout	P.54A-466

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B2222: Radio receiver internal fail

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, always diagnose the CAN bus lines.

⚠ CAUTION

Before replacing the satellite radio tuner, be sure to check that the power supply circuit, ground circuit, and communication circuit are normal.

TROUBLE JUDGMENT

When the ignition switch is ON and the system voltage is from 10 V to 16 V (data from ETACS-ECU), if the satellite radio tuner receives abnormal status by signal conditioning 10 times consecutively, DTC B2222 is stored.

COMMENTS ON TROUBLE SYMPTOM

The satellite radio tuner or CAN bus line may have a problem.

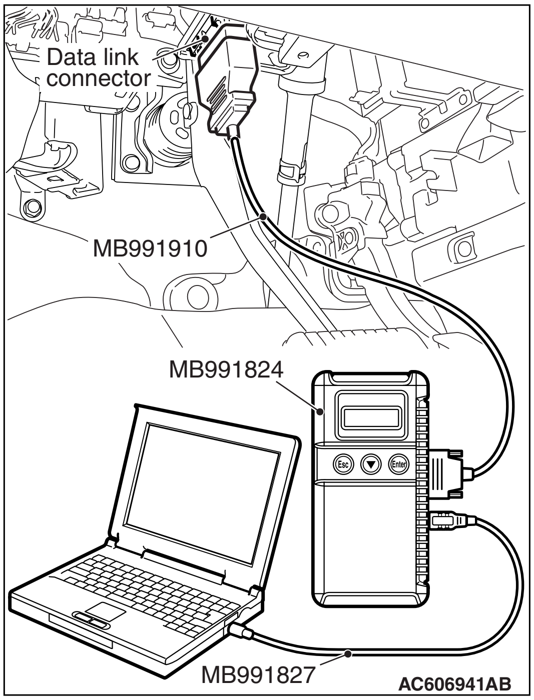
PROBABLE CAUSES

- Malfunctions of satellite radio tuner
- Malfunction of CAN bus line wiring harness and connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16.) On completion, go to Step 2.

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points, How to Cope with Intermittent Malfunction P.00-13).

DTC U0019: Bus off (CAN-B)

⚠ CAUTION

If DTC U0019 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the CAN-B circuit malfunction occurs, the satellite radio tuner sets DTC U0019.

JUDGMENT CRITERIA

With the ignition switch at the ON position and the system voltage at 10 –16 volts (data from ETACS-ECU), if the Satellite radio tuner becomes unable to transmit data normally due to the CAN-B bus circuit malfunction, the satellite radio tuner determines that a problem has occurred.

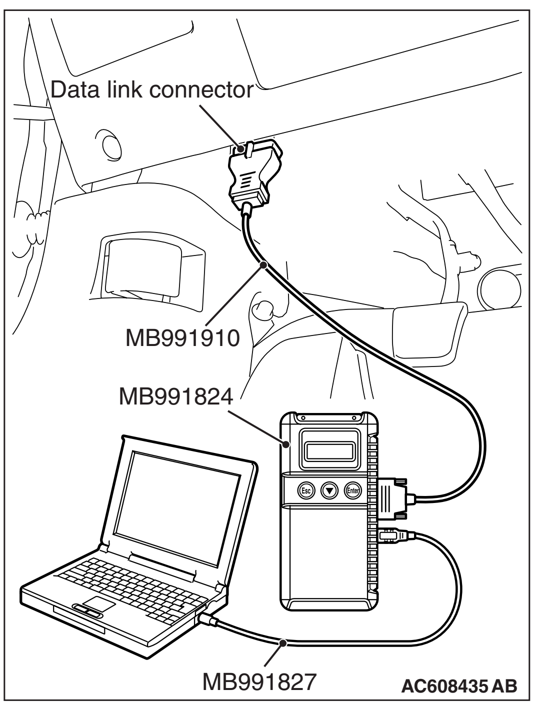
TROUBLESHOOTING HINTS

The satellite radio tuner may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 2.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.

(1) Turn the ignition switch to the "ON" position.
(2) Diagnose the CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

DTC U0141: ETACS CAN timeout

⚠ **CAUTION**

If DTC U0141 is set, be sure to diagnose the CAN bus line.

⚠ **CAUTION**

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

If the signal from ETACS-ECU cannot be received, the satellite radio tuner sets the DTC U0141.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with ETACS-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

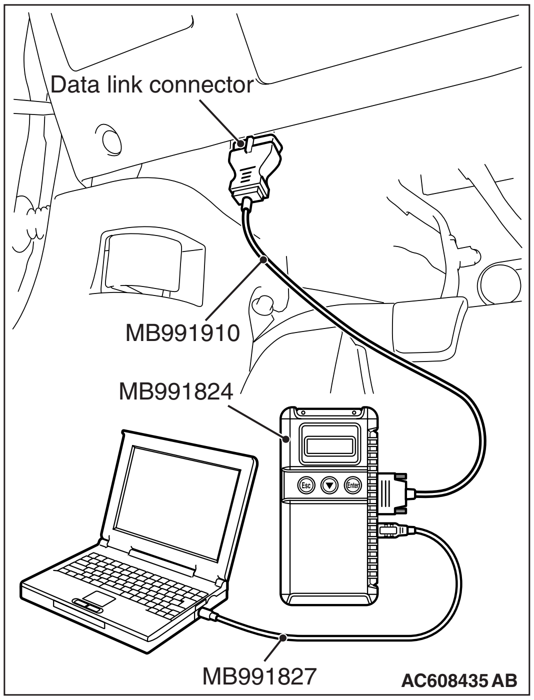
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The satellite radio tuner may be defective
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0151: SRS-ECU CAN timeout

⚠ CAUTION

- **If DTC U0151 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from SRS-ECU cannot be received, the satellite radio tuner sets DTC U0151.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with SRS-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

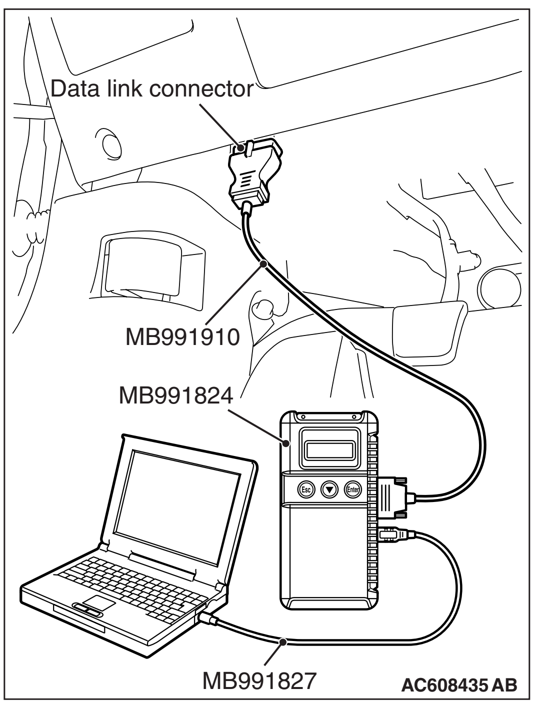
TROUBLESHOOTING HINTS

- The CAN bus line may be defective
- The satellite radio tuner may be defective
- The SRS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the SRS-ECU diagnostic trouble code

Check again if the DTC is set to the SRS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Troubleshooting P.52B-31).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.

(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.

(3) Check if DTC is set.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0154: Occupant classification-ECU CAN timeout

⚠ CAUTION

If DTC U0154 is set, be sure to diagnose the CAN bus line.

⚠ CAUTION

When replacing the ECU, always check that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from occupant classification-ECU cannot be received, the satellite radio tuner sets DTC U0154.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

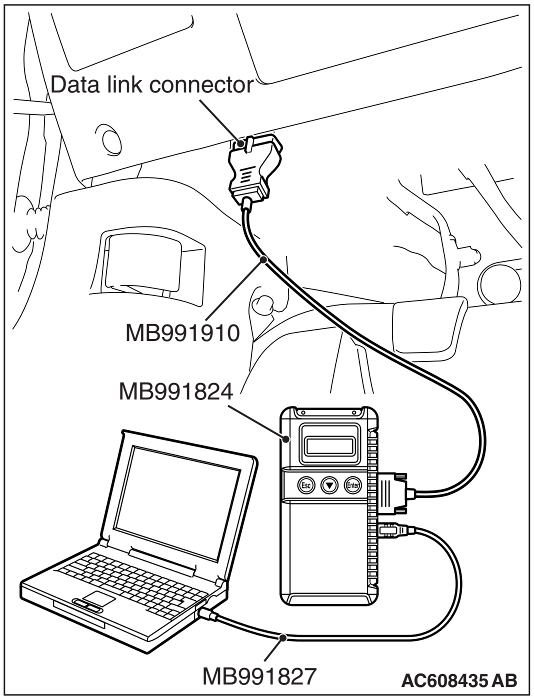
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The satellite radio tuner may be defective.
- The occupant classification-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the occupant classification-ECU diagnostic trouble code.

Check if DTC is set to the occupant classification-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-280).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0155: Combination meter CAN timeout

⚠ CAUTION

If DTC U0155 is set in the satellite radio tuner, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

DIAGNOSTIC FUNCTION

When the signals from combination meter cannot be received, the satellite radio tuner sets DTC U0155.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with occupant classification-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

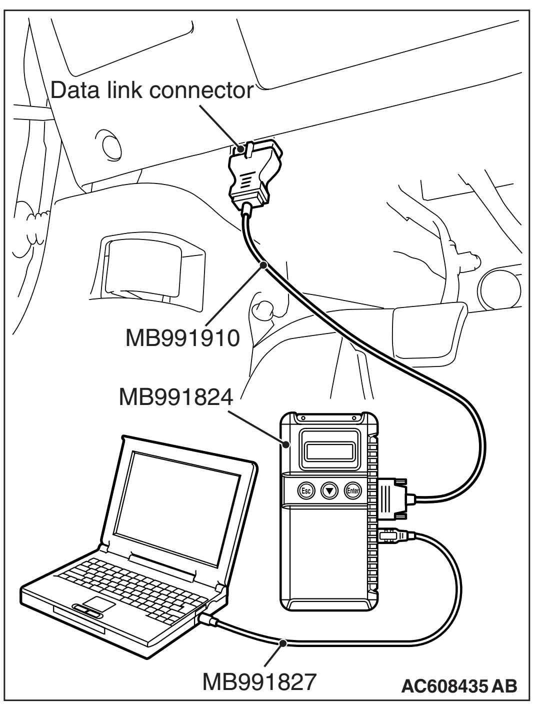
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The satellite radio tuner may be defective.
- The combination meter may be defective.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the combination meter diagnostic trouble code.

Check whether a combination meter DTCs are set or not.

(1) Turn the ignition switch to the "ON" position.
(2) Check for combination meter DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Diagnose the combination meter (Refer to combination meter, Diagnosis P.54A-23).

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0164: A/C-ECU CAN timeout

⚠ **CAUTION**

- **If DTC U0164 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from A/C-ECU cannot be received, the satellite radio tuner sets DTC U0164.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10–16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with A/C-ECU cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

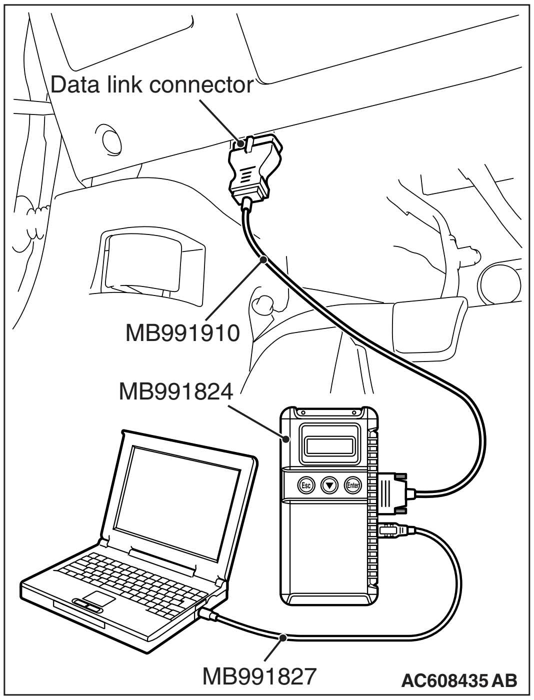
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The A/C-ECU may be defective.
- The satellite radio tuner may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-328."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the A/C diagnostic trouble code.

Check if DTC is set to the A/C-ECU.

Q: Is the DTC set?

YES : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 <vehicles with manual A/C> or GROUP 55B, Automatic A/C Diagnosis P.55B-7 <vehicles with automatic A/C>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0168: KOS-ECU or WCM CAN timeout

⚠ CAUTION

- **If DTC U0168 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

If the signal from KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be received, the satellite radio tuner sets DTC U0168.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 V (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communication with KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

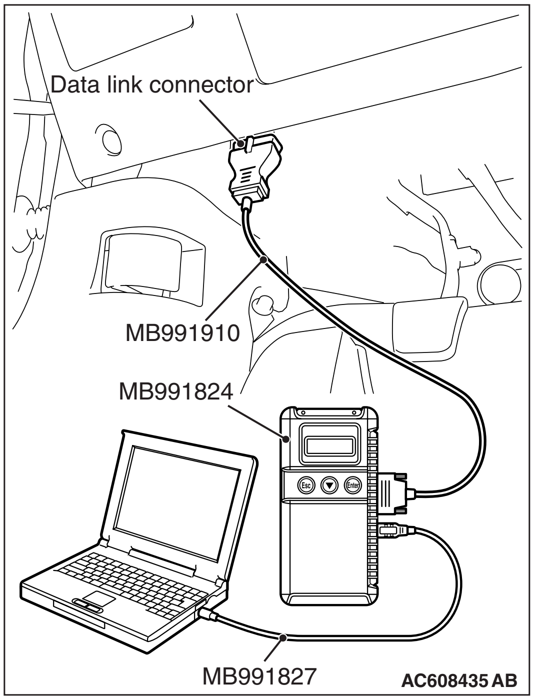
TROUBLESHOOTING HINTS

- Malfunction of CAN bus line may be defective.
- Malfunction of the KOS-ECU may be defective. <vehicles with KOS>
- Malfunction of the WCM may be defective. <vehicles with WCM>
- Malfunction of satellite radio tuner may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicles Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-20."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM> diagnostic trouble code.

Check again if the DTC is set to the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM>.

Q: Is the DTC set?

YES : Troubleshoot the KOS or WCM (Refer to GROUP 42B, Diagnosis P.42B-20 <KOS> or GROUP 42C, Diagnosis P.42C-14 <WCM>).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0184: Audio CAN timeout

⚠ CAUTION

- **If DTC U0184 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGMENT

If the signal from radio and CD player or CD changer cannot be received, the satellite radio tuner sets DTC U0184.

JUDGMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the radio and CD player or CD changer cannot be established for 0.6 second or more, the satellite radio tuner determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

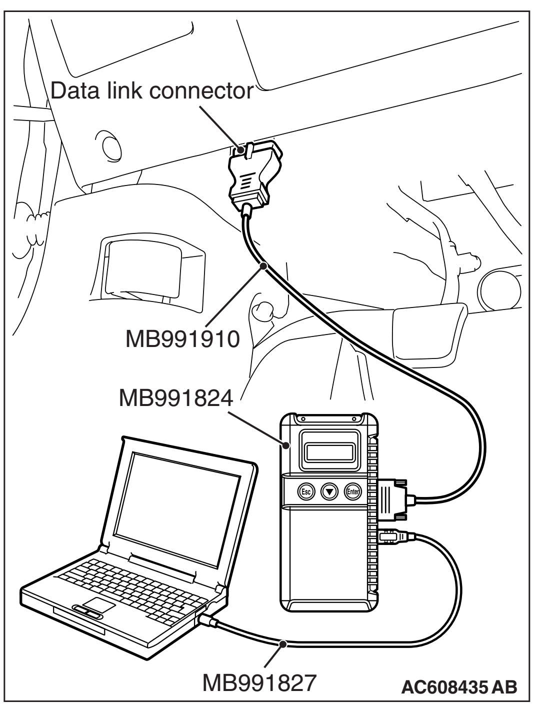
TROUBLESHOOTING HINTS

- The radio and CD player or CD changer may be defective.
- The satellite radio tuner may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the audio diagnostic trouble code.

Check if DTC is set to the audio.

Q: Is the DTC set?

YES : Troubleshoot the audio (Refer to P.54A-239).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

DTC U0197: Hands free module CAN timeout

⚠ CAUTION

- **If DTC U0197 is set, be sure to diagnose the CAN bus line.**
- **When replacing the ECU, always check that the communication circuit is normal.**

DIAGNOSTIC FUNCTION

When the signals from hands free module cannot be received, the satellite radio tuner sets DTC U0197.

JUDGMENT CRITERIA

With the ignition switch in the ON position, system voltage between 10 –16 volts (data from ETACS-ECU), power supply fuse is OK, or odometer value is 80.5 km (50 miles) or more, and the communications with hands free module cannot be established for 2,500 ms or more, the satellite radio tuner determines that a problem has occurred.

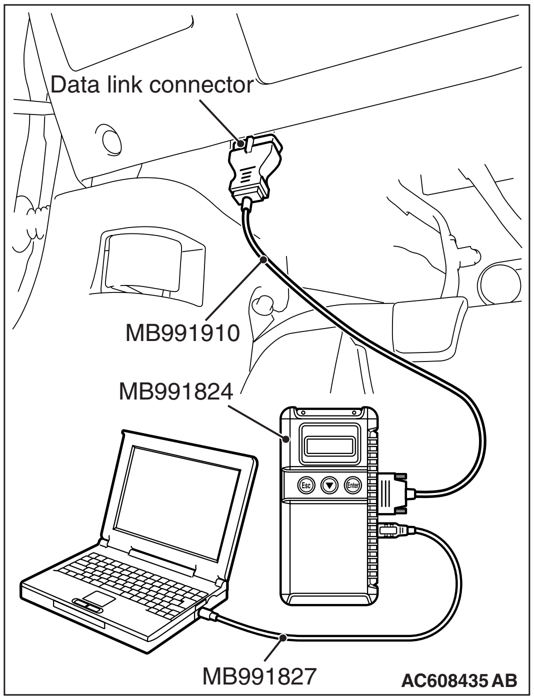
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.
- The satellite radio tuner may be defective.
- The hands free module may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-326."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the hands free module diagnostic trouble code.

Check again if the DTC is set to the hands free module.

Q: Is the DTC set?

YES : Troubleshoot the hands-free cellular phone system.
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the satellite radio tuner.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

TROUBLE SYMPTOM CHART

M1544016400011

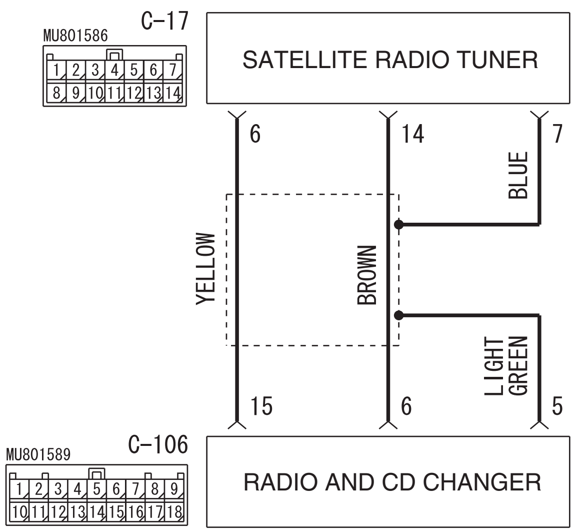
Inspection Procedure No.	Trouble symptom	Reference page
1	A satellite radio cannot be received.	P.54A-468
2	Check the satellite radio tuner power supply circuit.	P.54A-472

SYMPTOM PROCEDURES

Inspection Procedure 1: A satellite radio cannot be received.

⚠ CAUTION
Before replacing the satellite radio tuner, antenna feeder cable, radio and CD changer <vehicles with radio and CD changer> or audio visual navigation unit <vehicles with MMCS>, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Satellite Radio Tuner Communication Circuit <Vehicles with Radio and CD Changer>



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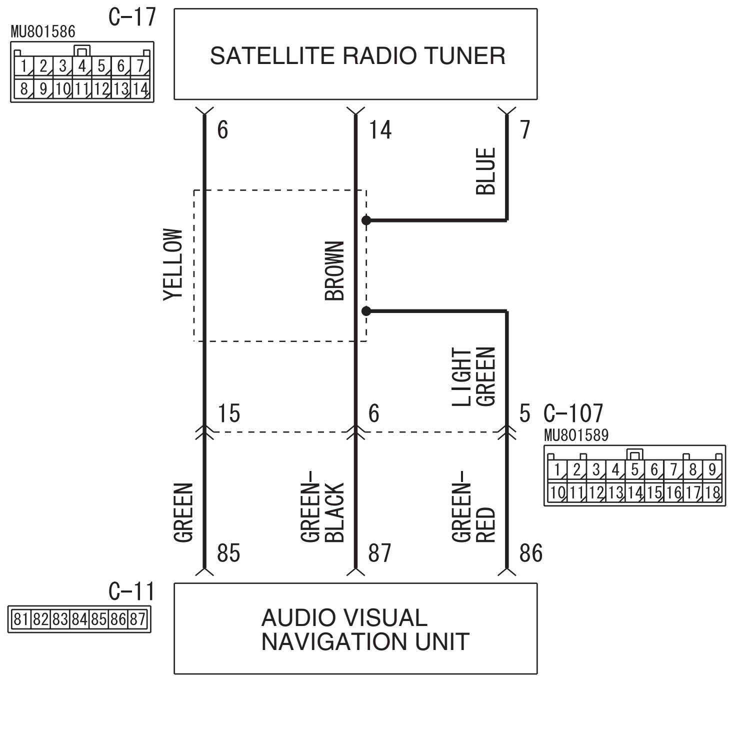
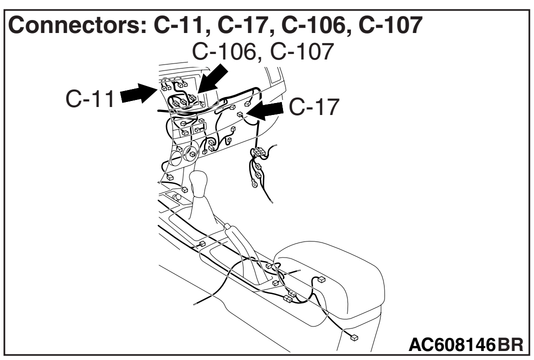
Satellite Radio Tuner Communication Circuit <Vehicles with MMCS>





COMMENTS ON TROUBLE SYMPTOM

There may be a failure in the wiring harness from the satellite radio tuner to the radio and CD changer <vehicles with radio and CD changer> or audio visual navigation unit <vehicles with MMCS>, its respective connector(s), the satellite radio tuner, the CD changer <vehicles with radio and CD changer> or the audio visual navigation unit <vehicles with MMCS>.

PROBABLE CAUSES

- Malfunctions of satellite radio tuner
- Malfunctions of changer <vehicles with radio and CD changer> or audio visual navigation unit <vehicles with MMCS>
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A

STEP 1. Check whether AM or FM broadcast frequency is received.

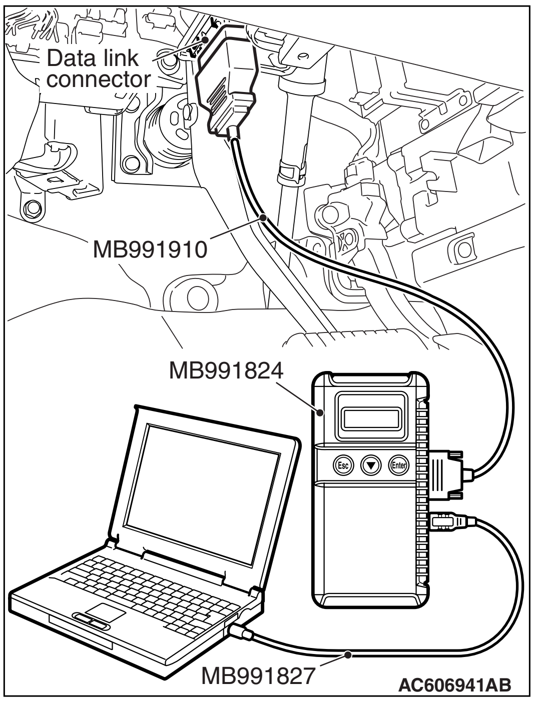
Check whether AM or FM broadcast frequency is received.

Q: Is AM or FM broadcast frequency received?

YES : Go to Step 2.

NO : Diagnose the radio <vehicles with radio and CD changer> or the audio visual navigation unit <vehicles with MMCS> (Refer to P.54A-267 <vehicles with radio and CD changer> or P.54A-350 <vehicles with MMCS>).

STEP 2. Using scan tool MB991958, diagnose the CAN bus line.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES <vehicles with radio and CD changer> : Go to Step 3.

YES <vehicles with MMCS> : Go to Step 6.

NO <vehicles with radio and CD changer or MMCS> : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 3. Check satellite radio tuner connector C-17 and radio and CD changer connector C-106 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is satellite radio tuner connector C-17 or radio and CD changer connector C-106 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between satellite radio tuner connector C-17 (terminal 6, 7, 14) and radio and CD changer connector C-106 (terminal 15, 5, 16).

- Check the communication lines for open circuit.

Q: Is the wiring harness between satellite radio tuner connector C-17 (terminal 6, 7, 14) and radio and CD changer connector C-106 (terminal 15, 5, 16) in good condition?

YES : Go to Step 5.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Substitute a known good radio and CD changer, and check the trouble symptom.

Check whether satellite radio broadcast can be received.

Q: Can a satellite radio be received?

YES : Replace the radio and CD changer.
NO : Replace the satellite radio tuner.

STEP 6. Check satellite radio tuner connector C-17 and audio visual navigation unit connector C-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is satellite radio tuner connector C-17 or audio visual navigation unit connector C-11 in good condition?

YES : Go to Step 7.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 7. Check the wiring harness between satellite radio tuner connector C-17 (terminal 6, 7, 14) and audio visual navigation unit connector C-11 (terminal 85, 86, 87).

- Check the communication lines for open circuit.

NOTE: Also check intermediate connector C-107 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-107 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between satellite radio tuner connector C-17 (terminal 6, 7, 14) and audio visual navigation unit connector C-11 (terminal 85, 86, 87) in good condition?

YES : Go to Step 8.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 8. Substitute a known good audio visual navigation unit, and check the trouble symptom.

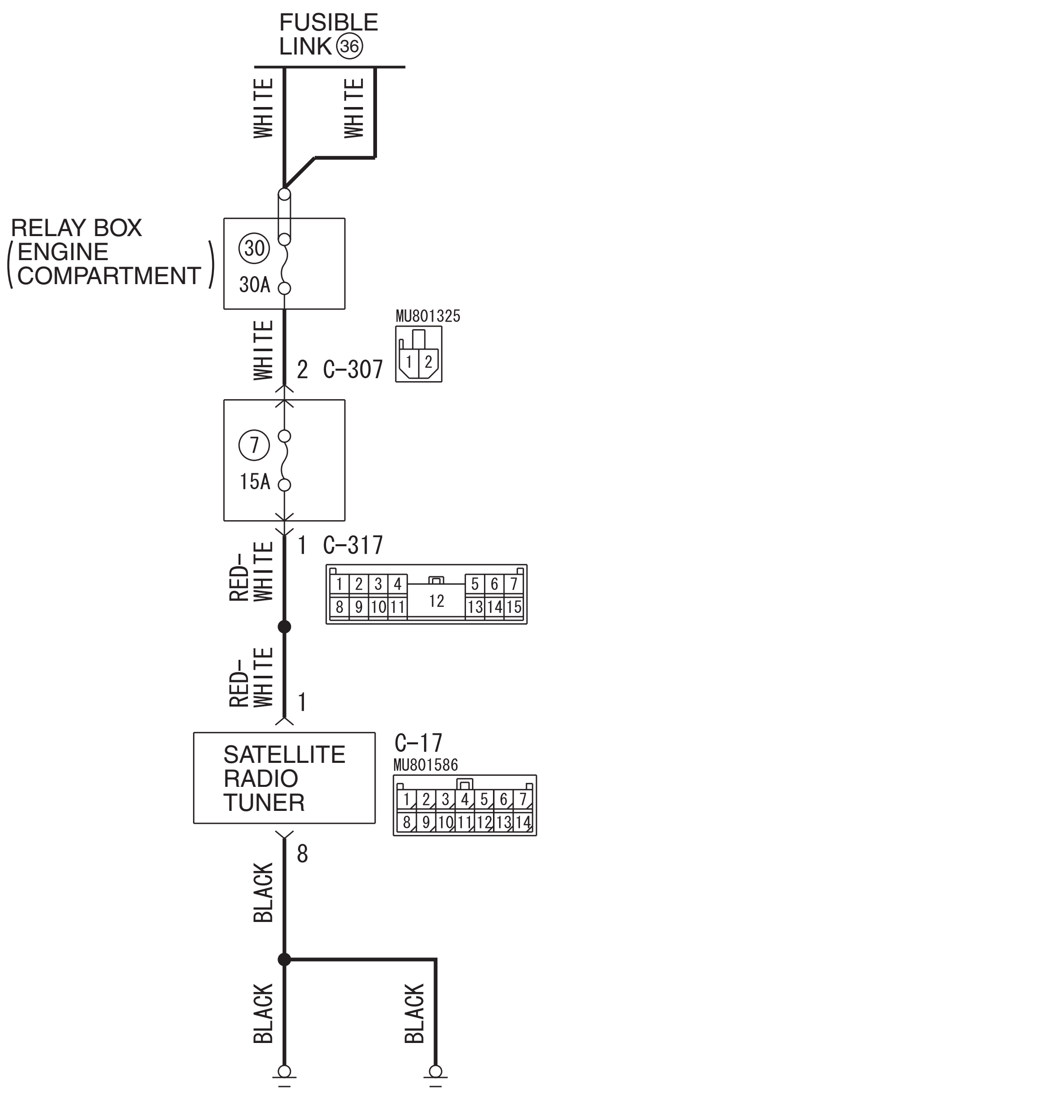
Check whether satellite radio broadcast can be received.

Q: Can a satellite radio be received?

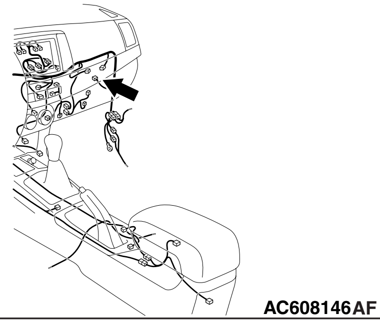
YES : Replace the audio visual navigation unit.
NO : Replace the satellite radio tuner.

Inspection Procedure 2: Check the satellite radio tuner power supply circuit.

Satellite Radio Tuner Power Supply Circuit



Connector: C-17



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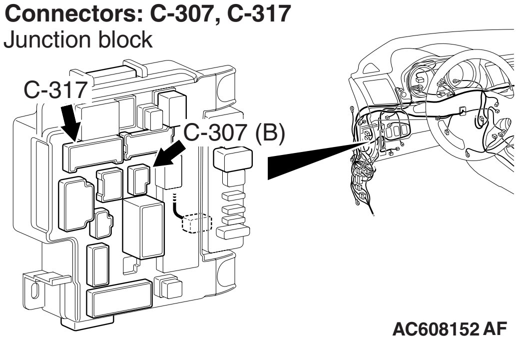
Connectors: C-307, C-317
Junction block



AC608152 AF

TECHNICAL DESCRIPTION (COMMENT)

If the satellite radio tuner functions do not work at all, the satellite radio tuner power supply system, ground system, or satellite radio tuner may have a problem.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The satellite radio tuner may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

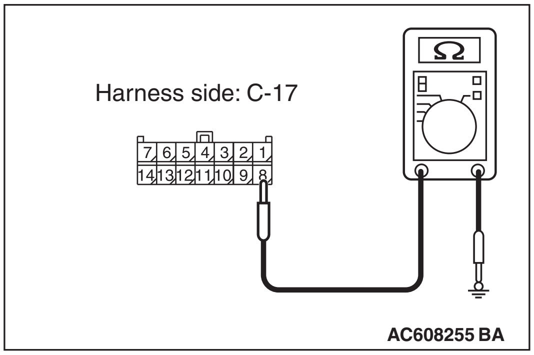
STEP 1. Check satellite radio tuner connectors C-17 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is satellite radio tuner connectors C-17 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 2. Check the ground circuit to the satellite radio tuner. Measure the resistance at satellite radio tuner connectors C-17.



(1) Disconnect satellite radio tuner connector C-17 and measure the resistance available at the wiring harness side of the connector.
(2) Measure the resistance value between satellite radio tuner connector C-17 terminal 8 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between satellite radio tuner connector C-17 (terminal 8) and ground.

Q: Is the wiring harness between satellite radio tuner connector C-17 (terminal 8) and ground in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check the wiring harness between satellite radio tuner connector C-17 (terminal 1) and fusible link (36).

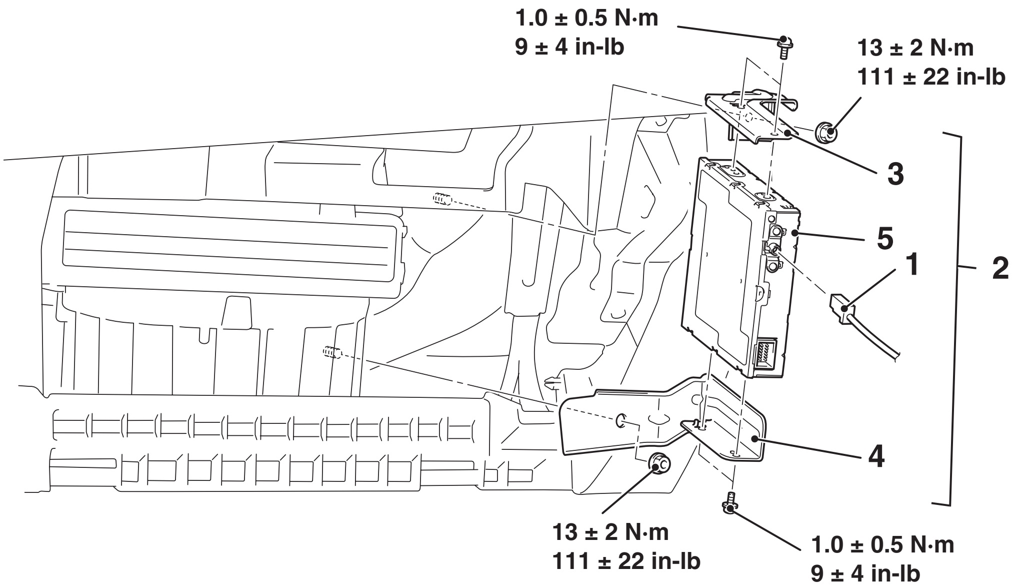
NOTE: Also check ETACS-ECU connectors C-307 and C-317 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-307 or C-317 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between satellite radio tuner connector C-17 (terminal 1) and fusible link (36) in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. The system should communicate with the satellite radio tuner normally.

REMOVAL AND INSTALLATION

M1544016100010



AC608845AB

Removal Steps

- Bottom cover (passenger side) (Refer to GROUP 52A –Grove box P.52A-5).
- Grove box (Refer to GROUP 52A –Grove box P.52A-5).

Removal Steps (Continued)

1. Satellite radio tuner connector
2. Satellite radio tuner assembly
3. Satellite radio tuner bracket (upper)
4. Satellite radio tuner bracket (lower)
5. Satellite radio tuner

DEFOGGER

TROUBLESHOOTING

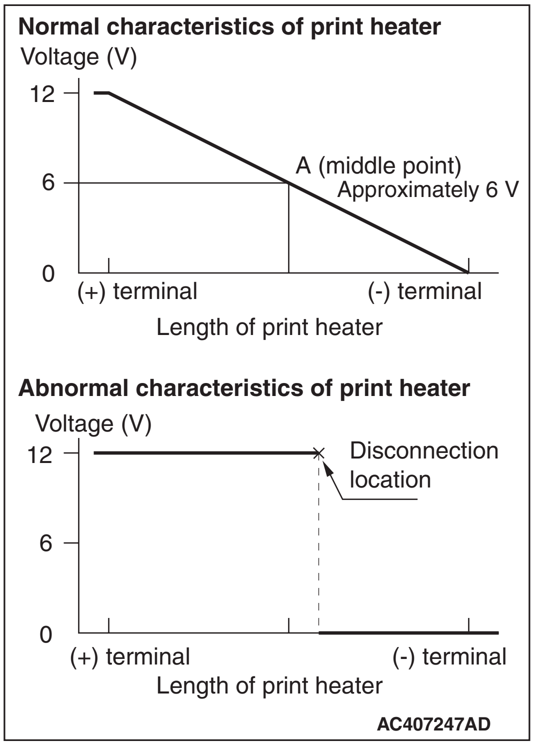
M1540500200152

Refer to GROUP 55 –Troubleshooting P.55B-12.

ON-VEHICLE SERVICE

PRINTED HEATER CHECK

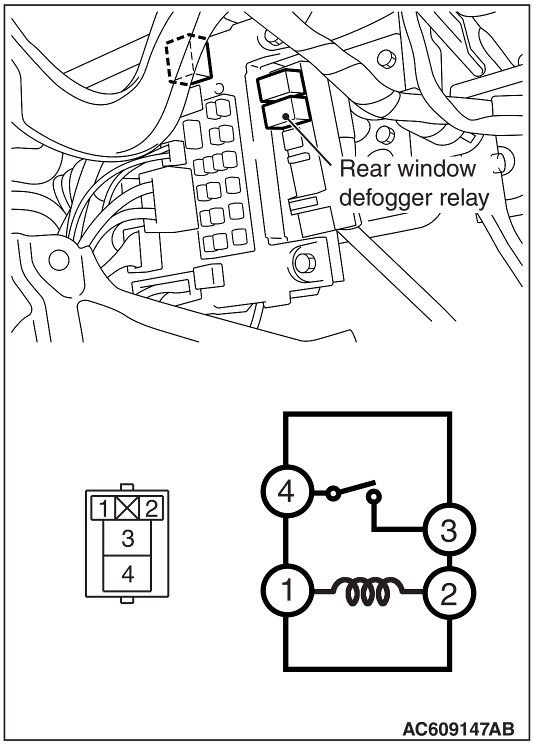
M1540500500131



1. Let the engine run (2,000 r/min), and check the printed heater with the battery fully charged.
2. With the rear window defogger switch "ON," use the circuit tester to measure the voltage of each printed heater at the rear window glass center A point. If approximately 6 V is indicated, it is judged good.
3. If the voltage of 12 V is indicated at the A point, there is an open circuit between the A point and negative terminal. Therefore, by moving the test bar slowly to the negative side, search and determine the location where the voltage changes suddenly (0 V). The location of voltage change indicates the open circuit position.
4. Also, if the voltage indicates 0 V at the A point, there is an open circuit between the A point and positive terminal. Therefore, search and determine the location of voltage change (12 V) using the above mentioned method.

REAR WINDOW DEFOGGER RELAY CHECK

M1540500600149



Battery voltage	Terminal number	Normal condition
At no energization	3 –4	No continuity
With current supply [terminal 1 (+), terminal 2 (–)]		Continuity exists (2 ohms or less)

DEFOGGER SWITCH

REMOVAL AND INSTALLATION

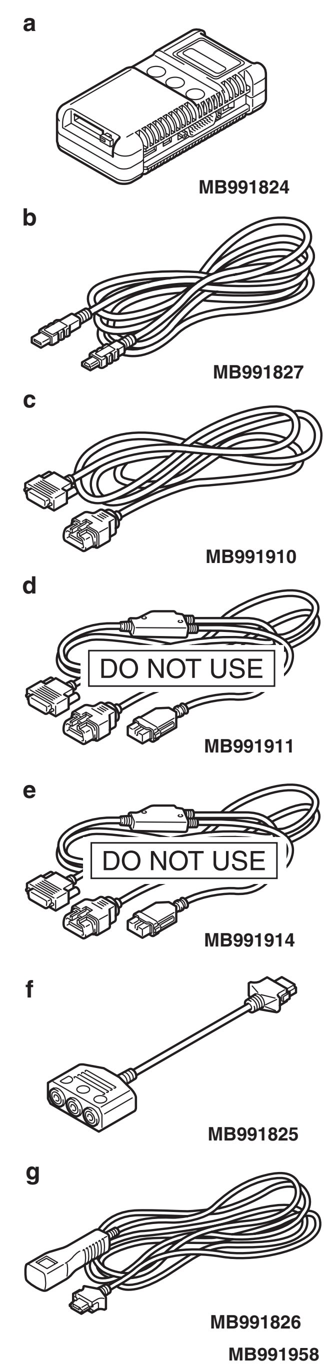
M1540600200148

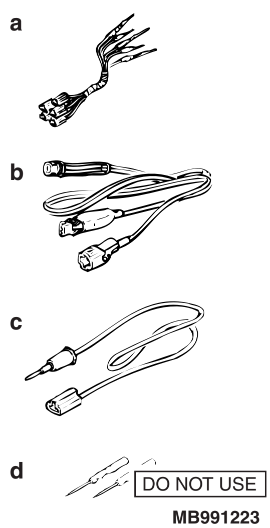
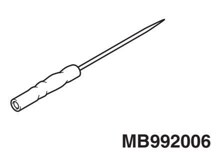
Refer to GROUP 55 –Heater control unit P.55A-118.

ETACS

SPECIAL TOOL

M1545000600105

Tool	Tool number and name	Supersession	Application
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ **CAUTION** **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** ETACS-ECU check (Diagnostic trouble code, service data)

Tool	Tool number and name	Supersession	Application
	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Test harness b. LED harness c. LED harness adaptor d. Probe	General service tools	Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector. a. Connector pin contact pressure inspection b. Power circuit inspection c. Power circuit inspection d. Commercial tester connection
	MB992006 Extra fine probe	–	Making voltage and resistance measurement during troubleshooting

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1545000900076

Refer to GROUP 00, Contents of troubleshooting P.00-6.

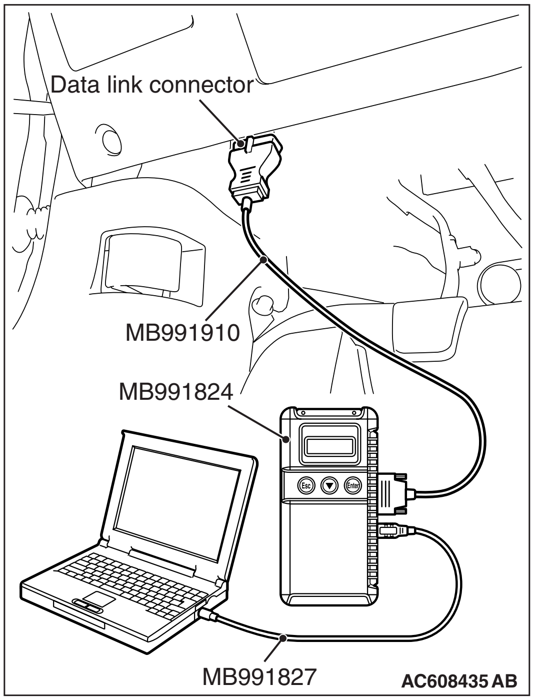
DIAGNOSTIC FUNCTION

M1545001000087

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

CHECK OF FREEZE FRAME DATA

The freeze frame data can be checked by using the scan tool (GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

When detecting fault and storing the DTC, the ECU connected to CAN bus line obtains the data before the determination of the DTC and the data when the DTC is determined, and then stores the ECU status of that time. By analyzing the data from scan tool, the troubleshooting can be performed more efficiently. The displayed items are as shown in the table below.

Display item list

Item No.	Item name	Data item	Unit
01	Odometer	Total driving distance after the diagnostic trouble code is generated	km*1
02	Ignition cycle	Number of times the ignition switch is turned "ON" or "LOCK (OFF)" after the past failure transition	Number of counts is displayed.
03	Elapsed time after failure	Total elapsed time after a diagnostic trouble code is generated	min*2
04	Current trouble accumulative time	Cumulative time for current malfunction of diagnostic trouble code	min

NOTE:

- **1*: *If a failure occurs to both the ABS-ECU and ETACS-ECU, 0000 km or FFFF km is displayed to the scan tool MB991958.*
- **2*: *Total elapsed time can be stored up to 65,534 minutes (45.5 days). The display of scan tool is fixed to 65,534 minutes after 65,534 minutes have elapsed. Or, if the battery is disconnected, the total elapsed time cannot be measured properly. Thus, 65,535 minutes (null value) is displayed. Because it is calculated based on the ETACS-ECU information, the correct display may not be shown if the ETACS-ECU has had a time-out.*

DIAGNOSTIC TROUBLE CODE CHART

M1545001100211

Diagnostic trouble code number	Trouble content	Reference page
U0001	Bus off (CAN-C)	P.54A-483
U0019	Bus off (CAN-B)	
U0100	Engine control module CAN timeout	P.54A-485
U0101	CVT-ECU CAN timeout	P.54A-487
U0121	ABS-ECU CAN timeout	P.54A-489
U0151	SRS-ECU CAN timeout	P.54A-491
U0154	Occupant classification-ECU CAN timeout	P.54A-493
U0155	Combination meter CAN timeout	P.54A-495
U0164	A/C-ECU CAN timeout	P.54A-497
U0168	WCM or KOS-ECU CAN timeout	P.54A-499
U0184	Audio CAN timeout	P.54A-501
U0195	Satellite radio tuner CAN timeout	P.54A-503
U0197	Hands free module CAN timeout	P.54A-505
U0245	Audio visual navigation unit CAN timeout	P.54A-507
U1108	Excess CAN-B ECU detection	P.54A-509
U1120	Bus line (CAN-C) low input	P.54A-510
U1121	Bus line (CAN-C) high input	
U0169	Sunroof-ECU timeout	Refer to GROUP 54B, Diagnosis P.54B-5.
U0215	Power window main switch timeout	
U1109	Column switch timeout	
U150B	Column switch checksum error	
U150C	Power window main switch checksum error	
U1511	Sunroof-ECU checksum error	
U1514	Bit error (LIN)	
U1515	Bus error (LIN)	
U0331*	ECU internal error	P.54A-512
B1034	Temperature sensor (low input)	Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8.
B1035	Temperature sensor (high input)	
B16A0	Taillight (right) open circuit	P.54A-157
B16A1	Taillight (left) open circuit	
B16A2	Blown turn-signal light (left) bulb	P.54A-96
B16A3	Turn-signal light (left) short circuit	
B16A4	Blown turn-signal light (right) bulb	
B16A5	Turn-signal light (right) short circuit	
B16A6	Blown turn-signal light fuse	P.54A-218

Diagnostic trouble code number	Trouble content	Reference page
B16A7	Taillight (right) short circuit	P.54A-157
B16A8	Taillight (left) short circuit	
B1761*	VIN not recorded	P.54A-513
B210A	+B power supply (low input)	P.54A-514
B210B	+B power supply (high input)	
B222C*	Coding incomplete	P.54A-517
B2206*	Chassis number does not match	P.54A-518
B2215*	ECU internal error	P.54A-519
B2350	Malfunction of lighting switch	P.54A-228
B2351	Malfunction of the wiper switch	
B2353	Ignition power supply (low input)	P.54A-519
B2354	Ignition power supply (high input)	

*NOTE: *: If diagnostic trouble codes No. U0331, B1761, B222C, B2206, or B2215 is set, there may be an error with the coding data stored in the ETACS-ECU.*

DIAGNOSIS TROUBLE CODE PROCEDURES

DTC U0001: Bus off (CAN-C)
DTC U0019: Bus off (CAN-B)

⚠ CAUTION

- **If DTC U0001 or U0019 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

When the ETACS-ECU is returned from the bus off state, or when the bus off error is indicated to the ETACS-ECU state, the DTC U0001 (CAN-C) or U0019 (CAN-B) is stored.

TECHNICAL DESCRIPTION (COMMENT)

The ETACS-ECU may have a malfunction, or the ETACS-ECU power supply or earth circuit may have a problem.

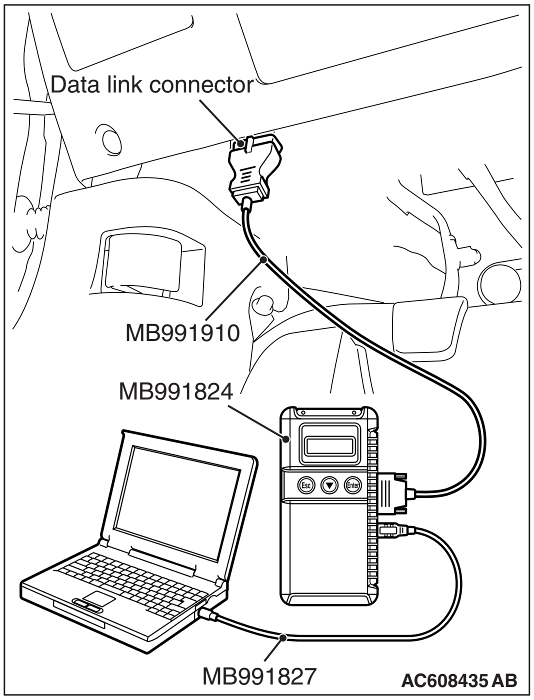
TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0100: Engine control module CAN timeout

⚠ CAUTION

- **If DTC U0100 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from engine control module cannot be received, the ETACS-ECU sets DTC U0100.

JUDGMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the engine control module cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

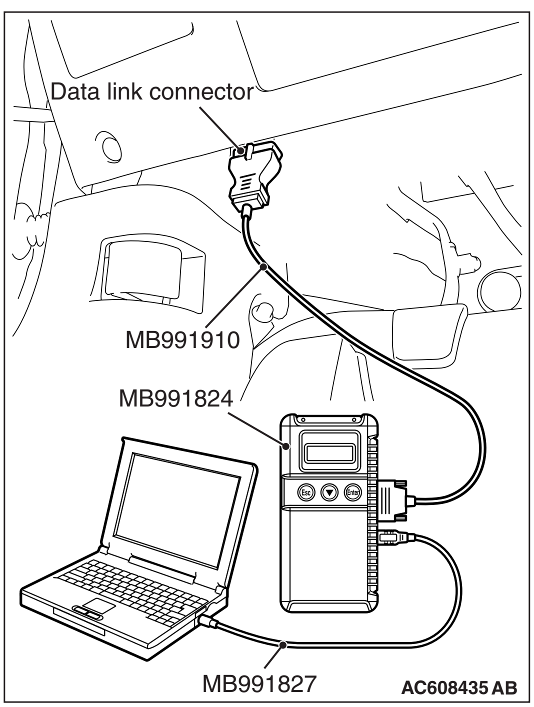
TROUBLESHOOTING HINTS

- The Engine control module may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the engine control module diagnostic trouble code.
Check if DTC is set to the engine control module.

Q: Is the DTC set?

YES : Troubleshoot the engine (Refer to GROUP 13A, Diagnostic Trouble Code Chart P.13A-46).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the CVT diagnostic trouble code.
Check if DTC U0100 is set to the CVT-ECU.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the engine control module.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the engine control module and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the engine control module and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0101: CVT-ECU CAN timeout

⚠ CAUTION

- **If DTC U0101 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGMENT

If the signal from CVT-ECU cannot be received, the ETACS-ECU sets the DTC U0101.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the CVT-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

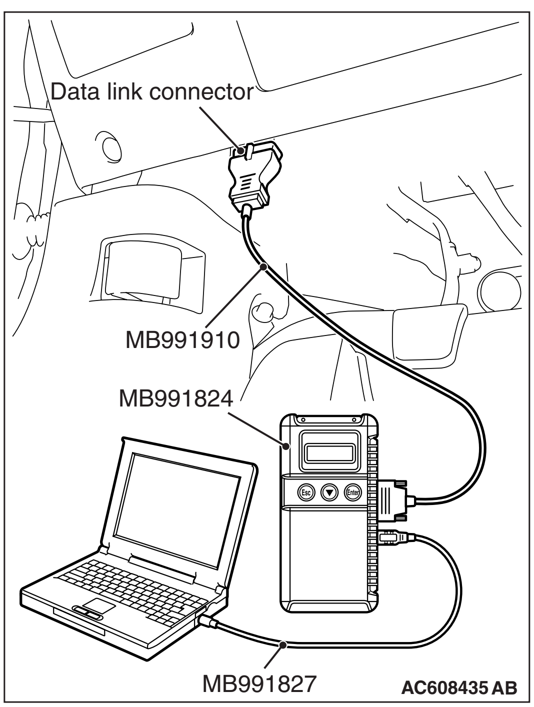
TROUBLESHOOTING HINTS

- The CVT-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the CVT diagnostic trouble code.
Check if DTC is set to the CVT.

Q: Is the DTC set?

YES : Troubleshoot the CVT (Refer to GROUP 23A, Diagnosis P.23A-29).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the engine control module diagnostic trouble code.
Check if the DTC U0101 is set to the engine control module.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CVT-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the CVT-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the CVT-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0121: ABS-ECU CAN timeout

⚠ CAUTION
- **If DTC U0121 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGMENT

If the signal from ABS-ECU cannot be received, the ETACS-ECU sets DTC U0121.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the ABS-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

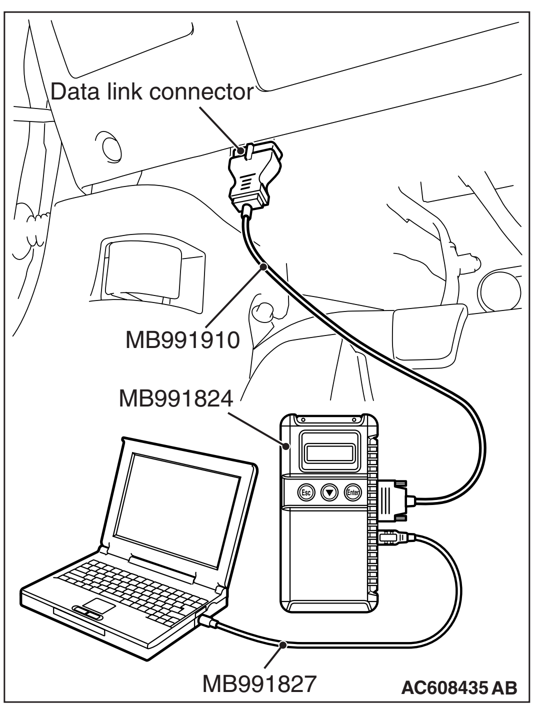
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

TROUBLESHOOTING HINTS

- The ABS-ECU may be defective.
- The ASC-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the ABS diagnostic trouble code.
Check if DTC is set to the ABS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the ABS (Refer to GROUP 35B, Diagnosis P.35B-8).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the CVT diagnostic trouble code.
Check if the DTC U0121 is set to the CVT-ECU.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ABS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the ABS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the ABS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0151: SRS-ECU CAN timeout

⚠ **CAUTION**

- **If DTC U0151 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from SRS-ECU cannot be received, the ETACS-ECU sets DTC U0151.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the SRS-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

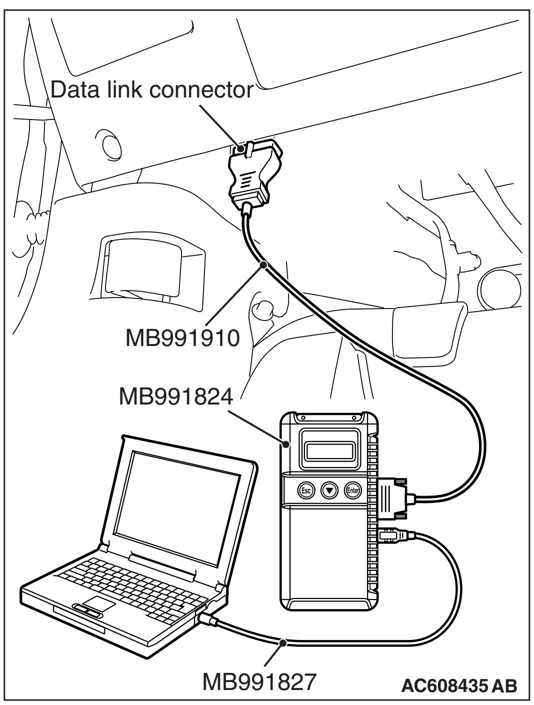
TROUBLESHOOTING HINTS

- The SRS-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the SRS-ECU diagnostic trouble code

Check if DTC is set to the SRS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the SRS (Refer to GROUP 52B, Diagnosis P.52B-31).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the A/C-ECU diagnostic trouble code.

Check if the DTC U0151 is set to the A/C-ECU.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the SRS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the SRS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the SRS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0154: Occupant classification-ECU CAN timeout

⚠ **CAUTION**
- **If DTC U0154 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from occupant classification-ECU cannot be received, the ETACS-ECU sets DTC U0154.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the occupant classification-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

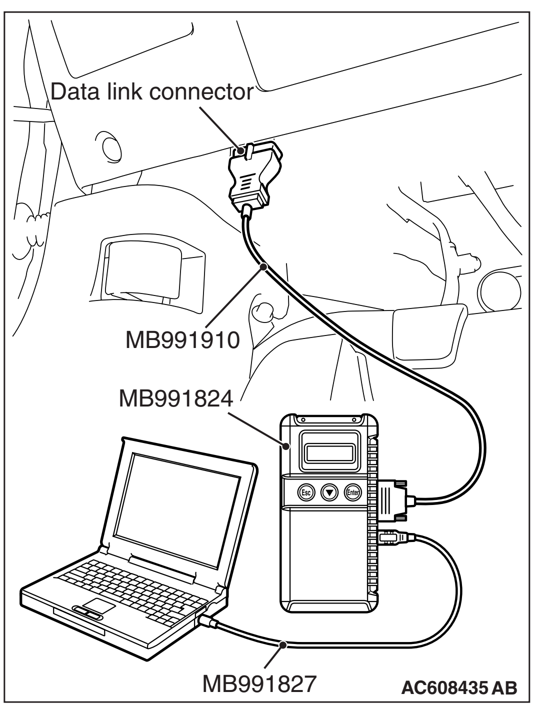
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

TROUBLESHOOTING HINTS

- The occupant classification-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the occupant classification-ECU diagnostic trouble code.

Check if DTC is set to the occupant classification-ECU.

Q: Is the DTC set?

YES : Troubleshoot the occupant classification-ECU (Refer to GROUP 52B, Diagnosis P.52B-280).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the occupant classification-ECU, then go to Step 4.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the occupant classification-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the occupant classification-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0155: Combination meter CAN timeout

⚠ CAUTION

- **If DTC U0155 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from combination meter cannot be received, the ETACS-ECU sets DTC U0155.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the combination meter cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

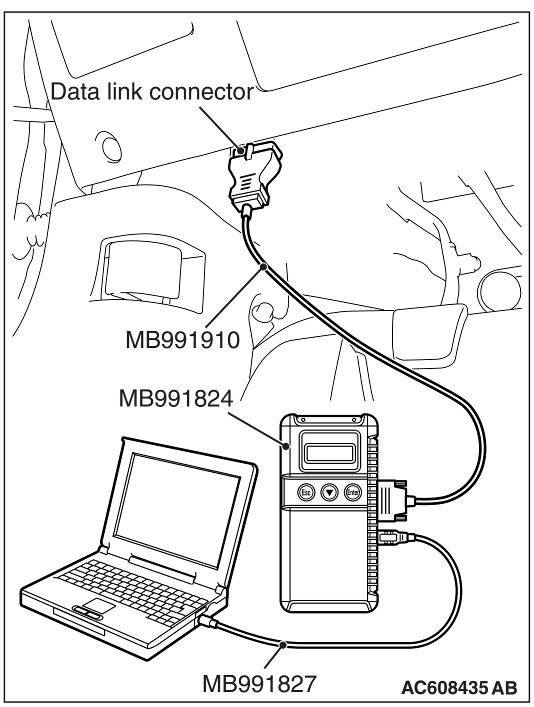
TROUBLESHOOTING HINTS

- The combination meter may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if DTC is set to the combination meter.

Q: Is the DTC set?

YES : Troubleshoot the combination meter (Refer to P.54A-23).

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the A/C-ECU diagnostic trouble code.

Check if the DTC U0155 is set to the A/C-ECU.

Q: Is the DTC set?

YES : Go to Step 4.

NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the combination meter and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the combination meter and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0164: A/C-ECU CAN timeout

⚠ CAUTION
- **If DTC U0164 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from A/C-ECU cannot be received, the ETACS-ECU sets DTC U0164.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the A/C-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

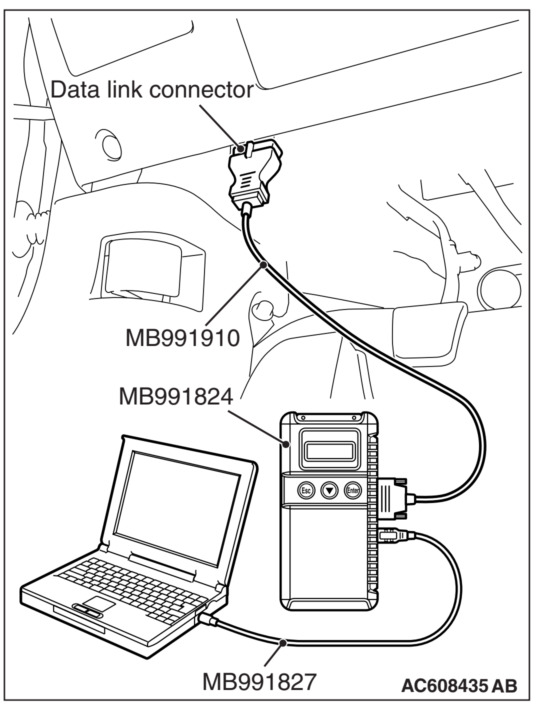
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

TROUBLESHOOTING HINTS

- The A/C-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the A/C-ECU diagnostic trouble code.

Check if DTC is set to the A/C-ECU.

Q: Is the DTC set?

YES : Troubleshoot the A/C (Refer to GROUP 55A, Manual A/C Diagnosis P.55A-8 or GROUP 55B, Auto A/C Diagnosis P.55B-7).

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if the DTC U0164 is set to the combination meter.

Q: Is the DTC set?

YES : Go to Step 4.

NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the A/C-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the A/C-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0168: WCM or KOS-ECU CAN timeout

⚠ **CAUTION**

- **If DTC U0168 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGMENT

If the signal from WCM or KOS-ECU cannot be received, the ETACS-ECU sets DTC U0168.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the WCM or KOS-ECU cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

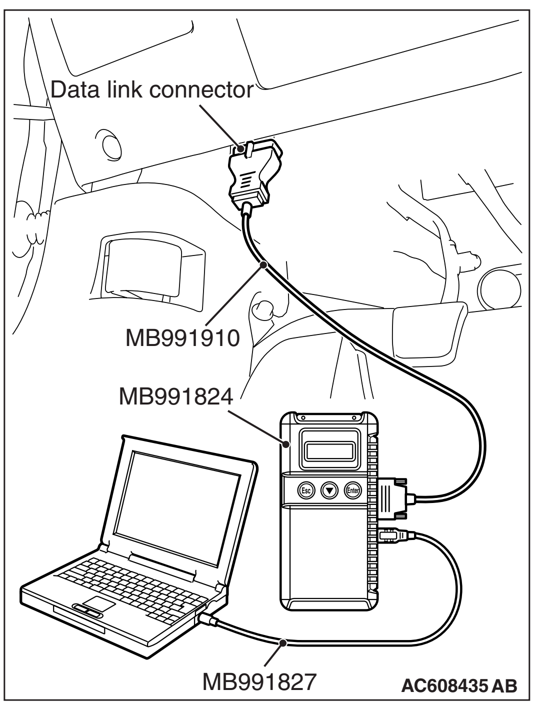
TROUBLESHOOTING HINTS

- The WCM may be defective.
- The KOS-ECU may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the WCM or KOS-ECU diagnostic trouble code.

Check if DTC is set to the WCM or KOS-ECU.

Q: Is the DTC set?

YES : Troubleshoot the WCM or KOS (Refer to GROUP 42B, Diagnosis P.42B-20 <KOS> or GROUP 42C, Diagnosis P.42C-14 <WCM>).

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the diagnostic trouble code.

Check if the DTC U0168 is set to the combination meter.

Q: Is the DTC set?

YES : Go to Step 4.

NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the WCM or KOS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the WCM or KOS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the WCM or KOS-ECU and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0184: Audio CAN timeout

⚠ CAUTION
- **If DTC U0184 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from radio and CD player or CD changer cannot be received, the ETACS-ECU sets DTC U0184.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the radio and CD player or CD changer cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

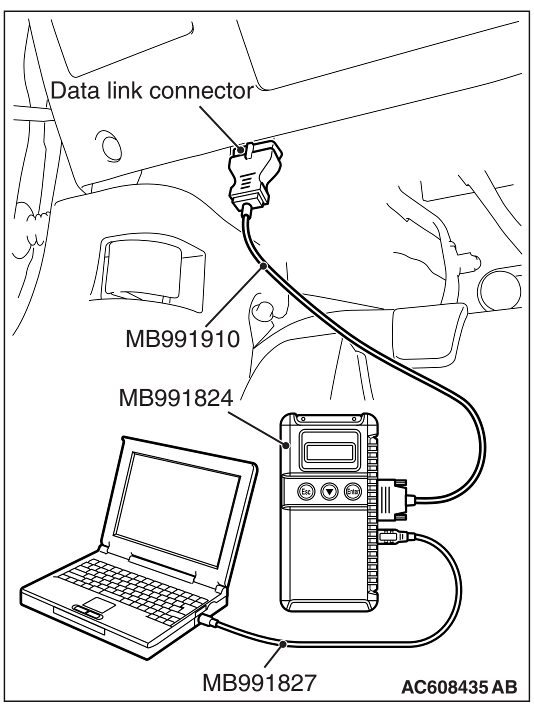
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10−16 volts.

TROUBLESHOOTING HINTS

- The radio and CD player or CD changer may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the audio diagnostic trouble code.

Check if DTC is set to the audio.

Q: Is the DTC set?

YES : Troubleshoot the audio (Refer to P.54A-239).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the combination meter diagnostic trouble code.

Check if the DTC U0184 is set to the combination meter.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the radio and CD player or CD changer.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the radio and CD player or CD changer and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the radio and CD player or CD changer and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0195: Satellite radio tuner CAN timeout

⚠ CAUTION
- **If DTC U0195 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from satellite radio tuner cannot be received, the ETACS-ECU sets DTC U0195.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the satellite radio tuner cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

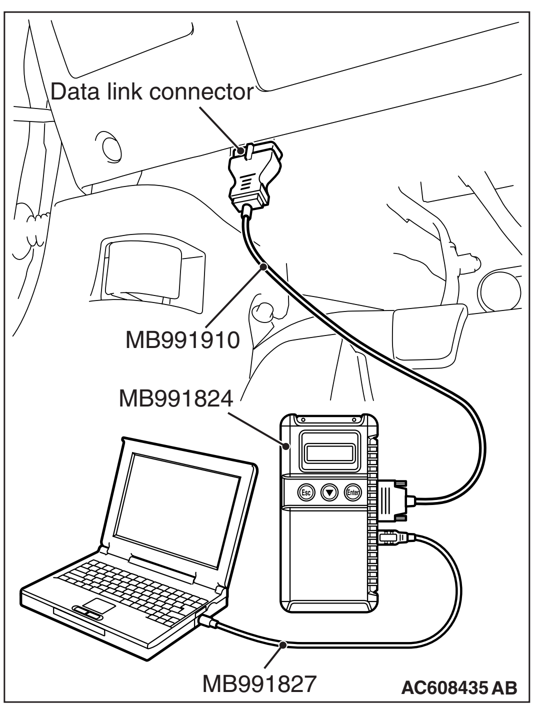
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10−16 volts.

TROUBLESHOOTING HINTS

- The satellite radio tuner may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the satellite radio tuner diagnostic trouble code.

Check if DTC is set to the satellite radio tuner.

Q: Is the DTC set?

YES : Troubleshoot the satellite radio (Refer to P.54A-468).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the satellite radio tuner, then go to Step 4.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the satellite radio tuner and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the satellite radio tuner and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0197: Hands free module CAN timeout

⚠ CAUTION
- **If DTC U0197 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from hands free module cannot be received, the ETACS-ECU sets DTC U0197.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the hands free module cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

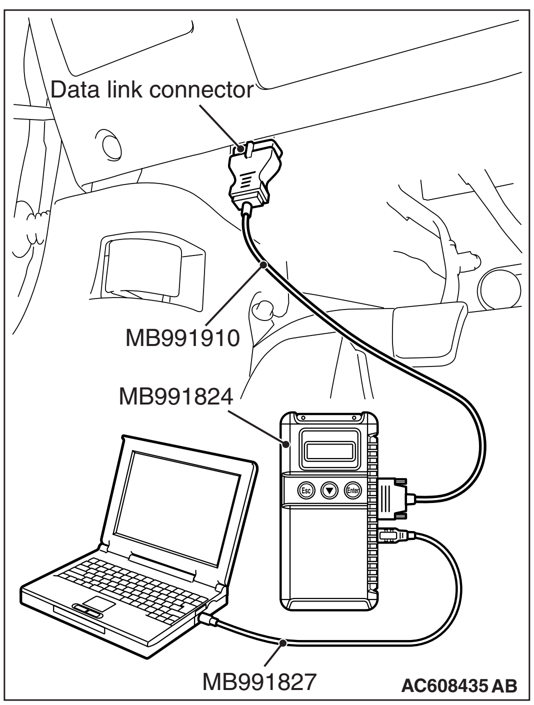
- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

TROUBLESHOOTING HINTS

- The hands free module may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the hands free module diagnostic trouble code.

Check if DTC is set to the hands free module.

Q: Is the DTC set?

YES : Troubleshoot the hands free telephone system (Refer to P.54A-409).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the hands free module, then go to Step 4.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the hands free module and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the hands free module and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U0245: Audio visual navigation unit CAN timeout

⚠ CAUTION

- **If DTC U0245 is set to the ETACS-ECU, always diagnose the CAN bus line.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

TROUBLE JUDGEMENT

If the signal from CAN box unit (audio visual navigation unit) cannot be received, the ETACS-ECU sets DTC U0245.

JUDGEMENT CRITERIA

After the following statuses continue to be true for 5 seconds, if the communication with the CAN box unit (audio visual navigation unit) cannot be established for 0.6 second or more, the ETACS-ECU determines that a problem has occurred.

- No abnormality is present to the network.
- Ignition switch is in the ON position.
- No abnormality is present to the power supply fuse, or the odometer value is at 80.5 km (50.0 miles) or more.
- ETACS-ECU system voltage is at 10–16 volts.

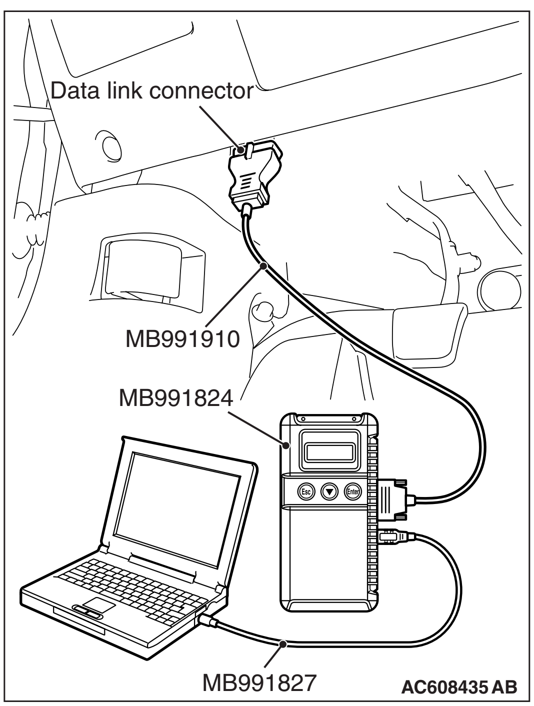
TROUBLESHOOTING HINTS

- The CAN box unit may be defective.
- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the audio visual navigation unit diagnostic trouble code.

Check if DTC is set to the audio visual navigation unit.

Q: Is the DTC set?

YES : Troubleshoot the MMCS (Refer to P.54A-328).
NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the CAN box unit (audio visual navigation unit), then go to Step 4.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the CAN box unit (audio visual navigation unit) and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction such as a poor connection or open circuit in the CAN bus lines between the CAN box unit (audio visual navigation unit) and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC U1108: Excess CAN-B ECU Detection

⚠ CAUTION
If the DTC U1108 is set to the ETACS-ECU, always diagnose the CAN bus line.

TROUBLE JUDGEMENT

If the ETACS-ECU receives the signal from the CAN-B line ECU which does not exist in the written variant code information, the ETACS-ECU sets DTC U1108.

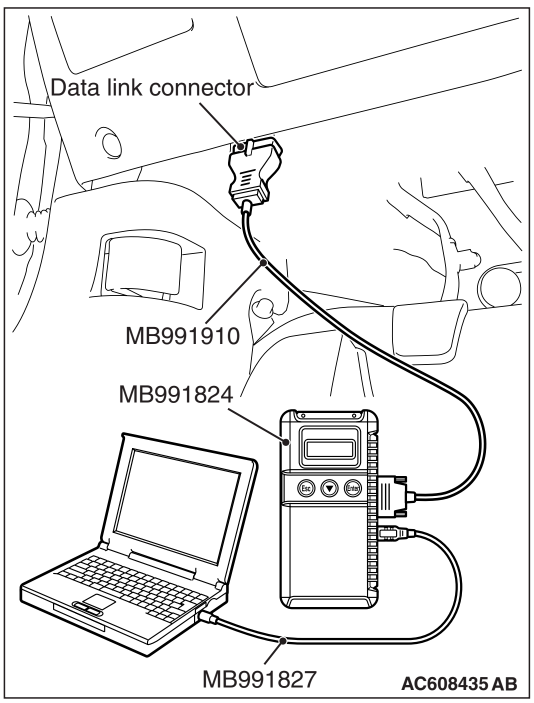
TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective.
- The CAN bus may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Variant code check.
Check the variant code written to the ETACS-ECU, and check whether it matches the ECU connected to the CAN-B line.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Make a correction so that the ECU connected to the CAN-B line matches with the variant code information, and then go to Step 3.

STEP 3. Recheck for diagnostic trouble code.
Check again if the DTC is set to the ETACS-ECU.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : This diagnosis is complete.

DTC U1120: Bus line (CAN-C) low input
DTC U1121: Bus line (CAN-C) high input

TROUBLE JUDGEMENT

When the CAN bus line voltage is in the following states, the ETACS-ECU set the DTC.

- If the CAN bus line voltage is 0.3 volt or less, DTC U1120 is set.
- If the CAN bus line voltage is 4.7 volts or more, DTC U1121 is set.

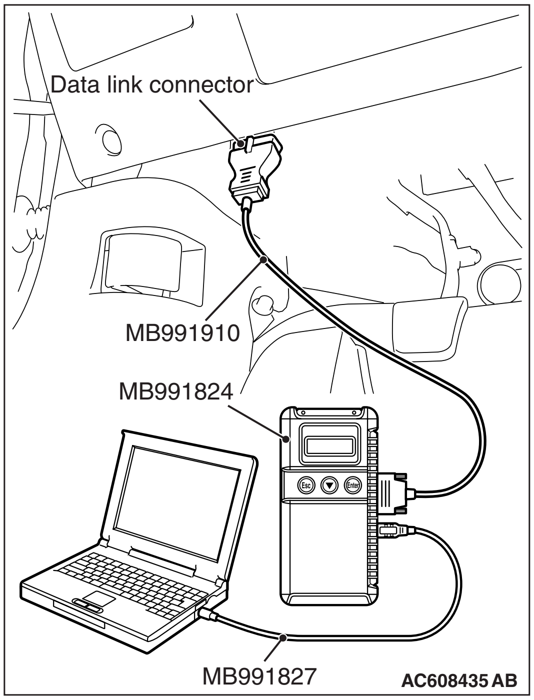
TROUBLESHOOTING HINTS

- The CAN bus line may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The diagnosis is complete.

DTC U0331: ECU internal error

TROUBLE JUDGEMENT

If the ETACS-ECU error counter value is detected to be "255," DTC U0331 is set, and the ETACS-ECU is reset. The DTC U0331 exists only as past trouble.

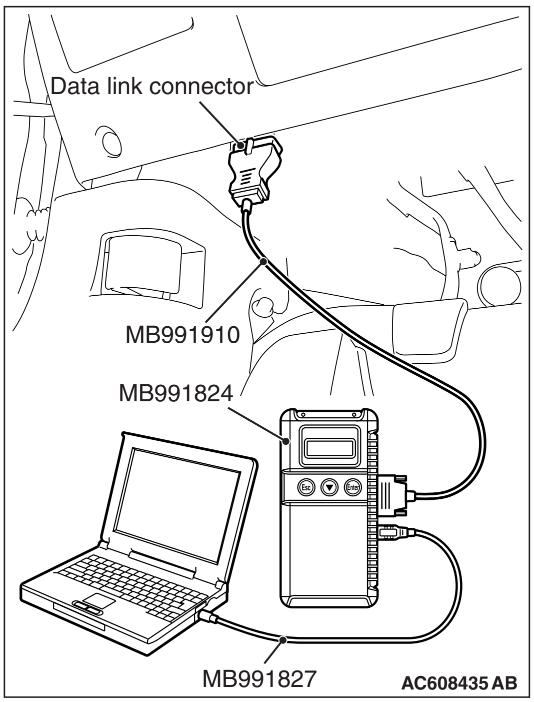
TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The diagnosis is complete.

DTC B1761: VIN not recorded

TROUBLE JUDGEMENT

If the VIN is not written to the ETACS-ECU, the ETACS-ECU sets DTC B1761.

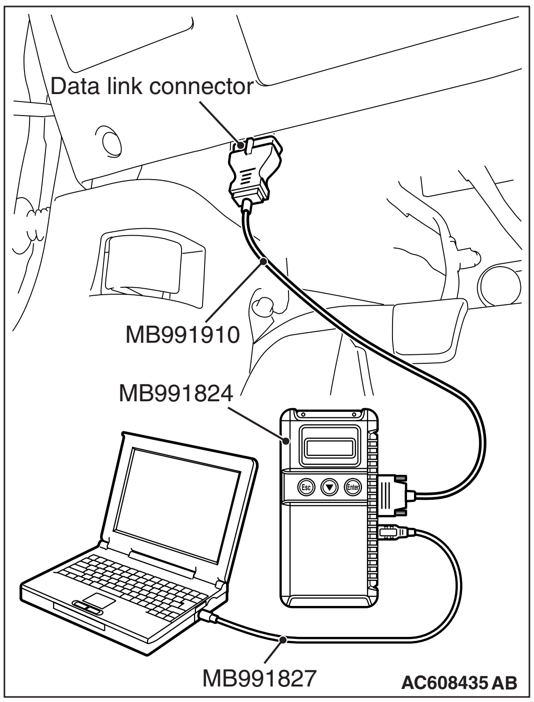
TROUBLESHOOTING HINTS

- Chassis number not recorded
- The ETACS-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(5) Check if DTC is set.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

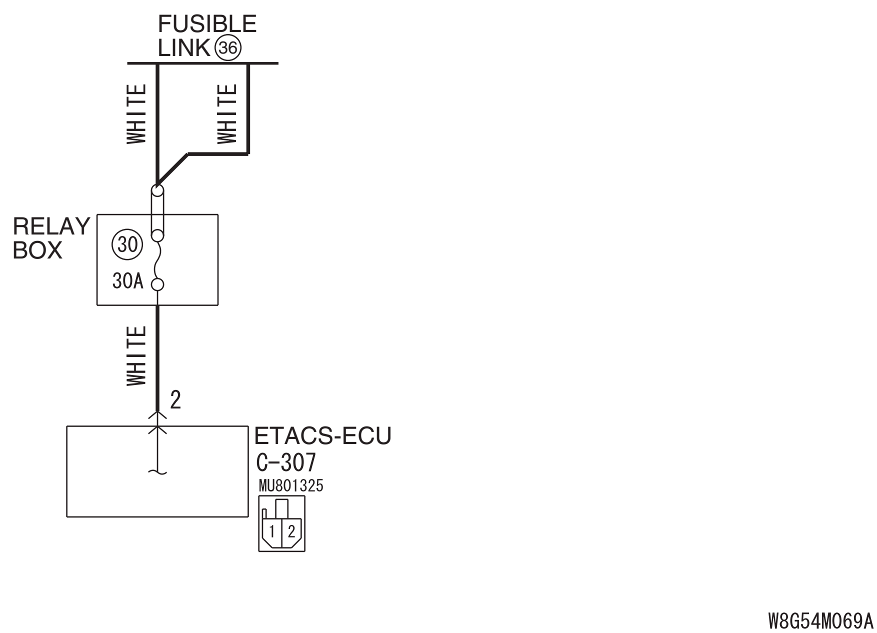
YES : Replace with the coded ETACS-ECU.
NO : The diagnosis is complete.

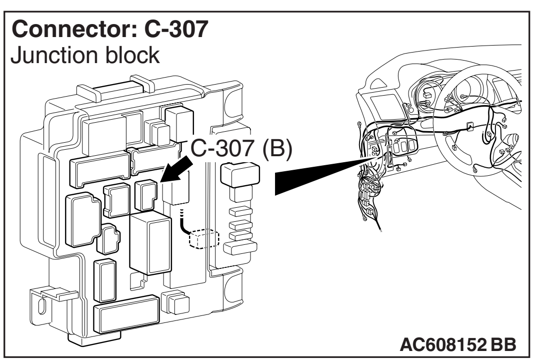
DTC B210A: +B power supply (low input)
DTC B210B: +B power supply (high input)

⚠ CAUTION

Before replacing the ECU, ensure that the input and output signal circuits are normal.

ETACS-ECU Power Supply Circuit





TROUBLE JUDGEMENT

The ETACS-ECU sets DTC B210A if the power supply fuse voltage decreases to the specified value or less, and sets DTC B210B if the power supply fuse voltage increases to the specified value or more. However, when the status returns to normal, the ETACS-ECU automatically erases DTCs B210A and B210B.

TECHNICAL DESCRIPTION (COMMENT)

The power supply fuse or the ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- The power supply fuse may be defective.
- The ETACS-ECU may be defective.
- The battery may be defective.
- The alternator may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Power supply fuse check.

Q: Is the fuse in good condition?

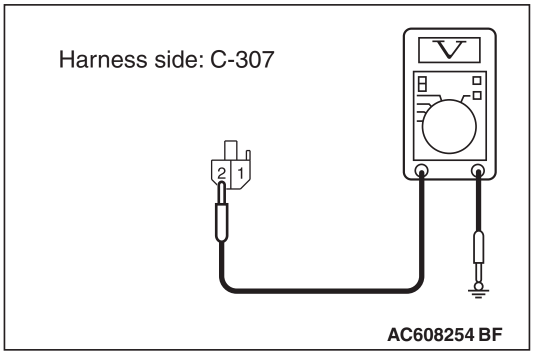
YES : Go to Step 2.
NO : Replace the power supply fuse, and then go to Step 2.

STEP 2. Check ETACS-ECU connector C-307 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-307 in good condition?

YES : Go to Step 3.
NO : Repair or replace the component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 3. Check the battery power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-307.



(1) Disconnect ETACS-ECU connector C-307 and measure the voltage available at the wiring harness side of the connector.
(2) Measure the voltage between terminal 2 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

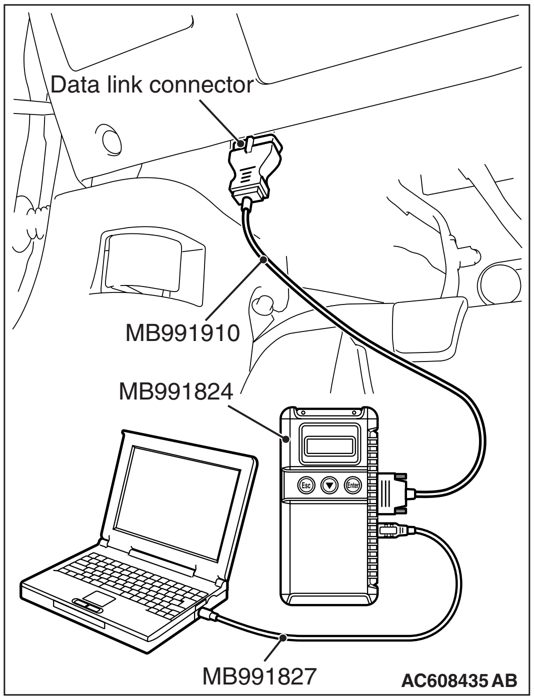
Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between ETACS-ECU connector C-307 (terminal 2) and the fusible link (36).

Q: Is the wiring harness between ETACS-ECU connector C-307 (terminal 2) and the fusible link (36) in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 5. Using scan tool MB991958, check data list.

Check the power supply fuse voltage.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Check the ETACS data list.
- Turn the ignition switch to the "ACC" position.

Item No.	Item name	Normal condition
Item 253	Voltage sensing of IOD Line	Approximately 12 volts (battery positive voltage)

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do the scan tool MB991958 display the item "voltage sensing of IOD Line" is normal condition?

YES : Go to Step 6.
NO : Replace the ETACS-ECU.

STEP 6. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DTC B222C: Coding incomplete

TROUBLE JUDGEMENT

If the ETACS-ECU is in the initial state or the variant coding is incomplete, the ETACS-ECU sets DTC B222C.

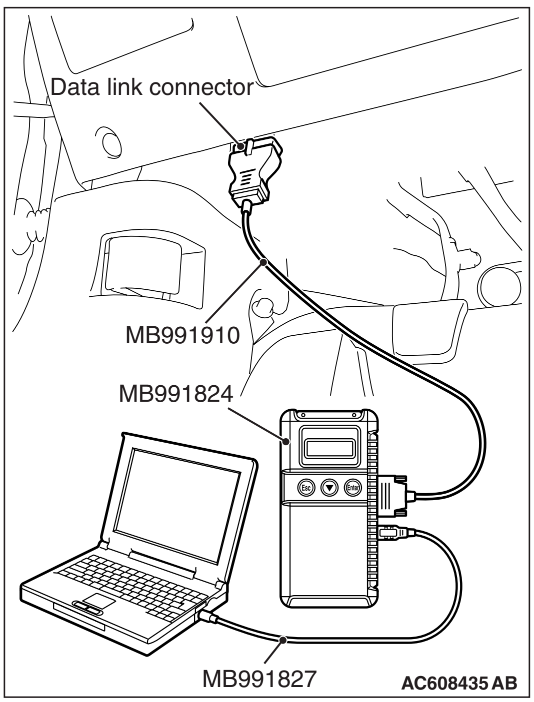
TROUBLESHOOTING HINTS

- Variant code not written
- The ETACS-ECU may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Perform the variant coding to the ETACS-ECU.
(4) Erase the DTC.
(5) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(6) Check if DTC is set.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace with the coded ETACS-ECU.
NO : The diagnosis is complete.

DTC B2206: Chassis number does not match

⚠ CAUTION

If DTC B2206 is set, always diagnose the CAN bus line.

TROUBLE JUDGEMENT

If the registered chassis number is different from the chassis number transmitted on the CAN bus lines, the ETACS-ECU sets DTC B2206.

JUDGEMENT CRITERIA

If the chassis number registered to ETACS-ECU and the chassis number on CAN bus lines do not match, the ETACS-ECU determines that a problem has occurred.

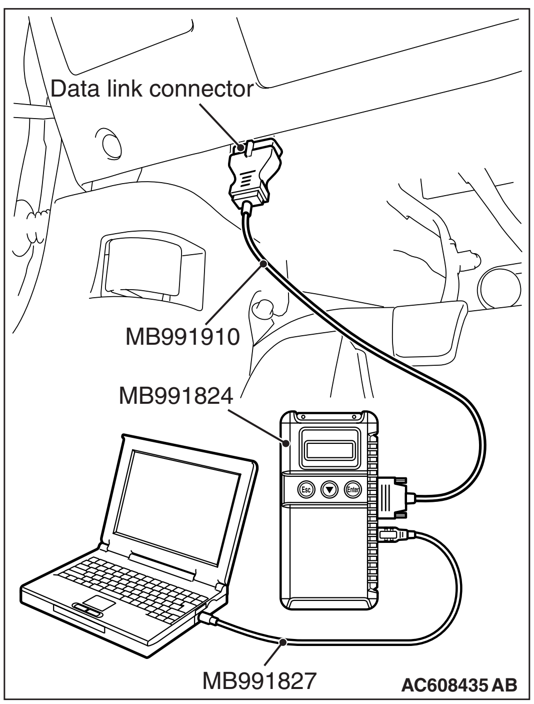
TROUBLESHOOTING HINTS

- Chassis number not written
- The ETACS-ECU may be defective.
- The engine control module may be defective.
- The CAN bus line may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, read the engine control module diagnostic trouble code.

Check if DTC is set to the engine control module.

Q: Is the DTC set?

YES : Troubleshoot the engine (Refer to GROUP 13A, Diagnostic Trouble Code Chart P.13A-46).

NO : Go to Step 3.

STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace with the coded ETACS-ECU.

NO : The diagnosis is complete.

DTC B2215: ECU internal error

TROUBLE JUDGEMENT

When the ETACS-ECU internal error count reaches "255," DTC B2215 is set.

TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective.

DIAGNOSIS

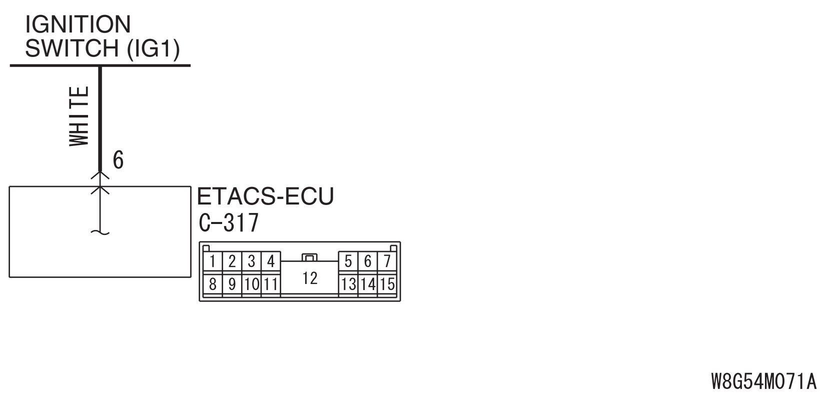
Replace the ETACS-ECU.

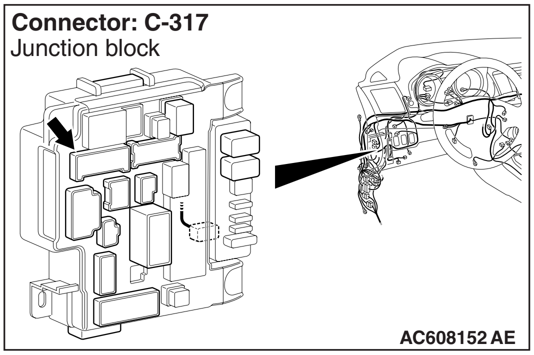
DTC B2353: Ignition power supply (low input)
DTC B2354: Ignition power supply (high input)

⚠ **CAUTION**

Before replacing the ECU, ensure that the input and output signal circuits are normal.

Ignition Switch (IG1) Input Circuit





TROUBLE JUDGMENT

These DTCs are set when the ignition power supply voltage decreases to the specified value or less (DTC B2353) or increases to the specified value or more (DTC B2354). However, when the status returns to normal, the DTCs B2353 and B2354 are automatically erased.

TECHNICAL DESCRIPTION (COMMENT)

The power supply circuit or the ETACS-ECU may have a problem.

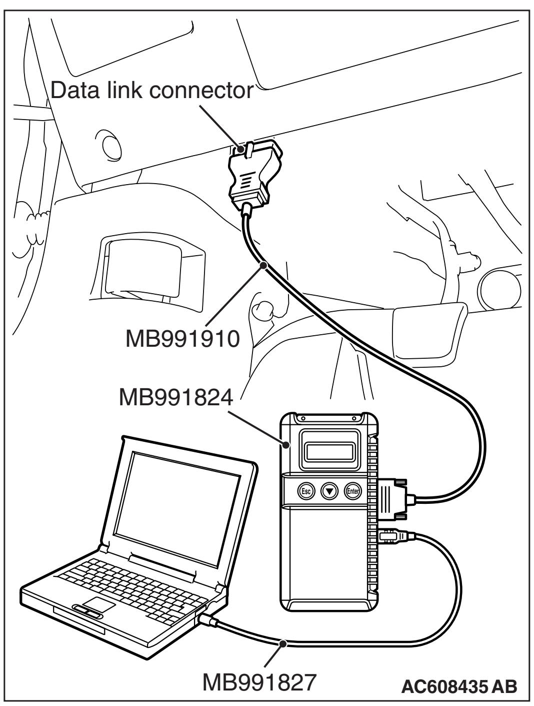
TROUBLESHOOTING HINTS

- The power supply circuit may be defective.
- The battery may be defective.
- The alternator may be defective.
- The ETACS-ECU may be defective.
- The ignition switch may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, check data list.

Check the ignition power supply voltage.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch to the "ON" position.
(3) Check the ETACS data list.
- Turn the ignition switch to the "ON" position.

Item No.	Item name	Normal condition
Item 254	IG voltage	Approximately 12 volts (battery positive voltage)

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do the scan tool MB991958 display the item "IG voltage" is normal condition?

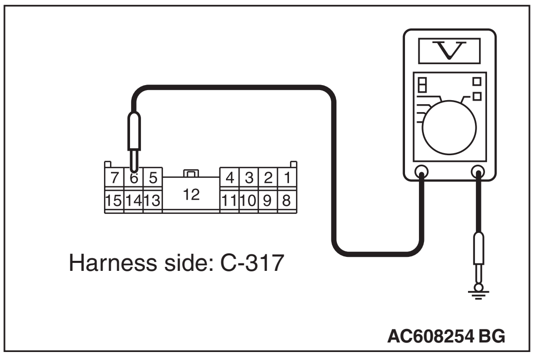
YES : Go to Step 2.
NO : Replace the ETACS-ECU.

STEP 2. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 3.
NO : Repair or replace the component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 3. Check the ignition switch (IG1) circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-317.



(1) Disconnect ETACS-ECU connector C-317 and measure the voltage available at the wiring harness side of the connector.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 6 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between ETACS-ECU connector C-317 (terminal 6) and the ignition switch (IG1).

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 6) and the ignition switch (IG1) in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 5. Recheck for diagnostic trouble .

Check again if the DTC is set to the ETACS-ECU.
(1) Erase the DTC.
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.
NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction P.00-13).

DATA LIST REFERENCE TABLE

M1545001300118

NOTE: Some items are not displayed on scan tool MB991958 according to the information in the ECU.

Item No.	Scan tool display	Condition
1	CAN-H voltage	0-4 V
2	CAN-L voltage	1-5 V
200	Original VIN writing status	Comp/Unperformed or ECU internal Err or Comp and locked
201	Current VIN writing status	Comp/Unperformed or ECU internal Err or Comp and locked
202	Internal error	No error or EEPROM error or Boot loader Err or EEPROM/Boot or ADC Error or ADC/EEPROM error or ADC/Boot error or ADC/Boot/EEPROM or PLL Error or PLL/EEPROM error or PLL/EEPROM error or PLL/Boot/EEPROM or PLL/ADC error or PLL/ADC/EEPROM or PLL/ADC/Boot or PLL/ADC/Boot/ROM
203	Process error	No error or Interrupt error or Switch error or Sequence error or Stck pointer Err or Dispatch call Er or Other error
204	Coding counter	times
205	Coding counter Option	times
206	Headlight LO ON duty	0-100%
207	Fan control relay ON duty	0-100%
208	Dome light ON duty	0-100%
209	Gate light ON duty	0-100%
210	IG key illumination	0-100%
211	Headlight Hi	ON or OFF
212	Front fog light	ON or OFF
213	Horn theft horn	ON or OFF
214	Headlight washer	ON or OFF
215	Security indicator	ON or OFF
216	IG1-2 fuel pump	ON or OFF
218	Taillight	ON or OFF
219	Turn RH/LH light	ON or OFF
220	Blower fan	ON or OFF
221	Defogger	ON or OFF
222	Interior light cut	ON or OFF
224	Door lock	ON or OFF
227	Door unlock	ON or OFF
228	Dr door unlock	ON or OFF
230	Trunk/gate opener	ON or OFF
231	Rear fog light	ON or OFF

Item No.	Scan tool display	Condition
232	ACC Relay	ON or OFF
233	Fan Lo	ON or OFF
234	Fan Hi	ON or OFF
235	Front wiper ACT	ON or OFF
236	Front wiper Lo/Hi	ON or OFF
237	Front washer	ON or OFF
238	Rear washer	ON or OFF
239	Rear wiper	ON or OFF
240	Power window	ON or OFF
241	Hold mirror open	ON or OFF
242	Hold mirror close	ON or OFF
243	Dead lock	ON or OFF
244	Independent DRL	ON or OFF
251	Auto light sensor	Voltage
252	Ambient temperature sensor	Voltage
253	Voltage sensing of IOD Line	Voltage
254	IG voltage	Voltage
255	Theft sensor	ON or OFF
256	Dr door ajar switch	Open or Close
257	As door ajar switch	Open or Close
258	RR door ajar switch	Open or Close
259	RL door ajar switch	Open or Close
260	Trunk/gate trunk ajar switch	Open or Close
262	dome light center ON switch	ON or OFF
263	dome light center OFF switch	ON or OFF
264	Handle lock switch	Key out or Key in
265	Hazard switch	ON or OFF
266	Hood switch	ON or OFF
267	Mirror switch	ON or OFF
268	Trunk/gate opener switch	ON or OFF
270	Dr door lock switch	Lock or Not lock
271	Dr door unlock switch	Unlock or Not Unlock
272	As door unlock switch	Unlock or Not Unlock
273	Except Dr/As door unlock switch	Unlock or Not Unlock
274	Door key lock switch	ON or OFF
275	Dr door key unlock switch	ON or OFF
276	Door key unlock switch	ON or OFF
277	Power lock switch	ON or OFF
278	Power unlock switch	ON or OFF
279	Brake fluid switch	ON or OFF

Item No.	Scan tool display	Condition
280	Washer fluid switch	ON or OFF
281	ASC/TCL OFF switch	ON or OFF
287	Starter switch	ON or OFF
288	ACC switch	ON or OFF
289	Backup light or shift reveres SW	ON or OFF
290	Brake switch	ON or OFF
291	Front wiper auto stop switch	ON or OFF
292	Rear wiper auto stop switch	ON or OFF
293	Process error information	–
294	Process error	times
295	Rear sunroof unlock	ON or OFF
340	Headlight switch(tail)	ON or OFF
341	Headlight switch	ON or OFF
342	Headlight switch(Dimmer)	ON or OFF
343	Turn switch left	ON or OFF
344	Turn switch right	ON or OFF
345	Fog light ON	ON or OFF
346	Fog light OFF	ON or OFF
347	Switch type	LHD or RHD
348	Headlight switch(auto)	ON or OFF
349	Headlight cleaner	ON or OFF
350	Headlight switch(flasher)	ON or OFF
351	Column ECU sleep	OK or NG
352	Front wiper(INT)	ON or OFF
353	Front wiper(LO)	ON or OFF
354	Front wiper(HI)	ON or OFF
355	Front wiper(washer)	ON or OFF
356	Rear wiper	ON or OFF
357	Rear wiper(washer)	ON or OFF
358	Front wiper(MIST)	ON or OFF
359	Front wiper(interval volume)	–
360	Wiper switch lever fail	No fail or Fail
361	Turn/Light switch lever fail	No fail or Fail

TROUBLE SYMPTOM CHART

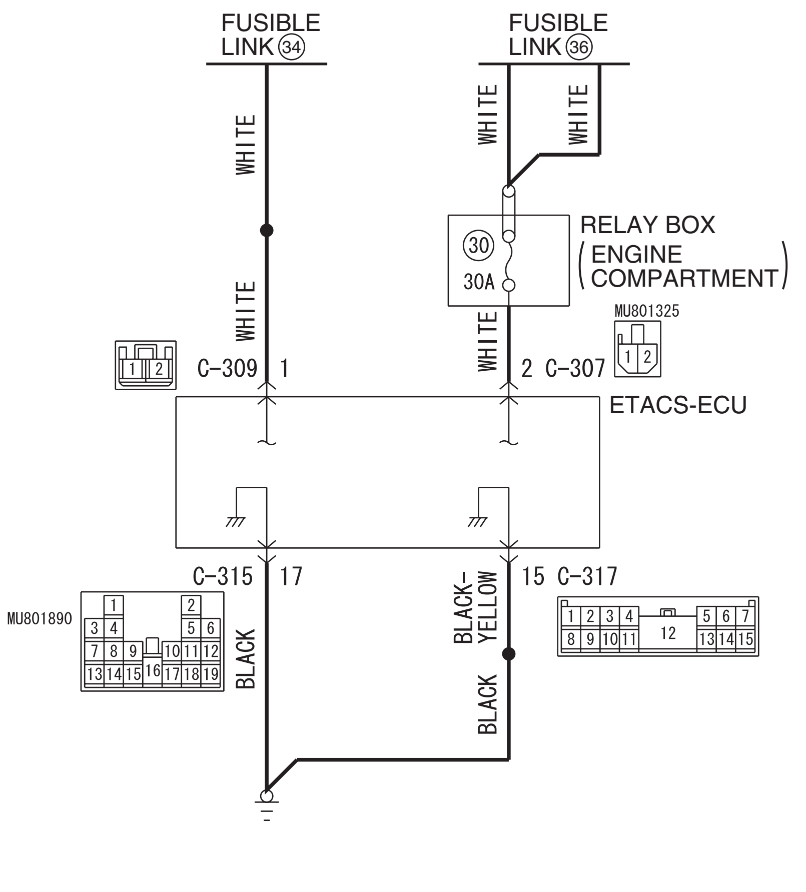
M1545001200111

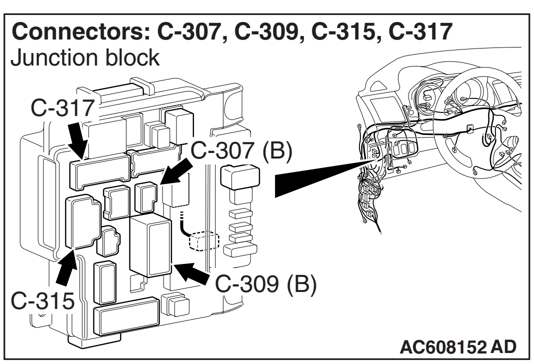
Trouble symptom	Reference page
Malfunction of ETACS-ECU power supply circuit	P.54A-525

SYMPTOM PROCEDURES

Malfunction of ETACS-ECU power supply circuit

ETACS-ECU Power Supply Circuit





TECHNICAL DESCRIPTION (COMMENT)

If the ETACS-ECU functions do not work at all, the ETACS-ECU power supply system, earth system, or ETACS-ECU may have a problem.

TROUBLESHOOTING HINTS

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector
- The ETACS-ECU may be defective

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

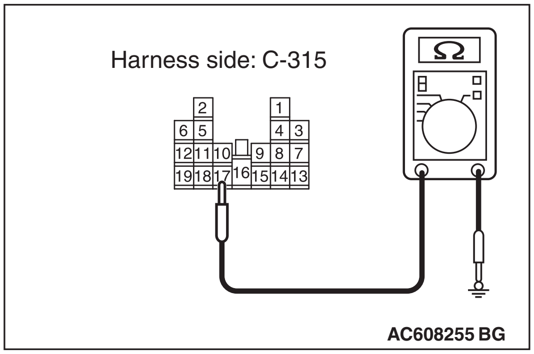
STEP 1. Check ETACS-ECU connectors C-315 and C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connectors C-315 and C-317 in good condition?

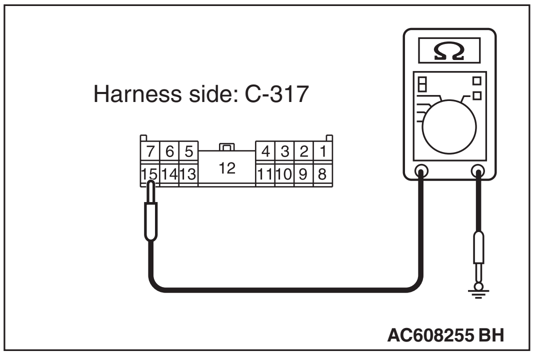
YES : Go to Step 2.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 2. Check the ground circuit to the ETACS-ECU. Measure the resistance at ETACS-ECU connectors C-315 and C-317.

(1) Disconnect ETACS-ECU connector C-315 and C-317 and measure the resistance available at the wiring harness side of the connector.



(2) Measure the resistance value between ETACS-ECU connector C-315 terminal 17 and ground.
- The resistance should be 2 ohms or less.



(3) Measure the resistance value between ETACS-ECU connector C-317 terminal 15 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the wiring harness between ETACS-ECU connector C-315 (terminal 17) or C-317 (terminal 15) and the ground.

Q: Is the wiring harness between ETACS-ECU connector C-315 (terminal 17) or C-317 (terminal 15) and the ground in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Check ETACS-ECU connectors C-307 and C-309 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

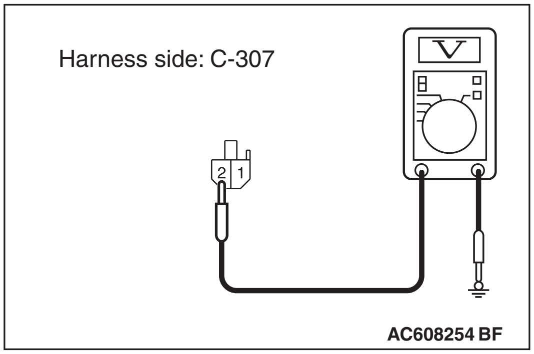
Q: Is ETACS-ECU connectors C-307 and C-309 in good condition?

YES : Go to Step 5.

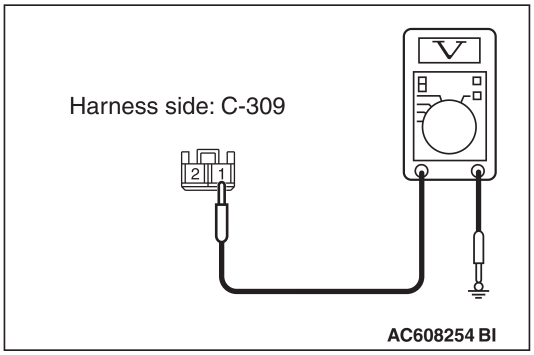
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 5. Check the battery power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connectors C-307 and C-309.

(1) Disconnect ETACS-ECU connectors C-307 and C-309 measure the voltage available at the wiring harness side of the connector.



(2) Measure the voltage between ETACS-ECU connector C-307 terminal 2 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).



(3) Measure the voltage between ETACS-ECU connector C-309 terminal 1 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Check the wiring harness between ETACS-ECU connectors C-307 (terminal 2) or C-309 (terminal 1) and the fusible link (36) or (34).

Q: Is the wiring harness between ETACS-ECU connectors C-307 (terminal 2) or C-309 (terminal 1) and the fusible link (36) or (34) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. The system should communicate with the ETACS-ECU normally.

STEP 7. Retest the system

Check that the ETACS-ECU functions work normally.

Q: Is the check result satisfactory?

YES : The procedure is complete (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

TROUBLE SYMPTOM CHART FOR INPUT SIGNAL

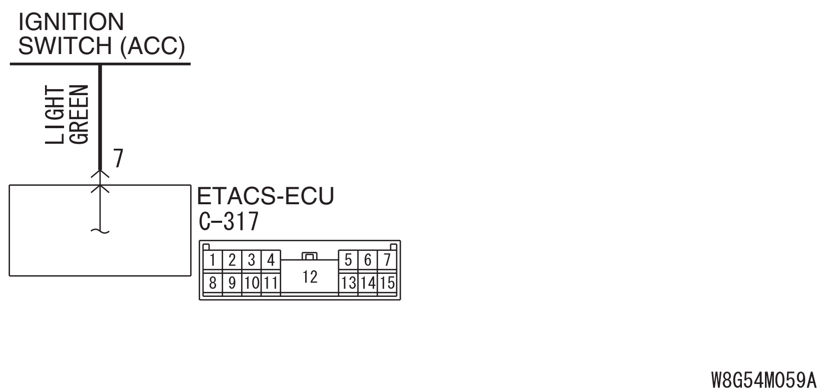
M1545004900090

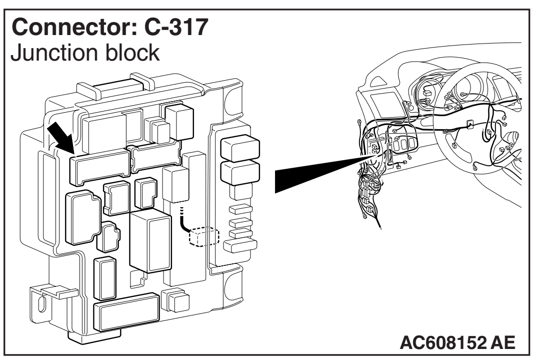
Trouble symptom	Inspection Procedure No.	Reference page
ETACS-ECU does not receive any signal from the ignition switch (ACC).	1	P.54A-529
ETACS-ECU does not receive any signal from the ignition switch (IG1).	2	P.54A-531
ETACS-ECU does not receive any signal from the key reminder switch.	3	P.54A-533
ETACS-ECU does not receive any signal from the front door lock actuator.	4	P.54A-536
ETACS-ECU does not receive any signal from the front door switch (LH).	5	P.54A-543
ETACS-ECU does not receive any signal from the front door switch (RH).	6	P.54A-545
ETACS-ECU does not receive any signal from the rear door switch (LH).	7	P.54A-548
ETACS-ECU does not receive any signal from the rear door switch (RH).	8	P.54A-550
ETACS-ECU does not receive any signal from the trunk lid actuator and switch.	9	P.54A-553
ETACS-ECU does not receive any signal from the hazard warning light switch.	10	P.54A-557
ETACS-ECU does not receive any signal from the column switch signal.	11	P.54A-559

INPUT SIGNAL PROCEDURES

Inspection Procedure 1: ETACS-ECU does not receive any signal from the ignition switch (ACC).

Ignition Switch (ACC) Input Circuit





TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the ignition switch (ACC) input signal, or the ACC relay inside the ETACS-ECU does not operate, the ignition switch (ACC) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective
- The ignition switch may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

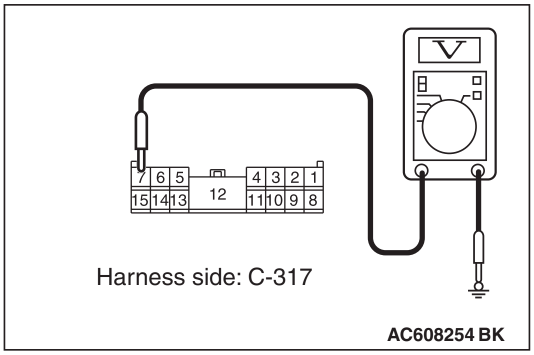
STEP 1. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of ignition switch (ACC) is normal.

STEP 2. Check the ignition switch (ACC) line of the power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-317.



(1) Disconnect ETACS-ECU connector C-317 and measure the voltage available at the junction block side of the connector.
(2) Turn the ignition switch to the "ACC" position.
(3) Measure the voltage between terminal 7 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Replace the ETACS-ECU. Check that the input signal of ignition switch (ACC) is normal.
NO : Go to Step 3.

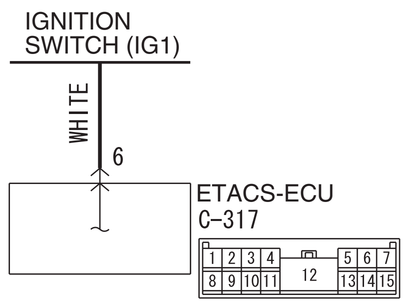
STEP 3. Check the wiring harness between ETACS-ECU connector C-317 (terminal 7) and the ignition switch (ACC).

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 7) and ignition switch (ACC) in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of ignition switch (ACC) is normal.

Inspection Procedure 2: ETACS-ECU does not receive any signal from the ignition switch (IG1).

Ignition Switch (IG1) Input Circuit



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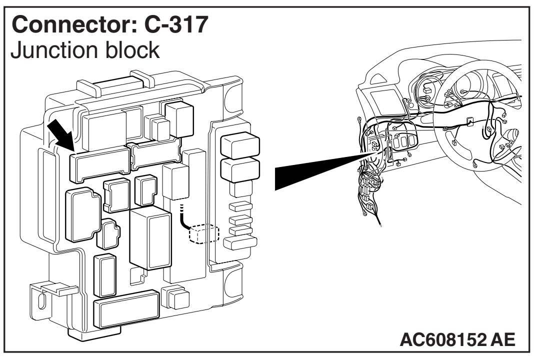


TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the ignition switch (IG1) input signal, or the IG1 relay inside the ETACS-ECU does not operate, the ignition switch (IG1) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The ignition switch may be defective
- The ETACS-ECU may be defective
- The fuse may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

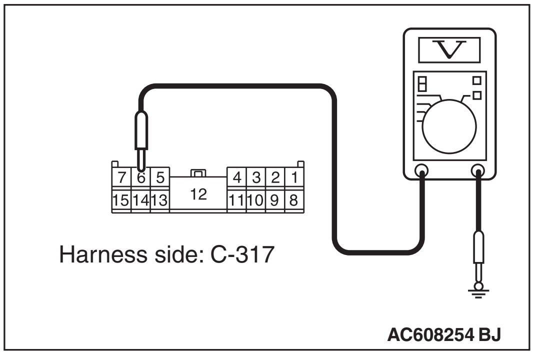
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of ignition switch (IG1) is normal.



STEP 2. Check the ignition switch (IG1) line of the power supply circuit to the ETACS-ECU. Measure the voltage at ETACS-ECU connector C-317.

(1) Disconnect ETACS-ECU connector C-317 and measure the voltage available at the junction block side of the connector.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 6 and ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Replace the ETACS-ECU. Check that the input signal of ignition switch (IG1) is normal.
NO : Go to Step 3.

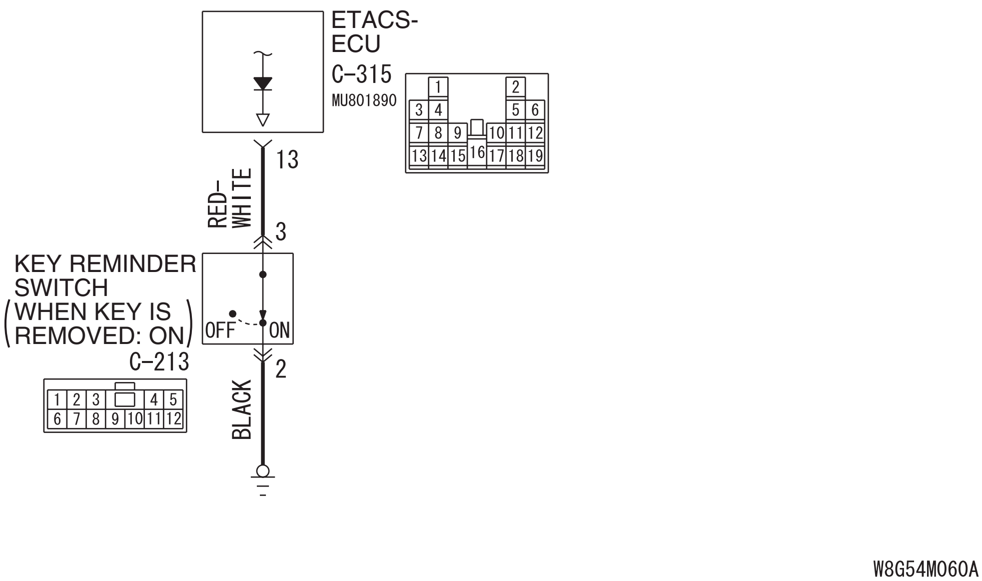
STEP 3. Check the wiring harness between ETACS-ECU connector C-317 (terminal 6) and the ignition switch (IG1).

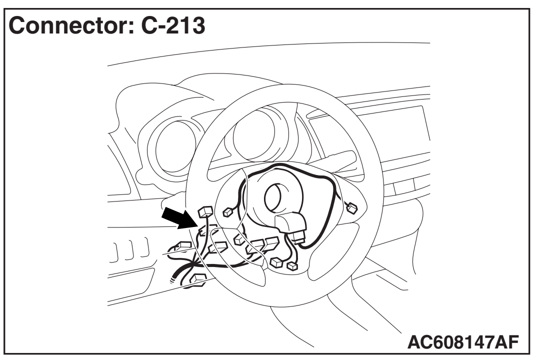
Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 6) and ignition switch (IG1) in good condition?

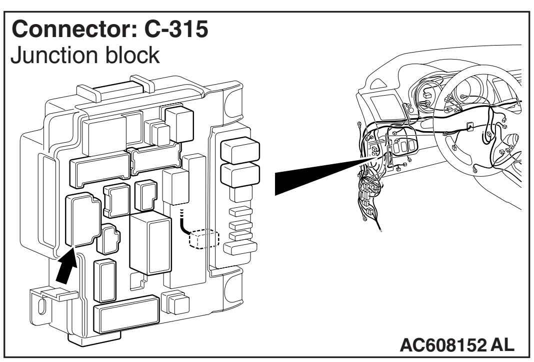
YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of ignition switch (IG1) is normal.

Inspection Procedure 3: ETACS-ECU does not receive any signal from the key reminder switch.

Key Reminder Switch Input Circuit







COMMENTS ON TROUBLE SYMPTOM

The key reminder switch input signal is used for the operation judgement of the functions below. If the signal is abnormal, these functions will not work.

- Ignition key reminder function
- Central door locking
- Keyless entry system
- KOS
- Ignition key cylinder illumination light
- Interior light

TROUBLESHOOTING HINTS

- The key reminder switch may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check key reminder switch connector C-213 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is key reminder switch connector C-213 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of key reminder switch is normal.

STEP 2. Check the key reminder switch.

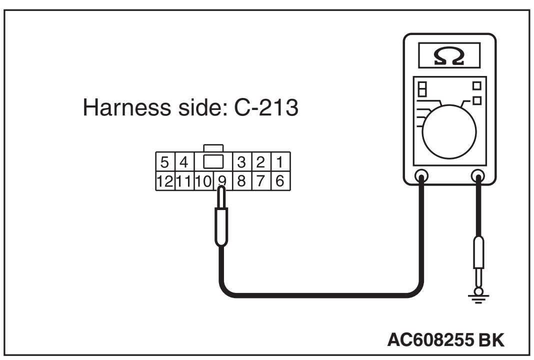
Disconnect key reminder switch connector C-213. Then check continuity between terminals.

Ignition key	Tester connection	Specified condition
Removed	2 –3	Open circuit
Inserted	2 –3	Continuity exists (2 ohms or less)

Q: Is the key reminder switch in good condition?

YES : Go to Step 3.

NO : Replace the key reminder switch. Check that the input signal of key reminder switch is normal.



STEP 3. Check the ground circuit to the key reminder switch. Measure the resistance at key reminder switch connector C-213.

(1) Disconnect key reminder switch connector C-213 and measure the resistance available at the wiring harness side of the connector.

(2) Measure the resistance value between terminal 2 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wiring harness between key reminder switch connector C-213 (terminal 2) and ground.

Q: Is the wiring harness between key reminder switch connector C-213 (terminal 2) and ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of key reminder switch is normal.

STEP 5. Check ETACS-ECU connector C-315 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-315 in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of key reminder switch is normal.

STEP 6. Check the wiring harness between key reminder switch connector C-213 (terminal 3) and ETACS-ECU connector C-315 (terminal 13).

Q: Is the wiring harness between key reminder switch connector C-213 (terminal 3) and ETACS-ECU connector C-315 (terminal 13) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of key reminder switch is normal.

STEP 7. Check for continuity between key reminder switch connector C-213 terminal 2 and each of the other terminals as well as terminal 3 and each of the other terminals.

(1) Disconnect key reminder switch connector C-213 and measure the resistance available at the equipment side of the connector.

(2) Check for continuity between key reminder switch connector C-213 terminal 2 and each of the other terminals as well as terminal 3 and each of the other terminals.

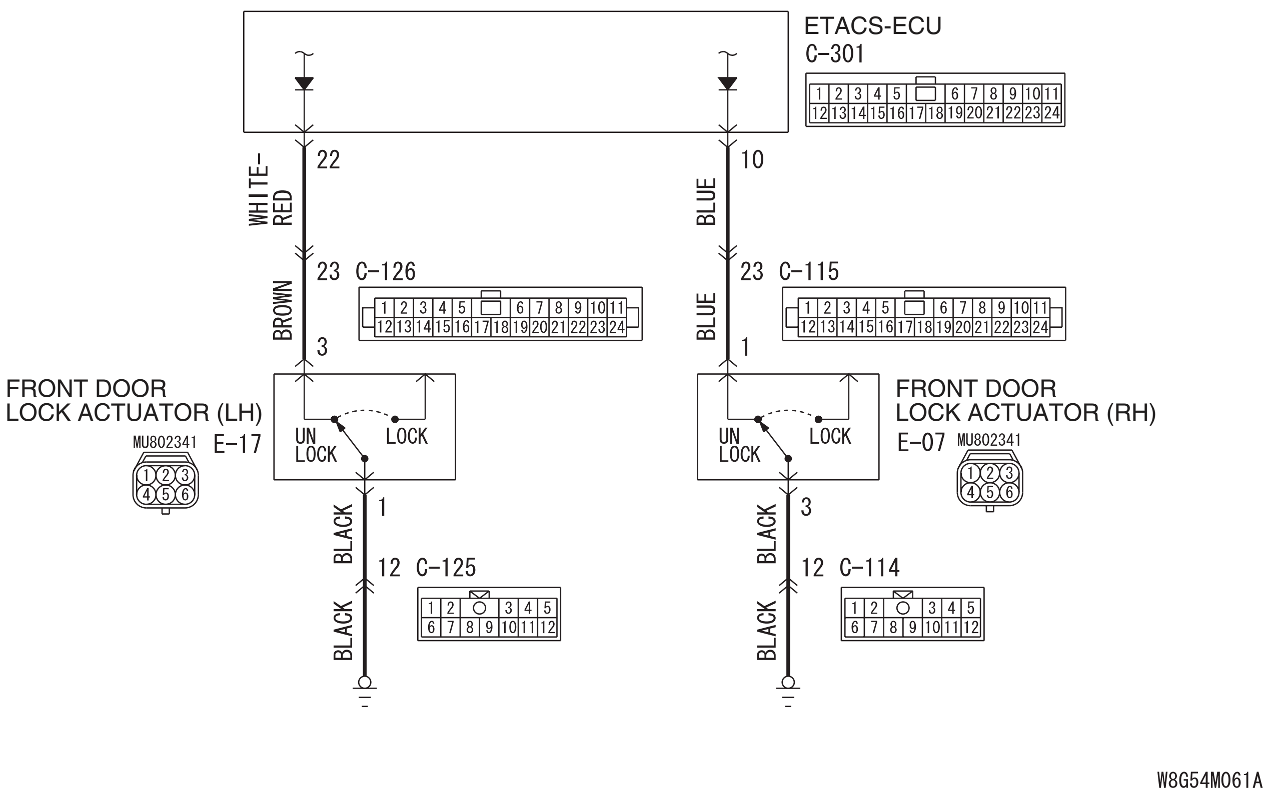
Q: Does continuity exist between the terminals?

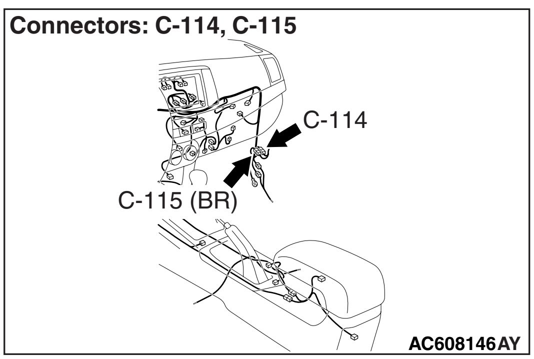
NO : Replace the ETACS-ECU. Check that the input signal of key reminder switch is normal.

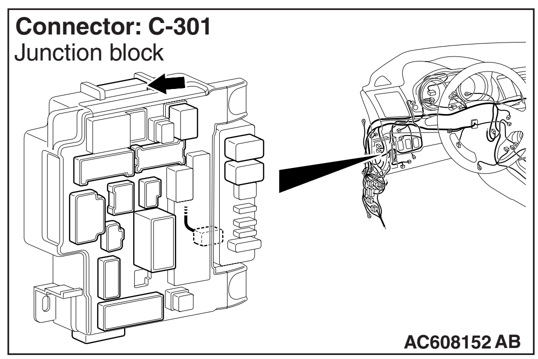
YES : Replace the key reminder switch. Check that the input signal of key reminder switch is normal.

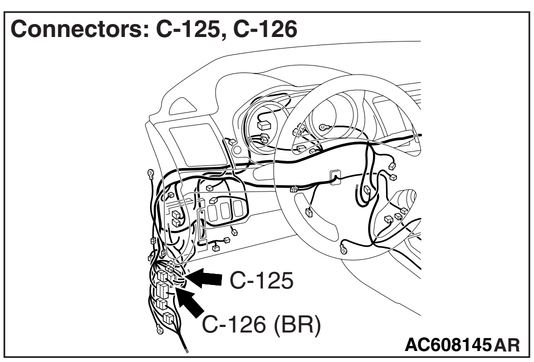
Inspection Procedure 4: ETACS-ECU does not receive any signal from the front door lock actuator.

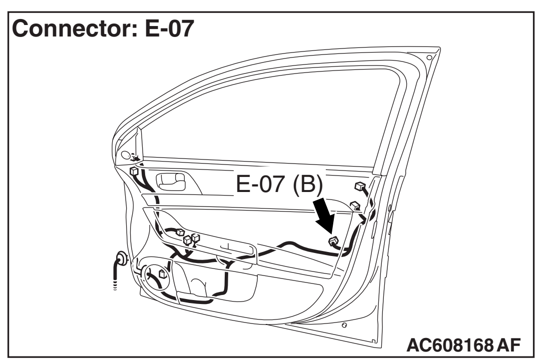
Door Look Actuator Input Circuit

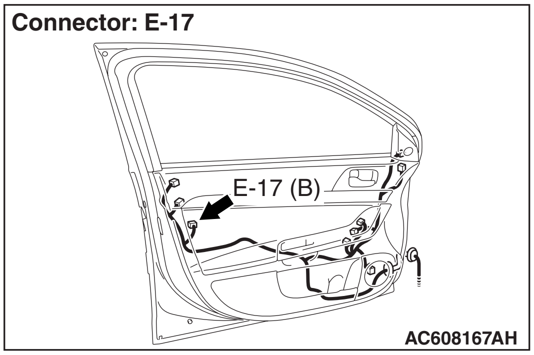












COMMENTS ON TROUBLE SYMPTOM

The front door lock actuator (LH) or front door lock actuator (RH) <vehicles with KOS> input signal is used for the operation judgement of the functions below. If the signal is abnormal, these functions will not work normally.

- Key reminder function
- Central door locking
- KOS
- Keyless entry system
- Interior light

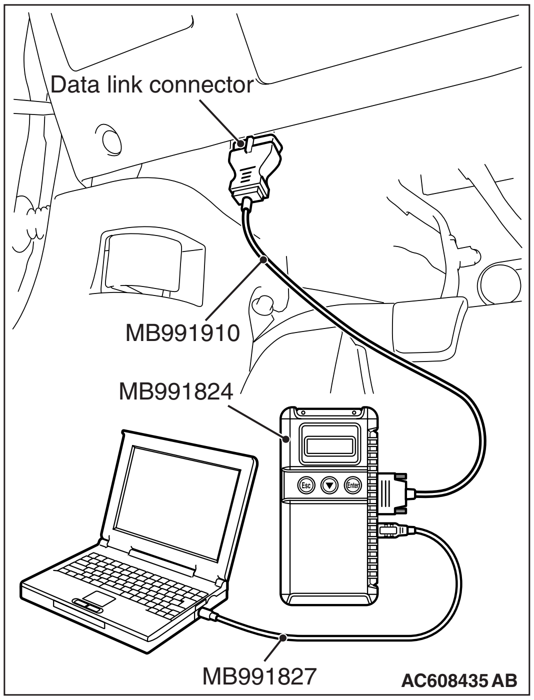
PROBABLE CAUSES

- The front door lock actuator (LH) may be defective
- The front door lock actuator (RH) may be defective <vehicles with KOS>
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, check data list.

Check the input signals from the front door lock actuators.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."

(2) Turn the ignition switch to the "ON" position.

(3) Check the ETACS data list.

- Set the driver's door to "UNLOCK."

Item No.	Item name	Normal condition
Item 271	Dr door unlock switch	Unlock

- Set the front passenger's door to "UNLOCK." <vehicles with KOS>

Item No.	Item name	Normal condition
Item 272	As door unlock switch	Unlock

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are normal conditions displayed on the "Dr door unlock switch" and "As door unlock switch"?

YES <Normal conditions are displayed for all the items> : No action is necessary and testing is complete.

NO <Normal condition is not displayed for item No.271> : Go to Step 2.

NO <Normal condition is not displayed for item No.272> : Go to Step 8.

STEP 2. Check front door lock actuator (LH) connector E-17 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front door lock actuator (LH) connector E-17 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door lock actuator (LH) is normal.

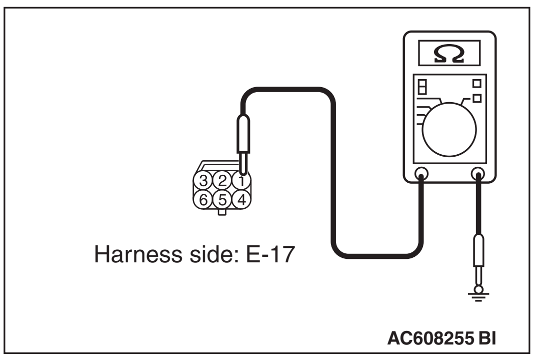
STEP 3. Check the front door lock actuator (LH).
Disconnect front door lock actuator (LH) connector E-17. Then check continuity between the terminals.

Lever position	Tester connection	Specified condition
UNLOCK	1 –3	Continuity exists (2 ohms or less)
LOCK	1 –3	Open circuit

Q: Is the front door lock actuator (LH) in good condition?

YES : Go to Step 4.
NO : Replace the front door lock actuator (LH). Check that the input signal of front door lock actuator (LH) is normal.

STEP 4. Check the ground circuit to the front door lock actuator (LH). Measure the resistance at front door lock actuator (LH) connector E-17.



(1) Disconnect front door lock actuator (LH) connector E-17 and measure the resistance available at the wiring harness side of the connector.
(2) Measure the resistance value between terminal 1 and ground.
- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Check the wiring harness between front door lock actuator (LH) connector E-17 (terminal 1) and ground.

NOTE: Also check intermediate connector C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between front door lock actuator (LH) connector E-17 (terminal 1) and ground in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door lock actuator (LH) is normal.

STEP 6. Check ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-301 in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door lock actuator (LH) is normal.

STEP 7. Check the wiring harness between front door lock actuator (LH) connector E-17 (terminal 3) and ETACS-ECU connector C-301 (terminal 22).

NOTE: Also check intermediate connector C-126 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-126 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between front door lock actuator (LH) connector E-17 (terminal 3) and ETACS-ECU connector C-301 (terminal 22) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of front door lock actuator (LH) is normal.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door lock actuator (LH) is normal.

STEP 8. Check front door lock actuator (RH) connector E-07 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front door lock actuator (RH) connector E-07 in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door lock actuator (RH) is normal.

STEP 9. Check the front door lock actuator (RH).

Disconnect front door lock actuator (RH) connector E-07. Then check continuity between the terminals.

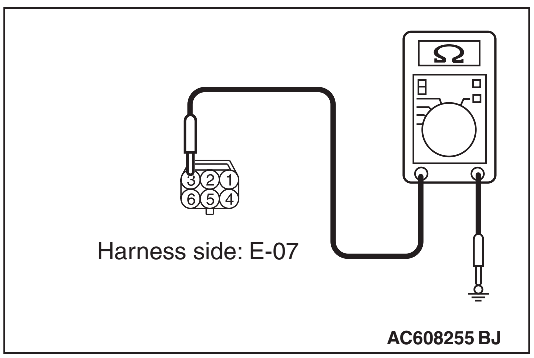
Lever position	Tester connection	Specified condition
UNLOCK	1 –3	Continuity exists (2 ohms or less)
LOCK	1 –3	Open circuit

Q: Is the front door lock actuator (RH) in good condition?

YES : Go to Step 10.

NO : Replace the front door lock actuator (RH). Check that the input signal of front door lock actuator (RH) is normal.

STEP 10. Check the ground circuit to the front door lock actuator (RH). Measure the resistance at front door lock actuator (RH) connector E-07.



(1) Disconnect front door lock actuator (RH) connector E-07 and measure the resistance available at the wiring harness side of the connector.

(2) Measure the resistance value between terminal 3 and ground.

- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 12.

NO : Go to Step 11.

STEP 11. Check the wiring harness between front door lock actuator (RH) connector E-07 (terminal 3) and ground.

NOTE: Also check intermediate connector C-114 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-114 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between front door lock actuator (RH) connector E-07 (terminal 3) and ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door lock actuator (RH) is normal.

STEP 12. Check ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-301 in good condition?

YES : Go to Step 13.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door lock actuator (RH) is normal.

STEP 13. Check the wiring harness between front door lock actuator (RH) connector E-07 (terminal 1) and ETACS-ECU connector C-301 (terminal 10).

NOTE: Also check intermediate connector C-115 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-115 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

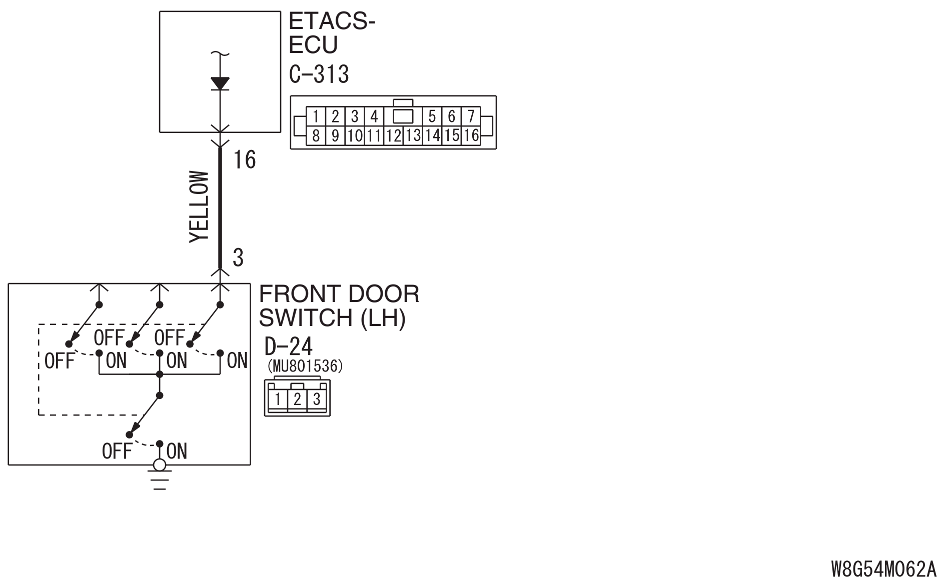
Q: Is the wiring harness between front door lock actuator (RH) connector E-07 (terminal 1) and ETACS-ECU connector C-301 (terminal 10) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of front door lock actuator (RH) is normal.

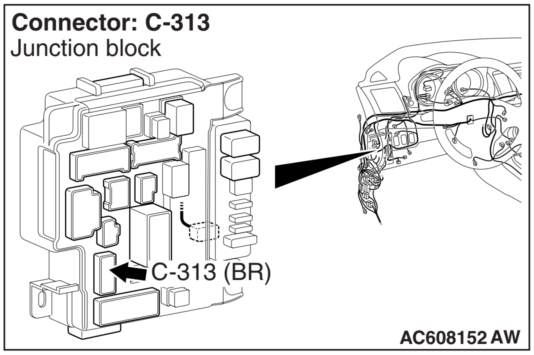
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door lock actuator (RH) is normal.

Inspection Procedure 5: ETACS-ECU does not receive any signal from the front door switch (LH).

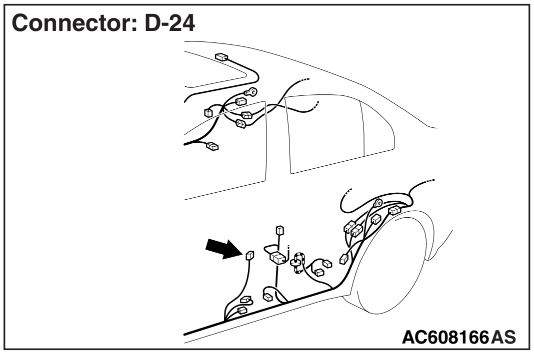
Front Door Switch (LH) Input Circuit



Connector: C-313
Junction block



Connector: D-24



TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the front door switch (LH) input signal, the front door switch (LH) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The front door switch (LH) may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check front door switch (LH) connector D-24 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front door switch (LH) connector D-24 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door switch (LH) is normal.

STEP 2. Check the front door switch (LH).

Remove the front door switch (LH). Then check the continuity between the switch terminals and the switch body.

Switch position	Tester connection	Specified condition
Released	3 –switch body	Continuity exists (2 ohms or less)
Pressed	3 –switch body	Open circuit

Q: Is the driver's door switch in good condition?

YES : Go to Step 3.

NO : Replace the front door switch (LH). Check that the input signal of front door switch (LH) is normal.

STEP 3. Measure at the lower metal part of the front door switch (LH) in order to check the ground circuit to the front door switch (LH).

NOTE: Check that the front door switch (LH) is grounded to the vehicle body by means of its mounting screw.

Remove the cap, and measure the resistance value between the lower metal part and the ground.

- The resistance should equal 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Check the fit of the switch, and repair if necessary. Check that the input signal of front door switch (LH) is normal.

STEP 4. Check ETACS-ECU connector C-313 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-313 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of front door switch (LH) is normal.

STEP 5. Check the wiring harness between driver's door switch connector D-24 (terminal 3) and ETACS-ECU connector C-313 (terminal 16).

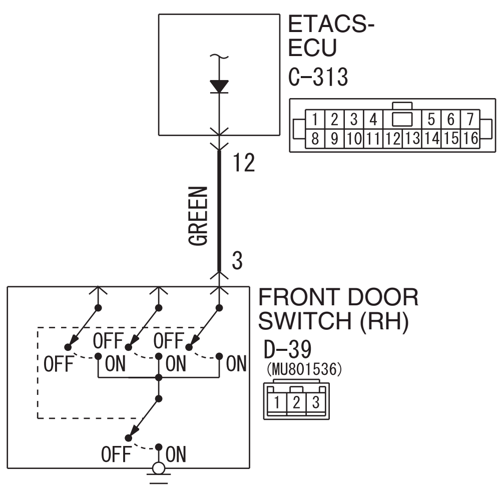
Q: Is the wiring harness between driver's door switch connector D-24 (terminal 3) and ETACS-ECU connector C-313 (terminal 16) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of front door switch (LH) is normal.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door switch (LH) is normal.

Inspection Procedure 6: ETACS-ECU does not receive any signal from the front door switch (RH).

Front Door Switch (RH) Input Circuit



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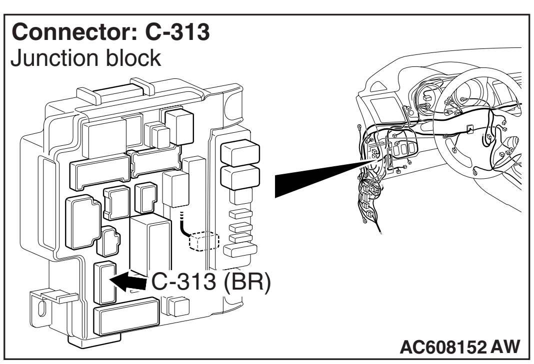
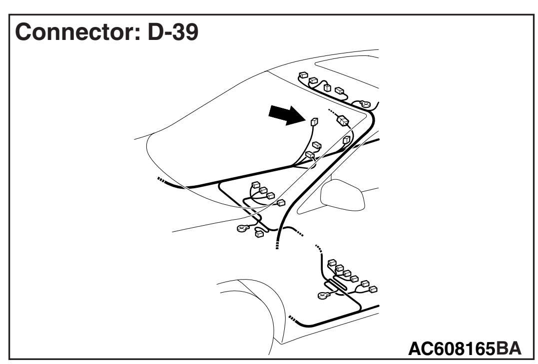




TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the front door switch (RH) input signal, the front door switch (RH) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The front door switch (RH) may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check front door switch (RH) connector D-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is front door switch (RH) connector D-35 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the input signal of front door switch (RH) is normal.

STEP 2. Check the front door switch (RH).

Remove the front door switch (RH). Then check the continuity between the switch terminals and the switch body.

Switch position	Tester connection	Specified condition
Released	3 –switch body	Continuity exists (2 ohms or less)
Pressed	3 –switch body	Open circuit

Q: Is the front door switch (RH) in good condition?

YES : Go to Step 3.

NO : Replace the front door switch (RH). Check that the input signal of front door switch (RH) is normal.

STEP 3. Measure at the lower metal part of the front door switch (RH) in order to check the ground circuit to the front door switch (RH).

NOTE: Check that the front door switch (RH) is grounded to the vehicle body by means of its mounting screw.

Remove the cap, and measure the resistance value between the lower metal part and the ground.

- The resistance should equal 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Check the fit of the switch, and repair if necessary. Check that the input signal of front door switch (RH) is normal.

STEP 4. Check ETACS-ECU connector C-313 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-313 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the input signal of front door switch (RH) is normal.

STEP 5. Check the wiring harness between front door switch (RH) connector D-39 (terminal 3) and ETACS-ECU connector C-313 (terminal 12).

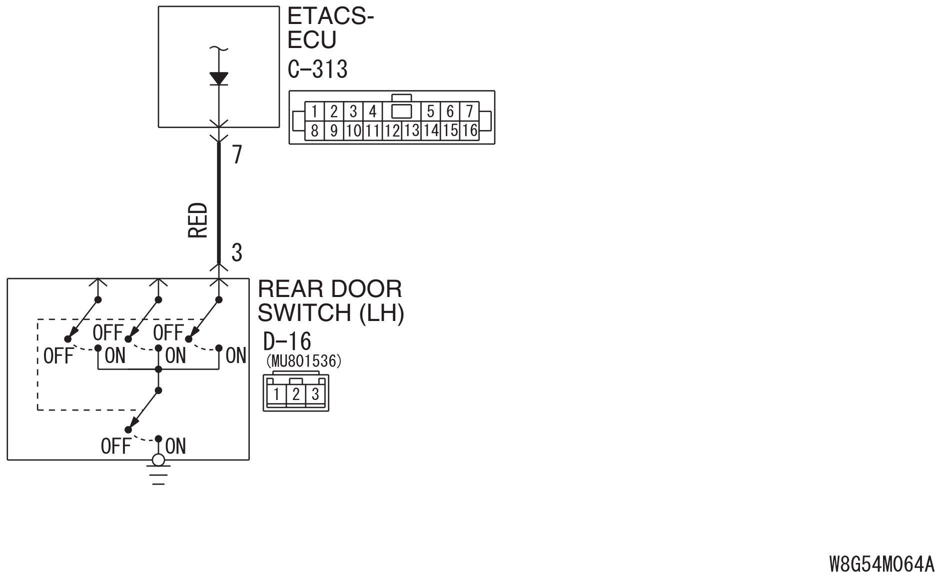
Q: Is the wiring harness between driver's door switch connector D-39 (terminal 3) and ETACS-ECU connector C-313 (terminal 12) in good condition?

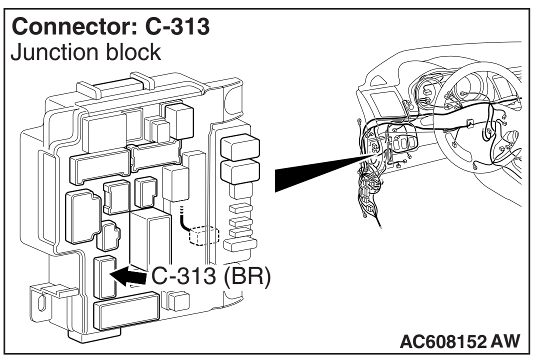
YES : Replace the ETACS-ECU. Check that the input signal of front door switch (RH) is normal.

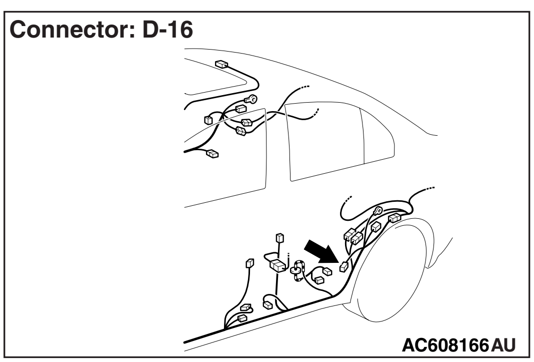
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of front door switch (RH) is normal.

Inspection Procedure 7: ETACS-ECU does not receive any signal from the rear door switch (LH).

Rear Door Switch (LH) Input Circuit







TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the rear door switch (LH) input signal, the rear door switch (LH) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The rear door switch (LH) may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check rear door switch (LH) connector D-16 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is rear door switch (LH) connector D-16 in good condition?

YES : Go to Step 2.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of rear door switch (LH) is normal.

STEP 2. Check the rear door switch (LH).
Remove the rear door switch (LH). Then check the continuity between the switch terminals and the switch body.

Switch position	Tester connection	Specified condition
Released	3 –switch body	Continuity exists (2 ohms or less)
Pressed	3 –switch body	Open circuit

Q: Is the rear door switch in good condition?

YES : Go to Step 3.
NO : Replace the rear door switch (LH). Check that the input signal of rear door switch (LH) is normal.

STEP 3. Measure at the lower metal part of the rear door switch (LH) in order to check the ground circuit to the rear door switch (LH).

NOTE: Check that the rear door switch (LH) is grounded to the vehicle body by means of its mounting screw.
Remove the cap, and measure the resistance value between the lower metal part and the ground.

- The resistance should equal 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.
NO : Check the fit of the switch, and repair if necessary. Check that the input signal of rear door switch (LH) is normal.

STEP 4. Check ETACS-ECU connector C-313 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-313 in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of rear door switch (LH) is normal.

STEP 5. Check the wiring harness between driver's door switch connector D-16 (terminal 3) and ETACS-ECU connector C-313 (terminal 7).

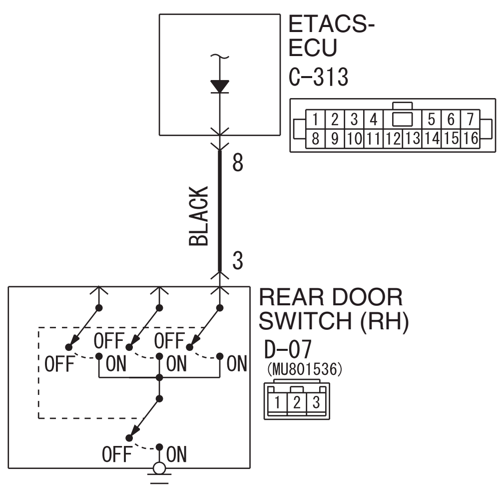
Q: Is the wiring harness between rear door switch connector D-16 (terminal 3) and ETACS-ECU connector C-313 (terminal 7) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of rear door switch (LH) is normal.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of rear door switch (LH) is normal.

Inspection Procedure 8: ETACS-ECU does not receive any signal from the rear door switch (RH).

Rear Door Switch (RH) Input Circuit



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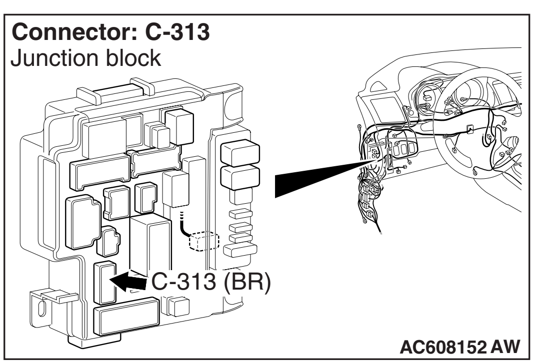
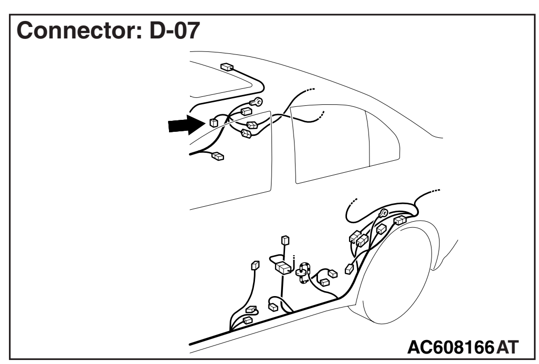




TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the rear door switch (RH) input signal, the rear door switch (RH) signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The rear door switch (RH) may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check rear door switch (RH) connector D-07 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is rear door switch (RH) connector D-07 in good condition?

YES : Go to Step 2.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of rear door switch (RH) is normal.

STEP 2. Check the rear door switch (RH).
Remove the rear door switch (RH). Then check the continuity between the switch terminals and the switch body.

Switch position	Tester connection	Specified condition
Released	3 –switch body	Continuity exists (2 ohms or less)
Pressed	3 –switch body	Open circuit

Q: Is the rear door switch in good condition?

YES : Go to Step 3.
NO : Replace the rear door switch (RH). Check that the input signal of rear door switch (RH) is normal.

STEP 3. Measure at the lower metal part of the rear door switch (RH) in order to check the ground circuit to the rear door switch (RH).

NOTE: Check that the rear door switch (RH) is grounded to the vehicle body by means of its mounting screw.
Remove the cap, and measure the resistance value between the lower metal part and the ground.

- The resistance should equal 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.
NO : Check the fit of the switch, and repair if necessary. Check that the input signal of rear door switch (RH) is normal.

STEP 4. Check ETACS-ECU connector C-313 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-313 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of rear door switch (RH) is normal.

STEP 5. Check the wiring harness between driver's door switch connector D-07 (terminal 3) and ETACS-ECU connector C-313 (terminal 8).

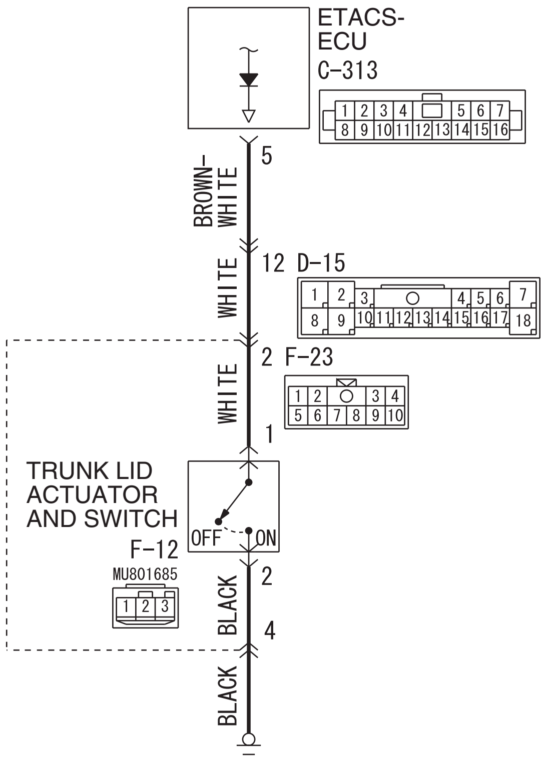
Q: Is the wiring harness between rear door switch connector D-07 (terminal 3) and ETACS-ECU connector C-313 (terminal 8) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of rear door switch (RH) is normal.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of rear door switch (RH) is normal.

Inspection Procedure 9: ETACS-ECU does not receive any signal from the trunk lid actuator and switch.

Trunk Lid Actuator and Switch Input Circuit



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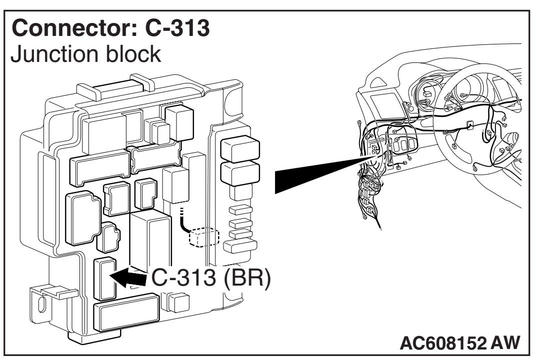
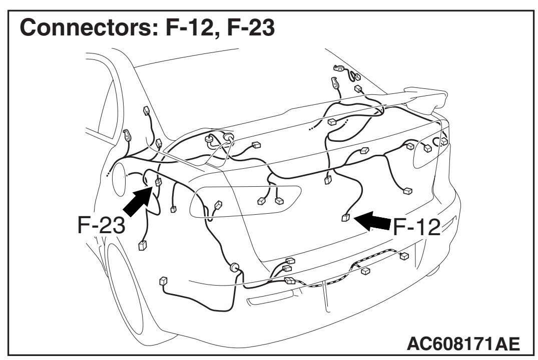


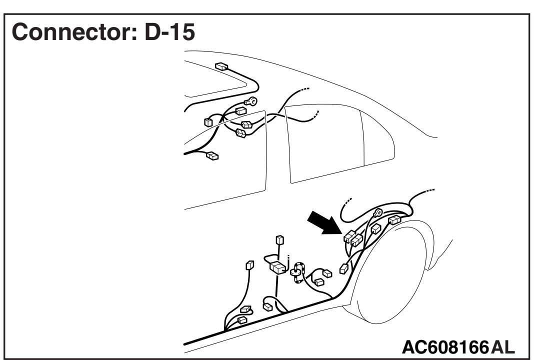
Connector: C-313
Junction block

AC608152 AW



Connectors: F-12, F-23

AC608171AE



Connector: D-15

AC608166AL

TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the trunk lid actuator and switch input signal, the trunk lid actuator and switch signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The trunk lid actuator and switch may be defective
- The ETACS-ECU may be defective

- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check trunk lid actuator and switch connector F-12 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is trunk lid actuator and switch connector F-12 in good condition?

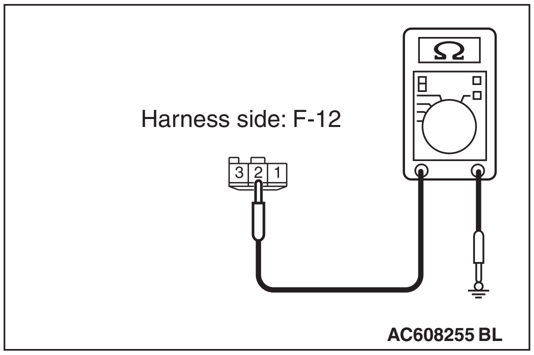
YES : Go to Step 2.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of trunk lid actuator and switch is normal.

STEP 2. Check the trunk lid actuator and switch.
Disconnect trunk lid actuator and switch connector F-12. Then check continuity between terminals.

Ignition key	Tester connection	Specified condition
Released	1 –2	Continuity exists (2 ohms or less)
Pressed	1 –2	Open circuit

Q: Is the trunk lid actuator and switch in good condition?

YES : Go to Step 3.
NO : Replace the trunk lid actuator and switch. Check that the input signal of trunk lid actuator and switch is normal.



STEP 3. Check the ground circuit to the trunk lid actuator and switch. Measure the resistance at trunk lid actuator and switch connector F-12.

(1) Disconnect trunk lid actuator and switch connector F-12 and measure the resistance available at the wiring harness side of the connector.

(2) Measure the resistance value between terminal 2 and ground.

- The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between trunk lid actuator and switch connector F-12 (terminal 2) and ground.

NOTE: Also check intermediate connector F-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between trunk lid actuator and switch connector F-12 (terminal 2) and ground in good condition?

YES : No action is necessary and testing is complete.
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of trunk lid actuator and switch is normal.

STEP 5. Check ETACS-ECU connector C-313 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-313 in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of trunk lid actuator and switch is normal.

STEP 6. Check the wiring harness between trunk lid actuator and switch connector F-12 (terminal 1) and ETACS-ECU connector C-313 (terminal 5).

NOTE: Also check intermediate connectors F-23 and D-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector F-23 or D-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2.*

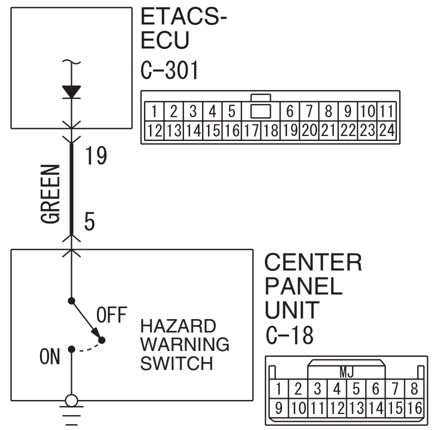
Q: Is the wiring harness between trunk lid actuator and switch connector F-12 (terminal 1) and ETACS-ECU connector C-313 (terminal 5) in good condition?

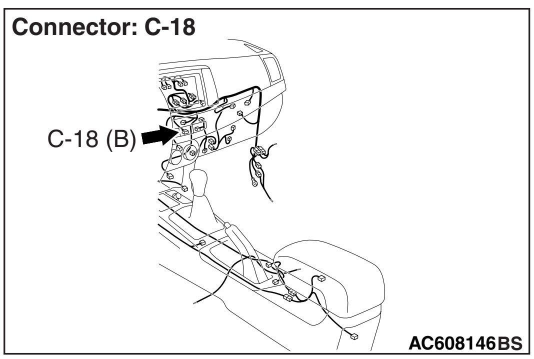
YES : Replace the ETACS-ECU. Check that the input signal of trunk lid actuator and switch is normal.

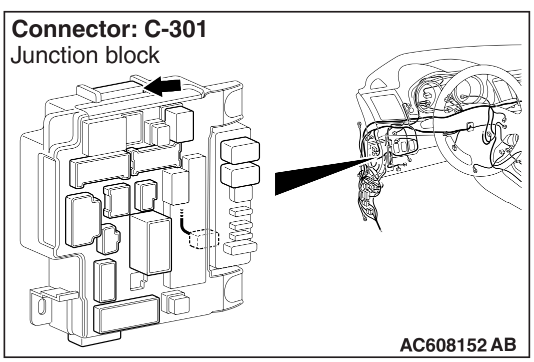
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of trunk lid actuator and switch is normal.

Inspection Procedure 10: ETACS-ECU does not receive any signal from the hazard warning light switch.

Hazard Warning Switch Input Circuit







TECHNICAL DESCRIPTION (COMMENT)

If there is an error to the hazard warning light switch input signal, the hazard warning light switch signal is no longer output to the communication line.

TROUBLESHOOTING HINTS

- The center panel unit may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check center panel unit connector C-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is center panel unit connector C-18 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of hazard warning light switch is normal.

STEP 2. Check the hazard warning light switch.

Remove the center panel unit. Then check continuity between the switch terminal and switch body.

Switch position	Tester connection	Specified condition
Released	5 –switch body	Continuity exists (2 ohms or less)
Pressed	5 –switch body	Open circuit

Q: Is the hazard warning light switch in good condition?

YES : Go to Step 3.

NO : Replace the center panel unit. Check that the input signal of hazard warning light switch is normal.

STEP 3. Check ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-301 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s) (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Check that the input signal of hazard warning light switch is normal.

STEP 4. Check the wiring harness between center panel unit connector C-18 (terminal 5) and ETACS-ECU connector C-301 (terminal 19).

Q: Is the wiring harness between center panel unit connector C-18 (terminal 5) and ETACS-ECU connector C-301 (terminal 19) in good condition?

YES : Replace the ETACS-ECU. Check that the input signal of hazard warning light switch is normal.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary. Check that the input signal of hazard warning light switch is normal.

Inspection Procedure 11: ETACS-ECU does not receive any signal from the column switch signal.

TECHNICAL DESCRIPTION (COMMENT)

The ETACS-ECU receives the column switch signal via the LIN communication. If there is an abnormality to column switch or LIN bus line, the lights and wiper/washer do not work normally.

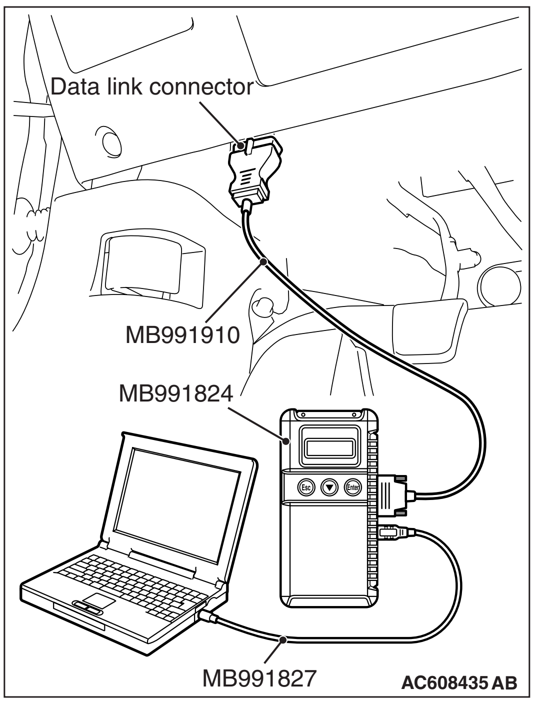
TROUBLESHOOTING HINTS

- The column switch may be defective
- The LIN bus line may be defective

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the ETACS diagnostic trouble code.

Check the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54A-479."
(2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Troubleshoot the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 2.

STEP 2. Column switch check

- Check the continuity for windshield wiper and windshield washer switch (Refer to P.54A-231).
- Check the continuity for column switch (switch body part) (Refer to P.54A-231).

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the column switch.

ON-VEHICLE SERVICE

CONFIGURATION FUNCTION

M1545002500104

Use scan tool MB991958 to adjust the following functions. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
ACC power auto cut	Time to ACC power cut-off when the ignition switch is in the ACC position	Disable	No function (default)
		30 min	30 minutes
		60 min	60 minutes
Turn power source	Adjustment of turn-signal light operation condition	ACC or IG1	Operable with ACC or ON position
		IG1	Operable with ON position (default)
Comfort flasher	With/without comfort flasher function	Disable	No function
		Enable	With function (default)
Comfort flasher switch time	Switch operation time to activate the comfort flasher function	Normal	0.4 seconds (default)
		Long	0.8 seconds
Hazard answer back	Adjustment of the number of keyless hazard warning light answer back flashes	Lock:1, Unlock:2	LOCK: Flashes once, UNLOCK: Flashes twice (default)
		Lock:1, Unlock:0	LOCK: Flashes once, UNLOCK: No flash
		Lock:0, Unlock:2	LOCK: No flash, UNLOCK: Flash twice
		Lock:2, Unlock:1	LOCK: Flash twice, UNLOCK: Flash once
		Lock:2, Unlock:0	LOCK: Flash twice, UNLOCK: No flash
		Lock:0, Unlock:1	LOCK: No flash, UNLOCK: Flash once
		Lock:0, Unlock:0	No function
Front wiper operation	Adjustment of the intermittent windshield wiper operation	Normal INT	Intermittent wiper interval is fixed to 4 seconds.
		Variable INT	Intermittent wiper interval is calculated only by the wiper volume control.
		Speed sensitive	Intermittent wiper interval is calculated according to the intermittent wiper volume control and vehicle speed (default).
Front wiper washer	Disabling or enabling washer-linked wiper function	Only washer	No function
		Washer and wiper	With function (default)

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
Dome light delay timer with door	Adjustment of interior light delay shutdown time	0 sec	0 second (no delay shutdown time) (default <Vehicles without central door locking system>)
		7.5 sec	7.5 seconds
		15 sec	15 seconds
		30 sec	30 seconds (default <Vehicles with central door locking system>)
		60 sec	60 seconds
		120 sec	120 seconds
		180 sec	180 seconds
Headlight auto cut customize	Adjustment of headlight automatic shutdown function	Disable	No function
		Enable (C-spec.)	With function (default)
Interior light auto cut timer	Adjustment of interior light automatic shutdown function operation time	Disable	No function
		3 min	3 minutes
		30 min	30 minutes (default)
		60 min	60 minutes
Door unlock mode	Door lock system <Vehicles with central door locking system>	All doors unlock	All the doors are unlocked when the driver's side door is unlocked.
		Dr door unlock	Only the driver's side door is unlocked when the driver's side door is unlocked. (default)
Auto door unlock by P position	Auto door unlock by P position function <Vehicles with central door locking system>	Disable	No function (default)
		Always enabled	Always with function
Duration of horn chirp	Horn sounding time during horn answer back	Short	0.01 second (default)
		Long	0.02 second
Horn chirp by keyless	Horn chirp by keyless entry system	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (default)
Buzzer answer back <Vehicles with KOS>	Adjusts the tone alarm answer back function.	Not sound buzzer	No function
		At keyless	Sounds when the keyless entry system is activated.
		At F.A.S.T.	Sounds when KOS is activated (default).
		At Both	Sounds when the keyless entry system or KOS is activated.

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
Timer lock timer	Timer lock period adjustment	30 sec	30 seconds (default)
		60 sec	60 seconds
		120 sec	120 seconds
		180 sec	180 seconds
Panic alarm switch	With/without panic alarm function	Disable	No function
		Enable	With function (default)
F.A.S.T. key out of car	With/without KOS key exterior detection function	Enable	No function
		Disable	With function (default)
F.A.S.T. feature	KOS function adjustment	Both enable	All KOS functions are enabled (default).
		DoorEntry enable	Only door entry function is enabled.
		ENG strt enable	Only engine starting function is enabled.
		Both disabled	All KOS functions are disabled.
F.A.S.T. unlock disable time	Adjusts the door unlock inhibition period after door lock is activated.	0 sec	0 seconds
		3 sec	3 seconds (default)
		5 sec	5 seconds

ETACS-ECU

REMOVAL AND INSTALLATION

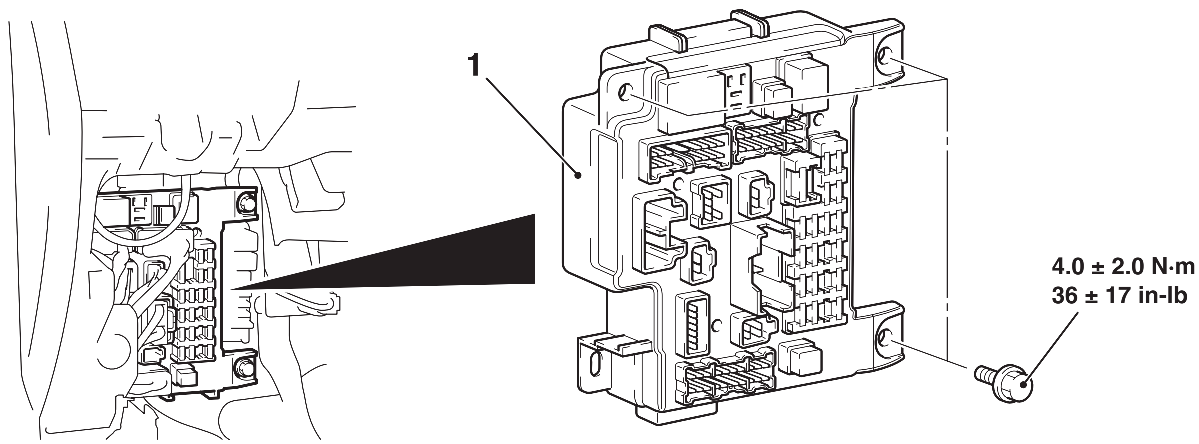
M1545004700030

⚠ *WARNING*

- ***Before removing the ETACS-ECU and knee air bag module, refer to GROUP 52B, Service Precautions P.52B-24 and Knee Air Bag Module P.52B-378.***
- ***When removing and installing the ETACS-ECU, do not let it bump against the knee air bag module.***

⚠ CAUTION

When replacing the ETACS-ECU, use the ETACS-ECU to which the chassis number is written and the coding is implemented. Also, if diagnosis code No. B1761 "VIN not programmed" or No. B222C "Coding not completed" is set to the ETACS-ECU, replace with the ETACS-ECU to which the chassis number same as that of vehicle is written and the coding is implemented.



AC610001AB

Removal Steps

- Side lower panel assembly (Refer to GROUP 52A, Instrument Lower Panel P.52A-7).

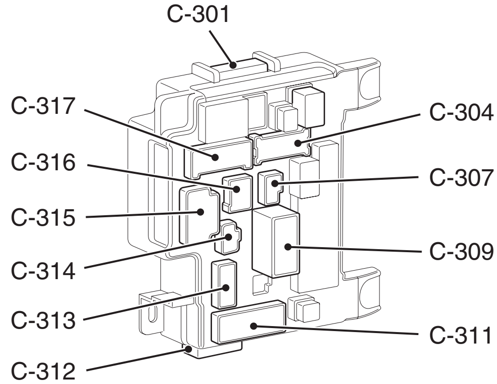
Removal Steps (Continued)

- Knee air bag module (Refer to GROUP 52B, Knee Air Bag Module P.52B-378).

1. ETACS-ECU

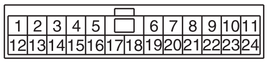
CHECK WITH TERMINAL VOLTAGE

M1545004800060



AC507027AB

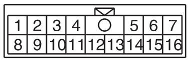
CONNECTOR: C-301



AC507030AB

Terminal No.	Check item	Check condition	Normal condition
1	–	–	–
2	Input from power window main switch or front power window sub switch (lock)	Power window main switch or front power window sub switch: Locked	0 volt
3–9	–	–	–
10	Input from front passenger's door lock actuator (unlock)	Front passenger's door lock: Unlocked	0 volt
11	–	–	–
12	Output to defogger switch	Defogger switch: ON	0 volt
13–15	–	–	–
16	Input from door lock key cylinder switch (lock)	Door lock key cylinder switch: Locked	0 volt
17	Input from door lock key cylinder switch (unlock)	Door lock key cylinder switch: Unlocked	0 volt
18	–	–	–
19	Input from hazard warning light switch	Hazard warning light switch: ON	0 volt
20	–	–	–
21	Input from windshield wiper backup switch	Windshield low-speed wiper switch or windshield high-speed wiper switch: ON	0 volt
22	Input from driver's door lock actuator (unlock)	Driver's door lock: Unlocked	0 volt
23, 24	–	–	–

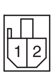
CONNECTOR: C-304



AC507031AB

Terminal No.	Check item	Check condition	Normal condition
1	Stop light switch power supply	Stop light switch: ON	Battery voltage
2	–	–	–
3	Output to position light (LH)	When position light is illuminated	Battery voltage
4	–	–	–
5	Output to windshield wiper (HI)	When windshield wipers are operating at high speed	Battery voltage
6	Output to windshield wiper (LO)	When windshield wipers are operating at low speed	Battery voltage
7	Output position light (RH)	When position light illuminated	Battery voltage
8	Input from windshield wiper auto stop switch	When windshield wipers are operating	Battery voltage
9	Output to front and side turn-signal light (LH)	When front and side turn-signal light (LH) is illuminated	Battery voltage
10	Output to engine control module (IG1)	Ignition switch: ON	Battery voltage
11	Input from engine control module (fuel control)	Engine: Started	0 volt
12	Output to windshield wiper (ACC)	Ignition switch: ACC	Battery voltage
13	Output to windshield washer	When windshield washer is operating	Battery voltage
14	–	–	–
15	Output to engine control module (START)	Ignition switch: START	Battery voltage
16	Output to front and side turn-signal light (RH)	When front and side turn-signal light (RH) is illuminated	Battery voltage

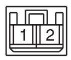
CONNECTOR: C-307



AC507032AB

Terminal No.	Check item	Check condition	Normal condition
1	Fuel pump power supply	Ignition switch: ON	Battery voltage
2	Battery power supply	Always	Battery voltage

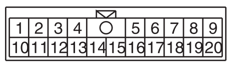
CONNECTOR: C-309



AC507033AB

Terminal No.	Check item	Check condition	Normal condition
1	Battery power supply	Always	Battery voltage
2	Battery power supply	Always	Battery voltage

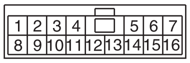
CONNECTOR: C-311



AC507035AB

Terminal No.	Check item	Check condition	Normal condition
1	Output to trunk lid lock actuator	When trunk is locked	Battery voltage
2	Backup light power supply	When backup light is illuminated	Battery voltage
3	Input from luggage compartment light	When luggage compartment light is illuminated	0 volt
4, 5	–	–	–
6	Output to rear door lock actuator (unlock)	When rear door is unlocked	Battery voltage
7, 8	–	–	–
9	Output to rear door lock actuator (lock)	When rear door is locked	Battery voltage
10	Output to taillight (LH) and side maker light (LH) and license plate light	When taillight (LH) and side maker light (LH) and license plate light are illuminated	Battery voltage
11	–	–	–
12	Rear power window motor power supply	Ignition switch: ON	Battery voltage
13	Output to taillight (RH) and side maker light (RH) and glove box light	When taillight (RH) and side maker light (RH) and glove box light are illuminated	Battery voltage
14, 15	–	–	–
16	Output to accessory socket 1	Ignition switch: ACC	Battery voltage
17	Output to luggage compartment light	When luggage compartment light is illuminated	2 volts or less
18	Output to rear turn-signal light (LH)	When rear turn-signal light (LH) is illuminated	Battery voltage
19	Output to rear turn-signal light (RH)	When rear turn-signal light (RH) is illuminated	Battery voltage
20	–	–	–

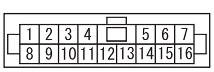
CONNECTOR: C-312



AC507034AB

Terminal No.	Check item	Check condition	Normal condition
1	Input from brake fluid level switch	Brake fluid level switch: ON	0 volt
2	Output to radiator fan relay	When radiator fan is operating	0 volt
3	–	–	–
4	Output to fog lights	Fog light switch: ON	0 volt
5	–	–	–
6	Output to headlight (LO)	Headlight switch: ON	0 volt
7	Input from ambient temperature sensor	Always	0.2 –2.72 volts
8	Output to condenser fan relay	When condenser fan is operating	0 volt
9	Output to fan control relay	When fan control is operating	0 volt
10	Output to daytime running light	Ignition switch: ON	0 volt
11	Output to horn	When horn sounds	0 volt
12	–	–	–
13	Output to Headlight (HI)	Dimmer switch: ON	0 volt
14	Ground (ambient temperature sensor)	Always	0 volt
15	–	–	–
16	Input from stoplight switch	Stoplight switch: ON	12 volts

CONNECTOR: C-313

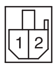


AC610017

Terminal No.	Check item	Check condition	Normal condition
1	–	–	–
2	Ignition switch (IG1) power supply	Ignition switch: ON	Battery voltage
3	–	–	–
4	Ignition switch (IG1) power supply	Ignition switch: ON	Battery voltage
5	Input from trunk lid actuator and switch	Trunk lid actuator and switch: ON (trunk lid open)	0 volt
6	–	–	–
7	Input from rear door switch (LH)	Rear door switch (LH): ON (door open)	0 volt
8	Input from rear door switch (RH)	Rear door switch (RH): ON (door open)	0 volt
9–11	–	–	–

Terminal No.	Check item	Check condition	Normal condition
12	Input from front door switch (RH)	Front door switch (LH): ON (door open)	0 volt
13−15	–	–	–
16	Input from front door switch (LH)	Front door switch (RH): ON (door open)	0 volt

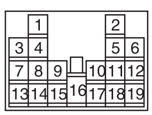
CONNECTOR: C-314



AC507037AB

Terminal No.	Check item	Check condition	Normal condition
1	Output to fuel pump	Engine: Started	Battery voltage
2	–	–	–

CONNECTOR: C-315

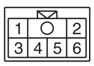


AC507029AB

Terminal No.	Check item	Check condition	Normal condition
1	–	–	–
2	Output to front door lock actuator (LH) (unlock)	When front door (LH) is unlocked	Battery voltage
3	–	–	–
4	Battery power supply	Always	Battery voltage
5	Output to front door lock actuator (RH) (unlock)	When front door (RH) is unlocked	Battery voltage
6	Output to central door locking (for locking the doors)	When the door lock actuators lock the doors	Battery voltage
7	Ignition switch (START) power supply	Ignition switch: START	Battery voltage
8	Power window motor power supply	Ignition switch: ON	Battery voltage
9	Ignition switch (ACC) power supply	Ignition switch: ACC	Battery voltage
10	Power window main switch power supply	Ignition switch: ON	Battery voltage
11	Output to accessory socket 2	Ignition switch: ACC	Battery voltage
12	Output to accessory socket 3	Ignition switch: ACC	Battery voltage
13	Input from key reminder switch	Key reminder switch: ON (ignition key removed)	0 volt
14	–	–	–

Terminal No.	Check item	Check condition	Normal condition
2	Input from power window main switch or front power window sub switch (unlock)	Power window main switch or front power window sub switch: Unlocked	0 volt
16	Output to blower motor	Blower motor in operation	Battery voltage
17	Ground (signal)	Always	0 volt
18	Output to ignition key cylinder illumination light	When ignition key cylinder illumination is ON	12 volts
19	Input from horn switch	Horn switch: ON	0 volt

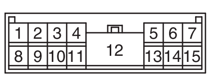
CONNECTOR: C-316



AC507038AB

Terminal No.	Check item	Check condition	Normal condition
1	–	–	–
2	Sunroof motor assembly power supply	Always	Battery voltage
3, 4	–	–	–
5	Input from dome light	When dome light is illuminated	0 volt
6	Output to dome light output	When dome light is illuminated	2 volts or less

CONNECTOR: C-317



AC507028AB

Terminal No.	Check item	Check condition	Normal condition
1	Battery power supply	Always	Battery voltage
2	Battery power supply	Always	Battery voltage
3, 4	–	–	–
5	Ignition switch (IG1) power supply	Ignition switch: ON	Battery voltage
6	Input from ignition switch (IG1)	Ignition switch: ON	Battery voltage
7	Input from ignition switch (ACC)	Ignition switch: ACC	Battery voltage
8	–	–	–
9	Output to theft-alarm indicator light	When theft-alarm indicator light is illuminated	0 volt
10	Battery power supply	Always	Battery voltage
11–14	–	–	–
15	Ground	Always	0 volt

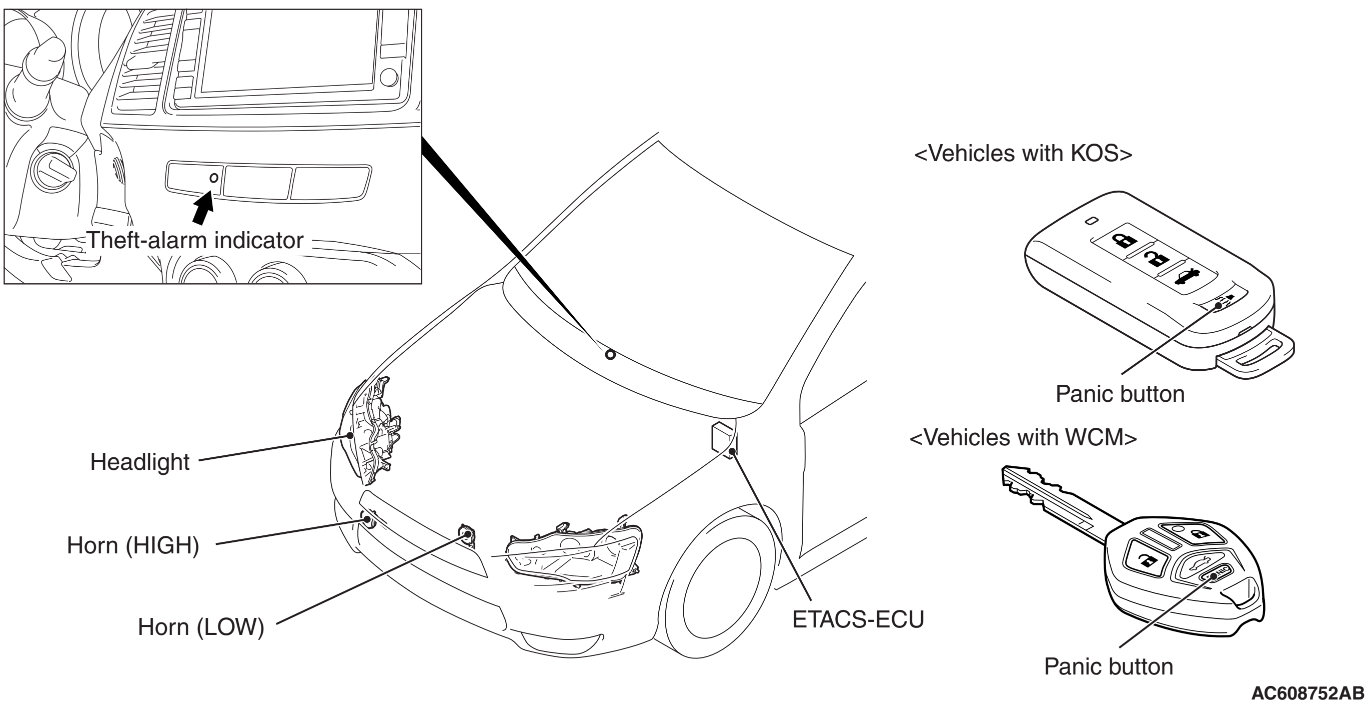
THEFT ALARM

GENERAL INFORMATION

M1547000100098

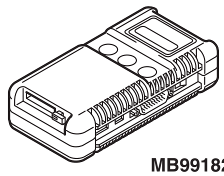
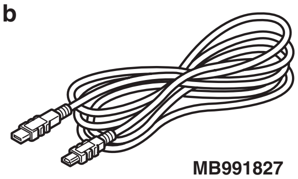
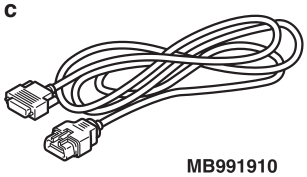
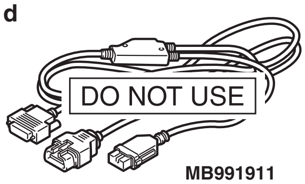
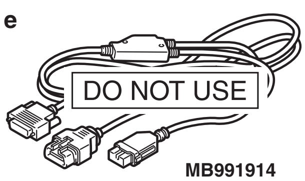
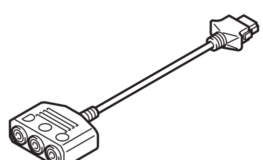
- When the doors are locked using the keyless entry or KOS (except when locked by using the key cylinder or door lock switch), the improper opening of door or trunk causes the ETACS-ECU function and control to give off an alarm with the flashing of headlights and the intermittent sounding of horns. Also, the ETACS-ECU warns that the theft-alarm system is being set by flashing the theft-alarm indicator. < ES,GTS: Standard, DE (Except for California and Canada): Option>
- By pressing the panic button of transmitter, the flashing of headlights and the intermittent sounding of horns can be performed by remote control operation. < ES,GTS: Standard, DE (Except for California and Canada):Option>

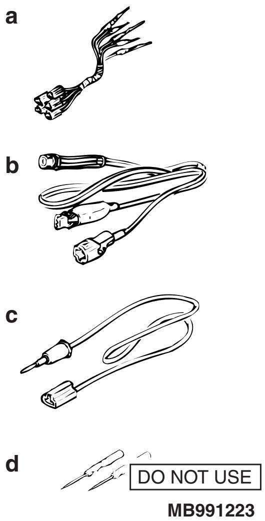
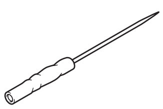
CONSTRUCTION DIAGRAM



SPECIAL TOOLS

M1547000600145

Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** Reading diagnostic trouble code.

Tool	Tool number and name	Supersession	Application
	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

DIAGNOSIS

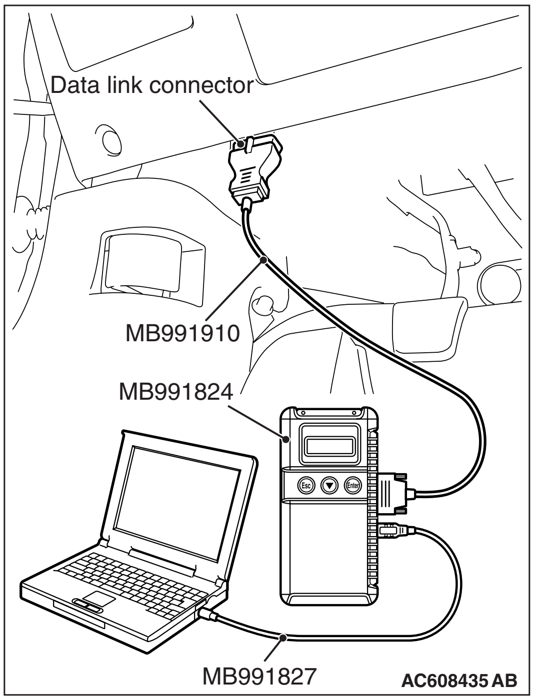
STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

M1547001200106

Refer to GROUP 00 –Contents of troubleshooting P.00-6.

DIAGNOSTIC FUNCTION

M1547001300028



HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle being diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

TROUBLE SYMPTOM CHART

M1547001500152

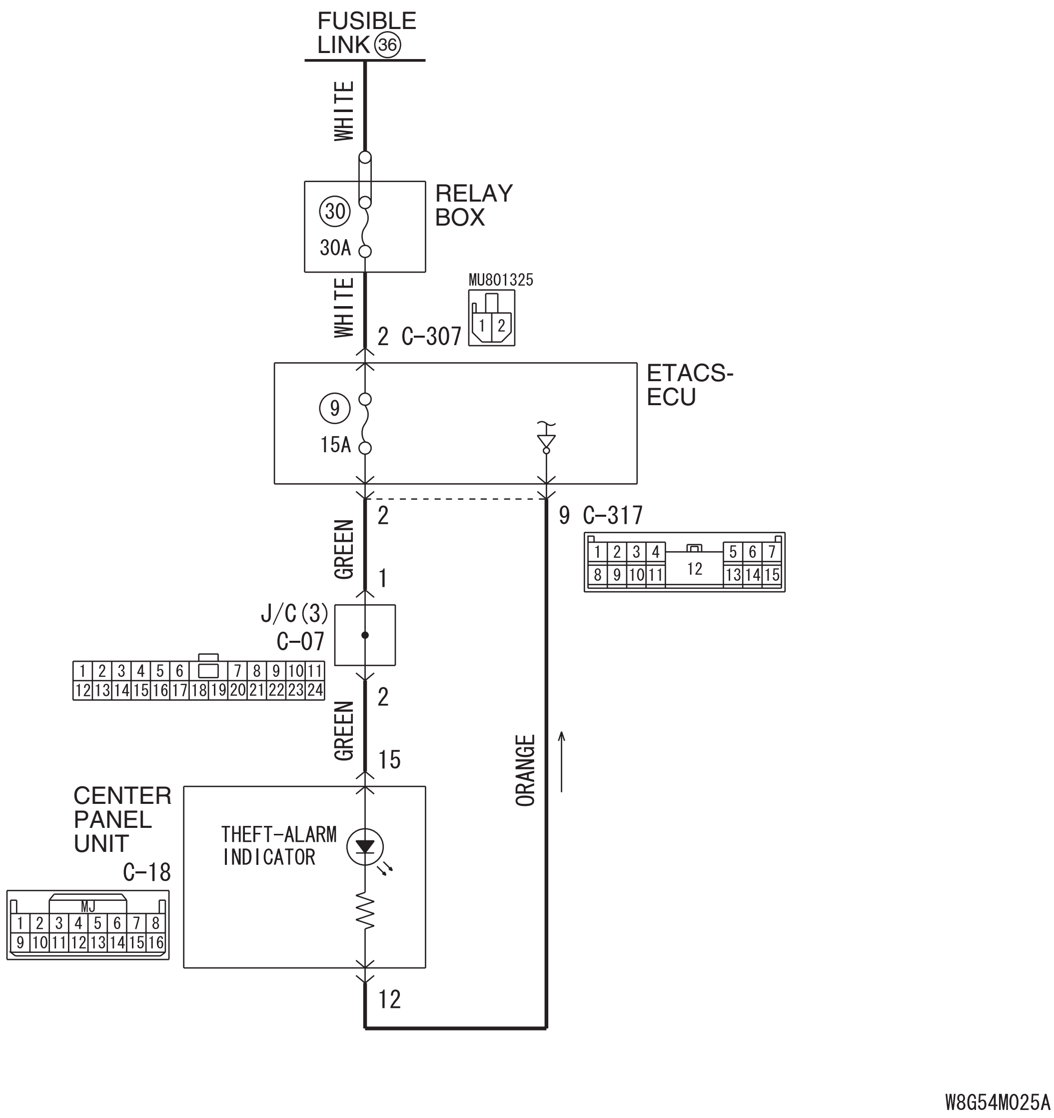
Trouble symptom	Inspection Procedure No.	Reference page
The theft-alarm is not armed (the theft-alarm indicator does not illuminate).	1	P.54A-577
The interior alarm does not work normally while the theft-alarm is triggered.	2	P.54A-583
Horns do not sound while the theft-alarm system is triggered.	3	P.54A-587
Panic alarm function does not work normally.	4	P.54A-592

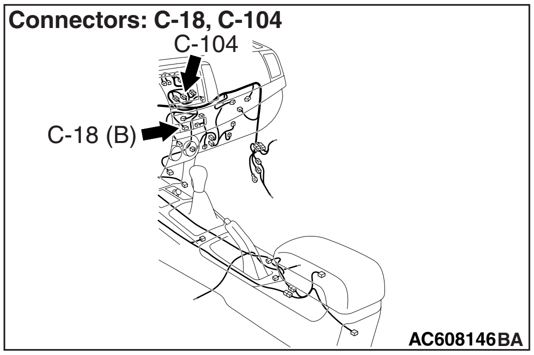
SYMPTOM PROCEDURES

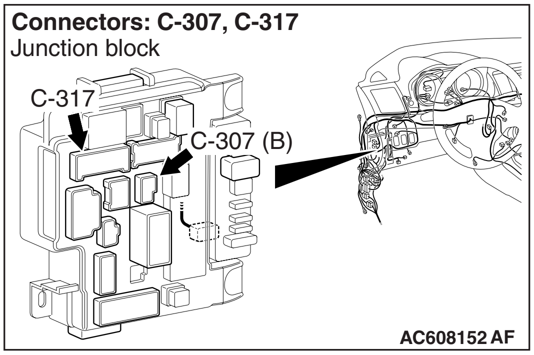
Inspection Procedure 1: The theft-alarm is not armed (the theft-alarm indicator does not illuminate).

⚠ CAUTION
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

Theft-alarm Indicator Circuit







TECHNICAL DESCRIPTION (COMMENT)

If this function does not work normally, the input signal circuits to the components below, the theft-alarm indicator, the ETACS-ECU or the CAN bus line may have a problem.

- Keyless entry transmitter
- Key reminder switch
- Ignition switch (ACC)
- Hood switch
- Door switches
- Trunk latch switch

TROUBLESHOOTING HINTS

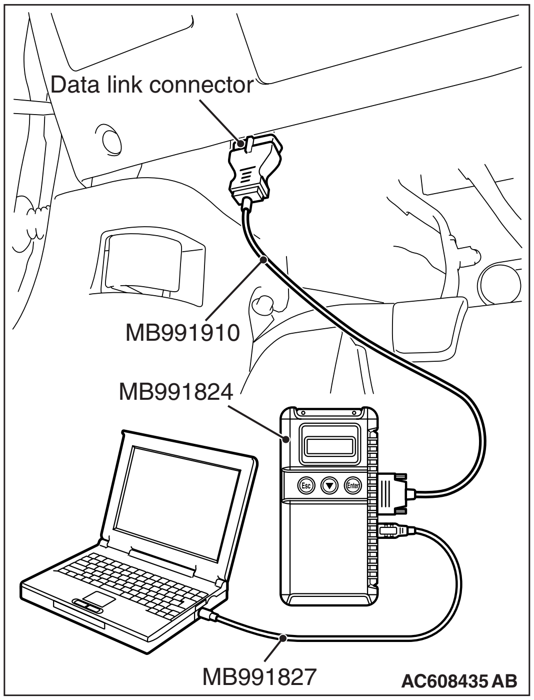
- CAN bus line may be defective
- Theft-alarm indicator may be defective
- Keyless entry transmitter may be defective
- The key reminder switch may be defective
- Door switch may be defective
- Trunk latch switch may be defective
- Hood switch may be defective
- The KOS-ECU may be defective
- The WCM may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the scan tool (M.U.T.-III) P.54A-574."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958, check for any diagnostic trouble code.

Check if DTC is set to the KOS-ECU <vehicles with KOS> or WCM <vehicles with WCM>.

(1) Turn the ignition switch to the "ON" position.
(2) Check whether the KOS or WCM related DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES <vehicles with KOS> : Troubleshoot the KOS (Refer to GROUP 42B, KOS P.42B-20).
YES <vehicles with WCM> : Troubleshoot the WCM (Refer to GROUP 42C, WCM P.42C-14).
NO : Go to Step 3.

STEP 3. Check the keyless operation key <KOS> or keyless entry transmitter <WCM>.

Q: is the keyless operation key <KOS> or keyless entry transmitter <WCM> normally?

YES : Go to Step 4.
NO <vehicles with KOS> : Troubleshoot the KOS (Refer to GROUP 42B, KOS P.42B-20).
NO <vehicles with WCM> : Troubleshoot the WCM (Refer to GROUP 42C, WCM P.42C-14).

STEP 4. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the theft-alarm function.

- Turn the ignition switch to the "ACC" position.
- Close the hood.
- Turn the ignition switch to the "LOCK" (OFF) position (with ignition key <vehicles with WCM> or emergency key <vehicles with KOS> inserted).
- Open each door.
- Open the Trunk.

Item No.	Item name	Normal condition
Item 256	Dr door ajar switch	Open
Item 257	As door ajar switch	Open
Item 258	RR door ajar switch	Open
Item 259	RL door ajar switch	Open
Item 260	Trunk/gate trunk ajar switch	Open
Item 264	Handle lock switch	Key in
Item 288	ACC switch	ON

Q: Does scan tool MB991958 display the items "Dr door ajar switch", "As door ajar switch", "RR door ajar switch", "RL door ajar switch", "Trunk/gate trunk ajar switch" , "Handle lock switch", "Hood switch" and "ACC switch" as normal condition?

YES <Normal conditions are displayed for all items.> : Go to Step 5.

NO <Normal condition is not displayed for item No. 256.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 5 "ETACS-ECU does not receive any signal from the front door switch (LH)" P.54A-543.

NO <Normal condition is not displayed for item No. 257.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 6 "ETACS-ECU does not receive any signal from the front door switch (RH)" P.54A-545.

NO <Normal condition is not displayed for item No. 258.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 7 "ETACS-ECU does not receive any signal from the rear door switch (LH)" P.54A-548.

NO <Normal condition is not displayed for item No. 259.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 8 "ETACS-ECU does not receive any signal from the rear door switch (RH)" P.54A-550.

NO <Normal condition is not displayed for item No.

260.> **:** Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 9 "ETACS-ECU does not receive any signal from the trunk lid actuator and switch P.54A-553.

NO <Normal condition is not displayed for item No. 264.> **:** Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 3 "ETACS-ECU does not receive any signal from key reminder switch" P.54A-533.

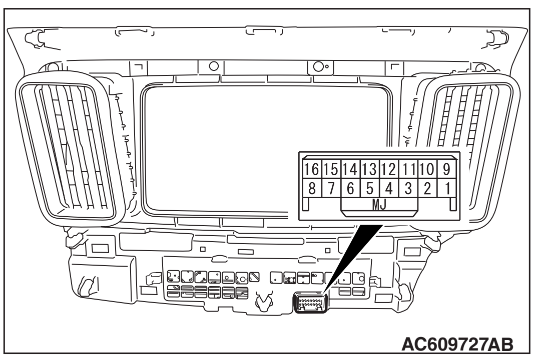
NO <Normal condition is not displayed for item No. 288.> **:** Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 1 "ETACS-ECU does not receive any signal from the ignition switch (ACC) signal" P.54A-529.

STEP 5. Check center panel unit connector C-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is center panel unit connector C-104 in good condition?

YES : Go to Step 6.
NO : Repair the damaged parts.

STEP 6. Check the theft-alarm indicator.



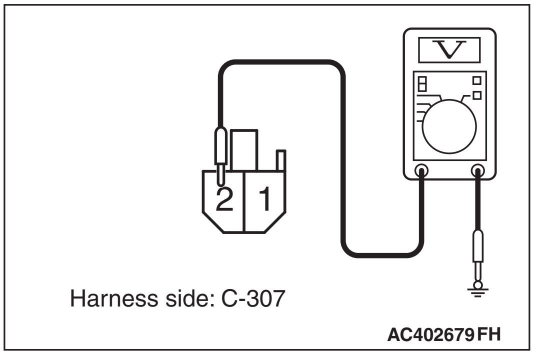
Q: Is the theft-alarm indicator in good condition?

YES : Go to Step 7.
NO : Replace the center panel unit.

STEP 7. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the ETACS-ECU connector C-307 in good condition?

YES : Go to Step 8.
NO : Repair the damaged parts.



STEP 8. Measure the voltage at ETACS-ECU connector C-307.

(1) Disconnect ETACS-ECU connector C-307, and measure the voltage wiring harness side.
(2) Measure the voltage between ETACS-ECU connector-307 (terminal No. 2) and the body ground.
- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 10.
NO : Go to Step 9.

STEP 9. Check the Wiring harness between ETACS-ECU connector C-307 (terminal No. 2) and fusible link (36).

- Check the power supply line for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness between ETACS-ECU connector C-307 and fusible link (36).

STEP 10. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 11.
NO : Repair the damaged parts.

STEP 11. Check the Wiring harness between ETACS-ECU connector C-317 (terminal No. 2,9) and center panel unit connector C-104 (terminal No. 15,12).

- Check the input/output lines for open circuit and short circuit.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness between ETACS-ECU connector C-317 and center panel unit connector C-104.

STEP 12. Retest the system.

Q: Does the theft-alarm work normally?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

Inspection Procedure 2: The interior alarm does not work normally while the theft-alarm is triggered.

⚠ **CAUTION**

Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

TECHNICAL DESCRIPTION (COMMENT)

If the interior alarm does not work normally, the input signal circuits to the components below, ETACS-ECU, or combination meter built-in tone alarm may have a problem.

- Hood switch
- All of the door switches
- Trunk latch switch

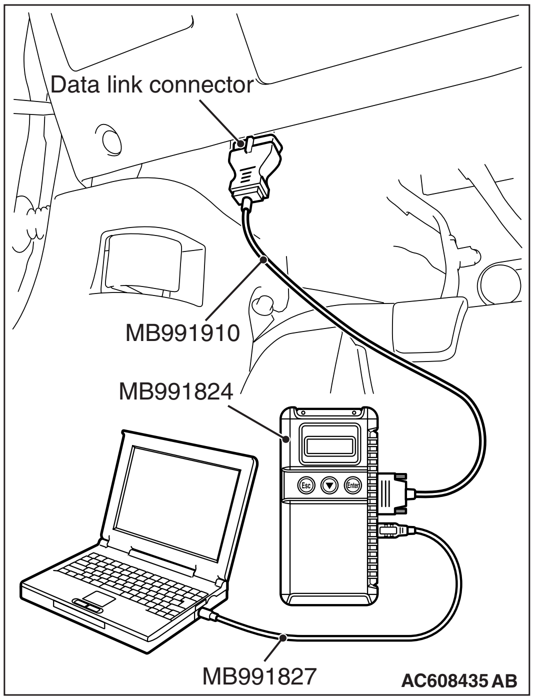
TROUBLESHOOTING HINTS

- Hood switch may be defective
- All the door switch may be defective
- Trunk latch switch may be defective
- The ETACS-ECU may be defective
- Combination meter may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the ETACS-ECU diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan tool (M.U.T.-III) P.54A-574."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the ETACS-ECU DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to P.54A-482).
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list.

Use the ETACS-ECU data list to check the signals related to the theft-alarm function.

- Turn the ignition switch to the "ACC" position.
- Close the hood.
- Turn the ignition switch to the "LOCK" (OFF) position (with ignition key <vehicles with WCM> or emergency key <vehicles with KOS> inserted).
- Open each door.
- Hood is opened
- Open the trunk.

Item No.	Item name	Normal condition
Item 256	Dr door ajar switch	Open
Item 257	As door ajar switch	Open
Item 258	RR door ajar switch	Open
Item 259	RL door ajar switch	Open
Item 260	Trunk/gate trunk ajar switch	Open

Q: Does scan tool MB991958 display the items "Dr door ajar switch", "As door ajar switch", "RR door ajar switch", "RL door ajar switch", "Trunk/gate trunk ajar switch" and "Hood switch" as normal condition?

YES <Normal conditions are displayed for all items.> : Go to Step 3.

NO <Normal condition is not displayed for item No. 256.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 5 "ETACS-ECU does not receive any signal from the front door switch (LH)" P.54A-543.

NO <Normal condition is not displayed for item No. 257.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 6 "ETACS-ECU does not receive any signal from the front door switch (RH)" P.54A-545.

NO <Normal condition is not displayed for item No. 258.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 7 "ETACS-ECU does not receive any signal from the rear door switch (LH)" P.54A-548.

NO <Normal condition is not displayed for item No. 259.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 8 "ETACS-ECU does not receive any signal from the rear door switch (RH)" P.54A-550.

NO <Normal condition is not displayed for item No. 260.> : Troubleshoot the ETACS-ECU. Refer to diagnosis - Inspection Procedure 9 "ETACS-ECU does not receive any signal from the trunk lid actuator and switch" P.54A-553.

STEP 3. Using scan tool MB991958, check actuator test.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode.
- Item 12: Buzzer

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace the combination meter.

STEP 4. Retest the system.

Check that the theft-alarm works normally.

Q: Does the theft-alarm work normally?

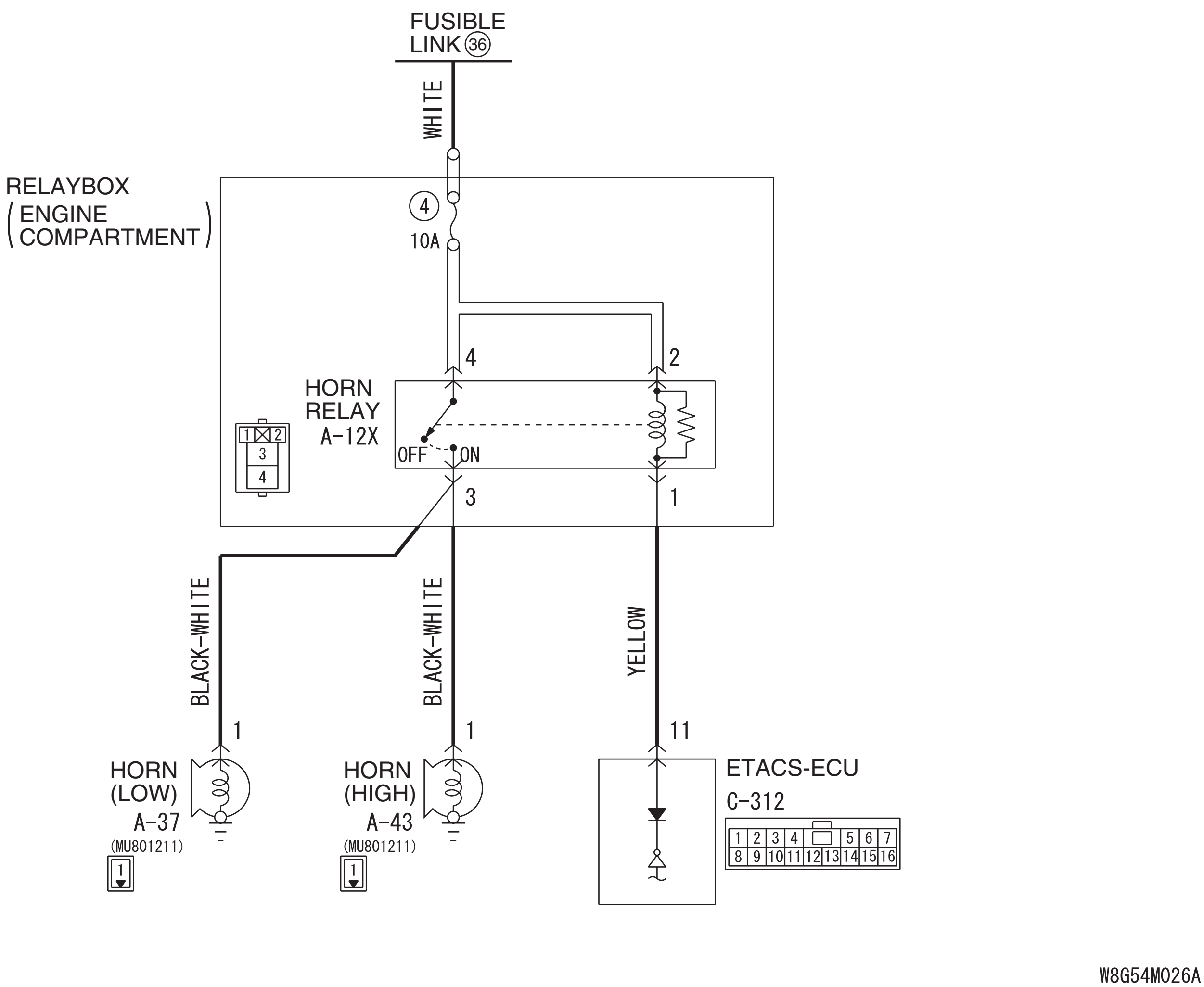
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU.

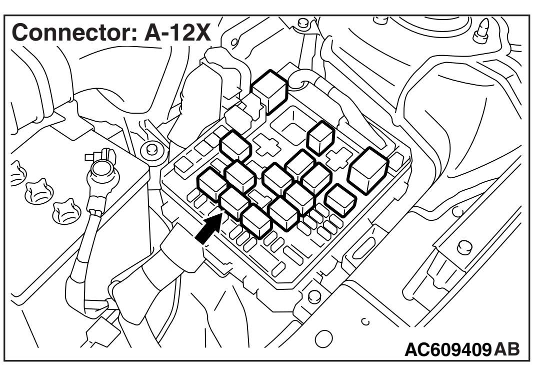
Inspection Procedure 3: Horns do not sound while the theft-alarm system is triggered.

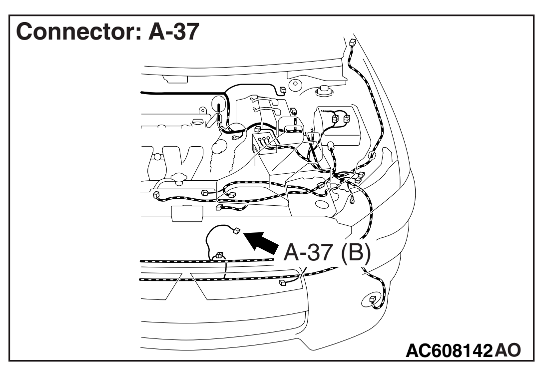
⚠ CAUTION

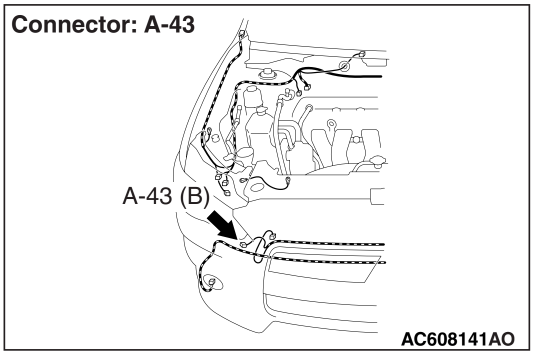
Before replacing the ECU, ensure that the power supply circuit, the ground circuit and the communication circuit are normal.

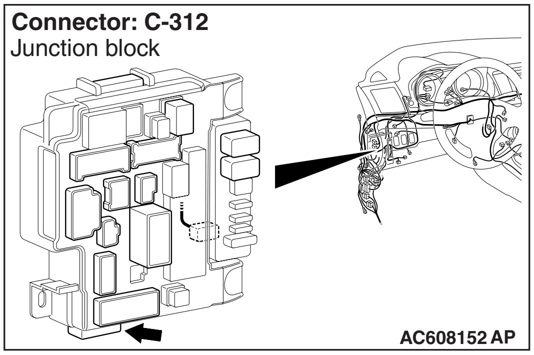
Horn Circuit











TECHNICAL DESCRIPTION (COMMENT)

If horns do not sound, the horn input signal circuit or the ETACS-ECU may be defective.

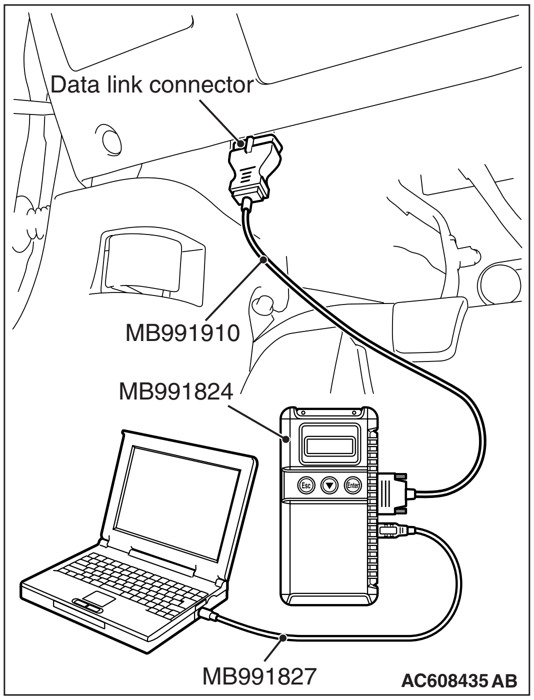
TROUBLESHOOTING HINTS

- Horns may be defective
- Horn relay may be defective
- The ETACS-ECU may be defective
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the diagnostic trouble code.

Check if DTC is set to the ETACS-ECU.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect scan too (M.U.T.-III) P.54A-574."

(2) Turn the ignition switch to the "ON" position.

(3) Check whether the ETACS-ECU related DTC is set.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU. Refer to P.54A-482.

NO : Go to Step 2.

STEP 2. Check horn relay connector A-12X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is horn relay connector A-12X in good condition?

YES : Go to Step 3.

NO : Repair the damaged parts.

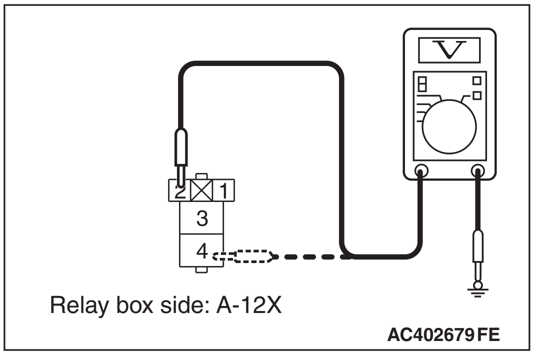
STEP 3. Check the horn relay.

Refer to P.54A-594.

Q: Is the horn relay in good condition

YES : Go to Step 4.

NO : Replace the theft-alarm horn relay.



STEP 4. Measure the voltage at horn relay A-12X.

(1) Remove the relay, and measure at the relay box side.

(2) Measure the voltage between horn relay connector A-12X (terminal No. 2,4) and the body ground.

- The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Check the Wiring harness between theft-alarm horn relay connector A-12X (terminal No. 2,4) and fusible link (36).

Check the power supply line for open circuit and short circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness between horn relay connector A-12X and fusible link (36).

STEP 6. Check ETACS-ECU connector C-312 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-312 in good condition?

YES : Go to Step 7.
NO : Repair the damaged parts.

STEP 7. Check the Wiring harness between theft-alarm horn relay connector A-12X (terminal No. 1) and ETACS-ECU connector C-312 (terminal No. 11).

Check the output lines for open circuit and short circuit.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the wiring harness between horn relay connector A-12X and ETACS-ECU connector C-312.

STEP 8. Check horn (HIGH) connector A-43 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is Horn (HIGH) connector A-43 in good condition?

YES : Go to Step 9.
NO : Repair the damaged parts.

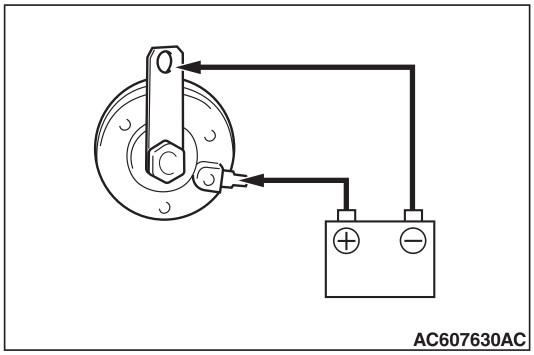
STEP 9. Check the Wiring harness between horn (HIGH) connector A-43 (terminal No. 1) and horn relay connector A-12X (terminal No. 3).

Check the output lines for open circuit and short circuit.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness between horn (HIGH) connector A-43 and horn relay connector A-12X.



STEP 10. Check the horn (HIGH) work normally.

Connect the battery as shown, and verify that the horn sounds.

Q: Is the check result normal?

YES : Go to Step 11.

NO : Replace the horn (HIGH). go to step 11.

STEP 11. Check horn (LOW) connector A-37 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is Horn (LOW) connector A-37 in good condition?

YES : Go to Step 12.

NO : Repair the damaged parts.

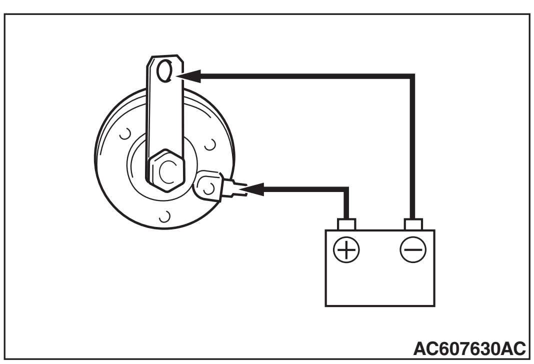
STEP 12. Check the Wiring harness between horn (LOW) connector A-37 (terminal No. 1) and horn relay connector A-12X (terminal No. 3).

Check the output lines for open circuit and short circuit.

Q: Is the check result normal?

YES : Go to Step 13.

NO : Repair the wiring harness between horn (LOW) connector A-37 and horn relay connector A-12X.



STEP 13. Check the horn (LOW) work normally.

Connect the battery as shown, and verify that the horn sounds.

Q: Is the check result normal?

YES : Go to Step 14.

NO : Replace the horn (LOW). go to step 14.

STEP 14.Retest the theft-alarm system.

Q: Does the theft-alarm system work normally?

YES : he trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction P.00-13).

NO : Replace the ETACS-ECU.

Inspection Procedure 4: Panic alarm does not work normally.

TECHNICAL DESCRIPTION (COMMENT)

If keyless operation system <KOS> or keyless entry system <WCM> is normal, the ETACS-ECU may be defective.

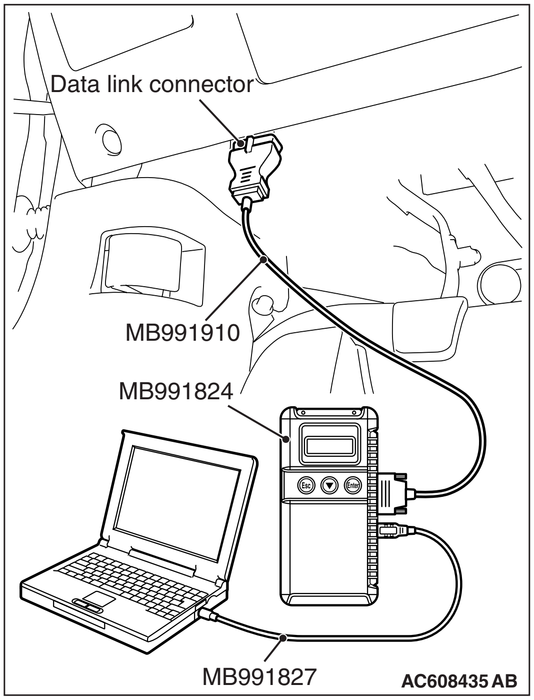
TROUBLESHOOTING HINTS

- Keyless operation system <KOS> or keyless entry system <WCM> may be defective
- The ETACS-ECU may be defective
- Function is not set with the customization.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB992006: Extra fine probe
- MB991223: Harness set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: Vehicle Communication Interface (V.C.I.)
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



STEP 1. Using scan tool MB991958, read the diagnostic trouble code.

Check if DTC is set to the KOS-ECU <Vehicles with KOS> or WCM <Vehicles with WCM>.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the scan tool (M.U.T.-III) P.54A-574."
(2) Turn the ignition switch to the "ON" position.
(3) Check whether the KOS or WCM related DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES <vehicles with KOS> : Troubleshoot the KOS (Refer to GROUP 42B, KOS P.42B-20).
YES <vehicles with WCM> : Troubleshoot the WCM (Refer to GROUP 42C, WCM P.42C-14).
NO : Go to Step 2.

STEP 2. Check keyless operation system <KOS> or keyless entry system <WCM>.

Q: Do keyless operation system <KOS> or keyless entry system <WCM> work normally?

YES : Go to Step 3.
NO <vehicles with KOS> : Troubleshoot the KOS (Refer to GROUP 42B, KOS P.42B-120).
NO <vehicles with WCM> : Troubleshoot the WCM (Refer to GROUP 42C, WCM P.42C-74).

STEP 3. Using scan tool MB991958, check the configuration function.

(1) Turn the ignition switch to the "ON" position.
(2) Use the ETACS-ECU configuration function to check that the "Panic alarm switch" is set to "Enable".
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the "Panic alarm switch" set to "Enable"?

YES : Replace the ETACS-ECU.
NO : Use the ETACS-ECU configuration function to set the "Panic alarm switch" to "Enable"(Refer to P.54A-594).

ON-VEHICLE SERVICE

CONFIGURATION FUNCTION

M1547003400098

Use scan tool MB991958 to adjust the following functions. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool display)	Adjustment item	Adjustment contents (scan tool display)	Adjusting contents
Panic alarm switch	With/without panic alarm function	Disable	Without function
		Enable	With function (default)

REMOVAL AND INSTALLATION

M1547001000339

Theft-alarm system component parts

- Headlight assembly (Refer to P.54A-151).
- Horn (Refer to P.54A-222).
- Door switch (Refer to GROUP 42A –Door, Door Assembly P.42A-148).
- Front and rear door lock actuator (Refer to GROUP 42A –Door, Door Handle and Latch P.42A-157).
- Trunk lid latch assembly (Refer to GROUP 42A – Trunk Lid P.42A-174).
- Key reminder switch (Refer to P.52A-6).
- Theft-alarm indicator (Refer to GROUP 52A – Instrument Center Panel P.52A-2).

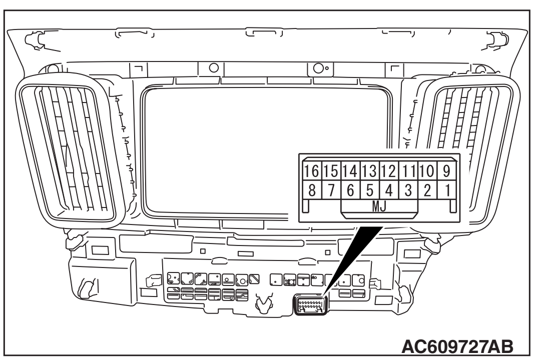
Panic alarm system component parts

- Headlight assembly (Refer to P.54A-151).
- Horn (Refer to P.54A-222).

INSPECTION

THEFT-ALARM INDICATOR CHECK

M1547001100187



1. Remove the center panel.
2. Connect the battery (+) terminal with the center panel connector (terminal No. 15). Then, check if the theft-alarm indicator is illuminated when the battery (–) terminal and the center panel connector (terminal No. 12) are connected.
3. If the theft-alarm indicator is illuminated, it is judged good.

GROUP 11A

ENGINE MECHANICAL

CONTENTS

GENERAL INFORMATION

M1111000101111

The 4B11 (2.0 L) engine is an in-line four-cylinder engine. The cylinder numbers are assigned as 1-2-3-4 from the front of the engine (timing belt side). The firing order is 1-3-4-2.

ITEMS			SPECIFICATIONS
Type			In-line DOHC
Number of cylinders			4
Bore mm (in)			86 (3.39)
Stroke mm (in)			86 (3.39)
Total displacement cm^3 (cu. in)			1,998 (121.9)
Compression ratio			10.0
Firing order			1-3-4-2
Valve timing	Intake valve	Opens (BTDC)	0° –25° <FED>
			3° –28° <CAL>
		Closes (ABDC)	48° –23° <FED>
			45° –20° <CAL>
	Exhaust valve	Opens (BBDC)	44° –24° <FED>
			41° –21° <CAL>
		Closes (ATDC)	0° –20° <FED>
			3° –23° <CAL>
Lubrication system			Pressure feed, full-flow filtration
Oil pump type			Trochoid type

ENGINE DIAGNOSIS

M1111000700370

SYMPTOMS	PROBABLE CAUSE	REMEDY
Compression is too low	Blown cylinder head gasket	Replace the gasket.
	Worn or damaged piston rings	Replace the rings.
	Worn piston or cylinder	Repair or replace the piston and/or the cylinder block.
	Worn or damaged valve seat	Repair or replace the valve and/or the seat ring
Drop in engine oil pressure	Engine oil level is too low	Check the engine oil level.
	Malfunction of engine oil pressure switch	Replace the engine oil pressure switch.
	Clogged oil filter	Install a new filter.
	Worn oil pump gears or cover	Replace the gears and/or the cover.
	Thin or diluted engine oil	Change the engine oil to the correct viscosity.
	Stuck (opened) oil relief valve	Repair the relief valve.
	Excessive bearing clearance	Replace the bearings.
Engine oil pressure too high	Stuck (closed) oil relief valve	Repair the relief valve.
Noisy valves	Incorrect valve clearance	Adjust valve clearance
	Thin or diluted engine oil (low engine oil pressure)	Change the engine oil.
	Worn or damaged valve stem or valve guide	Replace the valve and/or the guide.
Connecting rod noise/main bearing noise	Insufficient oil supply	Check the engine oil level.
	Thin or diluted engine oil	Change the engine oil.
	Excessive bearing clearance	Replace the bearings.

SERVICE SPECIFICATIONS

M1111000301278

Item		Standard value	Limit
Drive belt tension	Vibration frequency Hz (Reference)	102 –129	–
	Tension N (lb) (Reference)	248 –400 (56 – 90)	–
Valve clearance (at cold) mm (in)	Intake valve	0.20 ± 0.03 (0.008 ± 0.0012)	–
	Exhaust valve	0.03 ± 0.03 (0.012 ± 0.0012)	–
Basic ignition timing at idle		5° BTDC ± 3°	–
Actual ignition timing at curb idle		Approximately 10° BTDC	–
CO contents %		0.5 or less	–
HC contents ppm		100 or less	–
Curb idle speed r/min		700 ± 100	–
Compression pressure (200 r/min) kPa (psi)		1,470 (213)	Minimum 1,050 (152)
Compression pressure difference of all cylinder kPa (psi)		–	98 (14)
Intake manifold vacuum at curb idle kPa (in Hg)		–	Minimum 60 (18)
Auto-tensioner rod protrusion amount mm (in)		9.1 –13.4 (0.36 – 0.52)	–

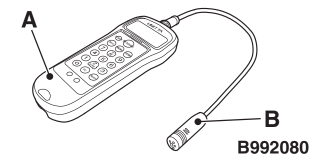
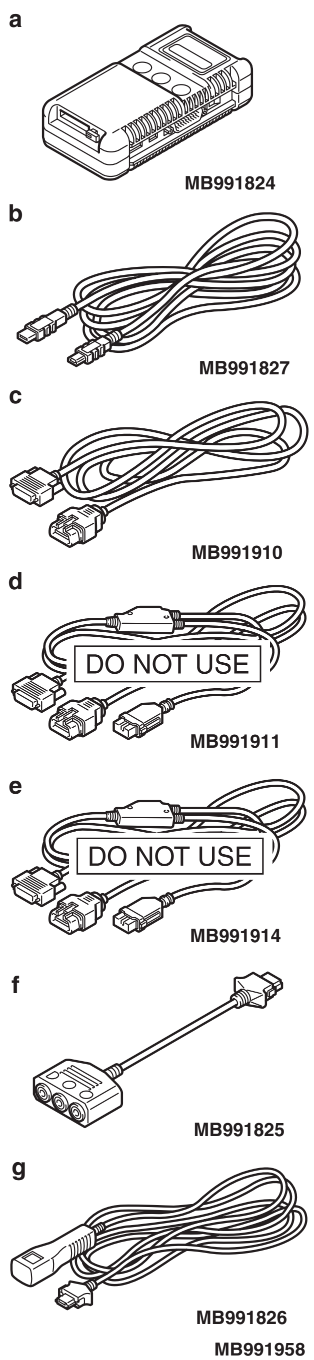
SEALANTS

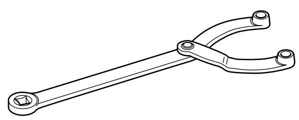
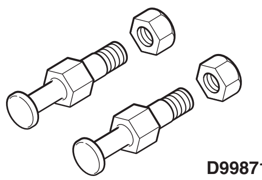
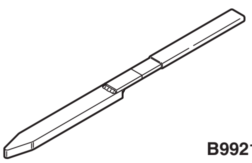
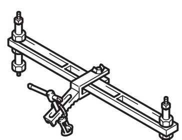
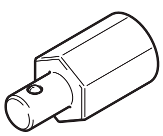
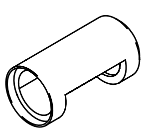
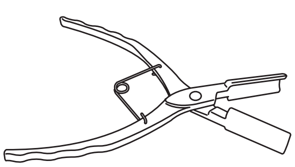
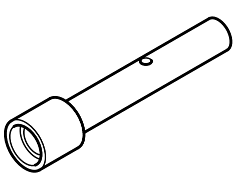
M1111000500536

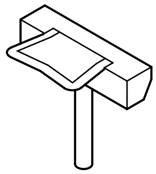
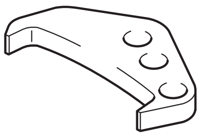
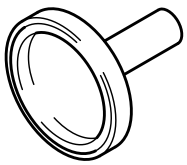
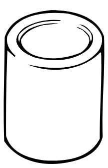
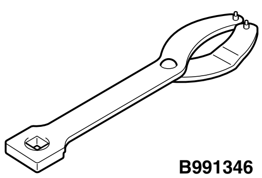
Item	Specified sealant	Remark
Flywheel bolt	LOCTITE 262, Three bond 1324 or equivalent	Semi-drying sealant
Cylinder head cover	Three bond 1227D, 1217G or equivalent	
Cylinder block	Three bond 1227D, 1217G, LOCTITE 5970, 5971, 5900 or equivalent	
Engine oil pan		
Timing chain case assembly		

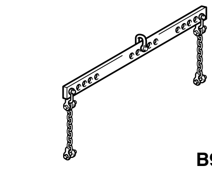
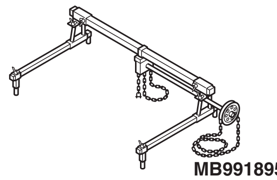
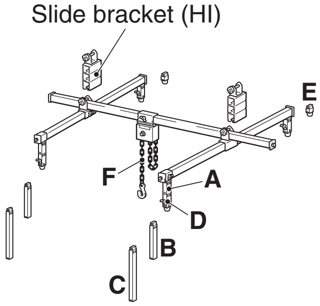
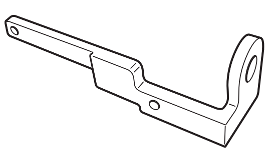
SPECIAL TOOLS

M1111000601570

Tool	Tool number and name	Supersession	Application
	MB992080 Belt tension meter set A: MB9912081 Belt tension meter B: MB992082 Mic assembly	Tool not available	Drive belt tension check
	MB991958 Scan tool (M.U.T.-III sub assembly) A: MB991824 Vehicle communication interface (V.C.I.) B: MB991827 M.U.T.-III USB cable C: MB991910 M.U.T.-III main harness A (Vehicles with CAN communication system) D: MB991911 M.U.T.-III main harness B (Vehicles without CAN communication system) E: MB991914 M.U.T.-III main harness C (for Daimler Chrysler models only) F: MB991825 M.U.T.-III adapter harness G: MB991826 M.U.T.-III trigger harness	MB991824-KIT *NOTE: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.** • Drive belt tension check • Ignition timing check • Curb idle speed check • Idle mixture check • Erasing the diagnostic trouble code

Tool	Tool number and name	Supersession	Application
 B990767	MB990767 Front hub and flange yoke holder	MB990767-01	Holding the camshaft sprocket
 D998719	MD998719 Pin	MIT308239	
 B992103	MB992103 Chain tension release bar	–	Camshaft and camshaft sprocket assembly (exhaust side) removal
 MD998772	MD998772 Valve spring compressor	General service tool	Valve spring compression
 B992090	MB992090 Retainer holder attachment	–	
	MB992089 Retainer holder C	–	
	MB992085 Valve stem seal pliers	–	Valve stem seal removal
	MD998737 Valve stem seal installer	MD998737-01	Valve stem seal press-fitting

Tool	Tool number and name	Supersession	Application
 D998727	MD998727 Oil pan FIPG cutter	MD998727-01	Oil pan removal
 MB991883	MB991883 Flywheel stopper	General service tool	Supporting the drive plate <CVT> or flywheel <M/T>
	MD998718 Crankshaft rear oil seal installer	MD998718-01	Press-fitting the crankshaft rear oil seal
	MB991448 Bush remover and installer base	MB991448-01	Press-fitting the crankshaft front oil seal
 B991346	MB991346 Top Cover Wrench	–	Holding the oil pump sprocket

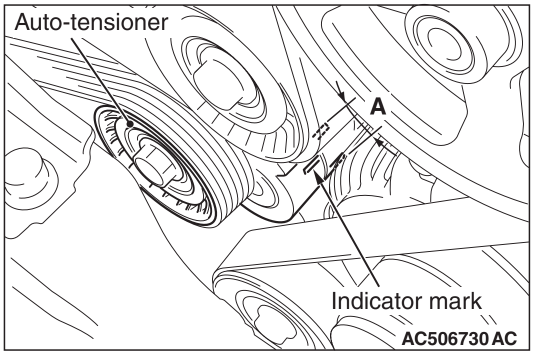
Tool	Tool number and name	Supersession	Application
	MB991454 Engine hanger balancer	MZ203827-01	When the engine hanger is used: Supporting the engine assembly during removal and installation of the transaxle assembly *NOTE: Special tool MB991454 is a part of engine hanger attachment set MB991453.*
	MB991895 Engine hanger	Tool not available	
	MB991928 Engine hanger A: MB991929 Joint (50) × 2 B: MB991930 Joint (90) × 2 C: MB991931 Joint (140) × 2 D: MB991932 Foot (standard) × 4 E: MB991933 Foot (short) × 2 F: MB991934 Chain and hook assembly	Tool not available	
	MB992201 Engine hanger plate	–	Transaxle removal

ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK

M1111003101596

1. Remove the radiator condenser tank mounting bolts.
2. Move the radiator condenser tank to a place where it will not be a hindrance when checking the drive belt tension.



⚠ CAUTION

Check the drive belt tension after turning the crankshaft clockwise one turn or more.

3. Make sure that the indicator mark on the auto-tensioner is within the area marked with A in the illustration.
4. If the mark is out of the area A, replace the drive belt (Refer to P.11A-19).

   NOTE: The drive belt tension check is not necessary as the auto-tensioner is adopted.

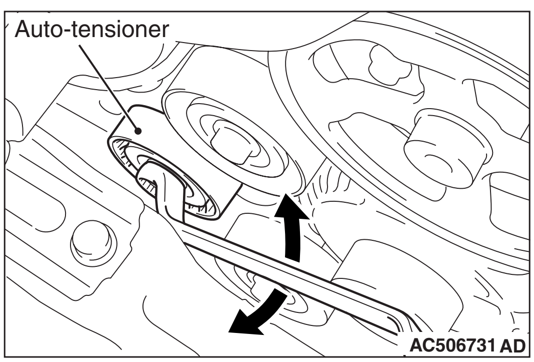
5. Tighten the radiator condenser tank mounting bolts to the specified torque.

   Tightening torque: 12 ± 2 N· m (102 ± 22 in-lb)

AUTO-TENSIONER CHECK

M1111003000972

OPERATION CHECK



1. Turn off the engine from the idle state then check to see that the drive belt is not protruding from the pulley width of the auto-tensioner.
2. Remove the drive belt (Refer to P.11A-19).
3. Rotate the pulley bolt of the auto-tensioner clockwise and counterclockwise with an offset wrench [45°, a long offset wrench (5/8 x 11/16 inches) recommended] to check for binding.
4. If there are any problems in the procedure 1 or 3, replace the auto-tensioner (Refer to P.11A-63).
5. Install the drive belt (Refer to P.11A-19).

FUNCTION CHECK

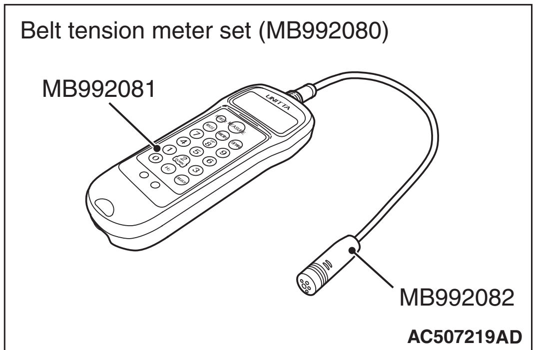
The auto-tensioner can be checked whether it is in good condition by checking its tension.

<When the vibration frequency is measured: Recommendation>

Required Special Tools:

- MB992080: Belt Tension Meter Set
  - MB992081: Belt Tension Meter
  - MB992082: Mic Assembly

1. Check the tension of the drive belt (Refer to P.11A-9).



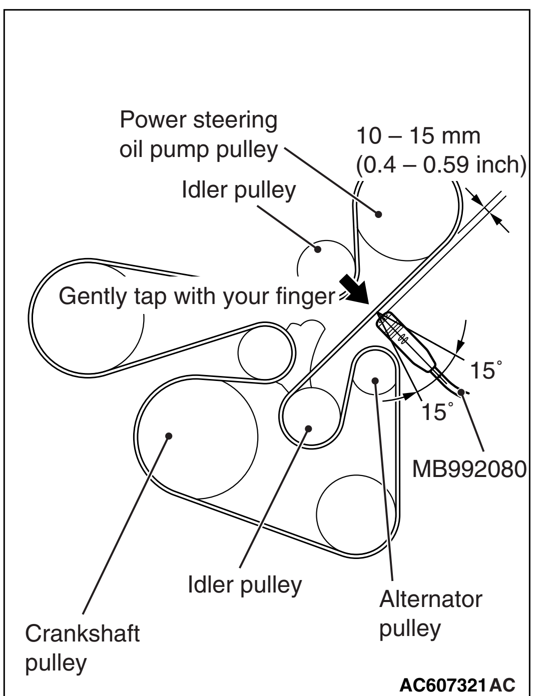
2. Check the tension of the drive belt in the following procedures.
   (1) Connect special tool microphone assembly (MB992082) to special tool belt tension meter (MB992081) of special tool belt tension meter set (MB992080).
   (2) Press the "POWER" button to turn on the power supply.
   (3) Press the numeral key of "1" and check that "No. 1" appears on the upper left of the display.

   NOTE: This operation is to temporarily set the preset data such as the belt specifications, because if the measurement is taken without input of the belt specifications, conversion to tension value (N) cannot be made, resulting in judgement of error.

   (4) Press "Hz" button twice to change the display to the frequency display (Hz).

⚠ CAUTION

- **The temperature of the surface of the belt should be as close to normal temperature as possible.**
- **Do not allow any contaminants such as water or oil to get onto the microphone.**
- **If strong gusts of wind blow against the microphone or if there are any loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.**
- **If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.**
- **Do not take the measurement while the vehicle's engine is running.**

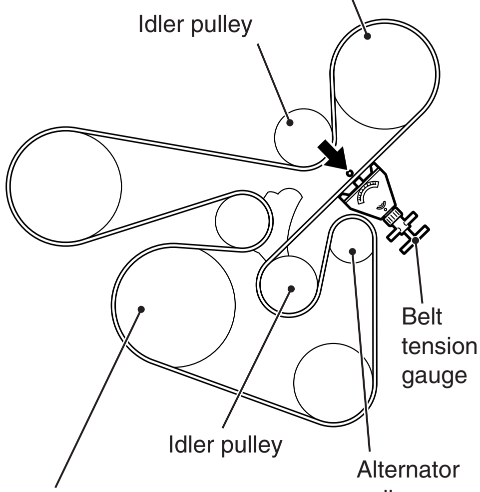


   (5) Hold special tool MB992080 to the middle of the belt between the pulleys (at the place indicated by arrow) where it does not contact the belt (approximately 10 –15 mm (0.4 –0.59 inch) away from the rear surface of the belt) so that it is perpendicular to the belt (within an angle of ± 15 degree).
   (6) Press the "MEASURE" button.
   (7) Gently tap the middle of the belt between the pulleys (the place indicated by the arrow) with your finger as shown in the illustration, and check that the vibration frequency of the belt is within the standard value.

   Standard value: 102 –129 Hz

   NOTE: To take the measurement repeatedly, tap the belt again.

   (8) Press and hold the "POWER" button to turn off the power supply.
3. If not within the standard value, replace the auto-tensioner (Refer to P.11A-63).



<When using a tension gauge>

1. Check the tension of the drive belt (Refer to P.11A-9).
2. Use a belt tension gauge in the middle of the belt between the pulleys shown in the figure (at the place indicated by the arrow) to check that the belt tension is within the standard value.

   Standard value: 248 –400 N (56 –90 lb)
3. If not within the standard value, replace the auto-tensioner (Refer to P.11A-63).

VALVE CLEARANCE CHECK AND ADJUSTMENT

M1111001500681

Refer to GROUP00, General –Maintenance service –Intake And Exhaust Valve Clearance (Inspect And Adjust)

IGNITION TIMING CHECK

M1111001701699

Required Special Tool:

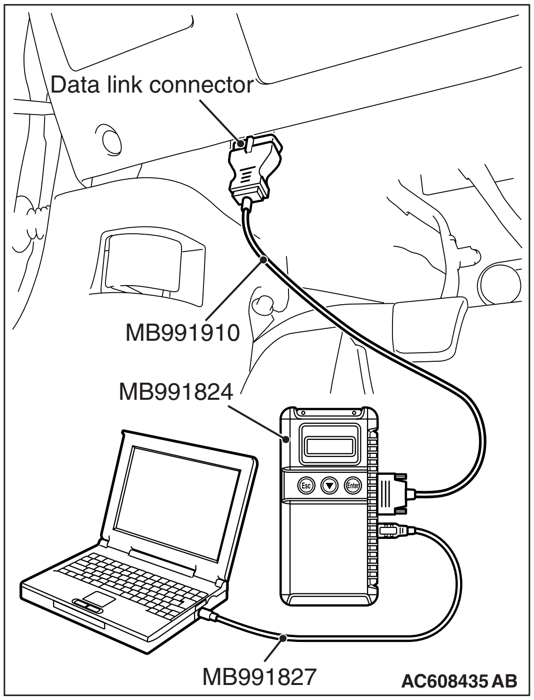
MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Before inspection, set the vehicle in the following condition:

- Engine coolant temperature: 80 –95° C (176 –203° F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with CVT)

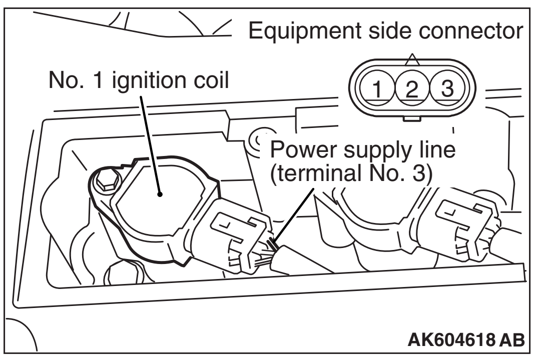
NOTE: On vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



3. Set the timing light to the power supply line (terminal No. 3) of the ignition coil No. 1.
4. Start the engine and run it at idle.
5. Check that the idle speed is approximately 700 r/min.
6. Select scan tool MB991958 actuator test "item number 11".
7. Check that basic ignition timing is within the standard value.

   Standard value: 5° BTDC ±3°

8. If the basic ignition timing is not within the standard value, check the following items:
- Diagnostic output
- Timing belt cover and crankshaft position sensor installation conditions
- Crankshaft sensing blade condition

⚠ CAUTION

If the actuator test is not canceled, the forced drive will continue for 27 minutes. Driving in this state could lead to engine failure.

9. Cancel the setting mode of the scan tool MB991958.
10. Check that the actual ignition timing is at the standard value.

   Standard value: Approximately 10° BTDC

   NOTE: Ignition timing fluctuates about ±7° Before Top Dead Center, even under normal operating condition.

   NOTE: It is automatically further advanced by about 5° to 10° Before Top Dead Center at higher altitudes.

11. Remove the timing light.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

12. Disconnect scan tool MB991958 from the data link connector.

CURB IDLE SPEED CHECK

M1111003501561

Required Special Tool:

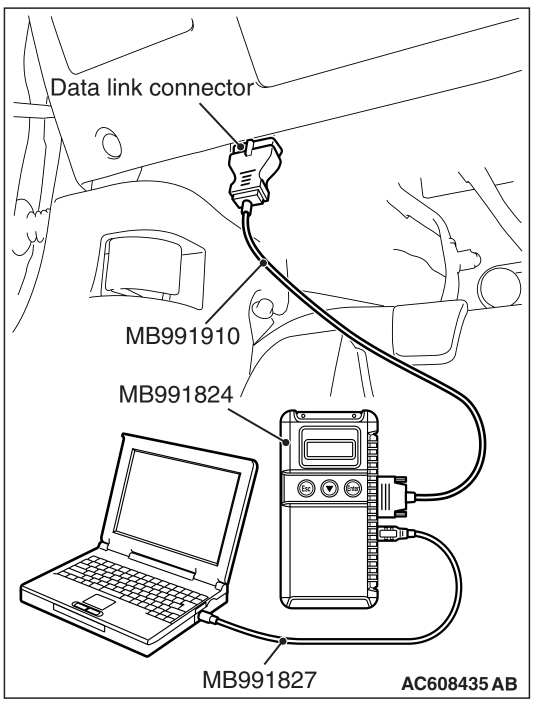
MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Before inspection, set the vehicle in the following condition:

- Engine coolant temperature: 80 –95° C (176 –203° F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with CVT)

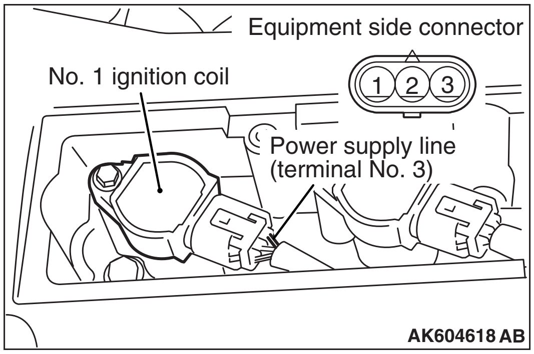
NOTE: On vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



3. Set the timing light to the power supply line (terminal No. 3) of the ignition coil No. 1.
4. Start the engine.
5. Run the engine at idle for 2 minutes.
6. Check the actual ignition timing is at the standard value.

   Standard value: Approximately 10° BTDC

7. Check the idle speed. Select item number 2 and take a reading of the idle speed.

   Curb idle speed: 700 ±100 r/min

   NOTE: The idle speed is controlled automatically by the idle air control system.

8. If the idle speed is outside the standard value, refer to GROUP 13A, Multiport Fuel Injection (MFI) –Multiport Fuel Injection (MFI) Diagnosis –Symptom Chart P.13A-51.

   NOTE: Ignition timing fluctuates about ±7° Before Top Dead Center, even under normal operating condition.

   NOTE: It is automatically further advanced by about 5° to 10° Before Top Dead Center at higher altitudes.

9. Remove the timing light.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

10. Disconnect scan tool MB991958 from the data link connector.

IDLE MIXTURE CHECK

M1111002101087

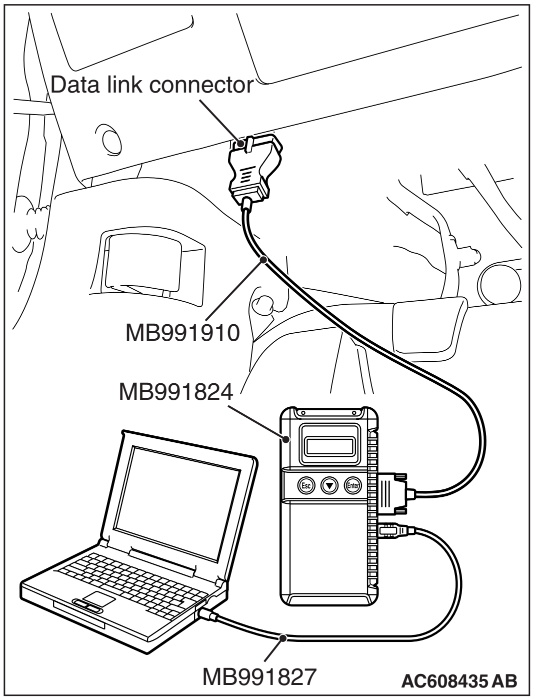
Required Special Tool:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Before inspection, set the vehicle in the following condition:
   - Engine coolant temperature: 80 –95° C (176 –203° F)
   - Lights and all accessories: OFF
   - Transaxie: Neutral (P range on vehicles with CVT)

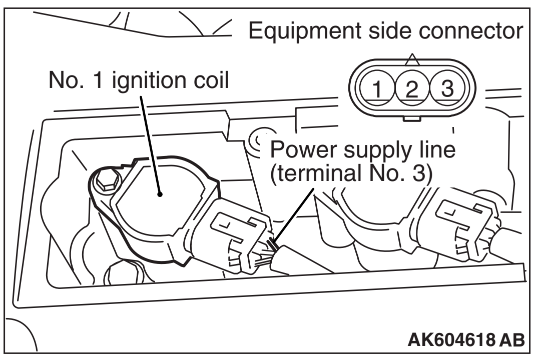
   NOTE: On vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



3. Set the timing light to the power supply line (terminal No. 3) of the ignition coil No. 1.
4. Start the engine and let it run at idle.
5. Check that the actual ignition timing is at the standard value.

   Standard value: Approximately 10° BTDC

   NOTE: Ignition timing fluctuates about ±7° Before Top Dead Center, even under normal operating condition.

   NOTE: It is automatically further advanced by about 5° to 10° Before Top Dead Center at higher altitudes.

6. Run the engine and increase the engine speed to 2,500 r/min for 2 minutes.
7. Set the CO, HC tester.
8. Check the CO contents and the HC contents at idle.

   Standard value:
   CO contents: 0.5% or less
   HC contents: 100 ppm or less

9. If there is a deviation from the standard value, inspect the MFI system (Refer to GROUP 13A –Multiport Fuel Injection (MFI) –Multiport Fuel Injection (MFI) Diagnosis –Symptom Chart P.13A-51)
10. Remove the timing light.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

11. Disconnect scan tool MB991958 from the data link connector.

COMPRESSION PRESSURE CHECK

M1111002601747

Required Special Tool:

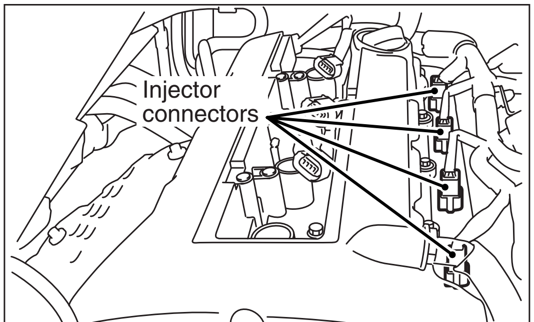
MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle in the following condition:

- Engine coolant temperature: 80 –95° C (176 –203° F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with CVT)

2. Remove all of the ignition coils and spark plugs.



AK502603AE

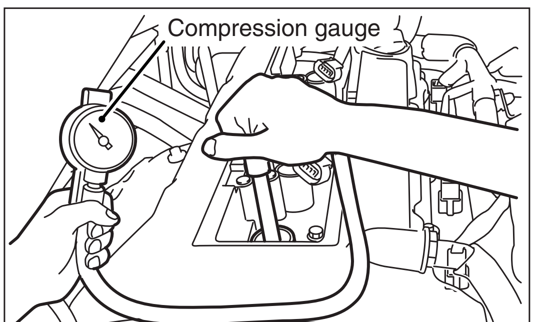
3. Disconnect the all of the injector connectors.

NOTE: Doing this will prevent the engine control module from carrying out ignition and fuel injection.

⚠ WARNING

Keep your distance from the spark plug hole when cranking. Oil, fuel, etc., may spray out from the spark plug hole and may cause serious injury.

4. Cover the spark plug hole with a shop towel etc., after the engine has been cranked, check that no foreign material is adhering to the shop towel.



AK502604AE

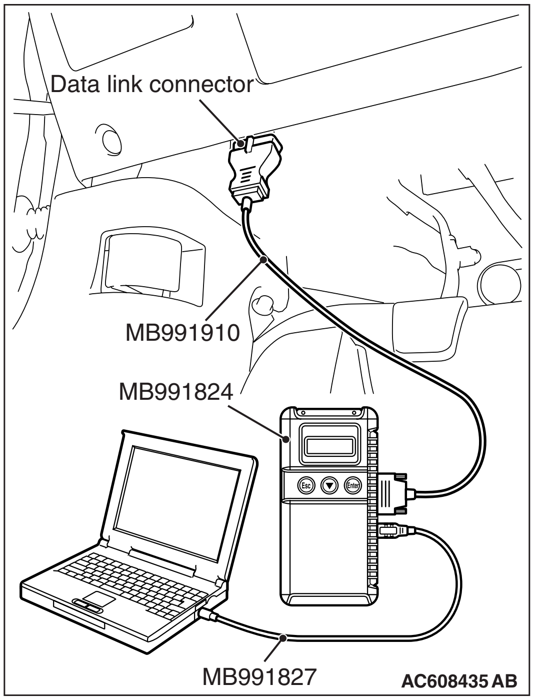
5. Set compression gauge to one of the spark plug holes.
6. Crank the engine with the throttle valve fully open and measure the compression pressure.

Standard value (at engine speed of 200 r/min): 1,470 kPa (213 psi)
Limit (at engine speed of 200 r/min): Minimum 1,050 kPa (152 psi)

7. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: Maximum 98 kPa (14 psi)

8. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps from 5 to 7.
   (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
   (2) If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
9. Connect the all of the injector connector.
10. Install the spark plugs and ignition coils.



11. Use the scan tool MB991958 to erase the diagnosis codes.

    NOTE: This will erase the diagnosis code resulting from the injector connectors being disconnected.

MANIFOLD VACUUM CHECK

M1111002701313

Required Special Tool:

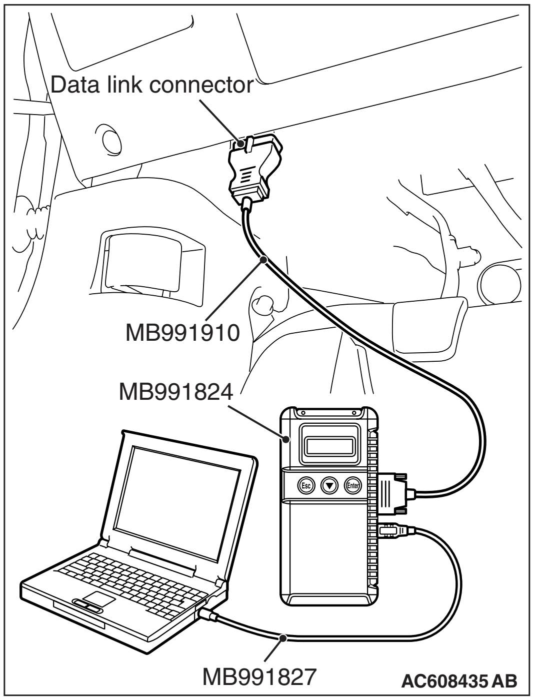
MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Before inspection, set the vehicle in the following condition:

- Engine coolant temperature: 80 –95° C (176 –203° F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with CVT)

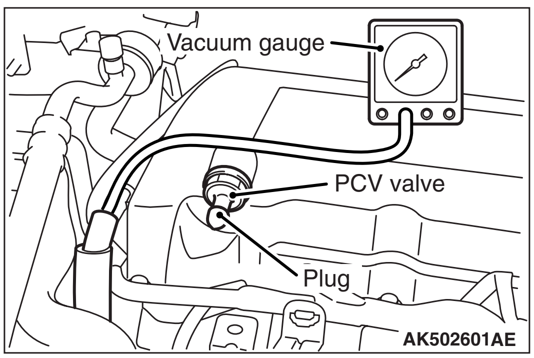
NOTE: On vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



3. Disconnect the ventilation hose from the positive crankcase ventilation (PCV) valve, and then connect a vacuum gauge to the ventilation hose. Plug the PCV valve.
4. Start the engine and check that idle speed is approximately 700 r/min.
5. Check the intake manifold vacuum.

   Limit: Minimum 60 kPa (18 in Hg)

6. Turn off the ignition switch.
7. Remove the vacuum gauge and then connect the ventilation hose to the PCV valve.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

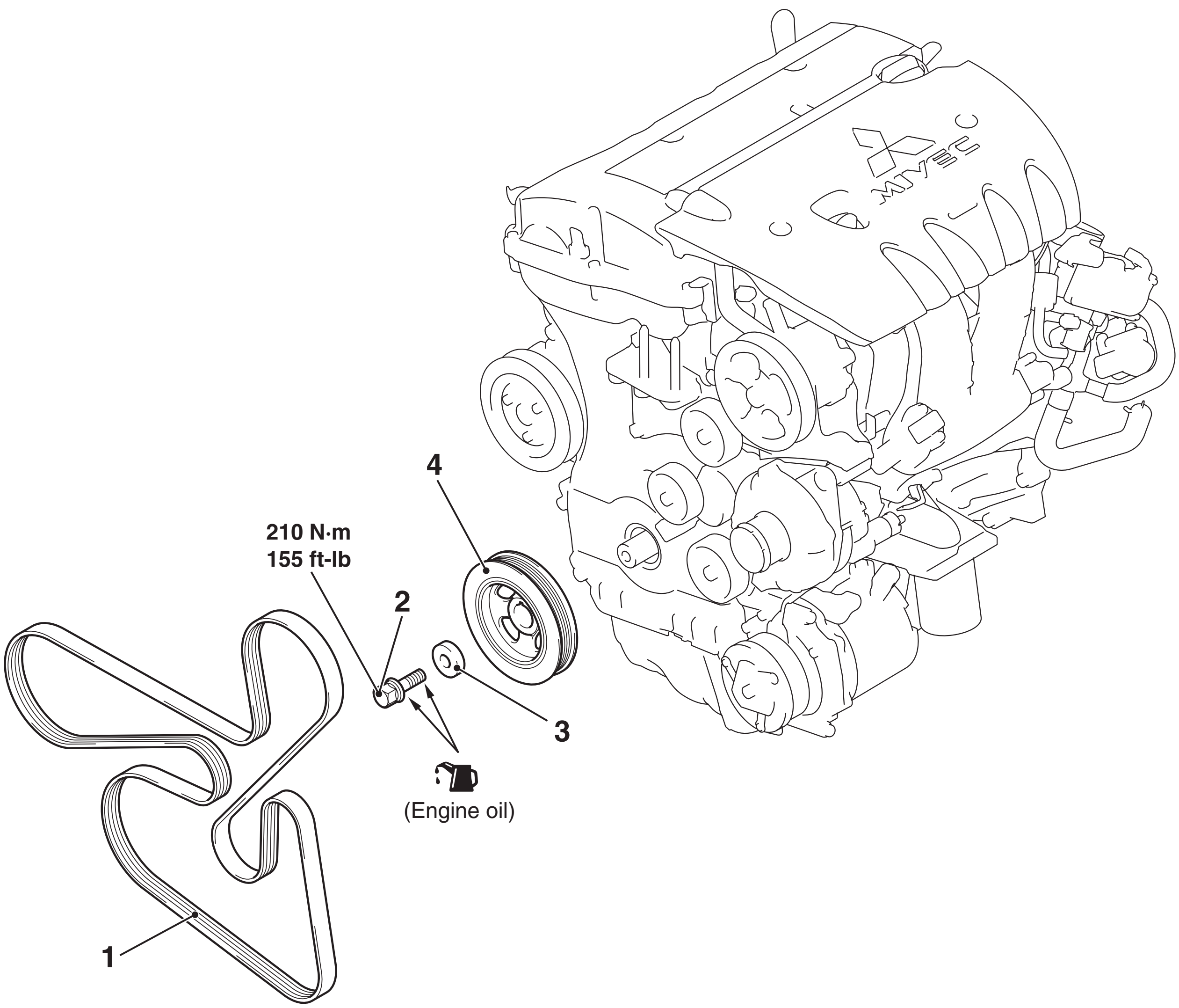
8. Disconnect scan tool MB991958 from the data link connector.

CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

M1112001601402

Pre-removal operation	Post-installation operation
• Engine Room Under Cover Front Removal (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Side Cover (RH) Removal (Refer to GROUP 51–Under Cover P.51-16). • Radiator Condenser Tank Removal (Refer to GROUP 14 –Radiator P.14-26).	• Radiator Condenser Tank Installation (Refer to GROUP 14 –Radiator P.14-26). • Drive Belt Tension Check (Refer to P.11A-9). • Engine Room Side Cover (RH) Installation (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Under Cover Front Installation (Refer to GROUP 51 –Under Cover P.51-16).



			Removal steps
<<A>>		1.	Drive belt
<<B>>	>>A<<	2.	Crank pulley center bolt

			Removal steps (Continued)
<<B>>	>>A<<	3.	Crankshaft washer
<<B>>	>>A<<	4.	Crankshaft pulley

Required Special Tools:

- MB990767: Front Hub and Flange End Yoke Holder
- MD998719:Pin

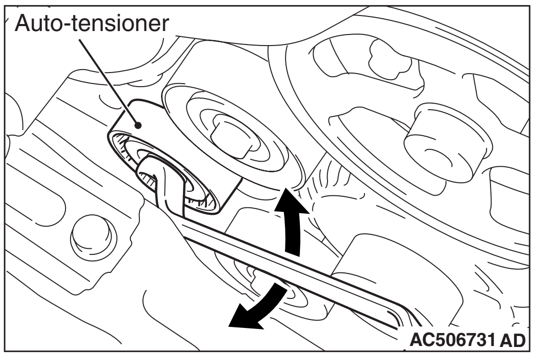
REMOVAL SERVICE POINTS

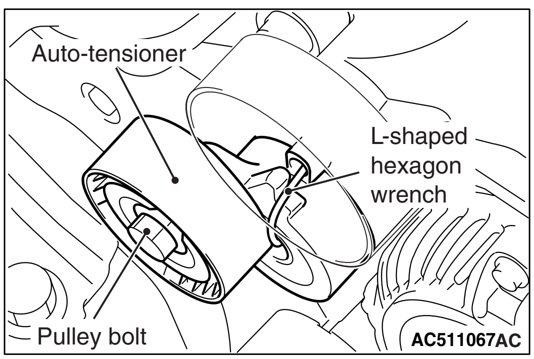
<<A>> DRIVE BELT REMOVAL

To introduce the serpentine drive system with the drive belt auto-tensioner, the following operations will be required.

⚠ CAUTION

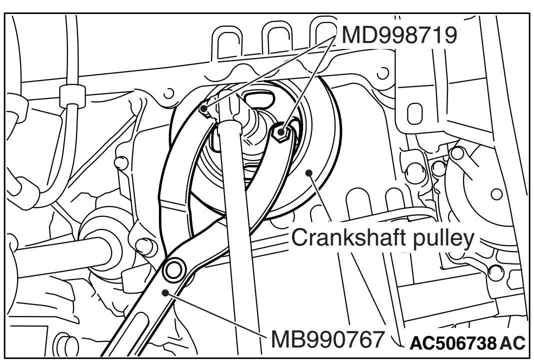
To reuse the Drive belt, draw an arrow indicating the rotating direction on the back of the belt using chalk to install the same direction.





1. Rotate the pulley bolt of the auto-tensioner counterclockwise with an offset wrench [45°, a long offset wrench (5/8 x 11/16 inches) recommended] and insert the hexagon wrench into the auto-tensioner hole to fix the auto-tensioner.
2. Remove the drive belt.

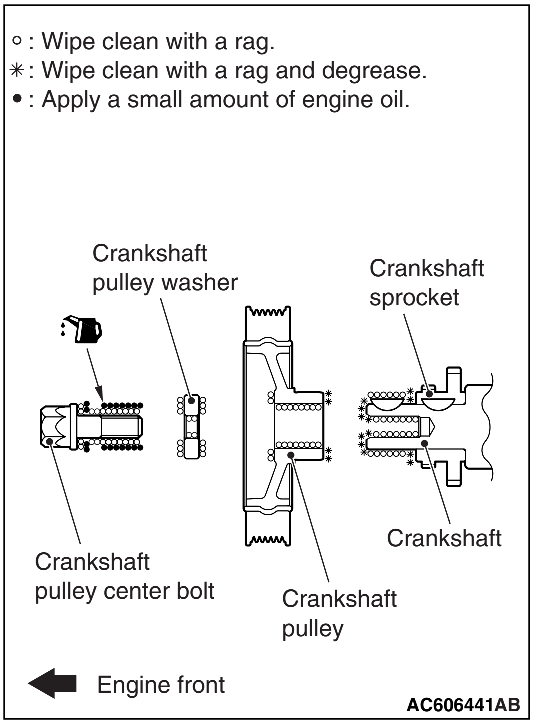
<<B>> CRANKSHAFT PULLEY CENTER BOLT/CRANKSHAFT PULLEY WASHER/CRANKSHAFT PULLEY REMOVAL



1. Hold the crankshaft drive sprocket with special tools MB990767 and MD998719.
2. Loosen the crankshaft pulley center bolt and remove the crankshaft pulley washer and crankshaft pulley.

