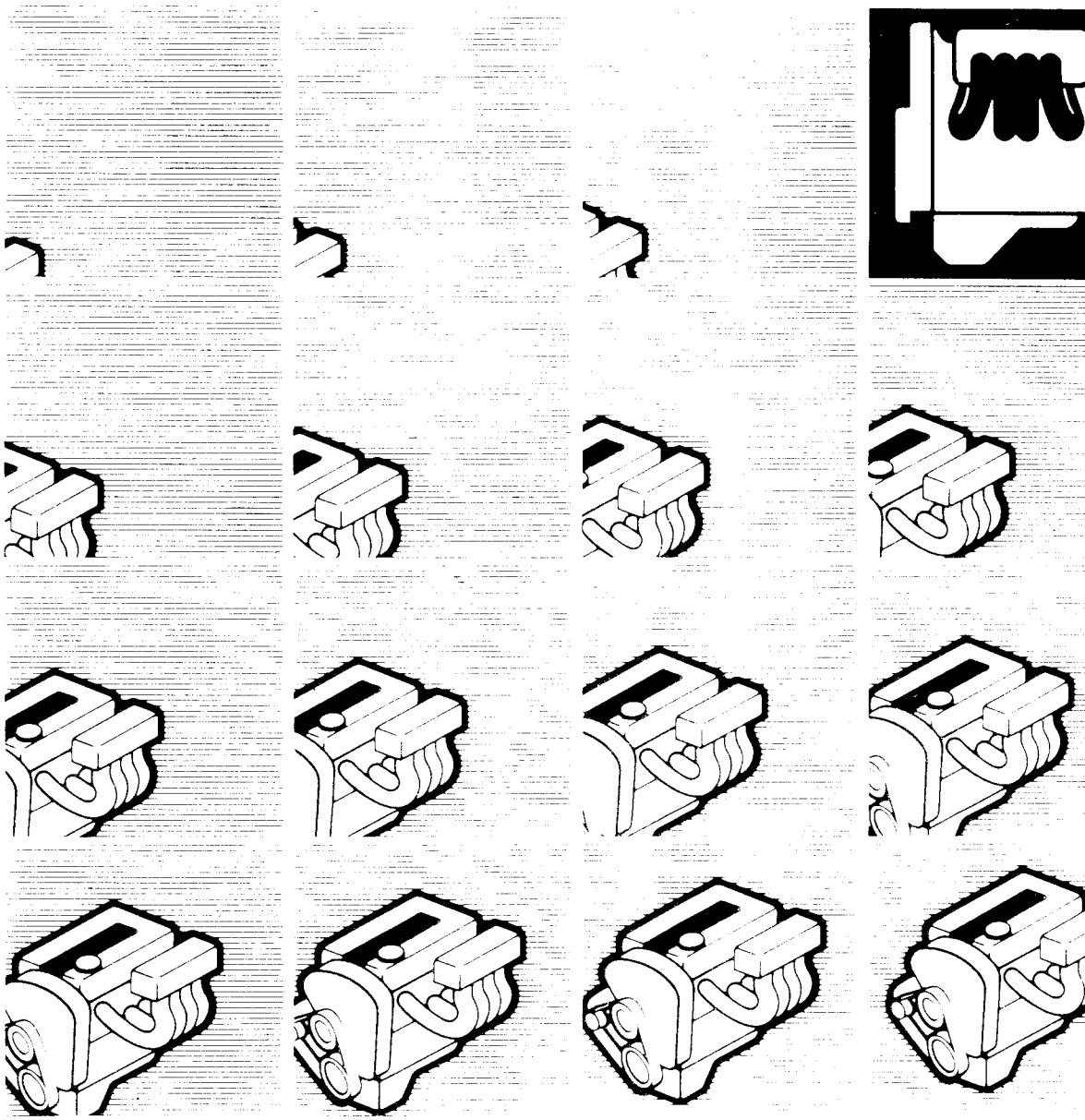
MITSUBISHI MOTORS

Workshop Manual

engine and transmission

6A12, F5M42, F5A42



Pub. No. PWEE9801

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.

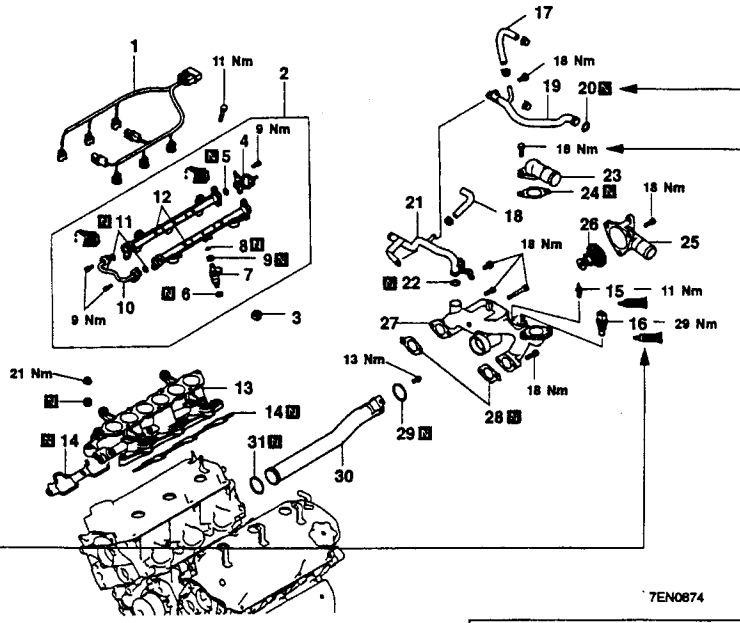
Indicates the group number.

Indicates the page number.

ENGINE – Intake Manifold 1-11

INTAKE MANIFOLD

REMOVAL AND INSTALLATION



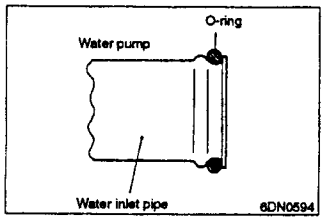
Denotes non-reusable part.

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