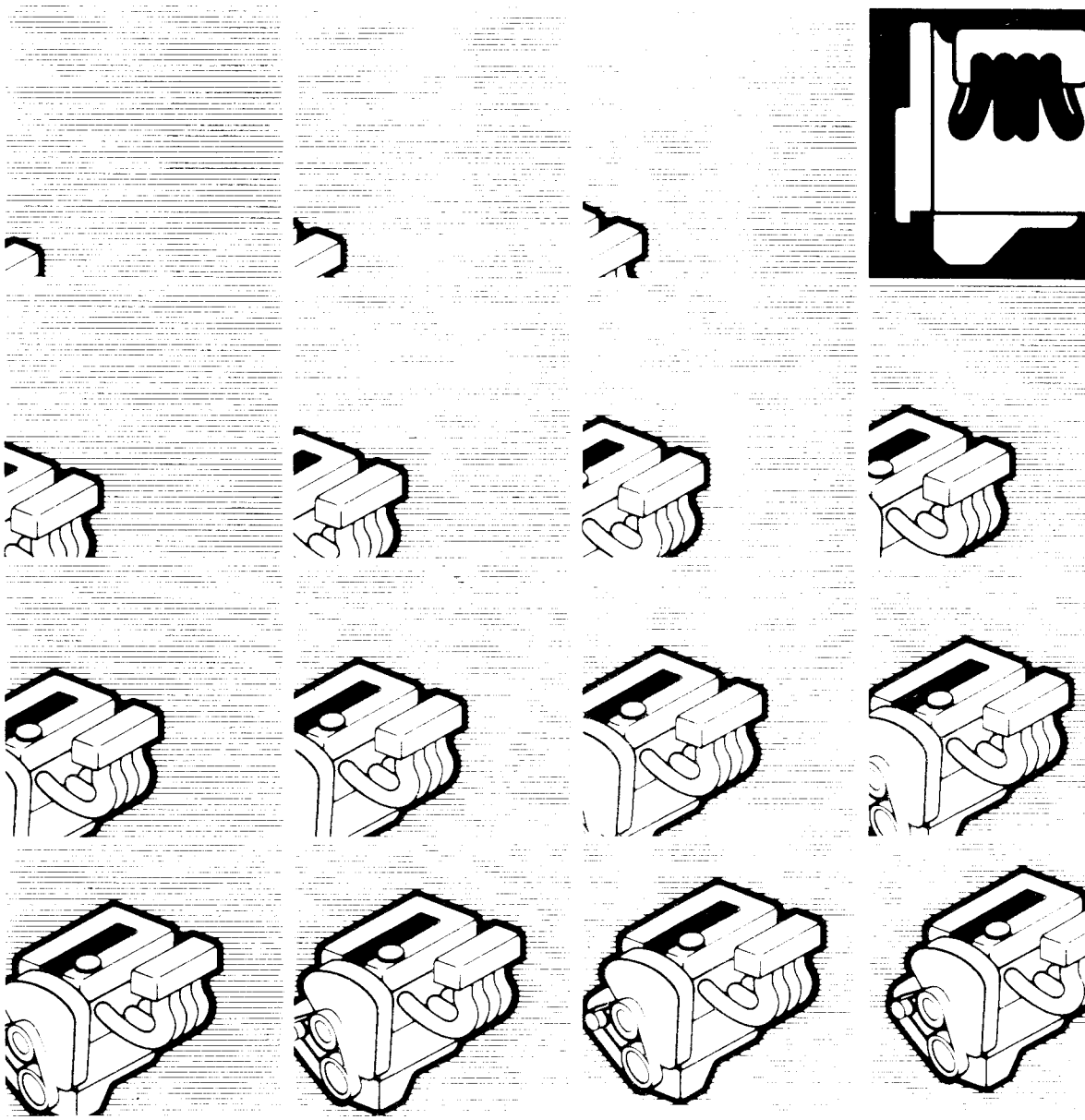
MITSUBISHI MOTORS

Workshop Manual

engine and transmission

6A12, F5M42, F5A42



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MITSUBISHI

ENGINE TRANSMISSION WORKSHOP MANUAL

FOREWORD

The information contained in this workshop manual has been prepared for the professional automotive technician involved in daily repair operations. Information in this manual is divided into engine and transmission models. Each group is further divided to address individual components within the group. These groups contain general information, specification, removal and installation, disassembly and reassembly procedures for the components. The information, descriptions and specifications were in effect at the time this manual was released.

GROUP INDEX

MITSUBISHI MOTORS CORPORATION

March 1998

GENERAL

CONTENTS

EXPLANATION OF MANUAL CONTENTS

Maintenance and Servicing Procedures

(1) A diagram of the component parts is provided near the front of each section in order to give the reader a better understanding of the installed condition of component parts.
(2) The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures.
N : Indicates a non-reusable part.
The tightening torque is provided where applicable.

- Removal steps:
  The part designation number corresponds to the number in the illustration to indicate removal steps.
- Disassembly steps:
  The part designation number corresponds to the number in the illustration to indicate disassembly steps.
- Installation steps:
  Specified in case installation is impossible in reverse order of removal steps. Omitted if installation is possible in reverse order of removal steps.
- Reassembly steps:
  Specified in case reassembly is impossible in reverse order of disassembly steps. Omitted if reassembly is possible in reverse order of disassembly steps.

Classification of Major Maintenance/Service Points

When there are major points relative to maintenance and servicing procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.), these are arranged together as major maintenance and service points and explained in detail.

◀A▶ : Indicates that there are essential points for removal or disassembly.
▶A◀ : Indicates that there are essential points for installation or reassembly.

Symbols for Lubrication, Sealants and Adhesives

Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagram of component parts, or on the page following the component parts page, and explained.

 : Grease (multipurpose grease unless there is a brand or type specified)

 : Sealant or adhesive

 : Brake fluid, automatic transmission fluid or air conditioner compressor oil

 : Engine oil or gear oil

Indicates the group title.

Indicates the section title.

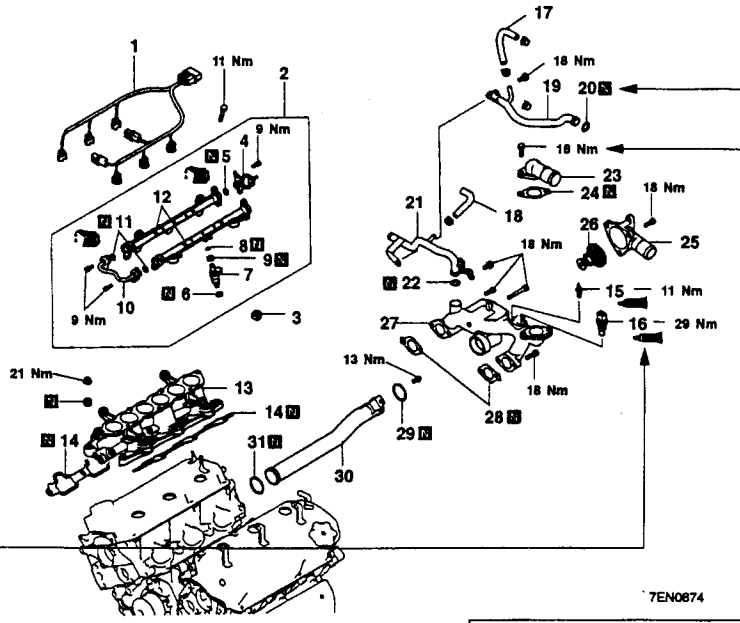
Indicates the group number.

Indicates the page number.

ENGINE – Intake Manifold 1-11

INTAKE MANIFOLD

REMOVAL AND INSTALLATION



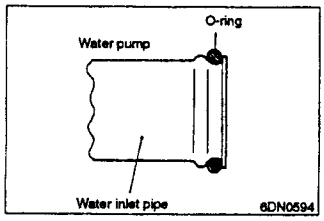
Denotes non-reusable part.

Denotes tightening torque.

This number corresponds to the number appearing in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps".

Removal Procedure

1. Engine harness
2. Injector and delivery pipe
3. Insulator
- ▶H◀ 4. Fuel pressure regulator
5. O-ring
6. Insulator
- ▶G◀ 7. Injector
8. O-ring
9. Grommet
10. Fuel pipe
11. O-ring
12. Delivery pipe
- ▶F◀ 13. Intake manifold
14. Intake manifold gasket
- ▶E◀ 15. Engine coolant temperature gauge unit
- ▶D◀ 16. Engine coolant temperature sensor
17. Water hose
18. Water hose
- ▶C◀ 19. Heater inlet pipe
- ▶A◀ 20. O-ring
- ▶C◀ 21. Heater inlet pipe
- ▶A◀ 22. O-ring
23. Water outlet fitting
24. Water outlet fitting gasket
25. Water inlet fitting
- ▶B◀ 26. Thermostat
27. Thermostat housing
28. Thermostat housing gasket
- ▶A◀ 29. O-ring
30. Water pipe
- ▶A◀ 31. O-ring



Operating procedures, cautions, etc. on removal, installation, disassembly and reassembly are described.

