

3.5L V6

1998 Mitsubishi Montero

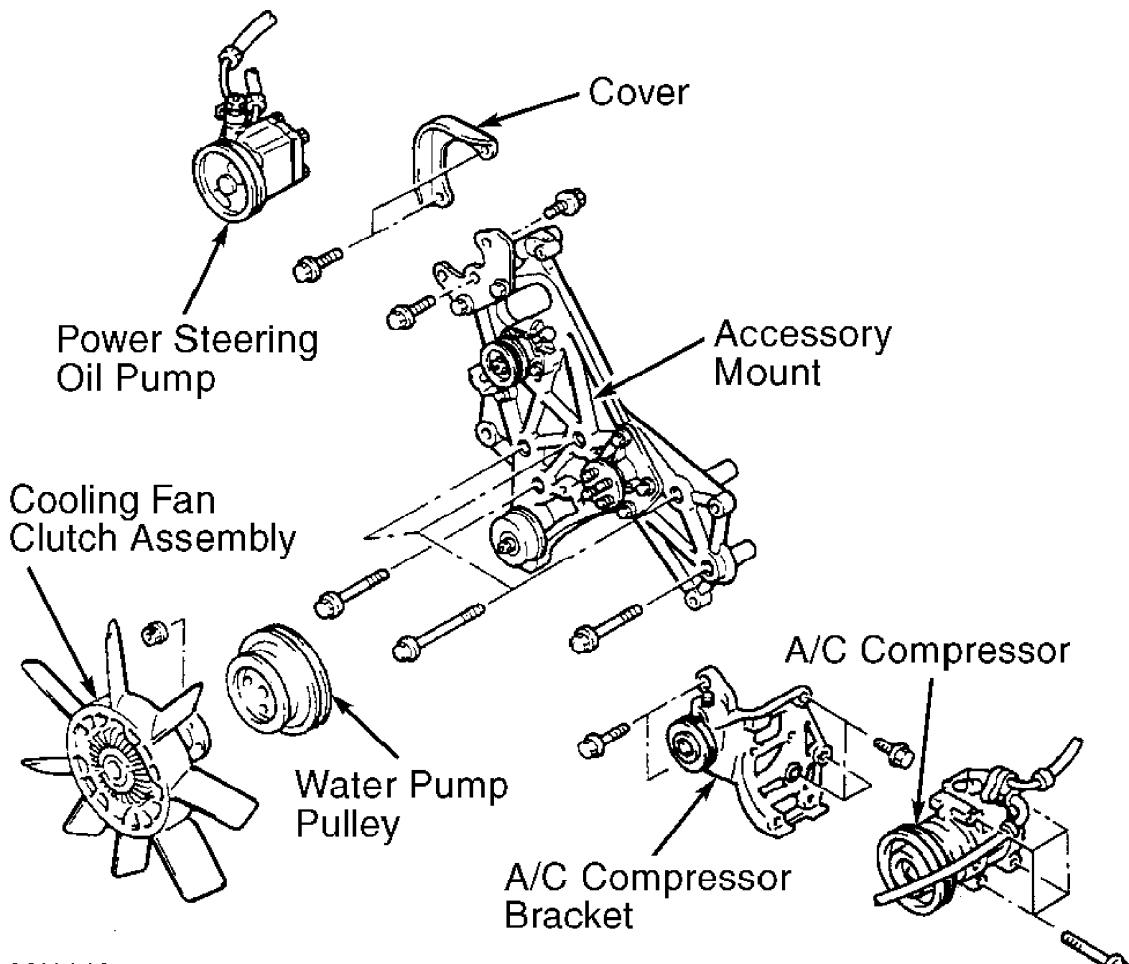
1997-98 ENGINES
Mitsubishi 3.5L V6
Diamante, Montero

* PLEASE READ THIS FIRST *

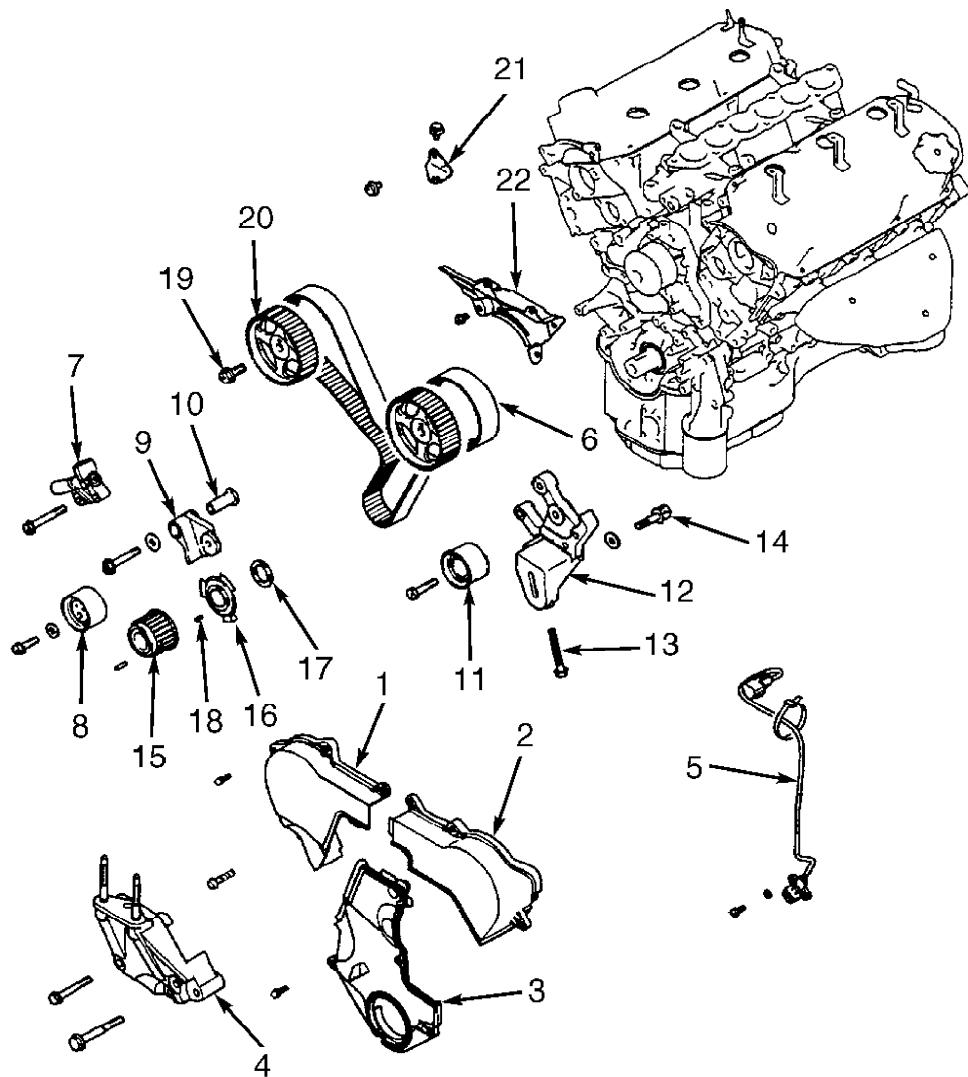
NOTE: Minimal information is available from manufacturer. For repair procedures not covered in this article, see ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION article in the GENERAL INFORMATION section.

REMOVAL & INSTALLATION

NOTE: Use appropriate illustrations to aid in removal and installation. See Figs. 1-9.



