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TECHNICAL INFORMATION

DAIHATSU
Charade

DAIHATSU

DAIHATSU MOTOR CO., LTD.
DAIHATSU MOTOR SALES CO., LTD.

NO. ECG10-7806-T1

FOR SOME EUROPEAN COUNTRIES

TECHNICAL INFORMATION

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FOREWORD

DAIHATSU has put on the market the "DAIHATSU CHARADE" (Model G10), a new small-sized passenger car which has been designed with an entirely new concept so as to meet increasing demand for a resource-saving, fuel-efficient vehicle.

The "DAIHATSU CHARADE" is a passenger car with a refined, hatch-back styling, in which a small-displacement, yet powerful engine has been combined with a compactly-designed, light body. In this way, this versatile "DAIHATSU CHARADE" features excellent fuel-economy, easy-operation and multi-purpose applications usually inherent in wagons alone, at the same time meeting "roominess and running performance," that are the basic requirements for automobiles.

We at DAIHATSU firmly believe that this compactly-built, economical, yet roomy passenger car will be favorably welcomed by all users as a vehicle which has pioneered a new field.

This "Technical Information" book contains the description and summary of the new mechanism of the "DAIHATSU CHARADE" as well as its periodic maintenance procedures.

As for the information regarding servicing items, such as the removal/installation, disassembly/reassembly and repairs, consult the workshop manual for the "DAIHATSU CHARADE."

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DAIHATSU MOTOR SALES, CO., LTD.

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VEHICLE PERSPECTIVE DRAWING

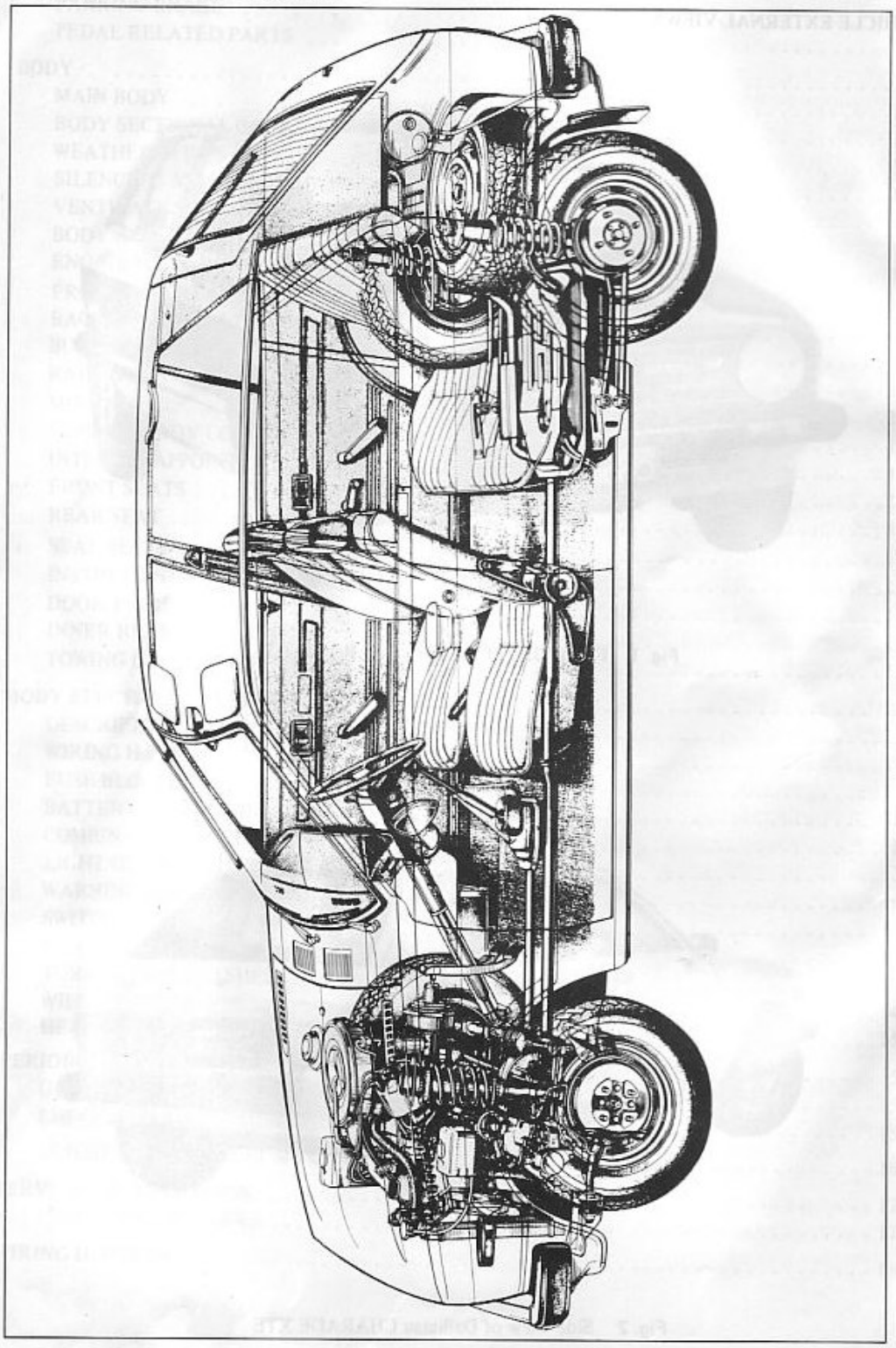


Fig. 3 Perspective Drawing of Model G10

VEHICLE 4-PLANE DIAGRAMS

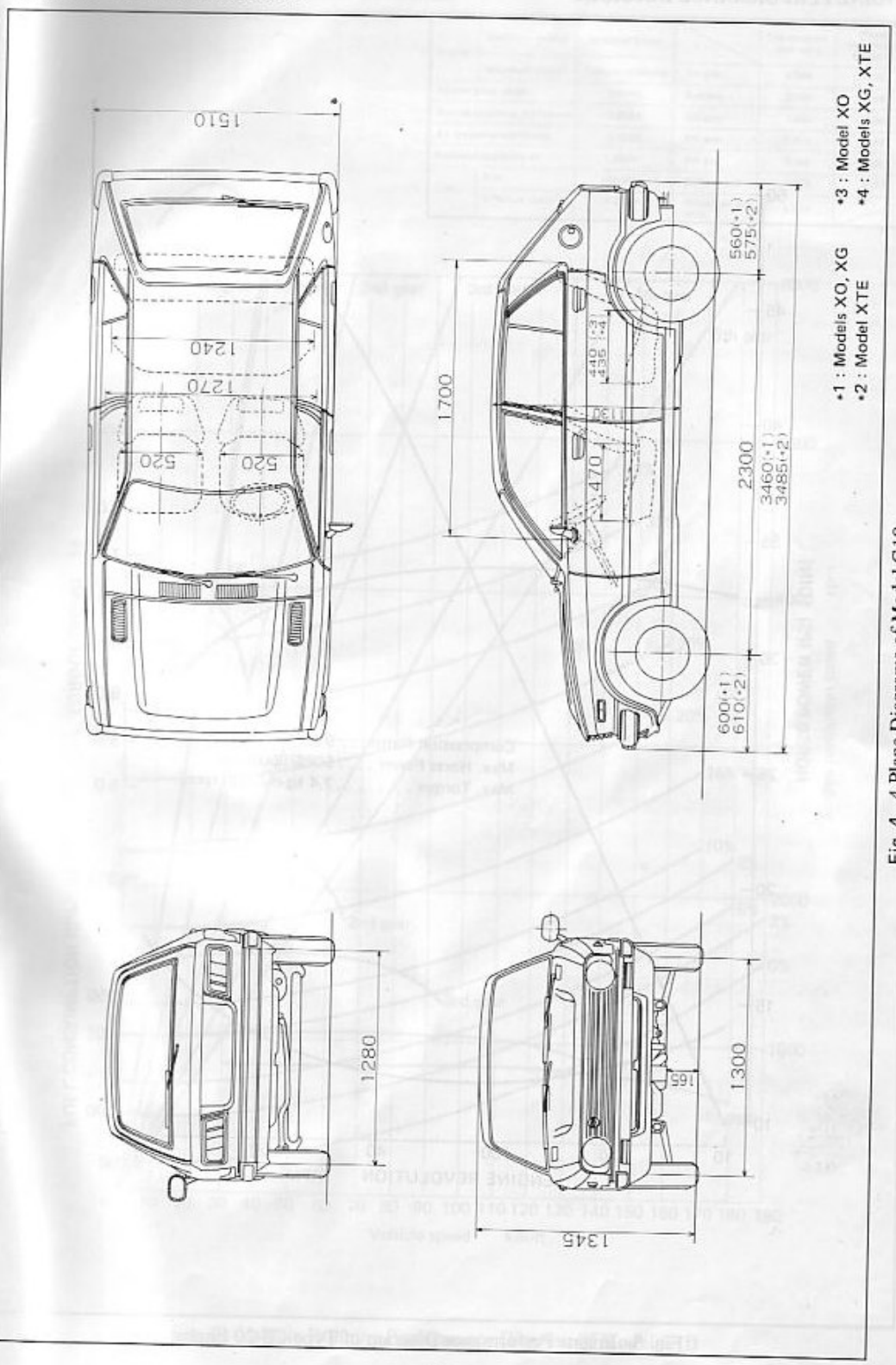


Fig. 4 4-Plane Diagrams of Model G10

ENGINE PERFORMANCE DIAGRAM

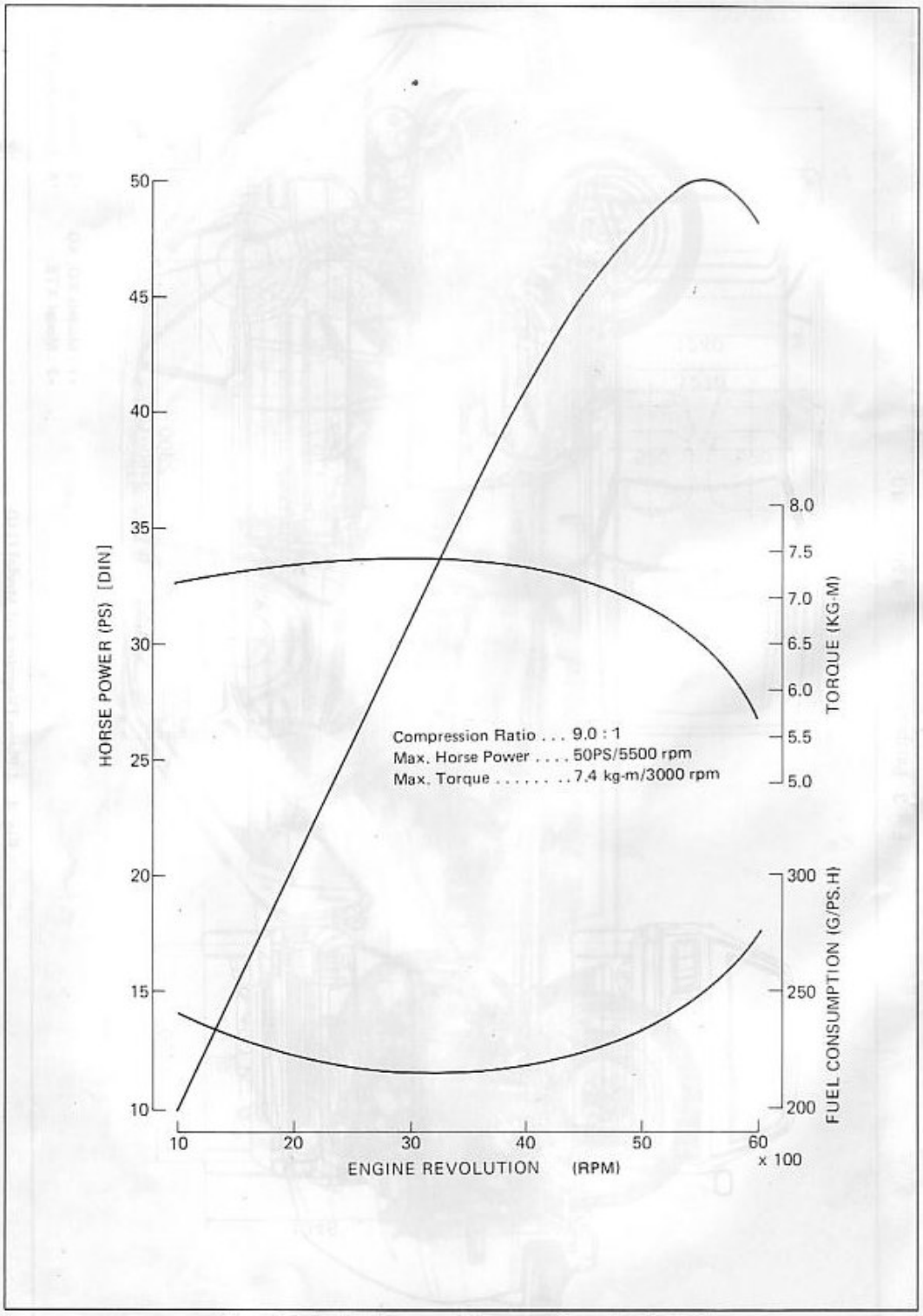


Fig. 5 Engine Performance Diagram of Type CB-20 Engine

VEHICLE RUNNING PERFORMANCE DIAGRAM

				Transmission gear ratio	Power transmission efficiency
Engine	Maximum output	50/5600PS/rpm			
	Maximum torque	7.4kg-m/3000rpm	1st gear	3.666	0.90
Vehicle gross weight		1040kg	2nd gear	2.150	0.90
Rolling resistance coefficient		0.0165	3rd gear	1.464	0.90
Air resistance coefficient		0.0026	4th gear	0.971	0.90
Frontal projected area		1.497m²	5th gear	0.795	0.90
Tire	Size	155SR12	Reverse gear	3.529	0.90
	Effective radius	0.266m	Reduction gear ratio	4.277	

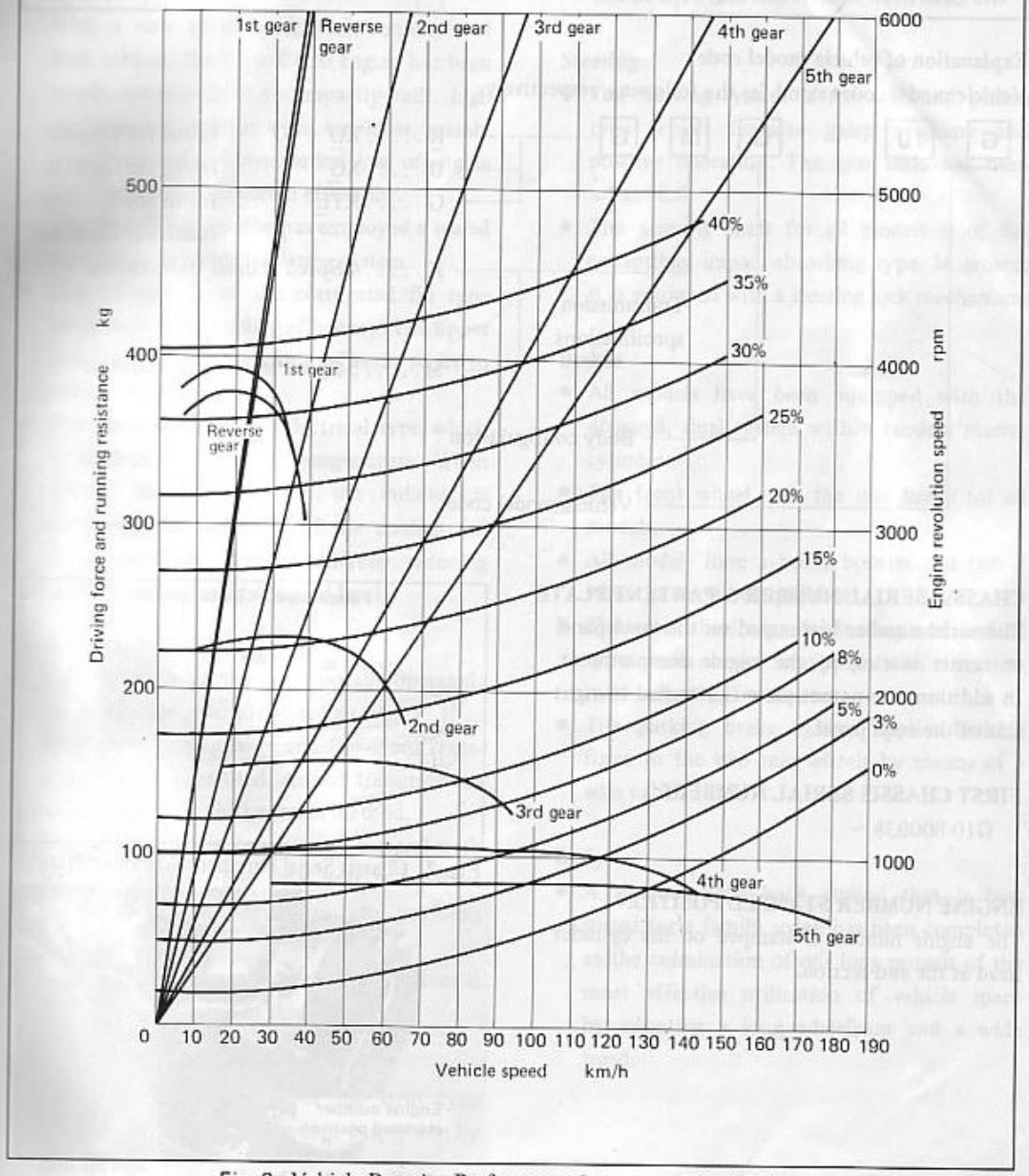


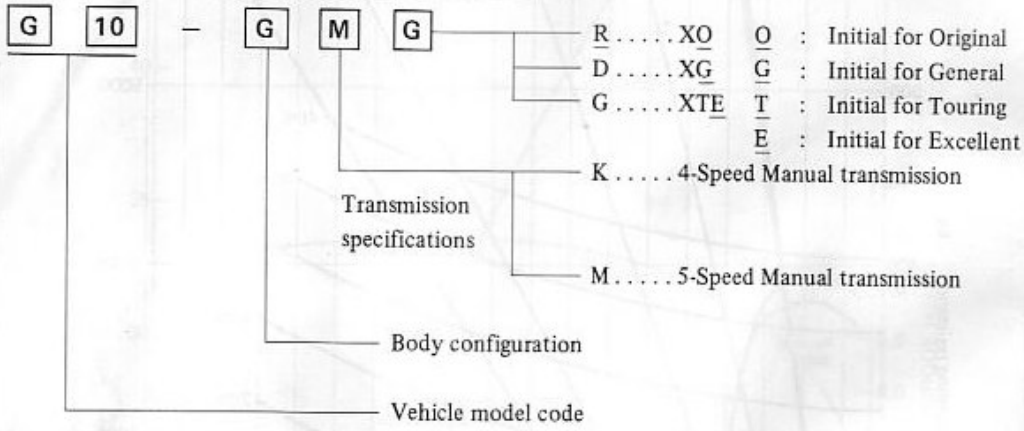
Fig. 6 Vehicle Running Performance Diagram of Model G10

VEHICLE MODELS

Vehicle model	Vehicle nomenclature	Transmission specifications	Tire size	Engine type
G10-GKR	Daihatsu CHARADE XO	4-Speed Manual transmission	Both for front and rear wheels 155 SR 12	CB-20
G10-GMR		5-Speed Manual transmission		
G10-GKD	Daihatsu CHARADE XG	4-Speed Manual transmission		
G10-GMD		5-Speed Manual transmission		
G10-GKG	Daihatsu CHARADE XTE	4-Speed Manual transmission		
G10-GMG		5-Speed Manual transmission		

Explanation of vehicle model code

Vehicle model codes stand for the following, respectively.



CHASSIS SERIAL NUMBER & PARTENT PLATE

The serial number is stamped on the cowl panel at center section in the engine compartment. In addition, the patent plate is attached to right side of the cowl panel.

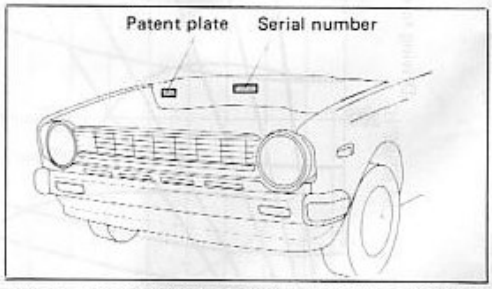


Fig. 7 Chassis Serial Number and Patent Plate

FIRST CHASSIS SERIAL NUMBERS

G10-800038 ~

ENGINE NUMBER STAMPED POSITION

The engine number is stamped on the cylinder head at the end section.

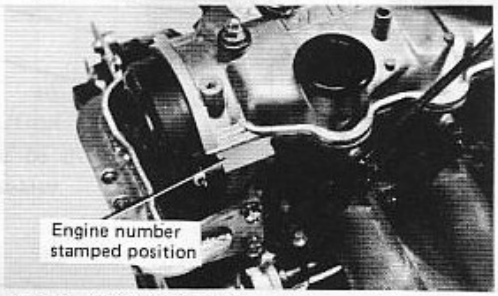


Fig. 8 Engine Number

SUMMARY OF VEHICLE CONSTRUCTION

Engine

- The Type CB20 engine, that is a water-cooled, 4-cycle, 3-cylinder-in-line, SOHC, total displacement 993cc engine, has been mounted transversely in the engine compartment. The engine can develop a maximum output of 50PS/5500 rpm [DIN] with a maximum torque of 7.4 kg-m/3000 rpm (53.5 ft-lb/3000 rpm) [DIN].
  With a view to attaining fuel-economy and high output, the Type CB20 engine has been newly developed as a compactly-built, high performance engine with emphasis mainly placed on reduced mechanical loss of engine and improved combustion efficiency.
  The Type CB20 engine has employed a sealed type blow-by gas recirculating system.
- The radiator is of the corrugated fin type featuring a good cooling efficiency. The upper and lower tanks are made of resin so as to reduce the weight.
- The cooling fan is the electrical type which is controlled by water temperature. When natural air flow through the radiator is sufficient, the operation of the cooling fan is automatically stopped, thereby reducing mechanical loss and fan sound level.

Power Train

- The clutch is of the mechanically-operated, dry, single-disc, diaphragm spring type.
- Four-speed transmission and five-speed transmission have been used. And all transmissions employ the floor shift control method.
- The differential is constructed integral with the transmission. The final gear is a helical gear. And the final reduction ratio has been set at 4.277.
- A bar-field type constant velocity ball joint is provided at each end of the drive shaft.

Suspensions and Wheels

- The front suspension is of the strut type which employs an independent suspension by coil springs.
- The rear suspension is of the five-link axle type which is suspended with coil springs. This uniquely-designed rear suspension has superior ground-contact characteristics and excellent riding comfort.
- Tieres of 155SR12 are standard equipment for all models.
- The 4J x 12 disc wheels have been used.

Steering

- The steering system is the rack and pinion type which features sharp response and positive operation. The gear ratio has been set at 18.0.
- The steering shaft for all models is of the collapsible, impact-absorbing type. Moreover, it is equipped with a steering lock mechanism.

Brakes

- All models have been equipped with the diagonal, dual system with a tandem master cylinder.
- The front wheel uses the disc brake for all models.
- All models have a brake booster and two P valves as standard equipment.
- The rear wheel uses the leading and trailing type drum brake equipped with an automatic adjusting mechanism.
- The parking brake system applies braking force to the two rear wheels by means of a wire cable.

Body

- A unique, hatch-back styling that is best suited for a family sedan has been completed as the culmination of our long pursuit of the most effective utilization of vehicle space by adopting a long wheelbase and a wide tread.

- The body construction is of the welded-mono-construction.
  The body has ample rigidity and strength without any waste portion so as to decrease the vehicle weight as much as possible.
- The body glasses come in two different kinds: standard glass and cool glass, depending upon models.
  The front windshield uses a 5 mm (0.20 inch) thick, zone-tempered glass as standard equipment, and 5.7 mm (0.22 inch) thick, laminated glass as an optional equipment. As for other glasses, 4 mm (0.16 inch) thick tempered glasses have been used.
- On Models XG and XTE vehicles, a package tray has been provided in the luggage compartment. Furthermore, the package tray is interlinked with the opening/closing of the hatch-back door, thus making loading/unloading operations easier.

Interior Appointments

- The front seat is of the separate type. On all models the front seat is equipped with a reclining mechanism and a seat sliding mechanism. Moreover, the front seat is provided with a height adjustable, insertion type headrest on all models.
- The rear seat is of the bench type. On the Model XO vehicle the rear seat is the fixed type, whereas on other models the rear seat has a seatback which can be tilted toward the front side.
  With the seatback tilted, the luggage compartment will become one part of the vehicle passenger room, thus making it possible to use the vehicle in the same way as with a wagon.
- The three-point, continuous webbing type equipped with E.L.R seat belt is installed on the front seat as standard equipment.
- The wall-to-wall type floor mat is installed in the assembly line, thereby making it possible to get a good appearance and fine finish. Furthermore, a gorgeous carpet is standard equipment in the case of the Model XTE vehicle.

Auxiliaries

- The headlamps are of the two-round-shaped-bulb type. Each headlamp is fitted with an ornament ring which features easy removal/installation.
- The rear combination lamp is made of resin body in which the lenses and housing are integral to each other. It has employed a horizontally-three-partitioned, rectangular design which has a good visibility.
- The combination meter is composed of three round-shaped meters which are arranged side by side, each meter having a refined design. Besides, the combination meter is fitted with a non-glare type glass.
- The centralized warning lamps are compactly located below the combination meter in order that the driver may recognize immediately even during the running any malfunction, if it should occur.
- A large-sized fuse block incorporating a relay has been provided in close vicinity of the instrument panel where a number of wiring harnesses have to be packed. As a result, the wiring work has been rationalized greatly.
- The Model XTE vehicle is equipped with the lamp glow-state warning system which will set off the buzzer, if the ignition switch is turned OFF and the door is opened, while the headlamps or the clearance lamps are still lighted.
- The introduction of the multi-use lever switch (centralized, integral switch) has made it possible to arrange all switches regarding the lighting system, wiper and washer compactly at the steering column section. Consequently, the driver can operate all switches effortlessly, even he buckles up his seat belt.
- As regards the front windshield wiper system,

the Models XO and XG vehicles are mounted with the two-speed type wiper. In addition, the Model XTE vehicle is equipped with the intermittent type wiper.

- The rear window wiper and rear window washer are standard equipment on the Model XTE vehicle.
- The rear window defogger is standard equipment in the case of the Model XTE vehicle.
- The heater is of the indoor air/outdoor air switching, hot-water type.
- As for the horn, a flat type high pitched horn is installed on all models.

SPECIFICATIONS
VEHICLE SPECIFICATIONS

Item \ Vehicle model				GKR [GMR]	GKD [GMD]	GKG [GMG]
Kind of engine				CB-20	←	←
Displacement			liter	0.993	←	←
Kind of fuel				Gasoline	←	←
Dimensions	Overall length		mm (inch)	3460 (136.22)	←	3485 (137.20)
	Overall width		mm (inch)	1510 (59.45)	←	←
	Overall height		mm (inch)	1345 (52.95)	←	←
	Wheelbase		mm (inch)	2300 (90.55)	←	←
	Tread	Front wheel	mm (inch)	1300 (51.18)	←	←
		Rear wheel	mm (inch)	1280 (50.39)	←	←
	Minimum ground clearance [When unloaded]		mm (inch)	165 (6.50)	←	←
	Interior dimensions of passenger room	Length	mm (inch)	1700 (66.93)	←	←
		Width	mm (inch)	1270 (50.00)	←	←
		Height	mm (inch)	1130 (44.49)	←	←
Weights	Net vehicle weight	Front axle	kg (lb)	405 (893.2)	←	←
		Rear axle	kg (lb)	265 (584.1)	270 (595.1)	275 (616.1)
		Total	kg (lb)	670 (1476.7)	675 (1487.7)	680 (1498.7)
	Riding capacity		persons	4	←	←
	Gross vehicle weight	Front axle	kg (lb)	535 (1179.1)	←	←
		Rear axle	kg (lb)	505 (1113.0)	←	←
		Total	kg (lb)	1040 (2292.2)	←	←
Performance	Maximum speed (estimated value)		km/hour (mph)	135 (83.9)	←	←
	Minimum turning radius		m (ft)	4.6 (15.1) [Body 5.0 (16.4)]	←	←
Others	Tire size	Front wheel		155SR12 steel radial. Tubeless	←	←
		Rear wheel				
	Tire inflation pressure kg/cm² (psi)	Front wheel		1.7 (24.2)	←	←
		Rear wheel				

ENGINE

Item				Engine type: CB-20
Engine proper	Kind			Gasoline, 4-cycle
	Mounting location			Front
	Cylinder No. and arrangement			3-cylinder-in-line, mounted transversely
	Combustion chamber type			Multi-sphere type
	Valve mechanism			Belt-driven overhead camshaft
	Cylinder liner type			Integral with cylinder block
	Bore x stroke	mm (inch)		76 x 73 (2.99 x 2.87)
	Compression ratio			9.0
	Compression pressure	kg/cm²-rpm (psi-rpm)		12.5 ~350 (177.8 ~ 350)
	Maximum output	PS/rpm		50/5500 [DIN]
	Maximum torque	kg-m/rpm (ft-lb/rpm)		7.4/3000 (53.5/3000) [DIN]
	Fuel consumption rate	g/ps-h (rpm)		210 (3200)
	Engine dimensions [Length x width x height]	mm (inch)		548 x 538 x 636 (21.57 x 21.18 x 25.00)
	Service engine weight	kg(lb)		89 (196.2)
	Number of piston rings	Compression ring		2
		Oil ring		1
	Valve timing	Intake	Open	21° BTDC
			Close	49° ABDC
		Exhaust	Open	49° BBDC
			Close	21° ATDC
	Valve clearance [hot]	Intake	mm (inch)	0.20 (0.0079)
		Exhaust	mm (inch)	0.20 (0.0079)
	Engine no-load revolution speed		rpm	900
	Blow-by gas recirculating system			Shield type
Lubricating system	Lubricating method			Fully-forced feed method
	Oil pump type			Trochoid type
	Oil filter type			Full-flow filter type, filter paper type
	Lubrication oil capacity	liter		2.9
Cooling system	Cooling method			Water-cooled, electromotor type
	Radiator type			Corrugation type forced circulation
	Coolant capacity	liter		4
	Water pump type			Centrifugal type, "V" belt-driven type
	Thermostat type			Wax pellet type
Air cleaner		Type		Filter paper type
		Number		1

Item \ Engine type					CB-20	
Fuel system	Fuel tank	Material			Zinc plated steel sheet [JIS] Upper sheet 0.8mm (0.0031 inch), Lower sheet 1.0mm (0.039 inch)	
		Capacity liter			34	
		Location			Mounted underneath rear seat floor	
	Fuel pipe material				Rubber (Rubber + Tetron intermediate braid) and steel tube	
	Fuel pump type				Diaphragm type	
	Fuel filter type				Filter paper type	
	Carburetor	Manufacturer			Aisan kogyo	
		Type			C28FU (stromberg)	
		Throttle valve diameter mm (inch)			28 (1.10), 32 (1.26)	
		Venturi diameter mm (inch)			18 (0.71), 25 (0.98)	
		Choke valve type			Manual type, butterfly-shaped valve	
		Air-fuel ratio			15	
Engine electrical system	Ignition system	Voltage V			12 [Negative ground]	
		Type			Battery ignition type	
		Ignition timing			10°/900 BTDC/rpm	
		Firing order			1-2-3	
		Distributor	Distributor type		Conventional type	
			Breaker type		Contact-point type	
			Performance of timing advancing mechanism	Centrifugal type	0/900rpm, 7.5°/2000rpm	
				Vacuum type	0/−100, 12°/−400mmHg	
		Spark plug	Manufacturer		Nippon Denso	NGK
			Type		W16EXR-U	BPR5EA-L
			Thread		M14X 1.25	
			Spark gap mm (inch)		0.7 ~ 0.8 (0.028 ~ 0.031)	
	Battery	Type			NX100-S6L	
		Capacity AH			45AH [20]	
	Alternator	Type			3-phase alternating current commutating type	
		Output V-A			12-45	
		Regulator type			Tirril type	
	Starter	Type			Magneto engaging type	
		Output kW			12 – 0.8 ((12 – 1.0))	
		Manufacturer			Nippon Denso	
	Radio noise suppressing device				Resistive cord	

Specification in (( )) denote optional equipment.

CHASSIS SPECIFICATIONS

Item \ Vehicle model				GKR [GMR]	GKD [GMD]	GKG [GMG]
Clutch	Mechanism from engine to transmission			Engine-clutch -transmission	←	←
	Reduction ratio from engine to transmission			1.000	←	←
	Manufacturer			Daikin seisakusyo	←	←
	Type			Dry, single disc, diaphragm	←	←
	Operation method			Mechanically-operated type	←	←
	Facing	Manufacturer		Asahi asbestos	←	←
		Dimension [Outer dia. × inner dia. × thickness] mm (inch)		160 × 110 × 3.0 (6.30 × 4.33 × 0.12)	←	←
		Facing area and No. of piece cm^2 ($inch^2$)		106, 1 (16.43)	←	←
		Material		Molding	←	←
Transmission	Type		Forward	Constant-mesh type	←	←
			Reverse	Select-sliding type	←	←
	Operation method			Floor shift type	←	←
	Gear ratio		1st gear	3.666 (Synchromesh)	←	←
			2nd gear	2.150 (Synchromesh)	←	←
			3rd gear	1.464 (Synchromesh)	←	←
			4th gear	0.971 (Synchromesh)	←	←
			5th gear	[0.795 (Synchromesh)]		
			Reverse gear	3.529	←	←
Final reduction gear	Type			Conventional type	←	←
	Gear type			Helical gear	←	←
	Reduction ratio			4.277	←	←
Differential gear	Housing type			Integral with transmission case	←	←
	Gear type and number			Straight bevel gears, 2 large, 2 small	←	←
Running system	Front axle	Type		Ball joint type	←	←
		Toe-in mm (inch)		3 (0.12)	←	←
		Camber		1°	←	←
		Caster		3°	←	←
		Kingpin inclination angle		13°	←	←
		Trail mm (inch)		14 (0.55)	←	←
	Rear axle type			Dead axle	←	←

Item \ Vehicle model				GKR [GMR]	GKD [GMD]	GKG [GMG]
Running system	Tire	Rim	Front wheel	Wide and deep center rim 4 J x 12	←	←
			Rear wheel			
		Type	Front wheel	Tubeless (with tube) (Radial construction)	←	←
			Rear wheel			
Steering	Type			Round	←	←
	Wheel	Location		Right or left	←	←
		Outer diameter mm (inch)		380 (15.0)	←	←
		Turning number of steering wheel required to travel from lock to lock position		3.45	←	←
	Gear	Type		Rack and pinion	←	←
		Gear ratio		∞	←	←
	Turning angle		Inner	37°35′	←	←
			Outer	33°	←	←
Theft-proof device	Manufacturer			Tokai Rika	←	←
	Type			Steering lock type	←	←
	Mounting location			Steering column	←	←
Service brake	Manufacturer			Daihatsu Motor Co., Ltd.	←	←
	Type		Front wheel	Disc	←	←
			Rear wheel	Leading and trailing	←	←
	Operating system and braking wheels			2, Right front-to-left rear 2 wheels and left front-to-right rear 2 wheels	←	←
	Dimensions of linings or pads mm (inch)		Front wheel	76.0 x 42.0 x 9.0 (2.99 x 1.65 x 0.35)	←	←
			Rear wheel	173.0 x 35.0 x 4.0 (6.81 x 1.38 x 0.16)	←	←
	Area of lining or pad cm^2 ($inch^2$)		Front wheel	27 (4.19) x 2 pieces x 2 wheels	←	←
			Rear wheel	60 (9.3) x 2 pieces x 2 wheels	←	←
	Brake drum diameter or disc effective diameter mm (inch)		Front wheel	164 (6.46)	←	←
			Rear wheel	180 (7.09)	←	←
	Lining or pad		Manufacturer	Nisshin Spinning	←	←
			Material	Resin molded	←	←
	Master cylinder		Manufacturer	Nisshin Kogyo	←	←
			Type	Tandem type	←	←
			Inner mm diameter (inch)	19.05 (0.75)	←	←

Item	Vehicle model		GKR [GMR]	GKD [GMD]	GKG [GMG]
Service brake	Supply tank type		Separated, a tank is used in common, mounted on cylinder body, 20cc, 15cc, common section 65cc.	←	←
	Wheel cylinder inner diameter or caliper bore mm (inch)	Front wheel	47.62 (1.87)	←	←
		Rear wheel	15.87 (0.62)	←	←
	Brake booster	Manufacturer	Nisshin Kogyo	←	←
		Type	Vacuum booster type	←	←
	Brake tube	Rust-Proof treatment	Outer: Cu + Zn plating Inner: Cu plating	←	←
	Braking force control device type		P valve	←	←
	Braking alarm device	Type	Fluid level type Lamp type	←	←
Parking brake	Manufacturer		Daihatsu motor Co., Ltd.	←	←
	Type		Mechanically-operated with braking force applied on road wheels	←	←
	Wheels where braking force is applied		Rear wheels	←	←
	Lining	Manufacturer	Nisshin Spinning	←	←
		Dimensions mm (inch)	173.0 x 35.0 x 4.0 (6.81 x 1.38 x 0.16)	←	←
		Area cm^2 ($inch^2$)	60 (9.3) x 2 pieces x 2 wheels	←	←
		Material	Resin molded	←	←
	Brake drum diameter mm (inch)		180 (7.09)	←	←
Suspension	Suspension type	Front wheel	Strut type	←	←
		Rear wheel	Axle type	←	←
	Spring type	Front wheel	Coil spring	←	←
		Rear wheel			
	Main spring dimension [wire dia. x spring dia. x free length – effective turns of of winding] mm (inch)	Front wheel	10.2x95.3x318–6.95 (0.40x3.75x12.50–6.95)	←	←
		Rear wheel	9.50x80.0x287.0–8.84 (0.37x3.15x11.30–8.84)	←	←
	Shock absorber type	Front wheel	Double – acting telescopic type	←	←
		Rear wheel	Gas sealed, Double-acting telescopic type	←	←
Body	Type		Uni-construction	←	←

Item		Vehicle model	GKR [GMR]	GKD [GMD]	GKG [GMG]
Occupant protective device	Seat	Manufacturer	Fuji seat	←	←
		Type	Front: Separate Rear: bench	←	←
		Number	Front: 2, Rear: 1	←	←
	Seat belt mounting location	Type	Front: 3-point type	←	←
		Number	Front: 2	←	←
	Seat belt	Manufacturer	Nippon Seiko	←	←
		Type	Front: continuous webbing 3-point type equipped with E.L.R	←	←
		Number	Front: 2	←	←
	Head restraint	Manufacturer	Fuji Seat	←	←
		Type	Insertion type with seatback	←	←
		Number	Front: 2	←	←
	Type of doors for entry and exit		Four doors, two-stages lock, Anti-burst type	←	←
Glasses	Front windshield glass	Manufacturer	Nippon plate glass	Asahi glass	←
		Kind	Zone tempered galss (Laminated glass)	Heat rays absorbing type zone tempered glass (Laminated glass)	←
		Thickness mm (inch)	5 (0.20) (5.7 (0.22))	←	←
	Glasses other than front windshield glass	Manufacturer	Nippon plate glass	Asahi glass	←
		Kind	Clear tempered glasses	Tinted glasses equipped with no deffoger	Front and rear door: Heat rays absorbing type tempered glass. Back door: Heat rays absorbing type tempered glass (incorporating heating wire)
		Thickness mm (inch)	4 (0.16)	←	←

Specifications in ( ) denote optional equipment.

LAMP SPECIFICATIONS

Item		Manufacturer and Performance	
Front lamp	Side turn signal lamp	Koito	12V – 5W
	Front turn signal lamp	Koito	12V – 21W
	Clearance lamp	Koito	12V – 5W
	Headlamp	Koito	12V – 45W/40W
Rear combination lamp	Side marker lamp	Koito	12V – 5W
	Reflex reflector	Koito	
	Tail and parking lamp	Koito	12V – 5W
	Rear turn signal lamp	Koito	12V – 21W
	Stop and tail lamp	Koito	12V – 21W/5W
	Back-up lamp	Koito	12V – 21W
	License plate lamp	Koito	12V – 10W × 2
Room lamp		Toyo industry	12V – 10W

OTHERS

Item \ Vehicle model				GKR [GMR]	GKD [GMD]	GKG [GMG]
Alarm device	Horn		Manufacturer	Nippon Denso	←	←
			Number	1	←	←
			Performance	Flat type, electric type, high pitch sound 100 phons	←	←
View ensuring device	Rear view mirror	Left	Manufacturer	Ichiko Kogyo	←	←
			Type	Glass, flexible type	←	←
			Dimension and curvature radius mm (inch)	Rectangular 82 x 131, 1800R (3.23 x 5.16)	←	←
		Inner	Manufacturer	Toyo Kogyo	←	←
			Type	Glass, dropping type	←	←
			Dimensions and curvature radius mm (inch)	60 x 201 (2.36 x 7.90) Flat type	←	←
	Wiper	Manufacturer		Tanaka instrument industry Co, Ltd.	←	←
		Type		Motor type	←	←
		Number		Front: 2	←	Front: 2, Rear: 1
		Performance		Front: 50 times/min Front: 75 times/min 3680cm² (570.40 inch²)	←	Front: 50 times/min. 75 times/min, 3680cm² (570.40 inch²) 10 times/min. (Intermittent) Rear: 50 times/min. 1916cm² (296.98 inch²)
	Window washer		Manufacturer	Tanaka instrument industry Co, Ltd.	←	←
			Number	Front 2	←	Front: 2, Rear: 1
			Performance	Front: 100mℓ/10 second, 1.2ℓ	←	Front: 100mℓ/10 second, 1.2ℓ Rear: 100mℓ/10 second 1.5ℓ
	Defroster		Manufacturer	Nippon Denso	←	←
			Type	Front: Hot water type	←	Front: Hot water type Rear: Heating wire type
Instrument	Speedometer		Manufacturer	Nippon Denso	←	←
			Type	Extension housing eddy-current type	←	←
			Performance	$40^{+1.5}_{-0.5}$km/h, ($24.9^{+0.93}_{-0.3}$mile/h) 0~150km/h (0~95 mile/h)	←	←

Item			Vehicle model	GKR [GMR]	GKD [GMD]	GKG [GMG]
Instrument	Odometer		Manufacturer	Nippon Denso	←	←
			Type	Extension housing gear type	←	←
Others	Water temperature gauge			Pointer type	←	←
	Fuel gauge			Pointer type	←	←
	Upper beam indicator lamp			3.4W	←	←
	Turn signal indicator lamp			3.4W	←	←
	Hazard warning lamp			3.4W	←	←
	Charge warning lamp			3.4W	←	←
	Oil pressure warning lamp			3.4W	←	←
	Parking brake application warning lamp			3.4W	←	←
	Speedometer illumination lamp			3.4W	←	←
	Combination meter illumination lamp			3.4W	←	←
	Passing lamp			Equipped	←	←
	Trip meter			—	—	Equipped
	Tachometer			—	—	Equipped
	Stop lamp open circuit warning lamp			3.4W	←	←
	Brake warning lamp level			3.4W	←	←

ENGINE

DESCRIPTION

The Model G10 vehicle is transversely mounted with the type CB20 gasoline engine, that is a newly-designed, water-cooled, 4-cycle, 3-cylinder-in-line, single overhead cam type, total displacement 993cc engine.

Advantages of a 3-Cylinder Engine

(When Compared with a 4-Cylinder Engine with the Same Displacement)

1. The engine can be desinged compactly with reduced engine weight.
2. It is possible to reduce the number of necessary engine components, such as the pistons, connecting rods, crankshaft bearings, valves and so forth, thus resulting in decreased mechanical loss.
3. The bore diameter of each cylinder can be set at a larger value. As a result, larger diameters of intake and exhaust valves become possible. Hence, the intake and exhaust efficiency can be improved, resulting in increased combustion power.
4. The total cylinder surface area becomes smaller, thereby making it possible to reduce cooling loss.
5. Engine vibrations inherent in a 3-cylinder engine can be counteracted by the introduction of a balance shaft.

Features in Engine Construction

1. The size of each sliding part has been designed as small as possible. Consequently, the engine mechanical loss has been greatly reduced.
2. The introduction of the single overhead camshaft (SOHC) mechanism makes it possible to arrange the valves in a Vee shape. And the intake and exhaust ports have been so designed that they may have an independent cross-flow construction, resulting in enhanced intake and exhaust efficiency. Besides, high output and fuel-economy of the engine have become possible because of the introduction of a polyspherical-combustion chamber.
3. Each supporting section of the camshaft and valve rocker shaft has become integral with the cylinder head. As a result, the number of necessary engine components has been reduced, thus resulting in a compactly-constructed engine.
4. A cogged belt has been employed to drive the camshaft. Therefore, the results are positive and quiet operation of the engine and light engine weight.
5. The center of the crankshaft is roughly aligned with the bottom of the cylinder block, thus making it possible to reduce the engine weight greatly.
6. Engine vibrations and comparatively high sound level that are inherent in ordinary 3-cylinder engines have been counterbalanced by employing a balance shaft.
7. The total cooling water capacity of the engine has been decreased, resulting in easier engine warming-up. Because of the resultant reduced cooling loss, the engine combustion efficiency has been further improved.
   In addition, an electrical fan has been used. Hence, the engine mechanical loss and sound level have been further reduced.
8. The carburetor is of the two-barrel type. The fuel-air mixture has been set at a comparatively-lean value, thus resulting in further improved fuel consumption.

Relationship Between Crankshaft Rotation Angles and Strokes of Each Cylinder

Arrow-heads in the chart below represent positions of crankpins.
These arrow-heads turn clockwise.

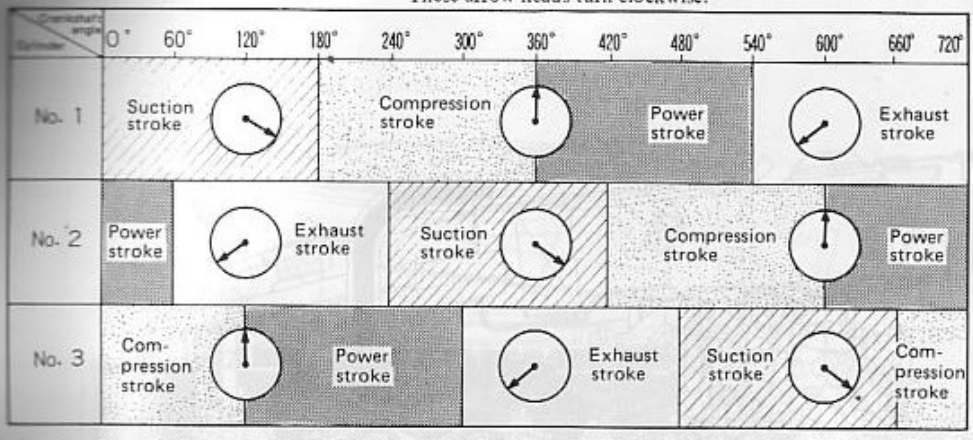


Fig. 9 Relationship Between Crankshaft Rotation Angle and Strokes of Each Cylinder

For example, when the piston of the No.1 cylinder reaches the top dead center on the compression stroke, the No.2 cylinder is on the suction stroke. And the crankpin of the No.2 cylinder is located at a point 120° from the top dead center.

Also, the No.3 cylinder is on the exhaust stroke. And the crankpin of the No.3 cylinder is located at a point 240° from the top dead center.

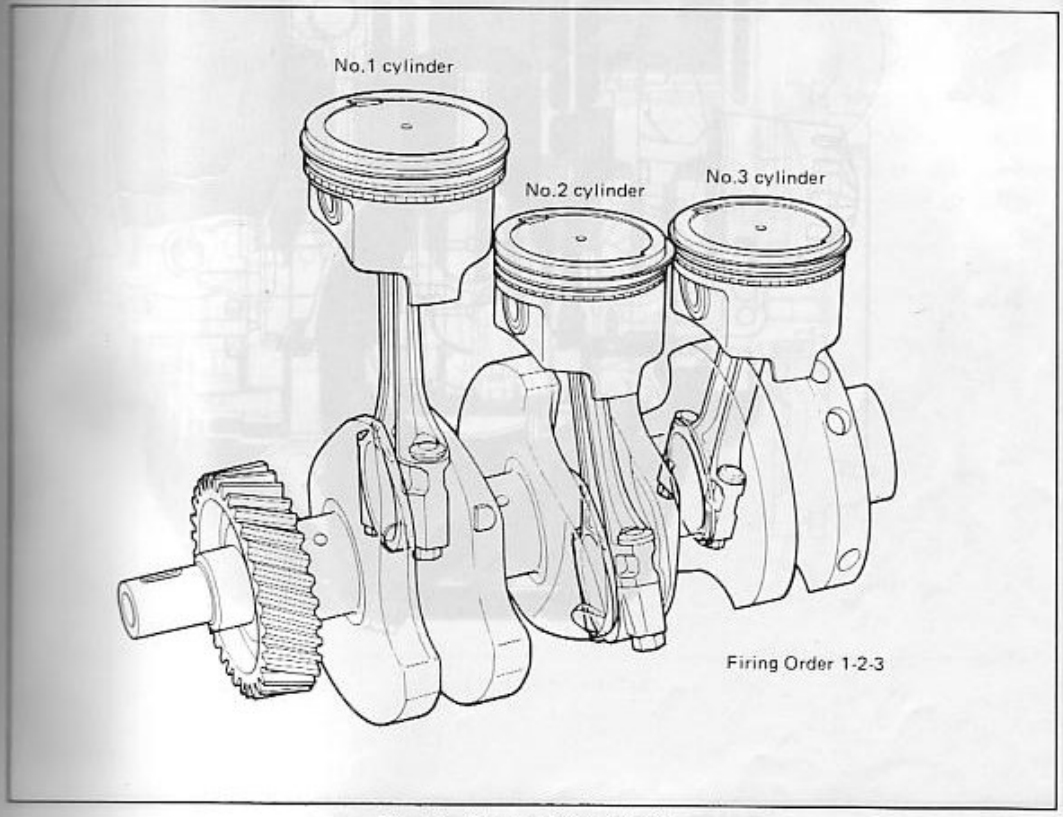


Fig. 10 Shape of Crankshaft

ENGINE SECTIONAL VIEWS

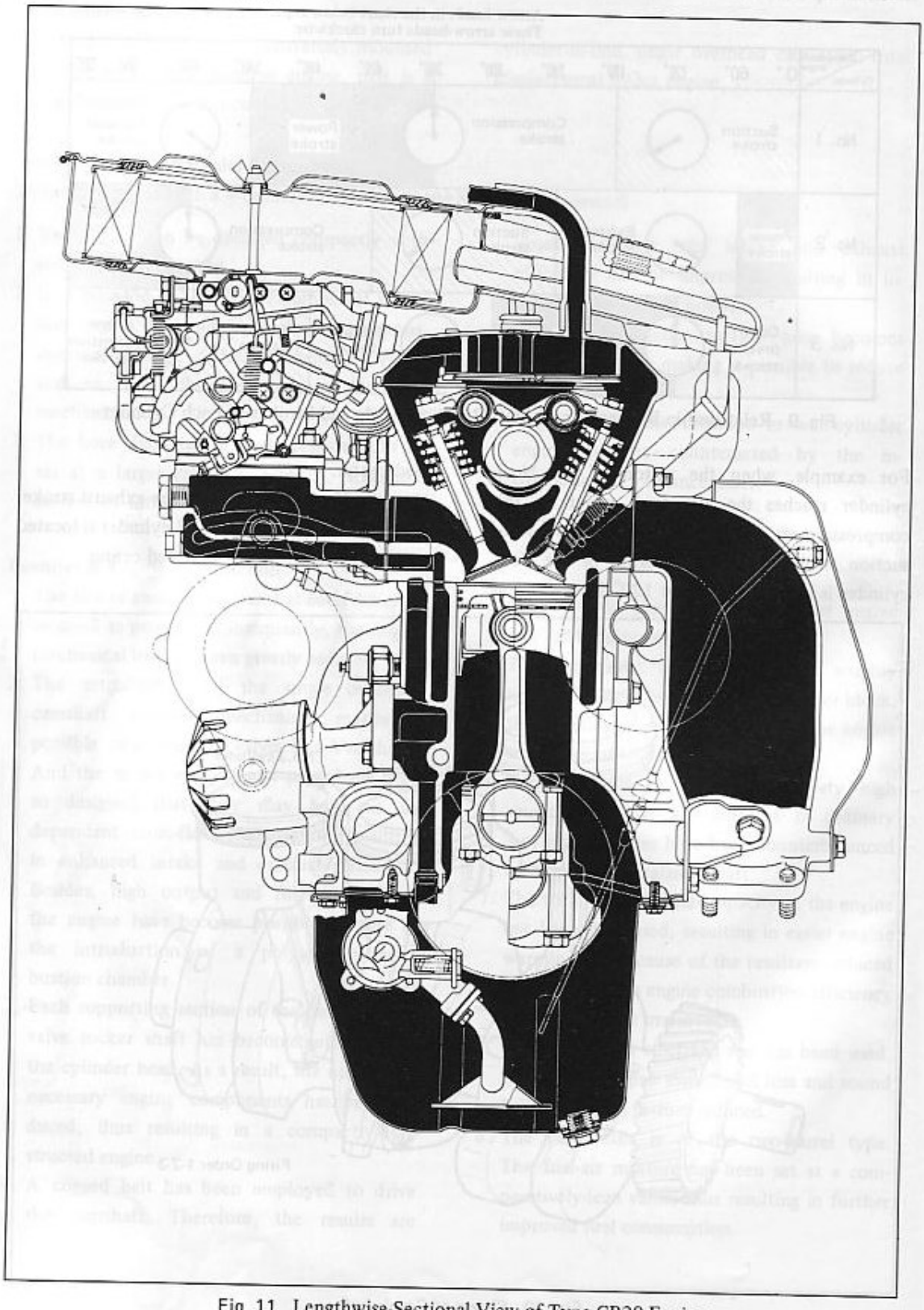


Fig. 11 Lengthwise-Sectional View of Type CB20 Engine

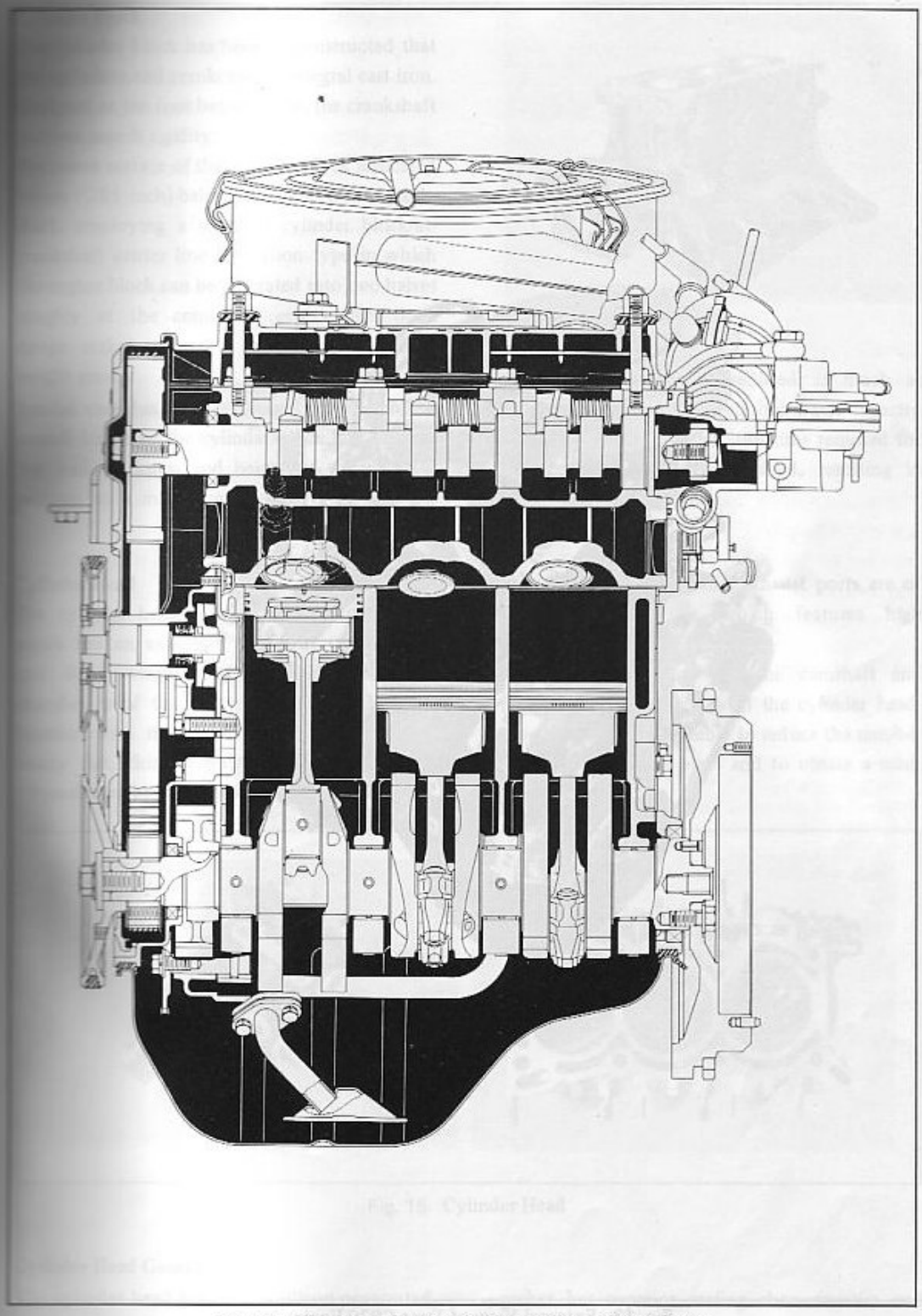


Fig. 12 Transverse-Sectional View of Type CB20 Engine

ENGINE EXTERNAL VIEWS

Fig. 13 External View of Type CB20 Engine

THE ENGINE PROPER

Cylinder Block

The cylinder block has been so constructed that the cylinders and crankcase are integral cast iron. Designed as the four bearing type, the crankshaft features superb rigidity.

The lower surface of the cylinder block is located 14mm (0.55 inch) below the center of the crankshaft, employing a so-called cylinder block-at-crankshaft center line separation type in which the engine block can be separated into two halves roughly at the crankshaft center line. Such design makes it possible to reduce the engine weight greatly.

Special care has been exercised to shorten the overall length of the cylinder block and to keep the wall thickness and height of water jacket sections at a minimum level in order that the engine weight may be reduced as much as possible. As a result, the cooling water capacity has been reduced. Hence, the time required for warming-up has been shortened, resulting in reduced cooling loss, too.

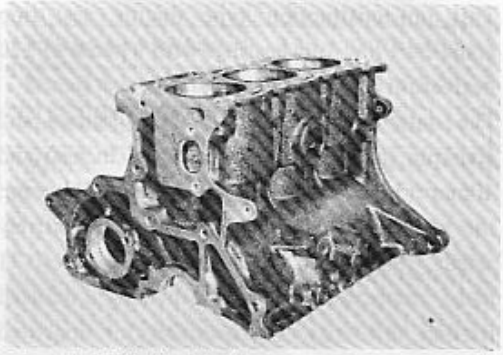


Fig. 14 Cylinder Block

Cylinder Head

The cylinder head is made of aluminum alloy which has an excellent high heat conductivity and light weight feature. The combustion chamber is of the polyspherical type. In combination with the piston whose top surface is nearly flat, this combustion chamber provides a squash area to get a better combustion.

Moreover, the intake and exhaust ports are of the cross-flow type which features high efficiency.

Each bearing section for the camshaft and rocker shaft is integral with the cylinder head, thereby making it possible to reduce the number of necessary engine parts and to obtain a compact engine design.

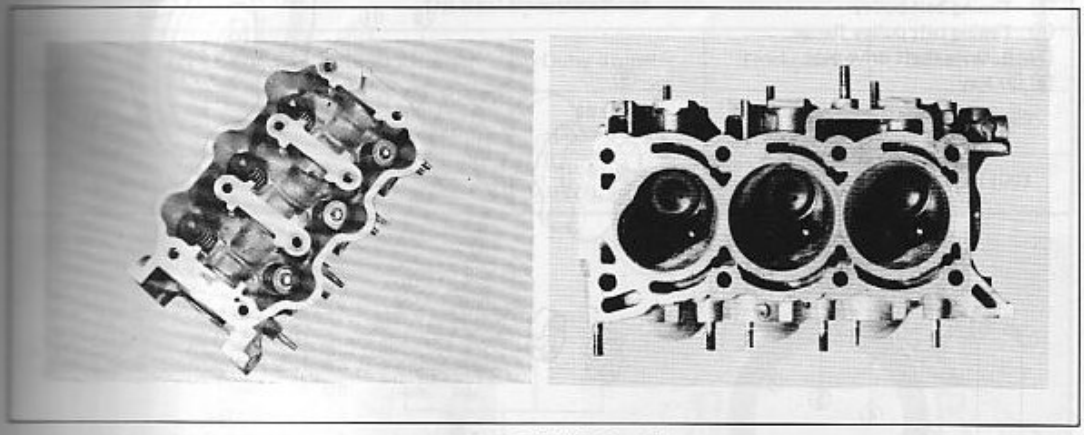


Fig. 15 Cylinder Head

Cylinder Head Gasket

The cylinder head gasket uses silicon-penetrated, high-density steel asbestos. In this way, the head gasket has superior sealing characteristics and distinctive durability.

Crankshaft

This uni-construction type ductile cast iron crankshaft has four bearings with a phase of 120 degrees for three cylinders.

The outer diameters of the main journal and crankpin journal are 42mm (1.654 inches) and 40mm (1.575 inches), respectively. However, the widths of their bearings are comparatively small: 19.5mm (0.77 inch) and 18mm (0.71 inch), respectively, thereby providing a reduced friction resistance. Furthermore, for improved durability, these bearings employ aluminum alloy.

The thrust force of the crankshaft is sustained by the No.3 journal. Two halves of alluminum alloy thrust washer are installed at the cylinder block side alone so as to provide a proper thrust clearance. A wide crankshaft bearing cap holds the above-described thrust washers so that they may not be dropped.

The balance shaft sections of the crankshaft must be coordinated with the balance shafts that are described at the latter part of this technical information book. To this end, the balance weight sections of the crankshaft have been so designed that they are balanced with the half of the total weight of the reciprocating sections, such as the pistons, the small ends of the connecting rods and so forth, in order that the engine vibrations inherent in a three-cylinder engine may be eliminated.

Moreover, in order to attain a top-level accuracy, the crankshaft has been accurately balanced by means of a balancing machine, after machining the circumference sections.

Crankshaft Specifications

Main journal outer diameter	42.0mm (1.654 inches)
Crankpin journal outer diameter	40.0mm (1.575 inches)
Weight	8.4kg (18.5 lb)

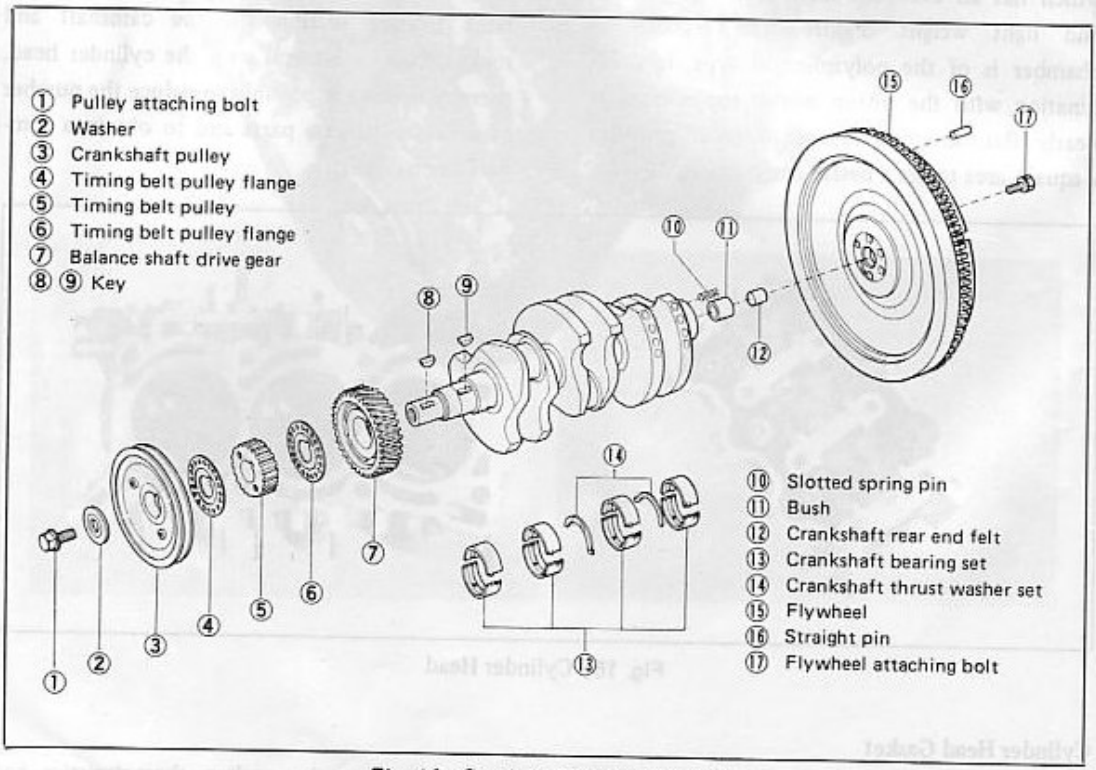


Fig. 16 Crankshaft Related Parts

Crankshaft Bearings

The crankshaft bearings employ aluminum alloy inserts which feature durability. The same bearing has been used in common for No.1 through No.4. Moreover, these bearing inserts are provided with adequate oil grooves so as to improve further bearing durability.

Crankshaft Bearing Specifications

Bearing insert thickness	2.0mm (0.079 inch)
Bearing insert width	19.5mm (0.771 inch)
Outer diameter	46mm (1.81 inches)
Material	Alluminum alloy

Flywheel

The flywheel is attached to the crankshaft by means of six bolts which are spaced equally around a circle. Furthermore, a slotted pin sets the flywheel exactly at the correct position in relation to the crankshaft.

Also, a 4mm dia. (0.16 inch dia.), 1mm (0.039 inch) deep ignition timing mark is provided at the BTDC 10° position on the periphery of the flywheel. The timing mark is painted yellow for the purpose of identification.

Flywheel ring gear tooth number	96

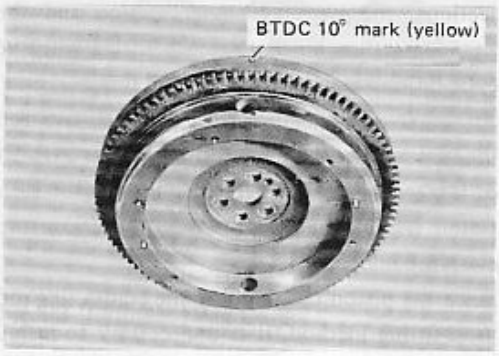


Fig. 17 Flywheel

Crankshaft Oil Seals

The front and rear oil seals of the crankshaft are of the type "T" with helix (spiral grooves) so as to prevent oil leakage.

The type"T"oil seal utilizes the screw pumping action which occurs when the crankshaft is turned and which always forces the oil to flow back into the inside of the engine. Hence, the type "T" oil seal has remarkable sealing characteristics.

Oil Seal Specifications

Item / Part nomenclature	Inner diameter	Outer diameter	Thickness	Oil seal Number
Front oil seal	32.0mm (1.26 inches)	48.0mm (1.89 inches)	7.0mm (0.28 inch)	90043-11109
Rear oil seal	58.0mm (2.28 inches)	74.0mm (2.91 inches)	10.0mm (0.39 inch)	90043-11095

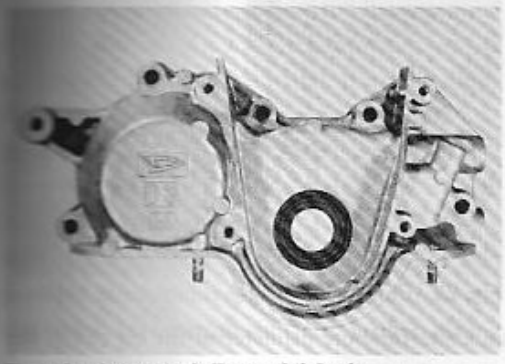


Fig. 18 Crankshaft Front Oil Seal

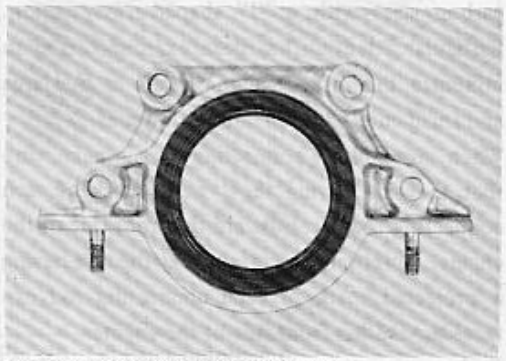


Fig. 19 Crankshaft Rear Oil Seal

Pistons

The piston is aluminum alloy. Its overall height has been set at a comparatively small value of 60mm (2.36 inches). Moreover, the skirt section of the piston is recessed in its pin direction in order that the friction loss and piston weight may be reduced.

The skirt section of each piston has two different sections; the two-stage taper section and the straight section, so that smooth fitting with the cylinder wall may be ensured at all times.

An ample clearance has been provided between the top surface of each piston and its exhaust & intake valves. Furthermore, the top of each piston is recessed in part so as to increase top clearance margin.

Since the piston pins employ the connecting rod press-fitting method, it is unnecessary to install a clip at each end of the piston pin to retain the pin in place.

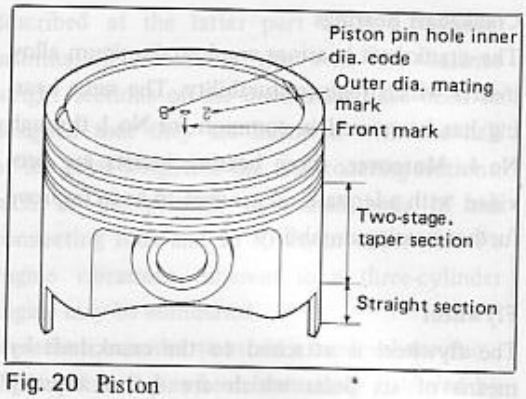


Fig. 20 Piston

Piston Specifications

Type	Slipper type
Outer diameter	76.0mm (2.99 inches)
Piston pin offset	0.5mm (0.02inch)
Piston pin diameter	18.0mm (0.71inch)

Piston Rings

Those piston rings having a small width have been employed. Also, their tensions have reduced as much as possible in order that a minimum friction loss may be achieved.