INSTALLATION SERVICE POINTS

▶A◀ O-RING/WATER PIPE

(1) Wet the O-ring (with water) to facilitate assembly.

Caution
Keep the O-ring of oil or grease.

ENGINE AND TRANSMISSION MODELS

Vehicle name	Engine			Transmission	
	Model	Displacement	Type	Model	Type
FTO	6A12	1,998 dm^3	V6, DOHC	F5M42	5-speed, Manual transmission
				F5A42	5-speed, Automatic transmission

STANDARD PARTS-TIGHTENING-TORQUE TABLE

Each torque value in the table is a standard value for tightening under the following conditions.
(1) Bolts, nuts and washers are all made of steel and plated with zinc.
(2) The threads and bearing surface of bolts and nuts are all in dry condition.

The values in the table are not applicable:
(1) If toothed washers are inserted.
(2) If plastic parts are fastened.
(3) If bolts are tightened to plastic or die-cast inserted nuts.
(4) If self-tapping screws or self-locking nuts are used.

Standard bolt and nut tightening torque

Thread size		Torque Nm		
Bolt nominal diameter (mm)	Pitch (mm)	Head mark "4"	Head mark "7"	Head mark "8"
M5	0.8	2.5	4.9	5.9
M6	1.0	4.9	8.8	9.8
M8	1.25	12	22	25
M10	1.25	24	44	52
M12	1.25	41	81	96
M14	1.5	72	137	157
M16	1.5	111	206	235
M18	1.5	167	304	343
M20	1.5	226	412	481
M22	1.5	304	559	647
M24	1.5	392	735	853

Flange bolt and nut tightening torque

Thread size		Torque Nm		
Bolt nominal diameter (mm)	Pitch (mm)	Head mark "4"	Head mark "7"	Head mark "8"
M6	1.0	4.9	9.8	12
M8	1.25	13	24	28
M10	1.25	26	49	57
M10	1.5	24	44	54
M12	1.25	46	93	103
M12	1.75	42	81	96

FORM-IN-PLACE GASKET (FIPG)

The engine and transmission have several areas where the form-in-place gasket (FIPG) is in use. To ensure that the gasket fully serves its purpose, it is necessary to observe some precautions when applying the gasket. Bead size, continuity and location are of paramount importance. Too thin a bead could cause leaks. Too thick a bead, on the other hand, could be squeezed out of location, causing blocking or narrowing of the fluid feed line. To eliminate the possibility of leaks from a joint, therefore, it is absolutely necessary to apply the gasket evenly without a break, while observing the correct bead size.
Since the RTV hardens as it reacts with the moisture in the atmospheric air, it is normally used in the metallic flange areas.

DISASSEMBLY

The parts assembled with the FIPG can be easily disassembled without use of a special method. In some cases, however, the sealant between the joined surfaces may have to be broken by lightly striking with a mallet or similar tool. A flat and thin gasket scraper may be lightly hammered in between the joined surfaces. In this case, however, care must be taken to prevent damage to the joined surfaces. For removal of the oil pan, the special tool "Oil Pan Remover" (MD998727) is available. Be sure to use the special tool to remove the oil pan.

SURFACE PREPARATION

Thoroughly remove all substances deposited on the gasket application surfaces, using a gasket scraper or wire brush. Check to ensure that the surfaces to which the FIPG is to be applied is flat. Make sure that there are no oils, greases and foreign substances deposited on the application surfaces. Do not forget to remove the old sealant remained in the bolt holes.

FORM-IN-PLACE GASKET APPLICATION

When assembling parts with the FIPG, you must observe some precautions, but the procedures is very simple as in the case of a conventional precut gasket.
Applied FIPG bead should be of the specified size and without breaks. Also be sure to encircle the bolt hole circumference with a completely continuous bead. The FIPG can be wiped away unless it is hardened. While the FIPG is still moist (in less than 15 minutes), mount the parts in position. When the parts are mounted, make sure that the gasket is applied to the required area only. In addition, do not apply any oil or water to the sealing locations or start the engine until a sufficient amount of time (about one hour) has passed after installation is completed.
The FIPG application procedure may vary on different areas. Observe the procedure described in the text when applying the FIPG.

ENGINE

CONTENTS

GENERAL INFORMATION

GENERAL SPECIFICATIONS

Descriptions			6A12-MIVEC
Type			60° V, OHV, DOHC (for each bank)
Number of cylinders			6
Combustion chamber			Pentroof type
Total displacement dm^3			1,998
Cylinder bore mm			78.4
Piston stroke mm			69.0
Compression ratio			10.0
Valve timing	Intake valve	Opens (BTDC)	15° (Low-speed cam) 37.5° (High-speed cam)
		Closes (ABDC)	41° (Low-speed cam) 82.5° (High-speed cam)
	Exhaust valve	Opens (BBDC)	41° (Low-speed cam) 75° (High-speed cam)
		Closes (ATDC)	15° (Low-speed cam) 30° (High-speed cam)
Lubrication system			Pressure feed, full-flow filtration
Oil pump type			Trochoid type
Cooling system			Water-cooled forced circulation
Water pump type			Centrifugal impeller type

SPECIFICATIONS

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Timing belt				
Auto tensioner rod projection mm			12.0	–
Auto tensioner rod pushed-in amount (when pushed with a force of 98 – 196 N) mm			1.0 or less	–
Rocker cover and camshaft				
Camshaft cam height mm	Intake	(Low-speed cam)	34.34	33.84
		(High-speed cam)	36.46	35.96
	Exhaust	(Low-speed cam)	34.40	33.90
		(High-speed cam)	35.86	35.36
Camshaft journal diameter mm			26	–
Valve clearance mm	Intake		0.10	–
	Exhaust		0.13	–
Cylinder head and valve				
Flatness of cylinder head gasket surface mm			–	–
Cylinder head gasket surface grinding limit (including grinding of cylinder block gasket surface) mm			Less than 0.03	–
Cylinder head overall height mm			119.6 – 119.8	–
Cylinder head bolt nominal length mm			–	96.4
Valve margin mm	Intake		1.0	0.5
	Exhaust		1.3	0.8
Valve stem diameter mm			6.0	–
Valve stem-to-guide clearance mm	Intake		0.02 – 0.05	0.10
	Exhaust		0.04 – 0.07	0.15
Valve face angle			45° – 45.5°	–
Valve stem projection mm			48.40	48.90
Overall valve length mm	Intake		112.37	111.87
	Exhaust		110.74	110.74
Valve spring free height mm			51.5	50.5
Valve spring load/installed height N/mm			255/44.5	–
Valve spring squareness			2°	4°
Valve seat contact width mm			0.9 – 1.3	–

Items		Standard value	Limit
Valve guide internal diameter mm		6.6	–
Valve guide projection mm		19.0	–
Oil pump case and oil pan			
Oil pump tip clearance mm		0.06 – 0.18	–
Oil pump side clearance mm		0.04 – 0.10	–
Oil pump body clearance mm		0.10 – 0.18	0.35
Piston and connecting rod			
Piston outside diameter mm		78.4	–
Piston ring side clearance mm	No.1 ring	0.02 – 0.06	–
	No.2 ring	0.02 – 0.06	–
Piston ring end gap mm	No.1 ring	0.20 – 0.35	0.8
	No.2 ring	0.35 – 0.50	0.8
	Oil ring	0.20 – 0.50	1.0
Piston pin outside diameter mm		19.0	–
Piston pin press-in load (at room temperature) N		4,900 – 14,700	–
Crankshaft pin oil clearance mm		0.02 – 0.05	0.1
Connecting rod big end side clearance mm		0.10 – 0.25	0.4
Crankshaft, cylinder block, flywheel and drive plate			
Crankshaft end play mm		0.05 – 0.25	0.4
Crankshaft journal diameter mm		53.0	–
Crankshaft pin diameter mm		43.0	–
Crankshaft journal oil clearance mm		0.01– 0.03	0.1
Cylinder block gasket surface flatness mm		0.05	–
Cylinder block gasket surface grinding limit (including grinding of cylinder head gasket surface) mm		–	0.2
Cylinder block overall height mm		190.0	–
Cylinder block cylindricity mm		0.01 or less	–
Cylinder block internal diameter mm		78.4	–
Bearing cap bolt nominal length mm		–	71.1
Piston-to-cylinder clearance mm		0.02 – 0.04	–