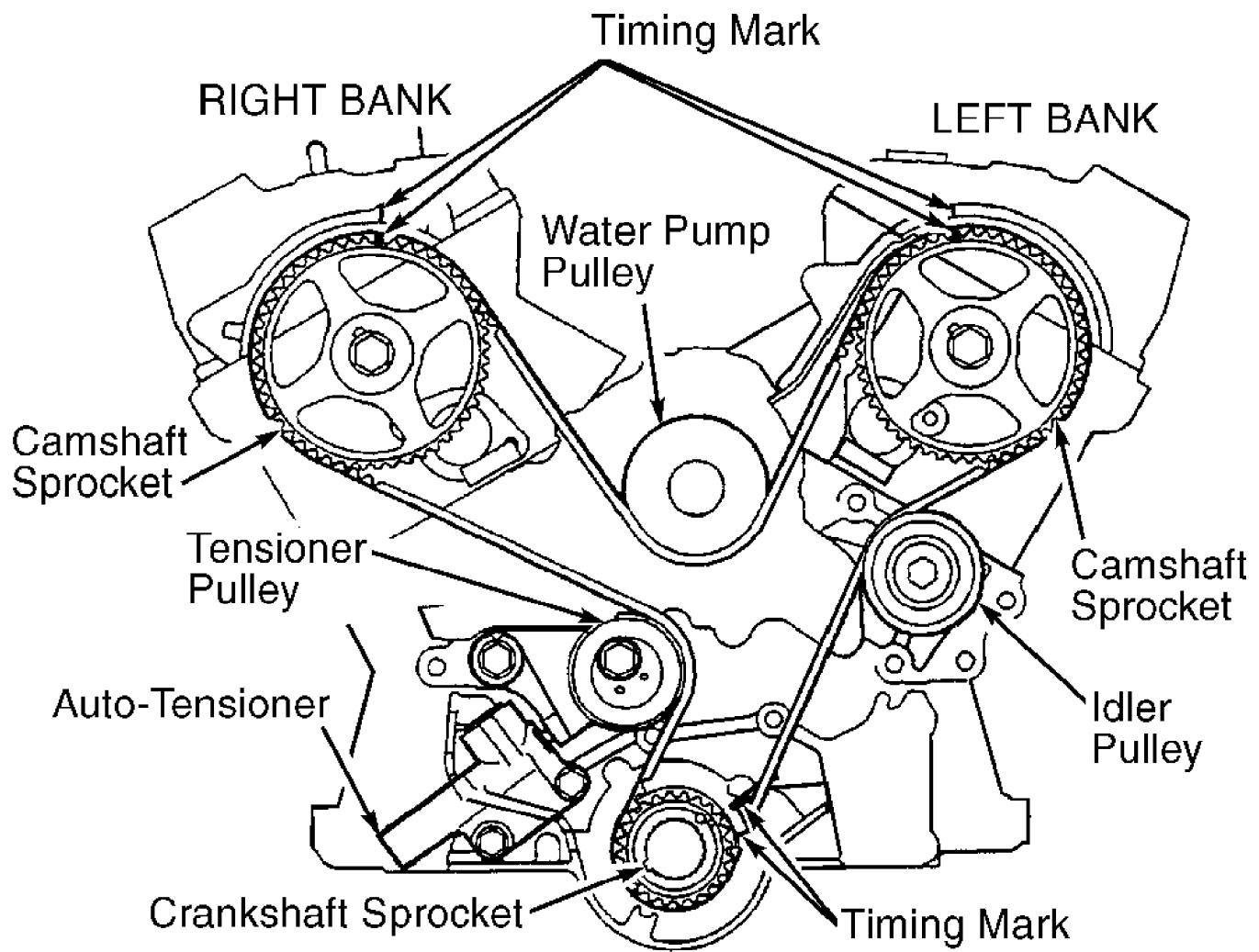
98I11435
Fig. 1: Accessories & Mounting (Montero)
Courtesy of Mitsubishi Motor Sales of America.



1. Timing Belt Front Cover
2. Timing Belt Front Cover
3. Timing Belt Lower Cover
4. Engine Support Bracket
(Diamante)
5. Crank Angle Sensor
6. Timing Belt
7. Automatic Tensioner
8. Tensioner Pulley
9. Tensioner Arm
10. Shaft
11. Idler Pulley
12. Idler Pulley Adjusting
Bracket
13. Adjusting Bolt
14. Adjusting Stud
15. Crankshaft Sprocket
16. Sensing Blade
17. Crankshaft Spacer
18. Crankshaft Key
19. Camshaft Sprocket Bolt
20. Camshaft Sprocket
21. Bracket
22. Timing Belt Rear Cover

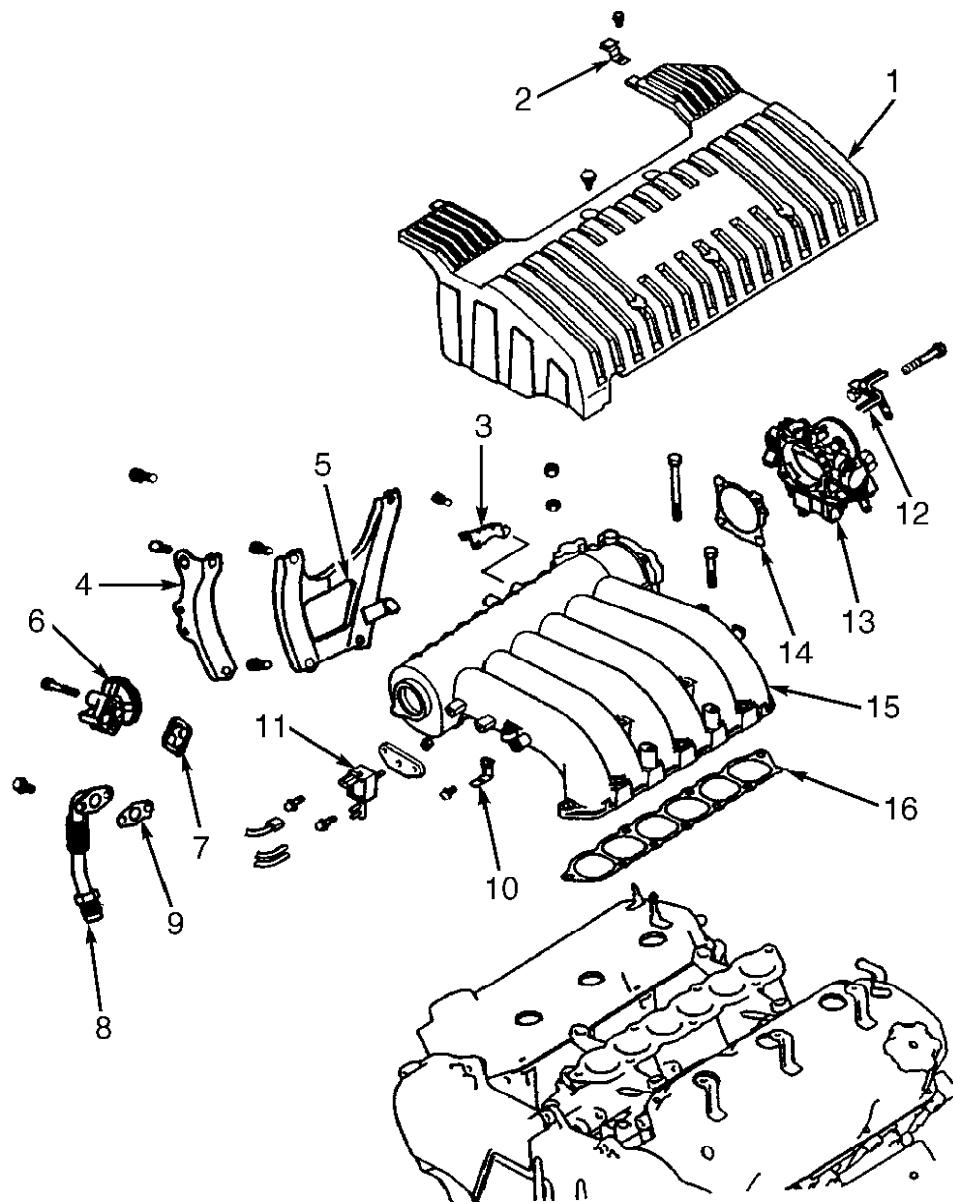
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Fig. 2: Timing Belt Components
Courtesy of Mitsubishi Motor Sales of America.