The top ring and second ring are of the tapered face type, whereas the oil ring is of the combination type so as to obtain improved oil consumption.

The No.1 & No.2 piston rings bear a top mark at each top surface.

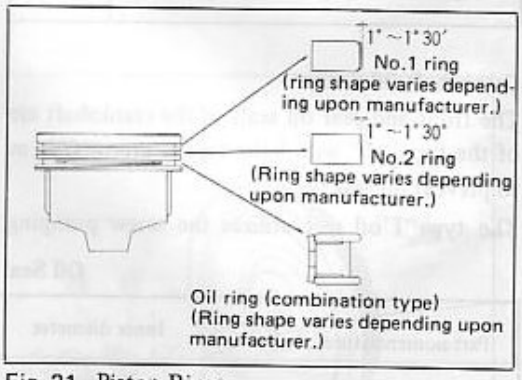


Fig. 21 Piston Rings

Connecting Rods

The connecting rods are made of high rigidity carbon steel with a "I" shaped-cross section. Particular attention has been exercised so as to minimize the difference in weight at the large and small ends between connecting rods.

When assembling connecting rods, make sure that the side having the "▷" mark of each connecting rod faces toward the front side of the engine. Moreover, be certain that the side having a projected mark of each connecting rod cap faces toward the front side of the engine.

Each connecting rod cap bears a code which indicates the bore diameter of the big end of the connecting rod.

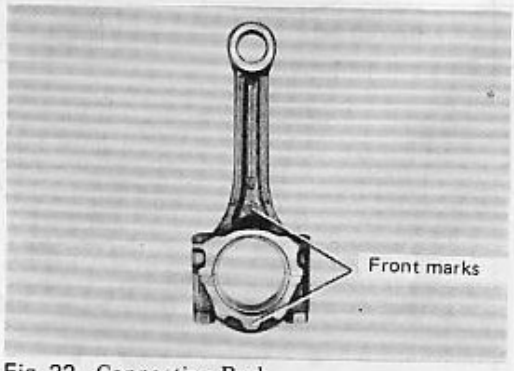


Fig. 22 Connecting Rod

Connecting Rod Bearings

The connecting rod bearings employ alminum alloy inserts which have remarkable corrosion-resistant characteristics and superb durability.

Bearing insert thickness	1.5mm (0.059 inch)
Bearing insert width	18.0mm (0.71inch)
Outer diameter	43mm (1.69 inches)
Material	Aluminum alloy

Cylinder Head Cover

This aluminum die casting cylinder head cover has many curved surfaces. It features great rigidity and distinctive anti-vibration effects.
There is a ventilation baffle plate inside the cylinder head cover in order that any oil contained in the blow-by gases may be separated.

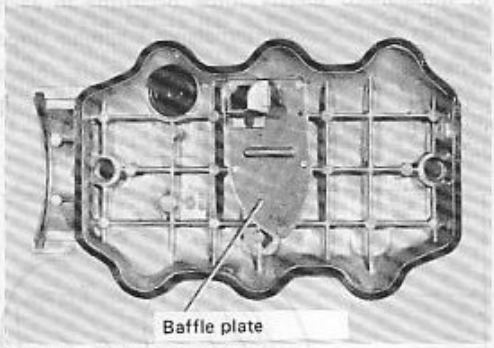


Fig. 23 Cylinder Head Cover

Distributor Housing

This aluminum die casting distributor housing is attached to the rear part of the cylinder head. The distributor housing has been constructed in such a way that it sustains the camshaft's force in its thrust direction. Furthermore, the lubrication oil that has passed through various parts of the cylinder head will lubricate the distributor driven gear, fuel pump lever and so on.

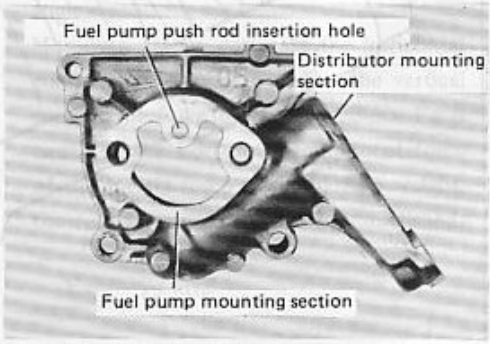


Fig. 24 Distributor Housing

Engine Rear End Plate

The engine rear end plate comprises upper and lower halves. It is attached to the rear part of the engine together with the transmission case. A recessed type ignition timing mark is provided on the top part of the engine rear end plate.

Oil Pan

The oil pan is made of steel sheet. For improved rigidity, the oil pan has been provided with a number of ribs at various vital places, resulting in reduced vibration and sound levels.
In addition, the oil pan strap has been welded integrally with the oil pan so that the oil pan may be fitted closely with the cylinder block.
With regard to the oil pan gasket a rib has been provided at each curved section at the front and rear sides in order to enhance further sealing characteristics.

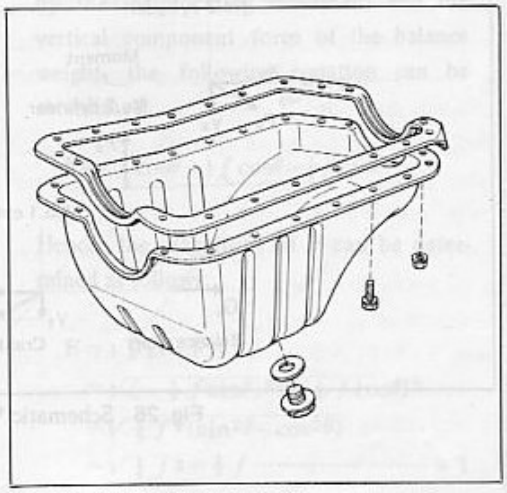


Fig. 25 Oil Pan Components

Balance Shaft

While the engine is running, an imbalanced inertia force due to the piston's reciprocating movements will be generated in each cylinder.

In the case of a 3-cylinder engine whose crankshaft has a phase of 120 degrees, the total sum of imbalanced inertia force occurring in each cylinder will be counterbalanced among three cylinders. Nonetheless, parts of inertia forces generated at the No.1 & No.3 cylinders will generate a moment about the No.2 cylinder.

In order to eliminate this moment a signle shaft balance shaft has been mounted in the engine so that the engine durability and riding comfort may be further improved.

Fig. 26 shows the contour of the balance shaft which is turned by the crankshaft drive gear at the same revolution speed as with the crankshaft but in the opposite direction.

A mating mark has been provided on each gear to ensure the correct assembly.

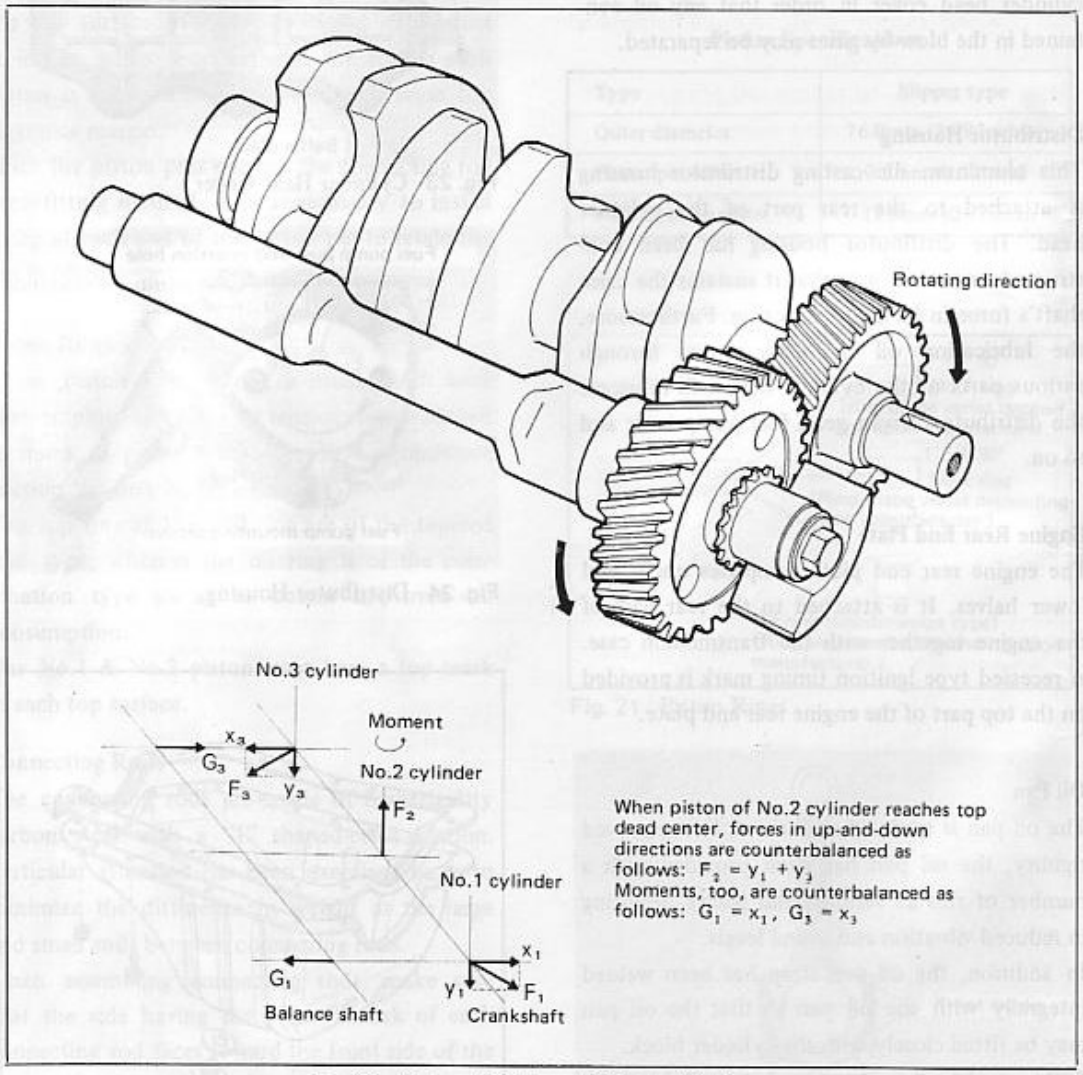


Fig. 26 Schematic View of Balance Shaft

Operation of Balance Shaft

Imbalance Inertia Force in Single Cylinder

The following study has been made as to a single cylinder that is picked up from among three cylinders. The combined force of the inertia force caused by the piston's reciprocating movement and the inertia force generated by the crankshaft's balance weight constitutes the imbalance inertia force that is now occurring in the engine.

The magnitude of this imbalance inertia force remains the same, provided that the engine revolution speed is constant. *1

Furthermore, this imbalance inertia force is a force that is turning in the opposite direction at the same revolution speed (angle) as with the crankshaft. *2

Therefore, in the case of the 3-cylinder engine whose crankshaft has a phase of 120 degrees, the imbalance inertia forces of the same magnitude are occurring at intervals of every 120-degree phase and these forces are turning in the opposite direction as with the crankshaft.

Supplement Reference Information on Items *1 and *2

1. Inertia force caused by piston reciprocating movement

The inertia force caused by the piston's reciprocating movement varies as the crankshaft turns. When the piston reaches the top dead center or the bottom dead center, the inertia force becomes the maximum. (But, the direction is opposite.)

Now, let us designate the inertia force caused by the piston's reciprocating movement (maximum value) as f, the rotating angle of the crankshaft as θ. f varies in the form of $f \cdot \cos\theta$, as the crankshaft turns.

2. Inertia force generated by crankshaft's balance weight

The weight of the balance weight of the crankshaft has been set at 1/2 of the reciprocating sections, e.g. the piston. Therefore, the balance weight is always generating an inertia force of $1/2\,f$, while the crankshaft is turning.

3. Now, let us calculate the magnitude of the composite force F by combining the inertia forces as described in paragraphs 1 & 2 above. Also, let us establish its rotating angle α.

Moreover, let us designate the horizontal component force of F as Fx; the vertical component force of F as Fy. Since Fx is equal to the horizontal component force of the inertia force of the balance weight, the following equation can be established:

$$Fx = -\frac{1}{2} f \sin\theta$$

Moreover, since Fy is equal to the difference between the inertia force caused by the reciprocating movement and the vertical component force of the balance weight, the following equation can be established:

$$Fy = f\cos\theta - \frac{1}{2} f\cos\theta = \frac{1}{2} f\cos\theta$$

Hence, the magnitude of F can be determined as follows:

$$\begin{aligned} F &= \sqrt{Fx^2 + Fy^2} \\ &= \sqrt{\left(-\tfrac{1}{2} f\sin\theta\right)^2 + \left(\tfrac{1}{2} f\cos\theta\right)^2} \\ &= \sqrt{\tfrac{1}{4} f^2(\sin^2\theta + \cos^2\theta)} \\ &= \sqrt{\tfrac{1}{4} f^2} = \tfrac{1}{2} f \quad \cdots\cdots \text{※ 1} \end{aligned}$$

As for the rotating angle α can be established as follows:

$$\alpha = \tan^{-1}\frac{Fx}{Fy} = \tan^{-1}\frac{-\frac{1}{2}f\sin\theta}{\frac{1}{2}f\cos\theta}$$

$$= \tan^{-1}(-\tan\theta) = -\theta \quad \cdots\cdots\cdots\cdots \text{※ 2}$$

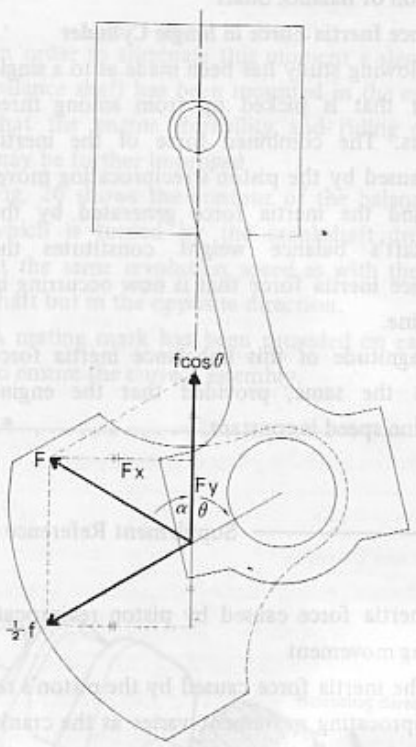


Fig. 27 Imbalance Inertia Forces

Imbalance Inertia Force in Three Cylinders

Let us decompose those inertia forces of F_1, F_2 and F_3 that are occurring in the three cylinders, in the X-axis and Y-axis, respectively, so that the balance of the inertia forces in the three cylinders may be examined.

Here, it should be noted that the magnitude of those forces of F_1, F_2 and F_3 is the same, but the difference in their phases is 120 degrees.

Now, let us study the balance of inertia forces in the y-axis direction.

Inasmuch as $y_1 = \frac{1}{2}F_1$, $y_3 = \frac{1}{2}F_3$ and, furthermore, $F_1 = F_2 = F_3$, the following equation can be established, indicating that there is equilibrium among the inertia forces.

$y_1 + y_3 = F_2$.

Let us proceed to study the balance of inertia forces in the x-axis direction.

Inasmuch as $x_1 = \frac{\sqrt{3}}{2}F_1$, $x_3 = \frac{\sqrt{3}}{2}F_3$ and, furthermore, $F_1 = F_3$, the following equation can be established, indicating that there is equilibrium as far as the magnitude of inertia forces is concerned.

$x_1 = x_3$

Nevertheless, the position of x_1 differs from that of x_3 and, moreover, their directions are opposite from each other. Hence, a moment about the y-axis has been generated.

In order to counterbalance this moment, it becomes necessary to install a weight which can generate the same inertia force G_1 as x_1, but in the opposite direction as well as another weight which can generate the same inertia force G_3 as x_3, but in the opposite direction. Their weights are the balance shaft.

Consequently, the crankshaft and balance shaft continue to rotate, maintaining the above-described relationship in which the moment is counterbalanced at all times.

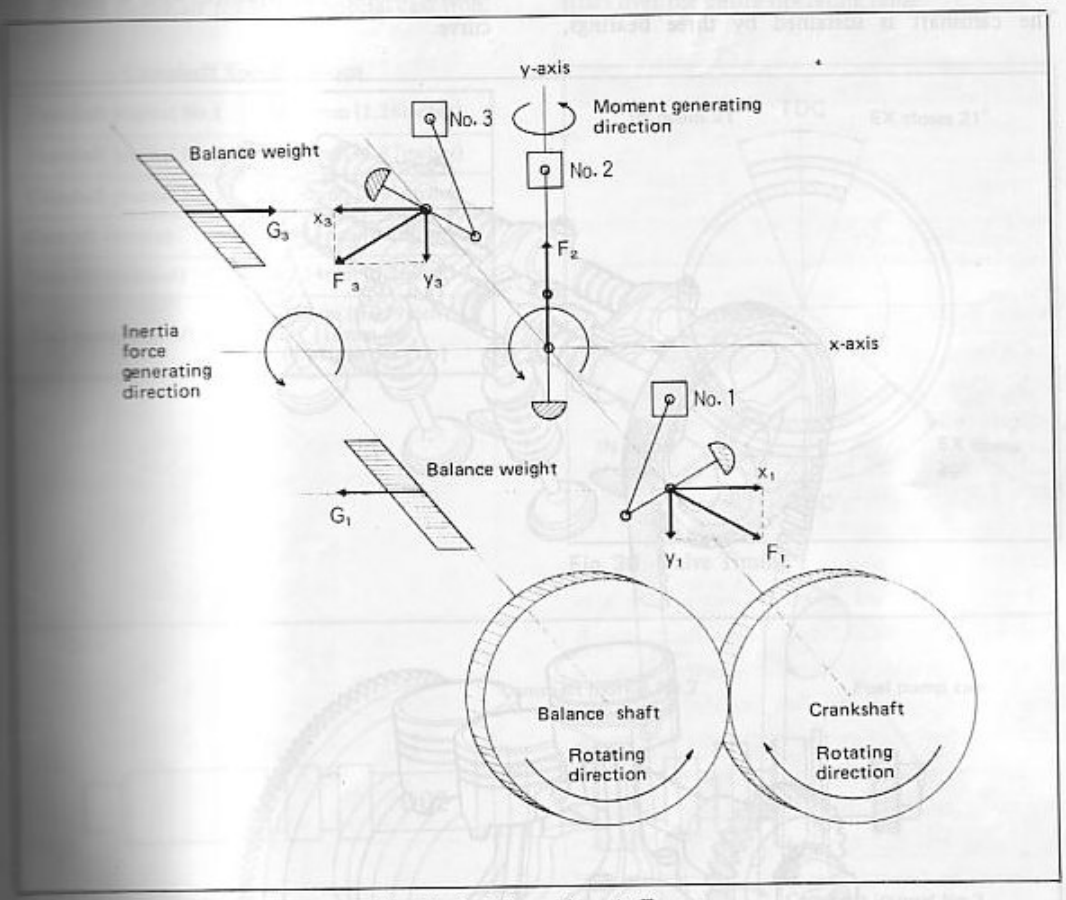


Fig. 28 Imbalance Inertia Forces

VALVE ACTUATING MECHANISM

Description

The valve actuating mechanism is of the single overhead camshaft (SOHC) in which a single camshaft commonly used for intake and exhaust valves is located above the cylinder head. And the camshaft is driven by a timing belt.

The camshaft is sustained by three bearings, featuring high rigidity and remarkable follow-up characteristics over the entire operating range. Furthermore, large-sized valves that are arranged in a Vee shape make it possible to get an excellent torque performance with a nearly flat curve.

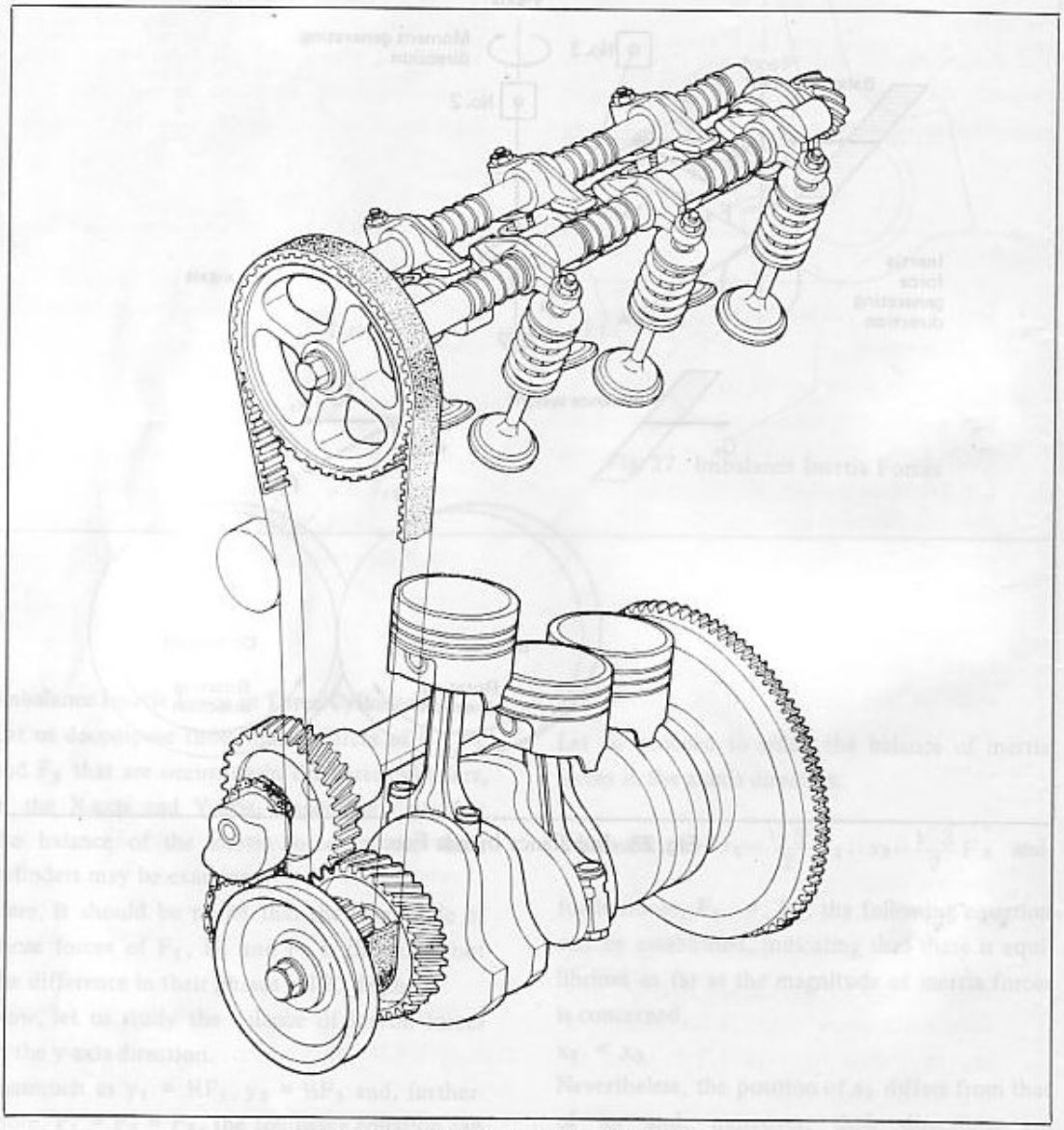


Fig. 29 Valve Actuating Mechanism

Camshaft

The single overhead camshaft that is located above the cylinder head is supported by three bearings. A total of six cam lobes are provided at the center section of the camshaft. A gear for driving the distributor is mounted at the rear end of this camshaft made of a special cast iron.

Camshaft Specifications

Camshaft journal No.1	32.00mm (1.26inches)
Camshaft journal No.2	47.50mm (1.87inches)
Camshaft journal No.3	48.50mm (1.91inches)
Cam lift (intake)	6.654mm (0.26inch)
Cam lift (exhaust)	6.654mm (0.26inch)
Fuel pump cam lift	2.0mm (0.079inch) [16mm dia. (0.63inch dia.) up]

The cam lobe surfaces have been chill treated. The results are improved wear-resistant property. Furthermore, the cam design features high rigidity.

The camlobe's contours have been designed such that they have remarkable follow-up characteristics over the entire operating range.

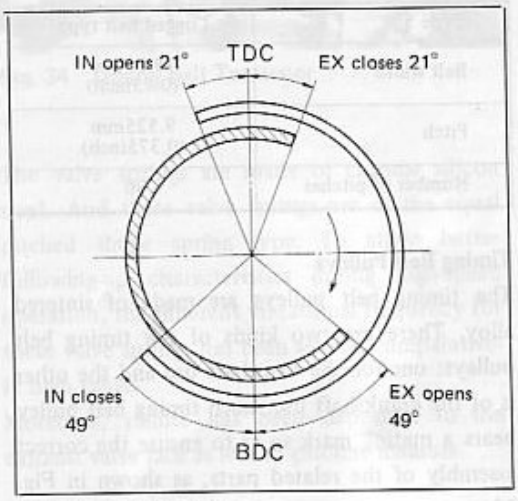


Fig. 30 Valve Timing

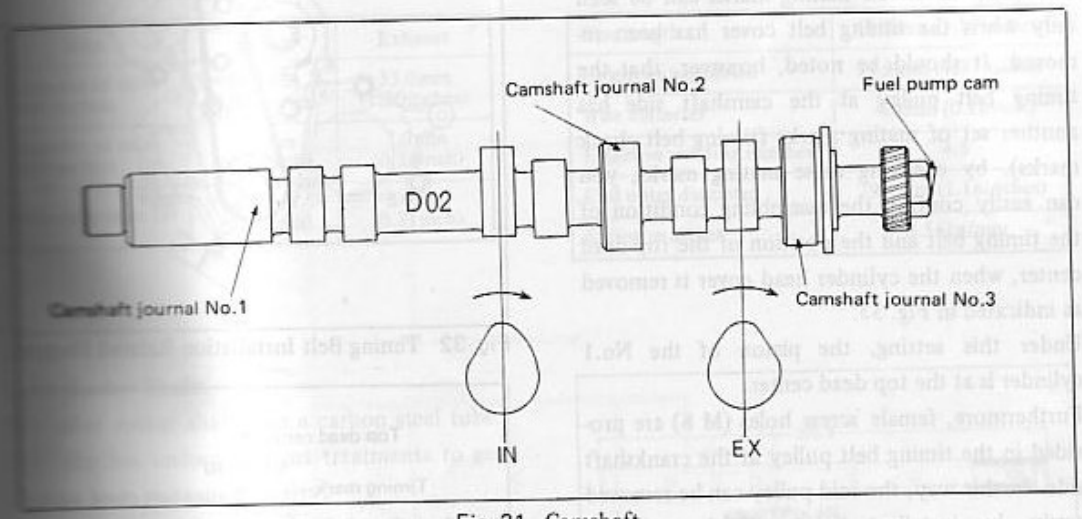


Fig. 31 Camshaft

Timing Belt

The timing belt for driving the camshaft is of the cogged belt type which ensures smooth rotations and a very low sound level. The timing belt contains cablacord as its ingredient. Hence, it features superior durability and can withstand even gruelling operating conditions.

Timing Belt Specifications

Type	Cogged belt type
Belt width	19.05mm (0.75inch)
Pitch	9.525mm (0.375inch)
Number of pitches	90

Timing Belt Pulleys

The timing belt pulleys are made of sintered alloy. There are two kinds of the timing belt pulleys: one for the camshaft use and the other is of the crankshaft use. Each timing belt pulley bears a mating mark so as to ensure the correct assembly of the related parts, as shown in Fig. 32.

The above-described mating marks can be seen only when the timing belt cover has been removed. It should be noted, however, that the timing belt pulley at the camshaft side has another set of mating marks (timing belt check marks). by checking these mating marks, you can easily confirm the assembling condition of the timing belt and the position of the top dead center, when the cylinder head cover is removed as indicated in Fig. 33.

Under this setting, the piston of the No.1 cylinder is at the top dead center.

Furthermore, female screw holes (M 8) are provided in the timing belt pulley at the crankshaft side. In this way, the said pulley can be removed easily, by installing bolts into these female screw holes.

Timing Belt Pulley Specifications

Item	Camshaft side	Crankshaft side
Tooth number	40	20
Width	24mm (0.94inch)	24mm (0.94inch)

NOTE:

1. The cablacord contained in the timing belt has superior durability against tensile forces. Nevertheless, it is very susceptible to breakage, when the belt is bent, resulting in a greatly-reduced strength.
   Hence, be very careful to avoid bending the timing belt.
2. Care also should be exercised not to let water or oils touch the timing belt, for the contamination due to these elements would cause the timing belt's rubber to swell.

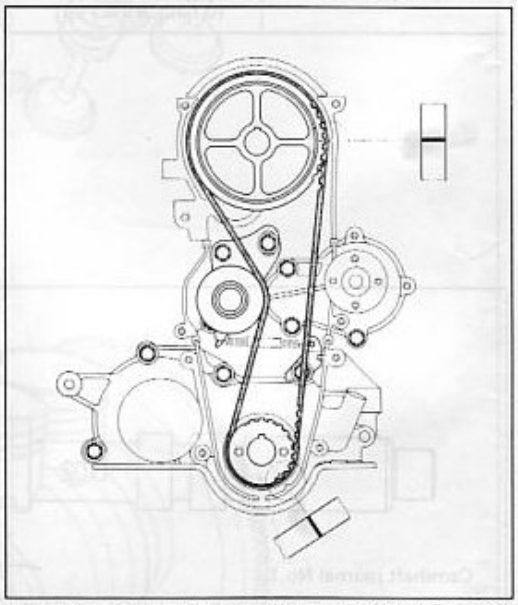


Fig. 32 Timing Belt Installation Related Diagram

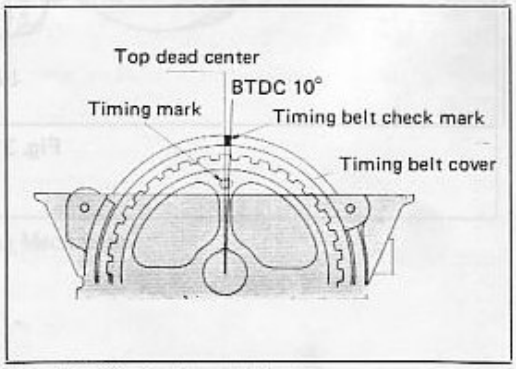


Fig. 33 Timing Check Marks

Timing Belt Tensioner

The timing belt tensioner provides the timing belt with an adequate tension in order that positive driving may be ensured and the durability of the timing belt may be improved.

The belt tension can be adjusted by setting the tension of the tensioner spring.

Incidentally, the roller section of the timing belt tensioner is of the maintenance-free type.

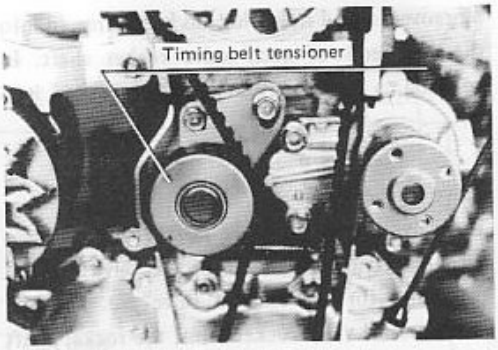


Fig. 34 Timing Belt Tensioner

Intake and Exhaust Valves

Both intake and exhaust valves are made of heat-resistant steel. For improved intake and exhaust efficiency, the diameters of the valve's mushroom head sections have been set at comparatively large values, respectively. Furthermore, an oil seal has been provided on each valve guide bush of the intake and exhaust valves so as to prevent oil dropping.

The valve springs are made of chrome silicon steel. And these valve springs are of the equal pitched single spring type. To attain better following-up characteristics during high-speed operation, the inherent vibrational frequency for these valve springs has been set at a comparatively high value.

Moreover, stellite has been deposited to the exhaust valve face as leaded-gasoline measure.

Valve Specifications

Item	Intake	Exhaust
Diameter of valve head section	36.0mm (1.92inches)	33.0mm (1.30inches)
Diameter of valve stem section	7.0mm (0.28inch)	7.0mm (0.28inch)
Maximum valve lift	8.0mm (0.31inch)	8.0mm (0.31inch)

Valve Spring Specifications

Free length	43.3mm (1.70inches)
Height as assembled	34.9mm (1.37inches)
Wire diameter	4.0mm (0.16inch)
Effective winding number	4.5
Coil outer diameter	29.4mm (1.16inches)
Spring constant	3.56kg/mm

Valve Rocker Shafts

The valve rocker shaft uses a carbon steel tube. The tube has undergone heat treatments to get a better wear-resistant property.

There are two different kinds of rocker shafts: one for the intake valve use and the other for the exhaust valve use. The exhaust valve rocker shaft is longer in its overall length. Furthermore, it has an oil passage at its front end. This oil passage is used to lubricate the bearing journal sections of the camshaft.

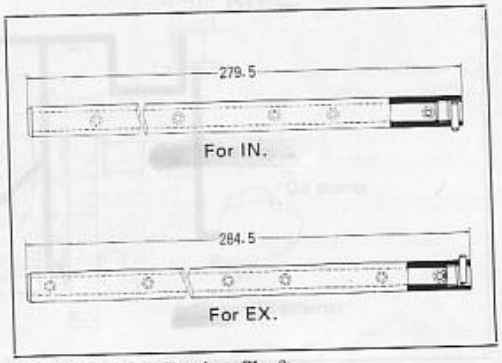


Fig. 35 Valve Rocker Shaft

Moreover, an oil hole plug has been screwed into the rear end of each valve rocker shaft. In addition, a roller pin has been press-fitted into each shaft for the purpose of locating the shaft as well as preventing the shaft from turning.

Valve Rocker Arms

The valve rocker arms are installed on the two rocker shafts: one for the intake valve use and the other for the exhaust valve use. In these chrome steel valve rocker arms, the rocker shaft fitting section incorporates a lead bronze bushing, while the pad surface area is hard chrome plated, thereby increasing wear-resistant property.

Valve Rocker Arm Specifications

Item \ Classification	Intake	Exhaust
Valve rocker arm leverage ratio	1.118	1.118
Valve clearance (hot)	0.20mm (0.0079inch)	0.20mm (0.0079inch)

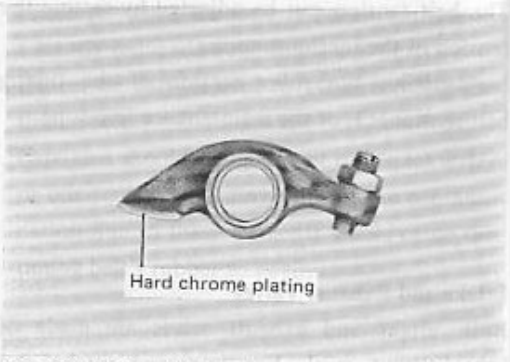
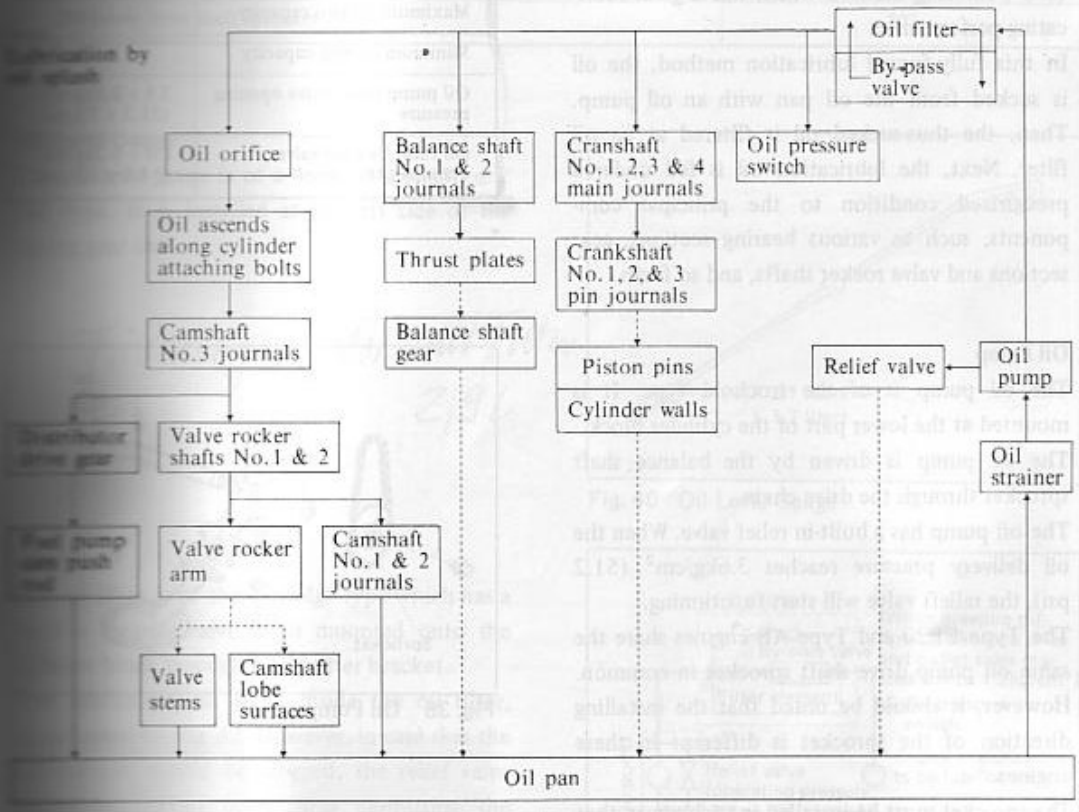


Fig. 36 Valve Rocker Arm

LUBRICATION SYSTEM

Block Diagram of Lubrication System



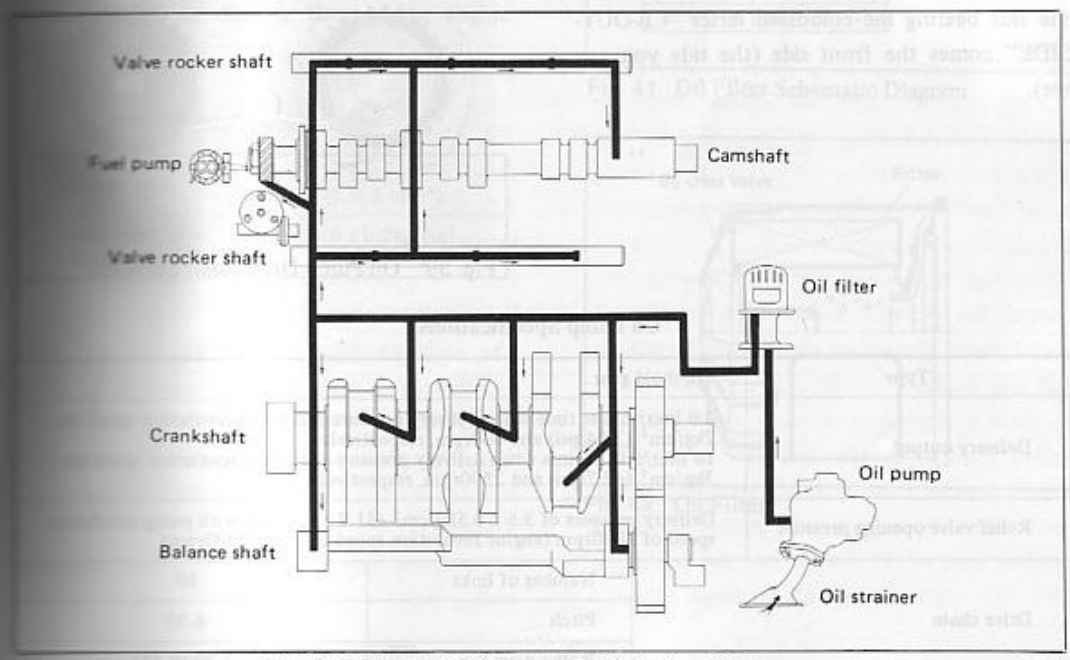


Fig. 37 Schematic Diagram of Lubrication System

Description

The lubrication system employs the fully-forced feed , filtering method which has a great lubricating performance.

In this fully-forced lubrication method, the oil is sucked from the oil pan with an oil pump. Then, the thus-sucked oil is filtered at an oil filter. Next, the lubrication oil is fed under a pressurized condition to the principal components, such as various bearing sections, gear sections and valve rocker shafts, and so forth.

Oil capacity (whole)	2.9 liters
Maximum oil pan capacity	2.7 liters
Minimum oil pan capacity	1.7 liters
Oil pump relief valve opening pressure	3.6 ± 0.5kg/cm² (51.2 ± 7.1 psi)
Oil filter by-pass valve opening pressure	1.0 ± 0.2kg/cm² (14.2 ± 2.8 psi)

Oil Pump

The oil pump is of the trochoid type. It is mounted at the lower part of the cylinder block.

The oil pump is driven by the balance shaft sprocket through the drive chain.

The oil pump has a built-in relief valve. When the oil delivery pressure reaches 3.6kg/cm² (51.2 psi), the relieft valve will start functioning.

The Type CB20 and Type AB engines share the same oil pump drive shaft sprocket in common. However, it should be noted that the installing direction of the sprocket is different in these engines.

The sprocket must be installed in such a way that the side bearing the embossed letter "CB-OUTSIDE" comes the front side (the side you can see).

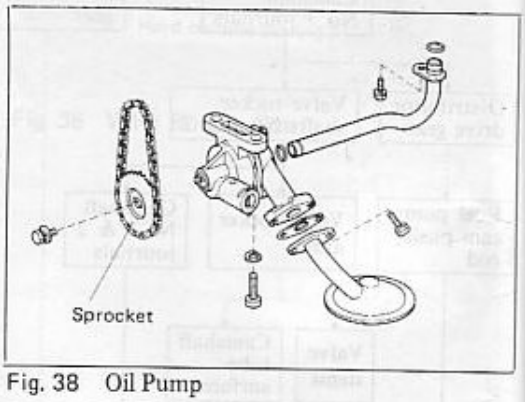


Fig. 38 Oil Pump

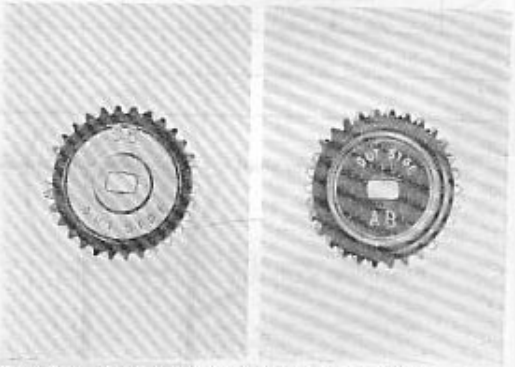


Fig. 39 Oil Pump Drive Shaft Sprocket

Oil Pump Specifications

Type	Trochoid gear	
Delivery output	4.0 liter/min at time when delivery pressure and pump revolution speed are 2kg/cm² (28.4 psi) and 600rpm, respectively. 16 liter/min at time when delivery pressure and pump revolution speed are 3kg/cm² (42.7 psi) and 2500rpm, respectively.	
Relief valve opening pressure	Delivery pressure of 3.6 ± 0.5kg/cm² (51.2 ± 7.1 psi), with pump revolution speed of 2000rpm (engine revolution speed of about 3300rpm)	
Drive chain	Number of links	50
	Pitch	6.35
	Roller diameter mm (inch)	3.30 (0.13)

Tooth Number of Oil Pump Sprocket

Oil pump drive sprocket (balance shaft)	18
Oil pump drive shaft sprocket	30

Oil Level Gauge

The oil level gauge is of a 4mm (0.16 inch) dia: rod type. It is installed at the left side of the timing gear case.

Füllmenge Motor mit Filter
2,9L

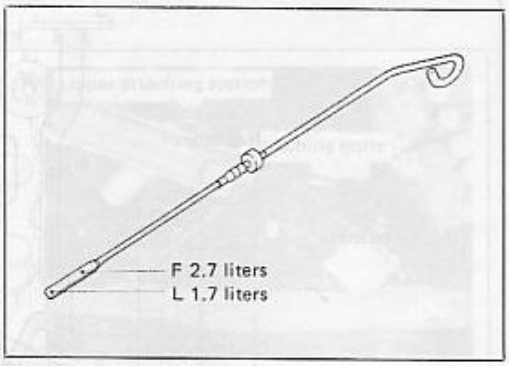


Fig. 40 Oil Level Gauge

Oil Filter

The oil filter is of the cartridge type which has a built-in by-pass valve. It is mounted onto the cylinder block through an oil filter bracket.

The lubrication oil flows inside the oil filter, as indicated by Fig. 42. However, in case that the oil element should be clogged, the relief valve would be pushed open, thus permitting the lubrication oil to directly flow to the engine lubrication points.

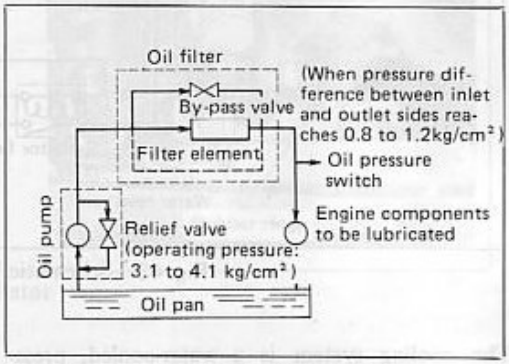


Fig. 41 Oil Filter Schematic Diagram

Oil Filter Specifications

Filtering area	810 cm² (125.6 inch²)
Relief valve opening pressure	1.0 ± 0.2kg/cm² (14.2 ± 2.8 psi)

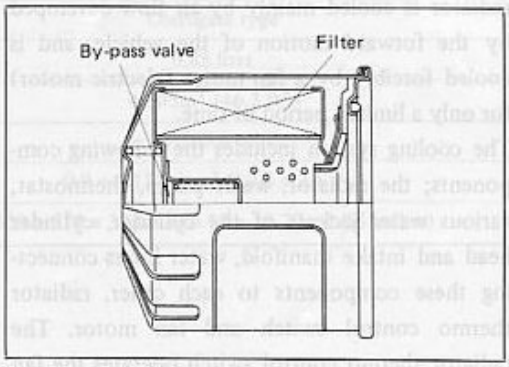


Fig. 42 Oil Filter

COOLING SYSTEM

Description of Cooling System

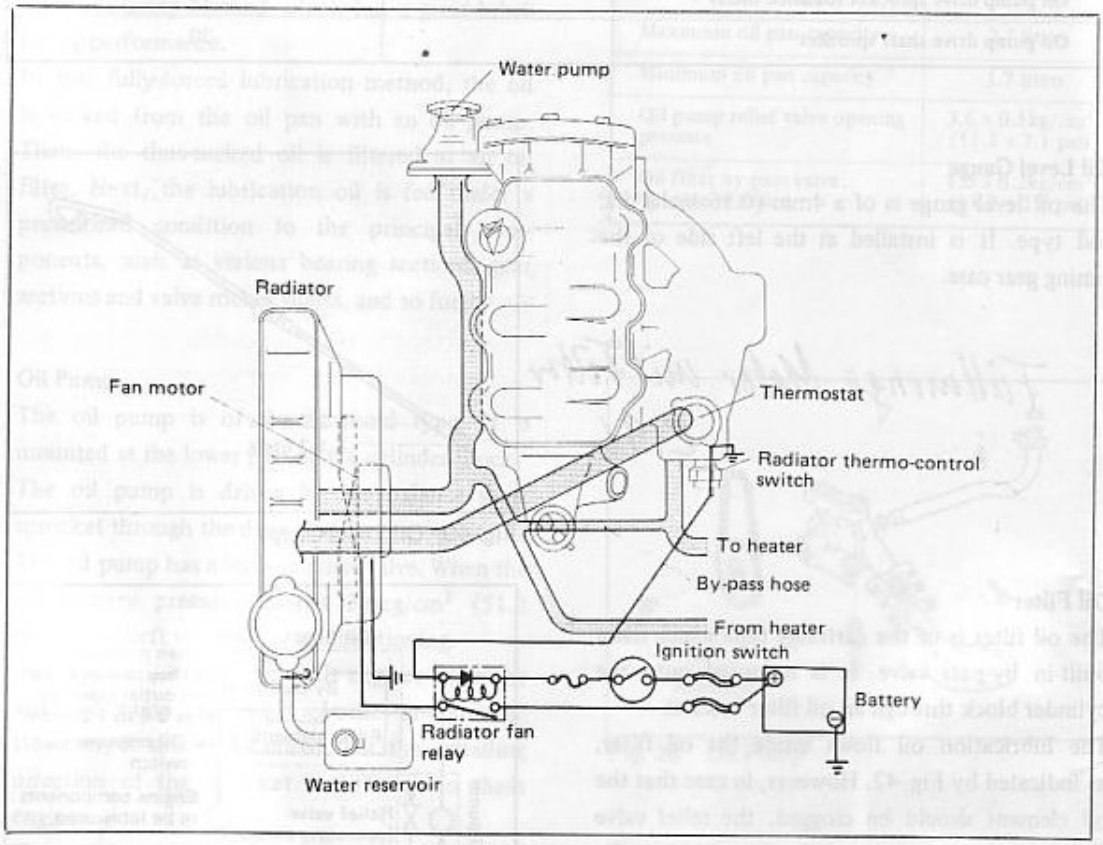


Fig. 43 Schematic View of Cooling System

The cooling system is a water-cooled, pressurized-circulation type. In this system, the radiator is cooled mainly by air flow developed by the forward motion of the vehicle, and is cooled forcibly by a fan motor (electric motor) for only a limited period of time.

The cooling system includes the following components; the radiator, water pump, thermostat, various water jackets of the cylinder, cylinder head and intake manifold, water hoses connecting these components to each other, radiator thermo control switch and fan motor. The radiator thermo control switch operates the fan motor when the engine temperature exceeds a specified level of 98°C and stops the fan motor when the engine temperature drops below a specified level of 93°C, thus maintaining an optimum temperature at all times.

The radiator is the corrugated fin type. It features a remarkable cooling efficiency, although its capacity is comparatively small. The radiator cap is the pressurized type which maintains the cooling system under a pressure of 0.9 kg/cm^2 (12.8 psi).

The water pump is of the centrifugal type. The pump body is made of aluminum alloy so as to reduce the pump weight.

The thermostat is the wax type which is hardly affected by the internal pressure of the cooling passages.

The radiator thermo-control switch is of the wax-sealing type.

Radiator

The radiator is equipped with a reservoir tank. The radiator core is of the corrugated fin type which has excellent heat radiating characteristics. The upper and lower tanks and radiator cap are made of resin so that the engine weight may be reduced.

As regards the radiator installation method, the rubber sections of the lower support boss have been inserted into the rubber rings, while the upper section has been attached to the upper baffle plate by means of two bolts.

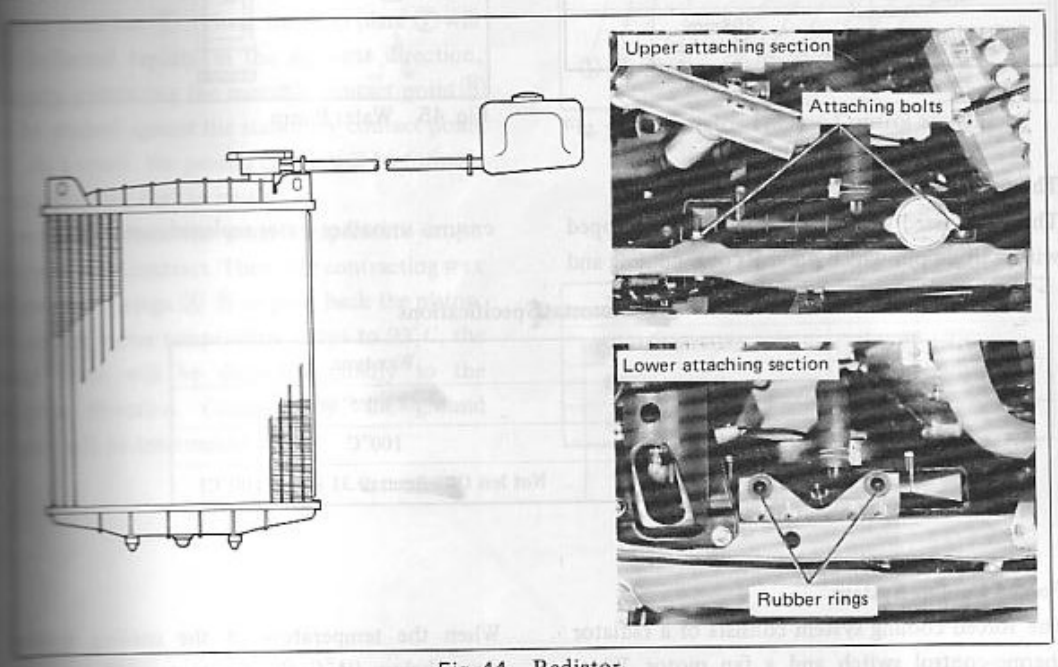


Fig. 44 Radiator

Radiator Specifications (Specifications vary depending upon manufacturers.)

Fin type	Corrugate type
Radiator water capacity	0.85 liter
Total heat radiating area	4.303m² (46.3 ft²)
Heat radiating rate	21,500 Kcal/h
Cap valve opening pressure	0.9 ± 0.15kg/cm² (12.8 ± 2.1 psi)
Core dimensions (height x width x depth)	350 x 310 x 32mm (13.78 x 12.20 x 1.26 inches)

Water Pump

Water Pump Specifications

Type	Centrifugal type
Delivery output	60 liter/min (with pump revolution speed of 3500 rpm)
Rotor diameter	53mm (2.09 inches)
Pulley diameter	108mm (4.25 inches)

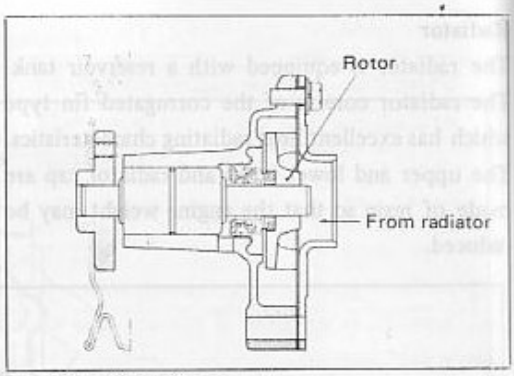


Fig. 45 Water Pump

Thermostat

This small-sized wax type thermostat is equipped with a jiggle pin which prevents over-cooling and ensures smoother water replenishment.

Thermostat Specifications

Type	Wax type
Valve opening temperature	88 ± 1.5°C
Valve full-opening temperature	100°C
Valve lift	Not less than 8mm (0.31 inch) [100°C]

Forced Cooling System

The forced cooling system consists of a radiator thermo-control switch and a fan motor. When the temperature of the cooling system reaches 98°C, the fan motor will be actuated automatically, thus cooling the radiator forcibly.

When the temperature of the cooling system drops below 93°C, the fan motor will cease its operation. In this way, an optimum temperature for the engine can be kept at all times.

Fan Motor Specifications

Type	Totally-enclosed type, direct current printed circuit
Rotating direction	Right (as viewed from drive side)
Revolution speed	2700 ± 300rpm
Current	6.7 ± 0.7A

Radiator Thermo-Control Switch

A wax-sealing type radiator thermo-control switch has been used.

The wax ① of the thermo-control switch, expands as the water temperature rises. When the water temperature reaches 98°C, the expanding wax pushes the diaphragm ②, tefron ③, piston ④ and push bar ⑥. Then, the snap plate ⑦ will be deflected rapidly in the opposite direction, thereby permitting the movable contact point ⑧ to be pushed against the stationary contact point ⑨. As a result, the ground circuit will be formed, thus operating the fan motor.

Conversely, when the water temperature drops, the wax will contract. Then, the contracting wax allows the springs Ⓐ Ⓑ to push back the piston. When the water temperature drops to 93°C, the snap plate will be deflected rapidly to the original direction. Consequently, the ground circuit will be interrupted again.

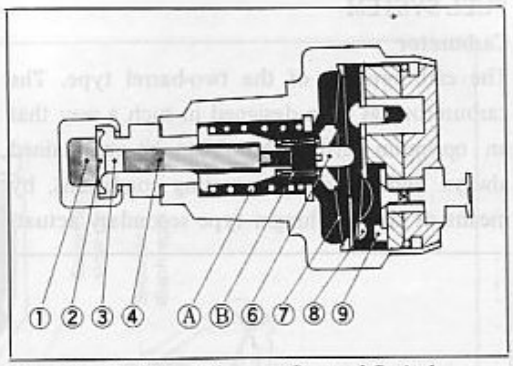


Fig. 46 Radiator Thermo-Control Switch

Type	Wax sealed type
ON temperature	98 ± 2°C
OFF temperature	93 ± 2°C
Identification color	Green

FUEL SYSTEM

Carburetor

The carburetor is of the two-barrel type. The carburetor has been designed in such a way that an optimum air-fuel ratio can be maintained always under varying operating conditions, by means of the diaphragm type secondary actuating mechanism, secondary slow mechanism and sintered alloy air bleeder and so forth. In addition to the above-described features, the transfer from the primary system to the secondary system can be carried out very smoothly.

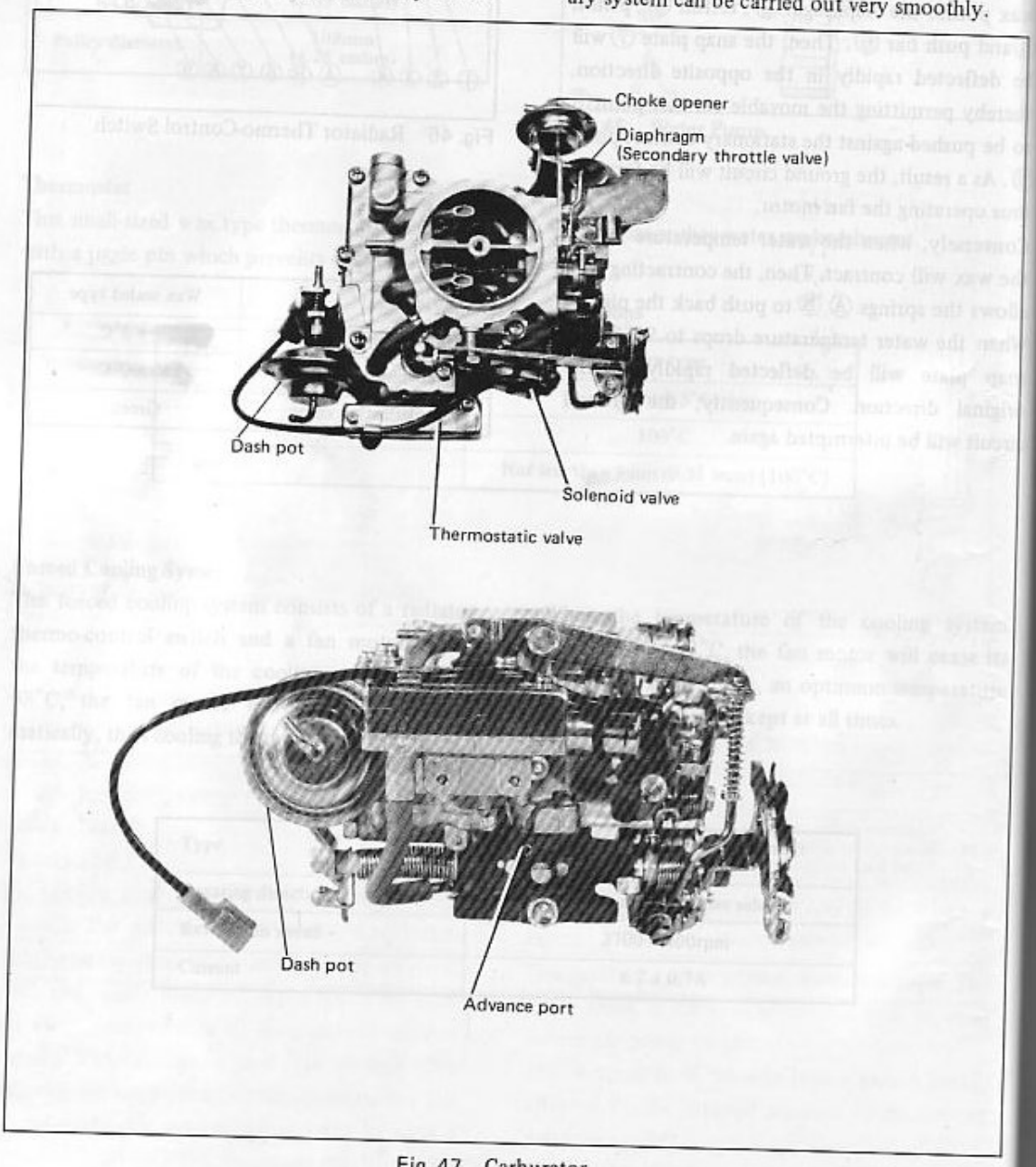


Fig. 47 Carburetor

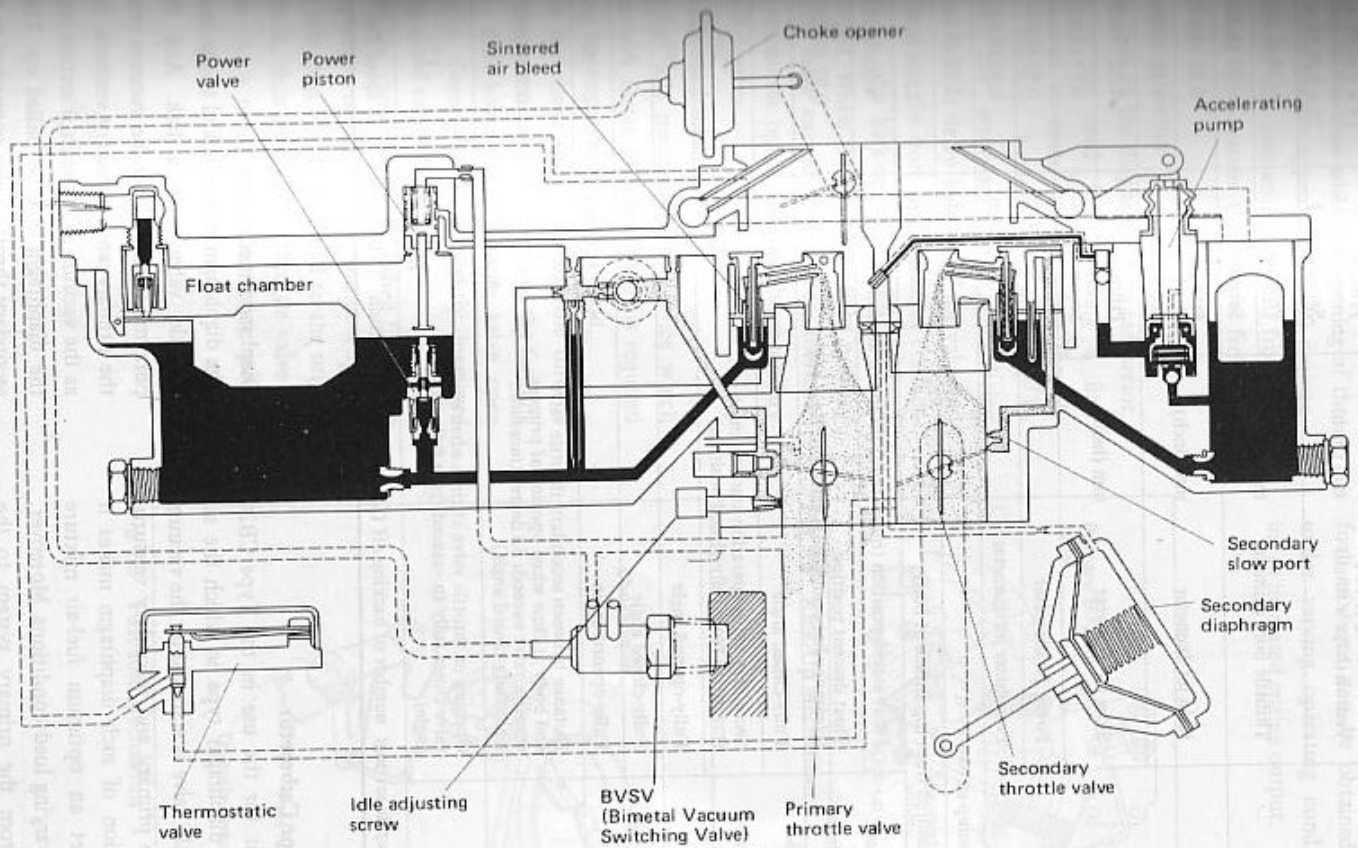


Fig. 48 Carburetor Schematic Diagram

Carburetor Specifications

Engine type			CB-20
Venturis & related parts	Air horn (inner dia. x outer dia.)	mm (inch)	58 x 63 (2.28 x 2.48)
	Venturi (large x small) mm (inch)	Primary	18 x 7 (0.71 x 0.28)
		Secondary	25 x 8 (0.98 x 0.31)
	Throttle bore diameter mm (inch)	Primary	28 (1.10)
		Secondary	32 (1.26)
Jets	Main jet diameter mm (inch)	Primary	0.81 (0.032)
		Secondary	1.38 (0.054)
	Slow jet diameter mm (inch)	Primary	0.52 (0.020)
		Secondary	0.57 (0.022)
	Power jet diameter	mm (inch)	0.40 (0.016)
	Econmizer jet diameter	mm (inch)	0.90 (0.035)
Accelerating pump stroke		mm (inch)	2.70 (0.11)
Fuel level (measured from top suface of body)		mm (inch)	22.00 (0.87)
Float adjustment values mm (inch)	Float ascent position (measured from top of air horn)		6.00 (0.24)
	Float descent position (clearance between needle valve and float lip)		0.90 (0.035)
Primary throttle valve	Fully-closed angle	(degree)	9
	Secondary valve operation-starting angle (measured from fully-closed position)	(degree)	50
	Fully-opened angle	(degree)	90
Secondary throttle valve	Fully-closed angle	(degree)	20
	Fully-opened angle	(degree)	90
Kick-up	Distance between secondary throttle valve and body at time when opening of primary throttle valve exceeds 55 degree (measured from fully-closed angle)	mm (inch)	0.3 (0.012)
Fast idle	Opening of throttle valve at time when choke valve closes fully (measured from fully-closed angle)	(degree)	17
Idle adjusting screw setting: number of backing off from fully-closed position		(turns)	about 2½

Diaphragm Type Carburetor

The carburetor for the use in the Type CB20 engine is the diaphragm type in which the secondary throttle valve is actuated by the vacuum created at the primary and secondary venturis. The introduction of such diaphragm makes it possible to get an optimum fuel-air mixture always under varying load conditions. Moreover, the transfer from the primary system to the secondary system can be made very smoothly.

Explanation on principal mechanism

1. Diaphragm mechanism
   The diaphragm is interlocked to the secondary throttle valve with a link. And the diaphragm is actuated by the vacuum created at the primary and secondary venturis. Namely, as the vacuum at the venturi section increases, the diaphragm will be pulled up. Then, the secondary throttle valve connected to the diaphragm by a link will open accordingly.
2. Secondary slow-speed system

The purpose of this secondary slow-speed system is to provide adequate air-fuel mixtures for an operating range from the time when the secondary throttle valve begins opening to the time when the opening of the said valve reaches approximately 10 degrees. Because of this assistance furnished from the secondary slow system, the transfer from the primary system to the secondary system can be carried out without the occurrence of any uneven air-fuel mixture during this transient period. Consequently, ideal air-fuel mixtures can be obtained at all times under varying operating conditions, resulting in increased engine output.

3. Kick-up mechanism

In the case of the diaphragm type carburetor, there is no need for providing a link mechanism to open the secondary throttle valve forcibly. Nevertheless, in order to prevent the secondary valve from being opened with a delay because of the valve being stuck to the bore or because of contact-resistance, the kick-up mechanism has been employed. When the opening of the primary throttle valve exceeds 50 degrees, the kick-up mechanism opens forcibly the secondary valve 3 degrees.

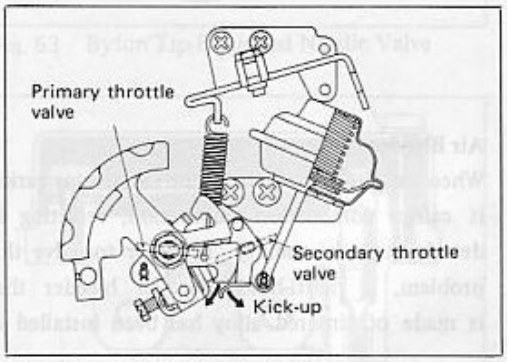


Fig. 49 Kick-Up Mechanism

4. Fast idle mechanism

The fast idle mechanism is a device which provides a faster idle speed that is required during the engine warming-up period.

When the choke valve is closed, the throttle lever arm rests on the high spot of the fast idle cam, thus keeping the throttle valve open slightly. Consequently, a slightly increased idling speed can be obtained.

When the choke button is pushed back upon completion of the engine warming-up, the fast idle cam will be returned to the original position, thus making the throttle valve free again. As a result, a normal idling speed is gained again.

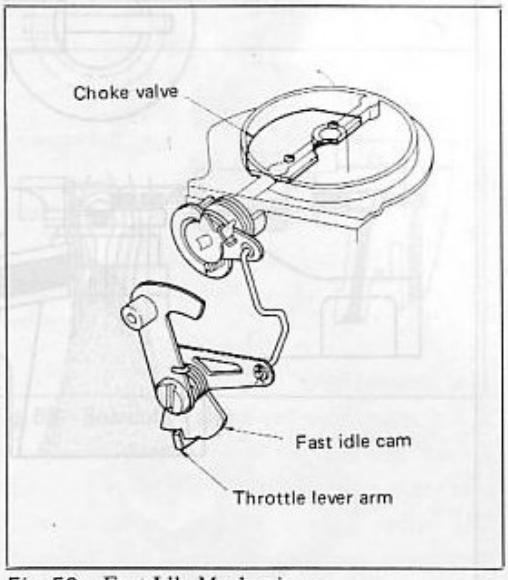


Fig. 50 Fast Idle Mechanism

Power Piston

The carburetor incorporates the power system. This power system provides additional fuel-air mixtures during heavy load operations.

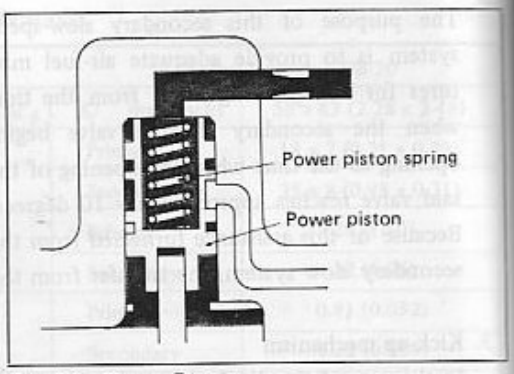


Fig. 51 Power Piston

Air Bleeder

When the fuel supply from the carburetor varies, it causes combustion fluctuation, resulting in deteriorated driveability. In order to solve this problem, a multi-hole type air bleeder that is made of sintered alloy has been installed in the emulsion tube at the carburetor primary side so that the change in the fuel supply from the carburetor may be kept at a minimum level and further finer fuel particles may be obtained.