REWORK DIMENSIONS

Item		Standard
Cylinder head and valves		
Cylinder head oversize valve guide hole diameter mm	0.05 O.S.	11.05 – 11.07
	0.25 O.S.	11.25 – 11.27
	0.50 O.S.	11.50 – 11.52
Oversize intake valve seat ring hole diameter mm	0.3 O.S.	32.30 – 32.32
	0.6 O.S.	32.60 – 32.62
Oversize exhaust valve seat ring diameter mm	0.3 O.S.	29.80 – 29.82
	0.6 O.S.	30.10 – 30.12

TORQUE SPECIFICATION

Items	Nm
Drive belt	
Alternator pivot nut	44
Alternator bolt	21
Oil level gauge guide	23
Tensioner pulley	15
Engine hanger	23
Tensioner pulley bracket A	45
Crankshaft bolt	182
Timing belt	
Timing belt front cover	11
Engine support bracket	49
Angle sensor	9
Angle sensor connector bracket	11
Tensioner pulley	48
Tensioner arm	24
Auto tensioner	21
Camshaft sprocket bolt	88
Idler pulley	35
Timing belt rear cover	11
Angle sensor connector bracket	11

Items	Nm
Fuel and emission control parts	
Air intake plenum stay	18
Connector bracket	11
EGR valve	22
Throttle body	12
Air intake plenum	18
Delivery pipe	12
Fuel pipe	9
Fuel pressure regulator	9
Alternator bracket	23
Ignition system	
Spark plug	25
Ignition failure sensor	10
Condenser bracket assembly	5
Ignition coil	10
Water pump and water pipe	
Engine hanger	11
Engine coolant temperature gauge unit	11
Engine coolant temperature sensor	29
Water inlet fitting	18
Water outlet fitting	18
Thermostat housing	23
Water pipe	13
Water pump	23
Intake manifold and exhaust manifold	
Intake manifold	17
Heat protector	13
Exhaust manifold stay	44
Exhaust manifold	49
Rocker arm and camshaft	
Rocker cover	4
Oil control valve holder	9

Items	Nm
Cam cap	24
Bearing cap M6	11
Bearing cap M8	24
Arm spring holder	11
Rocker arm and rocker shaft cap	
Rocker shaft cap	11
Cylinder head and valves	
Cylinder head bolt	20 + 120° + 120°
Oil pan and oil pump	
Oil pressure switch	10
Oil filter cover	21
Water hose	30
Bolt	68
Drain plug	39
Oil level sensor	9
Oil pan	7
Oil screen	19
Baffle plate	9
Relief plug	44
Oil pump case	14
Oil pump case cover	12
Piston and connecting rod	
Connecting rod	18 + 90° – 100°
Crankshaft, cylinder block, flywheel and drive plate	
Detonation sensor	23
Idler pulley bracket	35
Flywheel bolt	98
Drive plate bolt	98
Rear plate	11
Bell housing cover	9
Oil seal case	11
Bearing cap bolt	25 + 90° – 100°

NEW TIGHTENING METHOD – BY USE OF BOLTS TO BE TIGHTENED IN PLASTIC AREA

A new type of bolts, to be tightened in plastic area, is currently used in some parts of the engine. The tightening method for the bolts is different from the conventional one. Be sure to observe the method described in the text when tightening the bolts.
Service limits are provided for the bolts. Make sure that the service limits described in the text are strictly observed.

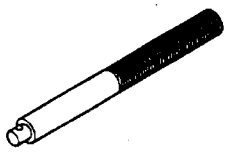
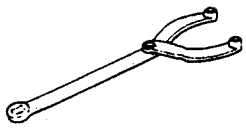
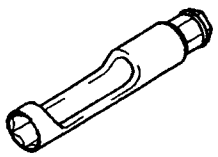
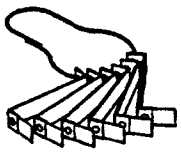
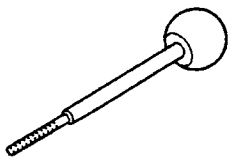
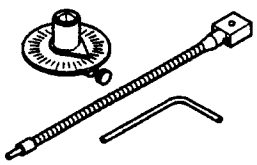
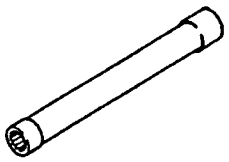
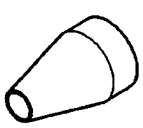
- Areas where the bolts are in use:
  (1) Cylinder head bolts
  (2) Main bearing cap bolts
  (3) Connecting rod cap bolts
- Tightening Method
  After tightening the bolts to the specified torque, tighten them another 90° to 100°, or 240° (twice 120°). The tightening method varies on different areas. Observe the tightening method described in the text.

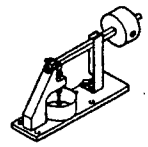
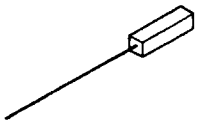
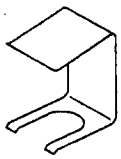
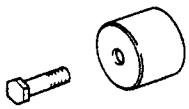
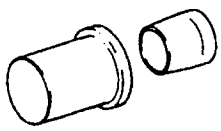
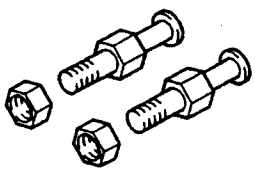
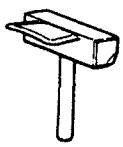
SEALANTS

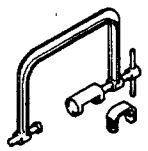
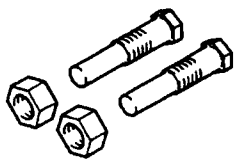
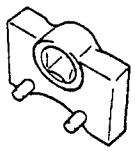
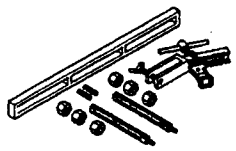
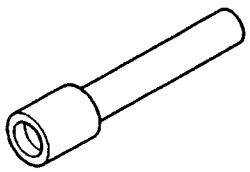
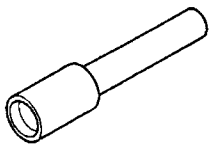
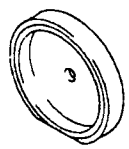
Item	Specified sealant	Quantity
Water pump*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Water outlet fitting*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent	As required
Engine coolant temperature gauge unit	3M ATD Part No. 8660 or equivalent	As required
Camshaft bearing	3M ATD Part No. 8660 or equivalent	As required
Cam cap	3M ATD Part No. 8660 or equivalent	As required
Oil control valve	3M ATD Part No. 8660 or equivalent	As required
Camshaft holder*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Rocker cover	3M ATD Part No. 8660 or equivalent	As required
Oil pump case*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Oil pan*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Oil pressure switch	3M ATD Part No. 8660 or equivalent	As required
Oil seal case*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Drive plate bolt	3M Nut Locking Part No. 4171 or equivalent	As required
Flywheel bolt	3M Nut Locking Part No. 4171 or equivalent	As required

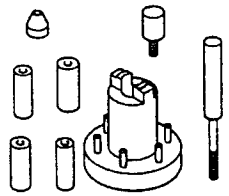
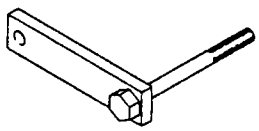
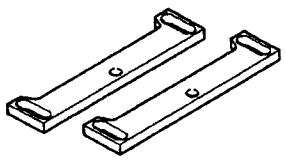
*: parts sealed by foam-in-place gasket (FIPG)

SPECIAL TOOLS

Tool	Number	Name	Use
	MB990685	Torque wrench	Adjustment of timing belt tension
	MB990938	Handle	Use with MD998776
	MB990767	Crankshaft pulley holder	Holding camshaft sprocket when loosening and tightening of bolt. Use with MD998719
	MB991477	Valve adjusting wrench	Adjustment of valve clearance
	MB991478	Valve adjusting wrench feeler gauge set	Adjustment of valve clearance
	MB991479	Rocker arm piston checker	Adjustment of valve clearance
	MB991614	Angle gauge	Tightening cylinder head bolt
	MB991653	Cylinder head bolt wrench	Tightening and loosening of cylinder head bolt
	MB991659	Guide D	Removal of piston pin (Use with MD998780)

