

STARTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08FB--

Items	2.6L Engine	3.0L Engine
Starter motor		
Type	Reduction drive	Reduction drive
Model No.	M1T70481	M1T72581
Part No.	MD099667	MD136933
Rated output kW/V	1.2/12	1.2/12
No. of pinion teeth	8	8

SERVICE SPECIFICATIONS

N08FC--

Items	Specifications
Standard values	
Starter motor	
Free running characteristics	
Terminal voltage V	11
Current A	Max. 90
Speed rpm	Min. 3000
Under-cut depth mm (in.)	0.5 (.020)
Commutator diameter mm (in.)	29.4 (1.157)
Pinion gap mm (in.)	0.5–2.0 (.020–.079)
Commutator runout mm (in.)	0.05 (.0020)
Limit	
Commutator diameter mm (in.)	28.8 (1.134)
Commutator runout mm (in.)	0.1 (.004)

TORQUE SPECIFICATIONS

N08FD--

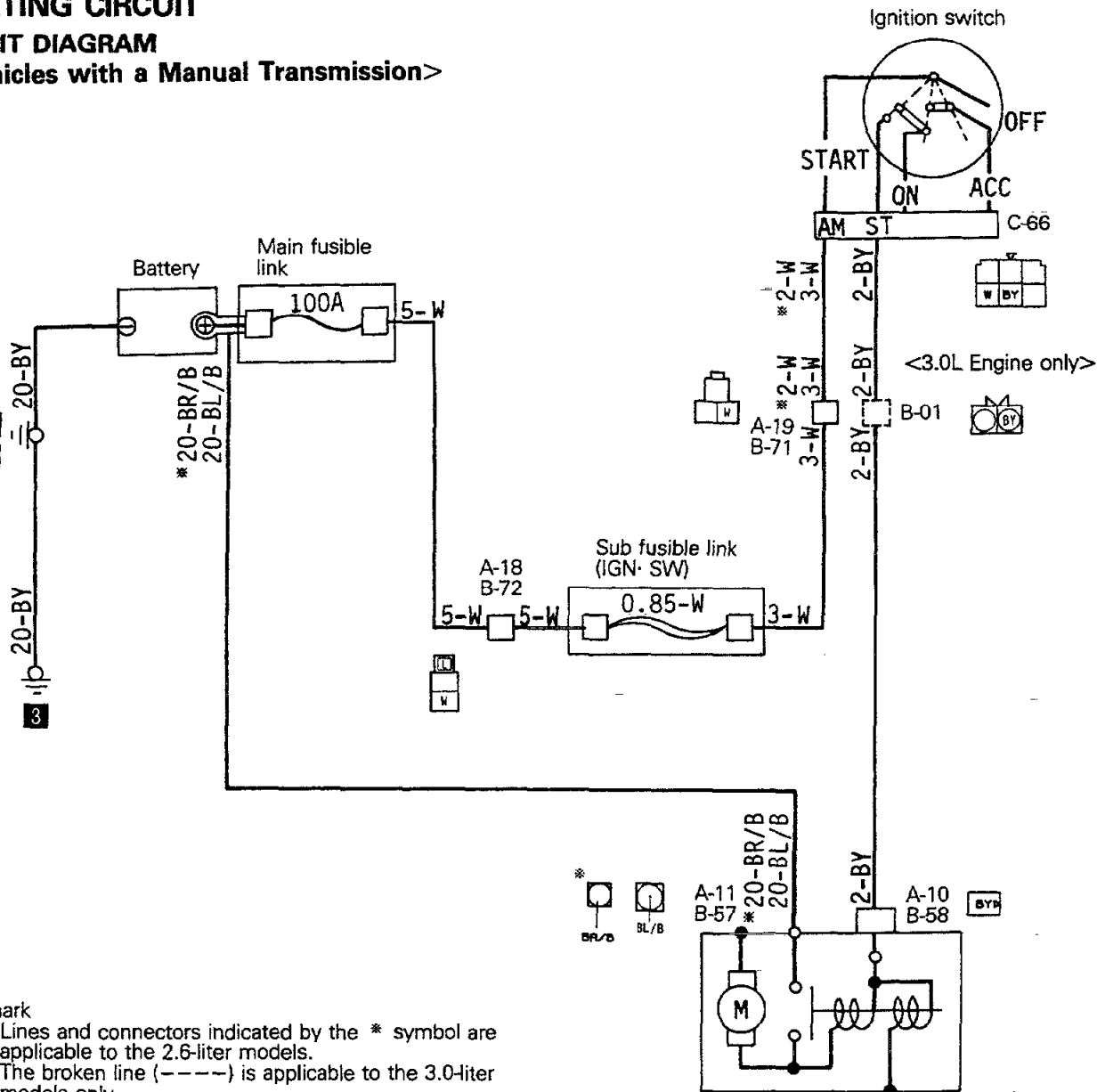
Items	Nm	ft.lbs.
Starter motor mounting bolts	27–34	20–24