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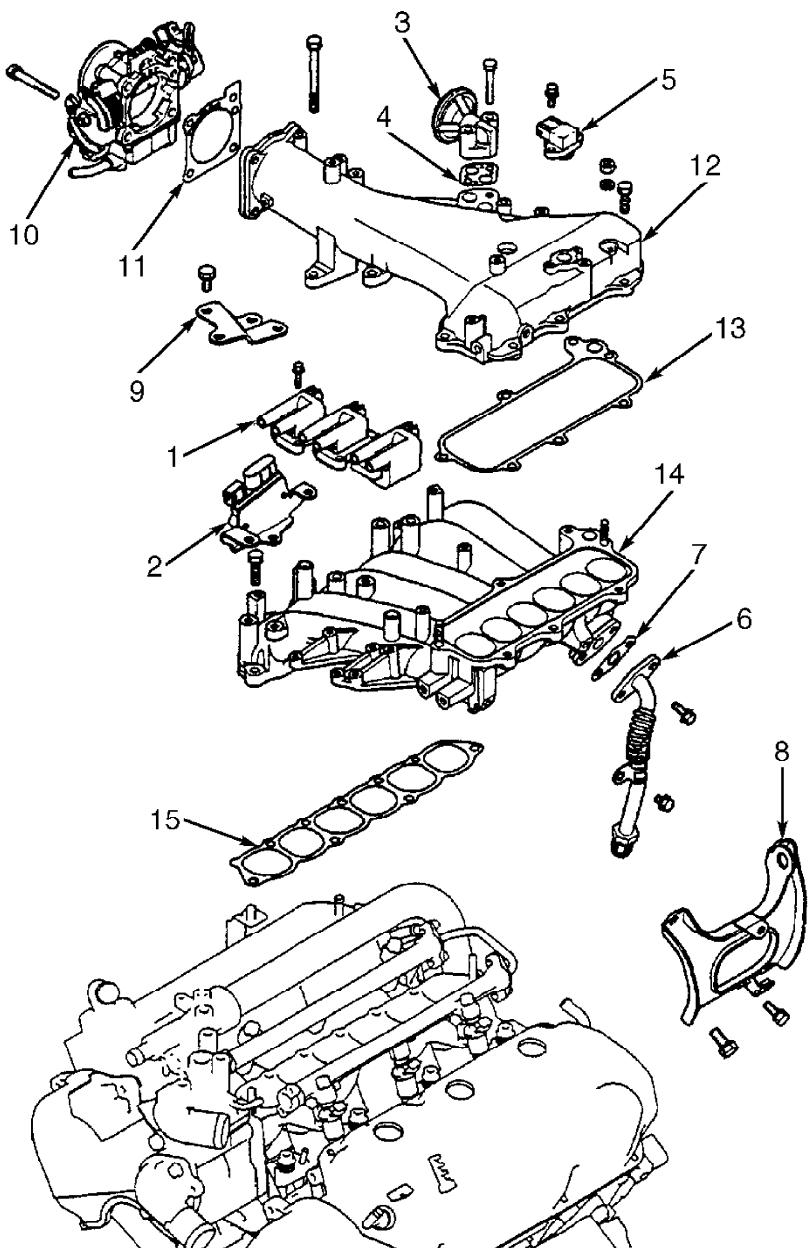
Fig. 3: Camshaft & Crankshaft Timing Marks
Courtesy of Mitsubishi Motor Sales of America.



- | | |
|------------------------------|--------------------------|
| 1. Engine Cover | 9. EGR Pipe Gasket |
| 2. Clamp | 10. Connector Bracket |
| 3. Accelerator Cable Bracket | 11. EVAP Purge Solenoid |
| 4. Intake Plenum Stay, Front | 12. Vacuum Pipe |
| 5. Intake Plenum Stay, Rear | 13. Throttle Body |
| 6. EGR Valve | 14. Throttle Body Gasket |
| 7. EGR Valve Gasket | 15. Intake Plenum |
| 8. EGR Pipe | 16. Intake Plenum Gasket |

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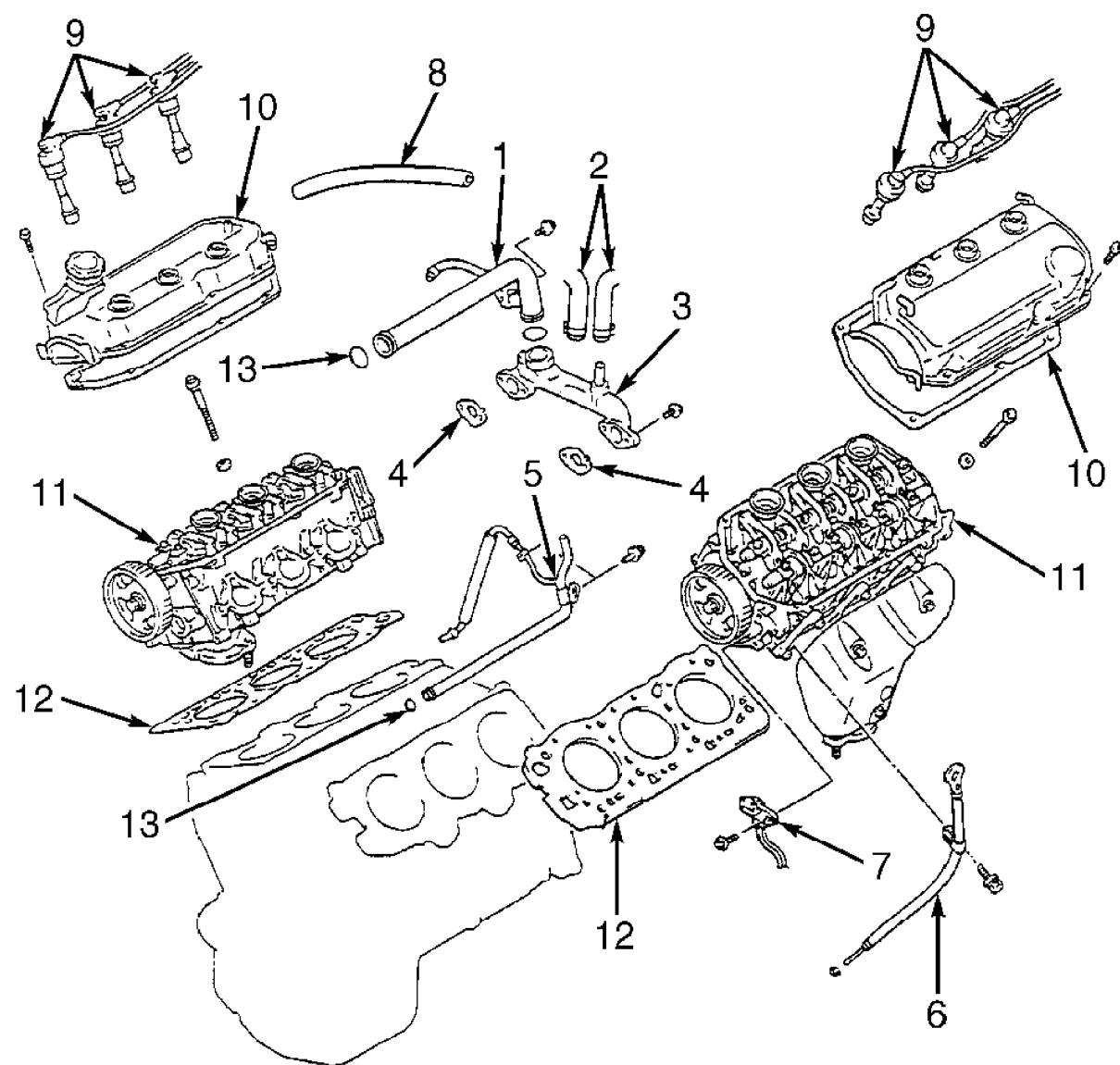
Fig. 4: Intake Manifold & Components (Diamante)
Courtesy of Mitsubishi Motor Sales of America.