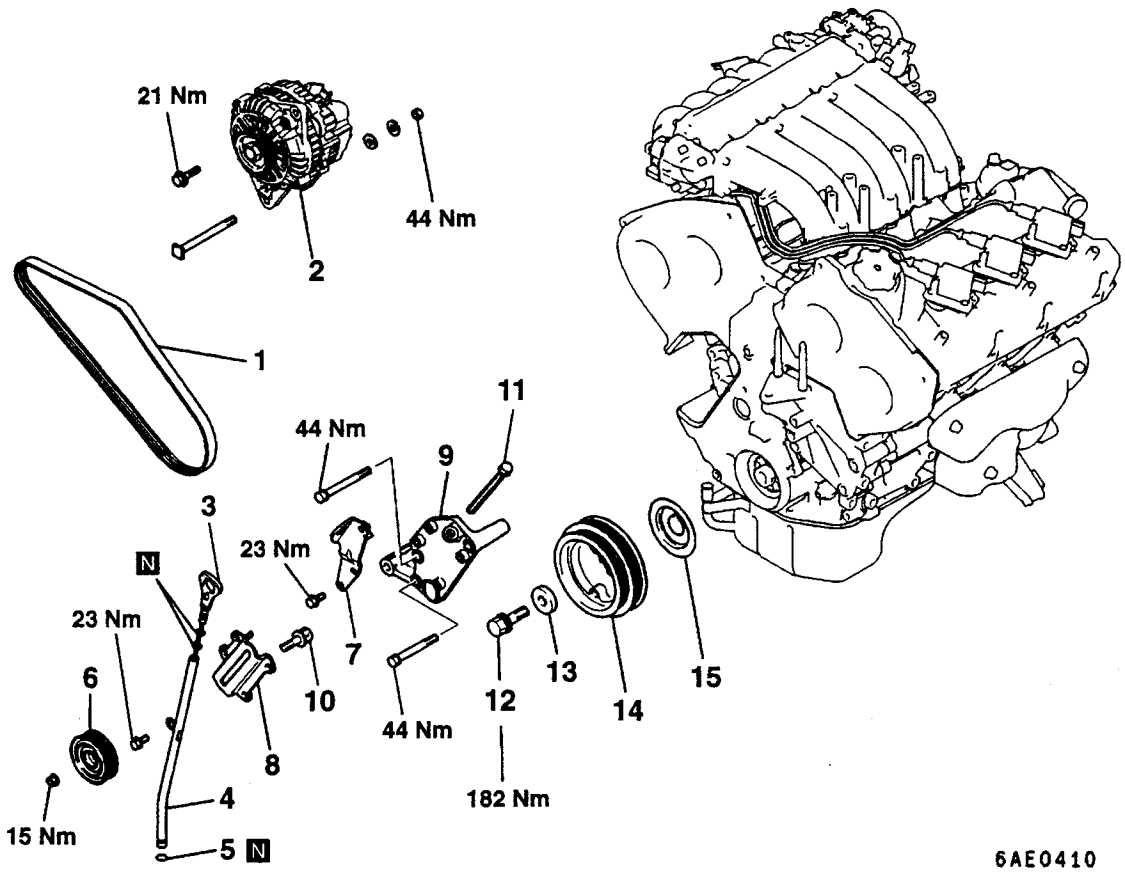
Tool	Number	Name	Use
	MD998440	Leak-down tester	Leak-down test of lash adjuster
	MD998441	Lash adjuster retainer	Air bleeding of lash adjuster
	MD998442	Air bleed wire	Air bleeding of lash adjuster
	MD998443	Lash adjuster holder	Retainer for holding lash adjuster in rocker arm at time of removal and installation of rocker arm and rocker shaft assembly
	MD998713	Camshaft oil seal installer	Installation of camshaft oil seal
	MD998716	Crankshaft wrench	Rotation of crankshaft when installing piston and timing belt.
	MD998717	Crankshaft front oil seal installer	Installation of crankshaft front oil seal
	MD998719	Pulley holder pin (2)	Use with MB990767
	MD998727	Oil pan remover	Removal of oil pan

Tool	Number	Name	Use
	MD998735	Valve spring compressor	Compression of valve spring
	MD998754	Pin	Use with MB990767
	MD998767	Tensioner pulley socket wrench	Adjustment of timing belt tension
	MD998772	Valve spring compressor	Removal and installation of valve and related parts
	MD998774	Valve stem seal installer	Installation of valve stem seal
	MD998775	Valve stem seal installer	Installation of valve stem seal
	MD998776	Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal Use with MB990938
	MD998777	Camshaft oil seal installer adapter	Installation of camshaft oil seal

Tool	Number	Name	Use
	MD998780	SETTING TOOL Piston pin	Removal and installation of piston pin
	MD998781	Flywheel stopper	Holding flywheel and drive plate
	MD998784	Valve spring compressor adapter	Compression of valve spring (Use with MD998772)

DRIVE BELT

REMOVAL AND INSTALLATION

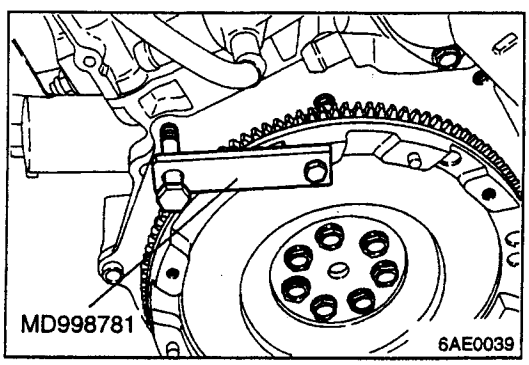


Removal steps

1. Drive belt
2. Alternator
3. Oil level gauge (dipstick)
4. Oil level gauge guide
5. O-ring
6. Tensioner pulley
7. Engine hanger
8. Tensioner pulley bracket A
9. Tensioner pulley bracket B
10. Adjusting stud
11. Adjusting bolt

◀A▶ ▶A◀ 12. Crankshaft bolt

13. Special washer
14. Crankshaft pulley
15. Flange



REMOVAL SERVICE POINT

◀A▶ CRANKSHAFT PULLEY BOLT REMOVAL

(1) Hold the flywheel or drive plate in position with the special tool before removing the crankshaft pulley bolts.