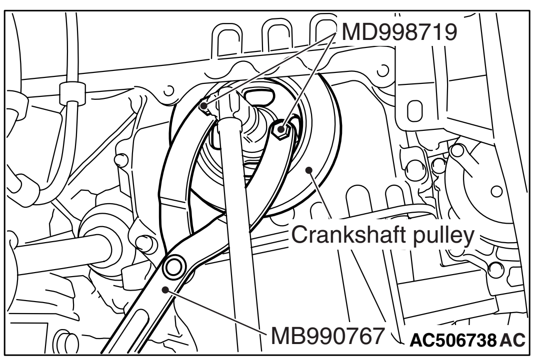
INSTALLATION SERVICE POINT

>>A<< CRANKSHAFT PULLEY/CRANKSHAFT PULLEY WASHER/CRANKSHAFT PULLEY CENTER BOLT INSTALLATION



1. Wipe off the dirt on the crankshaft and the crankshaft pulley as shown in the figure using a rag.
2. Wipe off the dirt on the crankshaft sprocket, the crankshaft and the crankshaft pulley as shown in the figure using a rag, and then degrease them.

   NOTE: Degrease them to prevent drop in the friction coefficient of the pressed area, which is caused by oil adhesion.
3. Install the crankshaft pulley.
4. Wipe off the dirt on the crankshaft pulley washer and the crankshaft pulley center bolt as shown in the figure using a rag.
5. Apply an adequate and minimum amount of engine oil to the threads of the crankshaft pulley center bolt and the lower area of the flange.



6. Hold the crankshaft pulley with special tools MB990767 and MD998719 in the same manner as removal.
7. Tighten the crankshaft pulley center bolt to the specified torque.

   Tightening torque: 210 N· m (155 ft-lb)

CAMSHAFT

REMOVAL AND INSTALLATION

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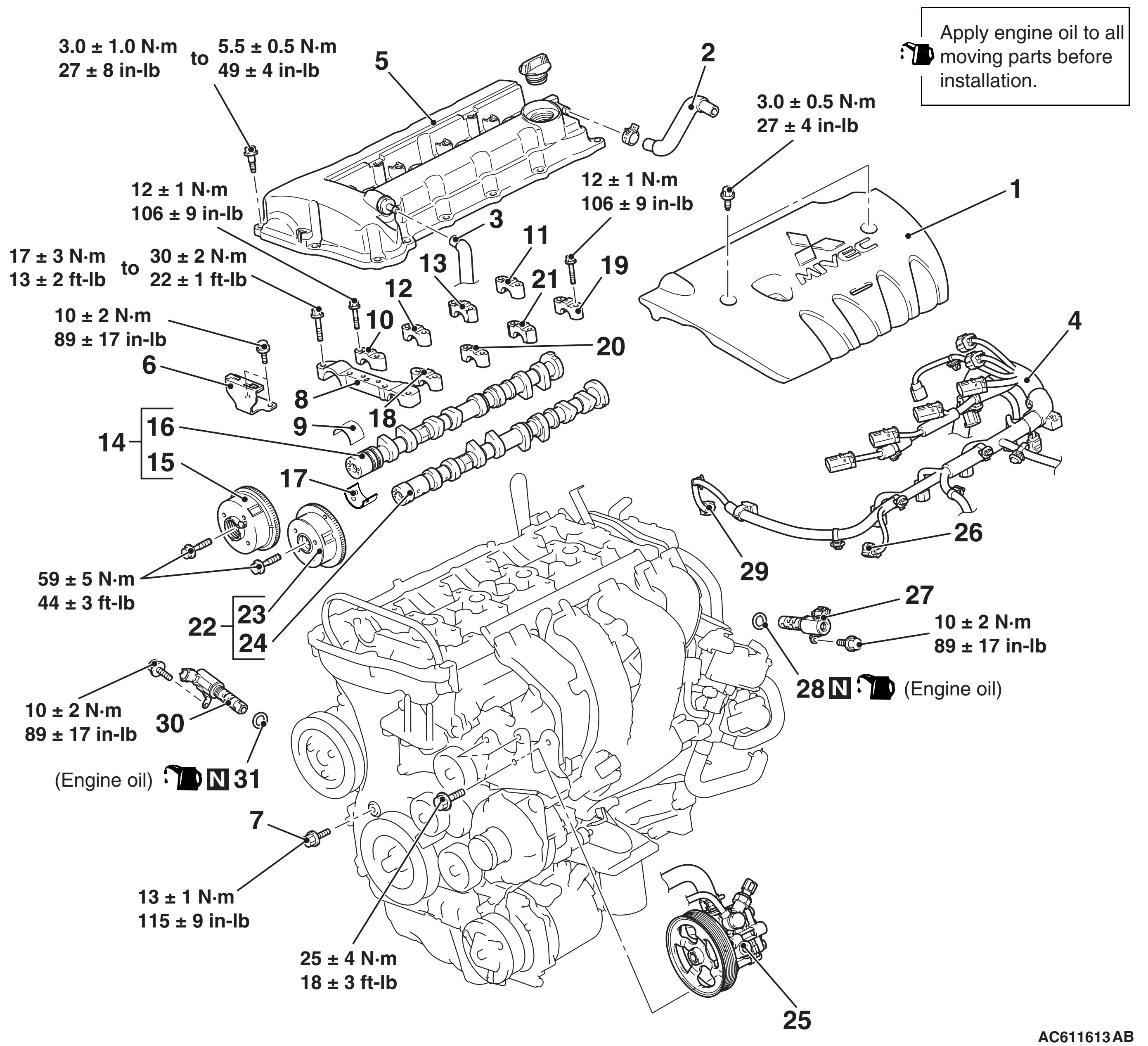


Camshaft removal steps

- Air cleaner assembly (Refer to GROUP 15 –Air Cleaner P.15-4).
- Strut tower bar (Refer to GROUP 42A –Strut Tower Bar P.42A-11).

1. Engine upper cover

- Ignition coil (Refer to GROUP 16 – Ignition System, Ignition Coil P.16-39).

2. Breather hose connection
3. PCV hose connection
4. Control wiring harness connection

<<A>> >>G<< 5. Cylinder head cover assembly

Camshaft removal steps

<<B>> • Cylinder No. 1 compression top dead center setting (only at removal)

- Valve clearance adjustment (Refer to P.11A-11). (only at installation)

6. Timing chain upper guide
7. Service hole bolt

<<C>> • Camshaft and camshaft sprocket assembly (exhaust side) removal preparatory operation (only at removal)

<<D>> >>F<< 8. Front camshaft bearing cap assembly

			Camshaft removal steps
	>>**E**<<	9.	Camshaft bearing
<<**E**>>	>>**D**<<	10.	Oil feeding camshaft bearing cap (exhaust side)
<<**E**>>	>>**D**<<	11.	Camshaft bearing cap (exhaust side)
<<**E**>>	>>**D**<<	12.	Camshaft bearing cap (exhaust side)
<<**E**>>	>>**D**<<	13.	Thrust camshaft bearing cap (exhaust side)
<<**F**>>	>>**E**<<	14.	Camshaft and camshaft sprocket assembly (exhaust side)
<<**G**>>	>>**B**<<	15.	Camshaft sprocket (exhaust side)
<<**G**>>	>>**B**<<	16.	Camshaft (exhaust side)
	>>**E**<<	17.	Camshaft bearing
<<**E**>>	>>**D**<<	18.	Oil feeding camshaft bearing cap (intake side)
<<**E**>>	>>**D**<<	19.	Camshaft bearing cap (intake side)
<<**E**>>	>>**D**<<	20.	Camshaft bearing cap (intake side)
<<**E**>>	>>**D**<<	21.	Thrust camshaft bearing cap (intake side)
	>>**C**<<	22.	Camshaft and camshaft sprocket assembly (intake side)
<<**G**>>	>>**B**<<	23.	Camshaft sprocket (intake side)
<<**G**>>	>>**B**<<	24.	Camshaft (intake side)
			Oil control valve removal steps
		•	Drive belt (Refer to P.11A-19).
<<**H**>>		25.	Power steering oil pump assembly
		26.	Intake engine oil control valve connector
<<**I**>>	>>**A**<<	27.	Intake engine oil control valve
	>>**A**<<	28.	O-ring
		29.	Exhaust engine oil control valve connector
<<**I**>>	>>**A**<<	30.	Exhaust engine oil control valve
	>>**A**<<	31.	O-ring

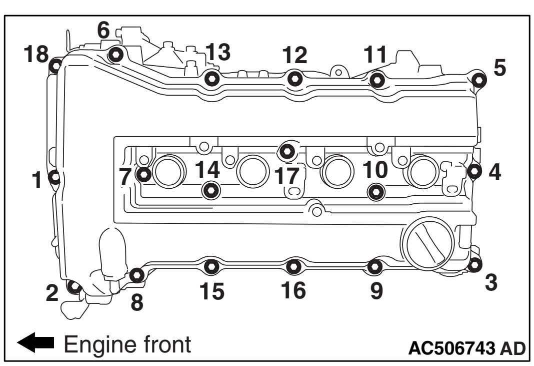
Required Special Tool:

- MB992103: Chain Tension Release Bar

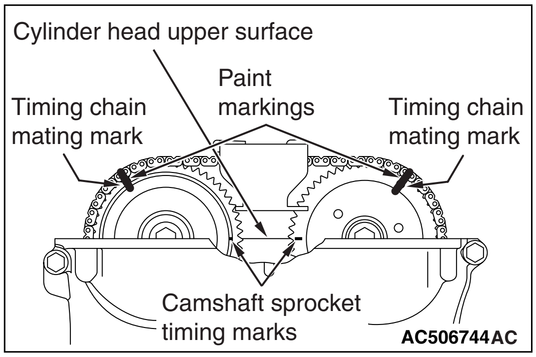
REMOVAL SERVICE POINTS

<<A>> CYLINDER HEAD COVER ASSEMBLY REMOVAL

Loosen the cylinder head cover assembly mounting bolts in the order of number shown in the figure, and remove the cylinder head cover assembly.



<<B>> CYLINDER NO. 1 COMPRESSION TOP DEAD CENTER SETTING

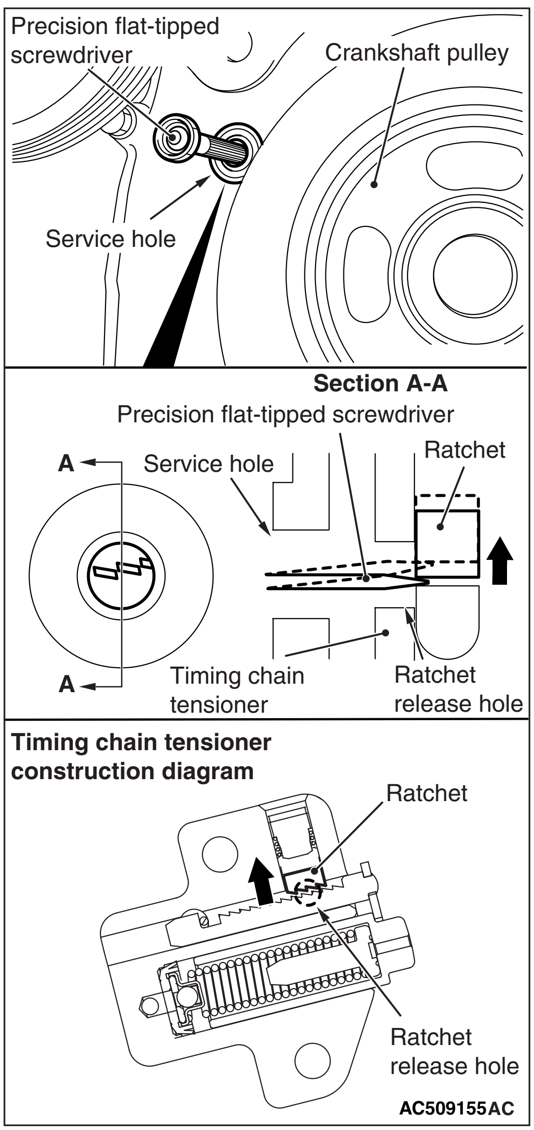


⚠ **CAUTION**

Turn the crankshaft clockwise.

1. Turn the crankshaft clockwise so that the camshaft sprocket timing marks become horizontal to the cylinder head upper surface, and set the cylinder No. 1 to the top dead center of compression. At this time, check that the crankshaft pulley timing mark is in the 0-degree position of the ignition timing indicator of the timing chain case assembly.
2. Put paint marks on both the camshaft sprocket and timing chain at the position of camshaft sprocket timing chain mating mark (circular hole).

<<C>> CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY (EXHAUST SIDE) REMOVAL PREPARATORY OPERATION

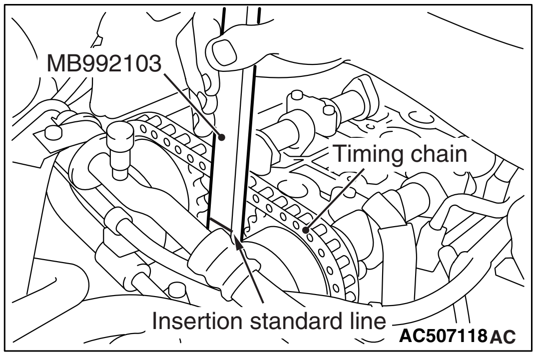


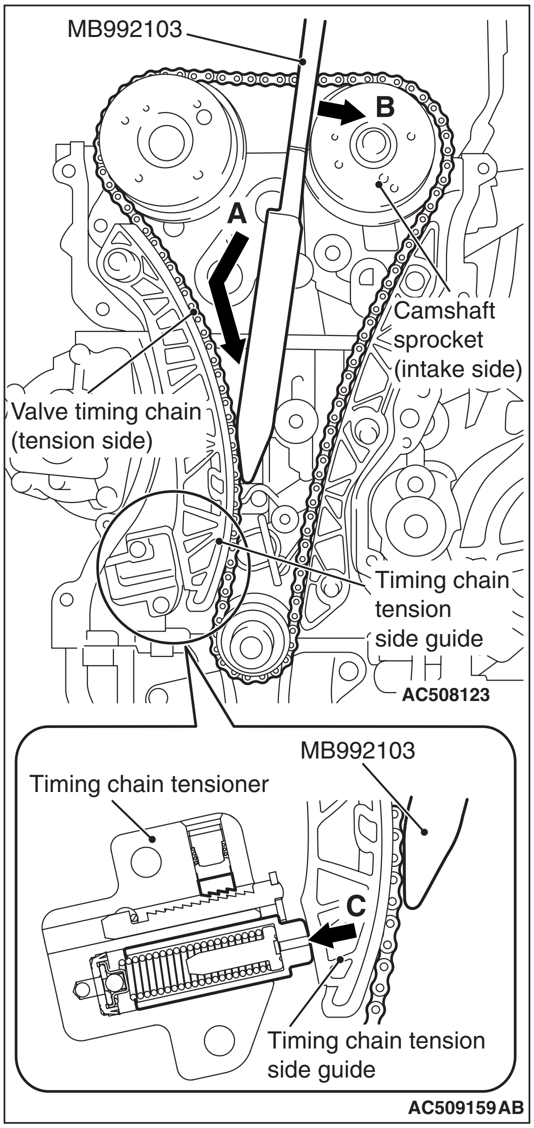
1. Insert a precision flat-tipped screwdriver (−) through the service hole of the timing chain case, press up the timing chain tensioner ratchet to unlock, and keep the timing chain tensioner with that state.

   NOTE: Lightly press down the tail end of the precision flat-tipped screwdriver (−) to press up the tip of the precision flat-tipped screwdriver (−) inserted to the timing chain tensioner to unlock.

⚠ CAUTION

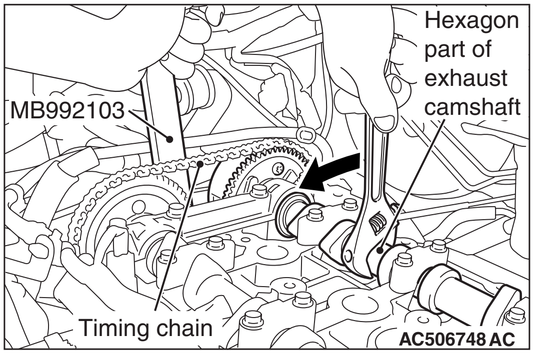
- **When inserting special tool MB992103 into the timing chain case assembly inside, pay attention to the position of the timing chain to avoid damage to the timing chain and timing chain tension side guide. Do not insert the special tool beyond its insertion guideline.**
- **If unlocking the timing chain tensioner is insufficient, the special tool cannot be inserted to the insertion guideline. Do not insert the special tool forcibly, follow Step 1 again to unlock the timing chain tensioner and insert the special tool.**





2. With the timing chain tensioner unlocked, insert special tool MB992103 inside the timing chain case assembly along the tension side of the timing chain until the insertion guide line aligns with the upper surface of the timing chain case assembly (Figure A).

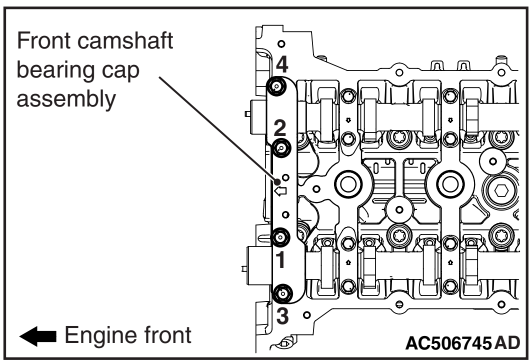
   NOTE: With the timing chain tensioner unlocked, insert the special tool along the tension side of the timing chain, according to the special tool top shape. The special tool can be inserted smoothly to the position where the special tool insertion guide line aligns with the timing chain case assembly top surface (Figure B), and the spread timing chain tension side guide can be held (Figure C).
3. With the special tool inserted up to the insertion guide line, press the special tool against the intake side camshaft sprocket and spread and hold the timing chain tension side guide.
4. Remove the flat-tipped precision screwdriver (-) unlocking the timing chain tensioner.



⚠ CAUTION

The timing chain may snag on by other parts. After sagging the timing chain, never rotate the crankshaft.

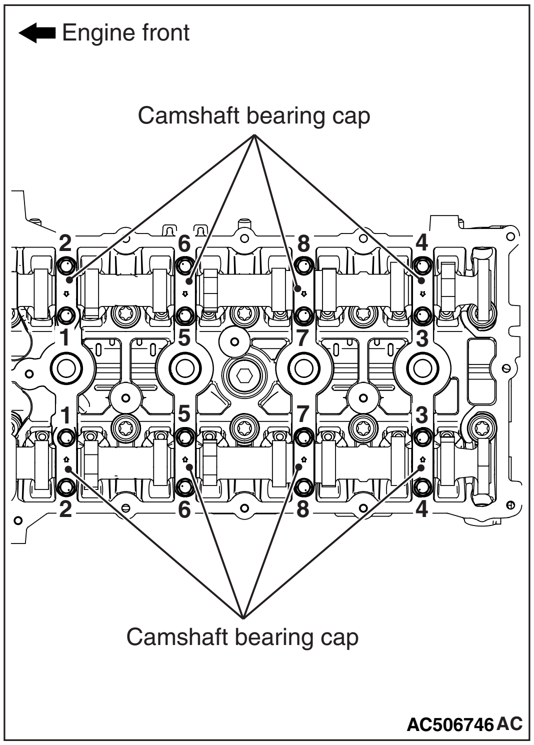
5. With the timing chain tension side guide spread, hook the special tool over the hexagon part of the camshaft on the exhaust side, and turn the camshaft clockwise to apply slack to the timing chain between the camshaft sprockets.



<<D>> FRONT CAMSHAFT BEARING CAP ASSEMBLY REMOVAL

Loosen the mounting bolts of front camshaft bearing cap in the order of number shown in the figure, and remove the front camshaft bearing cap assembly.

<<E>> OIL FEEDING CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/THRUST CAMSHAFT BEARING CAP REMOVAL

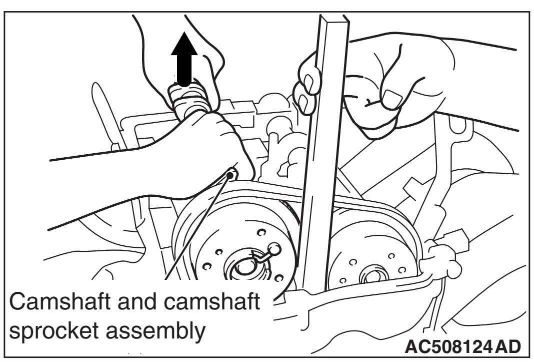


⚠ CAUTION

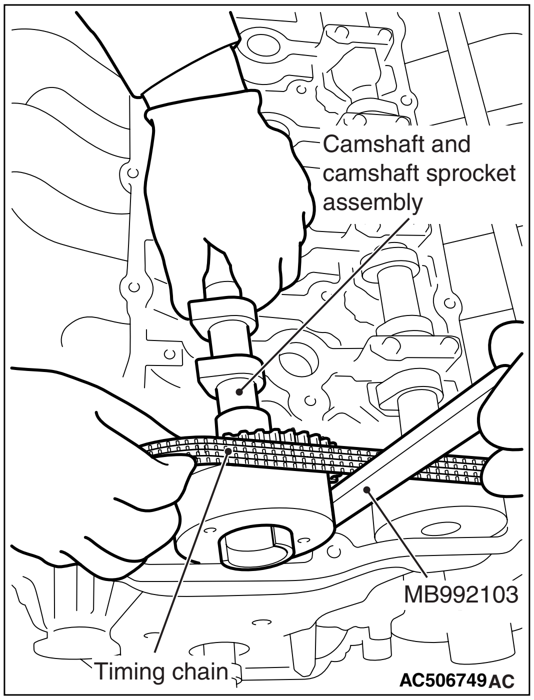
When the camshaft bearing cap mounting bolts are loosened at once, the mounting bolts jump out by the spring force and the threads are damaged. Always loosen the mounting bolts in four or five steps.

Loosen the mounting bolts of the camshaft bearing caps in the order of number shown in the figure in four or five steps, and remove the camshaft bearing caps.

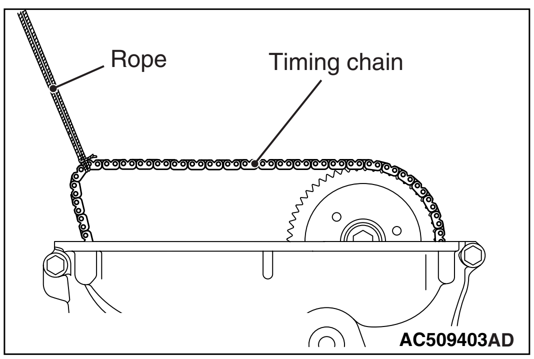
<<F>> CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY (EXHAUST SIDE) REMOVAL



1. Raise slightly the transaxle side of the camshaft and camshaft sprocket assembly (exhaust side) by using the slack of the timing chain, and remove from the cam bearing.



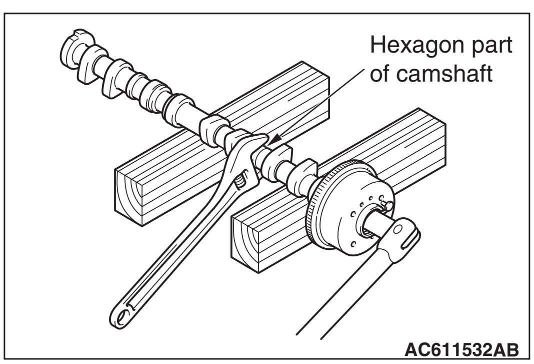
2. Remove the timing chain from the camshaft and camshaft sprocket assembly (exhaust side) toward the timing chain case assembly, and remove the camshaft and camshaft sprocket assembly (exhaust side) toward the transaxle.
3. Remove special tool MB992103 inserted into the timing chain case assembly.



⚠ CAUTION

The timing chain may snag on other parts. After removing the camshaft and camshaft sprocket assembly, never rotate the crankshaft.

4. After removing the camshaft and camshaft sprocket assembly (exhaust side), hang up the timing chain with a rope to prevent the timing chain from falling into the timing chain case assembly.



<<G>> CAMSHAFT SPROCKET/CAMSHAFT REMOVAL

Hold the flats of the camshaft with a monkey wrench. Loosen the camshaft sprocket mounting bolts and remove the camshaft sprocket from the camshaft.

<<H>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. With the hose installed, remove the power steering oil pump assembly from the bracket.
2. Tie the removed power steering oil pump assembly with a string at a position where it will not interfere with the removal and installation of oil control valve.

<<I>> OIL CONTROL VALVE REMOVAL

⚠ CAUTION

After removal of the oil control valve, be careful to prevent dust from getting into the oil passage in the cylinder head.

INSTALLATION SERVICE POINTS

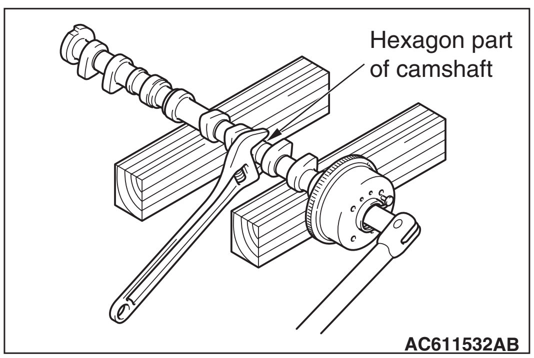
>>A<< O-RING/OIL CONTROL VALVE INSTALLATION

⚠ CAUTION

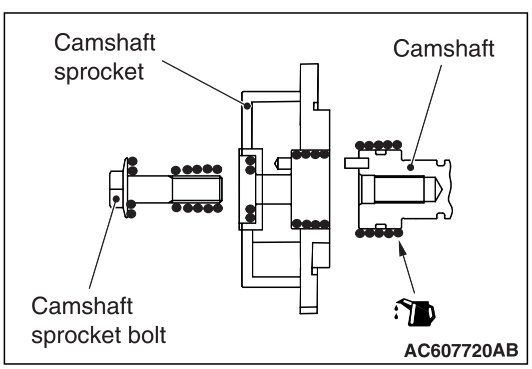
When installing the oil control valve, be careful to avoid damage to the O-ring.

Apply engine oil to the O-ring of the oil control valve and install the oil control valve to the cylinder head.

>>B<< CAMSHAFT/CAMSHAFT SPROCKET INSTALLATION



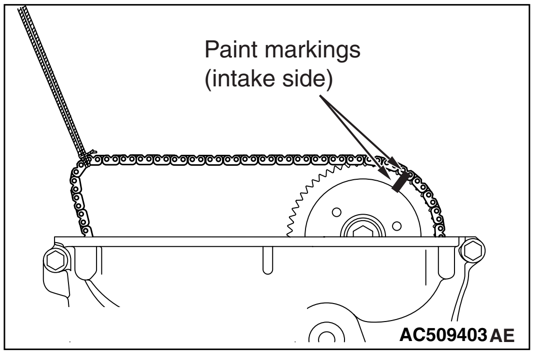
1. Use a monkey wrench to secure the flats of the camshaft in the same manner as removal.



2. Apply an adequate and minimum amount of engine oil to the camshaft and camshaft sprocket as shown in the figure.
3. Install the camshaft sprocket to the camshaft.
4. Apply an adequate and minimum amount of engine oil to the camshaft sprocket bolt.
5. Tighten the camshaft sprocket bolts to the specified torque.

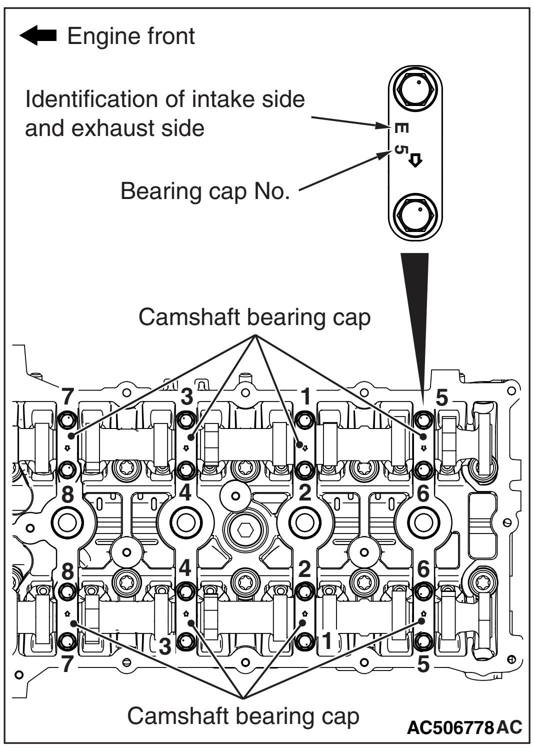
   Tightening torque: 59 ± 5 N· m (44 ± 3 ft-lb)

>>C<< CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY (INTAKE SIDE) INSTALLATION



1. Align the intake side paint mark of the timing chain which was put at removal with the paint mark of the intake side camshaft sprocket, and install the camshaft sprocket to the timing chain.
2. Install the camshaft and camshaft sprocket assembly (intake side) to the cylinder head.

>>D<< THRUST CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/OIL FEEDING CAMSHAFT BEARING CAP/CAMSHAFT BEARING INSTALLATION



1. Install the camshaft bearing caps to the cylinder heads.

   NOTE: Because the thrust camshaft bearing cap and camshaft bearing cap are the same in shape, check the bearing cap number and additionally its symbol to identify the intake and exhaust sides for correct installation.
2. Tighten each camshaft bearing cap mounting bolt to the specified torque in the order of number shown in the figure in two or three steps.

   Tightening torque: 12 ± 1 N·m (106 ± 9 in-lb)

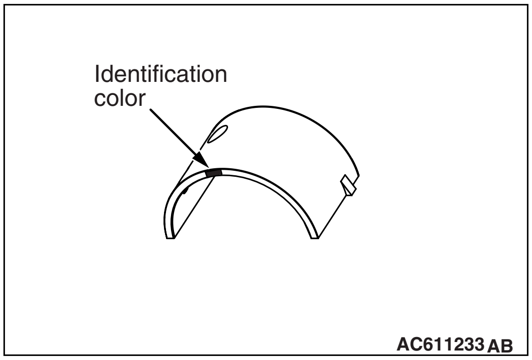
>>E<< CAMSHAFT BEARING/CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY (EXHAUST SIDE) INSTALLATION

⚠ CAUTION

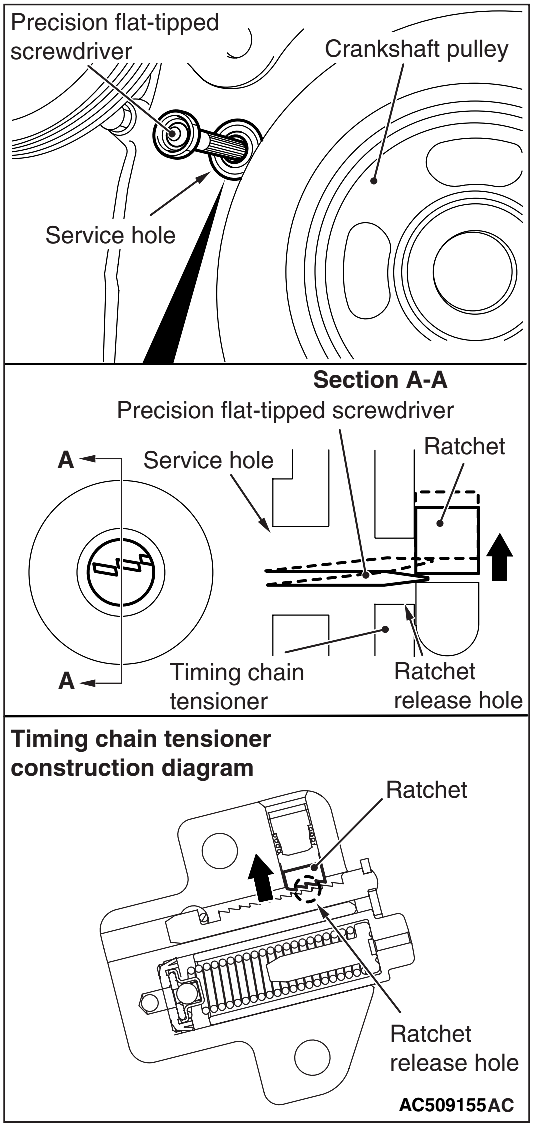
Be careful not to drop the camshaft bearing.

1. Install camshaft bearings on the cylinder head.

Camshaft		Camshaft bearing identification color
Identification mark	Journal diameter mm (in)	
1	40.000 - 40.008 (1.5748 - 1.5751)	Black
2	40.008 - 40.016 (1.5751 - 1.5754)	None
3	40.016 - 40.024 (1.5754 - 1.5757)	Green



2. The identification color of the camshaft bearing is painted at the illustrated position.

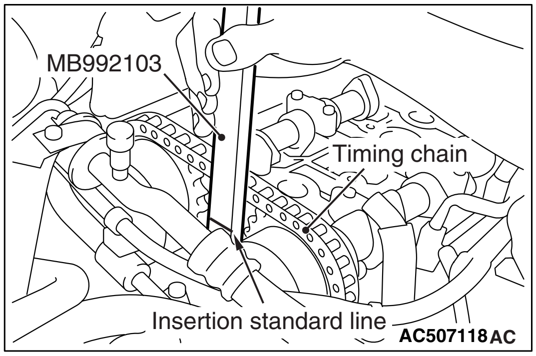


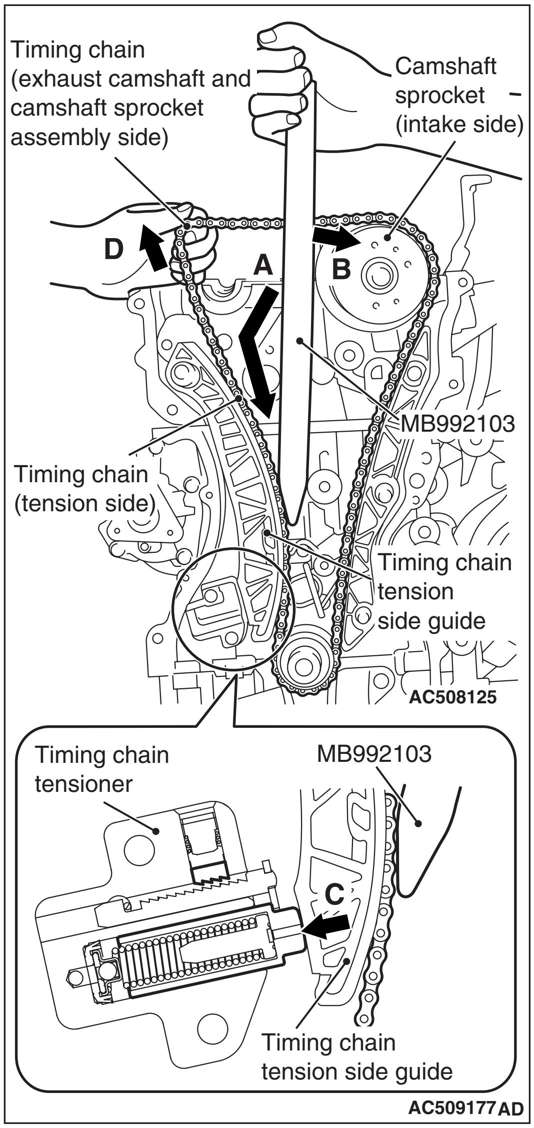
3. In the same manner as removal, insert the precision flat-tipped screwdriver (-) through the service hole of the timing chain case, press up the ratchet of timing chain tensioner to unlock, and hold the unlocked timing chain tensioner.

   NOTE: Lightly press down the tail end of the precision flat-tipped screwdriver (-) to press up the tip of the precision flat-tipped screwdriver (-) inserted to the timing chain tensioner to unlock.

⚠ CAUTION

- **When inserting special tool MB992103 into the timing chain case assembly, pay attention to the position of the timing chain to avoid damage to the timing chain and timing chain tension side guide. Do not insert the special tool beyond its insertion guideline.**
- **If unlocking the timing chain tensioner is insufficient, the special tool cannot be inserted to the insertion guideline. Do not insert the special tool forcibly, follow Step 1 again to unlock the timing chain tensioner and insert the special tool.**





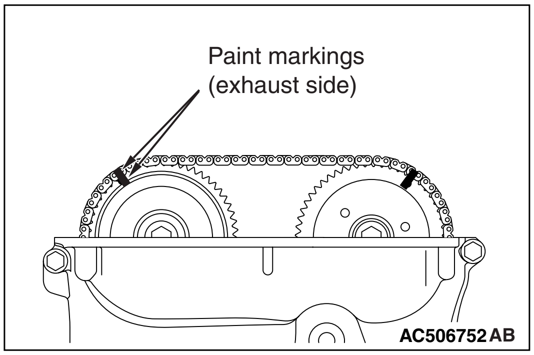
4. With the timing chain tensioner unlocked, insert special tool MB992103 inside the timing chain case assembly along the tension side of the timing chain until the insertion guide line aligns with the upper surface of the timing chain case assembly (Figure A).

   NOTE: With the timing chain tensioner unlocked, insert the special tool along the tension side of the timing chain, according to the special tool top shape. The special tool can be inserted smoothly to the position where the special tool insertion guideline aligns with the timing chain case assembly top surface, and the spread timing chain tension side guide can be hold.

5. With the special tool inserted up to the insertion guide line, press the special tool against the intake side camshaft sprocket (Figure B) and spread and hold the timing chain tension side guide (Figure C).
6. Remove the flat-tipped precision screwdriver (–) unlocking the timing chain tensioner.
7. Pull up the camshaft and camshaft sprocket assembly (exhaust side) mounting area of the timing chain (Figure D) to provide allowance for easy installation of the camshaft and camshaft sprocket assembly (exhaust side) to the timing chain.

⚠ CAUTION

When installing the camshaft and camshaft sprocket assembly (exhaust side), be careful not to let the camshaft bearing which is installed to the front cam bearing deviate from its position.

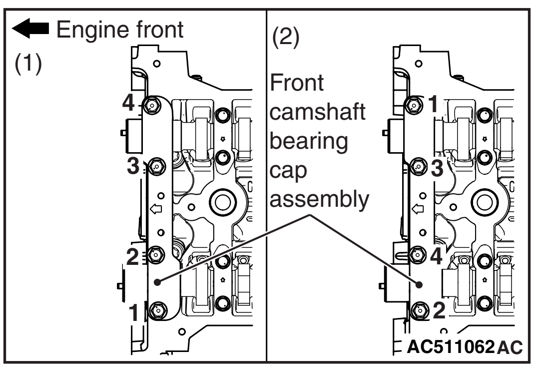


8. Align the exhaust side paint mark of the timing chain which was put at removal with the paint mark of the exhaust side camshaft sprocket, and install the timing chain to the camshaft sprocket.
9. Install the camshaft and camshaft sprocket assembly (exhaust side) to the cylinder head.
10. Remove the special tool inserted into the timing chain case assembly inside.

>>F<< FRONT CAMSHAFT BEARING CAP ASSEMBLY INSTALLATION

⚠ CAUTION

When the mounting bolts are tightened with the front camshaft bearing cap tilted, the front camshaft bearing cap is damaged. Install the front camshaft bearing cap properly to the cylinder head and camshaft.



1. Install the front camshaft bearing cap to the cylinder head, and temporarily tighten the camshaft bearing front cap to the specified torque in the order of the figure (1).

   Tightening torque: 17 ± 3 N· m (13 ± 2 ft-lb)

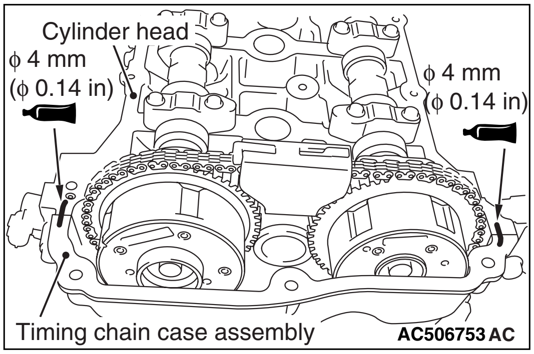
2. Tighten the front camshaft bearing cap again to the specified torque in the order of the figure (2).

   Tightening torque: 30 ± 2 N· m (22 ± 1 ft-lb)

3. After the front camshaft bearing cap installation, check that the paint markings of the camshaft sprocket and the timing chain and the timing mark of the crankshaft pulley and the 0-degree position of ignition timing indicator are aligned respectively.

>>G<< CYLINDER HEAD COVER ASSEMBLY INSTALLATION

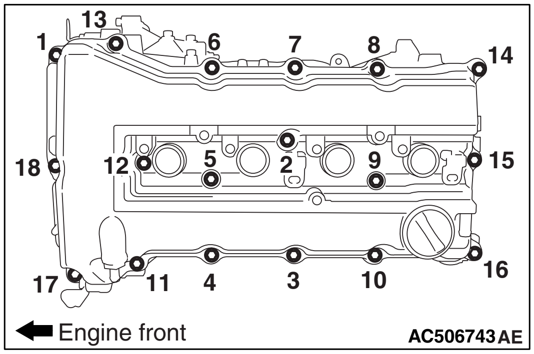
1. Wipe off the sealant on the mating surface of the cylinder head cover assembly and the cylinder head and timing chain case assembly, and degrease the surface where the sealant is applied by white gasoline or the like.



2. Apply sealant to the joint between the cylinder head and timing chain case assembly as shown in the figure and install the cylinder head cover assembly to the cylinder head.

   Specified sealant: Three bond 1227D or equivalent

   NOTE: Install the cylinder head cover assembly within 3 minutes after the application of sealant.



3. Tighten the cylinder head cover assembly mounting bolts to the specified torque in the order of number shown in the figure.

   Tightening torque: 3.0 ± 1.0 N· m (27 ± 8 in-lb)

4. Tighten again the cylinder head cover assembly mounting bolts to the specified torque in the order of number shown in the figure.

   Tightening torque: 5.5 ± 0.5 N· m (49 ± 4 in-lb)

VALVE STEM SEAL

REMOVAL AND INSTALLATION

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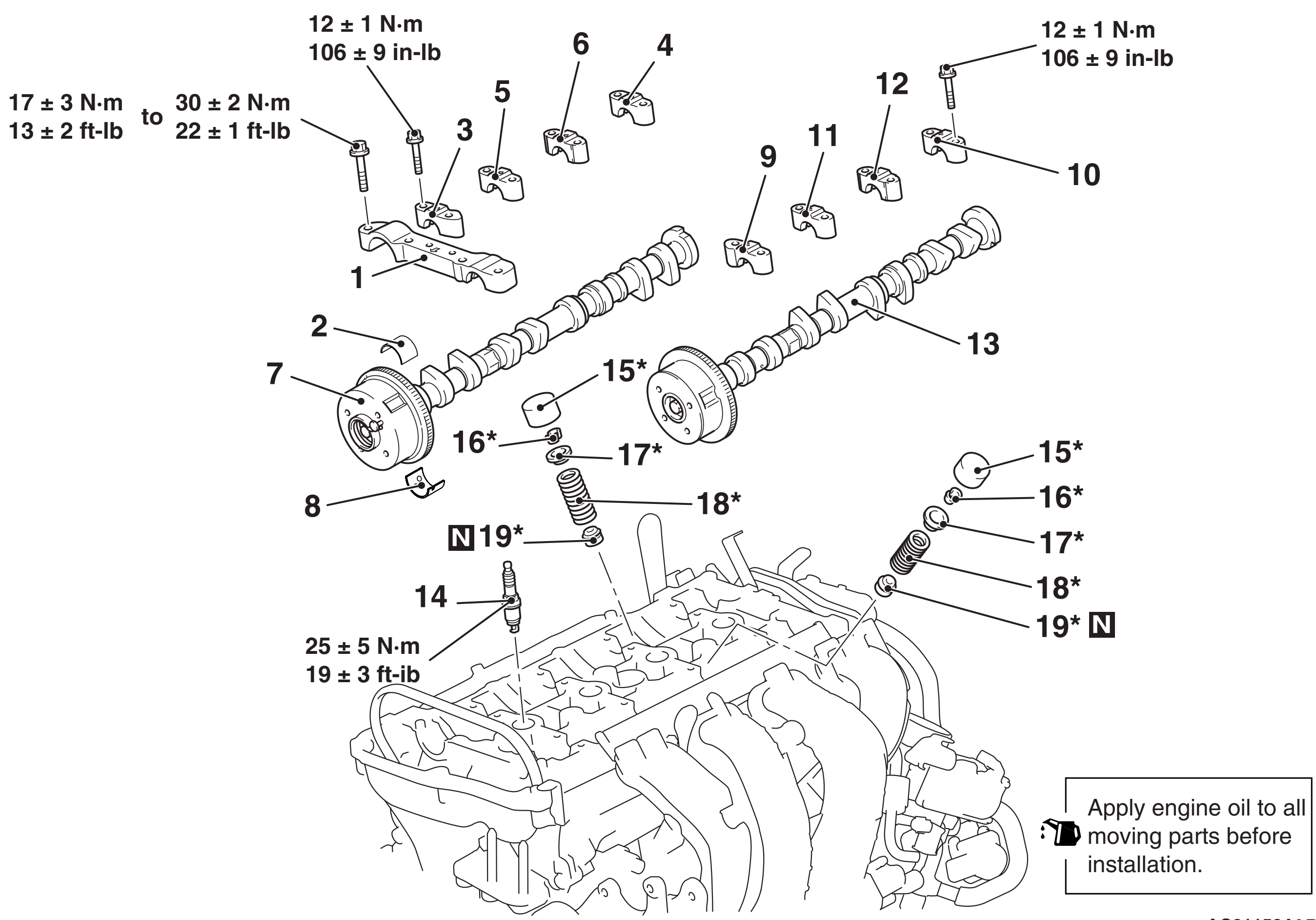
⚠ CAUTION

***Remove and assemble the marked parts in each cylinder unit.**

Pre-removal operation	Post-installation operation
• Engine Room Under Cover Front Removal (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Side Cover (RH) Removal (Refer to GROUP 51–Under Cover P.51-16). • Cylinder Head Cover Assembly Removal (Refer to P.11A-22). • Engine Oil Pan Removal (Refer to P.11A-45).	• Engine Oil Pan Installation (Refer to P.11A-45). • Valve Clearance Check (Refer to P.11A-11). • Cylinder Head Cover Assembly Installation (Refer to P.11A-22). • Engine Oil Refilling (Refer to GROUP 12 - On-vehicle Service, Engine Oil Replacement P.12-4). • Engine Room Side Cover (RH) Installation (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Under Cover Front Installation (Refer to GROUP 51 –Under Cover P.51-16).



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Removal steps

<<A>> >>F<< 1. Front camshaft bearing cap assembly
2. Camshaft bearing
<<B>> >>D<< 3. Oil feeding camshaft bearing cap (exhaust side)
<<B>> >>D<< 4. Camshaft bearing cap (exhaust side)
<<B>> >>D<< 5. Camshaft bearing cap (exhaust side)

Removal steps (Continued)

<<B>> >>D<< 6. Thrust camshaft bearing cap (exhaust side)
>>E<< 7. Camshaft and camshaft sprocket assembly (exhaust side)
8. Camshaft bearing
<<B>> >>D<< 9. Oil feeding camshaft bearing cap (intake side)
<<B>> >>D<< 10. Camshaft bearing cap (intake side)
<<B>> >>D<< 11. Camshaft bearing cap (intake side)

Removal steps (Continued)

<<B>>	>>D<<	12.	Thrust camshaft bearing cap (intake side)
		13.	Camshaft and camshaft sprocket assembly (intake side)
		14.	Spark plug
<<C>>	>>C<<	15.	Valve tappet
<<D>>	>>B<<	16.	Valve spring retainer lock
		17.	Valve spring retainer
		18.	Valve spring
<<E>>	>>A<<	19.	Valve stem seal

Required Special Tools:

- MD998772: Valve Spring Compressor
- MB992089: Retainer Holder C
- MB992090: Retainer Holder Attachment
- MB992085: Valve Stem Seal Pliers
- MD998737: Valve Stem Seal Installer

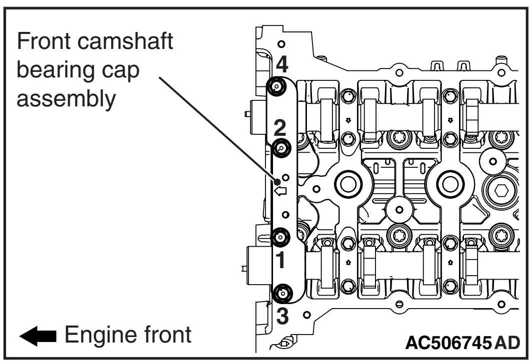
REMOVAL SERVICE POINTS

<<A>> FRONT CAMSHAFT BEARING CAP ASSEMBLY REMOVAL

⚠ CAUTION

Be careful not to drop the camshaft bearing.

Loosen the mounting bolts of front camshaft bearing cap in the order of number shown in the figure, and remove the front camshaft bearing cap assembly.

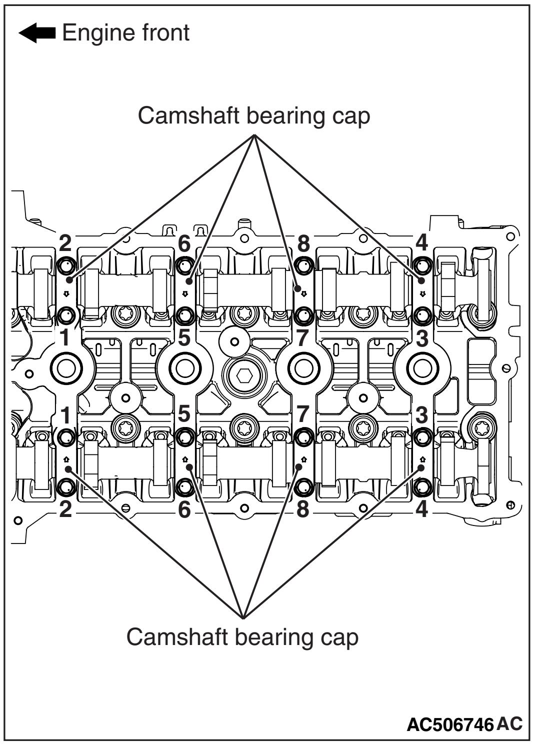


<<B>> OIL FEEDING CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/THRUST CAMSHAFT BEARING CAP REMOVAL

⚠ CAUTION

When the camshaft bearing cap mounting bolts are loosened at once, the mounting bolts jump out by the spring force and the threads are damaged. Always loosen the mounting bolts in four or five steps.

Loosen the mounting bolts of the camshaft bearing caps in the order of number shown in the figure in four or five steps, and remove the camshaft bearing caps.

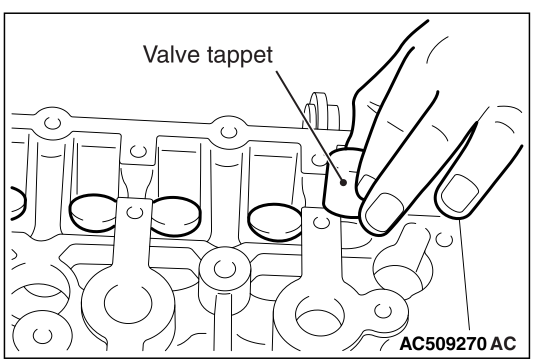


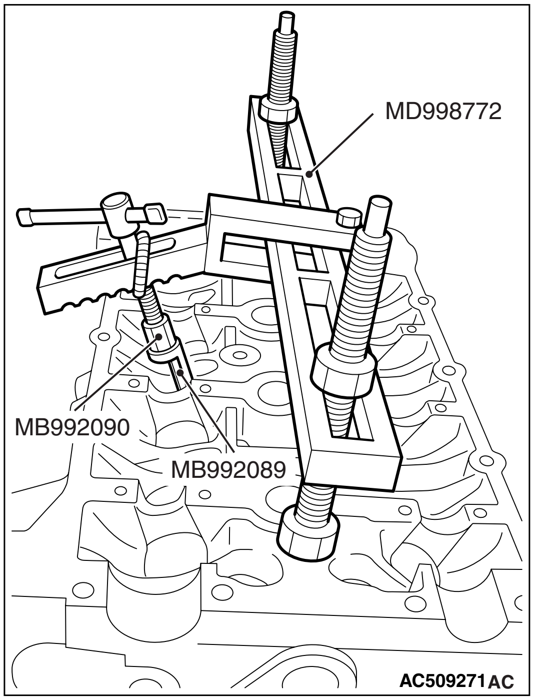
<<C>> VALVE TAPPET REMOVAL

⚠ CAUTION

- **Do not use pliers or other tools to remove the valve tappets. Always remove them by hand.**
- **When reusing the removed valve tappet, it has to be installed in the same position as before. Be sure to put a tab that shows the original installation position on the valve tappet when storing it.**

Remove all of the valve tappets by hand.





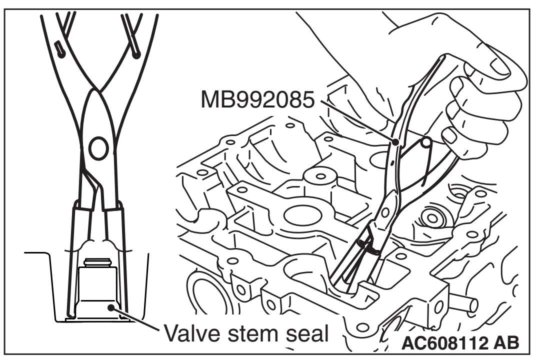
<<D>> VALVE SPRING RETAINER LOCK REMOVAL

1. Screw in special tool MB992090 to special tool MD998772 and assemble special tool MB992089.

⚠ CAUTION

When removing the valve spring retainer lock, leave the piston of the cylinder in the TDC (Top Dead Center) position. The valve may fall into the cylinder if the piston is not properly in the TDC position.

2. Install special tool MD998772 (with special tools MB992090 and MB992089 attached) to the cylinder head and compress the valve spring. Then, remove the valve spring retainer lock.



<<E>> VALVE STEM SEAL REMOVAL

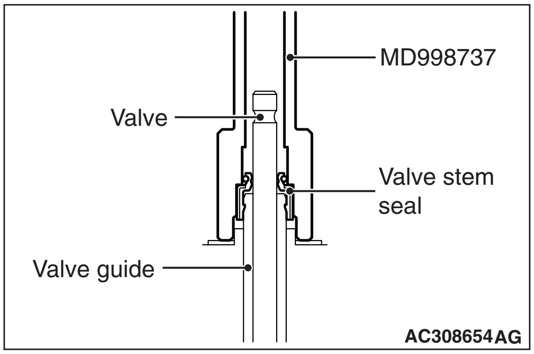
Use special tool MB992085 to grip the base of the stem seal (where the outside diameter is larger) securely, and remove it by twisting it to the left and right.

INSTALLATION SERVICE POINTS

>>A<< VALVE STEM SEAL INSTALLATION

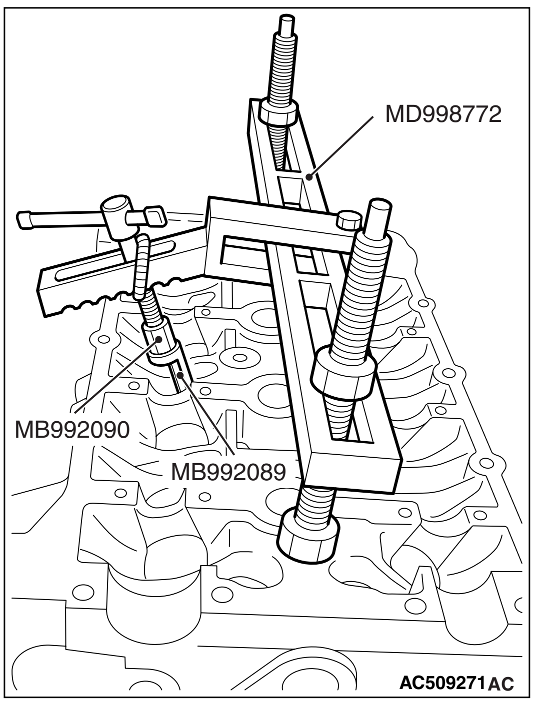
1. Apply a small amount of engine oil to the valve stem seals.

⚠ CAUTION
- **Valve stem seals cannot be reused.**
- **Do not damage the wall of the tappet hole when installing the valve stem seal.**
- **Special tool MD998737 must be used to install the valve stem seal. Improper installation of the valve stem seal could result in oil leaking past the valve guide.**



2. Use special tool MD998737 to press-fit a new valve stem seal in the valve guide using the valve stem area as a guide.

>>B<< VALVE SPRING RETAINER LOCK INSTALLATION



In the same manner as removal, use special tool MD998772 with special tool MB992090 and special tool MB992089 attached to compress the valve spring, and install the valve spring retainer lock.

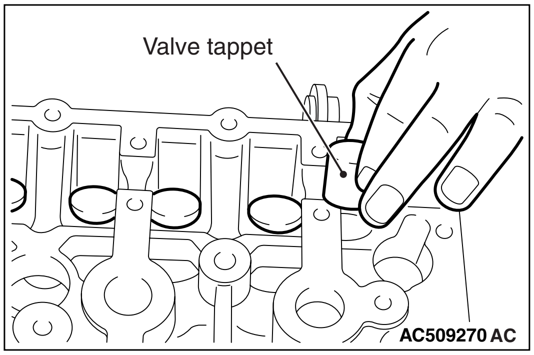
>>C<< VALVE TAPPET INSTALLATION

1. Apply a small amount of engine oil to the valve tappets.

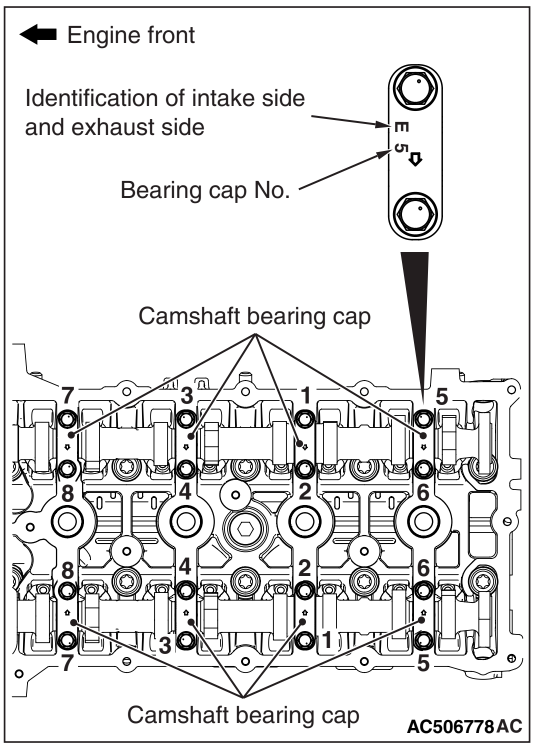
⚠ CAUTION

Be sure to install the valve tappets in the same position as before.

2. Install the valve tappet to the cylinder head.



>>D<< THRUST CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/OIL FEEDING CAMSHAFT BEARING CAP INSTALLATION



1. Install the camshaft bearing caps to the cylinder heads.

   NOTE: Because the thrust camshaft bearing cap and camshaft bearing cap are the same in shape, check the cap number and additionally its symbol to identify the intake and exhaust sides for correct installation.

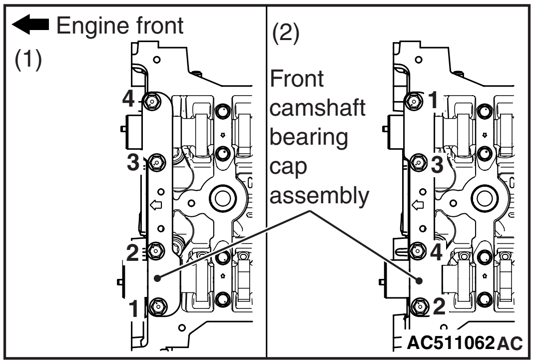
2. Tighten each camshaft bearing cap to the specified torque in the order of number shown in the figure in two or three steps.

   Tightening torque: 12 ± 1 N· m (106 ± 9 in-lb)

>>E<< CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY (EXHAUST SIDE) INSTALLATION

⚠ CAUTION

When installing the camshaft and camshaft sprocket assembly (exhaust side), be careful not to let the camshaft bearing which is installed to the front cam bearing deviate from its position.



>>F<< FRONT CAMSHAFT BEARING CAP ASSEMBLY INSTALLATION

⚠ CAUTION

When the mounting bolts are tightened with the front camshaft bearing cap tilted, the front camshaft bearing cap is damaged. Install the front camshaft bearing cap properly to the cylinder head and camshaft.

1. Install the front camshaft bearing cap to the cylinder head, and temporarily tighten the front camshaft bearing cap to the specified torque in the order of the figure (1).

   Tightening torque: 17 ± 3 N· m (13 ± 2 ft-lb)

2. Tighten the front camshaft bearing cap again to the specified torque in the order of the figure (2).

   Tightening torque: 30 ± 2 N· m (22 ± 1 ft-lb)

OIL PAN

REMOVAL AND INSTALLATION

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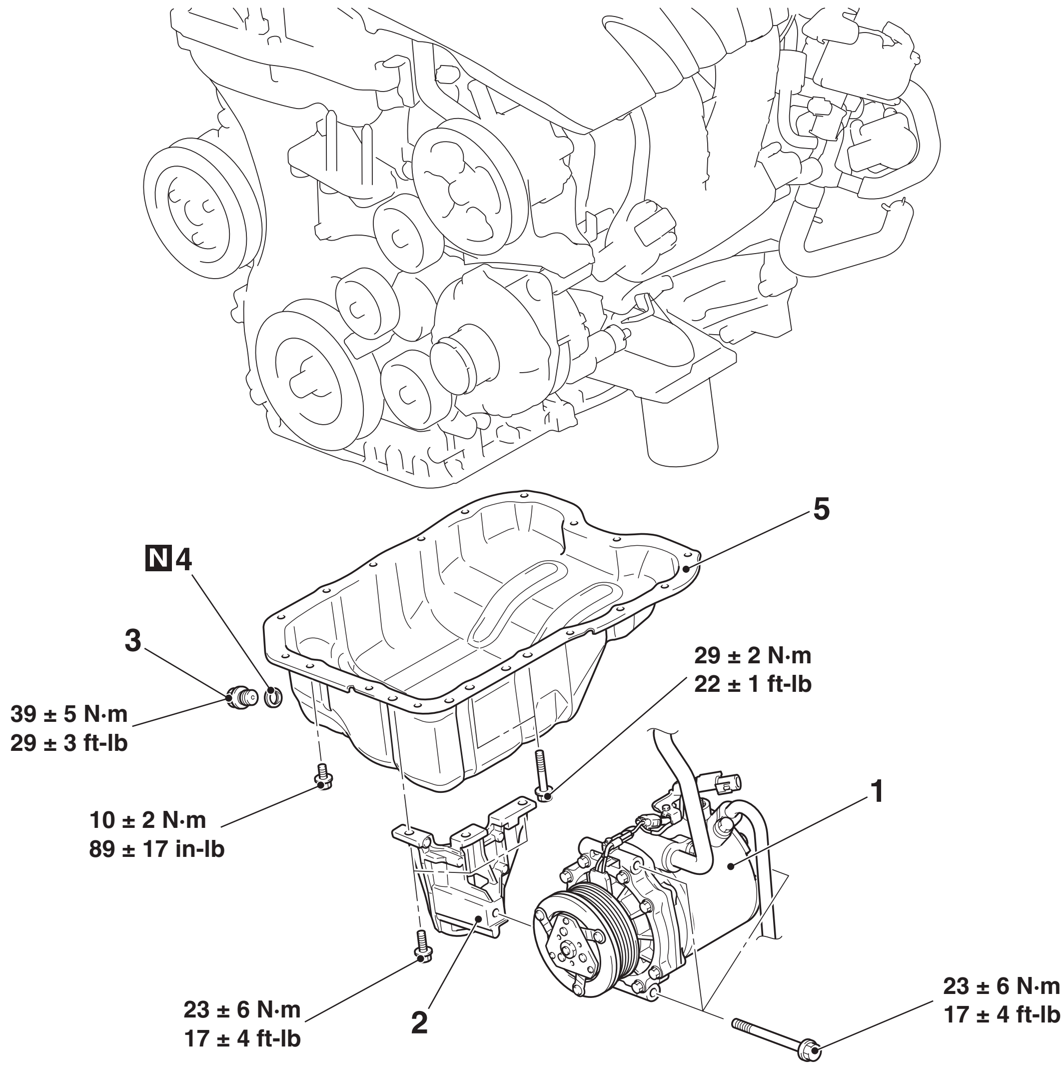
Pre-removal operation	Post-installation operation
• Engine Room Under Cover Front Removal (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Side Cover (RH) Removal (Refer to GROUP 51–Under Cover P.51-16). • Engine Oil Draining (Refer to GROUP 12 - On-vehicle Service, Engine Oil Replacement P.12-4). • Drive Belt Removal (Refer to P.11A-19).	• Drive Belt Installation (Refer to P.11A-19). • Engine Oil Refilling (Refer to GROUP 12 - On-vehicle Service, Engine Oil Replacement P.12-4). • Engine Room Side Cover (RH) Installation (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Under Cover Front Installation (Refer to GROUP 51 –Under Cover P.51-16).



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Removal steps

<<**A**>> >>**C**<< 1. A/C compressor and clutch assembly
2. A/C compressor bracket

Removal steps (Continued)

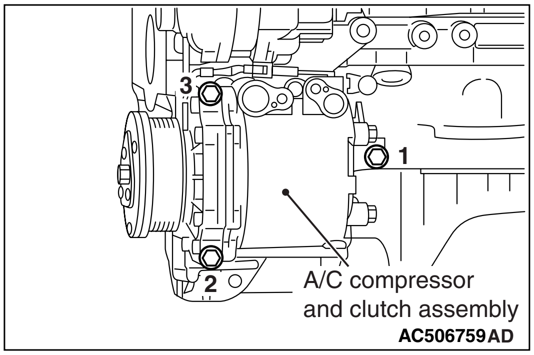
3. Engine oil pan drain plug
>>**B**<< 4. Engine oil pan drain plug gasket
<<**B**>> >>**A**<< 5. Engine oil pan

Required Special Tool:

- MD998727: Oil Pan FIPG Cutter

REMOVAL SERVICE POINTS

<<A>> A/C COMPRESSOR AND CLUTCH ASSEMBLY REMOVAL



1. Loosen the mounting bolts of A/C compressor and clutch assembly in the order of number as shown in the figure.
2. Remove the A/C compressor and clutch assembly together with the hose from the bracket.
3. Tie the removed A/C compressor and clutch assembly with a string at a position where they will not interfere with the removal and installation of engine oil pan.

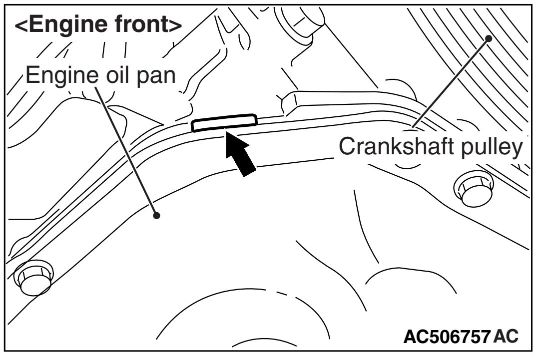
<<B>> ENGINE OIL PAN REMOVAL

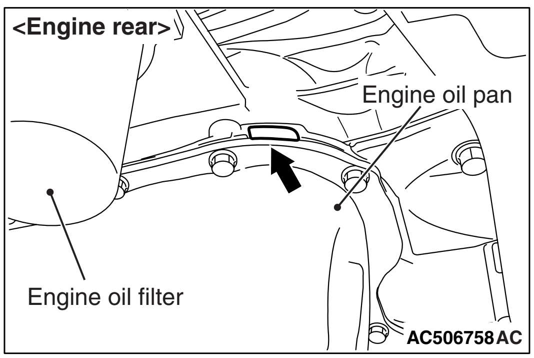
1. Remove the engine oil pan mounting bolts.

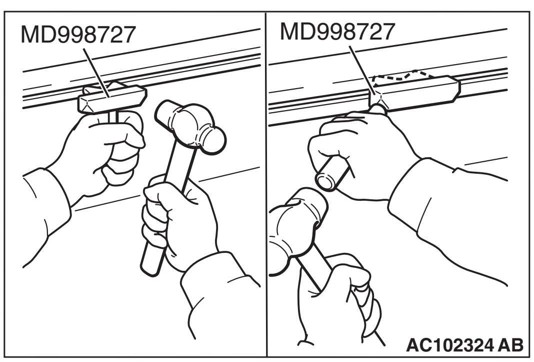
⚠ CAUTION

Do not forcibly drive in special tool MD998727 to avoid damage to the engine oil pan seal surface of cylinder block assembly.

2. Insert special tool MD998727 from the engine oil pan removal groove of the cylinder block assembly.
3. Lightly tap the special tool with a hammer to slide the oil pan seal surface, cut off the liquid gasket, and remove the engine oil pan.

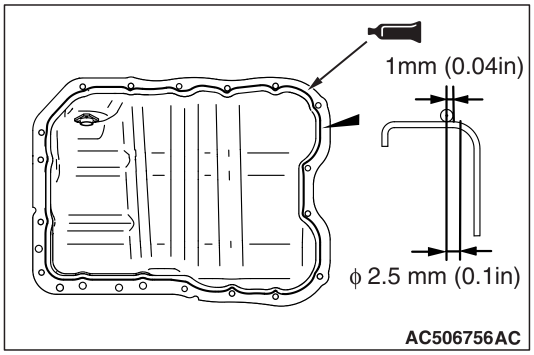






INSTALLATION SERVICE POINTS

>>A<< ENGINE OIL PAN INSTALLATION



1. Remove thoroughly the liquid gasket from the engine oil pan and cylinder block assembly with a remover.
2. Apply a bead of the sealant to the mating surface of the engine oil pan as shown in the figure, and install the engine oil pan to the cylinder block assembly.

   Specified sealant: Three bond 1227D or equivalent

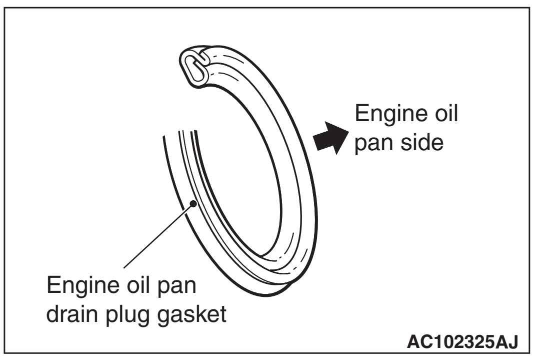
⚠ CAUTION

Do not apply oil or water to the sealant-applied area or start up the engine within 2 hours after the installation of the engine oil pan.

3. Tighten the engine oil pan mounting bolts to the specified torque.

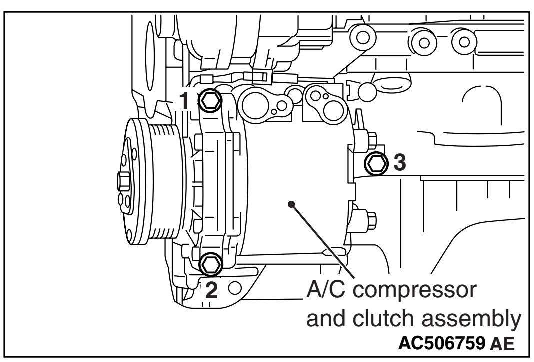
   Tightening torque:
   M6: 10 ± 2 N· m (89 ± 17 in-lb)
   M8: 29 ± 2 N· m (22 ± 1 ft-lb)

>>B<< ENGINE OIL PAN DRAIN PLUG GASKET INSTALLATION



Replace the engine oil pan drain plug gasket with a new one. Install the new gasket in the direction shown in the illustration.

>>C<< A/C COMPRESSOR AND CLUTCH ASSEMBLY INSTALLATION



Tighten A/C compressor and clutch assembly mounting bolts to the specified torque in the order of number shown in the illustration.

Tightening torque: 23 ± 6 N· m (17 ± 4 ft-lb)

INSPECTION

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- Check the oil pan for cracks.
- Check the oil pan sealant-coated surface for damage and deformation.

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION

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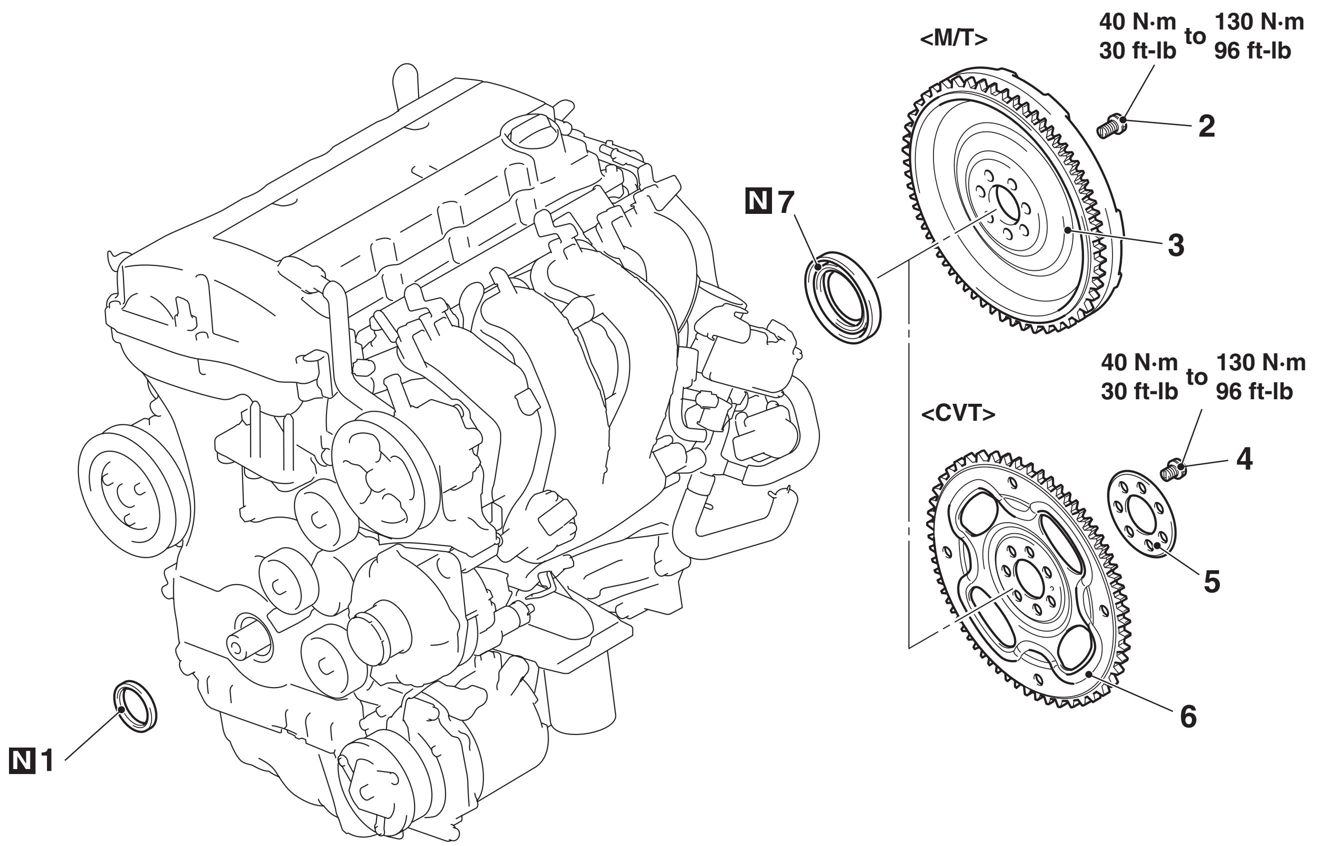

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Crankshaft front oil seal removal steps

- • Crankshaft pulley (Refer to P.11A-19).
- >>**D**<< 1. Crankshaft front oil seal

Crankshaft rear oil seal removal steps <M/T>

- • Manual transaxle assembly (Refer to GROUP 22A - Transaxle Assembly P.22A-12).
- <<**A**>> >>**C**<< 2. Flywheel bolts
- >>**C**<< 3. Flywheel
- >>**A**<< 7. Crankshaft rear oil seal

Crankshaft rear oil seal removal steps <CVT>

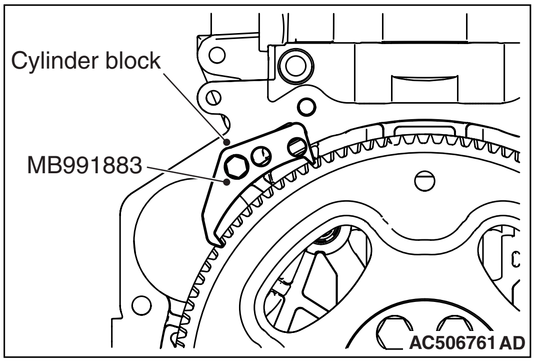
- • CVT assembly (Refer to GROUP 23A - Transaxle Assembly P.23A-149).
- <<**A**>> >>**B**<< 4. Drive plate bolts
- >>**B**<< 5. Drive plate adapter plate
- >>**B**<< 6. Drive plate
- >>**A**<< 7. Crankshaft rear oil seal

Required Special Tools:

- MB991883: Flywheel Stopper
- MD998718: Crankshaft Rear Oil Seal Installer
- MB991448: Bush Remover And Installer Base

REMOVAL SERVICE POINT

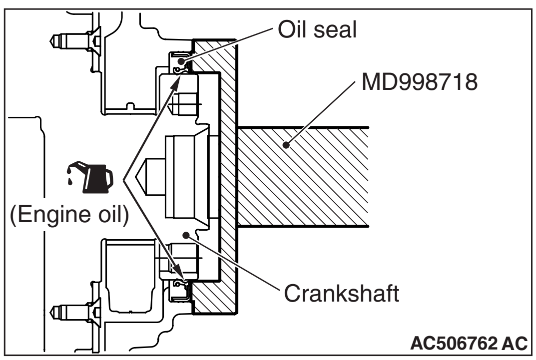
<<A>> FLYWHEEL BOLTS/DRIVE PLATE BOLTS REMOVAL



Fix the flywheel or drive plate using special tool MB991883, and loosen the flywheel bolts or drive plate bolts.

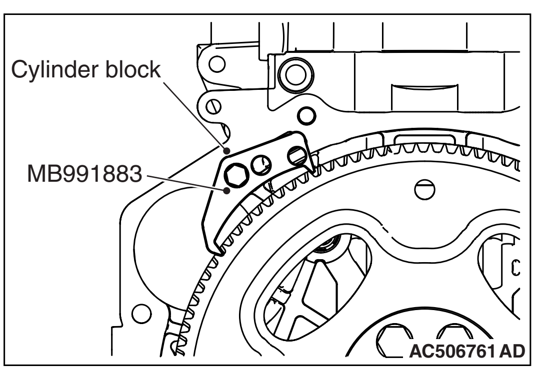
INSTALLATION SERVICE POINTS

>>A<< CRANKSHAFT REAR OIL SEAL INSTALLATION



1. Apply a small amount of engine oil to the entire inner diameter of the oil seal lip.
2. Using special tool MD998718, press in the crankshaft rear oil seal up to the cylinder block assembly end surface.

>>B<< DRIVE PLATE/DRIVE PLATE ADAPTER PLATE/DRIVE PLATE BOLT INSTALLATION

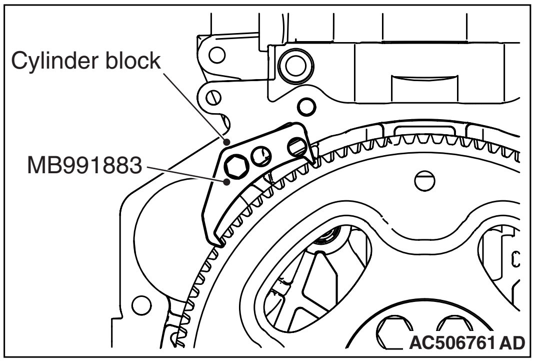


1. Remove the engine oil and deposit from the bolt threads of the drive plate, screw holes of crankshaft, and drive plate.
2. Apply a small amount of engine oil to the drive plate and the bearing surface of drive plate adapter plate.
3. Fix the flywheel or drive plate using special tool MB991883 in the same manner as removal.
4. Apply a small amount of engine oil to the bolt threads of drive plate or the screw holes of crankshaft.
5. Tighten drive plate bolts to temporarily torque 40 N· m (30 ft-lb).
6. Tighten the drive plate bolts to the specified torque.

   Tightening torque: 130 N· m (96 ft-lb)

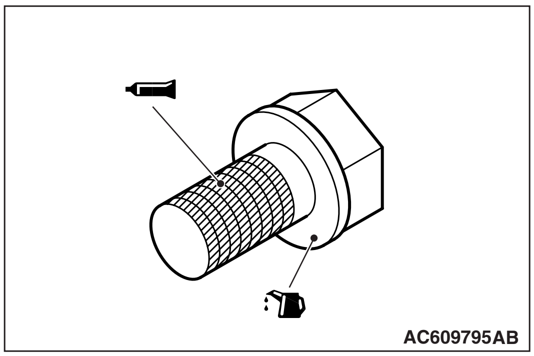
>>C<< FLYWHEEL/FLYWHEEL BOLTS INSTALLATION

1. Remove the sealant, the engine oil, and other adhering materials from the flywheel assembly installation face, the crankshaft screw hole, and flywheel bolts.
2. Install the flywheel assembly to the crankshaft.
3. Use special tool MB991883 to secure the flywheel assembly in the same manner as removal.



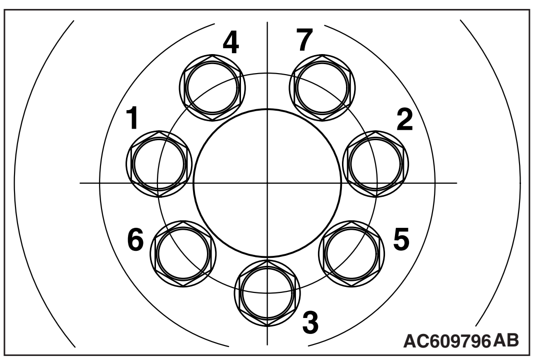
4. Apply the engine oil to the installation face of the flywheel bolts for the flywheel assembly.
5. Apply specified sealant to the flywheel bolt threads.

   Specified sealant: Three bond 1324 or equivalent



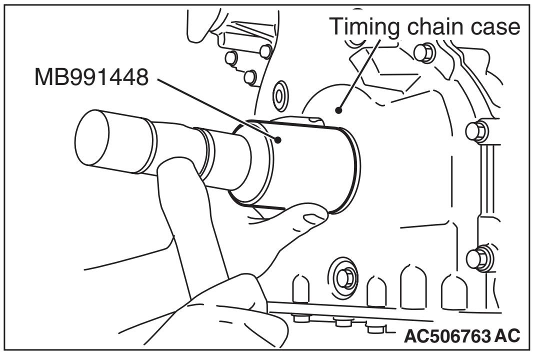
6. Tighten flywheel bolts to temporary torque 40 N· m (30 ft-lb) in the order shown in the illustration.
7. Tighten flywheel bolts to temporary torque in the order shown in the illustration.

   Tightening torque: 130 N· m (96 ft-lb)



>>D<< CRANKSHAFT FRONT OIL SEAL INSTALLATION

1. Apply a small amount of engine oil to the entire inner diameter of the oil seal lip.



⚠ CAUTION

When installing the crankshaft oil seal, be careful to avoid damage to the crankshaft front oil seal.

2. Using special tool MB991448, press in the crankshaft front oil seal up to the chamfered surface of timing chain case.

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

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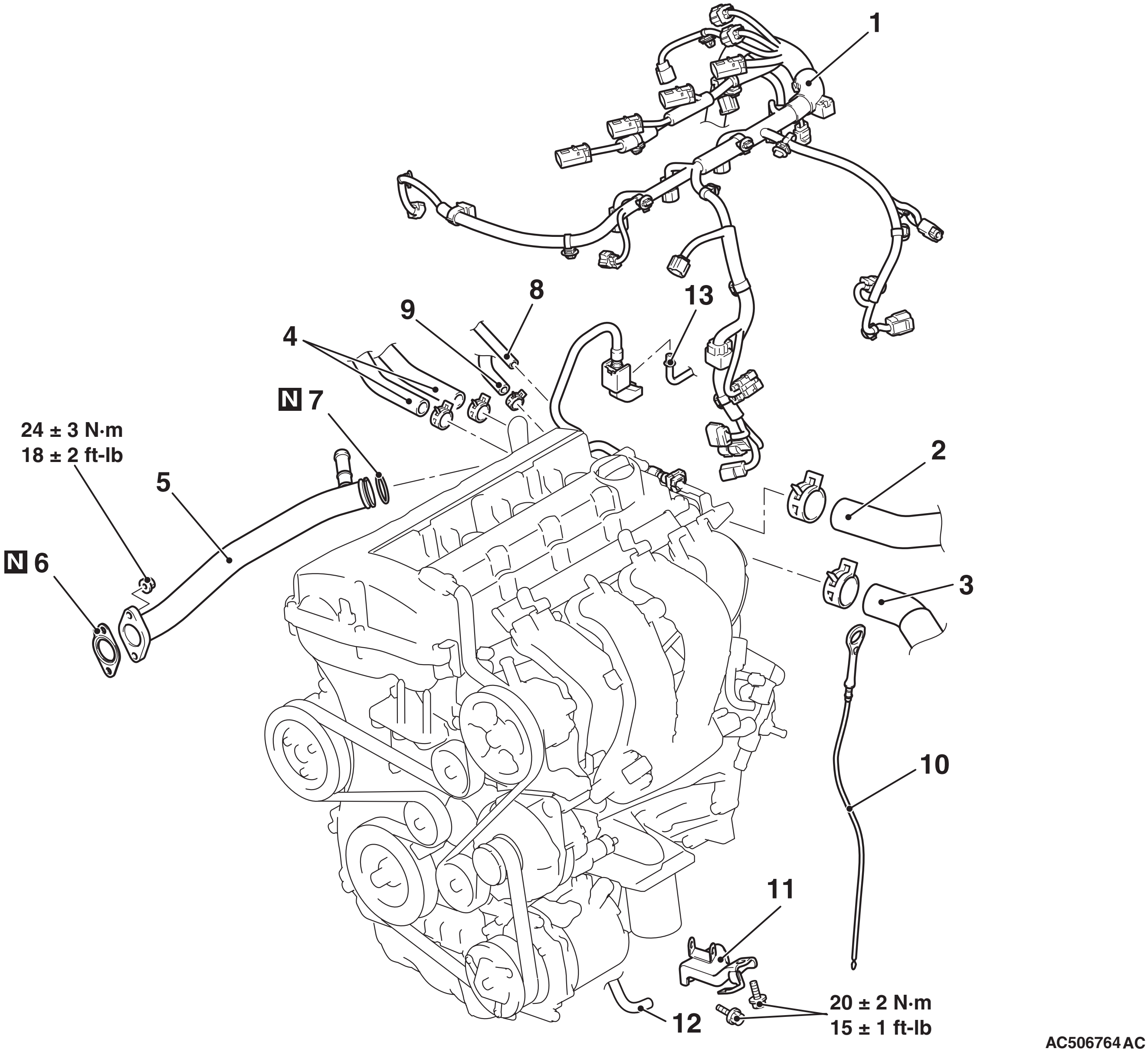
Pre-removal operation	Post-installation operation
• Fuel Line Pressure Reduction [Refer to GROUP 13A – On-vehicle Service, Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-932]. • Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13). • Air Cleaner Assembly Removal (Refer to GROUP 15 –Air Cleaner P.15-4). • Ignition Coil Removal (Refer to GROUP 16 –Ignition System, Ignition Coil P.16-39). • Strut Tower Bar Removal (Refer to GROUP 42A –Strut Tower Bar P.42A-11). • Exhaust Manifold Removal (Refer to GROUP 15 – Exhaust Manifold P.15-9). • Throttle Body Assembly Removal (Refer to GROUP 13A – Throttle Body Assembly P.13A-950). • EGR Valve and EGR Valve Stay Removal (Refer to GROUP 17 –EGR Valve P.17-85). • Water Pump Removal (Refer to GROUP 14 –Water Pump P.14-21).	• Water Pump Installation (Refer to GROUP 14 –Water Pump P.14-21). • EGR Valve and EGR Valve Stay Installation (Refer to GROUP 17 –EGR Valve P.17-85). • Throttle Body Assembly Installation (Refer to GROUP 13A –Throttle Body Assembly P.13A-950). • Exhaust Manifold Installation (Refer to GROUP 15 – Exhaust Manifold P.15-9). • Strut Tower Bar Installation (Refer to GROUP 42A –Strut Tower Bar P.42A-11). • Ignition Coil Installation (Refer to GROUP 16 –Ignition System, Ignition Coil P.16-39). • Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner P.15-4). • Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13). • Fuel Leak Check

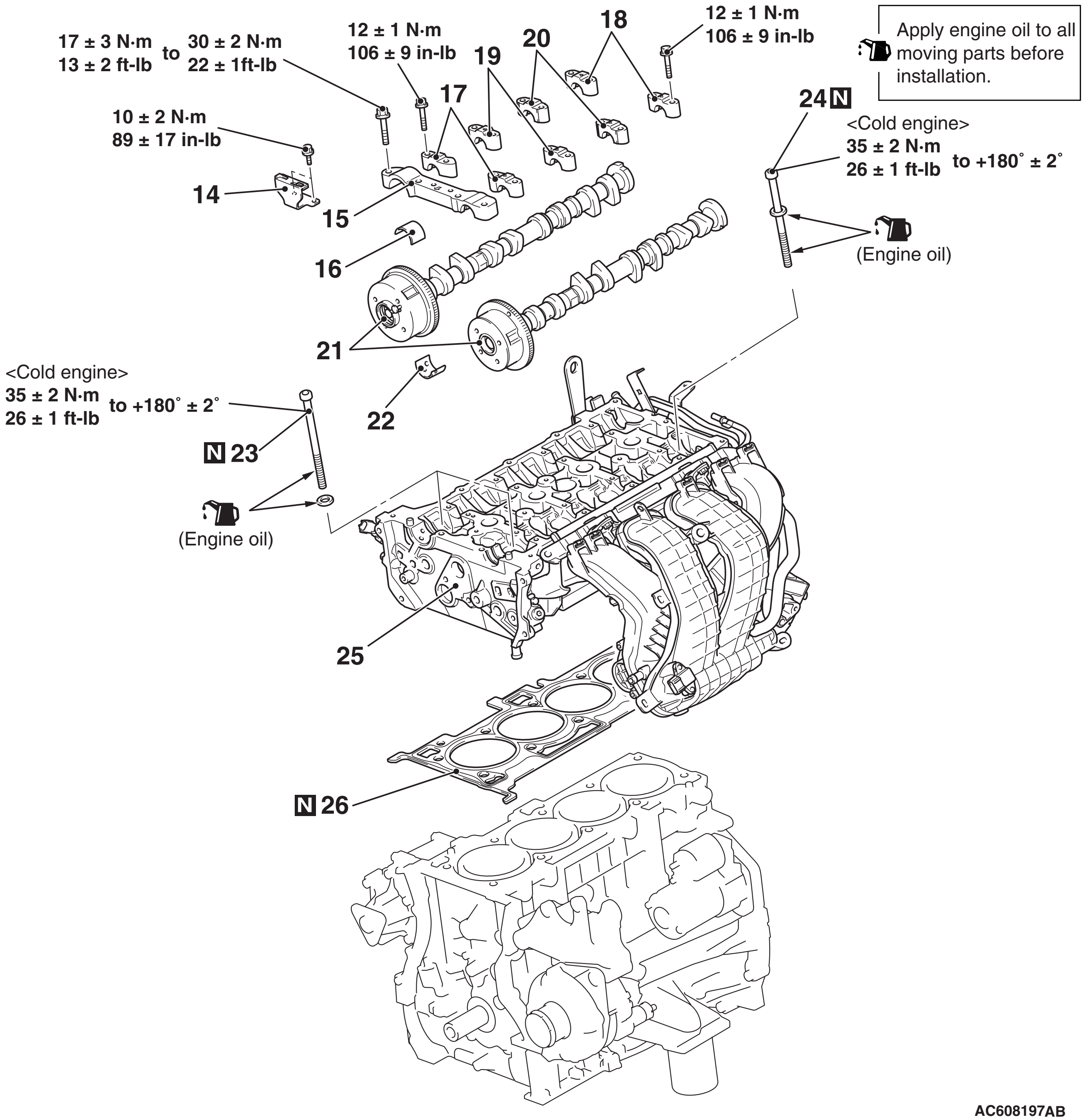


Removal steps

1. Control wiring harness connection
2. Radiator upper hose connection
3. Radiator lower hose connection
4. Heater hose connection
5. Water pump inlet pipe
6. Cooling water line gasket
7. O-ring
8. Emission vacuum hose connection

Removal steps (Continued)

9. Brake booster vacuum hose connection
10. Engine oil level gauge
11. Intake manifold stay
12. Cylinder head cover PCV hose connection
13. <<**A**>> >>**F**<< Fuel high-pressure hose connection



			Removal steps
		•	Valve timing chain (Refer to P.11A-63).
		14.	Timing chain upper guide
<<**B**>>	>>**E**<<	15.	Front camshaft bearing cap assembly
		16.	Camshaft bearing
<<**C**>>	>>**D**<<	17.	Oil feeding camshaft bearing cap
<<**C**>>	>>**D**<<	18.	Camshaft bearing cap

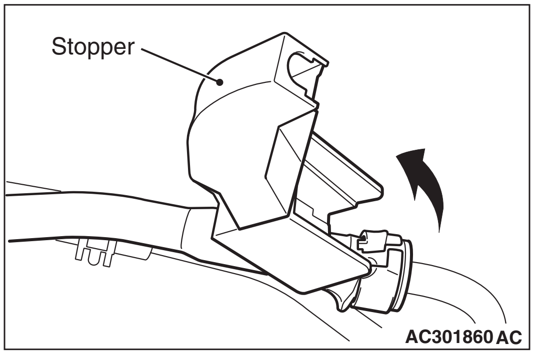
			Removal steps (Continued)
<<**C**>>	>>**D**<<	19.	Camshaft bearing cap
<<**C**>>	>>**D**<<	20.	Thrust camshaft bearing cap
	>>**C**<<	21.	Camshaft and camshaft sprocket assembly
		22.	Camshaft bearing
<<**D**>>	>>**B**<<	23.	Cylinder head bolt
<<**D**>>	>>**B**<<	24.	Cylinder head bolt assembly
	>>**A**<<	25.	Cylinder head assembly
	>>**A**<<	26.	Cylinder head gasket

Required Special Tools:

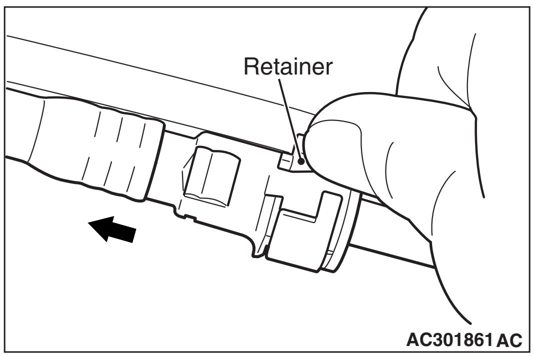
- MB991454: Engine Hanger Balancer
- MB991527: Hanger
- MB991895: Engine Hanger
- MB991928: Engine Hanger
- MB991956: Engine Hanger Plate

REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE REMOVAL



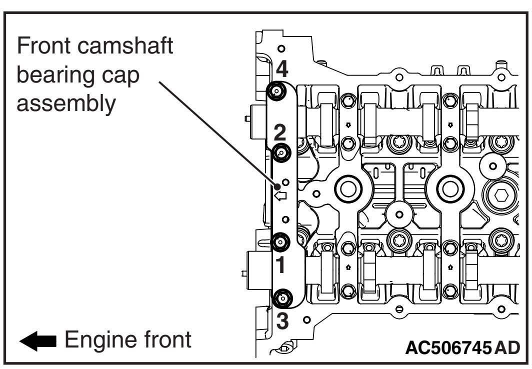
1. Remove the stopper of the fuel high-pressure hose.



2. Raise the retainer of the fuel high-pressure hose and pull out the fuel high-pressure hose in the direction shown in the figure.

   NOTE: If the retainer is released, install it securely after removing the fuel high-pressure hose.

<<B>> FRONT CAMSHAFT BEARING CAP ASSEMBLY REMOVAL

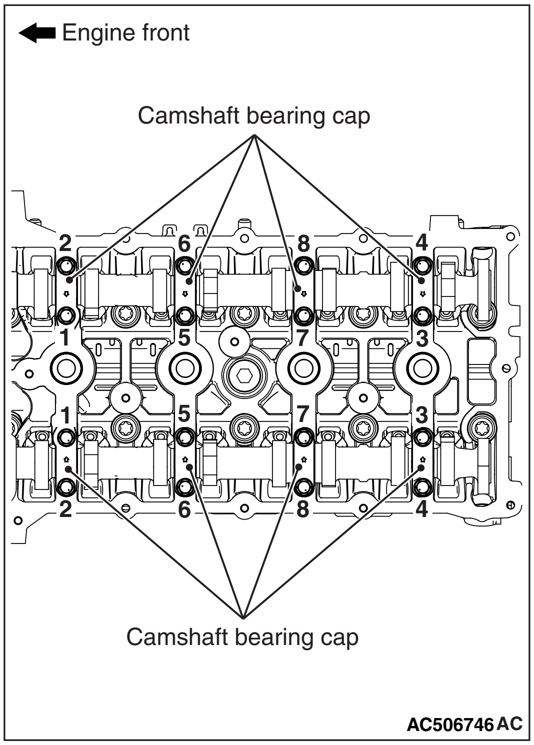


⚠ CAUTION

Be careful not to drop the camshaft bearing.

Loosen the mounting bolts of front camshaft bearing cap in the order of number shown in the figure, and remove the front camshaft bearing cap assembly.

<<C>> OIL FEEDING CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/THRUST CAMSHAFT BEARING CAP REMOVAL



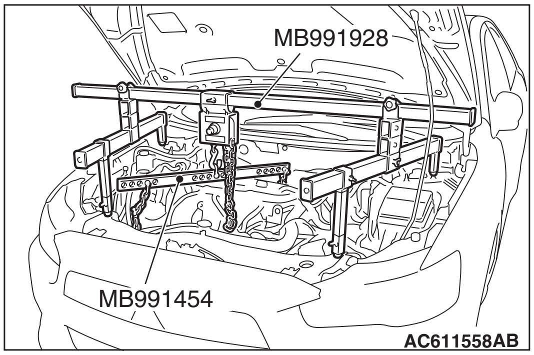
⚠ CAUTION

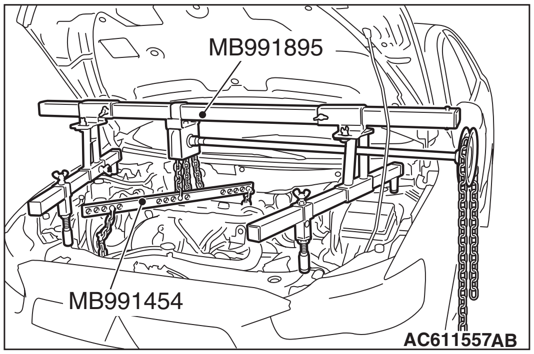
When the camshaft bearing cap mounting bolts are loosened at once, the mounting bolts jump out by the spring force and the threads are damaged. Always loosen the mounting bolts in four or five steps.

Loosen the mounting bolts of the camshaft bearing caps in the order of number shown in the figure in four or five steps, and remove the camshaft bearing caps.

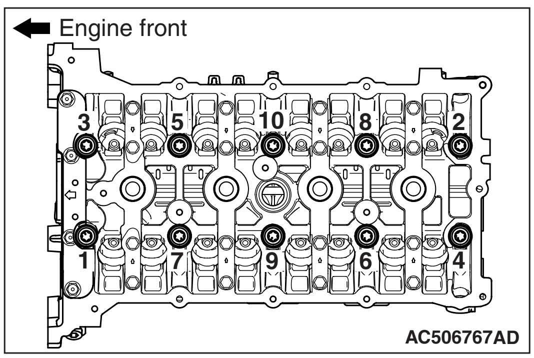
<<D>> CYLINDER HEAD BOLT/CYLINDER HEAD BOLT ASSEMBLY REMOVAL

1. Temporarily install the engine oil pan which was removed at the valve timing chain removal (Refer to P.11A-45).
2. Place a garage jack against the engine oil pan with a piece of wood in between to support the engine and transaxle assembly.





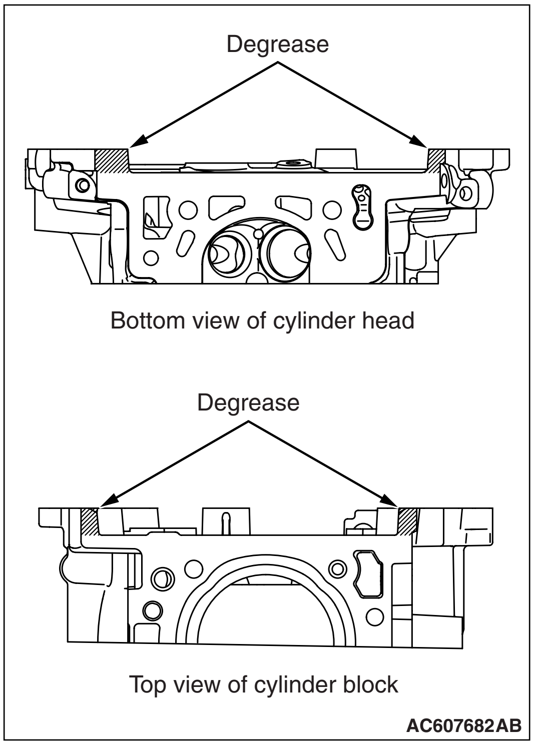
3. Remove special tool MB991928 or MB991895 which was installed for supporting the engine and transaxle assembly when the valve timing chain was removed.



4. Loosen and remove the bolts in two or three steps in the order of number shown in the figure.

INSTALLATION SERVICE POINTS

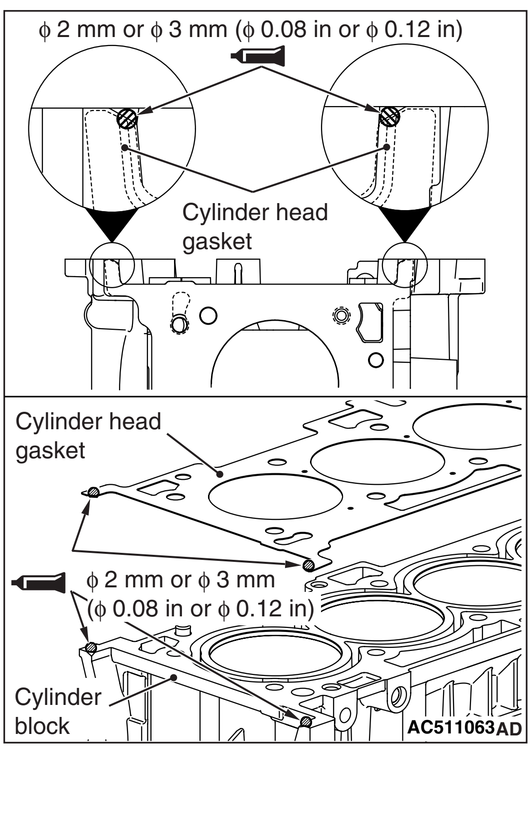
>>A<< CYLINDER HEAD GASKET/CYLINDER HEAD ASSEMBLY INSTALLATION



⚠ CAUTION

Do not allow any foreign materials get into the coolant passages, oil passages and cylinder.

1. Wipe off the sealant and grease on the top surface of cylinder head block and the bottom surface of the cylinder head, and degrease the surface where the sealant is applied.



2. Apply the sealant to the top surface of cylinder block as shown in the figure.

   Specified sealant: Three bond 1227D or equivalent

3. Install the cylinder head gasket to the cylinder block.

   NOTE: When the cylinder gasket is installed to the cylinder block, check that the sealant is securely applied to the bead line of the cylinder head gasket.

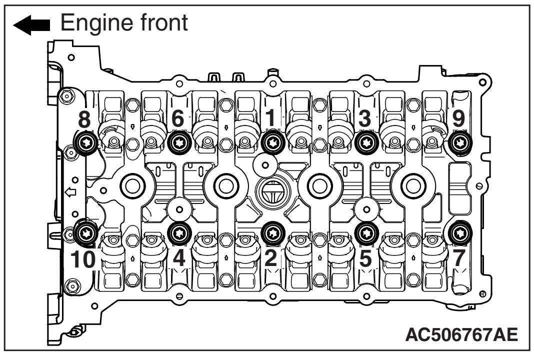
4. Apply the sealant to the top surface of cylinder head gasket as shown in the figure.

   Specified sealant: Three bond 1227D or equivalent

5. Install the cylinder head assembly.

>>B<< CYLINDER HEAD BOLT ASSEMBLY/CYLINDER HEAD BOLT INSTALLATION

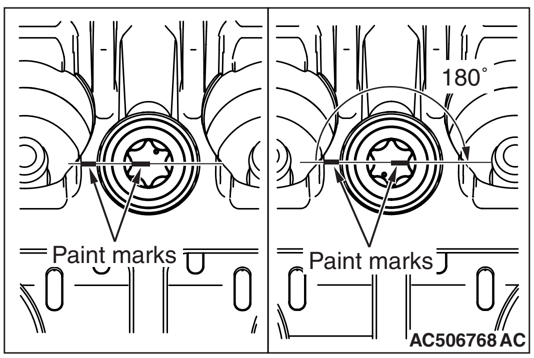
1. Replace cylinder head bolts with a new ones.
2. For two bolts of the timing chain side, the washer can be removed from the bolt. Install the washer, with its sag facing upward, to the bolts.
3. Apply a small amount of engine oil to the cylinder head bolt threads and the washers.



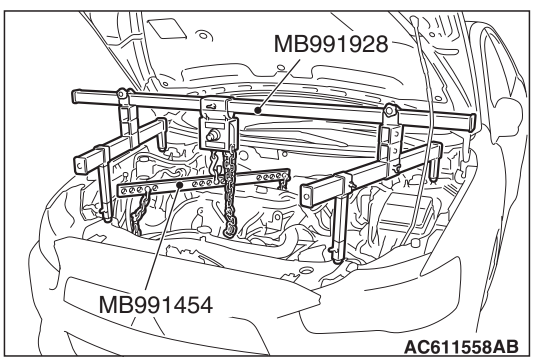
4. Tighten the bolts by the following procedure (plastic region angular tightening method).
   (1) Tighten the bolts to 35 ± 2 N·m (26 ± 1 ft-lb) in the order of number shown in the figure.

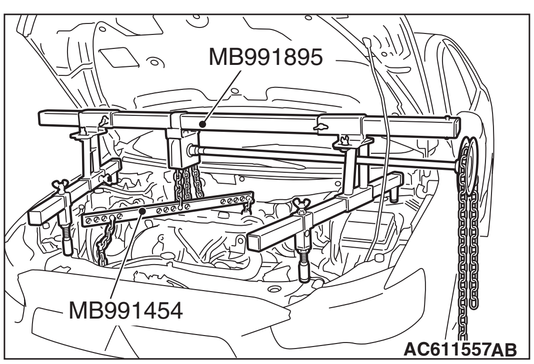
CAUTION

- **The bolt is not tightened sufficiently if the tightening angle is less than a 180 degrees angle.**
- **If the tightening angle exceeds the standard specification, remove the bolt and repeat the installation steps from Step 1.**



   (2) Put a paint mark on the cylinder head bolt head and cylinder head, tighten to 180 ± 2 degrees in the order shown in the figure, and check that the paint mark on the cylinder head bolt head aligns with the paint mark on the cylinder head.





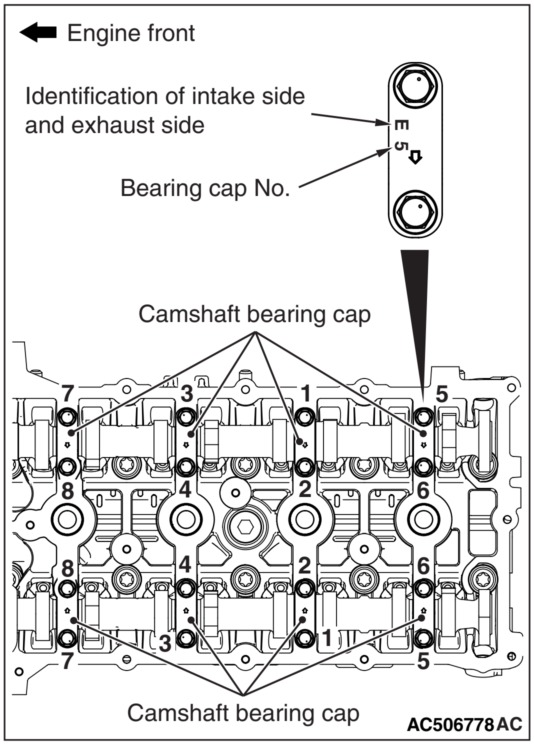
5. Install special tool MB991928 or MB991895 which was installed for supporting the engine and transmission assembly when the valve timing chain was removed (Refer to P.11A-63).
6. Remove the garage jack which supports the engine and transaxle assembly.
7. Remove the engine oil pan installed temporarily.

>>C<< CAMSHAFT AND CAMSHAFT SPROCKET ASSEMBLY INSTALLATION

⚠ CAUTION

When installing the camshaft and camshaft sprocket assembly (exhaust side), be careful not to let the camshaft bearing which is installed to the front cam bearing deviate from its position.

>>D<< THRUST CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/OIL FEEDING CAMSHAFT BEARING CAP INSTALLATION



1. Install the camshaft bearing caps to the cylinder heads.

   NOTE: Because the thrust camshaft bearing cap and camshaft bearing cap are the same in shape, check the bearing cap number and additionally its symbol to identify the intake and exhaust sides for correct installation.

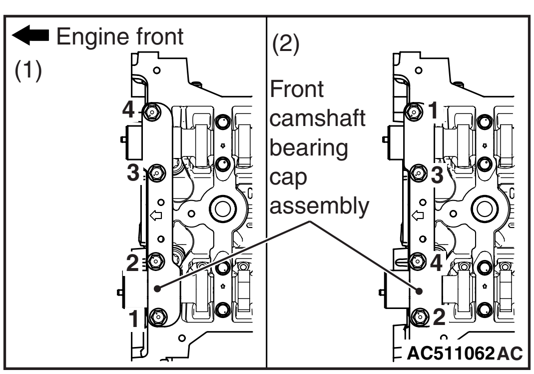
2. Tighten each camshaft bearing cap mounting bolt to the specified torque in the order of number shown in the figure in two or three steps.

   Tightening torque: 12 ± 1 N· m (106 ± 9 in-lb)

>>E<< FRONT CAMSHAFT BEARING CAP ASSEMBLY INSTALLATION

⚠ CAUTION

When the mounting bolts are tightened with the front camshaft bearing cap tilted, the front camshaft bearing cap is damaged. Install the front camshaft bearing cap properly to the cylinder head and camshaft.



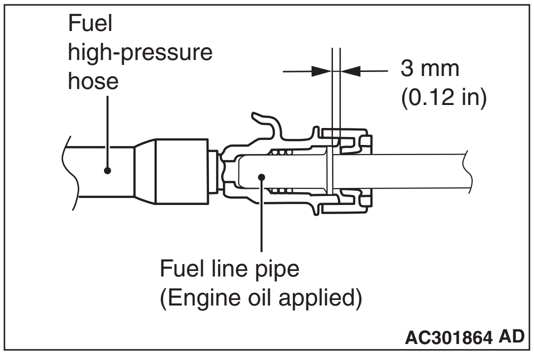
1. Install the front camshaft bearing cap to the cylinder head, and temporarily tighten the front camshaft bearing cap to the specified torque in the order of the figure (1).

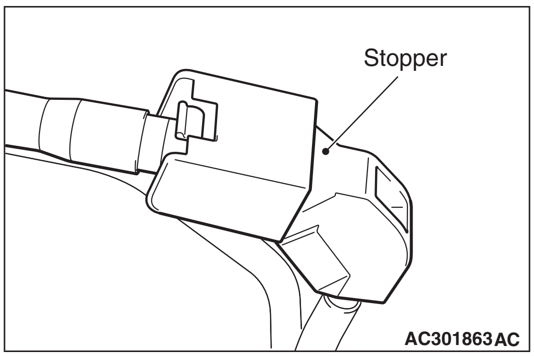
   Tightening torque: 17 ± 3 N· m (13 ± 2 ft-lb)

2. Tighten the front camshaft bearing cap again to the specified torque in the order of the figure (2).

   Tightening torque: 30 ± 2 N· m (22 ± 1 ft-lb)

>>F<< FUEL HIGH-PRESSURE HOSE INSTALLATION





⚠ CAUTION

After connecting the fuel high-pressure hose, slightly pull it in the pull-out direction to check that it is installed firmly. In addition, check that there is approximately 3mm (0.12 inch)play. After the check, install the stopper securely.

Apply a small amount of engine oil to the fuel line pipe, and install the fuel high-pressure hose.

TIMING CHAIN

REMOVAL AND INSTALLATION

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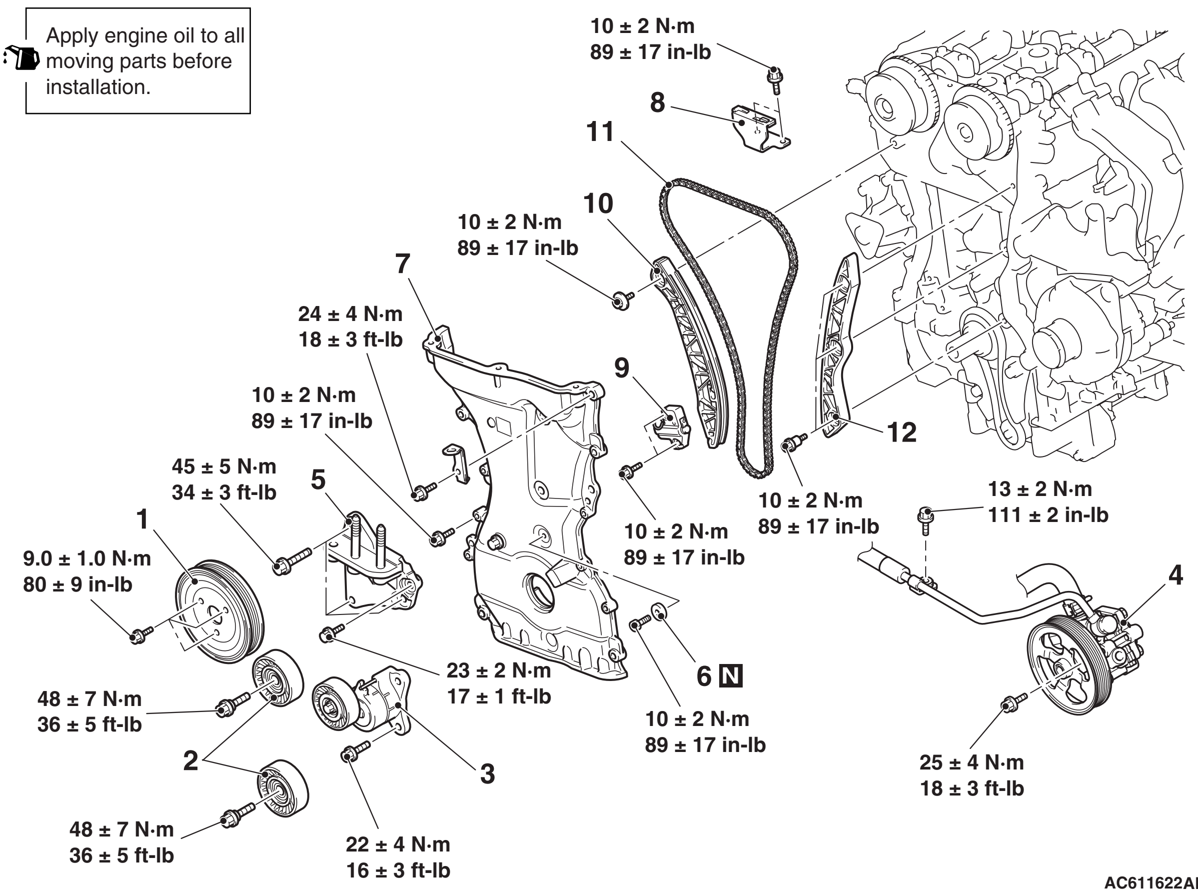
Pre-removal operation	Post-installation operation
• Engine Room Under Cover Front Removal (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Side Cover (RH) Removal (Refer to GROUP 51–Under Cover P.51-16). • Cylinder Head Cover Assembly Removal (Refer to P.11A-22). • Engine Oil Pan Removal (Refer to P.11A-45).	• Engine Oil Pan Installation (Refer to P.11A-45). • Cylinder Head Cover Assembly Installation (Refer to P.11A-22). • Engine Oil Refilling (Refer to GROUP 12 - On-vehicle Service, Engine Oil Replacement P.12-4). • Engine Room Side Cover (RH) Installation (Refer to GROUP 51 –Under Cover P.51-16). • Engine Room Under Cover Front Installation (Refer to GROUP 51 –Under Cover P.51-16).



Removal steps

<<A>>		•	Crankshaft pulley (Refer to P.11A-19).
	>>D<<	1.	Water pump pulley
		2.	Idler pulley
		3.	Alternator drive belt auto-tensioner
<<B>>		4.	Power steering oil pump assembly
<<C>>		•	Engine and transaxle assembly holding
		•	Engine mounting insulator (Refer to GROUP 32 –Engine Mounting P.32-3).

Removal steps (Continued)

		5.	Cylinder block engine front mounting bracket
		6.	Gasket
<<D>>	>>C<<	7.	Timing chain case assembly
		8.	Timing chain upper guide
<<E>>	>>B<<	9.	Timing chain tensioner
		10.	Timing chain tension side guide
	>>A<<	11.	Timing chain
		12.	Timing chain loose side guide

Required Special Tools:

- MB991454: Engine Hanger Balancer
- MB991895: Engine Hanger

- MB991928: Engine Hanger

REMOVAL SERVICE POINTS

<<A>> CRANKSHAFT PULLEY REMOVAL

When removing the crankshaft pulley, slightly loosen the water pump pulley mounting bolts before removal of the drive belt.

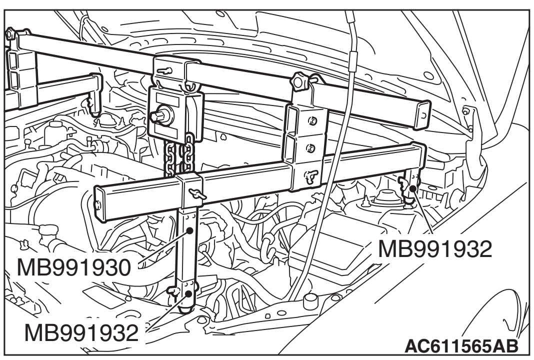
<<B>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. Remove the power steering oil pump assembly with hose on it.
2. Tie the removed power steering oil pump with a string at a position where it will not interfere with the removal and installation of timing chain.

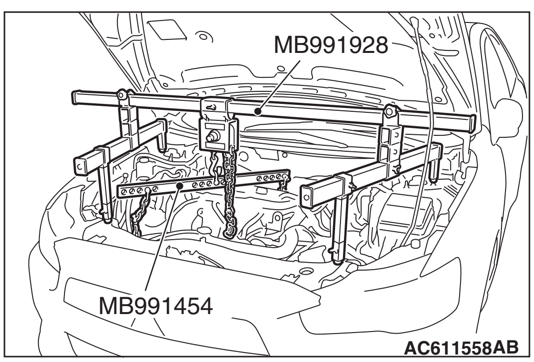
<<C>> ENGINE AND TRANSAXLE ASSEMBLY HOLDING

Install a special tool for holding the engine and transaxle assembly.

1. <Engine hanger MB991928 is used>
   (1) Assemble the engine hanger (special tool MB991928). Set the following parts on the base hanger.
   - Slide bracket (HI)
   - Foot x 4 (standard) (MB991932)
   - Joint x 2 (90) (MB991930)

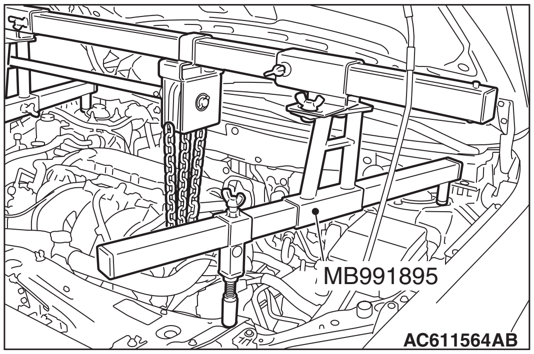


   (2) Set the foot of the special tool as shown in the figure.
   NOTE: Slide the slide bracket (HI) to adjust the engine hanger balance.



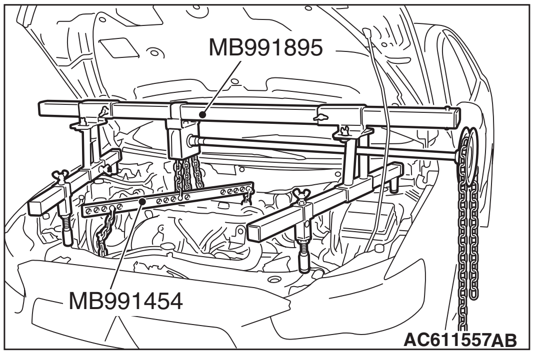
   (3) Mount special tool MB991454 to the power steering oil pump bracket and the engine hanger, and set it to special tool MB991928 to support the engine and transaxle assembly.

2. <Engine hanger MB991895 is used>



(1) Set the foot of special tool MB991895 as shown in the figure.

NOTE: Slide the foot to adjust the engine hanger balance.



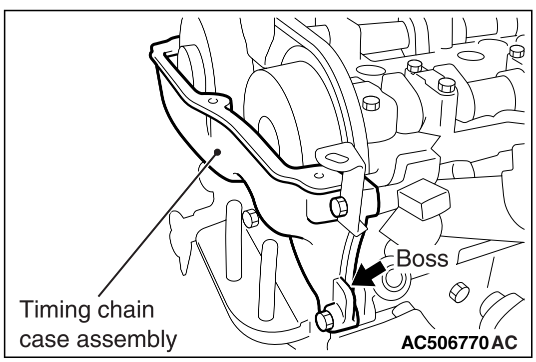
(2) Mount special tool MB991454 to the power steering oil pump bracket and the engine hanger, and set it to special tool MB991895 to support the engine and transaxle assembly.

<<D>> TIMING CHAIN CASE ASSEMBLY REMOVAL

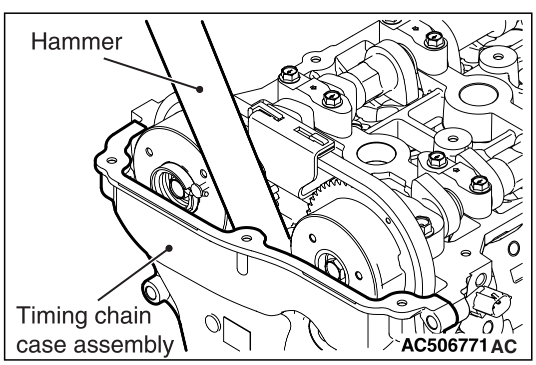
⚠ CAUTION

If the adhesive strength of sealant on the timing chain case assembly is so strong that the boss may be damaged by peeling off, do not peel it off forcibly.

1. After removing the timing chain case assembly mounting bolts, slightly pry the boss of the timing chain case assembly shown in the figure using a flat-tipped screwdriver (−), and remove the timing chain case assembly from the cylinder head and cylinder block.



2. If the sealant cannot be peeled off easily, insert a wooden hammer shank into the timing chain case assembly inside as shown in the figure, pry slightly, and remove the timing chain case assembly from the cylinder head and cylinder block.



<<E>> TIMING CHAIN TENSIONER REMOVAL

1. Temporarily install the crankshaft pulley to the crankshaft.

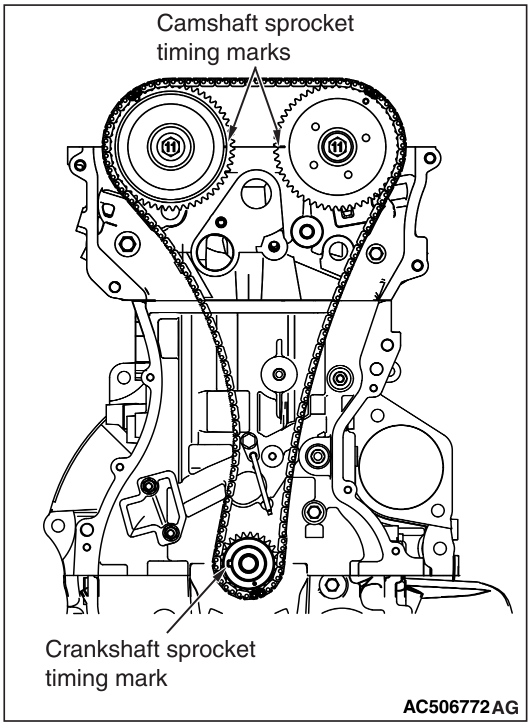
⚠ CAUTION

Turn the crankshaft clockwise.

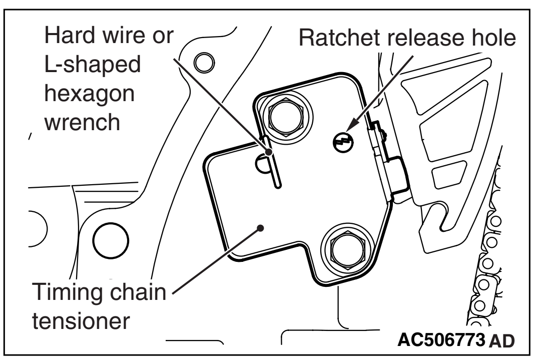
2. Turn the crankshaft clockwise to align the sprocket timing marks as shown in the figure and set the cylinder No. 1 to the top dead center of compression stroke.

   NOTE: At this time, it is not necessary that the link plate (orange) of the timing chain always aligns with each sprocket timing mark.

3. Remove the crankshaft pulley installed temporarily.

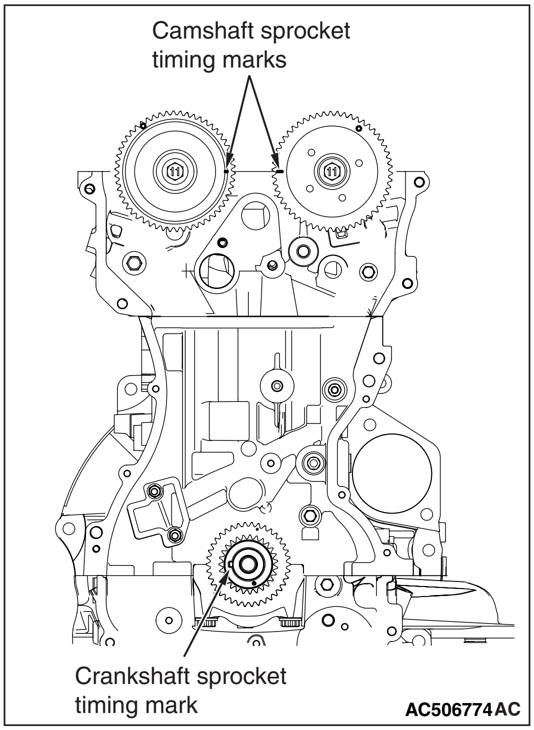


4. Using a flat-tipped precision screwdriver (-), release the ratchet of timing chain tensioner.
5. Compress the plunger of timing chain tensioner and insert hard wire (such as piano wire) or the L-shaped hexagon wrench (1.5 mm[0.05 inch]) to fix the plunger of the timing chain tensioner.
6. Remove the timing chain tensioner.

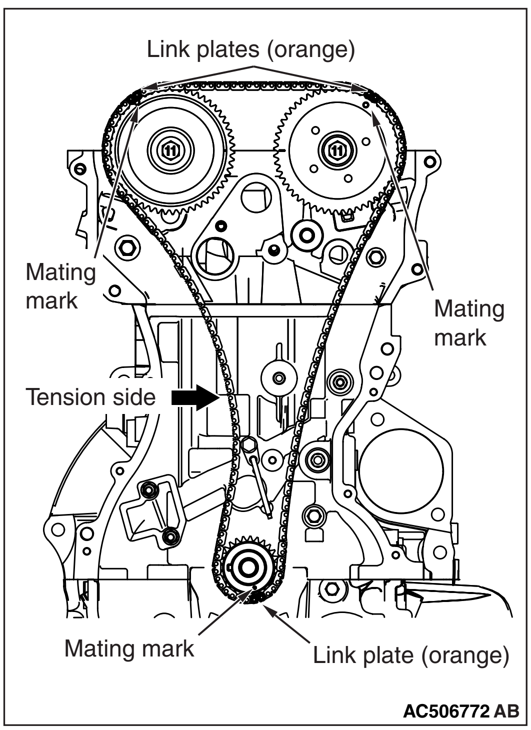


INSTALLATION SERVICE POINTS

>>A<< TIMING CHAIN INSTALLATION

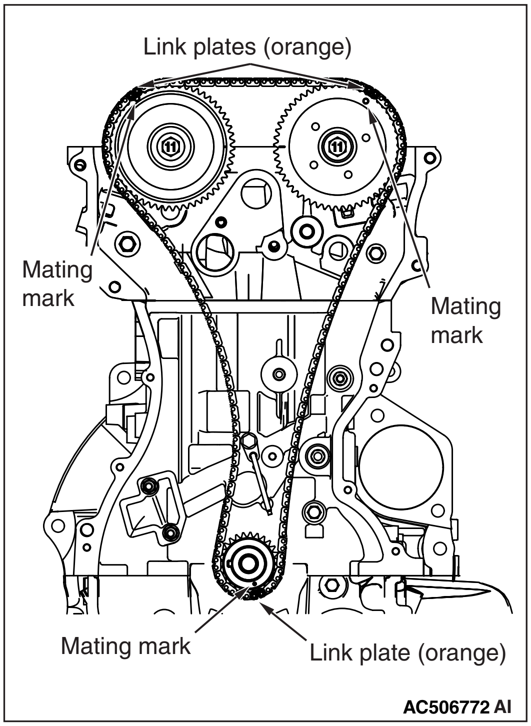


1. Set the timing marks of the camshaft sprockets and the crankshaft sprocket as shown in the figure.

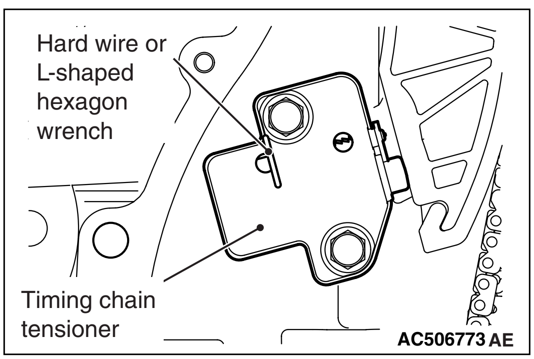


2. Align each sprocket timing chain mating mark with the link plate (orange) of timing chain to avoid slack of the timing chain tension side, and install the timing chain to the sprockets.

>>B<< TIMING CHAIN TENSIONER INSTALLATION



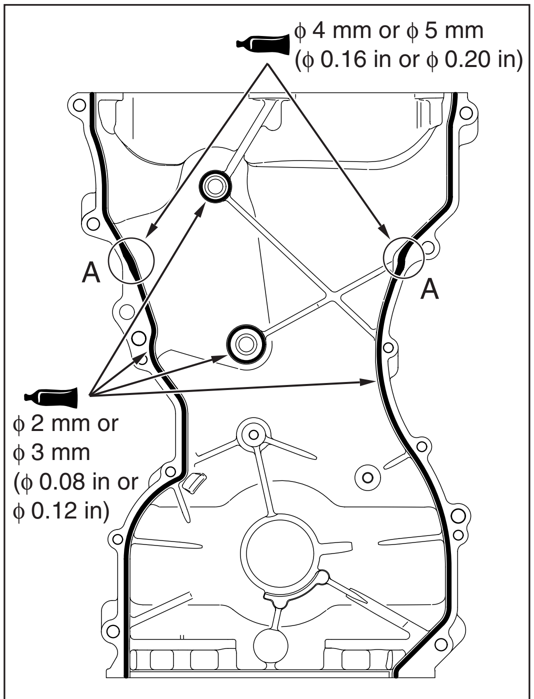
1. Check that the sprocket timing chain mating marks align with the link plates (orange) of the timing chain, and install the timing chain tensioner to the cylinder block.



2. Remove the hard wire or L-shaped hexagon wrench fixing the plunger of the timing chain tensioner to apply tension to the timing chain.

>>C<< TIMING CHAIN CASE ASSEMBLY INSTALLATION

1. Remove sealant from the timing chain case assembly and the timing chain case assembly mounting surface of the cylinder block and the cylinder head.



AC607643AB

2. Apply a bead of sealant to the timing chain case assembly mounting surface. The bead diameter shall be 4 or 5 mm (0.18 or 0.20 inch) for the areas shown by "A" in the figure and 2 or 3 mm (0.08 or 0.12 inch) for the other area.

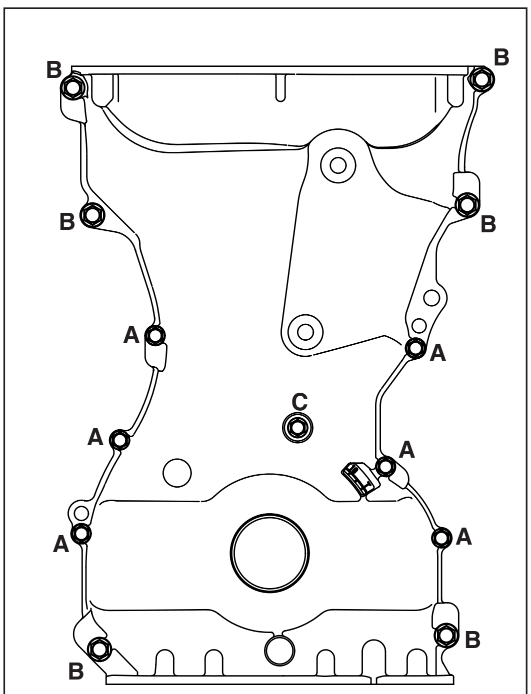
   Specified sealant: Three bond 1227D or equivalent

   NOTE: Install the timing chain case assembly within 15 minutes after the application of sealant.

⚠ CAUTION

If the sealant contacts any other part during installation of the timing chain case assembly, apply sealant again before installing the timing chain case assembly.

3. Install the timing chain case assembly to the cylinder block and cylinder head so that the sealant does not contact other parts.



AC506776 AC

4. Insert the bolts to the timing chain case assembly as shown, and tighten them to the specified torque.

Name	Symbol	Quantity	BOLT DIAMETER (D) × LENGTH (L) mm (in)
Flange bolt	A	6	6 × 25 (0.2 × 1.0)
	B	6	8 × 28 (0.3 × 1.1)
Bolt	C	1	6 × 25 (0.2 × 1.0)

NOTE: D: Nominal diameter, L: Nominal length

Tightening torque:
A, C: 10 ± 2 N·m (89 ± 17 in-lb)
B: 24 ± 4 N·m (13 ± 3 ft-lb)

>>D<< WATER PUMP PULLEY INSTALLATION

Temporarily tighten the water pump pulley mounting bolts. Then, tighten them to the specified torque after the installation of drive belt.

Tightening torque: 9.0 ± 1.0 N·m (80 ± 9 in-lb)

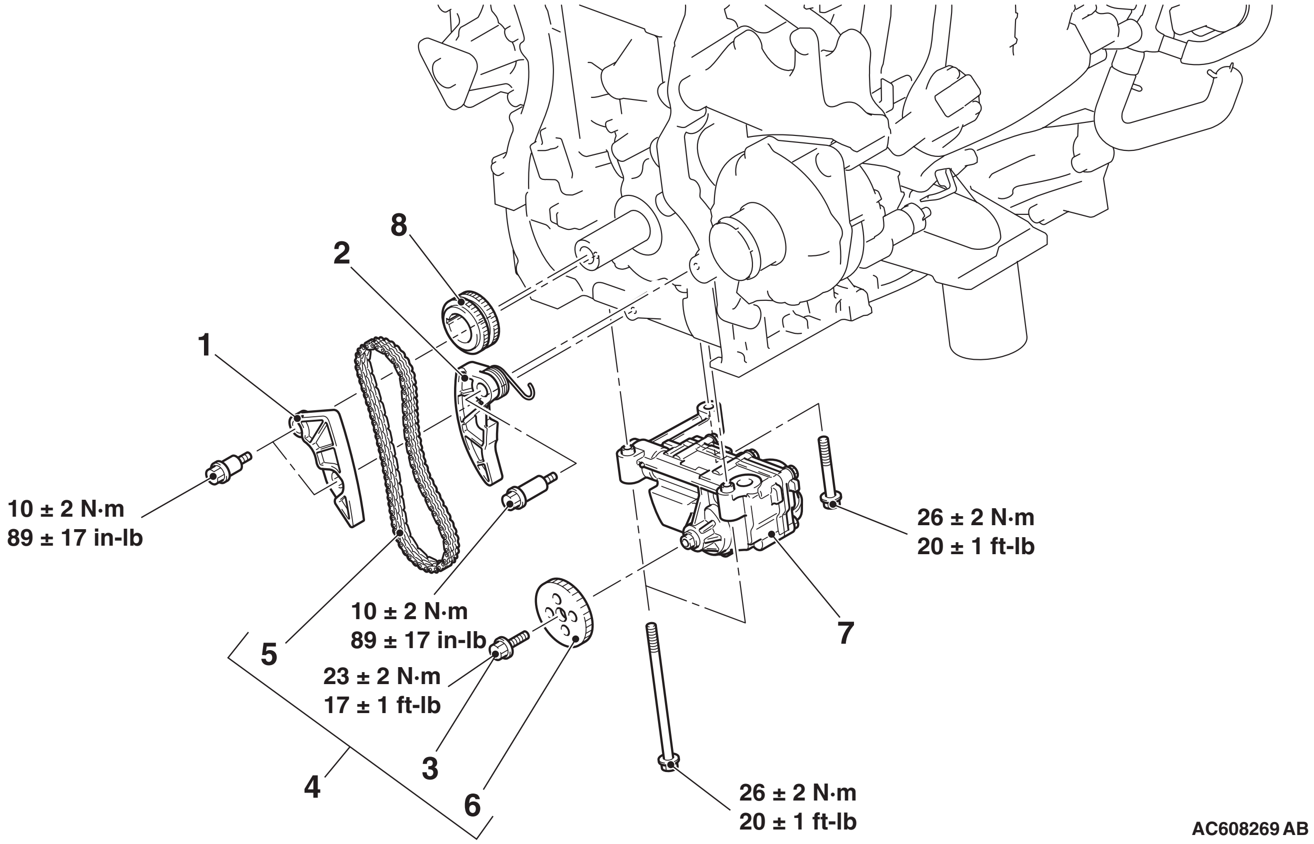
OIL PUMP CHAIN

REMOVAL AND INSTALLATION

M1112009100011

Pre-removal and post-installation operation

- Timing Chain Removal and Installation (Refer to P.11A-63).



Removal steps

	>>B<<	1.	Oil pump chain guide
	>>B<<	2.	Oil pump tensioner lever
<<A>>		3.	Oil pump sprocket center bolt
<<A>>		4.	Oil pump chain and oil pump sprocket

Removal steps (Continued)

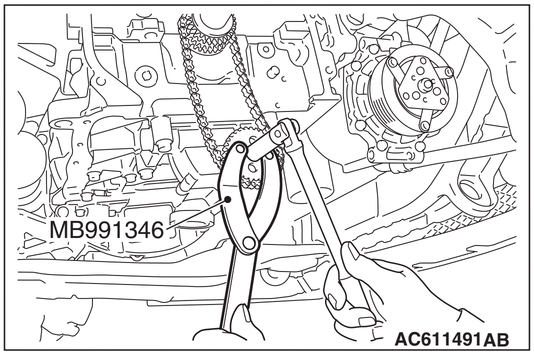
>>B<<	5.	Oil pump chain
>>B<<	6.	Oil pump sprocket
	7.	Oil pump case
>>A<<	8.	Crankshaft sprocket

Required Special Tool:

- MB991346: Top Cover Wrench

REMOVAL SERVICE POINT

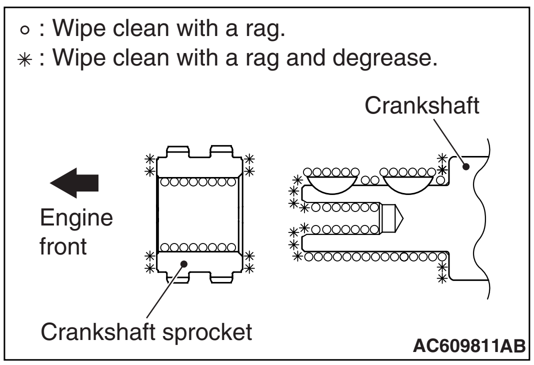
<<A>> OIL PUMP SPROCKET CENTER BOLT/OIL PUMP CHAIN AND OIL PUMP SPROCKET REMOVAL



1. Hold the oil pump sprocket with special tool MB991346.
2. Loosen the oil pump sprocket center bolt and remove the oil pump chain and oil pump sprocket.

INSTALLATION SERVICE POINTS

>>A<< CRANKSHAFT SPROCKET INSTALLATION



1. Wipe the dirt off of the crankshaft sprocket and the crankshaft using a rag, and then remove the grease from the portion shown in the illustration.

   NOTE: Remove grease to prevent a drop in the coefficient of friction of the pressing portion caused by adhesion of oil.
2. Set the No. 1 piston at top dead center of the compression stroke.
3. Install the crankshaft sprocket to the crankshaft.

>>B<< OIL PUMP SPROCKET/OIL PUMP CHAIN/OIL PUMP TENSIONER LEVER/OIL PUMP CHAIN GUIDE INSTALLATION

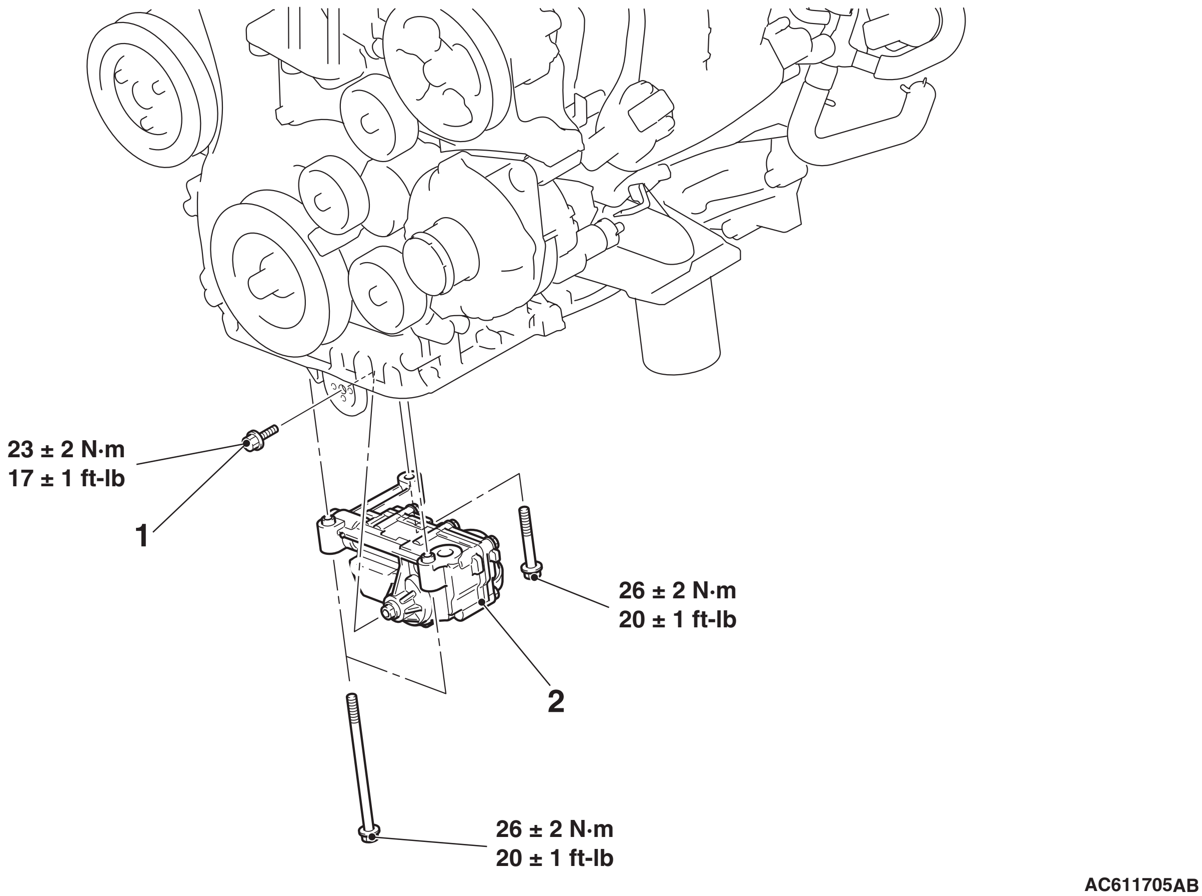
1. Set the No. 1 piston at top dead center of the compression stroke.
2. Install the oil pump sprocket to the oil pump case.
3. Install the oil pump chain to the crankshaft sprocket.
4. Install the oil pump chain to the oil pump sprocket.

OIL PUMP

REMOVAL AND INSTALLATION

M1112009300015

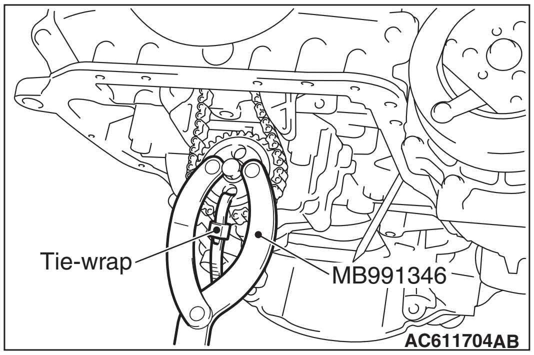
Pre-removal and post-installation operation
- Oil Pan Removal and Installation (Refer to P.11A-45).



Removal steps

<<A>> 1. Oil pump sprocket center bolt
2. Oil pump case

Required Special Tool:
- MB991346: Top Cover Wrench



REMOVAL SERVICE POINT

<<A>> OIL PUMP SPROCKET CENTER BOLT REMOVAL

1. Secure the oil pump sprocket and the oil pump chain with tie-wrap to prevent slippage between the oil pump sprocket and the oil pump chain.
2. Hold the oil pump sprocket with special tool MB991346.
3. Remove the oil pump sprocket with the oil pump chain attached.

ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

M1112001003268

⚠ CAUTION

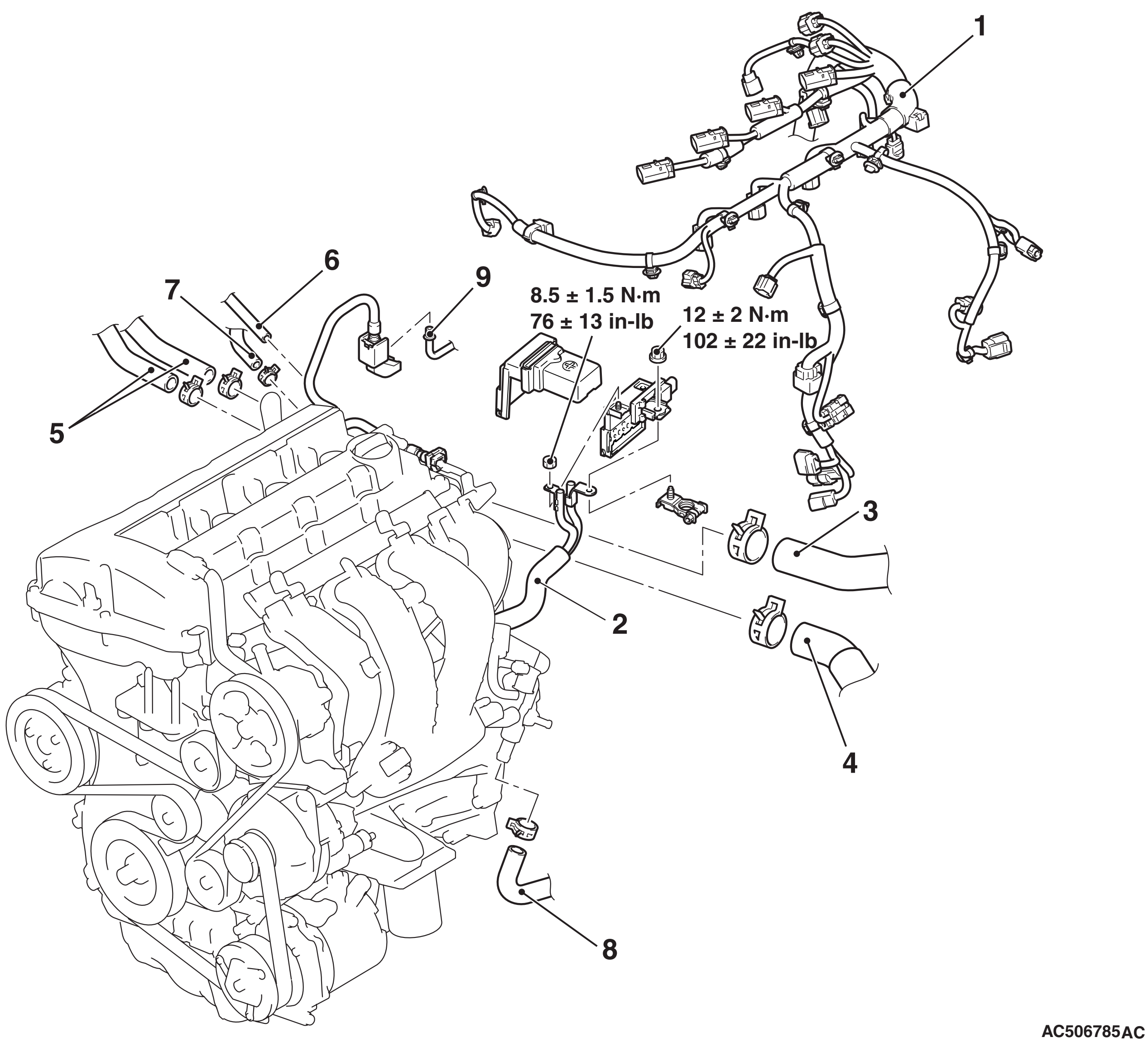
When the engine assembly replacement is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Initialization Procedure for Learning Value in MFI Engine P.00-30).

Pre-removal operation

- Fuel Line Pressure Reduction [Refer to GROUP 13A –On-vehicle Service, Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-932].
- Engine Room Under Cover Front Removal (Refer to GROUP 51 –Under Cover P.51-16).
- Engine Room Side Cover (RH) Removal (Refer to GROUP 51–Under Cover P.51-16).
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13).
- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement P.12-4).
- Transmission Fluid Draining (Refer to GROUP 22A –On-vehicle Service, Transmission Fluid Replacement P.22A-8) <M/T>, (Refer to GROUP 23A –On-vehicle Service, CVT Fluid Replacement P.23A-133) <CVT>.
- Engine Upper Cover Removal (Refer to GROUP 11A –Camshaft P.11A-22).
- Air Cleaner Assembly Removal (Refer to GROUP 15 –Air Cleaner P.15-4).
- Battery and Battery Tray Removal
- Engine-ECU Removal (Refer to GROUP 13A –Engine-ECU P.13A-952).
- Radiator Removal (Refer to GROUP 14 –Radiator P.14-26).
- Drive Shaft Removal (Refer to GROUP 26 –Drive Shaft Assembly P.26-17).
- Strut Tower Bar Removal (Refer to GROUP 42A –Strut Tower Bar P.42A-11).

Post-installation operation

- Strut Tower Bar Installation (Refer to GROUP 42A –Strut Tower Bar P.42A-11).
- Drive Shaft Installation (Refer to GROUP 26 –Drive Shaft Assembly P.26-17).
- Radiator Installation (Refer to GROUP 14 –Radiator P.14-26).
- Engine-ECU Installation (Refer to GROUP 13A –Engine-ECU P.13A-952).
- Battery and Battery Tray Installation
- Air Cleaner Assembly Installation (Refer to GROUP 15 –Air Cleaner P.15-4).
- Transmission Fluid Draining (Refer to GROUP 22A –On-vehicle Service, Transmission Fluid Replacement P.22A-8) <M/T>, (Refer to GROUP 23A –On-vehicle Service, CVT Fluid Replacement P.23A-133) <CVT>.
- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement P.12-4).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13).
- Drive Belt Tension Check (Refer to P.11A-9).
- Engine Room Side Cover (RH) Installation (Refer to GROUP 51 –Under Cover P.51-16).
- Engine Room Under Cover Front Installation (Refer to GROUP 51 –Under Cover P.51-16).
- Engine Upper Cover Installation (Refer to GROUP 11A –Camshaft P.11A-22).
- Fuel Leak Check



Removal steps

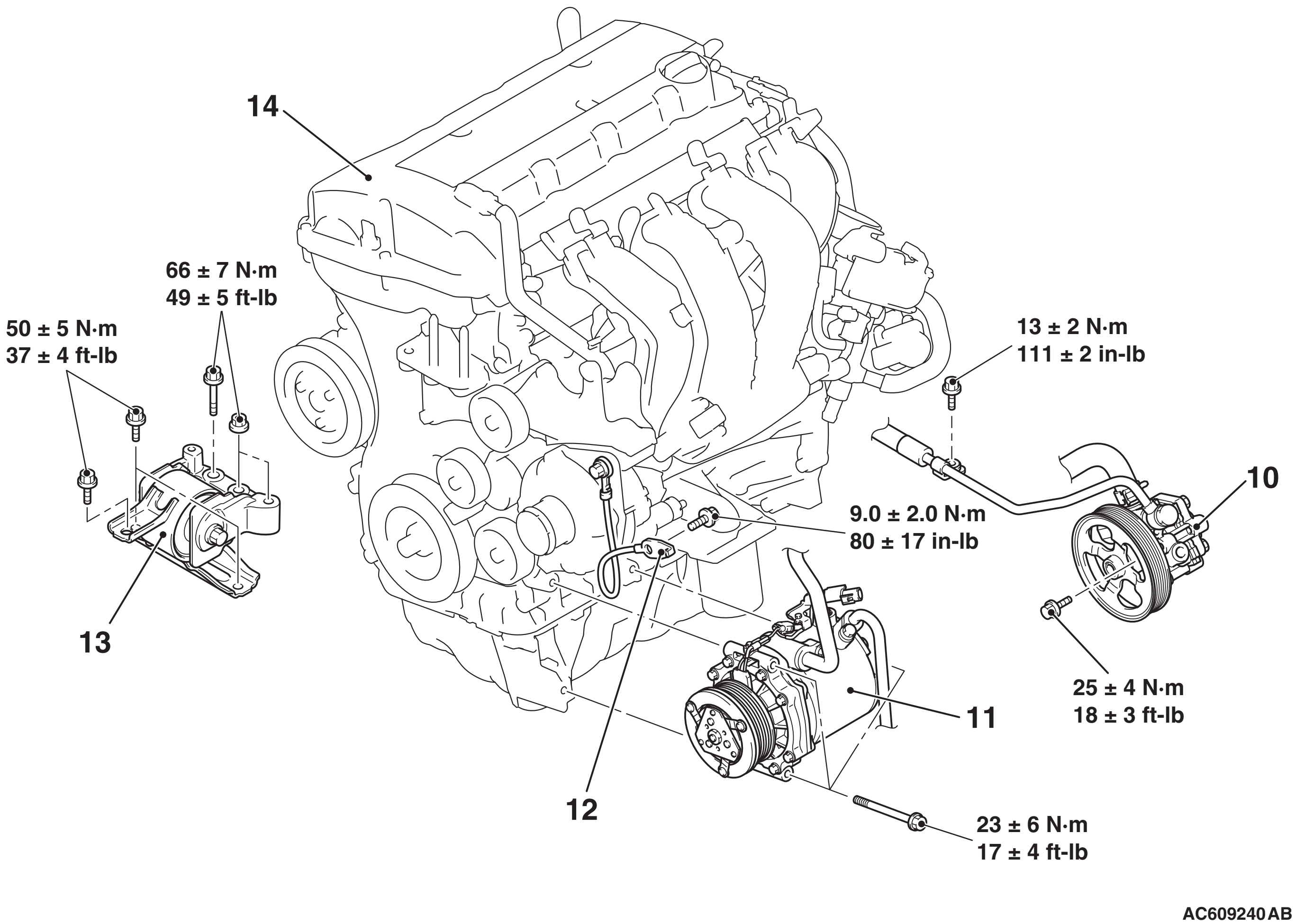
1. Control wiring harness connection
2. Battery cable connection
3. Radiator upper hose connection
4. Radiator lower hose connection
5. Heater hose connection
6. Emission vacuum hose connection

Removal steps (Continued)

7. Brake booster vacuum hose connection
8. Cooling water line hose connection

<<**A**>> >>**C**<< 9. Fuel high-pressure hose connection

- Drive belt (Refer to P.11A-19).



		Removal steps
<<**B**>>	10.	Power steering oil pump assembly
<<**C**>>	11.	A/C compressor and clutch assembly
<<**D**>>	•	Manual transaxle assembly

			Removal steps (Continued)
<<**D**>>		•	CVT assembly
		12.	Grounding cable connection
<<**E**>>	>>**B**<<	13.	Engine mounting insulator
<<**F**>>	>>**A**<<	14.	Engine assembly

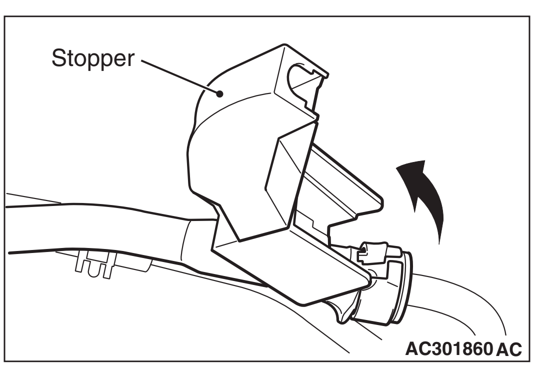
Required Special Tools:

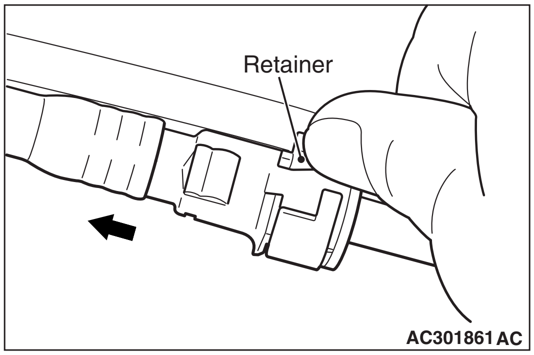
- MB991454: Engine Hanger Balancer
- MB991895: Engine Hanger
- MB991928: Engine Hanger
- MB992201: Engine Hanger Plate

REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE REMOVAL

1. Remove the stopper of the fuel high-pressure hose.





2. Raise the retainer of the fuel high-pressure hose and pull out the fuel high-pressure hose in the direction shown in the figure.

   NOTE: If the retainer is released, install it securely after removing the fuel high-pressure hose.

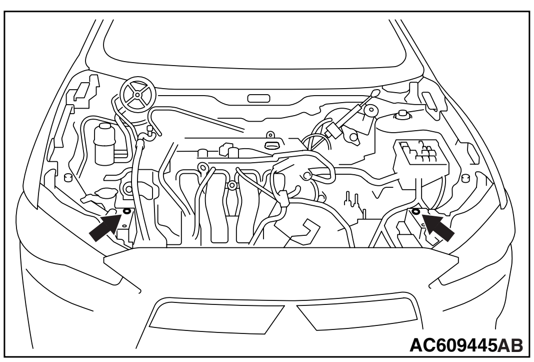
<<B>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. Remove the power steering oil pump assembly with hose on it.
2. Tie the removed power steering oil pump with a string at a position where it will not interfere with the removal and installation of engine assembly.

<<C>> A/C COMPRESSOR AND CLUTCH ASSEMBLY REMOVAL

1. Remove the A/C compressor and clutch assembly together with the hose from the bracket.
2. Tie the removed A/C compressor and clutch assembly with a string at a position where it will not interfere with the removal and installation of engine assembly.

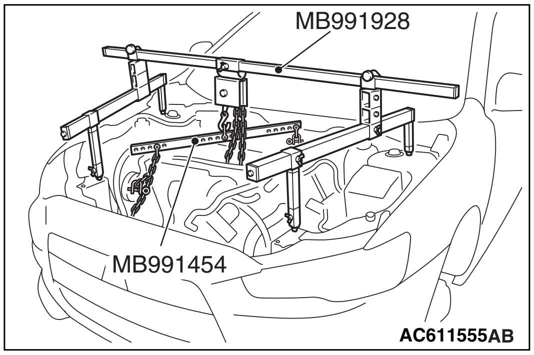
<<D>> MANUAL TRANSAXLE ASSEMBLY/CVT ASSEMBLY REMOVAL

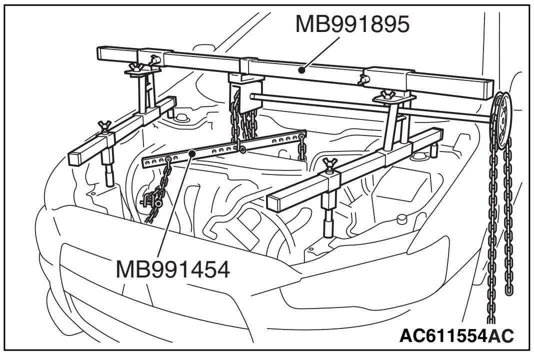


1. Install the front end upper bar bolt to the position as shown in the figure.
2. Remove the transaxle assembly. (Refer to GROUP 22A, Transaxle Assembly P.22A-12) <M/T>, (Refer to GROUP 23A, Transaxle Assembly P.23A-149) <CVT>.

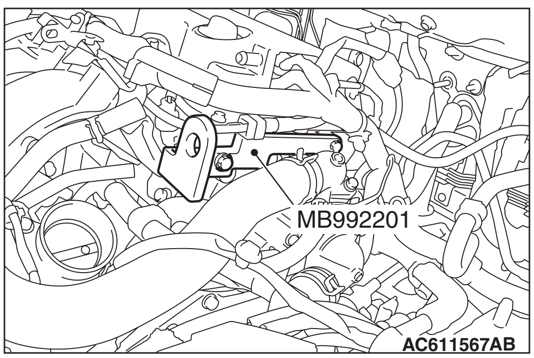
<<E>> ENGINE MOUNTING INSULATOR REMOVAL

1. Place a garage jack against the engine oil pan with a piece of wood in between to support the engine assembly.



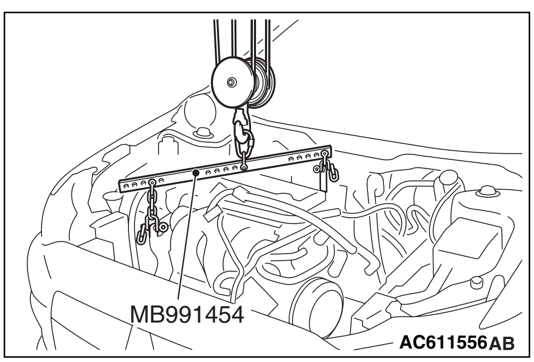


2. When the transaxle assembly is removed, remove special tool MB991928 or MB991895 which supports the engine assembly.



3. Remove special tool MB992201.
4. Operate a garage jack so that the engine weight is not applied to the engine mounting insulator, and remove the engine mounting insulator.

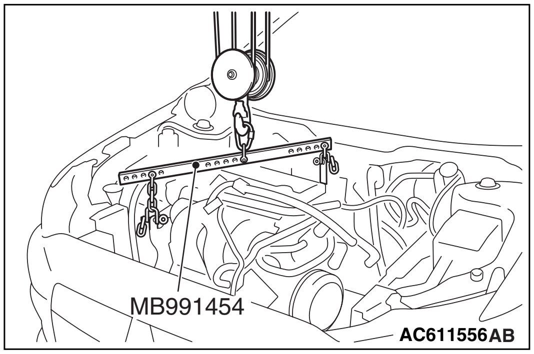
<<F>> ENGINE ASSEMBLY REMOVAL



1. Mount the special tool MB991454 to the power steering oil pump bracket and the engine hanger, and set the chain block.
2. After checking that all cables, hoses and wiring harness connectors and so on are disconnected from the engine, lift the engine assembly slowly with the chain block to remove the engine assembly upward from the engine compartment.

INSTALLATION SERVICE POINTS

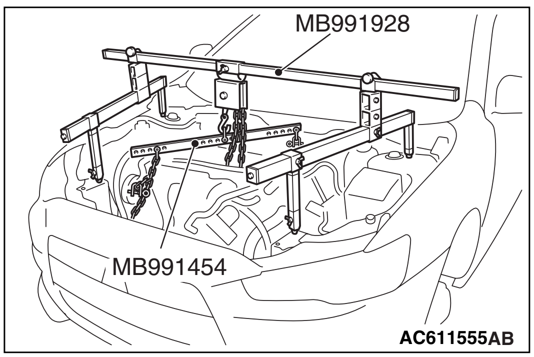
>>A<< ENGINE ASSEMBLY INSTALLATION

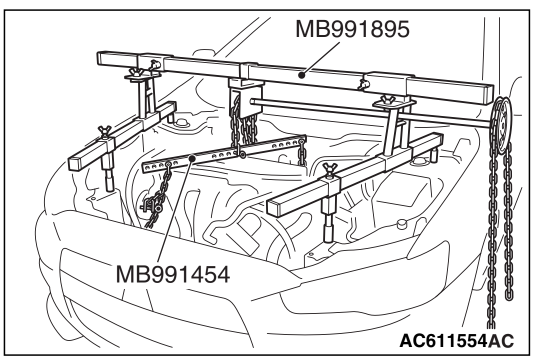


Install the engine assembly, being careful not to pinch the cables, hoses, or wiring harness connectors.

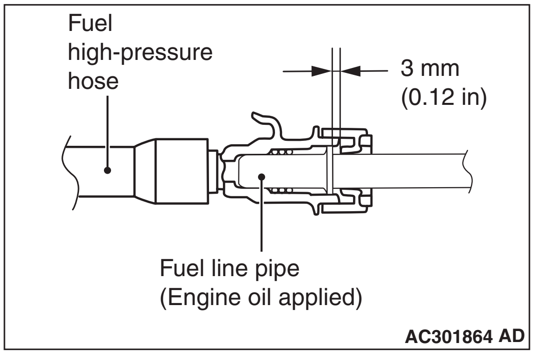
>>B<< ENGINE MOUNTING INSULATOR INSTALLATION

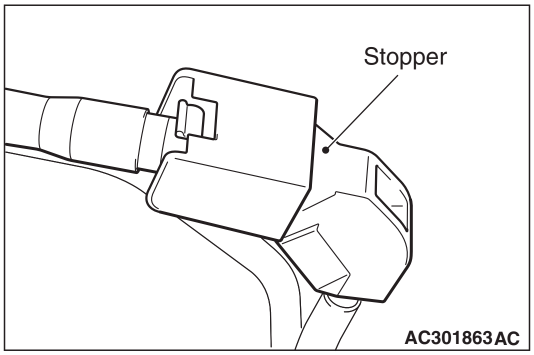
1. Place a garage jack against the engine oil pan with a piece of wood in between, and install the engine mounting insulator while adjusting the position of the engine.
2. Install special tool MB991454.
3. Install special tool MB991928 or MB991895 which is used during installation of transaxle assembly to hold the engine assembly (Refer to GROUP 22A –Transaxle Assembly P.22A-12) <M/T>, (Refer to GROUP 23A –Transaxle Assembly P.23A-149) <CVT>.





>>C<< FUEL HIGH-PRESSURE HOSE INSTALLATION





⚠ CAUTION

After connecting the fuel high-pressure hose, slightly pull it in the pull-out direction to check that it is installed firmly. In addition, check that there is approximately 3 mm (0.12 inch) play. After the check, install the stopper securely.

Apply a small amount of engine oil to the fuel line pipe, and install the fuel high-pressure hose.

GROUP 11

ENGINE

CONTENTS

NOTES

GROUP 14

ENGINE COOLING

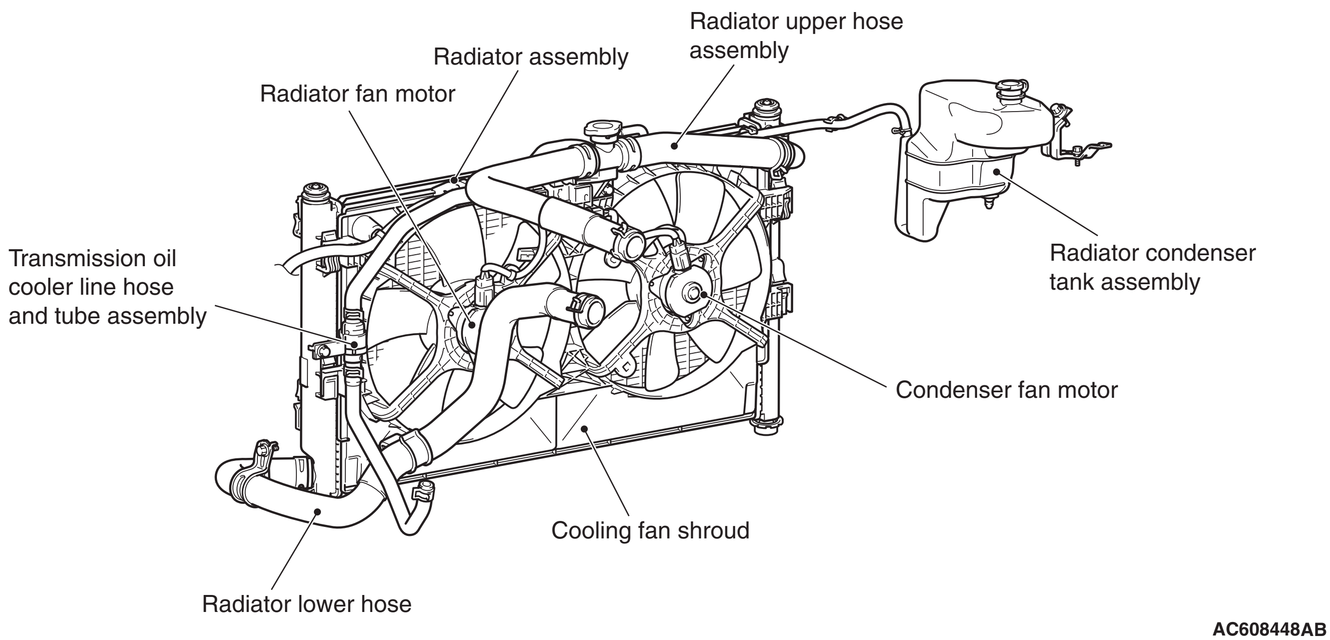
CONTENTS

GENERAL INFORMATION

M1141000101028

The cooling system is designed to keep every part of the engine at appropriate temperature in whatever condition the engine may be operated. The cooling method is of the water-cooled, pressure forced circulation type in which the water pump pressurizes coolant and circulates it throughout the engine. If the coolant temperature exceeds the prescribed temperature, the thermostat opens to circulate the coolant through the radiator as well so that the heat absorbed by the coolant may be radiated into the air. The water pump is of the centrifugal impeller type and is driven by the drive belt from the crankshaft. The radiator is the corrugated fin, cross flow type.

CONSTRUCTION DIAGRAM



SERVICE SPECIFICATIONS

M1141000300944

Item		Standard value	Limit
Valve opening pressure of radiator cap kPa (psi)		93 –123 (14 –18)	Minimum 83 (12)
Thermostat	Valve opening temperature of thermostat °C (°F)	82 ± 1.5 (180 ± 1)	–
	Full-opening temperature of thermostat °C (°F)	95 (203)	–
	Valve lift mm (in)	8.5 (0.33) or more	–

COOLANT

M1141000400877

Item	Quantity dm^3 (qt)
Long life antifreeze coolant or an equivalent	7.0 (7.4)

SEALANT

M1141000500885

Item	Specified sealant
Engine coolant temperature sensor	LOCTITE 262, Three bond 1324 or equivalent

ENGINE COOLING DIAGNOSIS

INTRODUCTION

M1141005300400

The system cools the engine so that it does not overheat and maintains the engine at an optimum temperature. The system components are the radiator, water pump, thermostat, condenser fan assembly. Possible faults include low coolant, contamination, belt loosening and component damage.

TROUBLESHOOTING STRATEGY

M1141005200395

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure to find most of the engine cooling faults.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find and repair the malfunction by following the SYMPTOM CHART.
4. Verify that the malfunction is eliminated.

SYMPTOM CHART

M1141005600542

Symptom	Inspection procedure	Reference page
Coolant leak	1	P.14-4
Engine overheating	2	P.14-5
Radiator fan and condenser fan do not operate	3	P.14-6

SYMPTOM PROCEDURES

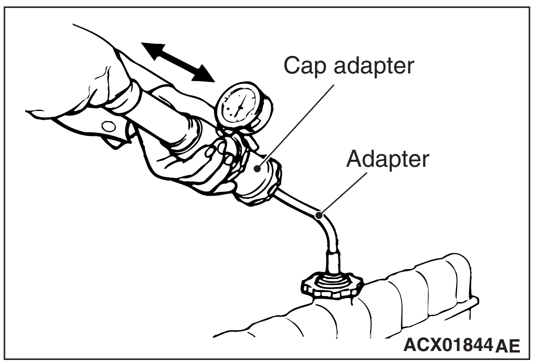
Inspection Procedure 1: Coolant Leak

DIAGNOSIS

STEP 1. Check for coolant leaks.

⚠ ***WARNING***
When pressure testing the cooling system, slowly release cooling system pressure to avoid getting burned by hot coolant.

⚠ **CAUTION**
- **Be sure to completely clean away any moisture from the places checked.**
- **When the tester is removed, be careful not to spill any coolant.**
- **When installing and removing the tester and when testing, be careful not to deform the filler neck of the radiator.**



Check that the coolant level is up to the filler neck. Install a radiator tester and apply 160 kPa (23 psi) pressure, and then check for leakage from the radiator hose or connections.

Q: Is leakage present from the radiator hose or connections?
YES : Repair or replace the appropriate part, then go to Step 2.
NO : There is no action to be taken.

STEP 2. Retest the system.

Q: It there still coolant leakage?
YES : Return to Step 1.
NO : The procedure is complete.

Inspection Procedure 2: Engine Overheating

DIAGNOSIS

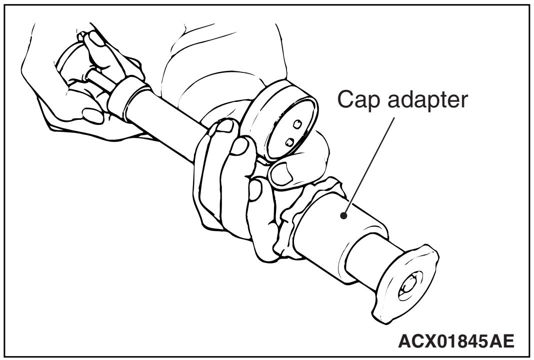
STEP 1. Remove the radiator cap and check for coolant contamination.

Q: Is the coolant contaminated with rust and oil?

YES : Replace it. Refer to P.14-13.
NO : There is no action to be taken. Go to Step 2.

STEP 2. Check the radiator cap valve opening pressure.

NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an improper reading.



(1) Use a cap adapter to attach the cap to the tester.
(2) Increase the pressure until the gauge indicator stops moving.

Minimum limit: 83 kPa (12 psi)
Standard value: 93 –123 kPa (14 –18 psi)

Q: Does the reading remain at or above the minimum limit?

YES : Go to Step 3.
NO : Replace the radiator cap. Then go to Step 5.

STEP 3. Check thermostat operation.
Refer to P.14-20.

Q: Does the thermostat operate correctly?

YES : Go to Step 4.
NO : Replace the thermostat, then go to Step 5.

STEP 4. Check the drive belt for slippage or damage.
Refer to GROUP 00 –Maintenance Service, Drive Belts (Check Condition) P.00-59.

Q: Is the drive belt loose or damaged?

YES : Adjust or replace the drive belt, then go to Step 5.
NO : There is no action to be taken.

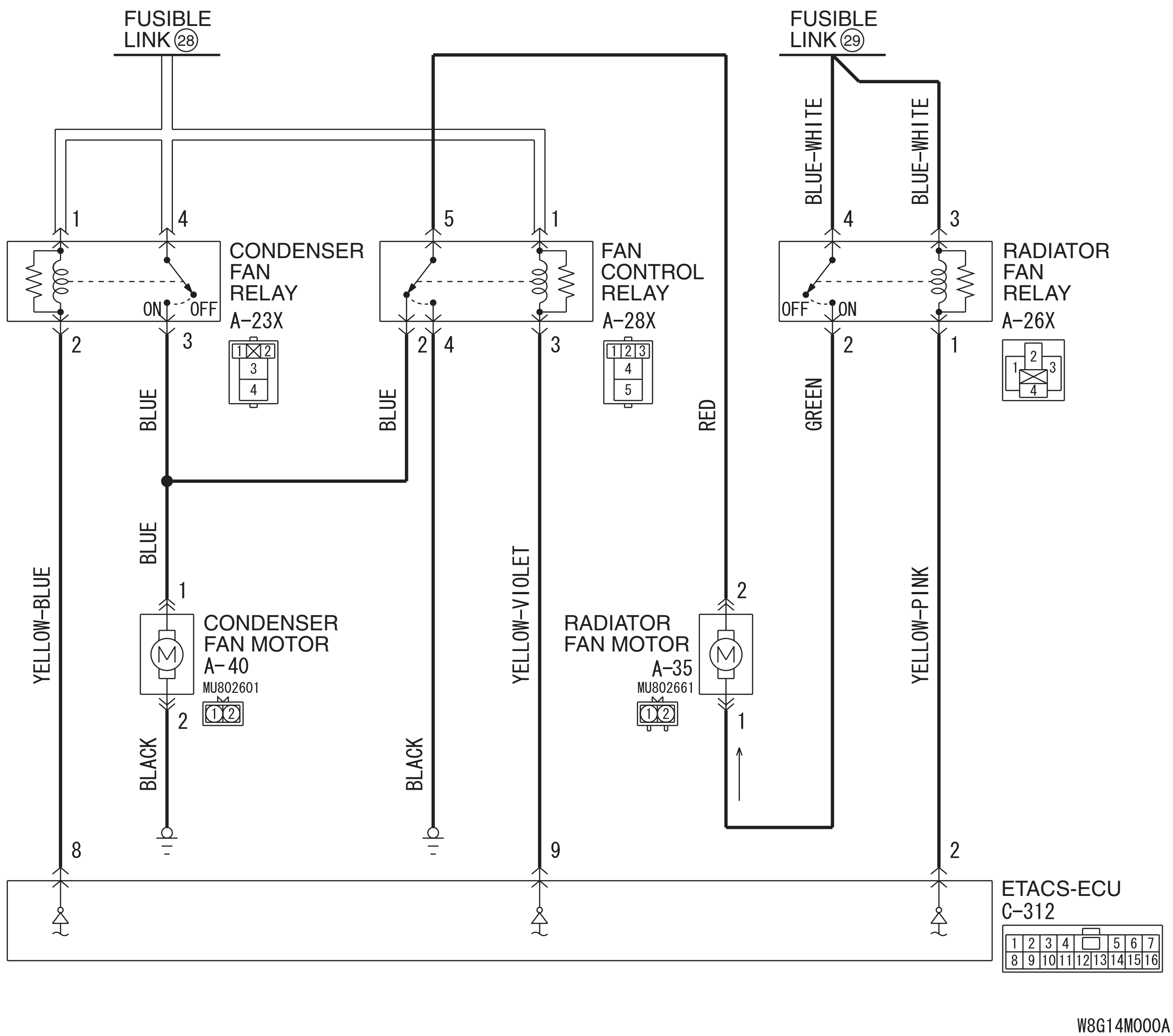
STEP 5. Retest the system.
Check the engine coolant temperature.

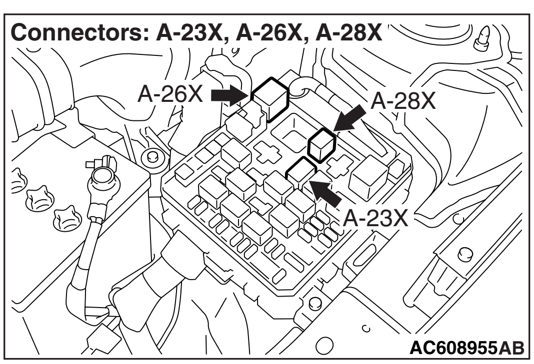
Q: Is the engine coolant temperature abnormally high?

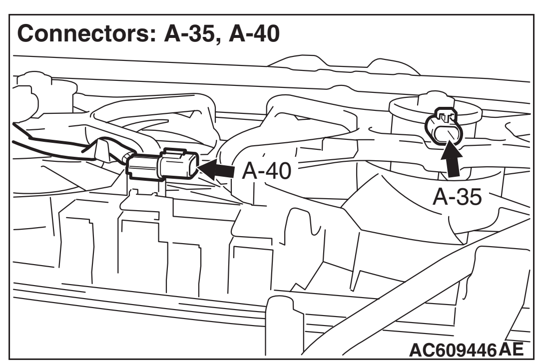
YES : Return to Step 2.
NO : The procedure is complete.

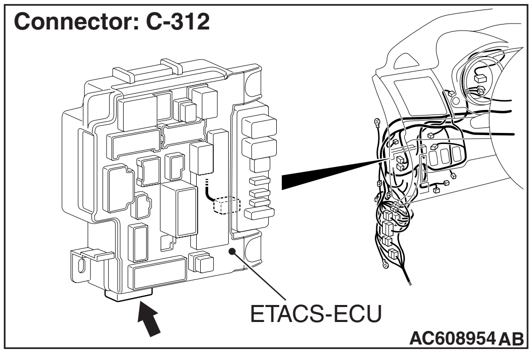
Inspection Procedure 3: Radiator Fan and Condenser Fan do not Operate

Radiator Fan and Condenser Fan Drive Circuit









CIRCUIT OPERATION

- Battery voltage is applied to the radiator fan relay (terminal 3), fan control relay (terminal 1), and condenser fan relay (terminal 1).
- ETACS-ECU (terminal 2, 8, and 9) turns ON the power transistor in the unit to apply current to the radiator fan relay, fan control relay, and condenser fan relay, thus turning ON the relays.
- When the radiator fan relay is turned ON and the fan control relay is also turned ON, battery voltage is applied from the radiator fan relay (terminal 2) to the radiator fan motor (terminal 1).
- When the condenser fan relay is turned ON, battery voltage is applied from the condenser fan relay (terminal 3) to the condenser fan motor (terminal 1).

FUNCTION

- When the radiator fan relay is turned ON, the radiator fan motor and condenser fan motor rotate at a low speed.
- When the radiator fan relay, fan control relay, and condenser fan relay are turned ON, the radiator fan motor and condenser fan motor rotate at a high speed.

TROUBLESHOOTING HINTS

- Malfunction of fusible link
- Malfunction of radiator fan relay
- Malfunction of fan control relay
- Malfunction of condenser fan relay
- Malfunction of radiator fan motor
- Malfunction of condenser fan motor
- Malfunction of relay box
- Malfunction of ETACS-ECU
- Damaged wiring harness or connector

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis codes

- Confirm whether the diagnosis codes are output from ETACS-ECU.

Q: Is the diagnosis code output?

YES : Perform the troubleshooting of ETACS-ECU (Refer to GROUP 54A –ETACS, Diagnosis Code Chart P.54A-482).
NO : Go to Step 2.

STEP 2. Check the cooling fan relay.

Refer to P.14-15.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Replace the relay.

STEP 3. Connectors check: A-23X condenser fan relay connector, A-26X radiator fan relay connector and A-28X fan control relay connector.

Check for the contact with terminals.

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the defective connector.

STEP 4. Check the cooling fan motor.
Refer to P.14-16.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the fan motor.

STEP 5. Connectors check: A-40 condenser fan motor connector and A-35 radiator fan motor connector.
Check for the contact with terminals.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the defective connector.

STEP 6. Measure the voltage at radiator fan relay connector A-26X.

(1) Remove the radiator fan relay, and measure at relay box side.
(2) Measure the voltage between terminal 3 and earth. Measure the voltage between terminal 4 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the harness between radiator fan relay connector A-26X (terminal 3, 4) and fusible link number 29.

- Check the power supply line for short or open circuit.

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness.

STEP 8. Measure the voltage at fan control relay connector A-28X.

(1) Remove the fan control relay, and measure at relay box side.
(2) Measure the voltage between terminal 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 9.

STEP 9. Check the harness between fan control relay connector A-28X (terminal 1) and fusible link number 28.

- Check the power supply line for short or open circuit.

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the relay box.

STEP 10. Measure the voltage at condenser fan relay connector A-23X.

(1) Remove the condenser fan relay, and measure at relay box side.
(2) Measure the voltage between terminal 1 and earth.
Measure the voltage between terminal 4 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12.
NO : Go to Step 11.

STEP 11. Check the harness between condenser fan relay connector A-23X (terminal 1, 4) and fusible link number 28.

- Check the power supply line for short or open circuit.

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the relay box.

STEP 12. Check the harness between radiator fan relay connector A-26X (terminal 2) and radiator fan motor connector A-35 (terminal 1).

- Check the output line for short or open circuit.

Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the wiring harness.

STEP 13. Check the harness between fan control relay connector A-28X (terminal 5) and radiator fan motor connector A-35 (terminal 2).

- Check the output line for short or open circuit.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the wiring harness.

STEP 14. Measure the resistance at fan control relay connector A-28X.

(1) Remove the fan control relay, and measure at relay box side.
(2) Measure the resistance between terminal 4 and body earth.

OK: Continuity (Less than 2 ohms)

Q: Is the check result normal?

YES : Go to Step 16.
NO : Go to Step 15.

STEP 15. Check the harness between fan control relay connector A-28X (terminal 4) and earth.

- Check the earth line for open circuit.

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness.

STEP 16. Check the harness between fan control relay connector A-28X (terminal 2) and condenser fan relay connector A-23X (terminal 3).

- Check the output line for short or open circuit.

Q: Is the check result normal?

YES : Go to Step 17.
NO : Repair the wiring harness.

STEP 17. Check the harness between condenser fan relay connector A-23X (terminal 3) and condenser fan motor connector A-40 (terminal 1).

- Check the output line for short or open circuit.

Q: Is the check result normal?

YES : Go to Step 18.
NO : Repair the wiring harness.

STEP 18. Measure the resistance at condenser fan motor connector A-40.

(1) Remove the condenser fan motor connector, and measure at harness side.
(2) Check the continuity between terminal 2 and body earth.

OK: Continuity (Less than 2 ohms)

Q: Is the check result normal?

YES : Go to Step 20.
NO : Go to Step 19.

STEP 19. Check the harness between condenser fan motor connector A-40 (terminal 2) and earth.

- Check the earth line for open circuit.

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Repair the wiring harness.

STEP 20. Check the harness between ETACS-ECU connector C-312 (terminal 2) and radiator fan relay connector A-26X (terminal 1).

- Check the ETACS-ECU input line for open circuit.

Q: Is the check result normal?

YES : Go to Step 21.
NO : Repair the wiring harness.

STEP 21. Check the harness between ETACS-ECU connector C-312 (terminal 9) and fan control relay connector A-28X (terminal 3).

- Check the ETACS-ECU input line for open circuit.

Q: Is the check result normal?

YES : Go to Step 22.
NO : Repair the wiring harness.

STEP 22. Check the harness between ETACS-ECU connector C-312 (terminal 8) and condenser fan relay connector A-23X (terminal 2).

- Check the ETACS-ECU input line for open circuit.

Q: Is the check result normal?

YES : Go to Step 23.
NO : Repair the wiring harness.

STEP 23. M.U.T.-III actuator test

Conduct the MPI system actuator test to check that the fan works (Refer to GROUP 13A –Troubleshooting, Actuator Test Reference Table P.13A-901).

- Item 14: Cooling fan

Q: Is the check result normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00 –How to use troubleshooting, How to Cope with Intermittent Malfunction P.00-13).
NO : Replace the ETACS-ECU (Refer to GROUP 54A –ETACS-ECU P.54A-564). Then go to Step 24.

STEP 24. Retest the system.

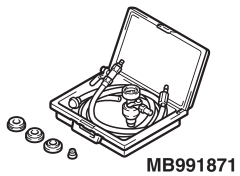
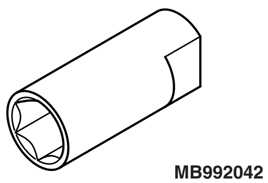
Check that the radiator fan and the condenser fan work.

Q: Is the check result normal?

YES : The procedure is complete.
NO : Return to Step 1.

SPECIAL TOOLS

M1141000600882

Tool	Tool number and name	Supersession	Application
	MB991871 LLC changer	General service tool	Coolant refilling
	MB992042 Water temp sensor wrench	MB992042-01	Engine coolant temperature sensor removal and installation

ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECK

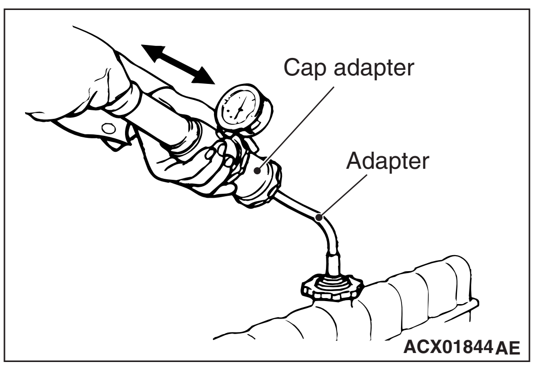
M1141001000690

⚠ *WARNING*

When pressure testing the cooling system, slowly release cooling system pressure to avoid getting burned by hot coolant.

⚠ **CAUTION**

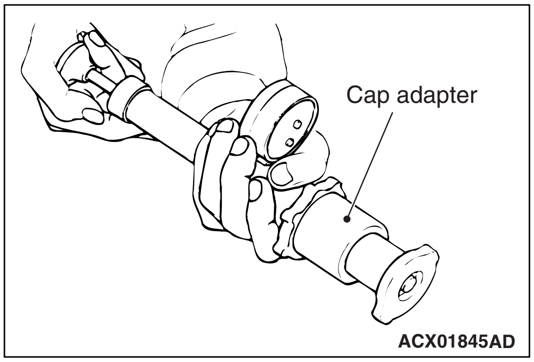
- **Be sure to completely clean away any moisture from the places checked.**
- **When the tester is taken out, be careful not to spill any coolant.**
- **Be careful when installing and removing the tester and when testing not to deform the filler neck of the radiator.**



1. Check that the coolant level is up to the filler neck. Install a radiator tester and apply 160 kPa (23 psi) pressure, and then check for leakage from the radiator hose or connections.
2. If there is leakage, repair or replace the appropriate part.

RADIATOR CAP OPENING PRESSURE CHECK

M1141001300840



NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an improper reading.

1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

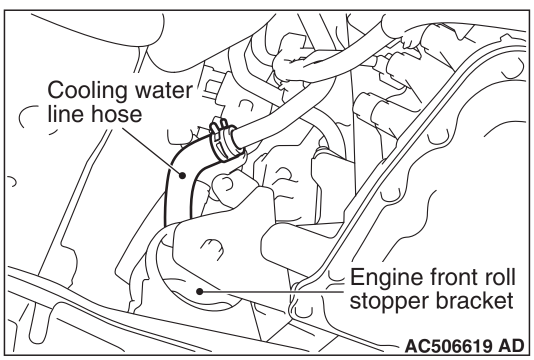
   Minimum limit: 83 kPa (12 psi)
   Standard value: 93 –123 kPa (14 –18 psi)
3. Replace the radiator cap if the reading does not remain at or above the limit.

ENGINE COOLANT CHANGE

M1141001201125

⚠ ***WARNING***

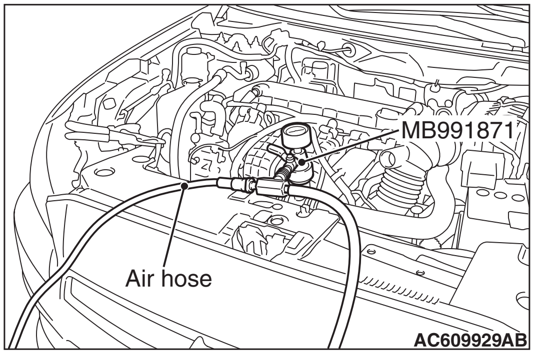
When removing the radiator cap, use care to avoid contact with hot coolant or steam. Place a shop towel over the cap and turn the cap anti-clockwise a little to let the pressure escape through the vinyl tube. After relieving the steam pressure, remove the cap by slowly turning it anti-clockwise.



1. Drain the water from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.
2. Disconnect the cooling water line hose and drain the coolant in the water jacket.
3. Remove the radiator condenser tank and drain the coolant.
4. Drain the coolant then clean the path of the coolant by injecting water into the radiator from the radiator cap area.
5. Install the cooling water line hose.
6. Securely tighten the drain plug of the radiator.
7. Reinstall the radiator condenser tank.

⚠ CAUTION

Do not use alcohol or methanol anti-freeze or any engine coolants mixed with alcohol or methanol anti-freeze. The use of an improper anti-freeze can cause corrosion of the aluminum components.



8. By referring to the section on coolant, select an appropriate concentration for safe operating temperature within the range of 30 to 60%. Use special tool MB991871 to refill the engine coolant up to the top of the radiator port. A convenient mixture is a 50% water and 50% antifreeze solution [freezing point: −31° C (−23.8 ° F)].

   Recommended antifreeze: Long Life Antifreeze Coolant or an equivalent

   Quantity: 7.0 dm^3 (7.4 quarts)

   NOTE: For how to use special tool (MB991871), refer to its manufacturer's instructions.
9. Tighten the radiator cap securely.
10. Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.
11. Turn the A/C switch to OFF position to start the engine and warm up until the cooling fan operates.

    NOTE: This step opens the thermostat fully.
12. Rev the engine several times and then stop it. Check that there are no coolant leaks.
13. Remove the radiator cap with the engine cool, and then refill the engine coolant up to the top of the radiator port.
14. Tighten the radiator cap securely.

⚠ CAUTION

Do not overfill the radiator condenser tank.

15. Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.

ENGINE COOLANT CONCENTRATION TEST

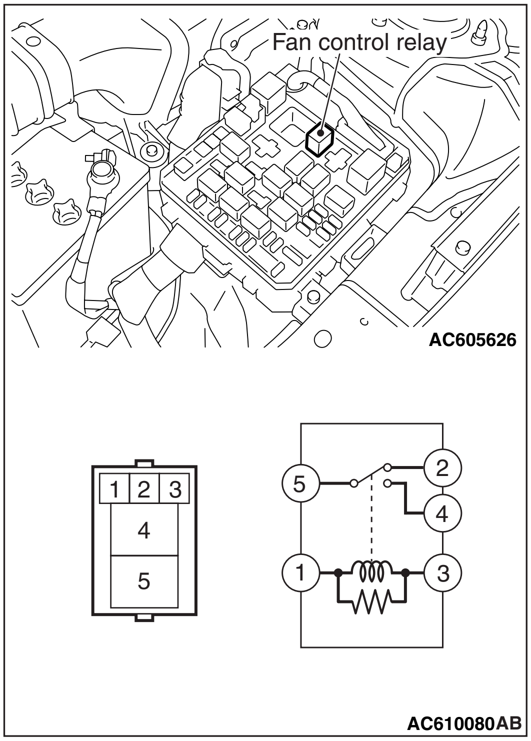
M1141001100802

Refer to GROUP 00, Recommended Lubricants and Lubricant Capacities Table P.00-51.

COOLING FAN RELAY CONTINUITY CHECK

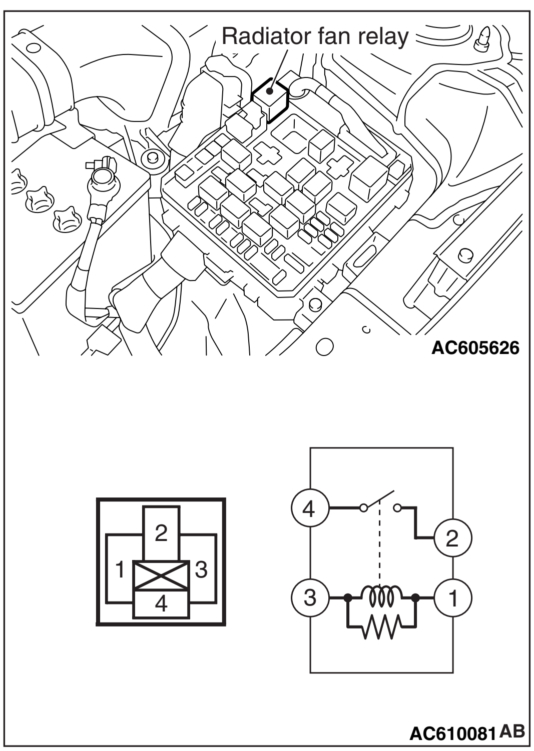
M1141006200826

FAN CONTROL RELAY CHECK



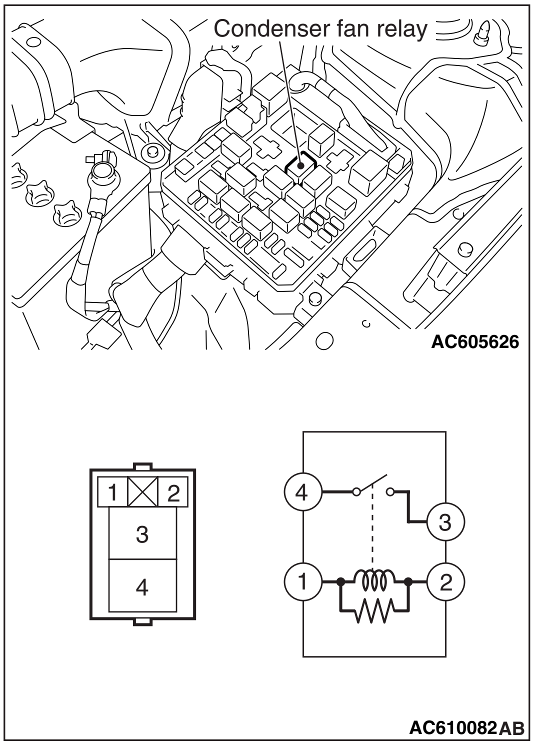
Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	2 –5	Continuity (Less than 2 ohms)
Not applied	4 –5	Open circuit
Connect terminal No. 1 and battery (+) terminal. Connect terminal No. 3 and battery (–) terminal.		Continuity (Less than 2 ohms)

RADIATOR FAN RELAY CHECK



Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	2 –4	Open circuit
Connect terminal No. 1 and battery (–) terminal. Connect terminal No. 3 and battery (+) terminal.		Continuity (Less than 2 ohms)

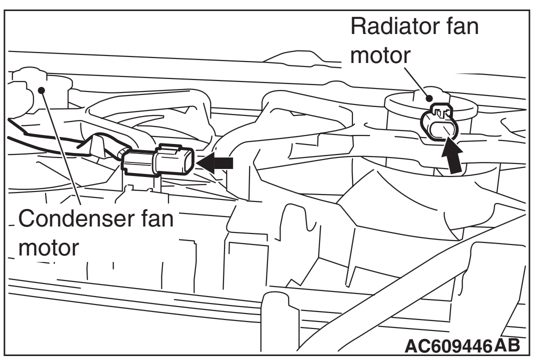
CONDENSER FAN RELAY CHECK



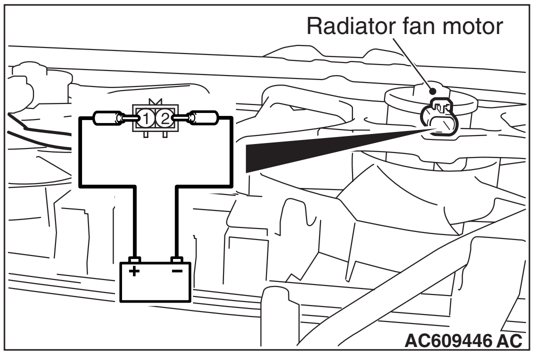
Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	3 –4	Open circuit
Connect terminal No.1 and battery (+) terminal. Connect terminal No.2 and battery (–) terminal.		Continuity (Less than 2 ohms)

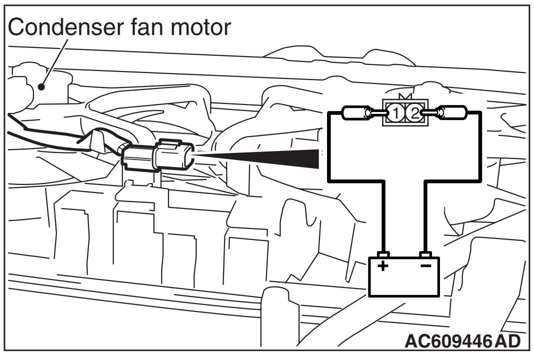
COOLING FAN MOTOR CHECK

M1141007600065



1. Disconnect the fan motor connector.





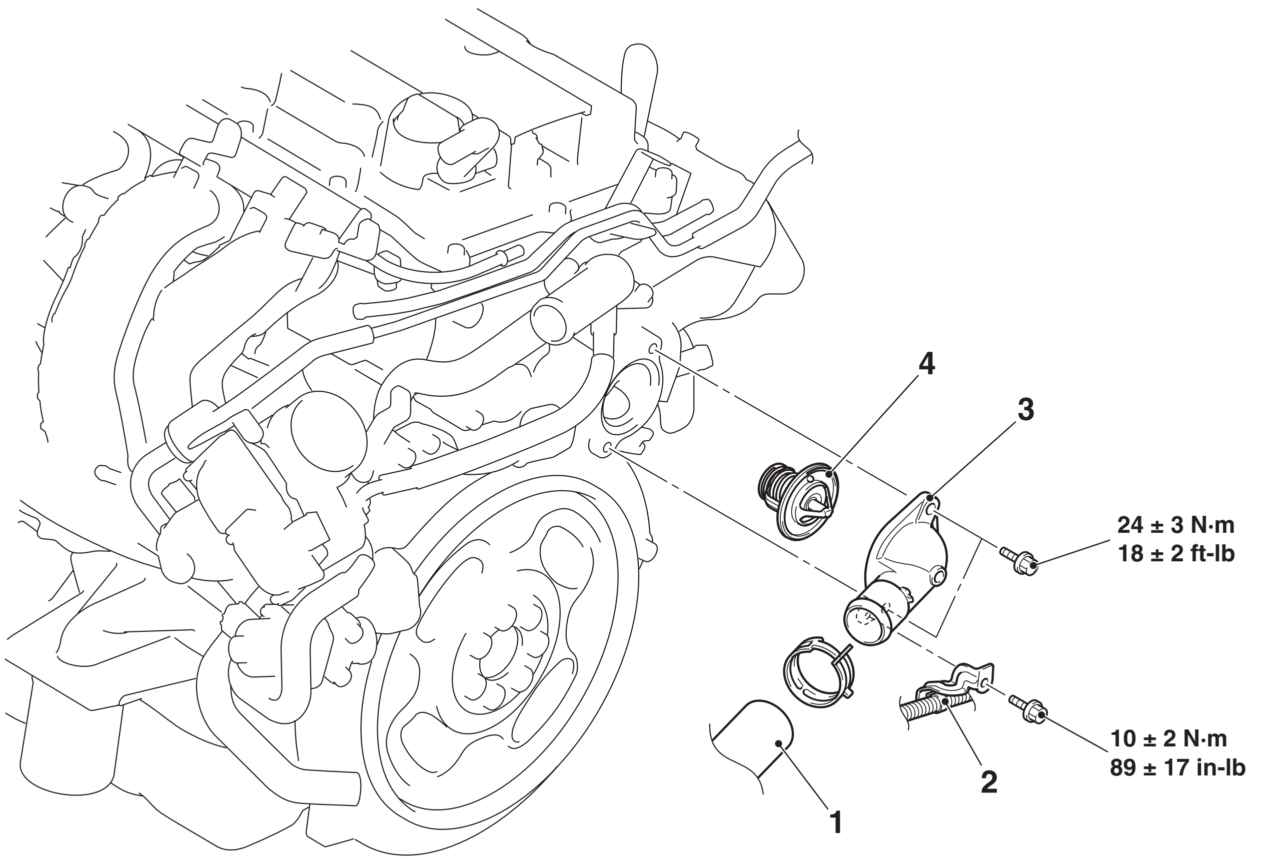
2. Check that the fan motor runs when a positive battery terminal is connected to the fan motor-side connector terminal No.1, and terminal No.2 is grounded. Also check to see that there is no abnormal sound emitted from the fan motor at this time.
3. If the fan motor is defective, replace it (Refer to P.14-26).

THERMOSTAT

REMOVAL AND INSTALLATION

M1141002401274

Pre-removal operation	Post-installation operation
• Engine Coolant Draining (Refer to P.14-13). • Engine Upper Cover Removal (Refer to GROUP 11A – Camshaft P.11A-22). • Air Cleaner Assembly Removal (Refer to GROUP 15 –Air Cleaner P.15-4).	• Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner P.15-4). • Engine Upper Cover Installation (Refer to GROUP 11A – Camshaft P.11A-22). • Engine Coolant Refilling (Refer to P.14-13).



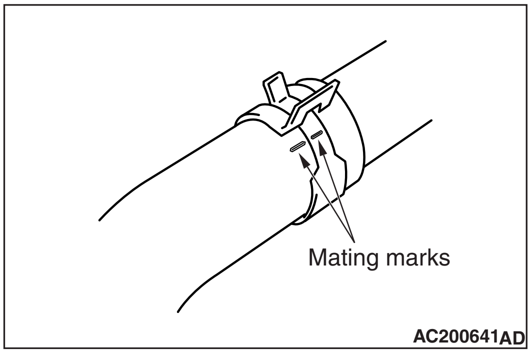
AC506788 AC

Removal steps

<<A>> >>B<< 1. Radiator lower hose connection
2. Control wiring harness clamp connection <CVT>

Removal steps (Continued)

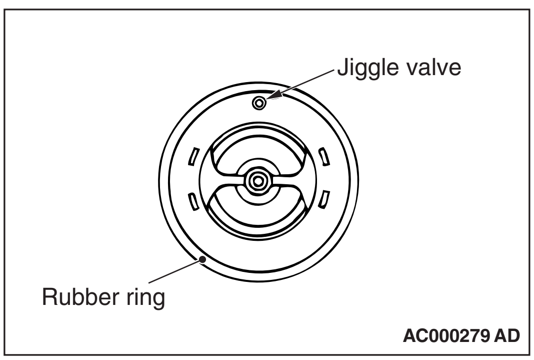
3. Cooling water inlet hose fitting
>>A<< 4. Thermostat



REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DISCONNECTION

Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.



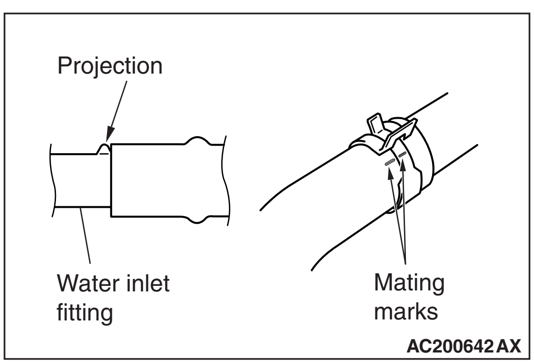
INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

⚠ CAUTION

Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.

Install the thermostat so that the jiggle valve is facing straight up. Be careful not to fold or scratch the rubber ring.



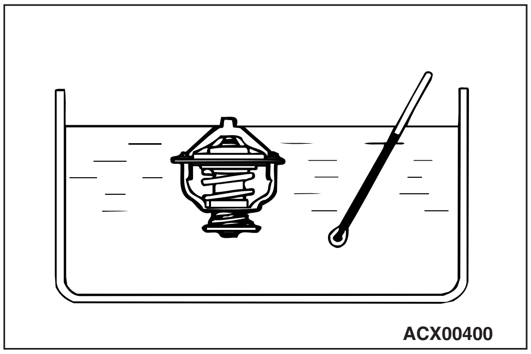
>>B<< RADIATOR LOWER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

INSPECTION

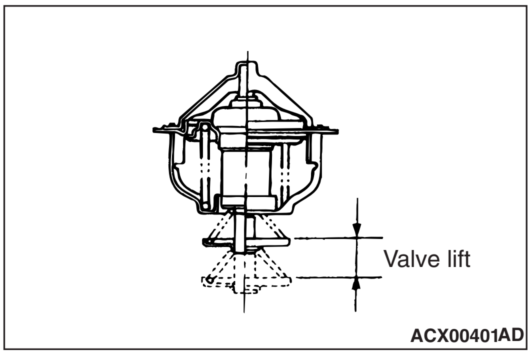
M1141002500814

Thermostat Check



1. Immerse the thermostat in water, and heat the water while stirring. Check the thermostat valve opening temperature.

   Standard value: Valve opening temperature: 82 ±1.5° C (180 ±3° F)



2. Check that the amount of valve lift is at the standard value when the water is at the full-opening temperature.

   NOTE: Measure the valve height when the thermostat is fully closed, and use this measurement to compare the valve height when the thermostat is fully open.

   Standard value:

   Full-opening temperature:95° C (203° F)

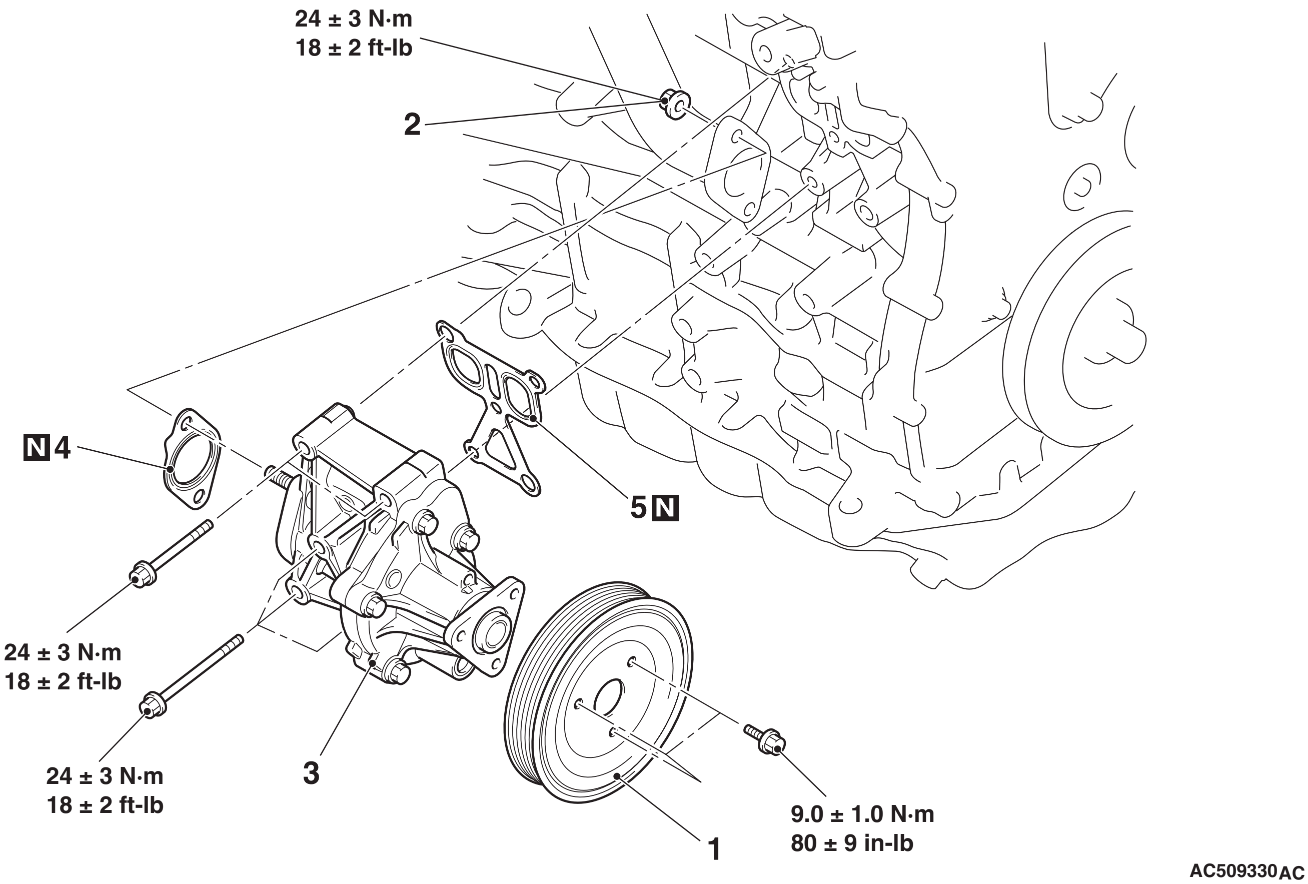
   Amount of valve lift: 8.5 mm (0.33 inch) or more

WATER PUMP

REMOVAL AND INSTALLATION

M1141002701338

Pre-removal operation	Post-installation operation
• Engine Coolant Draining (Refer to P.14-13). • Drive Belt Removal (Refer to GROUP 11A –Crankshaft Pulley P.11A-19.)	• Drive Belt Installation (Refer to GROUP 11A –Crankshaft Pulley P.11A-19.) • Drive Belt Tension Check (Refer to GROUP 11A –Engine Adjustment, Drive Belt Tension Check and Adjustment P.11A-9.) • Engine Coolant Refilling (Refer to P.14-13).



Removal steps

1. Water pump pulley
2. Water pump inlet pipe mounting nuts

Removal steps (Continued)

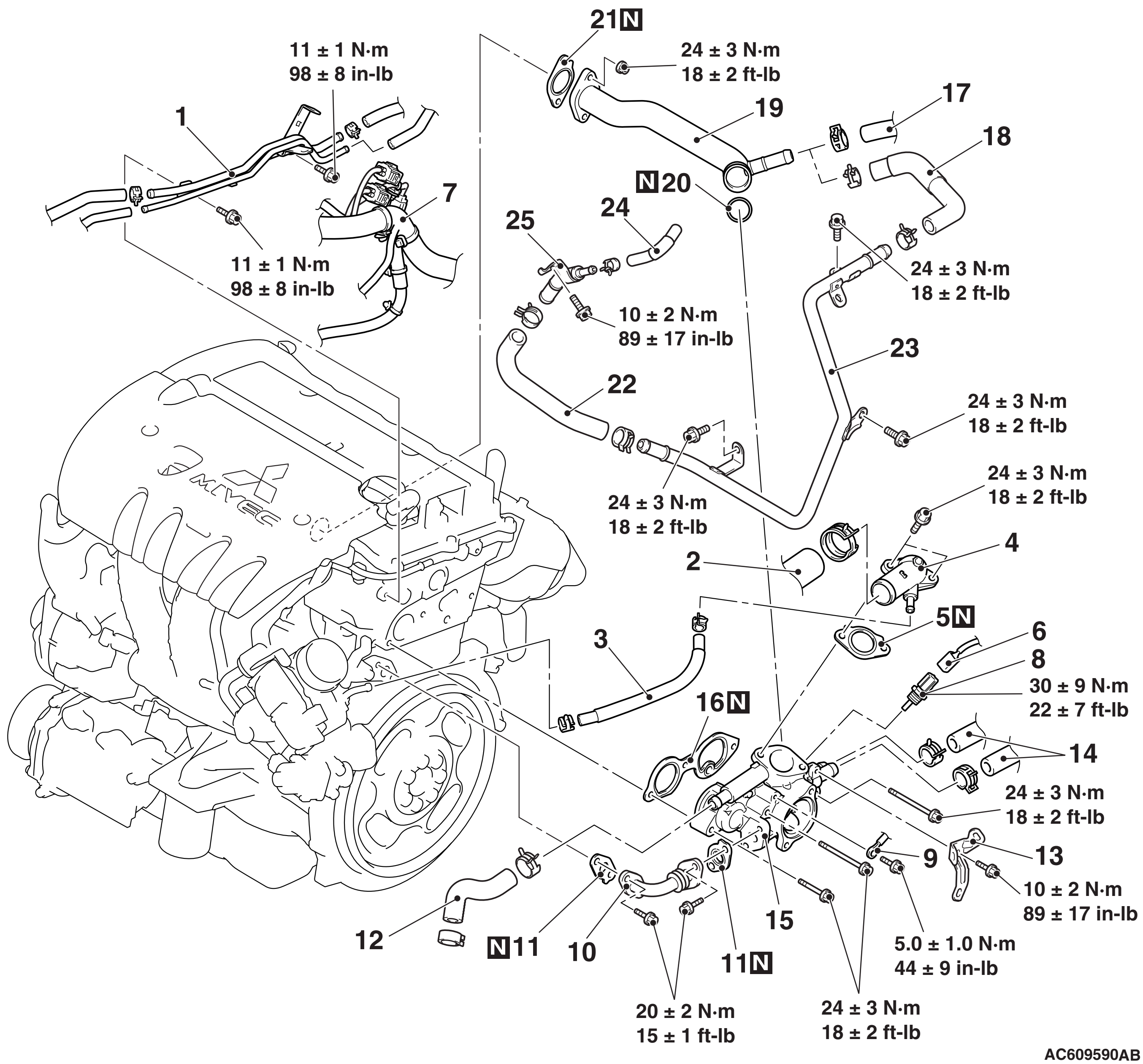
3. Water pump
4. Cooling water line gasket
5. Water pump gasket

WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION

M1141003301496

Pre-removal operation	Post-installation operation
• Engine Coolant Draining (Refer to P.14-13). • Engine Cover Removal (Refer to GROUP 11A –Camshaft P.11A-22). • Air Cleaner Assembly Removal (Refer to GROUP 15 –Air Cleaner P.15-4.) • Thermostat Removal (Refer to P.14-18.)	• Thermostat Installation (Refer to P.14-18.) • Air Cleaner Assembly Installation (Refer to GROUP 15 –Air Cleaner P.15-4.) • Engine Cover Installation (Refer to GROUP 11A –Camshaft P.11A-22.) • Engine Coolant Refilling (Refer to P.14-13).



Removal steps

1. Vacuum pipe assembly
2. <<A>> >>C<< Radiator upper hose
3. Throttle body water feed hose
4. Cooling water outlet hose fitting
5. Cooling water outlet hose fitting gasket

Removal steps (Continued)

6. Engine coolant temperature sensor connector
7. Control wiring harness connection
8. <<B>> >>B<< Engine coolant temperature sensor

Removal steps (Continued)

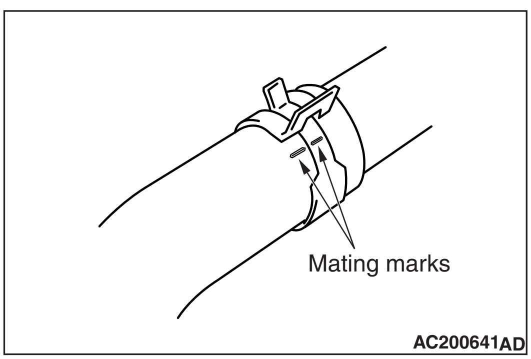
9. Ground cable connection
10. EGR valve pipe <vehicles for California>
11. EGR pipe gasket <vehicles for California>
12. Cooling water line hose <vehicles for California>
13. Wiring harness bracket
14. Heater hose connection
15. Thermostat case
16. Thermostat case gasket
17. Transmission oil cooler line hose connection <CVT>
18. Cooling water line hose <M/T>
19. Water pump inlet pipe
20. >>A<< O-ring
21. Cooling water line gasket
22. Cooling water line hose <M/T>
23. Cooling water line pipe <M/T>
24. Throttle body water return hose <vehicles for Federal –M/T>
25. Cooling water line pipe <vehicles for Federal –M/T>

Required Special Tool:

- MB992042: Water Temp Sensor Wrench

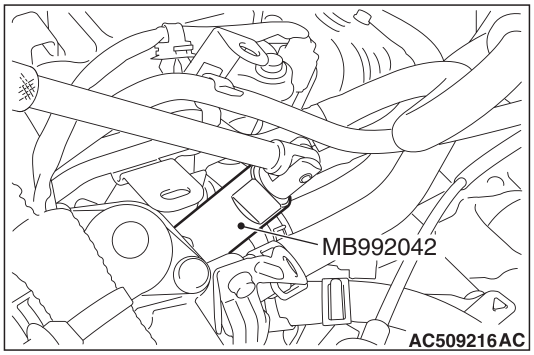
REMOVAL SERVICE POINTS

<<A>> RADIATOR UPPER HOSE DISCONNECTION



Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

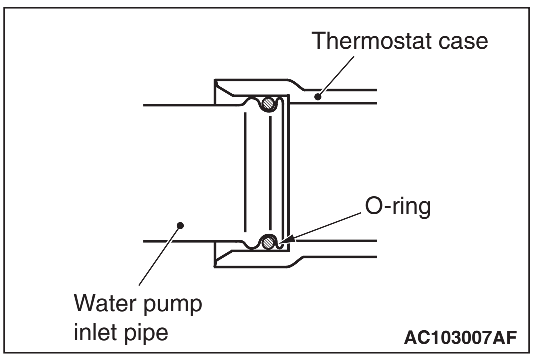
<<B>> ENGINE COOLANT TEMPERATURE SENSOR REMOVAL



Use special tool MB992042 to remove the engine coolant temperature sensor.

INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

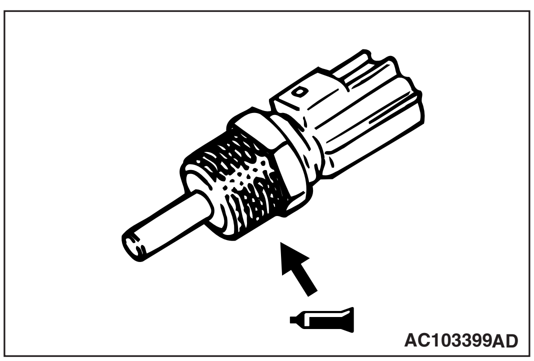


⚠ CAUTION

Avoid adhesion of engine oil or grease to the O-ring.

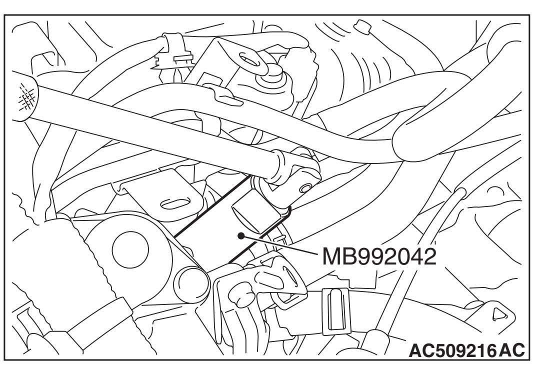
Fit the O-ring in the water pump inlet pipe groove, wet the O-ring circumference or the pipe mounting area inner wall, and then insert the O-ring.

>>B<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION



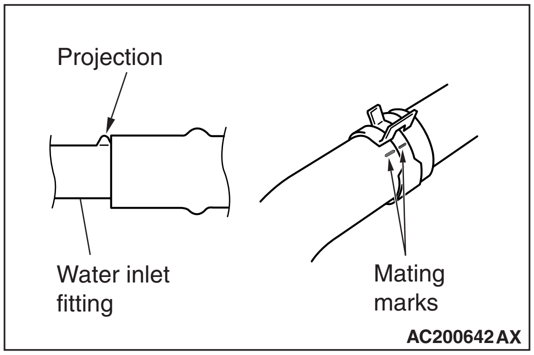
1. Apply sealant to the engine coolant temperature sensor thread.

   Specified sealant: LOCTITE 262 or equivalent



2. Use special tool MB992042 to tighten the engine coolant temperature sensor to the specified torque.

   Tightening torque: 30 ± 9 N· m (22 ± 7 ft-lb)



>>C<< RADIATOR UPPER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

INSPECTION

M1141003400542

Water Pipe and Hose Check

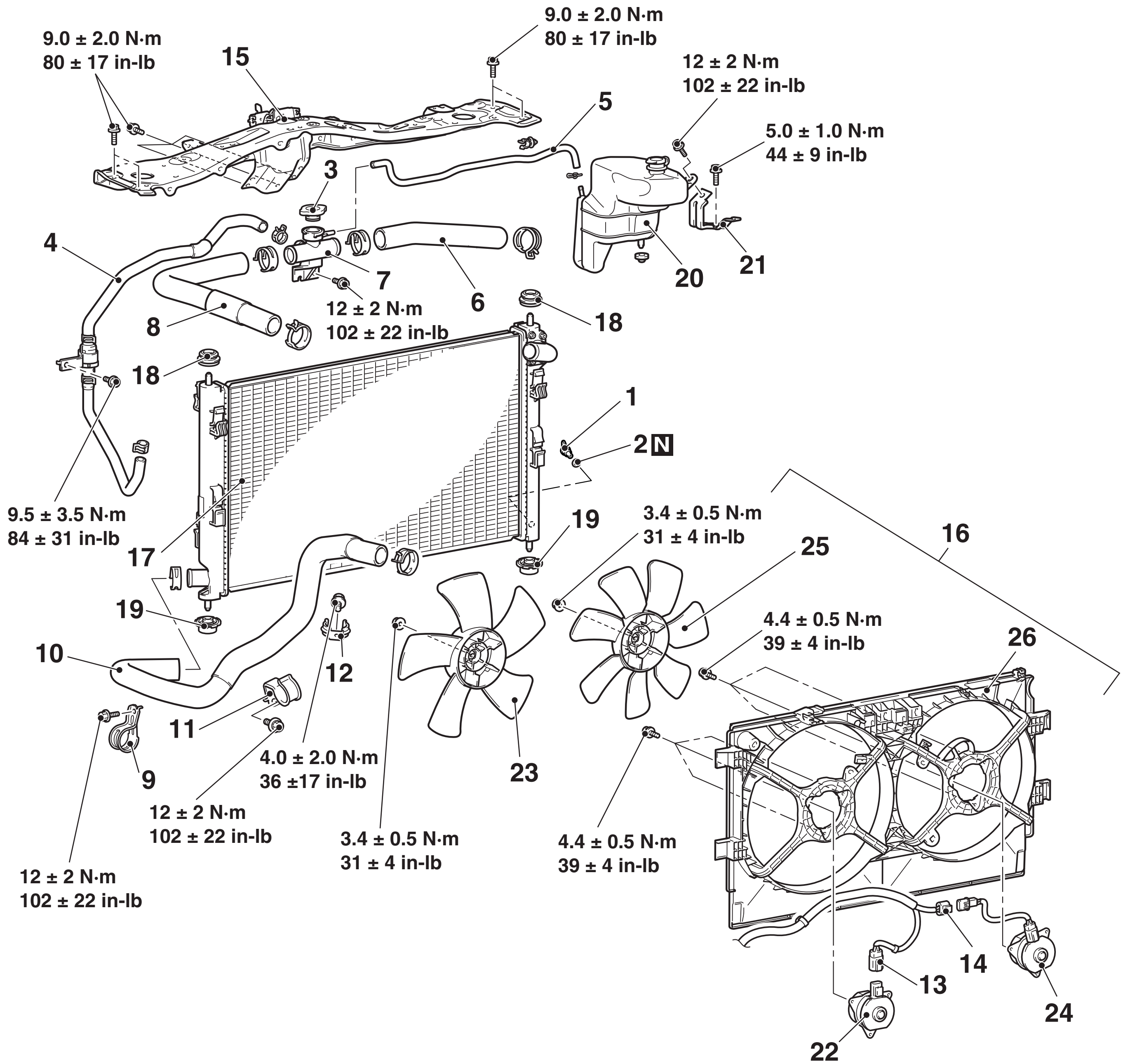
Check the water pipe and hose for cracks, damage and clogs. Replace them if necessary.

RADIATOR

REMOVAL AND INSTALLATION

M1141001501654

Pre-removal operation	Post-installation operation
• Engine Room Under Cover Front A Removal (Refer to GROUP 51 –Under Cover P.51-16). • Engine coolant Draining (Refer to P.14-13). • Air Cleaner Removal (Refer to GROUP 15 - Air Cleaner P.15-4).	• Air Cleaner Installation (Refer to GROUP 15 - Air Cleaner P.15-4). • Engine coolant Refilling and Check (Refer to P.14-13). • Engine Room Under Cover Front A Installation (Refer to GROUP 51 –Under Cover P.51-16).



AC608449AB

Radiator removal steps

1. Radiator drain plug
2. O-ring
3. Radiator cap
4. Transmission fluid cooler line hose assembly <CVT>

Radiator removal steps

5. Radiator condenser tank hose
6. <<A>> >>A<< Radiator upper hose
7. Radiator cap assembly
8. <<A>> >>A<< Radiator upper hose
9. Radiator hose clamp

Radiator removal steps

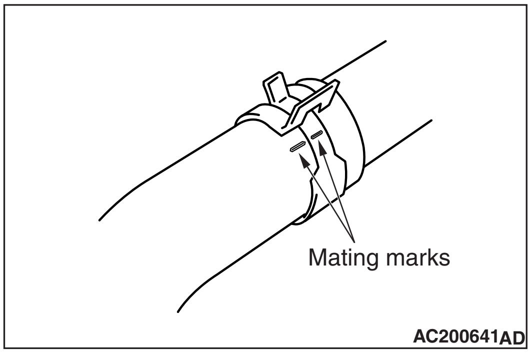
<<A>> >>A<< 10. Radiator lower hose
11. Radiator hose bracket <M/T>
12. Radiator hose support <CVT>
13. Radiator fan motor connector
14. Condenser fan motor connector
- Headlamp support panel cover (Refer to GROUP 51 –Front Bumper Assembly and Radiator Grille P.51-3).
- Hood lock release cable, hood switch (Refer to GROUP 42 –Hood P.42A-7).
- Front impact sensor (Refer to GROUP 52B –Front Impact Sensors P.52B-361).

15. Front end upper bar assembly
16. Fan, fan motor and fan shroud assembly
17. Radiator assembly
18. Support upper insulator
19. Support lower insulator
20. Radiator condenser tank
21. Radiator condenser tank bracket

Fan shroud removal steps

5. Radiator condenser tank hose
7. Radiator cap assembly
13. Radiator fan motor connector
14. Condenser fan motor connector
- Headlamp support panel cover (Refer to GROUP 51 –Front Bumper Assembly and Radiator Grille P.51-3).
- Hood lock release cable, hood switch (Refer to GROUP 42 –Hood P.42A-7).

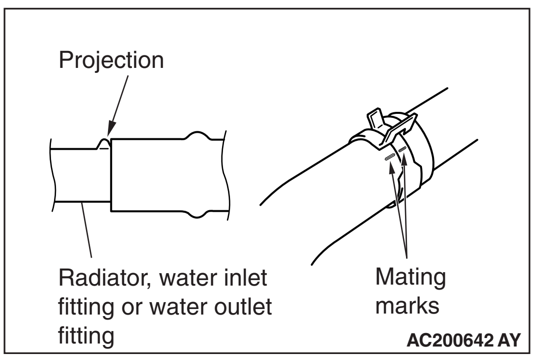
15. Front end upper bar assembly
16. Fan, fan motor and fan shroud assembly
22. Radiator fan motor
23. Fan
24. Condenser fan motor
25. Fan
26. Fan shroud



REMOVAL SERVICE POINT

<<A>> RADIATOR UPPER HOSE/RADIATOR LOWER HOSE REMOVAL

Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.



INSTALLATION SERVICE POINT

>>A<< RADIATOR LOWER HOSE/RADIATOR UPPER HOSE INSTALLATION

1. Insert each hose as far as the projection of the water inlet fitting, water outlet fitting or radiator.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

GROUP 52B

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

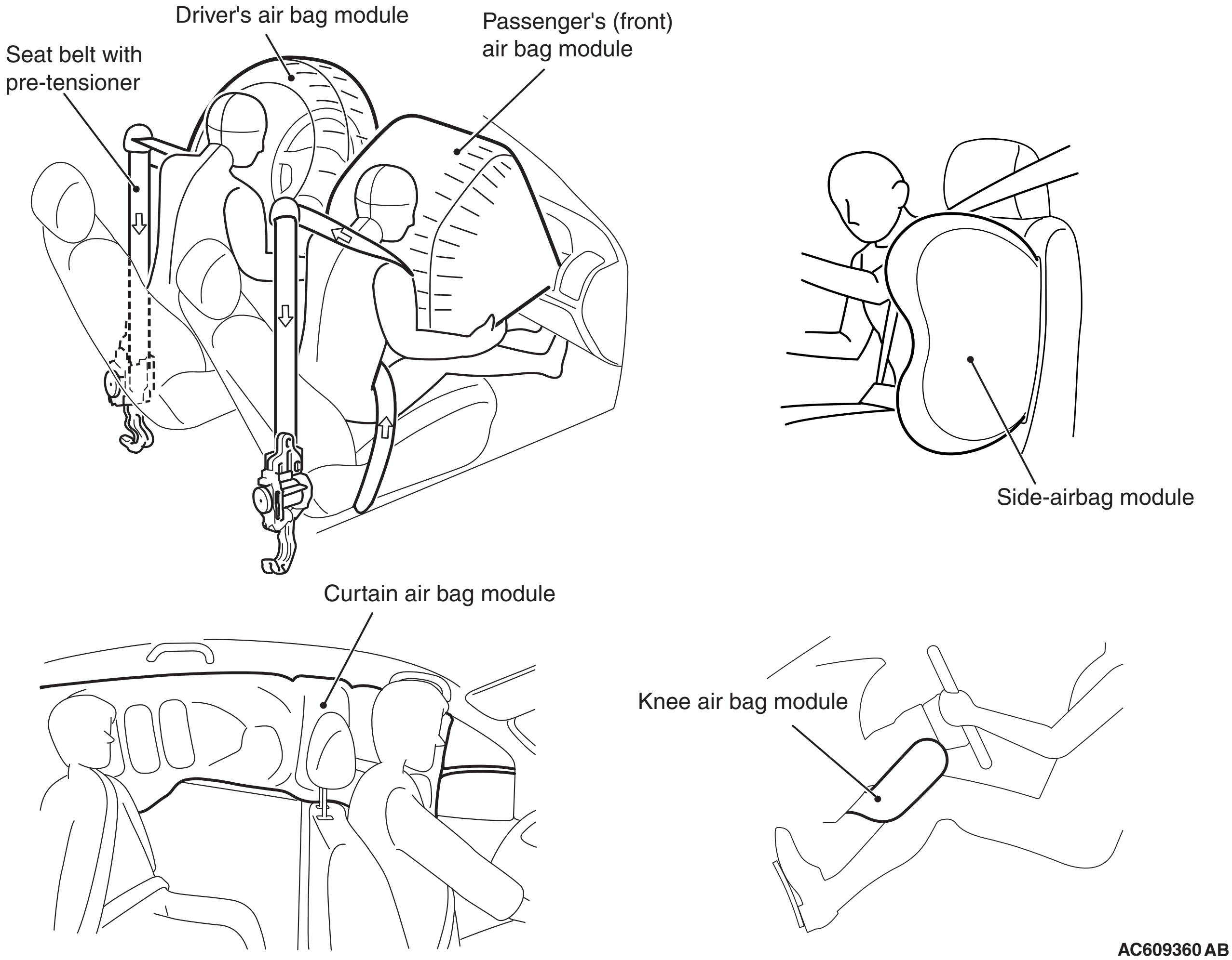
CONTENTS

GENERAL INFORMATION

M2521000100994

⚠ **CAUTION**

- **Driver and passenger's (front) air bags, knee air bag and seat belt pre-tensioner deploy and operate in frontal collisions that exceed the threshold to activate the SRS (Supplemental Restraint System).**
- **The front air bag deploys when a vehicle collides head-on with a concrete (fixed) wall at approximately 25 km/h (15 mph) or more, or when a vehicle suffers a severe impact from the front side.The side air bag deploys when a center of side body suffers a severe impact.**
- **The front air bags and pre-tensioner may not work under the following conditions:**
  - **A frontal collision is less than the specific value.**
  - **The collision is from the rear**
  - **The collision is from the side**
  - **The vehicle rolls over or is in a similar position.**
- **The side-airbags and curtain air bags may not work under the following conditions:**
  - **The collision is from the front**
  - **The collision is from the rear**
- Driver's and passenger's (front) air bags, side-airbags, knee air bag, curtain air bags and seat belts with pre-tensioner have been installed to all the vehicles as standard.
- The SRS is a system that is effective with the seat belt fastened, and it is designed as a supplemental system of the seat belt.
- The advanced air bag system has been adopted to the driver's and passenger's (front) sides. When a frontal impact exceeds the threshold upon a frontal collision, or depending on the seat position (driver's seat side), the air bag inflates the cushion air bag in two stages, improving the protection for the front seat passengers.
- When a frontal impact exceeds the threshold, the knee air bag is instantaneously inflated to protect the passenger's feet (knee and leg).
- The side-airbag is activated when an impact exceeds the threshold upon a side collision, and the cushion air bag is instantaneously inflated to protect the chest area of the front seat passengers.
- The curtain air bag is activated simultaneously with the side-airbag upon a side collision to protect the heads of the front seat and second seat passengers.
- All the air bag modules are equipped with the inflator that does not contain toxic sodium azide.
- The seat belt pre-tensioner is activated simultaneously with the deployment of driver's and passenger's (front) air bags in case of a frontal collision. Seat belts are pulled in to eliminate the slack upon a collision, thus improving the initial occupant restraint, and reducing the travel distance of the occupants. For the driver's seat, in addition to the seat belt pre-tensioner for the shoulder side, the lap pre-tensioner has been installed on the outer seat belt lower anchor side in order to improve the restraining performance in the waist and the chest areas.

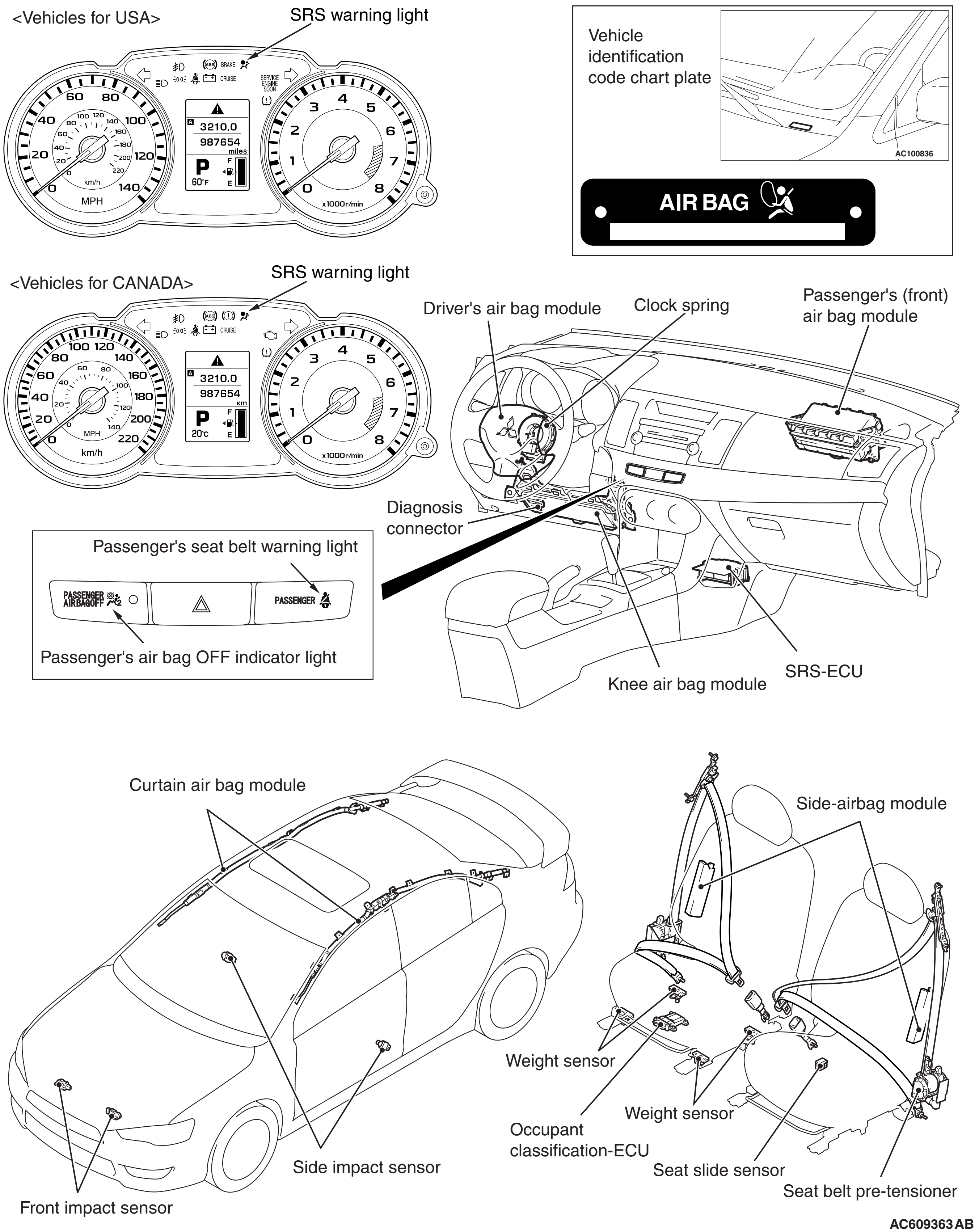


System Component Parts

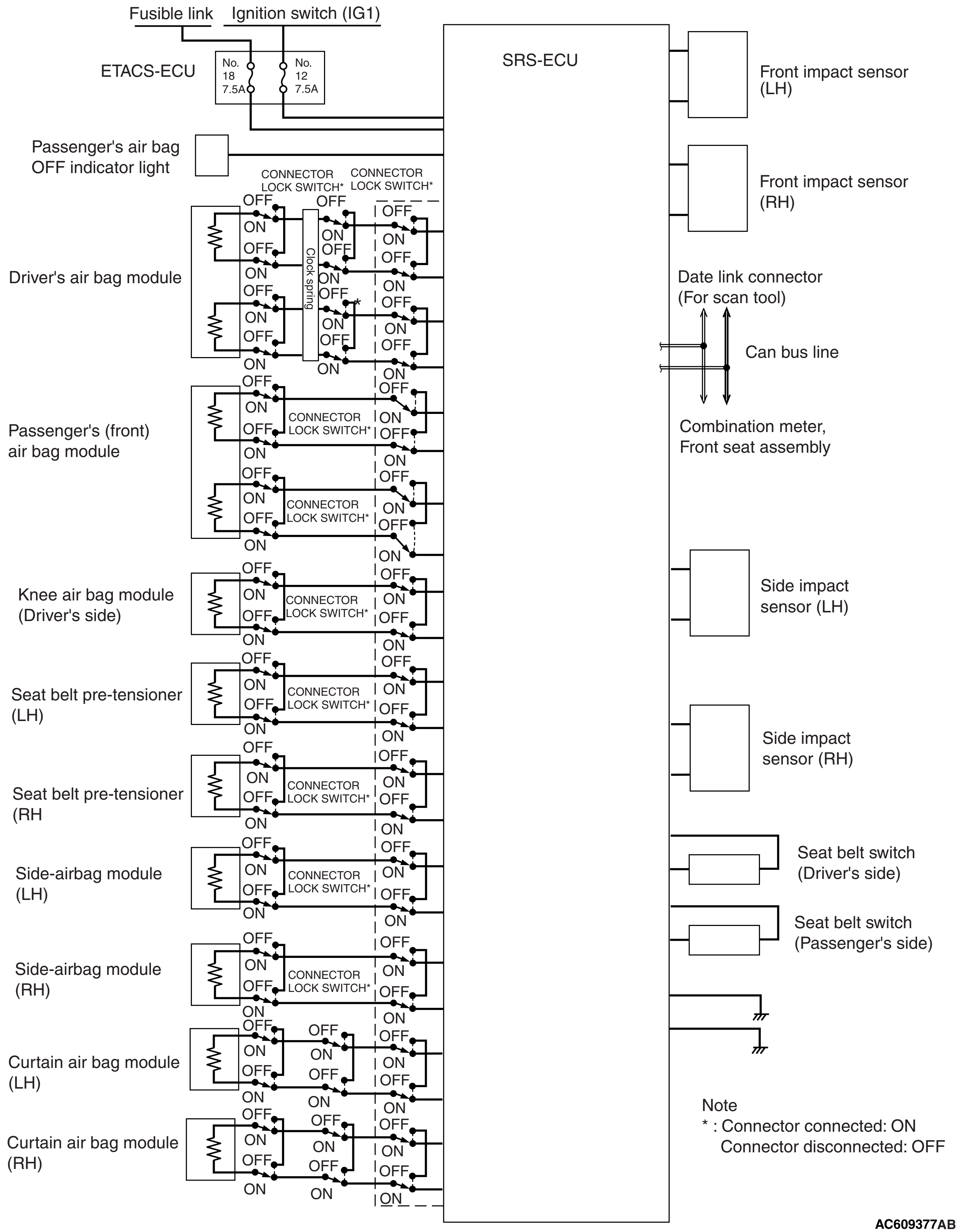
The SRS consists of driver’s and passenger’s (front) air bag modules, knee air bag modules, side-airbag modules, curtain air bag modules, SRS-ECU (air bag control unit), front impact sensors, side impact sensors, SRS warning light, passenger’s air bag OFF indicator light, passenger’s seat belt warning light, clock spring, seat belt pre-tensioner, seat belt switch, seat slide sensor, occupant classification-ECU and weight sensor. Driver’s and passenger’s (front) air bag modules are located in the center of the steering wheel and above the glove box. The knee air bag module has been installed to the instrument panel lower section under the steering column.Side-airbags are located inside the front seatback frame. The curtain air bag module has been installed onto the roof side section (from front pillar and back end of rear pillar).Each air bag consists of a folded air bag and an inflator unit. On all air bag modules, the inflator does not contain sodium azide. The SRS-ECU placed on the forefront of the floor monitors the system and has a front air bag safing G-sensor, front air bag analog G-sensor and a side-airbag safing G-sensor. The front impact sensor is assembled in the front end upper bar to monitor impact in case of front impact. The side impact sensors inside the center pillars monitor the shock incurred by the sides of the vehicle. The SRS warning light on the combination meter indicates the operational status of the SRS. The clock spring is installed in the steering column. The seat belt pre-tensioner is built into the driver's and passenger's front seat belt retractor. The seat slide sensor is installed at the seat adjuster section of the driver seat in order to detect the driver seat slide position. The weight sensor is installed underneath a rail of the passenger seat to detect the load on the seat. The occupant classification-ECU mounted under the front passenger's seat determines the occupant class according to the signals from the weight sensors and sends signals to SRS-ECU.The passenger’s air bag OFF indicator light is installed to the lower left of the center panel, and illuminates when the passenger’s (front) air bag is inactive. The passenger’s seat belt warning light is installed to the lower right of the center panel, and illuminates when the passenger is not wearing the seat belt. The seat belt switch detects whether the seat belt is used.

The SRS-ECU will start a squib ignition current to the driver's/passenger’s (front) air bag module, knee air bag module and seat belt pre-tensioner when simultaneously detecting frontal impact with the front impact sensor, front air bag safing G-sensor and front air bag analog G-sensor. It will also supply a squib ignition current to the side-airbag module and curtain air bag module when simultaneously detecting side impact with the side impact sensor and side-airbag safing G-sensor.

CONSTRUCTION DIAGRAM

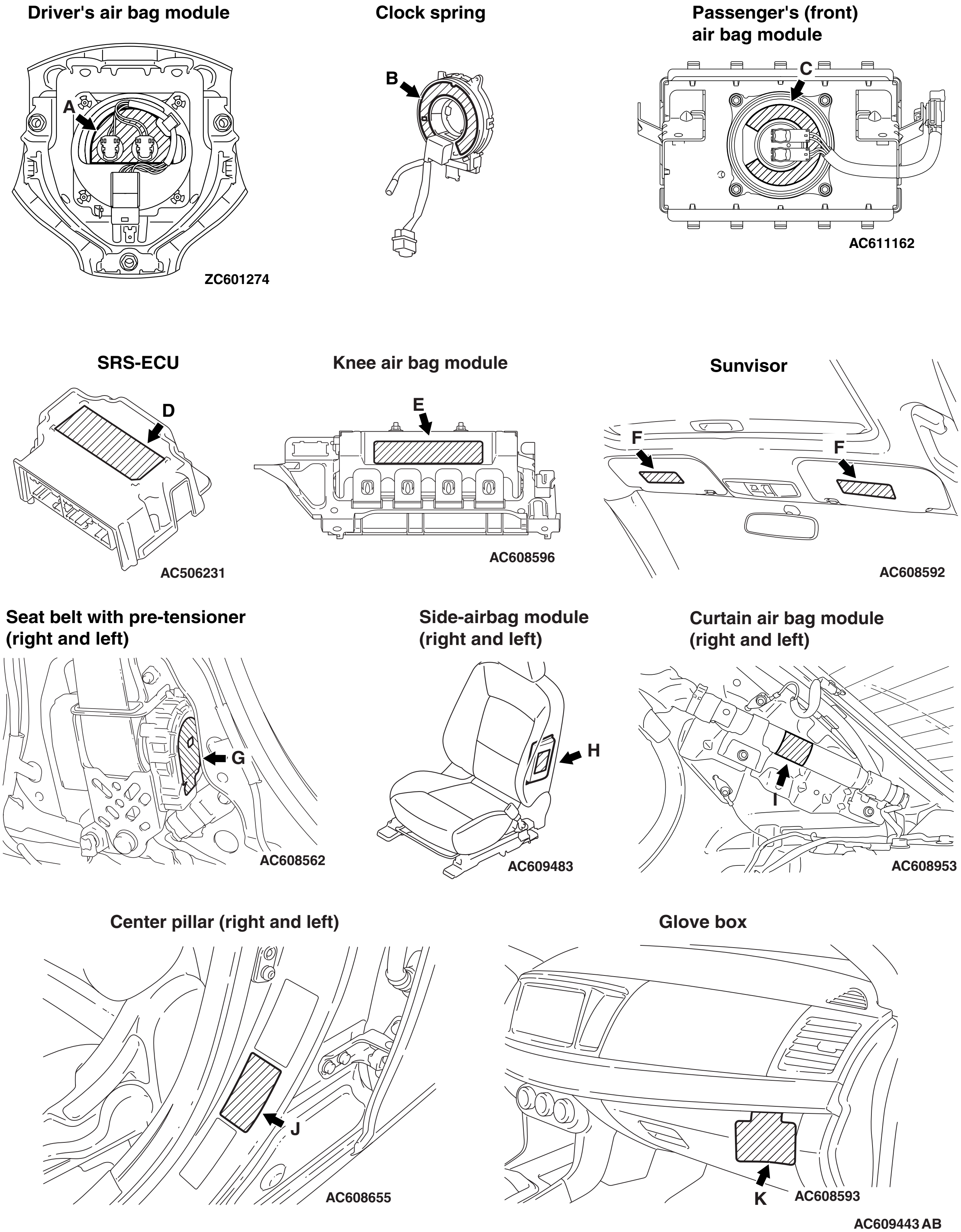


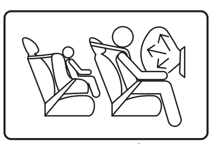
SRS SYSTEM CIRCUIT DIAGRAM



CAUTION LABELS

The labels indicating the precautions for handling and maintenance of SRS air bags and seat belt with pre-tensioner are adhered to the locations shown in the above figures.



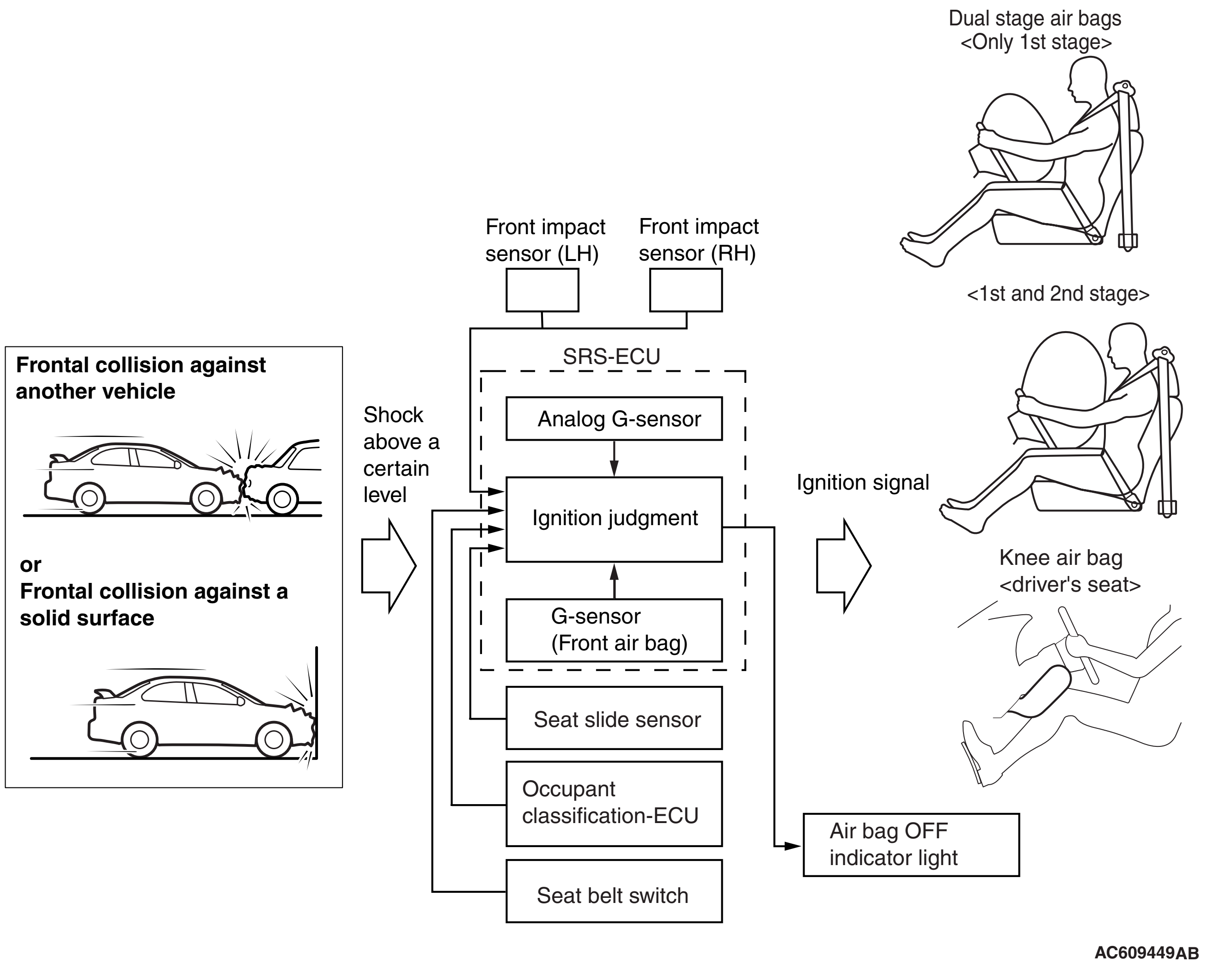
Label contents	
A, C	DANGER FLAMMABLE EXPLOSIVE DO NOT: DISASSEMBLE; HEAT; INCINERATE; APPLY ELECTRICITY; OR STORE AT HIGH TEMPERATURE (93° C or HIGHER). REFER TO WORKSHOP MANUAL FOR DETAILS.
B	CAUTION: SRS CLOCK SPRING PLEASE DO NOT TURN EXCEPT WHEN REQUIRED. THIS IS NOT A REPAIRABLE PART. IF DEFECTIVE, PLEASE REPLACE ENTIRE UNIT ACCORDING TO THE SERVICE MANUAL INSTRUCTIONS. ALIGNMENT OF MODULES IS NECESSARILY WHEN THEY ARE ADJUSTED AND/OR INSTALLED FOR THE ALIGNMENT PROCEDURES, FOLLOW THE SERVICE MANUAL INSTRUCTIONS.
D	CAUTION: DO NOT DISASSEMBLE OR DROP. IF DEFECTIVE, REFER TO SERVICE MANUAL.
E	DANGER FLAMMABLE EXPLOSIVE SRS AIR BAG MODULE • Do not disassemble or shock. • Do not heat or incinerate. • Do not contact with electricity or tester probes. • Do not test or diagnose. • Do not store in more than 200° F (93° C). • Store the air bag cover is top. • For information on handing, replacement, and disposal methods, refer to the service manual.
F <EXCEPT CANADA>  AC306673	WARNING EVEN WITH ADVANCED AIR BAGS • Children can be killed or seriously injured by the air bag • The back seat is the safest place for children • Never put a rear-facing child seat in the front • Always use seat belts and child restraints • See owner’s manual for more information about air bags
F <CANADA>  V0037AA	WARNING DEATH or SERIOUS INJURY can occur • Children 12 and under can be killed by the air bag. • The BACK SEAT is the SAFEST place for children. • NEVER put a rear-facing child seat in the front. • Sit as far back as possible from the air bag. • ALWAYS use SEAT BELTS and CHILD RESTRAINTS.
G	SEAT BELT PRETENSIONER CAUTION THIS ASSEMBLY CONTAINS AN EXPLOSIVE INITIATOR. DANGER FLAMMABLE MATERIAL TO PREVENT PERSONAL INJURY • DO NOT REMOVE. INSTALL IT INTO ANOTHER VEHICLE. • SERVICE OR DISPOSE OF IT AS DIRECTED IN THE REPAIR MANUAL. • DO NOT DISMANTLE INCINERATE OR BRING INTO CONTACT WITH ELECTRICITY.

Label contents	
H	WARNING SRS AIR BAG MODULE FLAMMABLE/EXPLOSIVE TO AVOID SERIOUS INJURY: • DO NOT REPAIR, DISASSEMBLE OR TAMPER. • AVOID CONTACT WITH FLAME OR ELECTRICITY. • DO NO DIAGNOSIS/USE NO TEST EQPT OR PROBES. • STORE BELOW 200° F (93° C). • BEFORE DOING ANY WORK INVOLVING MODULE, READ SERVICE MANUAL FOR IMPORTANT FURTHER DATA.
I	DANGER CONTAINS HIGH-PRESSURE GAS AND FLAMMABLE MATERIAL To avoid injury, NEVER; [Repair, Disassembly, Incinerate, Bring into contact with electricity, Install onto another vehicle or Store where the temperature is above 93° C (200° F)] -See Repair Manual for details.-
J	SRS SIDE AIRBAG WARNING TO AVOID SERIOUS INJURY OR DEATH: • Do not lean against the door. • Do not use seat covers. See owner’s manual for more information
K <EXCEPT CANADA>	This Vehicle is Equipped with Advanced Air Bags Even with Advanced Air Bags Children can be killed or seriously injured by the air bag. The back seat is the safest place for children. Never put a rear-facing child seat in the front. Always use seat belts and child restraints. See owner’s manual for more information about air bags. Not to be removed except by owner.
K <CANADA>	WARNING MISE EN GARDE Children Can Be KILLED or INJURED by Passenger Air Bag The back seat is the safest place for children 12 and under. Make sure all children use seat belts or child seats. Not to be removed except by owner.

SYSTEM OPERATION

ADVANCED AIR BAG AND SEAT BELT WITH PRE-TENSIONER

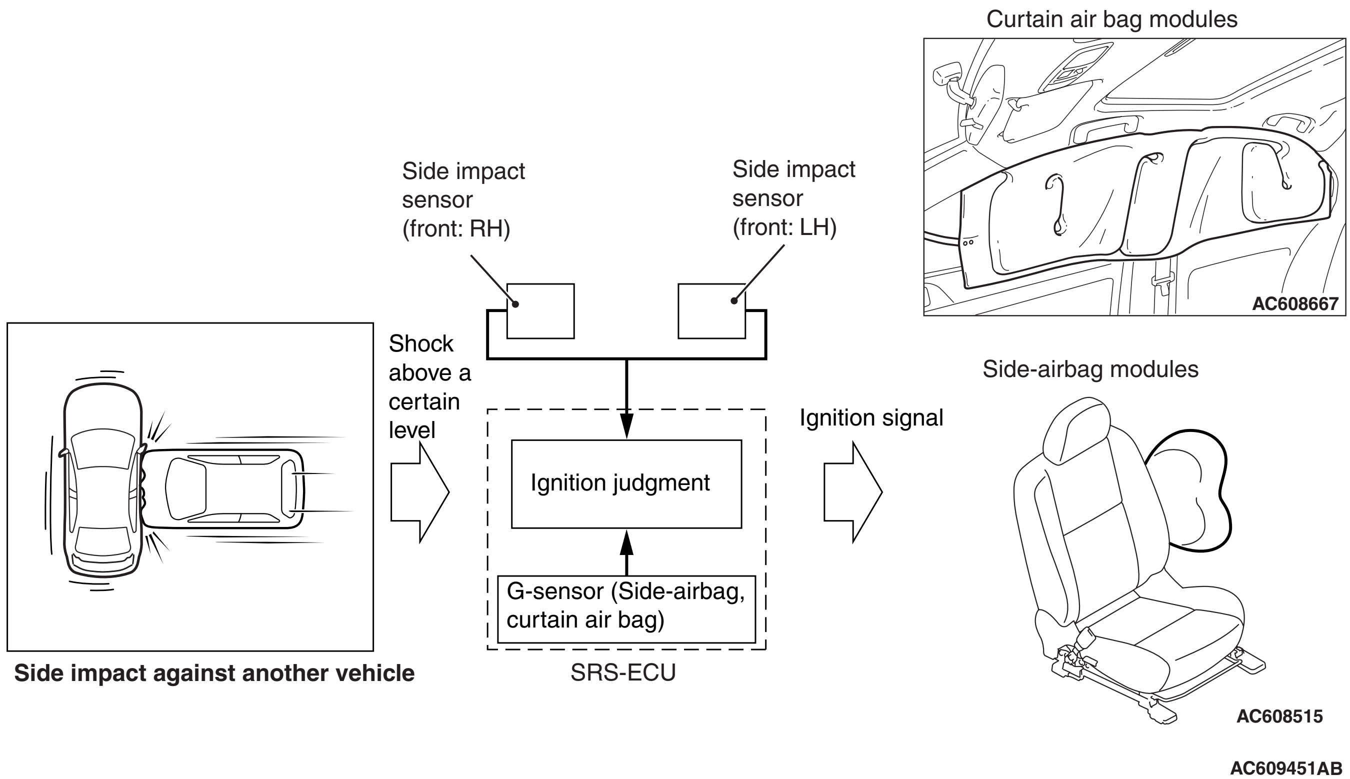
M2521000700349



- In case of a frontal collision, when the front impact sensor inside the engine room and the G-sensor inside SRS-ECU simultaneously detect an impact that exceeds a certain threshold (turned ON), SRS-ECU energizes the driver's and passenger's (front) air bag modules (squibs), knee air bag module (squib) and driver's and passenger's seat belt pre-tensioners (squibs), thus deploying the air bags and triggering the seat belt pre-tensioners. Also, the advanced air bag has been adopted to optimize the air bag deployment control by adjusting the inflation pressure.
- The seat slide sensor to detect the driver's seat position judges the deployment in two stages, and deploys the driver's air bag.
- The occupant classification-ECU has been added to recognize the passenger's seat occupant. The occupant classification-ECU identifies the occupant class based on the signals from weight sensors, and sends the signal to SRS-ECU.