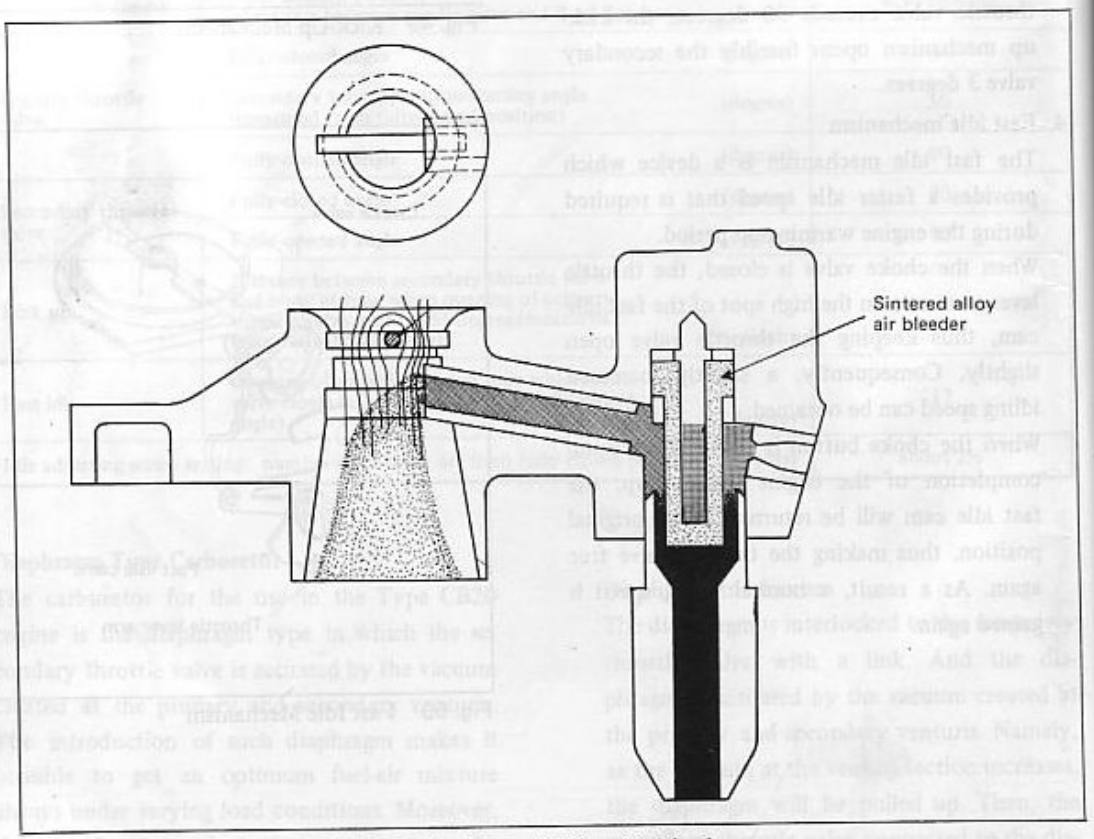


Fig. 52 Sintered Alloy Air Bleeder

Byton Tip Needle Valve

Overflowing in the carburetor will deteriorate greatly anti-pollution performance and fuel economy.

The Byton tip needle valve has a rubber tip at its end. Compared with the conventional metal-tip needle valves, the Byton tip needle valve has remarkable sealing characteristics, thereby eliminating overflow potential of the carburetor.

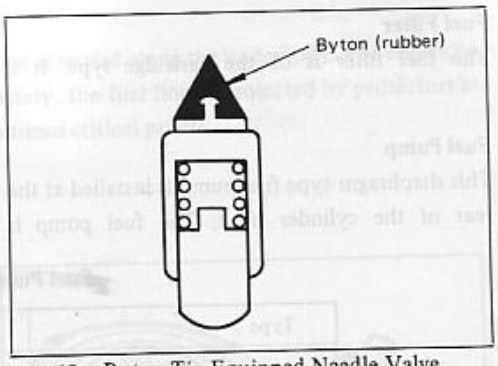


Fig. 53 Byton Tip-Equipped Needle Valve

Thermostatic Valve (Hot idle compensator)

The thermostatic valve is of the needle valve type.

It starts opening at a temperature of 50° to [illegible]°C. When the temperature reaches 62.5°C, it will provide an opening equivalent to a 1.5mm (0.059 inch) dia. jet.

Luftanreicherung

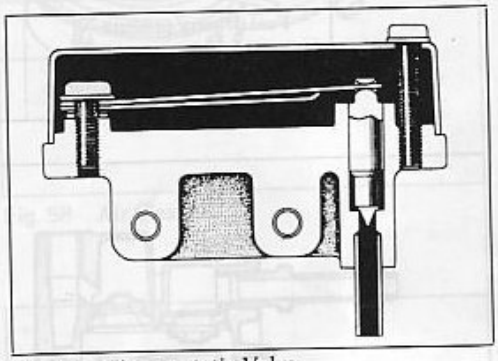


Fig. 54 Thermostatic Valve

Solenoid Valve

The solenoid valve (a magnet valve) has been provided in the slow-speed system of the carburetor.

At the moment when the ignition switch is turned OFF, the solenoid valve cuts off the fuel flow passing through the slow-speed system. In this way, it prevents the occurrence of engine run-on phenomenon.

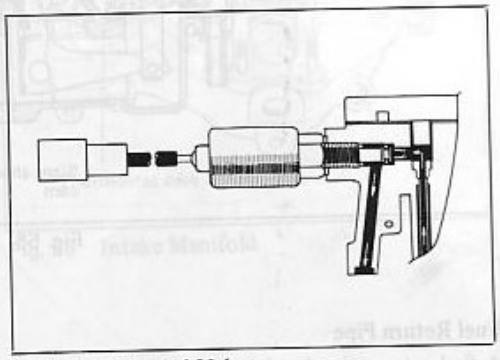


Fig. 55 Solenoid Valve

Fuel Filter

The fuel filter is of the cartridge type. It is mounted at the dash panel.

Fuel Pump

This diaphragm type fuel pump is installed at the rear of the cylinder head. The fuel pump is driven via a push rod by a slant-sheet type cam that is screwed into the end of the camshaft.

Fuel Pump Specifications

Type	Diaphragm type
Delivery output	Not less than 850cc/min (with cam revolution speed of 2500rpm)
Fuel delivery pressure	0.22 to 0.32kg/cm² (3.13 to 4.55 psi)
Fuel inlet negative pressure	Less than 300mmHg (with cam revolution speed of 2500rpm)

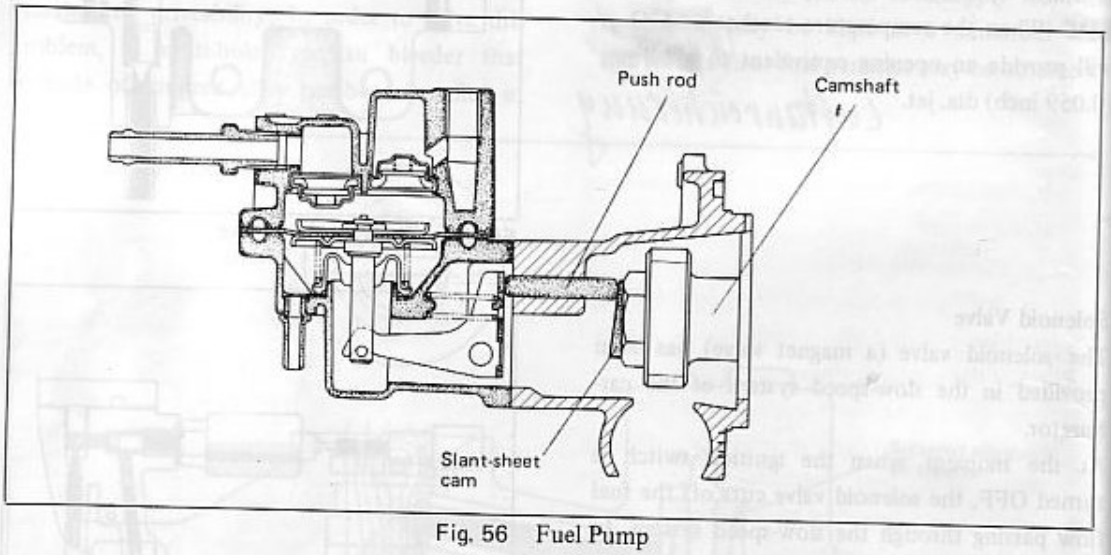


Fig. 56 Fuel Pump

Fuel Return Pipe

A fuel return pipe has been provided in order to prevent the occurrence of vapor lock and percolation.

The return pipe is a pipe that is connected between a spot immediately before the needle valve and the fuel tank. As a result, any excess gasoline is returned to the fuel tank in order that cold gasoline may be fed into the carburetor at all times.

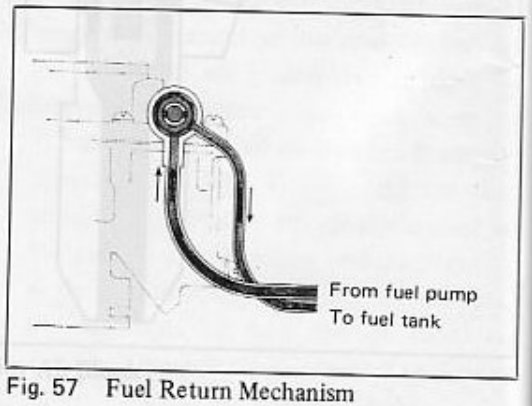


Fig. 57 Fuel Return Mechanism

Fuel Tank and Fuel Line

A fuel tank whose capacity is 34 liters is mounted on the underbody.

Moreover, the fuel line together with the brake line is routed along the underbody. For enhanced safety, the fuel line is protected by protectors at various critical points.

INTAKE AND EXHAUST SYSTEM

Air Cleaner

Filter paper material	Unwoven fabric
Effective filtrating area	About 2100cm² (325.5 inch²)
Number of pleats	73

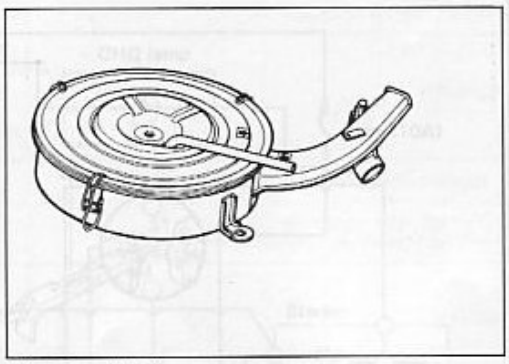


Fig. 58 Air Cleaner

Intake Manifold

Each cylinder has its own independent intake manifold. It is, therefore, possible to keep the intake interference at a minimum level and to get an even distribution of intake mixtures. The result is a superb intake efficiency.

Furthermore, the intake manifold is integral with the thermostat case. Being made of aluminum alloy, the intake manifold features light weight and superior heat conduction. In addition, the intake mixture is preheated by the cooling water so as to improve the fuel atomization and warm-up characteristics.

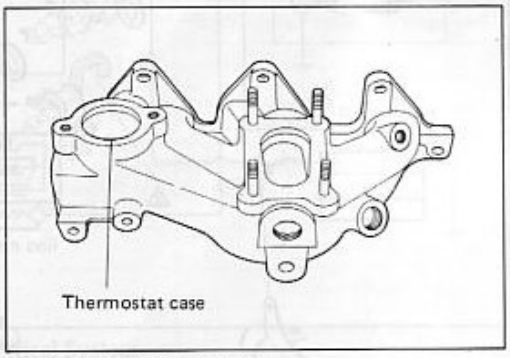


Fig. 59 Intake Manifold

Exhaust Manifold

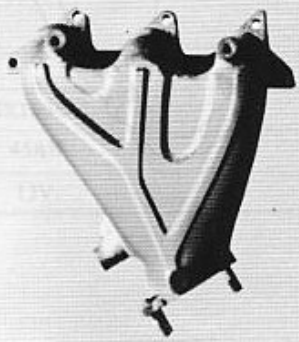
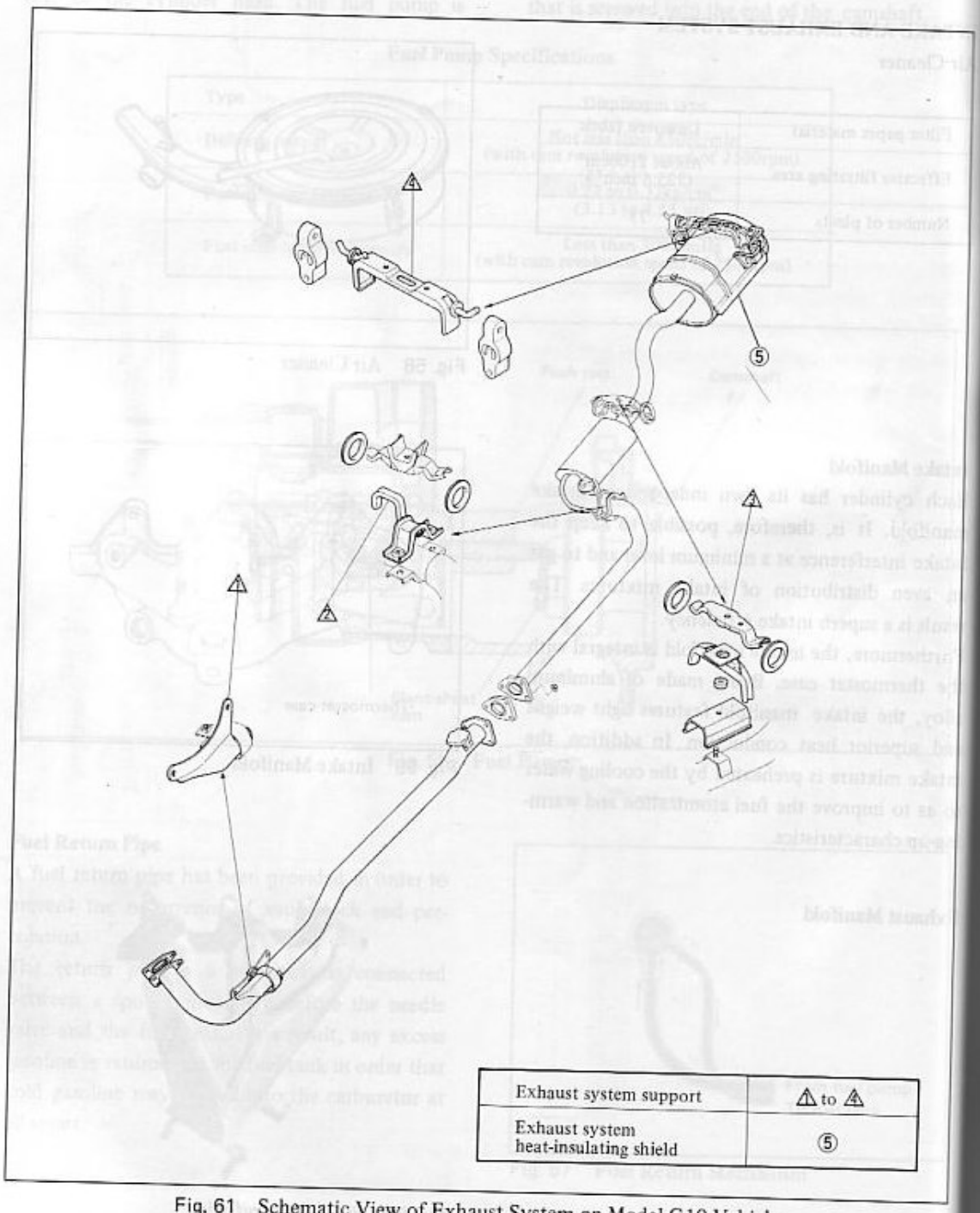


Fig. 60 Exhaust Manifold

Exhaust Pipe and Muffler

The exhaust system consists of a front exhaust pipe and an exhaust tail pipe attached with dual mufflers which feature quiet operation and superior efficiency.

As for the suspension method of the exhaust pipe, the sub-muffler is suspended at its rear end from the body, using "O" rings. Moreover, insulators have been provided at both ends of the main muffler so that vibration and sound levles may be reduced.



Exhaust system support	⚠ to ⚠
Exhaust system heat-insulating shield	⑤

Fig. 61 Schematic View of Exhaust System on Model G10 Vehicle

ENGINE ELECTRICAL SYSTEM

The ignition coil with an external resistor has been used in order that strong and positive ignition sparks may be obtained at all times. In addition, a starting system in which the external resistor can be by-passed only when the starter is cranking so as to ensure good ignition performance even during the cranking period has been employed.

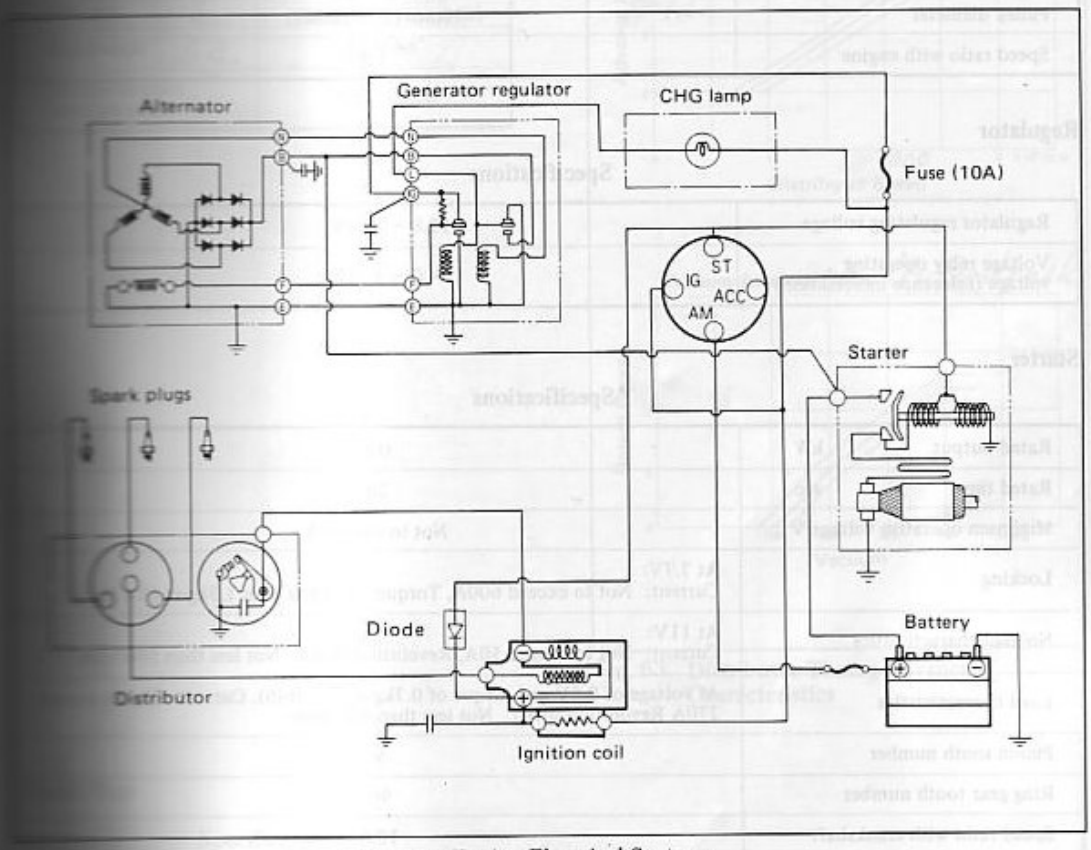


Fig. 62 Engine Electrical System

Battery

A newly-developed, small-sized, light battery has been used.

Specifications

Type	NX100-S6L
Capacity	45AH
Voltage	12V

Alternator

Specifications

Voltage	12V
Maximum output	45A
No-load revolution speed	860 rpm, 14V when hot
Pulley diameter	70mm (2.76 inches)
Speed ratio with engine	1.9

Regulator

Specifications

Regulator regulating voltage	13.8 ~ 14.8V
Voltage relay operating voltage (reference information)	4.0 ~ 5.8V

Starter

Specifications

Rated output kW	0.8
Rated time sec	30
Minimum operative voltage V	Not to exceed 8
Locking	At 7.7V: Current: Not to exceed 600A, Torque: Not less than 1.3kg-m (9.4 ft-lb)
No-load characteristics	At 11V: Current: Not to exceed 50A, Revolution speed: Not less than 5000rpm
Load characteristics	At voltage of 9.5V and torque of 0.7kg-m (5.1 ft-lb), Current: Not to exceed 270A Revolution speed: Not less than 1200rpm
Pinion tooth number	9
Ring gear tooth number	96
Speed ratio with crankshaft	10.6

Ignition Coil

Primary resistance	0.98 ± 0.1Ω	External resistance	1.92 ± 0.2Ω
Secondary resistance	17.5 ± 2.6KΩ	Three-needle spark gap	Not less than 10mm (0.39 inch)

Specifications

[illegible]	Governor advance and vacuum advance
[illegible]	0.27μF
[illegible]	0.4 ~ 0.5mm (0.016 ~ 0.020 inch)
[illegible]	58 ~ 66°
[illegible]	400 ~ 550g

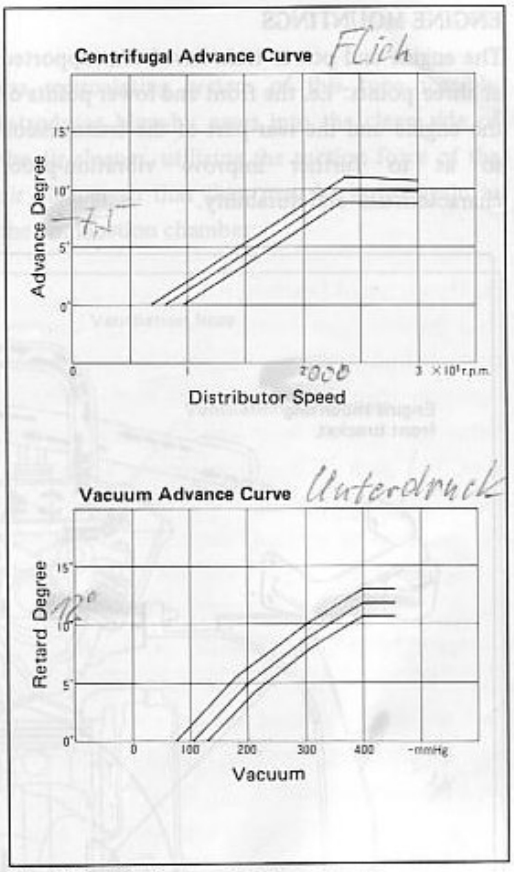


Fig. 63 Distributor Timing Advance Characteristics

Specifications

[illegible]	W16EXR-U
[illegible]	BPR5EA-L
[illegible]	0.7 ~ 0.8mm (0.028 ~ 0.031 inch)

ENGINE MOUNTINGS

The engine and power train have been supported at three points: i.e. the front and lower points of the engine and the rear part of the transmission so as to further improve vibration-proof characteristics and durability.

Under this design, almost all weight of the engine is supported by the engine lower mounting. As for the front and rear mountings, they are designed to support mainly the reaction force of the engine driving torque.

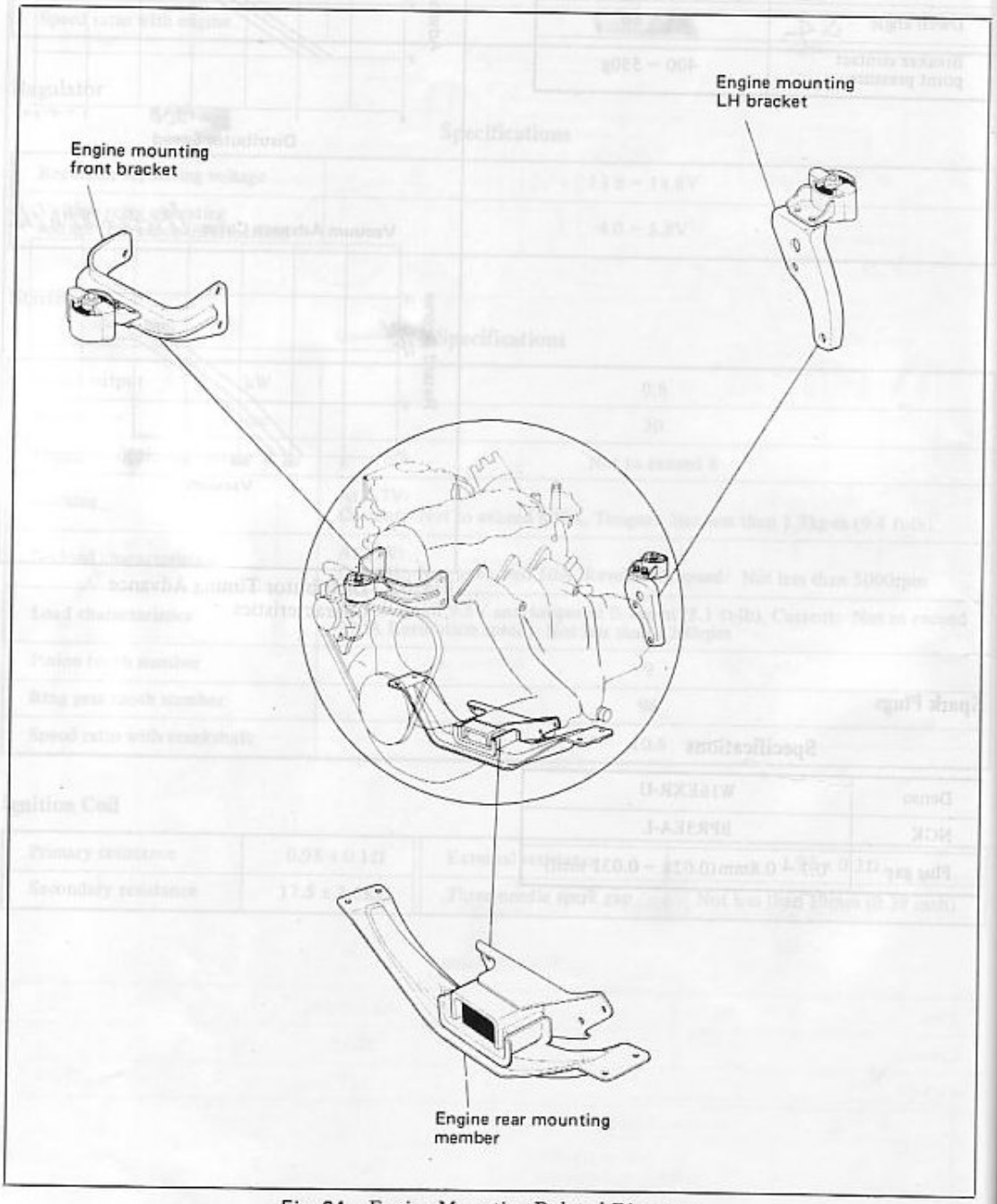


Fig. 64 Engine Mounting Related Diagram

EXHAUST EMISSION CONTROL SYSTEM

Blow-By Gas Recirculating System

To combat with air-pollution problems, the engine is equipped with a sealed type blow-by gas recirculating system in order to prevent blow-by gases generated inside the crankcase from being released into the atmosphere. The blow-by gas recirculating system of this type forcibly introduces blow-by gases into the clean side of the air cleaner, utilizing the suction force of the air cleaner so that they may be burnt again in the combustion chamber.

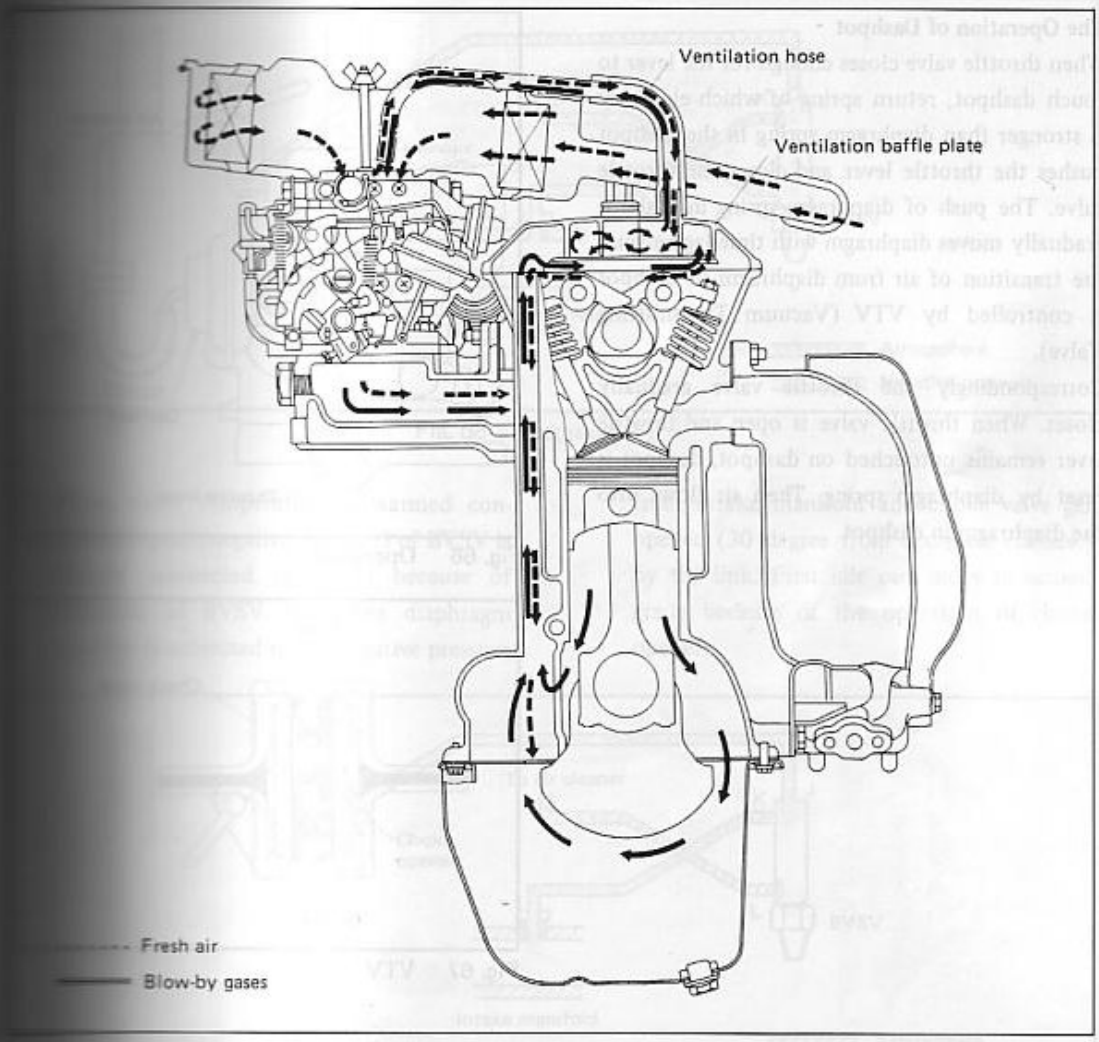


Fig. 65 Blow-By Gas Recirculating System

Blow-by gases generated inside the crankcase are led through the ventilation holes provided in the cylinder block to the ventilation baffle plate (oil separator) where the oil contained in the blow-by gases will be separated.

And the blow-by gases are introduced into the air cleaner in order that they may be burnt again in the combustion chamber.

As for the oil separated from the blow-by gases at the ventilation baffle plate provided inside the cylinder head cover, it will be returned through the cylinder head to the crankcase.

Dashpot

Description of Dashpot

If throttle valve rapidly closes at deceleration, negative pressure in intake manifold is extremely intensified, which causes the emission of much HC.

Dashpot gradually returns the throttle valve to idling position when decelerated from certain opening position of throttle valve and prevents sudden change of negative pressure in intake manifold, which causes decrease of HC emission.

The Operation of Dashpot

When throttle valve closes enough for the lever to touch dashpot, return spring of which elasticity is stronger than diaphragm spring in the dashpot pushes the throttle lever and closes the throttle valve. The push of diaphragm spring in dashpot gradually moves diaphragm with time lag because the transition of air from diaphragm of dashpot is controlled by VTV (Vacuum Transmitting Valve).

Correspondingly the throttle valve gradually closes. When throttle valve is open and throttle lever remains untouched on dashpot, dashpot is reset by diaphragm spring. Then air flows into the diaphragm in dashpot.

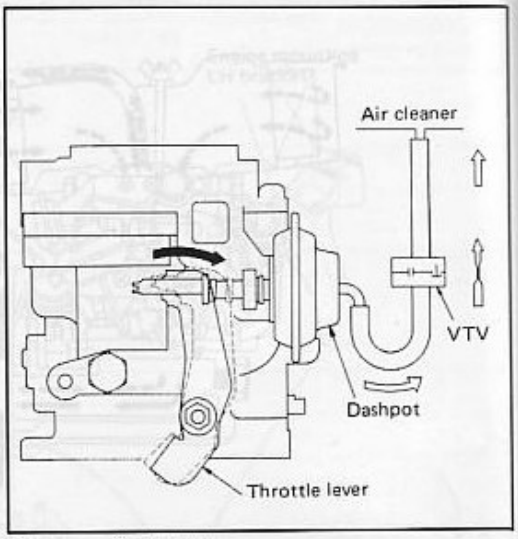


Fig. 66 Operation

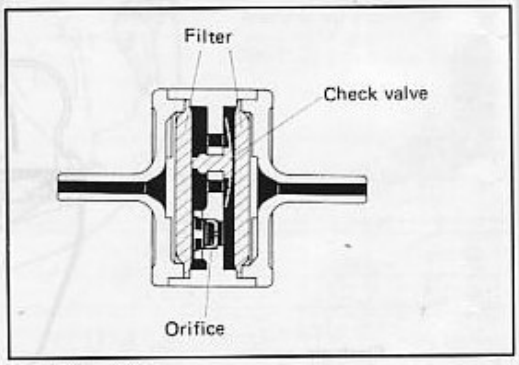


Fig. 67 VTV

Choke Opener

Description of Choke Opener

This device is intended to reduce the emission of HC and CO even if choke knob remains pulled.

The Operation of Choke Opener

(1) When water temperature is cooled condition, L-port (atmospheric pressure) and J-port are directly connected because BVSV (Bimetal Vacuum Switching Valve) is not operating. Therefore diaphragm chamber in choke opener is exposed to atomospheric and choke valve remains closed.

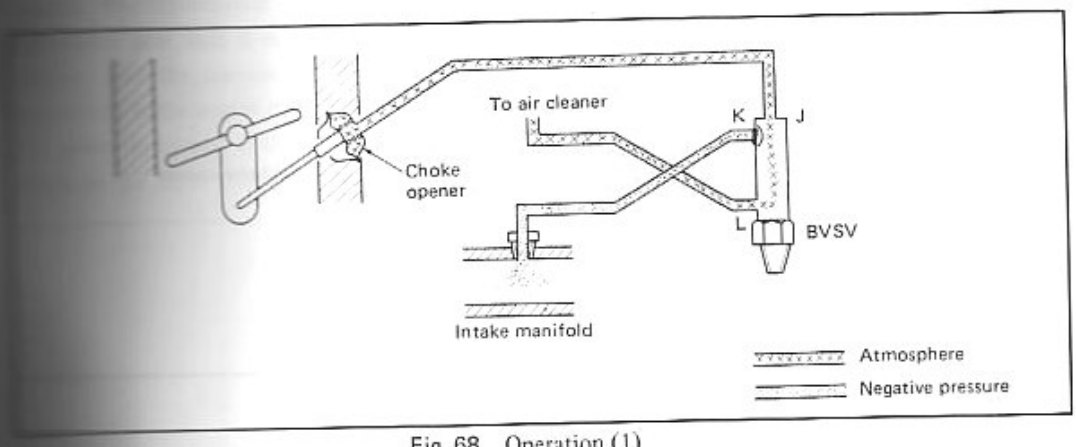


Fig. 68 Operation (1)

(2) When water temperature is warmed condition, K-port (negative pressure) of BVSV is directly connected to J-port because of operation of BVSV. Therefore diaphragm chamber is subjected to the negative pressure from intake manifold and choke valve get opened (30 degree from complete closure.) by the link. First idle cam move to second grade because of the operation of choke opener.

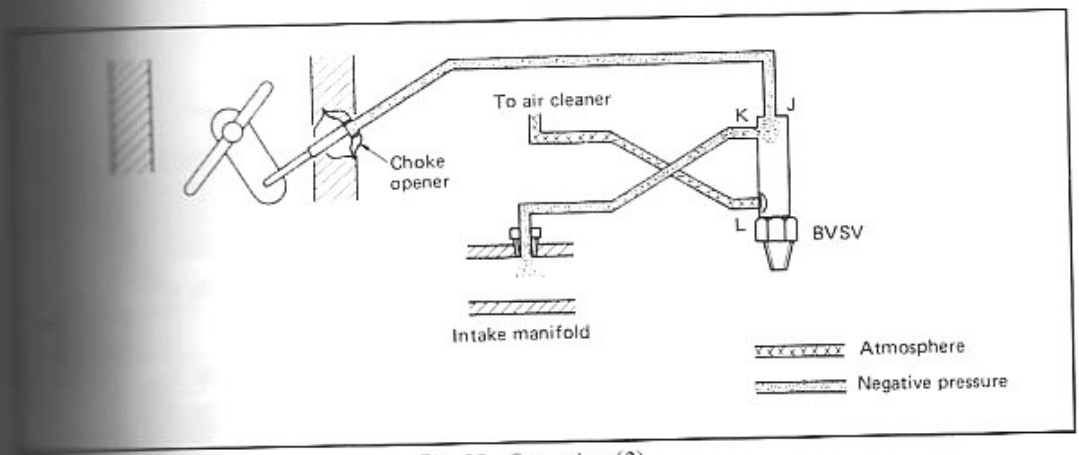


Fig. 69 Operation (2)

Description of BVSV

BVSV is located in inlet side for negative pressure of choke opener and controls this system by transmitting vacuum in intake manifold and exposing positive pressure in response to cooling water temperature.

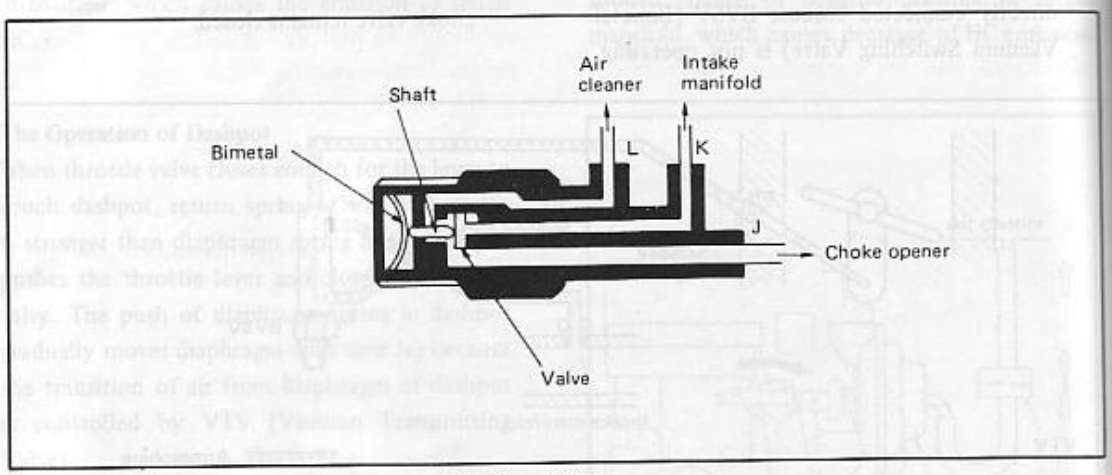


Fig. 70 BVSV

POWER TRAIN

DESCRIPTION

The Model G10 vehicle has adopted the "F-F" design, i.e. front engine and front drive design.

The transmission comes in two different kinds: the 4-speed transmission and 5-speed transmission. The transmission case contains also the differential gear that is integral with the transmission. And the transmission case is installed transversely in the engine compartment.

The power developed at the engine flows via the clutch to the input shaft, various gears and output shaft of the transmission.

At the end of the output shaft is provided the final reduction gear which meshes with the differential ring gear, thereby making it possible to reduce the revolution speed and at the same time to increase the torque. Then, the power flows to the drive shafts equipped with bar-field type constant velocity joints. As a result, the drive shafts drive the front wheels.

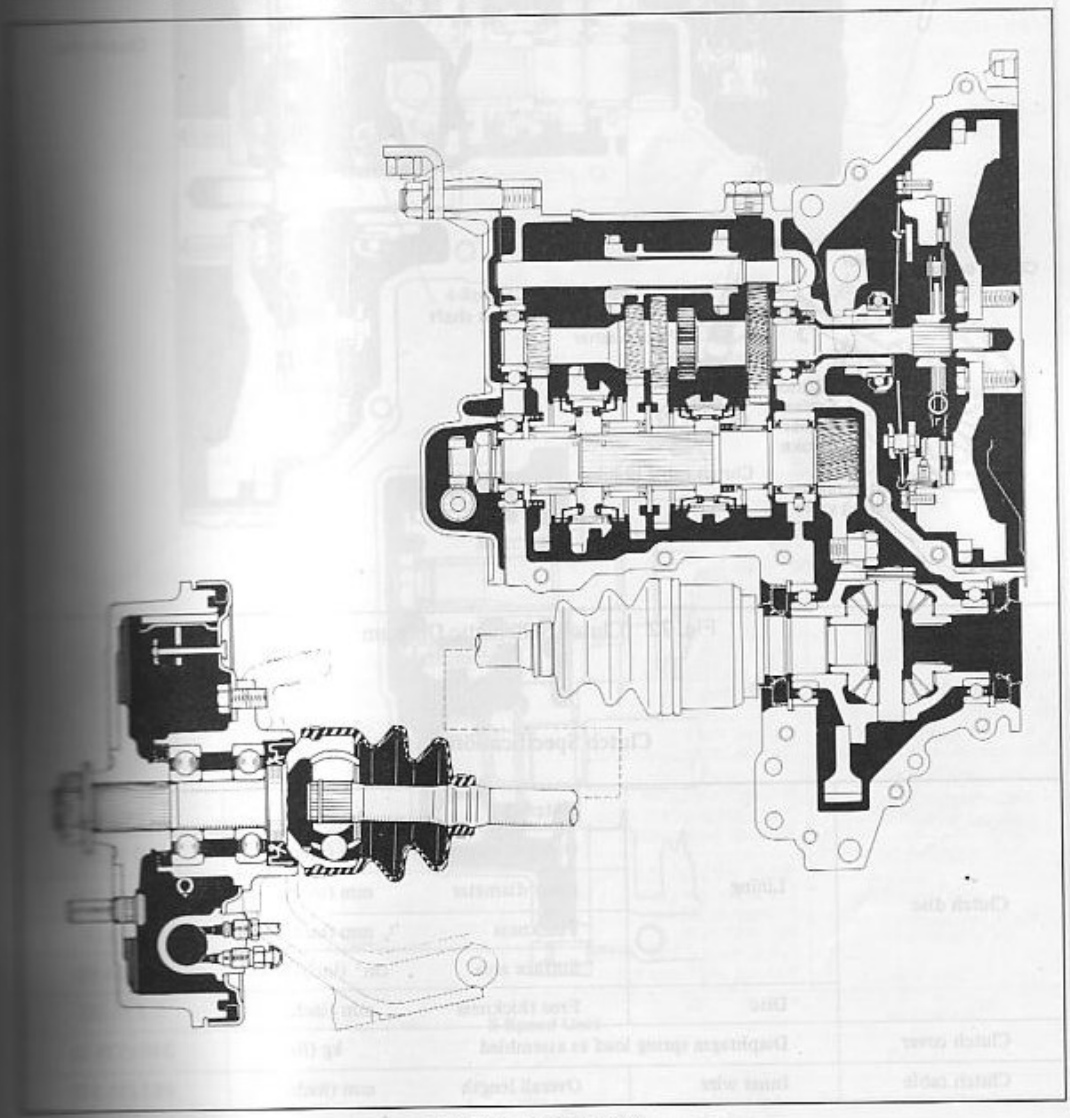


Fig. 71 Power Train

CLUTCH

The clutch is of the dry, single-disc, diaphragm spring type. Moreover, the clutch is operated by a cable whose method feaures positive operations and good serviceability.

The free travel of the clutch can be adjusted by changing the position of the "E" ring which is inserted into the clutch outer cable of the clutch release lever section.

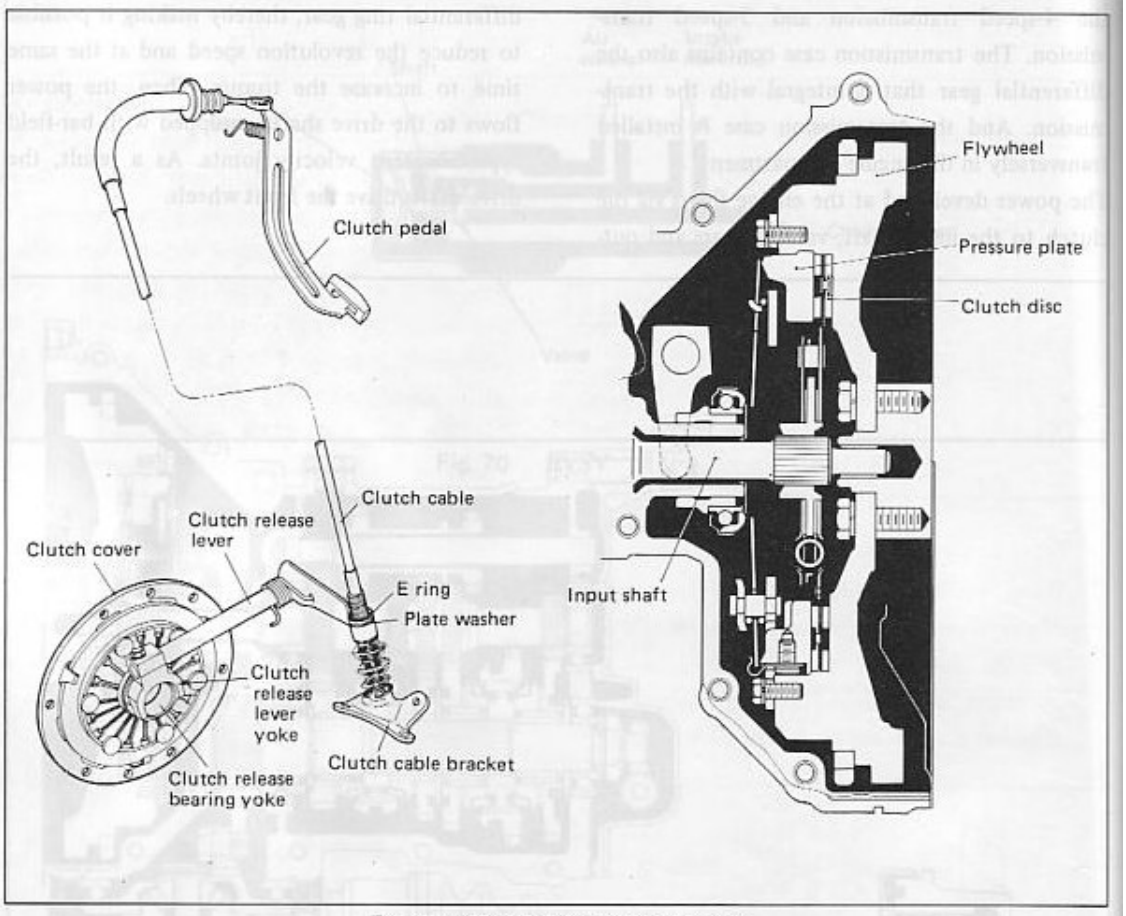
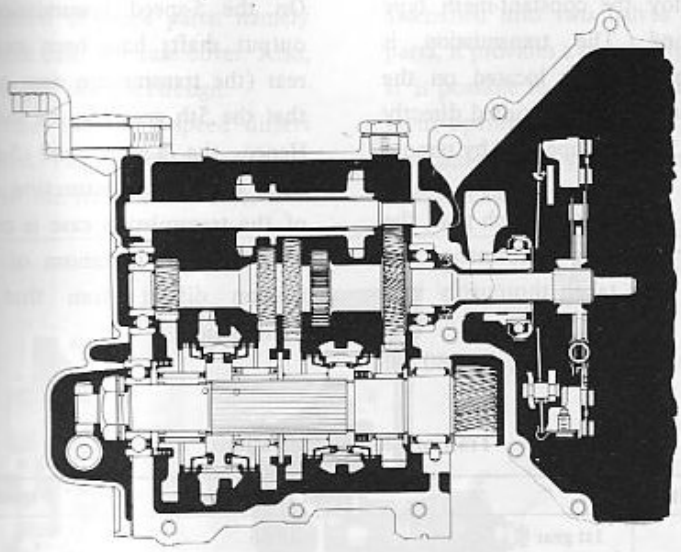


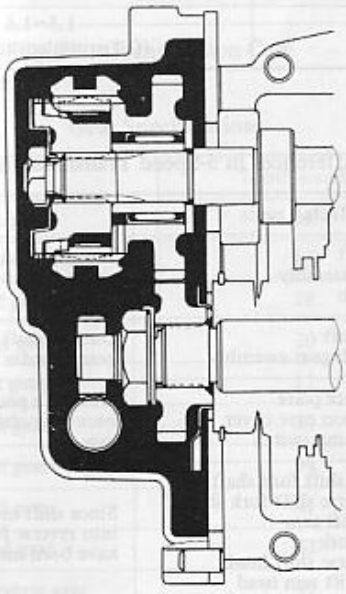
Fig. 72 Clutch Schematic Diagram

Clutch Specifications

Clutch disc	Lining	Material		Molding
		Outer diameter	mm (inch)	160 (6.30)
		Inner diameter	mm (inch)	110 (4.33)
		Thickness	mm (inch)	3 (0.12)
		Surface area	cm^2 ($inch^2$)	106 (16.43)
	Disc	Free thickness	mm (inch)	7.2 (0.28)
Clutch cover	Diaphragm spring load as assembled		kg (lb)	240 (529.2)
Clutch cable	Inner wire	Overall length	mm (inch)	892 (35.12)



4-Speed Transmission



5-Speed Unit

Fig. 73 Sectional View of Transmission

Description

Two kinds of transmissions are available: the 4-speed transmission and 5-speed tranlsmission. All forward gears employ the constant-mesh type synchromesh method. The transmission is controlled by a control lever located on the floor. The control lever is not mounted directly on the transmission, but it is operated by remote control method.

When designing the gear ratio of each gear, the engine characteristics, running performance and fuel economy have been taken thoroughly into consideration.

With regard to the lubrication oil, SAE80 oil which has small agitating and sliding resistances has been used.

On the 5-speed transmission, the input and output shafts have been extended toward the rear (the transmission case cover side) in order that the 5th gear may be mounted additionally. Hence, the 4-speed and 5-speed transmission share the same construction as far as the inside of the transmission case is concerned. Neverthless, the shift mecanism of the 4-speed transmission differs from that of the 5-speed transmission.

Transmission Specifications

Item		4-speed transmission	5-speed transmission
Gear ratio	1st gear	3.666	←
	2nd gear	2.150	←
	3rd gear	1.464	←
	4th gear	0.971	←
	5th gear	—	0.795
	Reverse gear	3.529	←
Lubrication oil		1.5~1.6 liters gear oil SAE 80 (Oil equivalent to API Classification GL 3 & 4)	

Comparison Chart Showing Main Differences in 5-Speed Transmission (Compared with 4-speed Transmission)

Affected components	Affected parts	Contents of differences
Input shaft related components	Input shaft 5th gear assembly Clutch hub	Input shaft has been extended to accommodate gear and hub in order that 5th gear may be installed.
Output shaft related components	Output shaft Output 5th gear assembly	Output shaft has been extended to accommodate gear in order that 5th gear may be installed.
Transmission case related components	Intermidiate plate Transmission case cover Back-up lamp switch	Since 5th gear is added at case cover side, some necessary changes have been made on transmission case.
Shift mechanism	3rd & 4th shift fork shaft 5th & reverse shift fork shaft Reverse shift arm 5th shift fork 5th & reverse shift head Reverse shift arm head	Since shift mechanism for 5th gear is incorporated into reverse fork shaft, some necessary changes have been made on shift mechanism.

Transmission Case

This aluminum die cast transmission case also serves as the clutch housing and differential carrier. It is composed of three parts: namely the upper case, lower case and case cover. Also, it features a light weight, compact design.

The transmission case for the 4-speed differs from that for 5-speed. The case cover for the 5-speed is attached to the transmission case, with an intermediate plate interposed.

Inasmuch as the transmission case can be disassembled into two halves of upper and lower parts, it provides a remakably-good serviceability. It is possible to carry out inspection and adjustment operations effortlessly, even with the shift mechanism and gears assembled in the transmission case.

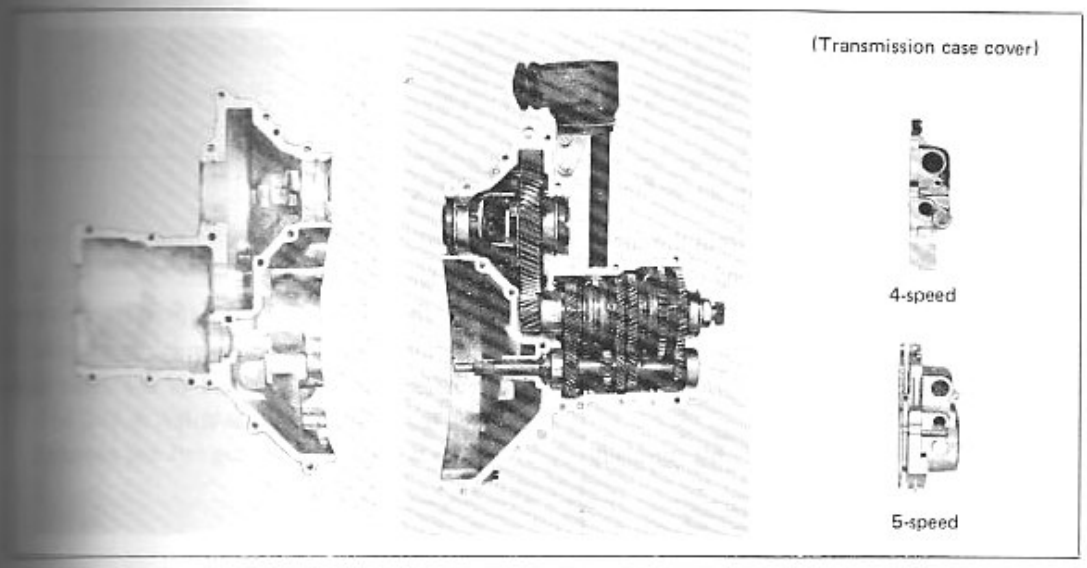


Fig. 74 Transmission Case

Gear Specifications

Item		Tooth number	Gear type
Input shaft	4th gear	35	Helical gear
	Reverse gear	15	Spur gear
	3rd gear	28	Helical gear
	2nd gear	20	Helical gear
	1st gear	12	Helical gear
	5th gear	39	Helical gear
Output shaft	4th gear	34	Helical gear
	3rd gear	41	Helical gear
	2nd gear	43	Helical gear
	Reverse gear	45	Spur gear
	1st gear	44	Helical gear
	5th gear	31	Helical gear

Input Shaft

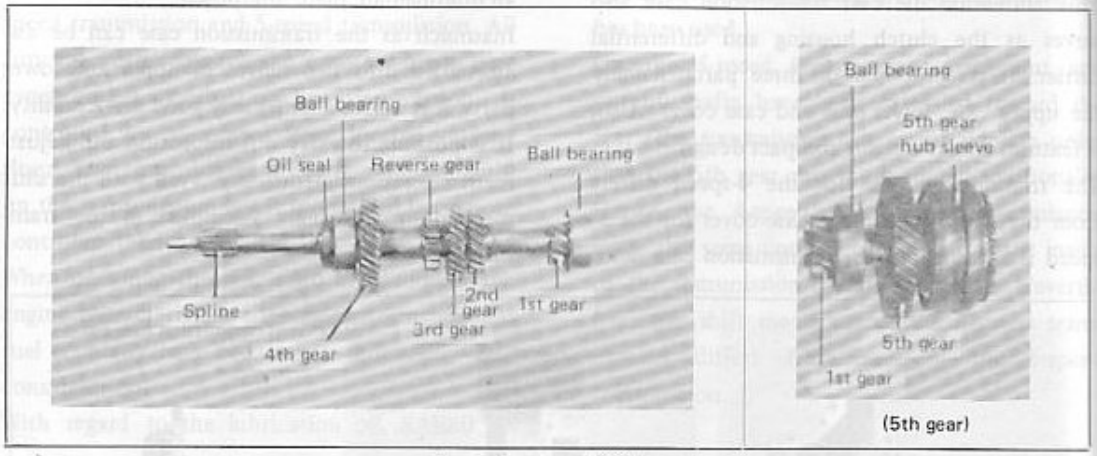


Fig. 75 Input Shaft

The input shaft transmits power from the engine into the output shaft. The front end of the input shaft is fitted into a hole provided at the end of the engine crankshaft with a bush interposed. Moreover, the clutch disc is mounted on the splined section of the input shaft.

The input shaft is supported by specially-designed ball bearings which have a reduced rolling surface pressure.

As for the 5th gear for the 5-speed transmission, it together with the synchromesh mechanism is assembled onto the rear end of the input shaft inside the transmission case cover.

Output Shaft

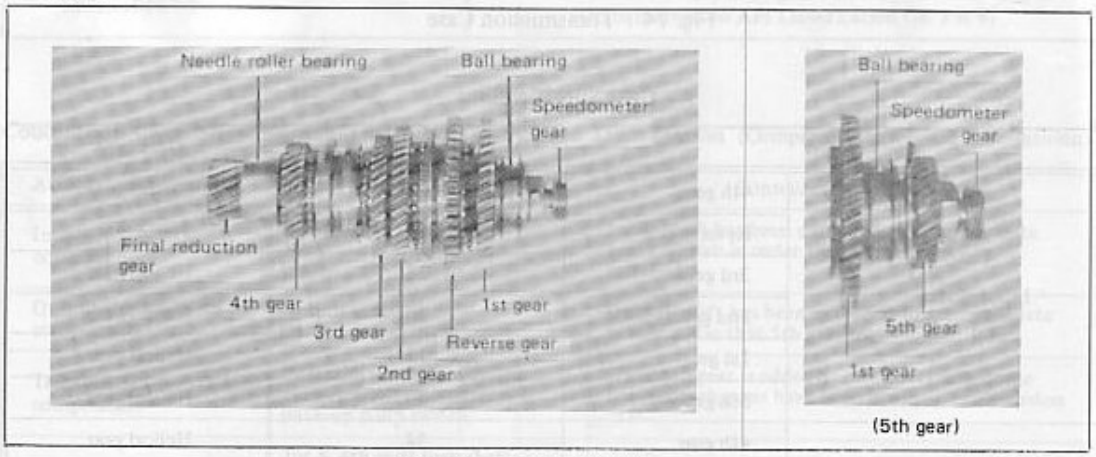


Fig. 76 Output Shaft

The output shaft is constructed integrally with the final reduction gear.

With regard to the bearings of the output shaft, the front end is supported by a needle roller bearing equipped with a crowning, whereas the rear end is supported by a ball bearing equipped with a snap ring.

Furthermore, the 5th gear for the 5-speed transmission is assembled onto the rear end of the output shaft inside the transmission case cover.

In addition, each of the 1st gear and 4th gear is equipped with a floating noise-preventive device.

First & Fourth Gears and Related Parts

Compression springs are provided between the 1st gear and the rear bearing as well as between the 4th gear and the clutch hub in such a way that each compression spring will lightly push the side of the corresponding gear via a washer. These compression springs are designed to prevent the gears from emanating floating sounds.

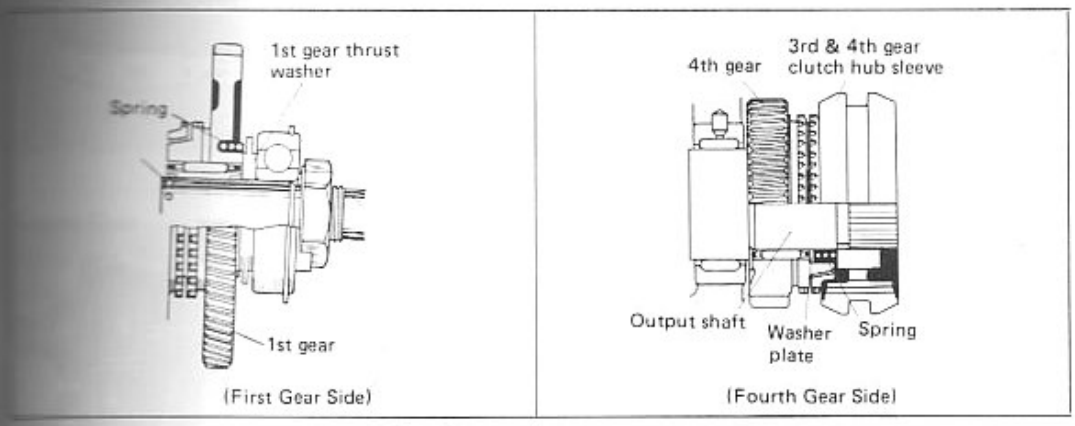


Fig. 77 First & Fourth Gears and Related Parts

Second & Third Gears and Related Parts

The 2nd & 3rd gear thrust washer is provided between the 2nd gear and the 3rd gear.

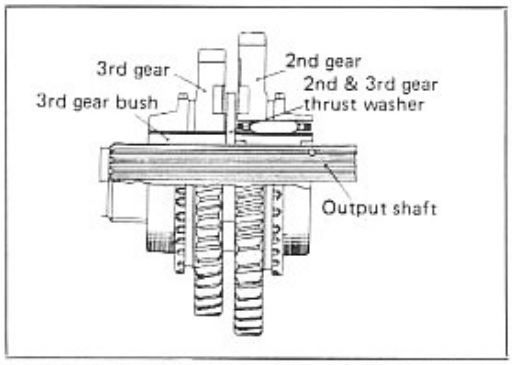


Fig. 78 Second & Third Gears and Related Parts

Reverse Idler Gear

The reverse idler gear is attached to the reverse idler gear shaft with a bimetal formed bush interposed in place.

This gear is provided with the shift arm fitting groove in order that the gear may be moved to mesh with the reverse gears of the input and output shafts by the manipulation of the fork.

Moreover, the gear for the 5-speed is pushed always toward the free side by means of a compression spring. As a result, the probability of wrong operation during the gear shift manipulation to the 5th gear has been eliminated.

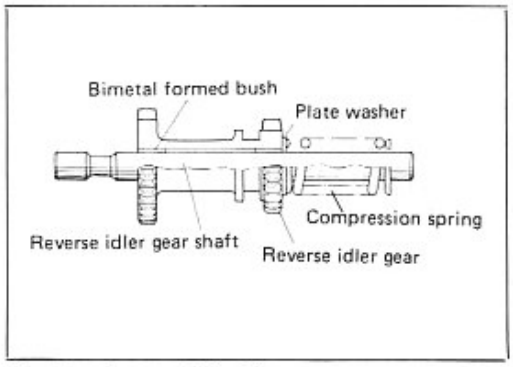


Fig. 79 Reverse Idler Gear

Power Flow in Transmission

Neutral

Every gear clustered on the output shaft rotates idly. Consequently, no power is transmitted to the differential.

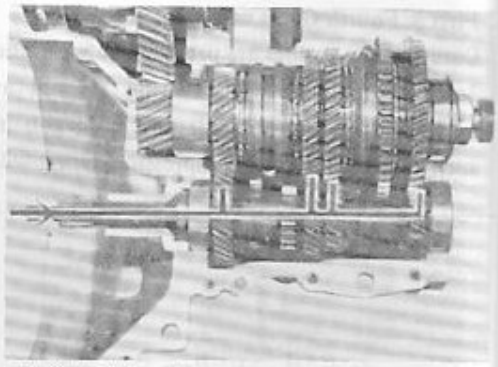


Fig. 80 Neutral

First Gear

The power flows as follows: Input shaft → low gear → output shaft → differential.

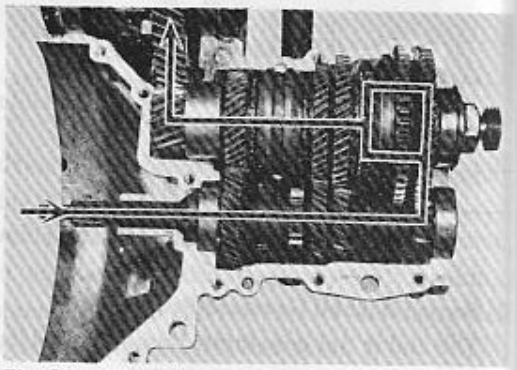


Fig. 81 First Gear

Second Gear

The power flows as follows: Input shaft → 2nd gear → output shaft → differential.

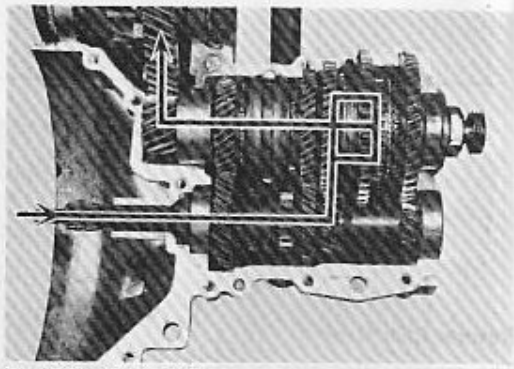


Fig. 82 Second Gear

Third Gear

The power flows as follows: Input shaft → 3rd gear → output shaft → differential.

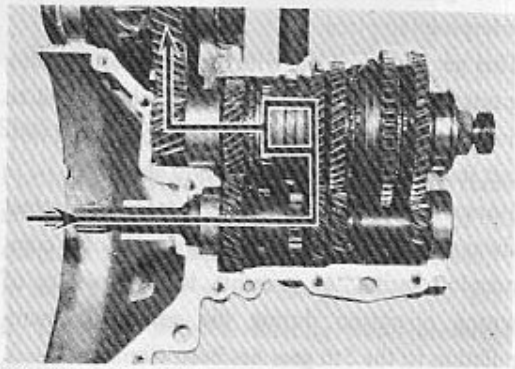


Fig. 83 Third Gear

Construction

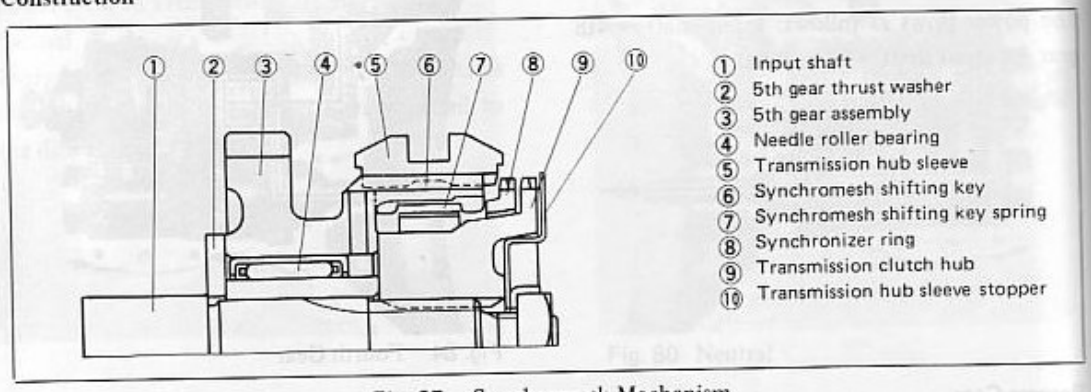


Fig. 87 Synchromesh Mechanism

The synchromesh mechanism consists of the 5th gear assembly ③, clutch hub sleeve ⑤, synchronizer ring ⑧, clutch hub ⑨ and so forth. Fig. 87 indicates how these parts are built to each other.

The internal spline provided inside the clutch hub is fitted with the external spline of the input shaft. In this way, the power transmission takes place.

Speedometer Gear

The speedometer drive gear is press-fitted on the rear end of the output shaft in the transmission case cover.

On the other hand, the speedometer shaft sleeve sub-assembly is inserted from the upper section of the transmission case cover deep into the cover so that the drive gear meshes with the speedometer driven gear located at the tip-end of the sleeve sub-assembly.

In addition, two "O" rings are installed on the shaft sleeve sub-assembly so as to prevent floating noise emanating from the gears as well as to enhance water-proof characteristics.

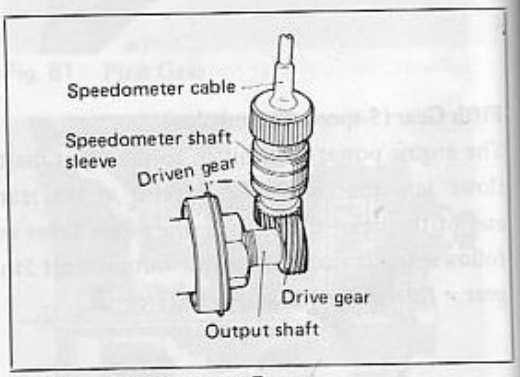


Fig. 88 Speedometer Gears

Gear Shift Mechanism

1. Four-Speed Transmission

The shift inner lever ② which is fitted in the slot of each shift fork is mounted on the shift & select shaft ① with a setting bolt. And the end of the shift & select shaft contacts the reverse restricting pin assembly.

The reverse restricting pin sets the neutral position and limits the axial movement of the shift & select shaft. Moreover, it also serves as a drain plug for the transmission case.

As for the other end of the transmission case, an oil seal is provided to prevent oil leakage from the case.