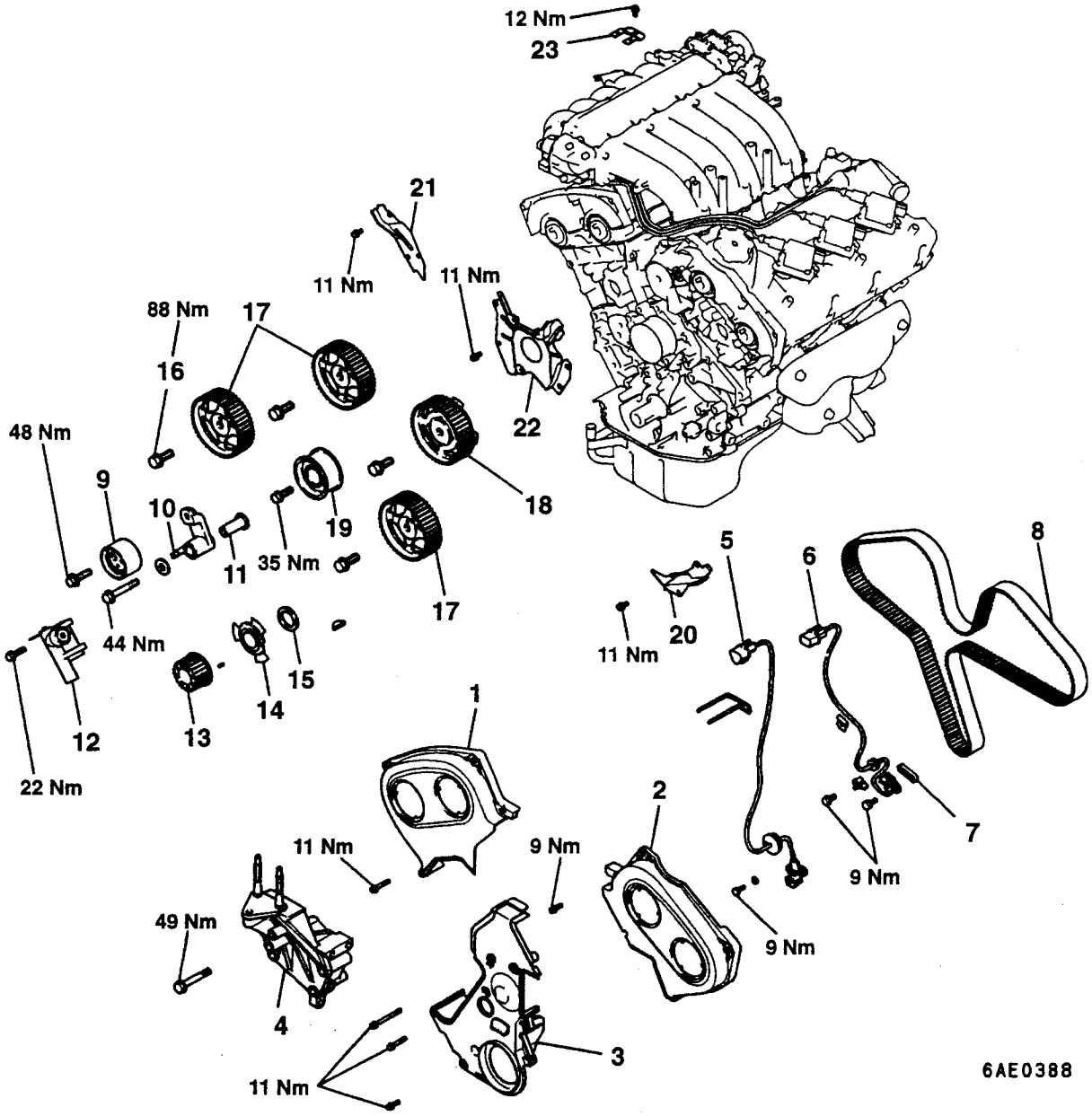
INSTALLATION SERVICE POINT

▶A◀ CRANKSHAFT PULLEY BOLT INSTALLATION

(1) Hold the flywheel or drive plate in position with the special tool before installing the crankshaft pulley bolts.

TIMING BELT

REMOVAL AND INSTALLATION



Removal steps

1. Timing belt front cover, upper right
2. Timing belt front cover, upper left
3. Timing belt front cover, lower
4. Engine support bracket
5. Angle sensor
6. Angle sensor
7. Spacer

◀A▶ ▶C◀ 8. Timing belt

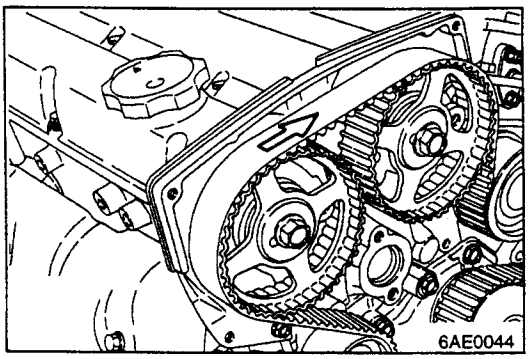
9. Tensioner pulley
10. Tensioner arm
11. Tensioner spacer

▶B◀ 12. Auto tensioner

13. Crankshaft sprocket
14. Sensing plate
15. Washer

◀B▶ ▶A◀ 16. Camshaft sprocket bolt

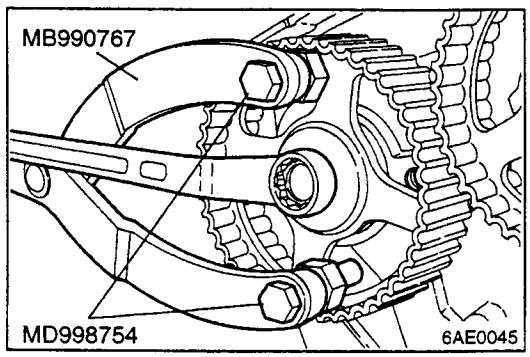
17. Camshaft sprocket
18. Camshaft sprocket with sensing plate
19. Idler pulley
20. Timing belt rear cover, left
21. Timing belt rear cover, right
22. Timing belt rear cover, center
23. Connector bracket



REMOVAL SERVICE POINTS

◀A▶ TIMING BELT REMOVAL

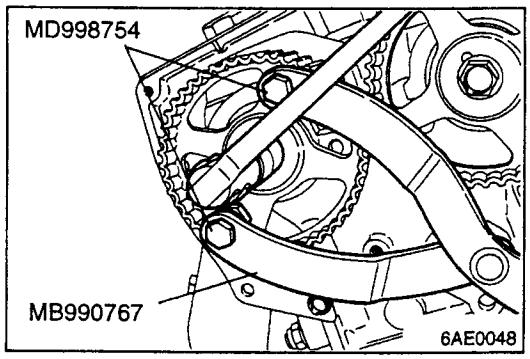
(1) Mark the belt running direction for reference in reinstallation.
(2) Loosen the bolt that secures the tensioner pulley to remove the timing belt.



◀B▶ CAMSHAFT SPROCKET BOLT REMOVAL

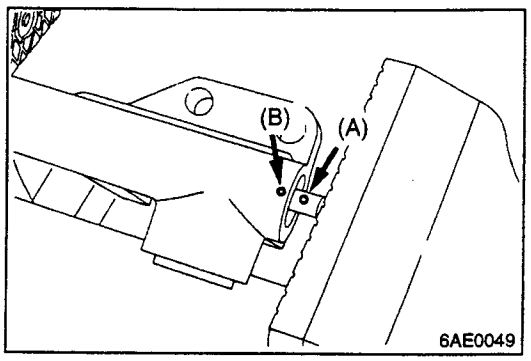
INSTALLATION SERVICE POINTS

▶A◀ CAMSHAFT SPROCKET BOLT INSTALLATION

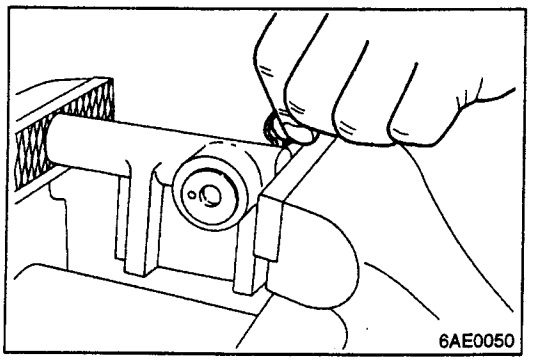


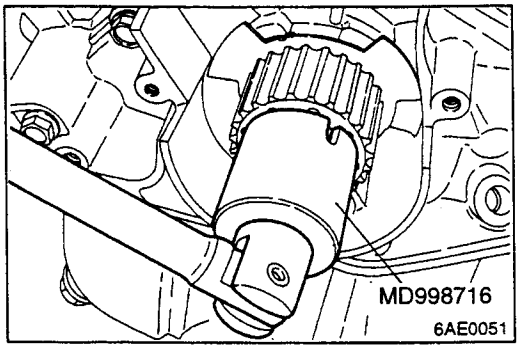
▶B◀ AUTO TENSIONER SETTING

(1) Set the auto tensioner in a vice, while making sure it is not tilted.
(2) Slowly close the vice to force the rod in until the set hole (A) of the rod is lined up with the set hole (B) of the cylinder.



(3) Insert a 1.4 mm wire in the set hole.
(4) Remove the auto tensioner from the vice.

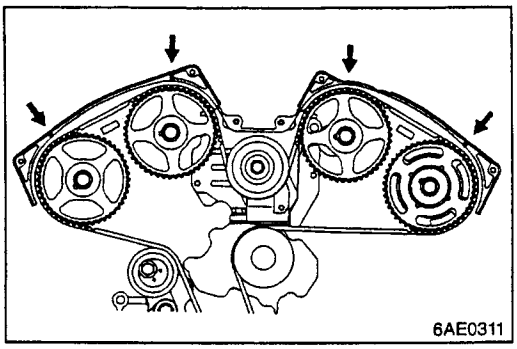




▶C◀ TIMING BELT INSTALLATION

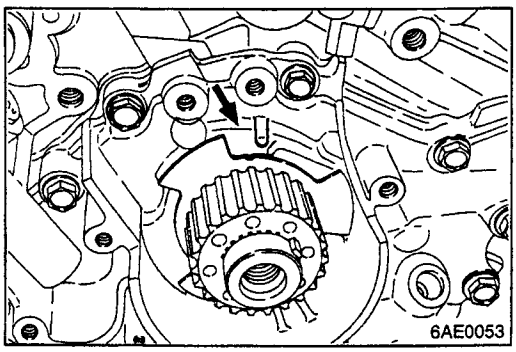
(1) Turn the crankshaft sprocket so that its timing mark will be away from the mating timing mark by approx. three teeth.

Caution
If the timing marks are aligned, the piston is brought to the TDC. When the camshaft is turned under this condition, the valves may interfere with the piston.

