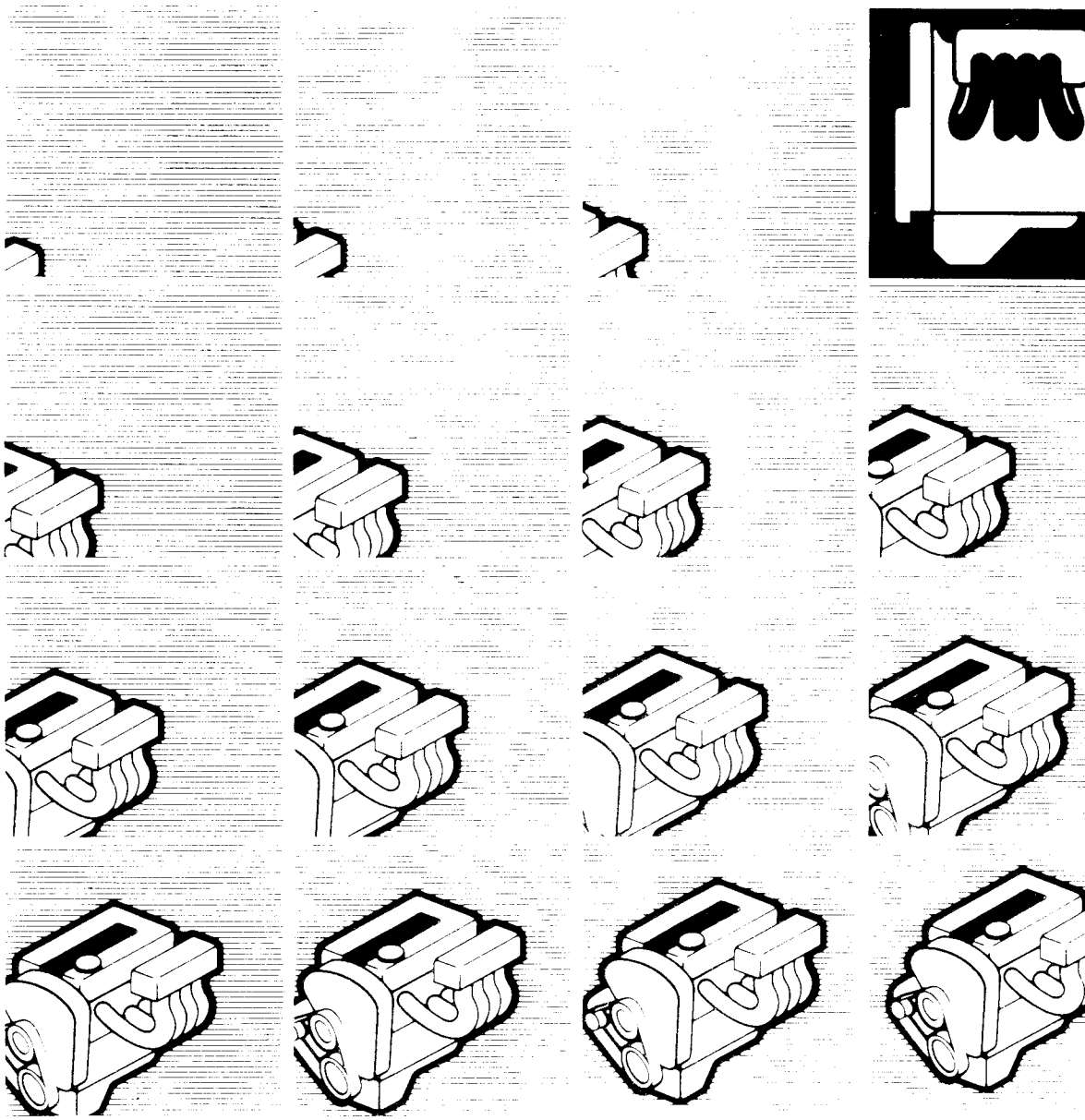
MITSUBISHI MOTORS

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.

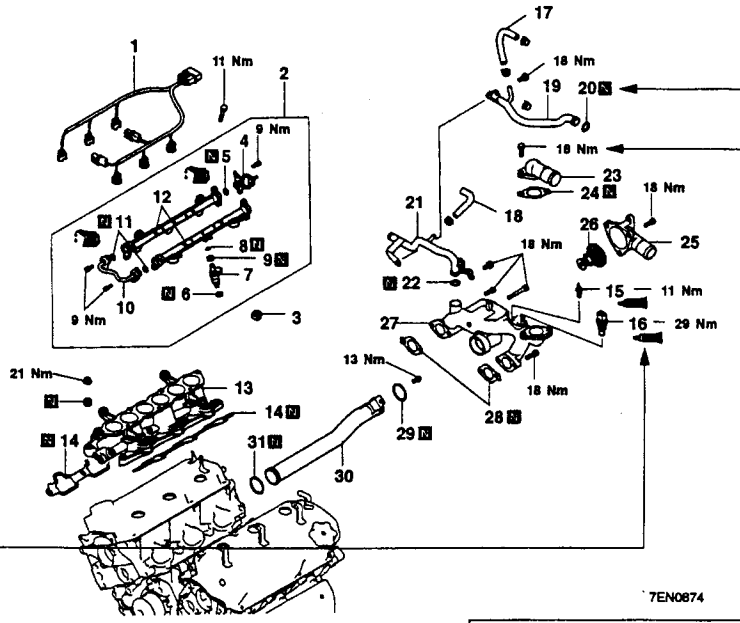
Indicates the group number.

Indicates the page number.

ENGINE – Intake Manifold 1-11

INTAKE MANIFOLD

REMOVAL AND INSTALLATION



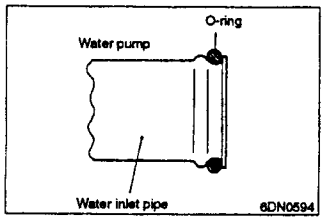
Denotes non-reusable part.

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

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.

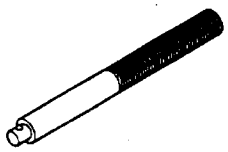
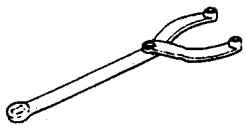
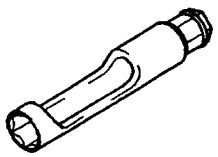
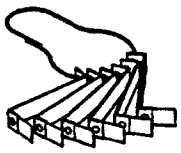
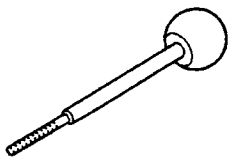
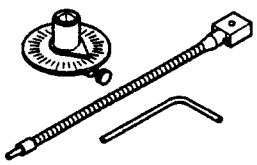
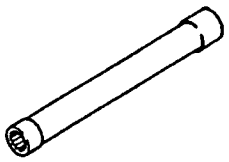
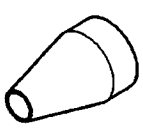
- Areas where the bolts are in use:
  (1) Cylinder head bolts
  (2) Main bearing cap bolts
  (3) Connecting rod cap bolts
- Tightening Method
  After tightening the bolts to the specified torque, tighten them another 90° to 100°, or 240° (twice 120°). The tightening method varies on different areas.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

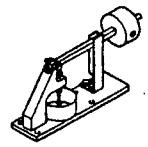
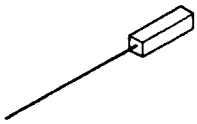
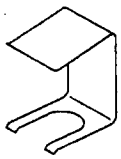
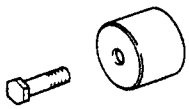
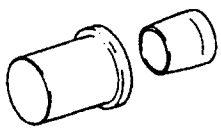
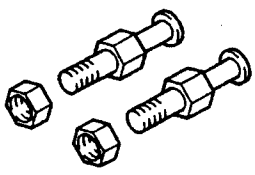
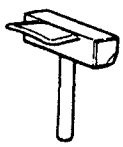
SEALANTS

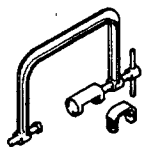
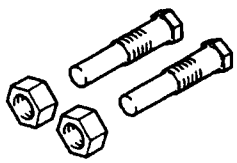
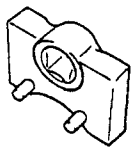
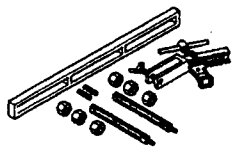
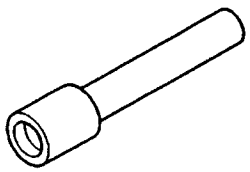
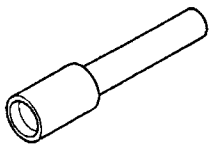
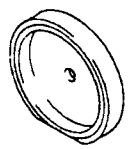
Item	Specified sealant	Quantity
Water pump*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Water outlet fitting*	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent	As required
Engine coolant temperature 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

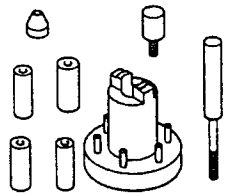
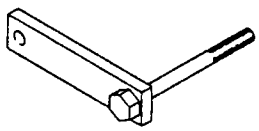
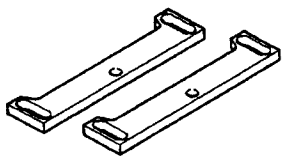
*: parts sealed by foam-in-place gasket (FIPG)

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)

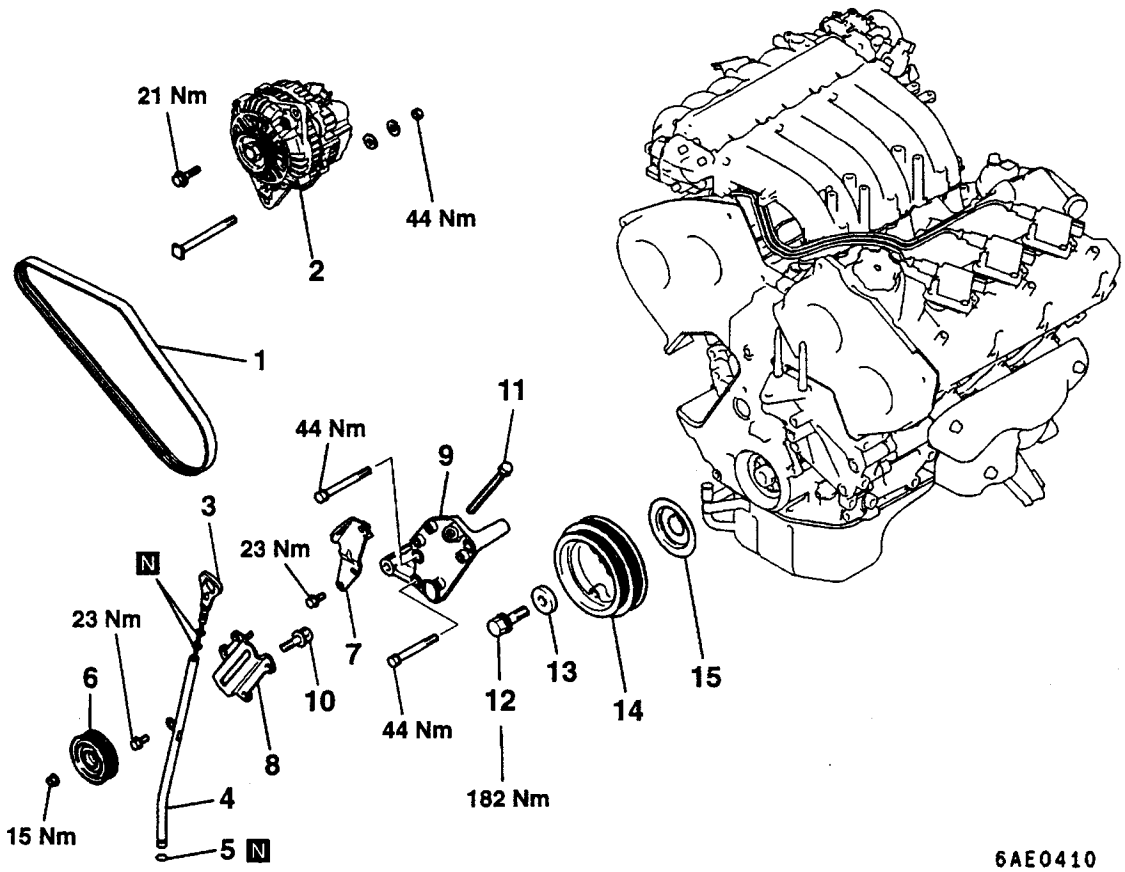
Tool	Number	Name	Use
	MD998440	Leak-down tester	Leak-down test of lash adjuster
	MD998441	Lash adjuster retainer	Air bleeding of lash adjuster
	MD998442	Air bleed wire	Air bleeding of lash adjuster
	MD998443	Lash adjuster holder	Retainer for holding lash adjuster in rocker arm at time of removal and 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

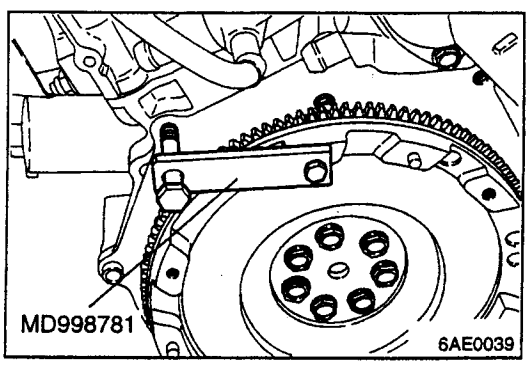


Removal steps

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.

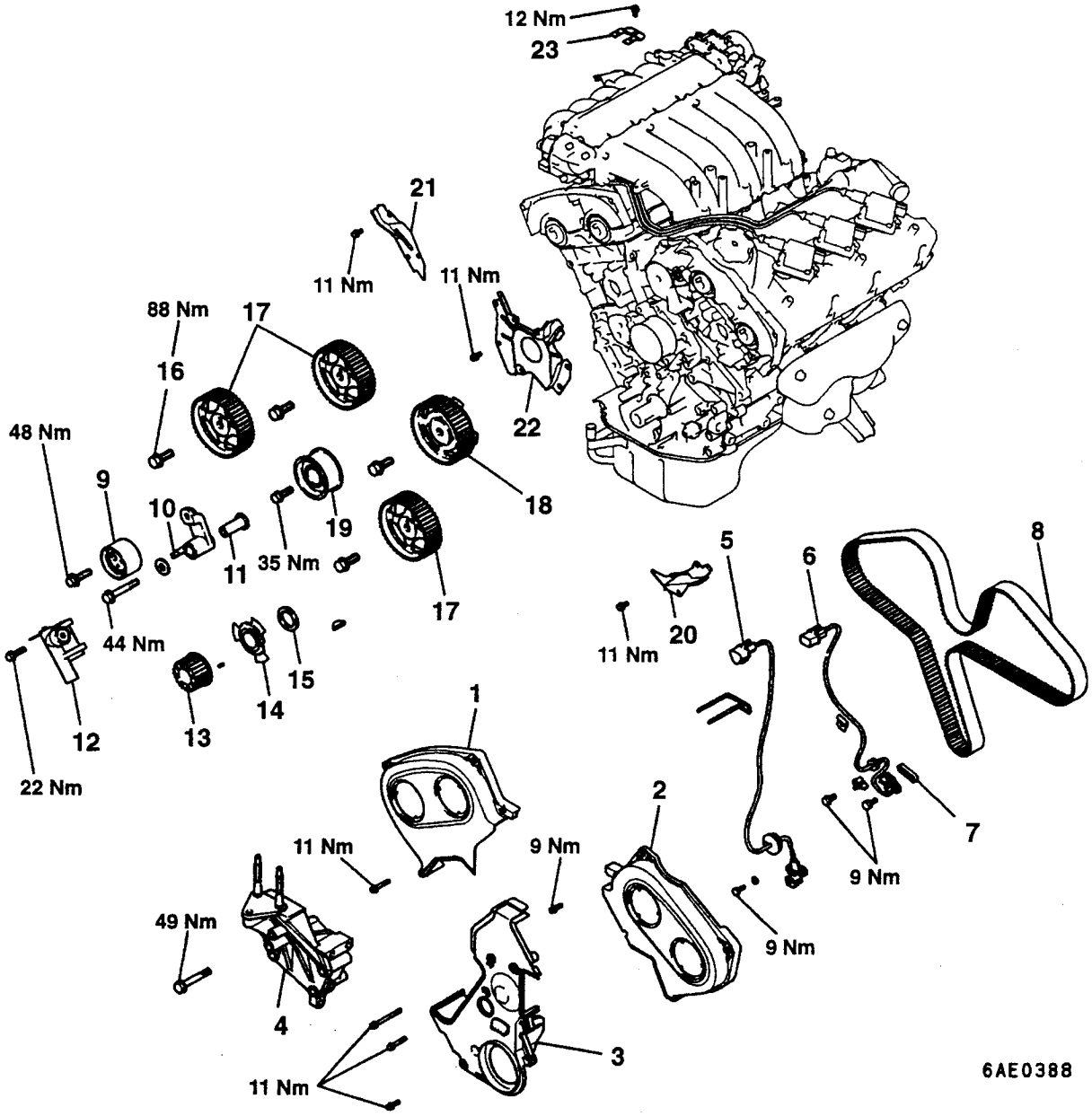
INSTALLATION SERVICE POINT

▶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

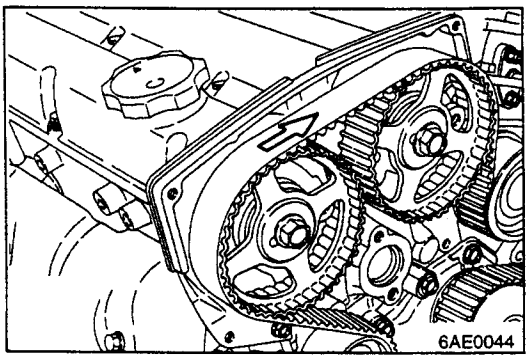
9. Tensioner pulley
10. Tensioner arm
11. Tensioner spacer

▶B◀ 12. Auto tensioner

13. Crankshaft sprocket
14. Sensing plate
15. Washer

◀B▶ ▶A◀ 16. Camshaft sprocket bolt

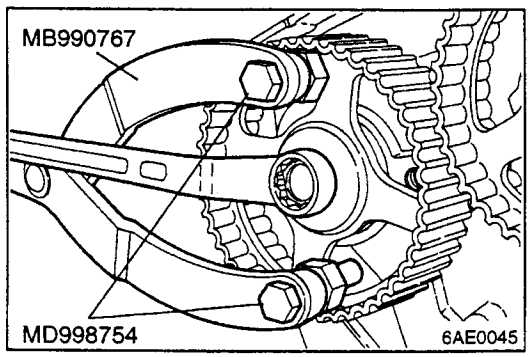
17. Camshaft sprocket
18. Camshaft sprocket with sensing plate
19. Idler pulley
20. Timing belt rear cover, left
21. Timing belt rear cover, right
22. Timing belt rear cover, center
23. Connector bracket



REMOVAL SERVICE POINTS

◀A▶ TIMING BELT REMOVAL

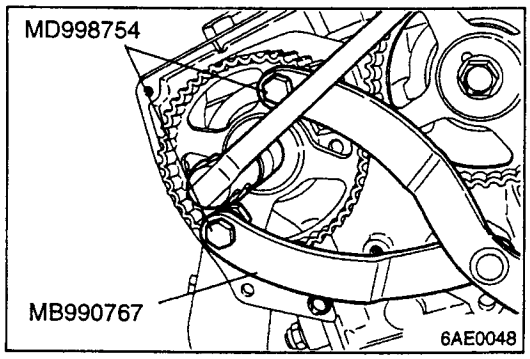
(1) Mark the belt running direction for reference in reinstallation.
(2) Loosen the bolt that secures the tensioner pulley to remove the timing belt.



◀B▶ CAMSHAFT SPROCKET BOLT REMOVAL

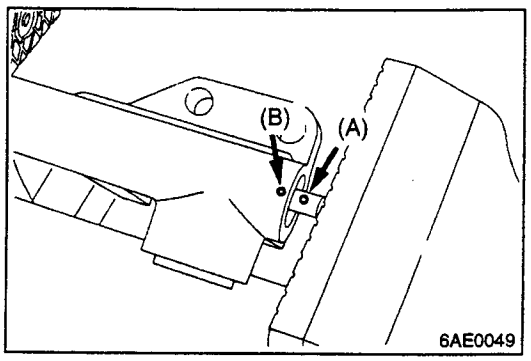
INSTALLATION SERVICE POINTS

▶A◀ CAMSHAFT SPROCKET BOLT INSTALLATION

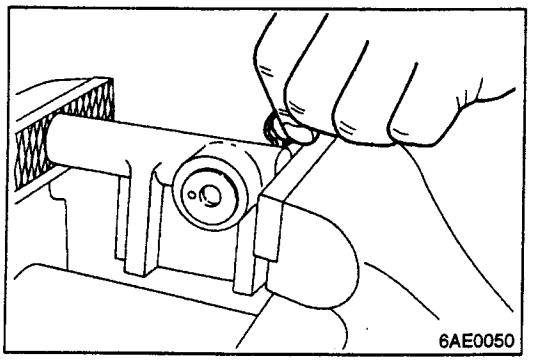


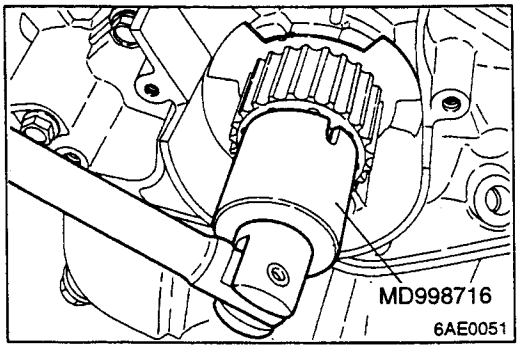
▶B◀ AUTO TENSIONER SETTING

(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.

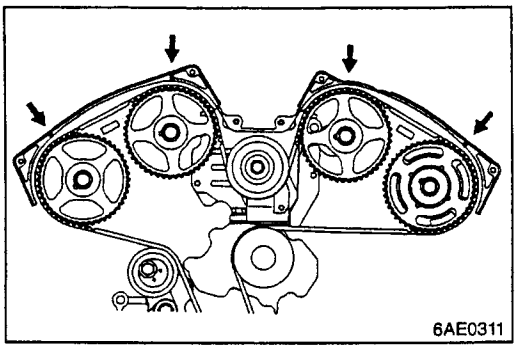




▶C◀ TIMING BELT INSTALLATION

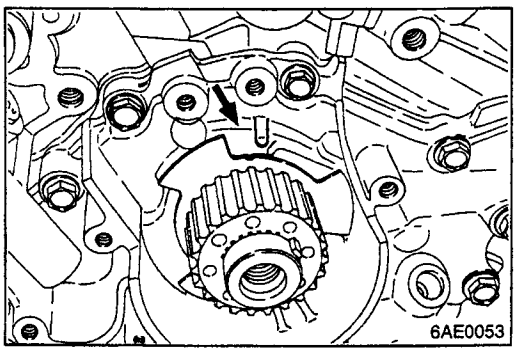
(1) Turn the crankshaft sprocket so that its timing mark will be away from the mating timing mark by approx. three teeth.

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.

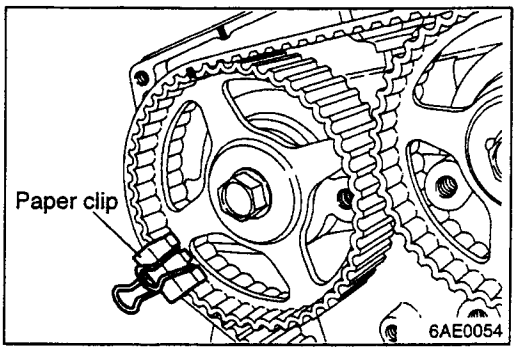


(2) Bring the timing marks of the camshaft sprockets as shown in the illustration.

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.

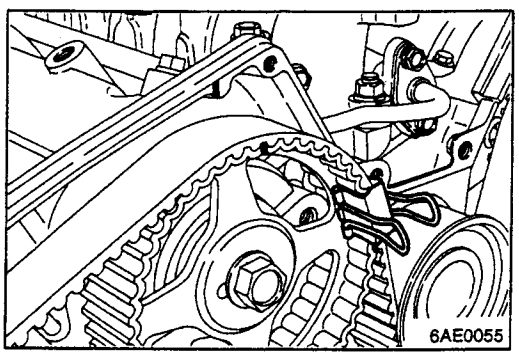


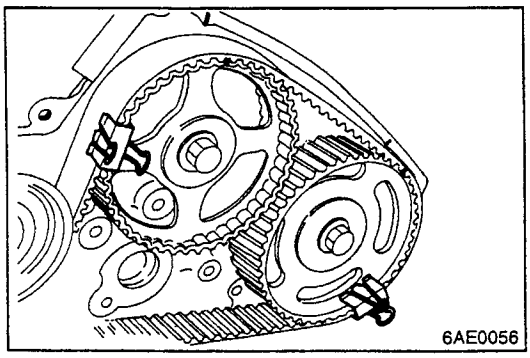
(4) Place the timing belt over the sprockets in the following method.

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.

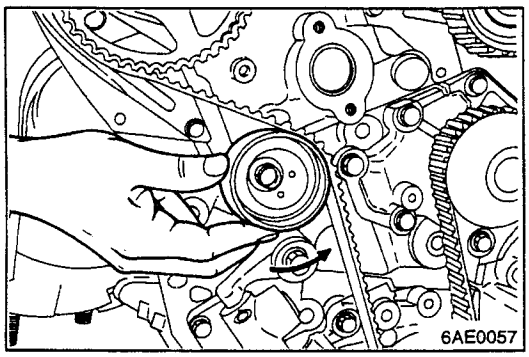
1) Align the timing mark of the right bank exhaust camshaft sprocket with the mating timing mark and hold the timing belt on the sprocket with a paper clip.
2) Align the timing mark of the intake camshaft sprocket and place the timing belt around that sprocket. Then, clip the belt at the location shown.

   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.

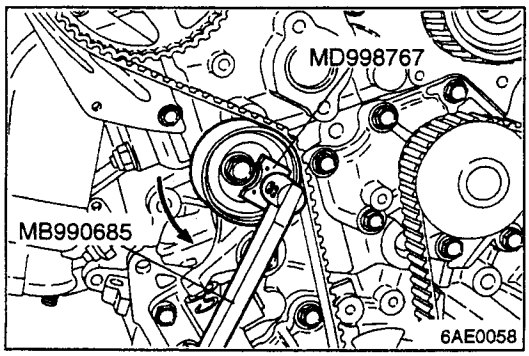




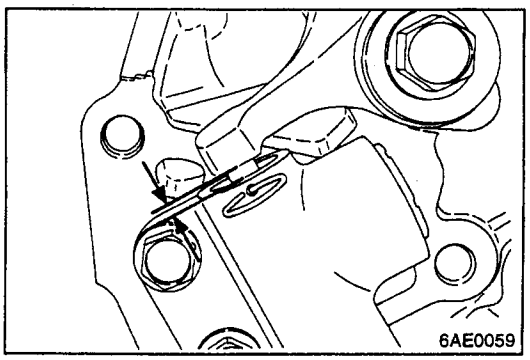
4) On the left bank, make sure that the timing marks of the camshaft sprockets are aligned and then hold the timing belt on these sprockets with paper clips.
5) Place the timing belt around the water pump pulley.
6) Place the timing belt around the crankshaft sprocket.
7) Place the timing belt around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



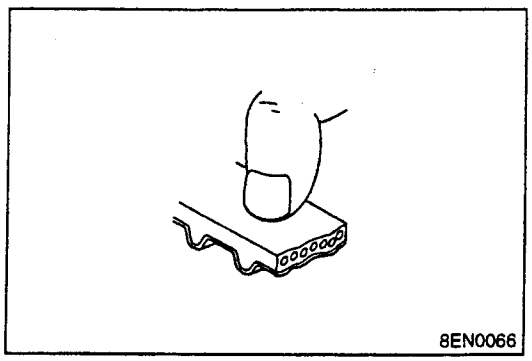
(9) Install the special tool and a torque wrench of 0 – 5 Nm to the tensioner pulley.
(10) Torque the tensioner pulley to 3 Nm with the torque wrench.
(11) While holding the tensioner pulley, tighten the center bolt to specification.
(12) Turn the crankshaft clockwise 2 turns and let it stand for about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

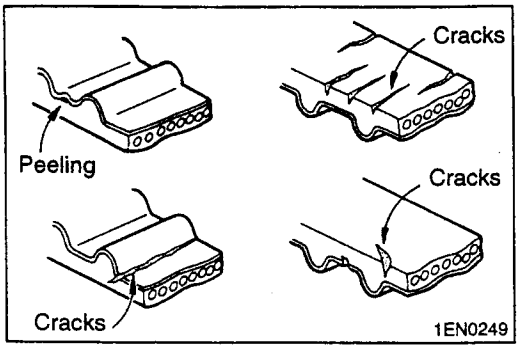
(14) If the wire cannot be removed easily or the rod protrusion is not up to specification, repeat steps (9) through (12) to obtain the correct tension.



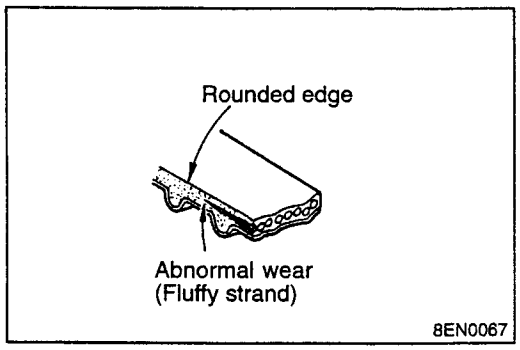
INSPECTION

TIMING BELT

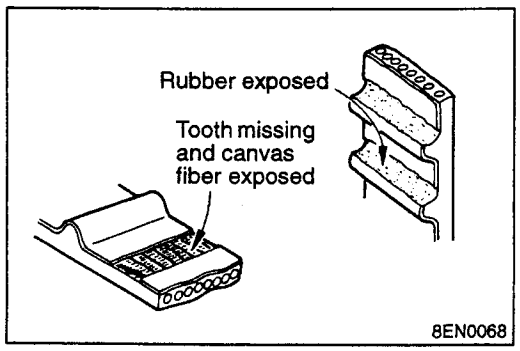
Replace belt if any of the following conditions exist.
(1) Hardening of back rubber.
Back side is glossy without resilience and leaves no indent when pressed with fingernail.



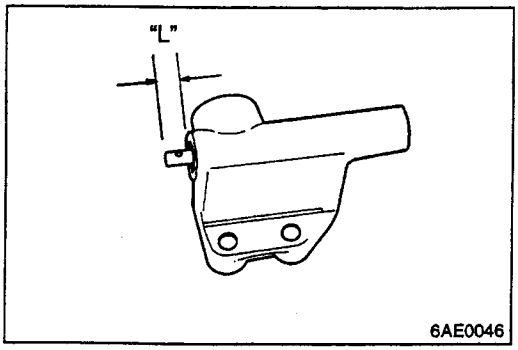
(2) Cracks on rubber back.
(3) Cracks or peeling of canvas.
(4) Cracks on tooth bottom.
(5) Cracks or belt sides.



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



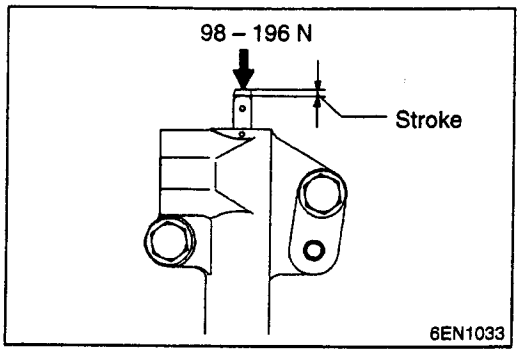
(7) Abnormal wear on teeth.
(8) Missing tooth.



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

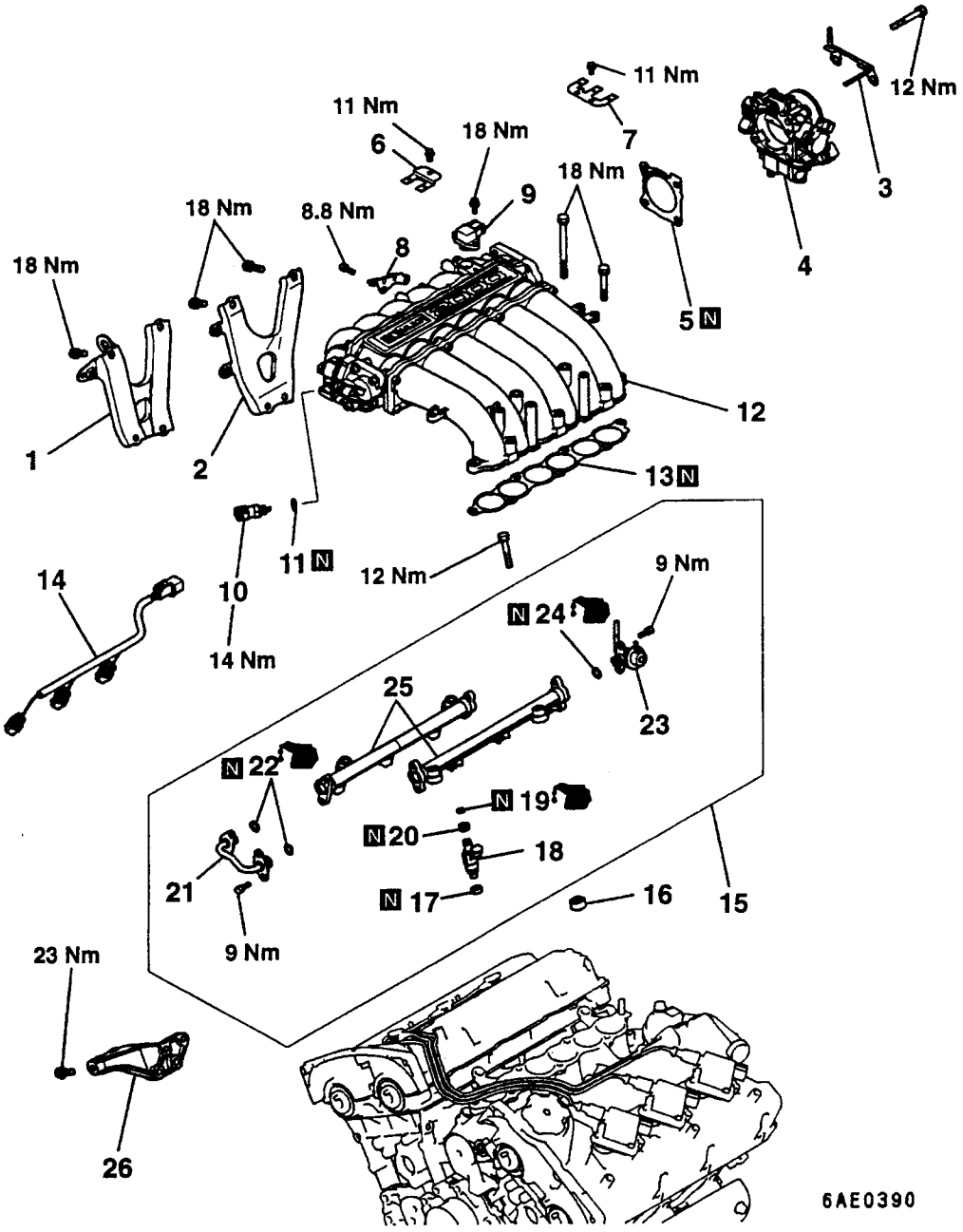


(4) Press the rod by a force of 98 to 196 N and measure the rod stroke. If the measured value exceeds the standard value, replace the tensioner.

Standard value: 1 mm or less

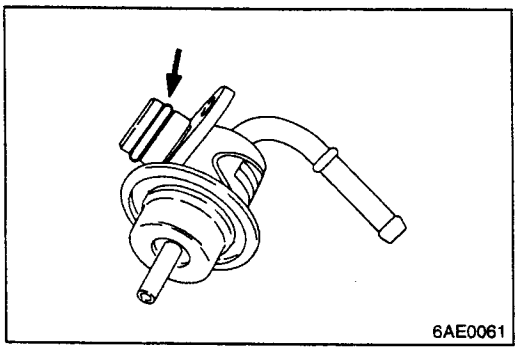
FUEL AND EMISSION CONTROL PARTS

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

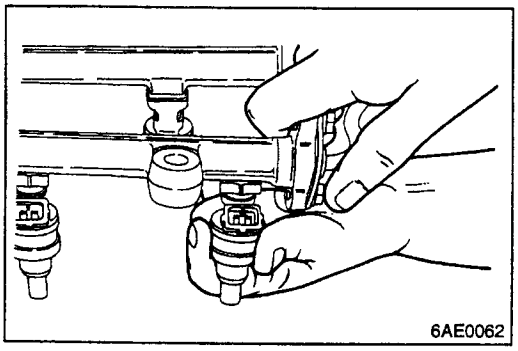


INSTALLATION SERVICE POINTS

▶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.

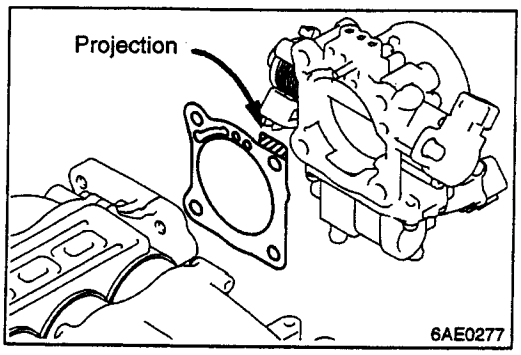


▶B◀ INJECTOR INSTALLATION

(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.

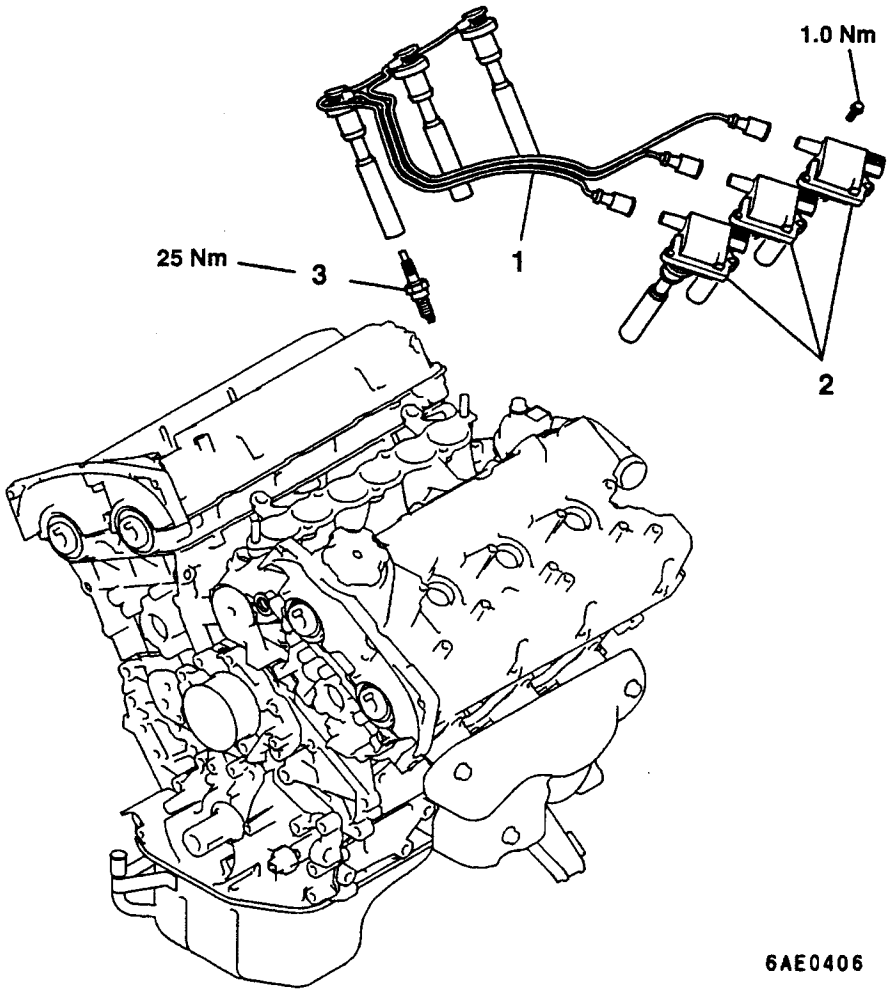


▶C◀ GASKET INSTALLATION

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

IGNITION SYSTEM

REMOVAL AND INSTALLATION

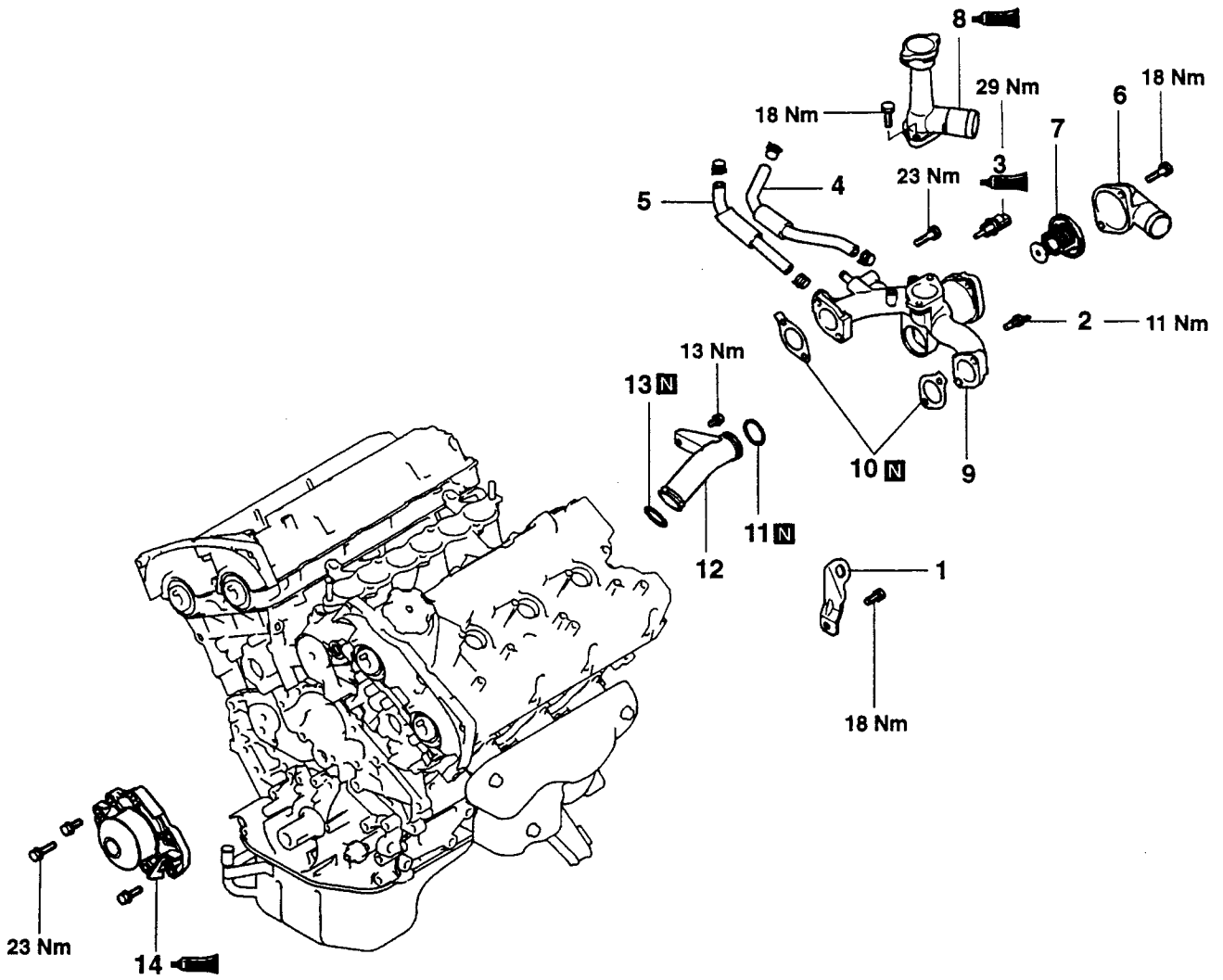


Removal steps

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

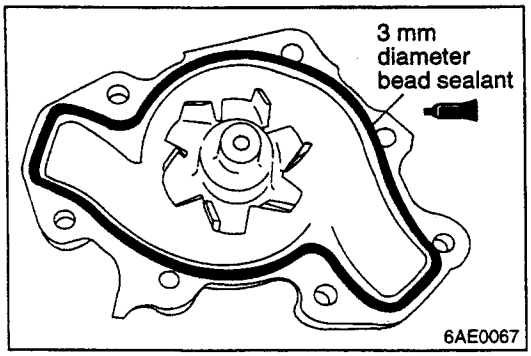
WATER PUMP AND WATER PIPE

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



INSTALLATION SERVICE POINTS

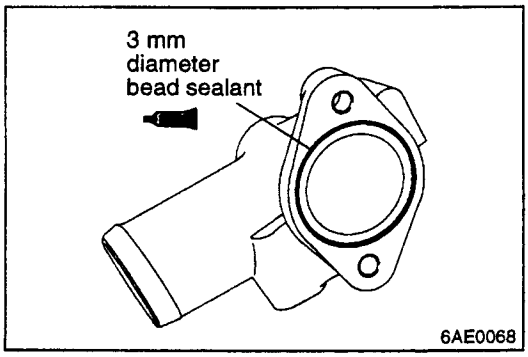
▶A◀ SEALANT APPLICATION TO WATER PUMP

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent

▶B◀ WATER PIPE / O-RING INSTALLATION

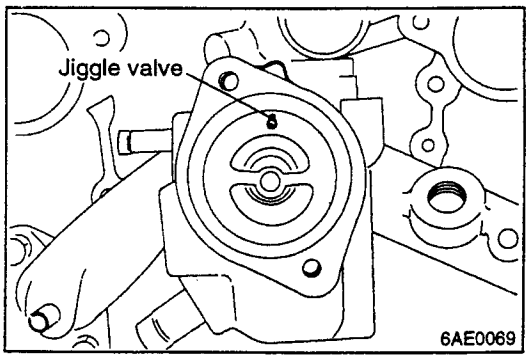
(1) Wet the O-ring (with water) to facilitate assembly.

Caution
1. **Keep the O-ring free of oil or grease.**
2. **Secure the water pipe after the thermostat housing has been installed.**



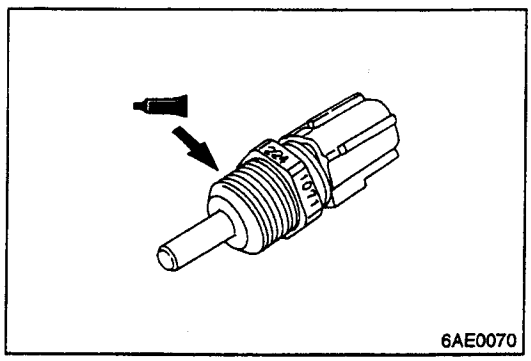
▶C◀ SEALANT APPLICATION TO WATER OUTLET FITTING

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent



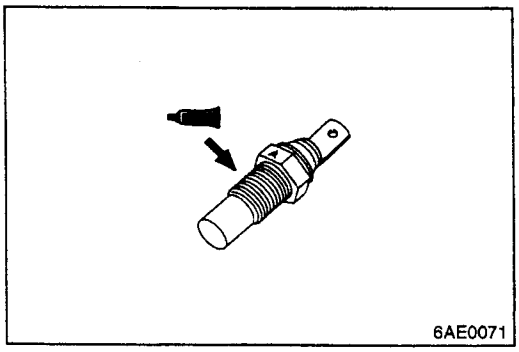
▶D◀ THERMOSTAT INSTALLATION

(1) Install the thermostat so that the jiggle valve will be located in the thermostat housing as shown.



▶E◀ SEALANT APPLICATION TO ENGINE COOLANT TEMPERATURE SENSOR

Specified sealant:
3M Nut locking Part No. 4171 or equivalent

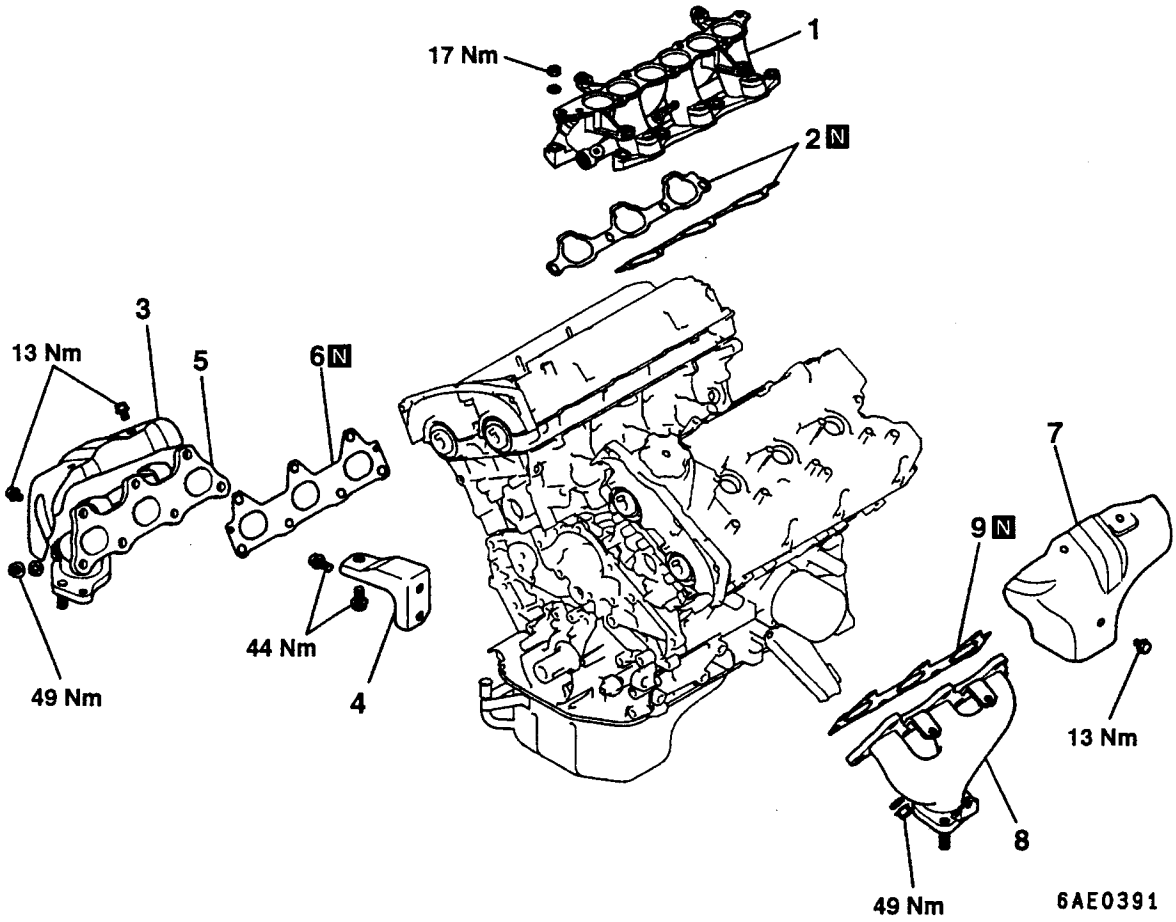


▶F◀ SEALANT APPLICATION TO ENGINE COOLANT TEMPERATURE GAUGE UNIT

Specified sealant:
3M ATD Part No. 8660 or equivalent

INTAKE MANIFOLD AND EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

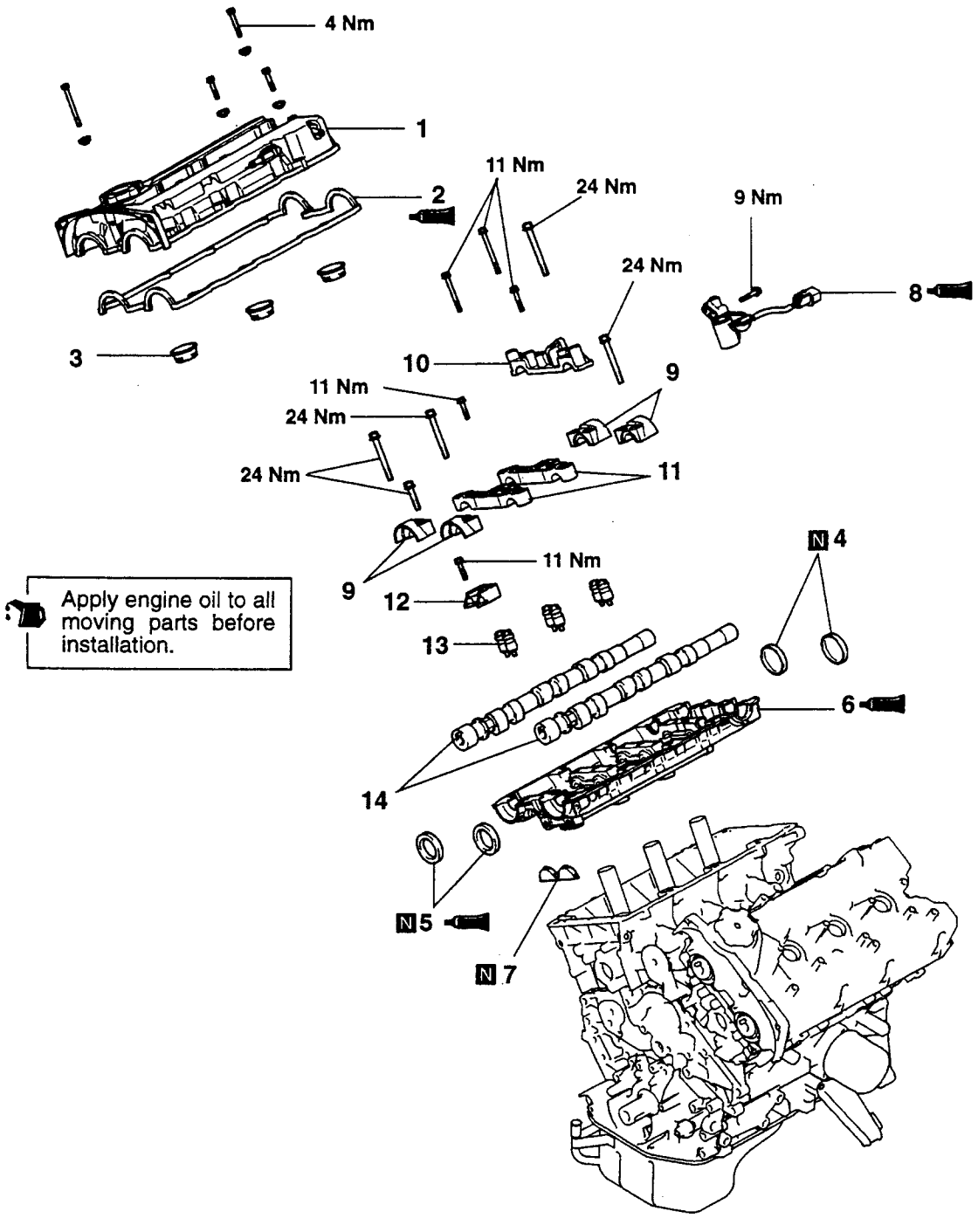


Removal steps

1. Intake manifold
2. Gasket
3. Heat protector, right
4. Exhaust manifold stay
5. Exhaust manifold, right
6. Gasket
7. Heat protector, left
8. Exhaust manifold, left
9. Gasket

ROCKER COVER AND CAMSHAFT

REMOVAL AND INSTALLATION



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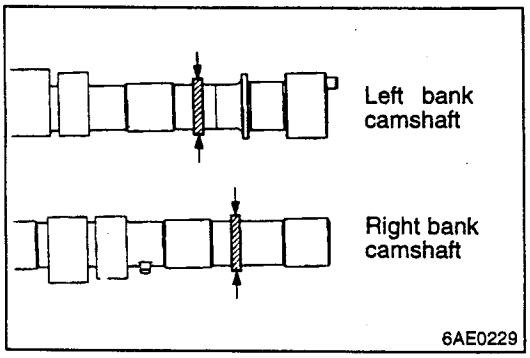
Removal steps

- ▶G◀ 1. Rocker cover
- 2. Rocker cover gasket
- 3. Oil seal
- ▶F◀ 4. Circuit packing
- ▶E◀ 5. Oil seal
- ▶D◀ 6. Camshaft holder
- ▶D◀ 7. Semi-circular packing
- ▶C◀ 8. Oil control valve
- ▶B◀ 9. Cam cap
- 10. Oil control valve holder
- ▶B◀ 11. Camshaft bearing cap
- 12. Arm spring holder
- 13. Arm spring
- ▶A◀ 14. Camshaft

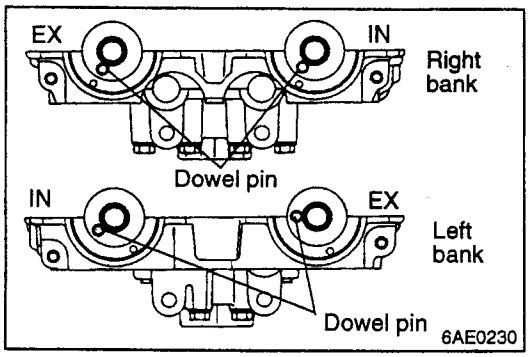


INSTALLATION SERVICE POINTS

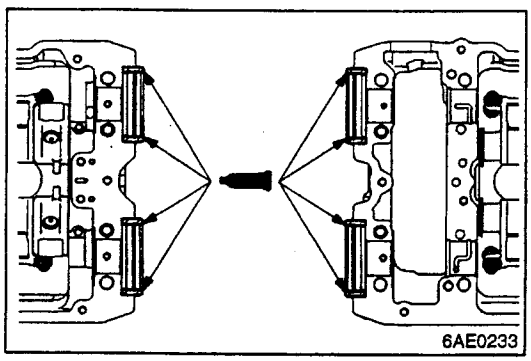
▶A◀ CAMSHAFT INSTALLATION

(1) Intake valve camshaft and exhaust valve camshaft can be identified by their diameters at the portions indicated in the illustration.

Intake valve camshaft: 25 mm
Exhaust valve camshaft: 30 mm



(2) Before installing each camshaft, apply engine oil to its journals and cams.
(3) The camshaft dowel pins must be positioned as shown in the illustration.

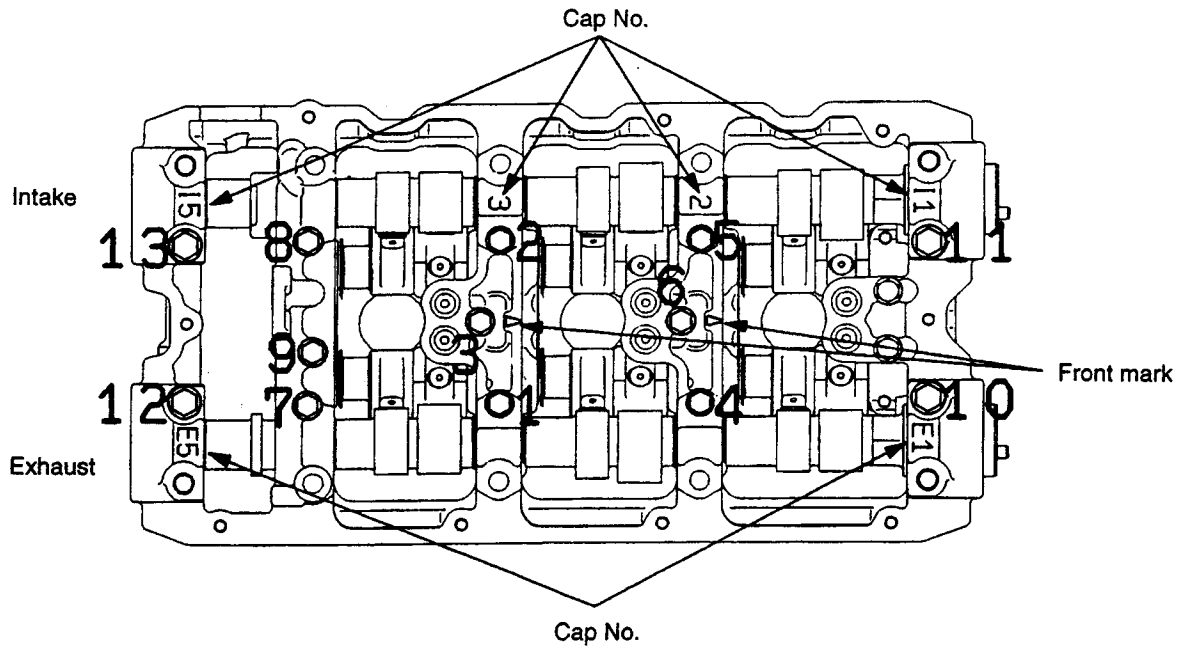


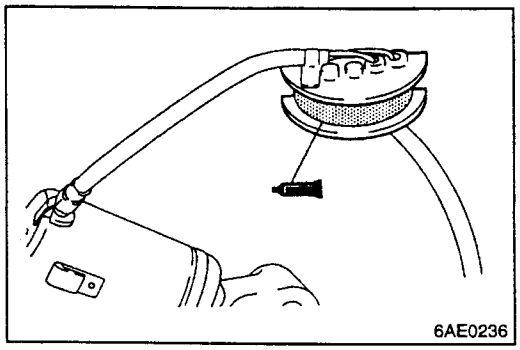
▶B◀ CAMSHAFT BEARING CAP / CAM CAP INSTALLATION

(1) Apply sealant to the illustrated points of the camshaft holders.

Specified sealant:
3M ATD part No. 8660 or equivalent

(2) Install the bearing caps and cam caps correctly according to the "I" (intake) and "E" (exhaust) marks as well as the stamped cap numbers and front marks.
(3) Tighten the bolts in the sequence of the numbers shown in the illustration.

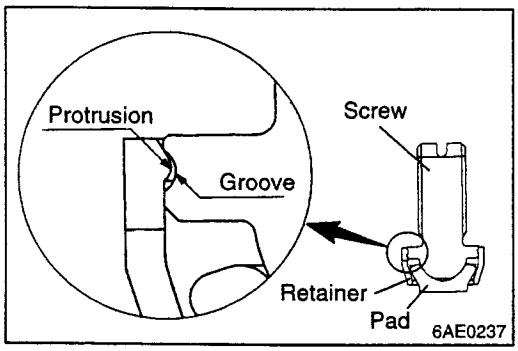




▶C◀ OIL CONTROL VALVE INSTALLATION

(1) Apply the specified sealant to the area shown.

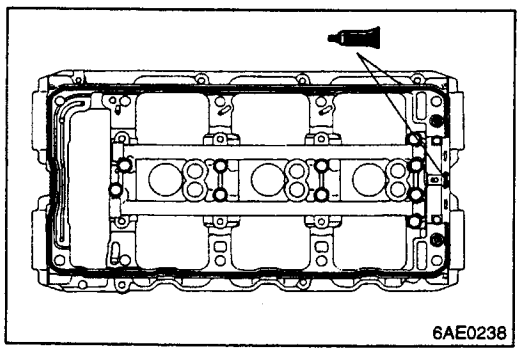
Specified sealant:
3M ATD Part No. 8660 or equivalent



▶D◀ SEMI-CIRCULAR PACKING / CAMSHAFT HOLDER INSTALLATION

(1) Make sure that the retainer of each adjusting screw is fitted correctly.

Caution
If the protrusion on the retainer is not correctly fitted in the groove of the screw, the pad could slip off the retainer.

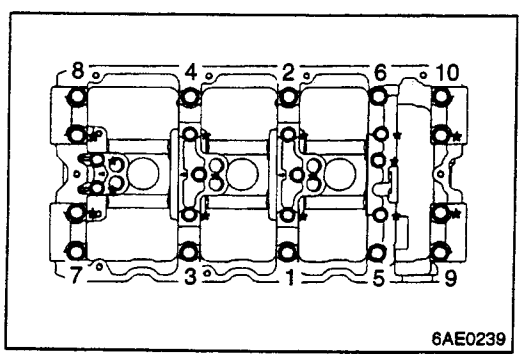


(2) Apply 3 mm thick bead of foam-in-place gasket (FIPG) to the gasket surface of the camshaft holder.

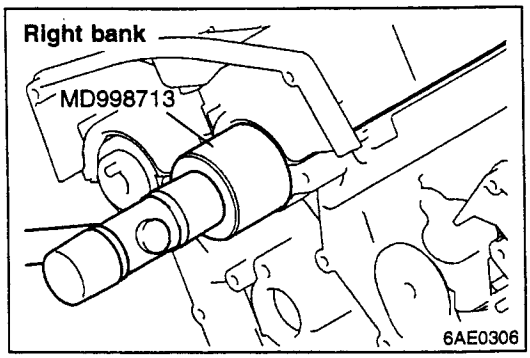
Caution
Since the FIPG could cause blocking of engine oil passages, be careful not to apply FIPG to other locations than specified.

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent

(3) Install the semi-circular packings.
(4) Raise the rocker arms until the rollers come into contact with the cams, and install the camshaft holder.

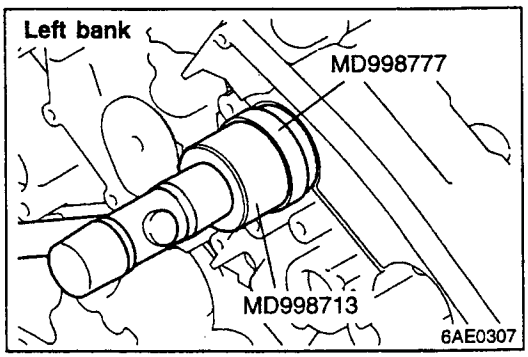


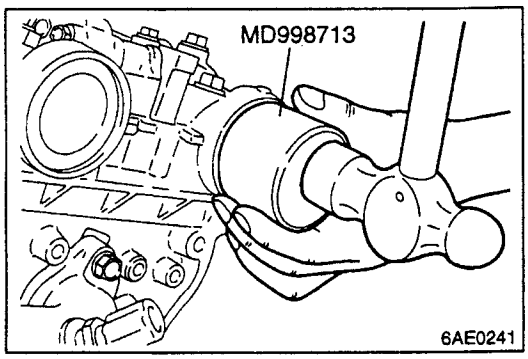
(5) Tighten the bolts in the order indicated in the illustration.
(6) Check the torque of the ★-marked bolts. See section ▶B◀ for the checking order.
(7) Verify that the pad of each adjusting screw is in place.



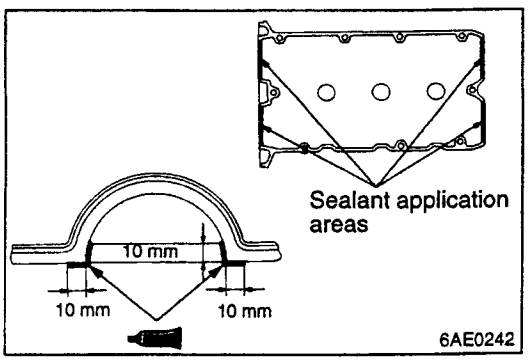
▶E◀ CAMSHAFT OIL SEAL INSTALLATION

(1) When installing the left bank camshaft oil seal, use the special tool to prevent interference with the knock pin.