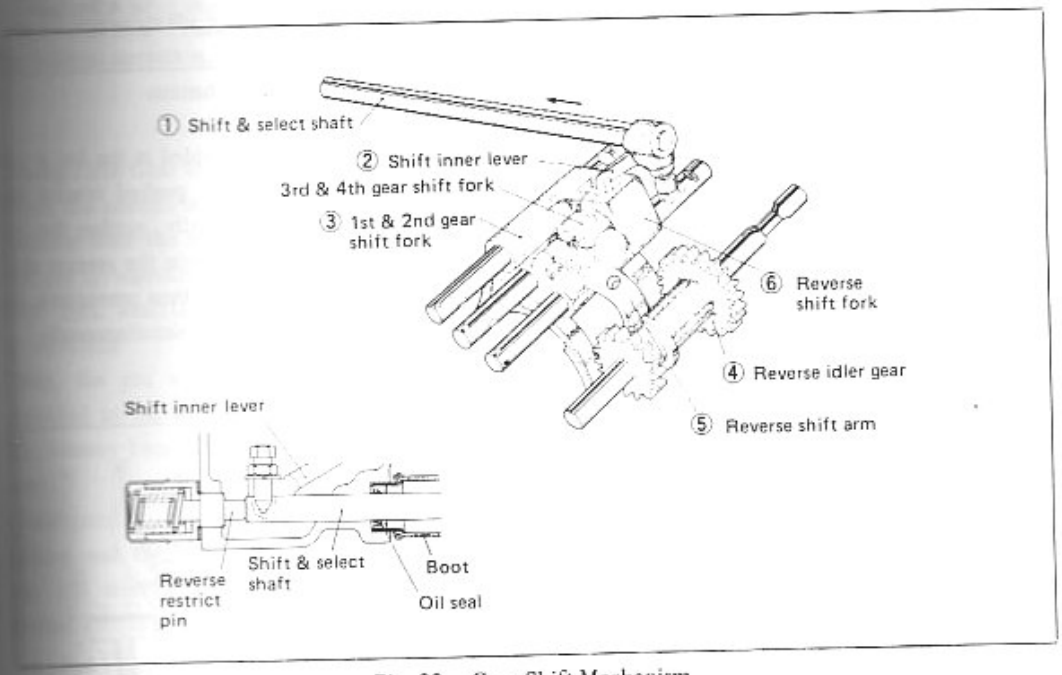


Fig. 89 Gear Shift Mechanism

Operation

When the control lever is selected toward the first and second side, the shift & select shaft ① moves in the direction of the arrow. Thus, the shift inner lever ② is led into the slot provided in the 1st & 2nd gear shift fork ③.

Next, when the control lever is shifted further into the first gear position, the shift & select shaft is turned, causing the shift inner lever to move toward the first gear side. As a result, the gears are engaged to each other.

As for the reverse gear shifting, one end of the reverse shift arm ⑤ is fitted in the slot in the reverse idler gear ④. The other end of the reverse shift arm is fitted in the groove provided in the reverse shift fork ⑥.

When the control lever is shifted into the reverse gear position, first the reverse shift fork moves in the axial direction, causing the reverse shift arm to be turned. As a result, the reverse idler gear will be engaged.

Interlocking Mechanism

The interlocking mechanism prevents two gears from being engaged simultaneously. This mechanism is composed of three gear shift lock rollers, large and small, as shown in Fig. 90. A small roller is located in the hole on the 3rd & 4th gear shift fork shaft. Large rollers are located in holes provided in the transmission case at the following places: one between the reverse shift fork shaft and the 3rd & 4th gear shift fork shaft and the other between the 1st & 2nd gear shift fork shaft and the 3rd & 4th gear shift fork shaft. Each roller fits with the cut-out section provided in the corresponding shaft.

When the 1st & 2nd gear shift fork shaft is moved in the axial direction, as shown in Fig. 90, the large roller engaged with the cut-out section of the shaft is pushed out. This causes the small roller fitted in the hole provided in the 3rd & 4th gear shift fork shaft to be pushed toward the reverse gear side. Consequently, neither the 3rd & 4th gear shift fork shaft nor the reverse shift fork shaft can move axially, thus preventing the two gears from being engaged simultaneously.

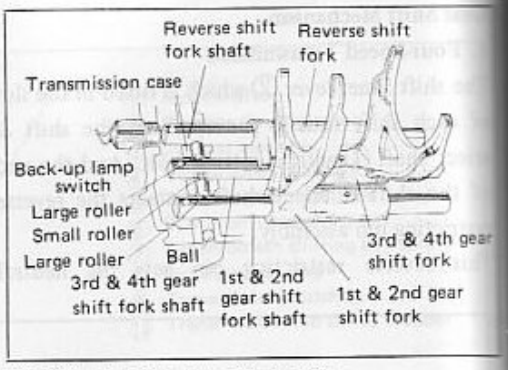


Fig. 90 Interlocking Mechanism

Shift Forks

Each shift fork is fixed securely on the corresponding shift fork shaft by means of a slotted spring pin.

Furthermore, at the side of the shaft there are recessed sections, against which a ball is retained. And this ball is pushed up by a compression spring that is fitted in the bore of the transmission case. In this way, the detent feeling during the shifting process can be obtained. Also, the allowable movement of the shaft in the axial direction can be determined.

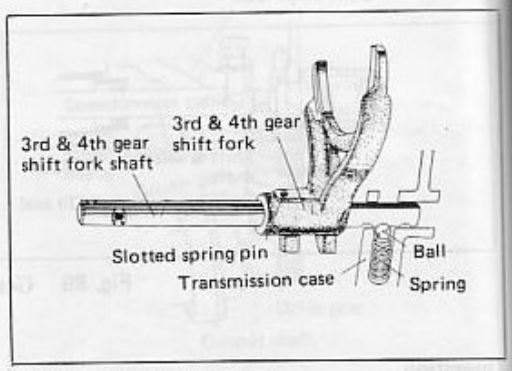


Fig. 91 Shift Fork Shaft

2. Five-Speed Transmission

Basically, the 5-speed transmission has the same construction as with the 4-speed transmission.

However, the 5th gear fork is mounted on the reverse shift fork shaft. Therefore, the reverse shift mechanism for the 5-speed transmission differs from that for the 4-speed tansmission, as indicated in Fig. 92.

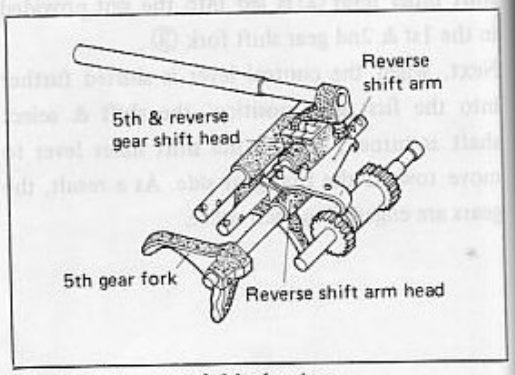


Fig. 92 Gear Shift Mechanism

During Neutral Operation

On the 5th & reverse gear shift fork shaft ① are mounted the 5th fork ②, reverse shift arm head ③ and 5th & reverse gear shift head ④. Furthermore, the 3rd & 4th gear shift fork shaft ⑤ is provided with a slot in which the reverse shift arm pin ⑥ can slide.

Fig. 93 indicates the gear shift mechanism during the neutral operation.

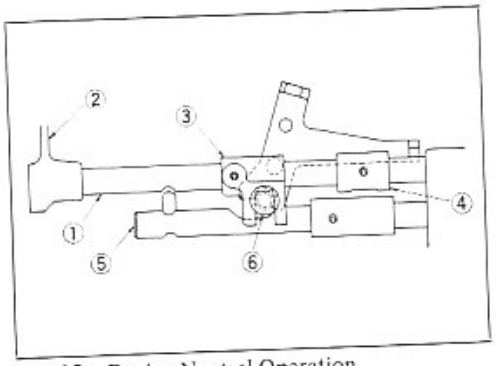


Fig. 93 During Neutral Operation

During Fifth Gear Shifting Period

When the control lever is shifted to the 5th gear position from the setting as described in Fig. 93, the pin ⑥ together with the 5th & reverse gear shift fork shaft ① moves in the arrow-headed Ⓐ direction.

Then, the pin will be dropped into the slot provided in the 3rd & 4th gear shift fork shaft ⑤, thereby becoming free from the reverse shift arm ⑦.

Consequently, the arm maintains its present setting and the 5th gear fork ② moves toward the left side. As a result, the transmission is shifted into the 5th gear position.

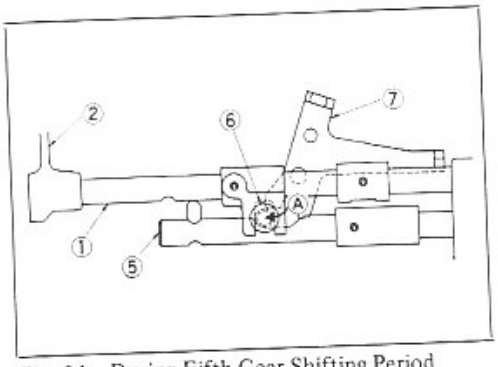


Fig. 94 During Fifth Gear Shifting Period

During Reverse Gear Shifting Period

When the control lever is shifted to the reverse gear position from the setting as described in Fig. 94, the pin ⑥ together with the 5th & reverse gear shift fork shaft ① moves in the arrow-headed direction Ⓑ.

During this movement, the pin ⑥ comes out from the slot provided in the 3rd & 4th gear shift fork shaft ⑤. Then, the pin ⑥ will fit into the slot section of the arm ⑦. The pin continues to travel in the arrow-headed direction, until it causes the arm to be turned counter-clockwise. As a result, the transmission is shifted into the reverse gear position.

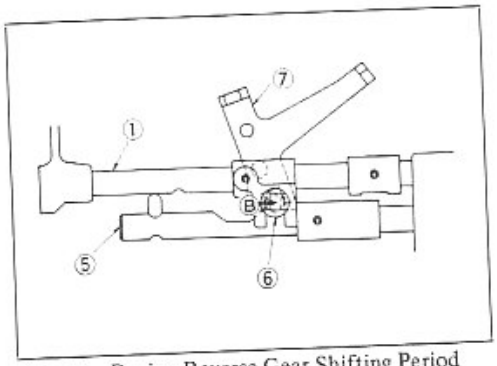


Fig. 95 During Reverse Gear Shifting Period

CONTROL MECHANISM

Transmission

is controlled by a shift lever

at the floor.

the transmission of the Model G10

is located inside the engine compart-

the remote control method in which

shift lever at the floor is connected to the transmission with levers and shafts, as indicated in Fig. 97, has been employed.

Furthermore, the floor support No.1 and the shift & select shaft support are mounted on the transmission case.

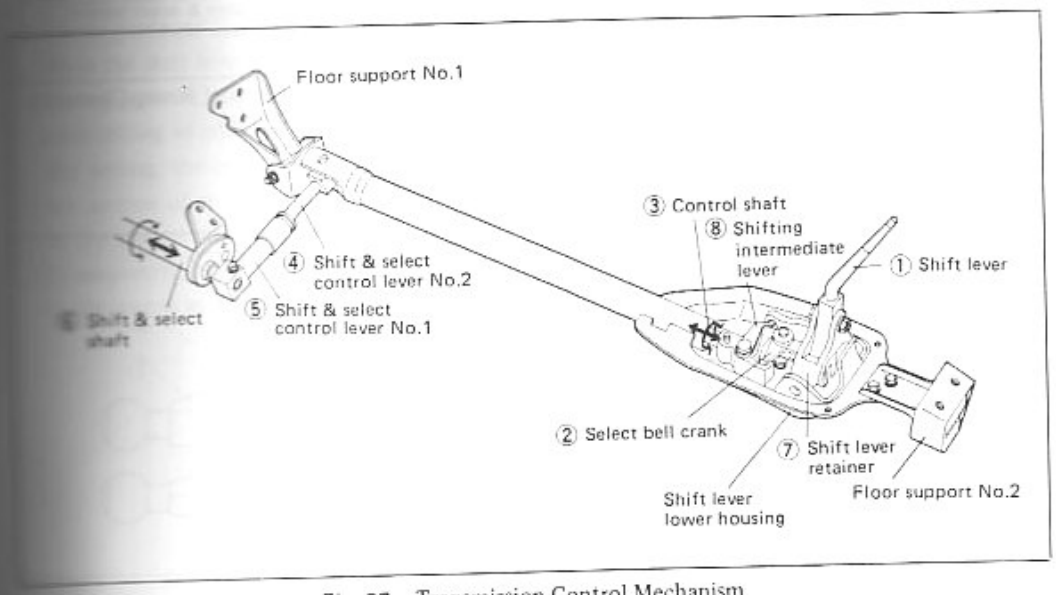


Fig. 97 Transmission Control Mechanism

Operation

When the shift lever ① is operated toward the selecting direction, the control shaft ③ is pulled (pushed) in the arrow-headed direction by the select bell crank ② that is fitted in the recessed section located at the bottom of the shift lever. Then, the shift & select shaft ⑥ is pulled (pushed) in the arrow-headed direction through the shift & select control levers No.2 ④ and No.1 ⑤ that are fixed at the end of the shaft. As a result, the selecting operation takes place. Next, when the shift lever is operated toward the shifting direction, the control shaft is turned in the arrow-headed direction by the shifting intermediate lever ⑧ that is attached to the shift lever retainer ⑦. At the same time, the shift & select shaft is turned in the arrow-headed direction through the control levers No.2 and No.1. As a result, the shifting operation takes place.

In this way, the selecting and shifting operations for each gear position can be carried out properly.

2. Five-Speed Transmission

The shift pattern for the 5-speed transmission has been arranged in such a way that the 5th gear is located opposite the reverse gear on the same selecting line. Hence, a wrong-operation-proof mechanism has been provided in the shift & select shaft support, thereby making it impossible for the driver to move the shift lever from the 5th gear position directly to the reverse gear position.

The shift to the reverse gear position must be made after returning the shift lever first to the neutral position.

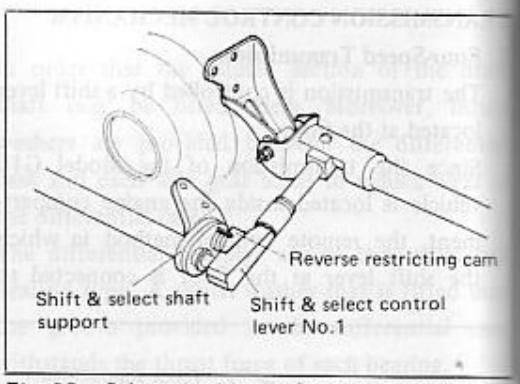


Fig. 98 Schematic View of Wrong-Operation-Proof Mechanism

Operation of Wrong-Operation-Proof Mechanism

(1) Neutral

When the transmission is in neutral, the shift & select control lever ① is located apart from the reverse restricting cam ②. Therefore, the wrong-operation-proof mechanism is inoperative.

Hence, the selecting and shifting operations for the 1st, 2nd, 3rd gears or 4th gear can be performed independent of the wrong-operation-proof mechanism.

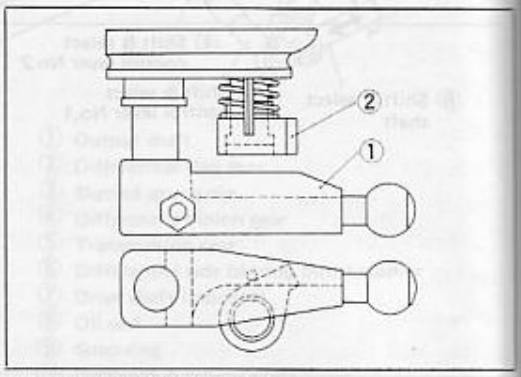


Fig. 99 Neutral Position

(2) Fifth Gear

When the transmission is selected toward the 5th gear position from the setting as indicated in Fig. 99, the lever ① pushes the cam ② in the arrow-headed direction. Consequently, the selecting to the 5th gear position takes place. (See Fig. 100.)

Next, when the transmission is shifted toward the 5th gear position, the cam is pushed out by the tension of the compression spring ③. As a result, the cam will fit into the cut-out section provided in the lever.

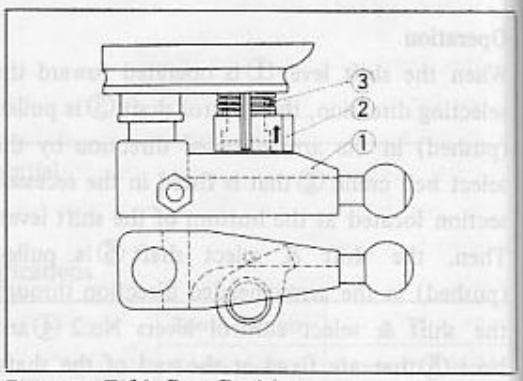


Fig. 100 Fifth Gear Position

(3) Reverse Gear

When the transmission is shifted toward the reverse gear position from the 5th gear position, the cam ② that is fitted in the cut-out section provided in the lever ① may be pushed down. However, inasmuch as the cam is fitted with the reverse restricting pin ③, the shift lever can not be shifted to the reverse position.

When the shift lever is returned once to the neutral position, the mechanism assumes the same setting as indicated in Fig. 100. Under this setting, the cam never fit into the cut-out section of the lever while the selecting to the reverse gear position is taking place. Consequently, the transmission is shifted to the reverse gear position.

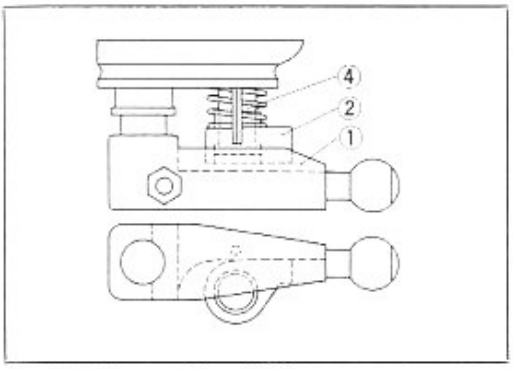


Fig. 101 Reverse Gear Position

As is evident from the foregoing, the transmission has been so designed that no shifting can be made from the 5th gear position directly to the reverse gear position.

DRIVE SHAFTS

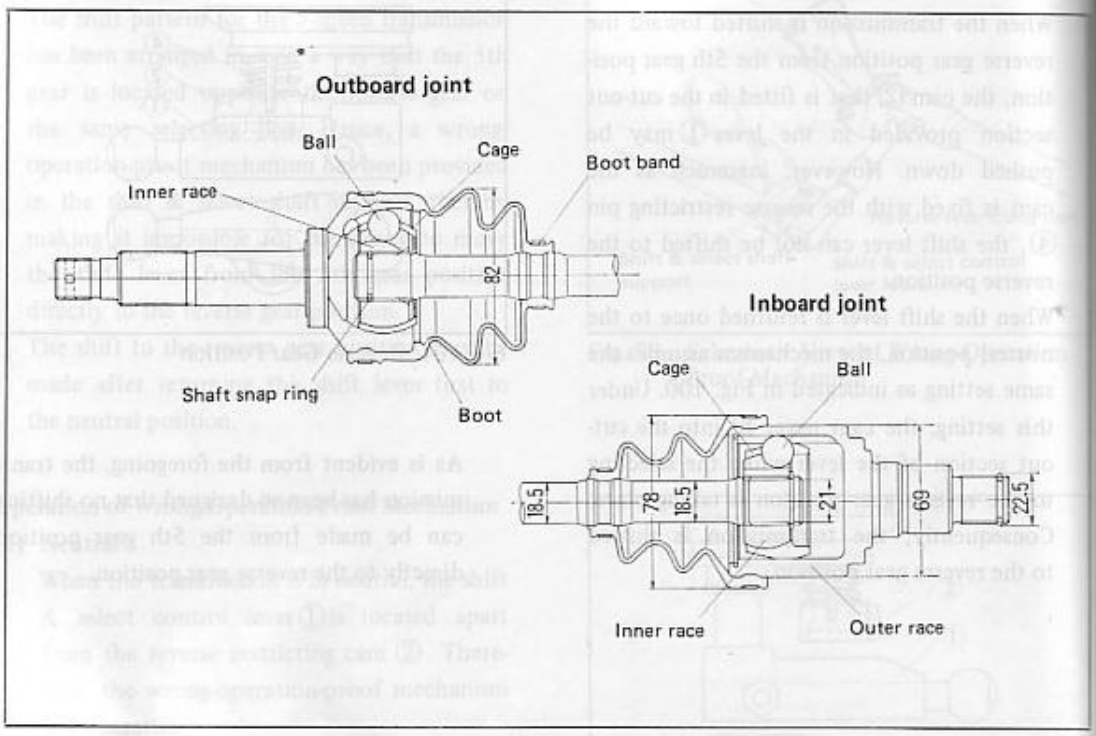


Fig. 102 Drive Shaft

A bar-field type constant velocity joint has been employed at each end of the drive shafts, thereby making it possible to smoothly transmit power to the front wheels.

The constant velocity joint located at the tire side of the drive shaft is called the outboard joint (BJ), and it compensates for the variation in operating angle. On the other hand, the constant velocity joint located at the differential side is called the inboard joint (DOJ), and it compensates for the variation in operating angle as well as in the axial movement of the drive shaft.

The splines on the inner races of both outer and inner board joints are connected with the same drive shaft. Moreover, each end is fixed securely with a snap ring.

There are six balls in the recessed sections on the inner race and cage, one each. These six balls are encased in the outer case (outboard or inboard). The inside of the joint is filled with grease containing molybdenum disulphide (NLGI, No.2 LIWITHMOS2). Furthermore, the joint is covered with a boot to protect the interior sections.

Drive Shaft Specifications

Drive shaft overall length	(Right) (Left)	822mm (32.36 inches) 635mm (25.00 inches)
Maximum allowable tilt angle	Inboard Outboard	20 degrees 42 degrees
Sealed grease in drive shaft joint	Amount of sealed NLGI, No.2 LIWITHMOS2 (Both inboard and outboard sides)	60 ~ 90g

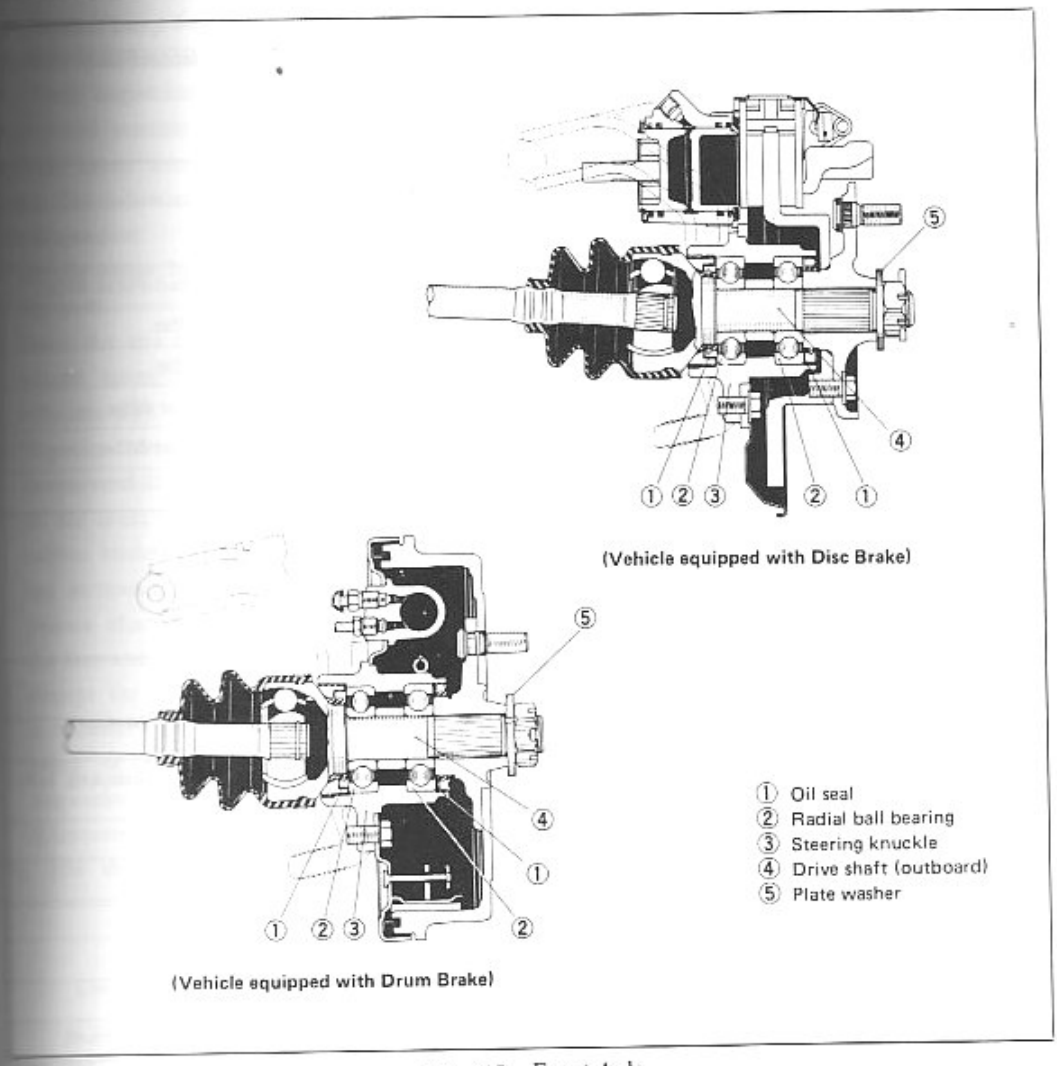


Fig. 103 Front Axle

The outboard drive shaft also serves as a front axle, thereby via the bearing supporting the load that is applied to the front wheel.

Two radial ball bearings are installed inside the bearing case that is integral with the steering knuckle. Also, an oil seal is provided at each end of these bearings as means to prevent ingression of water or dust into the bearing case.

The splined section of the drive shaft is fitted with the front axle hub. Moreover, a castle nut with a washer retains the end of the drive shaft. In addition, a cotter pin is provided to prevent the castle nut from becoming loose.

The brake drum or the front disc in the case of vehicles equipped with disc brake is attached to the axle hub by means of four attaching bolts.

Appendix Chart

The table below contains a list of principal parts in which the specifications for the 4-speed transmission mounted on the Model G10 vehicle differ from those specifications for the 4-speed transmission mounted on the Model L40 vehicle (September, 1977, onward).

Part nomenclature	Main differences
Transmission case assembly (Both upper and lower cases)	Contour of clutch housing differs.
Clutch cover assembly	Pressure plate capacity and installing load characteristics differ.
Clutch disc assembly	Capacity and thickness at time of free state differ.
Clutch release lever sub-assembly	Contour of lever and its installing direction differ.
Output shaft related parts	Tooth numbers of output shaft gear and 3rd gear differ.
Speedometer gear	Tooth numbers of both drive gear and driven gear differ.
Differential ring gear	Tooth number of gear differs.

List of Bearings

Input shaft bearing	Radial ball bearing Special product (B20-112AC3)
Output shaft bearing	Radial ball bearing
	Needle roller bearing with crowning, provided with knocking hole for turning prevention.
1st gear bearing	Needle roller bearing
2nd gear bearing	Needle roller bearing
4th gear bearing	Needle roller bearing unequal pitch
5th gear bearing	Needle roller bearing
Differential bearing	Radial ball bearing
Clutch release bearing	Angular ball bearing

SUSPENSIONS

FRONT SUSPENSION

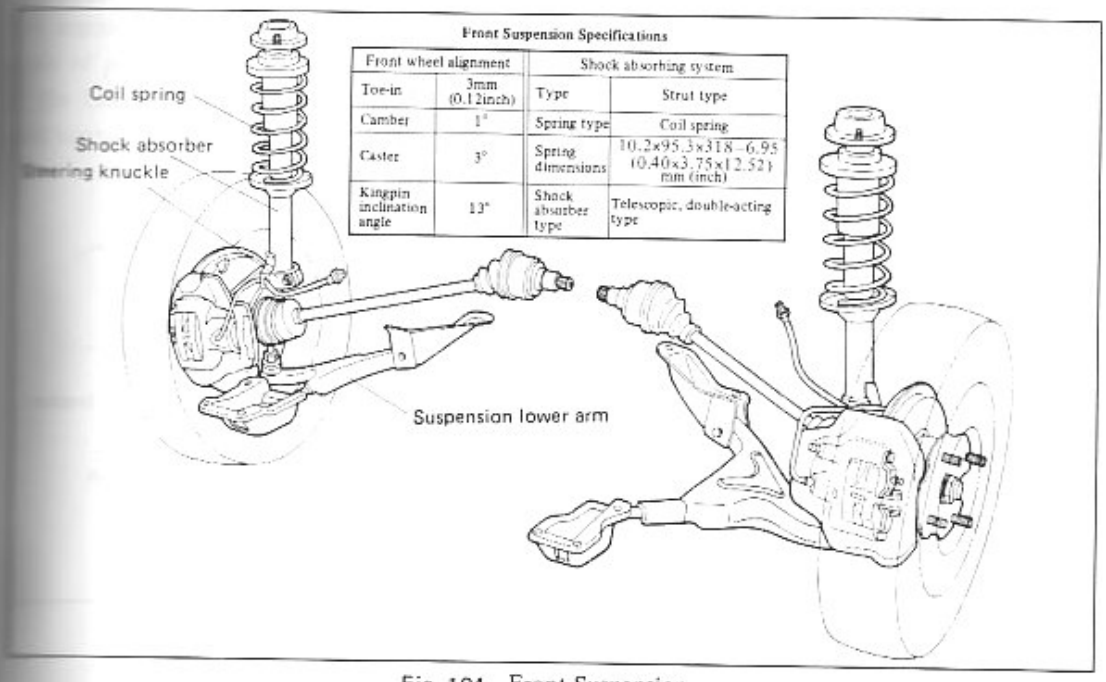
The front suspension is of the independent strut type which consists of the shock absorbers, coil springs, lower arms, steering knuckles and so forth. The following are some of the features of this suspension:

1. Simple design, light weight and fewer consuming parts.
2. Since the size of the suspension is small, the engine room can be utilized in the most effective way.
3. Superior driving comfort, stability and maneuverability, because the unsprung weight of the front suspension is very small and the rubber bushes incorporated inside the attaching sections of the lower arms provide *compliance characteristics to a certain degree in the fore-and-aft direction.
4. Except for the toe-in, no other adjustment is necessary for the front suspension. Also, being of the maintenance-free type, the suspension needs no lubrication. Moreover, it features a good serviceability.

Fig. 104 shows the construction of the front suspension. The movements of the front wheels in the up-and-down direction are transmitted to the coil springs via the steering knuckles. Simultaneously, the front shock absorbers are expanded or compressed, thus providing damping forces during their rebound and compression strokes.

Incidentally, a load applid to the front wheel is transmitted to the shock absorber via the steering knuckle in the upper part. Then, this load is further transmitted through the suspension support rubber bushes to the body fender apron which finally supports such load. On the other hand, in the lower part, the load is applied to the lower arm. Then, it is transmitted via the bracket to the body which finally supports such load.

* The compliance characteristics in the fore- and -aft direction denote the front suspension's following-up performance in its front-and-rear direction. They are determined by the elasticity of the rubber bushes, etc.



Front Suspension Specifications

Front wheel alignment		Shock absorbing system	
Toe-in	3mm (0.12inch)	Type	Strut type
Camber	1°	Spring type	Coil spring
Caster	3°	Spring dimensions	10.2×95.3×318–6.95 (0.40×3.75×12.52) mm (inch)
Kingpin inclination angle	13°	Shock absorber type	Telescopic, double-acting type

Fig. 104 Front Suspension

SUSPENSIONS

FRONT SUSPENSION

The front suspension is of the independent strut type which consists of the shock absorbers, coil springs, lower arms, steering knuckles and so forth. The following are some of the features of this suspension:

1. Simple design, light weight and fewer consuming parts.
2. Since the size of the suspension is small, the engine room can be utilized in the most effective way.
3. Superior driving comfort, stability and maneuverability, because the unsprung weight of the front suspension is very small and the rubber bushes incorporated inside the attaching sections of the lower arms provide *compliance characteristics to a certain degree in the fore-and-aft direction.
4. Except for the toe-in, no other adjustment is necessary for the front suspension. Also, being of the maintenance-free type, the suspension needs no lubrication. Moreover, it features a good serviceability.

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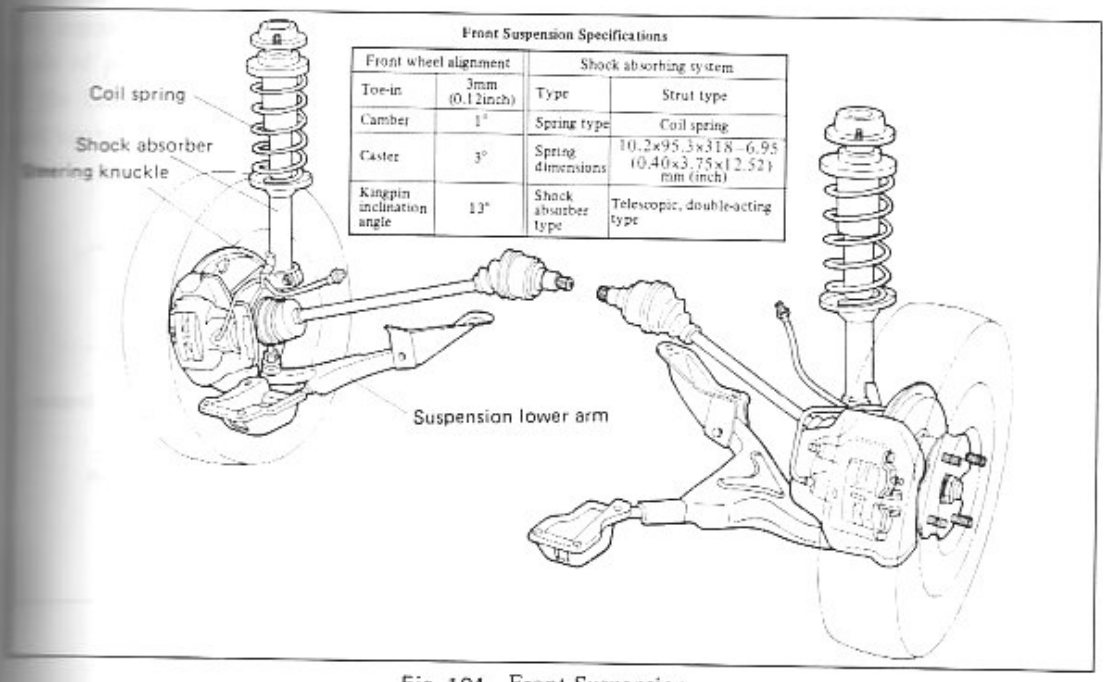
Incidentally, a load applid to the front wheel is transmitted to the shock absorber via the steering knuckle in the upper part. Then, this load is further transmitted through the suspension support rubber bushes to the body fender apron which finally supports such load. On the other hand, in the lower part, the load is applied to the lower arm. Then, it is transmitted via the bracket to the body which finally supports such load.

* The compliance characteristics in the fore- and -aft direction denote the front suspension's following-up performance in its front-and-rear direction. They are determined by the elasticity of the rubber bushes, etc.



Front Suspension Specifications

Front wheel alignment		Shock absorbing system	
Toe-in	3mm (0.12inch)	Type	Strut type
Camber	1°	Spring type	Coil spring
Caster	3°	Spring dimensions	10.2×95.3×318–6.95 (0.40×3.75×12.52) mm (inch)
Kingpin inclination angle	13°	Shock absorber type	Telescopic, double-acting type

Fig. 104 Front Suspension

Suspension Lower Arms

The suspension lower arm is welded integrally with the strut bar. It is so constructed that the span in its fore-and-aft direction is comparatively large, thus making it possible to effectively support any lateral load applied to the lower arm.

The lower arm is attached to the bracket through strut bar cushions at its front end; through a lower arm bush at its rear end.

As regards the rubber bushes incorporated inside the attaching sections of the lower arm, they have been given a certain degree of compliance characteristics in their fore-and-aft direction so as to improve further driving comfort, at the same time giving due consideration to stabilized maneuverability, too.

As for the inner sleeve of the lower arm bush, their both ends are knurled so as to prevent the inner sleeve from turning together with the rubber bush and nut, etc.

Strut Bar Brackets and Lower Arm Brackets

The strut bar bracket is attached to the front cross member and side cross member, while the lower arm bracket is attached to the dash cross member and side cross member, by means of attaching bolts, utilizing the rigidity of the whole body.

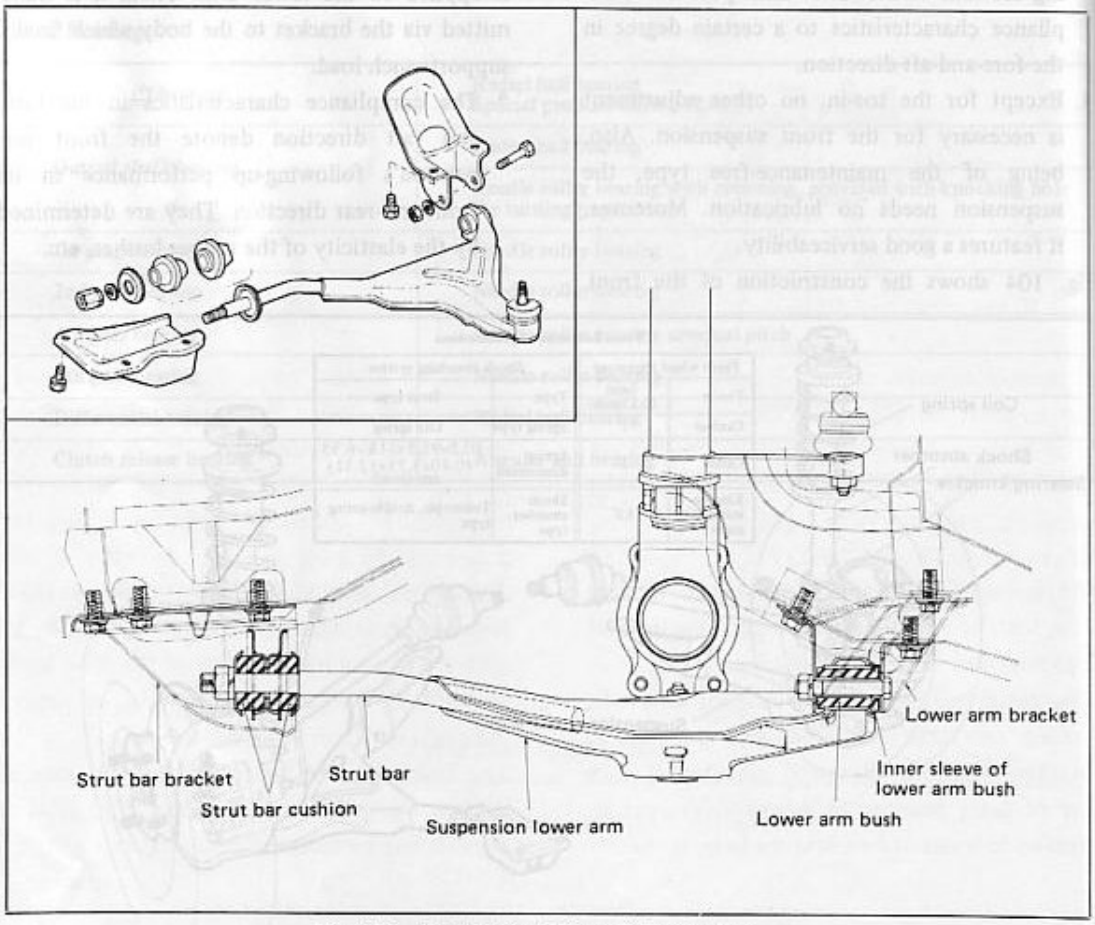


Fig. 105 Installation View of Lower Arm

Lower Ball Joints

The lower ball joint is of the maintenance-free type which can not be disassembled. Since it is welded onto the suspension lower arm proper, the ball joint section alone can be not removed or reinstalled.

The ball joint seat is acetal resin treated with oil so as to provide a more durable form of lubrication. The cushion rubber (rubber spring) regulates breaking-away torque and the tightness of the ball joint stud.

As for its lubricant, the ball joint is filled with lithium-base grease, and is sealed with a dust cover.

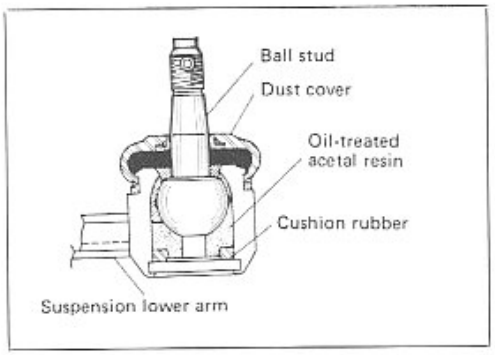


Fig. 106 Sectional View of Lower Ball Joint

Front Suspension Supports

The front suspension support has been so designed that the front shock absorber is sustained with a ball bearing that is connected to the fender apron through a rubber cushion with two attaching bolts.

Furthermore, a front spring bumper made of rubber has been provided inside the front spring upper seat in order to absorb impacts during the full rebound stroke as well as to prevent an over-stroke of the shock absorber.

For improved sealing characteristics, a dust seal made of polyurethane sponge has been installed at the ball bearing section in order to prevent dust ingression.

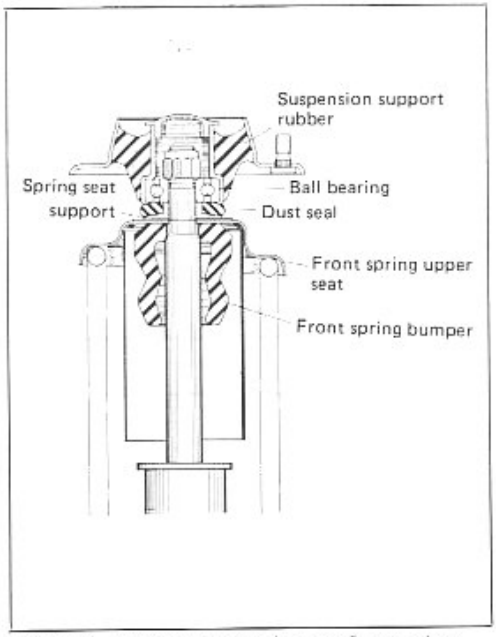


Fig. 107 Cross Section of Front Suspension Support

REAR SUSPENSION

The rear suspension is of the five-link axle type which consists of the shock absorbers, coil springs, rear axle beam, lower & upper control arms, lateral control rod and so forth. This rear suspension system has the following features given below:

1. Long wheelbase is possible. Space between links can be used effectively, since no propeller shaft or differential is located here because of the FF system.
2. Superior driving comfort owing to reduced unsprung weight, thanks to the introduction of the opening type axle beam which features light weight.
3. The movement of the axle beam is controlled by the lower and upper control arms. Hence, the dip and floating of the wheels during sudden acceleration or deceleration period become smaller, compared with the conventional leaf spring type suspensions.
4. Improved lateral rigidity of the whole rear suspension because of the adoption of a lateral control rod.

Fig. 109 shows the construction of the rear suspension. Loads applied to the wheel in the up-and-down direction are sustained by the coil spring through the axle beam. Simultaneously, the shock absorber is expanded or compressed, thus providing a damping force during its compression or rebound strokes.

Loads in the fore-and-aft direction are supported by the lower and upper control arms, whereas lateral loads are supported by the lateral control rod via the axle beam.

Also, with a view to reducing sound and vibration levels, the installation bracket located at the front ends of the lower and upper control arms has been provided on the body at such a place where the body rigidity is maximum.

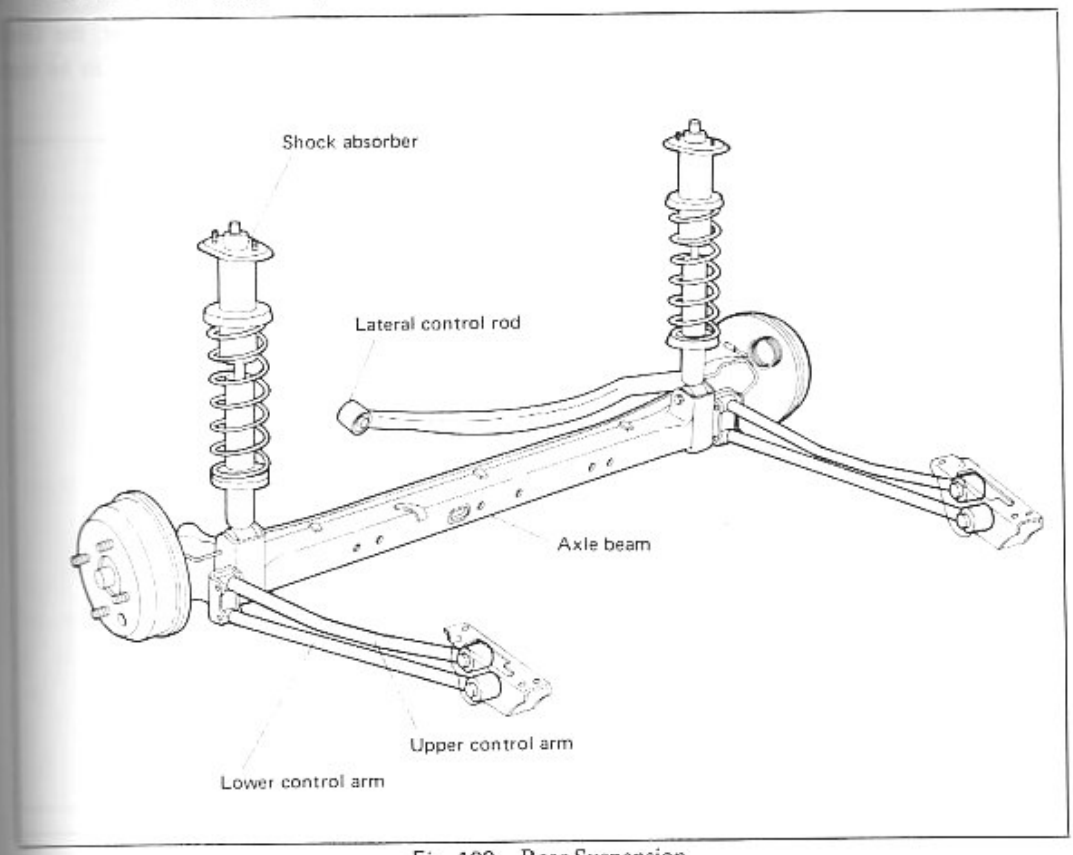


Fig. 109 Rear Suspension

REAR AXLE

Rear Axle Beam

The axle beam is made of a 3.2mm (0.13inch) thick steel sheet having a hat type cross section. Its design allows a light construction. Besides supporting loads as an axle, the rear axle beam has been given adequate rigidity, thus making it possible to absorb twisting loads.

Hence, the displacement of each of the right and left wheels can be absorbed when the rubber bushes and axle beam are twisted. As a result, the elasticity of the axle beam can provide a closer contact of the wheels with the ground. Furthermore, the brake tube and parking cable are routed inside the axle beam.

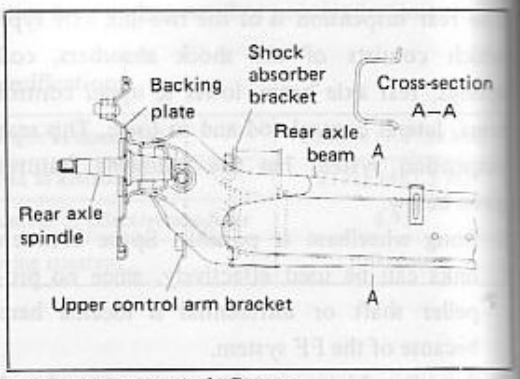


Fig. 110 Rear Axle Beam

Lower Control Arms and Upper Control Arms

The upper and lower control arms are made of steel tube. Primarily they sustain loads in the fore-and-aft direction. In adittion, they restrict the movement of the axle beam.

Rubber bushes are press-fitted into each end of these control arms. Each end is attached to the body or the axle beam, respectively, through a bracket.

As for the inner sleeve of the rubber bush, it has undergone knurling machining so as to prevent the inner sleeve from turning together with the rubber bush and nut, etc. Moreover, the front bracket serves as a transport hook to be used during the new car transport.

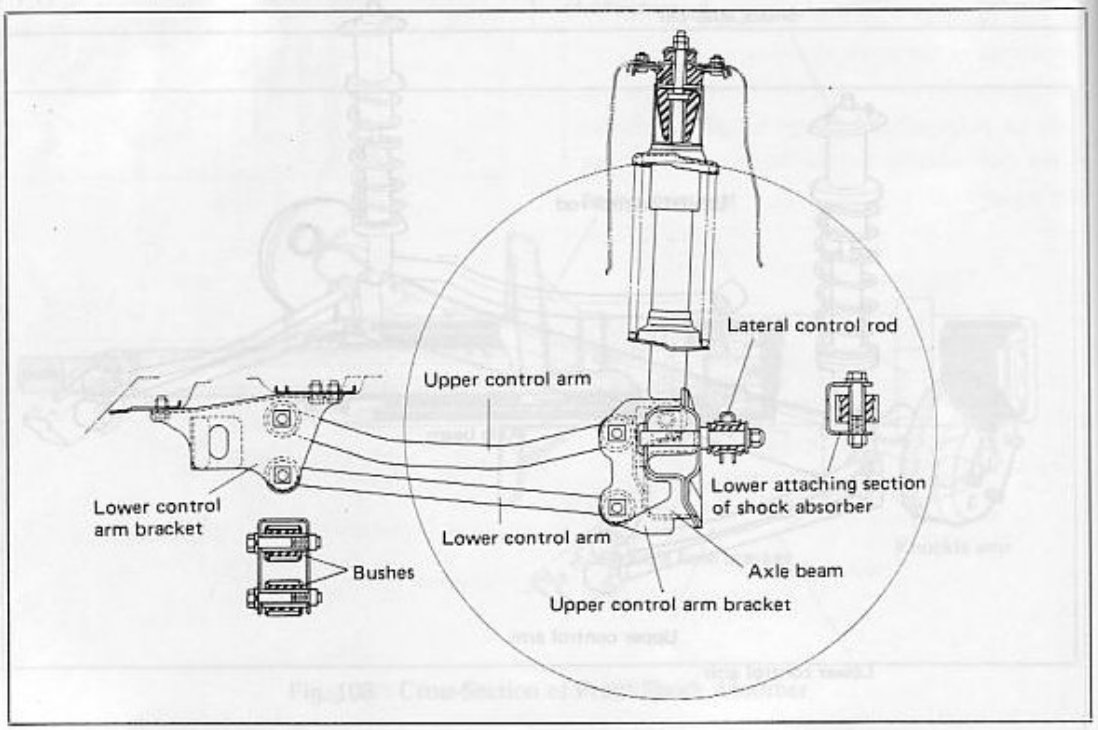


Fig. 111 Installation View of Lower & Upper Control Arms

Lateral Control Rod

The lateral control rod is made of a 2.3mm (0.09 inch) thick steel sheet having a U-shaped cross-section. This lateral control rod sustains lateral loads, thereby providing an adequate lateral rigidity in the rear suspension.

Rubber bushes are provided in each end of the lateral control rod. Each end is attached to the body or the axle beam.

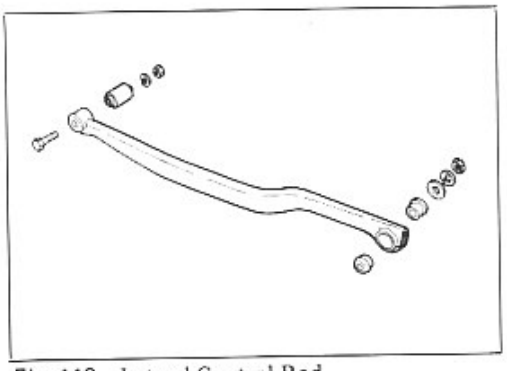


Fig. 112 Lateral Control Rod

Rear Axle Bearings

With regard to the rear axle bearings, radial ball bearings are used at the inboard and outboard sides, one each. Moreover, the inboard bearing is equipped with a sealing plate so that no grease may enter into the inside of the brake drum.

The outboard bearing is of the ordinary type radial ball bearing. The rear wheel grease retainer cap prevents any grease from flowing to the outside.

Furthermore, retainers for locating the bearings are provided between both bearings as well as between the inboard bearing and the backing plate, respectively, one each.

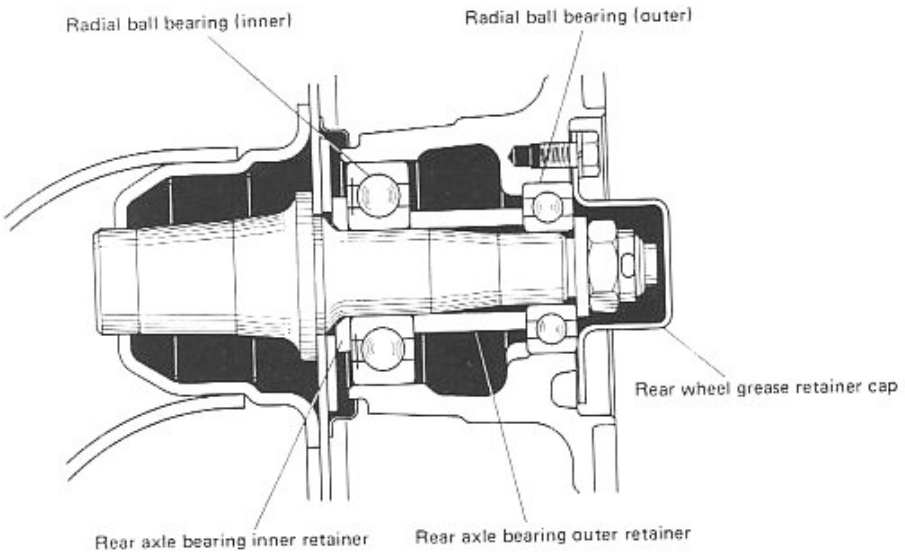


Fig. 113 Sectional View of Rear Axle Bearing Related Parts

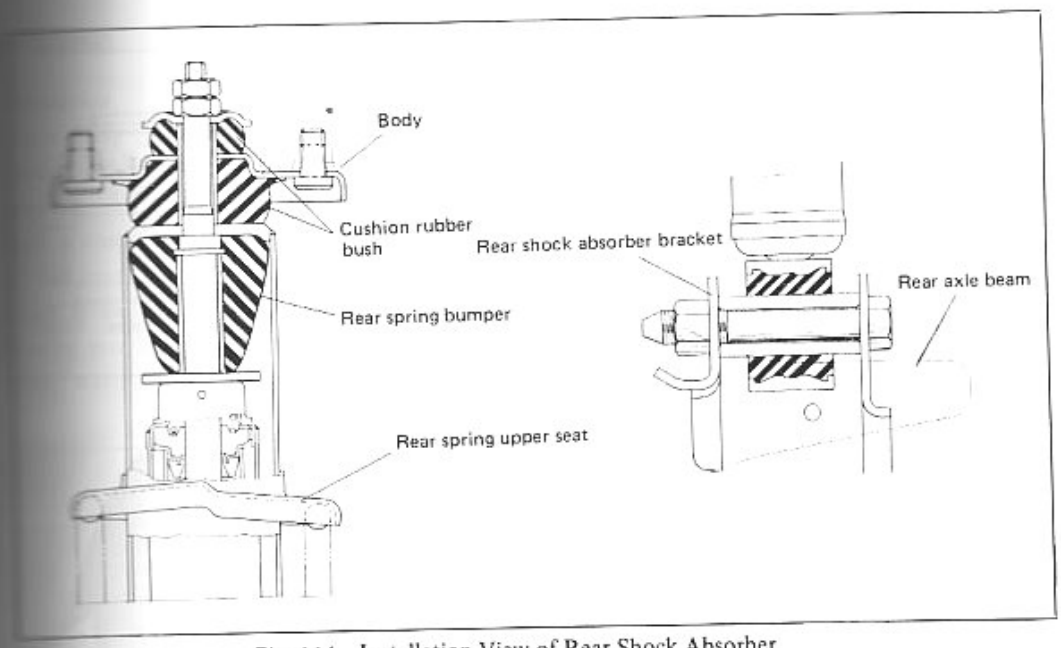


Fig. 114 Installation View of Rear Shock Absorber

TIRES AND DISC WHEELS

List of Specifications for Tires and Disc Wheels

Item			Air pressure kg/cm² (psi)	Grade		
			During normal and high-speed driving	XO	XG	XTE
Tires (standard)	Steel radial tubeless	155SR12	1.7 (24.2)	○	○	○
Tires (option)	With tube	155SR12	1.7 (24.2)	△	←	←
Disc wheel size			4J x 12	○	←	—
Hub nut			Ordinary nut	○	←	←
			Decoration nut	—	—	○
Wheel hub ornament				—	○	←

○ Standard △ Option

Tires

Radial tubeless tires are standard on all models. However, tube-installed-tires, radial tubeless tires and snow tires are available as optional equipment.

With regard to radial tires, all of them incorporate steel cords so as to improve further wear-resistant characteristics.

Disc Wheels

The disc wheel is of the 4J x 12 type in which the amount of off-set is 50 mm (1.97 inches).
Other disc wheels have different amounts of off-set. Hence, make sure to use disc wheels designed exclusively for the Model G10 vehicles.

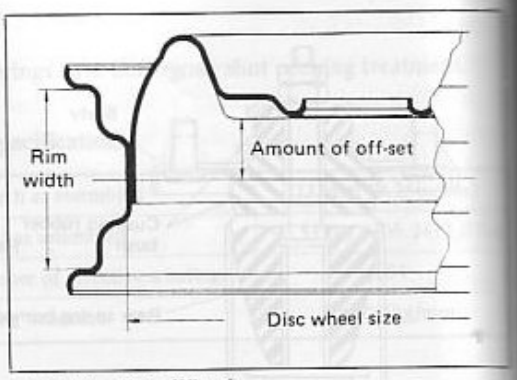


Fig. 115 Disc Wheel

Wheel Hub Ornaments

The newly-designed wheel hub ornament has been introduced. (The Model XO vehicle is excluded.)

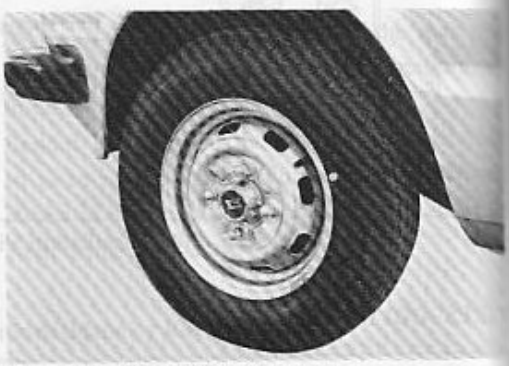


Fig. 116 Wheel Hub Ornament

Hub Nuts

As for the hub nuts, the Model XTE vehicle employs decoration nuts, whereas the Models XO and XG vehicles employ ordinary type nut.

STEERING

Description

The steering system is the rack and pinion type which features simple construction and sharp response. An impact absorbing type steering shaft is standard equipment on all models.

All ball joints are of the maintenance-free type in which grease is factory-sealed. Furthermore, the steering gear has been so designed as to ensure good water- and dust-proof characteristics, thereby making it a maintenance-free type.

Fig. 117 shows the construction of the steering system. The rotational movement of the steering main shaft is converted into the lateral movement by the rack & pinion type steering gear. Then, this lateral movement steers the front wheels through the steering rack ends, tie rod ends and steering knuckle arms.

Steering Specifications

Gear type	Rack & pinion
Gear ratio (Overall steering ratio)	∞ (18.0)
Turning angle	Inner: 37°35', Outer: 33°
Maximum turns lock to lock	3.45
Wheel outer diameter	380mm (14.96inches)
Impact absorbing type	Standard on all models

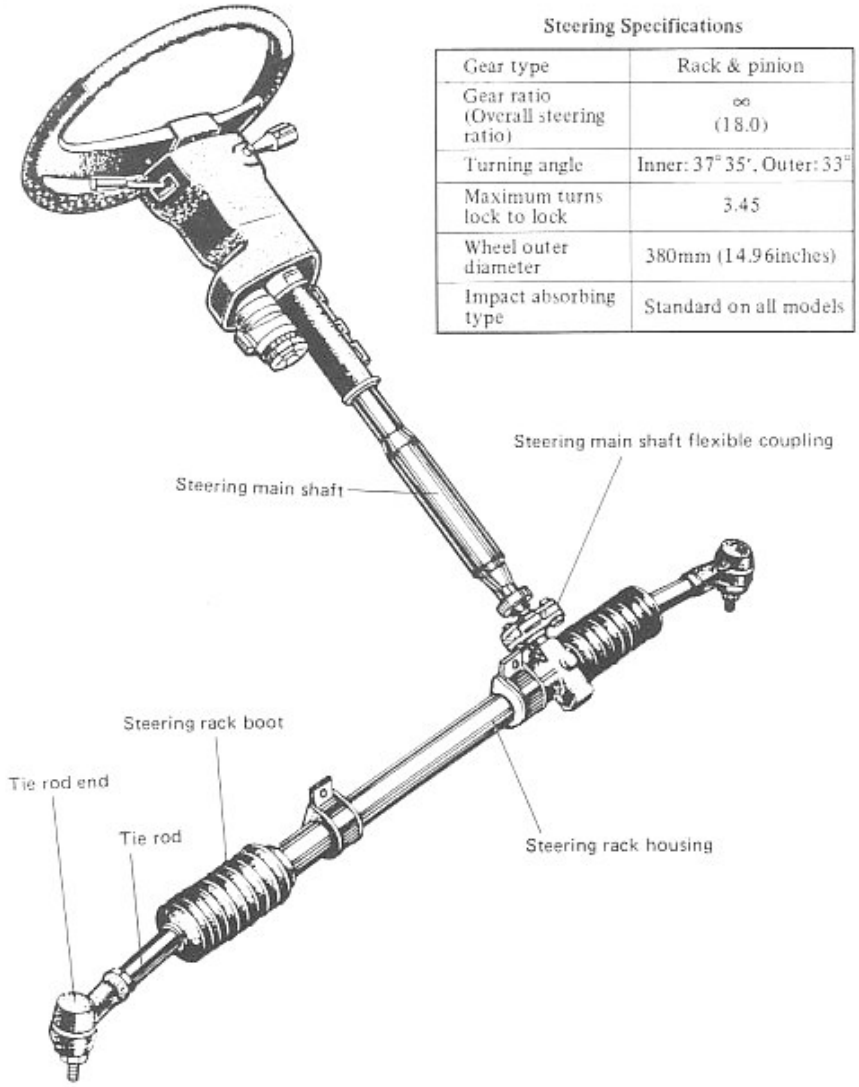


Fig. 117 Schematic Diagram of Steering System

Steering Main Shaft Assembly

The steering main shaft assembly consists of the steering main shaft No.1 and the steering main shaft No.2. And these two components are attached to each other by press-fitting of poly-acetal resin.

Moreover, the energy absorbing tube made of a thin-wall aluminum tube has been provided between the main shaft No.1 and the main shaft No.2 in order that impacts may be absorbed gradually in the event of collision.

If an impact load should be applied to the steering wheel in the event of accident, the main shaft No.1 would begin sliding inside the main shaft No.2, although the main shaft No.1 must overcome the resistance of poly-acetal resin at the mating section with the main shaft No.2.

Simultaneously, the impact load is applied to the energy absorbing tube via a collar welded to the main shaft No.1. As a result, the energy absorbing tube is compressed, thereby absorbing the impact energy.

In addition, the steering lock system is standard on all models. This steering lock system has been so designed that the lock bar is dropped into the groove provided in the main shaft collar, thus locking the steering system, when the key is pulled out after setting the key at the "LOCK" position.

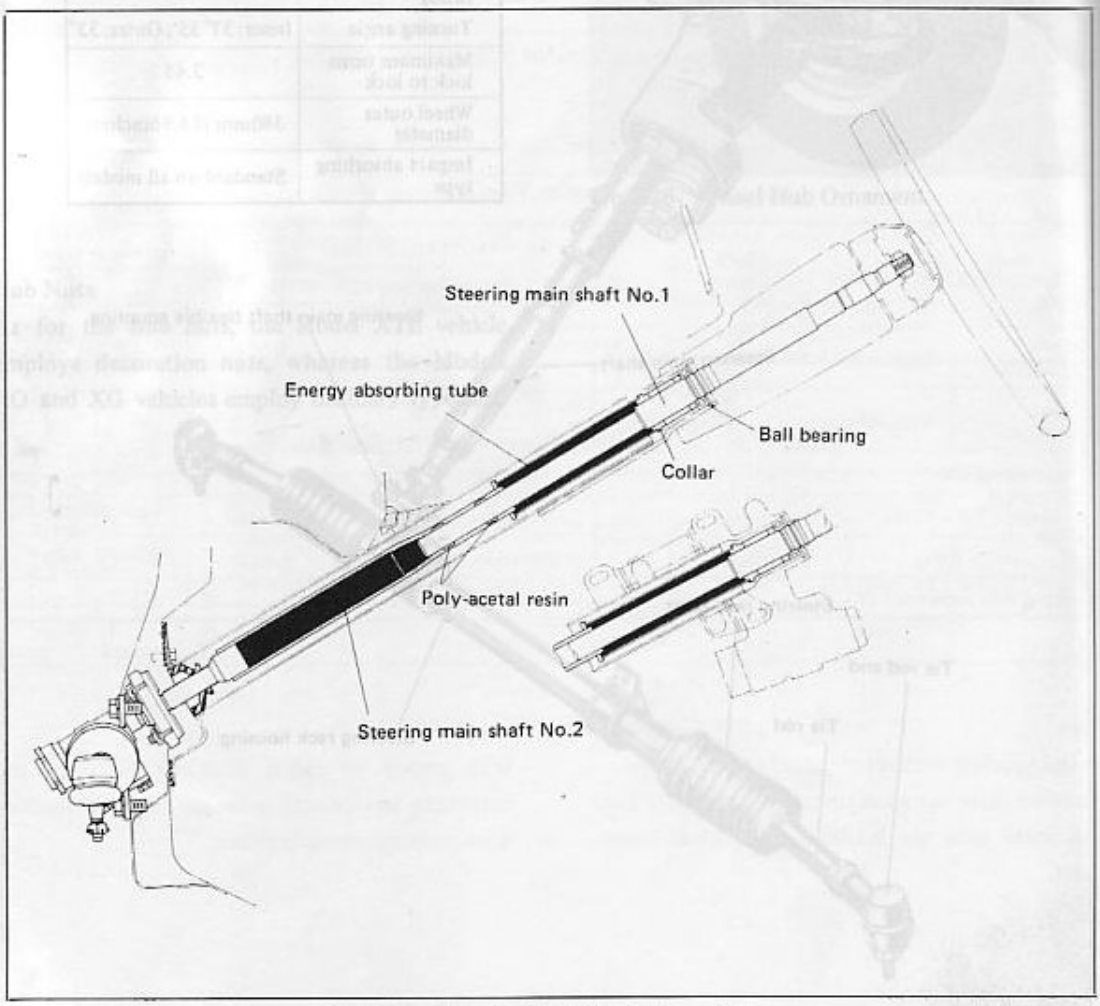


Fig. 118 Steering Main Shaft Assembly

Steering Gear Assembly

The steering gear assembly consists of a steering pinion, a steering rack, a steering rack housing and steering rack ends.

The steering pinion has seven helical gear teeth. And it is supported by two needle bearings.

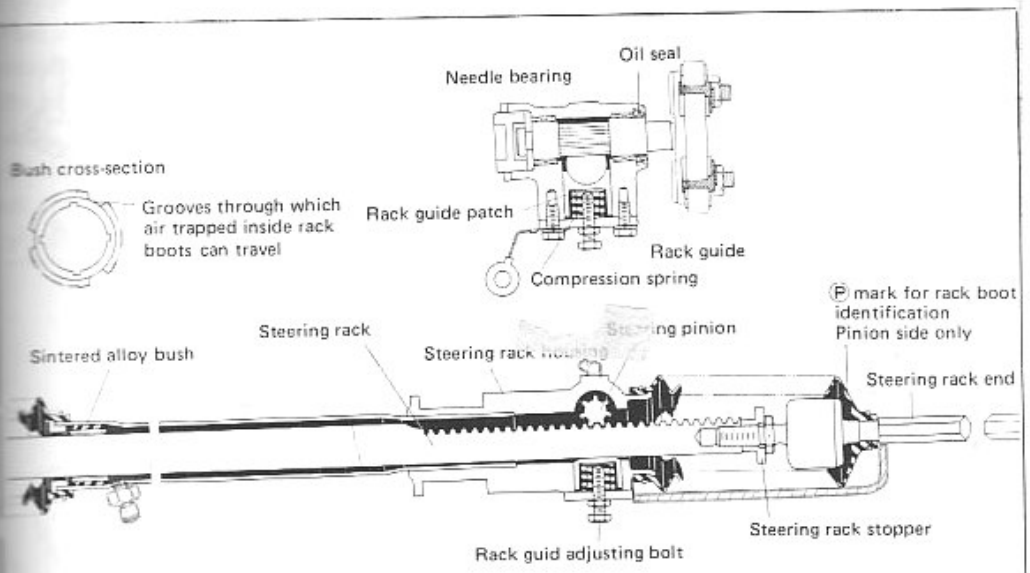
Furthermore, the steering rack has 29 helical gear teeth. And the steering rack is supported by a sintered alloy bush and a rack guide. Each sliding surface is lubricated by molybdenum disulphide lithium-base grease.

The back side of the steering rack is pushed via the rack guide by the steering rack guide patch and compression spring in order that the steering rack may be pushed always against the pinion tooth surfaces by a force of an optimum magnitude.

Incidentally, the relief amount of the steering rack is controlled by a bolt for adusting the rack guide.

The "T" type oil seal has been installed at the pinion insertion section of the steering rack housing. Furthermore, a rack boot has been provided at each end of the steering housing. In this way, this completely-sealed type steering gear assembly can prevent the ingression of water and dust, thereby making it a maintenance-free type.

Moreover, the steering gear has been designed in such a way that the trapped air can move through gaps between the steering housing and the rack, as the rack boots at both ends expand or contracts, during the steering rack operation.



Steering Gear Specifications

Gear type	Rack & pinion	Rack stroke	67 x 2
Gear ratio (Overall steering ratio)	∞ (18.0)	Grease to be used	Molybdenum disulphide lithium-base grease Long-life chassis grease
Rack tooth number	29		

Fig. 119 Steering Gear Assembly

Steering Rack Ends and Tie Rod Ends

Each steering rack end is composed of a rack end ball joint and a tie rod. Since these two parts are assembled by complete staking, they can not be disassembled.

As regards the ball joint, its ball seat is of the maintenance-free type in which lithium grease is factory-sealed. Hence, it is impossible to disassemble the ball joint.

Furthermore, the tie rod has a hexagonal cross-section, thus making the turning angle adjustment or toe in adjustment operations easier.

As for the tie rod end ball joint, it is of the maintenance-free type in which lithium grease is factory-sealed. Hence, it is impossible to disassemble the ball joint section. Furthermore, its ball stud section is attached to the steering knuckle arm with a castle nut.