SIDE AND CURTAIN AIR BAGS

M2521000800250

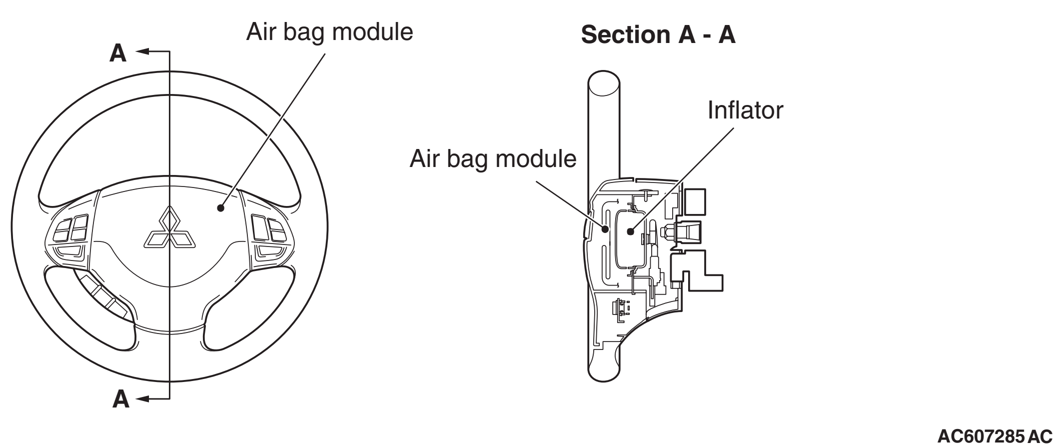


SRS-ECU uses data of the side impact sensor and G-sensor (in SRS-ECU) to calculate collision severity, during side collision. SRS-ECU judges necessity of side-airbag and curtain air bag based on the calculated collision severity.

SYSTEM CONSTRUCTION

DRIVER'S SIDE AIR BAG MODULE

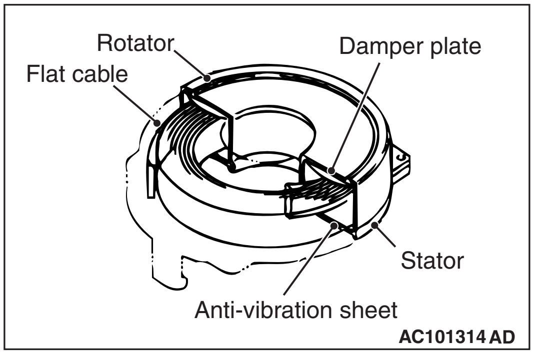
M2521002000432



The driver’s air bag module incorporates a three-spoke steering wheel. The driver’s air bag module is an assembly part consisting of an air bag, inflator, and their fasteners. The air bag is made from nylon and inflates by gas from the inflator. As a driver is being pressed to the air bag, it deflates discharging gas from two vents at the rear of the air bag to reduce the shock from the impact. The driver's air bag deploys by changing its inflation pressure in two steps. The inflator has two squib connectors to deploy the air bag in two steps. The inflator does not contain sodium azide.

CLOCK SPRING

M2521001100072

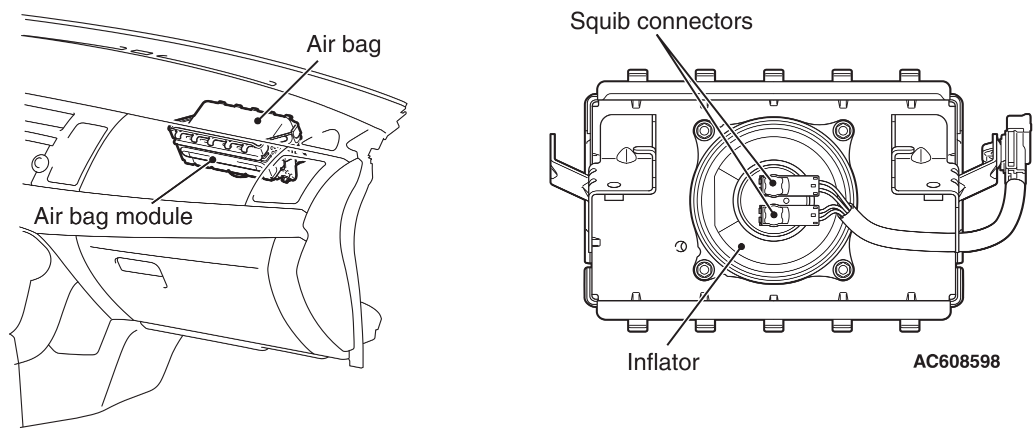


The clock spring consists of a flat cable, rotator, stator, etc. The flat cable is loosely wound in the case in coil-form. One end is attached to the rotator and the other end is attached to the stator. By turning the steering wheel, the clock spring rotator turns along with the steering shaft. The flat cable is wound or unwound by the rotator according to how the steering wheel turns. It must be in the neutral position when assembling the clock spring.

NOTE: For the clock spring centering procedures, refer to the SERVICE MANUAL.

PASSENGER'S (FRONT) AIR BAG MODULE

M2521002100116



AC609452 AB

The passenger’s (front) air bag module consists of an air bag, and their fasteners.

The air bag is made from nylon and inflates by the gas from the inflator. As a passenger is being pressed to the air bag, it deflates, discharging gas from two vents at the side of the air bag to reduce the shock from the impact.

The front passenger’s air bag deploys by changing its inflation pressure in two steps.

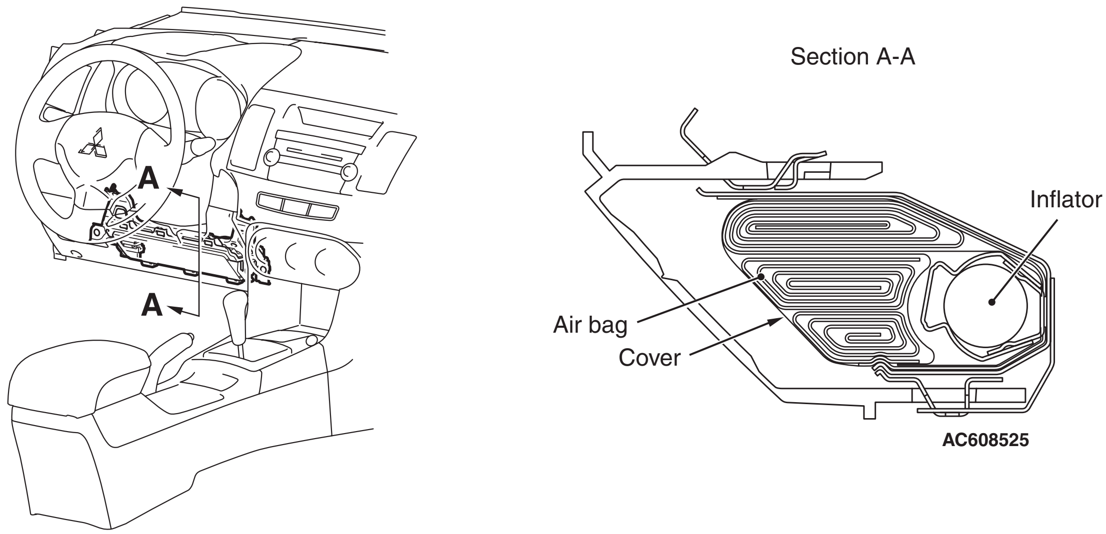
The inflator has two squib connector to deploy the air bag in two steps.

The front passenger air bag does not deploy at the front passenger seat is not occupied and when the occupant classification sensor in the front passenger seat senses a weight on the seat of less than 66 pounds (30 kg).

An inflator that does not contain sodium azide is used.

KNEE AIR BAG MODULE

M2521002600014



AC609476AB

The knee air bag consists of the air bag, inflator, and fixing gear relating to those parts, and is installed onto the instrument panel lower under the steering column.

At the frontal collision, the knee air bag deploys by the gas generated from the inflator to protect passenger's feet (knee and leg). Like the air bags for frontal collision, the side air bags are made of nylon whose inside is rubber-coated, and is folded up and housed in a cover. Gas exhaust openings are provided at the sewed sections of the air bags to reduce the impacts on the passenger's feet at deployment.
An inflator that does not contain sodium aziae is used.

SIDE-AIRBAG MODULE

M2521004000290

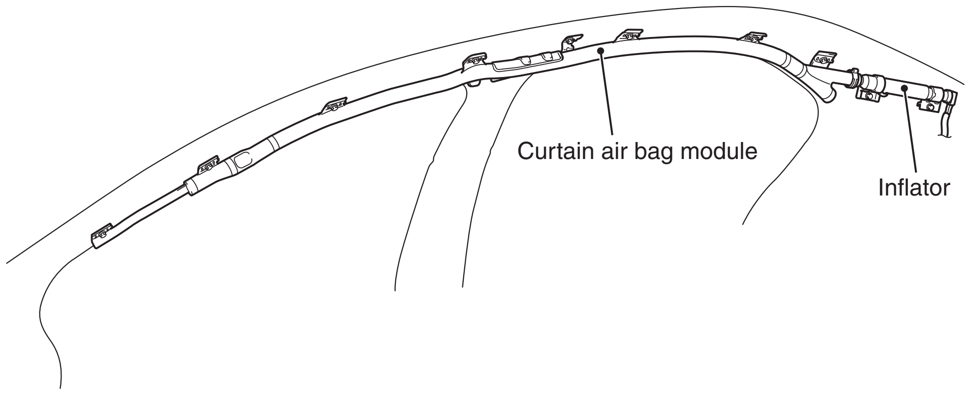
AC609459AB

The side-airbag module consists of an air bag, air bag cover, inflator and their fasteners. The modules are installed in the outer side supports of the driver’s and front passenger’s seatbacks. The side-airbags help protect the occupants regardless of the seat position and seatback angle.

The side-airbag made of nylon fabric. The air bags are compactly folded and stored under the cover. On the side of the air bag, there are holes through which gas is partially released to alleviate shock to the occupant when the air bag is deployed. An inflator that does not contain sodium azide is used.

CURTAIN AIR BAG MODULE

M2521000500226



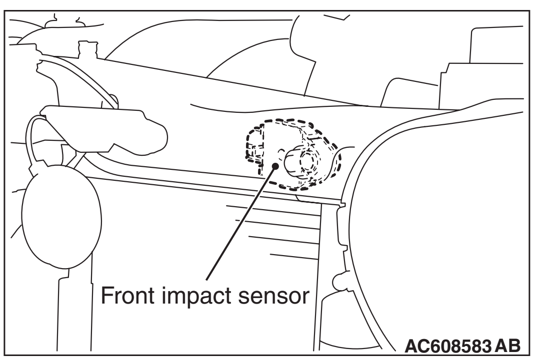
AC608585 AB

The curtain air bag module consists of an air bag, an inflator, and the fixing gear relating to those parts, and is installed in the roof side sections (from the driver's and the passenger's front pillars to the rear pillars).
The air bag is made from nylon with the inside coated with silicon, and housed in the roof side sections, folded up compactly.

The inflator is of a cold gas type filled with high-pressure gas (major component: Argon). When current passes through the squib to ignite the igniter powder, the burst disk bursts, emitting the gas into the air bag.

FRONT IMPACT SENSOR

M2521005000442

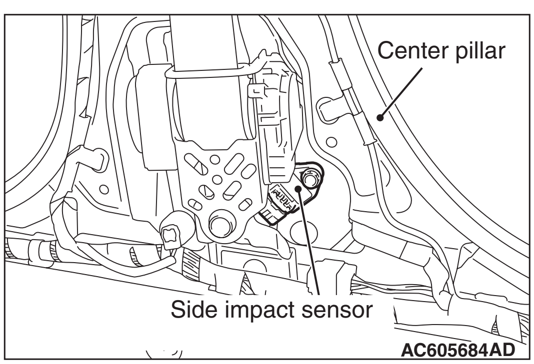


AC608583 AB

- The front impact sensor is installed on the front end upper in the engine room, and the analogue G-sensor is housed in the front impact sensor.
- The front impact sensor transmits the coded acceleration data to SRS-ECU. Based on the data, SRS-ECU determines the deployment stage of the front air bag, then energizes appropriate squib.
- SRS-ECU performs the diagnostics of the front impact sensor internal components. If a malfunction occurs, it sets the diagnostic trouble code.

SIDE IMPACT SENSOR

M2521006000371

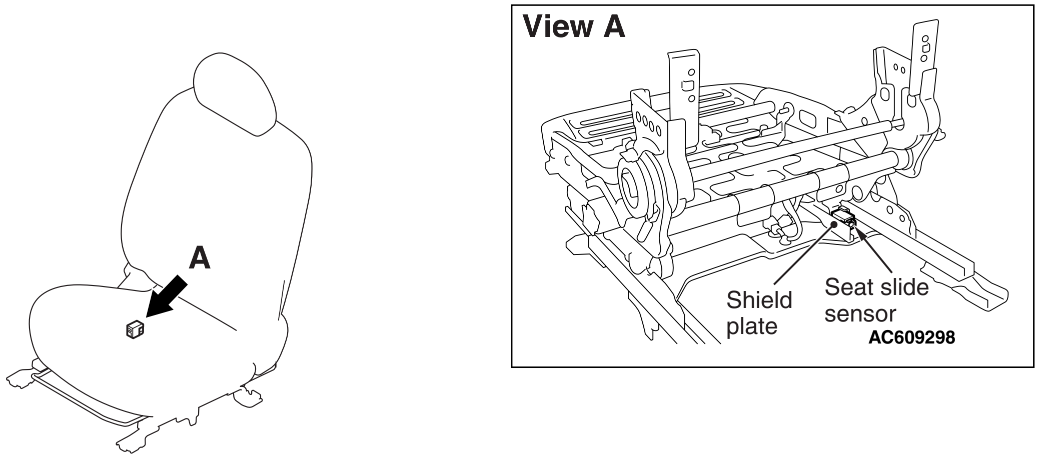


AC605684AD

- The side impact sensors are installed to the lower part of the center pillars on both sides and to the quarter panels on both sides, and the analogue G-sensor is housed in the side impact sensor.
- The side impact sensor transmits the coded acceleration data to SRS-ECU. Based on the data, SRS-ECU determines the deployment of the side-airbags and curtain air bags, then energizes appropriate squib(s).
- SRS-ECU performs the diagnostics of the side impact sensor internal components. If a malfunction occurs, it sets the diagnostic trouble code.

SEAT SLIDE SENSOR

M2521001400103



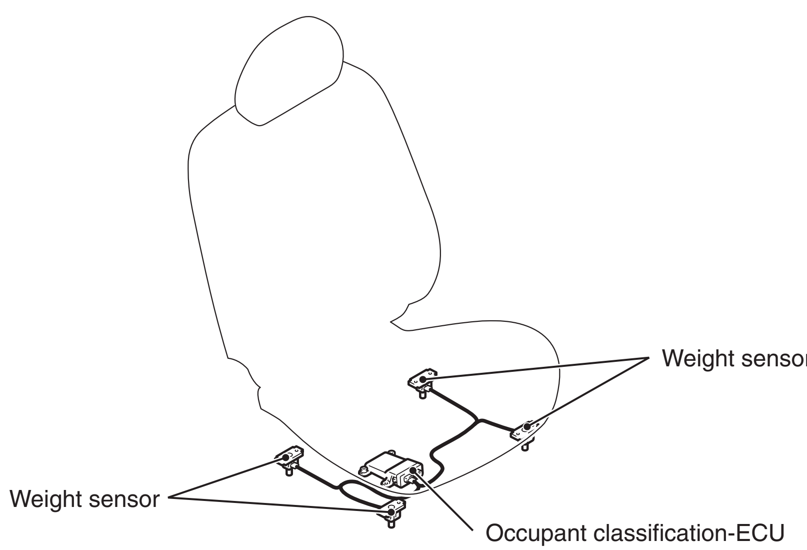
AC609466AB

- The seat slide sensor is attached to the slide adjuster on the driver's seat side, and the seat is moved forward/backward by seat sliding. When the seat is slid forward, the shield plate covers the sensor, and the sensor determines that the seat slide position is set forward.
- The seat slide sensor outputs the current by switching high output current and low output current from the seat slide position as shown in the figure. Based on the output current, SRS-ECU determines the deployment stage of the front air bag, and then energizes the squib.

Shield plate position	Current value	Deployment stage
When the shield plate is in the detection range of the seat slide sensor	Low output current	Only 1 stage
When the shield plate is not in the detection range of the seat slide sensor	High output current	1st and 2nd stage

OCCUPANT CLASSIFICATION-ECU AND WEIGHT SENSOR

M2521001300032



AC608516AB

The weight sensors are attached to the seat rails and provide SRS-ECU with information on the weight applied to the front passenger seat.

The occupant classification-ECU identifies the occupant class based on the signals from weight sensors, and sends the signal to SRS-ECU. When the occupant is determined to be less than 66 lbs (30 kg), the passenger's (front) air bag is not deployed.

DIAGNOSTIC TROUBLE CODE OUTPUT

The occupant classification-ECU diagnoses the following items and stores a diagnostic trouble code in the non-volatile memory (EEPROM*[1]) when a problem is detected. Therefore, the memory is not deleted after a battery terminal is disconnected, (The diagnostic trouble code memory can be deleted by the scan tool.)

Diagnostic trouble Code No.	Inspection item
B1B78	Passenger seat weight sensor (front) (LH) performance
B1B79	Passenger seat weight sensor (ground side) short-circuited (front) (LH)
B1B7A	Passenger seat weight sensor (power supply side) short-circuited (front) (LH)
B1B7D	Passenger seat weight sensor (front) (RH) performance
B1B7E	Passenger seat weight sensor (ground side) short-circuited (front) (RH)
B1B7F	Passenger seat weight sensor (power supply side) short-circuited (front) (RH)
B1B82	Passenger seat weight sensor (rear) (LH) performance
B1B83	Passenger seat weight sensor (ground side) short-circuited (rear) (LH)
B1B84	Passenger seat weight sensor (power supply side) short-circuited (rear) (LH)
B1B87	Passenger seat weight sensor (rear) (RH) performance
B1B88	Passenger seat weight sensor (ground side) short-circuited (rear) (RH)
B1B89	Passenger seat weight sensor (power supply side) short-circuited (rear) (RH)
B1B8C	Seat slide sensor circuit performance
B1B8D	Seat slide sensor open circuit
B1B8E	Seat slide sensor short circuit
B1B91	Driver seat slide sensor configuration mismatch
B1BA7	Occupant classification system verification required
B1BA8	Occupant classification-ECU out of calibration/Not calibrated
B1BBA	Passenger seat weight sensor supply circuit
B1BBC	Occupant classification system negative system weight
B1BBD	Occupant classification-ECU current configuration table unprogrammed
B1C23	Passenger seat weight sensor (front) (LH) configuration mismatch
B1C24	Passenger seat weight sensor (front) (RH) configuration mismatch
B1C25	Passenger seat weight sensor (rear) (LH) configuration mismatch
B1C26	Passenger seat weight sensor (rear) (RH) configuration mismatch
B1CB2	Occupant classification-ECU parameter table incompatible
B210D	Battery voltage low
B210E	Battery voltage high

Diagnostic trouble Code No.	Inspection item
B2206	Chassis number does not match
B2212	Occupant classification-ECU internal
B2250	Occupant classification-ECU not programmed/Flash required
B2262	Occupant classification-ECU electrostatic discharge event detected
U0020	CAN-B Bus off performance
U0021	CAN-B Bus(+) circuit open
U0022	CAN-B Bus(+) shorted to circuit ground
U0023	CAN-B Bus(+) shorted to circuit power supply
U0024	CAN-B Bus(-) circuit open
U0025	CAN-B Bus(-) shorted to circuit ground
U0026	CAN-B Bus(-) shorted to circuit power supply
U0141	ETACS CAN timeout
U0151	SRS-ECU CAN timeout
U0155	Combination meter CAN timeout
U0164	A/C-ECU CAN timeout
U0168	KOS-ECU or WCM CAN timeout
U0184	Audio CAN timeout
U0195	Satellite radio tuner CAN timeout
U0197	Hands free module CAN timeout
U0245	Audio visual navigation unit CAN timeout
U1419	The signal from a weight sensor (front) (LH) is unusual
U141A	The signal from a weight sensor (front) (RH) is unusual
U141B	The signal from a weight sensor (rear) (LH) is unusual
U141C	The signal from a weight sensor (rear) (RH) is unusual
U1423	The signal from a weight sensor is unusual

DATA LIST OUTPUT

The following items can be read by the scan tool from the occupant classification-ECU input data.

Item No.	Display on M.U.T.-III	Check conditions	Normal conditions
01	Passenger weight	Apply a load to the passenger seat.	−2,048 Kg (−4,515 lb) to 2,048 Kg (4,515 lb)
02	Dr seat position sensor current	Slide the seat the back-end to the front-position.	0 to 4,095.93 mA
03	Dr seat position sensor voltage	Slide the seat the back-end to the front-position.	0 to 5,000 mV
07	Dr seat position sensor status	Slide the seat the back-end to the front-position.	Not in Frontal Zone/In Frontal Zone/Undetermined
08	occupant classification status	Apply a load to the passenger seat.	Empty/PFIS/Child/More 5th%/Undermined
10	Battery voltage	Always	0 to 30 V

Item No.	Display on M.U.T.-III	Check conditions	Normal conditions
21	Pa seat weight sensor 1 RR	Apply a load to the passenger seat.	–2,048 Kg (–4,515 lb) to 2,048 Kg (4,515 lb)
22	Pa seat weight sensor 1 RR volt	Apply a load to the passenger seat.	0 to 5,000 mV
23	Pa seat weight sensor 2 RF	Apply a load to the passenger seat.	–2,048 Kg (–4,515 lb) to 2,048 Kg (4515 lb)
24	Pa seat weight sensor 2 RF volt	Apply a load to the passenger seat.	0 to 5,000 mV
25	Pa seat weight sensor 3 LF	Apply a load to the passenger seat.	–2,048 Kg (–4,515 lb) to 2,048 Kg (4,515 lb)
26	Pa seat weight sensor 3 LF volt	Apply a load to the passenger seat.	0 to 5,000 mV
27	Pa seat weight sensor 4 LR	Apply a load to the passenger seat.	–2,048 Kg (–4,515 lb) to 2,048 Kg (4,515 lb)
28	Pa seat weight sensor 4 LR volt	Apply a load to the passenger seat.	0 to 5,000 mV
30	VIN Information	Always	–

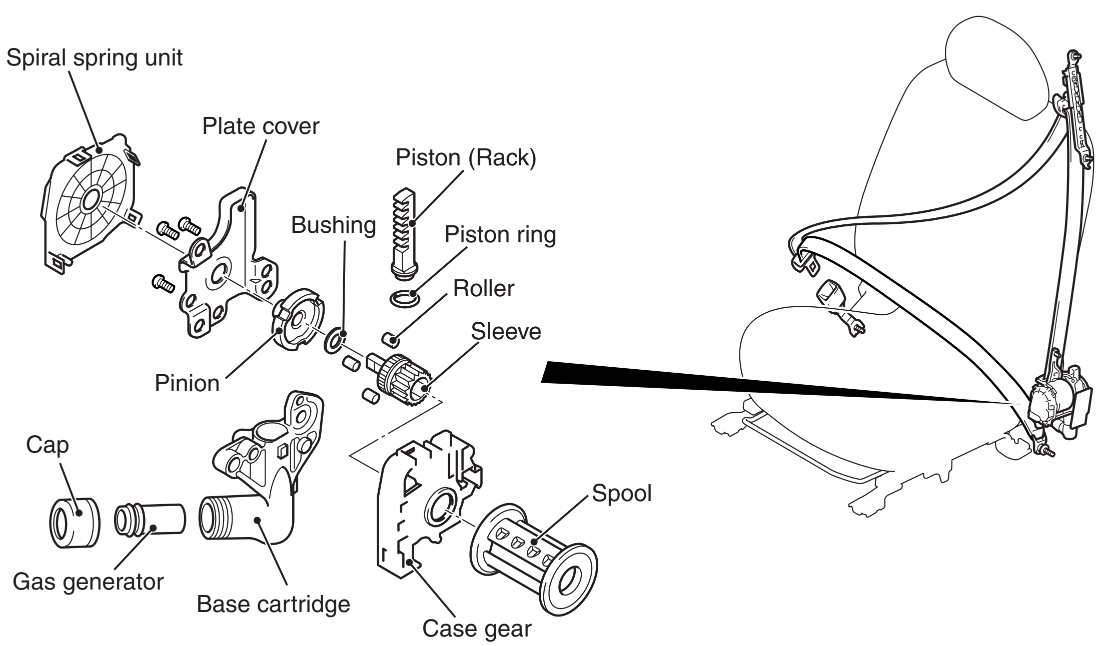
ACCURACY CHECK OCCUPANT classification sensor

The scan tool can be used to perform the next function.

- seat weight sensor Accuracy Check
- Zero-calibration

SEAT BELT WITH PRE-TENSIONER

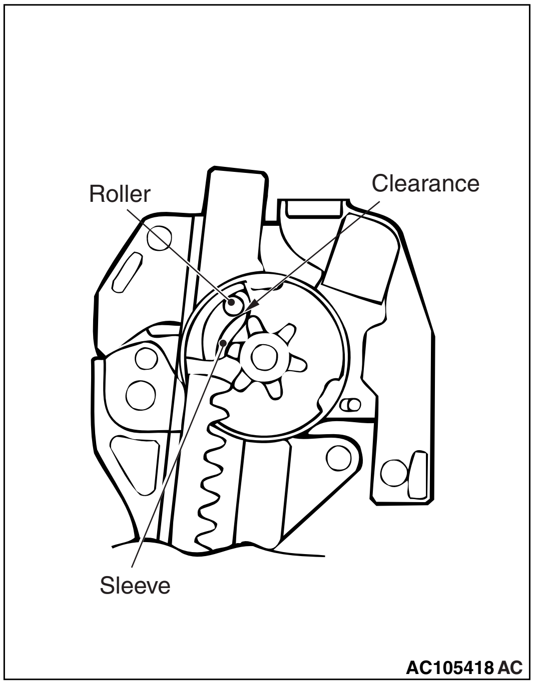
M2521008000429



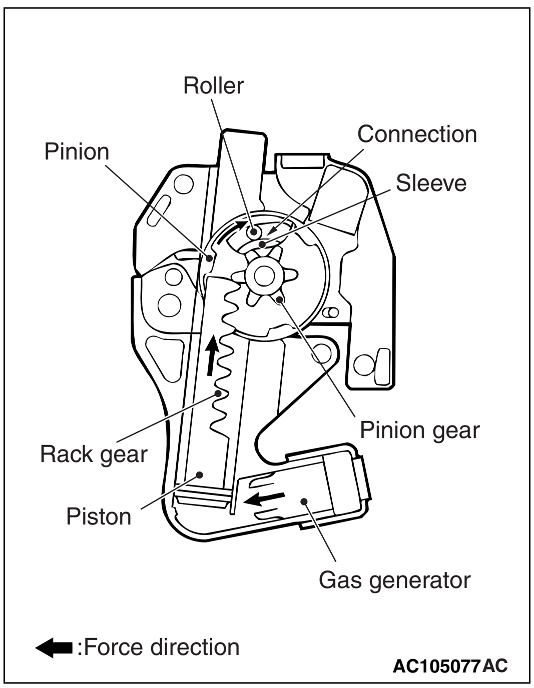
AC609471AB

The seatbelt pretensioner automatically winds the seatbelt at the frontal collision to restrain the forward travel of the passenger. The seatbelt pretensioner operates in ahead of the SRS airbag deployment to restrain the forward travel of the passenger at the frontal collision, for achieving the effective SRS airbag.

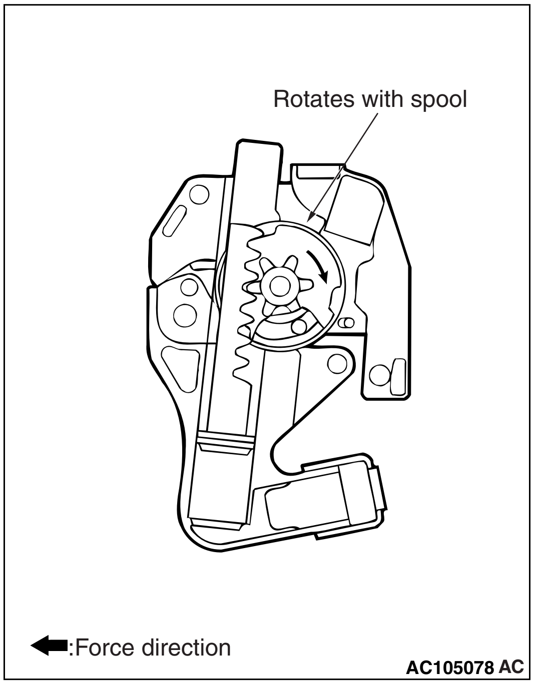
Seatbelt pretensioner operation



1. When the pretensioner is inactivated, the clearance between the roller and the sleeve is secured, and thus the sleeve rotates freely. The spool which winds the seatbelt rotates together as with the sleeve.



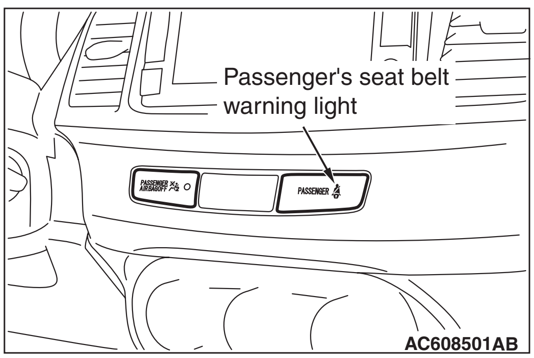
2. At the frontal collision, SRS-ECU which has detected the impact exceeding the threshold from the front impact sensors is energized to ignite the gas generator. Then the gas is generated, and the gas pressure moves up the piston.
3. When the piston moves up, the rack gear of the piston is engaged with the pinion gear of the pinion to rotate the pinion. When the pinion rotates, the pinion is tilted to move the roller to the center, and the pinion, sleeve, and spool are incorporated.



4. The gas pressure moves up the piston farther, and the pinion rotates the spool to wind the belt.

PASSENGER SEAT BELT WARNING LIGHT

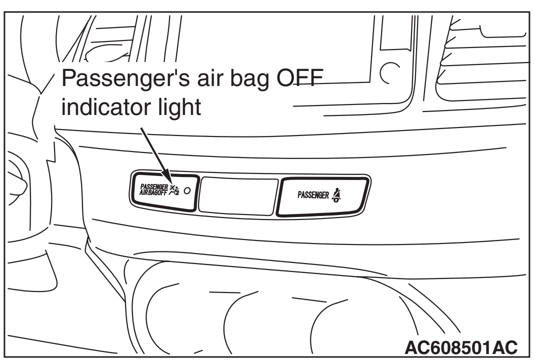
M2521001500036



The passenger's seat belt warning light turns ON when the passenger's seat occupant is determined to be 66 lbs (30 kg) or more by the occupant classification-ECU and his seat belt is not fastened.

PASSENGER'S AIR BAG OFF INDICATOR LIGHT

M2521001600055



The indicator normally comes on when the ignition switch is turned to the "ON" position and goes off a few seconds later. In the following situations, the indicator will stay on to show that the passenger’s (front) air bag is not operational.

- The occupant is determined to be less than 66 lbs (30 kg) by the occupant classification-ECU.
- The front passenger’s seat is not occupied.

The indicator goes off when the occupant is determined to be 66 lbs (30 kg) or more by the occupant classification-ECU, indicating that the passenger's (front) air bag is operational.

SRS-ECU

M2521007000631

The SRS-ECU incorporates a front analog G-sensor and front safing G-sensor for frontal collisions and a side-airbag safing G-sensor for side collisions. SRS-ECU enters an ignite signal to the driver's and passenger's (front) air bag modules if the front impact sensor in the engine compartment, the front analog G-sensor and front safing G-sensor in the SRS-ECU simultaneously detect gravitational impact upon front impact. Further, SRS-ECU starts an ignite signal for the side and curtain air bag module upon sideways gravitational impact that is simultaneously detected by the analog G-sensor of the side impact sensor and the side-airbag safing G-sensor inside the SRS-ECU.

The SRS-ECU is provided with the following capabilities:

- Backup power supply in case of power failure in collisions
- Boosting function in case of battery voltage drop
- Self-diagnosis function to avoid system’s operation errors and improve its reliability

DIAGNOSTIC FUNCTION

The SRS-ECU has the following functions to make system checking using the scan tool easy.

- Diagnostic trouble code output
- Service data output
- Actuator test

DIAGNOSTIC TROUBLE CODE OUTPUT

The SRS-ECU diagnoses the following items and stores a diagnostic trouble code in the non-volatile memory (EEPROM*[1]) when a problem is detected. Therefore, the memory is not deleted after a battery terminal is disconnected, (The diagnostic trouble code memory can be deleted by the scan tool.)

Diagnostic trouble Code No.	Inspection item
B1206	Passenger's air bag OFF indicator light (open circuit)
B1207	Passenger's air bag OFF indicator light (short circuit between circuit terminal)
B1B00	Driver's air bag module (1st squib) system (shorted to squib circuit ground)
B1B01	Driver's air bag module (1st squib) system (shorted to squib circuit power supply)
B1B02	Driver's air bag module (1st squib) system (squib circuit open)
B1B03	Driver's air bag module (1st squib) system (short circuit between squib circuit terminals)
B1B04	Driver's air bag module (2nd squib) system (shorted to squib circuit ground)
B1B05	Driver's air bag module (2nd squib) system (shorted to squib circuit power supply)
B1B06	Driver's air bag module (2nd squib) system (squib circuit open)
B1B07	Driver's air bag module (2nd squib) system (short circuit between squib circuit terminals)
B1B08	Passenger's (front) air bag module (1st squib) system (shorted to squib circuit ground)
B1B09	Passenger's (front) air bag module (1st squib) system (shorted to squib circuit power supply)
B1B0A	Passenger's (front) air bag module (1st squib) system (squib circuit open)
B1B0B	Passenger's (front) air bag module (1st squib) system (short circuit between squib circuit terminals)
B1B0C	Passenger's (front) air bag module (2nd squib) system (shorted to squib circuit ground)
B1B0D	Passenger's (front) air bag module (2nd squib) system (shorted to squib circuit power supply)

Diagnostic trouble Code No.	Inspection item
B1B0E	Passenger's (front) air bag module (2nd squib) system (squib circuit open)
B1B0F	Passenger's (front) air bag module (2nd squib) system (short circuit between squib circuit terminals)
B1B10	Driver’s knee air bag module (squib) system (shorted to squib circuit ground)
B1B11	Driver’s knee air bag module (squib) system (shorted to squib circuit power supply)
B1B12	Driver’s knee air bag module (squib) system (squib circuit open)
B1B13	Driver’s knee air bag module (squib) system (short circuit between squib circuit terminals)
B1B18	Curtain air bag module (LH) (squib) system (shorted to squib circuit ground)
B1B19	Curtain air bag module (LH) (squib) system (shorted to squib circuit power supply)
B1B1A	Curtain air bag module (LH) (squib) system (squib circuit open)
B1B1B	Curtain air bag module (LH) (squib) system (short circuit between squib circuit terminals)
B1B20	Curtain air bag module (RH) (squib) system (shorted to squib circuit ground)
B1B21	Curtain air bag module (RH) (squib) system (shorted to squib circuit power supply)
B1B22	Curtain air bag module (RH) (squib) system (squib circuit open)
B1B23	Curtain air bag module (RH) (squib) system (short circuit between squib circuit terminals)
B1B50	seat belt switch (LH) circuit (ground side) shorted
B1B51	seat belt switch (LH) circuit (power supply side) shorted
B1B52	seat belt switch (LH) circuit open
B1B54	seat belt switch (RH) circuit (ground side) shorted
B1B55	seat belt switch (RH) circuit (power supply side) shorted
B1B56	seat belt switch (RH) circuit open
B1B70	Malfunction of G-sensor inside front impact sensor (LH)
B1B71	Malfunction of G-sensor inside front impact sensor (RH)
B1B72	Malfunction of G-sensor inside side impact sensor (LH)
B1B75	Malfunction of G-sensor inside side impact sensor (RH)
B1BA3	Driver’s seat slide sensor malfunction (occupant classification-ECU)
B1BA5	SRS-ECU squib count mismatch
B1BAA	Occupant classification-ECU configuration mismatch
B1BC7	SRS-ECU (record data full) system
B1C27	Side-airbag module (LH) (squib) system (shorted to squib circuit ground)
B1C28	Side-airbag module (LH) (squib) system (shorted to squib circuit power supply)
B1C29	Side-airbag module (LH) (squib) system (squib circuit open)
B1C2A	Side-airbag module (LH) (squib) system (short circuit between squib circuit terminals)
B1C2B	Side-airbag module (RH) (squib) system (shorted to squib circuit ground)
B1C2C	Side-airbag module (RH) (squib) system (shorted to squib circuit power supply)
B1C2D	Side-airbag module (RH) (squib) system (squib circuit open)

Diagnostic trouble Code No.	Inspection item
B1C2E	Side-airbag module (RH) (squib) system (short circuit between squib circuit terminals)
B1C38	Driver's pre-tensioner (squib) system (shorted to squib circuit ground)
B1C39	Driver's pre-tensioner (squib) system (shorted to squib circuit power supply)
B1C3A	Driver's pre-tensioner (squib) system (squib circuit open)
B1C3B	Driver's pre-tensioner (squib) system (short circuit between squib circuit terminals)
B1C47	Front passenger's pre-tensioner (squib) system (shorted to squib circuit ground)
B1C48	Front passenger's pre-tensioner (squib) system (shorted to squib circuit power supply)
B1C49	Front passenger's pre-tensioner (squib) system (squib circuit open)
B1C4A	Front passenger's pre-tensioner (squib) system (short circuit between squib circuit terminals)
B210D	Battery abnormal low voltage
B212C	Open circuit to IG1 power supply (fuse No. 12 circuit)
B212D	Open circuit to IG1 power supply (fuse No. 18 circuit)
B2207	Occupant restraint controller internal 1
B2208	Occupant restraint controller internal 2
B2209	Occupant restraint controller internal 3
B220A	Occupant restraint controller internal 4
B220B	Occupant restraint controller firing stored energy
B220C	Occupant restraint controller accelerometer 1
B220D	Occupant restraint controller accelerometer 2
B223D	OCM (Occupant Classification-ECU) DTC present
U0019	Bus off (CAN-B)
U0141	ETACS CAN timeout
U0154	Occupant classification-ECU CAN timeout
U0155	Combination meter CAN timeout
U0164	A/C -ECU CAN timeout
U0168	KOS -ECU or WCM CAN timeout
U0170	Front impact sensor (LH) communication error
U0171	Front impact sensor (RH) communication error
U0172	Side impact sensor (LH) communication error
U0175	Side impact sensor (RH) communication error
U0184	Audio CAN timeout
U0195	Satellite radio tuner CAN timeout
U0197	Hands free Module CAN timeout
U1414	Defective Coding Data
U1415	Coding not completed/Data fail

DATA LIST OUTPUT

The following items can be read by the scan tool from the SRS-ECU input data.

Item No.	Display on M.U.T.-III	Check conditions	Normal conditions
01	SRS warning light "ON" request	• Ignition switch: ON • After warning lamp pre-check	OFF
		• Ignition switch: ON • During warning lamp pre-check	ON
02	Pass. SRS light "ON" request	• Ignition switch: ON • After warning light pre-check	OFF
		• Ignition switch: ON • During warning light pre-check	ON
03	Driver’s seatbelt switch	• Ignition switch: ON • After warning light pre-check • Wear the driver seatbelt.	Fastened
		• Ignition switch: ON • After warning light pre-check • Undo the driver seatbelt.	Unfastened
04	Passenger’s seatbelt switch	• Ignition switch: ON • After warning light pre-check • Wear the passenger seatbelt.	Fastened
		• Ignition switch: ON • After warning light pre-check • Undo the passenger seatbelt.	Unfastened
05	Passenger seat airbag ignition	• Ignition switch: ON • After warning light pre-check • Apply a load to the passenger seat.	Permission
		• Ignition switch: ON • After warning light pre-check • Undo a load from a passenger seat.	Prohibition

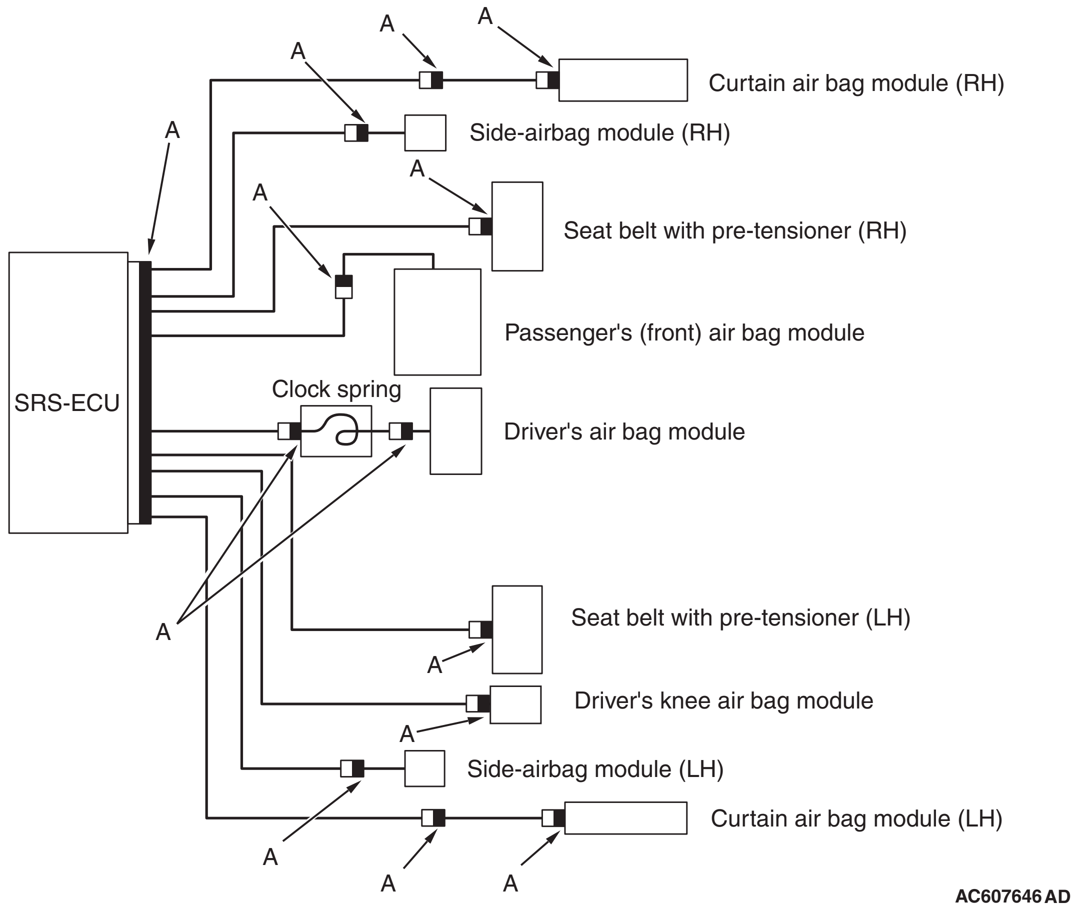
ACTUATOR TEST

The scan tool can be used to forcibly operate the next actuator.

Item No.	Display on M.U.T.-III	Test item	Driven component
01	SRS warning light	SRS warning light illumination	ON

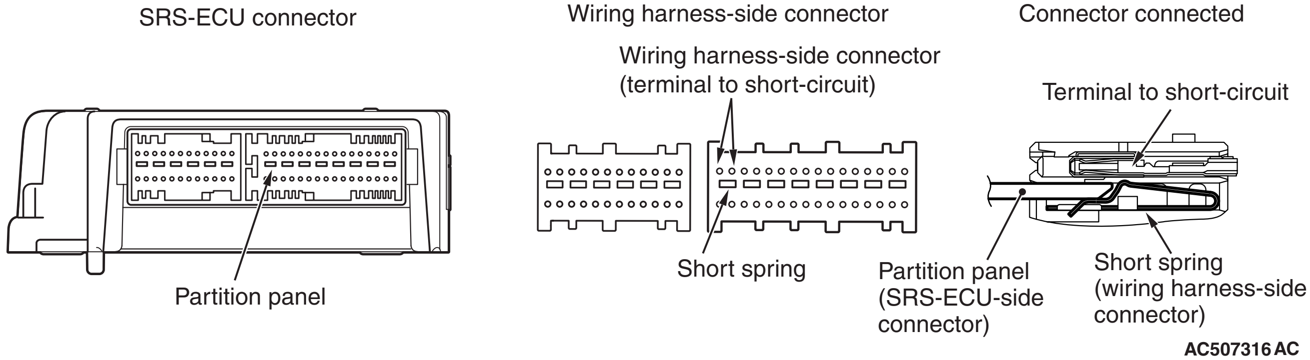
SRS AIR BAG SPECIAL CONNECTOR

M2521009000466



To enhance the system reliability, a connector short circuiting mechanism is integrated in the SRS-ECU connector, air bag module connectors, clock spring connector, and pre-tensioner connectors (black connector "A" shown in the figure).

CONNECTOR SHORT-CIRCUIT MECHANISM



This mechanism prevents the improper deployment of air bag module because of the current application to the squib due to the static electricity when connectors between SRS-ECU and air bag modules (squibs) are disconnected. When the connector is disconnected, the short spring short circuits the power supply side terminal and ground side terminal of squibs, and prevents the static electricity from generating the potential difference. This connector mechanism is adopted for the following connectors.

- SRS-ECU connector
- Connector between the clock spring and body-side wiring harness
- Each air bag module connector
- Each pre-tensioner connector

GROUP 15

INTAKE AND EXHAUST

CONTENTS

GENERAL DESCRIPTION

M1151000100899

The exhaust pipe is divided into three parts.

SERVICE SPECIFICATION

M1151000300989

Item	Limit
Exhaust manifold distortion of the installation surface mm (in)	0.70 (0.028)

INTAKE AND EXHAUST DIAGNOSIS

INTRODUCTION

M1151006900365

Intake leaks usually create driveability issues that are not obviously related to the intake system. Exhaust leaks or abnormal noise is caused by cracks, gaskets and fittings, or by exhaust pipe or muffler damage due to impacts during travel. The exhaust leaks from these sections and causes the exhaust noise to increase. There may be cases when the system contacts the body and vibration noise is generated.

TROUBLESHOOTING STRATEGY

M1151007000365

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an intake or exhaust system fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1151007100362

Symptom	Inspection procedure	Reference page
Exhaust Leakage	1	P.15-3
Abnormal Noise	2	P.15-3

SYMPTOM PROCEDURES

Inspection Procedure 1: Exhaust Leakage

DIAGNOSIS

STEP 1. Start the engine. Have an assistant stay in the driver's seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.

Q: Is the exhaust leaking?
YES : Go to Step 2.
NO : The procedure is complete.

STEP 2. Check the gasket for cracks, damage.

Q: Is the gasket damaged?
YES : Replace the gasket, then go to Step 1.
NO : Go to Step 3.

STEP 3. Check for loosening in each coupling section.

Q: Is there any loosening in any section?
YES : Tighten, then go to Step 1.
NO : There is no action to be taken.

Inspection Procedure 2: Abnormal Noise

DIAGNOSIS

STEP 1. Start the engine. Have an assistant stay in the drivers seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.

Q: Is any abnormal noise generated?
YES : Go to Step 2.
NO : The procedure is complete.

STEP 2. Check for missing parts in the muffler. Tap the muffler lightly to check for loose baffles, etc.

Q: Are there any missing parts in the muffler?
YES : Replace, then go to Step 1.
NO : Go to Step 3.

STEP 3. Check the hanger for cracks.

Q: Is the hanger cracked?
YES : Replace, then go to Step 1.
NO : Go to Step 4.

STEP 4. Check for interference of the pipes and muffler with the body.

Q: Are the pipes and muffler interfering with the body?
YES : Repair, then go to Step 1.
NO : Go to Step 5.

STEP 5. Check the heat protectors.

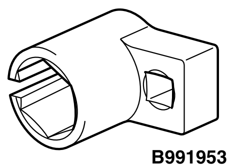
Q: Are any heat protectors loose or damaged?
YES : Tighten or replace, then go to Step 1.
NO : Go to Step 6.

STEP 6. Check the pipes and muffler for damage.

Q: Are the pipes and muffler damaged?
YES : Replace, then go to Step 1.
NO : There is no action to be taken.

SPECIAL TOOL

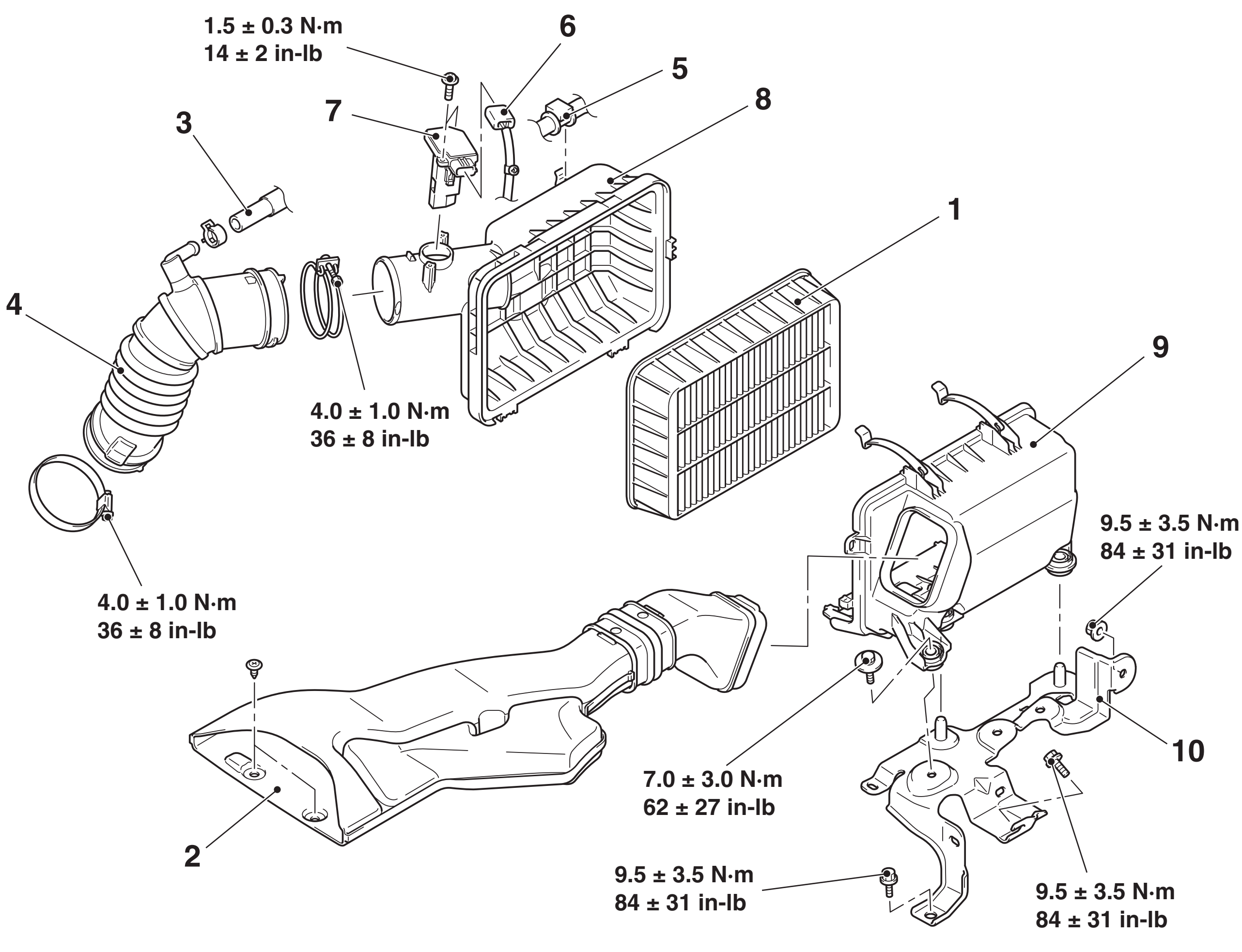
M1151000600827

Tool	Tool number and name	Supersession	Application
	MB991953 Oxygen sensor wrench	MB991953-01	Removal and installation of heated oxygen sensor

AIR CLEANER

REMOVAL AND INSTALLATION

M1151002101489



Removal steps

1. Air cleaner element
2. Air cleaner intake duct
3. Breather hose connection
4. Air cleaner intake hose
5. Vacuum hose connection
6. Mass airflow sensor connector
7. Mass airflow sensor

Removal steps (Continued)

8. Air cleaner cover
9. Air cleaner body

- Engine control module (Refer to GROUP 13A –Engine Control Module (ECM) P.13A-952).
- Battery and battery tray

10. Air cleaner bracket

INTAKE MANIFOLD

REMOVAL AND INSTALLATION

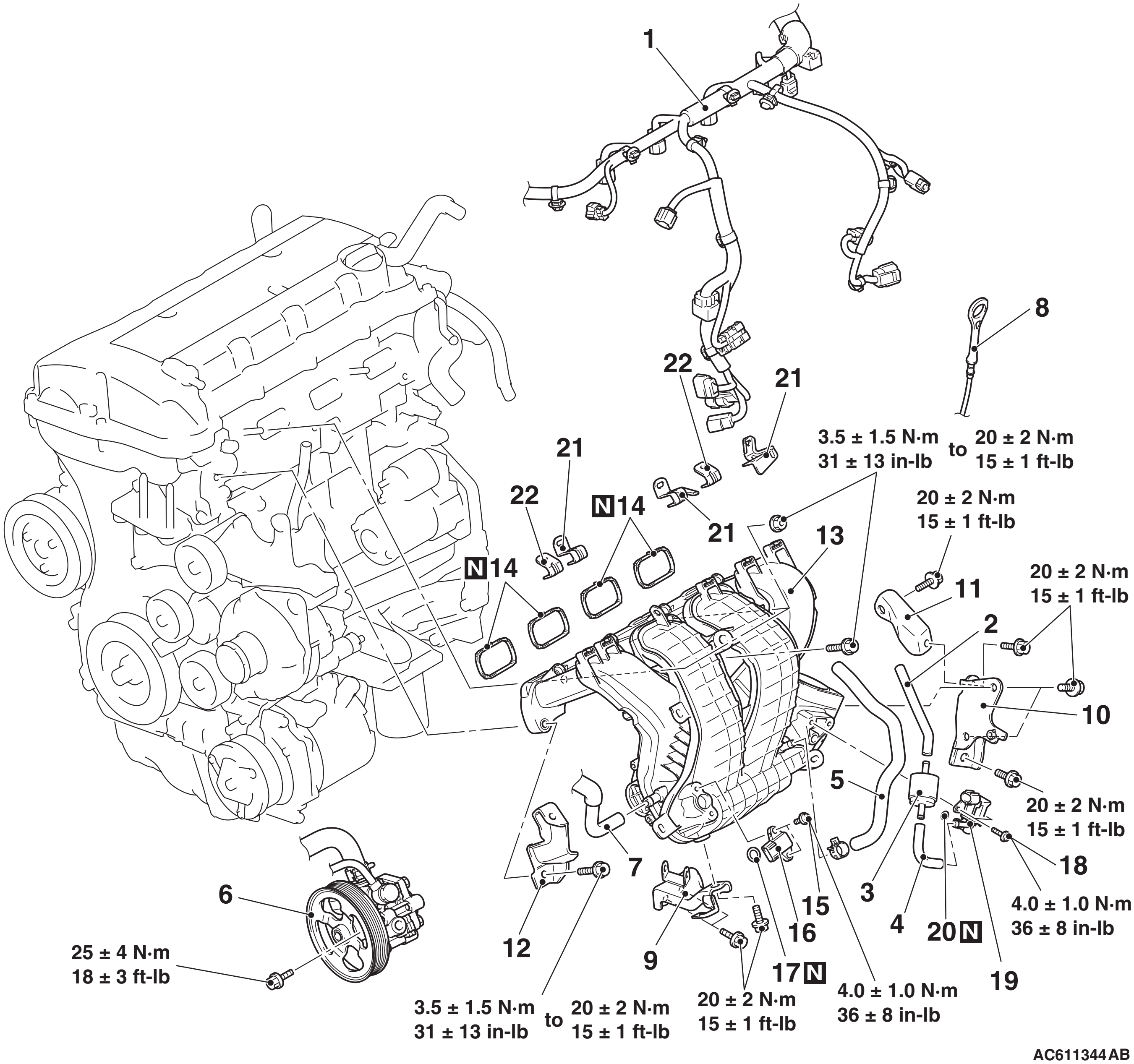
M1151003002035

Pre-removal operation

- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13).
- Engine Upper Cover Removal (Refer to GROUP 11A –Camshaft P.11A-22).
- Drive Belt Removal (Refer to GROUP 11A –Crankshaft Pulley P.11A-19).
- Air Cleaner Assembly and Air Cleaner Intake Hose Removal (Refer to P.15-4).
- Throttle Body Removal (Refer to GROUP 13A –Throttle Body P.13A-950).
- Fuel Injector Removal (Refer to GROUP 13A –Injector P.13A-945).
- EGR Valve and EGR Valve Stay Removal (Refer to GROUP 17 –EGR Valve P.17-85). <Vehicles for California>

Post-installation operation

- EGR Valve and EGR Valve Stay Installation (Refer to GROUP 17 –EGR Valve P.17-85). <Vehicles for California>
- Fuel Injector Installation (Refer to GROUP 13A –Injector P.13A-945).
- Throttle Body Installation (Refer to GROUP 13A –Throttle Body P.13A-950).
- Air Cleaner Assembly and Air Cleaner Intake Hose Installation (Refer to P.15-4).
- Drive Belt Installation (Refer to GROUP 11A –Crankshaft Pulley P.11A-19).
- Engine Upper Cover Installation (Refer to GROUP 11A –Camshaft P.11A-22).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement P.14-13).



Removal steps

1. Control wiring harness connection
2. Emission vacuum hose
3. Emission vacuum control chamber
4. Emission vacuum hose
5. Brake booster vacuum hose
6. <<**A**>> Power steering oil pump assembly
7. Rocker cover PCV hose
8. Engine oil level gauge
9. Intake manifold stay
10. Intake manifold stay B <except for California>
11. Intake manifold stay C <except for California>

Removal steps (Continued)

12. >>**C**<< Injector protector front
13. >>**C**<< Intake manifold
14. Intake manifold gasket
15. >>**A**<< Screw
16. >>**B**<< Manifold absolute pressure sensor
17. O-ring
18. >>**A**<< Screw
19. Purge control solenoid valve
20. O-ring
21. Intake manifold harness bracket
22. Engine cover bracket

REMOVAL SERVICE POINT

<<A>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. With the hose installed, remove the power steering oil pump assembly from the bracket.
2. Tie the removed power steering oil pump assembly with a string at a position where it will not interfere with the removal and installation of the intake manifold.

INSTALLATION SERVICE POINTS

>>A<< SCREW INSTALLATION

⚠ CAUTION

Do not over-tighten. As the self-forming-type screw is used, the excessive torque can damage the intake manifold threads.

>>B<< MANIFOLD ABSOLUTE PRESSURE SENSOR INSTALLATION

⚠ CAUTION

- **Install the manifold absolute pressure sensor, taking care that no shock is applied to it.**
- **Do not use a manifold absolute pressure sensor that has been dropped.**

>>C<< INTAKE MANIFOLD/INJECTOR PROTECTOR FRONT INSTALLATION

Install the intake manifold and the injector protector front, and tighten mounting bolts and nuts temporarily.

NOTE: The tightening of the fuel rail assembly, the intake manifold and the injector protector front has the specified order. Temporarily tighten the intake manifold and injector protector front mounting bolts and nuts (Refer to GROUP 13A –Injector P.13A-945).

INSPECTION

M1151003101028

INTAKE MANIFOLD CHECK

1. Check the intake manifold for damage and cracks, and replace it if necessary.
2. Check the vacuum outlet port for clogging, and clean it if necessary.

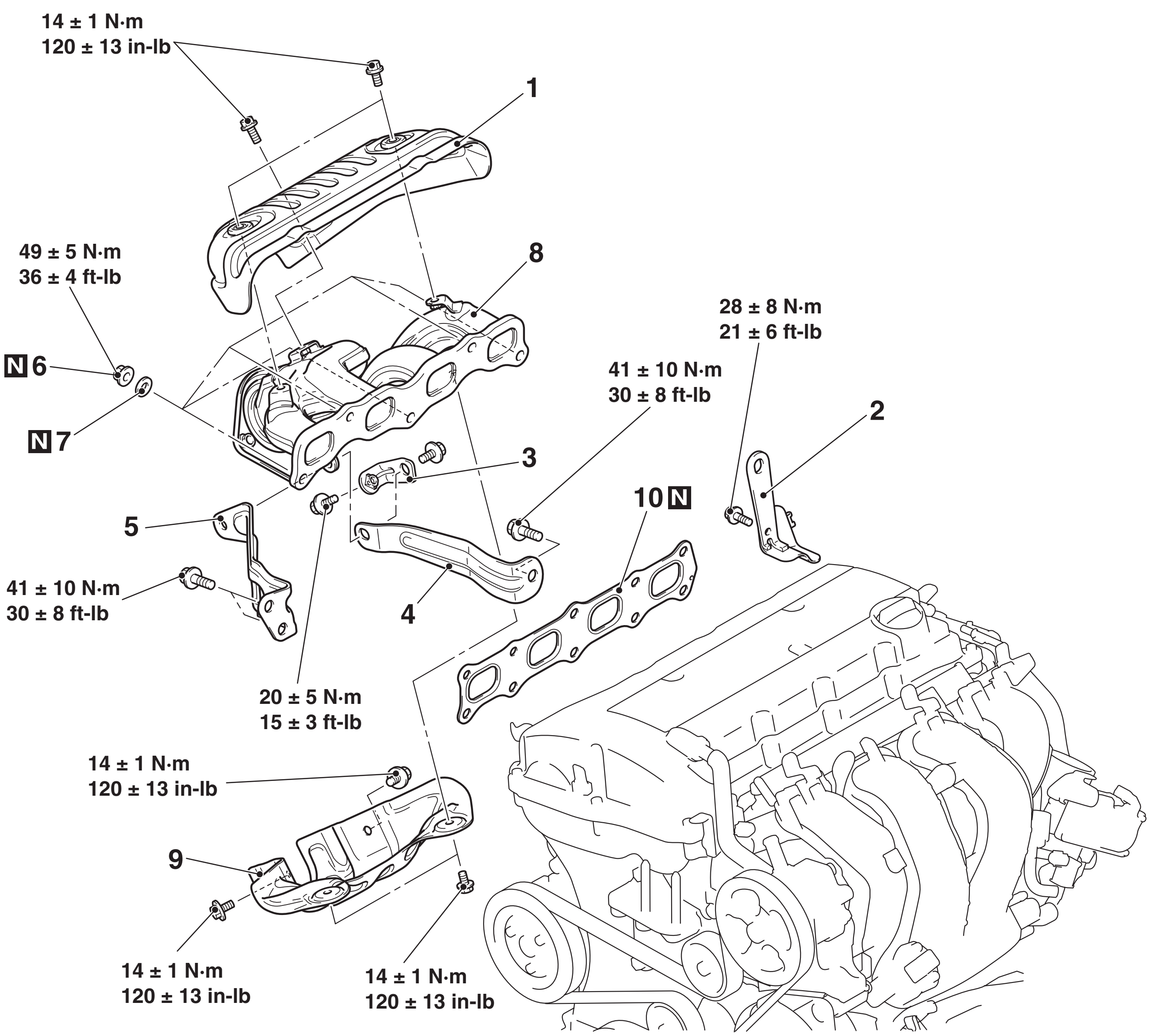
EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

M1151003301594

Pre-removal operation	Post-installation operation
• Front Exhaust Pipe Removal (Refer to P.15-12). • Strut Tower Bar Removal (Refer to GROUP 42A –Strut Tower Bar P.42A-11).	• Strut Tower Bar Installation (Refer to GROUP 42A –Strut Tower Bar P.42A-11). • Front Exhaust Pipe Installation (Refer to P.15-12).

<Except for CALIFORNIA>



AC608496 AB

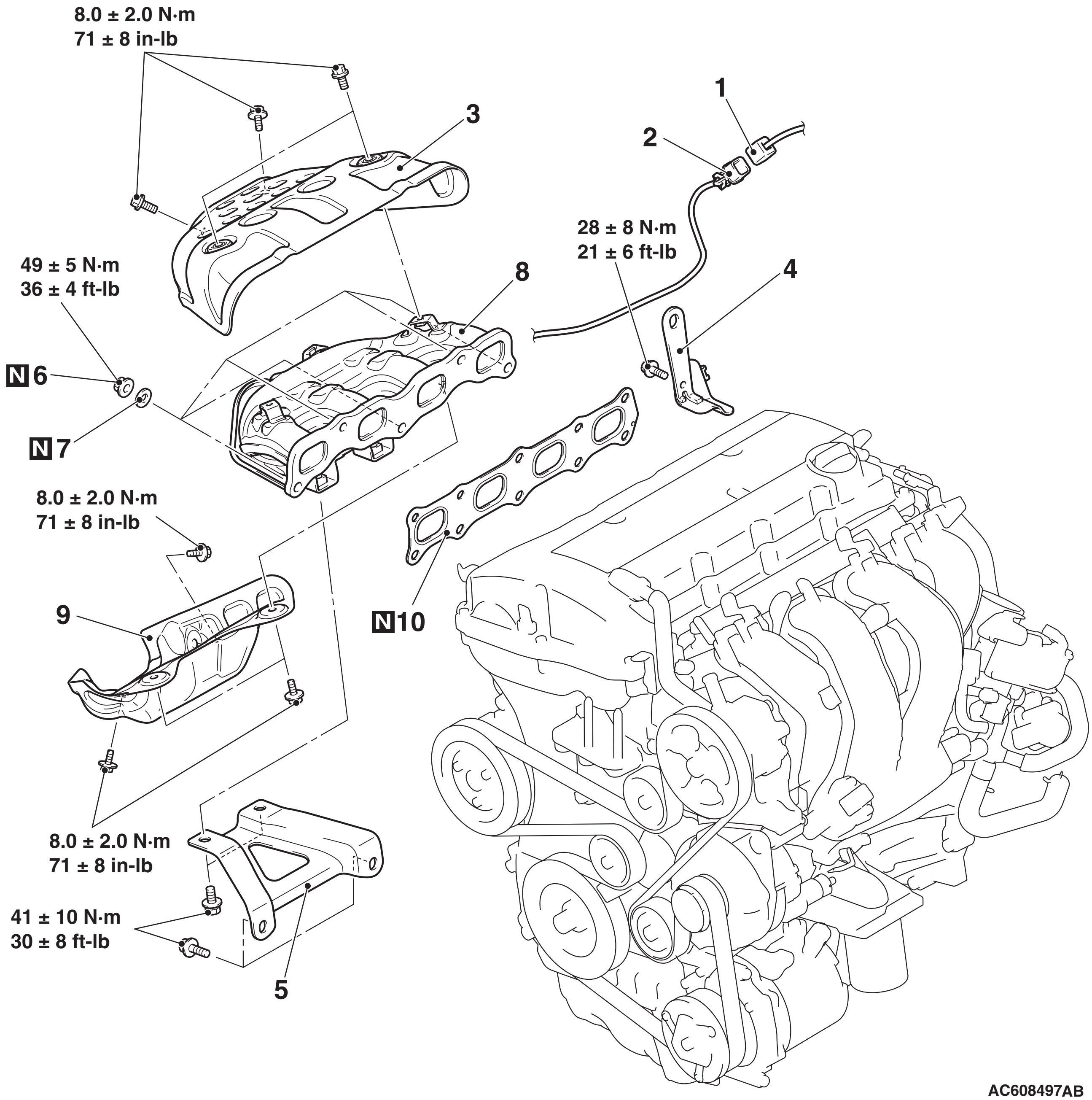
Removal steps

1. Exhaust manifold cover (upper)
2. Engine hanger
3. Exhaust manifold bracket D
4. Exhaust manifold bracket B
5. Exhaust manifold bracket A

Removal steps (Continued)

<<**A**>> >>**A**<< 6. Exhaust manifold nut
<<**A**>> >>**A**<< 7. Exhaust manifold washer
<<**A**>> >>**A**<< 8. Exhaust manifold
<<**A**>> >>**A**<< 9. Exhaust manifold cover (lower)
10. Exhaust manifold gasket

<Vehicles for CALIFORNIA>



Removal steps

1. Heated oxygen sensor (front) connector
2. Heated oxygen sensor (front)
3. Exhaust manifold cover (upper)
4. Engine hanger
5. Exhaust manifold bracket

Removal steps (Continued)

<<**A**>>	>>**A**<<	6.	Exhaust manifold nut
<<**A**>>	>>**A**<<	7.	Exhaust manifold washer
<<**A**>>	>>**A**<<	8.	Exhaust manifold
<<**A**>>	>>**A**<<	9.	Exhaust manifold cover (lower)
		10.	Exhaust manifold gasket

REMOVAL SERVICE POINT

<<A>> EXHAUST MANIFOLD NUT/EXHAUST MANIFOLD WASHER/EXHAUST MANIFOLD/EXHAUST MANIFOLD COVER REMOVAL

1. Remove the mounting bolts of the exhaust manifold cover (upper) and move them to the position where they will not interfere with the loosening of the exhaust manifold nut.
2. Loosen the exhaust manifold nut, and remove the exhaust manifold nut and the exhaust manifold washer.
3. Remove the exhaust manifold and the exhaust manifold cover (lower) as a set.

INSTALLATION SERVICE POINT

>>A<< EXHAUST MANIFOLD COVER/EXHAUST MANIFOLD/EXHAUST MANIFOLD WASHER/EXHAUST MANIFOLD NUT INSTALLATION

1. Install the exhaust manifold cover (lower) to the exhaust manifold (with mounting bolts removed), install the exhaust manifold and the exhaust manifold cover (upper) to the engine as a set.
2. Install the new exhaust manifold nut and exhaust manifold washer, and tighten the exhaust manifold nut to the specified torque.

   Tightening torque: 49 ± 5 N· m (36 ± 4 ft-lb)

3. Install the exhaust manifold cover (upper) to the exhaust manifold, and tighten the exhaust manifold cover (upper) to the specified torque.

   Tightening torque:
   14 ± 1 N· m (120 ± 13 in-lb) <except for California>
   8.0 ± 2.0 N· m (71 ± 18 in-lb) <vehicles for California>

INSPECTION

M1151003400930

EXHAUST MANIFOLD CHECK

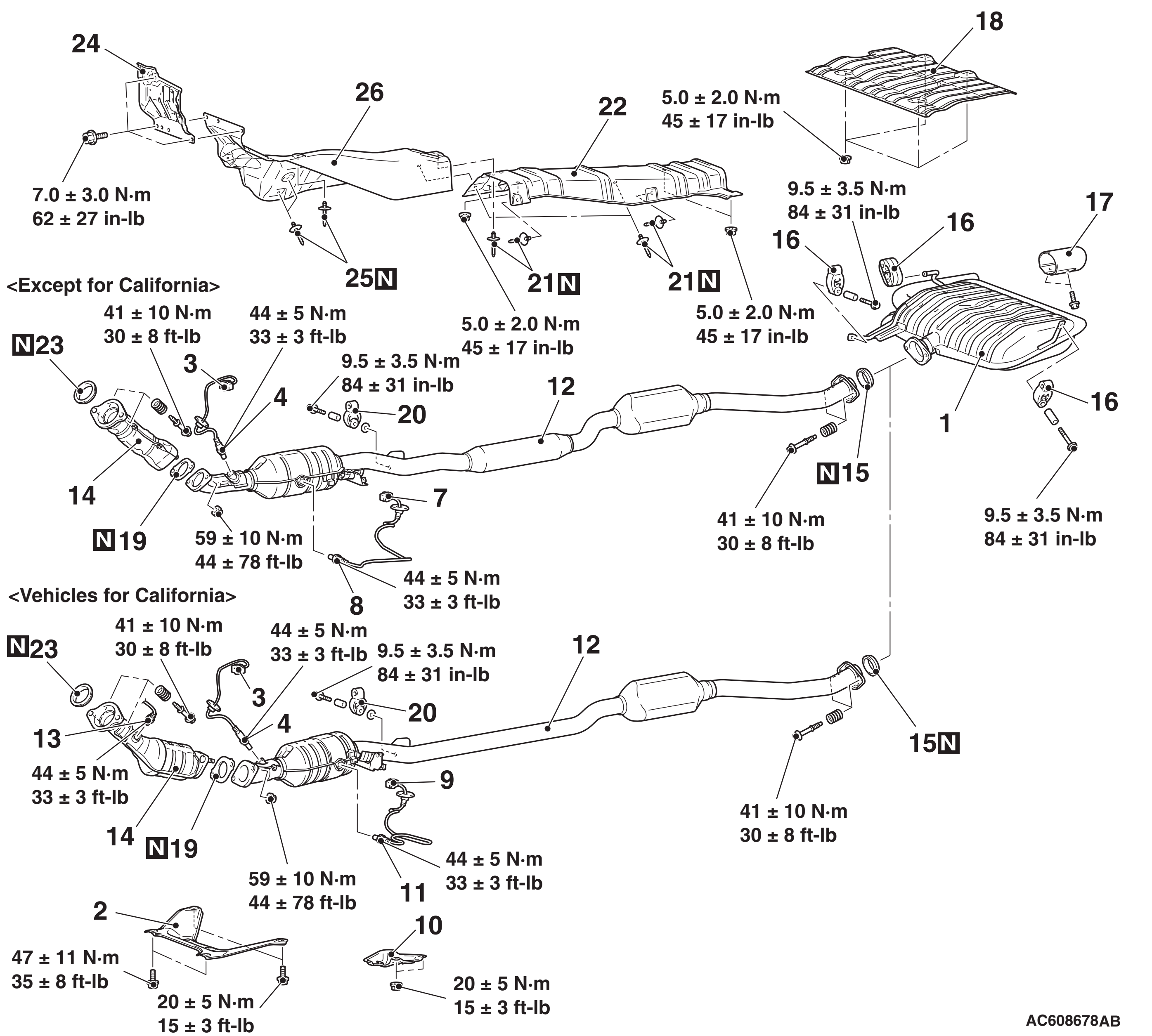
1. Check the exhaust manifold for damage and cracks, and replace it if necessary.
2. Using a straight edge and a thickness gauge, check for distortion of the cylinder head installation surface. If it exceeds the limit value, replace it.

   Limit: 0.70 mm (0.028 inch)

EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

M1151008701489



Exhaust main muffler and rear floor panel heat protector removal steps

1. Exhaust main muffler
15. Exhaust pipe gasket
16. Exhaust muffler hanger
17. Exhaust tail pipe diffuser
18. Rear floor panel heat protector

Center exhaust pipe and front floor panel rear heat protector removal steps

2. Backbone brace
- Footrest

Center exhaust pipe and front floor panel rear heat protector removal steps (Continued)

- Lower side cover (Refer to GROUP 52A –Front Floor Console Assembly P.52A-8).
- Turn up the passenger side floor carpet.

3. Heated oxygen sensor (front) connector <except for California>

<<**A**>> >>**B**<< 4. Heated oxygen sensor (front) <except for California>

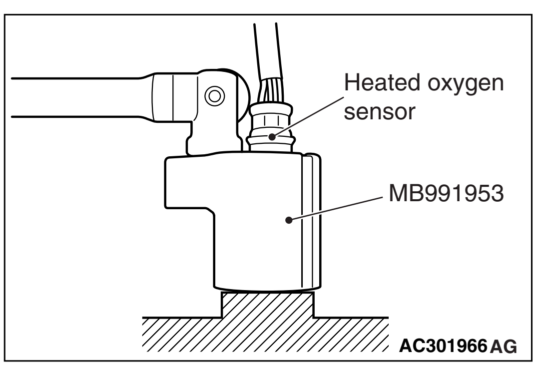
			Center exhaust pipe and front floor panel rear heat protector removal steps (Continued)
		5.	Heated oxygen sensor (rear) connector <vehicles for California>
<<**A**>>	>>**B**<<	6.	Heated oxygen sensor (rear) <vehicles for California>
		7.	Heated oxygen sensor (rear) connector <except for California>
<<**A**>>	>>**B**<<	8.	Heated oxygen sensor (rear) <except for California>
		9.	Heated oxygen sensor (3rd) connector <vehicles for California>
		10.	Harness cover <vehicles for California>
<<**A**>>	>>**B**<<	11.	Heated oxygen sensor (3rd) <vehicles for California>
		12.	Center exhaust pipe
		19.	Exhaust pipe gasket
		20.	Exhaust muffler hanger
<<**B**>>	>>**A**<<	21.	Rivet
<<**B**>>	>>**A**<<	22.	Front floor rear panel heat protector
			Front exhaust pipe and front floor panel front heat protector removal steps
<<**A**>>	>>**B**<<	13.	Heated oxygen sensor (front) <vehicles for California>
		14.	Front exhaust pipe
		19.	Exhaust pipe gasket
		23.	Seal ring
		24.	Dash panel heat protector
<<**B**>>	>>**A**<<	25.	Rivet
<<**B**>>	>>**A**<<	26.	Front floor front panel heat protector

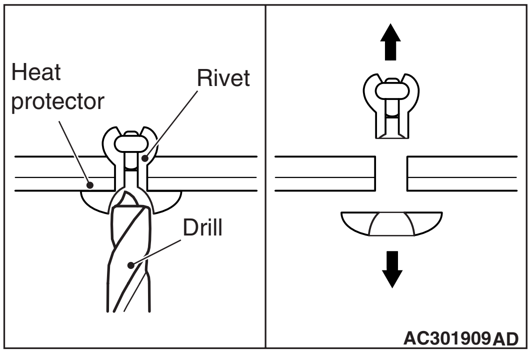
Required Special Tool:
- MB991953: Oxygen Sensor Wrench

REMOVAL SERVICE POINTS

<<A>> OXYGEN SENSOR REMOVAL

Remove the connection and clamp of oxygen sensor connector, and then use special tool MB991953 to remove the oxygen sensor.



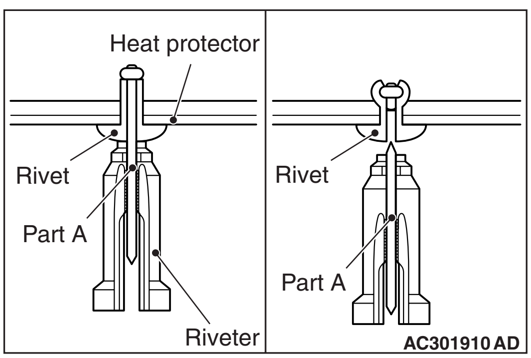


<<B>> RIVET/FRONT FLOOR REAR PANEL HEAT PROTECTOR/FRONT FLOOR FRONT PANEL HEAT PROTECTOR REMOVAL

⚠ CAUTION

Be careful not to score the heat protector by drill.

1. Use a 6.0 / diameter / mm drill to make a hole in the flange of rivet as shown.
2. Break the rivet, and remove the rivet and heat protector.

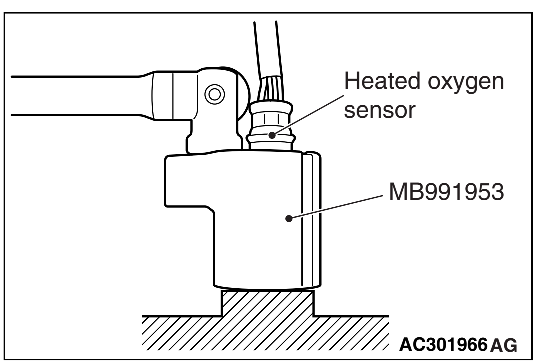


INSTALLATION SERVICE POINTS

>>A<< FRONT FLOOR FRONT PANEL HEAT PROTECTOR/FRONT FLOOR REAR PANEL HEAT PROTECTOR/RIVET INSTALLATION

Use a riveter to tighten the rivet by the following procedure.

1. Insert part A of rivet into the riveter, and insert the rivet into the assembling area.
2. Operate the tool's handle while pushing the flange surface of rivet by riveter. Part A of rivet is cut and the rivet is tightened.



>>B<< OXYGEN SENSOR INSTALLATION

1. Tighten the oxygen sensor to the specified torque by using special tool MB991953.

   Tightening torque: 44 ± 5 N· m (33 ± 3 ft-lb)

2. Connect the oxygen sensor connector and install the connector bracket.

GROUP 52

INTERIOR AND SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

NOTES

GROUP 15

INTAKE AND EXHAUST

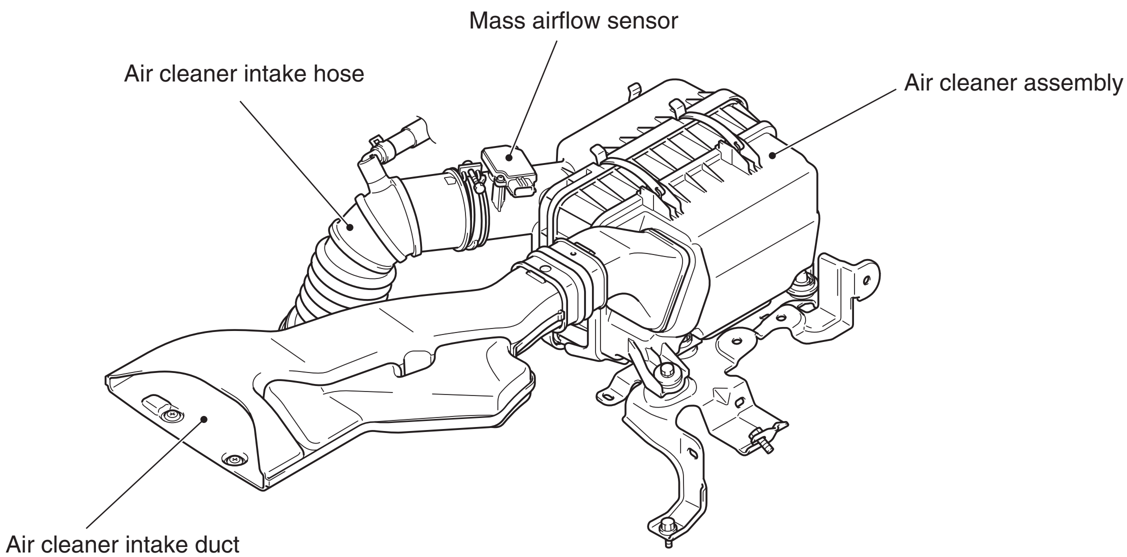
CONTENTS

AIR DUCT AND AIR CLEANER

M2150004000656

A front air intake system that actively sucks cooling air from the front through the top of the radiator has been adopted in order to improve engine performance and reduce air intake noise.

CONSTRUCTION DIAGRAM

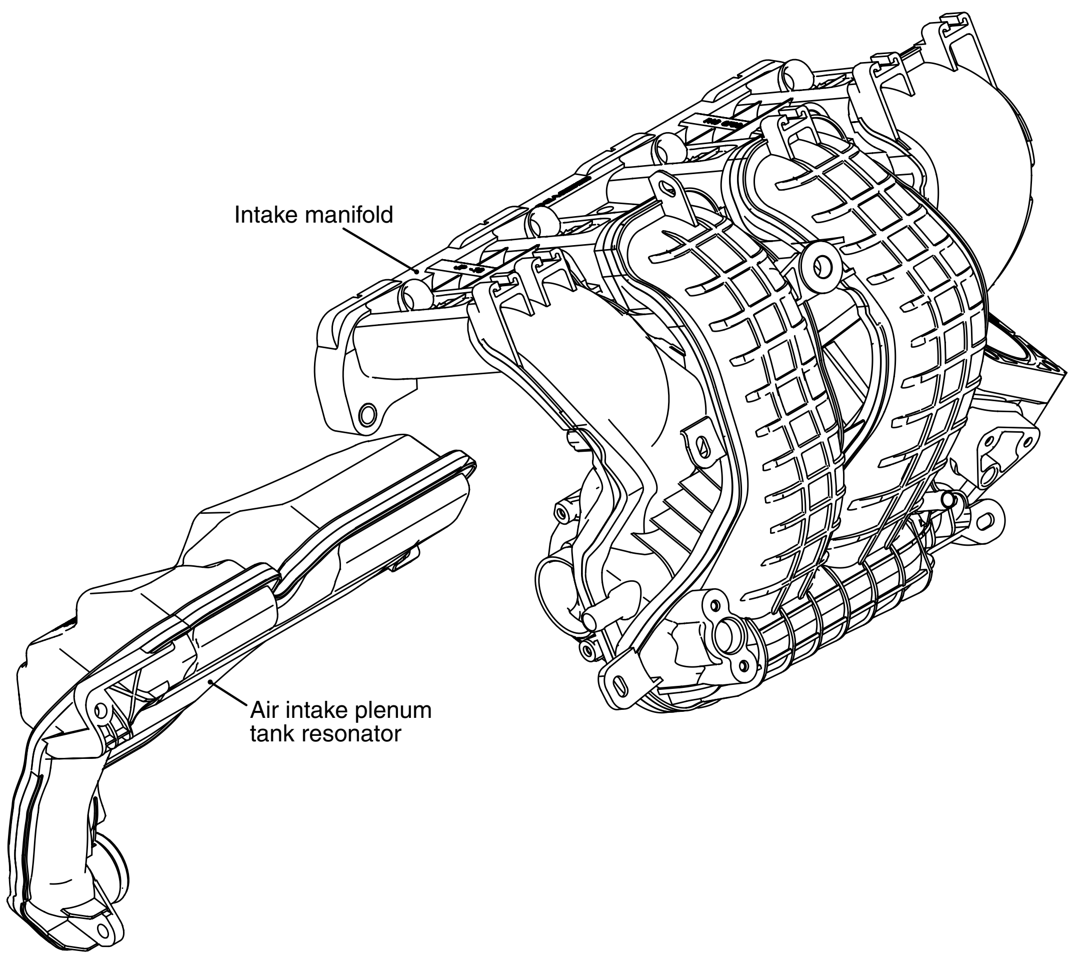


AC608342AB

INTAKE MANIFOLD

M2150005000239

The intake manifold is made of plastic for weight reduction, and the surface roughness of the inner walls of the ports has been improved to reduce intake resistance.



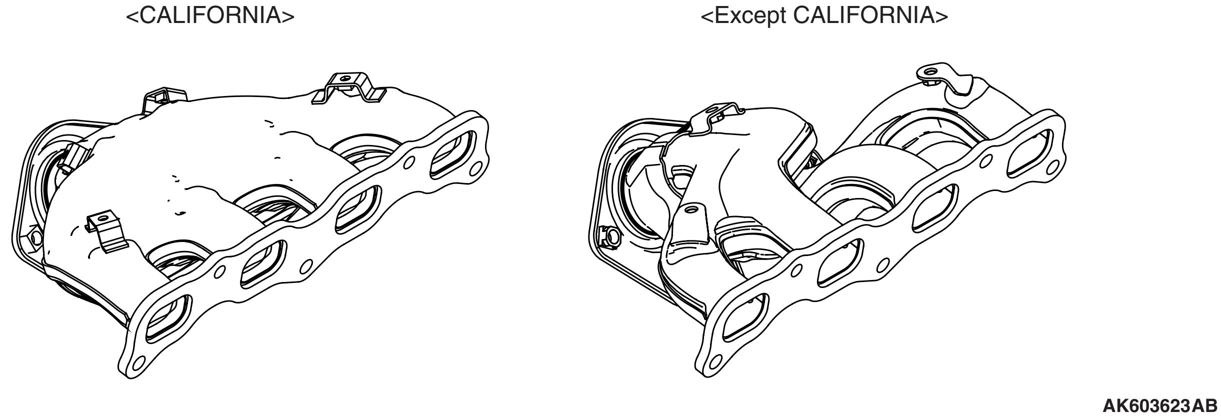
AK502555AD

EXHAUST MANIFOLD

M2150006000566

<California>
A clamshell type exhaust manifold is used.

<Except California>
A SUS pipe type exhaust manifold is used.



EXHAUST PIPE AND MUFFLER

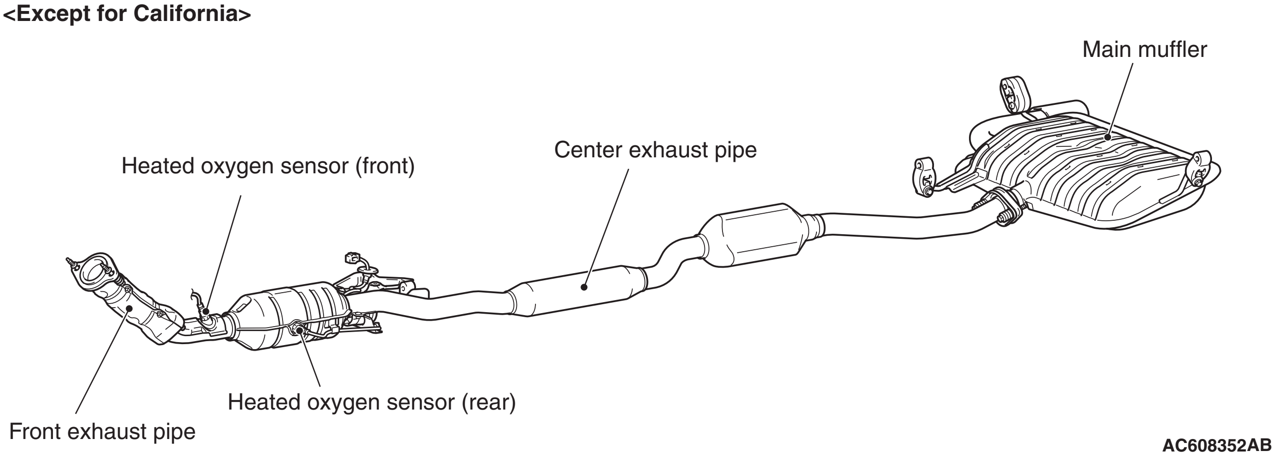
M2150003000783

The exhaust system is composed of the front exhaust pipe, center exhaust pipe, and main muffler, and it has the following characteristics.

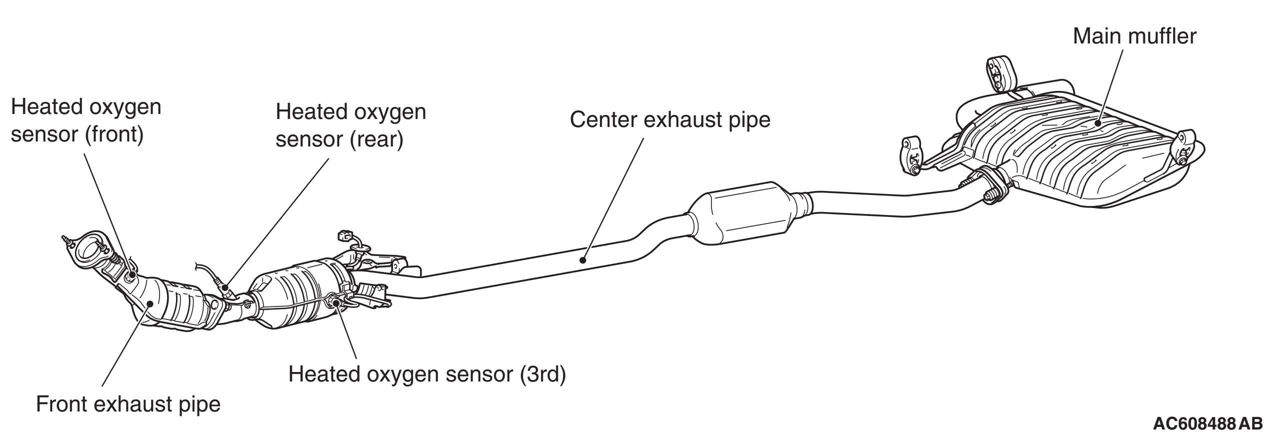
- Fewer, more environmentally-friendly rubber hangers to reduce vibration from exhaust system.
- Straighter exhaust pipe to reduce noise.

CONSTRUCTION DIAGRAM

<Except for California>



<Vehicles for California>



GROUP 21

CLUTCH

CONTENTS

NOTES

GROUP 14

ENGINE COOLING

CONTENTS

GENERAL INFORMATION

M2140000100780

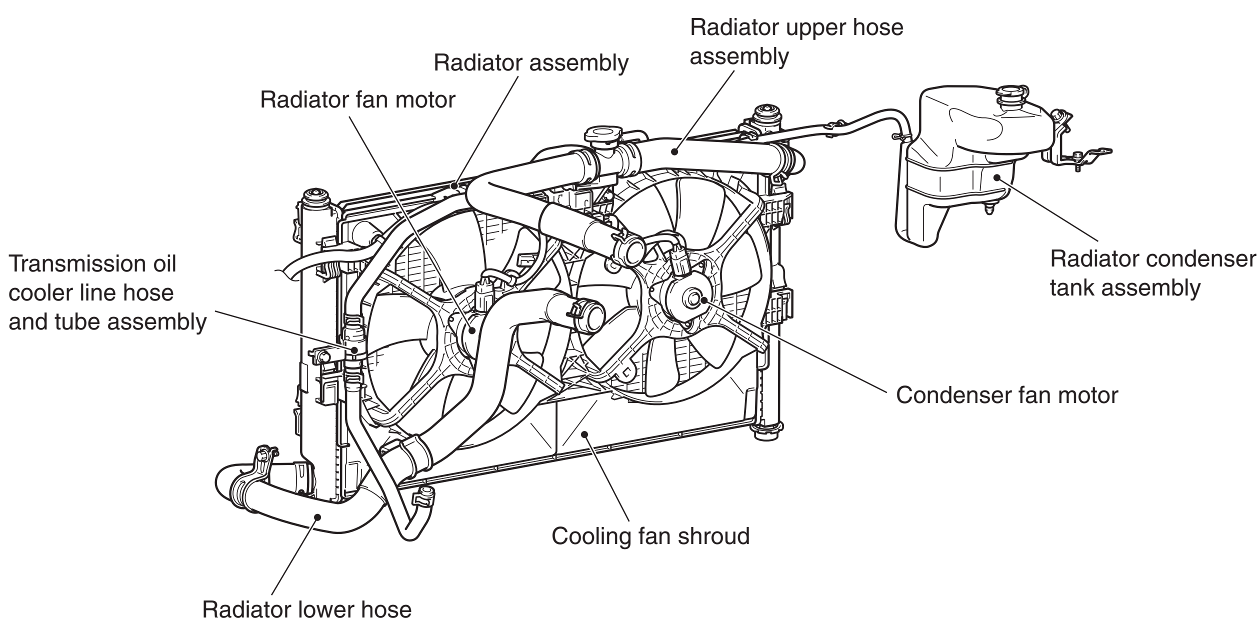
The cooling system is a water-cooled pressurized, forced circulation type which offers the following features.

- To stabilize engine coolant temperature, the thermostat is located at the coolant inlet port from the radiator.
- To improve engine cooling performance and save weight, a plastic tank and aluminum radiator fins are used.

SPECIFICATIONS

Item		Specification
Cooling method		Water-cooled pressurized, forced circulation with electrical fan
Radiator	Type	Pressurized corrugate type
	Performance kJ/h (kcal/h)	222,480 (53,148)
Water pump	Type	Centrifugal impeller
	Drive method	Drive belt
Thermostat	Type	Wax pellet with jiggle valve
	Valve open temperature °C (°F)	82 (180)

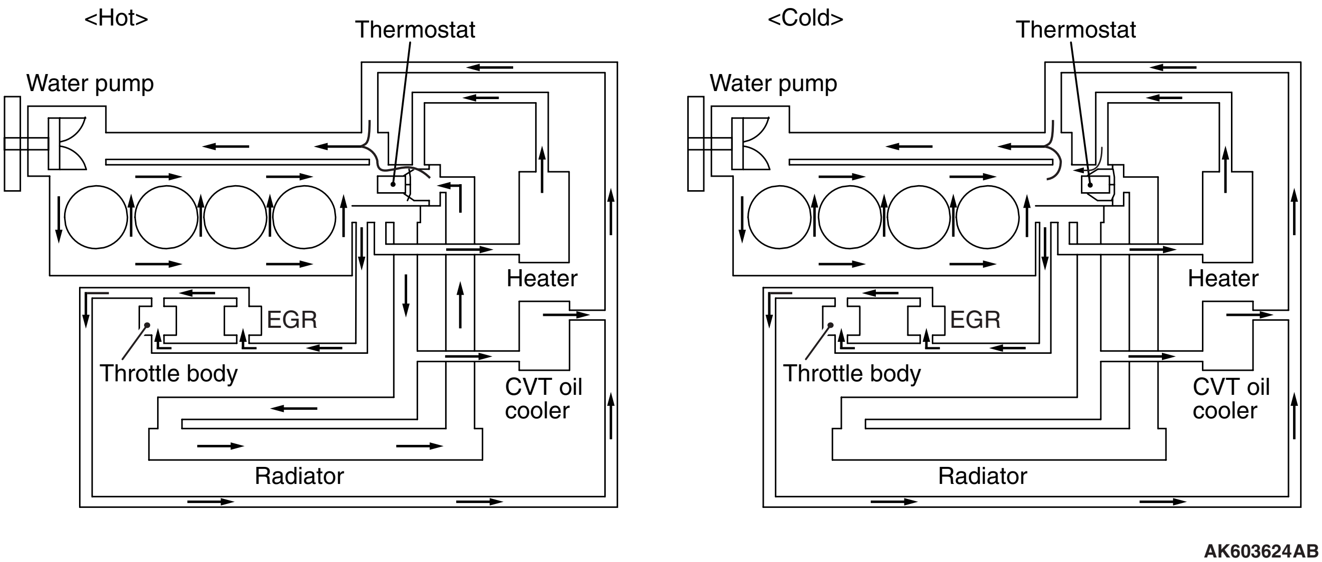
CONSTRUCTION DIAGRAM



AC608448AB

WATER PASSAGE

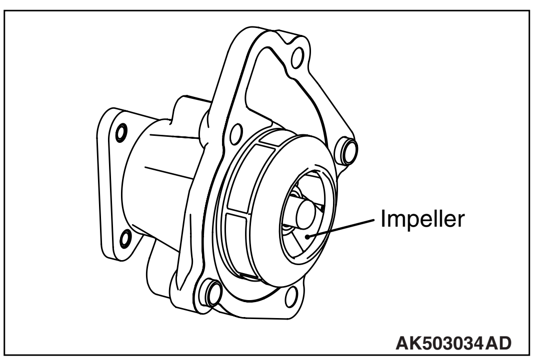
M2140004000172



NOTE: EGR: Exhaust Gas Recirculation <California only>
CVT: Continuously Variable Transmission

WATER PUMP

M2140003000168



The water pump is the centrifugal, impeller type that is installed in front of the cylinder block. It is driven by the drive belt.

Item	Specifications
Discharge volume L/min	185
Impeller diameter mm (in)	62 (2.4)
Pulley outer diameter mm (in)	137 (5.4)

NOTES

GROUP 52A

INTERIOR

CONTENTS

GENERAL INFORMATION

M2520000101013

Functionality, interior comfort, and safety have been emphasized, giving interior design for elegance and relaxation space. Various measures have been taken to protect the environment and recycle resources.

FEATURES

Quality improvement

1. Two-tone interior
2. Full interior trim

Usability improvement

1. Armrest (floor console, rear seat, front door trim, rear door trim)
2. Cup holder (floor console, rear seat armrest)
3. Bottle holder (front door trim)

Convenient storage

1. Glove box
2. Seatback pocket (driver's seat)
3. Card holder (glove box)
4. Tissue paper holder (floor console)
5. Floor console box
6. Door pocket (front door trim, rear door trim)

Safety improvement

1. Front and rear collision protection seat mechanism (front seat)
2. ISO-FIX lower anchor (rear seat outside)
3. Upper tether anchor (rear shelf)
4. ELR 3-point seat belt (driver's seat)
5. ELR/ALR 3-point seat belt (front passenger, rear)
6. Seat belt retractor with a driver's side pretensioner and force limiter
7. Seat belt retractor with a passenger's side pretensioner and force limiter
8. Headliner energy absorption rib <Vehicles without curtain air bag>

Consideration for the optimum driving position

1. Seat height adjustment (driver's seat)
2. Head restraint with height adjustment (front, rear)
3. Seat slide adjustment (front)

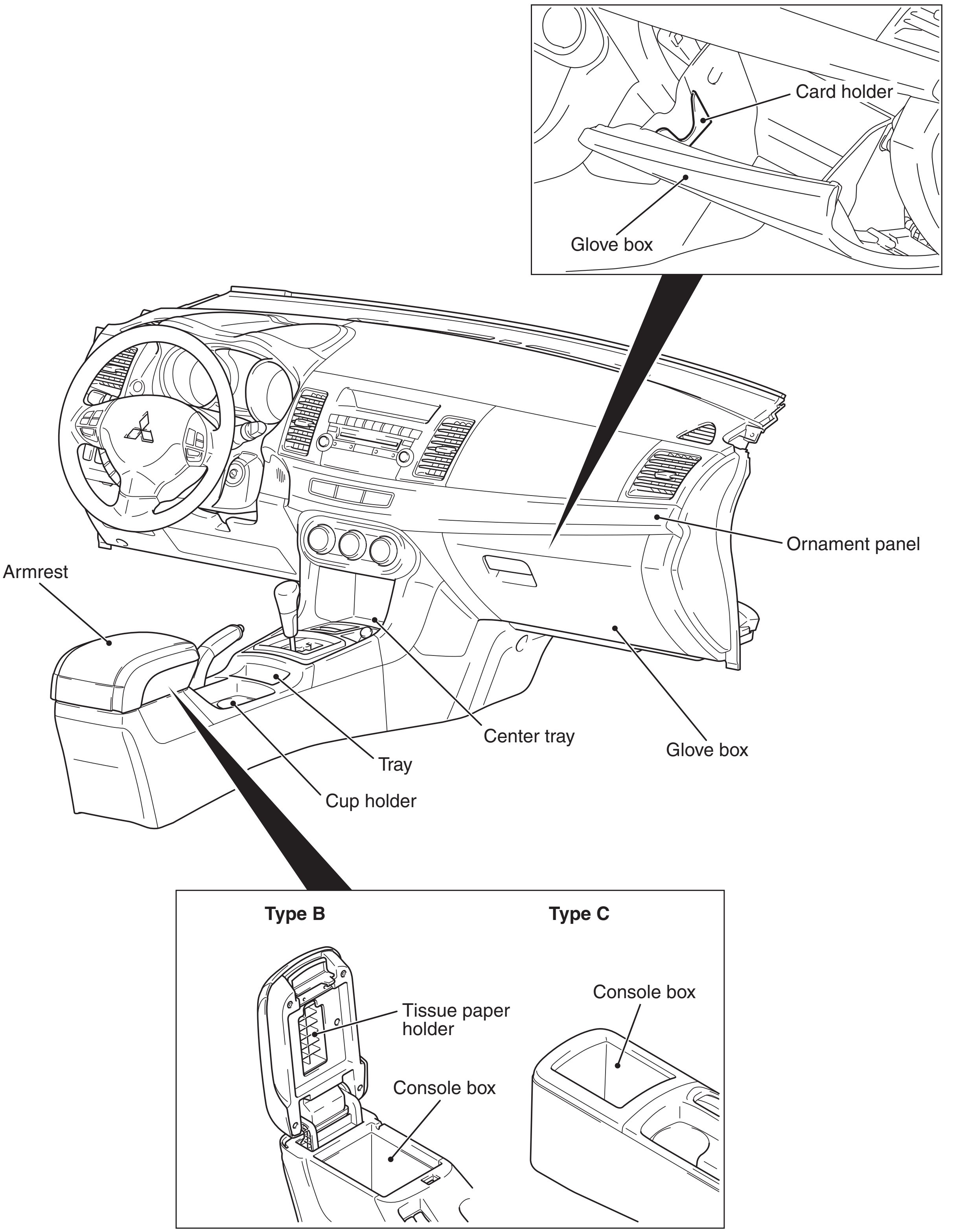
Measures for resource recycling

1. Aggressively use PP materials that are easy to recycle and easy to stamp material symbols on the plastic (resin) parts.
2. Reduction of chemical material (formaldehyde*, organic solvent)

*NOTE: *: Clear and colourless, toxic, irritating odour*

INSTRUMENT PANEL AND FLOOR CONSOLE

M2520001000793



AC609712

The instrument panel and the floor console have the following features.

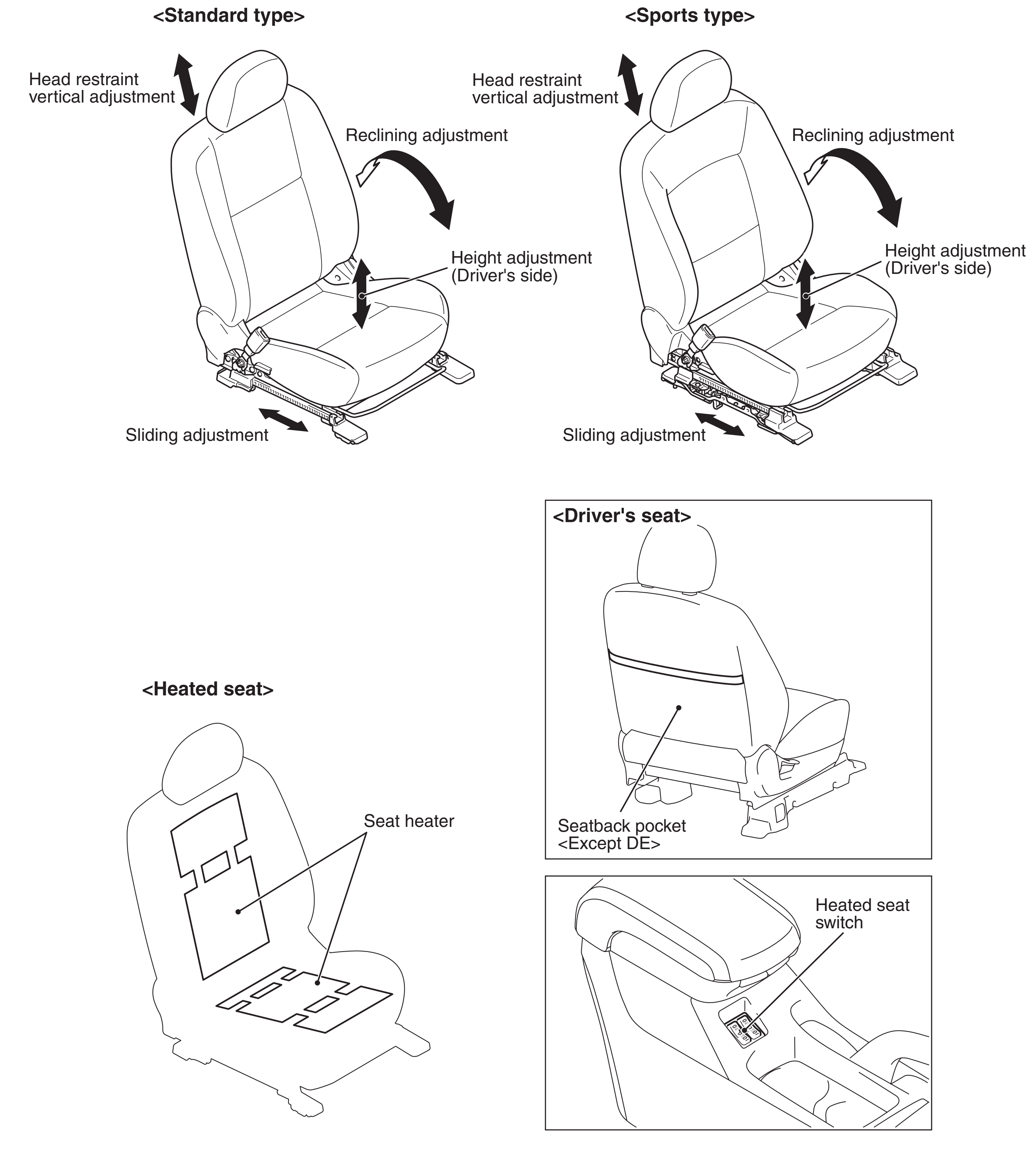
- The instrument panel is two-toned.
- The division unit of each part has been enlarged, also the gap and level difference between the instrument panel has been minimized to achieve the delicate quality.

- The decorated panel creating uniformity from the instrument panel to the door trim has been adopted.
- The holder in which two cards can be stored has been installed in the glove box.
- The glove box with damper function has been installed. <Except DE>
- The center tray for storing small items has been installed in front of the selector or shift lever center panel.
- The cup holder which can hold two 20-oz bottles has been equipped. The cup holder can store two CDs in the upright position and pen-size long items horizontally.
- Under the arm rest of type B, a large box that can store 6 CDs has been equipped. (9 CDs for type C)
- A tray that can store cigarettes and lighters has been equipped. <Vehicles without console switch>
- The synthetic cloth is used for the arm rest lid to enhance luxury and soft feelings.

SEAT

FRONT SEAT

M2520004000996



AC609378AB

The front seats offer the following advantages.

- The cross frame has been installed below the seat cushion to reduce a risk of injury by restraining the forward travel of the passenger. (Waist position travel reduction frame structure)

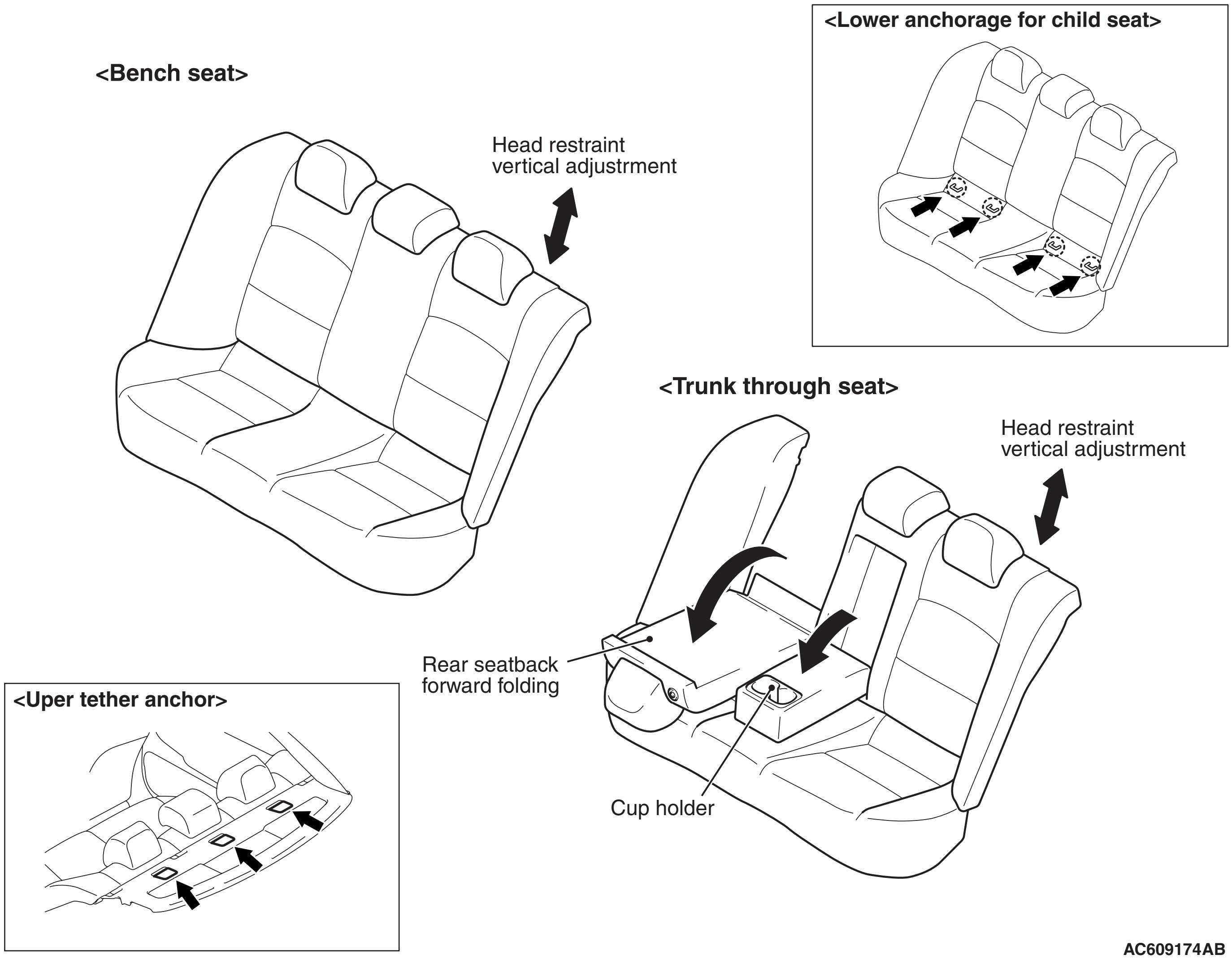
- The seat frame and head restraint have been installed to the proper positions to minimize the severity of whiplash injury at rear-end collision at a low speed. (Whiplash injury reduction seat structure)
- The overall height mechanism raises and lowers the seat cushion together with the seatback, thus the driver's posture is always kept at the best position, resulting in the improved riding comfort.
- The pump-type height lever has been adopted for easier operation with a light force by the vertical adjustment system. Also, the height adjustment amount has been increased for more optimum driving position.
- The variable hardness pad has been adopted for the sporty-look seat with increased bucket amount of side bolster in order to establish the sporty shape with support function <GTS>, and the standard shape which is basic and for actual use and comfortable driving.
- Heated seats are available for the driver's and passenger's seats. <ES, GTS: Option>
- The genuine leather for the seat has been upgraded to enhance the texture and luxury feeling. <GTS: Option>

SPECIFICATIONS FOR HEATED SEAT

Item		Specifications
ENERGY CONSUMPTION W	HIGH	61 ± 6.1
	LOW	16 ± 1.6
THERMOSTAT °C	ON → OFF	40 ± 4
	OFF → ON	30 ± 5

REAR SEAT

M2520007000605



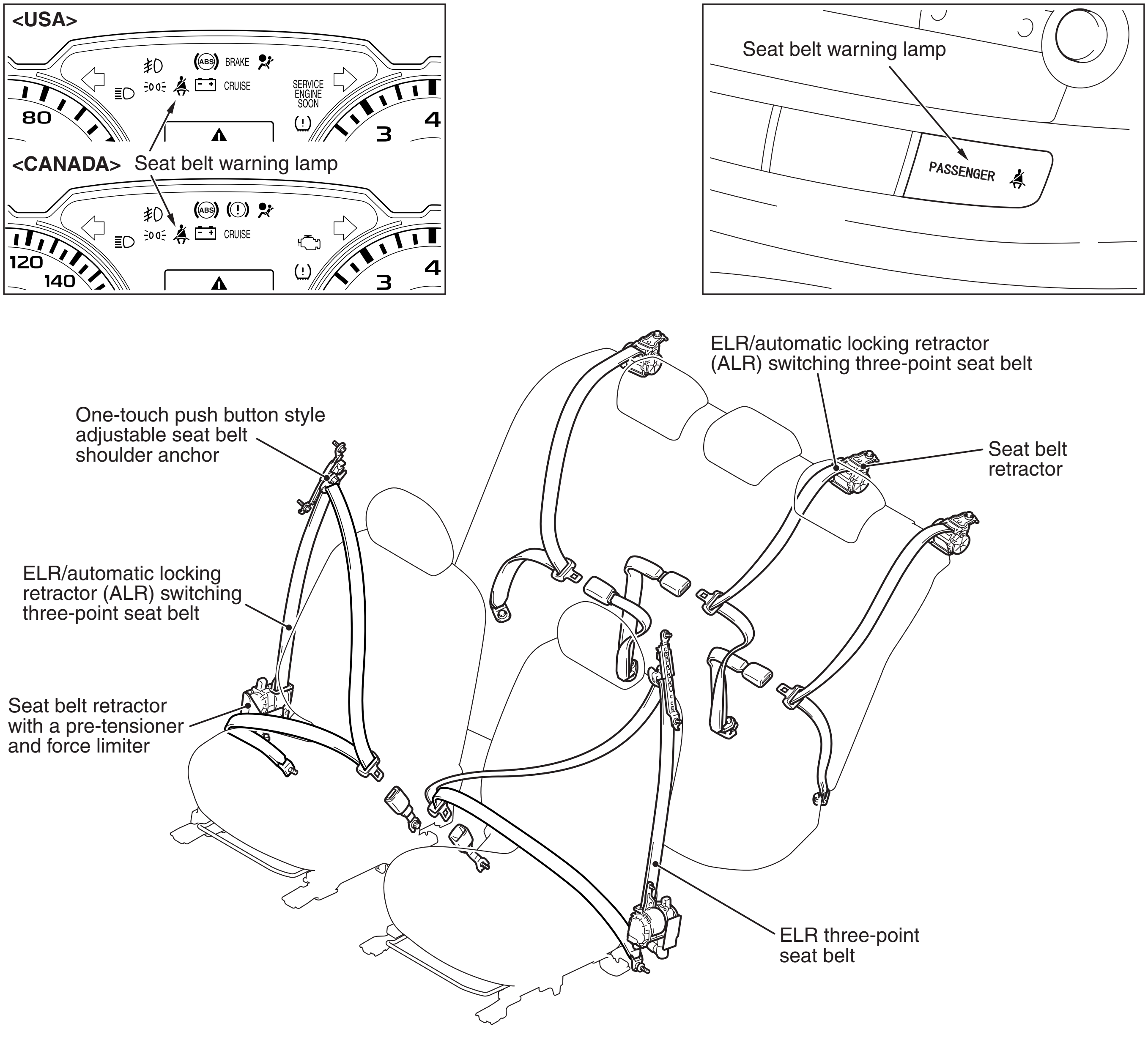
AC609174AB

A low-back bench seat is used for rear seat. The rear seat offer the following advantages:

- The center armrest has a cup holder.
- An upper tether anchor has been installed on the rear shelf trim, and an ISO-FIX lower anchor has been installed on the body side.

SEAT BELT

M2520010000683



AC608590AB

FRONT SEAT BELT

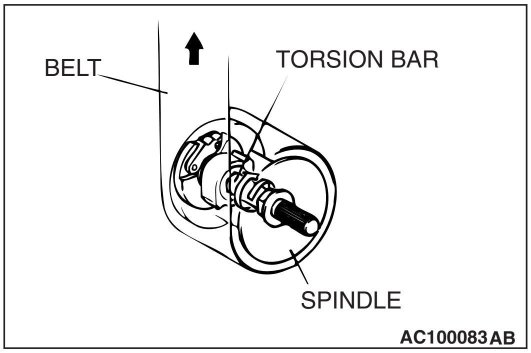
- An ELR three-point seat belt (driver's side) and three-point seat belt with ELR/ALR changeover mechanism (passenger's side) is used.
- One-touch push button style adjustable seat belt anchor and retractable buckle provide the most suitable belt fitting.
- The seat belt retractor with the force limiter for the driver’s seat and the front passenger’s seat increase safety.
- A seat belt warning light is installed to the driver’s and passenger’s seat.

REAR SEAT BELT

- 3-point seat belt with Automatic Locking Retractor (ALR)/ELR changeover mechanism (LH/RH/Center) is used for the rear seat.

SEAT BELT RETRACTOR WITH FORCE LIMITER

The driver’s/front passenger’s seat belt retractor has been equipped with a force limiter. The force limiter is a device which operates when a predetermined force is applied, and limits the force.



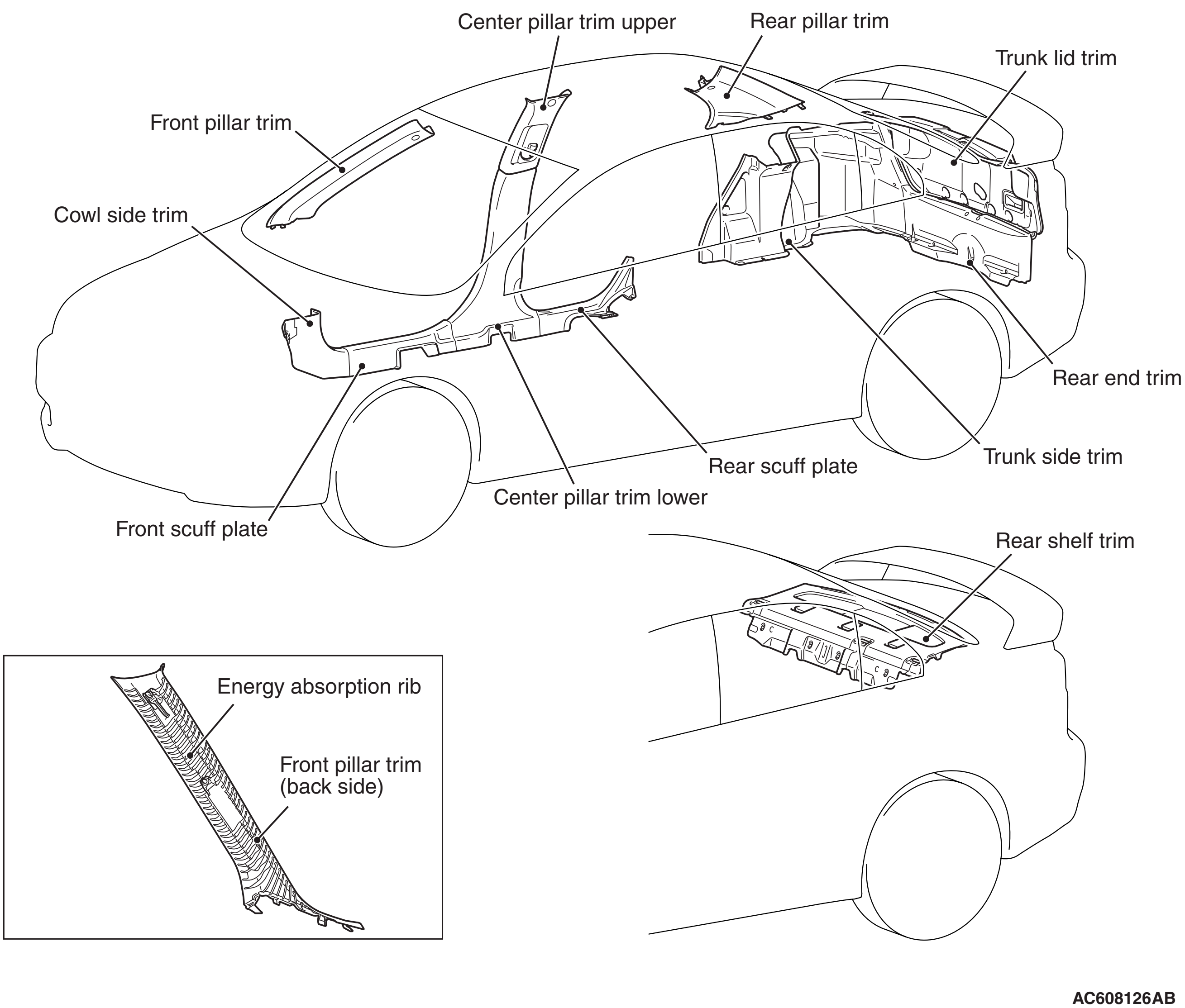
OPERATION

1. If a collision energy is transmitted to the seat belt, the ELR mechanism will operate to lock the seat belt.
2. If the energy increases to a predetermined value, the torsion bar will be distorted. As the spindle rotates together with the torsion bar, the seat belt webbing is pulled out, reducing the impact to the occupants.

TRIMS

INTERIOR TRIMS

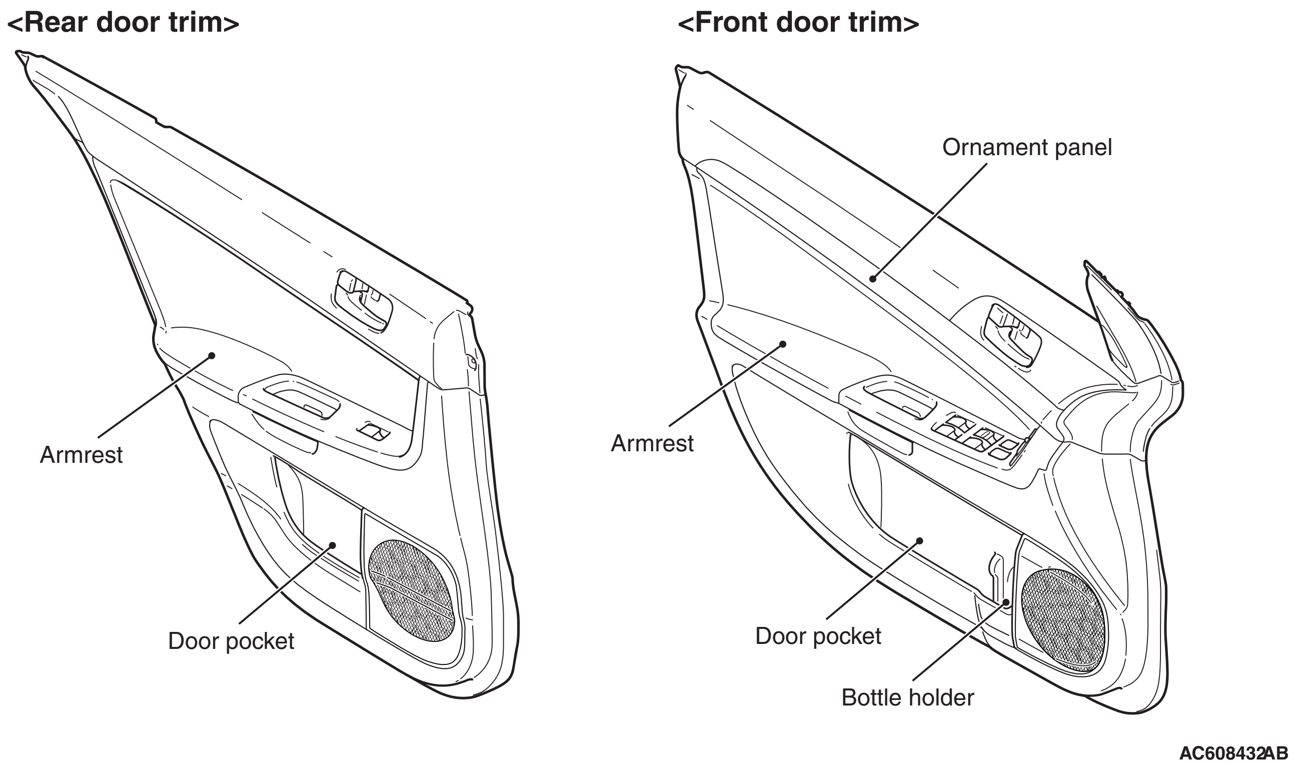
M2520012000559



- The interiors are fully covered by trims.
- The energy absorption rib molding located in the back side of the front pillar trim and the rear pillar trim protect head from side impacts and the resin materials for the trims are unbreakable materials.
- Use of nonflammable materials for the trims has increased safety as outstanding interiors. Also, material codes are indicated to deal with recycling easily.

DOOR TRIM

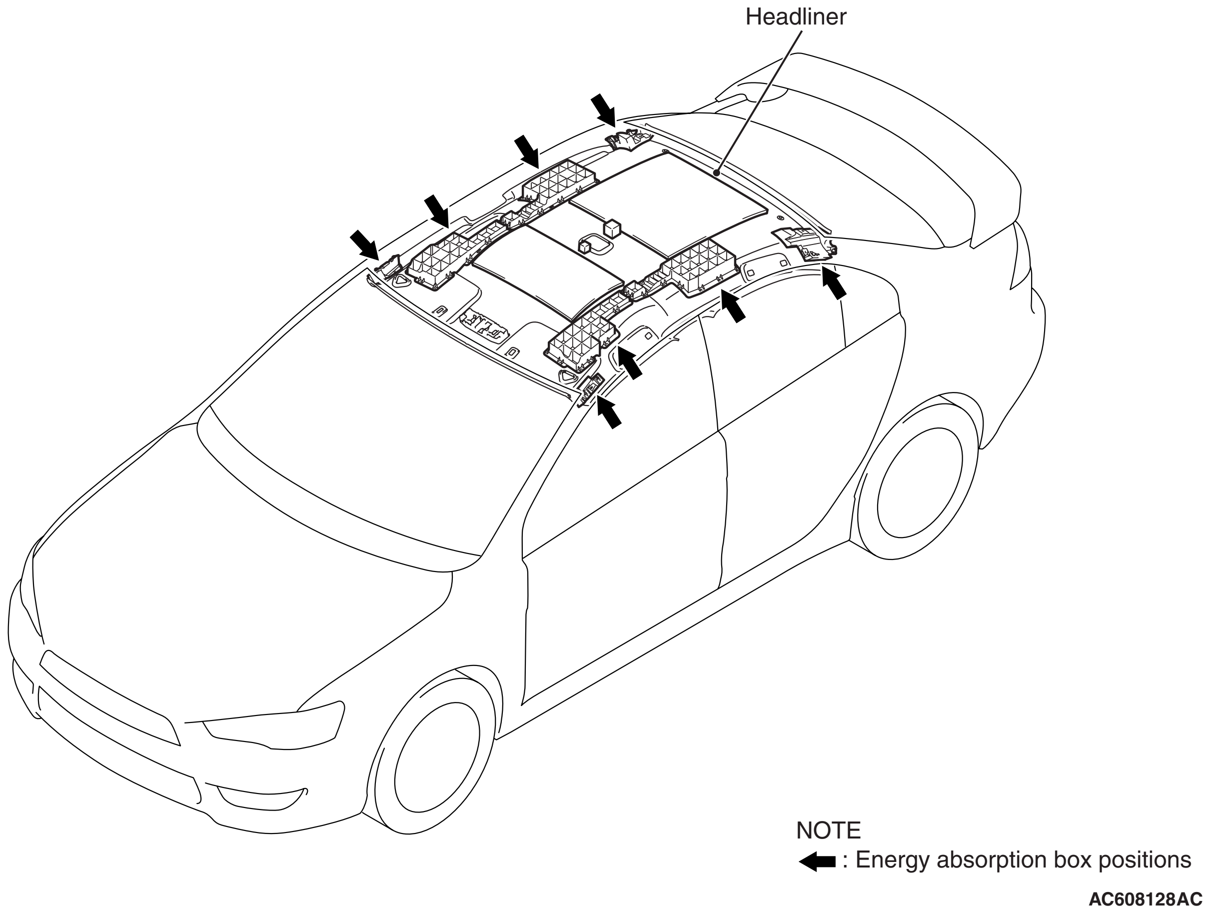
M2520012300594



- The decorated panel has been adopted for the front door trim.
- The bottle holder for bottles with shapes that are difficult to keep upright has been adopted for the front door pocket.
- The front door pocket with a large capacity has been adopted for items such as A4-size map. Also, the rear door pocket has been added.
- The shock absorbing arm rest has been adopted which reduces the mid section injuries to passengers by collapsing upon side impact.
- The arm rest which is formed with cloth has been adopted to create a continuous flow with the ornament section.

HEADLINING

M2520014000306



Interior design with safe material has been adopted, achieving more safe and comfortable interior.

- Energy absorption pad and rib have been adopted to the inside of headliner. This reduces head injuries upon the secondary impact against the cabin during a collision, and improves safety.

GROUP 17

ENGINE AND EMISSION CONTROL

CONTENTS

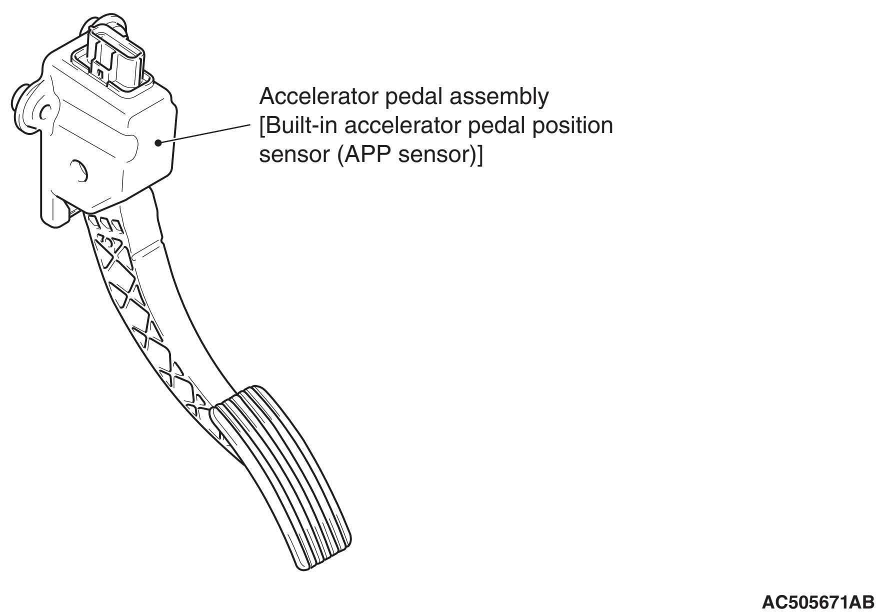
ENGINE CONTROL

GENERAL INFORMATION

M2170001000659

For the accelerator system, an electronic throttle valve control system has been adopted, disposing of an accelerator cable. This system detects the accelerator pedal travel by using a accelerator pedal position sensor (APP sensor) in the accelerator pedal assembly for electronic control of the throttle valve angle.

CONSTRUCTION DIAGRAM



AUTO-CRUISE CONTROL SYSTEM

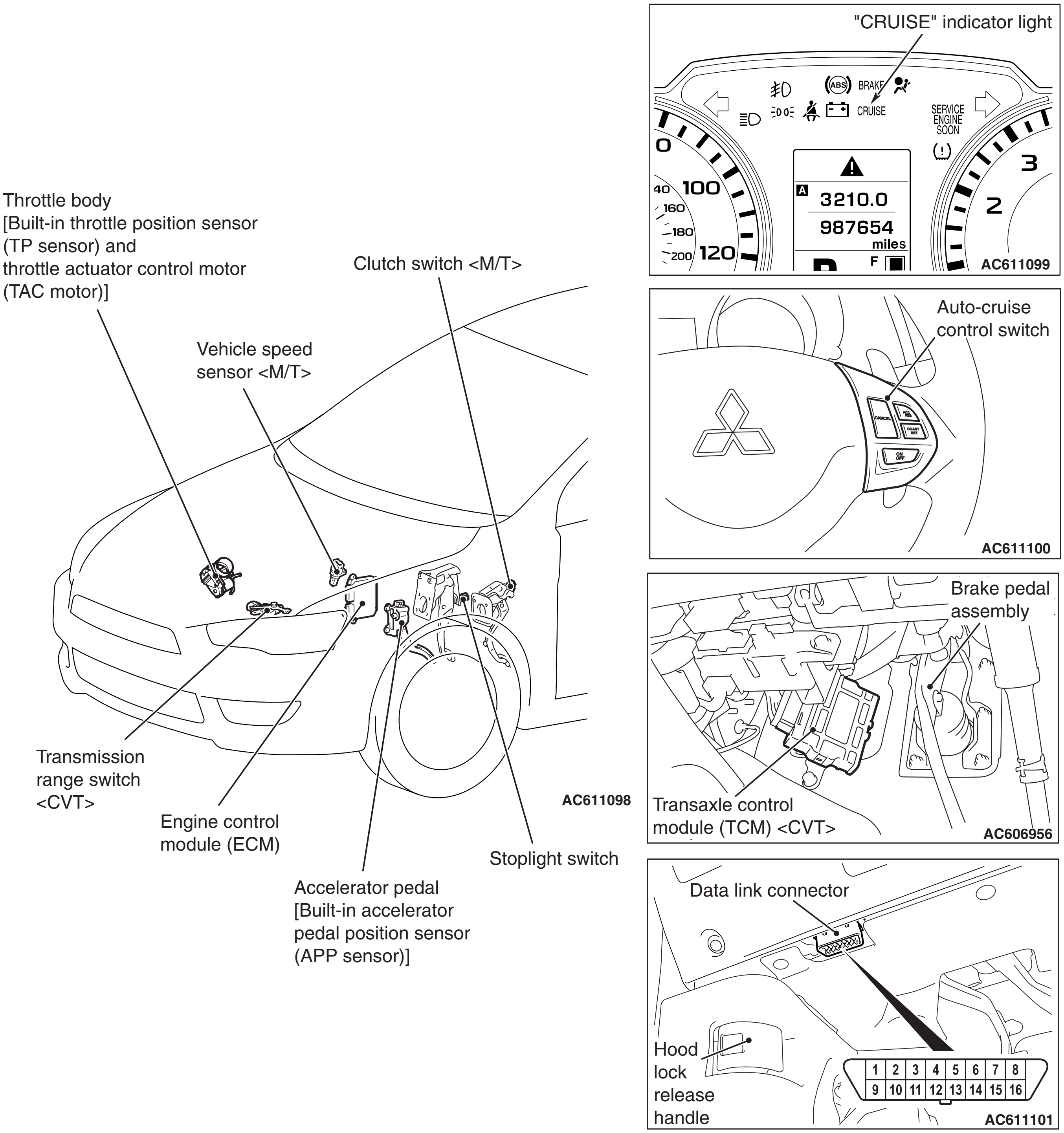
GENERAL INFORMATION

M2170001000682

By using the auto-cruise control system, the driver can drive at preferred speeds in a range of approximately 40 to 200 km/h (25 to 125 mph) without depressing the accelerator pedal.

For this auto-cruise control system, in conjunction with the electronic throttle valve control system, the engine control module (ECM) electronically controls the throttle valve.

CONSTRUCTION DIAGRAM


"CRUISE" indicator light
AC611099
Auto-cruise control switch
AC611100
Throttle body [Built-in throttle position sensor (TP sensor) and throttle actuator control motor (TAC motor)]
Clutch switch <M/T>
Vehicle speed sensor <M/T>
Transmission range switch <CVT>
Engine control module (ECM)
Accelerator pedal [Built-in accelerator pedal position sensor (APP sensor)]
Stoplight switch
AC611098
Brake pedal assembly
Transaxle control module (TCM) <CVT>
AC606956
Data link connector
Hood lock release handle
AC611101

AC611102 AD

COMPONENTS AND FUNCTIONS

Component		**Function**
Accelerator pedal position sensor (APP sensor)		Informs the ECM of the accelerator pedal depression.
Auto-cruise control switch	"ON/OFF" switch	Power switch for auto-cruise control system.
	"ACC/RES" switch	Vehicle speed is set with the "ACC/RES" switch and "COAST/SET" switch.
	"COAST/SET" switch	
	"CANCEL" switch	Cancels the cruise speed setting.
Cancel system	Clutch switch <M/T>	Because the constant speed driving is cancelled by the clutch operation, the clutch pedal status is detected.
	Stoplight switch	• Because the constant speed driving is canceled by the brake operation, it detects the brake pedal status. • As for the stoplight switch, two built-in switches, the stoplight switch which is also used for the stoplight illumination and the brake switch which is used exclusively for the auto-cruise control, are integrated, and thus the reliability is enhanced.
	Transmission range switch <CVT>	Because the constant speed driving is cancelled by the selector lever operation, it detects the "N" position.
"CRUISE" indicator light		The light is included in the combination meter and illuminates when the "ON/OFF" switch is pressed (auto-cruise control system: ON).
Data link connector		If the M.U.T.-III scan tool is connected, the input check code from the ECM can be read.
Engine control module (ECM)		• Based on the input signal from each sensor and switch, it outputs the throttle opening instruction signal to the TAC motor. • Based on the input signal from each sensor and switch, it outputs the transaxle control signal to the TCM <CVT>. • Based on the vehicle speed signal from the vehicle speed sensor, it calculates the vehicle speed <M/T>. • Based on the secondary pulley speed sensor signal from the TCM, it calculates the vehicle speed <CVT>. • Based on the selector lever "N" position signal of the transmission range switch from the ECM, it cancels constant speed driving. <CVT>. • Outputs the ON/OFF signals of "CRUISE" indicator light and auto-cruise control system. • The diagnostic trouble code signal is sent to the "CRUISE" indicator light. • The input check code is sent to the data link connector.
Throttle actuator control motor (TAC motor)		The throttle valve opens and closes in response to the throttle angle signal from the ECM.

Component	Function
Throttle position sensor (TP sensor)	Informs the ECM of the throttle valve opening angle.
Transaxle control module (TCM) <CVT>	• Based on the transaxle control signal from the ECM, it controls the transaxle. • Outputs the signal from the secondary pulley speed sensor to the ECM. • Transmits the selector lever "N" position signal from the transmission range switch to the ECM.
Vehicle speed sensor <M/T>	Transmits the vehicle speed signal proportional to the vehicle speed to the ECM.

CONSTRUCTION AND OPERATION

M2170002000232

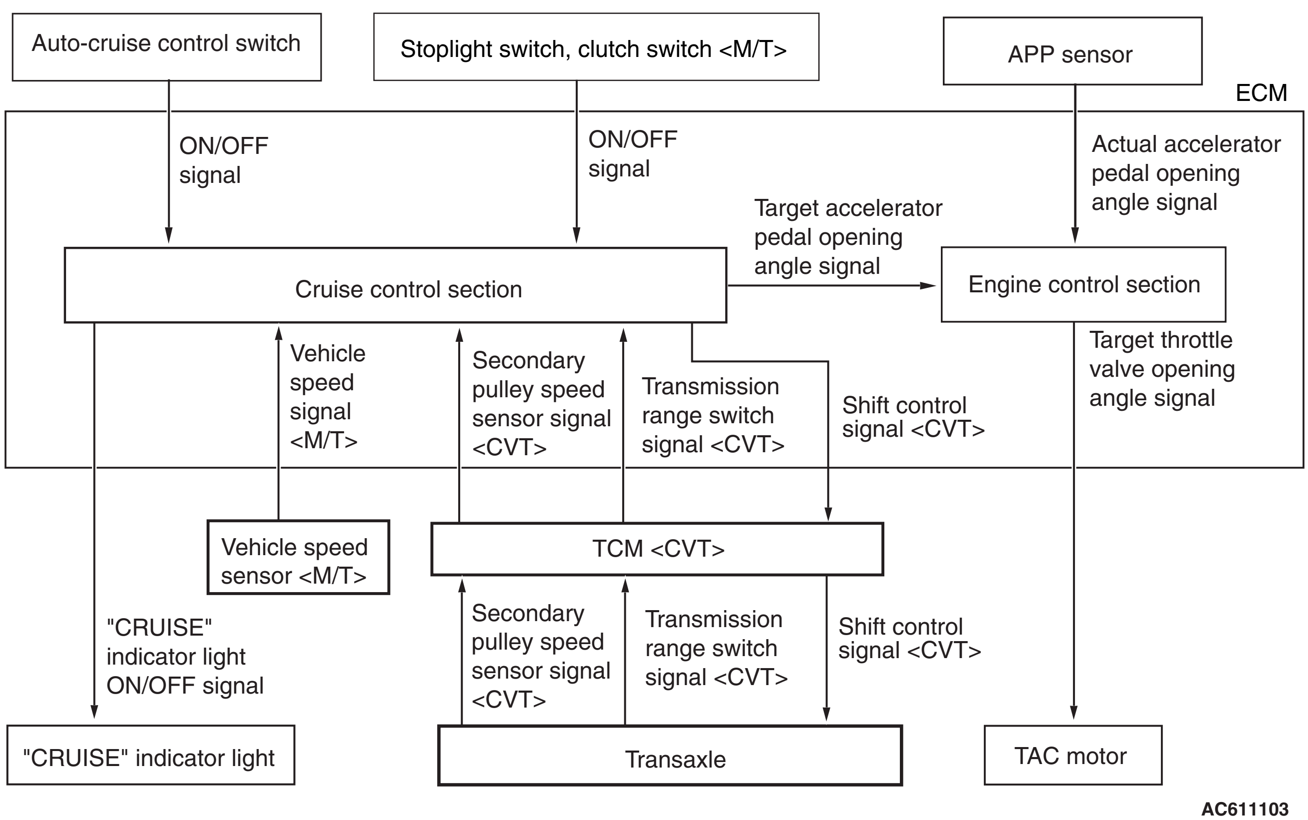
SYSTEM OUTLINE

The ECM calculates the auto-cruise control system operation status when the ECM receives input signals from the auto-cruise control switch, vehicle speed and cancel system [stoplight switch and clutch switch <M/T> or transmission range switch <CVT>].

The engine control section sends the target accelerator pedal opening angle value for auto-cruise control system, the TCM issues a command to transaxle control <CVT>, and the gauge issues an ON/OFF command for the "CRUISE" indicator light.

In the engine control section, the target throttle valve opening angle value is calculated from the target accelerator pedal opening angle value for auto-cruise control system and the actual accelerator angle value.The vehicle speed is then controlled by applying the TAC motor.

BLOCK DIAGRAM



SYSTEM FUNCTIONS

SET FUNCTION

1. During driving with the vehicle speed range from approximately 40 to 200 km/h (25 to 125 mph), press and release the "COAST/SET" switch.
2. The vehicle speed when the "COAST/SET" switch is released is memorized. Thereafter, the constant speed driving is performed at that vehicle speed.
3. When the "COAST/SET" switch is operated during the driving with the vehicle speed of approximately 200 km/h (125 mph) or more, the constant speed driving will not be performed.

COAST FUNCTION

1. When the "COAST/SET" switch is continuously pressed for 0.5 seconds or longer during constant speed driving, the throttle valve becomes fully closed while the switch is pressed, and the vehicle is decelerated.
2. When the "COAST/SET" switch is released, the vehicle speed at that time is now memorized. Thereafter, the constant speed driving is performed at that vehicle speed.
3. Also when the "COAST/SET" switch is pressed for less than 0.5 second, the vehicle is decelerated 1.6 km/h (1 mph) from the vehicle speed of constant speed driving, and the decelerated vehicle speed is now memorized. Thereafter, the constant speed driving is performed at that vehicle speed.
4. When the "COAST/SET" switch is continuously pressed and the vehicle speed is decelerated to approximately 40 km/h (25 mph) or less, the set function and coast function are cancelled, and the constant speed driving is cancelled.

RESUME FUNCTION

1. When the "CANCEL" switch is pressed or the brake pedal is depressed during the constant speed driving, it cancels the constant speed driving.
2. Subsequently, when the "ACC/RES" switch is pressed during driving with the vehicle speed of approximately 40 km/h (25 mph) or more, the constant speed driving is performed with the vehicle speed memorized at the last cancellation of constant speed driving.

ACCEL FUNCTION

1. When the "ACC/RES" switch is continuously pressed for 0.5 second or more during constant driving, it accelerates the vehicle with specified acceleration while the switch is pressed.
2. Then, when the "ACC/RES" switch is released, the vehicle speed at that time is now memorized. Thereafter, the constant speed driving is performed at that vehicle speed.
3. Also, when the "ACC/RES" switch is pressed for less than 0.5 second, the vehicle is accelerated 1.6 km/h (1 mph) from the vehicle speed of constant speed driving, and the accelerated vehicle speed is now memorized. Thereafter, the constant speed driving is performed at that vehicle speed.
4. It is possible to keep pressing the "ACC/RES" switch until the vehicle speed is accelerated to approximately 200 km/h (125 mph) or above. However, after the "ACC/RES" switch is released, the vehicle speed of approximately 200 km/h (125 mph) becomes the newly memorized vehicle speed. Thereafter, the constant speed driving is performed at that speed.

CANCEL FUNCTION

When any of the following conditions are satisfied, the constant speed driving will be cancelled.

- The auto-cruise control system is stopped by the pressing the "ON OFF" switch.
- The "CANCEL" switch is pressed.
- The brake pedal is depressed.
- The clutch pedal is depressed <M/T>.
- The selector lever is shifted to the "N" position <CVT>.
- The vehicle speed becomes approximately 40 km/h (25 mph) or less.
- The vehicle speed is reduced 15 km/h (9 mph) or more from the speed at which the constant speed driving was started.
- An abnormality occurs in the vehicle speed signal.
- The engine coolant temperature becomes abnormally high.
- An abnormality occurs to the ECM.
- An abnormality occurs to the TCM <CVT>.
- An abnormality occurs to the CAN communication.

FAIL-SAFE FUNCTION

When any of the following conditions are satisfied, the auto-cruise control system function is stopped until the system returns to normal. Also, when any of the conditions are satisfied during the constant speed driving, the constant speed driving is cancelled immediately.

- An abnormality occurs to the auto-cruise control switch.
- An abnormality occurs to the stoplight switch.

When any of the following conditions are satisfied, stop the vehicle once and turn the ignition switch to "LOCK" (OFF). Otherwise, even when the system returns to normal, the auto-cruise control system function will continue to be stopped. Also, when any of the conditions are satisfied during the constant speed driving, the constant speed driving is cancelled immediately.

- ECM abnormality
- TP sensor abnormality
- APP sensor abnormality

DIAGNOSIS FUNCTION

- The diagnostic trouble code check is possible with the "CRUISE" indicator light.
- To facilitate the system check, check the service data output with the M.U.T.-III.

NOTE: For diagnostic items, service data output items, and check method, refer to the Service Manual.

EMISSION CONTROL

GENERAL DESCRIPTION

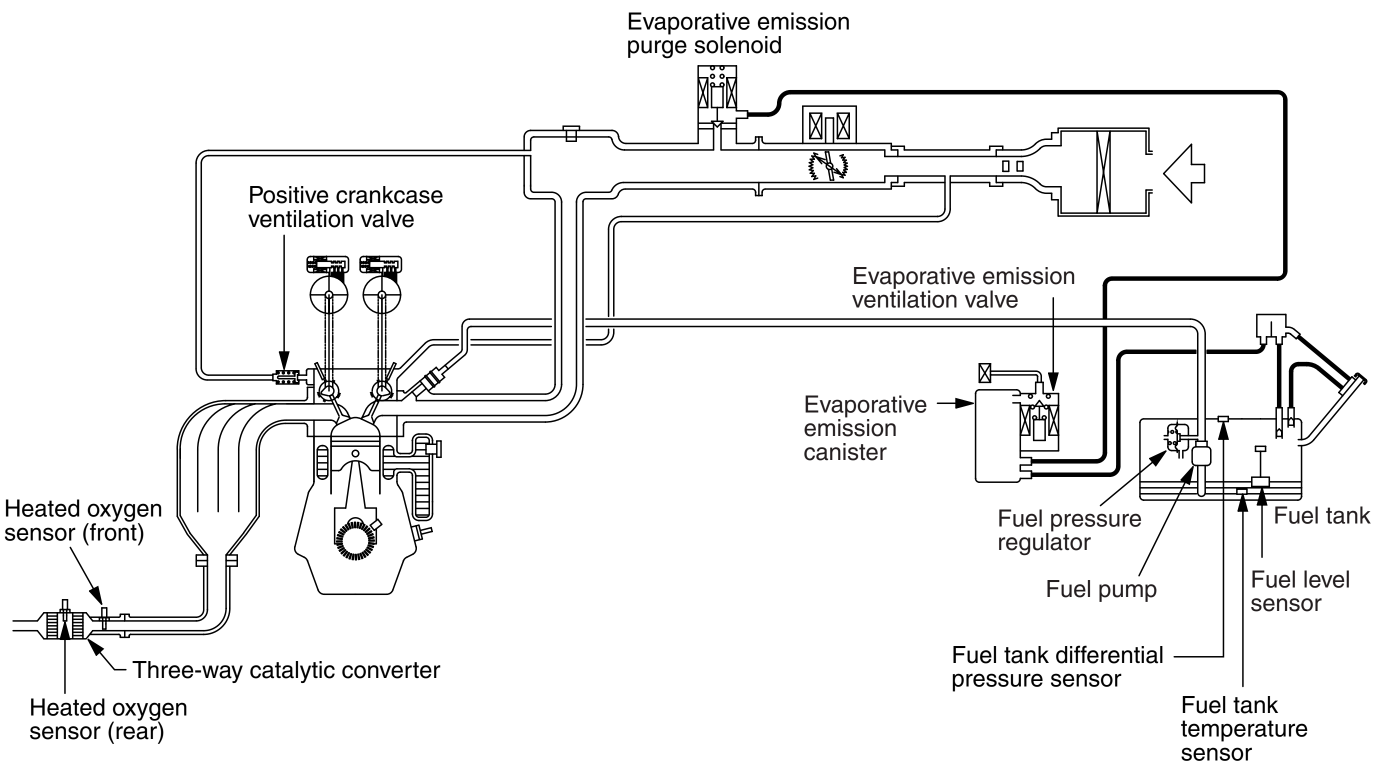
M2171000101024

The following changes have been made to the controls of the 2.4L engine provided on the GALANT.

Improvement / Additions	Remark
Addition of HC trap catalytic converter <California>	HC decrease

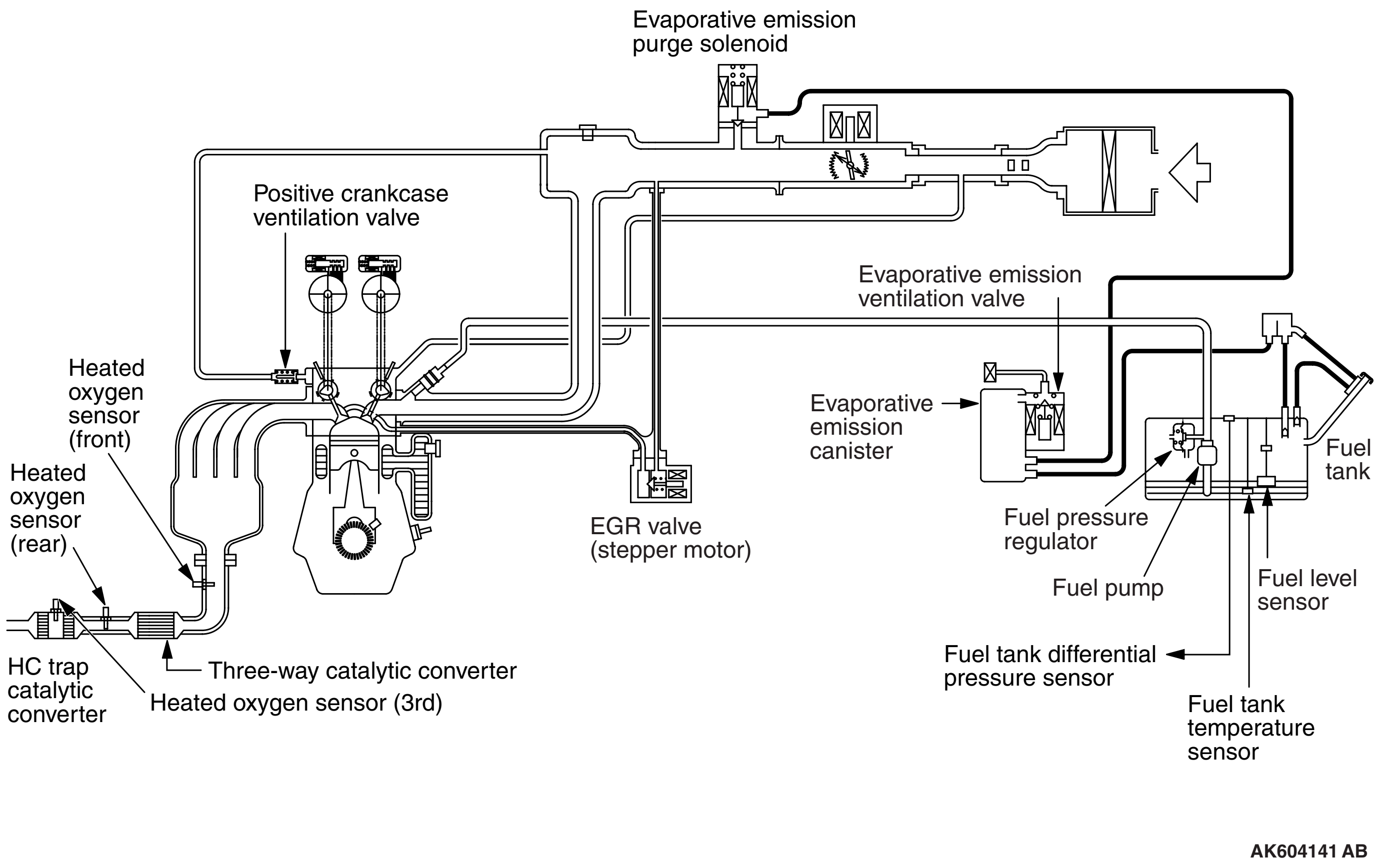
SYSTEM CONFIGURATION DIAGRAM

<Except for California>



AK604140AB

<California>



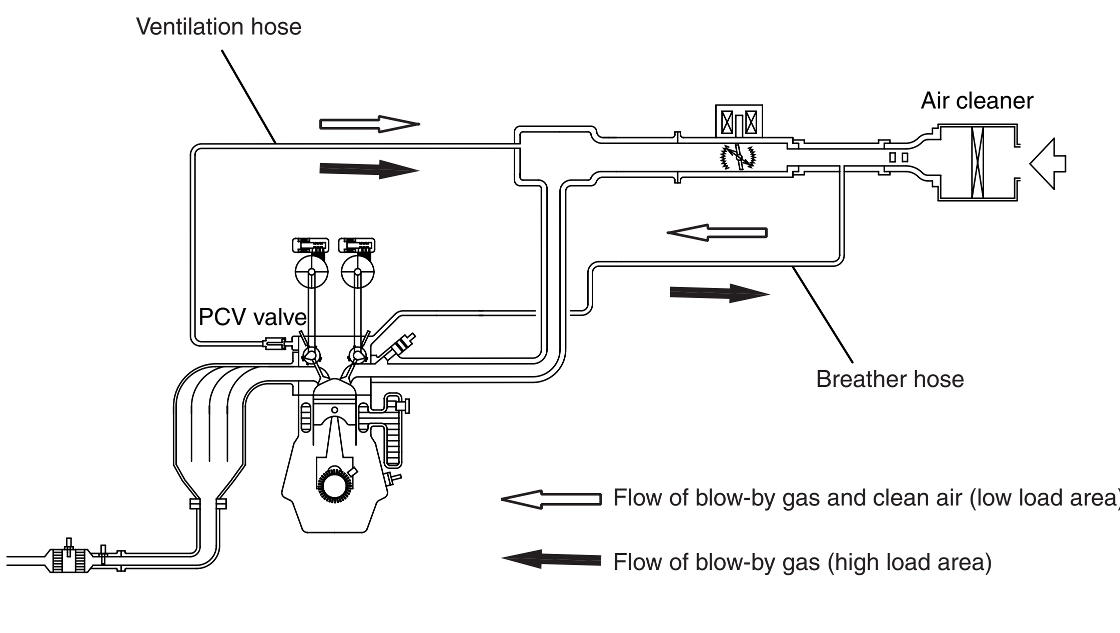
Exhaust gas cleaning devices list

System	Objective / Function	Composition parts
Crankcase ventilation system	HC decrease Re-combustion of blow-by gas.	Positive crankcase ventilation (PCV) valve
Evaporative emission control system	HC decrease Re-combustion of fuel vapor gas.	• Canister • Evaporative emission purge solenoid
Exhaust gas recirculation (EGR) system <California>	NOx decrease Reduce NOx generation by controlling EGR volume according to engine warm-up condition and driving conditions.	EGR valve

System		Objective / Function	Composition parts
Emission reduction systems	Air-fuel ratio feedback control	Decrease of CO, HC and NOx Controls air-fuel ratio of air-fuel mixture to become theoretical air-fuel ratio (about 14.7), which is when the 3-way catalytic converter's cleaning performance is best. It also controls optimum fuel supply based on coolant temperature, driving conditions etc.	• ECM • Mass airflow sensor • Injectors • Heated oxygen sensor • Crankshaft position sensor etc.
	Catalytic converter	Decrease of CO, HC and NOx It facilitates oxidation of CO and HC and reduction of NOx so that all 3 component gases are cleaned simultaneously.	Monolith catalyst
	HC trap catalytic converter <California>	HC decrease During cold operation of engine, exhaust HC is temporarily absorbed. And then Exhaust HC is released when temperature reaches to level at which catalyst is activated. This allows HC to be reduced.	Monolith catalyst

CRANKCASE VENTILATION SYSTEM

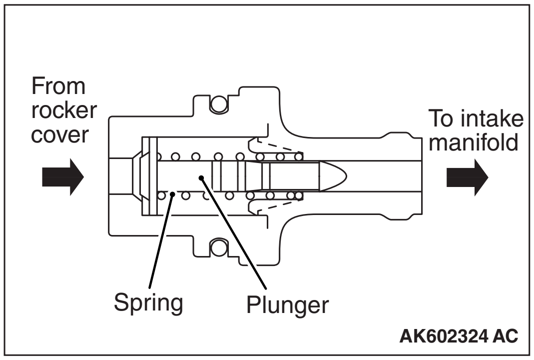
M2171000400129



AK604142AB

A blow-by gas reduction device prevents blow-by gas from being expelled into the atmosphere and is of closed type. A positive crankcase ventilation (PCV) valve is provided in the ventilation hose from the rocker cover to the intake manifold. During low load driving, clean air is supplied to the crankcase by the air intake hose via the breather hose and rocker cover, and it mixes with the blow-by gas in the crankcase. The blow-by gas in the crankcase is induced to the intake manifold through the rocker cover and PCV valve. During high load driving, blow-by gas in the crankcase is induced to the intake manifold through the rocker cover and PCV valve and at the same time also via the air intake hose and throttle body due to negative pressure in the air cleaner.

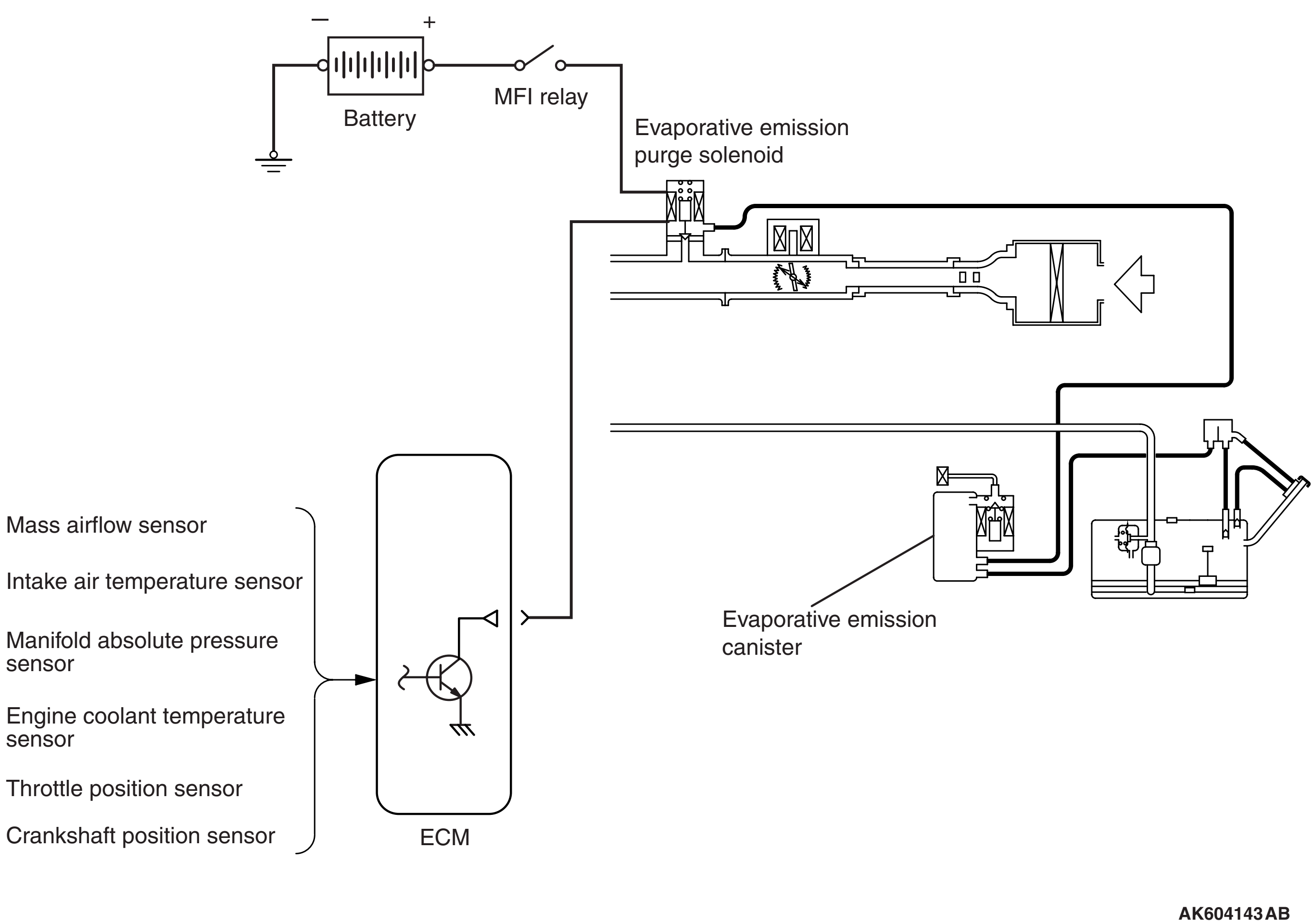
POSITIVE CRANKCASE VENTILATION (PCV) VALVE



PCV valve lifts the plunger according to negative pressure in the intake manifold to create appropriate ventilation for the crankcase.

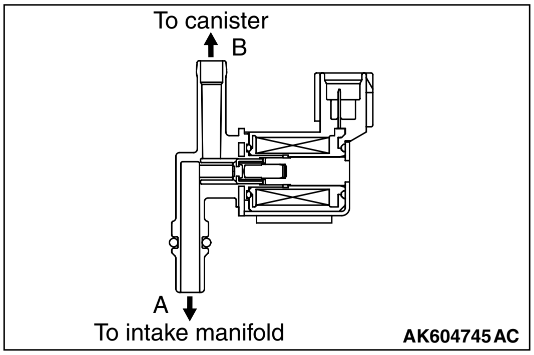
EVAPORATIVE EMISSION CONTROL SYSTEM

M2171000200147

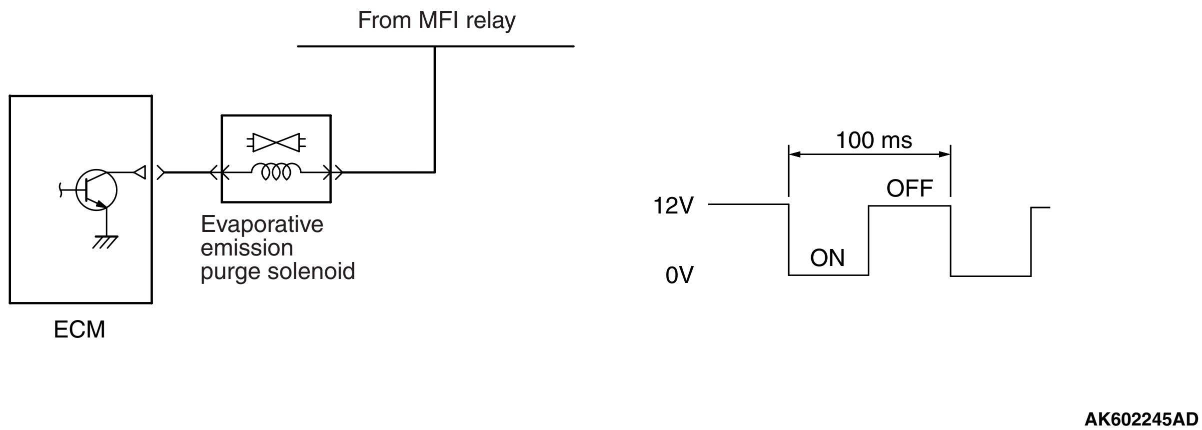


HC (hydrocarbon) generated in the fuel tank are adsorbed by the active carbon in the canister and stored. HC stored in the canister is introduced to the intake manifold when engine is in operation where it is mixed with intake air and combusted. ECM introduces optimum HC amount according to driving conditions and so performs duty control on the evaporative emission purge solenoid. Also, the evaporative emission purge solenoid is closed during deceleration or immediately after engine start to restrict change in air-fuel ratio and prevent engine from stalling.

EVAPORATIVE EMISSION PURGE SOLENOID

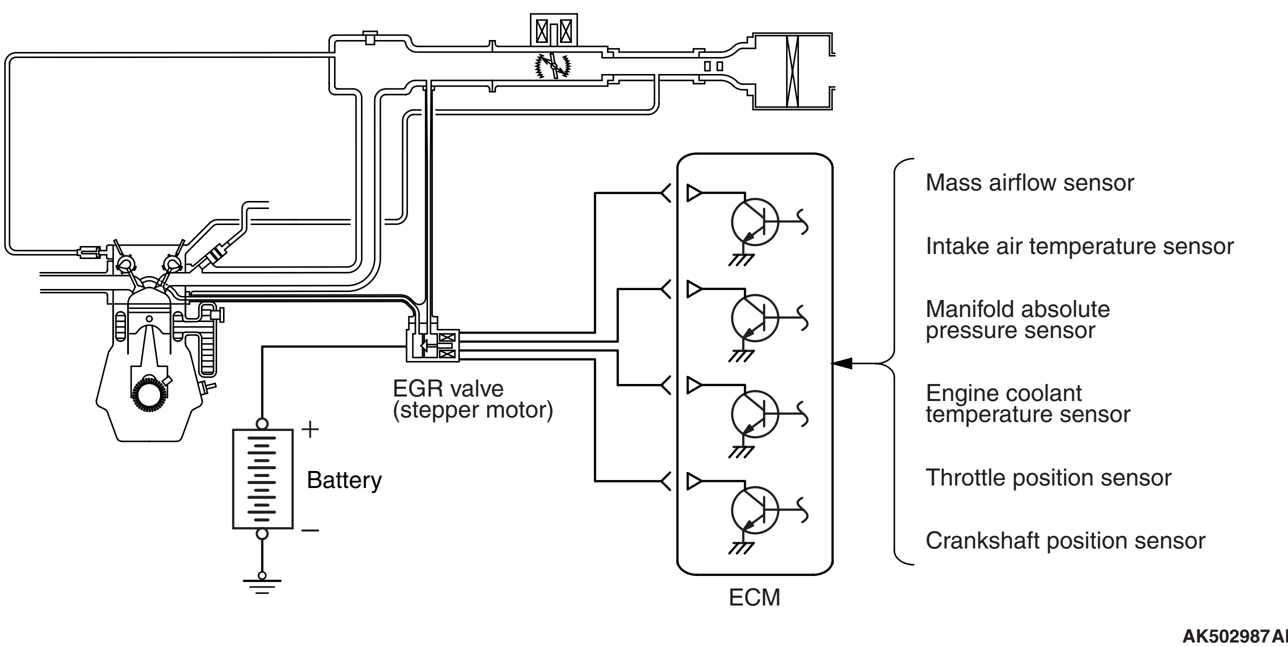


An evaporative emission purge solenoid is installed in the intake manifold.The evaporative emission purge solenoid controls the intake volume of fuel vapor gas from the canister. The evaporative emission purge solenoid is a duty control type solenoid valve. When current is not passing through the coil, nipple A is kept airtight and fuel vapor gas cannot be sucked in. When current passes through the coil, air can pass between nipple A and B and fuel vapor gas is sucked in. ECM changes the ON duty ratio according to engine's operating condition to control the intake volume of fuel vapor gas.



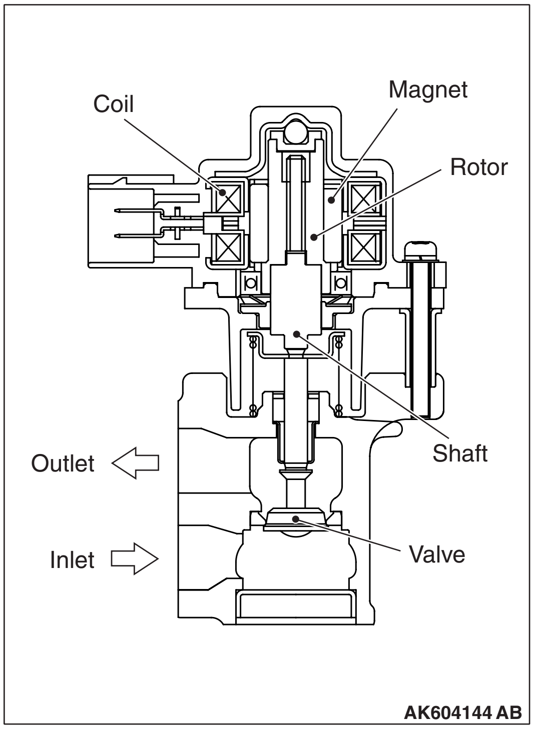
EXHAUST GAS RECIRCULATION (EGR) SYSTEM <California>

M2171000300122



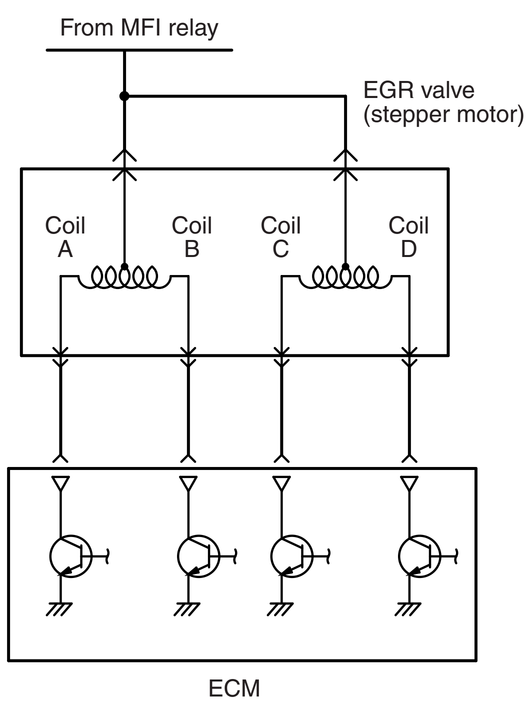
When the combustion gas temperature becomes high, generation of the environment polluting NOx (nitrogen oxides) increases rapidly. EGR system is used to decrease the volume of NOx generated. EGR system re-circulates exhaust gas inside the intake manifold. It increases specific heat of the combustion gases and reduces combustion speed to lower the combustion temperature and reduce the volume of NOx generated. ECM calculates the EGR introduction volume according to engine operating conditions and controls the EGR valve opening angle at optimum. Also, immediately after the ignition switch ON signal is input, it drives fully closed stepper motor and performs initialization.

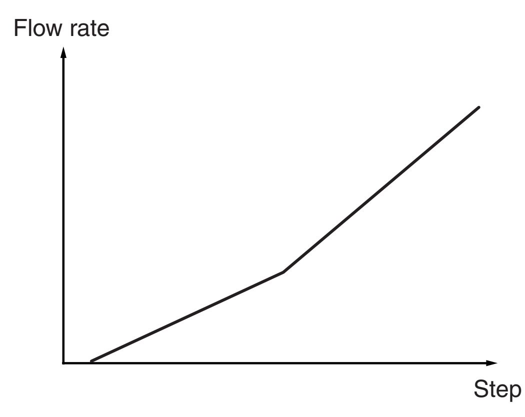
EXHAUST GAS RECIRCULATION (EGR) VALVE



An EGR valve is installed in the EGR valve support.The EGR valve controls EGR flow volume using the stepper motor method and reduces exhaust gas (NOx) and fuel consumption. The EGR valve drives the stepper motor based on the signal from ECM. When stepper motor rotor turns in clockwise or anti-clockwise direction, the shaft fitted with a rotor and a screw expands and contracts and the movement of the shaft causes the valve to go up and down. Thus, EGR path gap is controlled minutely. The stepper motor turns 15° per step. The stepper motor turns forward or back only up to the angle dictated by the number of pulse signals (number of steps) from the ECM. In other words, increase and decrease of the EGR flow volume depends on the number of signals (number of steps) from ECM. ECM changes current flow to the 4 coils (A, B, C, D) in the stepper motor in sequence according to the phase pattern in the following chart in order to turn the stepper motor rotor. Open valve changes phase in order of 0 →1 →2 →3 →0. Close valve changes phase in order of 3 →2 →1 →0 →3.

Phase number	Stepper motor coil			
	Coil A	Coil B	Coil C	Coil D
0	ON	OFF	OFF	ON
1	ON	OFF	ON	OFF
2	OFF	ON	ON	OFF
3	OFF	ON	OFF	ON





AK604145 AB

EMISSION REDUCTION SYSTEMS

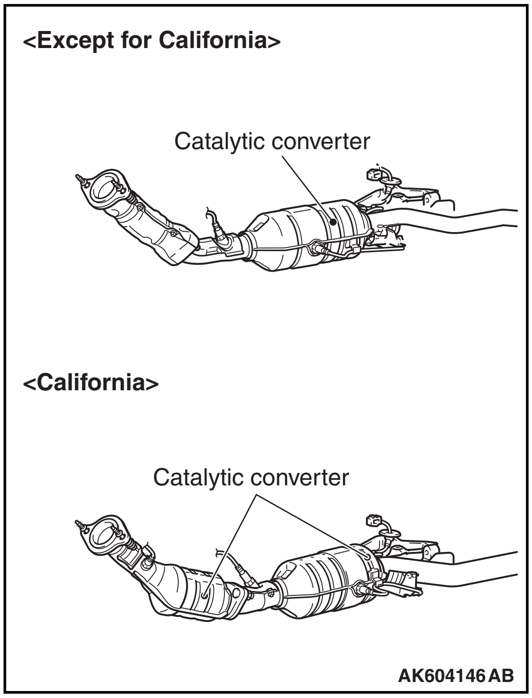
M2171000800064

These decrease CO, HC and NOx in the exhaust gases and consist of air-fuel ratio feedback control and catalytic converter.

1. AIR-FUEL RATIO FEEDBACK CONTROL

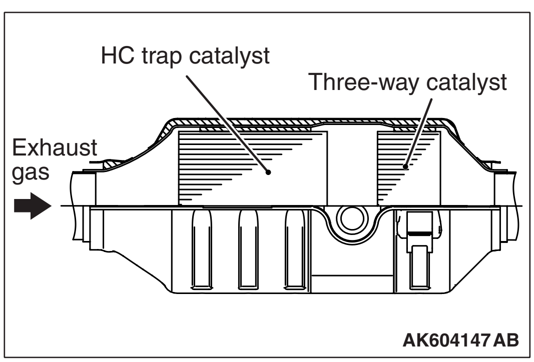
Refer to GROUP 13A –Fuel Injection Control P.13A-29.

2. CATALYTIC CONVERTER



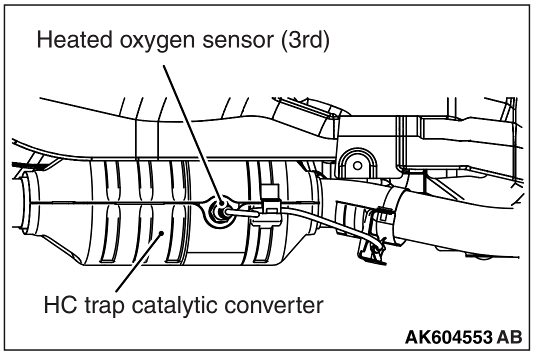
Catalytic converter is installed in the center of exhaust pipe below the floor and in the front of exhaust pipe <California>. Based on appropriate air-fuel ratio feedback from oxygen sensor, CO and HC are oxidized and NOx is reduced. Catalytic converter is a monolith with beehive design with catalysts on the unit surface. It is protected by a thermally insulating mat and enclosed in a shell.

3. HC TRAP CATALYTIC CONVERTER <California>



The HC trap catalytic converter is installed in the center of exhaust pipe below the floor. The HC trap catalytic converter consists of the HC trap catalyst and the three-way catalysts, which are the monolith type; the catalyst element is attached to the honeycomb catalyst surface. The HC trap catalyst and the three-way catalysts are held by the heat-insulating mat and installed in the shell. The HC trap catalyst temporarily absorbs the exhaust HC from the engine within the temperature range in which the three-way catalyst is not activated, and prevents the exhaust HC from releasing outside the vehicle. After that, the HC trap catalyst temperature rises and releases the absorbed HC. The released HC is burnt out in the downstream three-way catalyst.

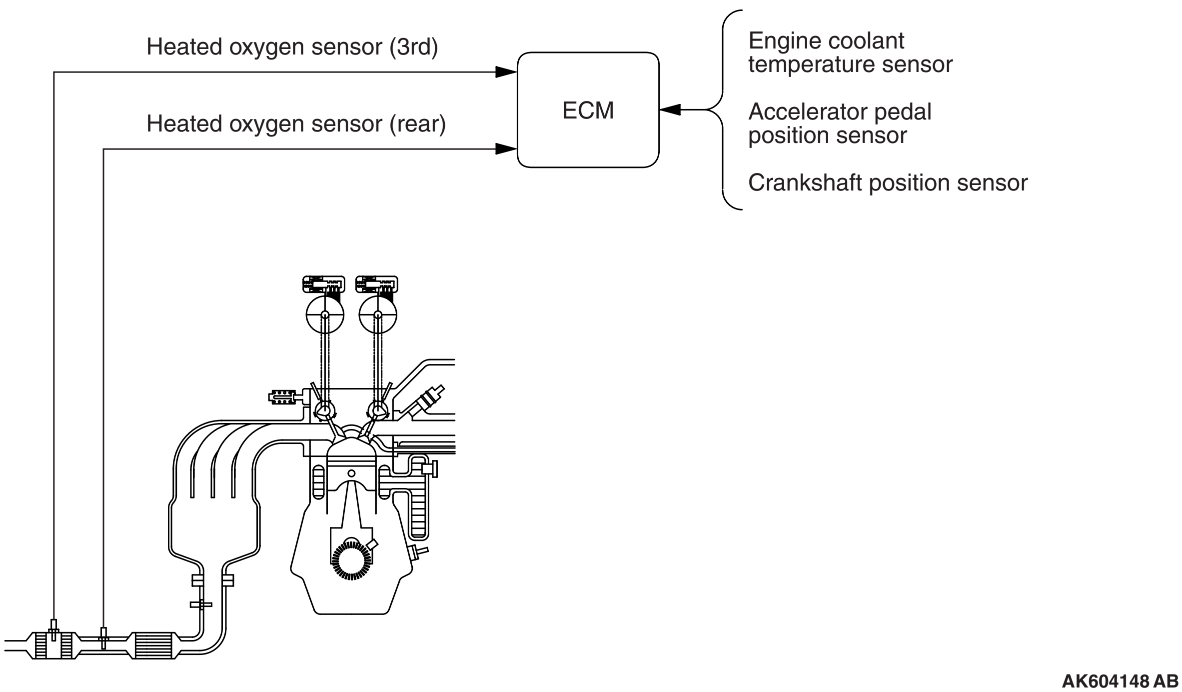
HEATED OXYGEN SENSOR (3RD)



The heated oxygen sensor (3rd) is installed to the HC trap catalytic converter. The heated oxygen sensor (3rd) detects the oxygen density of the exhaust gas and outputs the voltage to the ECM in accordance with the oxygen density.

The ECM uses this output voltage to detect the deterioration of the HC trap catalytic converter. The structure of the heated oxygen sensor (3rd) is the same as that of the heated oxygen sensor (rear) installed in the exhaust pipe.

HC TRAP CATALYTIC CONVERTER DETERIORATION MONITOR



The ECM detects the deterioration of the HC trap catalytic converter.

When reaching the certain operating range, the ECM begins monitoring the difference in the feedback time between the heated oxygen sensor (rear) on the upstream of the HC trap catalyst and the heated oxygen sensor (3rd) on the downstream of the HC trap catalyst. This monitoring allows the ECM to detect the deterioration of the HC trap catalytic converter.

NOTES

GROUP 21B

CLUTCH OVERHAUL

CONTENTS

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1212001800604

Item	Specification
Clutch cover mounting bolt	18 ± 3 N· m (13 ± 2 ft-lb)
Concentric slave cylinder mounting bolt	10 ± 2 N· m (89 ± 17 in-lb)

GENERAL SPECIFICATIONS

M1212000200762

Item	Specification
Clutch operating method	Hydraulic type
Clutch disc type	Single dry disc type
Clutch disc size OD x ID mm (in)	255 x 155 (10.03 × 6.10)
Clutch cover type	Diaphragm spring type
Clutch cover setting load N (lb)	4320 ± 350 (971 ± 78)

SERVICE SPECIFICATIONS

M1212000300457

Item	Limit
Diaphragm spring end height difference mm (in)	0.5 (0.019)
Clutch disc facing rivet sink mm (in)	Minimum 0.3 (0.012)

LUBRICANTS

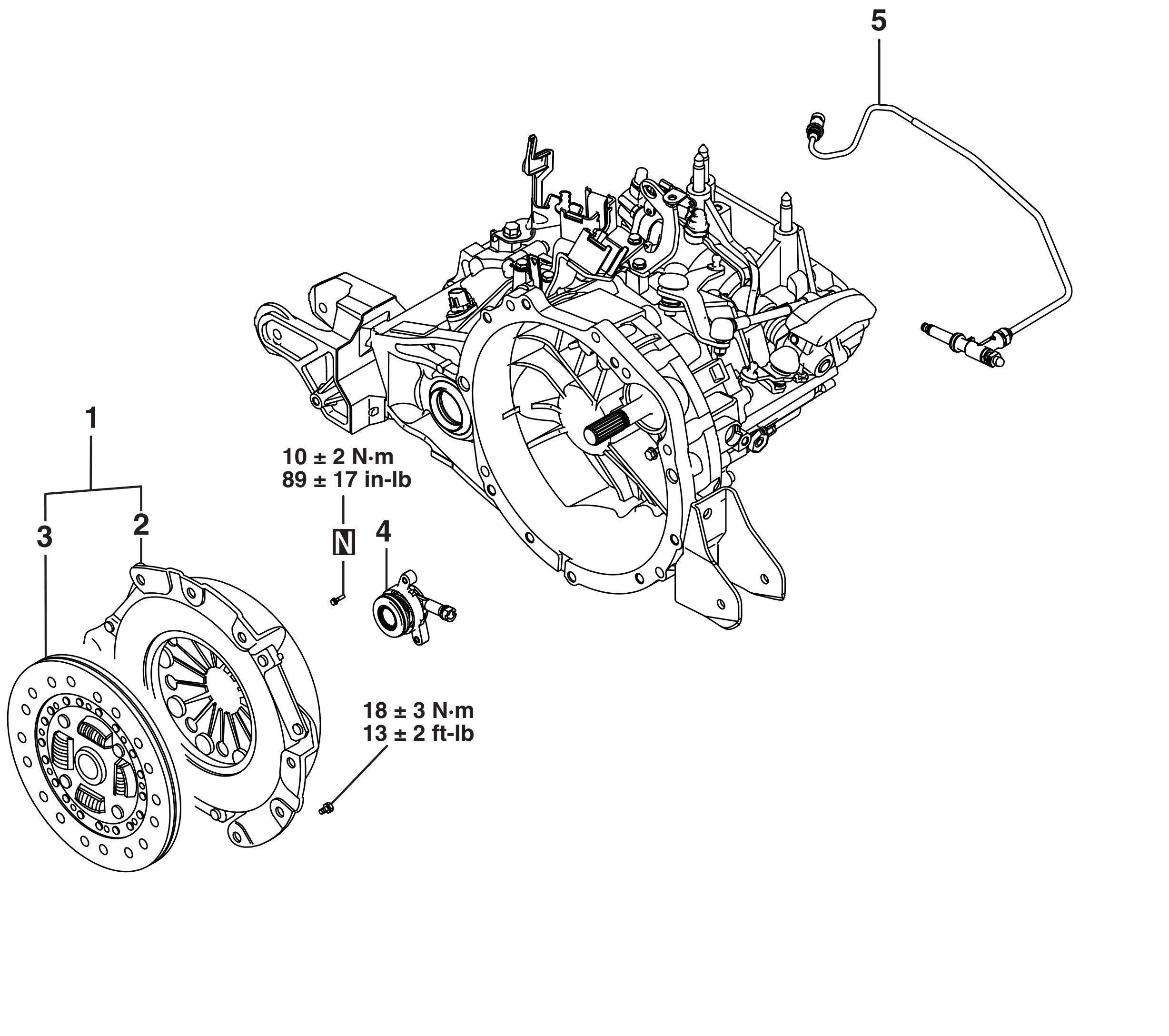
M1212000400506

Item	Specified lubricant
Clutch fluid	Brake Fluid DOT 3 or DOT 4
Clutch disc splines	Mitsubishi Part No. 0101011 or equivalent

CLUTCH

REMOVAL AND INSTALLATION

M1212001000749

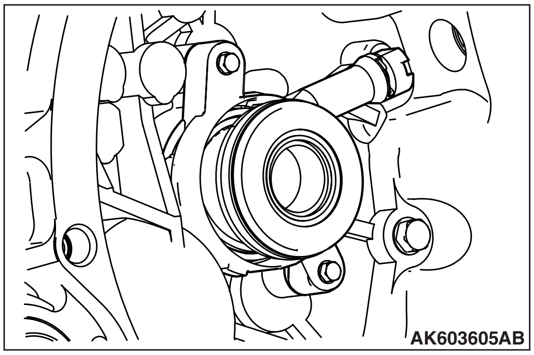


		Removal steps
>>**B**<<	1.	Clutch set
	2.	Clutch cover
	3.	Clutch disc

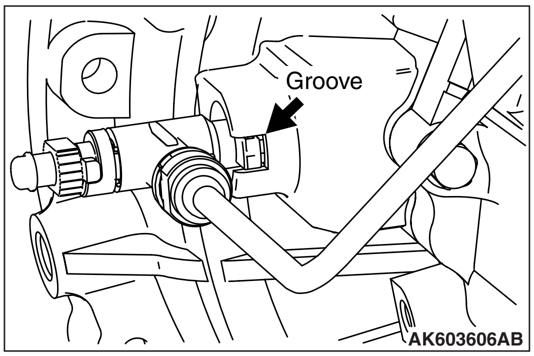
		Removal steps (Continued)
>>**A**<<	4.	Concentric slave cylinder adapter
>>**A**<<	5.	Concentric slave cylinder

INSTALLATION SERVICE POINTS

>>A<< CONCENTRIC SLAVE CYLINDER/CONCENTRIC SLAVE CYLINDER ADAPTER INSTALLATION



1. After setting the concentric slave cylinder to the transaxle case, tighten the flange bolt temporally.



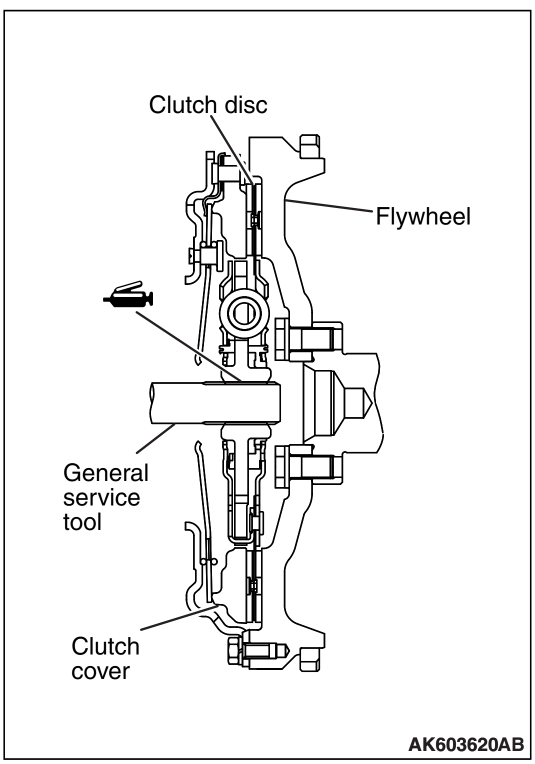
2. Assemble the concentric slave cylinder adapter with the concentric slave cylinder.

   NOTE: Fit into the groove of the transaxle case.

3. Tighten the flange bolt to the specified torque.

   Tightening torque: 10 ± 2 N· m (89 ± 17 in-lb)

>>B<< CLUTCH SET INSTALLATION



1. Apply Mitsubishi grease to the clutch disc splines and rub it into the splines with a brush.

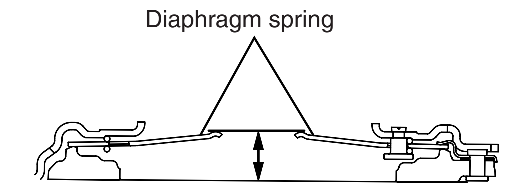
   Specified grease:
   Mitsubishi Part No. 0101011 or equivalent

2. Use the general service tool to position the clutch disc on the flywheel.
3. Install the clutch cover onto the flywheel.

CLUTCH INSPECTION

M1212001100456

CLUTCH COVER



AK603621AC

1. Check the diaphragm spring end for wear and uneven height. Replace if wear is evident or height difference exceeds the limit.

   Limit: 0.5 mm (0.019 inch)

2. Check the pressure plate surface for wear, cracks and discoloration.
3. Check the rivets of the strap plate for looseness. If loose, replace the clutch set.

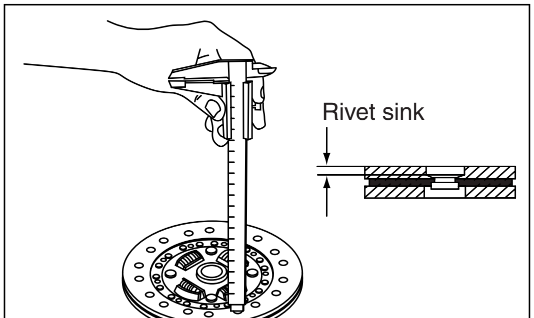
CLUTCH DISC

⚠ CAUTION

Don't clean the clutch disc in a cleaning solvent.

1. Check the facing for loose rivets, uneven contact, evidence of seizure, or deposited oils and greases. If defective, replace the clutch set.

   NOTE: If contaminated with grease or oil, determine the source of the contaminant and repair it.



AK400613AD

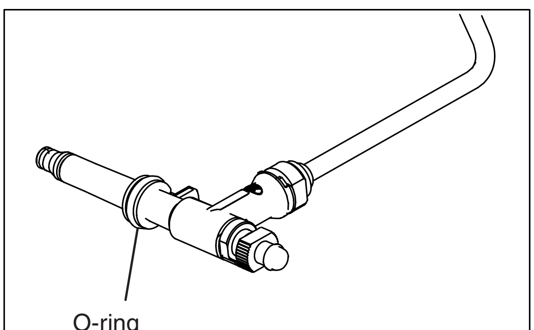
2. Measure the rivet sink. Replace the clutch disc if it is below the limit.

   Minimum limit: 0.3 mm (0.012 inch)

3. Place the clutch disc on the input shaft and check for sliding condition and play in the rotating direction. If poor sliding condition is evident, clean, reassemble, and recheck.

   If excessive play is evident, replace the clutch disc and/or input shaft.

CONCENTRIC SLAVE CYLINDER ADAPTER



AK603651AB

1. Check the O-ring for damage and deformation. If the O-ring is damage or deformed, replace the concentric slave cylinder adapter.
2. Check the surface that touches the concentric slave cylinder for contamination. If contaminated, clean the surface the specified clutch fluid.

   Specified fluid: Brake Fluid DOT 3 or DOT 4

3. Make sure there are no deformed and/or missing clips.

NOTES

GROUP 00

GENERAL

CONTENTS

HOW TO USE THIS MANUAL

M2000029000758

ABBREVIATIONS

The following abbreviations are used in this manual for classification of model types.

2.0 L Engine:1.998 liter <4B11> engine, or a model equipped with such an engine.

MFI: Multiport fuel injection, or engines equipped with multiport fuel injection.

PCM: Powertrain control module

M/T:Indicates manual transaxle, or models equipped with manual transaxle.

CVT: Indicates the continuously variable transmission.

FWD: 2-wheel drive vehicles.

SWS: Simplified wiring system

A/C: Air conditioning.

TARGETS OF DEVELOPMENT

M2000004001215

Since first launched in 1973, the LANCER has always been acknowledged as a motor sport based vehicle in the sporty sedan market. Keeping with the tradition of these LANCERS, the new LANCER has been developed aiming at acquiring additional LANCER users, and even more, Mitsubishi customers.

PRODUCT FEATURES

M2000005000594

STYLING

The global standard body size has been adopted to match the market trend.

DRIVING PERFORMANCE

- The newly-developed aluminum block engine and CVT have been adopted to achieve excellent power and performance.
  1. The power and performance greatly exceeds that of the previous LANCER.
  2. The fuel efficiency in cruising range has been greatly improved from the previous LANCER, both for M/T and CVT.
- High rigidity of body and suspension has been achieved.
- With fine tuning of suspension, sporty steering, flat cornaring and superior driving comfort have been achieved.
- The paddle shift has been adopted to achieve "Fun to Drive."

COMFORT

- The Rockford Fosgate premium sound system has been installed.
- The comfort equipment such as keyless operation system (KOS)*[1], HDD navigation, handsfree phone for Bluetooth*[2] has been adopted.

  NOTE:
  - **[1]: In this manual, F.A.S.T.-key (Free-hand Advanced Security Transmitter) is described as Keyless Operation System (KOS). Refer to P.42B-2.*
  - **[2]: Refer to P.54A-29.*

SAFETY

- The impact safety body aiming at high score in New Car Assessment Program (NCAP) has been developed.
- With consideration of Insurance Institute for Highway Safety (IIHS), going ahead of competitors, the knee air bag has been equipped as a standard feature in addition to the driver's and passenger's (front) air bags, side-air bag, and curtain air bag.

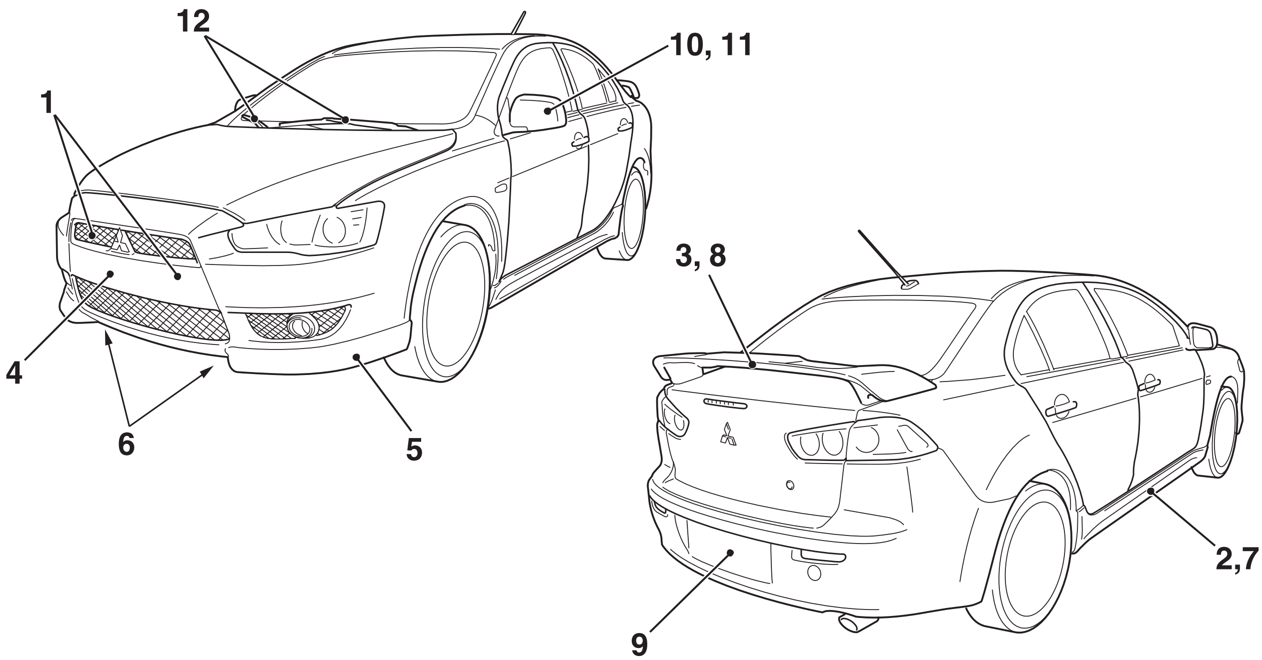
TECHNICAL FEATURES

EXTERIOR

M2000017000966

DESIGN FEATURES

The robust styling to create the image of LANCER EVOLUTION, the symbol of Mitsubishi Motors sport DNA, has been established.



BETTER APPEARANCE

1. Radiator grille integrated front bumper
2. Side air dams
3. Rear spoiler
5. Air dam skirt panels

BETTER AERODYNAMIC CHARACTERISTICS

4. Aerodynamic front bumper
5. Air dam skirt panels
6. Engine room under cover with bulges at left and right (Refer to P.51-3)
7. Side air dams
8. Rear spoiler
9. Aerodynamic rear bumper

BETTER USER-FRIENDLINESS

10. Electric remote-controlled door mirrors
11. Heated door mirrors

BETTER PRODUCT PACKAGE

12. Vehicle speed sensitive intermittent time variable windshield wiper

SUPPORT RECYCLING OF RESOURCES

Uses PP (polypropylene) materials that are easy to recycle and easy to stamp material symbols on the plastic (resin) parts.

INTERIOR

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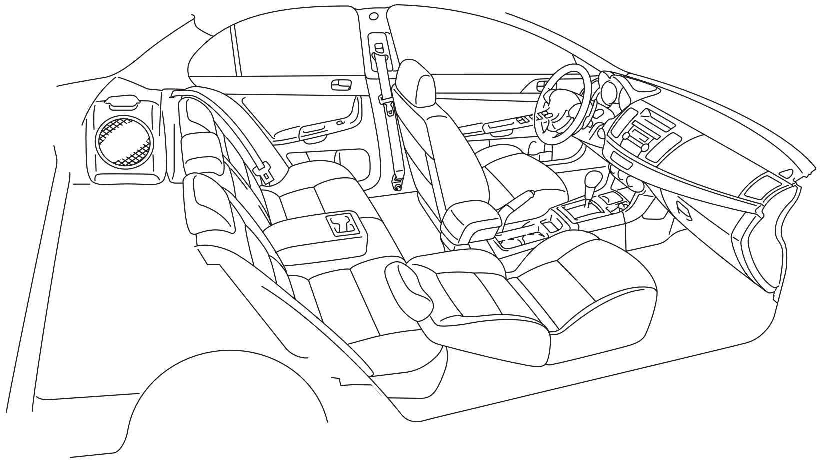
DESIGN FEATURES

Functionality, interior comfort, and safety have been emphasized, giving interior design for elegance and relaxation. Various measures have been taken to protect the environment and recycle resources.



AC609922

Quality improvement
- Two-tone interior
- Full interior trim

Usability improvement
- Armrest (floor console, rear seat, front door trim, rear door trim)
- Cup holder (floor console, rear seat armrest)
- Bottle holder (front door trim)

Convenient storage
- Glove box
- Card holder (Glove box)
- Seatback pocket [front seat (driver side)]
- Floor console box
- Door pocket (front door trim, rear door trim)
- Tissue paper holder (floor console)

Safety improvement
- Front and rear collision protection seat mechanism (front seat)
- ISO-FIX lower anchor (rear seat outside)
- Upper tether anchor (rear shelf)
- deiver’s and passenger’s (front) air bags
- Knee air bag
- Side-airbag
- Curtain air bag
- ELR 3-point seat belt (driver side)
- ELR/ALR 3-point seat belt (front passenger side)
- ELR/ALR 3-point seat belt (rear)
- Seat belt retractor with a driver's side pretensioner and variable force limiter
- Seat belt retractor with a passenger’s side pretensioner and force limiter
- Headliner energy absorption rib

Consideration for the optimum driving position
- Seat height adjustment (driver’s seat)
- Headrestraint with height adjustment (front, rear)
- Seat slide adjustment (front)

Measures for resource recycling
- Aggressively use PP materials that are easy to recycle and easy to stamp material symbols on the plastic (resin) parts.
- Reduction of chemical material (formaldehyde*, organic solvent)

*NOTE: *: Clear and colourless, toxic, irritating odour*

BODY DIMENSIONS AND SPACIOUS CABIN

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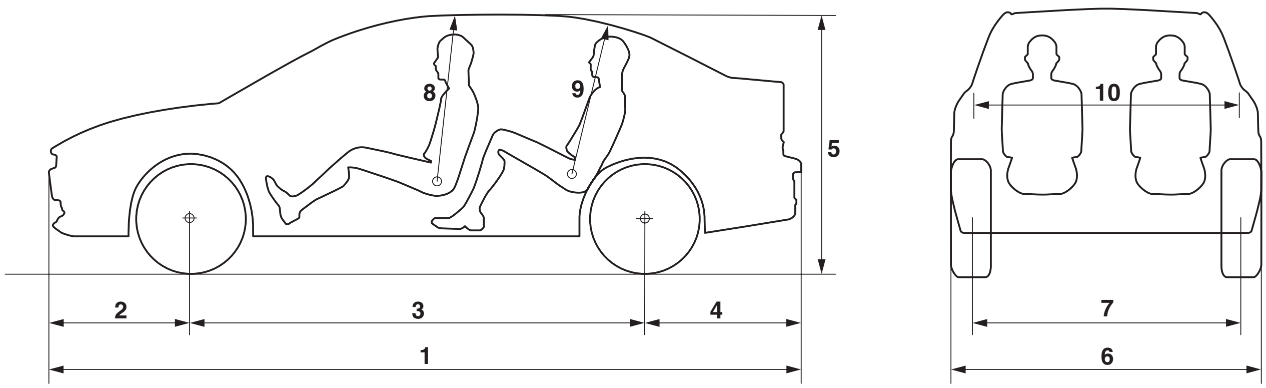


AC609780AB

No.	Item	Dimension
1	Overall length mm (in)	4,570 (180.0)
2	Front overhang mm (in)	955 (37.6)
3	Wheel base mm (in)	2,635 (103.7)
4	Rear overhang mm (in)	980 (38.7)
5	Overall height mm (in)	1,490 (58.7)
6	Overall width mm (in)	1,760 (69.4)
7	Tread mm (in)	1,530 (60.2)
8	Front head room mm (in)	1,005 (39.6)
9	Rear head room mm (in)	935 (36.9)
10	Interior width mm (in)	1,390 (54.7)

ENGINE

M2000020000717

The newly-developed 4B11 MIVEC engine has been adopted. For the 4B11 engine, the aluminum die-cast cylinder block has been adopted to achieve the top level of this class in high performance, good fuel efficiency, while being compact and lightweight.

Technology and purpose for 4B11 engine adoption

Item	High performance /good fuel efficiency	Compact and lightweight	Low exhaust gas	Low vibration	Reliability improvement
Aluminum die-cast cylinder block		X			
Cylinder head cover made of resin		X			
Direct injection DOHC valve drive	X	X			X
Intake/exhaust continuously variable valve timing (MIVEC)	X		X	X	
Timing chain cam drive		X			X
Serpentine auxiliary drive		X			

Item	High performance /good fuel efficiency	Compact and lightweight	Low exhaust gas	Low vibration	Reliability improvement
Isometric long port intake manifold made of resin	X	X			
Exhaust manifold made of stainless steel (double structure)	X	X	X		
Rear exhaust engine layout		X	X		
Ultra fine injection			X		
EGR system <California only>	X		X		
Water pump with shroud-integrated resin impeller	X				
Returnless fuel system			X		
Iridium spark plug			X		X

TRANSAXLE

M2000021000732

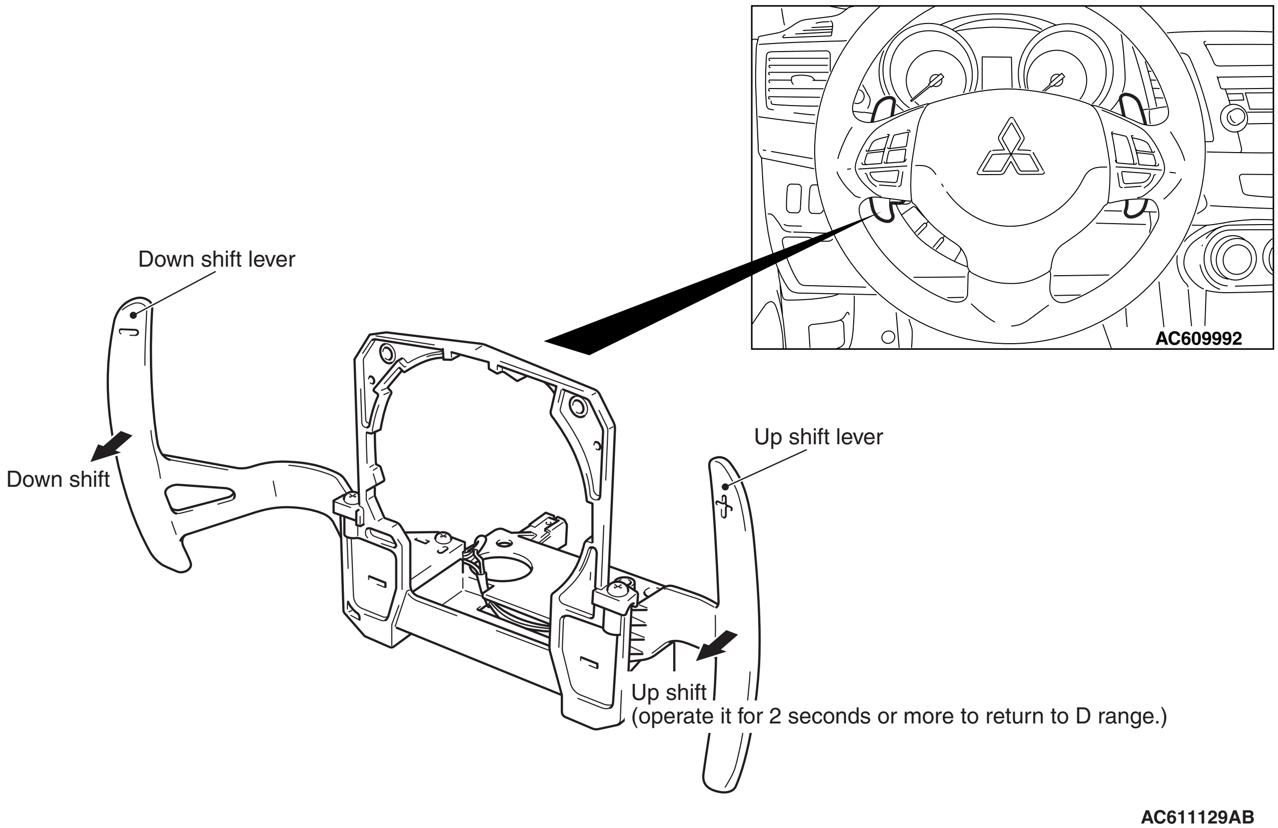
MANUAL TRANSAXLE

F5MBB type (5M/T) has been adopted.

CONTINUOUSLY VARIABLE TRANSAXLE (CVT)

The new CVT has been developed to achieve excellent fuel economy, driving ease, and fun. This CVT achieves quick and smooth acceleration suitable for LANCER from any speeds. The CVT combines "torque converter" and "continuously variable transaxle mechanism by steel belt & pulley" to achieve "high driving performance" and "better fuel economy." Depending on the driving conditions, the comfortable gear ratio is automatically and continuously selected from low to overdrive, ensuring driver-intended smooth driving without shift shocks related to acceleration pedal operation.

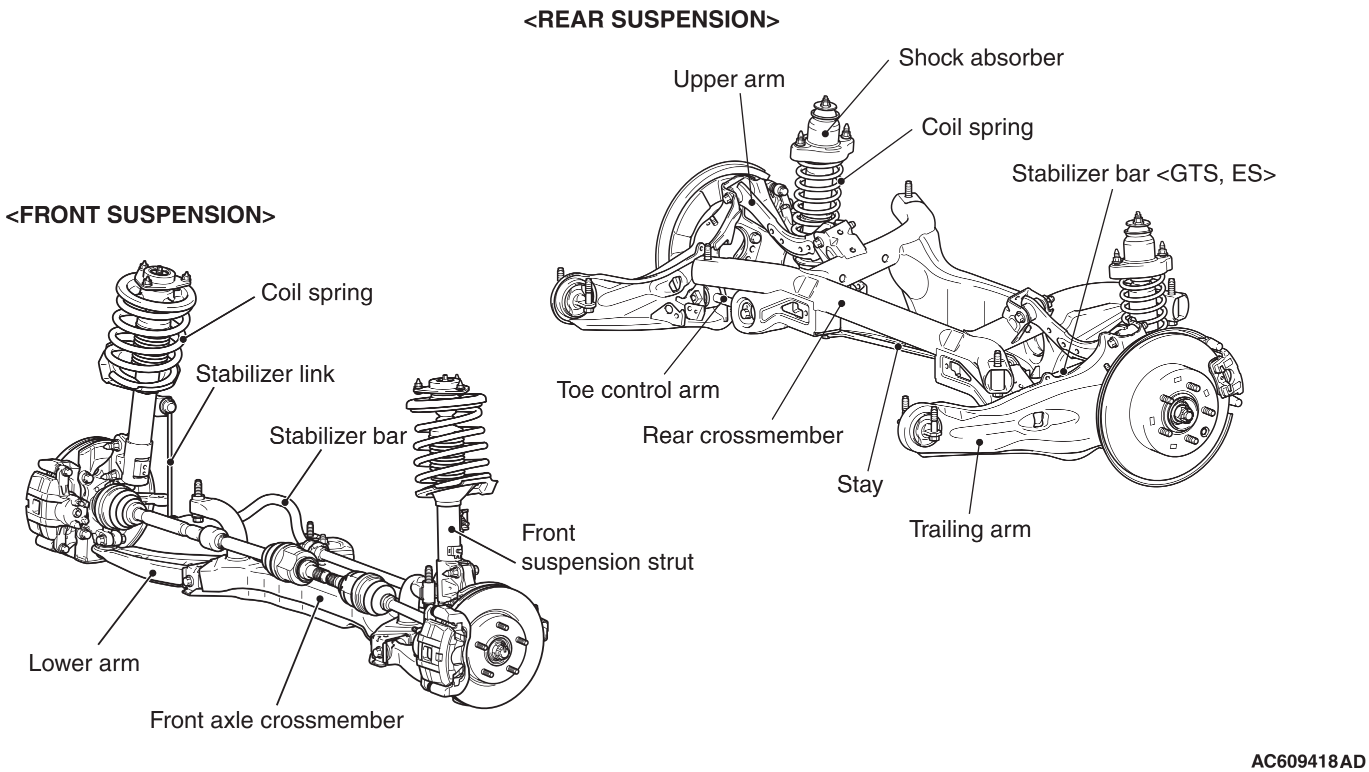
PADDLE SHIFT <Vehicle with sports mode (CVT) >



For some models, the paddle-shaped up shift/down shift lever has been fitted just behind the steering wheel to allow the driver to operate up shift or down shift with his/her hands kept on the steering wheel.

SUSPENSION

M2000023000590

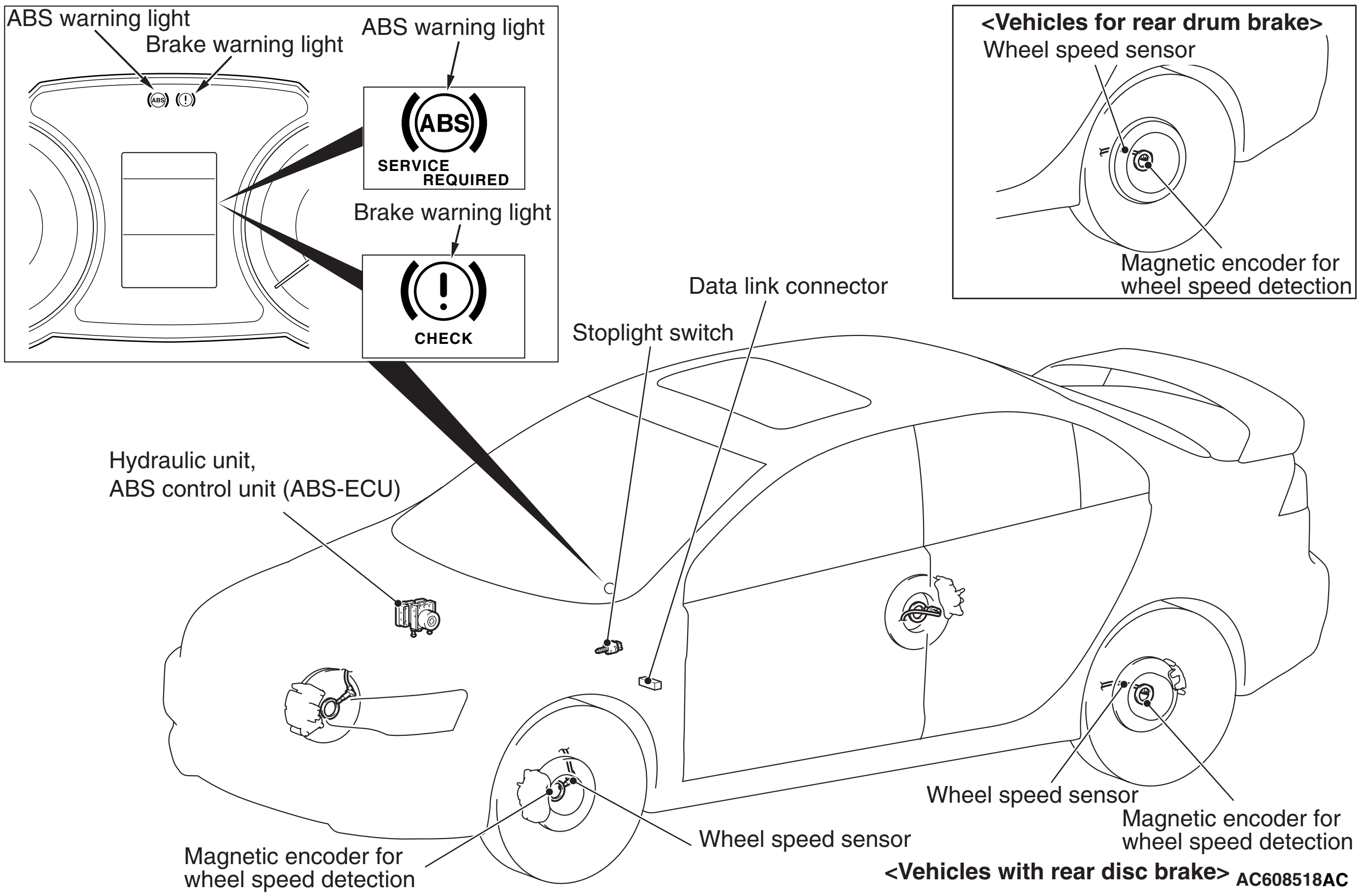


- A MacPherson strut type suspension is adopted for the front suspension.
- A trailing arm type multi-link suspension is adopted for the rear suspension.
- Flexible steering stability is achieved, along with comfortable driving, secure handling, and flat cornering.

ACTIVE SAFETY

M2000031000700

BRAKING SYSTEM <VEHICLES WITH ABS>



The ABS that ensures directional stability and controllability during hard braking. ABS is standard equippment on the ES and GTS models but is optional.

This ABS uses a 4-sensor system that controls all four wheels independently of each other, and has the following features:

- EBD *1 (Electronic Brake-force Distribution system) control that can obtain ideal rear wheel brake force has been employed.
- The magnetic encoder for detecting the wheel speed has been installed instead of the rotor as the wheel speed sensor.
- For wiring harness simplification and secure data communication, CAN *2 bus has been adopted as a tool of communication with another ECU.

NOTE:

- **1: EBD (Electronic Brake-force Distribution)*
- **2: For more information about CAN (Controller Area Network), refer to GROUP 54C P.54C-2.*

PASSIVE SAFETY

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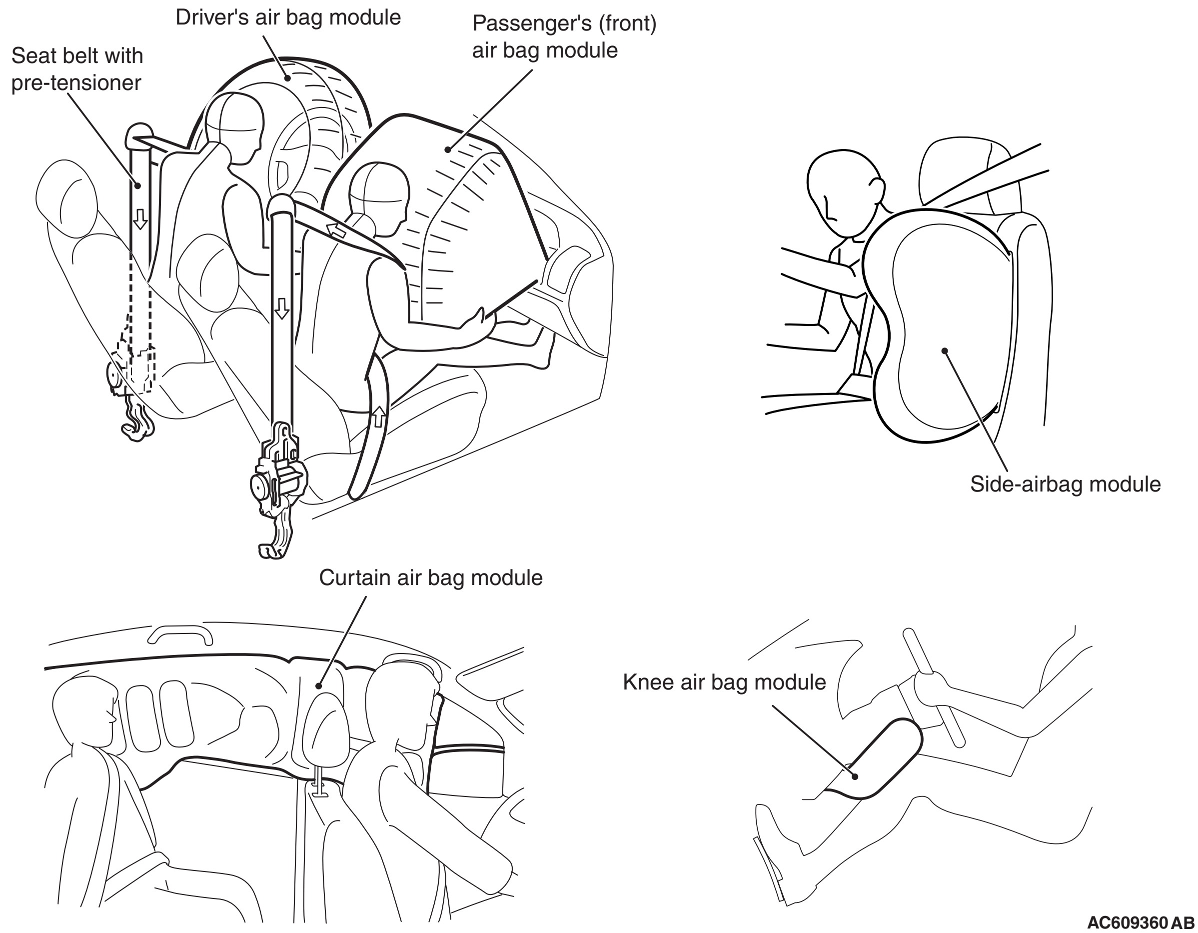
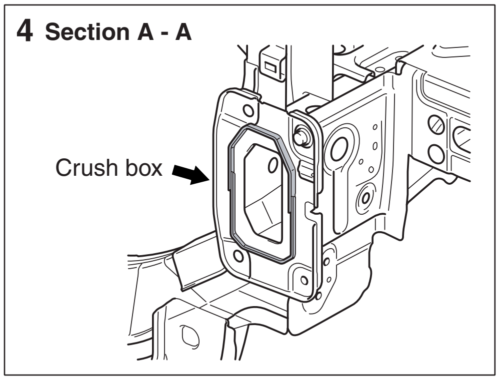
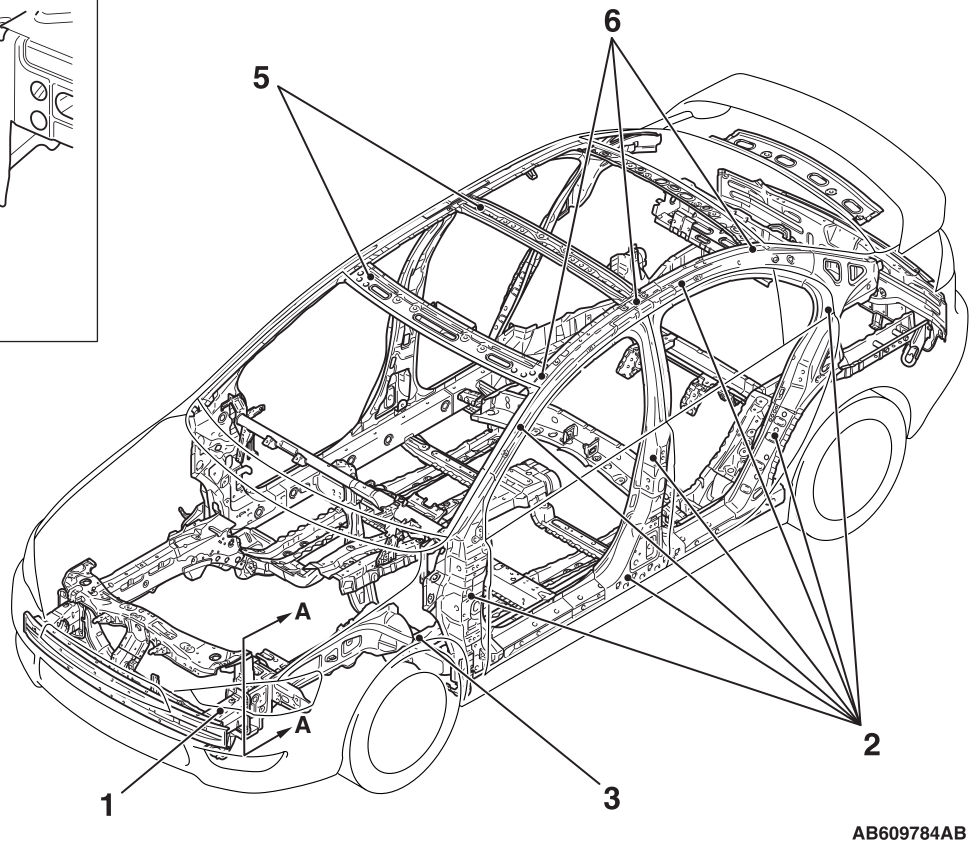
SRS AIR BAGS



- Driver's and passenger's (front) air bags, side-air bags, knee air bag, curtain air bags and seat belts with pre-tensioner are installed on all the vehicles as standard.
- The SRS is a system that is effective with the seat belt fastened, and it is designed as a supplemental system of the seat belt.
- The advanced air bag system is adopted to the driver's and passenger's (front) sides. When a frontal impact exceeds the threshold upon a frontal collision, or depending on the seat position (driver's seat side), the air bag inflates the cushion air bag in two stages, improving the protection for the front seat passengers. When a frontal impact exceeds the threshold, the knee air bag is instantaneously inflated to protect the passenger's feet (knee and leg).
- The side-air bag is activated when an impact exceeds the threshold upon a side collision, and the cushion air bag is instantaneously inflated to protect the chest area of the front seat passengers.
- The curtain air bag is activated simultaneously with the side-air bag upon a side collision to protect the heads of the front seat and second seat passengers.
- All the air bag modules are equipped with the inflator that does not contain toxic sodium azide.
- The seat belt pre-tensioner is activated simultaneously with the deployment of driver's and passenger's (front) air bags in case of a frontal collision. Seat belts are pulled in to eliminate the slack upon a collision, thus improving the initial occupant restraint, and reducing the travel distance of the occupants. For the driver's seat, in addition to the seat belt pre-tensioner for the shoulder side, the lap pre-tensioner has been installed on the outer seat belt lower anchor side in order to improve the restraining performance in the waist and the chest areas.

BODY CONSTRUCTION





The front and rear structures to absorb high energy, and the strong and sturdy cabin structure is adopted to reduce the risk of passenger injuries at front-, rear-, and side-impact collisions, secure the space for life protection, and facilitate rescuing passengers. The structures also have the following features:

1. The crush box structure is adopted for the front end of the sidemember to reduce the vehicle repair cost in a low speed collision.
2. An annular construction is used for the side structure reinforcement to improve collision safety and vehicle body rigidity.
3. The front frame structure is supported in three directions by the dash crossmember center, dash crossmember lower, and front sidemember rear in order to improve the frontal collision characteristics, and increase the vehicle body rigidity.
4. The crush box structure has been changed to straight type with an octagon cross-section so that the structure can effectively absorb energy from the impact at the time of collision.
5. The closed section structure has been adopted for the roof bow and roof rail to improve driving stability and reduce vibration and noise.
6. The roof bow and roof rail and the side outer panel have been jointed by the brace to improve driving stability.

SAFETY-ENHANCED FRONT SEATS

The front seats are designed to minimize the risk of whiplash in a collision from the rear.
The head restraints have been ideally angled forward, while the seat frame was moved toward the rear.

OTHER SAFETY FEATURES

- Brake pedal recede-control device
- Collapsible steering column
- Child-protection rear door locks
- Front fog lamps
- Passenger’s seat weight sensor system
- 3-point ELR seat belts <Driver’s seat, rear seat on each side>
- 3-point ELR/ALR seat belts <Passenger's seat, rear seat center>
- Tire pressure monitoring system (TPMS)

ENVIRONMENTAL PROTECTION

M2000027000473

Mitsubishi has given careful consideration to protection of natural resources and the environment in the vehicle. Environmentally friendly features are shown below.

Items Dealing with Environmental Protection

Prevention of atmospheric pollution	Parts name	Features
Adoption of easy recycling material	Bumper, Instrument panel, Door trim, Interior trim and soon	Adoption of thermoplastic resin
Expansion of recycled material	Bumper, Instrument panel, Door trim, Radiator grille	Re-use of material discarded in plant
	Sound absorbing material in dash panel and roof, Oil level gauge	Re-use of discarded material in other industry
Reduction of hazardous substances	Fuel tank, Radiator, Heater core, Battery cable terminal, Balance weight for wheel, Pressure hose for power steering, Glass ceramics print, Harness, Electrostatic coating, Intake valve sheet, Crank bearing metal, Connecting rod bearing metal, Connecting rod	Adoption of lead free material

SERVICEABILITY AND RELIABILITY

M2000028000647

ENHANCED DIAGNOSIS SYSTEM

Diagnosis functions have been included for the following systems, so that it is possible to use the scan tool to read the diagnosis codes and service data and to carry out actuator tests. In addition, it is also possible to read the diagnosis codes by the flashing of the warning light in some systems.

- MFI
- Auto-cruise control system
- CVT
- ABS
- Power window
- Keyless operation system (KOS)

  NOTE: In this manual, F.A.S.T.-key (Free-hand Advanced Security Transmitter) is described as Keyless Operation System (KOS).
- SRS air bag
- Immobilizer
- Combination meter
- Headlight auto leveling device
- ETACS
- Radio and CD player and visual information equipment etc.
- Heater and air conditioning

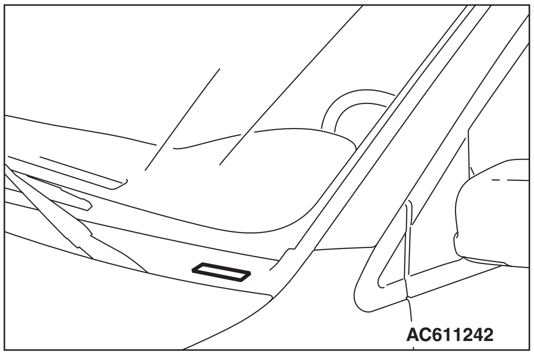
ADAPTATION OF BOLTS AND NUTS WITH STABILIZER FOR COEFFICIENT OF FRICTION *

The bolts and nuts with stabilizer for coefficient of friction are used for the connections such as the suspension arm and crossmember in order to stabilize the axial force and to ensure the high axial force at bolt/nut connections, resulting in improved reliability.

*NOTE: *: The bolts and nuts with stabilizer for coefficient of friction mean that the bolts and nuts with surface treatment to stabilize and reduce the coefficient of friction, allowing to achieve the stable axial force and to secure the high axial force with low tightening torque.*

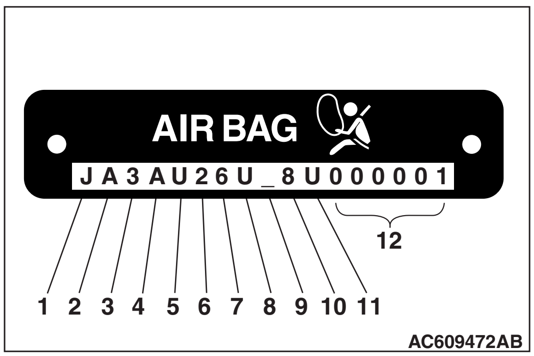
VEHICLE IDENTIFICATION

M2000001002662



VEHICLE IDENTIFICATION NUMBER LOCATION

The vehicle identification number (VIN) is located on a plate attached to the left top side of the instrument panel.



VEHICLE IDENTIFICATION CODE CHART PLATE

All vehicle identification numbers contain 17 digits. The vehicle number is a code which tells country, make, vehicle type, etc.

No.	Item	Content
1	Country	J: Japan
2	Make	A: Mitsubishi
3	Vehicle type	3: Passenger car
4	Others	Restraint system A: Driver and passenger air bags
5	Line	U: LANCER
6	Price class	1: Economy
		2: Low
		8: Sports
7	Body	6: 4-door sedan
8	Engine	U: 2.0 L (4B11) MIVEC
9	Check digits*	0, 1, 2, 3, -----------9, X
10	Model year	8: 2008 year
11	Plant	U: Mizushima
12	Serial number	000001 to 999999

*NOTE: *: Check digit means a single number, or letter X, used to verify the accuracy of transcription of vehicle identification number.*

VEHICLE IDENTIFICATION NUMBER LIST

VEHICLES FOR USA

(VEHICLES FOR FEDERAL EMISSION REGULATION)

VIN (Except sequence number)	Brand	Engine displacement	Model code
JA3AU16U_8U	MITSUBISHI LANCER	2.0L	CY4ASNLHL2M
			CY4ASTLHL2M
JA3AU26U_8U			CY4ASNSHL2M
			CY4ASTSHL2M
JA3AU86U_8U			CY4ASNXHL2M
			CY4ASTXHL2M

(VEHICLES FOR CALIFORNIA EMISSION REGULATION)

VIN (Except sequence number)	Brand	Engine displacement	Model code
JA3AU16U_8U	MITSUBISHI LANCER	2.0L	CY4ASNLHL7M
			CY4ASTLHL7M
JA3AU26U_8U			CY4ASNSHL7M
			CY4ASTSHL7M
JA3AU86U_8U			CY4ASNXHL7M
			CY4ASTXHL7M

VEHICLES FOR PUERTO RICO

VIN (Except sequence number)	Brand	Engine displacement	Model code
JA3AU16U_8U	MITSUBISHI LANCER	2.0L	CY4ASNLHL2M
			CY4ASTLHL2M
JA3AU26U_8U			CY4ASNSHL2M
			CY4ASTSHL2M
JA3AU86U_8U			CY4ASNXHL2M
			CY4ASTXHL2M

VEHICLES FOR CANADA

VIN (Except sequence number)	Brand	Engine displacement	Model code
JA3AU16U_8U	MITSUBISHI LANCER	2.0L	CY4ASNLHL3M
			CY4ASTLHL3M
JA3AU26U_8U			CY4ASNSHL3M
			CY4ASTSHL3M
JA3AU86U_8U			CY4ASNXHL3M
			CY4ASTXHL3M

GENERAL DATA AND SPECIFICATIONS

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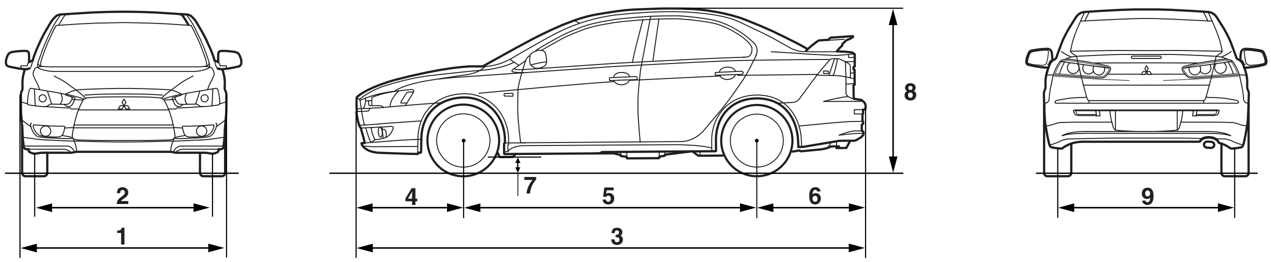
GENERAL SPECIFICATIONS



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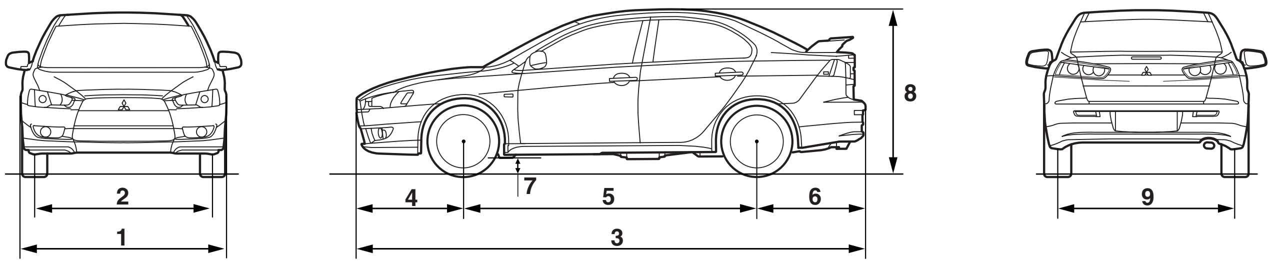
Item			CY4ASNLHL2M/ 3M/7M	CY4ASTLHL2M/ 3M/7M	CY4ASNSHL2M/ 3M/7M
Vehicle dimension mm (in)	Overall width	1	1,760 (69.4)	1,760 (69.4)	1,760 (69.4)
	Tread-front	2	1,530 (60.2)	1,530 (60.2)	1,530 (60.2)
	Overall length	3	4,570 (180.0)	4,570 (180.0)	4,570 (180.0)
	Overhang-front	4	955 (37.6)	955 (37.6)	955 (37.6)
	Wheelbase	5	2,635 (103.7)	2,635 (103.7)	2,635 (103.7)
	Overhang-rear	6	980 (38.7)	980 (38.7)	980 (38.7)
	Ground clearance	7	147 (5.8)	147 (5.8)	147 (5.8)
	Overall height (unladen)	8	1,490 (58.7)	1,490 (58.7)	1,490 (58.7)
	Tread-rear	9	1,530 (60.2)	1,530 (60.2)	1,530 (60.2)
Vehicle weight kg (lb)	Curb weight		1,325 (2,922)	1,360 (2,999)	1,335 (2,944)
	Gross vehicle weight rating		1,850 (4,079)	1,850 (4,079)	1,850 (4,079)
	Gross axle weight rating-front		1,010 (2,227)	1,010 (2,227)	1,010 (2,227)
	Gross axle weight rating-rear		910 (2,007)	910 (2,007)	910 (2,007)
Seating capacity			5	5	5
Engine	Model No.		4B11	4B11	4B11
	Piston displacement cm^3 (cu in)		1,998 (121.9)	1,998 (121.9)	1,998 (121.9)
	Maximum output kW/r/min (HP/r/min)		113/6,000 (152/6,000) <Except California>, 107/6,000 (143/6,000) <California>		
	Maximum torque N· m/r/min (ft-lb/r/min)		198/4,250 (146/4,250) <Except California>, 194/4,250 (143/4,250) <California>		
Fuel system	Fuel supply system		Electronic controlled multiport fuel injection		
Transaxle	Model No.		F5MBB	F1CJA	F5MBB
	Type		5-speed manual	CVT	5-speed manual
Turning radius m (ft)			5.0 (16.4)	5.0 (16.4)	5.0 (16.4)



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ITEM			CY4ASTSHL2M/ 3M/7M	CY4ASNXHL2M/ 3M/7M	CY4ASTXHL2M/ 3M/7M
Vehicle dimension mm (in)	Overall width	1	1,760 (69.4)	1,760 (69.4)	1,760 (69.4)
	Tread-front	2	1,530 (60.2)	1,530 (60.2)	1,530 (60.2)
	Overall length	3	4,570 (180.0)	4,570 (180.0)	4,570 (180.0)
	Overhang-front	4	955 (37.6)	955 (37.6)	955 (37.6)
	Wheelbase	5	2,635 (103.7)	2,635 (103.7)	2,635 (103.7)
	Overhang-rear	6	980 (38.7)	980 (38.7)	980 (38.7)
	Ground clearance	7	147 (5.8)	147 (5.8)	147 (5.8)
	Overall height (unladen)	8	1,490 (58.7)	1,490 (58.7)	1,490 (58.7)
	Tread-rear	9	1,530 (60.2)	1,530 (60.2)	1,530 (60.2)
Vehicle weight kg (lb)	Curb weight		1,370 (3,021)	1,375 (3,032)	1,410 (3,109)
	Gross vehicle weight rating		1,850 (4,079)	1,850 (4,079)	1,850 (4,079)
	Gross axle weight rating-front		1,010 (2,227)	1,010 (2,227)	1,010 (2,227)
	Gross axle weight rating-rear		910 (2,007)	910 (2,007)	910 (2,007)
Seating capacity			5	5	5
Engine	Model No.		4B11	4B11	4B11
	Piston displacement cm^3 (cu in)		1,998 (121.9)	1,998 (121.9)	1,998 (121.9)
	Maximum output kW/r/min (HP/r/min)		113/6,000 (152/6,000) <Except California>, 107/6,000 (143/6,000) <California>		
	Maximum torque N· m/r/min (ft-lb/r/min)		198/4,250 (146/4,250) <Except California>, 194/4,250 (143/4,250) <California>		
Fuel system	Fuel supply system		Electronic controlled multiport fuel injection		
Transaxle	Model No.		F1CJA	F5MBB	F1CJA
	Type		CVT	5-speed manual	CVT with sport mode
Turning radius m (ft)			5.0 (16.4)	5.0 (16.4)	5.0 (16.4)

GROUP 22

MANUAL TRANSAXLE

CONTENTS

NOTES

GROUP 42B

KEYLESS OPERATION SYSTEM (KOS)

CONTENTS

GENERAL INFORMATION

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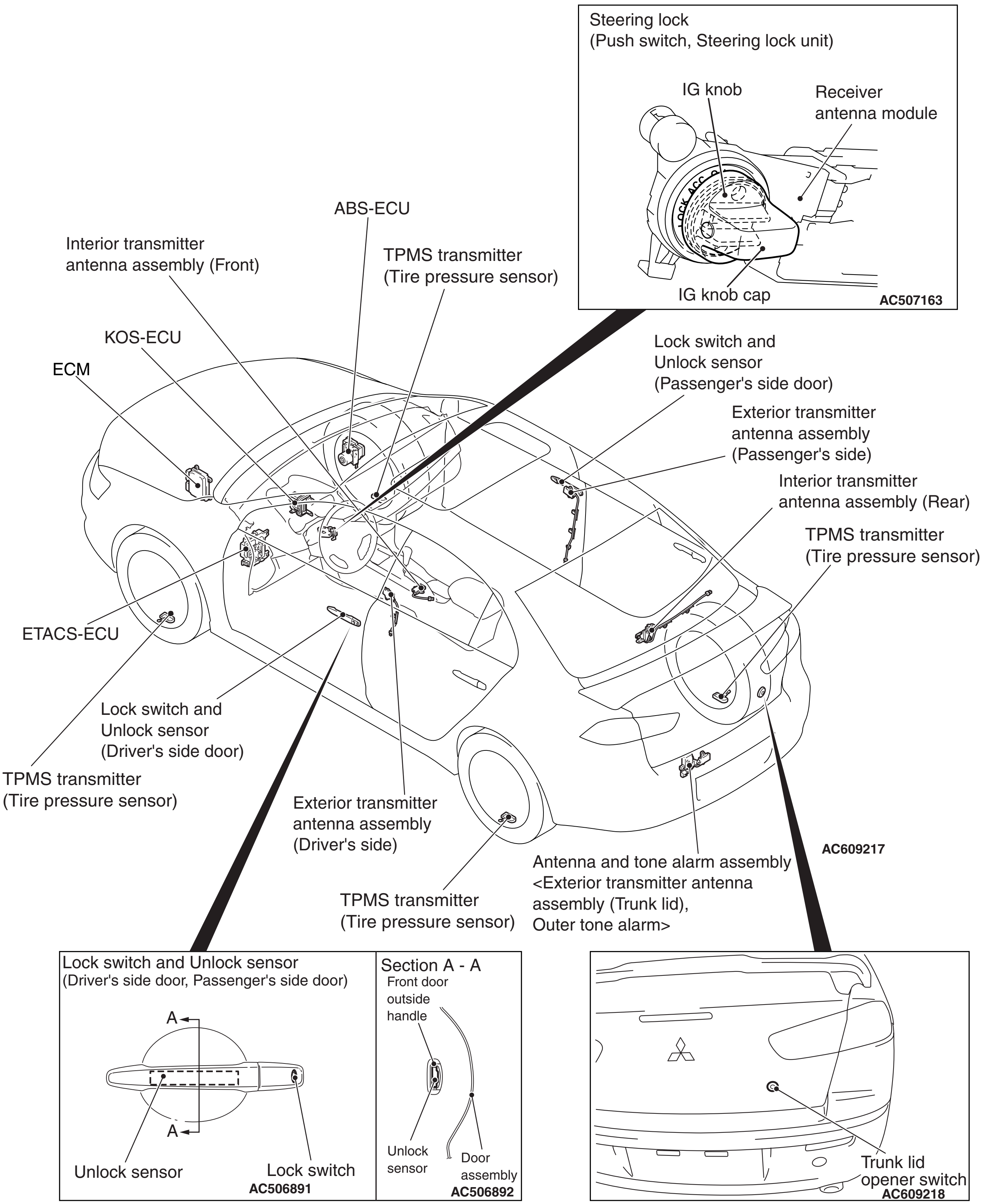
NOTE: In this manual, F.A.S.T.-key (Free-hand Advanced Security Transmitter) is described as Keyless Operation System (KOS). (KOS is indicated as F.A.S.T. in the M.U.T.-III display.)

The keyless operation system (KOS) is an integrated system of the following functions: the door entry function which enables the driver to unlock the door (only the driver's door when the driver's door outside handle is operated, and all the doors when the front passenger's door outside handle is operated) by gripping the front door outside handle without taking the key out from his/her pocket or bag when he/she is carrying a keyless operation key which has been registered in the vehicle's KOS-ECU. It also allows the driver to unlock the trunk lid by operating the trunk opener switch and to lock all the doors by pressing the lock switch on the front door outside handle or to lock the trunk lid just by closing; the engine start function which starts the engine without using the conventional mechanical key; and the tire pressure monitoring system (TPMS) which warns the driver of low tire pressure by illuminating the warning light. The KOS has the following features:

- The keyless operation key incorporates a lock/unlock button, trunk lid button, and panic button, and can be operated by remote control in the same manner as the conventional keyless entry system. The keyless operation key also incorporates an indicator light that enables the driver to check if the signal is transmitted correctly or if the battery in the key is discharged. (Refer to P.42B-13.)
- The keyless operation key incorporates the immobilizer function that inhibits the engine start-up by using an unauthorized key.
- Two keyless operation keys are provided for each vehicle, and up to four keyless operation keys can be registered.
- The keyless operation key incorporates an emergency key to lock/unlock the doors and start the engine when the battery in the keyless operation key is discharged or the keyless operation system malfunction occurs.
- The driver can customize KOS; enabling the door entry/engine start function, disabling the door entry/engine start function, enabling the door locking/unlocking function only, or enabling the engine starting function only. (Refer to P.42B-27.)

CONSTRUCTION DIAGRAM



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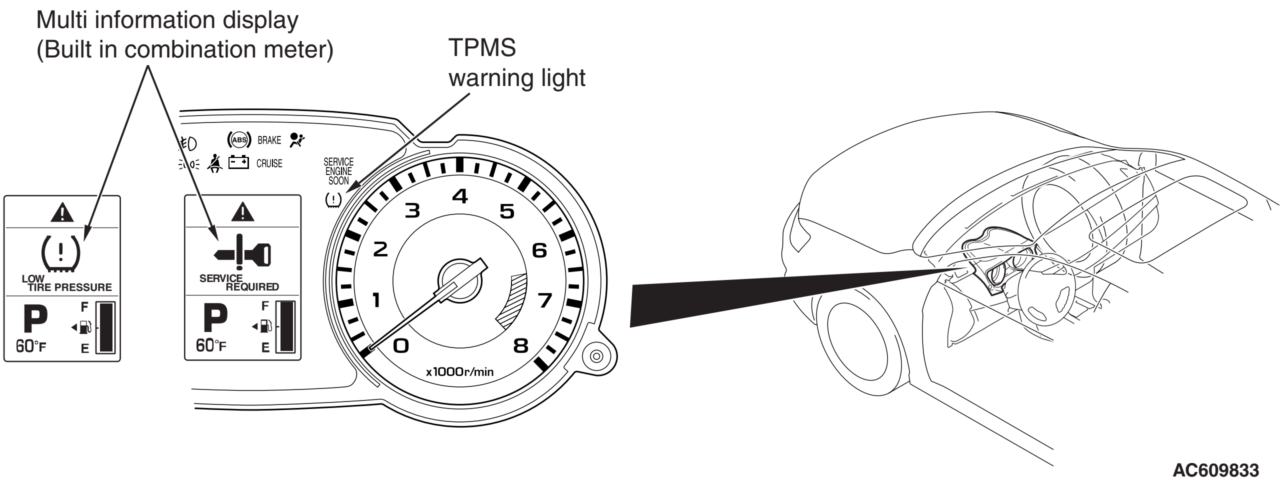

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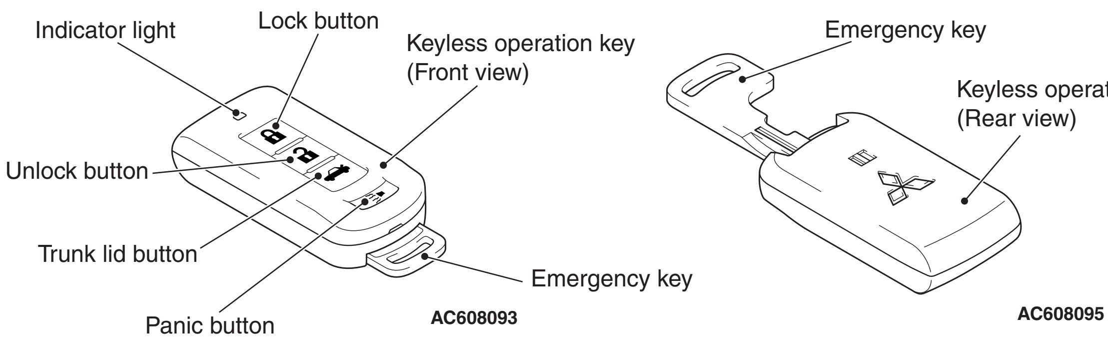

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Main components and functions

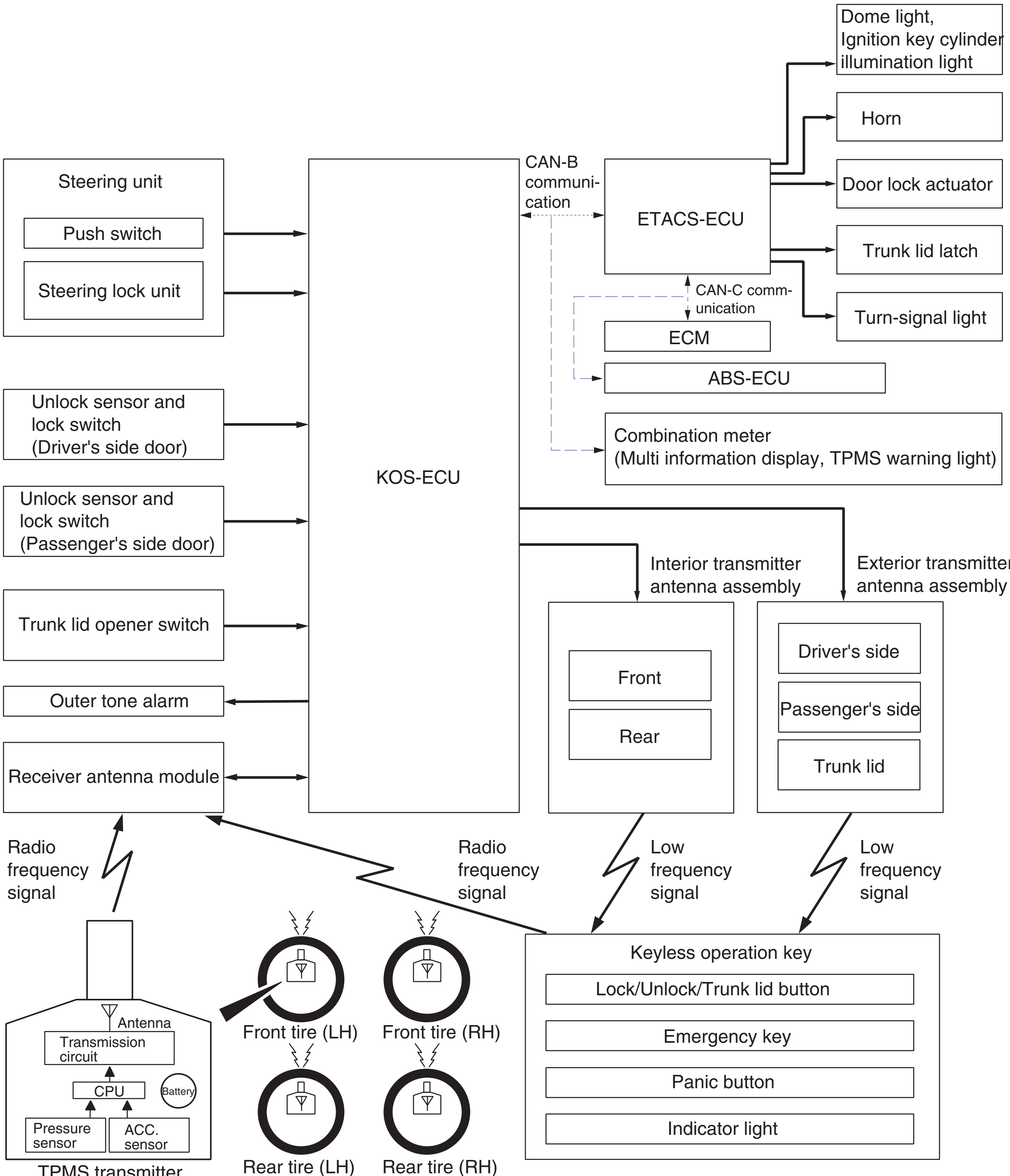
<table>
<tr><th colspan="2">Parts name</th><th>Functional description</th></tr>
<tr><td colspan="2">KOS-ECU</td><td>Controls KOS by using the following inputs/outputs and communications.
• Input from the unlock sensor and lock switch on each door, input from the push switch on the IG knob
• Communications with ETACS-ECU, ECM, ABS or ASC-ECU and combination meter via CAN
• Wire communication with the steering lock unit
• Wireless communication with the keyless operation key via the receiver antenna module and interior/exterior transmitter antennas
• Wireless communication with the TPMS transmitter
• Output to the outer tone alarm</td></tr>
<tr><td colspan="2">Steering lock (incorporates push switch and steering lock unit)</td><td>The steering lock has two unlocking mechanisms; a mechanical mechanism that uses an emergency key and an electrical mechanism. In the electrical unlocking mechanism, the steering lock communicates with KOS-ECU via wire, and when requested by KOS-ECU, the steering lock unlocks for two seconds.</td></tr>
<tr><td colspan="2">Keyless operation key (incorporates emergency key)</td><td>• The keyless operation key receives signals sent from each interior/exterior transmitter antenna, certifies the keyless operation key ID code, calculates the key ID, and sends the reply data signal to KOS-ECU via the receiver antenna module. The lock button, unlock button, and trunk lid button operations of keyless operation key transmit signals to KOS-ECU via the receiver antenna module.
• If two or more keyless operation keys registered in KOS-ECU respond at the same time, their signals would interfere. To avoid this interference, each signal from KOS-ECU is given the priority*1 data, and the keyless operation keys respond in accordance with this priority.</td></tr>
<tr><td rowspan="2">Lock switch</td><td>Driver's door</td><td rowspan="2">Locks all the doors when a driver carrying the keyless operation key presses the lock switch on the front door outside handle.</td></tr>
<tr><td>Front passenger's door</td></tr>
<tr><td rowspan="2">Unlock sensor</td><td>Driver's door</td><td>The unlock sensors incorporated in the driver’s front door outside handles unlock driver’s the door when a driver carrying the keyless operation key pulls the driver’s door outside handle.</td></tr>
<tr><td>Front passenger's door</td><td>The unlock sensors incorporated in the passenger's front door outside handles unlock all the doors when a driver carrying the keyless operation key pulls the front door outside handle.</td></tr>
<tr><td colspan="2">Trunk lid opener switch</td><td>By pressing the trunk lid opener switch on the trunk lid while he/she is carrying the keyless operation key, the trunk lid is unlocked.</td></tr>
<tr><td rowspan="2">Exterior transmitter antenna assembly</td><td>Driver's side</td><td rowspan="2">Converts the data output from KOS-ECU via wire into a signal, and sends it to the keyless operation key. (For the transmission area, refer to Operation Manual –Door Entry Function P.42B-8.)</td></tr>
<tr><td>Front passenger's side</td></tr>
</table>

Parts name		Functional description
Interior transmitter antenna assembly	Front	Converts the data output from KOS-ECU via wire into a signal, and sends it to the keyless operation key. (For the transmission area, refer to Operation Manual –Engine Start Function P.42B-17.)
	Rear	
Antenna & tone alarm assembly	Exterior transmitter antenna assembly (trunk lid)	Converts the data output from KOS-ECU via wire into a signal, and sends it to the keyless operation key. (For the transmission area, refer to Operation Manual –Door Entry Function P.42B-8.)
	Outer tone alarm	The outer tone alarm sounds when: • The doors are locked or unlocked by the door entry function. • The lock switch on the keyless operation switch is pressed when the IG knob is in the "LOCK" (OFF) position and the push switch is in other than the "ON" position. • The lock switch is pressed on the keyless operation key from inside the car. • The lock switch on the keyless operation key is pressed when the door is ajar.
Receiver antenna module		Receives the operation signals from the lock/unlock switches and panic alarm switch on the keyless operation key, and the air pressure signal from the TPMS transmitter, and then converts them into data and sends them to KOS-ECU.
TPMS transmitter		Measure tire pressure directly, then send radio frequency signal to receiver antenna module.
Combination meter (Multi information display, TPMS warning light)		Communicates with KOS-ECU via CAN. Receives the warning request or warning information from KOS-ECU, activates[*2] the warning light. Warning symbol and message is additionally displayed on the multi information display
ETACS-ECU		Communicates with KOS-ECU via CAN. Receives the door lock/unlock request from KOS-ECU, outputs the lock/unlock signal, and flashes the turn signal light to inform the driver that the doors are locked/unlocked.
ECM		Communicates with KOS-ECU via CAN. Permits/inhibits the engine starting and controls the engine operation. Send atmospheric pressure data. Sends the vehicle speed data <Vehicles without ABS>.
ABS-ECU <Vehicles with ABS>		Communicates with KOS-ECU via CAN. Sends the vehicle speed data <Vehicles with ABS>.