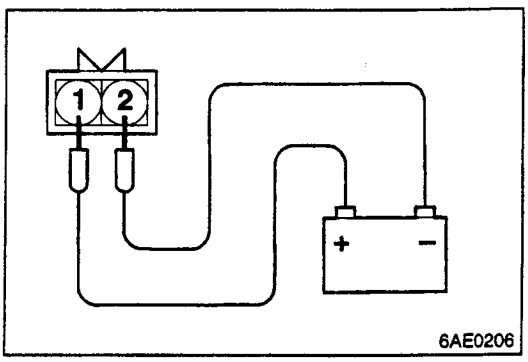
▶F◀ CIRCULAR PACKING INSTALLATION



▶G◀ ROCKER COVER INSTALLATION

(1) Apply the specified sealant to the area shown.

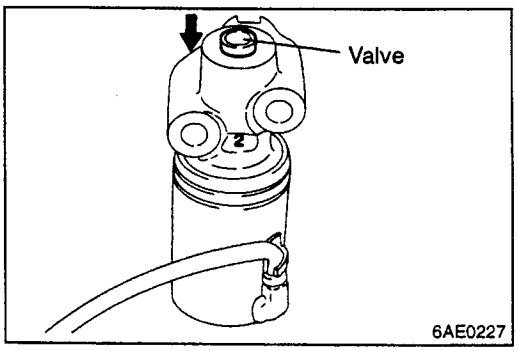
Specified sealant:
3M ATD Part No. 8660 or equivalent

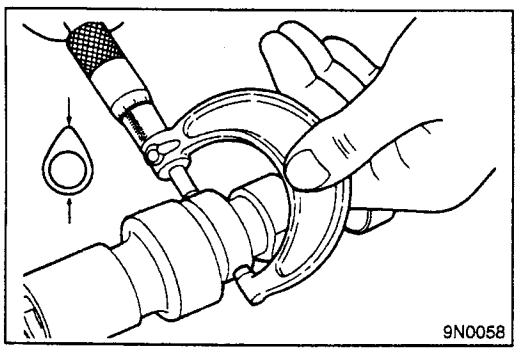


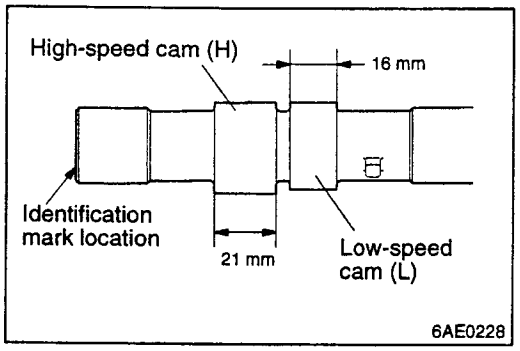
INSPECTION

OIL CONTROL VALVE

(1) Connect a 12VDC power supply between terminals (1) and (2) of the oil control valve and check if the valve operates smoothly.







CAMSHAFT

(1) Measure the cam heights. If the specified limit is exceeded, replace the camshaft.

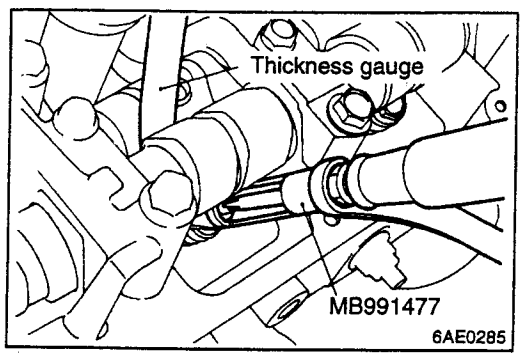
NOTE
Each camshaft has an identification mark on its rear end surface.

( ): Identification mark		Standard value	Limit
IN (3)	L	34.34 mm	33.84 mm
	H	36.46 mm	35.96 mm
EX (C)	L	34.40 mm	33.90 mm
	H	35.86 mm	35.36 mm

VALVE CLEARANCE ADJUSTMENT

NOTE
Adjust the valve clearance for each cylinder and for both intake and exhaust valves with the piston at the compression stroke top dead center.

(1) Bring the No. 1 cylinder piston into the compression stroke top dead center.

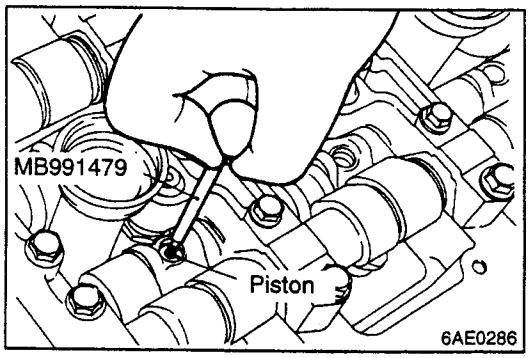


(2) Use the special tool to loosen the adjusting screw.
(3) Insert a thickness gauge of the thickness specified below between the low-speed cam (narrow cam) and roller.

Intake ..... **0.10 mm**
Exhaust ..... **0.13 mm**

(4) Screw in one of the two adjusting screws until it comes into contact with the valve (when the turning torque changes).

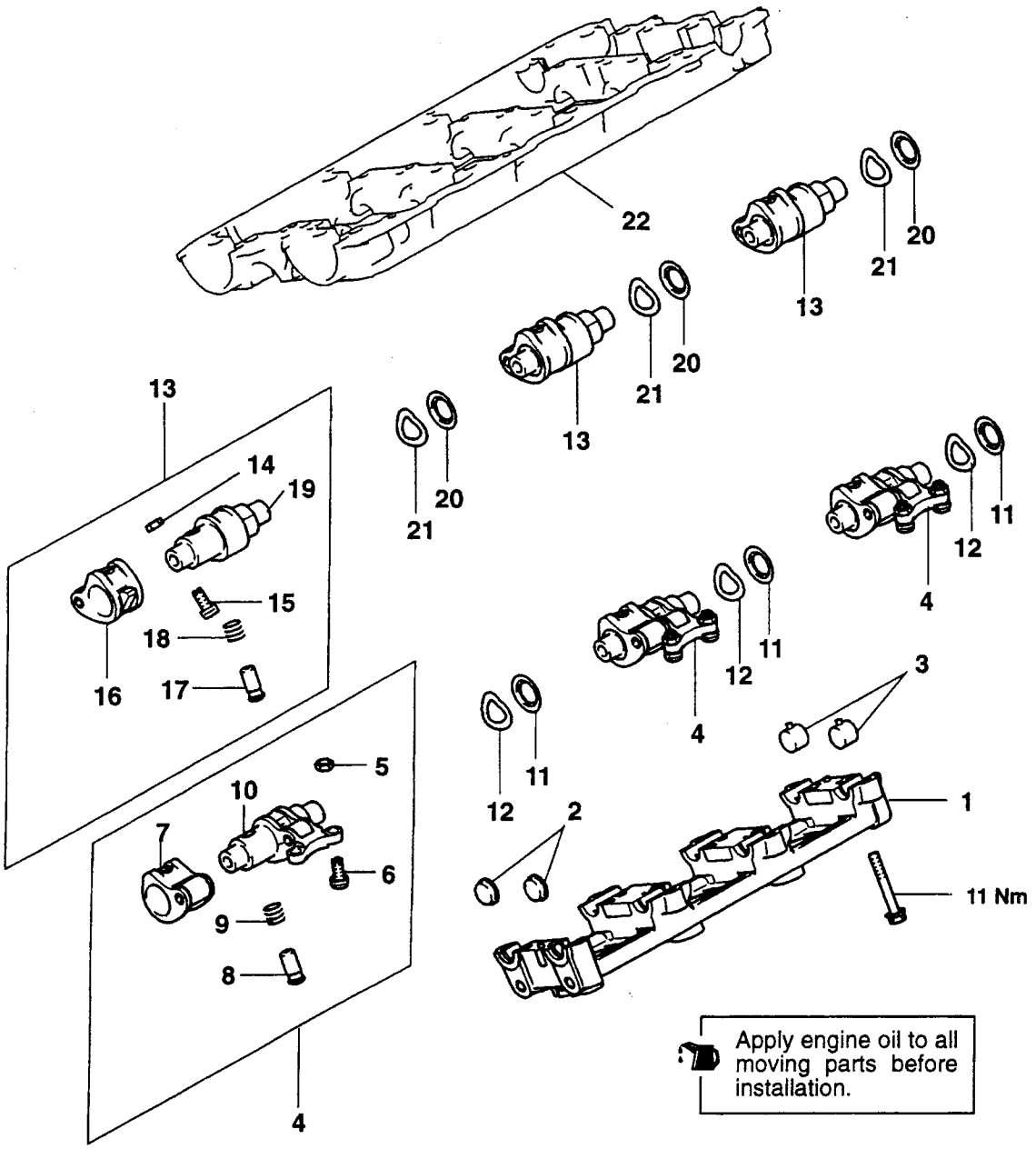
(5) Screw in the other adjusting screw until it comes into contact with the valve (when the turning torque changes), and then tighten the lock nut.
(6) Loosen the adjusting screw that was screwed in first slightly (until the turning torque becomes almost zero). Screw in the adjusting screw until it comes into contact with the valve again (when the turning torque changes) and tighten the lock nut.
(7) Remove the thickness gauge.



(8) Screw the special tool into the top of piston of the rocker arm "H", and pull up the tool to make sure that the piston can be lifted smoothly by hand.
(9) Perform valve clearance adjustments for other cylinders by turning every time the crankshaft through 120° (60° in camshaft sprocket angle) and following the above steps (2) through (8). Perform the adjustments in the following order of cylinder number:
No. 2 → No. 3 → No. 4 → No. 5 → No. 6

ROCKER ARM AND ROCKER SHAFT CAP

REMOVAL AND INSTALLATION



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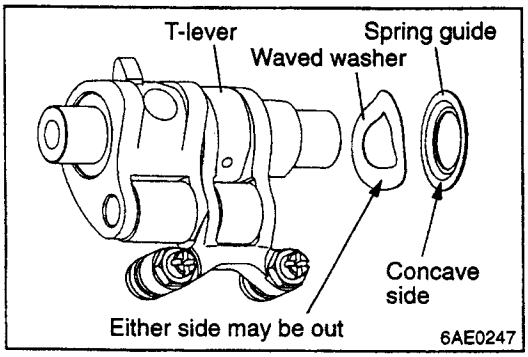
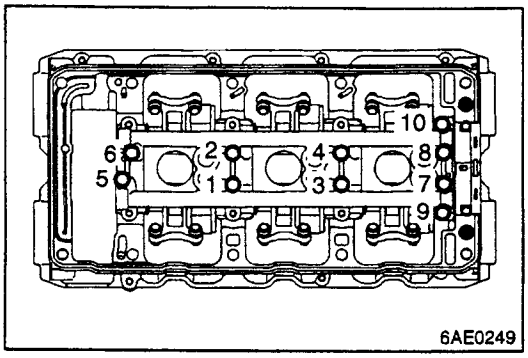
Removal steps

▶B◀ 1. Rocker shaft cap
2. Seal cap A
3. Seal cap C
4. Intake rocker arm assembly A
5. Nut
6. Adjusting screw
7. Intake rocker arm H
8. Piston H
9. Piston spring H
10. Intake T-lever
▶A◀ 11. Spring guide
12. Wave washer
13. Exhaust rocker arm assembly A
14. Nut
15. Adjusting screw
16. Exhaust rocker arm H
17. Piston H
18. Piston spring H
19. Exhaust T-lever L
▶A◀ 20. Spring guide
21. Wave washer
22. Camshaft holder





INSTALLATION SERVICE POINTS

▶A◀ SPRING GUIDE INSTALLATION

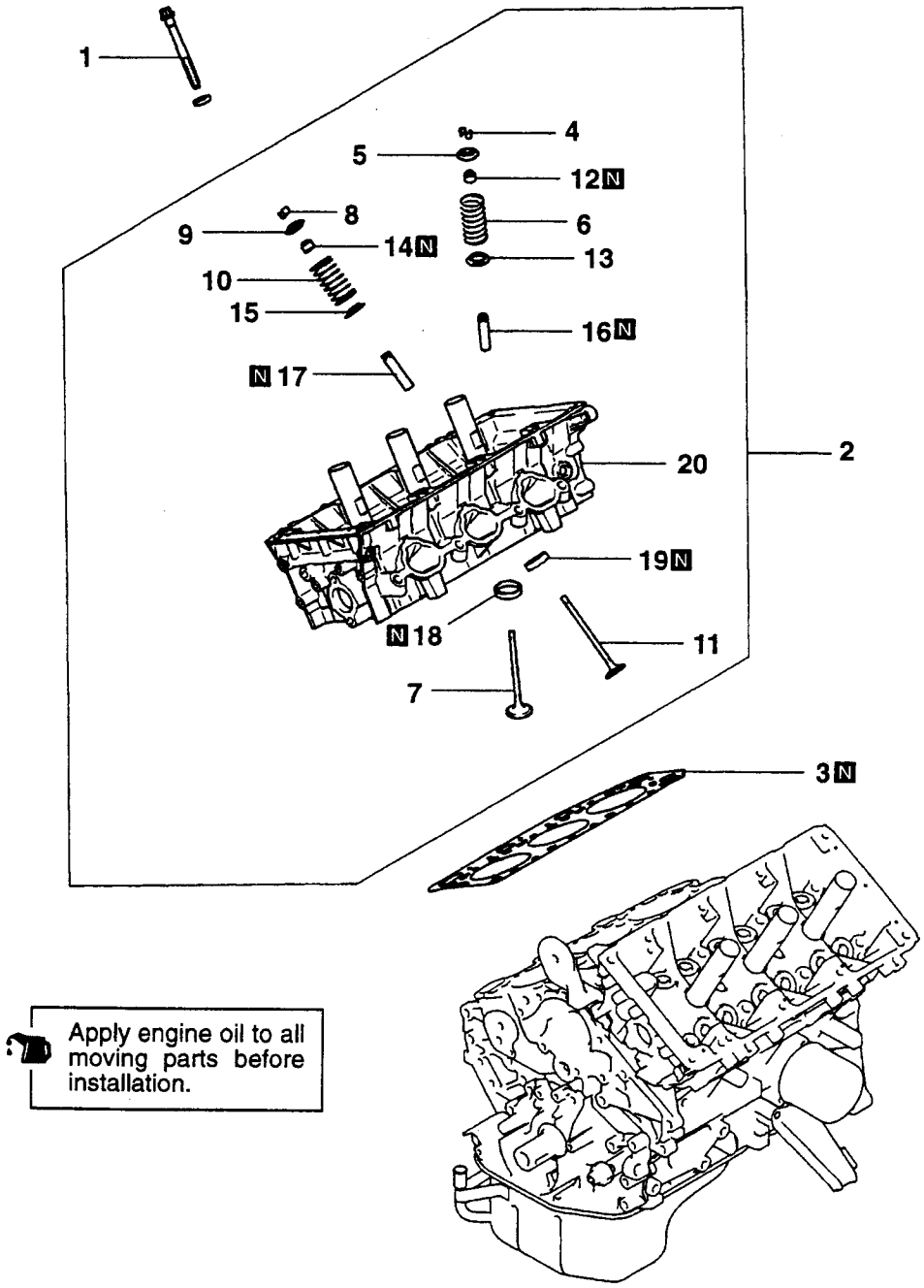
(1) Install the spring guide with the concave side toward the rocker arm. The waved washer may be installed with either side out.

▶B◀ ROCKER SHAFT CAP INSTALLATION

(1) Tighten the bolts in the sequence shown.
(2) Make sure that each rocker arm moves smoothly.

CYLINDER HEAD AND VALVES

REMOVAL AND INSTALLATION



Apply engine oil to all moving parts before installation.

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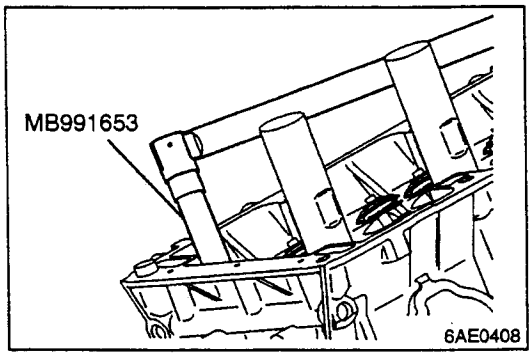
Removal steps

◀A▶ ▶D◀ 1. Cylinder head bolt
2. Cylinder head
3. Cylinder head gasket
◀B▶ ▶C◀ 4. Retainer lock
5. Valve spring retainer
▶B◀ 6. Valve spring
7. Intake valve
◀B▶ ▶C◀ 8. Retainer lock
9. Valve spring retainer
▶B◀ 10. Valve spring
◀D▶ 11. Exhaust valve
◀C▶ ▶A◀ 12. Valve stem seal
13. Valve spring seat
◀C▶ ▶A◀ 14. Valve stem seal
15. Valve spring seat
16. Intake valve guide
17. Exhaust valve guide
18. Intake valve seat
19. Exhaust valve seat
20. Cylinder head



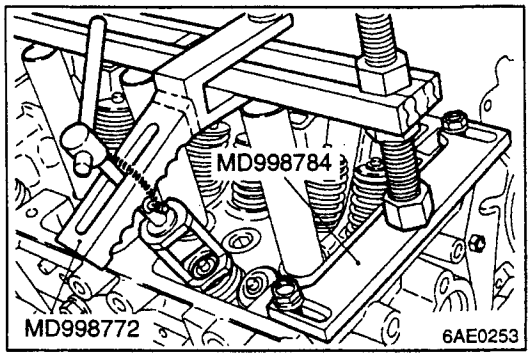
REMOVAL SERVICE POINTS

PRECAUTION FOR REMOVED PARTS

Keep removed parts in order according to the cylinder number and intake/exhaust side.

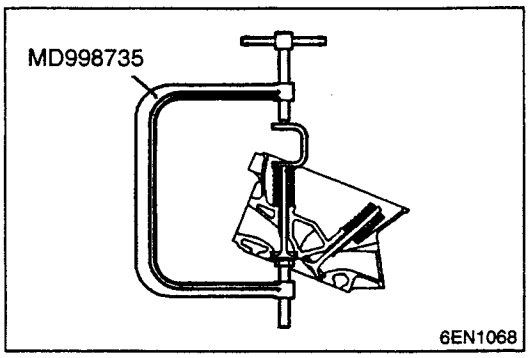
◀A▶ CYLINDER HEAD BOLT REMOVAL

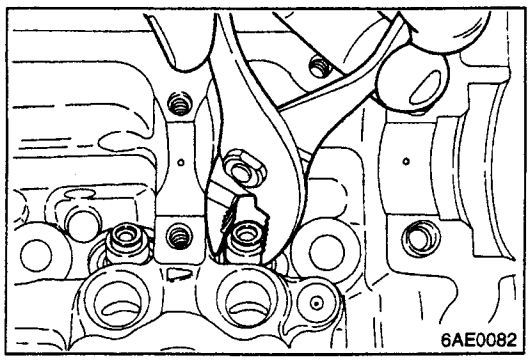
(1) Using the special tool, loosen the cylinder head bolts. Loosen evenly, little by little.



◀B▶ RETAINER LOCK REMOVAL

(1) Store removed valves, springs and other parts, tagged to indicate their cylinder Nos. and location for reassembly.





◀C▶ VALVE STEM SEAL REMOVAL

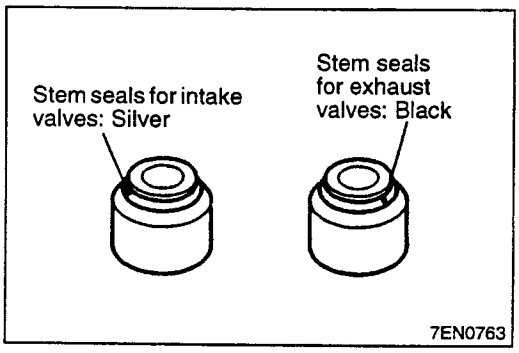
(1) Do not reuse removed valve stem seals.

◀D▶ VALVE HANDLING PRECAUTIONS

(1) Sodium reacts violently with water or moisture generation heat and liberating hydrogen. It must be handled with utmost care because otherwise the following dangerous conditions may result:
Loss of eyesight if sodium gets in eyes.
Burns if sodium contact skin.
Fire hazard.

(2) Handling of Sodium-filled Exhaust Valves
Sodium-filled exhaust valves are not dangerous and may be handled in the same way as ordinary valves unless they are broken.
Never try to break the valves and expose sodium to the air. When worn exhaust valves are to be discarded, have them disposed of by a salvage company equipped with special disposal system, notifying them that the valves contain sodium.
Should the exhaust valves be broken, neutralize sodium using the method described below, and discard the valves in the same way as ordinary valves.

(3) How to Neutralize Sodium
Place a container filled with more than 10 liters of water in a well ventilated large space.
Wear rubber gloves and goggles, and carefully take out broken valves from the cylinder head.
Put a broken valve in the water-filled container and quickly get away from the container at least 2 or 3 m.

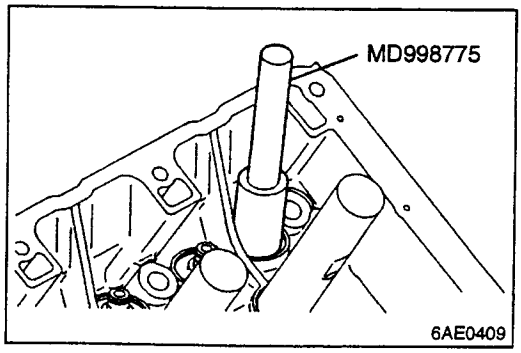


INSTALLATION SERVICE POINTS

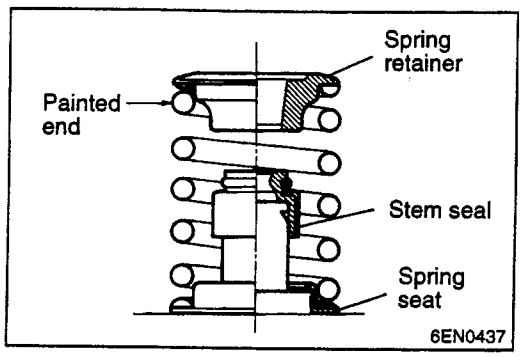
▶A◀ VALVE STEM SEAL INSTALLATION

(1) Install the valve spring seat.
(2) Use the special tool to fit a new stem seal on the valve guide.

NOTE
Valve stem seals for intake valves are different from those for exhaust valves. They are identified by colors of their spring sections as follows:
Stem seals for intake valves: Silver
Stem seals for exhaust valves: Black

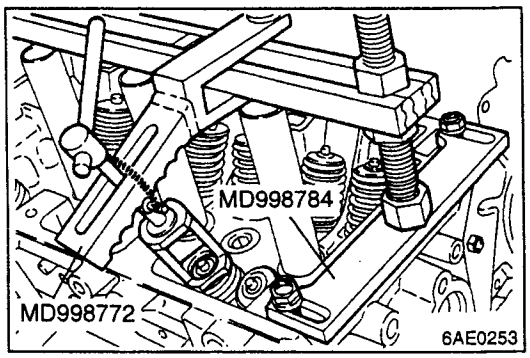


Caution
1. **Do not reuse the valve stem seal.**
2. **Always use the special tool to install the valve stem seal. If the seal is improperly fitted, engine oil may work its way down along the valve stem.**



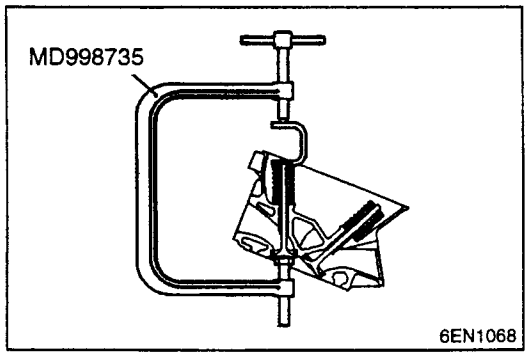
▶B◀ VALVE SPRING INSTALLATION

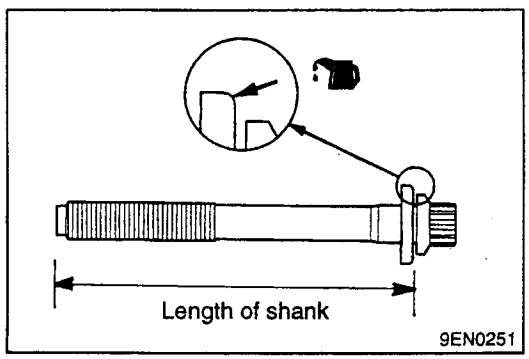
(1) Install the valve spring with the painted end on the rocker arm side.



▶C◀ RETAINER LOCK INSTALLATION

(1) The valve spring, if excessively compressed, causes the bottom end of retainer to be in contact with, and damage, the stem seal.



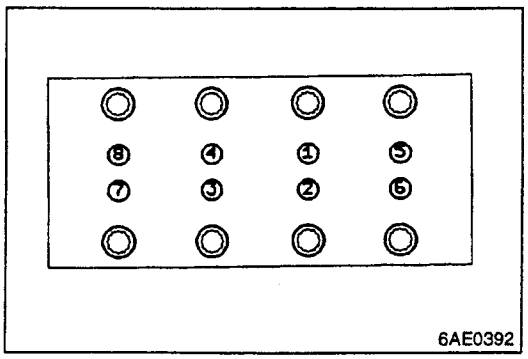


▶D◀ CYLINDER HEAD BOLT INSTALLATION

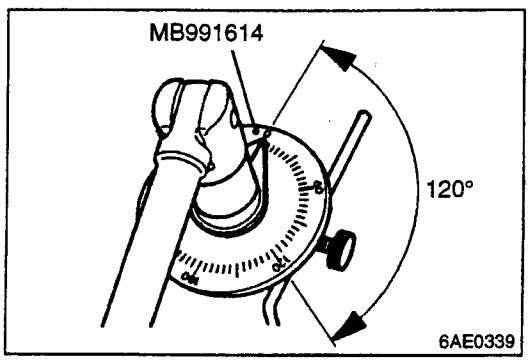
(1) When installing the cylinder head bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolts.

Limit: max. 96.4 mm

(2) Install the washers as illustrated.
(3) Apply engine oil to the bolt threads and washers.



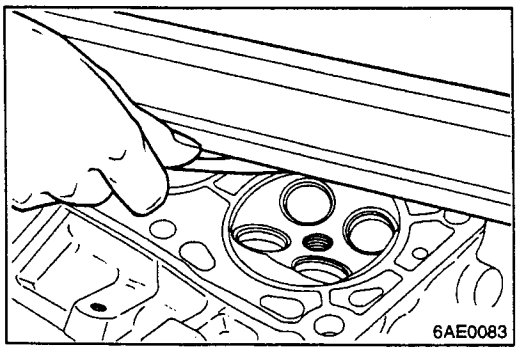
(4) Retighten the loosened bolts to a torque of 20 Nm in the specified tightening sequence.



(5) Make paint marks on the cylinder head bolts and cylinder head.
(6) Give a 120° turn to the bolts in the specified tightening sequence.

Caution

1. **If the bolts are tightened by an angle of less than 120°, they may not hold the cylinder head with sufficient strength.**
2. **If a bolt is overtightened, completely remove all the bolts and carry out the installation procedure again from step (1).**



INSPECTION

CYLINDER HEAD

(1) Check the cylinder head gasket surface for flatness by using a straightedge and thickness gauge.

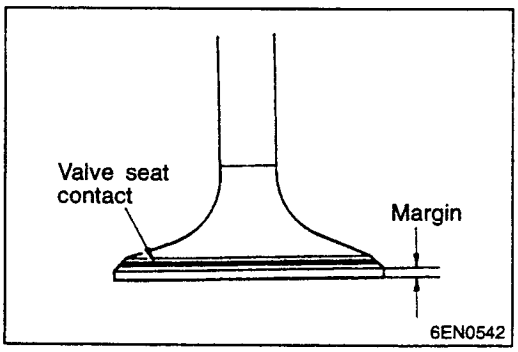
Standard value: 0.03 mm
Limit: 0.2 mm

(2) If the service limit is exceeded, correct to meet the specification.

Grinding limit: *0.2 mm

*Includes/combined with cylinder block grinding

Cylinder head height (Specification when new): 119.6 – 119.8 mm



VALVE

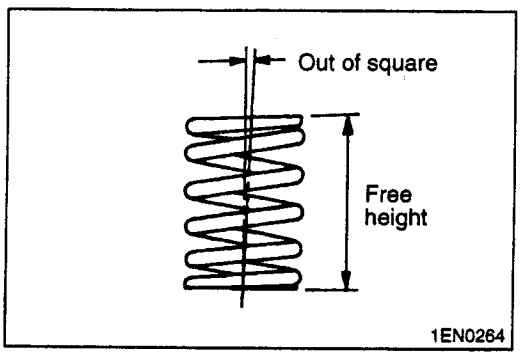
(1) Check the valve face for correct contact. If incorrect, reface using a valve refacer. Valve should make a uniform contact with the seat at the centre of valve face.

(2) If the margin is smaller than the service limit, replace the valve.

	Standard value mm	Limit mm
Intake	1.0	0.5
Exhaust	1.3	0.8

(3) Measure the overall height of the valve. If the specified limit is exceeded, replace the valve.

	Standard value mm	Limit mm
Intake	112.37	111.87
Exhaust	110.74	110.74



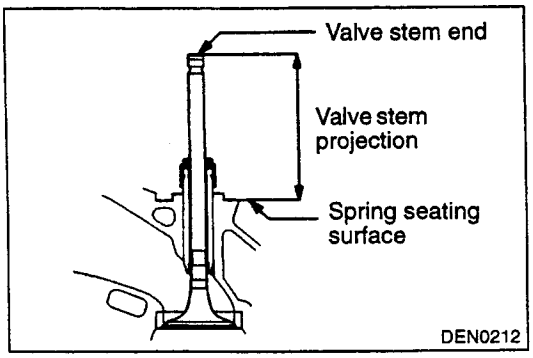
VALVE SPRING

(1) Measure the valve spring's free height. If the measurement is less than specified, replace the spring.

Standard value mm	Limit mm
51.5	50.5

(2) Measure the squareness of the spring. If the measurement exceeds the specified limit, replace the spring.

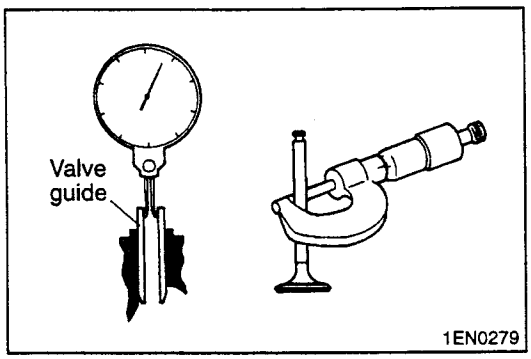
Standard value: 2° or less
Limit: 4°



VALVE SEAT

(1) Assemble the valve, then measure the valve stem projection between the end of the valve stem and the spring seating surface. If the measurement exceeds the specified limit, replace the valve seat.

Standard value mm	Limit mm
48.40	48.90

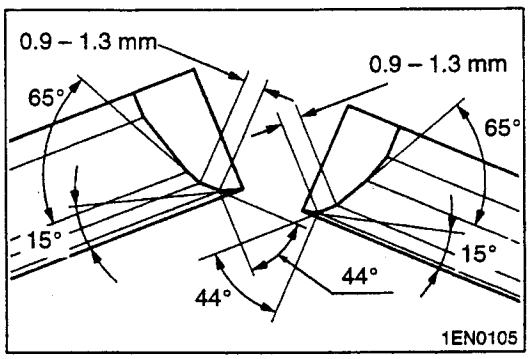


VALVE GUIDE

(1) Measure the clearance between the valve guide and valve stem. If the limit is exceeded, replace the valve guide or valve, or both.

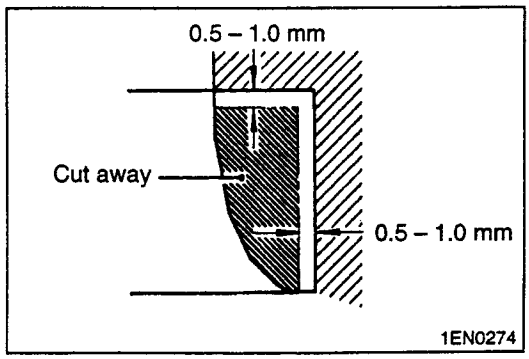
Standard value:
Intake: 0.02 – 0.05 mm
Exhaust: 0.04 – 0.07 mm

Limit:
Intake: 0.10 mm
Exhaust: 0.15 mm



VALVE SEAT RECONDITIONING PROCEDURE

(1) Before correcting the valve seat, check the clearance between the valve guide and valve. If necessary, replace the valve and/or valve guide.
(2) Using the appropriate special tool or seat grinder, correct the valve seat to achieve the specified seat width and angle.
(3) After correcting the valve seat, lap the valve and valve seat using lapping compound. Then, check the valve stem projection (refer to VALVE SEAT in INSPECTION).

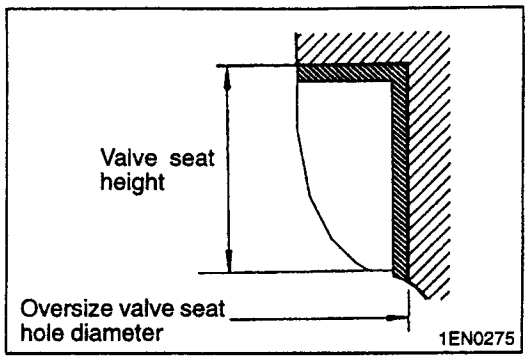


VALVE SEAT REPLACEMENT PROCEDURE

(1) Cut the valve seat to be replaced from the inside to thin the wall thickness. Then, remove the valve seat.
(2) Rebore the valve seat hole in the cylinder head to a selected oversize valve seat diameter.

Intake valve seat hole diameter
0.3 O.S.: 32.30 – 32.32 mm
0.6 O.S.: 32.60 – 32.62 mm

Exhaust valve seat hole diameter
0.3 O.S.: 29.80 – 29.82 mm
0.6 O.S.: 30.10 – 30.12 mm



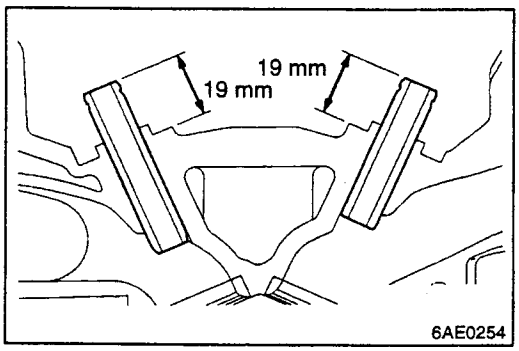
(3) Before fitting the valve seat, either heat the cylinder head up to approximately 250°C or cool the valve seat in liquid nitrogen, to prevent the cylinder head bore from galling.
(4) Correct the valve seat to the specified width and angle.

VALVE GUIDE REPLACEMENT

(1) Force the valve guide out toward the cylinder block using a press.
(2) Machine the valve guide hole in the cylinder head to the size of the oversize valve guide to be installed.

Caution
Do not use the valve guide of the same size as the removed one.

Valve guide hole diameters in cylinder head
0.05 O.S.: 11.05 – 11.07 mm
0.25 O.S.: 11.25 – 11.27 mm
0.50 O.S.: 11.50 – 11.52 mm



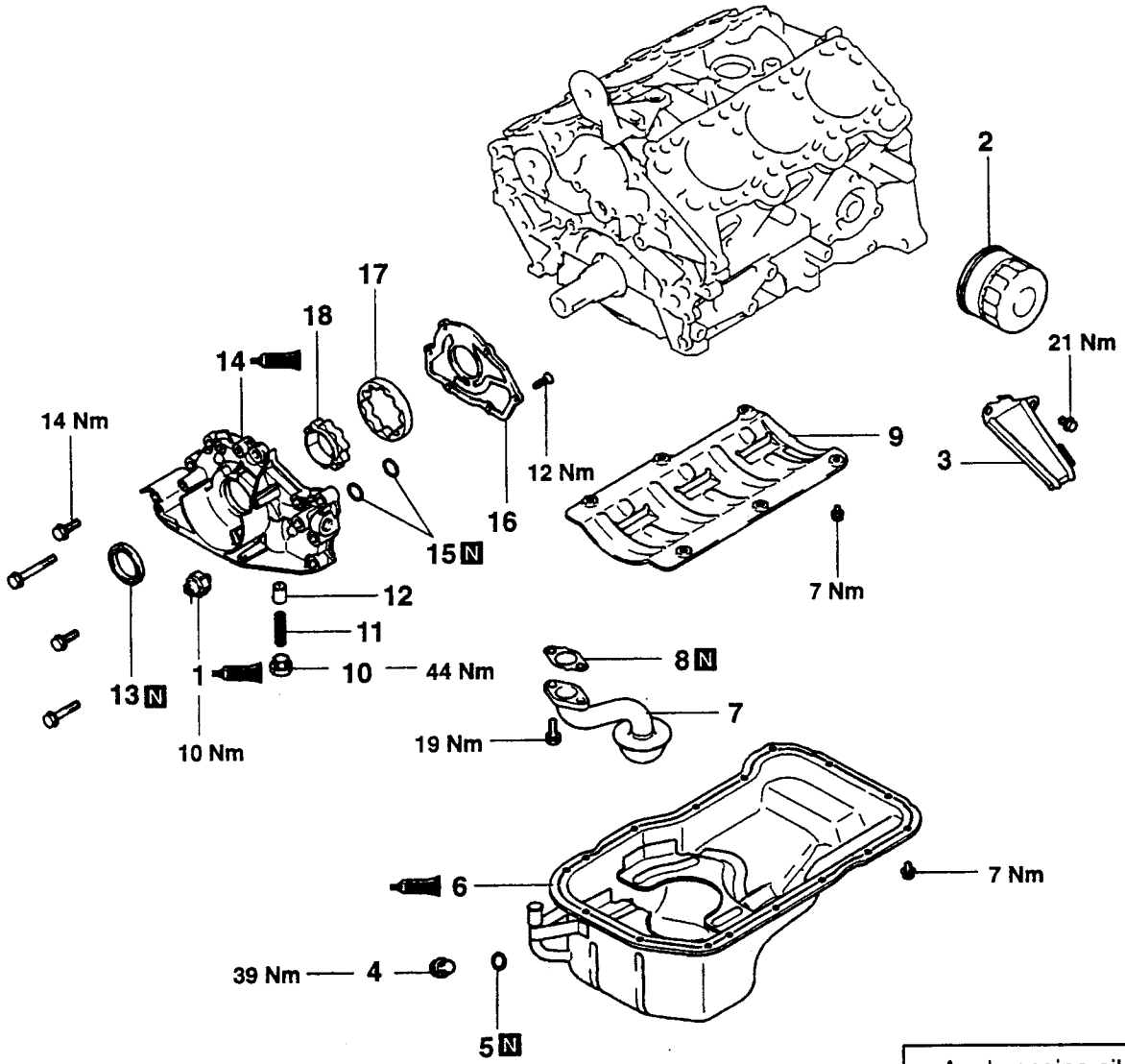
(3) Press-fit the valve guide until it protrudes specified value as shown in the illustration.

Caution
1. **Press the valve guide from the cylinder head top surface.**
2. **Valve guide for intake valve and that for exhaust valve are different in length. (45.5 mm for intake valve; 50.5 mm for exhaust valve)**

(4) After the valve guide has been installed, insert a new valve to check for smooth sliding motion.

OIL PUMP CASE AND OIL PAN

REMOVAL AND INSTALLATION



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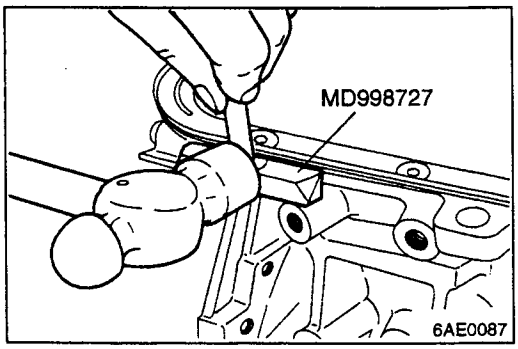
Removal steps

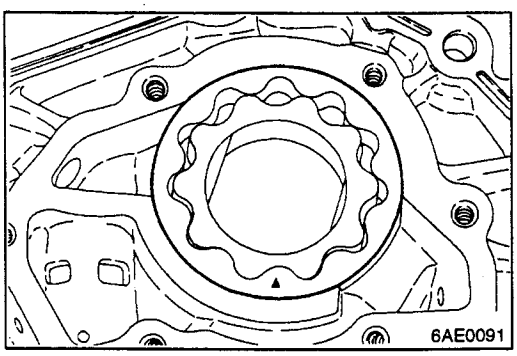
- ▶G◀ 1. Oil pressure switch
- ▶F◀ 2. Oil filter
- 3. Oil filter cover
- 4. Drain plug
- ▶E◀ 5. Gasket
- ◀A▶ ▶D◀ 6. Oil pan
- 7. Oil screen
- 8. Gasket
- 9. Buffle plate
- 10. Relief plug
- 11. Relief spring
- 12. Relief plunger
- ▶C◀ 13. Oil seal
- ▶B◀ 14. Oil pump case
- 15. O-ring
- 16. Oil pump case cover
- ▶A◀ 17. Outer rotor
- ▶A◀ 18. Inner rotor



REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL

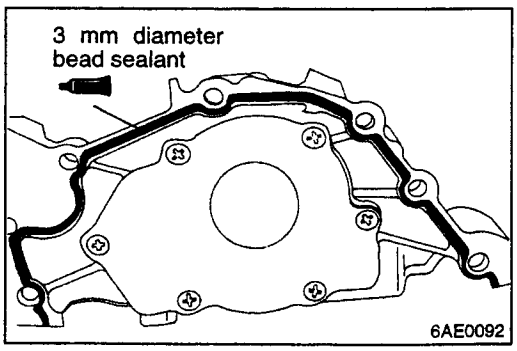
(1) Knock the special tool deeply between the oil pan and the cylinder block.
(2) Hitting the side of the special tool, slide the special tool along the oil pan to remove it.



INSTALLATION SERVICE POINTS

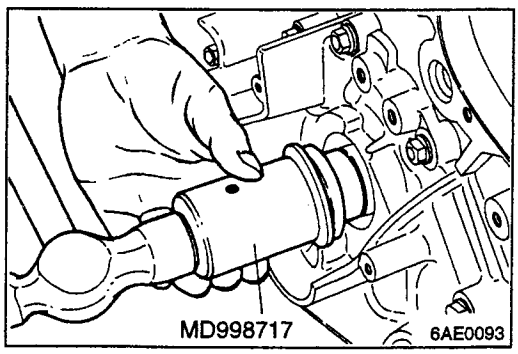
▶A◀ INNER ROTOR / OUTER ROTOR INSTALLATION

(1) Apply engine oil to the rotors. Then, install the rotors ensuring that the alignment dots made at disassembly are properly aligned.



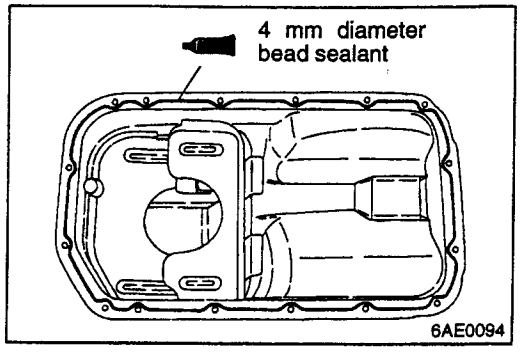
▶B◀ SEALANT APPLICATION TO OIL PUMP CASE

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent



▶C◀ OIL SEAL INSTALLATION

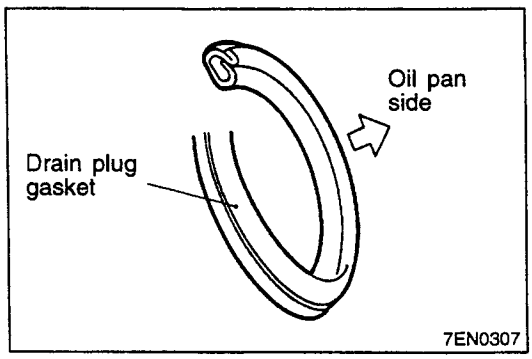
(1) Apply engine oil to the oil seal lip.
Using the special tool, knock the oil seal into the oil pump case.



▶D◀ OIL PAN INSTALLATION

(1) Clean the cylinder block and oil pan gasket application surfaces.
(2) Install the oil pan within 15 minutes after FIPG has been applied to the entire flange surfaces of the oil pan.

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent



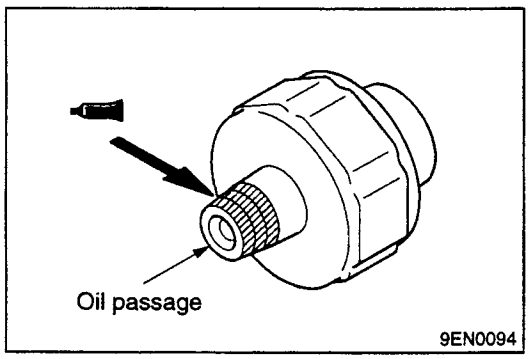
▶E◀ DRAIN PLUG GASKET INSTALLATION

(1) Install the drain plug gasket in the shown direction.

▶F◀ OIL FILTER INSTALLATION

(1) Clean the surfaces of the cylinder block on which the oil filter is to be mounted.
(2) Apply engine oil to the O-ring of the oil filter.
(3) Turn down the oil filter until the O-ring contacts the cylinder block surface, and then give the oil filter one more turn (or tighten with a 16 Nm torque).

NOTE
For MD135737 oil filter, the tightening torque should be 14 Nm.



▶G◀ SEALANT APPLICATION TO SEALANT TO OIL PRESSURE SWITCH

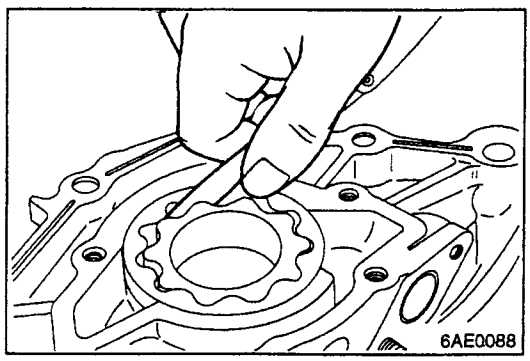
(1) Apply sealant to the threads of the switch.

Specified sealant:
3M ATD Part No. 8660 or equivalent

Caution
Use care not to allow the sealant to plug the oil passage.

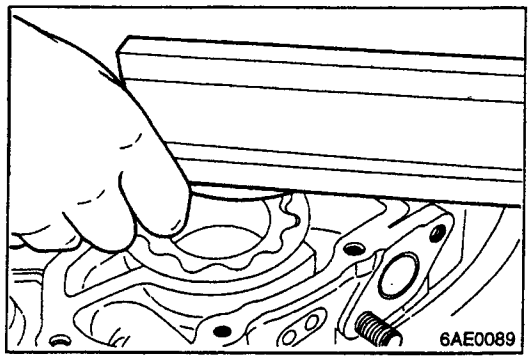
INSPECTION

OIL PUMP



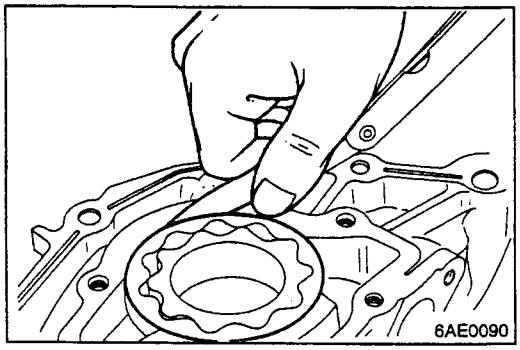
(1) Check the tip clearance.

Standard value: 0.06 – 0.18 mm



(2) Check the side clearance.

Standard value: 0.04 – 0.10 mm

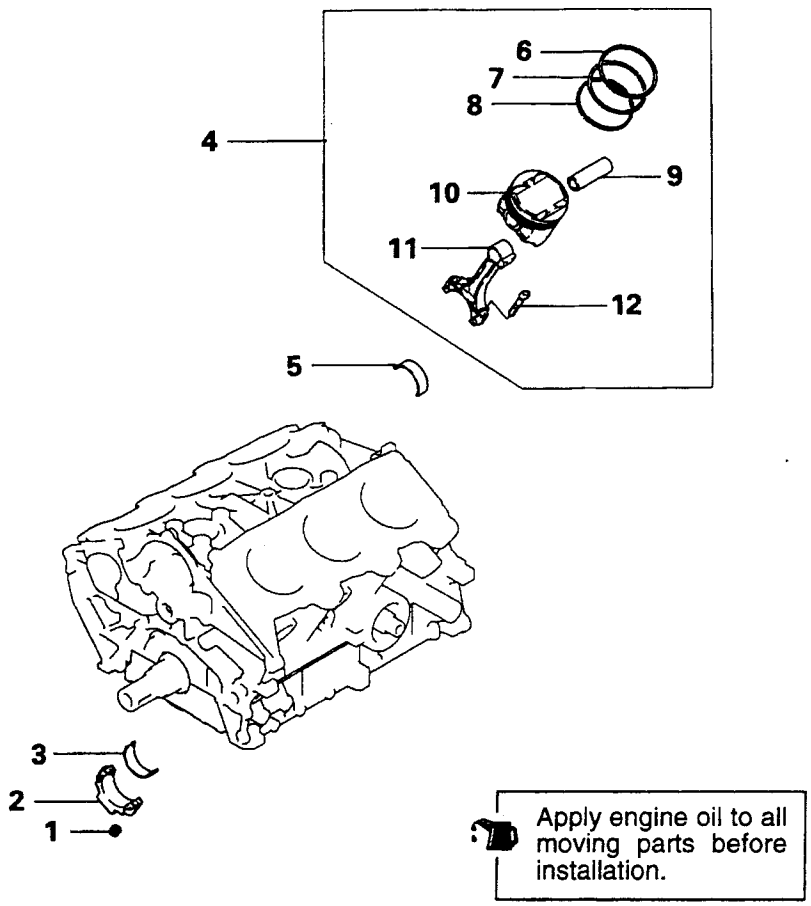


(3) Check the body clearance.

Standard value: 0.10 – 0.18 mm
Limit: 0.35 mm

PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION



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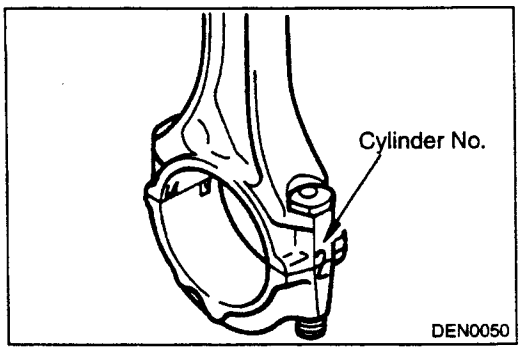
Removal steps

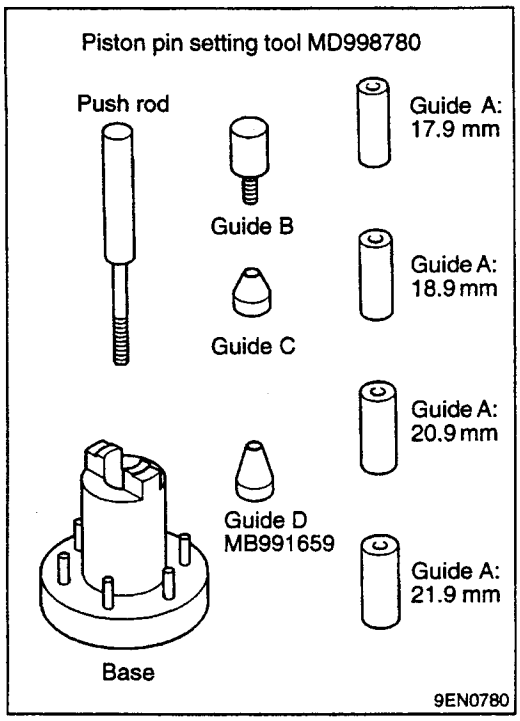
◀A▶ ▶G◀ 1. Nut
▶F◀ 2. Connecting rod cap
▶E◀ 3. Connecting rod bearing
▶D◀ 4. Piston and connecting rod
▶E◀ 5. Connecting rod bearing
▶C◀ 6. Piston ring No.1
▶C◀ 7. Piston ring No.2
▶B◀ 8. Oil ring
◀B▶ ▶A◀ 9. Piston pin
10. Piston
11. Connecting rod
12. Bolt



REMOVAL SERVICE POINTS

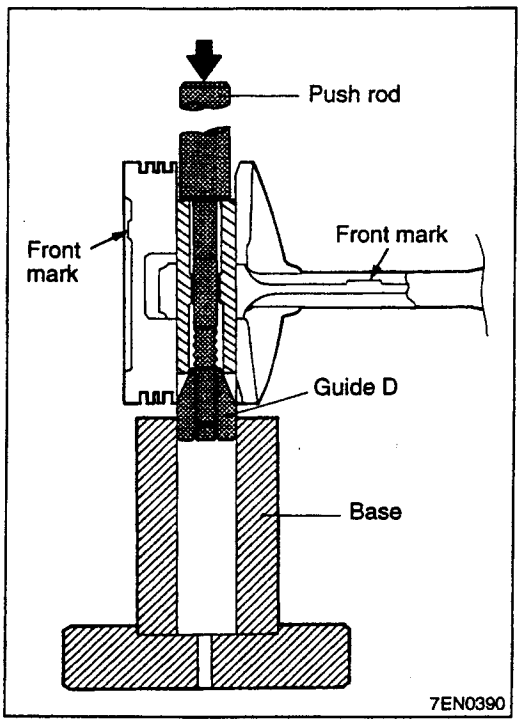
◀A▶ CONNECTING ROD CAP REMOVAL

(1) Mark the large end of the connecting rod with the cylinder number for use during reassembly.



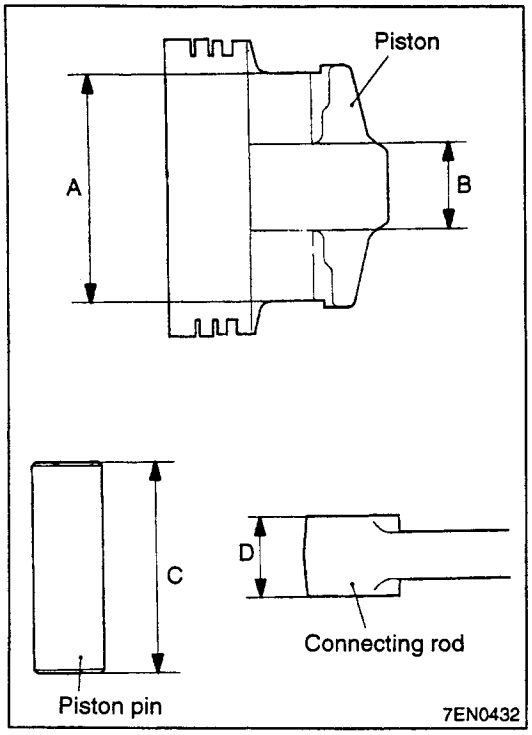
◀B▶ PISTON PIN REMOVAL

(1) Piston pin setting tool (MD998780) consists of the parts shown in the illustration at left.
To remove the piston pin, Guide D (MB991659) is also used in combination with the Piston pin setting tool.



(1) Insert the Push Rod (special tool) into the piston from the side on which the front mark is stamped in the piston head, and attach the guide D to the push rod end.
(2) Place the piston and connecting rod assembly on the Piston Pin Setting Base (special tool) with the front mark facing upward.
(3) Using a press, remove the piston pin.

NOTE
Keep the disassembled pistons, piston pins and connecting rods in order according to the cylinder number.



INSTALLATION SERVICE POINTS

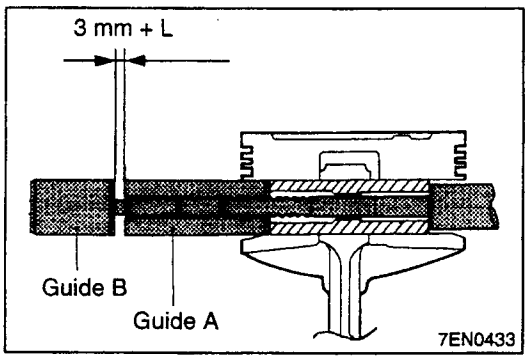
▶A◀ PISTON PIN INSTALLATION

(1) Measure the following dimensions of the piston, piston pin and connecting rod.
A: Piston pin insertion hole length
B: Distance between piston bosses
C: Piston pin length
D: Connecting rod small end width

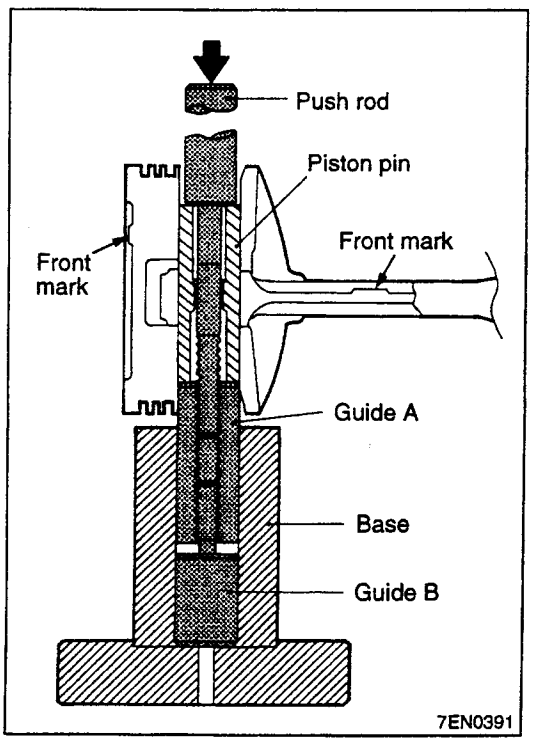
(2) Calculate the following formula by substituting the measured values.

$$L = \frac{(A-C)-(B-D)}{2}$$

(3) Insert the Push Rod (special tool) into the piston pin and attach the guide A to the push rod end.
(4) Assemble the connecting rod in the piston with their front marks facing the same direction.
(5) Apply engine oil to the entire periphery of the piston pin.
(6) Insert the piston pin, push rod and guide A assembly having assembled in step (3) from the guide A side into the piston pin hole on the front marked side.

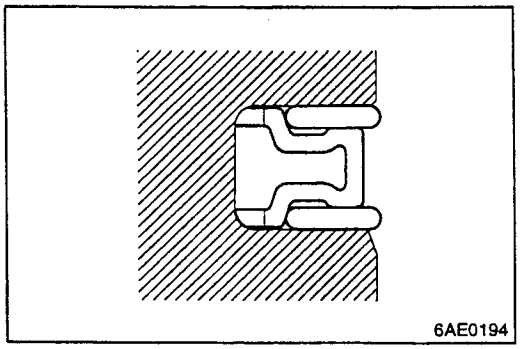


(7) Screw the guide B into the guide A until the gap between both guides amounts to the value L obtained in step (2) plus 3 mm.



(8) Place the piston and connecting rod assembly onto the piston setting base with the front marks directed upward.
(9) Press-fit the piston pin using a press.
If the press-fitting force required is less than the standard value, replace the piston and piston pin set or/and the connecting rod.

Standard value: 5,000 – 15,000 N

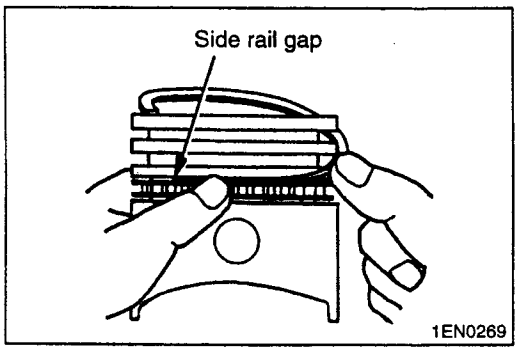


▶B◀ OIL RING INSTALLATION

(1) Fit the oil ring spacer into the piston ring groove.

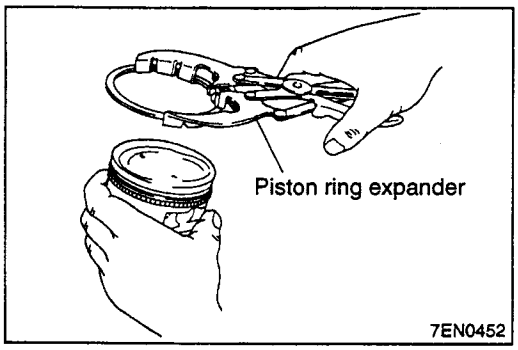
NOTE
The side rails and spacer may be installed in either direction.

(2) Install the upper side rail.
To install the side rail, first fit one end of the rail into the piston groove, then press the remaining portion into position by finger. See illustration.



NOTE
Do not use piston ring expander when installing side rail. Use of ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

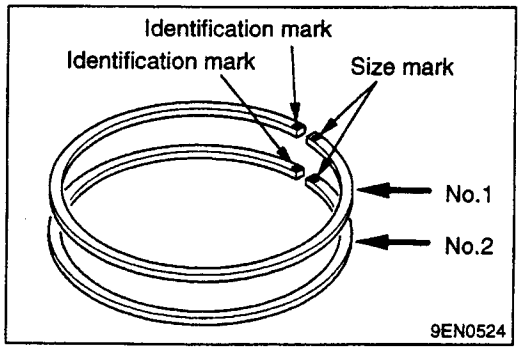
(3) Install the lower side rail in the same procedure as described in step (2).
(4) Make sure that the side rails move smoothly in either direction.



▶C◀ PISTON RING NO. 2 / PISTON RING NO. 1 INSTALLATION

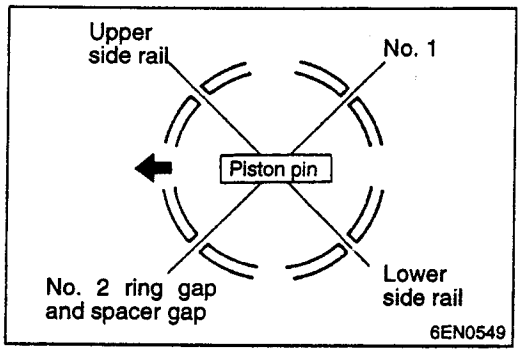
(1) Using piston ring expander, install the piston rings with their side having identification marks facing up.

Identification mark:
No. 1 ring: T
No. 2 ring: 2T



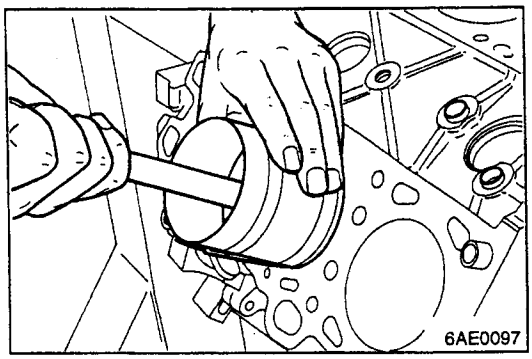
NOTE
The piston ring is stamped with the following size mark.

Size	Size mark
Standard size	None
0.50 mm O.S.	50
1.00 mm O.S.	100



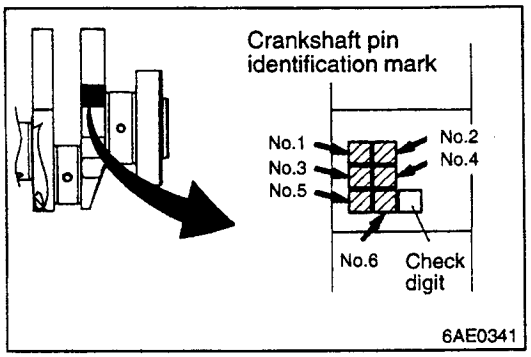
▶D◀ PISTON AND CONNECTING ROD INSTALLATION

(1) Liberally coat engine oil on the circumference of the piston, piston ring, and oil ring.
(2) Arrange the piston ring and oil ring gaps (side rail and spacer) as shown in the figure.
(3) Rotate crankshaft so that the crank pin is on center of the cylinder bore.



(4) Use suitable thread protectors on connecting rod bolts before inserting piston and connecting rod assembly into cylinder block. Care must be taken not to nick crank pin.
(5) Using a suitable piston ring compressor tool, install piston and connecting rod assembly into the cylinder block.

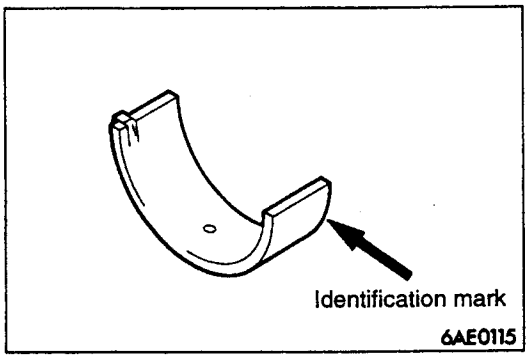
Caution
Insert the front mark (arrow) on the top of the piston so it faces the engine front (timing belt side).

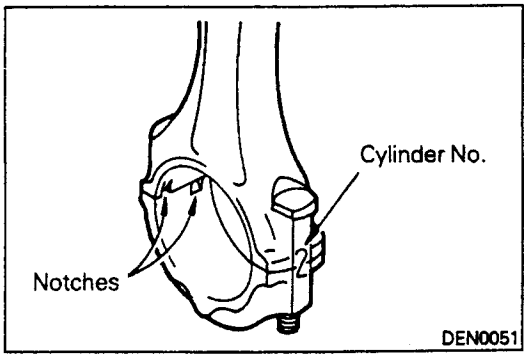


▶E◀ CONNECTING ROD BEARINGS INSTALLATION

(1) When the bearings are to be replaced, select correct ones and install them in the correct positions according to the identification marks stamped on the crankshaft.

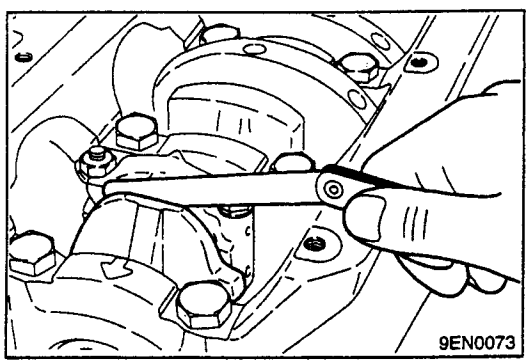
Crankshaft pin		Connecting rod bearing
Identification mark	Outer diameter mm	Identification mark
I	42.995 – 43.000	1
II	42.985 – 42.995	2
III	42.980 – 42.985	3





▶F◀ CONNECTING ROD CAP INSTALLATION

(1) Mate the correct bearing cap with the correct connecting rod by checking with the alignment marks marked during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.