- | | |
|---|-----------------------------------|
| 1. Ignition Coil | 8. Intake Manifold Plenum Stay |
| 2. Ignition Power Transistor | 9. Water Outlet Fitting Bracket |
| 3. EGR Valve | 10. Throttle Body |
| 4. EGR Valve Gasket | 11. Throttle Body Gasket |
| 5. Manifold Differential Pressure
Sensor (MDP) | 12. Air Intake Fitting |
| 6. EGR Pipe | 13. Intake Fitting Gasket |
| 7. EGR Pipe Gasket | 14. Intake Upper Manifold |
| | 15. Intake Manifold Plenum Gasket |

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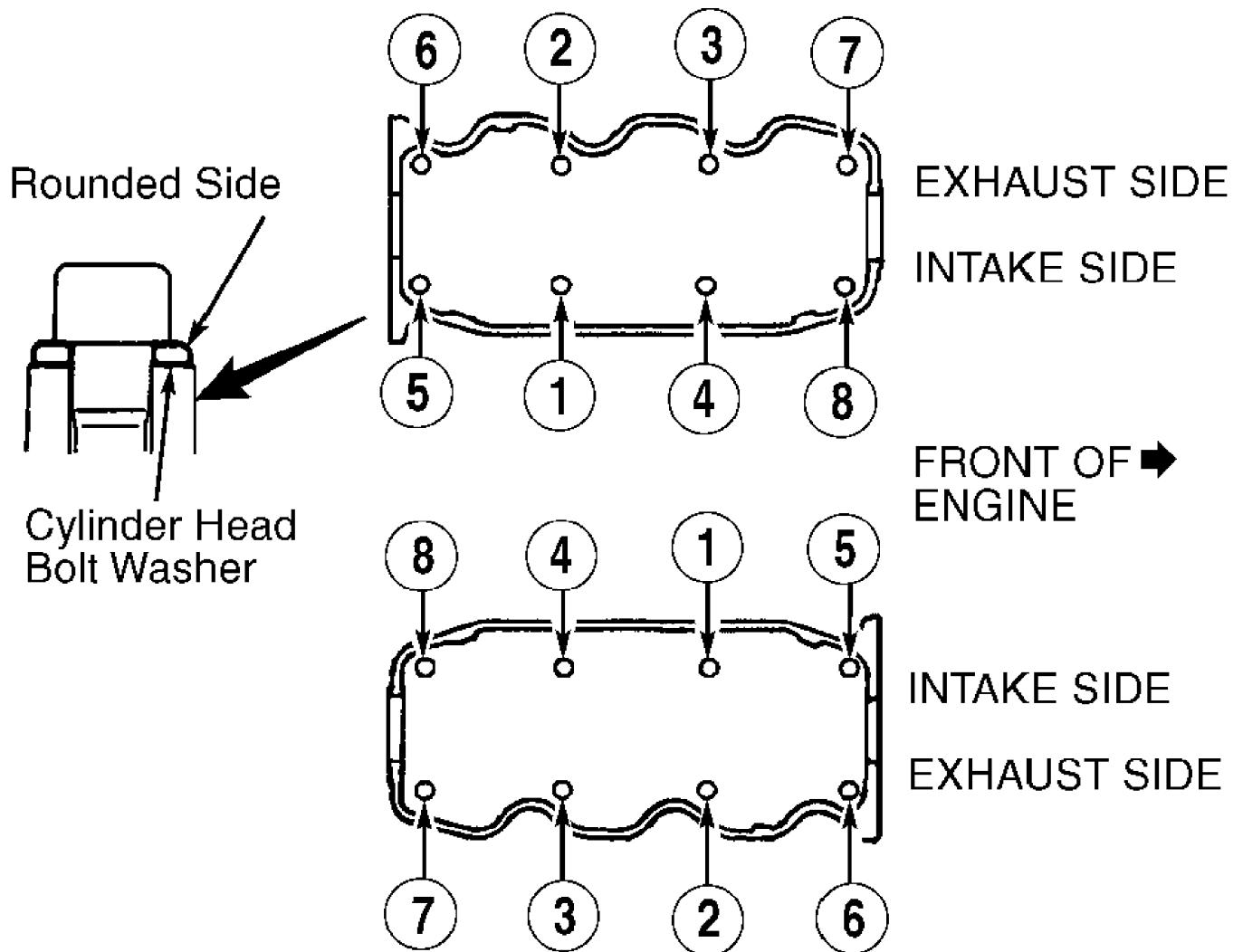
Fig. 5: Intake Manifold & Components (Montero)
Courtesy of Mitsubishi Motor Sales of America.



- | | |
|--|-----------------------------|
| 1. Water Outlet Pipe (Montero) | 7. Camshaft Position Sensor |
| 2. Heater Hose (Montero) | 8. Ventilation Hose |
| 3. Water Passage (Montero) | 9. Spark Plug Cable |
| 4. Gasket (Montero) | 10. Rocker Cover |
| 5. Water Pipe & Hose Assembly
(Montero) | 11. Cylinder Head |
| 6. Oil Level Gage Guide | 12. Cylinder Head Gasket |
| | 13. "O" Ring (Montero) |

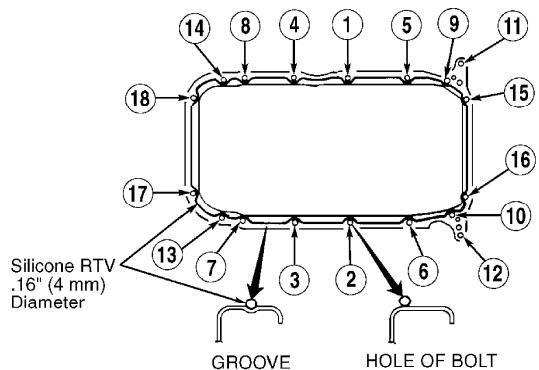
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Fig. 6: Cylinder Head & Components
Courtesy of Mitsubishi Motor Sales of America.