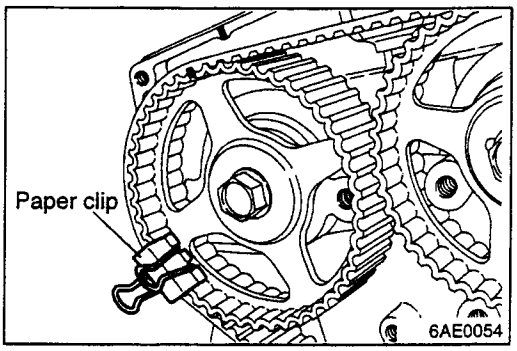


(2) Bring the timing marks of the camshaft sprockets as shown in the illustration.

Caution
If one of the camshaft sprockets on the right bank is turned with the timing mark on the other sprocket aligned, there may be danger for the intake and exhaust valves to interfere with each other.



(3) Align the timing mark on the crankshaft sprocket with the mating timing mark, and then turn the crankshaft counterclockwise by one tooth.

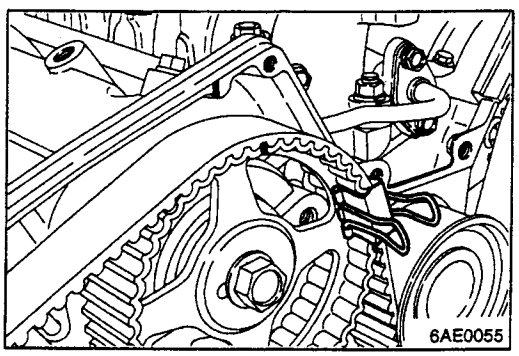


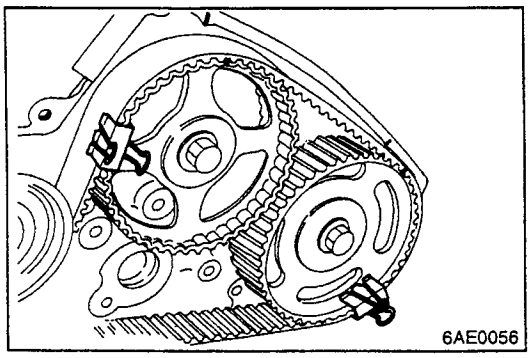
(4) Place the timing belt over the sprockets in the following method.

Caution
The camshaft sprockets on the right bank can turn very easily because of the valve spring tension. Use care not to allow your fingers to get caught between the sprockets.

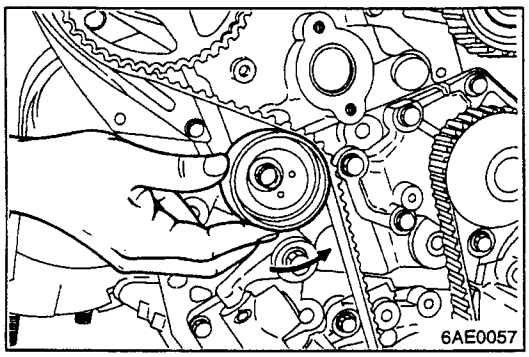
1) Align the timing mark of the right bank exhaust camshaft sprocket with the mating timing mark and hold the timing belt on the sprocket with a paper clip.
2) Align the timing mark of the intake camshaft sprocket and place the timing belt around that sprocket. Then, clip the belt at the location shown.

   Caution
   The camshaft sprockets can turn easily and do not give excessive tension to the timing belt.
3) Place the timing belt around the idler pulley.

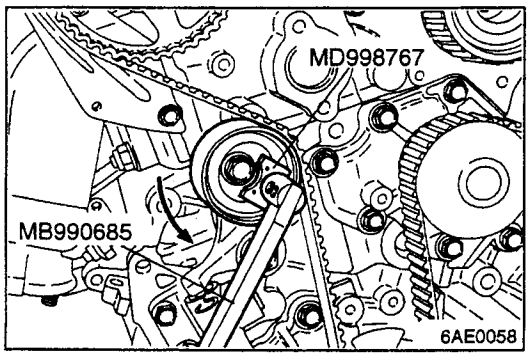




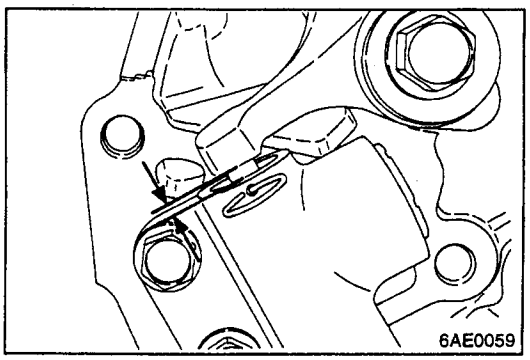
4) On the left bank, make sure that the timing marks of the camshaft sprockets are aligned and then hold the timing belt on these sprockets with paper clips.
5) Place the timing belt around the water pump pulley.
6) Place the timing belt around the crankshaft sprocket.
7) Place the timing belt around the tensioner pulley.



(5) Move the tensioner pulley in the direction of the arrow and hold it in raised position by tightening the tensioner pulley bolt.
(6) Check that all timing marks are aligned correctly.
(7) Turn the crankshaft counterclockwise a quarter turn.
(8) Turn back the crankshaft clockwise until the timing marks align again.



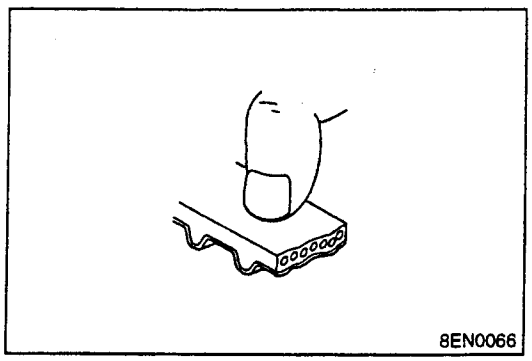
(9) Install the special tool and a torque wrench of 0 – 5 Nm to the tensioner pulley.
(10) Torque the tensioner pulley to 3 Nm with the torque wrench.
(11) While holding the tensioner pulley, tighten the center bolt to specification.
(12) Turn the crankshaft clockwise 2 turns and let it stand for about 5 minutes.



(13) Make sure that the wire, which has been inserted when installing the auto tensioner, can be removed easily. Belt tension should be acceptable if the wire can be easily removed. Remove the wrench. The belt tension can also be verified by checking the protrusion amount of the auto tensioner rod which should conform to the following.

Standard value: 3.8 – 4.5 mm

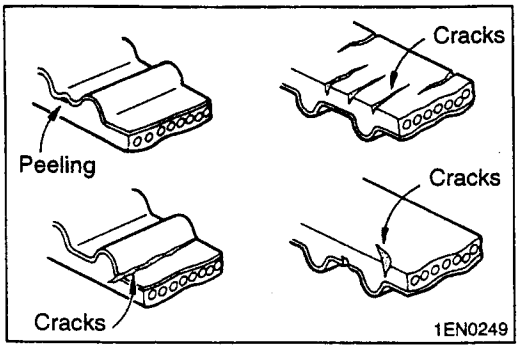
(14) If the wire cannot be removed easily or the rod protrusion is not up to specification, repeat steps (9) through (12) to obtain the correct tension.



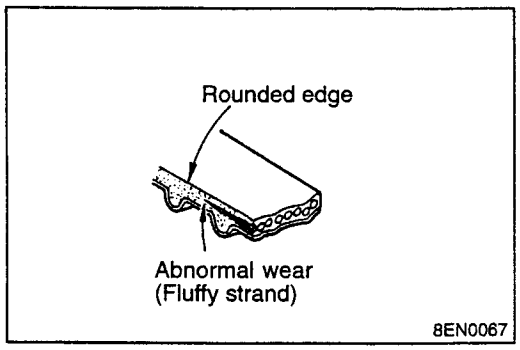
INSPECTION

TIMING BELT

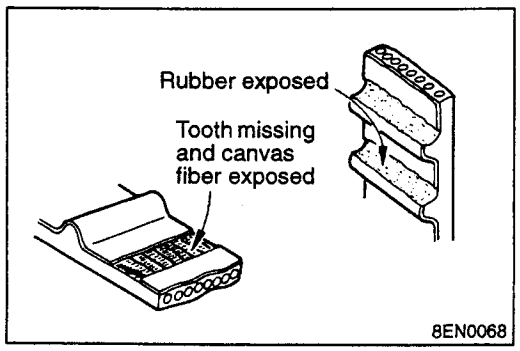
Replace belt if any of the following conditions exist.
(1) Hardening of back rubber.
Back side is glossy without resilience and leaves no indent when pressed with fingernail.