TROUBLESHOOTING

STARTING CIRCUIT

CIRCUIT DIAGRAM

<Vehicles with a Manual Transmission>



Remark

- (1) Lines and connectors indicated by the * symbol are applicable to the 2.6-liter models.
- (2) The broken line (-----) is applicable to the 3.0-liter models only.
- (3) For information concerning the ground points (example:), refer to P.8-12, 14.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
LI: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

37W717

OPERATION

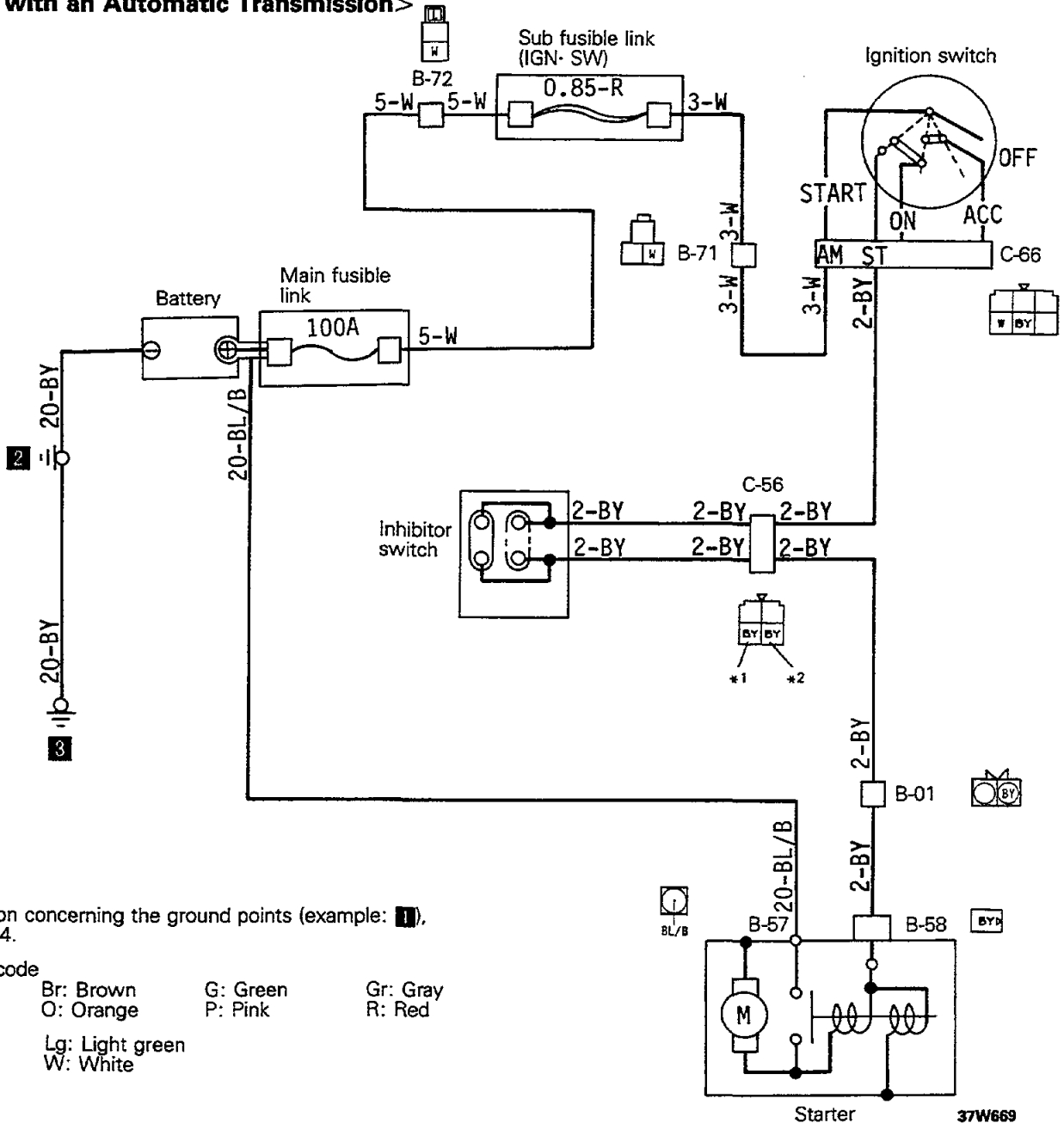
- When the ignition switch is turned to "START" with the inhibitor switch in "P" or "N" position (automatic transmission vehicles), current flows through the inhibitor switch and starter coil to ground. This closes the contacts of the starter switch (magnetic switch).
- Closing the magnetic switch contacts completes the circuit from the battery to magnetic switch to starter motor and ground, so that the starter motor starts rotating.