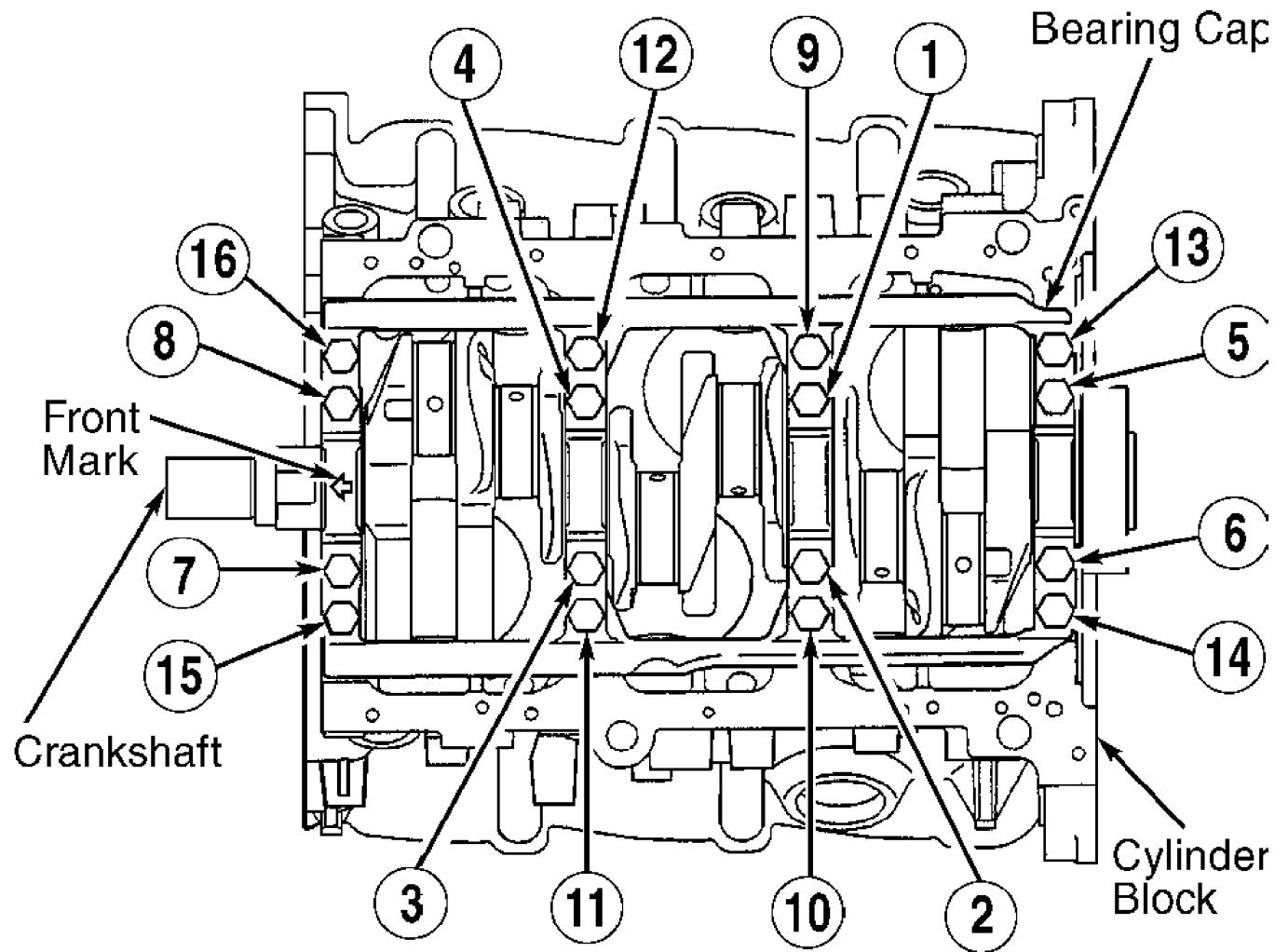


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Fig. 7: Cylinder Head Tightening Sequence
Courtesy of Mitsubishi Motor Sales of America.



98F11440
Fig. 8: Oil Pan Tightening Sequence
Courtesy of Mitsubishi Motor Sales of America.



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Fig. 9: Main Bearing Cap Tightening Sequence
Courtesy of Mitsubishi Motor Sales of America.

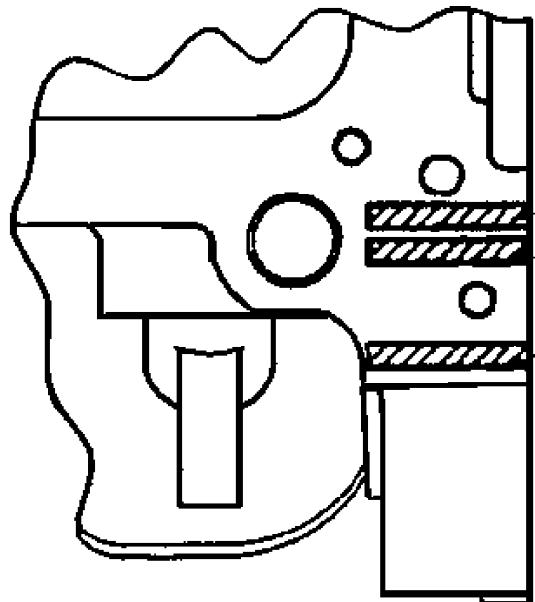
OVERHAUL

CRANKSHAFT JOURNAL IDENTIFICATION (DIAMANTE) (1)

Crankshaft Journal Outer Diameter In. (mm)	Cylinder Block Bearing Bore Diameter ID	Main Bearing ID Color (Mark)
2.362-2.3622 (59.994-60.0) (2)	I	Pink (1)
"	II	Red (2)
"	III	Green (3)
2.3617-2.3620 (59.988-59.994) (3)	I	Red (2)
"	II	Green (3)
"	III	Black (4)

22.3614-2.3617 (59.982-59.988) (4)	I	Green (3)
"	II	Black (4)
"	III	Brown (5)

(1) - See Figs. 10, 12 and 14.
 (2) - Yellow paint mark.
 (3) - No paint mark.
 (4) - White paint mark.



Cylinder Block Bore
Size Mark (Reference)

Cylinder Block
Bearing Bore
Diameter
Identification
Mark

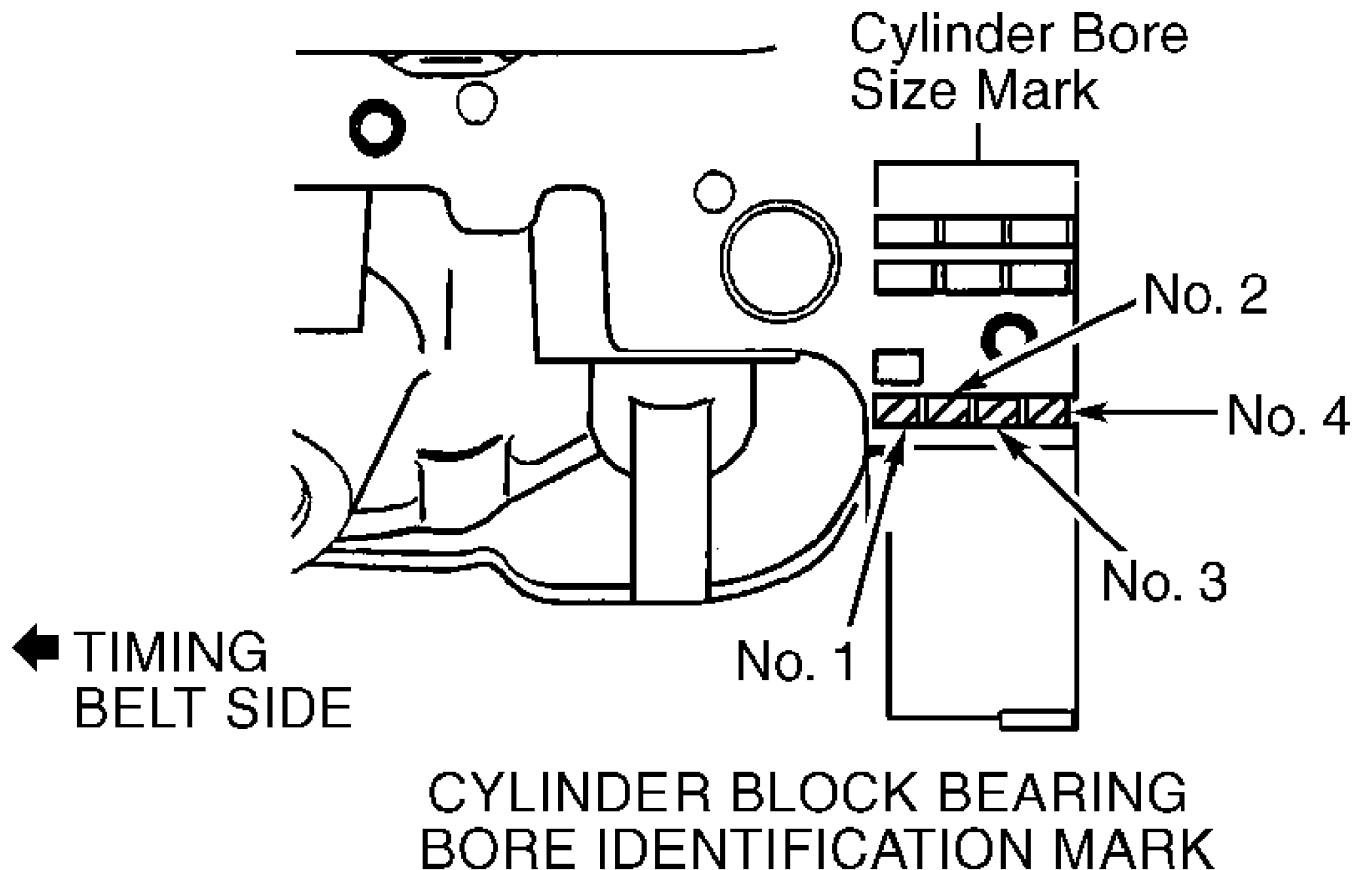
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Fig. 10: Main Journal O.D. Identification (Diamante)
 Courtesy of Mitsubishi Motor Sales of America.