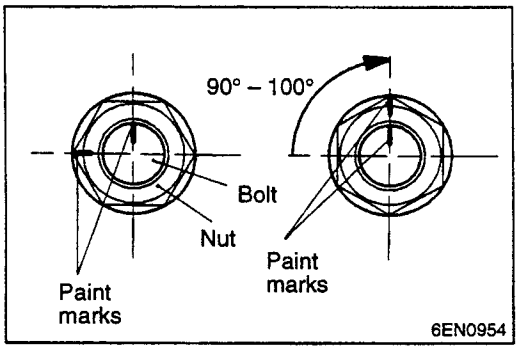


(2) Check if the thrust clearance in the connecting rod big end is correct.

Standard value: 0.10 – 0.25 mm
Limit: 0.4 mm

▶G◀CONNECTING ROD CAP NUT INSTALLATION

(1) Since the connecting rod bolts and nuts are torqued using a new procedure they should be examined BEFORE reuse. If the bolt threads are "necked down" the bolts should be replaced.
Necking can be checked by running a nut with fingers to the full length of the bolt's thread. If the nut does not run down smoothly, the bolt should be replaced.

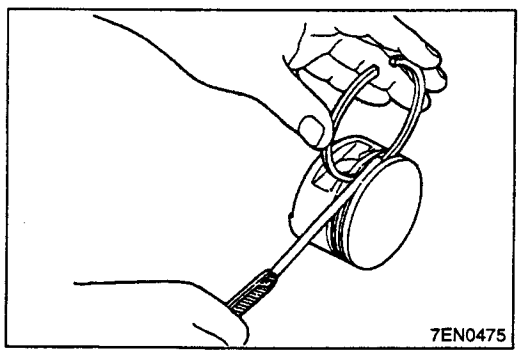


(2) Before installation of each nut, apply engine oil to the threaded portion and bearing surface of the nut.
(3) Install each nut to the bolt and tighten it finger tight. Then tighten the nuts alternately to install the cap properly.
(4) Tighten the nuts to a torque of 18 Nm.
(5) Make a paint mark on the head of each nut.
(6) Make a paint mark on the bolt at the position 90° to 100° from the paint mark made on the nut in the direction of tightening the nut.
(7) Give a 90° to 100° turn to the nut and make sure that the paint mark on the nut and that on the bolt are in alignment.

Caution
1. **If the nuts are tightened by an angle of less than 90°, they may not hold the caps with sufficient strength.**
2. **If a nut is tightened by an angle exceeding 100°, completely remove all the nuts and carry out the installation procedure again from step (1).**

INSPECTION

PISTON RING



(1) Check the side clearance between the piston ring and ring groove. If the limit is exceeded, replace the ring or piston, or both.

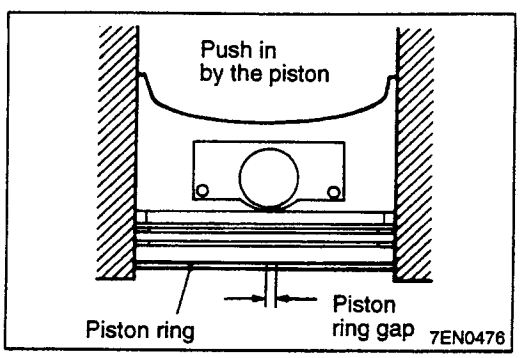
Standard value:

No. 1	**0.03 – 0.07 mm**
No. 2	**0.02 – 0.06 mm**

Limit:

No. 1	**0.1 mm**
No. 2	**0.1 mm**

Install the piston ring into the cylinder bore. Force it down with a piston, its crown being in contact with the ring, to correctly position it at right angles to the cylinder wall. Then, measure the end gap with a feeler gauge.
If the ring gap is excessive, replace piston ring.

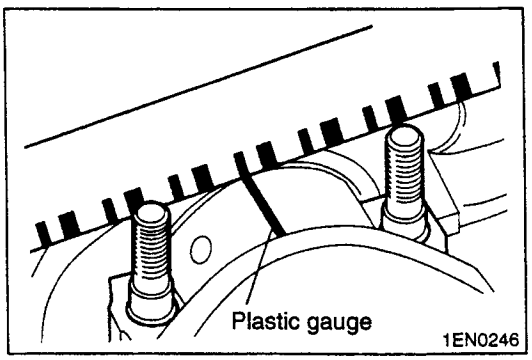


Standard value:

No. 1	**0.25 – 0.40 mm**
No. 2	**0.40 – 0.55 mm**
Oil	**0.10 – 0.35 mm**

Limit:

No. 1, No. 2	**0.8 mm**
Oil	**1.0 mm**



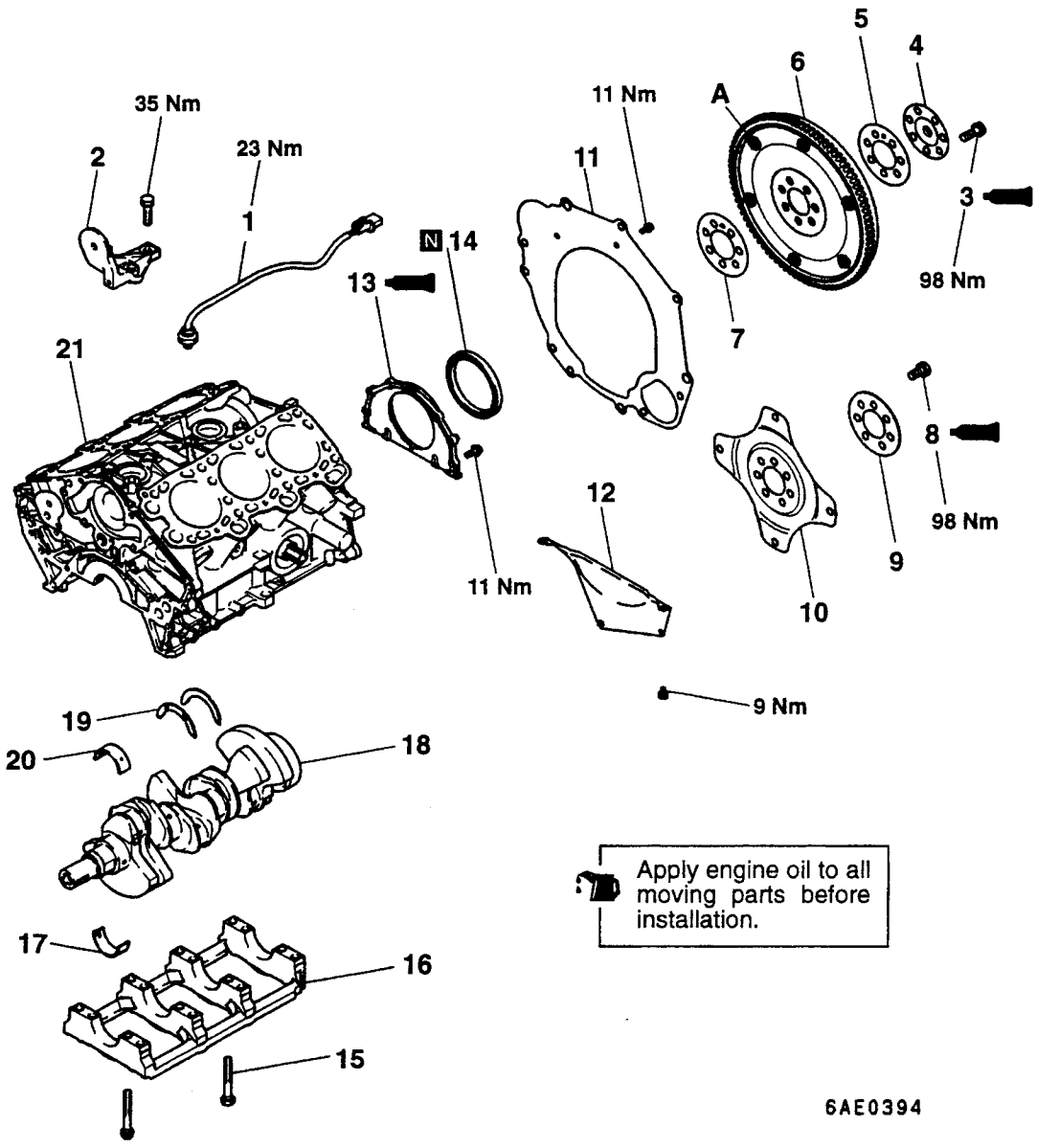
CRANKSHAFT PIN OIL CLEARANCE (PLASTIC GAUGE METHOD)

(1) Remove oil from crankshaft pin and connecting rod bearing.
(2) Cut the plastic gauge to the same length as the width of bearing and place it on crankshaft pin in parallel with its axis.
(3) Install the connecting rod cap carefully and tighten the bolts to specified torque.
(4) Carefully remove the connecting rod cap.
(5) Measure the width of the plastic gauge at its widest part by using a scale printed on the plastic gauge package.

Standard value: 0.02 – 0.05 mm
Limit: 0.1 mm

CRANKSHAFT, CYLINDER BLOCK, FLYWHEEL AND DRIVE PLATE

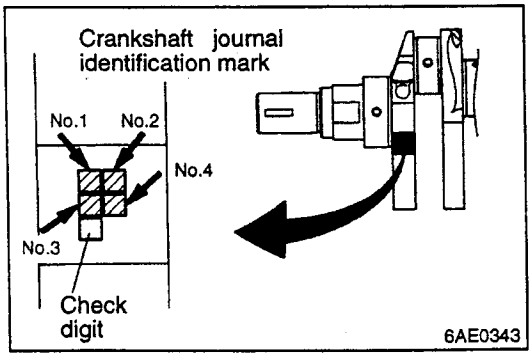
REMOVAL AND INSTALLATION

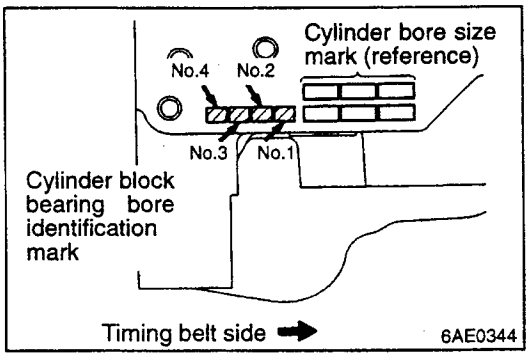


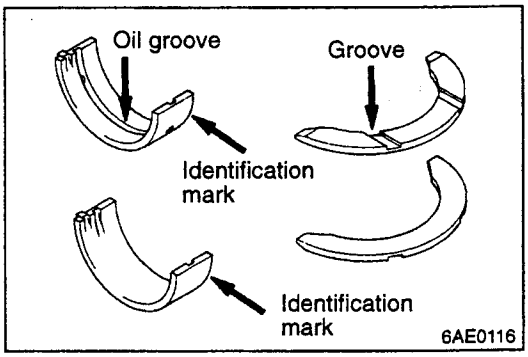
Removal steps

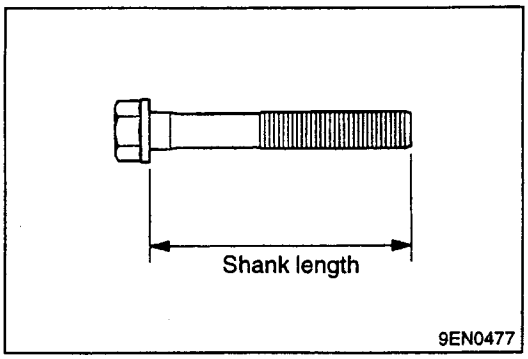
1. Detonation sensor
2. Idler pulley bracket <M/T>
3. ▶E◀ Flywheel bolt <M/T>
4. Plate <M/T>
5. Adapter plate <M/T>
6. Flexible flywheel <M/T>
7. Adapter plate <M/T>
8. ▶E◀ Drive plate bolt <A/T>
9. Adapter plate <A/T>
10. Drive plate <A/T>
11. Rear plate
12. Bell housing cover
13. ▶D◀ Oil seal case
14. ▶C◀ Oil seal
15. ▶B◀ Bearing cap bolt
16. ▶B◀ Bearing cap
17. ▶A◀ Crankshaft bearing, lower
18. Crankshaft
19. ▶A◀ Thrust bearing
20. ▶A◀ Crankshaft bearing, upper
21. Cylinder block

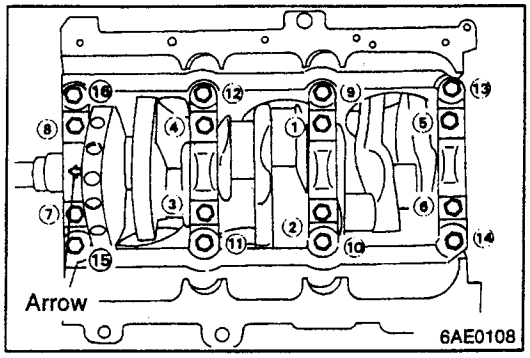
Caution
On the flexible wheel equipped engines, do not remove any of the bolts "A" of the flywheel shown in the illustration.
The balance of the flexible flywheel is adjusted in an assembled condition. Removing the bolt, therefore, can cause the flexible flywheel to be out of balance, giving damage to the flywheel.











INSTALLATION SERVICE POINTS

▶A◀ CRANKSHAFT BEARING INSTALLATION

(1) When replacing bearing, select a one of proper size according to the identification marks stamped on both crankshaft and cylinder block.

Crankshaft Journal		Cylinder Block Bearing Bore		Crankshaft Bearing
Identification mark	Outer diameter mm	Identification mark	Inner diameter mm	Identification mark
1	52.994 – 53.000	0	57.000 – 57.006	1
		1	57.006 – 57.012	2
		2	57.012 – 57.018	3
2	52.988 – 52.994	0	57.000 – 57.006	2
		1	57.006 – 57.012	3
		2	57.012 – 57.018	4
3	52.982 – 52.988	0	57.000 – 57.006	3
		1	57.006 – 57.012	4
		2	57.012 – 57.018	5

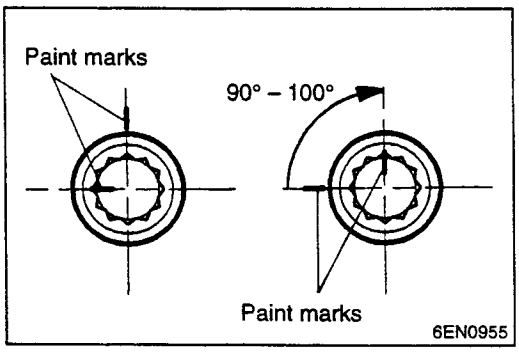
(2) Install the bearings having an oil groove to the cylinder block.
(3) Install the bearings having no oil groove to the bearing caps.
(4) Install the thrust bearings at the No. 3 upper bearing with the grooved side toward the crank web.

▶B◀ BEARING CAP / BEARING CAP BOLT INSTALLATION

(1) Install the bearing caps so that their arrows are positioned on the timing belt side.
(2) When installing the bearing cap bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolt.

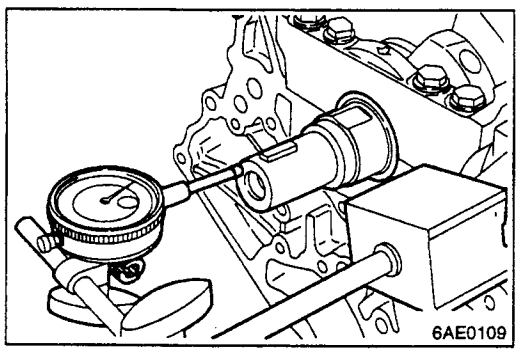
Limit: max. 71.1 mm

(3) Apply engine oil to the threaded portion and bearing surface of the bolt.
(4) Tighten the bearing cap bolts to 25 Nm torque in the tightening sequence.



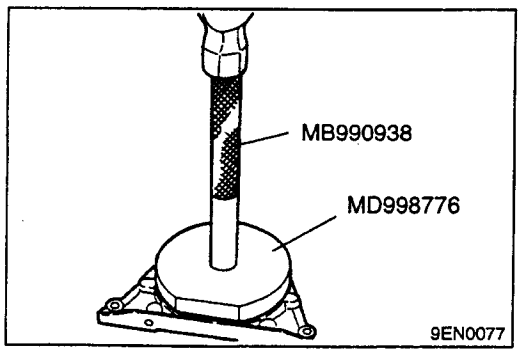
(5) Make a paint mark on the head of each nut.
(6) Make a paint mark on the area around the bolt bearing surface at location 90° to 100° in the direction of tightening the bolt.
(7) Give a 90° to 100° turn to the bolts in the tightening sequence. Make sure that the paint mark on the bolt and that on the area around the bolt bearing surface are in alignment.

Caution
1. **If the bolts are tightened by an angle of less than 90°, they may not hold the cap with sufficient strength.**
2. **If a bolt is tightened by an angle exceeding 100°, completely remove all the bolts and carry out the installation procedure again from step (1).**



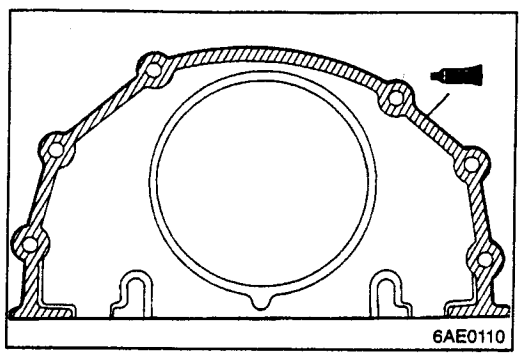
(8) After installing the bearing caps, make sure that the crankshaft turns smoothly and the end play is correct. If the end play exceeds the limit, replace crankshaft bearings.

Standard value: 0.05 – 0.25 mm
Limit: 0.4 mm



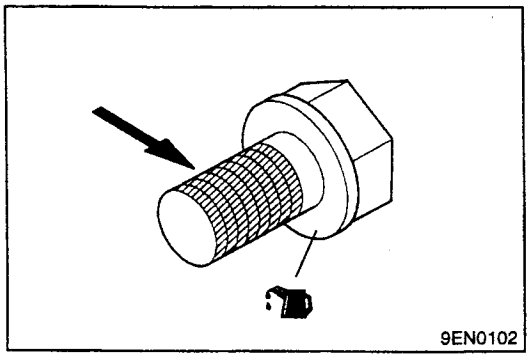
▶C◀ OIL SEAL INSTALLATION

(1) Apply engine oil to oil seal lip.



▶D◀ APPLICATION OF OIL SEAL CASE

Specified sealant:
Mitsubishi Genuine Part No. MD970389 or equivalent



▶E◀ DRIVE PLATE BOLT / FLYWHEEL BOLT INSTALLATION

(1) Remove all the remaining sealant from bolts and thread holes of crankshaft.
(2) Apply engine oil to the flange of bolt.
(3) Apply engine oil into the thread holes of crankshaft.
(4) Apply specified sealant to the thread of bolts.

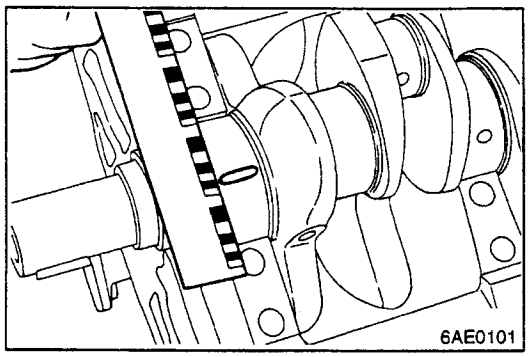
Specified sealant:
3M Nut Locking Part No. 4171 or equivalent

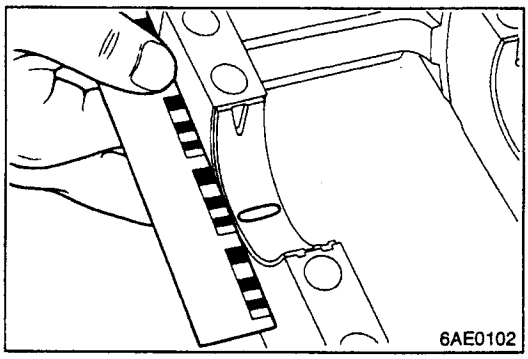
(5) Tighten the bolts to specified torque.

INSPECTION

CRANKSHAFT OIL CLEARANCE (PLASTIC GAUGE METHOD)

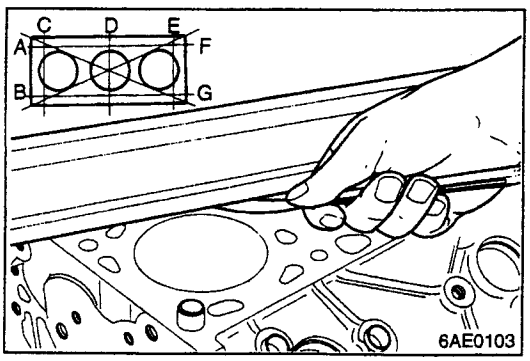
(1) Remove oil from crankshaft journal and crankshaft bearing.
(2) Install the crankshaft.
(3) Cut the plastic gauge to the same length as the width of bearing and place it on journal in parallel with its axis.





(4) Install the crankshaft bearing cap carefully and tighten the bolts to specified torque.
(5) Carefully remove the crankshaft bearing cap.
(6) Measure the width of the plastic gauge at its widest part by using a scale printed on the plastic gauge package.

Standard value: 0.01 – 0.03 mm
Limit: 0.1 mm



CYLINDER BLOCK

(1) Using a straightedge and feeler gauge, check the block top surface for warpage. Make sure that the surface is free from gasket chips and other foreign matter.

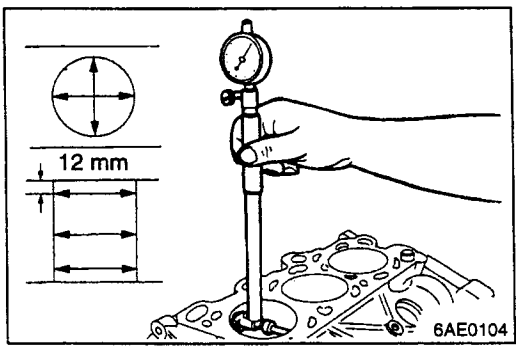
Standard value: 0.05 mm or less
Limit: 0.1 mm

(2) If the distortion is excessive, correct within the allowable limit or replace.

Grinding limit: 0.2 mm
The total thickness of the stock allowed to be removed from cylinder block and mating cylinder head is 0.2 mm at maximum.

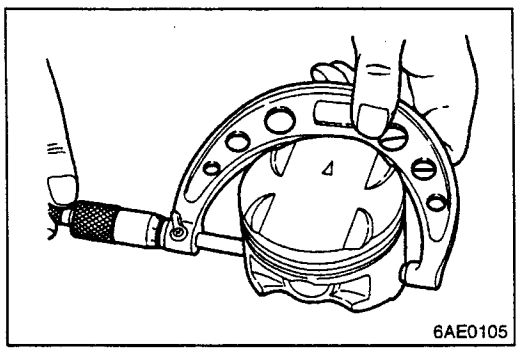
Cylinder block height (when new): 190 mm

(3) Check cylinder walls for scratches and seizure. If defects are evident, correct (bored to oversize) or replace.



(4) Using cylinder gauge, measure the cylinder bore and cylindricity. If worn badly, correct cylinder to an oversize and replace piston and piston rings. Measure at the points shown in illustration.

Standard value:
Cylinder I.D.: 78.40 – 78.43 mm
Out-of-roundness and taper of cylinder bore: 0.01 mm or less



BORING CYLINDER

(1) Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

Piston size identification

Size	Identification mark
0.50 mm O.S.	0.50
1.00 mm O.S.	1.00

NOTE
Size mark is stamped on piston top.

(2) Measure outside diameter of piston to be used. Measure it in thrust direction as shown.
(3) Based on measured piston O.D. calculate boring finish dimension.

Boring finish dimension = Piston O.D. + (Clearance between piston O.D. and cylinder) – 0.02 mm (honing margin)

(4) Bore all cylinders to calculated boring finish dimension.

Caution
To prevent distortion that may result from temperature rise during honing, bore cylinders, working from No. 1, No. 2, No. 3, No. 4, No. 5 and No. 6

(5) Hone to final finish dimension (piston O.D. + clearance between piston O.D. and cylinder.)
(6) Check clearance between piston and cylinder.

Clearance between piston and cylinder: 0.02 – 0.04 mm

NOTE
When boring cylinders, finish all of four cylinders to same oversize. Do not bore only one cylinder to an oversize.

CLUTCH

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	F5M42
Clutch operating method	Hydraulic type
Clutch disc type	Single dry disc type
Clutch disc size O.D. x I.D. mm	225 x 150
Clutch cover type	Diaphragm spring type
Clutch cover setting load N	4511
Clutch release cylinder I.D. mm	20.64

SERVICE SPECIFICATIONS

Items	Specifications (limit)
Clutch disc facing rivet sink mm	0.3
Diaphragm spring end height difference mm	0.5
Release cylinder I.D. to piston O.D. clearance mm	0.15

TORQUE SPECIFICATIONS

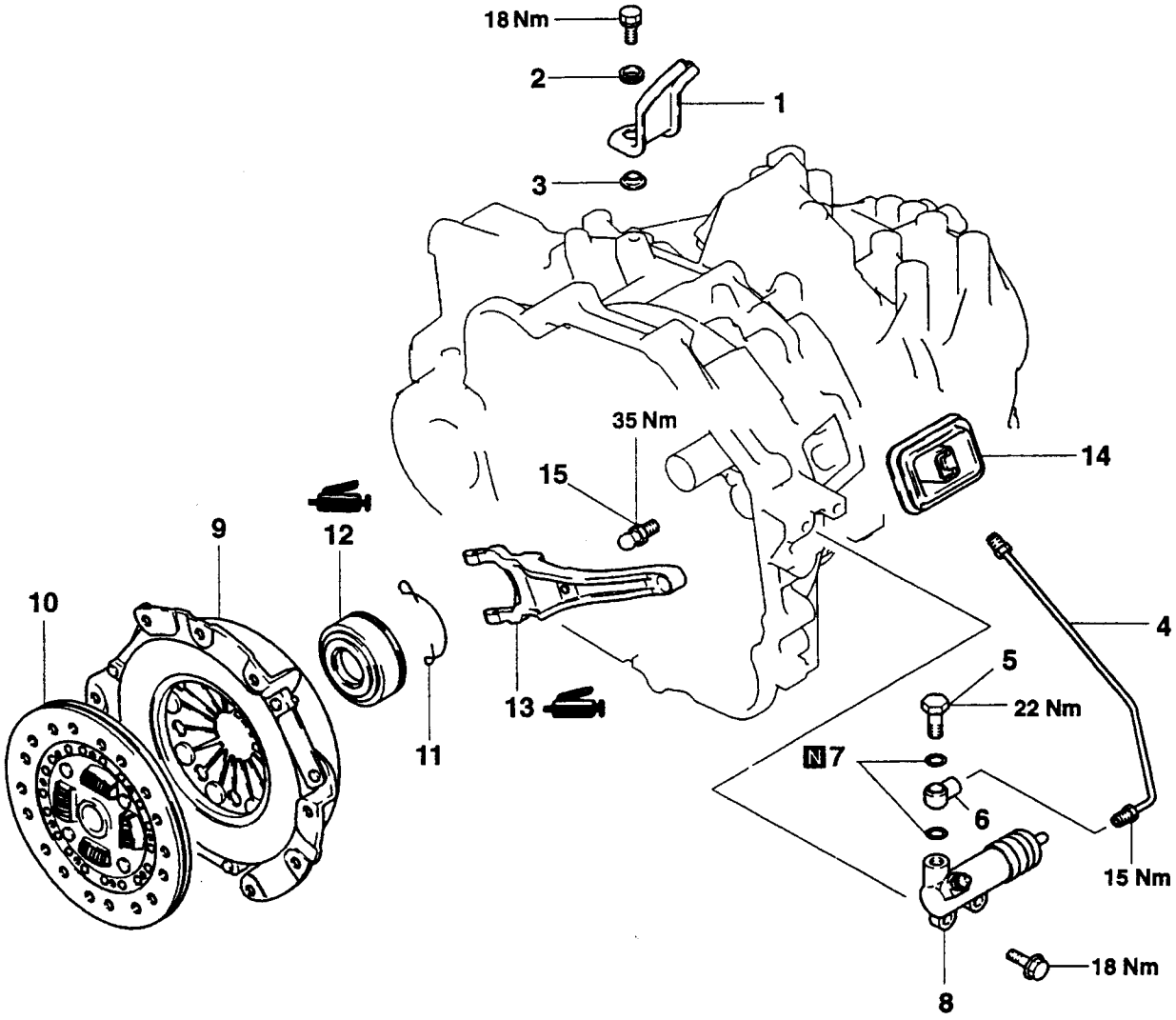
Items	Specified torque
Clutch fluid line bracket Nm	18
Clutch release cylinder air bleeder Nm	11
Clutch release cylinder mounting bolt Nm	18
Clutch release cylinder union bolt Nm	22
Clutch tube flare nut Nm	15
Fulcrum Nm	35

LUBRICANTS

Items	Specified lubricants
Clutch release bearing inner surface	MITSUBISHI genuine grease Part No. 0101011 or equivalent
Release fork and fulcrum contact surface	
Release fork and release bearing contact surface	
Release fork and release cylinder push rod contact surface	
Piston and piston cup outer surface	Brake fluid SAE J1703 (DOT3)
Release cylinder inner surface	

CLUTCH

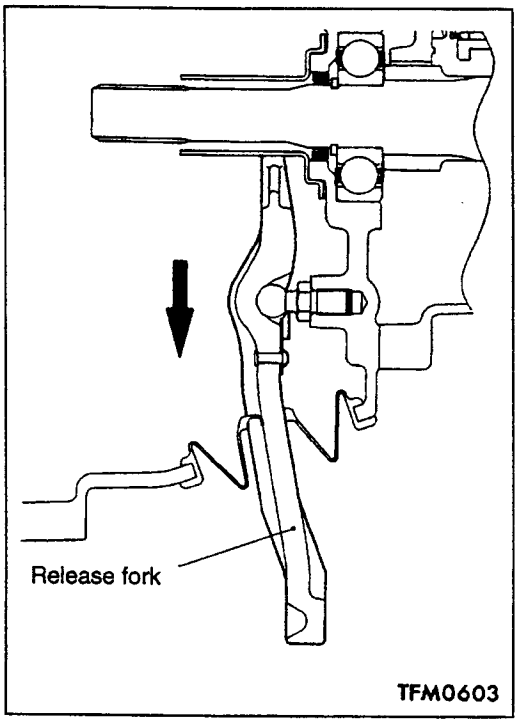
REMOVAL AND INSTALLATION



TFM0595

Removal steps

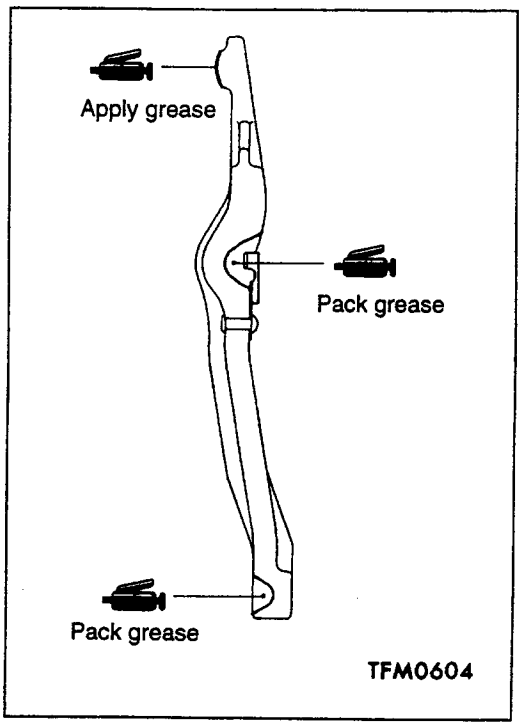
1. Clutch fluid line bracket
2. Insulator
3. Washer
4. Clutch tube
5. Union bolt
6. Union
7. Gasket
8. Clutch release cylinder
9. Clutch cover
10. Clutch disc
11. Return clip
▶B◀ 12. Clutch release bearing
◀A▶ ▶A◀ 13. Release fork
14. Release fork boot
15. Fulcrum



REMOVAL SERVICE POINT

◀A▶ RELEASE FORK REMOVAL

Move the release fork in the direction shown to remove the clip from the fulcrum.

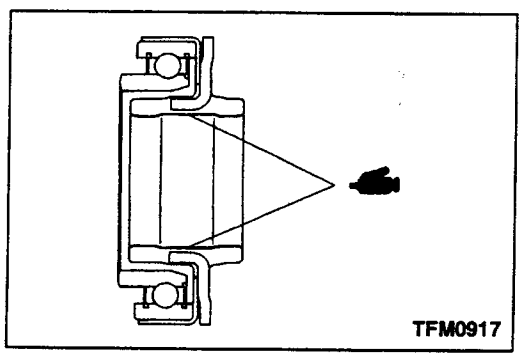


INSTALLATION SERVICE POINTS

▶A◀ RELEASE FORK INSTALLATION

Apply/pack grease to the illustrated positions of the release fork.

Specified grease:
MITSUBISHI genuine grease part No. 0101011 or equivalent



▶B◀ CLUTCH RELEASE BEARING INSTALLATION

Apply grease to the illustrated position of the clutch release bearing.

Specified grease:
MITSUBISHI genuine grease Part No. 0101011 or equivalent.

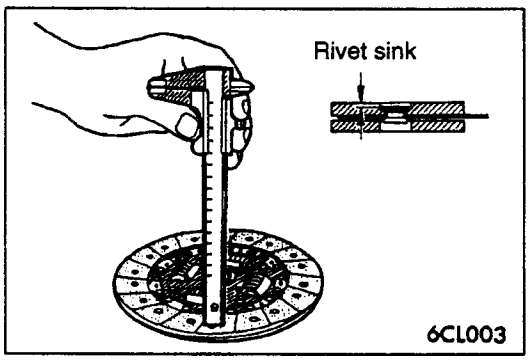
INSPECTION

CLUTCH COVER

Check the diaphragm spring end for wear and uneven height. Replace if wear is evident or height difference exceeds the limit.

Limit: 0.5 mm

Check the pressure plate surface for wear, cracks and discoloration.
Check the rivets of the strap plate for looseness. If loose, replace the clutch cover.



CLUTCH DISC

Caution
Don't clean the clutch disc in a cleaning fluid.

Check the facing for loose rivets, uneven contact, evidence of seizure, or deposited oils and greases. If defective, replace the clutch disc.
Measure the rivet sink and replace the clutch disc if it is out of specification.

Limit: 0.3 mm

Check the torsion spring for looseness and damage. If defective, replace the clutch disc.
Combine the clutch disc with the input shaft and check for sliding condition and play in the rotating direction. If poor sliding condition is evident, clean, reassemble, and recheck. If excessive looseness is evident, replace the clutch disc and/or input shaft.

CLUTCH RELEASE BEARING

Caution
Release bearing is packed with grease. Therefore, do not wash it in a cleaning fluid and the like.

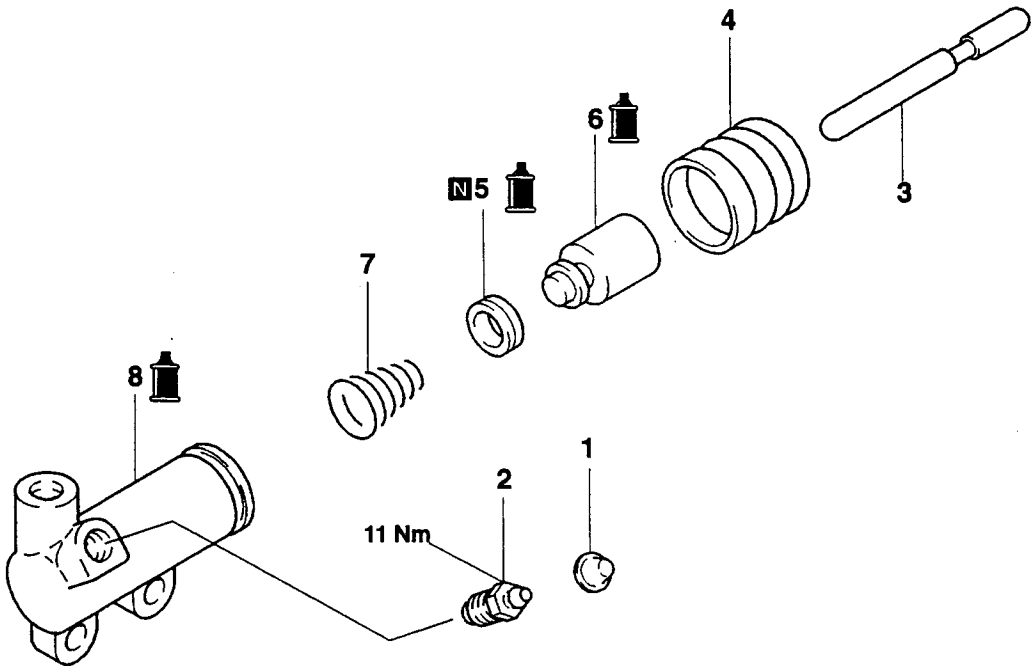
Check for seizure, damage, noise or improper rotation.
Check for wear on the surface which contacts with the diaphragm spring.
Check for wear on the surface which contacts with release fork. If abnormally worn, replace.

RELEASE FORK

If the surface which contacts with the bearing is abnormally worn, replace.

CLUTCH RELEASE CYLINDER

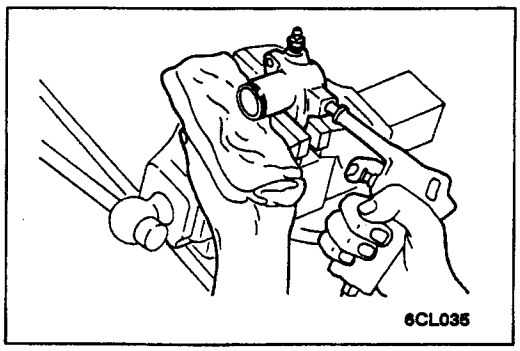
DISASSEMBLY AND REASSEMBLY



TFM0594

Disassembly steps

1. Cap
2. Air bleeder
3. Push rod
4. Boot
- ◀A▶ ▶A◀ 5. Piston cup
- ◀A▶ ▶A◀ 6. Piston
7. Conical spring
8. Release cylinder



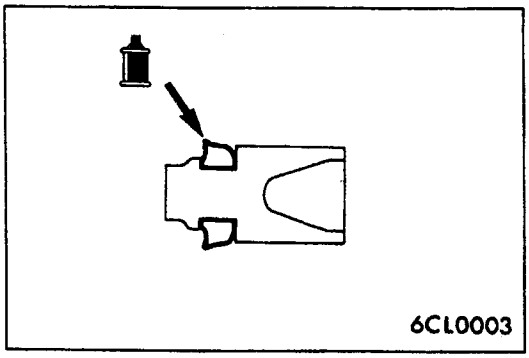
DISASSEMBLY SERVICE POINT

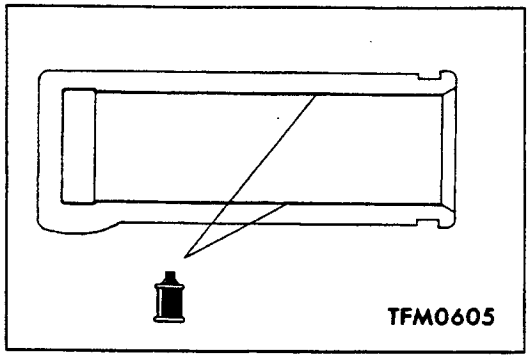
◀A▶ PISTON CUP / PISTON REMOVAL

Remove the piston from the release cylinder using compressed air.

Caution

1. **Cover with shop towel to prevent the piston from popping out.**
2. **Apply compressed air slowly to prevent brake fluid from splashing.**





REASSEMBLY SERVICE POINT

▶A◀ PISTON / PISTON CUP INSTALLATION

After applying brake fluid to the inside wall surface of the release cylinder and all the circumferential surfaces of the piston and piston cup, insert the piston and piston cup into the cylinder.

Specified brake fluid: Brake fluid SAE J1703 (DOT3)

INSPECTION

RELEASE CYLINDER

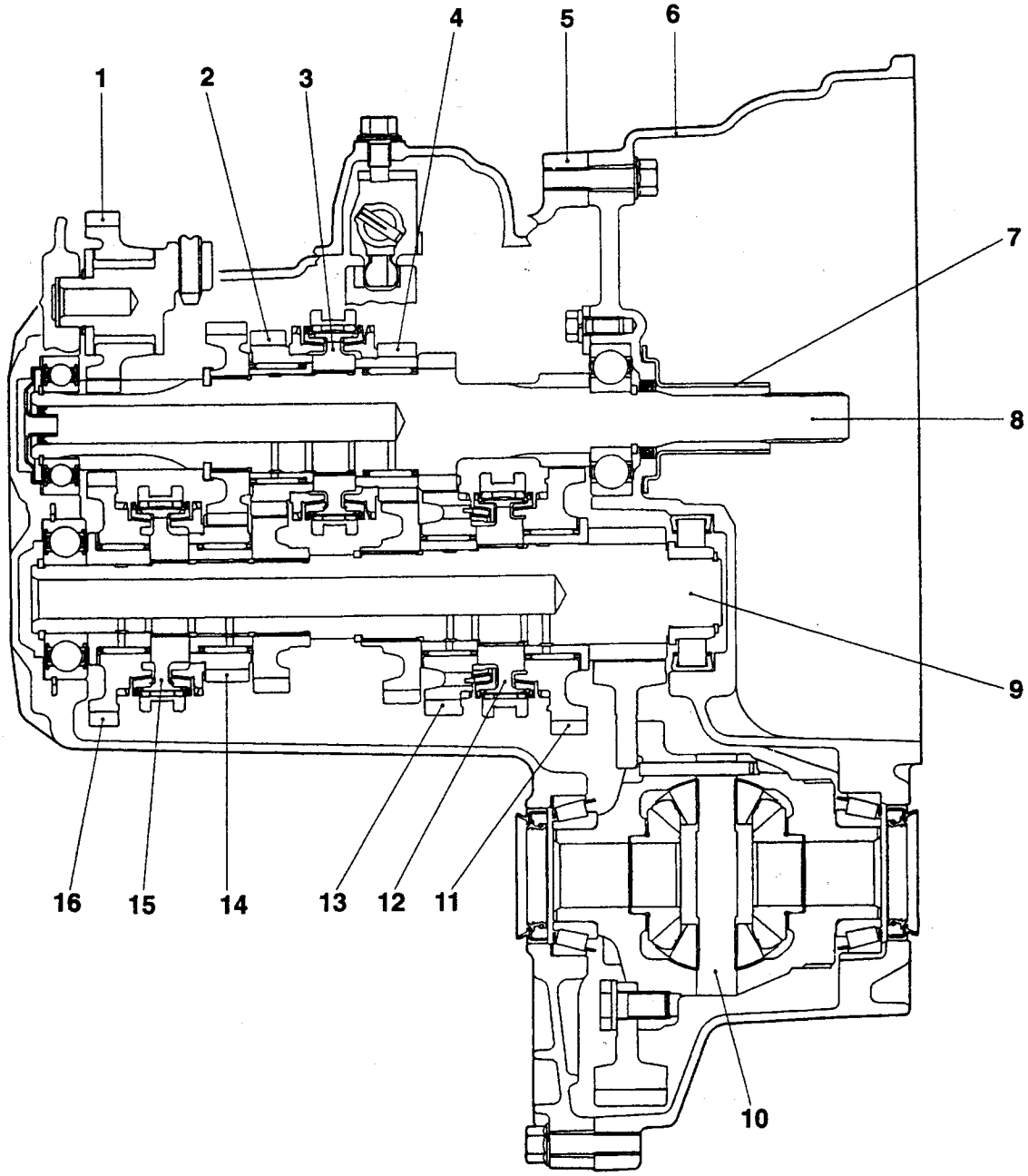
Check the inside wall surface of the release cylinder for rust and damage.
Using a cylinder gauge, measure the inside diameter of the release cylinder at about three positions (the deepest, middle and brim positions). If the clearance from the outside diameter of the piston exceeds the limit, replace the release cylinder as an assembly.

Limit: 0.15 mm

MANUAL TRANSMISSION

CONTENTS

GENERAL INFORMATION



TFM0601

1. Reverse idler gear
2. 4th speed gear
3. 3rd-4th speed synchronizer
4. 3rd speed gear
5. Transmission case
6. Clutch housing
7. Release bearing retainer
8. Input shaft
9. Output shaft
10. Differential
11. 1st speed gear
12. 1st-2nd speed synchronizer
13. 2nd speed gear
14. 5th speed gear
15. 5th-reverse speed synchronizer
16. Reverse gear

SPECIFICATIONS

Transmission model	Speedometer gear ratio	Final gear ratio	Vehicle model	Engine model
F5M42-2-V7A	30/36	4.312	DE3A	6A12

GEAR RATIO TABLE

1st	3.583
2nd	1.947
3rd	1.379
4th	1.030
5th	0.820
Reverse	3.363

SERVICE SPECIFICATIONS

Items	Allowable range	Limit
Input shaft front bearing end play mm	–0.01 – 0.12	–
Input shaft rear bearing end play mm	–0.01 – 0.12	–
Input shaft 5th speed gear end play mm	–0.01 – 0.09	–
Output shaft front bearing end play mm	–0.01 – 0.12	–
Output shaft rear bearing end play mm	–0.01 – 0.09	–
Output shaft 3rd speed gear end play mm	–0.01 – 0.09	–
Differential case pinion backlash	0.025 – 0.150	–
Differential case preload mm	0.05 – 0.11	–
Synchronizer ring back surface to gear clearance mm	–	0.5

NOTE: Standard play = 0 mm

SEALANTS AND ADHESIVES

Items	Specified sealants and adhesives
Clutch housing – transmission case mating surface	MITSUBISHI genuine sealant part No. MD997740 or equivalent
Control housing – transmission case mating surface	
Under cover – transmission case mating surface	
Air breather	3M SUPER WEATHERSTRIP No. 8001 or equivalent
Differential drive gear bolt	3M STUD Locking No. 4170 or equivalent

LUBRICANTS

Items	Specified lubricants
Drive shaft oil seal lip area	Hypoid gear oil SAE 75W-85W conforming to API classification GL-4 or higher
Input shaft oil seal lip area	MITSUBISHI genuine grease part No. 0101011 or equivalent
Select lever shoe	

SNAP RINGS, SPACERS AND THRUST PLATE FOR ADJUSTMENT

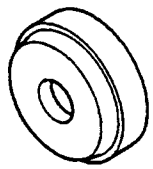
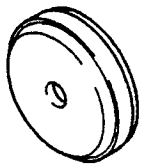
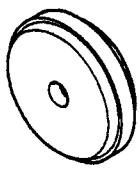
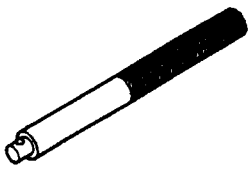
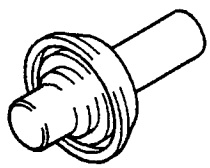
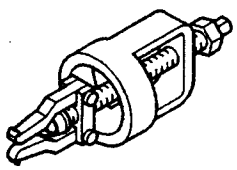
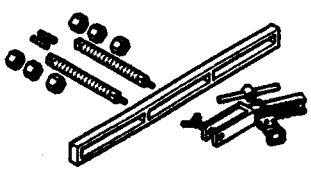
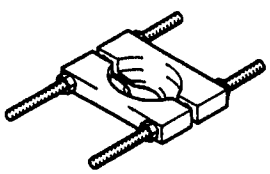
Part name	Thickness mm	Identification symbol	Part No.
Snap ring (For adjustment of input shaft front bearing end play)	2.24	None	MD706537
	2.31	Blue	MD706538
	2.38	Brown	MD706539
Snap ring (For adjustment of input shaft rear bearing end play) (For adjustment of output shaft rear bearing end play)	2.31	Black (2)	MD747149
	2.35	None	MD746561
	2.39	Blue	MD746562
	2.43	Brown	MD746563
	2.47	Green	MD746564
	2.51	White	MD746565
	2.55	Yellow	MD746566
	2.59	Black	MD746567
	2.63	Orange	MD746568
	2.67	Blue	MD746569
	2.71	Brown	MD746570
Thrust plate (For adjustment of input shaft 5th speed gear end play)	2.82	–	MD748015
	2.86	–	MD748016
	2.90	–	MD748017
	2.94	–	MD748018
	2.98	–	MD748019
	3.02	–	MD748020
	3.06	–	MD748021
	3.10	–	MD748022
Snap ring (For adjustment of output shaft front bearing end play)	1.43	Green (2)	MD746708
	1.51	White (2)	MD746709
	1.59	Yellow (2)	MD746710

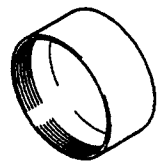
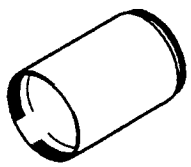
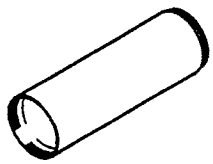
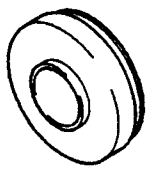
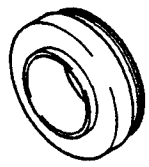
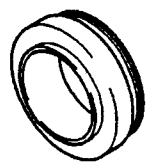
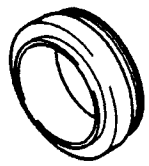
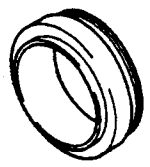
Part name	Thickness mm	Identification symbol	Part No.
Snap ring (For adjustment of output shaft 3rd speed gear end play)	2.81	Green	MD745799
	2.85	White	MD745800
	2.89	Yellow	MD745801
	2.93	Black	MD745802
	2.97	Orange	MD745803
	3.01	Red	MD745804
	3.05	Pink	MD745805
	3.09	Blue	MD745806
Spacer (For adjustment of differential case preload)	0.80	80	MD727661
	0.83	83	MD720937
	0.86	86	MD720938
	0.89	89	MD720939
	0.92	92	MD720940
	0.95	95	MD720941
	0.98	98	MD720942
	1.01	01	MD720943
	1.04	04	MD720944
	1.07	07	MD720945
	1.10	J	MD710454
	1.13	D	MD700270
	1.16	K	MD710455
	1.19	L	MD710456
	1.22	G	MD700271
	1.25	M	MD710457
Spacer (For adjustment of differential case pinion backlash)	0.75 – 0.82	–	MA180862
	0.83 – 0.92	–	MA180861
	0.93 – 1.00	–	MA180860
	1.01 – 1.08	–	MA180875
	1.09 – 1.16	–	MA180876

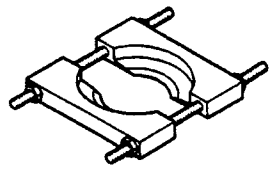
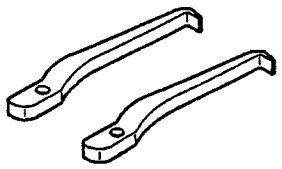
TORQUE SPECIFICATIONS

Items	Nm
Under cover mounting bolt	6.9
Interlock plate bolt	30
Clutch housing – transmission case mounting bolt	44
Clutch release bearing retainer mounting bolt	9.8
Control housing mounting bolt	18
Shift cable bracket mounting bolt	18
Speedometer gear mounting bolt	3.9
Stopper bracket mounting bolt	22
Select lever mounting bolt	18
Select lever mounting nut	11
Differential drive gear mounting bolt	132
Back-up lamp switch	32
Front bearing retainer mounting bolt	18
Poppet spring	32
Reverse idler gear shaft mounting bolt	48
Roll stopper bracket mounting bolt	69

SPECIAL TOOLS

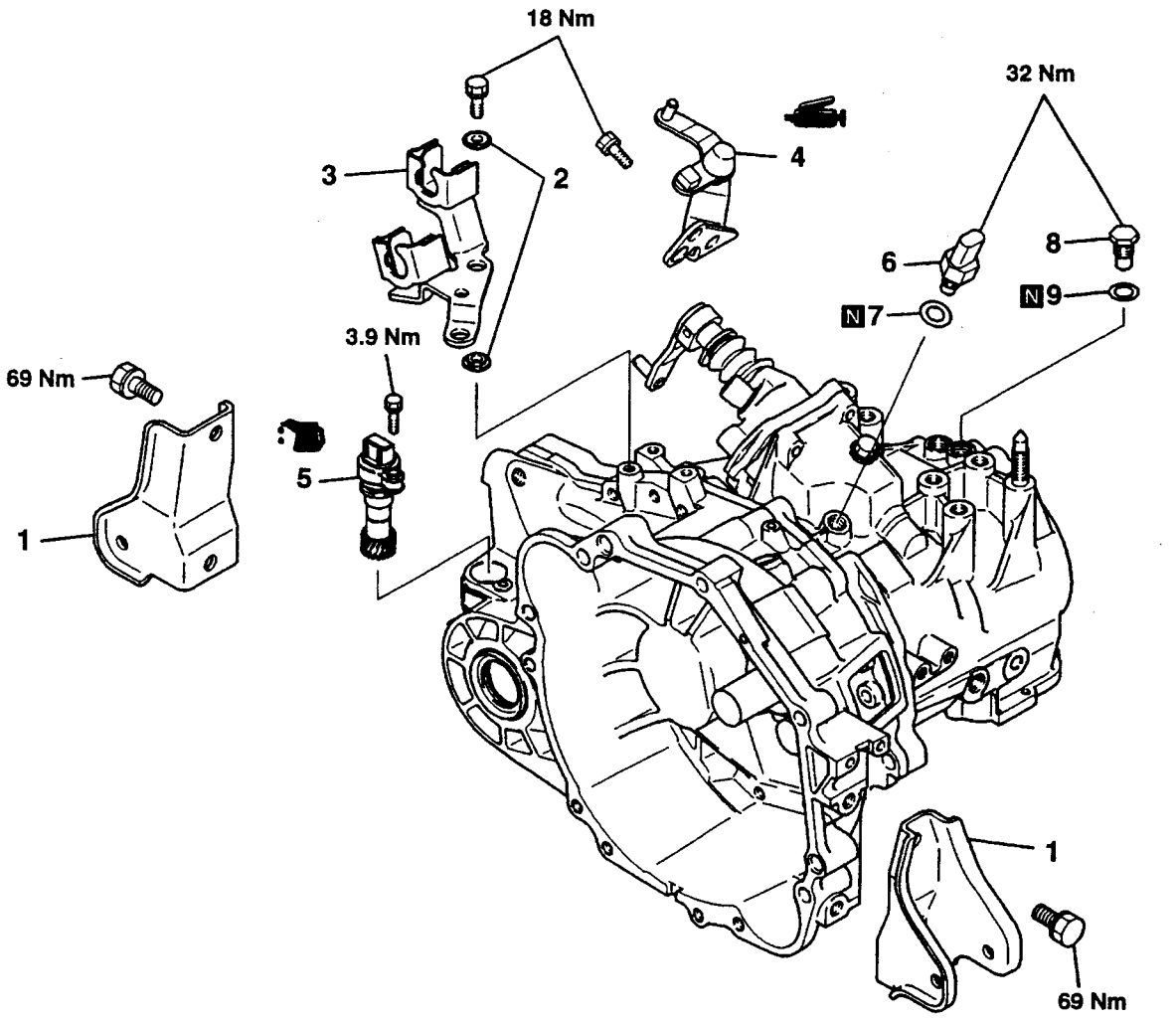
Tool	Number	Name	Use
	MB990926	Installer adapter	Installation of clutch housing input shaft oil seal
	MB990927	Installer adapter	Installation of sealing cap
	MB990934	Installer adapter	Installation of roller bearing outer race
	MB990935	Installer adapter	Installation of differential case taper roller bearing outer race
	MB990938	Handle	Use with Installer adapter
	MD998325	Differential oil seal installer	Installation of differential oil seal
	MD998346	Bearing outer race remover	Removal of roller bearing outer race
	MD998772	Valve spring compressor	Removal of roller bearing outer race
	MD998801	Bearing remover	Installation and removal of gears, bearings and sleeves

Tool	Number	Name	Use
	MD998812	Installer cap	Use with Installer and Installer adapter
	MD998813	Installer-100	Use with Installer cap and Installer adapter
	MD998814	Installer-200	Use with Installer cap and Installer adapter
	MD998816	Installer adapter (30)	Installation of input shaft front bearing
	MD998818	Installer adapter (38)	Installation of input shaft rear bearing, roller bearing inner race, reverse gear, needle roller bearing, reverse gear bearing sleeve and output shaft rear bearing
	MD998819	Installer adapter (40)	Installation of 5th-reverse speed synchronizer hub, differential case bearing, 4th speed gear and 5th speed gear sleeve
	MD998822	Installer adapter (46)	Installation of 1st speed gear sleeve, 2nd speed gear sleeve and 3rd speed gear
	MD998824	Installer adapter (50)	Installation of 4th speed gear sleeve and 5th speed gear
	MD998825	Installer adapter (52)	Installation of 1st-2nd speed synchronizer hub, 3rd-4th speed synchronizer hub and 1st speed gear sleeve

Tool	Number	Name	Use
	MD998917	Bearing remover	Installation and removal of gears, bearings and sleeves
	MD999566	Claw	Removal of differential case taper roller bearing outer race

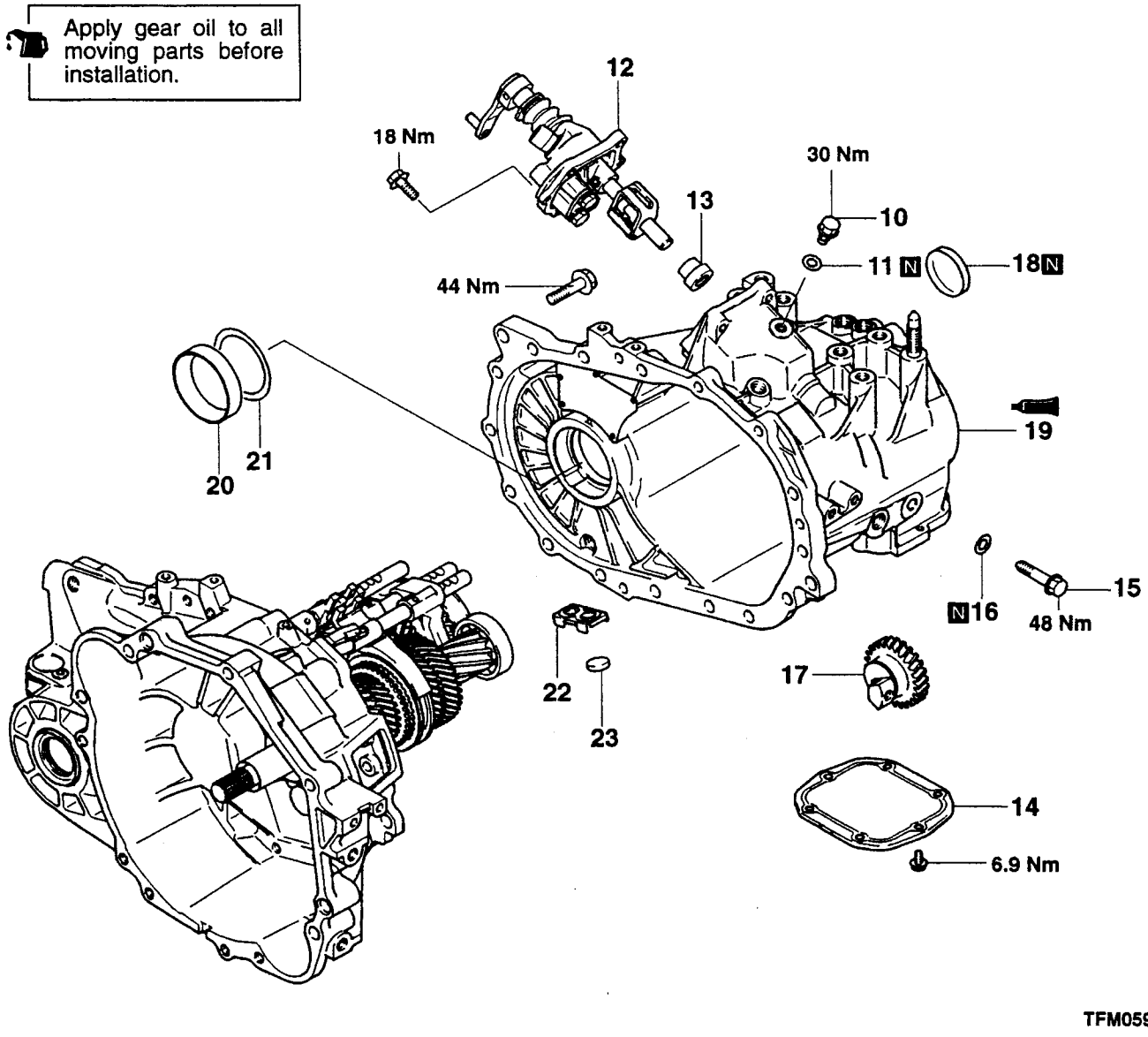
TRANSMISSION

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Roll stopper bracket
2. Insulator washer
3. Shift cable bracket
4. ▶K◀ ▶J◀ Select lever
5. Speedometer gear
6. Back-up lamp switch
7. Gasket
8. Poppet spring
9. Gasket



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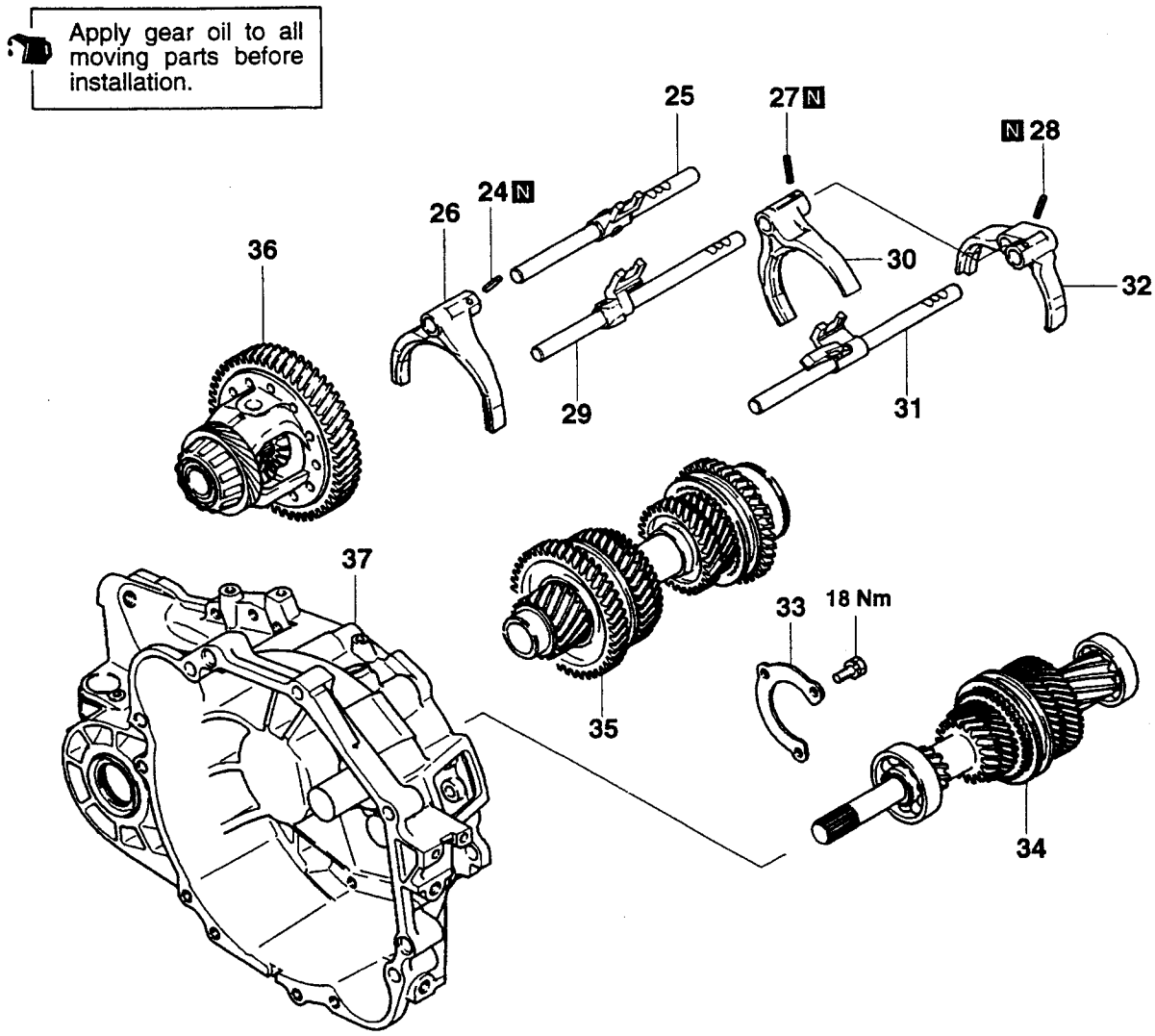
Disassembly steps

10. Interlock plate bolt
11. Gasket
▶I◀ 12. Control housing
13. Neutral return spring
▶H◀ 14. Under cover
15. Reverse idler gear shaft bolt
16. Gasket
17. Reverse idler gear
◀A▶ ▶G◀ 18. Sealing cap
◀B▶ ▶F◀ 19. Transmission case
▶E◀ 20. Outer race
▶D◀ 21. Spacer
22. Magnet holder
23. Magnet



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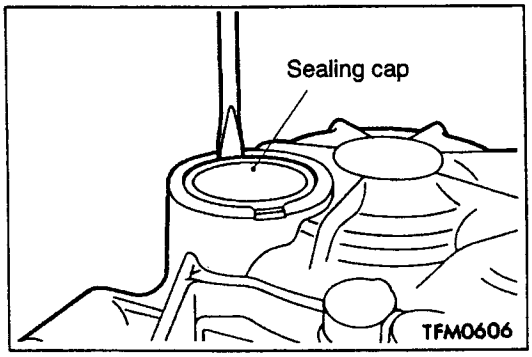
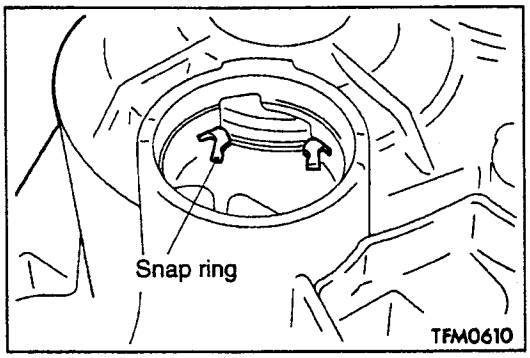
Disassembly steps

- ▶C◀ 24. Spring pin
- 25. 1st-2nd speed shift rail
- 26. 1st-2nd speed shift fork
- ▶C◀ 27. Spring pin
- ▶C◀ 28. Spring pin
- ◀C▶ ▶B◀ 29. 3rd-4th speed shift rail
- ◀C▶ ▶B◀ 30. 3rd-4th speed shift fork
- ◀C▶ ▶B◀ 31. 5th-reverse speed shift rail
- ◀C▶ ▶B◀ 32. 5th-reverse speed shift fork
- 33. Front bearing retainer
- ◀D▶ ▶A◀ 34. Input shaft
- ◀D▶ ▶A◀ 35. Output shaft
- 36. Differential
- 37. Clutch housing



DISASSEMBLY SERVICE POINTS

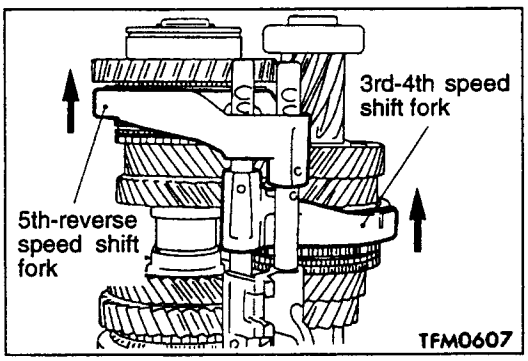
◀A▶ SEALING CAP REMOVAL



◀B▶ TRANSMISSION CASE REMOVAL

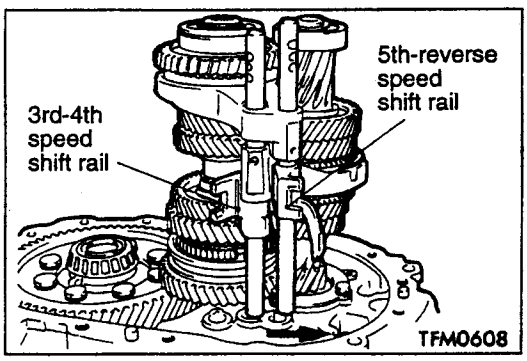
Expand the snap ring to remove it from the snap ring groove of the ball bearing.