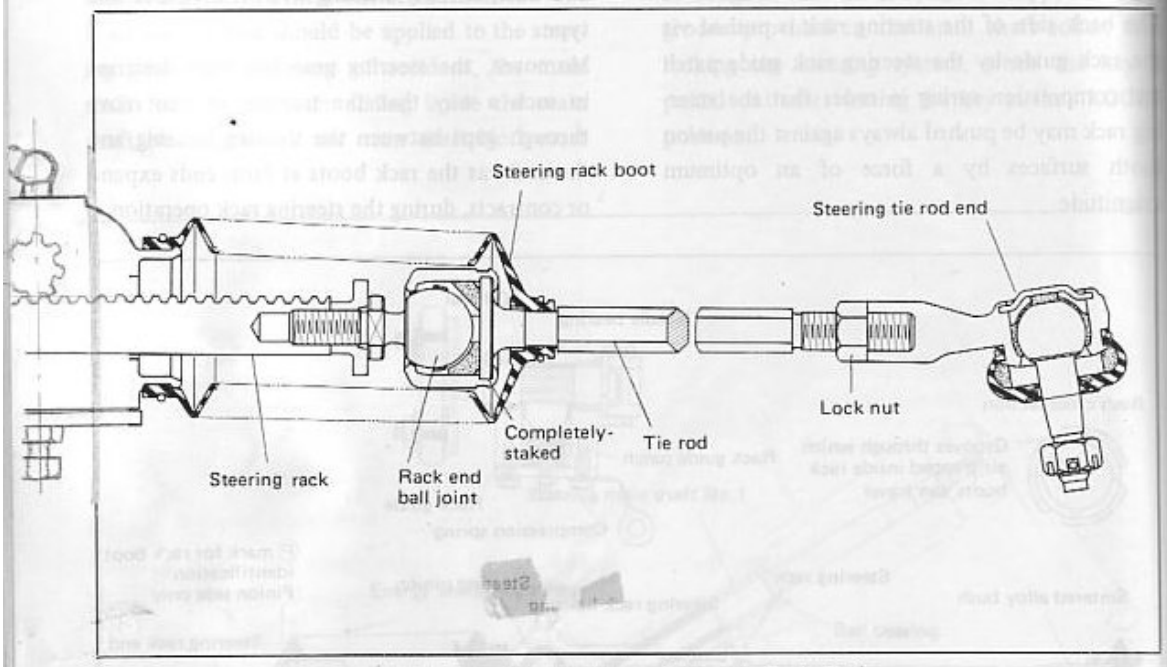


Fig. 120 Cross-Section of Steering Rack End

Steering Wheel

The steering wheel is the bar type whose outer diameter is 380mm (14.96inches). The whole horn bar serves as the horn button.

The steering wheel proper is made of polypropylene. The steering wheel comes in two different colors: black and light brown. Either color is used depending upon the color of the vehicle interior so as to provide a better matching.

With regard to the color of the steering wheel ornament, green color is used for the black steering wheel, whereas gold color is used for the light brown steering wheel.

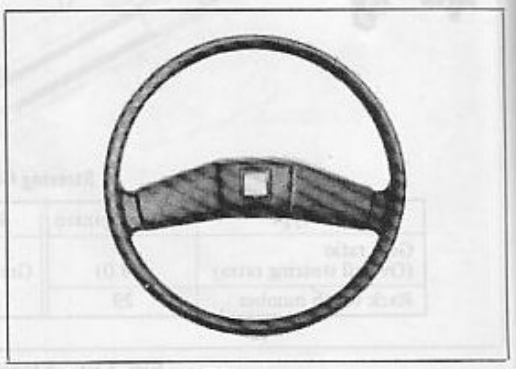


Fig. 121 Steering Wheel

BRAKES

The Model G10 vehicles use the following brake specifications, depending upon models.

Brake Specifications

Specifications \ Grade			XO, XG, XTE
Service brake	Type	Front	Disc
		Rear	Leading and trailing (with automatic adjuster)
	Brake booster		Vacuum booster type
	Braking force control device		P valve

Specifications \ Grade			XO, XG XTE
Service brake	Master cylinder	Type	Tandem
		Bore diameter	19.05mm (0.75inch)
	Wheel cylinder	Front	47.62mm (1.87inches)
		Rear	15.87mm (0.62inch)
Parking brake			Mechanical type with braking force applied to two rear wheels

BRAKE LINE

The brake line is of the dual-system type equipped with a tandem master cylinder.

When determining the brake line routing, careful consideration has been paid as to safety.

The brake line has employed diagonal routing which is connecting the right front wheel cylinder to the left rear wheel cylinder and the left front wheel cylinder to the right rear wheel cylinder. As for the routing inside the vehicle interior, the brake line together with the fuel line is routed along the side memeber.

Also, as regards to the routing at the under-floor section, the brake tube is protected by a polyethylene, heat-contracted tube. In addition, for further enhanced safety a protector has been provided at each critical point so as to avoid any damage to the brake line due to contact with the ground or stones bouncing from the road.

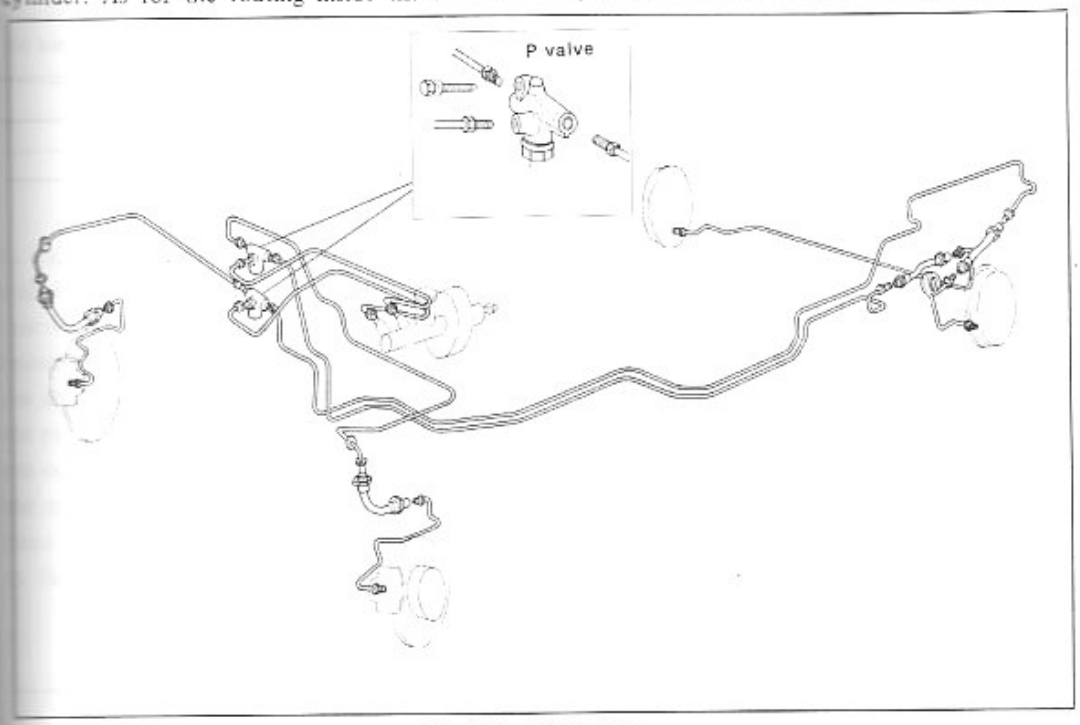


Fig. 122 Brake Line

MASTER CYLINDER

The master cylinder for all models is the tandem type, with the front disc brake. Moverover, the brake fluid level warning switch has been provided in the filler tank.

Also, the master cylinder for all models has been equipped with a brake booster.

Master Cylinder Specifications

Item \ Front brake specifications		Disc	Item \ Front brake specifications		Disc	
Bore diameter	mm (inch)	19.05 (0.75)	Filter tank capacity	(cc)	20	Common section 65
Stroke	mm (inch)	15.2 (0.60)			15	
		15.0 (0.59)				

BRAKE BOOSTER

The brake booster has an aluminum die-cast body. It incorporates the jumping mechanism which can slightly reduce the braking force only at the time when the brake system begins to operate. In this way, a smoother braking application has been obtained.

Brake Booster Specifications

Item \ Grade		XO, XG, XTE	Item \ Grade		XO, XG, XTE
Manufacturer name		Nishin Kogyo	Servo ratio		2.13
Size	inch	5	Jumping	kg (lb)	15 (33.1)
Type		Direct acting	Thrust force at time of starting operation	kg (lb)	7 (15.4)
Effective stroke	mm (inch)	34 (1.34)	Check valve opening pressure	(mmHg)	Not to exceed 30
Diaphragm effective diameter	mm (inch)	127 (5.00)			

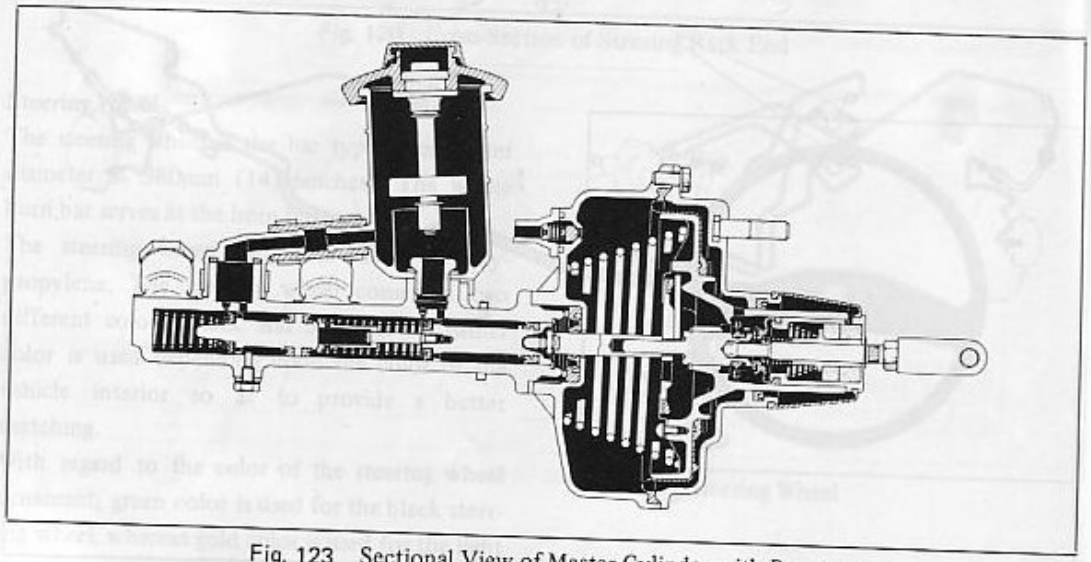


Fig. 123 Sectional View of Master Cylinder with Booster

Brake Booster Jumping Mechanism

The brake booster jumping mechanism utilizes the elasticity of rubber piece which is fused onto the reaction plate in order to slightly reduce the braking force only at the time when the brake system begins to operate. As a result, a smoother braking application has been provided.

Operation

In instances where the brake booster is equipped with no jumping mechanism, when the brake pedal is depressed and the operating rod moves forward, immediately the vacuum passage will be blocked by the control valve, thereby opening the atmospheric passage.

Consequently, the piston also moves forward and a force indicated in Fig. 124 will be applied to the reaction lever. As a result, as the piston moves forward, the reaction force at the master cylinder will be sustained at the operating rod side.

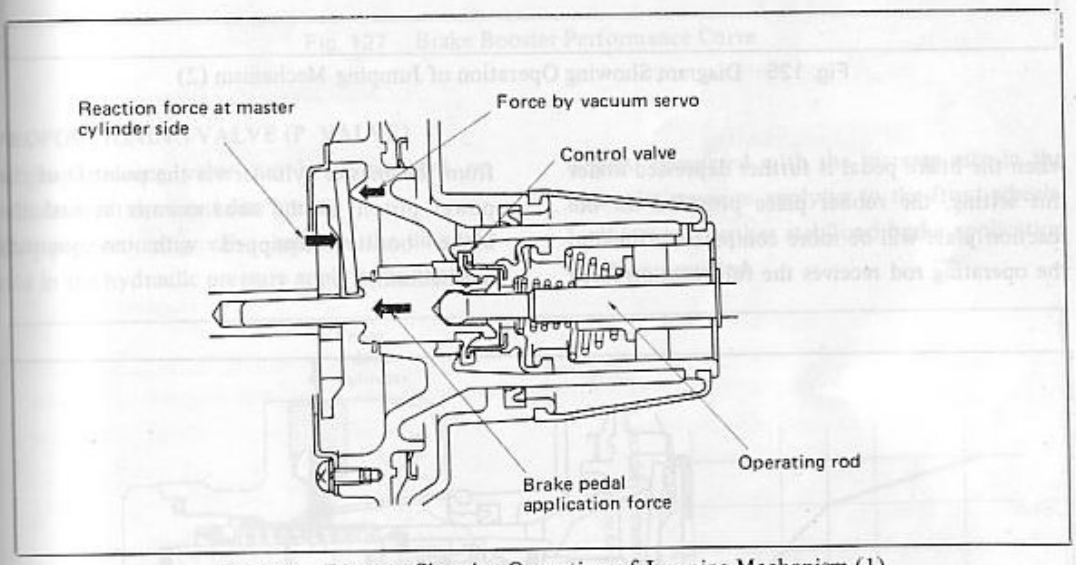


Fig. 124 Diagram Showing Operation of Jumping Mechanism (1)

In instances where the brake booster is equipped with the jumping mechanism, the brake booster functions in the same way as with the brake booster without the jumping mechanism, until the atmospheric passage is opened. However, as the piston moves forward, no force is applied to the operating rod while the reaction force from the master cylinder is small, because the reaction force from the master cylinder which is applied to the point C of the reaction lever with the point A of the power piston as its fulcrum will be sustained at the point B by the elasticity of a rubber piece provided on the reaction plate. In this way, the applying force of the operating rod must overcome first the tension of the control valve return spring, before the brake system starts its function. As a result, the braking force at the time when the brake system starts functioning will be reduced.

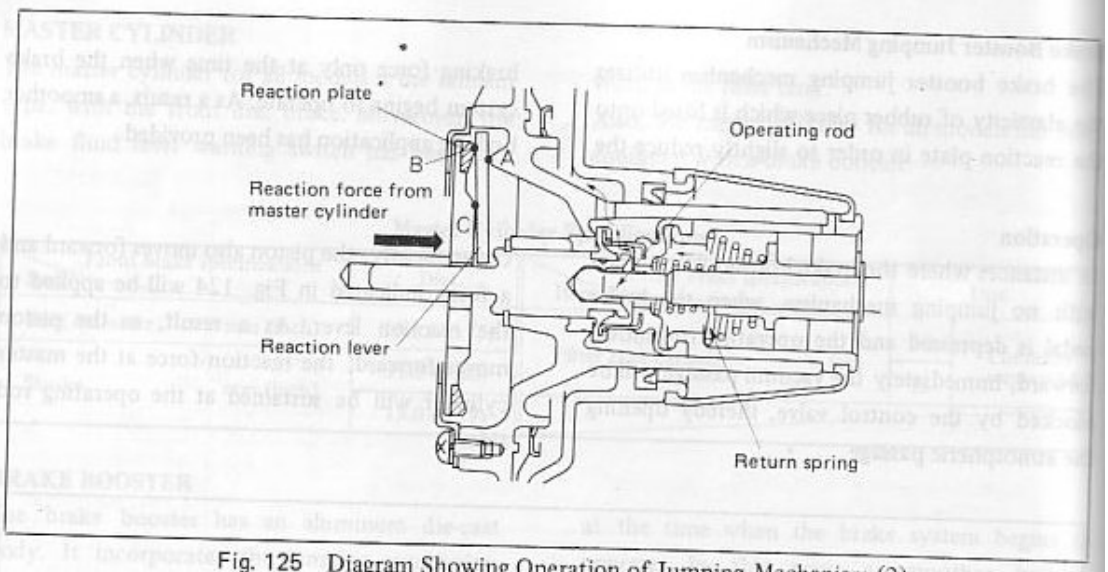


Fig. 125 Diagram Showing Operation of Jumping Mechanism (2)

When the brake pedal is further depressed under this setting, the rubber piece provided on the reaction plate will be more compressed. Finally, the operating rod receives the full reaction force from the master cylinder via the point D of the power piston, in the same manner as with the brake booster equipped with no jumping mechanism.

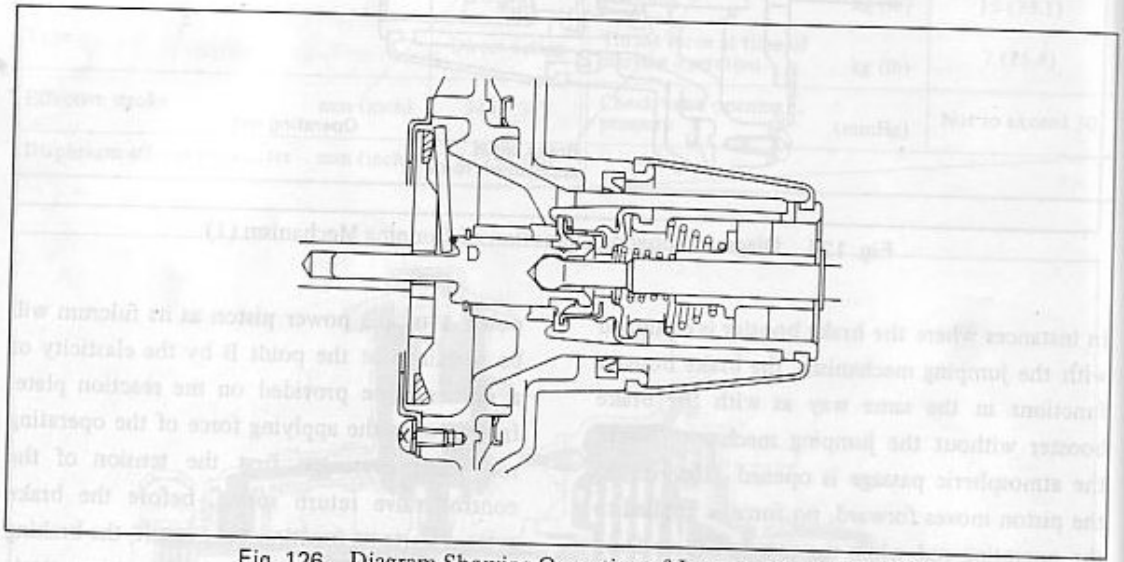


Fig. 126 Diagram Showing Operating of Jumping Mechanism (3)

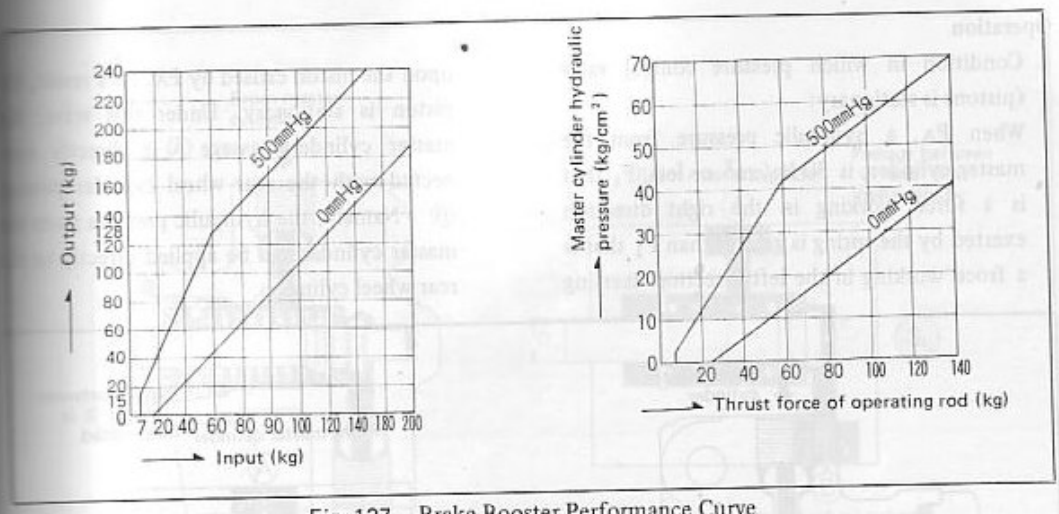


Fig. 127 Brake Booster Performance Curve

PROPORTIONING VALVE (P VALVE)

A proportioning valve has been provided on vehicles with the front disc brake.

The proportioning valve reduces the increase rate in the hydraulic pressure applying to the rear wheels, compared with the increase rate in the hydraulic pressure applying to the front wheels. In this way, further stabilized brake application has been provided.

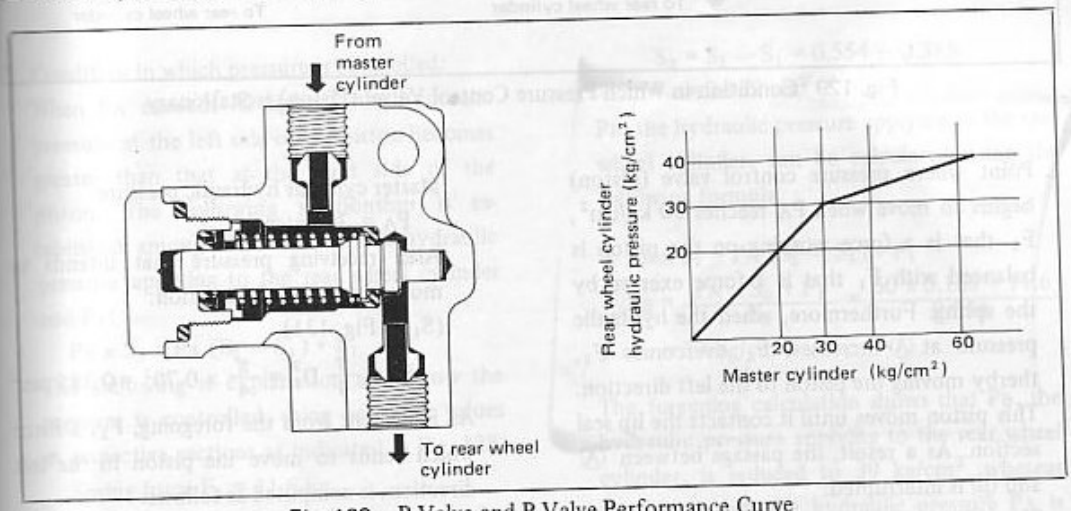


Fig. 128 P Valve and P Valve Performance Curve

Operation

1. Condition in which pressure control valve (piston) is stationary:

When P_A, a hydraulic pressure from the master cylinder, is 30 kg/cm^2 or less, F_1 that is a force working in the right direction exerted by the spring is greater than F_2 that is a froce working in the left direction exerting upon the piston caused by P_A. As a result, the piston is stationary. Under this state, the master cylinder passage Ⓐ is directly connected with the rear wheel cylinder passage Ⓑ . Namely, the hydraulic pressure from the master cylinder can be applied directly to the rear wheel cylinders.

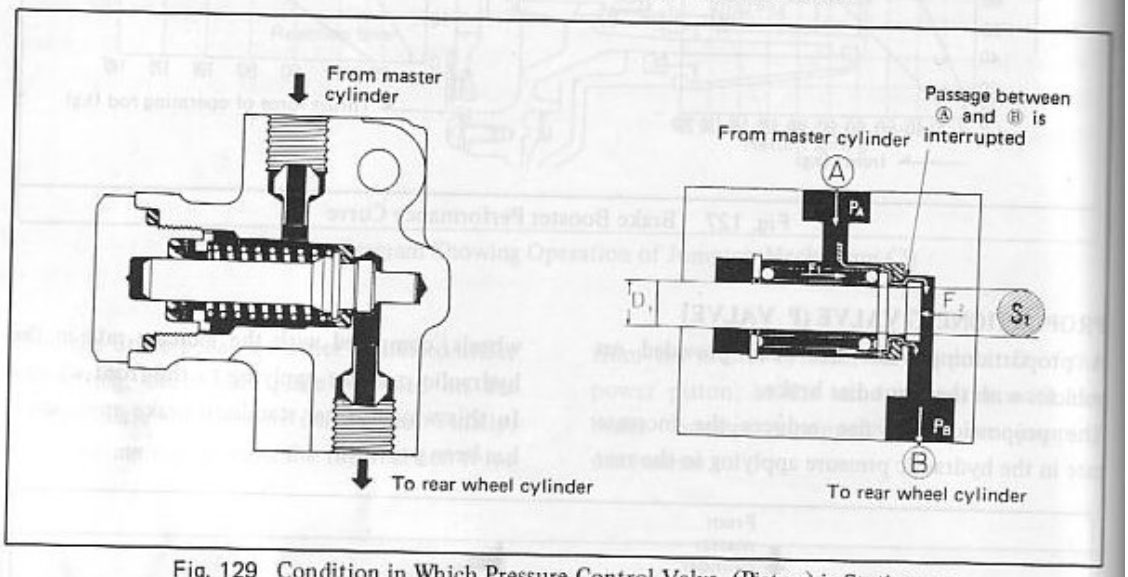


Fig. 129 Condition in Which Pressure Control Valve (Piston) is Stationary

2. Point where pressure control valve (piston) begins to move when P_A reaches 30 kg/cm^2, F_2 that is a force working on the piston is balanced with F_1 that is a force exerted by the spring. Furthermore, when the hydfaulic pressure at Ⓐ increases, F_2 overcomes F_1, therby moving the piston to the left direction. This piston moves until it contacts the lip seal section. As a result, the passage between Ⓐ and Ⓑ is interrupted.

The following is explanation on this movement of the piston, using pertinent values at respective sections.

Spring force F_1 = 11.6 kg

Master cylinder hydraulic pressure

P_A = 30 kg/cm^2

Area receiving pressure that intends to move piston to left direction:

(S_1 in Fig. 131)

$$S_1 = \frac{\pi}{4} D_1^2 = \frac{\pi}{4} \times 0.70^2 = 0.385 \text{ cm}^2$$

As is evident from the foregoing, F_2, a force which tends to move the piston to the left direction, is computed as follows:

$F_2 = P_A \times S_1 = 30 \times 0.385 = 11.6$ kg

When F_2 equals to F_1, balance is obtained. However, when PA increases slightly, the piston is moved, thereby interrupting the passage between Ⓐ and Ⓑ .

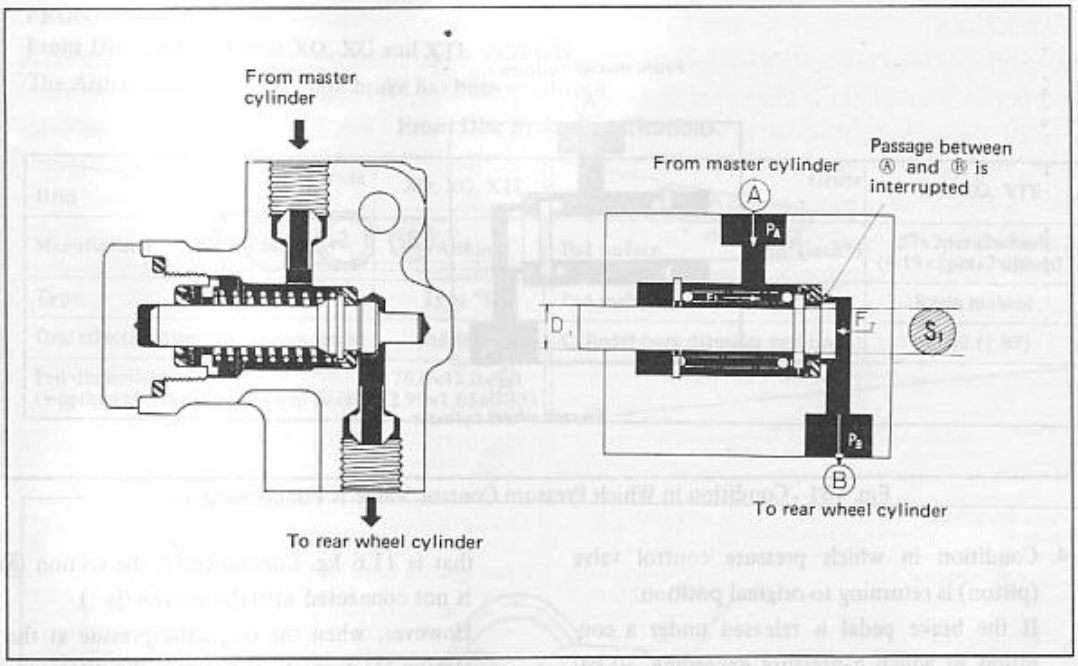


Fig. 130 Point Where Pressure Control Valve (Piston) Begins to Move

3. Condition in which pressure is controlled:

When P_A exceeds 30 kg/cm², the hydraulic pressure at the left side of the piston becomes greater than that at the right side of the piston. The following relationship is established among P_A, PB that is a hydraulic pressure applying to the rear wheel cylinder and F_1:

$$P_B \times S_2 = P_A (S_2 - S_1) + F_1$$

The following is explanation as to how the pressure is controlled, using pertinent values at respective sections as indicated in Fig. 128.

Spring force F_1 = 11.6 kg

Let us assume that the master cylinder hydraulic pressure P_A = 60 kg/cm².

Area receiving pressure that intends to move piston to left direction

(S_2 in Fig. 131)

$$S_2 = \frac{\pi}{4} \times D_2^2 = \frac{\pi}{4} \times 0.84^2 = 0.554 \text{cm}^2$$

Area receiving pressure that intends to move piston to right direction

(S_1 in Fig. 131)

$$S_0 = S_2 - S_1 = 0.554 - 0.385$$
$$= 0.169 \text{ cm}^2$$

P_B, the hydraulic pressure applying to the rear wheel cylinder, can be calculated using the following formula.

$$P_B \times S_2 = P_A (S_2 - S_1) + F_1$$

$$P_B = \frac{P_A \times S_0 + F_1}{S_2} = \frac{60 \times 0.169 + 11.6}{0.554}$$

$$= 39 \text{ kg/cm}^2$$

The foregoing calculation shows that P_B, the hydraulic pressure applying to the rear wheel cylinder, is reduced to 39 kg/cm², whereas the master cylinder hydraulic pressure P_A is 60 kg/cm².

Fig. 128 is the pressure control valve performance diagram which shows to what extent the hydraulic pressure is controlled, using typical values.

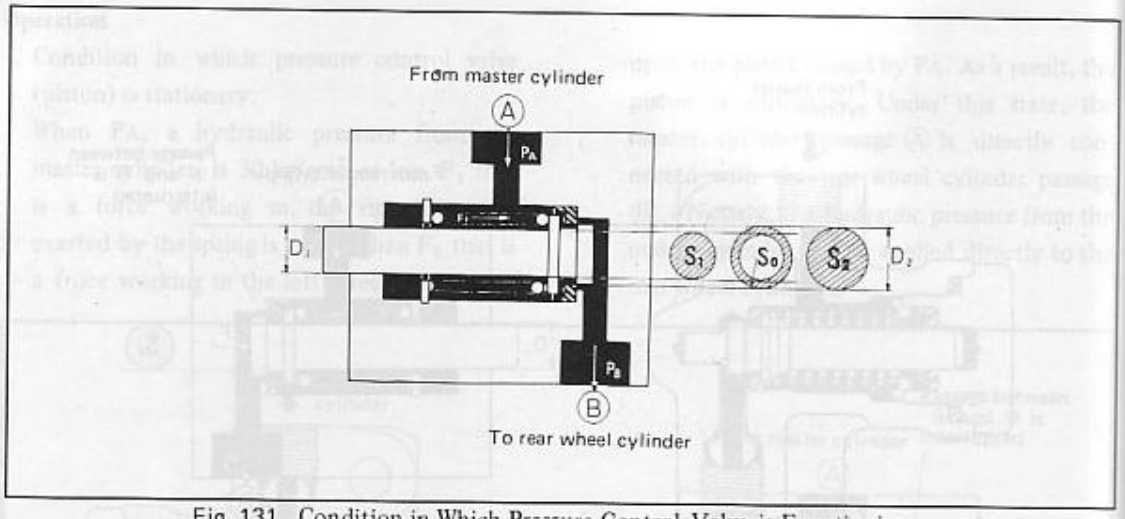


Fig. 131 Condition in Which Pressure Control Valve is Functioning

4. Condition in which pressure control valve (piston) is returning to original position:

If the brake pedal is released under a condition in which a pressure exceeding 30 kg/cm^2 is applied to the section Ⓐ, the pressure at the section Ⓐ drops to 0 kg/cm^2.

However, a pressure exceeding 30 kg/cm^2 is still applied to the section Ⓑ. Hence, the piston is pushed to the left side. As a result, the section Ⓐ is not connected with the section Ⓑ. (Under this condition, the force pushing the piston to the left direction, $F_2 = P_B \times S_2 = 30 \times 0.554 = 16.6$ kg.

Therefore, this force of F_2 is greater than F_1 that is 11.6 kg. Consequently, the section Ⓐ is not connected with the section Ⓑ.)

However, when the hydraulic pressue at the section Ⓐ drops to 0 kg/cm^2, the difference in pressure between the section Ⓐ and Ⓑ will cause the lip seal to be deflected. As a result, the pressure at the section Ⓑ will decrease, for its pressure escapes to the section Ⓐ. Then, the spring tension F_1 overcomes the pressure at the section Ⓑ, thus moving the piston to the right side. In this way, the section Ⓐ will be connected with the section Ⓑ to each other.

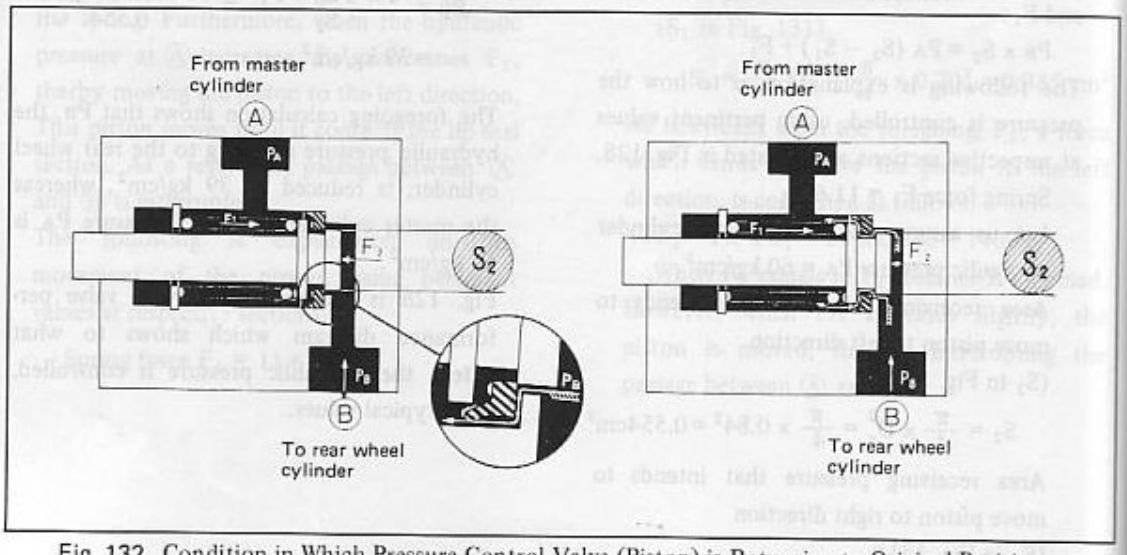


Fig. 132 Condition in Which Pressure Control Valve (Piston) is Returning to Original Position

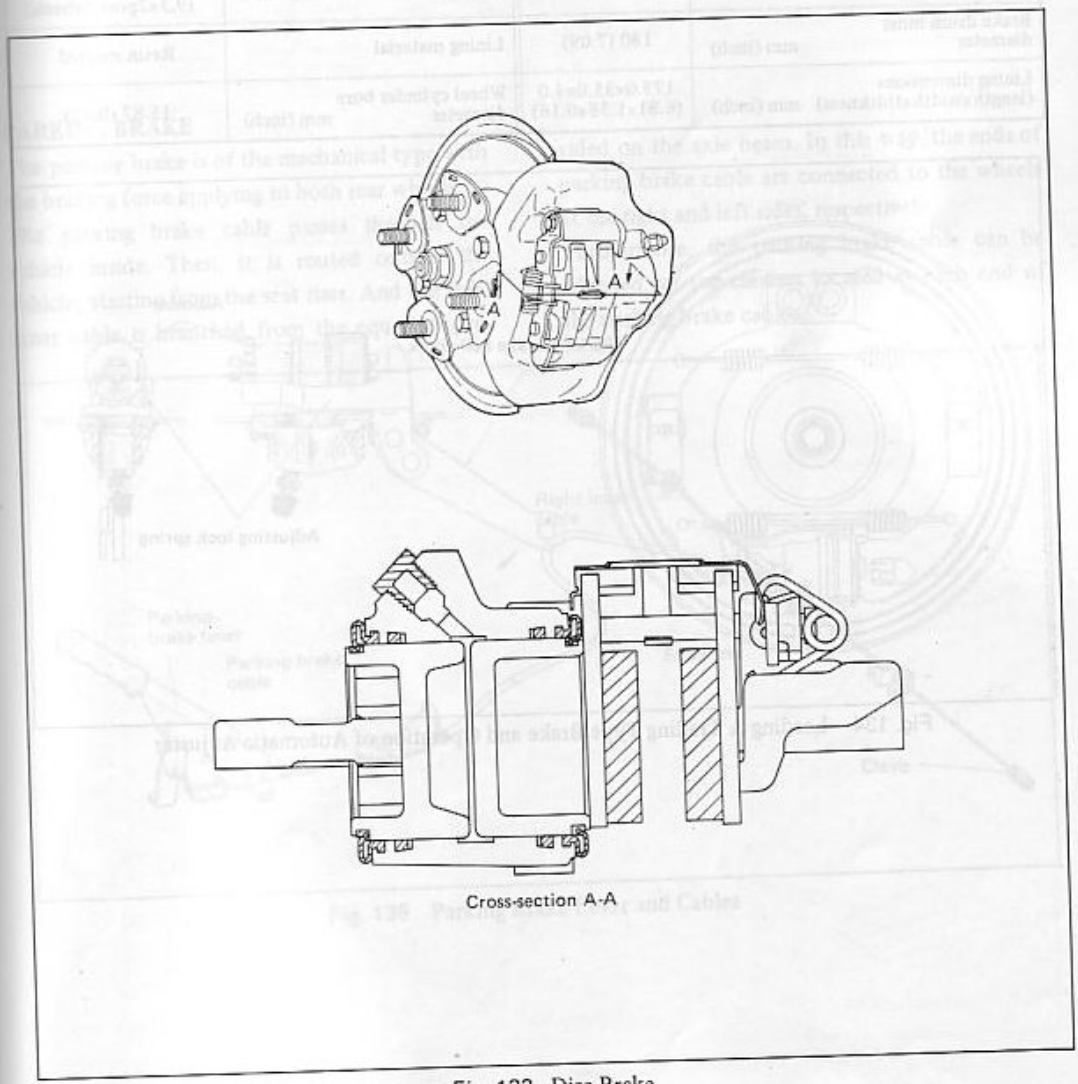
FRONT BRAKE

Front Disc Brake (Models XO, XG and XTE Vehicles)

The Aishin-made Type "B" disc brake has been employed.

Front Disc Brake Specifications

Item \ Grade	XO, XG, XTE	Item \ Grade	XO, XG, XTE
Manufacturer	Aishin	Pad surface cm^2 ($inch^2$)	27x2pcsx2wheels (4.19x2pcsx2wheels)
Type	Type "B"	Pad material	Resin molded
Disc effective diameter mm (inch)	164 (6.46)	Cylinder bore diameter mm (inch)	47.62 (1.87)
Pad dimensions (lengthxwidthxthickness) mm (inch)	76.0x42.0x9.0 (2.99x1.65x0.35)		



Cross-section A-A

Fig. 133 Disc Brake

REAR BRAKE

The rear brake is of the leading and trailing type equipped with an automatic brake shoe clearance adjusting device (which will be operated during the parking brake operation).

For simplified construction, the rear wheel cylinder is of the sliding cylinder type which incorporates only one piston.

When the braking force is applied and the brake shoe is pressed against the brake drum by means of the wheel cylinder piston, the reaction force of the piston will cause the wheel cylinder proper to slide on the backing plate, until the wheel cylinder proper pushes the brake shoe at the opposite side. As a result, the wheel is braked.

Rear Brake Specifications

Item \ Vehicle model	All models	Item \ Vehicle model	All models
Type	Leading & trailing	Lining surface cm² (inch²)	60×2pcs×2wheels (9.3×2pcs×2wheels)
Brake drum inner diameter mm (inch)	180 (7.09)	Lining material	Resin molded
Lining dimensions (length×width×thickness) mm (inch)	173.0×35.0×4.0 (6.81×1.38×0.16)	Wheel cylinder bore diameter mm (inch)	15.87 (0.62)

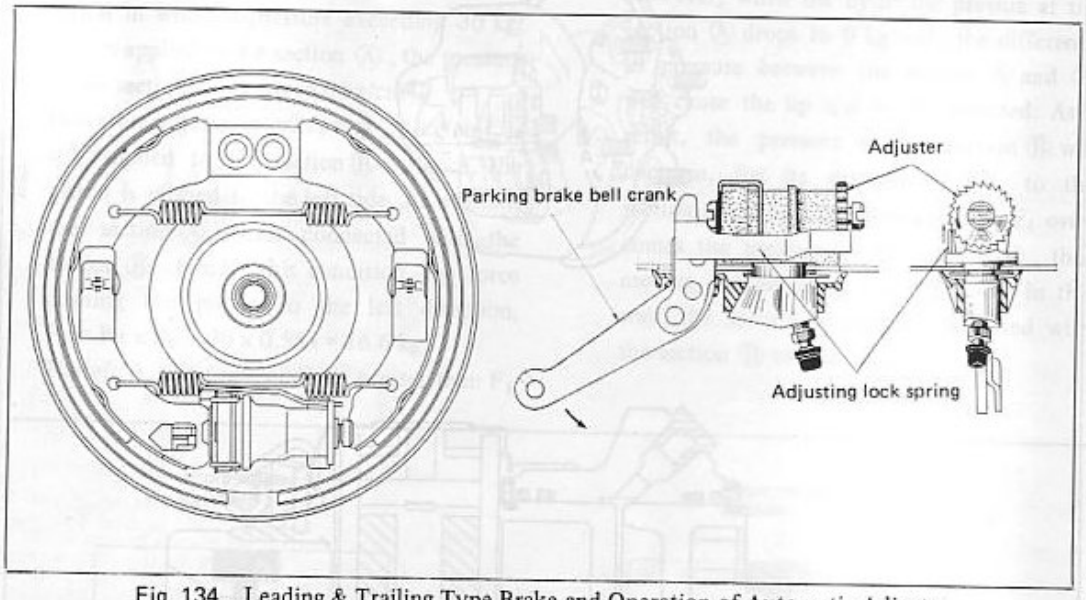


Fig. 134 Leading & Trailing Type Brake and Operation of Automatic Adjuster

Operation of Automatic Adjuster

The automatic brake shoe clearance adjusting device is actuated only when the parking brake is operated.

A spring is attached to the parking brake bell crank, as indicated in Fig. 135.

This spring locks the adjuster, by holding the tooth surface of the adjuster. Besides this locking operation, the adjusing lock spring will cause the adjuster's notch to be advanced, when the parking brake is pulled out, since the one end of the spring is secured at the bell crank.

When the brake shoe-to-drum clearance is within the specified value, the movement of the spring is not large enough to advance the adjuster by one notch. Conversely, when the brake shoe-to-drum clearance has exceeded the specified value due to worn brake lining, the operating angle of the bell crank becomes larger. Consequently, the movement of the spring, too, will become large enough to advance the adjuster by one notch, thus making it possible to maintain the shoe-to-drum clearance at the specified level at all times.

PARKING BRAKE

The parking brake is of the mechanical type with the braking force applying to both rear wheels.

The parking brake cable passes through the vehicle inside. Then, it is routed outside the vehicle, starting from the seat riser. And the right inner cable is branched from the equalizer provided on the axle beam. In this way, the ends of parking brake cable are connected to the wheels at the right and left sides, respectively.

Furthermore, the parking brake cable can be adjusted by the clevises located at each end of the parking brake cables.

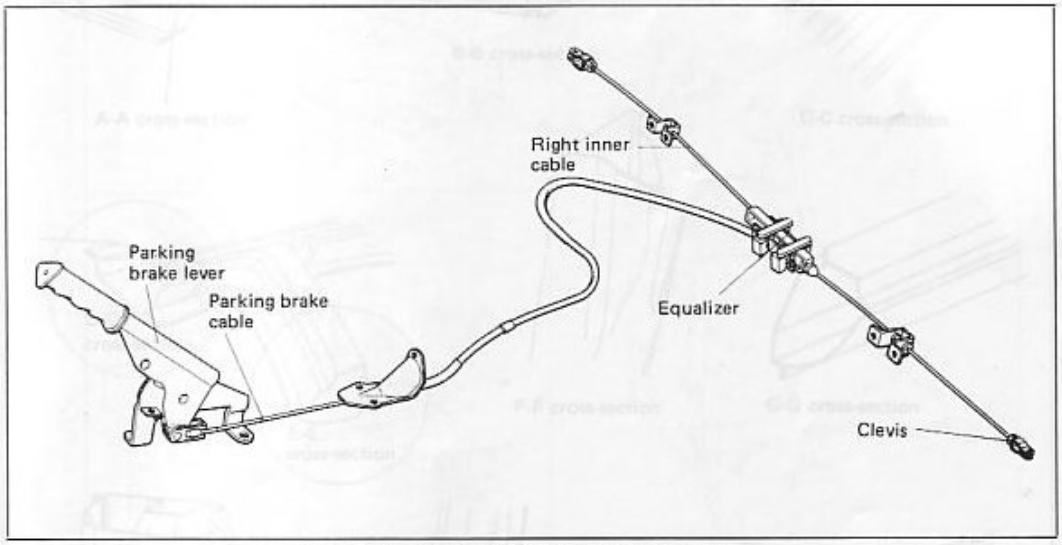


Fig. 135 Parking Brake Lever and Cables

PEDAL RELATED PARTS

The pedals are of the pendant type. The pedal-related specifications, such as the distance between pedals, height, leverage ratio and so forth, have been determined so that the pedals may be operated easily.

Pedal Related Specifications

Item \ Vehicle model		All models
Pedal height mm(inch)	Clutch	200 (7.87)
	Brake	200 (7.87)
Pedal leverage ratio	Clutch	4.36
	Brake	4.50
Stroke mm(inch)	Clutch	135 (5.31)
	Brake	140 (5.51)
Free travel mm(inch)	Clutch	15 ~ 30 (0.59 ~ 1.18)
	Brake	1 ~ 5 (0.04 ~ 0.20) (during engine running period)
Distance between pedals mm(inch)	Between clutch pedal and brake pedal	105 (4.13)
	Between brake pedal and accelerator pedal	110 (4.33)

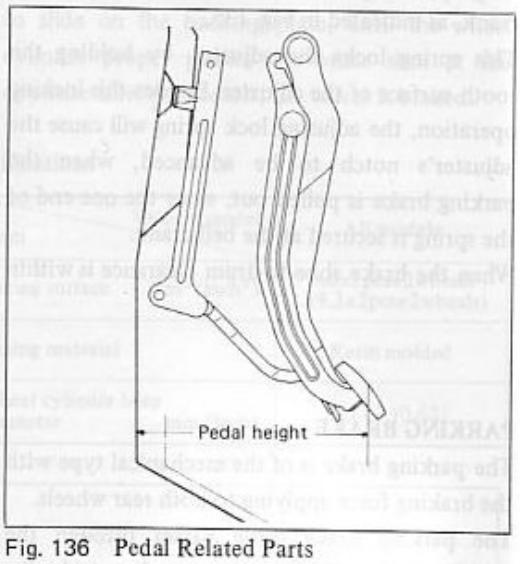


Fig. 136 Pedal Related Parts

PEDAL RELATED PARTS

The pedals are of the pendant type. The pedal-related specifications, such as the distance between pedals, height, leverage ratio and so forth, have been determined so that the pedals may be operated easily.

Pedal Related Specifications

Item \ Vehicle model		All models
Pedal height mm(inch)	Clutch	200 (7.87)
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Pedal leverage ratio	Clutch	4.36
	Brake	4.50
Stroke mm(inch)	Clutch	135 (5.31)
	Brake	140 (5.51)
Free travel mm(inch)	Clutch	15 ~ 30 (0.59 ~ 1.18)
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	Between brake pedal and accelerator pedal	110 (4.33)

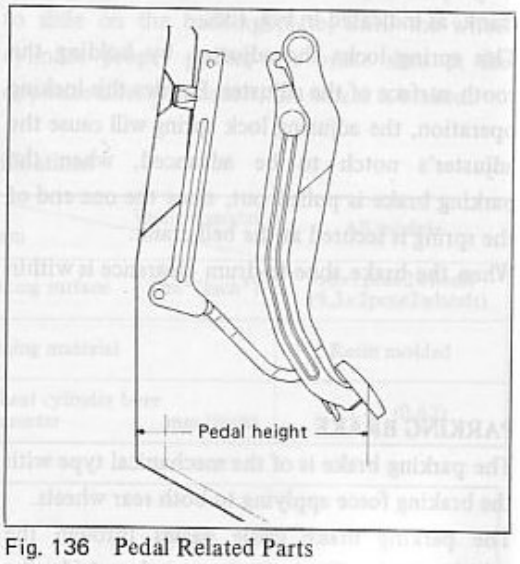


Fig. 136 Pedal Related Parts

BODY SECTIONAL CONSTRUCTION

Body Sealer

For improved rust-proof and water-proof characteristics, body sealer in sufficient quantity has been applied to each of various joint sections and hemming sections of the body sheets.

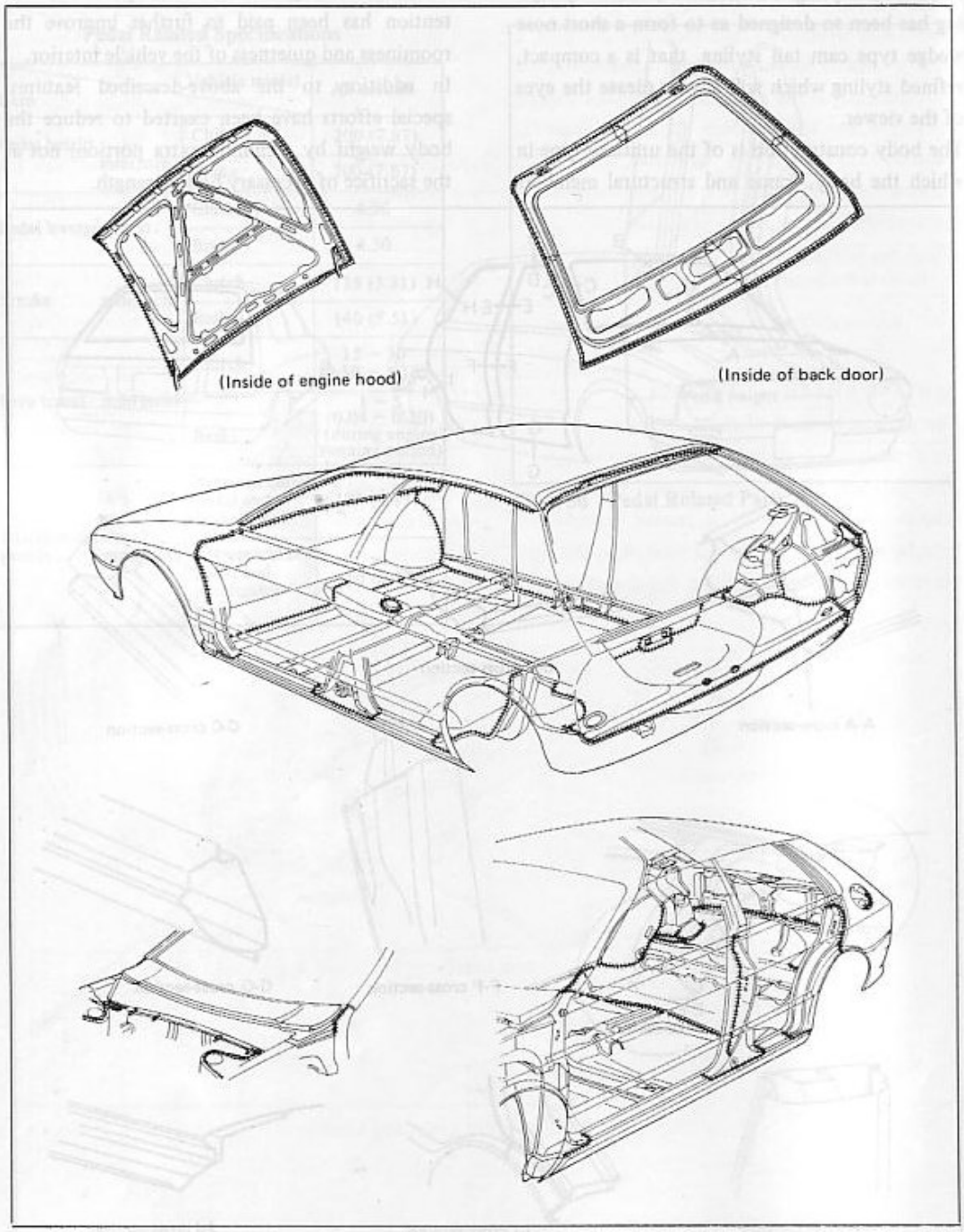


Fig. 138 Diagram Showing Body Sealer Applying Points

WEATHER STRIPS

As for the door weather strips, the hollow type which can provide superior sealing because of its wider body contact surface has been employed.

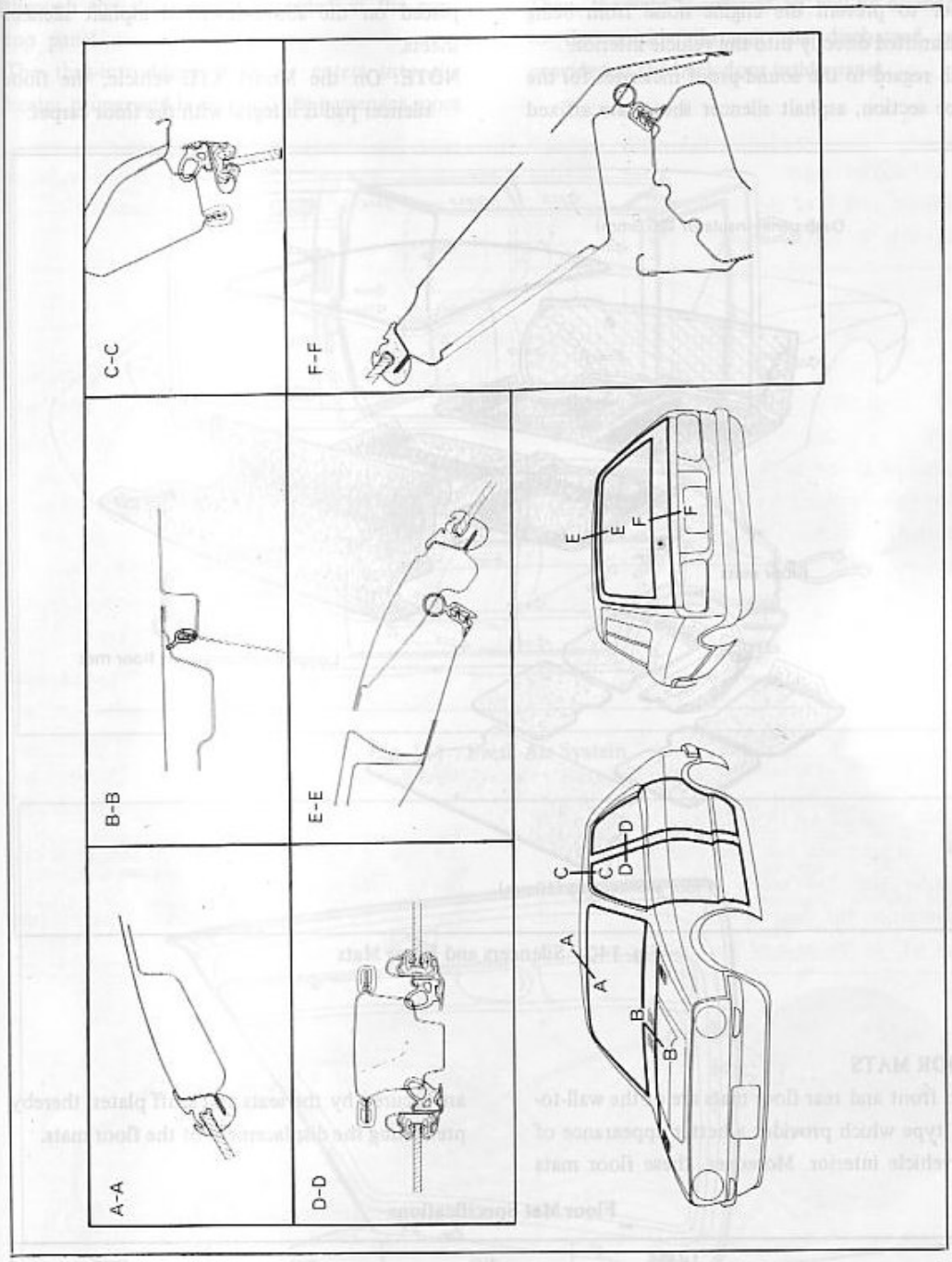


Fig. 139 Configuration of Weather Strips

SILENCERS

A large-sized dash panel insulator is installed at the passenger room side of the dash panel in order to prevent the engine noise from being transmitted directly into the vehicle interior.

With regard to the sound-proof measures for the floor section, asphalt silencer sheets are affixed over the floor sections. In addition, floor silencer pads which are made of linen-woven felt are placed on the above-described asphalt silencer sheets.

NOTE: On the Model XTE vehicle, the floor silencer pad is integral with the floor carpet.

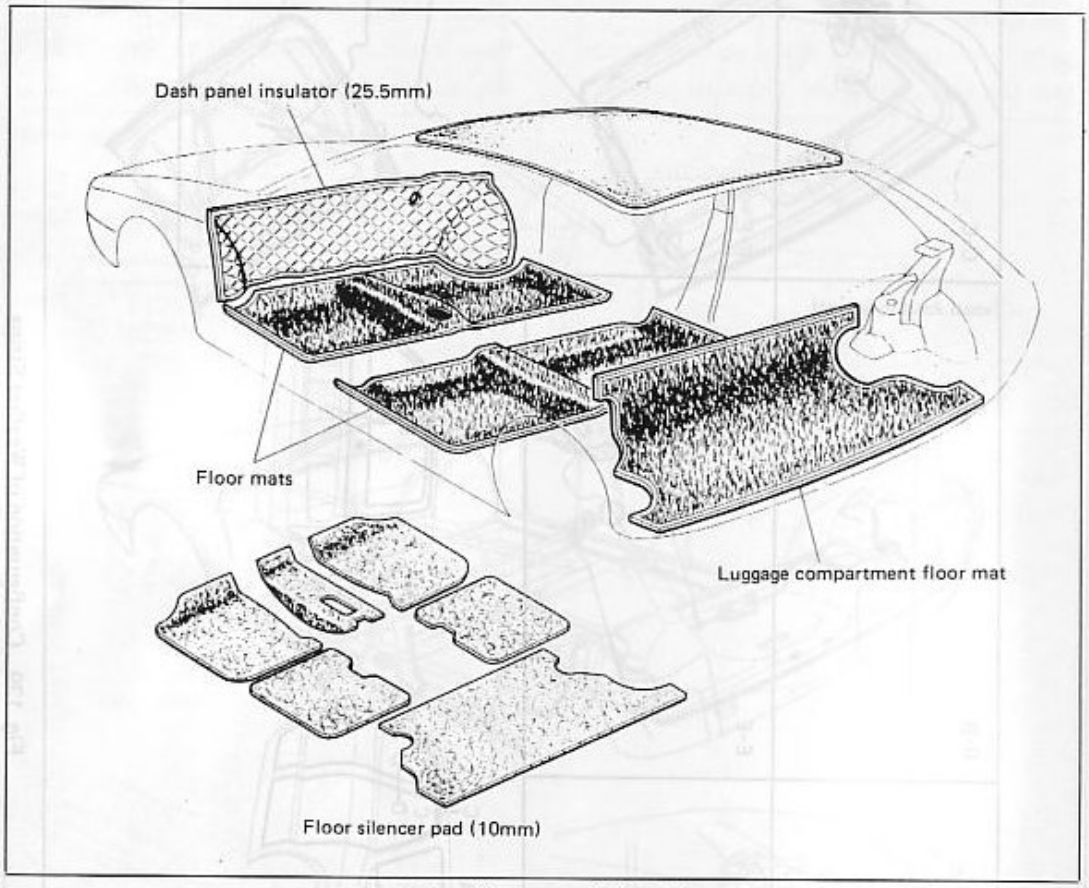


Fig. 140 Silencers and Floor Mats

FLOOR MATS

Both front and rear floor mats are of the wall-to-wall type which provides a better appearance of the vehicle interior. Moreover, these floor mats are secured by the seats and scuff plates, thereby preventing the displacement of the floor mats.

Floor Mat Specifications

Item \ Grade	XO	XG	XTE
Floor mat	Vinyl	←	Carpet
Luggage compartment floor mat	Vinyl	←	Carpet

VENTILATION OF VEHICLE INTERIOR (Fresh Air System)

A positive ventilation system has been employed. Fresh air is introduced into the vehicle interior through the slit sections provided in the cowl top panel.

The thus-introduced fresh air enters into the heater proper and is sent into the passenger room through those ventilators that are located at both sides as well as at the center of the dash panel. Then, the vehicle interior air will be discharged to the outside through the discharged ports provided at the back door inside panel.

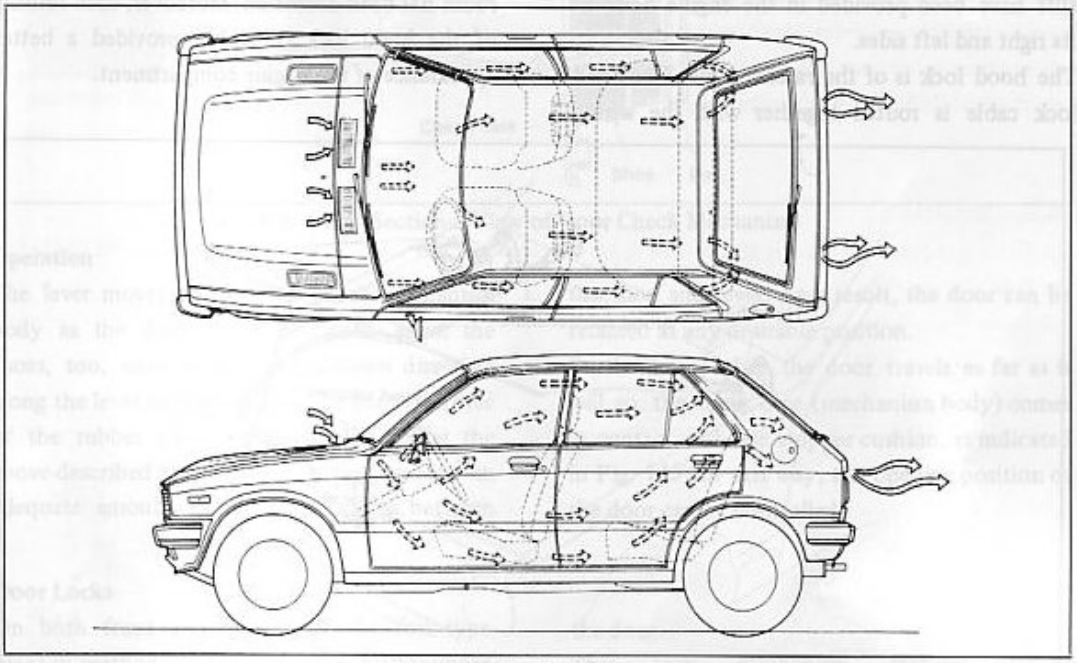


Fig. 141 Fresh Air System

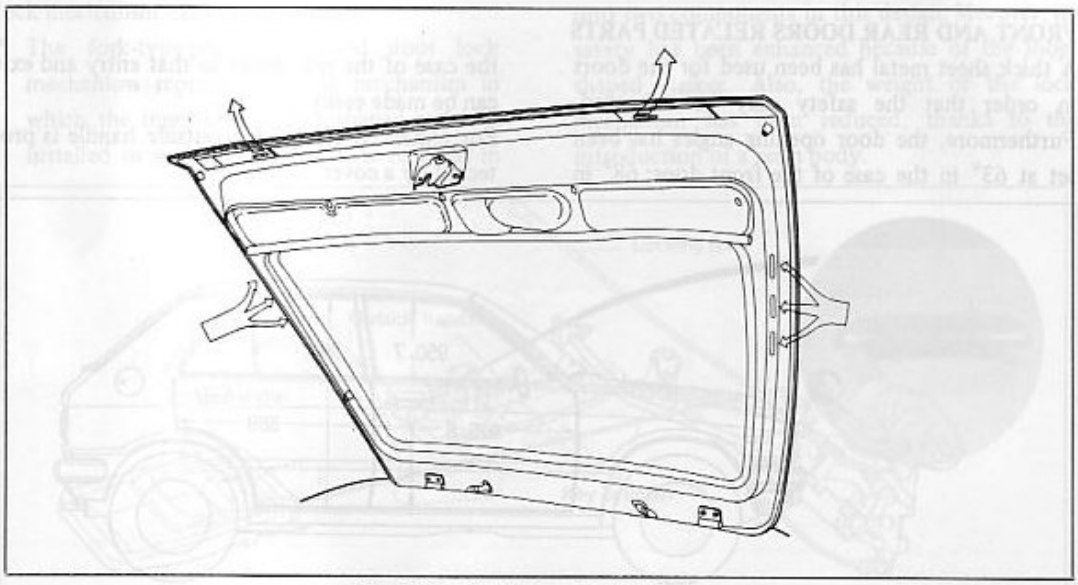


Fig. 142 Back Door Inside Panel

BODY APPOINTMENTS

ENGINE HOOD RELATED PARTS

The engine hood is the rear arm hinged type in which the front end can be lifted. And the hood will be supported by a bar at its raised position. To provide better ventilation and cooling characteristics in the engine compartment, louver slits have been provided in the engine hood at its right and left sides.

The hood lock is of the ratchet type. The hood lock cable is routed together with the wiring harness through the inside of the right fender panel. In this way, the number of the passing-through holes in the dash panel has been reduced. Consequently, the level of noises which are transmitted from the engine to the passenger room has been decreased. Moreover, such routing of the hood lock cable has provided a better appearance of the engine compartment.

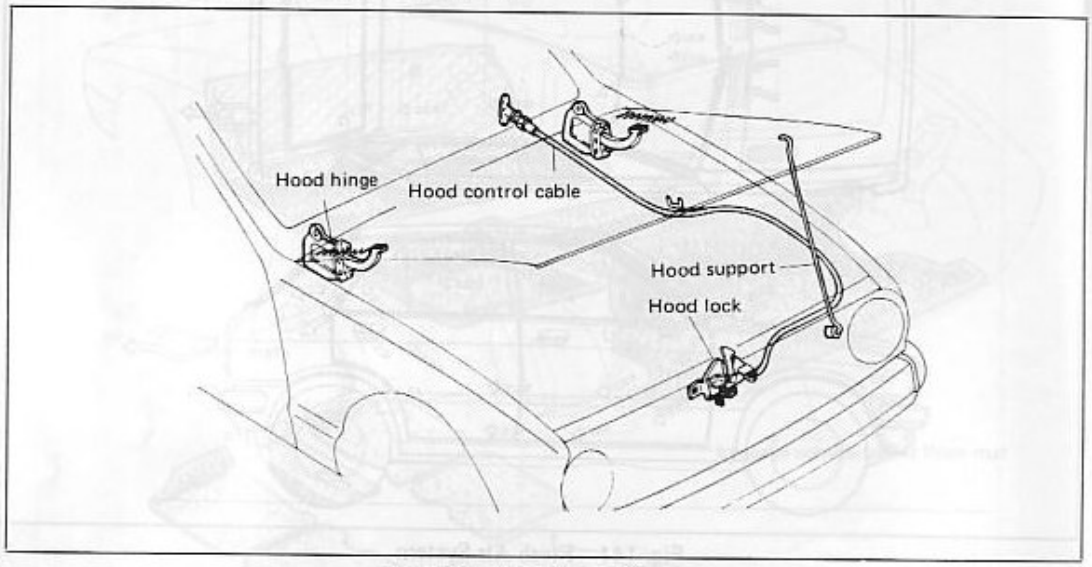


Fig. 143 Hood Lock Diagram

FRONT AND REAR DOORS RELATED PARTS

A thick sheet metal has been used for the doors in order that the safety may be enhanced. Furthermore, the door opening angles has been set at 63° in the case of the front door; 68° in the case of the rear doors so that entry and exit can be made easily.

For enhanced safety, the outside handle is protected by a cover.

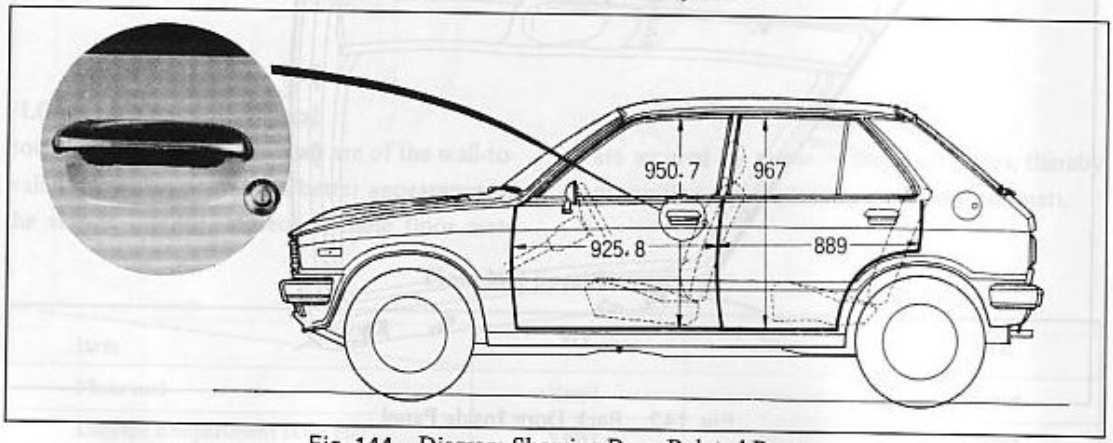


Fig. 144 Diagram Showing Door Related Parts

Door Check Mechanism

The door check mechanism has been newly introduced. This mechanism makes it possible to retain the door at any desirable position over the range between the half-opened position and the fully-opened position. This unique feature provides easy entrance/exit of the vehicle, especially at those narrow places.