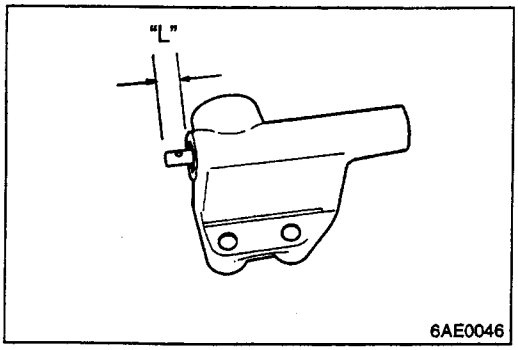
(2) Cracks on rubber back.
(3) Cracks or peeling of canvas.
(4) Cracks on tooth bottom.
(5) Cracks or belt sides.



(6) Abnormal wear of belt sides. The sides are normal if they are sharp as if cut by a knife.



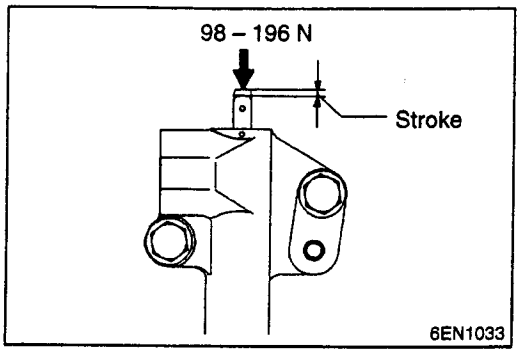
(7) Abnormal wear on teeth.
(8) Missing tooth.



AUTO-TENSIONER

(1) Check for oil leaks. If oil leaks are evident, replace the auto-tensioner.
(2) Check the rod end for wear or damage and replace the auto-tensioner if necessary.
(3) Measure the rod projection length "L". If the reading is outside the standard value, replace the auto tensioner.

Standard value "L": 12 mm

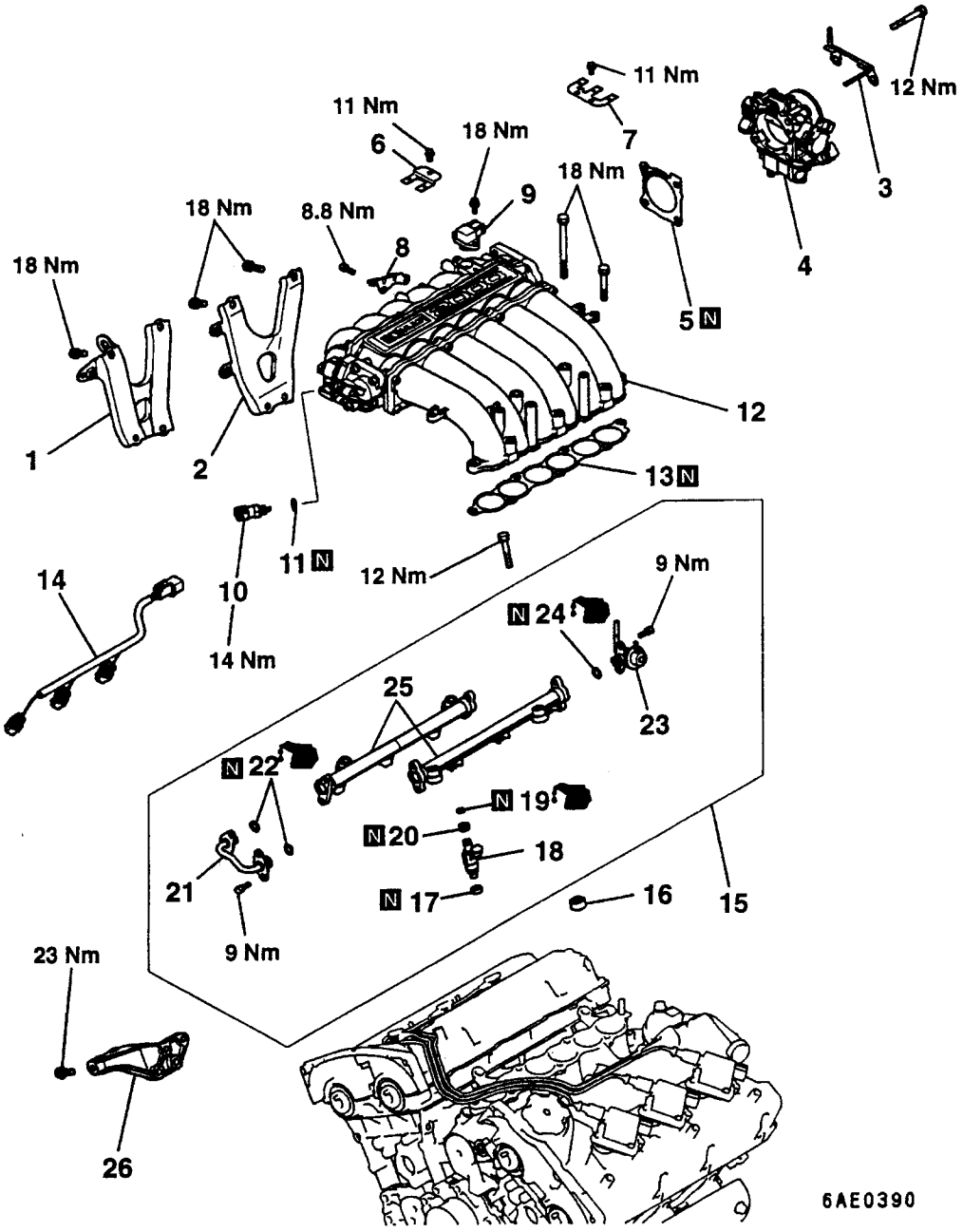


(4) Press the rod by a force of 98 to 196 N and measure the rod stroke. If the measured value exceeds the standard value, replace the tensioner.

Standard value: 1 mm or less

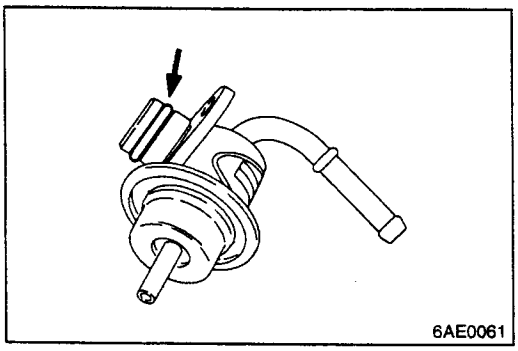
FUEL AND EMISSION CONTROL PARTS

REMOVAL AND INSTALLATION



Removal steps

1. Air intake plenum stay, front
2. Air intake plenum stay, rear
3. Vacuum pipe
4. Throttle body
▶C◀ 5. Gasket
6. Connector bracket
7. Connector bracket
8. Accelerator cable bracket
9. Ignition failure sensor
10. Air temperature sensor
11. Gasket
12. Air intake plenum
13. Gasket
14. Control harness
15. Delivery pipe and injector
16. Insulator
17. Insulator
▶B◀ 18. Injector
19. Grommet
20. O-ring
21. Fuel pipe
22. O-ring
▶A◀ 23. Fuel pressure regulator
24. O-ring
25. Delivery pipe
26. Alternator bracket

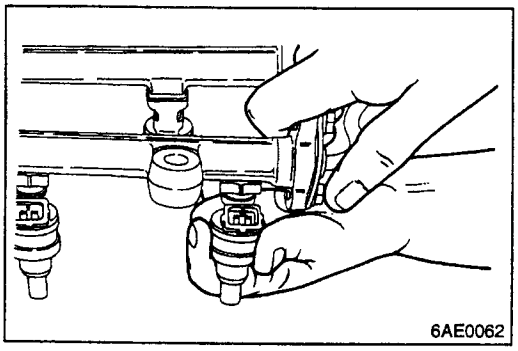


INSTALLATION SERVICE POINTS

▶A◀ FUEL PRESSURE REGULATOR INSTALLATION

(1) Apply spindle oil or gasoline to the new O-ring installed on the fuel pressure regulator.
(2) Insert the fuel pressure regulator in the delivery pipe.
(3) Make sure that the fuel pressure regulator turns smoothly; then align the threaded holes and tighten the regulator bolts to specification.

Caution
If the regulator does not turn smoothly, the O-ring probably gets caught somewhere in the delivery pipe. In such a case, remove the fuel pressure regulator and reinsert it into the delivery pipe. Check it again for smooth rotation before securing.