NOTE
Expansion of the snap ring causes the snap ring groove to get out of position because of the output shaft's own weight.

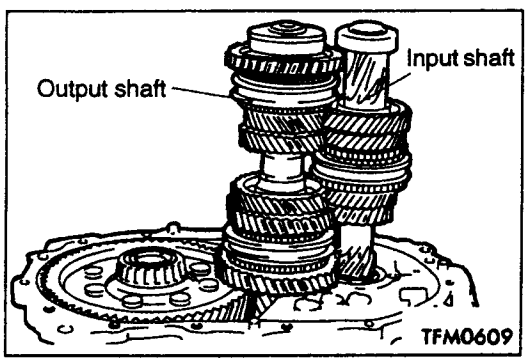


◀C▶ 3RD-4TH SPEED SHIFT RAIL / 3RD-4TH SPEED SHIFT FORK / 5TH-REVERSE SPEED SHIFT RAIL / 5TH-REVERSE SPEED SHIFT FORK REMOVAL

(1) Shift the 3rd-4th speed shift fork and 5th-reverse speed shift fork in the direction shown.

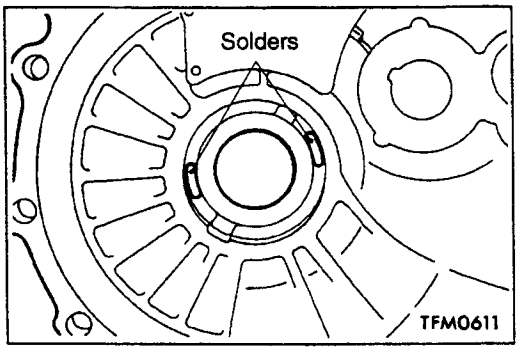


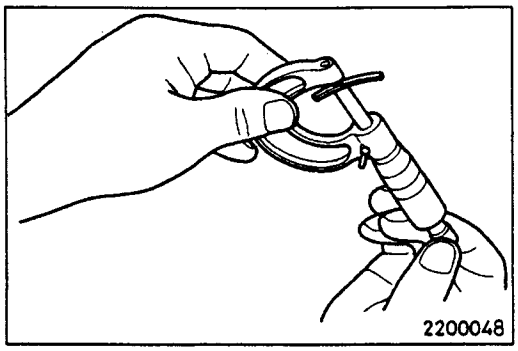
(2) Slide the 3rd-4th speed shift rail and 5th-reverse speed shift rail in the direction shown and remove them together with the shift fork.



◀D▶ INPUT SHAFT / OUTPUT SHAFT REMOVAL

Remove the input and output shafts together.



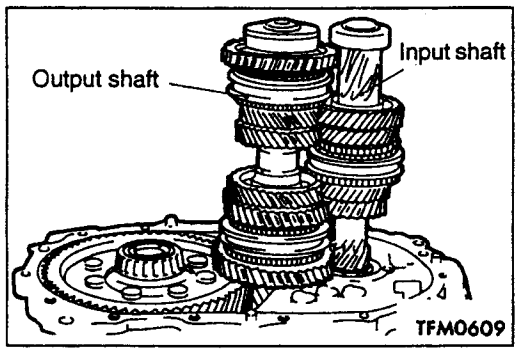


ADJUSTMENT BEFORE REASSEMBLY

SPACER SELECTION FOR DIFFERENTIAL CASE PRELOAD ADJUSTMENT

(1) Put solders (about 10 mm long, 1.6 mm in diameter) in the illustrated positions of the transmission case and install the bearing outer race and differential.
(2) Install the clutch housing and tighten the bolts to the specified torque.
(3) If the solders are not crushed, put larger diameter solders and repeat Steps (1) and (2).
(4) Measure the thickness (T) of the crushed solder with a micrometer and select a spacer according to the following equation.

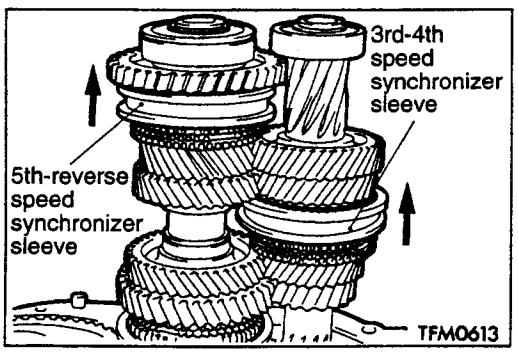
Spacer thickness: (T + 0.05 mm) to (T + 0.11 mm)



REASSEMBLY SERVICE POINTS

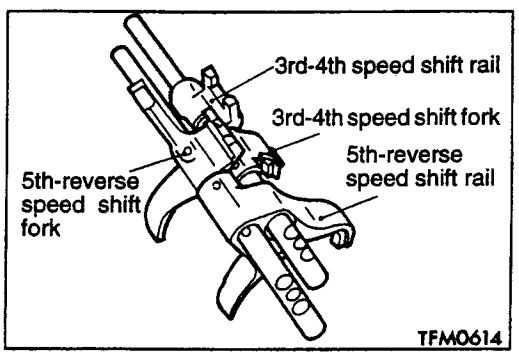
▶A◀ OUTPUT SHAFT / INPUT SHAFT INSTALLATION

Install the input and output shafts together.

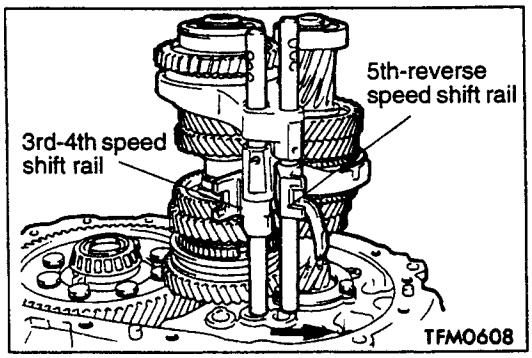


▶B◀ 5TH-REVERSE SPEED SHIFT FORK / 5TH-REVERSE SPEED SHIFT RAIL / 3RD-4TH SPEED SHIFT FORK / 3RD-4TH SPEED SHIFT RAIL INSTALLATION

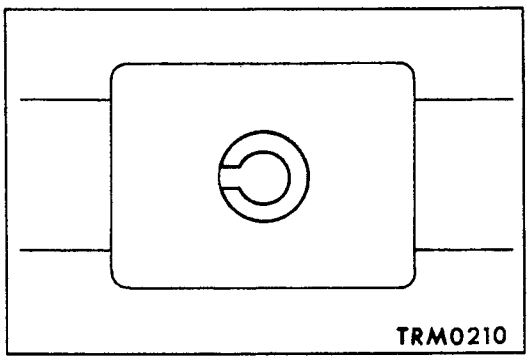
(1) Shift the 3rd-4th speed synchronizer sleeve and 5th-reverse speed synchronizer sleeve in the direction shown.



(2) Install the 3rd-4th speed shift rail and fork and the 5th-reverse speed shift rail and fork.



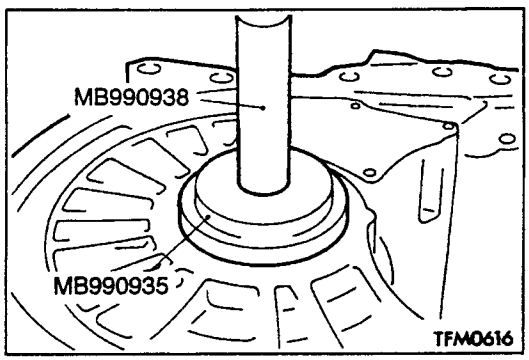
(3) While fitting each shift fork in the sleeve, slide the shift rails in the direction shown and install.



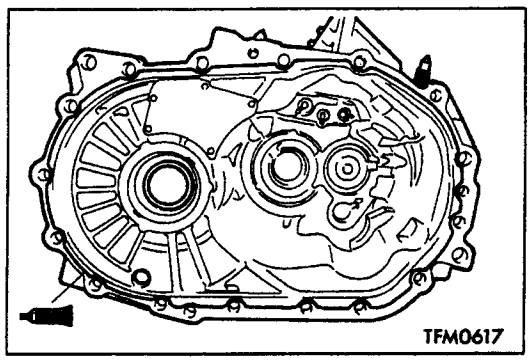
▶C◀ SPRING PIN INSTALLATION

▶D◀ SPACER INSTALLATION

Install the spacer selected in the section "ADJUSTMENT BEFORE REASSEMBLY".



▶E◀ OUTER RACE INSTALLATION

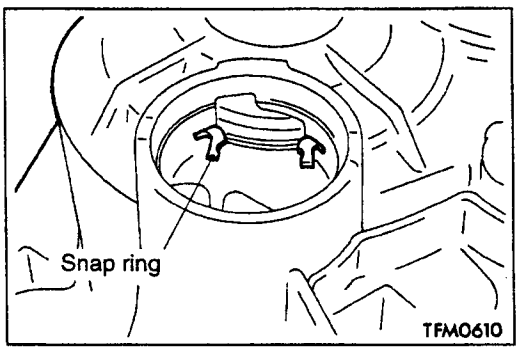


▶F◀ TRANSMISSION CASE INSTALLATION

(1) Apply a 1.5 mm bead of sealant to the illustrated position of the transmission case.

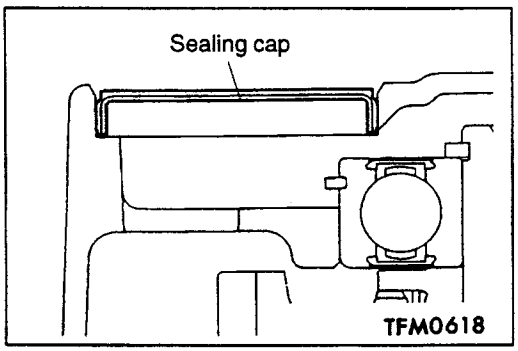
Specified sealant:
MITSUBISHI genuine sealant part No. MD997740 or equivalent

Caution
Squeeze out the sealant uniformly, while making sure that it is not broken or excessively applied.



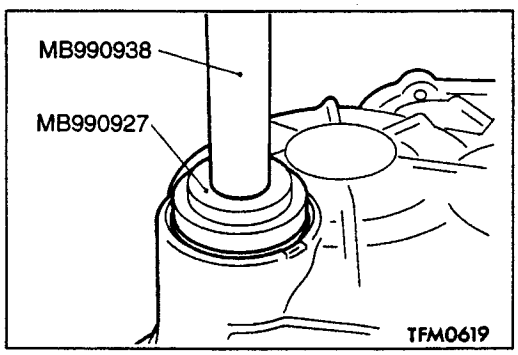
(2) Install the transmission case and expand the snap ring.
(3) Tighten the transmission case to the specified torque.

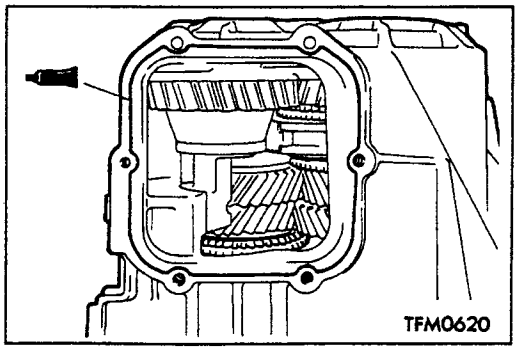
NOTE
Place the transmission upside down and let the snap ring fit in the groove by taking advantage of the output shaft's own weight.



▶G◀ SEALING CAP INSTALLATION

Press-fit the sealing cap all the way up to the illustrated position.



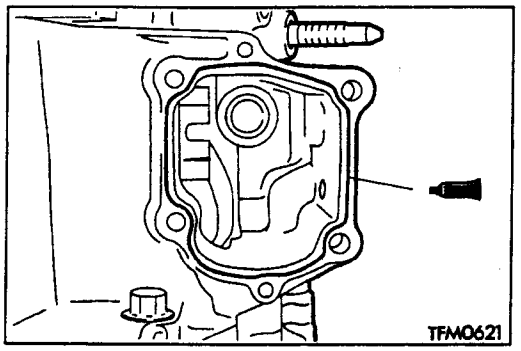


▶H◀ UNDER COVER INSTALLATION

Apply a 1.5 mm bead of sealant to the illustrated position of the transmission case.

Specified sealant:
MITSUBISHI genuine sealant part No. MD997740 or equivalent

Caution
Squeeze out the sealant uniformly, while making sure that it is not broken or excessively applied.

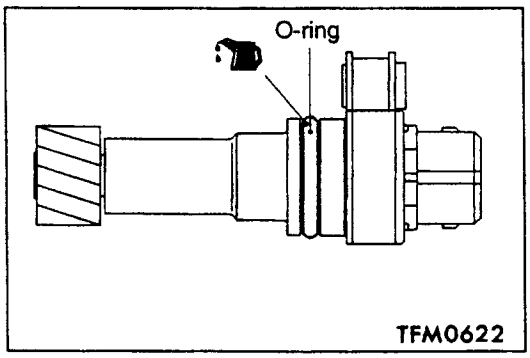


▶I◀ CONTROL HOUSING INSTALLATION

Apply a 1.5 mm bead of sealant to the illustrated position of the transmission case.

Specified sealant:
MITSUBISHI genuine sealant part No. MD997740 or equivalent

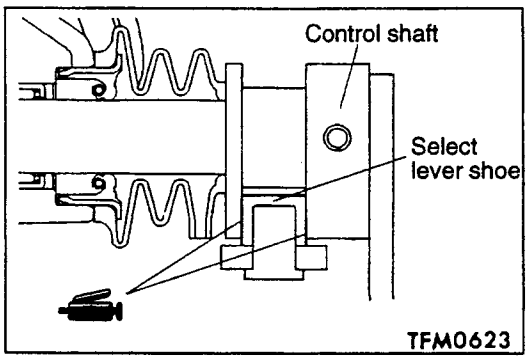
Caution
Squeeze out the sealant uniformly, while making sure that it is not broken or excessively applied.



▶J◀ SPEEDOMETER GEAR INSTALLATION

Apply transmission oil to the O-ring of the speedometer gear.

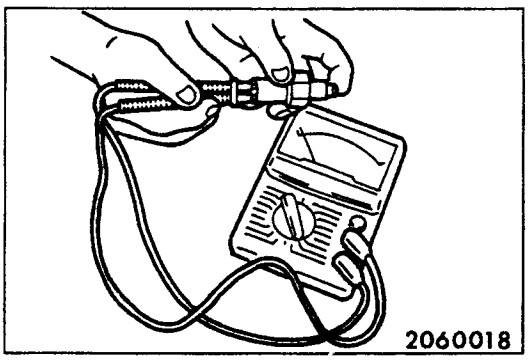
Transmission oil:
Hypoid gear oil SAE 75W-85W conforming to API classification GL-4 or higher



▶K◀ SELECT LEVER INSTALLATION

Apply grease to the control shaft sliding portion of the select lever shoe.

Specified grease:
MITSUBISHI genuine grease part No. 0101011 or equivalent



INSPECTION

BACK-UP LAMP SWITCH

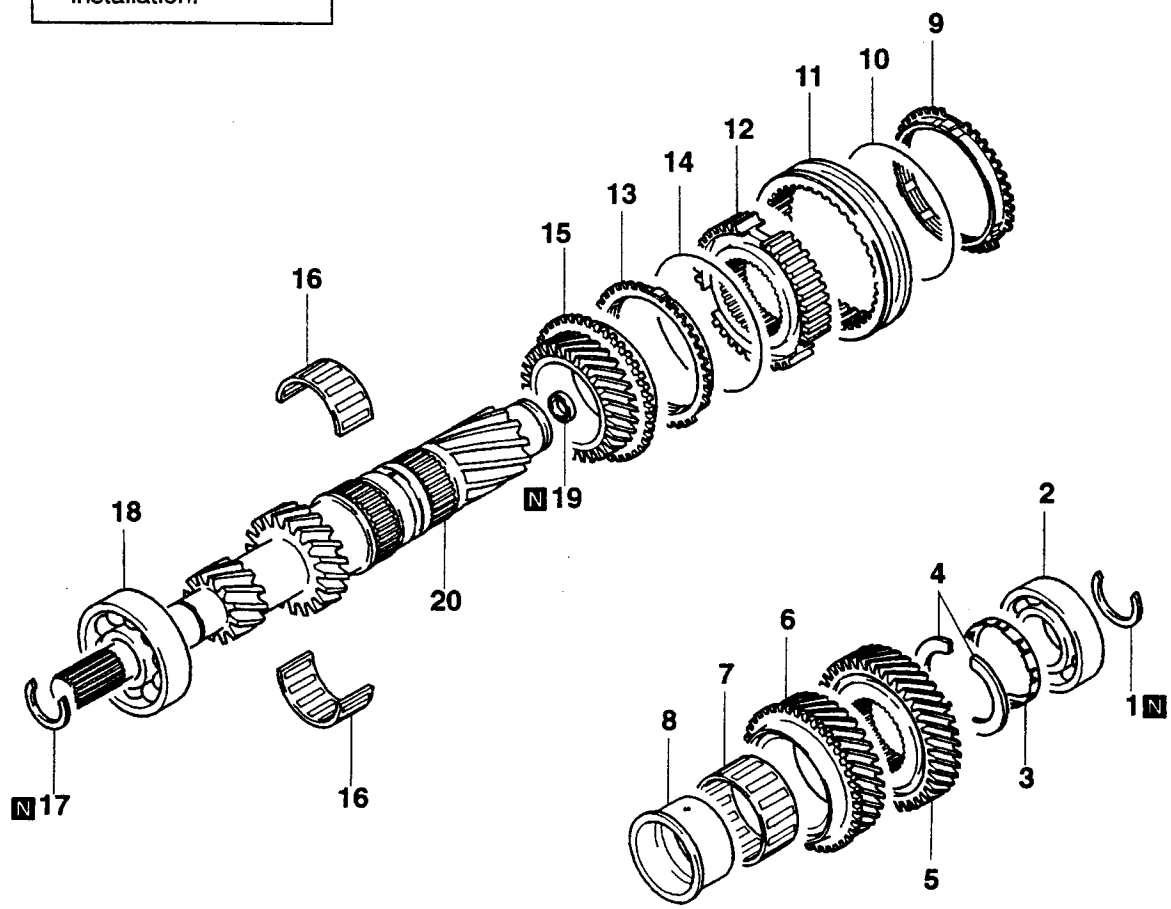
Check for continuity between terminals.

Switch condition	Continuity
Pressed	Not exist
Released	Exists

INPUT SHAFT

DISASSEMBLY AND REASSEMBLY

Apply gear oil to all moving parts before installation.



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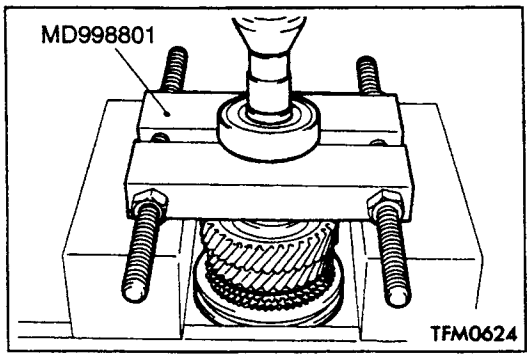
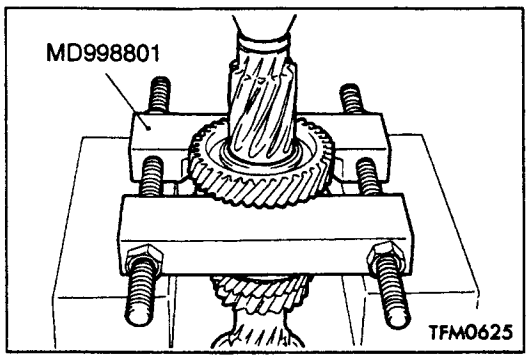
Disassembly steps

- 1. Snap ring
- ◀A▶ 2. Ball bearing
- 3. Thrust plate stopper
- 4. Thrust plate
- ◀B▶ 5. 5th speed gear
- 6. 4th speed gear
- 7. Needle roller bearing
- ◀C▶ 8. 4th speed gear sleeve
- 9. Synchronizer ring
- 10. Synchronizer spring
- 11. Synchronizer sleeve
- 12. 3rd-4th speed synchronizer hub
- 13. Synchronizer ring
- 14. Synchronizer spring
- 15. 3rd speed gear
- 16. Needle roller bearing
- 17. Snap ring
- ◀D▶ 18. Ball bearing
- 19. Oil seal
- 20. Input shaft

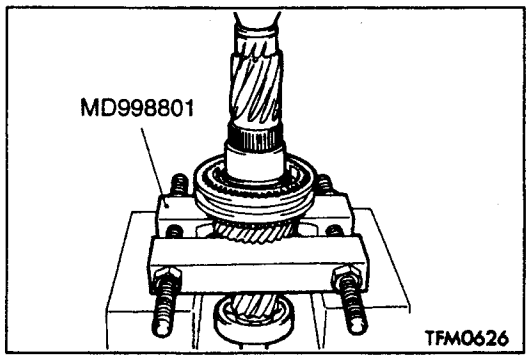


DISASSEMBLY SERVICE POINTS

◀A▶ BALL BEARING REMOVAL

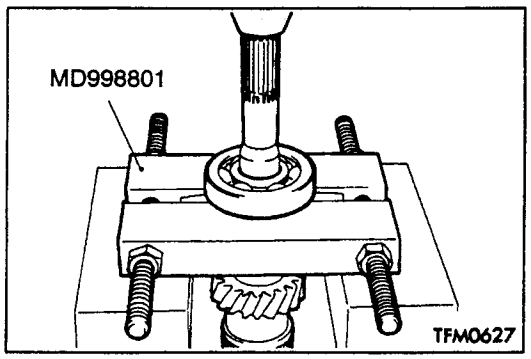


◀B▶ 5TH SPEED GEAR REMOVAL

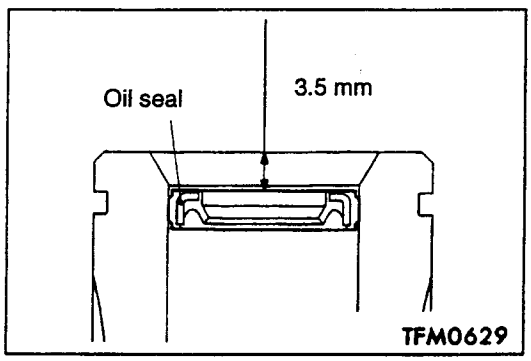


◀C▶ 4TH SPEED GEAR SLEEVE REMOVAL

Mount a special tool on the 3rd gear and remove the 4th speed gear sleeve.



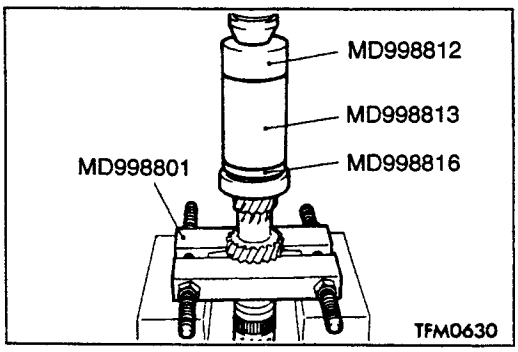
◀D▶ BALL BEARING REMOVAL



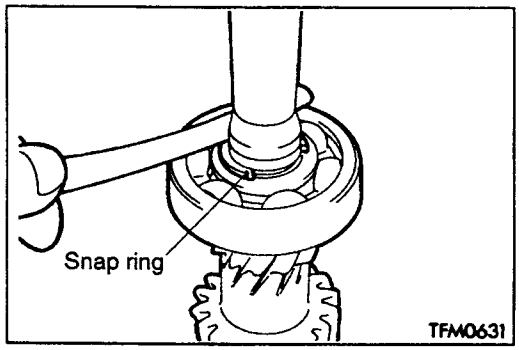
REASSEMBLY SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION

Drive in the oil seal all the way up to the illustrated dimension.



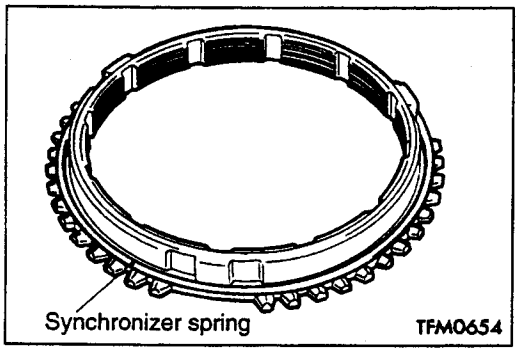
▶B◀ BALL BEARING INSTALLATION



▶C◀ SNAP RING INSTALLATION

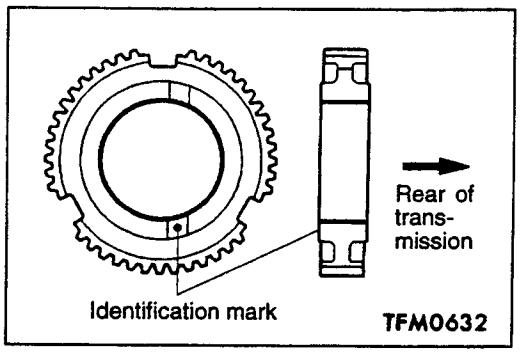
Select and install a snap ring so that the input shaft front bearing end play will have the standard value.

Standard value: –0.01 – 0.12 mm



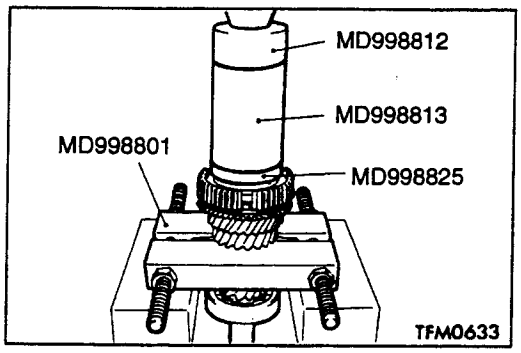
▶D◀ SYNCHRONIZER SPRING INSTALLATION

Install the synchronizer spring securely up to the illustrated position of the synchronizer ring.

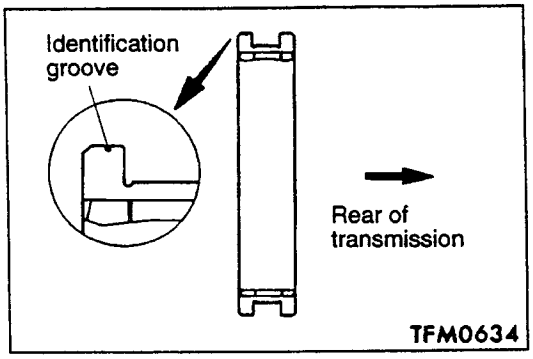


▶E◀ 3RD-4TH SPEED SYNCHRONIZER HUB INSTALLATION

Install the 3rd-4th speed synchronizer hub in such a way that it will be oriented in the direction shown.

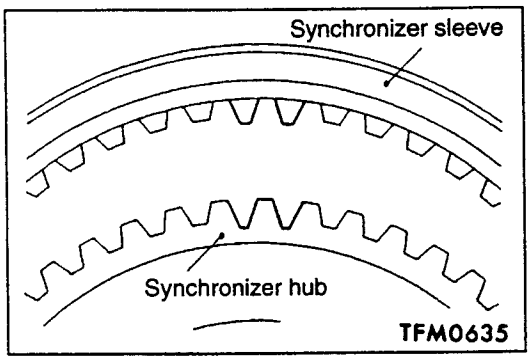


Caution
When the hub is installed, make sure that the synchronizer ring is not caught.



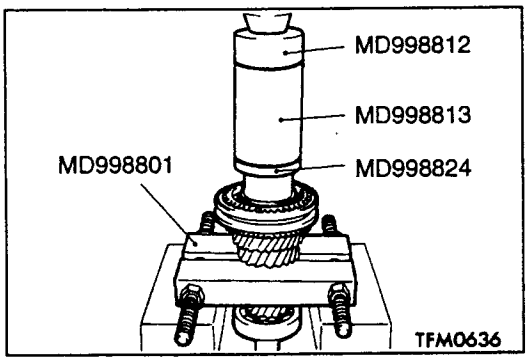
▶F◀ SYNCHRONIZER SLEEVE INSTALLATION

(1) Install the synchronizer sleeve in such a way that it will be oriented in the direction shown.

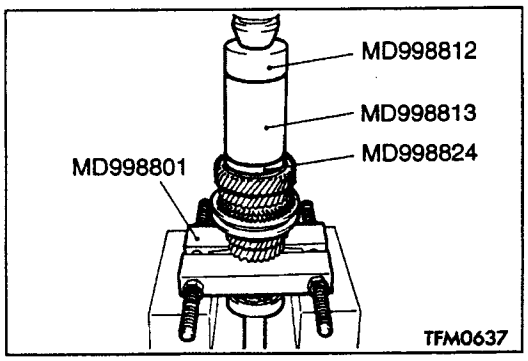


(2) When the synchronizer sleeve is installed, make sure that the deep groove portion of the synchronizer hub is aligned with the projecting portion of the sleeve.

▶G◀ 4TH SPEED GEAR SLEEVE INSTALLATION



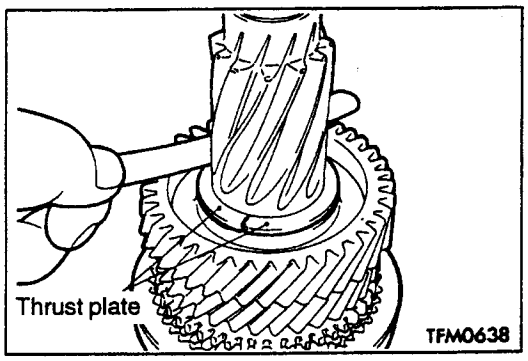
▶H◀ 5TH SPEED GEAR INSTALLATION

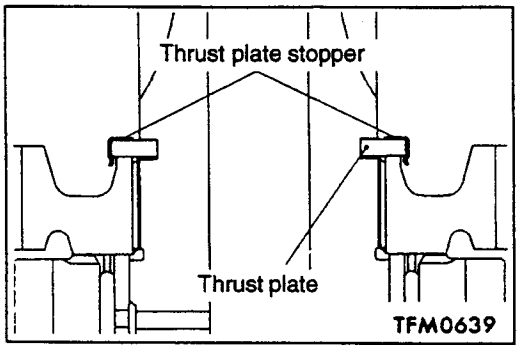


▶I◀ THRUST PLATE INSTALLATION

Select and install a thrust plate so that the input shaft 5th speed gear end play will have the standard value.

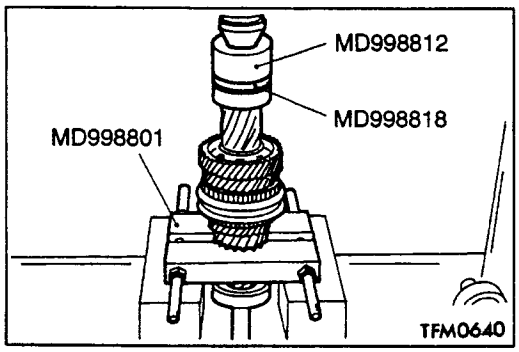
Standard value: –0.01 – 0.09 mm



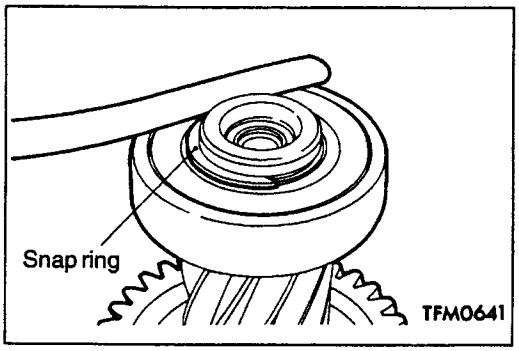


▶J◀ THRUST PLATE STOPPER INSTALLATION

When the thrust plate is installed, make sure that it is not tilted.



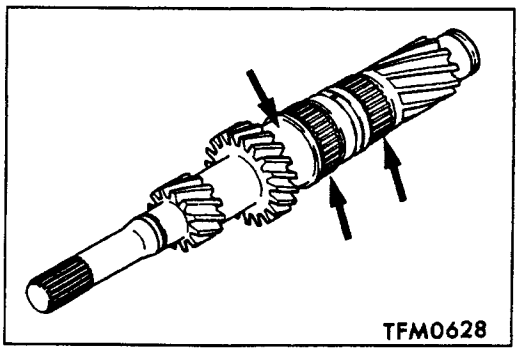
▶K◀ BALL BEARING INSTALLATION



▶L◀ SNAP RING INSTALLATION

Select and install a snap ring so that the input shaft rear bearing end play will have the standard value.

Standard value: –0.01 – 0.12 mm



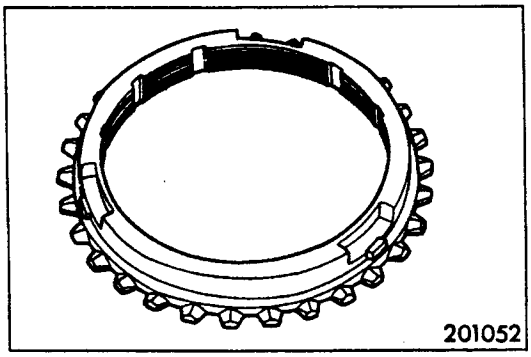
INSPECTION

INPUT SHAFT

(1) Check the outside diameter of the needle bearing mounting portion for damage, abnormal wear and seizure.
(2) Check the splines for damage and wear.

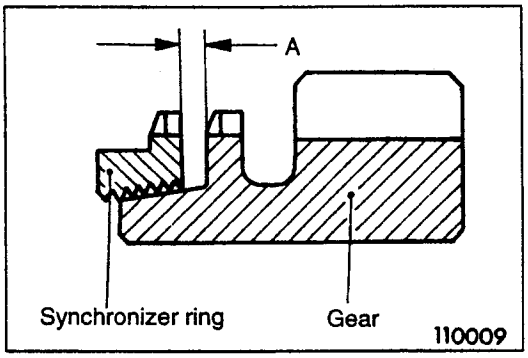
NEEDLE ROLLER BEARING

Check to ensure that when the input shaft and gear are combined and made to rotate, they rotate smoothly without looseness and noise.



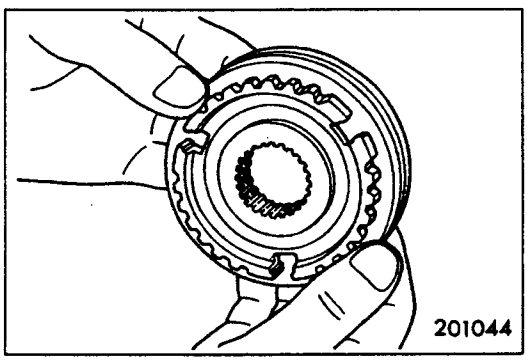
SYNCHRONIZER RING

(1) Check to ensure that the clutch gear tooth surfaces are not damaged and broken.
(2) Check to ensure that the cone inside diameter is not damaged or worn and that the threads are not crushed.



(3) Press the synchronizer ring against the gear and check clearance "A". If "A" is less than the limit, replace.

Limit: 0.5 mm



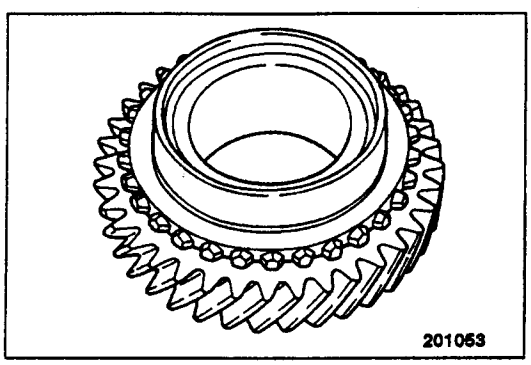
SYNCHRONIZER SLEEVE AND HUB

(1) Check to ensure that when the synchronizer sleeve and hub are combined and made to slide, they slide smoothly without binding.
(2) Check to ensure that the front and rear ends of the sleeve inside surface are not damaged.

Caution
When replacement of either the synchronizer sleeve or hub is necessary, make sure that the synchronizer sleeve and hub are replaced as a set.

SYNCHRONIZER SPRING

Check to ensure that the spring is not sagging, deformed or broken.



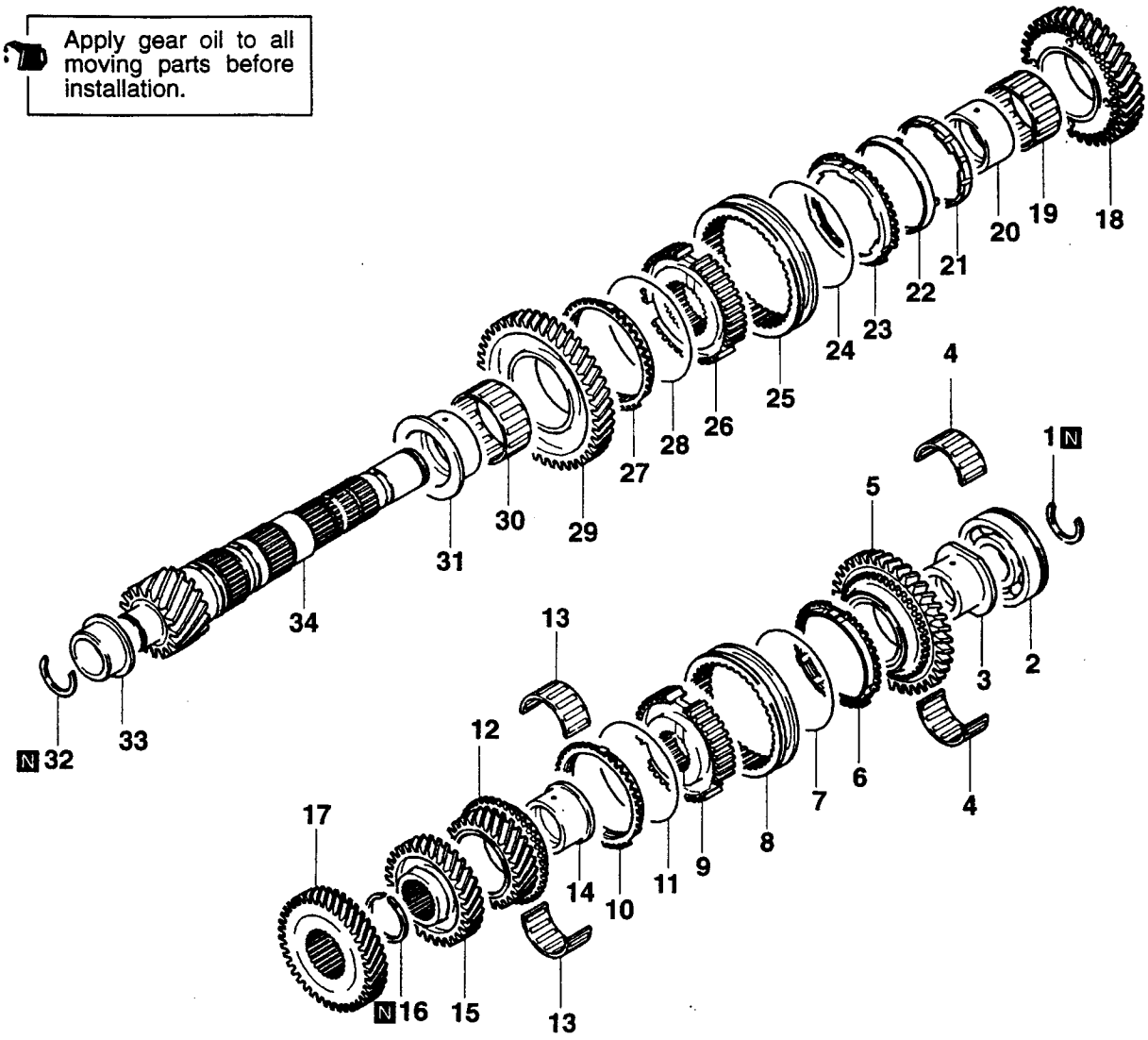
SPEED GEARS

(1) Check to ensure that the helical and clutch gear tooth surfaces are not damaged or worn.
(2) Check to ensure that the synchronizer cone surfaces are not roughened, damaged or worn.
(3) Check to ensure that the gear inside diameter and front and rear surfaces are not damaged and worn.

OUTPUT SHAFT

DISASSEMBLY AND REASSEMBLY

Apply gear oil to all moving parts before installation.



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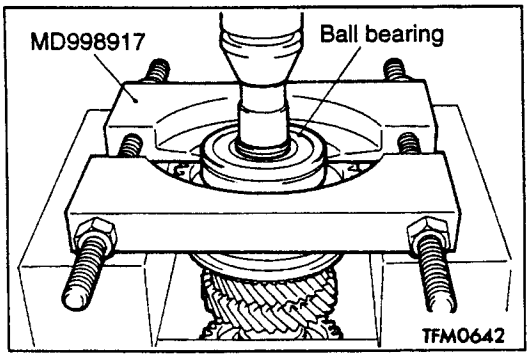
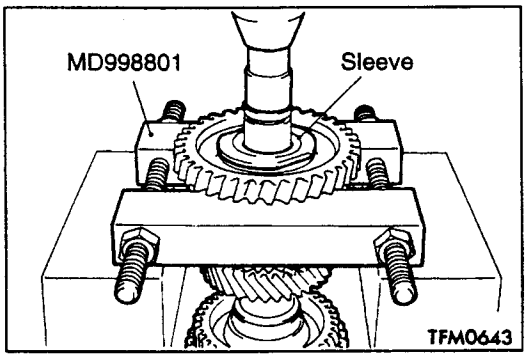
Disassembly steps

	▶P◀	1. Snap ring			18. 2nd speed gear
◀A▶	▶O◀	2. Ball bearing			19. Needle roller bearing
◀B▶	▶N◀	3. Reverse gear bearing sleeve	▶E◀	▶H◀	20. 2nd speed gear sleeve
	▶N◀	4. Needle roller bearing			21. Inner synchronizer ring
	▶N◀	5. Reverse gear			22. Synchronizer cone
		6. Synchronizer ring			23. Outer synchronizer ring
	▶D◀	7. Synchronizer spring		▶G◀	24. Synchronizer spring
	▶F◀	8. Synchronizer sleeve		▶F◀	25. Synchronizer sleeve
◀C▶	▶M◀	9. 5th-reverse speed synchronizer hub		▶E◀	26. 1st-2nd speed synchronizer hub
		10. Synchronizer ring			27. Synchronizer ring
	▶D◀	11. Synchronizer spring		▶D◀	28. Synchronizer spring
		12. 5th speed gear			29. 1st speed gear
		13. Needle roller bearing			30. Needle roller bearing
	▶L◀	14. 5th speed gear sleeve	◀F▶	▶C◀	31. 1st speed gear sleeve
	▶K◀	15. 4th speed gear		▶B◀	32. Snap ring
	▶J◀	16. Snap ring	◀G▶	▶A◀	33. Roller bearing inner race
◀D▶	▶I◀	17. 3rd speed gear			34. Output shaft



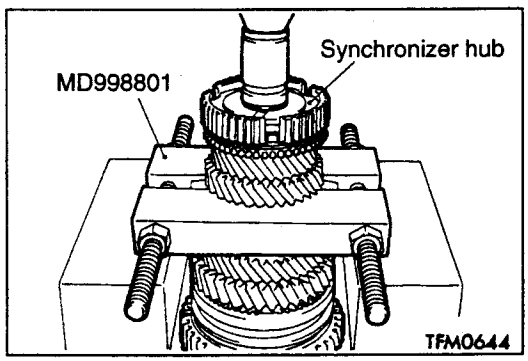
DISASSEMBLY SERVICE POINTS

◀A▶ BALL BEARING REMOVAL



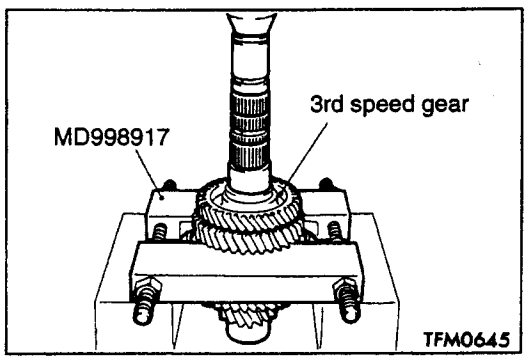
◀B▶ REVERSE GEAR BEARING SLEEVE REMOVAL

Mount a special tool on the reverse gear and remove the reverse gear bearing sleeve.



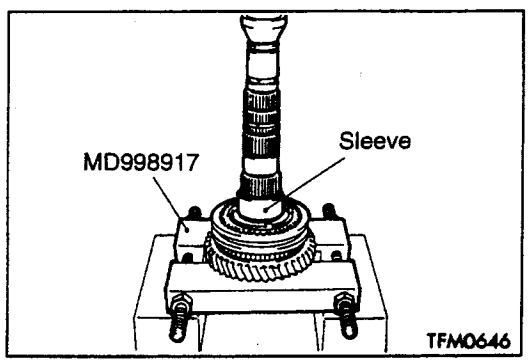
◀C▶ 5TH-REVERSE SPEED SYNCHRONIZER HUB REMOVAL

Mount a special tool on the 4th speed gear and remove the 5th-reverse speed synchronizer hub.



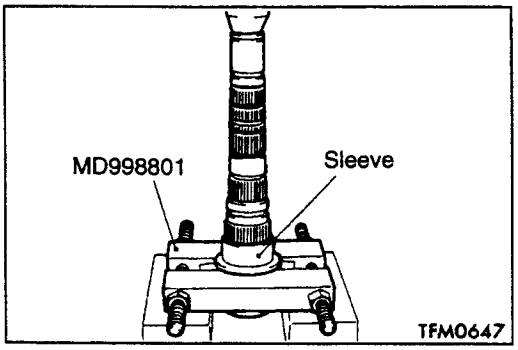
◀D▶ 3RD SPEED GEAR REMOVAL

Mount a special tool on the 2nd speed gear and remove the 3rd speed gear.

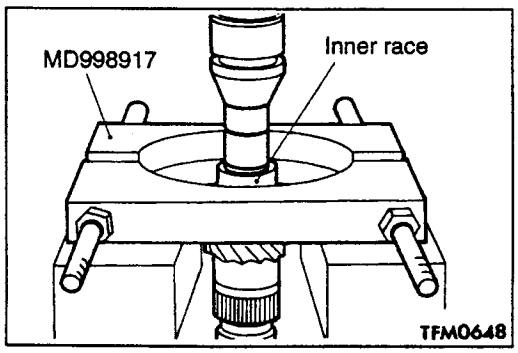


◀E▶ 2ND SPEED GEAR SLEEVE REMOVAL

Mount a special tool on the 1st speed gear and remove the 2nd speed gear sleeve.

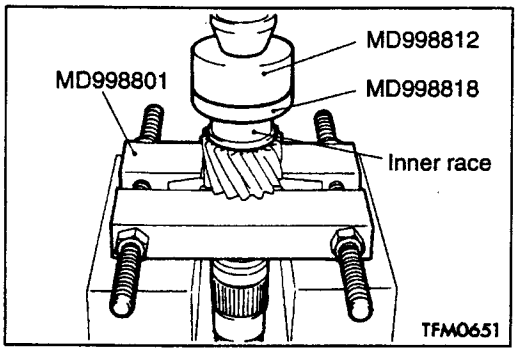


◀F▶ 1ST SPEED GEAR SLEEVE REMOVAL

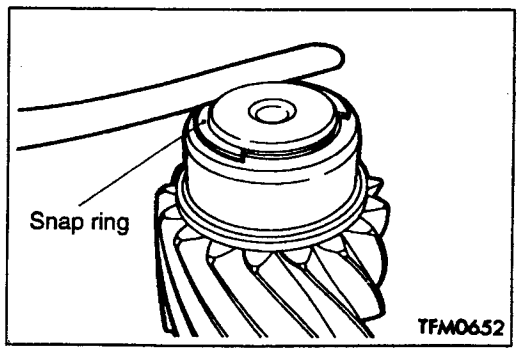


◀G▶ ROLLER BEARING INNER RACE REMOVAL

REASSEMBLY SERVICE POINTS



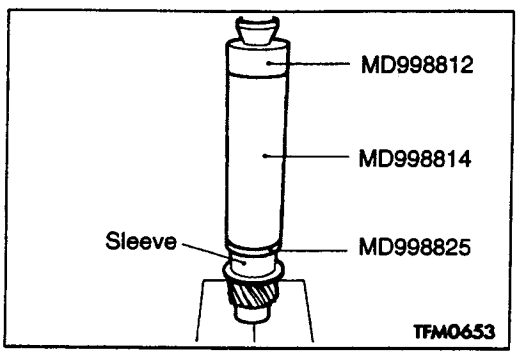
▶A◀ ROLLER BEARING INNER RACE INSTALLATION



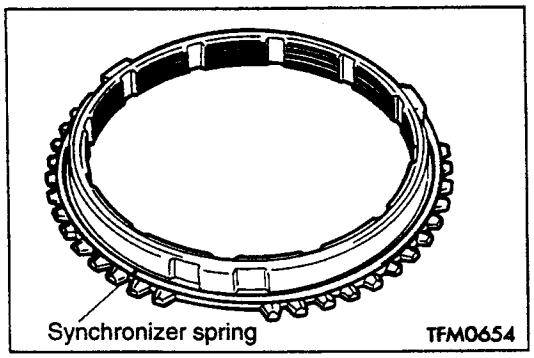
▶B◀ SNAP RING INSTALLATION

Select and install a snap ring so that the output shaft front bearing end play will have the standard value.

Standard value: –0.01 – 0.12 mm

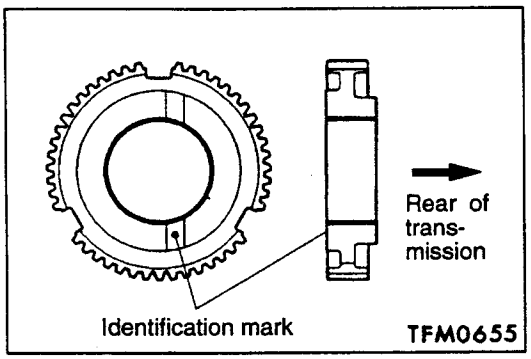


▶C◀ 1ST SPEED GEAR SLEEVE INSTALLATION



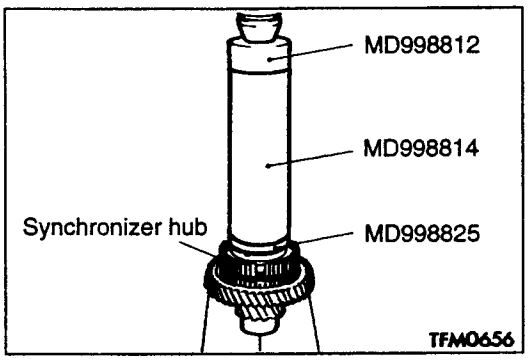
▶D◀ SYNCHRONIZER SPRING INSTALLATION

Install the synchronizer spring securely up to the illustrated position of the synchronizer ring.

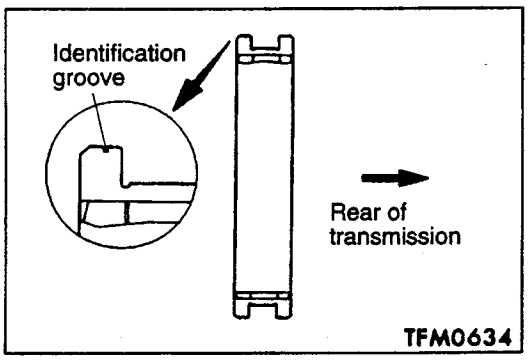


▶E◀ 1ST-2ND SPEED SYNCHRONIZER HUB INSTALLATION

Install the 1st-2nd speed synchronizer hub in such a way that it will be oriented in the direction shown.

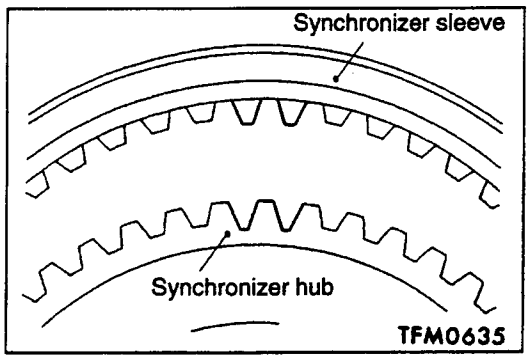


Caution
When the hub is installed, make sure that the synchronizer ring is not caught.

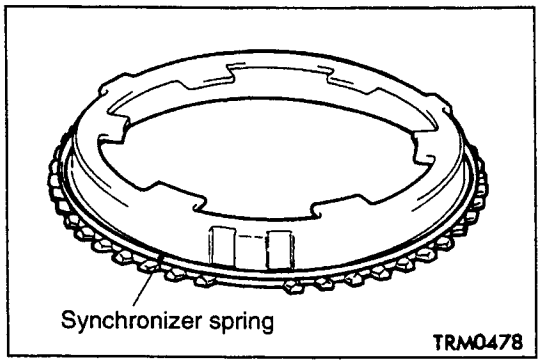


▶F◀ SYNCHRONIZER SLEEVE INSTALLATION

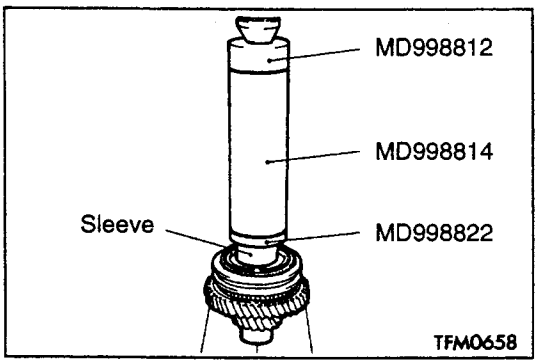
(1) Install the synchronizer sleeve in such a way that it will be oriented in the direction shown.



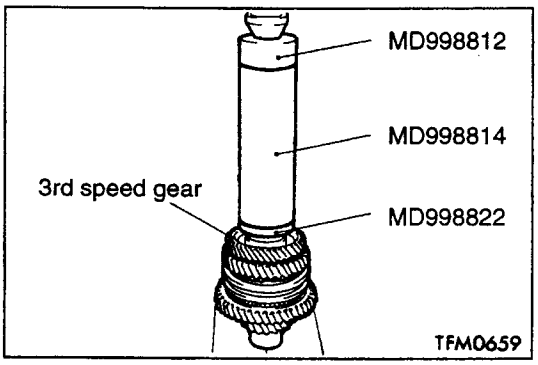
(2) When the synchronizer sleeve is installed, make sure that the deep groove portion of the synchronizer hub is aligned with the projecting portion of the sleeve.



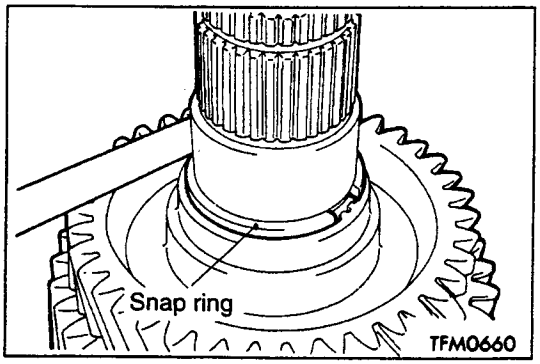
▶G◀ SYNCHRONIZER SPRING INSTALLATION



▶H◀ 2ND SPEED GEAR SLEEVE INSTALLATION



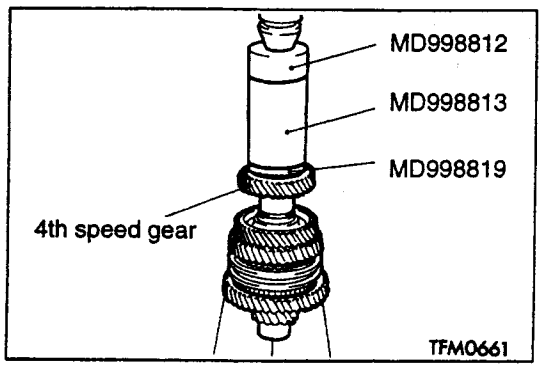
▶I◀ 3RD SPEED GEAR INSTALLATION



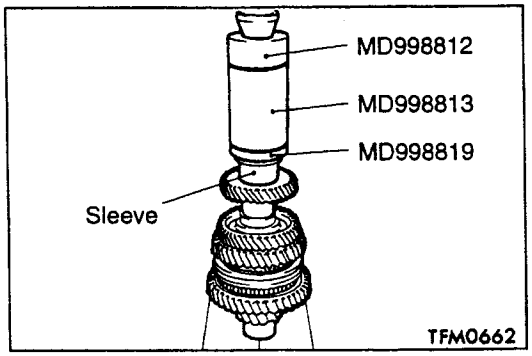
▶J◀ SNAP RING INSTALLATION

Select and install a snap ring so that the output shaft 3rd speed gear end play will have the standard value.

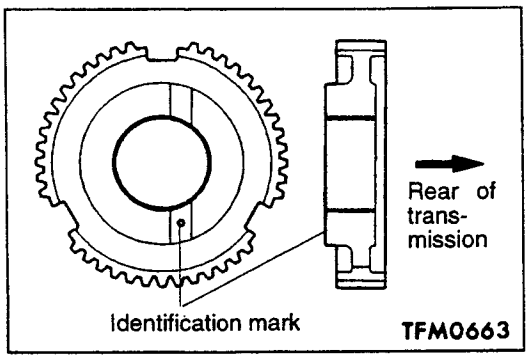
Standard value: –0.01 – 0.09 mm



▶K◀ 4TH SPEED GEAR INSTALLATION

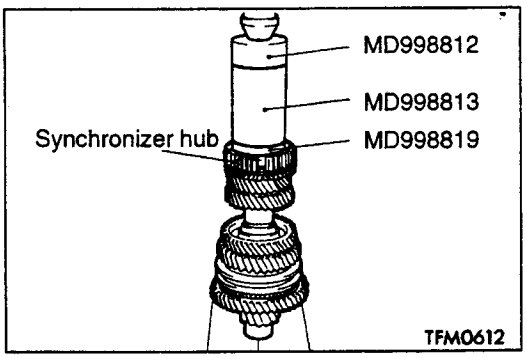


▶L◀ 5TH SPEED GEAR SLEEVE INSTALLATION

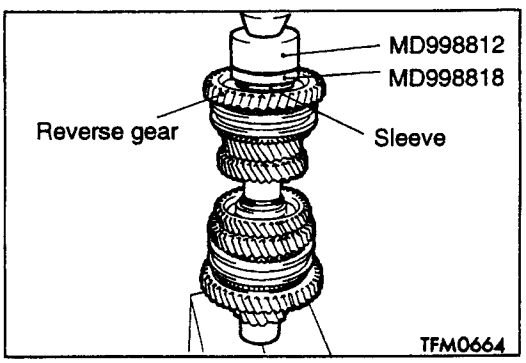


▶M◀5TH-REVERSE SPEED SYNCHRONIZER HUB INSTALLATION

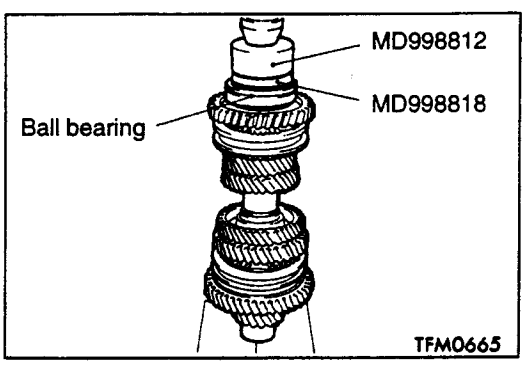
Install the 5th-reverse speed synchronizer hub in such a way that it will be oriented in the direction shown.



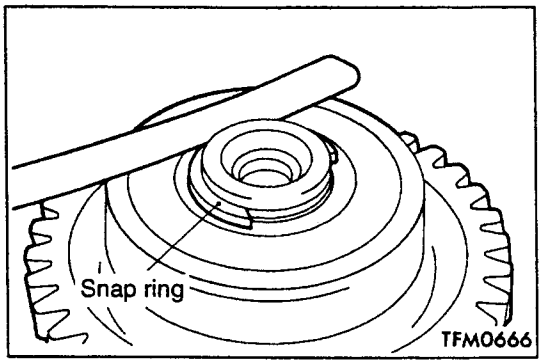
Caution
When the 5th-reverse speed synchronizer hub is installed, make sure that the synchronizer ring is not caught.



▶N◀ REVERSE GEAR / NEEDLE ROLLER BEARING / REVERSE GEAR BEARING SLEEVE INSTALLATION



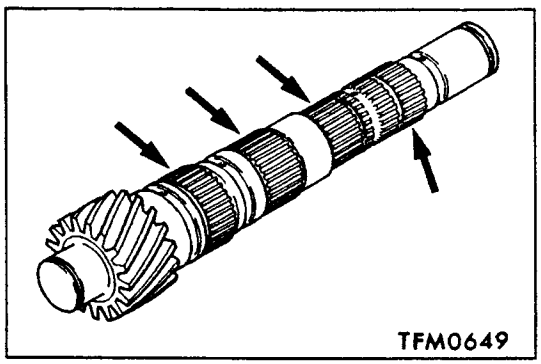
▶O◀ BALL BEARING INSTALLATION



▶P◀ SNAP RING INSTALLATION

Select and install a snap ring so that the output shaft rear bearing end play will have the standard value.

Standard value: –0.01 – 0.09 mm



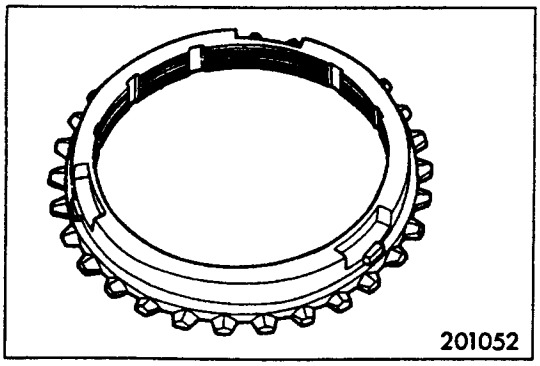
INSPECTION

OUTPUT SHAFT

Check the splines for damage and wear.

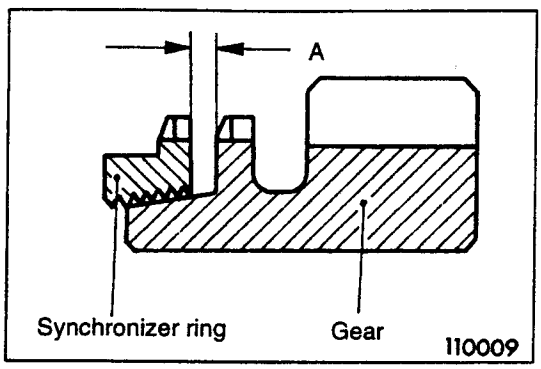
NEEDLE ROLLER BEARING

(1) Check to ensure that when the bearing sleeve and gear are combined and made to rotate, they rotate smoothly without looseness and noise.
(2) Check to ensure that the cage is not deformed.



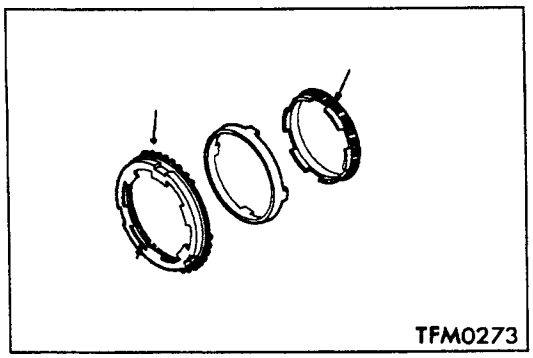
SYNCHRONIZER RING

(1) Check to ensure that the clutch gear tooth surfaces are not damaged and broken.
(2) Check to ensure that the cone inside diameter is not damaged or worn and that the threads are not crushed.



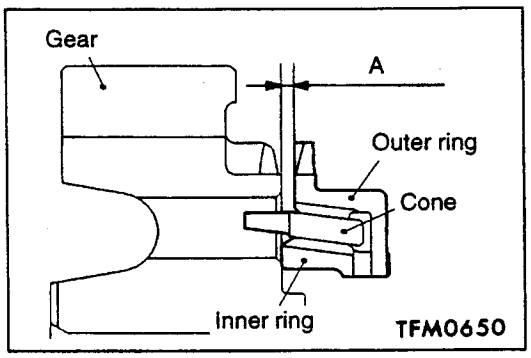
(3) Press the synchronizer ring against the gear and check clearance "A". If "A" is less than the limit, replace.

Limit: 0.5 mm



OUTER SYNCHRONIZER RING / INNER SYNCHRONIZER RING / SYNCHRONIZER CONE

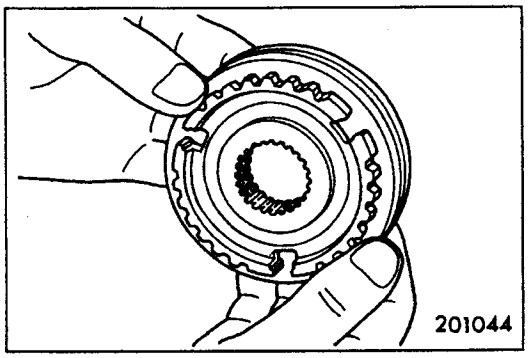
(1) Check to ensure that the clutch gear tooth surfaces and cone surfaces are not damaged and broken.



(2) Install the outer ring, inner ring and cone, press them against the gear, and check clearance "A". If "A" is less than the limit, replace.

Limit: 0.5 mm

Caution
When the outer ring, inner ring or cone has to be replaced, make sure that the outer ring, inner ring and cone are replaced as a set.