TROUBLESHOOTING HINTS

1. Starter motor does not turn over
 - 1) Starter motor operating sound is heard for an instant
 - Check starter motor for condition of its magnetic switch.
 - 2) Starter motor does not operate at all
 - Check starter motor coils.
2. Starter motor does not stop
 - Check starter motor for condition of its magnetic switch.

N08FHAH

<Vehicles with an Automatic Transmission>



Remark
For information concerning the ground points (example: **1**), refer to P.8-14.

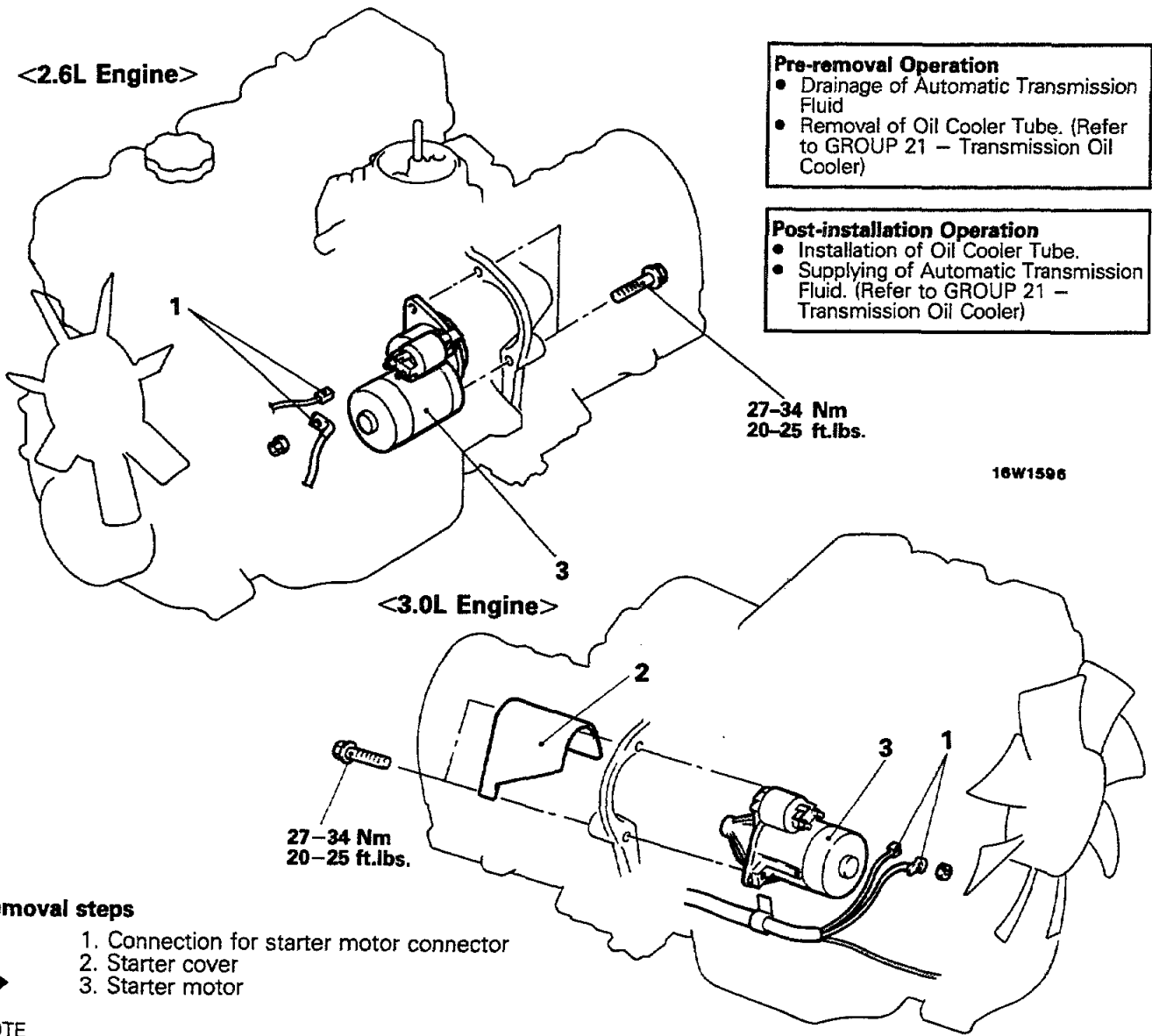
Wiring color code
 B: Black Br: Brown G: Green Gr: Gray
 Ll: Light blue O: Orange P: Pink R: Red
 L: Blue Lg: Light green
 Y: Yellow W: White