*NOTE: [*1]: When registering the keyless operation keys, KOS-ECU numbers each key (1 to 4) in the order they are registered (initial priority). This priority is renewed each time the doors are locked/unlocked and the IG knob is pressed. For example, when only keys 1 and 3 have responded to the signal sent from KOS-ECU, the new priority of the keys would be 1-3-2-4. When keys 3 and 4 have responded, then the priority of the keys becomes 3-4-1-2.*

*NOTE: [*2]: Illuminates for tire pressure warning. Flashes for about 1 minute and then continuously illuminated for TPMS malfunction warning.*

System configuration



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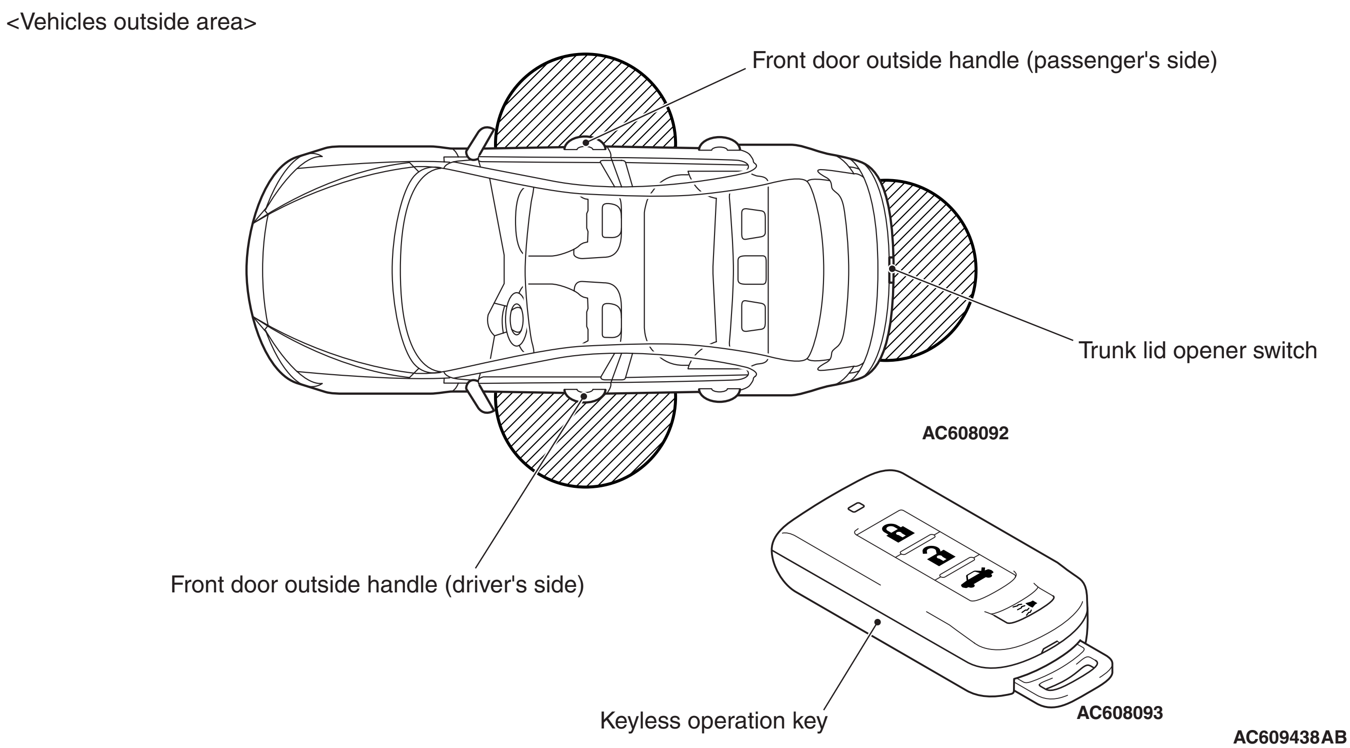
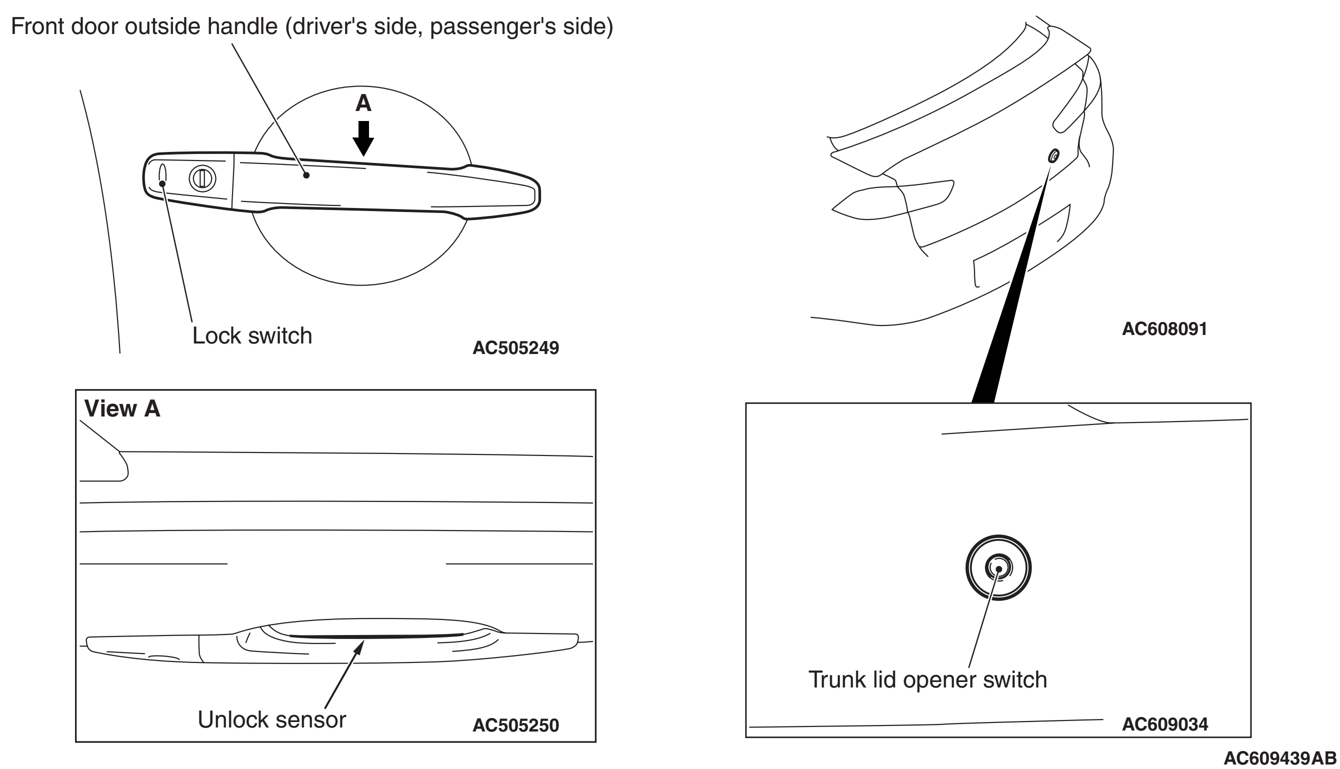
SYSTEM OPERATION

DOOR ENTRY FUNCTION

M2421009100109

DESCRIPTION OF CONSTRUCTION AND OPERATION





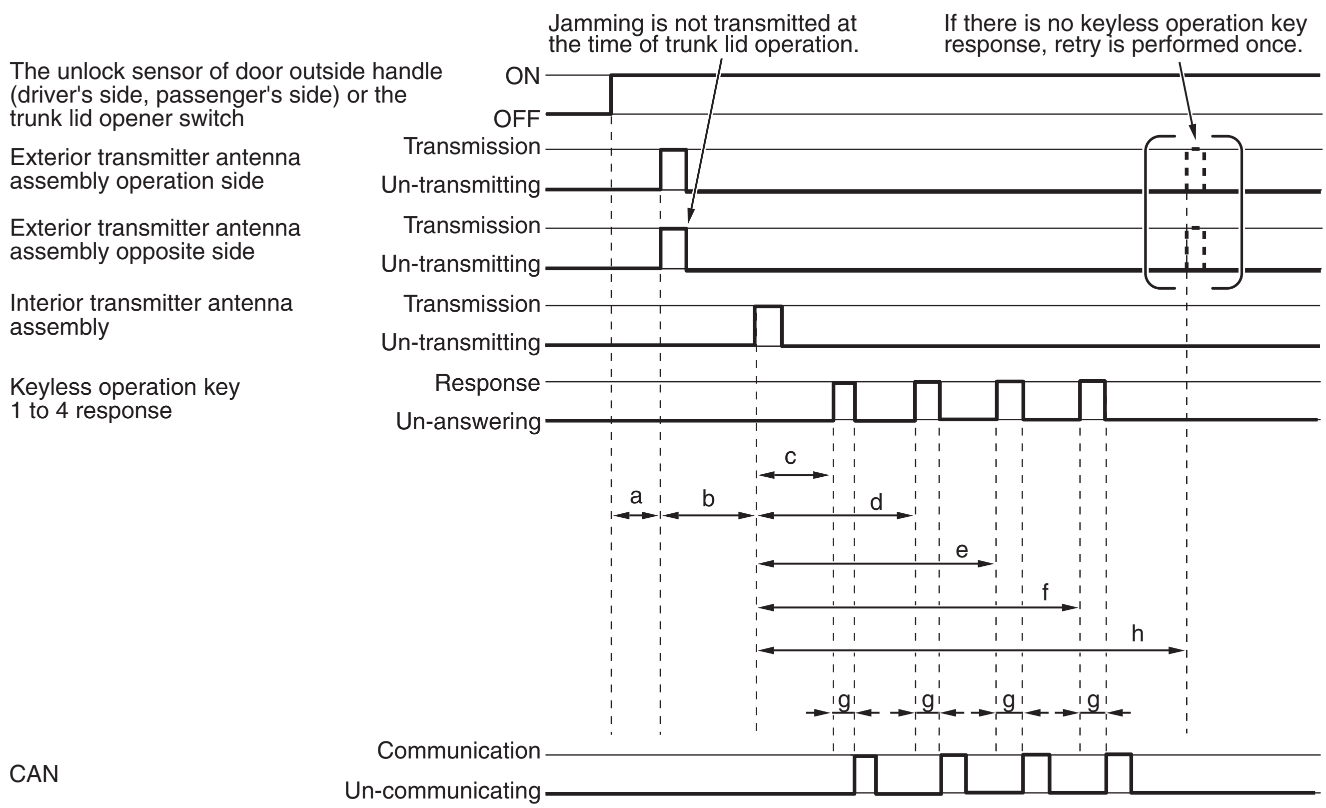
When a driver carrying a keyless operation key presses the lock switch and the unlock sensor (door outside handle) on the driver's/passenger's door outside handle or the trunk lid opener switch, the keyless operation key and KOS-ECU communicate to certify* the keyless operation key. When KOS-ECU certifies the registered keyless operation key within 70 cm (28 inches) in radius from the outer side of the vehicle, it requests ETACS-ECU to lock/unlock the doors (Even within this range, the key may not be certified when it is positioned too high or too low).

*NOTE: *: In the communication for certification of the keyless operation key, KOS-ECU judges if the keyless operation key ID (specified to keyless operation key) contained in the response data from the keyless operation key coincides with the ID that has been stored in ECU by registration operation. The keyless operation key sends the response to KOS-ECU only when the KOS ID (specific to KOS-ECU) contained in the received data coincided with the stored ID. In the beginning of the communication for certification, KOS-ECU creates an encrypted code calculation factor in random number, and sends it to the keyless operation key together with the transmit data. The keyless operation key calculates the code by using the received factor, and sends the result to KOS-ECU together with the response data. KOS-ECU determines that the communication is established only when the code calculation results of both parties coincided.*

UNLOCKING OPERATION OF DOOR ENTRY FUNCTION

The keyless operation key and KOS-ECU communicate to certify the keyless operation key when the unlock sensor on the driver-side/front passenger-side door outside handle or the trunk lid opener switch is turned ON. When KOS-ECU certifies the registered keyless operation key on the outer side of the vehicle, it requests ETACS-ECU to unlock the doors.

CONTROL OF UNLOCKING OPERATION



a: Exterior data transmitting start: 0.015 to 0.04 sec
b: Interior data transmitting start: 0.03 to 0.05 sec
c: Keyless operation key 1 response time of onset 0.035 to 0.06 sec
d: Keyless operation key 2 response time of onset 0.08 to 0.115 sec
e: Keyless operation key 3 response time of onset 0.135 to 0.18 sec
d: Keyless operation key 2 response time of onset 0.205 to 0.26 sec
g: CAN communication time of onset: to 0.3 sec
h: Retry time: It is variable by the registration number (at the time of 4 pieces registration 3.1 sec).

AC500829AD

1. When KOS-ECU detects that the unlock sensor on the driver-side/front passenger-side door outside handle or the trunk lid opener switch is turned ON, it transmits the exterior data from the exterior transmitter antenna assembly on the operation side. At the same time, KOS-ECU transmits the interfering radio wave* (reversal code) from the exterior transmitter antenna assembly on the other side (The interfering radio wave will be transmitted from the front passenger-side antenna assembly when the driver-side door outside handle is operated, and vice versa. It will not be transmitted when the trunk lid opener switch is operated).

   *NOTE: *: The interfering radio wave is transmitted to disable the door lock operation by a person without the keyless operation key while a user with the keyless operation key is operating the door lock from the opposite side of the vehicle.*
2. After the exterior data is transmitted from the exterior transmitter antenna assembly, the interior data is transmitted from the interior transmitter antenna assembly (front, rear).
3. For the specified time period (varies with the number of the keyless operation keys registered in KOS-ECU), KOS-ECU monitors the response from the keyless operation key that meets the unlock conditions.

- When the keyless operation key receives the exterior data only, KOS-ECU transmits the unlock request (request to unlock the applicable position) to ETACS-ECU.
- When KOS-ECU received no response that enables the unlocking after the specified time period has passed, it performs the retry cycle once (When no response after the retry, KOS-ECU terminates the unlocking operation).

UNLOCKING OPERATION INHIBITION TIME

Considering the customer pulls the door outer handle to make sure the doors are locked, unlocking operation is inhibited for three seconds after the doors are locked by the lock switches on the driver-side/front passenger-side door outside handle or on the trunk lid opener switch. This duration can be selected from zero, three seconds, and five seconds, and can be switched using a customization function (Refer to P.42B-27). The initial setting at factory is 3 seconds.

UNLOCKING OPERATION INHIBITION CONDITIONS

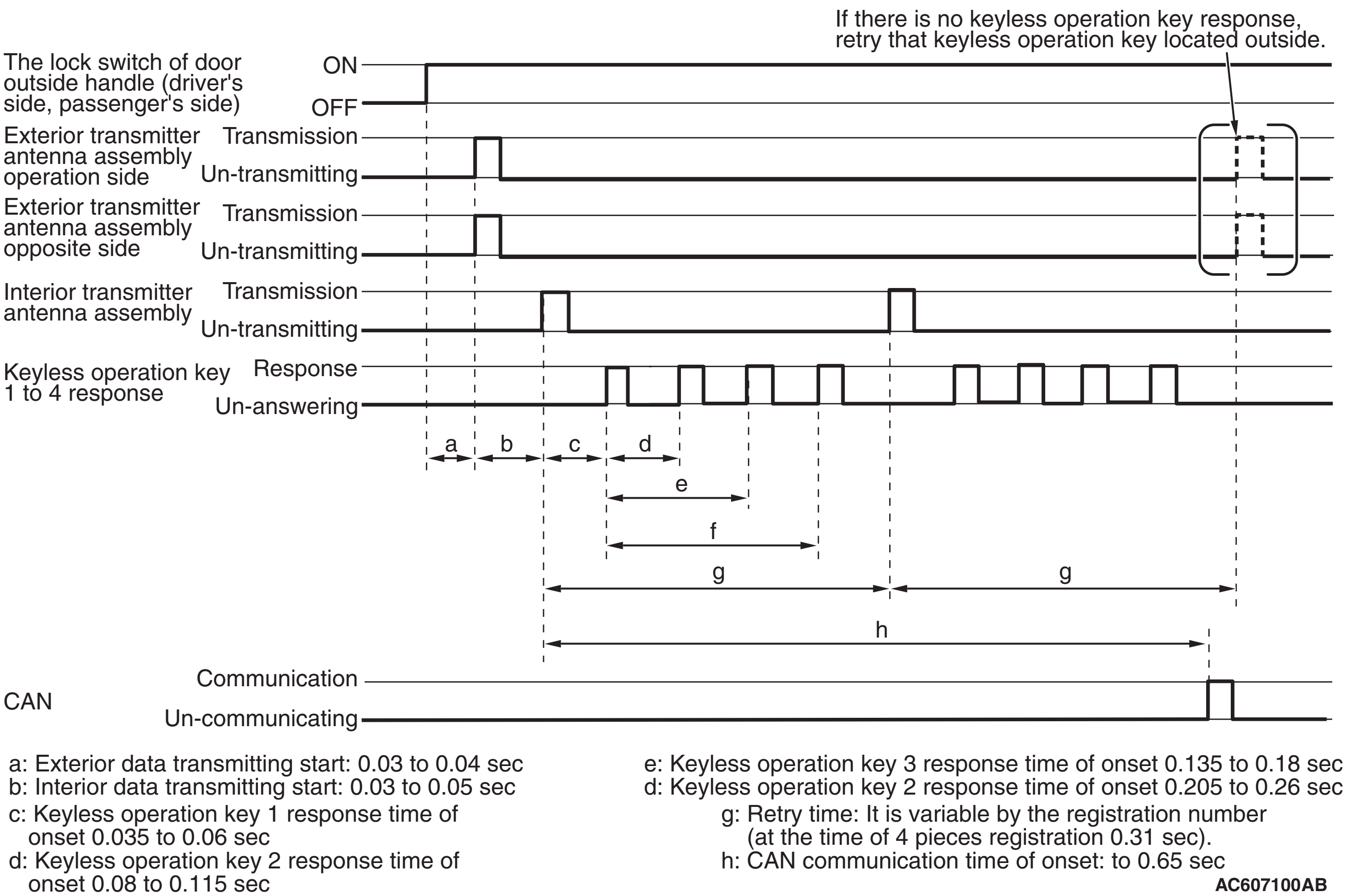
The door unlocking operation is inhibited when:

- The emergency key is in the ignition switch.
- The push switch in the steering lock is ON.
- The IG knob is in other than LOCK (OFF) position.
- During the unlocking operation inhibition time

LOCKING OPERATION OF DOOR ENTRY FUNCTION

The keyless operation key and KOS-ECU communicate to certify the keyless operation key when the lock switch on the driver-side/front passenger-side door outside handle is turned ON. When KOS-ECU certifies the registered keyless operation key only on the outer side of the vehicle, it requests ETACS-ECU to lock all the doors.

CONTROL OF LOCKING OPERATION



1. When KOS-ECU detects that the lock switch on the driver-side/front passenger-side door outside handle is turned ON, it transmits the exterior data from the exterior transmitter antenna assembly on the operation side. At the same time, KOS-ECU transmits the interfering radio wave (reversal code) from the exterior transmitter antenna assembly on the other side. (The interfering radio wave will be transmitted from the front passenger-side antenna assembly when the driver-side door outside handle is operated, and vice versa.)
2. After the exterior data is transmitted from the exterior transmitter antenna assembly, the interior data is transmitted from the interior transmitter antenna assembly (front, rear).
3. After the specified time period (varies with the number of the keyless operation keys registered in KOS-ECU) has passed, confirm that there is no keyless operation key in the interior.
   - When KOS-ECU receives the response from the keyless operation keys that received the interior data, KOS-ECU cancels the locking operation.
4. KOS-ECU transmits the interior data from the interior transmitter antenna assembly (Front).
5. After the specified time period (varies with the number of the keyless operation keys registered in KOS-ECU) has passed, confirm that the lock conditions are met.
   - When KOS-ECU receives the response from the keyless operation keys that received the interior data, KOS-ECU cancels the locking operation.
   - When all the responding keyless operation keys receive the exterior data only, KOS-ECU transmits the lock request to ETACS-ECU.
   - If there is no response from the keyless operation keys, perform step 6 once.
6. KOS-ECU transmits the exterior data from the exterior transmitter antenna assembly on the operation side. At the same time, KOS-ECU transmits the interfering radio wave (reversal code) from the exterior transmitter antenna assembly on the other side. (The interfering radio wave will be transmitted from the front passenger-side antenna assembly when the driver-side door outside handle is operated, and vice versa.)

7. After the specified time period (varies with the number of the keyless operation keys registered in KOS-ECU) has passed, confirm that the lock conditions are met.
   - When the responded keyless operation keys after the retry receives the exterior data only, KOS-ECU transmits the lock request (request to lock the actuated position) to ETACS-ECU.

LOCKING OPERATION INHIBITION CONDITIONS

In the following cases, the door locking operation is inhibited.

- Any door is open/ajar (door switch is ON). (including door ajar)
- The emergency key is in the ignition switch.
- The push switch in the steering lock is ON.
- The IG knob is in other than LOCK (OFF) position.

ANSWERBACK FUNCTIONS

When KOS-ECU sends a signal to ETACS-ECU, ETACS-ECU outputs the lock/unlock signal and activates the hazard warning light and the outer buzzer to notify the driver the doors are locked/unlocked.

	Lock signal received	**Unlock signal received**
ETACS-ECU	Lock signal output	Unlock signal output
Hazard warning light	Flashes once	Flashes twice
Outer buzzer	Sounds once (initial setting) or none	Sounds twice (initial setting) or none

KOS TIMER LOCK FUNCTION

When none of the doors are opened within 30 seconds after the doors are unlocked by KOS, ETACS-ECU automatically outputs the door lock signal to lock the doors. This function prevents the doors from being unlocked accidentally.

KEYLESS ENTRY FUNCTION

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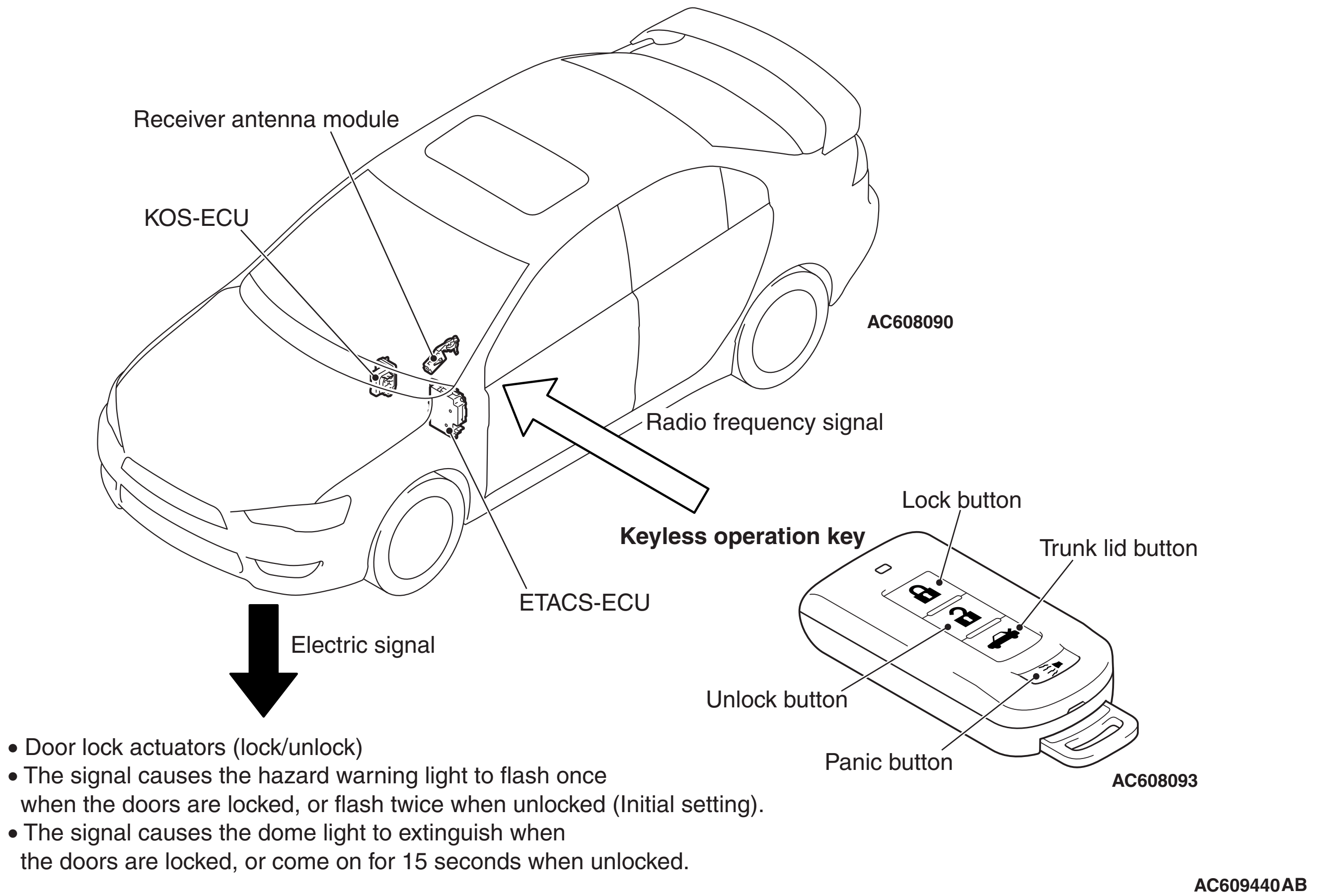


This keyless entry function has the following features: A keyless entry system enables locking and unlocking of all doors, the trunk lid from 12m (39.4 feet) away from the vehicle. The following features are also available.

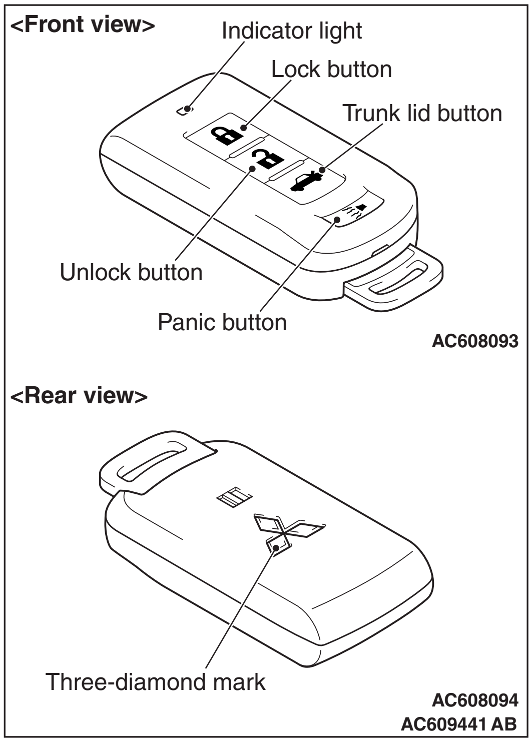
- A four-knob type keyless operation key with lock, unlock, trunk lid and panic buttons.
- The receiver antenna module incorporates a receiver and a receiving antenna.
- Up to four encrypted codes can be registered using scan tool MB991958 (M.U.T.-III sub-assembly).
- Answerback functions

  NOTE: The answerback function can be changed using a customisation function (Refer to P.42B-27).
- Keyless entry timer lock

  NOTE: Timer of the keyless entry timer lock can be changed using a customization function (Refer to P.42B-27).

DESCRIPTION OF CONSTRUCTION AND OPERATION

KEYLESS OPERATION KEY

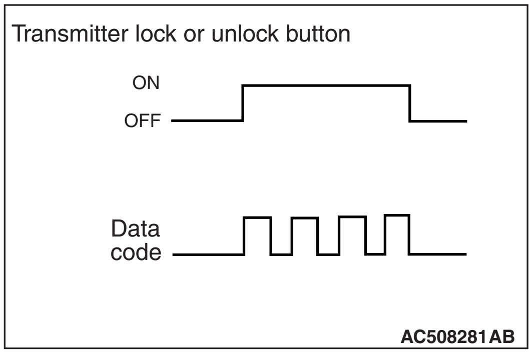


- The keyless operation key is integrated into the master key. The four-knob button is adopted, and the specific encrypted code is transmitted as radio wave signal.
- A brilliant silver three-diamond mark is stamped on the back side of the key grip to improve appearance.
- An indicator light, which illuminates when signals are sent, is added on the key grip. This indicator light informs you of the signal transmission status and warns you of flat battery.
- A signal transmission circuit (printed circuit) and a battery are housed in one case. The case is housed in the key grip, thus improving resistance to water ingress.
- A coin type battery, CR2032 is used in the keyless operation key.
- Using a customization feature, the keyless operation key operation can be changed (Refer to P.42B-27).
- The keyless operation key button operation allows the system to operate as follows:

KEYLESS OPERATION SYSTEM OPERATION TABLE (DEFAULT)

OPERATION OF KEYLESS OPERATION KEY			SYSTEM OPERATION
Lock button		Press once	Lock all doors
Unlock button		Press once	Unlock the driver's door
		Press twice	Unlock all doors
Trunk lid button		Press twice (press once, and then press again within 5 seconds)	Open the trunk lid
Panic alarm system	Panic button	Press once (press and hold for 1 second).	Starts the panic alarm (headlights flash and horn honks for three minutes)
	Lock button, unlock button, trunk lid button or panic button	Press again	Stops the panic alarm in progress

ENCRYPTED CODE



Four data codes are transmitted when a switch is operated once. The encrypted code for user identification is a combination of 0 and 1, and more than 1 million different combinations are available. To prevent theft by copying signal codes, the data code includes a rolling code with the encrypted code. The rolling code changes each time a signal is sent.

RECEIVER

The receiver is incorporated into the receiver antenna module together with the receiving antenna. It sends the signal the antenna received from the keyless operation key to KOS-ECU. KOS-ECU compares this signal with the ID code registered in it, and when they coincided, a signal is output from ETACS-ECU. By connecting scan tool MB991958 (M.U.T.-III sub-assembly) to the data link connector, up to four encrypted codes of keyless operation keys can be registered.

NOTE: IA keyless operation key can be added without using the scan tool. <USA only>

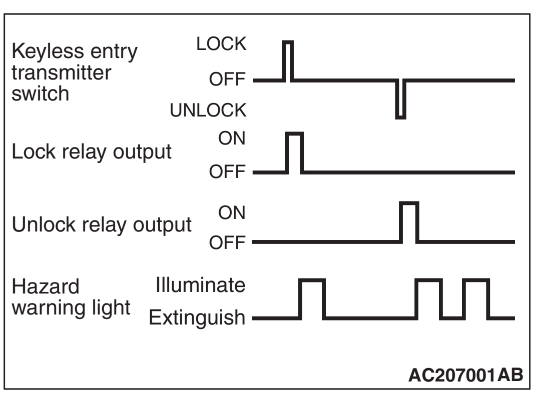
FUNCTION FOR CONFIRMING RECEIVER ANTENNA MODULE OUTPUT AND OPERATION

When the KOS-ECU receives an electric wave signal of the identification code stored in the receiver antenna module, the KOS-ECU outputs LOCK/UNLOCK signal to the ETACS-ECU and informs the driver of the keyless entry system operation by flashing the light and blowing horn (Answerback). The initial setting at factory for the answerback function is as the following table. Using a customization feature, the answerback function can be changed (Refer to P.42B-27).

FUNCTION TABLE FOR CONFIRMING KEYLESS ENTRY OPERATION (DEFAULT)

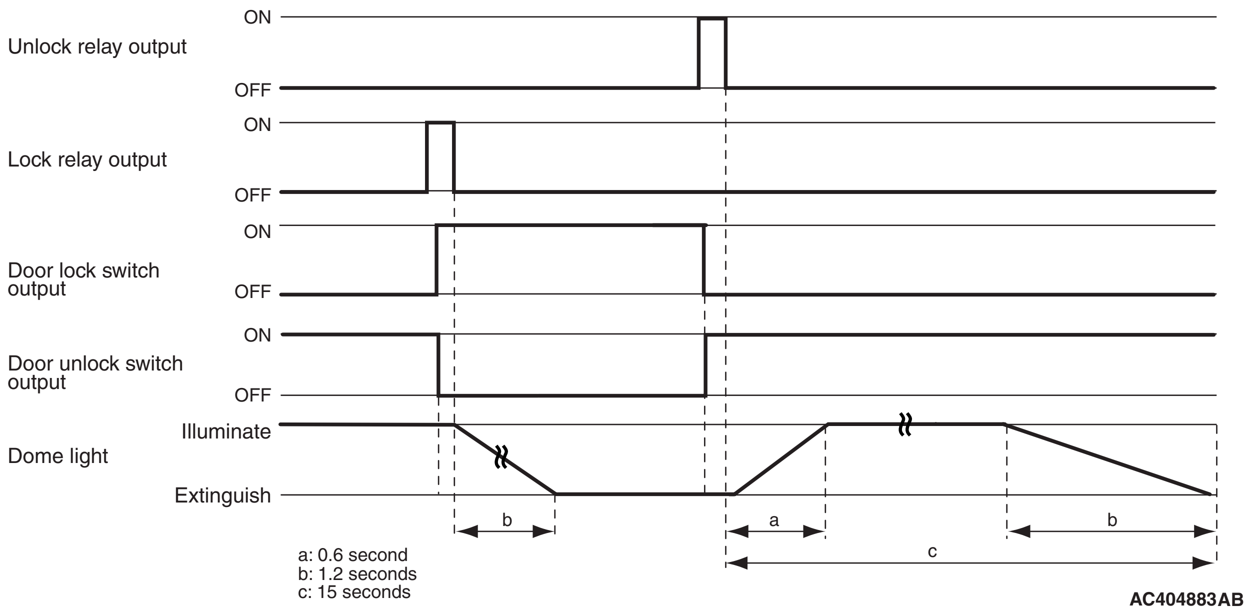
ITEM	OPERATION	
	DOORS LOCKED	DOORS UNLOCKED
ETACS-ECU (receiver antenna module)	Sends lock signal	Sends unlock signal
Dome light	Flashes once	Illuminates for 15 seconds
Turn-signal lights (RH and LH)	Flashes once	Flashes twice
Horn	Sounds once if doors are already locked	–

KEYLESS ENTRY HAZARD LIGHT ANSWERBACK FUNCTION



The hazard answerback function that allows checking the lock/unlock state of the door easily even in the daytime is installed. When the LOCK signal from the keyless operation key is input to ETACS-ECU, all doors are locked and the hazard warning light flashes once. When UNLOCK signal is input, all doors are unlocked and the hazard warning light flashes twice.

KEYLESS ENTRY DOME LIGHT ANSWERBACK FUNCTION



When LOCK signal from the keyless operation key is input to the ETACS-ECU via receiver antenna module, all doors are locked and the dome light will extinguish*. When UNLOCK signal is input, all doors are unlocked and the dome light illuminates for 15 seconds. The dome light fades in, keeps on, and fades out in 15 seconds after the door unlock relay is operated.

*NOTE: *: If doors are locked with the keyless operation key when the dome light is ON while doors are opened, the dome light is switched off in 1.2 seconds. In addition, if doors are locked with the keyless operation key when the dome light is OFF, the dome light does not work.*

KEYLESS ENTRY HORN ANSWERBACK FUNCTION

When the LOCK signal from the keyless operation key is received into ETACS-ECU via receiver antenna module, all doors are locked and the horn sounds. If the driver's door cannot be locked even when the keyless operation key is operated, the horn does not sound.

KEYLESS ENTRY TIMER LOCK TIME

When none of the doors are opened within 30 seconds after the doors are unlocked by the keyless entry system, ETACS-ECU automatically outputs the door lock signal to lock the doors. This function prevents the doors from being unlocked unexpectedly by operation errors. Using a customization function, the timer lock period can be changed (Refer to P.42B-27).

OPERATION INHIBITION CONDITIONS

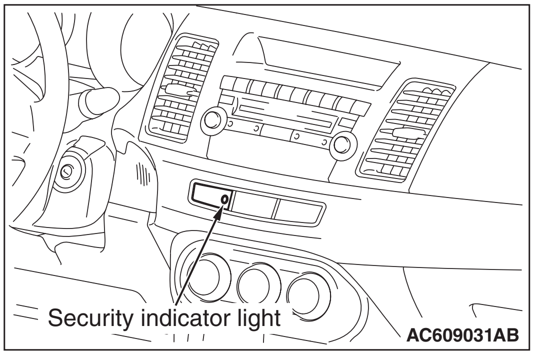
The operation of the system is inhibited when:

- The ignition key is in the ignition switch.

SECURITY ALARM

The security alarm function is based on the door lock operation by the keyless entry system or KOS. The function warns when the doors are opened by any operation other than the keyless entry system or KOS. Using a customization function, the security alarm can be enabled/disabled (Refer to GROUP 54A, Security alarm P.54A-37). This customization function is described in the owner’s manual.

SECURITY INDICATOR LIGHT



The security indicator light has been installed on the center panel of the instrument panel.

ENGINE STARTING FUNCTION

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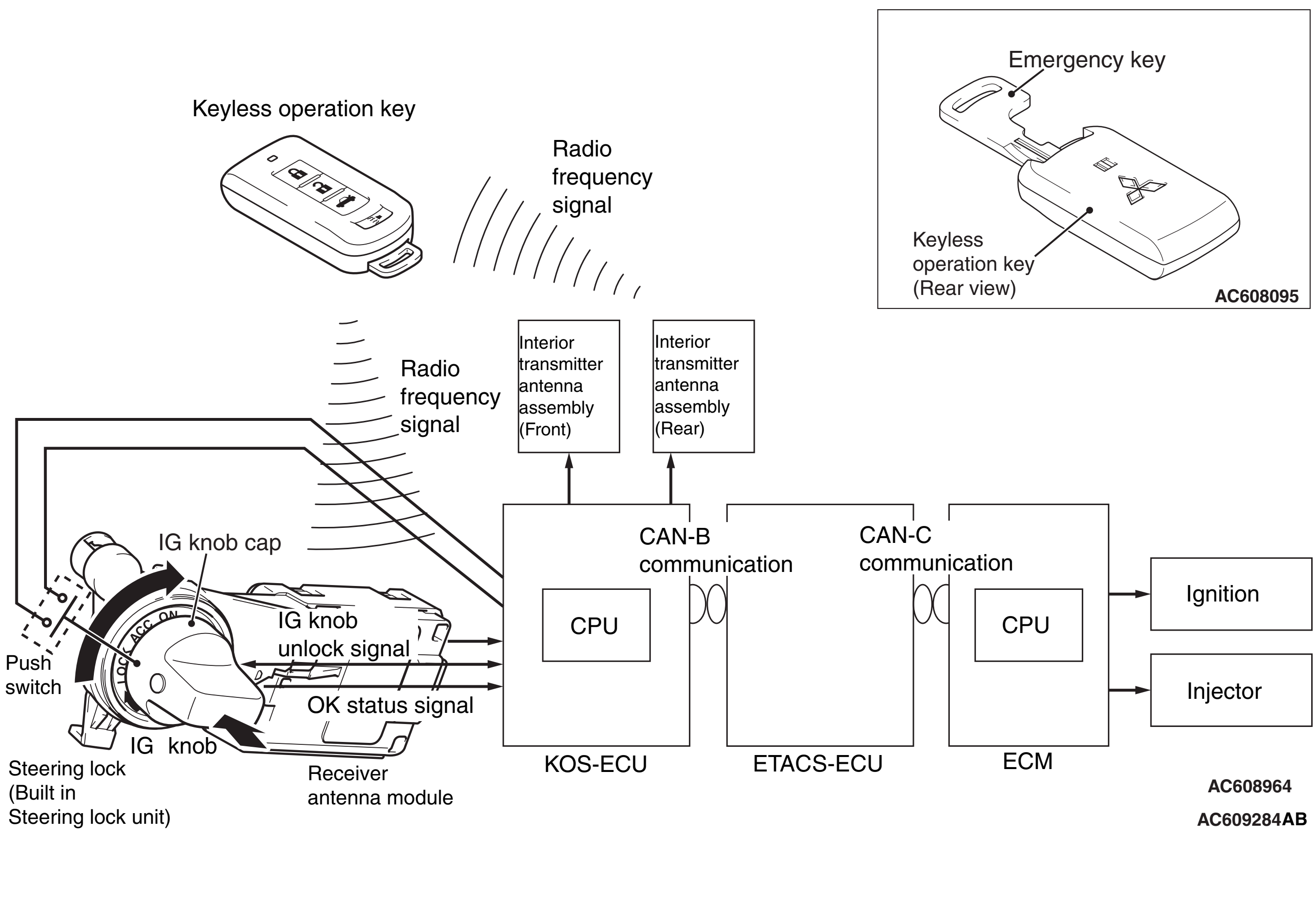
When carrying the keyless operation key, a driver can start/stop the engine by operating the IG knob, not using the ignition key.

CONSTRUCTION DIAGRAM



OPERATION

WHEN THE USER IS CARRYING THE KEYLESS OPERATION KEY

1. Press the IG knob on the steering lock, and the push switch inside the steering lock is turned ON.
2. When the push switch inside the steering lock is turned ON, KOS-ECU activates the interior transmitter antenna assembly to send the transmitter signal to the keyless operation key.
3. On receiving the transmitter signal from KOS-ECU, the keyless operation key performs the keyless operation key certification and the key ID calculation, and sends the keyless operation key ID data to KOS-ECU. (The keyless operation key cannot receive the transmitter signal from KOS-ECU when it is not located within the engine starting function valid area .)
4. The receiver antenna receives the signal from the keyless operation key, and then KOS-ECU compares the keyless operation key ID data sent from the key with the one registered in it.
5. When this data coincides, KOS-ECU sends the IG knob unlock signal to the steering lock unit inside the steering lock.
6. On receiving the IG knob unlock signal, the steering lock unit performs processing (verification of the KOS ID, etc.) based on the received data. When no problem is found during the processing, the unit sends the OK status signal to KOS-ECU, and at the same time, electrically disengages the steering lock mechanism to make the IG knob rotatable.
7. When a keyless operation key certification agreement memory "exists" *1 in KOS-ECU when it received the OK status signal from the steering lock unit, the engine start permission communication (CAN communication) is performed between KOS-ECU and the ECM by turning the IG knob from the "ACC" position to the "ON"/"START" position, and the engine starts. If the keyless operation key certification agreement memory "does not exist" *2, the engine does not start.

   NOTE:

   **1: The keyless operation key certification agreement memory "exists" means that a registered keyless operation key has been recognized during the keyless operation key certification communication.*

   **2: When the keyless operation key certification agreement memory "does not exist," the "keyless operation key bringing-out monitoring function" and the "keyless operation key replacement monitoring function" (keyless operation key monitoring controls) have judged that the keyless operation key has been carried out of the vehicle with the IG knob in the LOCK "(OFF)" position while turning ON the push switch or in the ACC, ON, or START position.*

KEYLESS OPERATION KEY TAKE OUT MONITORING FUNCTION

To prevent the engine from starting when the keyless operation key is carried out of the vehicle with the IG knob in the LOCK "(OFF)" position and the push switch OFF, KOS-ECU performs the certification communication with the keyless operation key inside the vehicle and monitors if it is carried out of the vehicle.

When none of the registered keyless operation keys (up to four) respond during the communication, KOS-ECU determines that the key has been brought out of the car, and the keyless operation key certification agreement memory "does not exist," and does not permit starting of the engine.

NOTE: The monitoring function is inhibited when:

- *The keyless operation key certification agreement memory "does not exist" from the start.*
- *The emergency key is in the IG knob.*
- *The IG knob is in LOCK "(OFF)" position and the push switch is OFF.*
- *The vehicle is judged running (shift lever in "P" or "N", or vehicle speed is 6 km/h or higher).*

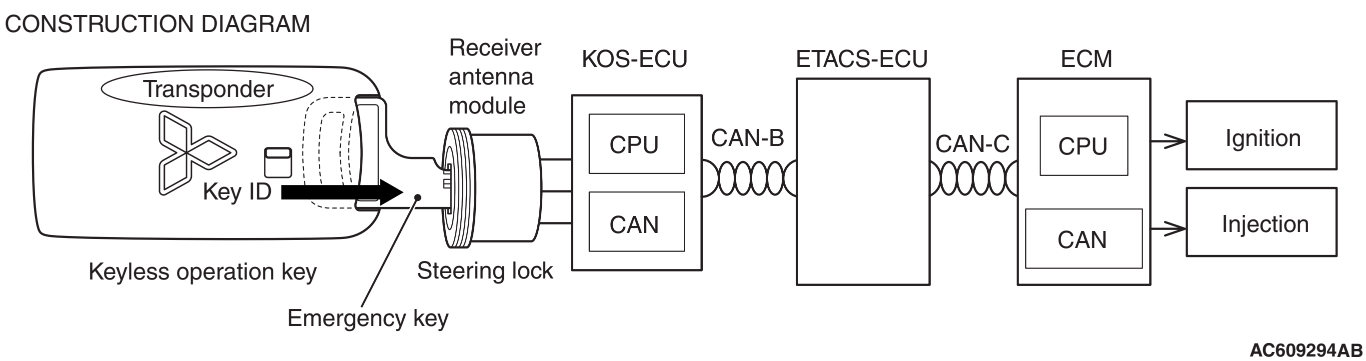
KEYLESS OPERATION KEY REPLACEMENT MONITORING FUNCTION

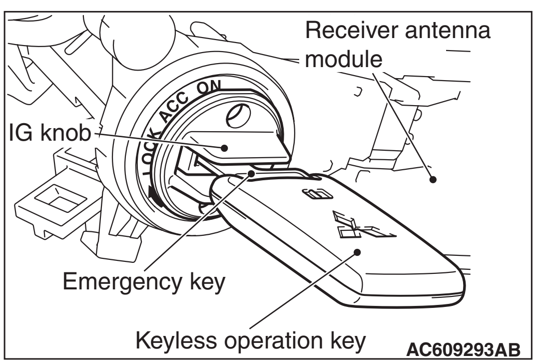
If the keyless operation key carrying-out monitoring function once detects that the key has been carried out of the vehicle with the IG knob in the LOCK "(OFF)" position and with the push switch in other than OFF, and then the key is brought into the vehicle, the engine must be started when the IG knob is turned to the ON or START position. For this purpose, KOS-ECU performs the certification communication with the keyless operation key inside the vehicle every 5 seconds to monitor the replacement of the keyless operation key. When any of the registered keyless operation keys sends a responce, KOS-ECU determines that the key has been brought into the vehicle (replaced), and sets the keyless operation key certification agreement memory to "exist," and permits starting of the engine.

NOTE: The monitoring function is inhibited when:

- *The keyless operation key certification agreement memory "exists" from the start.*
- *The emergency key is in the IG knob.*
- *The IG knob is in LOCK (OFF) position and the push switch is OFF.*
- *The vehicle is judged running (shift lever in "P" or "N", or vehicle speed is 6 km/h or higher).*

WHEN USING EMERGENCY KEY





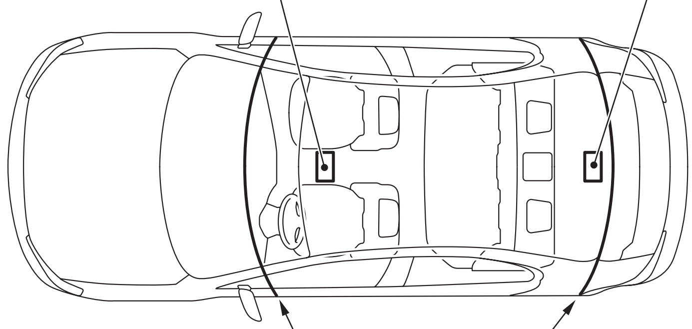
The engine can be started by removing the IG knob cap and inserting the emergency key in KOS steering lock. In this case, the system operates as follows:

1. Inversely insert the emergency key in the keyless operation key, insert that in KOS steering lock, and then press and turn the emergency key using the keyless operation key.
2. When the emergency key is turned to the ON position, the transponder (a small transmitter) incorporated in the keyless operation key transmits a key-specific ID code (key ID) to the receiver antenna module by radio wave.
3. The KOS-ECU compares the ID code that was sent with pre-registered ID codes, and only when the code matches, the KOS-ECU controls the ECM.
4. Since the power to the transponder incorporated in the keyless operation key is supplied from the receiver antenna module, the keyless operation key can be used even when its battery is discharged. Two keyless operation keys are provided for each vehicle, and up to four keys can be registered as needed. In addition, the emergency keys can be registered as many as the keyless operation keys. There are one trillion possible combination for the registered ID codes which improves security by preventing theft using a copied ID code.

NOTE: If KOS-ECU is replaced, or if the keyless operation key is lost or the additional key is added, all the keyless operation key ID codes must be re-registered using the scan tool. (A key can be added without using the scan tool. <USA only>)

ENGINE STARTING FUNCTION VALID AREA

The engine can be started only when the keyless operation key is within the interior antenna receiving area.



TIRE PRESSURE MONITORING SYSTEM (TPMS) FUNCTION

M2421000600011

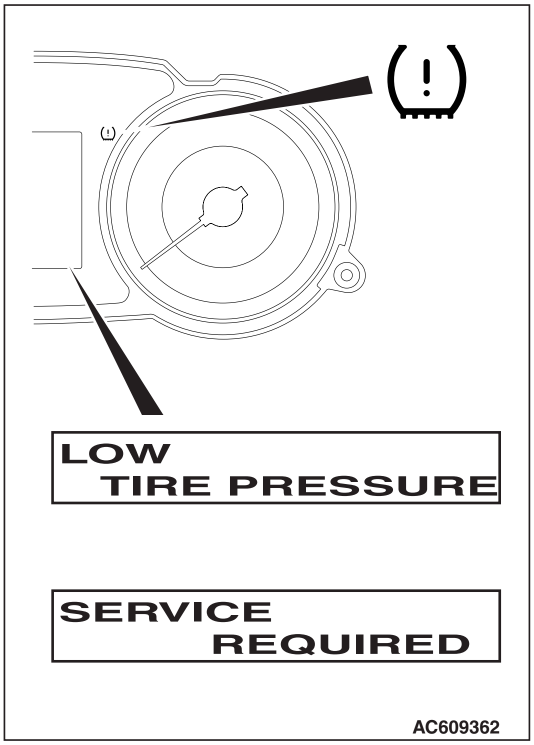
When the tire pressure becomes under the specified value, the TPMS function warns the driver of that state by illuminating the TPMS warning light.

OPERATION

- The signals from the TPMS transmitter are received by the KOS-ECU.
- KOS-ECU processes input signals from each TPMS transmitter as well as vehicle speed signals from the ABS-ECU. It receives the atmospheric pressure signal from ECM, and when the atmospheric pressure is low (such as at high altitude), it calibrates the tire pressure received from TPMS transmitter and makes a judgment of warning. When the road tire pressure is low, it sends a warning signal causing the TPMS warning light to be illuminated. When the TPMS has problems, it sends a warning signal causing the TPMS warning light to be flashed*.

  *NOTE: *: Change to continuous illumination after flashing for about 1 minute.*
- For 3 seconds after the ignition switch is turned to the "ON" position, KOS-ECU illuminates the TPMS warning light to check any breaks in the TPMS warning light circuit.
- By connecting the scan tool to the data link connector, data stored in KOS-ECU (data of tire pressure and TPMS transmitter ID, the alarm status and warning history, etc.) can be displayed and TPMS transmitter ID can be registered.

  NOTE: If the TPMS transmitter is replaced, register the ID codes of all the TPMS transmitters again using the M.U.T.-III.



TPMS WARNING LIGHT

The TPMS warning light on the combination meter illuminates or flashes* to alert the driver by request from KOS-ECU. When the tire pressure warning or the fault warning is activated, a warning symbol and a message are displayed on the multi information display.

WARNING DISPLAY PATTERN OF TPMS WARNING LIGHT AND MULTI INFORMATION DISPLAY

Circumstance	Warning light	Multi information display
For 3 seconds after the ignition switch is turned to the "ON" position (warning light circuit self-check)	Illuminates	No indication
TPMS problems	Flashes*	Symbol and "SERVICE REQUIRED" is displayed
Low tire pressure	Illuminates	Symbol and "LOW TIRE PRESSURE" is displayed

TIRE PRESSURE THRESHOLD VALUES

Item	Tire pressure kPa (psi)
Standard pressure at cold (reference)	220 (32)
Alarm ON pressure	174 (25.2) or less
Alarm OFF pressure	189 (27.4) or more

TPMS TRANSMITTER (TIRE PRESSURE SENSOR)

The TPMS transmitter combines the valve and tire pressure sensor in a single unit. The TPMS transmitters are mounted inside the tires. The TPMS transmitter measures tire pressure directly with its tire pressure sensor and sends radio frequency signals to KOS-ECU. The TPMS transmitter includes acceleration sensor that senses tire rotation, and change tire pressure sampling and data transmission timing when vehicle is running.

NOTE: Use only genuine wheels. The use of non-genuine wheels may cause the improper installation of the TPMS transmitters, possibly resulting in air leakage and damage to the TPMS transmitter.

TIRE PRESSURE SAMPLING TIMING

Vehicle status	Sampling timing
At vehicle moving	once every 5 seconds
At vehicle stationary	once every 1 minute

NOTE: Vehicle moving = vehicle speed: approximately 25 km/h (15 mph) or more

DATA TRANSMISSION TIMING

Vehicle status	Transmission timing
At vehicle moving	once every 1 minute*
At vehicle stationary	once every 13 hours

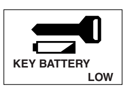
If a sampled pressure varies by ±10 kPa (1.5psi) from the last transmitted pressure value, an additional transmission will occur.

*NOTE: *: Once every 15 seconds for first 30 transmission after vehicle starts moving.*

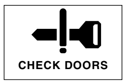
M2421009300062

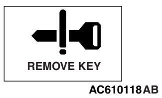
WARNINGS/ALARMS

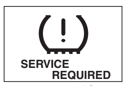
If the KOS failed, operated improperly, KOS-ECU warns the driver of this by setting off the outer tone alarm and the keyless operation warning indicator, on the multi information display in the combination meter. If the TPMS fails or the tire pressure is low, KOS-ECU warns the driver of that state by the TPMS warning light and the multi information display in the combination meter.

Display contents	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
			TPMS warning light	Multi information display	
 AC610126AB	Low keyless operation key battery voltage warning	The keyless operation key with low battery voltage is detected when the IG knob is pressed.	–	• Warning indicator flashes for 30 seconds. • The outer tone alarm will not sound.	• IG knob in "LOCK" (OFF) position and push switch OFF are detected. • 30 seconds have passed after the warning output started.
 AC610127AB	No keyless operation key detected inside the car	No keyless operation key is detected inside the car when the IG knob is pressed.	–	• The warning indicator flashes for 5 minutes. • The outer tone alarm will not sound.	• IG knob in "LOCK" (OFF) position and push switch OFF are detected. • 5 minutes have passed after the warning output started.

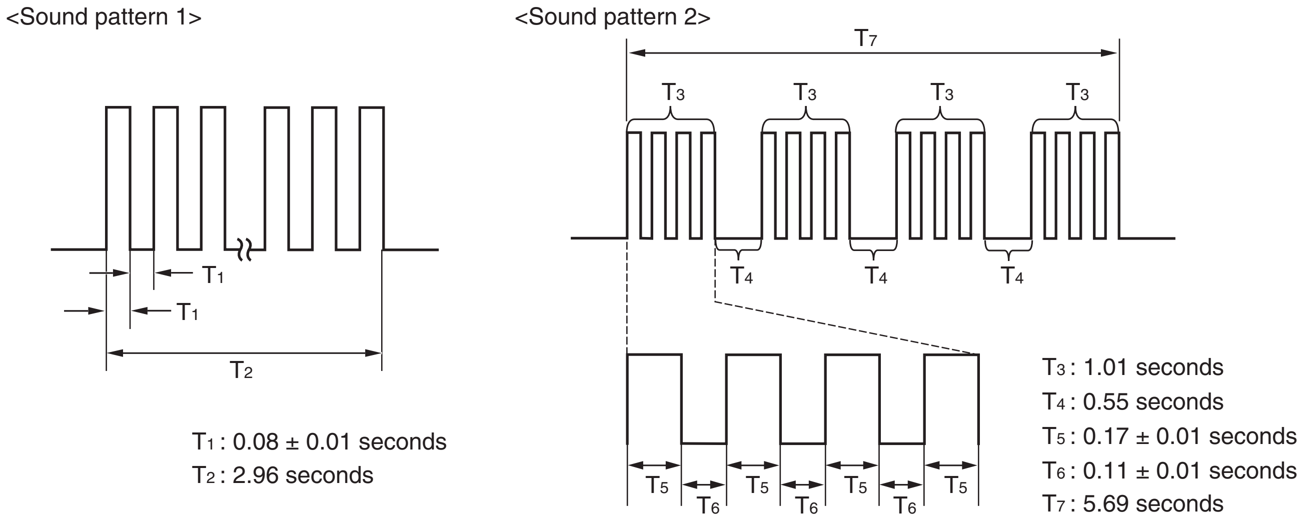
Display contents	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
			TPMS warning light	Multi information display	
	IG knob is not returned properly.	Opening of the driver's door is detected when the IG knob is in ACC or LOCK position and the push switch is ON.	–	• The warning indicator flashes for 5 minutes. • The outer tone alarm will not sound. • Key reminder warning tone alarm sounds until closing of the driver's door is detected.	• The IG knob in the "RUN" or "START" position, or the IG knob in the "LOCK" (OFF) position, and the push switch OFF are detected. • The driver's door is detected closed from the open position. • 5 minutes have passed after the warning output started.
	Keyless operation key brought out of the car warning	The keyless operation key is brought out of the car when the IG knob is in other than the LOCK position.	–	• The warning indicator flashes for 5 minutes. • Outer tone alarm sounds for 5.69 seconds in pattern 2.	• IG knob in "LOCK" (OFF) position and push switch OFF are detected. • KOS-ECU has detected a keyless operation key inside the vehicle. • 5 minutes have passed after the warning output started.

<table>
<tr><th rowspan="2">Display contents</th><th rowspan="2">Item</th><th rowspan="2">State</th><th colspan="2">Warning operations</th><th rowspan="2">Warning cancellation conditions (Cancels warning operations when one of the conditions met)</th></tr>
<tr><th>TPMS warning light</th><th>Multi information display</th></tr>
<tr><td rowspan="3">AC610129AB</td><td rowspan="3">Door lock does not operate.</td><td>Push switch is pressed ON when the IG knob is in other than LOCK position.</td><td rowspan="3">–</td><td rowspan="3">• Warning indicator flashes for 5 seconds.
• Outer tone alarm sounds for 2.96 seconds in pattern 1.</td><td>• IG knob in "LOCK" (OFF) position and push switch OFF are detected.
• 5 seconds have passed after the warning output started.</td></tr>
<tr><td>Push switch is pressed ON when the keyless operation key is inside the car.</td><td>• Lock switch on the keyless operation switch is pressed again.
• 5 seconds have passed after the warning output started.</td></tr>
<tr><td>Push switch is pressed ON when the door is ajar.</td><td>• All doors are closed.
• 5 seconds have passed after the warning output started.</td></tr>
</table>

Display contents	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
			TPMS warning light	Multi information display	
	System error	Push switch is pressed ON from OFF when an error has been detected in EEPROM in KOS-ECU.	–	• The warning indicator flashes for 5 minutes. • The outer tone alarm will not sound.	5 minutes have passed after the push switch was pressed ON and IG knob is in "LOCK" (OFF) position.
		Push switch is pressed ON from OFF while open circuit in the transmitter antennas are being detected.			
		The push switch is pressed ON from OFF while short circuit in the power supply output (steering lock, transmitter antennas, receiver antenna module, etc.) is detected.			
		Steering lock communication error has been detected when the push switch was pressed ON.			
		The IG knob is in other than the LOCK position while some error is being detected.			
	TPMS warning light bulb open circuit check	The ignition switch is turned from "LOCK" (OFF) to "ON."	Illuminates for 3 seconds.	–	3 seconds have passed after the TPMS warning light is lit.
	Tire pressure alarm	The received tire pressure value is under the alarm ON threshold value.	Illuminates.	Symbol and "LOW TIRE PRESSURE" is displayed.	The received tire pressure value is over the alarm OFF threshold value.

Display contents	**Item**		**State**	**Warning operations**		**Warning cancellation conditions (Cancels warning operations when one of the conditions met)**
				TPMS warning light	**Multi information display**	
b  AC610120AB	TPMS failure warning	ID not stored	The TPMS transmitter ID is not registered in the KOS-ECU.	Flashes *	Symbol and "SERVICE REQUIRED" is displayed.	ID is registered normally.
		Defective EEPROM	Abnormality of data in the EEPROM of the KOS-ECU is detected.			Data in the EEPROM of the KOS-ECU is checked to be normal.
		Problem in signal reception	The signals from TPMS transmitters cannot be received while driving for about 20 minutes.			The signal from the TPMS transmitter that was warned is received.
		Defective sensor	The sensor failure signal is received from the TPMS transmitter.			A normal signal is received from the TPMS transmitter that was warned.
		The battery voltage of the TPMS transmitter is low.	The reception problem warning is activated because of the low battery voltage of the TPMS transmitter.			The signal of normal battery voltage is received from the TPMS transmitter that was warned.
		Vehicle speed input problem	The vehicle speed is not input.			The vehicle speed is input.
		Abnormal vehicle speed value	The vehicle speed value is abnormal.			The normal vehicle speed value is received.

NOTE:
**: Change to continuous illumination after flashing for about 1 minuite.*



AC501053AC

CONFIGURATION FUNCTION

M2421000300076

Using the scan tool, the following functions can be programmed. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool MB991958 display)	Adjustment item	Adjusting contents (scan tool MB991958 display)	Adjusting contents
Hazard answer back	Adjustment of the number of keyless hazard warning light answer back flashes	Lock:1, Unlock:2	LOCK: Flashes once, UNLOCK: Flashes twice (default)
		Lock:1, Unlock:0	LOCK: Flashes once, UNLOCK: No flash
		Lock:0, Unlock:2	LOCK: No flash, UNLOCK: Flash twice
		Lock:2, Unlock:1	LOCK: Flash twice, UNLOCK: Flash once
		Lock:2, Unlock:0	LOCK: Flash twice, UNLOCK: No flash
		Lock:0, Unlock:1	LOCK: No flash, UNLOCK: Flash once
		Lock:0, Unlock:0	No function
Dome light delay timer with door	Adjustment of interior light delay shutdown time	0sec	0 second (no delay shutdown time) (default <Vehicles without central door locking system>)
		7.5sec	7.5 seconds
		15sec	15 seconds
		30sec	30 seconds (default <Vehicles with central door locking system>)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds

Adjustment item (scan tool MB991958 display)	**Adjustment item**	**Adjusting contents (scan tool MB991958 display)**	**Adjusting contents**
Door unlock mode	Door lock system	All doors unlock	All the doors are unlocked when the driver's side door is unlocked.
		Dr door unlock	Only the driver's side door is unlocked when the driver's side door is unlocked. (default)
Auto door unlock by P position	Auto door unlock by P position function	Disable	No function (default)
		Always enabled	Always with function
		P/W unlocked	With function (with power window unlocked)
Duration of horn chirp	Horn sounding time during horn answer back	Short	0.01 second (default)
		Long	0.02 second
Horn chirp by RKE	Horn chirp by RKE	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (default)
Tone alarm answer back	Adjusts the tone alarm answer back function.	Not sound tone alarm	No function
		At keyless key	Sounds when the keyless entry system is activated.
		At keyless	Sounds when KOS is activated (default).
		At Both	Sounds when the keyless entry system or KOS is activated.
Timer lock timer	Timer lock period adjustment	30sec	30 seconds (default)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Auto door unlock by P position	Auto door unlock by P position function <Vehicles with central door locking system>	Disable	No function (default)
		Always enabled	Always with function
Duration of horn chirp	Horn sounding time during horn answer back	Short	0.01 second (default)
		Long	0.02 second
Horn chirp by keyless	Horn chirp by keyless entry system	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (default)

Adjustment item (scan tool MB991958 display)	Adjustment item	Adjusting contents (scan tool MB991958 display)	Adjusting contents
Buzzer answer back	Adjusts the tone alarm answer back function.	Not sound buzzer	No function
		At keyless	Sounds when the keyless entry system is activated.
		At F.A.S.T.	Sounds when KOS is activated (default).
		At Both	Sounds when the keyless entry system or KOS is activated.
Timer lock timer	Timer lock period adjustment	30sec	30 seconds (default)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Panic alarm switch	With/without panic alarm function	Disable	No function
		Enable	With function (default)
F.A.S.T. key out of car	With/without KOS key exterior detection function	Enable	No function
		Disable	With function (default)
F.A.S.T. feature	KOS function adjustment	Both enable	All KOS functions are enabled (default).
		DoorEntry enable	Only door entry function is enabled.
		ENG strt enable	Only engine starting function is enabled.
		Both disabled	All KOS functions are disabled.
F.A.S.T. unlock disable time	Adjusts the door unlock inhibition period after door lock is activated.	0sec	0 seconds
		3sec	3 seconds (default)
		5sec	5 seconds

NOTES

GROUP 42C

WIRELESS CONTROL MODULE (WCM)

CONTENTS

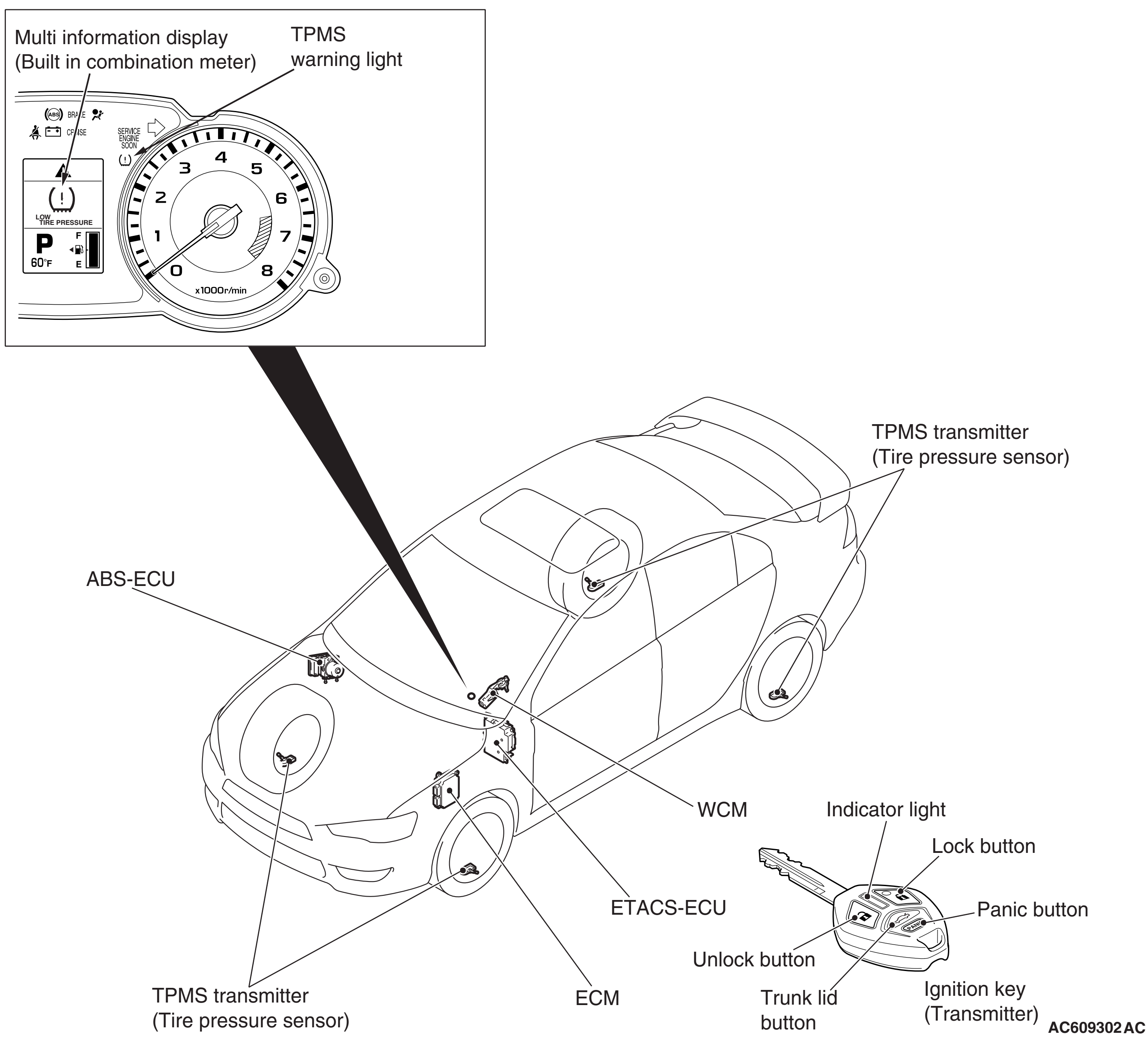
GENERAL INFORMATION

M2422000100075

The wireless control module (WCM) is a system that integrates the keyless entry function, immobilizer function, and the TPMS function, and it has the following features:

- The ignition key (transmitter) incorporates a lock/unlock/trunk lid button and a panic button. The ignition key also incorporates an indicator light that enables the driver to check if the signal is transmitted correctly or if the battery in the key is discharged. (Refer to P.42C-5.)
- The ignition key incorporates the immobilizer function that inhibits starting the engine by using an unauthorized key.
- The incorporated TPMS function monitors the air pressure of all the tires (except spare tire).
- Each vehicle is provided with two ignition keys (transmitter), and up to eight ignition keys can be registered.
- Settings of the keyless entry function can be adjusted using a customization function (Refer to P.42C-13).

CONSTRUCTION DIAGRAM



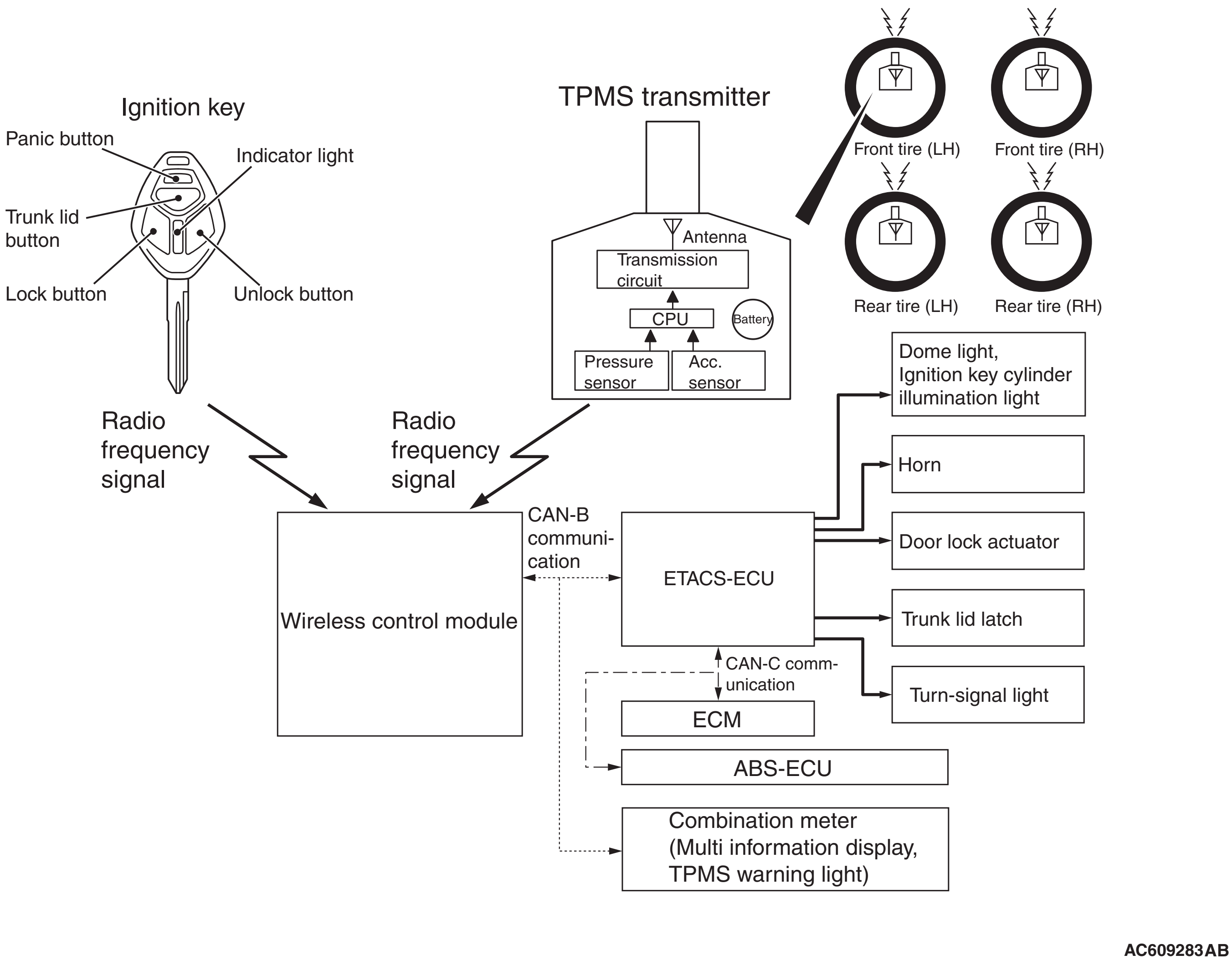
Main components and functions

Parts name	Functional description
WCM	Controls the keyless entry functions, TPMS functions and starting of the engine by using the following communications. • Communications with ETACS-ECU, ECM, ABS-ECU <vehicles for ABS> and combination meter via CAN • Wireless communication with the ignition key (transmitter) • Wireless communication with the TPMS transmitter
Ignition key (transmitter)	The ignition key (transmitter) also sends signals to WCM when the lock/unlock/trunk lid button and the panic button on it are operated.
Combination meter (Multi information display, TPMS warning light)	Communicates with WCM via CAN. Send ignition switch status. Receives the warning request or warning information about TPMS from WCM, activates* the TPMS warning iight. Warning symbol and message is additionally displayed on the multi information display.
ETACS-ECU	Communicates with WCM via CAN send ignition switch status. Receives the door lock/unlock request from WCM, outputs the lock/unlock signal and flashes the turn signal light, dome light and horn to inform the driver that the doors are locked/unlocked.
ABS-ECU	Communicates with WCM via CAN. Sends the vehicle speed data <Vehicles with ABS>.
ECM	Communication with WCM via CAN. Send atmospheric pressure data. Sends the vehicle speed data <Vehicles without ABS>.
TPMS transmitter	Measure tire pressure directly, then send radio frequency signal to WCM.

NOTE:

- **: Illuminates for tire pressure warning.*
- **: Flashes for about 1 minute and then continuously illuminated for TPMS malfunction warning.*

System configuration

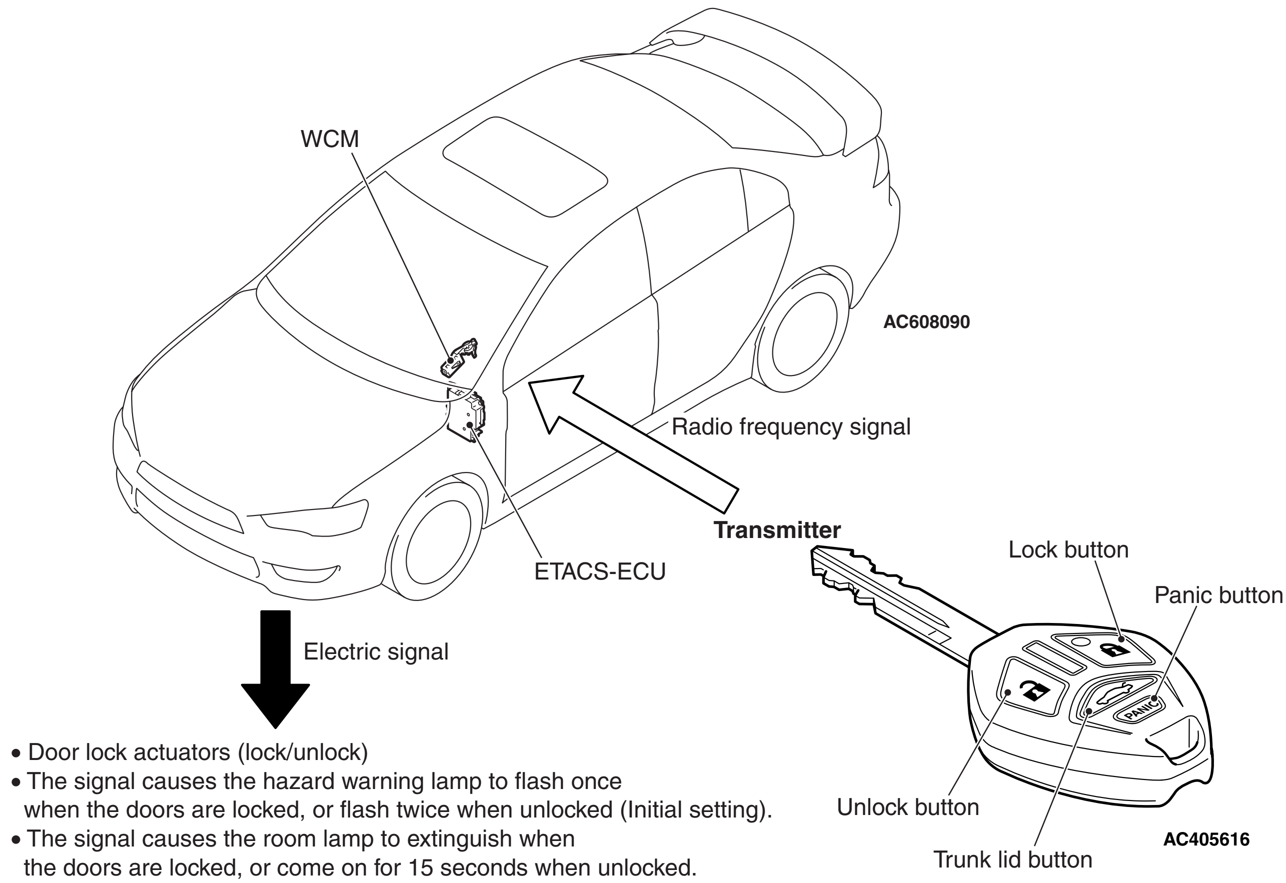


NOTE: In case of replacement of WCM, all keyless ID, key ID and tire pressure sensor ID should be re-registered using scan tool MB991958 (M.U.T.-III sub-assembly).

SYSTEM OPERATION

KEYLESS ENTRY FUNCTION

M2422000400076



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This keyless entry function has the following features: A keyless entry system enables locking and unlocking of all doors, the trunk lid from 12m (39.4 feet) away from the vehicle. The following features are also available.

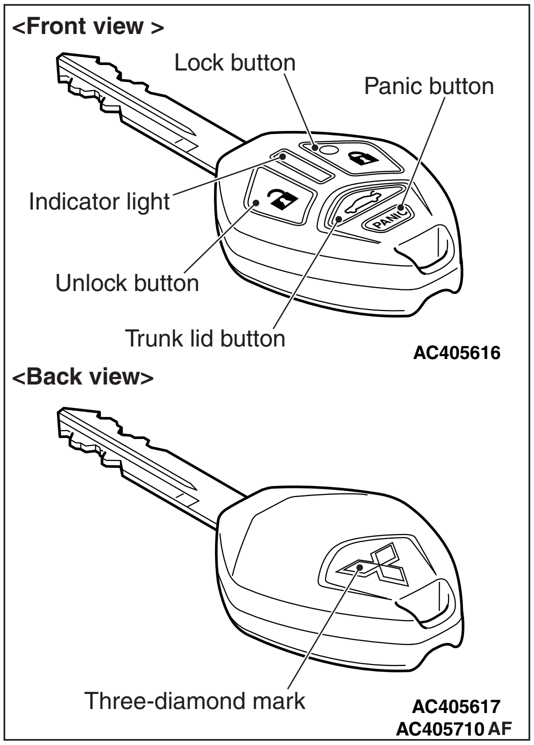
- A four-knob type transmitter with lock, unlock, trunk lid and panic buttons.
- The WCM incorporates a receiver and a receiving antenna.
- Up to eight encrypted codes can be registered using scan tool MB991958 (M.U.T.-III sub-assembly).
- Answerback functions

  NOTE: The answerback function can be changed using a customization function (Refer to P.42C-13).
- Keyless entry timer lock

  NOTE: Timer of the keyless entry timer lock can be changed using a customization function (Refer to P.42C-13).

DESCRIPTION OF CONSTRUCTION AND OPERATION

TRANSMITTER

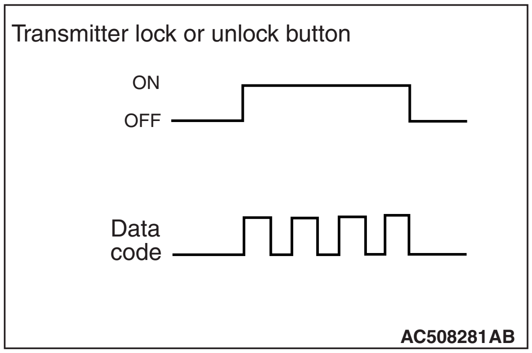


- The transmitter is integrated into the master key. The four-knob button is adopted, and the specific encrypted code is transmitted as radio wave signal.
- An indicator light, which illuminates when signals are sent, is added on the key grip. This indicator light informs you of the signal transmission status and warns you of flat battery.
- A signal transmission circuit (printed circuit) and a battery are housed in one case. The case is housed in the key grip, thus improving resistance to water ingress.
- A coin type battery, CR1620 is used in the transmitter.
- The functions of the immobilizer system are integrated (Refer to P.42C-9).
- Using a customization feature, the transmitter button operation can be changed (Refer to P.42B-27).
- The transmitter button operation allows the system to operate as follows:

KEYLESS ENTRY SYSTEM OPERATION TABLE (DEFAULT)

OPERATION OF TRANSMITTER			OPERATION OF KEYLESS ENTRY SYSTEM
Lock button		Press once	Lock all doors
Unlock button		Press once	Unlock the driver's door
		Press twice	Unlock all doors
Trunk lid button		Press twice (press once, and then press again within 5 seconds)	Open the trunk lid
Panic alarm system	Panic button	Press once (press and hold for 1 second).	Starts the panic alarm (headlights flash and horn honks for three minutes)
	Lock button, unlock button, trunk lid button or panic button	Press again	Stops the panic alarm in progress

ENCRYPTED CODE



Four data codes are transmitted when a switch is operated once. The encrypted code for user identification is a combination of 0 and 1, and more than 1 million different combinations are available. To prevent theft by copying signal codes, the data code includes a rolling code with the encrypted code. The rolling code changes each time a signal is sent.

RECEIVER

The receiver is incorporated into WCM together with the receiving antenna. The receiver compares the signal the antenna received from the transmitter with the encrypted code registered in it, and when they coincide, outputs a signal from WCM. By connecting scan tool MB991958 (M.U.T.-III sub-assembly) to the data link connector, encrypted codes of up to eight transmitters can be registered.

NOTE: IA transmitter can be added without using the scan tool. <USA only>

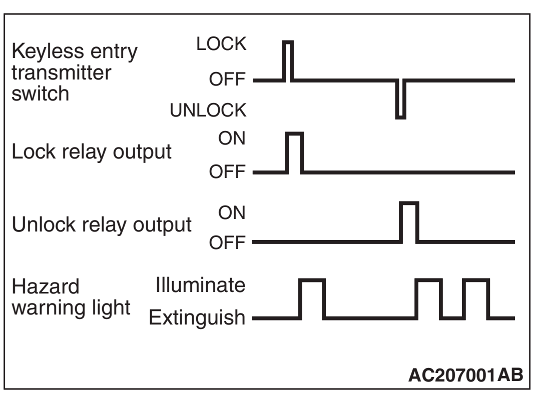
FUNCTION FOR CONFIRMING WCM (RECEIVER) OUTPUT AND OPERATION

When the ETACS-ECU receives can command from WCM, the ETACS-ECU outputs LOCK/UNLOCK signal and informs the driver of the keyless entry system operation by flashing the light and blowing horn (Answerback). The initial setting at factory for the answerback function is as following table. Using a customization feature, the answerback function can be changed (Refer to P.42C-13).

FUNCTION TABLE FOR CONFIRMING KEYLESS ENTRY OPERATION (DEFAULT)

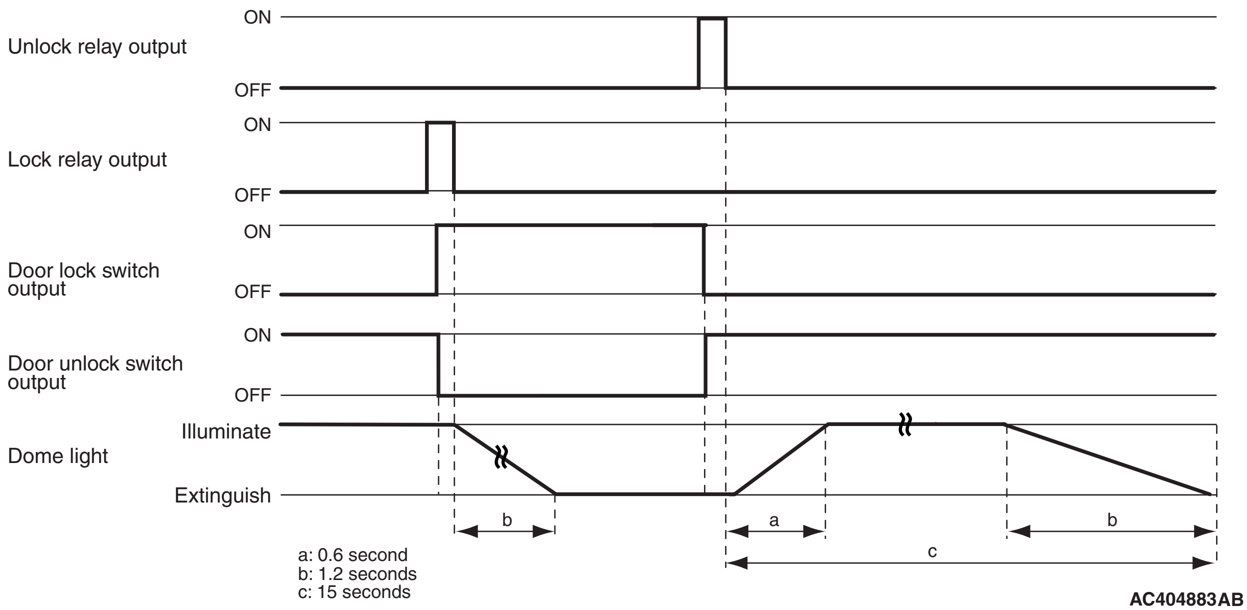
ITEM	OPERATION	
	DOORS LOCKED	DOORS UNLOCKED
ETACS-ECU (WCM)	Sends lock signal	Sends unlock signal
Dome light	Flashes once	Illuminates for 15 seconds
Turn-signal lights (RH and LH)	Flashes once	Flashes twice
Horn	Sounds once if doors are already locked	–

KEYLESS ENTRY HAZARD LIGHT ANSWERBACK FUNCTION



The hazard answerback function that allows checking the lock/unlock state of the door easily even in the daytime is installed. When the LOCK signal from the transmitter is input to ETACS-ECU, all doors are locked and the hazard warning light flashes once. When UNLOCK signal is input, all doors are unlocked and the hazard warning light flashes twice.

KEYLESS ENTRY DOME LIGHT ANSWERBACK FUNCTION



When LOCK signal from the transmitter is input to the ETACS-ECU via WCM, all doors are locked and the dome light will extinguish*. When UNLOCK signal is input, all doors are unlocked and the dome light illuminates for 15 seconds. The dome light fades in, keeps on, and fades out in 15 seconds after the door unlock relay is operated.

*NOTE: *: If doors are locked with the transmitter when the dome light is ON while doors are opened, the dome light is switched off in 1.2 seconds. In addition, if doors are locked with the transmitter when the dome light is OFF, the dome light does not work.*

KEYLESS ENTRY HORN ANSWERBACK FUNCTION

When WCM receives the LOCK signal from the transmitter and send LOCK signal to ETACS-ECU, all doors are locked and the horn sounds. If the driver's door cannot be locked even when the keyless entry transmitter is operated, the horn does not sound.

KEYLESS ENTRY TIMER LOCK TIME

When none of the doors is opened within 30 seconds after the doors are unlocked by the keyless entry system, ETACS-ECU automatically outputs the door lock signal to lock the doors. This function prevents the doors from being unlocked unexpectedly by operation errors. Using a customization function, the timer lock time can be changed (Refer to P.42C-13).

OPERATION INHIBITION CONDITIONS

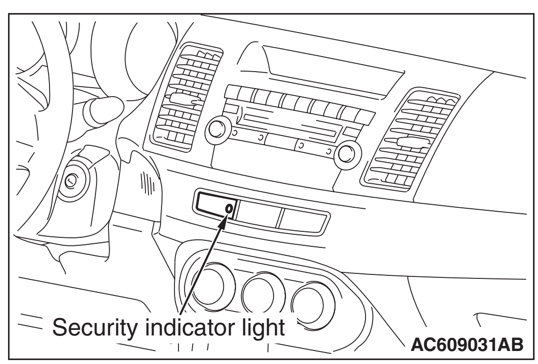
The operation of the system is inhibited when:

- The ignition key is in the ignition switch.

SECURITY ALARM

The security alarm function is based on the door lock operation by the keyless entry system. The function warns when the doors are opened by any operation other than the keyless entry system. Using a customization function, the security alarm can be enabled/disabled (Refer to GROUP 54A, Security alarm P.54A-37). This customization function is described in the owner's manual.

SECURITY INDICATOR LIGHT



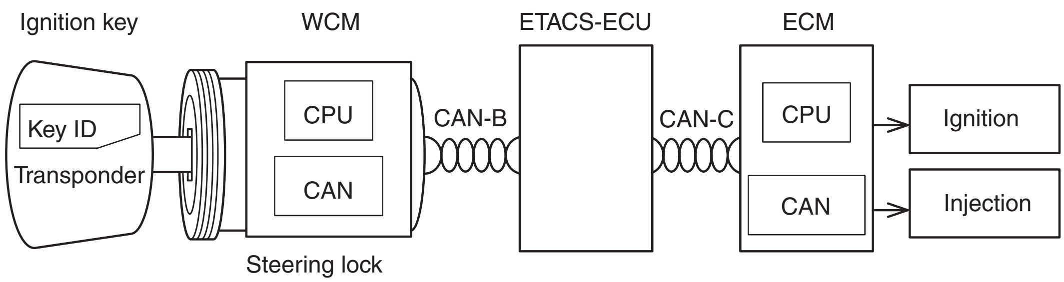
The security indicator light has been installed on the center panel of the instrument panel.

IMMOBILIZER FUNCTION

M2422000500062

The immobilizer function prevents the engine from starting and immobilizes the vehicle if a key other than the key registered for that vehicle is used in an attempt to start the engine after forced entry.

CONSTRUCTION DIAGRAM



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OPERATION

1. With the ignition key turned ON, the transponder (a small transmitter) integrated in the ignition key transmits its own ID code (key ID) to WCM via radio wave.
2. According to the sent key ID, WCM controls the ECM only when the sent ID code agrees with the pre-registered one.
3. Since the power to the transponder incorporated in the ignition key is supplied from the WCM, the ignition key can be used even when its battery is discharged. Two ignition keys are provided, and up to eight ignition keys can be registered to one vehicle as needed. More than one trillion of ID code combinations can be registered. This feature prevents code copying, resulting in higher security of the system.

NOTE: In case of replacement of WCM, or loss or addition of the ignition key, all key ID codes should be re-registered using scan tool. (A key can be added without using the scan tool. <USA only>)

TIRE PRESSURE MONITORING SYSTEM (TPMS) FUNCTION

M2422000800018

When the tire pressure becomes under the specified value, the TPMS function warns the driver of that state by illuminating the TPMS warning light.

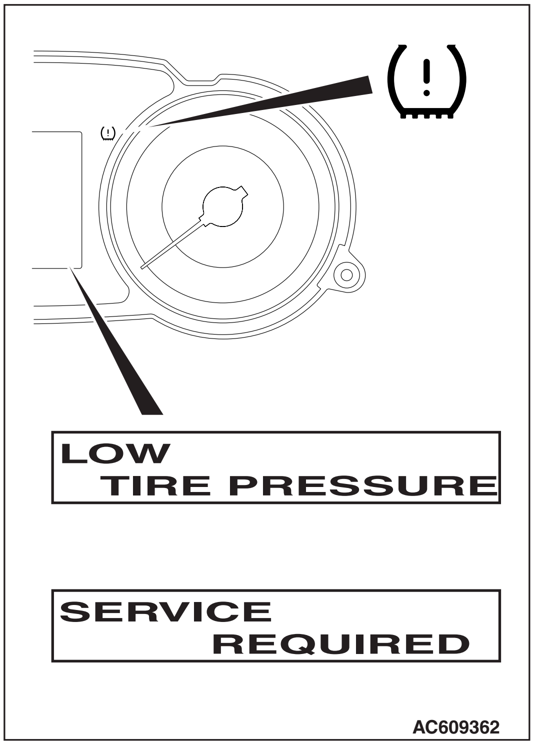
OPERATION

- The signals from the TPMS transmitter are received by the WCM.
- WCM processes input signals from each TPMS transmitter as well as vehicle speed signals from the ABS-ECU if equipped. It receives the atmospheric pressure signal from ECM, and when the atmospheric pressure is low (such as at high altitude), it calibrates the tire pressure received from TPMS transmitter and makes a judgment of warning. When the road tire pressure is low, it sends a warning signal causing the TPMS warning light to be illuminated. When the TPMS has problems, it sends a warning signal causing the TPMS warning light to be flashed*.

  *NOTE: *: Change to continuous illumination after flashing for about 1 minute.*
- For 3 seconds after the ignition switch is turned to the "ON" position, WCM illuminates the TPMS warning light to check any breaks in the TPMS warning light circuit.

- By connecting the scan tool to the data link connector, data stored in WCM (data of tire pressure and TPMS transmitter ID, the alarm status and warning history, etc.) can be displayed and TPMS transmitter ID can be registered.

NOTE: If the TPMS transmitter is replaced, register the ID codes of all the TPMS transmitters again using the M.U.T.-III.



TPMS WARNING LIGHT

The TPMS warning light on the combination meter illuminates or flashes* to alert the driver by request from WCM. When the tire pressure warning or the fault warning is activated, a warning symbol and a message are displayed on the multi information display.

WARNING DISPLAY PATTERN OF TPMS WARNING LIGHT AND MULTI INFORMATION DISPLAY

Circumstance	Warning light	Multi information display
For 3 seconds after the ignition switch is turned to the "ON" position (warning light circuit self-check)	Illuminates	No indication
TPMS problems	Flashes*	Symbol and "SERVICE REQUIRED" is displayed
Low tire pressure	Illuminates	Symbol and "LOW TIRE PRESSURE" is displayed

TIRE PRESSURE THRESHOLD VALUES

Item	Tire pressure kPa (psi)
Standard pressure at cold (reference)	220 (32)
Alarm ON pressure	174 (25.2) or less
Alarm OFF pressure	189 (27.4) or more

TPMS TRANSMITTER (TIRE PRESSURE SENSOR)

The TPMS transmitter combines the valve and tire pressure sensor in a single unit. The TPMS transmitters are mounted inside the tires. The TPMS transmitter measures tire pressure directly with its tire pressure sensor and sends radio frequency signals to WCM. The TPMS transmitter includes acceleration sensor that senses tire rotation, and change tire pressure sampling and data transmission timing when vehicle is running.

NOTE: Use only genuine wheels. The use of non-genuine wheels may cause the improper installation of the TPMS transmitters, possibly resulting in air leakage and damage to the TPMS transmitter.

TIRE PRESSURE SAMPLING TIMING

Vehicle status	Sampling timing
At vehicle moving	once every 5 seconds
At vehicle stationary	once every 1 minute

NOTE: Vehicle moving = vehicle speed: approximately 25 km/h (15 mph) or more

DATA TRANSMISSION TIMING

Vehicle status	Transmission timing
At vehicle moving	once every 1 minute*
At vehicle stationary	once every 13 hours

If a sampled pressure varies by ±10 kPa (1.5psi) from the last transmitted pressure value, an additional transmission will occur.

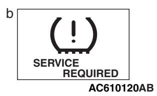
*NOTE: *: Once every 15 seconds for first 30 transmission after vehicle starts moving.*

M2422000900015

WARNINGS/ALARMS

If the TPMS fails or the tire pressure is low, the WCM warns the driver of that state by the TPMS warning light and the multi information display in the combination meter.

Display contents	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
			TPMS warning light	Multi information display	
	TPMS warning light bulb open circuit check	The ignition switch is turned from "LOCK" (OFF) to "ON."	Illuminates for 3 seconds.	–	3 seconds have passed after the TPMS warning light is lit.
a 	Tire pressure alarm	The received tire pressure value is under the ararm ON threshold value.	Illuminates.	Symbol and "LOW TIRE PRESSURE" is displayed.	The received tire pressure value is over the alarm OFF threshold value.

Display contents	Item		State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
				TPMS warning light	Multi information display	
	TPMS failure warning	ID not stored	The TPMS transmitter ID is not registered in the WCM.	Flashes *	Symbol and "SERVICE REQUIRED" is displayed.	ID is registered normally.
		Defective EEPROM	Abnormality of data in the EEPROM of the WCM is detected.			Data in the EEPROM of the WCM is checked to be normal.
		Problem in signal reception	The signals from TPMS transmitters cannot be received while driving for about 20 minutes.			The signal from the TPMS transmitter that was warned is received.
		Defective sensor	The sensor failure signal is received from the TPMS transmitter.			A normal signal is received from the TPMS transmitter that was warned.
		The battery voltage of the TPMS transmitter is low.	The reception problem warning is activated because of the low battery voltage of the TPMS transmitter.			The signal of normal battery voltage is received from the TPMS transmitter that was warned.
		Vehicle speed input problem	The vehicle speed is not input.			The vehicle speed is input.
		Abnormal vehicle speed value	The vehicle speed value is abnormal.			The normal vehicle speed value is received.

*NOTE: *: Change to continuous illumination after flashing for about 1 minuite.*

CONFIGURATION FUNCTION

M2422000600070

Using the scan tool, the following functions can be programmed. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool MB991958 display)	Adjustment item	Adjusting contents (scan tool MB991958 display)	Adjusting contents
Hazard answer back	Adjustment of the number of keyless hazard warning light answer back flashes	Lock:1, Unlock:2	LOCK: Flashes once, UNLOCK: Flashes twice (default)
		Lock:1, Unlock:0	LOCK: Flashes once, UNLOCK: No flash
		Lock:0, Unlock:2	LOCK: No flash, UNLOCK: Flash twice
		Lock:2, Unlock:1	LOCK: Flash twice, UNLOCK: Flash once
		Lock:2, Unlock:0	LOCK: Flash twice, UNLOCK: No flash
		Lock:0, Unlock:1	LOCK: No flash, UNLOCK: Flash once
		Lock:0, Unlock:0	No function
Dome light delay timer with door	Adjustment of interior light delay shutdown time	0sec	0 second (no delay shutdown time) (default <Vehicles without central door locking system>)
		7.5sec	7.5 seconds
		15sec	15 seconds
		30sec	30 seconds (default <Vehicles with central door locking system>)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Door unlock mode	Door lock system <Vehicles with central door locking system>	All doors unlock	All the doors are unlocked when the driver's side door is unlocked.
		Dr door unlock	Only the driver's side door is unlocked when the driver's side door is unlocked. (default)
Auto door unlock by P position	Auto door unlock by P position function <Vehicles with central door locking system>	Disable	No function (default)
		Always enabled	Always with function
Duration of horn chirp	Horn sounding time during horn answer back	Short	0.01 second (default)
		Long	0.02 second
Horn chirp by keyless	Horn chirp by keyless entry system	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (default)

Adjustment item (scan tool MB991958 display)	Adjustment item	Adjusting contents (scan tool MB991958 display)	Adjusting contents
Timer lock timer	Timer lock period adjustment	30sec	30 seconds (default)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Panic alarm switch	With/without panic alarm function	Disable	No function
		Enable	With function (default)

GROUP 11A

ENGINE MECHANICAL

CONTENTS

GENERAL DESCRIPTION

M2112000101162

This model is equipped with a newly developed 4B11 engine. It is a 4-cylinder, double overhead camshaft (DOHC) engine with a 2.0-L cylinder displacement. This engine has adopted the following features:

- MIVEC (MITSUBISHI INNOVATIVE VALVE TIMING ELECTRONIC CONTROL SYSTEM) for both the intake and exhaust valves
- Cylinder block made of an aluminum alloy
- Valve train with direct-acting valve tappets
- Silent timing chain

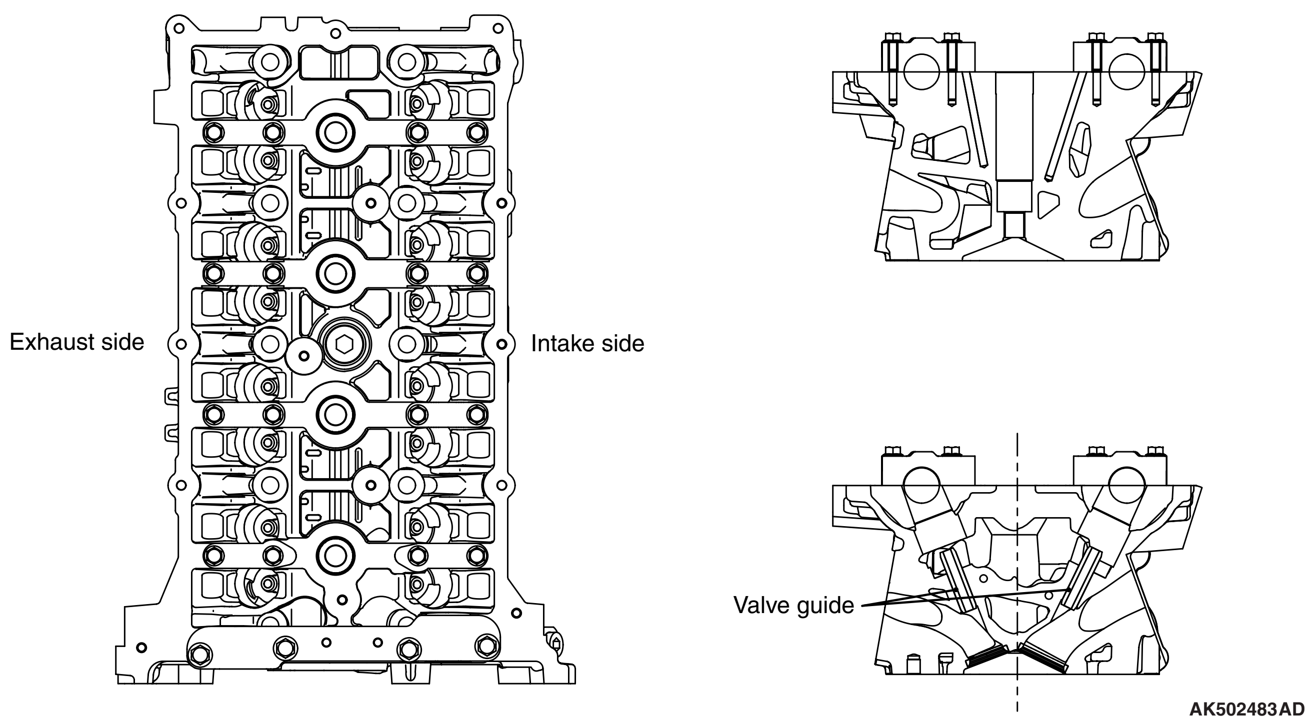
MAIN SPECIFICATIONS

Descriptions			Specifications
Engine type			4B11
Bore × stroke mm (in)			86 (3.4) × 86 (3.4)
Total displacement cm^3 (cu in)			1,998 (121.9)
Combustion chamber			Pent-roof type
Number of cylinders			4
Valve mechanism		Type	DOHC
		Intake valve	8
		Exhaust valve	8
Compression ratio			10.0
Valve timing	Intake valve	Opens (BTDC)	3° –28° <California> 0° –25° <except California>
		Closes (ABDC)	45° –20° <California> 48° –23° <except California>
	Exhaust valve	Opens (BBDC)	41° –21° <California> 44° –24° <except California>
		Closes (ATDC)	3° –23° <California> 0° –20° <except California>
Maximum output kW/r/min (HP/r/min)			107/6,000 (143/6,000) <California> 113/6,000 (152/6,000) <except California>
Maximum torque N· m/r/min (lbs-ft/r/min)			194/4,250 (143/4,250) <California> 198/4,250 (146/4,250) <except California>
Fuel injection system type			Electronic control MPI
Ignition system type			Electronic spark-advance control type (4-coil type)
Generator type			Alternating current system (with built-in IC regulator)
Starter motor type			Reduction drive type

BASE ENGINE

M2112001001050

CYLINDER HEAD



A cylinder head made of an aluminum alloy, which is lightweight and offers a high level of cooling efficiency, has been adopted. A pentroof combustion chamber with a center spark plug has been adopted. It has a small valve compound angle to realize a compact chamber.

Cross-flow type intake and exhaust ports have been adopted. Two intake ports and two exhaust ports are provided independently on the right and left sides. Five camshaft bearings are provided at the intake and exhaust sides, respectively. The No. 4 bearing sustains the thrust load of the camshaft. Only the No. 1 bearing uses a bearing cap that integrates both the intake and exhaust sides.

VALVE SEATS

Sintered alloy valve seats have been adopted.

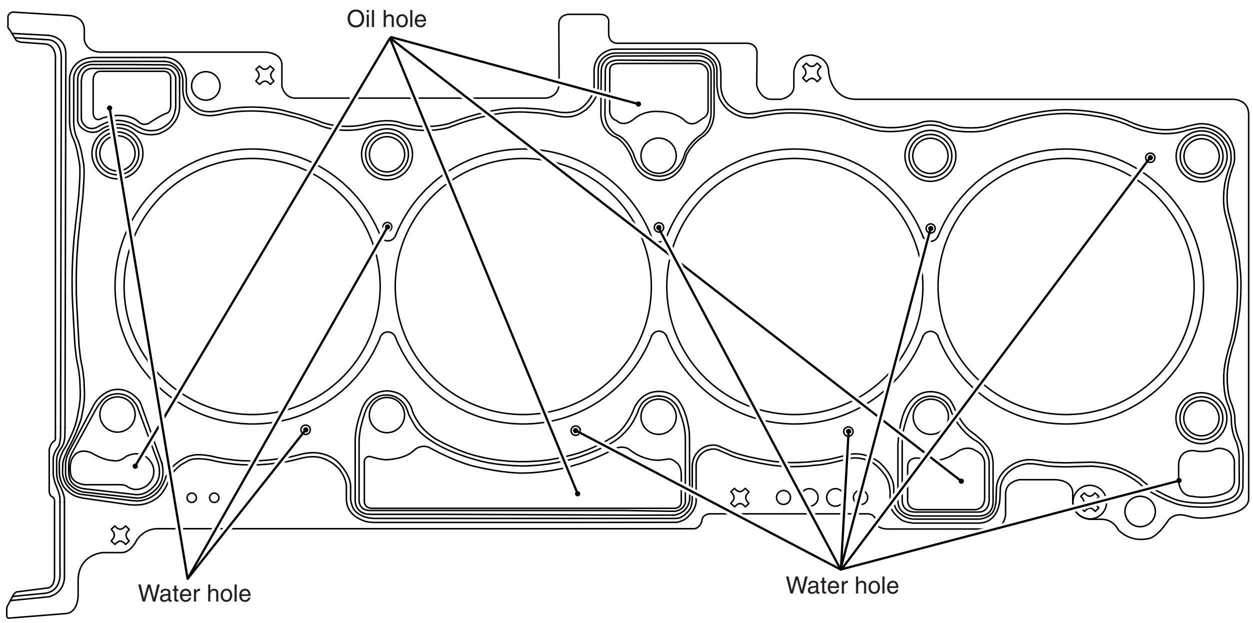
The oversized (0.3 mm) service parts are available.

VALVE GUIDES

Valve guides that are common to both the intake and exhaust have been adopted.

The oversized (0.25 mm) service parts are available.

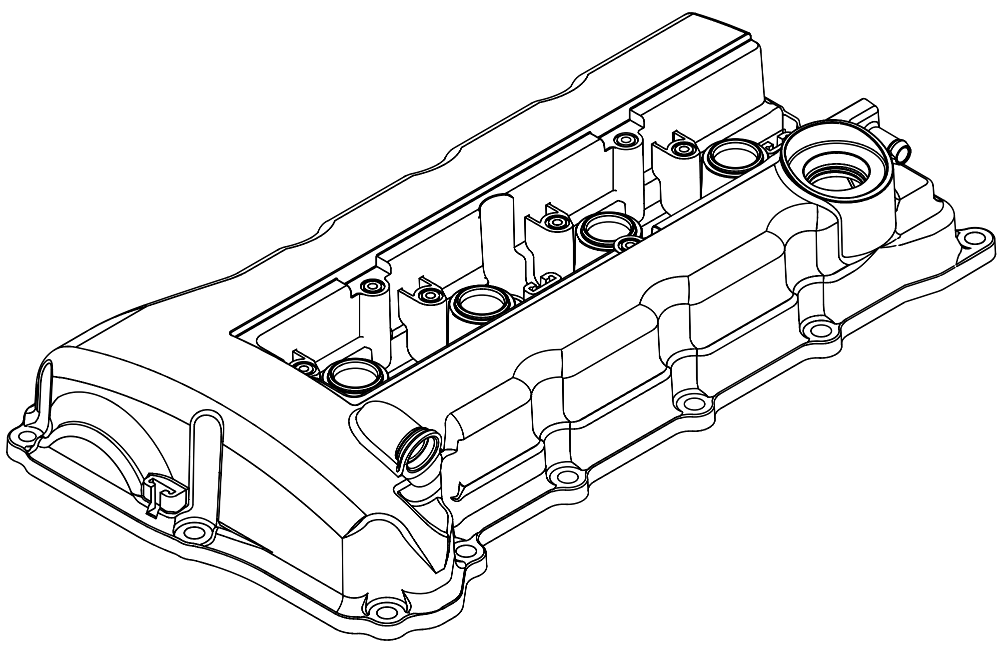
CYLINDER HEAD GASKET



AK604543AB

A dual-layer, metal type cylinder head gasket that excels in heat resistance and sealing performance has been adopted.

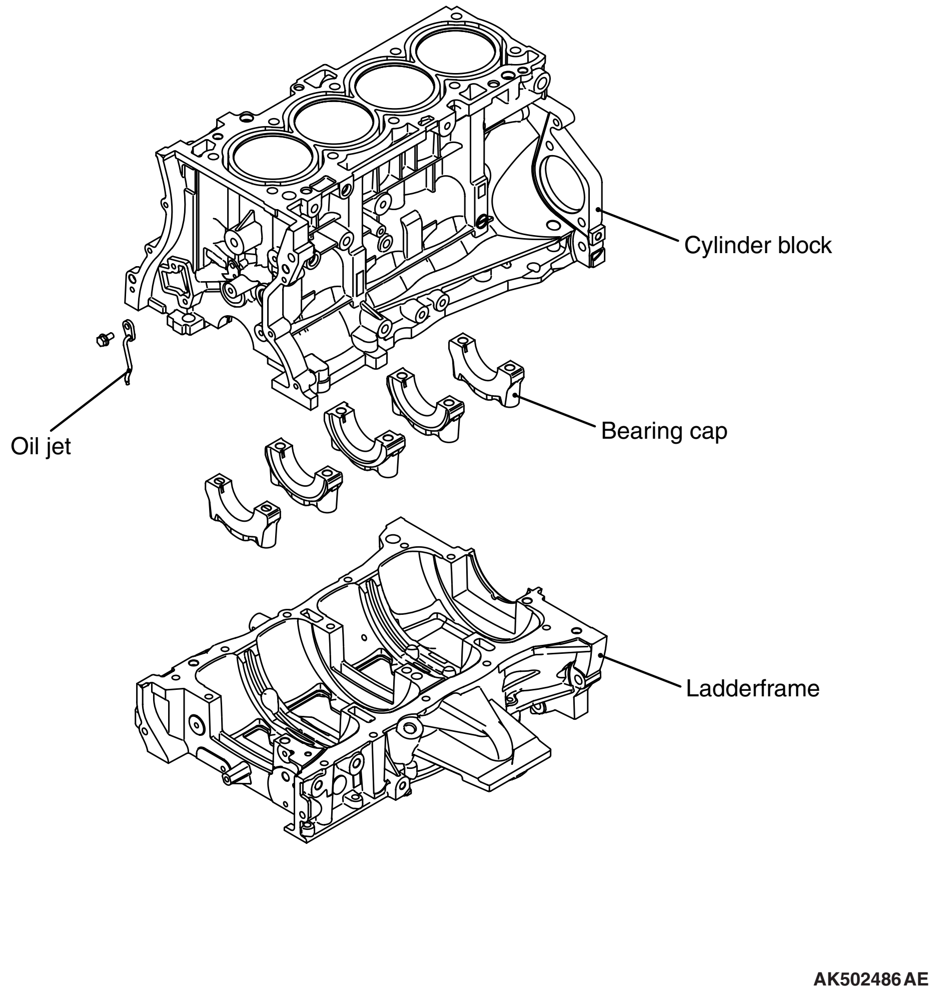
CYLINDER HEAD COVER



AK502485

A Plastic cylinder head cover has been adopted.

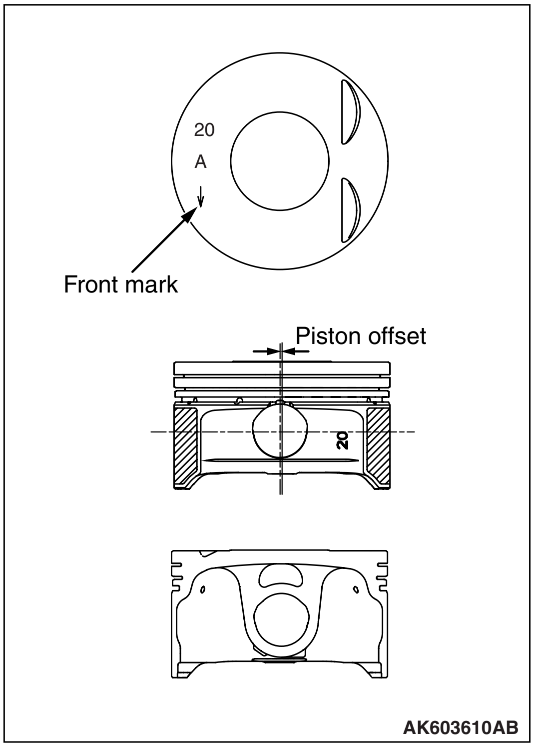
CYLINDER BLOCK



A cylinder block made of an aluminum alloy has been adopted for weight reduction.
5 bearings are used for the crankshaft journals and the No. 3 bearing sustains the thrust load of the crankshaft.
The water jacket is the full Siamese type.
An oil jet is used in front of the cylinder block to supply engine oil to the timing chain.

ITEM	SPECIFICATIONS
Distance between top and crankshaft center mm (in)	230.1 (9.06)
Bore mm (in)	86 (3.4)
Bore pitch mm (in)	96 (3.8)
Stroke mm (in)	86 (3.4)

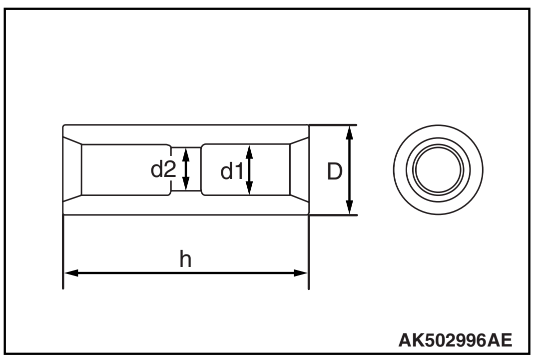
PISTONS



The pistons are made of a special aluminum alloy. Their weight has been reduced by lowering their overall height and increasing the depression at each end of the piston pin.
The piston pin hole center is offset 0.8 mm (0.031 in) towards the thrust side of the piston center.
The skirt portion along the perimeter of the piston is finished with streaks that excel in oil retention and seizure resistance.

ITEM	SPECIFICATIONS
Basic diameter mm (in)	86 (3.4)
Pin hole diameter mm (in)	21 (0.8)
Overall height mm (in)	50.5 (1.99)

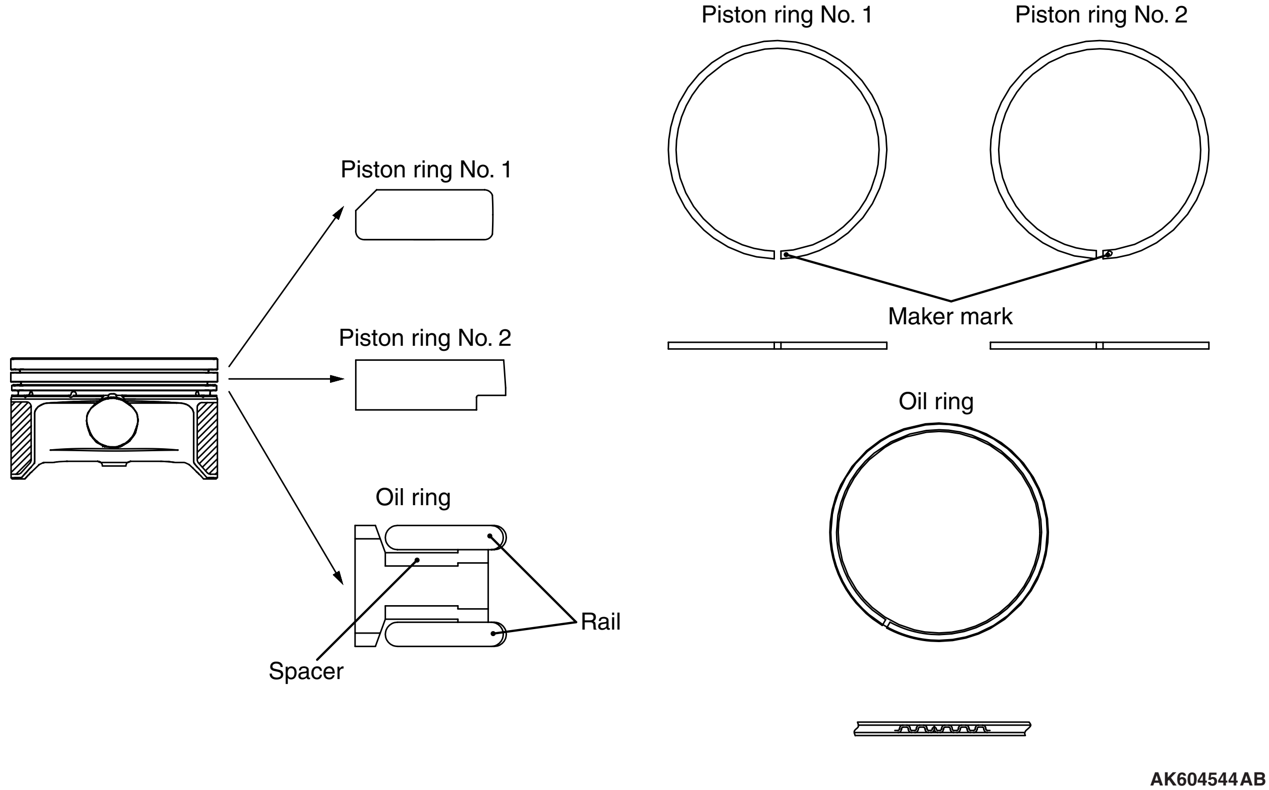
PISTON PINS



The piston pins are the semi-floating type. Each pin is press-fit and secured in the small end of the connecting rod, while it floats in the piston.

ITEM	SPECIFICATIONS
Outer diameter (D) mm (in)	21 (0.8)
Inner diameter (d1) mm (in)	12 (0.5)
Inner diameter (d2) mm (in)	10.5 (0.41)
Overall length (h) mm (in)	58 (2.3)

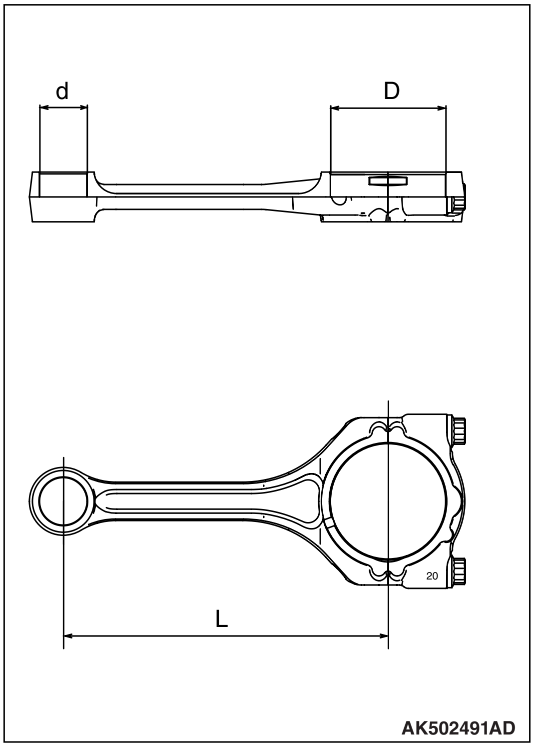
PISTON RINGS



The piston rings consist of No. 1 and No. 2 rings and an oil ring.

Item	Piston ring No. 1	Piston ring No. 2	Oil ring
Shape	Inside bevel, Barrel	Taper undercut	3-piece, Barrel
Surface treatment (cylinder contact surface)	Chrome plating	Parkerizing	Hard plated Parkerizing
Supplier mark	1T	2T	None

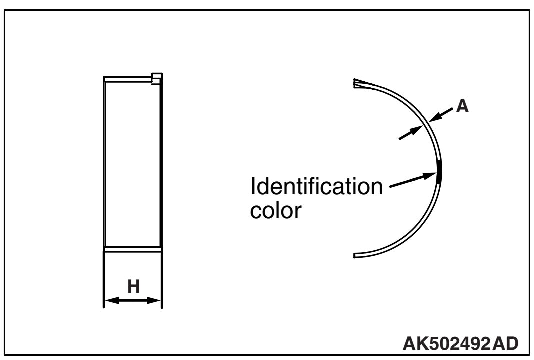
CONNECTING RODS



The connecting rods are made of highly rigid, forged carbon steel. The cross section of the rod portion is shaped like the letter H.
A fracture-split process has been adopted for splitting the big end of the connecting rod.
The fracture split connecting rod has the high insertion force between the rod and the cap as well as the high installation location accuracy.
The oil holes that feed oil from the main journals of the crankshaft to the crankshaft pins lubricate the bearings at the big ends of the connecting rods.

Item	Specifications
Small end hole diameter (d) mm (in)	21 (0.87)
Big end hole diameter (D) mm (in)	51 (2.01)
Center-to-center distance (L) mm (in)	149.25 (5.876)

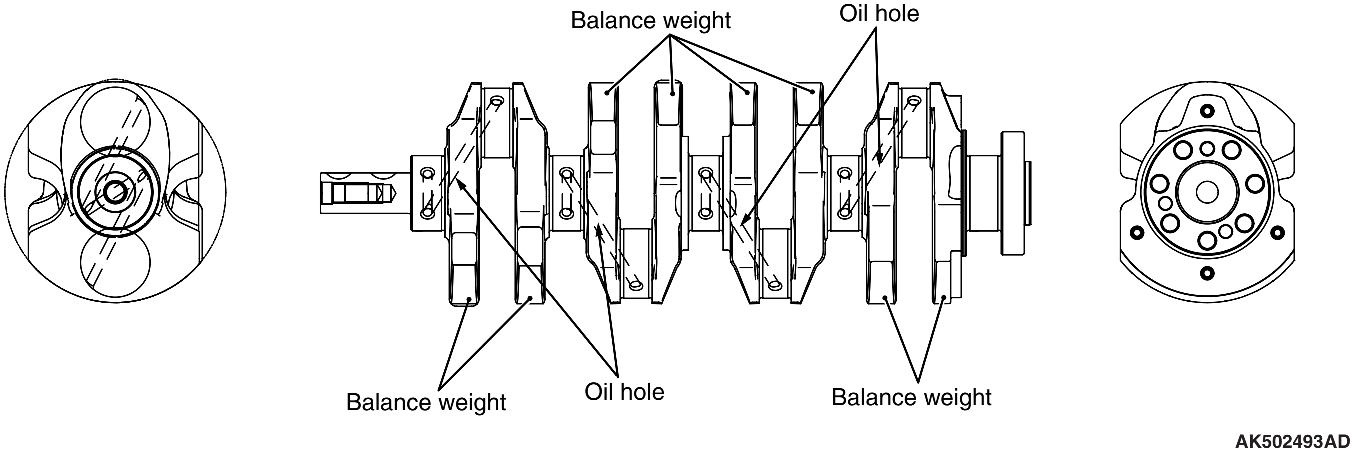
CONNECTING ROD BEARINGS



The upper and lower connecting rod bearings are the same. Each connecting rod bearing is provided with a backing plate. Its bearing portion is made of an aluminum alloy and its backing plate is made of ordinary sheet steel.
The width of the connecting rod bearing has been made as narrow as possible in proportion to the bearing cap in order to reduce friction loss.

Item	Specifications
Width (H) mm (in)	17 (0.7)
Thickness (A) mm (in)	1.5 (0.06)

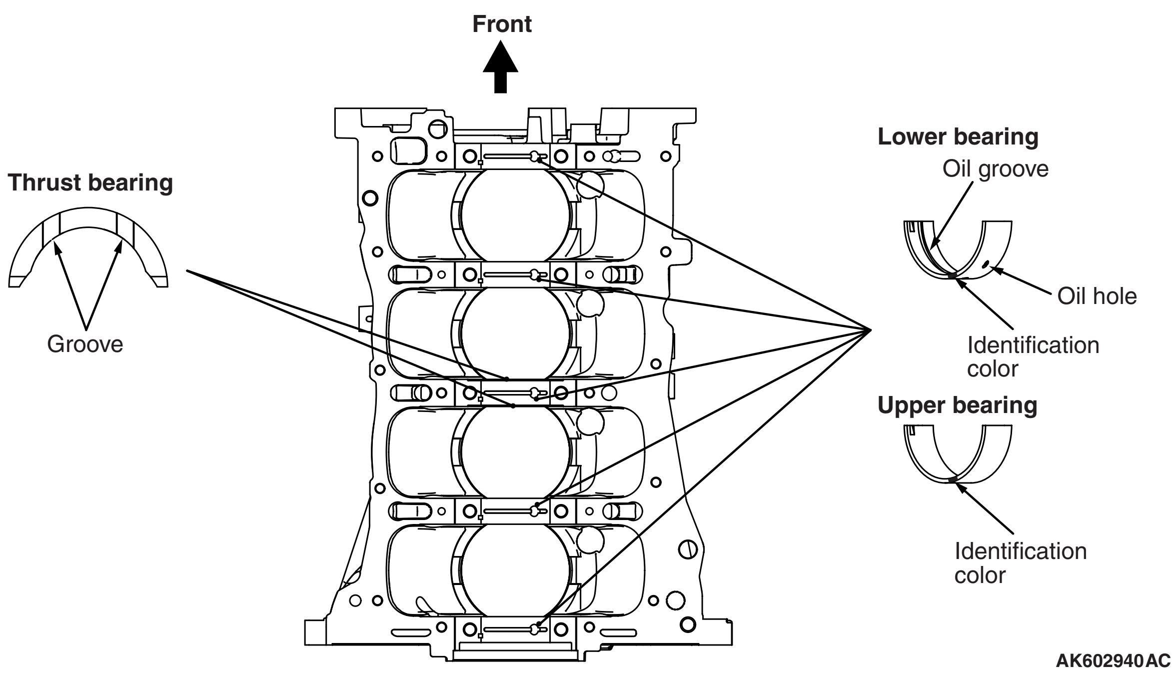
CRANKSHAFT



A forged crankshaft has been adopted.
It has 5 main bearings and 8 balance weights.
The crankshaft pins are located at equal 180° intervals.
The oil holes feed engine oil from the journals to the pins.
A crankshaft sprocket and an oil pump drive shaft are press-fit to the front of the crankshaft.

Item	Specifications
Pin outer diameter mm (in)	48 (1.9)
Journal outer diameter mm (in)	52 (2.0)

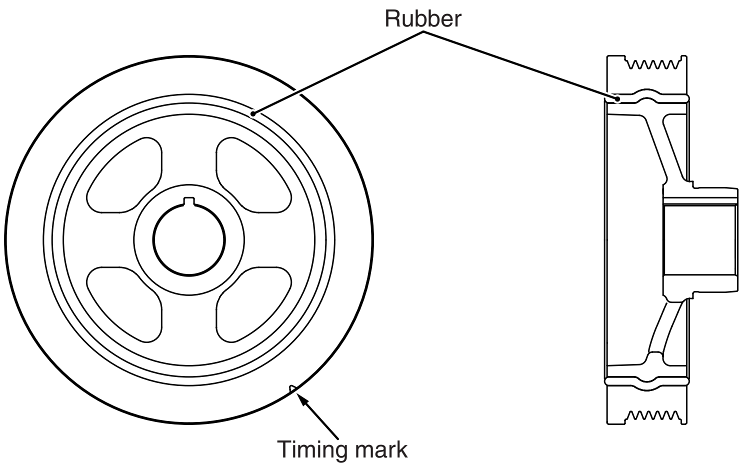
CRANKSHAFT BEARINGS, THRUST BEARINGS



The upper crankshaft bearings have oil grooves and the lower crankshaft bearings do not.
Each crankshaft bearing is provided with a backing plate. Its bearing portion is made of an aluminum alloy and its backing plate is made of ordinary sheet steel. A thrust bearing, which sustains the load in the thrust direction, is provided at each end of the No. 3 bearing.

Item		Specifications
Crankshaft bearing	Width mm (in)	18 (0.71)
	Thickness mm (in)	2.0 (0.08)
Crankshaft thrust bearing	Thickness mm (in)	2.0 (0.08)

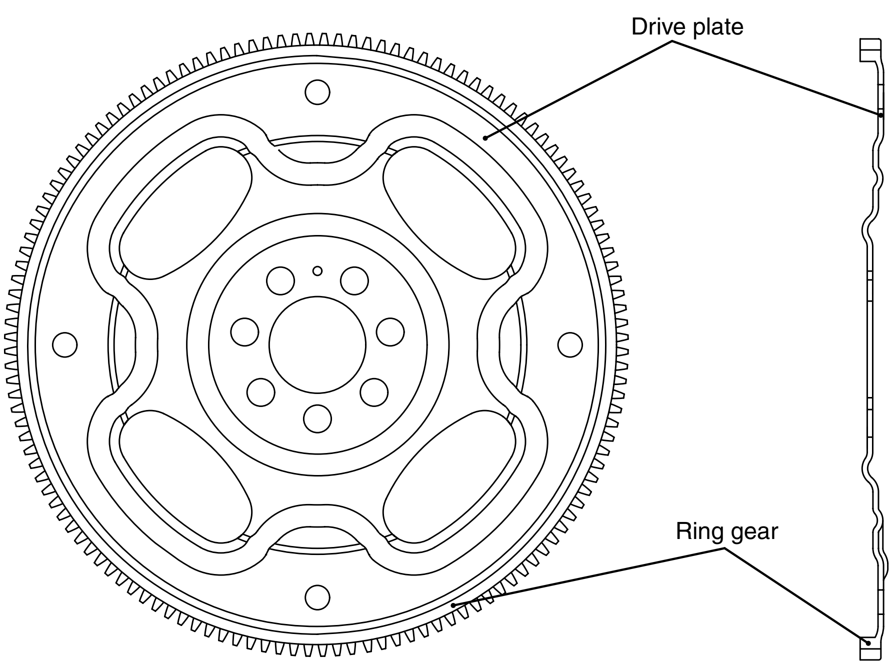
CRANKSHAFT PULLEY



The pulley is made of cast iron.
The pulley portion has grooves for the V-ribbed belt (with 6 crests).
The flange portion of the pulley has a timing mark notch for checking the ignition timing.

A torsion damper has been adopted to reduce the torsional vibration of the crankshaft, as well as to dramatically reduce noise and vibration in the high-speed range.

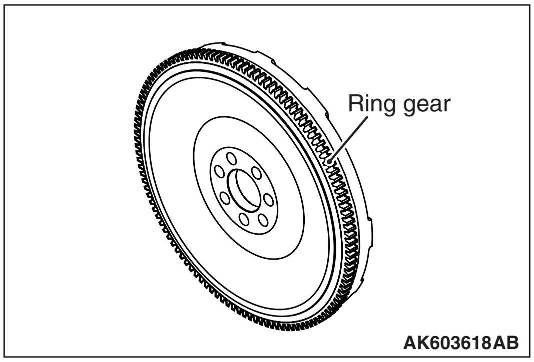
DRIVE PLATE



The drive plate is made of sheet metal.

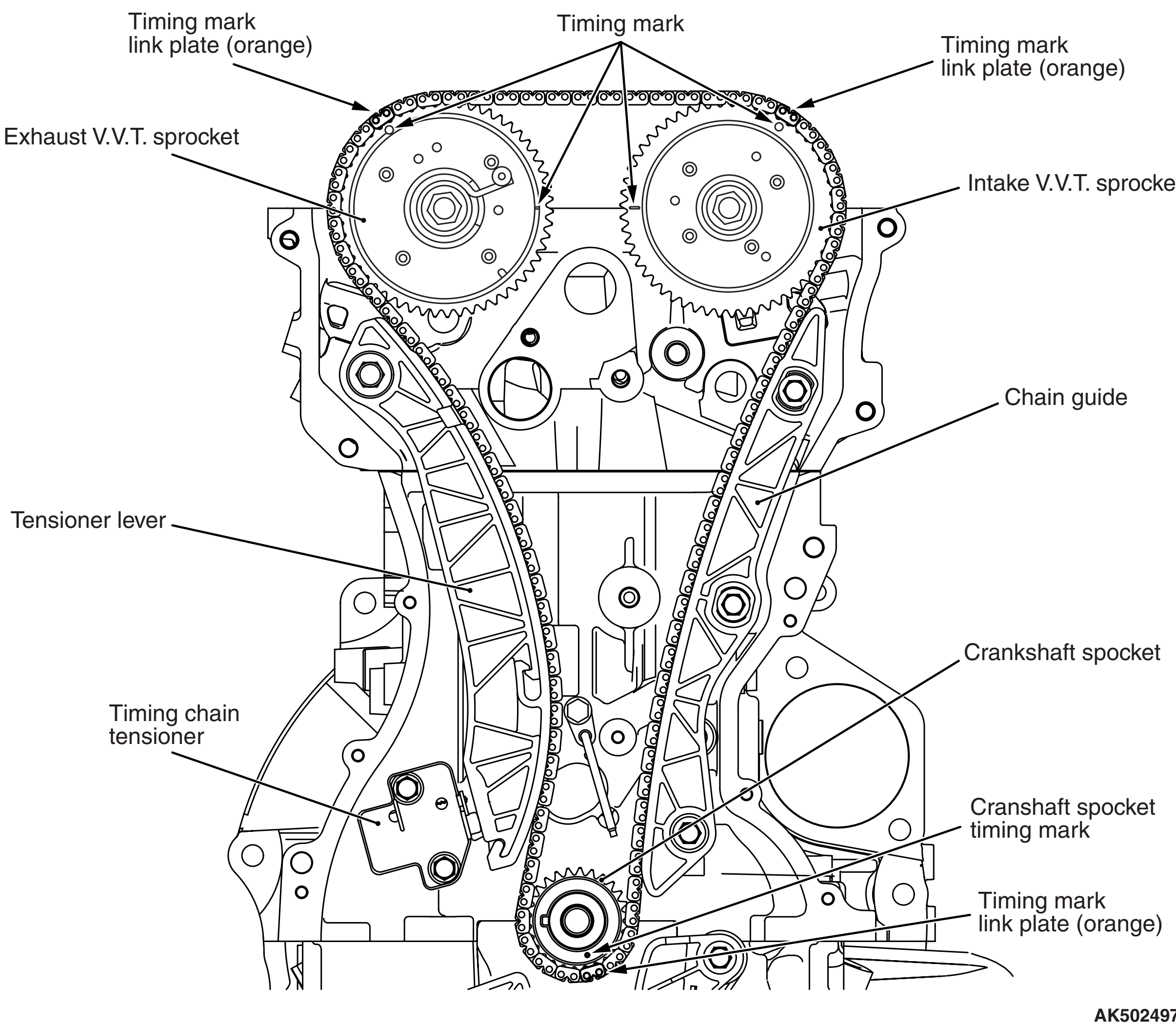
The drive plate is mounted with 7 bolts.

FLYWHEEL



A cast iron ring gear is a shrink fit in the iron casting of the flywheel.
The flywheel is mounted with 7 bolts.

TIMING CHAIN TRAIN

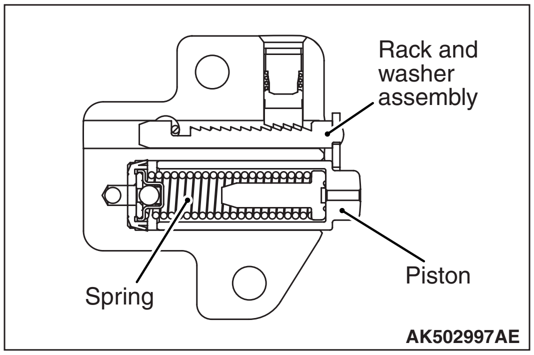


The two camshafts are driven by the timing chain via the camshaft sprockets.
The timing chain is a silent, endless type, consisting of 180 links. It is installed around the V.V.T. sprockets and the crankshaft sprocket.

Three (orange) mark link plates are installed on the timing chain to locate the sprockets.

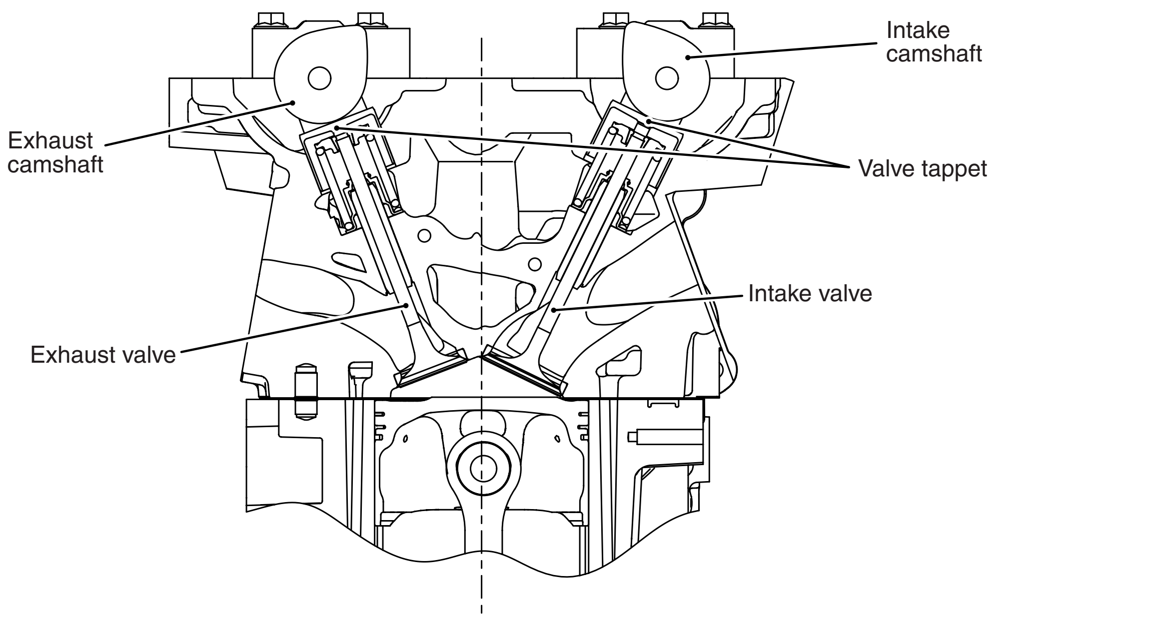
Item	Number of teeth
V.V.T. sprockets	54
Crankshaft sprocket	27

TIMING CHAIN TENSIONER



The tensioner maintains the tension of the timing chain. It contains a piston with a built-in spring. With the tensioner installed, its piston directly pushes on the tension lever in order to automatically adjust the tension of the timing chain.

VALVE TRAIN

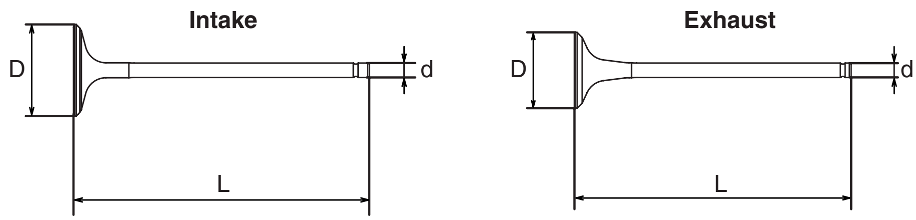


The valve train is the 4-valve, double overhead camshaft (DOHC) type in which the camshafts are located above the valves.

Two intake and exhaust valves for each cylinder are arranged in a V shape.

A valve tappet is interposed between the camshaft and each valve, which allows the valve to open and close.

VALVES

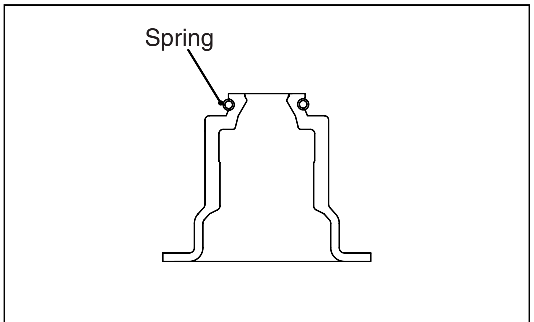


AK502500AD

The valves are made of heat-resistant steel and are nitrided on their entire surface.

Item	Intake valve	Exhaust valve
Head diameter (D) mm (in)	35 (1.4)	29 (1.1)
Stem diameter (d) mm (in)	5.5 (0.22)	5.5 (0.22)
Overall length (L) mm (in)	113.180 (4.4559)	105.887 (4.1688)

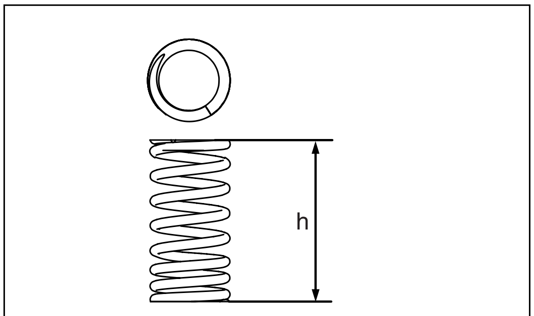
VALVE STEM SEALS



AK502501AD

The valve stem seals are integrated with the valve spring seats.
The valve stem seal portion excels in sealing performance and is equipped with a spring to prevent oil from descending.

VALVE SPRINGS

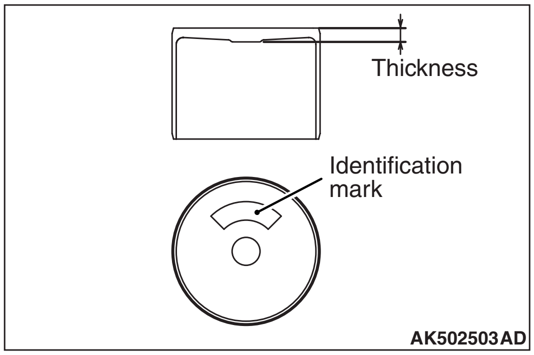


AK502502 AD

To prevent the engine from surging at high speeds, unequal-pitch springs are used.

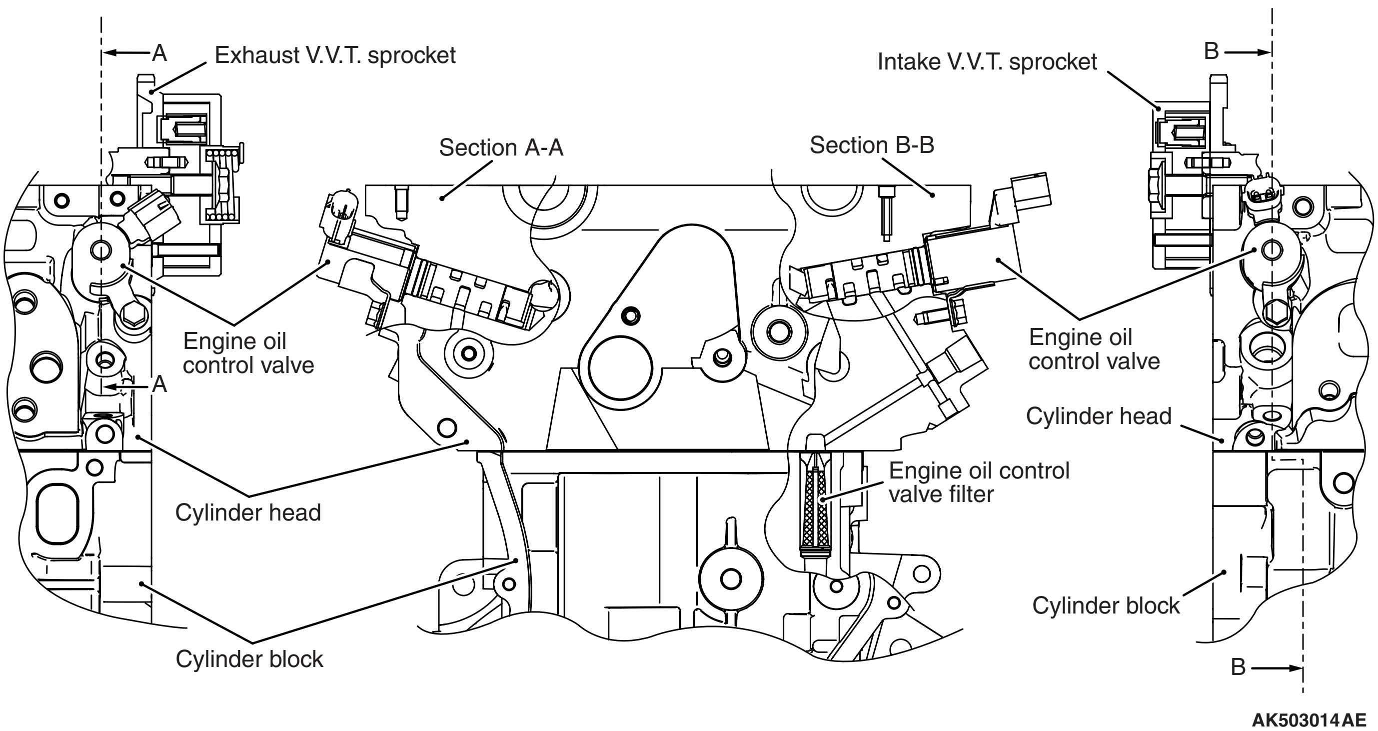
Item	Specifications
Free height (h) mm (in)	47.44 (1.867)
Total number of windings	8.67

VALVE TAPPETS



To adjust the valve lift, 47 sizes of valve tappets are available in 0.015 mm (0.0006 in) increments, from 3.000 mm (0.1181 inch) to 3.690 mm (0.1453 in).

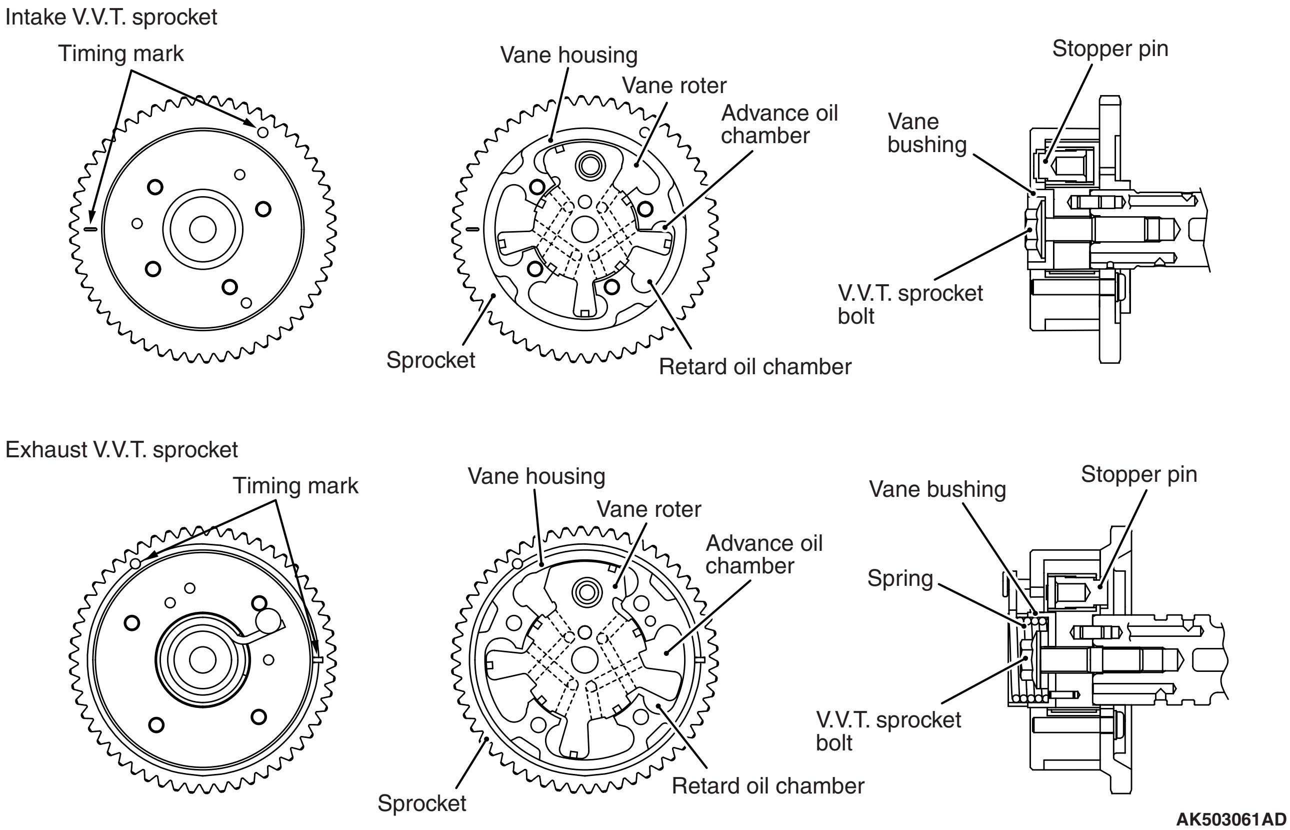
MIVEC (MITSUBISHI INNOVATIVE VALVE TIMING ELECTRONIC CONTROL SYSTEM)



The MIVEC consists of the parts shown in the illustration.

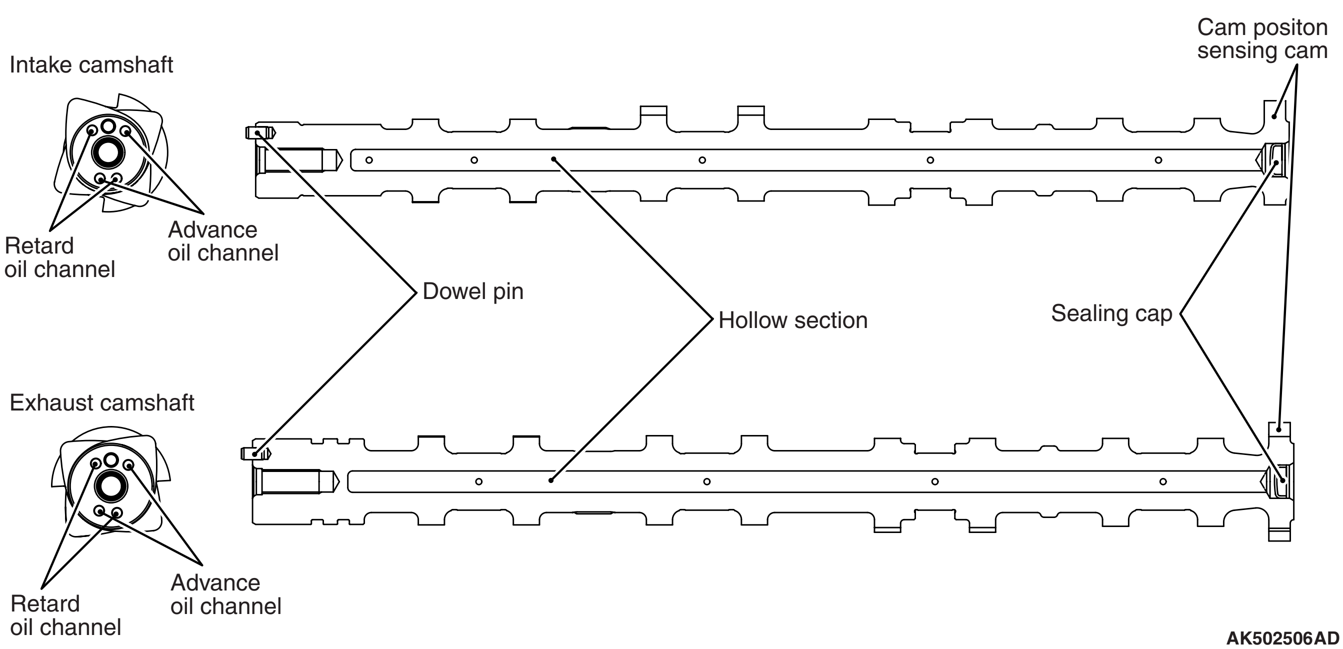
This system continuously varies and optimally controls the opening and closing timing of the individual intake and exhaust valves, in order to improve torque and power output in all speed ranges.

V.V.T. SPROCKET (VARIABLE VALVE TIMING SPROCKET)



The engine oil control valve controls the hydraulic pressure in order to move the vane rotor in the V.V.T. sprocket to optimally control valve timing.

CAMSHAFT

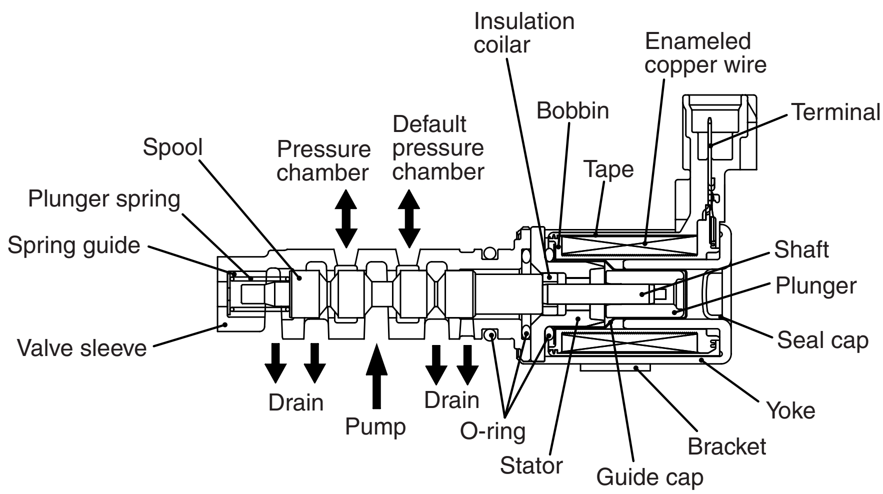


The camshaft are hollow for weight reduction. Each camshaft is provided with an oil passage to guide the hydraulic pressure from the engine oil control valve to the V.V.T. sprocket.

A cam position sensing cam for detecting the cam position (used by the cam position sensor) is integrated at the back of each camshaft.

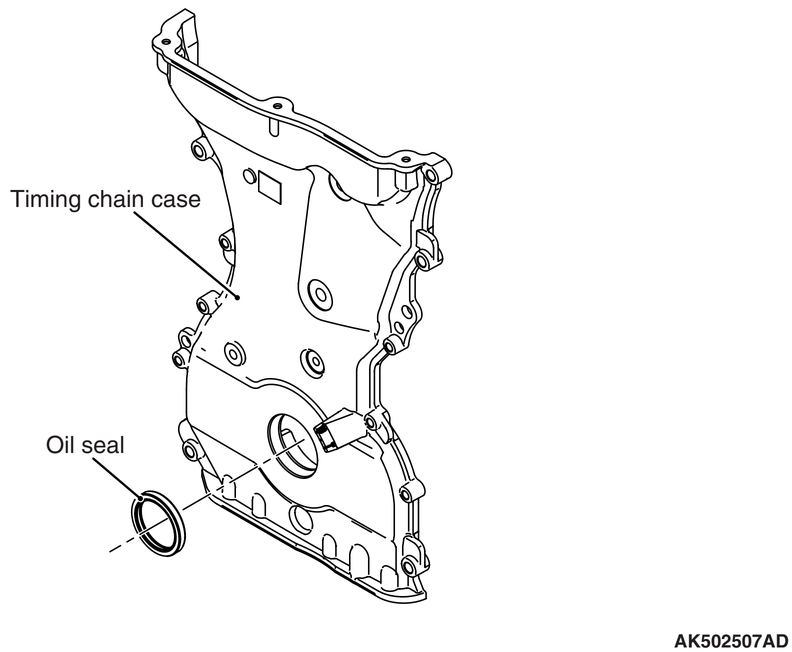
Item			Specifications
Overall length mm (in)	Intake		435.00 (17.126)
	Exhaust		438.27 (17.255)
Journal outer diameter mm (in)	Intake	No.1	30 (1.2)
		No.2 –5	24 (0.9)
	Exhaust	No.1	36 (1.4)
		No.2 –5	24 (0.9)
Camshaft lift mm (in)	Intake		8.45 (0.333)
	Exhaust		8.20 (0.323)

ENGINE OIL CONTROL VALVE



The engine oil control valve consists of a solenoid valve, which switches the hydraulic pressure that acts on the vane rotor in the V.V.T. sprocket assembly. This valve is actuated by a signal from the engine ECU.

TIMING CHAIN CASE



The timing chain case is made of an aluminum alloy.
A front crankshaft oil seal is press-fit into the case.

NOTES

GROUP 22B

MANUAL TRANSAXLE OVERHAUL

CONTENTS

GENERAL SPECIFICATIONS

M1222000200774

Item		Specification
Model		F5MBB-1-BBY
Applicable engine		4B11
Type		5-speed transaxle floor shift
Gear ratio	1st	3.538
	2nd	1.913
	3rd	1.333
	4th	1.028
	5th	0.820
	Reverse	3.538
Final reduction ratio		4.235

SERVICE SPECIFICATIONS

M1222000300533

Item	Standard value
Rotational starting torque of differential case N· m (in-lb)	0.8 –1.6 (7.08 –14.16)
Output shaft bearing preload N· m (in-lb)	0.8 –1.6 (7.08 –14.16)
Input shaft synchronizer hub No.3 thrust crevice mm (in.)	0 –0.1 (0 –0.0039)
Input shaft synchronizer hub No.2 thrust crevice mm (in.)	0 –0.1 (0 –0.0039)
Input shaft radial ball bearing thrust crevice mm (in.)	0 –0.1 (0 –0.0039)

ADJUSTING SNAP RINGS AND SPACERS

M1222012000614

Adjustment shims (for differential side LH tapered roller bearing preload adjustment)

Thickness mm (in)	Thickness mm (in)
1.99 –2.01 (0.0783 –0.0791)	2.44 –2.46 (0.0961 –0.0969)
2.04 –2.06 (0.0803 –0.0811)	2.49 –2.51 (0.0980 –0.0988)
2.09 –2.11 (0.0823 –0.0831)	2.54 –2.56 (0.1000 –0.1008)
2.14 –2.16 (0.0843 –0.0850)	2.59 –2.61 (0.1020 –0.1028)
2.19 –2.21 (0.0862 –0.0870)	2.64 –2.66 (0.1039 –0.1047)
2.24 –2.26 (0.0882 –0.0890)	2.69 –2.71 (0.1059 –0.1067)
2.29 –2.31 (0.0902 –0.0909)	2.74 –2.76 (0.1079 –0.1087)
2.34 –2.36 (0.0921 –0.0929)	2.79 –2.81 (0.1098 –0.1106)
2.39 –2.41 (0.0941 –0.0949)	2.84 –2.86 (0.1118 –0.1126)

Adjustment shims (for output shaft bearing preload adjustment)

Thickness mm (in)	Thickness mm (in)
1.29 –1.31 (0.0508 –0.0516)	1.94 –1.96 (0.0764 –0.0772)
1.34 –1.36 (0.0528 –0.0535)	1.99 –2.01 (0.0783 –0.0791)
1.39 –1.41 (0.0547 –0.0555)	2.04 –2.06 (0.0803 –0.0811)
1.44 –1.46 (0.0567 –0.0575)	2.09 –2.11 (0.0823 –0.0831)
1.49 –1.51 (0.0587 –0.0594)	2.14 –2.16 (0.0843 –0.0850)
1.54 –1.56 (0.0606 –0.0614)	2.19 –2.21 (0.0862 –0.0870)
1.59 –1.61 (0.0626 –0.0634)	2.24 –2.26 (0.0882 –0.0890)
1.64 –1.66 (0.0646 –0.0654)	2.29 –2.31 (0.0902 –0.0909)
1.69 –1.71 (0.0665 –0.0673)	2.34 –2.36 (0.0921 –0.0929)
1.74 –1.76 (0.0685 –0.0693)	2.39 –2.41 (0.0941 –0.0949)
1.79 –1.81 (0.0705 –0.0713)	2.44 –2.46 (0.0961 –0.0969)
1.84 –1.86 (0.0724 –0.0732)	2.49 –2.51 (0.0980 –0.0988)
1.89 –1.91 (0.0744 –0.0752)	

Shaft snap rings (for input shaft synchronizer hub No.3 bushing end play adjustment)

Thickness mm (in)	Thickness mm (in)
1.75 –1.80 (0.0689 –0.0709)	2.00 –2.05 (0.0787 –0.0807)
1.80 –1.85 (0.0709 –0.0728)	2.05 –2.10 (0.0807 –0.0827)
1.85 –1.90 (0.0728 –0.0748)	2.10 –2.15 (0.0827 –0.0846)
1.90 –1.95 (0.0748 –0.0768)	2.15 –2.20 (0.0846 –0.0866)
1.95 –2.00 (0.0768 –0.0787)	

FASTENER TIGHTENING SPECIFICATIONS

M1222012100536

Item	Specification
Clutch housing case assembly	
Roll stopper bracket	90 ± 10 N· m (66 ± 6 ft-lb)
Vehicle speed sensor	10 ± 2 N· m (88 ± 17 in-lb)
Wiring harness clamp bracket	17 ± 6.8 N· m (13 ± 4 ft-lb)
Transaxle case hanger No.1	17 ± 6.8 N· m (13 ± 4 ft-lb)
Reverse shift arm bracket assembly	17 ± 5.1 N· m (12 ± 3 ft-lb)
Gear shift fork assembly No.2	24 ± 4.8 N· m (18 ± 3 ft-lb)
Gear shift head No.1	24 ± 4.8 N· m (18 ± 3 ft-lb)
Gear shift fork assembly No.1	24 ± 4.8 N· m (18 ± 3 ft-lb)
Transaxle case receiver	7.0 ± 2.8 N· m (62 ± 24 in-lb)
Transaxle case assembly	
Backup light switch	40 ± 16 N· m (29 ± 11 ft-lb)
Lock ball assembly	29 ± 8.7 N· m (21 ± 6 ft-lb)
Backup light switch wiring harness clamp	7.5 ± 2.3 N· m (66 ± 19 in-lb)
Control cable bracket	17 ± 6.8 N· m (13 ± 4 ft-lb)
Lever lock pin mounting nut	11.8 ± 3.5 N· m (104 ± 30 in-lb)
Control shift lever connecting nut	6.4 ± 1.9 N· m (56 ± 16 in-lb)
Control shaft cover	20 ± 8 N· m (14 ± 5 ft-lb)
Clutch tube bracket	50 ± 5 N· m (37 ± 3 ft-lb)
Transaxle case cover sub assembly mounting bolt	29 ± 8.7 N· m (21 ± 6 ft-lb)
Gear shift fork assembly No.3	24 ± 4.8 N· m (18 ± 3 ft-lb)
5th drive gear mounting nut	123 ± 36.9 N· m (90 ± 26 ft-lb)
Rear bearing retainer	42 ± 8.4 N· m (31 ± 6 ft-lb)
Reverse idler shaft mounting bolt	30 ± 9 N· m (22 ± 6 ft-lb)
Clutch housing case mounting bolt	29 ± 5.8 N· m (21 ± 3 ft-lb)
Oil receiver pipe	17 ± 6.8 N· m (12 ± 4 ft-lb)
With head straight screw plug	13 ± 5.2 N· m (115 ± 45 in-lb)
Differential case	
Ring gear	106 ± 6.4 N· m (78 ± 4 ft-lb)

SEALANTS AND ADHESIVES

M1222000500515

Item	Specified sealant
Mating face for transaxle case and clutch housing	Mitsubishi Part No. MD994421 or equivalent
Mating face for transaxle case and transaxle case cover sub assembly	

FORM-IN-PLACE GASKET (FIPG)

This transaxle has several areas where the form-in-place gasket (FIPG) is used for sealing. To ensure that the FIPG fully serves its purpose, it is necessary to observe some precautions when applying it. Bead size, continuity and location are of paramount importance.

Too thin a bead could cause leaks. Too thick a bead, on the other hand, could be squeezed out of location, causing blocking or narrowing of fluid passages. To prevent leaks or blocking of passages, therefore, it is absolutely necessary to apply the FIPG evenly without a break, while observing the correct bead size.

FIPG hardens as it reacts with the moisture in the atmospheric air, and it is usually used for sealing metallic flange areas.

Disassembly

Parts sealed with a FIPG can be easily removed without need for the use of a special method. In some cases, however, the FIPG in joints may have to be broken by tapping parts with a mallet or similar tool.

Surface Preparation

Thoroughly remove all substances deposited on the FIPG application surface, using a gasket scraper. Make sure that the FIPG application surfaces is flat and smooth. Also make sure that the surface is free from oils, greases and foreign substances. Do not fail to remove old FIPG that may remain in the fastener fitting holes.

FIPG Application

Applied FIPG bead should be of the specified size and free of any break. FIPG can be wiped away unless it has completely hardened. Install the mating parts in position while the FIPG is still wet (in less than 10 minutes after application). Do not allow FIPG to spread beyond the sealing areas during installation. Avoid operating the transaxle or letting oils or water come in contact with the sealed area before a time sufficient for FIPG to harden (approximately one hour) has passed.

FIPG application method may vary from location to location. Follow the instruction for each particular case described later in this manual.

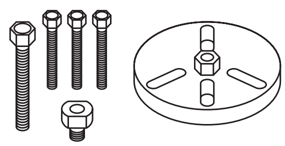
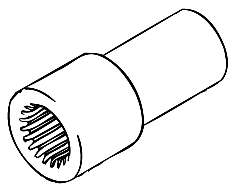
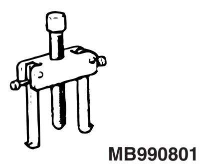
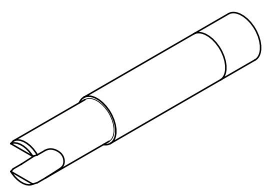
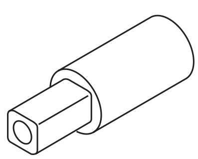
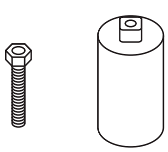
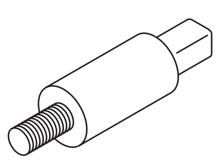
LUBRICANTS

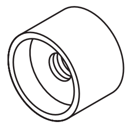
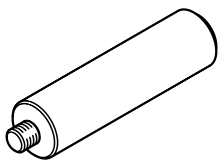
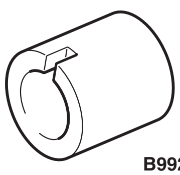
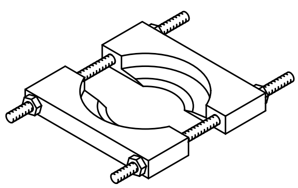
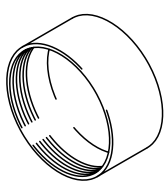
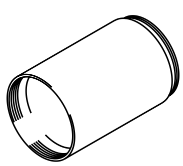
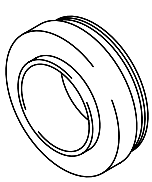
M1222000400518

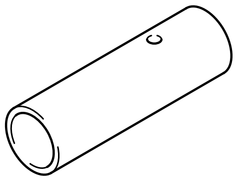
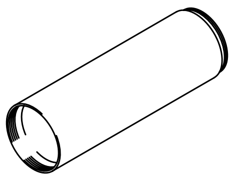
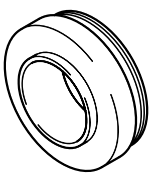
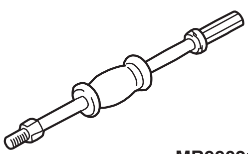
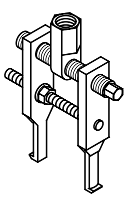
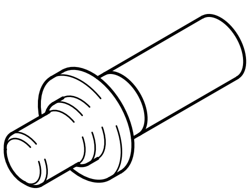
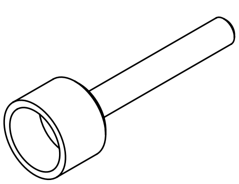
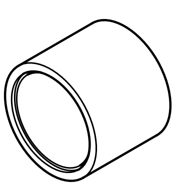
Item	Specified sealant
Gear oil	DiaQueen NEW MULTI GEAR OIL API classification GL-3, SAE 75W-80
Select lever oil seal	Mitsubishi Part No. 0101011 or equivalent
Oil seal	

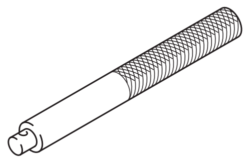
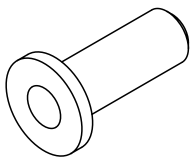
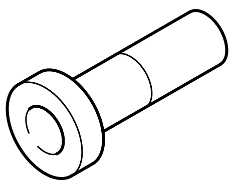
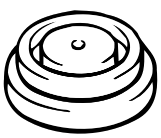
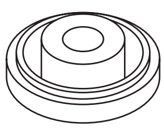
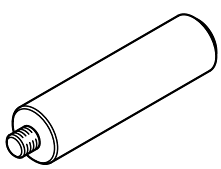
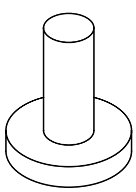
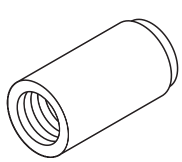
SPECIAL TOOLS

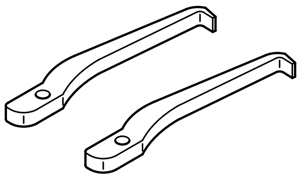
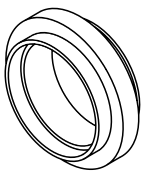
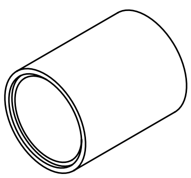
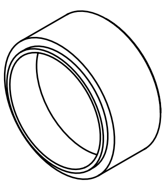
M1222000600578

Tool	Tool number and name	Supersession	Application
	MB992221 Puler set	–	Remove of synchronizer hub No.3
	MD998802 Input shaft holder	–	Remove and installation of 5th drive gear mounting lock nut
	MB990801 Rear axle bearing outer race puller	General service tool	Remove of 5th drive gear removal
	MB992038 Preload socket	MB992038-01	• Measurement of differential side bearing preload • Measurement of output shaft assembly bearing preload
	MB992219 Output shaft adapter	–	Installation of 5th drive gear
	MB992216 Installer	–	• Installation of 5th drive gear • Installation of synchronizer hub No.3
	MB992220 Input shaft adapter	–	Installation of synchronizer hub No.3

Tool	Tool number and name	Supersession	Application
	MB992212 Oil seal installer	–	Installation of oil seal
	MB992075 Handle	–	
 B992000	MB992000 Crankshaft adapter	–	Installation of plug
	MD998917 Bearing remover	General service tool or MD998348-01	• Remove of each bearing • Remove of input and output shaft each gear
	MD998812 Installer cap	General service tool or MIT304180-A	Use with installer and installer adapter
	MD998813 Installer 100	General service tool or MIT304180-A	Use with installer and installer adapter
	MD998820 Installer adapter	MD998820-01	• Installation of synchronizer sleeve No.2 and synchronizer hub No.2 • Installation of 4th gear sub-assembly and radial ball bearing • Installation of tapered roller bearing inner race

Tool	Tool number and name	Supersession	Application
	MD998368 Bearing installer	–	Remove of tapered roller bearing inner race
	MD998814 Installer 200	MIT304180-A	Use with installer cap and installer adapter
	MD998819 Installer adapter	General service tool	• Install the synchronizer hub and reverse gear • Installation of 3rd drive gear • Installation of 4th drive gear • Installation of tapered roller bearing inner race
 MB990211	MB990211 Slide hammer	MB990211-01	Use with slide hammer puller
	MB992039 Slide hammer puller	MB992039-01	• Remove of cylindrical roller bearing (outer race) • Remove of tapered roller bearing outer race
	MD998200 Oil seal installer	–	Installation of oil seal
	MD998550 Extension housing seal installer	–	Install the oil seal
	MB991445 Bush remover and installer base	MB991445-01	Installation of tapered roller bearing outer race

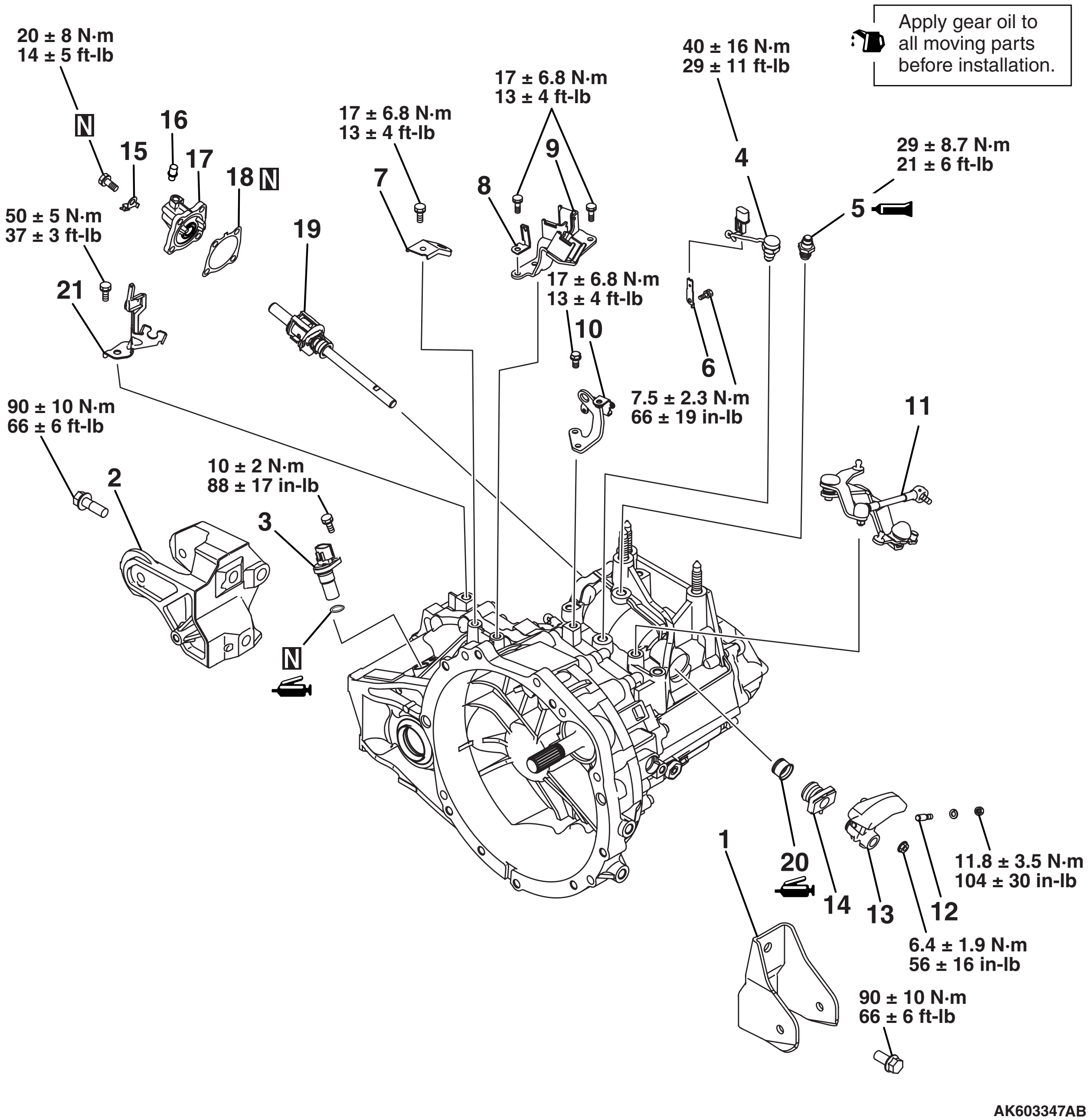
Tool	Tool number and name	Supersession	Application
	MB990938 Installer bar	MB990938-01	Installation of tapered roller bearing outer race
	MB990699 Differential oil seal installer	–	Installation of tapered roller bearing outer race
	MD999547 Oil seal installer	–	Installation of cylindrical roller bearing outer race
 MB991015	MB991015 Knuckle oil seal installer	MB991015-01	Remove of tapered roller bearing outer race
	MB992210 Oil seal installer	–	Installation of oil seal
	MB992075 Handle	–	Installation of oil seal
	MB991966 Bearing outer race installer	–	Installation of tapered roller bearing outer race
	MB991395 Crankshaft front oil seal installer	–	• Remove of tapered roller bearing inner race • Remove of speedometr drive gear • Remove of tapered roller bearing outer race

Tool	Tool number and name	Supersession	Application
 MB990810	MB990810 Side bearing puller	General service tool	Remove of tapered roller bearing outer race
	MD999566 Claw	–	Remove of tapered roller bearing outer race
	MB992150 Oil seal installer	–	Installation of tapered roller bearing outer race
	MB990891 Rear suspension bushing base	MB990891-01	Installation of speedometer drive gear
	MB992138 Bearing installer	–	Installation of tapered roller bearing outer race

TRANSAXLE

DISASSEMBLY AND ASSEMBLY

M1222016500019

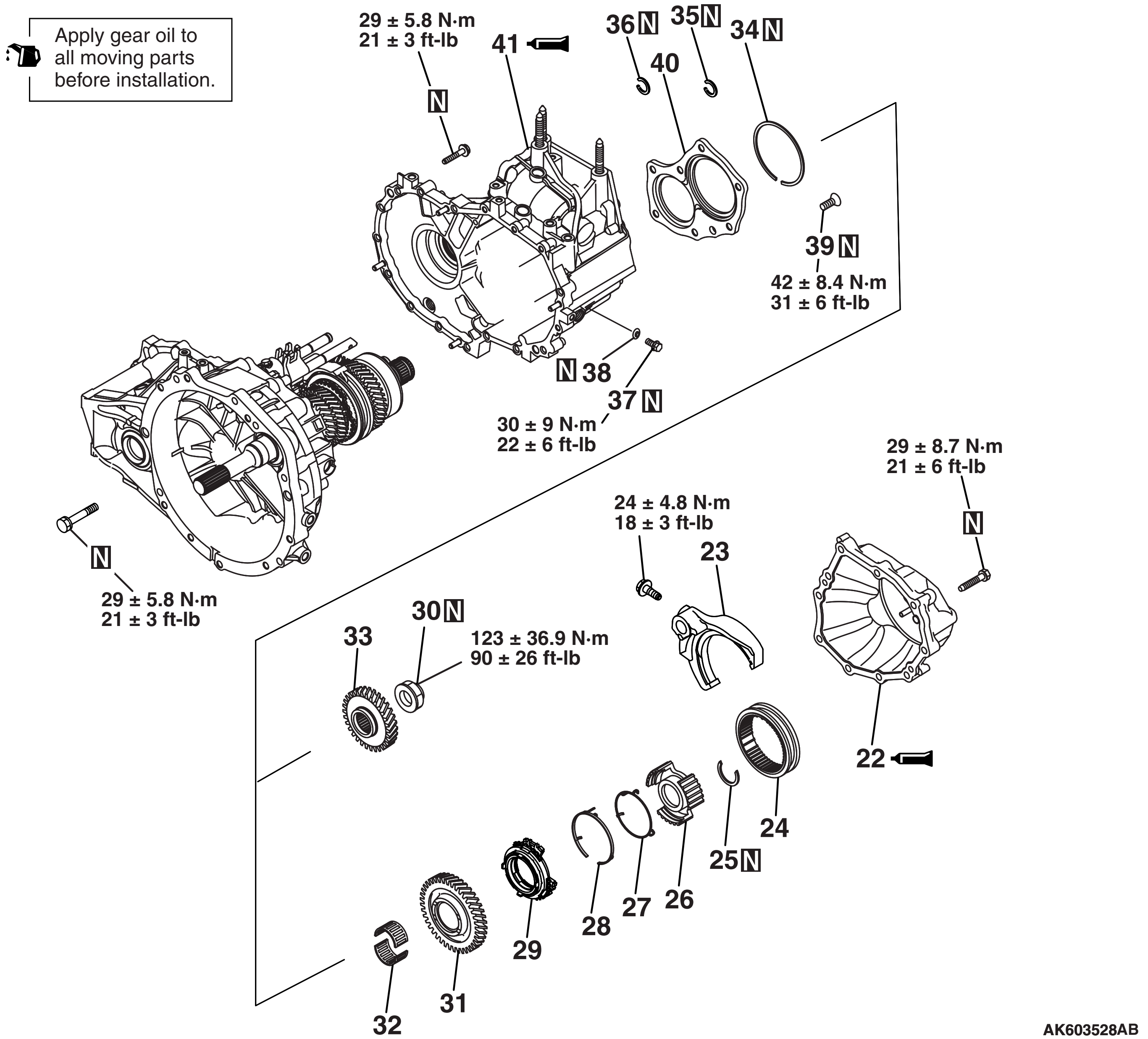


Removal steps

1. Roll stopper bracket front
2. Roll stopper bracket rear
3. Vehicle speed sensor
4. Backup light switch assembly
5. Lock ball assembly
6. Backup light switch wiring harness clamp bracket
7. Wiring harness clamp bracket
8. Wiring harness clamp bracket
9. Transaxle case hanger No.1
10. Control cable bracket

Removal steps (Continued)

<<A>> 11. Selecting bell crank assembly and control bell crank dust cover
12. Lever lock pin
13. Control shift lever
14. Dust boot
15. Clamp
>>M<< 16. Plug
17. Control shaft cover
>>L<< 18. Control shift retainer gasket
19. Shift and select lever shaft
>>K<< 20. Oil seal
21. Clutch tube bracket

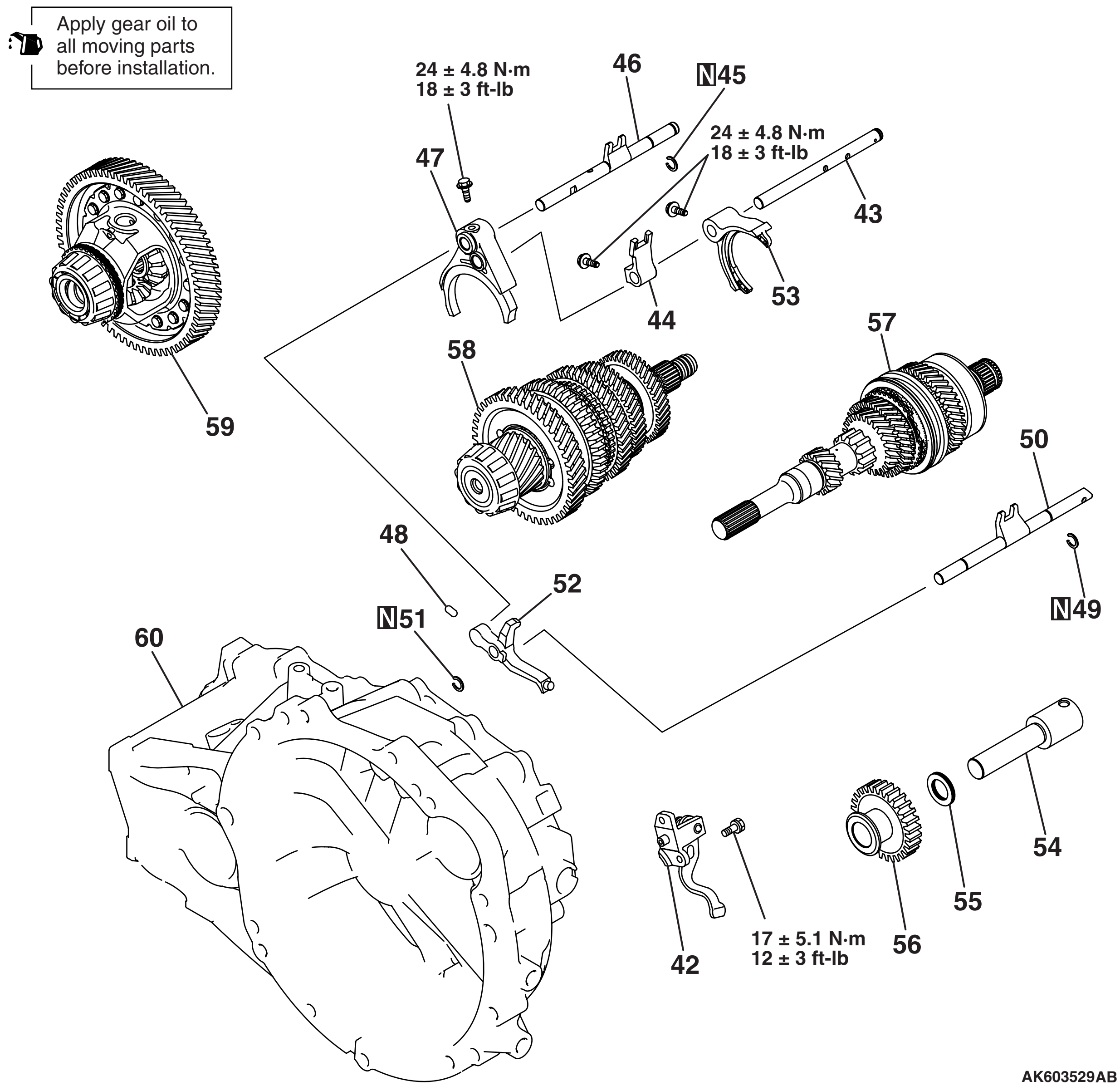


Removal steps

>>J<<	22.	Transaxle case cover sub assembly
	23.	Gear shift fork assembly No.3
>>I<<	24.	Synchronizer sleeve No.3
>>H<<	25.	Shaft snap ring
<<B>> >>G<<	26.	Synchronizer hub No.3
>>G<<	27.	Synchromesh shifting key spring No.3 (A)
>>G<<	28.	Synchromesh shifting key spring No.3 (B)
>>G<<	29.	Synchronizer ring assembly
<<C>> >>F<<	30.	5th drive gear mounting lock nut
	31.	5th gear

Removal steps (Continued)

	32.	Needle roller bearing
<<D>> >>E<<	33.	5th drive gear
	34.	Shaft snap ring
	35.	Shaft snap ring
	36.	Shaft snap ring
	37.	Reverse idler gear shaft mounting bolt
	38.	Gasket
	39.	Rear bearing retainer mounting bolt
	40.	Rear bearing retainer
>>D<<	41.	Transaxle case assembly



Removal steps

- >>C<< 42. Reverse shift arm bracket assembly
- 43. Gear shift fork shaft No.2
- 44. Gear shift head No.1
- 45. Shaft snap ring
- >>B<< 46. Gear shift fork shaft No.1
- >>B<< 47. Gear shift fork assembly No.1
- 48. Roller
- 49. Shaft snap ring
- 50. Gear shift fork shaft No.3
- 51. Shaft snap ring

Removal steps (Continued)

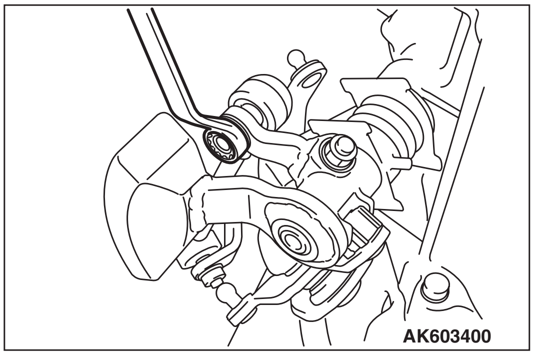
- 52. Reverse shift fork
- 53. Gear shift fork assembly No.2
- >>A<< 54. Reverse idler shaft
- >>A<< 55. Reverse idler thrust washer
- >>A<< 56. Reverse idler gear
- 57. Input shaft assembly
- 58. Output shaft assembly
- 59. Differential assembly
- 60. Clutch housing case assembly

Required Special Tools:

- MB992221: Puller set
- MD998802: Input shaft Holder
- MB990801: Rear axle bearing outer race puller
- MB992038: Preload socket
- MB992219: Output shaft adapter
- MB992216: Installer
- MB992220: Input shaft adapter
- MB992212: Oil seal installer
- MB992075: Handle
- MB992000: Crankshaft adapter

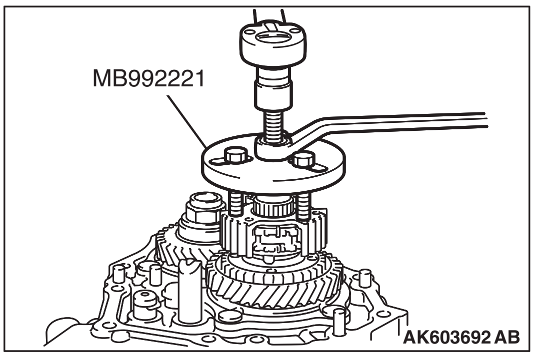
DISASSEMBLY SERVICE POINTS

<<A>> SELECTING BELL CRANK ASSEMBLY AND CONTROL BELL CRANK DUST COVER REMOVAL



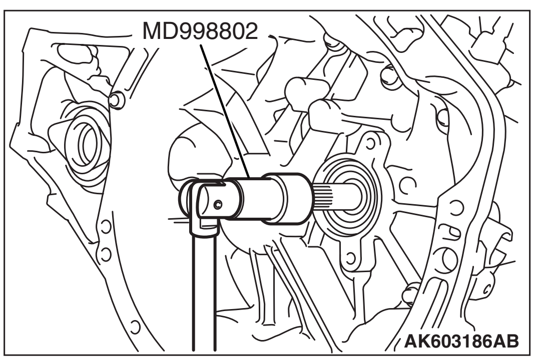
Remove the fixing nuts shown, then separate the control shift lever from the selecting bell crank assembly and control bell crank dust cover.

<<B>> SYNCHRONIZER HUB NO.3 REMOVAL

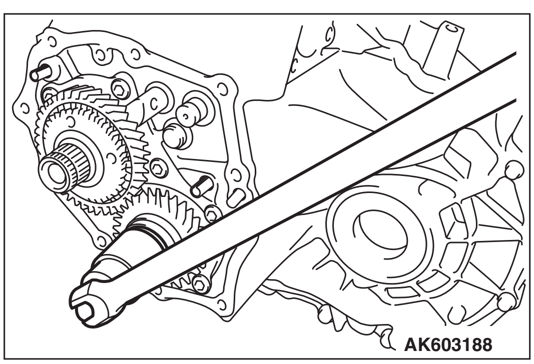


1. Using special tool MB992221, remove the synchronizer hub No.3.

<<C>> 5TH DRIVE GEAR MOUNTING LOCK NUT REMOVAL

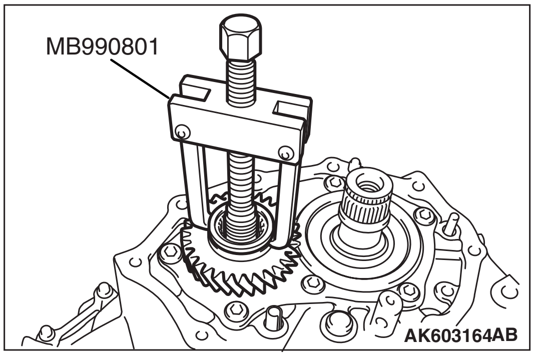


1. Using special tool MD998802, lock the input shaft.



2. Remove the 5th drive gear mounting lock nut from output shaft assembly.

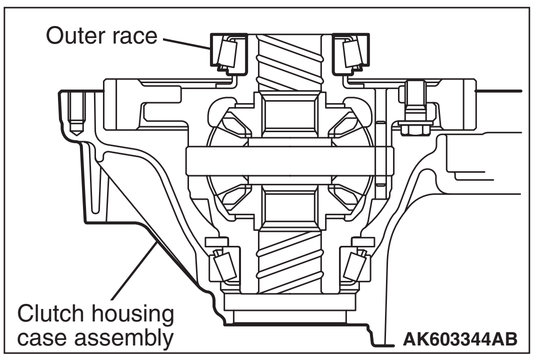
<<D>> 5TH DRIVE GEAR REMOVAL



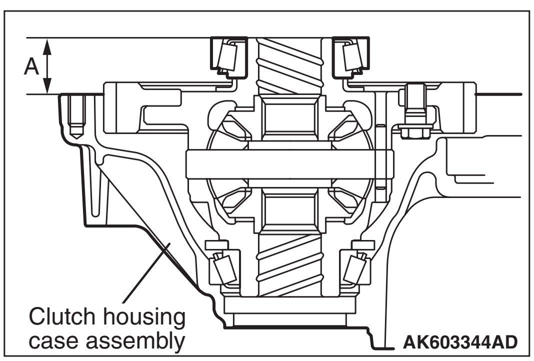
Using special tool MB990801, remove the 5th drive gear.

ADJUSTMENT BEFORE ASSEMBLY

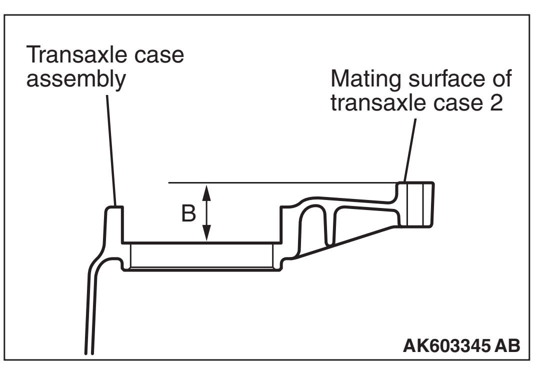
DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT



1. Set the differential assembly to the clutch housing case assembly.
2. Push and fit the tapered roller bearing outer race by hand.
3. To fit the tapered roller bearing outer race, rotate the differential assembly by hand about 10 times.

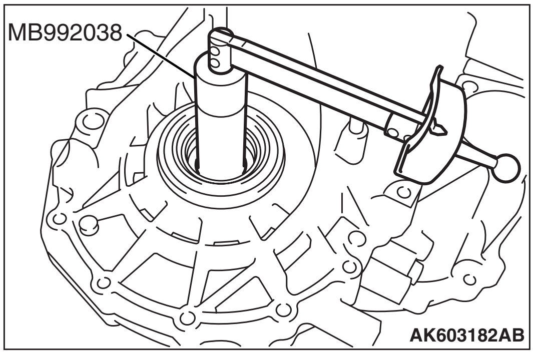


4. Put the clutch housing case assembly on the surface table and use a height gauge to measure the dimension "A" which is from the mating surface of the clutch housing case assembly to the end surface of the tapered roller bearing outer race.



5. Put the straight edge on the mating surface of the transaxle case assembly and measure the dimension "B" with a vernier caliper.
6. Select the shim whose dimension is the difference between "B" and "A."
7. Install the differential assembly to the clutch housing case assembly. Tighten the transaxle case bolts to the specified torque.

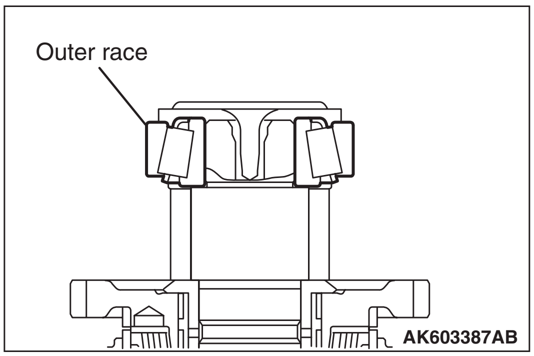
Tightening torque: 29 ± 5.8 N· m (21 ± 3 ft-lb)



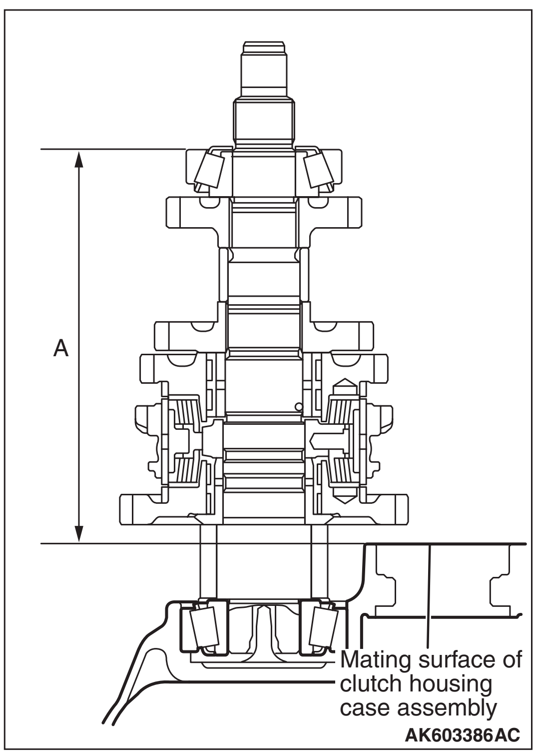
8. Using special tool MB992038, measure the rotational starting torque of differential case. When it is not within the standard range, reselect the shim.

   Standard value: 0.80 –1.60 N· m (7.08 –14.16 in-lb)

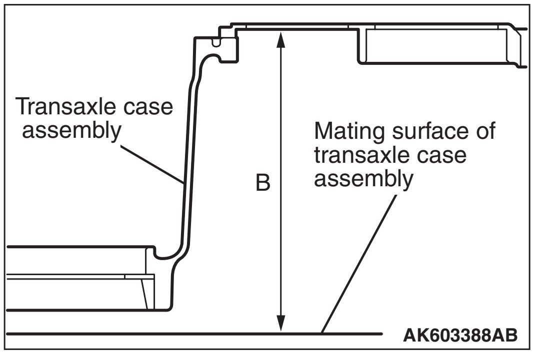
OUTPUT SHAFT ASSEMBLY BEARING PRELOAD ADJUSTMENT



1. Set the output shaft assembly to the clutch housing case assembly.
2. Push and fit the tapered roller bearing outer race by hand.
3. To fit the tapered roller bearing outer race, rotate the output shaft assembly by hand.



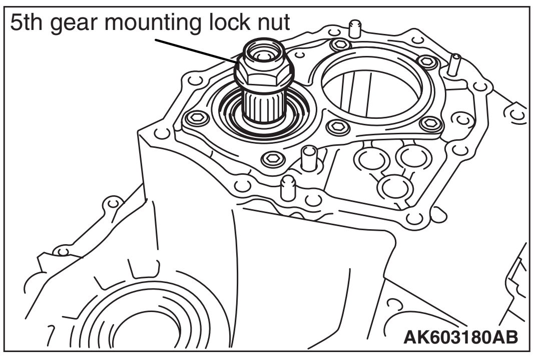
4. Put the clutch housing case assembly on the surface table and measure the dimension "A" which is from the mating surface of the clutch housing case assembly to the end surface of the bearing outer race, with a height gauge.



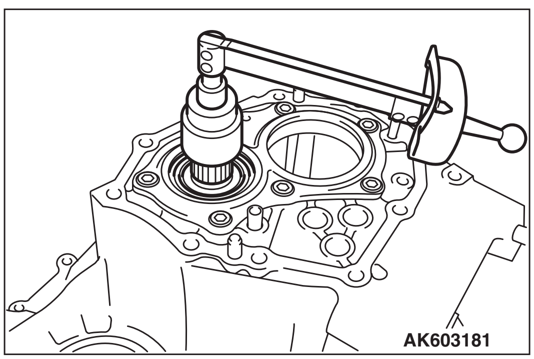
5. Put the straight edge on the mating surface of the transaxle case assembly and measure the dimension "B" with a vernier caliper.
6. Select the shim whose dimension is the difference between "B" and "A"
7. Install the output shaft assembly and differential assembly to the clutch housing case assembly. Tighten the transaxle case bolts to the specified torque.

   Tightening torque: 29 ± 5.8 N· m (21 ± 3 ft-lb)
8. Place the selected shim, then install the output shaft assembly.
9. Install the rear bearing retainer to specified torque.

   Tightening torque: 42 ± 8.4 N· m (31 ± 6 ft-lb)



10. Install the 5th gear mounting lock nut to measure rotational starting torque.

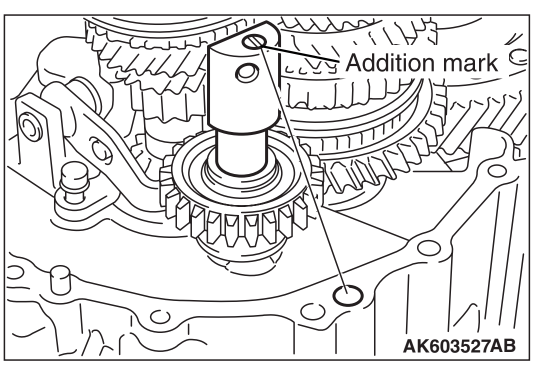


11. Measure the rotational starting torque of output shaft. When it is not within the standard range, reselect the shim.

    Standard value: 0.80 − 1.60 N· m (7.08 − 14.16 in-lb)

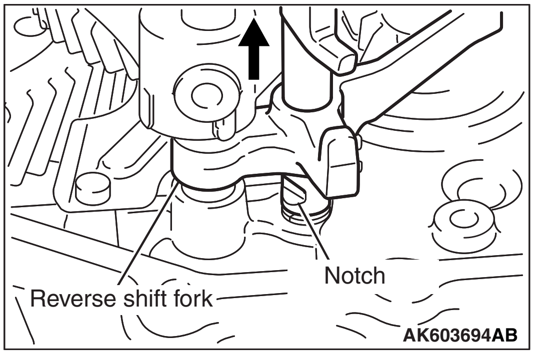
ASSEMBLY SERVICE POINTS

>>A<< REVERSE IDLER GEAR, REVERSE IDLER THRUST WASHER AND REVERSE IDLER SHAFT INSTALLATION

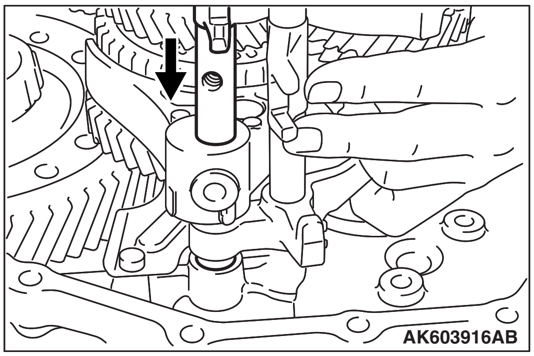


1. Install the reverse idler gear, reverse idler thrust washer and reverse idler shaft.
2. Before installing the transaxle case assembly, confirm that the reverse idler gear addition mark is positioned as show in the illustration.

>>B<< GEAR SHIFT FORK ASSEMBLY NO.1 AND GEAR SHIFT FORK SHAFT NO.1 INSTALLATION

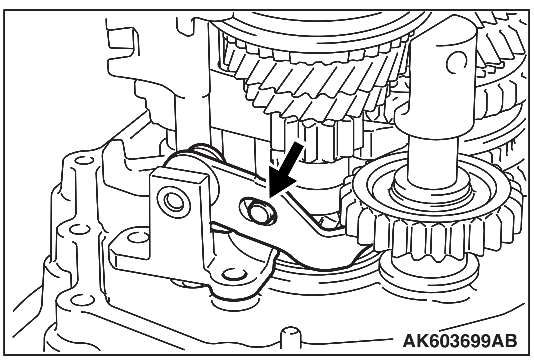


1. Fit the shaft snap ring onto the gear shaft fork shaft No. 1.
2. Bring up the notch in the gear shift fork shaft No. 3 to the reverse shift fork into neutral position, and move the roller in the reverse shift fork to the gear shift fork shaft No 3 side.



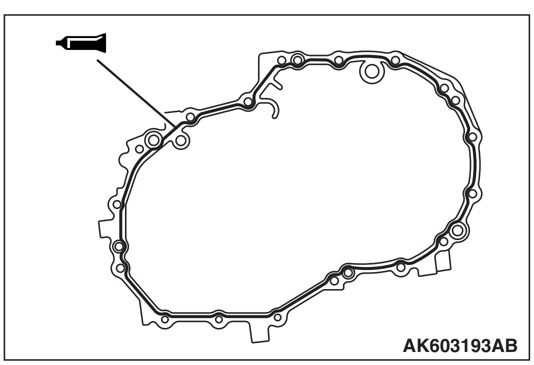
3. Pass the gear shift fork shaft No. 1 through the gear shift fork assembly No. 1 and reverse shift fork in that order, then install it to the clutch housing case assembly.

>>C<< REVERSE SHIFT ARM BRACKET ASSEMBLY INSTALLATION



Fit the arm tip of the reverse shift fork into the mating slot in the reverse shift arm bracket assembly.

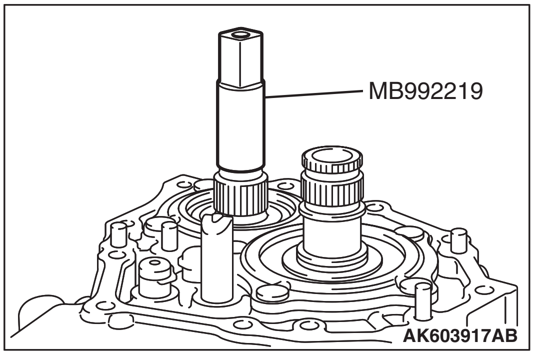
>>D<< TRANSAXLE CASE ASSEMBLY INSTALLATION



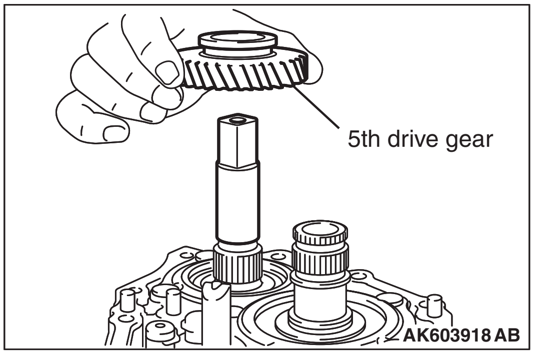
Apply a 1.2 mm (0.0472 inch) diameter bead of sealant as illustrated onto the transaxle case assembly.

Specified sealant:
Mitsubishi Part No. MD994421 or equivalent

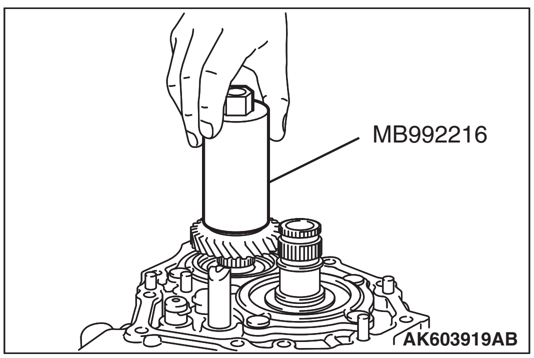
>>E<< 5TH DRIVE GEAR INSTALLATION



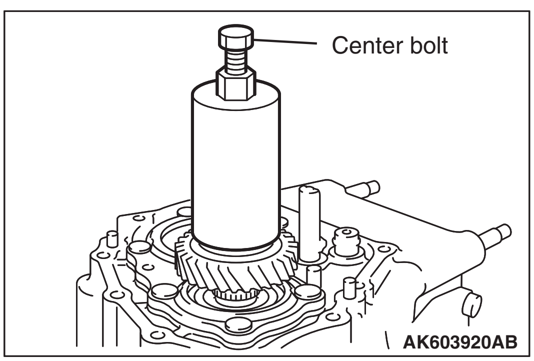
1. Install special tool MB992219 until it hits the end face of the output shaft.



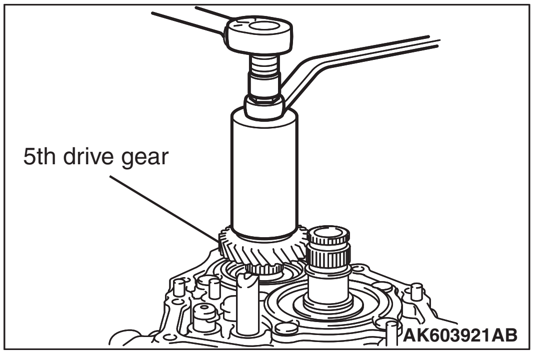
2. Install the 5th drive gear.



3. Set special tool MB992216 on top of the 5th drive gear.

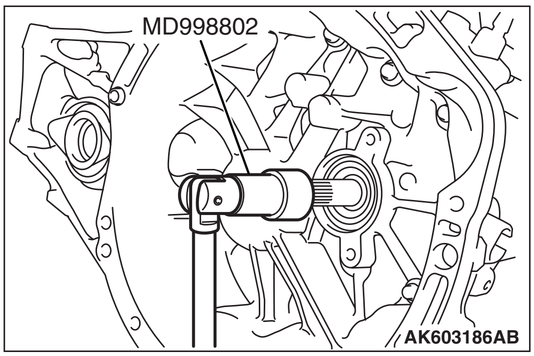


4. Install the center bolt that is included in the set of special tool MB992216 as shown.

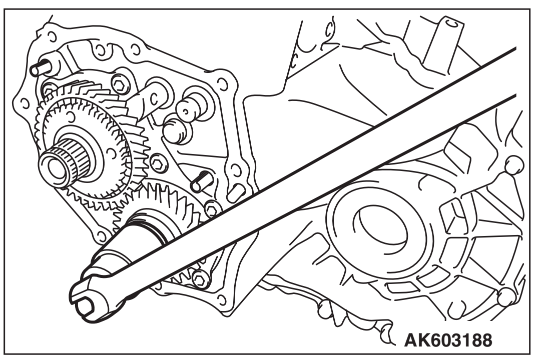


5. Press-fit the 5th drive gear as shown.

>>F<< 5TH DRIVE GEAR MOUNTING LOCK NUT INSTALLATION



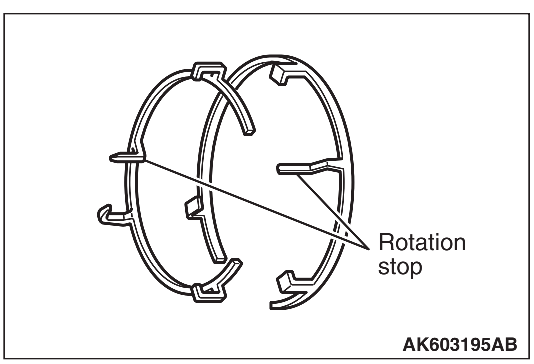
1. Using special tool MD998802, lock the input shaft.



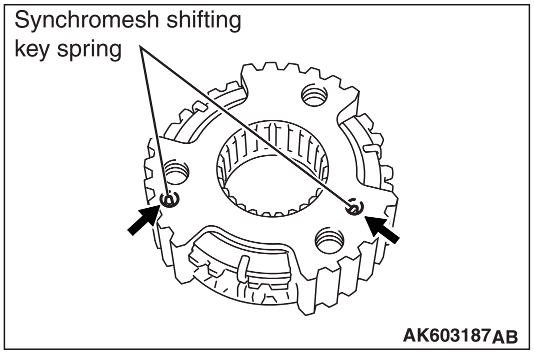
2. Install the 5th drive gear mounting lock nut from output shaft assembly.
3. Tighten the 5th drive gear mounting lock nut to the specified torque.

   Tightening torque: 123 ± 36.9 N· m (90 ± 26 ft-lb)
4. Stake the 5th gear mounting lock nut.

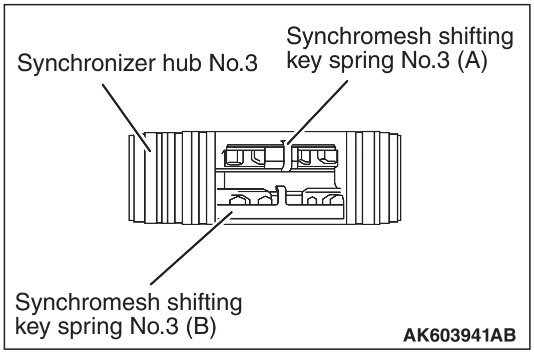
>>G<< SYNCHRONIZER RING ASSEMBLY, SYNCHROMESH SHIFTING KEY SPRING NO.3 (A), SYNCHROMESH SHIFTING KEY SPRING NO.3 (B) AND SYNCHRONIZER HUB NO.3 INSTALLATION



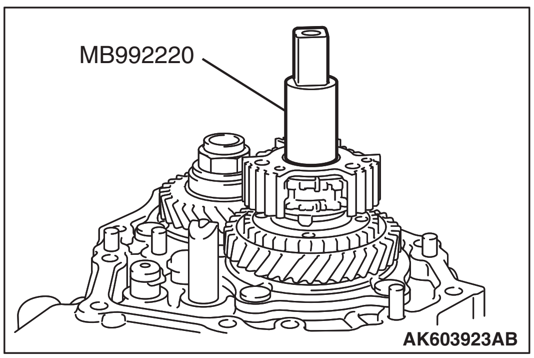
1. Install the synchromesh shifting key springs No. 3 onto the synchronizer ring assembly holding the claws and rotation stops of the key springs in the illustrated positions.



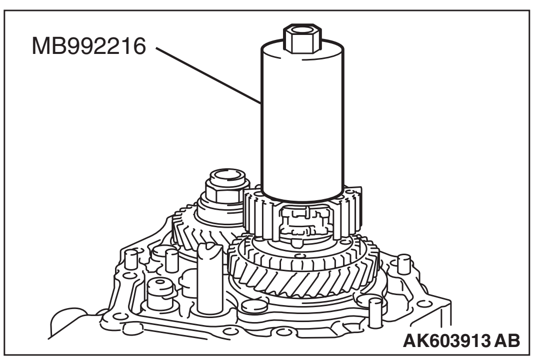
2. Make sure that the rotation stops of the synchromesh shifting key springs No. 3 fit into the mating holes in the synchronizer ring assembly.



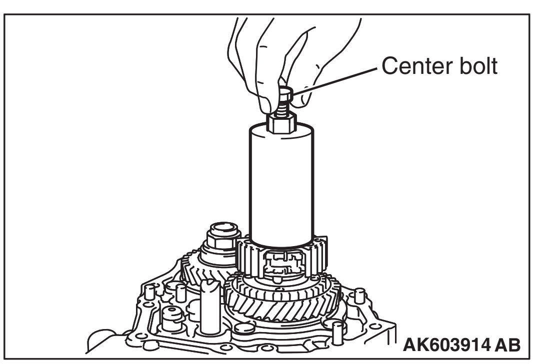
3. Compress the key springs into place inside the hub as shown.



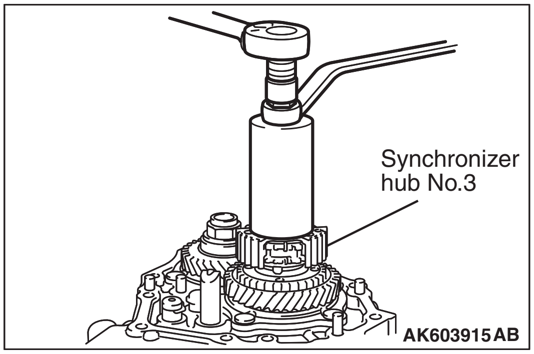
4. Install special tool MB992220 until it hits the end face of the input shaft.



5. Set special tool MB992216 on top of the synchronizer hub No. 3.

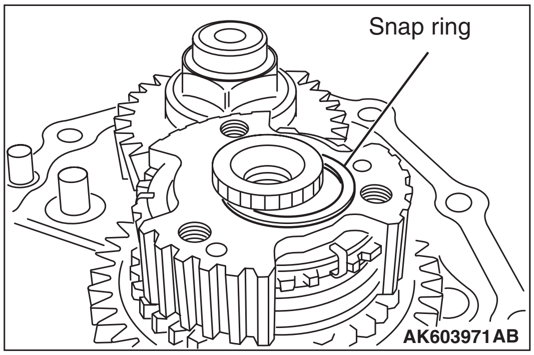


6. Install the center bolt that is a part of the set of special tool MB992216 as shown.



7. Press-fit the synchronizer hub No. 3 as shown.

>>H<< SHAFT SNAP RING INSTALLATION

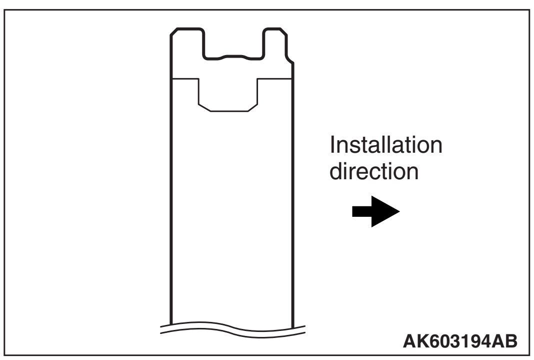


Select a shaft snap ring that allows distance of the thrust crevice of synchronizer hub No.3 to fall within the standard value range.

Standard value: 0 –0.1 mm (0 –0.0039 in.)

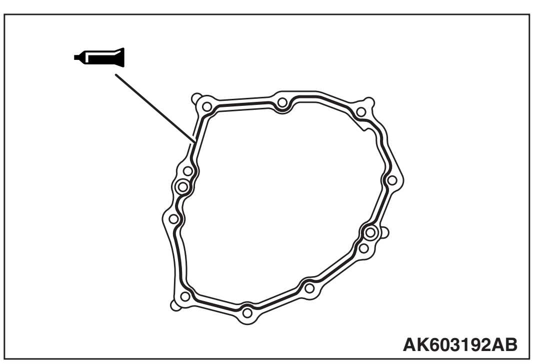
NOTE: Try on snap rings in the decreasing order of thickness, and install the first one that fits into the hub.

>>I<< SYNCHRONIZER SLEEVE NO.3 INSTALLATION



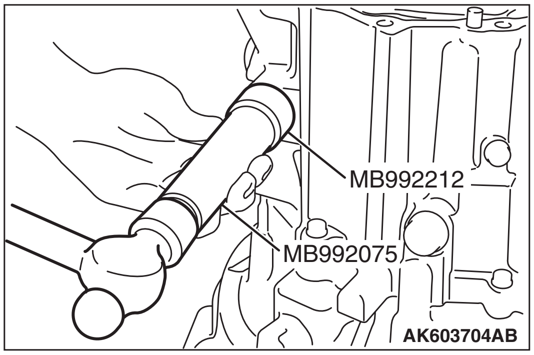
Put the synchronizer sleeve No. 3 and gear shaft fork assembly No. 3 together, then install the synchronizer sleeve No. 3 in the illustrated direction.

>>J<< TRANSAXLE CASE COVER SUB ASSEMBLY INSTALLATION



Apply a 1.2 mm (0.0472 inch) diameter bead of sealant as illustrated onto the transaxle case cover sub assembly.

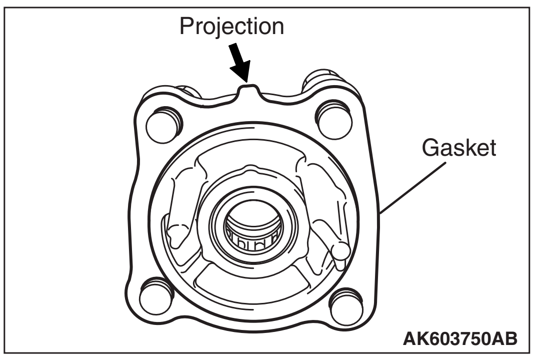
Specified sealant:
Mitsubishi Part No. MD994421 or equivalent



>>K<< OIL SEAL INSTALLATION

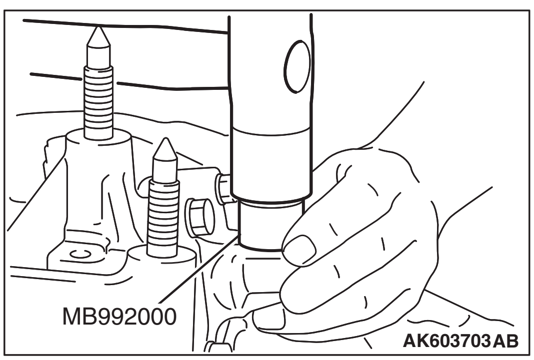
1. Using special tool MB992212 and MB992075, install the oil seal.
2. Pack grease to the oil seal lip area.

Specified grease:
Mitsubishi Part No. 0101011 or equivalent



>>L<< CONTROL SHIFT RETAINER GASKET INSTALLATION

Install the control shift retainer gasket to the control shaft cover with the projection of the gasket in the illustrated position.



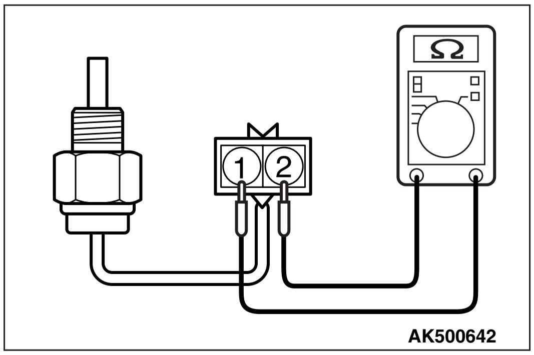
>>M<< PLUG INSTALLATION

Using special tool MB992000, install the plug.

INSPECTION

M1222016600016

BACKUP LIGHT SWITCH



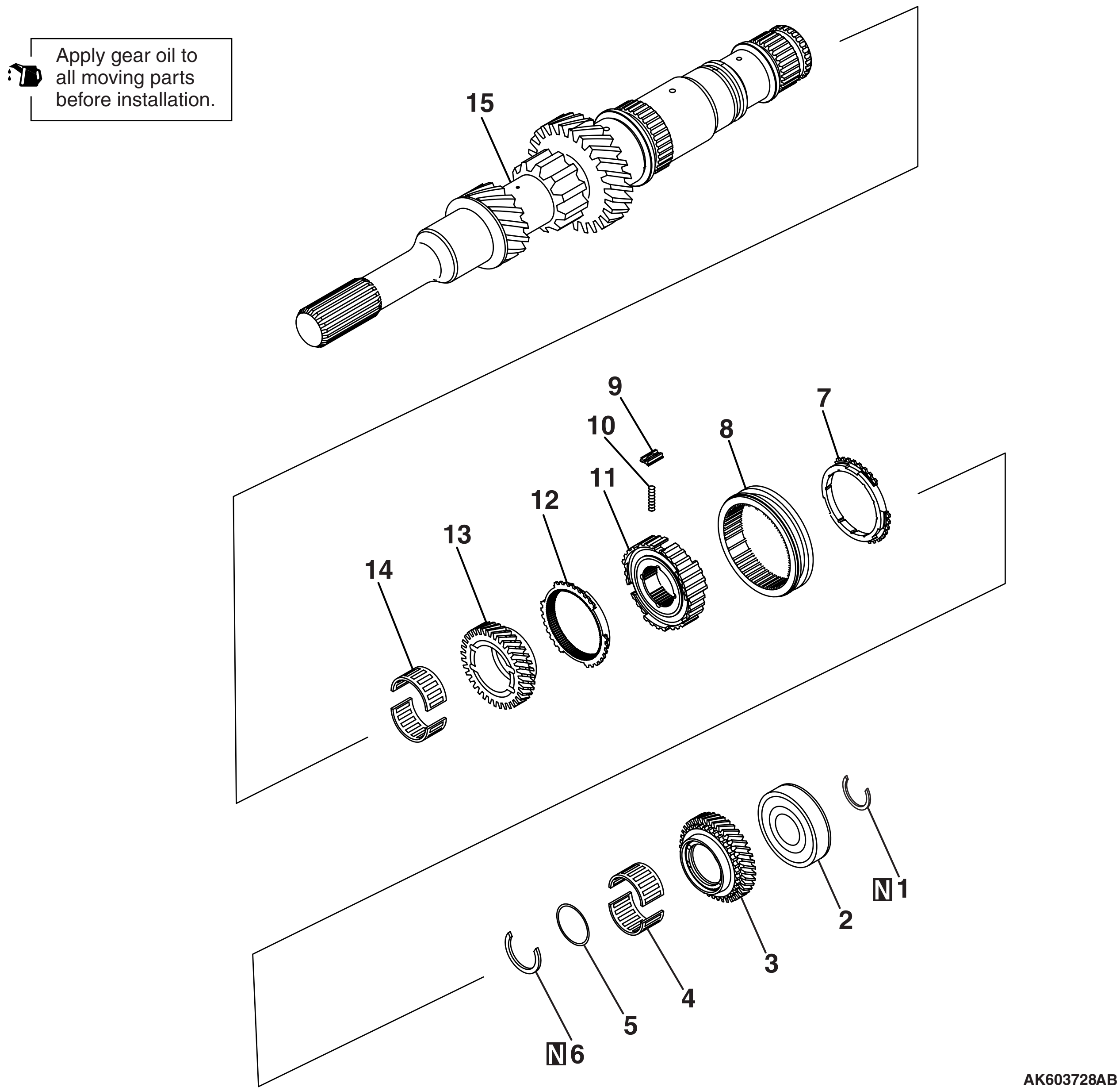
Check for continuity between terminals.

Switch Condition	Continuity
Pressed	Open
Released	Conductive

INPUT SHAFT

DISASSEMBLY AND ASSEMBLY

M1222001600537



			Removal steps
	>>D<<	1.	Snap ring
<<A>>	>>C<<	2.	Radial ball bearing
		3.	4th gear sub-assembly
		4.	Needle roller bearing
		5.	Spacer
	>>B<<	6.	Snap ring
		7.	Synchronizer ring No.4
<<B>>	>>A<<	8.	Synchronizer sleeve No.2

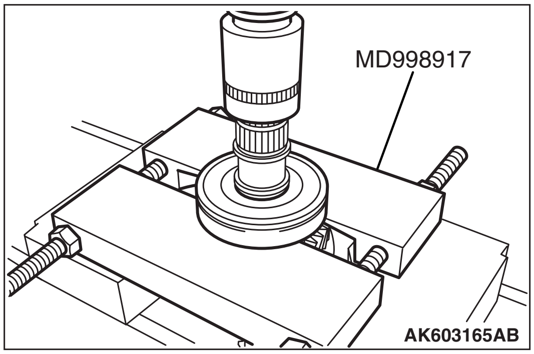
			Removal steps (Continued)
		9.	Synchromesh shifting key No2
		10.	Compression spring
<<B>>	>>A<<	11.	Synchronizer hub No.2
		12.	Synchronizer ring No.3
<<B>>		13.	3rd gear sub-assembly
		14.	Needle roller bearing
		15.	Input shaft

Required Special Tools:

- MD998917: Bearing remover
- MD998812: Installer cap
- MD998813: Installer-100
- MD998820: Installer adapter

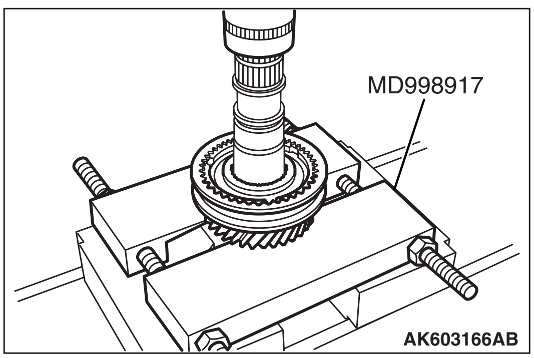
DISASSEMBLY SERVICE POINTS

<<A>> RADIAL BALL BEARING REMOVAL



Using special tool MD998917, support the radial ball bearing and remove the radial ball bearing.

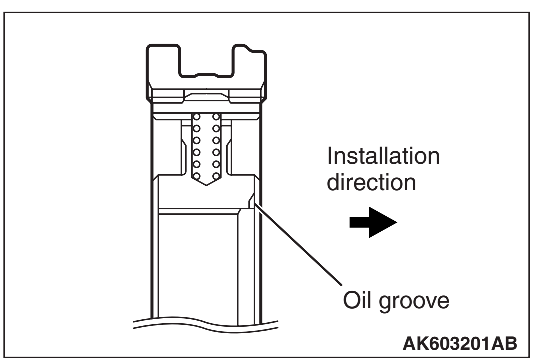
<<B>> SYNCHRONIZER SLEEVE NO.2, SYNCHRONIZER HUB NO.2 AND 3RD GEAR SUB-ASSEMBLYREMOVAL



Using special tool MD998917, support the 3rd gear sub-assembly and remove the 3rd gear sub- assembly, synchronizer sleeve No.2 and synchronizer hub No.2.

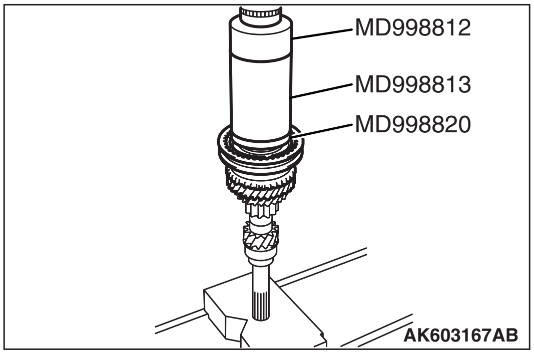
ASSEMBLY SERVICE POINTS

>>A<< SYNCHRONIZER HUB NO.2 AND SYNCHRONIZER SLEEVE NO.2 INSTALLATION



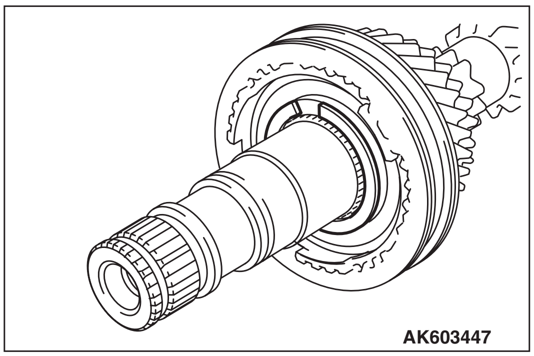
1. Before assembly, make sure that the hub and sleeve face the correct direction.

   NOTE:
   - *Apply gear oil to the caulked area between the sleeve and the hub.*
   - *After installation, confirm the sleeve and the hub slide smoothly.*



2. Using special tools MD998812, MD998813 and MD998820, install the synchronizer sleeve No.2 and synchronizer hub No.2.

>>B<< SNAP RING INSTALLATION

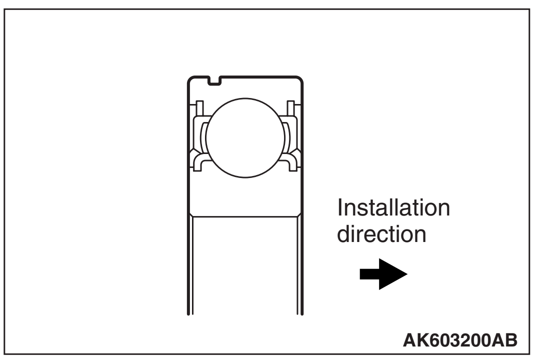


Select a snap ring that allows distance of the thrust crevice of synchronizer hub No.2 to fall within the standard value range.

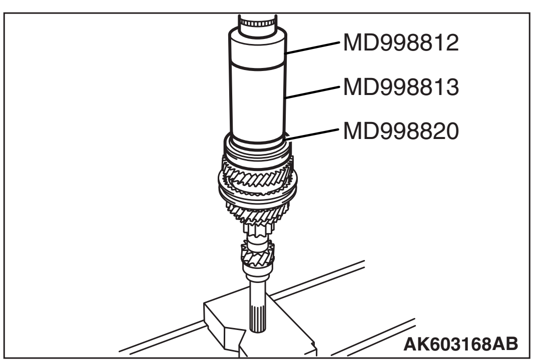
Standard value: 0 –0.1 mm (0 –0.0039 inch)

NOTE: Note: Try on snap rings in the decreasing order of thickness, and install the first one that fits into the input shaft.

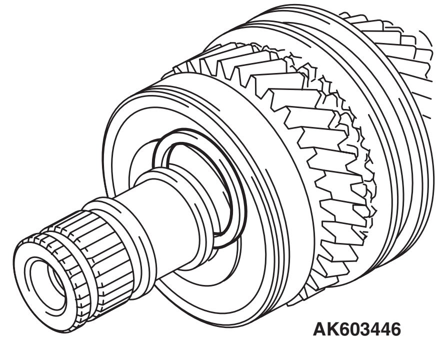
>>C<< RADIAL BALL BEARING INSTALLATION



1. Before assembly, make sure that the radial ball bearing faces the correct direction.



2. Using special tools MD998812, MD998813 and MD998820, install the radial ball bearing.


AK603446

>>D<< SNAP RING INSTALLATION

Select a snap ring that allows distance of the thrust crevice of radial ball bearing to fall within the standard value range.

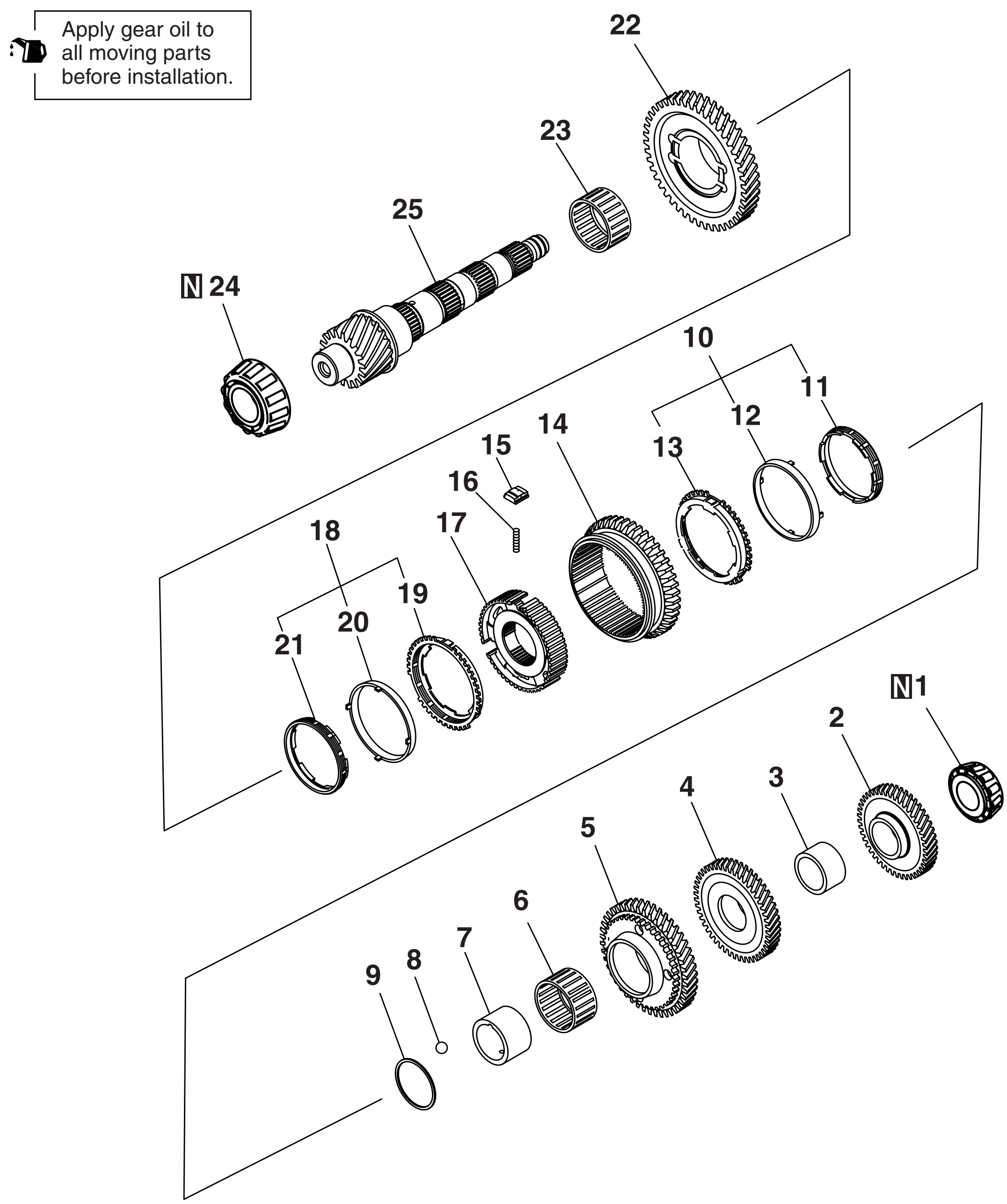
Standard value: 0 –0.1 mm (0 –0.0039 inch)

NOTE: Note: Try on snap rings in the decreasing order of thickness, and install the first one that fits into the input shaft.

OUTPUT SHAFT

DISASSEMBLY AND ASSEMBLY

M1222002200480



AK603531AB

Removal steps

<<A>> >>G<<	1.	Tapered roller bearing inner race
<<A>> >>F<<	2.	4th drive gear
	3.	Spacer
<<B>> >>E<<	4.	3rd drive gear
<<B>> >>D<<	5.	2nd gear
	6.	Needle roller bearing
	7.	2nd gear bush
	8.	Ball
	9.	Spacer
>>D<<	10.	Synchronizer ring set No.2
>>D<<	11.	Synchronizer inner ring No.2
>>D<<	12.	Synchronizer middle ring No.2
>>D<<	13.	Synchronizer outer ring No.2

Removal steps (Continued)

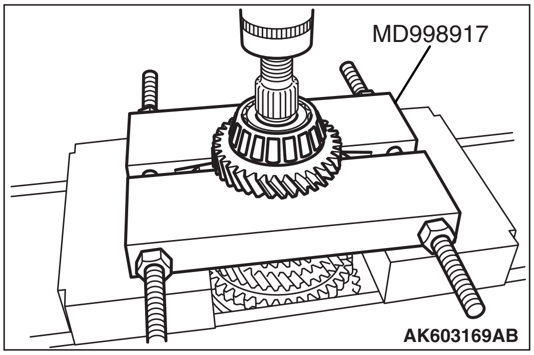
<<C>> >>C<<	14.	Reverse gear
	15.	Synchromesh shifting key No1
	16.	Compression spring
<<C>> >>C<<	17.	Synchronizer hub No.1
>>B<<	18.	Synchronizer ring set No.1
>>B<<	19.	Synchronizer outer ring No.1
>>B<<	20.	Synchronizer middle ring No.1
>>B<<	21.	Synchronizer inner ring No.1
<<C>> >>B<<	22.	1st gear
	23.	Needle roller bearing
<<D>> >>A<<	24.	Tapered roller bearing
	25.	output shaft

Required Special Tools:

- MD998917: Bearing remover
- MD998368: Bearing installer
- MD998812: Installer cap
- MD998813: Installer-100
- MD998820: Installer adapter
- MD998814: Installer 200
- MD998819: Installer adapter

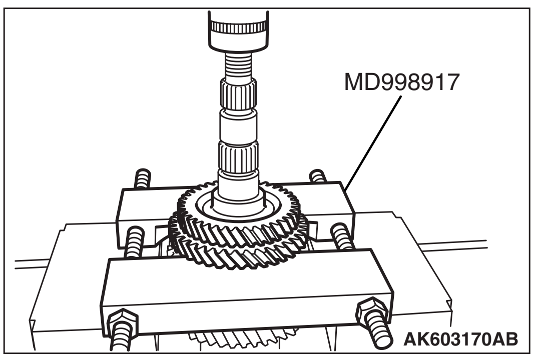
DISASSEMBLY SERVICE POINTS

<<A>> TAPERED ROLLER BEARING INNER RACE AND 4TH DRIVE GEAR REMOVAL



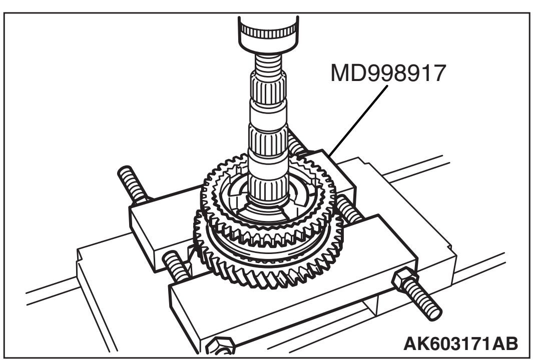
Using special tool MD998917, support the 4th drive gear and remove the tapered roller bearing Inner race and 4th drive gear.

<<B>> 3RD DRIVE GEAR AND 2ND GEAR REMOVAL

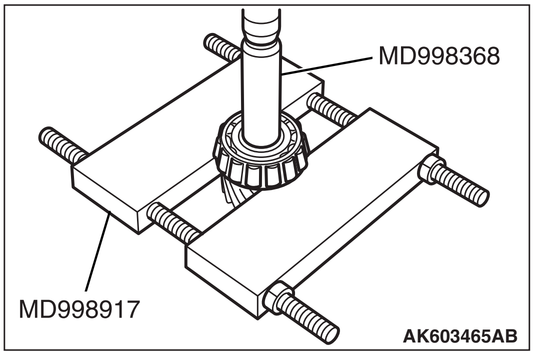


Using special tool MD998917, support the 2nd gear and remove the 3rd drive gear and 2nd gear.

<<C>> REVERSE GEAR, SYNCHRONIZER HUB NO.1 AND 1ST GEAR REMOVAL



Using special tool MD998917, support the 1st gear and remove the 1st gear, reverse gear and synchronizer hub No.1.

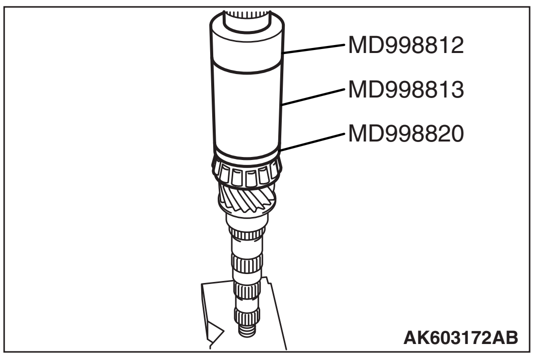


<<D>> TAPERED ROLLER BEARING INNER RACE REMOVAL

Using special tool MD998917 and MD998368, support the tapered roller bearing Inner race and remove the tapered roller bearing Inner race.

NOTE: Since special tool MD998917 holds the tapered roller bearing at the roller portion, the roller portion is broken when the inner race is removed.

ASSEMBLY SERVICEPOINTS



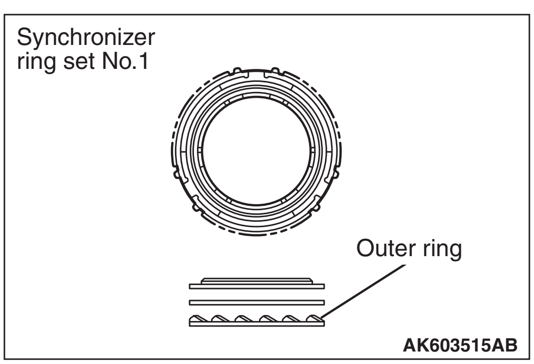
>>A<< TAPERED ROLLER BEARING INNER RACE INSTALLATION

Using special tools MD998812, MD998813 and MD998820, install the tapered roller bearing inner race.

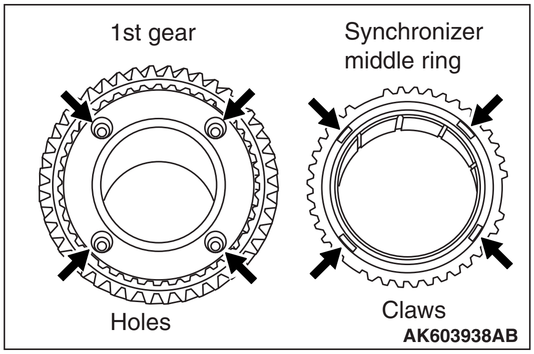
>>B<< SYNCHRONIZER RING SET NO.1 (SYNCHRONIZER OUTER RING NO.1, SYNCHRONIZER MIDDLE RING NO.1, SYNCHRONIZER INNER RING NO.1) INSTALLATION

⚠ CAUTION

The rings of the synchronizer ring set No. 1 and No. 2 are dedicated to the 1st and 2nd gears. Be sure to install the right ring set to the right gear.



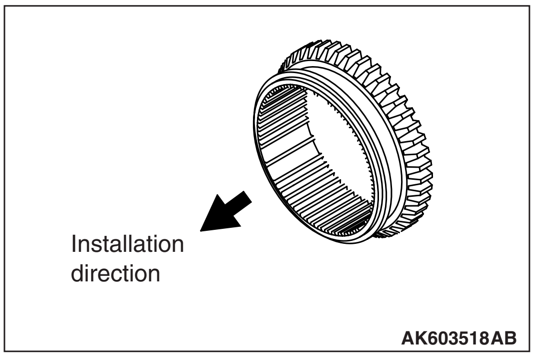
1. Make sure that the synchronizer outer ring of the synchronizer ring set No. 1 is as shown.



2. Install the synchronizer ring set No. 1 aligning the claws of the synchronizer middle ring to the positioning holes in the 1st gear.

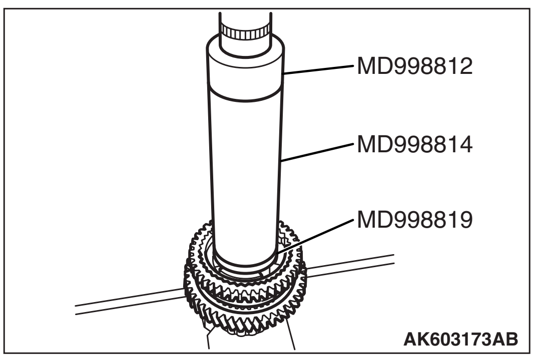
   NOTE: Apply gear oil to the sufficiently on the sliding surface

>>C<< REVERSE GEAR AND SYNCHRONIZER HUB NO.1 INSTALLTION



1. Install the reverse gear onto the synchronizer hub in the illustrated direction.

   NOTE: Apply gear oil to the sufficiently on the sliding surface

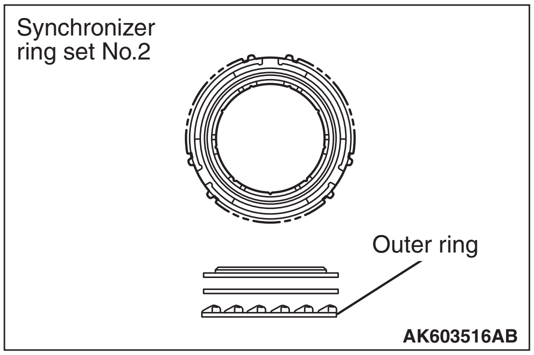


2. Using special tools MD998812, MD998814 and MD998819, install the synchronizer hub and reverse gear.
3. After installation, confirm the 1st gear slides smoothly.

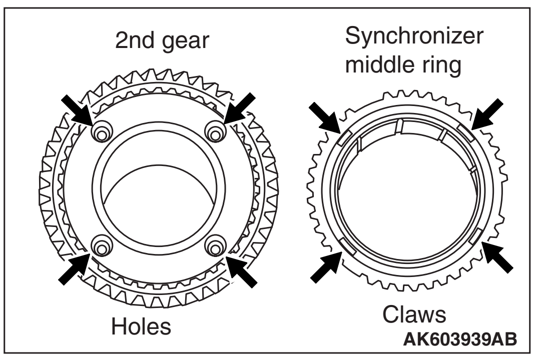
>>D<< SYNCHRONIZER RING SET NO.2 (SYNCHRONIZER OUTER RING NO.2, SYNCHRONIZER MIDDLE RING NO.2, SYNCHRONIZER INNER RING NO.2) AND 2ND GEAR INSTALLATION

⚠ CAUTION

The rings of the synchronizer ring set No. 1 and No. 2 are dedicated to the 1st and 2nd gears. Be sure to install the right ring set to the right gear.



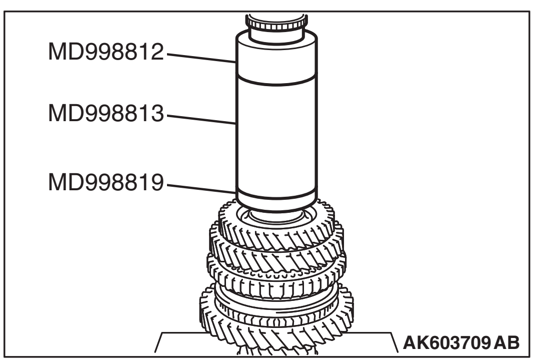
1. Make sure that the synchronizer outer ring of the synchronizer ring set No. 2 is as shown.



2. Install the synchronizer ring set No. 2 to the 2nd gear aligning the claws of the synchronizer middle ring to the positioning holes in the 2nd gear.

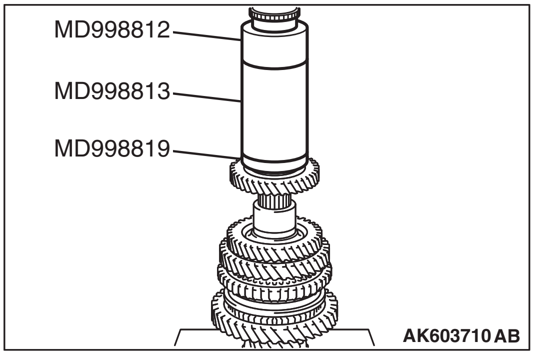
   NOTE: Apply gear oil to the sufficiently on the sliding surface

>>E<< 3RD DRIVE GEAR INSTALLATION



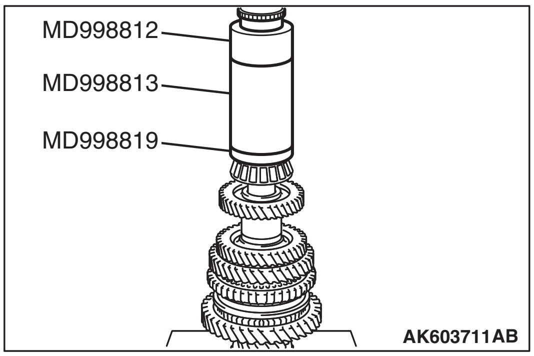
Using special tools MD998812, MD998813 and MD998819, install the 3rd drive gear.

>>F<< 4TH DRIVE GEAR INSTALLATION



Using special tools MD998812, MD998813 and MD998819, install the 4th drive gear.

>>G<< TAPERED ROLLER BEARING INNER RACE INSTALLATION



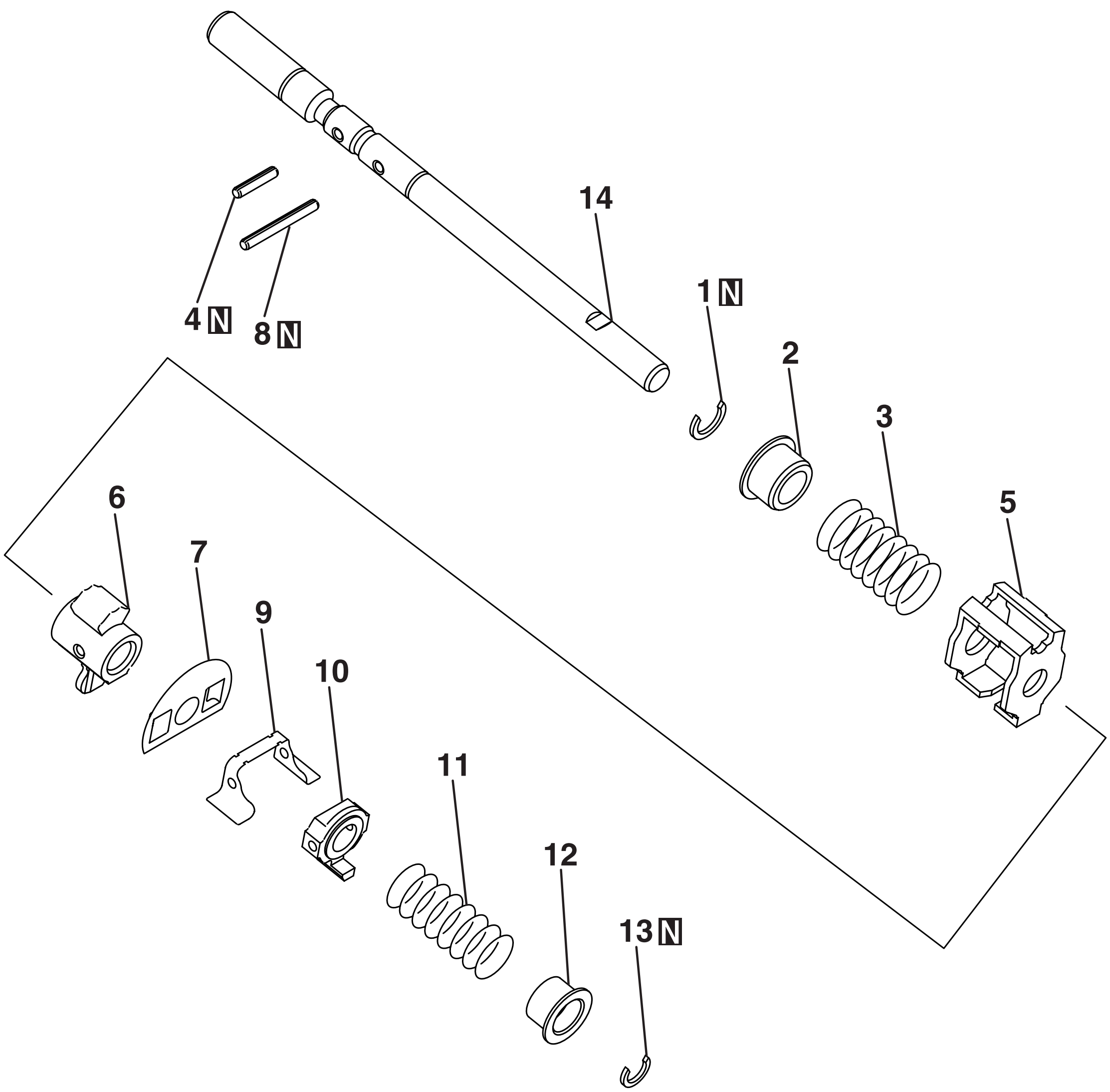
Using special tools MD998812, MD998813 and MD998819, install the tapered roller bearing inner race.

SELECT LEVER

DISASSEMBLY AND ASSEMBLY

M1222012800234

Apply gear oil to all moving parts before installation.



Removal steps

1. Shaft snap ring
2. Select spring seat
3. Spring
4. >>B<< Slotted spring pin
5. Shift inter lock plate
6. Shift inner lever No.1
7. Shift inter lock plate cover

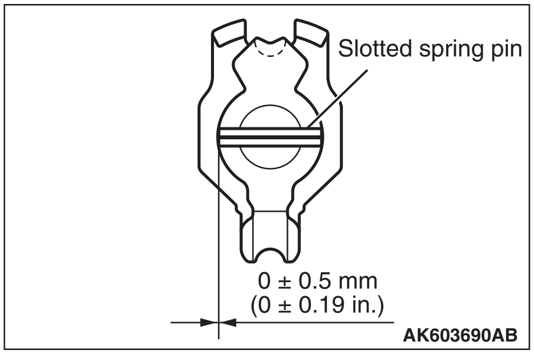
Removal steps (Continued)

8. >>A<< Slotted spring pin
9. Transmission oil baffle
10. Shift inner lever No.2
11. Spring
12. Select spring shift No.2
13. Shaft snap ring
14. Shift and select lever shaft

ASSEMBLY SERVICE POINTS

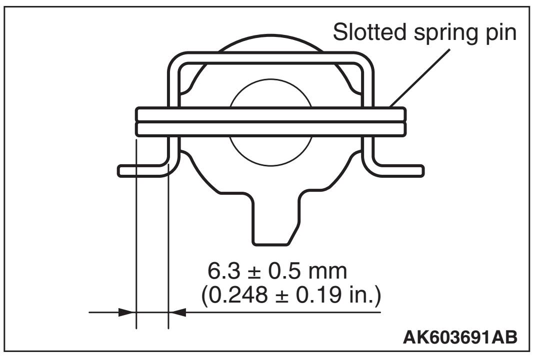
>>A<< SLOTTED SPRING PIN INSTALLATION

Drive in the slotted spring pin to the illustrated dimension.



>>B<< SLOTTED SPRING PIN INSTALLATION

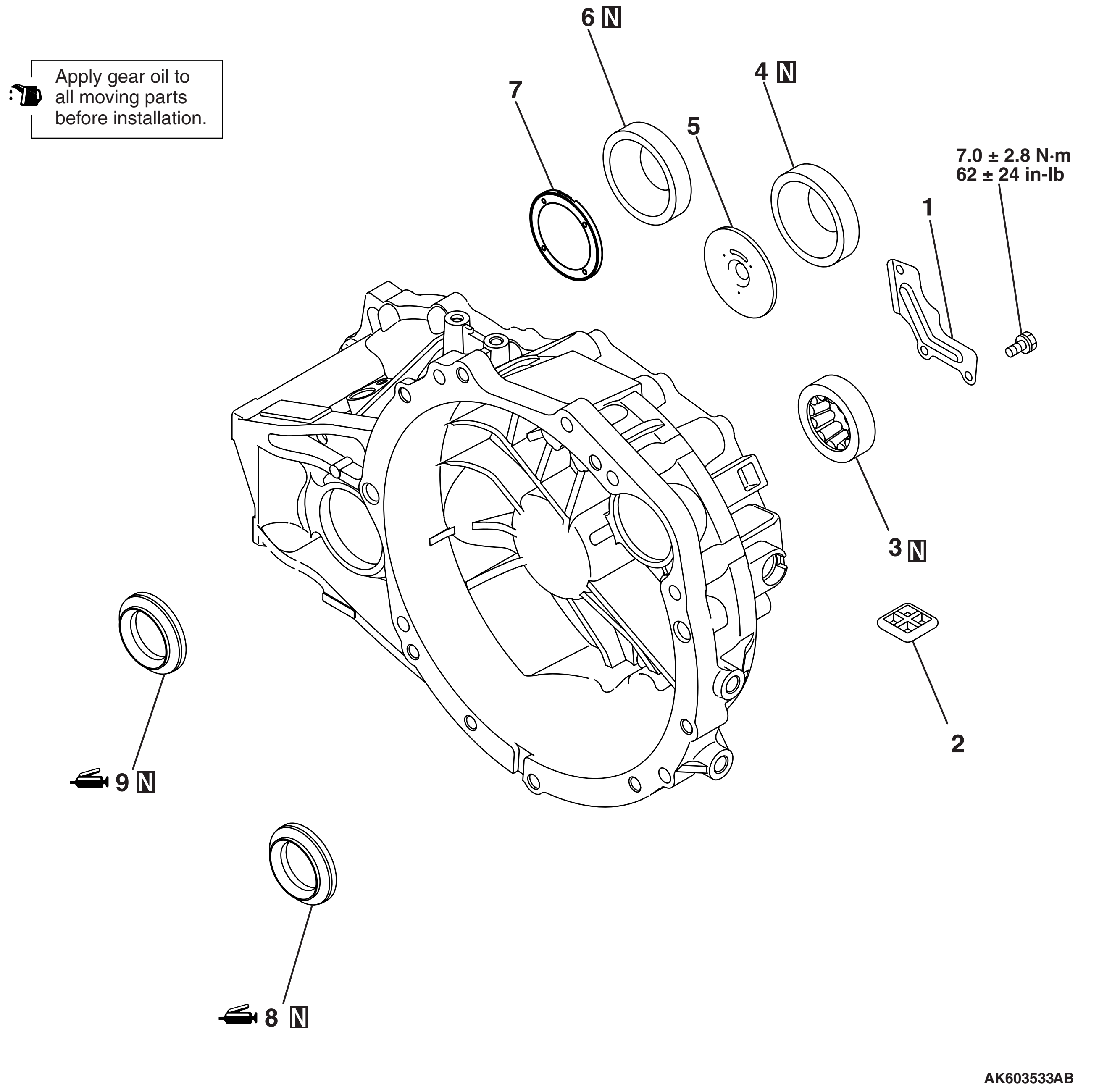
Drive in the slotted spring pin to the illustrated dimension.



CLUTCH HOUSING

DISASSEMBLY AND ASSEMBLY

M1222003700444



			Removal steps
		1.	Transaxle case receiver
		2.	Magnet
<<A>>	>>G<<	3.	Cylindrical roller bearing (outer race)
<<B>>	>>F<<	4.	Tapered roller bearing outer race

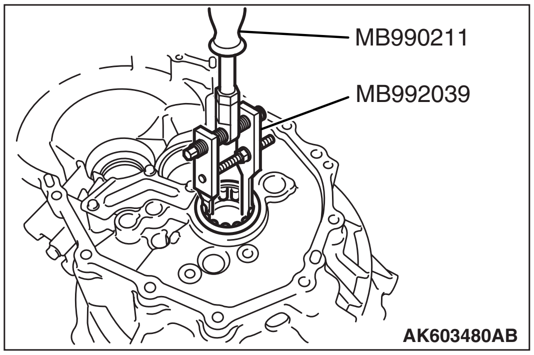
			Removal steps (Continued)
	>>E<<	5.	Out put shaft cover
<<C>>	>>D<<	6.	Tapered roller bearing outer race
	>>C<<	7.	Extension housing oil baffle
	>>B<<	8.	Oil seal
	>>A<<	9.	Oil seal

Required Special Tools:

- MB990211: Slide hammer
- MB992039: Slide hammer puller
- MD998200: Oil seal installer
- MD998550: Extension housing seal installer
- MB991445: Bush remover & installer base
- MB990938: Installer bar
- MD999547: Oil seal installer
- MB990699: Differential oil seal installer

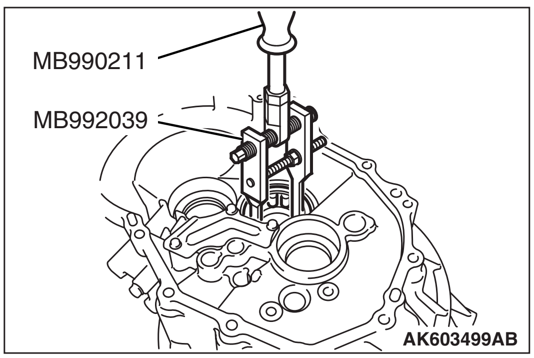
DISASSEMBLY SERVICE POINTS

<<A>> CYLINDRICAL ROLLER BEARING (OUTER RACE) REMOVAL



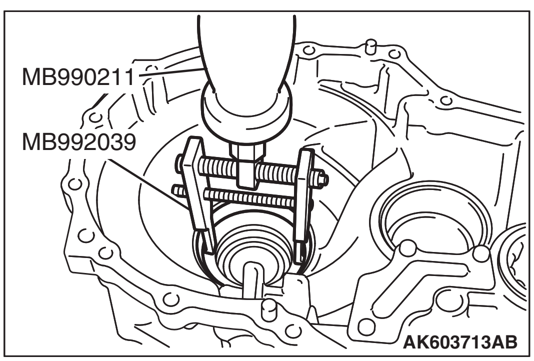
1. Using special tools MB990211 and MB992039, remove the cylindrical roller bearing (outer race).