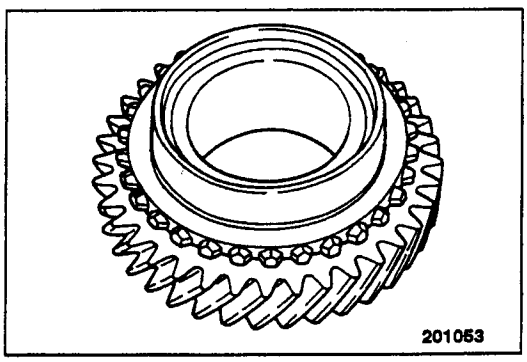
SYNCHRONIZER SLEEVE AND HUB

(1) Check to ensure that when the synchronizer sleeve and hub are combined and made to slide, they slide smoothly without binding.
(2) Check to ensure that the front and rear ends of the sleeve inside surface are not damaged.

Caution
When replacement of either the synchronizer sleeve or hub is necessary, make sure that the synchronizer sleeve and hub are replaced as a set.

SYNCHRONIZER SPRING

Check to ensure that the spring is not sagging, deformed or broken.



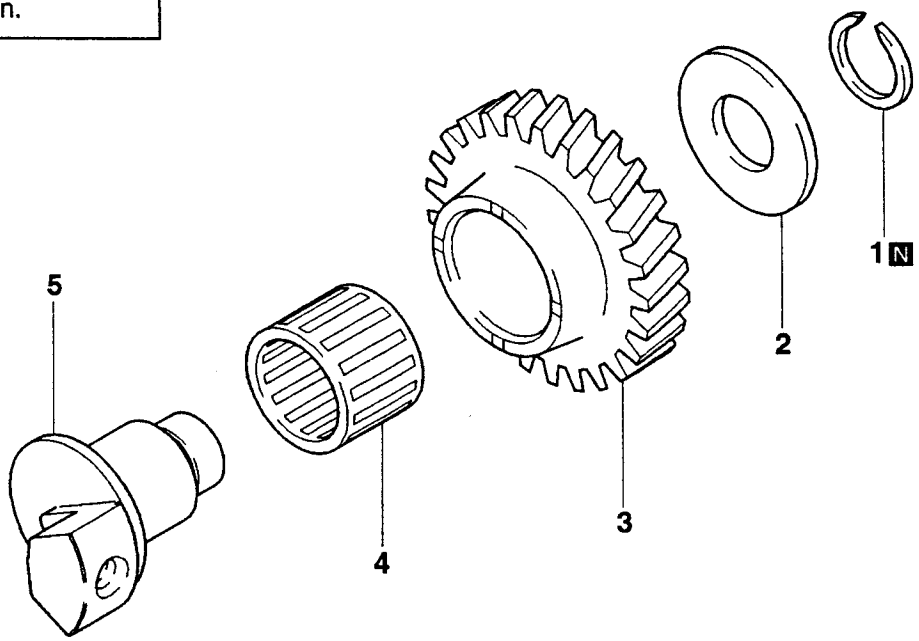
SPEED GEARS

(1) Check to ensure that the helical and clutch gear tooth surfaces are not damaged or worn.
(2) Check to ensure that the synchronizer cone surfaces are not roughened, damaged or worn.
(3) Check to ensure that the gear inside diameter and front and rear surfaces are not damaged and worn.

REVERSE IDLER GEAR

DISASSEMBLY AND REASSEMBLY

Apply gear oil to all moving parts before installation.



TFM0590

Disassembly steps

1. Snap ring
2. Thrust washer
3. Reverse idler gear
4. Needle roller bearing
5. Reverse idler gear shaft

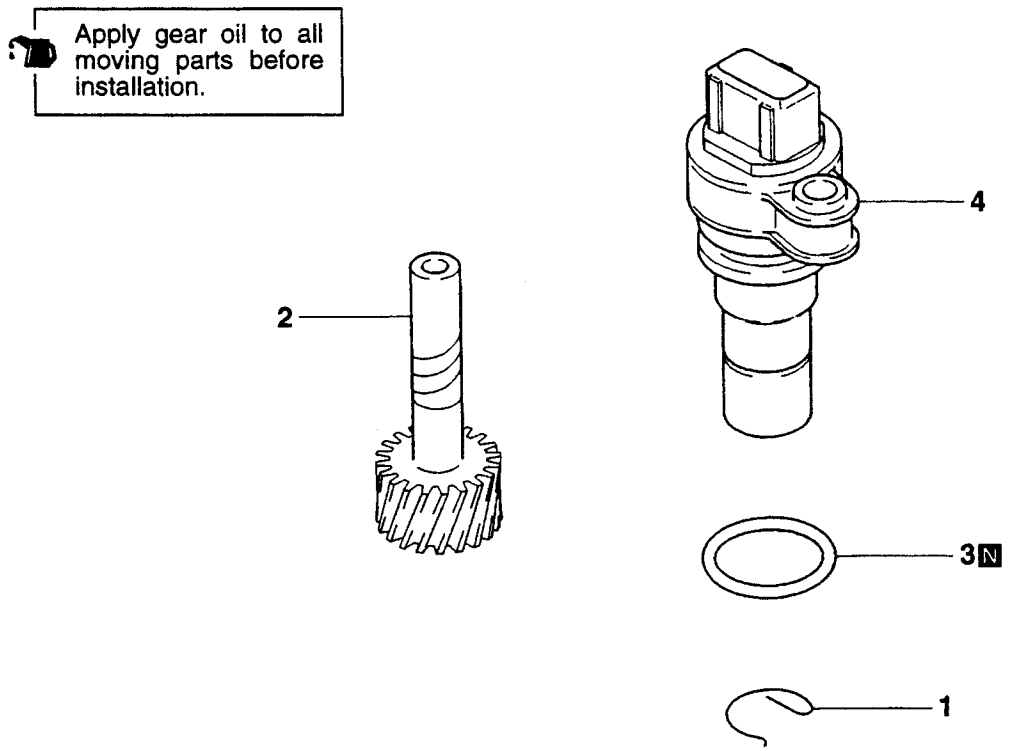
INSPECTION

NEEDLE ROLLER BEARING

(1) Check to ensure that when the shaft and gear are combined and made to rotate, they rotate smoothly without looseness and noise.
(2) Check to ensure that the cage is not deformed.

SPEEDOMETER GEAR

DISASSEMBLY AND REASSEMBLY



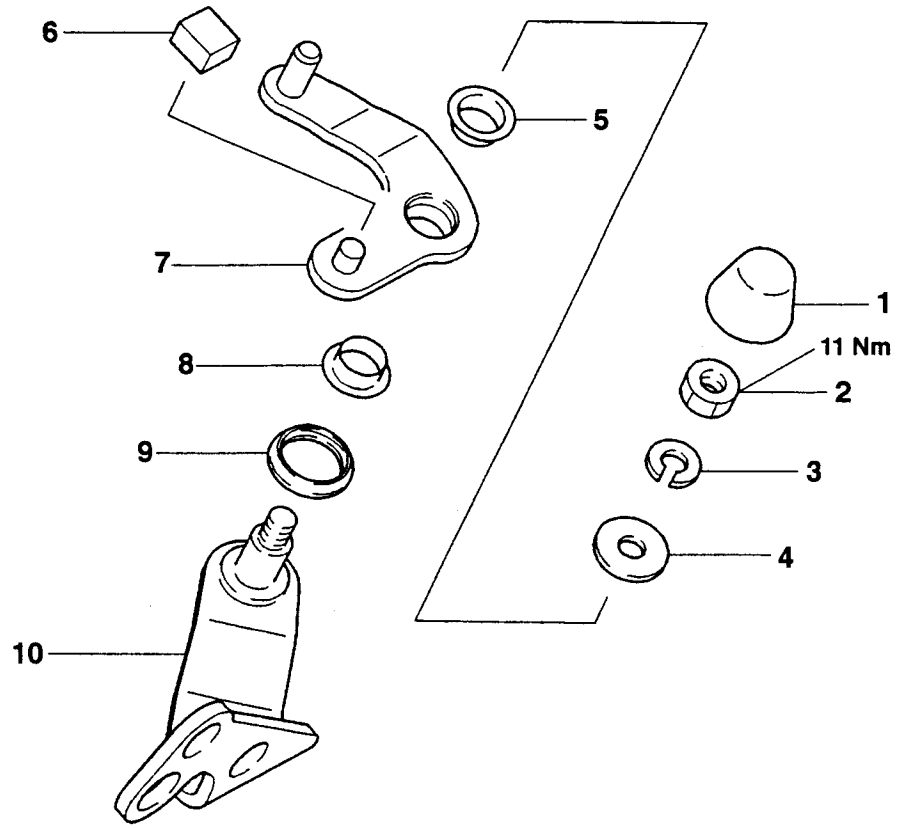
TFM0593

Disassembly steps

1. e-clip
2. Speedometer driven gear
3. O-ring
4. Sleeve

SELECT LEVER

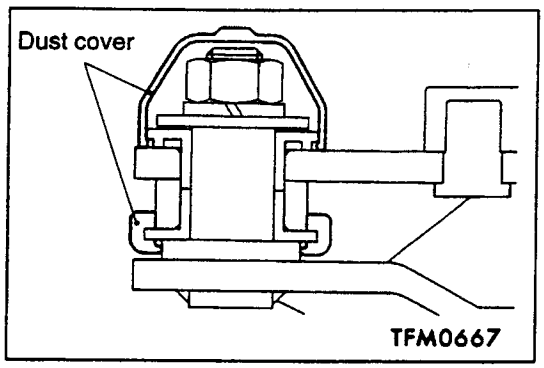
DISASSEMBLY AND REASSEMBLY



TFM0589

Disassembly steps

▶A◀ 1. Dust cover
2. Nut
3. Spring washer
4. Washer
5. Select lever bushing
6. Select lever shoe
7. Select lever
8. Select lever bushing
▶A◀ 9. Dust cover
10. Select lever shaft

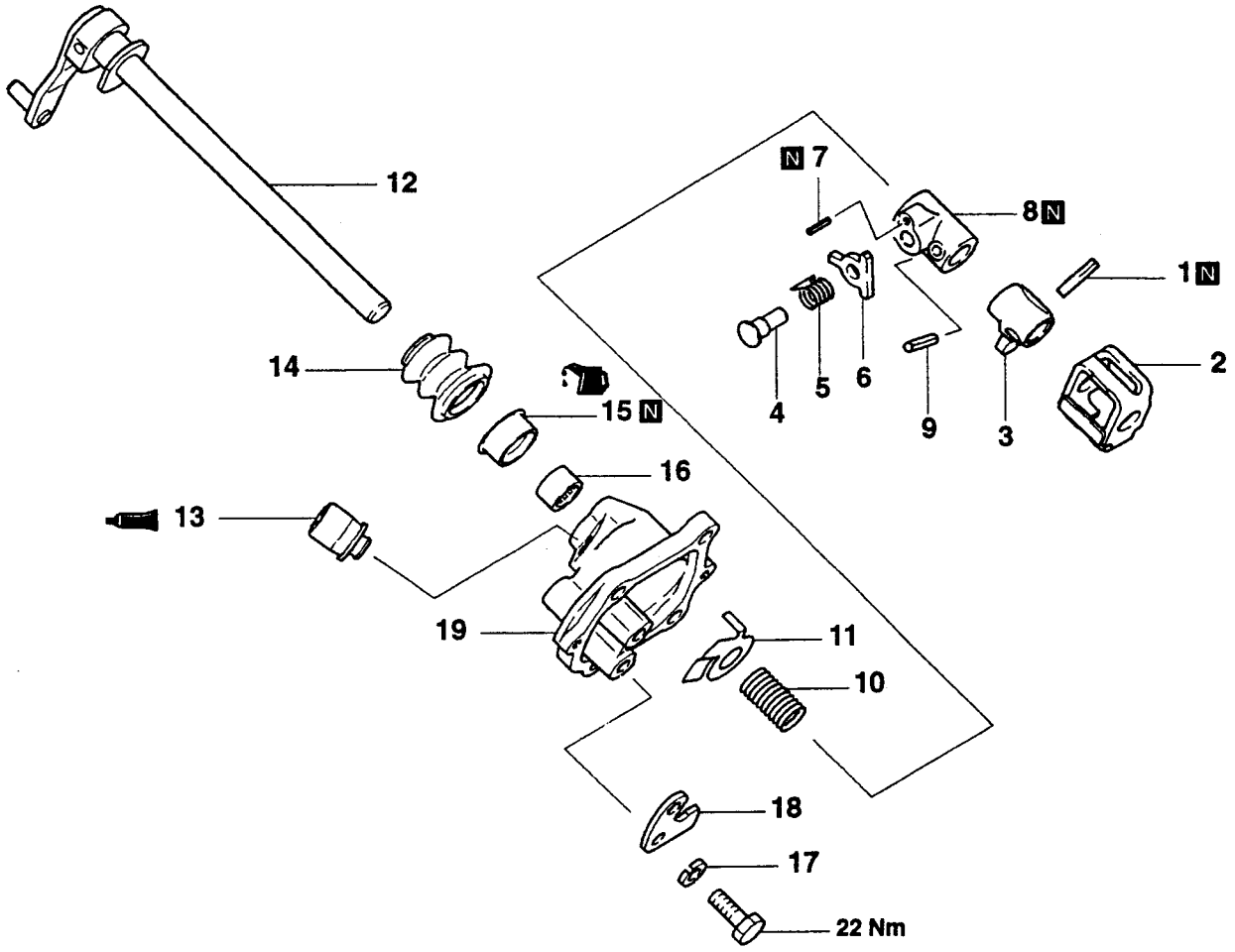


REASSEMBLY SERVICE POINT

▶A◀ DUST COVER INSTALLATION

CONTROL HOUSING

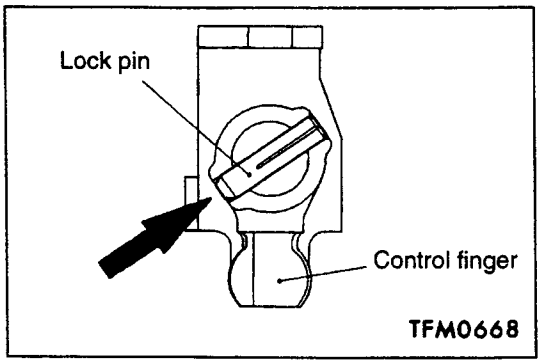
DISASSEMBLY AND REASSEMBLY



TFM0588

Disassembly steps

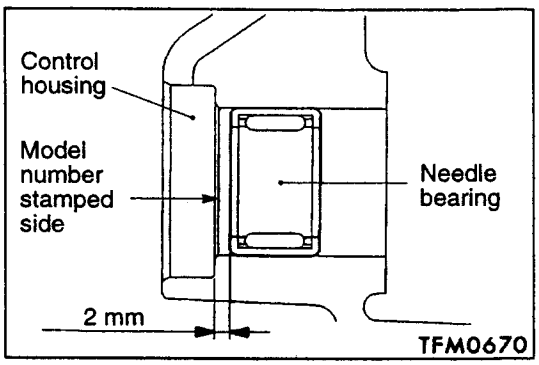
◀A▶ ▶F◀ 1. Lock pin
2. Interlock plate
3. Control finger
4. Pin
5. Return spring
6. Stopper plate
▶E◀ 7. Spring pin
▶D◀ 8. Spring pin
9. Stopper body
10. Neutral return spring
11. Spacer
12. Control shaft
▶C◀ 13. Air breather
14. Control shaft boot
▶B◀ 15. Oil seal
▶A◀ 16. Needle bearing
17. Spring washer
18. Stopper bracket
19. Control housing



DISASSEMBLY SERVICE POINT

◀A▶ LOCK PIN REMOVAL

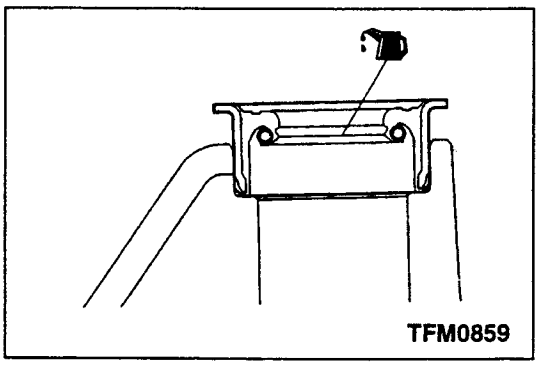
Drive the lock pin out of position from the direction shown.



REASSEMBLY SERVICE POINTS

▶A◀ NEEDLE BEARING INSTALLATION

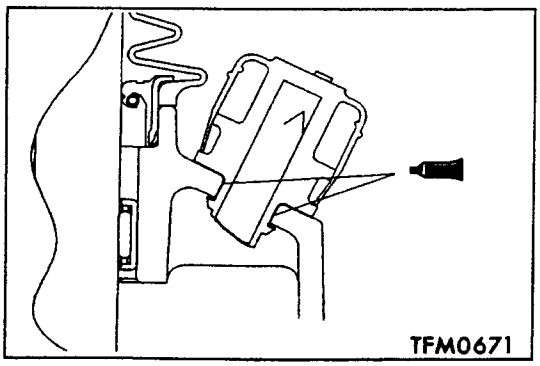
Press fit the needle bearing up the illustrated dimension, while making sure that the model number stamped side is oriented in the direction shown.



▶B◀ OIL SEAL INSTALLATION

Apply transmission oil to the oil seal lip area.

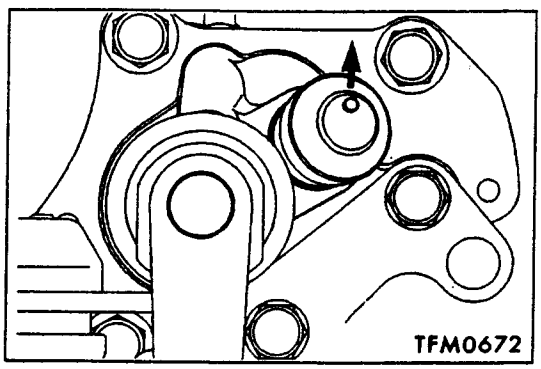
Transmission oil:
Hypoid gear oil SAE 75W-85W conforming to API classification GL-4 or higher



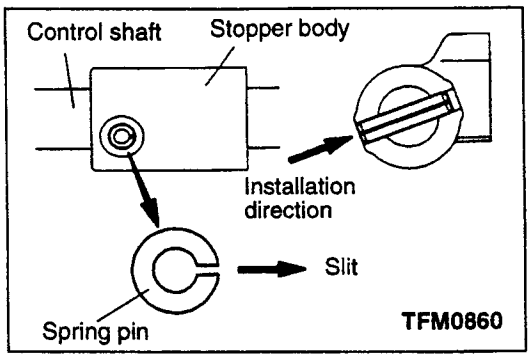
▶C◀ AIR BREATHER INSTALLATION

(1) Apply a sealant to the outside circumference of the inserting portion.

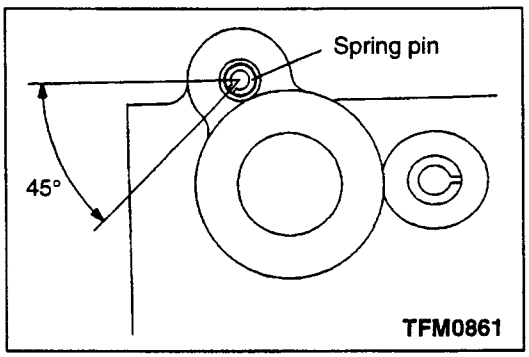
Specified sealant:
3M SUPER WEATHERSTRIP No. 8001 or equivalent



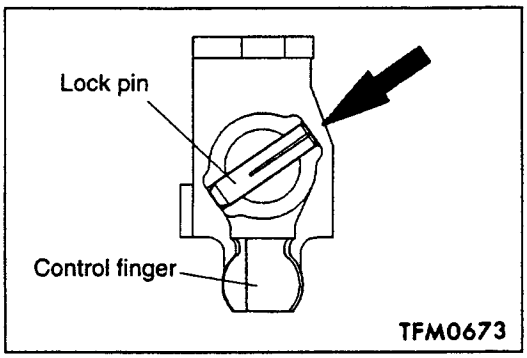
(2) Make sure that the projecting portion is oriented in the direction shown.



▶D◀ SPRING PIN INSTALLATION



▶E◀ SPRING PIN INSTALLATION

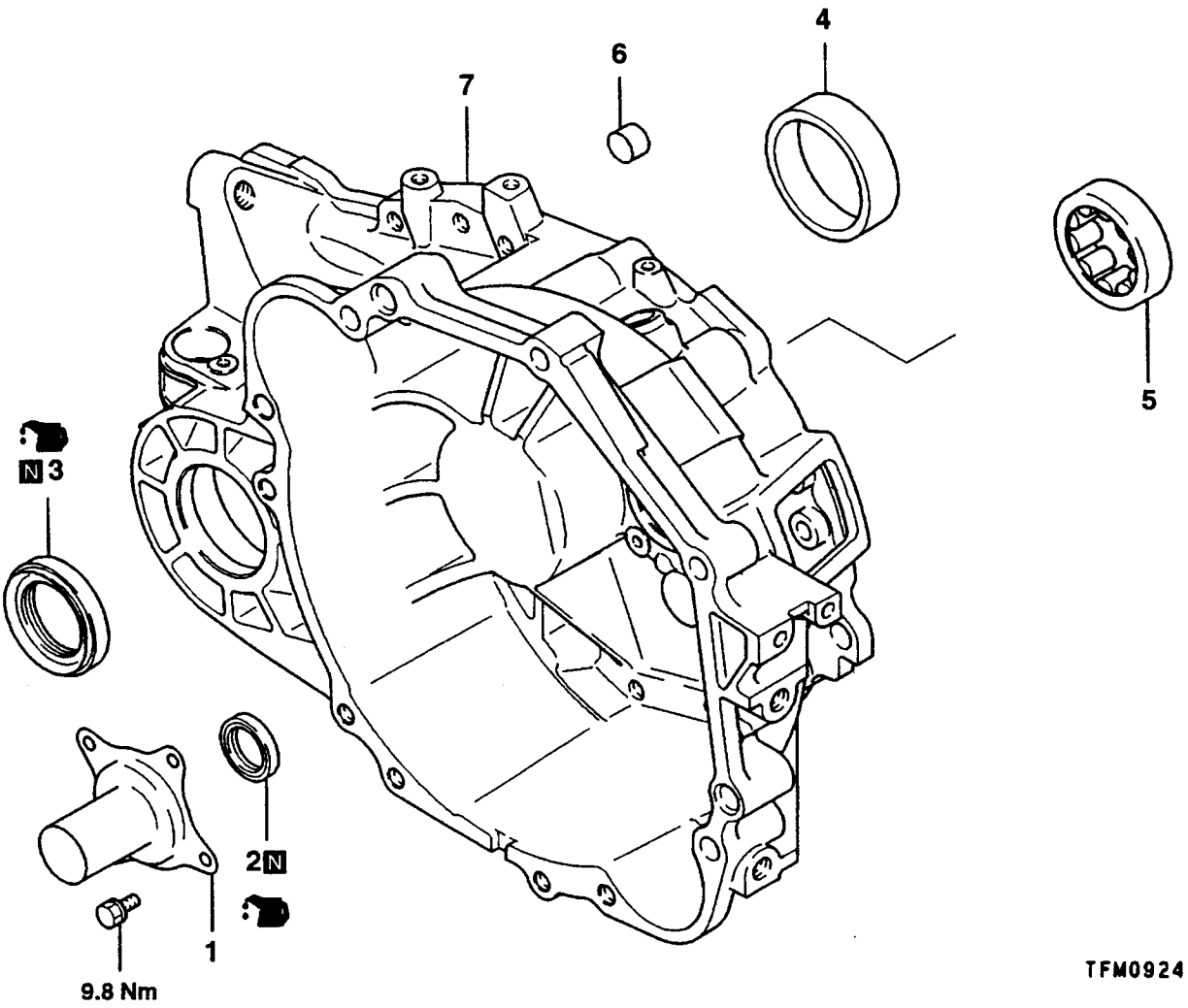


▶F◀ LOCK PIN INSTALLATION

Drive in the lock pin in the direction shown in the illustration.

CLUTCH HOUSING

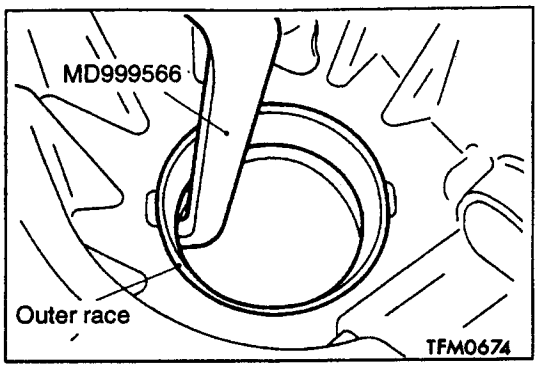
DISASSEMBLY AND REASSEMBLY



Disassembly steps

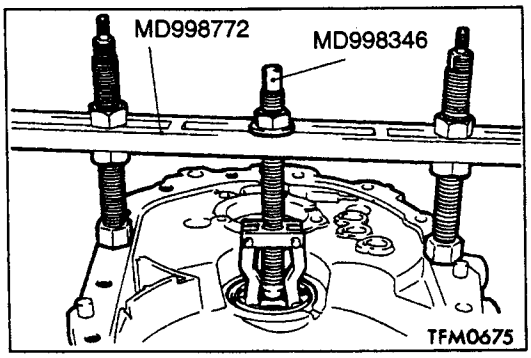
1. Clutch release bearing retainer
2. Oil seal
3. Oil seal
4. Outer race
5. Outer race
6. Bushing
7. Clutch housing

◀A▶ ▶C◀ ▶D◀ ▶E◀ ◀B▶ ▶B◀ ▶A◀

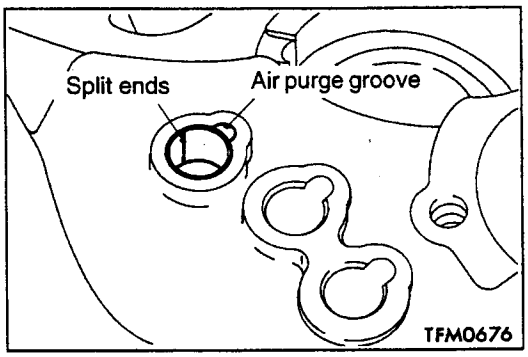


DISASSEMBLY SERVICE POINTS

◀A▶ OUTER RACE REMOVAL



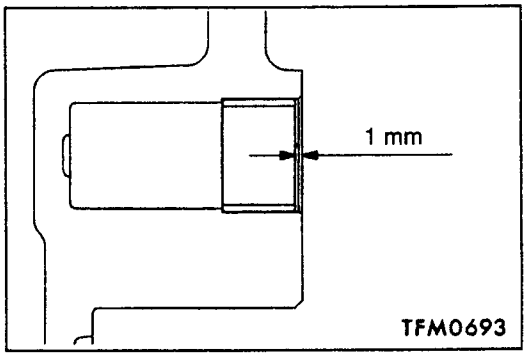
◀B▶ OUTER RACE REMOVAL



REASSEMBLY SERVICE POINTS

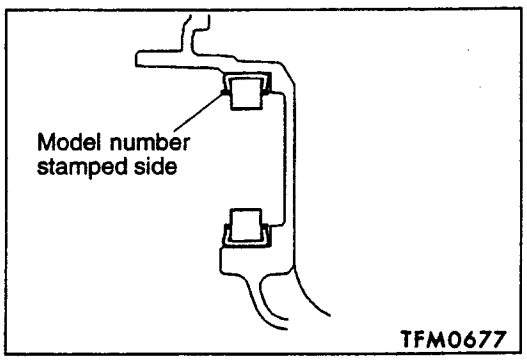
▶A◀ BUSHING INSTALLATION

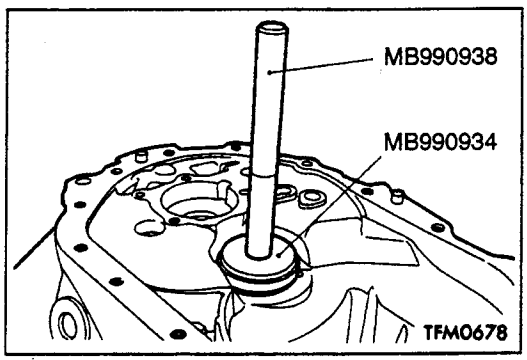
Press fit the bushing up to the illustrated position, while making sure that the split ends of the bushing do not coincide with the air purge groove.

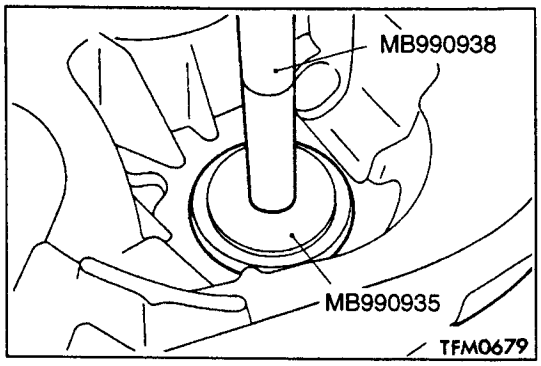


▶B◀ OUTER RACE INSTALLATION

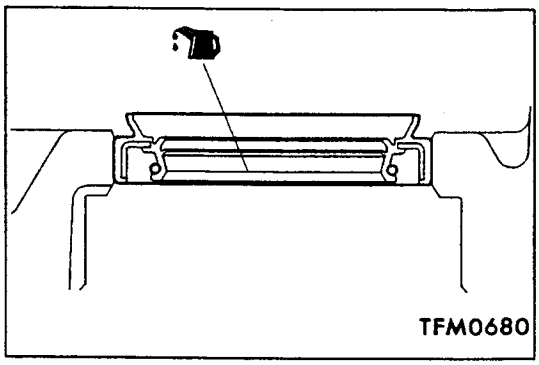
Install the outer race so that the model number stamped side will be oriented in the direction shown.







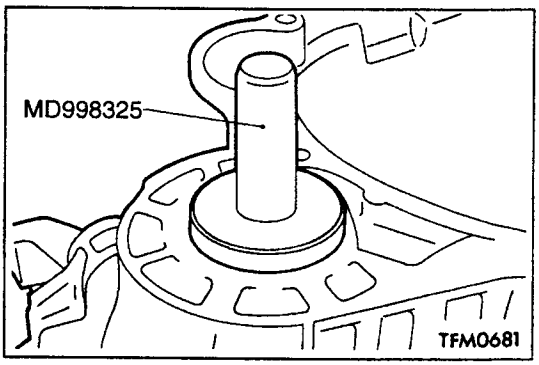
▶C◀ OUTER RACE INSTALLATION

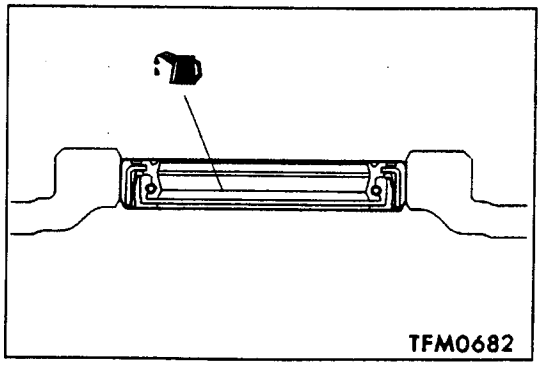


▶D◀ OIL SEAL INSTALLATION

Apply transmission oil to the oil seal lip area.

Specified oil:
Hypoid gear oil SAE 75W-85W conforming to API classification GL-4 or higher

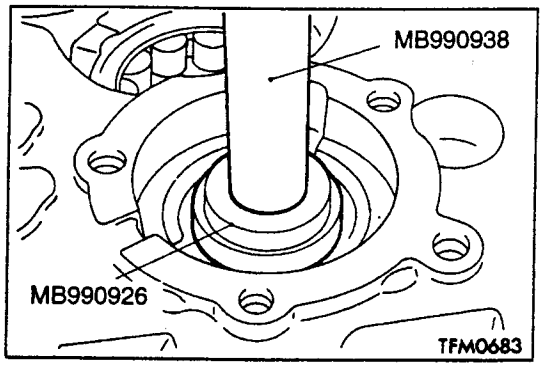




▶E◀ OIL SEAL INSTALLATION

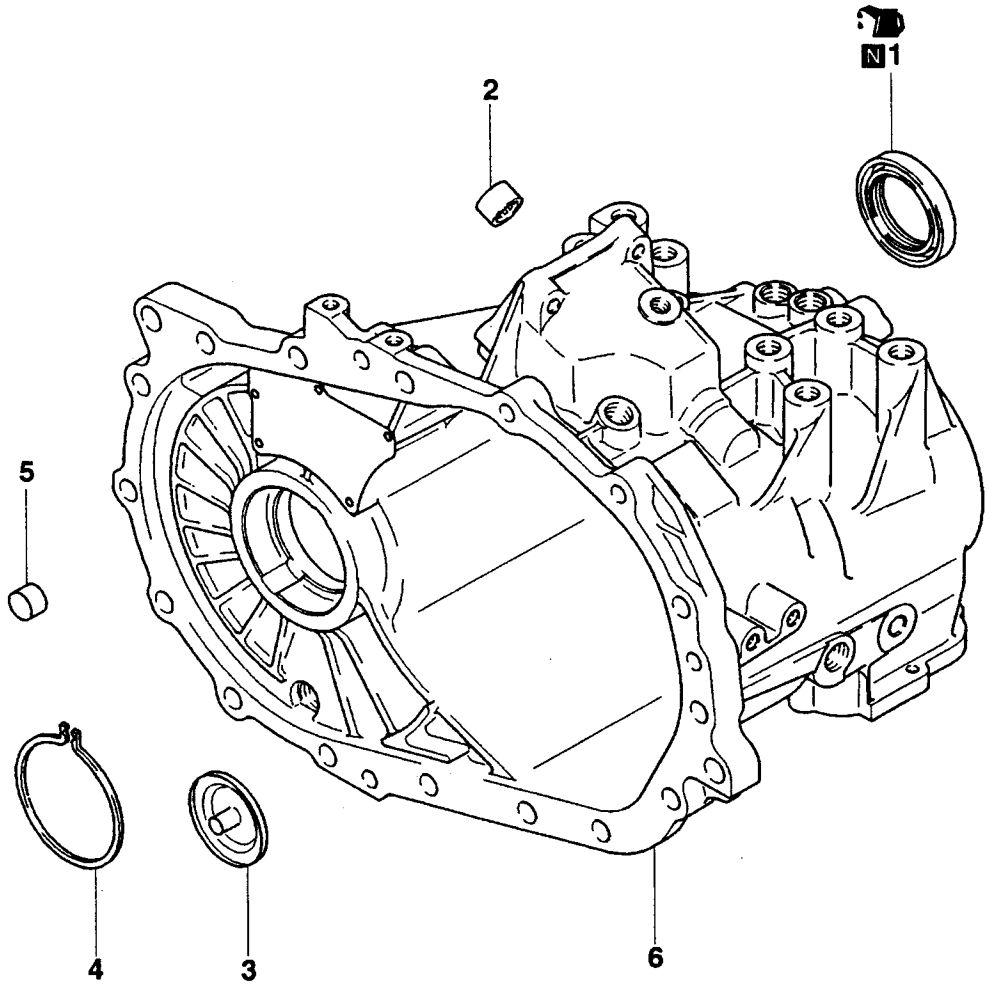
Pack grease in the oil seal lip area.

Specified grease:
MITSUBISHI genuine grease part No. 0101011 or equivalent



TRANSMISSION CASE

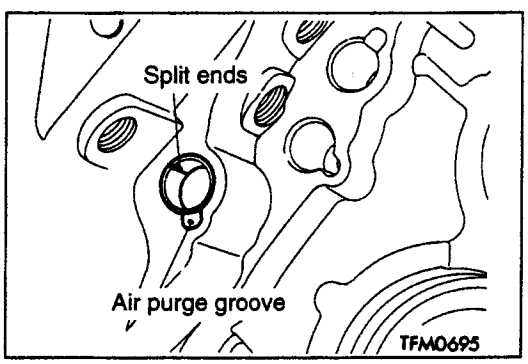
DISASSEMBLY AND REASSEMBLY



TFM0600

Disassembly steps

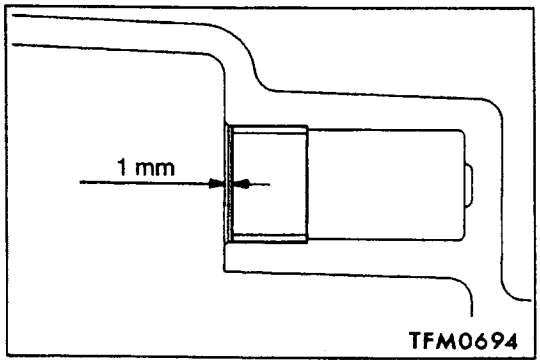
▶C◀ 1. Oil seal
▶B◀ 2. Needle bearing
3. Oil guide
4. Snap ring
▶A◀ 5. Bushing
6. Transmission case

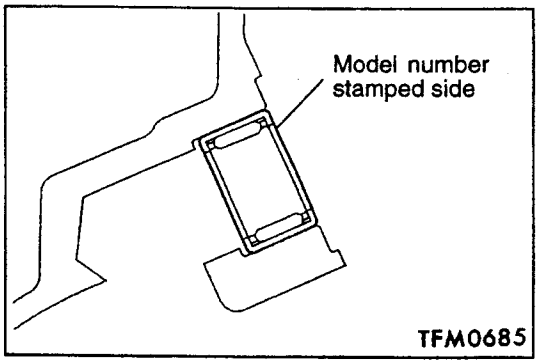


REASSEMBLY SERVICE POINTS

▶A◀ BUSHING INSTALLATION

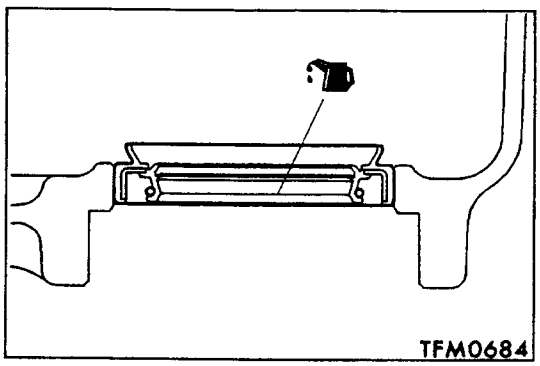
Press fit the bushing up to the illustrated position, while making sure that the split ends of the bushing do not coincide with the air purge groove.





▶B◀ NEEDLE BEARING INSTALLATION

Press fit the needle bearing until it is flush with the case, while making sure that the model number stamped side is oriented in the direction shown.

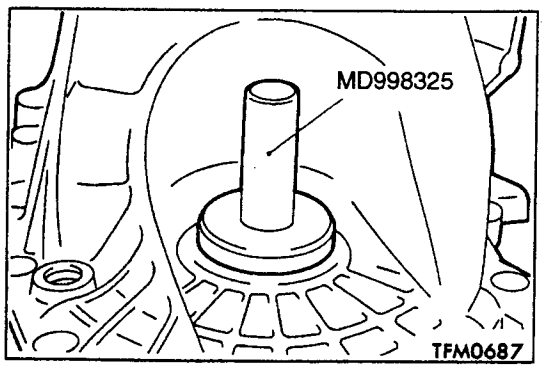


▶C◀ OIL SEAL INSTALLATION

Apply transmission oil to the oil seal lip area.

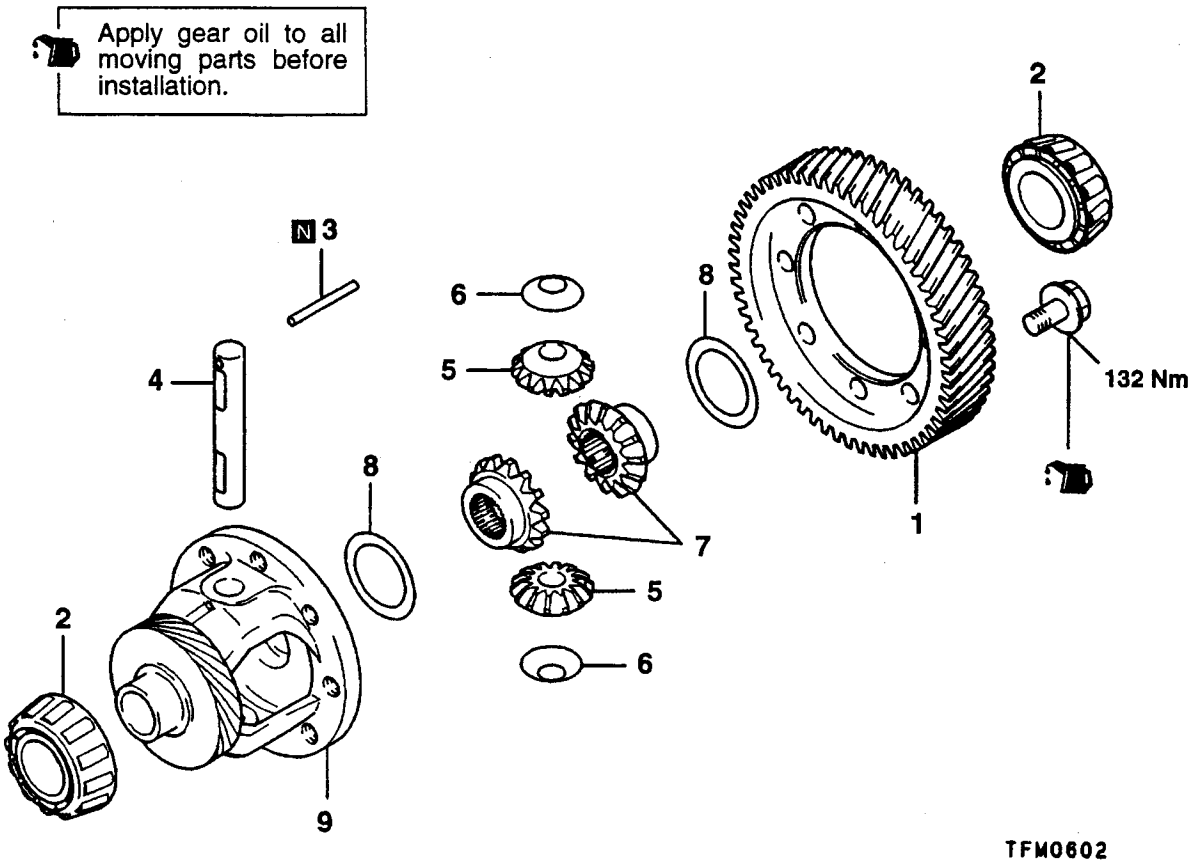
Specified oil:

Hypoid gear oil SAE 75W-85W conforming to API classification GL-4 or higher



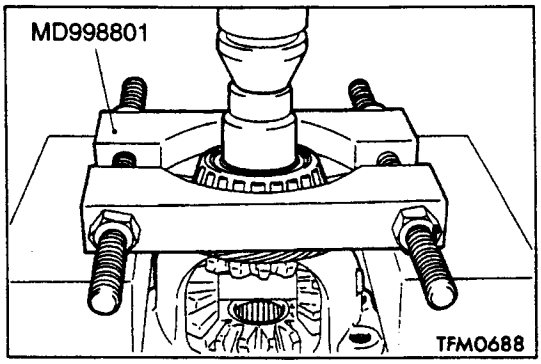
DIFFERENTIAL

DISASSEMBLY AND REASSEMBLY



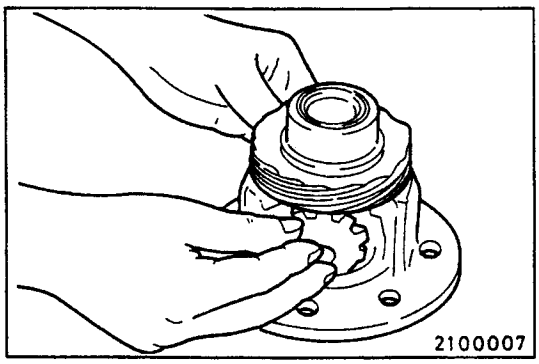
Disassembly steps

◀A▶ ▶D◀ 1. Differential drive gear
▶C◀ 2. Taper roller bearing
▶B◀ 3. Lock pin
▶A◀ 4. Pinion shaft
▶A◀ 5. Pinion
▶A◀ 6. Washer
▶A◀ 7. Side gear
▶A◀ 8. Spacer
9. Differential case



DISASSEMBLY SERVICE POINT

◀A▶ TAPER ROLLER BEARING REMOVAL



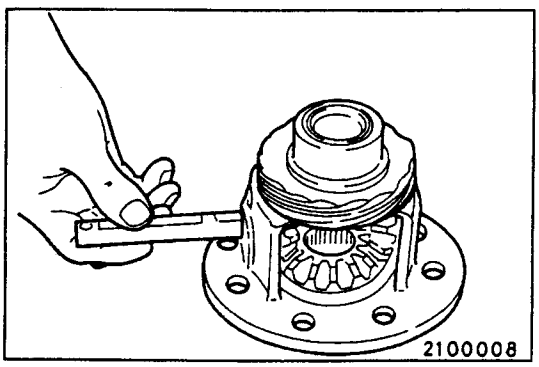
REASSEMBLY SERVICE POINTS

▶A◀ SPACER / SIDE GEAR / WASHER / PINION / PINION SHAFT INSTALLATION

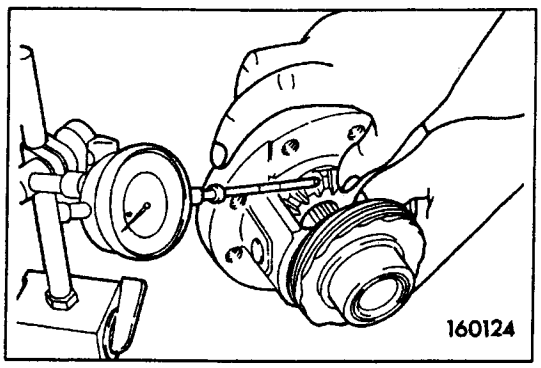
(1) After a spacer has been mounted on the back surface of the side gear, install the side gear in the differential case.

NOTE
When a new side gear is to be installed, mount a medium thickness spacer (0.93 – 1.00 mm).

(2) Set the washer on the back of each pinion, and put both pinions simultaneously in mesh with the side gears. While rotating them, install them in position.



(3) Insert the pinion shaft.

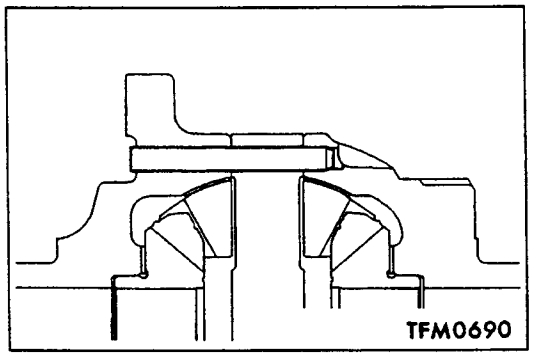


(4) Measure the backlash between the side gear and pinion.

Standard value: 0.025 – 0.150 mm

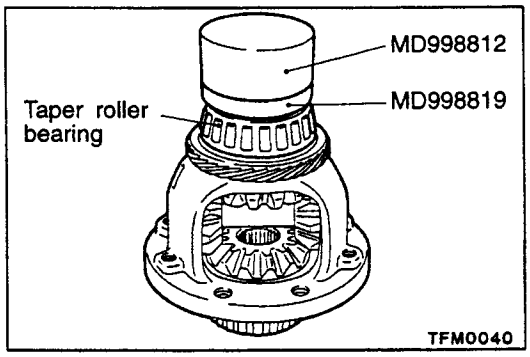
(5) If the backlash is out of specification, select a spacer and re-measure the backlash.

NOTE
Adjust until the backlashes on both sides are equal.

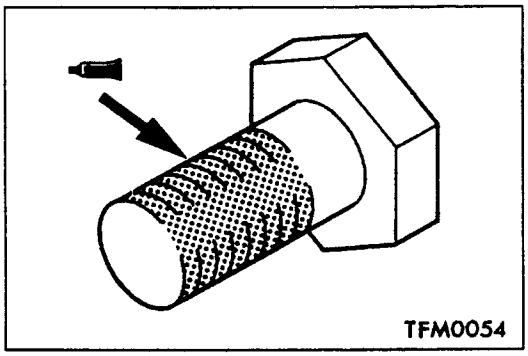


▶B◀ LOCK PIN INSTALLATION

Install the lock pin in such a way that it will be oriented in the direction shown.



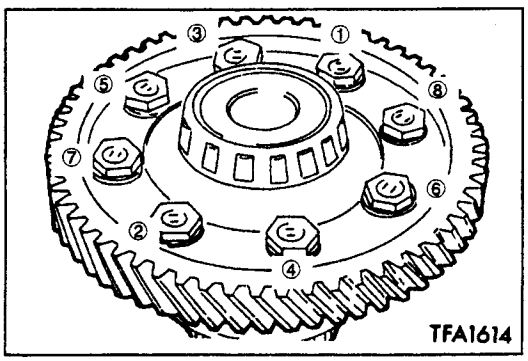
▶C◀ TAPER ROLLER BEARING INSTALLATION



▶D◀ DIFFERENTIAL DRIVE GEAR INSTALLATION

(1) Apply a sealant to the entire threaded portion of the bolt.

Specified sealant:
3M STUD Locking No. 4170 or equivalent



(2) Tighten to the specified torque in the illustrated sequence.

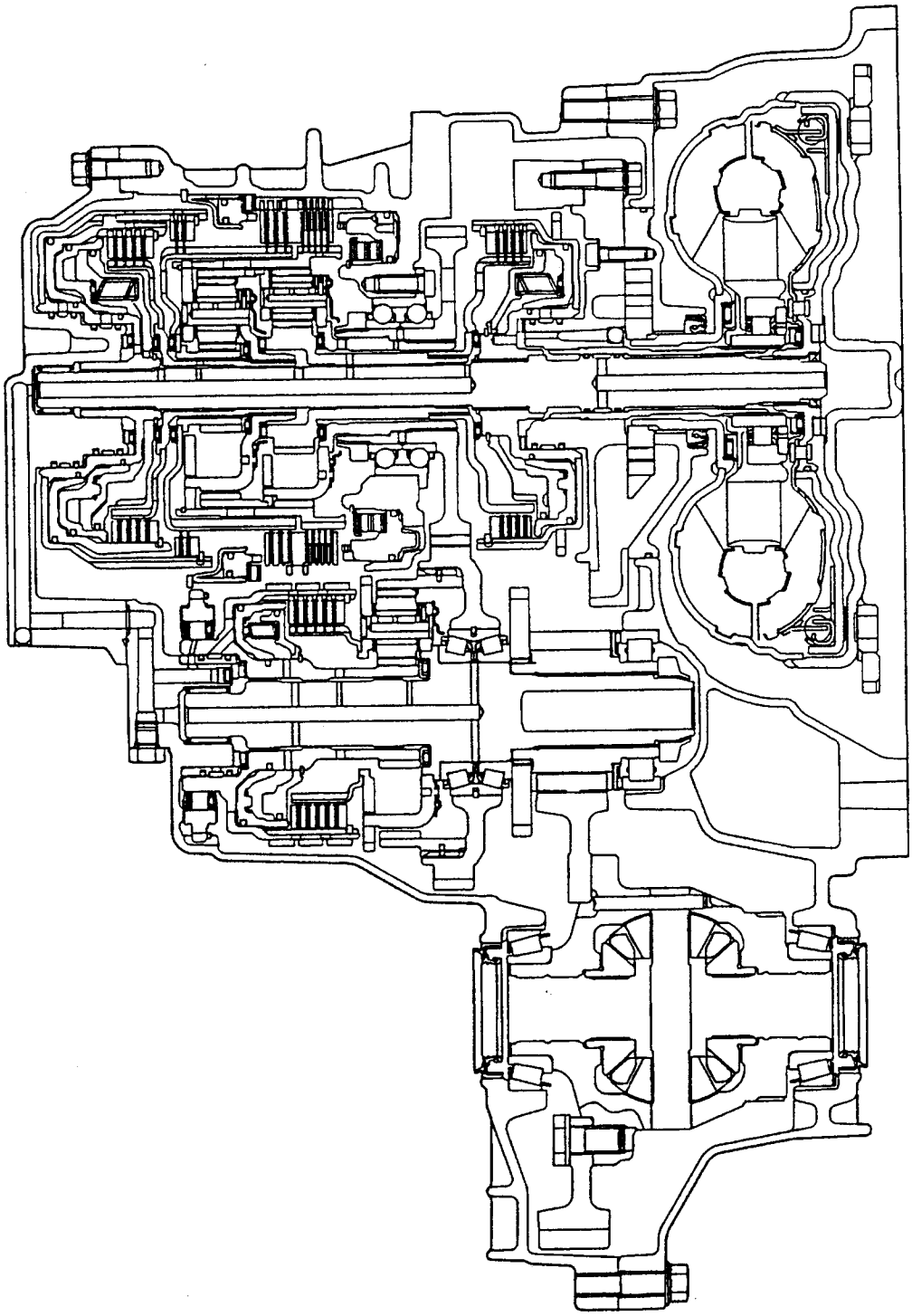
AUTOMATIC TRANSMISSION

CONTENTS

GENERAL INFORMATION

(1) The combination of highest-precision electronic and mechanical technology heralds a new era in automatic transmission performance.
(2) The gear shifting clutches use a hydraulic balancing mechanism to enable gear shifting at extra-high engine speeds.
(3) The number of shafts has been decreased to two, increased use has been made of metal plates and the one-way clutch has been abolished, which all contribute to reduce the weight.
(4) Increased meshing ratios and improved rigidity of the gear supports and casing result in less noise.
(5) In addition, adoption of a newly-developed automatic transmission fluid (ATF) and an external oil filter eliminates the need to periodically replace the fluid.
(6) The number of oil cooler feed tubes is increased to two.

SECTIONAL VIEW



TFA1970

SPECIFICATIONS

Transmission model	Driving method	Damper clutch	Speedometer gear ratio
F5A42-1-E7A	2WD	Provided	30/36

Items			F5A42
Torque converter type	Type		3-element, 1-stage, 2-phase
Transmission	Type		5-speed forward, 1-speed reverse
	Gear ratio	1st	3.789
		2nd	2.057
		3rd	1.421
		4th	1.000
		5th	0.731
		Reverse	3.865
	Final gear ratio		3.735
	Number of underdrive clutch discs		4
	Number of overdrive clutch discs		4
	Number of reverse clutch discs		2
	Number of direct clutch discs		5
	Number of low-reverse brake discs		5
	Number of second brake discs		3

SERVICE SPECIFICATIONS

Items	Standard value
Brake reaction plate end play mm	0 – 0.16
Low-reverse brake end play mm	1.35 – 1.81
Second brake end play mm	0.79 – 1.25
Underdrive sun gear end play mm	0.25 – 0.45
Input shaft end play mm	0.70 – 1.45
Differential case preload mm	0.045 – 0.105
Underdrive clutch end play mm	1.6 – 1.8
Reverse and overdrive clutch return spring end play mm	0 – 0.09
Overdrive clutch end play mm	1.6 – 1.8
Reverse clutch end play mm	1.5 – 1.7
Differential case pinion backlash mm	0.025 – 0.150
Direct drive clutch end play mm	1.0 – 1.2

VALVE BODY SPRING IDENTIFICATION TABLE

mm

Spring	Wire diameter	Outside diameter	Free length	Number of loops
Regulator valve spring	1.8	15.7	86.7	24
Underdrive pressure control valve spring	0.7	7.6	37.7	25
Overdrive pressure control valve spring	0.7	7.6	37.7	25
Low-reverse pressure control valve spring	0.7	7.6	37.7	25
Second pressure control valve spring	0.7	7.6	37.7	25
Torque converter spring	1.6	11.2	34.4	12.5
Damper clutch control valve spring	0.7	5.9	28.1	19
Fail-safe valve A spring	0.7	8.9	21.9	9.5
Damping valve spring	1.0	7.7	35.8	17
Line relief valve spring	1.0	7.0	17.3	10
Orifice check ball spring	0.5	4.5	17.2	15

SNAP RING, SPACER, THRUST WASHER, THRUST RACE AND PRESSURE PLATE FOR ADJUSTMENT

Part name	Thickness mm	Identification symbol	Part No.
Thrust washer (For adjustment of input shaft end play)	1.8	18	MD754509
	2.0	20	MD754508
	2.2	22	MD754507
	2.4	24	MD753793
	2.6	26	MD753794
	2.8	28	MD753795
Snap ring (For adjustment of underdrive clutch and overdrive clutch end plays)	1.6	None	MD754666
	1.7	Blue	MD754667
	1.8	Brown	MD754668
	1.9	None	MD752124
	2.0	Blue	MD752125
	2.1	Brown	MD752126
	2.2	None	MD752127
	2.3	Blue	MD752128
	2.4	Brown	MD752129
	2.5	None	MD752130
	2.6	Blue	MD752131
	2.7	Brown	MD752132
	2.8	None	MD752133
	2.9	Blue	MD752134
	3.0	Brown	MD754680
Snap ring (For adjustment of low-reverse brake and second brake reaction plates end plays)	2.2	Blue	MD754786
	2.3	Brown	MD754787
	2.4	None	MD758240
	2.5	Blue	MD758241
Pressure plate (For adjustment of low-reverse brake and second brake end play)	1.6	6	MD759567
	1.8	1	MD759414
	2.0	0	MD759415
	2.2	2	MD759416
	2.4	4	MD759417
	2.6	6	MD759418
	2.8	8	MD759419
	3.0	D	MD759420

Part name	Thickness mm	Identification symbol	Part No.
Snap ring (For adjustment of reverse clutch end play)	1.9	None	MD752137
	2.0	Blue	MD752138
	2.1	Brown	MD752139
	2.2	None	MD752140
	2.3	Blue	MD752141
	2.4	Brown	MD752142
	2.5	None	MD752143
	2.6	Blue	MD752144
	2.7	Brown	MD752145
	2.8	None	MD752146
Snap ring (For adjustment of reverse clutch and overdrive clutch spring retainers end plays)	1.48	Brown	MD755600
	1.53	None	MD755601
	1.58	Blue	MD755602
	1.63	Brown	MD755603
Thrust race (For adjustment of underdrive sun gear end play)	1.6	–	MD707267
	1.7	–	MD759681
	1.8	–	MD723064
	1.9	–	MD754794
	2.0	–	MD707268
	2.1	–	MD754795
	2.2	–	MD723065
	2.3	–	MD754796
	2.4	–	MD724358
	2.5	–	MD754797
	2.6	–	MD754798

Part name	Thickness mm	Identification symbol	Part No.
Spacer (For adjustment of output shaft preload)	1.88	88	MD756579
	1.92	92	MD756580
	1.96	96	MD756581
	2.00	00	MD756582
	2.04	04	MD756583
	2.08	08	MD756584
	2.12	12	MD756585
	2.16	16	MD756586
	2.20	20	MD756587
	2.24	24	MD756588
	2.28	28	MD756589
	2.32	32	MD756590
	2.36	36	MD756591
	2.40	40	MD756592
	2.44	44	MD756593
	2.48	48	MD756594
	2.52	52	MD756595
	2.56	56	MD756596
	2.60	60	MD756597
	2.64	64	MD756598
	2.68	68	MD756599
	2.72	72	MD760685
	2.76	76	MD760686
Spacer (For adjustment of differential case pinion backlash)	0.75 – 0.82	–	MD722986
	0.83 – 0.92	–	MD722985
	0.93 – 1.00	–	MD722984
	1.01 – 1.08	–	MD722982
	1.09 – 1.16	–	MD722983

Part name	Thickness mm	Identification symbol	Part No.
Spacer (For adjustment of differential case preload)	0.71	71	MD754475
	0.74	74	MD727660
	0.77	77	MD754476
	0.80	80	MD727661
	0.83	83	MD720937
	0.86	86	MD720938
	0.89	89	MD720939
	0.92	92	MD720940
	0.95	95	MD720941
	0.98	98	MD720942
	1.01	01	MD720943
	1.04	04	MD720944
	1.07	07	MD720945
	1.10	J	MD710454
	1.13	D	MD700270
	1.16	K	MD710455
	1.19	L	MD710456
	1.22	G	MD700271
	1.25	M	MD710457
	1.28	N	MD710458
	1.31	E	MD706574
	1.34	O	MD710459
	1.37	P	MD710460
Snap ring (For adjustment of direct clutch end play)	1.9	None	MD760987
	2.0	Blue	MD760988
	2.1	Brown	MD760989
	2.2	None	MD760990
	2.3	Blue	MD760991
	2.4	Brown	MD760992
	2.5	None	MD760993
	2.6	Blue	MD760994
	2.7	Brown	MD760995
	2.8	None	MD760996
	2.9	Blue	MD760997
	3.0	Brown	MD760998

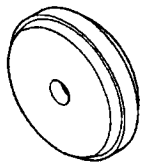
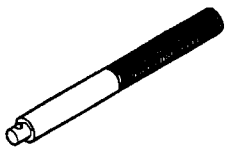
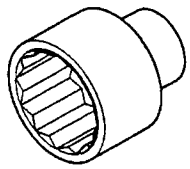
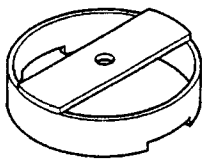
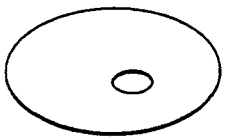
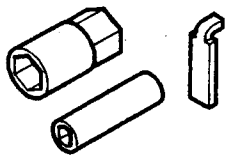
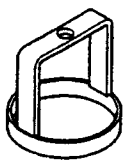
TORQUE SPECIFICATIONS

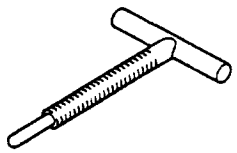
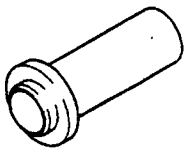
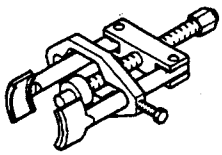
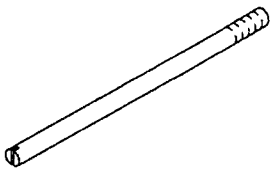
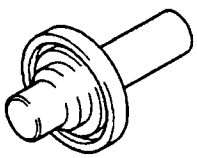
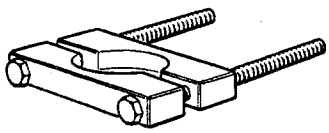
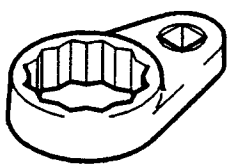
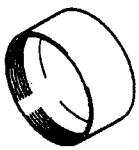
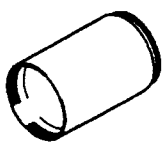
Items		Nm
Transmission	Roll stopper bracket	69
	Wiring harness bracket	22
	Control cable bracket	22
	Eye bolt	30
	Oil cooler feed tube (to transmission case)	10
	Oil cooler feed tube (to roll stopper bracket)	11
	Oil filter	12
	Input shaft speed sensor	10
	Output shaft speed sensor	10
	Manual control lever	21
	Inhibitor switch	10
	Speedometer gear	4.5
	Valve body cover	11
	Valve body mounting bolt	11
	Fluid temperature sensor	11
	Manual control shaft detent	6
	Rear cover	23
	Torque converter housing	47
	Oil pump	23
	Transfer drive gear	19
	Anchor plug	98
	Reduction brake piston nut	19
Components	Transfer drive gear lock nut	191
	Differential drive gear	132
	Valve body	11
	Solenoid valve support	6
	Plate	6
	Direct planetary carrier lock nut	166

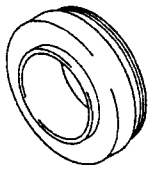
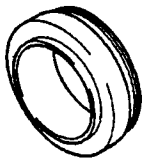
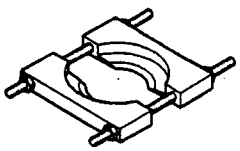
SEALANTS

Items	Specified sealant
Rear cover	Mitsubishi genuine sealant Part No. MD974421 or equivalent
Torque converter housing	Mitsubishi genuine sealant Part No. MD974421 or equivalent
Valve body cover	Mitsubishi genuine sealant Part No. MD974421 or equivalent

SPECIAL TOOLS

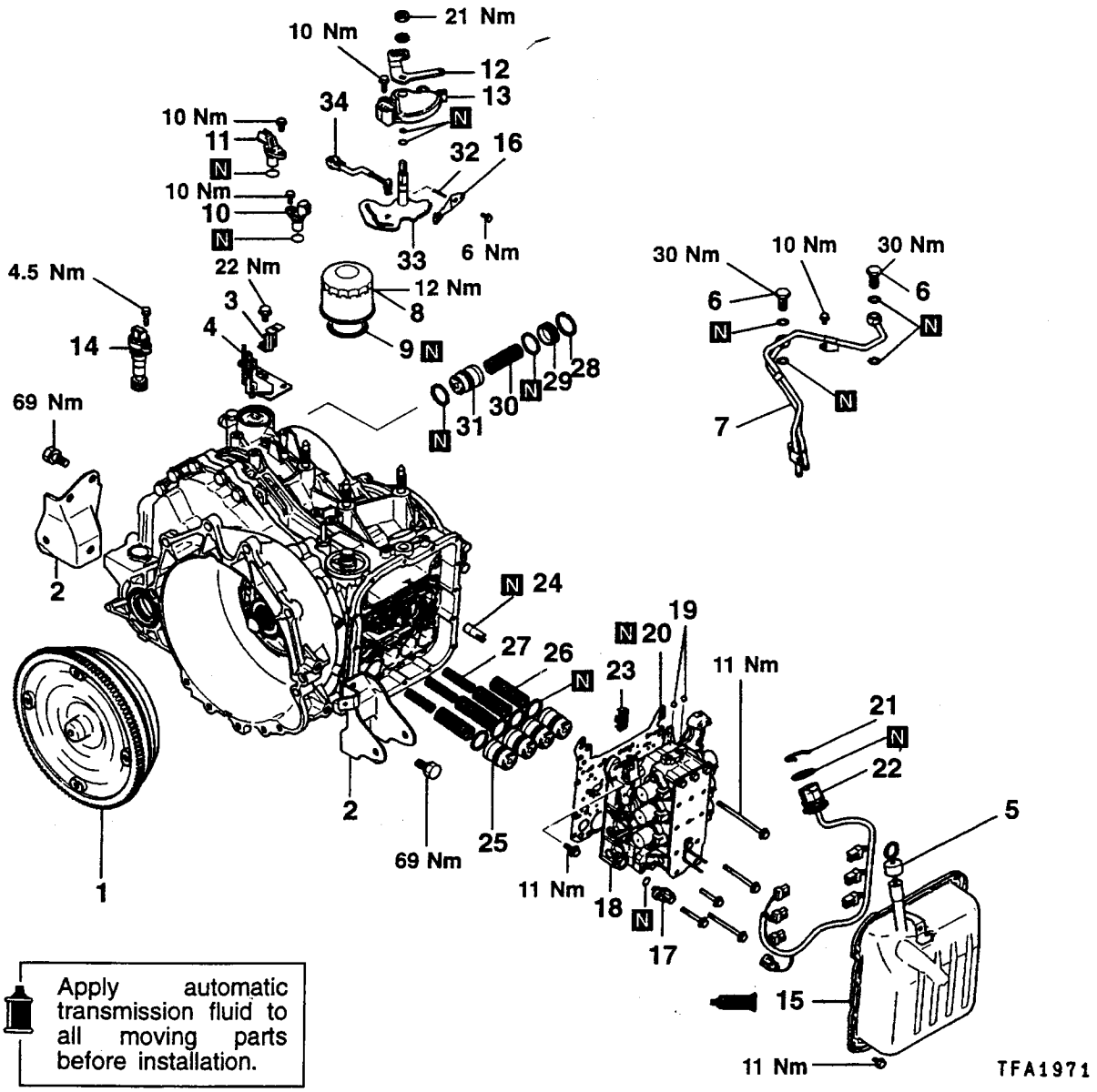
Tool	Number	Name	Use
	MB990935	Installer adapter	Installation of differential taper roller bearing outer race
	MB990938	Handle	• Installation of input shaft rear bearing • Use with installer adapter
	MB991626	Socket (60)	Removal and installation of transfer drive gear lock nut
	MB991628	Spring compressor	• Removal and installation of low-reverse brake snap ring • Measurement of underdrive clutch and overdrive clutch end plays
	MB991631	Clearance dummy plate	Measurement of low-reverse brake and second brake end plays
	MB991633	RED brake wrench set	Adjustment of reduction brake piston
	MB991688	Spring compressor	Removal and installation of direct clutch snap ring

Tool	Number	Name	Use
	MD998333	Oil pump remover	Removal of oil pump
	MD998334	Oil seal installer	Installation of oil pump oil seal
	MD998348	Bearing and gear puller	Removal of transfer drive gear bearing
	MD998412	Guide	Installation of oil pump and transfer drive gear
	MD998800	Oil seal installer	Installation of drive shaft oil seal
	MD998801	Bearing remover	Removal of each bearing
	MD998809	Special spanner	Removal and installation of direct planetary carrier lock nut
	MD998812	Installer cap	Use with installer and installer adapter.
	MD998813	Installer – 100	Use with installer cap and installer adapter.