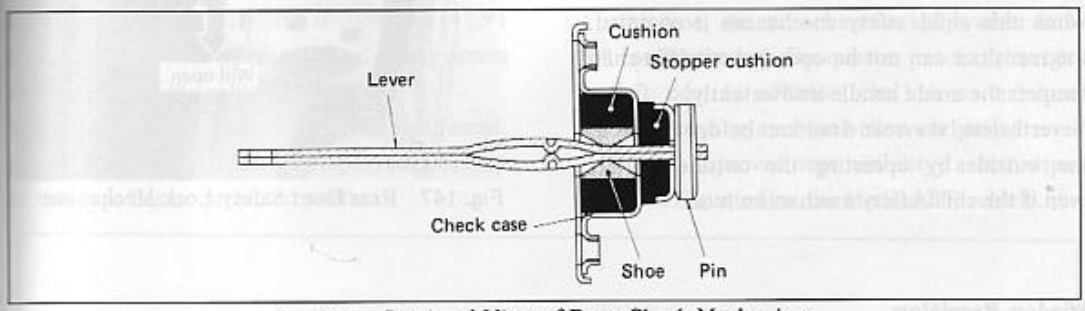


Fig. 145 Sectional View of Door Check Mechanism

Operation

The lever moves through the check mechanism body as the door opens or closes. Then, the shoes, too, move in the up-and-down direction along the lever curved surface. The reaction force of the rubber piece which occurs during the above-described movement will provide an adequate amount of sliding resistance between the shoe and lever. As a result, the door can be retained at any desirable position.

Furthermore, when the door travels as far as it will go, the check case (mechanism body) comes in contact with the stopper cushion, as indicated in Fig. 145. In this way, the opening position of the door can be controlled.

Door Locks

On both front and rear doors, the fork-type-plant-in method has been adopted. Furthermore, the locking lever type (lock button type) inside lock mechanism has been employed.

* The fork-type-plant-in method door lock mechanism represents a lock mechanism in which the inner lever is fork-shaped and it is installed in such a way that it is recessed in the door.

This lock mechanism features robust construction since the reaction force is divided into two components in this design. Morover, its safety has been enhanced because of the loop-shaped striker. Also, the weight of the lock mechanism has been reduced, thanks to the introduction of a resin body.

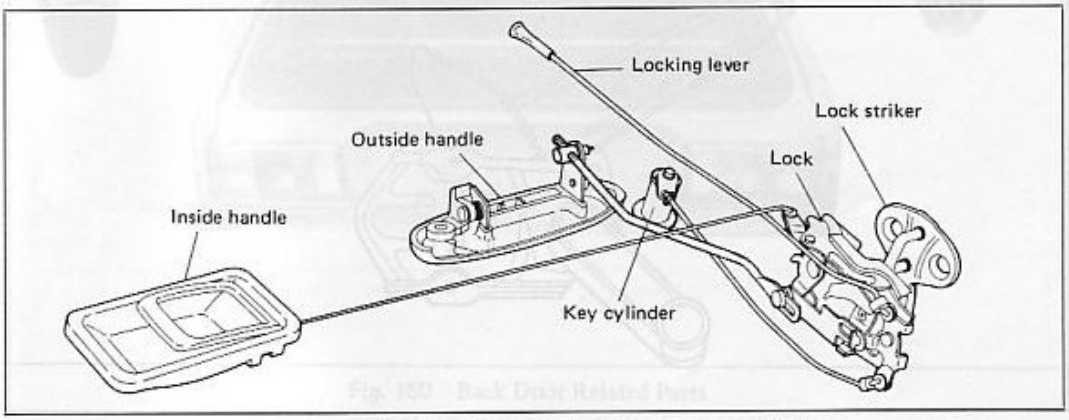


Fig. 146 Schematic Diagram of Door Lock Mechanism

Rear Door Safety Lock Mechanism

In addition to the locking lever type mechanism (push-button type) as with the front door, the inside lock mechanism on the rear door has incorporated a child safety mechanism. When this child safety mechanism is operated, the rear door can not be operated even if a child tampers the inside handle inadvertently. Nevertheless, the rear door can be opened from the outside by operating the outside handle, even if the child safety mechanism is on.

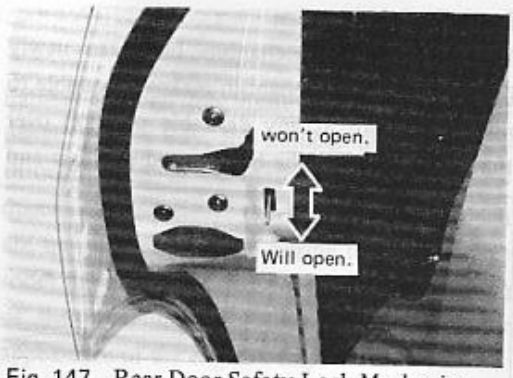


Fig. 147 Rear Door Safety Lock Mechanism

Window Regulators

The front window regulator is the X arm type, whereas the rear window regulator employs the single lift arm type.

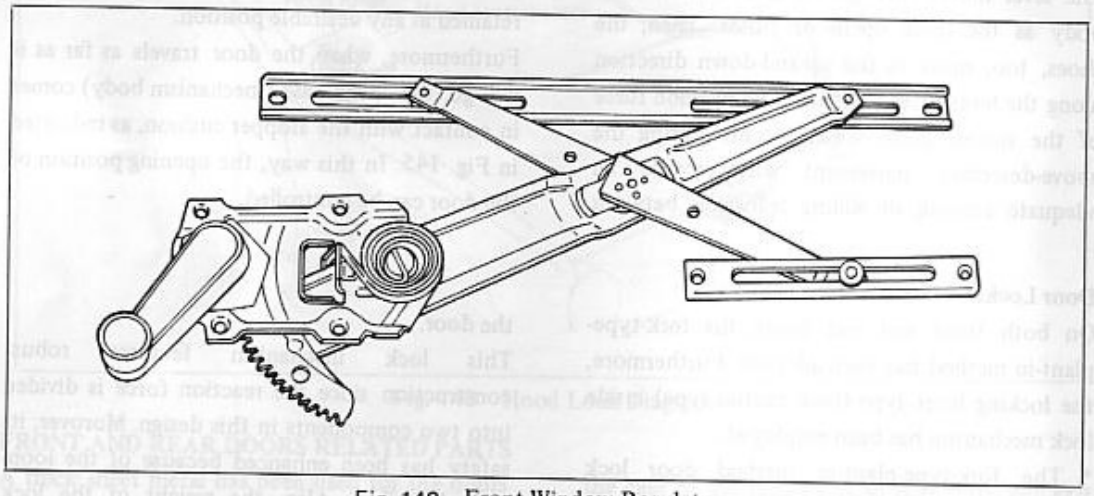


Fig. 148 Front Window Regulator

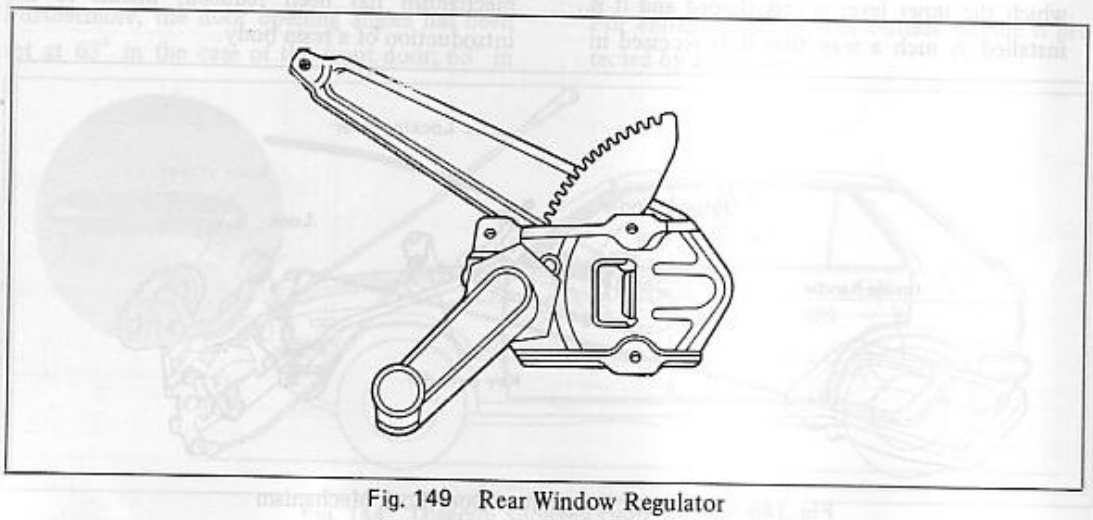


Fig. 149 Rear Window Regulator

BACK DOOR RELATED PARTS

The back door is of the single-sheet, pop-up type. The height of the back door at its raised position is 1740mm (68.50 inches) above the ground. (The back door assumes an angle of 75°, when fully opened.) And its width is 1090mm (42.91 inches). Such a wide opening provides easy access to the inside of the vehicle.

With regard to the back door stay, a small-sized, gas-sealed type stay has been employed. The stay of this type has no projected portions.

Inasmuch as the package tray is interlocked with the opening/closing of the back door, the luggage room can be used with ease, (excluding the Model XO vehicle).

Furthermoe, the wire harness and washer hose are routed through the quarter panel at the right or left side. In addition, the harness and hose are protected by a rubber bellows tube.

Also, for improved rear visibility, a rear wiper has been mounted on the Model XTE vehicle.

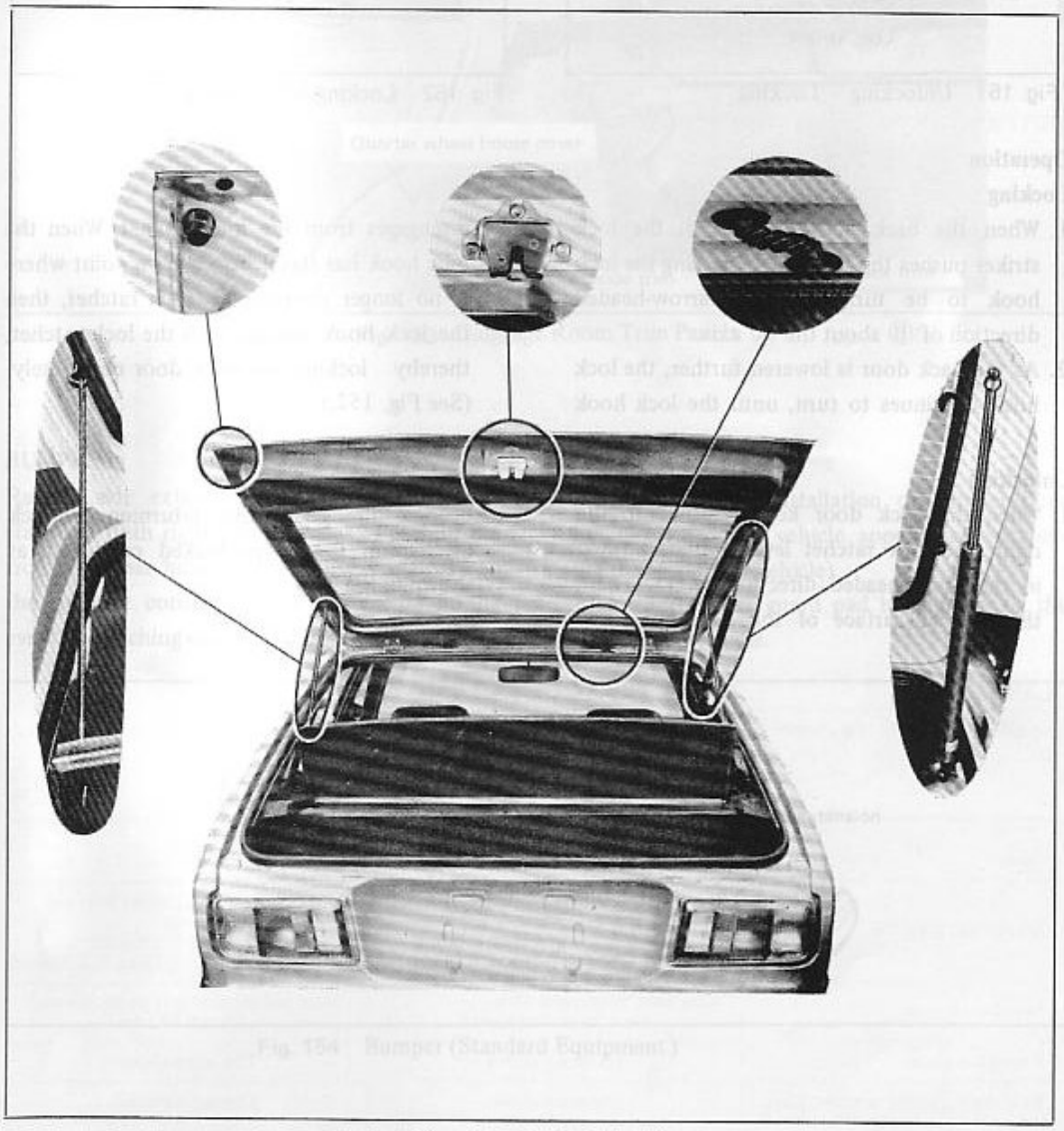


Fig. 150 Back Door Related Parts

Back Door Lock

The back door can be unlocked by means of the key. And the door can be locked, while holding the door lightly.

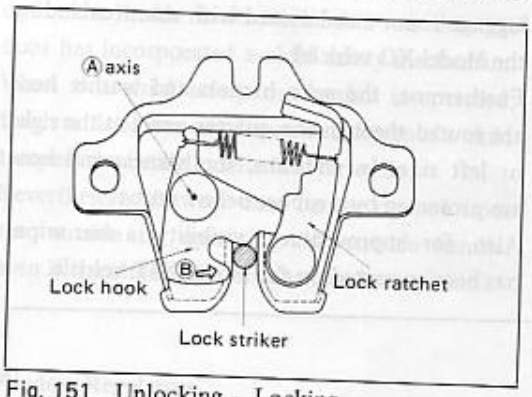


Fig. 151 Unlocking – Locking

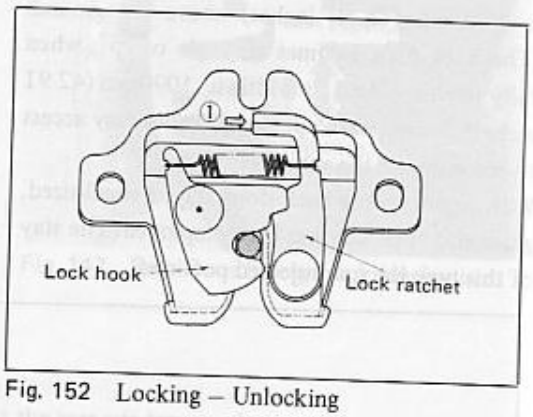


Fig. 152 Locking – Unlocking

Operation

Locking

1. When the back door is lowered, the lock striker pushes the lock hook, causing the lock hook to be turned in the arrow-headed direction of Ⓑ about the Ⓐ axis.
2. As the back door is lowered further, the lock hook continues to turn, until the lock hook disengages from the lock ratchet. When the lock hook has traveled to such a point where it no longer contacts the lock ratchet, then the lock hook engages with the lock ratchet, thereby locking the back door completely. (See Fig. 152.)

Unlocking

1. When the back door key is turned to the right, the lock ratchet lever will be pushed in the arrow-headed direction of ①. Then, the contact surface of the lock hook will become disengaged, thus returning the lock mechanism to the pre-locked condition, as shown in Fig. 151.

Back Door Lock

The back door can be unlocked by means of the key. And the door can be locked, while holding the door lightly.

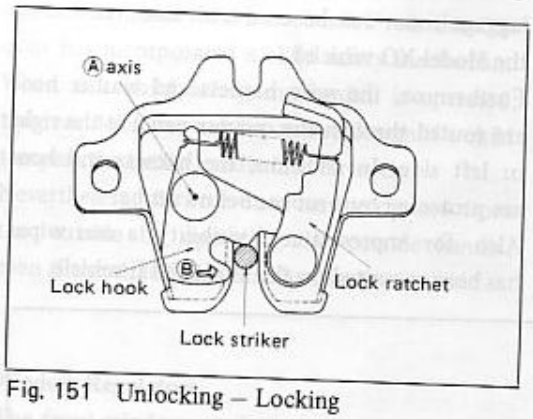


Fig. 151 Unlocking – Locking

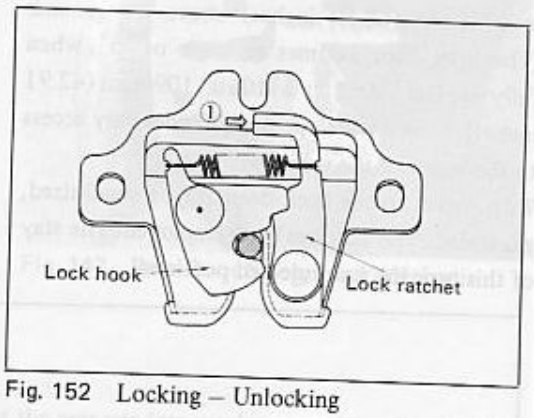


Fig. 152 Locking – Unlocking

Operation

Locking

1. When the back door is lowered, the lock striker pushes the lock hook, causing the lock hook to be turned in the arrow-headed direction of Ⓑ about the Ⓐ axis.
2. As the back door is lowered further, the lock hook continues to turn, until the lock hook disengages from the lock ratchet. When the lock hook has traveled to such a point where it no longer contacts the lock ratchet, then the lock hook engages with the lock ratchet, thereby locking the back door completely. (See Fig. 152.)

Unlocking

1. When the back door key is turned to the right, the lock ratchet lever will be pushed in the arrow-headed direction of ①. Then, the contact surface of the lock hook will become disengaged, thus returning the lock mechanism to the pre-locked condition, as shown in Fig. 151.

Luggage Room Trim Related Parts

To provide a better appearance, the inside of the luggage room has been lined with resin trim panels.

Each trim panel is secured, except some places, by means of plastic clips which will not rust.

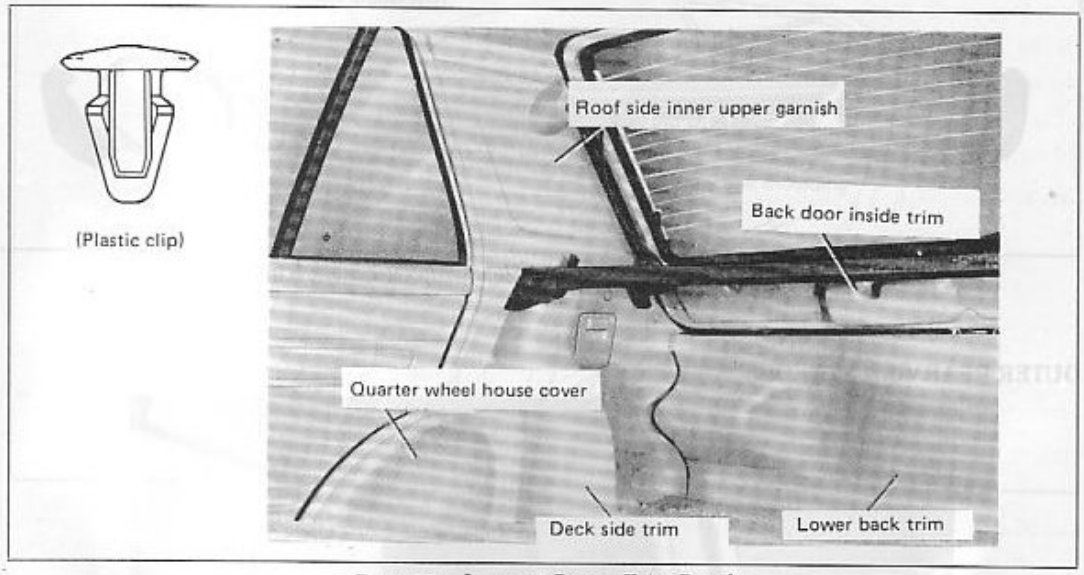


Fig. 153 Luggage Room Trim Panels

BUMPERS

Rubber side extension bumpers have been installed at both right and left sides of each of the front and rear bumpers. In this way, damage to the bumper corners can be minimized in the event of touching other objects.

Furthermore, the installation of bumper filler has beautified the vehicle appearance, (excluding the Model XO vehicle).

Also, the bumper guard pad is standard on the Model XTE vehicle.

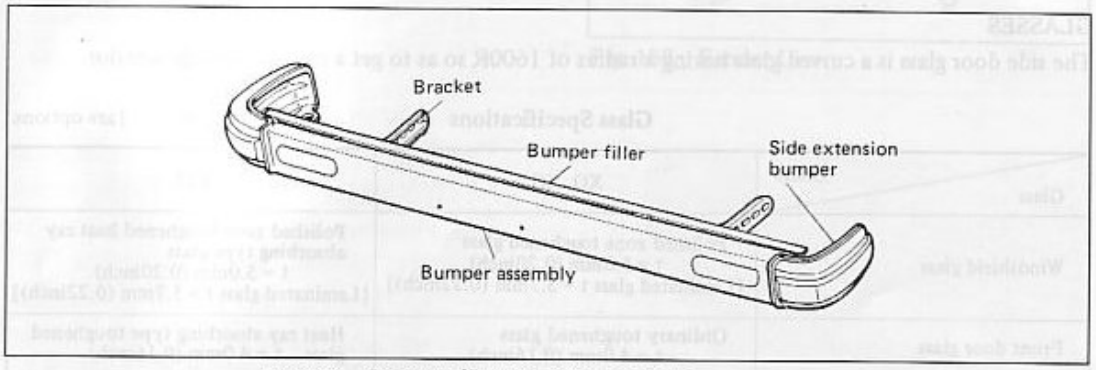


Fig. 154 Bumper (Standard Equipment)

RADIATOR GRILLE AND HEADLAMP ORNAMENT RINGS

All models share the same radiator grille which is of the three-piece type.

The headlamp ornament ring is of the snapping-in type which features easy removal/installation.

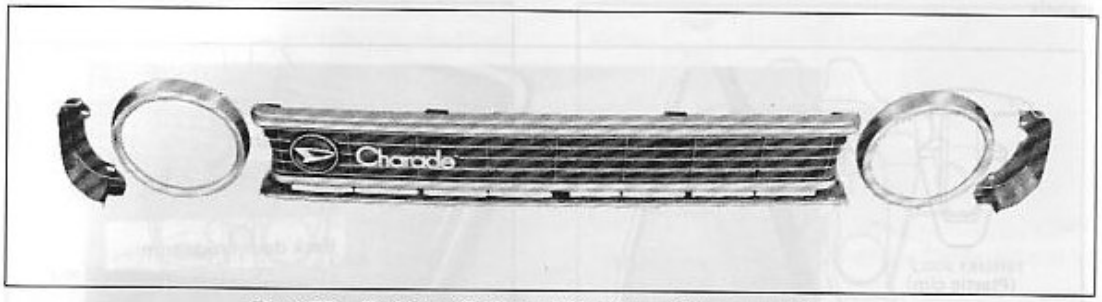


Fig. 155 Radiator Grille and Headlamp Ornament Rings

OUTER REARVIEW MIRRORS

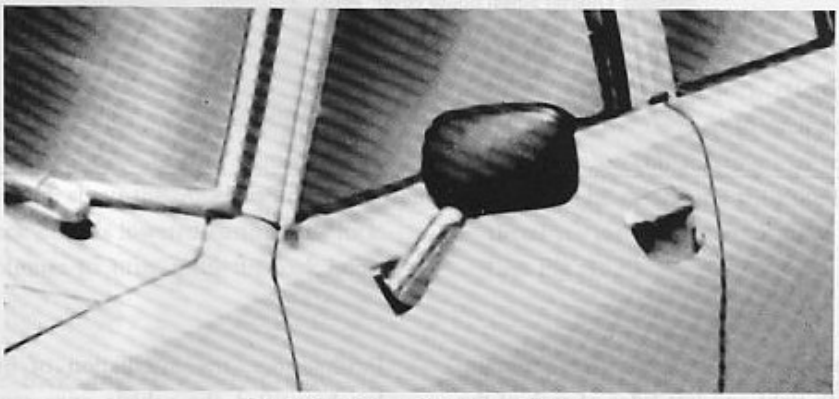


Fig. 156 Outer Rearview Mirrors

GLASSES

The side door glass is a curved glass having a radius of 1600R so as to get a roomier vehicle interior.

Glass Specifications

Items in [ ] are options.

Glass \ Grade	XO, XG	XTE
Windshield glass	Polished zone toughened glass t = 5.0mm (0.20inch) [Laminated glass t = 5.7mm (0.22inch)]	Polished zone toughened heat ray absorbing type glass t = 5.0mm (0.20inch) [Laminated glass t = 5.7mm (0.22inch)]
Front door glass	Ordinary toughened glass t = 4.0mm (0.16inch)	Heat ray absorbing type toughened glass t = 4.0mm (0.16inch)
Rear door glass	The same above	The same above
Rear door quarter window glass	The same above	The same above
Back door glass	The same above [Heat ray absorbing type toughened glass with defogger t = 4.0mm (0.16inch)]	Heat ray absorbing type toughened glass with defogger t = 4.0mm (0.16inch)

MOULDINGS

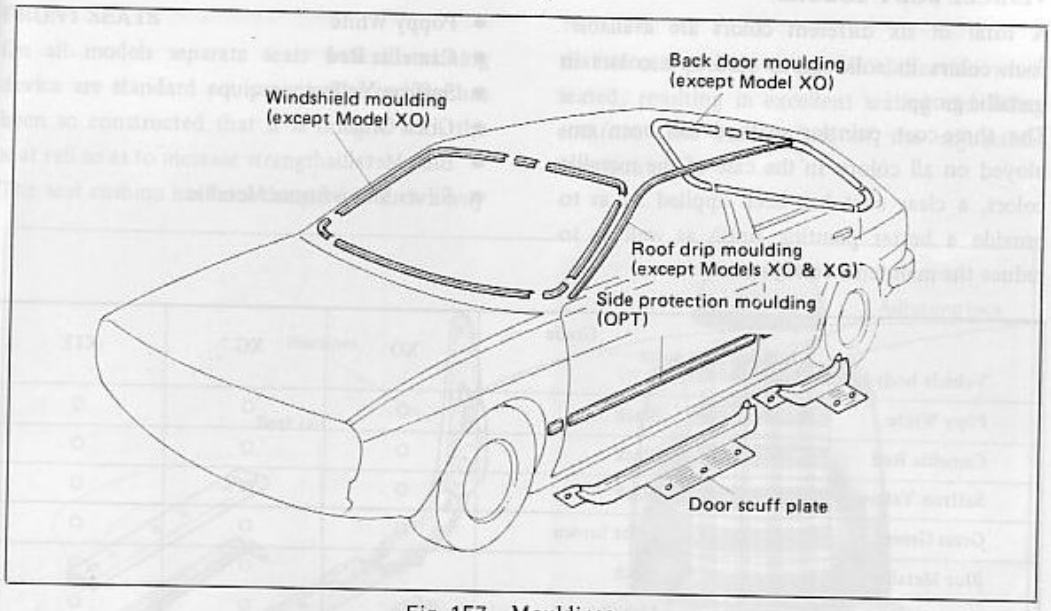


Fig. 157 Mouldings

Fender Liners

A fender liner made of polyethylene (PE) has been installed at each front fender in order that the inside of the fender may not be corroded or may not emanate noises becuase of grit or mud that is most likely bounced by the tire during the vehicle running.

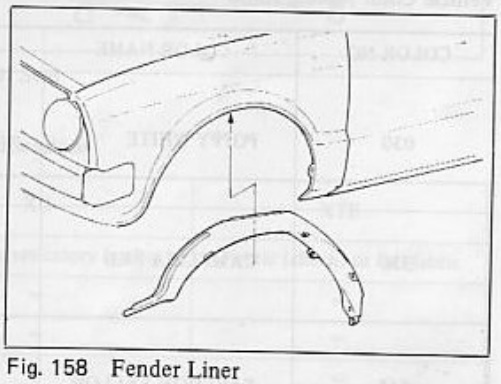


Fig. 158 Fender Liner

VEHICLE BODY COLORS

A total of six different colors are available: four colors in solid group and two colors in metallic group.

The three-coat painting method has been employed on all colors. In the case of the metallic colors, a clear coat has been applied so as to provide a better painting finish as well as to reduce the maintenance expense.

- Poppy White
- Camellia Red
- Saffron Yellow
- Grass Green
- Blue Metallic
- Silver Moon Stone Metallic

Vehicle body color \ Grade / Interior trim color		XO	XG	XTE
Popy White	Black	○	○	○
Camellia Red	Black	○	○	○
Saffron Yellow	Black	○	○	○
Grass Green	Light brown	○	○	○
Blue Metallic	Black	○	○	○
Silver Moon Stone Metallic	Light brown	○	○	○

Vehicle Color Mixing Ratio

* Made by KANSAI PAINT CO., LTD.

COLOR NO.	COLOR NAME	PRIMARY COLOR		MIXING RATIO
030	POPPY WHITE	1531	WHITE	98%
		1361	OXIDE YELLOW	small amount
		1618	DEEP GREEN	small amount
		1400	DEEP BLACK	small amount
		1584	INDIAN RED	small amount
336	CAMELLIA RED	1480	ROZAN ORENGE	54
		1584	INDIAN RED	29
		1330	BON RED	16
		1131	AUTO WHITE	1
545	SAFFRON YELLOW	1629	ROYAL YELLOW	42
		1611	SAFFRON YELLOW	29
		1131	AUTO WHITE	23
		1361	OXIDE YELLOW	6
		1681	DEEP GREEN	small amount
6B2	GRASS GREEN	1618	DEEP GREEN	54
		1629	ROYAL YELLOW	35
		1131	AUTO WHITE	11
		1400	DEEP BLACK	small amount
870	BLUE METALLIC	1617	FRESH BLUE	75.0
		1628	ROYAL VIOLET	5.0
		1101	METALLIC BASE	5.0
		1202	SUN METALLIC BASE	15.0
		1400	DEEP BLACK	small amount
125	SILVER MOON STONE METALLIC	1202	SUN METALLIC BASE	75
		1101	METALLIC BASE	25
		1400	DEEP BLACK	Small amount

INTERIOR APPOINTMENTS

FRONT SEATS

On all models separate seats with a reclining device are standard equipment. The recliner has been so constructed that it is integral with the seat rail so as to increase strength.

The seat cushion has been designed in such a way that it can provide a smooth deflection when seated, resulting in excellent seating and riding comfort. The headrest is of the adjustable, insertion type.

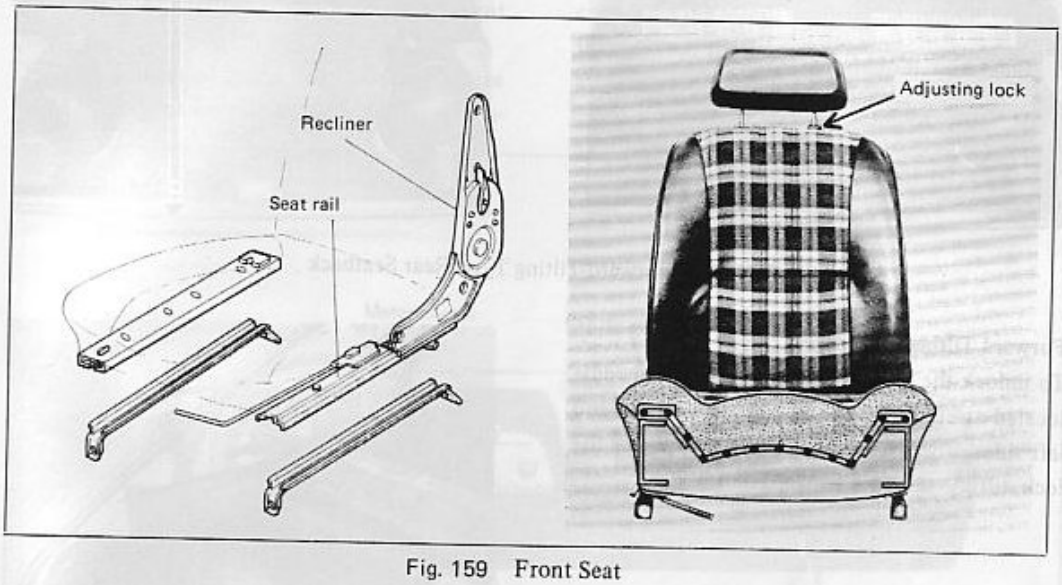


Fig. 159 Front Seat

Front Seat Specifications

Item \ Grade	XO	XG	XTE
Main seat	Ordinary leather	Ventilative vesicatory leather	Fabric (check) or full-fabric
Seat sliding amount	160mm (6.30inches)	←	←
Reclining device	Equipped	←	←
Headrest	Insertion type	←	←

REAR SEAT

The rear seat is of the bench type on which two persons can seat. It uses molded urethane.

The seat cushion is the corner-cut type where both ends of the rear seat are rounded, thereby making it possible for passengers to make easier entrance and exit.

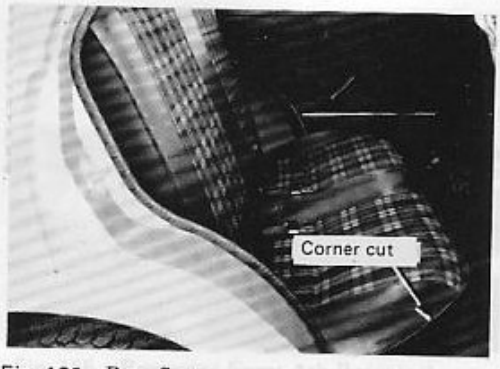


Fig. 160 Rear Seat

Forward-Tilting Type Seatback (Except Model XO)

When the seatback is tilted forward, the vehicle interior will become integral with the luggage room. Consequently, the space of the vehicle interior and luggage room can be utilized in a most effective way.

Fig. 161 Forward-Tilting Type Rear Seatback

Forward Tilting Procedure

To unlock the seatback, operate the lever handle located at each seatback stopper on the right and left sides of the package tray. After releasing the lock, tilt the seatback forward.

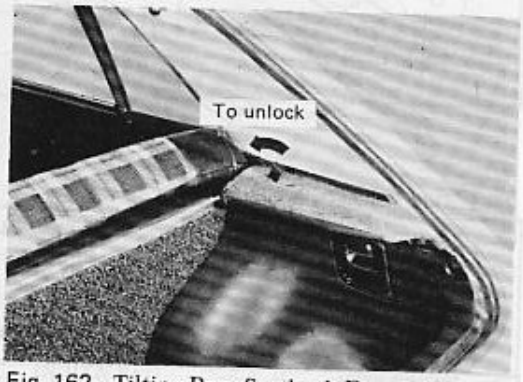


Fig. 162 Tilting Rear Seatback Forward

SEAT BELTS

The three-point, continuous webbing type equipped with E.L.R seat belt is standard equipment.

The retractor is recessed inside the center piller, thereby making the foot area more specious.

Fig. 163 Front Seat Belt

INSTRUMENT PANEL RELATED PARTS

The instrument panel consists of the instrument core, safety pad, meter cluster and glove compartment, etc. The instrument panel has been so constructed that the projected area is small, while the leg space is large. Furthermore, the visibility has been further improved by the newly-designed configuration of the instrument panel.

On the instrument panel are arranged three round-shaped meters side by side. And the warning lamps are located below the center of the meter cluster in order that the centralized control of the warning lamps, e.g. monitoring of burnt out bulbs, may be performed effectively and effortlessly. Moreover, the centralized, integral type switch has been employed, further enhancing the safety and easy-operation.

In addition, the suspension type console box is available as optional equipment.

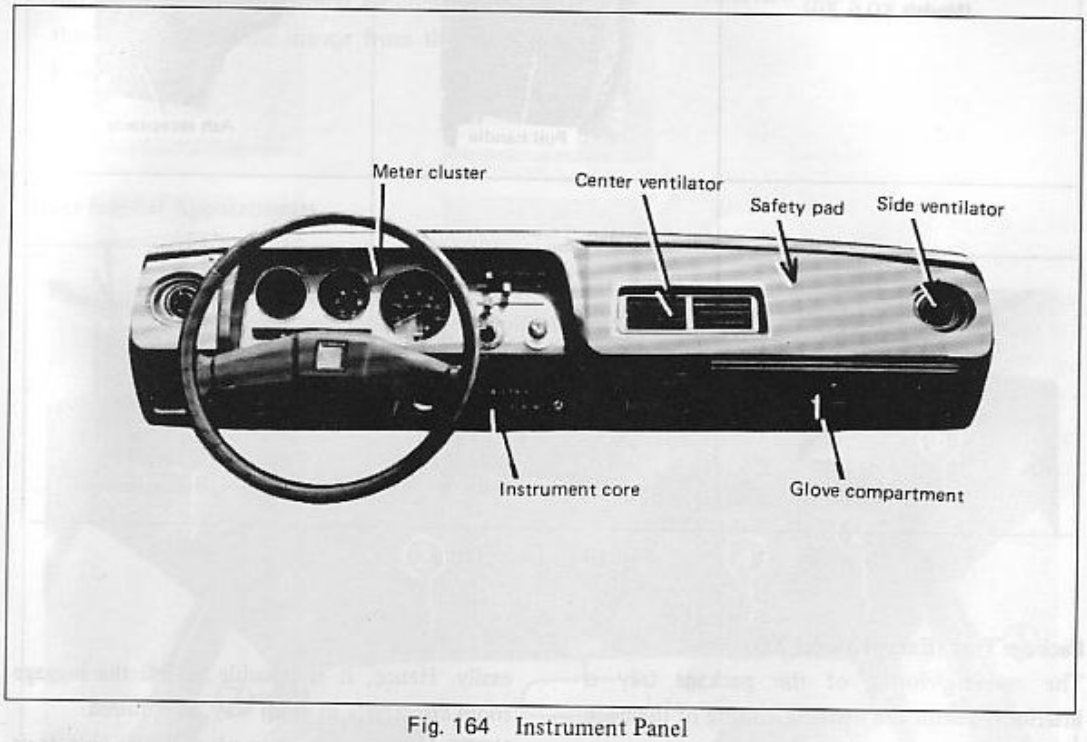


Fig. 164 Instrument Panel

Ash Receptacle

The ash receptacle is of the two-stage-pulling-out type. It should be pulled out two stages when it is removed for the purpose of cleaning. The rear ash receptacle is incorporated into each of the rear door trim panels at the right and left sides. As a result, the space at the rear seat can be utilized effectively.

Fig. 165 Removing Front Ash Receptacle

DOOR TRIMS

Both front and rear doors come in two different specifications: the semi-trim and full-trim specifications. They are selected depending upon grades of vehicle models.

With regard to the pull handle, it is available in two kinds. A large-sized, deluxe type pull handle is mounted on those vehicles having full-trim specifications.

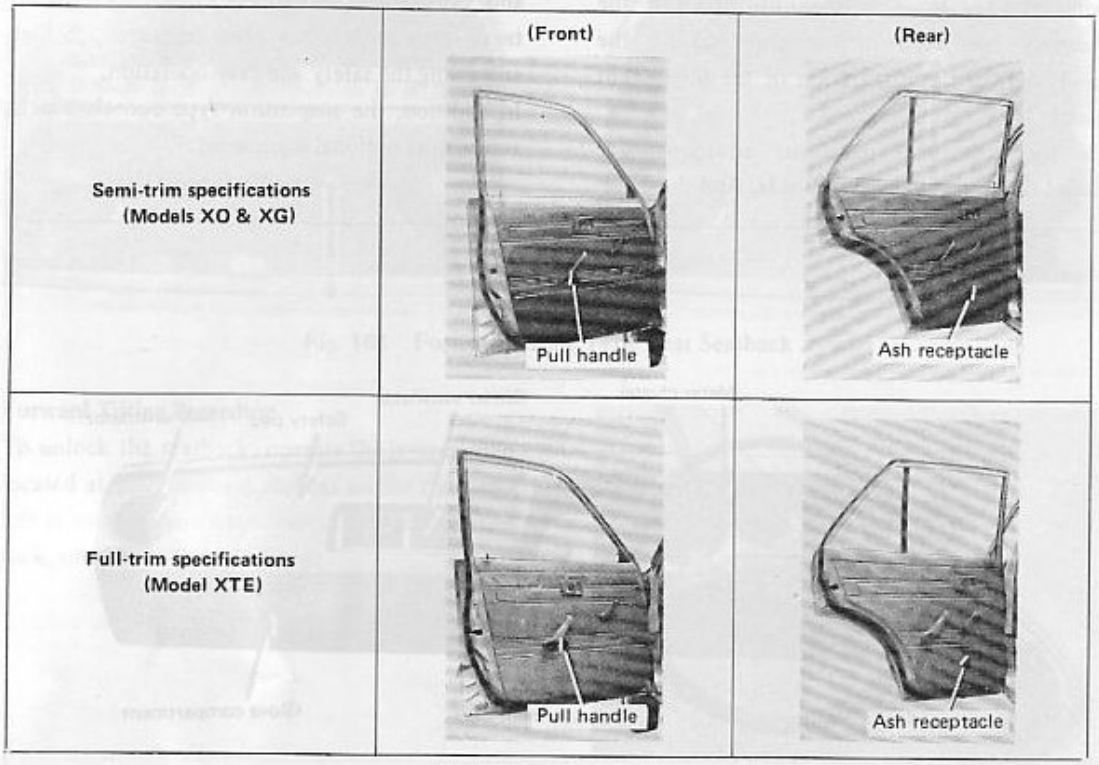


Fig. 166 Door Trims

Package Tray (Except Model XO)

The opening/closing of the package tray is interlocked with the opening/closing of the back door.

Also, the package tray can be removed very easily. Hence, it is possible to use the luggage room effectively in other way, as required.

NOTE: Make sure not to place heavy objects or large articles on the package tray.

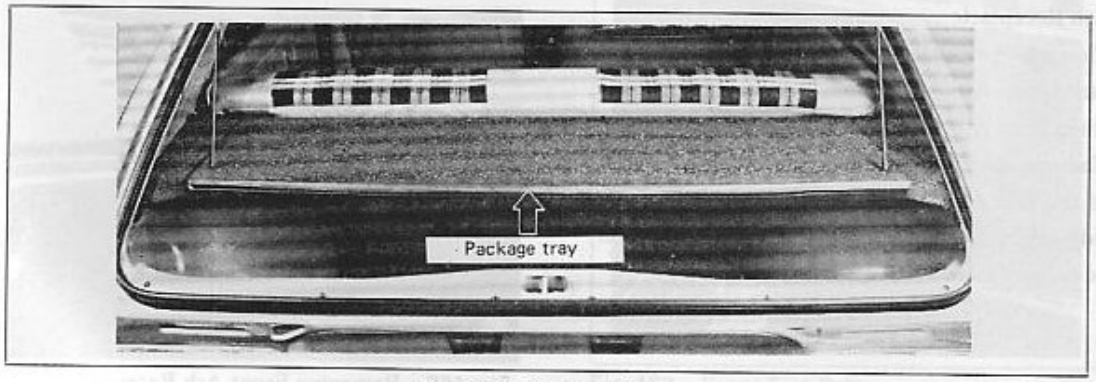


Fig. 167 Package Tray

INNER REARVIEW MIRROR

A large-sized inner mirror has been employed so as to provide an improved rear visibility.

Dropable Construction

1. The inner rearview mirror is incorporated into the room lamp body through a resin catch.
2. Inside the resin catch is installed a snap ring which always exerts a force to expand the resin catch to the outer periphery.
3. If an impact should be applied to the rearview mirror, the snap ring would be compressed, thereby dropping the mirror from the room lamp body.

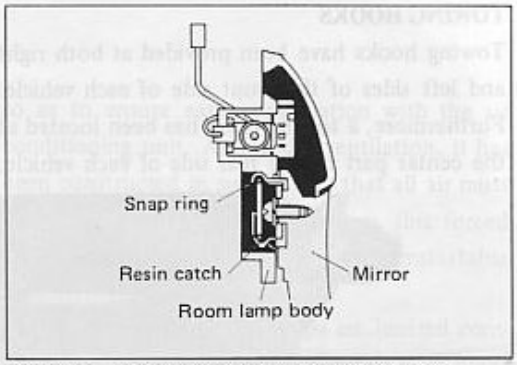
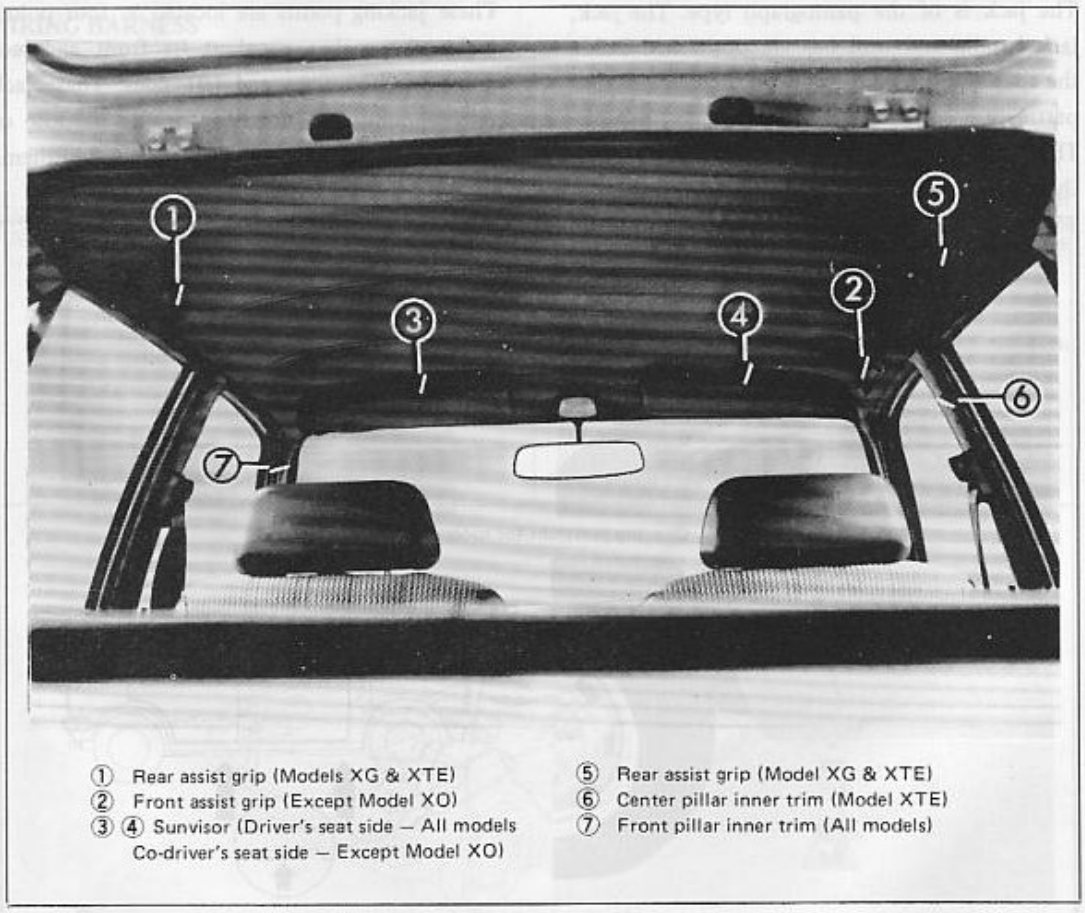


Fig. 168 Dropable Construction of Inner Rearview Mirror

Other Interior Appointments



① Rear assist grip (Models XG & XTE)
② Front assist grip (Except Model XO)
③ ④ Sunvisor (Driver's seat side – All models
Co-driver's seat side – Except Model XO)
⑤ Rear assist grip (Model XG & XTE)
⑥ Center pillar inner trim (Model XTE)
⑦ Front pillar inner trim (All models)

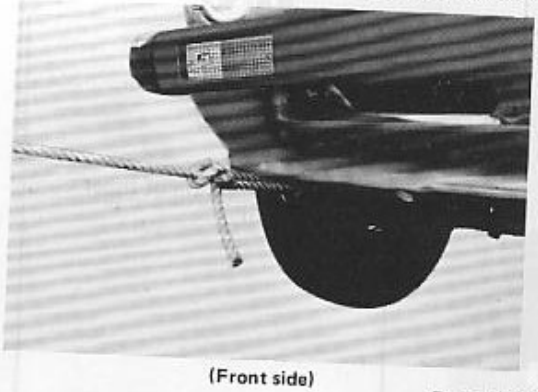
Fig. 169 Other Interior Appointments

TOWING HOOKS

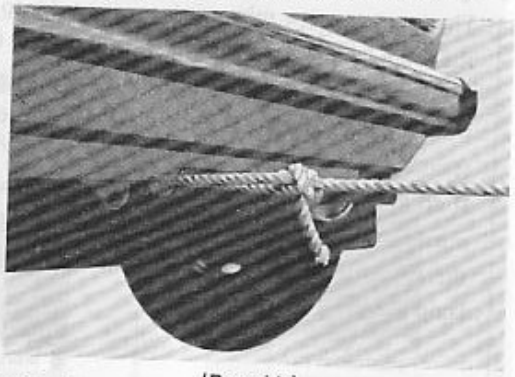
Towing hooks have been provided at both right and left sides of the front side of each vehicle. Furthermore, a towing hook has been located at the center part of the rear side of each vehicle.

When the towing is to be made, make certain to use these towing hooks.

CAUTION: Under no circumstances, should a towing rope be attached to the axle beam.



(Front side)



(Rear side)

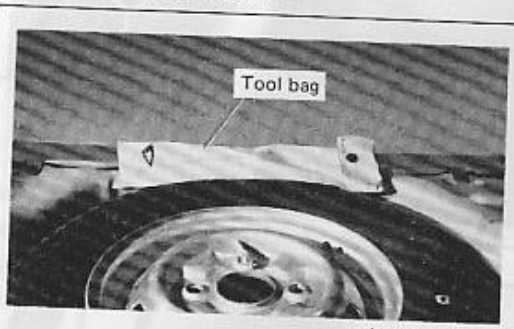
Fig. 170 Towing Hooks

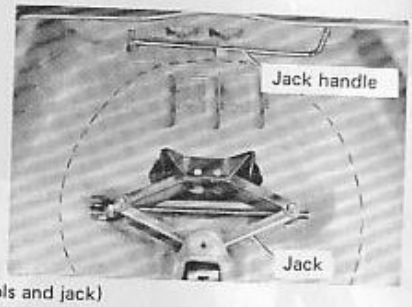
JACK AND TOOLS

The jack is of the pantograph type. The jack, jack handle and tool bag are positioned inside the spare tire house provided in the luggage compartment.

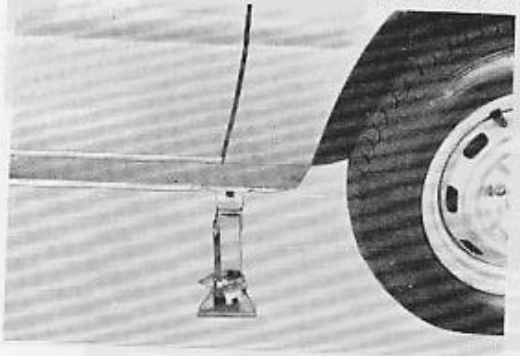
The pantograph type jack must be set only at those specified jacking points.

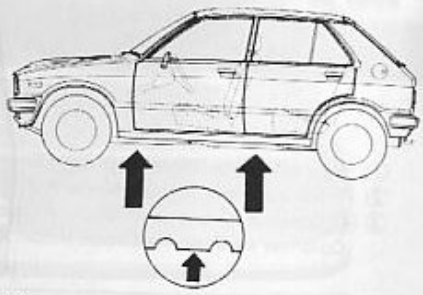
These jacking points are located at four points under the rocker panel at its front and rear points on the right and left sides. These jack setting points are notched for the purpose of identification so that you may readily find them.





(Storing positions for tools and jack)





(Jack setting points)

Fig. 171 Jack and Tools

BODY ELECTRICAL SYSTEM

DESCRIPTION

With emphasis placed on the driving comfort and safety, a wide variety of equipment has been installed on the Model G10 vehicles.

As regards the wiring related parts, a relay-built-in fuse block has been newly introduced, thereby making it possible to rearrange and rationalize the wiring work. Also, with a view to further improving vehicle functions and its safety, the following pieces of equipment have been provided: the light glow-state warning system, intermittent wiper, rear wiper, semi-transistorized flasher unit and so forth.

Furthermore, when designing the heater (OPTION), special consideration has been paid so as to ensure easy combination with the air conditioning unit. As for the ventilation, it has been constructed in such a way that all air must enter the heater unit. In this way, this forced type ventilating method ensures comfortable air conditioning at all times.

The centralized warning lamps are located compactly on the instrument cluster panel in order that the driver may readily know whether or not there is any malfunction in respective system. Moreover, the multi-use lever switch has been employed so that each switch of the lighting system may be operated effortlessly.

WIRING HARNESS

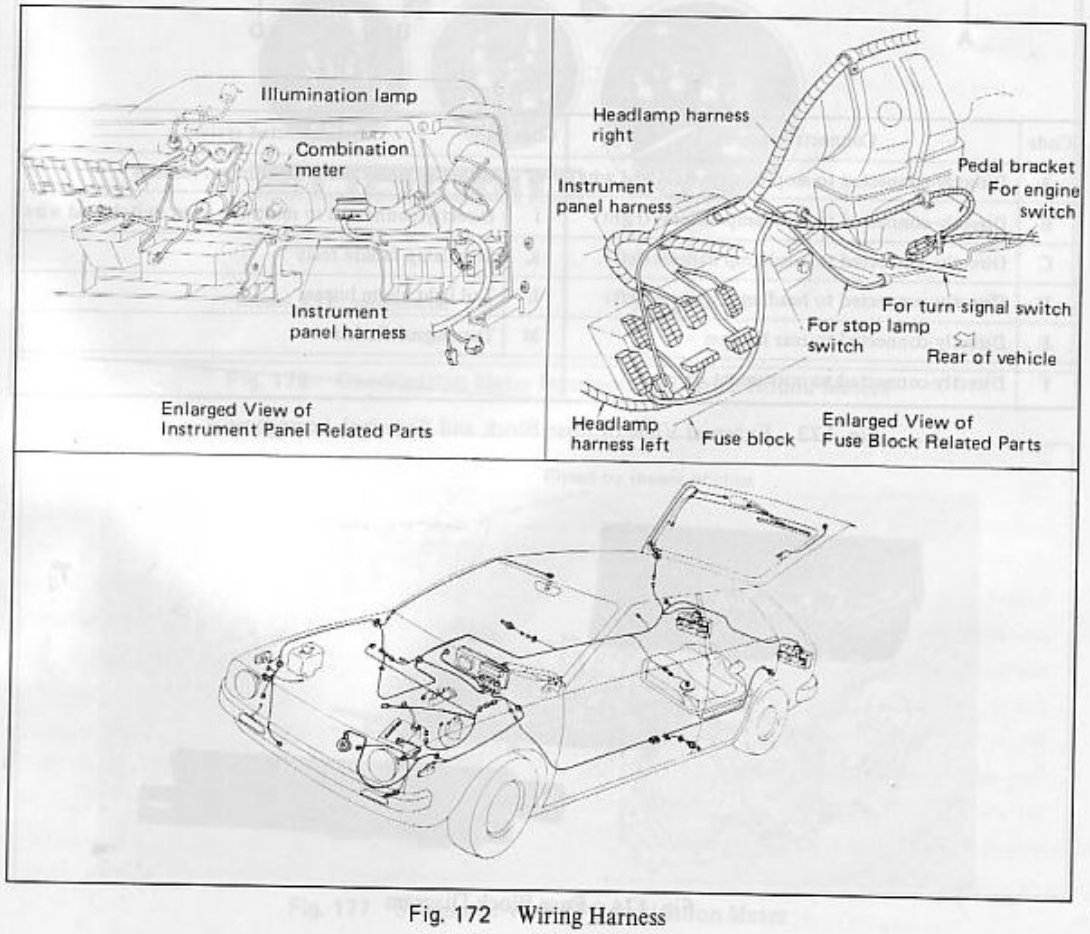


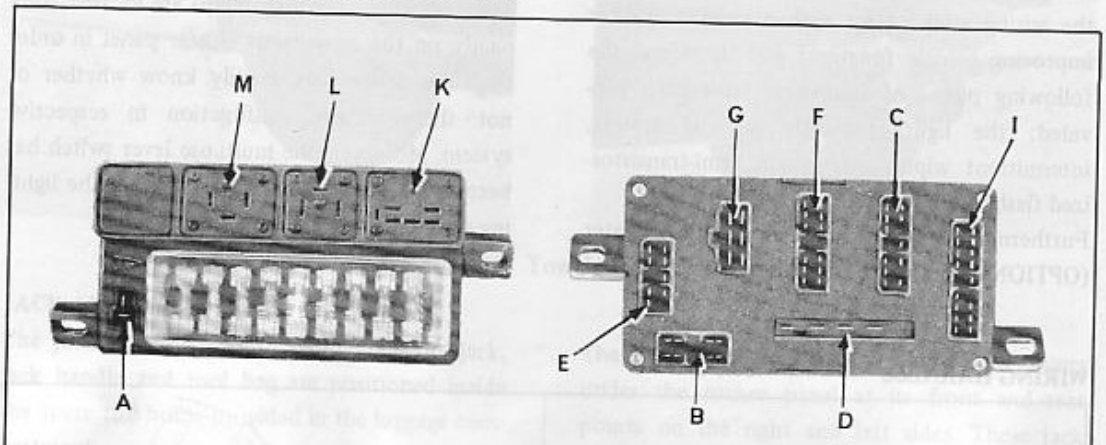
Fig. 172 Wiring Harness

FUSE BLOCK

The wiring routing in close vicinity of the instrument panel has been made so that all main wiring harnesses are connected to the fuse block concentratedly, thus making it possible to arrange these wiring harnesses in order. Then, these wiring harnesses are routed to respective systems.

In this way, the wiring harnesses have been arranged ideally, at the same time providing a better appearance.

Besides, the following parts have been built into the fuse block compactly: the turn signal flasher unit, tail light alarm buzzer and stop lamp failure relay. Also, the centralized ground method has been employed to give excellent ground.



Code	Connected system	Code	Connected system
A	Directly-connected to stop lamp switch lead wire	G	Directly-connected to instrument harness
B	Directly-connected to headlamp harness (right)	I	Directly-connected to multi-use lever switch lead wire
C	Directly-connected to headlamp harness (left)	K	Stop lamp failure relay
D	Directly-connected to headlamp harness (left)	L	Tail light alarm buzzer
E	Directly-connected to rear harness	M	Turn signal flasher
F	Directly-connected to instrument harness		

Fig. 173 External View of Fuse Block and Terminal Arrangement

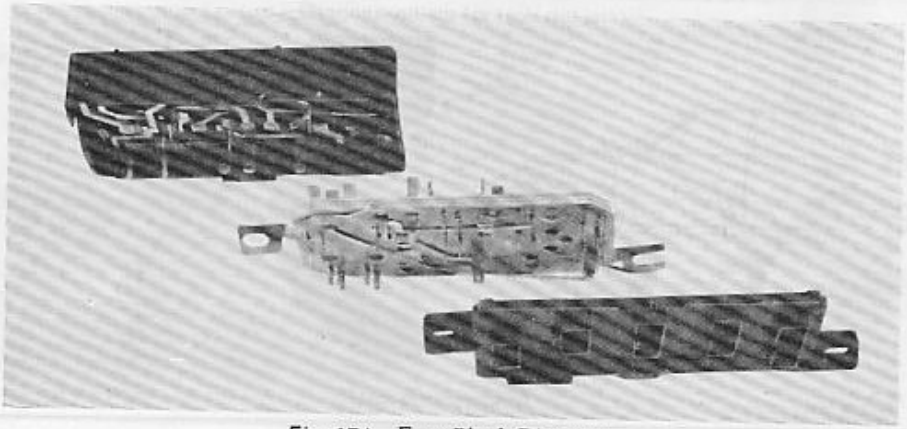


Fig. 174 Fuse Block Diagram

BATTERY AND FUSIBLE LINKS

A 12V, 45AH battery is mounted on the left side inside the engine compartment. The battery features compact size and light weight which have been made possible by the improvement in the separator material and their configuration. Furthermore, to protect the wiring harnesses, fusible links have been provided between the battery and the headlamp circuit as well as between the battery and the fuse block, one each.

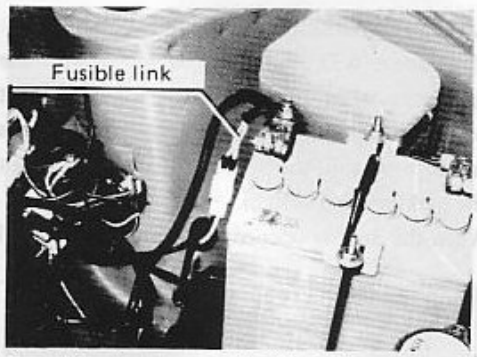


Fig. 175 Battery and Fusible Link

COMBINATION METER

The combination meter consists of three meters which are arranged in line horizontally.
On all models a non-reflecting type glass has been employed in order to avoid glare. Moreover, the combination meter has been designed so that the meters, meter glasses, meter casees and meter bodies, etc. can be removed or installed very easily.

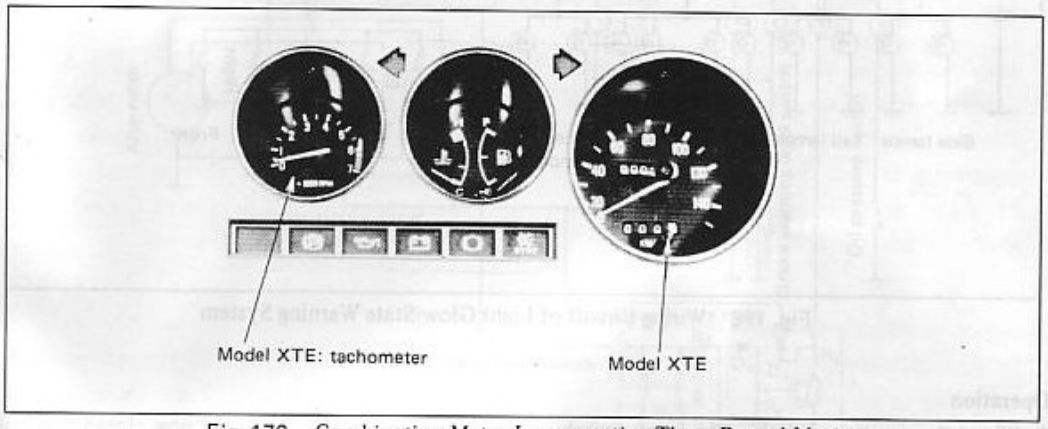


Fig. 176 Combination Meter Incorporating Three Round Meters

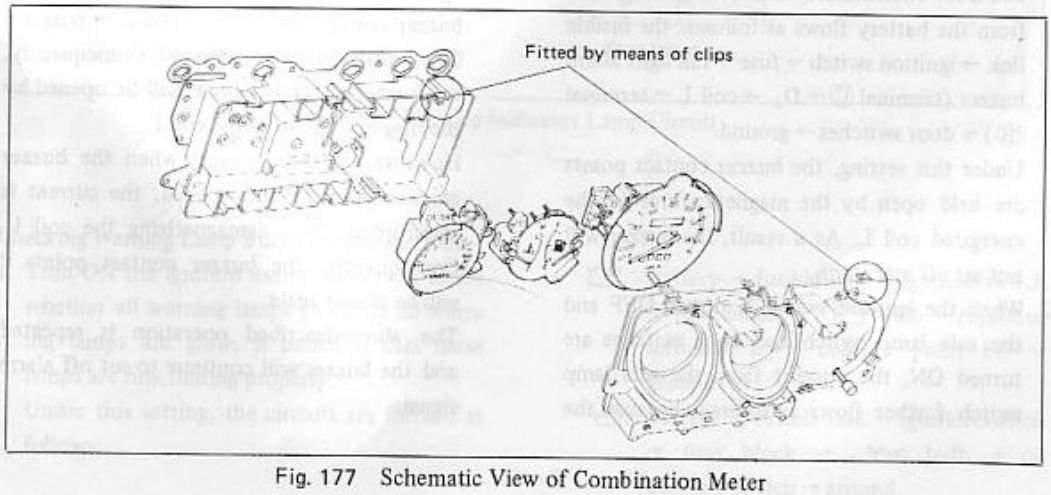


Fig. 177 Schematic View of Combination Meter

LIGHT GLOW-STATE WARNING SYSTEM

The Model XTE vehicle is equipped with the light glow-state warning system which will set off alarm signal in the event that the driver has failed to turn off the light control switch (except the parking lamp switch).

When the door is opened while the light control switch is turned ON and the ignition switch is turned OFF, the tail light alarm buzzer will be set off, thus reminding the driver of the fact that the lights are still glow.

The tail light alarm buzzer above has been incorporated into the fuse block.

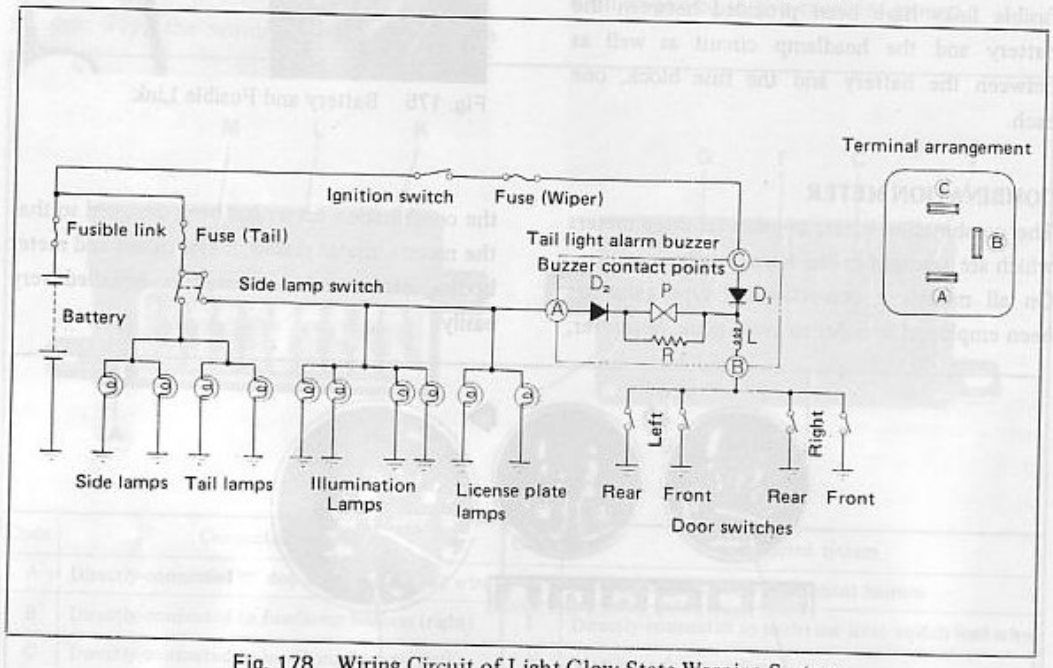


Fig. 178 Wiring Circuit of Light Glow-State Warning System

Operation

1. When the ignition switch, side lamp switch and door switches are turned ON, the current from the battery flows as follows: the fusible link → ignition switch → fuse → tail light alarm buzzer (terminal Ⓒ → D_1 → coil L → terminal Ⓑ) → door switches → ground.
   Under this setting, the buzzer contact points are held open by the magnetic force of the energized coil L. As a result, the buzzer will not set off any alarm.
2. When the ignition switch is turned OFF and the side lamp switch and door switches are turned ON, the current from the side lamp switch further flows as follows, because the buzzer contact points are now closed: the tail light alarm buzzer (terminal Ⓐ → D_2 → buzzer contact points P → coil L → terminal Ⓑ) → door switches → ground. Consequently, the buzzer contact poins P will be opened by the magnetic force of the coil L.
   However, at the moment when the buzzer contact points P are opened, the current is interrupted, thus demagnetizing the coil L. Consequently, the buzzer contact points P will be closed again.
   The above-described operation is repeated and the buzzer will continue to set off alarm signals.

WARNING INDICATOR SYSTEM

The centralized warning indicator lamps have been arranged compactly at the center part of the instrument cluster finish panel. Because of this centralized monitoring system, the driver can readily know as to whether any malfunction which may prevent safe, normal driving is present in the vehicle's functional systems.

The warning indicator system is composed of those warning lamps for those states of stop lamp bulb burning-out, charging, oil pressure and brake, etc.

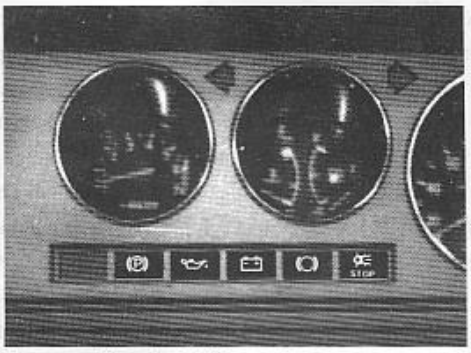


Fig. 179 Warning Indicator Lamps

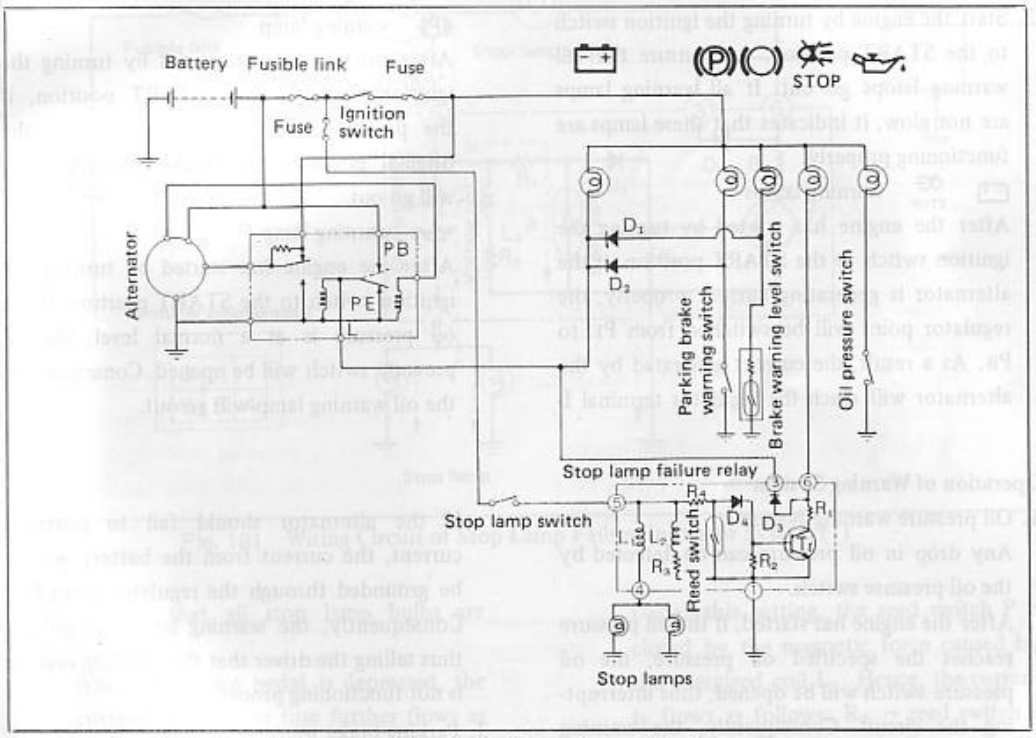


Fig. 180 Warning Indicator Lamp Circuit

Checking Warning Lamp Bulbs for Burning Out

1. Turn ON the ignition switch and check to see whether all warning lamps go on. If all warning lamps are glow, it indicates that these lamps are functioning properly.
   Under this setting, the circuits are formed as follows:

   Battery → fusible link → ignition switch → fuse block → bulb → regulator terminal L → contact point PE → ground.