CRANKSHAFT JOURNAL IDENTIFICATION (MONTERO) (1)

Crankshaft Journal Outer Diameter In. (mm)	Cylinder Block Bearing Bore Diameter ID	Main Bearing ID Color
2.5194-2.5197 (63.994-64.0) (2)	I	Pink
"	II	Red
"	III	Green
2.5192-2.5194 (63.988-63.994) (3)	I	Red
"	II	Green
"	III	Black
2.5190-2.5192 (63.982-63.988) (4)	I	Green

"	II	Black
"	III	Brown
(1) - See Figs. 11, 12 and 14.		
(2) - Yellow paint mark.		
(3) - No paint mark.		
(4) - White paint mark.		



98H07905

Fig. 11: Main Journal O.D. Identification (Montero)
Courtesy of Mitsubishi Motor Sales of America.

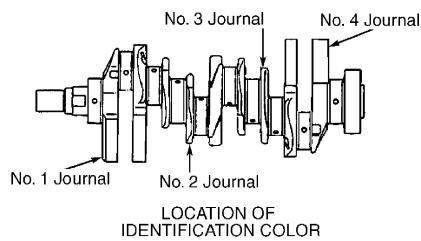
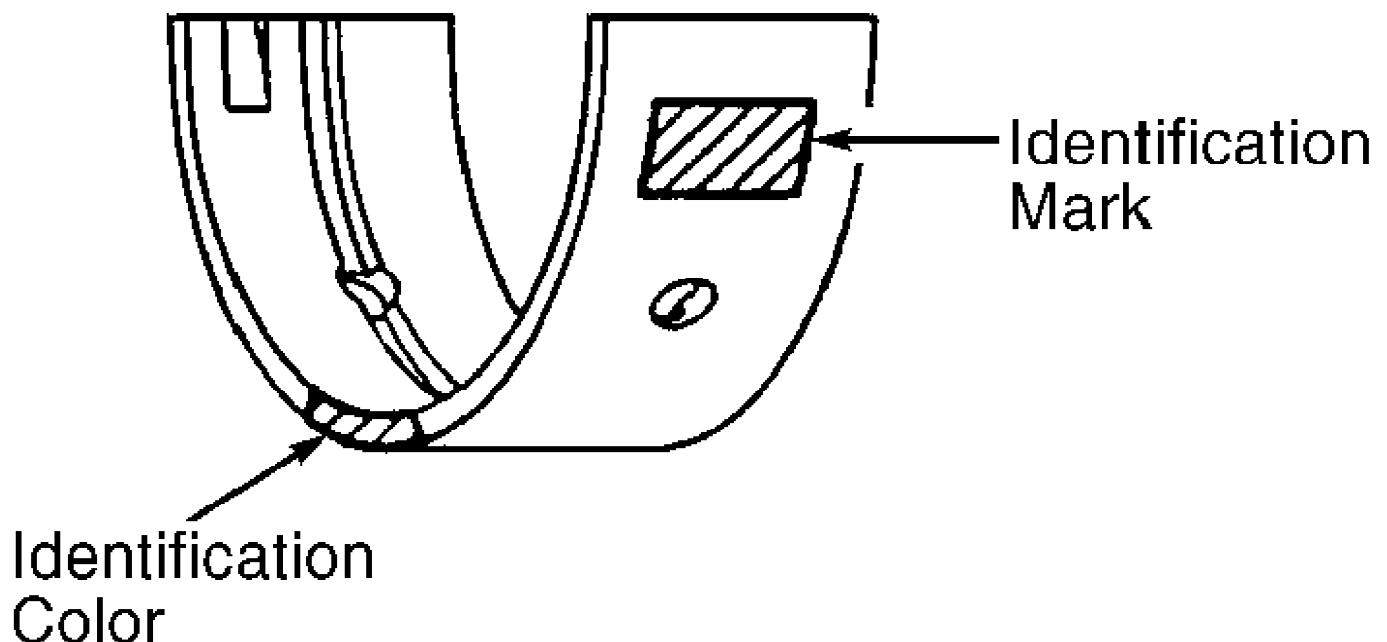
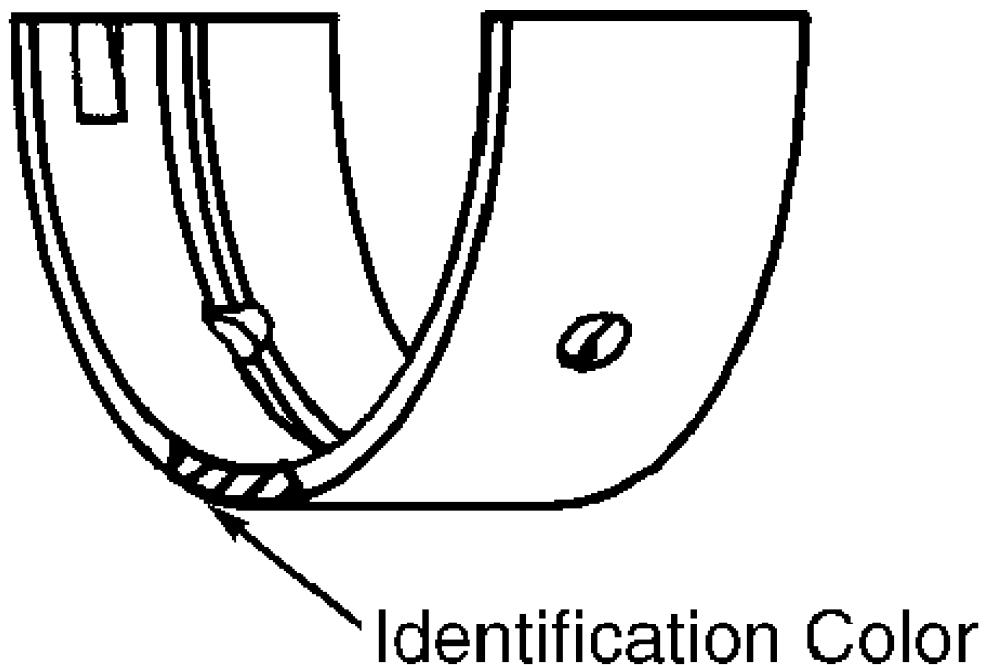


Fig. 12: Main Journal I.D. Identification
Courtesy of Mitsubishi Motor Sales of America.



98H07910

Fig. 13: Main Bearing Identification (Diamante)
Courtesy of Mitsubishi Motor Sales of America.



98E07904

Fig. 14: Main Bearing Identification (Montero)
Courtesy of Mitsubishi Motor Sales of America.