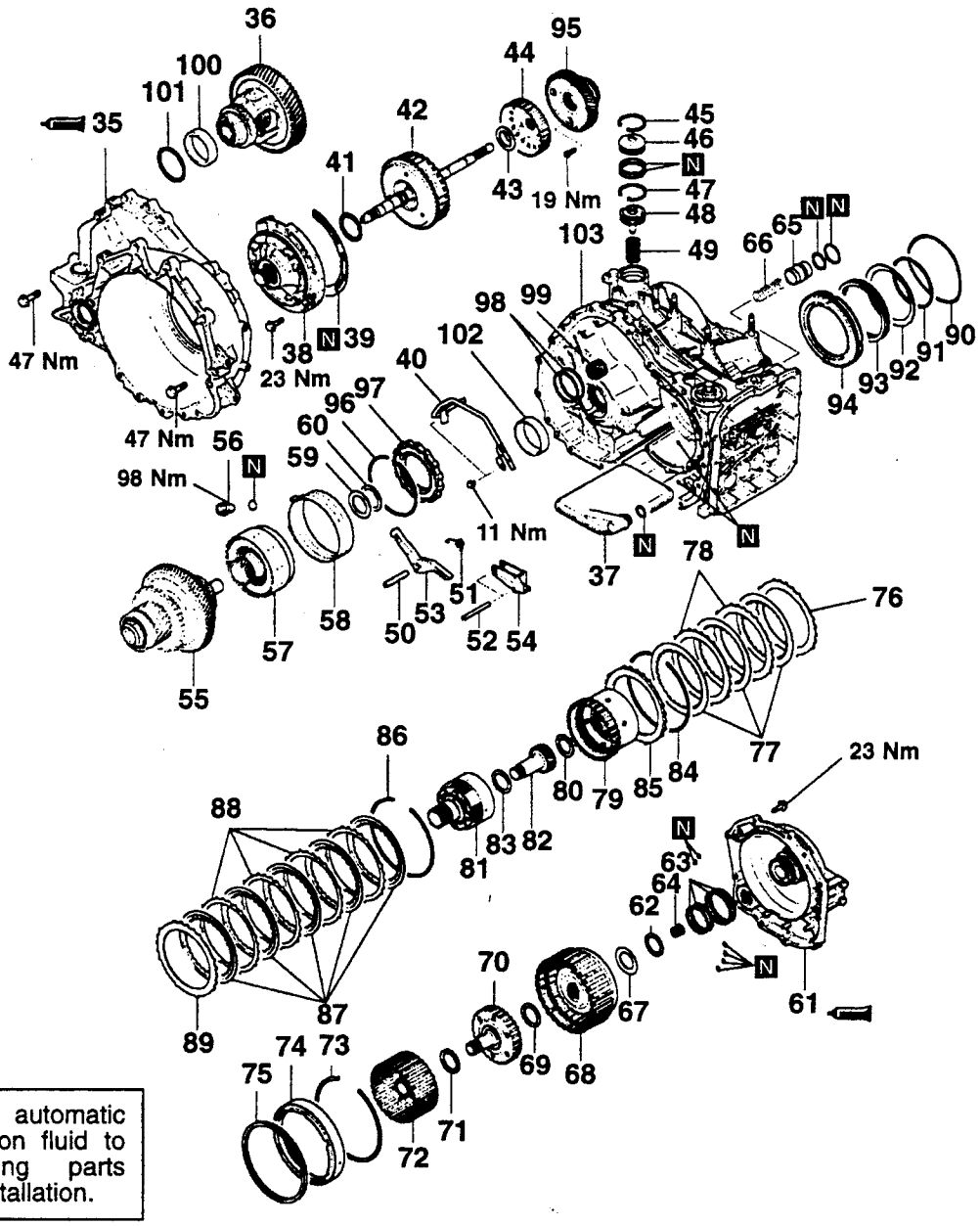
Tool	Number	Name	Use
	MD998820	Installer adapter (42)	Installation of differential taper roller bearing
	MD998824	Installer adapter (50)	Installation of transfer drive gear, differential taper roller bearing
	MD998829	Installer adapter (60)	Installation of transfer drive gear bearing
	MD998907	Spring compressor	Removal and installation of underdrive clutch snap ring
	MD998913	Dial gauge extension	Measurement of low-reverse brake and second brake end plays
	MD998917	Bearing remover	Removal of output shaft taper roller bearing
	MD998924	Spring compressor retainer	• Removal and installation of low-reverse brake snap ring • Measurement of underdrive clutch and overdrive clutch end plays
	MD999590	Spring compressor	Removal and installation of overdrive clutch snap ring

TRANSMISSION

DISASSEMBLY AND REASSEMBLY



1. Torque converter
2. Roll stopper bracket
3. Harness bracket
4. Control cable support bracket
5. Oil level gauge
6. Eye bolt
7. Oil cooler feed tube
8. Oil filter
9. Oil filter gasket
10. Input shaft speed sensor
11. Output shaft speed sensor
12. Manual control lever
13. Inhibitor switch
14. Speeometer gear
15. Valve body cover
16. Manual control shaft
17. Oil temperature sensor
18. Valve body
19. Steel ball
20. Gasket
21. Snap ring
22. Solenoid valve harness
23. Strainer
24. Second brake retainer oil seal
25. Accumulator piston
26. Accumulator spring
27. Accumulator spring
28. Snap ring
29. Accumulator cover
30. Accumulator spring
31. Accumulator piston
32. Manual control lever shaft roller
33. Manual control lever shaft
34. Parking pawl rod

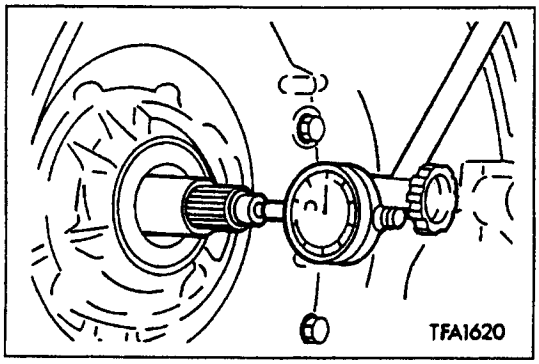


35. Converter housing
36. Differential
37. Oil filter
38. Oil pump
39. Gasket
40. Pipe
41. Thrust washer #1
42. Underdrive clutch and input shaft
43. Thrust bearing #2
44. Underdrive clutch hub
45. Snap ring
46. Reduction brake piston cover
47. Snap ring
48. Reduction brake piston
49. Reduction brake spring
50. Parking pawl shaft
51. Parking pawl spring
52. Parking roller support shaft
53. Parking pawl
54. Parking roller support
55. Direct planetary carrier assembly
56. Anchor plug
57. Direct clutch
58. Reduction brake band
59. Thrust bearing #9
60. Thrust race #10
61. Rear cover
62. Thrust race #8
63. Seal ring
64. Input shaft rear bearing
65. Accumulator piston
66. Accumulator spring
67. Thrust bearing #7
68. Reverse and overdrive clutch
69. Thrust bearing #6
70. Overdrive clutch hub
71. Thrust bearing #5
72. Planetary reverse sun gear
73. Snap ring
74. Second brake piston
75. Return spring
76. Pressure plate
77. Second brake disc
78. Second brake plate
79. Overdrive planetary carrier
80. Thrust bearing #4
81. Output planetary carrier
82. Underdrive sun gear
83. Thrust bearing #3
84. Snap ring
85. Reaction plate
86. Snap ring
87. Low-reverse brake disc
88. Low-reverse brake plate
89. Pressure plate
90. Wave spring
91. Snap ring
92. Spring retainer
93. Return spring
94. Low-reverse brake piston
95. Transfer drive gear
96. Snap ring
97. One-way clutch
98. Seal ring
99. Needle bearing
100. Outer race
101. Spacer
102. Outer race
103. Transmission case

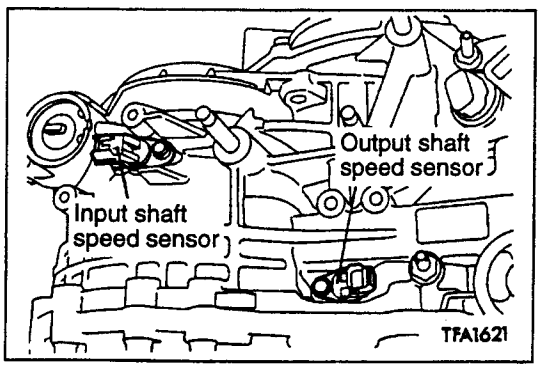
DISASSEMBLY

Caution

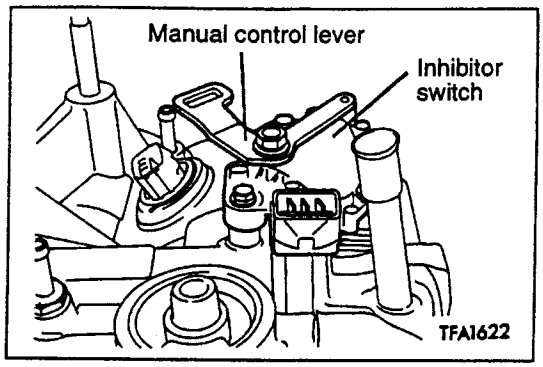
1. **Because the automatic transmission is manufactured from high-precision parts, sufficient care must be taken not to scratch or damage these parts during disassembly and reassembly.**
2. **The working area should be covered with a rubber mat to keep it clean at all times.**
3. **Do not wear any cloth gloves and do not use any rags during disassembly. Use nylon cloth or paper towels if you need to use something.**
4. **Parts which have been disassembled should all be cleaned. Metal parts can be cleaned with normal detergent, but they should be dried completely using compressed air.**
5. **Clutch discs, plastic thrust plates and rubber parts should be cleaned with automatic transmission fluid (ATF) so that they do not become dirty.**
6. **If the transmission body has been damaged, disassemble and clean the cooler system also.**



(1) Remove the torque converter.
(2) Use the dial gauge to measure the input shaft end play.
(3) Remove each bracket.
(4) Remove the oil level gauge.
(5) Remove the eye bolt, gasket and the oil cooler feed tube.
(6) Remove the oil filter.

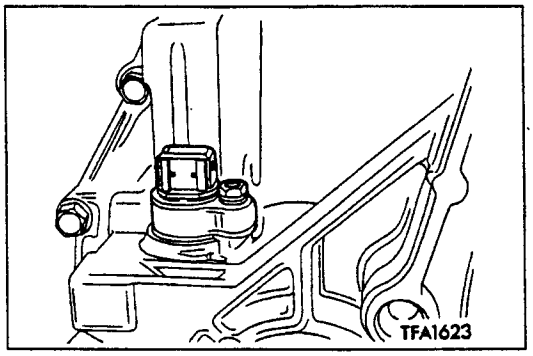


(7) Remove the input shaft speed sensor and output shaft speed sensor.

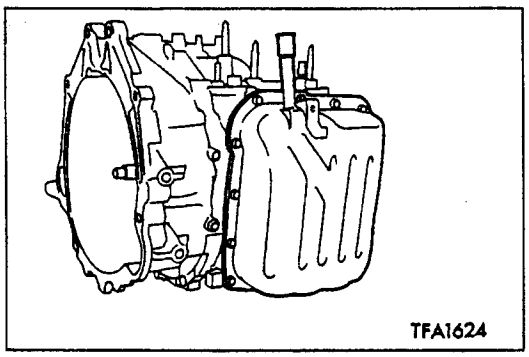


(8) Remove the manual control lever, and then remove the inhibitor switch.

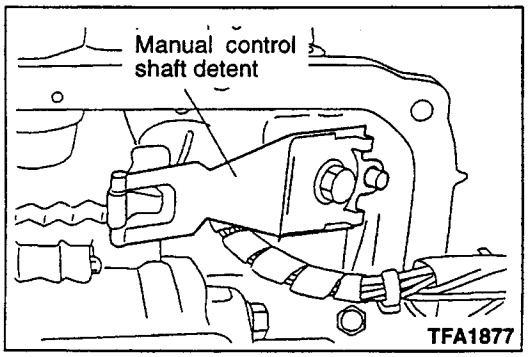
Caution
Make sure that the valve body is installed before removing the manual control lever installation nut.



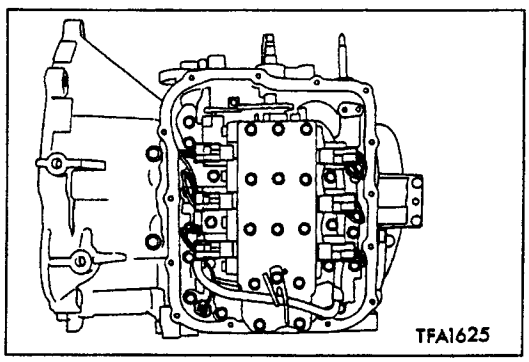
(9) Remove the speedometer gear.



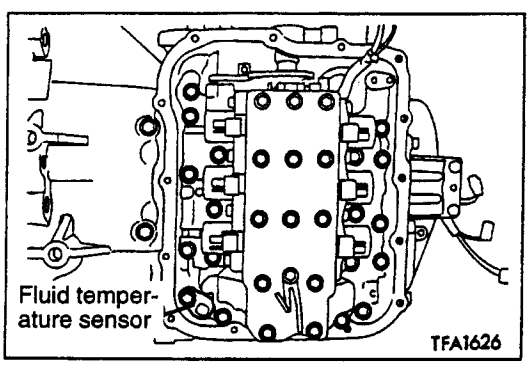
(10)Remove the valve body cover.



(11)Remove the manual control shaft detent.

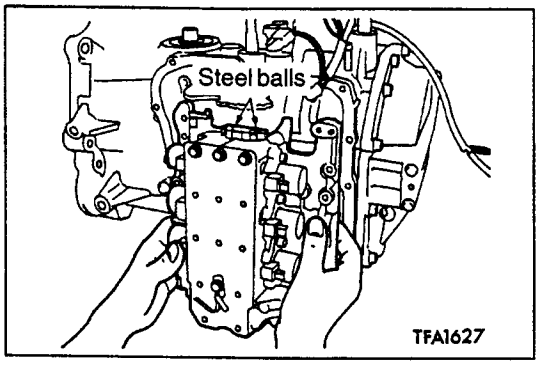


(12)Disconnect the harness connectors of the valve body.



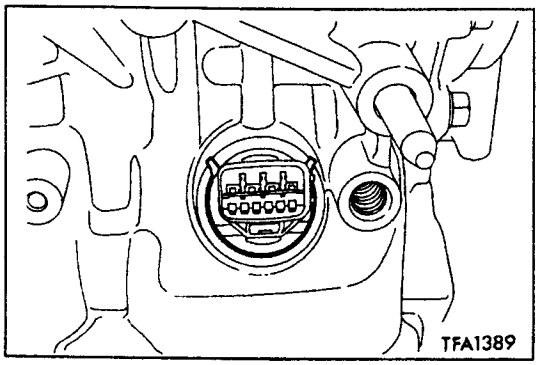
(13)Remove the valve body mounting bolts (28 pieces).
(14)Remove the fluid temperature sensor.

Caution
Make sure that the manual control lever and the inhibitor switch are removed.

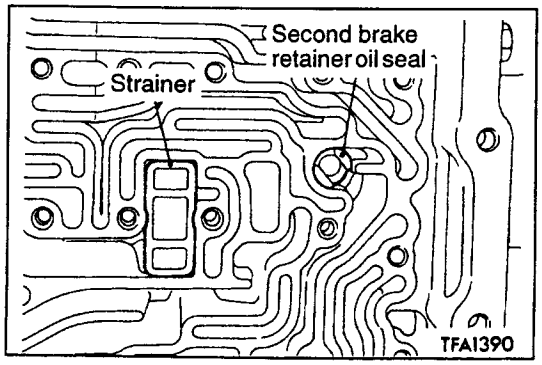


(15)Remove the valve body, gasket and the steel balls (2 pieces).

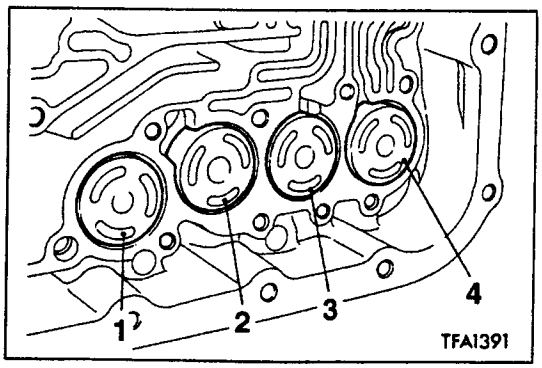
Caution
Do not lose the steel balls (2 pieces).



(16)Remove the snap ring, and then remove the solenoid valve harness.

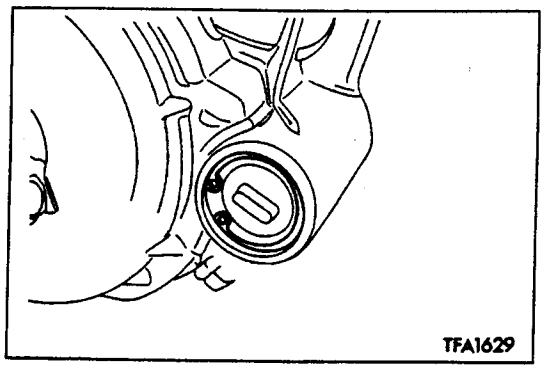


(17)Remove the strainer and the second brake retainer oil seal.

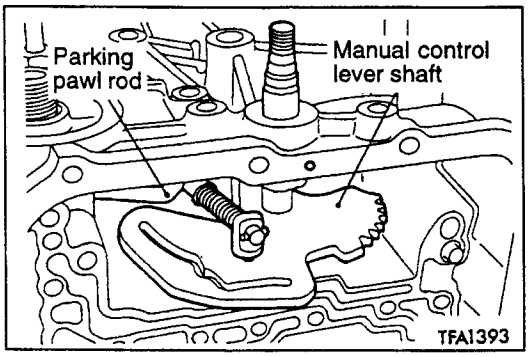


(18)Remove each accumulator piston and spring.

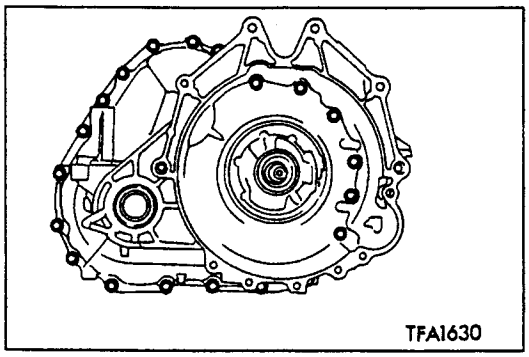
No.	Name
1	For low-reverse brake
2	For underdrive clutch
3	For second brake
4	For overdrive clutch



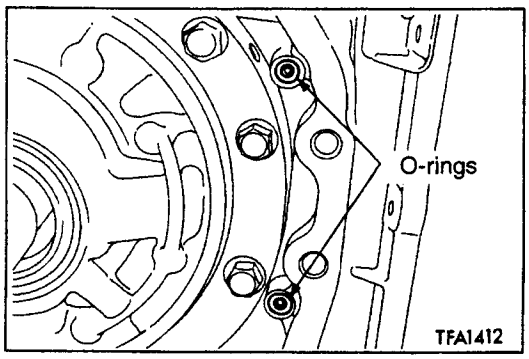
(19)Remove the snap ring to remove the reduction brake accumulator cover, spring and piston.



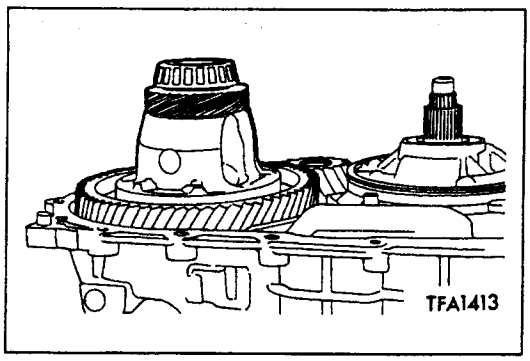
(20) Remove the manual control lever shaft roller.
(21) Remove the manual control lever shaft and the parking pawl rod.



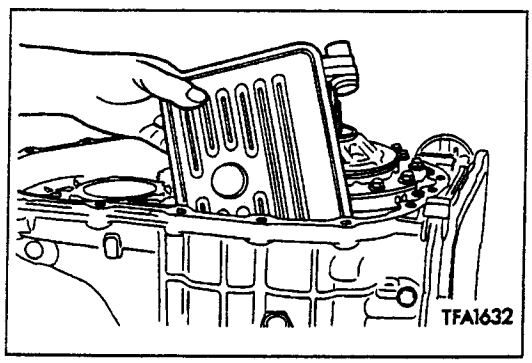
(22) Remove the torque converter housing mounting bolts (20 pieces), and then remove the torque converter housing.



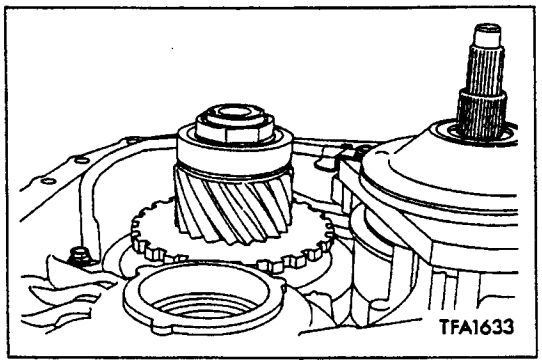
(23) Remove the O-rings (2 pieces).



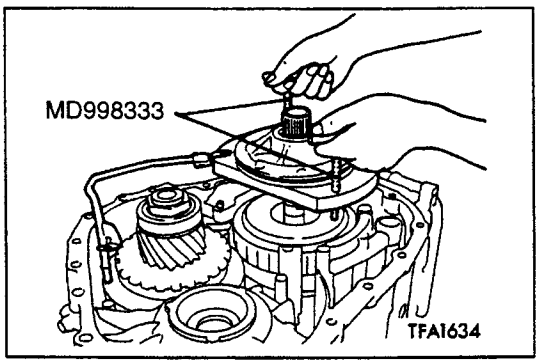
(24) Remove the differential.



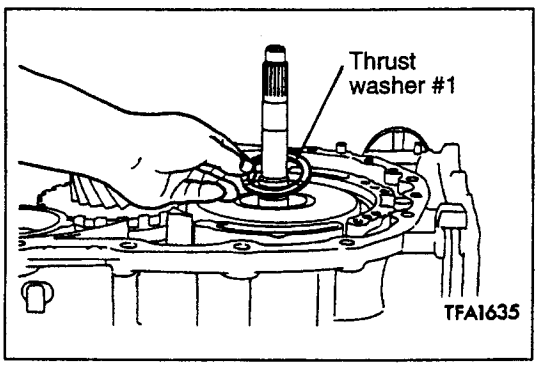
(25) Remove the oil filter.



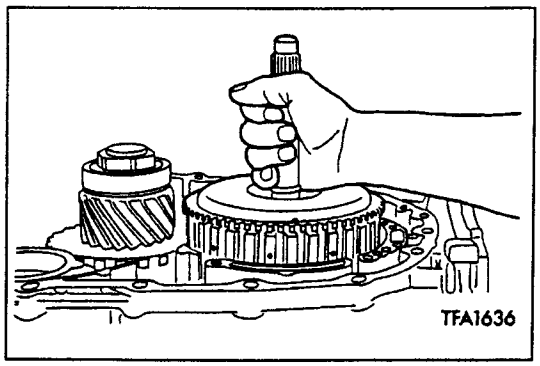
(26)Remove the two pipe mounting bolts.



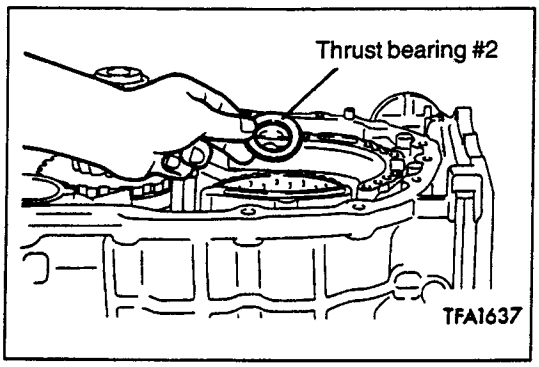
(27)Remove the oil pump together with the pipe by screwing in the special tools evenly.
(28)Remove the oil pump gasket.
(29)Remove the pipe from the oil pump.



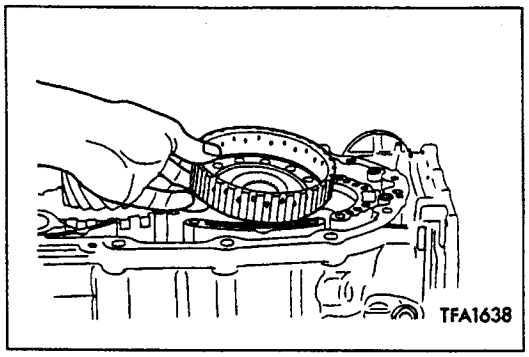
(30)Remove the thrust washer #1.



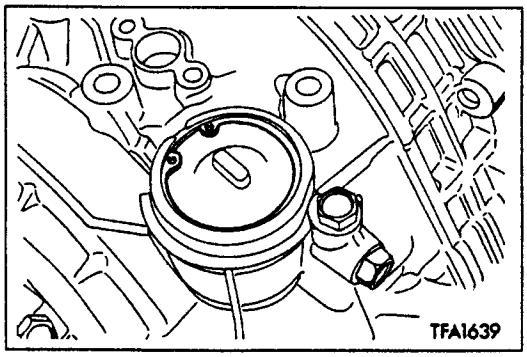
(31)Hold the input shaft, and then remove the underdrive clutch.



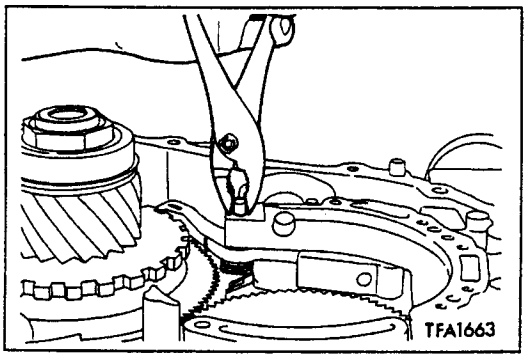
(32)Remove the thrust bearing #2.



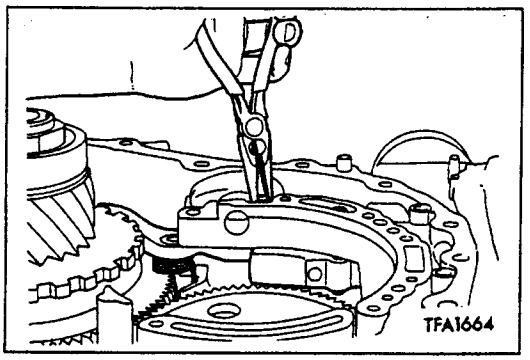
(33)Remove the underdrive clutch hub.



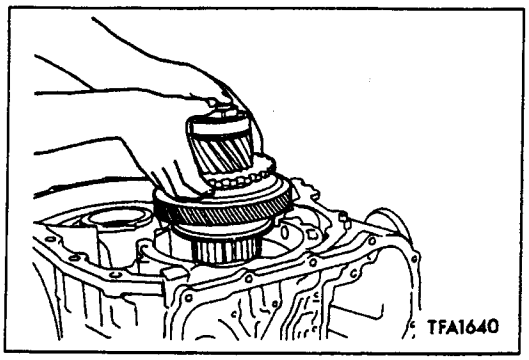
(34)Remove the snap ring and then the reduction brake piston cover.
(35)Remove the snap ring and take out the reduction brake piston and the spring.



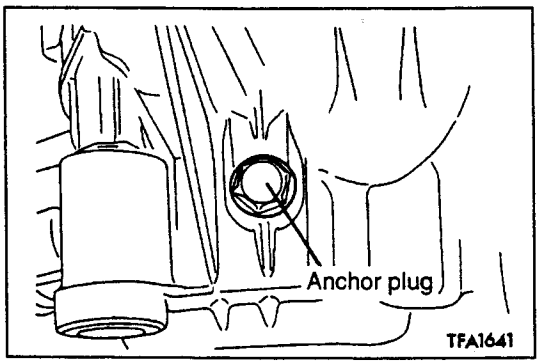
(36)Remove the parking pawl shaft.



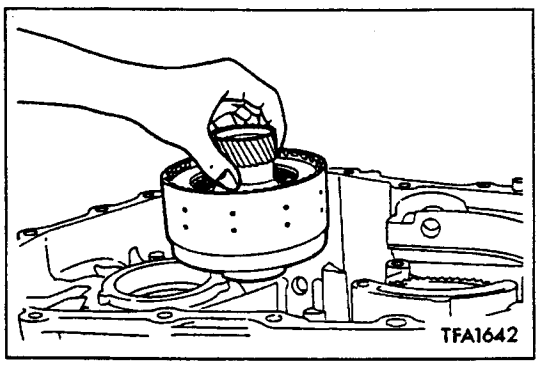
(37)Pull out the two parking roller support shafts, then remove the parking pawl case, parking roller support and spring.



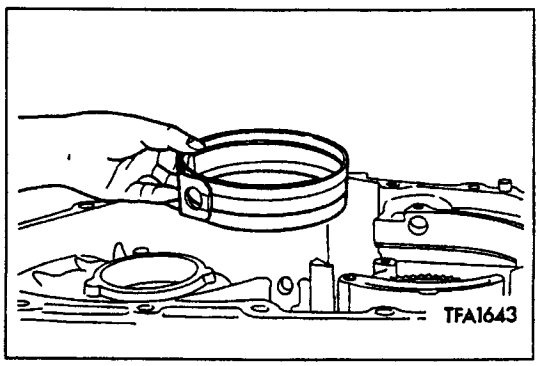
(38)Remove the direct planetary carrier assembly.



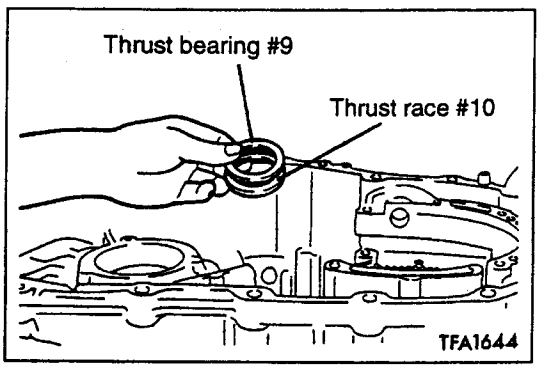
(39)Remove the anchor plug and the O-ring.



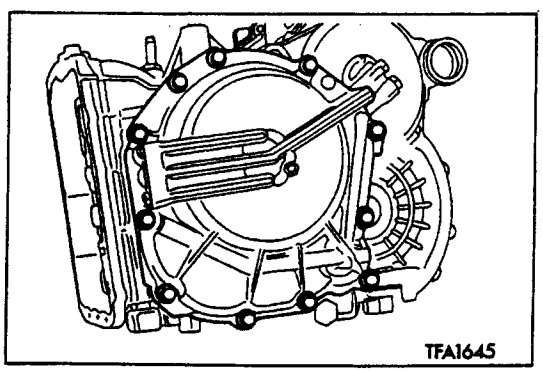
(40)Remove the direct clutch.



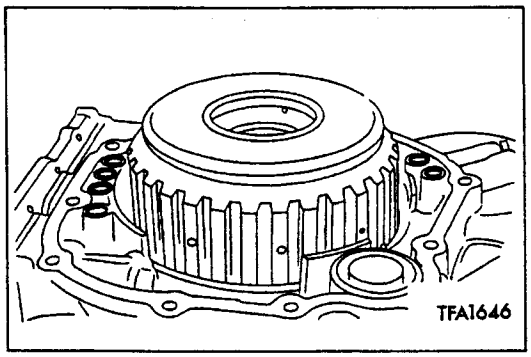
(41)Remove the reduction brake band.



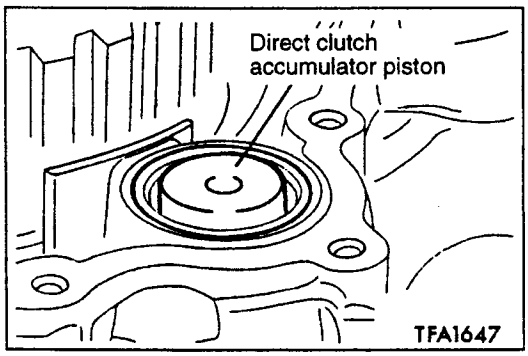
(42)Remove the thrust bearing #9 and the thrust race #10.



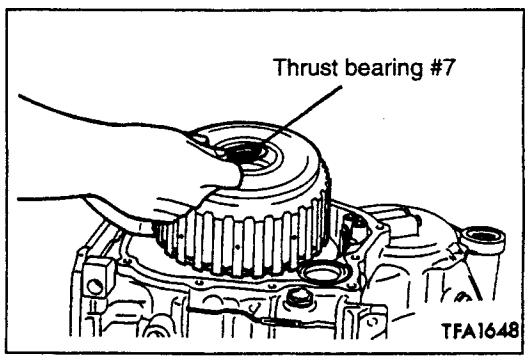
(43)Remove the rear cover.
(44)Remove the thrust race #8.
(45)Remove the seal rings (4 pieces).
(46)Remove the input shaft rear bearing.



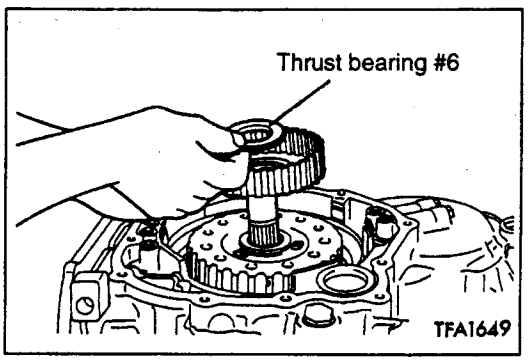
(47)Remove the six O-rings.



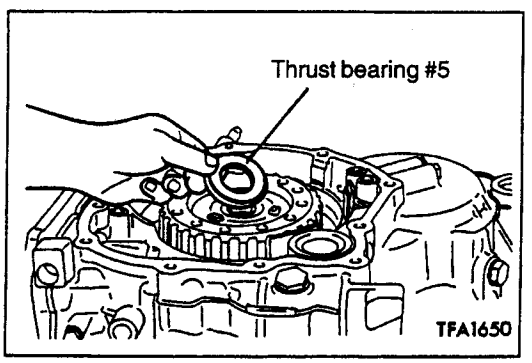
(48)Remove the O-ring. Then, remove the direct clutch accumulator piston and the spring.



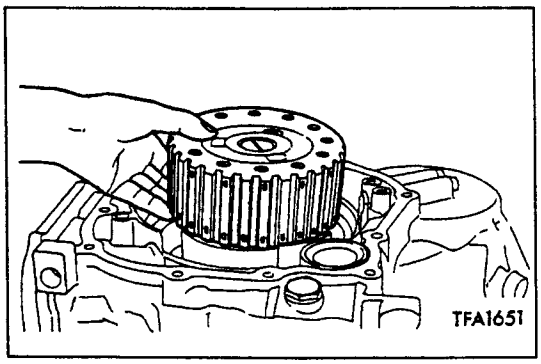
(49)Remove the reverse and overdrive clutch and the thrust bearing #7.



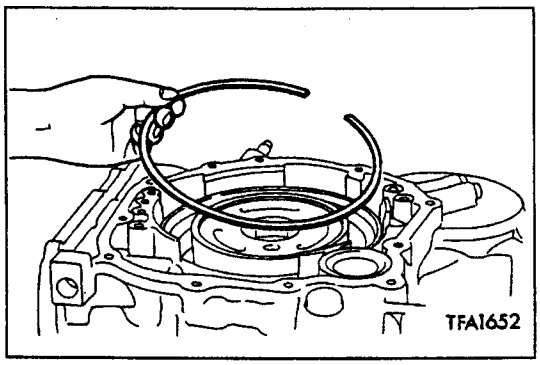
(50)Remove the overdrive clutch hub and the thrust bearing #6.



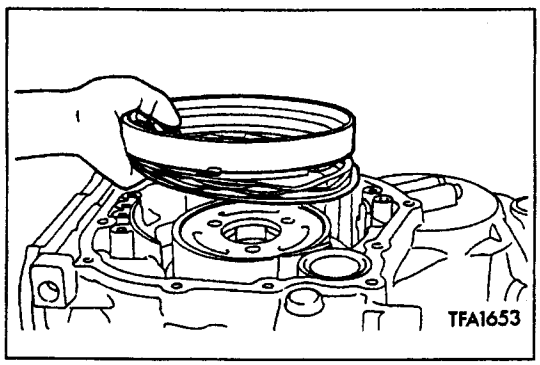
(51)Remove the thrust bearing #5.



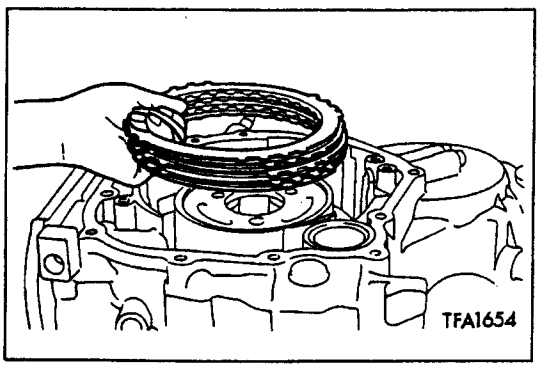
(52)Remove the planetary reverse sun gear.



(53)Remove the snap ring.



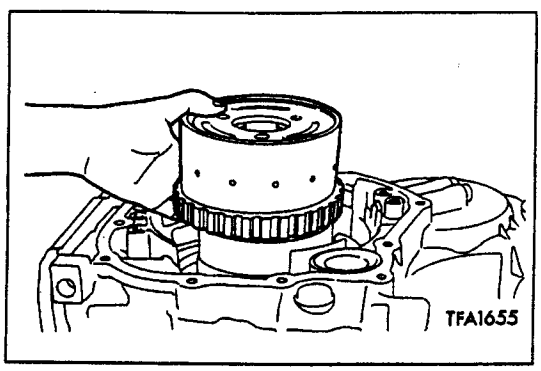
(54)Remove the second brake piston and the return spring.



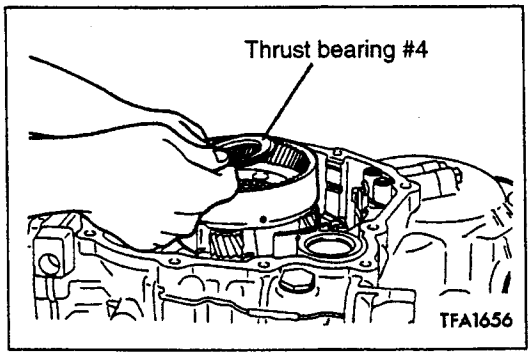
(55)Remove the pressure plate, brake discs and brake plate(s).

No. of brake discs and plates

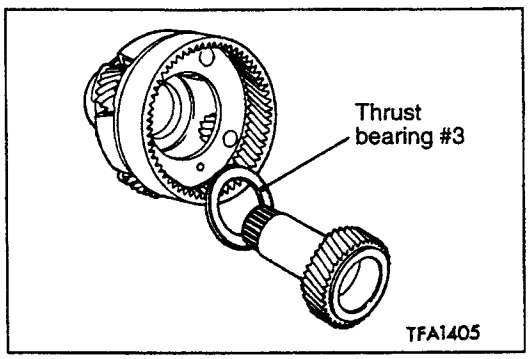
Brake disc	Brake plate	Pressure plate
3	2	1



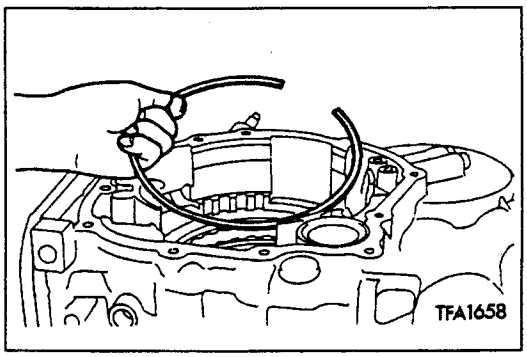
(56)Remove the overdrive planetary carrier.



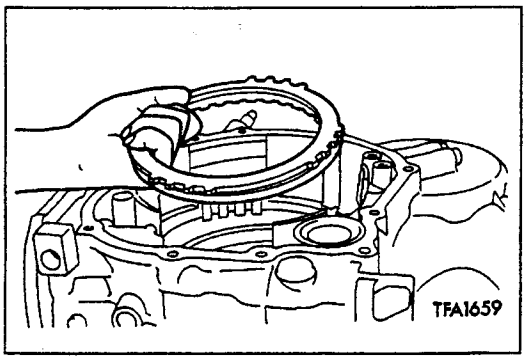
(57) Remove the output planetary carrier and the thrust bearing #4.



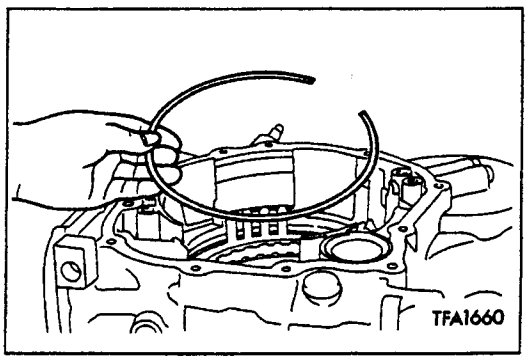
(58) Remove the underdrive sun gear and the thrust bearing #3 from the output planetary carrier.



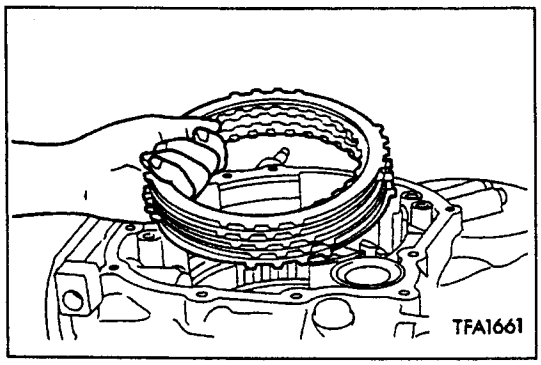
(59) Remove the snap ring.



(60) Remove the reaction plate and the brake disc.



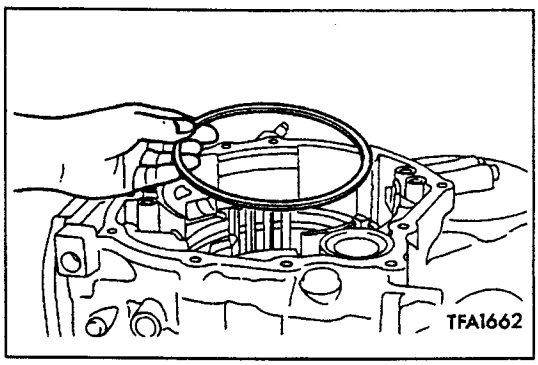
(61) Remove the snap ring.



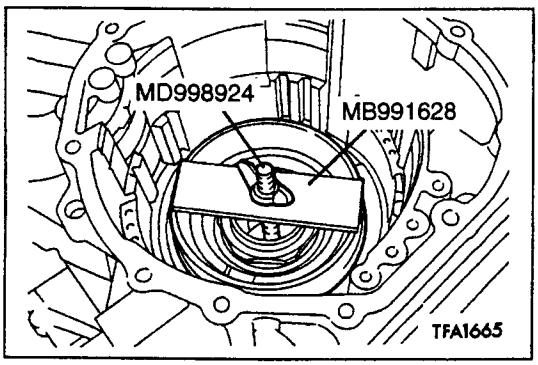
(62)Remove the brake plates, brake discs and pressure plate.

No. of brake discs and plates

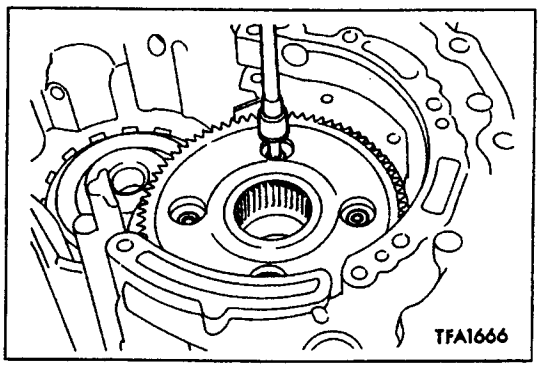
Brake disc	Brake plate	Pressure plate
5	4	1



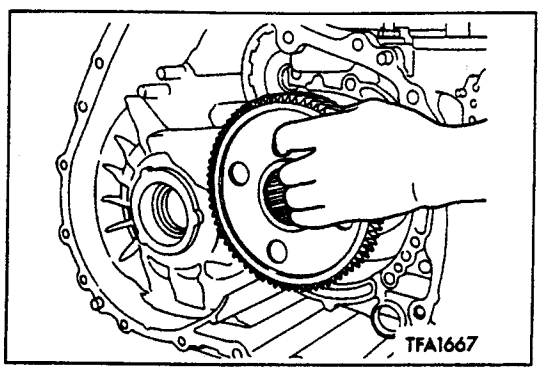
(63)Remove the wave spring.



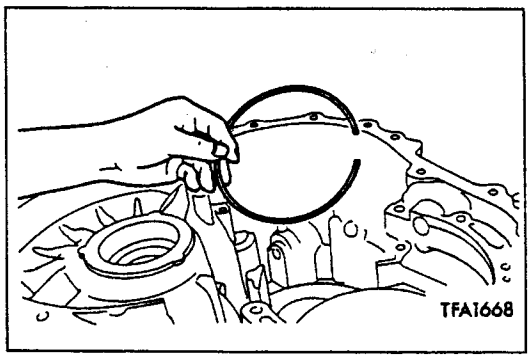
(64)Use the special tool to remove the snap ring.
(65)Remove the spring retainer, return spring and the low-reverse brake piston.



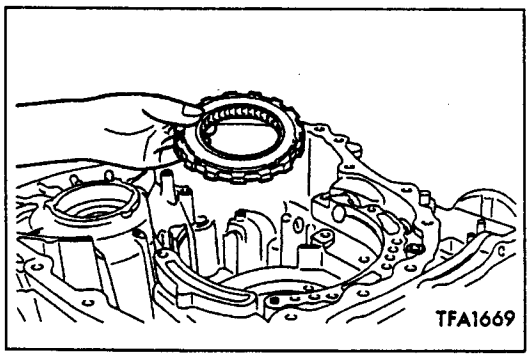
(66)Remove the transfer drive gear mounting bolts.



(67)Remove the transfer drive gear.



(68)Remove the snap ring.



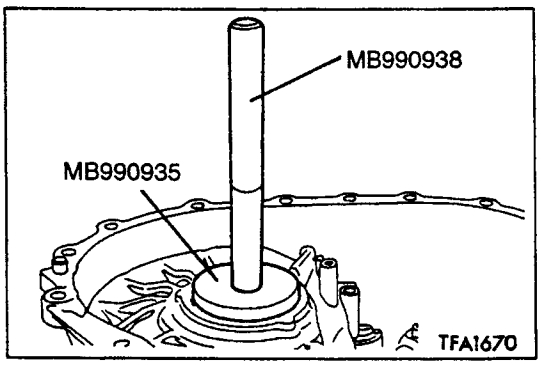
(69)Remove the one-way clutch.
(70)Remove the two seal rings.
(71)Remove the needle bearing.

(72)Remove the differential bearing outer race and spacer from the torque converter housing.
(73)Remove the differential bearing outer race from the transmission case.

REASSEMBLY

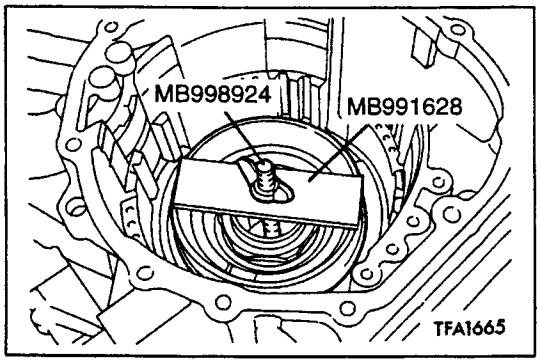
Caution

1. **Never reuse the gasket, O-ring, oil seal, etc. Always replace with a new one when reassembling.**
2. **Never use grease other than blue petrolatum jelly and white Vaseline.**
3. **Apply ATF to friction components, rotating parts, and sliding parts before installation. Immerse a new clutch disc or brake disc in ATF for at least two hours before assembling them.**
4. **Never apply sealant or adhesive to gaskets.**
5. **When replacing a bushing, replace the assembly which it belongs to.**
6. **Never use any cloth gloves or any rags during reassembly. Use nylon cloth or paper towels if you need to use something.**
7. **Change the oil in the cooler system.**

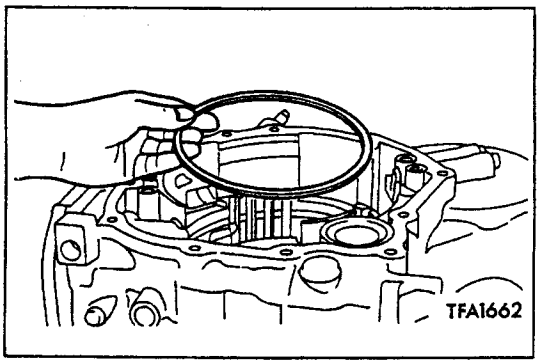


(1) Use the special tools to tap the differential bearing outer race in the transmission case.

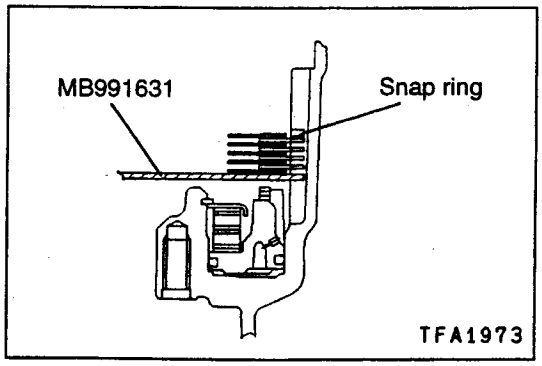
Special tools No.	MB990935, MB990938



(2) Install the low-reverse brake piston, return spring, and spring retainer.
(3) Use the special tools to install the snap ring.



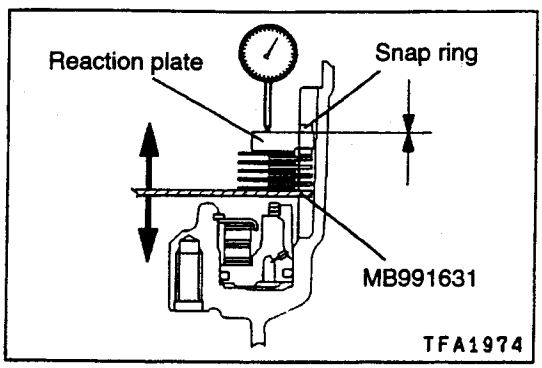
(4) Install the wave spring.



(5) Replace the pressure plate of the low-reverse brake with the special tool, and then install the brake disc, brake plate and snap ring as shown in the figure.

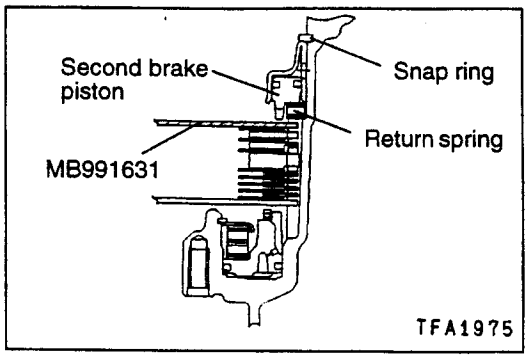
Number of brake discs and plates

Brake disc	Brake plate	Special tool
5	4	1



(6) Install the reaction plate and the used snap ring.
(7) Move the special tool to measure the end play, and then replace the snap ring installed in step (6) to adjust the end play to standard value.

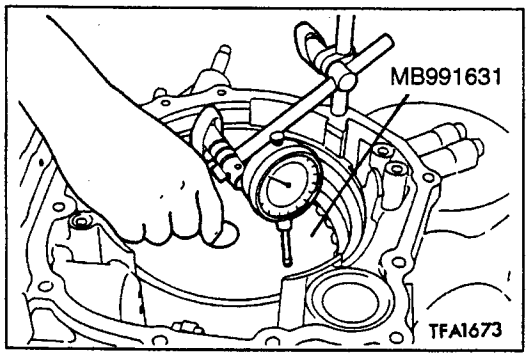
Standard value: 0 – 0.16 mm



(8) Replace the pressure plate of the second brake with the special tool, and then install the brake disc and brake plate as shown in the figure.
(9) Install the return spring, second brake piston and snap ring.

Number of brake discs and plates

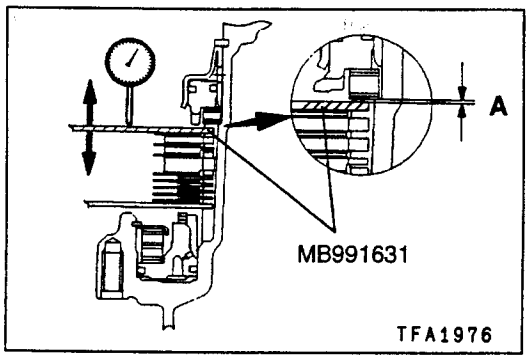
Brake disc	Brake plate	Special tool
3	2	1



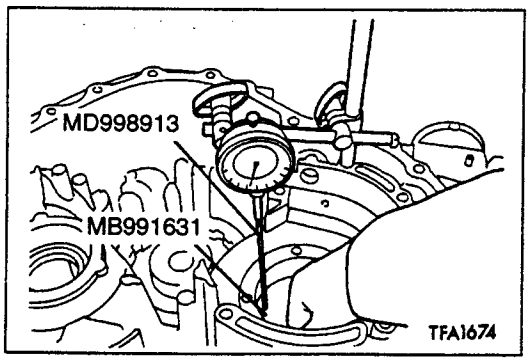
(10) Move the special tool to measure the end play.

Standard value: 0.79 – 1.25 mm

Special tool No.	MB991631

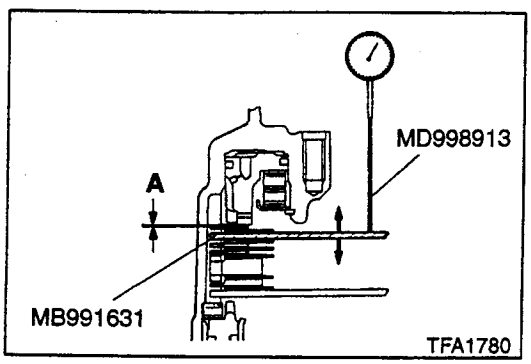


Reference
Select a pressure plate which thickness is within the following value, and replace the special tool mounted in the step (8) with it.
[A (moving amount) + thickness of the special tool (2.0 mm) – 1.25] to [A (moving amount) + thickness of the special tool (2.0 mm) – 0.79]



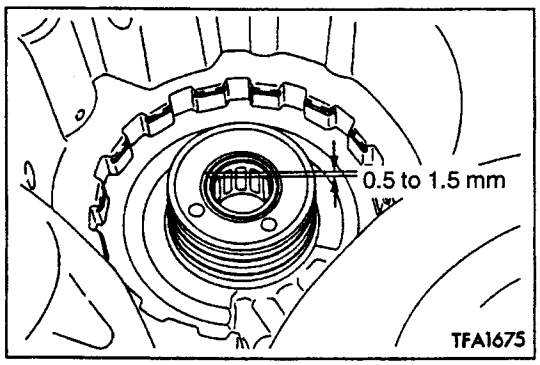
(11) Reverse the transmission.
(12) Install the special tool (MD998913) in a dial gauge, and then move the special tool (MB991631) to measure the end play.

Standard value: 1.35 – 1.81 mm

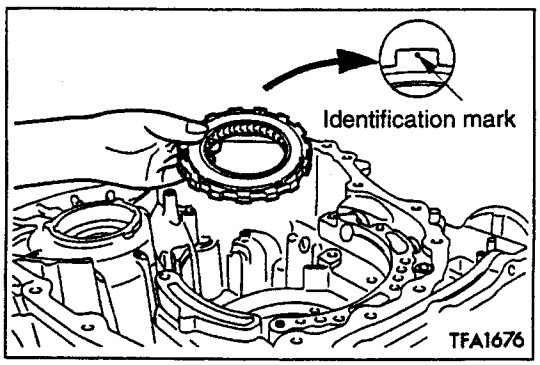


Reference
Select a pressure plate which thickness is within the following value, and replace the special tool mounted at the step (5) with it.
[A (moving amount) + thickness of the special tool (2.0 mm) – 1.81] to [A (moving amount) + thickness of the special tool (2.0 mm) – 1.35]

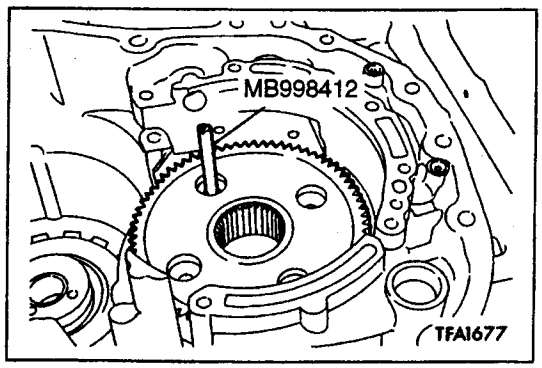
(13)Remove the parts installed from steps (4) to (12).



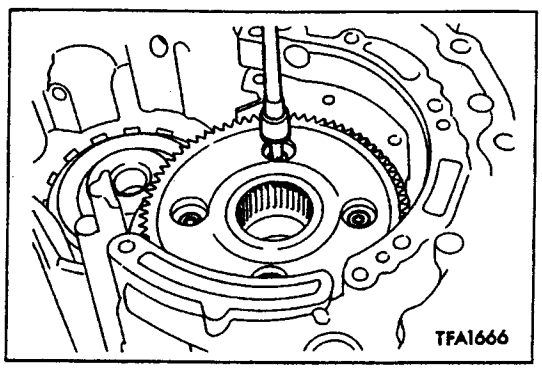
(14)Install the needle bearing as shown in the figure.
(15)Install two seal rings.



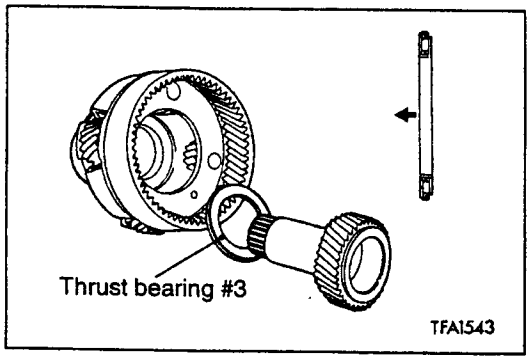
(16)Install the one-way clutch with the identification mark upward.
(17)Install the snap ring.



(18)Use the special tool to install the transfer drive gear.

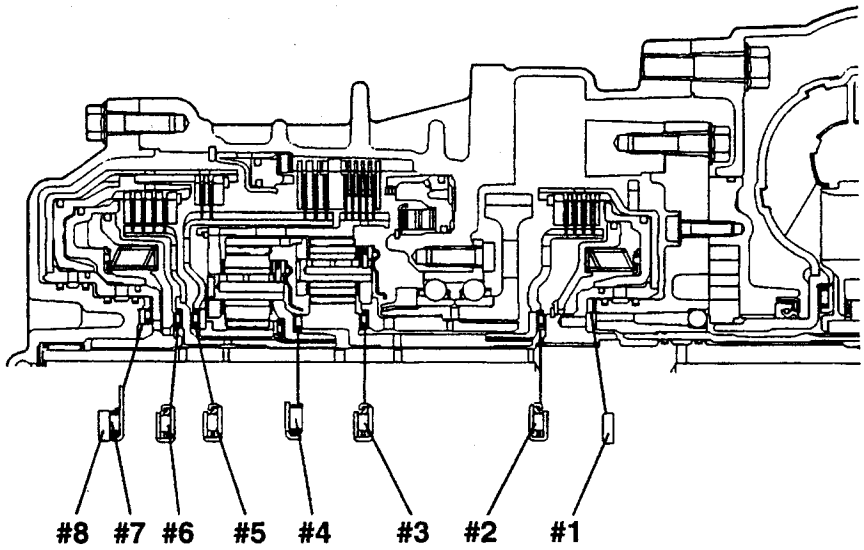


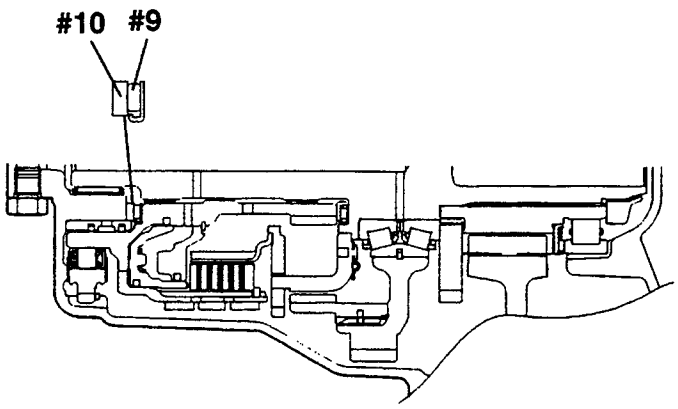
(19)Tighten the four mounting bolts of the transfer drive gear to the specified torque.



(20) Install the underdrive sun gear and thrust bearing #3 to the output planetary carrier.

Caution
Be careful about the installation direction of the thrust bearing.



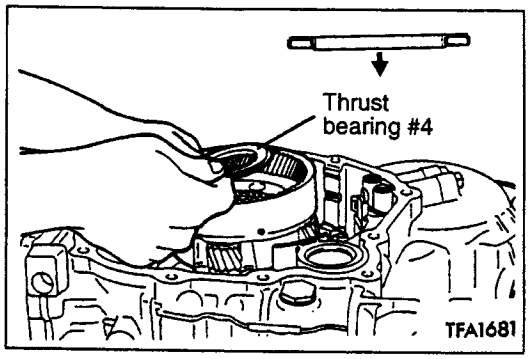


TFA2059

IDENTIFICATION OF THRUST BEARINGS, THRUST RACES, AND THRUST WASHERS

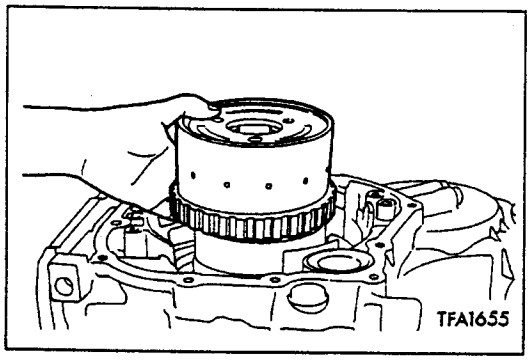
mm

Symbol	O.D.	I.D.	Thick-ness	Part number	Symbol	O.D.	I.D.	Thick-ness	Part number
#1	59	47	1.8	MD754509	#8	48.9	37	1.6	MD707267
			2.0	MD754508				1.7	MD759681
			2.2	MD754507				1.8	MD723064
			2.4	MD753793				1.9	MD754794
			2.6	MD753794				2.0	MD707268
			2.8	MD753795				2.1	MD754795
#2	49	36	3.6	MD756846				2.2	MD723065
#3	49	36	3.6	MD756846				2.3	MD754796
#4	45.3	31	3.3	MD757647				2.4	MD724358
#5	49	36	3.6	MD756846				2.5	MD754797
#6	49	36	3.6	MD756846				2.6	MD754798
#7	59	37	2.8	MD754595	#9	49	31	3.3	MD761026
					#10	46.5	33	3.0	MD761022

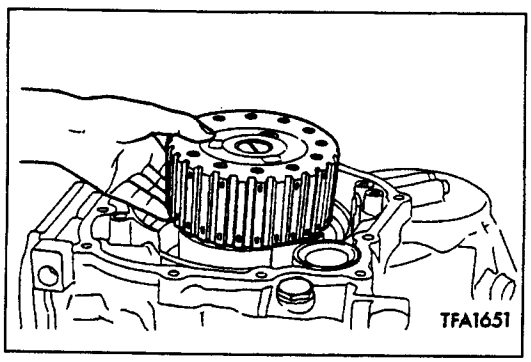


(21)Install the output planetary carrier and thrust bearing #4.

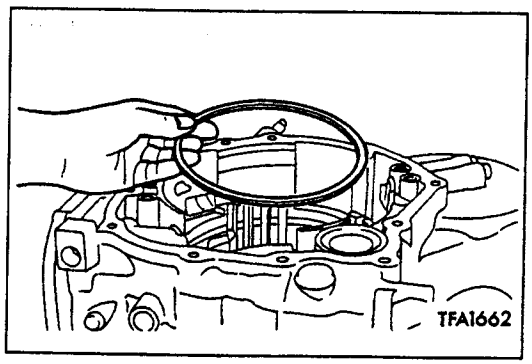
Caution
Be careful about the installation direction of the thrust bearing.