37W669

STARTER MOTOR

REMOVAL AND INSTALLATION

NOBFJAN



Pre-removal Operation

- Drainage of Automatic Transmission Fluid
- Removal of Oil Cooler Tube. (Refer to GROUP 21 – Transmission Oil Cooler)

Post-installation Operation

- Installation of Oil Cooler Tube.
- Supplying of Automatic Transmission Fluid. (Refer to GROUP 21 – Transmission Oil Cooler)

27-34 Nm
20-25 ft.lbs.

16W1596

27-34 Nm
20-25 ft.lbs.

Removal steps

1. Connection for starter motor connector
2. Starter cover
3. Starter motor

NOTE

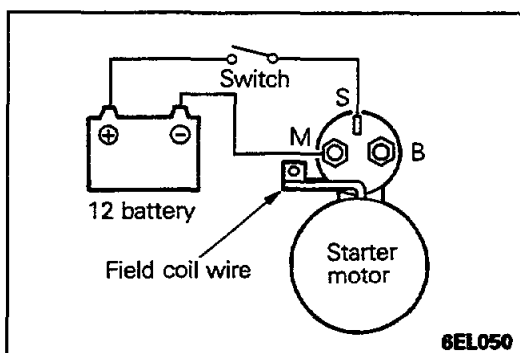
- (1) Reverse the removal procedures to reinstall.
- (2) ◀▶ : Refer to "Service Points of Removal."

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SERVICE POINTS OF REMOVAL

3. REMOVAL OF STARTER MOTOR

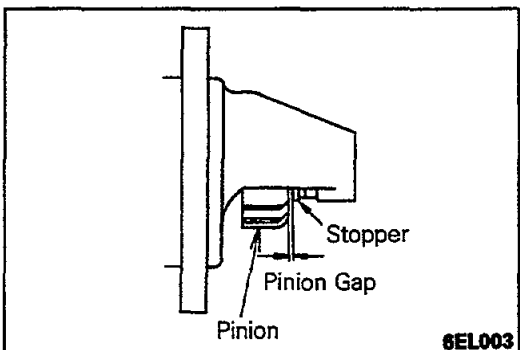
Models with manual transmission
Jack up the vehicle; then remove (from below the body) the starter motor mounting bolts, and separate the starter motor from the transmission assembly.

**INSPECTION****PINION GAP ADJUSTMENT**

- (1) Disconnect field coil wire from "M"-terminal of magnetic switch.
- (2) Connect a 12V battery between "S"-terminal and "M"-terminal.
- (3) Set switch to "ON", and pinion will move out.

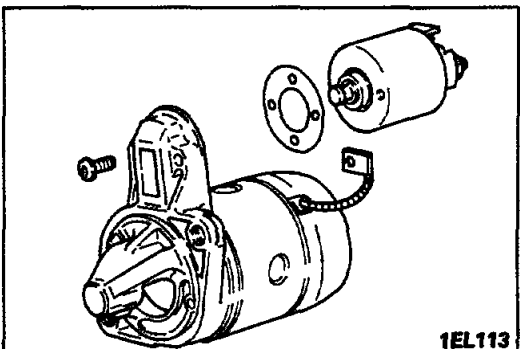
Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

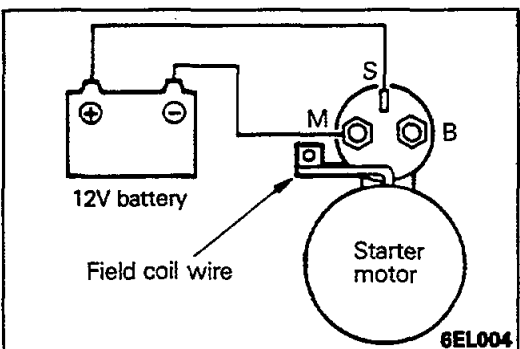


- (4) Check pinion to stopper clearance (pinion gap) with a feeler gauge.

Standard value: 0.5–2.0 mm (.020–.079 in.)



- (5) If pinion gap is out of specification, adjust by adding or removing gaskets between magnetic switch and front bracket.