   Battery → fusible link → ignition switch → fuse block → bulb → oil pressure switch → ground.

STOP Battery → fusible link → ignition switch → fuse block → STOP bulb → stop lamp failure relay [terminal ⑥, D_3, terminal ③] – regulator terminal L → contact point PE → ground.

(○) Battery → fusible link → ignition switch → fuse block → (○) bulb → D_1 → regulator terminal L → Contact point PE → ground.

(P) Battery → fusible link → ignition switch → fuse block → (P) bulb → D_2 → regulator terminal L → contact point PE → ground.

2. Start the engine by turning the ignition switch to the START position. And ensure that all warning lamps go out. If all warning lamps are not glow, it indicates that these lamps are functioning properly.

🔋 STOP warning lamps

After the engine has started by turning the ignition switch to the START position, if the alternator is generating current properly, the regulator point will be switched from PE to PB. As a result, the current generated by the alternator will reach the regulator terminal L through the points PB, thereby raising the potential at the terminal L. Consequently, no current flows through each warning lamp of the 🔋 and STOP. In this way, each warning lamp of the 🔋 and STOP will remain off.

(○) warning lamp

After the engine has started by turning the ignition switch to the START position, if the brake fluid level is the specified value (i. e. at the time when the brake warning level switch is opened). The brake warning lamp will go out.

(P) warning lamp

After the engine has started by turning the ignition switch to the START position, if the parking brake lever is returned to the original position, the brake warning lamp will go out.

warning lamp

After the engine has started by turning the ignition switch to the START position, if the oil pressure is at a normal level, the oil pressure switch will be opened. Consequently, the oil warning lamp will go out.

Operation of Warning System

1. Oil pressure warning system

Any drop in oil pressure can be detected by the oil pressure switch.

After the engine has started, if the oil pressure reaches the specified oil pressure, the oil pressure switch will be opened, thus interrupting the circuit. Consequently, the warning lamp will go out.

When the oil pressure drops below 0.5kg/cm² (7.1psi), the oil pressure switch will be closed and the warning lamp will go on, thus telling the driver that the oil pressure is abnormally low.

2. Charging state warning system

If the charge warning lamp remains off, it indicates that the charging system is functioning properly.

If the alternator should fail to generate current, the current from the battery would be grounded through the regulator point PE. Consequently, the warning lamp will go on, thus telling the driver that the charging system is not functioning properly.

3. Parking brake warning lamp

This warning lamp will remind the driver that the parking brake is still on, in order that the vehicle may not be moved off while the parking brake is still applied.

When the parking brake lever is pulled out, the brake warning switch will be closed. As a result, the warning lamp goes on, thus reminding the driver that the parking brake is still on.

4. Brake fluid warning lamp

If the brake fluid level should drop below the specified level (i.e. below the half of the whole capacity), the brake warning level switch would be closed. Consequently, the warning lamp goes on, thus telling the driver that the brake fluid level is abnormally low.

5. Stop lamp burning-out warning system

If the stop lamp bulb should be burnt out, the warning lamp would glow, when the brake pedal is depressed during the engine running. In this way, the warning lamp tells the driver that the stop lamp has failed.

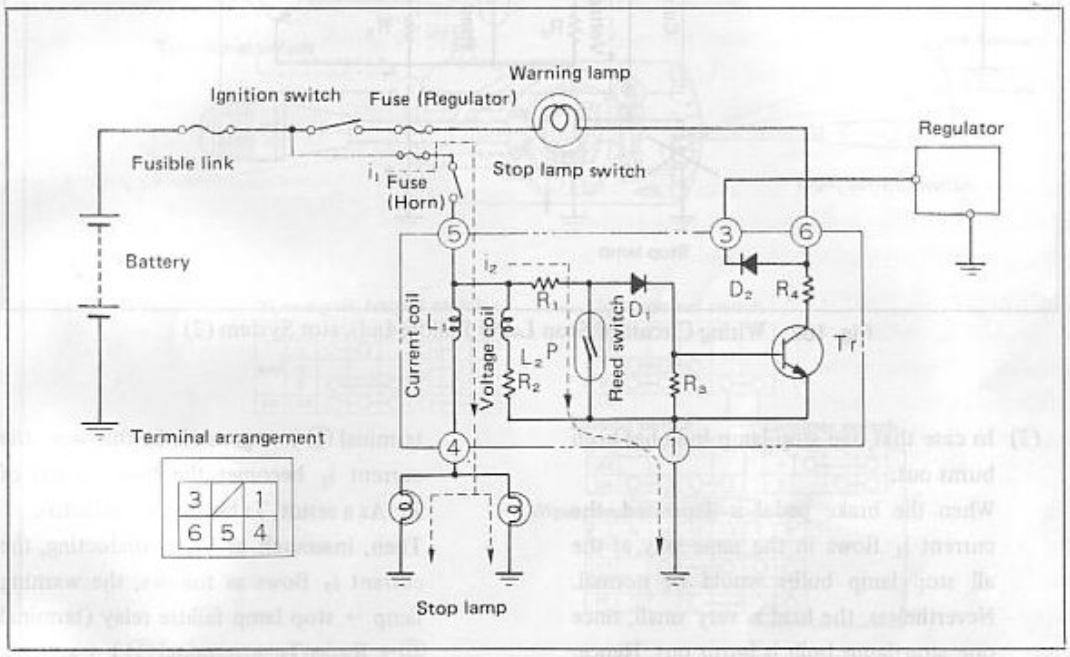


Fig. 181 Wiring Circuit of Stop Lamp Failure Indicator System (1)

(1) In case that all stop lamp bulbs are normal:

When the brake pedal is depressed, the current i_1 from the fuse further flows as follows: the stop lamp switch → stop lamp failure relay (terminal ⑤ → current coil L_1 → terminal ④) – stop lamps – ground.

As a result, all stop lamps will go on.

Under this setting, the reed switch P is closed by the magnetic force caused by the energized coil L_1. Hence, the current i_2 flows as follows: R_1 → reed switch P → terminal ① → ground. Consequently, no base current flows through Tr.

As a result, Tr is not conducting. Therefore, the warning lamp remains off.

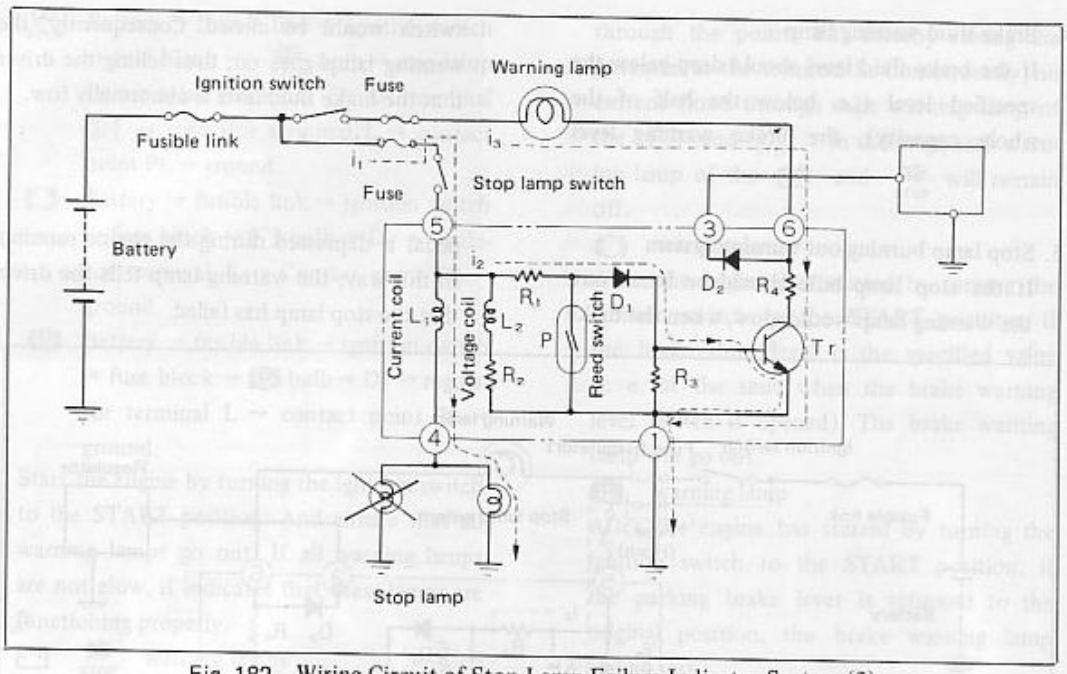


Fig. 182 Wiring Circuit of Stop Lamp Failure Indicator System (2)

(2) In case that one stop lamp bulb has been burnt out:

When the brake pedal is depressed, the current i_1 flows in the same way as the all stop lamp bulbs would be normal. Nevertheless, the load is very small, since one stop lamp bulb is burnt out. Hence, only a current of a small magnitude flows through the coil L_1.

As a result, the magnetic force caused by the energized coil L_1 will decrease to such an extent it no longer hold the reed switch in a closed state. Consequently, the current i_2 flows as follows: the stop lamp failure relay (R_1 → D_1 → Tr → terminal ①) → ground. In this way, the current i_2 becomes the base current of Tr. As a result, Tr becomes conductive.

Then, inasmuch as Tr is conducting, the current i_3 flows as follows; the warning lamp → stop lamp failure relay (terminal ⑥→ R_4 → Tr → terminal ①) → ground. In this way, the warning lamp goes on. The current coil L_2 has been provided in the system in order that the operation of the reed switch P may not be affected by the change in magnetic force of the current coil L_1 due to voltage variation.

SWITCHES

Multi-Use Lever Switch (Centralized Type Switch)

The Model G10 vehicles have employed the multi-use lever switch in which all switches to be used frequently during the operation are centralized at the steering column section in order that the driver, even when he buckles up his seat belt, may operate all switches effortlessly.

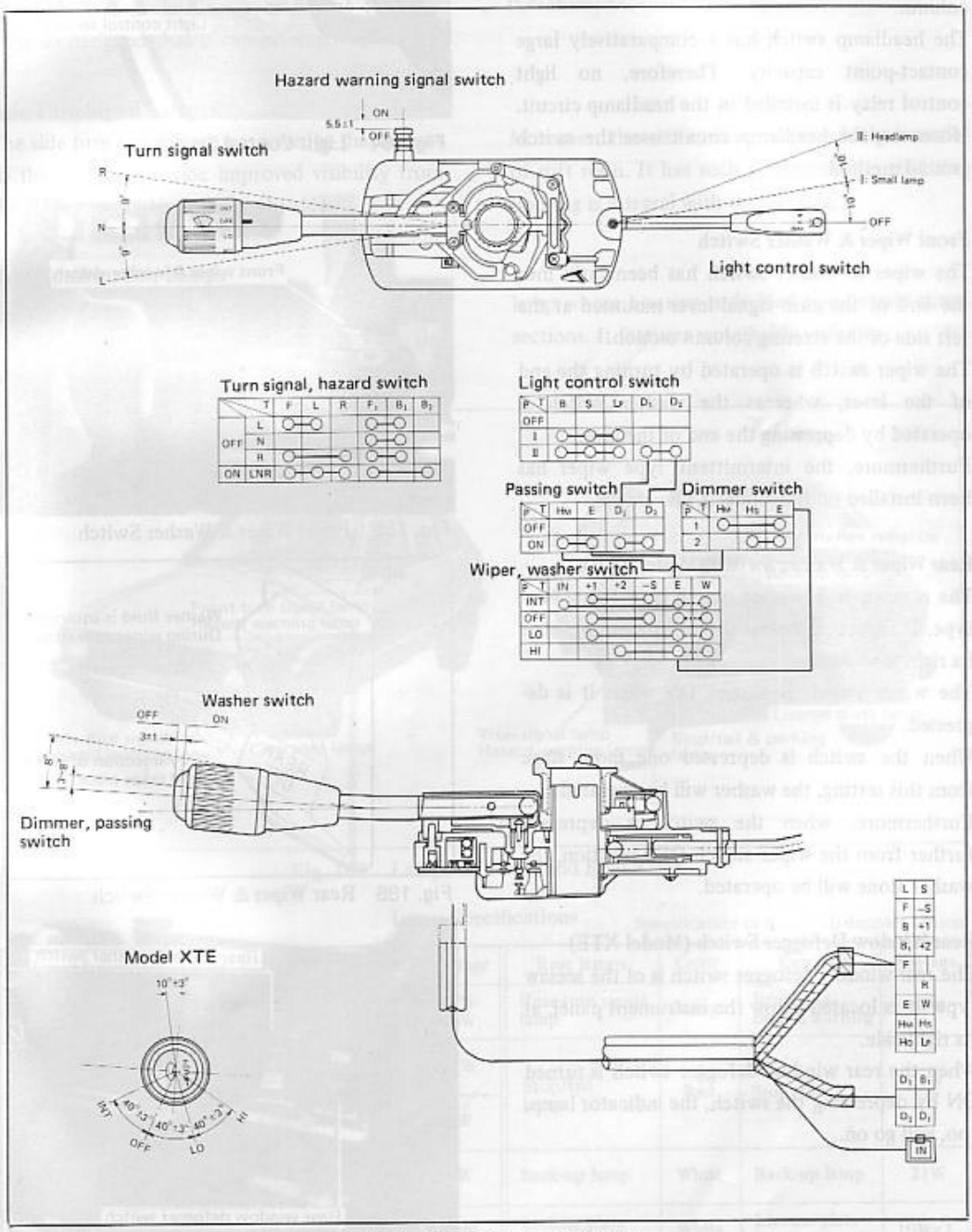


Fig. 183 Multi-Use Lever Switch

Light Control Switch

The light control switch incorporates each lamp switch for the side lamps, headlamps and parking lamps.

The light control switch can be operated with a lever provided at the right side of the steering column.

The headlamp switch has a comparatively large contact-point capacity. Therefore, no light control relay is installed in the headlamp circuit. Moreover, the headlamp circuit uses the switch ground method.

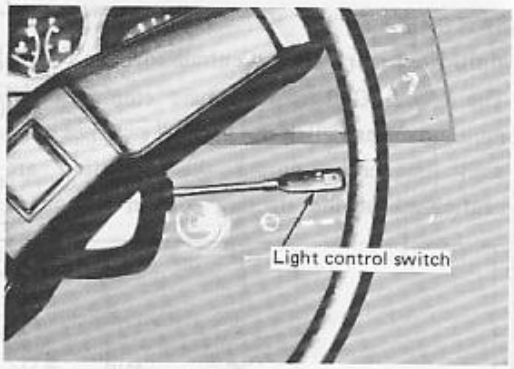


Fig. 184 Light Control Switch

Front Wiper & Washer Switch

The wiper & washer switch has been built into the end of the turn signal lever mounted at the left side of the steering column section.

The wiper switch is operated by turning the end of the lever, whereas the washer switch is operated by depressing the end of the lever.

Furthermore, the intermittent type wiper has been installed on the Model XTE vehicle.

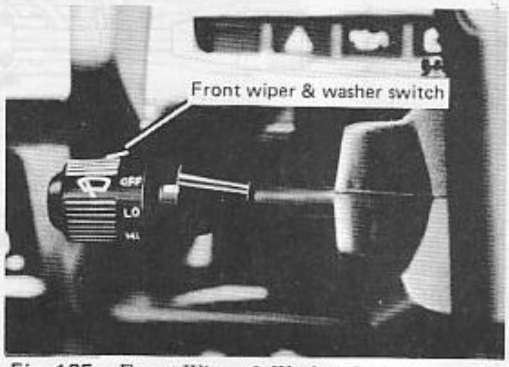


Fig. 185 Front Wiper & Washer Switch

Rear Wiper & Washer Switch (Model XTE)

The rear wiper & washer switch is of the seesaw type. It is located below the instrument panel at its right side.

The wiper switch is turned ON when it is depressed.

When the switch is depressed one more stage from this setting, the washer will be operated.

Furthermore, when the switch is depressed further from the wiper switch OFF position, the washer alone will be operated.

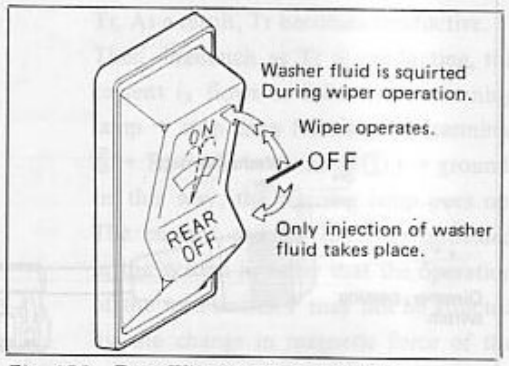


Fig. 186 Rear Wiper & Washer Switch

Rear Window Defogger Switch (Model XTE)

The rear window defogger switch is of the seesaw type. It is located below the instrument panel, at its right side.

When the rear window defogger switch is turned ON by depressing the switch, the indicator lamp, too, will go on.

Fig. 187 Rear Window Defogger Switch

LIGHTING SYSTEM

Headlamps and Front Combination Lamps

The headlamps have employed round-shaped bulb type.

Moreover, a headlamp ornament ring is fitted in each headlamp so as to provide a better appearance. This headlamp ornament ring has been so designed that it can be removed and installed very easily for the purpose of photometric adjustments, etc.

The front combination lamp incorporates a turn signal lamp, a clearance lamp and a parking lamp. It features excellent visibility.

Side Turn Signal Lamp

The side turn signal lamp has a wedge-shaped lens so that it may provide improved visibility from the front or rear direction at the side.

Moreover, the side turn signal lamp body is made of soft resin. It has such a construction that the housing is integral with the packing.

Rear Combination Lamps

This resin rear combination lamp has been so designed that the housing is integral with the lens. It is large-sized, square type combination lamp whose housing is divided equally into three sections. It features remarkable visibility .

Fig. 188 Lamps on Front and Rear Sides

Lamp Specifications Specification in (( )) denotes option.

Front lamps	Color	Function	Wattage	Rear lamps	Color	Function	Wattage
Headlamp	White ((Yellow))	Upper beam, lower beam	45W 40W	Rear turn signal lamp	Orange	Rear turn, hazard warning	21W
Front turn signal lamp	Orange	Front turn signal, hazard warning	21W	Stop/tail lamp	Red	Stop, tail	21W 5W
Clearance lamp	White	Clearance	5W				
Side turn signal lamp	Orange	Side turn, hazard warning	5W	Back-up lamp	White	Back-up lamp	21W
Room lamp	White	Room lamp	10W	License plate lamp	White	License plate lamp	10W×2

TURN SIGNAL FLASHER

The turn signal flasher is the semi-transistorized type which features positive and stable functions.

Indicating Performance in Event of Turn Signal Lamp Failure (Reference information)

Trouble nature \ Lamp nomenclature	Turn signal lamp	Side turn signal lamp	Indicator lamp
During normal operation	Flashing speed is 85±10times/min.	←	←
Open circuit in one turn signal lamp (front or rear)	Flashing speed exceeds 125times/min.	←	←
Side turn signal lamp open circuited	Flashing speed increases by more than 10times/min.		←
Open circuit in indicator lamp	Flashing speed increases by more than 5times/min.	←	

(Note) Flashing speed may slightly vary depending upon conditions.

Turn Signal & Hazard Lamps

Operation

1. When the turn signal switch is turned OFF:
   Even if the turn signal switch is turned OFF, the current i_1 from the battery flows as follows: B → R_2 → R_3 → Tr → E. As a result, Tr_1 becomes ON, while Tr_2 becomes OFF. When Tr_1 becomes ON, the current i_2 flows in the following path: B → R_1 → Tr_3 → C_1 → Tr_1 → E. On the Other hand, the current i_3 flows in the following path: B → coil → R6 → C_1 → Tr_1 → E. Hence, the condenser C_1 is charged by these two currents. When the condenser C_1 has been charged fully, the currents i_2 and i_3 cease to flow. And this condition continues until the turn signal switch is turned ON.

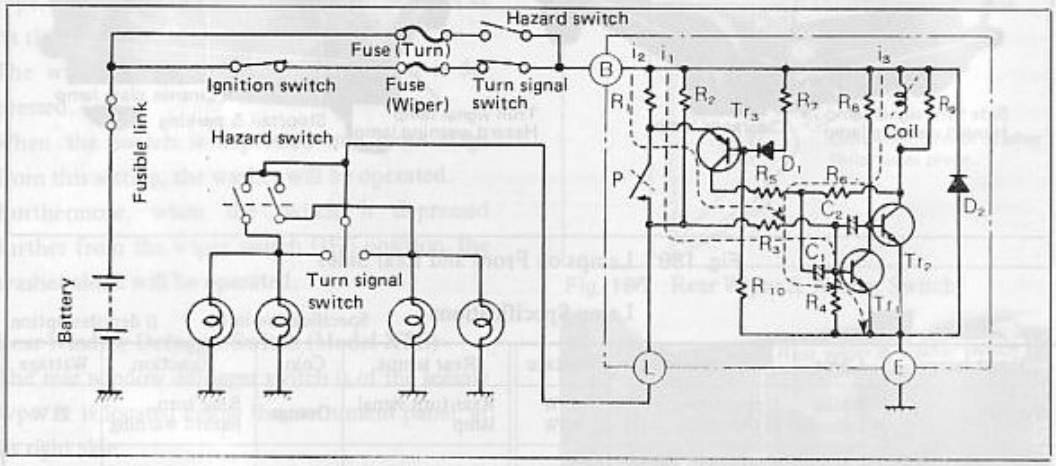
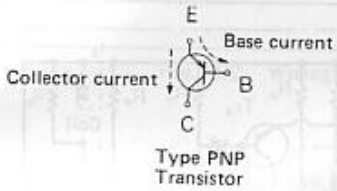


Fig. 189 Wiring Diagram of Turn Signal Flasher System (1)

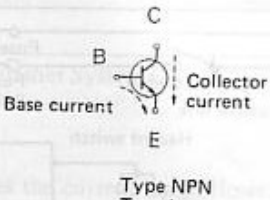
Operation of Transistors

PNP Type . . . In the case of a transistor of this type, when the base current flows from the emitter to the base, the transistor is conducting between the emitter and the collector, thus allowing the collector current to flow through this path.



Type PNP Transistor

NPN Type . . . In the case of a transistor of this type, when the base current flows from the base to the emitter, the transistor is conducting between the collector and the emitter, thus allowing the collector current to flow through this path.



Type NPN Transistor

2. When the turn signal switch is turned ON: If the turn signal switch is turned ON from the foregoing condition, the potential at the terminal Ⓛ will become nearly equal to the ground potential. Consequently, the base voltage of Tr_1 will drop, thereby turning Tr_1 off.

When Tr_1 is turned off, Tr_2 is turned on, allowing the current i_4 to flow through the following path: B → coil → Tr_2 → E. As a result, the contact points P will be closed. Then, the current i_5 of a large amount flows as follows: B → R_1 → terminal Ⓛ → switch → lamp → ground. In this way, the lamps will glow. Inasmuch as Tr_2 has been turned on, the electric charge will begin to discharge as the current i_6 flows in the following parth: C_1 → R_6 → Tr_2 → R_4 → C1.

While C_1 is discharging, the base current of Tr_1 will become negative because of the drop in voltage across R_4. In this way, Tr_1 remains off, wherease Tr_2 remains on. Consequently, the turn signal lamps remain lighted, as long as Tr_2 is turned on.

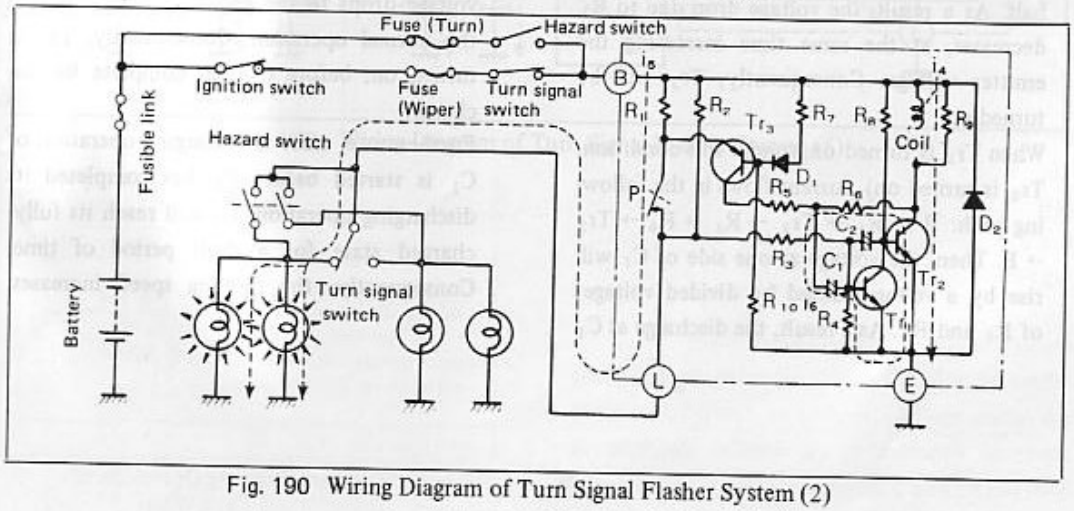


Fig. 190 Wiring Diagram of Turn Signal Flasher System (2)

3. When the turn signal lamps remain OFF:

When C_1 has completed its discharge, the base voltage of Tr_1 will increase, thereby turning Tr_1 on.

When Tr_1 is turned on, Tr_2 is turned off. As a result, the current passing through the relay coil is interrupted, thus opening the contact points P. Consequently, the turn signal lamps go out.

When Tr_1 is turned on, the following two currents flow as the base current of Tr_1 in respective paths: i.e. the current i_2, $B \rightarrow R_1 \rightarrow Tr_3 \rightarrow R_5 \rightarrow C_1 \rightarrow Tr_1 \rightarrow E$, and the current i_3, $B \rightarrow$ coil $\rightarrow R_6 \rightarrow C_1 \rightarrow Tr_1 \rightarrow E$. In this way, C_1 will be charged by these two currents of i_2 and i_3.

The lamps remain off, until C_1 is charged fully. When C_1 has been charged completely, Tr_1 will be turned off and Tr_2 will be turned on. As a result, the lamps go on again. The above-described operations are repeated and the turn signal lamps continue to flash.

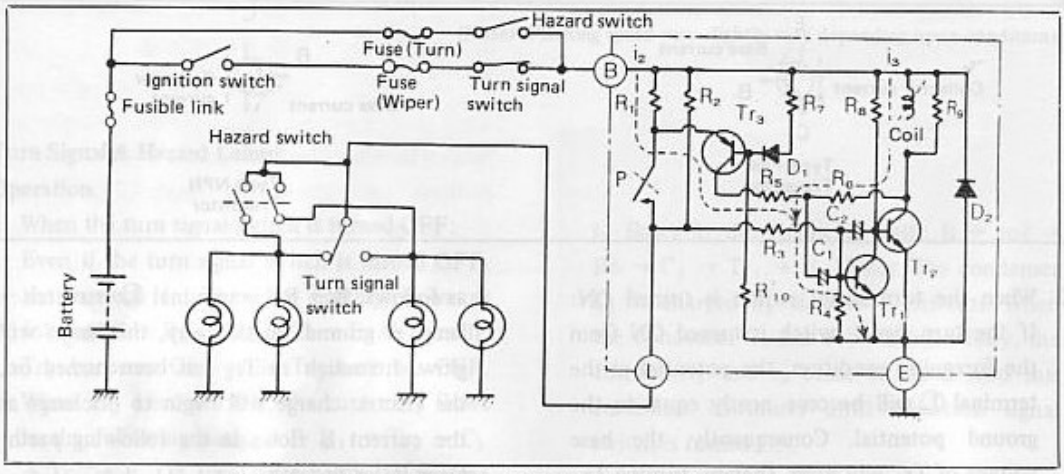


Fig. 191 Wiring Diagram of Turn Signal Flasher System (3)

4. When one bulb (23W) is burnt out:

If one bulb (23W) of the turn signal lamps is burnt out, the current passing through R_1 during the light-on period will be reduced to half. As a result, the voltage drop due to R_1 decreases, at the same time increasing the emitter voltage. Consequently, Tr_3 will be turned on.

When Tr_3 is turned on, (under this condition, Tr_2 is turned on), current flows in the following path: $B \rightarrow R_1 \rightarrow Tr_3 \rightarrow R_5 \rightarrow R_6 \rightarrow Tr_2 \rightarrow E$. Then, the voltage at one side of C_1 will rise by a voltage caused by divided voltages of R_5 and R_6. As a result, the discharge at C_1 takes place only until a voltage cuased by divided voltages of R_5 and R_6 is obtained, in this case where one bulb has failed, whereas the discharge at C_1 takes place until the voltage drops to the ground potential during the normal operation. Consequently, Tr_1 is turned on, before C_1 can complete its discharge.

Furthermore, since the charging operation of C_1 is started before C_1 has completed its discharging operation, C_1 will reach its fully-charged state for a short period of time. Consequently, the flashing speed increases.

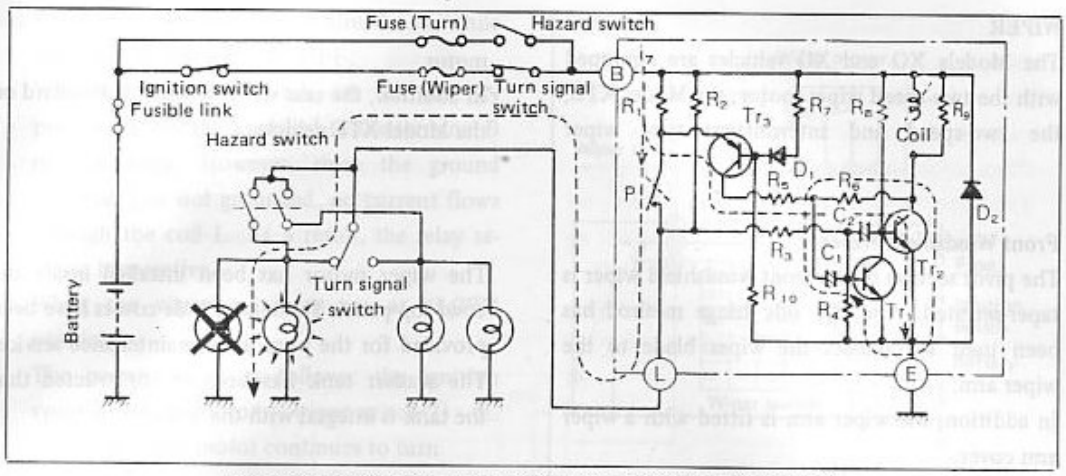


Fig. 192 Wiring Diagram of Turn Signal Flasher System (4)

5. When the hazard warning lamps are functioning:
   The hazard warning lamps operate in the same way as with the turn signal lamps.
   The number of operating lamps increases and so does the current lamp. However, the flashing speed remains almost unchanged.
   Also, even if one bulb has failed, the flashing speed during the hazard lamp operation remains the same.

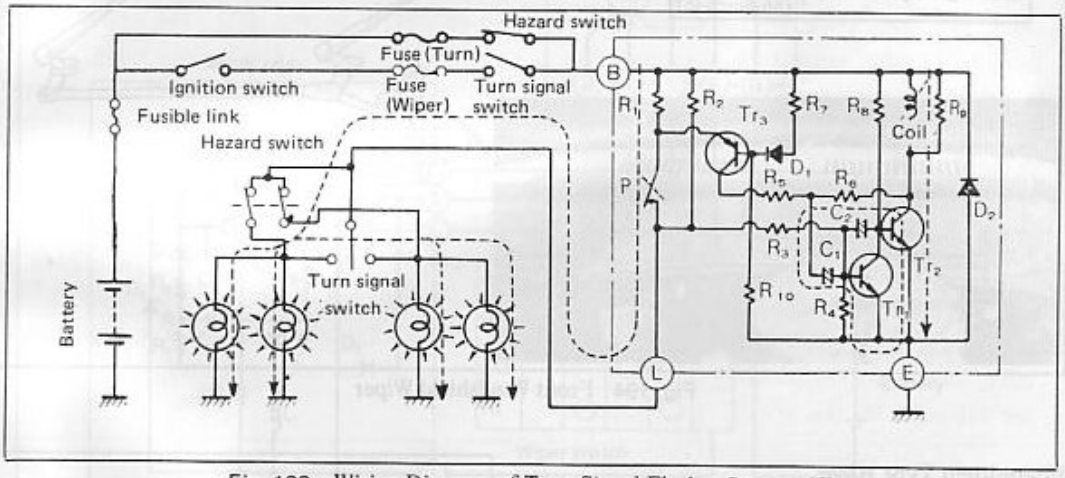


Fig. 193 Wiring Diagram of Turn Signal Flasher System (5)

WIPER

The Models XO and XG vehicles are equipped with the two-speed wiper motor; the Model XTE, the two-speed and intermittent type wiper motor.

In addition, the rear window wiper is standard on the Model XTE vehicle.

Front Windshield Wiper

The pivot section of the front windshield wiper is taper-serrated. And the side hinge method has been used to connect the wiper blade to the wiper arm.

In addition, the wiper arm is fitted with a wiper arm cover.

The wiper motor has been installed inside the cowl top panel. The service hole covers have been provided for the purpose of maintenance service. The washer tank has been so constructed that the tank is integral with the impeller section.

Wiper Motor Specifications

Kind of motor		Ferrite magnetic type
No-load revolution speed	During low-speed operation	50±5rpm
	During high-speed operation	75±5rpm
Locking torque		Not less than 100 kg-cm (86.8inch-lb)

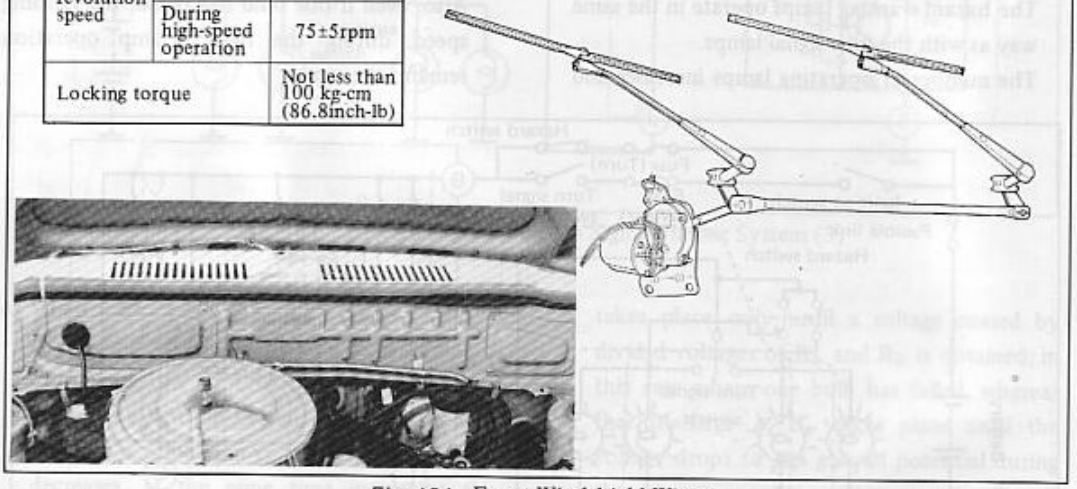


Fig. 194 Front Windshield Wiper

Intermittent Type Wiper

The Model XTE vehicle is equipped with the intermittent type wiper motor which will be very handy in those weathers, such as when it is misting or raining lightly.

Operation of Intermittent Type Wiper

When the wiper switch is set at the intermittent operation position marked as "INT," the wiper starts to function at a rate of one time at intervals of 3 to 5 seconds.

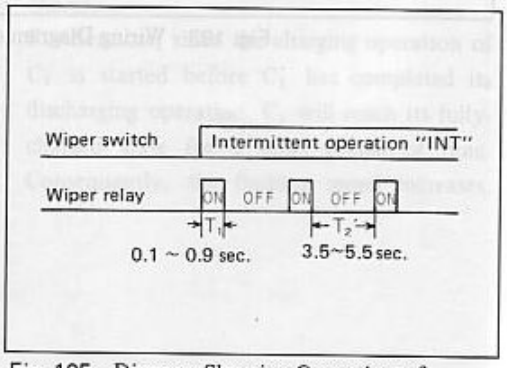


Fig. 195 Diagram Showing Operation of Intermittent Type Wiper

1. When the ignition switch is turned ON, while the wiper switch is turned OFF:
   With the ignition switch set at the ON position, a voltage is applied to the terminal B of the relay. However, since the ground terminal ① is not grounded, no current flows through the coil L. As a result, the relay remains inoperative.
2. When the wiper switch is set at "LOW" position:
   The current flows as follows: the ignition switch – wiper motor – wiper switch ① – E. Thus, the wiper motor continues to turn.
3. When the wiper switch is set at "HIGH" position:
   The current flows as follows: the ignition switch → wiper motor → wiper switch ② → E. Thus, the wiper motor continues to turn at a high speed.

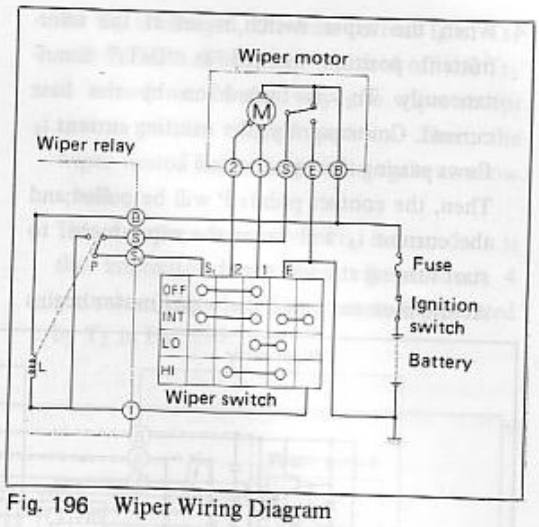
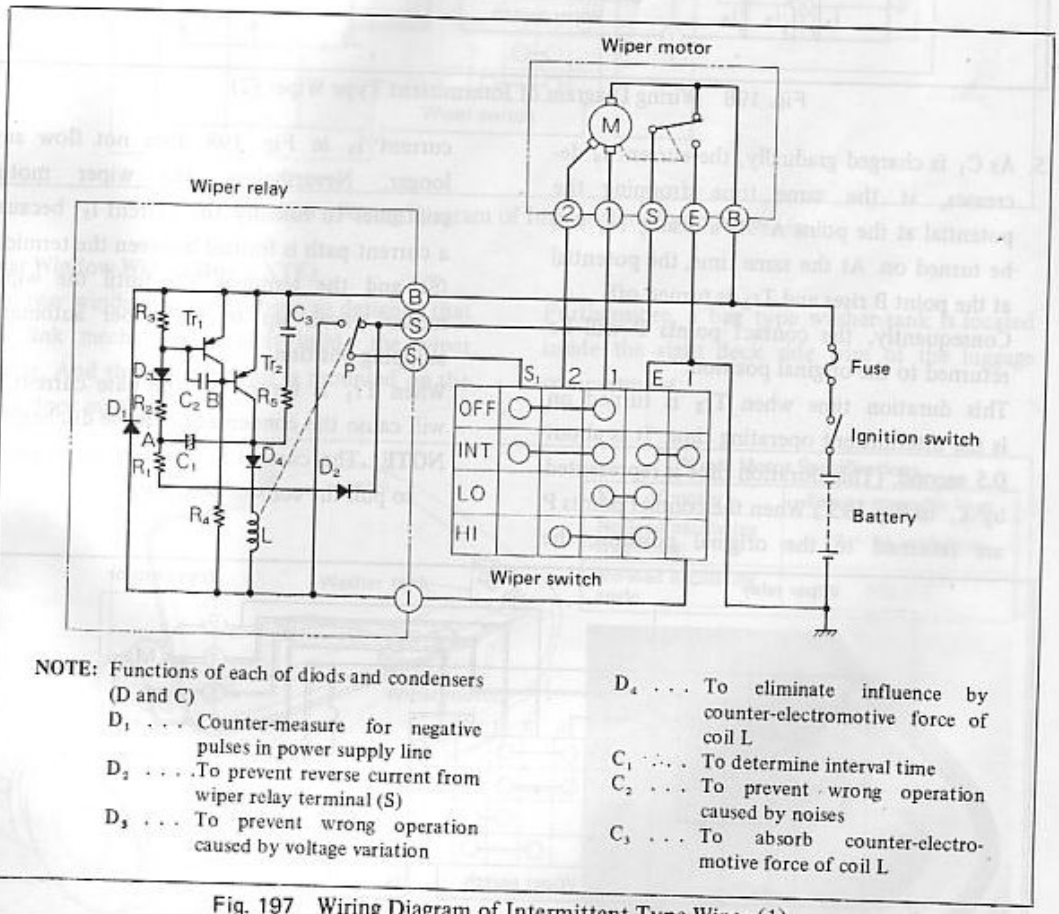


Fig. 196 Wiper Wiring Diagram



NOTE: Functions of each of diods and condensers (D and C)

- D_1 . . . Counter-measure for negative pulses in power supply line
- D_2 . . . To prevent reverse current from wiper relay terminal (S)
- D_3 . . . To prevent wrong operation caused by voltage variation
- D_4 . . . To eliminate influence by counter-electromotive force of coil L
- C_1 . . . To determine interval time
- C_2 . . . To prevent wrong operation caused by noises
- C_3 . . . To absorb counter-electromotive force of coil L

Fig. 197 Wiring Diagram of Intermittent Type Wiper (1)

4. When the wiper switch is set at the intermittent position marked as "INT," simultaneously Tr_2 is turned on by the base current. Consequently, the exciting current i_2 flows passing through the coil L.
   Then, the contact points P will be pulled and the current i_3 will cause the wiper motor to start turning at a low speed.
   At the moment when the wiper motor begins to turn, a path is formed between the terminal Ⓢ and the terminal Ⓔ. Consequently, the current i_4 begins to flow. In this way, the condenser C_1 will begin to be charged to positive potential, as indicated Fig. 198.
   When C_1 has been charged only a little, the potential at the point A is high and Tr_1 is turned off.

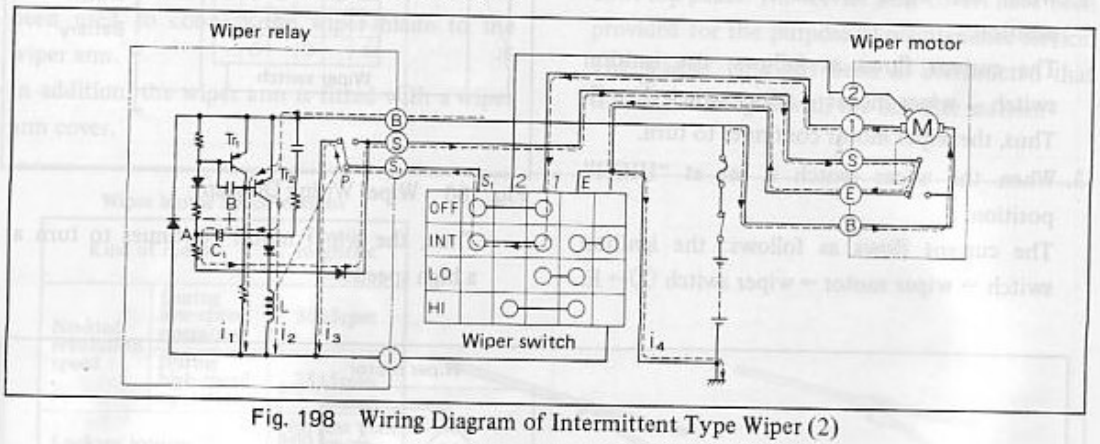


Fig. 198 Wiring Diagram of Intermittent Type Wiper (2)

5. As C_1 is charged gradually, the current i_4 decreases, at the same time dropping the potential at the point A. As a result, Tr_1 will be turned on. At the same time, the potential at the point B rises and Tr_2 is turned off.
   Consequently, the contact points P will be returned to the original position.
   This duration time when Tr_2 is turned on is the intermittent operating time. It is about 0.5 second. (This duration time is represented by T_1 in Fig. 195.) When the contact points P are returned to the original position, the current i_3 in Fig. 198 does not flow any longer. Nevertheless, the wiper motor continues to turn by the current i_5, because a current path is formed between the terminal Ⓢ and the terminal Ⓔ, until the wiper motor travels up to the wiper automatic stopping position.
   When Tr_1 is turned on, the base current i_6 will cause the condenser C_1 to be discharged.
   NOTE: The current i_6 is not strong engough to pull the contact points P.

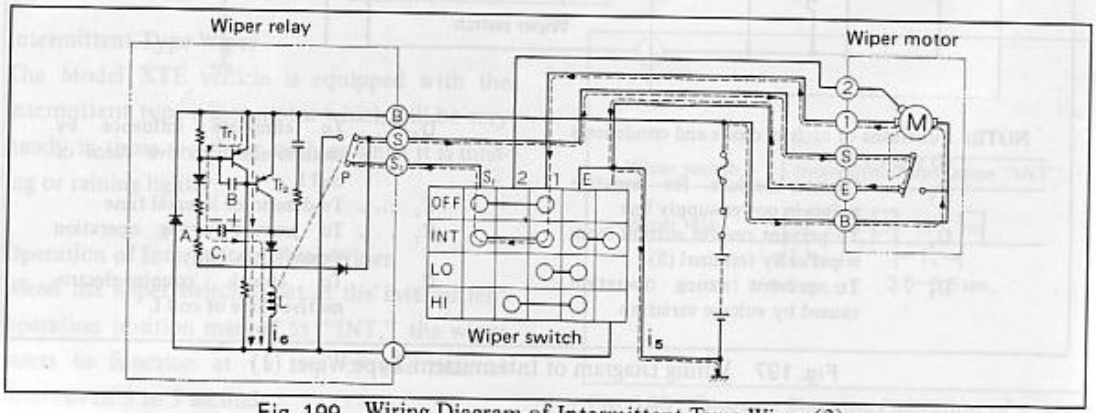


Fig. 199 Wiring Diagram of Intermittent Type Wiper (3)

6. When the wiper motor reaches the automatic stopping position, a current path is formed between the terminal Ⓢ and the terminal Ⓑ through the contact points provided inside the wiper motor, thereby permitting the current i_7 to flow. Consequently, electrical braking is applied to the wiper motor. In this way, the wiper motor can be stopped immediately. On the other hand, the condenser C_1 will soon begin to be charged by the current i_6 from the opposite direction.

As C_1 is charged, the base current i_6 of Tr_1 will decrease. Then, Tr_1 is turned off and Tr_2 is turned on. In this way, the wiper motor returns to the original position. Then, the wiper motor begins to operate again at a low speed.

This duration time when Tr_1 is turned on is the intermittent rest time. It is about 4 seconds. (This duration time is represented by T_2 in Fig. 195.)

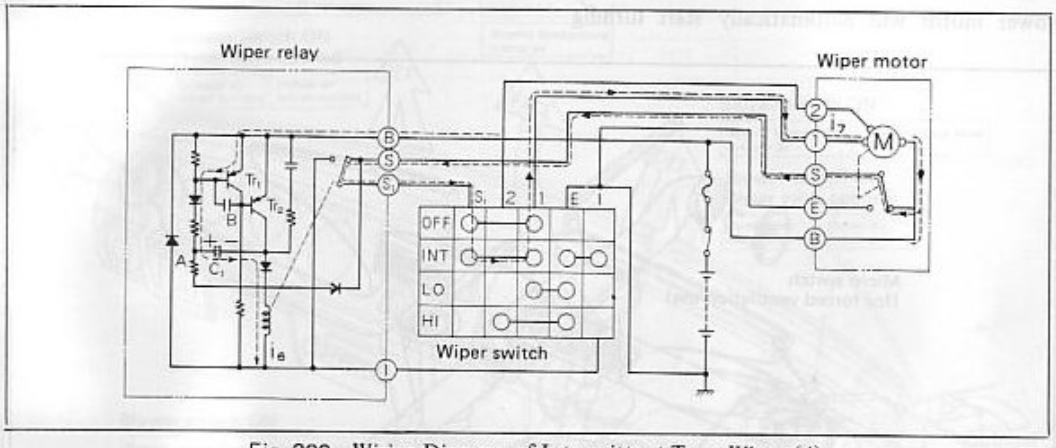
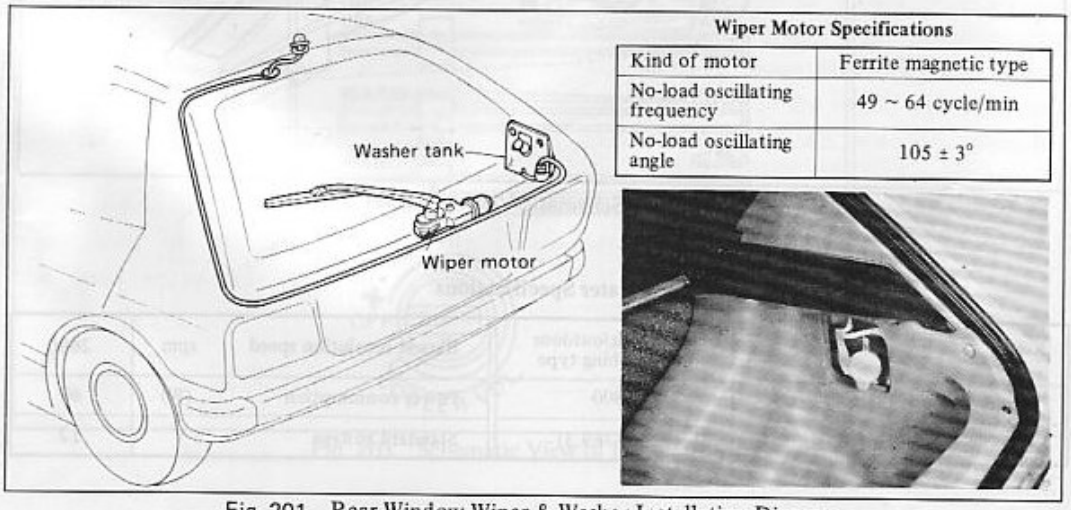


Fig. 200 Wiring Diagram of Intermittent Type Wiper (4)

Rear Window Wiper (Model XTE)

The rear window wiper has been so designed that the link mechanism is built inside the wiper motor. And this wiper motor is mounted on the back door inner panel.

Furthermore, a bag type washer tank is located inside the right deck side trim of the luggage compartment.



Wiper Motor Specifications

Kind of motor	Ferrite magnetic type
No-load oscillating frequency	49 ~ 64 cycle/min
No-load oscillating angle	105 ± 3°

Fig. 201 Rear Window Wiper & Washer Installation Diagram

HEATER

The heater is the indoor/outdoor air switching type hot water heater.

The forced type ventilation method has been employed to ventilate the vehicle interior in order that comfortable ventilation may be assured at all times, even when the vehicle is stopped or it is involved in a traffic jam.

This forced type ventilation system has been so designed that, when the ventilation outlet port switching lever is set at the FACE position, the blower motor will automatically start turning at a low speed. In this way, fresh outdoor air that has not routed the heater radiator can be discharged into the vehicle interior.

In order to ensure comfortable ventilation, the ventilation outlet ports are located on the top of the instrument panel cluster as well as on high places at both ends of the instrument panel.

On the Model XTE vehicle, the indicator lamp is located above the instrument panel so as to illuminate the heater control panel.

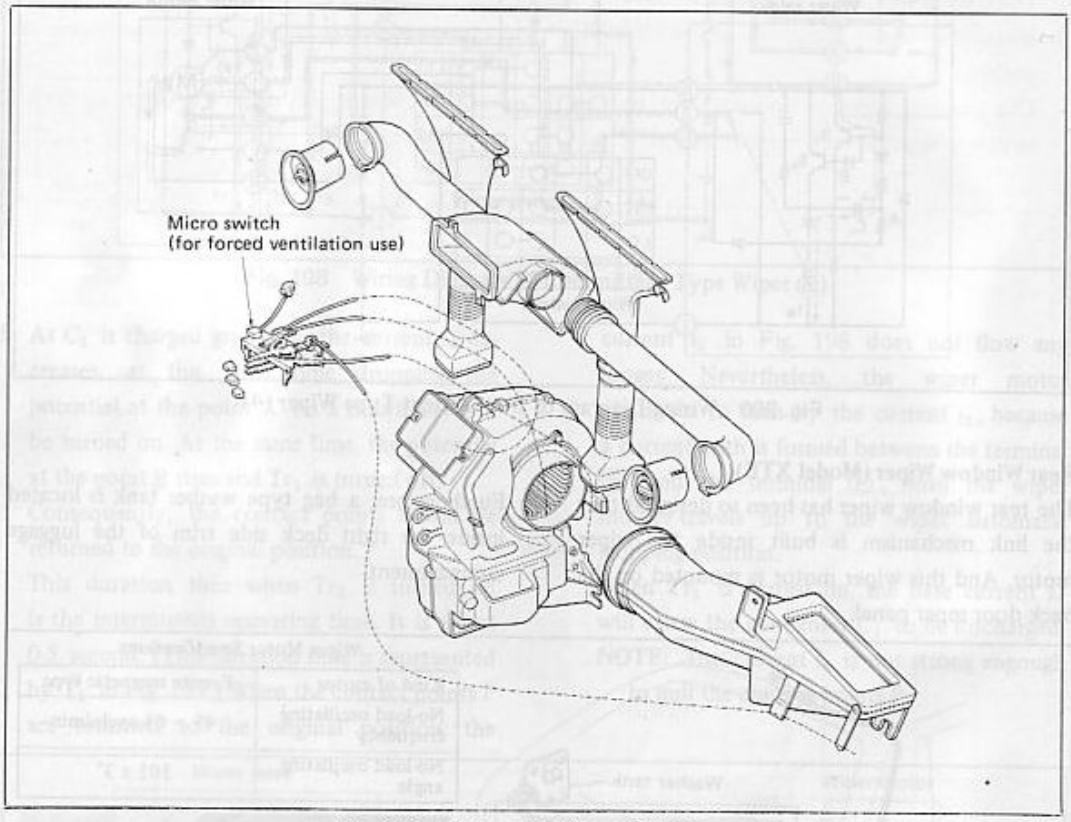


Fig. 202 Schematic View of Heater

Heater Specifications

Type		Indoor air/outdoor air switching type	Blower revolution speed	rpm	2600
Heat radiating rate	Kcal/h	2800	Power consumption	(W)	60
Air flow	mm^3/h (ft^3/h)	220 (7769.3)	Standard voltage	V	12

Heater Control Mechanism

1. Heater blower switch: It is possible to regulate the air flow over three stages.
2. Indoor air/outdoor air switching lever: This lever controls opening/closing of the indoor air/outdoor air switching lever.
3. Outlet port switching lever: This lever controls opening/closing of the FACE/FOOT switching damper and the FOOT/DEF switching damper. Also, when the lever is set at the FACE position, the micro switch actuates the blower motor which will start turning, thus performing forced ventilation.
4. Temperature regulating lever: This lever which is interlocked with the water valve will perform temperature regulation.

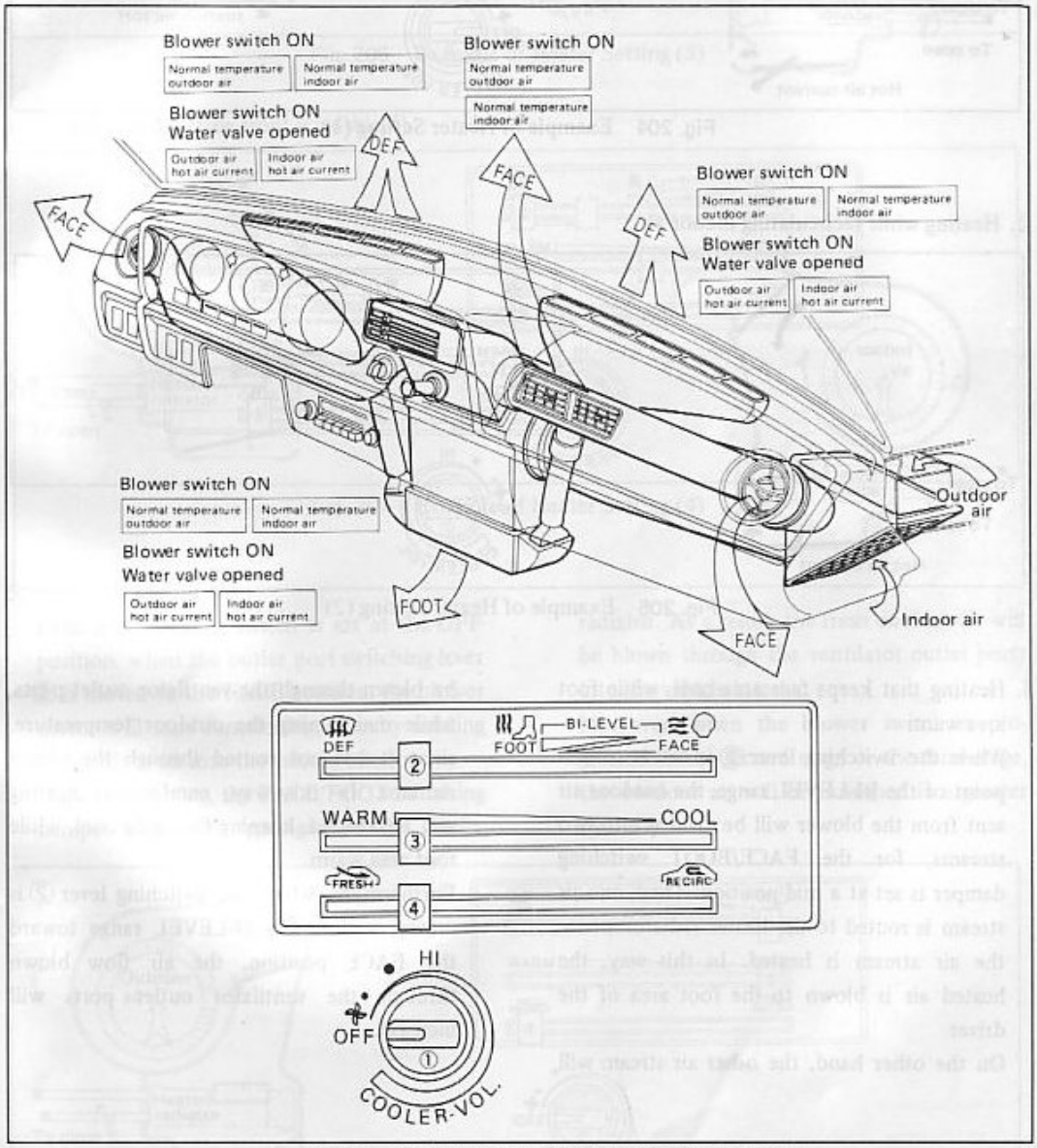


Fig. 203 Schematic View of Heater Control System

Examples of Heater Settings

1. Heating while introducing outdoor air

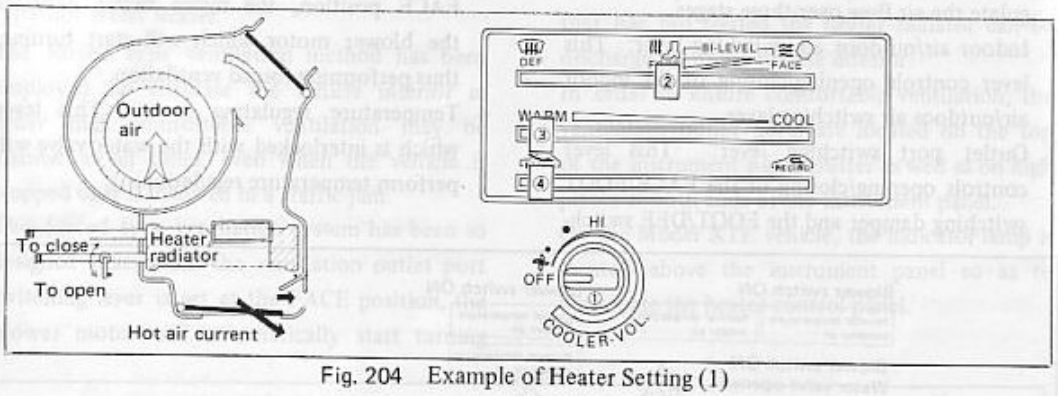


Fig. 204 Example of Heater Setting (1)

2. Heating while recirculating indoor air

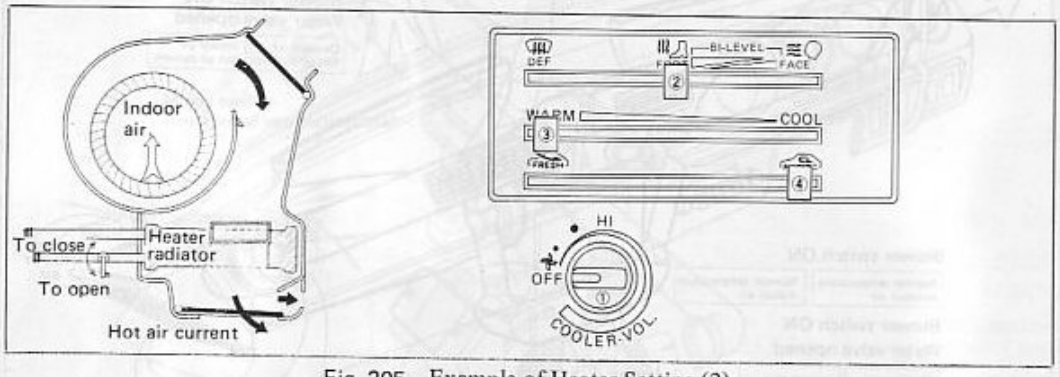


Fig. 205 Example of Heater Setting (2)

3. Heating that keeps face area cool, while foot area warm

When the switching lever ② is set at a mid-point of the BI-LEVEL range, the outdoor air sent from the blower will be divided into two streams, for the FACE/FOOT switching damper is set at a mid-position. Then, one air stream is routed to the heater radiator where the air atream is heated. In this way, the heated air is blown to the foot area of the driver.

On the other hand, the other air stream will be blown through the ventilator outlet ports, while maintaining the outdoor temperature, since it has not routed through the heater radiator. In this way, comfortable heating will be assured, keeping face area cool, while foot area warm.

Furthermore, when the switching lever ② is moved within the BI-LEVEL range toward the FACE position, the air flow blown through the ventilator outlet ports will increase.

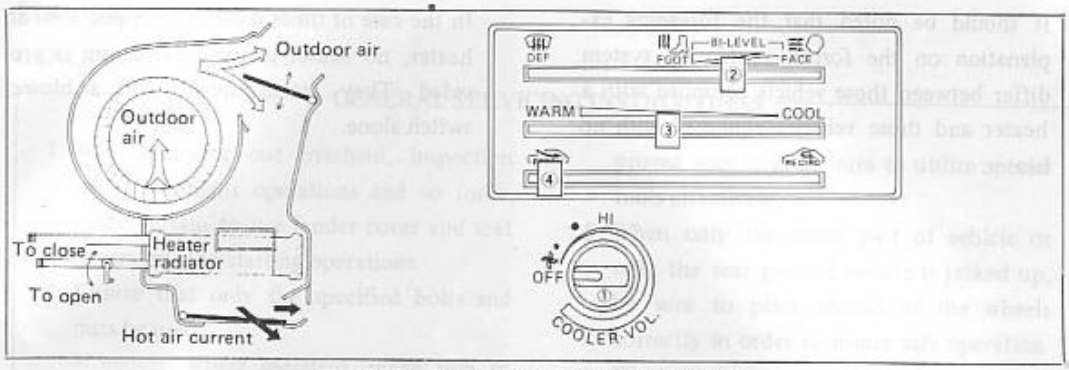


Fig. 206 Example of Heater Setting (3)

4. Defroster (Demisting front windshield)

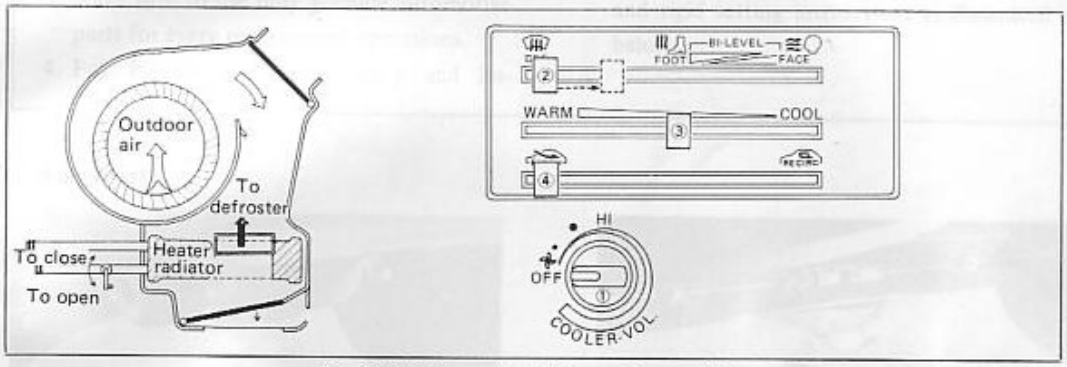


Fig. 207 Example of Heater Setting (4)

5. Forced ventilating

Even if the blower switch is set at the OFF position, when the outlet port switching lever ② is moved to the FACE position, the blower motor will start functioning, thereby sending the outdoor air into the vehicle interior.

Under this setting, the FACE/FOOT switching damper closes the passage for the heater radiator. As a result, the fresh outdoor air will be blown through the ventilator outlet ports into the vehicle interior.

Moreover, when the blower switch is progressed to the second stage or the third stage, the outdoor air will be furnished in a greater quantity.

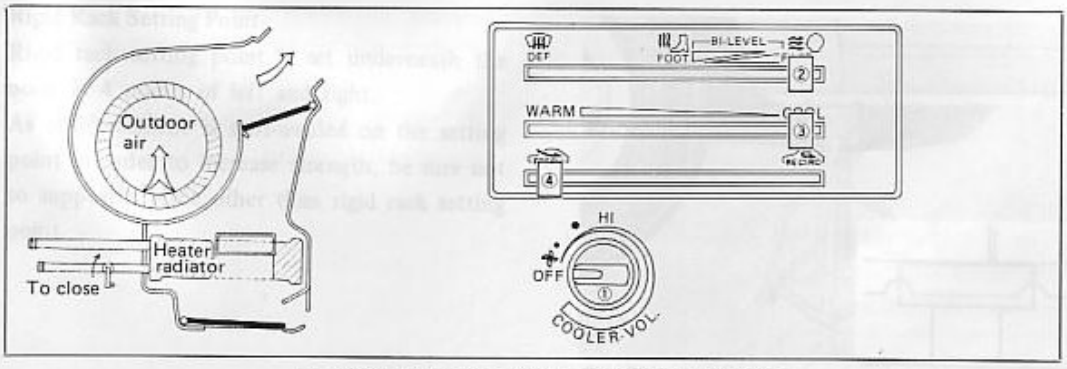


Fig. 208 Example of Forced Ventilator Setting

It should be noted that the foregoing explanation on the forced ventilation system differ between those vehicle equipped with a heater and those vehicles equipped with no heater.

In the case of those vehicles equipped with no heater, no heater control mechanism is provided. They are equipped with a blower switch alone.

PERIODIC MAINTENANCE

GENERAL INFORMATION

GENERAL SERVICING INSTRUCTIONS

1. When carrying out overhaul, inspection and adjustment operations and so forth, make certain to use fender cover and seat covers prior to starting operations.
2. Ensure that only the specified bolts and nuts be used.
   Moreover, where specified, make sure to employ a torque wrench to torque bolts and nuts to specifications.
3. Make sure to use only genuine automotive parts for every replacement operations.
4. For increased work efficiency and improved accuracy, be sure to utilize special tools effectively.
5. When only the front part of vehicle or only the rear part of vehicle is jacked up, be sure to place chocks at the wheels correctly in order to insure safe operation.
6. When you are going to jack up vehicle and place rigid racks underneath the vehicle, be certain to follow the car jacking and rigid setting instructions as illustrated below.

Jacking Point

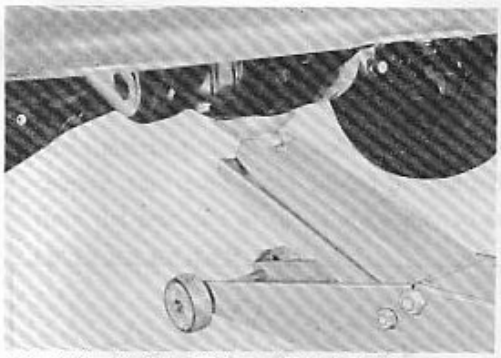


Fig. 209 Jacking Point at Front End

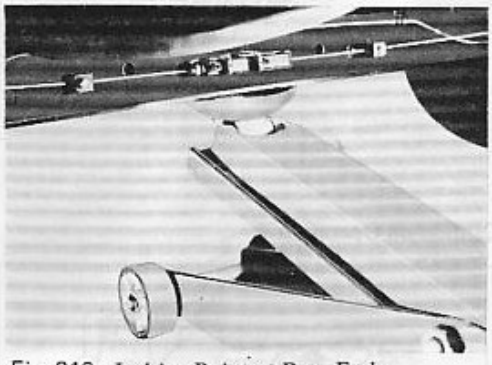


Fig. 210 Jacking Point at Rear End

NOTE: When placing jack underneath the axle beam, special care should be excercised not to damage it.

Rigid Rack Setting Point

Rigid rack setting point is set underneath the body at 4 points of left and right.

As reinforcement is spot-welded on the setting point in order to increase strength, be sure not to support a place other than rigid rack setting point.

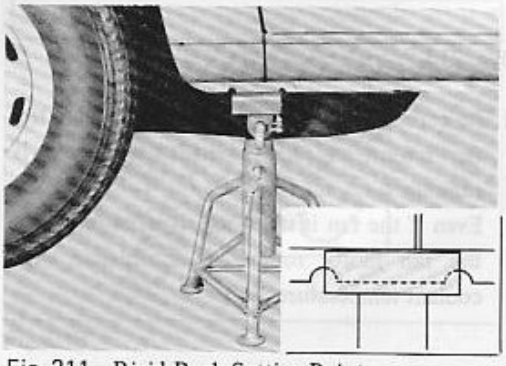


Fig. 211 Rigid Rack Setting Point

Moreover, when lifting the car with a two-post lift, support it with rigid rack setting points (4-points).