<<B>> TAPERED ROLLER BEARING OUTER RACE REMOVAL



1. Using special tools MB990211 and MB992039, remove the tapered roller bearing outer race.

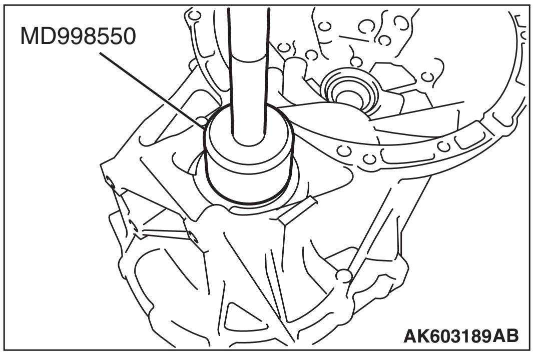
<<C>> TAPERED ROLLER BEARING OUTER RACE REMOVAL



1. Using special tools MB990211 and MB992039, remove the tapered roller bearing outer race.

ASSEMBLY SERVICE POINTS

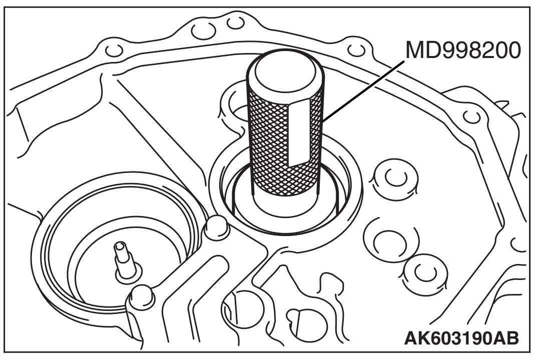
>>A<< OIL SEAL INSTALLATION



Using special tools MD998550, install the oil seal.

Specified grease:
Mitsubishi Part No. 0101011 or equivalent

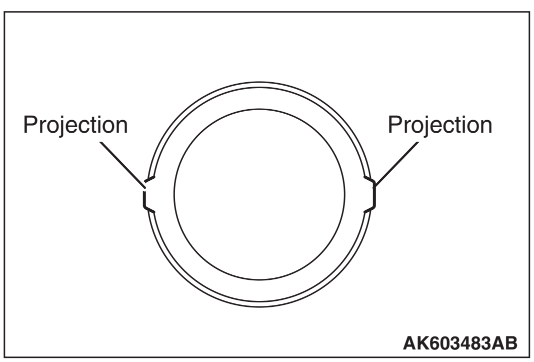
>>B<< OIL SEAL INSTALLATION



Using special tools MD998200, install the oil seal.

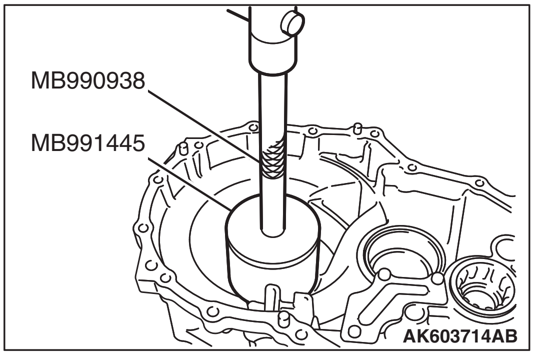
Specified grease:
Mitsubishi Part No. 0101011 or equivalent

>>C<< EXTENSION HOUSING OIL BAFFLE INSTALLATION



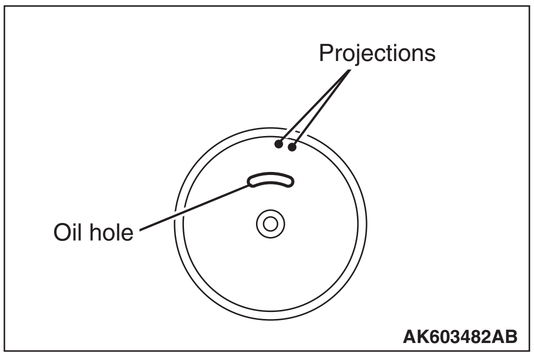
Install the extension housing oil baffle to the clutch housing case assembly with its projections fitted in the slots in the clutch housing case assembly.

>>D<< TAPERED ROLLER BEARING OUTER RACE INSTALLATION



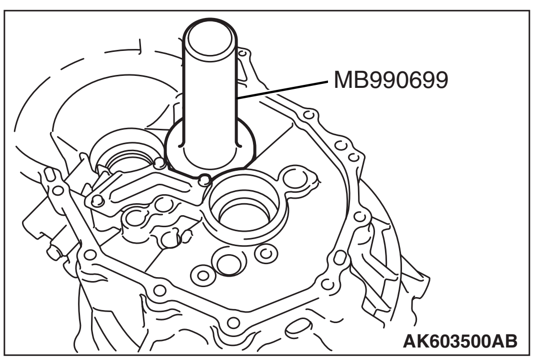
Using special tools MB991445 and MB990938, install the tapered roller bearing outer race.

>>E<< OUTPUT SHAFT COVER INSTALLATION

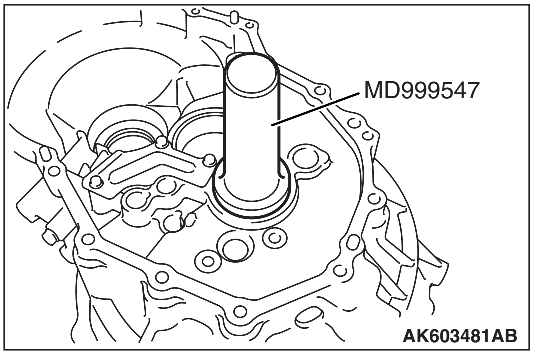


Install the output shaft cover to the clutch housing case assembly with its projections fitted in the slots in the clutch housing case assembly. Make sure that the oil hole in the output shaft cover is up as shown.

>>F<< TAPERED ROLLER BEARING OUTER RACE INSTALLATION



Using special tools MB990699 and install the tapered roller bearing outer race.



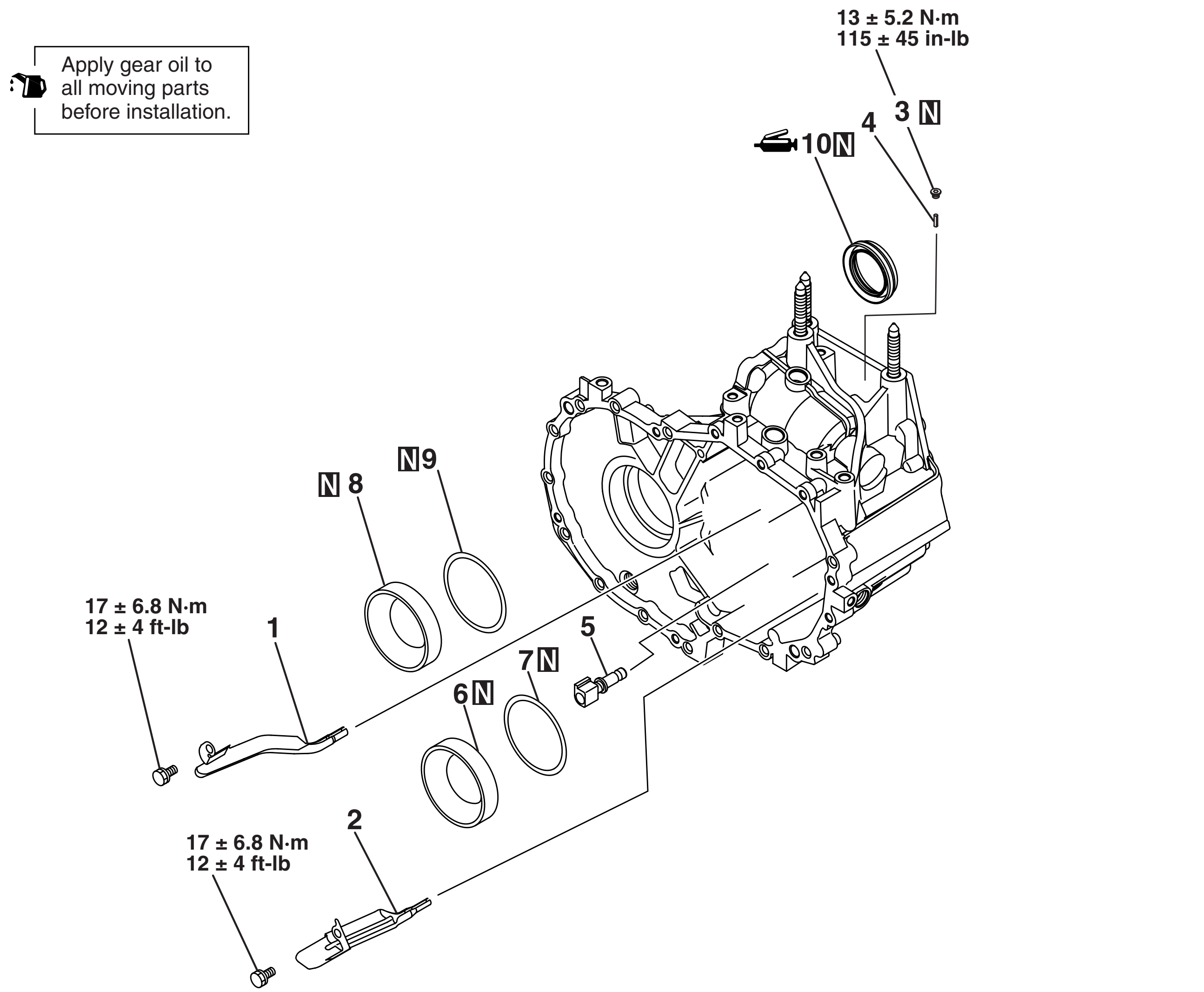
>>G<< CYLINDRICAL ROLLER BEARING (OUTER RACE) INSTALLATION

Using special tools MD999547, install the cylindrical roller bearing (outer race).

TRANSAXLE CASE

DISASSEMBLY AND ASSEMBLY

M1222016300015



AK603534AB

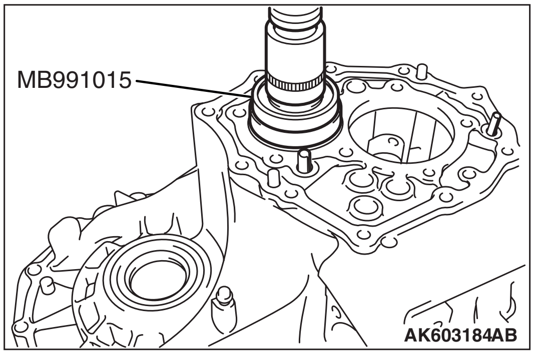
	Removal steps			**Removal steps (Continued)**
1.	Oil receiver pipe A	<<A>>	>>C<<	6. Tapered roller bearing outer race
2.	Oil receiver pipe B			7. Shim
3.	With head straight screw plug	<<B>>	>>B<<	8. Tapered roller bearing outer race
4.	Slotted spring pin			9. Shim
5.	Reverse restrict pin assembly		>>A<<	10. Oil seal

Required Special Tools:

- MB991015: Knuckle oil seal installer
- MB990211: Slide hammer
- MB992039: Slide hammer puller
- MB992210: Oil seal installer
- MB992075: Handle
- MB991966: Bearing outer race installer
- MB990938: Installer bar

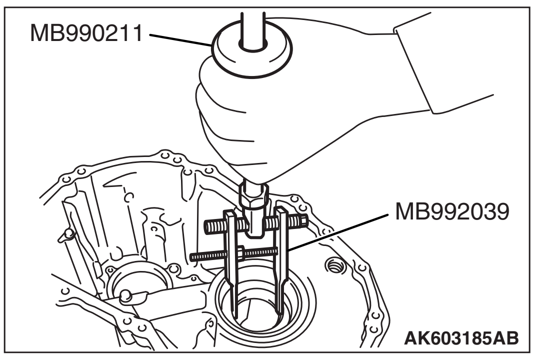
DISASSEMBLY SERVICE POINTS

<<A>> TAPERED ROLLER BEARING OUTER RACE REMOVAL



Using special tools MB991015, remove the tapered roller bearing outer race.

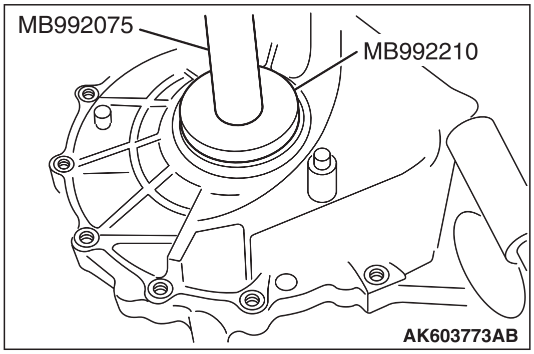
<<B>> TAPERED ROLLER BEARING OUTER RACE REMOVAL

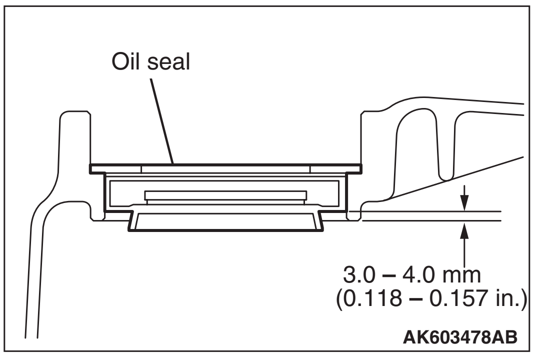


Using special tools MB990211 and MB992039, remove the tapered roller bearing outer race.

ASSEMBLY SERVICE POINTS

>>A<< OIL SEAL INSTALLATION

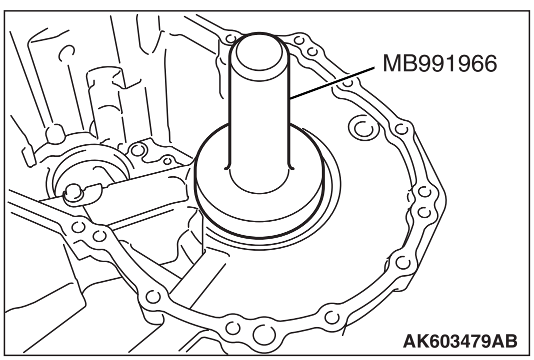




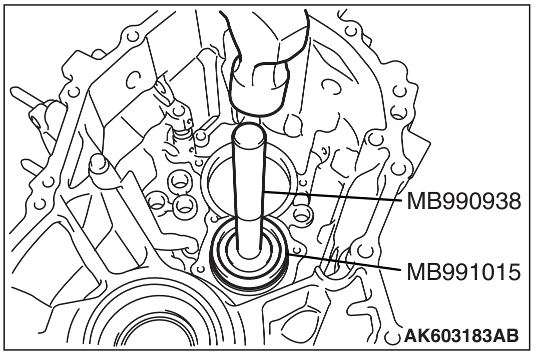
1. Using special tools MB992210 and MB992075, press-fit the oil seal until the difference in height between the transaxle case and oil seal is obtained as shown.
2. Pack grease to the oil seal lip area.

   Specified grease:
   Mitsubishi Part No. 0101011 or equivalent

>>B<< TAPERED ROLLER BEARING OUTER RACE INSTALLATION

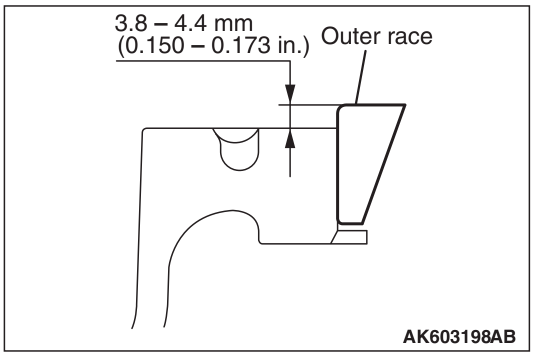


Using special tools MB991966, Install the tapered roller bearing outer race.



>>C<< TAPERED ROLLER BEARING OUTER RACE INSTALLATION

1. Set special tools MB991015 and MB990938.

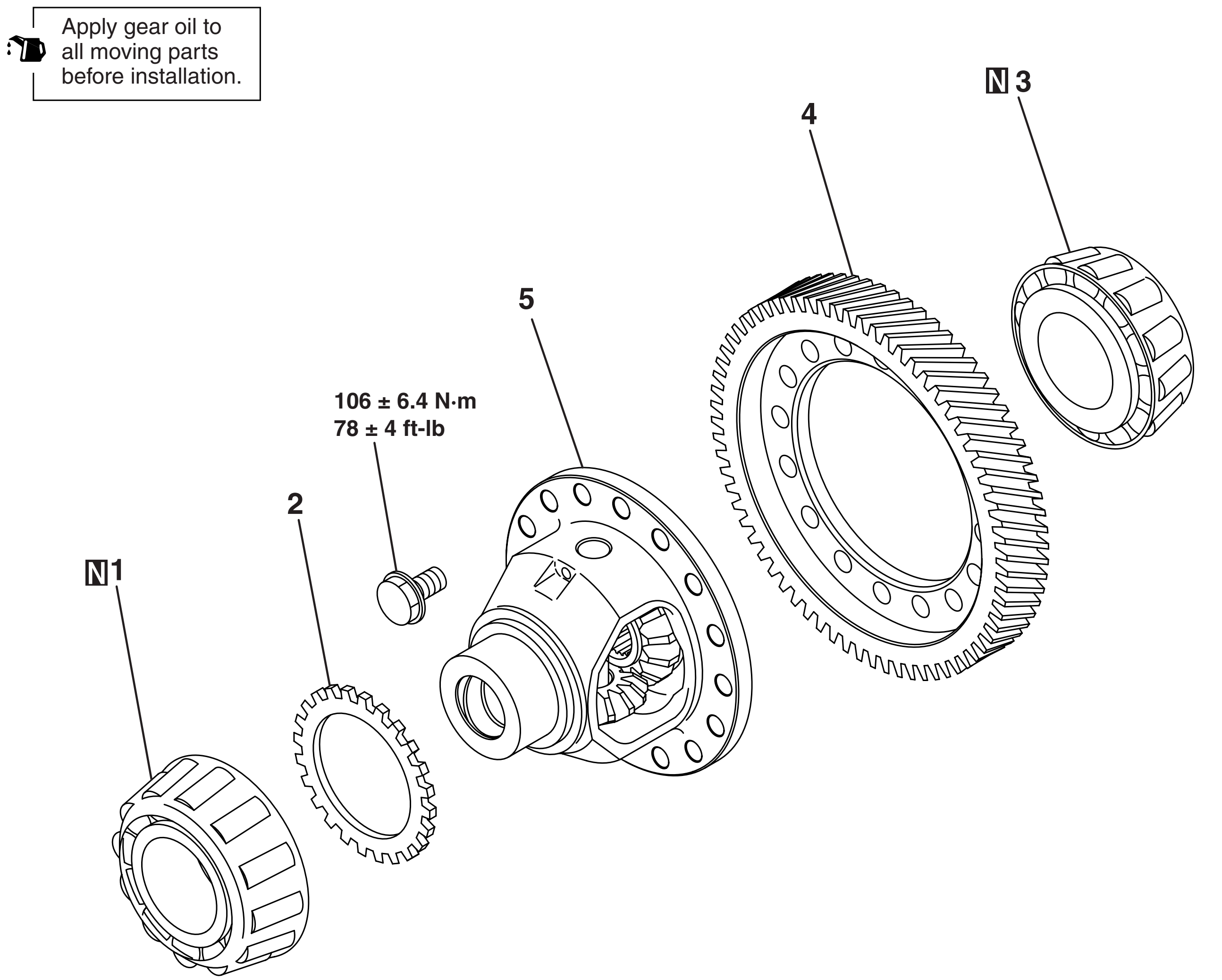


2. Press-fit the tapered roller bearing outer race to the height shown in the illustration.

DIFFERENTIAL

DISASSEMBLY AND ASSEMBLY

M1222002500351



AK603535AB

Removal steps

<<A>>	>>C<<	1. Tapered roller bearing inner race
<<B>>	>>B<<	2. Speedometer drive gear
<<C>>	>>A<<	3. Tapered roller bearing inner race

Removal steps (Continued)

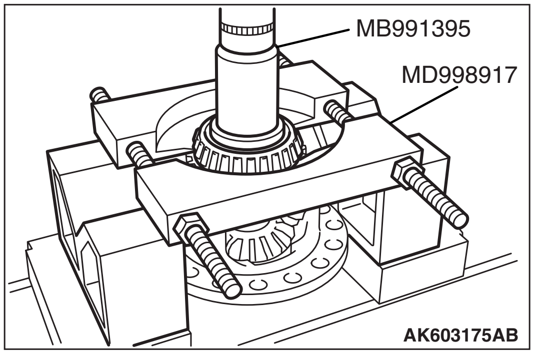
4. Ring gear
5. Differential case assembly

Required Special Tools:

- MD998917: Bearing remover
- MB991395: Crankshaft front oil seal installer
- MB990810: Side bearing puller
- MD999566: Craw
- MD998812: Installer cap
- MB992150: Oil seal installer
- MB990891: Rear suspension bushing base
- MB992138: Bearing installer

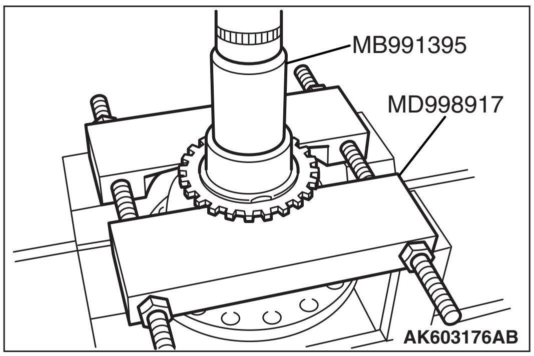
DISASSEMBLY SERVICE POINTS

<<A>> TAPERED ROLLER BEARING INNER RACE REMOVAL



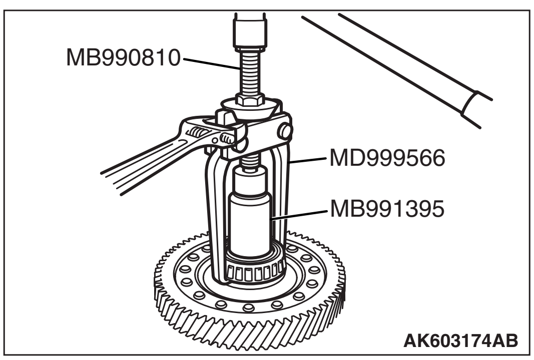
1. Using special tool MD998917 and MB991395, support the tapered roller bearing inner race, and then set them on the press.
2. Push down on the differential case with the press and remove the tapered roller bearing inner race.

<<B>> SPEEDOMETR DRIVE GEAR REMOVAL



1. Using special tool MD998917 and MB991395, support the speedometer drive gear, and then set them on the press.
2. Push down on the differential case with the press and remove the speedometer drive gear.

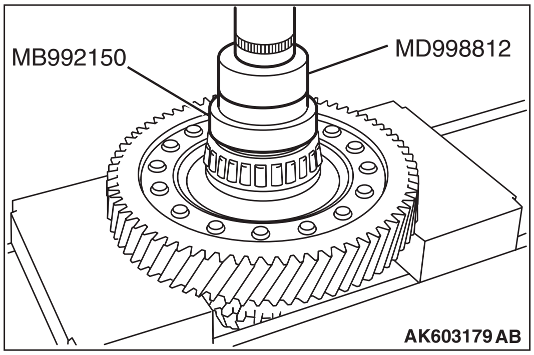
<<C>> TAPERED ROLLER BEARING INNER RACE REMOVAL



1. Using special tool MB990810, MD999566 and MB991395, remove the tapered roller bearing inner race.
2. Push down on the differential case with the press and remove the tapper roller bearing inner race.

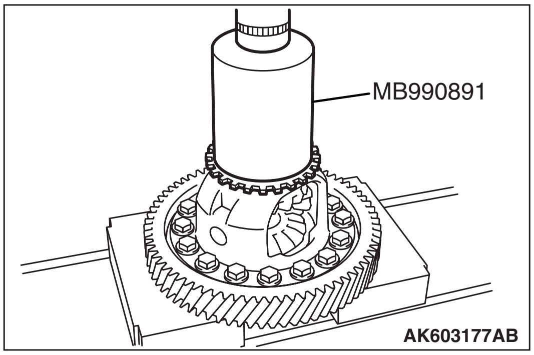
ASSEMBLY SERVICE POINTS

>>A<< TAPERED ROLLER BEARING INNER RACE INSTALLATION



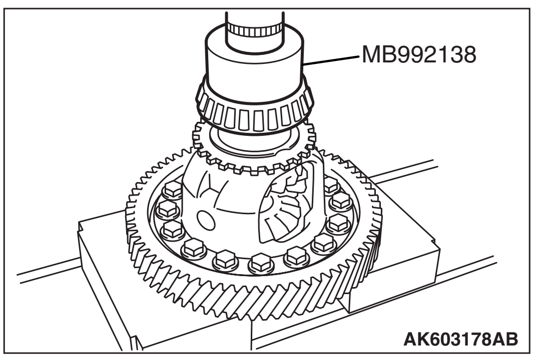
Using special tools MD998812 and MB992150, install the tapered roller bearing inner race.

>>B<< SPEEDOMETR DRIVE GEAR INSTALLATION



Using special tools MB990891, install the speedometer drive gear.

>>C<< TAPERED ROLLER BEARING INNER RACE INSTALLATION



Using special tools MB992138, install the tapered roller bearing inner race.

GROUP 11B

ENGINE OVERHAUL

CONTENTS

GENERAL SPECIFICATIONS

M1113000201501

Descriptions			Specifications
Engine type			4B11
Bore × stroke mm (in)			86 (3.39) × 86 (3.39)
Total displacement cm^3 (cu in)			1,998 (121.9)
Combustion chamber			Pent-roof type
Number of cylinders			4
Valve mechanism		Type	DOHC
		Intake valve	8
		Exhaust valve	8
Compression ratio			10.0
Valve timing	Intake valve	Opens (BTDC)	25° –0° <CALIFORNIA>, 28° –3° <Except CALIFORNIA>
		Closes (ABDC)	48° –23° <CALIFORNIA>, 45° –20° <Except CALIFORNIA>
	Exhaust valve	Opens (BBDC)	24° –44° <CALIFORNIA>, 21° –41° <Except CALIFORNIA>
		Closes (ATDC)	0° –20° <CALIFORNIA>, 3° –23° <Except CALIFORNIA>
Fuel injection system type			Electronic control MPI
Ignition system type			Electronic spark-advance control type (4-coil type)
Generator type			Alternating current system (with built-in IC regulator)
Starter motor type			Reduction drive type

SERVICE SPECIFICATIONS

M1113000301627

Item		Standard value	Limit
Timing chain			
Valve clearance mm (in)	Intake	0.20 (0.008)	–
	Exhaust	0.30 (0.012)	–
Camshaft			
Cam height of camshaft mm (in)	Intake	43.25 (1.703)	42.75 (1.683)
	Exhaust	45.00 (1.772)	44.50 (1.752)
Camshaft oil clearance mm (in)		0.035 –0.072 (0.0014 –0.0028)	–
Cylinder head and valves			
Distortion of cylinder head bottom mm (in)		Within 0.05 (0.002)	0.02 (0.0008)
Grinding limit of cylinder head bottom mm (in)		–	0.2 (0.008)
Overall height of cylinder head mm (in)		128.5 (5.06)	–

Item		Standard value	Limit
Overall length of valve mm (in)	Intake	113.18 (4.456)	112.68 (4.436)
	Exhaust	105.89 (4.169)	105.39 (4.149)
Valve margin mm (in)	Intake	1.022 (0.0402)	0.522 (0.0206)
	Exhaust	1.094 (0.0431)	0.594 (0.0234)
Free height of valve spring mm (in)		47.44 (1.868)	46.44 (1.828)
Squareness of valve spring		2° or less	4°
Clearance between valve guide and valve stem mm (in)	Intake	0.020 –0.047 (0.0008 –0.0019)	0.10 (0.004)
	Exhaust	0.030 –0.054 (0.0012 –0.0021)	0.15 (0.006)
Valve seat contact width mm (in)	Intake	1.16 –1.46 (0.046 –0.058)	–
	Exhaust	1.35 –1.65 (0.053 –0.065)	–
Oversize rework dimensions of valve guide hole mm (in)	0.25 oversize diameter	11.23 –11.25 (0.442 –0.443)	–
Intake oversize rework dimensions of valve seat hole mm (in)	0.3 oversize diameter	36.22 –36.24 (1.426 –1.427)	–
Exhaust oversize rework dimensions of valve seat hole mm (in)	0.3 oversize diameter	30.22 –30.24 (1.190 –1.191)	–
Piston and connecting rod			
Piston pin press-fit load N (pound)		7,500 –17,500 (1,686 –3,934)	–
Clearance between piston ring and ring groove mm (in)	No.1	0.03 –0.07 (0.001 –0.003)	0.1 (0.004)
	No.2	0.03 –0.07 (0.001 –0.003)	0.1 (0.004)
Piston ring end gap mm (in)	No.1	0.15 –0.28 (0.006 –0.011)	0.8 (0.03)
	No.2	0.30 –0.45 (0.012 –0.018)	0.8 (0.03)
	Oil	0.10 –0.35 (0.004 –0.014)	1.0 (0.004)
Clearance of connecting rod big end thrust mm (in)		0.10 –0.25 (0.004 –0.010)	0.4 (0.016)
Outside diameter of connecting rod bolt mm (in)		–	0.1 (0.004)
Connecting rod bearing oil clearance mm (in)		0.018 –0.045 (0.0007 –0.0018)	0.1 (0.004)
Crankshaft and cylinder block			
Underhead length of bearing cap bolt mm (in)		75.3 (2.96)	–
Crankshaft end play mm (in)		0.05 –0.25 (0.002 –0.010)	0.4 (0.016)
Crankshaft journal oil clearance mm (in)		0.012 –0.030 (0.0005 –0.0012)	0.1 (0.004)
Distortion of cylinder block top surface mm (in)		0.05 (0.002)	0.02 (0.0008)
Grinding limit of cylinder block top surface mm (in)		–	0.2 (0.008)
Cylinder block cylinder bore mm (in)		86 (3.4)	–
Cylindricity of cylinder block mm (in)		0.15 (0.006)	–

FASTENER TIGHTENING SPECIFICATIONS

M1113023402071

Item	Specification
Generator and ignition system	
Idler pulley bolt	48 ± 7 N· m (36 ± 4 ft-lb)
Auto tensioner	22 ± 4 N· m (17 ± 2 ft-lb)
Crankshaft bolt	210 N· m (155 ft-lb)
Generator nut	44 ± 10 N· m (32 ± 7 ft-lb)
Generator bolt	44 ± 10 N· m (32 ± 7 ft-lb)
Ignition coil bolt	10 ± 2 N· m (89 ± 17 in-lb)
Spark plug	25 ± 5 N· m (19 ± 3 ft-lb)
Power steering pump bracket bolt (M8)	23 ± 2 N· m (17 ± 1 ft-lb)
Power steering pump bracket bolt (M10)	44 ± 8 N· m (33 ± 5 ft-lb)
Throttle body and EGR system	
Vacuum pump assembly bolt (M6)	11 ± 1 N· m (98 ± 8 in-lb)
Vacuum pump assembly bolt (M8)	24 ± 3 N· m (18 ± 1 ft-lb)
Throttle body bolt	9.5 ± 2.5 N· m (84 ± 22 in-lb)
Throttle body stay bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Exhaust gas recirculation valve support bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Exhaust gas recirculation pipe bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Exhaust gas recirculation support stay A bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Exhaust gas recirculation support stay B bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Exhaust gas recirculation valve bolt	24 ± 3 N· m (18 ± 1 ft-lb)
Manifold absolute pressure (MAP) sensor screw	4.0 ± 1.0 N· m (36 ± 8 in-lb)
Solenoid valve screw	4.0 ± 1.0 N· m (36 ± 8 in-lb)
Intake manifold and fuel system	
Oil dipstick guide bolt	10 ± 2 N· m (89 ± 17 in-lb)
Injector protector rear bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Fuel rail bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Intake manifold nut	20 ± 2 N· m (15 ± 1 ft-lb)
Intake manifold assembly bolt washer	20 ± 2 N· m (15 ± 1 ft-lb)
Intake manifold stay bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Injector protector front bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Generator bracket bolt	44 ± 8 N· m (33 ± 5 ft-lb)
Knock sensor bolt	20 ± 2 N· m (15 ± 1 ft-lb)
Engine oil pressure switch	10 ± 2 N· m (89 ± 17 in-lb)
Exhaust manifold	
Exhaust manifold upper cover bolt	14 ± 1 N· m (124 ± 8 in-lb)
Exhaust manifold lower cover bolt	14 ± 1 N· m (124 ± 8 in-lb)
Exhaust manifold nut	49 ± 5 N· m (36 ± 3 ft-lb)
Exhaust manifold bracket D bolt	20 ± 5 N· m (15 ± 3 ft-lb)

Item	Specification
Exhaust manifold bracket bolt	41 ± 10 N· m (30 ± 7 ft-lb)
Exhaust manifold bracket A, B bolt	41 ± 10 N· m (30 ± 7 ft-lb)
Crankshaft position sensor bolt	11 ± 1 N· m (98 ± 8 in-lb)
Crankshaft position sensor cover bolt (M6)	11 ± 1 N· m (98 ± 8 in-lb)
Crankshaft position sensor cover bolt (M10)	49 ± 6 N· m (36 ± 4 ft-lb)
Water hose and pipe	
Water inlet fitting bolt	24 ± 3 N· m (18 ± 1 ft-lb)
Water outlet fitting bolt	24 ± 3 N· m (18 ± 1 ft-lb)
Thermostat housing bolt	24 ± 3 N· m (18 ± 1 ft-lb)
Engine hanger bolt	28 ± 8 N· m (21 ± 5 ft-lb)
Engine coolant temperature sensor	30 ± 9 N· m (22 ± 6 ft-lb)
Water pump bolt	24 ± 3 N· m (18 ± 1 ft-lb)
Water pipe nut	24 ± 3 N· m (18 ± 1 ft-lb)
Camshaft position sensor	11 ± 1 N· m (98 ± 8 in-lb)
Oil pan and timing chain case	
Cylinder head cover bolt	3.0 ± 1.0 N· m (27 ± 8 in-lb) →5.5 ± 0.5 N· m (49 ± 8 in-lb)
Timing chain case bolt (M6)	10 ± 2 N· m (89 ± 17 in-lb)
Timing chain case bolt (M8 × 10)	13 ± 1 N· m (115 ± 8 in-lb)
Timing chain case bolt (M8 × 28)	24 ± 4 N· m (18 ± 2 ft-lb)
Oil pan bolt (M6)	10 ± 2 N· m (89 ± 17 in-lb)
Oil pan bolt (M8)	29 ± 2 N· m (21 ± 1 ft-lb)
Air compressor bracket bolt	23 ± 6 N· m (17 ± 4 ft-lb)
Oil drain plug	39 ± 5 N· m (29 ± 3 ft-lb)
Oil filter	14 ± 2 N· m (124 ± 17 in-lb)
PCV valve	2.5 ± 0.4 N· m (22 ± 3 in-lb)
Engine support bracket assembly washer bolt	45 ± 5 N· m (33 ± 3 ft-lb)
Timing chain	
Chain upper guide bolt	10 ± 2 N· m (89 ± 17 in-lb)
Oil jet bolt	10 ± 2 N· m (89 ± 17 in-lb)
V.V.T. intake sprocket bolt	59 ± 5 N· m (44 ± 3 ft-lb)
V.V.T. exhaust sprocket bolt	59 ± 5 N· m (44 ± 3 ft-lb)
Timing chain tensioner bolt	10 ± 2 N· m (89 ± 17 in-lb)
Tensioner lever bolt	10 ± 2 N· m (89 ± 17 in-lb)
Timing chain guide bolt	10 ± 2 N· m (89 ± 17 in-lb)
Camshaft	
Engine oil control valve (OCV) bolt	10 ± 2 N· m (89 ± 17 in-lb)
Camshaft bearing cap bolt (M6)	12 ± 1 N· m (107 ± 8 in-lb)
Front camshaft bearing cap bolt (M8)	17 ± 3 N· m (14 ± 2 ft-lb) →30 ± 2 N· m (22 ± 1 ft-lb)

Item	Specification
Cylinder head and valves	
Cylinder head bolt	35 ± 2 N· m (26 ± 1 ft-lb) →+180°
Oil pump chain	
Drive plate bolt	40 ± 2 N· m (29 ± 1 ft-lb) →+30°
Flywheel bolt	40 N· m (30 ft-lb) →130 N· m (96 ft-lb)
Oil pump case bolt	26 ± 2 N· m (19 ± 1 ft-lb)
Oil pump sprocket bolt	23 ± 2 N· m (17 ± 1 ft-lb)
Oil pump tensioner lever bolt	10 ± 2 N· m (89 ± 17 in-lb)
Oil pump chain guide bolt	10 ± 2 N· m (89 ± 17 in-lb)
Ladder frame bolt	26 ± 1 N· m (19 ± 1 ft-lb)
Piston and connecting rod	
Connecting rod cap bolt	5.0 N· m (44 in-lb) →20 N· m (15 ft-lb) →+90°
Crankshaft and cylinder block	
Crankshaft sensing ring bolt	11 ± 1 N· m (98 ± 8 in-lb)
Bearing cap bolt	26.5 ± 2.0 N· m (20 ± 1 ft-lb) →+45°

NEW TIGHTENING METHOD BY USING PLASTIC REGION TIGHTENING BOLT

Plastic region tightening bolts are used in some parts of the engine. Install these bolts according to the method described in the body of the manual because the tightening method of these bolts are different from the conventional method. The service limit is determined for these bolts. Be sure to strictly follow the service limit described in the body of the manual.

- Parts to be used
  1. Cylinder head bolt
  2. Bearing cap bolt
  3. Connecting rod cap bolt
- Tightening method
  After tightening to the specified torque, further tighten 45° and 90°, or 180° (90° + 90°). Follow the tightening method described in the body of the manual because the tightening method differs from part to part.

SIZE OF TORQUE WRENCH USED

Tool size	Main parts to be used
T25	Solenoid valve
T25	Manifold absolute pressure (MAP) sensor
T30	Crankshaft sensing ring
T55	Cylinder head bolt

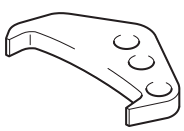
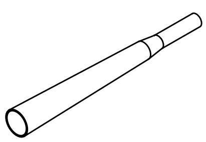
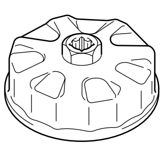
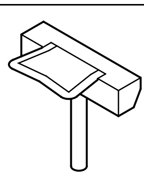
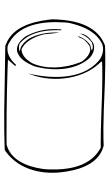
SEALANTS AND ADHESIVES

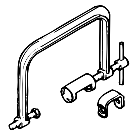
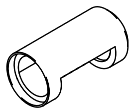
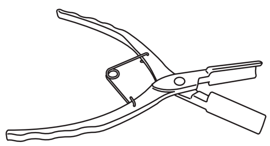
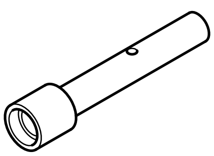
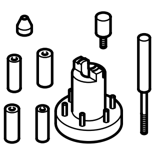
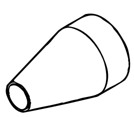
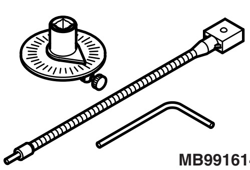
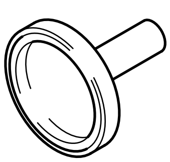
M1113000501494

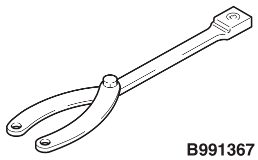
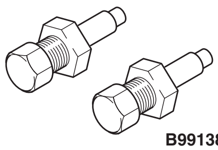
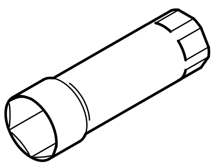
Item	Specified sealant
Flywheel bolt	LOCTITE 262 or equivalent
Ladder frame	Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent
Cylinder block	
Cylinder head	
Cylinder head gasket	
Oil pan	
Timing chain case	
Cylinder head cover	Three bond 1217G or equivalent
Engine coolant temperature sensor	LOCTITE 262 or equivalent
Engine oil pressure switch	LOCTITE 565 or equivalent

SPECIAL TOOLS

M1113000601899

Tool	Tool number and name	Supersession	Application
 MB991883	MB991883 Flywheel stopper	–	Securing of drive plate and flywheel
	MB992106 O-ring installer	–	Installation of O-ring on injector injection nozzle side
 B991396	MB991396 Oil filter wrench	–	Removal and installation of oil filter
 D998727	MD998727 Oil pan FIPG cutter	MD998727-01	Removal of oil pan
	MB991448 Bushing remover and installer base	MB991448-01	Press fit of front oil seal

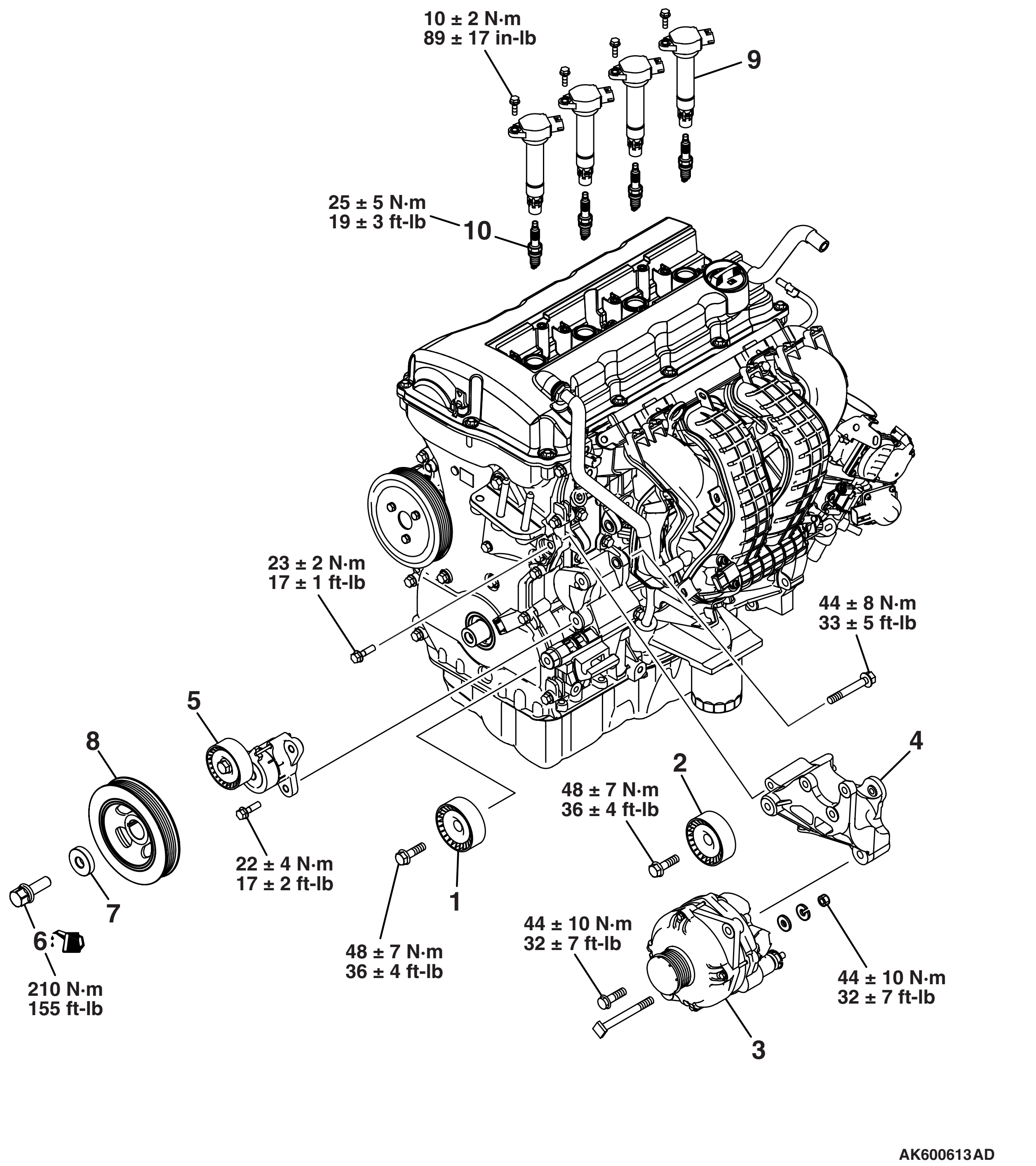
Tool	Tool number and name	Supersession	Application
	MD998735 Valve spring compressor	MD998735-01	Compression of valve spring
	MB992089 Retainer holder C	MB992089-01	
	MB992085 Valve stem seal pliers	–	Extraction of valve stem seal
	MD998737 Valve stem seal installer	MD998737-01	Installation of valve stem seal
	MD998780 Piston pin setting tool	MIT216941	Extraction and press fit of piston pin
	MB991659 Guide D	–	
	MB991614 Angle gauge	General service tool	Installation of crankshaft bearing cap bolt and installation of balancer shaft module bolt
	MD998718 Rear oil seal installer	MD998718-01	Press fit of rear oil seal

Tool	Tool number and name	Supersession	Application
 B991367	MB991367 Special spanner	–	Removal and installation of oil pump sprocket
 B991385	MB991385 Pin	–	
	MB991398 Spark plug wrench	–	Removal and installation of spark plug

GENERATOR AND IGNITION SYSTEM

REMOVAL AND INSTALLATION

M1113001001403



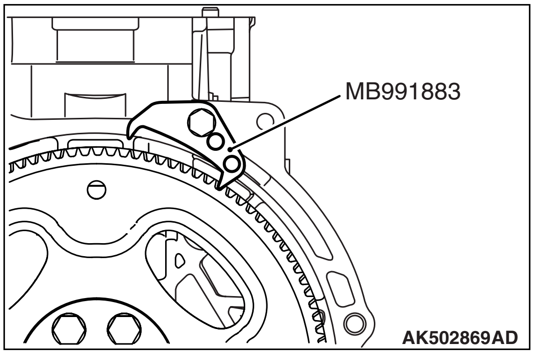
			Removal steps
		1.	Idler pulley
		2.	Idler pulley
		3.	Generator
		4.	Power steering pump bracket
	>>C<<	5.	Auto tensioner

			Removal steps (Continued)
<<A>>	>>B<<	6.	Crankshaft pulley bolt
	>>B<<	7.	Washer
	>>B<<	8.	Crankshaft pulley
		9.	Ignition coil
<<B>>	>>A<<	10.	Spark plug

Required Special Tools:

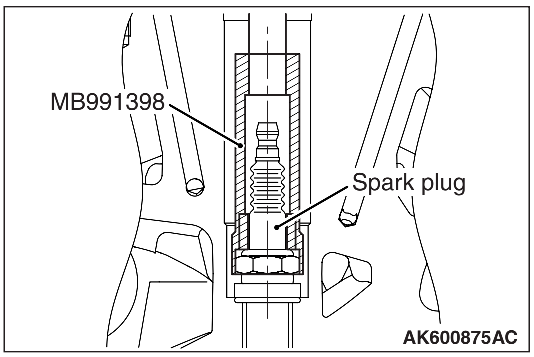
- MB991398: Spark Plug Wrench
- MB991883: Flywheel Stopper

REMOVAL SERVICE POINT



<<A>> CRANKSHAFT PULLEY BOLT REMOVAL

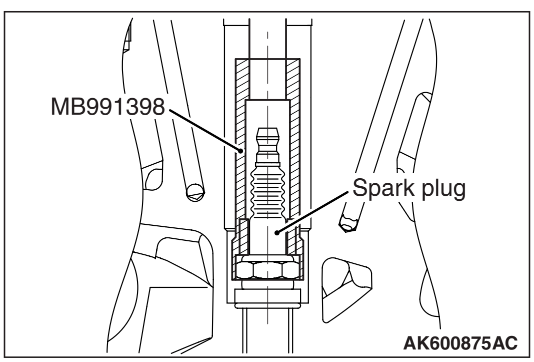
1. Use special tool MB991883 to secure the drive plate or flywheel.
2. Remove the crankshaft pulley bolt.



<<B>> SPARK PLUG REMOVAL

Using special tool MB991398, removal the spark plug.

INSTALLATION SERVICE POINTS

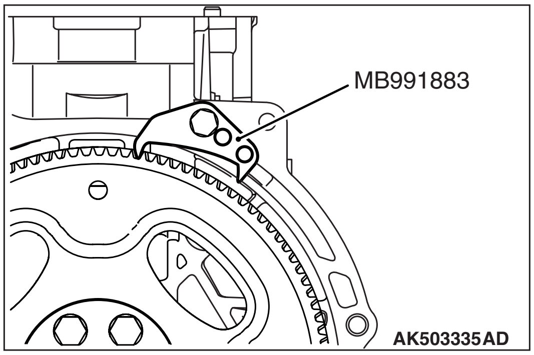


>>A<< SPARK PLUGS INSTALLATION

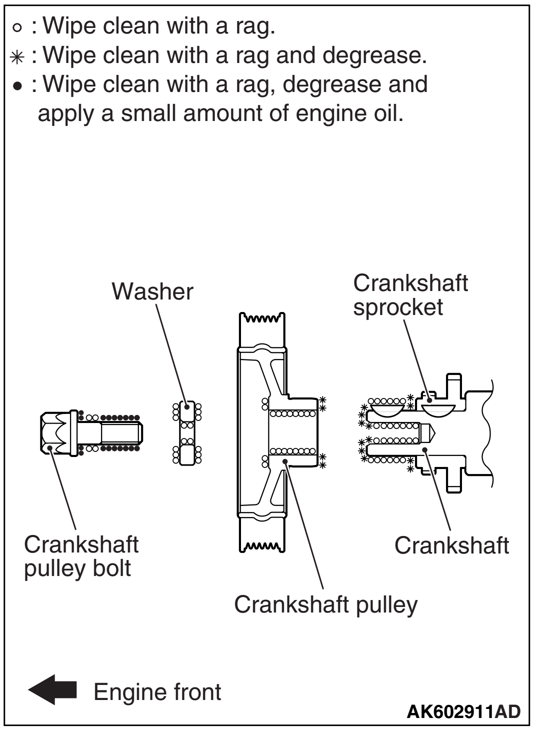
Using special tool MB991398, tighten the spark plug to the specified torque.

Specified torque: 18 ± 2 N· m (13 ± 1 ft-lb)

>>B<< CRANKSHAFT PULLEY / WASHER / CRANKSHAFT PULLEY BOLT INSTALLATION



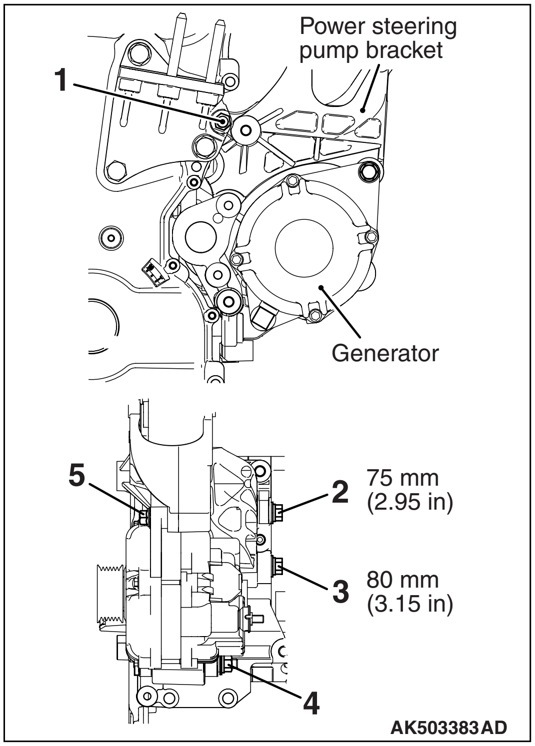
1. Use special tool MB991883 to secure the drive plate or flywheel.



2. Wipe off the dirt on the washer and on the thread hole of the crankshaft using a rag.
3. Wipe off the dirt on the crankshaft pulley and the crankshaft sprocket using a rag, and then remove the grease from the portion shown in the illustration.

   NOTE: Remove grease to prevent the coefficient of friction of the pressing portion from declining due to adhesion of oil.
4. Install the crankshaft pulley.
5. Apply an appropriate and minimum amount of engine oil to the threaded portion of the crankshaft and lower part of the flange.
6. With off the chamfered side on the inside of the washer facing the bolt top, install the washer to the crankshaft pulley bolt.
7. Tighten the crankshaft pulley bolt to the specified torque.

   Specified torque: 210 N· m (155 ft-lb)



>>C<< GENERATOR / POWER STEERING PUMP BRACKET INSTALLATION

1. Temporarily tighten power steering pump bracket bolts.
2. Temporarily tighten generator bolts.
3. Tighten them to the specified torque according to the order as illustrated.

Specified torque

Power steering pump bracket:

M8 23 ± 2 N· m (17 ± 1 ft-lb)

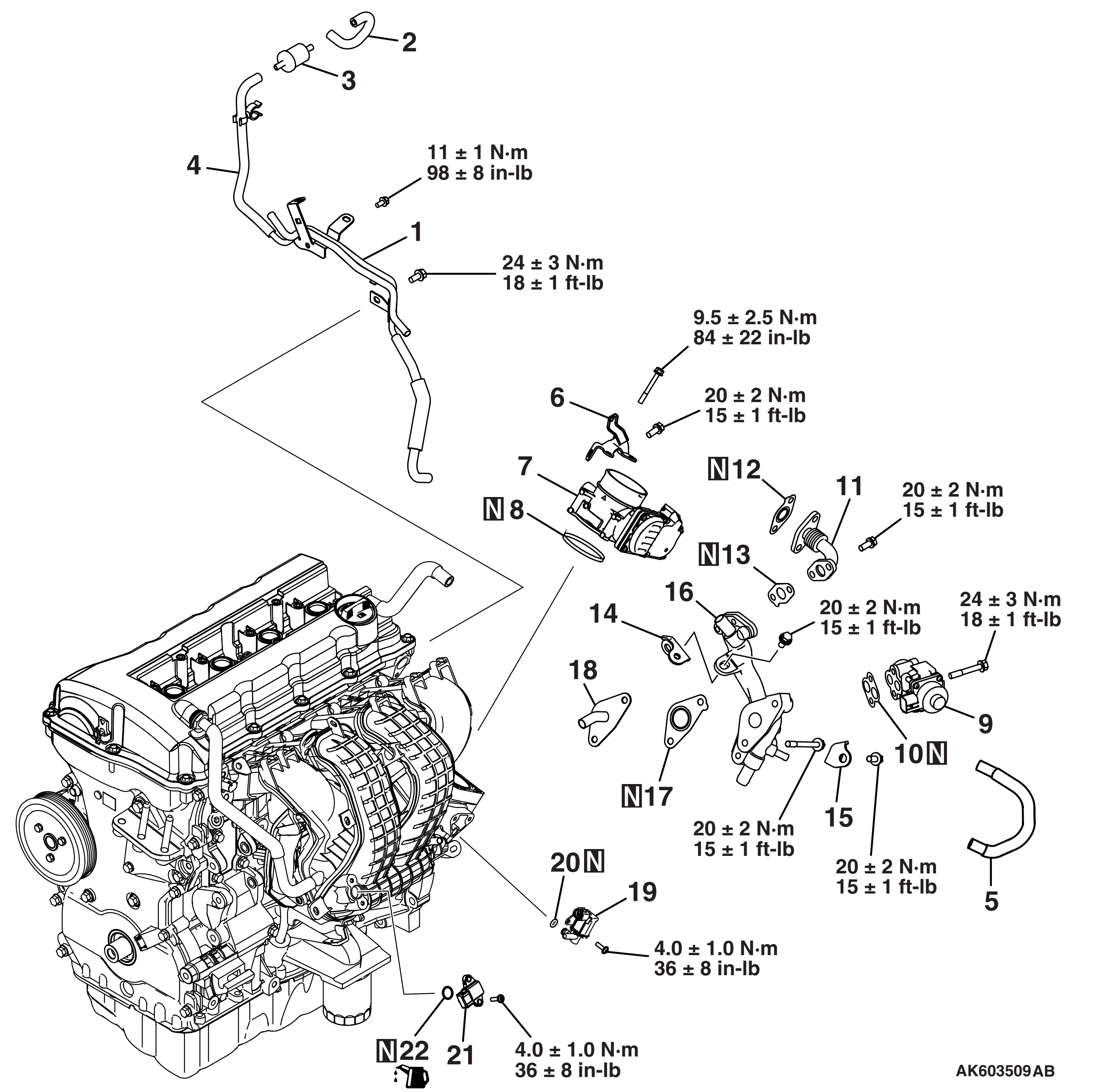
M10 44 ± 8 N· m (33 ± 5 ft-lb)

Generator: 44 ± 10 N· m (32 ± 7 ft-lb)

THROTTLE BODY AND EGR SYSTEM

REMOVAL AND INSTALLATION

M1113032700063



Removal steps

1. Vacuum pipe assembly
2. Purge hose
3. Chamber
4. Purge hose
5. Water hose
6. Throttle body stay

\>>D<< 7. Throttle body

\>>D<< 8. Throttle body gasket

\>>C<< 9. Exhaust gas recirculation valve <for California>

\>>C<< 10. Exhaust gas recirculation valve gasket <for California>

Removal steps (Continued)

\>>B<< 11. Exhaust gas recirculation pipe <for California>

\>>B<< 12. Gasket <for California>

\>>B<< 13. Gasket <for California>

\>>B<< 14. Exhaust gas recirculation support stay A <for California>

\>>B<< 15. Exhaust gas recirculation support stay B <for California>

\>>B<< 16. Exhaust gas recirculation valve support <for California>

\>>B<< 17. Gasket <for California>

\>>B<< 18. Exhaust gas recirculation inlet pipe <for California>

Removal steps (Continued)

19. Solenoid valve
20. O-ring
>>A<< 21. Manifold absolute pressure (MAP) sensor
22. O-ring

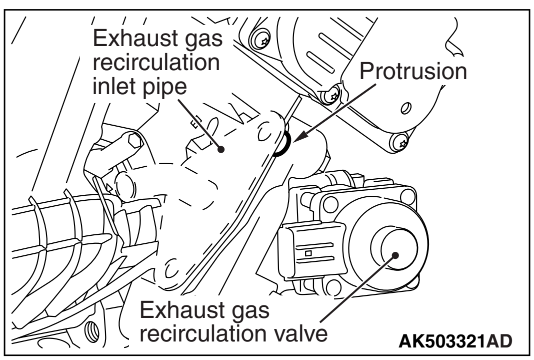
INSTALLATION SERVICE POINTS

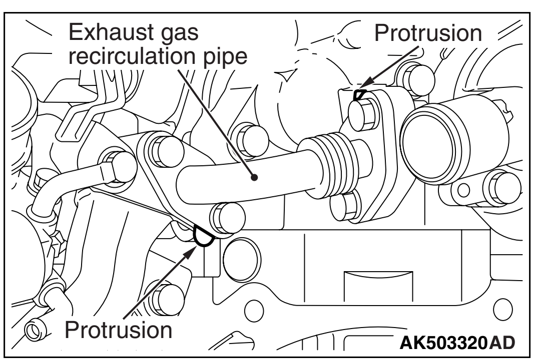
>>A<< MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSTALLATION

⚠ CAUTION

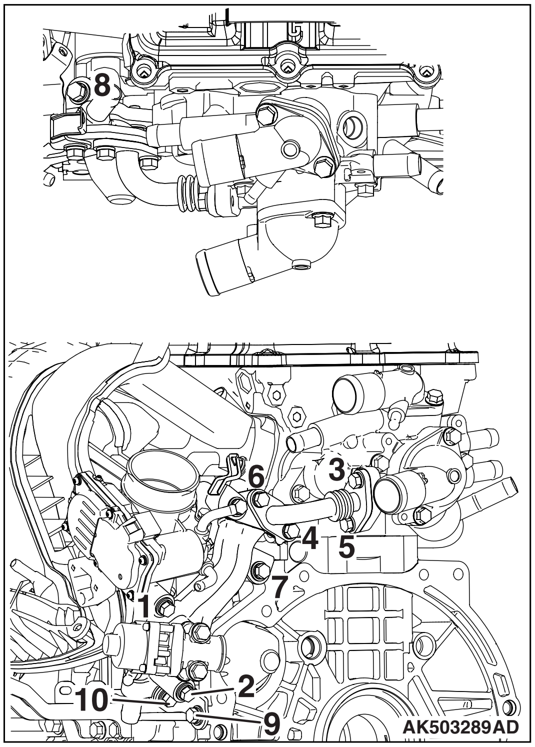
- **Install the manifold absolute pressure (MAP) sensor, taking care not to give a shock to it.**
- **Do not use a manifold absolute pressure (MAP) sensor that has been dropped.**

>>B<< EXHAUST GAS RECIRCULATION INLET PIPE / EXHAUST GAS RECIRCULATION VALVE SUPPORT / EXHAUST GAS RECIRCULATION SUPPORT STAY A / EXHAUST GAS RECIRCULATION SUPPORT STAY B / EXHAUST GAS RECIRCULATION PIPE / GASKET INSTALLATION



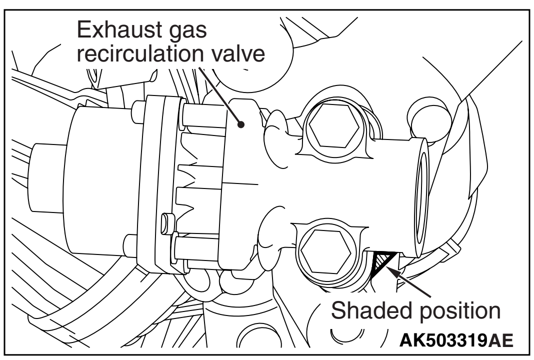


1. Temporarily tighten each part so that the protrusion of each gasket is positioned as illustrated.



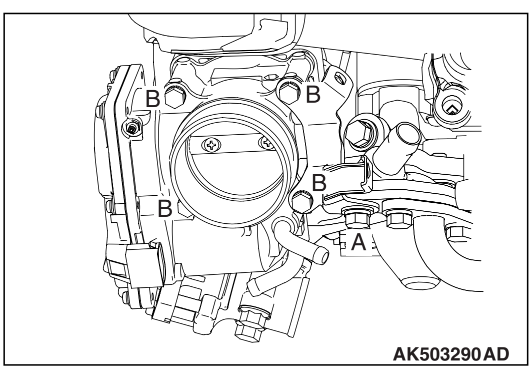
2. Tighten mounting bolts to the specified torque of 20 ± 2 N· m (15 ± 1 ft-lb) in the order shown in the illustration.

>>C<< EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION



Install the exhaust gas recirculation valve gasket with the diagonally shaded area used as the illustrated position so as not to confuse the front with the back.

>>D<< THROTTLE BODY GASKET / THROTTLE BODY INSTALLATION

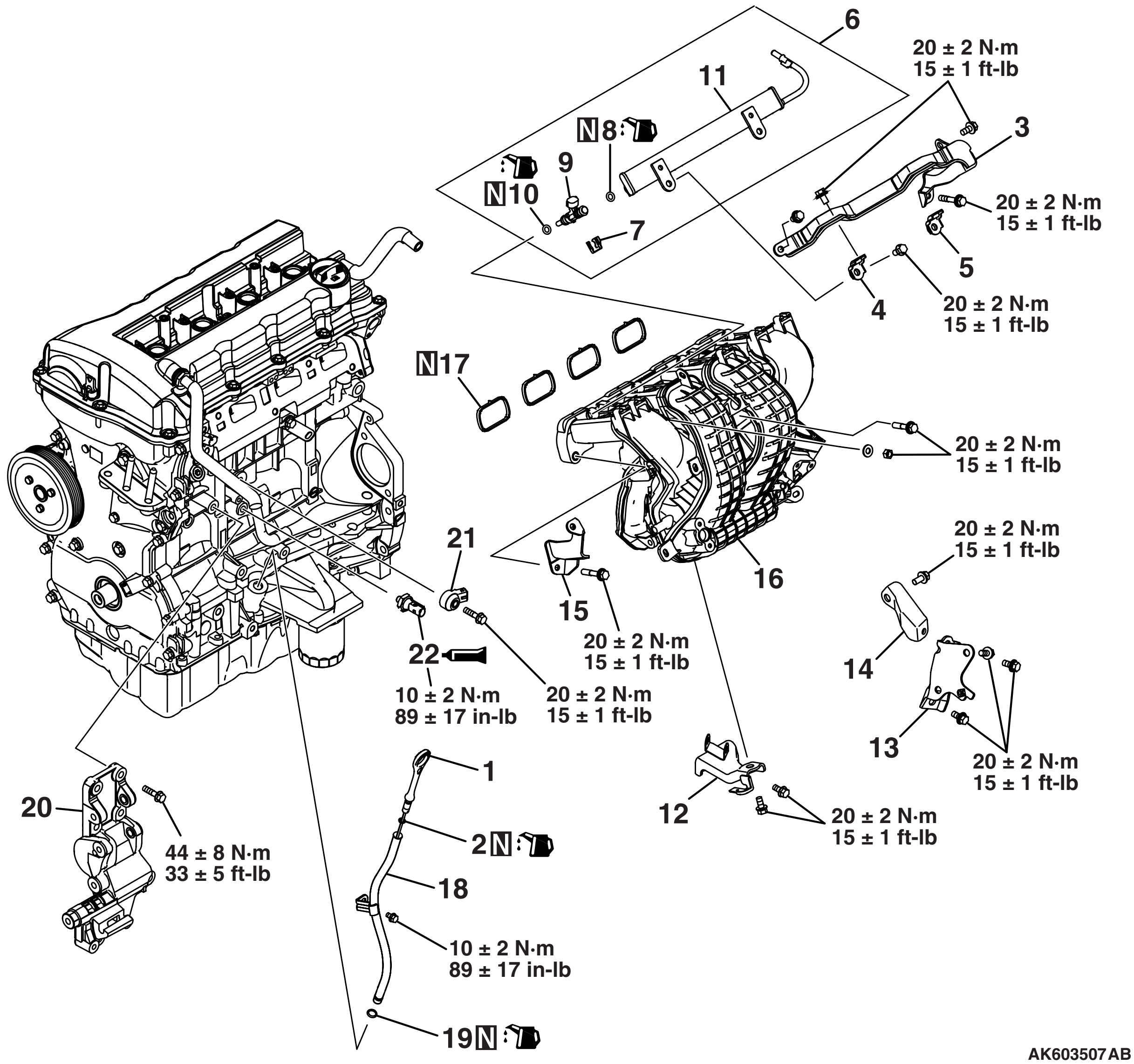


1. Make sure that the throttle body gasket is placed before installing the throttle body.
2. Temporarily tighten throttle body and throttle body stay mounting bolts at A and B in the illustration.
3. Tighten the throttle body mounting bolt at illustrated position A to the specified torque of 20 ± 2 N· m (15 ± 1 ft-lb).
4. Tighten the throttle body mounting bolts at illustrated position B to the specified torque of 9.5 ± 2.5 N· m (84 ± 22 in-lb).

INTAKE MANIFOLD AND FUEL SYSTEM

REMOVAL AND INSTALLATION

M1113032500144



	Removal steps
	1. Oil dipstick rod
	2. O-ring
>>G<<	3. Injector protector rear
>>G<<	4. Bracket
>>G<<	5. Bracket
>>G<<	6. Fuel rail assembly
>>F<<	7. Injection support
	8. O-ring
>>F<<	9. Injector
>>E<<	10. O-ring
	11. Fuel rail
>>D<<	12. Intake manifold stay

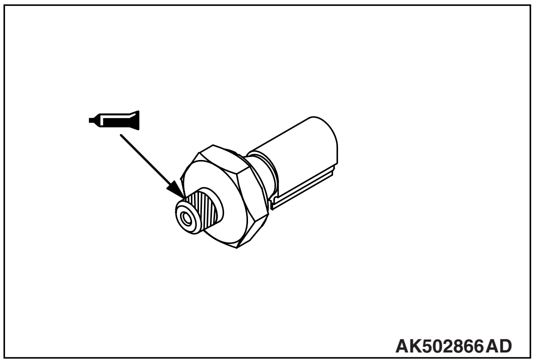
	Removal steps (Continued)
	13. Intake manifold stay B <except for California>
	14. Intake manifold stay C <except for California>
	15. Injector protector front
>>C<<	16. Intake manifold
	17. Intake manifold gasket
	18. Oil dipstick guide
	19. O-ring
>>B<<	20. Generator bracket
	21. Knock sensor
>>A<<	22. Engine oil pressure switch

Required Special Tool:

- MB992106: O-ring Installer

INSTALLATION SERVICE POINTS

>>A<< ENGINE OIL PRESSURE SWITCH INSTALLATION



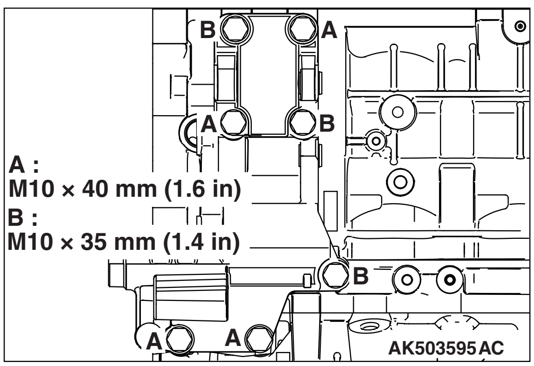
⚠ CAUTION

- **Do not allow sealant to squeeze out to the screw tip.**
- **Do not exceed the specified torque.**

1. Completely remove sealant adhering to the engine oil pressure switch and cylinder block threaded holes.
2. Apply sealant (LOCTITE 565 or equivalent) of 5 mm to the threaded portion of the engine oil pressure switch shown in the illustration.
3. Tighten the engine oil pressure switch to the cylinder block to the specified torque.

Specified torque: 10 ± 2 N· m (89 ± 17 in-lb)

>>B<< GENERATOR BRACKET INSTALLATION



Tighten the Generator bracket to the specified torque.

Specified torque: 44 ± 8 N· m (33 ± 5 ft-lb)

NOTE: Be careful when install mounting bolts as they are different in length. See illustration for bolt locations.

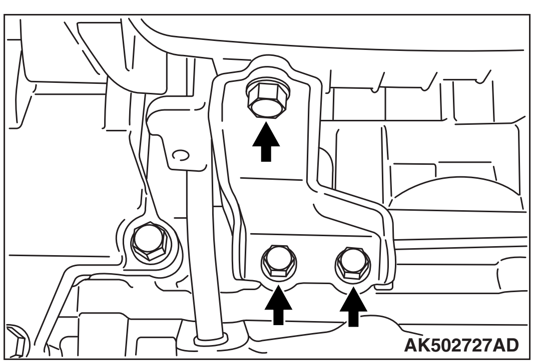
>>C<< INTAKE MANIFOLD INSTALLATION

⚠ CAUTION

Temporarily tighten the intake manifold because there is a bolt tightening procedure for the intake manifold, fuel rail and injector protector.

Install the intake manifold and temporarily tighten bolts.

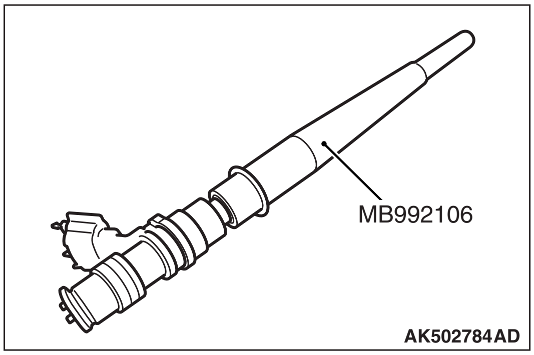
>>D<< INTAKE MANIFOLD STAY INSTALLATION



Make sure that the intake manifold stay is in intimate contact with the intake manifold and cylinder block boss before tightening it to the specified torque.

Specified torque: 20 ± 2 N· m (15 ± 1 ft-lb)

>>E<< O-RING INSTALLATION



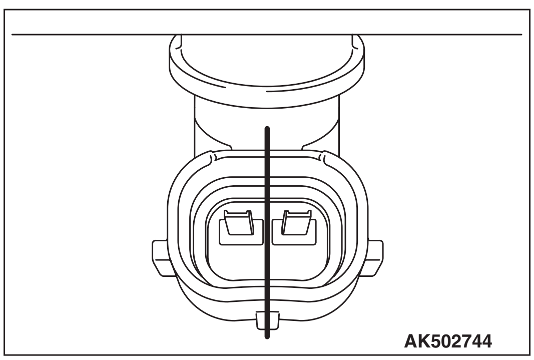
⚠ CAUTION

Do not allow engine oil to enter the fuel rail.

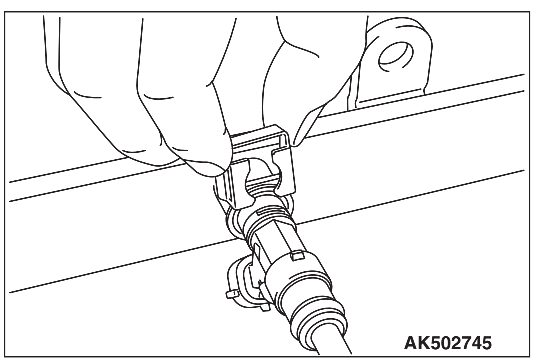
When inserting an O-ring into the injector on the injection nozzle side, use special tool MB992106 to gradually expand the O-ring, and fit it in place.

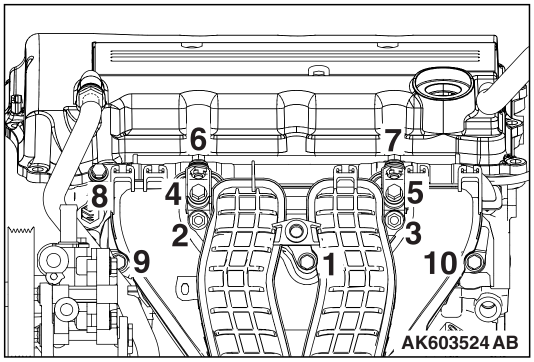
>>F<< INJECTOR AND INJECTOR SUPPORT INSTALLATION

1. Apply spindle oil or gasoline to the O-ring of the injector.
2. Insert the injector into the fuel rail while rotating the injector from side to side, taking care not to damage the O-ring.
3. Check that the injector rotates smoothly. If it does not rotate smoothly, the O-ring may be caught. Remove the injector and check the O-ring for damage. Then, insert it again into the fuel rail and check.
4. Make sure that the protrusion of the injector is at the center as shown in the illustration.



5. Securely assemble the injector to the injector groove and fuel rail collar.





>>G<< FUEL RAIL ASSEMBLY / BRACKET / INJECTOR PROTECTOR REAR INSTALLATION

1. Install the fuel rail assembly, bracket and injector protector on the cylinder head.
2. Tighten mounting bolts to the specified torque together with temporarily tightened intake manifold mounting bolts in the order shown in the illustration.

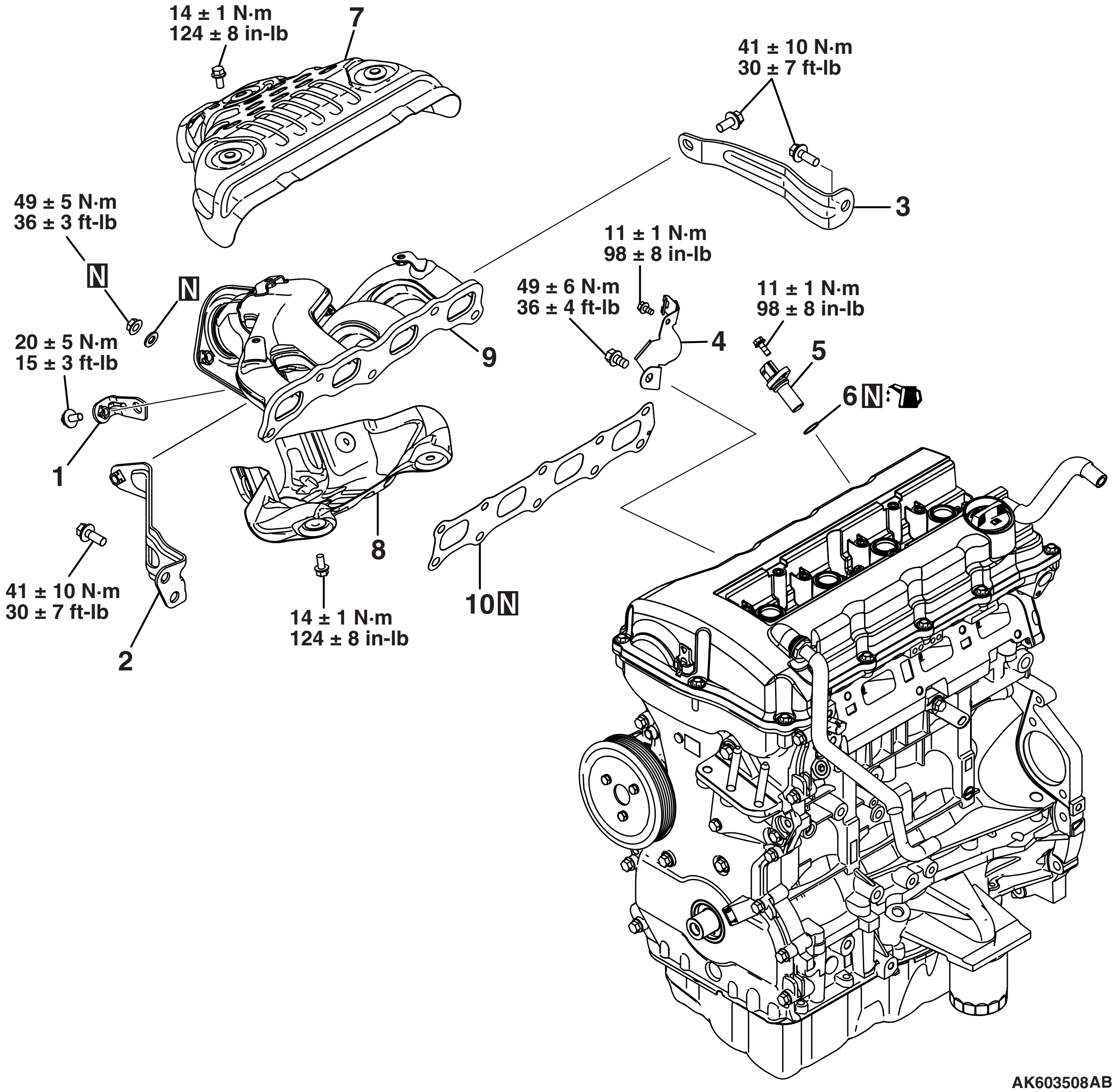
Specified torque: 20 ± 2 N· m (15 ± 1 ft-lb)

EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

M1113004901320

<For except CALIFORNIA>



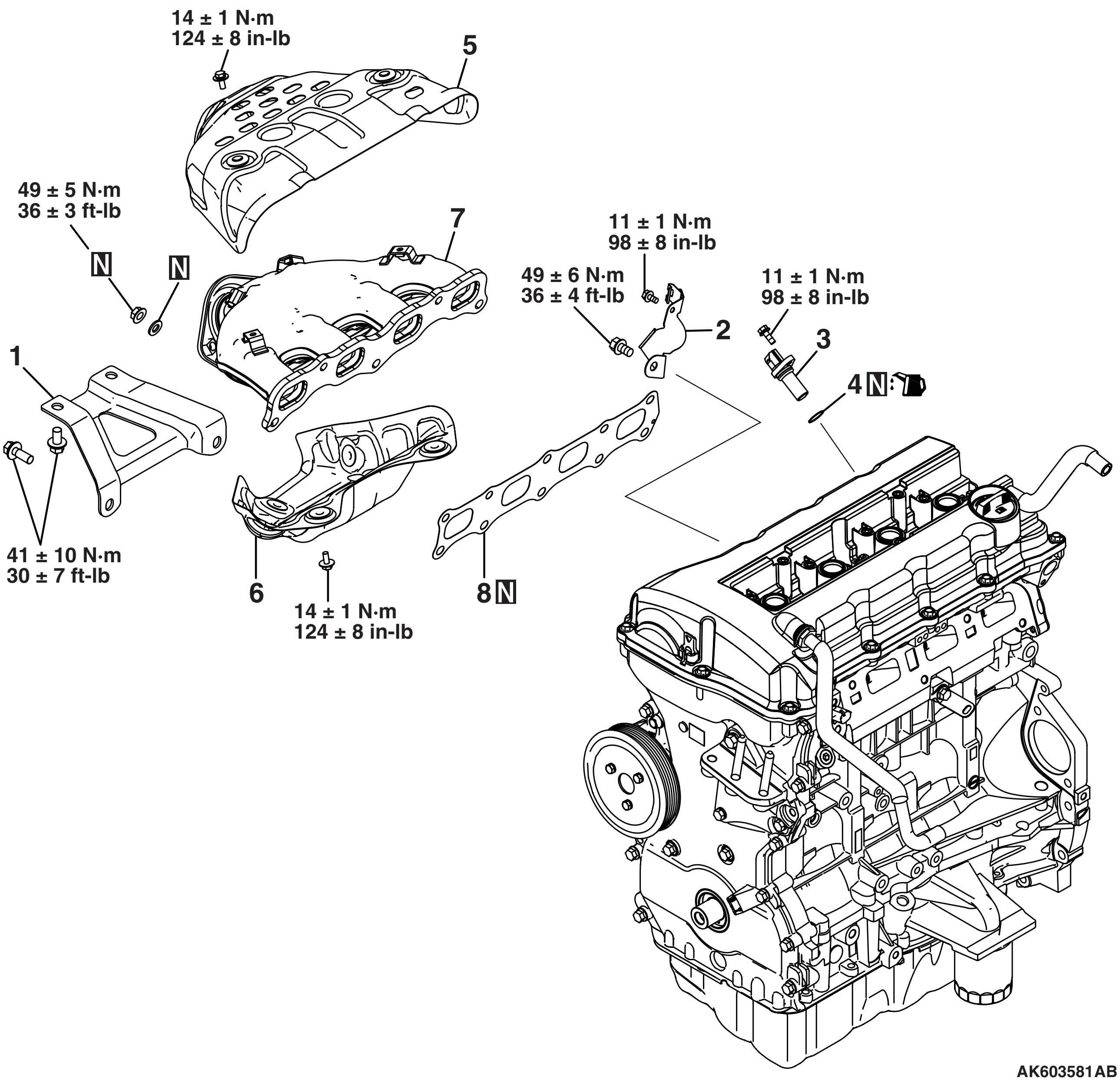
Removal steps

1. Exhaust manifold bracket D
2. >>B<< Exhaust manifold bracket A
3. >>B<< Exhaust manifold bracket B
4. Crankshaft position sensor cover
5. >>A<< Crankshaft position sensor

Removal steps (Continued)

6. O-ring
7. Exhaust manifold upper cover
8. Exhaust manifold lower cover
9. Exhaust manifold
10. Exhaust manifold gasket

<For CALIFORNIA>



Removal steps

1. Exhaust manifold bracket
2. Crankshaft position sensor cover
3. >>A<< Crankshaft position sensor
4. O-ring

Removal steps (Continued)

5. Exhaust manifold upper cover
6. Exhaust manifold lower cover
7. Exhaust manifold
8. Exhaust manifold gasket

INSTALLATION SERVICE POINTS

>>A<< CRANKSHAFT POSITION SENSOR INSTALLATION

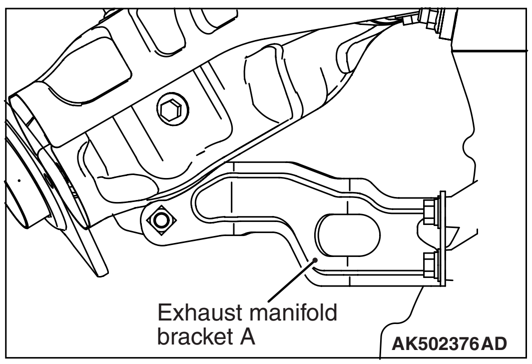
⚠ CAUTION

- **Do not apply a force such as torsion or twist to the O-ring during assembly of the sensor.**
- **Assemble the sensor, taking care not to give a shock to it.**
- **Do not use a sensor that has been dropped.**

Tighten the crankshaft position sensor to the specified torque.

Specified torque: 11 ± 1 N· m (98 ± 8 in-lb)

>>B<< EXHAUST MANIFOLD BRACKET A / EXHAUST MANIFOLD BRACKET B INSTALLATION



⚠ CAUTION

The exhaust manifold gasket, washers and nuts must not be reused.

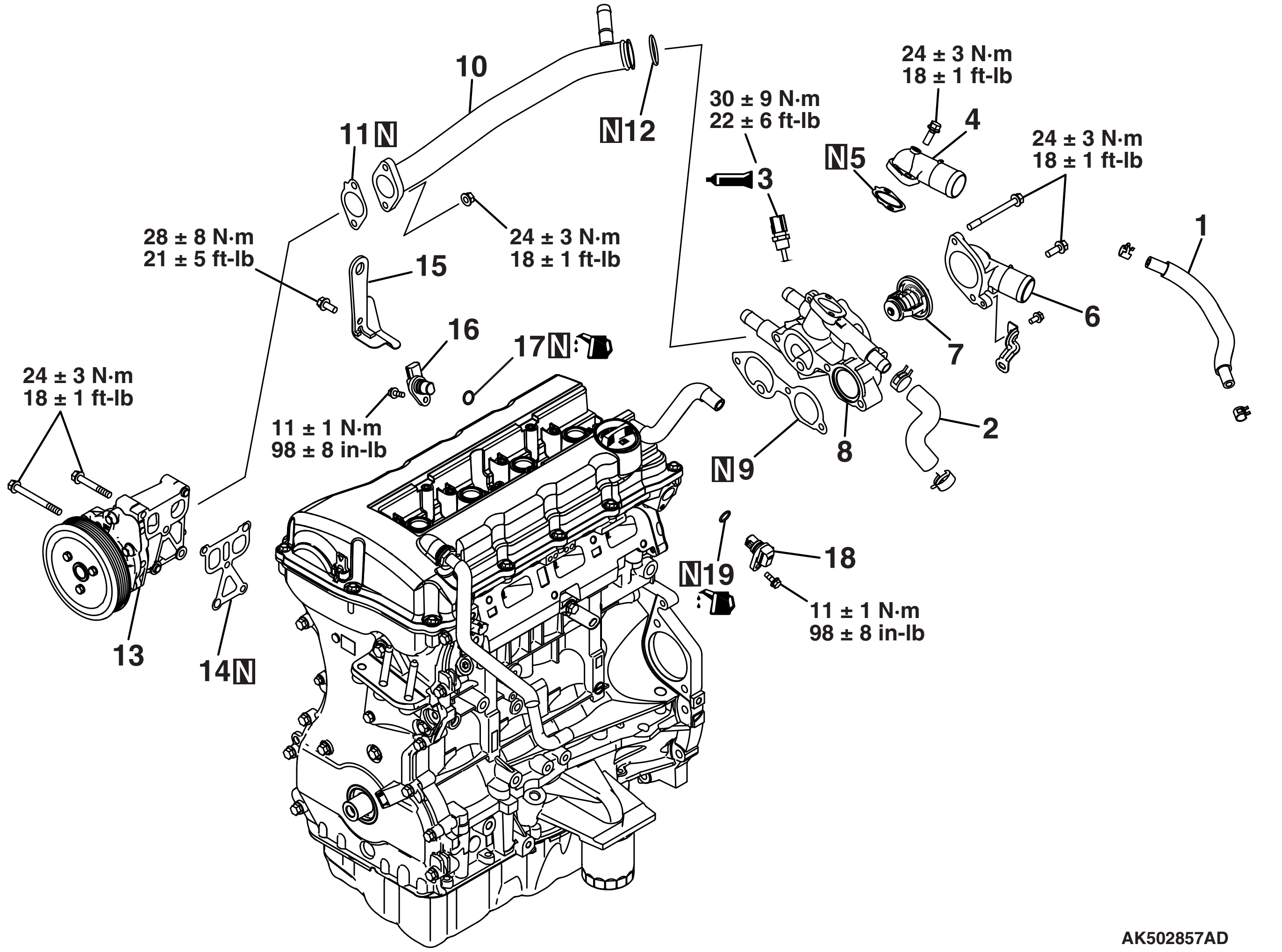
Make sure that exhaust manifold bracket B is in direct contact with the exhaust manifold and exhaust manifold bracket A, and then tighten it to the specified torque.

Specified torque: 41 ± 10 N· m (30 ± 7 ft-lb)

WATER HOSE AND PIPE

REMOVAL AND INSTALLATION

M1113032900078



Removal steps

1. Water hose
2. Water hose <for California>
3. >>C<< Engine coolant temperature sensor
4. Water outlet fitting
5. Outlet fitting gasket
6. Water inlet fitting
7. >>B<< Thermostat
8. >>A<< Thermostat housing
9. Thermostat housing gasket
10. >>A<< Water pipe assembly

Removal steps (Continued)

11. Water pipe gasket
12. O-ring
13. Water pump assembly
14. Water pump gasket
15. Engine hanger
16. Intake camshaft position sensor
17. O-ring
18. Exhaust camshaft position sensor
19. O-ring

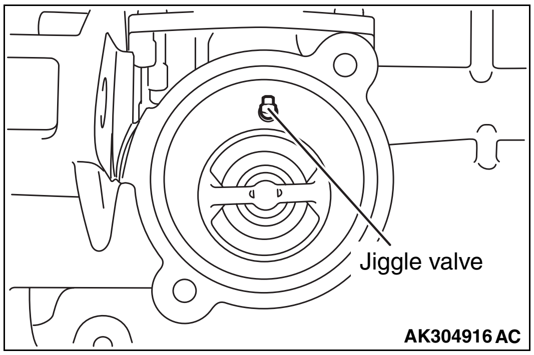
INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT HOUSING / WATER PIPE ASSEMBLY INSTALLATION

Assemble the thermostat housing and water pipe, and temporarily tighten them to the cylinder head and water pump. Then tighten them to the specified torque.

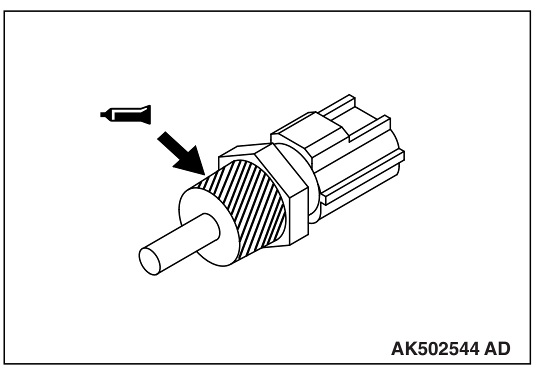
Specified torque: 24 ± 3 N· m (18 ± 1 ft-lb)

>>B<< THERMOSTAT INSTALLATION



Install the thermostat with the jiggle-valve facing almost straight upwards.

>>C<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION



⚠ CAUTION

Be careful not to give a shock, twist and the like to the resin mold with a tool during installation.

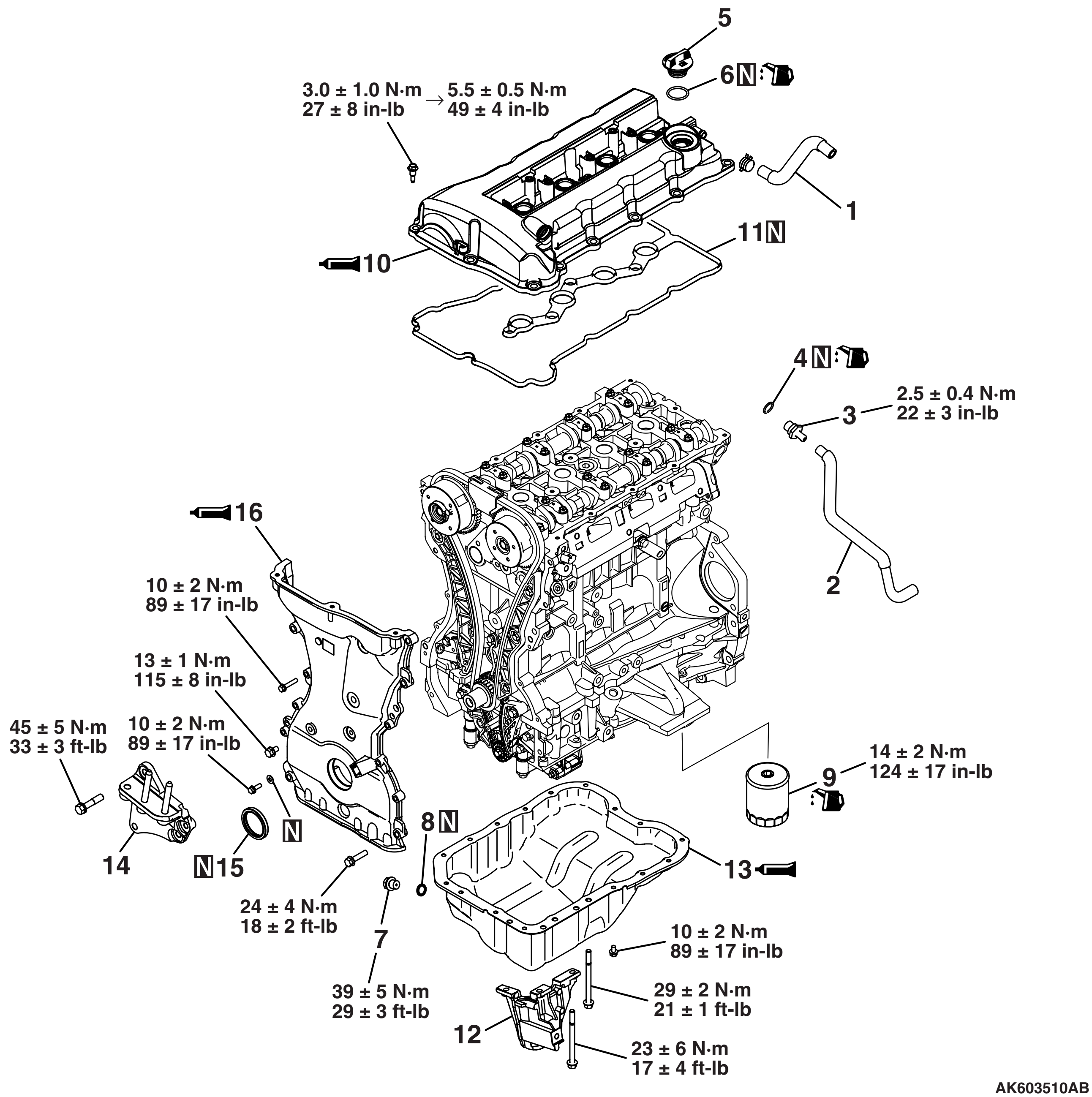
1. Apply an appropriate and minimum amount of sealant (LOCTITE 262 or equivalent) to the engine coolant temperature sensor, taking care not to allow sealant to squeeze out.
2. Tighten the engine coolant temperature sensor to the cylinder block to the specified torque.

   Specified torque: 30 ± 9 N· m (22 ± 6 ft-lb)

OIL PAN AND TIMING CHAIN CASE

REMOVAL AND INSTALLATION

M1113026300312



Removal steps

1. Breather hose
2. PCV hose
3. PCV valve
4. O-ring
5. Oil filler cap
6. O-ring
7. Oil drain plug
8. Oil drain plug gasket

Removal steps (Continued)

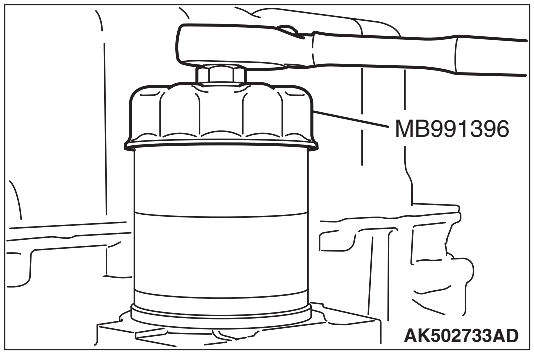
<<A>>	>>E<<	9. Oil filter
	>>D<<	10. Cylinder head cover
		11. Cylinder head cover gasket
		12. Air compressor bracket
<<B>>	>>C<<	13. Oil pan
		14. Engine support bracket
	>>B<<	15. Front oil seal
<<C>>	>>A<<	16. Timing chain case

Required Special Tools:

- MB991396: Oil Filter Wrench
- MD998727: Oil Pan FIPG Cutter
- MB991448: crankshaft front oil seal installer

REMOVAL SERVICE POINTS

<<A>> OIL FILTER REMOVAL



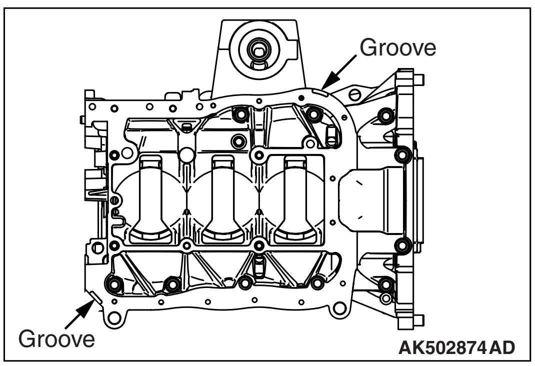
Use special tool MB991396 to remove the oil filter.

<<B>> OIL PAN REMOVAL

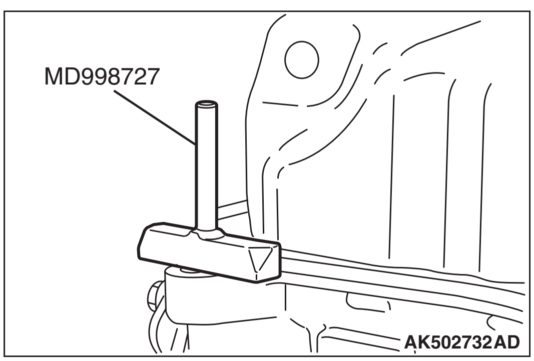
1. Remove oil pan tightening bolts.

⚠ CAUTION

Lightly tap the oil pan FIPG cutter to drive in, taking care not to damage the ladder frame and oil pan sealed area.

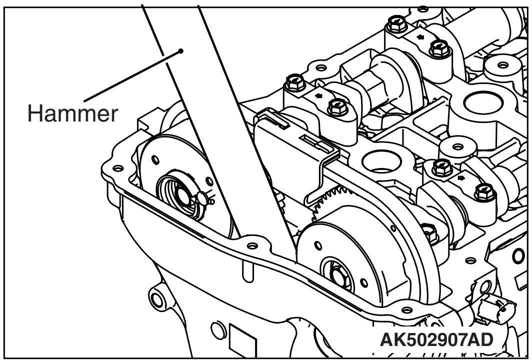


2. Lightly tap special tool oil pan FIPG cutter (MD998727) to drive in the illustrated groove of the oil pan and ladder frame.



3. Lightly tap and slide special tool MD998727 to remove the oil pan.

<<C>> TIMING CHAIN CASE REMOVAL



If the timing chain case is difficult to remove, insert a hammer handle as shown in the illustration and lightly pry it.

INSTALLATION SERVICE POINTS

>>A<< TIMING CHAIN CASE INSTALLATION

⚠ CAUTION

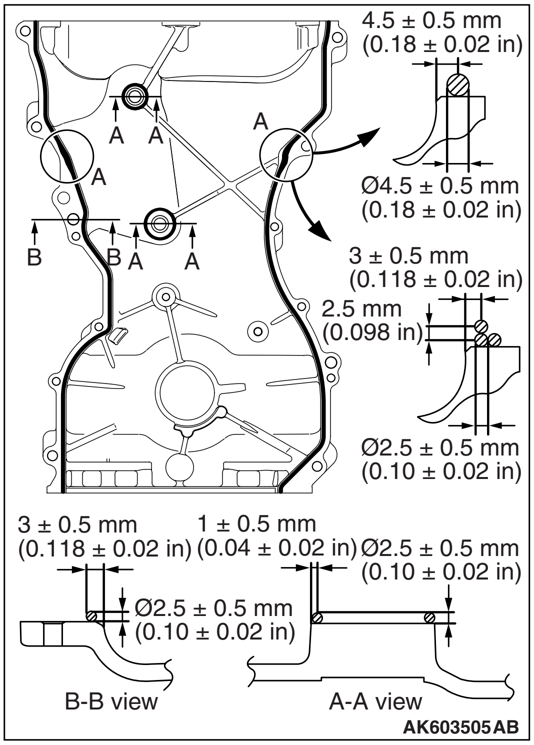
Be sure to remove liquid gasket that has entered mounting holes and O-ring grooves.

1. Completely remove liquid gasket adhering to the timing chain case, cylinder block and cylinder head.

⚠ CAUTION

Sufficiently check that there is no residual oil on the place where degreasing is performed. If fingerprints are left, do not touch it with bare hands after the degreasing, since the oils from your fingers will harm the seal ability.

2. Using white gasoline and so on, degrease the surface where the liquid gasket is applied and the contact surface between the cylinder block and the cylinder head.

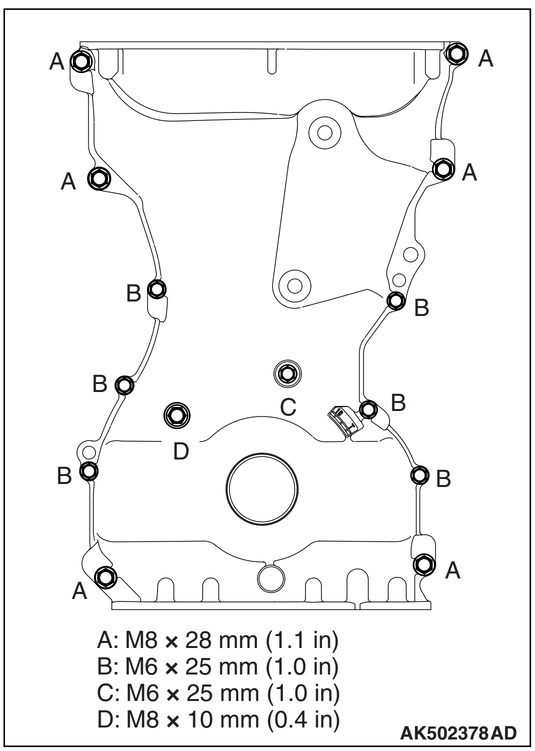


⚠ CAUTION

Install the timing chain case within three minutes after applying liquid gasket.

3. Apply liquid gasket (Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent) of 2.5 ±0.5 mm (0.10 ±0.02 inch) in thickness to the timing chain case. For illustrated A locations, however, apply liquid gasket of 4.5 ±0.5 mm (0.18 ±0.02 inch) in diameter or liquid gasket of 2.5 ±0.5 mm (0.10 ±0.02 inch) by putting one on top of another as shown in the illustration.
4. Install the timing chain case.

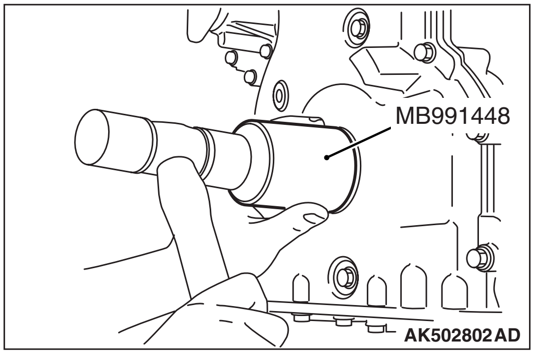
   NOTE: Be careful when install mounting bolts as they are different in length.



5. Tighten timing chain case mounting bolts to the specified torque.

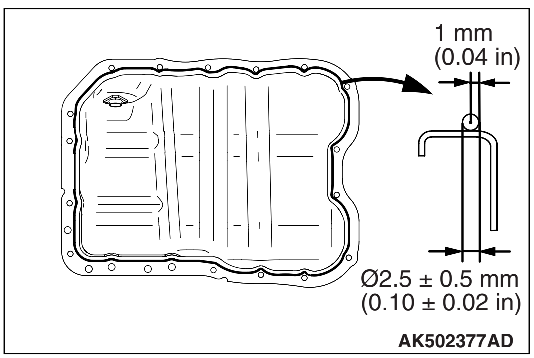
   Specified torque

   A: 24 ±4 N· m (18 ±2 ft-lb)
   B: 10 ±2 N· m (89 ±17 in-lb)
   C: 10 ±2 N· m (89 ±17 in-lb)
   D: 13 ±1 N· m (115 ±8 in-lb)



>>B<< FRONT OIL SEAL INSTALLATION

1. Apply engine oil to the internal circumference of the oil seal.
2. Use special tool MB991448 to install the front oil seal on the timing chain case.



>>C<< OIL PAN INSTALLATION

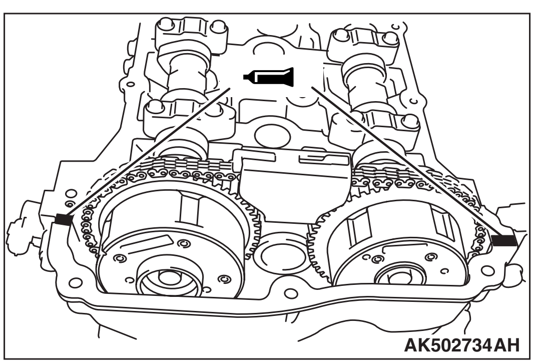
1. Completely remove liquid gasket adhering to the cylinder block and oil pan.
2. Using white gasoline and so on, degrease the cylinder block and oil pan.

⚠ CAUTION

Install the oil pan within three minutes after liquid gasket is applied.

3. Apply liquid gasket (Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent) of ϕ2.5 ± 0.5 mm (0.10 ± 0.02 inch) of thickness in diameter to the illustrated area of the oil pan.
4. Tighten the oil pan to the specified torque.

   Specified torque
   M6: 10 ± 1 N· m (89 ± 17 in-lb)
   M8: 29 ± 2 N· m (21 ± 1 ft-lb)



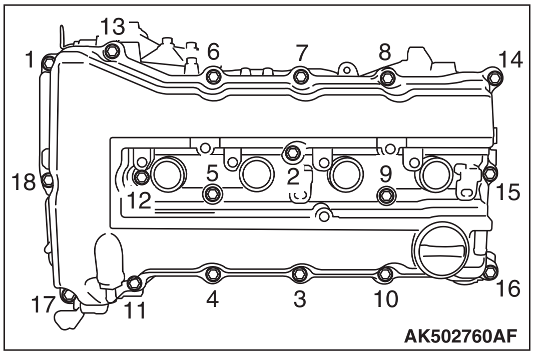
>>D<< CYLINDER HEAD COVER INSTALLATION

1. Completely remove liquid gasket adhering to the cylinder head cover, timing chain case and cylinder head.
2. Using white gasoline and so on, degrease the cylinder head cover, timing chain case and cylinder head.

⚠ CAUTION

Install the cylinder head cover immediately after liquid gasket is applied.

3. Appropriately use a minimum amount of sealant. Be careful not to allow sealant to squeeze out from the application area.
   Apply liquid gasket (Three bond 1217G or equivalent) of 4 mm of thickness in diameter.

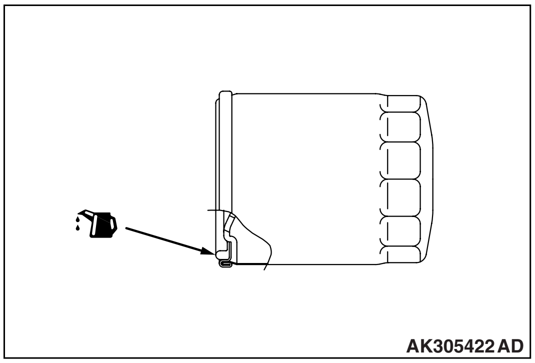


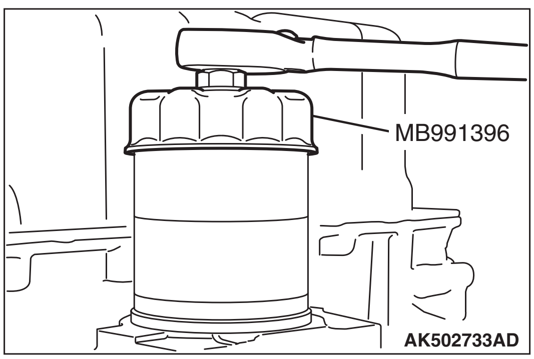
4. Tighten the cylinder head cover to the tightening torque of 3.0 ± 1.0 N· m (27 ± 8 in-lb) in the order shown in the illustration.
5. Then, tighten it to the specified torque in the same order.

   Specified torque: 5.5 ± 0.5 N· m (49 ± 4 in-lb)

>>E<< OIL FILTER INSTALLATION

1. Clean the oil filter mounting surface of the ladder frame.
2. Apply engine oil to the O-ring of the oil filter.





⚠ CAUTION

Use special tool MB991396 to install the oil filter. Tightening it by hand causes oil leakage due to lack of torque.

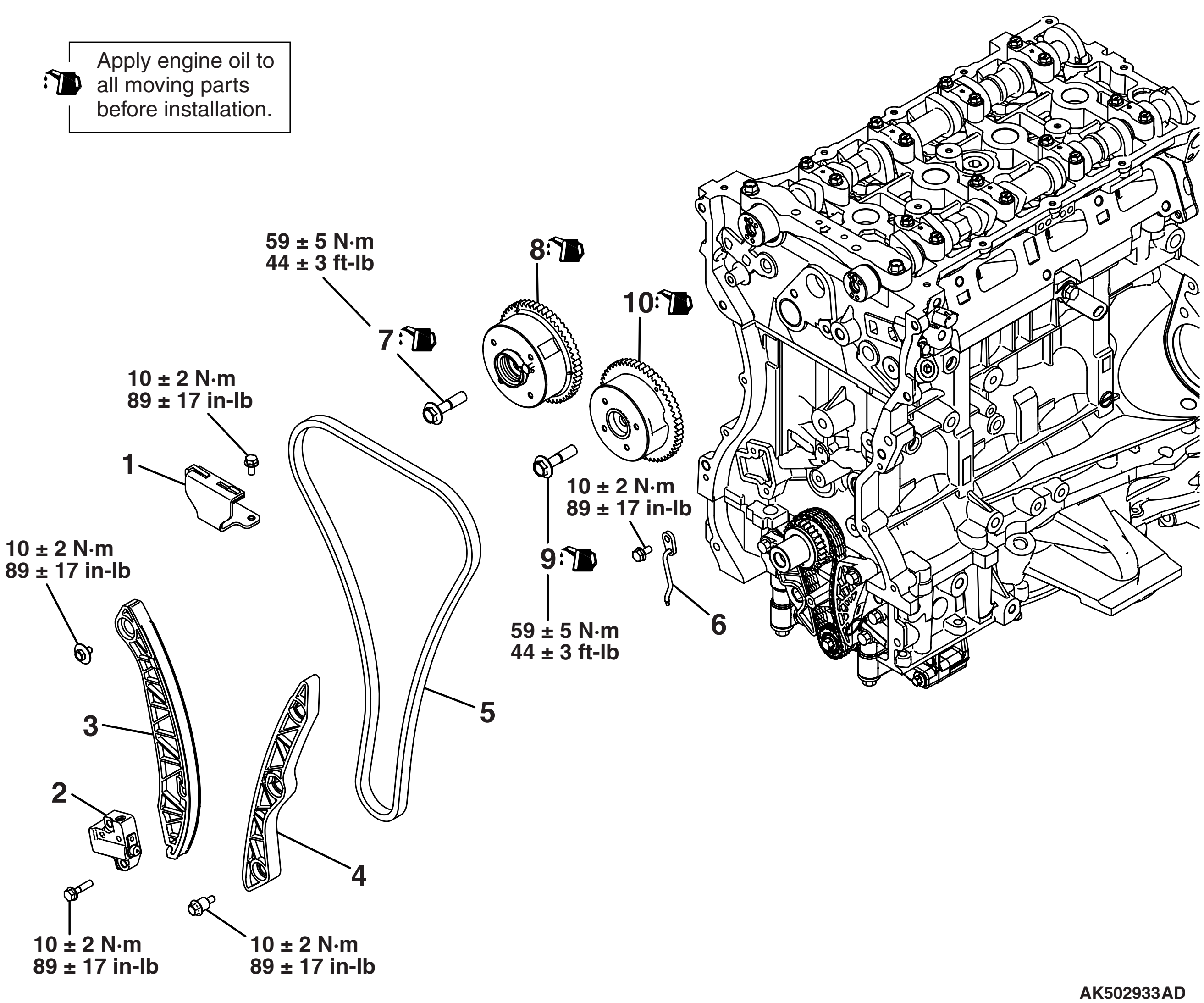
3. Screw in the oil filter. When the O-ring contacts the mounting surface, use a filter wrench to tighten it

   Specified torque: 3/4 turn (14 ± 2 N· m [124 ± 17 in-lb]).

TIMING CHAIN

REMOVAL AND INSTALLATION

M1113026600261

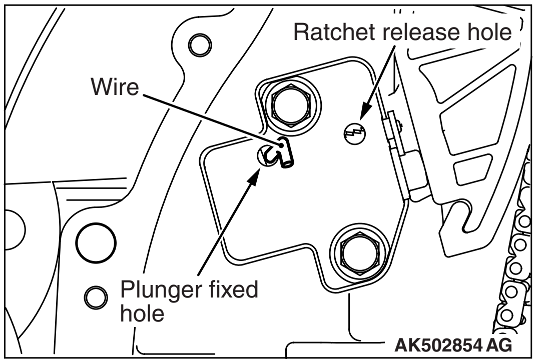


		Removal steps
		1. Chain upper guide
<<A>>	>>D<<	2. Timing chain tensioner
		3. Tensioner lever
		4. Timing chain guide
	>>C<<	5. Timing chain

		Removal steps (Continued)
		6. Oil jet
<<B>>	>>B<<	7. Exhaust V.V.T. sprocket bolt
		8. Exhaust V.V.T. sprocket assembly
<<C>>	>>A<<	9. Intake V.V.T. sprocket bolt
		10. Intake V.V.T. sprocket assembly

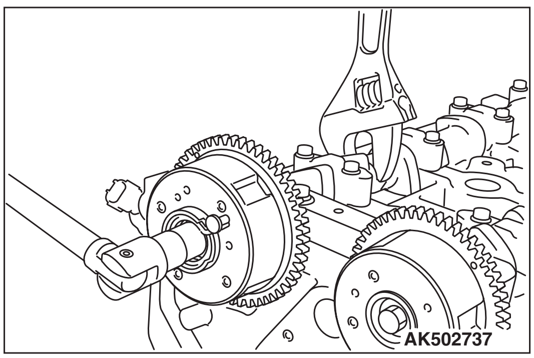
REMOVAL SERVICE POINTS

<<A>> TIMING CHAIN TENSIONER REMOVAL



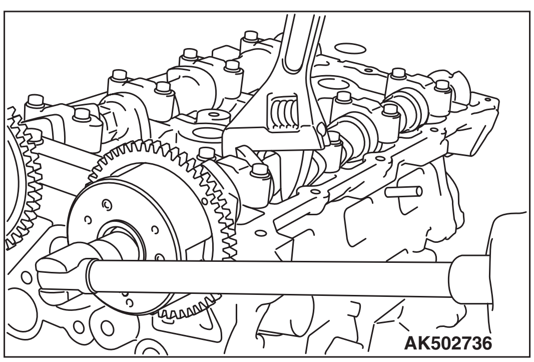
1. Insert a flatblade screwdriver into the release hole of the timing chain tensioner to release the latch.
2. Push the tensioner lever by hand and push in the plunger of the timing chain tensioner until it hits the bottom. Then, insert a hard wire (piano wire or the like) of ϕ1.5 or hexagonal bar wrench (1.5 mm [0.05 inch]) into the fixing hole of the plunger.
3. Remove the timing chain tensioner.

<<B>> EXHAUST V.V.T. SPROCKET BOLT REMOVAL



Hold the hexagonal portion of the exhaust camshaft with a wrench and loosen the exhaust V.V.T. sprocket bolt.

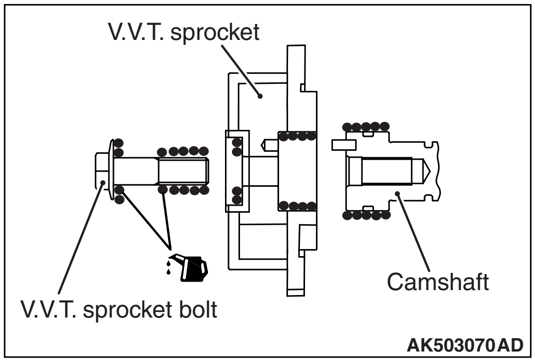
<<C>> INTAKE V.V.T. SPROCKET BOLT REMOVAL



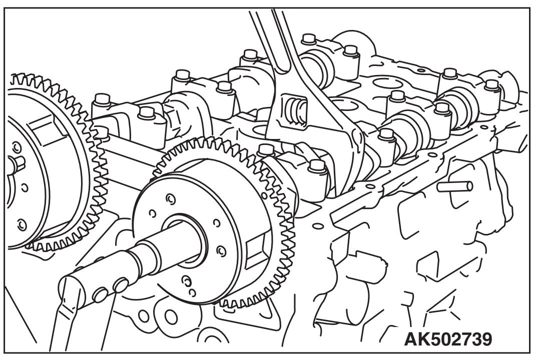
Hold the hexagonal portion of the intake camshaft with a wrench and loosen the intake V.V.T. sprocket bolt.

INSTALLATION SERVICE POINTS

>>A<< INTAKE V.V.T. SPROCKET BOLT INSTALLATION



1. Assemble the intake V.V.T. sprocket assembly in the following procedure.
   - Make sure that the knock pin of the inlet camshaft assembly is positioned facing straight upward.
   - Apply an appropriate and minimum amount of engine oil to the circumference of the tip of the intake V.V.T. sprocket assembly and the entire circumference of the area into which the intake V.V.T. sprocket assembly is inserted.
   - Slowly insert the intake V.V.T. sprocket assembly into the normal position of the inlet camshaft assembly with its knock pin hole facing straight upward.
2. Install the V.V.T. sprocket.
3. Make sure that the V.V.T. sprocket is securely inserted into the bottom and that the V.V.T. sprocket does not rotate with the hexagonal portion of the camshaft secured with a wrench.

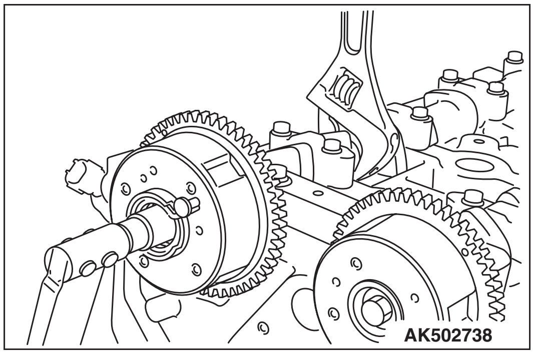


4. Hold the hexagonal portion of the camshaft with a wrench and tighten the intake V.V.T. sprocket bolt to the specified torque.

   Specified torque: 59 ± 5 N· m (44 ± 3 ft-lb)

>>B<< EXHAUST V.V.T. SPROCKET BOLT INSTALLATION

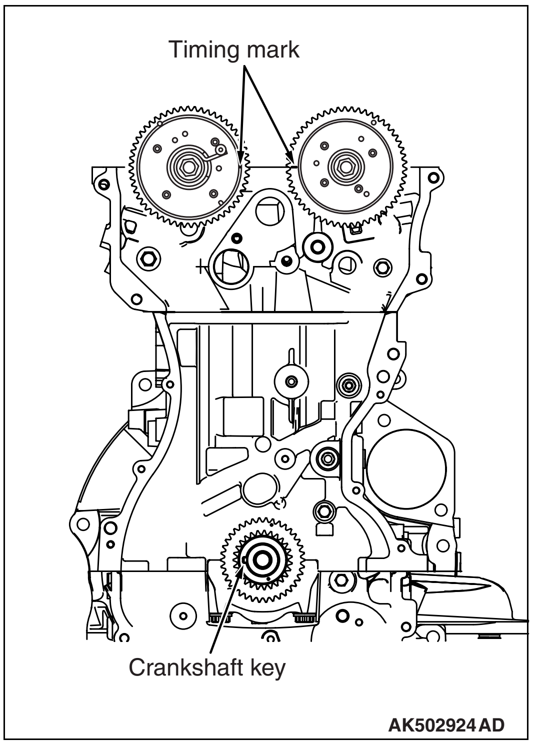
1. Assemble the exhaust V.V.T. sprocket assembly in the following procedure.
   - Make sure that the knock pin of the exhaust camshaft assembly is positioned facing straight upward.
   - Apply an appropriate and minimum amount of engine oil to the circumference of the tip of the exhaust V.V.T. sprocket assembly and the entire circumference of the area into which the exhaust V.V.T. sprocket assembly is inserted.
   - Slowly insert the exhaust V.V.T. sprocket assembly into the normal position of the exhaust camshaft assembly with its knock pin hole facing straight upward.
2. Install the V.V.T. sprocket.
3. Make sure that the V.V.T. sprocket is securely inserted into the bottom and that the V.V.T. sprocket does not rotate with the hexagonal portion of the camshaft secured with a wrench.



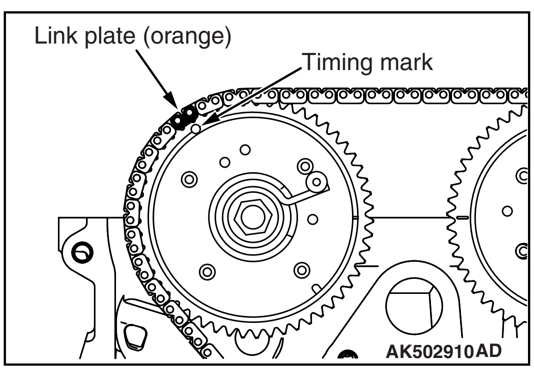
4. Hold the hexagonal portion of the camshaft with a wrench and tighten the camshaft sprocket bolt to the specified torque.

Specified torque: 59 ± 5 N· m (44 ± 3 ft-lb)

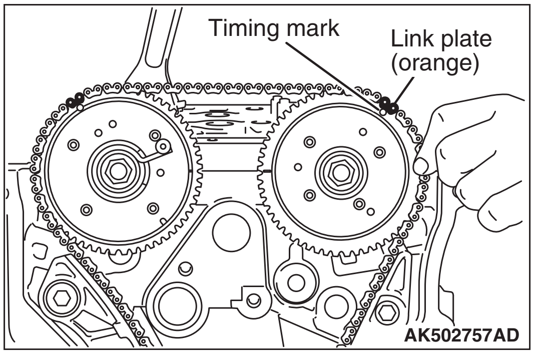
>>C<< TIMING CHAIN INSTALLATION



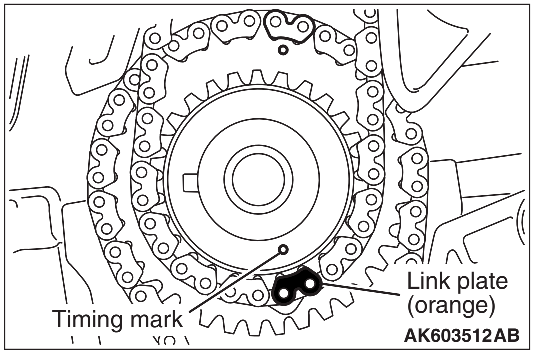
1. Align the timing mark of the V.V.T. sprocket.
2. Align the crankshaft sprocket keys with illustrated positions.



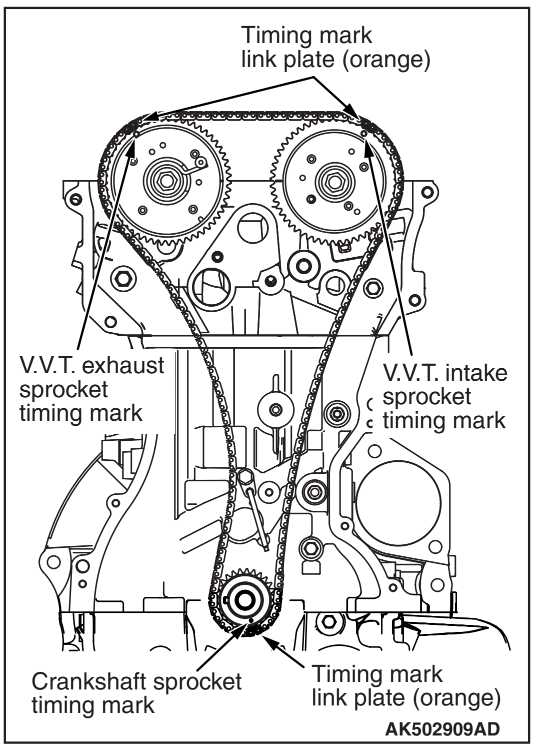
3. Align the link plate (orange) with the timing mark of the exhaust V.V.T. sprocket and loop the timing chain.



4. Align the link plate (orange) with the timing mark of the intake V.V.T. sprocket to loop the timing chain.
   Rotate the intake V.V.T. sprocket by one or two teeth to align with the timing mark.

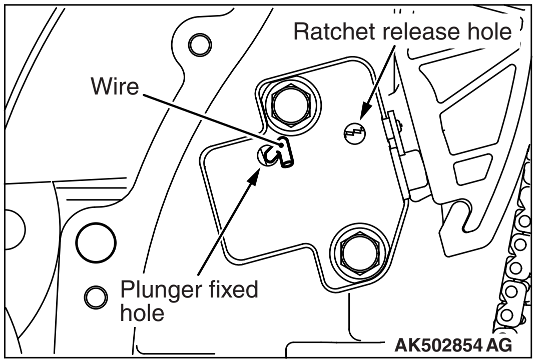


5. Align the timing mark of the crankshaft sprocket with the link plate (orange) to loop the timing chain. Because of timing chain slacks, hold it to prevent the timing mark from coming off the link plate (orange).



6. Make sure that the timing mark of each sprocket is aligned with the link plate (orange) of the timing chain at all of three locations.
7. Install the timing chain guide and tensioner lever.

>>D<< TIMING CHAIN TENSIONER INSTALLATION



1. Install the timing chain tensioner on the cylinder block and tighten it to the specified torque.

   Specified torque: 11 ± 1 N· m (98 ± 8 in-lb)

2. Remove the hard wire (piano wire or the like) of ϕ1.5 or hexagonal bar wrench (1.5 mm [0.05 inch]) from the timing chain tensioner. This enables the plunger of the timing chain tensioner to push the tensioner lever to keep the timing chain tight.

INSPECTION

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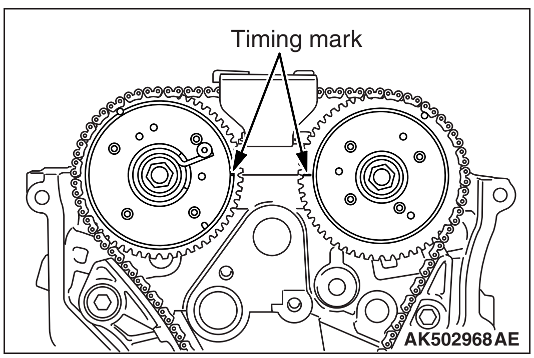
VALVE CLEARANCE ADJUSTMENT

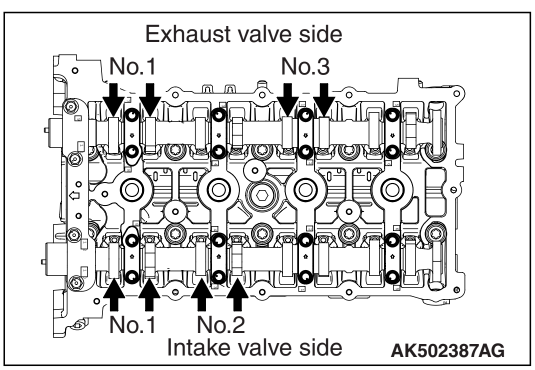
Measure valve clearance as described in the following procedure.
Check and adjust the valve clearance with the timing chain installed.

⚠ CAUTION

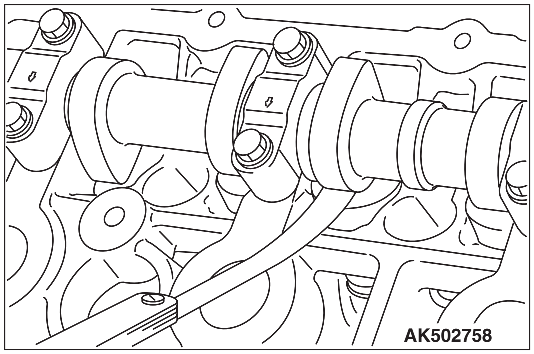
Always rotate the crankshaft clockwise.



1. Rotate the crankshaft clockwise to align the timing mark of the V.V.T. sprocket with the top surface of the cylinder head as illustrated. (Set the No. 1 piston at top dead center on the compression stroke.)



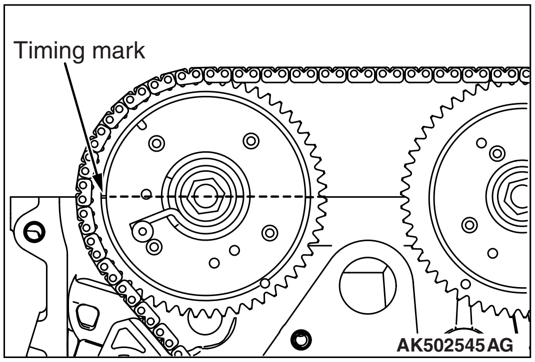
2. Valve clearance can be measured at the illustrated location in this condition.



3. Use a thickness gauge to measure clearance between the camshaft and valve tappet.

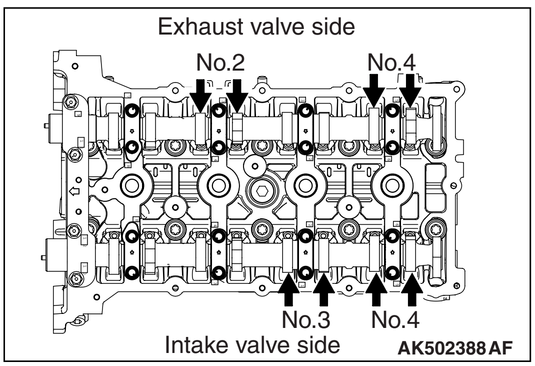
   Standard value (when engine is cold):
   Intake side: 0.20 mm (0.008 inch)
   Exhaust side: 0.30 mm (0.012 inch)

4. If measured values are out of the standard value, record measured values.



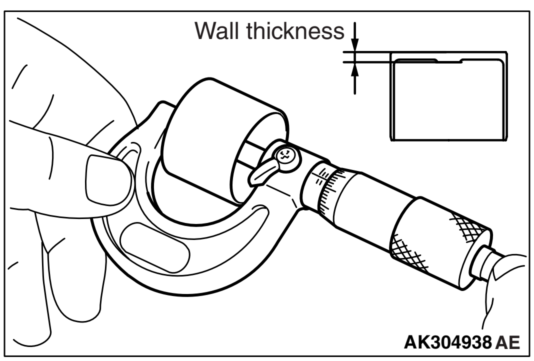
5. Rotate the crankshaft by one turn clockwise to set the No. 4 piston at top dead center on the compression stroke.

   NOTE: The timing mark of the V.V.T. exhaust sprocket must be at the illustrated position.



6. Valve clearance can be measured at the illustrated location in this condition.
7. If measured values are out of the standard value, record measured values.
8. If the measured value is out of the standard value, replace the valve tappet.

   NOTE: There are 47 kinds of valve tappets at intervals of 0.015 mm (0.0006 inch) in the range between 3.000 (0.1181 inch) and 3.690 mm (0.1453 inch).



9. Use the following procedure select a valve tappet.
   (1) Measure thickness of a removed valve tappet.
   (2) Calculate thickness of a valve tappet so that valve clearance meets the standard value.

   A: Thickness of valve tappet to be selected
   B: Thickness of removed valve tappet
   C: Measured valve clearance

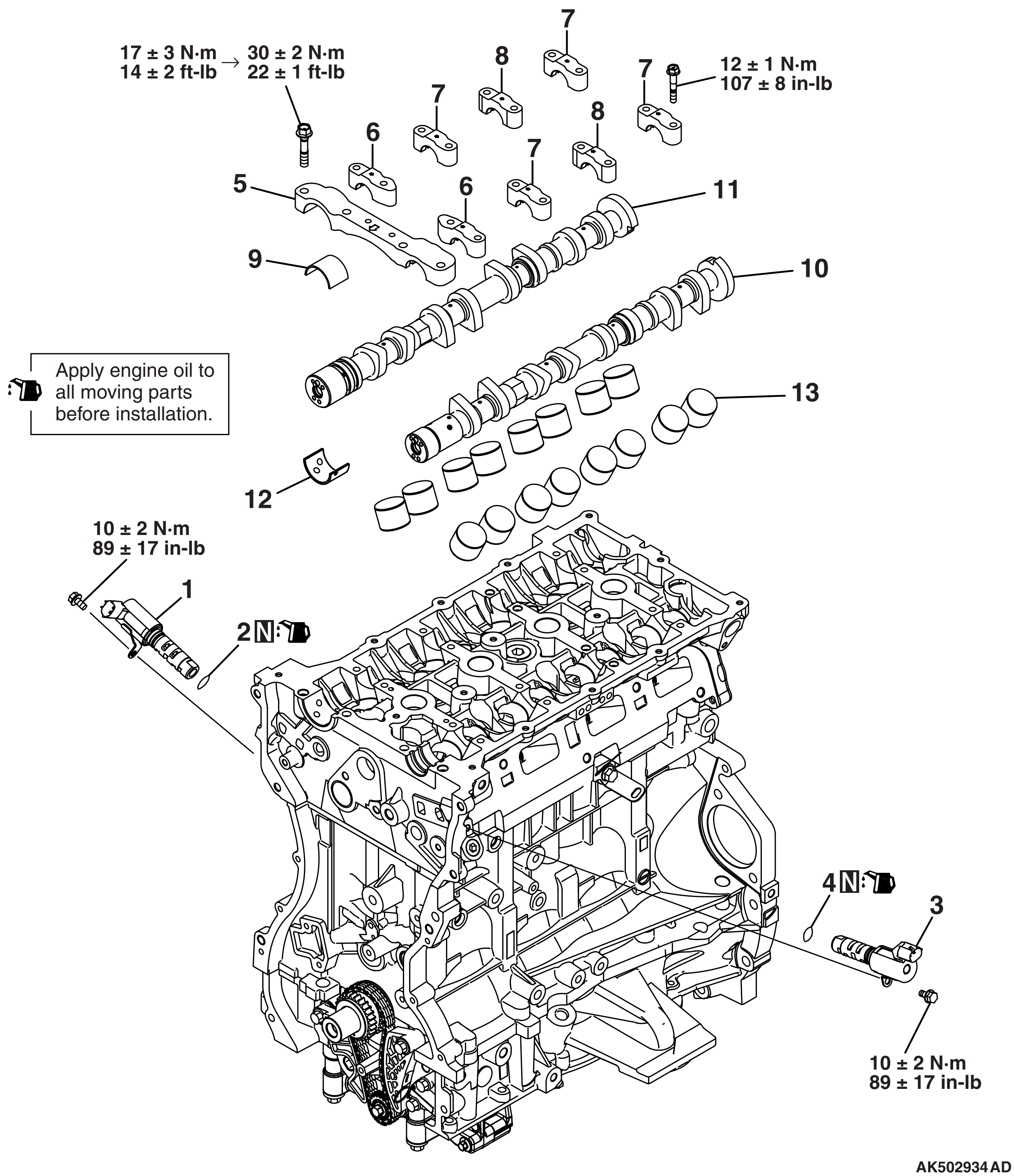
   Formula
   Intake side: A = B + (C –0.20 mm [0.008 inch])
   Exhaust side: A = B + (C –0.30 mm [0.012 inch])

Refer to "Removal and installation of camshaft" for removal, installation and inspection procedure of valve tappets.

CAMSHAFT

REMOVAL AND INSTALLATION

M1113026900176



Removal steps

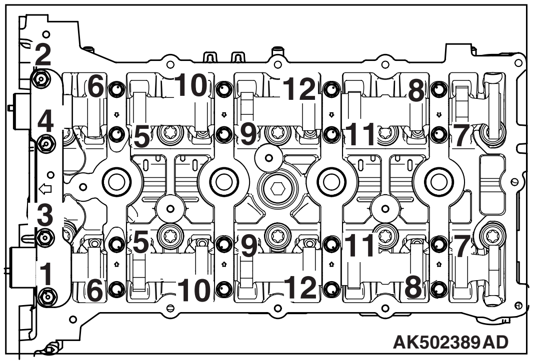
	>>C<<	1. Engine oil control valve (OCV) exhaust
	>>C<<	2. O-ring
	>>C<<	3. Engine oil control valve (OCV) intake
	>>C<<	4. O-ring
<<A>>	>>B<<	5. Front camshaft bearing cap
<<A>>	>>B<<	6. Oil feeding camshaft bearing cap

Removal steps (Continued)

<<A>>	>>B<<	7. Camshaft bearing cap
<<A>>	>>B<<	8. Thrust camshaft bearing cap
	>>B<<	9. Bearing
	>>B<<	10. Camshaft intake
	>>B<<	11. Camshaft exhaust
		12. Bearing
<<B>>	>>A<<	13. Valve tappet

REMOVAL SERVICE POINTS

<<A>> FRONT CAMSHAFT BEARING CAP / OIL FEEDING CAMSHAFT BEARING CAP / CAMSHAFT BEARING CAP / THRUST CAMSHAFT BEARING CAP REMOVAL



⚠ CAUTION

Loosing the camshaft bearing cap installation bolts in four to five steps. Do not loosen bolts in one step as this causes the valve spring force to push on the bolts and make them jump out causing damage to the threads.

First remove a mounting bolt of the front camshaft bearing cap and then a mounting bolt of each camshaft bearing cap in the order shown in the illustration.

<<B>> VALVE TAPPET REMOVAL

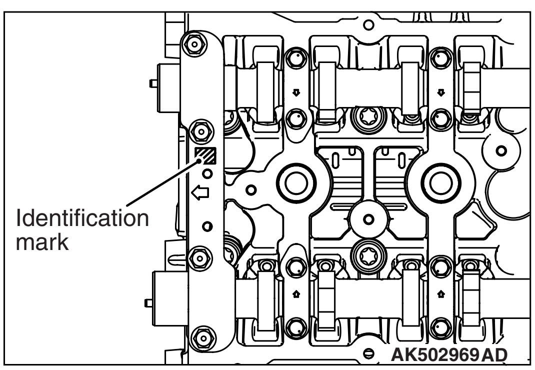
Pick out valve tappets with fingers and store removed valve tappets with tags describing the installed position attached for reassembly.

INSTALLATION SERVICE POINTS

>>A<< VALVE TAPPET INSTALLATION

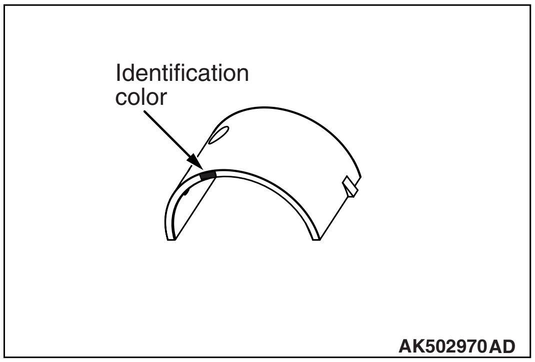
Install valve tappets at the same position based on tags describing the installed position for reassembly.

>>B<< CAMSHAFT / BEARING / THRUST CAMSHAFT BEARING CAP / CAMSHAFT BEARING CAP / OIL FEEDING CAMSHAFT BEARING CAP / FRONT CAMSHAFT BEARING CAP INSTALLATION

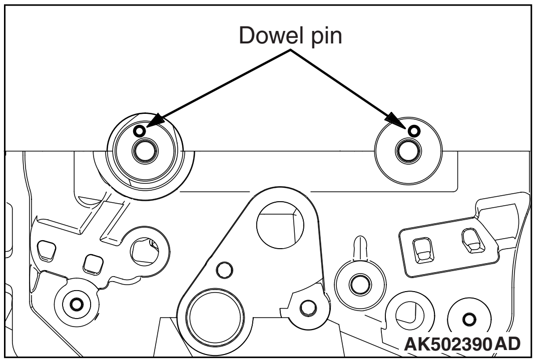


1. When replacing a camshaft bearing, select a bearing with the size corresponding to the identification mark in the table below.
2. Install camshaft bearings on the cylinder head.

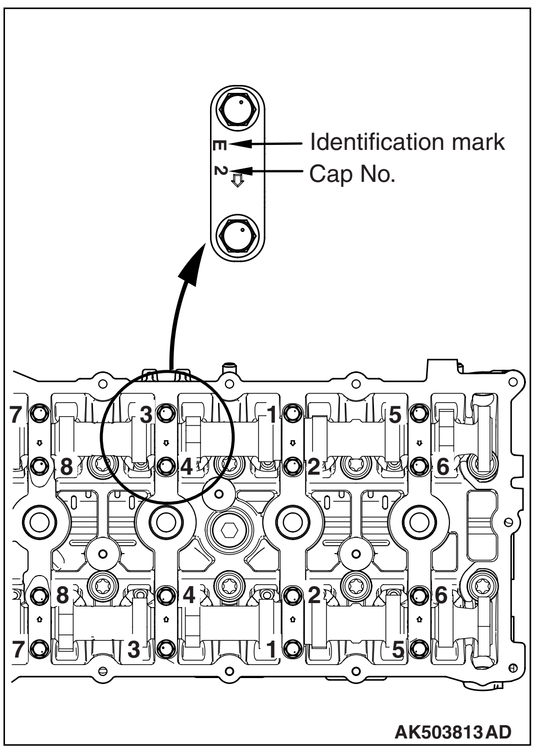
Front camshaft bearing cap		Camshaft bearing identification color
Identification mark	**Inner diameter mm (in)**	
1	40.000 - 40.008 (1.5748 - 1.5751)	Black
2	40.008 - 40.016 (1.5751 - 1.5754)	None
3	40.016 - 40.024 (1.5754 - 1.5757)	Green



3. The identification color of the camshaft bearing is painted at the illustrated position.



4. Set the dowel pins of the camshaft at the illustrated positions.



5. Install them upon checking the identification mark so as not to misidentify cap No. and to confuse the intake side with the exhaust side.

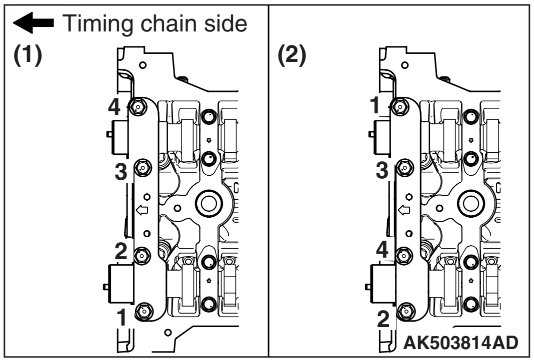
   Identification mark

   I: Intake side

   E: Exhaust side

6. Tighten each camshaft bearing cap mounting bolt to the specified torque in the order of number shown in the figure in two or three steps.

   Specified torque: 12 ± 1 N· m (106 ± 8 in-lb)



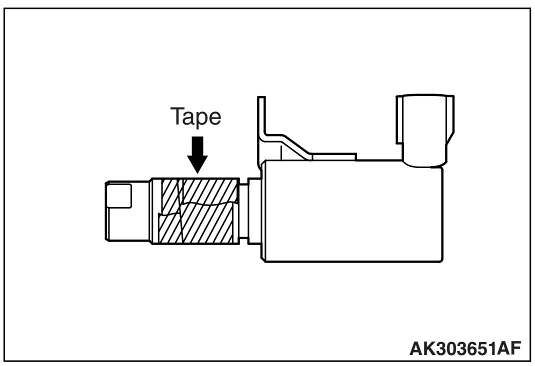
7. Tighten each front camshaft bearing cap mounting bolt to the temporarily torque of 17 ±3 N· m (14 ±2 ft-lb) in the order shown (1).
8. Tighten each front camshaft bearing cap mounting bolt to the specified torque in the order shown (2).

   Specified torque: 30 ±2 N· m (22 ±1 ft-lb)

>>C<< O-RING / ENGINE OIL CONTROL VALVE INSTALLATION

⚠ CAUTION

- **The O-ring must not be reused.**
- **Wind non-adhesive tape (seal tape, etc.) around the notch of the oil passage of the engine oil control valve before installing the O-ring to prevent damage. Damage to the O-ring causes oil leakage.**



1. Apply a small amount of engine oil to the O-ring of the engine oil control valve.
2. Install the engine oil control valve on the cylinder head.
3. Tighten the engine oil control valve to the specified torque.

   Specified torque: 10 ±2 N· m (89 ±17 in-lb)

INSPECTION

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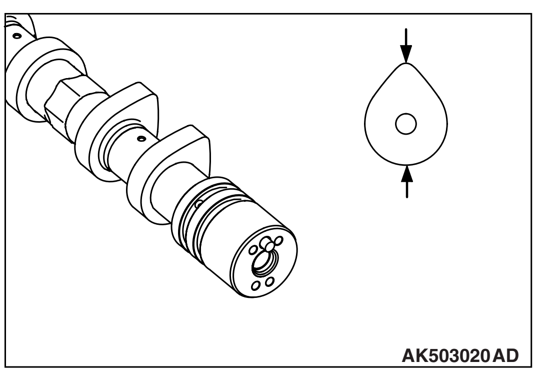
CAMSHAFT

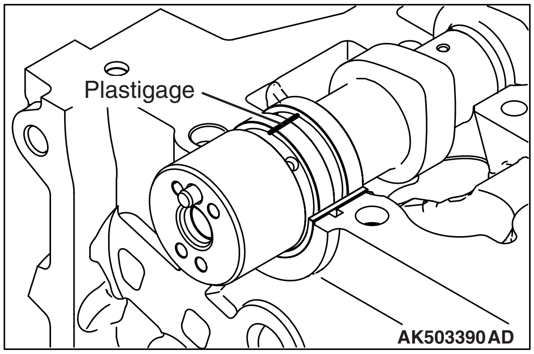


Measure camshaft height (camshaft major axis). If the height is less than the limit, replace the camshaft.

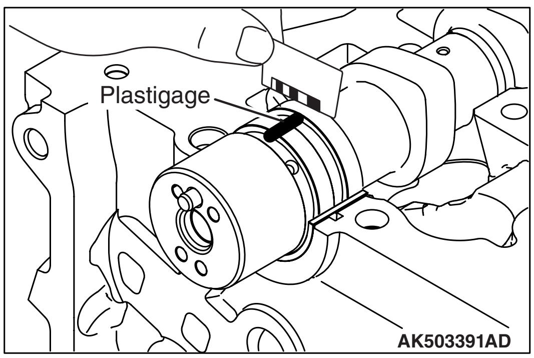
Standard value:
Intake: 43.25 mm (1.703 inches)
Exhaust: 45.00 mm (1.772 inches)

Limit:
Intake: 42.75 mm (1.683 inches)
Exhaust: 44.50 mm (1.752 inches)

CAMSHAFT OIL CLEARANCE (PLASTIGAGE METHOD)



1. Thoroughly wipe oil on the outside diameter of the camshaft and the inside diameter of the bearing.
2. Install the bearing to the camshaft.
3. Put straightly the plastigage having the length of the bearing width on the journal axis, centering the axis.
4. Carefully install the bearing cap.Tighten the bolt as instructed in >>B<< Bolt Installation Point.
5. Remove the bolt and the bearing cap carefully.



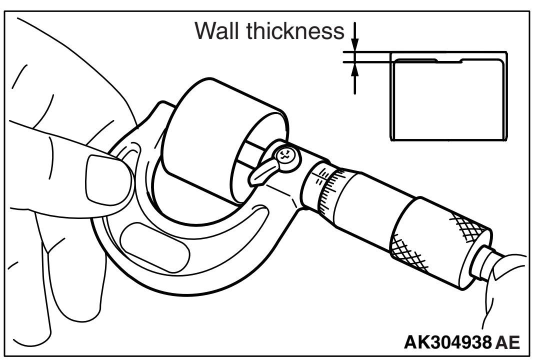
6. Measure the plastigage whose width is most compressed using the scale printed on the plastigage bag. When the measured value deviates from the standard one, replace the bearing.

   Standard value: 0.035 –0.072 mm (0.0014 –0.0028 inch)

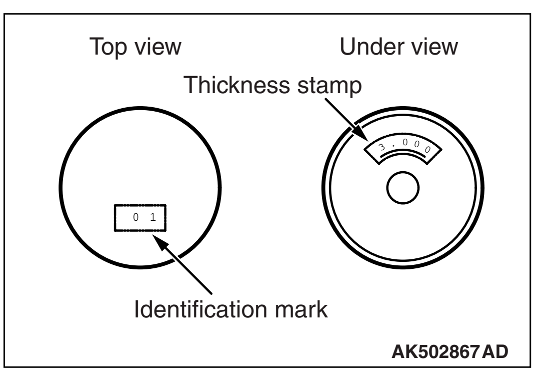
⚠ CAUTION

When the bearing is used again, be careful not to reverse the cylinder head side and the camshaft side during installation.

VALVE TAPPET



1. Measure the valve tappet at the illustrated position. If the measured value is not in agreement with the value in the table corresponding to the identification mark, replace the valve tappet.



2. The valve tappet has an identification mark and stamping of thickness at illustrated positions.

   There are 47 kinds of valve tappets at intervals of 0.015 mm (0.0006 inch) in the range between 3.000 mm (0.1181 inch) and 3.690 mm (0.1453 inch).

Thickness mm (in)	Identification mark	Thickness mm (in)	Identification mark	Thickness mm (in)	Identification mark
3.000 (0.1181)	01	3.240 (0.1276)	17	3.480 (0.1370)	33
3.015 (0.1187)	02	3.255 (0.1281)	18	3.495 (0.1376)	34
3.030 (0.1193)	03	3.270 (0.1287)	19	3.510 (0.1382)	35
3.045 (0.1199)	04	3.285 (0.1293)	20	3.525 (0.1388)	36
3.060 (0.1205)	05	3.300 (0.1299)	21	3.540 (0.1394)	37
3.075 (0.1211)	06	3.315 (0.1305)	22	3.555 (0.1400)	38
3.090 (0.1217)	07	3.330 (0.1311)	23	3.570 (0.1406)	39
3.105 (0.1222)	08	3.345 (0.1317)	24	3.585 (0.1411)	40
3.120 (0.1228)	09	3.360 (0.1323)	25	3.600 (0.1417)	41
3.135 (0.1234)	10	3.375 (0.1329)	26	3.615 (0.1423)	42
3.150 (0.1240)	11	3.390 (0.1335)	27	3.630 (0.1429)	43
3.165 (0.1246)	12	3.405 (0.1341)	28	3.645 (0.1435)	44
3.180 (0.1252)	13	3.420 (0.1346)	29	3.660 (0.1441)	45
3.195 (0.1258)	14	3.435 (0.1352)	30	3.675 (0.1447)	46
3.210 (0.1264)	15	3.450 (0.1358)	31	3.690 (0.1453)	47
3.225 (0.1270)	16	3.465 (0.1364)	32		

CYLINDER HEAD AND VALVES

REMOVAL AND INSTALLATION

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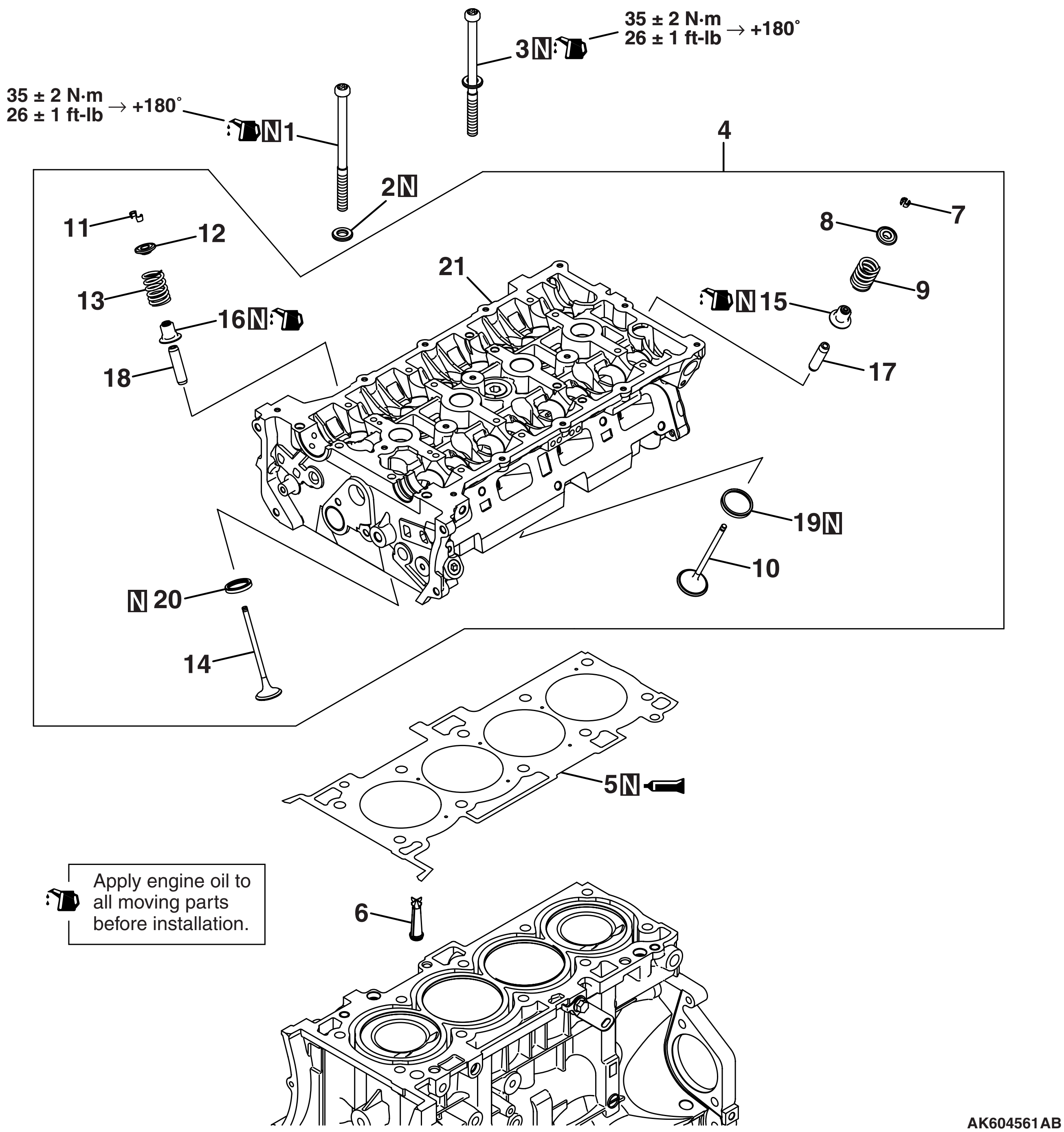


		Removal steps
	>>D<<	1. Cylinder head bolt
	>>D<<	2. Cylinder head bolt washer
	>>D<<	3. Cylinder head bolt & washer assembly
	>>C<<	4. Cylinder head assembly
	>>C<<	5. Cylinder head gasket
		6. Oil feeder control valve (OCV) filter
<<A>>	>>B<<	7. Retainer lock
		8. Valve spring retainer

		Removal steps (Continued)
		9. Valve spring
		10. Intake valve
<<A>>	>>B<<	11. Retainer lock
		12. Valve spring retainer
		13. Valve spring
		14. Exhaust valve
<<B>>	>>A<<	15. Valve stem seal
<<B>>	>>A<<	16. Valve stem seal
		17. Intake valve guide

Removal steps (Continued)

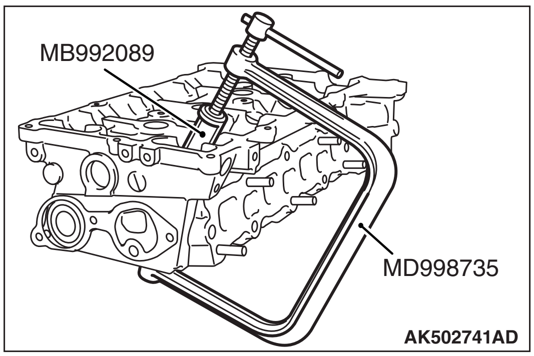
18. Exhaust valve guide
19. Intake valve seat
20. Exhaust valve seat
21. Cylinder head

Required Special Tools:

- MD998735: Valve Spring Compressor
- MB992089: Retainer Holder
- MB992085: Valve Stem Seal Pliers
- MD998737: Valve Stem Seal Installer

REMOVAL SERVICE POINTS

<<A>> RETAINER LOCK REMOVAL



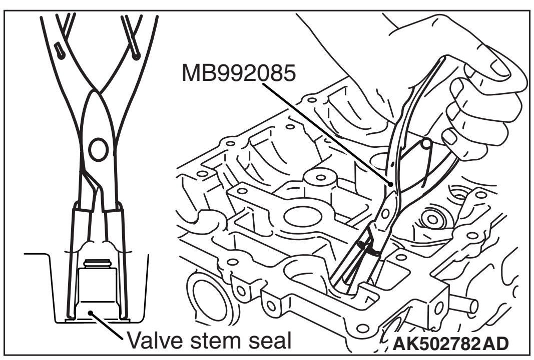
⚠ CAUTION

Be careful not to allow retainer holder C to interfere with the wall of the tappet hole and to damage it.

Use a special tool MD998735 and MB992089 to compress the valve spring and to remove the retainer lock.

NOTE: Store removed parts such as valves and springs with tags describing cylinder No. and installed position attached for reassembly.

<<B>> VALVE STEM SEAL REMOVAL



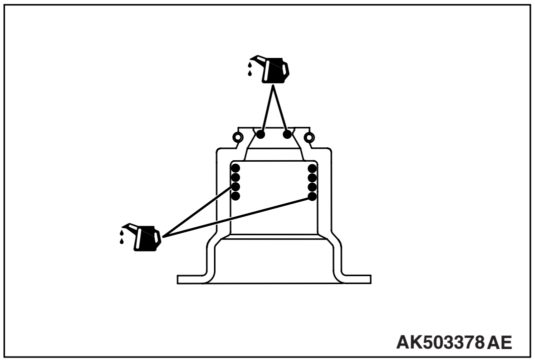
Use special tool MB992085 to firmly pinch the base (larger external shape) of the stem seal and twist it right and left for pulling out.

INSTALLATION SERVICE POINTS

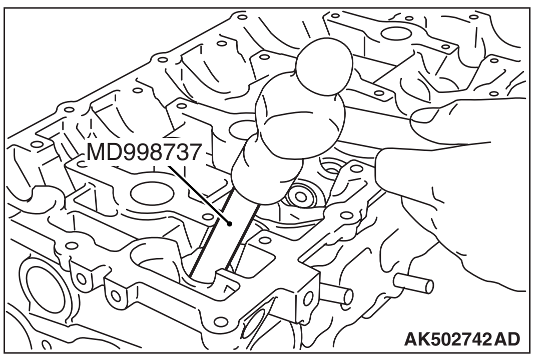
>>A<< VALVE STEM SEAL INSTALLATION

⚠ CAUTION

- **The valve stem seal must not be reused.**
- **Do not damage the tappet wall during assembly.**
- **Be sure to use a special tool to install the valve stem seal. Poor installation causes oil loss via valve guides.**
- **If oil is not applied, the valve stem seal may rise to the surface after it is press fitted.**

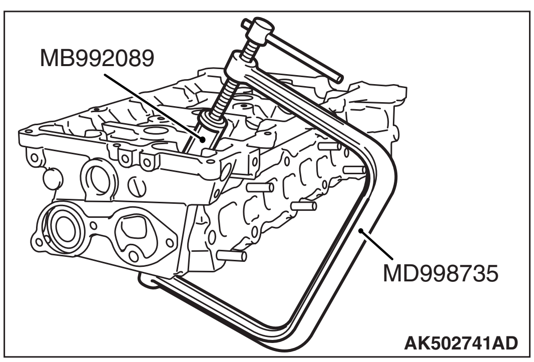


1. Apply a thin coat of engine oil to a new valve stem seal.



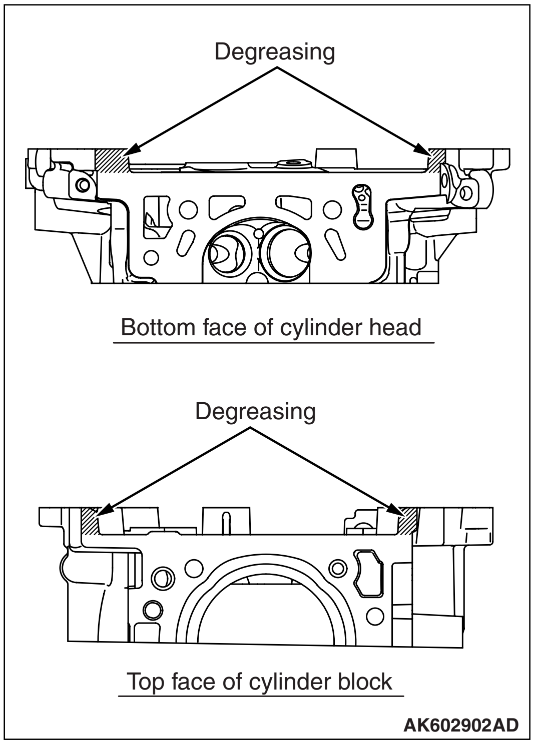
2. Use special tool MD998737 to press fit the valve stem seal into the valve guide with the valve stem used as a guide.

>>B<< RETAINER LOCK INSTALLATION



Use a special tool MD998735 and MB992089 to compress the valve spring and to install the retainer lock.

>>C<< CYLINDER HEAD GASKET / CYLINDER HEAD ASSEMBLY INSTALLATION

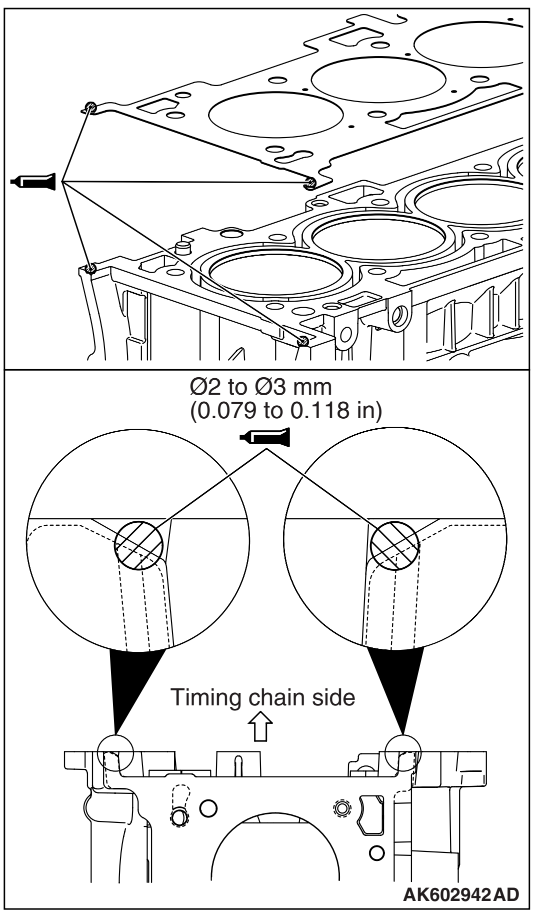


1. Completely remove the liquid gasket on the upper plane of the cylinder block and the lower plane of the cylinder head.

⚠ CAUTION

Sufficiently check that there is no residual oil on the place where degreasing is performed. If fingerprints are left, do not touch it with bare hands after the degreasing, since the oils from your fingers will harm the seal ability.

2. Using white gasoline and so on, degrease the place specified in the illustration.



3. As shown in the illustration, apply a ϕ2 to 3 mm (0.079 to 0.118 inch) of sealant (Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent) to the top face of cylinder block.
4. Install the cylinder head gasket.

   NOTE: Check that the center of the liquid gasket is located toward the cylinder gasket in the position specified in the illustration.
5. As shown in the illustration, apply a ϕ2 to 3 mm (0.079 to 0.118 inch) of sealant (Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent) to the top face of cylinder head gasket.
6. Install the cylinder head assembly.

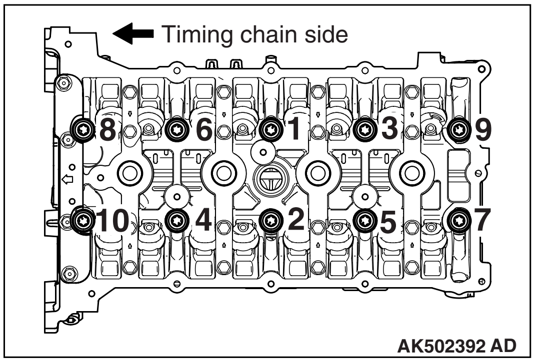
>>D<< CYLINDER HEAD BOLT INSTALLATION

1. Install new cylinder head bolts and washers in the following procedure.

   NOTE: Cylinder head bolts and washers must not be reused.

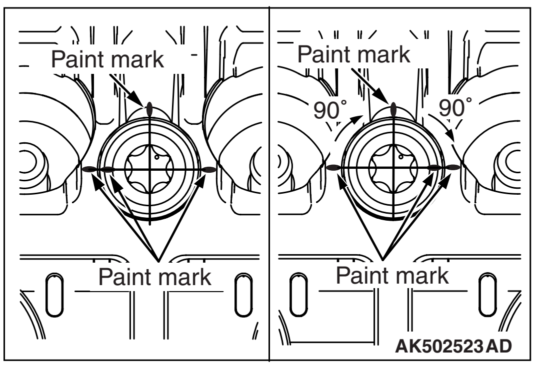
2. Apply an appropriate amount of engine oil to top and bottom surfaces of washers and threaded portion of bolts.
3. Install cylinder head bolts to the cylinder head.

   NOTE: Bolts and washers are different parts for bolts on the timing chain side.



4. Tighten cylinder head bolts in several steps to the specified torque according to the assembly order shown.

   Specified torque: 35 ± 2 N· m (26 ± 1 ft-lb)



5. Put a paint mark on all of cylinder head bolt heads and cylinder head.

⚠ CAUTION

- **If the tightening angle is 180° or less, tightening performance may not be secured. Use caution to the tightening angle during tightening.**
- **If the tightening angle becomes more than 180°, completely loosen bolts and start tightening over again according to the procedure.**

6. Tighten the cylinder head 90° according to the tightening order.

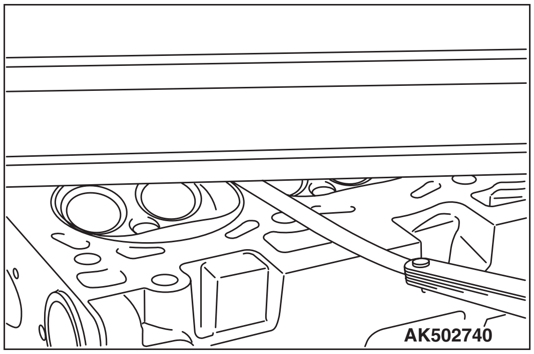
   Tighten it further 90° and make sure that the paint mark on the cylinder head bolt is in a straight line with that on the cylinder head.

INSPECTION

M1113007001371

CYLINDER HEAD

1. Check the cylinder head for water leakage, gas leakage, damage or cracks before cleaning.
2. Completely remove oil, scale, sealant, carbon, etc. After cleaning oil passages, blow air to make sure that they are not clogged.



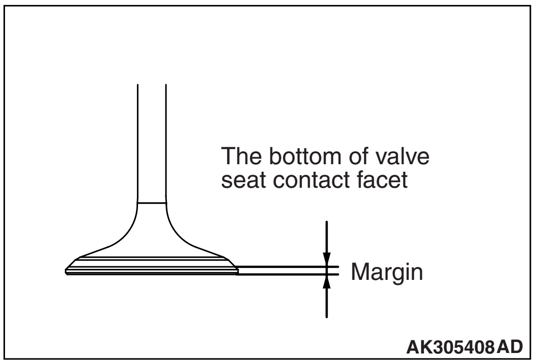
⚠ CAUTION

The grinding limit shall be within 0.2 mm (0.008 inch) in combination with the cylinder block to be assembled.

3. For the flatness on the cylinder head bottom, measure distortion using a straight edge and thickness gauge. If the distortion exceeds the limit, grind and repair it.

   Distortion on bottom
   Standard value: Within 0.05 mm (0.002 inch)
   Limit: 0.02 mm (0.0008 inch)
   Grinding limit: 0.2 mm (0.008 inch)
   Cylinder head height: 128.5 mm (5.06 inches)

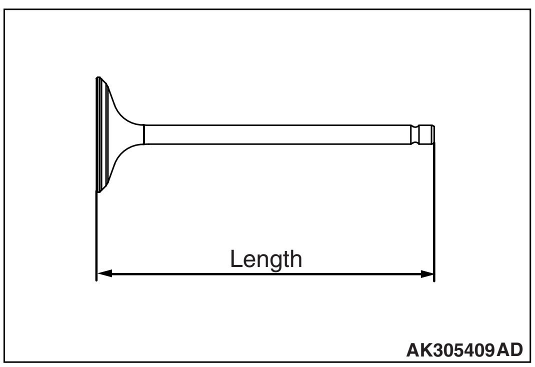
VALVE



1. Repair the valve seat if contact with the valve seat is poor, uneven or broken.
2. Measure the margin.
   If the limit is exceeded, replace the valve.

   Standard value:
   Intake 1.022 mm (0.0402 inch)
   Exhaust 1.094 mm (0.0431 inch)

   Limit:
   Intake 0.522 mm (0.0206 inch)
   Exhaust 0.594 mm (0.0234 inch)

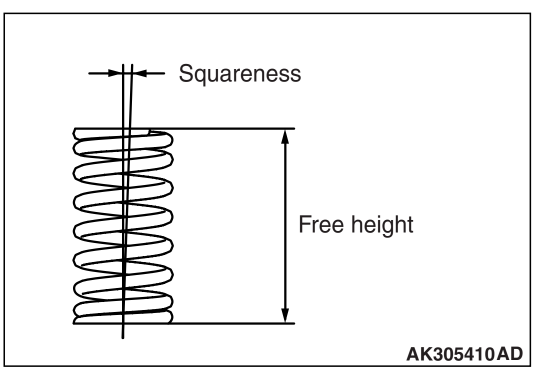


3. Measure overall length of the valve.
   If the limit is exceeded, replace the valve.

   Standard value:
   Intake 113.18 mm (4.456 inches)
   Exhaust 105.89 mm (4.169 inches)

   Limit:
   Intake 112.68 mm (4.436 inches)
   Exhaust 105.39 mm (4.149 inches)

VALVE SPRING



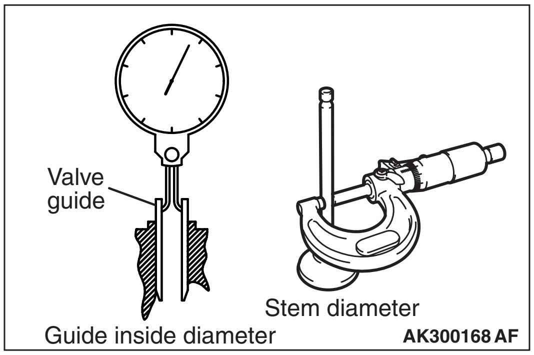
1. Measure free height of the spring.
   If the limit is exceeded, replace the spring.

   Standard value: 47.44 mm (1.868 inch)
   Limit: 46.44 mm (1.828 inch)

2. Measure squareness of the spring.
   If the inclination exceeds the limit, replace the spring.

   Standard value: 2° or less
   Limit: 4°

VALVE GUIDE

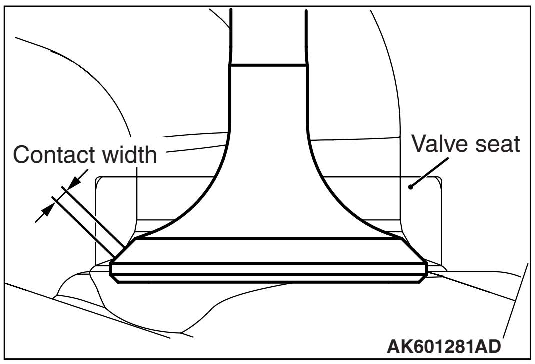


Measure clearance between the valve guide and valve stem. If the clearance exceeds the limit, replace the valve guide or valve, or both.

Standard value:
Intake 0.020 – 0.047 mm (0.0008 – 0.0019 inch)
Exhaust 0.030 – 0.054 mm (0.0012 – 0.0021 inch)

Limit:
Intake 0.10 mm (0.004 inch)
Exhaust 0.15 mm (0.006 inch)

VALVE SEAT



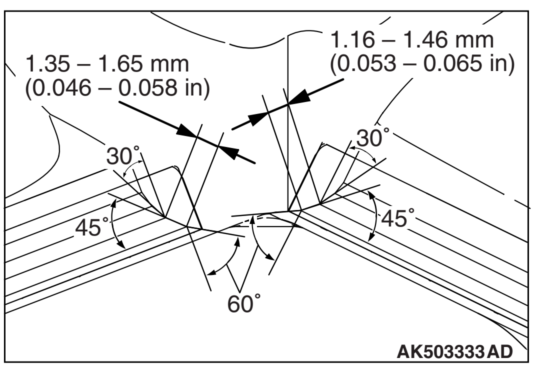
Assemble the valve, then measure the contact width. If the measurement exceeds the specified limit, replace the valve seat.

Standard value
Intake: 1.16 – 1.46 mm (0.046 – 0.058 inch)
Exhaust: 1.35 – 1.65 mm (0.053 – 0.065 inch)

⚠ CAUTION

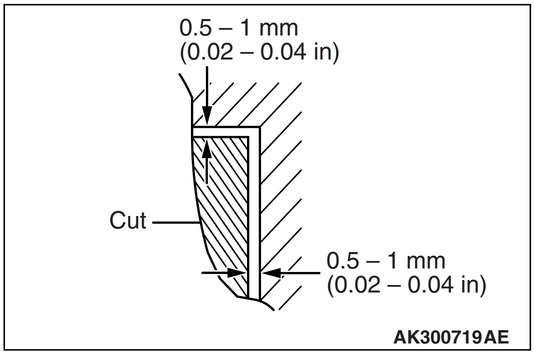
If the variation in the width exceeds 0.2 mm (0.008 inch) even if the contact width is within the standard value, replace or correct the valve seat.

REPAIR PROCEDURE OF VALVE SEAT

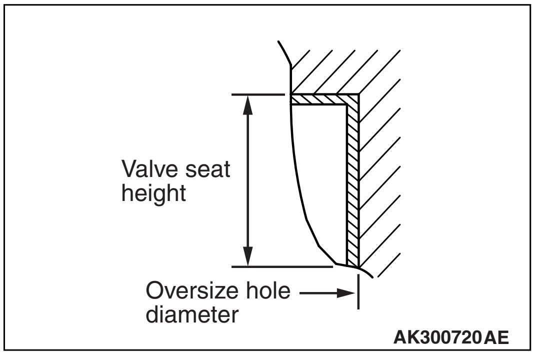


1. Check clearance between valve guide and valve and replace the valve guide if necessary before repairing the valve seat.
2. Repair the valve seat so that seat width and seat angle are to the specified shape.
3. Lap valve and valve seat with lapping compound after repairing valve seat.

REPLACEMENT PROCEDURE OF VALVE SEAT



1. Scrape the valve seat to be replaced from inside to make its wall thickness thin before pulling out.



2. Repair the valve seat hole of the cylinder head to match it with the diameter of the oversize valve seat to be press fitted.

   Intake valve seat bore diameter:
   0.3 O.S.: 36.22 –36.24 mm (1.426 –1.427 inches)

   Exhaust valve seat bore diameter:
   0.3 O.S.: 30.22 –30.24 mm (1.190 –1.191 inches)

3. Press fit the valve seat, taking care not to score the cylinder head bore at room temperature.
4. Ream the valve seat.
   Refer to "Repair procedure of valve seat."

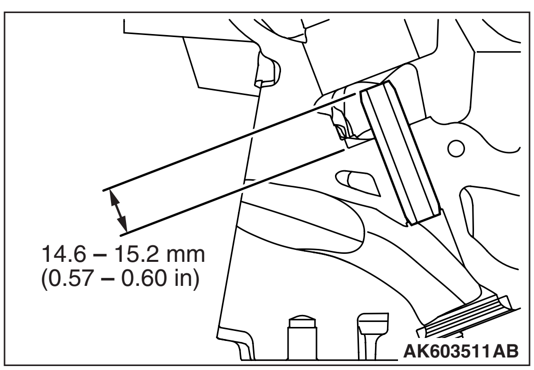
REPLACEMENT PROCEDURE OF VALVE GUIDE

1. Pull out the valve guide with a press toward the cylinder block side.
2. Ream the valve guide hole of the cylinder head to match it with the diameter of the oversize valve guide to be press fitted.

⚠ CAUTION

Do not use a valve guide with the same size as that of the pulled out valve guide because it cannot be press fitted.

   Valve guide bore diameter
   0.25 O.S.: 11.23 –11.25 mm (0.442 –0.443 inch)



3. Press fit the valve guide to the illustrated dimension.

   Standard value: 14.6 –15.2 mm (0.57 –0.60 inch)

   NOTE: Press fit the valve guide from the cylinder head top surface.

4. After pressing fit the valve guide, insert a new valve to check for sliding.

OIL PUMP CHAIN

REMOVAL AND INSTALLATION

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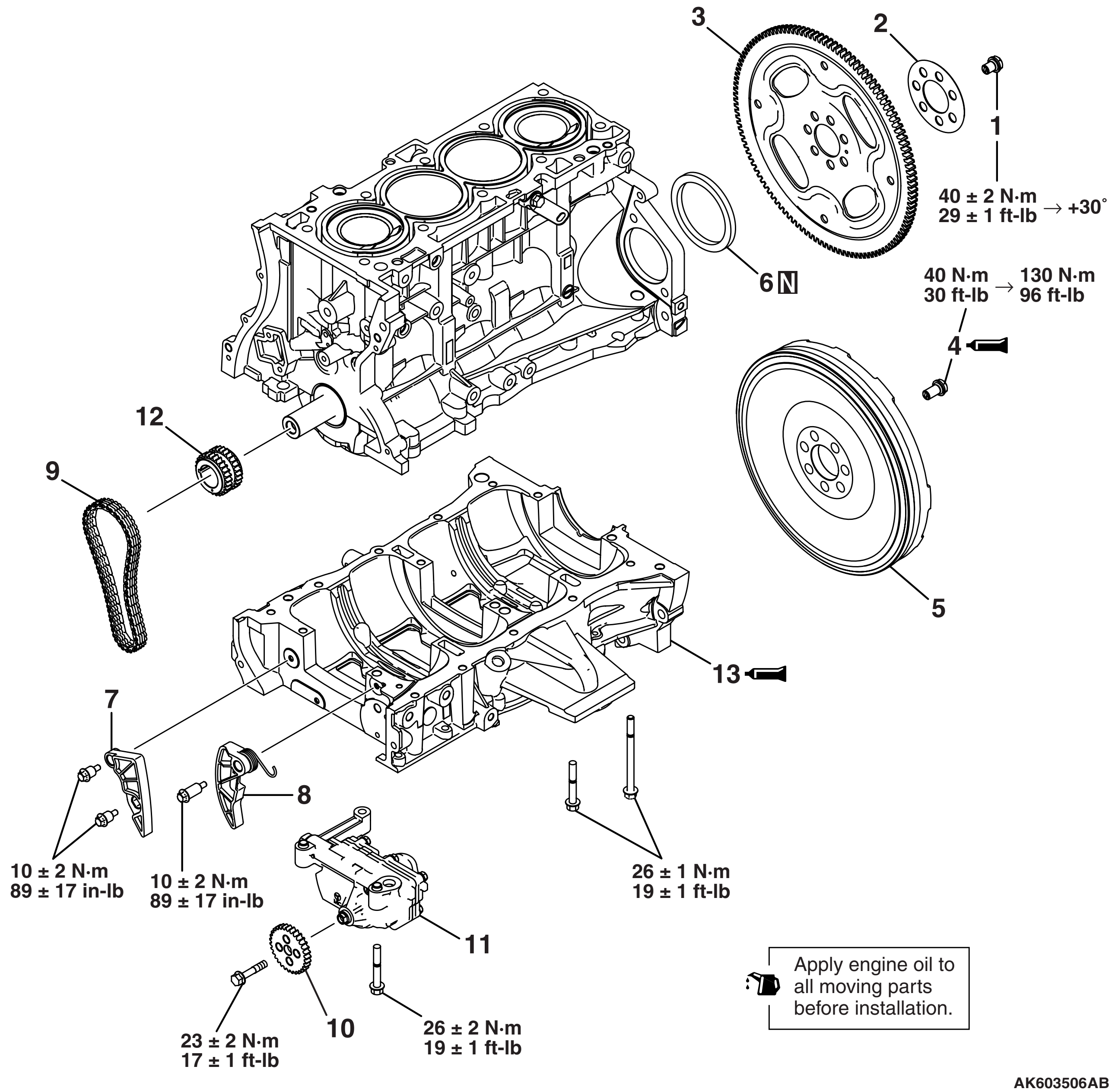


Removal steps

<<A>>	>>F<<	1. Drive plate bolt <CVT>
		2. Adapter plate <CVT>
		3. Drive plate <CVT>
<<A>>	>>E<<	4. Flywheel bolt <M/T>
		5. Flywheel <M/T>
	>>D<<	6. Rear oil seal
	>>C<<	7. Oil pump chain guide

Removal steps (Continued)

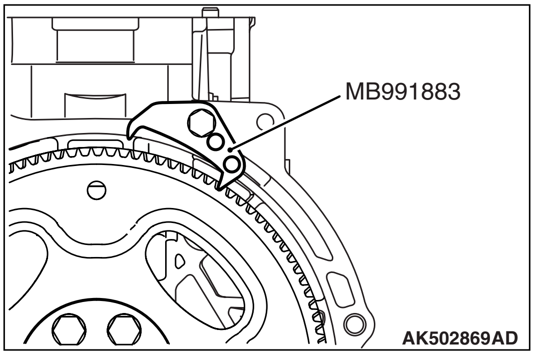
	>>C<<	8. Oil pump tensioner lever
	>>C<<	9. Oil pump chain
<<B>>	>>C<<	10. Oil pump sprocket
		11. Oil pump case
	>>B<<	12. Crankshaft sprocket
<<C>>	>>A<<	13. Ladder frame

Required Special Tools:

- MB991367: Special Spanner
- MB991385: Pin
- MB991614: Angle Gauge
- MB991883: Flywheel Stopper
- MD998718: Rear Oil Seal Installer

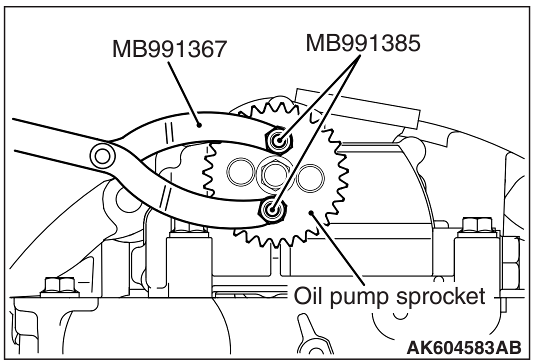
REMOVAL SERVICE POINTS

<<A>> DRIVE PLATE BOLT / FLYWHEEL BOLT REMOVAL



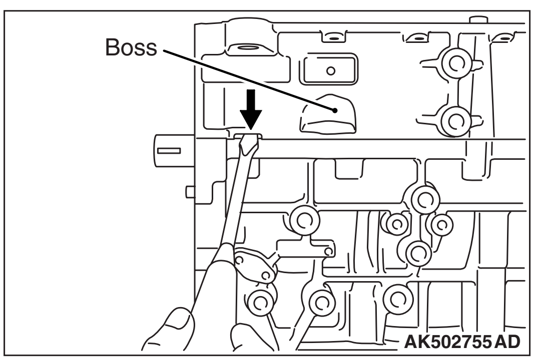
1. Use special tool MB991883 to secure the drive plate or flywheel.
2. Remove the drive plate bolts or flywheel bolts.

<<B>> OIL PUMP SPROCKET REMOVAL

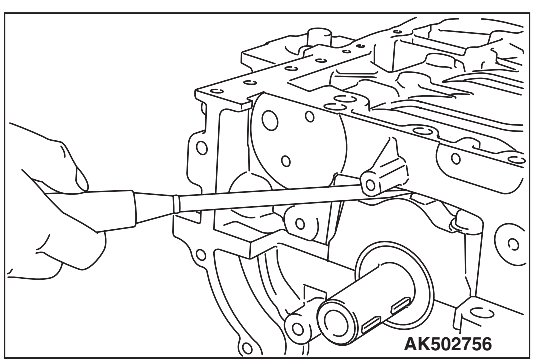


Fix the oil pump sprocket with a special tools MB991367 and MB991385, loosen a center bolt, and remove the oil pump sprocket.

<<C>> LADDER FRAME REMOVAL



1. Pry the illustrated position with a screwdriver or tap the boss with a hammer.



2. If the ladder frame does not come off, insert a flatblade screwdriver into the gap between the ladder frame and bearing cap as shown in the illustration and lightly pry it to remove the ladder frame.

INSTALLATION SERVICE POINTS

>>A<< LADDER FRAME INSTALLATION

⚠ **CAUTION**

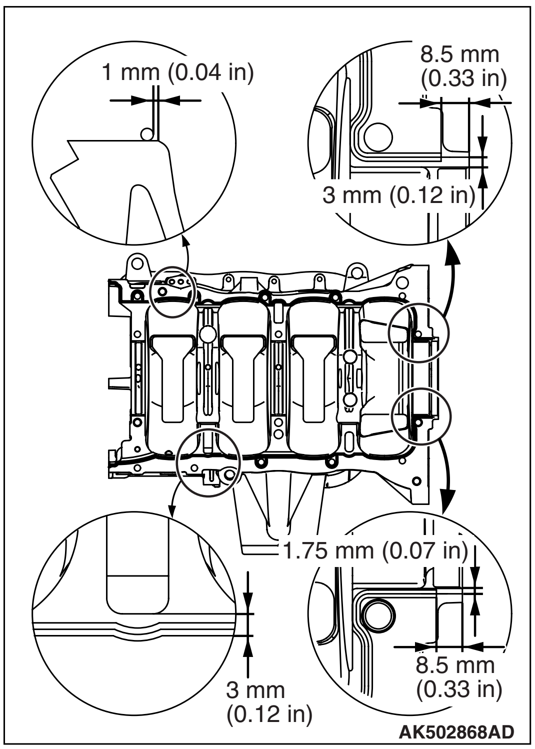
Be sure to remove liquid gasket that has entered mounting holes.

1. Completely remove liquid gasket adhering to the cylinder block and ladder frame.

⚠ **CAUTION**

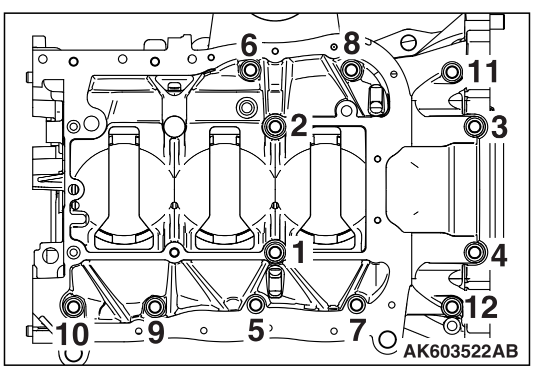
Sufficiently check that there is no residual oil on the place where degreasing is performed. If fingerprints are left, do not touch it with bare hands after the degreasing, since the oils from your fingers will harm the seal ability.

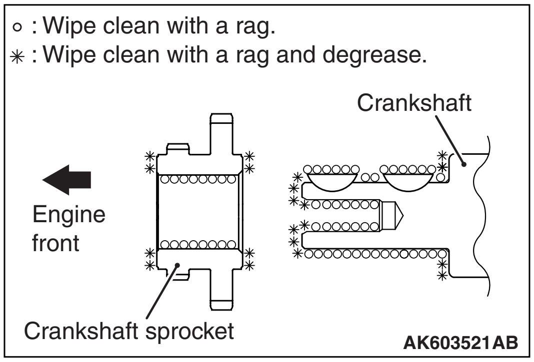
2. Using white gasoline and so on, degrease the surface where the liquid gasket is applied and the contact surface between the cylinder block and ladder frame.
3. Squeeze liquid gasket (Three bond 1217G, LOCTITE 5900, 5970, 5971 or equivalent) of φ2 to 3 mm (0.08 to 0.12 inch) in thickness and apply it to the illustrated position of the ladder frame.



4. Tighten the ladder frame to the specified torque in the order shown in the illustration.

   Specified torque: 26 ± 1 N· m (19 ± 1 ft-lb)



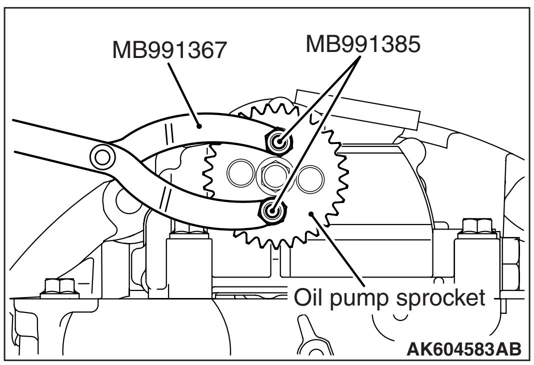


>>B<< CRANKSHAFT SPROCKET INSTALLATION

1. Wipe off the dirt on the crankshaft sprocket and the crankshaft using a rag, and then remove the grease from the portion shown in the illustration.

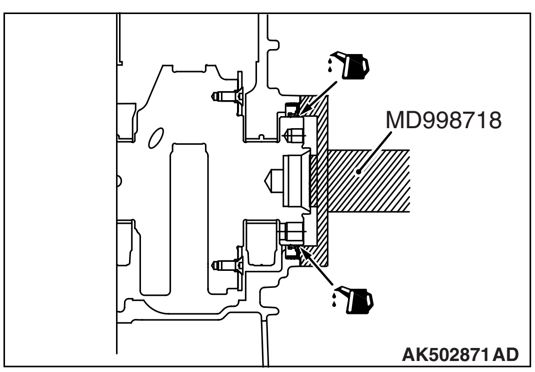
   NOTE: Remove grease to prevent a drop in the coefficient of friction of the pressing portion caused by adhesion of oil.
2. Set the No. 1 piston at top dead center on the compression stroke.
3. Install the crankshaft sprocket to the crankshaft.

>>C<< OIL PUMP SPROCKET / OIL PUMP CHAIN / OIL PUMP CHAIN GUIDE / OIL PUMP TENSIONER LEVER INSTALLATION



1. Set the No. 1 piston at top dead center on the compression stroke.
2. Using the special tools MB991367 and MB991385, install the oil pump sprocket to the oil pump case.
3. Install the oil pump chain to the crankshaft sprocket.
4. Install the oil pump chain to the oil pump sprocket.

>>D<< REAR OIL SEAL INSTALLATION



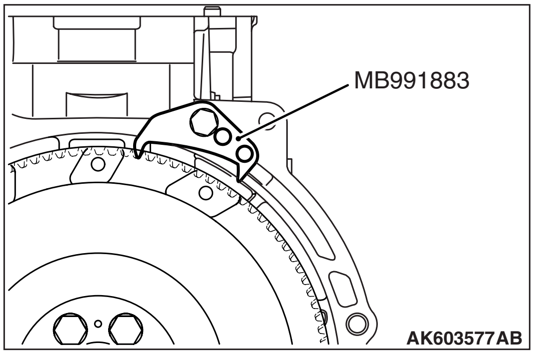
⚠ CAUTION

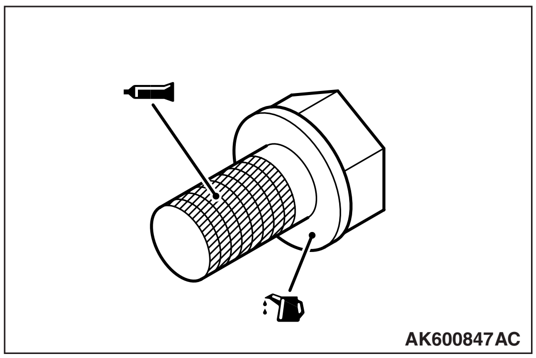
Do not apply oil to the circumference of the oil seal and oil seal pressing hole on the cylinder block side to prevent teeth from pulling out.

After applying a small amount of engine oil to the oil seal lip, use special tool MD998718 to press fit the oil seal.

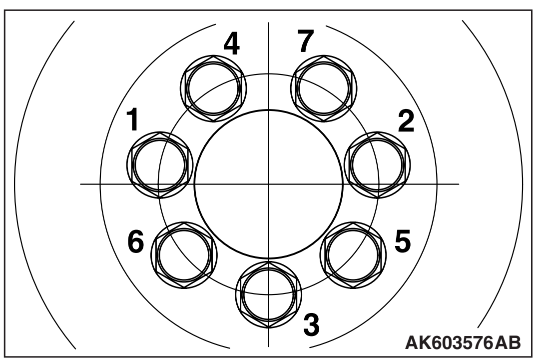
>>E<< FLYWHEEL BOLT INSTALLATION

1. Clean off sealant and oil of thread of crankshaft and flywheel bolt.
2. Use special tool MB991883 to secure the flywheel.





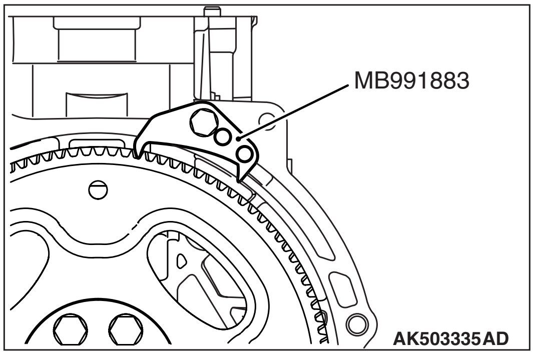
3. Apply engine oil to thread of crankshaft and bolt seat area of flywheel.
4. Apply the sealant (LOCTITE 262 or equivalent) to the thread of flywheel bolt.



5. Tighten flywheel bolts to temporary torque 40 N· m (30 ft-lb) in the order shown to illustration.
6. Tighten flywheel bolts to specified torque in the order shown in the illustration.

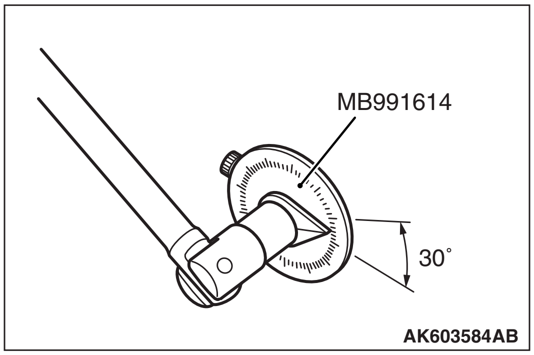
   Specified torque: 130 N· m (96 ft-lb)

>>F<< DRIVE PLATE BOLT INSTALLATION



1. Use special tool MB991883 to secure the drive plate.
2. Clean off sealant and oil of thread of crankshaft and drive plate bolt.
3. Tighten drive plate bolts to specified torque.

   Specified torque: 40 ± 2 N· m (29 ± 1 ft-lb)



⚠ CAUTION

- **If the tightening angle is less than 30°, tightening performance may not be secured. Use caution to the tightening angle during tightening.**
- **If the tightening angle becomes more than 30°, completely loosen bolts and start tightening over again according to the procedure.**

4. Use special tool MB991614 to tighten bolts 30° according to the tightening order.

PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION

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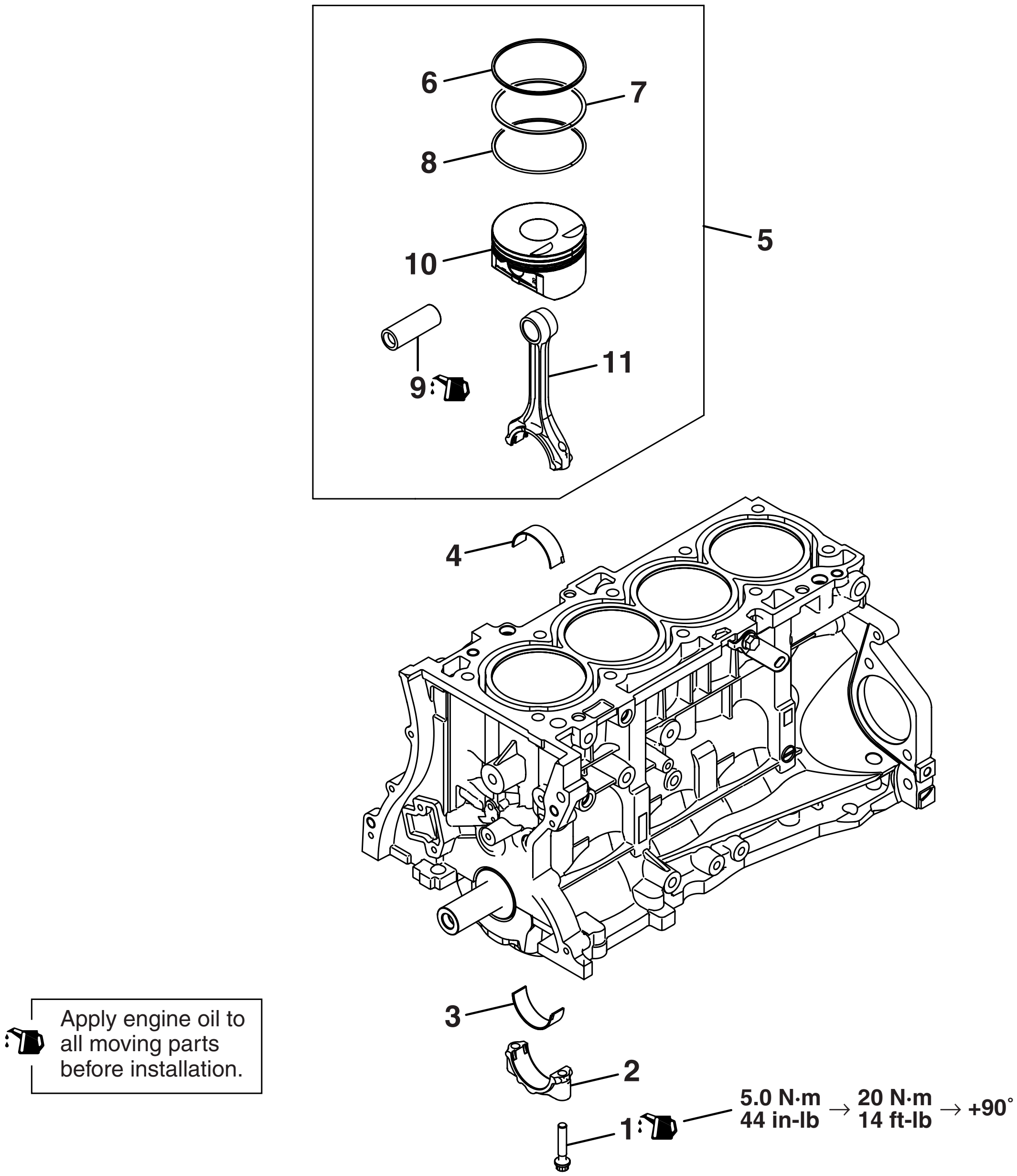

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			Removal steps
	>>G<<	1.	Connecting rod cap bolt
<<A>>	>>F<<	2.	Connecting rod cap
	>>E<<	3.	Connecting rod bearing
	>>E<<	4.	Connecting rod bearing
	>>D<<	5.	Piston connecting rod assembly
	>>C<<	6.	Piston ring No. 1

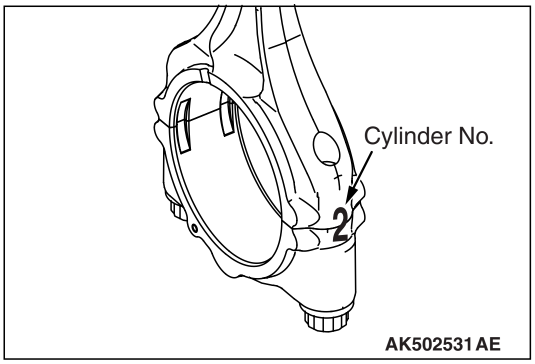
			Removal steps (Continued)
	>>C<<	7.	Piston ring No. 2
	>>B<<	8.	Oil ring
<<B>>	>>A<<	9.	Piston pin
		10.	Piston
		11.	Connecting rod

Required Special Tools:

- MD998780: Piston Setting Tool
- MB991659: Guide D

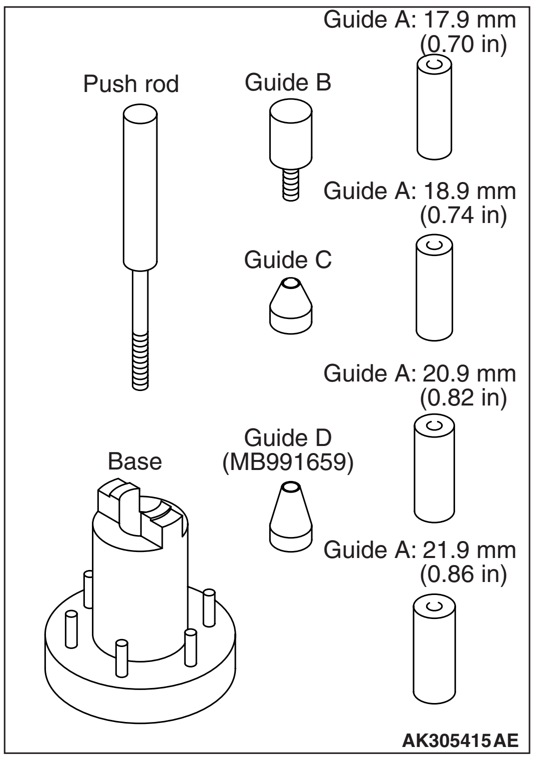
REMOVAL SERVICE POINTS

<<A>> CONNECTING ROD REMOVAL

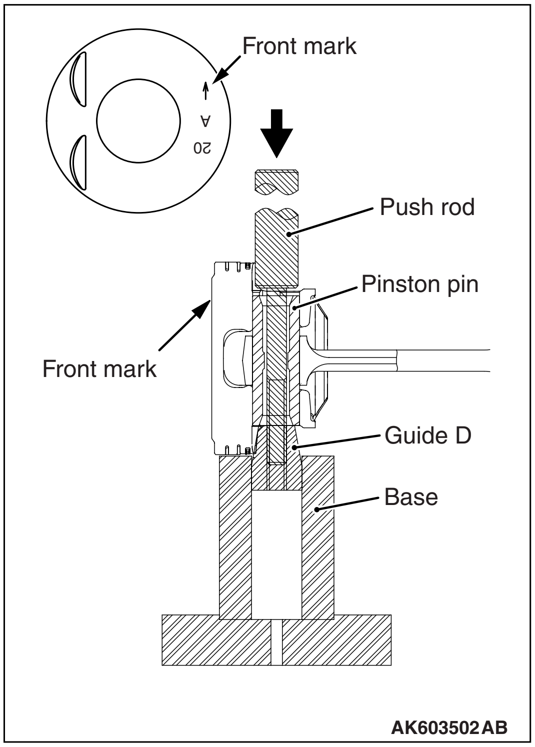


Mark the connecting rod on the big end with the cylinder number it is being removed from.

<<B>> PISTON PIN REMOVAL



Special tool MD998780 consists of parts shown in the illustration. Also use special tool MB991659 to remove the piston pin.

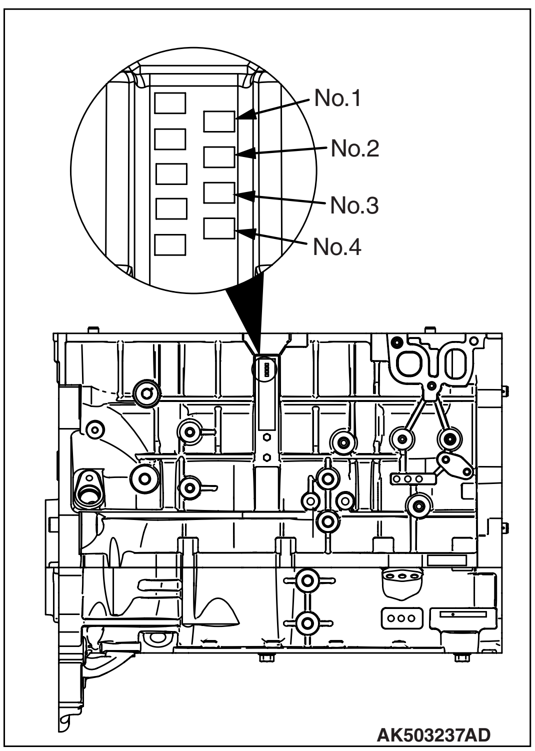


1. Insert the push rod into the piston pin from the front mark side of the piston top surface, and attach special tool MB991659.
2. Set the piston and connecting rod assembly on the base so that the front mark of the piston faces upward.
3. Use a press to push the push rod and pull out the piston pin.

   NOTE: After pulling out the piston pin, organize pistons, piston pins and connecting rods by cylinder No.

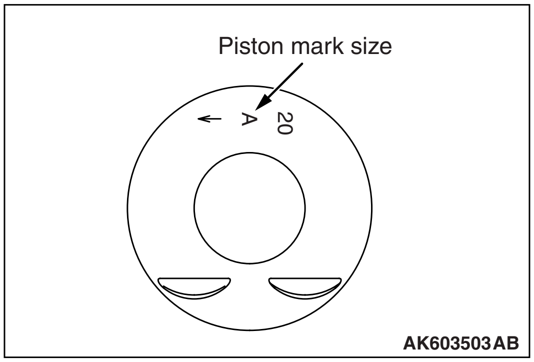
INSTALLATION SERVICE POINTS

>>A<< PISTON PIN INSTALLATION



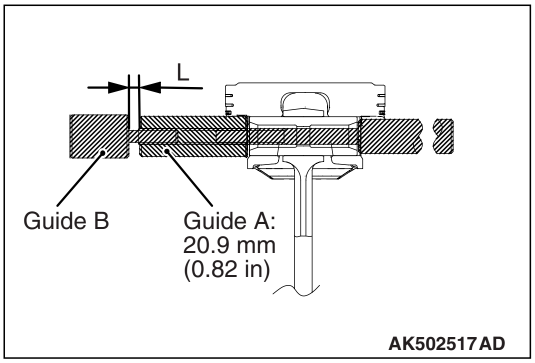
1. When replacing a piston, check the cylinder bore size mark stamped on the illustrated position of the cylinder block and select a corresponding piston from the table below.

Cylinder bore size mark	Piston size mark
A	A
B	B
C	C



NOTE: The piston size mark is indicated on the piston top face.

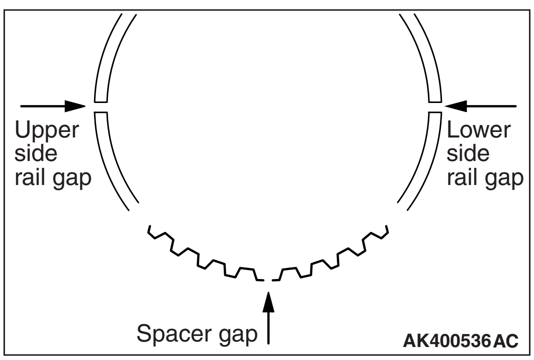
2. Insert the push rod into the piston pin and attach guide A.
3. Align the front mark of the piston with that of the connecting rod to assemble.
4. Apply engine oil to the circumference of the piston pin.
5. Insert the guide A side of the piston pin assembled in section 1 into the pin hole from the front mark side of the piston.



6. Screw guide B into guide A and open clearance between guide A and guide B by 3 mm (0.12 inch) (make the base in line with flushed surface) to assemble.
7. Set the piston on special tool piston setting base so that its front mark faces upward.
8. Use a press to press fit the piston pin. If the press fit load is below the standard value, replace the piston pin (piston assembly) or connecting rod, or both.

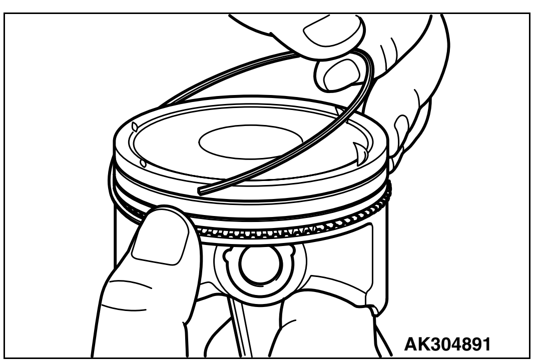
   Standard value: 7,500 − 17,500 N (1,686 − 3,934 pound)

>>B<< OIL RING INSTALLATION



1. Assemble the spacer of the oil ring into the piston ring groove. Then, assemble the upper side rail, and after this assemble the lower side rail.

   NOTE: Install the side rail and end gap of the spacer so that they are at the position as shown in the illustration.

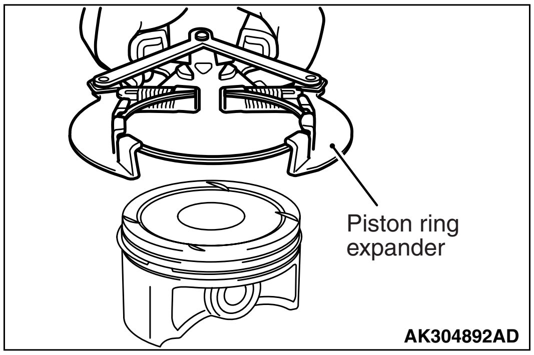


⚠ CAUTION

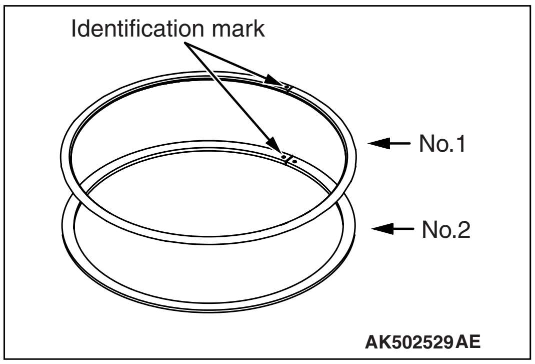
The side rail may be broken if its end gap is widened by a ring expander as in other piston rings.

2. When assembling the side rail, push it by fingers, after fitting one end of the side rail into the piston groove, for easy assembly.
3. After assembling the oil ring into the piston, make sure that the side rail turns smoothly to either direction.

>>C<< PISTON RING NO. 2 / PISTON RING NO. 1 INSTALLATION



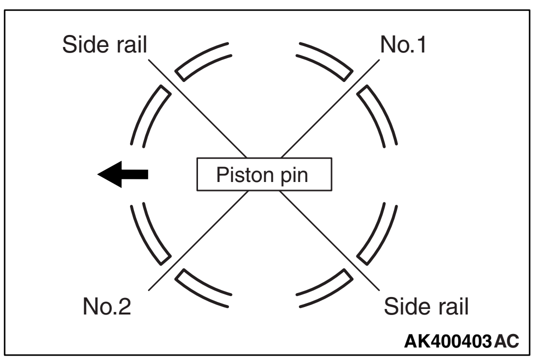
Use a piston ring expander to assemble piston rings with their identification marks facing upward. Piston rings can be assembled by hand without using the piston ring expander.



Identification mark
No. 1 ring: 1T
No. 2 ring: 2T

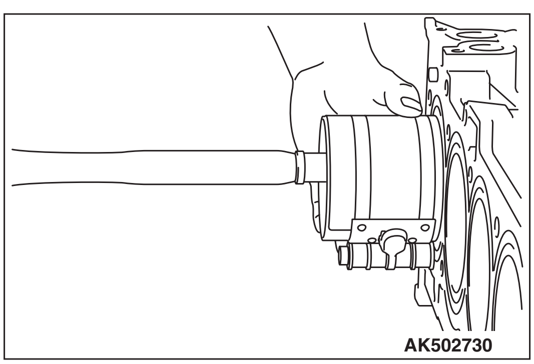
>>D<< PISTON CONNECTING ROD ASSEMBLY INSTALLATION

1. Apply a sufficient amount of engine oil to the circumference of the piston, piston rings and oil ring.
2. Arrange end gap positions of piston rings and oil ring (side rail and spacer) as shown in the illustration.
3. Insert the piston and connecting rod assembly from the top surface of the cylinder block with the front mark of the piston top face facing toward the timing chain side.

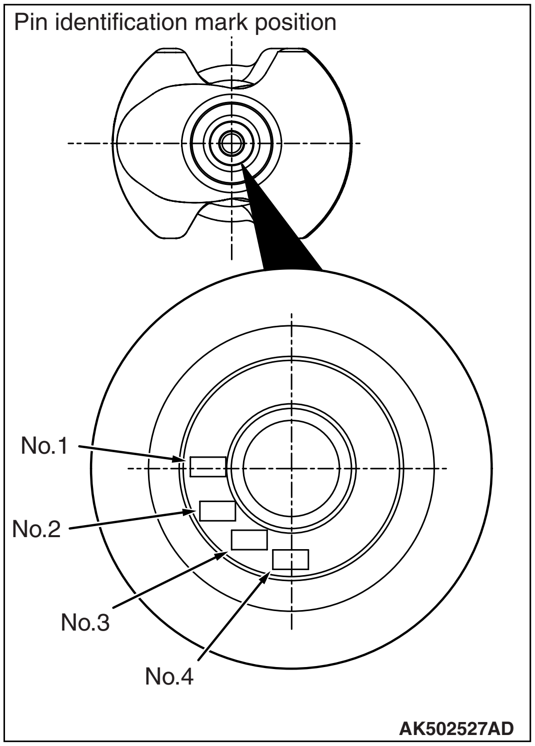


⚠ CAUTION
Driving it in hard causes breakage of piston rings and damage to the crank pin.

4. Firmly tighten the piston ring with a ring band and insert the piston and connecting rod assembly.

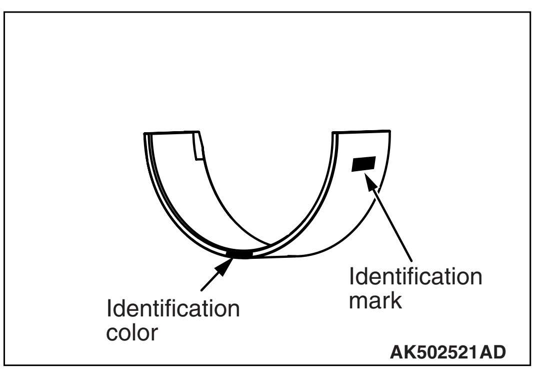


>>E<< CONNECTING ROD BEARING INSTALLATION



1. When replacing a connecting rod bearing, select the bearing corresponding to the crankshaft pin outside diameter according to the crankshaft pin identification in the table below.

Crankshaft pin		Connecting rod bearing	
Identification mark	**Journal diameter mm (in)**	**Identification color**	**Identification mark**
1	47.966 –47.972 (1.8884 –1.8887)	Black	1
2	47.960 –47.966 (1.8882 –1.8884)	None	2
3	47.954 –47.960 (1.8880 –1.8882)	Green	3

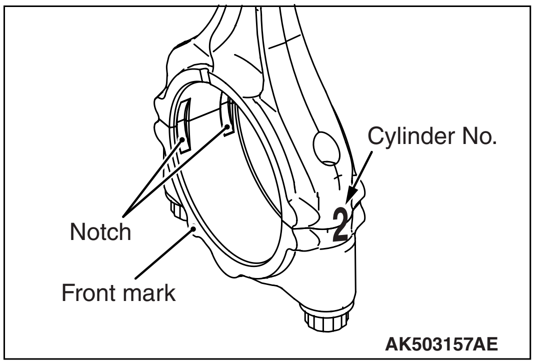


2. An identification mark of a crankshaft is stamped at the illustrated position by No.
3. A connecting rod bearings an identification color or identification mark at the illustrated position.

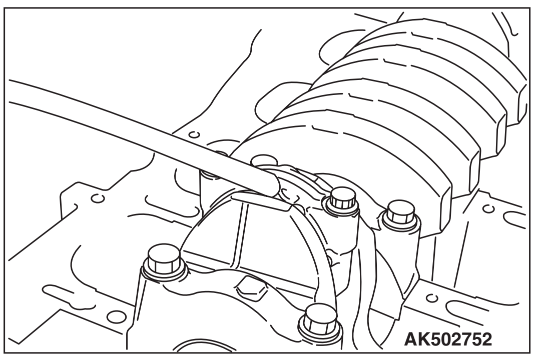
>>F<< CONNECTING ROD CAP INSTALLATION

NOTE: The connecting rod resulting from the breaking process has the high insertion force. The new connecting rod assembly may possibly be difficult to remove the connecting rod.
If difficult to remove it, alternately strike the two bolt heads with a plastic hammer while the connecting rod bolt is slightly loosened, or strike the center of the cap shaft's inside diameter slightly and outward.

If the outside of the cap is directly struck, the lateral force is added to the broken-out section. Thus, pay attention to the broken-out section that might be difficult to be separated or might fall.
Clean the broken-out section before the installation to the engine, using compression air.



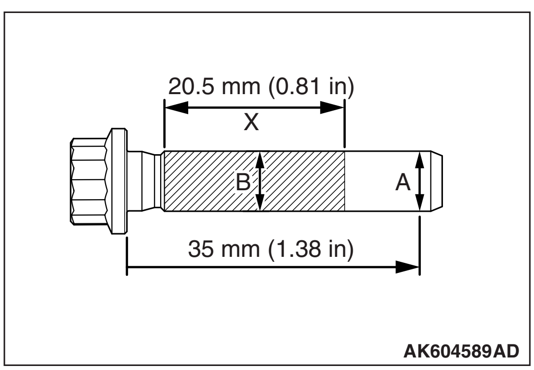
1. Assemble the bearing cap on the connecting rod by aligning it with the mark put during removal. If a new connecting rod without a mating mark is used, assemble so that the detent notch of the bearing is on the same side as illustrated.



2. Make sure that clearance of the thrust of the connecting rod big end is appropriate.

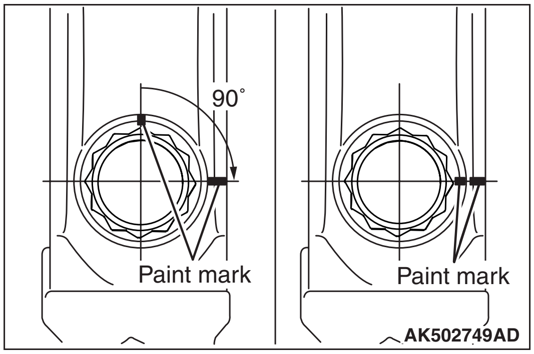
   Standard value: 0.10 −0.25 mm (0.004 −0.010 inch)
   Limit: 0.4 mm (0.016 inch)

>>G<< CONNECTING ROD CAP BOLT INSTALLATION



1. Check in the following procedure before reusing the connecting rod bolt.
   (1) Measure the outside diameter "A."
   (2) Measure the smallest outside diameter "B" within the range "X" shown in the illustration.
   (3) If the difference of outside diameter of thread exceeds the limit, replace the connecting rod bolt.

   Limit: 0.1 mm
2. Apply engine oil to the threaded portion and seat surface of the bolt before installing it.
3. After installing each bolt and tightening it by fingers, tighten bolts alternately to properly assemble the cap.
4. Tighten the bolt in several steps until the torque reaches 5.0 N· m (44 in-lb).
5. Tighten the bolt in several steps until the torque reaches 20 N· m (15 ft-lb).



6. Put a paint mark on the bolt head as illustrated.
7. Put a paint mark on the connecting rod at 90° position in the tightening direction of the bolt with reference to the paint mark position of the bolt.

⚠ CAUTION

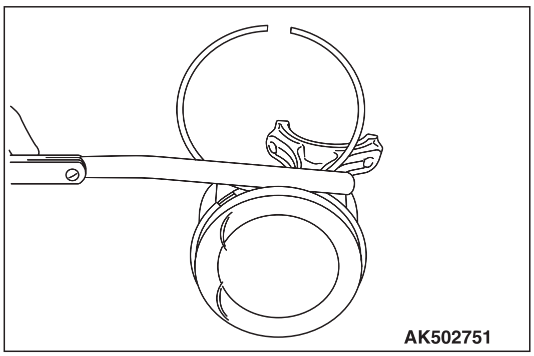
- **If the tightening angle is less than 90°, tightening performance may not be secured. Use caution to the tightening angle during tightening.**
- **If the tightening angle becomes more than 90°, completely loosen the bolt and start tightening over again according to the procedure.**

8. Tighten the bolt 90°, and make sure that the paint mark of the connecting rod is aligned with that of the bolt.

INSPECTION

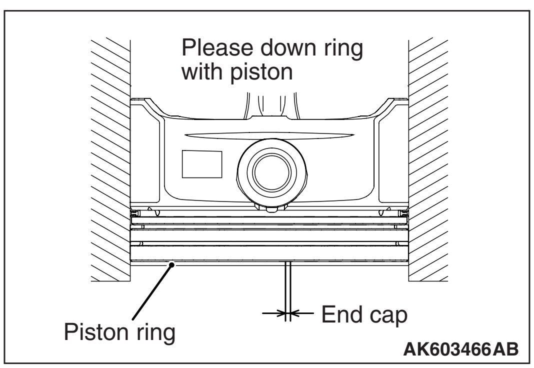
M1113008501368

PISTON RINGS



1. Check clearance between piston rings and ring grooves. If the limit is exceeded, replace piston rings or piston, or both.

Standard value:
No. 1 ring: 0.03 – 0.07 mm (0.001 – 0.003 inch)
No. 2 ring: 0.03 – 0.07 mm (0.001 – 0.003 inch)
Limit: 0.1 mm (0.004 inch)



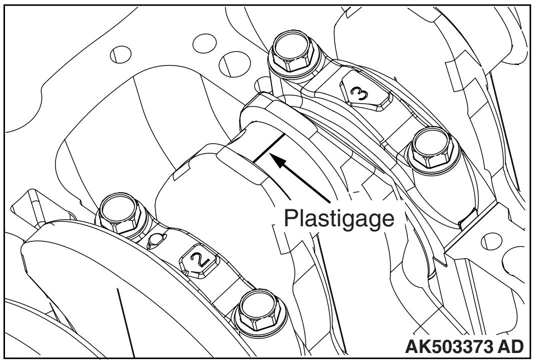
2. Put piston rings into the cylinder bore, press them against the piston top face, and push them in. After achieving squareness, measure the end gap with a thickness gauge. If the end gap is excessive, replace piston rings.

Standard value:
No. 1 ring: 0.15 – 0.28 mm (0.006 – 0.011 inch)
No. 2 ring: 0.30 – 0.45 mm (0.012 – 0.018 inch)
Oil ring: 0.10 – 0.35 mm (0.004 – 0.014 inch)

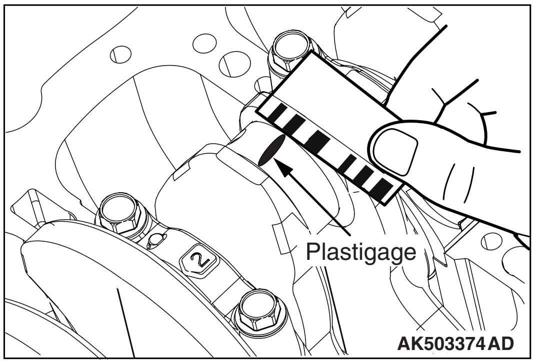
Limit:
No. 1 ring: 0.8 mm (0.03 inch)
No. 2 ring: 0.8 mm (0.03 inch)
Oil ring: 1.0 mm (0.04 inch)

CRANKSHAFT PIN OIL CLEARANCE (PLASTIGAGE METHOD)

1. Wipe oil off the crankshaft pin and connecting rod bearing.
2. Place a plastigage in length equal to the bearing width on the pin shaft straight in alignment with the shaft center.



3. Carefully install the connecting rod cap and tighten bolts to the specified torque of 5.0 N· m (44 in-lb) → 20 N· m (15 ft-lb) → +90° .
4. Remove bolts and gently remove the connecting rod cap.



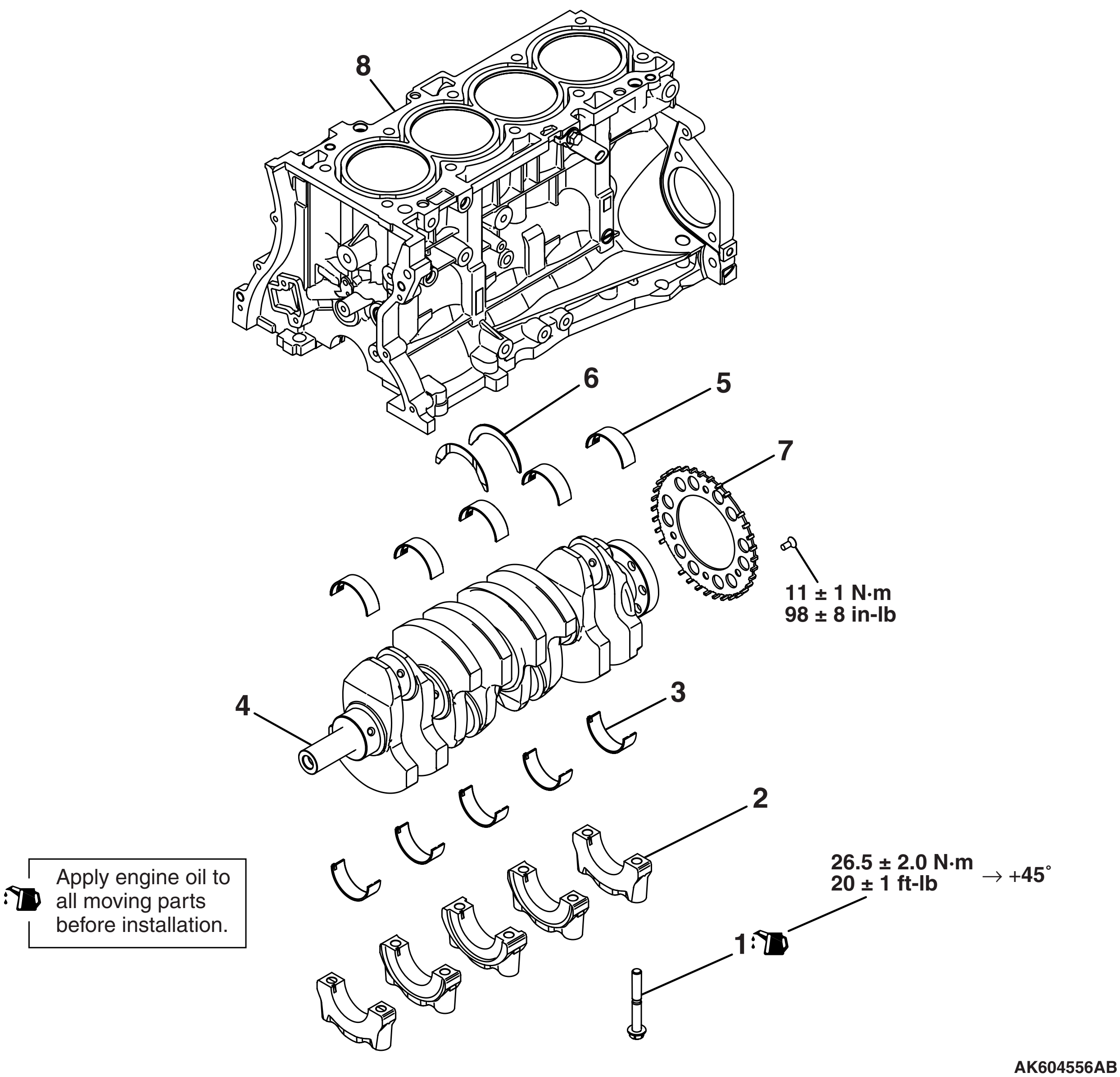
5. Measure the crushed plastigage width (area most widely crushed) using a scale printed on the plastigage bag.

   Standard value: 0.018 – 0.045 mm (0.0007 – 0.0018 inch)
   Limit: 0.1 mm (0.004 inch)

CRANKSHAFT AND CYLINDER BLOCK

REMOVAL AND INSTALLATION

M1113008702105



		Removal steps
>>E<<	1.	Crankshaft bearing cap bolt
>>E<<	2.	Crankshaft bearing cap
>>D<<	3.	Crankshaft bearing lower
<<A>>	4.	Crankshaft

		Removal steps (Continued)
>>C<<	5.	Crankshaft bearing upper
>>B<<	6.	Thrust bearing
>>A<<	7.	Crankshaft sensing ring
	8.	Cylinder block

Required Special Tool:

- MB991614: Angle Gauge

REMOVAL SERVICE POINT

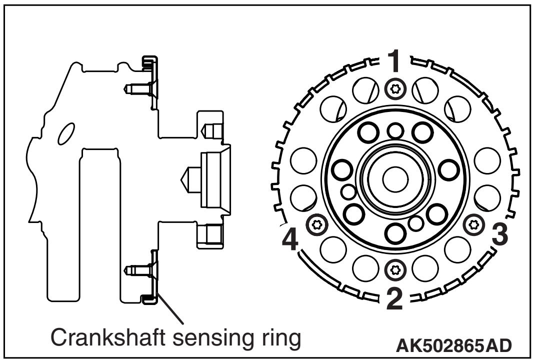
<<A>> CRANKSHAFT REMOVAL

After removing the crankshaft with the crankshaft sensing ring attached, temporarily place it on a V-block to prevent teeth of the sensing ring from deforming.

NOTE: If a tooth bends, be sure to replace the crankshaft sensing ring with a new one.

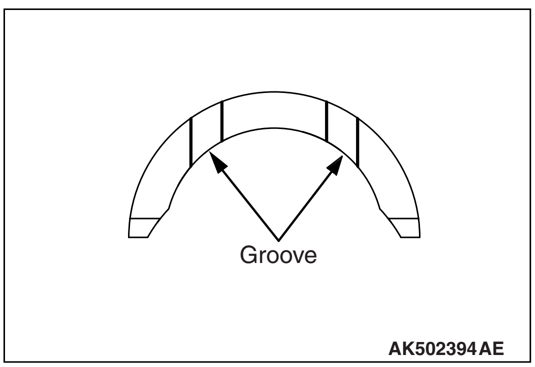
INSTALLATION SERVICE POINTS

>>A<< CRANKSHAFT SENSING RING INSTALLATION



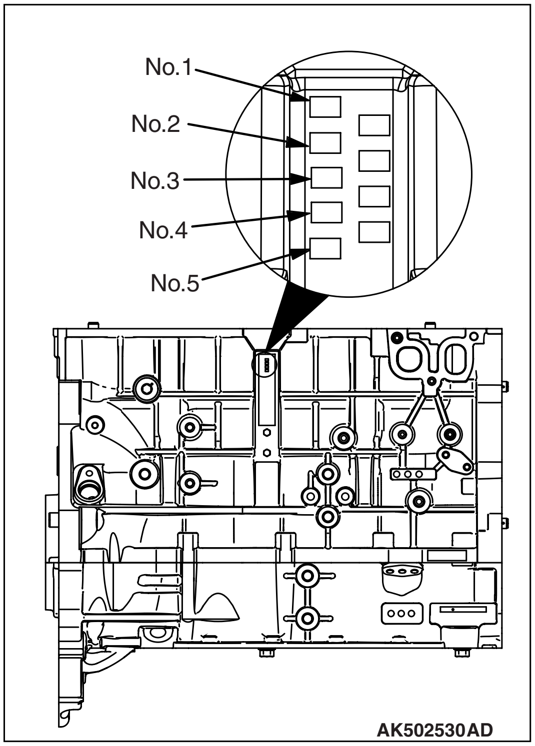
Tighten crankshaft sensing ring bolts to the torque of 11 ± 1 N· m in the tightening order shown in the illustration.

>>B<< THRUST BEARING INSTALLATION

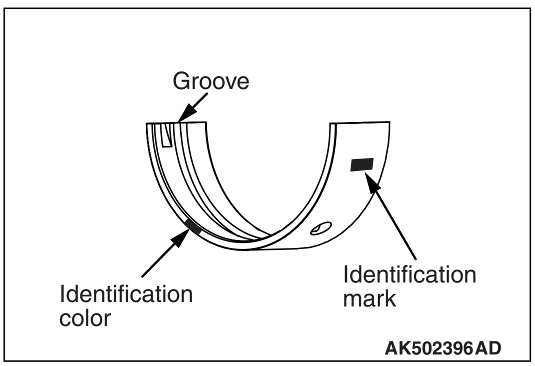


1. Install the thrust bearing on the No. 3 bearing on the cylinder block side. Application of engine oil makes the installation easier.
2. Install the thrust bearing so that the grooved side is on the crankshaft weight side.

>>C<< CRANKSHAFT BEARING UPPER INSTALLATION



1. When replacing the crankshaft bearing upper, select a bearing with the size corresponding to the crankshaft journal diameter in the table below.

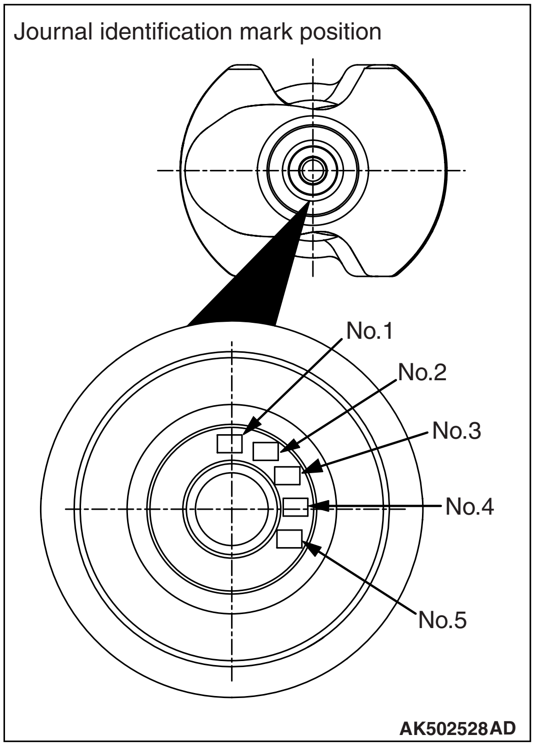


2. The crankshaft bearing upper has an identification color or identification mark at the illustrated position.

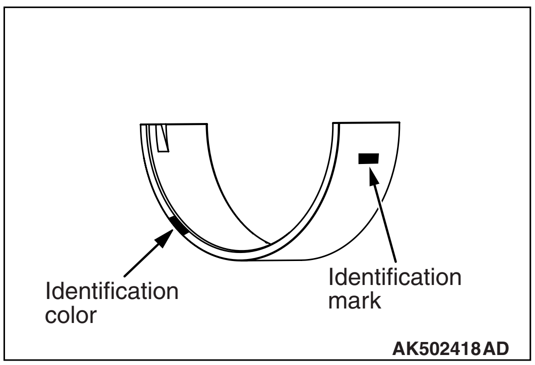
Cylinder block		Crankshaft bearing	
Identification mark	Journal diameter mm (in)	Identification color	Identification mark
1	56.000 –56.006 (2.2047 –2.2050)	Black	1
2	56.006 –56.012 (2.2050 –2.2052)	None	2
3	56.012 –56.018 (2.2052 –2.2054)	Green	3

3. Install the selected crankshaft bearing upper.

>>D<< CRANKSHAFT BEARING LOWER INSTALLATION



1. When replacing the crankshaft bearing lower, select a bearing with the size corresponding to the crankshaft journal diameter in the table below.

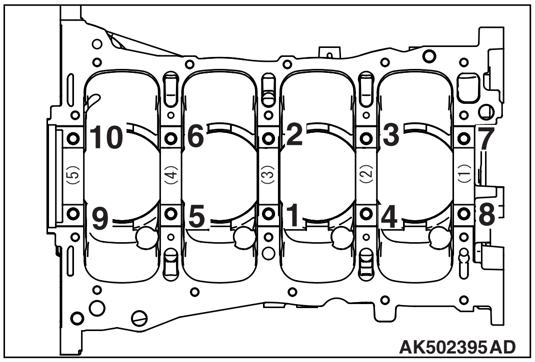


2. The crankshaft bearing lower has an identification color or identification mark at the illustrated position.

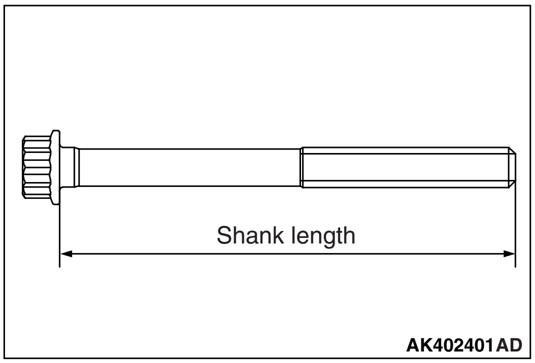
Crankshaft		Crankshaft bearing	
Identification mark	**Journal diameter mm (in)**	**Identification color**	**Identification mark**
0	51.985 –51.988 (2.0467 –2.0468)	Pink or red	0
1	51.982 –51.985 (2.0465 –2.0467)	Black	1
2	51.979 –51.982 (2.0464 –2.0465)	None	2
3	51.976 –51.979 (2.0463 –2.0464)	Green	3
4	51.973 –51.976 (2.0462 –2.0463)	Blue	4

3. Install the selected crankshaft bearing lower.

>>E<< CRANKSHAFT BEARING CAP / CRANKSHAFT BEARING CAP BOLT INSTALLATION



1. Install the crankshaft bearing cap with reference to the identification mark as illustrated.



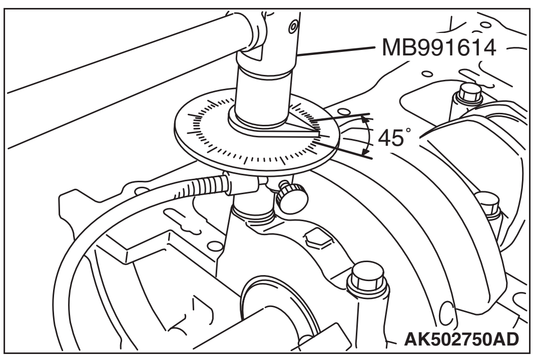
2. Make sure that the underhead length of the bolt is at or below the limit before installing the crankshaft bearing cap bolt. If the length exceeds the limit, replace the bolt with a new one.

   Limit: 75.3 mm (2.96 inch)

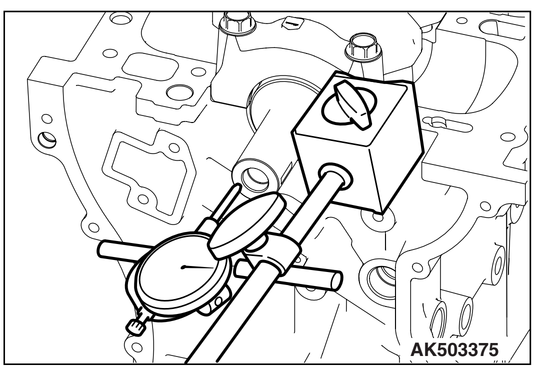
3. Apply engine oil to the threaded portion and seat surface of the bolt.
4. Tighten crankshaft bearing cap bolts to the torque of 26.5 ± 2.0 N· m (20 ± 1 ft-lb) according to the tightening order.

⚠ CAUTION

- **If the tightening angle is less than 45°, tightening performance may not be secured. Use caution to the tightening angle during tightening.**
- **If the tightening angle becomes more than 45°, completely loosen bolts and start tightening over again according to the procedure.**



5. Use special tool MB991614 to tighten bolts 45° according to the tightening order.



6. Check end play of the crankshaft after installing the crankshaft bearing cap. If the end play exceeds the limit, replace the thrust bearing.

   Standard value: 0.05 − 0.25 mm (0.002 − 0.010 inch)
   Limit: 0.4 mm (0.016 inch)

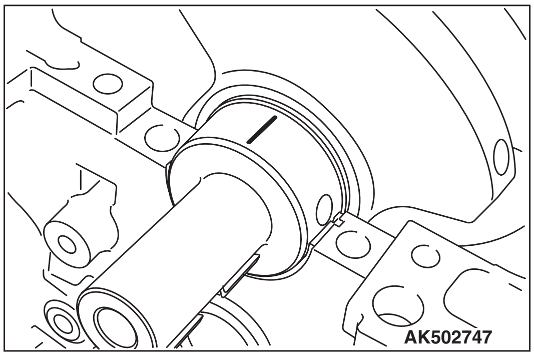
INSPECTION

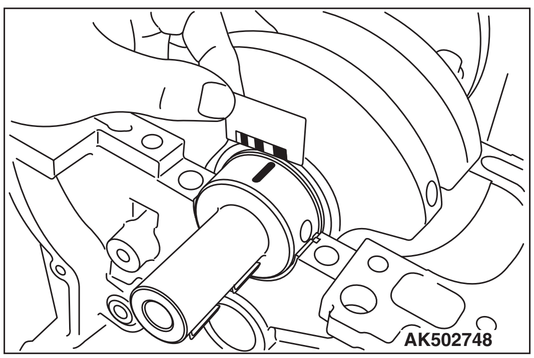
M1113008801381

CRANKSHAFT OIL CLEARANCE (PLASTIGAGE METHOD)

Oil clearance can be easily measured by using a "plastigage." When using a "plastigage," perform measurement in the following procedure.

1. Fully wipe oil off the outside diameter of the crankshaft and inside diameter of the bearing.
2. Assemble the crankshaft.
3. Place a plastigage in length equal to the bearing width on the journal shaft straight in alignment with the shaft center.
4. Carefully install the bearing cap and tighten the bolt according to the main point of installation >>B<<.
5. Remove the bolt, and then carefully remove the crankshaft bearing cap.





6. Measure the crushed plastigage width (area most widely crushed) using a scale printed on the plastigage bag.

   Standard value: 0.012 −0.030 mm (0.0005 −0.0012 inch)
   Limit: 0.1 mm (0.004 inch)

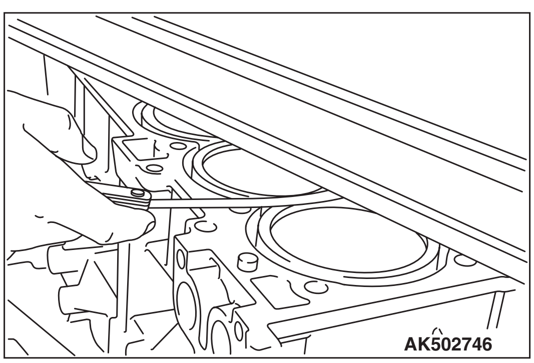
CYLINDER BLOCK

1. Visually check the cylinder block for scratch, rust and corrosion. Use a flaw detecting agent to check for cracks. If it is found faulty, repair or replace it.
2. Measure distortion on the top surface of the cylinder block using a straight edge and thickness gauge.

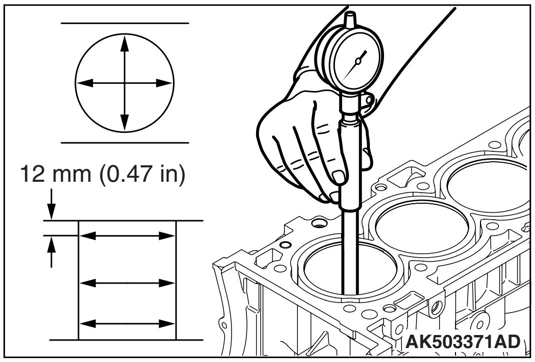
   If distortion exceeds the limit, grind and repair it.

   A gasket or the like must not be adhered to the top surface of the cylinder block during measurement.

   Distortion on bottom
   Standard value: Within 0.05 mm (0.0020 inch)
   Limit: 0.02 mm (0.0008 inch)
   Grinding limit: 0.2 mm (0.008 inch)



3. Check the cylinder wall for scratch or seizure. If there is any defect, replace the cylinder block.



4. Measure the bore and cylindricity of the cylinder using a cylinder gauge.
   If the cylinder is excessively worn, repair the cylinder and replace the piston and piston rings.
   Measuring points are as shown in the illustration.
   Standard value
   Cylinder bore: 86 mm (3.4 inches)
   Cylindricity: 0.15 mm (0.006 inch)

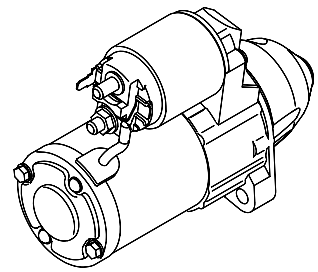
GROUP 16

ENGINE ELECTRICAL

CONTENTS

STARTER MOTOR

M2161002000160

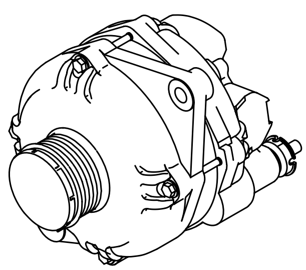


AK603841

The starter motor is a reduction drive planetary gear type.

ALTERNATOR

M2162001000126

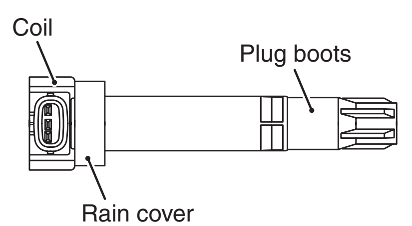


AK603842

The alternator is a battery detection type.
It uses a pulley with a one-way clutch.

IGNITION COIL

M2163001000174

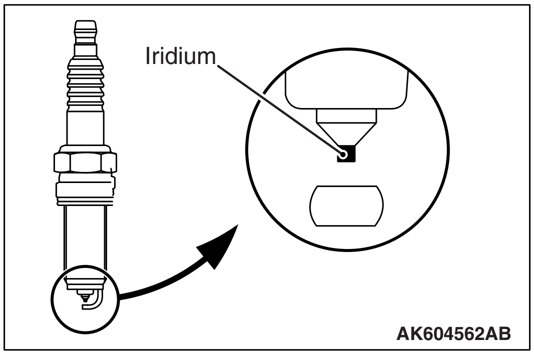


AK602597AC

The ignition coil is a plug-top type.

SPARK PLUG

M2163005000068



Iridium-tipped spark plugs are used.

NOTES

GROUP 55

HEATER, AIR CONDITIONING AND VENTILATION

CONTENTS

NOTES

GROUP 12

ENGINE LUBRICATION

CONTENTS

GENERAL DESCRIPTION

M2120000100249

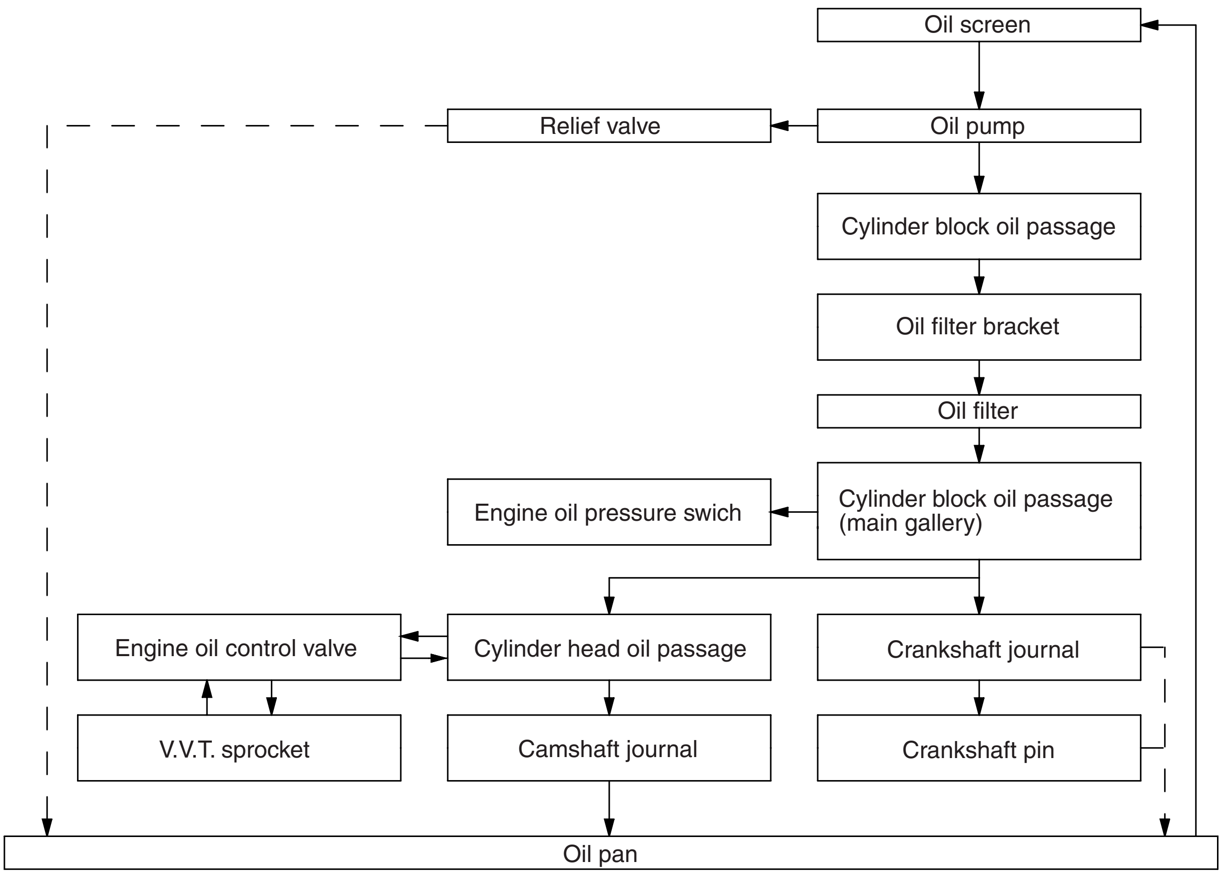
The lubrication system is a full-flow, filter pumping system.

The engine oil that accumulates in the oil pan is drawn and discharged by the oil pump. After its pressure is regulated by the relief valve, the oil passes through the oil filter. Then, it flows from the oil passage in the cylinder block to the individual crankshaft journals and the cylinder head.

After the oil is pumped to the individual crankshaft journals, it passes through a passage in the crankshaft and is fed to the pins. After the oil is pumped to the cylinder head, it flows to the camshaft journals and the engine oil control valves.

OIL PASSAGE

M2120000200194



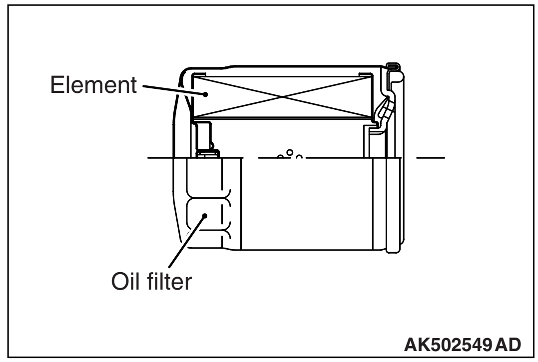
AK603615AB

OIL FILTER

M2120005000195

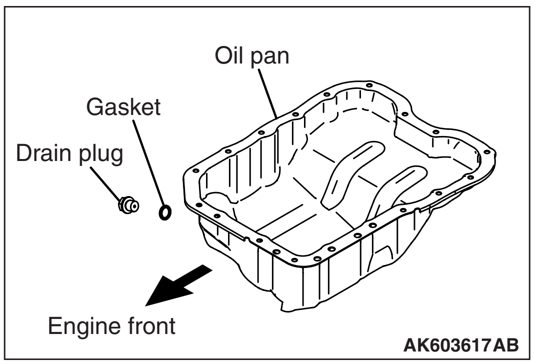
The oil filter is installed on the left side of the cylinder block.

Item	Specifications
Filtering system	Full-flow filtering, filter paper type
Filtering area m^2	0.11
Rated flow volume L/min	30



OIL PAN

M2120006000187

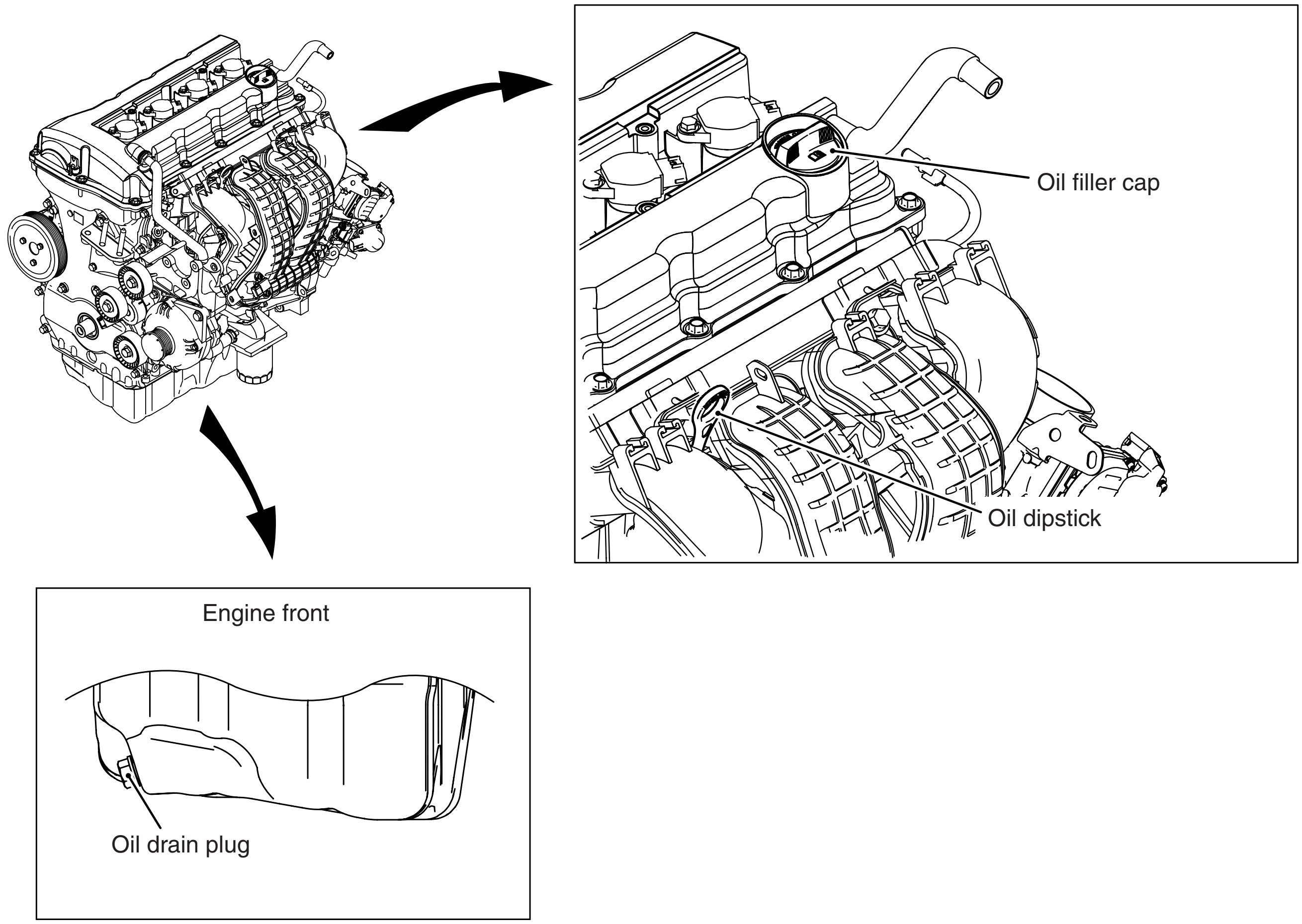


The oil pan is made of sheet metal and contains an oil sump in the forward area of the engine.
FIPG (Formed-In-Place Gasket) is used to seal between the oil pan and the ladder frame.

OIL DIPSTICK, OIL FILLER CAP, OIL DRAIN PLUG

M2120007000124

The oil dipstick, oil filler cap, and oil drain plug are located with serviceability in mind.



AK503035AD

OIL PUMP

M2120002000077

The oil screen is integrated into the oil pump case to be compact and lightweight.

The oil pump case, which is installed to the bottom of the ladder flame, is driven by the oil pump chain through the oil pump sprocket installed to the front of the oil pump case.

GROUP 55A

HEATER, AIR CONDITIONING AND VENTILATION

CONTENTS

Continued on next page

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ WARNING

- ***Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).***
- ***Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.***
- ***MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.***

NOTE
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, driver's and passenger's (front) air bag modules, knee air bag module, side-airbag module, curtain air bag module, side impact sensors, seat belt pre-tensioners, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL DESCRIPTION

M1552000100685

The blower, heater, and evaporator have been integrated with the heater and A/C system to achieve greater fan power and noise reduction.

ITEM	SPECIFICATION
Heater control assembly	Dial type
Compressor mode	MSC90CAS
Compressor type	Scroll type
Refrigerant and quantity g (oz)	R-134a (HFC-134a), 480 –520 (16.9 –18.3)

SAFETY PRECAUTIONS

⚠ ***WARNING***

Wear safety goggles and gloves when servicing the refrigeration system to prevent severe damage to eyes and hands.

Because R-134a refrigerant is a hydro fluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.

Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Mitsubishi Motors Corporation recommends an R-134a refrigerant recycling device.

Refrigerant R-134a is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8° C (–21.64° F) at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and non-explosive. The following precautions must be observed when handling R-134a.

⚠ ***WARNING***

Do not heat R-134a above 40°C (104.0°F) or it may catch fire and explode.

R-134a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the A/C system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system.

1. Should any liquid refrigerant get into your eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil.
2. Next, splash your eyes with plenty of cold water.
3. Call your doctor immediately even if irritation has ceased.

⚠ **CAUTION**

Keep R-134a containers upright when charging the system.

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.

A bucket or large pan of hot water not over 40° C (104.0° F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam-clean on or near the system components or refrigerant lines.

⚠ ***WARNING***

The leak detector for R-134a should be used to check for refrigerant gas leaks.

⚠ **CAUTION**

Do not allow liquid refrigerant to touch bright metal or it will be stained.

When metering R-134a into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

OPERATION

CONDENSER FAN AND RADIATOR FAN CONTROL

The ECM judges the required revolution speed of radiator fan motor and condenser fan motor using the input signals transmitted from A/C switch, secondary pulley speed sensor <CVT> or vehicle speed sensor (VSS) <M/T> and engine coolant temperature sensor.

COMPRESSOR CONTROL

When operating the A/C switch

- The air thermo sensor, which senses the temperature of the air flowing out of the evaporator, deactivates the compressor at 1° C (33.8° F) or below.
- The dual pressure switch turns OFF when the refrigerant pressure becomes excessively high or low, thus protecting the compressor circuit (See Table below).
- When the air thermo sensor is activated, and the ignition switch, blower switch, and A/C switch are ON, the A/C compressor clutch relay is energized.

When operating the mode selection dial

- The A/C will work when the mode selection dial is set to the "Defroster" or "Defroster/foot" position, or the temperature control dial is set to the "MAX A/C" position. In other dial positions, when the A/C switch is turned on, the A/C will work.

A/C Compressor Clutch Relay ON Conditions

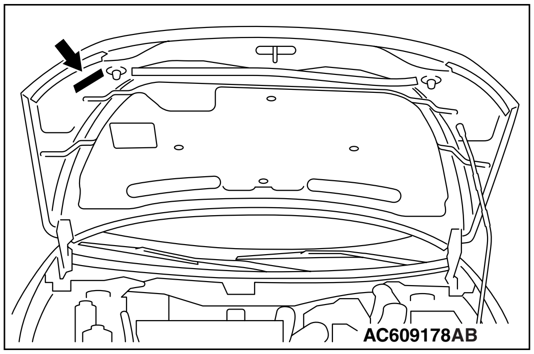
<table>
<tr><td colspan="2">Ignition switch (IG2)</td><td>ON</td><td rowspan="7">NOTE: A/C compressor clutch relay is de-energized when any one switch, sensor or control unit shown on the left turns off.
NOTE: The components marked by * communicate with the ECM. If the air thermo sensor detects a temperature of 1°C (33.8°F), the A/C-ECU will turn off the A/C compressor clutch relay.</td></tr>
<tr><td colspan="2">Blower switch</td><td>ON</td></tr>
<tr><td colspan="2">A/C switch, mode selection dial defroster, defroster/foot position or temperature control MAX A/C</td><td>ON</td></tr>
<tr><td colspan="2">Air thermo sensor</td><td>*</td></tr>
<tr><td rowspan="2">Pressure detected by A/C pressure sensor</td><td>2.94 MPa (427psi) or less (If the refrigerant pressure exceeds 2.94 MPa (427psi), A/C compressor clutch relay is not ON condition until the refrigerant pressure has been measured up to 2.35 MPa (341psi) a or less.)</td><td rowspan="2">ON</td></tr>
<tr><td>0.19 MPa (27psi) or more (If the refrigerant pressure falls short of 0.19 MPa (27psi), A/C compressor clutch relay is not ON condition until the refrigerant pressure has been measured up to 0.22 MPa (32psi) or more.)</td></tr>
<tr><td colspan="2">A/C compressor clutch relay driving transistor (within powertrain control module)</td><td>ON</td></tr>
</table>

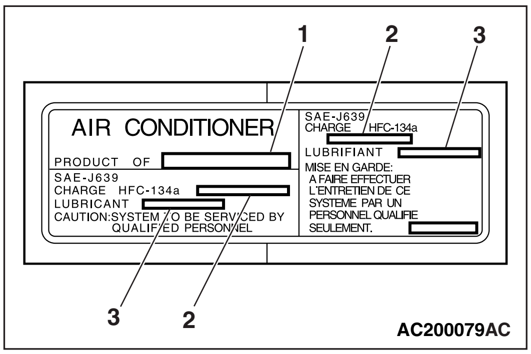
SERVICE PRECAUTIONS

CAUTION LABELS

M1552017400321

The refrigerant gas caution label must be affixed in the location shown in the figure on the left. Follow the instructions on the label when servicing.





No.	Contents
1	Name of A/C manufacturer
2	Amount of refrigerant
3	Name of compressor oil

MANUAL A/C DIAGNOSIS

INTRODUCTION TO HEATER, A/C AND VENTILATION DIAGNOSIS

M1552012200407

Air is drawn into the heater assembly from either the outside, or from the inside of the passenger cabin if DEFROST, maximum cooling or RECIRCULATION are selected. The air is then forced through the evaporator where heat is removed, cooling and de-humidifying the air. Depending on the temperature selected, a portion of this air is then forced through the heater core to achieve the selected discharge temperature.