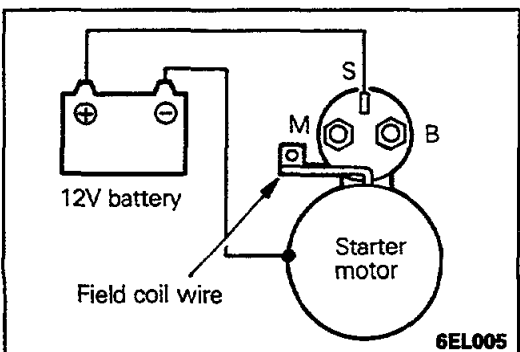
**PULL-IN TEST OF MAGNETIC SWITCH**

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between S-terminal and M-terminal.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- (3) If pinion moves out, then pull-in coil is good. If it doesn't replace magnetic switch.

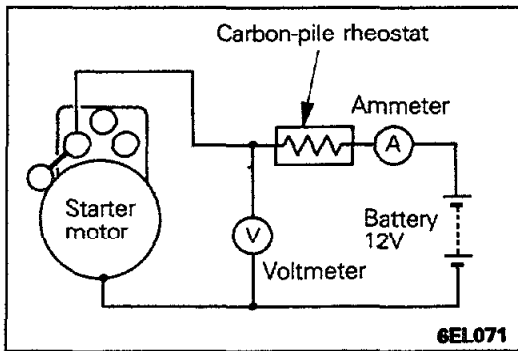
**HOLD-IN TEST OF MAGNETIC SWITCH**

- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between S-terminal and body.

Caution

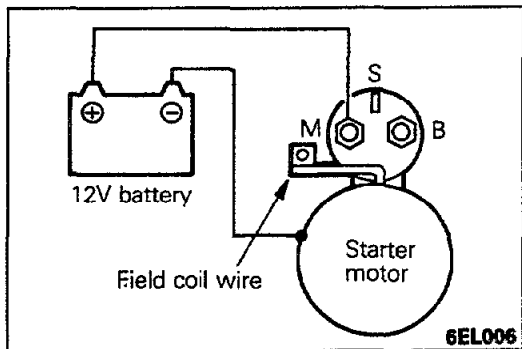
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- (3) If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.

**FREE RUNNING TEST**

- (1) Place starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows:
- (2) Connect a test ammeter (100-ampere scale) and carbon pile rheostat in series with battery positive post and starter motor terminal.
- (3) Connect a voltmeter (15-volt scale) across starter motor.
- (4) Rotate carbon pile to full-resistance position.
- (5) Connect battery cable from battery negative post to starter motor body.
- (6) Adjust rheostat until battery voltage shown on the voltmeter reads 11V.
- (7) Confirm that the maximum amperage is within the standard value and that the starter motor turns smoothly and freely.