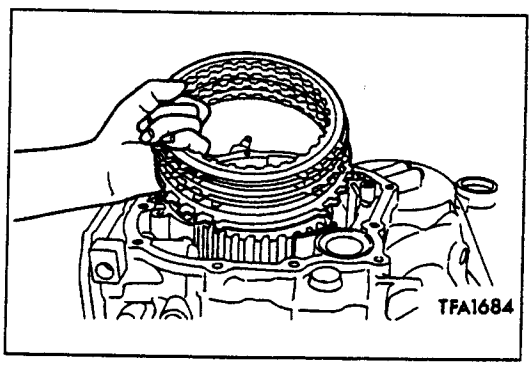
(22)Install the overdrive planetary carrier.



(23)Install the planetary reverse sun gear.



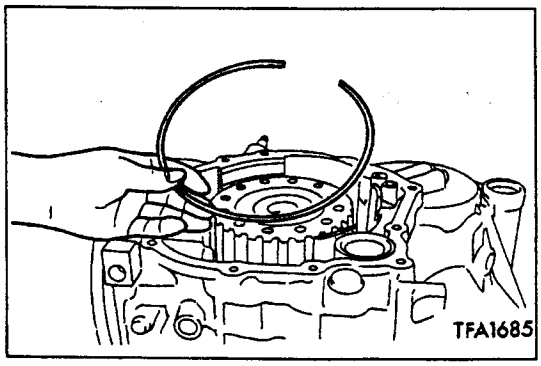
(24)Install the wave spring.



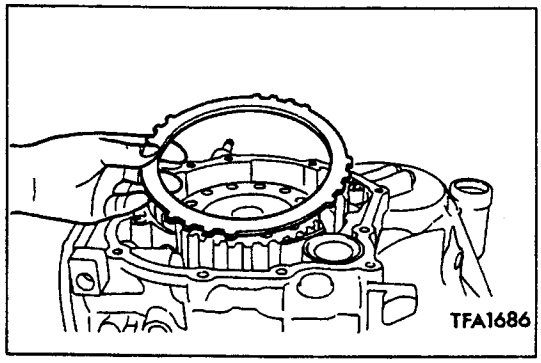
(25)Install the pressure plate, brake disc, and brake plate.

Number of brake discs and plates

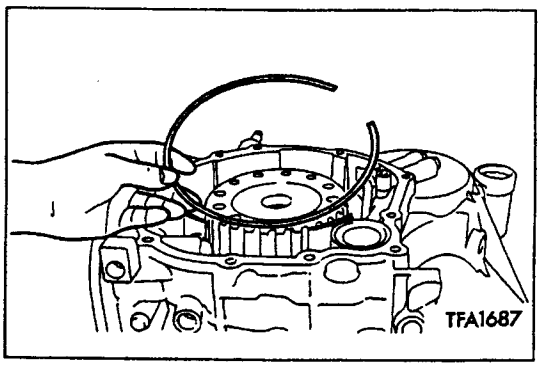
Brake disc	Brake plate	Pressure plate
5	4	1



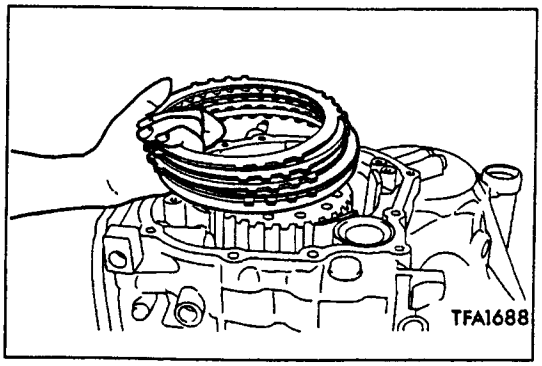
(26)Install the snap ring.



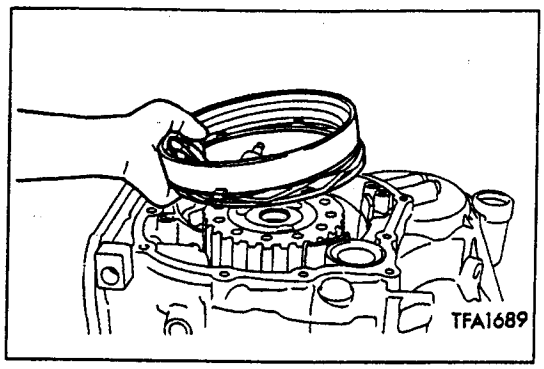
(27)Install the reaction plate.



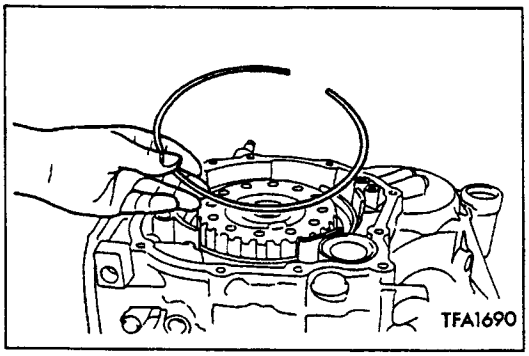
(28)Install the snap ring.



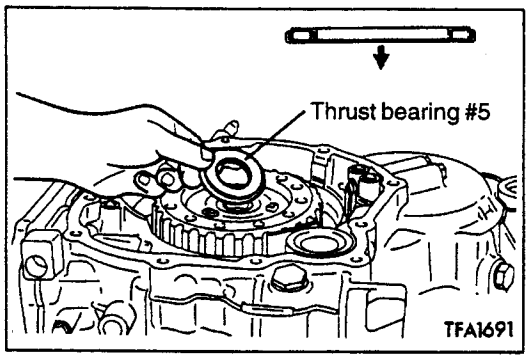
(29)Install the brake disc, brake plate, and pressure plate.



(30)Install the return spring and second brake piston.

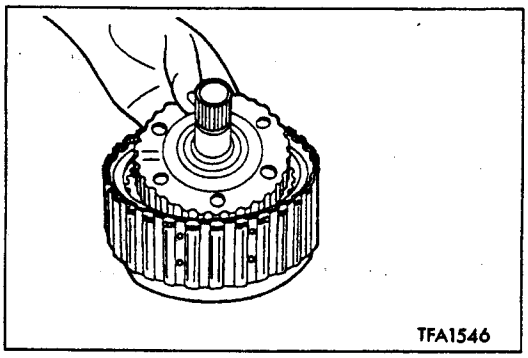


(31)Install the snap ring.



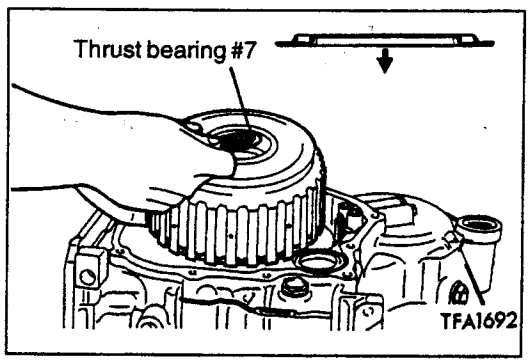
(32)Install the thrust bearing #5.

Caution
Be careful about the installation direction of the thrust bearing.



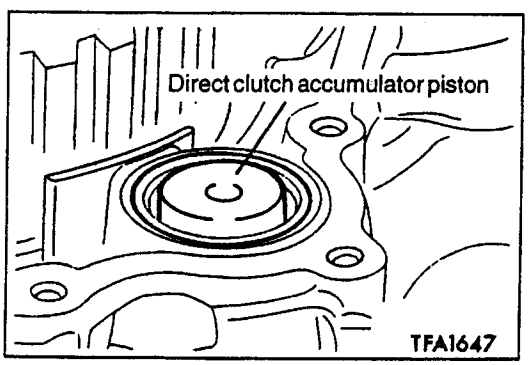
(33)Install the overdrive clutch hub and thrust bearing #6 to the reverse and overdrive clutch.

Caution
Be careful about the installation direction of the thrust bearing.

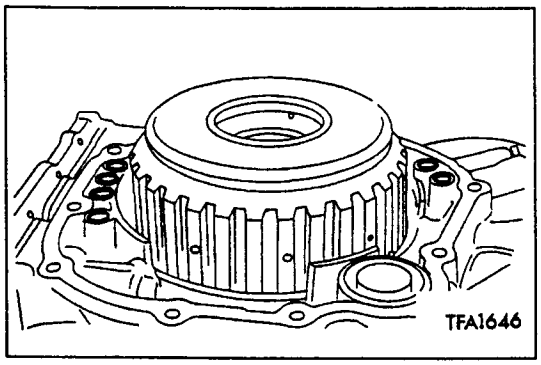


(34)Install the reverse and overdrive clutch, and thrust bearing #7.

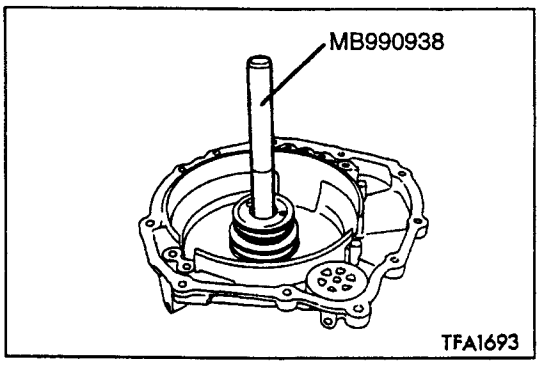
Caution
Be careful about the installation direction of the thrust bearing.



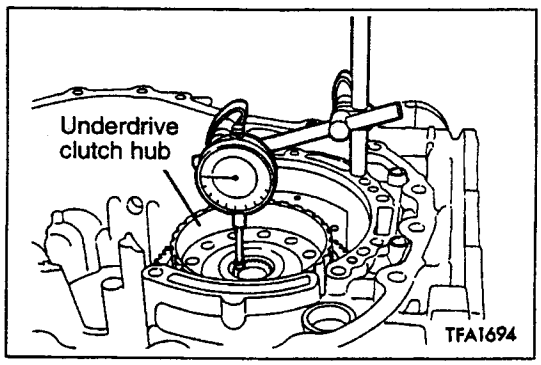
(35)Install the direct clutch accumulator spring and piston. Fit the O-ring.



(36)Install six O-rings.



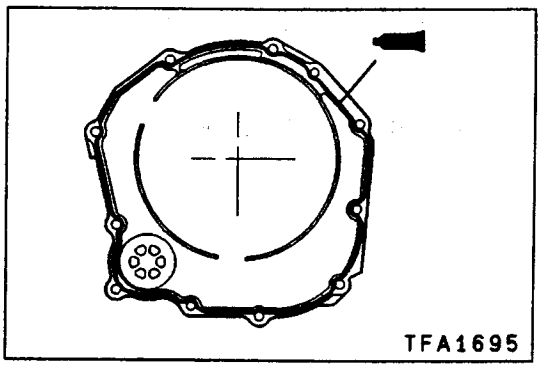
(37)Install the input shaft bearing.
(38)Install the four seal rings.



(39)Install the used thrust race #8, and then the rear cover.
(40)Measure end play of the underdrive sun gear. Replace the thrust race installed in step (39) to adjust the play to the standard value.

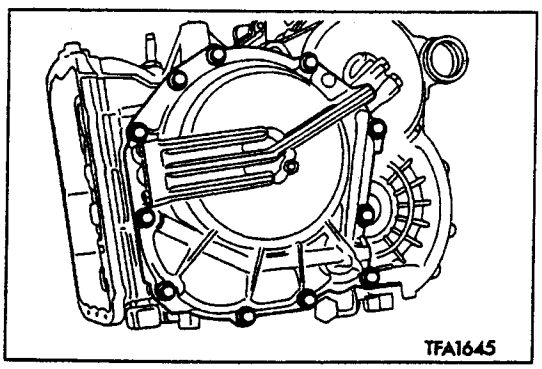
Standard value: 0.25 – 0.45 mm

NOTE
Installing the underdrive clutch hub makes it easy to measure the end play of the underdrive sun gear.

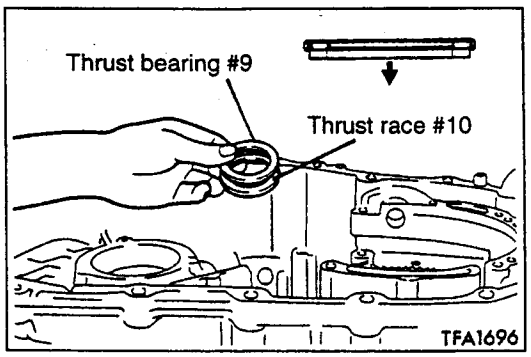


(41)Squeeze out the liquid gasket of 1.6 mm in diameter and apply it to the shown points of the rear cover.

Liquid gasket:
MITSUBISHI genuine sealant Part No. MD974421 or equivalent

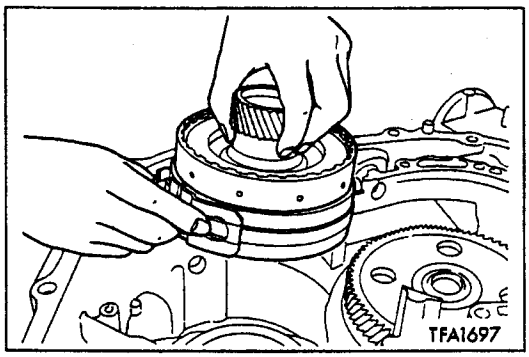


(42)Install the rear cover, and tighten its mounting bolts to the specified torque.

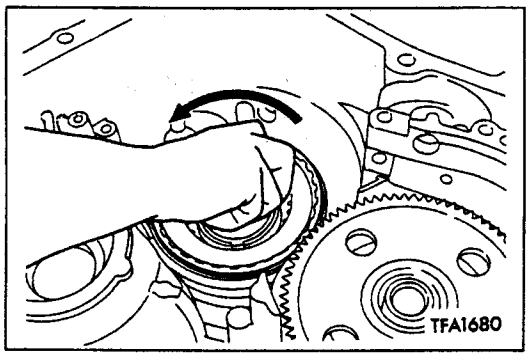


(43)Install the thrust race #10 and the thrust bearing #9.

Caution
Pay attention to the mounting direction of the thrust bearing.

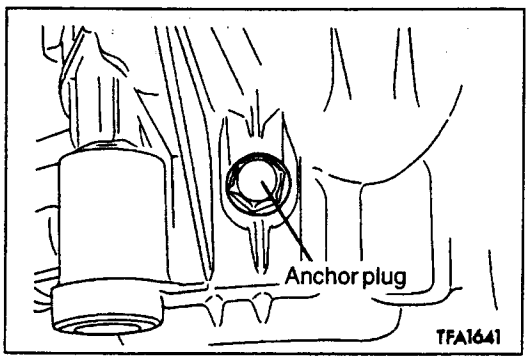


(44)Tighten the anchor plug handtight with a new O-ring attached, then install the reduction brake band and the direct clutch simultaneously.

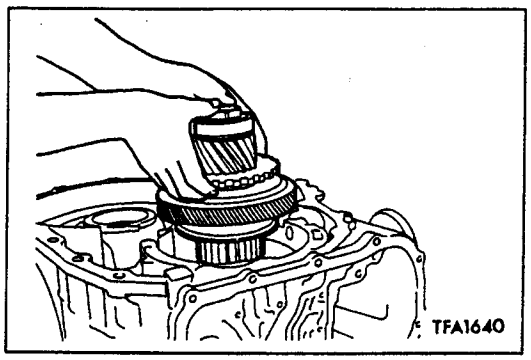


(45)Check to ensure that the direct clutch rotates only in the indicated direction.

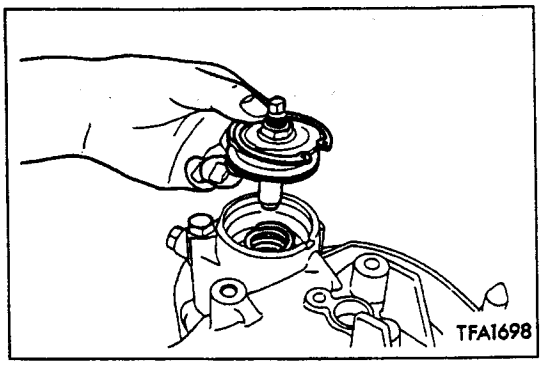
NOTE
If it rotates in the opposite direction, remove and reinstall the one-way clutch in the reverse direction.



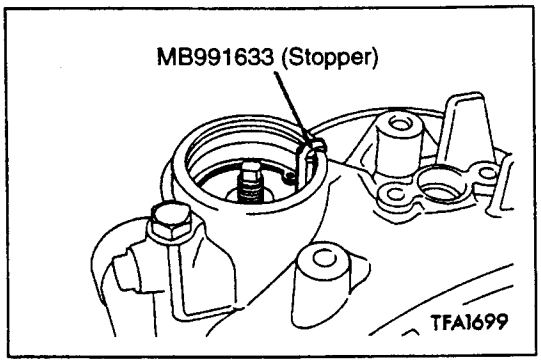
(46)Tighten the anchor plug to the specified torque.



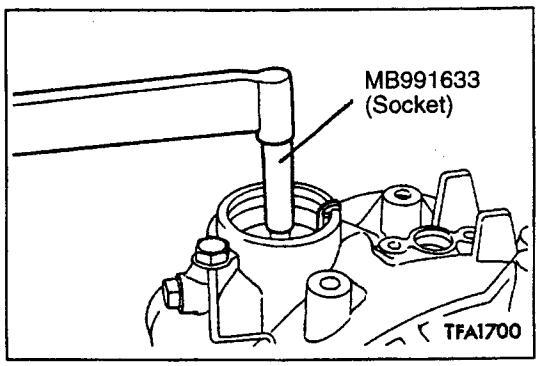
(47)Install the direct planetary carrier assembly.



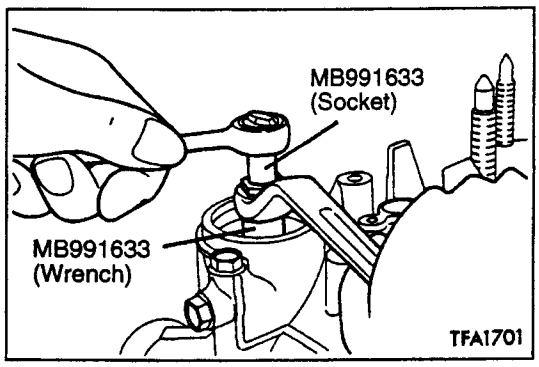
(48) Install the spring and the piston of the reduction brake in the transmission case and secure them with the snap ring.



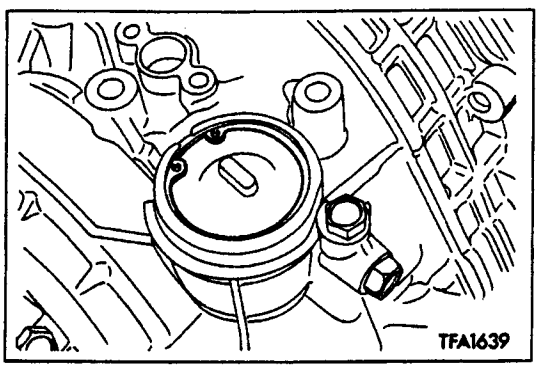
(49) Adjust the reduction brake piston using the following procedure.
1) Remove the nut from the reduction brake piston.
2) Install the special tool (Stopper) to hold the reduction brake piston against rotation.



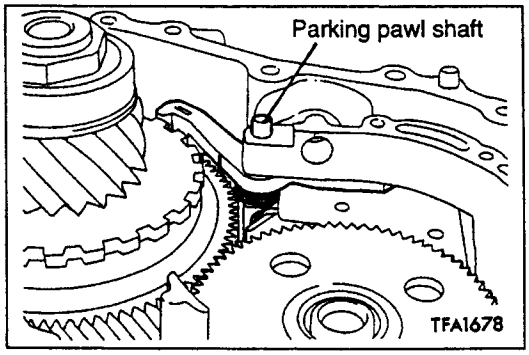
3) Using a torque wrench with the special tool (Socket) attached, tighten the adjust rod to a torque of 5 Nm after performing the procedure of tightening to 10 Nm then loosening twice. Then, back off the special tool (Socket) 5-1/2 to 5-3/4 turns.



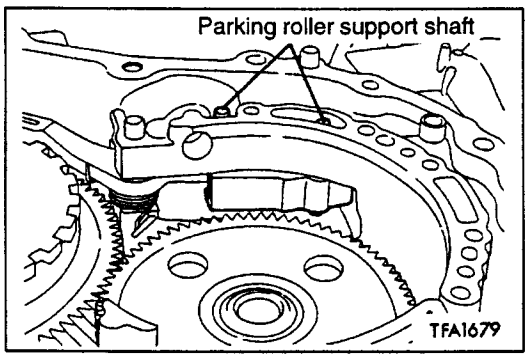
4) Attach the nut to the adjust rod while taking care not to change the position. Fit the special tool (Wrench) to the nut.
5) Tighten the nut to a torque of 19 Nm.



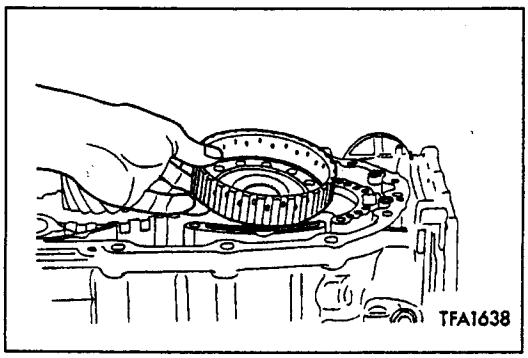
(50) Install the reduction brake piston cover and the snap ring.



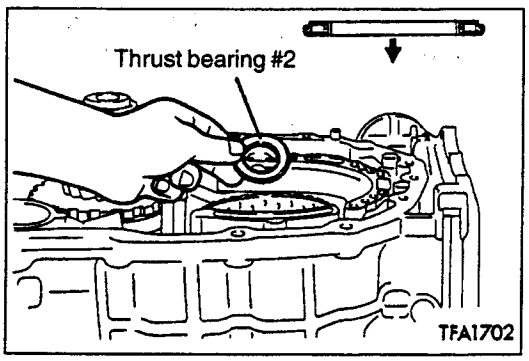
(51)Install the parking pawl and the spring. Install the parking pawl shaft.



(52)Install the parking roller support and then two parking roller support shafts.

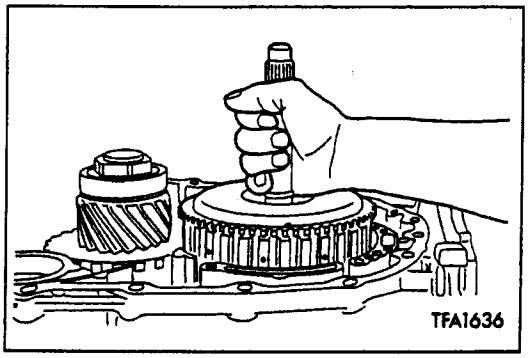


(53)Install the underdrive clutch hub.

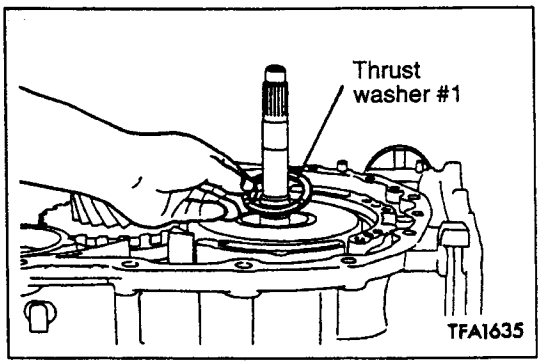


(54)Install the thrust bearing #2.

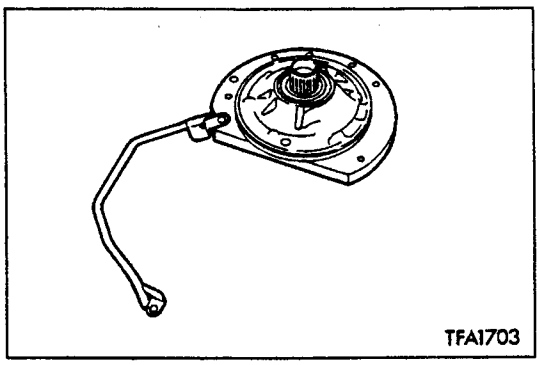
Caution
Install the thrust bearing in correct direction.



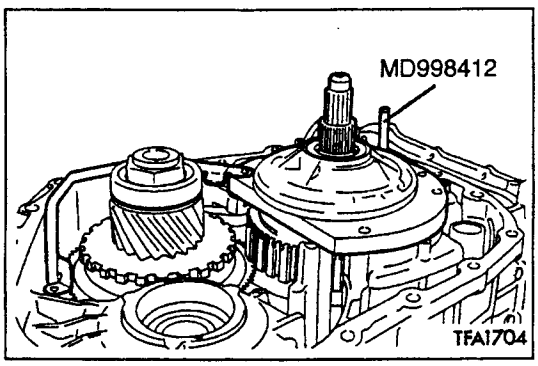
(55)Hold the input shaft, and install the underdrive clutch.



(56)Install the used thrust washer #1.



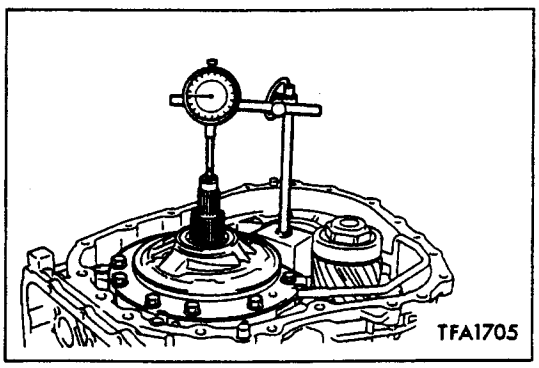
(57)Fit the pipe to the oil pump.



(58)Using the special tool, install a new oil pump gasket and the oil pump together with the pipe.

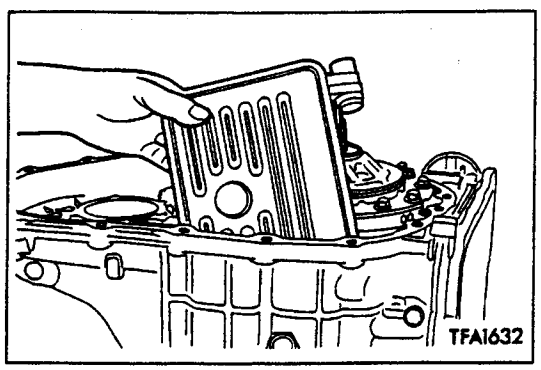
Caution
Never reuse the old gasket.

(59)Tighten the oil pump mounting bolts and the pipe mounting bolt to the specified torque.

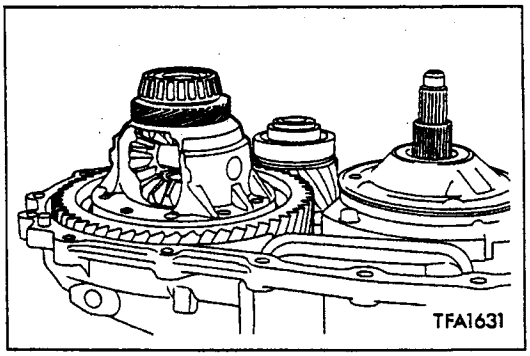


(60)Measure end play of the input shaft. Replace the thrust washer installed in step (56) to adjust the play to the standard value.

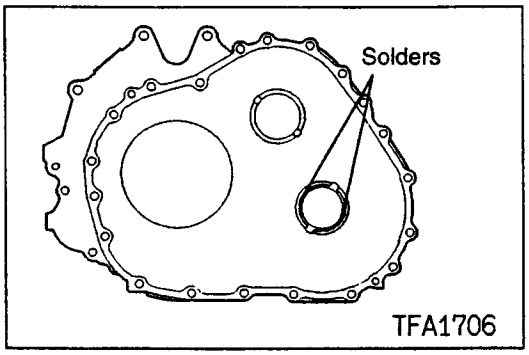
Standard value: 0.70 – 1.45 mm



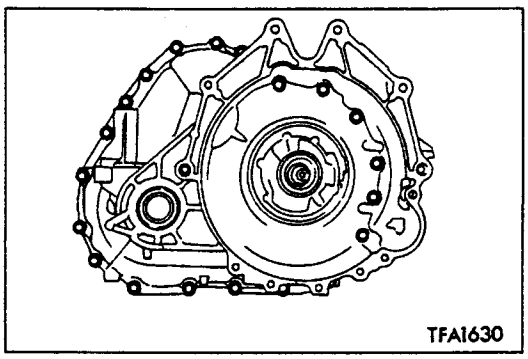
(61)Install the oil filter.



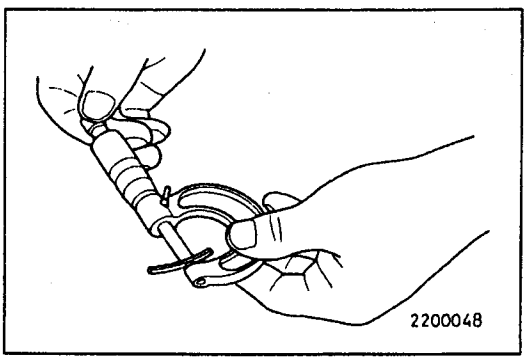
(62)Install the differential.
(63)Install the center differential.



(64)Place a solder (approx. 10 mm in length, 3 mm in diameter) on the torque converter housing as shown in the figure.
(65)Install the outer race.

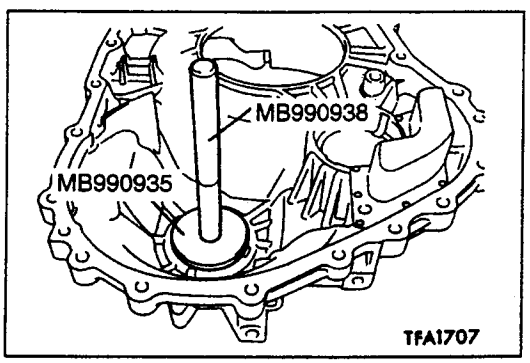


(66)Install the torque converter housing to the transmission case without applying sealant. Tighten its mounting bolts to the specified torque.
(67)Loosen the bolts, and remove the solder.



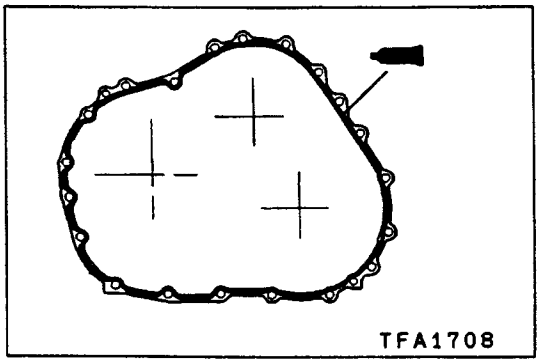
(68)Use a micrometer to measure the thickness (T) of the pressed solder. Select a spacer which thickness is within the following value.

(T + 0.045 mm) to (T + 0.105 mm)



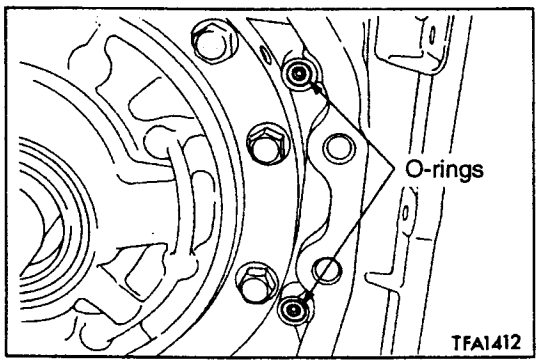
(69)Assemble the spacer selected in step (68) to the torque converter housing. Use the special tools to press in the outer race.

Special tools No.	MB990935, MB990938

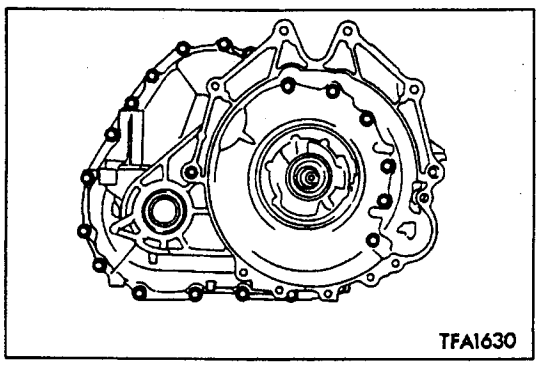


(70)Squeeze out the liquid gasket of 1.6 mm in diameter and apply it to the shown points of torque converter.

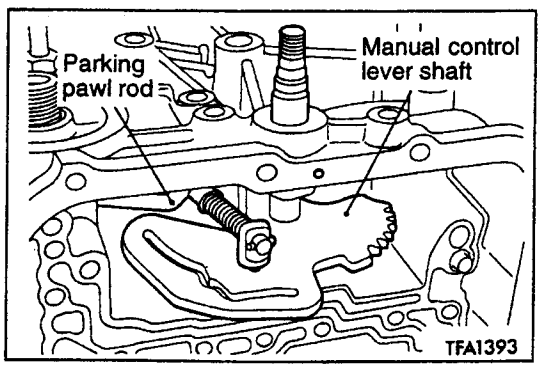
Liquid gasket:
MITSUBISHI genuine sealant Part No. MD974421 or equivalent



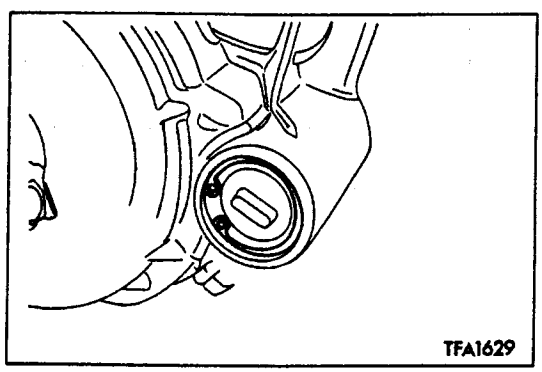
(71)Install the two O-rings.



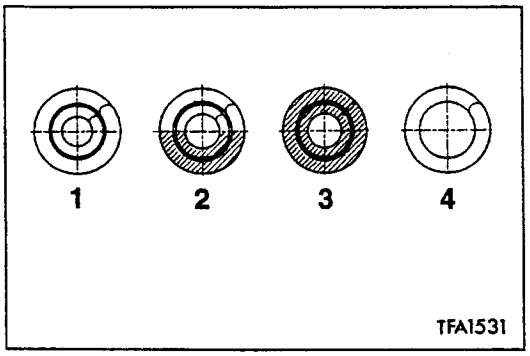
(72)Install the torque converter, and then tighten its 20 mounting bolts to the specified torque.



(73)Install the manual control lever shaft and parking pawl rod.
(74)Install the manual control lever shaft roller.



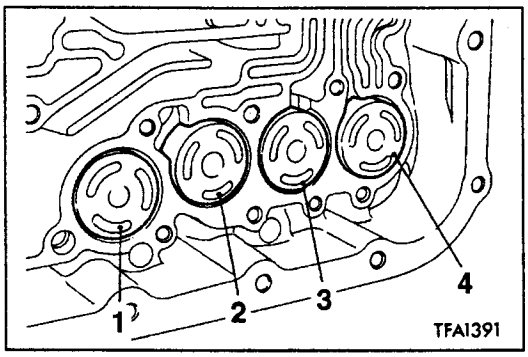
(75)Install the reduction brake accumulator piston, spring and accumulator cover.

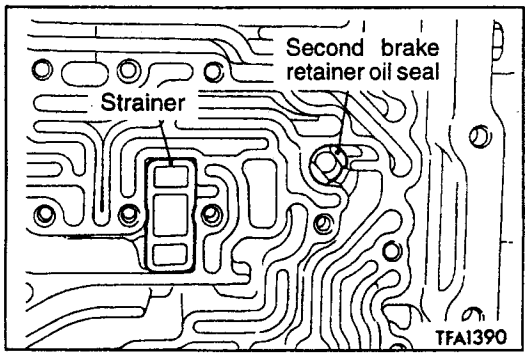


(76)Install the accumulator pistons, new seal rings, and springs.

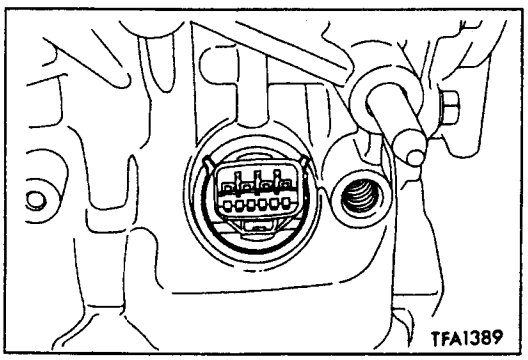
NOTE
The accumulator springs are identified as shown in the figure.

No.	Name
1	For low-reverse brake
2	For underdrive clutch
3	For second brake
4	For overdrive clutch

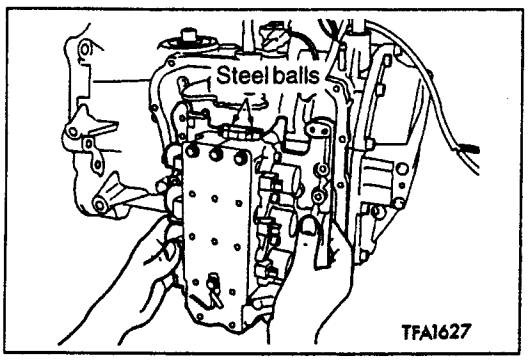




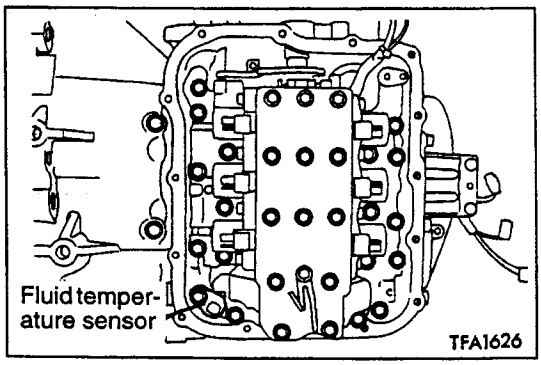
(77)Install the strainer and second brake retainer oil seal.



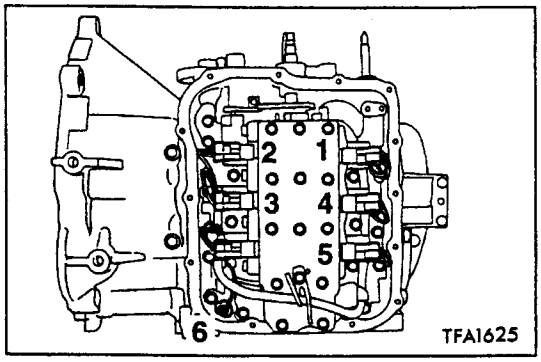
(78)Install the solenoid valve harness, and then secure the snap ring to the connector groove.



(79)Install the valve body, gasket, and two steel balls.

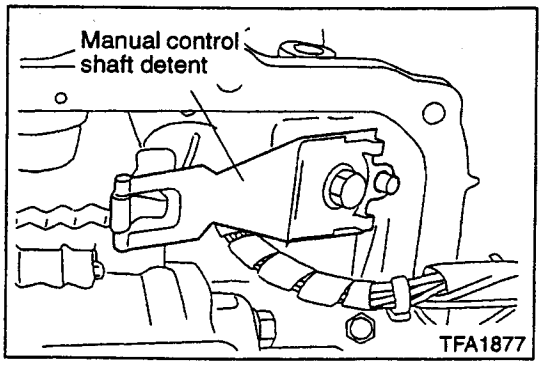


(80)Install the fluid temperature sensor.
(81)Install the 28 mounting bolts of the valve body.

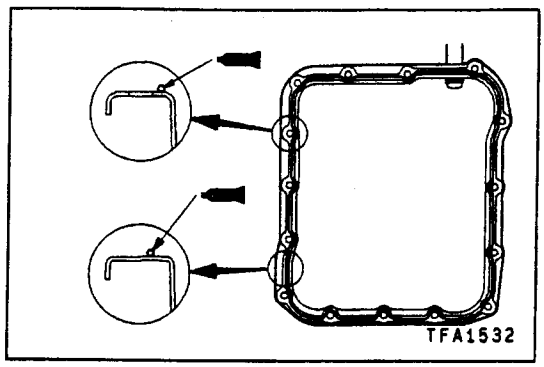


(82)Connect the connectores of the valve body.

No.	Parts to be connected	Cable colour	Connector housing colour
1	Underdrive solenoid valve	White, red, red	Black
2	Overdrive solenoid valve	Orange, red	Black
3	Low-reverse solenoid valve	Brown, yellow	Milky white
4	Second solenoid valve	Green, red, red	Milky white
5	Damper clutch control solenoid valve	Blue, yellow, yellow	Black
6	Fluid temperature sensor	Black, red	Black

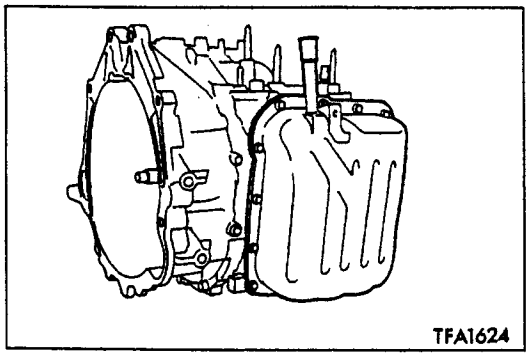


(83)Install the manual control shaft detent.

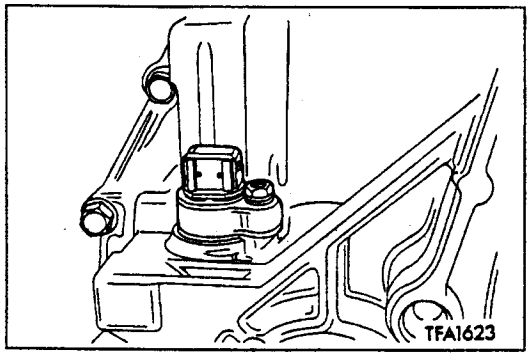


(84)Apply the liquid gasket to the valve body cover.

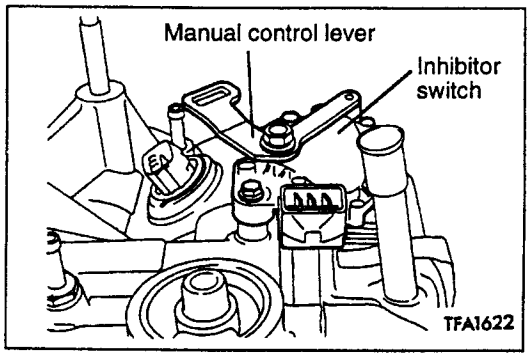
Liquid gasket:
MITSUBISHI genuine sealant Part No. MD974421 or equivalent



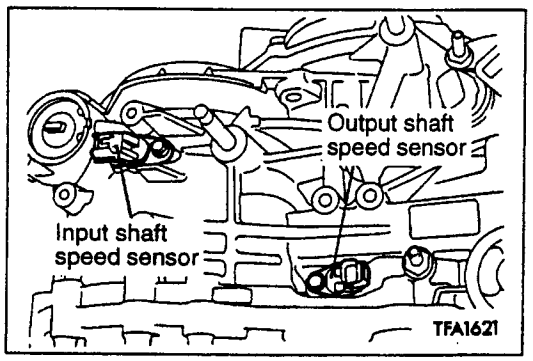
(85) Install the valve body cover, and then tighten its mounting bolts to the specified torque.



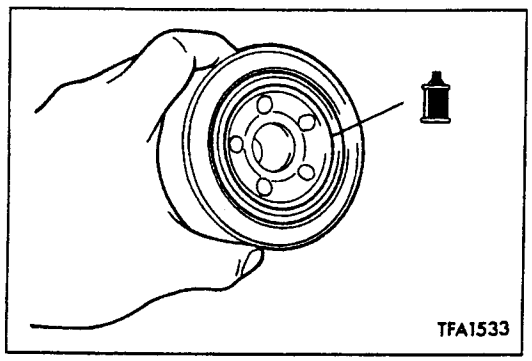
(86) Install the speedometer gear.



(87) Install the inhibitor switch and manual control lever.

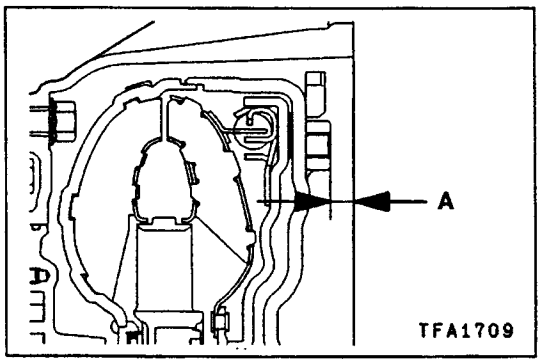


(88) Install the input shaft speed sensor and output shaft speed sensor.



(89) Apply a small amount of ATF to the oil filter gasket. Tighten the filter to the specified torque.

(90)Install the eye bolt, a new gasket, and the oil cooler feed tube.
(91)Install the oil dipstick.
(92)Install the brackets.



(93)Install the torque converter, and secure it so that the shown dimension (A) meets the reference value.

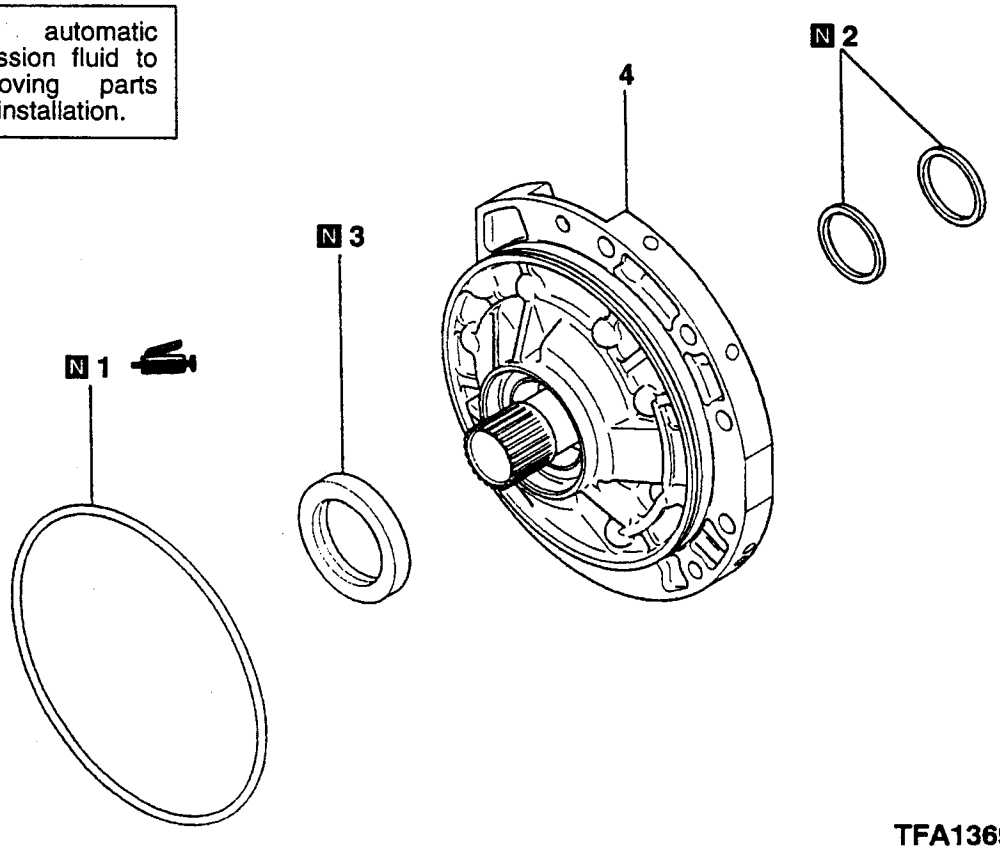
Reference value: approx. 12.2 mm

Caution
Apply ATF to the oil pump drive hub before installing the torque converter. Be careful not to damage the oil seal lip when installing the torque converter.

OIL PUMP

DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.

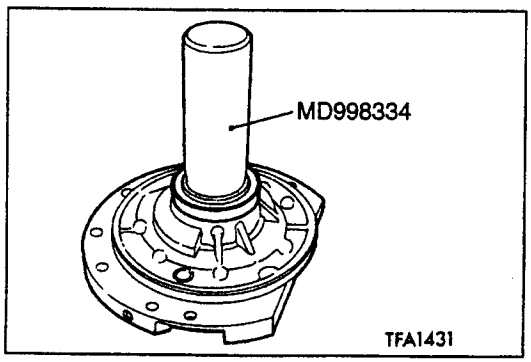


TFA1369

Disassembly steps

▶B◀ 1. O-ring
2. Seal ring

▶A◀ 3. Oil seal
4. Oil pump assembly



REASSEMBLY SERVICE POINTS

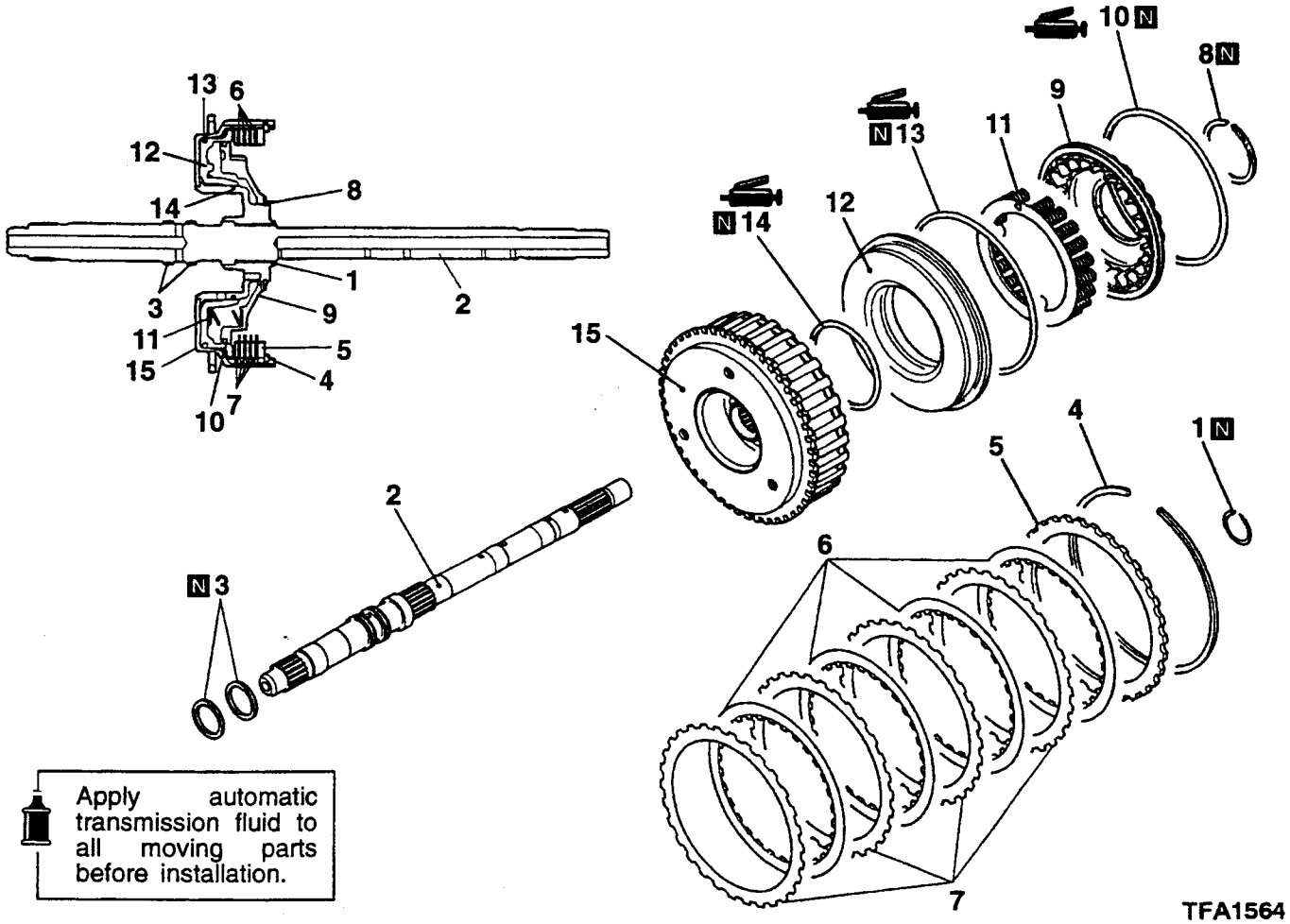
▶A◀ OIL SEAL INSTALLATION

▶B◀ O-RING INSTALLATION

Install a new O-ring to the outer groove of the oil pump, and apply ATF, blue petrolatum jelly or white Vaseline to the outer inside diameter of the O-ring.

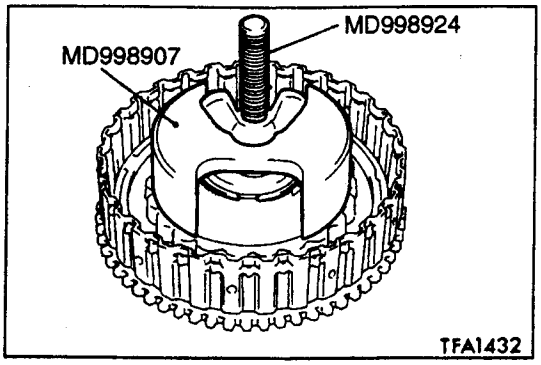
UNDERDRIVE CLUTCH AND INPUT SHAFT

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Snap ring
2. Input shaft
3. Seal ring
4. ▶D◀ Snap ring
5. ▶C◀ Clutch reaction plate
6. ▶C◀ Clutch disc
7. ▶C◀ Clutch plate
8. ◀A▶ ▶B◀ Snap ring
9. Spring retainer
10. ▶A◀ D-ring
11. Return spring
12. Underdrive clutch piston
13. ▶A◀ D-ring
14. ▶A◀ D-ring
15. Underdrive clutch retainer



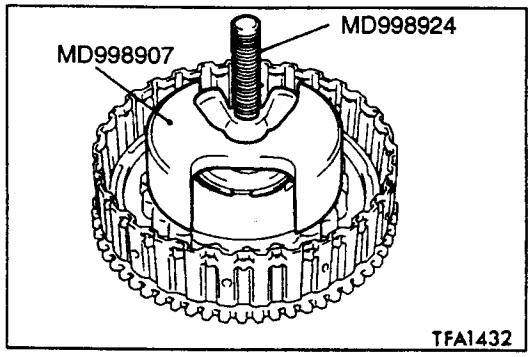
DISASSEMBLY SERVICE POINT

◀A▶ SNAP RING REMOVAL

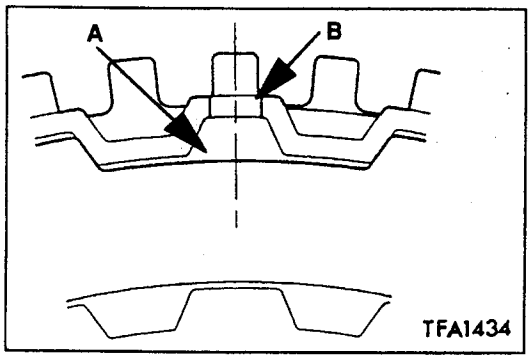
REASSEMBLY SERVICE POINTS

▶A◀ D-RING INSTALLATION

Apply ATF, blue petrolatum jelly or white Vaseline to D-ring, and install carefully.



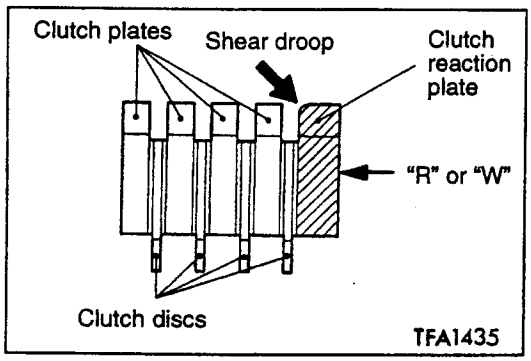
▶B◀ SNAP RING INSTALLATION



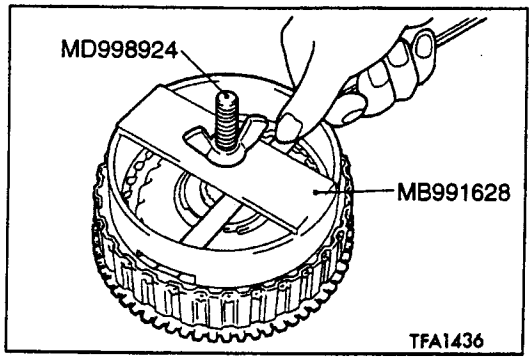
▶C◀ CLUTCH PLATE / CLUTCH DISC / CLUTCH REACTION PLATE INSTALLATION

(1) Align each teeth missing part (part A) of the clutch plate, clutch disc and clutch reaction plate to the outer circumference hole (part B) of the underdrive clutch retainer.

Caution
Immerse the clutch disc in ATF before assembling it.



(2) Install the clutch reaction plate in the shown direction.



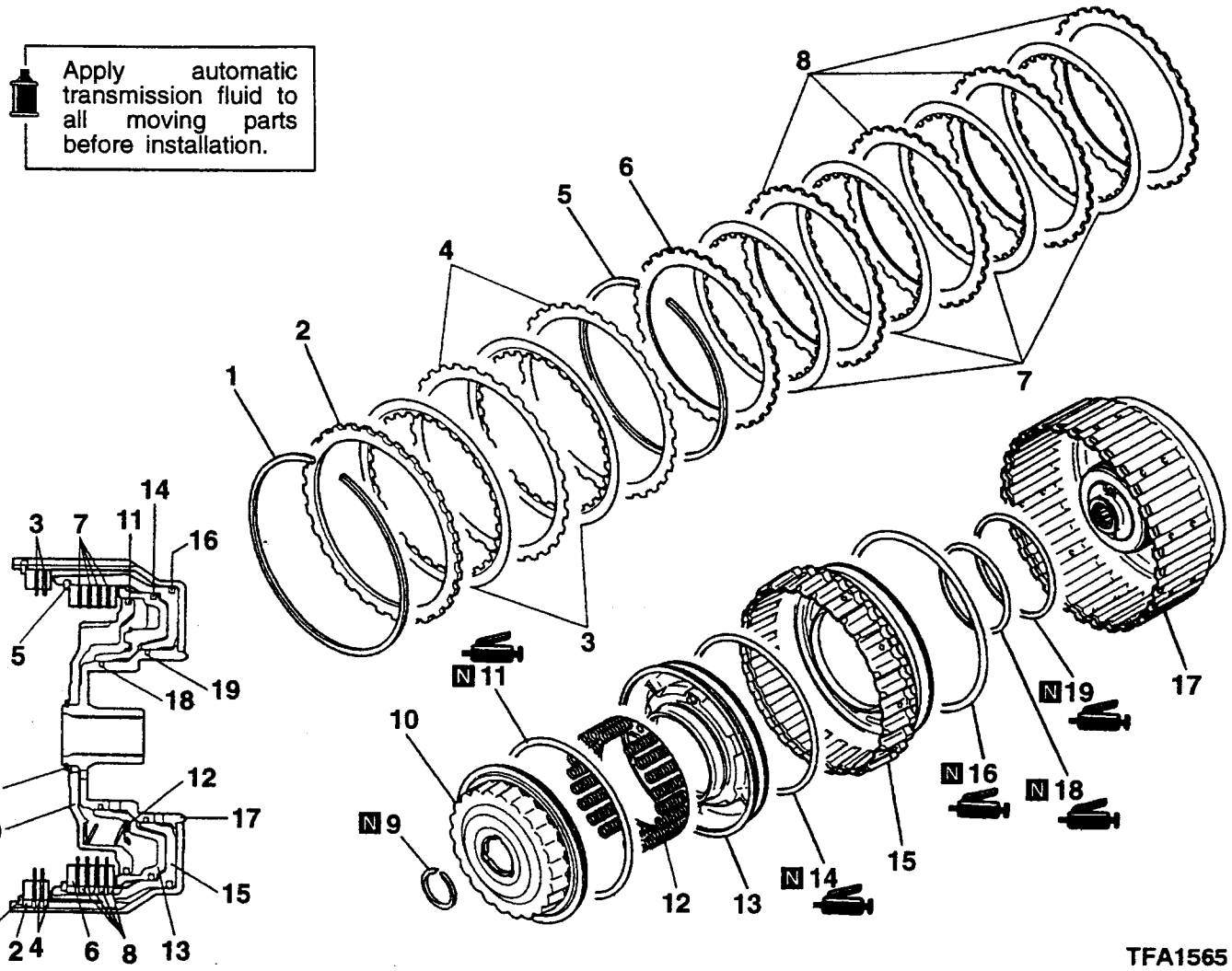
▶D◀ SNAP RING INSTALLATION

Check that the clearance between the snap ring and the clutch reaction plate is within the standard value. When measuring the clearance, use the special tool to press the clutch reaction plate evenly. If not within the standard value, select a snap ring to adjust.

Standard value: 1.6 – 1.8 mm

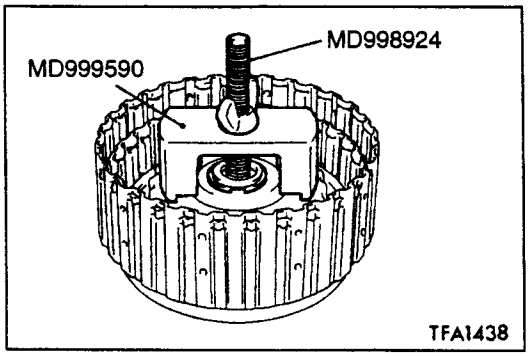
REVERSE CLUTCH AND OVERDRIVE CLUTCH

DISASSEMBLY AND REASSEMBLY



Disassembly steps

- ▶G◀ 1. Snap ring
- ▶F◀ 2. Clutch reaction plate
- ▶F◀ 3. Clutch disc
- ▶F◀ 4. Clutch plate
- ▶E◀ 5. Snap ring
- ▶D◀ 6. Clutch reaction plate
- ▶D◀ 7. Clutch disc
- ▶D◀ 8. Clutch plate
- ◀A▶ ▶C◀ 9. Snap ring
- 10. Spring retainer
- ▶A◀ 11. D-ring
- 12. Return spring
- 13. Overdrive clutch piston
- ▶A◀ 14. D-ring
- ▶B◀ 15. Reverse clutch piston
- ▶A◀ 16. D-ring
- 17. Reverse clutch retainer
- ▶A◀ 18. D-ring
- ▶A◀ 19. D-ring



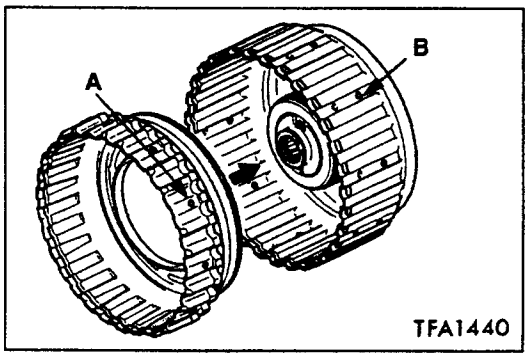
DISASSEMBLY SERVICE POINT

◀A▶ SNAP RING REMOVAL

REASSEMBLY SERVICE POINTS

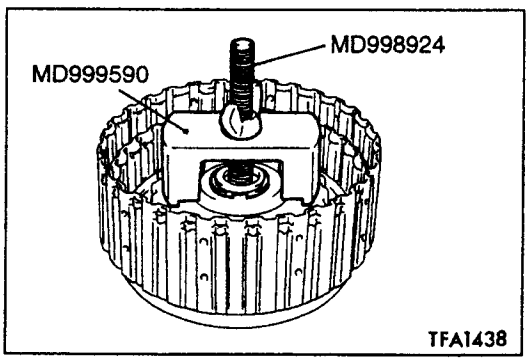
▶A◀ D-RING INSTALLATION

Apply ATF, blue petrolatum jelly or white Vaseline to D-ring, and install carefully.



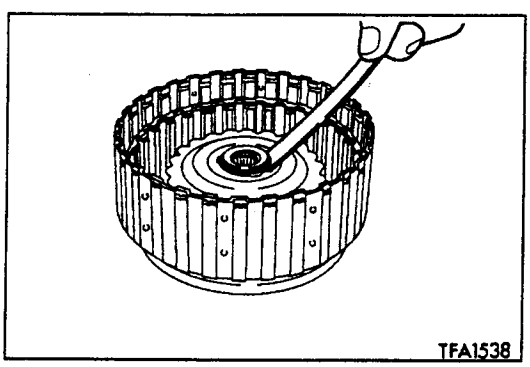
▶B◀ REVERSE CLUTCH PISTON INSTALLATION

Align the outer circumference holes (parts A and B) of the reverse clutch piston and the reverse clutch retainer to assemble them.



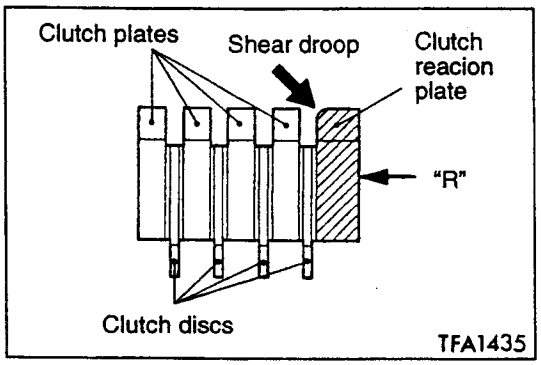
▶C◀ SNAP RING INSTALLATION

(1) Use the special tool to install the snap ring.



(2) Check that the clearance between the snap ring and the return spring retainer is within the standard value. When measuring the clearance, press the return spring retainer by the force of 5 kg evenly. If not within the standard value, select a snap ring to adjust.

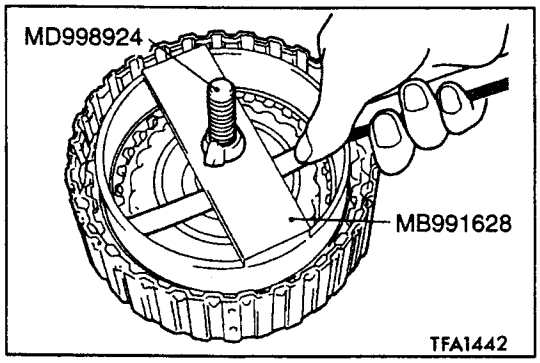
Standard value: 0 – 0.09 mm



▶D◀ CLUTCH PLATE / CLUTCH DISC / CLUTCH REACTION PLATE INSTALLATION

Install the clutch reaction plate in the shown direction.

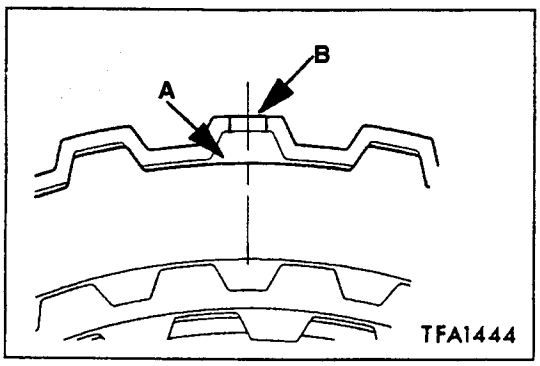
Caution
Immerse the clutch disc in ATF before assembling the clutch disc.