If the system does not cool properly, look for a problem with the refrigerant, blower or air distribution systems. If the system does not heat properly, look for a problem with the coolant, blower or air distribution systems. In either case all system fuses, circuit breaker and relays should be checked.

HEATER, A/C AND VENTILATION DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1552009600483

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a heater, A/C and ventilation fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify that the malfunction is eliminated.

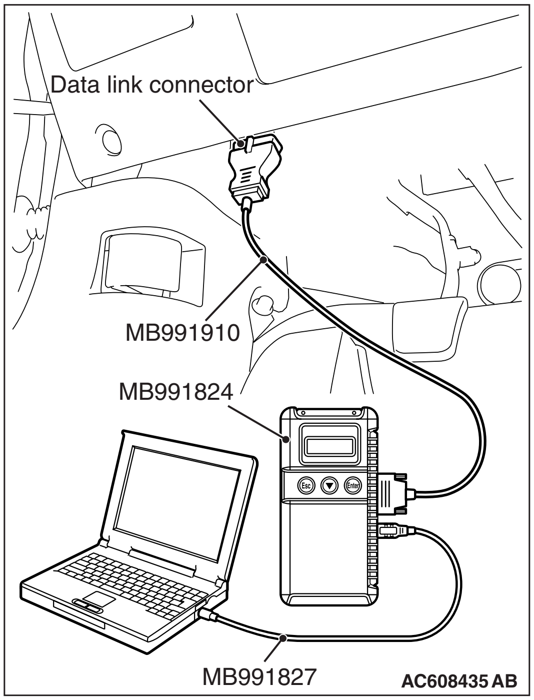
DIAGNOSTIC FUNCTION

M1552019800154

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

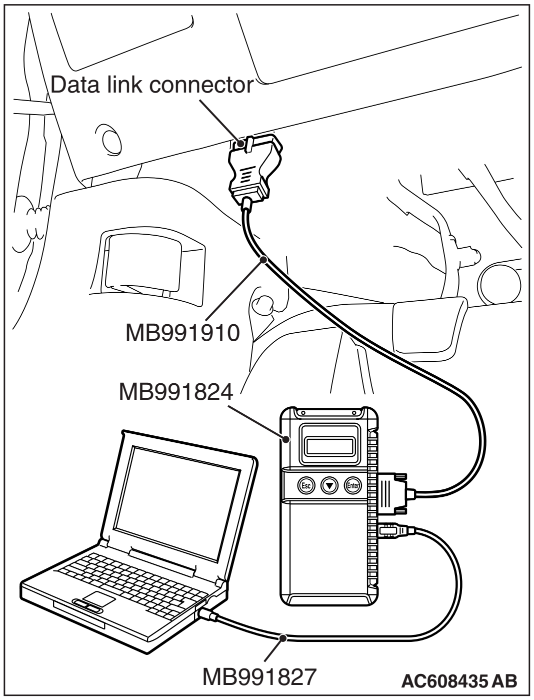
   NOTE: When the special tool MB991824 is energized, the special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting the scan tool special tool MB991824 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be output. Check the battery if scan tool MB991958 does not display.

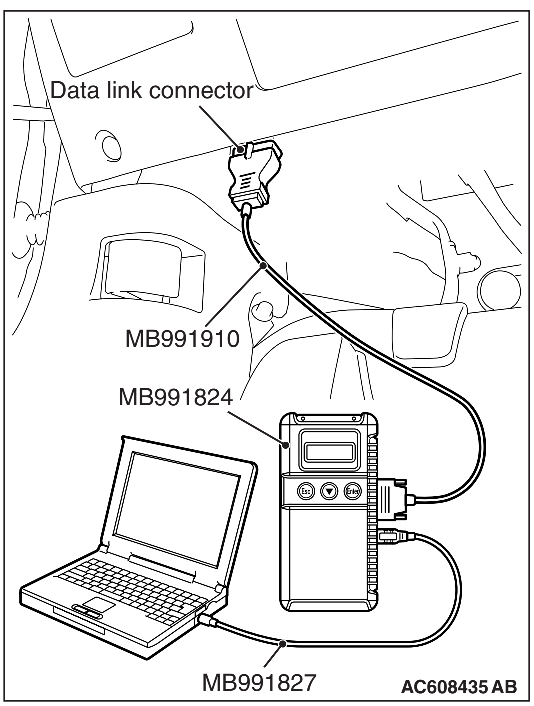
1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "AUTO A/C" from "System List," and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO DIAGNOSE THE CAN BUS LINE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle whose CAN bus lines will be diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select "view vehicle information" button.
6. When the vehicle information is displayed, confirm again that it matches the vehicle which is diagnosed CAN bus line.
   - If they match, go to step 8.
   - If not, go to step 5.
7. Press the "OK" button.
8. When the options are displayed, choose the options (mark the check) and then select "OK".

DIAGNOSTIC TROUBLE CODE CHART

M1554004900894

⚠ CAUTION

During diagnosis, a DTC code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion of repairs, check all systems for DTC code(s). If DTC code(s) are set, erase them all.

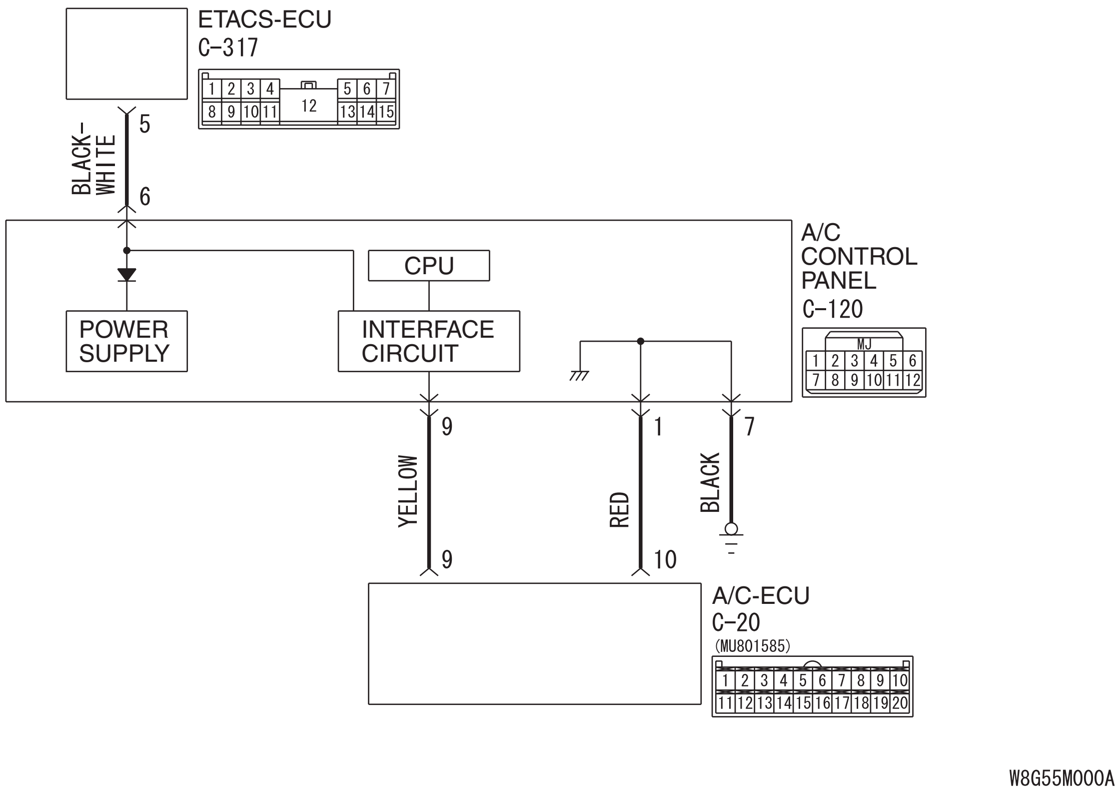
Diagnostic trouble code No.	Diagnostic item	Reference page
B1000	Control panel communication error	P.55A-9
B1003	Mode dial SW error	P.55A-14
B1018	Temperature control dial SW error	P.55A-17
B1021	Fan dial SW error	P.55A-20
B1031	Air thermo sensor system (short circuit)	P.55A-20
B1032	Air thermo sensor system (open circuit)	P.55A-20
B1034*	Ambient air temperature sensor system (short circuit)	P.55A-26
B1035*	Ambient air temperature sensor system (open circuit)	P.55A-26
B1079	Refrigerant leaks	P.55A-29
B2214	Control panel failure	P.55A-33
B223B	Control panel improperly assembled	P.55A-37
U1415	Coding not completed	P.55A-37
U0019	Bus off (CAN1)	P.55A-42
U0141	ETACS-ECU time-out	P.55A-43
U0151	SRS-ECU time-out	P.55A-46
U0154	Occupant classification-ECU time-out	P.55A-48
U0155	Combination meter time-out	P.55A-51
U0168	WCM time-out	P.55A-53
U0184	Audio time-out	P.55A-56
U0195	Satellite radio tuner time-out	P.55A-59
U0197	Hands free module time-out	P.55A-61

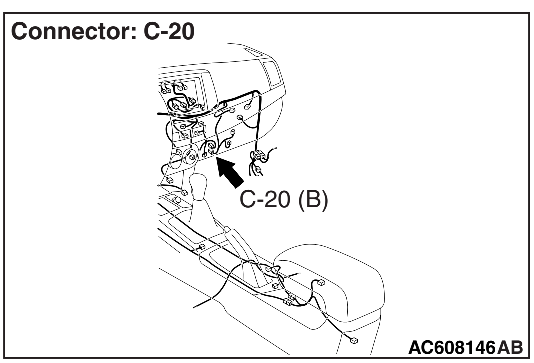
*NOTE: The diagnostic trouble codes marked by * are set from the ETACS-ECU.*

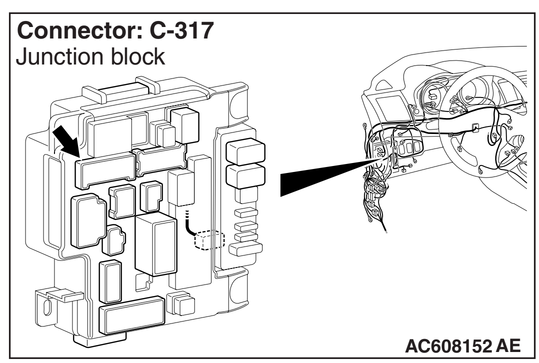
DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B1000: Control Panel Communication Error

A/C Control Panel Circuit







DTC SET CONDITION

DTC B1000 will be set when the communication between A/C-ECU and A/C control panel cannot be performed.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1000 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

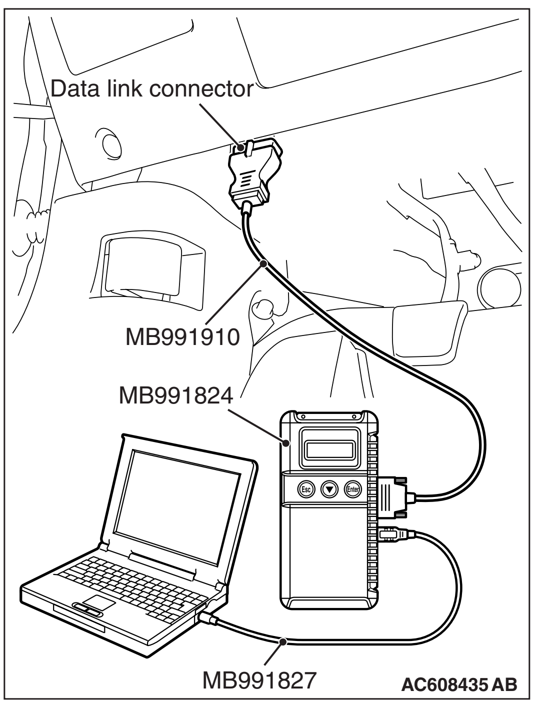
TROUBLESHOOTING HINT

- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

Use scan tool MB991958 to diagnose the CAN bus lines.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result satisfactory?

YES : Go to Step 2.
NO : Repair the CAN bus lines. Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis-Can Bus Diagnostic Chart P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.

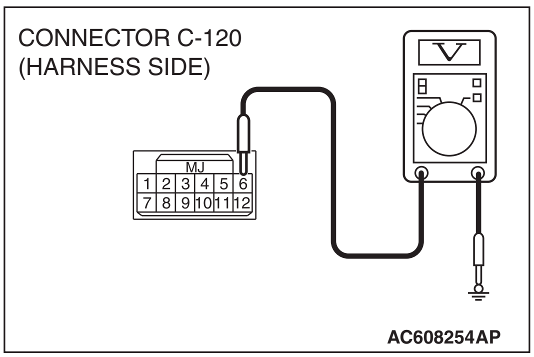
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C control panel connector C-120 in good condition?

YES : Go to Step 4.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Measure the voltage at A/C control panel connector C-120.

(1) Disconnect A/C control panel connector C-120, and measure the voltage at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 6 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 6.

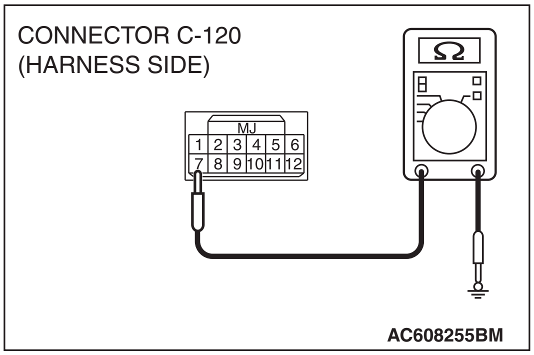
NO : Go to Step 5.

STEP 5. Check the wiring harness between A/C control panel connector C-120 (terminal 6) and ETACS-ECU connector C-317 (terminal 5).

Q: Is the wiring harness between A/C control panel connector C-120 (terminal 6) and ETACS-ECU connector C-317 (terminal 5) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness.



STEP 6. Measure the resistance at A/C control panel connector C-120.

(1) Disconnect A/C control panel connector C-120, and measure the resistance at the wiring harness side.
(2) Measure the resistance value between terminal 7 and ground.
- The measured value should be 2 ohms or less.

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the wiring harness between A/C control panel connector C-120 (terminal 7) and ground.

Q: Is the wiring harness between A/C control panel connector C-120 (terminal 7) and ground in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.
NO : Repair the wiring harness.

STEP 8. Check A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C-ECU connector C-20 in good condition?

YES : Go to Step 9.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 9. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 10.
NO : Repair the wiring harness.

STEP 10. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 11.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 11. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

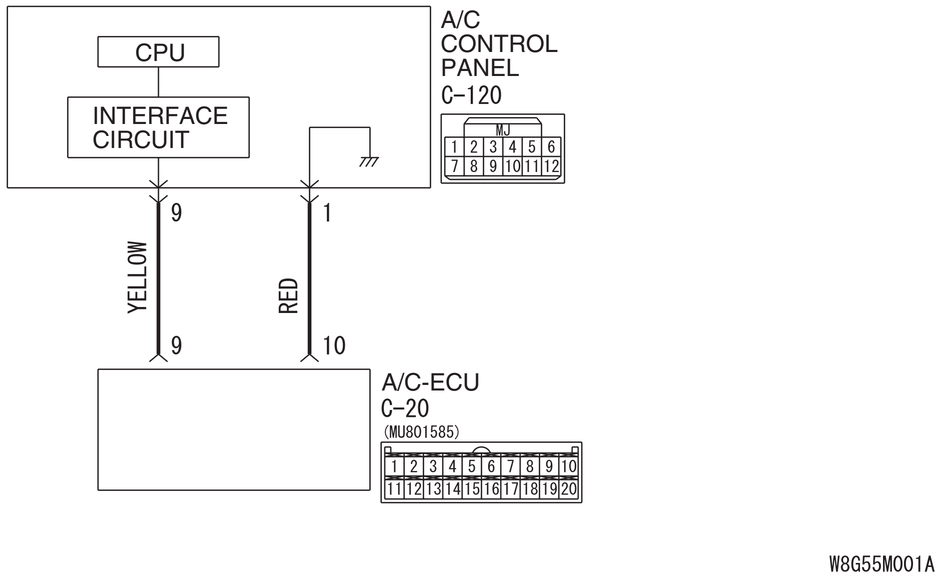
Q: Is the DTC set?

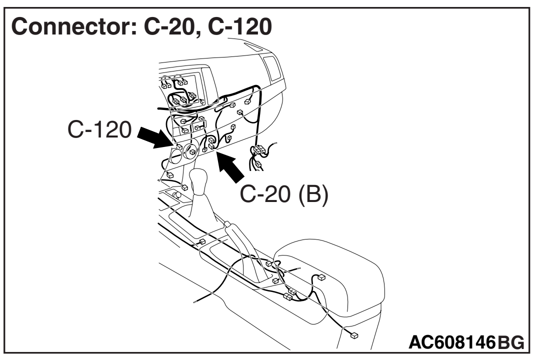
YES : Replace the A/C-ECU.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B1003: Mode Dial SW Error

A/C Control Panel Circuit





DTC SET CONDITION

DTC B1003 will be set when the A/C-ECU cannot receive the signal of mode selection knob.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1003 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

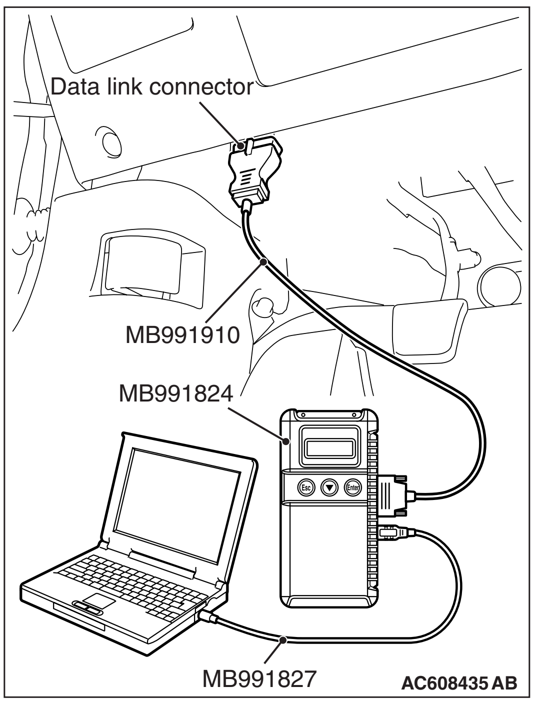
Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C control panel connector C-120 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 6. Recheck for diagnostic trouble code.

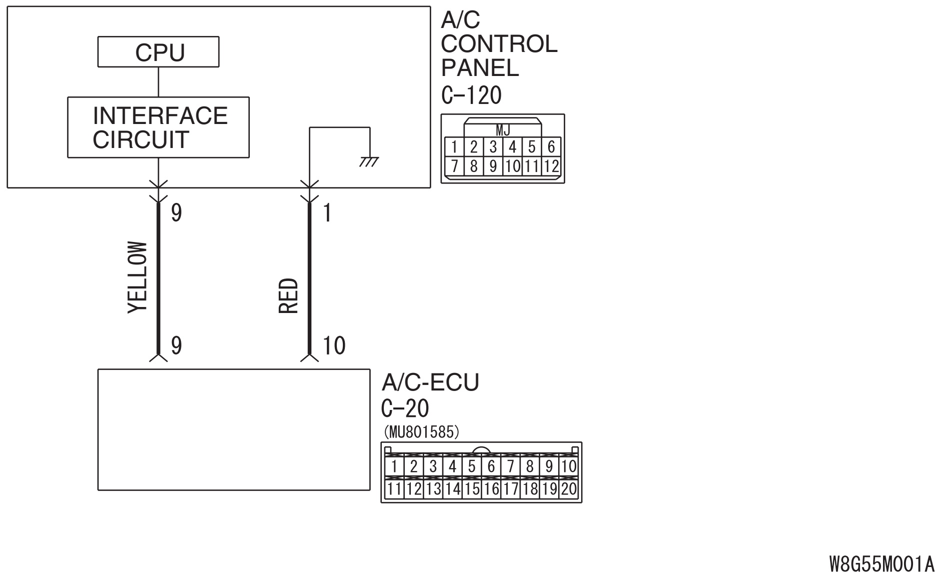
Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

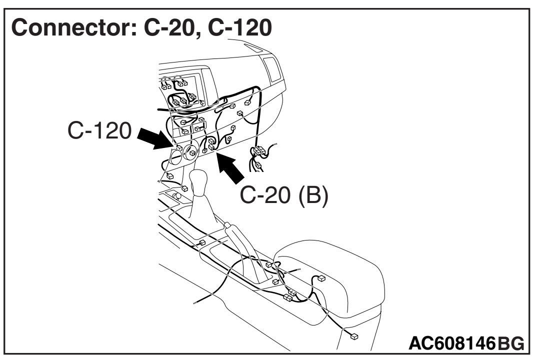
Q: Is the DTC set?

YES : Replace the A/C-ECU.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B1018: Temperature Control Dial SW Error

A/C Control Panel Circuit





DTC SET CONDITION

DTC B1018 will be set when the A/C-ECU cannot receive the signal of temperature adjustment knob.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1018 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

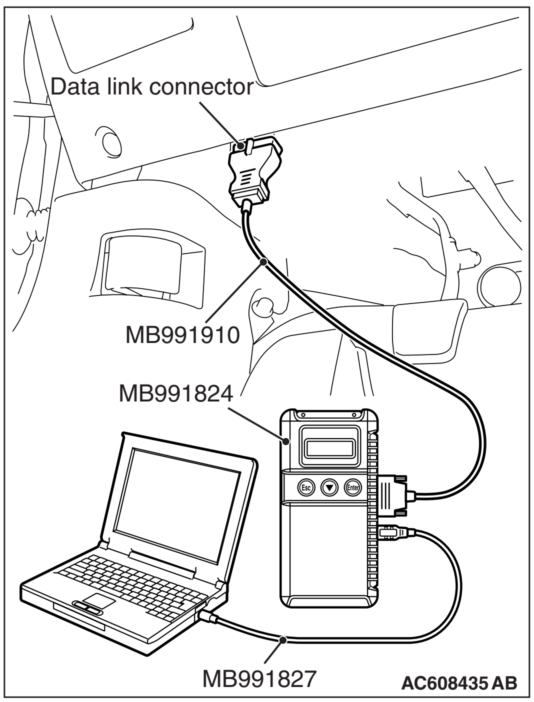
- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C control panel connector C-120 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 6. Recheck for diagnostic trouble code.

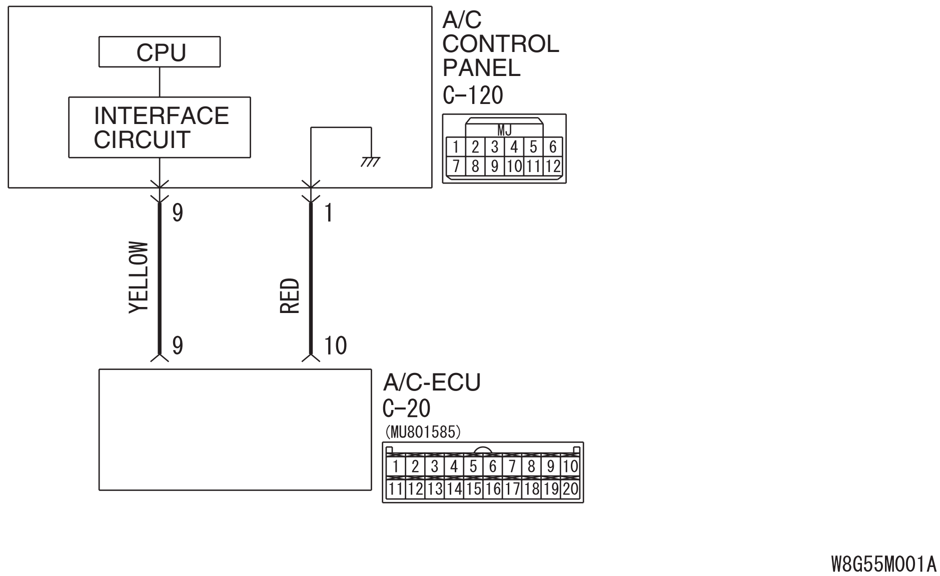
Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

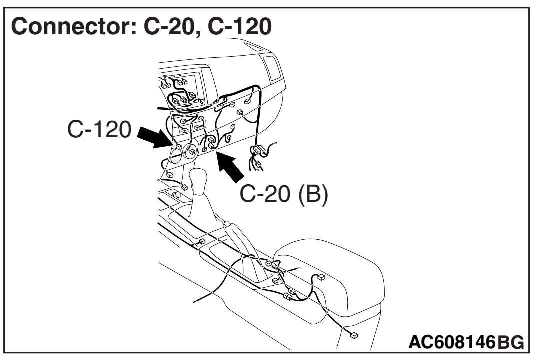
Q: Is the DTC set?

YES : Replace the A/C-ECU.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B1021: Fan Dial SW Error

A/C Control Panel Circuit





DTC SET CONDITION

DTC B1021 will be set when the A/C-ECU cannot receive the signal of blower knob.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1021 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

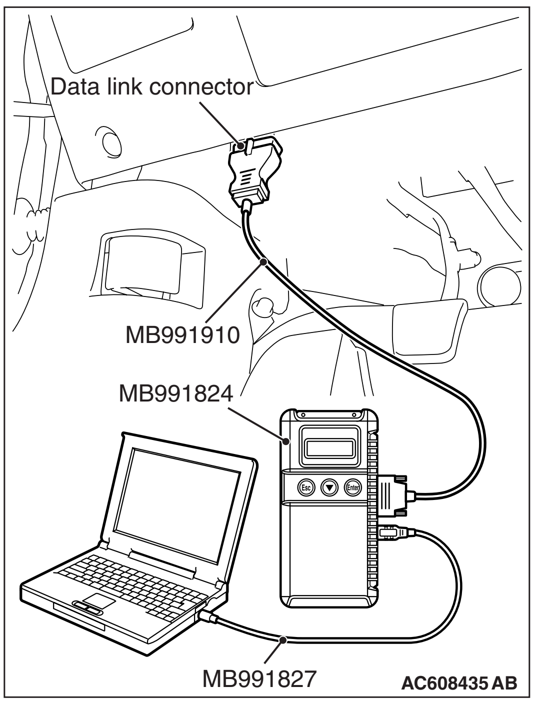
Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C control panel connector C-120 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 6. Recheck for diagnostic trouble code.

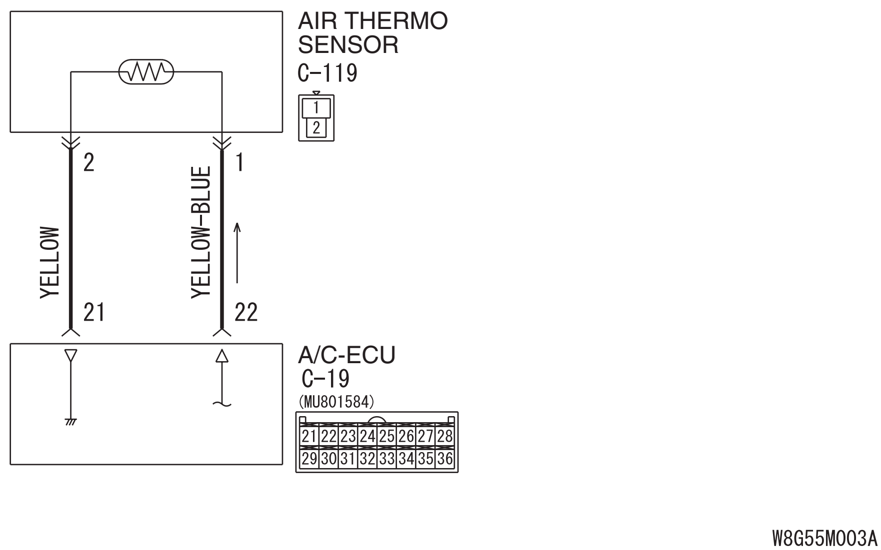
Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

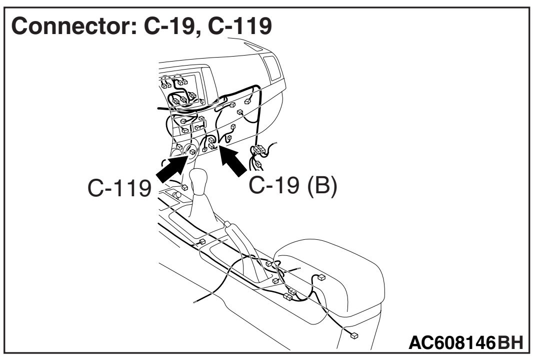
Q: Is the DTC set?

YES : Replace the A/C-ECU.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B1031, B1032: Air Thermo Sensor System

Air Thermo Sensor Circuit





DTC SET CONDITION

- DTC B1031 is set if there is a short circuit in the air thermo sensor input circuit.
- DTC B1032 is set if there is a defective connector connection, or if there is an open circuit in the harness.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the air thermo sensor, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1031 or B1032 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the air thermo sensor. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

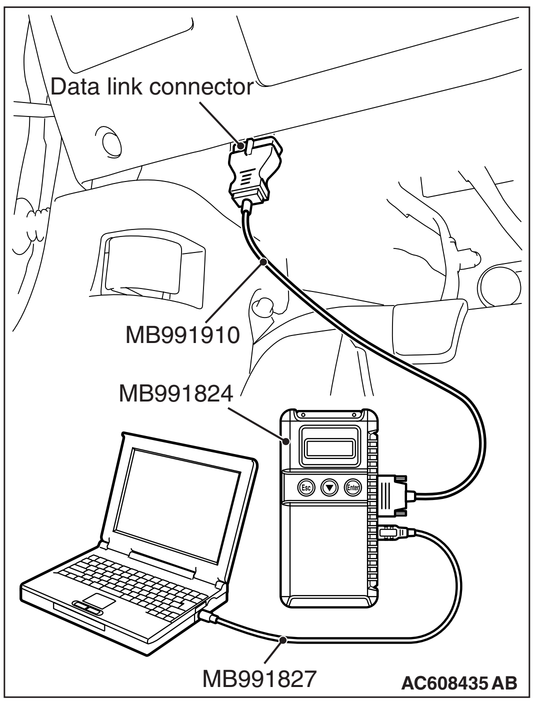
- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the air thermo sensor.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTCset?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check air thermo sensor connector C-119 and A/C-ECU connector C-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

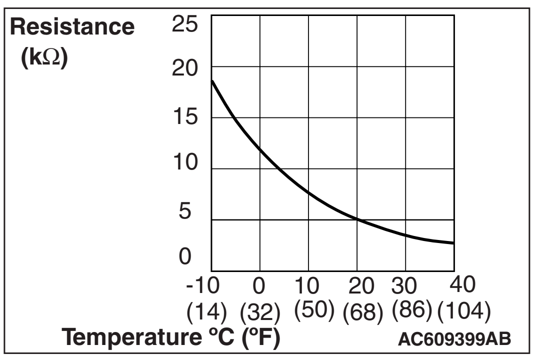
Q: Are air thermo sensor connector C-119 and A/C-ECU connector C-19 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-19 (terminal 22 and 21) and air thermo sensor connector C-119 (terminals 1 and 2).

Q: Is the wiring harness between A/C-ECU connector C-19 (terminal 22 and 21) and air thermo sensor connector C-119 (terminals 1 and 2) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.



STEP 5. Check the air thermo sensor.

Measure the resistance between connector terminals 1 and 2 under at least two different temperatures. The resistance values should generally match those in the graph.

NOTE: The temperature at the check should not exceed the range in the graph.

Q: Is the air thermo sensor in good condition?

YES : Replace the A/C-ECU. Then go to Step 6.
NO : Replace the air thermo sensor. Then go to Step 6.

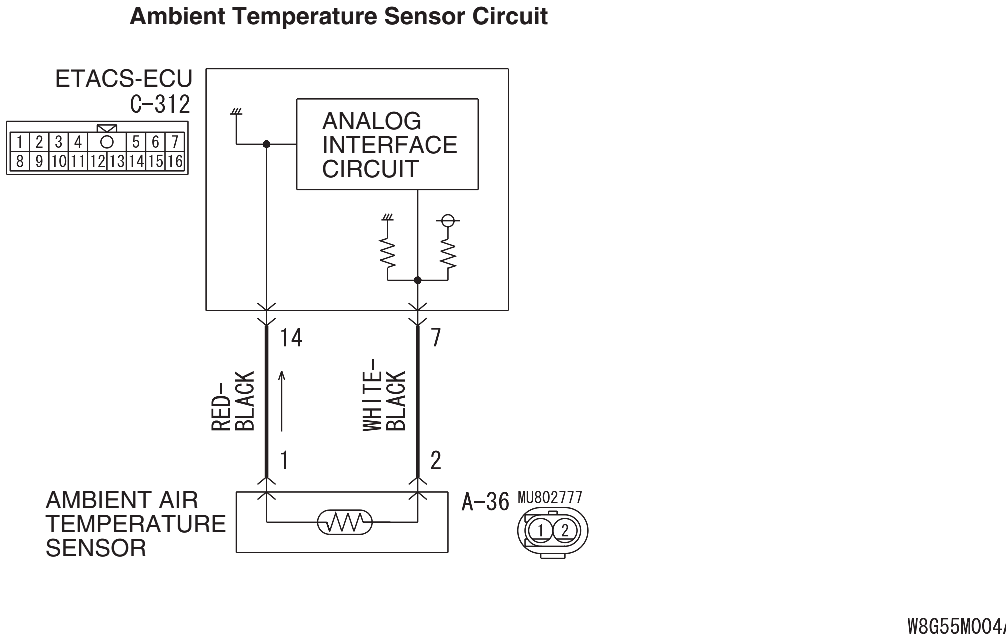
STEP 6. Recheck for diagnostic trouble code.

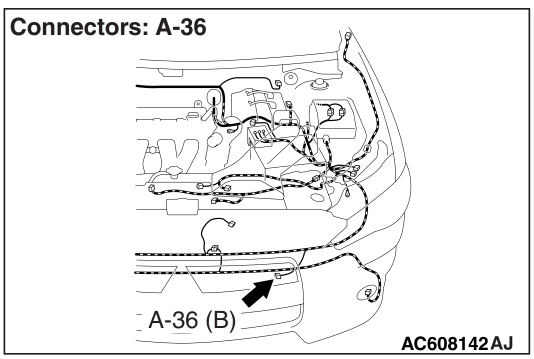
Check again if the DTC is set.
(1) Connect scan tool MB991958 to the data link connector
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

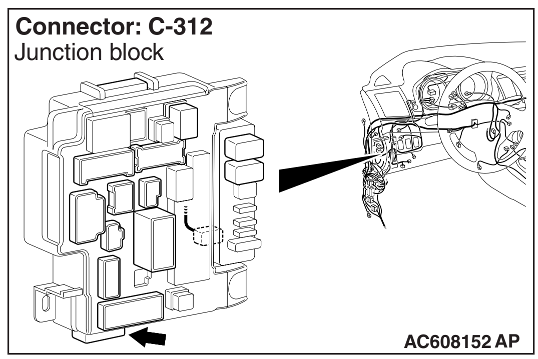
Q: Is the DTC set?

YES : Return to Step 1.
NO : The procedure is complete.

DTC B1034, B1035: Ambient air temperature Sensor System







DTC SET CONDITION

- DTC B1034 is set if there is a short circuit in the ambient air temperature sensor input circuit.
- DTC B1035 is set if there is a defective connector connection, or if there is an open circuit in the harness.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the ambient air temperature sensor, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B1034 or B1035 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the ambient air temperature sensor. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

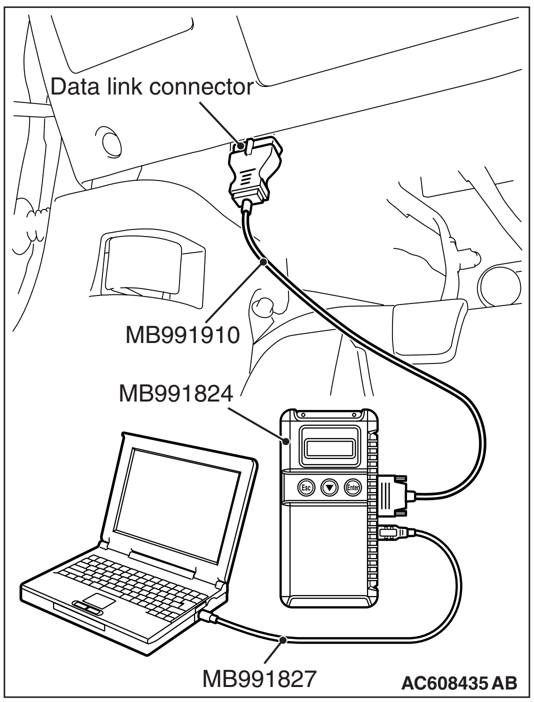
- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the ambient air temperature sensor.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check ambient air temperature sensor connector A-36 and ETACS-ECU connector C-312 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ambient air temperature sensor connector A-36 and ETACS-ECU connector C-312 in good condition?

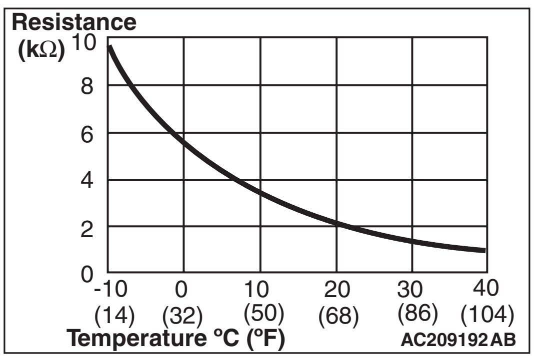
YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between ambient air temperature sensor connector A-36 (terminals 2 and 1) and ETACS-ECU connector C-312 (terminals 7 and 14).

Q: Is the wiring harness between ambient air temperature sensor connector A-36 (terminals 2 and 1) and ETACS-ECU connector C-312 (terminals 7 and 14) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the ambient air temperature sensor.
Measure the resistance between connector terminals 1 and 2 under at least two different temperatures. The resistance values should generally match those in the graph.



NOTE: The temperature at the check should not exceed the range in the graph.

Q: Is the ambient air temperature sensor in good condition?

YES : Replace the A/C-ECU. Then go to Step 6.
NO : Replace the ambient air temperature sensor. Then go to Step 6.

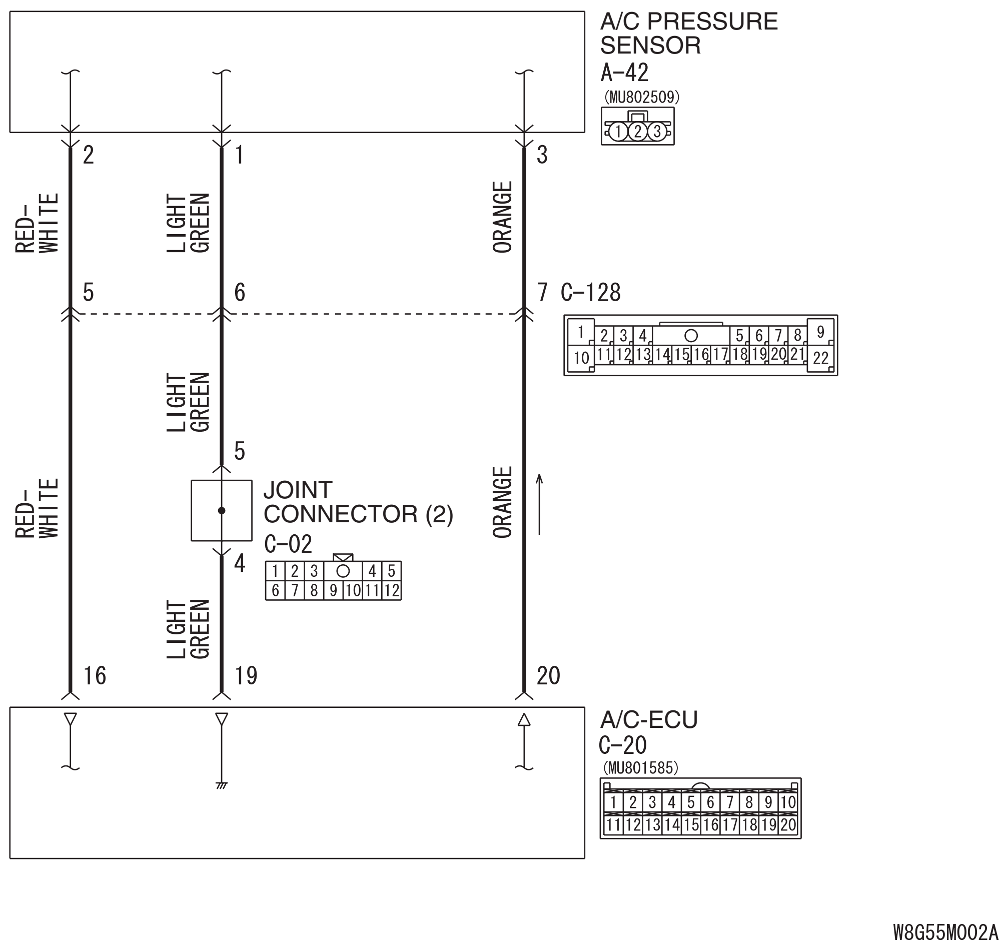
STEP 6. Recheck for diagnostic trouble code.
Check again if the DTC is set.
(1) Connect scan tool MB991958 to the data link connector
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

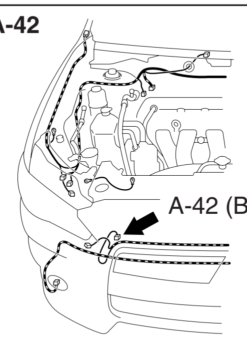
YES : Return to Step 1.
NO : The procedure is complete.

DTC B1079: Refrigerant Leaks

A/C Pressure Sensor Circuit

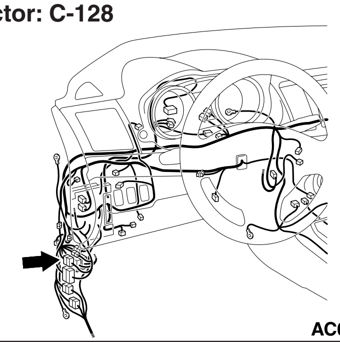


Connector: A-42



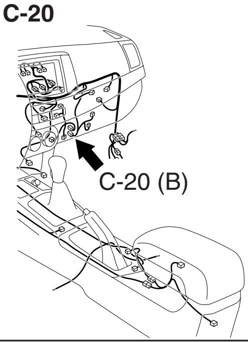
AC608141AN

Connector: C-128



AC608145BP

Connector: C-20



AC608146AB

DTC SET CONDITION

DTC B1079 will be set when the A/C pressure sensor detects the refrigerant pressure of specified level or less.

NOTE: When DTC B1079 is set, the A/C indicator of A/C control panel flashes.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The refrigerant amount is not at the specified level, or the wiring harness or connector between the A/C-ECU and A/C pressure sensor, and the A/C-ECU itself or A/C pressure sensor itself may have failed.

Past trouble

- If DTC B1079 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C pressure sensor. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

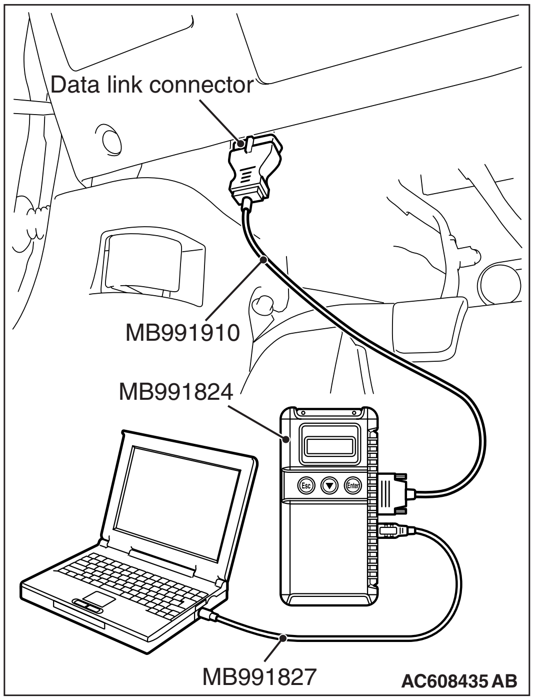
TROUBLESHOOTING HINT

- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C pressure sensor.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C pressure sensor connector A-42 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are air A/C pressure sensor connector A-42 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminals 20, 16 and 19) and A/C pressure sensor connector A-42 (terminals 3, 2 and 1).

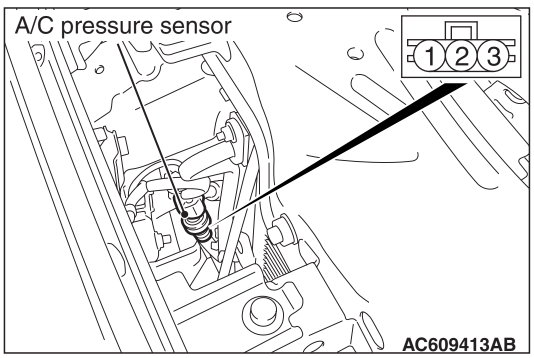
NOTE: Also check intermediate connector C-128 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-128 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

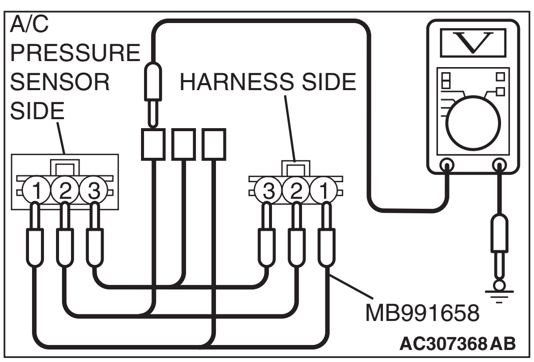
Q: Is the wiring harness between A/C-ECU connector C-20 (terminals 20, 16 and 19) and A/C pressure sensor connector A-42 (terminals 3, 2 and 1) in good condition?

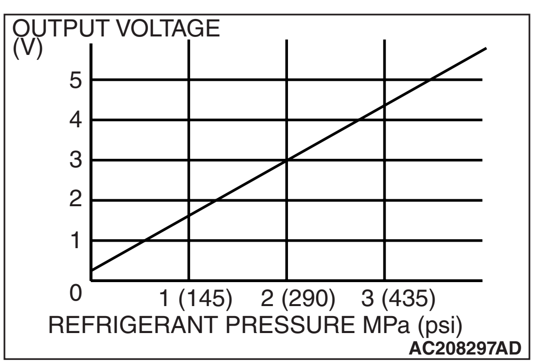
YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the A/C pressure sensor operation.

(1) Assemble a gauge manifold on the high pressure service valve.
(2) Disconnect the A/C pressure sensor connector and connect special tool test harness MB991658 as shown in the illustration.
(3) Turn ON the engine and then turn ON the A/C switch.







(4) At this time, check to see that the voltage of A/C pressure sensor terminal No. 2 reflects the specifications of the figure.

NOTE: The allowance shall be defined as ±5%.

Q: Is the A/C pressure sensor operating properly?

YES : Go to Step 6.
NO : Replace the A/C pressure sensor. Then go to Step 7.

STEP 6. Check the refrigerant level.

Use the refrigerant recovery station to remove all of the refrigerant, and then calculate the amount of the refrigerant and charge it.

Q: Is the refrigerant level correct?

YES : Go to Step 7.

NO : Correct the refrigerant level (Refer to On-vehicle Service P.55A-113). Then go to Step 7.

STEP 7. Recheck for diagnostic trouble code.

Check again if the DTC is set.

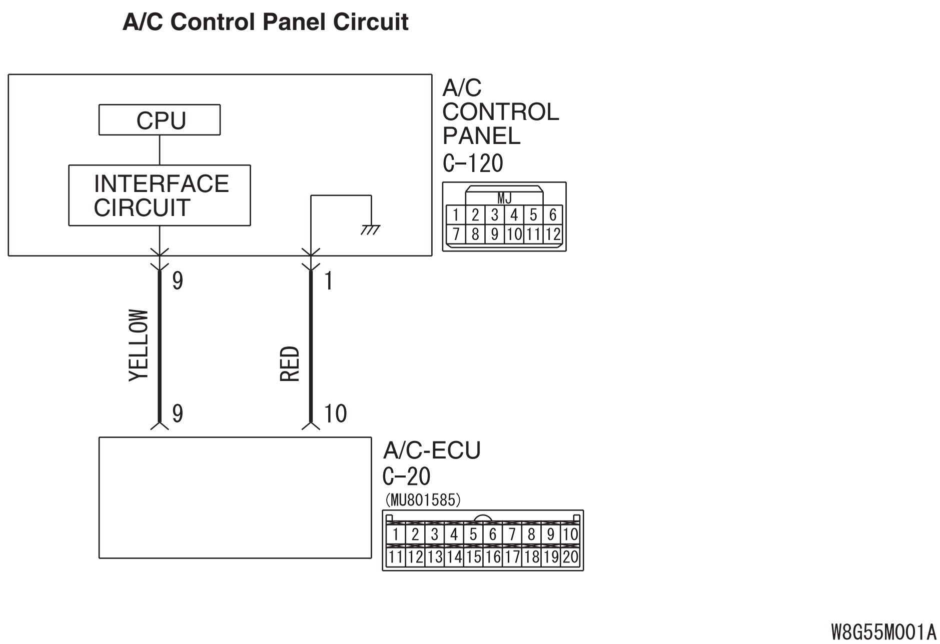
(1) Connect scan tool MB991958 to the data link connector
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

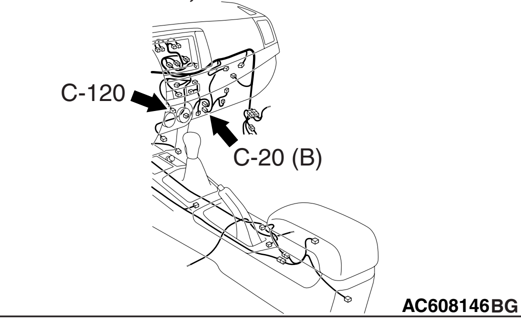
YES : Return to Step 1.

NO : The procedure is complete.

DTC B2214: Control Panel Failure



Connector: C-20, C-120



DTC SET CONDITION

DTC B2214 will be set when the A/C-ECU detects the A/C control panel abnormality.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B2214 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

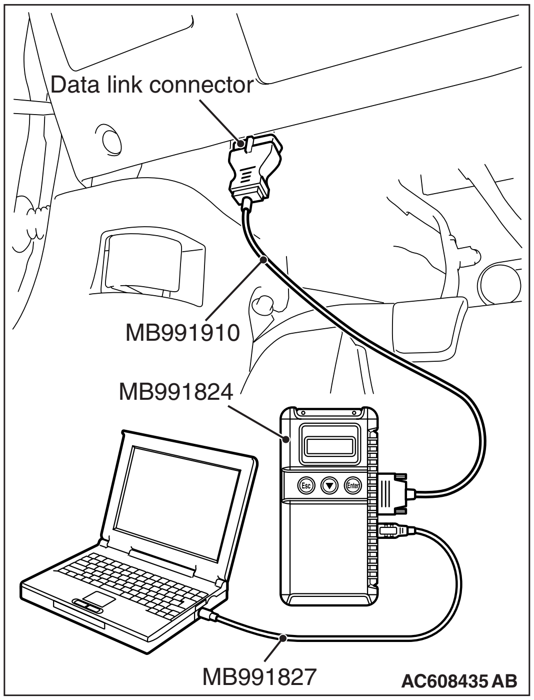
- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C control panel connector C-120 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 6. Recheck for diagnostic trouble code.

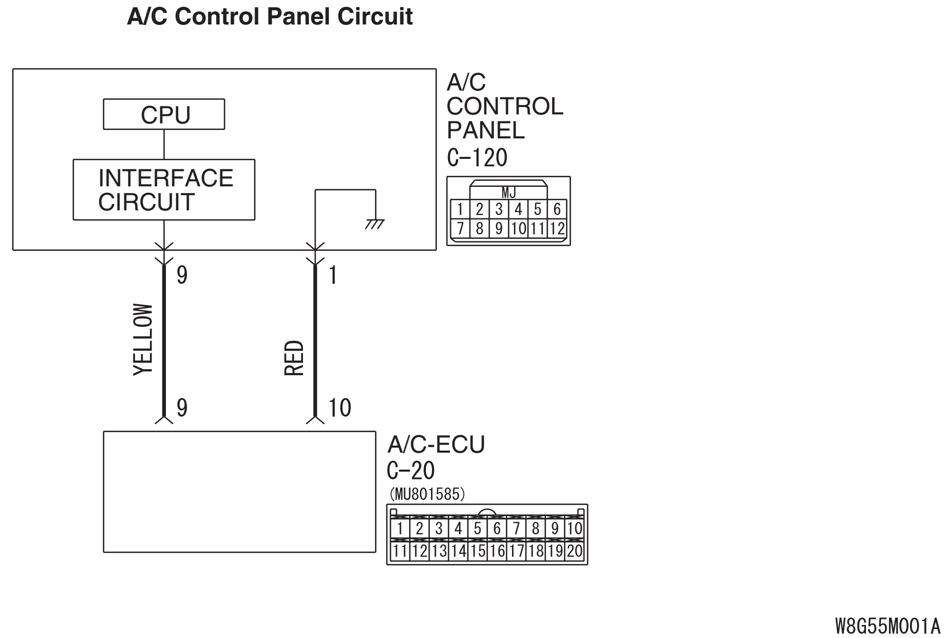
Recheck if the DTC is set.

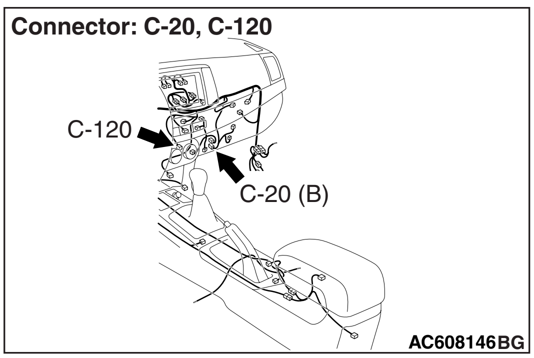
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C-ECU.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B223B: Control Panel Improperly Assembled





DTC SET CONDITION

DTC B223B will be set when the A/C control panel sends an abnormal data, the A/C control panel for RHD is improperly assembled, or the ETACS-ECU sends incorrect vehicle information (information for RHD is sent).

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the A/C control panel, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B223B is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the A/C control panel. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

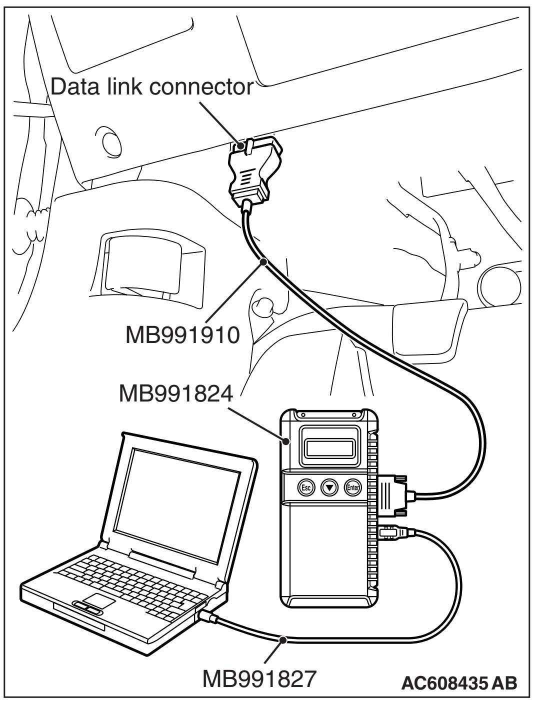
- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the A/C control panel.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DCT set?

YES : Go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 3. Check A/C control panel connector C-120 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C control panel connector C-120 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 9 and 10) and A/C control panel connector C-120 (terminals 9 and 1) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C control panel. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

STEP 6. Recheck for diagnostic trouble code.

Recheck if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the DTC set?

YES : Replace the A/C-ECU.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

DTC B222C: Coding Not Completed

⚠ CAUTION

If DTC U222C is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives the vehicle information signals from the ETACS-ECU via the CAN bus lines. If incorrect global coding data is received or coding data cannot be received with the ignition switch turned ON when the coding confirmation is completed, diagnostic trouble code B222C is stored.

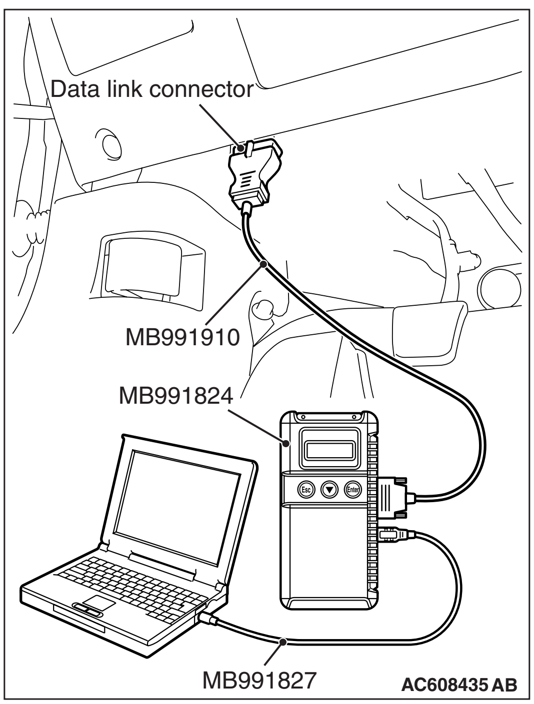
TROUBLESHOOTING HINTS

- Malfunction of the ETACS-ECU
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the ETACS-ECU diagnostic trouble code.

Check whether an ETACS DTC.

(1) Turn the ignition switch to the "ON" position.
(2) Check for the DTC related to the ETACS-ECU.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to GROUP 54A, Diagnostic Trouble Code P.54A-482).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- WCM <vehicles with WCM>
  B2204: Coding data unmatched
- KOS <vehicles with KOS>
  B2204: Coding data unmatched

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU. On completion, check that the DTC is not reset.
NO : A poor connection, open circuit or other intermittent malfunction is present in the lines between the ETACS-ECU and the A/C-ECU (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.
NO : A poor connection, open circuit or other intermittent malfunction is present in the lines between the ETACS-ECU and the A/C-ECU (Refer to GROUP 00E, Harness Connector Inspection P.00E-2).

DTC U0019: Bus Off (CAN1)

⚠ CAUTION

If DTC U0019is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

DTC U0019 will be stored when the A/C-ECU ceases CAN communication (bus off) and then resumes the communication when the ignition switch is turned to the "LOCK" (OFF) position.

TECHNICAL DESCRIPTION (COMMENT)

The wiring harness wire or connectors may have loose, corroded, or damage terminals, or terminals pushed back in the connector, or the A/C-ECU may be defective.

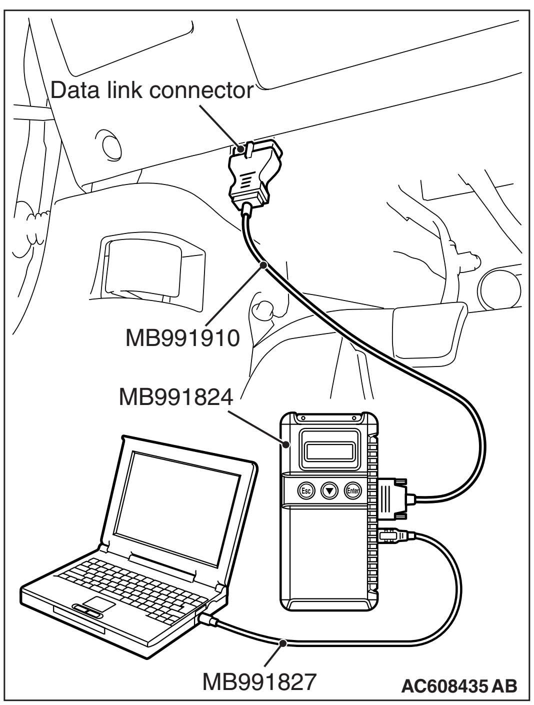
TROUBLESHOOTING HINTS

- Defective connector(s) or wiring harness
- Malfunction of the A/C-ECU

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Connect scan tool MB991958 to the data link connector
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0141: ETACS-ECU Time-out

⚠ CAUTION

If DTC U0141 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives air conditioning operation-related signals from the ETACS-ECU via the CAN bus lines. If the ECU cannot receive any of the air conditioning control-related signals from the ETACS-ECU, the diagnostic trouble code U0141 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the ETACS-ECU and the A/C-ECU, the power supply system to the ETACS-ECU, the ETACS-ECU itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0141 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the ETACS-ECU, and the power supply system to the ETACS-ECU. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-16).

TROUBLESHOOTING HINTS

- Malfunction of the A/C-ECU
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

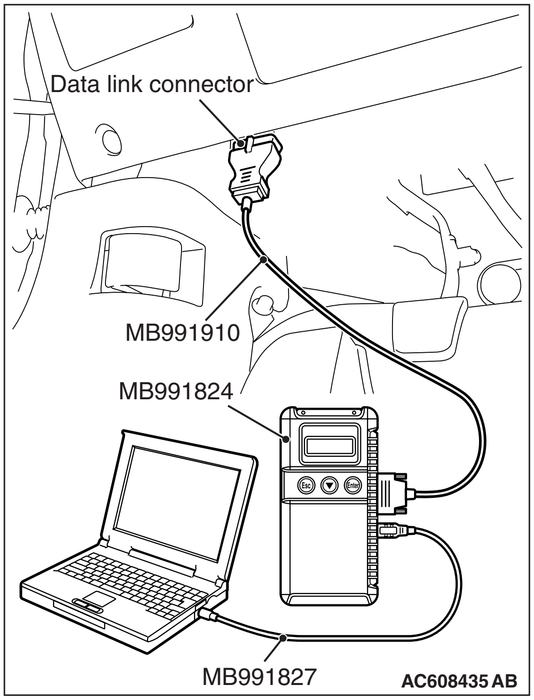
- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.

- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.



(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the ETACS-ECU diagnostic trouble code.

Check whether an ETACS-ECU DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for ETACS-ECU DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the ETACS-ECU (Refer to GROUP 54A, Diagnostic Trouble Code P.54A-482).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- Combination meter
  DTC indicating a time-out error related to the engine or automatic transaxle control system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0151: SRS-ECU Time-out

⚠ CAUTION

If DTC U0151 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives air conditioning operation-related signals from the SRS-ECU via the CAN bus lines. If any of the air conditioning control-related signals from the SRS-ECU cannot be received, the diagnostic trouble code U0151 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the SRS-ECU and the A/C-ECU, the power supply system to the SRS-ECU, the SRS-ECU itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0151 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the SRS-ECU, and the power supply system to the SRS-ECU. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-16).

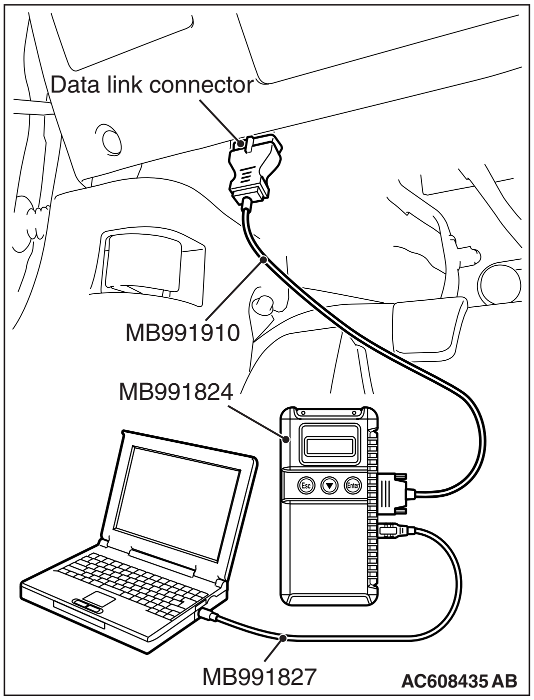
TROUBLESHOOTING HINTS

- Malfunction of the SRS-ECU
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the SRS-ECU diagnostic trouble code.

Check whether an SRS-ECU DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for SRS-ECU DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the SRS-ECU (Refer to GROUP 52B, Diagnostic Trouble Code P.52B-31).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the SRS-ECU system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the SRS-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0154: Occupant classification ECU time out

⚠ CAUTION

If DTC U0154 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives air conditioning operation-related signals from the SRS-ECU via the CAN bus lines. If any of the air conditioning control-related signals from the SRS-ECU cannot be received, the diagnostic trouble code U0154 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the SRS-ECU and the A/C-ECU, the power supply system to the SRS-ECU, the SRS-ECU itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0151 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the SRS-ECU, and the power supply system to the SRS-ECU. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-16).

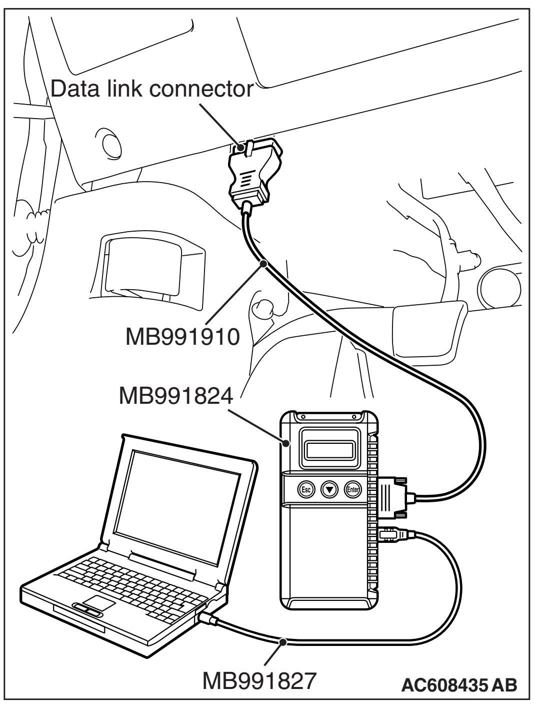
TROUBLESHOOTING HINTS

- Malfunction of the SRS-ECU
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the SRS-ECU diagnostic trouble code.

Check whether an SRS-ECU DTCs are set or not.

(1) Turn the ignition switch to the "ON" position.
(2) Check for SRS-ECU DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the SRS-ECU (Refer to GROUP 52B, Diagnostic Trouble Code P.52B-280).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the SRS-ECU system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the SRS-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0155: Combination meter Time-out

⚠ **CAUTION**

If DTC U0155 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ **CAUTION**

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives the air conditioning control-related signals from the combination meter via the CAN bus lines. If any of the air conditioning control-related signals from the combination meter cannot be received, the diagnostic trouble code U0155 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the combination meter and the A/C-ECU, the power supply system to the combination meter, the combination meter itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0155 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the combination meter, and the power supply system to the combination meter. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-9).

TROUBLESHOOTING HINTS

- Malfunction of the combination meter
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

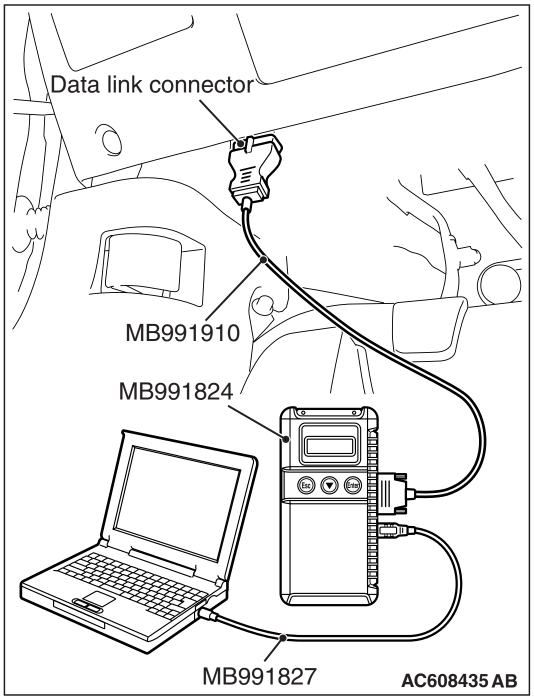
DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable

- MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the combination meter diagnostic trouble code.

Check whether a combination meter DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for combination meter DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the combination meter (Refer to GROUP 54A, Diagnostic Trouble Code P.54A-23).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the combination meter system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the combination meter. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0168: WCM Time-out

⚠ CAUTION

If DTC U0168 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives the air conditioning control-related signals from the WCM-ECU via the CAN bus lines. If any of the air conditioning control-related signals from the WCM-ECU cannot be received, diagnostic trouble code U0168 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the WCM-ECU and the A/C-ECU, the power supply system to the WCM-ECU, the WCM-ECU itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0168 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the WCM-ECU, and the power supply system to the WCM-ECU. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-9).

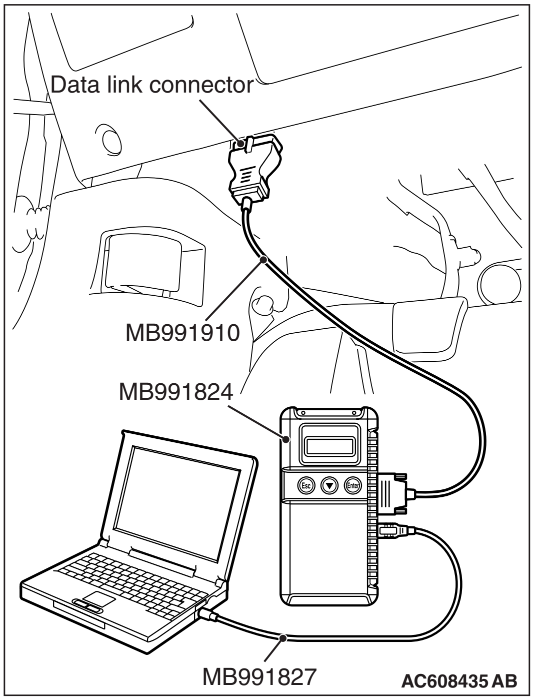
TROUBLESHOOTING HINTS

- Malfunction of the WCM-ECU
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the WCM-ECU diagnostic trouble code.

Check whether an WCM-ECU DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for WCM-ECU DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 3.
NO : Diagnose the WCM-ECU (Refer to GROUP 42C, Diagnostic Trouble Code P.42C-14).

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the WCM-ECU system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the WCM-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0184: Audio Time-out

⚠ CAUTION

If DTC U0184 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives air conditioning operation-related signals from the audio via the CAN bus lines. If any of the air conditioning control-related signals from the audio cannot be received, the diagnostic trouble code U0184 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the Audio and the A/C-ECU, the power supply system to the Audio, the Audio itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0184 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the Audio, and the power supply system to the Audio. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-9).

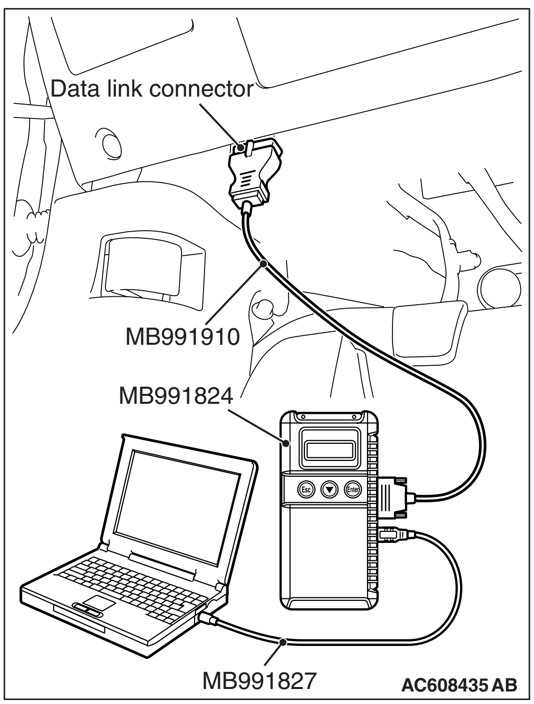
TROUBLESHOOTING HINTS

- Malfunction of the Audio
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the Audio diagnostic trouble code.

Check whether an audio DTCs are set or not.

(1) Turn the ignition switch to the "ON" position.
(2) Check for Audio DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the Audio (Refer to GROUP 54A, Diagnostic Trouble Code P.54A-239).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the Audio system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the Audio. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0195: Satellite radio tuner CAN timeout

⚠ CAUTION

If DTC U0195 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives air conditioning operation-related signals from the satellite radio via the CAN bus lines. If any of the air conditioning control-related signals from the satellite radio cannot be received, the diagnostic trouble code U0195 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the Satellite Radio and the A/C-ECU, the power supply system to the Satellite Radio, the Satellite Radio itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0195 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the Satellite Radio, and the power supply system to the Satellite Radio. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

  NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-9).

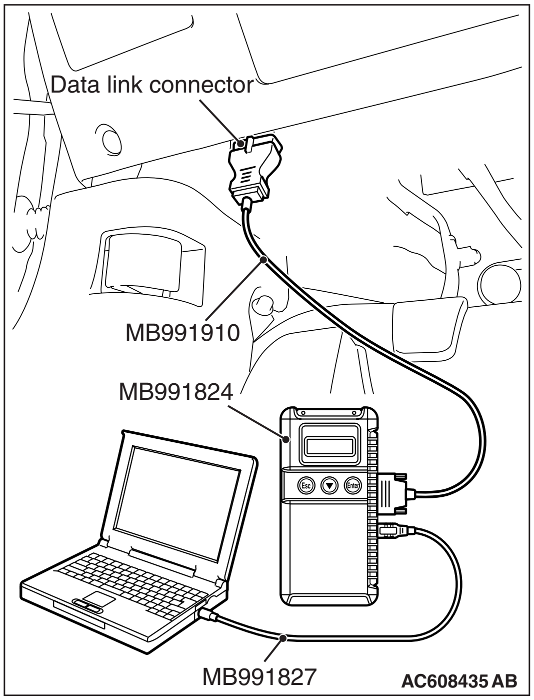
TROUBLESHOOTING HINTS

- Malfunction of the Satellite Radio
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the Satellite Radio diagnostic trouble code.

Check whether an satellite radio DTCs are set or not.
(1) Turn the ignition switch to the "ON" position.
(2) Check for Satellite Radio DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the Satellite Radio (Refer to GROUP 54A, Diagnostic Trouble Code).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the Satellite Radio system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the Satellite Radio. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

DTC U0197: Hands Free Module Time-out

⚠ CAUTION

If DTC U0197 is set in the A/C-ECU, diagnose the CAN main bus line.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the communication circuit is normal.

TROUBLE JUDGMENT

The A/C-ECU receives the air conditioning control-related signals from the hands-free module via the CAN bus lines. If any of the air conditioning control-related signals from the SRS-ECU cannot be received, the diagnostic trouble code U0197 is stored.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the CAN bus lines between the hands free module and the A/C-ECU, the power supply system to the hands free module, the hands free module itself, or the A/C-ECU may be defective.

Past trouble

- If DTC U0151 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the CAN bus line between the A/C-ECU and the hands free module, and the power supply system to the hands free module. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

NOTE: For a past trouble, you cannot find it by the scan tool CAN bus diagnostics even if there is a failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13) and check the CAN bus lines. You can narrow down the possible cause of the trouble by referring to the DTC, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C, Explanation about the scan too CAN bus diagnostics P.54C-9).

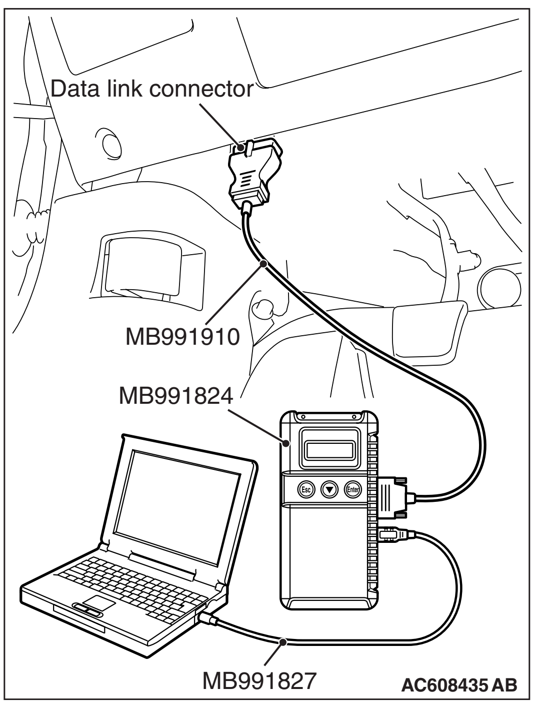
TROUBLESHOOTING HINTS

- Malfunction of the hands free module
- Malfunction of the A/C-ECU
- Damaged harness wires and connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
    - MB991824: V.C.I.
    - MB991827: M.U.T.-III USB Cable
    - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. (Refer to GROUP 54C, Diagnosis P.54C-16).

STEP 2. Using scan tool MB991958 read the hands free module diagnostic trouble code.

Check whether an hands free module DTCs are set or not.

(1) Turn the ignition switch to the "ON" position.
(2) Check for hands free module DTCs.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Diagnose the hands free module (Refer to GROUP 54A, Diagnostic Trouble Code).
NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check for any diagnostic trouble code.

Check if a DTC, which relates to CAN communication-linked systems below, is set.

- ETACS-ECU
  DTC indicating a time-out error related to the hands free module system

(1) Turn the ignition switch to the "ON" position.
(2) Check for a DTC related to the relevant system.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the SRS-ECU. On completion, check that the DTC is not reset.
NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

STEP 5. Recheck for diagnostic trouble code.

Check again if the DTC is set.

(1) Turn the ignition switch to the "ON" position.
(2) Check if the DTC is set.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the A/C-ECU. On completion, check that the DTC is not reset.

NO : There is an intermittent malfunction such as poor engaged connector(s) or open circuit (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.)

SYMPTOM CHART

M1552009900718

⚠ CAUTION

During diagnosis, a DTC code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.

Symptom	Inspection procedure	Reference page
When the A/C is operation, temperature inside the passenger compartment does not decrease (Cool air is not emitted).	1	P.55A-64
Malfunction of the A/C power supply system.	2	P.55A-67
The compressor does not work.	3	P.55A-71
Blower fan and motor do not turn.	4	P.55A-78
Blower air amount cannot be changed.	5	P.55A-83
Outside/inside air changeover is not possible.	6	P.55A-86
A/C outlet air temperature does not increase.	7	P.55A-88
Air outlet vent cannot be changed.	8	P.55A-91
Rear window defogger does not operate.	9	P.55A-94
Blower motor power supply system.	10	P.55A-103

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: When the A/C is Operation, Temperature Inside the Passenger Compartment does not Decrease (Cool Air is not Emitted).

TECHNICAL DESCRIPTION (COMMENT)

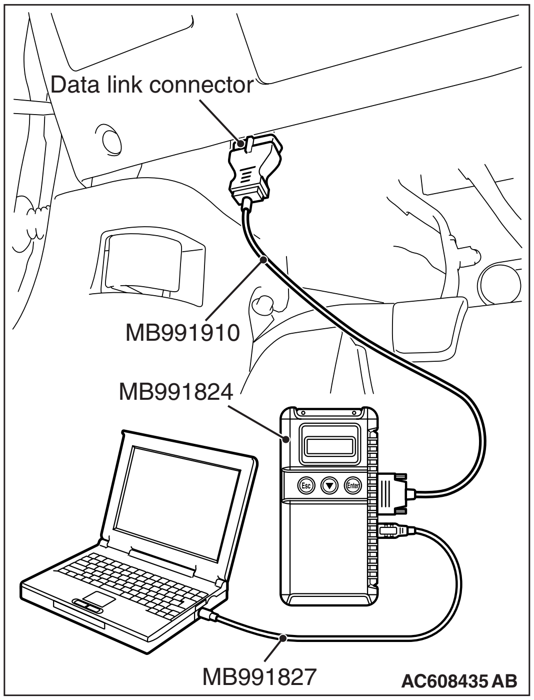
The blower system or the compressor system may be defective if there is no cool air coming from the vents.

TROUBLESHOOTING HINTS

- Malfunction of blower motor
- Malfunction of A/C-ECU
- Malfunction of A/C compressor

DIAGNOSIS

STEP 1. Using scan tool MB991958, read the diagnostic trouble code.



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

Check if an A/C-ECU DTC is set.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.55A-8.
NO : Go to Step 2.

STEP 2. Check that the blower motor operation when the blower knob is moved to the "Maximum air volume" position.

(1) Turn the ignition switch to the "ON" position.
(2) Turn the blower knob to the "Maximum air volume" position

Q: Does the blower motor operate when the blower knob is moved to the "Maximum air volume" position?

YES : Go to Step 3.
NO : Refer to Inspection procedure 4 "Blower fan and motor do not turn P.55A-78."

STEP 3. Check the rear window defogger and outside/inside air selection damper control motor operation.

(1) Turn the ignition switch to the "ON" position.
(2) Check the engine running.
(3) Check the operations of rear window defogger and outside/inside air selection damper control motor.

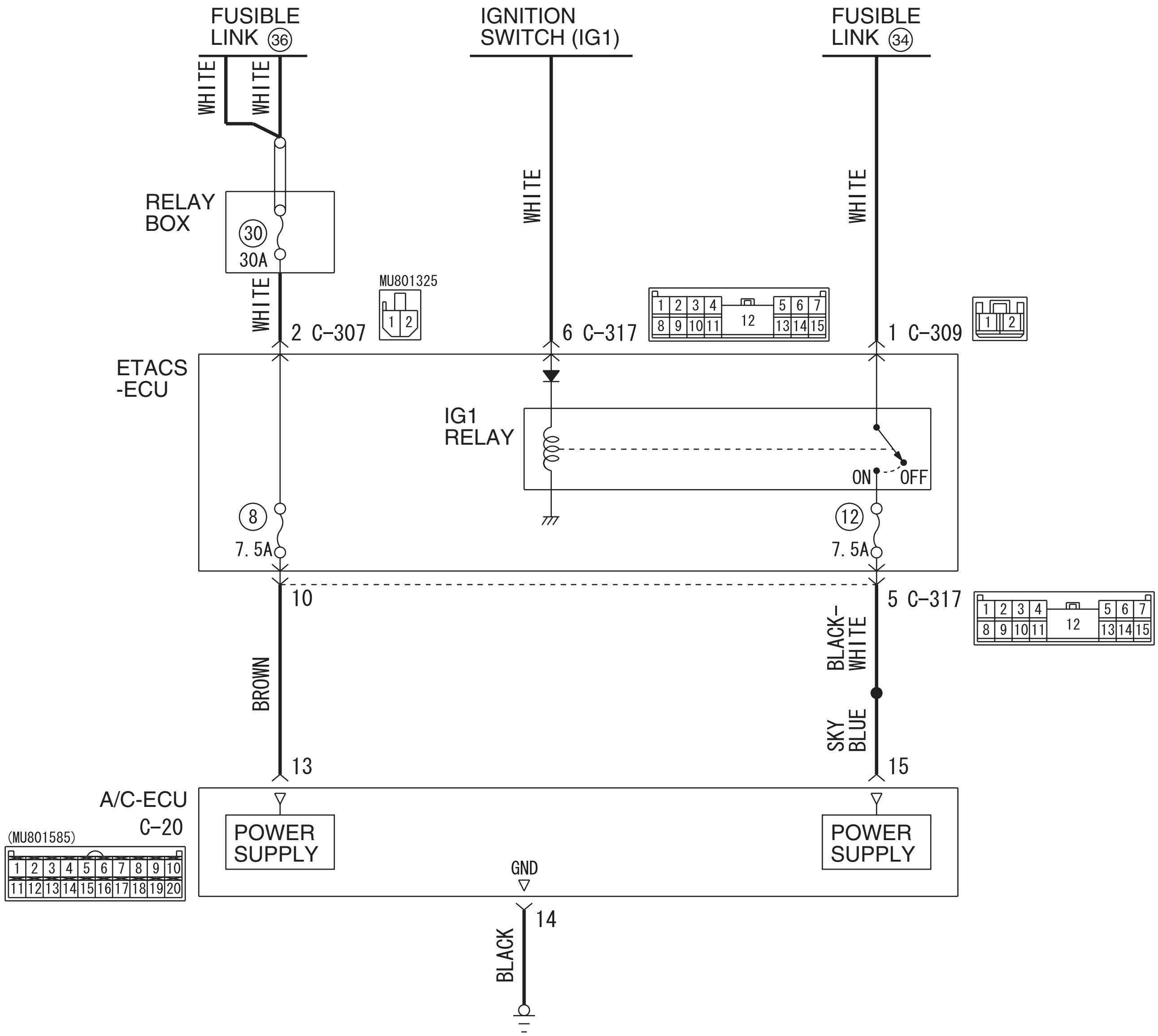
Q: Do the rear window defogger and outside/inside air selection damper control motor work normally?

YES : Refer to Inspection procedure 3 "The A/C compressor does not Work P.55A-71."

NO : Refer to Inspection procedure 2, "Malfunction of the A/C-ECU power supply system P.55A-67."

INSPECTION PROCEDURE 2: Malfunction of the A/C-ECU Power Supply System.

A/C-ECU Power Supply Circuit



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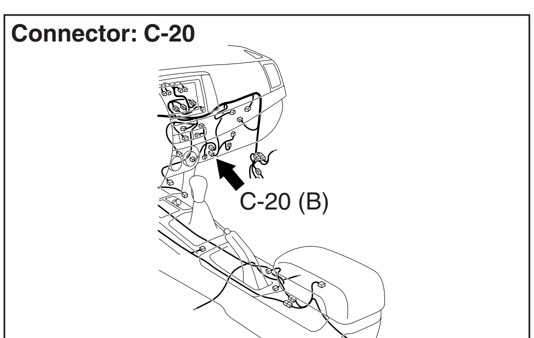

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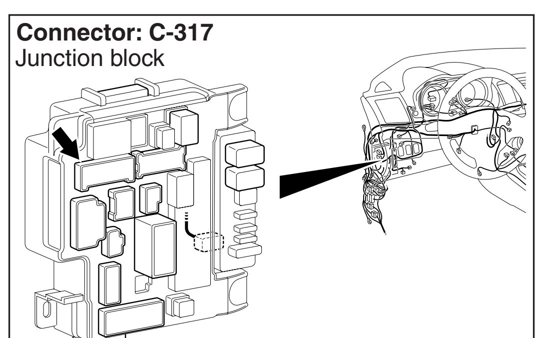

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TECHNICAL DESCRIPTION (COMMENT)

The A/C-ECU power system may be defective if the air conditioning, defogger, and outside/inside air selection damper motor all do not operate normally.

TROUBLESHOOTING HINTS

- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tool:

- MB991223: Test Harness Set

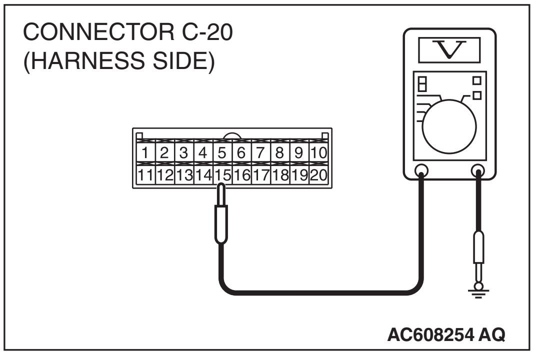
STEP 1. Check A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C-ECU connector C-20 in good condition?

YES : Go to Step 2.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the A/C works normally.

STEP 2. Measure the voltage at A/C-ECU connector C-20.

(1) Disconnect A/C-ECU connector C-20 and measure the voltage at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 15 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).



Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 5.
NO : Go to Step 3.

STEP 3. Check ETACS-ECU connector C-317 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-317 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the A/C works normally.

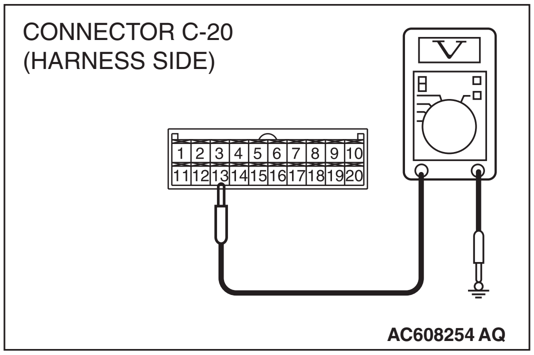
STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 15) and ETACS-ECU connector C-317 (terminal 5).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 15) and ETACS-ECU connector C-317 (terminal 5) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness. Check that the A/C works normally.

STEP 5. Measure the voltage at A/C-ECU connector C-20.



(1) Disconnect A/C-ECU connector C-20 and measure the voltage at the harness side.
(2) Measure the voltage between terminal 13 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 V?

YES : Go to Step 7.

NO : Go to Step 6.

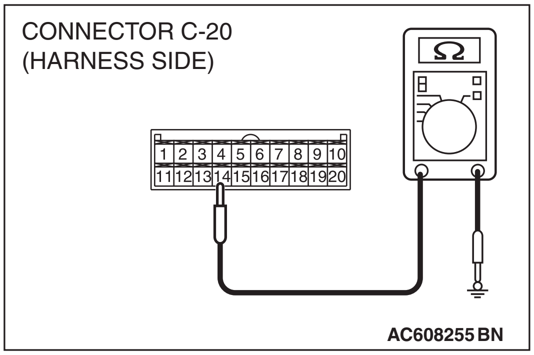
STEP 6. Check the wiring harness between A/C-ECU connector C-20 (terminal 13) and the FUSIBLE LINK (36).

NOTE: Also check ETACS-ECU connector C-317 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-317 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 13) and the FUSIBLE LINK (36) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness. Check that the A/C works normally.



STEP 7. Measure the resistance at A/C-ECU connector C-20.

(1) Disconnect A/C-ECU connector C-20, and measure at the wiring harness side.
(2) Measure the resistance between terminal 14 and ground.
- The measured value should be 2 ohms or less.

Q: Does the measured resistance value correspond with this range?

YES : Replace the A/C-ECU, and check that the A/C works normally.
NO : Go to Step 8.

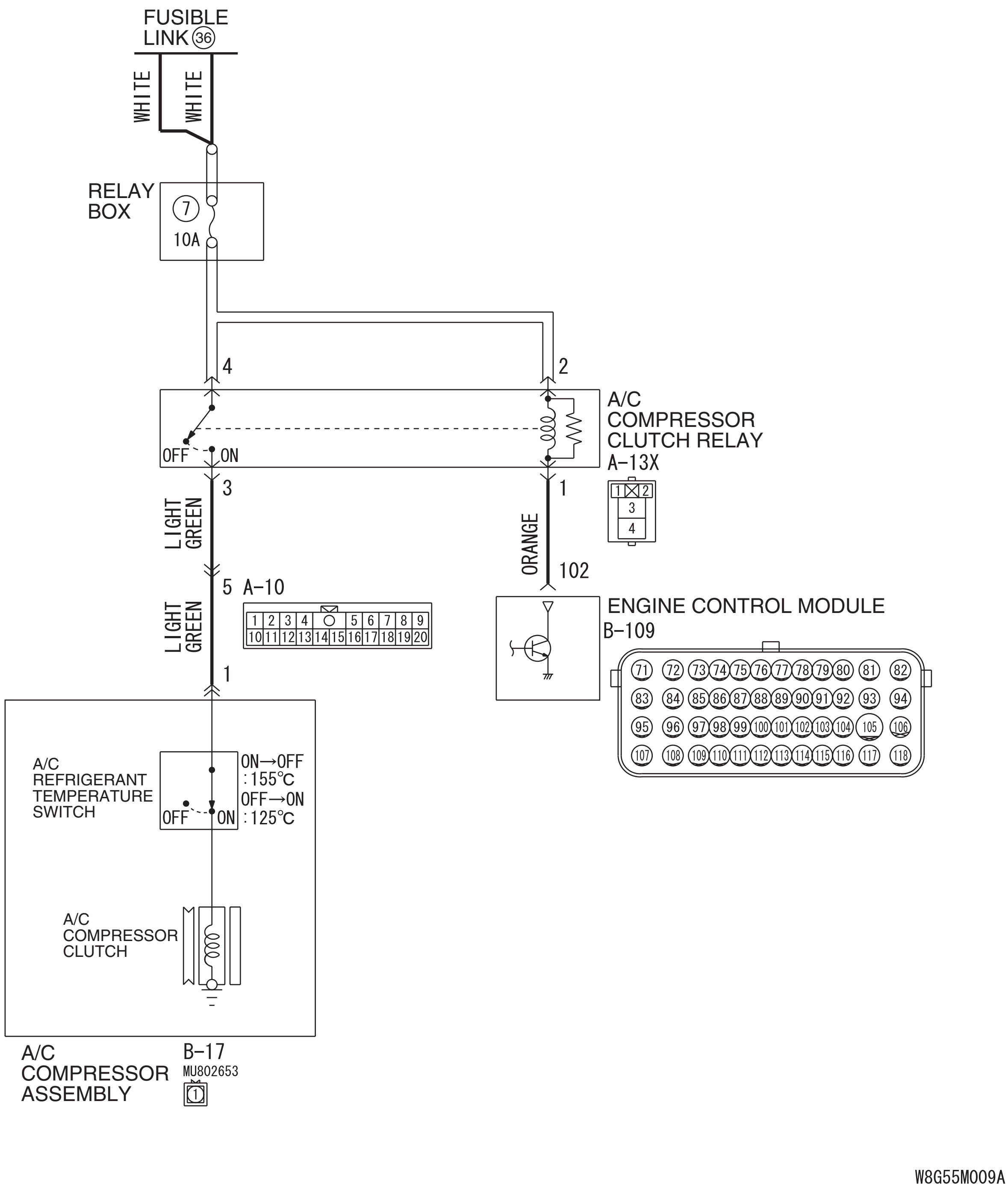
STEP 8. Check the wiring harness between A/C-ECU connector C-20 (terminal 14) and the ground.

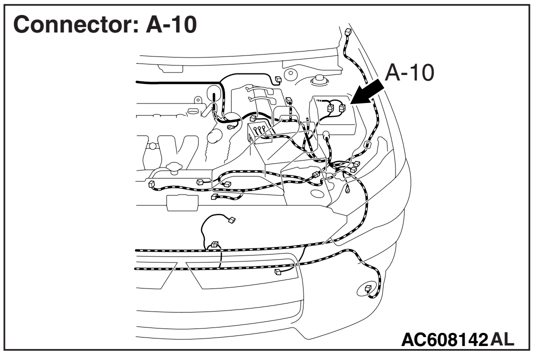
Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 14) and ground in good condition?

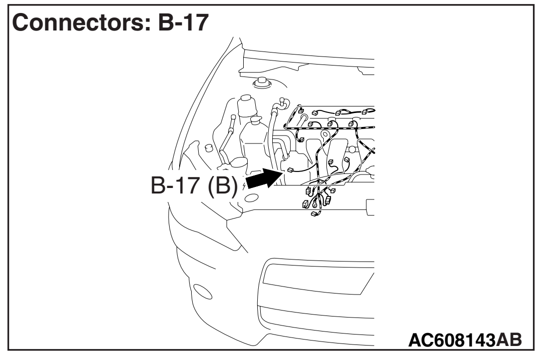
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.
NO : Repair the wiring harness. Check that the A/C works normally.

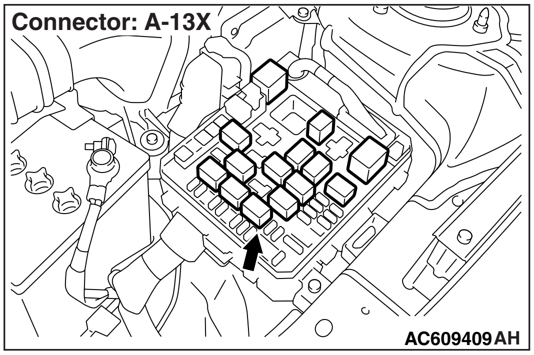
INSPECTION PROCEDURE 3: The Compressor does not Work.

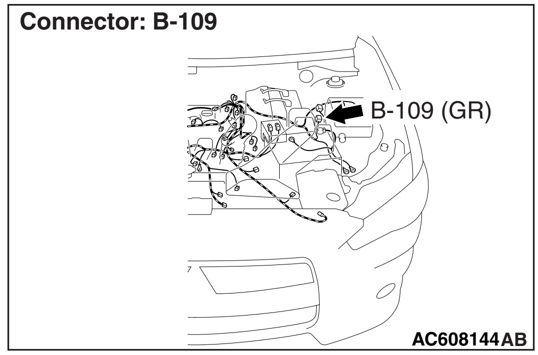
A/C Compressor Assembly Circuit











FUNCTION

Compressor that recovers the refrigerant, which evaporated in the evaporator and became a high-temperature and high-pressure gas, and turns it into liquid again.

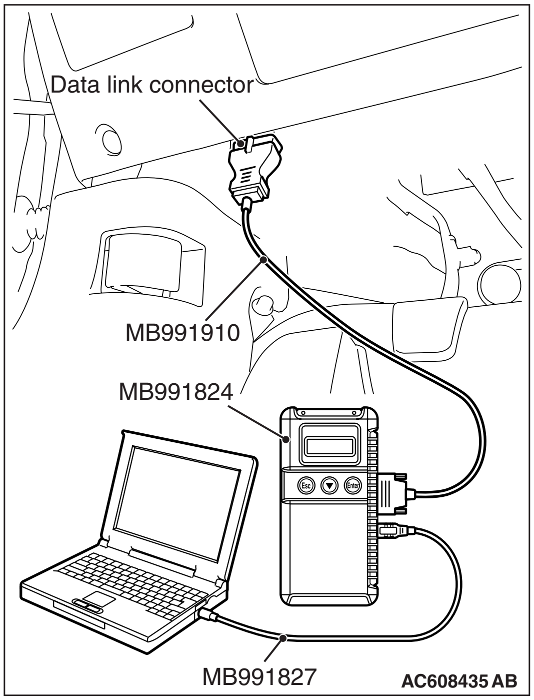
PROBABLE CAUSES

- Insufficient refrigerant
- Malfunction of connector.
- Malfunction of the harness (A/C compressor circuit is open/shorted to ground)
- Malfunction of the A/C pressure sensor.
- Malfunction of the A/C compressor.
- Malfunction of the A/C compressor clutch relay.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991658: Test Harness Set
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ **CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose the CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line found to be normal?

YES : Go to Step 2.
NO : Repair the CAN bus lines (Refer to GROUP 54C, precautions on how to repair the CAN bus lines P.54C-16).

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.

Check if an A/C-ECU DTC is set.
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

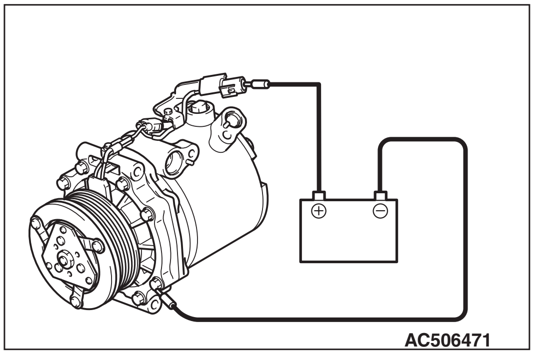
Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.55A-8.
NO : Go to Step 3.

STEP 3. Check A/C compressor assembly connector B-17 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C compressor assembly connector B-17 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Check the A/C compressor clutch operation.
Connect the compressor connector terminal to the battery positive (+) terminal and ground the battery's negative (-) terminal to the compressor unit. At that time, the A/C compressor clutch should make a definite operating sound.

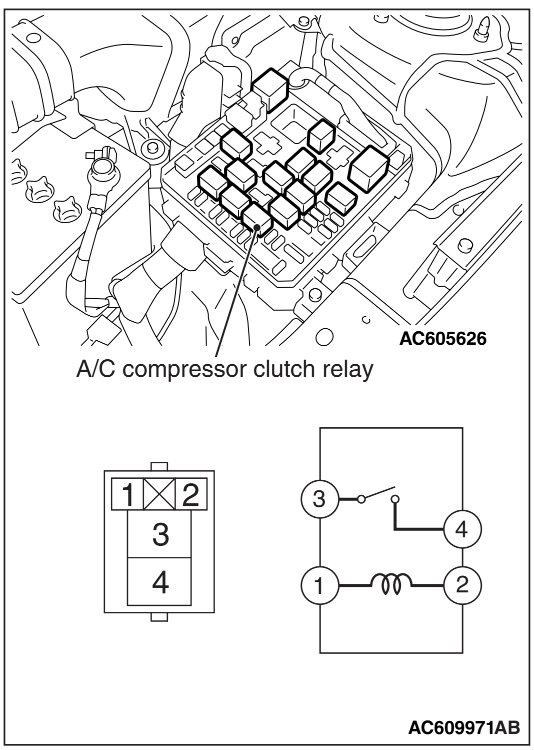
Q: Can the sound (click) of the A/C compressor clutch operation be heard?

YES : Go to Step 5.
NO : Replace the compressor magnet clutch.

STEP 5. Check A/C compressor clutch relay connector A-13X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C compressor clutch relay connector A-13X in good condition?

YES : Go to Step 6.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 6. Check the A/C compressor clutch relay continuity.
Follow the table below to check the A/C compressor clutch relay for continuity.

BATTERY VOLTAGE	TESTER CONNECTION	SPECIFIED CONDITION
Not applied	3 –4	Open circuit
• Connect terminal 2 to the positive battery terminal • Connect terminal 1 to the negative battery terminal	3 –4	Less than 2 ohms

Q: Is the A/C compressor clutch relay in good condition?

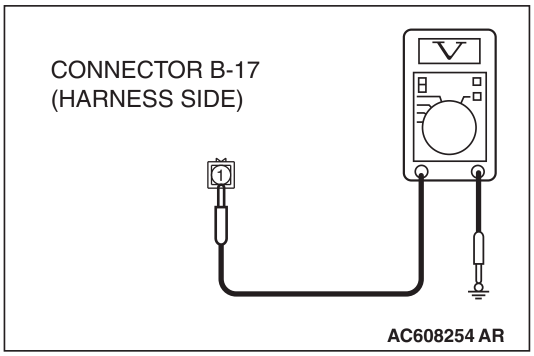
YES : Go to Step 7.
NO : Replace the A/C compressor clutch relay.

STEP 7. Check engine control module connector B-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is engine control module connector B-109 in good condition?

YES : Go to Step 8.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 8. Measure the voltage at A/C compressor assembly connector B-17.

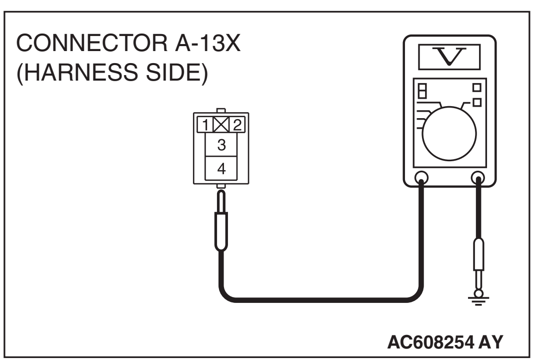


(1) Disconnect A/C compressor assembly connector B-17 and measure the voltage at the wiring harness side.
(2) Disconnect powertrain control module connector B-109 and ground harness side terminal No.102.
(3) Turn the ignition switch to the "ON" position.
(4) A/C compressor assembly connector B-17 terminal 1 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 13.
NO : Go to Step 9.

STEP 9. Measure the voltage at A/C compressor clutch relay connector A-13X.



(1) Disconnect A/C compressor connector A-13X and measure the voltage at the relay box side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 4 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

(4) Measure the voltage between terminal 2 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 11.
NO : Go to Step 10.

STEP 10. Check the wiring harness between A/C compressor clutch relay connector A-13X (terminals 2 and 4) and the fusible link (36).

Q: Is the wiring harness between A/C compressor clutch relay connector A-13X (terminals 2 and 4) and the fusible link (36) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness. Check that the A/C works normally.

STEP 11. Check the wiring harness between A/C compressor clutch relay connector A-13X (terminal 3) and A/C compressor assembly connector B-17 (terminal 1).

NOTE: Also check intermediate connector A-10 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector A-10 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between A/C compressor clutch relay connector A-13X (terminal 3) and A/C compressor assembly connector B-17 (terminal 1) in good condition?

YES : Go to Step 12.

NO : Repair the wiring harness. Check that the A/C works normally.

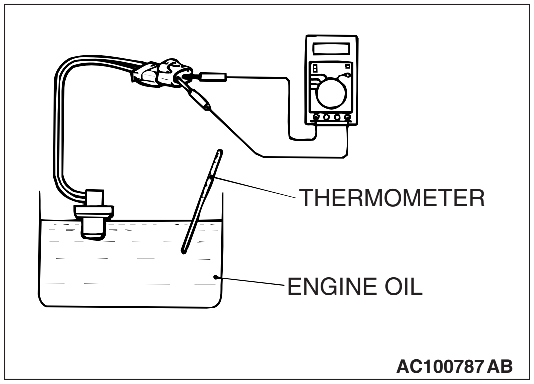
STEP 12. Check the wiring harness between powertrain control module connector B-109 (terminal 102) and A/C compressor clutch relay connector A-13X (terminal 1).

Q: Is the wiring harness between powertrain control module connector B-109 (terminal 102) and A/C compressor clutch relay connector A-13X (terminal 1) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness. Check that the A/C works normally.

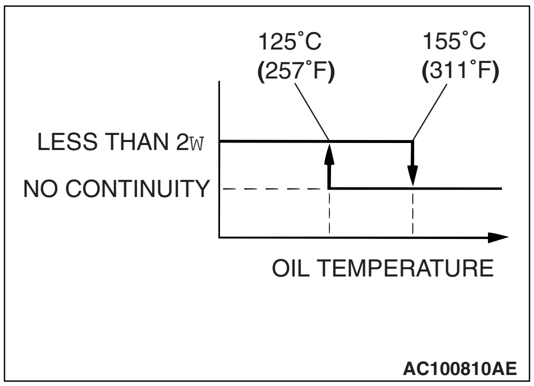
STEP 13. Check the refrigerant temperature switch.



⚠ CAUTION

Do not heat more than necessary.

(1) Dip the metal part of the cooling temperature switch into engine oil and increase the oil temperature using a gas burner or similar.



(2) When the oil temperature reaches the standard value, check that resistance is supplied between the terminals.

Standard value:

ITEM	TEMPERATURE
Less than 2 ohms	Slightly below 155° C (311° F)
No continuity	155° C (311° F) or more

NOTE: When the oil temperature is 155°C (311°F) or more and there is no continuity, the resistance will not be 2Ωor lower until the oil temperature reduces to 125°C (257°F) or less.

Q: Is the refrigerant temperature switch operating properly?

YES : Go to Step 14.
NO : Replace the refrigerant temperature switch. Check that the A/C works normally.

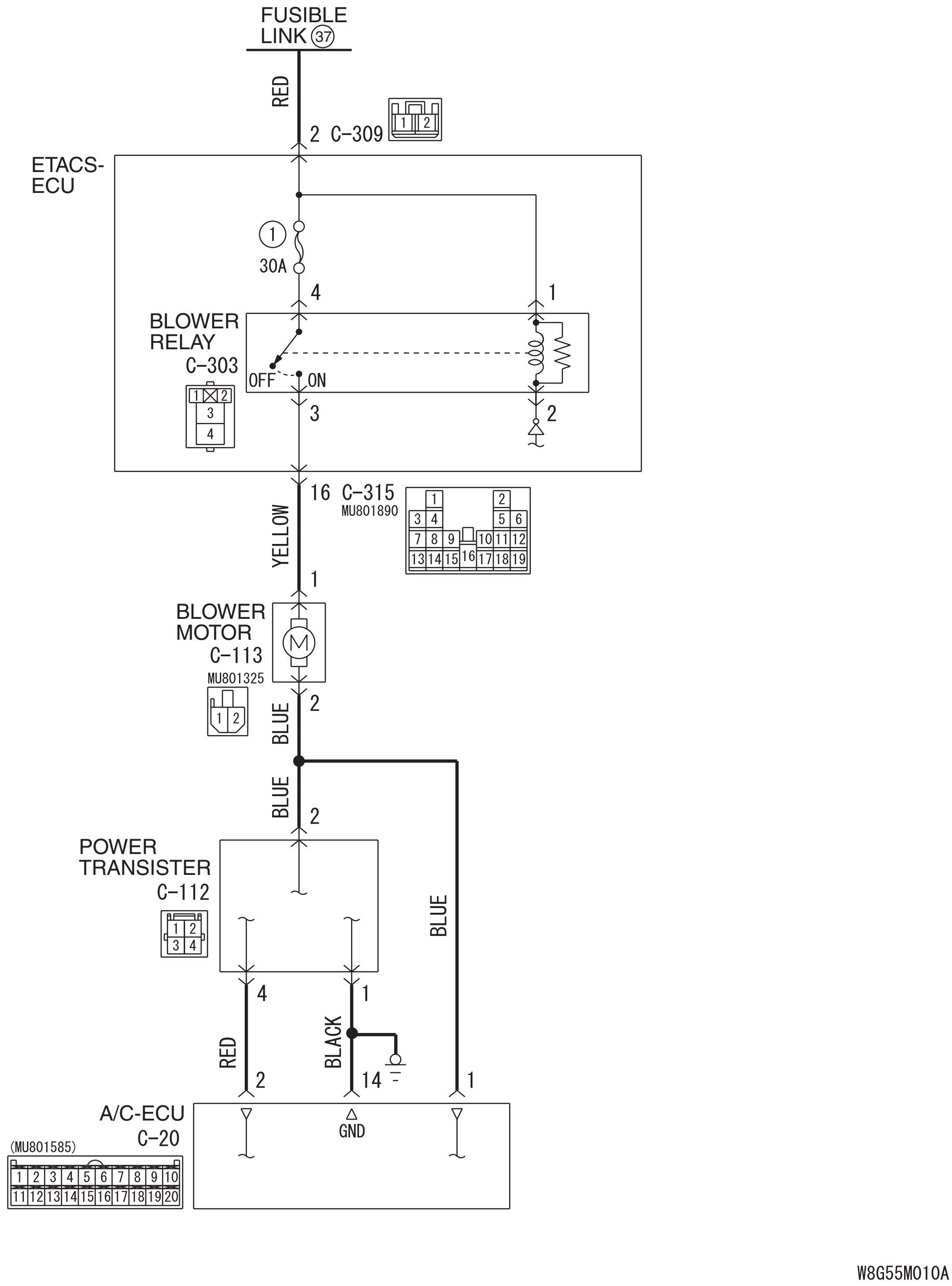
STEP 14. Replace the A/C-ECU.

Q: Does the A/C operate normally?

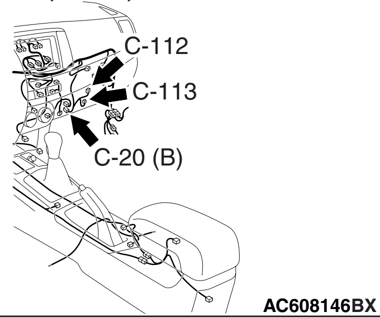
YES : No action is necessary and testing is complete.
NO : Replace the powertrain control module. Check that the A/C works normally.

INSPECTION PROCEDURE 4: Blower Fan and Motor do not Turn.

Blower Motor Circuit



Connector: C-20, C-112, C-113



CIRCUIT OPERATION

If the blower motor does not operate, the blower relay system is suspected.

TROUBLESHOOTING HINTS

- Malfunction of the power transistor
- Malfunction of the blower motor
- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check blower motor connector C-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

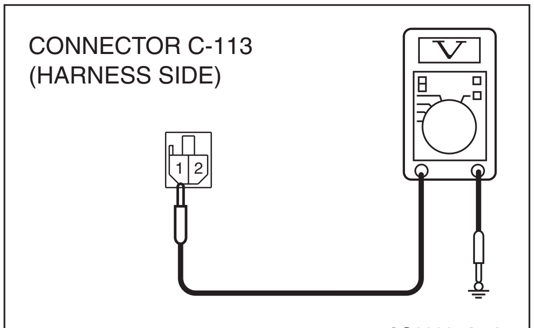
Q: Is blower motor connector C-113 in good condition?

YES : Go to Step 2.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 2. Measure the voltage at blower motor connector C-113.

(1) Disconnect blower motor connector C-113, and measure the voltage at the wiring harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Turn the blower switch to the "Maximum air volume" position.
(4) Measure the voltage between terminal 1 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).



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Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 3.
NO : Refer to Inspection procedure 10, "Blower motor power supply system P.55A-103."

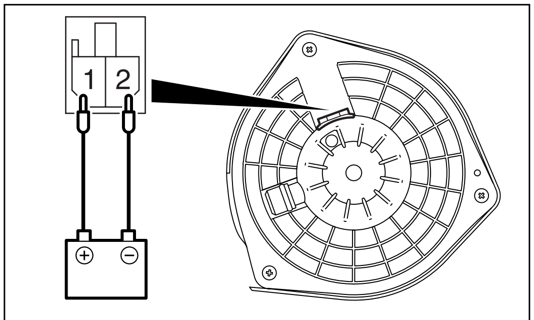
STEP 3. Check blower motor connector C-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is blower motor connector C-113 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 4. Check the blower fan and motor operation.

Check that the motor turns when applying battery power between the connector terminals. Also check to see that there is no abnormal sound emitted from the motor at this time..



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Q: Is there any abnormal noise?

YES : Go to Step 5.
NO : Replace the blower relay. The blower motor should operate normally.

STEP 5. Check A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C-ECU connector C-20 in good condition?

YES : Go to Step 6.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 6. Check the wiring harness between A/C-ECU connector C-20 (terminal 1) and blower motor connector C-113 (terminal 1).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 1) and blower motor connector C-113 (terminal 1) in good condition?

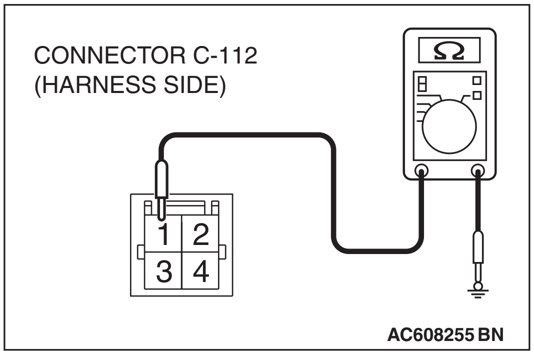
YES : Go to Step 7.
NO : Repair the wiring harness. The blower motor should operate normally.

STEP 7. Check power transistor connector C-112 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is power transistor connector C-112 in good condition?

YES : Go to Step 8.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 8. Measure the resistance at power transistor connector C-112.



(1) Disconnect power transistor connector C-112, and measure the resistance at the wiring harness side.
(2) Measure the resistance value between terminal 1 and ground.

OK: The measured value should be 2 ohms or less

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 10.
NO : Go to Step 9.

STEP 9. Check the wiring harness between power transitor connector C-112 (terminal 1) and ground.

Q: Is the wiring harness between power transitor connector C-112 (terminal 1) and ground in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.
NO : Repair the wiring harness. The blower motor should operate normally.

STEP 10. Check the wiring harness between A/C-ECU connector C-20 (terminals 1 and 2) and power transitor connector C-112 (terminals 2 and 4).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminals 1 and 2) and power transitor connector C-112 (terminals 2 and 4) in good condition?

YES : Go to Step 11.
NO : Repair the wiring harness. The blower motor should operate normally.

STEP 11. Replace the power transistor and check the trouble symptom again

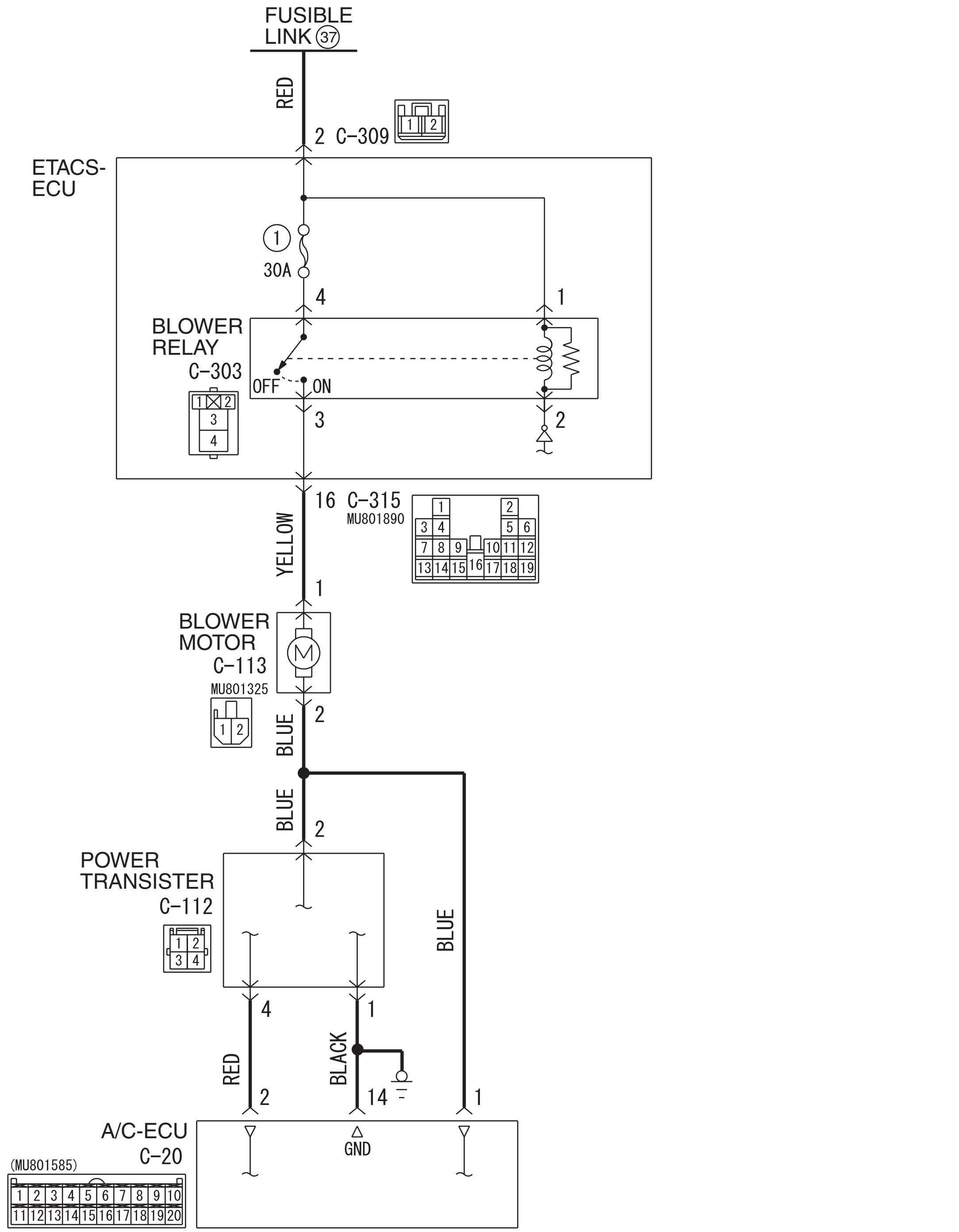
Check the trouble symptom again.

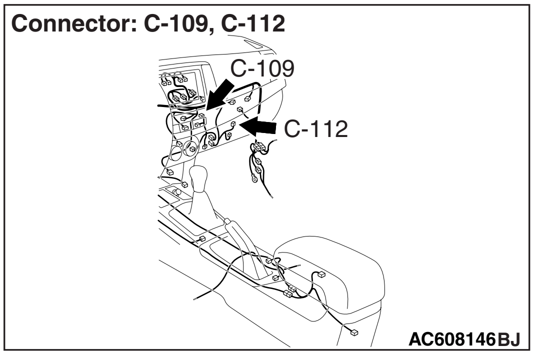
Q: Is the check result satisfactory?

YES : The procedure is complete.
NO : Replace the A/C-ECU.

INSPECTION PROCEDURE 5: Blower Air Amount cannot be Changed.

Blower Motor Circuit





CIRCUIT OPERATION

If the blower motor speed cannot be changed, the power transistor circuit is suspected.

TROUBLESHOOTING HINTS

- Malfunction of the power transistor
- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

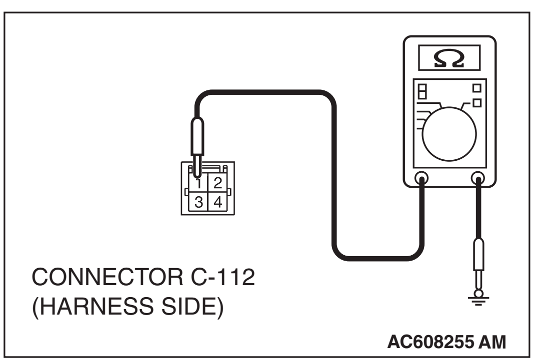
STEP 1. Check power transistor connector C-112 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is power transistor connector C-112 in good condition?

YES : Go to Step 2.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 2. Measure the resistance at power transistor connector C-112.



(1) Disconnect power transistor connector C-112, and measure the resistance at the wiring harness side.

(2) Measure the resistance value between terminal 1 and ground.

OK: The measured value should be 2 ohms or less

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 4.

NO : Go to Step 3.

STEP 3. Check the wiring harness between power transitor connector C-112 (terminal 1) and ground.

Q: Is the wiring harness between power transitor connector C-112 (terminal 1) and ground in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair the wiring harness. The blower motor should operate normally.

STEP 4. Check A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C-ECU connector C-20 in good condition?

YES : Go to Step 5.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.The blower motor should operate normally.

STEP 5. Check the wiring harness between A/C-ECU connector C-20 (terminals 1 and 2) and power transitor connector C-112 (terminals 2 and 4).

Q: Is the wiring harness between A/C-ECU connector C-20 (terminals 1 and 2) and power transitor connector C-112 (terminals 2 and 4) in good condition?

YES : Go to Step 6.

NO : Repair the wiring harness. The blower motor should operate normally.

STEP 6. Replace the power transistor and check the trouble symptom again

Check the trouble symptom again.

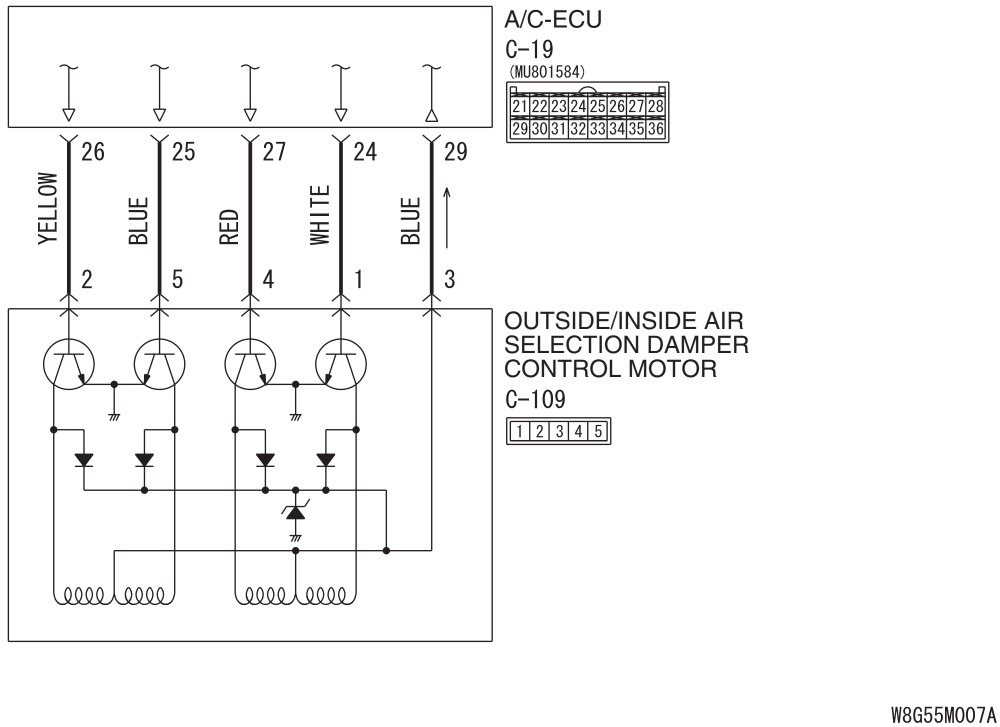
Q: Is the check result satisfactory?

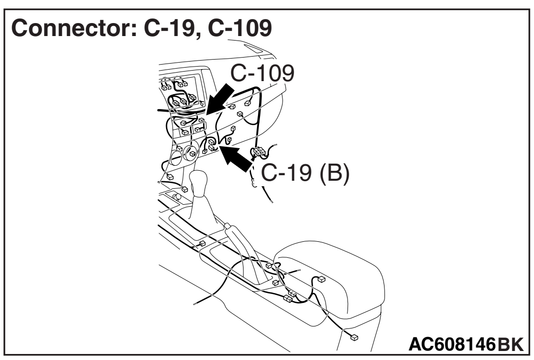
YES : The procedure is complete.

NO : Replace the A/C-ECU.

INSPECTION PROCEDURE 6: Outside/Inside Air Changeover is not possible.

Outside/Inside Air Selection Damper Control Motor Circuit





CIRCUIT OPERATION

If the outside/inside air selection damper control motor does not operate normally, the outside/inside air selection damper control motor system may be defective.

TROUBLESHOOTING HINTS

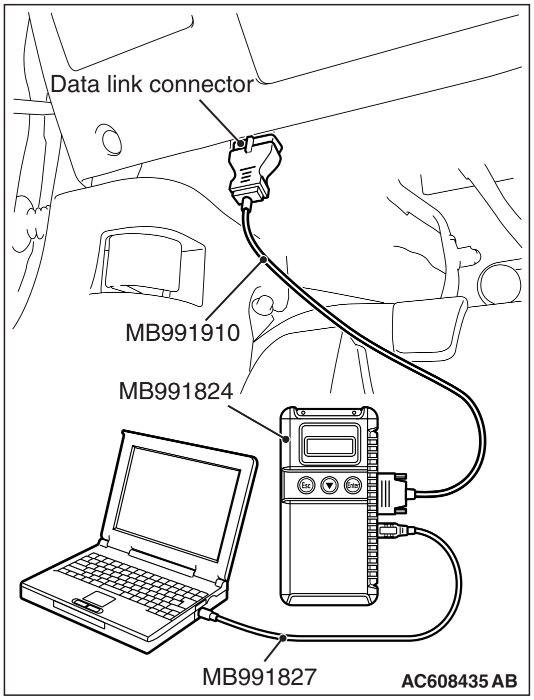
- Malfunction of the outside/inside air selection damper control motor
- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, check for diagnostic trouble code.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

Check if an A/C-ECU DTC is set.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55A-6."
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to DIAGNOSTIC TROUBLE CODE CHART P.55A-8.
NO : Go to Step 2.

STEP 2. Check outside/inside air selection damper control motor connector C-109 and A/C-ECU connector C-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are outside/inside air selection damper control motor connector C-109 and A/C-ECU connector C-19 in good condition?

YES : Go to Step 3.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the A/C works normally.

STEP 3. Check the wiring harness between A/C-ECU connector C-19 (terminal 26, 25, 27, 24 and 29) and outside/inside air selection damper control motor connector C-109 (terminals 2, 5, 4. 1 and 3).

Q: Are the wiring harness between A/C-ECU connector C-19 (terminal 26, 25, 27, 24 and 29) and outside/inside air selection damper control motor connector C-109 (terminals 2, 5, 4. 1 and 3) in good condition?

YES : Go to Step 4.
NO : Repair the wiring harness. Check that the A/C works normally.

STEP 4. Replace the outside/inside air selection damper control motor and check the trouble symptom again

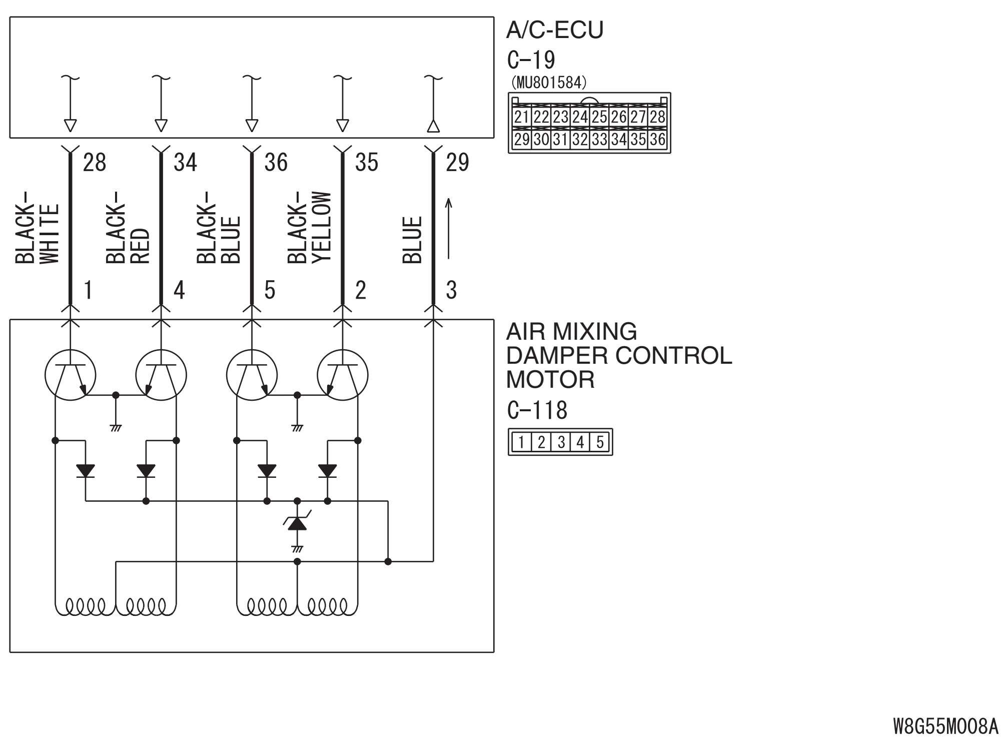
Check the trouble symptom again.

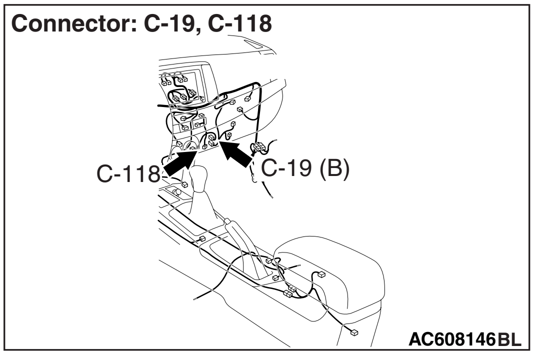
Q: Is the check result satisfactory?

YES : The procedure is complete.
NO : Replace the A/C-ECU.

INSPECTION PROCEDURE 7: A/C Outlet Air Temperature does not Increase

Air Mixing Damper Control Motor Circuit





CIRCUIT OPERATION

If the air outlet temperature cannot be adjusted, the air mixing damper control motor circuit may be failed.

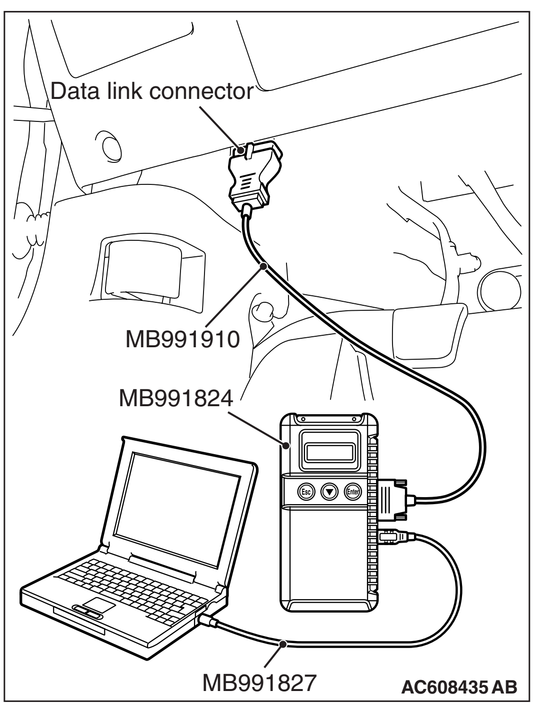
TROUBLESHOOTING HINTS

- Malfunction of the air mixing damper control motor
- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, check for diagnostic trouble code.

Check if an A/C-ECU DTC is set.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to DIAGNOSTIC TROUBLE CODE CHART P.55A-64.

NO : Go to Step 2.

STEP 2. Check air mixing damper control motor connector C-118 and A/C-ECU connector C-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are air mixing damper control motor connector C-118 and A/C-ECU connector C-19 in good condition?

YES : Go to Step 3.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the A/C works normally.

STEP 3. Check the wiring harness between A/C-ECU connector C-19 (terminal 29, 35, 36, 34 and 28) and air mixing damper control motor connector C-118 (terminals 3, 2, 5. 4 and 1).

Q: Are the wiring harness between A/C-ECU connector C-19 (terminal 29, 35, 36, 34 and 28) and air mixing damper control motor connector C-118 (terminals 3, 2, 5. 4 and 1) in good condition?

YES : Go to Step 4.
NO : Repair the wiring harness. Check that the A/C works normally.

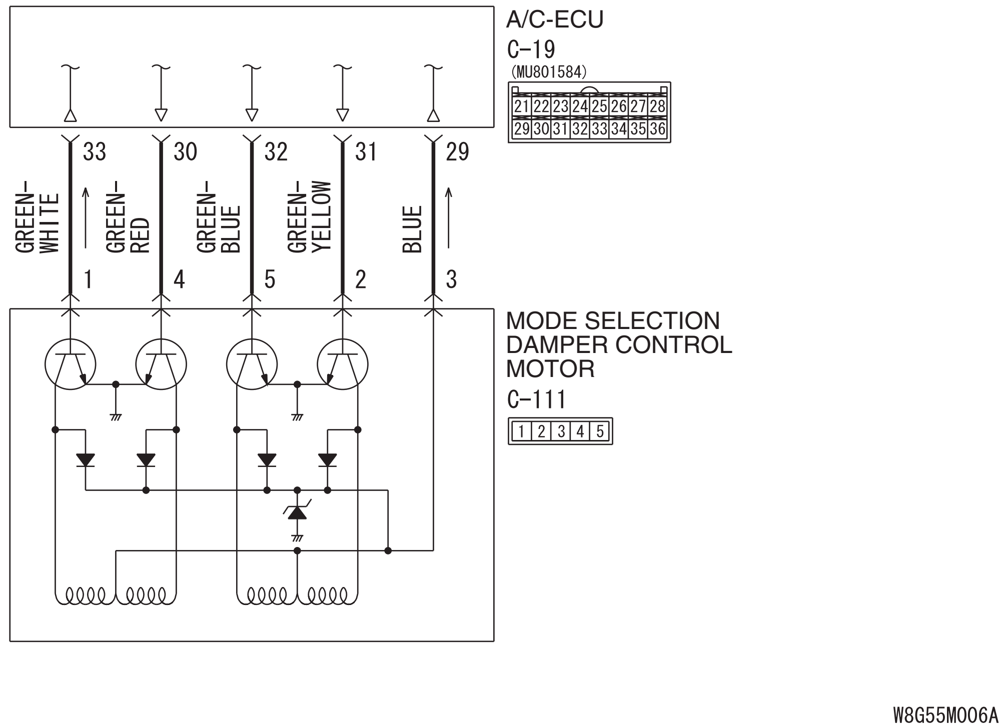
STEP 4. Replace the air mixing damper control motor and check the trouble symptom again
Check the trouble symptom again.

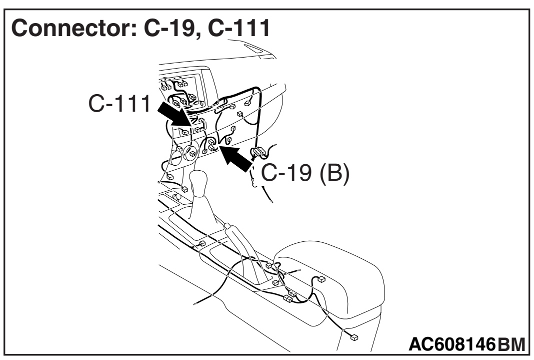
Q: Is the check result satisfactory?

YES : The procedure is complete.
NO : Replace the A/C-ECU.

INSPECTION PROCEDURE 8: Air Outlet Vent cannot be Changed.

Mode Selection Damper Control Motor Circuit





CIRCUIT OPERATION

If the air outlet cannot be switched, the mode selection damper control motor circuit may be failed.

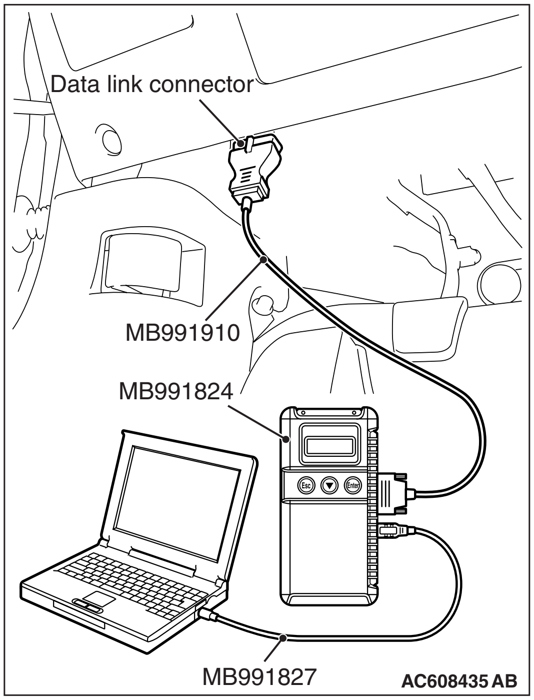
TROUBLESHOOTING HINTS

- Malfunction of the mode selection damper control motor
- Malfunction of the A/C-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



STEP 1. Using scan tool MB991958, check for diagnostic trouble code.

Check if an A/C-ECU DTC is set.

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to DIAGNOSTIC TROUBLE CODE CHART P.55A-8.

NO : Go to Step 2.

STEP 2. Check mode selection damper control motor connector C-111 and A/C-ECU connector C-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are mode selection damper control motor connector C-111 and A/C-ECU connector C-19 in good condition?

YES : Go to Step 3.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the A/C works normally.

STEP 3. Check the wiring harness between A/C-ECU connector C-19 (terminal 29, 31, 32, 30 and 33) and mode selection damper control motor connector C-111 (terminals 3, 2, 5. 4 and 1).

Q: Are the wiring harness between A/C-ECU connector C-19 (terminal 29, 31, 32, 30 and 33) and mode selection damper control motor connector C-111 (terminals 3, 2, 5. 4 and 1) in good condition?

YES : Go to Step 4.
NO : Repair the wiring harness. Check that the A/C works normally.

STEP 4. Replace the mode selection damper control motor and check the trouble symptom again

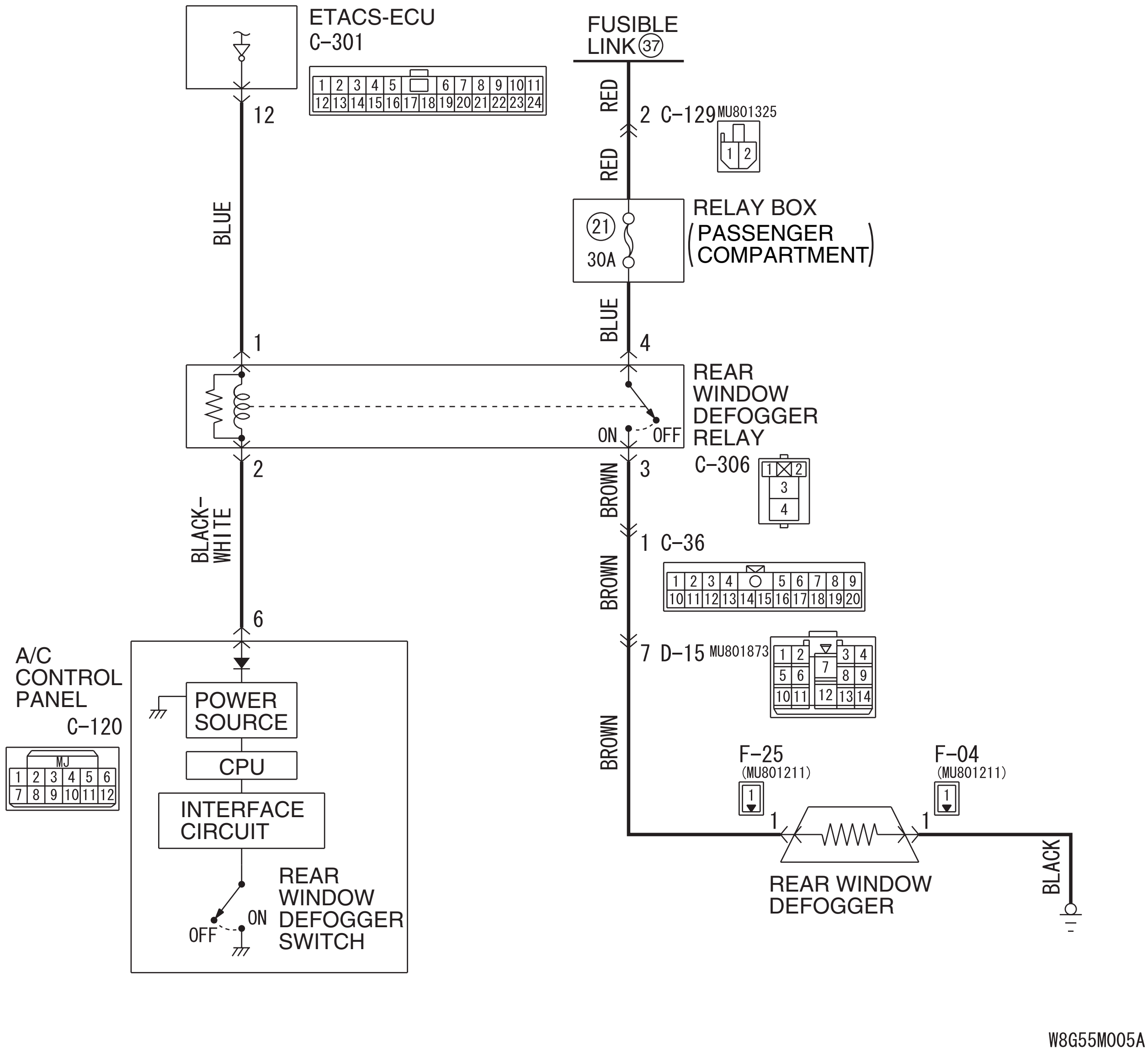
Check the trouble symptom again.

Q: Is the check result satisfactory?

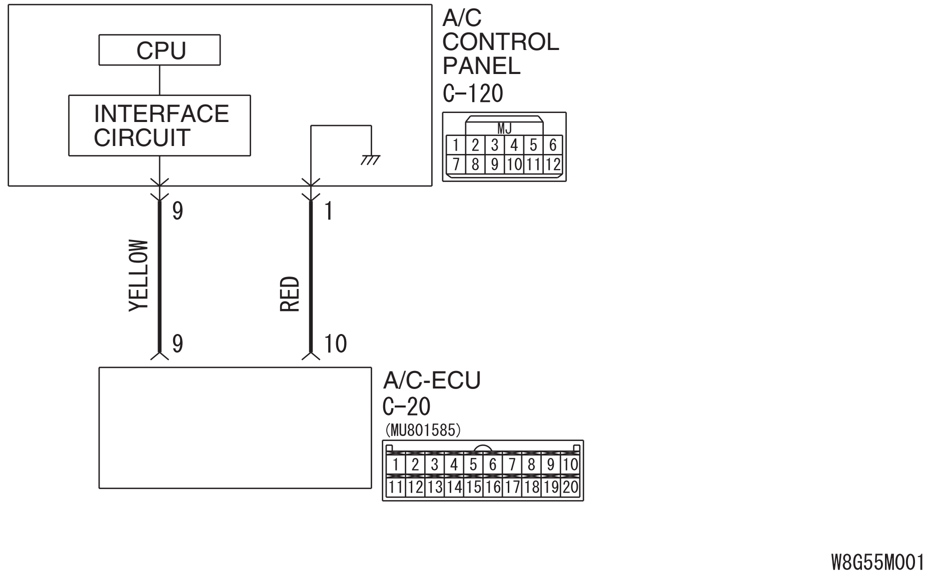
YES : The procedure is complete.
NO : Replace the A/C-ECU.

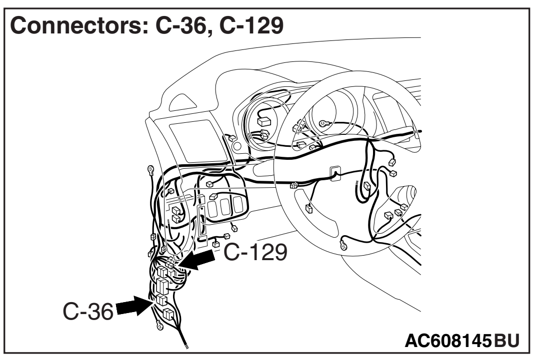
INSPECTION PROCEDURE 9: Rear window defogger does not operate.

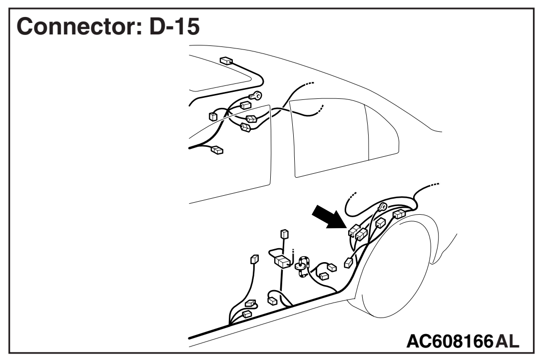
Rear Window Defogger Circuit

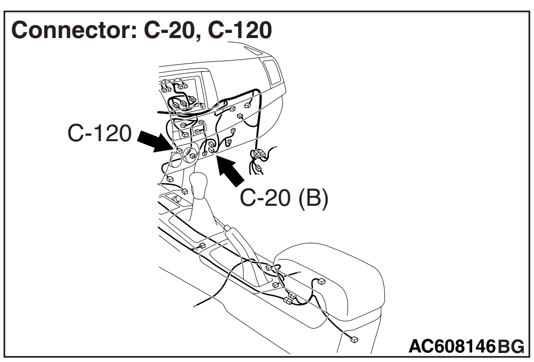


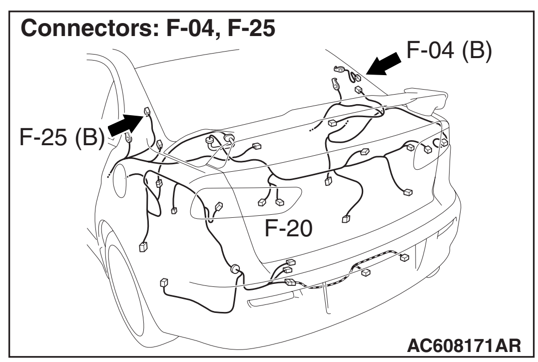
A/C Control Panel Circuit

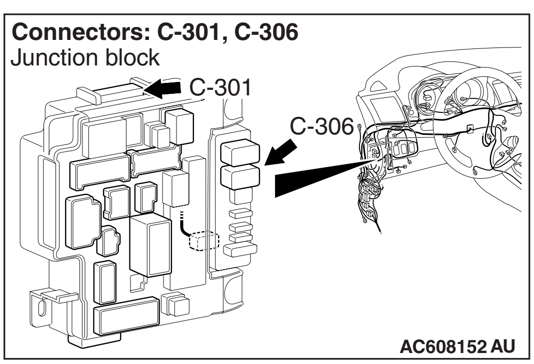












TECHNICAL DESCRIPTION (COMMENT)

The rear window defogger is able to turn on while engine is running. If the defogger does not operate when the rear window defogger switch is turned on, the rear window defogger relay system may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the A/C-ECU
- Malfunction of the rear window defogger relay
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check the A/C and outside/inside air selection damper control motor operation.

(1) Turn the ignition switch to the "ON" position.
(2) Check the engine running.
(3) Check the operations of rear window defogger and A/C.

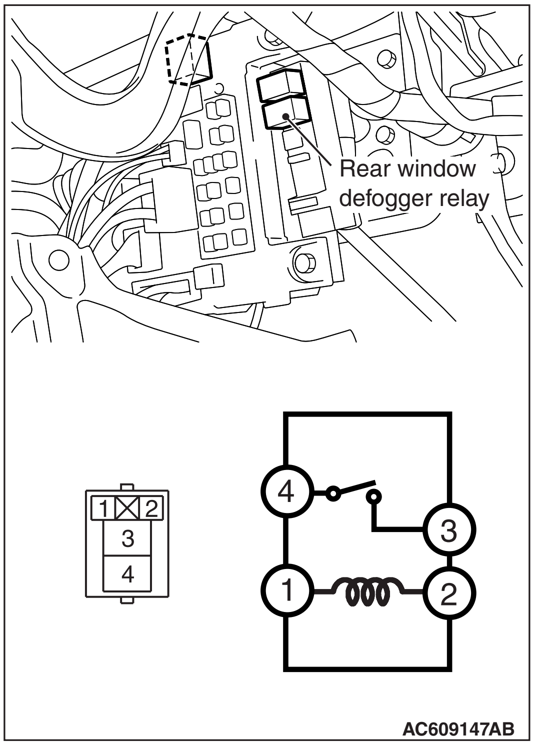
Q: Do the A/C and outside/inside air selection damper control motor work normally?

YES : Go to Step 2.
NO : Refer to Inspection procedure 2, "Malfunction of the A/C-ECU power supply system P.55A-67."

STEP 2. Check rear window defogger relay connector C-306 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is rear window defogger relay connector C-306 in good condition?

YES : Go to Step 3.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The rear window defogger system should work normally.



STEP 3. Check the rear window defogger relay continuity.
Follow the table below to check the rear window defogger relay for continuity.

Battery voltage	Terminal number	Normal condition
With no current applied	3 –4	No continuity
With current applied [terminal 1 (+), terminal 2 (–)]		Continuity exists (2 Ω or less)

Q: Is the rear window defogger relay in good condition?

YES : Go to Step 4.

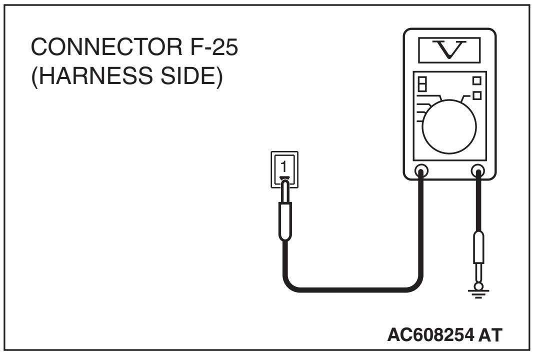
NO : Replace the rear window defogger relay. The rear window defogger system should work normally.

STEP 4. Check rear window defogger connector F-25 and A/C control panel connector C-120 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are rear window defogger connector F-25 and A/C control panel connector C-120 in good condition?

YES : Go to Step 5.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The rear window defogger system should work normally.

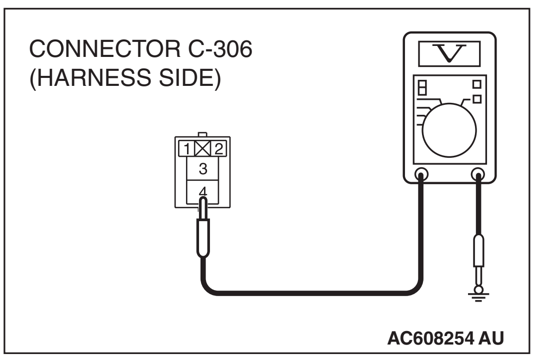


STEP 5. Measure the voltage at rear window defogger connector F-25.

(1) Disconnect rear window defogger connector F-25, and measure the voltage at the harness side.
(2) Disconnect A/C-ECU connector C-120 and ground harness side terminal No.6.
(3) Turn the ignition switch to the "ON" position.
(4) Measure the voltage between rear window defogger connector F-25 terminal No.1 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 13.
NO : Go to Step 6.



STEP 6. Measure the voltage at rear window defogger relay connector C-306.

(1) Disconnect rear window defogger relay connector C-306, and measure the voltage at the junction block side.
(2) Measure the voltage between terminal 4 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

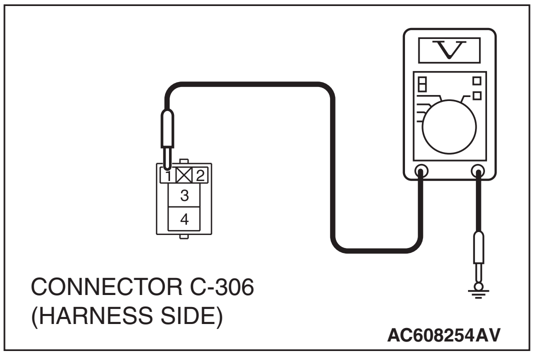
YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the wiring harness between rear window defogger relay connector C-306 (terminal 4) and the fusible link (37).

NOTE: Also check intermediate connector C-129 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-129 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection *P.00E-2**.*

Q: Is the wiring harness between rear window defogger relay connector C-306(terminal 4) and the fusible link (37) in good condition?

YES : Check that the rear window defogger system works normally.
NO : Repair the wiring harness. Check that the rear window defogger system works normally.



STEP 8. Measure the voltage at rear window defogger relay connector C-306.

(1) Disconnect rear window defogger relay connector C-306, and measure the voltage at the junction block side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal 1 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 11.
NO : Go to Step 9.

STEP 9. Check ETACS-ECU connector C-301 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is ETACS-ECU connector C-301 in good condition?

YES : Go to Step 10.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

STEP 10. Check the wiring harness between rear window defogger relay connector C-306 (terminal 1) and ETACS-ECU C-301 (terminal 12).

Q: Is the wiring harness between rear window defogger relay connector C-306 (terminal 1) and ETACS-ECU C-301 (terminal 12) in good condition?

YES : Check that the rear window defogger system works normally.
NO : Repair the wiring harness. Check that the rear window defogger system works normally.

STEP 11. Check the wiring harness between rear window defogger relay connector C-306 (terminal 2) and A/C-ECU connector C-120 (terminal 6).

Q: Is the wiring harness between rear window defogger relay connector C-306 (terminal 2) and A/C-ECU connector C-120 (terminal 6) in good condition?

YES : Go to Step 12.
NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

STEP 12. Check the wiring harness between rear window defogger relay connector C-306 (terminal 3) and rear window defogger connector F-25 (terminal 1).

NOTE: Also check intermediate connector C-36 and D-15 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-36 and D-15 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between rear window defogger relay connector C-306 (terminal 3) and rear window defogger connector F-25 (terminal 1) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

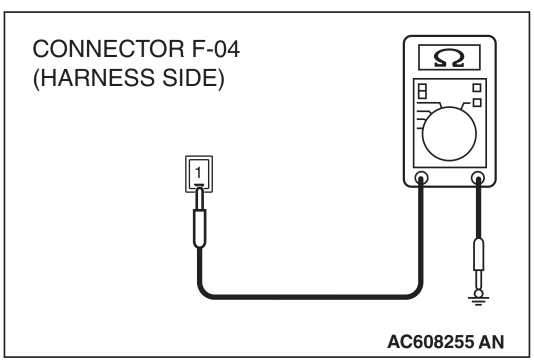
STEP 13. Check rear window defogger connector F-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is rear window defogger connector F-04 in good condition?

YES : Go to Step 14.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

STEP 14. Measure the resistance at rear window defogger connector F-04.



(1) Disconnect rear window defogger connector F-04, and measure at the wiring harness side.
(2) Measure the resistance between terminal 1 and ground.
- The measured value should be 2 ohms or less.

Q: Does the measured resistance value correspond with this range?

YES : Go to Step 16.

NO : Go to Step 15.

STEP 15. Check the wiring harness between rear window defogger connector F-04 (terminal 1) and the ground.

Q: Is the wiring harness between rear window defogger connector F-04 (terminal 1) and the ground in good condition?

YES : Check that the rear window defogger system works normally.

NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

STEP 16. Check A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is A/C-ECU connector C-20 in good condition?

YES : Go to Step 17.

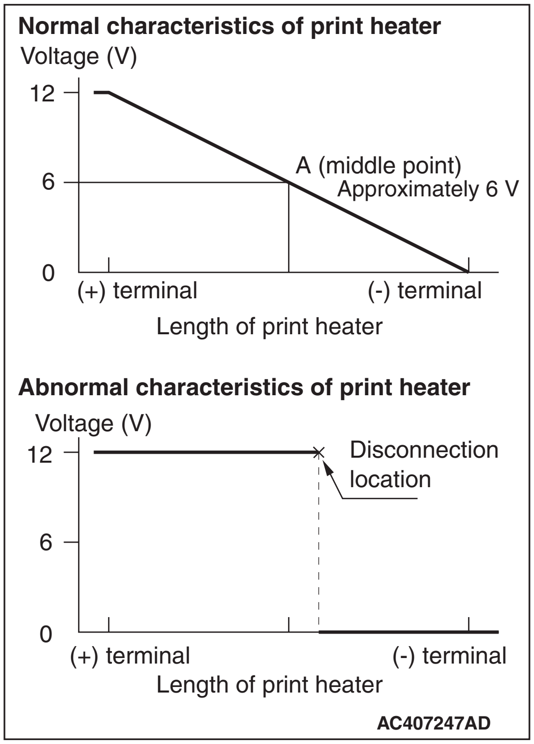
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.

STEP 17. Check the wiring harness between A/C-ECU connector C-20 (terminals 9 and 10) and A/C control panel connector C-120 (terminals 1 and 9).

Q: Are the wiring harness between A/C-ECU connector C-20 (terminals 9 and 10) and A/C control panel connector C-120 (terminals 1 and 9) in good condition?

YES : Go to Step 18.

NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Check that the rear window defogger system works normally.



STEP 18. Check the rear window defogger.

(1) Let the engine run at 2,000 r/min, and check the printed heater with the battery fully charged.

(2) Turn on the rear window defogger switch, and use a voltmeter to measure the voltage in each printed heater at middle point A on the rear window glass.

- The value should be approximately 6 volts.

Q: Does the rear window defogger work normally?

YES : Go to Step 19.

NO : Repair the rear window defogger.

STEP 19. Replace the A/C control panel and check the trouble symptom again

Check the trouble symptom again.

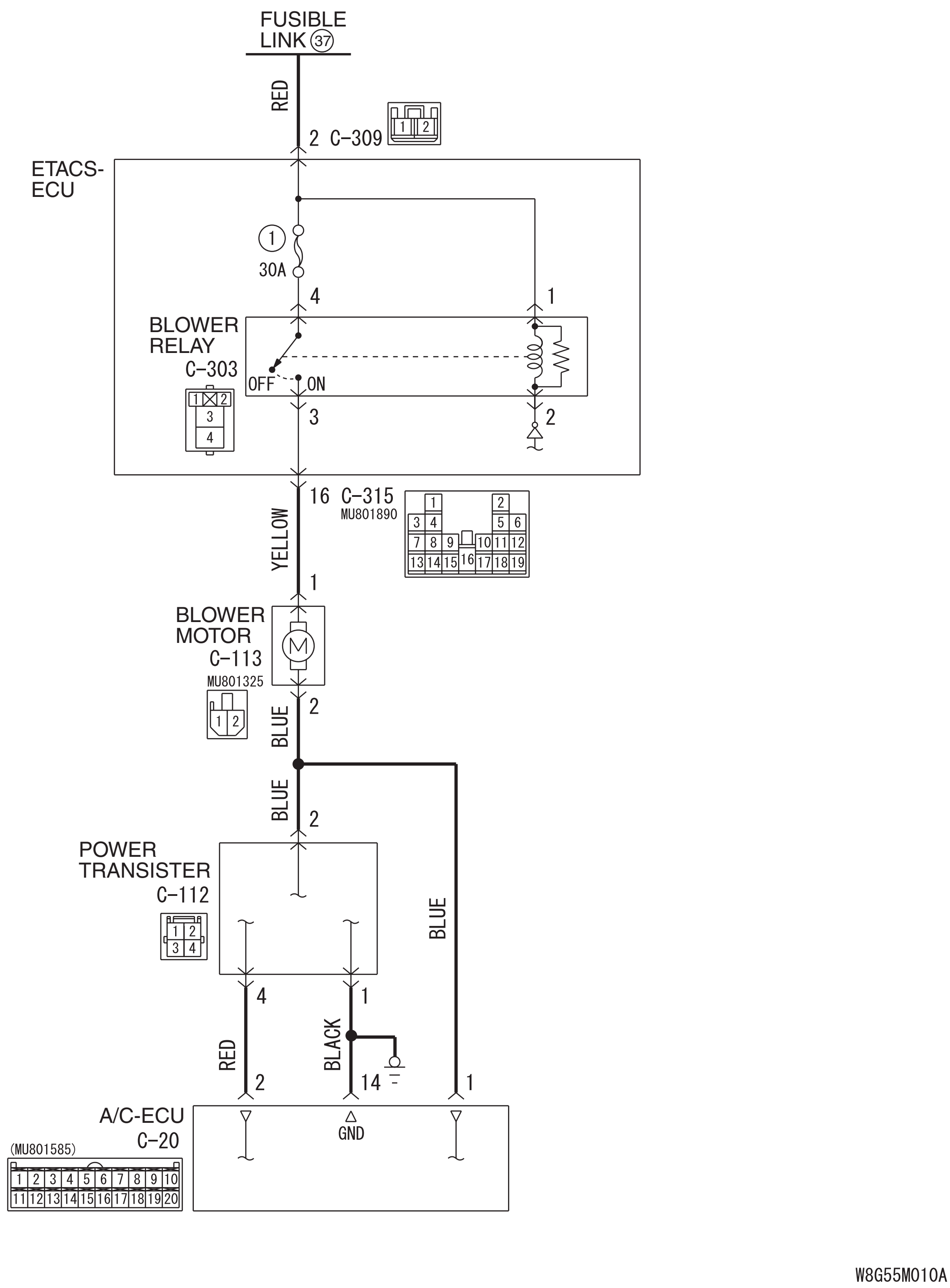
Q: Is the check result satisfactory?

YES : The procedure is complete.

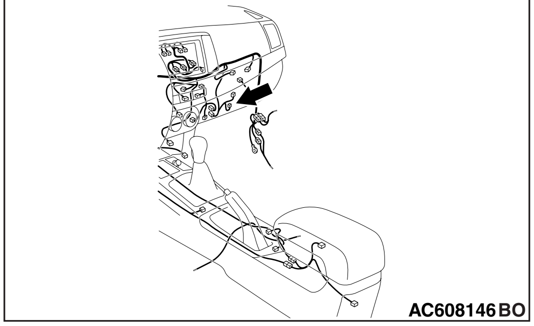
NO : Replace the A/C-ECU.

INSPECTION PROCEDURE 10: Blower Motor power supply system.

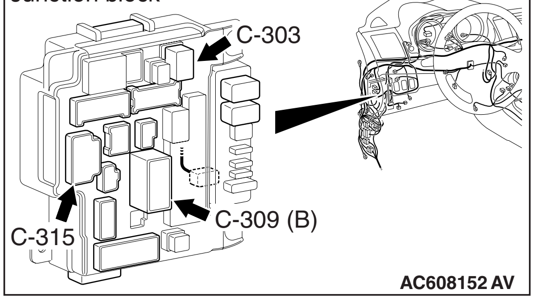
Blower Motor Circuit



Connectors: C-113



Connectors: C-303, C-309, C-315



TECHNICAL DESCRIPTION (COMMENT)

If the voltage is not supplied to the blower motor, the blower relay system may be failed.

TROUBLESHOOTING HINTS

- Malfunction of the ETACS-ECU
- Malfunction of the blower relay
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

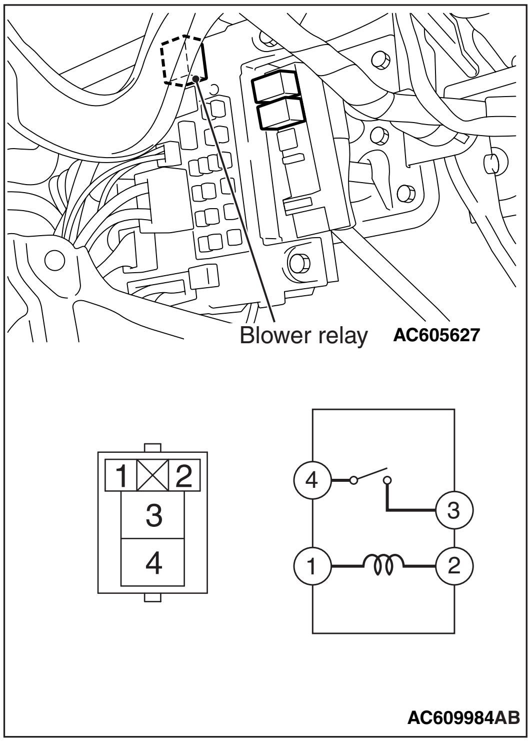
- MB991223: Harness Set
- MB992006: Extra Fine Probe

STEP 1. Check blower relay connector C-303 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is blower relay connector C-303 in good condition?

YES : Go to Step 2.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



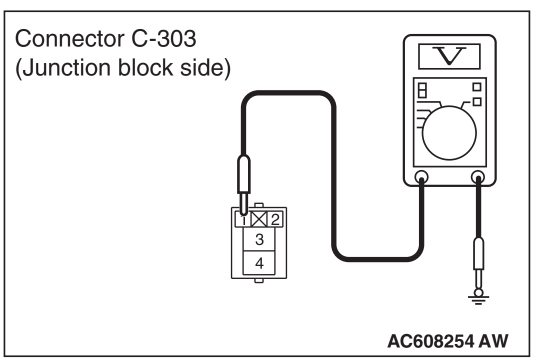
STEP 2. Check the blower relay continuity.

Follow the table below to check the blower relay for continuity.

Battery voltage	Tester connection	Specified condition
Not applied	3 –4	Open circuit
• Connect terminal 1 to the positive battery terminal • Connect terminal 2 to the negative battery terminal	3 –4	Less than 2 ohms

Q: Is the blower relay in good condition?

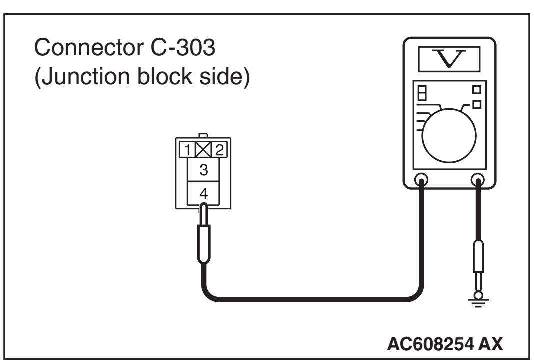
YES : Go to Step 3.
NO : Replace the rear window defogger relay.



STEP 3. Measure the voltage at blower relay connector C-303.

(1) Disconnect blower relay connector C-303, and measure the voltage at the junction block side.

(2) Measure the voltage between terminals 1 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).



(3) Measure the voltage between terminals 4 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check the wiring harness between blower relay connector C-303 (terminals 1 and 4) and the fusible link (37).

NOTE: Also check ETACS-ECU connector C-309 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-309 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between blower relay connector C-303 (terminals 1 and 4) and the fusible link (37) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Check blower relay connector C-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is blower relay connector C-113 in good condition?

YES : Go to Step 6.

NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Check the wiring harness between blower relay connector C-303 (terminal 3) and blower motor connector C-113 (terminal 1).

NOTE: Also check ETACS-ECU connector C-315 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If ETACS-ECU connector C-315 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between blower relay connector C-303 (terminal 3) and blower motor connector C-113 (terminal 1) in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

NO : Repair or replace the wiring harness. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

DATA LIST REFERENCE TABLE

M1554005100620

Refer to GROUP 55B - Data list reference table P.55B-16.)

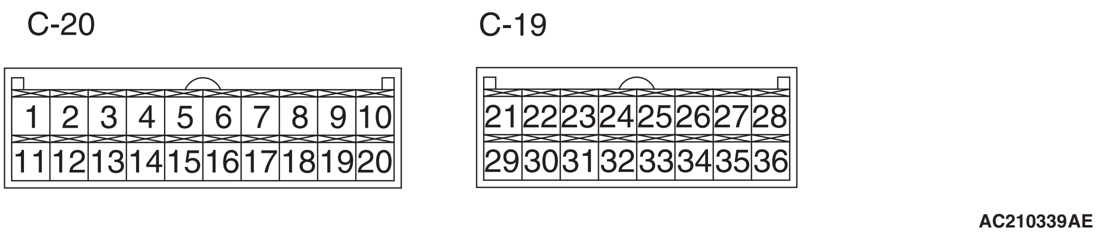
ACTUATOR TEST REFERENCE

M1554005200564

Refer to GROUP 55B - Actuator test reference P.55B-20.)

CHECK AT A/C-ECU TERMINAL

M1552010301263

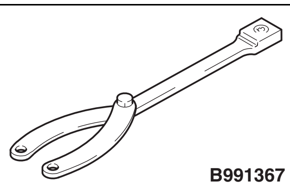
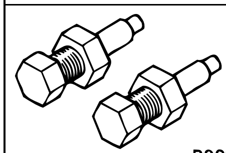
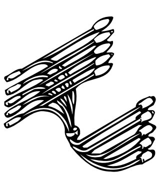


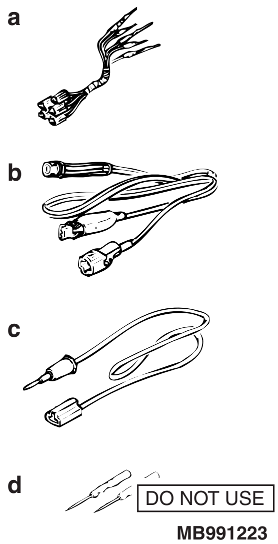
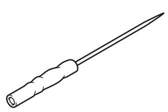
Terminal No.	Check items	Check conditions	Normal conditions
1	Power transistor (DRAIN)	Air volume control dial: Maximum air volume	0 to 2 V
2	Power transistor (GATE)	Air volume control dial: Maximum air volume	Battery voltage
3 –8	–	–	–
9	A/C control panel (input)	–	–
10	A/C control panel (input)	–	–
11, 12	–	–	–
13	Battery power supply	Always	Battery voltage
14	Ground	Always	0 V
15	IG1 power supply	Ignition switch: IG1	Battery voltage
16	A/C pressure sensor input	Refer to P.55A-112.	Refer to P.55A-112.
17	Interior temperature sensor	Sensor probe temperature: 25° C (77° F) (4.0 kΩ)	2.1 to 2.7 V
18	–	–	–
19	Sensor ground	Always	0 V
20	A/C pressure sensor power supply	Ignition switch: IG2	5 V
21	Air thermo sensor ground	Always	0 V
22	Air thermo sensor	Sensor probe temperature: 25° C (77° F) (4.0 kΩ)	2.1 to 2.7 V
23	–	–	–
24	Motor for air outside/inside air circulation switching damper	–	–
25	Motor for air outside/inside air circulation switching damper	–	–
26	Motor for air outside/inside air circulation switching damper	–	–
27	Motor for air outside/inside air circulation switching damper	–	–

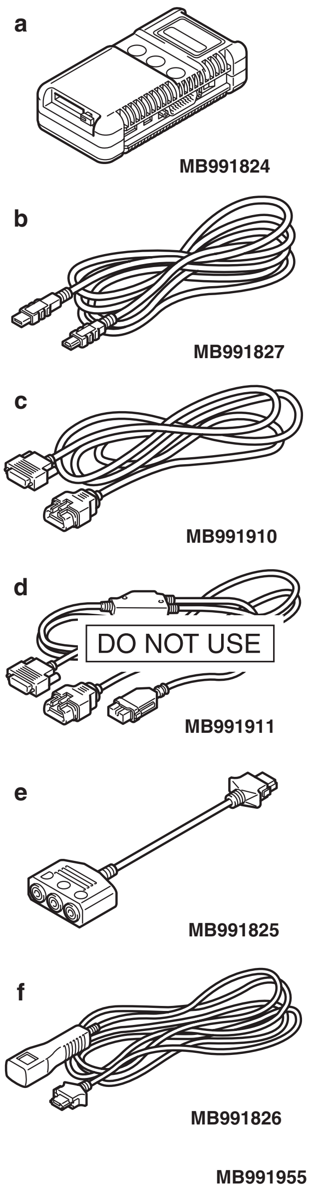
Terminal No.	Check items	Check conditions	Normal conditions
28	Air mix damper motor	–	–
29	Motor power supply	–	–
30	Air outlet changeover damper motor	–	–
31	Air outlet changeover damper motor	–	–
32	Air outlet changeover damper motor	–	–
33	Air outlet changeover damper motor	–	–
34	Air mix damper motor	–	–
35	Air mix damper motor	–	–
36	Air mix damper motor	–	–

SPECIAL TOOLS

M1552000600613

Tool	Tool number and name	Supersession	Application
 B991367	MB991367 Special spanner	MB991367-01	Armature mounting nut of compressor removal and installation
 B991386	MB991386 Pin	MIT217213	Armature mounting nut of compressor removal and installation
 MB991658	MB991658 Test harness set	Tool not available	Inspection of throttle position sensor

Tool	Tool number and name	Supersession	Application
	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222	Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	General service tool	Making voltage and resistance measurement during troubleshooting

Tool	Tool number and name	Supersession	Application
	MB991955 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991825 f. MB991826	M.U.T.-III sub-assembly a. Vehicle Communication Interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III measure adapter f. M.U.T.-III trigger harness	⚠ CAUTION **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.** A/C-ECU check (Diagnosis code, service data, actuator test)

ON-VEHICLE SERVICE

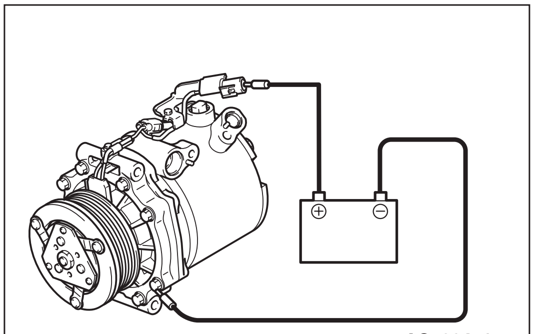
REFRIGERANT LEVEL TEST

M1552008400583

Use the refrigerant recovery station to remove all of the refrigerant, and then calculate the amount of the refrigerant and charge it.

A/C COMPRESSOR CLUTCH TEST

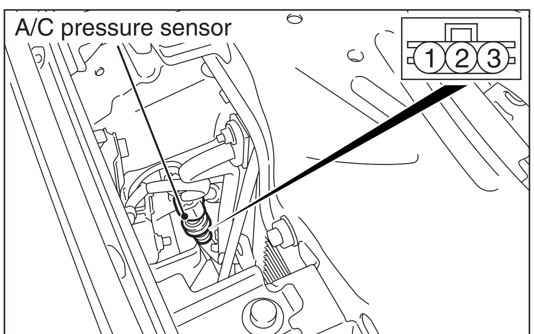
M1552019900117


AC506471

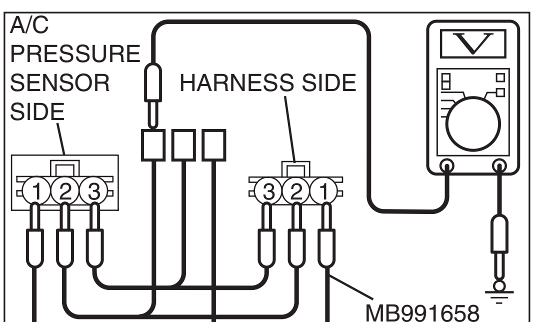
1. Disconnect the A/C compressor clutch connector to the A/C compressor clutch.
2. Connect positive battery voltage directly to the connector for the A/C compressor clutch.
3. Supply a ground to the A/C compressor assembly.
4. If the A/C compressor clutch is normal, there will be a "click." If the pulley and armature do not make contact ("no click"), there is a malfunction.

SIMPLE INSPECTION OF THE A/C PRESSURE SENSOR

M1552014700367

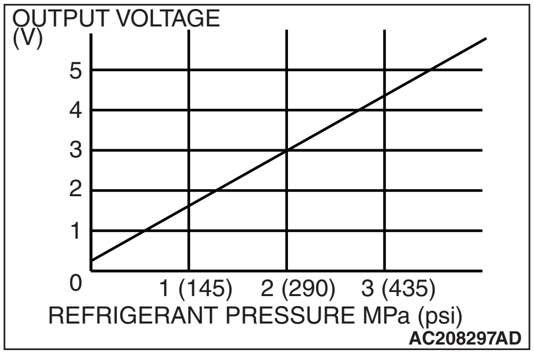


AC609413AB



AC307368AB

1. Assemble a gauge manifold on the high pressure service valve.
2. Disconnect the A/C pressure sensor connector and connect special tool test harness MB991658 as shown in the illustration.
3. Turn ON the engine and then turn ON the air conditioner switch.



4. At this time, check to see that the voltage of A/C pressure sensor terminal No. 2 reflects the specifications of the figure.

   NOTE: The allowance shall be defined as ±5%.

COMPRESSOR DRIVE BELT ADJUSTMENT

M1552001000896

Refer to GROUP 11A, On-vehicle Service –Drive Belt tension check and adjustment P.11A-9.

CHARGING

M1552001200652

Use the refrigerant recovery station to charge the refrigerant.

METHOD BY USING REFRIGERANT RECOVERY AND RECYCLING UNIT

Using the refrigerant recovery and recycling unit, refill the refrigerant.

NOTE: Refer to the Refrigerant Recovery and Recycling Unit's Instruction Manual for operation of the unit.

DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

NOTE: Refer to the Refrigerant Recovery and Recycling Unit's Instruction Manual for operation of the unit.

REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

When a compressor is installed at the factory, it contains 140 cm^3 (4.7 fl.oz) of refrigerant oil. While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.

When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG 56

Quantity:

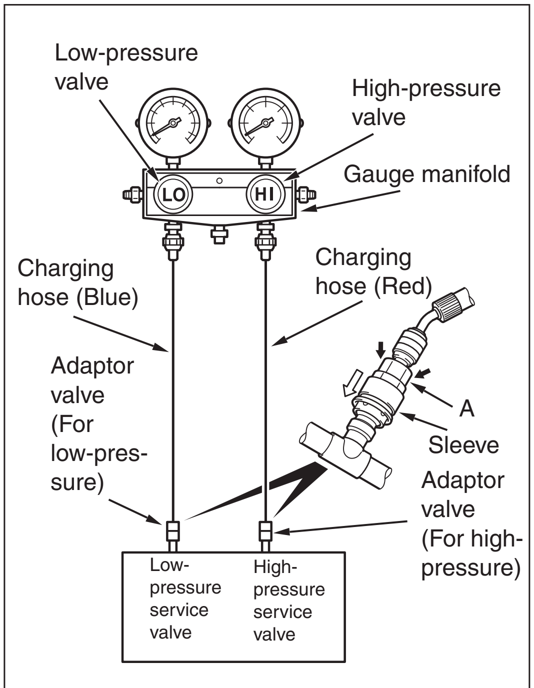
Evaporator: 60 cm^3 (2.0 fl.oz)

Condenser: 15 cm^3 (0.5 fl.oz)

Suction hose: 10 cm^3 (0.3 fl.oz)

PERFORMANCE TEST

M1552001400827



AC609415AC

The vehicles to be tested should be parked out of direct sunlight.

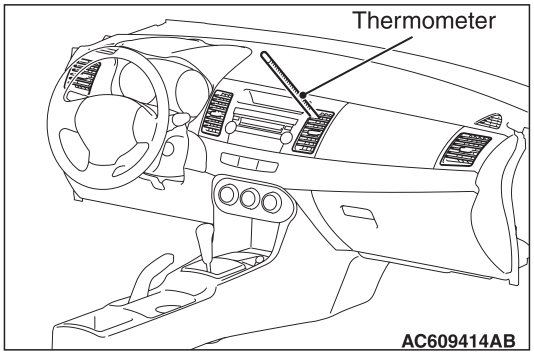
1. Close the high and low-pressure valve of the gauge manifold.
2. Connect the charging hose (blue) to the low-pressure valve and connect the charging hose (red) to the high-pressure valve of the gauge manifold.
3. Install the quick joint (for low-pressure) to the charging hose (blue), and connect the quick joint (for high-pressure) to the charging hose (red).

⚠ CAUTION

- **To connect the quick joint, press section A firmly against the service valve until a click is heard.**
- **When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.**

4. Connect the quick joint (for low-pressure) to the low-pressure service valve and connect the quick joint (for high-pressure) to the high-pressure service valve.

   NOTE: The high-pressure service valve is on the A/C pipe and the low-pressure service valve is on the suction hose.
5. Start the engine.
6. Set the A/C controls as follows:
   - A/C switch: A/C –ON position
   - Mode selection: FACE position
   - Temperature control: MAXIMUM COOLING position
   - Air selection: RECIRCULATION position
   - Blower switch: Maximum air volume
7. Set the engine speed to the idle speed.
8. Engine should be warmed up with hood, doors and windows opened.



AC609414AB

9. Insert a thermometer in the center air outlet and operate the engine for 20 minutes.

   NOTE: If the A/C clutch cycles, take the reading before the clutch disengages.
10. Note the discharge air temperature.

PERFORMANCE TEMPERATURE CHART

Garage ambient air temperature °C (°F)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Discharge air temperature °C (°F)	4.7 (40) – 17 (63)	10 (50) –23 (73)	15 (59) –28 (82)	20 (68) –33 (91)	26 (79) –38 (100)	31 (88) –44 (111)	36 (97) –49 (120)
Compressor high pressure kPa (psi)	934 (136) – 1700 (247)	1068 (155) –1850 (268)	1201 (174) –2000 (290)	1335 (193) –2150 (312)	1468 (213) –2300 (334)	1602 (232) –2450 (355)	1735 (252) –2600 (377)
Compressor low pressure kPa (psi)	170 (24.7) – 359 (52.1)	215 (31.2) – 406 (58.9)	260 (37.7) – 452 (65.6)	305 (44.2) – 499 (72.4)	350 (50.8) – 545 (79.1)	395 (57.3) – 592 (85.9)	440 (63.8) – 638 (92.6)

REFRIGERANT LEAK REPAIR PROCEDURE

M1552001500437

LOST CHARGE

If the system has lost all charge due to a leak:

1. Evacuate the system. (Refer to P.55A-113).
2. Charge the system with approximately 0.453 kg (1 pound) of refrigerant.
3. Check for leaks.
4. Discharge the system.
5. Repair leaks.

⚠ CAUTION

Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick assembly to avoid keeping the system open any longer than necessary.

6. Replace receiver drier.
7. Evacuate and charge system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting of connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.

Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3.1 inches) from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

On standard plumbing fittings with O-rings, these O-rings are not reusable.

COMPRESSOR NOISE CHECK

M1552008700476

You must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature or any other special conditions.

Noises that develop during A/C operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or generator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

Drive belts are speed-sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

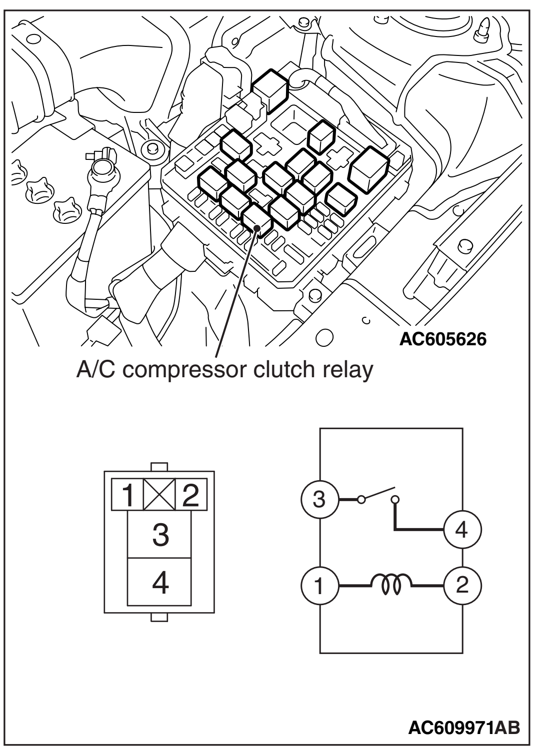
ADJUSTMENT

1. Select a quiet area for testing. Duplicate conditions as much as possible. Switch the compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through the condenser. Install a manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (300.2 psi).
2. Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
3. Check refrigerant hoses for rubbing or interference that can cause unusual noises.
4. Check refrigerant charge (Refer to P.55A-113).
5. Recheck compressor noise as in Step 1.
6. If noise still exists, loosen compressor mounting bolts and retighten. Repeat Step 1.
7. If noise continues, replace compressor and repeat from Step 1.

POWER RELAY CHECK

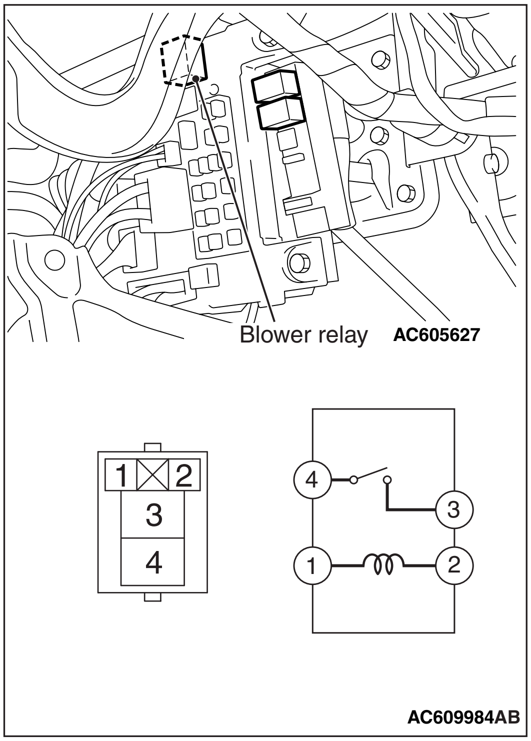
M1552008800796

A/C COMPRESSOR CLUTCH RELAY CONTINUITY CHECK



Battery voltage	Tester connection	Specified condition
Not applied	3 –4	Open circuit
• Connect terminal 2 to the positive battery terminal • Connect terminal 1 to the negative battery terminal	3 –4	Less than 2 ohms

BLOWER RELAY CONTINUITY CHECK



Battery voltage	Tester connection	Specified condition
Not applied	3 –4	Open circuit
• Connect terminal 1 to the positive battery terminal • Connect terminal 2 to the negative battery terminal	3 –4	Less than 2 ohms

IDLE-UP OPERATION CHECK

M1552001600940

Before inspection and adjustment, set vehicle in the following condition:

- Engine coolant temperature: 80 –90 °C (176.0 –194.0 °F)
- Lights, electric cooling fan and accessories: OFF
- Transmission: Neutral ("N" or "P" position)
- Steering wheel: Straightforward

1. Check whether or not the idle speed is the standard value. Refer to GROUP 11A, On-vehicle Service –Idle Speed Check P.11A-13.

   Standard value: 700 ± 50 r/min

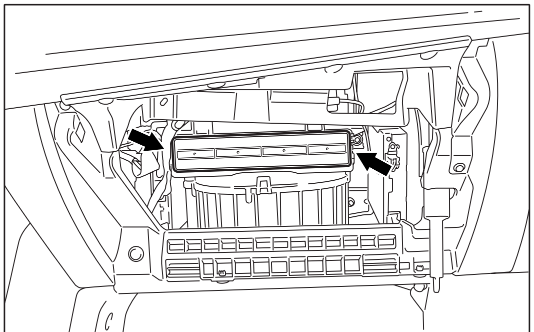
2. Turn on the air conditioning switch and the blower speed selection dial. Engine idling speed should be within the standard value:

   Standard value: 700 ± 50 r/min

   NOTE: It is not necessary to make an adjustment, because the idling speed is automatically adjusted by the ISC system. If, however, a deviation from the standard value occurs for some reason, check the ISC system (Refer to GROUP 11A, On-vehicle Service –Idle Speed Check P.11A-13)

REPLACE THE CLEAN AIR FILTER

M1552020100267


AC611715AB

1. Remove the glove box (Refer to GROUP 52A –glove box, P.52A-5).
2. Loosen the two lugs as shown to replace the clean air filter.
3. Install the glove box.

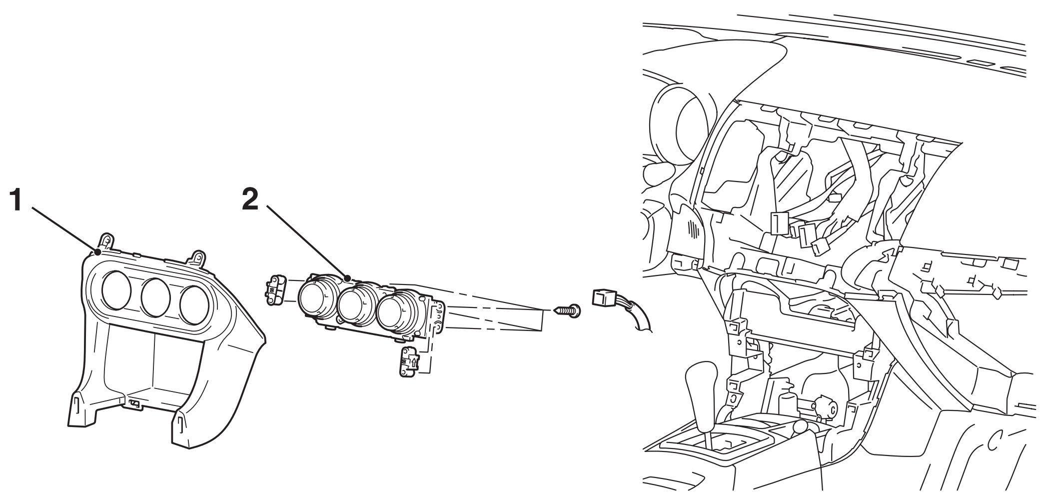
HEATER CONTROL UNIT

REMOVAL AND INSTALLATION

M1554014700255

Pre-removal and Post-installation Operation

- Side cover, Instrument panel garnish, Upper panel Removal and Installation (Refer to GROUP 52A, Instrument Panel P.52A-2).
- Floor console Removal and Installation (Refer to GROUP 52A, Floor console P.52A-8).



AC608191AB

Removal steps

1. Center panel assembly (Refer to GROUP 52A, Instrument panel center panel P.52A-6)
2. Heater control

HEATER UNIT AND BLOWER ASSEMBLY

REMOVAL AND INSTALLATION

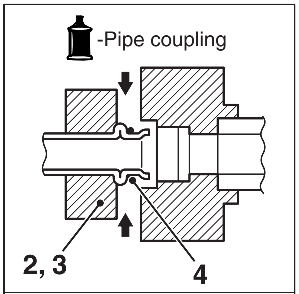
M1552020800307

⚠ ***WARNING***

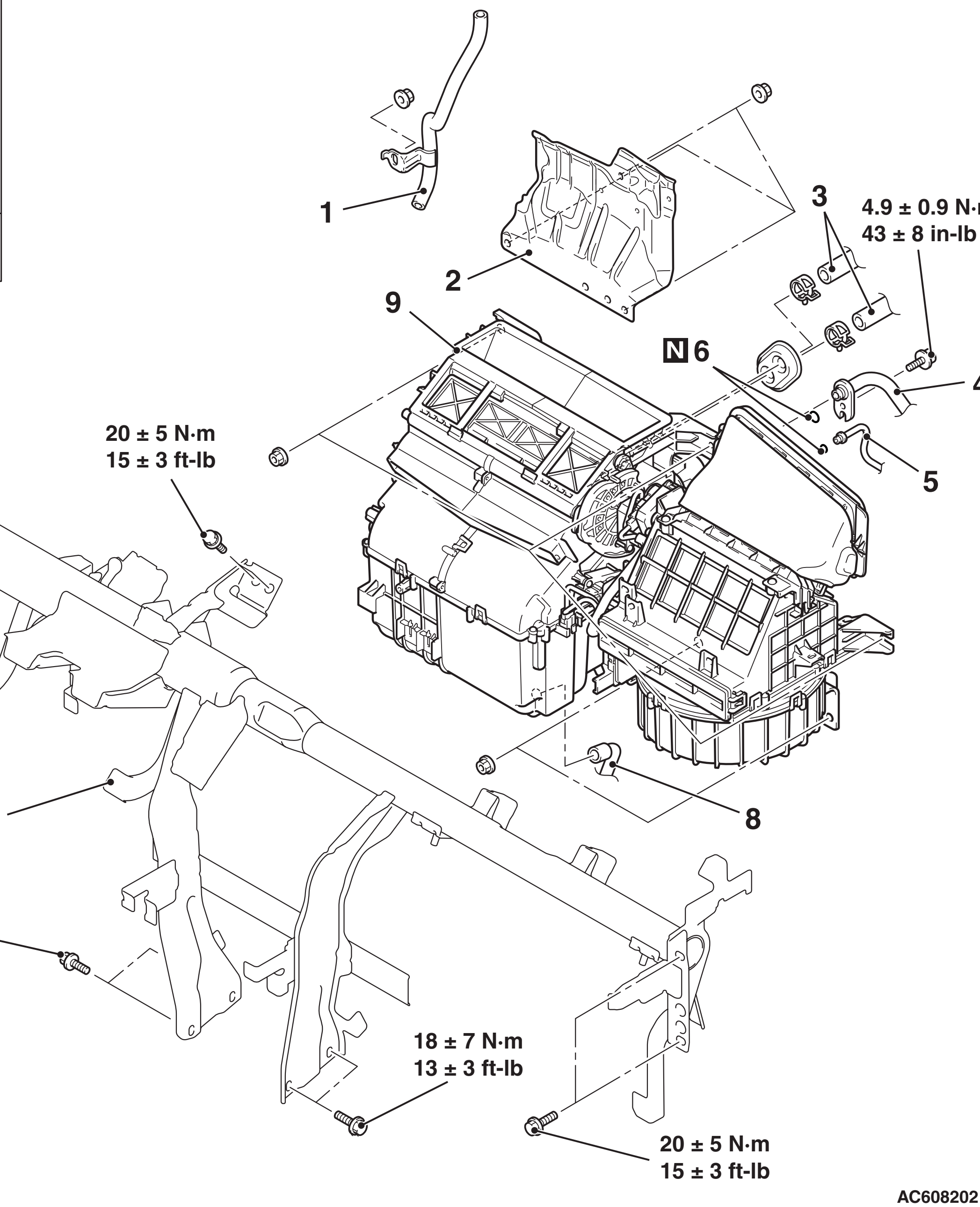
- ***Before removing the front seat assembly, refer to GROUP 52B, Service Precautions P.52B-24 and Air Bag Module and Clock Spring P.52B-367.***
- ***When removing and installing the front passenger seat, be sure to carry out accuracy check occupant classification sensor after the seat has been installed in the vehicle (Refer to GROUP 52B, On-Vehicle Service P.52B-358).***

Pre-removal and Post-installation Operation

- Refrigerant draining and Refilling (Refer to Charging and Discharging P.55A-113).
- Engine coolant Draining and Refilling (Refer to GROUP 00, Engine coolant P.00-65).
- Steering Column Shaft Assembly Removal and Installation (Refer to GROUP 37, Steering Shaft P.37-25).
- Instrument Panel Removal and Installation (Refer to GROUP 52A, Instrument Panel P.52A-2).
- Floor console Removal and Installation (Refer to GROUP 52A, Floor console P.52A-8).



A/C compressor oil:
SUN PAG 56



Removal steps

	1. Drain assembly
	2. Heat protector
	3. Heater hose connection
<<**A**>>	4. Suction pipe connection
<<**A**>>	5. Liquid pipe connection

Removal steps (Continued)

	6. O-ring
	7. Front deck crossmember
	8. Drain hose
<<**B**>>	9. Heater unit

REMOVAL SERVICE POINTS

<<A>> SUCTION PIPE AND LIQUID PIPE DISCONNECTION

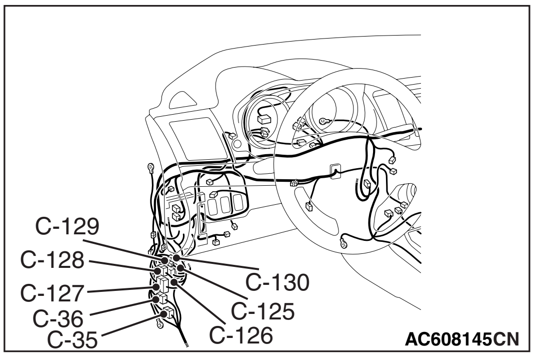
⚠ CAUTION

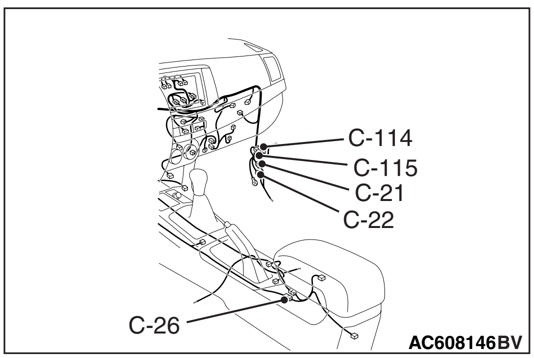
As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

To prevent the entry of dust or other foreign bodies, plug the dismantled hose and the nipples of the expansion valves.

<<B>> HEATER UNIT AND DECK CROSSMEMBER ASSEMBLY REMOVAL

Disconnect the following connectors to gain access to the front deck crossmember.

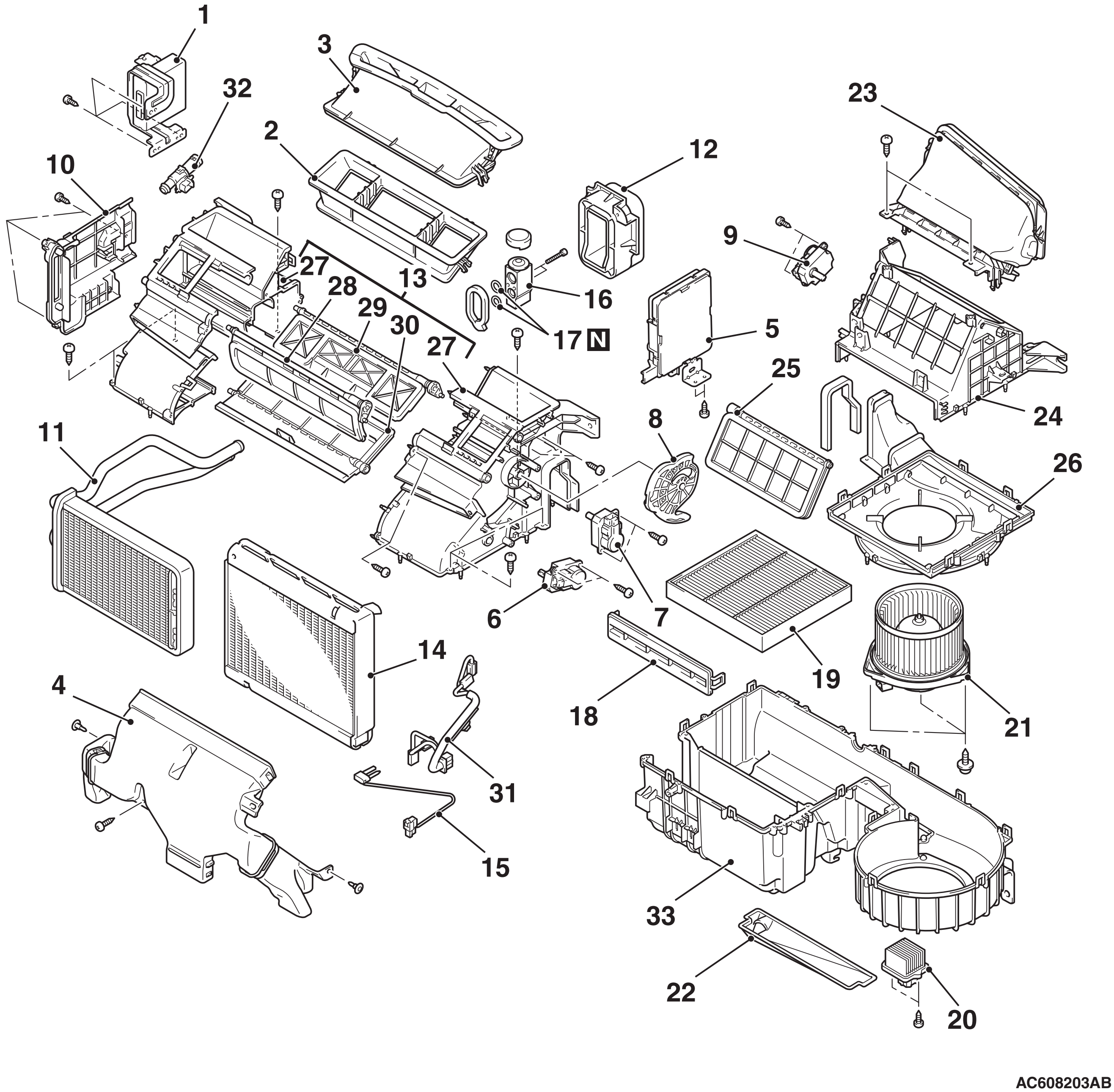




Connector number	Connector name
C-21	Instrument panel wiring harness and floor wiring harness combination
C-22	Instrument panel wiring harness and floor wiring harness combination
C-26	Instrument panel wiring harness and console wiring harness combination
C-35	Instrument panel wiring harness and floor wiring harness combination
C-36	Instrument panel wiring harness and floor wiring harness combination
C-114	Instrument panel wiring harness and front door wiring harness (RH) combination
C-115	Instrument panel wiring harness and front door wiring harness (RH) combination
C-125	Instrument panel wiring harness and front door wiring harness (LH) combination
C-126	Instrument panel wiring harness and front door wiring harness (LH) combination
C-127	Instrument panel wiring harness and front wiring harness combination
C-128	Instrument panel wiring harness and front wiring harness combination
C-129	Instrument panel wiring harness and front wiring harness combination
C-130	Instrument panel wiring harness and roof wiring harness combination

DISASSEMBLY AND REASSEMBLY

M1552020900230



Disassembly steps

1. KOS-ECU
2. Front center duct
3. Rear center duct
4. Foot duct
5. A/C-ECU
6. Air mixing damper control motor
7. Mode selection damper control motor
8. Mode lever
9. Outside/Inside air selection damper control motor
10. Heater core cover
11. Heater core
12. Expansion valve cover

Disassembly steps (Continued)

13. Upper case assembly
14. Evaporator
15. Air thermo sensor
16. Expansion valve
17. O-ring
18. Air filter cover
19. Air filter
20. Power transistor
21. Blower motor
22. Insulator
23. Air intake duct
24. Blower case upper
25. Outside/inside air selection damper
26. Blower case lower

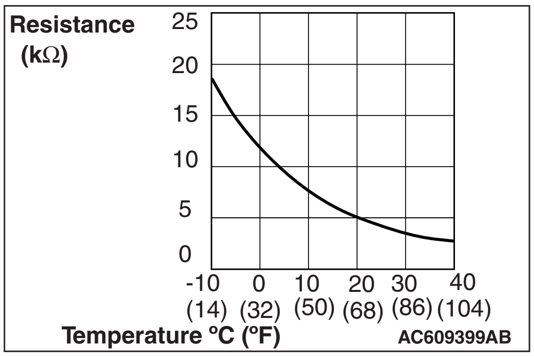
Disassembly steps (Continued)

27. Upper case
28. Mode selection damper (FOOT)
29. Mode selection damper (DEF)
30. Air mixing damper
31. Wiring harness
32. Aspirator
33. Lower case

INSPECTION

M1554011900197

AIR THERMO SENSOR CHECK



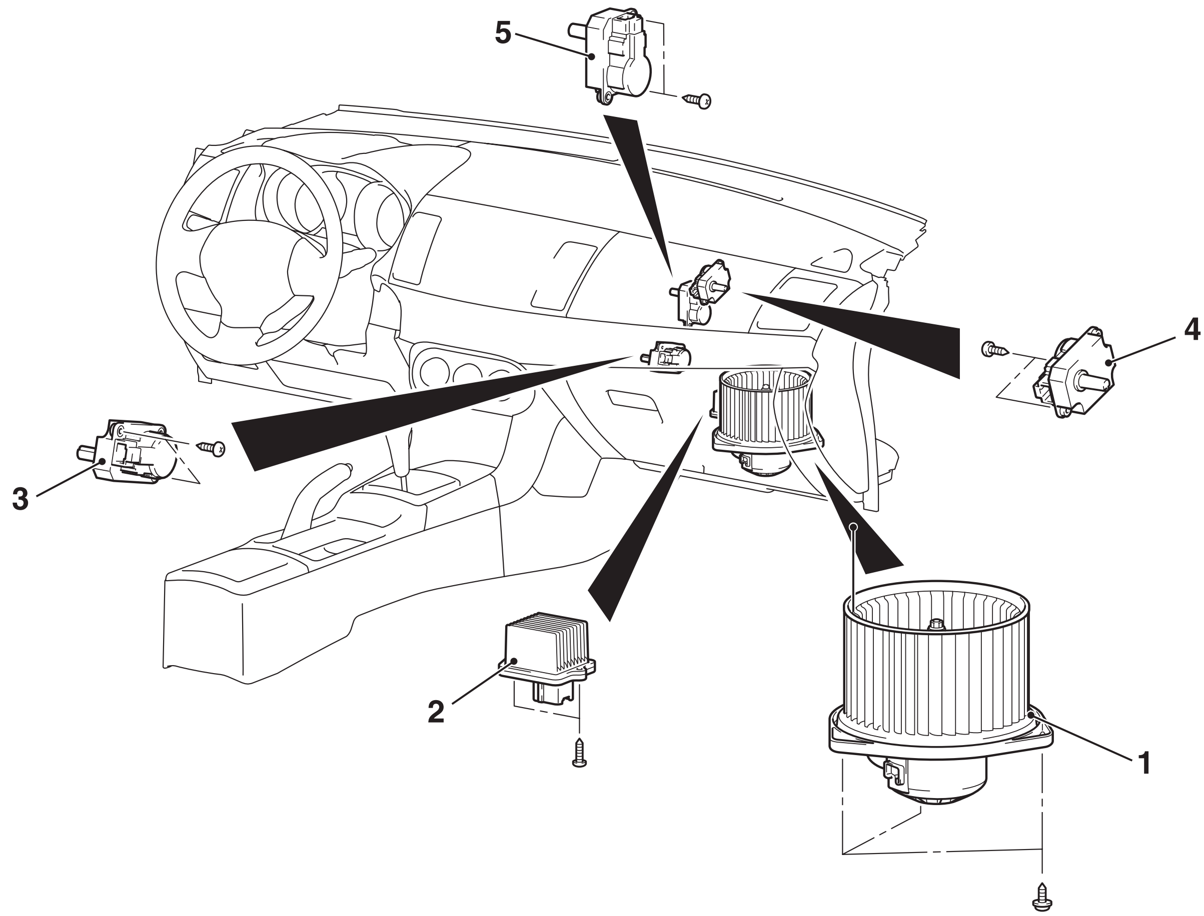
Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the values shown.

NOTE: The temperature should be within the shown range.

MOTORS AND TRANSISTOR

REMOVAL AND INSTALLATION

M1551006900084



AC608213AB

Blower motor removal step

- Under cover (Refer to GROUP 52A, Glove box P.52A-5).

1. Blower motor

Power transistor removal step

- Under cover (Refer to GROUP 52A, Glove box P.52A-5).

2. Power transistor

Air mixing damper control motor removal step

- Glove box, Under cover (Refer to GROUP 52A, Glove box P.52A-5).
- Foot duct (Refer to P.55A-136).
- A/C-ECU (Refer to P.55A-127).

<<**A**>> 3. Air mixing damper control motor

Outside/inside air selection damper motor removal step

- Glove box, Under cover, Upper cover (Refer to GROUP 52A, Glove box P.52A-5).
- Foot duct (Refer to P.55A-136).
- A/C-ECU (Refer to P.55A-127).

<<**A**>> 4. Outside/inside air selection damper motor

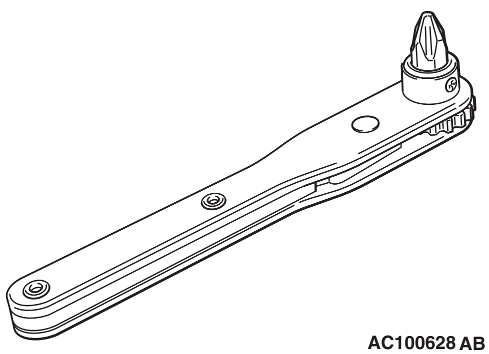
Mode selection damper control motor removal step

- Glove box, Under cover, Upper cover (Refer to GROUP 52A, Glove box P.52A-5).
- Foot duct (Refer to P.55A-136).
- A/C-ECU (Refer to P.55A-127).

<<**A**>> 5. Mode selection damper control motor

REMOVAL SERVICE POINT

<<A>> AIR MIXING DAMPER CONTROL MOTOR, OUTSIDE/INSIDE AIR SELECTION DAMPER MOTOR, MODE SELECTION DAMPER CONTROL MOTOR REMOVAL



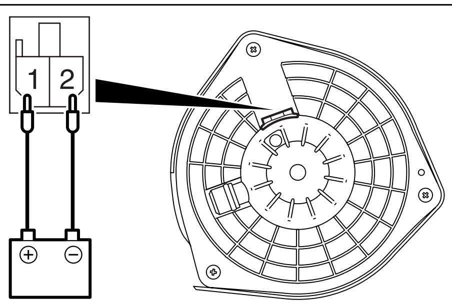
AC100628 AB

NOTE: A normal plate-type ratchet driver is recommended.

INSPECTION

M1551006300747

BLOWER MOTOR CHECK



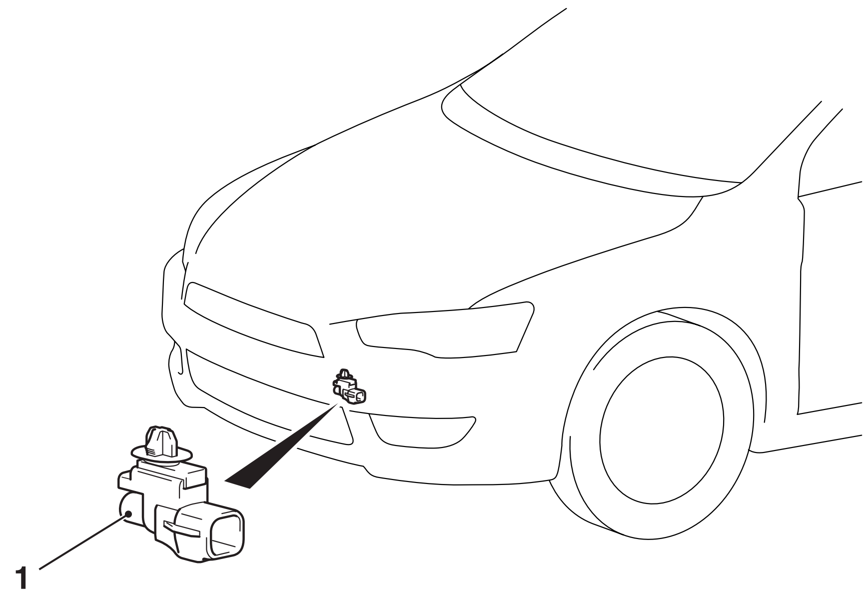
AC611918AC

Check that the motor turns when applying battery power between the connector terminals. Also check to see that there is no abnormal sound emitted from the motor at this time..

AMBIENT TEMPERATURE SENSOR

REMOVAL AND INSTALLATION

M1554003400368



AC609030AB

Removal step

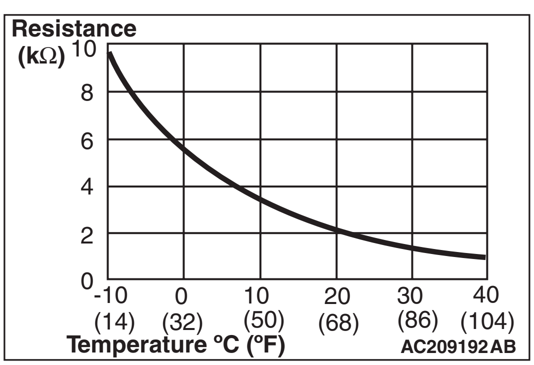
- Headlamp support panel cover (Refer to GROUP 51, Front bumper assembly P.51-3).

1. Ambient air temperature sensor

INSPECTION

M1551006300736

AMBIENT AIR TEMPERATURE SENSOR CHECK



⚠ CAUTION

The ambient air temperature sensor should be checked without removing it. If the sensor is removed, it is no longer serviceable.

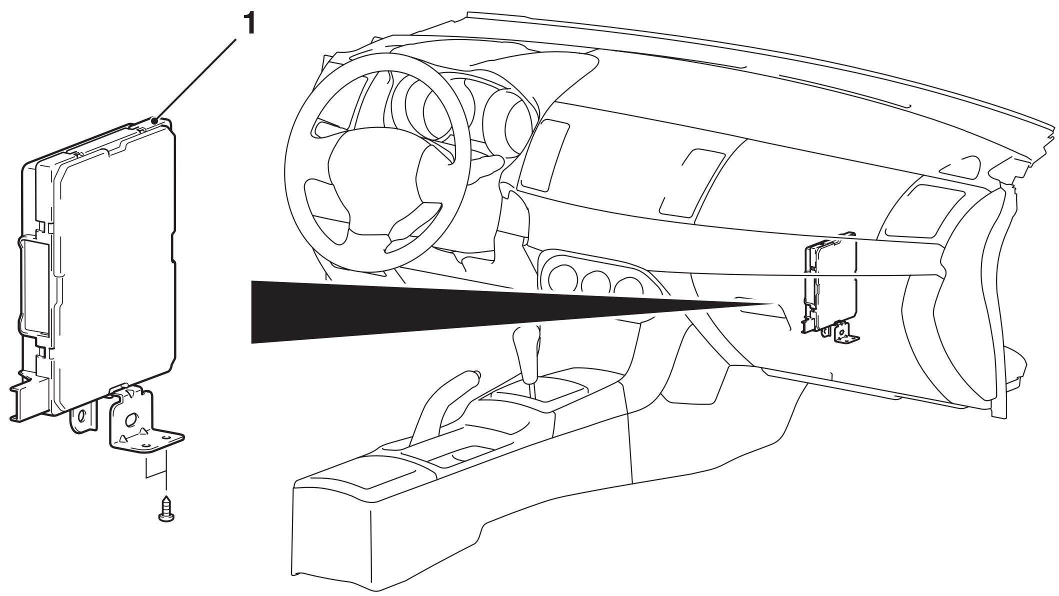
Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the values shown.

NOTE: The temperature should be within the shown range.

A/C-ECU

REMOVAL AND INSTALLATION

M1554016600124



AC608297AB

Removal steps

- Glove box, Under cover (Refer to GRUOP 52A Glove box P.52A-5)

Removal steps (Continued)

- Foot duct (Refer to P.55A-136)

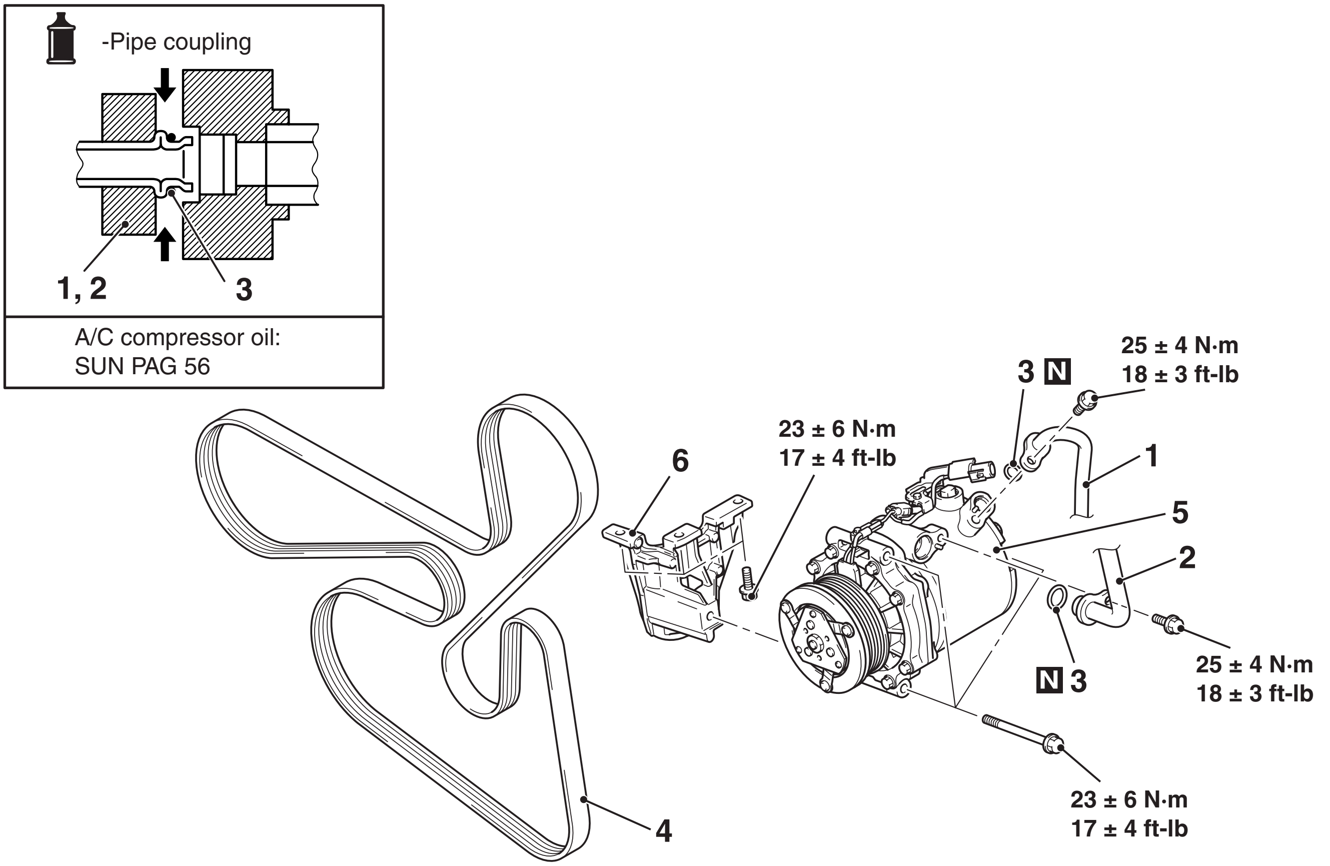
1. A/C-ECU

COMPRESSOR ASSEMBLY AND TENSION PULLEY

REMOVAL AND INSTALLATION

M1552004100591

Pre-removal Operation	Post-installation Operation
• Refrigerant Discharging (Refer to P.55A-113). • Engine room under cover front A (Refer to GROUP 51, under cover P.51-16). • Front Under Cover RH (Refer to GROUP 51, Under cover P.51-16).	• Drive Belt Tension Adjustment (Refer to GROUP 11A, On vehicle service –Drive Belt P.11A-9). • Refrigerant Charging (Refer to P.55A-113). • Engine room under cover front A (Refer to GROUP 51, under cover P.51-16). • Front Under Cover RH (Refer to GROUP 51, Under cover P.51-16).



AC608280

		Removal steps
<<**A**>>	1.	Flexible discharge hose connection
<<**A**>>	2.	Flexible suction hose connection
	3.	O-ring

			Removal steps (Continued)
		4.	Drive belt
<<**B**>>	>>**A**<<	5.	A/C compressor
		6.	A/C compressor bracket

REMOVAL SERVICE POINTS

<<A>> FLEXIBLE SUCTION HOSE AND FLEXIBLE DISCHARGE HOSE DISCONNECTION

⚠ CAUTION

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

To prevent the entry of dust or other foreign bodies, plug the dismantled hoses and compressor nipples.

<<B>> COMPRESSOR REMOVAL

Take care not to spill any compressor oil when removing the compressor.

INSTALLATION SERVICE POINT

>>A<< COMPRESSOR INSTALLATION

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

1. Measure the amount [X cm^3 (X fl.oz) of oil within the removed compressor.
2. Drain (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

   New compressor oil amount = 80cm^2 (2.7 fl.oz)

80 cm^3 –X cm^3 = Y cm^3 (2.7 fl.oz. –X fl.oz. = Y fl.oz)

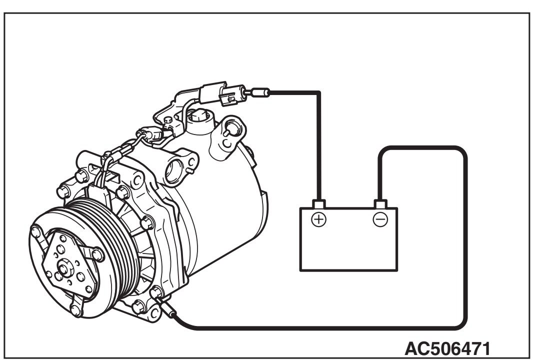
NOTE: Y cm^3 (Y fl.oz) indicates the amount of oil in the refrigerant line, the condenser, the evaporator, etc.

NOTE: When replacing the following parts at the same times as the compressor, subtract the rated oil amount of each part from Y cm^3 (Y fl.oz) and discharge from the new compressor.

INSPECTION

M1552014303186

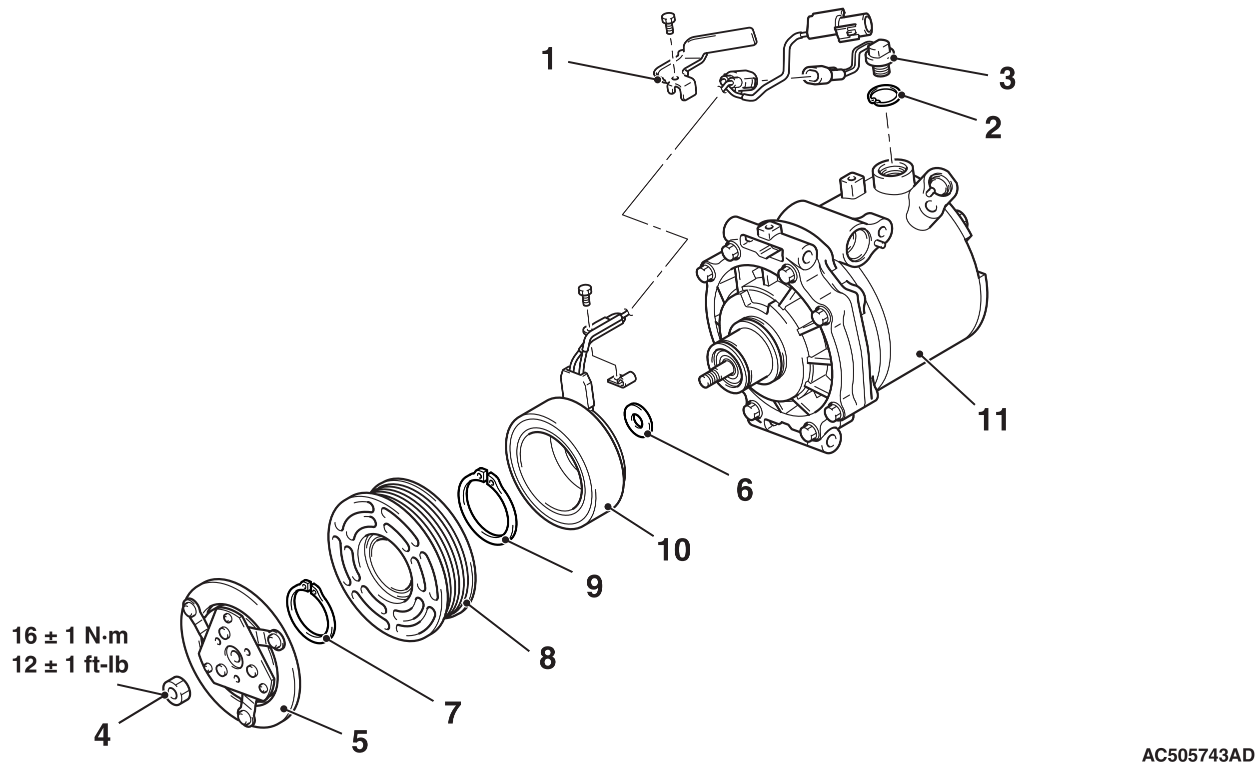
COMPRESSOR A/C COMPRESSOR CLUTCH OPERATION CHECK



Connect the compressor connector terminal to the battery positive (+) terminal and ground the battery's negative (-) terminal to the compressor unit. At that time, the A/C compressor clutch should make a definite operating sound.

DISASSEMBLY AND ASSEMBLY

M1552004601072



Cooling temperature switch disassembly steps

1. Bracket
2. Snap ring
3. Cooling temperature switch

A/C compressor clutch disassembly

- >>D<< • Air gap adjustment
- <<A>> >>C<< 4. Self-locking nut
- 5. Armature
- 6. Shim

A/C compressor clutch disassembly (Continued)

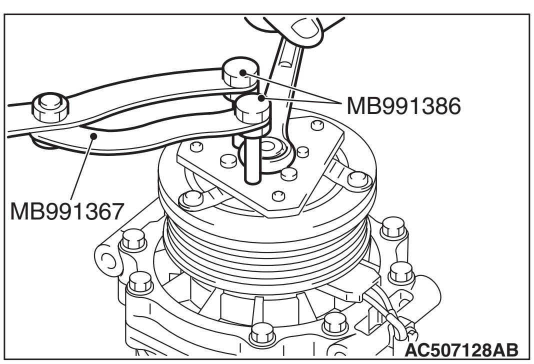
- >>B<< 7. Snap ring
- 8. Rotor
- 9. Snap ring
- >>A<< 10. Field core
- 11. A/C compressor

Required Special Tools:

- MB991367: Special Spanner
- MB991386: Pin

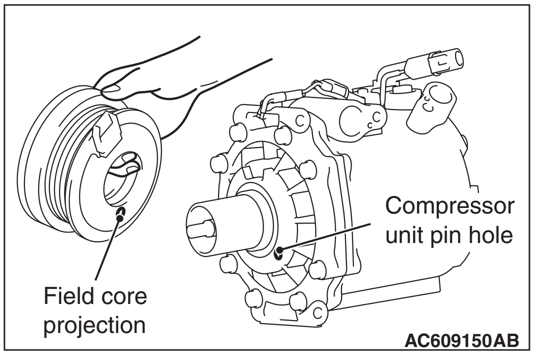
DISASSEMBLY SERVICE POINT

<<A>> SELF-LOCKING NUT REMOVAL



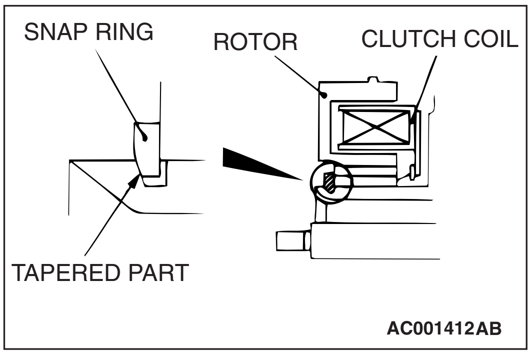
ASSEMBLY SERVICE POINTS

>>A<< FIELD CORE ATTACHMENT



Line up the pin hole on the compressor unit with the field core projection and attach.

>>B<< SNAP RING INSTALLATION

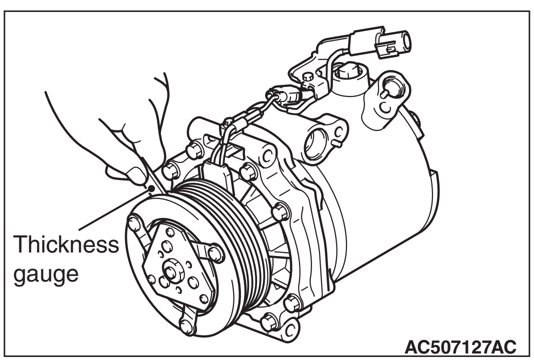


Using snap ring pliers, fit the snap ring so that the snap ring's tapered part is on the outside.

>>C<< SELF-LOCKING NUT INSTALLATION

Using a special tool, as when removing the nut, secure the armature and tighten the self-locking nut.

>>D<< AIR GAP ADJUSTMENT



Check whether or not the air gap of the clutch is within the standard value.

Standard value:
0.3 – 0.5 mm (0.012 – 0.020 inch)

NOTE: If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

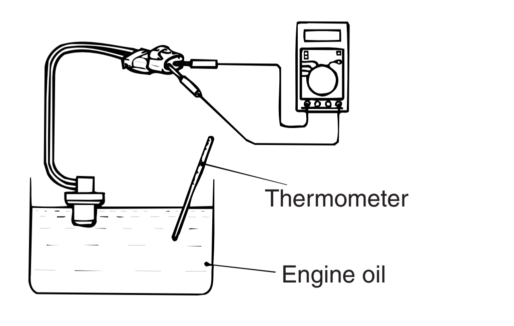
INSPECTION

M1552014303197

COOLING TEMPRATURE SWITCH

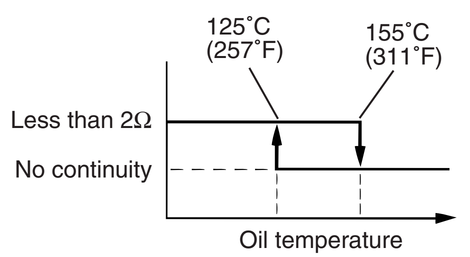
⚠ CAUTION

Do not heat more than necessary.



AC100787AD

1. Dip the metal part of the cooling temperature switch into engine oil and increase the oil temperature using a gas burner or similar.



AC100810AB

2. When the oil temperature reaches the standard value, check that resistance is supplied between the terminals.

Standard value:

ITEM	TEMPERATURE
Less than 2 ohms	Slightly below 155° C (311° F)
No continuity	155° C (311° F) or more

NOTE: When the oil temperature is 155°C (311°F) or more and there is no continuity, the resistance will not be 2Ωor lower until the oil temperature reduces to 125°C (257°F) or less.

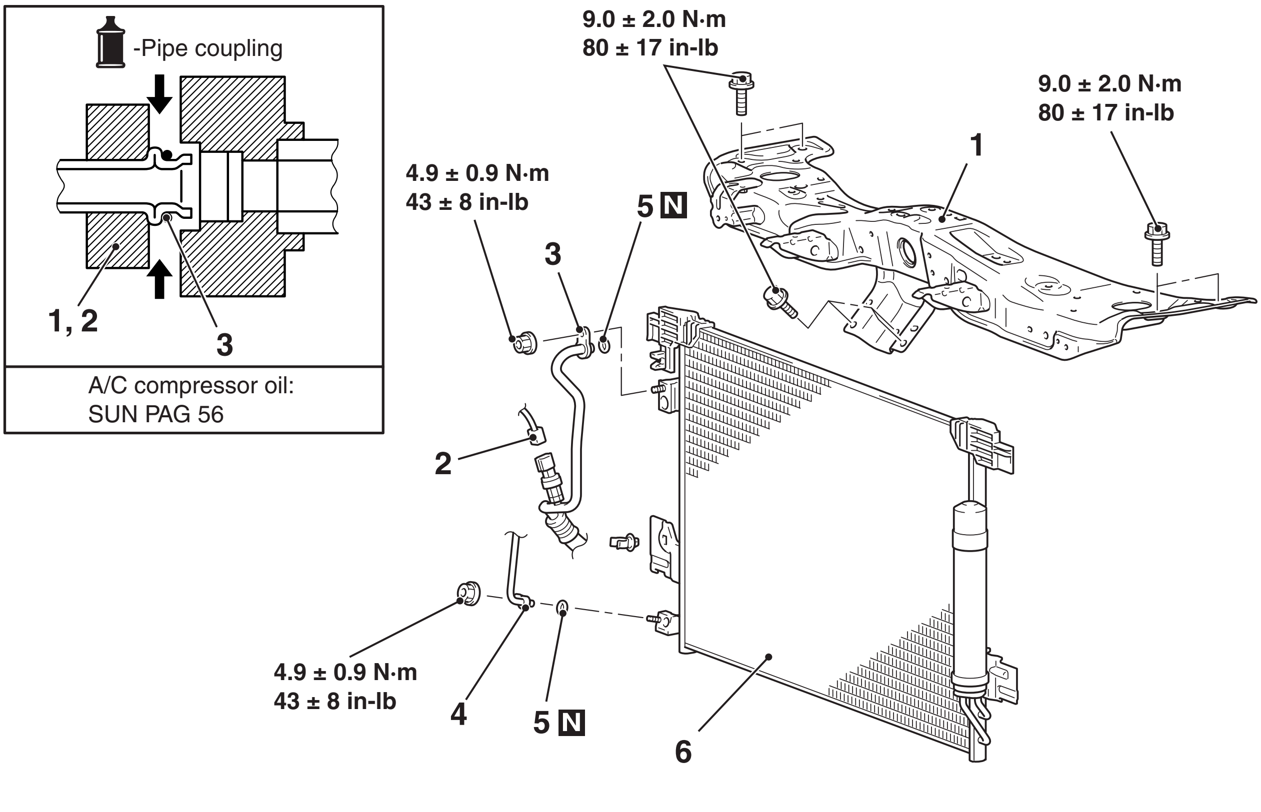
CONDENSER ASSEMBLY

REMOVAL AND INSTALLATION

M1552015400541

Pre-removal and Post-installation Operation

- Refrigerant Draining and Refilling (Refer to P.55A-113).
- Air Duct Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Headlamp support panel cover Removal and Installation (Refer to GROUP 51, Front bumper P.51-3).



REMOVAL STEPS

1. Front end upper bar assembly
2. Connector

<<A>> 3. Flexible discharge hose connection

REMOVAL STEPS (Continued)

<<A>> 4. Liquid pipe A connection

5. O-ring
6. Condenser assembly

REMOVAL SERVICE POINTS

<<A>> FLEXIBLE SUCTION HOSE AND LIQUID PIPE A DISCONNECTION

⚠ CAUTION

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

To prevent the entry of dust or other foreign bodies, plug the dismantled hose and condenser assembly nipples.

INSTALLATION SERVICE POINT

>>A<< CONDENSER INSTALLATION

When replacing the condenser, refill it with a specified amount of compressor oil and install it to the vehicle.

Compressor oil: SUN PAG 56

Quantity: 15 cm^3 (0.5 fl.oz)

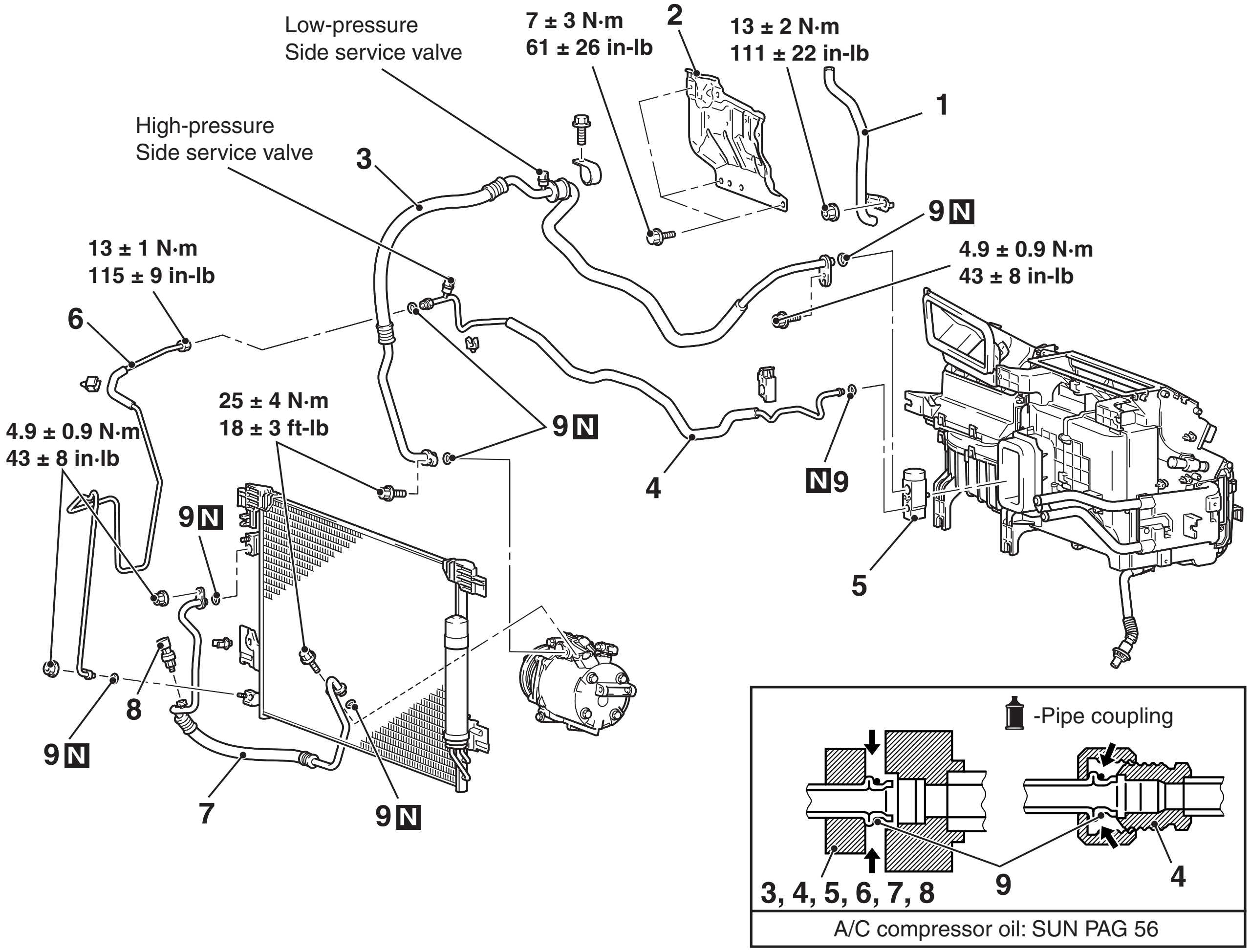
REFRIGERANT LINE

REMOVAL AND INSTALLATION

M1552006401450

Pre-removal and Post-installation Operation

- Refrigerant Draining and Refilling (Refer to Charging and Discharging P.55A-113).
- Headlamp support panel cover Removal and Installation (Refer to GROUP 51, Front bumper P.51-3).



AC607818AD

		Removal steps
<<A>>	1.	Drain assembly
<<A>>	2.	Heat protector
<<A>>	3.	Flexible suction hose
<<A>>	4.	Liquid pipe B
<<A>>	5.	Expansion valve

		Removal steps (Continued)
<<A>>	6.	Liquid pipe A
<<A>>	7.	Flexible discharge hose
<<A>>	8.	A/C pressure sensor
	9.	O-ring

REMOVAL SERVICE POINT

<<A>> HOSE/PIPE DISCONNECTION

⚠ CAUTION

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

To prevent the entry of other foreign bodies, plug the condenser, compressor, and expansion valve nipples.

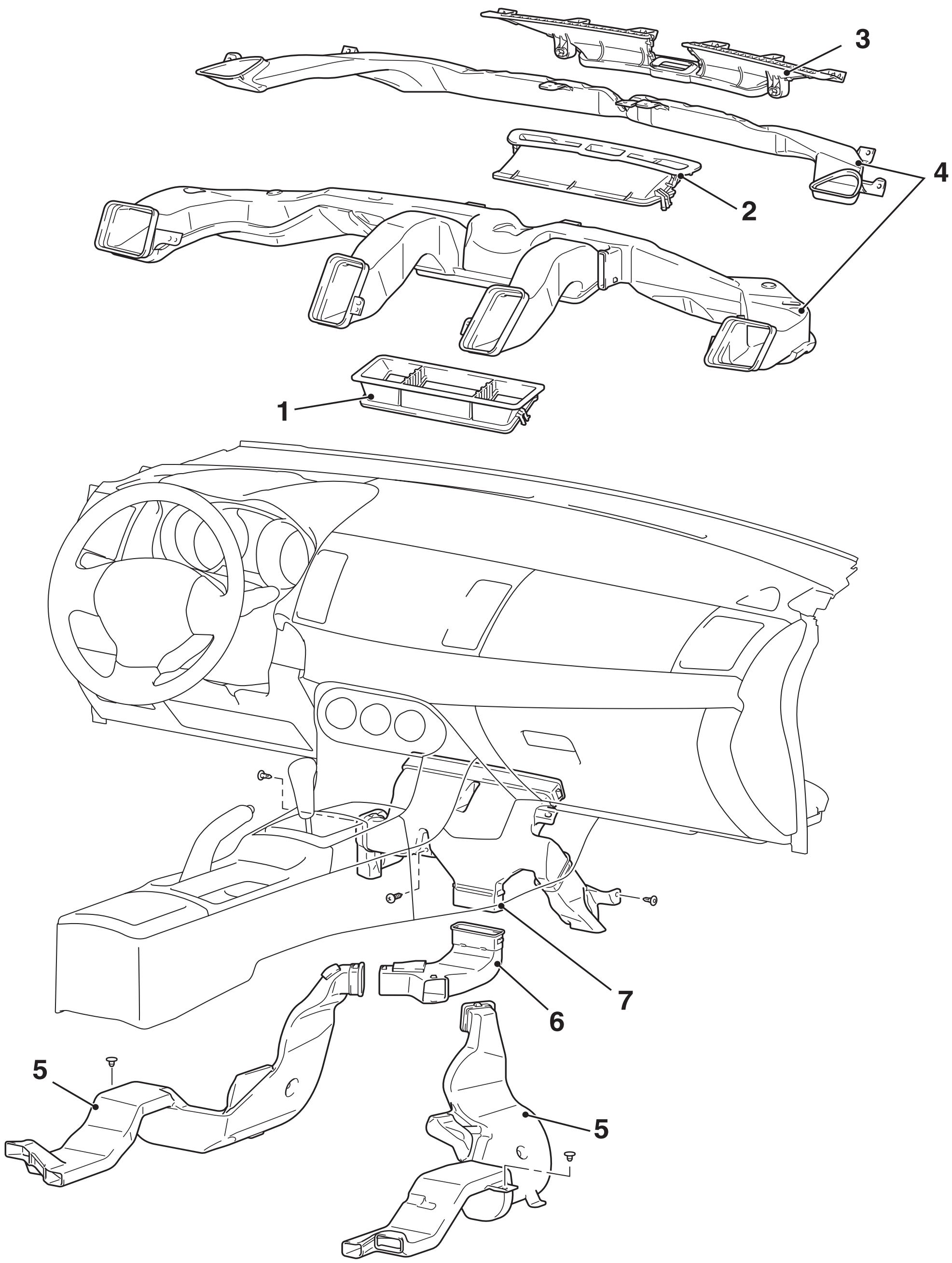
DUCTS

REMOVAL AND INSTALLATION

M1553001000714

⚠ WARNING

When removing and installing the front passenger seat, be sure to carry out accuracy check occupant classification sensor after the seat has been installed in the vehicle. (Refer to GROUP 52B, On-Vehicle Service P.52B-358).



Defroster nozzle and distribution duct removal steps

- Instrument panel (Refer to GROUP 52A P.52A-2).

1. Center duct front
2. Center duct rear
3. Defroster nozzle
4. Ventilator air distribution duct & Side defroster duct

Foot duct and rear heater duct removal steps

- Front seat assembly (Refer to GROUP 52A, Front seat assembly P.52A-17).
- Front scuff plate, cowl side trim (Refer to GROUP 52A, Trims P.52A-10).

Foot duct and rear heater duct removal steps (Continued)

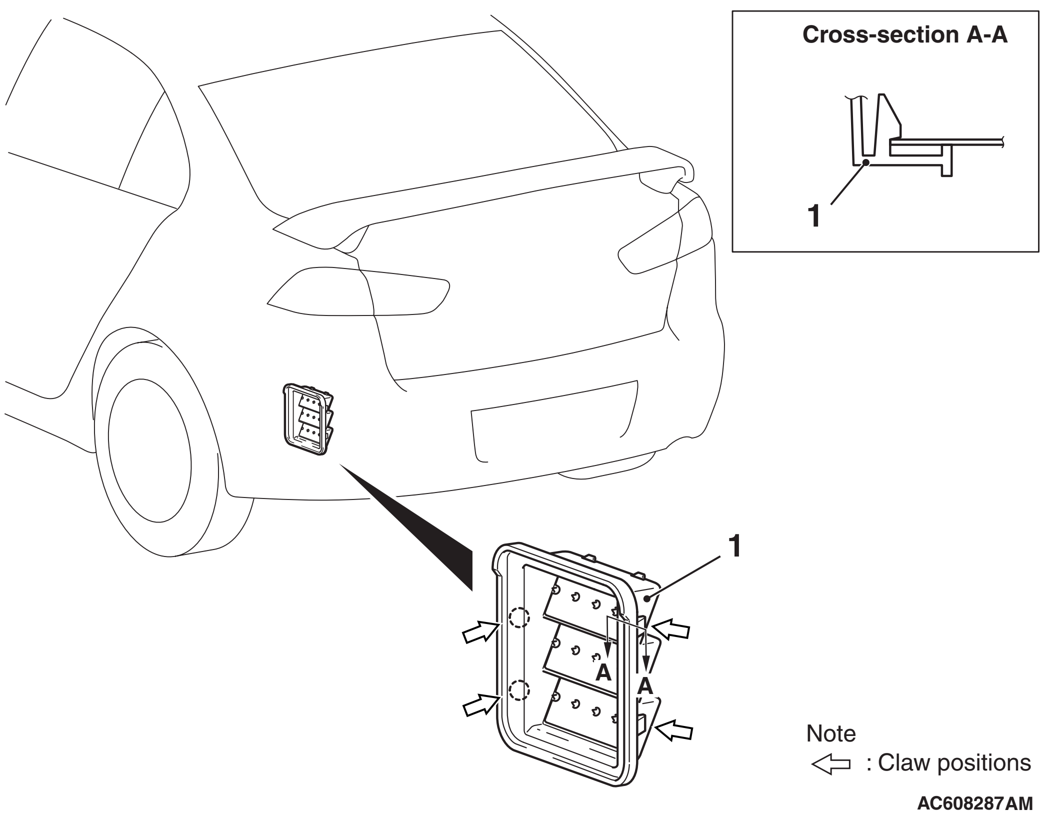
- Floor carpet peeling
- Floor console assembly (Refer to GROUP 52A, Floor console assembly P.52A-8).
- Trunk lid release handle cover (Refer to GROUP 42, Trunk lid P.42A-174).
- Accelerator stopper (Refer to GROUP 17, Accelerator cable and pedal P.17-8).

5. Rear heater duct B
6. Rear heater duct A
7. Foot duct

VENTILATORS

REMOVAL AND INSTALLATION

M1553001600608



Removal steps

- Rear bumper assembly (Refer to GROUP 51, P.51-6).

1. Rear ventilation duct

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1552012100347

Item	Specification
Armature plate mounting bolt	16 ± 1 N· m (12 ± 1 ft-lb)
Discharge flexible hose mounting bolt (compressor side)	25 ± 4 N· m (18 ± 3 ft-lb)
Discharge flexible hose mounting nut (condenser side)	4.9 ± 0.9 N· m (43 ± 8 in-lb)
Connection between the liquid pipe A and B	13 ± 1 N· m (115 ± 9 in-lb)
Liquid pipe A mounting bolt (condenser side)	4.9 ± 0.9 N· m (43 ± 8 in-lb)
Suction flexible hose mounting bolt (compressor side)	25 ± 4 N· m (18 ± 3 ft-lb)
Suction flexible hose mounting nut (heater unit side)	4.9 ± 0.9 N· m (43 ± 8 in-lb)
Front deck crossmember mounting bolt (left side)	23 ± 6 N· m (17 ± 4 ft-lb)
Front deck crossmember mounting bolt (right side)	20 ± 5 N· m (15 ± 3 ft-lb)
Front deck crossmember mounting bolt (front deck side)	20 ± 5 N· m (15 ± 3 ft-lb)

GENERAL SPECIFICATIONS

M1552000200325

Item		Standard value
Heater control assembly		Rotary type
A/C switch		Push-button type
Compressor model, type		MSC90CAS, Scroll type
Refrigerant	Type	R134a (HFC-134a)
	Amount g (oz)	480 – 520 (16.9 – 18.3)

SERVICE SPECIFICATIONS

M1552000300593

Item	Standard value
Idle speed r/min	700 ± 50
Idle-up speed r/min	700 ± 50
Air gap (A/C compressor clutch) mm (in)	0.3 – 0.5 (0.012 – 0.020)

LUBRICANTS

M1552000400534

Item	Specified lubricant	Quantity
Each connection of refrigerant line	SUN PAG 56	As required
Compressor refrigerant unit lubricant cm^3 (fl.oz)	SUN PAG 56	80 – 100 (2.7 – 3.4)

GROUP 54B

LOCAL INTERCONNECT NETWORK (LIN)

CONTENTS

GENERAL INFORMATION

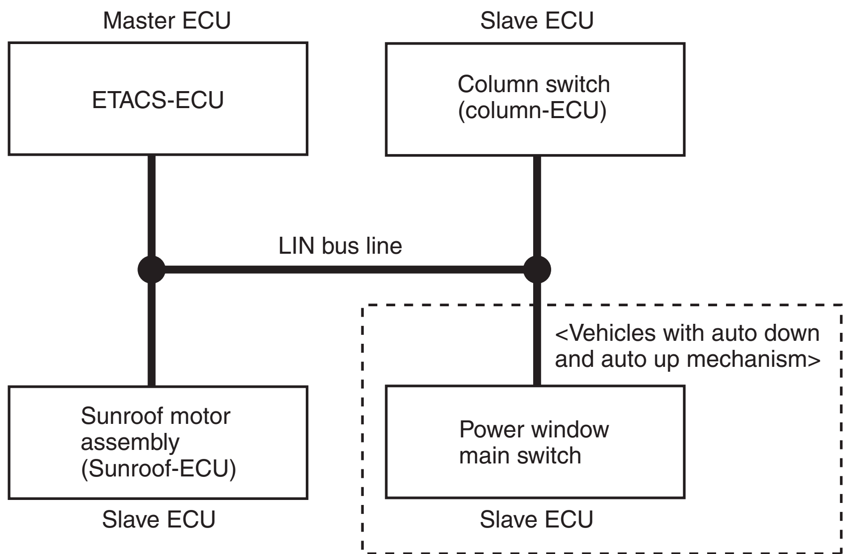
M2545600100064

LIN refers to "Local Interconnect Network," which is a serial multiplex communication protocol* administrated by LIN consortium. A communication circuit employing the LIN protocol connects each ECU, and switch and sensor data can be shared among ECUs, which enables more reduction in wiring.

*NOTE: *: The regulations that have been decided in detail, from software matters such as the necessary transmission rate for communication, the system, data format, and communication timing control method to hardware matters such as the harness type and length and the resistance values.*

STRUCTURE

M2545600200083



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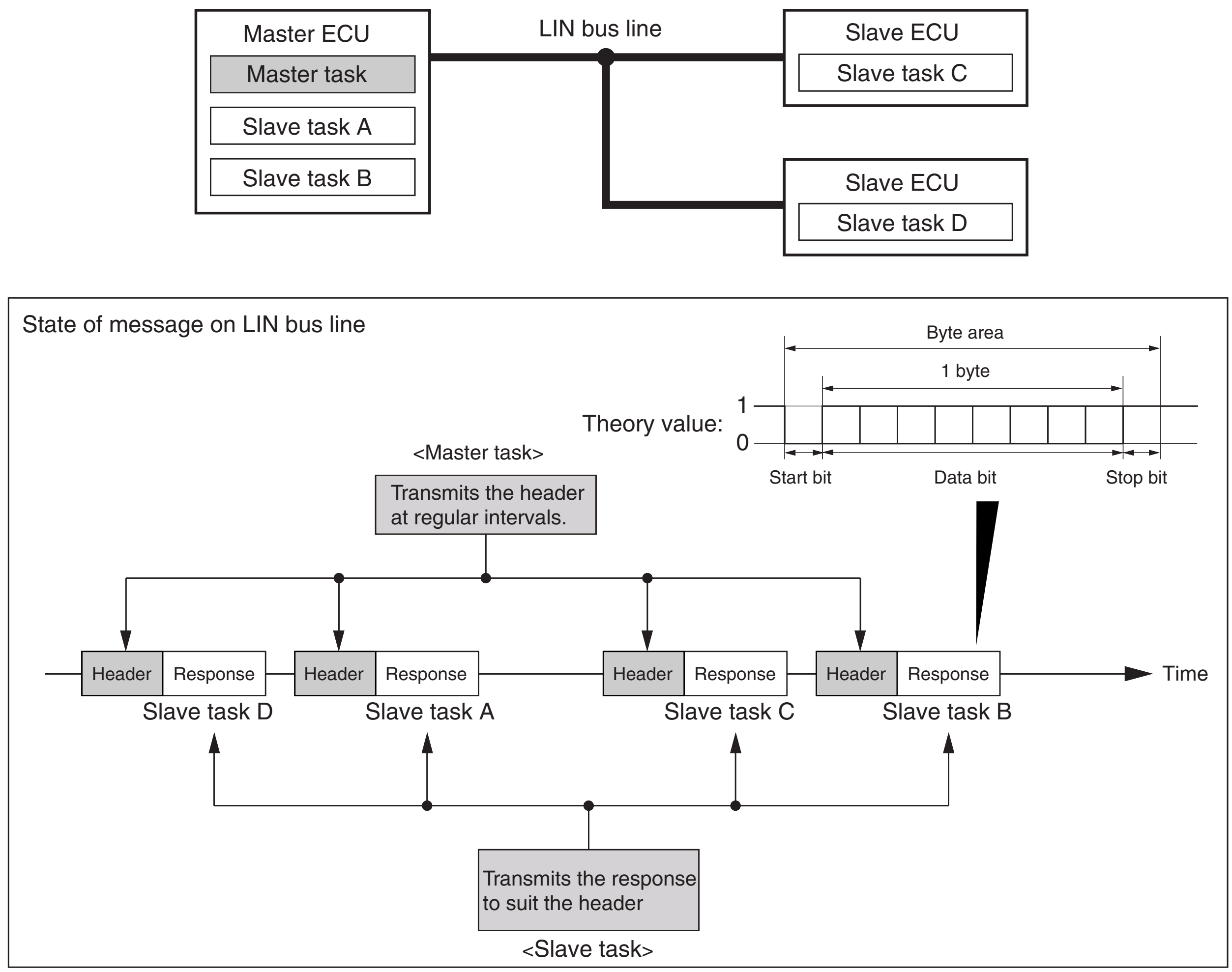
Master and slave ECUs are connected to the LIN bus lines. The master ECU is the ETACS*1-ECU, and the slave ECUs are the column switch (column-ECU), the sunroof-ECU and the power window main switch*2. The master ECU requests these slave ECUs to communicate each other via communication lines.

*NOTE: *1: ETACS (Electronic Time and Alarm Control System)*

*NOTE: *2: Vehicles with auto down and auto up mechanism.*

SYSTEM OPERATION

M2545600300068

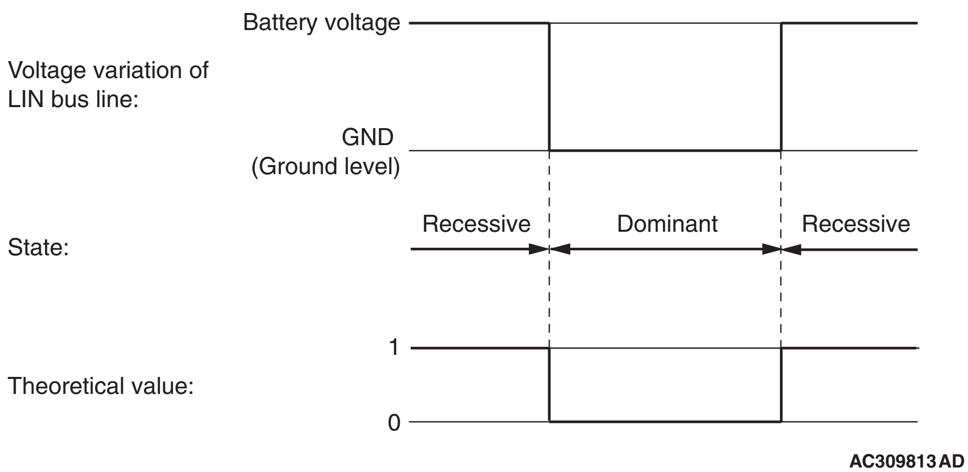


AC506324AB

LIN communication system is described below:

- The master ECU performs the master tasks and slave tasks, and the slave ECUs perform the slave tasks.
- When the master ECU performs a master task, the header frame which stores information to call certain slave tasks (ECU) is transmitted at regular intervals.
- When the master ECU and slave ECU perform a slave task, the ECU called by the header frame transmits the response frame which stores data used for control.
- A header and response collectively are called as a message frame, and the communication method that uses the message frame is called as the frame communication.
- Basically, the communication data is used with some blocks of 10-bit data group which includes one start bit and one stop bit (byte region) arranged in order.

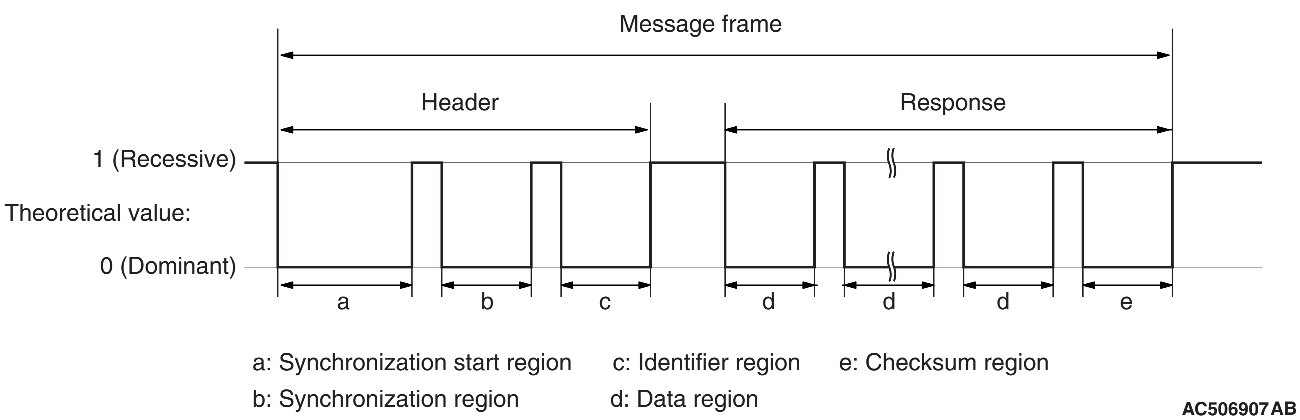
VOLTAGE VARIATION OF LIN BUS LINE



When each ECU sends or receives signals, LIN bus line voltage varies as follows:

- The voltage variation of LIN bus line (0 and 1 combination as a theoretical value) ranging between battery voltage (recessive) and 0 V (dominant) is output (transmitted) as a control signal.
- When no communication is established, the LIN bus line remains recessive (battery voltage).

MESSAGE FRAME



A message frame consists of regions that include a synchronization start region, identifier region, data region, and checksum region. A few bits of recessive data is used to separate the frame from each region.

Frame	**Region name**	**Description**
Header	Synchronization start region	A region that informs each ECU of the starting of header transmission by sending dominant signals for a given period of time.
	Synchronization region	A region that synchronizes the transmission cycle of each ECU connected to the LIN bus line (the slave ECU matches its communication speed to that of the master ECU).
	Identifier region	A region that stores an ID to call the slave ECU defined by the LIN protocol. The number of bytes for the data region is also defined in this region.
Response	Data region	A region to store the control data used by ECU that is called by the header
	Checksum region	A region for checking errors in data content The sending-end ECU calculates data region value according to the specified computing equation, and the result is stored in this filed. The receiving-end ECU detects the transmission error based on the checksum filed value.

NOTES

GROUP 55B

AUTOMATIC AIR CONDITIONING

CONTENTS

GENERAL DESCRIPTION

M1552000100696

The blower, heater, and evaporator have been integrated with the heater and A/C system to achieve greater fan power and noise reduction.

ITEM	SPECIFICATION
Heater control assembly	Dial type
Compressor mode	MSC90CAS
Compressor type	Scroll type
Refrigerant and quantity g (oz)	R-134a (HFC-134a), 480 –520 (16.9 –18.3)

SAFETY PRECAUTIONS

⚠ *WARNING*

Wear safety goggles and gloves when servicing the refrigeration system to prevent severe damage to eyes and hands.

Because R-134a refrigerant is a hydro fluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.

Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Mitsubishi Motors Corporation recommends an R-134a refrigerant recycling device.

Refrigerant R-134a is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8° C (–21.64° F) at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and non-explosive. The following precautions must be observed when handling R-134a.

⚠ *WARNING*

Do not heat R-134a above 40°C (104.0°F) or it may catch fire and explode.

R-134a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the A/C system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system.

1. Should any liquid refrigerant get into your eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil.
2. Next, splash your eyes with plenty of cold water.
3. Call your doctor immediately even if irritation has ceased.

⚠ **CAUTION**

Keep R-134a containers upright when charging the system.

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.

A bucket or large pan of hot water not over 40° C (104.0° F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam-clean on or near the system components or refrigerant lines.

⚠ *WARNING*

A leak detector for R-134a should be used to check for refrigerant gas leaks.

⚠ **CAUTION**

Do not allow liquid refrigerant to touch bright metal or it will be stained.

When metering R-134a into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

OPERATION

CONDENSER FAN AND RADIATOR FAN CONTROL

The ECM judges the required revolution speed of radiator fan motor and condenser fan motor using the input signals transmitted from A/C switch, output shaft speed sensor and engine coolant temperature sensor.

COMPRESSOR CONTROL

When operating the A/C switch

- The air thermo sensor, which senses the temperature of the air flowing out of the evaporator, deactivates the compressor at 1° C (33.8° F) or below.
- A/C-ECU detect refrigerant pressure by A/C pressure sensor and turns OFF when the refrigerant pressure becomes excessively high or low, thus protecting the compressor circuit (See Table below).
- When the air thermo sensor is activated, and the ignition switch, blower switch, and A/C switch are ON, the A/C compressor clutch relay is energized.

When operating the mode selection dial

- The A/C will work when the mode selection dial is set to the "Defroster" or "Defroster/foot" position, or the temperature control dial is set to the "MAX A/C" position. In other dial positions, when the A/C switch is turned on, the A/C will work.