Standard value:	Current	Max. 90A
	Speed	Min. 3,000 rpm

**RETURN TEST OF MAGNETIC SWITCH**

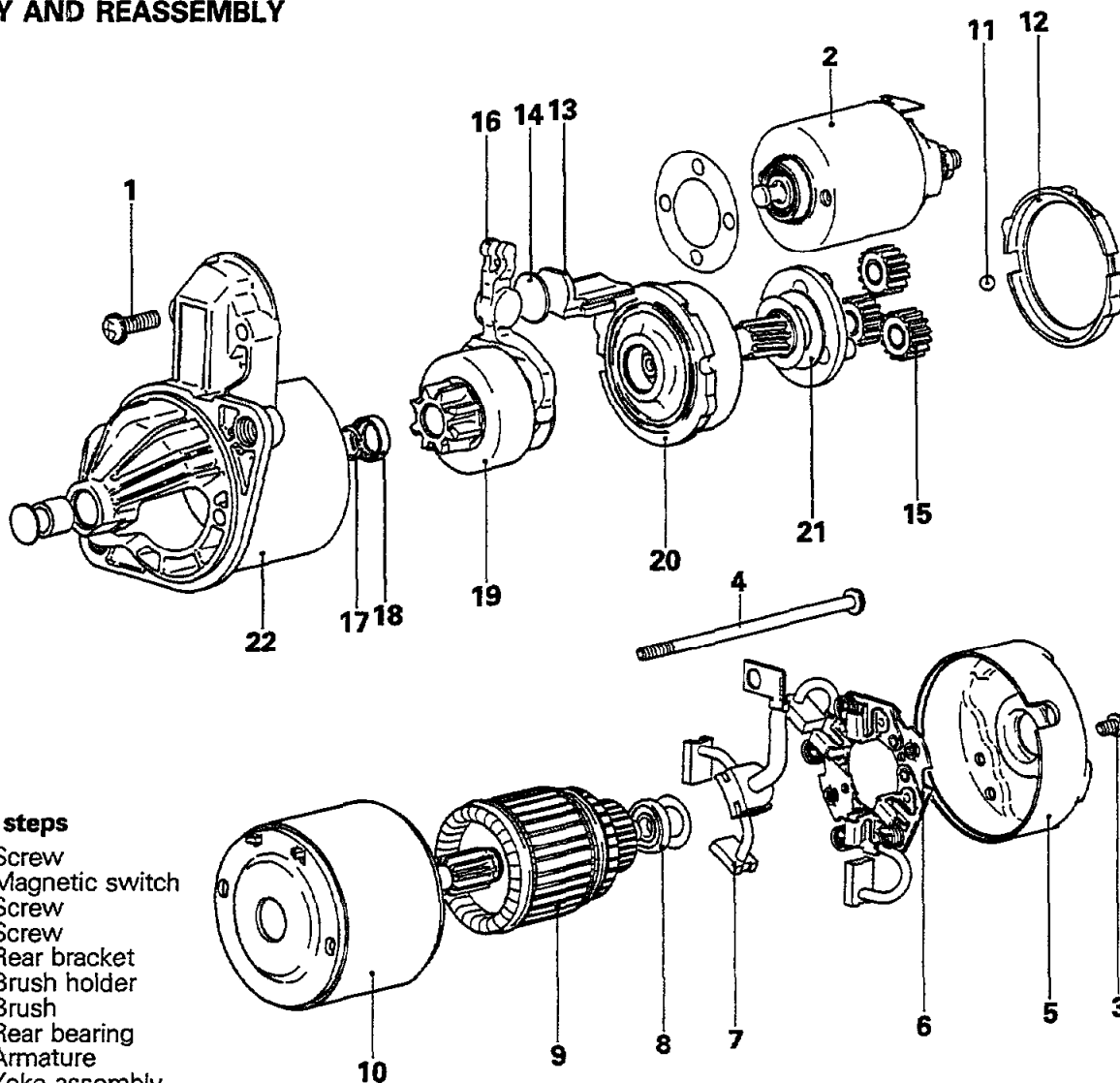
- (1) Disconnect field coil wire from M-terminal of magnetic switch.
- (2) Connect a 12V battery between M-terminal and body.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- (3) Pull pinion out and release. If pinion quickly returns to its original position, everything is in order. If it doesn't, replace magnetic switch.

DISASSEMBLY AND REASSEMBLY



Disassembly steps

- 1. Screw
- 2. Magnetic switch
- 3. Screw
- 4. Screw
- 5. Rear bracket
- 6. Brush holder
- 7. Brush
- 8. Rear bearing
- ↔ 9. Armature
- ↔ 10. Yoke assembly
- 11. Ball
- 12. Packing A
- 13. Packing B
- 14. Plate
- 15. Planetary gear
- 16. Lever
- ↔↔↔ 17. Snap ring
- ↔↔↔ 18. Stop ring
- 19. Over running clutch
- 20. Internal gear
- 21. Planetary gear holder
- 22. Front bracket

NOTE

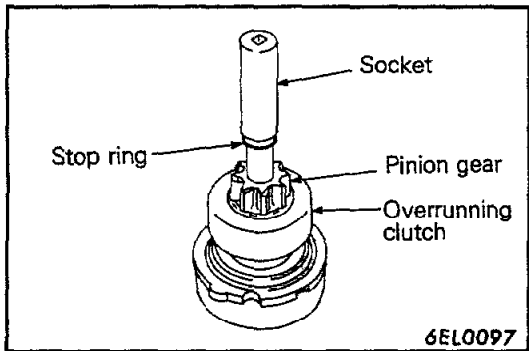
- (1) Reverse the disassembly procedures to reassemble.
- (2) ↔ : Refer to "Service Points of Disassembly".
- (3) ↔↔ : Refer to "Service Points of Reassembly".

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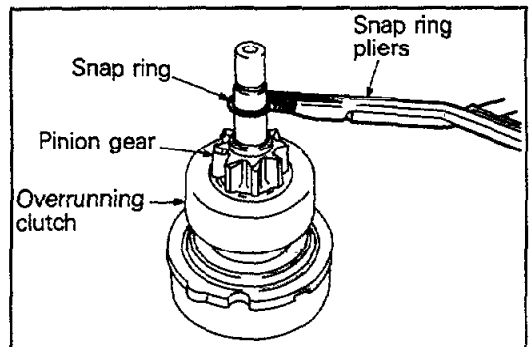
SERVICE POINTS OF DISASSEMBLY

9. REMOVAL OF ARMATURE / 11. BALL

When removing the armature, do not lose the ball which acts as a bearing for the armature and tip.