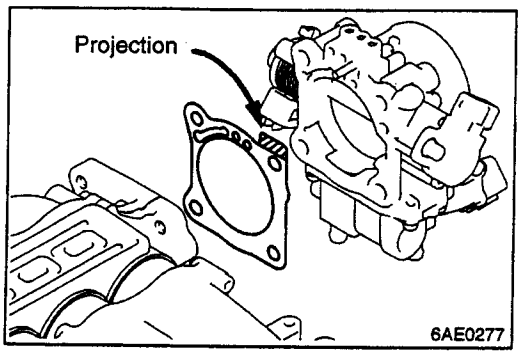


▶B◀ INJECTOR INSTALLATION

(1) Install new grommet and O-ring on the injector.
(2) Apply spindle oil or gasoline to the O-ring of the injector.
(3) While turning the injector in both directions, install it in the delivery pipe.
(4) Make sure that the injector turns smoothly.

Caution
If the injector does not turn smoothly, the O-ring probably gets caught somewhere in the delivery pipe. In such a case, remove the injector and reinsert it into the delivery pipe. Check it again for smooth rotation.

(5) On the right bank, align the marks on the injector and delivery pipe.

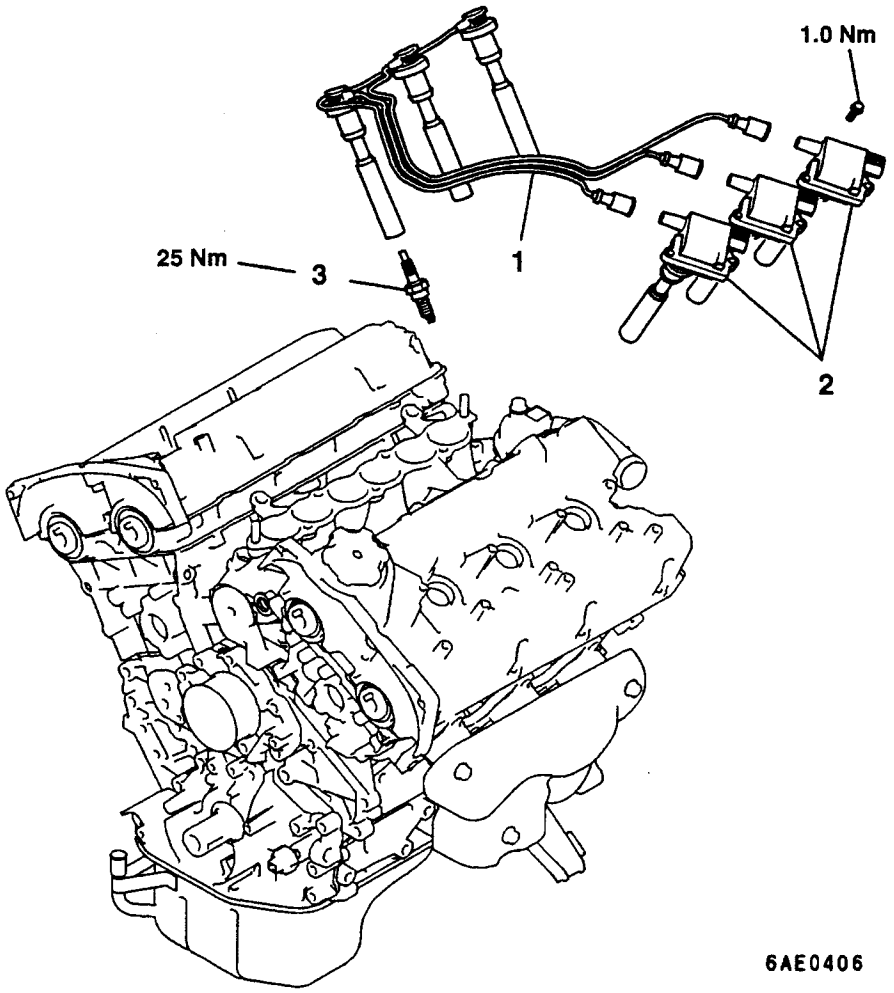


▶C◀ GASKET INSTALLATION

(1) Locate the projection on the gasket as shown.

IGNITION SYSTEM

REMOVAL AND INSTALLATION

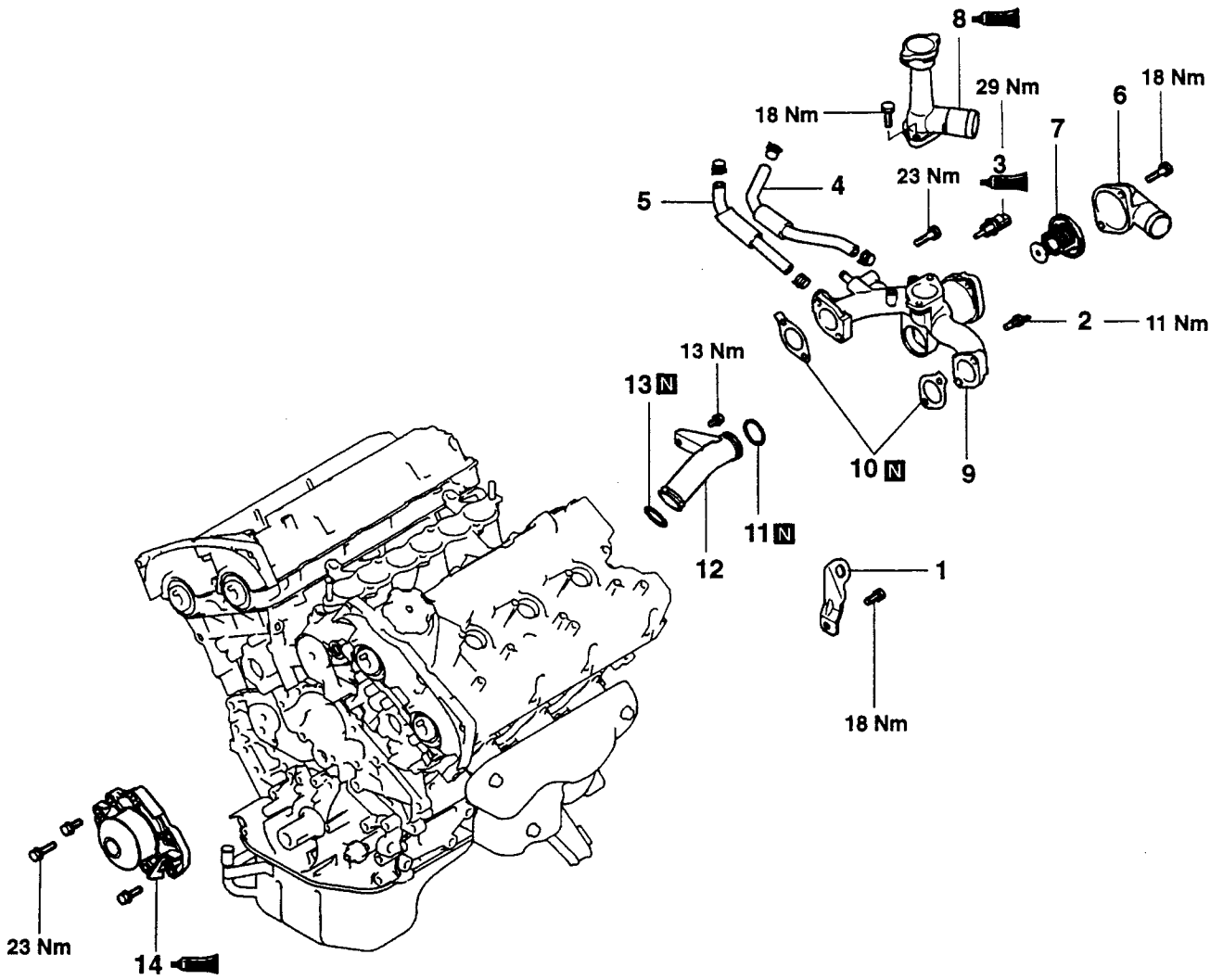


Removal steps

1. Spark plug cable
2. Ignition coil
3. Spark plug

WATER PUMP AND WATER PIPE

REMOVAL AND INSTALLATION



Removal steps

1. Engine hanger
- ▶F◀ 2. Engine coolant temperature gauge unit
- ▶E◀ 3. Engine coolant temperature sensor
4. Water hose
5. Water hose
6. Water inlet fitting
- ▶D◀ 7. Thermostat
- ▶C◀ 8. Water outlet fitting
9. Thermostat housing
10. Gasket
- ▶B◀ 11. O-ring
- ▶B◀ 12. Water pipe
- ▶B◀ 13. O-ring
- ▶A◀ 14. Water pump