▶E◀ SNAP RING INSTALLATION

Check that the clearance between the snap ring and the clutch reaction plate is within the standard value. When measuring the clearance, use the special tool to press the clutch reaction plate evenly. If not within the standard value, select a snap ring to adjust.

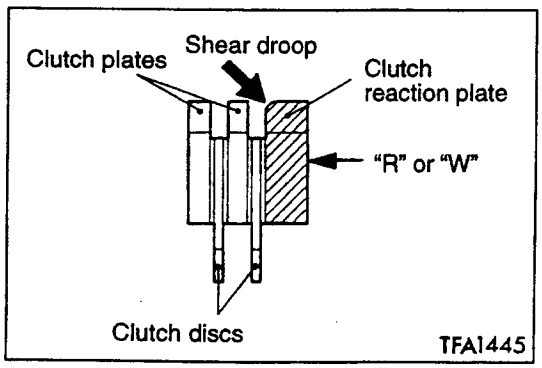
Standard value: 1.6 – 1.8 mm



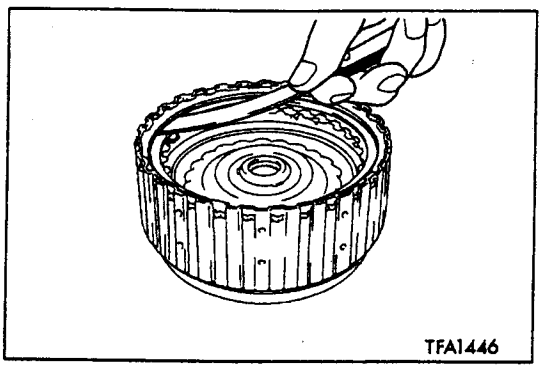
▶F◀ CLUTCH PLATE / CLUTCH DISC / CLUTCH REACTION PLATE INSTALLATION

(1) Align each teeth missing part (part A) of the clutch plate, clutch disc and clutch reaction plate to the outer circumference hole (part B) of the reverse clutch retainer.

Caution
Immerse the clutch disc in ATF.



(2) Install the clutch reaction plate in the shown direction.



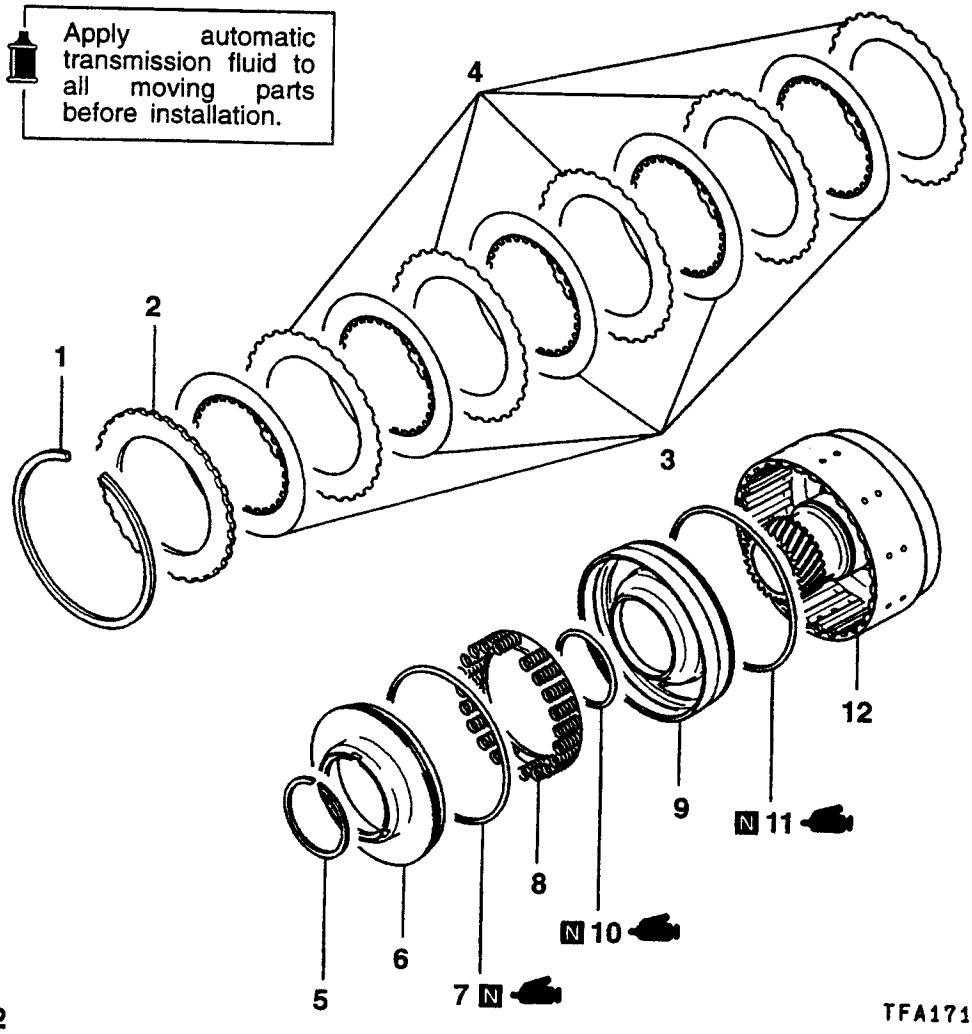
▶G◀ SNAP RING INSTALLATION

Check that the clearance between the snap ring and the clutch reaction plate is within the standard value. When measuring the clearance, press the clutch reaction plate by the force of 5 kg evenly. If not within the standard value, select a snap ring to adjust.

Standard value: 1.5 – 1.6 mm

DIRECT CLUTCH

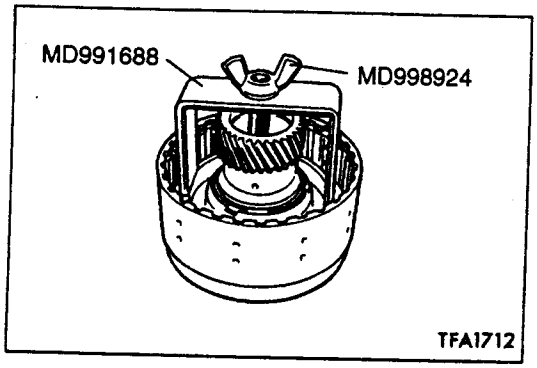
DISASSEMBLY AND REASSEMBLY



TFA1711

Disassembly steps

- ▶D◀ 1. Snap ring
- ▶C◀ 2. Clutch reaction plate
- ▶C◀ 3. Clutch disc
- ▶C◀ 4. Clutch plate
- ◀A▶ ▶B◀ 5. Snap ring
- 6. Spring retainer
- ▶A◀ 7. D-ring
- 8. Return spring
- 9. Direct clutch piston
- ▶A◀ 10. D-ring
- ▶A◀ 11. D-ring
- 12. Direct clutch retainer



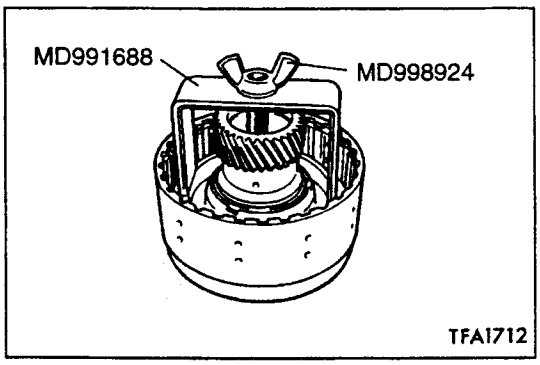
DISASSEMBLY SERVICE POINT

◀A▶ SNAP RING REMOVAL

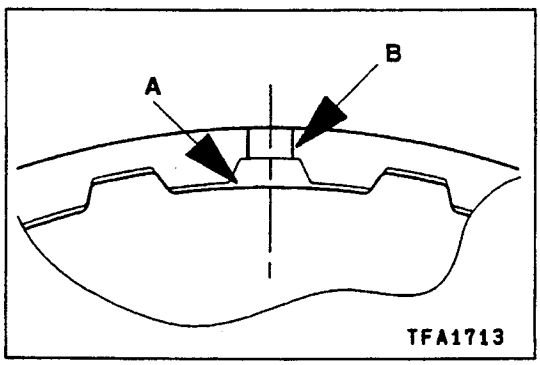
REASSEMBLY SERVICE POINTS

▶A◀ D-RING INSTALLATION

Apply ATF, blue petrolatum jelly or white Vaseline to D-ring, and install carefully.



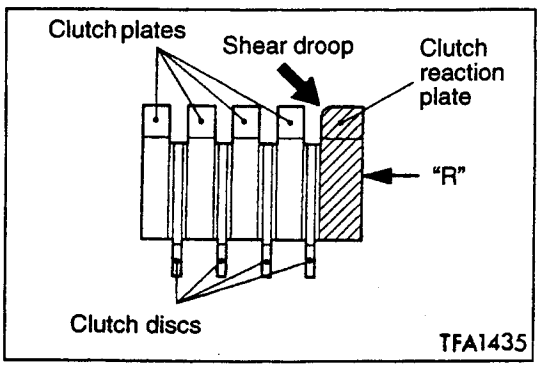
▶B◀ SNAP RING INSTALLATION



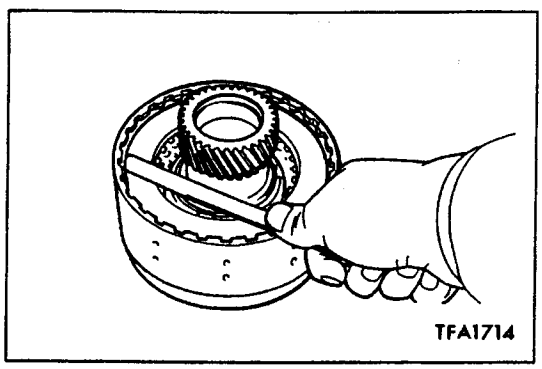
▶C◀ CLUTCH PLATE / CLUTCH DISC / CLUTCH REACTION PLATE INSTALLATION

(1) Align each teeth missing part (part A) of the clutch plates, clutch discs and clutch reaction plate to the outer circumference hole (part B) of the direct clutch retainer.

Caution
Immerse the clutch discs in AFT before assembly.



(2) Install the clutch reaction plate in the shown direction.



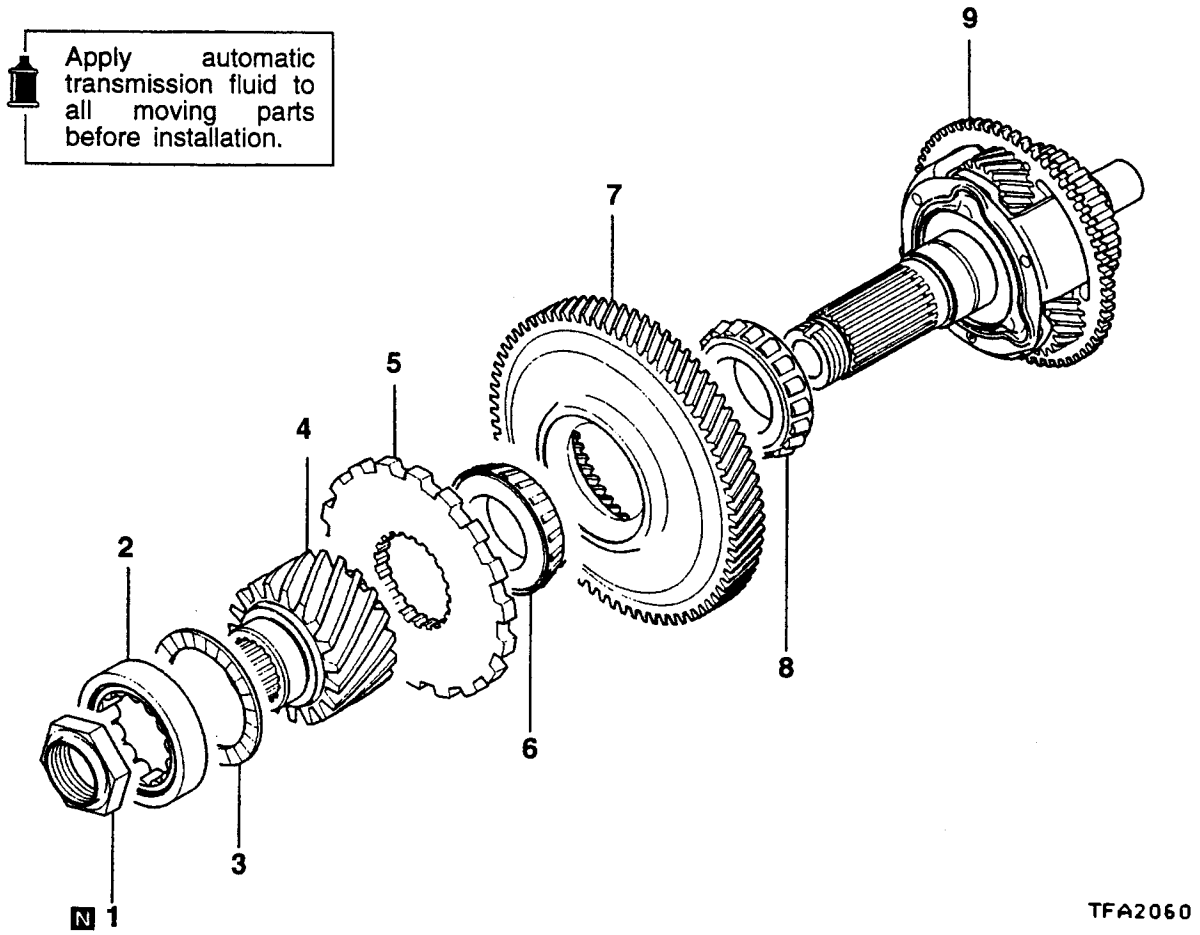
▶D◀ SNAP RING INSTALLATION

Check that the clearance between the snap ring and the clutch reaction plate conforms to the standard value. When measuring the clearance, press down the entire periphery of the clutch reaction plate evenly with a force of 5 kg. If the clearance does not conform to the standard value, select an appropriate snap ring to adjust.

Standard value: 1.0 – 1.2 mm

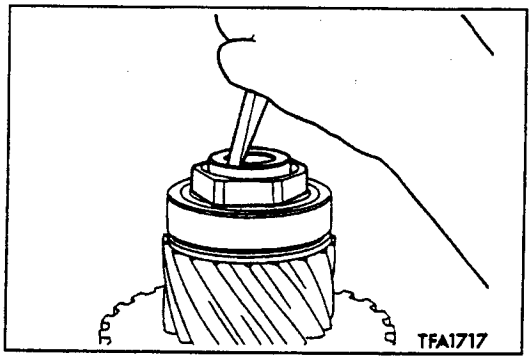
DIRECT PLANETARY CARRIER

DISASSEMBLY AND REASSEMBLY



Disassembly steps

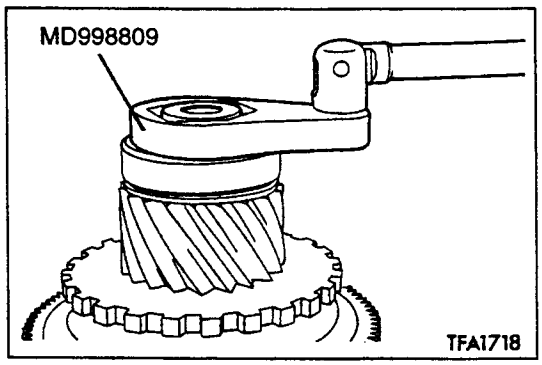
◀A▶ ▶D◀ 1. Lock nut
2. Roller bearing
3. Thrust bearing
◀B▶ ▶C◀ 4. Output gear
◀B▶ ▶C◀ 5. Parking gear
◀C▶ ▶B◀ 6. Taper roller bearing
7. Transfer driven gear and direct annulus gear
◀D▶ ▶A◀ 8. Taper roller bearing
9. Direct planetary carrier



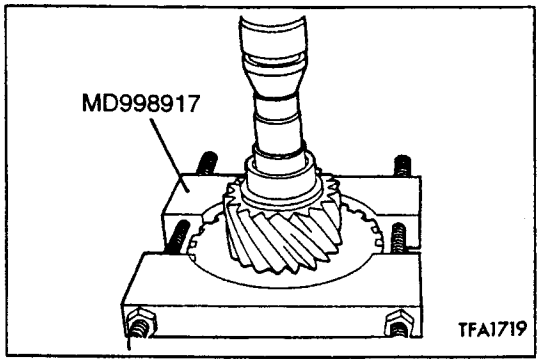
DISASSEMBLY SERVICE POINTS

◀A▶ LOCK NUT REMOVAL

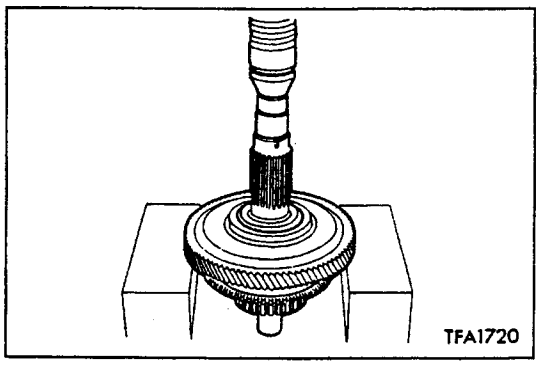
(1) Unstake the lock nut.



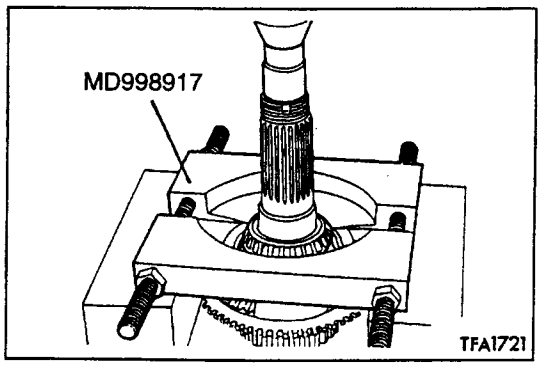
(2) Remove the lock nut using the special tool.



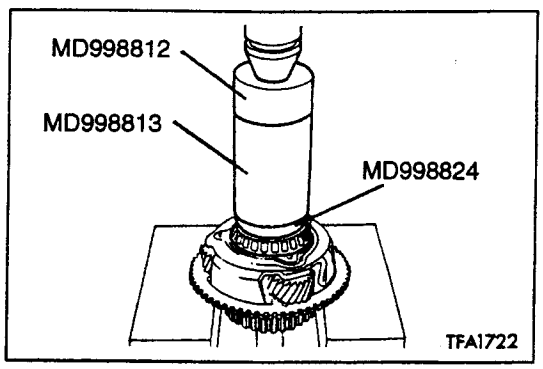
◀B▶ OUTPUT GEAR / PARKING GEAR REMOVAL



◀C▶ TAPER ROLLER BEARING REMOVAL

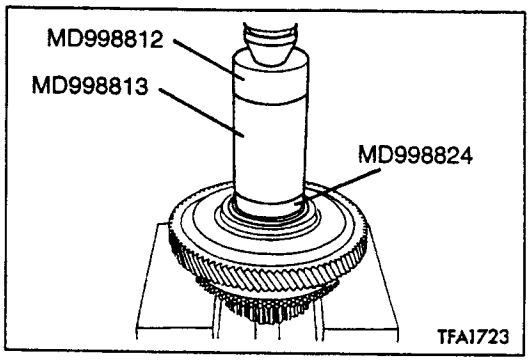


◀D▶ TAPER ROLLER BEARING REMOVAL

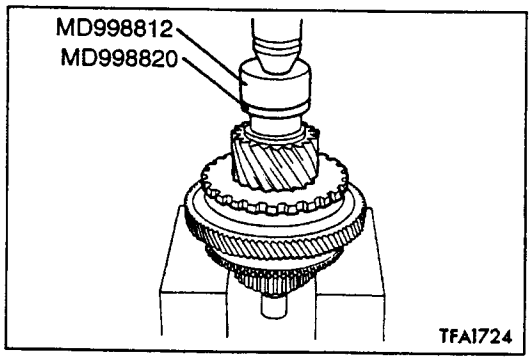


REASSEMBLY SERVICE POINTS

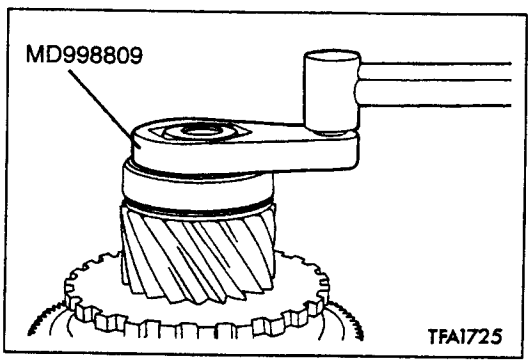
▶A◀ TAPER ROLLER BEARING INSTALLATION



▶B◀ TAPER ROLLER BEARING INSTALLATION

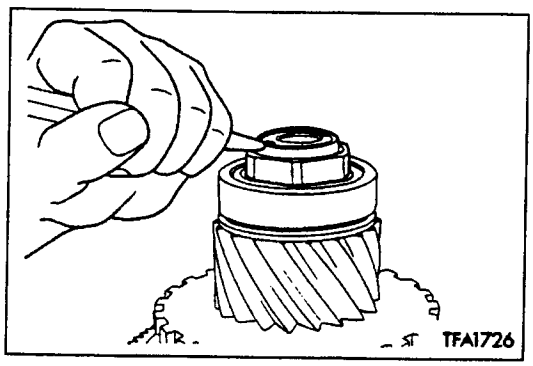


▶C◀ OUTPUT GEAR / PARKING GEAR INSTALLATION



▶D◀ LOCK NUT INSTALLATION

(1) Apply ATF to a new lock nut. Install and tighten it to the specified torque. Then, back it off one turn and tighten again to the specified torque.

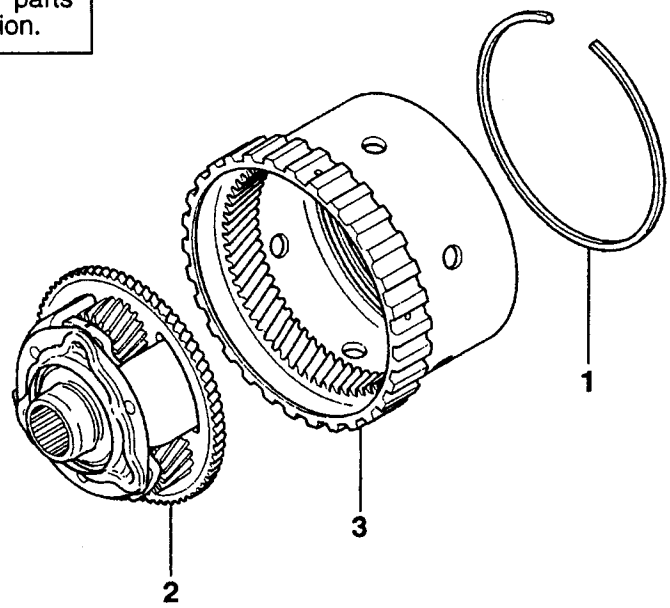


(2) Using a punch or a similar tool, stake the lock nut at two points to prevent it from loosening.

OVERDRIVE PLANETARY CARRIER

DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.



TFA1372

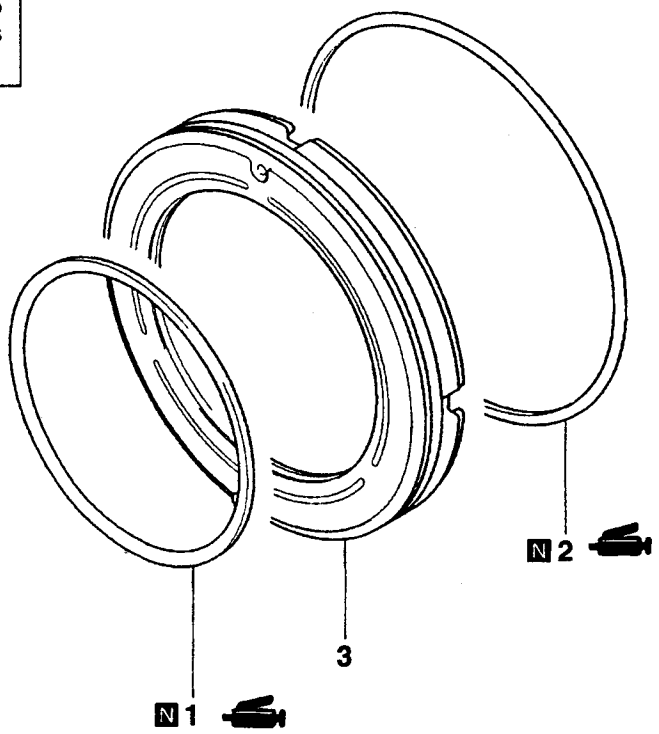
Disassembly steps

1. Snap ring
2. Overdrive planetary carrier
3. Overdrive annulus gear

LOW-REVERSE BRAKE

DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.



TFA1373

Disassembly steps

▶A◀ 1. D-ring
▶A◀ 2. D-ring
3. Low-reverse brake piston

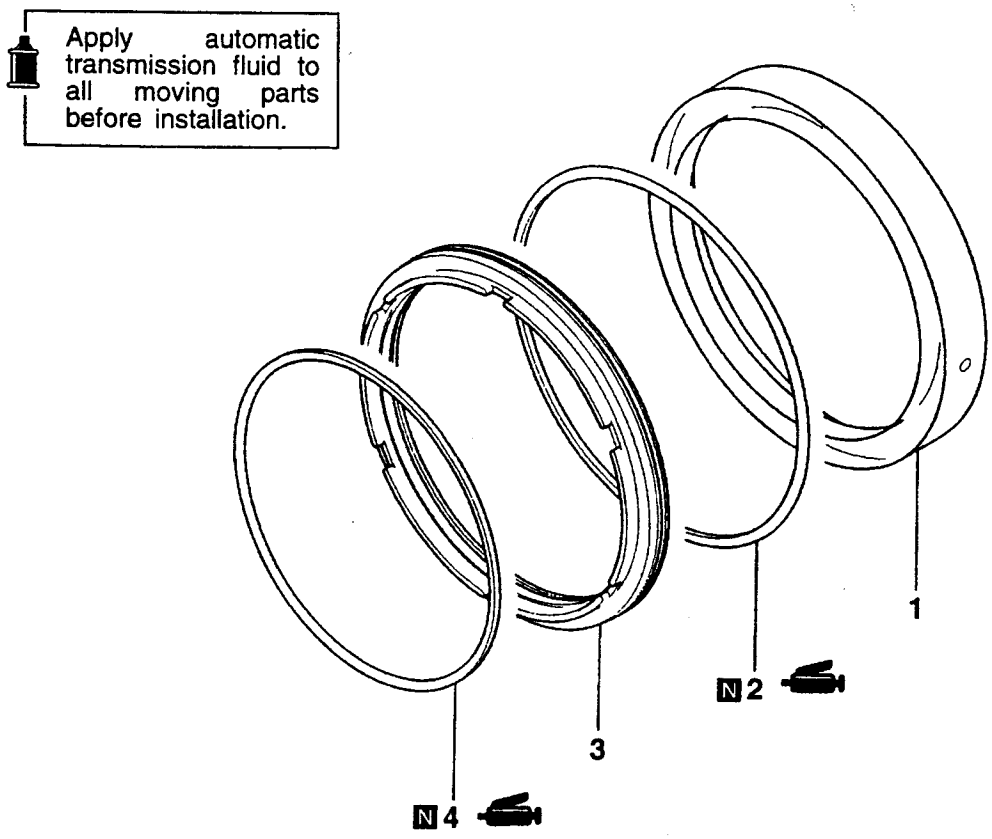
REASSEMBLY SERVICE POINT

▶A◀ D-RING INSTALLATION

Apply ATF, blue petrolatum jelly or white Vaseline to D-ring, and install carefully.

SECOND BRAKE

DISASSEMBLY AND REASSEMBLY



TFA1374

Disassembly steps

▶A◀ 1. Second brake retainer
2. D-ring
3. Second brake piston
▶A◀ 4. D-ring

REASSEMBLY SERVICE POINT

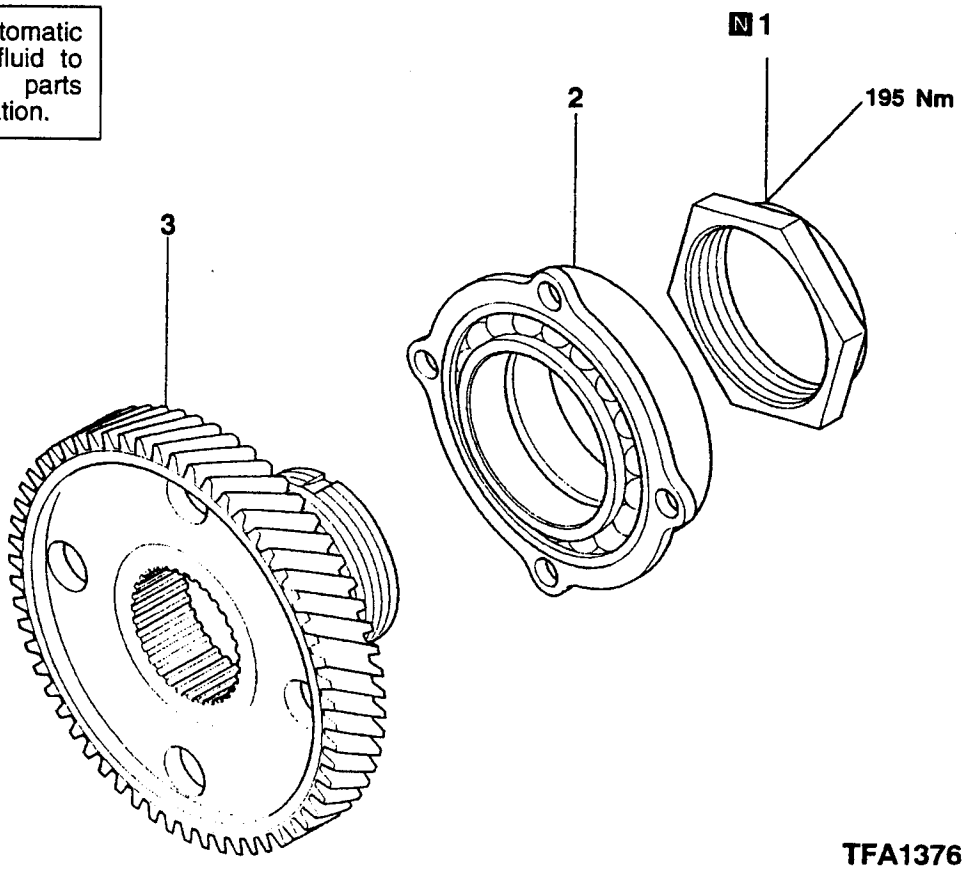
▶A◀ D-RING INSTALLATION

Apply ATF, blue petrolatum jelly or white Vaseline to D-ring, and install carefully.

TRANSFER DRIVE GEAR

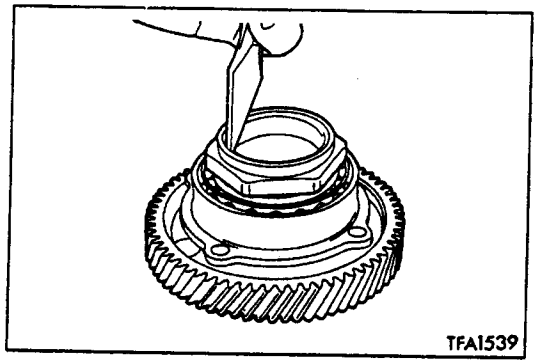
DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.



Disassembly steps

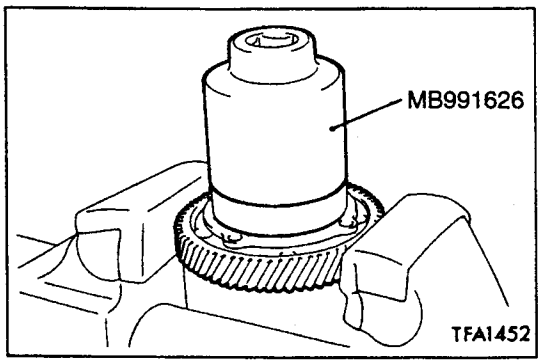
◀A▶ ▶B◀ 1. Lock nut
◀B▶ ▶A◀ 2. Transfer drive gear bearing
3. Transfer drive gear



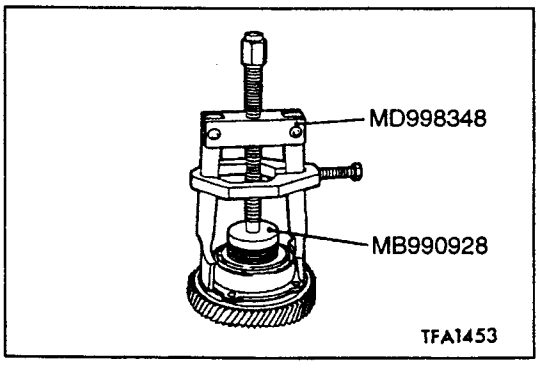
DISASSEMBLY SERVICE POINTS

◀A▶ LOCK NUT REMOVAL

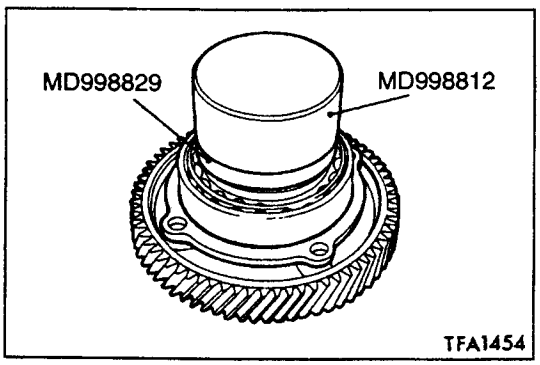
(1) Pull up the turning stopper of the lock nut.



(2) Use the special tool to remove the lock nut.

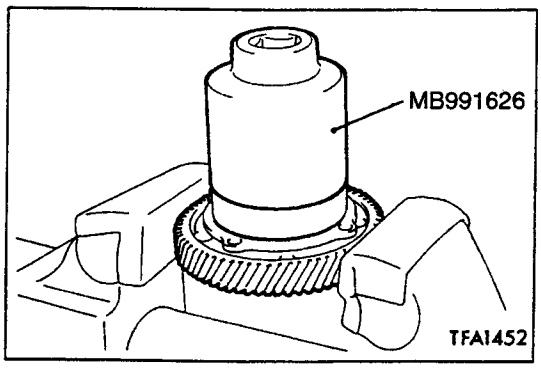


◀B▶ TRANSFER DRIVE GEAR BEARING REMOVAL



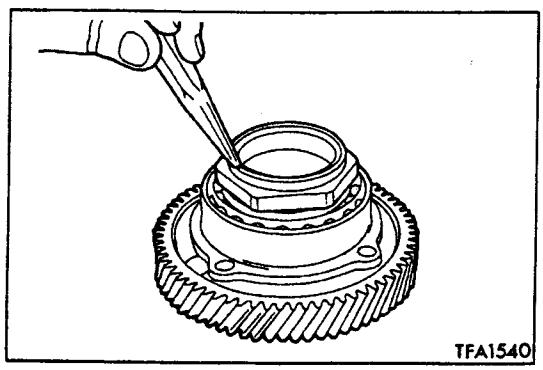
REASSEMBLY SERVICE POINTS

▶A◀ TRANSFER DRIVE GEAR BEARING INSTALLATION



▶B◀ LOCK NUT INSTALLATION

(1) Apply ATF to a new lock nut, and tighten it to the specified torque. Then turn back one turn, and tighten to the specified torque again.

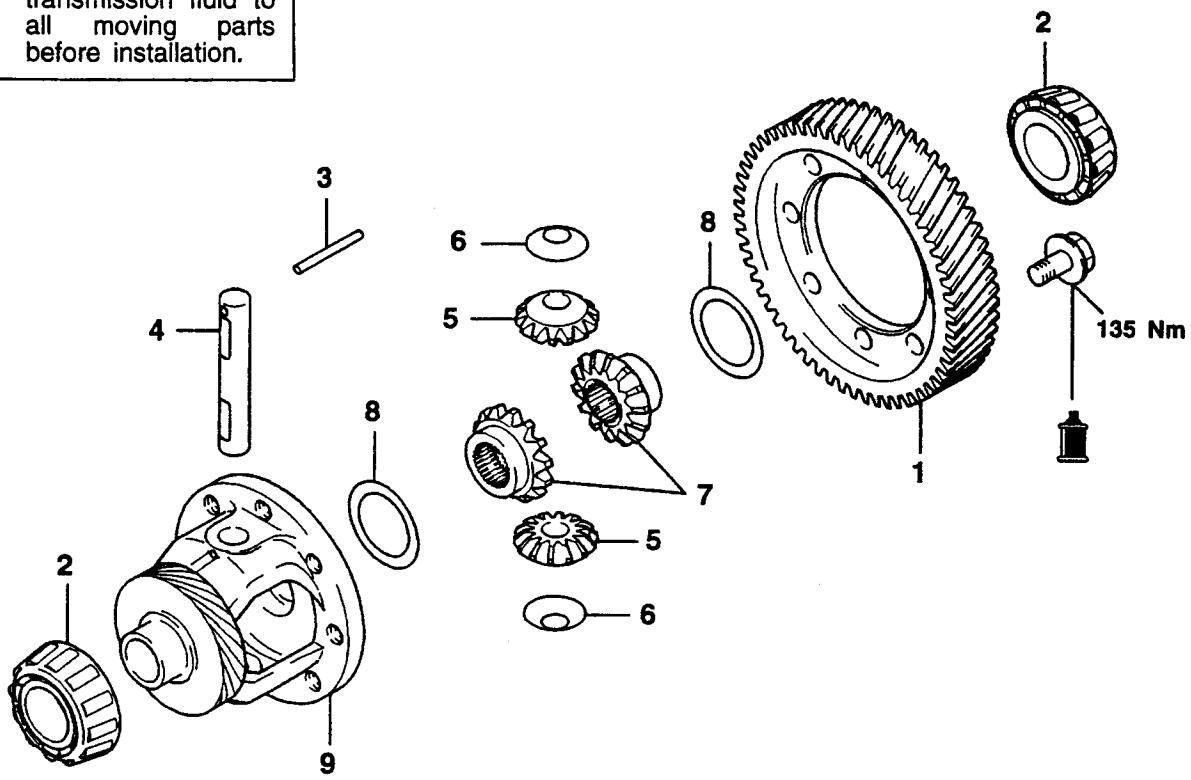


(2) Use a punch or other to prevent the nut from turning (two points).

DIFFERENTIAL

DISASSEMBLY AND REASSEMBLY

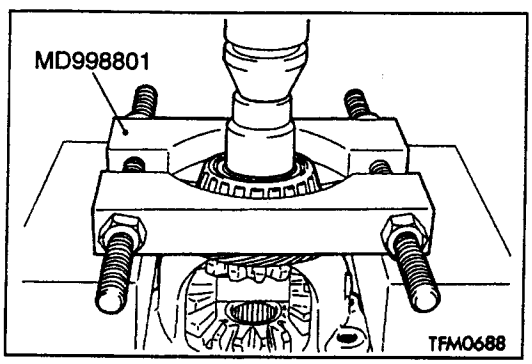
Apply automatic transmission fluid to all moving parts before installation.



ATFM0602

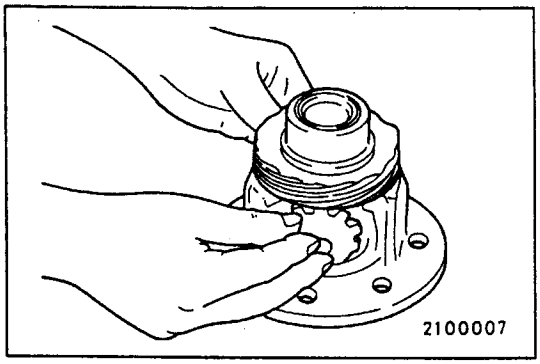
Disassembly steps

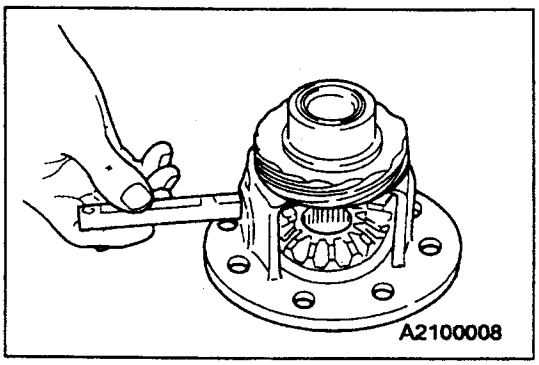
◀A▶ ▶D◀ 1. Differential drive gear
▶C◀ 2. Taper roller bearings
▶B◀ 3. Lock pin
▶A◀ 4. Pinion shaft
▶A◀ 5. Pinions
▶A◀ 6. Washers
▶A◀ 7. Side gears
▶A◀ 8. Spacers
9. Differential case



DISASSEMBLY SERVICE POINT

◀A▶ TAPER ROLLER BEARING REMOVAL





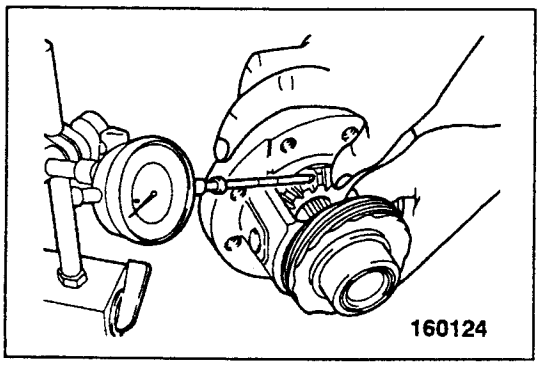
REASSEMBLY SERVICE POINTS

▶A◀ SPACER, SIDE GEAR, WASHER, PINION, PINION SHAFT INSTALLATION

(1) Install the spacers to the back side of the side gears, and then assemble the side gears into the differential case.

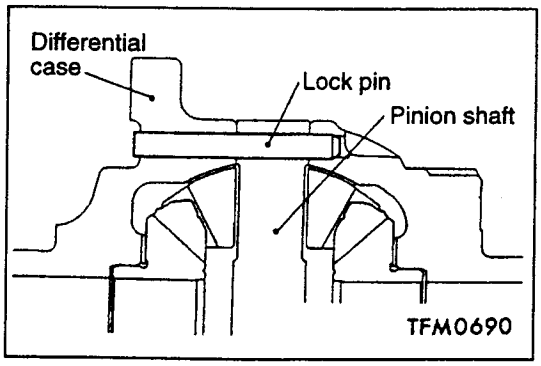
NOTE
Select the medium size spacer (0.93 – 1.00 mm) when assembling a new side gear.

(2) Attach the washers to the back side of the pinions, engage the pinions simultaneously to the side gears, and settle the gears by turning.
(3) Insert the pinion shaft.



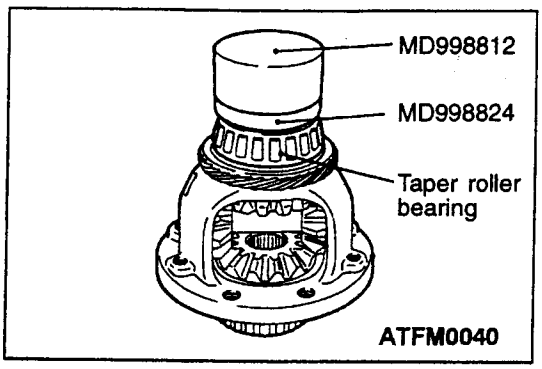
(4) Measure the backlash between the side gears and pinions.
Standard value: 0.025 – 0.150 mm
(5) If not within the standard value, change a spacer and measure the backlash again.

NOTE
Adjust so that both backlashes are equal.

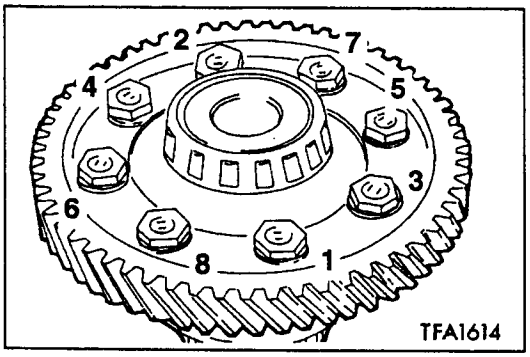


▶B◀ LOCK PIN INSTALLATION

Install the lock pin in the shown direction.



▶C◀ TAPER ROLLER BEARING INSTALLATION

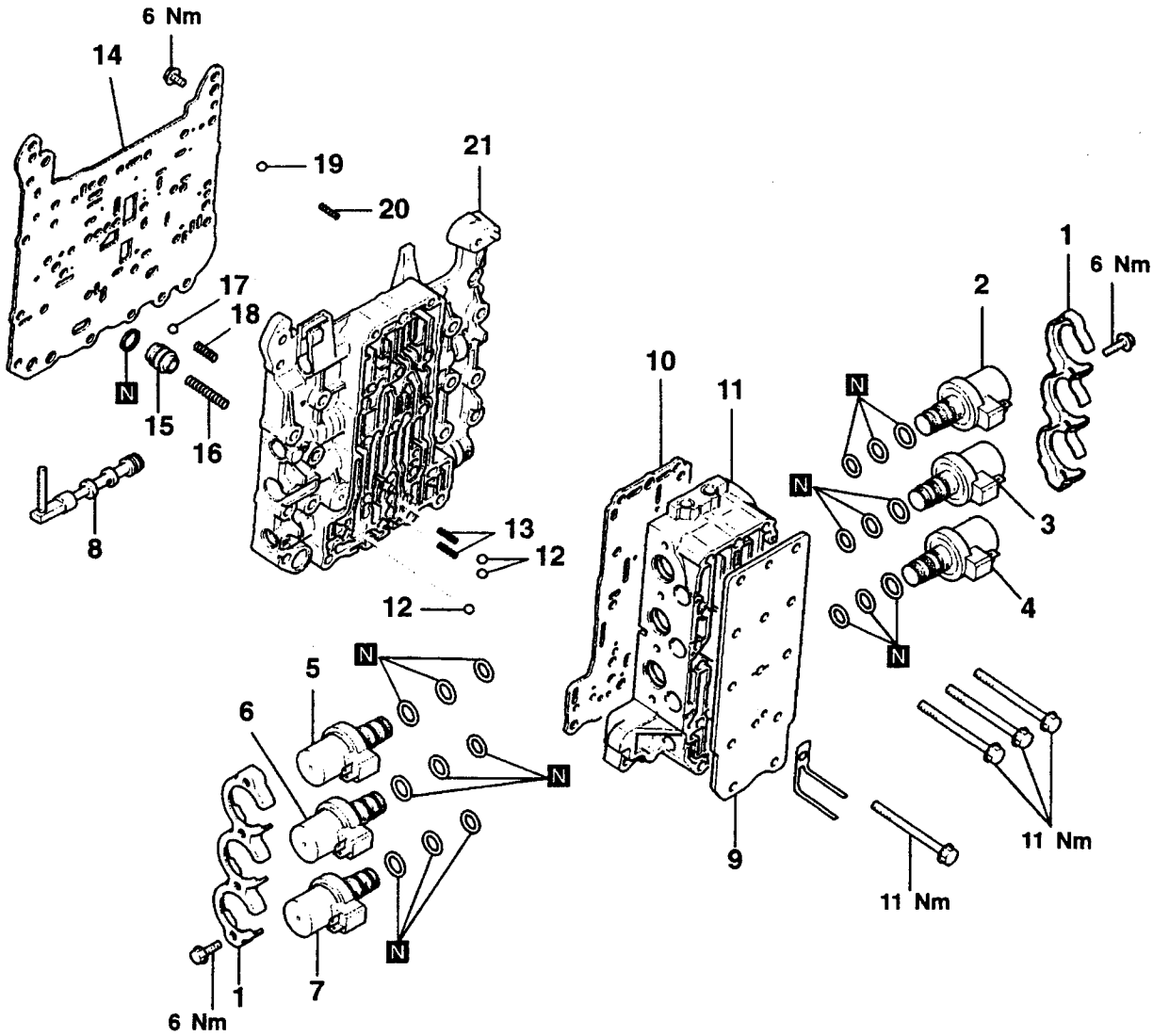


▶D◀ DIFFERENTIAL DRIVE GEAR INSTALLATION

Apply ATF to the bolt, tighten the bolts to the specified torque in the shown sequence.

VALVE BODY

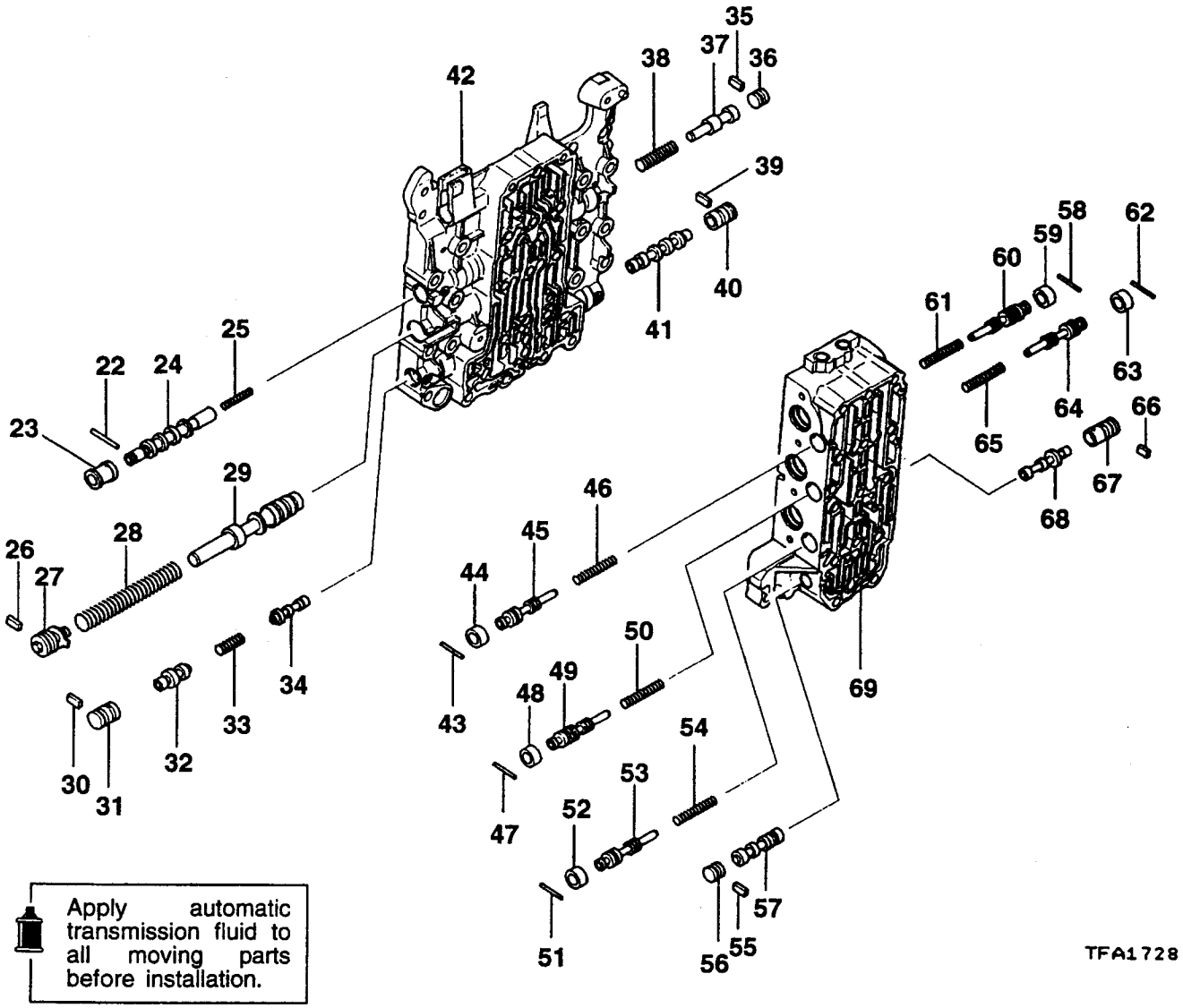
DISASSEMBLY AND REASSEMBLY



Apply automatic transmission fluid to all moving parts before installation.

Disassembly steps

1. Solenoid valve support
◀A▶ ▶C◀ 2. Underdrive solenoid valve
◀A▶ ▶C◀ 3. Second solenoid valve
◀A▶ ▶C◀ 4. Damper clutch control solenoid valve
◀A▶ ▶C◀ 5. Overdrive solenoid valve
◀A▶ ▶C◀ 6. Low-reverse solenoid valve
◀A▶ ▶C◀ 7. Reduction solenoid valve
8. Manual valve
9. Cover
10. Plate
11. Outside valve body assembly
▶B◀ 12. Steel ball (orifice check ball)
▶B◀ 13. Spring
14. Plate
▶A◀ 15. Damping valve
▶A◀ 16. Damping valve spring
▶A◀ 17. Steel ball (line relief)
▶A◀ 18. Spring
▶A◀ 19. Steel ball (orifice check ball)
▶A◀ 20. Spring
21. Inside valve body assembly



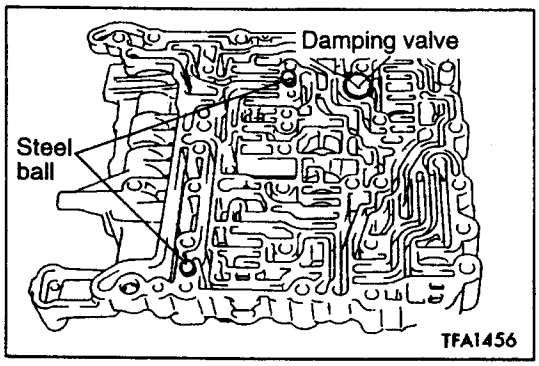
Disassembly steps

22. Roller
23. Damper clutch control valve sleeve
24. Damper clutch control valve
25. Damper clutch control valve spring
26. Plate
27. Screw
28. Regulator valve spring
29. Regulator valve
30. Plate
31. Fail-safe valve A sleeve
32. Fail-safe valve A2
33. Fail-safe valve A spring
34. Fail-safe valve A1
35. Plate
36. Plug
37. Torque converter valve
38. Torque converter valve spring
39. Plate
40. Fail-safe valve B sleeve
41. Fail-safe valve B
42. Inside valve body
43. Roller
44. Overdrive pressure control valve sleeve
45. Overdrive pressure control valve
46. Overdrive pressure control valve spring
47. Roller
48. Low-reverse pressure control valve sleeve
49. Low-reverse pressure control valve
50. Low-reverse pressure control valve spring
51. Roller
52. Reduction pressure control valve sleeve
53. Reduction pressure control valve
54. Reduction pressure control valve spring
55. Plate
56. Plug
57. Switch valve
58. Roller
59. Underdrive pressure control valve sleeve
60. Underdrive pressure control valve
61. Underdrive pressure control valve spring
62. Roller
63. Second pressure control valve sleeve
64. Second pressure control valve
65. Second pressure control valve spring
66. Plate
67. Fail-safe valve C sleeve
68. Fail-safe valve C
69. Outside valve body

DISASSEMBLY SERVICE POINT

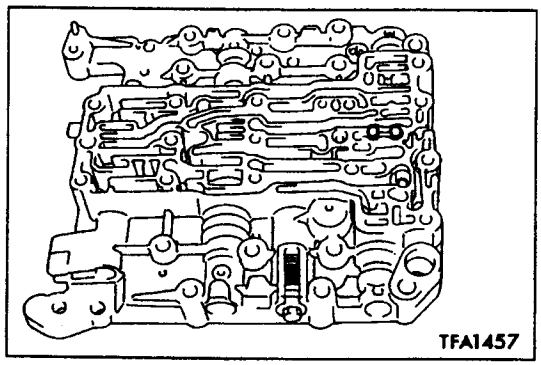
▶A◀ SOLENOID VALVE REMOVAL

Mark the solenoid valves with white paint so that they can be reinstalled in the correct positions.

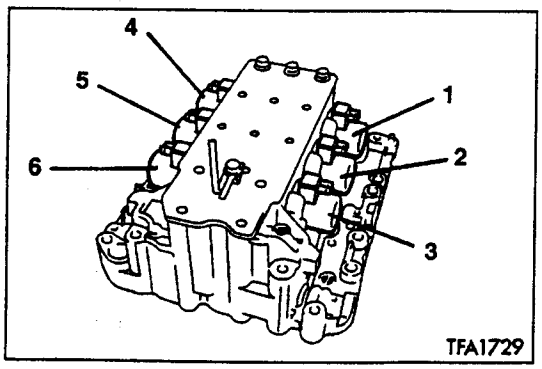


REASSEMBLY SERVICE POINTS

▶A◀ SPRING / STEEL BALL / DAMPING VALVE / DAMPING VALVE SPRING INSTALLATION



▶B◀ SPRING / STEEL BALL INSTALLATION



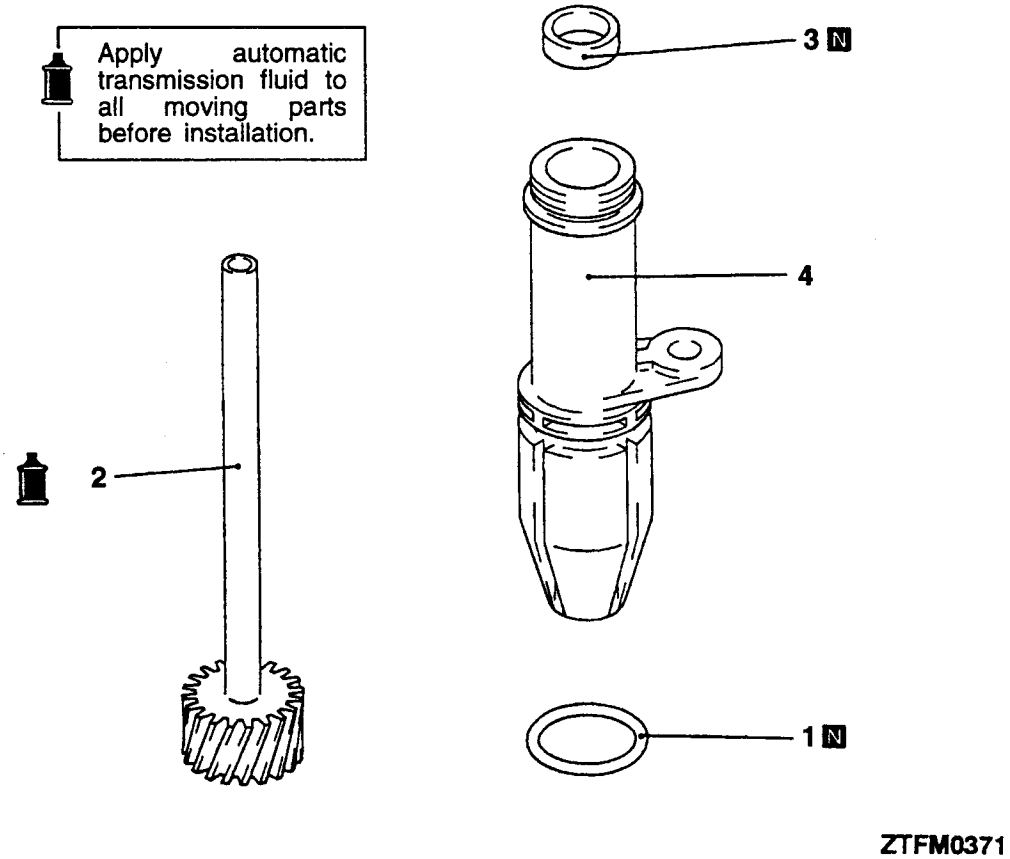
▶C◀ SOLENOID VALVE INSTALLATION

(1) Apply ATF, blue petrolatum jelly or white Vaseline to O-ring and install carefully.
(2) Install the solenoid valves according to the marks put during disassembly.

No.	Name
1	Underdrive solenoid valve
2	Second solenoid valve
3	Damper clutch control solenoid valve
4	Overdrive solenoid valve
5	Low-reverse solenoid valve
6	Reduction solenoid valve

SPEEDOMETER GEAR

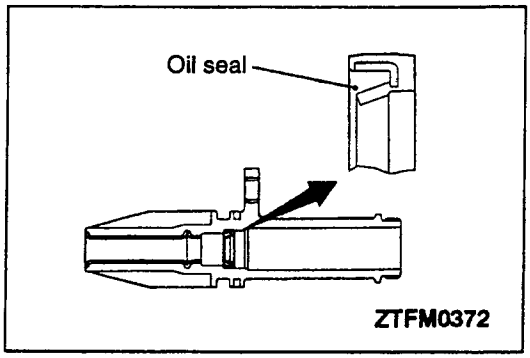
DISASSEMBLY AND REASSEMBLY



ZTFM0371

Disassembly steps

1. O-ring
2. Speedometer driven gear
▶A◀ 3. Oil seal
4. Sleeve



ZTFM0372

REASSEMBLY SERVICE POINT

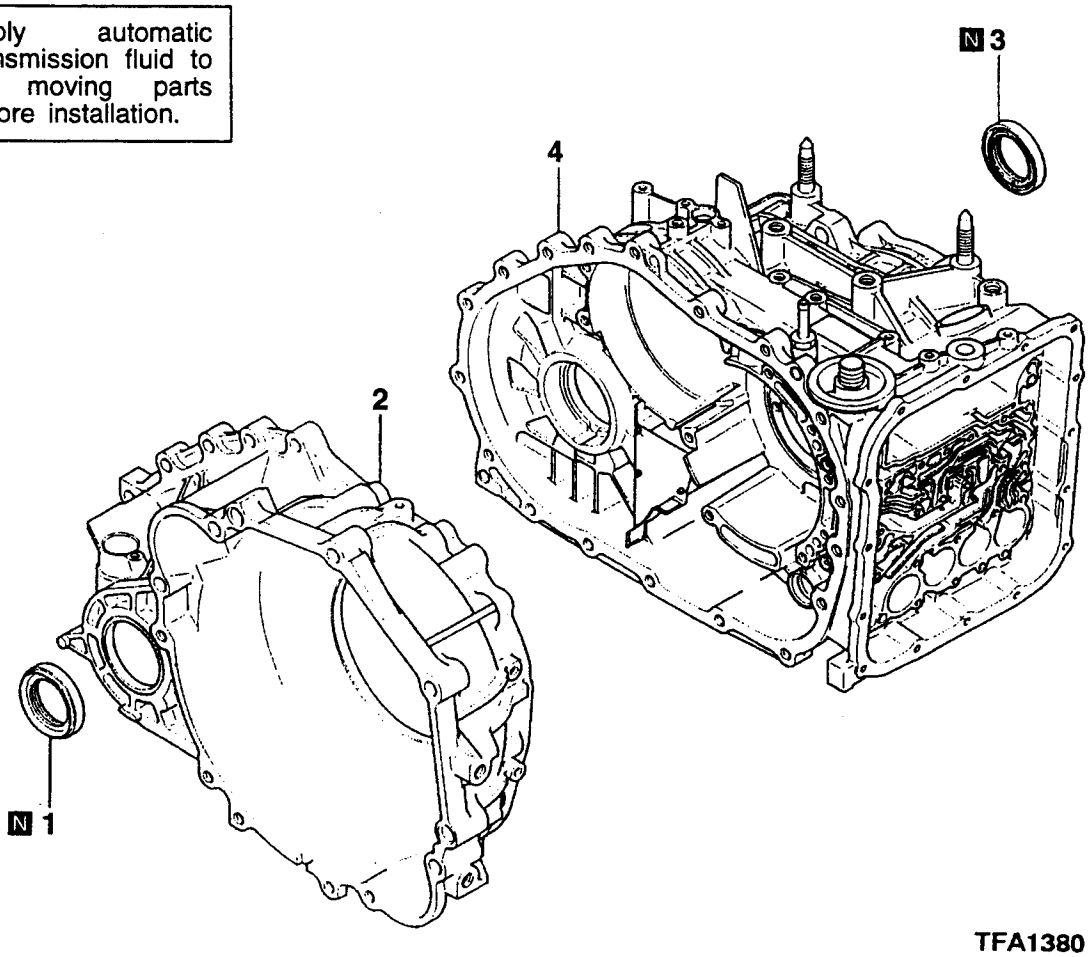
▶A◀ OIL SEAL INSTALLATION

Insert the oil seal in the position and direction shown in the figure.

DRIVE SHAFT OIL SEAL

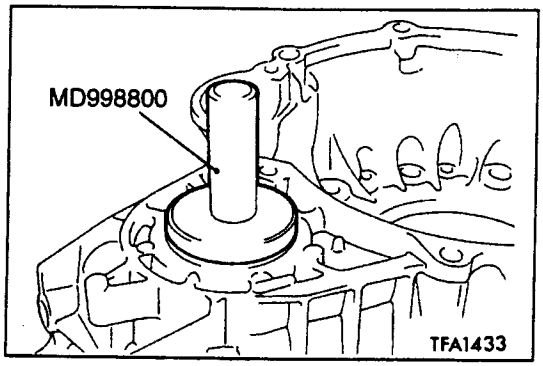
DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.



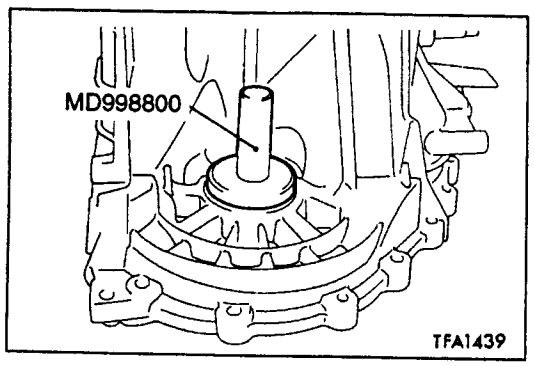
Disassembly steps

▶A◀ 1. Oil seal
2. Torque converter housing
▶B◀ 3. Oil seal
4. Transmission case



REASSEMBLY SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION

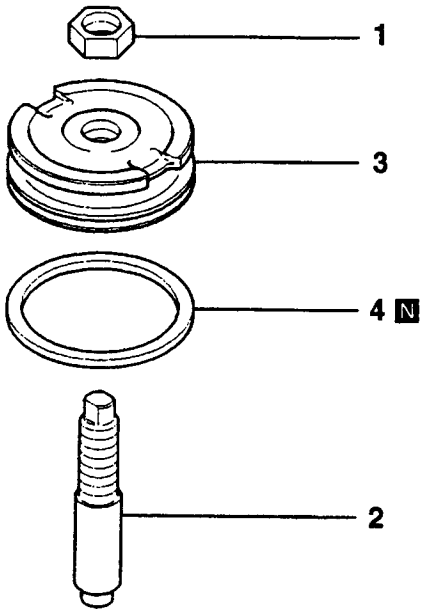


▶B◀ OIL SEAL INSTALLATION

REDUCTION BRAKE PISTON

DISASSEMBLY AND REASSEMBLY

Apply automatic transmission fluid to all moving parts before installation.



TFA1730

Disassembly steps

1. Nut
2. Adjust rod
3. Reduction brake piston
4. Seal ring

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