**17. REMOVAL OF SNAP RING / 18. STOP RING**

- (1) Push the stop ring towards the snap ring using the proper socket.
- (2) After removal of the snap ring with the snap ring pliers, remove the stop ring and the over-running clutch.

**CLEANING STARTER MOTOR PARTS**

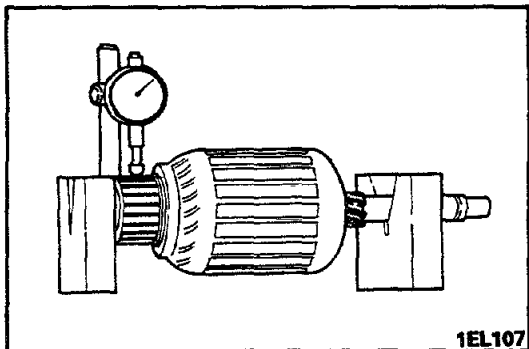
1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage insulation. Wipe these parts with a cloth only.
2. Do not immerse drive unit in cleaning solvent. Overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

INSPECTION**CHECKING COMMUTATOR**

- (1) Plate the armature on a pair of V blocks and check run-out with a dial gauge.

Standard value: 0.05 mm (.0020 in.)

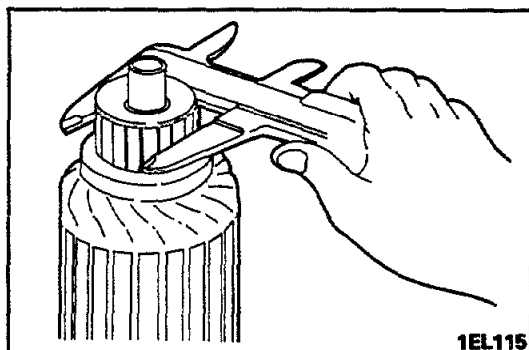
Limit: 0.1 mm (.004 in.)



- (2) Check the outer diameter.

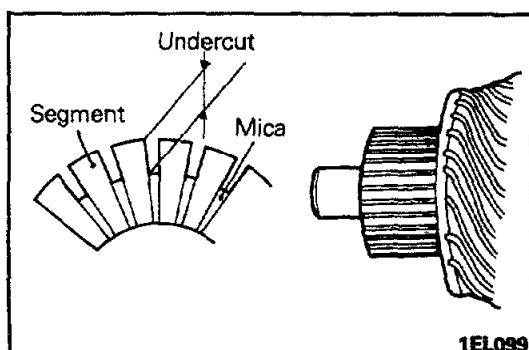
Standard value: 29.4 mm (1.157 in.)

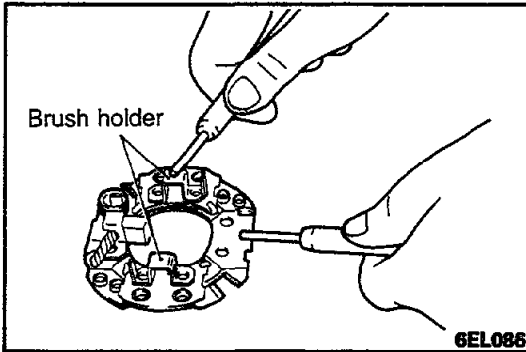
Limit: 28.8 mm (1.134 in.)



- (3) Check the depth of the undercut between segments.

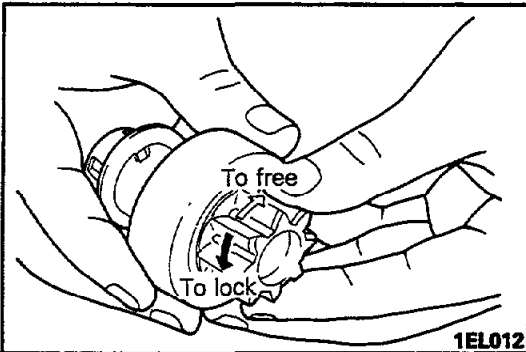
Standard value: 0.5 min. (.020 in.)