A/C Compressor Clutch Relay ON Conditions

<table>
<tr><td colspan="2">Ignition switch (IG2)</td><td>ON</td><td rowspan="7">NOTE: A/C compressor clutch relay is de-energized when any one switch, sensor or control unit shown on the left turns off.
NOTE: The components marked by * communicate with the ECU. If the air thermo sensor detects a temperature of 1°C (33.8°F), the A/C-ECU will turn off the A/C compressor clutch relay.</td></tr>
<tr><td colspan="2">Blower switch</td><td>ON</td></tr>
<tr><td colspan="2">A/C switch, mode selection dial defroster, defroster/foot position or temperature control MAX A/C</td><td>ON</td></tr>
<tr><td colspan="2">Air thermo sensor</td><td>*</td></tr>
<tr><td rowspan="2">Pressure detected by A/C pressure sensor</td><td>2.94 MPa (427psi) or less (If the refrigerant pressure exceeds 2.94 MPa (427psi), A/C compressor clutch relay is not ON condition until the refrigerant pressure has been measured up to 2.35 MPa (341psi) a or less.)</td><td rowspan="2">ON</td></tr>
<tr><td>0.19 MPa (27psi) or more (If the refrigerant pressure falls short of 0.19 MPa (27psi), A/C compressor clutch relay is not ON condition until the refrigerant pressure has been measured up to 0.22 MPa (32psi) or more.)</td></tr>
<tr><td colspan="2">A/C compressor clutch relay driving transistor (within powertrain control module)</td><td>ON</td></tr>
</table>

AUTOMATIC A/C DIAGNOSIS

INTRODUCTION

M1554006200103

After air is taken in through the air selection damper, it is fed to the evaporator by the blower fan and motor and cooled. The air cooled by the evaporator is mixed appropriately with the warmed air which pass through the heater core to achieve a comfortable temperature. If the A/C does not operate or the cooled air is not discharged, the system components or relay may be faulty.

AUTOMATIC AIR CONDITIONING TROUBLESHOOTING STRATEGY

M1554004700652

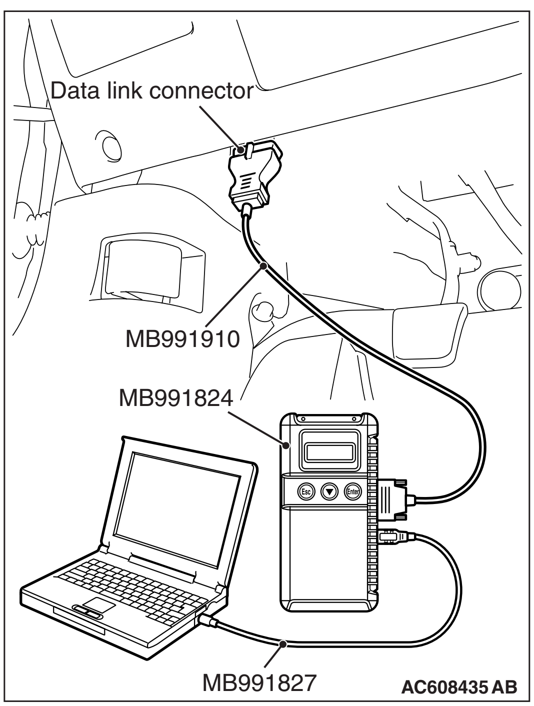
Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a heater, air conditioning and ventilation fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

DIAGNOSTIC FUNCTION

M1552019800165

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)



Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

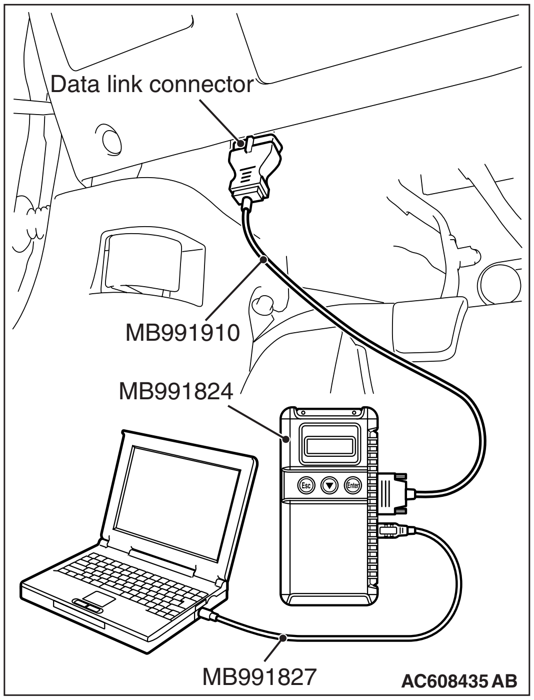
   NOTE: When the special tool MB991824 is energized, the special tool MB991824 indicator light will be illuminated in a green color.
7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting the scan tool special tool MB991824 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be output. Check the battery if scan tool MB991958 does not display.

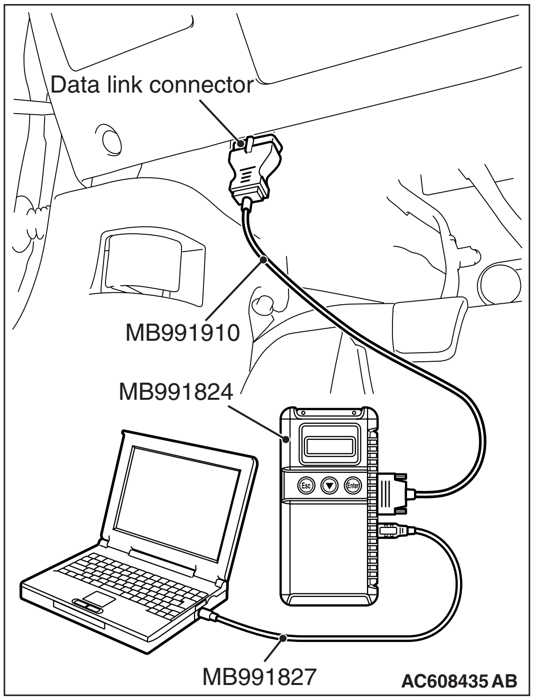
1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "AUTO A/C" from "System List," and press the "OK" button.

   NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO READ DATA LIST

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System Select."

Select "AUTO A/C" from "System List," and press the "OK" button.

5. Select "Data List."
6. Choose an appropriate item and select the "OK" button.

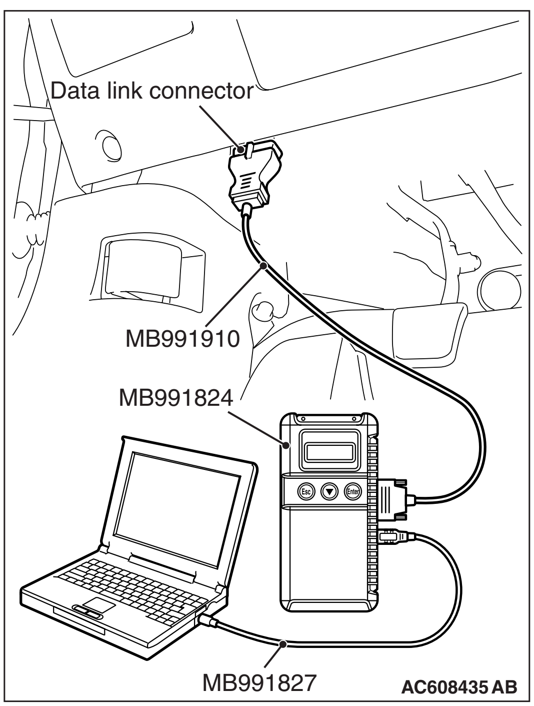
HOW TO PERFORM ACTUATOR TEST

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

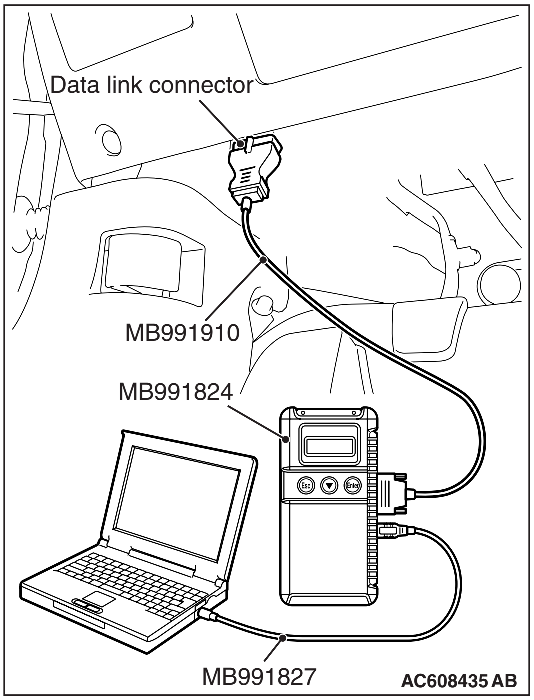


1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "AUTO A/C" from "System List," and press the "OK" button.
5. Choose "Actuator Test" from "AUTO A/C" screen.
6. Choose an appropriate item and select the "OK" button.

HOW TO DIAGNOSE THE CAN BUS LINE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle whose CAN bus lines will be diagnosed.
   - If they match, go to step 8.
   - If not, go to step 5.
5. Select "view vehicle information" button.
6. When the vehicle information is displayed, confirm again that it matches the vehicle which is diagnosed CAN bus line.
   - If they match, go to step 8.
   - If not, go to step 5.
7. Press the "OK" button.
8. When the options are displayed, choose the options (mark the check) and then select "OK".

DIAGNOSTIC TROUBLE CODE CHART

M1554004900902

⚠ CAUTION

During diagnosis, a DTC code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. After completing the repair, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.

Diagnostic trouble code No.	Diagnostic item	Reference page
B10C0	Interior temperature sensor system (short circuit)	P.55B-9
B10C1	Interior temperature sensor system (open circuit)	P.55B-9

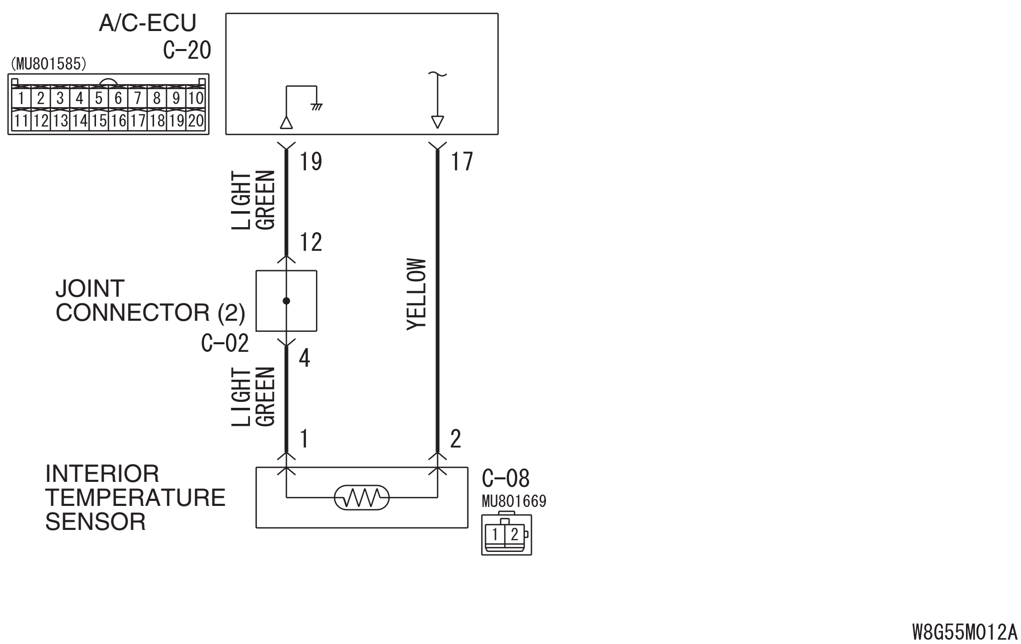
Diagnostic trouble code No.	Diagnostic item	Reference page
B1000	Control panel communication error	Refer to GROUP 55A diagnostic trouble code chart P.55A-8
B1003	Mode dial SW error	
B1018	Temperature control dial SW error	
B1021	Fan dial SW error	
B1031	Air thermo sensor system (short circuit)	
B1032	Air thermo sensor system (open circuit)	
B1034*	Ambient air temperature sensor system (short circuit)	
B1035*	Ambient air temperature sensor system (open circuit)	
B1079	Refrigerant leaks	
B2214	Control panel failure	
B223B	Control panel improperly assembled	
U1415	Coding not completed	
U0019	Bus off (CAN1)	
U0141	ETACS-ECU time-out	
U0151	SRS-ECU time-out	
U0154	Occupant classification-ECU time-out	
U0155	Combination meter time-out	
U0168	WCM time-out	
U0184	Audio time-out	
U0195	Satellite radio tuner time-out	
U0197	Hands free module time-out	

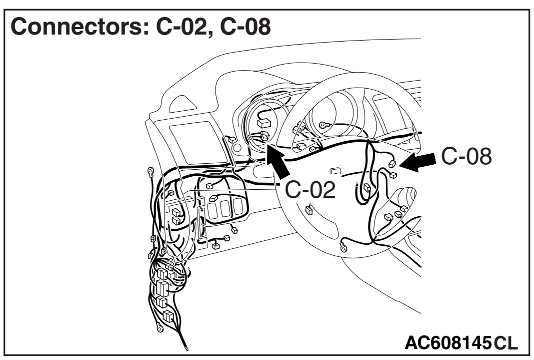
*NOTE: The diagnostic trouble codes marked by * are set from the ETACS-ECU.*

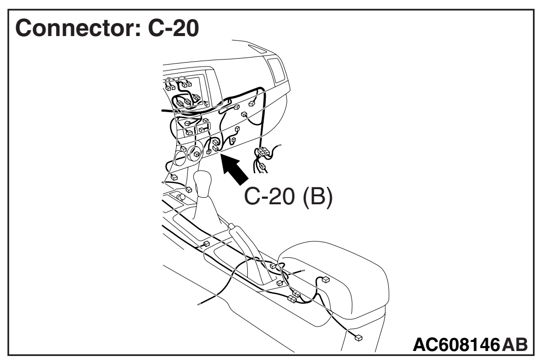
DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC B10C0, B10C1: Interior Temperature Sensor System

Interior Temperature Sensor Circuit







DTC SET CONDITION

- DTC B10C0 is set if there is a short circuit in the interior temperature sensor input circuit.
- DTC B10C1 is set if there is a defective connector connection, or if there is an open circuit in the harness.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- The A/C-ECU, the interior temperature sensor, or connector(s) or wiring between the two may be defective.

Past trouble

- If DTC B10C0 or B10C1 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) between the A/C-ECU and the interior temperature sensor. If the connectors and wiring are normal, and obviously the ECU is the cause of the trouble, replace the ECU. If in doubt, do not replace the ECU.

TROUBLESHOOTING HINT

- Malfunction of connector.
- Malfunction of the harness.
- Malfunction of the interior temperature sensor.
- Malfunction of the A/C-ECU.

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, diagnose the CAN bus line.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

Use scan tool MB991958 to diagnose the CAN bus lines.

(1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.55B-4."
(2) Turn the ignition switch to "ON" position.
(3) Diagnose the CAN bus line.

Q: Is the check result satisfactory?

YES : Go to Step 2.
NO : Repair the CAN bus lines. Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis-Can Bus Diagnostic Chart P.54C-16).

STEP 2. Recheck for diagnostic trouble code.

Recheck if the DTC is set.

(1) Erase the DTC.
(2) Turn the ignition switch to "ON" position.
(3) Check if the DTC is set.

Q: Is the check result satisfactory?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.
NO : Go to Step 3.

STEP 3. Check interior temperature sensor connector C-08 and A/C-ECU connector C-20 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are interior temperature sensor connector C-08 and A/C-ECU connector C-20 in good condition?

YES : Go to Step 4.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

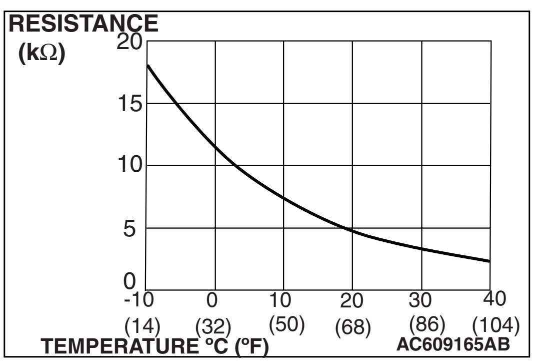
STEP 4. Check the wiring harness between A/C-ECU connector C-20 (terminal 17 and 19) and interior temperature sensor connector C-08 (terminals 1 and 2).

NOTE: Also check joint connector C-02 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-02 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between A/C-ECU connector C-20 (terminal 17 and 19) and interior temperature sensor connector C-08 (terminals 1 and 2) in good condition?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the interior temperature sensor.
Measure the resistance between connector terminals 1 and 2 under at least two different temperatures. The resistance values should generally match those in the graph.



NOTE: The temperature at the check should not exceed the range in the graph.

Q: Is the interior temperature sensor in good condition?

YES : Replace the A/C-ECU. Then go to Step 6.
NO : Replace the interior temperature sensor. Then go to Step 6.

STEP 6. Recheck for diagnostic trouble code.
Check again if the DTC is set.
(1) Connect scan tool MB991958 to the data link connector
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : The procedure is complete.
NO : Return to Step 1.

SYMPTOM CHART

M1554005000946

⚠ CAUTION

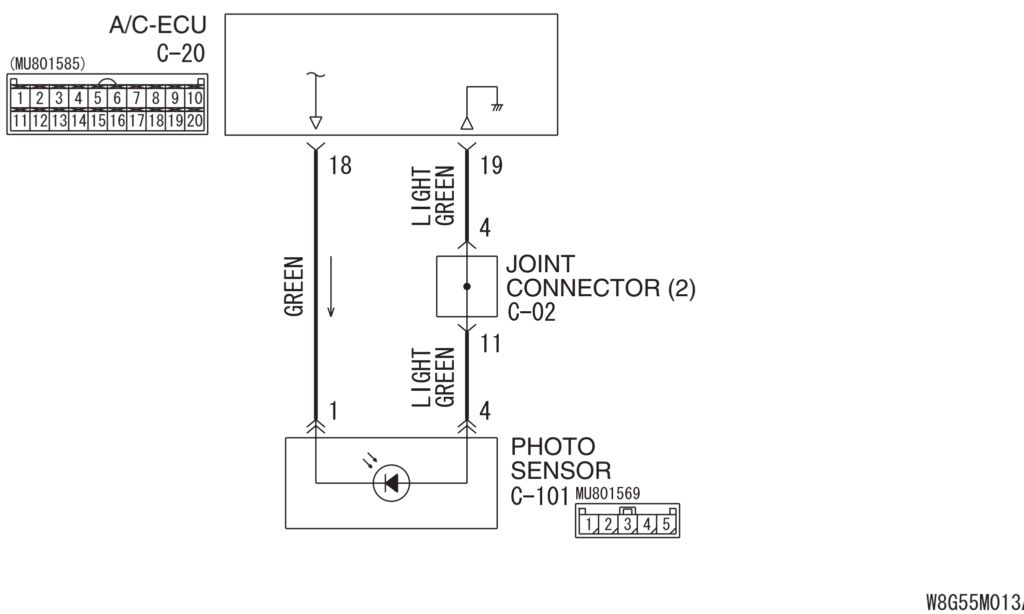
During diagnosis, a DTC code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.

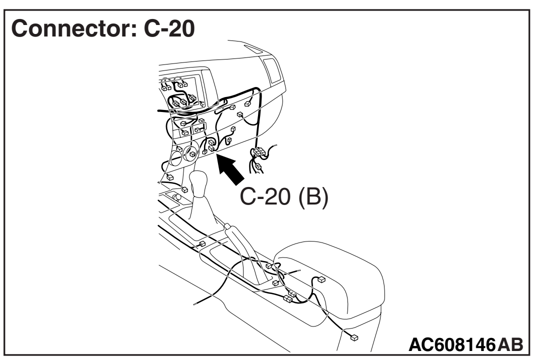
Symptom	Inspection procedure	Reference page
When the A/C is operation, temperature inside the passenger compartment does not decrease (Cool air is not emitted).	1	Refer to GROUP 55A, symptom chart P.55A-64
Malfunction of the A/C power supply system.	2	
The compressor does not work.	3	
Blower fan and motor do not turn.	4	
Blower air amount cannot be changed.	5	
Outside/inside air changeover is not possible.	6	
A/C outlet air temperature does not increase.	7	
Air outlet vent cannot be changed.	8	
Rear window defogger does not operate.	9	
Blower motor power supply system.	10	
When sunlight intensity changes, air outlet temperature does not change.	11	P.55B-13

SYMPTOM PROCEDURES

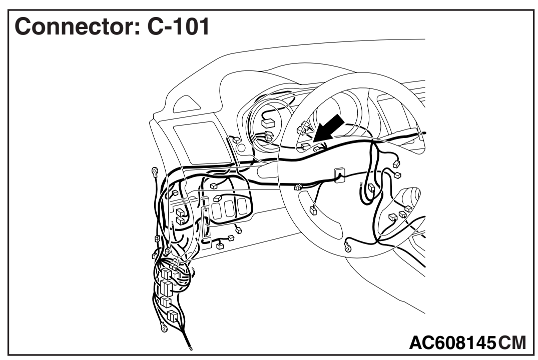
INSPECTION PROCEDURE 11: When Sunlight Intensity Changes, Air Outlet Temperature Does Not Change.

Photo Sensor Circuit





Connector: C-20



Connector: C-101

CIRCUIT OPERATION

When the blower air temperature cannot be changed even if the preset temperature is changed, the sensors may be defective.

TROUBLESHOOTING HINTS

- Malfunction of the photo sensor
- Malfunction of the A/C-ECU
- Malfunction of connector.
- Malfunction of the harness.

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set

- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Check the defogger and outside/inside air selection damper control motor operation.

Q: Do the defogger and outside/inside air selection damper control motor work normally?

YES : Go to Step 2.
NO : Refer to GROUP 55A, Symptom chart, P.55A-64.

STEP 2. Using scan tool MB991958, read the diagnostic trouble code.

⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

Check if an A/C-ECU DTC is set.
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the check result satisfactory?

YES : Go to Step 3.
NO : Refer to P.55B-7.

STEP 3. Using scan tool MB991958, check data list.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode.
  - Item 67: Photo sensor

(4) Cover the photo sensor and security indicator with your hand or a shop towel.

NOTE: Check that the voltage displayed on the scan tool changes.

(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does the voltage displayed on the scan tool change when the photo sensor and security indicator is covered?

YES : Replace the A/C-ECU. Check that the A/C works normally.
NO : Go to Step 4.

STEP 4. Check A/C-ECU connector C-20 and photo sensor connector C-101 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are A/C-ECU connector C-20 and photo sensor connector C-101 in good condition?

YES : Go to Step 5.
NO : Repair or replace the connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 5. Check the wiring harness between photo sensor connector C-101 (terminals 4 and 1) and A/C-ECU connector C-20 (terminals 19 and 18).

Q: Is the wiring harness between photo sensor connector C-101 (terminals 4 and 1) and A/C-ECU connector C-20 (terminals 19 and 18) in good condition?

YES : Go to Step 6.
NO : Repair the wiring harness. Check that the A/C works normally.

STEP 6. Replace the photo sensor.

Q: Does the A/C operate normally?

YES : No action is necessary and testing is complete.
NO : Replace the A/C-ECU. Check that the A/C works normally.

DATA LIST REFERENCE TABLE

M1554005100631

Scan tool display	Item No.	Inspection status	The display contents under normal conditions
Engine speed	17	–	Displays correct engine speed.
Ambient temperature sensor	19	–	Ambient temperature is the same as scan tool displayed temperature
Air thermo sensor	20	–	Evaporator outlet temperature is the same as scan tool displayed temperature.
Interior temperature sensor	21	–	Interior temperature is the same as scan tool displayed temperature
Temperature setting	23		Displays air conditioning set temperature.
ETC sensor	24	–	Engine coolant temperature is the same as scan tool displayed temperature.
Vehicle speed	26	–	Displays vehicle speed.
A/C Compressor drive request	27	Compressor ON	ON
		Compressor OFF	OFF
Air conditioning switch	28	Air conditioning switch ON	ON
		Air conditioning switch OFF	OFF
Refrigerant leak	29	–	Normal
Idel up request	34	–	Displays idle-up request signal.
Rear heater SW light*	35	–	–
PTC heater 1*	36	–	–
PTC heater 2*	37	–	–
PTC heater 3*	38	–	–
In/out select damp poten (target)	45	–	Displays outside/inside air selection damper target position.
In/out select damp potentiometer	46	–	Displays outside/inside air selection damper position.
Air outlet c/o potentiometer	55	–	Displays air outlet changeover damper position.
Air outlet c/o potentio. (Target)	56	–	Displays air outlet changeover damper target position.

Scan tool display	Item No.	Inspection status	The display contents under normal conditions
Low pressure judgment	57	–	Normal
Rear defogger switch	60	Rear window defogger switch ON	ON
		Rear window defogger switch OFF	OFF
Pressure sensor	61	–	Displays refrigerant pressure.
Air mix potentiometer	63	–	Displays the air mix damper position.
Photo sensor	67	–	Displays sunload.
Front blower fan	68	–	Displays blower motor condition.
Front blower fan (Target)	69	–	Displays blower motor target value.
Refrigerant pressure	73	–	Displays refrigerant pressure status.
Condenser fan	74	–	Displays condenser fan running condition.
Temp. set dial position	76	–	Displays the set temperature output value on the control panel.
A/C Panel type	77	–	Dial/Auto/RHD
Fan set dial position	78	–	Displays the air volume output value on the control panel.
Air outlet c/o set dial position	79	–	Displays output value to the air outlet changeover dial on the control panel.
Fan set dial operation flag	80	–	ON when the air volume adjusting dial is operated
A/C SW operation flag	81	–	ON when the air conditioning switch is operated
Temp. set dial operation flag	82	–	ON when the air conditioning switch is operated
Defogger flag	83	–	ON when the air outlet changeover dial is set to the DEF position.
In/out air c/o SW operation flag	84	–	ON when the inside air/outside air changeover switch is operated

Scan tool display	Item No.	Inspection status	The display contents under normal conditions
Rear defogger SW operation flag	87	–	ON when the rear window switch is operated
Rear defogger SW light	88	–	Displays rear window switch indicator status.
A/C SW light	89	–	Displays air conditioning switch indicator status.
In/out air c/o SW light	90	–	Displays the status of the inside air/outside air changeover switch indicator.
A/C Compressor drive flag	91	–	ON when the compressor is activated.
Wiper operation flag	92	–	ON when the wiper is operated.
Ignition position information	93	–	Ignition switch position status
Power source voltage	94	–	Displays power supply voltage.
IOD fuse equipment flag	95	–	IOD fuse status
A/T lock up open request	96	–	Displays A/T lock open request signal.
System operation time	100	–	–
Compressor use times	101	–	–
Rear defogger use times	102	–	–
In/out air c/o poten drive time	103	–	–
Air outlet c/o poten drive time	104	–	–
Air mix potentiometer drive time	105	–	–
Hot state time (Interior TEMP.)	106	–	–
Cold state time (Interior TEMP.)	107	–	–
Hot state time (Ambient TEMP.)	108	–	–
Cold state time (Ambient TEMP.)	109	–	–
Maximum ambient temperature	110	–	–
Minimum ambient temperature	111	–	–
Maximum Engine coolant TEMP.	112	–	–
Engine high speed time	113	–	–

Scan tool display	Item No.	Inspection status	The display contents under normal conditions
Maximum Engine speed	114	–	–
High pressure drive time	115	–	–
High pressure cut times	116	–	–
Maximum pressure (kPa)	117	–	–
A/C use rate	118	–	–
Compressor operation rate	119	–	–
Eco operation rate	120	–	–
Recirc use rate	121	–	–
A/C operation times	122	–	–
In/out air c/o operation times	123	–	–
Mode dial operation times	124	–	–
Blower fan dial operation times	125	–	–
TEMP. set dial operation times	126	–	–
FACE mode use rate	127	–	–
B/L mode use rate	128	–	–
FOOT mode use rate	129	–	–
D/F mode use rate	130	–	–
DEF mode use rate	131	–	–
Fan OFF use rate	132	–	–
Fan 1-2step use rate	133	–	–
Fan 3-4step use rate	134	–	–
Fan 5-6step use rate	135	–	–
Fan 7-8step use rate	136	–	–
Temp 1-7 step use rate	137	–	–
Temp 8-10step use rate	138	–	–
Temp 11-13 step use rate	139	–	–
Temp 17-19step use rate	140	–	–
Temp 20-22step use rate	141	–	–
Temp 23-29step use rate	142	–	–
PTC heater1 use times	143	–	–
PTC heater2 use times	144	–	–
PTC heater3 use times	145	–	–
Fan LO driving time	146	–	–
Fan M1 driving time	147	–	–

Scan tool display	Item No.	Inspection status	The display contents under normal conditions
Fan M2 driving time	148	–	–
Fan HI driving time	149	–	–
Rear PTC heater counter	150	–	–

*NOTE: * shows that it is displayed but not used.*

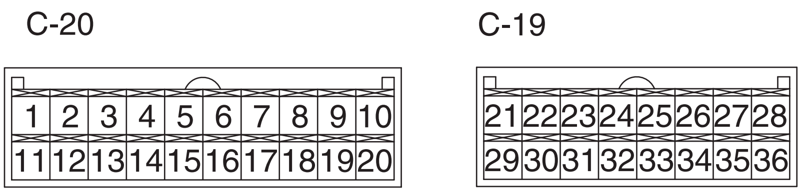
ACTUATOR TEST

M1554005200575

Item No.	Check items	Driven content
2	idle up request	Idle-up request signal
5	In/out selection damper	The moving position of outside/inside air selection damper motor
6	Air mix damper motor	The moving position of air mix damper motor
7	Front blower fan	The amount of blower motor rotation
8	Air outlet c/o damper	Air outlet changeover damper motor moving position
10	Condenser fan	The amount of condenser fan rotation
11	Air conditioning	A/C switch selection position
12	Rear defogger switch	Rear window defogger switch selection position
13	A/T lock open request	A/T lock open request signal

CHECK AT A/C-ECU TERMINAL

M1552010301274



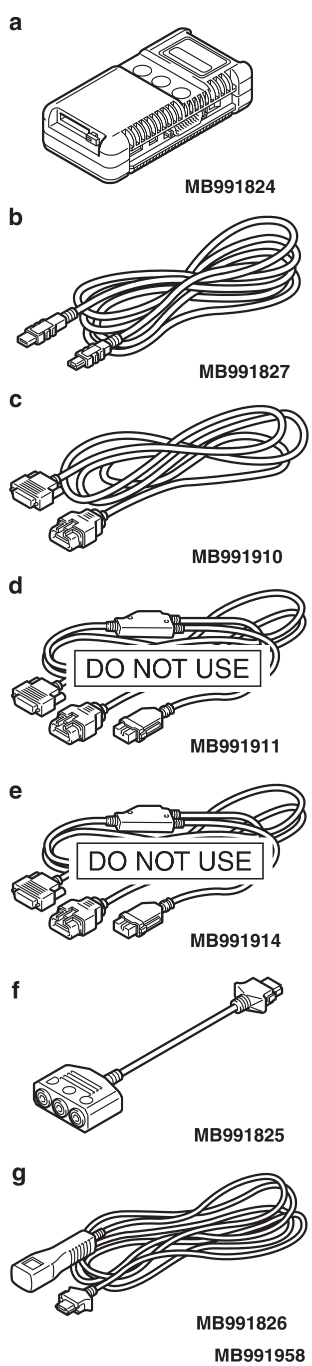
AC210339AF

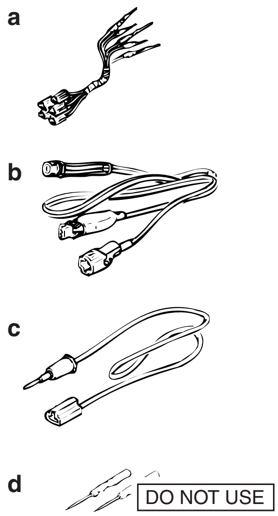
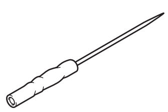
Terminal No.	Check items	Check conditions	Normal conditions
1	Power transistor (DRAIN)	Air volume control dial: Maximum air volume	0 to 2 V
2	Power transistor (GATE)	Air volume control dial: Maximum air volume	Battery voltage
3 –8	–	–	–
9	A/C control panel (input)	–	–
10	A/C control panel (input)	–	–
11, 12	–	–	–
13	Battery power supply	Always	Battery voltage
14	Ground	Always	0 V
15	IG1 power supply	Ignition switch: IG1	Battery voltage
16	A/C pressure sensor input	Refer to P.55A-112.	Refer to P.55A-112.
17	Interior temperature sensor	Sensor probe temperature: 25° C (77° F) (4.0 kΩ)	2.1 to 2.7 V
18	Photo sensor input	Brightness 0 lux	5 V
		Brightness 100000 lux or more (under summer sunshine)	0 V
19	Sensor ground	Always	0 V
20	A/C pressure sensor power supply	Ignition switch: IG2	5 V
21	Air thermo sensor ground	Always	0 V
22	Air thermo sensor	Sensor probe temperature: 25° C (77° F) (4.0 kΩ)	2.1 to 2.7 V
23	–	–	–
24	Motor for air outside/inside air circulation switching damper	–	–
25	Motor for air outside/inside air circulation switching damper	–	–
26	Motor for air outside/inside air circulation switching damper	–	–

Terminal No.	Check items	Check conditions	Normal conditions
27	Motor for air outside/inside air circulation switching damper	–	–
28	Air mix damper motor	–	–
29	Motor power supply	–	–
30	Air outlet changeover damper motor	–	–
31	Air outlet changeover damper motor	–	–
32	Air outlet changeover damper motor	–	–
33	Air outlet changeover damper motor	–	–
34	Air mix damper motor	–	–
35	Air mix damper motor	–	–
36	Air mix damper motor	–	–

SPECIAL TOOLS

M1552000600624

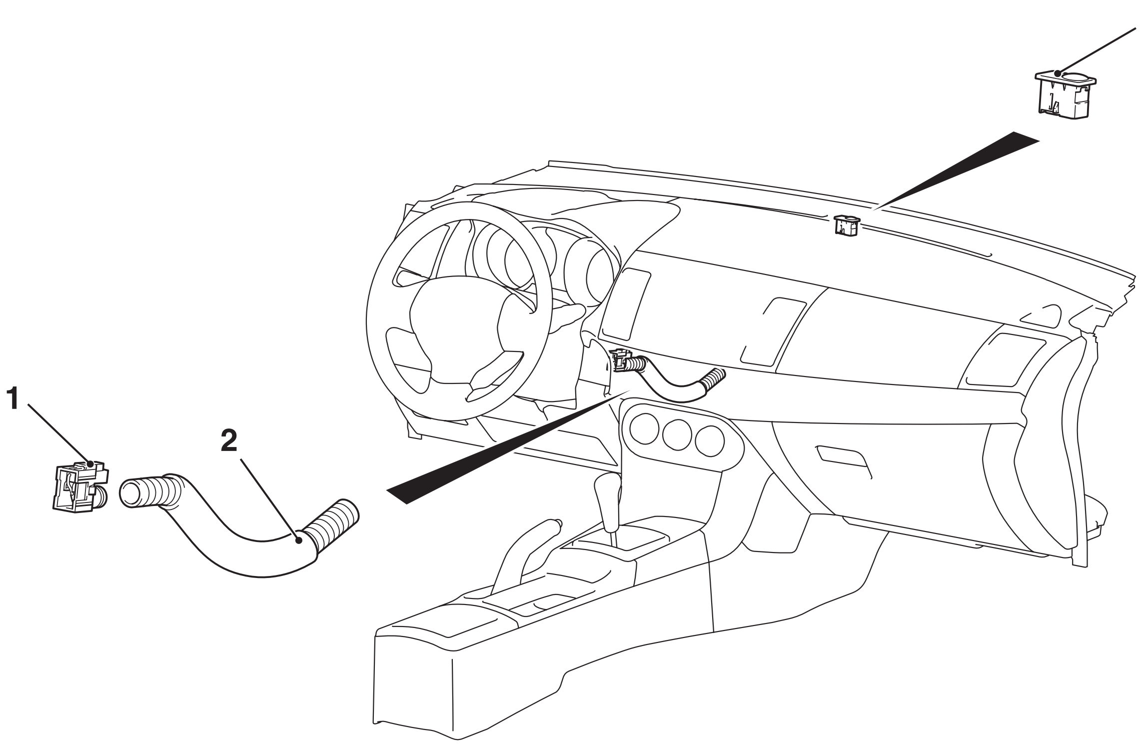
Tool	Tool number and name	Supersession	Application
	MB991958 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991914 f. MB991825 g. MB991826 M.U.T.-III sub-assembly a. Vehicle communication interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III main harness C (for Daimler Chrysler models only) f. M.U.T.-III measurement adapter g. M.U.T.-III trigger harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	⚠ CAUTION **M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.** DTC, data list and actuator test check.

Tool	Tool number and name	Supersession	Application
 MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222 Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	General service tool (jumper)	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006 Extra fine probe	–	Continuity check and voltage measurement at harness wire or connector

SENSORS

REMOVAL AND INSTALLATION

M1554001900356



Interior temperature sensor removal steps

- Lower panel (Refer to GROUP 52A, Instrument panel P.52A-2).
1. Interior temperature sensor
2. Aspirator hose

Photo sensor removal steps

- Instrument panel (Refer to GROUP 52A, Instrument panel P.52A-2).
3. Photo sensor

Required Special Tools:

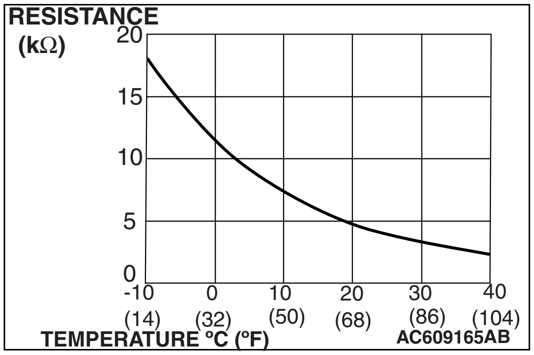
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

INSPECTION

M1554002000237

INTERIOR TEMPERATURE SENSOR CHECK

When the resistance between the sensor terminals is measured under two or more temperature conditions, the resistance should approximately satisfy the illustrated values.



NOTE: The temperature conditions when checking should not exceed the range shown in the diagram.

PHOTO SENSOR CHECK

1. Connect scan tool MB991958, and check the data list of the photo sensor (Refer to P.55B-16).
2. Check that the displayed value changes when you cover the photo sensor with your hands.

OTHER PARTS

OTHER PARTS MAINTENANCE SERVICE POINTS

M1554004000426

The following maintenance service points are the same as for the manual A/C.

Item		Reference page
On-vehicle service	Refrigerant level test	P.55A-112
	Air conditioning compressor clutch test	P.55A-112
	Simple inspection of the a/c pressure sensor	P.55A-112
	Compressor drive belt adjustment	P.55A-113
	Charging, discharging	P.55A-113
	Performance test	P.55A-114
	Refrigerant leak repair	P.55A-115
	Compressor noise check	P.55A-116
	Power relay continuity check	P.55A-116
	Idle-up operation check	P.55A-117

Item	Reference page
Heater control unit	P.55A-118
Heater unit and blower assembly	P.55A-119
Motors and transistor	P.55A-124
Ambient air temperature sensor	P.55A-126
A/C-ECU	P.55A-127
Compressor and tension pulley	P.55A-128
Condenser	P.55A-133
Refrigerant line	P.55A-134
Ducts	P.55A-137
Rear ventilation duct	P.55A-137

GROUP 21

CLUTCH

CONTENTS

GENERAL INFORMATION

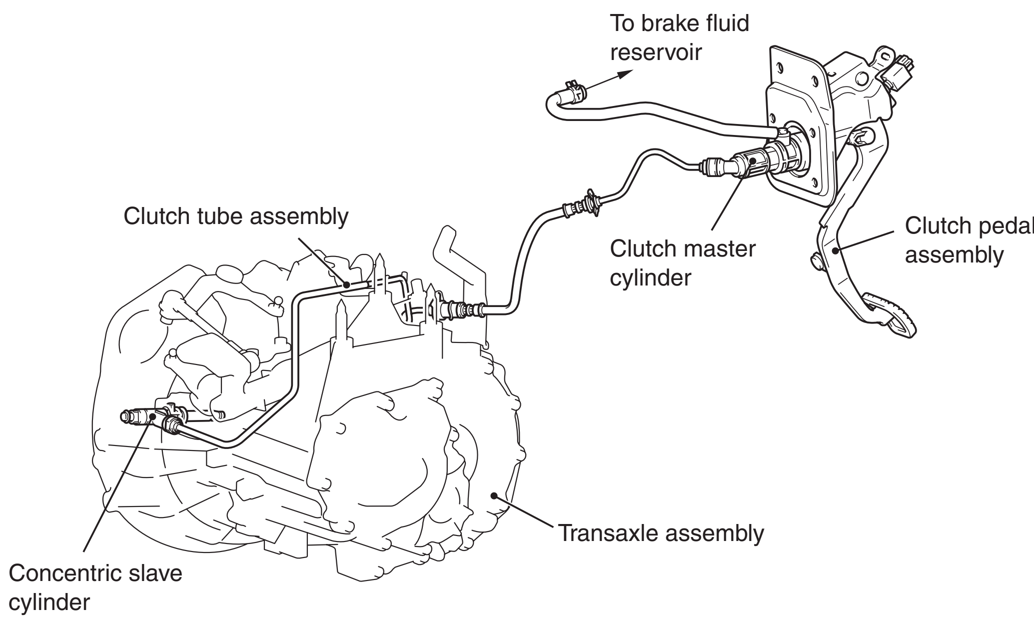
M2210000100483

The clutch is a dry single-disc, diaphragm type; hydraulic pressure is used for the clutch control. The clutch shares a brake fluid reservoir with the brake system.

SPECIFICATIONS

Item	Specification
Clutch disc type	Dry single plate type
Clutch disc facing diameter OD x ID mm	225 × 155
Clutch cover type	Diaphragm spring type
Clutch cover setting load N (lb)	4,320 ± 350 (971 ± 78)
Control system	Hydraulic type
Master cylinder ID mm	15.87
Clutch fluid	Brake fluid DOT 3 or DOT 4 (commonly used as brake fluid)

CONSTRUCTION DIAGRAM



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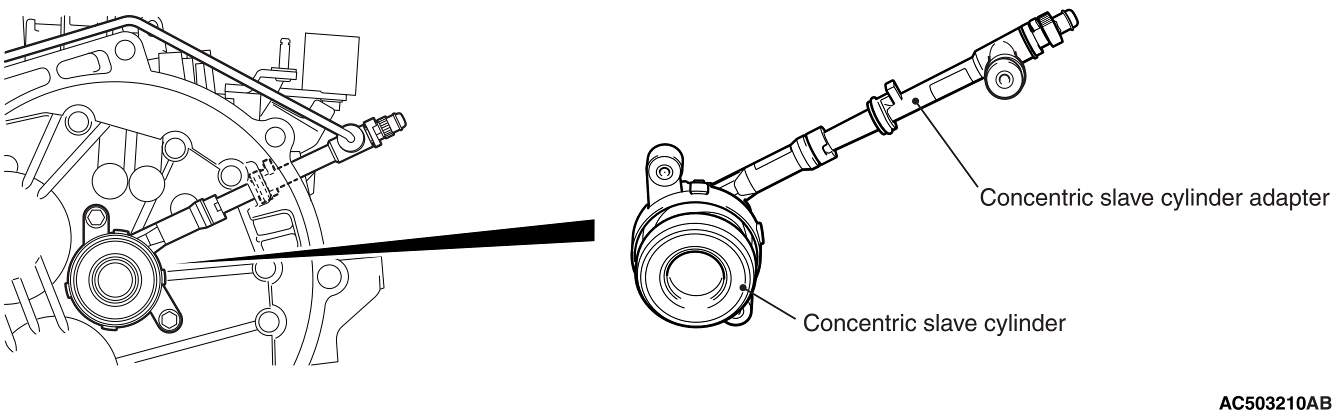
CONCENTRIC SLAVE CYLINDER

M2210005000049

To reduce the clutch pedal force, the clutch control method is by hydraulic pressure only.



NOTES

GROUP 32

POWER PLANT MOUNT

CONTENTS

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ WARNING

- ***Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).***
- ***Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.***
- ***MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.***

NOTE
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, driver’s and passenger’s (front) air bag modules, knee air bag module, side-airbag module, curtain air bag module, side impact sensors, seat belt pre-tensioners, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

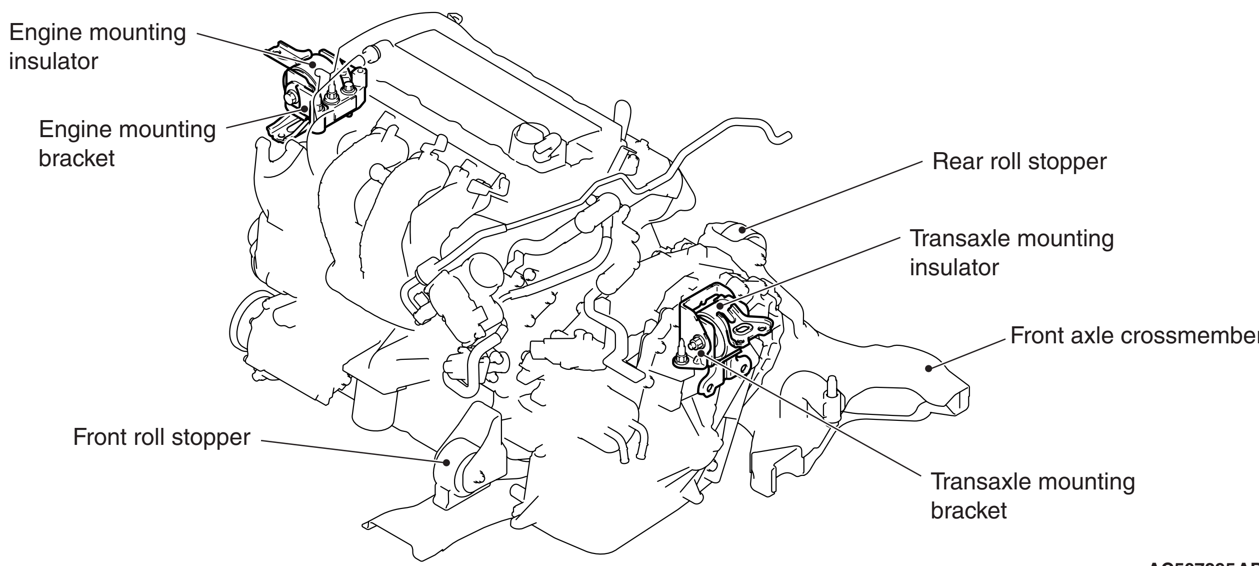
GENERAL INFORMATION

M1321000101075

To support the power plant, the inertial axis four-point mount system has been adopted. The system has the following features:

- For the engine and transaxle mounting insulator, the cylindrical liquid seal mount has been adopted. It reduces the idling vibration and acceleration noise, and improves riding comfort.
- For the engine mounting bracket, lightweight and high rigidity aluminum has been adopted to reduce acceleration noise.
- For the transaxle mounting bracket, lightweight and high rigidity sheet metal has been adopted to reduce the gear noise.
- For the front and rear roll stopper, insulators developed for CVT have been adopted. It reduces the idling vibration and acceleration/deceleration shock.
- A front axle crossmember has been adopted to improve steering ability.

CONSTRUCTION DIAGRAM



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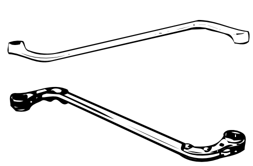
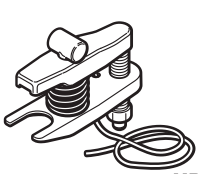
SPECIAL TOOLS

M1321000600828

Tool	Tool number and name	Supersession	Application
 MB990900	MB990900 or MB991164 Door adjusting wrench	MB990900-01	Removal and installation of transaxle mounting insulator
 MB991897	MB991897 or MB992011 Ball joint remover	MB991113-01, MB990635-01 or General service tool	Knuckle and tie rod end ball joint disconnection *NOTE: Conventional steering linkage puller, MB991406, MB990635 or MB991113 can also be used*

ENGINE MOUNTING

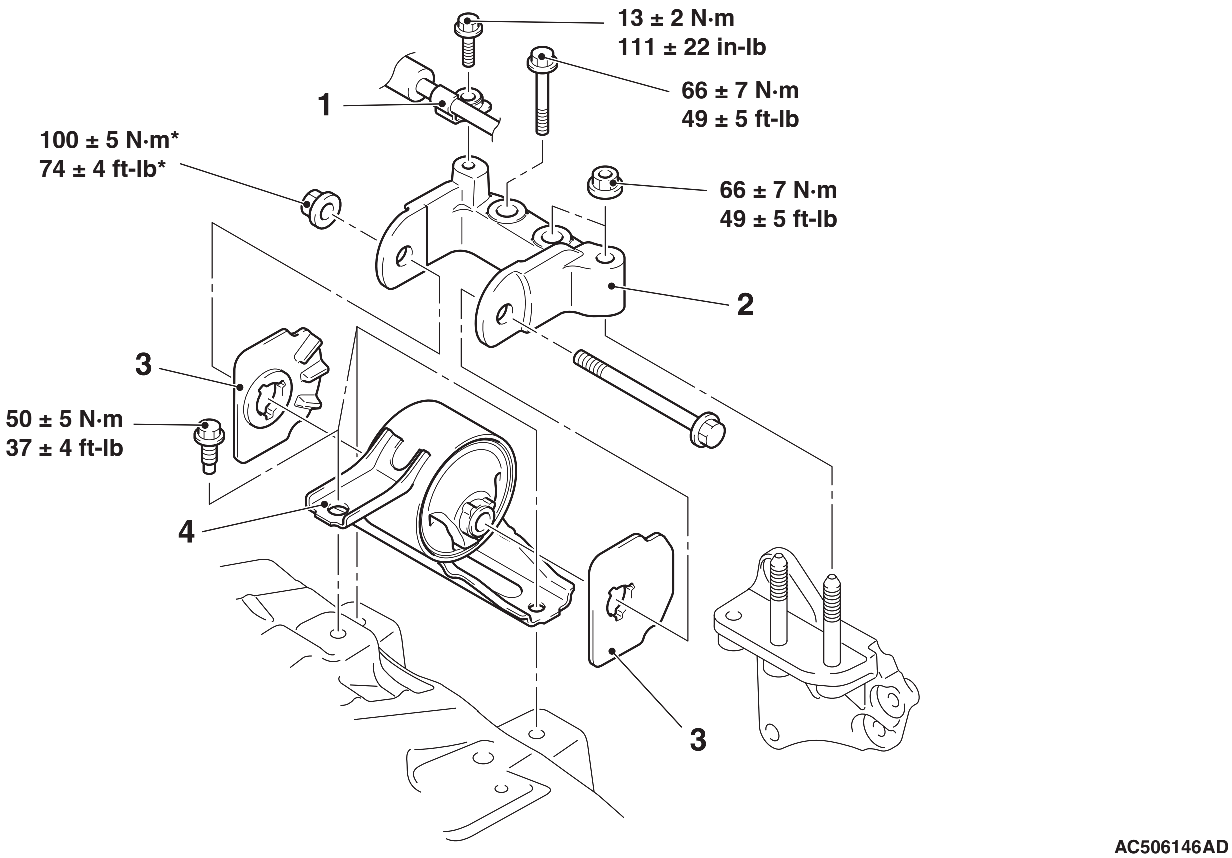
REMOVAL AND INSTALLATION

M1321001101584

⚠ CAUTION

The part indicated * mark should be temporarily tightened and then should be fully tightened with the engine weight applied on the vehicle body.

Pre-removal Operation	Post-installation Operation
• Radiator Condenser Tank Removal (Refer to GROUP 14 – Radiator P.14-26). • Power Steering Oil Pump Removal (Refer to GROUP 11A –Engine Assembly P.11A-74). • Raise the Engine and Transaxle Assembly to the Position Where the Weight is not Applied to the Insulator.	• Power Steering Oil Pump Installation (Refer to GROUP 11A –Engine Assembly P.11A-74). • Radiator Condenser Tank Installation (Refer to GROUP 14 –Radiator P.14-26).

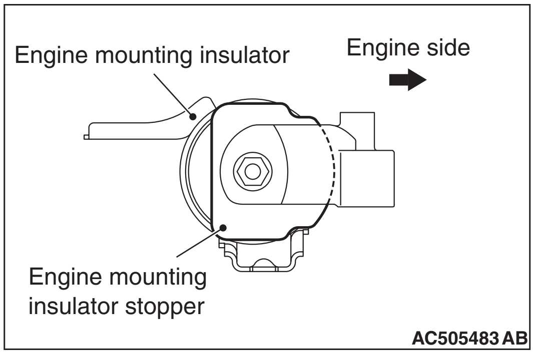


Removal steps

1. Power steering pressure hose clamp
2. Engine mounting bracket

Removal steps (Continued)

>>**A**<< 3. Engine mounting insulator stopper
4. Engine mounting insulator



INSTALLATION SERVICE POINT

>>A<< ENGINE MOUNTING INSULATOR STOPPER INSTALLATION

Install the engine mounting insulator stopper as shown in the figure.

TRANSAXLE MOUNTING

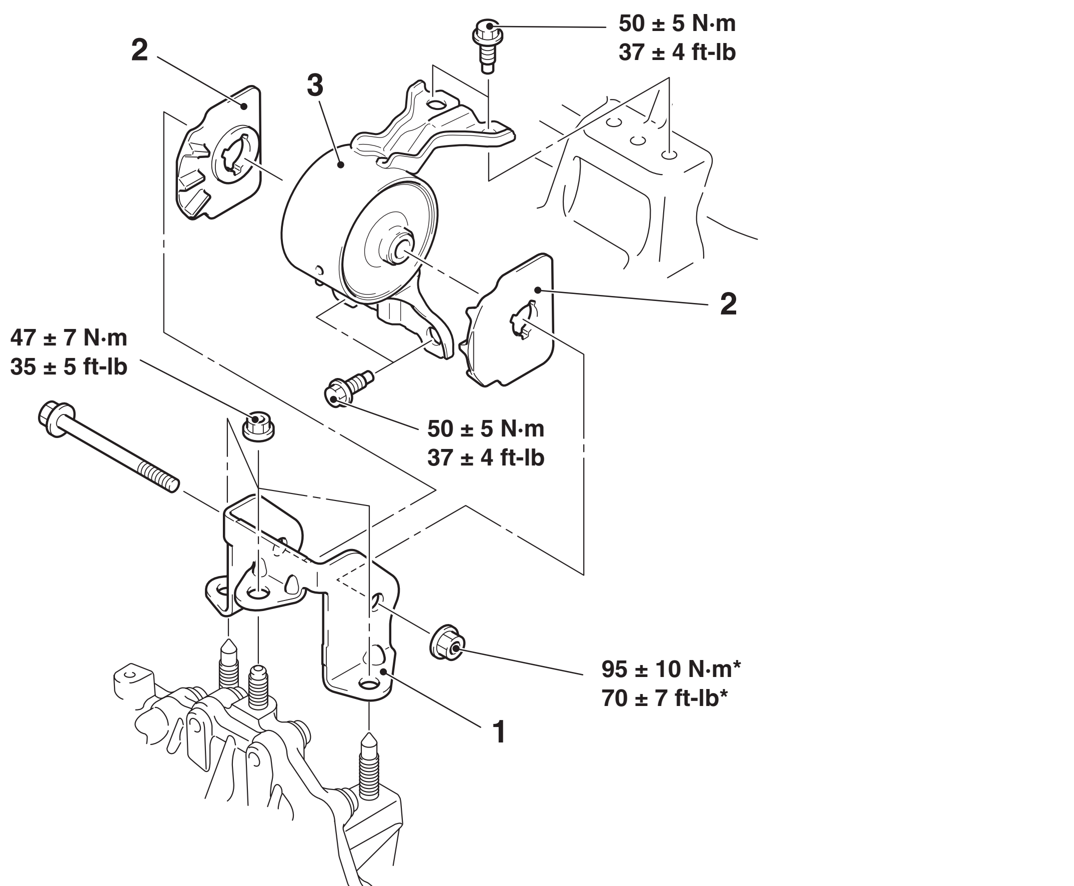
REMOVAL AND INSTALLATION

M1321001401314

⚠ CAUTION

The part indicated * mark should be temporarily tightened and then should be fully tightened with the engine weight applied on the vehicle body.

Pre-removal operation	Post-installation operation
• Battery and Battery Tray Removal (Refer to GROUP 54A – Battery P.54A-8). • Air Cleaner Assembly Removal (Refer to GROUP 15 –Air Cleaner P.15-4). • Engine Control Module (ECM) Removal (Refer to GROUP 13A –Engine Control Module (ECM) P.13A-952). • Raise the Engine and Transmission Assembly to the Position Where the Weight is not Applied to the Insulator.	• Engine Control Module (ECM) Installation (Refer to GROUP 13A –Engine Control Module (ECM) P.13A-952). • Air Cleaner Assembly Installation (Refer to GROUP 15 –Air Cleaner P.15-4). • Battery and Battery Tray Installation (Refer to GROUP 54A –Battery P.54A-8).



Removal steps

		1.	Transaxle mounting bracket
	>>**B**<<	2.	Transaxle mounting insulator stopper
<<**A**>>	>>**A**<<	3.	Transaxle mounting insulator

Required Special Tool:

- MB990900 or MB991164: Door Adjusting Wrench

REMOVAL SERVICE POINT

<<A>> TRANSAXLE MOUNTING INSULATOR REMOVAL

To remove the mounting bolt on the lower side of the transaxle mounting insulator, use the special tool MB990900 or MB991164.

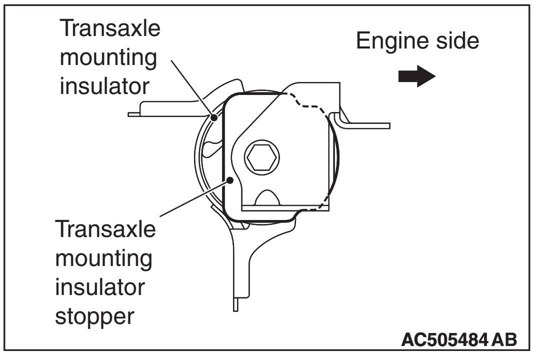
INSTALLATION SERVICE POINTS

>>A<< TRANSAXLE MOUNTING INSULATOR INSTALLATION

To install the mounting bolt on the lower side of the transaxle mounting insulator, use the special tool MB990900 or MB991164.

Tightening torque: 50 ± 5 N· m (37 ± 4 ft-lb)

>>B<< TRANSAXLE MOUNTING INSULATOR STOPPER INSTALLATION



Install the transaxle mounting insulator stopper as shown in the figure.

ENGINE ROLL STOPPER AND CENTERMEMBER

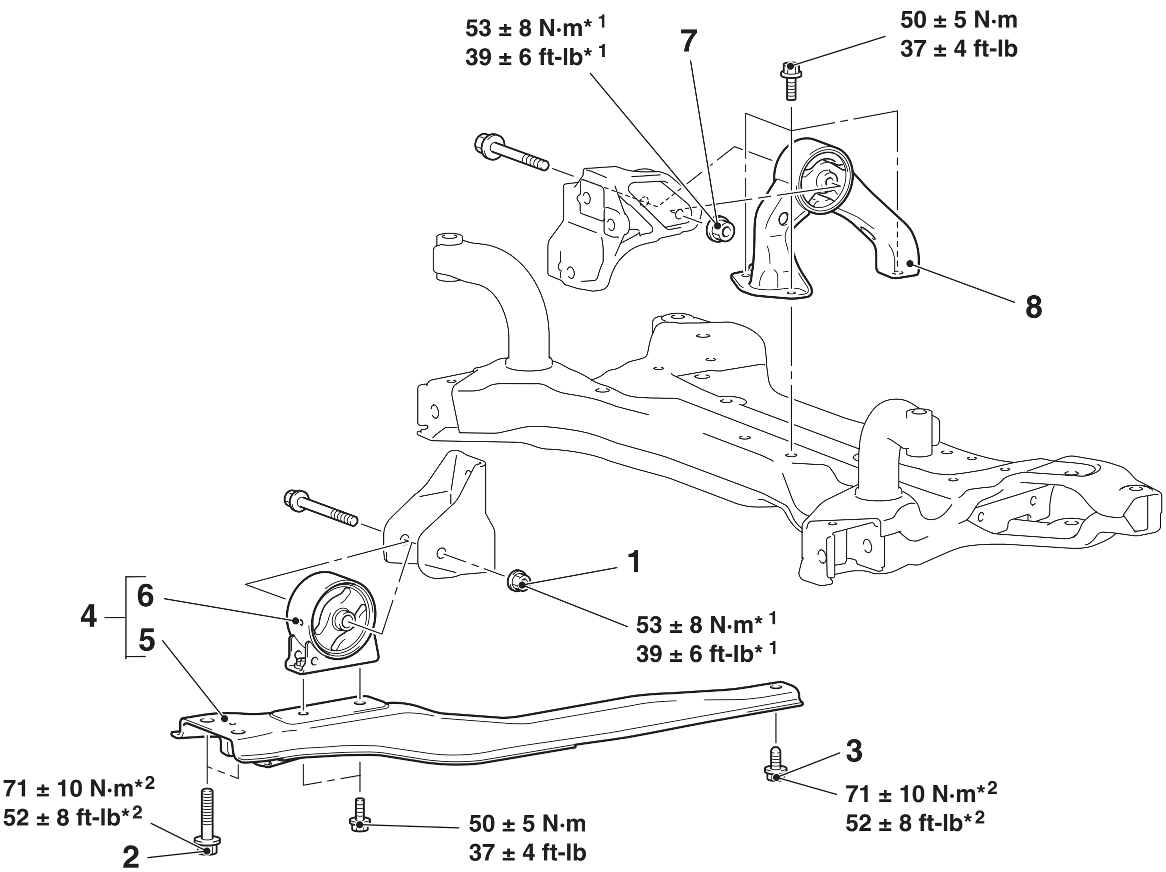
REMOVAL AND INSTALLATION

M1321002300726

⚠ CAUTION

- **The part indicated by the *1 mark should be temporarily tightened, and then fully tightened with the engine and transaxle assembly weight applied on the vehicle body.**
- **The parts indicated by the *2 are the bolts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal and post-installation operation
- Engine Room Under Cover Front Removal and Installation (Refer to GROUP 51 –Under Cover P.51-16).



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Front roll stopper and centermember removal steps

1. Flange nut
2. Centermember and body connection
3. Centermember and front axle crossmember connection
4. Centermember and front roll stopper assembly

Front roll stopper and centermember removal steps

5. Centermember
6. >>**A**<< Front roll stopper

Rear roll stopper removal steps

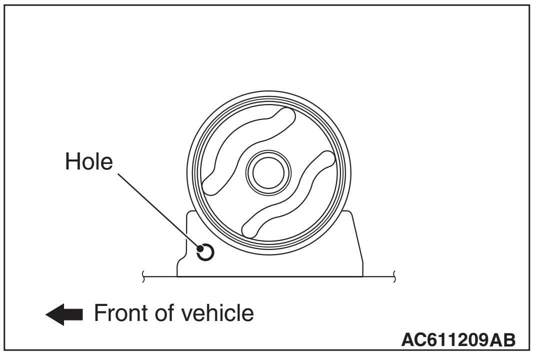
- Backbone Brace (Refer to GROUP 15 - Exhaust Pipe and Main Muffler P.15-12).

7. Flange nut
8. Rear roll stopper

INSTALLATION SERVICE POINT

>>A<< FRONT ROLL STOPPER INSTALLATION

Install the front roll stopper so that the hole faces toward the vehicle front.



CROSSMEMBER

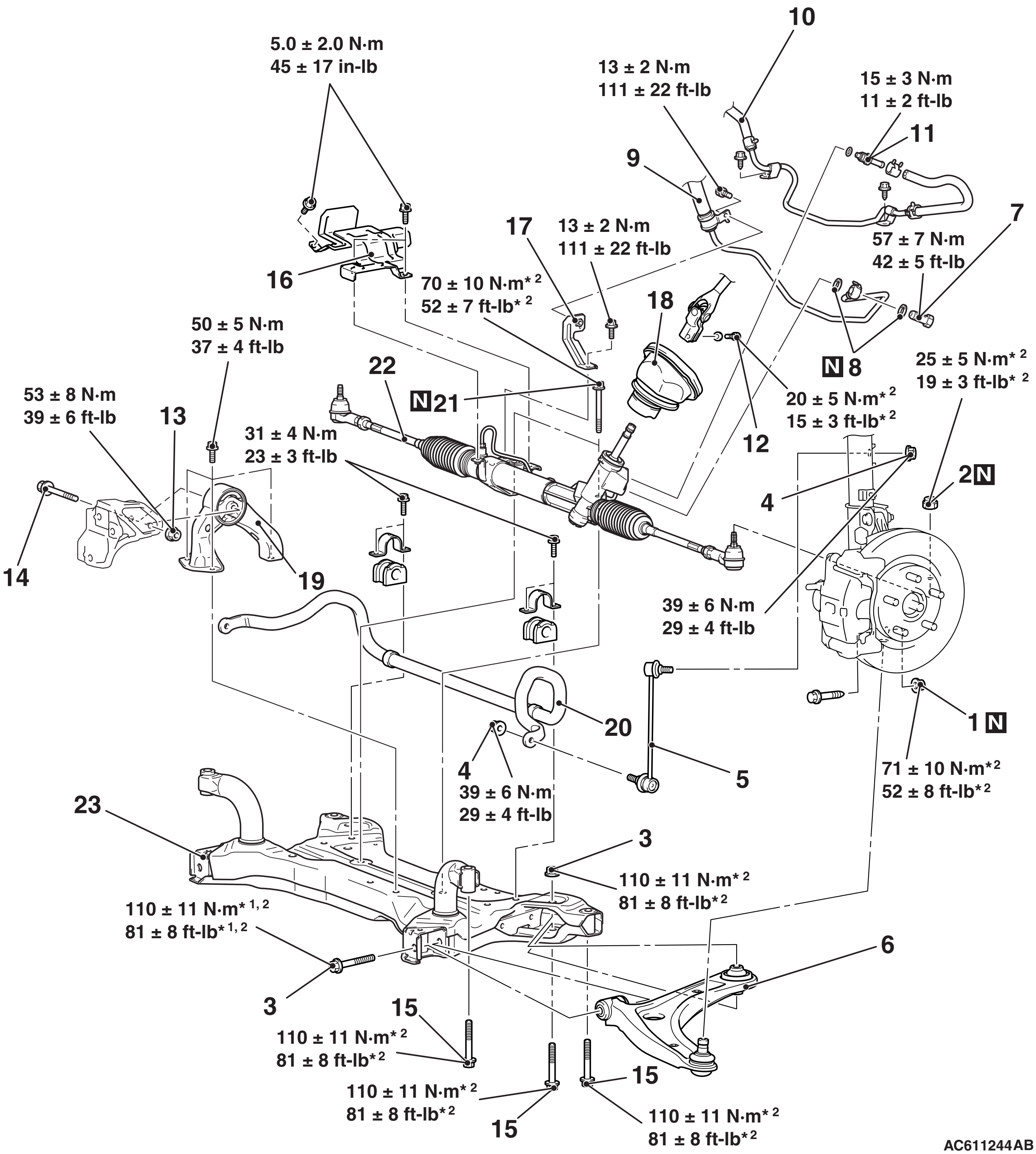
REMOVAL AND INSTALLATION

M1321003200982

⚠ CAUTION

- **Before removing the steering wheel and air bag module assembly, always refer to GROUP 52B – Service Precautions and Driver's, Front Passenger's Air Bag Module and Clock Spring (P.52B-367). Also, set the front wheels so that they are facing straight forward, and remove the ignition key. If you fail to do this, the SRS clock spring will be damaged, causing the SRS air bag to be inoperative resulting in serious injury.**
- **The part indicated by *1 should be temporarily tightened, and then fully tightened with the vehicle standing on the earth and the curb weight condition.**
- **The parts indicated by *2 are the bolts/nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal operation	Post-installation operation
• Steering Wheel and Air Bag Module Assembly Removal (Refer to GROUP 37 –Steering Wheel P.37-21). • Centremember Removal (Refer to P.32-7). • Power Steering Fluid Draining (Refer to GROUP 37 – On-vehicle Service, Power Steering Fluid Replacement P.37-17).	• Centremember Removal (Refer to P.32-7). • Clock Spring Centring (Refer to GROUP 52B –Driver's, Front Passenger's Air Bag Modules and Clock Spring P.52B-367). • Steering Wheel and Air Bag Module Assembly Installation (Refer to GROUP 37 –Steering Wheel P.37-21). • Power Steering Fluid Air Bleeding (Refer to GROUP 37 – On-vehicle Service, Power Steering System Air Bleeding P.37-17). • Using Your Fingers, Press The Ball Joint Dust Cover To Check for A Crack or Samage. • Steering Wheel Straight-ahead Position Check • Front Wheel Alignment Check and Adjustment (Refer to GROUP 33 –On-vehicle Service –Front Wheel Alignment Check and Adjustment P.33-8).



Removal steps

1. Self-lock nut (Lower arm and knuckle connection)

<<A>> 2. Self-lock nut (Tie-rod end and knuckle connection)

3. Lower arm and crossmember mounting bolts and nuts
4. Stabilizer link mounting nuts
5. Stabilizer link assembly
6. Lower arm assembly
7. Eye bolt
8. Gasket

Removal steps (Continued)

9. Pressure hose connection
10. Return hose connection
11. Return tube assembly
- Footrest joint cover removal
12. Steering gear and joint connecting bolt
13. Flanged nut
14. Rear roll stopper centre bolt
15. Front axle crossmember and body connection

<<B>> • Front axle crossmember assembly

Removal steps (Continued)

16. Heat protector
17. Power steering oil line bracket

>>**A**<< 18. Joint cover grommet

19. Rear roll stopper
20. Stabilizer bar
21. Steering gear and linkage mounting bolt

Removal steps (Continued)

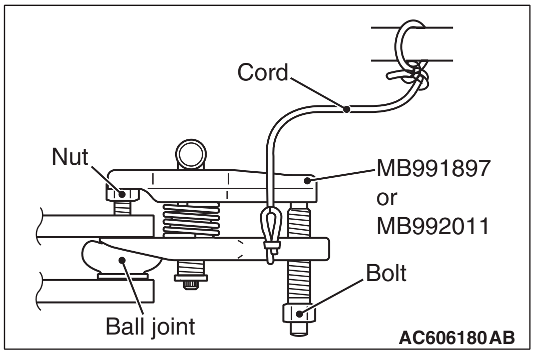
22. Steering gear and linkage
23. Front axle crossmember

Required Special Tool:

- MB991897 or MB992011: Ball Joint Remover

REMOVAL SERVICE POINTS

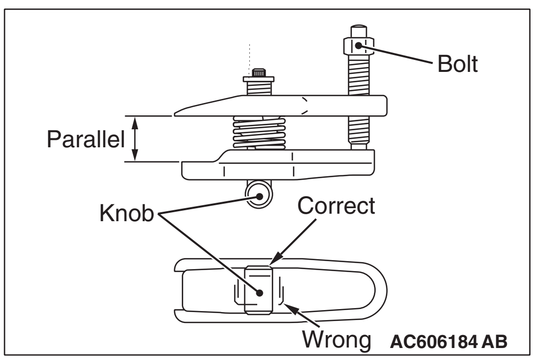
<<A>> TIE-ROD END AND KNUCKLE DISCONNECTION



⚠ CAUTION

- **Do not remove the nut from the ball joint, but only loosen it, and use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a cord.**

1. Install special tool MB991897or MB992011 as shown in the figure.

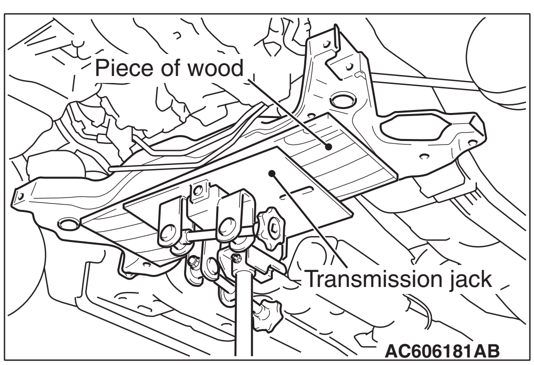


2. Turn the bolt and knob to make the special tool jaws parallel, then hand-tighten the bolt. After tightening, check that the jaws are still parallel.

   NOTE: To adjust the special tool jaws to be parallel, set the knob as shown in the figure so that it functions as a fulcrum of the jaws.

3. Turn the bolt and disconnect the tie-rod end from the steering knuckle.

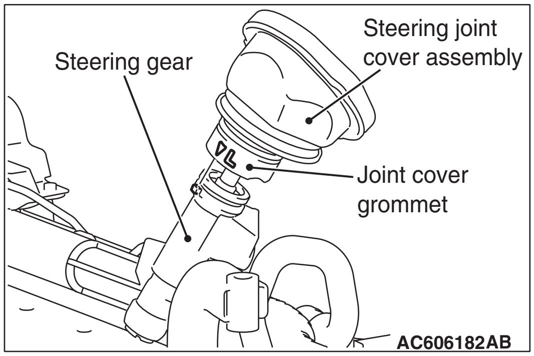
<<B>> FRONT AXLE CROSSMEMBER ASSEMBLY REMOVAL



1. Jack up and support the font axle crossmember, remove the front axle crossmember mounting bolt.
2. Check the hoses and harnesses for roughness, and then remove the front axle crossmember assembly with the rear roll stopper and the steering gear and linkage installed.

INSTALLATION SERVICE POINT

>>A<< JOINT COVER GROMMET INSTALLATION



Install the joint cover grommet to the steering gear and linkage by aligning the mating marks as shown in the figure.

GROUP 22

MANUAL TRANSAXLE

CONTENTS

MANUAL TRANSAXLE

MANUAL TRANSAXLE

GENERAL INFORMATION

M2220000100729

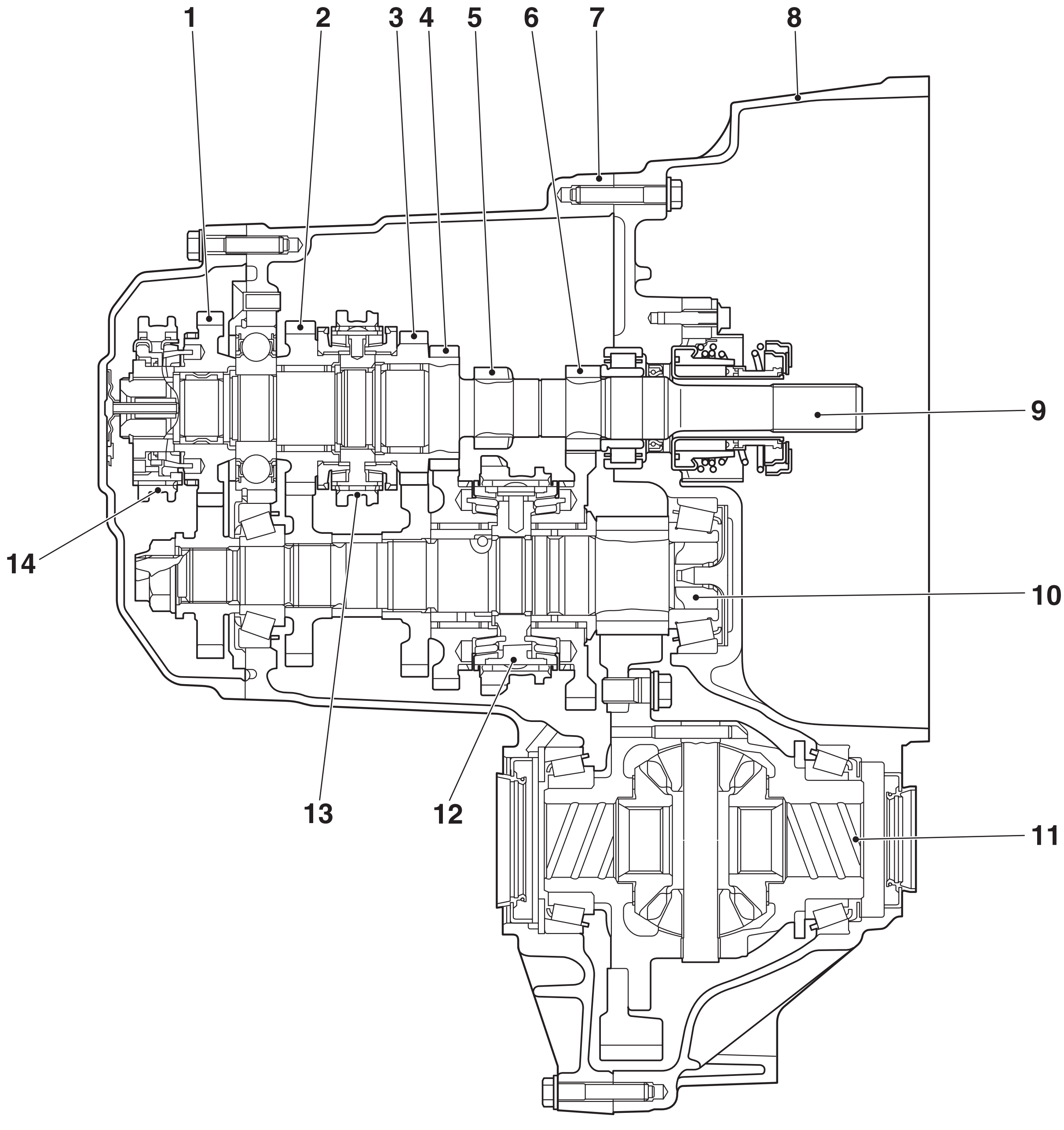
F5MBB type has been adopted.

SPECIFICATIONS

Item		Specification
Transmission model		F5MBB
Transmission type		5-speed forward, 1-speed reverse constant mesh
Gear ratio	1st	3.538
	2nd	1.913
	3rd	1.333
	4th	1.028
	5th	0.820
	Reverse	3.583
Final gear ratio		4.235

SECTIONAL VIEW

M2220000500136



1. 5th speed gear
2. 4th speed gear
3. 3rd speed gear
4. 2nd speed gear
5. Reverse speed gear
6. 1st speed gear
7. Transaxle case
8. Clutch housing
9. Input shaft
10. Output shaft
11. Front differential
12. 1st –2nd speed synchronizer hub
13. 3rd –4th speed synchronizer hub
14. 5th speed synchronizer hub

TRANSAXLE CONTROL

GENERAL INFORMATION

M2222000100286

For the transaxle control, a cable-type remote control gear shift has been adopted, and each section has the following features.

Shift lever assembly

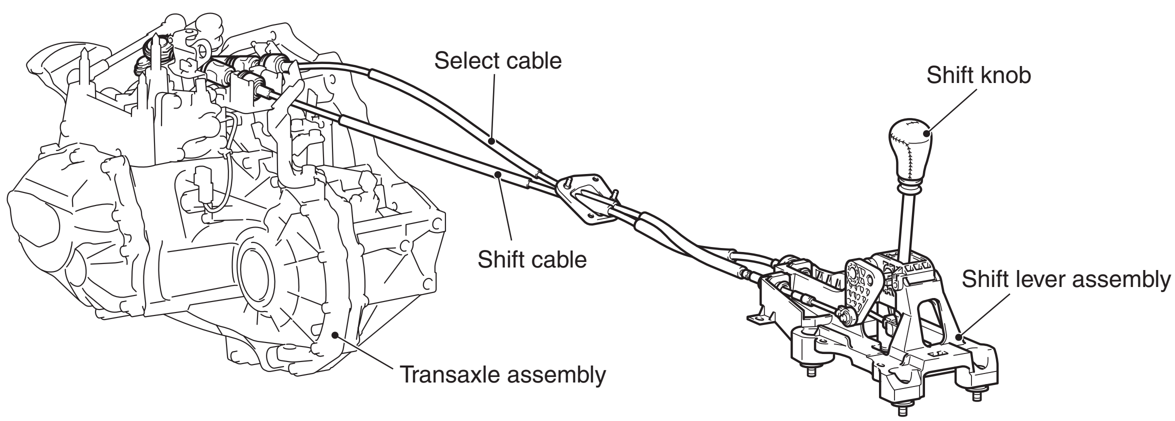
- A spherical rotary shaft fulcrum type has been adopted to assure a non-rickety, smooth shift feeling.
- A resin base bracket has been adopted to reduce weight.

Shift cable

- A cable end that can be installed by one-touch has been adopted to the transaxle side and the shift lever side to improve assembling workability.
- For the transaxle side of the shift cable and the select cable, mounting sockets that have elastic solid inside have been adopted to minimize the binding touch or tight spots.

Shift knob

- A mass-filled shift knob has been adopted to minimize the binding touch or tight spots at the time of a shift.



AC609226AB

GROUP 23B

CONTINUOUSLY VARIABLE TRANSAXLE OVERHAUL

CONTENTS

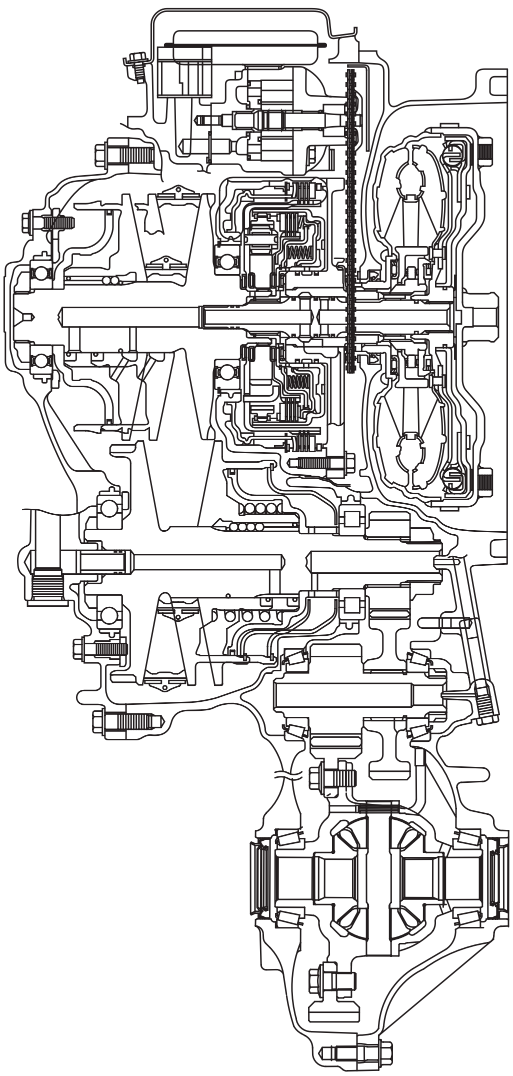
GENERAL INFORMATION

M1233201400014

AUTOMATIC TRANSAXLE MODEL

Transaxle model	Applicable engine	Vehicle model
F1CJA-2-BBZ	4B11 MIVEC	CY4A

SECTIONAL VIEW



AK603120

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1233205000115

Item	Specifications N· m
Detent spring	6.9 (61 in-lb)
Plug	7.5 (66 in-lb)
Clip	6.9 (61 in-lb)
Oil pump	19 (14 ft-lb)
Oil pump	28 (21 ft-lb)
Control valve assembly	7.9 (70 in-lb)
Manual lever	22.1 (16 ft-lb)
Bracket	7.9 (70 in-lb)
Oil strainer	7.9 (70 in-lb)
Oil pan	7.9 (70 in-lb)
Drain plug	34.3 (25 ft-lb)
Baffle plate	5.9 (52 in-lb)
Bracket	26 (19 ft-lb)
Baffle plate	26 (19 ft-lb)
Oil pump cover	26 (19 ft-lb)
Converter housing	45 (33 ft-lb)
Shift lever	17.2 (13 ft-lb)
Inhibitor switch	5.5 (49 in-lb)
Primary pulley speed sensor	5.9 (52 in-lb)
Secondary pulley speed sensor	5.9 (52 in-lb)
CVT fluid cooler	4.2 (37 in-lb)
Plug	7.5 (66 in-lb)
Oil filter tube	11 ± 1 (97 ± 9 in-lb)
Control cable bracket	23 ± 3 (17 ± 2 ft-lb)
Harness bracket	23 ± 3 (17 ± 2 ft-lb)
FR roll stopper bracket	90 ± 10 (66 ± 7 ft-lb)
RR roll stopper bracket	90 ± 10 (66 ± 7 ft-lb)
Reduction gear nut	250 (184 ft-lb)
Final gear	154 (114 ft-lb)

GENERAL SPECIFICATION

M1233201000191

Transaxle model		F1CJA
Torque converter	type	3-element· 1-stage· 2-phase
	lockup	available
Transaxle type		forward: continuously variable (with steel belt), reverse: 1 gear
Gear ratio		2.349 –0.394
Reverse		1.750
Final reduction ratio		6.120

SERVICE SPECIFICATIONS

M1233202000149

Item		Standard value mm
Reverse brake clearance		1.2 –1.5
Total end play		0.25 –0.55
Differential preload		0.17 –0.29
Reduction gear preload		0.13 –0.19
Oil pump drive sprocket to converter housing clearance		0.10 –0.23
Mounting bore diameter of reduction gear bearing outer race	converter housing side	ϕ61.949 –61.979
	transaxle case side	
Mounting bore diameter of differential side bearing outer race	converter housing side	ϕ84.941 –84.976
	transaxle case side	ϕ67.949 –67.979
Mounting bore diameter of reduction gear bearing inner race	converter housing side	ϕ30.008 –30.029
	transaxle case side	
Mounting bore diameter of differential side bearing inner race	converter housing side	ϕ60.032 –60.078
	transaxle case side	ϕ40.026 –40.051

SNAP RING, SPACER AND THRUST WASHER FOR ADJUSTMENT

M1233204000145

Snap rings (for adjustment of reverse brake)

Thickness mm	Identification	Thickness mm	Identification
2.2	–	2.8	–
2.4	–	3.0	–
2.6	–		

Needle bearings (for adjustment of total end play)

Thickness mm	Identification	Thickness mm	Identification
3.58	–	4.26	–
3.75	–	4.43	–
3.92	–	4.60	–
4.09	–	4.77	–

Adjusting shims (for adjustment of differential preload)

Thickness mm	Identification	Thickness mm	Identification
0.40	–	0.96	–
0.44	–	1.00	–
0.48	–	1.04	–
0.52	–	1.08	–
0.56	–	1.12	–
0.60	–	1.16	–
0.64	–	1.20	–

Thickness mm	Identification	Thickness mm	Identification
0.68	–	1.24	–
0.72	–	1.28	–
0.76	–	1.32	–

Adjusting shims (for adjustment of reduction gear preload)

Thickness mm	Identification	Thickness mm	Identification
0.64	–	1.48	–
0.68	–	1.52	–
0.72	–	1.56	–
0.76	–	1.60	–
0.80	–	1.64	–
0.84	–	1.68	–
0.88	–	1.72	–
0.92	–	1.76	–
0.96	–	1.80	–
1.00	–	1.84	–
1.04	–	1.88	–
1.08	–	1.92	–
1.12	–	1.96	–
1.16	–	2.00	–
1.20	–	2.04	–
1.24	–	2.08	–
1.28	–	2.12	–
1.32	–	2.16	–
1.36	–	2.20	–
1.40	–	2.24	–
1.44	–		

Adjusting shims (for adjustment of oil pump drive sprocket / converter housing clearance)

Thickness mm	Identification	Thickness mm	Identification
0.64	–	0.92	–
0.68	–	0.96	–
0.72	–	1.00	–
0.76	–	1.04	–
0.80	–	1.08	–
0.84	–	1.12	–
0.88	–		

SEALANT(S) AND ADHESIVE(S)

M1233206000099

Item	Specified sealant and adhesive
Transaxle	
Converter housing	Loctite 509

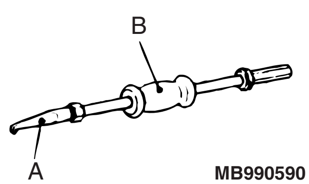
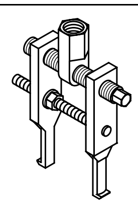
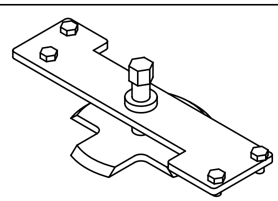
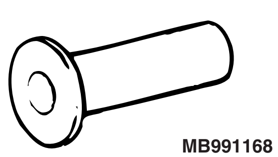
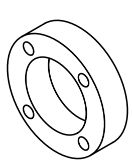
LUBRICANT(S)

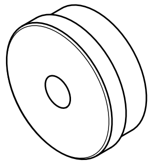
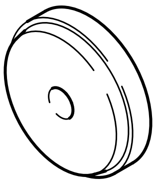
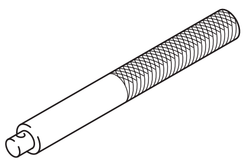
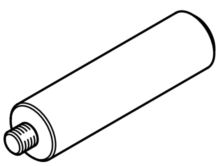
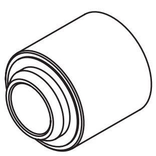
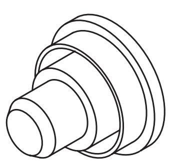
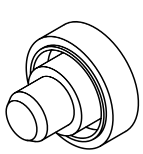
M1233200400033

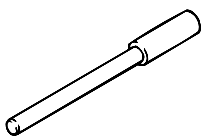
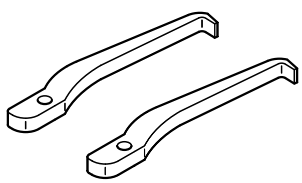
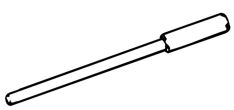
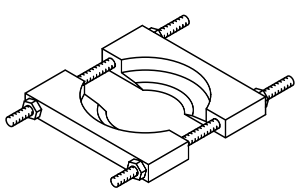
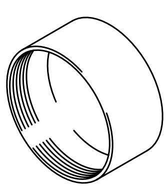
Item	Specified lubricant
Transaxle	
CVT fluid application parts	Diaqueen CVTF-J1
Vaseline application parts	White vaseline (main ingredient: isoparaffinic hydrocarbon)

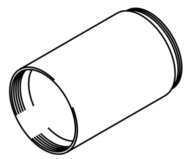
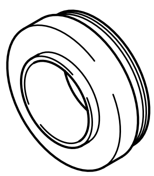
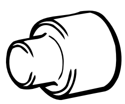
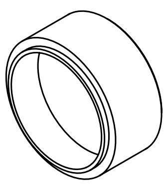
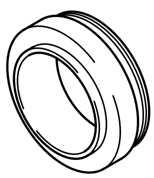
SPECIAL TOOLS

M1233207000155

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990590 Real axle shaft oil seal remover	MB990211-01	Removal of outer race of reduction gear bearing and differential side bearing
	MB992039 Slide hammer puller	MB992039-01	Removal of outer race of reduction gear bearing and differential side bearing
	MB992139 Spring compressor	–	Removal and installation of reverse brake
	MB991168 Differential oil seal installer	MB991168-01	Installation of differential side bearing outer race (converter housing side)
	MB991702 Adapter	–	Installation of differential side bearing outer race (converter housing side)

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990780 Real axle shaft bushing installer	–	Installation of differential side bearing outer race (transaxle case side)
	MB990932 Installer adapter	–	Reduction gear bearing outer race
	MB990938 Installer bar	–	Reduction gear bearing outer race
	MB992075 Handle	–	Installation of oil seal
	MB992141 Oil seal installer	–	Installation of converter housing oil seal
	MB992206 Oil seal installer	–	Installation of converter housing side oil seal
	MB992140 Oil seal installer	–	Installation of side oil seal

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB990810	MB990810 Side bearing puller	–	Removal of reduction gear bearing inner race (converter housing side), removal of differential side bearing inner race (converter housing side), removal of differential side bearing inner race (transaxle case side)
 MB990947	MB990947 Lower arm push arbor	MB990947-01	Removal of reduction gear bearing inner race (converter housing side)
	MD999566 Crow	–	Removal of reduction gear bearing inner race (converter housing side)
	MB990984 Mount bushing lower roll insulator arbor	–	Removal of reduction gear bearing inner race (transaxle case side)
	MD998917 Bearing remover	–	Removal of reduction gear bearing inner race (transaxle case side)
	MD998812 Installer cap	MIT304180-A or General service tool	Installation of reduction gear bearing inner race (converter housing side and transaxle case side), installation of differential side bearing outer race (converter housing side), installation of differential side bearing inner race (converter housing side), installation of reduction pinion gear

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998813 Installer-100	MIT304180-A or General service tool	Installation of reduction gear bearing inner race (converter housing side and Transaxle case side), installation of differential side bearing outer race (converter housing side), installation of differential side bearing inner race (converter housing side), installation of reduction pinion gear
	MD998819 Installer adapter (40)	–	Installation of reduction gear bearing inner race (converter housing side and Transaxle case side), installation of reduction pinion gear
	MB991452 Oil seal installer	–	Removal of differential side bearing inner race (converter housing side)
	MB992138 Bearing Installer	–	Installation of differential side bearing inner race (converter housing side)
	MD998823 Installer adapter (48)	–	Installation of differential side bearing inner race (transaxle case side)

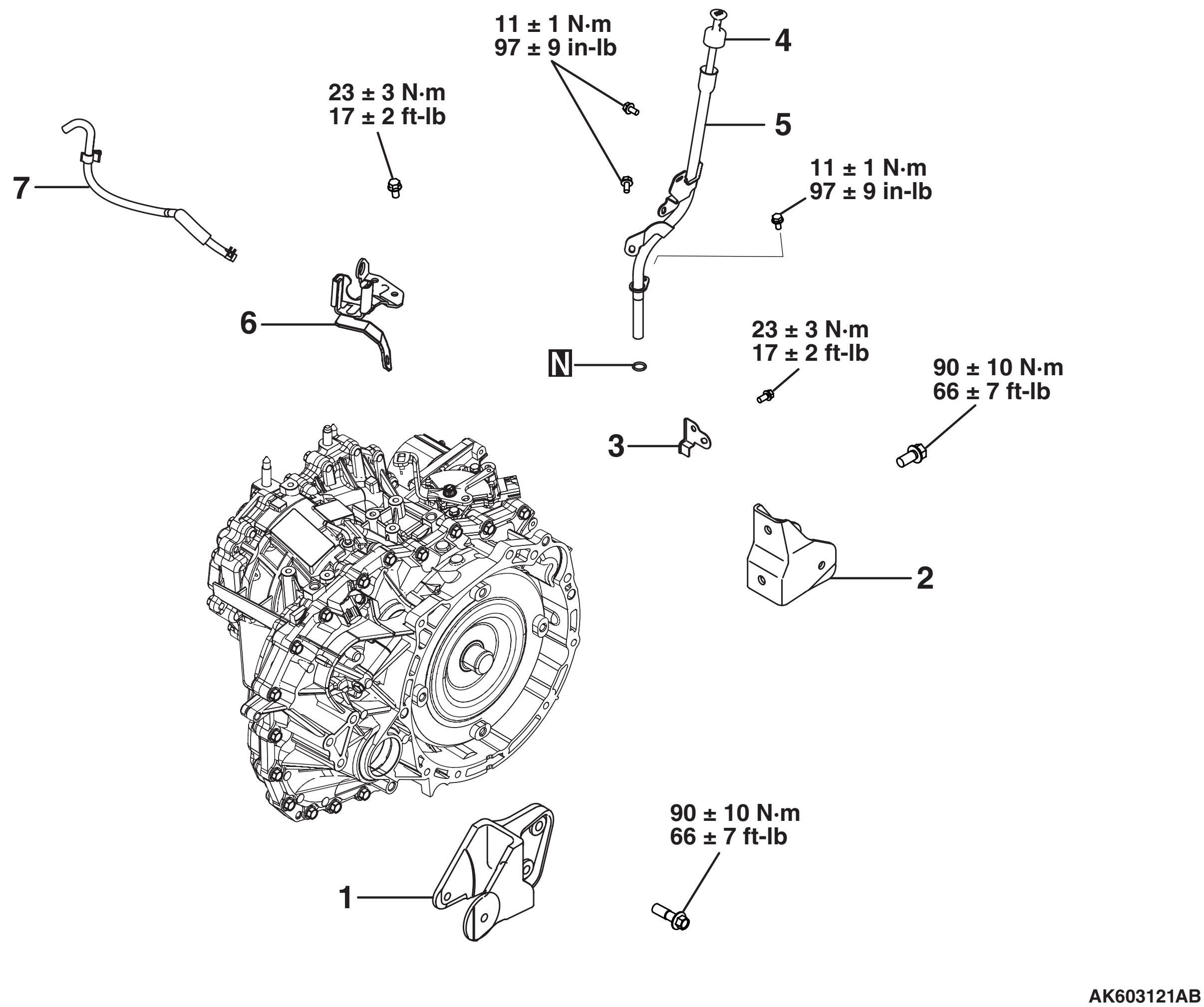
TRANSAXLE

DISASSEMBLY AND ASSEMBLY

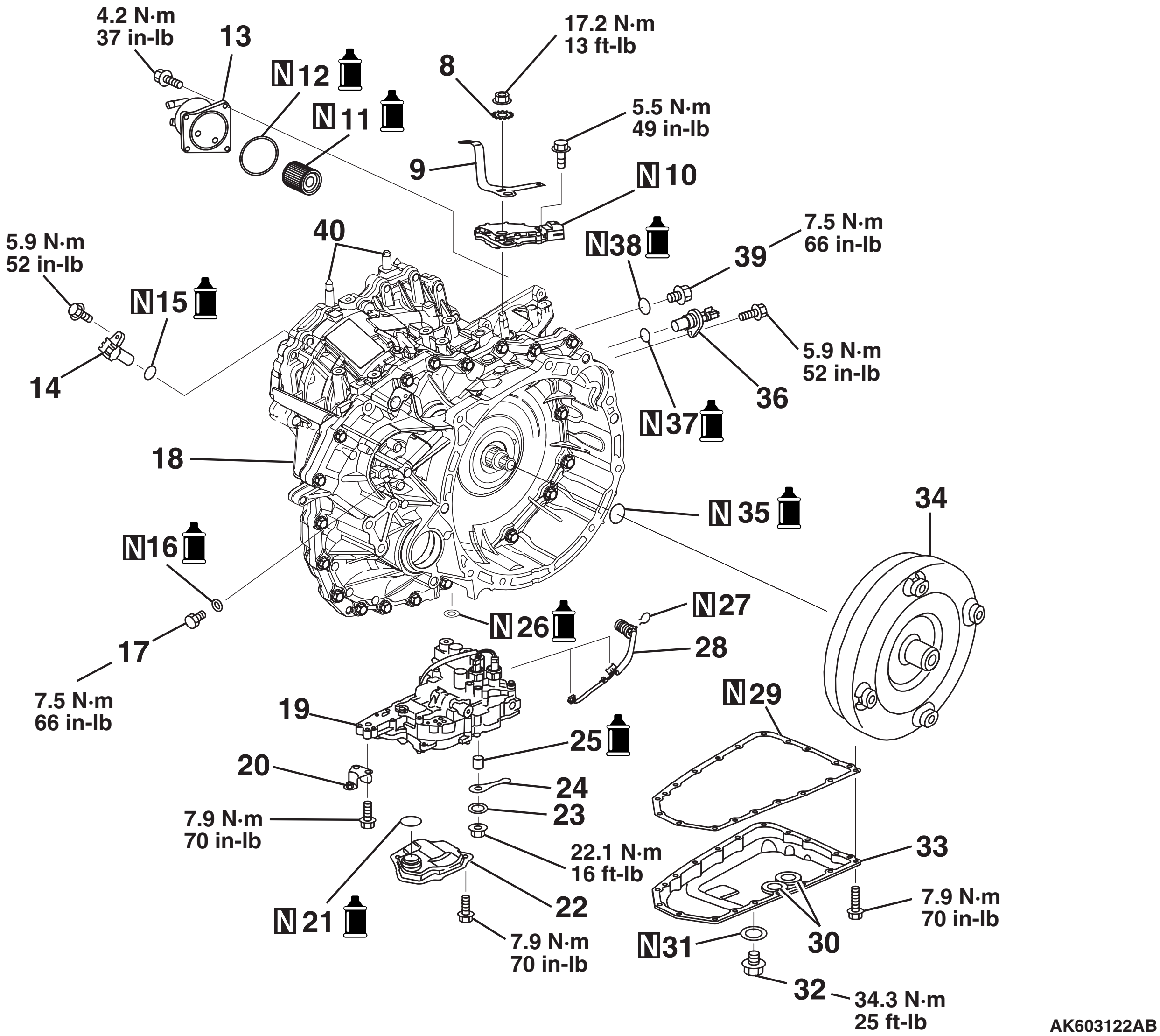
M1233208000192

⚠ CAUTION

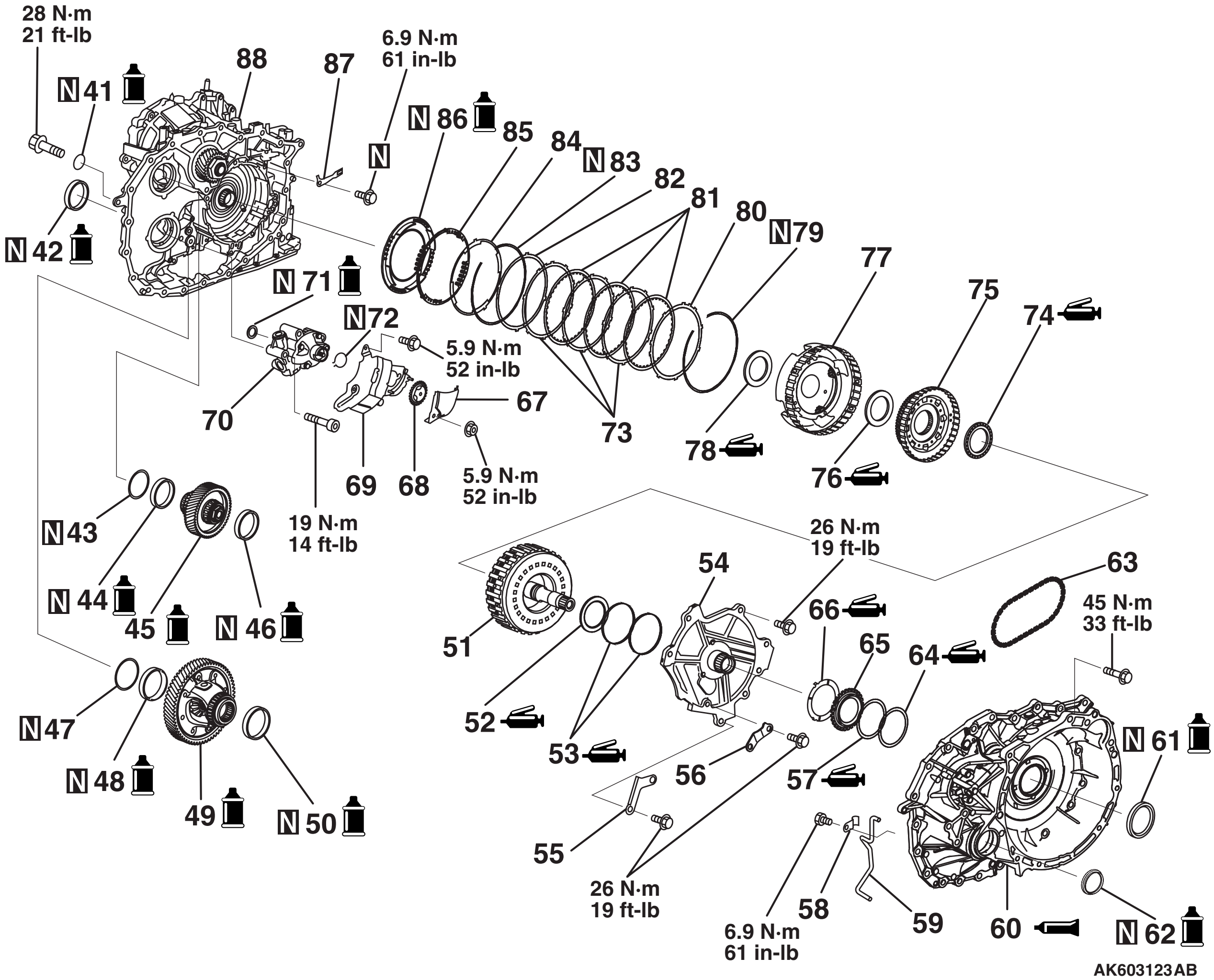
- **Only use CVT fluid of the specified brand. Use of CVT fluid other than specified will impair driveability and CVT endurance, and may lead to breakage of CVT.**
- **Only use the specified vaseline. Use of vaseline other than specified will impair driveability and CVT endurance, and may lead to breakage of CVT.**
- **Disassembly work should be done in a clean dust-proof room.**
- **Prior to disassembly, clean any sand or dirt adhered to the outer parts of transaxle using steam, white gasoline or another solvent, outside the clean room, so as not to contaminate inner parts of transaxle during disassembly or assembly. (Do not allow steam to get inside the transaxle, and do not clean rubber parts with gasoline).**
- **After cleaning, remove the torque converter, and drain the CVT fluid.**
- **Disassembly and assembly work should be done with bare hands or using plastic gloves.**
- **Do not touch inner parts of the transaxle after touching its outer parts. (Wash hands after touching the outer parts).**
- **Do not use cotton gloves and rags to prevent from lint; instead, use paper rags.**
- **Prior to assembly or disassembly work, make sure conditions are appropriate.**
- **Do not re-use the drained CVT fluid.**
- **Refer to "HOW TO USE THIS MANUAL" for the symbols in the schematic.**



1. RR roll stopper bracket
2. FR roll stopper bracket
3. Harness bracket
4. Oil level gage
5. Oil filler tube
6. Control cable bracket
7. Breather hose



8. Washer
9. Shift lever
10. Inhibitor switch
11. CVT fluid filter
12. O-ring
13. CVT fluid cooler
14. Secondary pulley speed sensor
15. O-ring
16. O-ring
17. Plug
18. Transaxle
19. Control valve
20. Bracket
21. O-ring
22. Oil strainer
23. Spring washer
24. Manual lever
25. Bush
26. Lip seal
27. Snap ring
28. Valve body harness
29. Oil pan gasket
30. Magnet
31. Drain plug gasket
32. Drain plug
33. Oil pan
34. Torque converter
35. O-ring
36. Primary pulley speed sensor
37. O-ring
38. O-ring
39. Plug
40. Stud bolt



41. O-ring
42. Side oil shim
43. Adjusting shim
44. Outer race
45. Reduction gear assembly
46. Outer race
47. Adjusting shim
48. Outer race
49. Differential assembly
50. Outer race
51. Forward clutch assembly
52. Needle bearing
53. Seal ring
54. Oil pump cover
55. Baffle plate
56. Bracket
57. Adjusting shim
58. Clip
59. Pipe
60. Converter housing
61. Converter housing oil seal
62. Converter housing side oil seal
63. Oil pump chain
64. Adjusting shim
65. Drive sprocket
66. Thrust washer
67. Baffle plate
68. Driven sprocket
69. Baffle plate
70. Oil pump
71. Lip seal
72. Snap ring
73. Driven plate
74. Needle bearing
75. Sun gear
76. Needle bearing
77. Planet carrier
78. Needle bearing
79. Snap ring
80. Retaining plate
81. Drive plate
82. Dish plate
83. Snap ring
84. Retaining plate
85. Spring retainer assembly
86. Reverse brake piston
87. Detent spring
88. Transaxle

Required Special Tools:

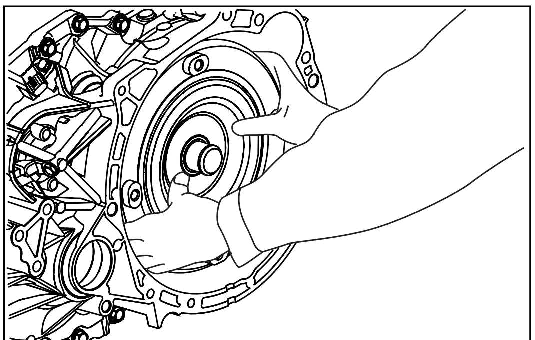
- MB990590: Real axle shaft oil seal remover
- MB992039: Slide hammer puller
- MB992139: Spring compressor
- MB991168: Differential oil seal installer
- MB991702: Adapter
- MB990780: Real axle shaft bushing installer
- MB990932: Installer adapter
- MB990938: Installer bar
- MB992075: Handle
- MB992141: Oil seal installer
- MB992206: Oil seal installer
- MB992140: Oil seal installer

DISASSEMBLY SERVICE POINT

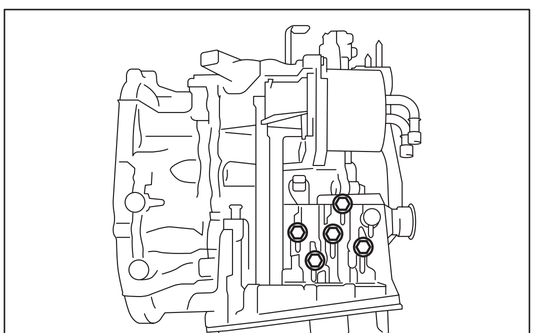
⚠ CAUTION

Do not disassemble parts other than specified in this manual.

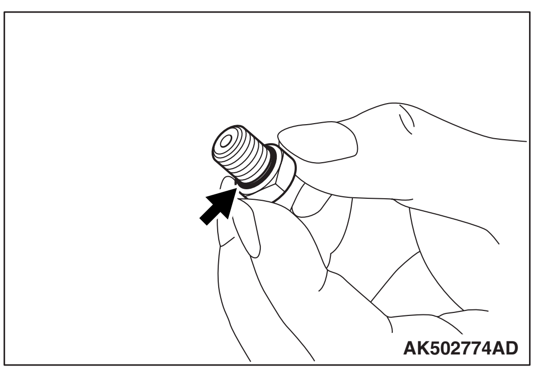
1. Remove the RR roll stopper bracket and FR roll stopper bracket from the transaxle.
2. Remove the harness bracket from the transaxle.
3. Remove the oil filler tube and oil level gage from the transaxle.
4. Remove the control cable bracket and breather hose from the transaxle.


AK603124

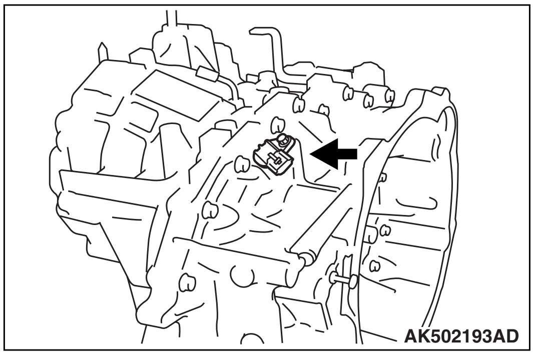
5. Remove the torque converter from the transaxle.


AK502775

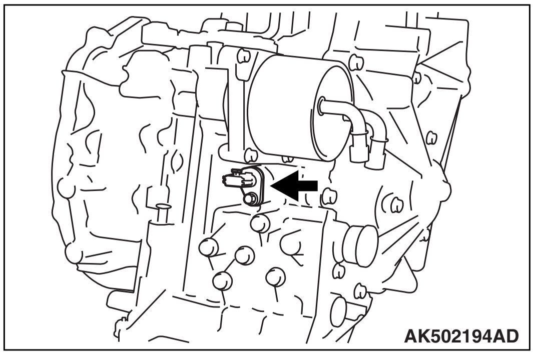
6. Remove the plug from the transaxle case.


AK502774AD

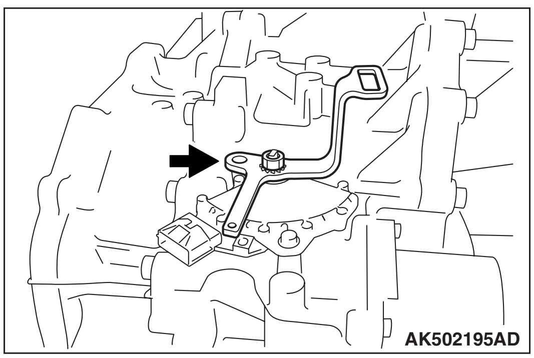
7. Remove the O-ring from the plug.



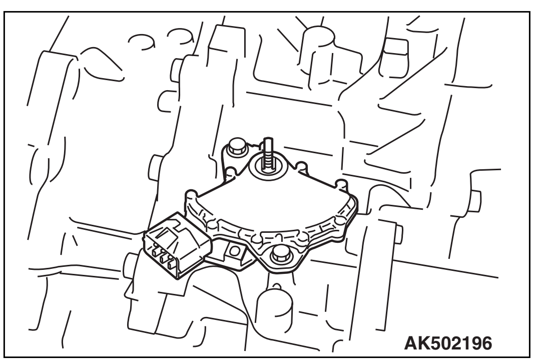
8. Remove the secondary pulley speed sensor from the converter housing, and detach the O-ring from the sensor.



9. Remove the primary pulley speed sensor from the transaxle case, and detach the O-ring from the sensor.



10. Remove the shift lever from the manual shaft.

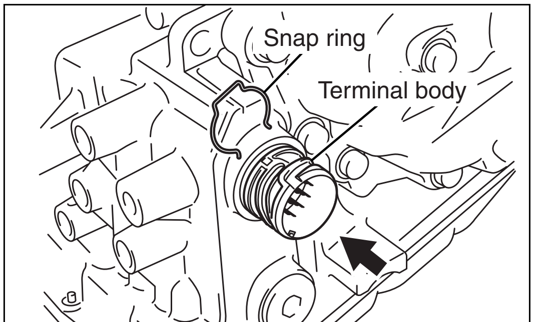


11. Remove the inhibitor switch from the transaxle.

⚠ CAUTION

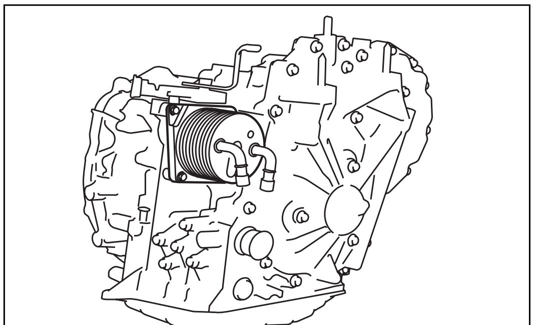
Be careful not to cause damage to the terminal body.

12. Remove the snap ring from the terminal body, and press the terminal body into the transaxle case.



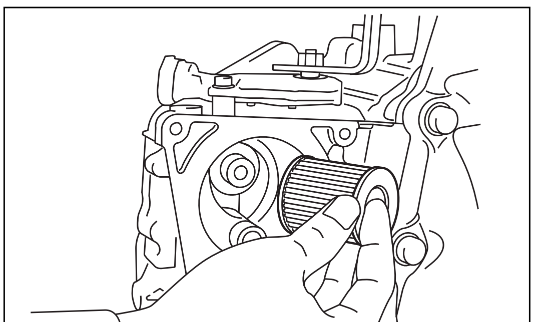
AK502197AF

13. Remove the CVT fluid cooler from the transaxle case, and detach the O-ring from the cooler.



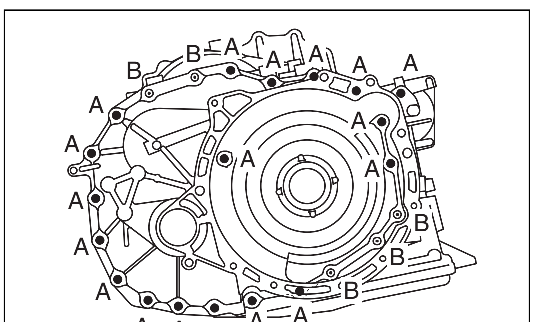
AK502198

14. Remove the CVT fluid cooler filter from the transaxle case.



AK502199

15. Remove the fastening bolts of converter housing.



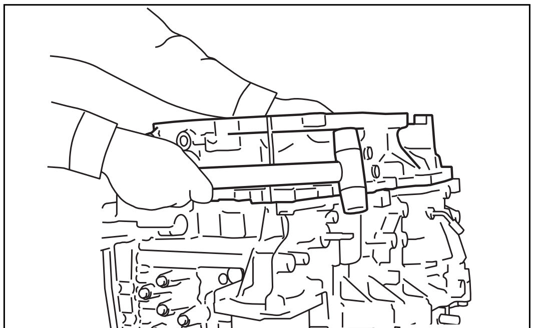
AK502200AD

Bolt symbol	A	B
Bolt length mm	30	35
Quantity	18	5

⚠ CAUTION

Be careful because adjusting shim of the drive sprocket may depart.

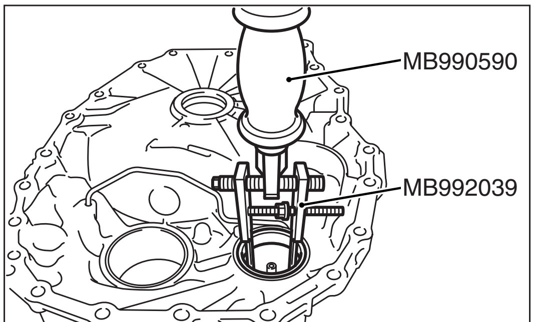
16.Remove the converter housing by tapping with a plastic hammer etc.


AK502201

17.Using the Special Tools MB990590 and MB992039, remove the outer race of reduction gear bearing from the converter housing.

18.Using cylinder gage etc., measure the mounting bore diameter of reduction gear bearing outer race at the converter housing side; if the standard value is not satisfied, then replace the converter housing.

Standard value: ϕ 61.949 – 61.979 mm

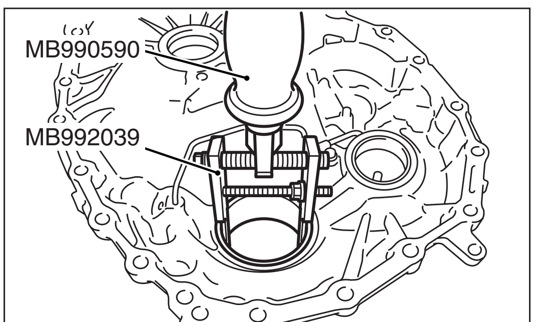


AK502819AD

19.Using the Special Tools MB990590 and MB992039, remove the outer race of differential side bearing from the converter housing.

20.Using cylinder gage etc., measure the mounting bore diameter of differential side bearing outer race at the converter housing side; if the standard value is not satisfied, then replace the converter housing.

Standard value: ϕ 84.941 – 84.976 mm

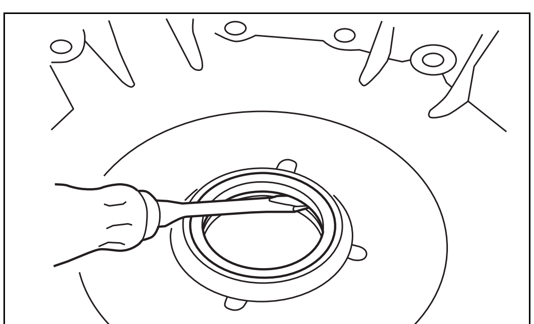


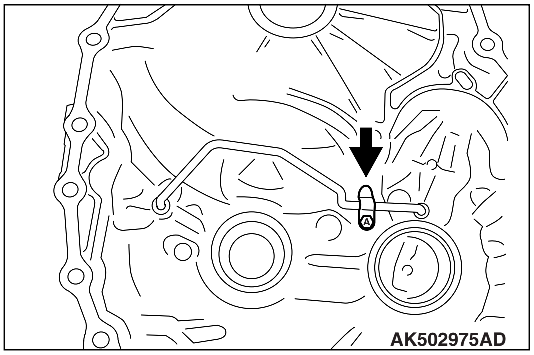
AK502820AD

⚠ CAUTION

When removing the oil seal, be careful not to cause damage to the converter housing.

21.Using a flat blade screwdriver etc., remove the converter housing oil seal from the housing.


AK502204

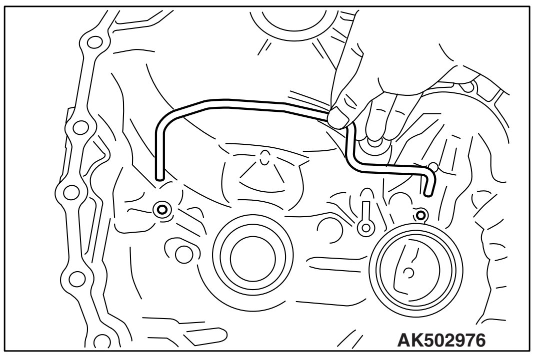


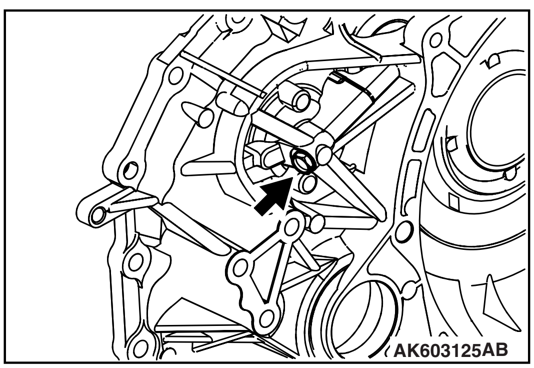
22.Remove the clip.

⚠ CAUTION

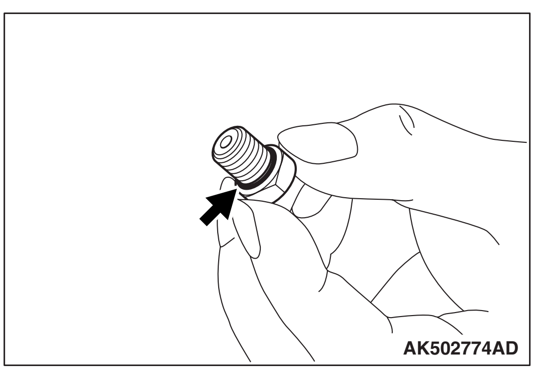
When removing the pipe, be careful not to bend it.

23.Remove the pipe from the converter housing.

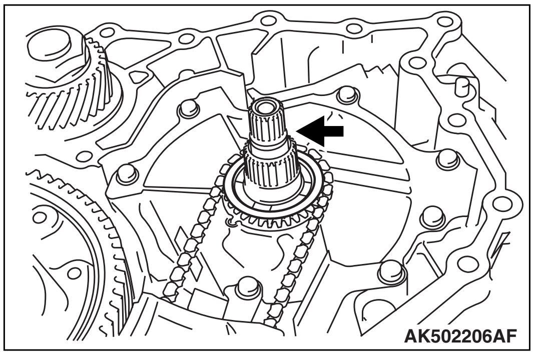




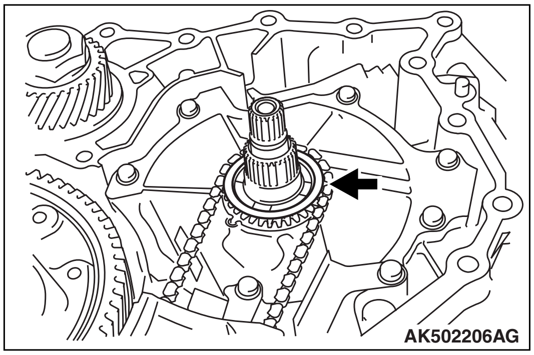
24.Remove the plug from the converter housing.



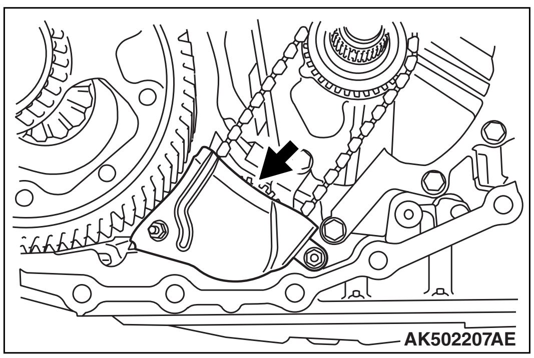
25.Remove the O-ring from the plug.



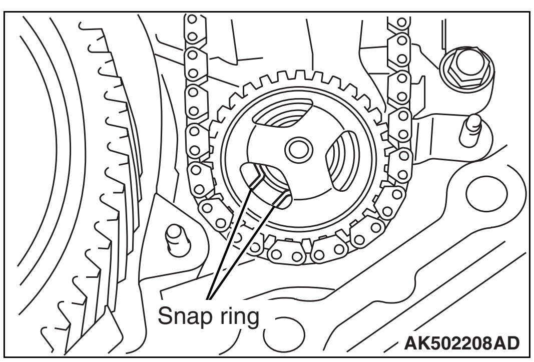
26.Remove the O-ring from the input shaft.



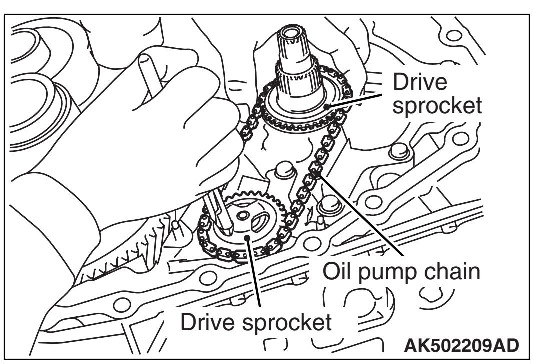
27.Remove the adjusting shim from the drive sprocket.

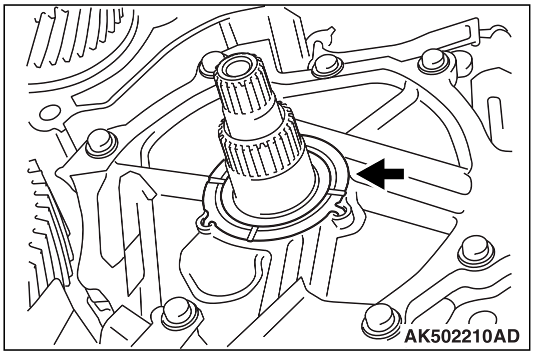


28.Remove the baffle plate.

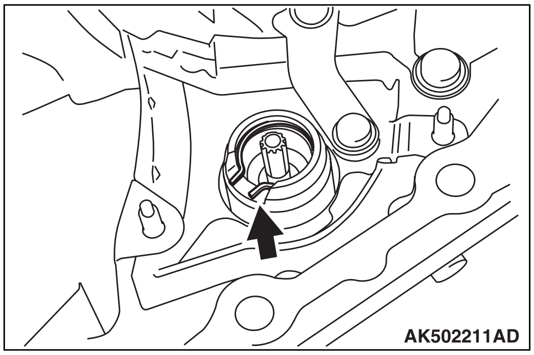


29.Expand the snap ring, and remove the driven sprocket, oil pump chain, and drive sprocket.

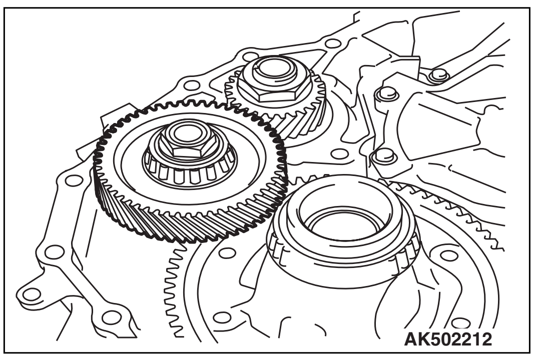




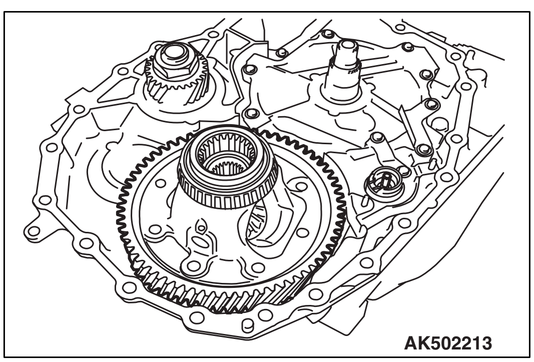
30.Remove the thrust washer from the oil pump cover.



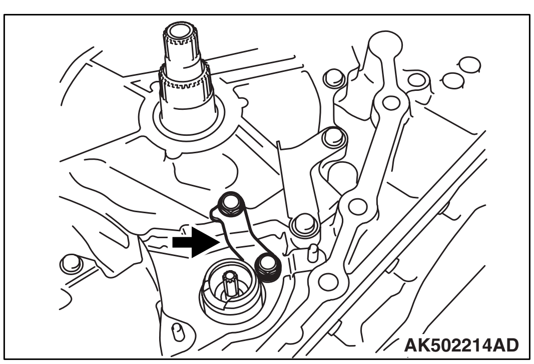
31.Remove the snap ring from the oil pump.



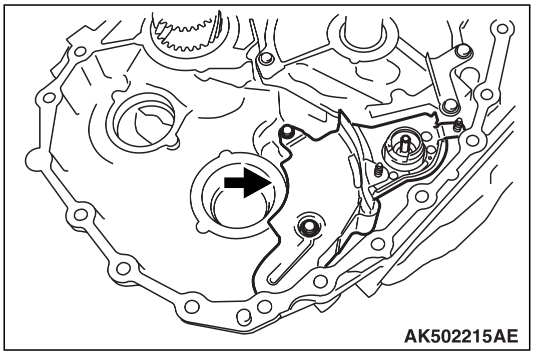
32.Remove the reduction gear assembly from the transaxle case.



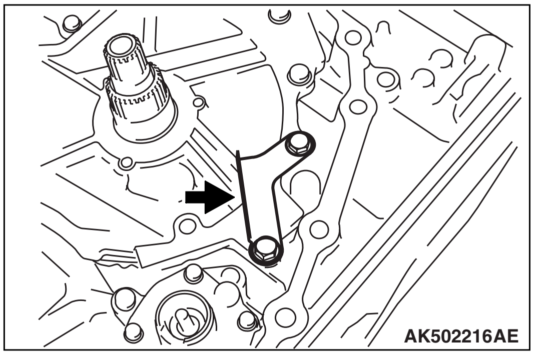
33.Remove the differential assembly from the transaxle case.



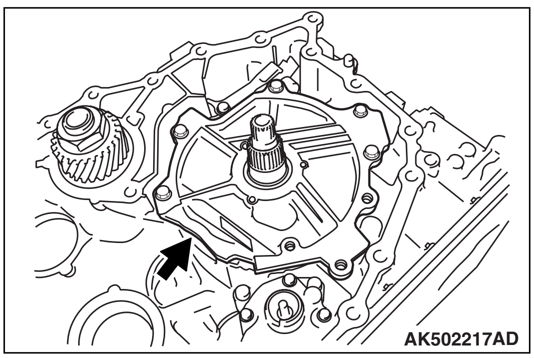
34.Remove the bracket.



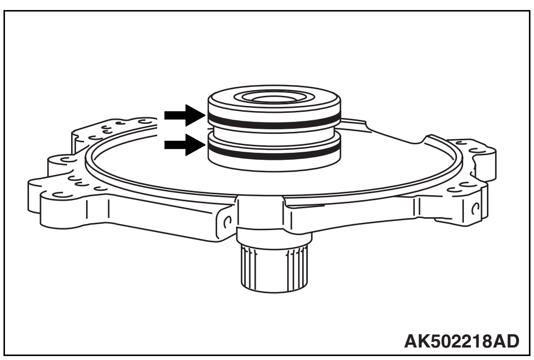
35.Remove the baffle plate.



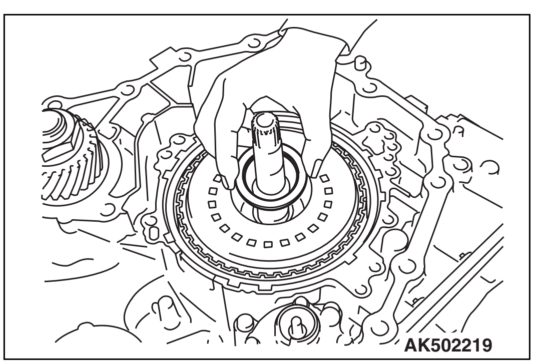
36.Remove the baffle plate.



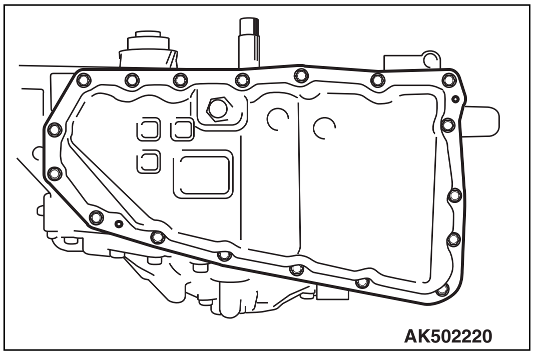
37.Remove the oil pump cover from the transaxle case.



38.Remove the seal rings from the oil pump cover.

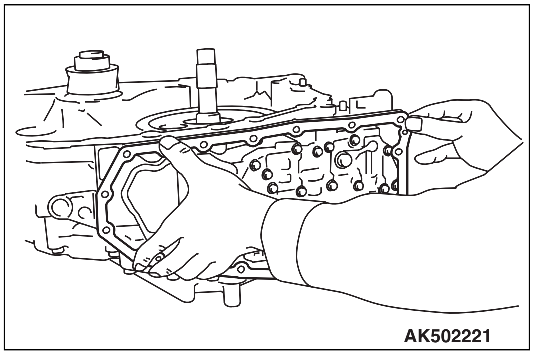


39.Remove the needle bearing from the forward clutch assembly.

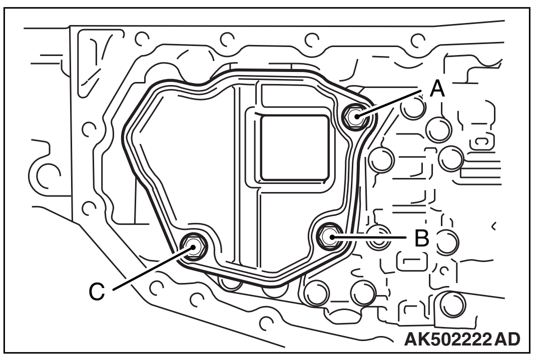


40.Remove the oil pan from the transaxle case.

41.Remove the magnet from the oil pan.

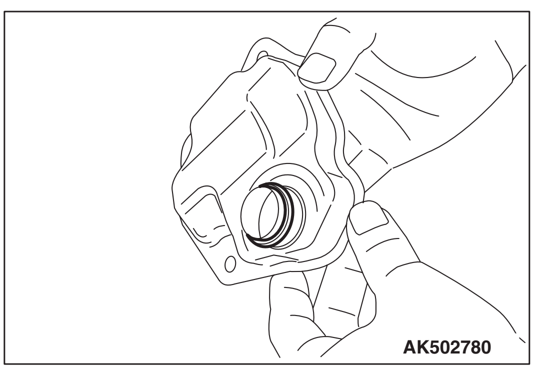


42.Remove the oil pan gasket from the transaxle case.

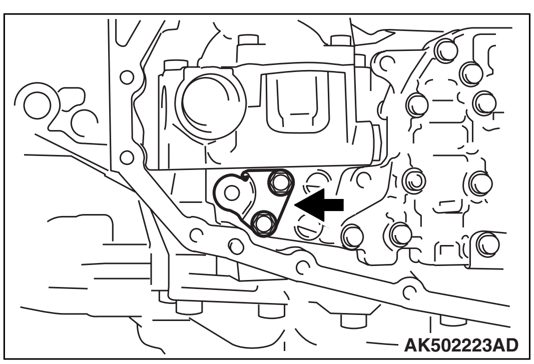


43.Remove the oil strainer

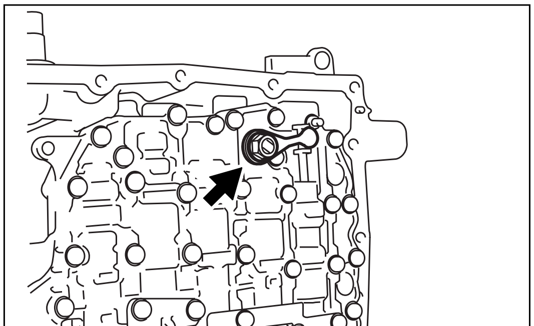
Bolt symbol	A	B	C
Bolt length mm	12	44	12
Quantity	1	1	1



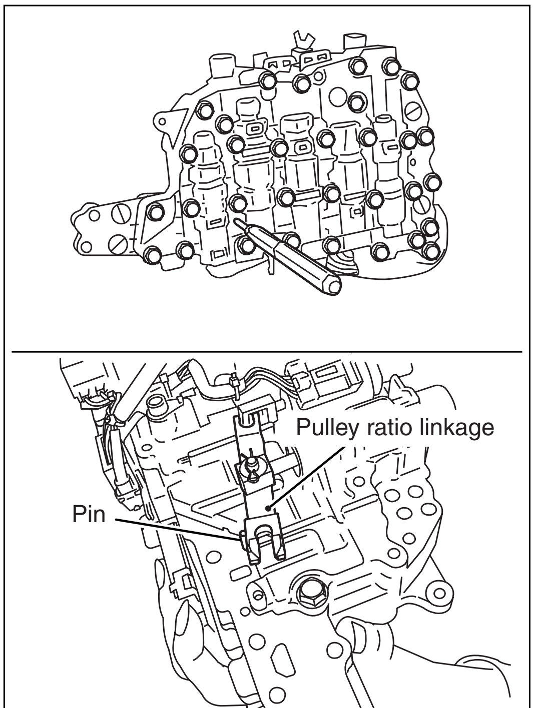
44.Remove the O-ring from the oil strainer.



45.Remove the bracket from the control valve assembly.


AK502224AD

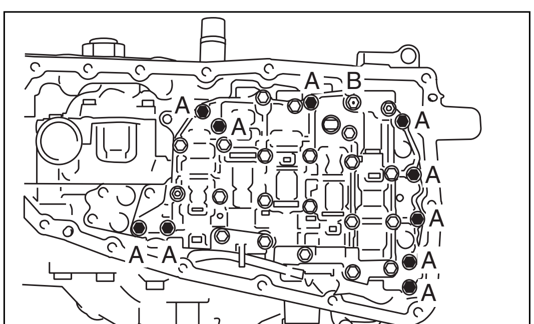
46.Remove the manual lever.



AK502225AD

47.Remove the control valve assembly from the transaxle case as follows:

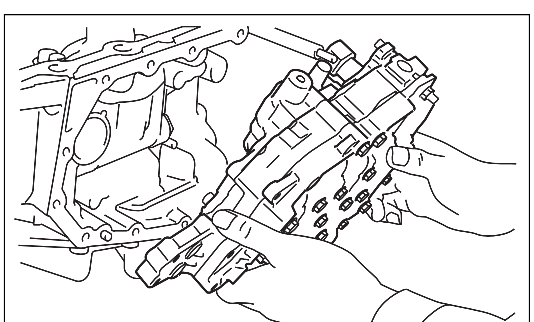
(1) Insert pins etc. (ϕ3 mm) into linkage stopper holes of the control valve assembly to fix the pulley ratio linkage.



AK502226AD

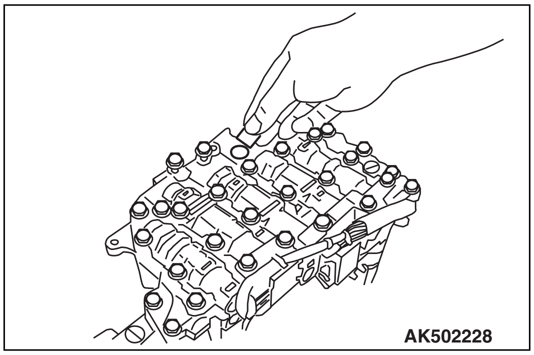
(2) Remove fastening bolts of the control valve assembly.

Bolt symbol	A	B
Bolt length mm	54	44
Quantity	10	1

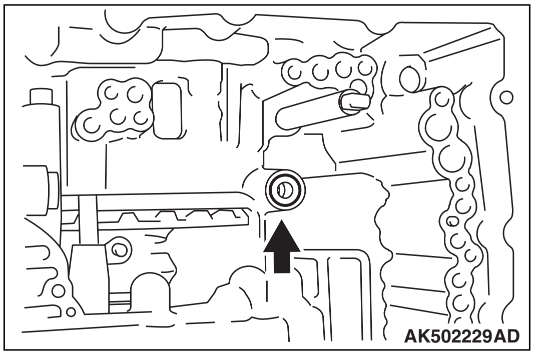

AK502227

(3) Remove the control valve assembly from the transaxle case.

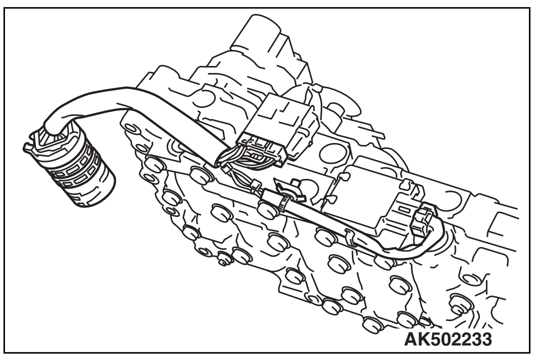
NOTE: Tilt the control valve assembly, and after removing from the manual shaft side, remove the terminal body from the transaxle case.



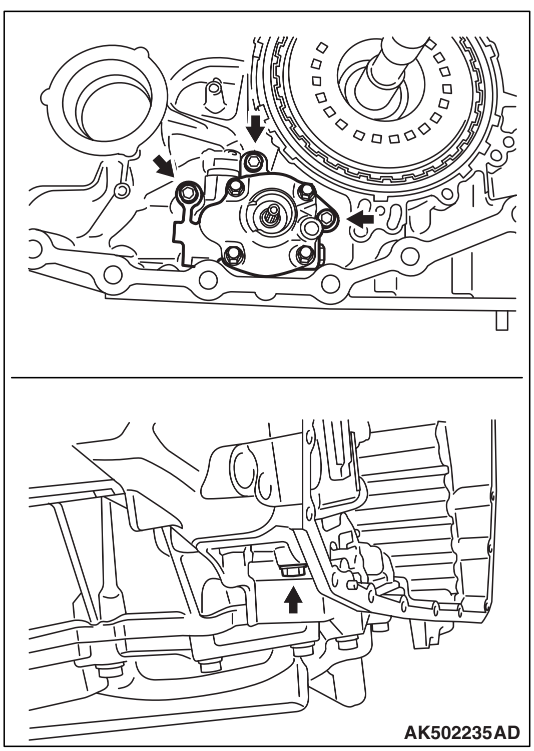
48.Remove the bush from the control valve.



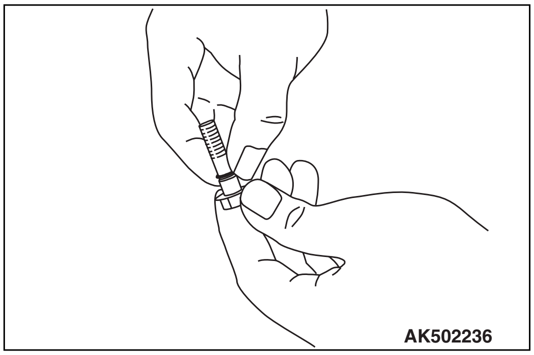
49.Remove the lip seal from the transaxle case.



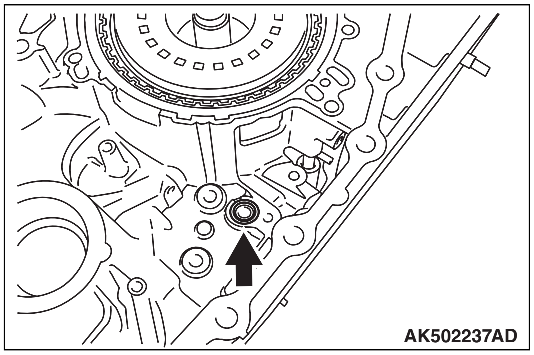
50.Remove the valve body harness from the control valve.



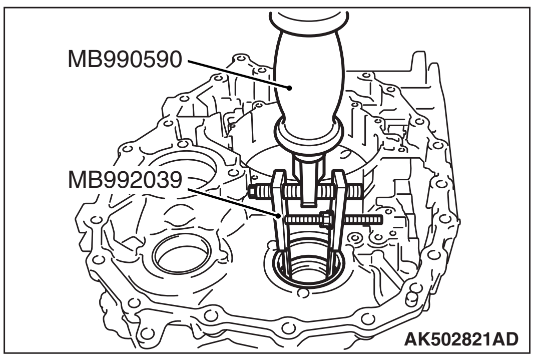
51.Remove the oil pump from the transaxle case. (One fastening bolt is installed at the backside from the transaxle case side).



52.Remove the O-ring from the oil pump fastening bolt.



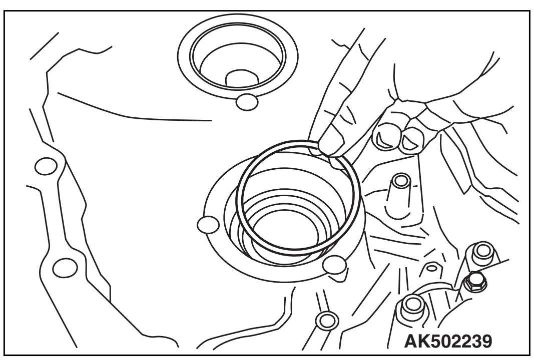
53.Remove the lip seal from the transaxle case.



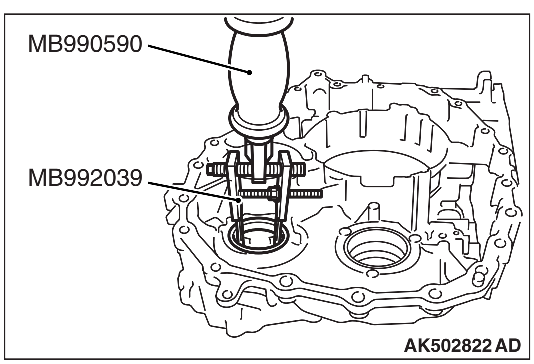
54.Using the Special Tools MB990590 and MB992039, remove outer race of the differential side bearing from the transaxle case.

55.Using cylinder gage etc., measure the mounting bore diameter of differential side bearing outer race at the transaxle case side; if the standard value is not satisfied, then replace the CVT assembly.

Standard value: ϕ 67.949 –67.979 mm



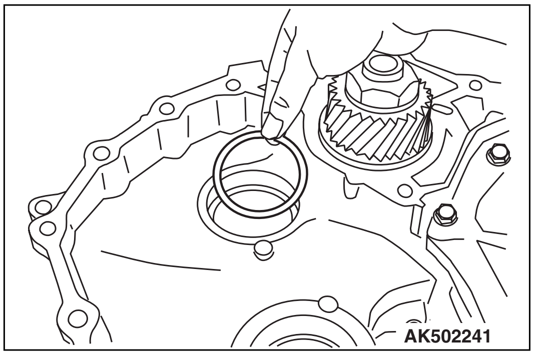
56.Remove the adjusting shim from the transaxle case.



57.Using the special tools MB990590 and MB992039, remove outer race of the reduction gear bearing from the transaxle case.

58.Using cylinder gage etc., measure the mounting bore diameter of reduction gear bearing outer race at the transaxle case side; if the standard value is not satisfied, then replace the CVT assembly.

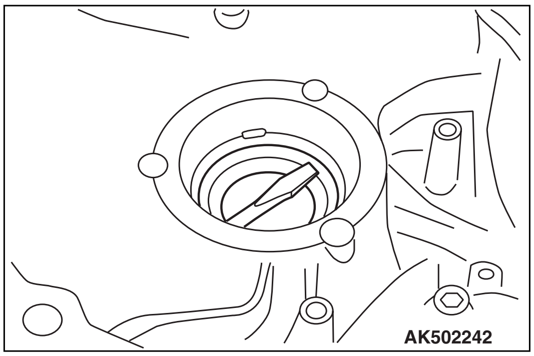
Standard value: ϕ 61.949 –61.979 mm


AK502241

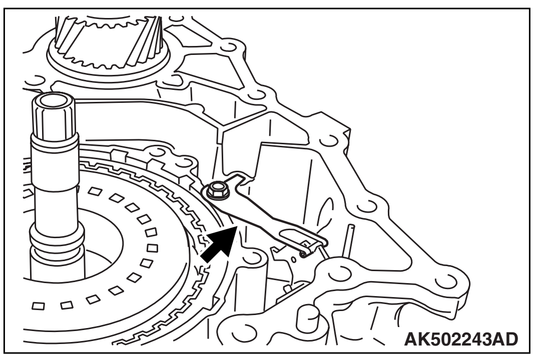
59.Remove the adjusting shim from the transaxle case.

⚠ CAUTION

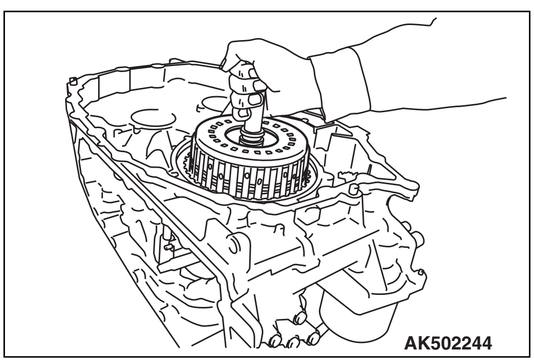
When removing the side oil seal, be careful not to cause damage to the transaxle case.


AK502242

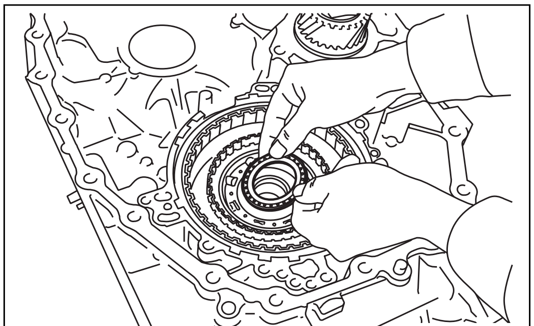
60.Using a flat blade screwdriver etc., remove the side oil seal from the transaxle case.


AK502243AD

61.Remove the detent spring from the transaxle case.

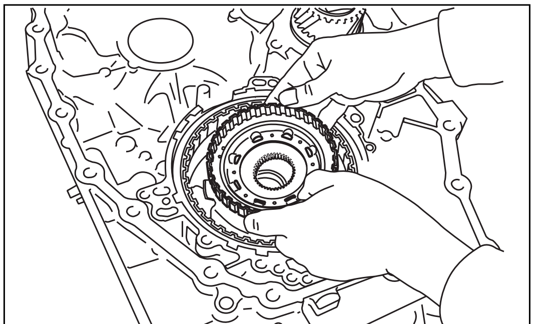

AK502244

62.Remove the forward clutch assembly from the transaxle case.



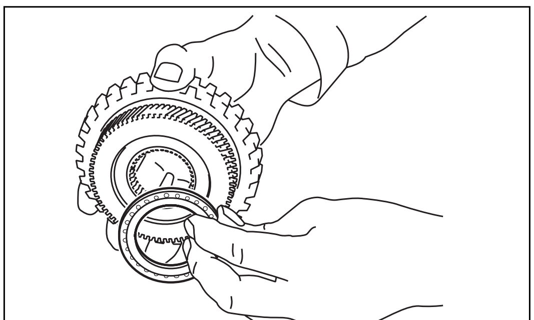
AK502245

63.Remove the needle bearing on forward clutch drum side from the sun gear.



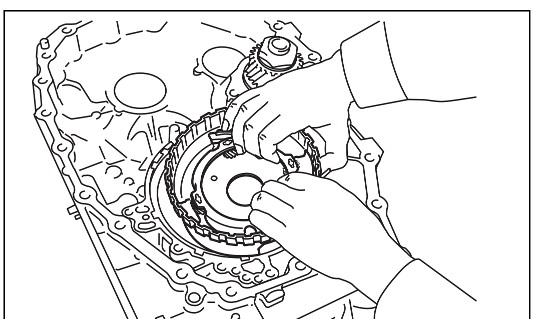
AK502246

64.Remove the sun gear from the planet carrier.



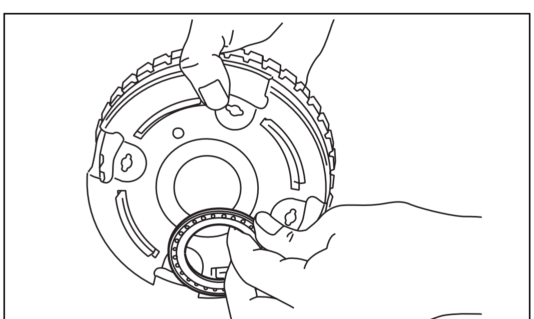
AK502247

65.Remove the needle bearing on primary pulley side from the sun gear.



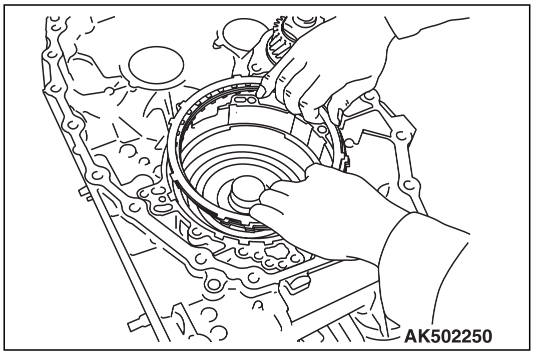
AK502248

66.Remove the planet carrier from the transaxle case.



AK502249

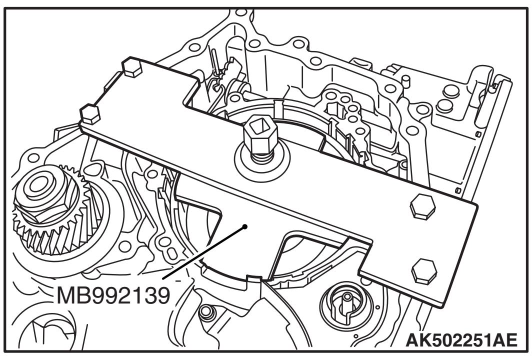
67.Remove the needle bearing from the planet carrier.



⚠ CAUTION

Check if there is damage, deformation, burn marks or permanent sets of the dish plate, driven plate, snap ring, and drive plate. Replace any defective part.

68. Using a flat blade screwdriver etc., remove the reverse brake retaining plate, drive plate, driven plate, and dish plate from the transaxle case.

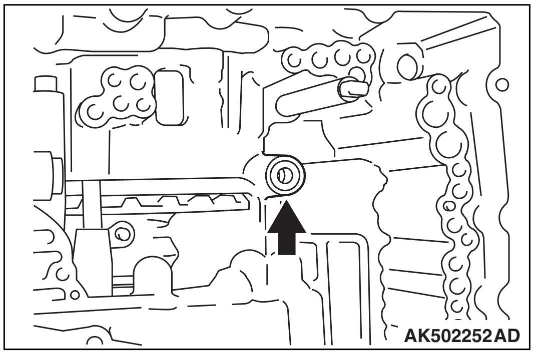


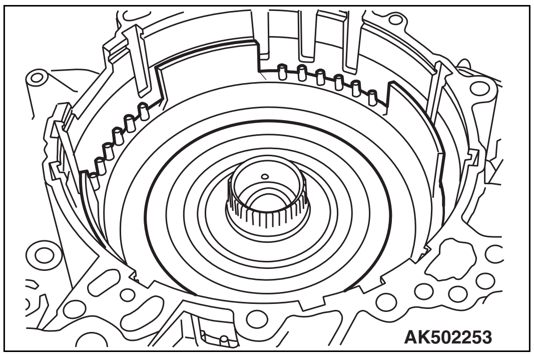
⚠ CAUTION

- **Set the spring compressor right on top of the spring of spring retainer assembly.**
- **Do not remove the return spring from the spring retainer assembly.**

69. Using the Special Tool MB992139, compress the return spring, and remove the snap ring from the transaxle case.

70. Remove the retaining plate and return spring assembly.



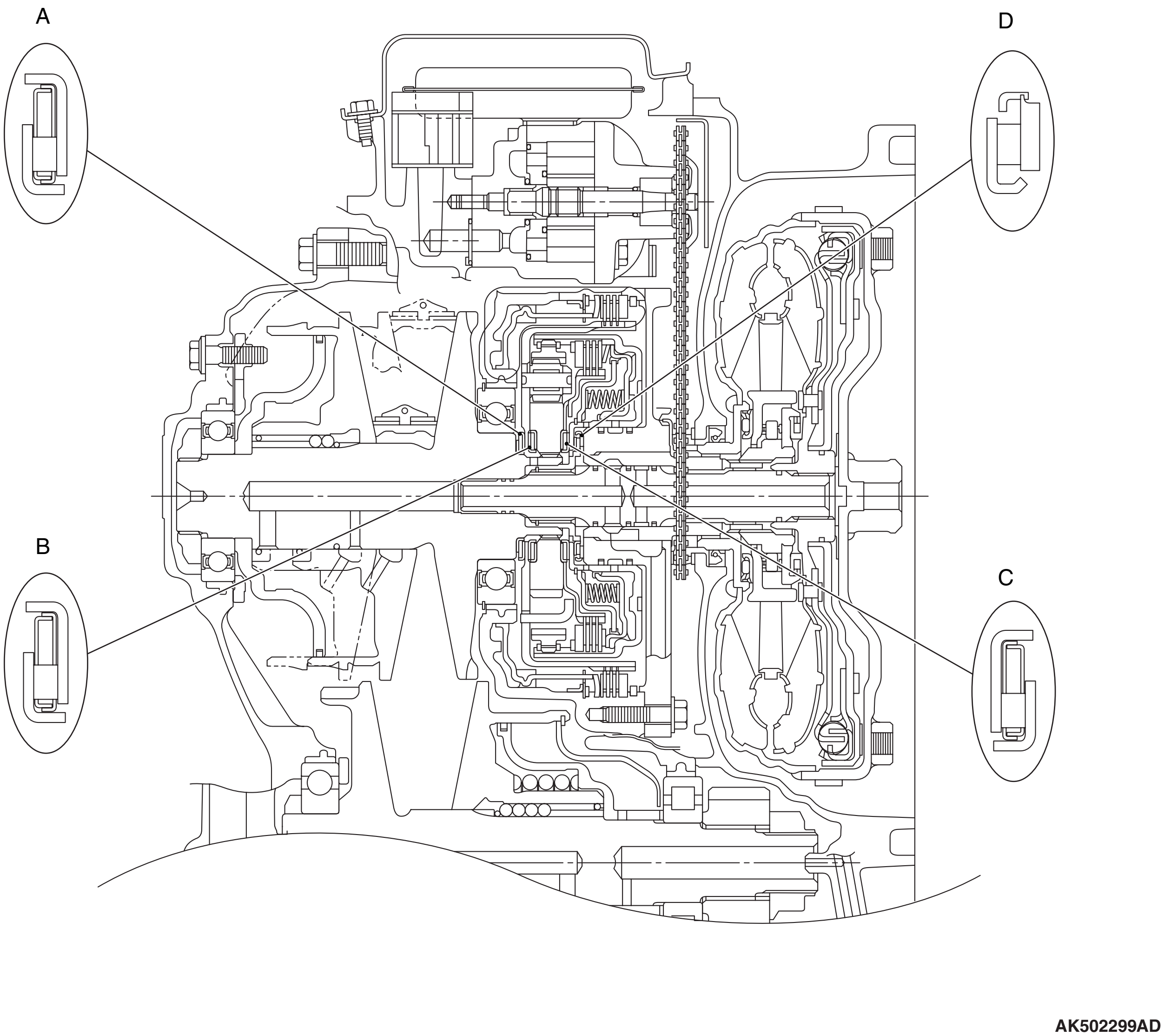


⚠ CAUTION

Be careful. Do not use to much air pressure as this may cause the reverse brake piston be stuck.

71. Feed the air in the oil hole shown in the diagram, and remove the reverse brake piston from the transaxle case.

IDENTIFICATION OF NEEDLE BEARINGS



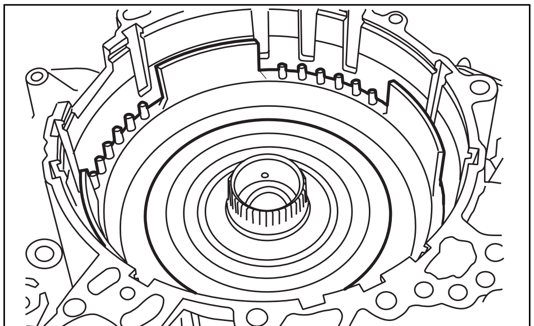
ASSEMBLY SERVICE POINT

⚠ CAUTION

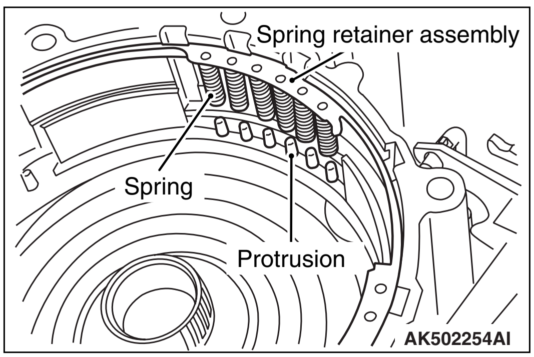
When the outer races of reduction gear bearing and differential side bearing are removed, measure the mounting bore diameters of outer race in the converter housing and transaxle case, and replace the housing case or the CVT assembly if the standard value is not satisfied. The standard values are listed in "SERVICE SPECIFICATIONS".

⚠ CAUTION

- **Do not re-use the reverse brake piston.**
- **Apply CVT fluid when installing the reverse brake piston.**

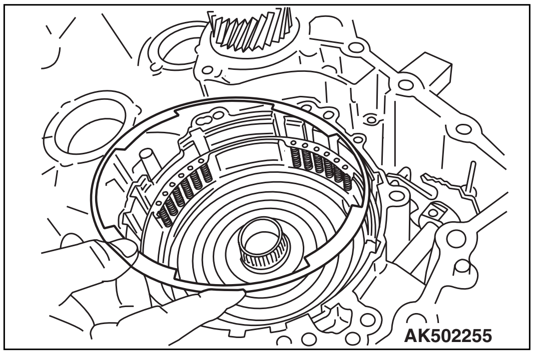

AK502253

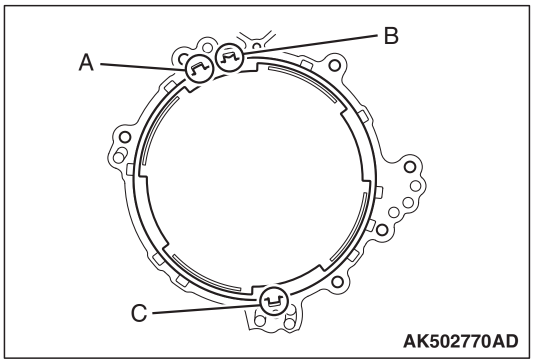
1. Install the reverse brake piston, while turning it, on the transaxle case.



AK502254AI

2. Align the spring portion of spring retainer assembly with the projections of the reverse brake piston, and install the spring retainer assembly.

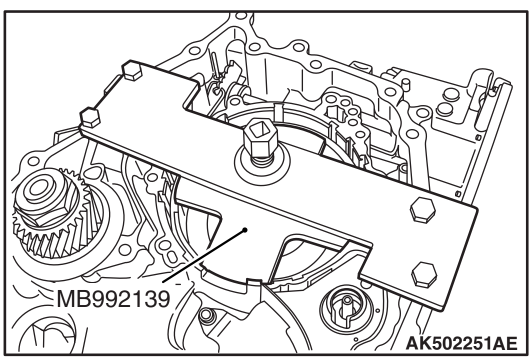


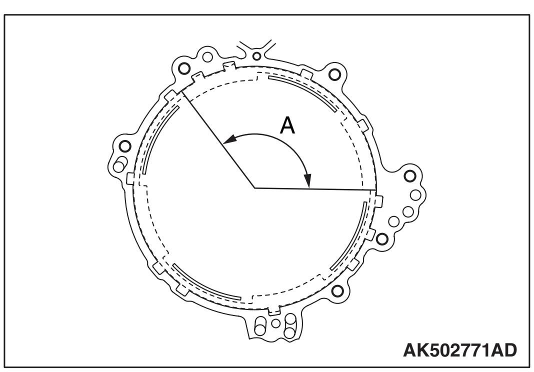


⚠ CAUTION

When installing the retaining plate, align the tangs at positions A, B, C in the diagram.

3. Install the retaining plate on the transaxle case.

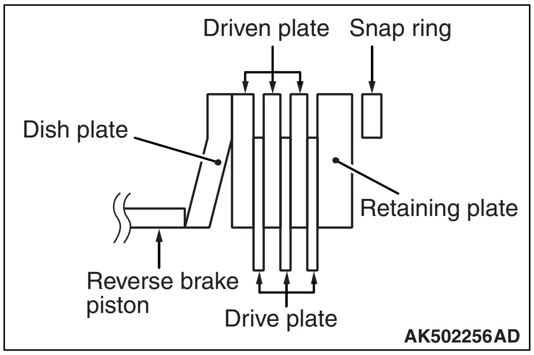




⚠ CAUTION

- **Set the spring compressor right on top of the spring of spring retainer assembly.**
- **Do not re-use the snap ring.**
- **When installing the snap ring, make sure that the joint falls in the area A in the diagram.**

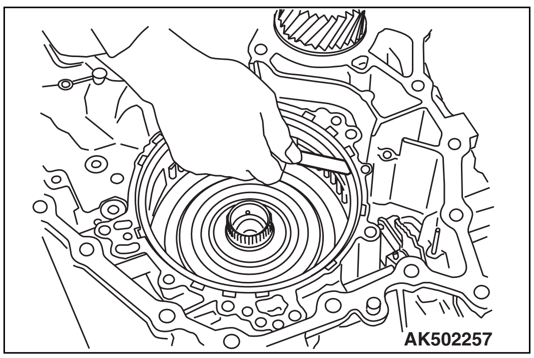
4. Using the Special Tool MB992139, compress the return spring, and install the snap ring on the transaxle case by means of a flat blade screwdriver etc.



5. Install the reverse brake retaining plate, drive plate, driven plate, and dish plate on the transaxle case.

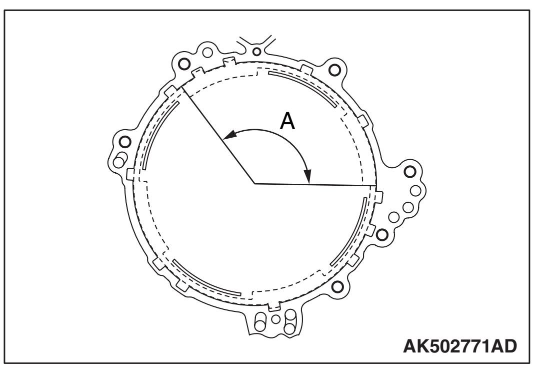
⚠ CAUTION

- **When conducting measurements, measure two or more places, and find the average value.**
- **Do not re-use the snap ring.**
- **When installing the snap ring, make sure that the joint falls in the area A in the diagram.**



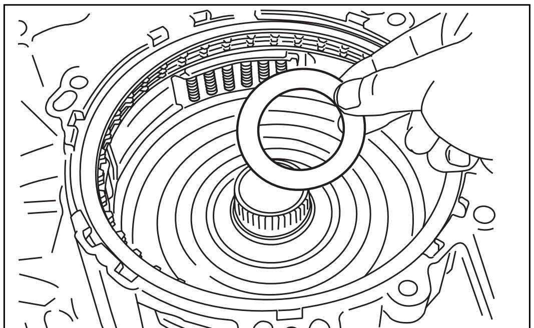
6. Using a flat blade screwdriver etc., install the snap-ring on the transaxle case, and measure clearance between the snap ring and retaining plate. Select the snap ring so as to obtain standard value of the clearance. For selection of the snap ring, refer to "SERVICE SPECIFICATIONS".

   Standard value: 1.2 –1.5 mm

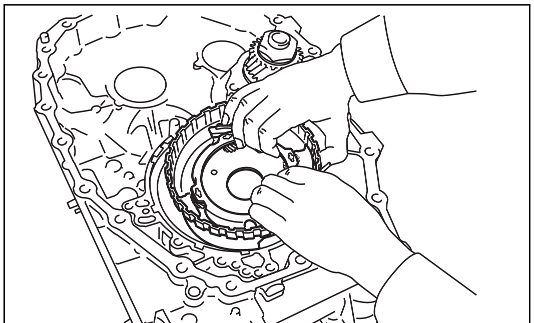


⚠ **CAUTION**

- **Apply vaseline when installing the needle bearing.**
- **Be careful to attach the needle bearing in right direction.**


AK502258

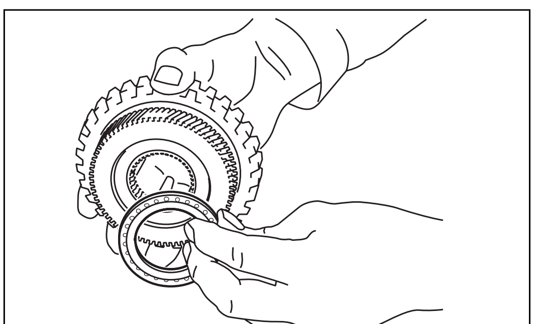
7. Install the needle bearing on the reverse brake piston. Refer to A in the "IDENTIFICATION OF NEEDLE BEARINGS" for right direction.


AK502248

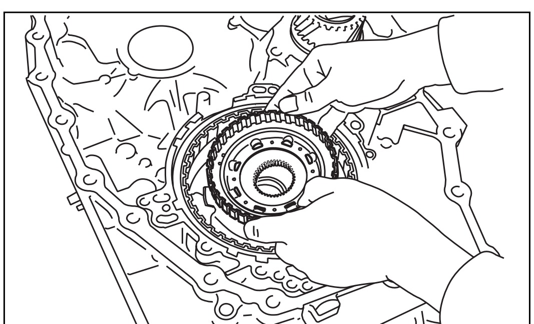
8. Install the planet carrier on the reverse brake.

⚠ **CAUTION**

- **Apply vaseline when installing the needle bearing.**
- **Be careful to attach the needle bearing in right direction.**

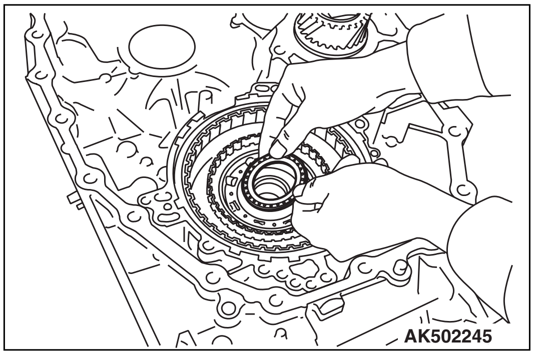

AK502247

9. Install the needle bearing on the primary pulley side of the sun gear. Refer to B in the "IDENTIFICATION OF NEEDLE BEARINGS" for right direction.

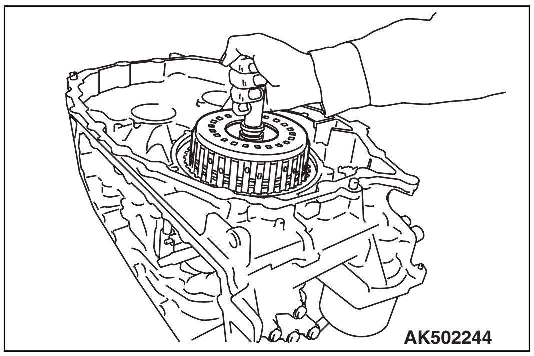

AK502246

10. Install the sun gear on the planet carrier.

⚠ **CAUTION**
- **Apply vaseline when installing the needle bearing.**
- **Be careful to attach the needle bearing in right direction.**

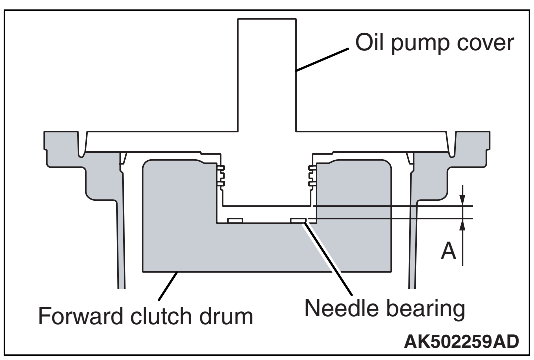


11. Install the needle bearing on the forward clutch drum side of the sun gear. Refer to C in the "IDENTIFICATION OF NEEDLE BEARINGS" for right direction.

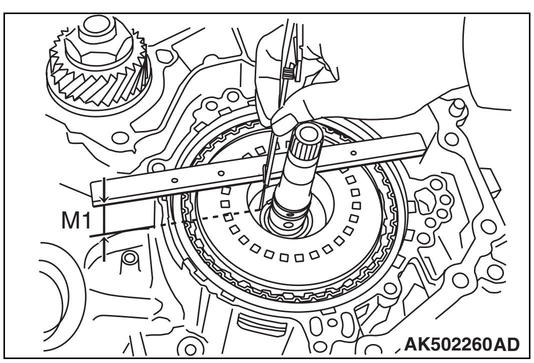


12. Install the forward clutch assembly on the transaxle case.

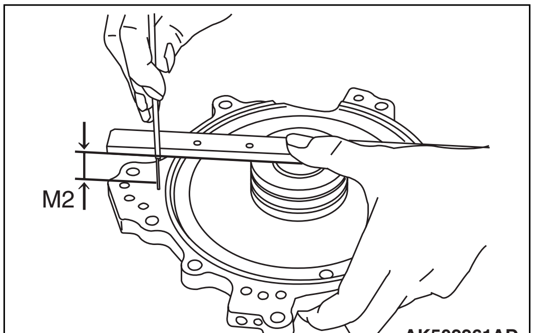
⚠ **CAUTION**
When conducting measurements, measure two or more places, and find the average value.



13. Measure the total end play as follows:



(1) Measure the distance M1 from the oil pump cover mounting surface of the transaxle case to the needle bearing mounting surface of the forward clutch drum.



AK502261AD

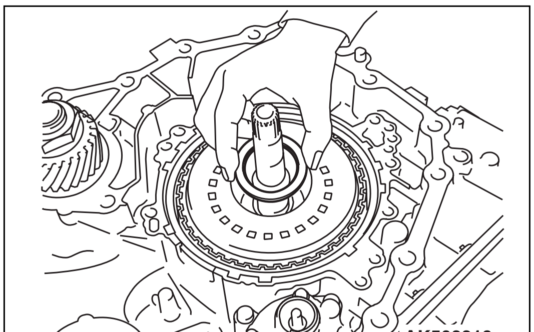
(2) Measure the distance M2 from the edge of oil pump cover to the mounting surface on the transaxle case.

(3) Calculate the total end play by the following expression. Select the needle bearing so that the total end play meets its standard value.

Total end play = M1 –M2 –bearing thickness
Standard value: 0.25 –0.55 mm

⚠ CAUTION

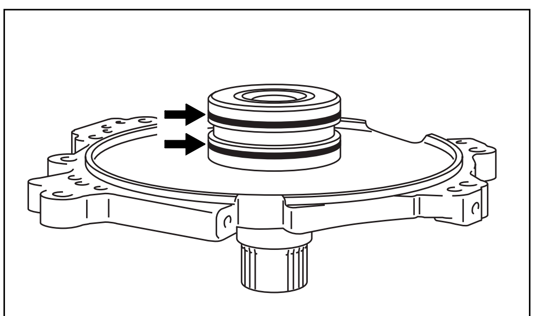
- **Apply vaseline when installing the needle bearing.**
- **Be careful to attach the needle bearing in right direction.**


AK502219

14. Install the selected needle bearing on the forward clutch assembly. Refer to D in the "IDENTIFICATION OF NEEDLE BEARINGS" for right direction.

⚠ CAUTION

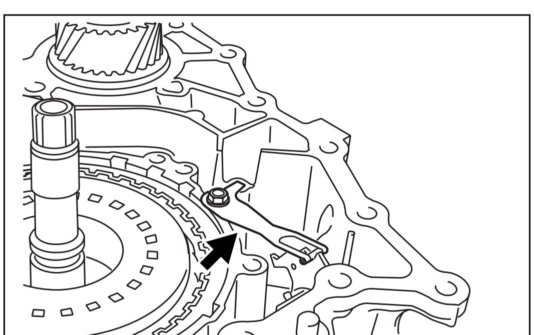
- **Do not re-use the seal rings.**
- **Apply vaseline when installing the seal rings.**


AK502218AD

15. Install the seal rings on the oil pump cover.

⚠ CAUTION

Do not re-use the bolt.


AK502243AD

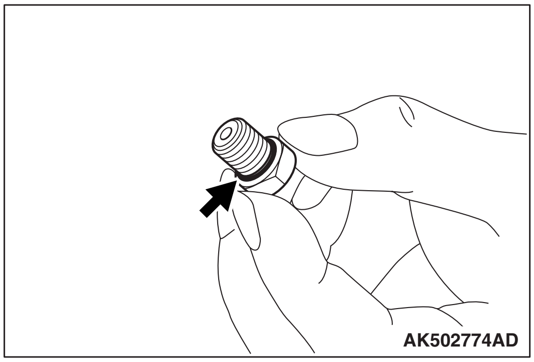
16. Install the detent spring on the transaxle case and tighten the bolt to the specified torque.

Tightening torque: 6.9 N· m (61 in-lb)

⚠ CAUTION

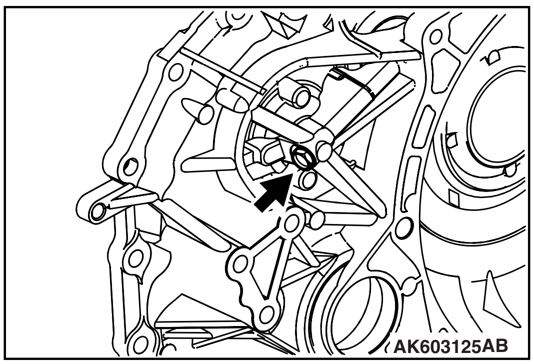
- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**

17.Install the O-ring on the plug.



18.Install the plug on the converter housing and tighten the bolt to the specified torque.

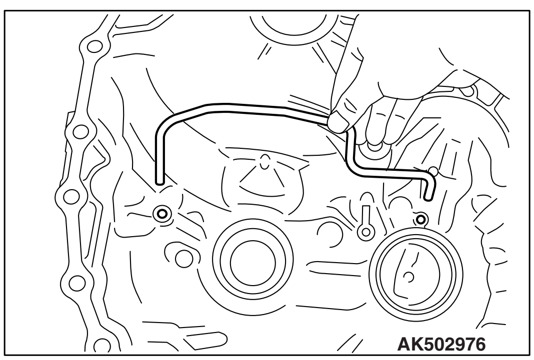
Tightening torque: 7.5 N· m (66 in-lb)



⚠ CAUTION

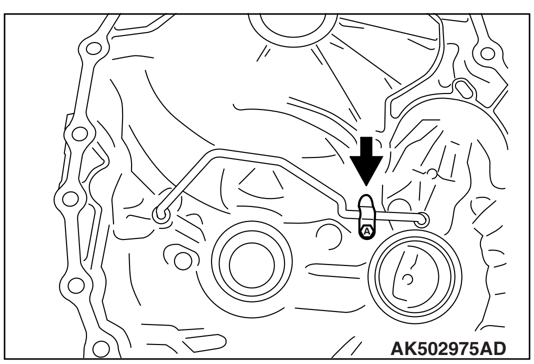
Do not bend the pipe when attaching it.

19.Install the pipe on the converter housing.



20.Install the clip and tighten the bolt to the specified torque.

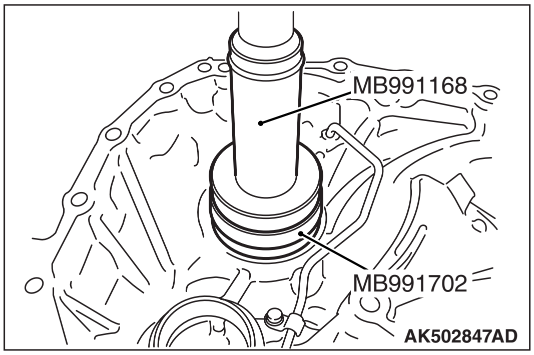
Tightening torque: 6.9 N· m (61 in-lb)



⚠ CAUTION

- **Do not re-use the outer race.**
- **Replace the outer race together with the inner race.**

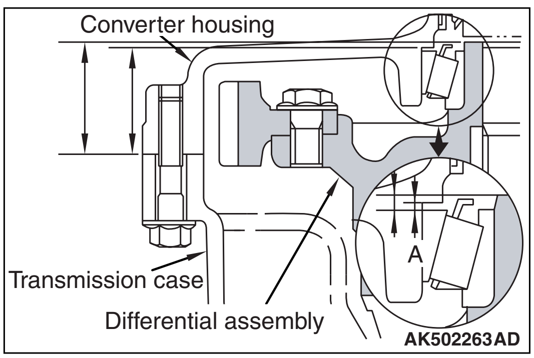
21. Using the Special Tools MB991168 and MB991702, Install the differential bearing outer race.



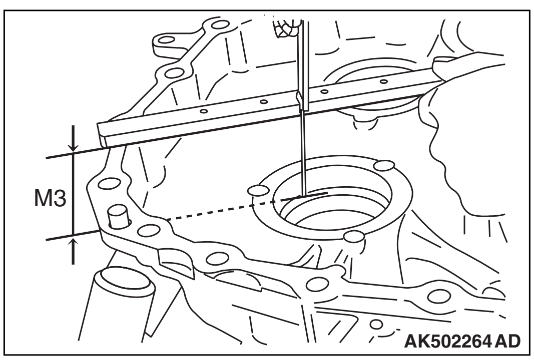
⚠ CAUTION

- **When adjusting the preload, apply CVT fluid to the bearing to make it roll smoothly.**
- **When conducting measurements, measure two or more places, and find the average value.**

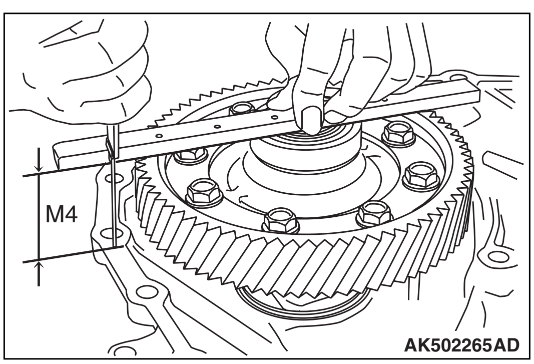
22. Measure the preload A of the differential assembly as follows:

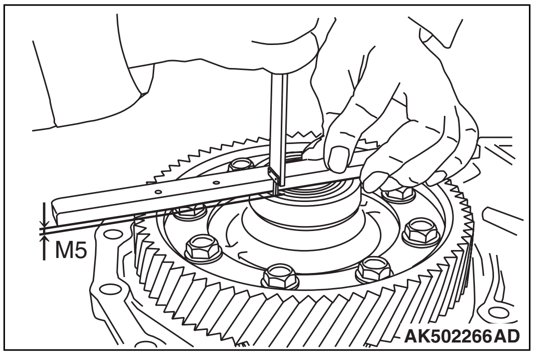


(1) Measure the distance M3 from the edge of transaxle case to the mounting surface of adjusting shim.



(2) Install the differential assembly on the converter case, and measure the distance M4 from the differential case to the edge of converter housing.





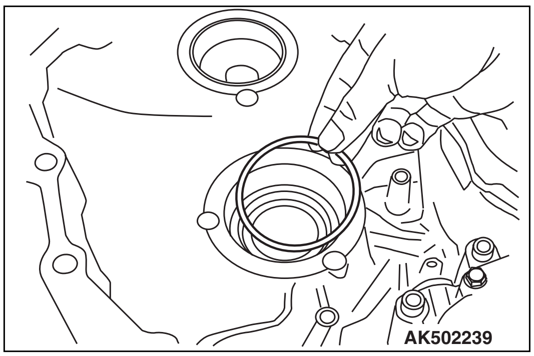
(3) Install the outer race on differential side bearing, and measure the distance M5 from the differential case to the outer race of differential side bearing.

(4) Using the following expression, calculate the distance M6 from the edge of converter housing to the outer race of differential side bearing.

M6 = M4 − M5

(5) Using the following expression, calculate thickness of the adjusting shim.

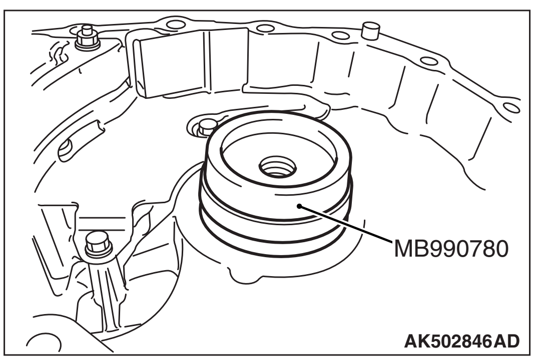
Thickness of adjusting shim = M3 − M6 + preload
Preload standard value: 0.17 − 0.29 mm



⚠ CAUTION

Do not re-use the adjusting shim.

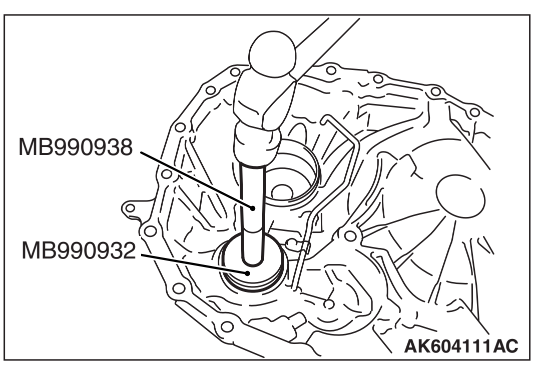
23. Install the selected shim on the transaxle case. For selection of the adjusting shim, refer to "SERVICE SPECIFICATIONS".



⚠ CAUTION

- **Do not re-use the outer race.**
- **Replace the outer race together with the inner race.**

24. Using the Special Tool MB990780, install the outer race of differential side bearing on the transaxle case.



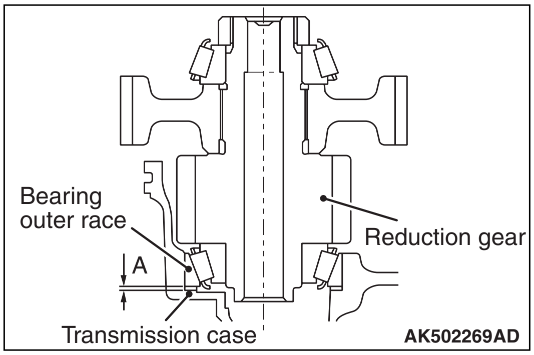
⚠ CAUTION

- **Do not re-use the outer race.**
- **Replace the outer race together with the inner race.**

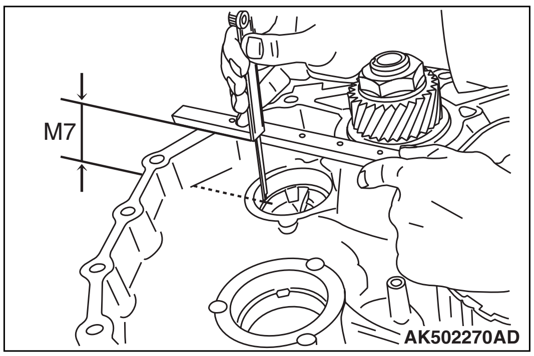
25. Using the Special Tools MB990932 and MB990938, install the outer race of reduction gear bearing on the converter housing.

⚠ CAUTION

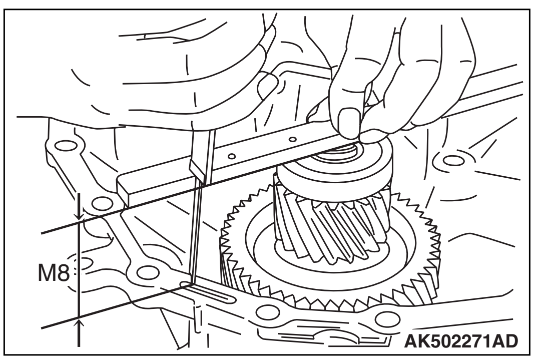
- **When adjusting the preload, apply CVT fluid to the bearing to make it roll smoothly.**
- **When conducting measurements, measure two or more places, and find the average value.**



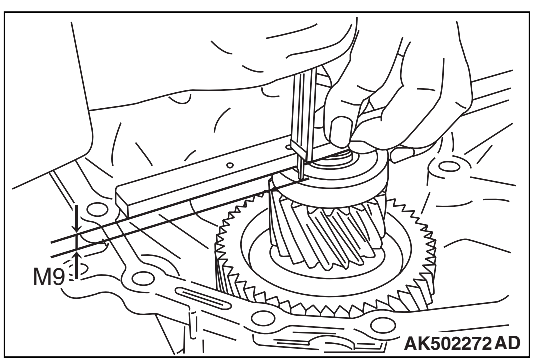
26. Measure the preload A of the reduction gear assembly in the following way.



(1) Measure the distance M7 from the edge of transaxle case to the mounting surface of adjusting shim.



(2) Install the reduction gear assembly on the converter housing, and measure the distance M8 from the edge of reduction gear assembly to the edge of converter housing.



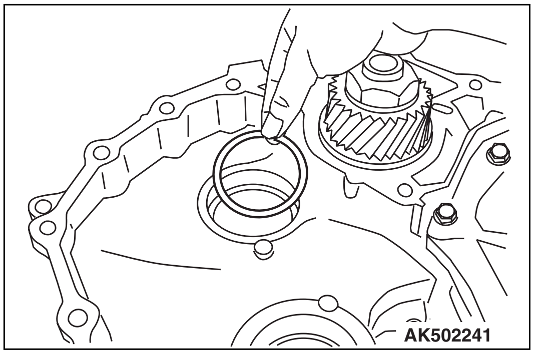
(3) Install the outer race of reduction gear side bearing on the bearing, and measure the distance M9 from the edge of reduction gear assembly to the outer race of reduction gear bearing.

(4) Using the following expression, calculate the difference M10 from the outer race of reduction gear bearing to the edge of converter housing.

M10 = M8 − M9

(5) Using the following expression, calculate the thickness of adjusting shim.

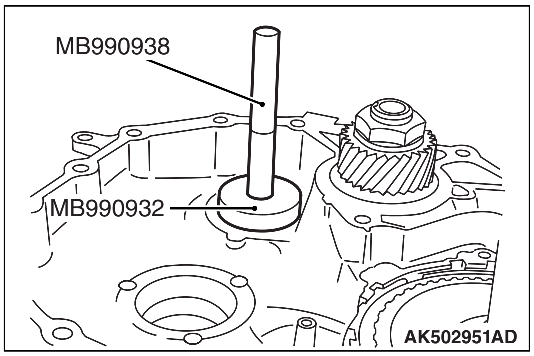
Thickness of adjusting shim = M7 − M10 + preload
Preload standard value: = 0.13 − 0.19 mm



⚠ CAUTION

Do not re-use the adjusting shim.

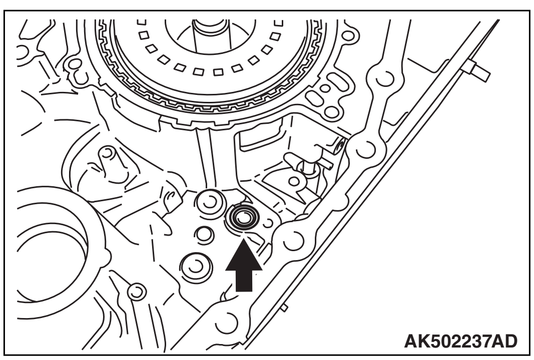
27. Install the selected adjusting shim on the transaxle case. For selection of the adjusting shim, refer to "SERVICE SPECIFICATIONS".



⚠ CAUTION

- **Do not re-use the outer race.**
- **Replace the outer race together with the inner race.**

28. Using the Special Tools MB990932 and MB990938, install the outer race of reduction gear bearing on the transaxle case.

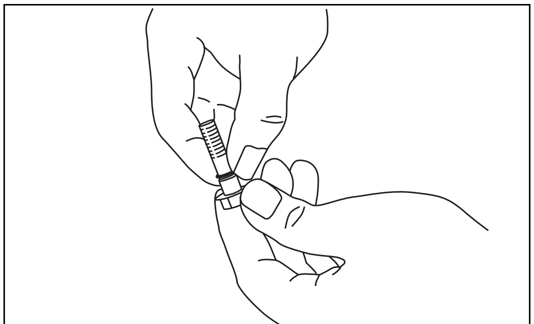


⚠ CAUTION

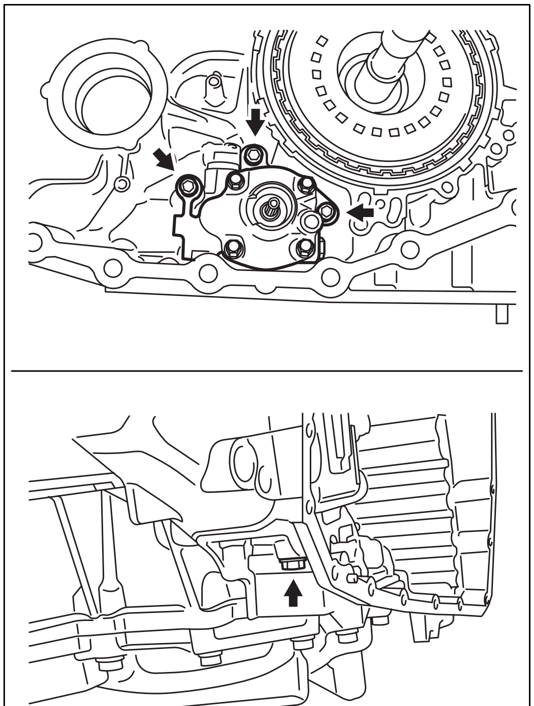
- **Do not re-use the lip seal.**
- **Apply CVT fluid when installing the lip seal.**

29. Install the lip seal on the transaxle case.

⚠ CAUTION
- **Do not re-use the O-rings.**
- **Apply CVT fluid when installing the O-rings.**


AK502236

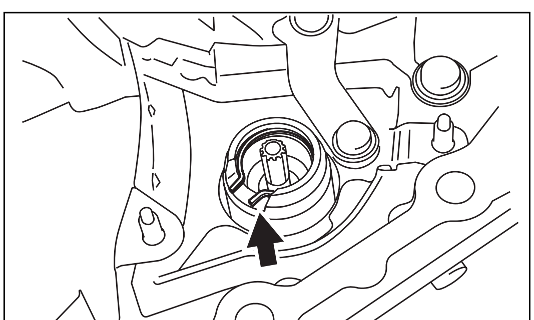
30. Install the O-rings on the oil pump fastening bolts.


AK502235AD

31. Install the oil pump on the transaxle case and tighten the bolt to the specified torque. (One fastening bolt is installed at the backside from the transaxle case side. Only this bolt should be tightened to the specified torque of 28 N· m [21 ft-lb]).

    Tightening torque: 19 N· m (14 ft-lb)

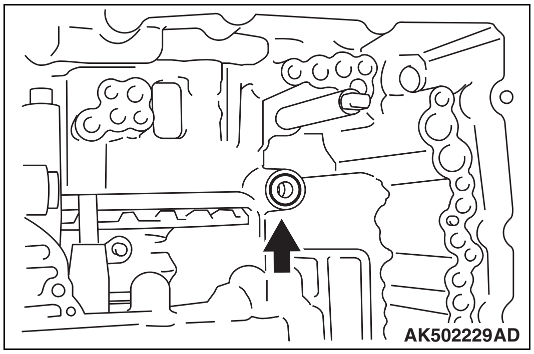
⚠ CAUTION
Do not re-use the snap ring.


AK502211AD

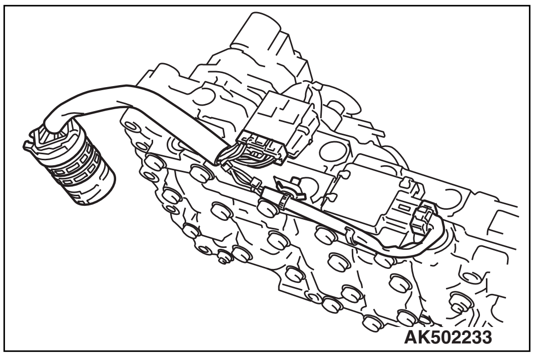
32. Install the snap ring on the oil pump.

⚠ CAUTION
- **Do not re-use the lip seal.**
- **Apply CVT fluid or vaseline when installing the lip seal.**

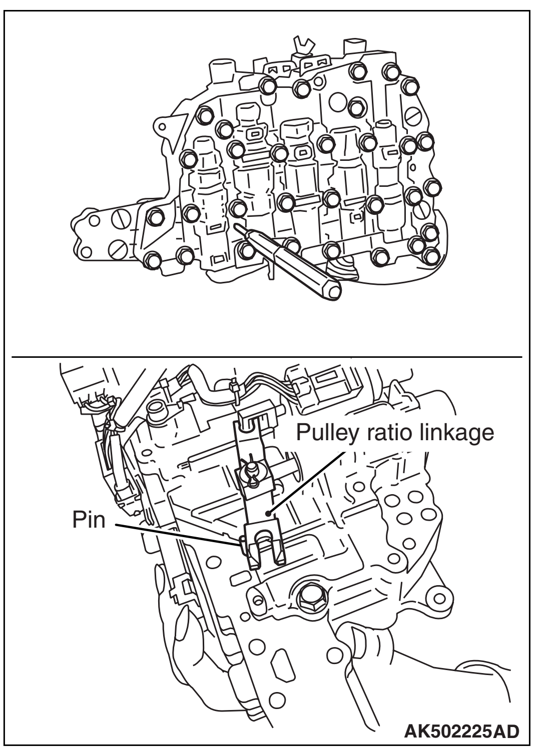
33. Install the lip seal on the transaxle case.

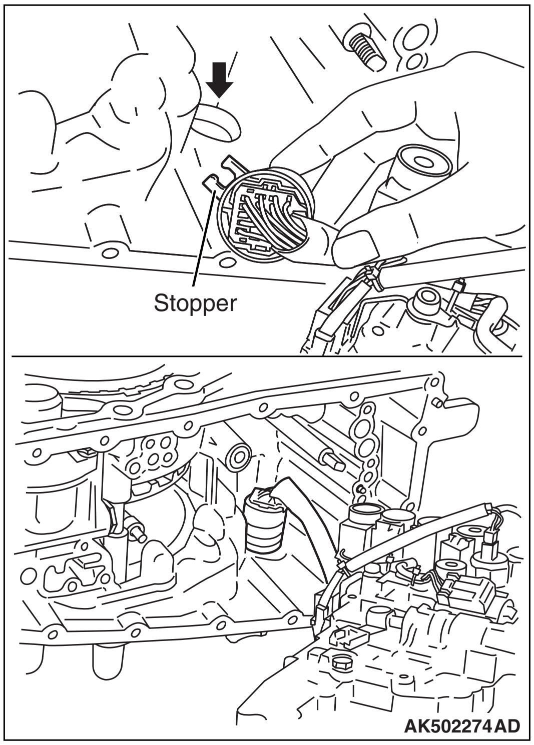


34. Install the valve body harness on the control valve.



35. Install the control valve assembly on the transaxle case as follows:
   (1) Insert pins etc. (ϕ 3 mm) into linkage stopper holes of the control valve assembly to fix the pulley ratio linkage.



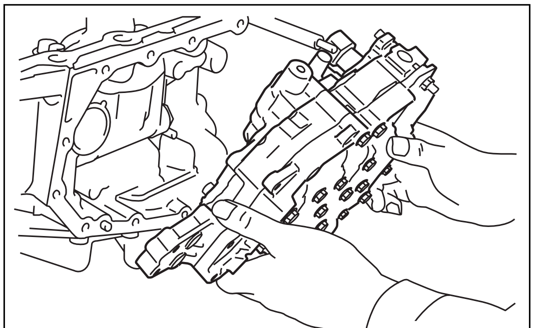


(2) Install the terminal body on the transaxle case, while aligning the detent of terminal body with the transaxle case as shown in the diagram.

⚠ CAUTION

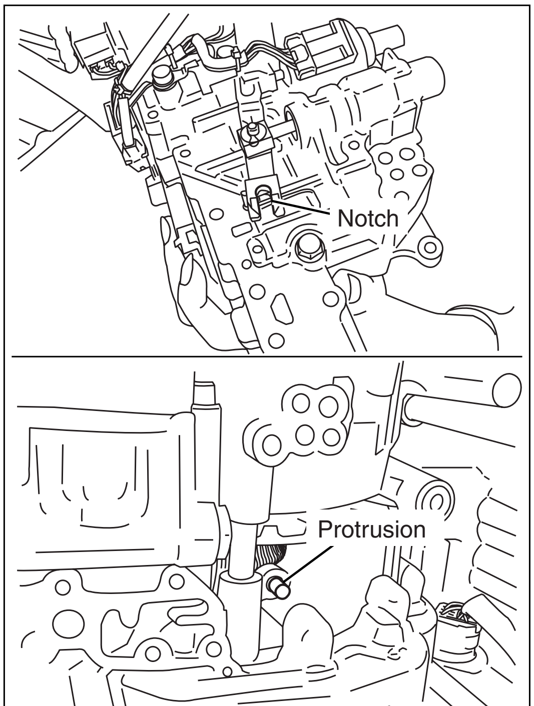
Align the notch of pulley ratio linkage with the prong of pulley sensor.

(3) Slide the control valve assembly from the bottom, and install it on the transaxle case.


AK502227

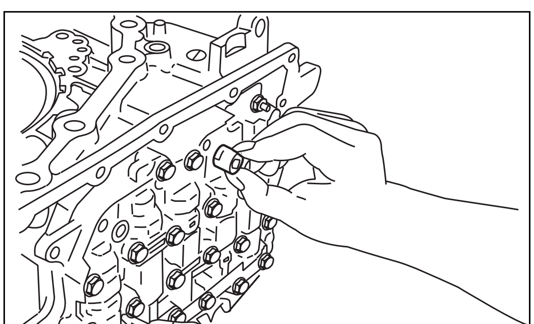
⚠ CAUTION

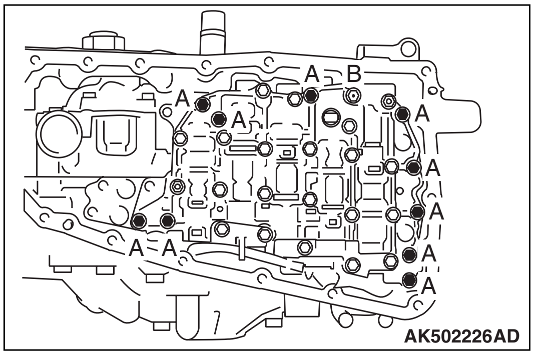
Apply CVT fluid when attaching the bush.



AK502275AD

(4) Install the bush on the control valve assembly.

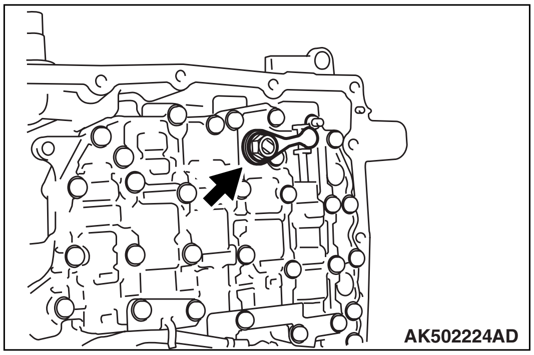

AK502276



(5) Install the fastening bolts of control valve assembly and tighten the bolt to the specified torque.

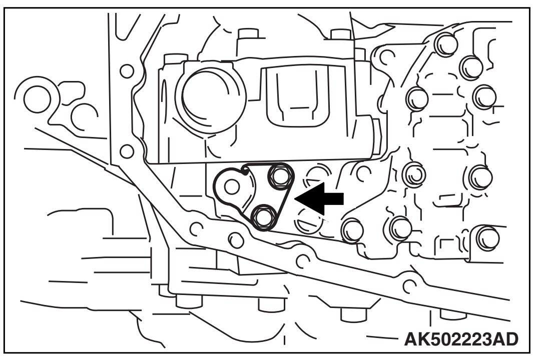
Tightening torque: 7.9 N· m (70 in-lb)

Bolt symbol	**A**	**B**
Bolt length mm	54	44
Quantity	10	1



36. Install the manual lever and tighten the bolt to the specified torque.

Tightening torque: 22.1 N· m (16 ft-lb)

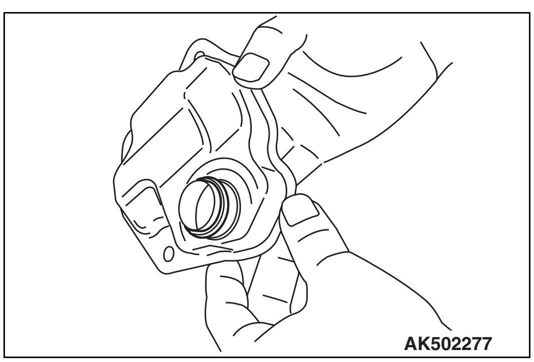


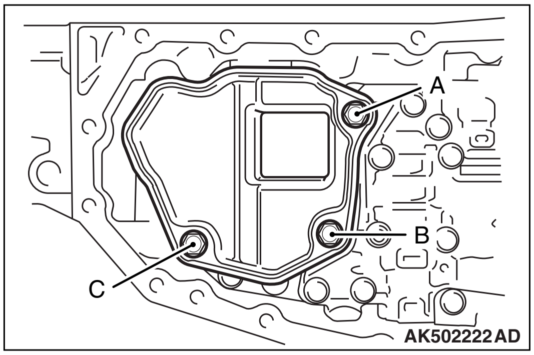
37. Install the bracket on the control valve assembly and tighten the bolt to the specified torque.

Tightening torque: 7.9 N· m (70 in-lb)

⚠ CAUTION
- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**

38. Install the O-ring on the oil strainer.





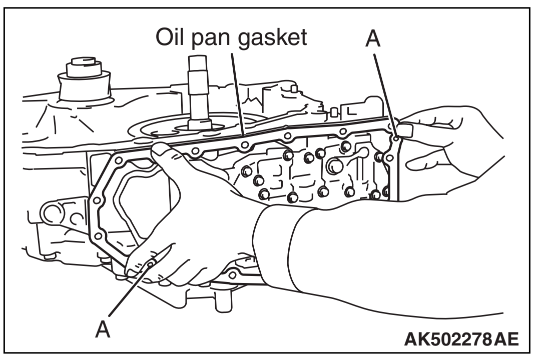
39.Install the oil strainer and tighten the bolt to the specified torque.

Tightening torque: 7.9 N· m (70 in-lb)

Bolt symbol	**A**	**B**	**C**
Bolt length mm	12	44	12
Quantity	1	1	1

⚠ CAUTION

- **Do not re-use the oil pan gasket.**
- **Remove any moisture, oil, and used gasket from the mounting surface of oil pan gasket.**
- **When installing the oil pan gasket, align the dowel pins of transaxle case with dowel pin holes A of the oil pan gasket.**

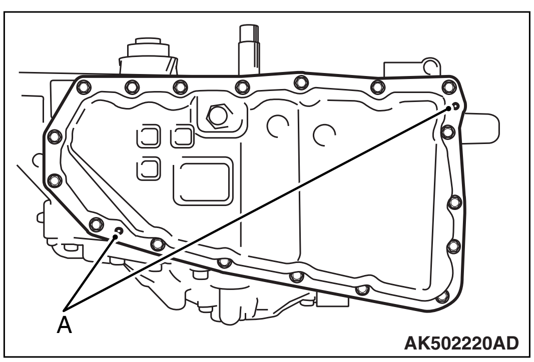


40.Install the oil pan gasket on the transaxle case.

41.Install the magnet on the oil pan.

⚠ CAUTION

When installing the oil pan, align the dowel pins of transaxle case with dowel pin holes A of the oil pan.



42.Install the oil pan on the transaxle case and tighten the bolts to the specified torque.

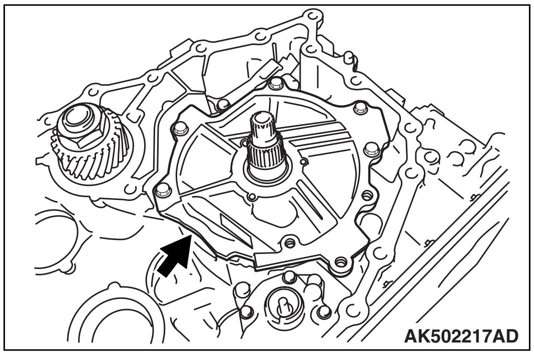
Tightening torque: 7.9 N· m (70 in-lb)

⚠ CAUTION

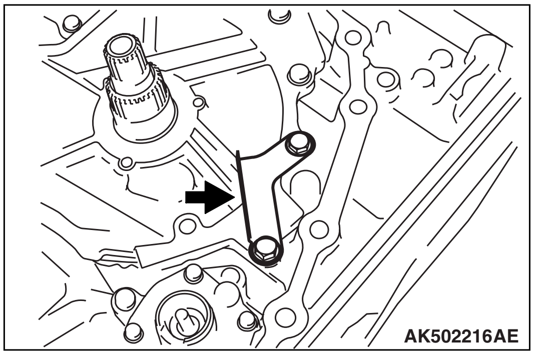
Do not re-use the drain plug gasket.

43.Install the drain plug and drain plug gasket on the transaxle case and tighten the bolt to the specified torque.

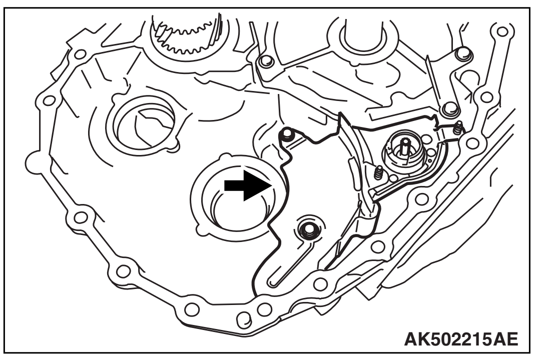
Tightening torque: 34.3 N· m (25 ft-lb)



44. Install the oil pump cover on the transaxle case, and fix the fastening bolts temporarily.

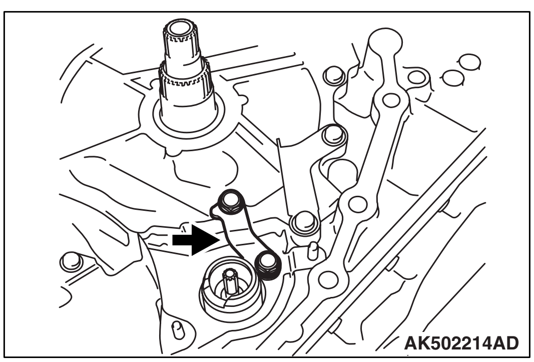


45. Install the baffle plate, and fix the fastening bolts temporarily.



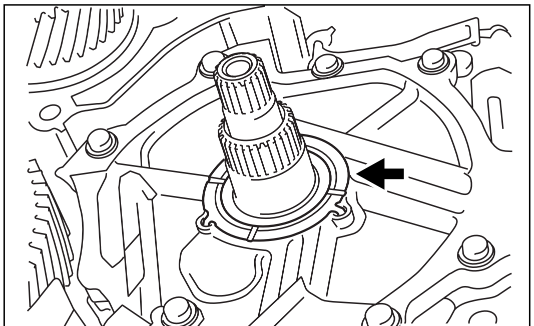
46. Install the baffle plate and tighten the bolt to the specified torque.

Tightening torque: 5.9 N· m (52 in-lb)



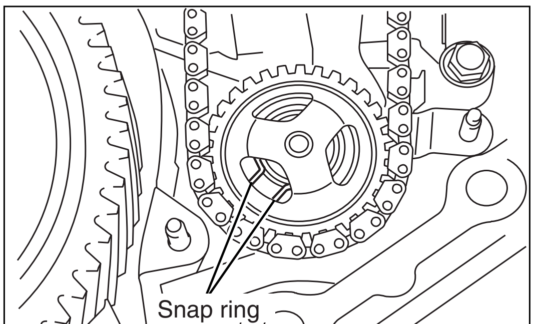
47. Install the bracket, and tighten the fastening bolts of the oil pump cover, baffle plate and tighten the bolts to the specified torque.

Tightening torque: 26 N· m (19 ft-lb)

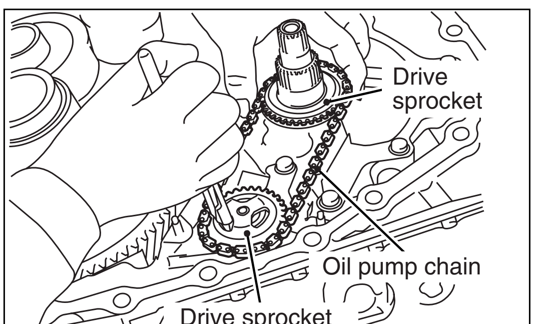

AK502210AD

⚠ CAUTION
- **Make sure the tang of thrust washer is aligned with the mounting hole of oil pump cover.**
- **Apply vaseline when installing the thrust washer.**

48. Install the thrust washer on the oil pump cover.



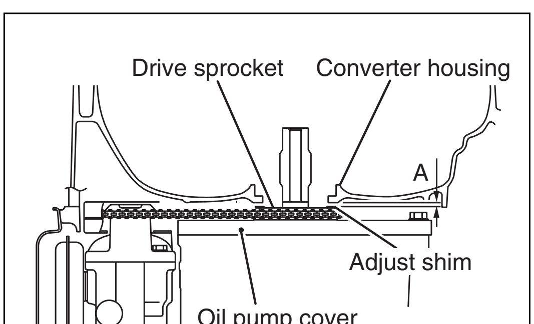
AK502208AD



AK502209AD

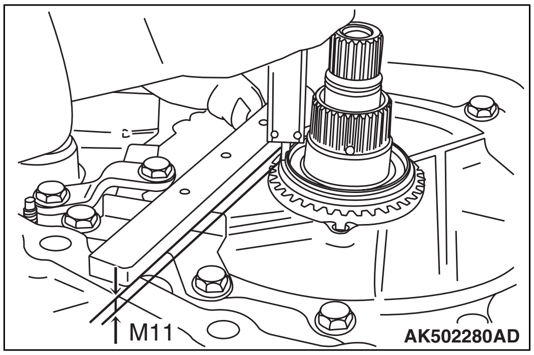
⚠ CAUTION
Pull the driven sprocket up softly to make sure it is securely attached.

49. Expand the snap ring, and install the driven sprocket, oil pump chain, and drive sprocket.

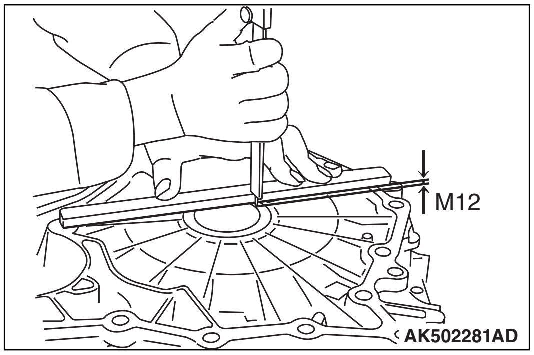


AK502279AD

50. Measure the clearance A between the oil pump drive sprocket and the converter housing as follows:



(1) Measure the distance M11 between the edge of transaxle case and the adjusting shim mounting surface of drive sprocket.



(2) Measure the distance M12 between the edge of converter housing and the surface contacting the adjusting shim.

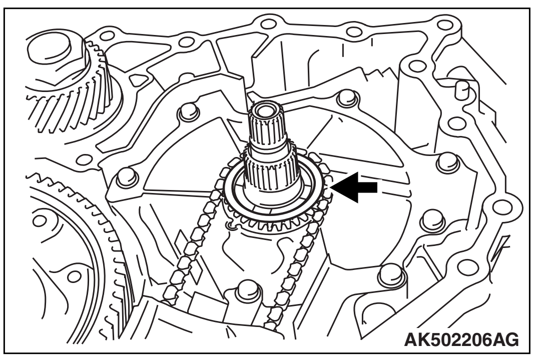
(3) Use the following expression, to select the adjusting shim having the standard value.

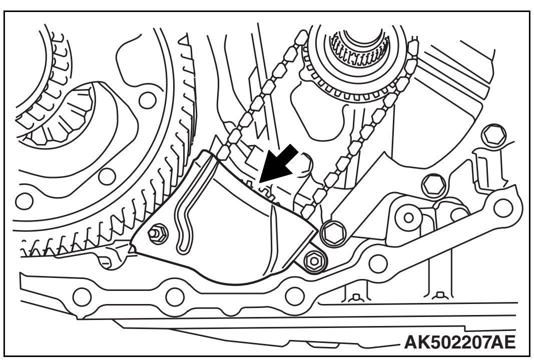
Standard value of clearance = M11 + M12 –thickness of adjusting shim
Standard value: 0.10 –0.23 mm

⚠ CAUTION

Apply vaseline when installing the adjusting shim.

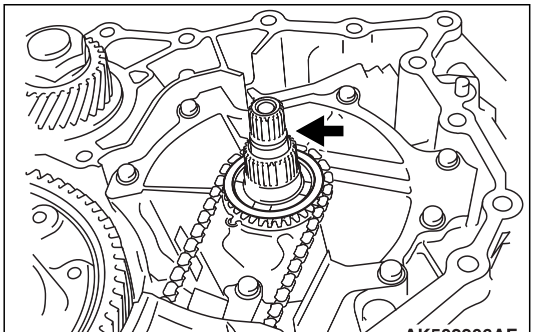
(4) Install the selected adjusting shim on the drive sprocket. For selection of the adjusting shim, refer to "SERVICE SPECIFICATIONS".





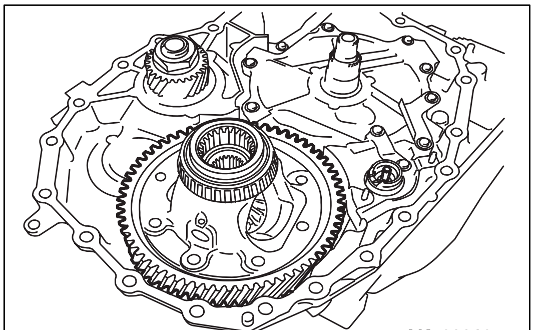
51.Install the baffle plate, and tighten the fastening nuts to the specified torque.

Tightening torque: 5.9 N· m (52 in-lb)

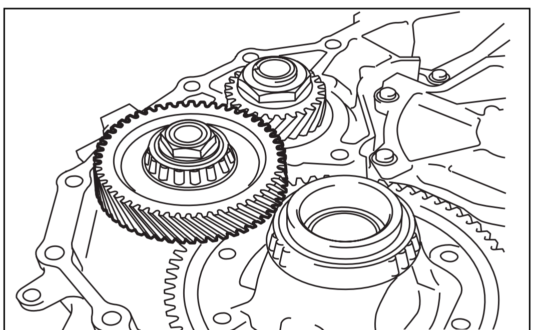

AK502206AF

⚠ CAUTION
- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**

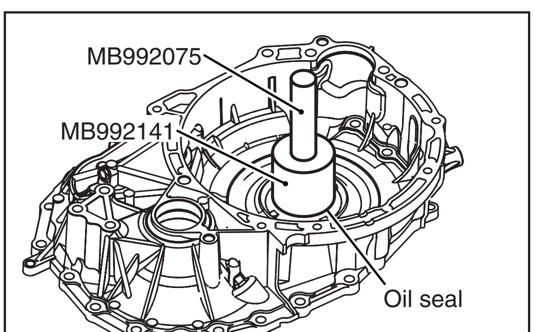
52.Install the O-ring on the input shaft.


AK502213

53.Install the differential assembly on the transaxle case.


AK502212

54.Install the reduction gear assembly on the transaxle case.

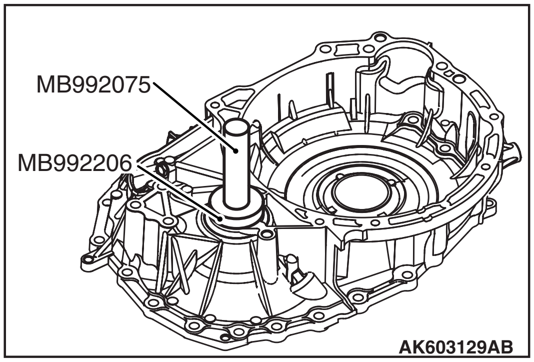


AK603128AB

⚠ CAUTION
- **Do not re-use the converter housing oil seal.**
- **Apply CVT fluid when installing the converter housing oil seal.**

55.Using the Special Tools MB992141 and MB992075, install the converter housing oil seal on the converter housing.

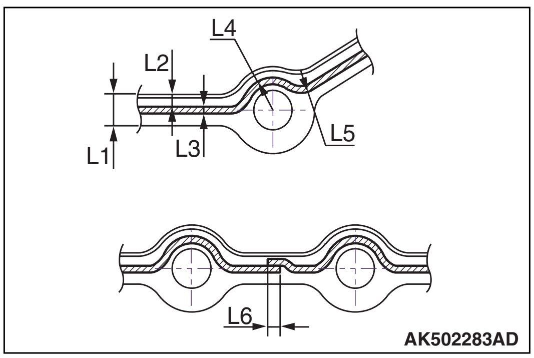
Depth from the case edge: within −1.0 ± 0.5 mm (recessed).

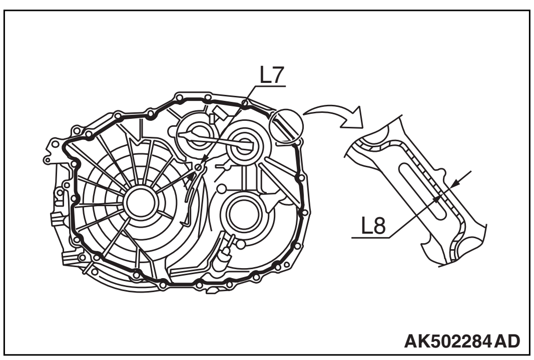


⚠ CAUTION

- **Do not re-use the converter housing side oil seal.**
- **Apply CVT fluid when installing the converter housing side oil seal.**

56.Using the Special Tools MB992206 and MB992075, install the converter housing side oil seal on the converter housing.





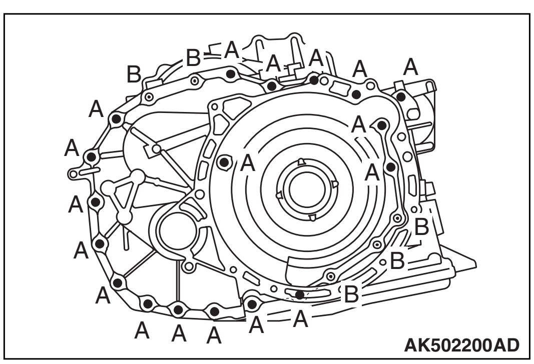
⚠ CAUTION

- **Remove any moisture, oil and oil sealant from the application surface.**
- **Make sure the starting point and the ending point are about the middle between the bolts.**

57.Apply the sealant on the converter housing mounting surface of the transaxle case in the following way.

Specified sealant: Loctite 509

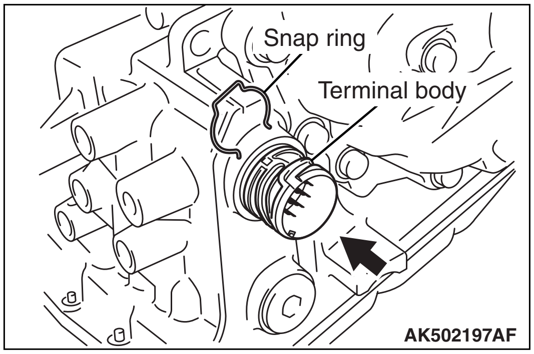
L1	9 mm
L2	5 mm
L3	ϕ 1.5 mm
L4	R 8.5 mm
L5	R 5 –8 mm
L6	R 3 –5 mm
L7	ϕ 17 mm
L8	3.5 mm



58.Install the converter housing on the transaxle case, and tighten the fastening bolts to the specified torque of 45 N· m.

Tightening torque: 45 N· m (33 ft-lb)

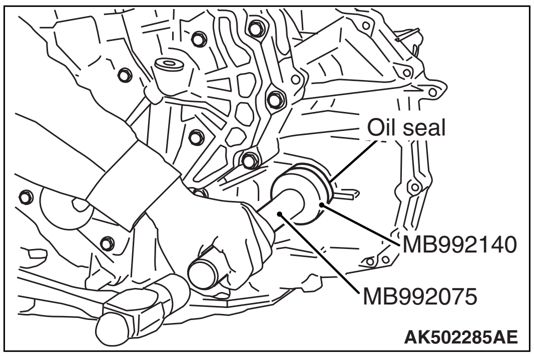
Bolt symbol	**A**	**B**
Bolt length mm	30	35
Quantity	18	5



⚠ CAUTION

Do not re-use the snap ring.

59. Install the snap ring on the terminal body.

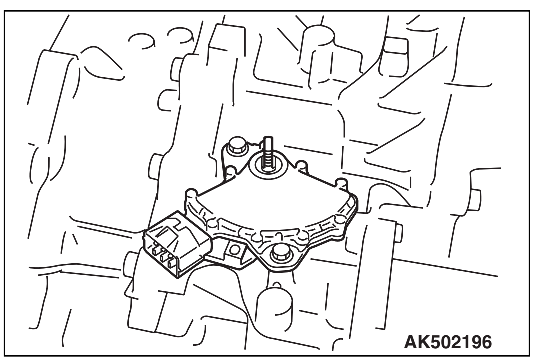


⚠ CAUTION

- **Do not re-use the side oil seal.**
- **Apply CVT fluid when installing the side oil seal.**

60. Using the Special Tool MB992140 and MB992075, install the side oil seal on the transaxle case.

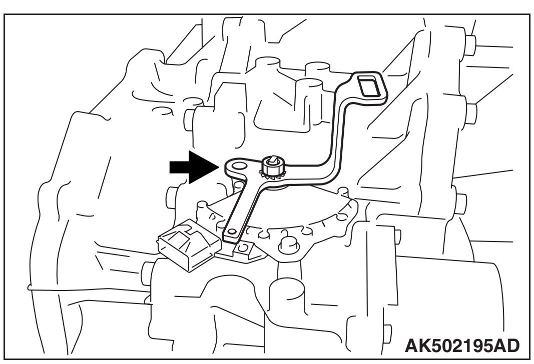
Depth from the case edge: within −1.8 ± 0.5 mm (recessed).



⚠ CAUTION

Do not re-use the inhibitor switch.

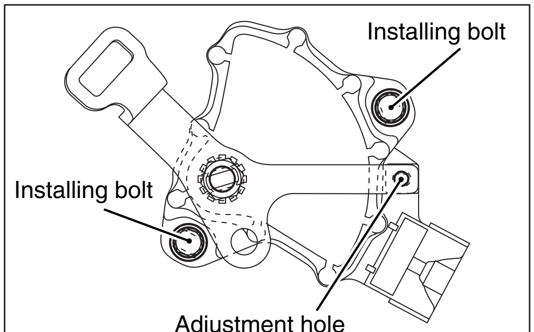
61. Install the inhibitor switch on the transaxle case as follows:
(1) Install the inhibitor switch on the transaxle case.



(2) Install the shift lever on the manual shaft, and tighten the fastening nuts to the specified torque.

Tightening torque: 17.2 N· m (13 ft-lb)

(3) Set the manual shaft at N position.

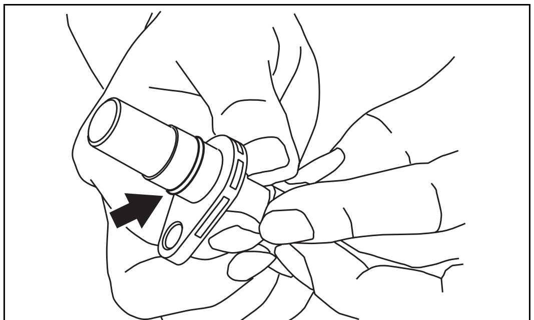


AK502773AD

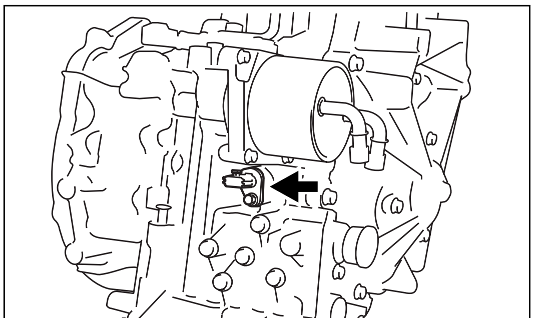
(4) Insert pins etc. (ϕ 5 mm) in adjusting holes in both inhibitor switch and shift lever, and after alignment, tighten the fastening bolts to the specified torque.

Tightening torque: 5.5 N· m (49 in-lb)

⚠ CAUTION
- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**


AK502287AD

62.Install the oil ring on the primary pulley speed sensor.

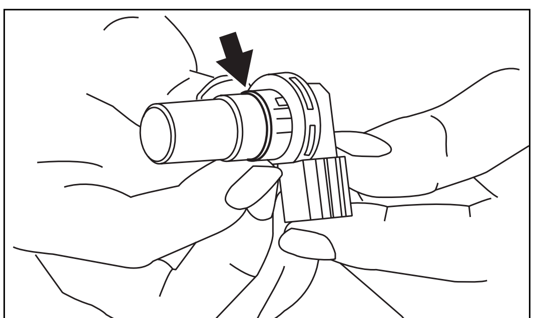

AK502194AD

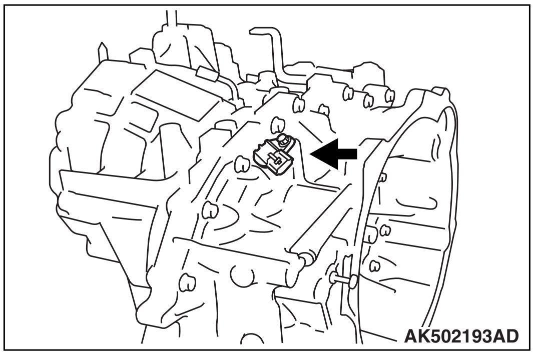
63.Install the primary pulley speed sensor on the transaxle case, and tighten the fastening bolts to the specified torque.

Tightening torque: 5.9 N· m (52 in-lb)

⚠ CAUTION
- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**

64.Install the O-ring on the secondary pulley speed sensor.


AK502288AD

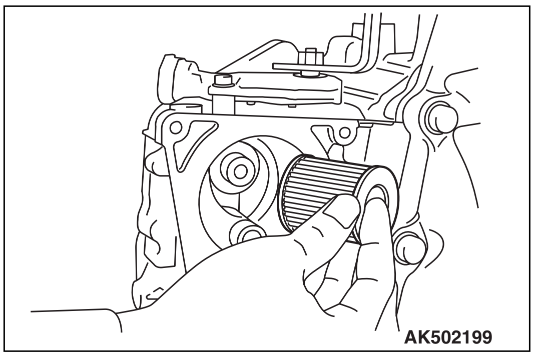


65.Install the secondary pulley speed sensor on the transaxle case, and tighten the fastening bolts to the specified torque.

Tightening torque: 5.9 N· m (52 in-lb)

⚠ **CAUTION**

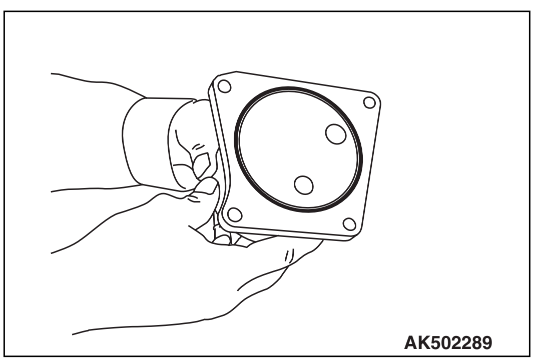
- **Apply CVT fluid or vaseline when installing the CVT fluid cooler filter.**
- **Do-not re-use the CVT fluid cooler filter.**



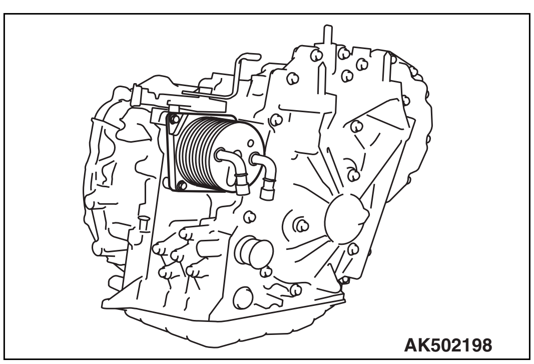
66.Install the CVT fluid cooler filter on the transaxle case.

⚠ **CAUTION**

- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**
- **When installing O-ring, make sure that projection of the O-ring is put into the groove on the filter.**



67.Install the O-ring on the CVT fluid filter.

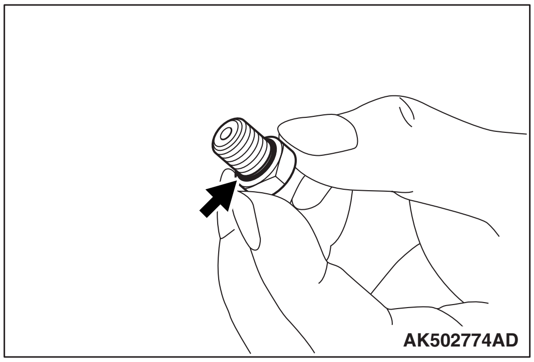


68.Install the CVT fluid cooler on the transaxle case, and tighten the fastening bolts to the specified torque.

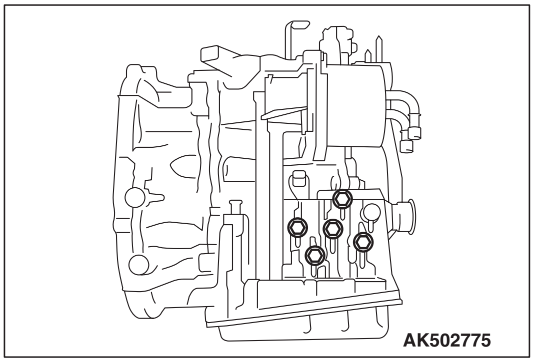
Tightening torque: 4.2 N· m (37 in-lb)

⚠ **CAUTION**

- **Do not re-use the O-ring.**
- **Apply CVT fluid when installing the O-ring.**



69.Install the O-ring on the plug.

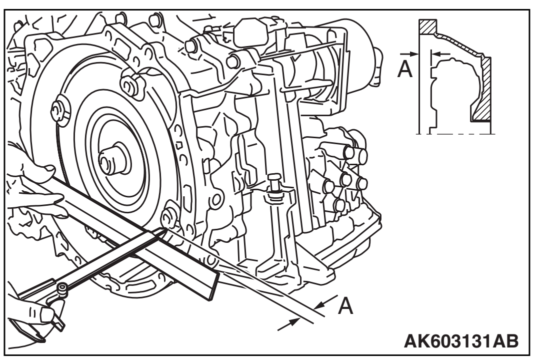


70.Fasten the plug on the transaxle case and tighten the bolt to the specified torque.

Tightening torque: 7.5 N· m (66 in-lb)

⚠ **CAUTION**

When conducting measurements, measure two or more places, and find the average value.



71.Install the converter on the transaxle, and measure the size A to check if it meets the standard value.

Standard value: 15.9 mm.

72.Install the control cable bracket and breather hose on the transaxle.

73.Install the oil filler tube and oil level gage on the transaxle.

74.Install the harness bracket on the transaxle.

75.Install the RR roll stopper bracket and FR roll stopper bracket on the transaxle.

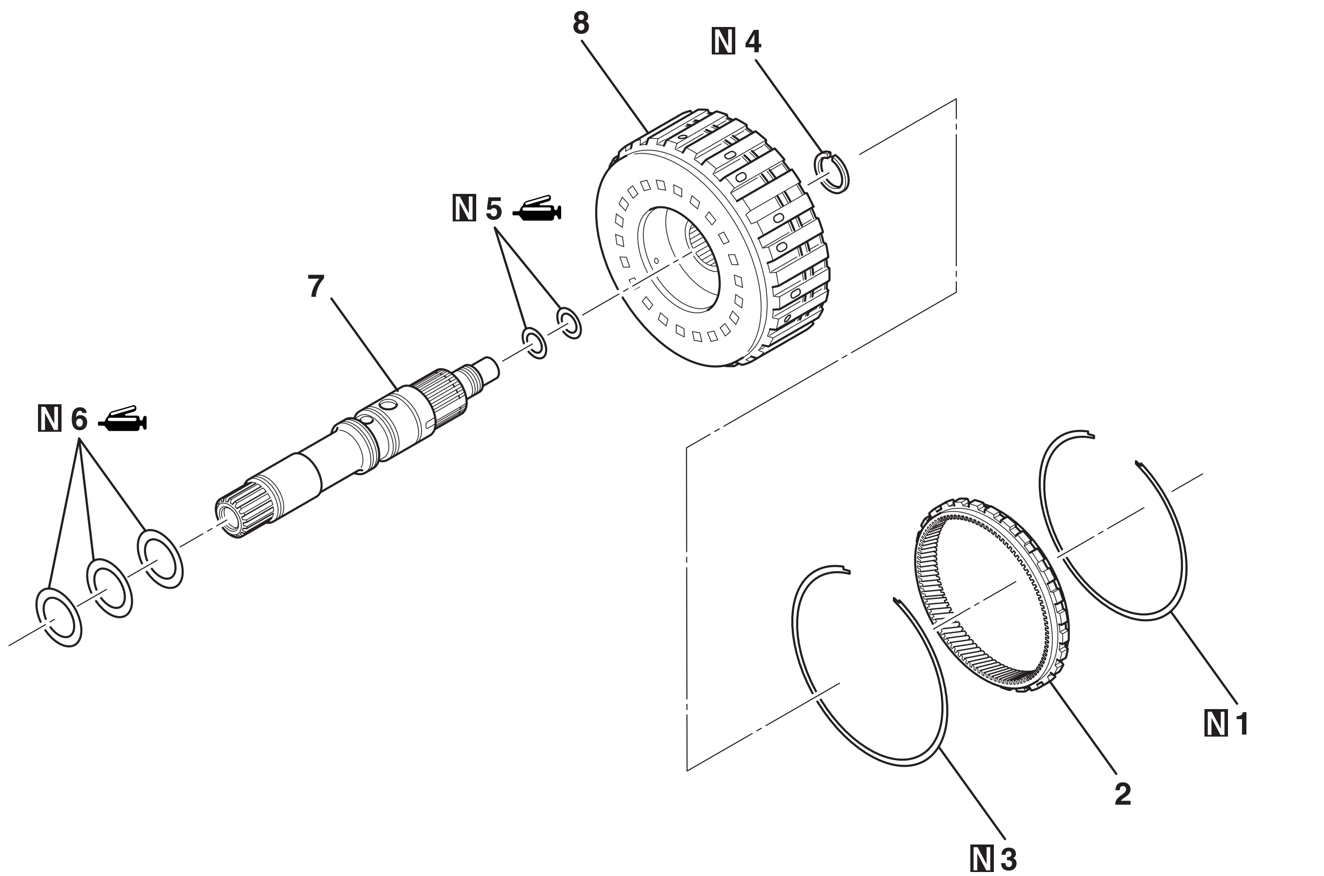
FORWARD CLUTCH

DISASSEMBLY AND ASSEMBLY

M1233209000184

⚠ CAUTION

Refer to "HOW TO USE THIS MANUAL" for the symbols in the schematic.



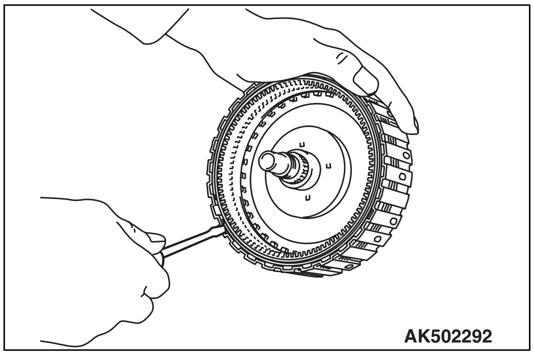
AK502291AD

			Disassembly steps
<<A>>	>>E<<	1.	Snap ring
<<B>>	>>D<<	2.	Internal gear
<<C>>	>>C<<	3.	Snap ring
<<D>>	>>B<<	4.	Snap ring

			Disassembly steps (Continued)
<<E>>	>>A<<	5.	Seal ring (small)
<<E>>	>>A<<	6.	Seal ring (big)
		7.	Input shaft
		8.	Forward clutch sub-assembly

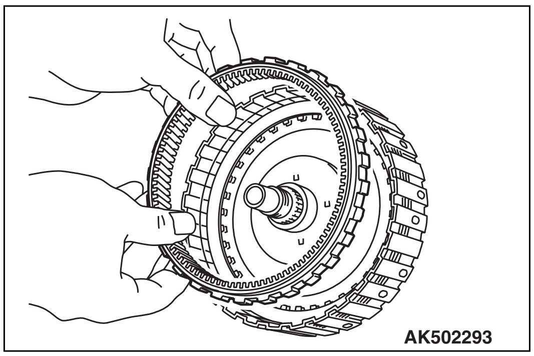
DISASSEMBLY SERVICE POINT

<<A>>SNAP RING REMOVAL



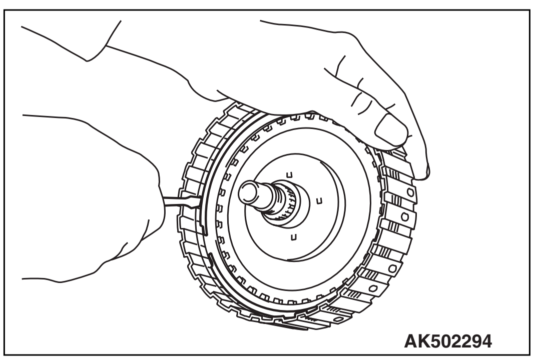
Using a flat blade screwdriver etc., remove the snap ring from the forward clutch drum.

<<B>>INTERNAL GEAR REMOVAL



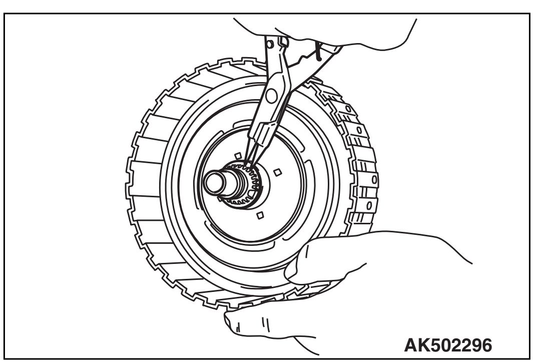
Remove the internal gear from the forward clutch drum.

<<C>>SNAP RING REMOVAL



Using a flat blade screwdriver etc., remove the snap ring from the forward clutch drum.

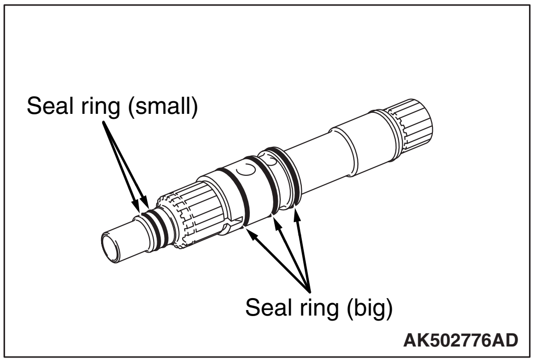
<<D>>SNAP RING REMOVAL



Remove the snap ring using snap ring pliers, and remove the input shaft from the forward clutch drum.

<<E>>SEAL RING REMOVAL

Remove the seal rings (small and big) from the input shaft.



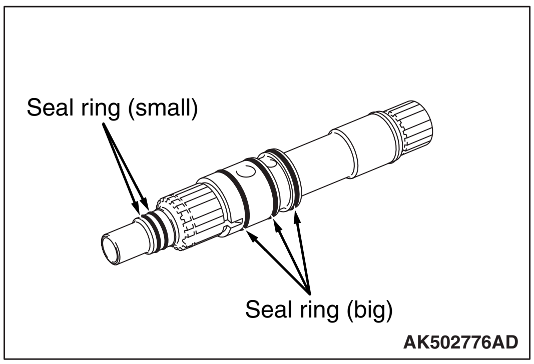
REASSEMBLY SERVICE POINT

>>A<<SEAL RING INSTALLATION

⚠ CAUTION

- **Apply vaseline when installing the seal rings.**
- **Do not re-use the seal rings.**

Install the seal rings (small and big) on the input shaft.

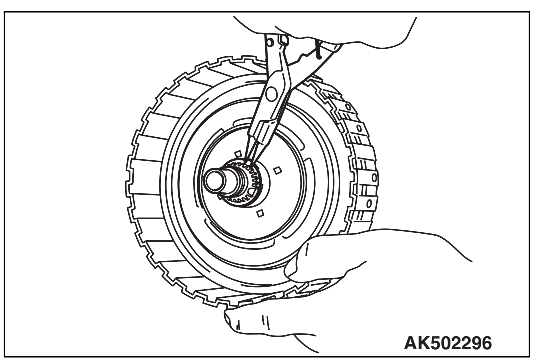


>>B<<SNAP RING INSTALLATION

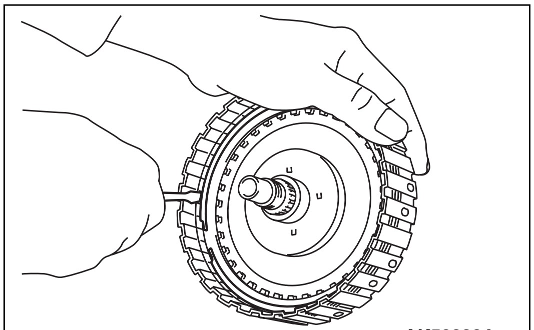
⚠ CAUTION

- **Be careful not to strain the snap ring by expanding it excessively.**
- **Do not re-use the snap ring.**

Install the input shaft on the forward clutch drum, and attach the snap ring.



>>C<<SNAP RING INSTALLATION

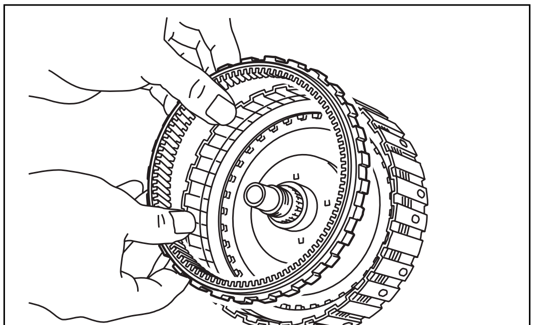

AK502294

⚠ CAUTION

Do not re-use the snap ring.

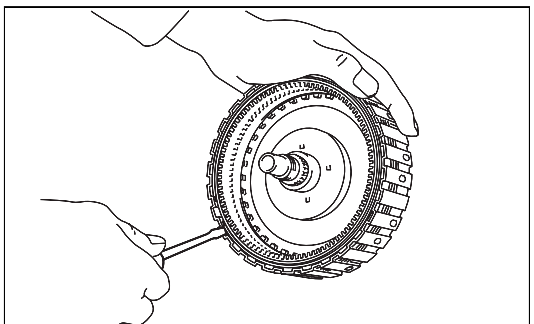
Install the snap ring on the forward clutch drum.

>>D<<INTERNAL GEAR INSTALLATION


AK502293

Install the internal gear on the forward clutch drum.

>>E<<SNAP RING INSTALLATION


AK502292

⚠ CAUTION

Do not re-use the snap ring.

Install the snap ring on the forward clutch drum.

INSPECTION

M1233200200040

FORWARD CLUTCH SUB-ASSEMBLY

Check if there is a damage, deformation, or burn marks, and replace the forward clutch sub-assembly if any defect is found.

INPUT SHAFT AND INTERNAL GEAR

Check if there is a damage or deformation, and replace if any defect is found.

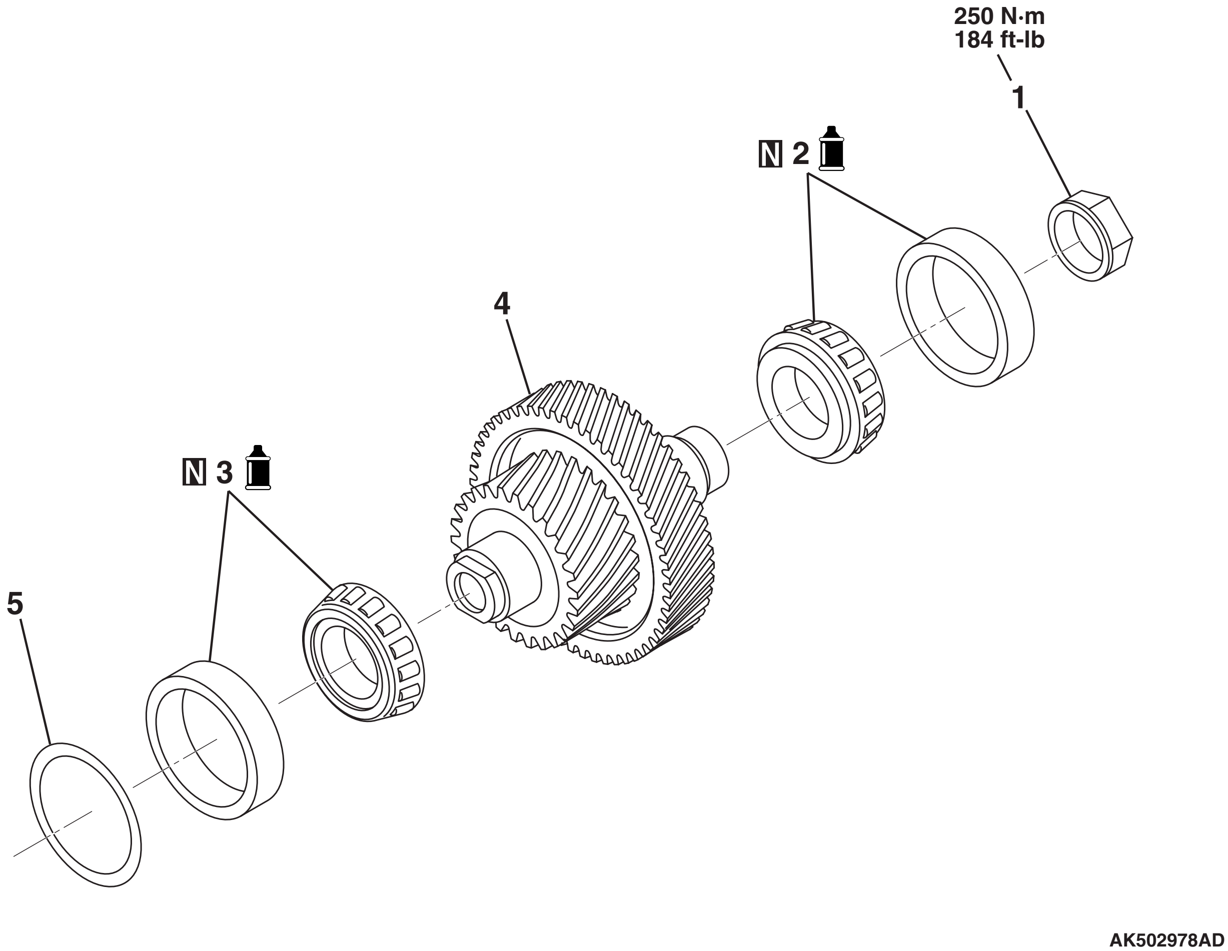
REDUCTION GEAR

DISASSEMBLY AND ASSEMBLY

M1233200600059

⚠ CAUTION

Refer to "HOW TO USE THIS MANUAL" for the symbols in the schematic.



			Disassembly steps
<<A>>	>>C<<	1.	Nut
<<B>>	>>B<<	2.	Reduction gear bearing
<<C>>	>>A<<	3.	Reduction gear bearing

Disassembly steps (Continued)

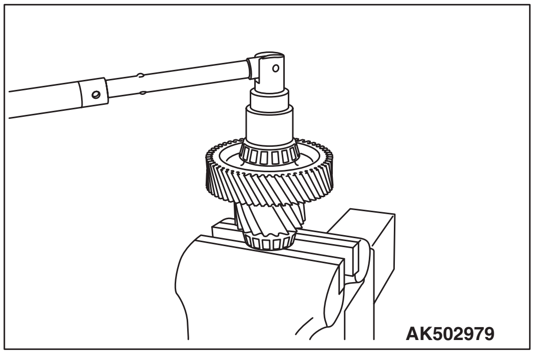
4. Reduction gear sub-assembly
5. Adjusting shim

Required Special Tools:

- MB990810: Side bearing puller
- MB990947: Lower arm push arbor
- MD999566: Crow
- MB990984: Mount bushing lower roll insulator arbor
- MD998917: Bearing remover
- MD998812: Installer Cap
- MD998813: Installer-100
- MD998819: Installer adapter (40)

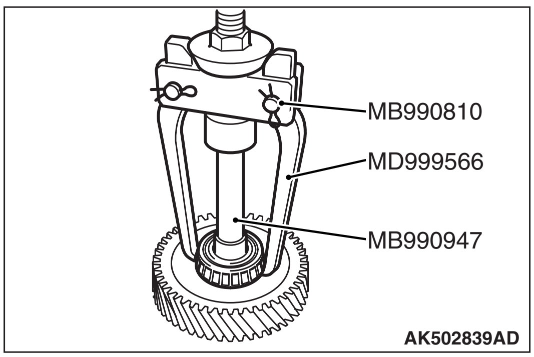
DISASSEMBLY SERVICE POINT

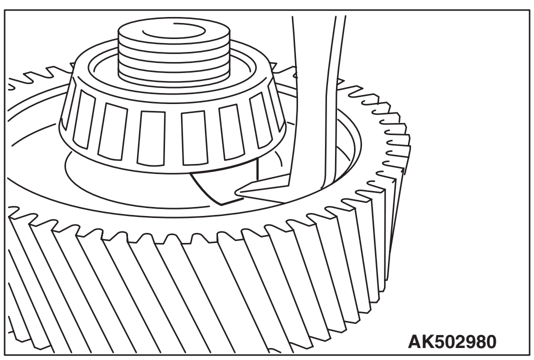
<<A>>NUT REMOVAL



Remove the nut from the reduction gear sub-assembly.

<<B>>REDUCTION GEAR BEARING REMOVAL



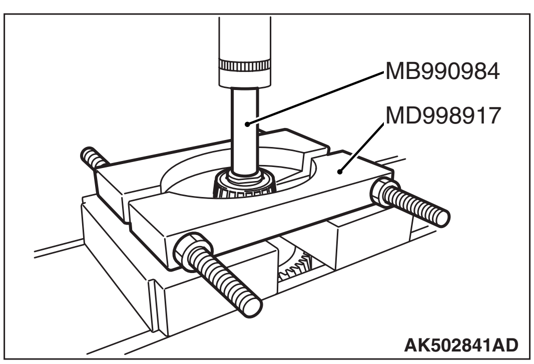


⚠ CAUTION

Align the tang of special tool as shown in the diagram.

Using the Special Tools MB990810, MB990947 and MD999566, remove the inner race of reduction gear bearing (converter housing side) from the reduction gear sub-assembly.

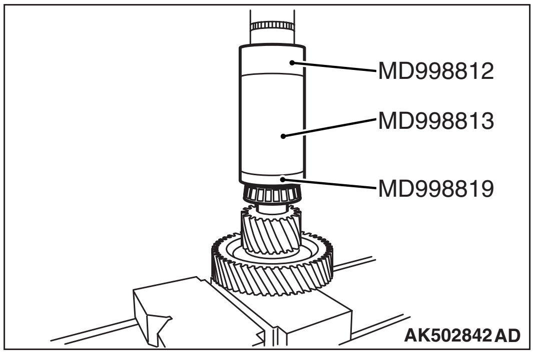
<<C>>REDUCTION GEAR BEARING REMOVAL



Using the Special Tools MB990984 and MD998917, remove the outer race of reduction gear bearing (transaxle case side) from the reduction gear sub-assembly.

ASSEMBLY SERVICE POINT

>>A<<REDUCTION GEAR BEARING INSTALLTION

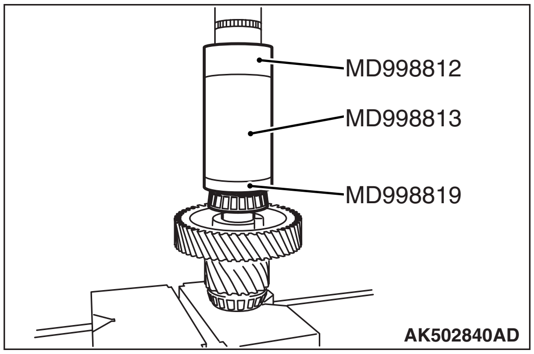


⚠ **CAUTION**

- **Do not re-use the inner race.**
- **Replace the inner race together with the outer race.**

Using the Special Tools MD998812, MD998813 and MD998819, install the inner race of reduction gear bearing (transaxle case side) on the reduction gear sub-assembly.

>>B<<REDUCTION GEAR BEARING INSTALLATION

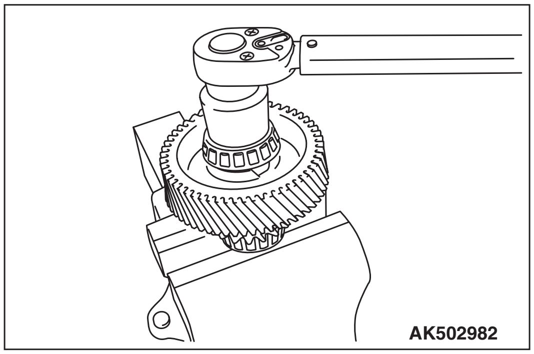


⚠ **CAUTION**

- **Do not re-use the inner race.**
- **Replace the inner race together with the outer race.**

Using the Special Tools MD998812, MD998813 and MD998819, install the inner race of reduction gear bearing (converter housing side) on the reduction gear sub-assembly.

>>C<<NUT INSTALLATION



Install the nut on the reduction gear sub-assembly to the specified torque.

Tightening torque: 250 N· m (184 ft-lb)

INSPECTION

M1233200700034

REDUCTION GEAR SUB-ASSEMBLY

Measure the inner race press-fit shaft diameter of reduction gear sub-assembly, and replace the assembly if the diameter does not meet the standard value.

Standard values

- **Converter housing side: ϕ 30.008 – 30.029 mm**
- **transaxle case side: ϕ 30.008 – 30.029 mm**

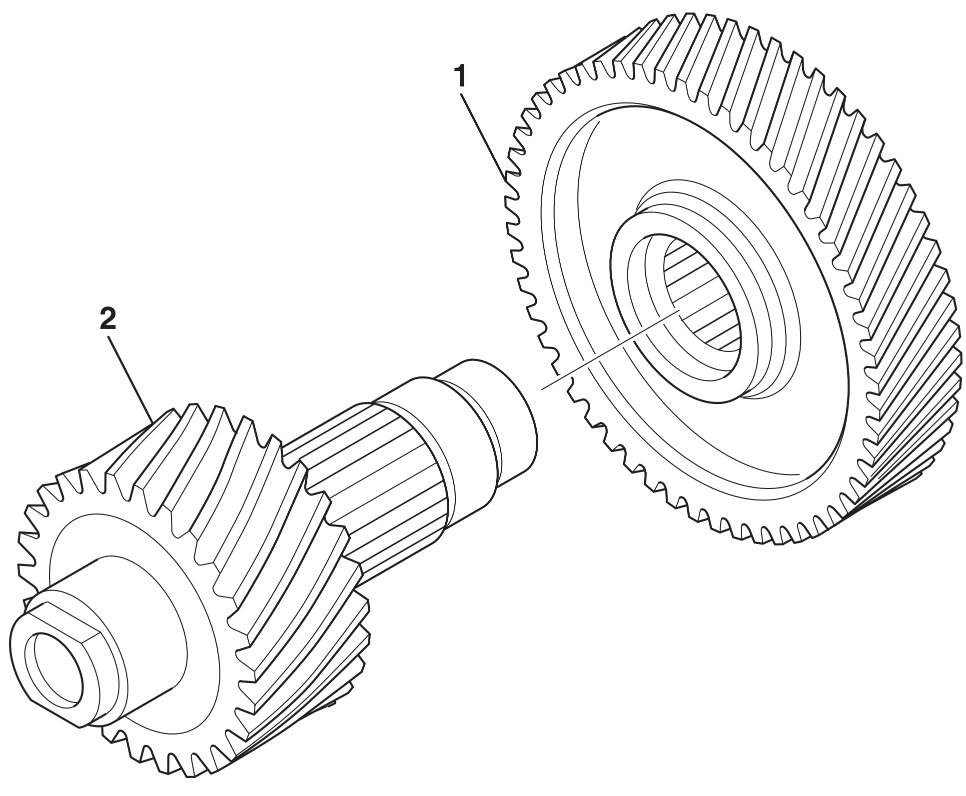
REDUCTION GEAR SUB-ASSEMBLY

ASSEMBLY

M1233200900038

⚠ CAUTION

The reduction gear sub-assembly can only be assembled, not disassembled.