CRANKSHAFT PIN & CONNECTING ROD BEARING IDENTIFICATION (MONTERO) (1)

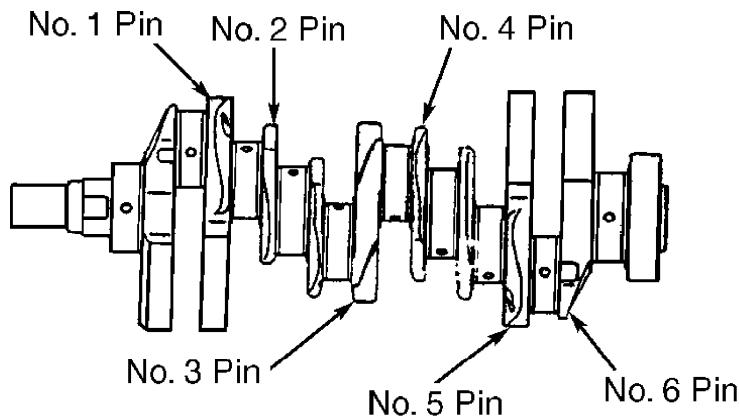
Crankshaft Rod Journal Diameter In. (mm)	Connecting Rod Big End Diameter In. (mm)	Connecting Rod Big End ID (Connecting Rod Bearing Color)	Connecting Rod Bearing Thickness In. (mm)
2.1651-2.1654 (54.994-55.000) (2)	2.2835-2.2837 (58.000-58.006)	0 (Pink)	.0584-.0585 (1.483-1.486)
"	2.2837-2.2839 (58.006-58.012)	1 (Red)	.0585-.0586 (1.486-1.489)
"	2.2839-2.2842 (58.012-58.018)	2 (Green)	.0586-.5587 (1.489-1.492)
2.1649-2.1651 (54.988-54.994) (3)	2.2835-2.2837 (58.000-58.006)	0 (Red)	.0585-.0586 (1.486-1.489)
"	2.2839-2.2842 (58.006-58.012)	1 (Green)	.0586-.5587 (1.489-1.492)
"	2.2842-2.2839 (58.012-58.018)	2 (Black)	.0587-.0589 (1.492-1.495)
2.1646-2.1649 (54.982-54.988) (4)	2.2835-2.2837 (58.000-58.006)	0 (Green)	.0586-.0587 (1.489-1.492)
"	2.2839-2.2842 (58.006-58.012)	1 (Black)	.0587-.5589 (1.492-1.495)
"	2.2842-2.2839 (58.012-58.018)	2 (Brown)	.0589-.0580 (1.495-1.498)

(1) - See Figs. 15 and 16.

(2) - Yellow paint mark.

(3) - No paint mark.

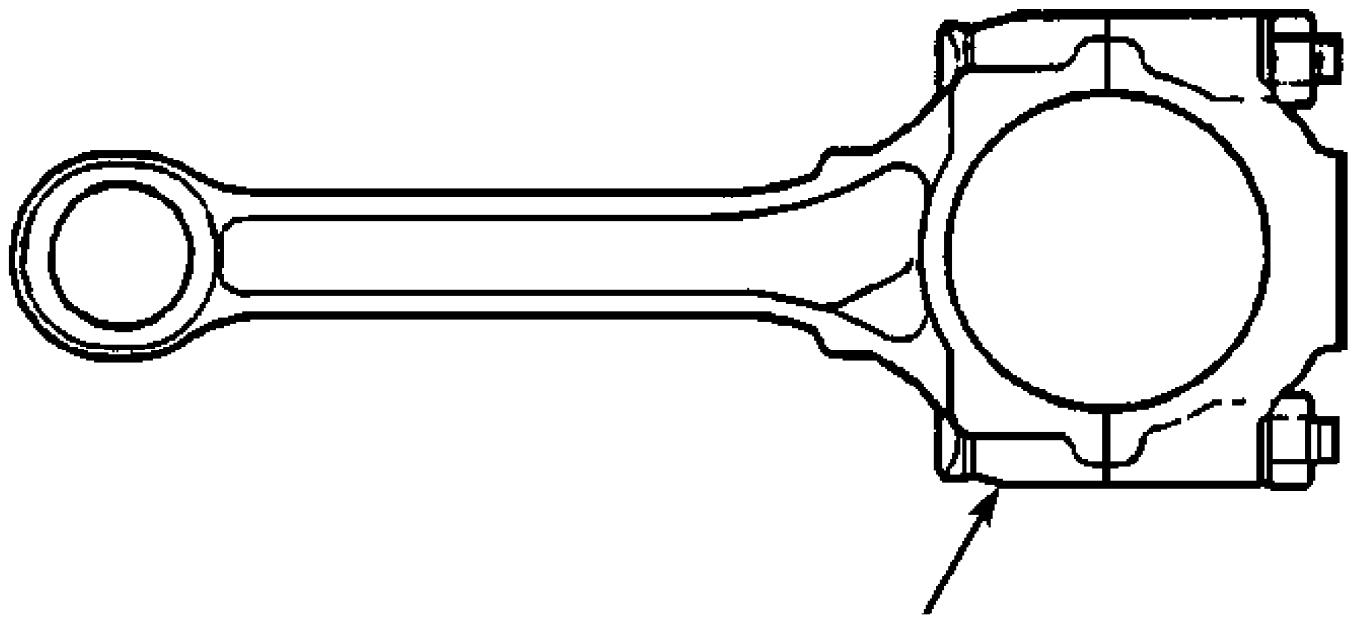
(4) - White paint mark.



LOCATION OF IDENTIFICATION COLOR

98B07907

Fig. 15: Connecting Rod Crankshaft Pin Color Identification Location (Montero)
Courtesy of Mitsubishi Motor Sales of America.



Identification Mark

98C13161

Fig. 16: Connecting Rod Identification Location (Montero)
Courtesy of Mitsubishi Motor Sales of America.

ENGINE OILING

OIL PUMP SPECIFICATIONS

Application	Specification
Gear Side Clearance .....	.0016-.0039" (.040-.10 mm)
Gear-To-Front Cover Clearance Standard .....	.0039-.0071" (.10-.180 mm)
Limit .....	.0138" (.350 mm)
Tip to Tip Clearance .....	.0024-.0071" (.060-.180 mm)
Minimum Warm Oil Pressure at Idle	11.4 psi (.8 kg/cm ²)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Crankshaft Drive Plate	55 (74)
Crankshaft Main Bearing Cap Bolt Diamante	69 (93)
Montero	55 (74)
Crankshaft Pulley Bolt	134 (182)
Cylinder Head Bolt (1)	80 (108)
Distributor Lock Nut (Diamante)	17 (23)
Exhaust Manifold Nut	21 (29)
Generator & Drive Belt Accessory Mount Bolt (Montero)	32 (44)

Accessory Mount Stay Bolt (Montero)	
8 mm Bolt	17 (23)
10 mm Bolt	36 (49)
Cooling Fan Bracket (Montero)	30 (41)
Engine Hanger (Montero)	13 (17)
Generator Bolt (Diamante)	15 (21)
Generator Bolt (Montero)	
8 mm Bolt	15 (21)
10 mm Bolt	38 (51)
Generator Bracket (Diamante)	
8 mm Bolt	35 (48)
10 mm Bolt	17 (23)
Generator Pivot Nut (Diamante)	32 (44)
Tensioner Pulley Nut	37 (50)
Tensioner Bracket Stay Bolt (Montero)	18 (24)
Intake Manifold & Fuel	
Bracket (Montero)	18 (24)
ECT Sensor	22 (30)
Intake Manifold Nut	15 (21)
Thermostat Case	14 (19)
Water Inlet Fitting Bolt	14 (19)
Water Outlet Fitting Bolt	14 (19)
Water Passage (Montero)	14 (19)
Heater Pipe Bolt (Diamante)	13 (18)
Intake Plenum & Throttle Body	
Air Intake Fitting Bolt & Nut (Montero)	13 (18)
EGR Pipe Bolt	13 (18)
EGR Pipe Flair Nut	44 (59)
EGR Valve Bolt	16 (22)
Intake Manifold Plenum (Diamante)	13 (18)
Intake Manifold Plenum Stay Bolt	
8 mm Bolt	13 (18)
10 mm Bolt	27 (36)
Water Outlet Fitting Bracket Bolt	14 (19)
Bracket (Diamante)	18 (24)
Motor Mount Brackets	
Bracket	
8 mm Bolt	16 (22)
10 mm Bolt	30 (41)
12 mm Bolt	55 (75)
Oil Pan & Oil Pump	
Drain Plug	30 (40)
Oil Cooler By-Pass Valve (Montero)	41 (55)
Oil Filter Bolt (Montero)	15 (21)
Oil Filter Bracket	
8 mm Bolt	18 (24)
10 mm Bolt	30 (40)
Oil Screen	
8 mm Bolt	14 (19)
Plug	33 (45)
Piston & Connection Rod	
Connecting Rod Cap Nut	38 (52)
Rocker Arms & Camshafts	
Distributor Adapter Bolt (Diamante)	17 (23)
Rocker Arm Shaft Bolt	23 (31)
Spark Plug	18 (25)
Timing Belt	
Auto Tensioner Bolt	18 (24)
Camshaft Sprocket Bolt	65 (88)
Idler Pulley Bolt	32 (44)
Tensioner Arm Bolt	32 (44)
Tensioner Pulley Bolt	36 (49)
Water Pump Bolt (Montero)	18 (24)