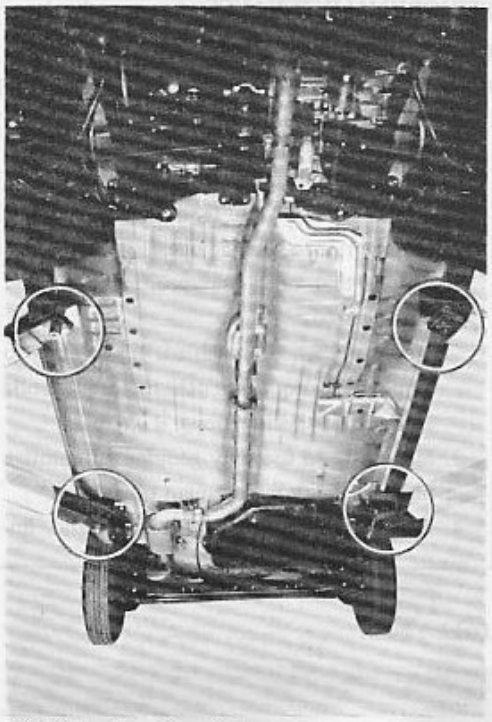


Fig. 212 Two-Post Lift

Caution on Operation

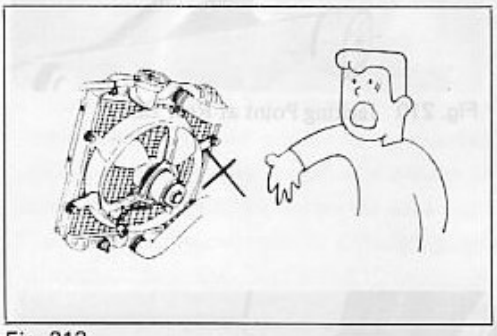


Fig. 213

1. Be certain to keep your hands away from the fan motor, especially when the engine is running.
   Even if the fan is stand-still, it is danger, since the fan motor rotates in accordance with coolant temperature.

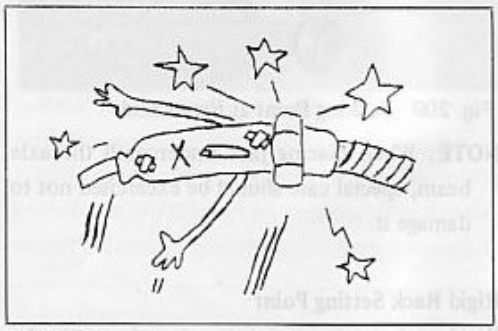


Fig. 214

2. Be careful not to drop or damage the electrical components.

3. When removing the resistive cord, pull out it with cap section held, never pull the resistive cord by holding cord section. When installing the resistive cord, insert it securely after bleeding the cap.
   When using a timing light, be sure not to damage the resistive cord with a wire etc.

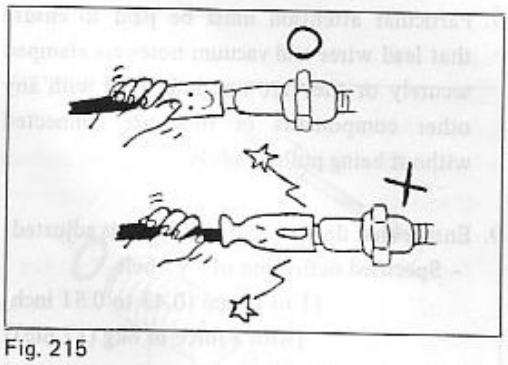


Fig. 215

4. When removing the connector, pull the connector itself, never pull the wiring harness by holding wiring harness section.
   Care should be paid to ensure that no open circuit or poor contact of the wiring harness is present, and make sure it again after operation has been completed.
   The connector equipped with lock inserts securely until clicking sound occurs. And make sure that it is locked securely, by pulling it lightly.

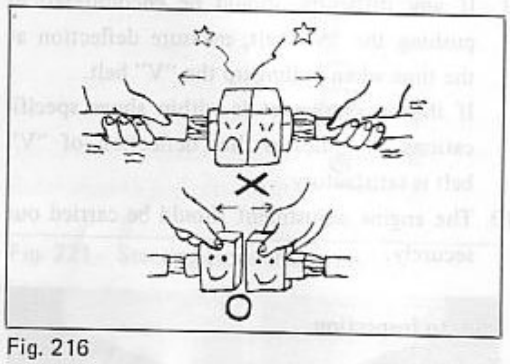


Fig. 216

5. When inserting the tester probe into the wire coupler, the tester probe should be inserted from the rear side of the wire coupler so as not to damage the terminal.

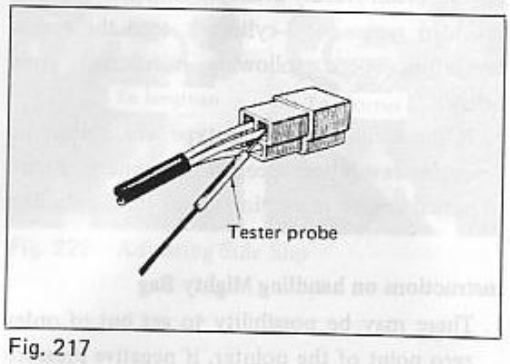


Fig. 217

6. When performing steam cleaning, particular attention must be paid to ensure that no water is applied directly to the electrical components, especially ignition system.

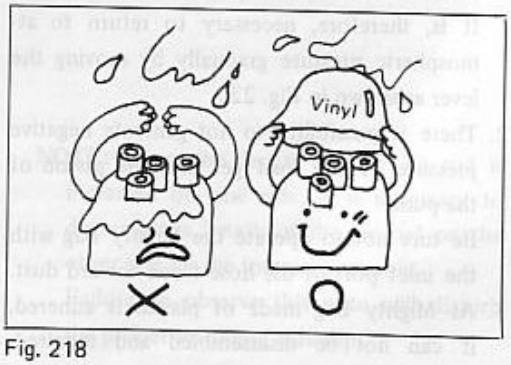


Fig. 218

7. Particular attention must be paid to ensure that lead wires and vacuum hoses are clamped securely or they are not interfered with any other components or they are connected without being pulled tightly.

9. Ensure that deflection of "V" belt is adjusted.
   Specified deflection of "V" belt
   11 to 13mm (0.43 to 0.51 inch)
   [with a force of 8kg (17.6lb)]
   Reference information
   - If any difficulty should be encountered in pushing the "V" belt, measure deflection at the time when pulling up the "V" belt.
     If this measurement is within above specifications, it indicates that deflection of "V" belt is satisfactory.
10. The engine adjustment should be carried out securely.

Prior to Inspection

Tachometer

As the commercially-available tachometer is not provided range for 3-cylinders, read the engine revolution speed following instruction given below.

1. If the tachometer is the type which picks up engine revolution speed from primary circuit, actual engine revolution speed for 3-cylinders is two times of reading at range for 6-cylinders.
2. If the tachometer is the type which detects pulse flowing in the resistive cord for No.1 cylinder, indicated value is actual engine revolution speed regardless of cylinder number.

Instructions on handling Mighty Bag

1. There may be possibility to get out of order zero point of the pointer, if negative pressure returns to atmospheric pressure suddenly.
   It is, therefore, necessary to return to atmospheric pressure gradually by moving the lever as shown in Fig. 220.
2. There is possibility to not generate negative pressure, if any dust get into the piston of the pump.
   Be sure not to operate the Mighty Bag with the inlet port of the hose faced toward dust.
3. As Mighty Bag made of plastic is adhered, it can not be disassembled and repaired. Therefore, care should be paid not to damage the Mighty Bag.
4. When a Mighty Bag is used, be sure to use the hose furnished along the instrument.

8. Make certain to use the following engine oil.
   - **SAE 10W-30**
   - **Chilly region SAE 5W-30**
   - **Oils equivalent to API classification SD**

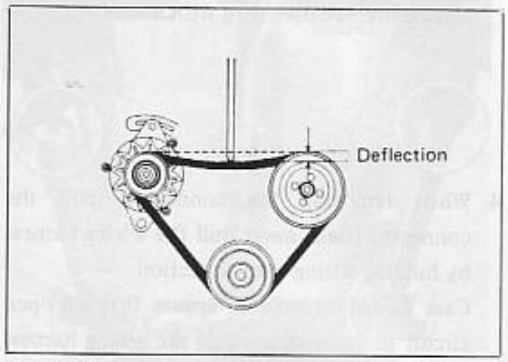


Fig. 219

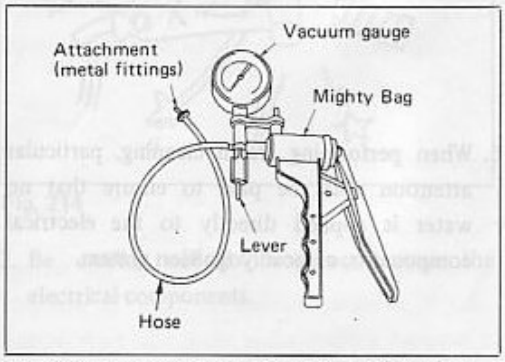


Fig. 220 Instructions on handling Mighty Bag

CHECK AND ADJUSTMENT PROCEDURE

Steering

Checking Rods and Arms for Looseness, Excessive Wear, or Damage

1. Check to see if any looseness, excessive wear or damage is present at the following parts.
   (1) Tie rod ① and lock nut ②
   (2) Tie rod end ③, boot ④ and rack boot ⑤
   (3) Castle nut ⑥ and cotter pin ⑦
2. Repeatedly move the steering wheel from its straight-ahead position to the right or left. And check to see whether any excessive wear is present at the ball joint section.

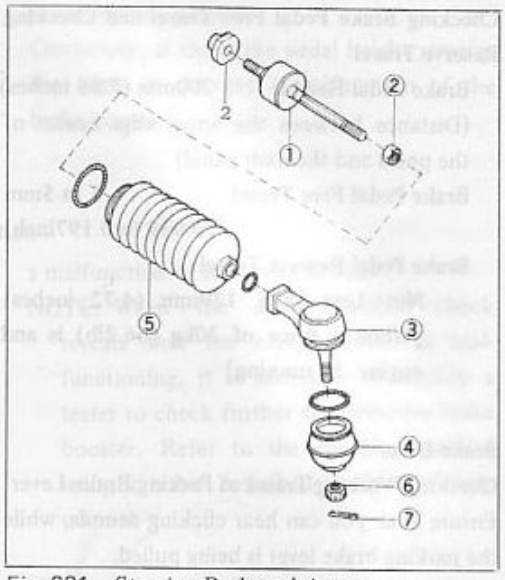


Fig. 221 Steering Rods and Arms

Wheel Alignment (side slip)

Inspection

Inflate all tires to the specified air pressures. Then, carry out the side slip test.

Specified Amount of Side Slip

IN 3mm (0.12 inch) to
OUT 3mm (0.12 inch)/m (3.28ft)

If the side slip does not fall within the specified range, adjust the length of the tie rod.

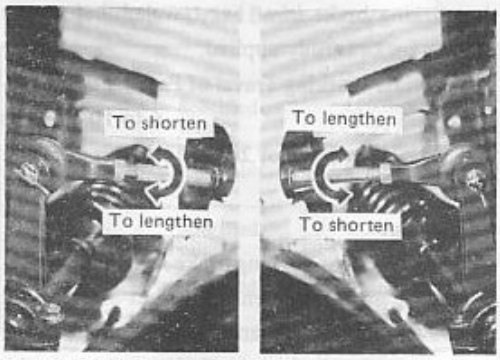


Fig. 222 Adjusting Side Slip

Adjustment

1. If the side slip tester registers an excessive "OUT" reading, increase the length of the tie rod.
2. If the side slip tester registers an excessive "IN" reading, decrease the length of the tie rod.
3. After the tie rods have been adjusted, be sure to check the turning angle of each wheel.

Turning angles

Inner side $37°35' \pm 2°$
Outer side $33°0' \pm 2°$

Difference in Angle between Right and Left Sides: Not to Exceed 2°

NOTE: When the length of the tie rod is increased on one side, it is necessary to decrease the length of the tie rod on the other side by the increased amount.
Failure to observe this note will disturb the proper setting of side slip.

Brake System

Brake Pedal

Checking Brake Pedal Free Travel and Checking Reserve Travel

Brake Pedal Height **200mm (7.86 inches)**
(Distance between the upper edge center of the pedal and the dash panel)

Brake Pedal Free Travel **1 to 5mm (0.039 to 0.197inch)**

Brake Pedal Reserve Travel
Not Less than 120mm (4.72 inches) [When a force of 30kg (66.2lb) is and engine is running]

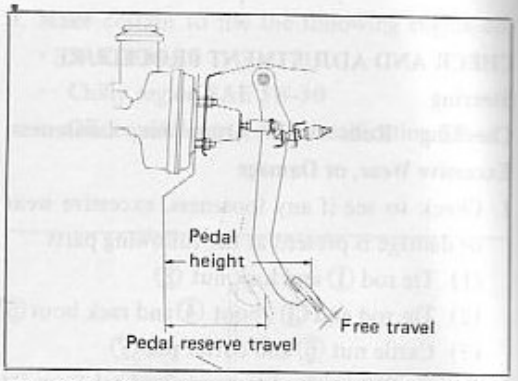


Fig. 223 Checking and Adjusting Brake Pedal

Brake Lever

Checking Working Travel of Parking Brake Lever

Ensure that you can hear clicking sounds, while the parking brake lever is being pulled.

Count the number of the sector teeth over which the parking brake lever has traveled, before the parking brake is fully applied.

Specified Working Travel of Parking Brake: 6 to 10 Notches [When a force of 20kg (44.1lb) is applied]

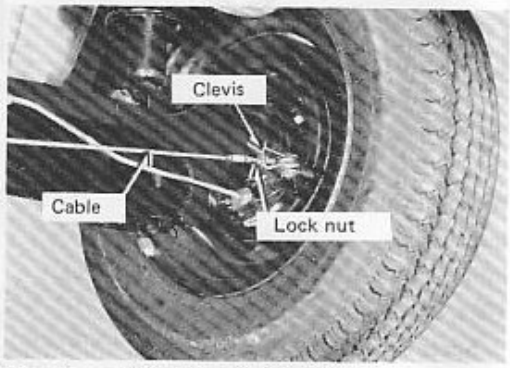


Fig. 224 Adjusting Brake Lever

Adjustment

Working travel of parking brake lever adjustment should be made after ensuring that brake pedal reserve travel is more than specified value.

1. Slacken the lock nut of the parking brake cable. Then, thurn the parking brake cable, until the working travel becomes the specified value.
2. Carry out the adjustment of the left side by turning the clevis of the parking brake cable end.

Brake Booster Performance Checks (simple performance checks)

1. Air-Tight Performance Check

Start the engine. After running the engine for one to two minutes, stop the engine. Depress the brake pedal several times, applying a force which would be used during normal brake application. If the brake pedal rises progressively at the second and third brake applications, it indicates that the brake booster is functioning properly.

Conversely, if the brake pedal height does not vary, it denotes a malfunction of the brake booster.

2. Performance Check

With the engine stopped, depress the brake pedal several times, applying the same force at each brake application. Ensure that the brake pedal height does not vary at each brake application. While the brake pedal is being depressed, start the engine. If the brake pedal moves in slightly, it indicates that the booster is functioning properly.

Conversely, if the brake pedal height remains the same, it denotes a malfunction of the brake booster.

3. Air-Tight Performance Check Under Loaded Condition

While the engine is running, depress the brake pedal. With the brake pedal held at the depressed position, stop the engine.

Hold the brake pedal at the same position for a period of 30 seconds. If the brake pedal height remains unchanged, it shows that the brake booster is functioning properly.

Conversely, if the brake pedal rises, it denotes a malfunction of teh brake booster.

NOTE: When the above-described check reveals that the brake booster is malfunctioning, it is necessary to employ a tester to check further the defective brake booster. Refer to the checking method using a tester described in the workshop manual.

Checking Brake Drums and Brake Shoes

Check to see whether any damage, wear of inner surface, or uneven wear is present at the brake drum.

In addition, check to see if any wear, damage, or peeling off is present at the brake lining.

Drum Brake

Item		Rear
Drum inner diameter	Specified value	180.0mm (7.09 inches)
	Allowable limit	182.0mm (7.17 inches)
Lining thickness	Specified value	4.0mm (0.16 inch)
	Allowable limit	1.0mm (0.039 inch)

Disc Brake – Equipped Vehicle

Check the disc for proper thickness. Also, check to see whether any excessive rust, or run-out is present at the disc.

In addition, check the outer and inner pads for proper thickness.

Also, check them for uneven wear.

Disc Brake

Disc thickness	Specified value	10.0mm (0.39inch)
	Allowable limit	9.0mm (0.35inch)
Disc run-out	Allowable limit	0.15mm (0.006inch)
Pad thickness	Specified value	9.0mm (0.35inch)
	Allowable limit	1.0mm (0.039inch)

2. **Performance Check**

With the engine stopped, depress the brake pedal several times, applying the same force at each brake application. Ensure that the brake pedal height does not vary at each brake application. While the brake pedal is being depressed, start the engine. If the brake pedal moves in slightly, it indicates that the booster is functioning properly.

Conversely, if the brake pedal height remains the same, it denotes a malfunction of the brake booster.

3. **Air-Tight Performance Check Under Loaded Condition**

While the engine is running, depress the brake pedal. With the brake pedal held at the depressed position, stop the engine.

Hold the brake pedal at the same position for a period of 30 seconds. If the brake pedal height remains unchanged, it shows that the brake booster is functioning properly.

Conversely, if the brake pedal rises, it denotes a malfunction of teh brake booster.

NOTE: When the above-described check reveals that the brake booster is malfunctioning, it is necessary to employ a tester to check further the defective brake booster. Refer to the checking method using a tester described in the workshop manual.

Checking Brake Drums and Brake Shoes

Check to see whether any damage, wear of inner surface, or uneven wear is present at the brake drum.

In addition, check to see if any wear, damage, or peeling off is present at the brake lining.

Drum Brake

Item		Rear
Drum inner diameter	Specified value	180.0mm (7.09 inches)
	Allowable limit	182.0mm (7.17 inches)
Lining thickness	Specified value	4.0mm (0.16 inch)
	Allowable limit	1.0mm (0.039 inch)

Disc Brake – Equipped Vehicle

Check the disc for proper thickness. Also, check to see whether any excessive rust, or run-out is present at the disc.

In addition, check the outer and inner pads for proper thickness.

Also, check them for uneven wear.

Disc Brake

Disc thickness	Specified value	10.0mm (0.39inch)
	Allowable limit	9.0mm (0.35inch)
Disc run-out	Allowable limit	0.15mm (0.006inch)
Pad thickness	Specified value	9.0mm (0.35inch)
	Allowable limit	1.0mm (0.039inch)

ADJUSTING BRAKE DRUM-TO-LINING CLEARANCE

Rear Brake

It is unnecessary to carry out brake adjustments, for their brakes are of the automatic adjusting type.

Operate the parking brake lever several times. Then, the brakes will be adjusted automatically to the specified clearance.

If the brakes should fail to be adjusted automatically, check the function of the brake automatic adjuster mechanism, by removing the brake drums.

Running System

Checking Front Wheel Bearings for Looseness

1. Jack up the vehicle. Place one's hands on the upper part of the tire.
   Alternately push and pull upper and lower parts of the tire to see if any looseness is present.
   If any looseness should exist, carry out the following checks while the brake pedal is being depressed.
   - If the looseness is no longer noticeable: – it indicates that the wheel bearings are loose.
   - If the looseness should persist: – it indicates that the knuckle section or other suspension parts are loose.

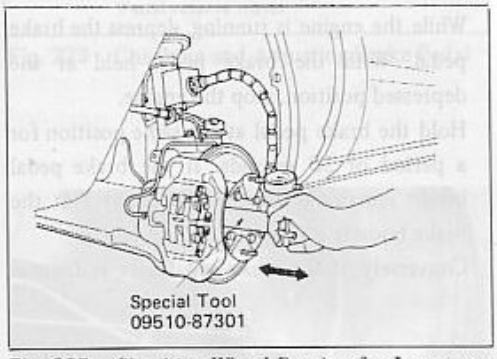


Fig. 225 Checking Wheel Bearing for Looseness

2. Turn the tire, by one's hands. If the tire turns smoothly and it emanates no abnormal sound, the front wheel bearings are satisfactory.

Checking Rear Wheel Bearings for Looseness

Carry out the same inspection as with the front side. If any looseness is not present, also the tire turns smoothly and it emanates no abnormal sound, the rear wheel bearings are satisfactory.

When checking the wheel bearing for looseness is carried out, if any looseness is present, measure the looseness, by using a Special Tool and as shown in Fig. 225.

Looseness of Front wheel Bearing	
Specified Value	No more than 0.25mm (0.0098 inch) (Axial direction)
Allowable Limit	0.5mm (0.0197inch)

Looseness of Rear wheel Bearing	
Specified Value	No more than 0.20mm (0.0079inch) (Axial direction)
Allowable Limit	0.35mm (0.0138inch)

Suspensions

Checking Suspension Arm and Knuckle Support Mounting Sections and Connecting Sections for Damage and Looseness.

Check to see if any looseness or damage is present at the mounting sections and connecting sections of the following parts:

Front Side

1. Lower arm
2. Lower arm and bracket of strut bar
3. Shaft of lower arm and bush
4. Lower arm ball joint and boots
5. Castle nut of lower arm ball joint and cotter pin
6. Strut bar cushion
7. Steering knuckle connecting section
8. Shock absorber

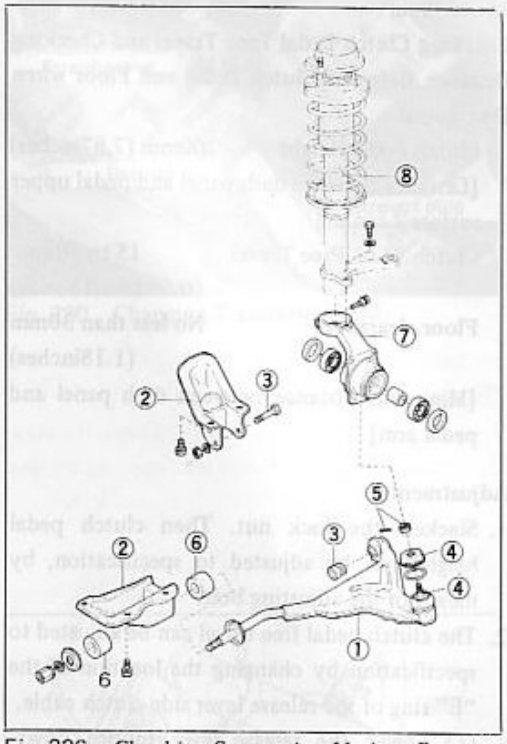


Fig. 226 Checking Suspension Various Parts (Front)

Rear Side

1. Rear axle beam
2. Upper and lower control arm
3. Shaft of control arm and bush (8 pieces for both left and right sides)
4. Bracket of control arm
5. Lateral rod
6. Shaft of lateral rod and bush
7. Shock absorber

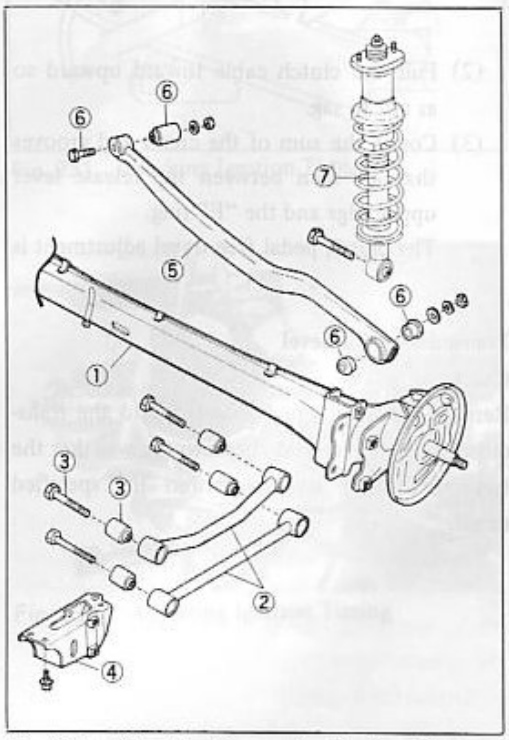


Fig. 227 Checking Suspension Various Parts (Rear)

Power Train

Checking Clutch Pedal Free Travel and Checking Distance Between Clutch Pedal and Floor when Disengaged.

Clutch Pedal Height **200mm (7.87inches)**
[Distance between dash panel and pedal upper surface's center]

Clutch Pedal Free Travel **15 to 30mm (0.59 to 1.18 inch)**

Floor clearance **No less than 30mm (1.18inches)**
[Minimum distance between dash panel and pedal arm]

Adjustment

1. Slacken the lock nut. Then clutch pedal height can be adjusted to specification, by means of the adjusting bolt.
2. The clutch pedal free travel can be adjusted to specification by changing the location of the "E" ring of the release lever side clutch cable.
   (1) Lower the release lever toward downward, until a resistance is felt.

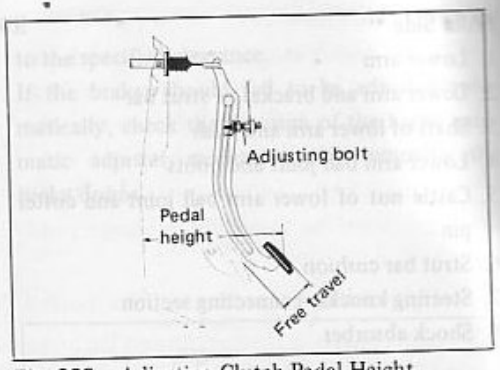


Fig. 228 Adjusting Clutch Pedal Height

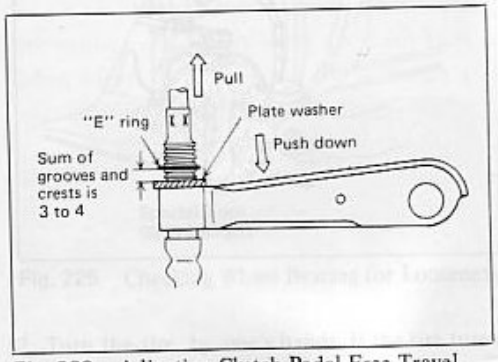


Fig. 229 Adjusting Clutch Pedal Free Travel

   (2) Pull the clutch cable toward upward so as not to sag.
   (3) Count the sum of the crests and grooves that are seen between the release lever upper edge and the "E" ring.
   The clutch pedal free travel adjustment is correct, if this sum of crests and grooves ranges from 3 to 4.
   (4) Depress the clutch pedal several times. And check to see whether the clutch pedal free travel conforms to specification.

Transmission Oil Level

Check

Remove the level gauge inserted into the transmission case cover and check to see whether the transmission oil level is within the specified range.

If the transmission oil should lack, replenish the transmission with specified oil from the straight plug provided at the transmission side.

Changing Transmission Oil

Gear Oil SAE80 **1.4 liters**
(Oils equivalent to API classification GL3 or 4)
Transmission oil change Intervals:
Every 30,000 km (18,000 miles) Run or 18 Months
Tightening Torque of Each Plug
Straight screw plug
Restrict pin plug **3.0 to 5.0 kg-m (21.7 to 36.2 ft-lb)**

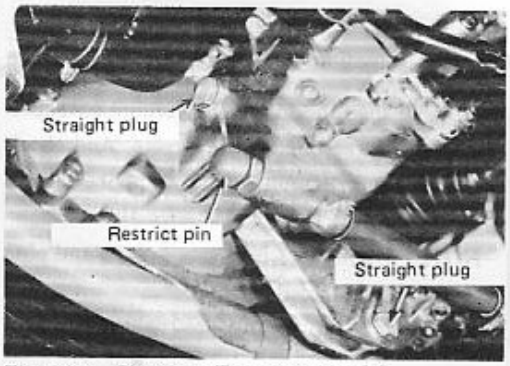


Fig. 230 Changing Transmission Oil

NOTE:
1. Apply bond sealer to each plug.
2. Be sure not to change the restrict pin gasket thickness.

Electrical System
Ignition System
Check
Run the engine at idling speed. Check the ignition timing with a timing light.
Specified Ignition Timing: BTDC 10°/900 rpm
(The ignition timing should be checked by the timing mark on the flywheel)

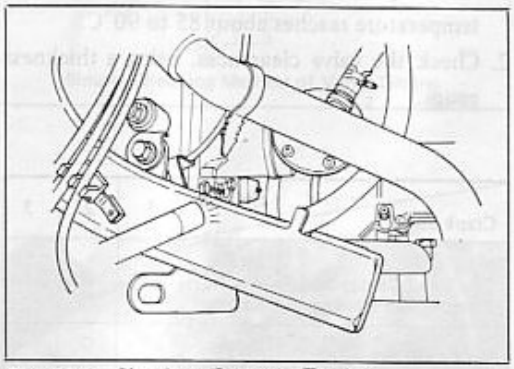


Fig. 231 Checking Ignition Timing

Adjustment
The ignition timing can be adjusted by slackening the retaining bolt of the distributor flange and by turning the distributor housing.

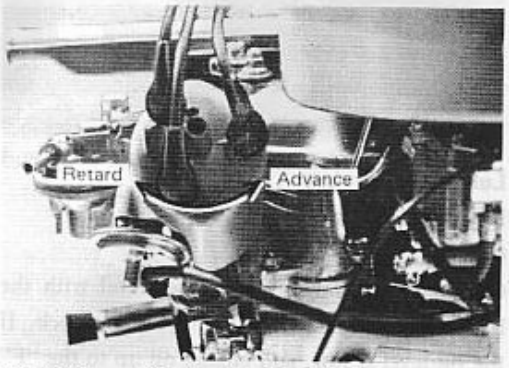


Fig. 232 Adjusting Ignition Timing

Checking Function of Ignition Timing Advance Device

1. Suspend the function of the vacuum advancer. Repeatedly accelerate the engine. And check the governor timing advancement with a timing light.
   NOTE: Disconnect the vacuum hose and plug the disconnected hose.
2. Apply a negative pressure to the vacuum advancer, (e.g. by sucking the hose through one's mouth or by using a Mighty Bag). If the Ignition mark moves to advancing direction, it indicates that the vacuum advancer is functioning properly.
3. Connect the disconnected vacuum hose.

Engine

Checking State of Exhaust Gases

Warm up the engine thoroughly. Check the state of exhaust gases under different running modes, such as low speed, medium and high speed operations and acceleration operation.

Checking Valve Clearances

1. Warm up the engine, until the cooling water temperature reaches about 85 to 90°C.
2. Check the valve clearances, using a thickness gauge.

Crank angle \ Cylinder		1	2	3
No.1 cylinder Top Dead Center on compression stroke	Intake	○		○
	Exhuast	○	○	
No.1 cylinder overlap	Intake		○	
	Exhaust			○

Specified Valve Clearances: Both for Intake and Exhaust Valves 0.20mm (0.0079 inch) [Hot]

[Measurement is made between camshaft and rocker arm.]

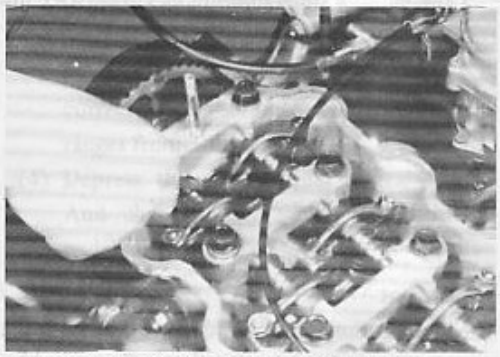


Fig. 233 Checking Valve Clearances

Lubrication System

Engine Oil Level

Check

Check the engine oil for proper level with the level gauge provided at the cylinder block. If the oil level is low, add engine oil up to the "F" mark, removing the oil filler cap provided on the cylinder head cover.

Engine Oil Capacity

Oil pan	**2.7 liters**	**Total capacity**
Oil cleaner	**0.2 liter**	**2.9 liters**

Changing Engine Oil

- **Specified Engine Oils** **SAE 10W-30**
- **Chilly region** **SAE 5W-30**
- **Oils equivalent to API classification SD**

Change Intervals

Engine oil: Every 5000km (3000 Miles) Run.

Oil cleaner: Every 10,000km (6000Miles) Run.

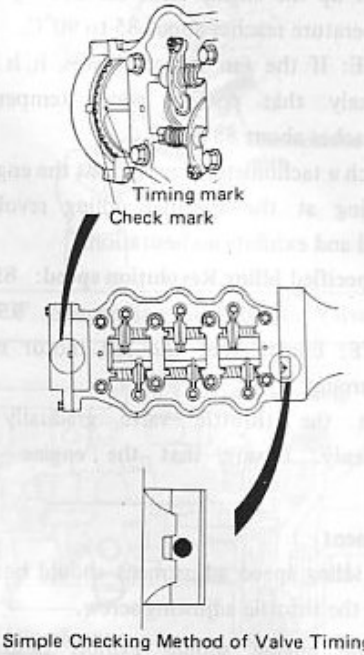
Reference Information

Simple checking Method of Valve Timing

With No.1 cylinder assumed top dead center on compression stroke, while you are performing the check and adjustment of the valve clearances, the valve timing can be checked easily following the procedure given below:

Check Procedure

1. Line up the ignition mark provided on the flywheel with the ignition timing of the No.1 cylinder.
2. When the operation described in step 1 above has been completed, if the check mark provided on the timing belt cover aligns with the timing mark provided on the camshaft pulley as shown in right Figures, it indicates that the valve timing is correct.



Simple Checking Method of Valve Timing

Fuel System

Checking Carburetor Throttle Valve and Choke Valve for Proper Condition

1. Check the thrttle valve shaft for wear.
2. Depress the accelerator pedal fully so as to check the opening of the throttle valve.
3. Operate the choke button. And check to see whether the choke valve can stop at any position over the entire range from the fully-closed position to the fully-opened position.

   NOTE: With the choke button pulled fully, operate the accelerator pedal once.

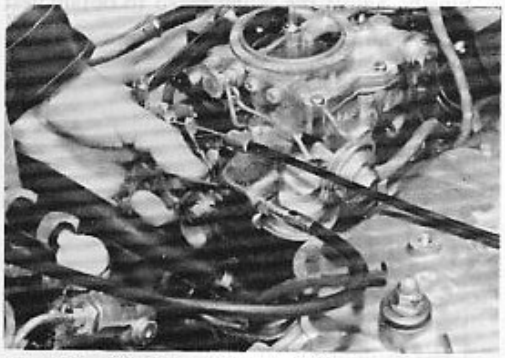


Fig. 234 Checking Throttle Valve

Checking Carburetor Adjustment

1. Warm up the engine until the cooling water temperature reaches about 85 to 90°C.
   NOTE: If the fan motor rotates, it is most likely that cooling water temperature reaches about 85 to 90°C.
2. Attach a tachometer. Ensure that the engine is running at the specified idling revolution speed and exhibits no hesitation.
   Specified Idling Revolution speed: 850 to 950rpm
   NOTE: Ensure that the fan motor is not turning.
3. Open the throttle valve gradually and suddenly. Ensure that the engine speed increases smoothly in proportion to the throttle valve opening.

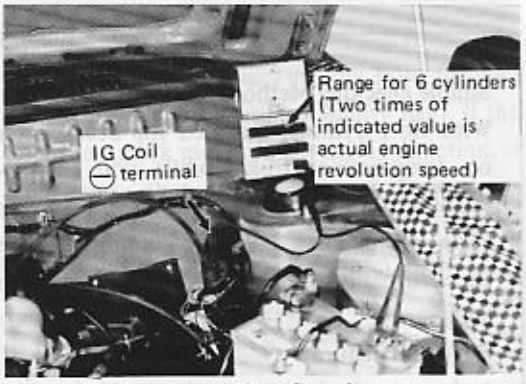


Fig. 235 Checking Idling Speed

Adjustment

1. The idling speed adjustment should be made with the throttle adjusting screw.
2. If the engine should exhibit hesitation, back-off the idle adjusting screw slowly by using a special tool until a stable revolution speed is obtained.
   Finally, adjust the idling speed to obtain best idle performance of 900 ± 50 rpm with the throttle adjusting screw.

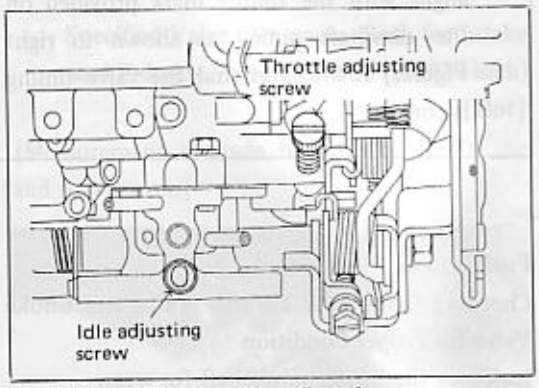


Fig. 236 Adjusting Idling Speed

Idling Adjustment

(1) Initial check and adjustment, and warming-up engine and test equipment → (2) Installing test equipment → (3) Idling adjustment and check

Idling Speed Adjustment Should be Made Under the Following Conditions

1. The idling speed adjustment should be made after the engine has been warmed up throughly.
2. While the fan motor is turning, suspend the idling speed adjustment operation.
3. Remove the hose of the thermostatic valve and plug the disconnected hose.

Checking Carburetor Adjustment

1. Warm up the engine until the cooling water temperature reaches about 85 to 90°C.
   NOTE: If the fan motor rotates, it is most likely that cooling water temperature reaches about 85 to 90°C.
2. Attach a tachometer. Ensure that the engine is running at the specified idling revolution speed and exhibits no hesitation.
   Specified Idling Revolution speed: 850 to 950rpm
   NOTE: Ensure that the fan motor is not turning.
3. Open the throttle valve gradually and suddenly. Ensure that the engine speed increases smoothly in proportion to the throttle valve opening.

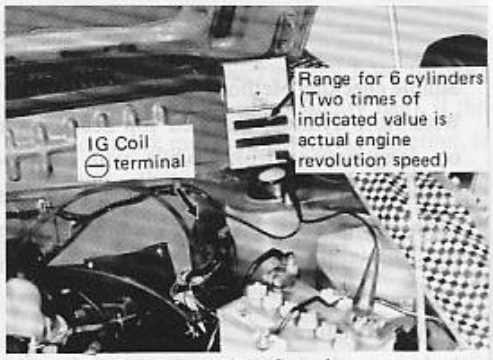


Fig. 235 Checking Idling Speed

Adjustment

1. The idling speed adjustment should be made with the throttle adjusting screw.
2. If the engine should exhibit hesitation, back-off the idle adjusting screw slowly by using a special tool until a stable revolution speed is obtained.
   Finally, adjust the idling speed to obtain best idle performance of 900 ± 50 rpm with the throttle adjusting screw.

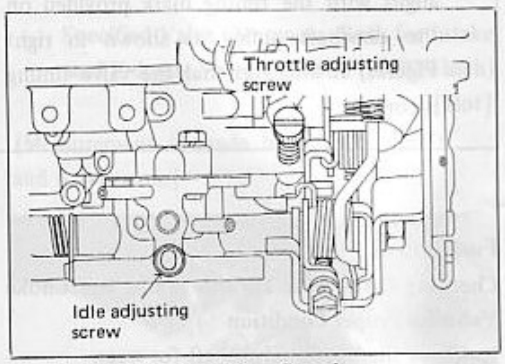


Fig. 236 Adjusting Idling Speed

Idling Adjustment

(1) Initial check and adjustment, and warming-up engine and test equipment → (2) Installing test equipment → (3) Idling adjustment and check

Idling Speed Adjustment Should be Made Under the Following Conditions

1. The idling speed adjustment should be made after the engine has been warmed up throughly.
2. While the fan motor is turning, suspend the idling speed adjustment operation.
3. Remove the hose of the thermostatic valve and plug the disconnected hose.

1. Initial check, adjustment, and warming-up engine and test equipment.
   (1) Checking function of the choke valve.
   (2) Warm-up the engine and test equipment.
   Cooling water temperature 85 to 90°C (If the fan motor turns, it is most likely that the cooling water reaches about 85 to 90°C)
   (3) Remove the idle limit cap.

2. Installing test equipment
   Attach a tachometer to the engine.
3. Idling adjustment and check
   (1) Back off the idle adjusting screw by using a special tool about 3¼ turns from the fully-closed position.
   (2) Start the engine.
   Screw-in the throttle adjusting screw so as to set the engine speed at 900 rpm.
   (3) Turn the idle adjusting screw by using a special tool so that the idling speed may be set at 850 rpm.

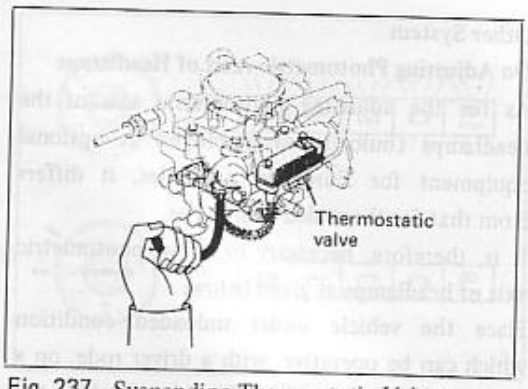


Fig. 237 Suspending Thermostatic Valve

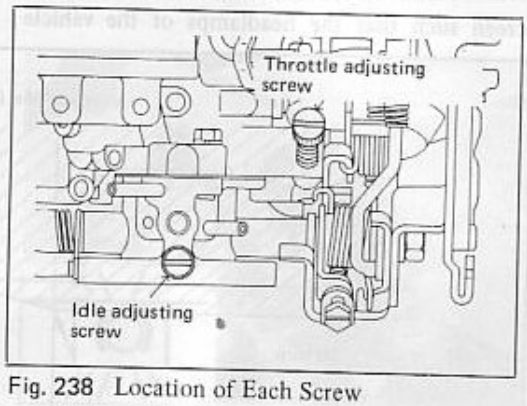


Fig. 238 Location of Each Screw

Cooling System

Checking Cooling Water for Leakage and Amount

1. Pressurize the cooling system at 1.2 kg/cm² (17.1 psi), using a radiator cap tester. And check to see whether any leak is present at various parts of the cooling system.
2. Check the water hose for deterioration, crack or damage.
3. Checking the cooling water amount and replenishing should be made at the reservoir tank.
   Ensure that cooling water is filled up to "FULL" line of the reservoir tank.

   NOTE:
   1. Checking the cooling water for leak must be carried out by means of a radiator cap tester.
   2. With a radiator cap tester installed, be sure not to run the engine.

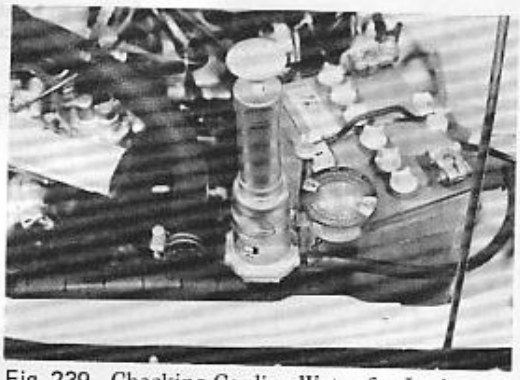


Fig. 239 Checking Cooling Water for Leak

Cooling Water and Anti-freeze Solution

	Ambient temperature	Concentration	Radiator	Reservoir tank
Anti-freeze solution filling amount	−10°C	23%	0.9 liter	0.1 liter
	−20°C	35%	1.31 liters	0.2 liter
	−35°C	50%	1.71 liters	0.3 liter
Cooling water capacity			4 liters	

Other System

On Adjusting Photometric Axis of Headlamps

As for the adjusting photometric axis of the headlamps (bulb type) employed as optional equipment for European countries, it differs from that for the sealed beam type.

It is, therefore, necessary to adjust photometric axis of headlamps as given below.

Place the vehicle under unloaded condition which can be operative, with a driver rode, on a level floor. Position the vehicle in front of the screen such that the headlamps of the vehicle come at a distance of three (3) meters from the screen. In addition, the vehicle must be positioned exactly normal to the screen.

1. Adjusting outboard headlamps of 4-headlamps type and Two-headlamps type (with lower beams selected).

   A. In case of L.H. unit

   Adjust the headlamps so that the lighting pattern of the lower beams as shown below is obtained.

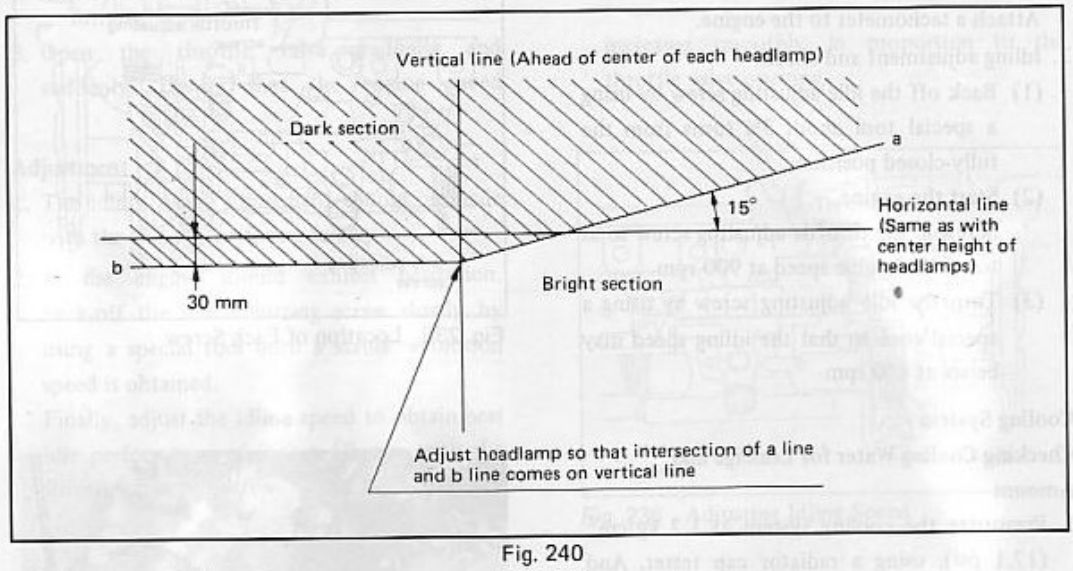


Fig. 240

B. In case of R.H. unit

With regard to R.H. unit, it is symmetry with L.H. unit.

Function of Instruments

Checking Function of Warning Lamps

1. When the engine switch is moved to the "ON" position, the warning lamps should go on.
2. Next, after the engine has fired, the warning lamps should go out.

   NOTE: The (P) warning lamp remains on, while the parking brake lever is applied.

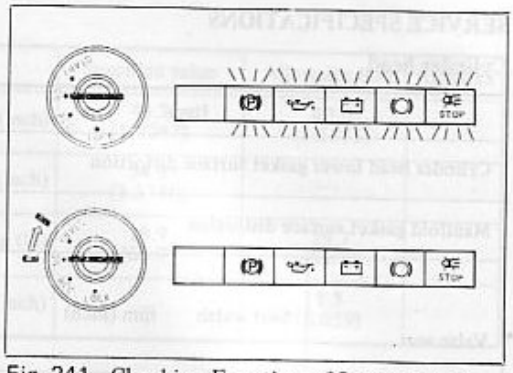


Fig. 241 Checking Function of Instruments

Checking Operation of Brake Fluid Remaining Amount Warning System

1. Turn the ignition switch to the "ON" position.
2. While the reservoir tank cap is being pulled up gradually, if the (○) warning lamp goes on, it inidcates that the brake fluid remaining amount warning system is functioning properly.

   NOTE:

   1. Make sure that the brake fluid level is within the specified range.
   2. Be very careful not to spill the brake fluid.

Fig. 242 Brake Fluid Remaining Amount Warning System

SERVICE SPECIFICATIONS

Cylinder head

Item			Specified value	Allowable limit	Remarks
Cylinder head lower gasket surface distortion mm (inch)			—	0.10 (0.0039)	
Manifold gasket surface distortion mm (inch)			—	0.10 (0.0039)	
Valve seat	Seat width mm (inch)	Intake	1.0 ~ 1.8 (0.039 ~ 0.071)	—	
		Exhaust	1.0 ~ 1.8 (0.039 ~ 0.071)	—	
	Seat angle		45°	—	
	Recession allowable limit mm (inch)		—	0.5 (0.020)	

Valve guide bush

Item		Specified value	Allowable limit	Remarks
Valve stem-to-bush clearance mm (inch)	Intake	0.040 ~ 0.070 (0.0016 ~ 0.0028)	0.09 (0.0035)	
	Exhaust	0.045 ~ 0.075 (0.0018 ~ 0.0030)	0.10 (0.0039)	

Valves

Item		Specified Value	Allowable limit	Remarks
Seat width mm (inch)	Intake	1.0 ~ 1.8 (0.039 ~ 0.071)	—	
	Exhaust	1.0 ~ 1.8 (0.039 ~ 0.071)	—	
Seat angle		45°	—	
Valve head stock thickness mm (inch)	Intake	0.9 ~ 1.5 (0.035 ~ 0.059)		
	Exhaust	1.2 ~ 1.8 (0.047 ~ 0.071)	1.0 (0.039)	
Valve stem outer diameter mm (inch)	Intake	6.945 ~ 6.960 (0.2734 ~ 0.2740)	6.920 (0.2724)	
	Exhaust	6.940 ~ 6.955 (0.2732 ~ 0.2738)	6.910 (0.2720)	

Valve spring

Item	Specified value	Allowable limit	Remarks
Free length mm (inch)	43.3 (1.7047)	42.0 (1.6535)	
Length as installed mm (inch)	34.9 (1.3740)	—	
Tension as installed kg (lb)	29.9 (65.9)	25.7 (56.7)	
Out-of-squareness mm (inch)	—	1.5 (0.059)	

Valve rocker shaft and Rocker arm

Item	Specified value	Allowable limit	Remarks
Rocker shaft-to-rocker arm clearance mm (inch)	0.016 ~ 0.060 (0.0006 ~ 0.0024)	0.09 (0.0035)	

Cylinder block

Item		Specified value	Allowable limit	Remarks
Top gasket surface distortion mm (inch)		—	0.05 (0.0020)	
Cylinder bore	Wear mm (inch)	—	0.10 (0.0039)	
	Out-of roundness, taper mm (inch)	—	0.10 (0.0039)	

Piston, piston pin and piston ring

Item			Specified value	Allowable limit	Remarks
Piston-to-cylinder clearance mm (inch)			0.045 ~ 0.065 (0.0018 ~ 0.0026)	0.12 (0.0047)	
Piston ring	End gap mm (inch)	Compression No.1 and No.2	0.12 ~ 0.4 (0.0079 ~ 0.0157)	0.70 (0.0276)	
		Oil	0.2 ~ 0.9 (0.0079 ~ 0.0354)	1.30 (0.0512)	
	Side clearance mm (inch)	Compression No.1	0.03 ~ 0.07 (0.0012 ~ 0.0026)	0.12 (0.0047)	
		Compression No.2	0.02 ~ 0.06 (0.0008 ~ 0.0024)	0.12 (0.0047)	
Piston outer diameter mm (inch)			75.945 ~ 75.975 (2.9900 ~ 2.9911)	—	
Piston-to-piston pin clearance mm (inch)			0.005 ~ 0.011 (0.0002 ~ 0.0004)	—	

Connecting rod

Item		Specified value	Allowable limit	Remarks
Bend of rod per 100mm (3.94 inches)	mm (inch)	—	0.05 (0.0020)	
Twist of rod per 100mm (3.94 inches)	mm (inch)	—	0.05 (0.0020)	
Connecting rod bearing oil clearance	mm (inch)	0.020 ~ 0.044 (0.0008 ~ 0.0017)	0.07 (0.0028)	
Big end thrust clearance	mm (inch)	0.150 ~ 0.220 (0.0059 ~ 0.0087)	0.30 (0.0118)	

Crankshaft

Item		Specified value	Allowable limit	Remarks
Crankshaft run-out	mm (inch)	—	0.03 (0.0012)	
Uneven wear of journal section	mm (inch)	—	0.02 (0.0008)	
Crankshaft bearing oil clearance	mm (inch)	0.020 ~ 0.044 (0.0008 ~ 0.0017)	0.07 (0.0028)	
Side clearance	mm (inch)	0.020 ~ 0.220 (0.0008 ~ 0.0087)	0.30 (0.0118)	

Balance shaft

Item		Specified value	Allowable limit	Remarks
Thrust clearance	mm (inch)	0.03 ~ 0.13 (0.0012 ~ 0.0051)	0.20 (0.0079)	
Balance shaft bearing oil clearance	mm (inch)	0.025 ~ 0.066 (0.0010 ~ 0.0026)	0.10 (0.0039)	

Camshaft

Item			Specified value	Allowable limit	Remarks
Thrust clearance		mm (inch)	0.050 ~ 0.290 (0.0020 ~ 0.0114)	0.40 (0.0157)	
Cam lobe height		mm (inch)	39.604 ~ 39.704 (1.5592 ~ 1.5631)	39.40 (1.5512)	
Camshaft journal uneven wear		mm (inch)	—	0.04 (0.0016)	
Camshaft bearing oil clearance	Front	mm (inch)	0.04 ~ 0.09 (0.0016 ~ 0.0035)	0.14 (0.0055)	
	Center		0.09 ~ 0.14 (0.0035 ~ 0.0055)	0.19 (0.0075)	
	Rear		0.06 ~ 0.11 (0.0024 ~ 0.0043)	0.16 (0.0063)	

Timing belt pulley

Item		Specified value	Allowable limit	Remarks
Pulley outer diameter mm (inch)	Camshaft pulley	119.86 ~ 120.04 (4.7189 ~ 4.7260)	119.80 (4.7165)	
	Crankshaft pulley	59.26 ~ 59.36 (2.3331 ~ 2.3370)	59.20 (2.3307)	

Manifold

Item	Specified value	Allowable limit	Remarks
Intake manifold gasket surface distortion mm (inch)	—	0.10 (0.0039)	
Exhaust manifold gasket surface distortion mm (inch)	—	0.10 (0.0039)	

Flywheel

Item	Specified value	Allowable limit	Remarks
Flywheel run-out		0.10 (0.0039)	

Clutch

Item		Specified value	Allowable limit	Remarks
Clutch pedal	Height mm (inch)	200 ~ 205 (7.87 ~ 8.07)	—	Distance between pedal pad upper surface's center and dash panel
	Free travel mm (inch)	15 ~ 30 (0.59 ~ 1.18)		
Clutch disc	Thickness mm (inch)	7.2 (0.28)	—	At free
	Run-out mm (inch)	—	1.0 (0.039)	
	Lining wear mm (inch)	—	0.3 (0.012)	Depth of counter-sunk Rivets, Measured from the facing surface

Transmission and Differential

Item			Specified value	Allowable limit	Remarks
Gear bush	2nd and 3rd gear bush outer diameter	mm (inch)	34.92 ~ 34.96 (1.3748 ~ 1.3764)	34.89 (1.3736)	
Thrust washer	For 1st gear	mm (inch)	2.97 ~ 3.03 (0.1169 ~ 0.1193)	2.85 (0.1122)	
	For 2nd and 3rd gear	mm (inch)	2.985 ~ 3.015 (0.1175 ~ 0.1187)	2.80 (0.1102)	
	For 4th gear	mm (inch)	1.95 ~ 2.05 (0.0768 ~ 0.0807)	1.85 (0.0728)	
	For 5th gear	mm (inch)	2.97 ~ 3.03 (0.1169 ~ 0.1193)	2.85 (0.1122)	
Gear thrust clearance [Gear end play]	For 1st gear	mm (inch)	0.1 ~ 0.23 (0.0039 ~ 0.0091)	0..4 (0.0157)	
	For 2nd gear	mm (inch)	0.1 ~ 0.23 (0.0039 ~ 0.0091)	0.4 (0.0157)	
	For 3rd gear	mm (inch)	0.1 ~ 0.23 (0.0039 ~ 0.0091)	0.4 (0.0157)	
	For 4th gear	mm (inch)	0.1 ~ 0.46 (0.0039 ~ 0.0181)	0.6 (0.0236)	
	For 5th gear	mm (inch)	0.1 ~ 0.23 (0.0039 ~ 0.0091)	0.4 (0.0157)	
Gear oil clearance	2nd gear	mm (inch)	0.04 ~ 0.10 (0.0016 ~ 0.0039)	0.15 (0.0059)	
	3rd gear	mm (inch)	0.04 ~ 0.10 (0.0016 ~ 0.0039)	0.15 (0.0059)	
Shift fork	Hub sleeve contact surface width	mm (inch)	6.6 ~ 7.0 (0.2598 ~ 0.2756)	6.3 (0.2480)	
	Shift inner lever groove width	mm (inch)	12.0 ~ 12.1 (0.4724 ~ 0.4764)	12.7 (0.5000)	
Shift fork-to-hub sleeve groove clearance		mm (inch)	0.05 ~ 0.52 (0.0020 ~ 0.0205)	0.7 (0.0276)	
Synchronizer ring-to-gear clearance		mm (inch)	0.85 ~ 1.45 (0.0335 ~ 0.0571)	0.5 (0.0197)	
Reverse idler gear	Bush inner diameter	mm (inch)	15.000 ~ 15.027 (0.5906 ~ 0.5916)	15.05 (0.5925)	
	Shaft outer diameter	mm (inch)	14.941 ~ 14.968 (0.5882 ~ 0.5893)	14.90 (0.5866)	
	Bush-to-shaft clearance	mm (inch)	0.032 ~ 0.086 (0.0013 ~ 0.0034)	0.100 (0.0039)	
Reverse shift arm-to-reverse idler gear clearance		mm (inch)	0.080 ~ 0.116 (0.0031 ~ 0.0046)	0.14 (0.0055)	
Reverse shift arm-to-reverse shift fork clearance		mm (inch)	0.020 ~ 0.300 (0.0008 ~ 0.0118)	0.33 (0.0130)	
Differential pinion	Gear inner diameter	mm (inch)	15.003 ~ 15.008 (0.5907 ~ 0.5909)	15.03 (0.5917)	
	Shaft outer diameter	mm (inch)	14.950 ~ 14.968 (0.5886 ~ 0.5893)	14.97 (0.5894)	
	Gear-to-shaft clearance	mm (inch)	0.035 ~ 0.053 (0.0014 ~ 0.0021)	0.08 (0.0031)	
Differential side gear-to-pinion backlash		mm (inch)	0.02 ~ 0.20 (0.0008 ~ 0.0079)	0.250 (0.0098)	
Differential side bearing end play		mm (inch)	—	0.1 (0.0039)	

Steering

Item			Specified value	Allowable limit	Remarks
Front wheel alignment	Camber		1° ± 1°		Differences in left and right sides should be within 1°
	Caster		3° ± 1°		Differences in left and right sides should be within 1°
	Kingpin inclination angle		13° ± 1°		Differences in left and right sides should be within 1°
	Turning angle	Inner side	37° 35' ± 2°		Differences in left and right sides should be within 2°
		Outer side	33° 0' ± 2°		Differences in left and right sides should be within 2°
	Toe-in mm (inch)		−1 ~ 7 (−0.039 ~ 0.276)		
	Side slip mm (inch)		In 3.0 ~ Out 3.0 (0.12) (0.12)		Per 1m (3.28ft)
Steering wheel	Steering wheel play [Measured at wheel circumference] mm (inch)		Within 10 (0.39)		
	Turning effort kg (lb)		No more than 11 (24.3)		Reference information: No more than 1.3kg (2.9lb) [when the vehicle is jacked up]

Brake Pedal

Item		Specified value	Allowable limit	Remarks
Brake pedal	Free travel mm (inch)	1 ~ 5 (0.039 ~ 0.197) [while engine is running]		
	Height mm (inch)	200 ~ 205 (7.87 ~ 8.07)		Distance between pedal pad upper surface's center and dash panel
	Reserve travel mm (inch)	No less than 120 (4.72) [when a force of 30kg (66.2lb) is applied and while engine is running]		

Front brake

Item				Specified value	Allowable limit	Remarks
Disc brake	Wheel cylinder inner diameter mm (inch)			47.62 (1.875)		
	Pad thickness mm (inch)			9.0 (0.354)	1.0 (0.039)	
	Disc	Thickness mm (inch)		10.0 (0.394)	9.0 (0.354)	
		Run-out mm (inch)		—	0.15 (0.006)	

Rear brake

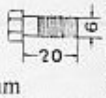
Item		Specified value	Allowable limit	Remarks
Wheel cylinder inner diameter	mm (inch)	15.87 (0.625)		
Brake drum inner diameter	mm (inch)	180.0 (7.087)	182.0 (7.165)	
Brake lining thickness	mm (inch)	4.0 (0.157)	1.0 (0.039)	
Parking brake lever working travel	Notch	6 ~ 10		When a force of 20kg (44.1) is applied

TIGHTENING TORQUES

Table of general standard bolt tightening torque

Kind	diameter	Pitch	Standard tightening torque kg-m (ft-lb)	
			Standard value	Tightening range
4T (Bolt bearing mark of 4 at bolt head) (Example of part number 91○○○-4○○○○)	6	1	0.47 (3.4)	0.4~ 0.7 (2.9~ 5.1)
	8	1.25	1.11 (8.0)	1.0~ 1.6 (7.2~ 11.6)
	10	1.25	2.25 (16.3)	1.9~ 3.1 (13.7~ 22.4)
	10	1.5	2.14 (15.5)	1.8~ 3.0 (13.0~ 21.7)
	12	1.25 (ISO)	4.40 (31.8)	3.5~ 5.5 (25.3~ 39.8)
	12	1.5	3.89 (28.1)	3.5~ 5.5 (25.3~ 39.8)
	12	1.75	3.74 (27.1)	3.0~ 5.0 (21.7~ 36.2)
	13	1.5	5.08 (36.7)	4.5~ 7.0 (32.5~ 50.6)
	14	1.5	6.33 (45.8)	5.0~ 8.0 (36.2~ 57.9)
	14	2	5.93 (42.9)	4.7~ 7.7 (34.0~ 55.7)
	16	1.5	9.57 (69.2)	7.5~11.0 (54.2~ 79.6)
	16	2	9.10 (65.8)	7.1~10.6 (51.4~ 76.7)
5T (Bolt bearing mark of 5 at bolt head) (Example of part number 91○○○-5○○○○)	6	1	0.71 (5.1)	0.6~ 0.9 (4.3~ 6.5)
	8	1.25	1.66 (12.0)	1.5~ 2.3 (10.8~ 16.6)
	10	1.25	3.37 (24.4)	3.0~ 4.5 (21.7~ 32.5)
	10	1.5	3.20 (23.1)	2.7~ 4.2 (19.5~ 30.4)
	12	1.25 (ISO)	6.60 (47.7)	5.0~ 8.0 (36.2~ 57.9)
	12	1.5	5.84 (42.2)	5.0~ 7.0 (36.2~ 50.6)
	12	1.75	5.60 (40.5)	4.8~ 6.8 (34.7~ 49.2)
	13	1.5	7.63 (55.2)	6.5~ 9.0 (47.0~ 65.1)
	14	1.5	9.50 (68.7)	7.5~11.0 (54.2~ 79.6)
	14	2	8.90 (64.4)	7.0~10.5 (50.6~ 75.9)
	16	1.5	14.36 (103.9)	12.0~17.0 (86.8~123.0)
	16	2	13.58 (98.2)	11.5~16.5 (83.2~119.3)
6T (Bolt bearing mark of 6 at bolt head) (Example of part number 91○○○-6○○○○)	6	1	0.71 (5.1)	0.6~ 0.9 (4.3~ 6.5)
	8	1.25	1.66 (12.0)	1.5~ 2.2 (10.8~ 15.9)
	10	1.25	3.37 (24.4)	3.0~ 4.5 (21.7~ 32.5)
	10	1.5	3.20 (23.1)	2.7~ 4.2 (19.5~ 30.4)
	12	1.25 (ISO)	6.60 (47.7)	5.0~ 8.0 (36.2~ 57.9)
	12	1.5	5.84 (42.2)	5.0~ 7.0 (36.2~ 50.6)
	12	1.75	5.61 (40.6)	4.8~ 6.8 (34.7~ 49.2)
7T (Bolt bearing mark of 7 at bolt head) (Example of part number 91○○○-7○○○○)	6	1	0.95 (6.9)	0.8~ 1.2 (5.8~ 8.7)
	8	1.25	2.20 (15.9)	2.0~ 3.0 (14.5~ 21.7)
	10	1.25	4.50 (32.5)	4.0~ 5.5 (28.9~ 39.8)
	10	1.5	4.30 (31.1)	3.7~ 5.2 (26.8~ 37.6)
	12	1.25 (ISO)	8.80 (63.7)	7.5~10.5 (54.2~ 75.9)
	12	1.5	7.78 (56.3)	7.0~ 9.0 (50.6~ 65.1)
	12	1.75	7.48 (54.1)	6.0~ 8.5 (43.4~ 61.5)
	13	1.5	10.17 (73.6)	8.0~12.0 (57.9~ 86.8)
	14	1.5	12.67 (91.6)	10.0~15.0 (72.3~108.5)
	14	2	11.86 (85.8)	9.5~14.0 (68.7~101.3)
	16	1.5	19.15 (138.5)	15.0~23.0 (108.5~166.4)
	16	2	18.11 (131.0)	14.0~22.0 (101.3~159.1)

NOTE: Example 91111-40620



Bolt length below head (ℓ) mm
Diameter of bolt (d) mm

Example Bolt (40620)
4 stands for mark bearing at bolt head
06 stands for diameter of bolt
20 stands for length below head

Standard tightening torque denotes value when tightening the materials made of steel.
In case that the materials other than steel made are tightened or, heat or stress such as vibration load etc. is applied to a bolt, standard tightening torque should be changed as required.

Unit: kg-m (ft-lb)

Tightening component	Tightening Torques
Cylinder block × cylinder head	5.0 ~ 6.0 (36.2 ~ 43.4)
Cylinder block × crankshaft bearing cap	6.4 ~ 6.6 (39.1 ~ 47.7)
Cylinder block × balance shaft thrust plate	1.0 ~ 1.5 (7.2 ~ 10.8)
Cylinder head × manifold	IN 1.0 ~ 1.6 (7.2 ~ 11.6) EX 1.0 ~ 1.6 (7.2 ~ 11.6)
Cylinder head × spark plug	1.8 ~ 2.4 (13.0 ~ 17.4)
Cylinder head × head cover	0.4 ~ 0.6 (2.9 ~ 4.3)
Crankshaft × flywheel	4.0 ~ 5.0 (28.9 ~ 36.2)
Crankshaft × crankshaft pulley	5.0 ~ 6.0 (36.2 ~ 43.4)
Connecting rod × connecting rod cap	2.1 ~ 2.9 (15.2 ~ 21.0)
Camshaft × camshaft timing belt pulley	3.0 ~ 4.5 (21.7 ~ 32.5)
Camshaft × fuel pump drive cam	1.0 ~ 1.5 (7.2 ~ 10.8)
Timing belt tensioner × cylinder block	1.0 ~ 1.6 (7.2 ~ 11.6)
Oil pan × cylinder block	0.4 ~ 0.7 (2.9 ~ 5.1)
Oil pan × drain plug	2.5 ~ 3.5 (18.1 ~ 25.3)
Oil pump × cylinder block	1.5 ~ 2.2 (10.8 ~ 15.9)
Oil pump drive shaft sprocket × oil pump rotor	1.0 ~ 1.6 (7.2 ~ 11.6)
Balance shaft gear cover × cylinder block	1.0 ~ 1.6 (7.2 ~ 11.6)
Distributor housing × cylinder block	0.4 ~ 0.7 (2.9 ~ 5.1)
Fuel pipe × fuel pump	1.5 ~ 2.0 (10.8 ~ 14.5)
Fuel pipe × carburetor	1.5 ~ 2.0 (10.8 ~ 14.5)
Distributor × distributor housing	1.5 ~ 2.2 (10.8 ~ 15.9)
Oil seal retainer × cylinder block	1.0 ~ 1.6 (7.2 ~ 11.6)

Clutch and Transmission

Unit: kg-m (ft-lb)

Tightening component	Tightening torques
Transmission × cylinder block	5.0 ~ 7.0 (36.2 ~ 50.6)
Output shaft hexagon nut	6.0 ~ 7.0 (43.4 ~ 50.6)
Input shaft hexagon nut [For 5-speeds transmission]	3.0 ~ 5.0 (21.7 ~ 36.2)
Transmission case [upper] × [lower]	1.2 ~ 2.2 (8.7 ~ 15.9)
Transmission case cover	Nut [For 4-speeds transmission] M12: 6.0 ~ 7.0 (43.4 ~ 50.6) Bolt [For 5-speeds transmission] 10.0 ~ 12.0 (72.3 ~ 86.8) M10: 3.5 ~ 5.5 (25.3 ~ 39.8) M8: 1.2 ~ 2.2 (8.7 ~ 15.9)
Transmission case × intermediate plate	6.0 ~ 8.0 (43.4 ~ 57.9)
Drain plug	3.0 ~ 5.0 (21.7 ~ 36.2)
Reverse restrict pin	3.0 ~ 5.0 (21.7 ~ 36.2)
Back-up lamp switch	3.0 ~ 5.0 (21.7 ~ 36.2)
Speedometer sleeve lock plate	0.8 ~ 1.0 (5.8 ~ 7.2)
Bleeder plug	1.0 ~ 1.3 (7.2 ~ 9.4)
Differential ring gear	8.0 ~ 10.0 (57.9 ~ 72.3)
Clutch cover	0.7 ~ 1.0 (5.1 ~ 7.2)
Clutch release lever × release lever yoke	2.0 ~ 3.0 (14.5 ~ 21.7)
Shift and select shaft × shift inner lever	Bolt 4.0 ~ 5.0 (28.9 ~ 36.2) Nut 2.0 ~ 3.0 (14.5 ~ 21.7)
Floor support No.1 × transmission case	1.0 ~ 1.6 (7.2 ~ 11.6)
Shift and select shaft support × transmission case	2.0 ~ 3.0 (14.5 ~ 21.7)
Lever lock pin	0.7 ~ 1.1 (5.1 ~ 8.0)
Shift arm pivot	1.0 ~ 1.6 (7.2 ~ 11.6)

Drive shaft and Front suspension

Unit: kg-m (ft-lb)

Tightening component	Tightening torques
Lower arm bracket x body	3.0 ~ 4.5 (21.7 ~ 32.5)
Strut bar bracket x body	3.0 ~ 4.5 (21.7 ~ 32.5)
Lower arm x lower arm bracket	4.0 ~ 6.0 (28.9 ~ 43.4)
Lower arm x strut bar bracket	7.5 ~ 11.0 (54.2 ~ 79.6)
Lower arm ball joint x steering knuckle	2.5 ~ 4.0 (18.1 ~ 28.9)
Front shock absorber piston rod x suspension support	4.0 ~ 5.5 (28.9 ~ 39.8)
Suspension support x body	2.0 ~ 3.0 (14.5 ~ 21.7)
Front shock absorber x steering knuckle	4.0 ~ 6.0 (28.9 ~ 43.4)
Steering knuckle x disc brake front cover	4.0 ~ 5.5 (28.9 ~ 39.8)
Drive shaft x front axle hub	18.0 ~ 22.0 (13.02 ~ 159.1)
Disc wheel x front axle hub	9.0 ~ 12.0 (65.1 ~ 86.8)

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