AK503079AD

Assembly steps

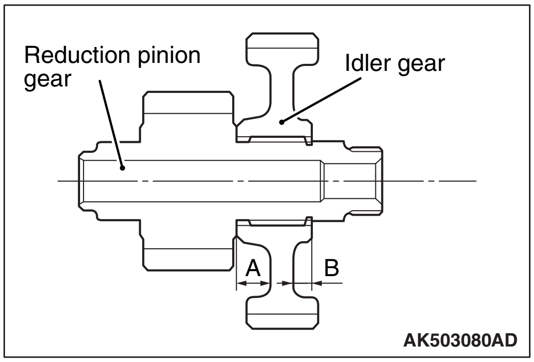
- >>A<< 1. Idler gear
- >>A<< 2. Reduction pinion gear

Required Special Tools:

- MD998812: Installer Cap
- MD998813: Installer-100
- MD998819: Installer adapter (40)

ASSEMBLY SERVICE POINT

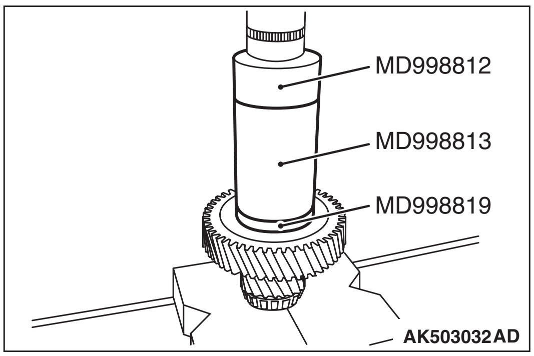
>>A<<REDUCTION PINION GEAR / IDLER GEAR INSTALLATION



⚠ CAUTION

When attaching the idler gear to the reduction pinion gear, make sure the center boss portion A faces the reduction pinion gear.

Center boss portion A	**Long**
Center boss portion B	**Short**



Using the Special Tools MD998812, MD998813 and MD998819, attach the idler gear to the reduction pinion gear.

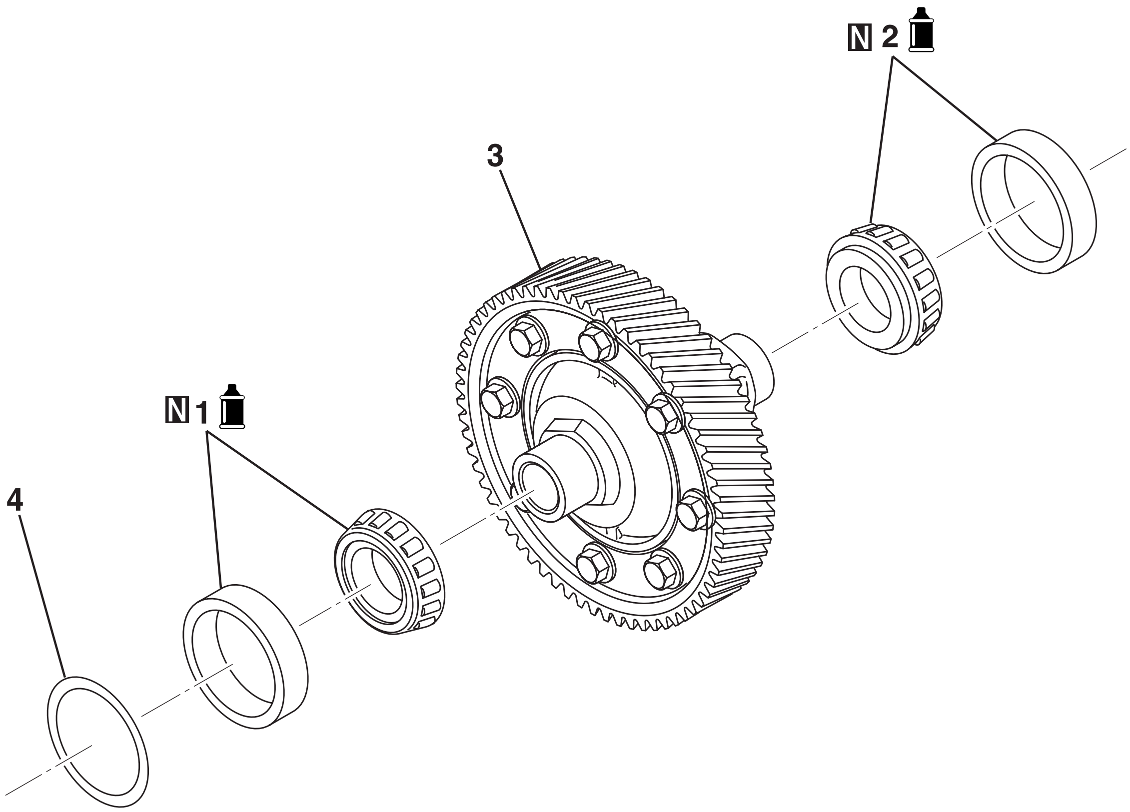
DIFFERENTIAL

DISASSEMBLY AND ASSEMBLY

M1233213000176

⚠ CAUTION

Refer to "HOW TO USE THIS MANUAL" for the symbols in the schematic.



			Disassembly steps
<<A>>	>>B<<	1.	Differential side bearing
<<B>>	>>A<<	2.	Differential side bearing

Disassembly steps (Continued)

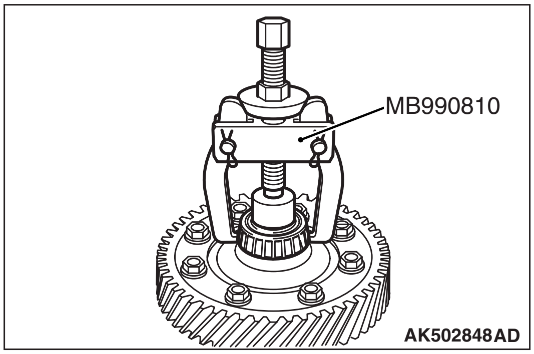
3. Differential sub-assembly
4. Adjusting shim

Required Special Tools:

- MB990810: Side bearing puller
- MB991452: Oil seal installer
- MD998812: Installer Cap
- MD998813: Installer-100
- MD998819: Installer adapter (40)
- MB992138: Bearing Installer
- MD998823: Installer adapter (48)

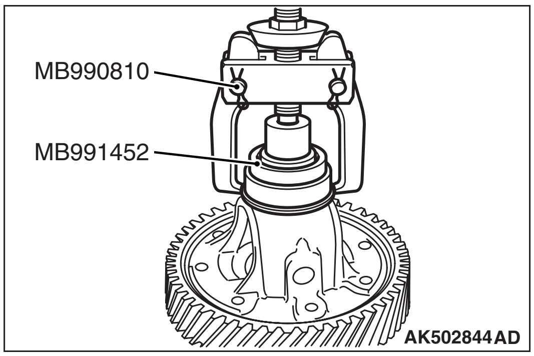
DISASSEMBLY SERVICE POINT

<<A>>DIFFERENTIAL SIDE BEARING REMOVAL



Using the Special Tool MB990810, remove the inner race of differential side bearing (transaxle case side) from the differential sub-assembly.

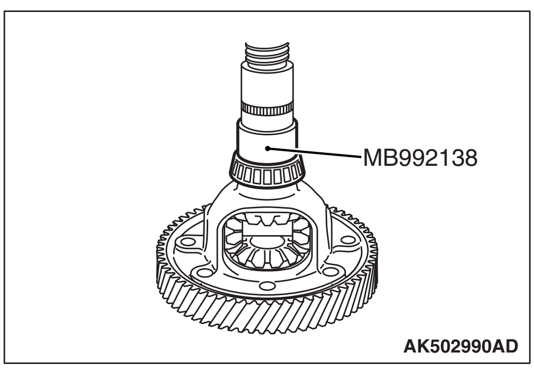
<<B>>DIFFERENTIAL SIDE BEARING REMOVAL



Using the Special Tools MB990810 and MB991452, remove the inner race of differential side bearing (converter housing side) from the differential sub-assembly.

REASSEMBLY SERVICE POINT

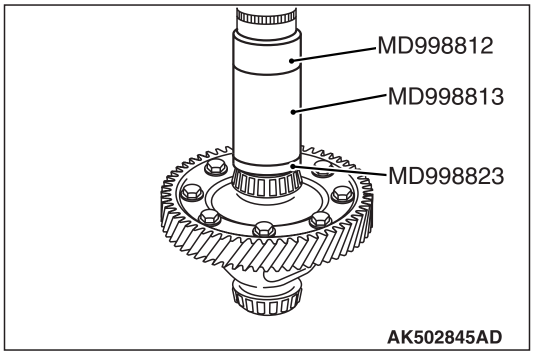
>>A<<DIFFERENTIAL SIDE BEARING INSTALLATION



⚠ **CAUTION**

- **Do not re-use the inner race.**
- **Replace the inner race together with the outer race.**

Using the Special Tool MB992138, install the inner race of reduction gear bearing (converter housing side) on the reduction gear sub-assembly.



>>B<<REDUCTION GEAR BEARING INSTALLATION

CAUTION

- **Do not re-use the inner race.**
- **Replace the inner race together with the outer race.**

Using the Special Tools MD998812, MD998813 and MD998823, install the inner race of reduction gear bearing (transaxle case side) on the reduction gear sub-assembly.

INSPECTION

M1233200800031

DIFFERENTIAL SUB-ASSEMBLY

Measure the inner race press-fit shaft diameter of differential sub-assembly, and replace the assembly if the diameter does not meet the standard value.

Standard values

- **Converter housing side: ϕ 60.032 –60.078 mm**
- **Transaxle case side: ϕ 40.026 –40.051 mm**

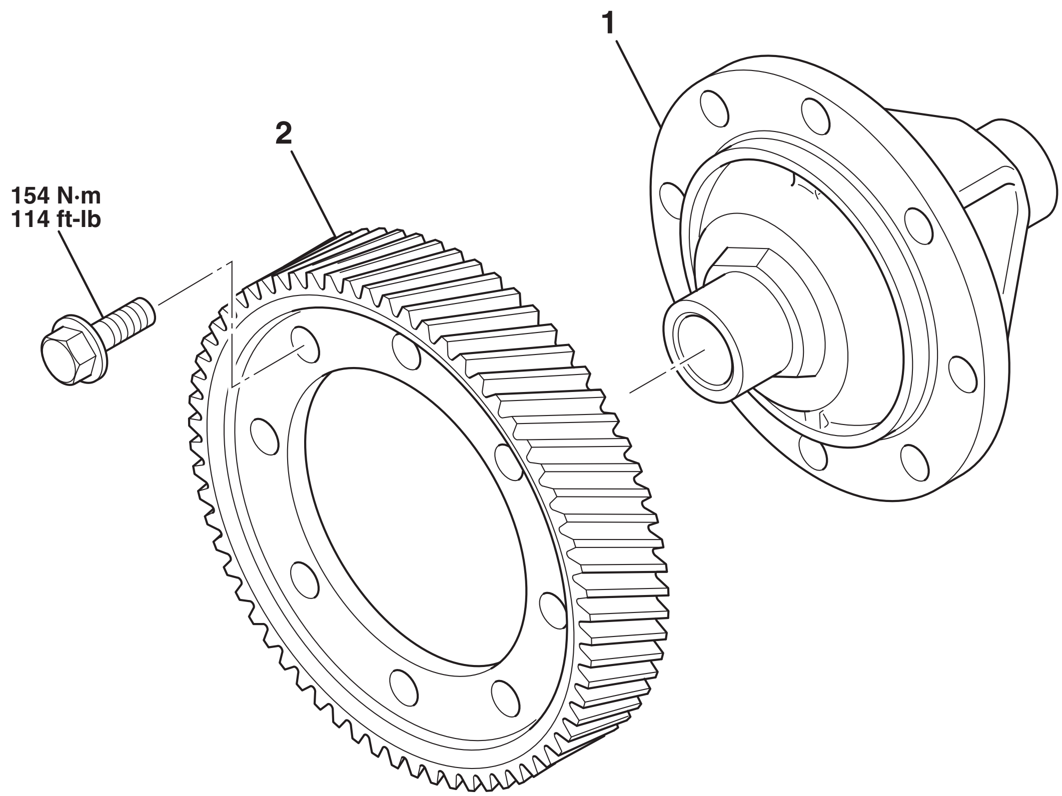
DIFFERENTIAL SUB-ASSEMBLY

ASSEMBLY

M1233201200032

⚠ CAUTION

The differential sub-assembly can only be assembled, not disassembled.

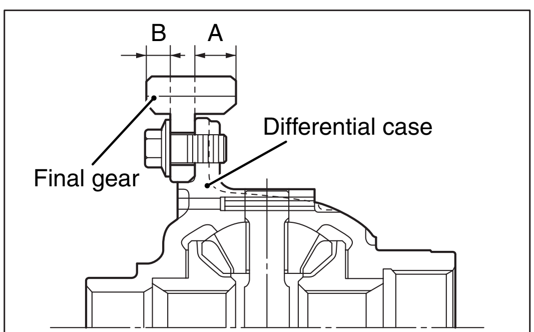


AK503081AD

		Assembly steps
>>A<<	1.	Differential case
>>A<<	2.	Final gear

ASSEMBLY SERVICE POINT

>>A<<DIFFERNTIAL CASE/FINAL GEAR INSTALLATION

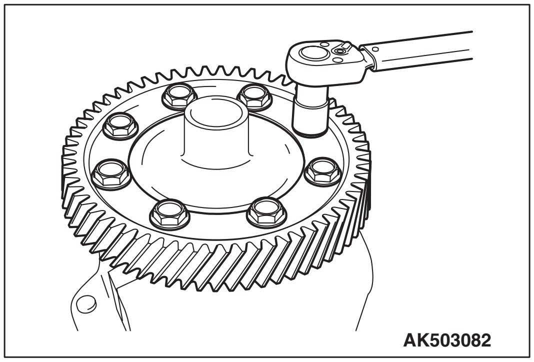


AK503083 AD

⚠ CAUTION

When attaching the final gear to the differential case, make sure the side with the bigger distance from the edge to the flange A face the differential case.

Distance from gear edge to flange A	**Long**
Distance from gear edge to flange B	**Short**



Install the final gear on the differential case, and tighten the fastening bolts to the specified torque.

Tightening torque: 154 N·m (114 ft-lb)

GROUP 36

PARKING BRAKES

CONTENTS

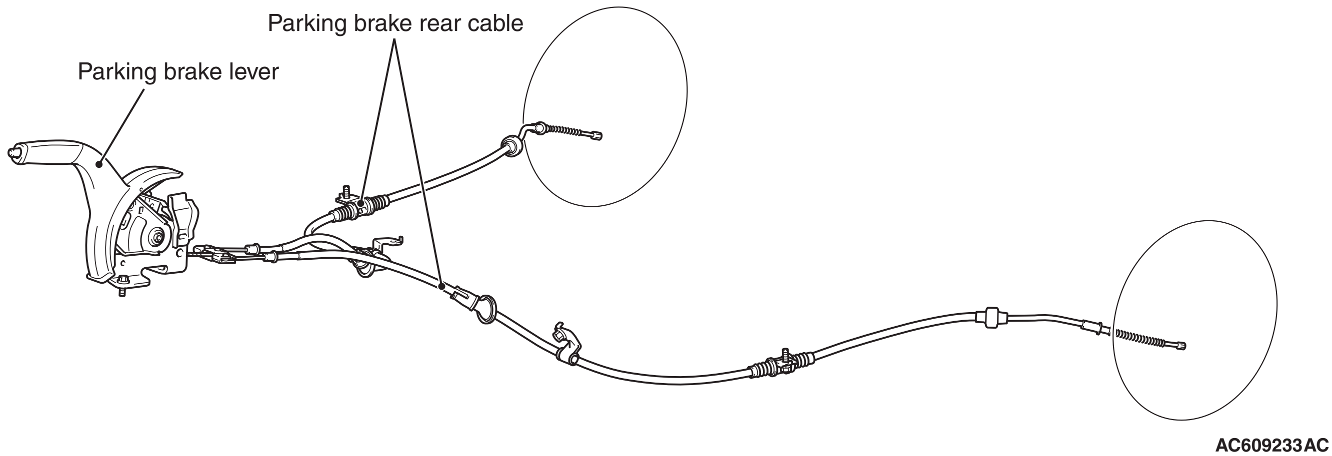
GENERAL INFORMATION

M2360000100753

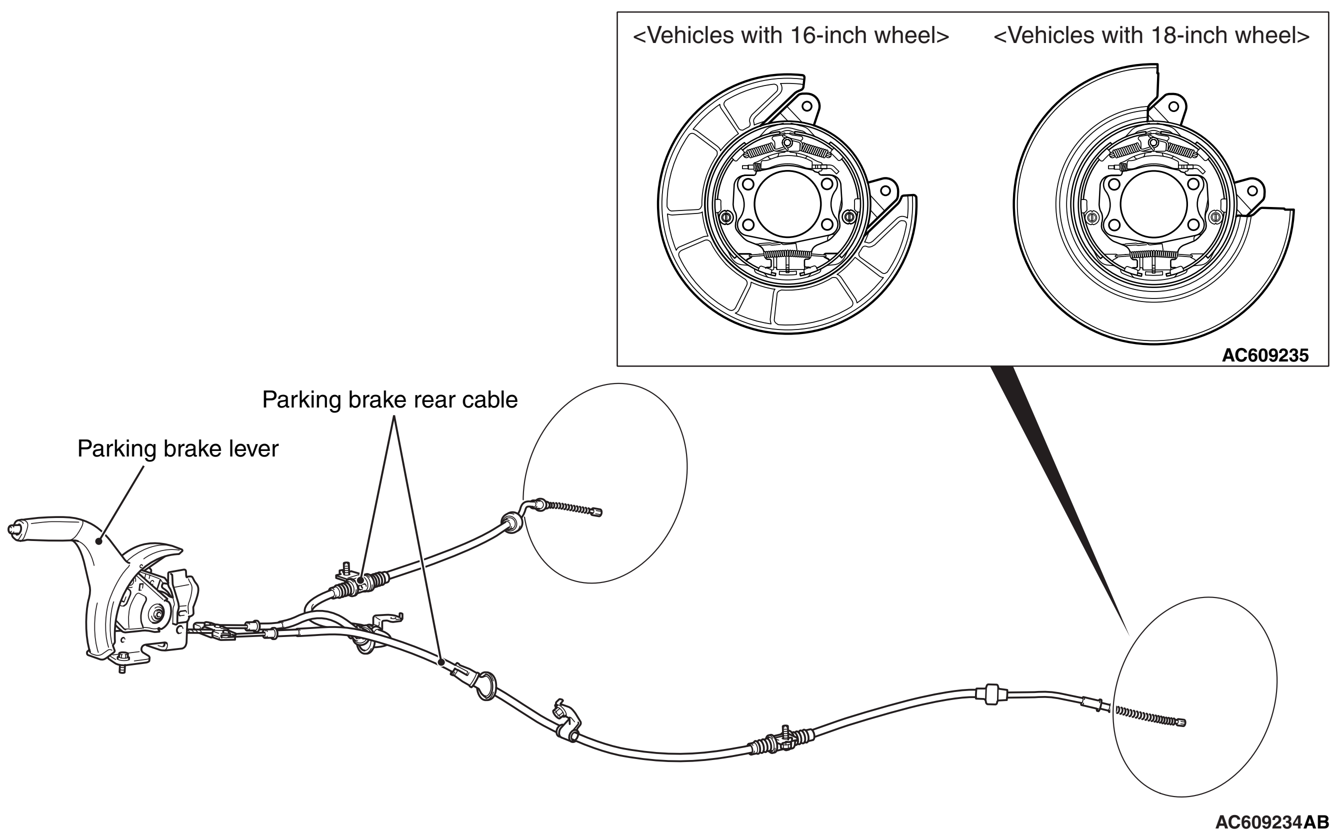
A parking brake lever is used to operate the mechanical rear-wheel acting type parking brake.

CONSTRUCTION DIAGRAM

<Vehicles with rear drum brake>



<Vehicles with rear disc brake>



GROUP 35A

BASIC BRAKE SYSTEM

CONTENTS

GENERAL

M2350000100956

Brake systems with higher reliability and durability have achieved distinguished braking performance.

FEATURES

IMPROVEMENT OF BRAKING PERFORMANCE

- A 10-inch single brake booster with the variable boost ratio mechanism has been used to assure maximum braking force with less pedal pressure in case of emergency. <Vehicles with ABS>
- In addition to the 10-inch single brake booster, a small and long stroke-type master cylinder has been adopted to achieve downsizing and secure assist force.
- 15-inch or 16-inch ventilated disc brakes have been adopted for the front.
- 8-inch leading trailing-type drum brake, 14-inch or 16-inch solid disc brake has been adopted for the rear.

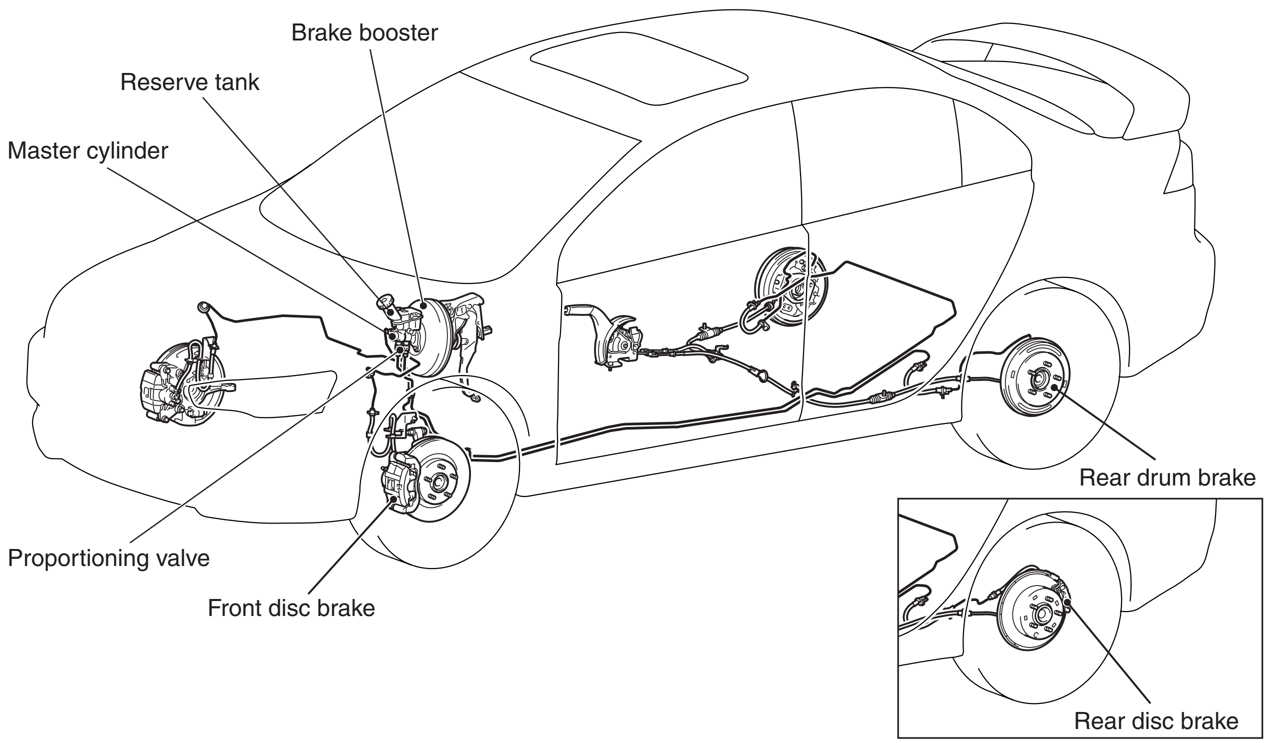
IMPROVEMENT IN SAFETY

- The 4-wheel anti-lock brake system (4ABS) has been installed to prevent slippage resulting from the wheel lock and assure stable vehicle posture and driveability.<Vehicles with ABS>
- A rear wheel early lock-prevention proportioning valve has been used. <Vehicles without ABS>
- Electronic control braking force distribution system (EBD) has been adopted to assure the maximum braking force independently of the passenger's position in the vehicle. <Vehicles with ABS>
- X-type piping of brake lines have been adopted for the front and rear wheels.
- Audible wear indicators are used on the front and rear brake pads to warn the driver of wear limit.

SERVICE QUALITY IMPROVEMENTS

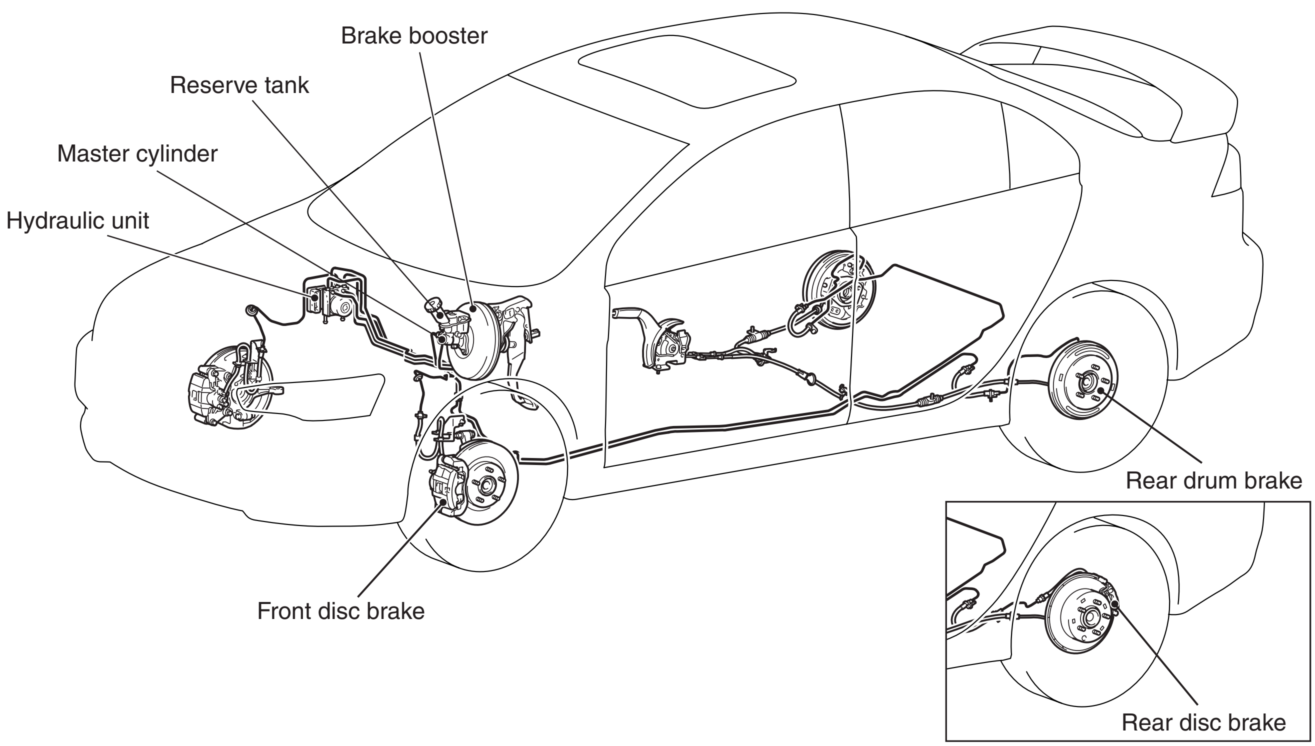
- Diagnostic function has been adopted to ABS for easier inspection. <Vehicles with ABS>
- Brake fluid reservoir, master cylinder, and brake booster have been integrated for downsizing and better serviceability.

<Vehicles without ABS>



AC609311AB

<Vehicles with ABS>



AC609312AB

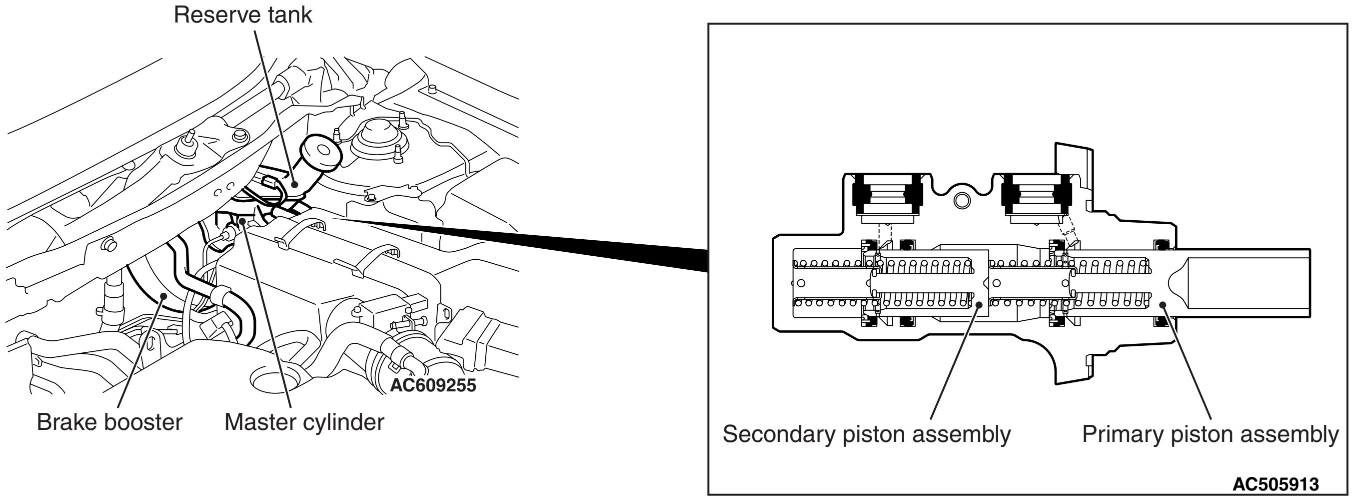
SPECIFICATIONS

Item			Specifications
Master cylinder	Type		Tandem type
	I.D. mm (in)		20.6 (0.81)
Brake booster	Type		Vacuum type, single
	Effective dia. of power cylinder mm (in)		254 (10.0)
	Boost ratio	Vehicles without ABS	6.5 (Pedal pressure: 188N)
		Vehicles with ABS	6.5 (Pedal pressure: 92N) 8.5 (Pedal pressure: 156N)
Rear wheel hydraulic control type		Vehicles without ABS	Proportioning valves
		Vehicles with ABS	Electronic control braking force distribution system (EBD)
Front disc brake	Type	Vehicles with 16-inch wheel	Floating caliper 1 piston ventilated disc (V5-S57)
		Vehicles with 18-inch wheel	Floating caliper 1 piston ventilated disc (V6-S57)
	Disc effective dia × thickness mm (in)	Vehicles with 16-inch wheel	222 × 26 (8.7 × 1.02)
		Vehicles with 18-inch wheel	241.6 × 26 (9.5 × 1.02)
	Cylinder I.D. mm (in)		57.1 (2.25)
	Pad thickness mm (in)		10.0 (0.39)
	Clearance adjustment		Automatic adjustment
Rear drum brake	Type		Leading trailing drum
	Drum I.D. mm (in)		203 (8.0)
	Wheel cylinder I.D. mm (in)		19.0 (0.75)
	Lining thickness mm (in)		4 (0.157)
	Clearance adjustment		Automatic
Rear disc brake	Type	Vehicles with 16-inch wheel	Floating caliper 1 piston solid disc (S4-S35)
		Vehicles with 18-inch wheel	Floating caliper 1 piston solid disc (S6-S35)
	Disc effective dia × thickness mm (in)	Vehicles with 16-inch wheel	226 × 10 (8.9 × 0.39)
		Vehicles with 18-inch wheel	258 × 10 (10.2 × 0.39)
	Cylinder I.D. mm (in)		34.9 (1.37)
	Pad thickness mm (in)		10.0 (0.39)
	Clearance adjustment		Automatic adjustment

CONSTRUCTION DESCRIPTION

MASTER CYLINDER

M2350001000576

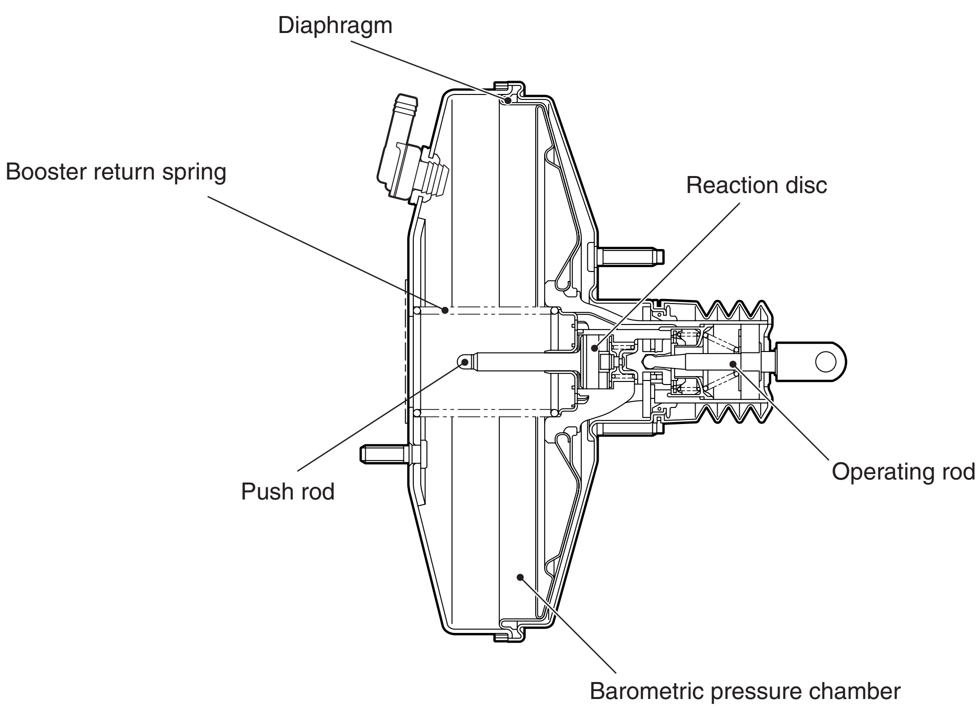


AC609469AB

The master cylinder is a tandem type and is integrated with the brake fluid reservoir with the level switch.

BRAKE BOOSTER

M2350002000698

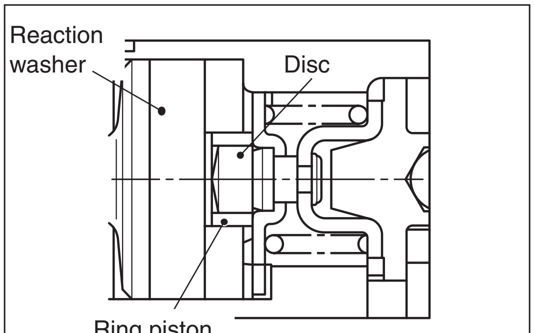


AC505931 AB

A 10-inch single brake booster has been installed. The variable boost ratio mechanism which increases the brake booster gain has been adopted.

VARIABLE BOOST RATIO MECHANISM

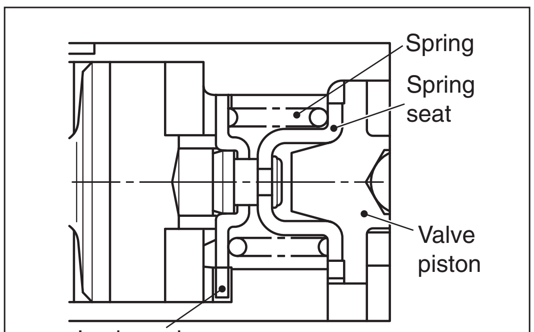
The variable boost ratio mechanism changes the input/output characteristics of the brake booster in two phases by changing the reaction force applied to the valve plunger during the assist phase.



AC507766AB

AT INITIAL ASSISTING

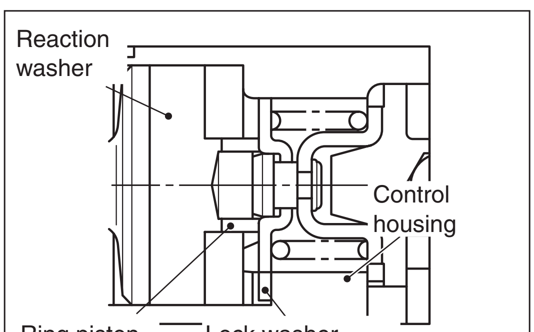
1. When the brake pedal is not depressed (no input load applied), the reaction washer is not deformed.
2. When the brake pedal is depressed, the reaction washer is deformed to reach the ring piston and disc, then the first input characteristics begin (Ratio 1).



AC507768AB

AT AN INCREMENT OF ASSIST RATIO

1. The reaction washer is further deformed and pushes down the ring piston and lock washer, deflecting the spring. All the force pushing the ring piston and disc is transferred to the brake pedal via spring seat and disc as the reaction force.

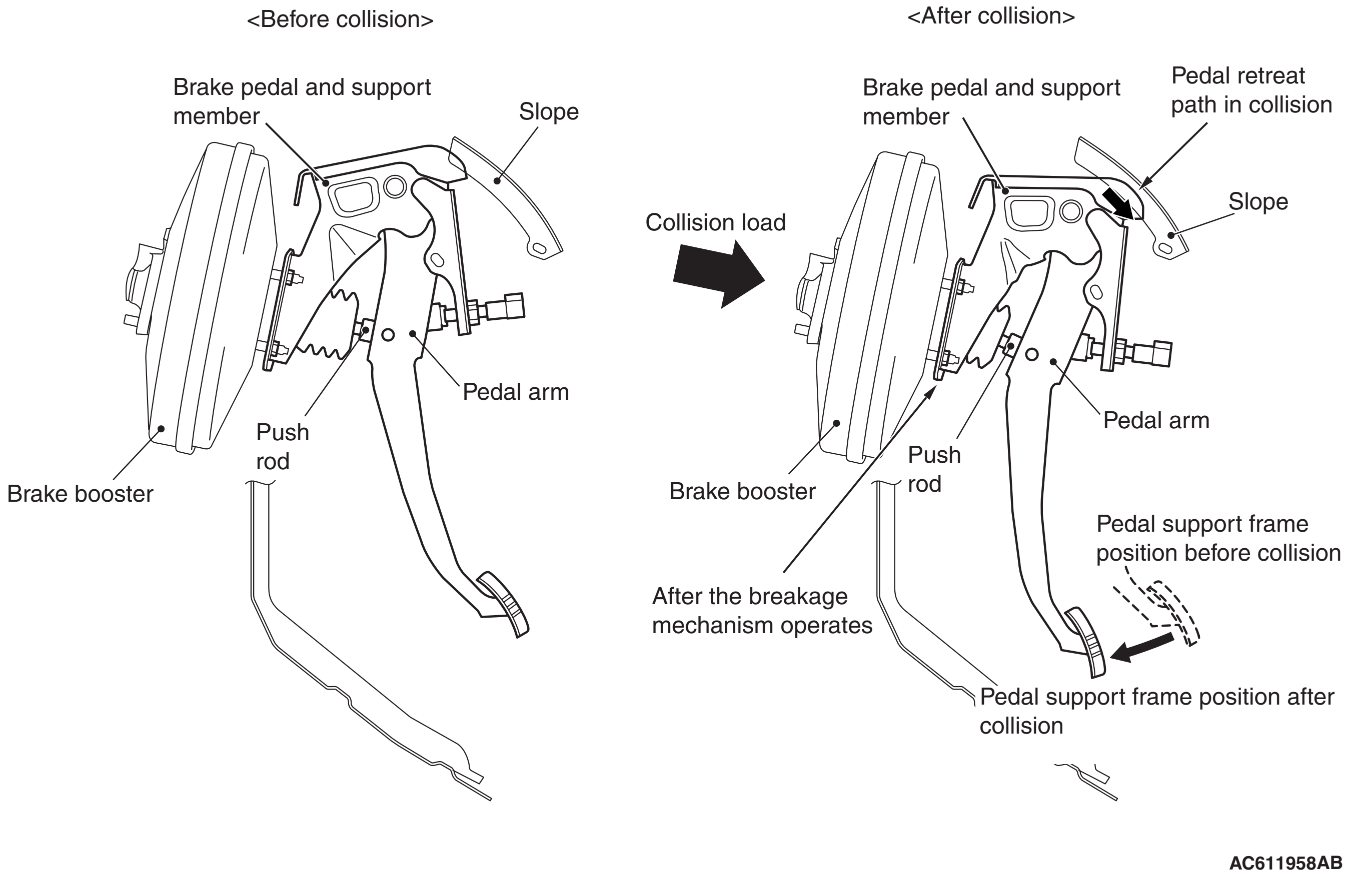


AC507769AB

2. The reaction washer is then further deformed, and when the lock washer makes contact with the control housing, the input characteristics change. All the force applied from the reaction washer to the ring piston is now transferred to the control housing via the lock washer, so no force is applied to the brake pedal. The second input characteristics (Ratio 2) begin.

BRAKE PEDAL

M2350007000422

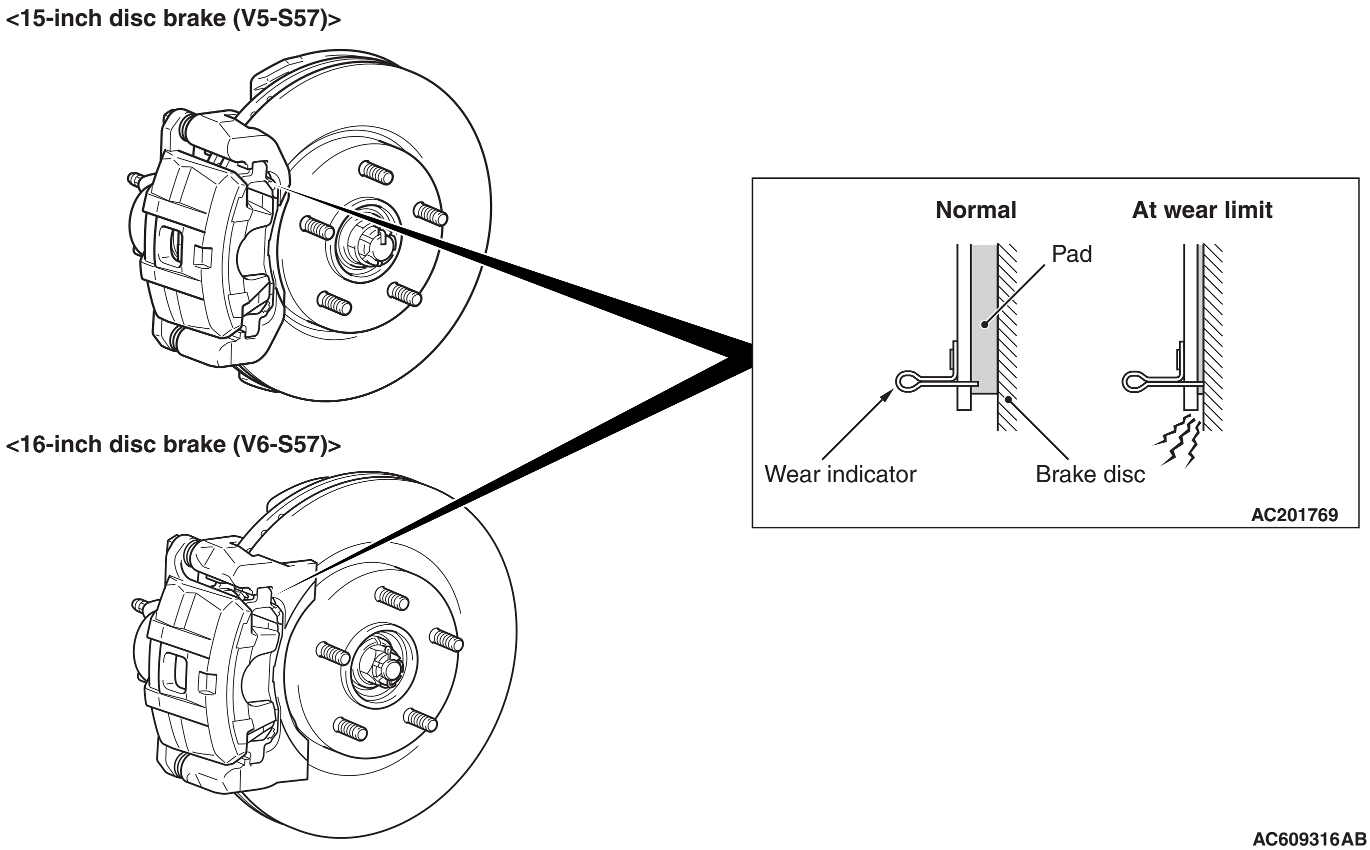


The brake pedal retreat suppression mechanism that restraints the retraction of the brake pedal surface during a frontal collision has been adopted in order to reduce the shock to the driver's feet.

When the brake booster is crushed rearward by the engine retreat during a frontal collision, the installation surface of the brake pedal is retreated. In this case, the end of the pedal support is forcibly slid down and back by the interference with the slope mounted on the front deck crossmember assembly. At the same time, the linkage comprised of the pedal support, pedal arm, and push rod moves the brake pedal pad surface forward.

FRONT BRAKE

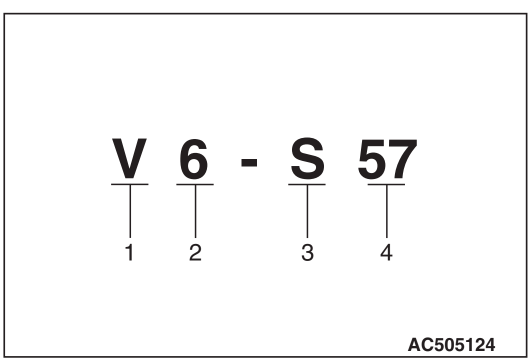
M2350003000602



Brakes with the following specifications have been adopted for the front brakes.

- The 1-piston ventilate disc brake (V5-S57 <Vehicles with 16-inch wheel> or V6-S57 <Vehicles with 18-inch wheel>) has been adopted.
- An audible wear indicator that informs the driver of application limit has been adopted onto the front brake LH pads.
- The outer disc type brake disc which can be tightened together with the wheel has been introduced for better serviceability.

DISC BRAKE DESIGNATION

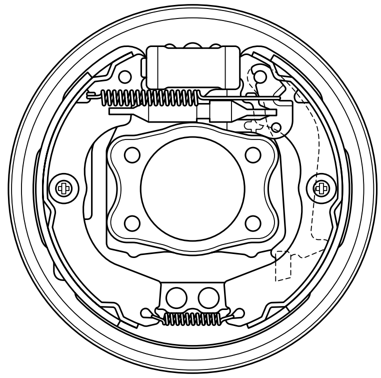


No.	Item	Contents
1	Brake disc type	V: Ventilated S: Solid
2	Brake size (Minimum applicable disc wheel)	4: 14" 5: 15" 6: 16"
3	Number of pistons	S: 1 (Floating type)
4	Piston size (Rounded integral value)	35: ϕ34.9 mm 57: ϕ57.1 mm

REAR BRAKE

M2350004000616

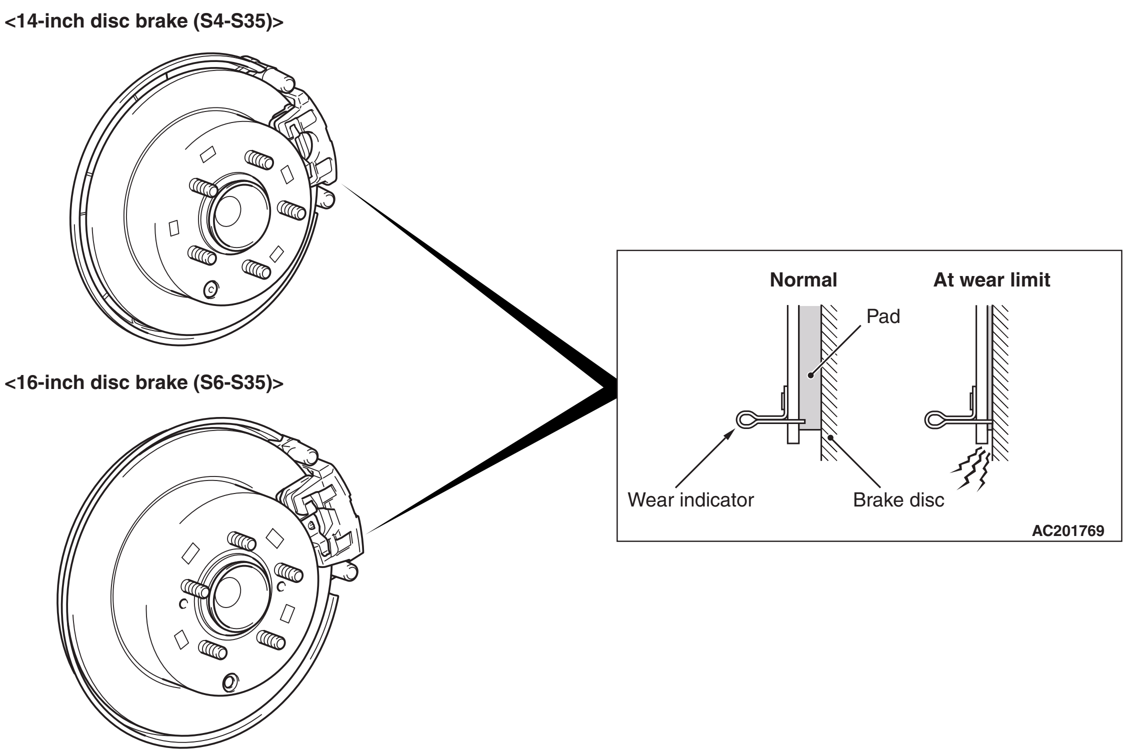
<Vehicles with rear drum brake>



AC609282

8-inch leading trailing-type drum brakes have been adopted for the rear brakes in order to provide stable braking force at all times both when moving forward and reverse.

<Vehicles with rear disc brake>



AC609315AB

Brakes with the following specifications have been adopted for the rear.

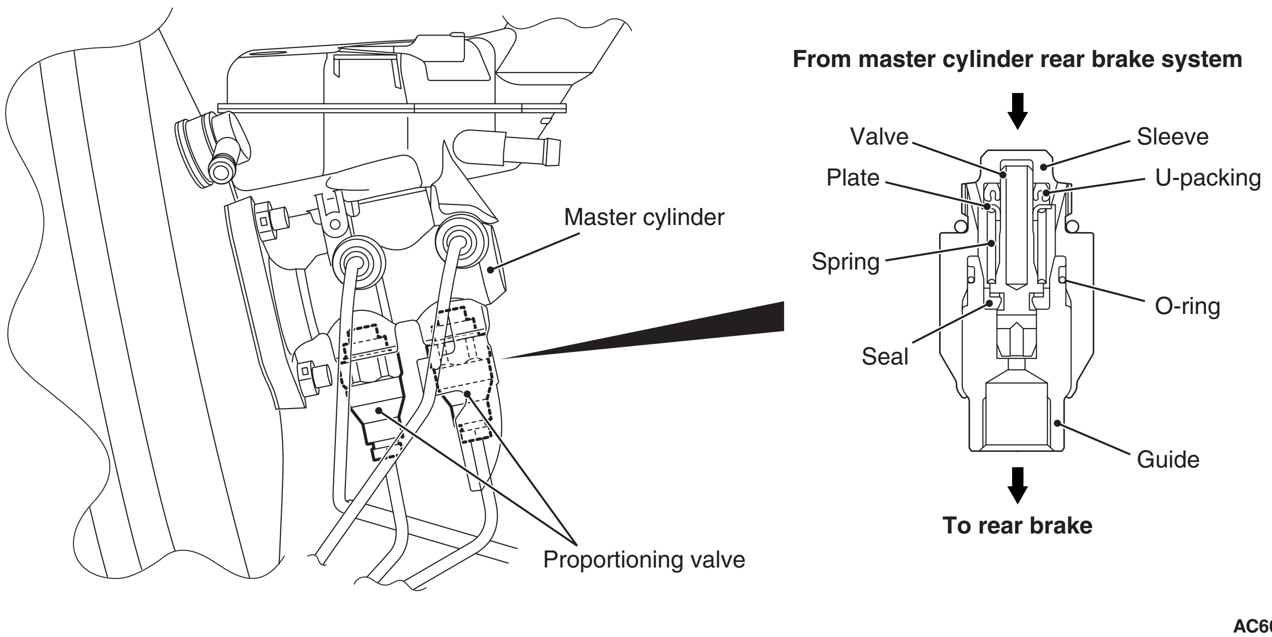
- The 1-piston solid disc brake (S4-S35 <Vehicles with 16-inch wheel> or S6-S35 <Vehicles with 18-inch wheel>) has been adopted.*
- An audible wear indicator that informs the driver of application limit has been adopted onto the brake pads.
- The outer disc type brake disc which can be tightened together with the wheel has been introduced for better serviceability.

*NOTE: *For the brake disc name, refer to FRONT BRAKE P.35A-8.*

BRAKE LINE

M2350005000266

PROPORTIONING VALVE <Vehicles without ABS>



A proportioning valve is used to prevent early locking of the rear wheels, in order to provide improved stability during braking.

GROUP 23

CVT

CONTENTS

NOTES

GROUP 35

SERVICE BRAKE

CONTENTS

NOTES

GROUP 13B

FUEL SUPPLY

CONTENTS

GENERAL INFORMATION

M2134000100833

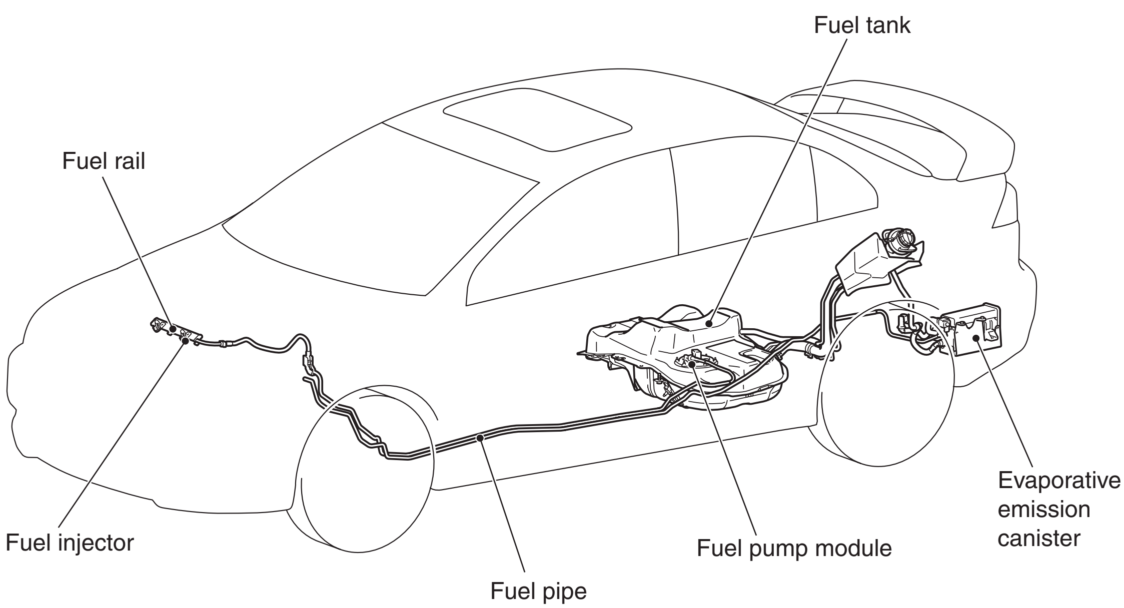
The fuel system consists of the following components:

- Fuel injector
- Fuel rail
- Fuel pipe
- Fuel tank
- Fuel pump module
- Evaporative emission canister

SPECIFICATIONS

Item		Specification
Fuel tank capacity dm^3 (gal)		59 (15.5)
Fuel pump type		Electric
Fuel filter type		Cartridge (incorporates fuel pump module)
Fuel return system		Returnless
Fuel pump pressure regulator pressure kPa (psi)		324 (46)
Fuel injector	Type	Elector-magnetic
	Quantity	4
Evaporative emission control system		Canister

CONSTRUCTION DIAGRAM



AC610224 AB

This fuel system is designed with consideration for global environment protection to ensure safety at a collision, reduce weight, and improve reliability and quality. This system has the following features:

- A quick-joint connector of a plastic tube is used for the fuel high-pressure hoses in the engine compartment to reduce the permeation of fuel evaporative emission.
- The surface of underfloor fuel pipes is coated with 1-mm thickness of plastic to improve resistance to corrosion and chipping.
- A returnless fuel system eliminates returned fuel from the engine. The heat that fuel receives from the engine is reduced, minimizing fuel temperature in the fuel tank and controlling the amount of evaporated gas.

FUEL TANK

M2134001000817

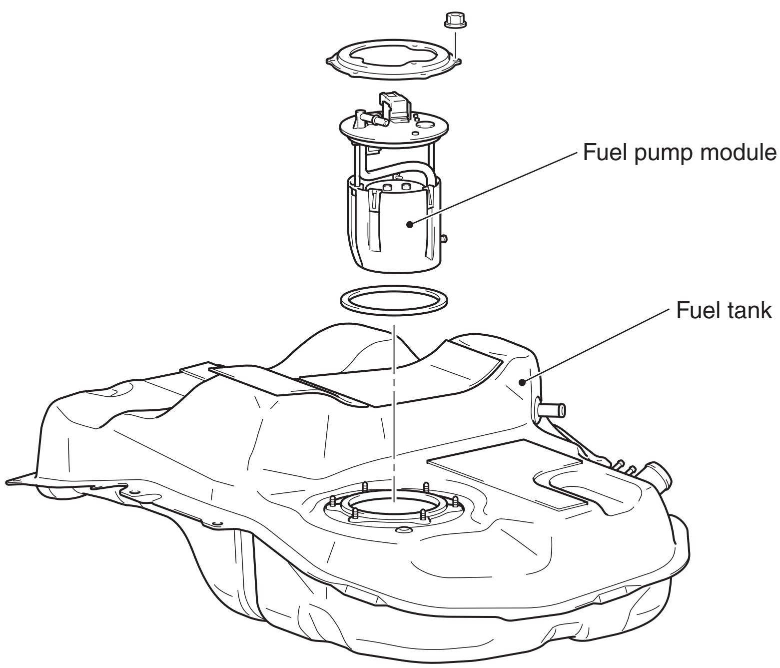
The fuel tank assembly consists of the fuel pump module, the fuel tank, and so on, and features the following characteristics:

- The fuel tank is mounted underneath the second seat to improve safety at a collision.
- The fuel tank itself is made of a pre-coat zinc alloy galvanised steel sheet that contains no lead.
- The capacity of the fuel tank is 59 dm^3 (15.5 gal) to meet long-distance drives.
- The fuel cut-off valve, fuel tank leveling valve and fuel tube have been installed using in-tank construction to reduce the amount of evaporated fuel from hoses.

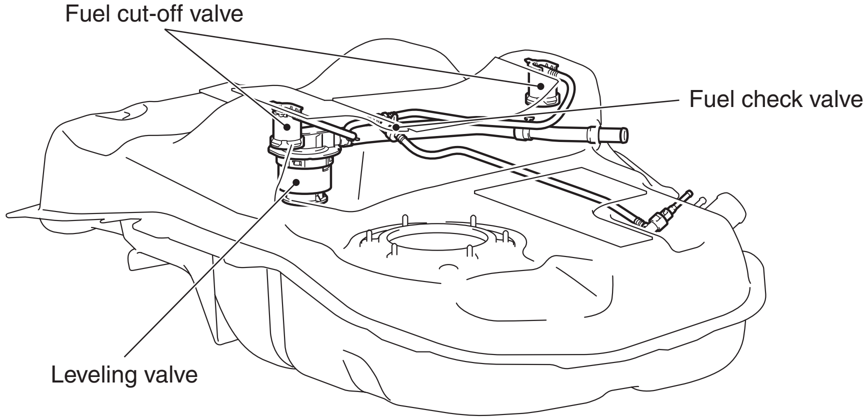
The fuel pump module consists of the following components:

- Fuel pump
- Fuel level sensor
- Fuel filter
- Fuel pump pressure regulator
- Fuel tank differential pressure sensor
- Fuel tank temperature sensor

CONSTRUCTION DIAGRAM



AC610225AB



AC610226AC

NOTES

GROUP 32

POWER PLANT MOUNT

CONTENTS

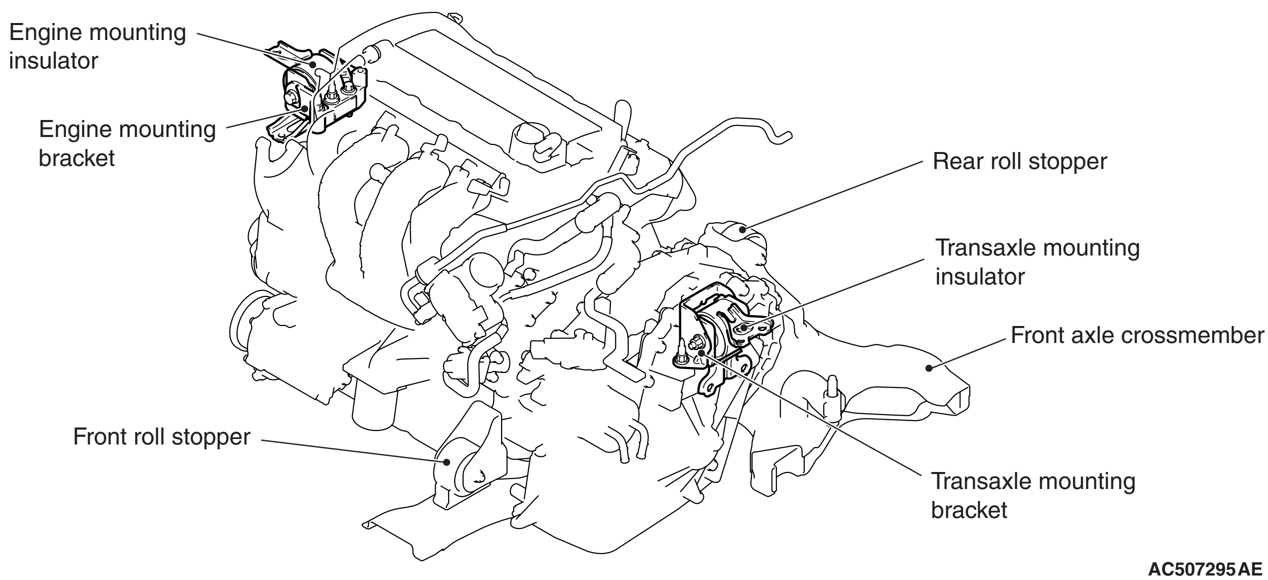
GENERAL INFORMATION

M2320000100856

For the power plant support, the inertial axis four-point mounting system is adopted, and the system has the following features.

- For the engine and transmission mounting insulator, the cylindrical liquid seal mountings are adopted. This reduces idling vibration and acceleration noise, and improves riding comfort.
- For the engine mounting bracket, lightweight and high rigidity aluminum is adopted to reduce acceleration noise.
- For the transmission mounting bracket, light weight and high rigidity sheet metal is adopted to reduce gear noise.
- For the front and rear roll stoppers, insulators developed for CVT. This reduces idling vibration and acceleration/deceleration shock.
- A front axle crossmember is adopted to improve steering ability.

CONSTRUCTION DIAGRAM



GROUP 13A

MULTIPORT FUEL SYSTEM (MFI)

CONTENTS

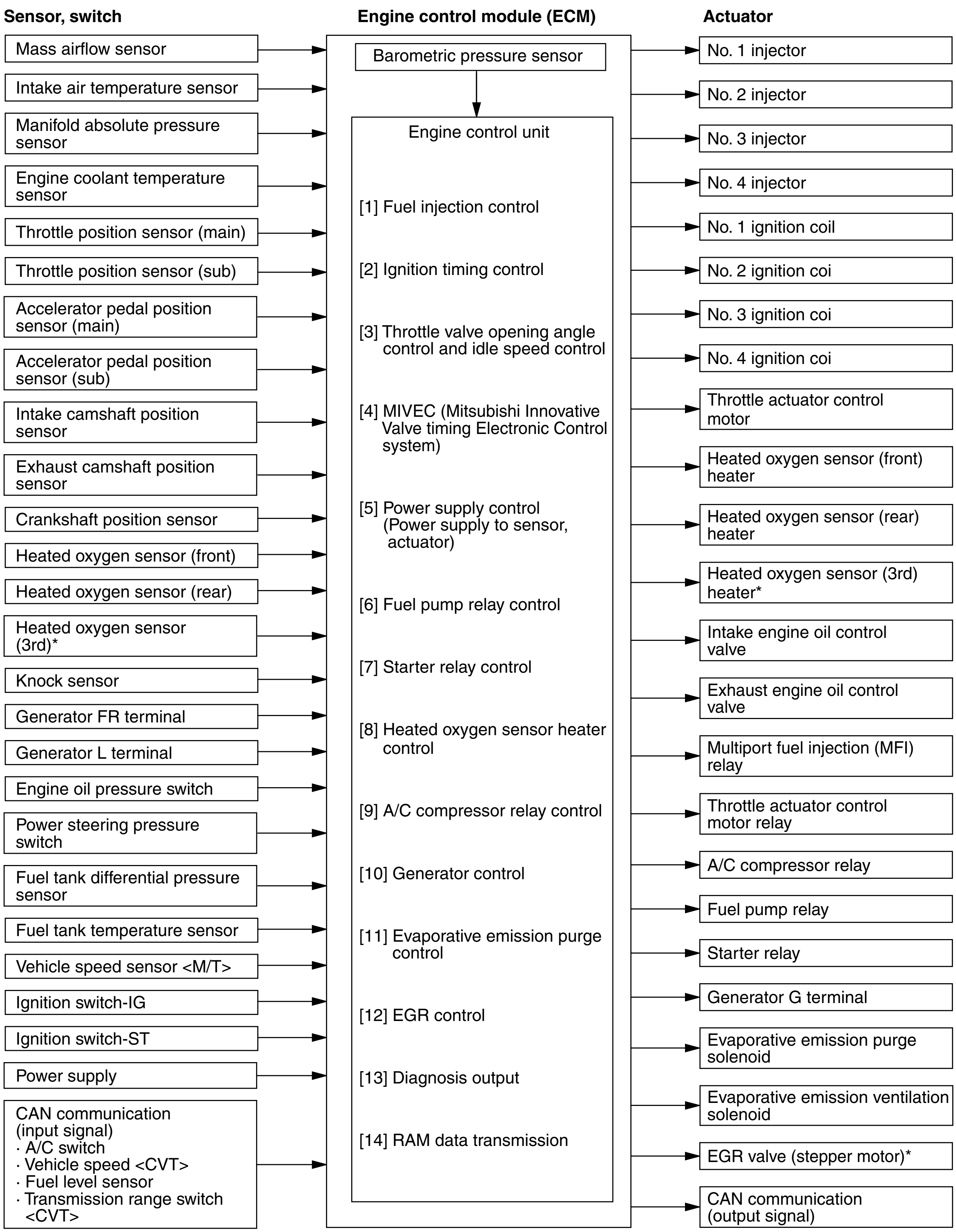
GENERAL DESCRIPTION

M2132000101283

Although the control systems are basically the same as those of 2.4L engine used in the GALANT, the following improvements have been added.

Improvement / Additions	Remark
MIVEC, continuously and variably control the intake valve timing and exhaust valve timing, is used.	System optimally control the timing of the intake valve and exhaust valve in accordance with the engine speed and load.
Addition of heated oxygen sensor (3rd) <California>	Detection of the HC trap catalyst malfunction.

System Block Diagram



NOTE
*1: California

AK604116 AB

Control System Diagram

<Except for California>

Sense

- ★1 Mass airflow sensor
- ★2 Intake air temperature sensor
- ★3 Throttle position sensor (main/sub)
- ★4 Manifold absolute pressure sensor
- ★5 Engine coolant temperature sensor
- ★6 Intake camshaft position sensor
- ★7 Exhaust camshaft position sensor
- ★8 Crankshaft position sensor
- ★9 Knock sensor
- ★10 Heated oxygen sensor (front)
- ★11 Heated oxygen sensor (rear)
- ★12 Fuel tank differential pressure sensor
- ★13 Fuel tank temperature sensor

- ● Accelerator pedal position sensor (main/sub)
- ● Engine oil pressure switch
- ● Power steering pressure switch
- ● Generator FR terminal
- ● Generator L terminal
- ● Vehicle speed sensor <M/T>
- ● Ignition switch-IG
- ● Ignition switch-ST
- ● Power supply
- ● CAN communication (input signal)

⇨

Decide

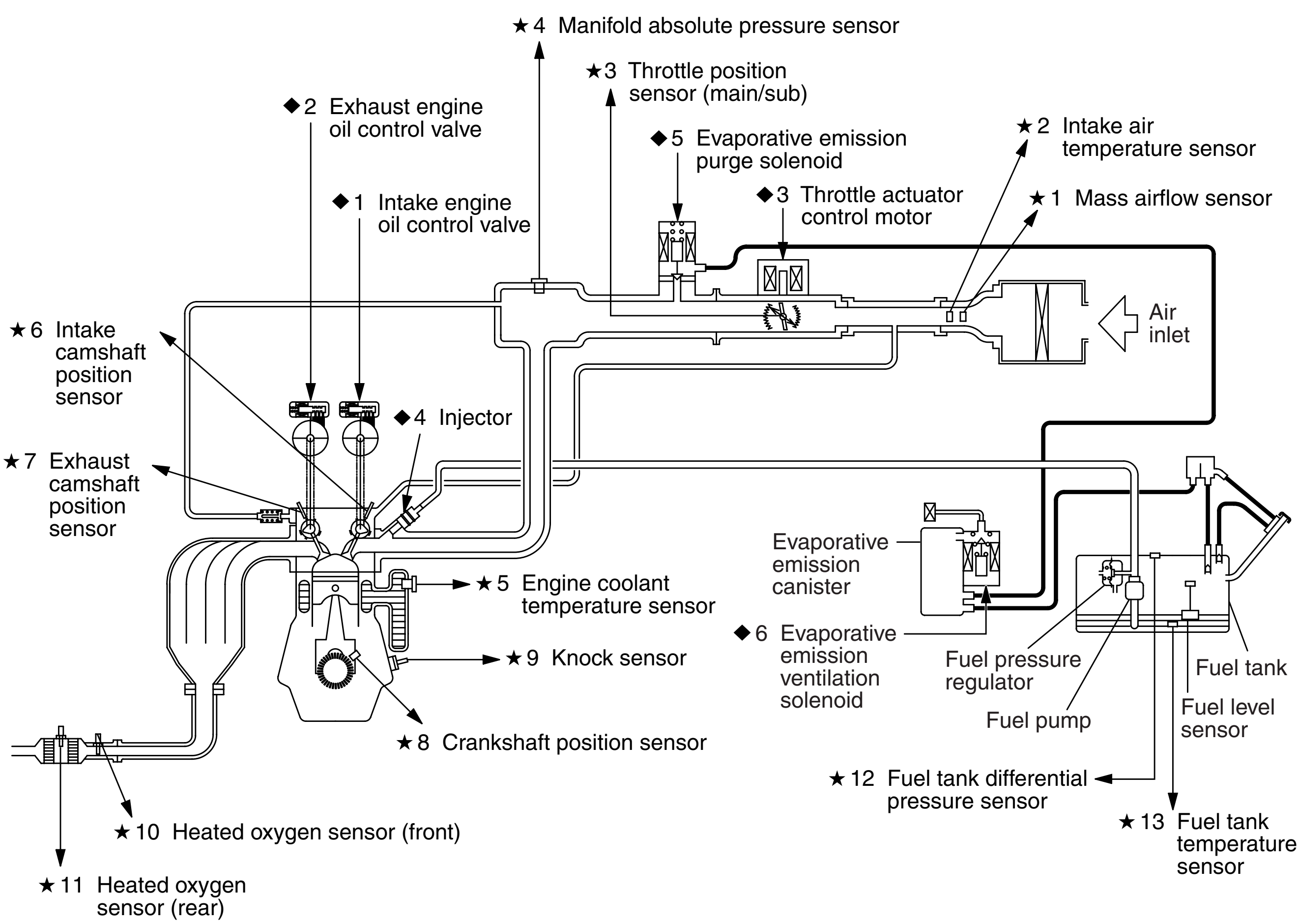
ECM
(with barometric
pressure sensor)

⇨

Act

- ◆1 Intake engine oil control valve
- ◆2 Exhaust engine oil control valve
- ◆3 Throttle actuator control motor
- ◆4 Injector
- ◆5 Evaporative emission purge solenoid
- ◆6 Evaporative emission ventilation solenoid

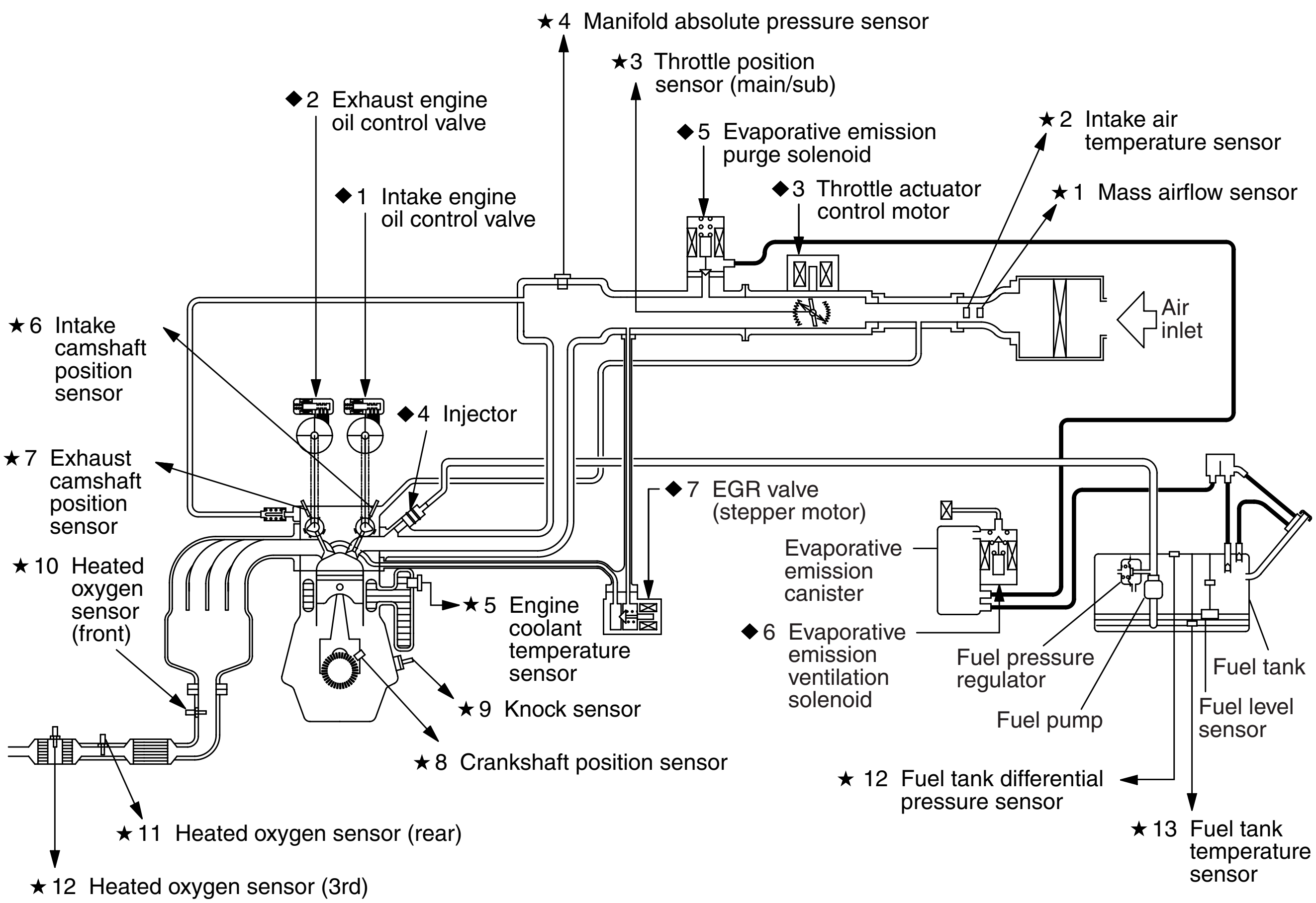
- ● Ignition coil, ignition power transistor
- ● Multiport fuel injection (MFI) relay
- ● Fuel pump relay
- ● Starter relay
- ● Throttle actuator control motor relay
- ● Generator G terminal
- ● Heated oxygen sensor heater
- ● A/C compressor relay
- ● Diagnostic output
- ● CAN communication (output signal)



AK604117AB

<California>

Sense	Decide	Act
★1 Mass airflow sensor ★2 Intake air temperature sensor ★3 Throttle position sensor (main/sub) ★4 Manifold absolute pressure sensor ★5 Engine coolant temperature sensor ★6 Intake camshaft position sensor ★7 Exhaust camshaft position sensor ★8 Crankshaft position sensor ★9 Knock sensor ★10 Heated oxygen sensor (front) ★11 Heated oxygen sensor (rear) ★12 Heated oxygen sensor (3rd) ★13 Fuel tank differential pressure sensor ★14 Fuel tank temperature sensor	ECM (with barometric pressure sensor)	◆1 Intake engine oil control valve ◆2 Exhaust engine oil control valve ◆3 Throttle actuator control motor ◆4 Injector ◆5 Evaporative emission purge solenoid ◆6 Evaporative emission ventilation solenoid ◆7 EGR valve (stepper motor)
● Accelerator pedal position sensor (main/sub) ● Engine oil pressure switch ● Power steering pressure switch ● Generator FR terminal ● Generator L terminal ● Vehicle speed sensor <M/T> ● Ignition switch-IG ● Ignition switch-ST ● Power supply ● CAN communication (input signal)		● Ignition coil, ignition power transistor ● Multiport fuel injection (MFI) relay ● Fuel pump relay ● Starter relay ● Throttle actuator control motor relay ● Generator G terminal ● Heated oxygen sensor heater ● A/C compressor relay ● Diagnostic output ● CAN communication (output signal)

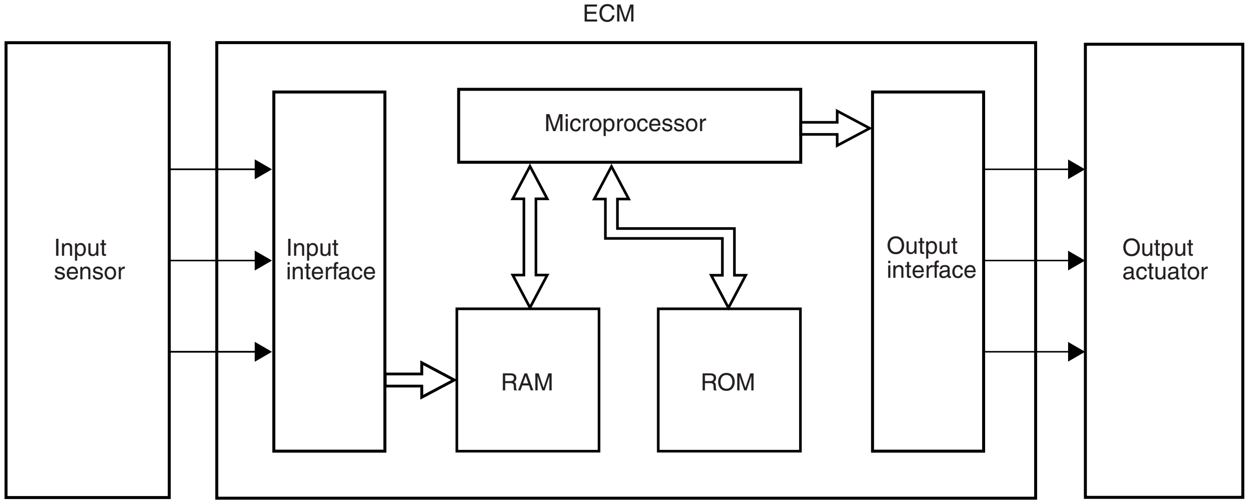


AK604118 AB

CONTROL UNIT

M2132021500153

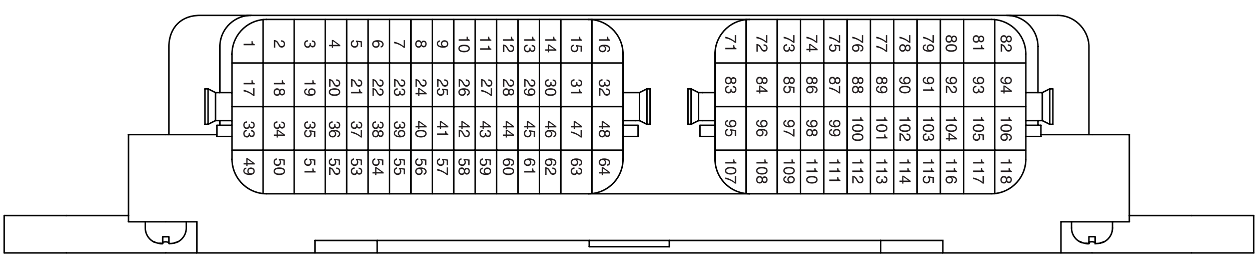
ENGINE CONTROL MODULE (ECM)



AK604119AB

ECM is installed in the engine room. ECM judges (calculates) the optimum control to deal with the constant minute changes in driving conditions based on information input from the sensors and drives the actuator. ECM is composed of 32-bit microprocessor and Random Access Memory (RAM), Read Only Memory (ROM) and Input /Output interface. ECM uses flash-memory ROM that allows re-writing of data so that change and correction of control data is possible using special tools. It also uses Electrically Erasable Programmable Read Only Memory (EEPROM) so that studied compensation data is not deleted even if battery terminals are disconnected.

ECM CONNECTOR INPUT/OUTPUT PIN ARRANGEMENT



AK602565AC

*NOTE: *: California*

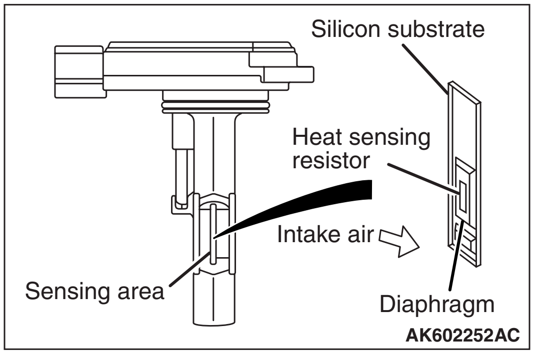
1	Intake engine oil control valve	2	No.1 injector
3	No.2 injector	4	Ignition coil No.1 (ignition power transistor)
5	Ignition coil No.2 (ignition power transistor)	6	Starter active signal
7	Exhaust camshaft position sensor	8	Crankshaft position sensor
9	Sensor supplied voltage	10	Throttle position sensor (main)
11	Throttle position sensor (sub)	12	Power supply voltage applied to throttle position sensor
13	Throttle position sensor ground	14	Intake camshaft position sensor

15	Throttle actuator control motor (+)	16	Throttle actuator control motor (-)
17	Exhaust engine oil control valve	18	No.3 injector
19	No.4 injector	20	Ignition coil No.3 (ignition power transistor)
21	Ignition coil No.4 (ignition power transistor)	23	Exhaust camshaft position sensor ground
24	Crankshaft position sensor ground	25	Knock sensor
26	Engine coolant temperature sensor	27	Engine coolant temperature sensor ground
30	Intake camshaft position sensor ground	31*	EGR valve (stepper motor coil <A>)
32*	EGR valve (stepper motor coil <B>)	33*	Heated oxygen sensor (3rd) heater
34	Heated oxygen sensor (front) heater	35	Heated oxygen sensor (rear) heater
36	Engine oil pressure switch	37	Evaporative emission purge solenoid
38	Heated oxygen sensor (front)	39	Heated oxygen sensor (front) offset voltage
40	Heated oxygen sensor (rear)	41	Heated oxygen sensor (rear) offset voltage
42	Knock sensor ground	44	Power supply voltage applied to manifold absolute pressure sensor
45	Manifold absolute pressure sensor	46	Manifold absolute pressure sensor ground
47*	EGR valve (stepper motor coil <C>)	48*	EGR valve (stepper motor coil <D>)
54*	Heated oxygen sensor (3rd)	55*	Heated oxygen sensor (3rd) offset voltage
58	Power steering pressure switch	60	Generator G terminal
61	Generator FR terminal	62	Generator L terminal
71	Throttle actuator control motor ground	72	Throttle actuator control motor power supply
73	MFI relay (power supply)	74	Accelerator pedal position sensor (main)
75	Power supply voltage applied to accelerator pedal position sensor (main)	76	Accelerator pedal position sensor (main) ground
77	Accelerator pedal position sensor (sub)	78	Power supply voltage applied to accelerator pedal position sensor (sub)
79	Accelerator pedal position sensor (sub) ground	81	ECM ground
82	Power supply	83	Throttle actuator control motor ground
84	Throttle actuator control motor relay	87	Mass airflow sensor
88	Mass airflow sensor ground	89	Intake air temperature sensor
90	CAN interface (high)	91	CAN interface (low)
92	Ignition switch-IG	93	ECM ground
96	Fuel pump relay	102	A/C compressor relay
103	Flash EP-ROM power supply	104	Backup power supply
105	Ignition switch-ST	106	Starter relay
112	Fuel tank differential pressure sensor	113	Fuel tank differential pressure sensor ground
114	Power supply voltage applied to fuel tank differential pressure sensor	115	Fuel tank temperature sensor
117	Evaporative emission ventilation solenoid		

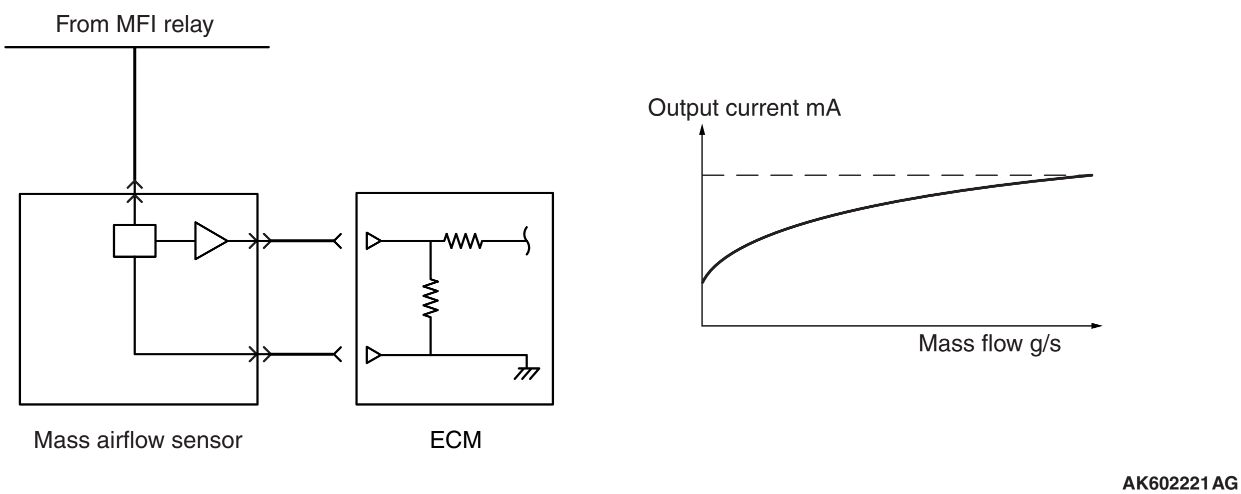
SENSOR

M2132001000565

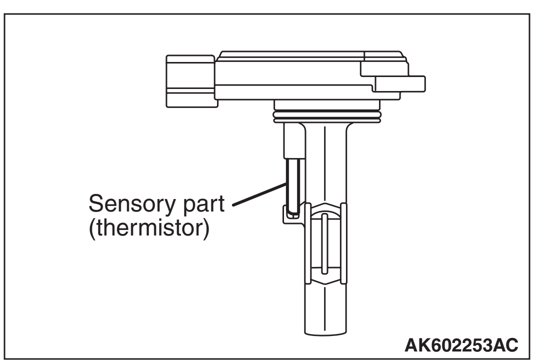
MASS AIRFLOW SENSOR



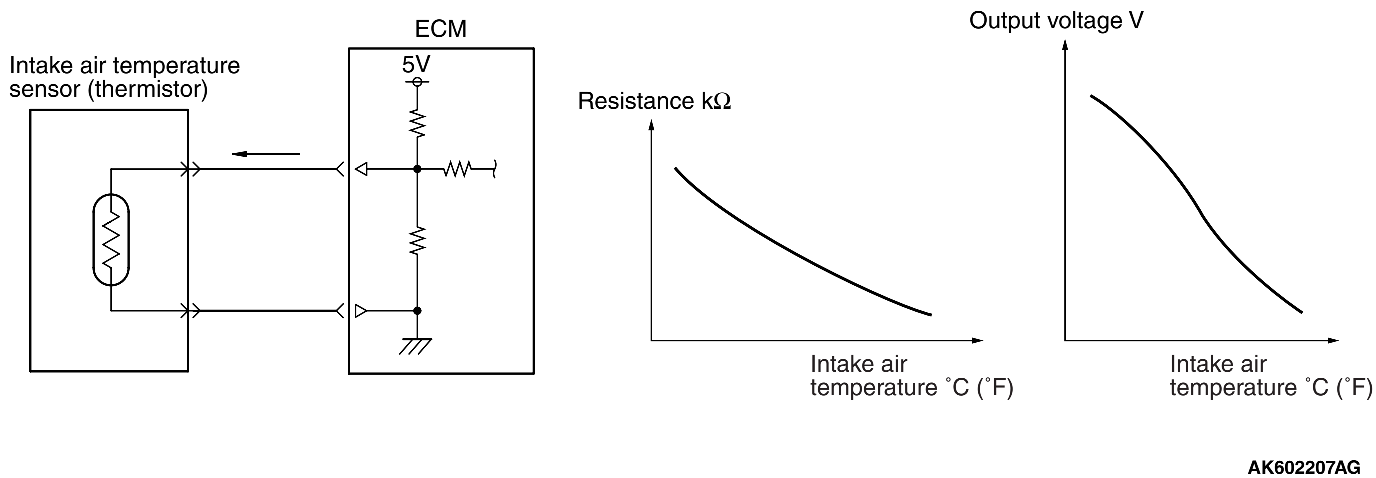
Mass airflow sensor is installed in the air intake hose. Mass airflow sensor is composed of an extremely small heatsensing resistor. The mass airflow sensor controls the amount of electric current flowing into the heat sensing resistor to keep the heat sensing resistor at a constant temperature to the intake air temperature. The faster the air flow speed, the higher the mass flow rate.Because the amount of heat transfer from the heat sensing resistor to the air increases, the mass airflow sensor increases the amount of electric current to the heat sensing resistor. Thus, the amount of electric current increases in accordance with the air mass flow rate. The mass airflow sensor measures the air mass flow rate by detecting the amount of electric current. The mass airflow sensor amplifies the detected electric current amount and outputs it into the ECM. ECM uses this output current and engine speed to calculate and decide basic fuel injection time. Sensor properties are as shown in the figure.



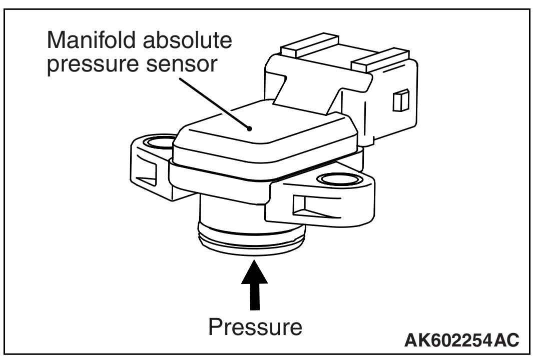
INTAKE AIR TEMPERATURE SENSOR



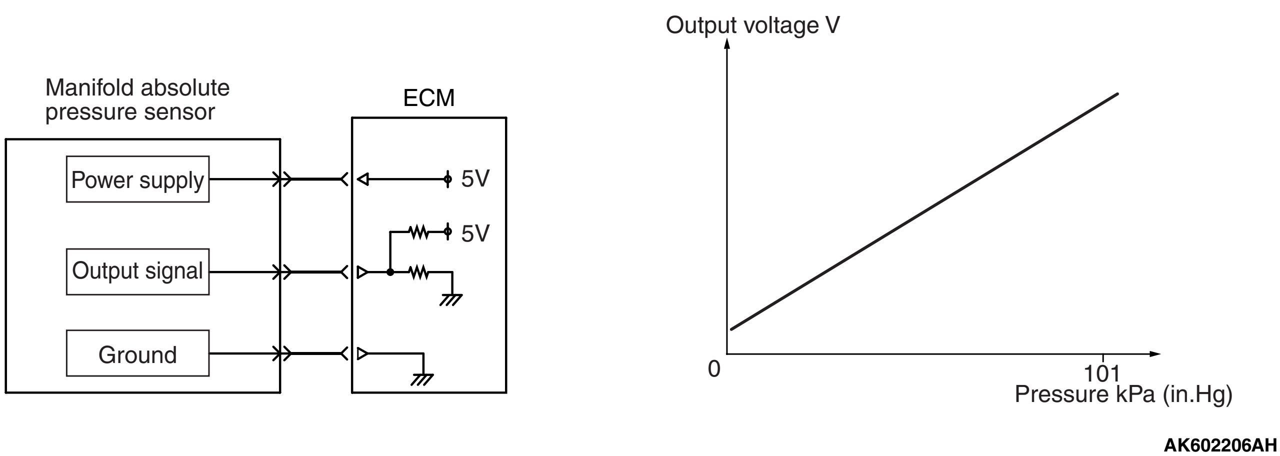
Intake air temperature sensor is built in to the mass airflow sensor. Intake air temperature sensor detects intake air temperature through thermistor's resistance change and outputs the voltage according to intake air temperature to ECM. ECM uses this output voltage to compensate fuel injection control and ignition timing control. Sensor properties are as shown in the figure.



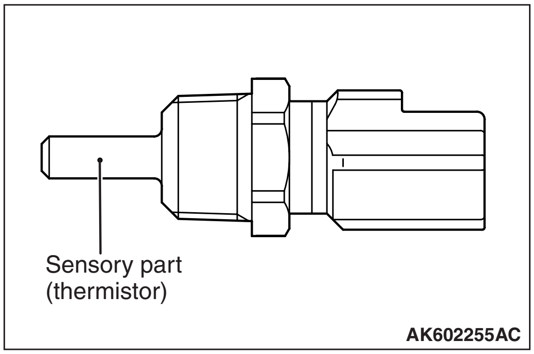
MANIFOLD ABSOLUTE PRESSURE SENSOR



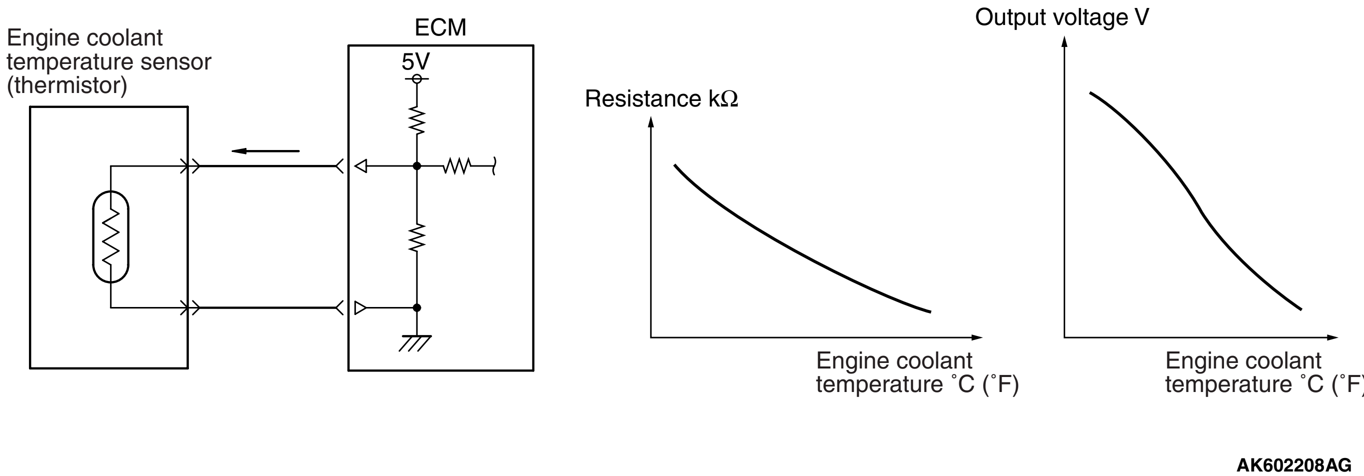
The manifold absolute pressure sensor is installed in the intake manifold. Manifold absolute pressure sensor uses a piezo resistive semiconductor to output the voltage according to manifold absolute pressure to ECM. ECM uses this output voltage to compensate fuel injection volume according to manifold absolute pressure. Sensor properties are as shown in the figure.



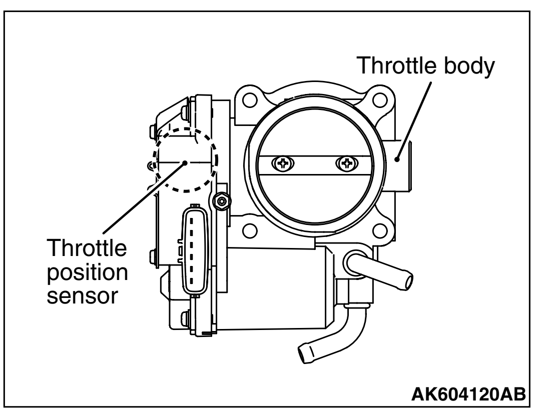
ENGINE COOLANT TEMPERATURE SENSOR



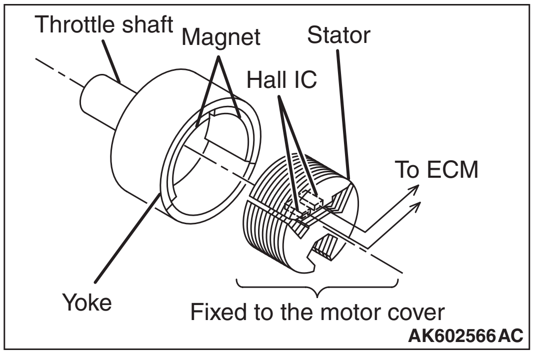
The engine coolant temperature sensor is installed in the thermostat housing. Engine coolant temperature sensor uses thermistor's resistance change to detect coolant temperature and output the voltage according to coolant temperature to ECM. ECM uses this output voltage to appropriately control fuel injection volume, idle speed and ignition timing. Sensor properties are as shown in the figure.



THROTTLE POSITION SENSOR

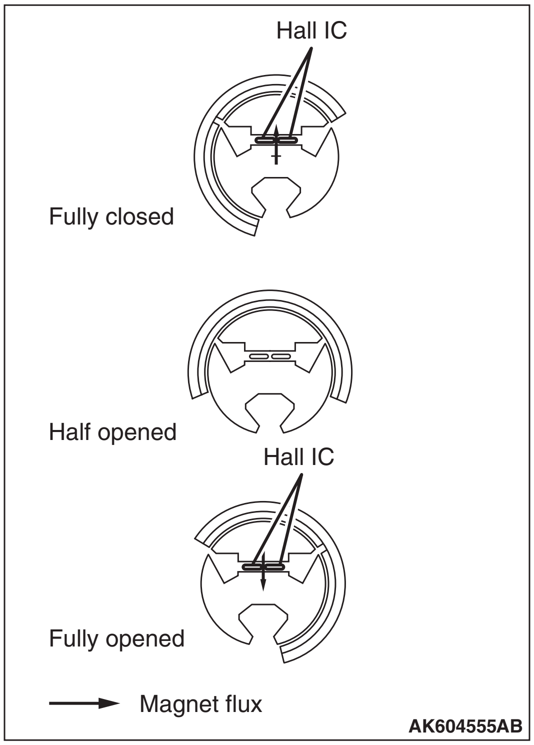


The throttle position sensor is installed in the throttle body. Throttle position sensor outputs voltage to ECM based on the throttle shaft rotation angle. ECM uses this signal to detect the throttle valve opening angle to perform throttle actuator control motor feedback control. This throttle position sensor uses Hall IC and is a non-contact type.



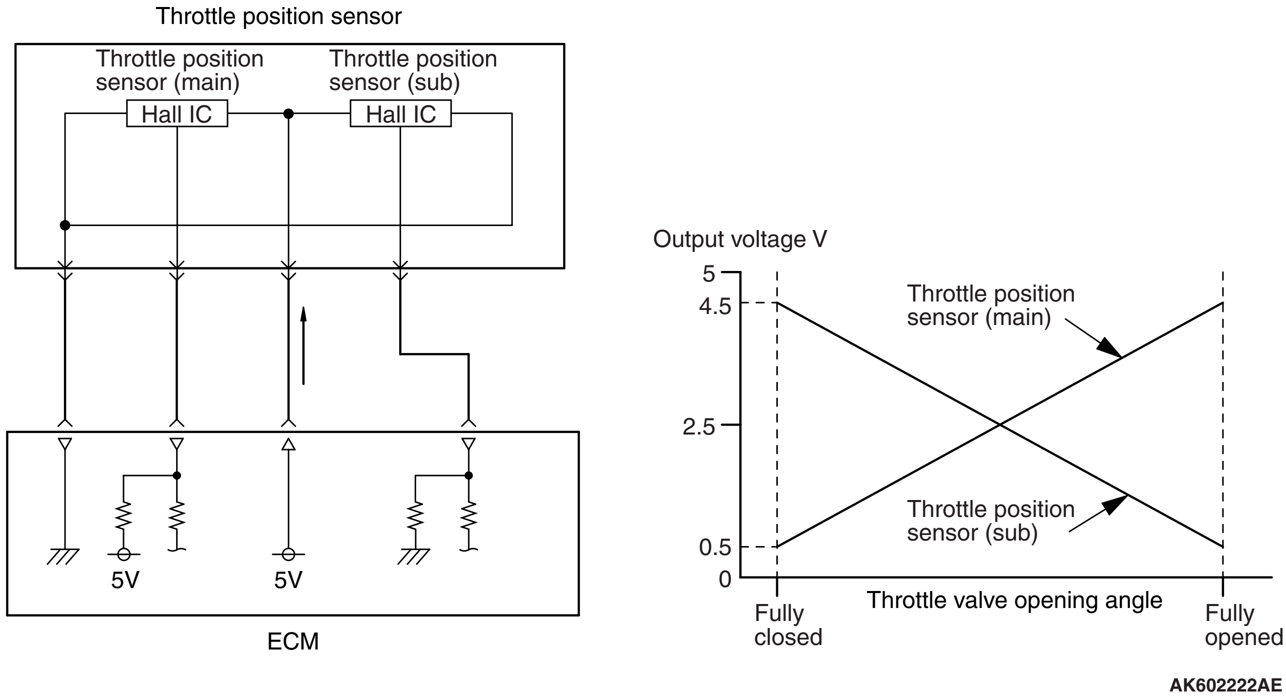
STRUCTURE AND SYSTEM

Throttle position sensor is composed of a permanent magnet fixed on the throttle shaft, Hall IC that outputs voltage according to magnetic flux density and a stator that efficiently introduces magnetic flux from the permanent magnet to Hall IC.

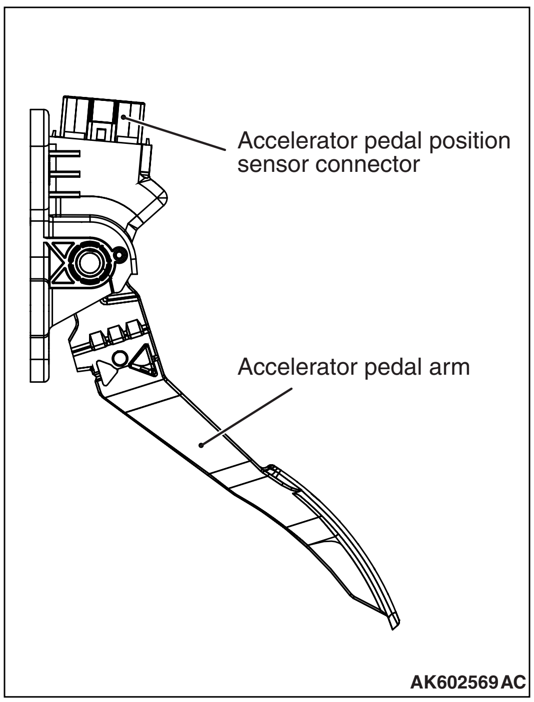


Magnetic flux density at Hall IC is proportional to the output voltage.

Throttle position sensor has 2 output systems –throttle position sensor (main) and throttle position sensor (sub), and the output voltage is output to ECM. When throttle valve turns, output voltage of throttle position sensor (main) and throttle position sensor (sub) changes. This allows ECM to detect actual throttle opening angle. ECM uses this output voltage for throttle actuator control motor feedback control. Also, ECM compares output voltage of the throttle position sensor (main) and throttle position sensor (sub) to check for abnormality in the throttle position sensor. The relationship between throttle opening angle and output voltage of the throttle position sensor (main) and throttle position sensor (sub) is as shown in the figure below.

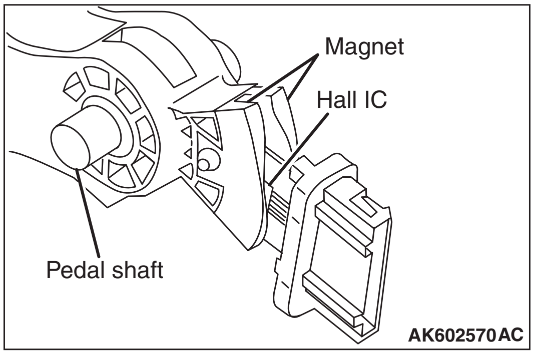


ACCELERATOR PEDAL POSITION SENSOR

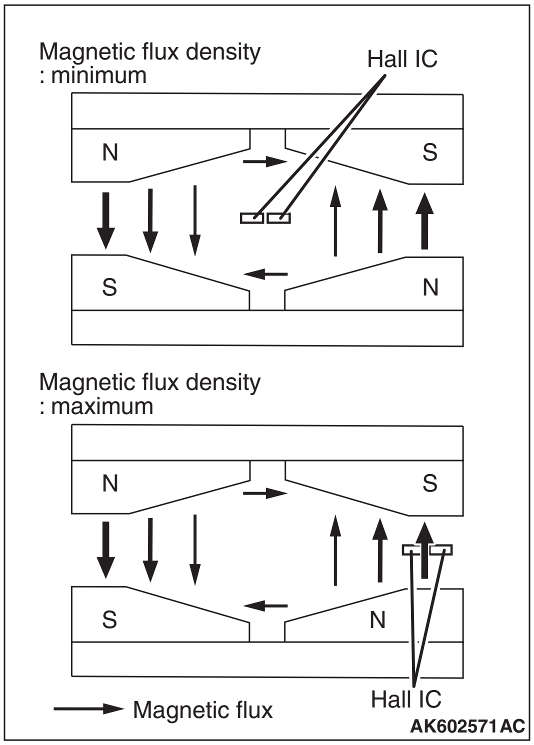


Accelerator pedal position sensor is integrated with accelerator pedal, and detects accelerator opening angle. ECM uses the output voltage of this sensor to control appropriate throttle valve opening angle and fuel injection volume. This accelerator pedal position sensor uses Hall IC and is a non-contact type.

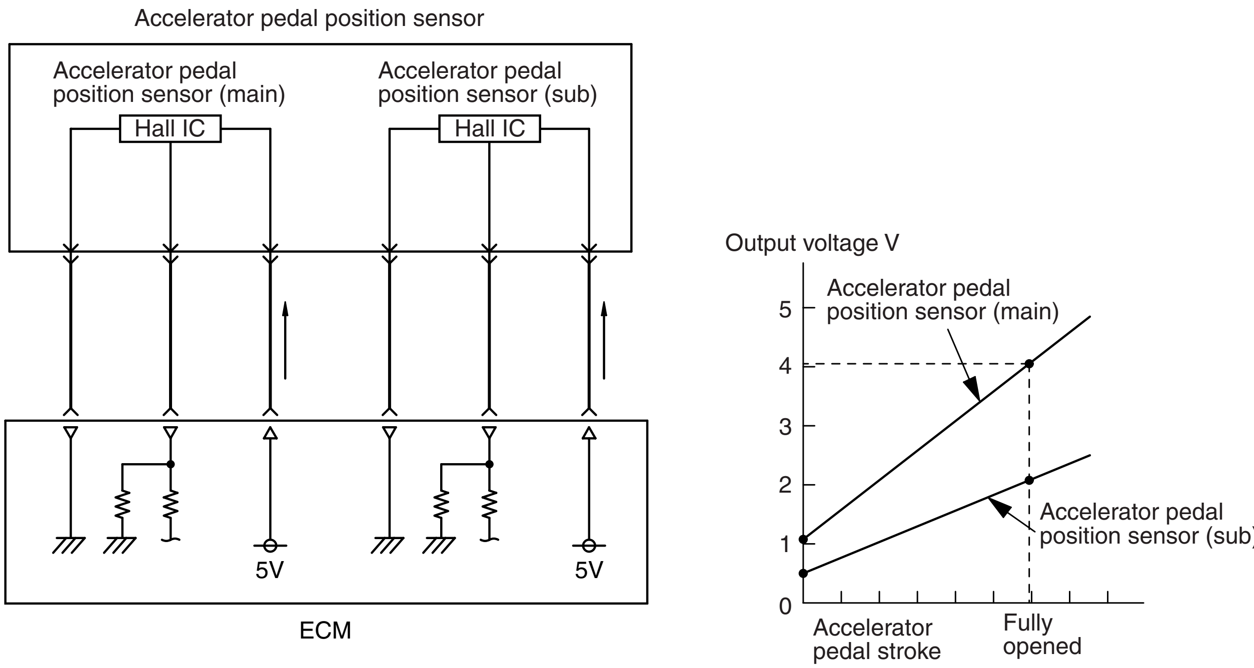
STRUCTURE AND SYSTEM



Accelerator pedal position sensor is composed of a permanent magnet fixed on the magnet carrier of the pedal shaft, Hall IC outputs voltage according to magnetic flux density and a stator that efficiently introduces magnetic flux from the permanent magnet to Hall IC.

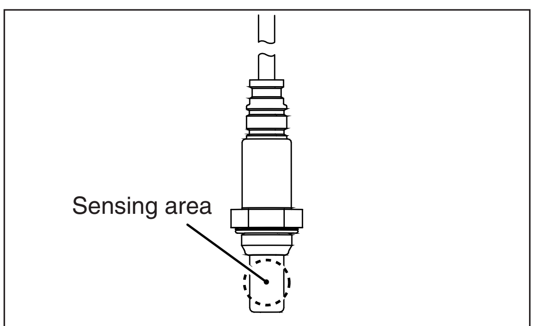


Magnetic flux density at Hall IC is proportional to the output voltage.
The accelerator pedal position sensor has 2 output systems – accelerator pedal position sensor (main) and accelerator pedal position sensor (sub), and the output voltage is output to ECM. According to depression of the accelerator pedal, output voltage of the accelerator pedal position sensor (main) and accelerator pedal position sensor (sub) changes. This allows ECM to detect the actual accelerator pedal depression amount. ECM uses accelerator pedal position sensor (main) output voltage for appropriate throttle valve opening angle control and fuel injection volume control. Also, ECM compares output voltage of the accelerator pedal position sensor (main) and accelerator pedal position sensor (sub) to check for abnormality in sensor. The relationship between accelerator opening angle and output voltage of the accelerator pedal position sensor (main) and accelerator pedal position sensor (sub) is as shown in the figure below.



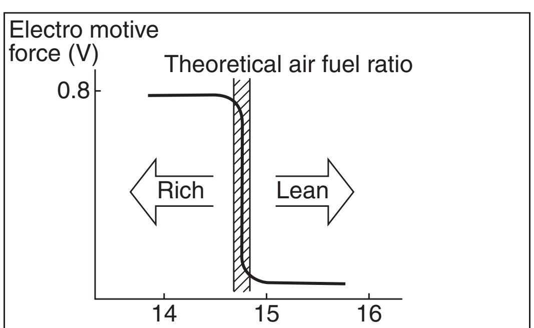
AK602211AE

HEATED OXYGEN SENSOR (except centor exhaust pipe heated oxygen sensor <California>)



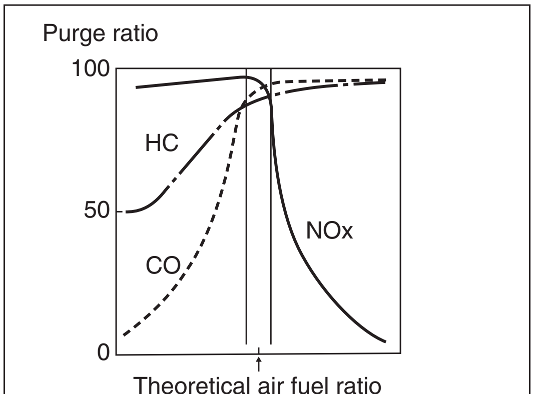
AK602572 AC

Heated oxygen sensors are installed in 2 positions (front, rear) on the catalytic converter. Heated oxygen sensor has a built-in heater to help early activation of the sensor. This allows feedback control of air-fuel ratio soon after engine start.



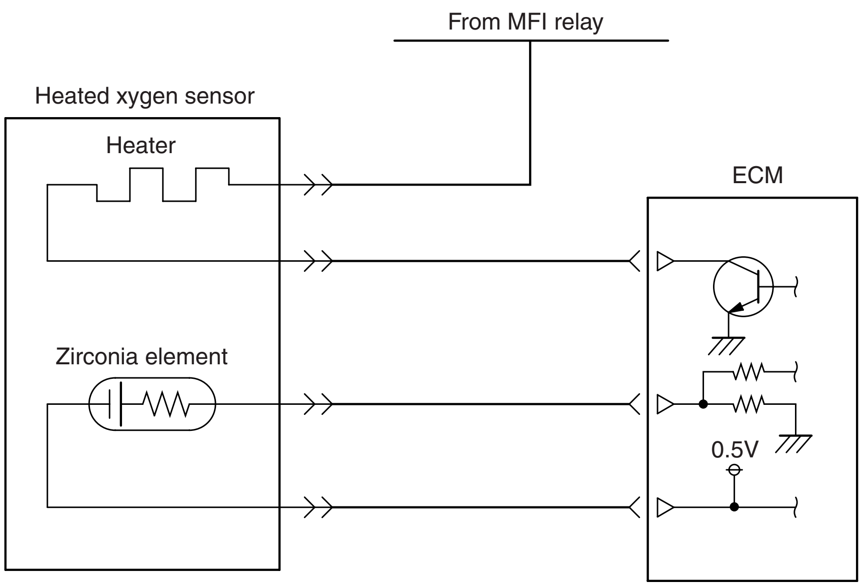
AK602262AC

This sensor uses the oxygen concentration cell principle of solid electrolyte (zirconia) and displays the property of sudden change in output voltage near theoretical air-fuel ratio. This property is used to detect oxygen density in exhaust gas. Feedback to ECM allows it to judge whether air-fuel ratio is rich or lean compared to theoretical air-fuel ratio.

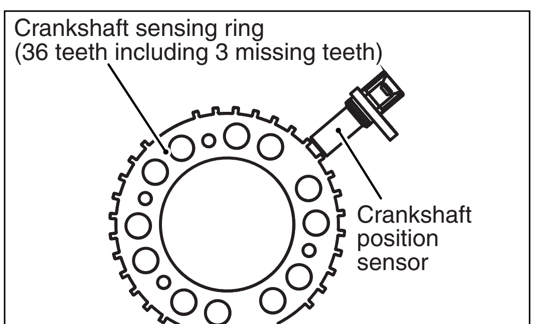


AK602263AC

This allows ECM precise feedback control to get theoretical air-fuel ratio with best cleaning efficiency of 3-way catalytic converter.



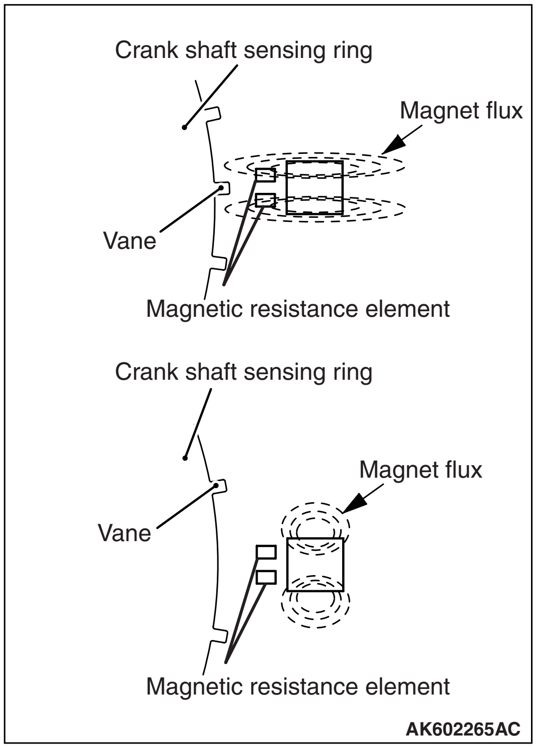
AK602576AC



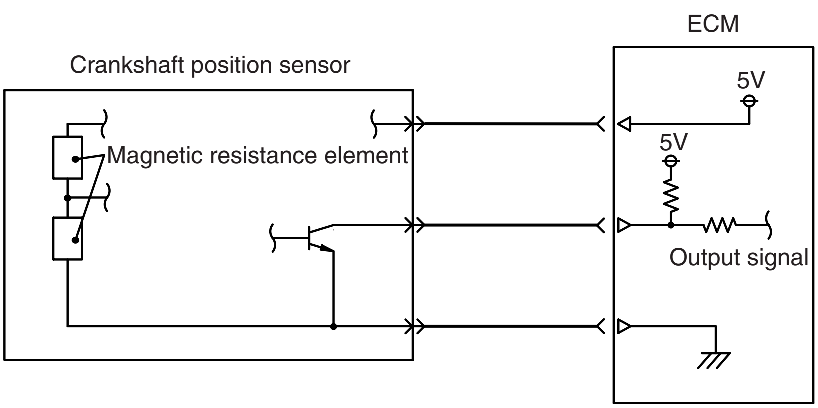
AK602737AC

CRANKSHAFT POSITION SENSOR

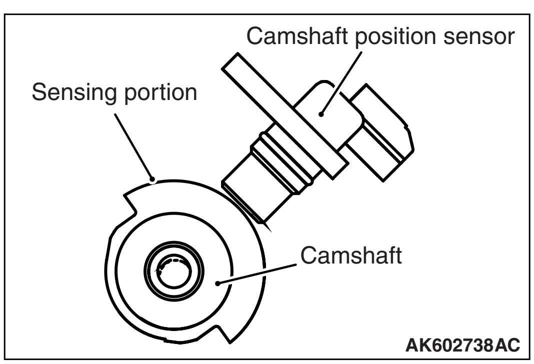
A crankshaft position sensor is installed on the right side of the cylinder block. The crankshaft position sensor monitors rotation of crankshaft sensing ring (36 teeth including 3 missing teeth) installed on the crankshaft and converts to voltage (pulse signal) that is output to ECM. ECM uses crankshaft position sensor's output pulse to detect crankshaft position.



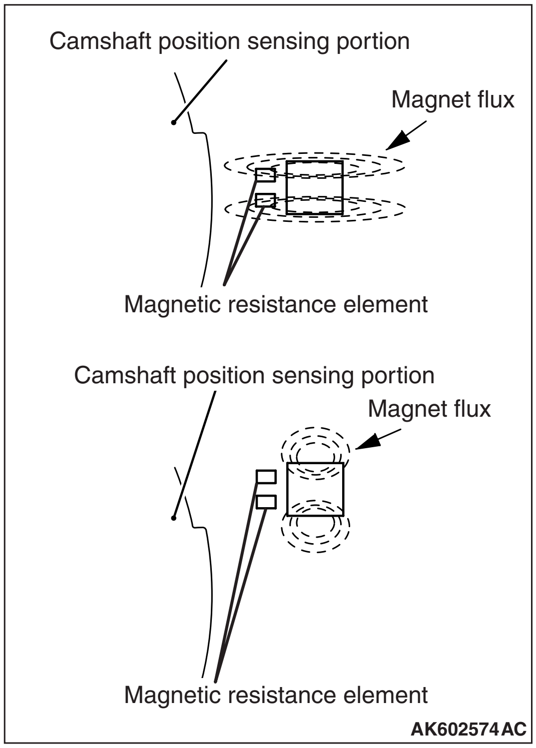
The crankshaft position sensor uses a magnetic resistance element. When the vane of the crankshaft-sensing blade passes the front surface of the magnetic resistance element, the flux from the magnet passes the magnetic resistance element. Thus, resistance of the magnetic resistance element increases. When the vane of the crankshaft-sensing blade does not pass the front surface of the magnetic resistance element, the flux from the magnet does not pass the magnetic resistance element and the resistance decreases. The crankshaft position sensor converts this change in resistance of the magnetic resistance element to a 5 V pulse signal and outputs it to ECM.



INTAKE CAMSHAFT POSITION SENSOR



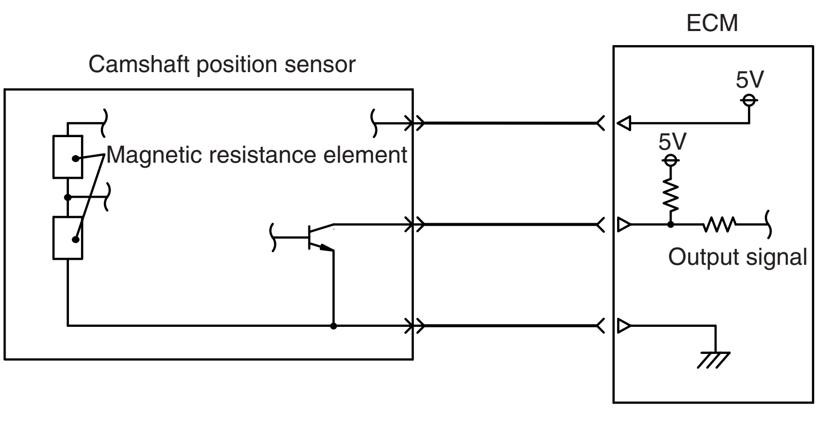
The intake camshaft position sensor is installed on the left side of the cylinder head. The intake camshaft position sensor monitors shape of the half-moon sensing portion and converts to voltage (pulse signal) that is output to ECM. Upon receiving this output voltage, the ECM effects feedback control to optimize the phase of the intake camshaft. Also, ECM uses a combination of the intake camshaft position sensor output pulse signal and crankshaft position sensor output pulse signal to identify cylinders in the compression process.



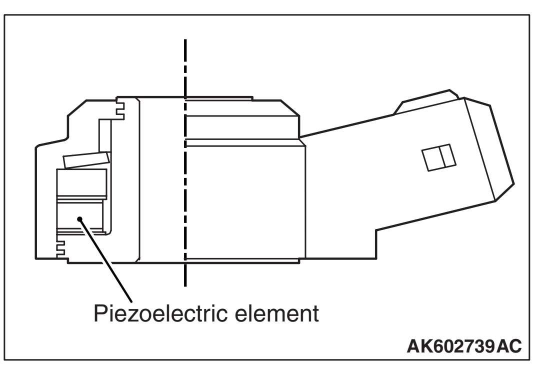
The intake camshaft position sensor uses a magnetic resistance element. When the camshaft position sensing portion passes the front surface of the magnetic resistance element, the flux from the magnet passes the magnetic resistance element. Thus, resistance of the magnetic resistance element increases. When the camshaft position sensing portion does not pass the front surface of the magnetic resistance element, the flux from the magnet does not pass the magnetic resistance element and the resistance decreases. The intake camshaft position sensor converts this change in resistance of the magnetic resistance element to a 5 V pulse signal and outputs it to ECM

EXHAUST CAMSHAFT POSITION SENSOR

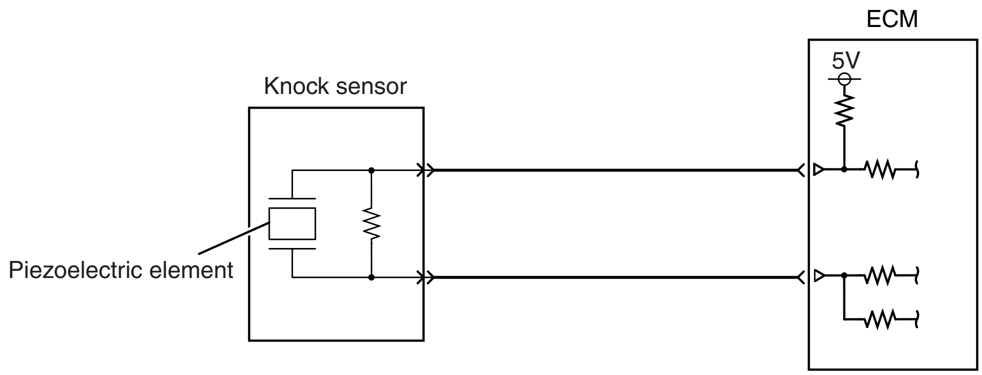
The exhaust camshaft position sensor is installed on the right side of the cylinder head. The exhaust camshaft position sensor monitors shape of the half-moon sensing portion and converts to voltage (pulse signal) that is output to ECM. Upon receiving this output voltage, the ECM effects feedback control to optimize the phase of the exhaust camshaft. The structure and system of this sensor are basically the same as intake camshaft position sensor.



KNOCK SENSOR

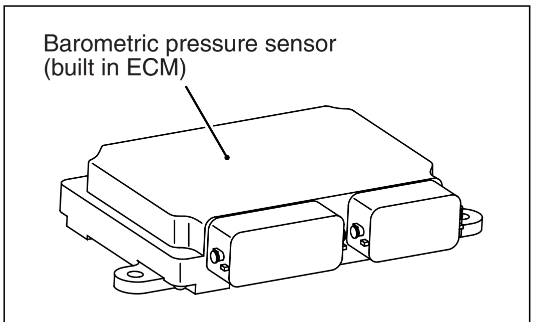


A knock sensor is installed on the left side of the cylinder block. Knock sensor uses the piezoelectric element to convert the vibration of the cylinder block generated when engine is in operation to minute voltage that is output to ECM. ECM uses the minute output voltage from the knock sensor filtered through the cylinder block's natural frequency to detect knocking, and compensates the ignition timing lag according to the strength of the knocking.



AK602226AD

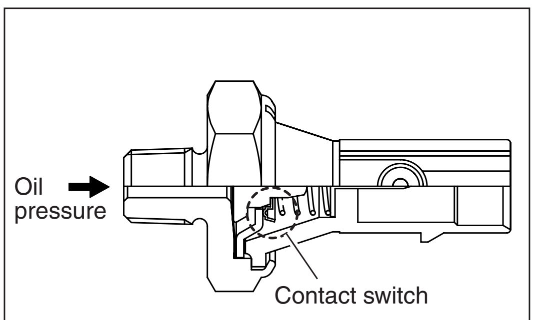
BAROMETRIC PRESSURE SENSOR



AK602575AC

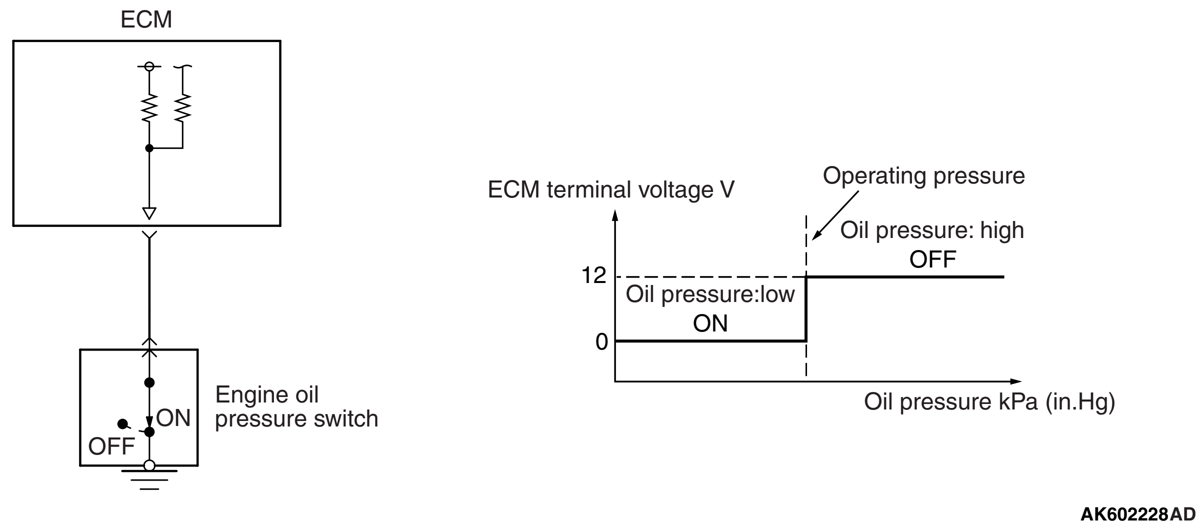
A barometric pressure sensor is built into ECM. The barometric pressure sensor is a semiconductor diffused pressure element which outputs voltage to ECM according to atmospheric pressure. ECM uses this output voltage to sense the altitude of the vehicle and compensates fuel injection volume to achieve the appropriate air-fuel ratio for that altitude.

ENGINE OIL PRESSURE SWITCH



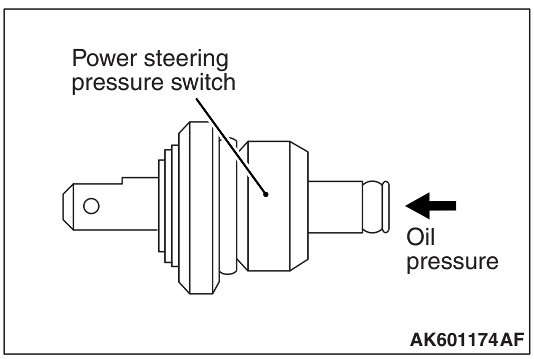
AK602587AC

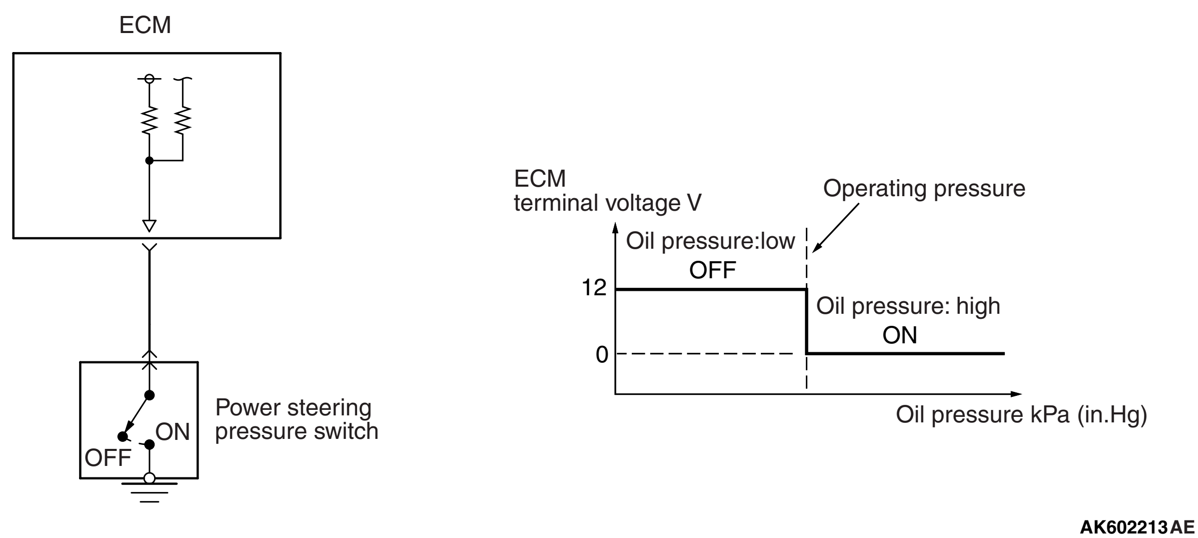
The engine oil pressure switch is installed on the left side of the cylinder block. The engine oil pressure switch detects whether the oil pressure is high or low using the contact switch. When the oil pressure becomes higher than the specified value after the engine starts, the contact point of the engine oil pressure switch opens. This allows the ECM to detect the oil pressure is higher than the specified value. The ECM outputs the OFF signal to the combination meter through the CAN and then turns off the oil pressure warning lamp.

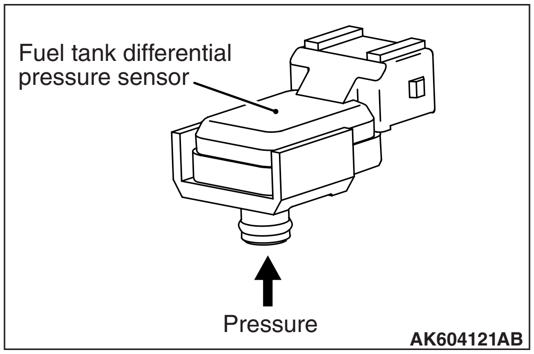


POWER STEERING PRESSURE SWITCH

A power steering pressure switch is installed on the power steering oil pump. The power steering pressure switch uses a contact switch to detect the power steering oil pressure. When power steering oil pressure rises due to operation of the steering wheel, the power steering load switch outputs an ON signal to ECM. ECM performs idle-up according to the voltage and prevents reduction in engine speed due to power steering load and so maintains stable idle speed.

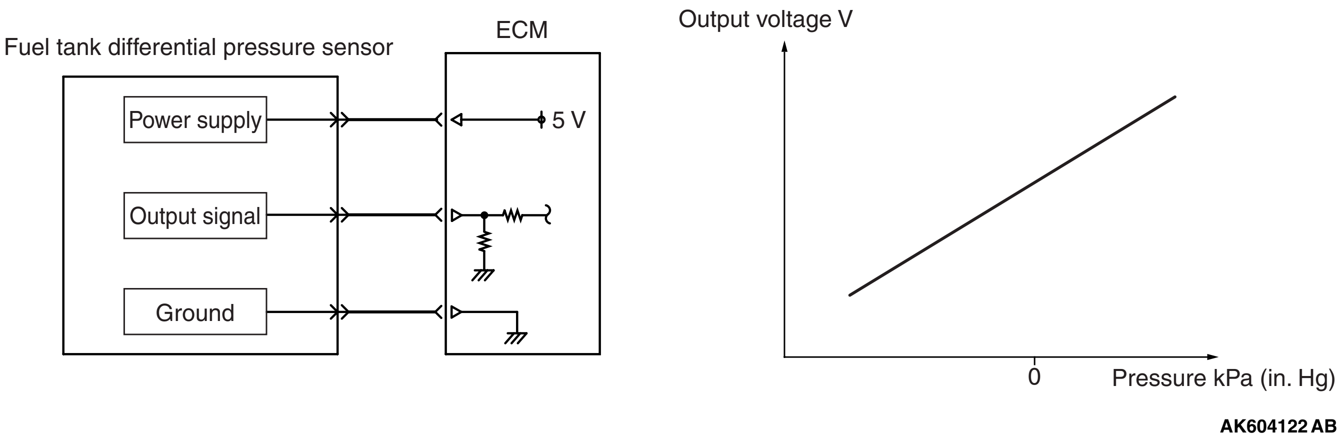


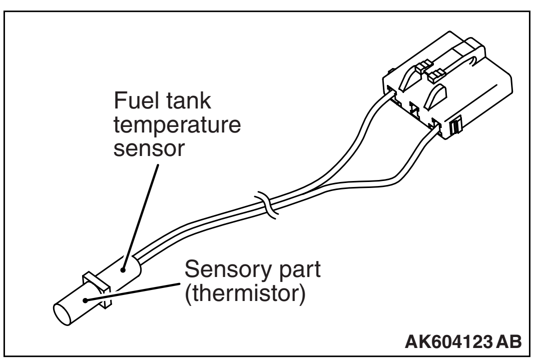




FUEL TANK DIFFERENTIAL PRESSURE SENSOR

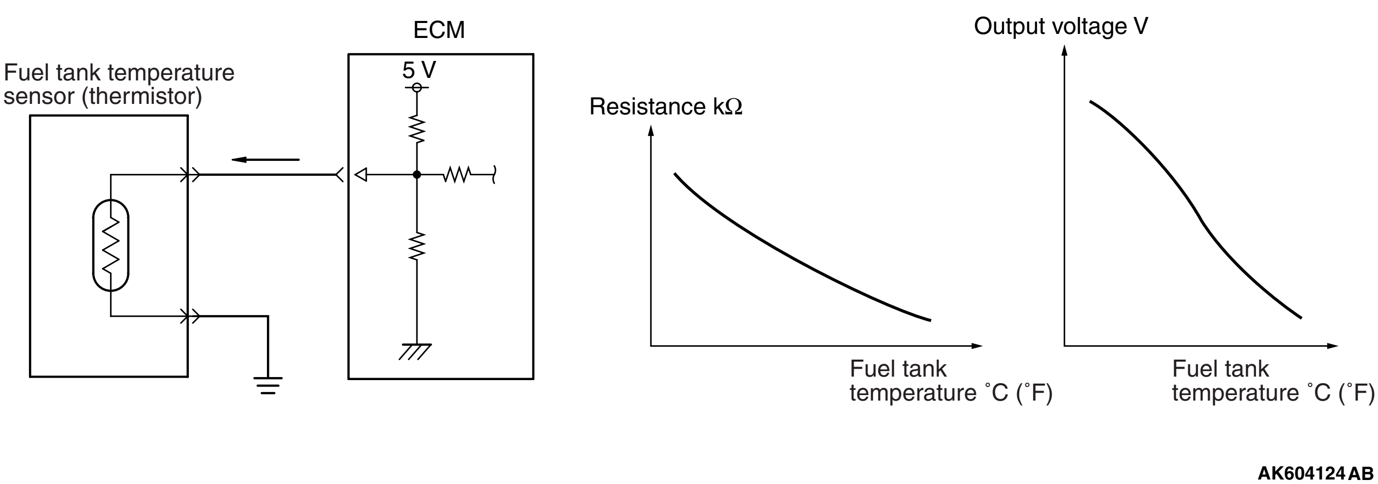
The fuel tank differential pressure sensor is installed to the fuel pump module. The fuel tank differential pressure sensor outputs the voltage to the ECM using the piezo resistive semiconductor in accordance with the difference between pressure in the fuel tank and the pressure of the atmosphere. When monitoring the evaporative leak, the ECM detects malfunctions of the evaporative emission control system by monitoring the amount of output voltage changes from this sensor. The sensor characteristics are as shown in the diagram.





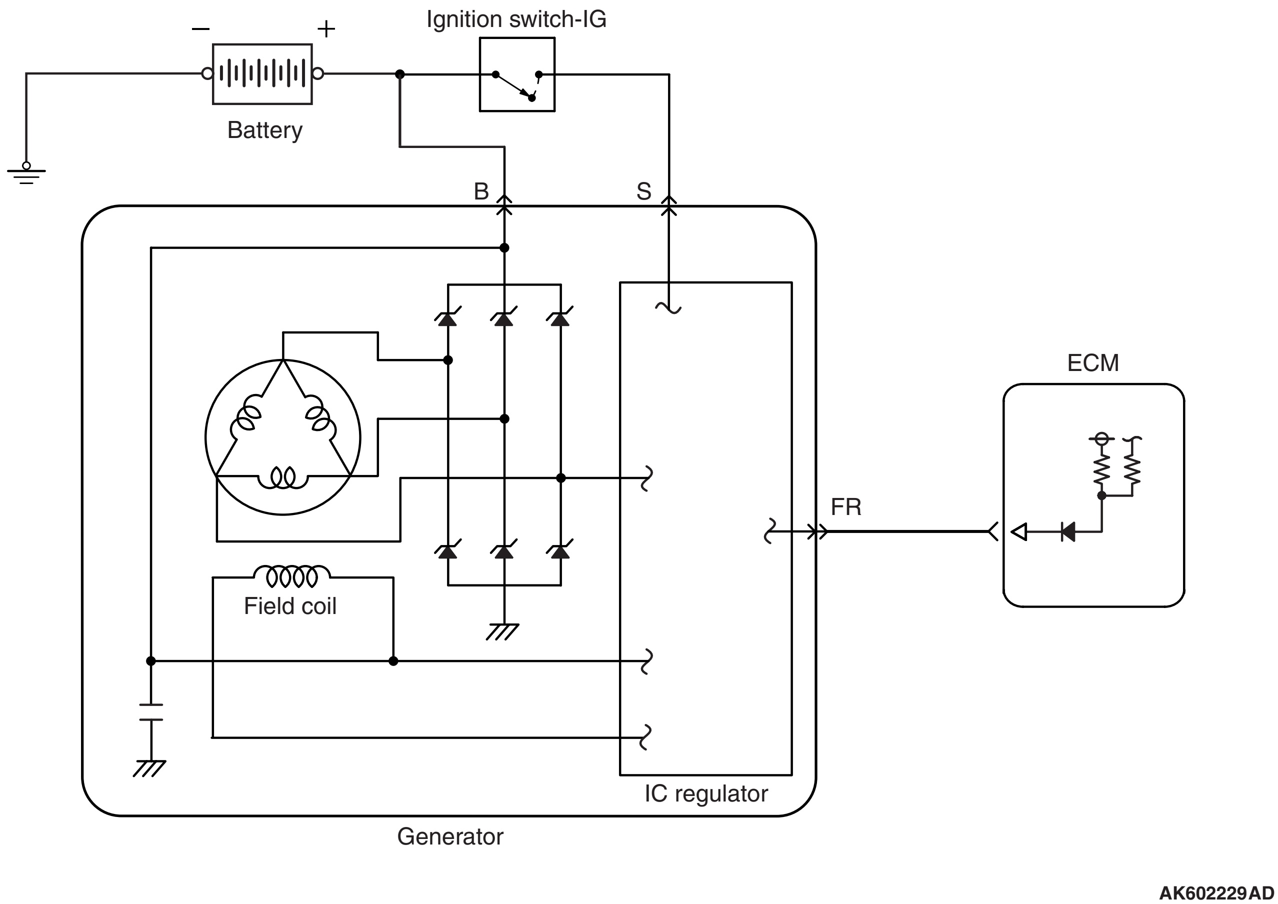
FUEL TANK TEMPERATURE SENSOR

The fuel tank temperature sensor is installed to the fuel pump module. The fuel tank temperature sensor detects the temperature inside the fuel tank using the resistance change in the thermistor and outputs the voltage to the ECM in accordance with the temperature inside the fuel tank. The ECM monitors the evaporative leak in accordance with the fuel tank temperature. The sensor characteristics are as shown in the diagram.



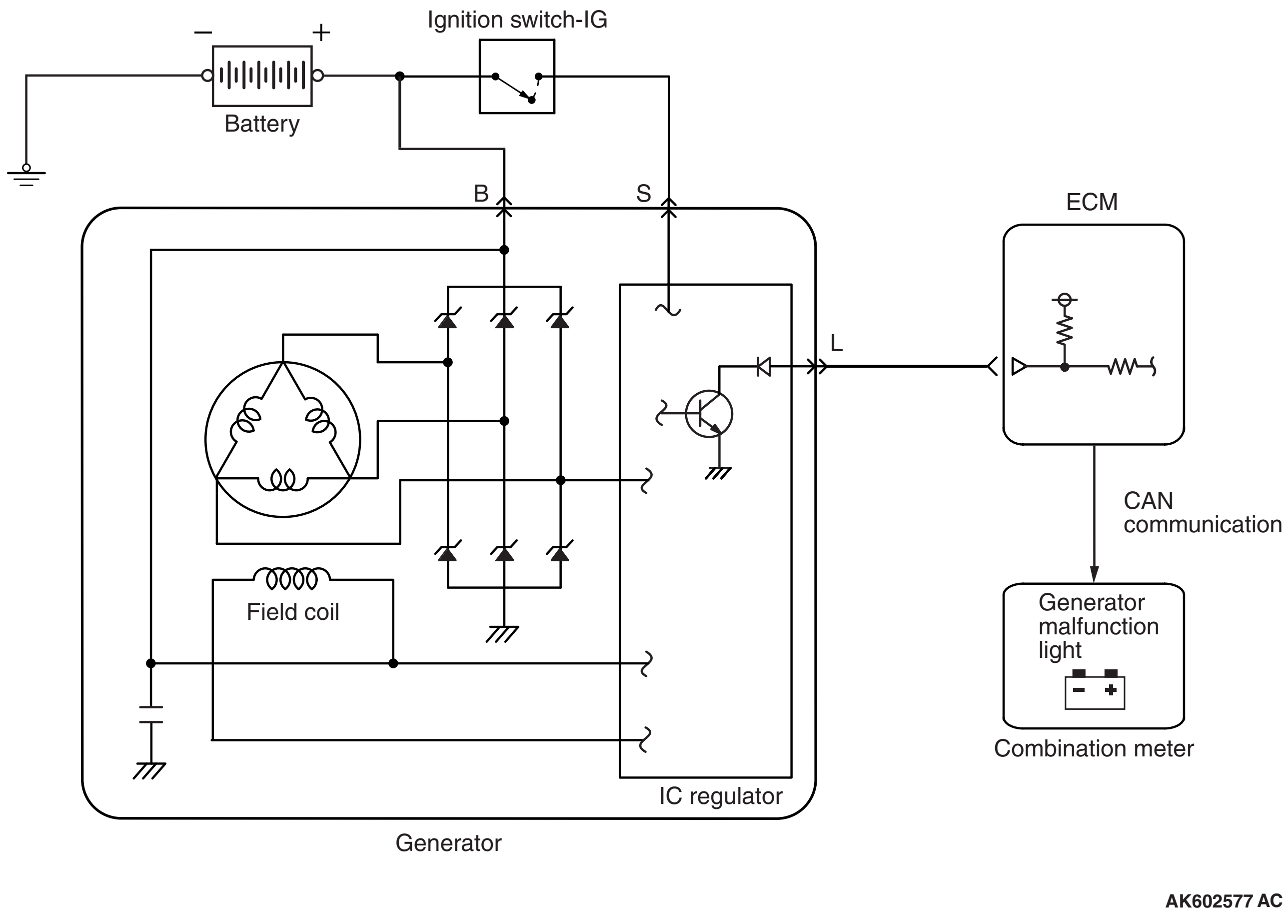
GENERATOR FR TERMINAL

Generator turns ON/OFF the power transistor in the voltage regulator to adjust current flow in the field coil according to alternator output current. In this way generator's output voltage is kept adjusted (to about 14.7 V). The ratio of power transistor ON time (ON duty) is output from generator FR terminal to ECM. ECM uses this signal to detect generator's output current and drives throttle actuator control motor according to output current (electric load). This prevents change in idle speed due to electric load and helps maintain stable idle speed.



GENERATOR L TERMINAL

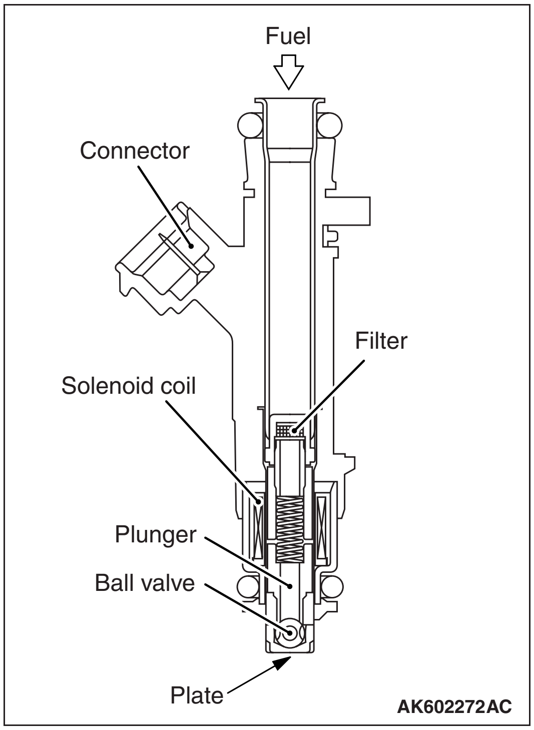
After turning on the ignition switch, the current is input by the ECM to the generator L terminal. This allows the IC regulator to be on and the field coil to be excited. When the generator rotates in this situation, the voltage is excited in the stator coil and the current is output from B-terminal through the commutation diode. Also the generated voltage is input to the voltage regulator through the commutation diode. After the electric generation begins, the current is supplied to the field coil from this circuit. In addition, the generated voltage is output from the generator L terminal to the ECM. This allows the ECM to detect that the electric generation begins. The ECM outputs the ON signal to the combination meter through the CAN and then turns off the generator malfunction light.



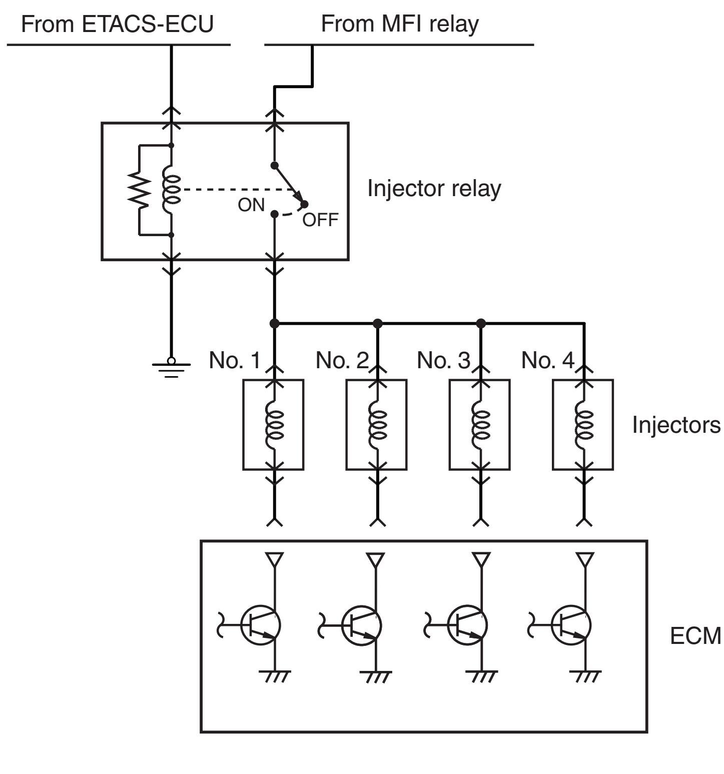
ACTUATOR

M2132002000353

INJECTOR



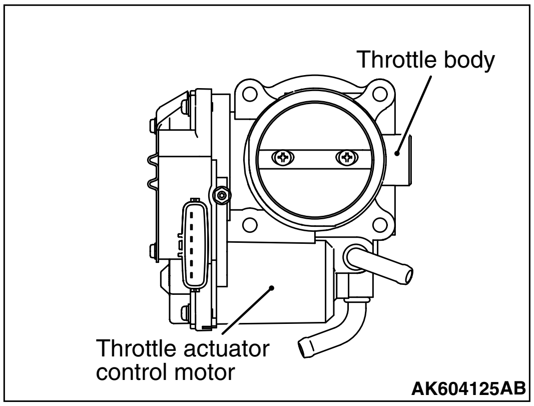
An injector is an injection nozzle with the electromagnetic valve that injects fuel based on the injection signal sent by ECM. 1 injector is installed in the intake manifold of each cylinder and fixed to the fuel rail. When electricity flows through the solenoid coil, the plunger gets sucked in. The ball valve is integrated with the plunger, and gets pulled together with the plunger till the fully open position so that the injection hole is fully open and the fuel gets injected.



AK602578 AC

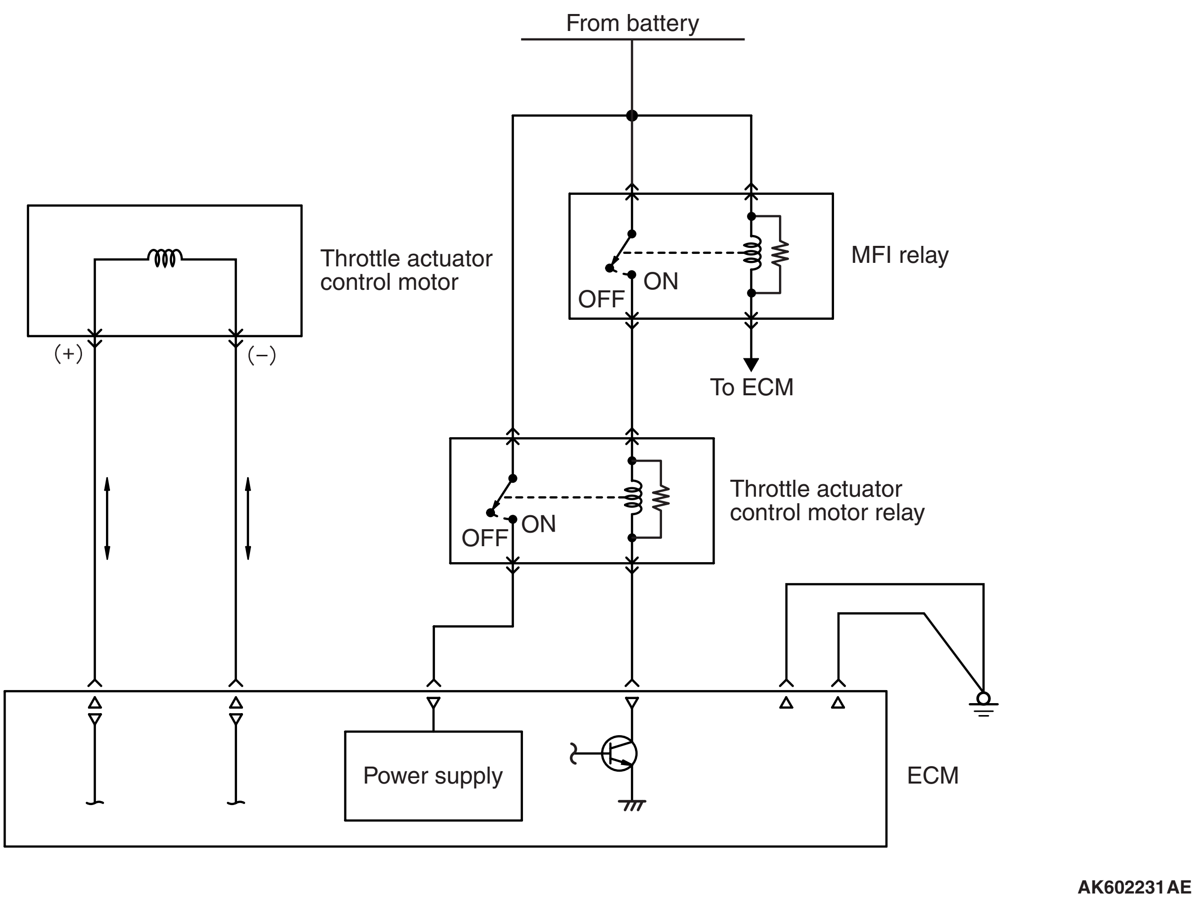
Voltage from the battery gets applied from the injector relay to the injector and up to the ECM. ECM turns ON its power transistor and prepares the injector's ground circuit. Thus, current flows through the injector while power transistor is ON and the injector injects fuel.

THROTTLE ACTUATOR CONTROL MOTOR



A throttle actuator control motor is installed in throttle body. The throttle actuator control motor performs the Open/Close of the throttle valve through the reduction gear. ECM changes current direction according to the Open/Close direction and also changes current to the motor coil to control the throttle actuator control motor.

Throttle actuator control motor is composed of a good response, low energy, and small DC motor with brush and can generate rotation force corresponding to the current applied on the coil. When there is no current passing through the throttle actuator control motor, the throttle valve remains at a prescribed opening angle. So, even if current stops because of a fault in the system, a minimum level of running remains possible.



IGNITION COIL

Refer to GROUP 16 –Ignition Coil P.16-2.

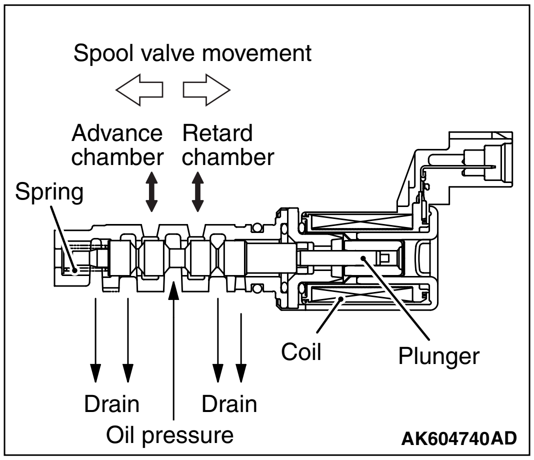
EXHAUST GAS RECIRCULATION (EGR) VALVE

Refer to GROUP 17 –Emission Control –Exhaust Gas Recirculation (EGR) System P.17-12.

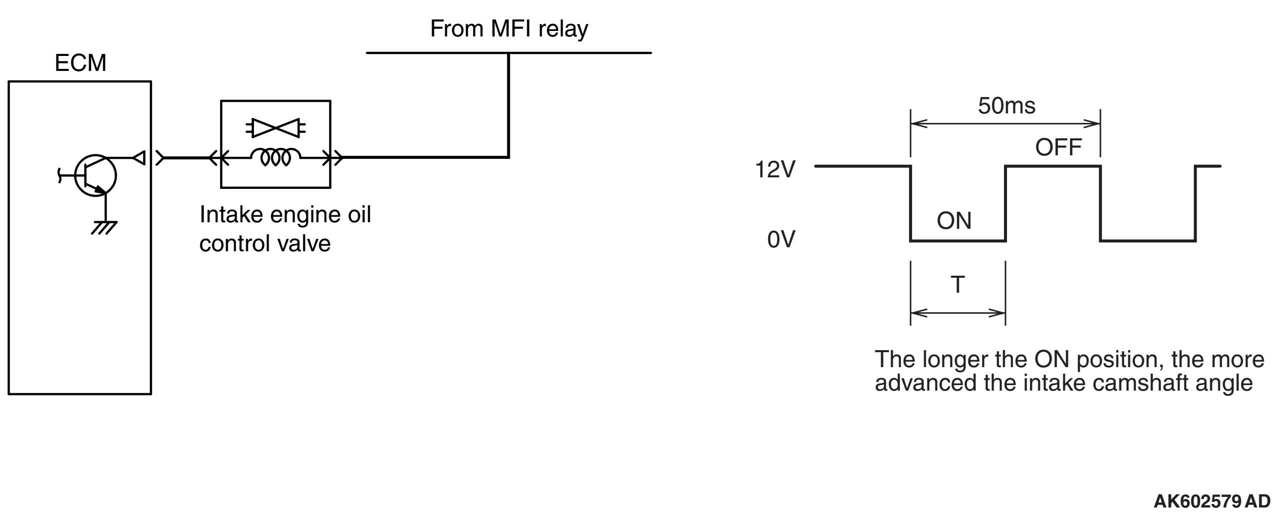
EVAPORATIVE EMISSION PURGE SOLENOID

Refer to GROUP 17 –Emission Control –Evaporative Emission Control System P.17-11.

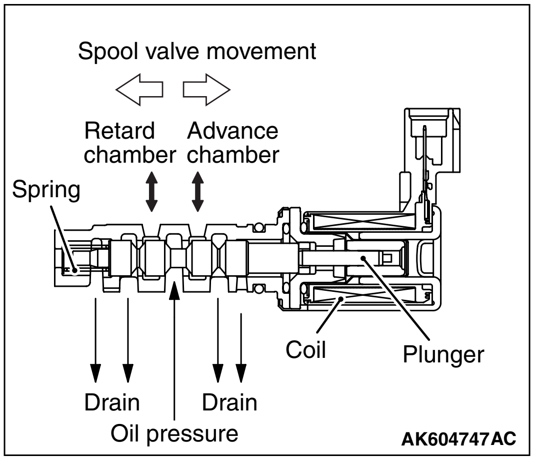
INTAKE ENGINE OIL CONTROL VALVE



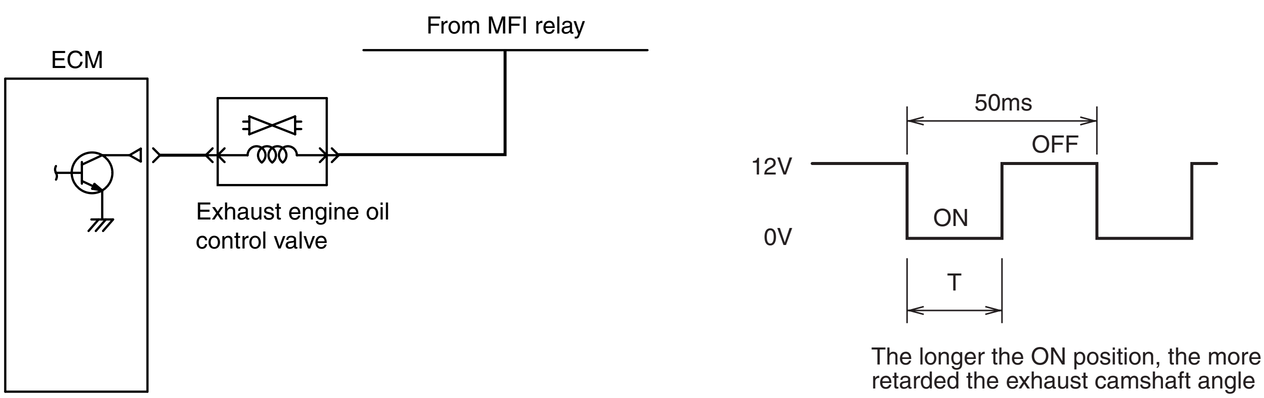
The intake engine oil control valve is installed on the left side of the cylinder head. Receiving the duty signal from the ECM, the intake engine oil control valve moves the spool valve position and divides the oil pressure from the cylinder block into the advanced chamber and the retarded chamber of the V.V.T. sprocket as well as continually changes the intake camshaft phase. The spring makes spool valve stop at the position where the intake camshaft is at the most retarded angle when the engine is stopped. The ECM moves the spool valve position by increasing and decreasing ON duty ratio of the intake engine oil control valve and allows the intake camshaft to be at the target phase angle. When the duty ratio increases, the spool valve moves. The sprocket rotates toward the advanced angle side. When the duty ratio decreases, the sprocket rotates toward the retarded angle side. When the medium duty ratio, at which the spool valve is at the medium position, is achieved, all the oil passages are closed. This allows the phase angle to be kept constant. The ECM changes and controls the duty ratio in accordance with the engine operation to get the optimum phase angle.



EXHAUST ENGINE OIL CONTROL VALVE

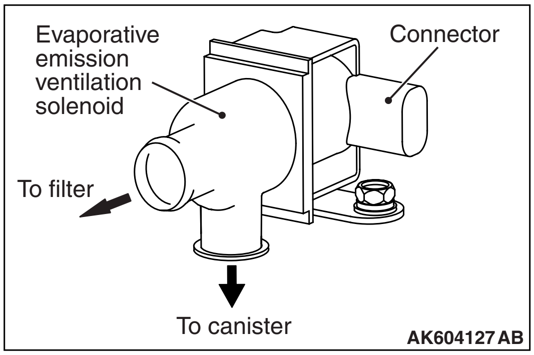


The exhaust engine oil control valve is installed on the right side of the cylinder head. Receiving the duty signal from the ECM, the exhaust engine oil control valve moves the spool valve position and divides the oil pressure from the cylinder block into the advanced chamber and the retarded chamber of the V.V.T. sprocket as well as continually changes the exhaust camshaft phase. The spring makes spool valve stop at the position where the exhaust camshaft is at the most advanced angle when the engine is stopped. The ECM moves the spool valve position by increasing and decreasing ON duty ratio of the exhaust engine oil control valve and allows the exhaust camshaft to be at the target phase angle. When the duty ratio increases, the spool valve moves. The sprocket rotates toward the retarded angle side. When the duty ratio decreases, the sprocket rotates toward the advanced angle side. When the medium duty ratio, at which the spool valve is at the medium position, is achieved, all the oil passages are closed. This allows the phase angle to be kept constant. The ECM changes and controls the duty ratio in accordance with the engine operation to get the optimum phase angle.

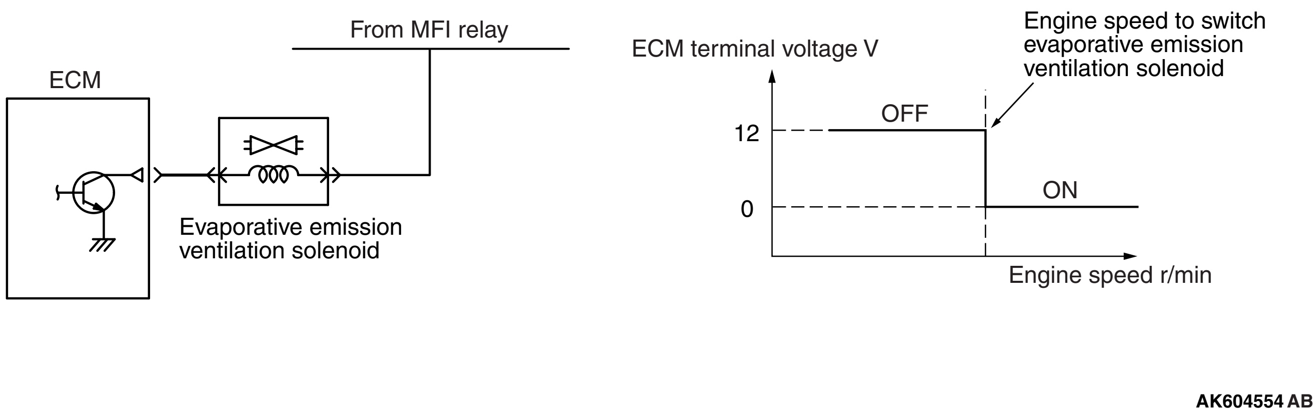


AK602579 AG

EVAPORATIVE EMISSION VENTILATION SOLENOID

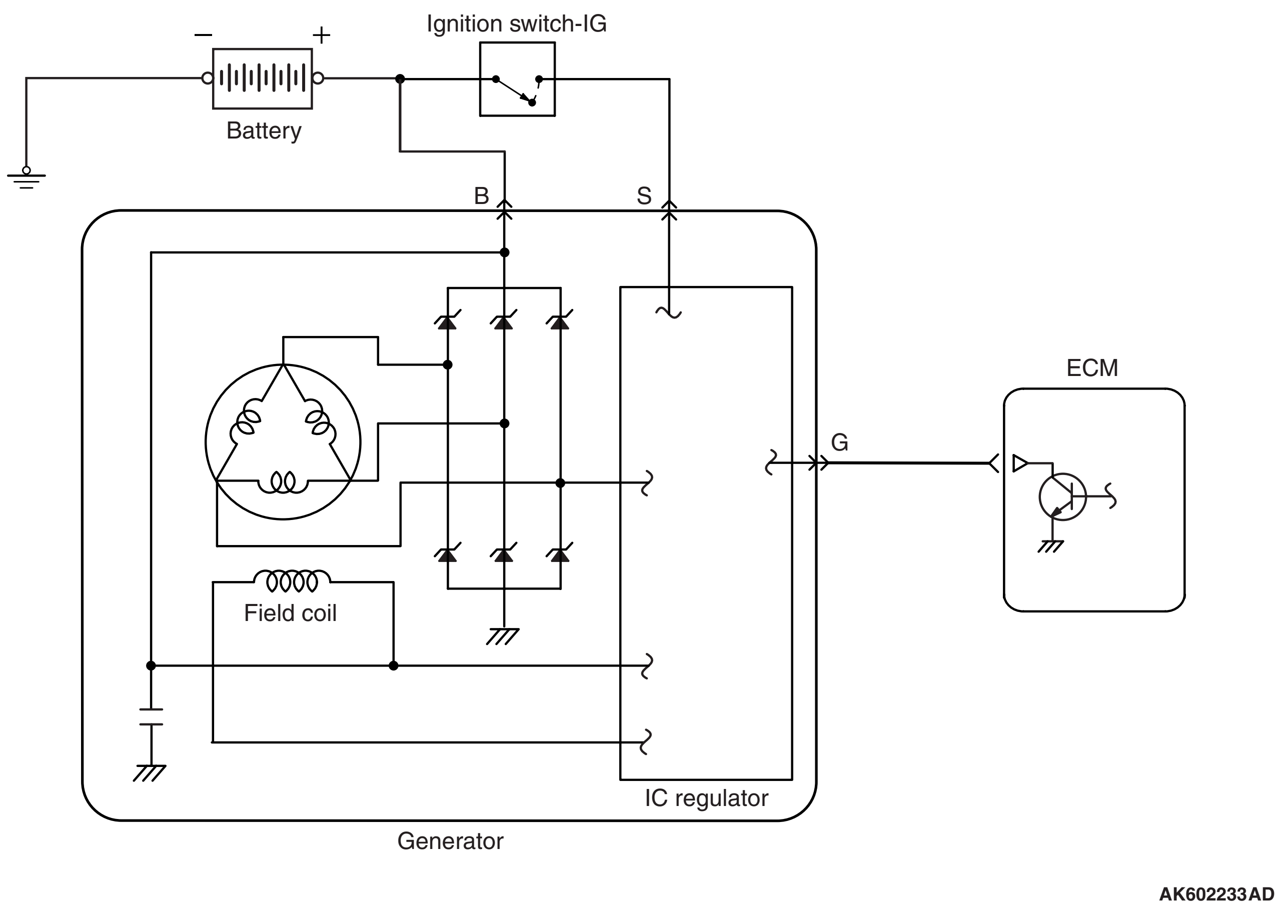


The evaporative emission ventilation solenoid, an ON/OFF type solenoid valve, is integrated in the evaporative canister.The evaporative emission ventilation solenoid is installed between the evaporative canister and the air-releasing end, where the evaporative emission ventilation solenoid takes or shuts off air.When the current is not flowing through the coil, the air flows between the nipples, "A" and "B", and through the evaporative canister.When the current is flowing through the coil, the air is sealed in the nipple "A" and the air through the evaporative canister is shut off.When monitoring the evaporative leak, the ECM turns the evaporative emission ventilation solenoid on to create the slight vacuum condition in the evaporative emission control system. The ECM shuts off the air flowing through the evaporative canister to maintain the vacuum condition necessary for monitoring.



GENERATOR G TERMINAL

ECM uses ON/OFF of generator G terminal to control generator output voltage. When the power transistor in the ECM turns ON, output voltage gets adjusted to about 12.8 V. When generator output voltage drops to 12.8 V it becomes lower than voltage of the charged battery and almost no current is output from the generator. When the power transistor in the ECM turns OFF, output voltage gets adjusted to about 14.7 V. When generator output voltage is about 14.7 V, generator outputs current to produce electricity. In case electric load is generated suddenly, ECM controls generator G terminal's On-duty to limit the sudden increase in generator load due to generation and thus prevents change in idle speed.

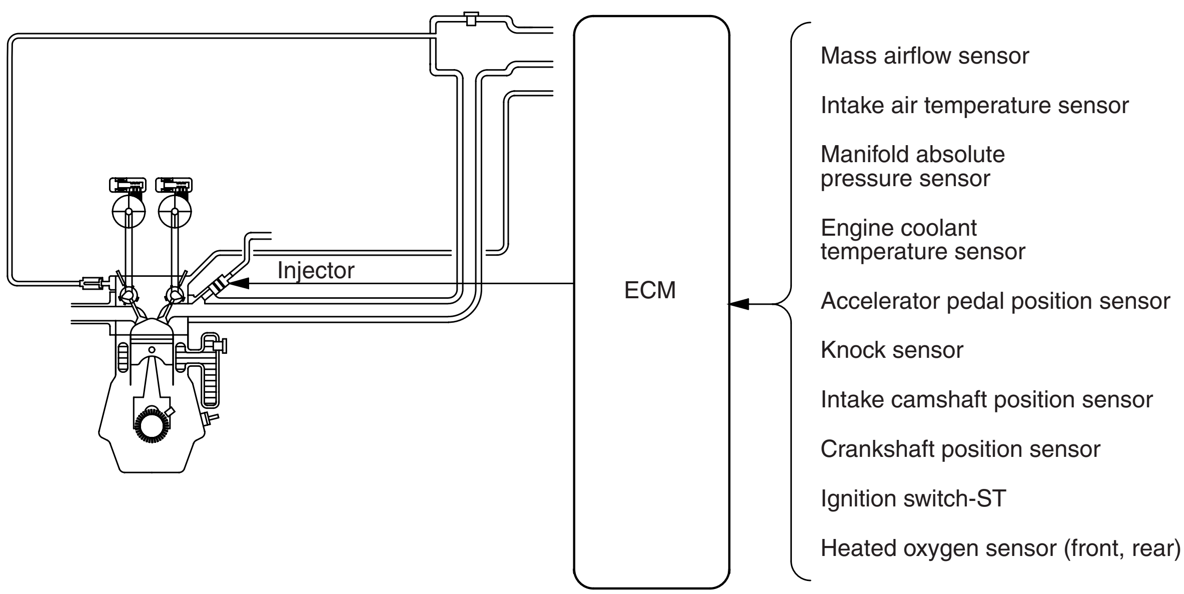


FUEL INJECTION CONTROL

M2132003001036

Fuel injection volume is regulated to obtain the optimum air-fuel ratio in accordance with the constant minute changes in engine driving conditions. Fuel injection volume is controlled by injector drive time (injection time). There is a prescribed basic drive time that varies according to the engine speed and intake air volume. ECM adds prescribed compensations to this basic drive time according to conditions such as the intake air temperature and engine coolant temperature to decide injection time. Fuel injection is done separately for each cylinder and is done once in two engine rotations.

System Configuration Diagram

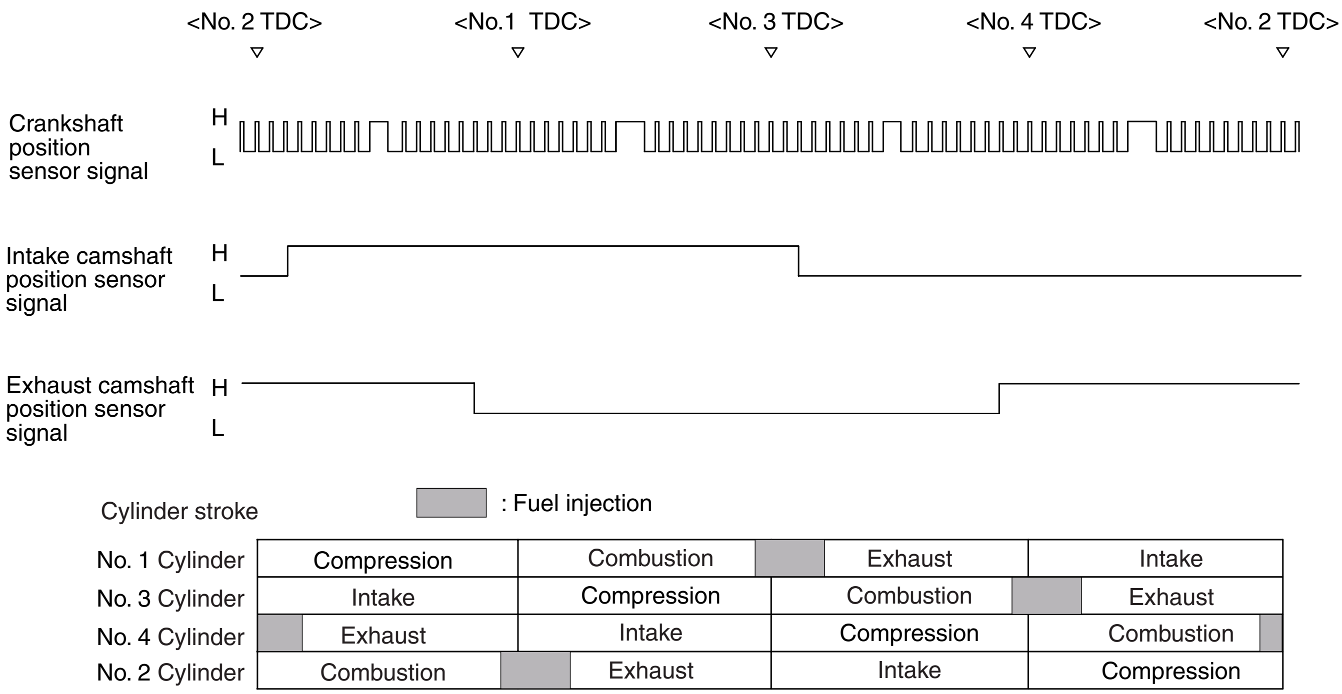


AK604128AB

1. INJECTOR ACTUATION (FUEL INJECTION) TIMING

Injector drive time in case of multiport fuel injection (MFI) is controlled as follows according to driving conditions.

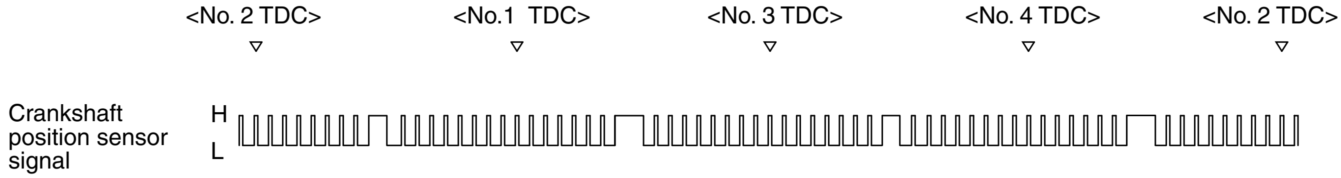
Fuel Injection During Cranking and Normal Operation



AK604622AB

Fuel injection to each cylinder is done by driving the injector at optimum timing while it is in exhaust process based on the crankshaft position sensor signal. ECM compares the crankshaft position sensor output pulse signal and intake camshaft position sensor output pulse signal to identify the cylinder. Using this as a base, it performs sequential injection in the sequence of cylinders 1, 3, 4, 2.

Additional Fuel Injection During Acceleration



Increase injection for acceleration

Cylinder stroke

No. 1 Cylinder	Compression	Combustion		Exhaust	Intake
No. 3 Cylinder	Intake	Compression		Combustion	Exhaust
No. 4 Cylinder	Exhaust	Intake		Compression	Combustion
No. 2 Cylinder	Combustion	Exhaust		Intake	Compression

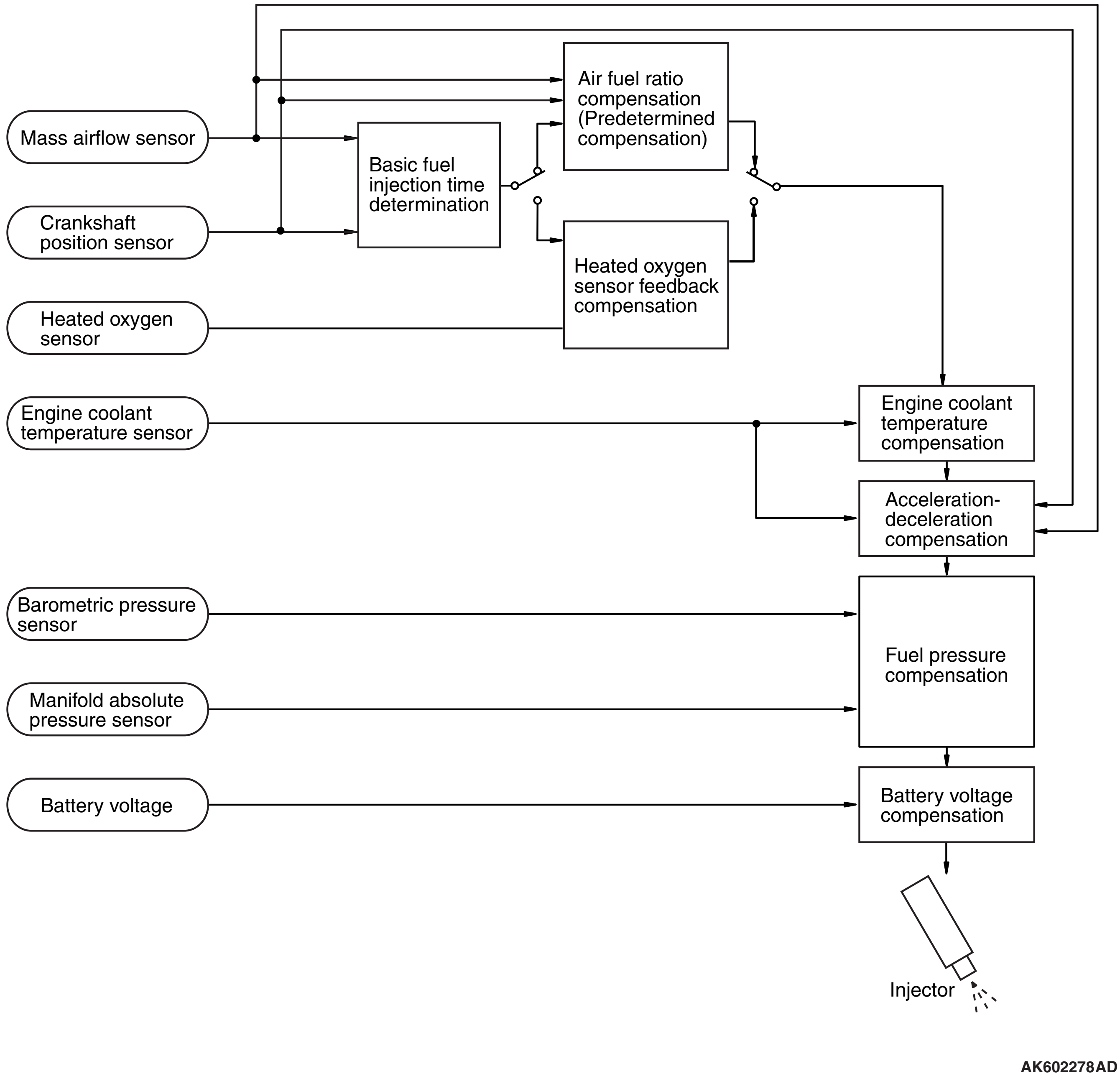
AK604623AB

In addition to the synchronizing fuel injection with crankshaft position sensor signal during acceleration, the volume of fuel is injected according to the extent of the acceleration.

2. Fuel injection volume (injector drive time) control

The figure shows the flow for injector drive time calculation. Basic drive time is decided based on the mass airflow sensor signal (intake air volume signal) and crankshaft position sensor signal (engine rotation signal). This basic drive time is compensated according to signals from various sensors and optimum injector drive time (fuel injection volume) is calculated according to driving conditions.

Fuel Injection Volume Control Block Diagram



[Injector basic drive time]

Fuel injection is performed once per cycle for each cylinder. Basic drive time refers to fuel injection volume (injector drive time) to achieve theoretical air-fuel ratio for the intake air volume of 1 cycle of 1 cylinder. Fuel injection volume changes according to the pressure difference (injected fuel pressure) between manifold absolute pressure and fuel pressure (constant). So, injected fuel pressure compensation is made to injector drive time for theoretical air-fuel ratio to arrive at basic drive time.

$$\text{Basic fuel injection time} \propto \frac{\text{Intake air amount per cycle per cylinder}}{\text{Theoretical air-fuel ratio}} \times \text{Fuel injection pressure compensation}$$

AK602279AC

Intake air volume of each cycle of 1 cylinder is calculated by ECM based on the mass airflow sensor signal and crankshaft position sensor signal. Also, during engine start, the map value prescribed by the engine coolant temperature sensor signal is used as basic drive time.

[Injector drive time compensation]

After calculating the injector basic drive time, the ECM makes the following compensations to control the optimum fuel injection volume according to driving conditions.

List of main compensations for fuel injection control

Compensations	Content
Heated oxygen sensor feedback compensation	The heated oxygen sensor signal is used for making the compensation to get air-fuel ratio with best cleaning efficiency of the 3-way catalytic converter. This compensation might not be made sometimes in order to improve drivability, depending on driving conditions. (Air-fuel ratio compensation is made.)
Air-fuel ratio compensation	Under driving conditions where heated oxygen sensor feedback compensation is not performed, compensation is made based on pre-set map values that vary according to engine speed and intake air volume.
Engine coolant temperature compensation	Compensation is made according to the engine coolant temperature. The lower the engine coolant temperature, the greater the fuel injection volume.
Acceleration/ Deceleration compensation	Compensation is made according to change in intake air volume. During acceleration, fuel injection volume is increased. Also, during deceleration, fuel injection volume is decreased.
Fuel injection compensation	Compensation is made according to the pressure difference between atmospheric pressure and manifold absolute pressure. The greater the difference in pressure, the shorter the injector drive time.
Battery voltage compensation	Compensation is made depending on battery voltage. The lower the battery voltage, the greater the injector drive signal time.
Learning value for fuel compensation	Compensation amount is learned to compensate feedback of heated oxygen sensor. This allows system to compensate in accordance with engine characteristics.

[Fuel limit control during deceleration]

ECM limits fuel when decelerating downhill to prevent excessive rise of catalytic converter temperature and to improve fuel efficiency.

[Fuel-cut control when over-run]

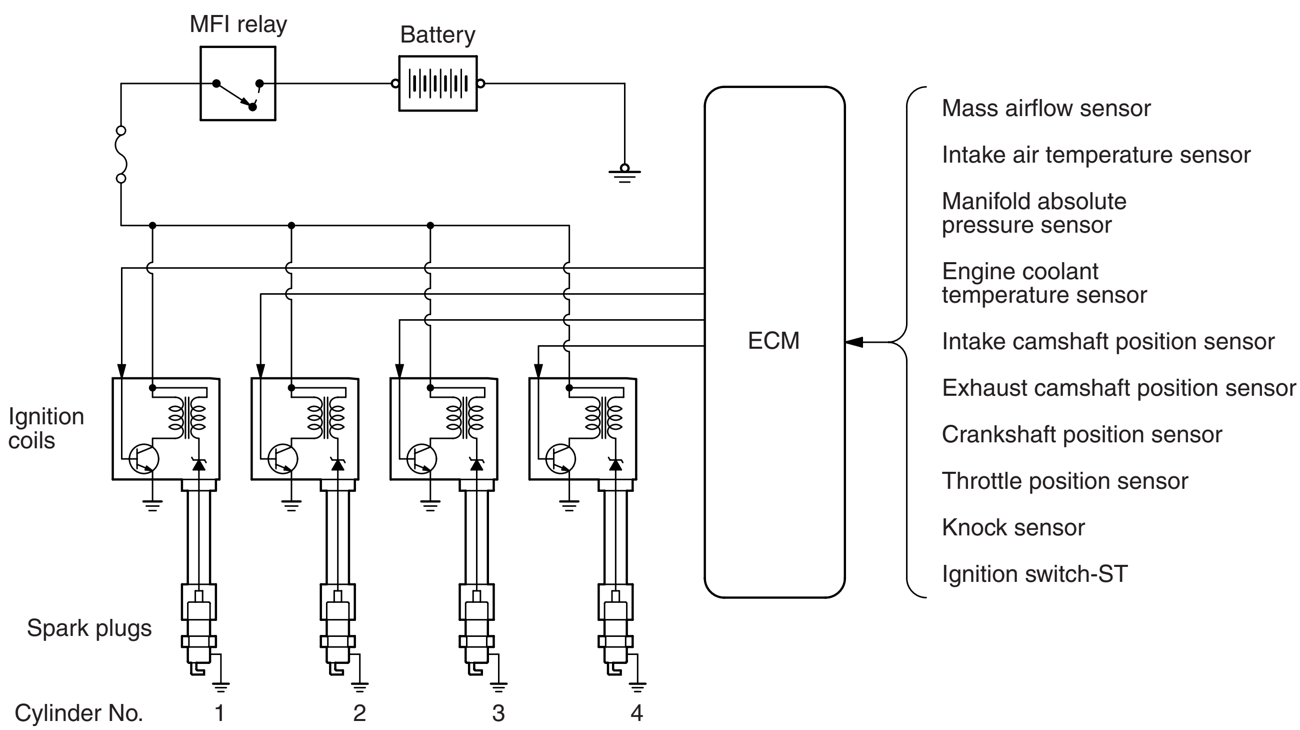
When engine speed exceeds a prescribed limit (6,600 r/min), ECM cuts fuel supply to prevent overrunning and thus protect the engine. Also, if engine speed exceeds 4,000 r/min for 15 seconds while vehicle is stationary (no load), it cuts fuel supply and controls the throttle valve opening angle to protect the engine.

IGNITION TIMING AND CONTROL FOR CURRENT CARRYING TIME

M2132027100089

Ignition timing is pre-set according to engine driving conditions. Compensations are made according to pre-set values depending on conditions such as engine coolant temperature, battery voltage etc. to decide optimum ignition timing. Primary current connect/disconnect signal is sent to the power transistor to control ignition timing. Ignition is done in sequence of cylinders 1, 3, 4, 2.

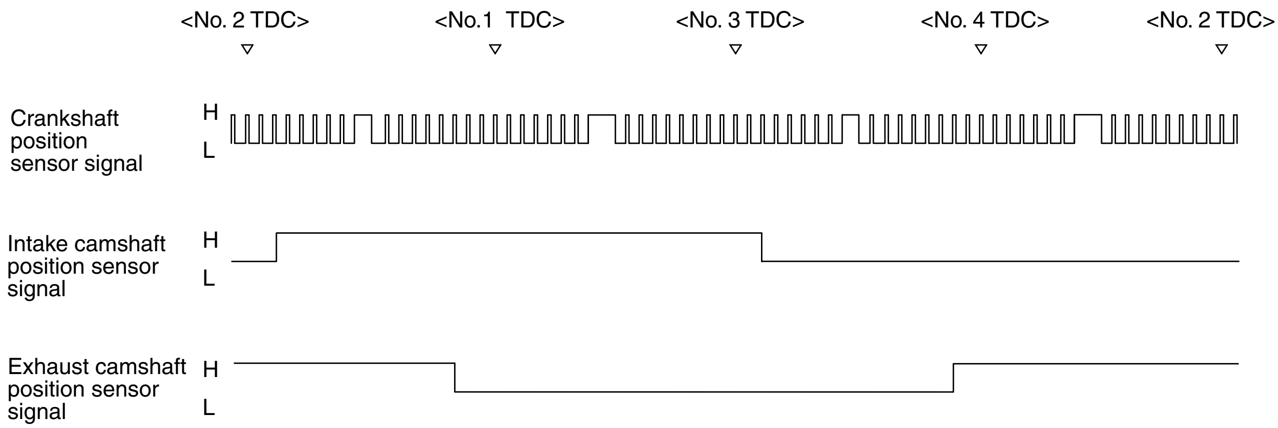
System Configuration Diagram



AK502722AD

1. Ignition distribution control

Based on the crankshaft position sensor signal and camshaft position sensor signal, ECM decides the ignition cylinder, calculates the ignition timing and sends the ignition coil primary current connect/disconnect signal to the power transistor of each cylinder in the ignition sequence.



Cylinder stroke

Ignition

No. 1 Cylinder	Compression	Combustion	Exhaust	Intake
No. 3 Cylinder	Intake	Compression	Combustion	Exhaust
No. 4 Cylinder	Exhaust	Intake	Compression	Combustion
No. 2 Cylinder	Combustion	Exhaust	Intake	Compression

AK604624AB

2. Spark-advance control and current carrying time control

[During start]

ECM initiates ignition at fixed ignition timing (5° BTDC) synchronized with the crankshaft position sensor signal.

[During normal operation]

After determining the basic spark-advance based on the intake air volume and engine speed, ECM makes compensations based on input from various sensors to control the optimum spark-advance and current carrying time.

List of main compensations for spark-advance control and current carrying time control

Compensations	Content
Intake air temperature compensation	Compensation is made according to intake air temperature. The higher the intake air temperature the greater the delay in ignition timing.
Engine coolant temperature compensation	Compensation is made according to engine coolant temperature. The lower the engine coolant temperature the greater the advance in ignition timing.
Knocking compensation	Compensation is made according to generation of knocking. The greater the knocking the greater the delay in ignition timing.
Stable idle compensation	Compensation is made according to change in idle speed. In case engine speed becomes lower than target speed, ignition timing is advanced.
Delay compensation when changing shift	During change of shift, sparking is delayed compared to normal ignition timing to reduce engine output torque and absorb the shock of the shift change.
Battery voltage compensation	Compensation is made depending on battery voltage. The lower the battery voltage the greater the current carrying time and when battery voltage is high current carrying time is shortened.

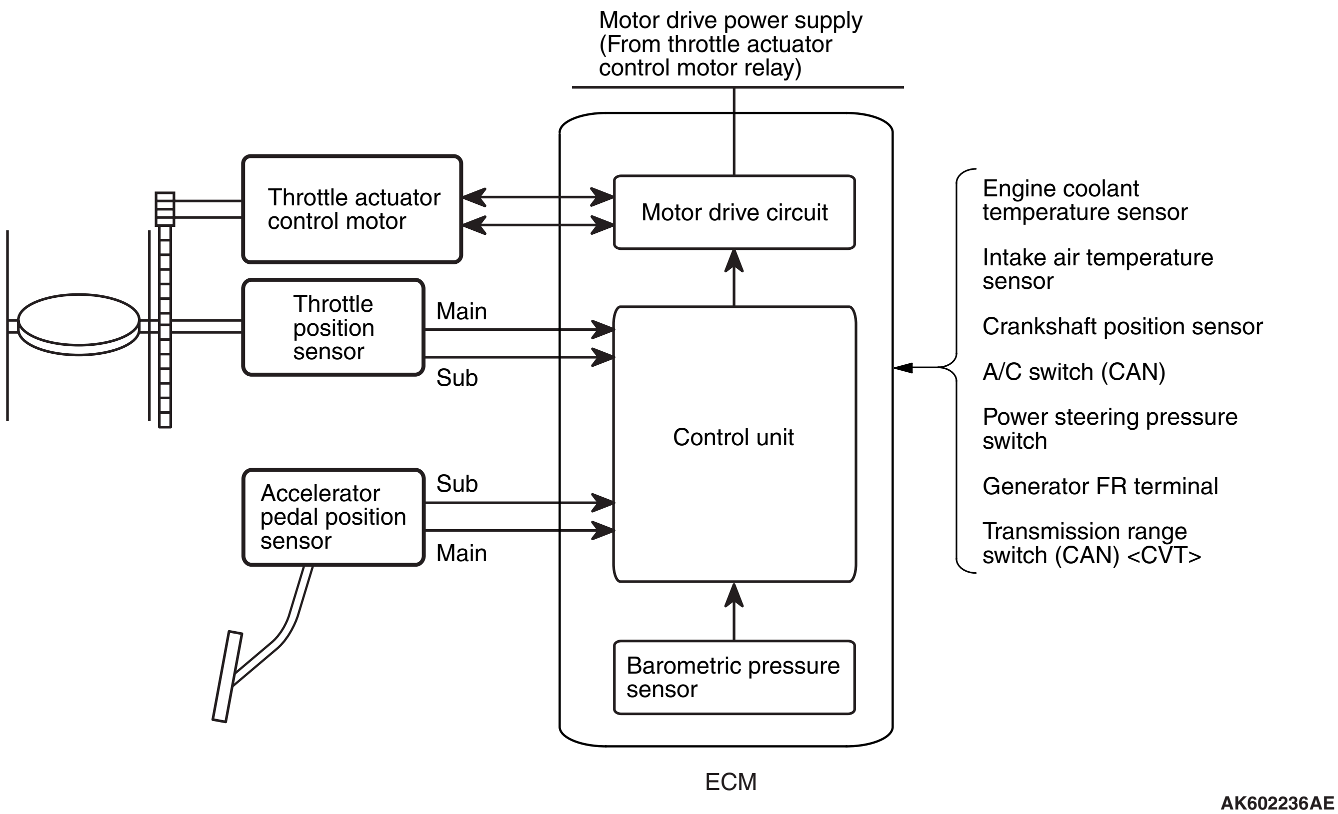
[Control for checking ignition timing]

During basic ignition timing set mode for M.U.T.-III actuator test function, sparking is done with fixed ignition timing (5° BTDC) synchronized with crankshaft position sensor signal.

THROTTLE VALVE OPENING ANGLE CONTROL AND IDLE SPEED CONTROL

M2132003500328

ECM detects the amount of accelerator pedal depression (as per operator's intention) through the accelerator pedal position sensor. Based on pre-set basic target opening angles it adds various compensations and controls the throttle valve opening angle according to the target opening angle.



While starting

ECM adds various compensations to the target opening angle that are set based on the engine coolant temperature, so that the air volume is optimum for starting.

While idling

ECM controls the throttle valve to achieve the target opening angle that are set based on the engine coolant temperature. In this way best idle operation is achieved when engine is cold and when it is hot. Also, the following compensations ensure optimum control.

While driving

Compensations are made to the target opening angle set according to the accelerator pedal opening angle and engine speed to control the throttle valve opening angle.

List of main compensations for throttle valve opening angle and idle speed control

Compensations	Content
Stable idle compensation (immediately after start)	In order to stabilize idle speed immediately after start, target opening angle is kept big and then gradually reduced. Compensation values are set based on the engine coolant temperature.
Rotation speed feedback compensation (while idling)	In case there is a difference between the target idle speed and actual engine speed, ECM compensates the throttle valve opening angle based on that difference.
Atmospheric pressure compensation	At high altitudes atmospheric pressure is less and the intake air density is low. So, the target opening angle is compensated based on atmospheric pressure.
Engine coolant temperature compensation	Compensation is made according to the engine coolant temperature. The lower the engine coolant temperature the greater the throttle valve opening angle.
Electric load compensation	Throttle valve opening angle is compensated according to electric load. The greater the electric load, the greater the throttle valve opening angle.
Compensation when shift is in D range <CVT>	When transmission is changed from P or N range to some other range, throttle valve opening angle is increased to prevent reduction in engine speed.
Compensation when A/C is functioning	Throttle valve opening angle is compensated according to functioning of A/C compressor. While A/C compressor is being driven, the throttle valve opening angle is increased.
Power steering fluid pressure compensation	Throttle valve opening angle is compensated according to power steering functioning. When power steering oil pressure rises and power steering pressure switch is ON, the throttle valve opening angle is increased.

Initialize control

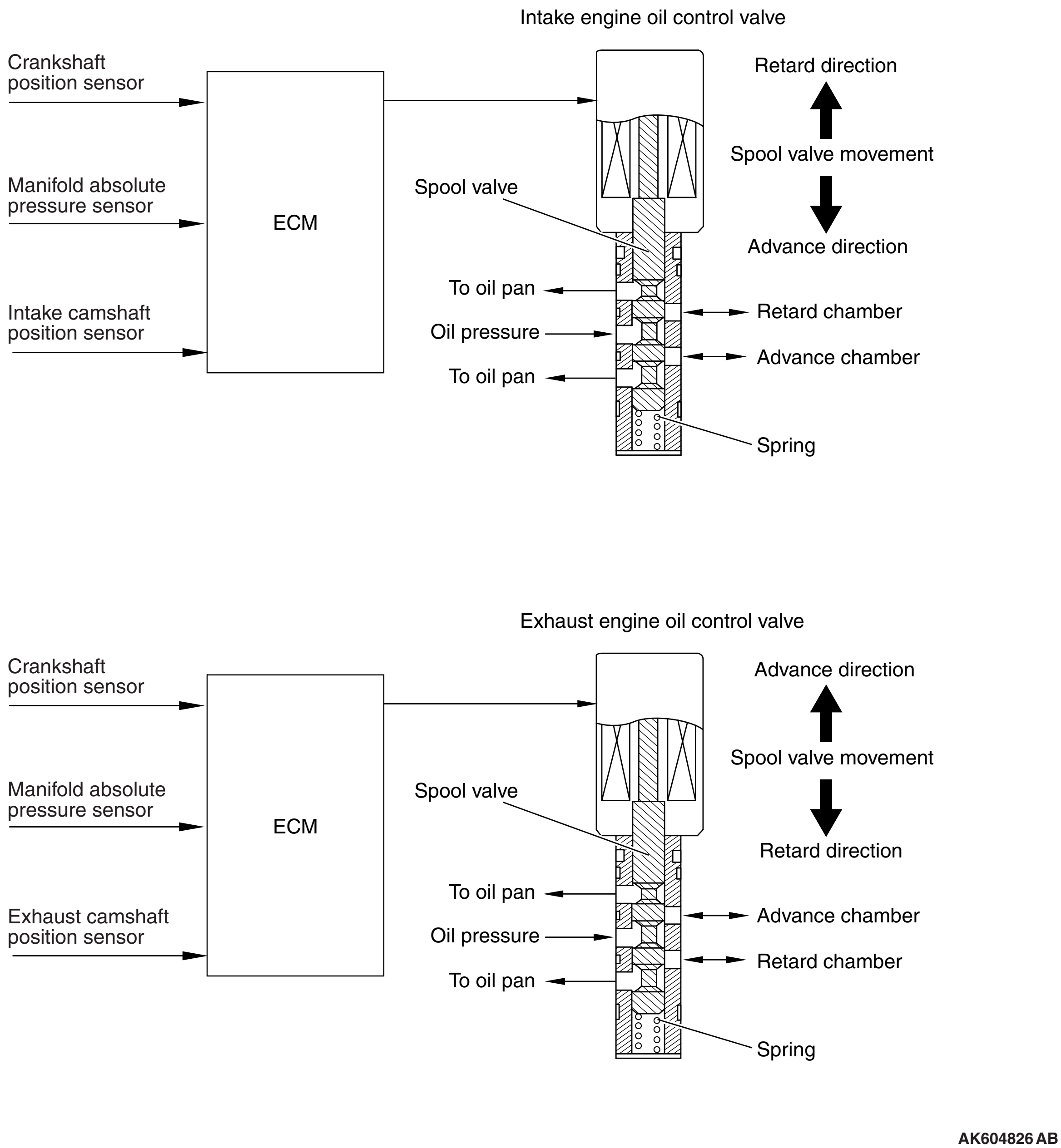
After ignition switch turns OFF, ECM drives the throttle valve from fully closed position to fully open position and records the fully closed/open studied value of the throttle position sensor (main and sub) output signals. The recorded studied values are used as studied value compensation for compensating basic target opening angle when the engine is started next.

MIVEC (Mitsubishi Innovative Valve Timing Electronic Control System)

M2132023500212

MIVEC is the system which continuously varies and controls the opening and closing timings of the intake valve and the exhaust valve.

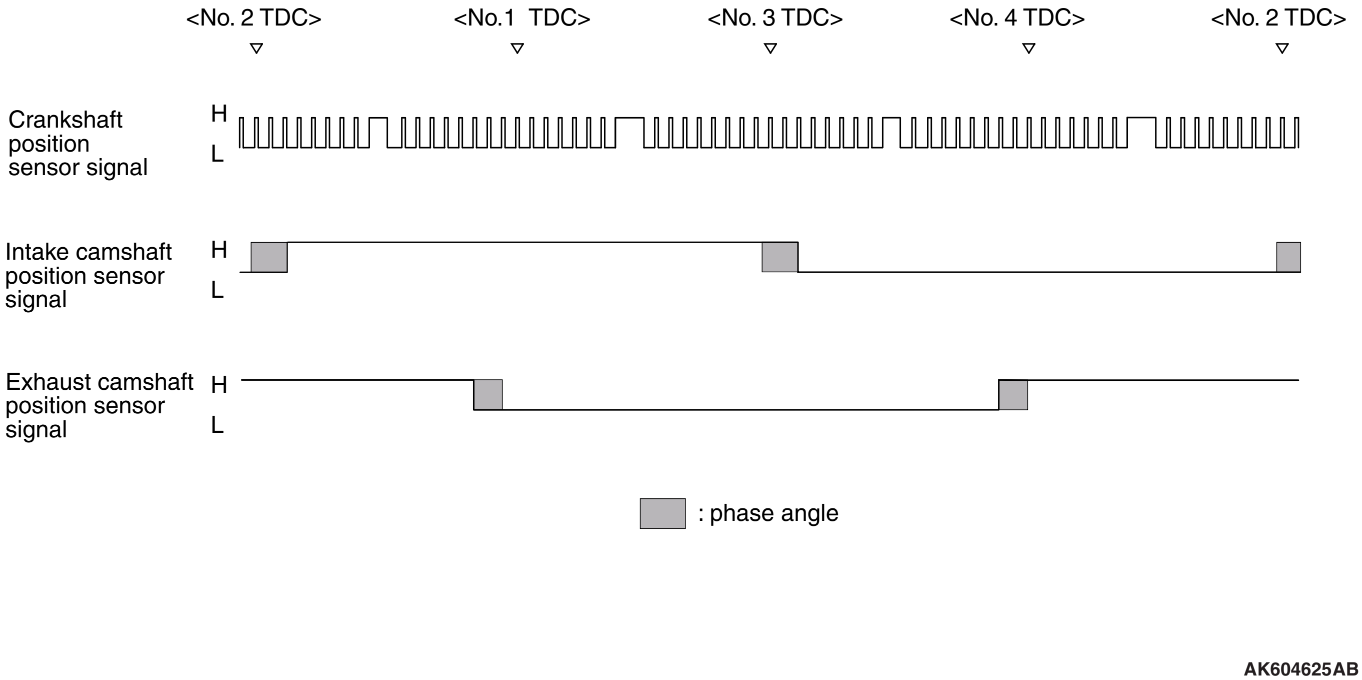
System Configuration Diagram



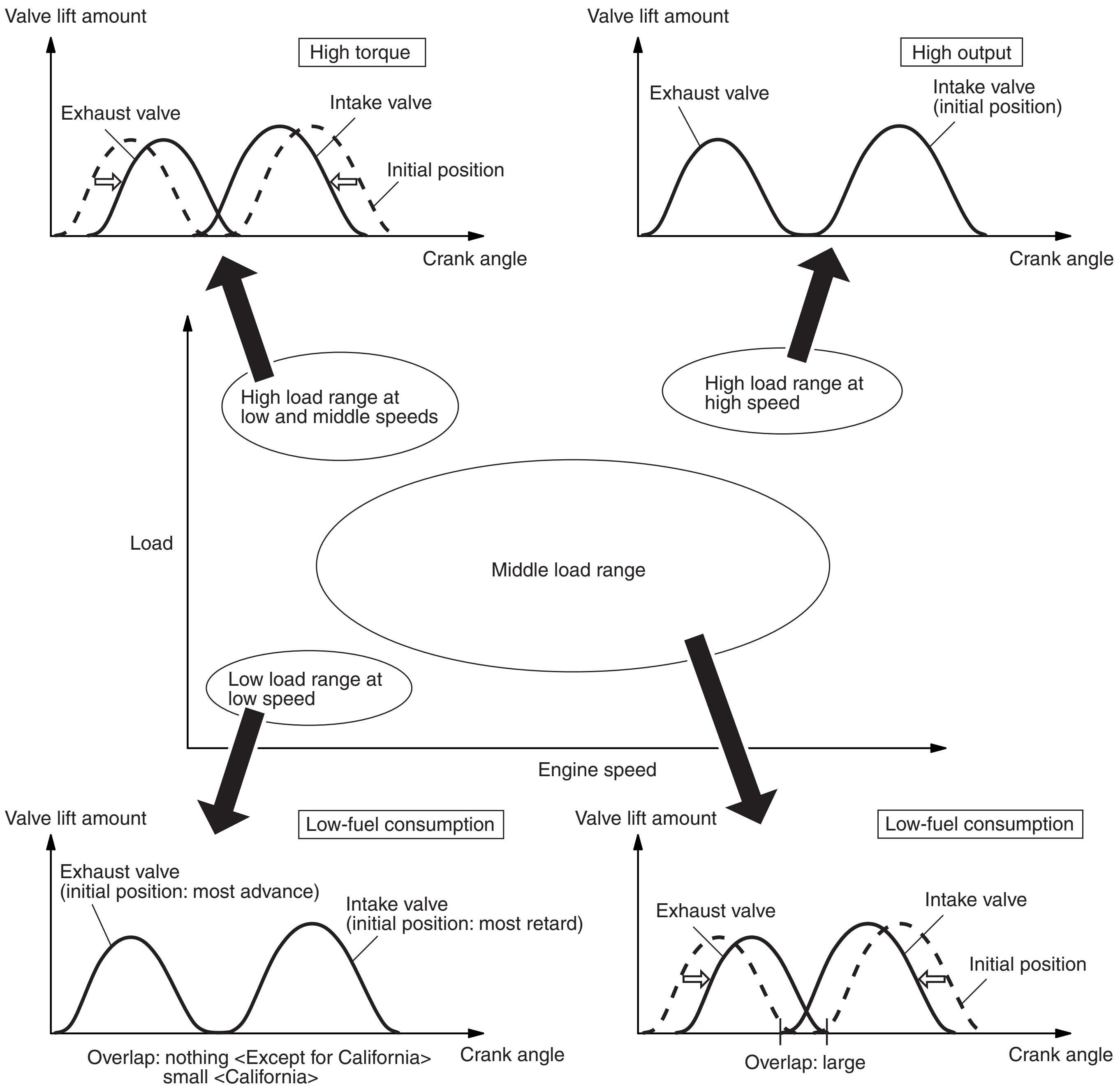
MIVEC allows the optimum valve timing to be controlled in accordance with the engine operation and the idling stability to be improved, as well as the output and the torque to be better in all the operation ranges.

- The ECM assesses the engine operation through the signals from each sensor.
- Based on the assessed information, the ECM sends the duty signal to the intake engine oil control valve and exhaust engine oil control valve as well as controls the spool valve position.
- Changing the spool valve position allows the oil pressure to be divided into the retarded chamber and the advanced chamber, as well as allows the phases of the intake camshaft and the exhaust camshaft to be continuously changed.

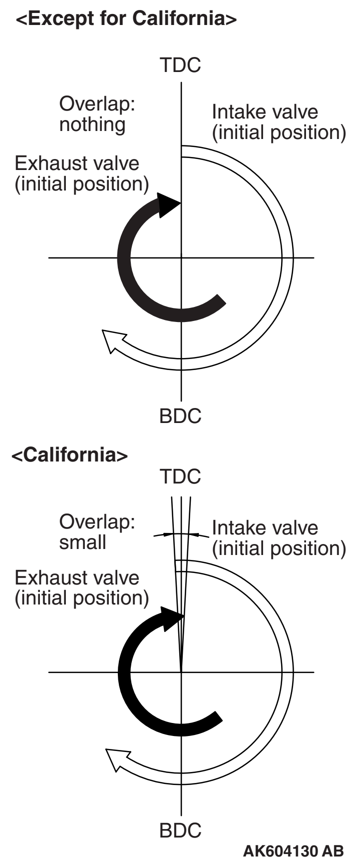
Phase Angle Detection

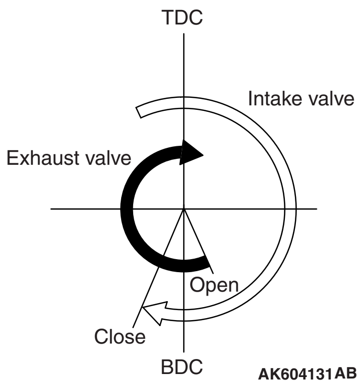
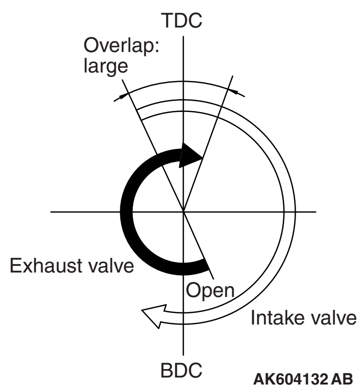
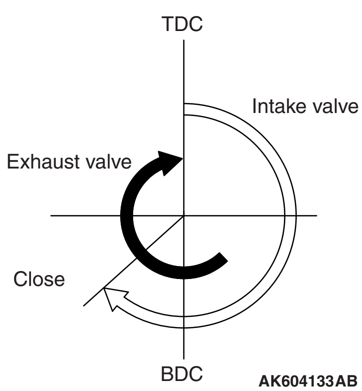


The detected phase angle is calculated using the cam position sensor signal.



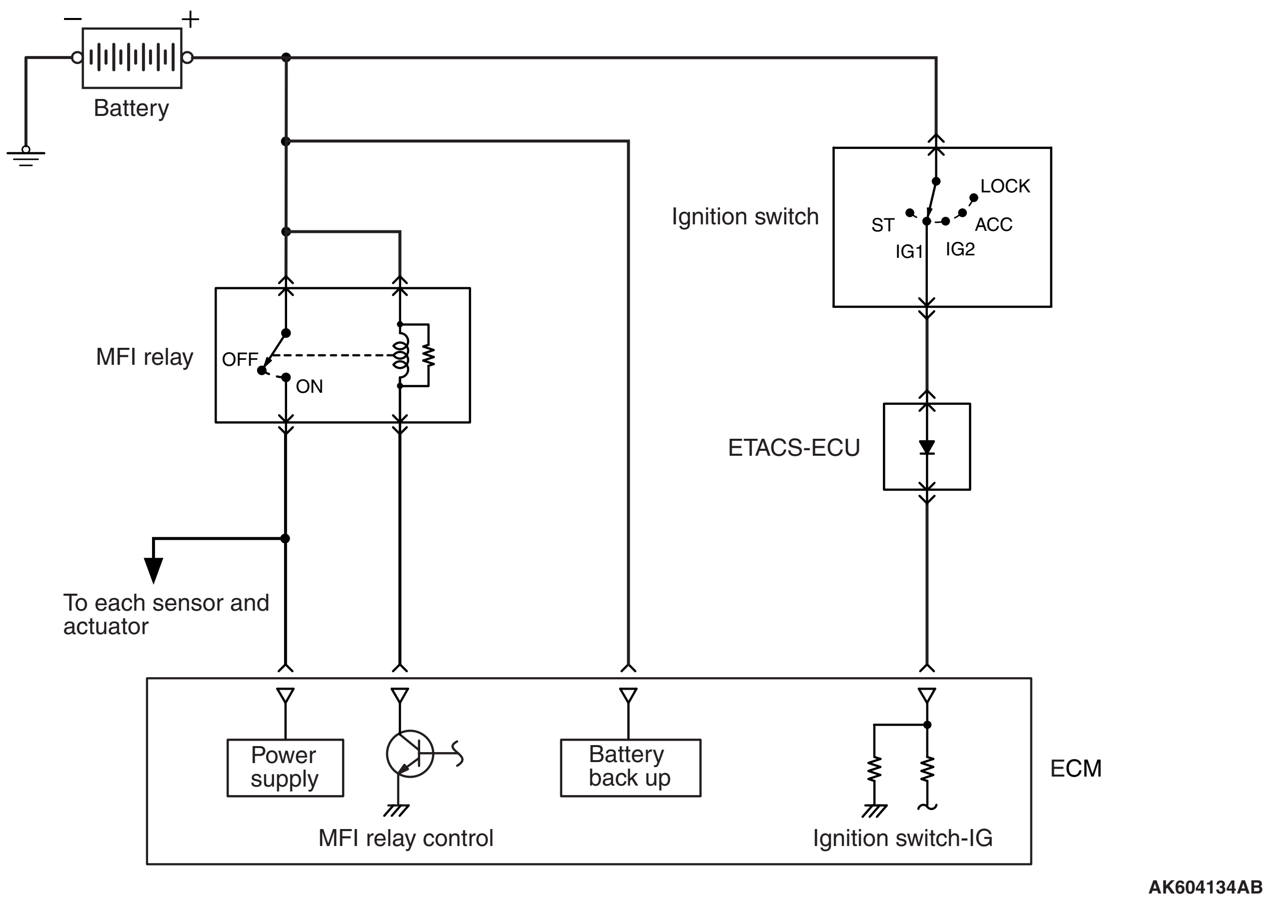
AK604129AB

Operation condition	Valve timing	Operation	Effectiveness
Within range of low speed and low load at idle		Overlap is decreased and amount of exhaust gas flowing back into intake port is limited.	Idle speed stable

Operation condition	Valve timing	Operation	Effectiveness
Within range of low speed and high load at acceleration		Advancing closing timing of intake valve allows amount of intake air flowing back into intake port to be limited as well as allows volumetric efficiency to be improved, resulting in low and middle speed torques improved.	Low and middle speed torques improved
Within range of middle speed and middle load		Increasing overlap amount allows pumping loss to be decreased. Retarding opening timing of exhaust valve allows burned gas to work sufficiently and allows cycle efficiency to be improved, resulting in higher expansion ratio.	Fuel economy improved
Within range of high speed and high load		Retarding closing timing of intake valve in accordance with engine speed allows valve timing to be controlled according to inertia force of intake air and allows volumetric efficiency to be improved.	Output improved

MULTIPORT FUEL INJECTION (MFI) RELAY CONTROL

M2132006000173

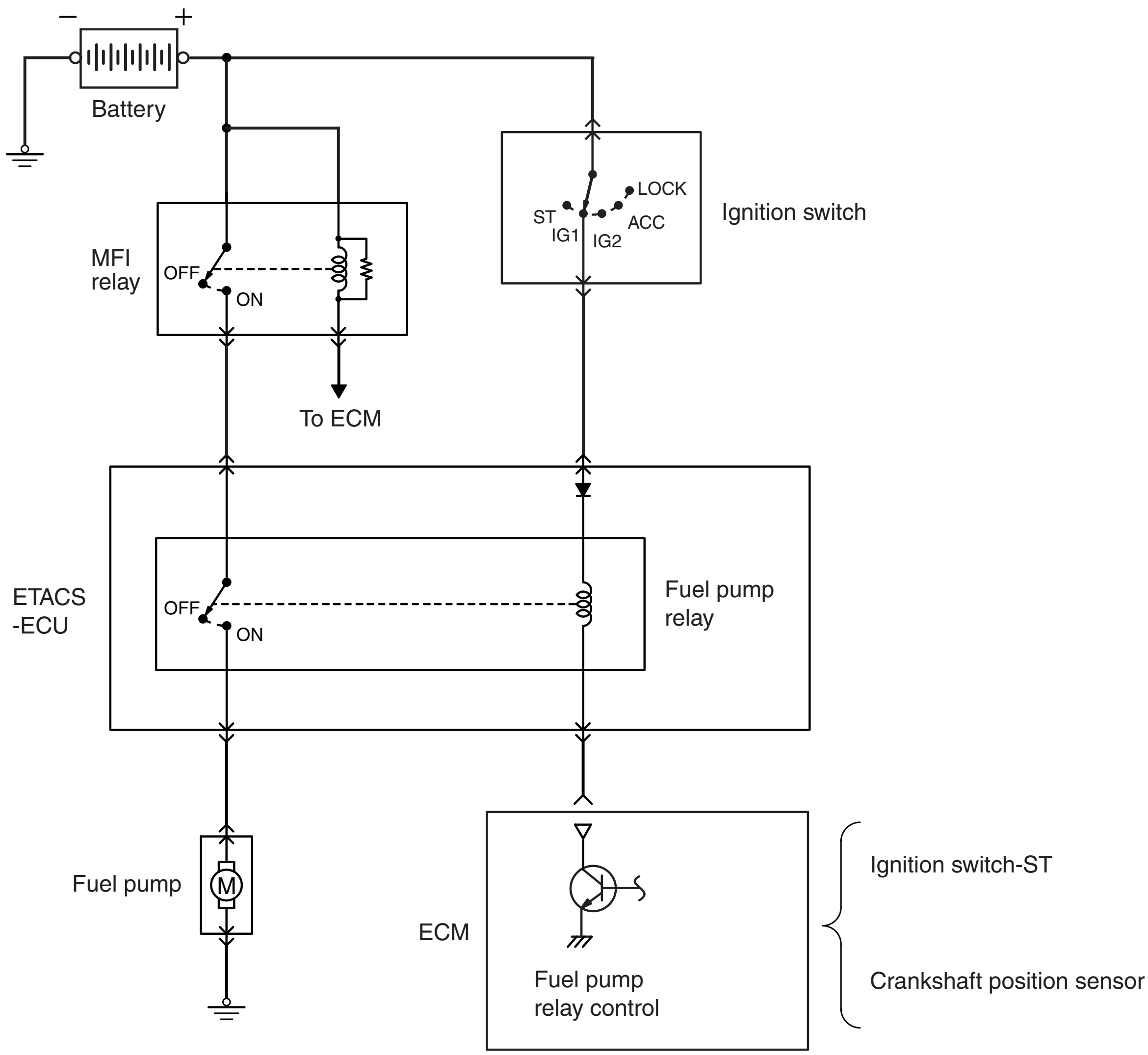


When the ignition switch-IG "ON" signal is input, ECM turns ON the power transistor for control of the MFI relay. As a result, current flows through the MFI relay's coil, the relay switch turns ON and power is supplied to each sensor and actuator. Also, when ignition switch-IG "OFF" signal is input, ECM performs the following controls and then turns OFF the power transistor for control of MFI relay.

- Throttle valve initializing control

FUEL PUMP RELAY CONTROL

M2132006500208



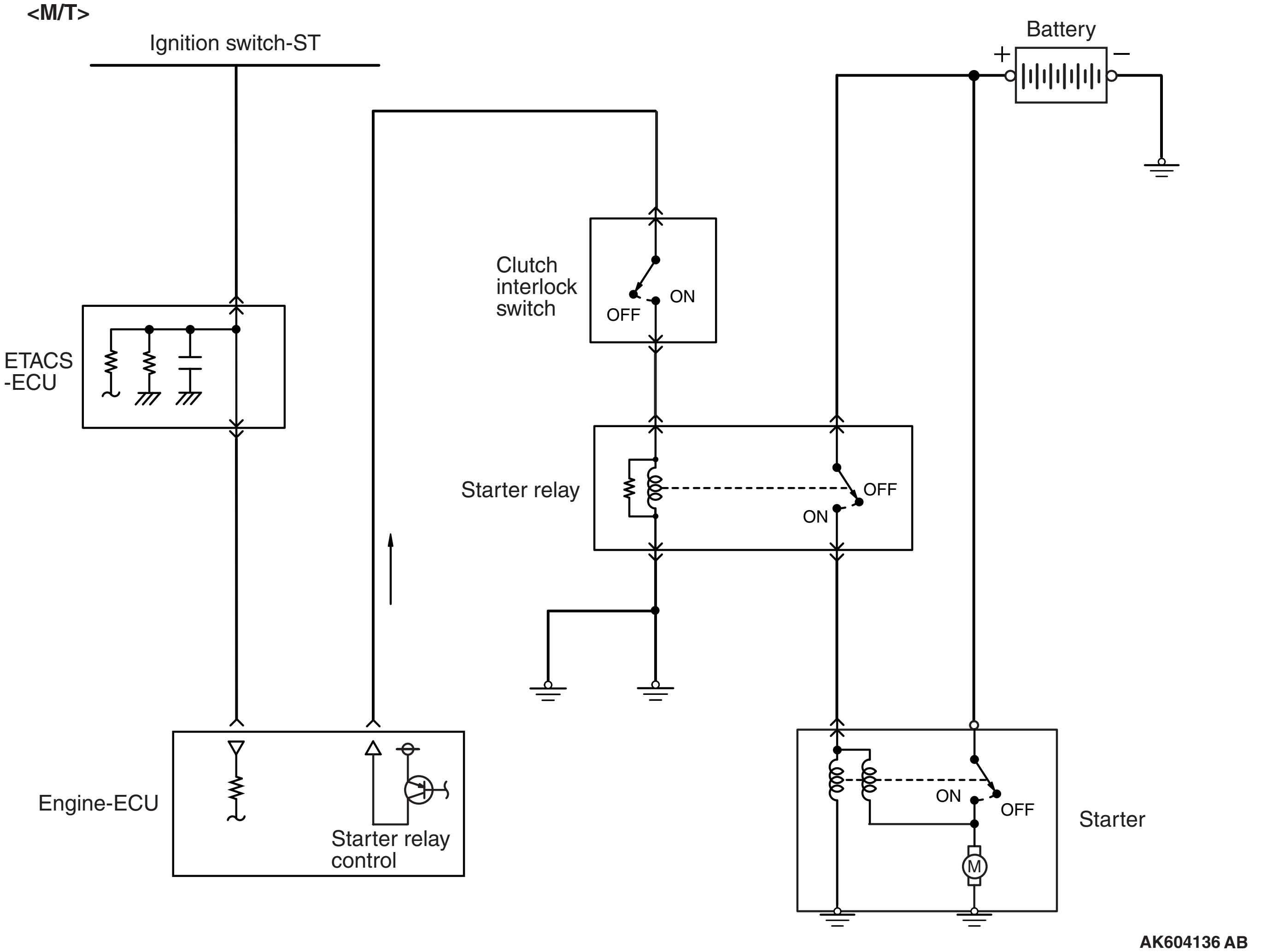
AK604135 AB

When current flows through the fuel pump relay, the relay turns ON and the fuel pump is driven. The fuel pump relay is built into the ETACS-ECU. When the ignition switch-ST signal is input, ECM turns ON the power transistor for control of the fuel pump relay. As a result, power is supplied to the fuel pump. Also, if engine speed falls below a set value, the fuel pump relay is turned OFF. Thus, it deals with sudden stoppages such as engine stalling etc. by stopping the pump.

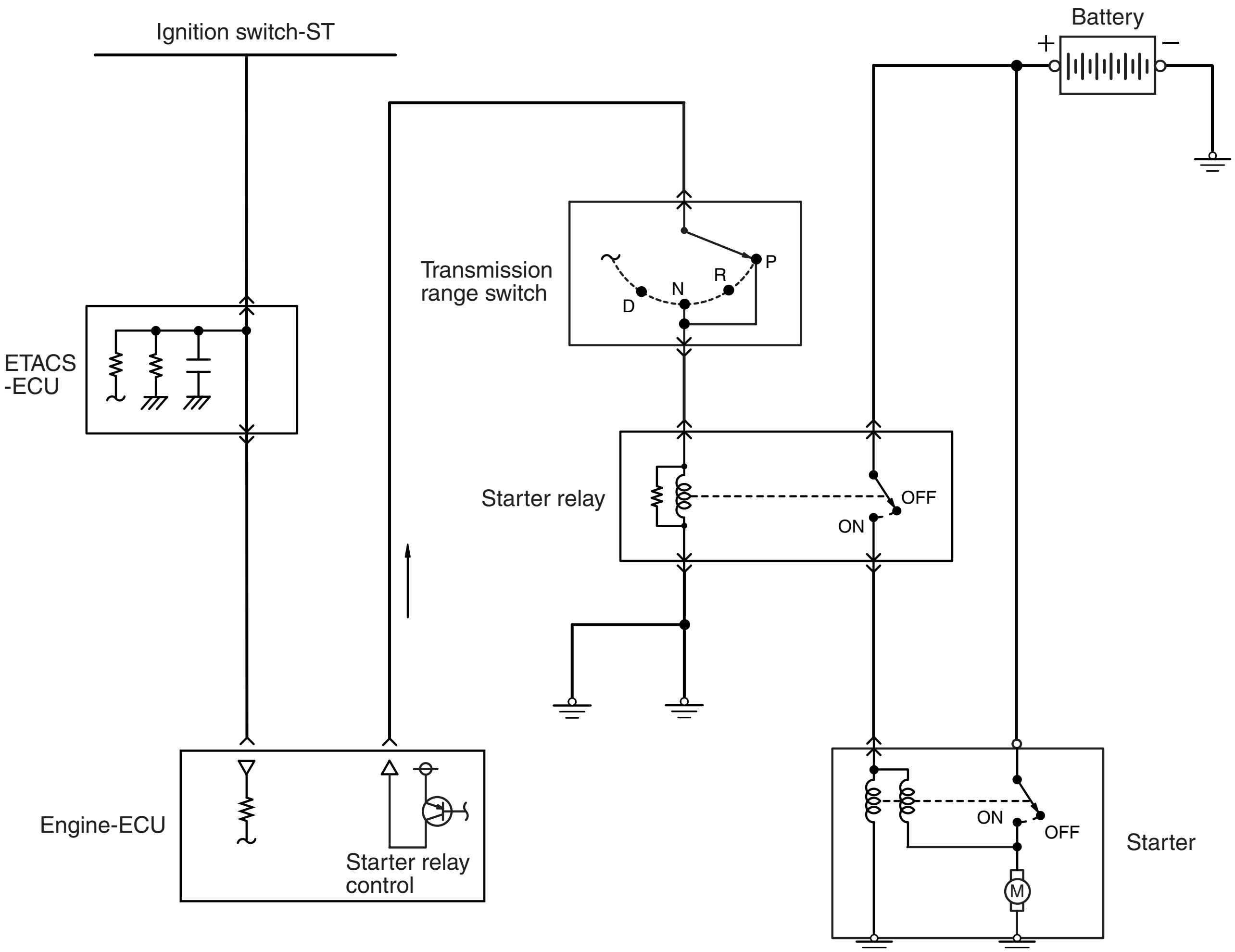
STARTER RELAY CONTROL

M2132025500092

<M/T>



<CVT>

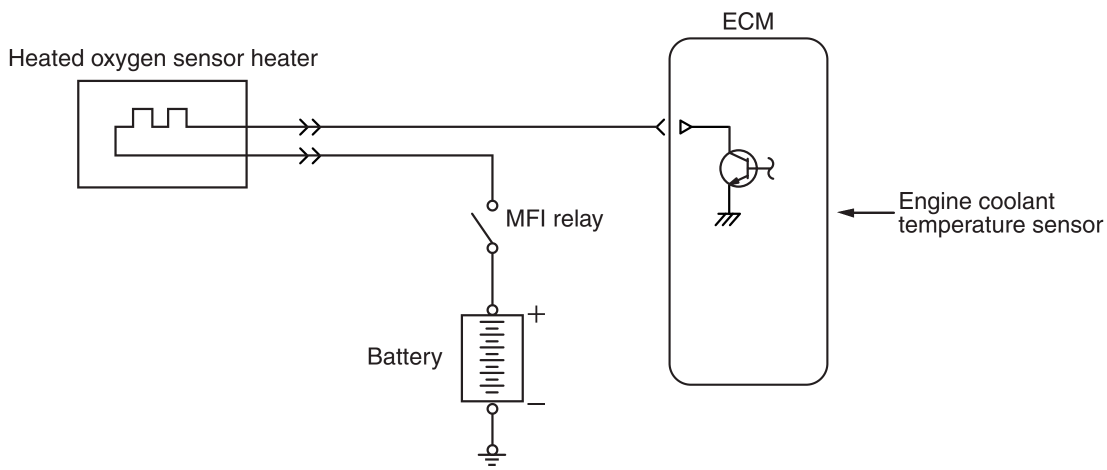


AK604137 AB

When the ignition switch-ST signal is input, ECM turns ON the power transistor for control of the starter relay.

HEATED OXYGEN SENSOR HEATER CONTROL

M2132007000206

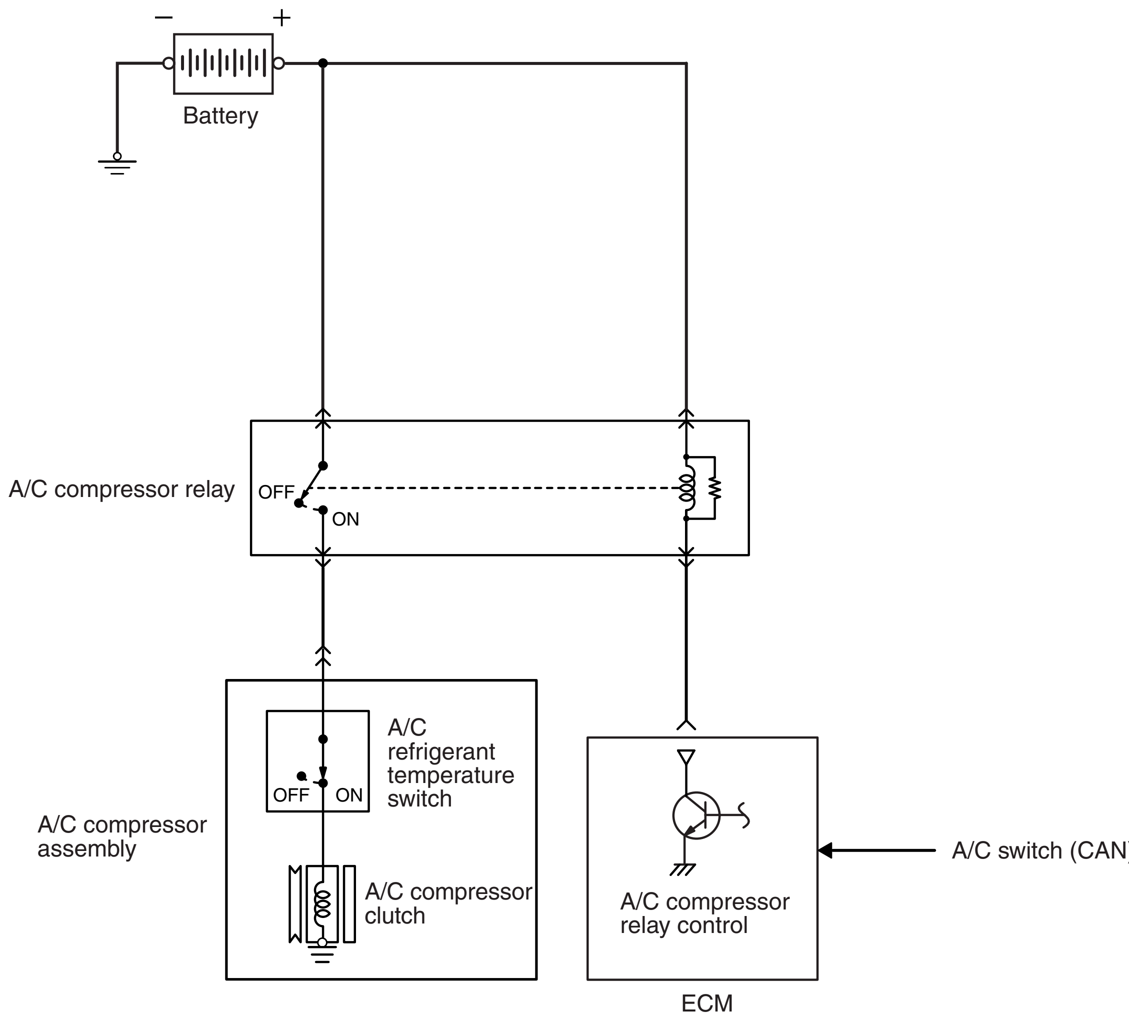


AK602241AD

When exhaust gas temperature is low, the heated oxygen sensor response is dull. So, response is improved by raising the sensor temperature by passing current through the heater at a low exhaust gas temperature, such as in the immediate aftermath of the engine start, or during the warm up operation and in cutting the fuel during deceleration. Based on driving conditions and the heated oxygen sensor activation state, ECM changes the amount of current (duty ratio) to the heater to quicken the activation of the heated oxygen sensor.

A/C COMPRESSOR RELAY CONTROL

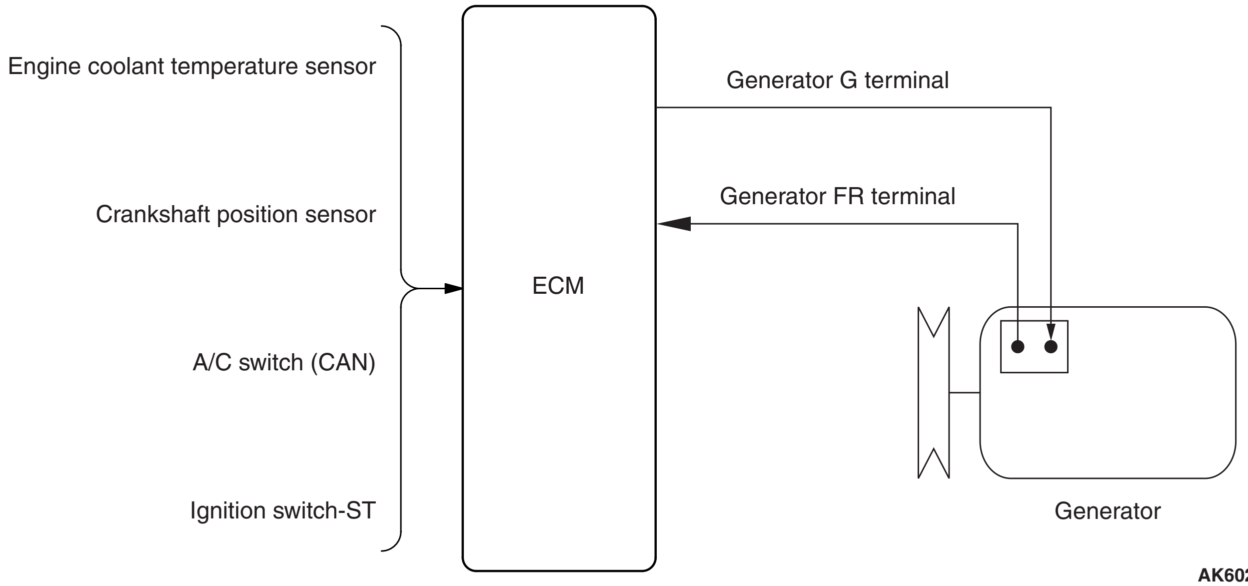
M2132034500120



The ECM turns on the power transistor when the A/C switch ON signal is input by the A/C-ECU through the CAN. This allows the A/C compressor relay to be ON and to be operated. During the high load operation, such as the acceleration with the fully opened accelerator, the ECM secures the acceleration capability by turning off the A/C compressor relay for the specified period to produce no load on the A/C compressor.

GENERATOR CONTROL

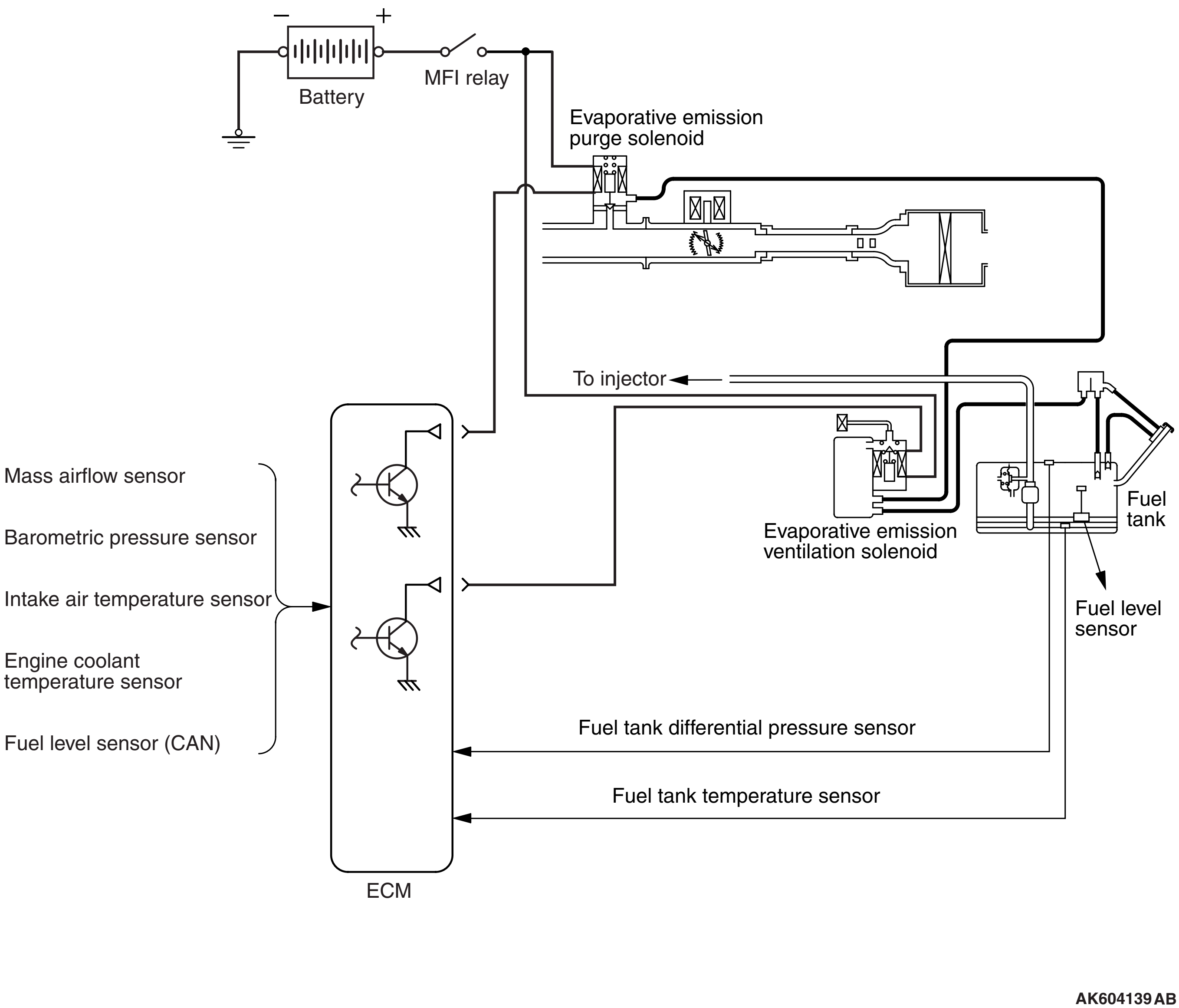
M2132025000172



During engine idle operation, ECM controls duty of conduction between generator G terminal and ground. (G terminal duty is controlled to be the same as ON duty of the power transistor inside the voltage regulator). If headlights etc. are turned on while engine is idling, the consumed current increases suddenly, but by gradually increasing the generator G terminal OFF duty, ECM restricts sudden increase in generator's output current and output current is increased only gradually. (Battery current is supplied to the headlamp etc. till generator produces sufficient current.) Thus, ECM prevents change in idle speed due to sudden increase of engine load.

EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW MONITOR

M2132027200019



The ECM detects whether the fuel vapor leakage exists or not from the evaporative emission control system. By the specified pattern within the certain operation range, the ECM drives the evaporative emission purge solenoid and the evaporative emission ventilation solenoid. This allows slight vacuum to be produced in the fuel tank.

The ECM measures the vacuum condition through the fuel tank differential pressure sensor signal. By comparing the normal (expected) value and the actual value, the ECM detects whether the fuel vapor leakage exists or not from the evaporative emission control system.

EXHAUST GAS RECIRCULATION CONTROL

M2132016000099

Refer to GROUP 17 –Emission Control –Exhaust Gas Recirculation System P.17-12.

CONTROLLER AREA NETWORK (CAN)

M2132019000429

CAN communication is established to ensure the reliable transmission of information. Refer to GROUP 54C –General InformationP.54C-2.

EVAPORATIVE EMISSION PURGE CONTROL

M2132012000138

Refer to GROUP 17 –Emission Control –Evaporative Emission Control System P.17-11.

HC TRAP CATALYTIC CONVERTER DETERIORATION MONITOR

M2132027300016

Refer to GROUP 17 –Emission Control –Emission Reduction SystemP.17-14.

ON-BOARD DIAGNOSTICS

M2132009001067

The engine control module (ECM) has been provided with the following functions for easier system inspection.

Diagnostic Trouble Codes and Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) Function

The diagnostic trouble code and malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) items are shown in the following table.

*NOTE: *1: Diagnostic Trouble Code*

*NOTE: *2: Malfunction Indicator Lamp*

DTC*1	DIAGNOSTIC ITEM	MIL*2 ITEM
–	Engine control module (ECM)	×
P0011	Intake variable valve timing system target error	×
P0014	Exhaust variable valve timing system target error	×
P0016	Crankshaft/camshaft (intake) position sensor phase problem	×
P0017	Crankshaft/camshaft (exhaust) position sensor phase problem	×
P0031	Heated oxygen sensor heater (front) circuit low	×
P0032	Heated oxygen sensor heater (front) circuit high	×
P0037	Heated oxygen sensor heater (rear) circuit low	×
P0038	Heated oxygen sensor heater (rear) circuit high	×
P0043	Heated oxygen sensor heater (3rd) circuit low <California>	×

DTC*1	DIAGNOSTIC ITEM	MIL*2 ITEM
P0044	Heated oxygen sensor heater (3rd) circuit high <California>	×
P0069	Abnormal correlation between manifold absolute pressure sensor and barometric pressure sensor	×
P0101	Mass airflow circuit range/performance problem	×
P0102	Mass airflow circuit low input	×
P0103	Mass airflow circuit high input	×
P0106	Manifold absolute pressure circuit range/performance problem	×
P0107	Manifold absolute pressure circuit low input	×
P0108	Manifold absolute pressure circuit high input	×
P0111	Intake air temperature circuit range/performance problem	×
P0112	Intake air temperature circuit low input	×
P0113	Intake air temperature circuit high input	×
P0116	Engine coolant temperature circuit range/performance problem	×
P0117	Engine coolant temperature circuit low input	×
P0118	Engine coolant temperature circuit high input	×
P0122	Throttle position sensor (main) circuit low input	×
P0123	Throttle position sensor (main) circuit high input	×
P0125	Insufficient coolant temperature for closed loop fuel control	×
P0128	Coolant thermostat (Coolant temperature below thermostat regulating temperature)	×
P0131	Heated oxygen sensor (front) circuit low voltage	×
P0132	Heated oxygen sensor (front) circuit high voltage	×
P0133	Heated oxygen sensor (front) circuit slow response	×
P0134	Heated oxygen sensor (front) circuit no activity detected	×
P0137	Heated oxygen sensor (rear) circuit low voltage	×
P0138	Heated oxygen sensor (rear) circuit high voltage	×
P0139	Heated oxygen sensor (rear) circuit slow response	×
P0140	Heated oxygen sensor (rear) circuit no activity detected	×
P0143	Heated oxygen sensor (3rd) circuit low voltage <California>	×
P0144	Heated oxygen sensor (3rd) circuit high voltage <California>	×
P0145	Heated oxygen sensor (3rd) circuit slow response <California>	×
P0146	Heated oxygen sensor (3rd) circuit no activity detected <California>	×
P0171	System too lean	×
P0172	System too rich	×
P0181	Fuel tank temperature sensor circuit range/performance	×
P0182	Fuel tank temperature sensor circuit low input	×
P0183	Fuel tank temperature sensor circuit high input	×
P0201	Injector circuit-cylinder 1	×

DTC*1	DIAGNOSTIC ITEM	MIL*2 ITEM
P0202	Injector circuit-cylinder 2	×
P0203	Injector circuit-cylinder 3	×
P0204	Injector circuit-cylinder 4	×
P0222	Throttle position sensor (sub) circuit low input	×
P0223	Throttle position sensor (sub) circuit high input	×
P0300	Random/multiple cylinder misfire detected	×
P0301	Cylinder 1 misfire detected	×
P0302	Cylinder 2 misfire detected	×
P0303	Cylinder 3 misfire detected	×
P0304	Cylinder 4 misfire detected	×
P0326	Knock sensor circuit performance	–
P0327	Knock sensor circuit low	–
P0328	Knock sensor circuit high	–
P0335	Crankshaft position sensor circuit	×
P0340	Intake camshaft position sensor circuit	×
P0365	Exhaust camshaft position sensor circuit	×
P0401	Exhaust gas recirculation flow insufficient detected <California>	×
P0420	Warm up catalyst efficiency below threshold <except for California>	×
P0421	Warm up catalyst efficiency below threshold <California>	×
P0441	Evaporative emission control system incorrect purge flow	×
P0442	Evaporative emission control system leak detected (small leak)	×
P0443	Evaporative emission control system purge control valve circuit	×
P0446	Evaporative emission control system vent control circuit	×
P0450	Evaporative emission control system pressure sensor malfunction	×
P0451	Evaporative emission control system pressure sensor range/performance	×
P0452	Evaporative emission control system pressure sensor low input	×
P0453	Evaporative emission control system pressure sensor high input	×
P0455	Evaporative emission control system leak detected (gross leak)	×
P0456	Evaporative emission control system leak detected (very small leak)	×
P0461	Fuel level sensor circuit range/performance	×
P0462	Fuel level sensor circuit low input	×
P0463	Fuel level sensor circuit high input	×
P0489	EGR valve (stepper motor) circuit malfunction (ground short) <California>	×
P0490	EGR valve (stepper motor) circuit malfunction (battery short) <California>	×
P0500	Vehicle speed sensor malfunction <M/T>	×
P0506	Idle control system RPM lower than expected	×
P0507	Idle control system RPM higher than expected	×

DTC*1	DIAGNOSTIC ITEM	MIL*2 ITEM
P0513	Immobilizer malfunction	–
P0551	Power steering pressure switch circuit range/performance	×
P0554	Power steering pressure switch circuit intermittent	×
P0603	EEPROM malfunction	×
P0606	Engine control module main processor malfunction	×
P0622	Generator FR terminal circuit malfunction	–
P0630	Vehicle Identification Number (VIN) malfunction	×
P0638	Throttle actuator control motor circuit range/performance	×
P0642	Throttle position sensor power supply	×
P0657	Throttle actuator control motor relay circuit malfunction	×
P1021	Intake engine oil control valve circuit	×
P1025	Exhaust engine oil control valve circuit	×
P1231	Active stability control plausibility	–
P1232	Fail safe system	–
P1233	Throttle position sensor (main) plausibility	×
P1234	Throttle position sensor (sub) plausibility	×
P1235	Mass airflow sensor plausibility	×
P1236	A/D converter	×
P1237	Accelerator pedal position sensor plausibility	×
P1238	Mass airflow sensor plausibility (torque monitor)	×
P1239	Engine RPM plausibility	×
P1240	Ignition angle	–
P1241	Torque monitor	×
P1242	Fail safe control monitor	–
P1243	Inquiry/response error	–
P1244	RAM test for all area	–
P1245	Cycle RAM test (engine)	–
P1247	CVT plausibility <CVT>	–
P1320	Ignition Timing Retard Insufficient	×
P1506	Idle control system RPM lower than expected at low temperature	×
P1507	Idle control system RPM higher than expected at low temperature	×
P1590	TCM to ECM communication error in torque reduction request <CVT>	×
P1603	Battery backup circuit malfunction	×
P1676	Variant coding	×
P2100	Throttle actuator control motor circuit (open)	×
P2101	Throttle actuator control motor magneto malfunction	×
P2122	Accelerator pedal position sensor (main) circuit low input	×

DTC*[1]	DIAGNOSTIC ITEM	MIL*[2] ITEM
P2123	Accelerator pedal position sensor (main) circuit high input	×
P2127	Accelerator pedal position sensor (sub) circuit low input	×
P2128	Accelerator pedal position sensor (sub) circuit high input	×
P2135	Throttle position sensor (main and sub) circuit range/performance problem	×
P2138	Accelerator pedal position sensor (main and sub) circuit range/performance problem	×
P2195	Heated oxygen sensor (front) inactive	×
P2228	Barometric pressure circuit low input	×
P2229	Barometric pressure circuit high input	×
P2252	Heated oxygen sensor offset circuit low voltage	×
P2253	Heated oxygen sensor offset circuit high voltage	×
P2423	HC adsorber (HC trap catalyst) efficiency below threshold <California>	×
U0001	Bus off	–
U0101	CVT-ECU time-out	×
U0121	ABS-ECU time-out	–
U0141	ETACS-ECU time-out	×
U0167	Immobilizer communication error	–
U0180	Combination meter time-out	×

Data List Function

The data list items are shown in the following table.

NOTE: Data list items consist of M.U.T.-III items and GST items. GST items can be accessed through the use of a general scan tool.

NOTE: When M.U.T.-III is used, M.U.T.-III items appear alphabetically

M.U.T.-III Item

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	UNIT
A/C compressor relay	93	A/C compressor relay	ON/OFF
A/C SW	76	A/C switch	ON/OFF
Absolute load value	72	Absolute load value	%
Airflow sensor	10	Mass airflow sensor	mV
Airflow sensor	AA	Mass airflow sensor	g/s
APP sensor (main)	11	Accelerator pedal position sensor (main)	mV
APP sensor (main)	BE	Accelerator pedal position sensor (main)	%
APP sensor (sub)	12	Accelerator pedal position sensor (sub)	mV
APP sensor (sub)	BF	Accelerator pedal position sensor (sub)	%
Barometric pressure sensor	BB	Barometric pressure sensor	kPa (in.Hg)
Brake light switch	74	Brake light switch	ON/OFF
Calculated load value	73	Calculated load value	%
Closed throttle position switch	84	Closed throttle position switch	ON/OFF
Cranking signal	79	Cranking signal (ignition switch-ST)	ON/OFF
Crankshaft position sensor	2	Crankshaft position sensor	r/min
ECT sensor	6	Engine coolant temperature sensor	°C (°F)
EGR step motor	31	EGR valve (stepper motor)	Step
Engine control relay	95	Engine control relay	ON/OFF
Engine oil pressure switch	90	Engine oil pressure switch	ON/OFF
ETV relay	96	Throttle actuator control motor relay	ON/OFF
EVAP. emission purge SOL. duty	49	Evaporative emission purge solenoid duty	%
Exhaust VVT angle (bank1)	39	Exhaust MIVEC phase angle	°CA
Fan duty	47	Fan motor duty	%
Fuel level gauge	51	Fuel level gauge	%
Fuel pump relay	97	Fuel pump relay	ON/OFF
Fuel system status (bank 1)	105	Fuel control system status	Closed loop/ Open circuit drive condition
Fuel system status (bank 2)*	106	–	–
Fuel tank differential PRS. SNSR	52	Fuel tank differential pressure sensor	mV
Fuel tank temperature sensor	53	Fuel tank temperature sensor	°C (°F)
Ignition switch	85	Ignition switch (IG1)	ON/OFF

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	UNIT
Injectors	17	Injectors	ms
Intake air temperature sensor	5	Intake air temperature sensor	°C (°F)
Intake VVT angle (bank1)	36	Intake MIVEC phase angle	°CA
ISC learned value (A/C OFF)	68	Idle speed control learned value (A/C OFF)	L/s
ISC learned value (A/C ON)	69	Idle speed control learned value (A/C ON)	L/s
Knock retard	32	Knock retard	°CA
Learned knock retard	33	Knock control learned value	%
Long term fuel trim (bank 1)	26	Long-term fuel trim	%
MAP sensor	8	Manifold absolute pressure sensor	kPa (in.Hg)
Neutral switch	87	Neutral switch	ON/OFF
Normally closed brake switch	89	Normally closed brake switch	ON/OFF
Oxygen sensor (bank 1 sensor 1)	AC	Heated oxygen sensor (front)	V
Oxygen sensor (bank 1 sensor 2)	AD	Heated oxygen sensor (rear)	V
Power steering switch	83	Power steering pressure switch	ON/OFF
Power supply voltage	1	Power supply voltage	V
Relative TP sensor	BC	Relative throttle position sensor	%
Short term fuel trim (bank 1)	28	Short-term fuel trim	%
Spark advance	16	Ignition timing advance	°CA
Starter relay	102	Starter relay <M/T>	ON/OFF
Target EGR	BA	Target EGR valve (stepper motor)	%
Target ETV value	59	Throttle actuator control motor target value	V
Target idle speed	3	Target idle speed	r/min
Throttle actuator	58	Throttle actuator control motor	%
TP sensor (main)	13	Throttle position sensor (main)	mV
TP sensor (main)	AB	Throttle position sensor (main)	%
TP sensor (main) learned value	14	Throttle position sensor (main) mid opening learning value	mV
TP sensor (sub)	15	Throttle position sensor (sub)	mV
TP sensor (sub)	BD	Throttle position sensor (sub)	%
Vehicle speed	4	Vehicle speed	km/h (mph)

*NOTE: *:The item is only displayed, but not applied.*

GST Item

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY
01	Number of emission-related DTCs and MIL status	DTC and MIL status:
	Number of DTCs stored in this ECU	DTC_CNT: xxxd
	Malfunction Indicator Lamp (MIL) status	MIL: OFF or ON
	Supported tests which are continuous	Support status of continuous monitors:
	Misfire monitoring	MIS_SUP: YES
	Fuel system monitoring	FUEL_SUP: YES
	Comprehensive component monitoring	CCM_SUP: YES
	Status of continuous monitoring tests since DTC cleared	Completion status of continuous monitors since DTC cleared:
	Misfire monitoring	MIS_RDY: YES or NO
	Fuel system monitoring	FUEL_RDY: YES or NO
	Comprehensive component monitoring	CCM_RDY: YES or NO
	Supported tests run at least once per trip	Supported status of non-continuous monitors:
	Catalyst monitoring	CAT_SUP: YES
	Heated catalyst monitoring	HCAT_SUP: NO
	Evaporative system monitoring	EVAP_SUP: YES
	Secondary air system monitoring	AIR_SUP: NO
	A/C system refrigerant monitoring	ACRF_SUP: NO
	Oxygen sensor monitoring	O2S_SUP: YES
	Oxygen sensor heater monitoring	HTR_SUP: YES
	EGR system monitoring	EGR_SUP: YES
	Status of tests run at least once per trip	Completion status of non-continuous monitors since DTC cleared:
	Catalyst monitoring	CAT_RDY: YES or NO
	Heated catalyst monitoring	HCAT_RDY: YES
	Evaporative system monitoring	EVAP_RDY: YES or NO
	Secondary air system monitoring	AIR_RDY: YES
	A/C system refrigerant monitoring	ACRF_RDY: YES
	Oxygen sensor monitoring	O2S_RDY: YES or NO
	Oxygen sensor heater monitoring	HTR_RDY: YES or NO
	EGR system monitoring	EGR_RDY: YES or NO

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY
03	Fuel system 1 status	FUELSYS1: OL/CL/OL-Drive/OL-Fault/CL-Fault
	Fuel system 2 status	FUELSYS2: OL/CL/OL-Drive/OL-Fault/CL-Fault
04	Calculated LOAD Value	LOAD_PCT: xxx.x%
05	Engine Coolant Temperature	ECT: xxx° C (xxx° F)
06	Short Term Fuel Trim-Bank 1	SHRTFT1: xxx.x %
07	Long Term Fuel Trim-Bank 1	LONGFT1: xxx.x %
08	Short Term Fuel Trim-Bank 2	SHRTFT2: xxx.x %
09	Long Term Fuel Trim-Bank 2	LONGFT2: xxx.x %
0B	Intake Manifold Absolute Pressure	MAP: xxx kPa (xx.x inHg)
0C	Engine RPM	RPM: xxxxx min^{-1}
0D	Vehicle Speed Sensor	VSS: xxx km/h (xxx mph)
0E	Ignition Timing Advance for #1 Cylinder	SPARKADV: xx°
0F	Intake Air Temperature	IAT: xxx° C (xxx° F)
10	Air Flow Rate from Mass Airflow Sensor	MAF: xxx.xx g/s (xxxx.x lb/min)
11	Absolute Throttle Position	TP: xxx.x%
13	Location of Oxygen Sensor	O2SLOC: O2S11/O2S12/O2S13/O2S21/O2S22
14	Bank 1-Sensor 1	O2S11: x.xxx V
		SHRTFT11: xxx.x%
15	Bank 1-Sensor 2	O2S12: x.xxx V
		SHRTFT12: xxx.x%
16	Bank 1-Sensor 3	O2S13: x.xxxV
		SHRTFT13: xxx.x%
18	Bank 2-Sensor 1	O2S21: x.xxx V
		SHRTFT21: xxx.x%
19	Bank 2-Sensor 2	O2S22: x.xxx V
		SHRTFT22: xxx.x%
1C	OBD requirements to which vehicle is designed	OBDSUP: OBD II
1F	Time Since Engine Start	RUNTM: xxxxx sec.
21	Distance Travelled While MIL is Active	MIL DIST: xxxxx km (xxxxx miles)
2C	Commanded EGR	EGR_PCT: xxx.x%
2E	Commanded Evaporative Purge	EVAP_PCT: xxx.x%
2F	Fuel Level Input	FLI: xxx.x%
30	Number of warm-ups since diagnostic trouble codes cleared	WARM_UPS: xxx

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY
31	Distance since diagnostic trouble codes cleared	CLR_DIST: xxxxx km (xxxxx miles)
32	Evap System Vapor Pressure	EVAP_VP: xxxx.xx Pa (xx.xxx in H2O)
33	Barometric Pressure	BARO: xxx kPa (xx.x inHg)
41	Monitor status this driving cycle	
	Enable status of continuous monitors this monitoring cycle: NO means disable for rest of this monitoring cycle or not supported in PID 01, YES means enable for this monitoring cycle.	Enable status of continuous monitors this monitoring cycle:
	Misfire monitoring	MIS_ENA: NO or YES
	Fuel system monitoring	FUEL_ENA: NO or YES
	Comprehensive component monitoring	CCM_ENA: YES
	Completion status of continuous monitors this monitoring cycle:	Completion status of continuous monitors this monitoring cycle:
	Misfire monitoring	MIS_COMPL: YES or NO
	Fuel system monitoring	FUEL_COMP: YES or NO
	Comprehensive component monitoring	CCM_CMPL: YES or NO
	Enable status of non-continuous monitors this monitoring cycle:	Enable status of non-continuous monitors this monitoring cycle:
	Catalyst monitoring	CAT_ENA: YES or NO
	Heated catalyst monitoring	HCAT_ENA: NO
	Evaporative system status	EVAP_ENA: YES or NO
	Secondary air system monitoring	AIR_ENA: YES or NO
	A/C system refrigerant monitoring	ACRF_ENA: YES or NO
	Oxygen sensor monitoring	O2S_ENA: YES or NO
	Oxygen sensor heater monitoring	HTR_ENA: YES or NO
	EGR system monitoring	EGR_ENA: YES or NO
	Completion status of non-continuous monitors this monitoring cycle:	Completion status of non-continuous monitors this monitoring cycle:
	Catalyst monitoring	CAT_CMPL: YES or NO
	Evaporative system status	EVAP_CMPL: YES or NO
	Oxygen sensor monitoring	O2S_CMPL: YES or NO
	Oxygen sensor heater monitoring	HTR_CMPL: YES or NO
	EGR system monitoring	EGR_CMPL: YES or NO

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY
42	Control module voltage	VPWR: xx.xxx V
43	Absolute Load Value	LOAD_ABS: xxx.x%
44	Commanded Equivalence Ratio	EQ_RAT: x.xxx
45	Relative Throttle Position	TP_R: xxx.x%
46	Ambient air temperature	AAT: xxx° C (xxx° F)
47	Absolute Throttle Position B	TP_B: xxx.x%
49	Accelerator Pedal Position D	APP_D: xxx.x%
4A	Accelerator Pedal Position E	APP_E: xxx.x%
4C	Commanded Throttle Actuator Control	TAC_PCT: xxx.x%

Actuator Test Function

The actuator test items are shown in the following table.

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	ACTIVATING CONTENT
A/C relay	16	A/C compressor clutch relay	The relay turns from OFF to ON
EVAP. emission purge SOL.	10	Evaporative emission purge solenoid	The solenoid valve turns from OFF to ON
EVAP. emission ventilation SOL.	15	Evaporative emission ventilation solenoid	The solenoid valve turns from OFF to ON
Fuel pump	9	Fuel pump	Fuel pump operates
Ignition timing 5 BTDC	11	Basic ignition timing	Set to ignition timing adjustment mode
No. 1 injector	1	Injectors	Cut fuel to No. 1 injector
No. 2 injector	2		Cut fuel to No. 2 injector
No. 3 injector	3		Cut fuel to No. 3 injector
No. 4 injector	4		Cut fuel to No. 4 injector
VVT oil control valve	17	Engine oil control valve	Engine oil control valve turns from OFF to ON
Cooling fan	14	Radiator fan, A/C condenser fan	Drives the fan motor

NOTES

GROUP 13

FUEL

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GROUP 13

FUEL

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