Water Pump Bolt (Diamante)	
8 mm Bolt	18 (24)
10 mm Bolt	30 (41)
	INCH Lbs. (N.m)
Crankshaft & Drive Plate	
Bell Housing	79.7 (9)
Oil Seal Case	97.3 (11)
Rear Plate (Montero)	97.3 (11)
Exhaust Manifold	
Heat Shield	123.9 (14)
Oil Level Gauge Guide Bolt	123.9 (14)
Generator & Drive Belt	
Cooling Fan Bolt (Montero)	97.3 (11)
Cooling Fan Nut (Montero)	97.3 (11)
Timing Indicator Bolt (Montero)	97.3 (11)
Intake Manifold & Fuel	
ECT Gauge Sender	97.4 (11)
Fuel Pressure Regulator Bolt	79.6 (9)
Fuel Pipe Banjo Bolt	79.6 (9)
Injector & Fuel Rail Bolt	106.2 (12)
Water Outlet Pipe	123.9 (14)
Intake Plenum & Throttle Body	
Ignition Coil Bolt (Montero)	115 (13)
Manifold Differential Pressure (MDP) Sensor	44 (4.9)
Throttle Body Bolt	106 (12)
Vacuum Hose Assembly (Diamante)	88 (9.8)
Oil Pan & Oil Pump	
Baffle Plate (Montero)	97.3 (11)
Baffle Plate (Diamante)	97.3 (11)
6 mm Bolt	53.1 (6)
8 mm Bolt	79.6 (9)
Oil Pump Cover Bolt (Diamante)	88.5 (10)
Oil Pump Cover Bolt (Montero)	
6 mm x 10 mm Bolt	97.3 (11)
6 mm x 18 mm Bolt	53.1 (6)
Oil Pressure Gauge Sender	88.5 (10)
Oil Pan (Upper)	53.1 (6)
Oil Pan (Lower)	97.3 (11)
Oil Pump Case	123.9 (14)
Oil Screen (Montero)	
6 mm Bolt	53.1 (9)
Rocker Arms & Camshafts	
Rocker Cover Bolt	31 (3.5)
Thrust Case Bolt	115.1 (13)
Timing Belt	
Camshaft Position (CMP) Sensor (Montero)	79.6 (9)
Crankshaft Position (CKP) Sensor	79.6 (9)

(1) - Tighten cylinder head bolts in 2 or 3 steps with engine cold.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification
Displacement	213.4 Cu. In. (3.5L)
Bore	3.6614" (93 mm)

Stroke	3.3779"	(85.8 mm)
Compression Ratio	9.0:1	
Fuel System		MFI
Horsepower @ RPM	200 @ 5000	
Torque Ft. Lbs. @ RPM	228 @ 3500	

ROCKER ARMS & CAMSHAFT

ROCKER ARMS & CAMSHAFT

Application	In. (mm)
Camshaft Lobe Height	
Montero	
Intake	
Standard	1.4846 (37.710)
Limit	1.4650 (37.210)
Exhaust	
Standard	1.4622 (37.140)
Limit	1.4425 (36.640)
Diamante	
Intake	
Standard	1.4795 (37.580)
Limit	1.4598 (37.080)
Exhaust	
Standard	1.4547 (36.950)
Limit	1.4350 (36.450)
Camshaft Journal Diameter	1.7689 (44.930)

CYLINDER HEAD & VALVES

CYLINDER HEAD & VALVES

Application	Specification
Head Warpage	
Standard .....	.0012" (.030 mm)
Limit .....	.0079" (.200 mm)
Maximum Resurface .....	.0079" (.200 mm)
Overall Height	4.7244" (120.000 mm)
Valve Margin	
Intake	
Standard .....	.0394" (1.000 mm)
Limit .....	.0197" (.500 mm)
Exhaust	
Standard .....	.0472" (1.200 mm)
Limit .....	.0276" (.700 mm)
Valve Height (Montero)	
Intake	
Standard	4.4213" (112.300 mm)
Limit	4.4016" (111.800 mm)
Exhaust	
Standard	4.4924" (114.110 mm)
Limit	4.4728" (113.610 mm)
Stem Diameter	
Intake .....	.2362" (6.000 mm)
Exhaust .....	.2362" (6.000 mm)
Stem to Guide Clearance	
Intake	
Standard .....	.0008-.0020" (.020-.050 mm)
Limit .....	.0039" (.100 mm)

Exhaust	
Standard	.0016-.0028" (.040-.070 mm)
Limit	.0059" (.150 mm)
Valve Stem Projection (Montero)	
Standard	1.9409" (49.300 mm)
Limit	1.9606" (49.800 mm)
Valve Face Angle	45°-45.5°
Valve Spring	
Free Height	
Standard	2.0079" (51.000 mm)
Limit	1.9685" (50.000 mm)
Out of Square	
Standard	2° Or Less
Limit	4°
Valve Seat Width	.0354-.0512" (.900-1.300 mm)
Valve Guide	
Inner Diameter	.2362" (6.000 mm)
Outer Diameter	.433" (11.000 mm)

PISTON & CONNECTING ROD

PISTON & CONNECTING ROD

Application	In. (mm)
Piston Diameter	3.6614 (93.000)
Piston to Block Clearance (Diamante)	.0008-.0016 (.020-.040)
Piston to Block Clearance (Montero)	.0012-.0020 (.030-.050)
Piston Ring	
No. 1	
Ring to Groove Clearance	
Standard	.0012-.0028 (.030-.070)
Limit	.0039 (.100)
End Gap	
Standard	.0118-.0177 (.300-.450)
Limit	.0315 (.800)
No. 2	
Ring to Groove Clearance	
Standard	.0008-.0024 (.020-.060)
Limit	.0039 (.100)
End Gap	
Standard	.0177-.0236 (.450-.600)
Limit	.0315 (.800)
Oil Control Ring	
End Gap (Diamante)	
Standard	.0079-.0236 (.200-.600)
Limit	.0394 (1.000)
End Gap (Montero)	
Standard	.0039-.0138 (.100-.350)
Limit	.0394 (1.000)
Piston Pin	
Outer Diameter	
Standard	.8661 (22.000)
Limit	.0039 (.100)
Connecting Rod	
Big End Side Clearance	
Standard	.0039-.0098 (.100-.250)
Limit	.0157 (.4)
Oil Clearance	.0008-.0020 (.020-.050)

CRANKSHAFT

CRANKSHAFT

Application	Specification
End Play	
Standard .....	.0020-.0098 (.050-.250)
Limit .....	.0118 (.3)
Journal Diameter	
Diamante	
Main Bearing	2.3622 (60.000)
Rod Bearing	1.9685 (50.000)
Montero	
Main Bearing	2.5197 (64.000)
Rod Bearing	(1)
Oil Clearance	
Standard .....	.0008-.0016 (.020-.040)
Limit .....	.0039 (.1)
Max. Out Of Round .....	.0002 (.005)
Max. Taper .....	.0002 (.005)

(1) - See CRANKSHAFT PIN & CONNECTING ROD BEARING IDENTIFICATION
(MONTERO) table under REMOVAL & INSTALLATION.

CYLINDER BLOCK

CYLINDER BLOCK

Application	In. (mm)
Warpage	
Standard .....	.0020 (.050)
Limit .....	.0039 (.100)
Overall Height	8.2834-8.2913 (210.400-210.600)
Cylinder Bore Diameter	
Diamante	3.6614 (93.000)
Montero	3.5866 (91.100)