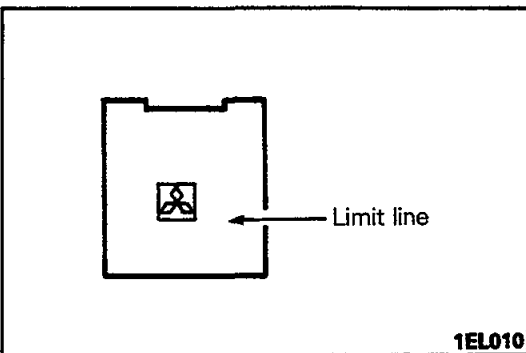
BRUSH HOLDER

Check conductivity between the brush holder plate and brush holder. If there is no conductivity this is normal.



OVERRUNNING CLUTCH

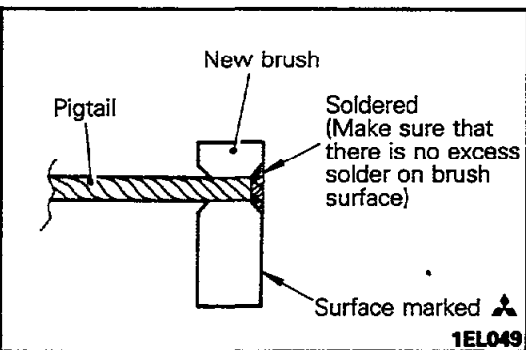
1. While holding clutch housing, rotate the pinion. Drive pinion should rotate smoothly in one direction, but should not rotate in opposite direction. If clutch does not function properly, replace overrunning clutch assembly.
2. Inspect pinion for wear or burrs. If pinion is worn or burred, replace overrunning clutch assembly. If pinion is damaged, also inspect ring gear for wear or burrs.



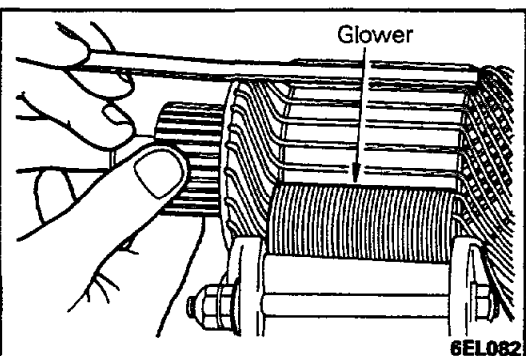
FRONT AND REAR BRACKET BUSHING

Inspect bushing for wear or burrs. If bushing is worn or burred, replace front bracket assembly or rear bracket assembly.

REPLACEMENT OF BRUSHES AND SPRINGS



1. Brushes that are worn beyond limit line, or are oil-soaked, should be replaced.
2. When replacing field coil brushes, crush worn brush with pliers, taking care not to damage pigtail.

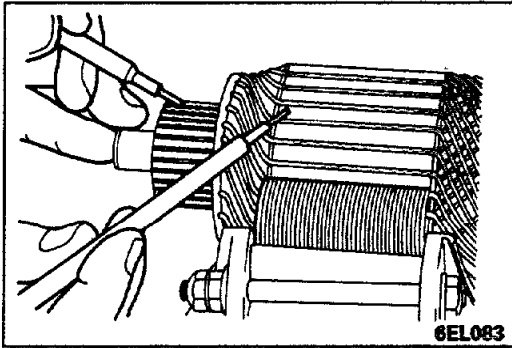


3. Sand pigtail end with sandpaper to ensure good soldering.
4. Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.

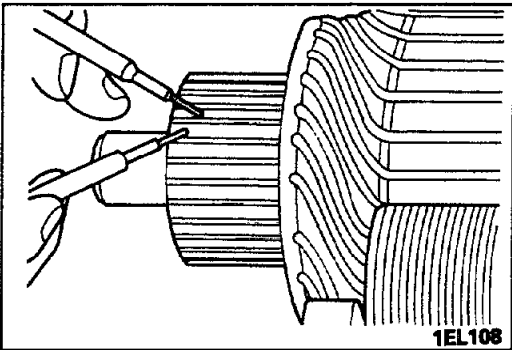
TESTING ARMATURE

TESTING ARMATURE FOR SHORT-CIRCUIT

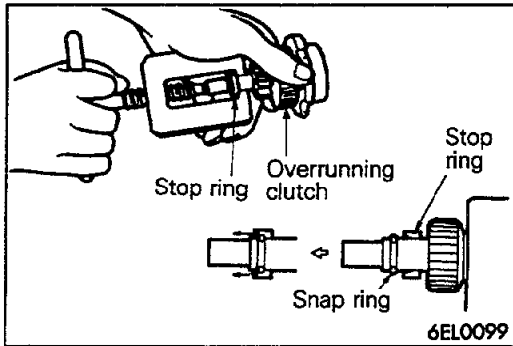
1. Place armature in a growler.
2. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.

**TESTING ARMATURE FOR GROUNDING**

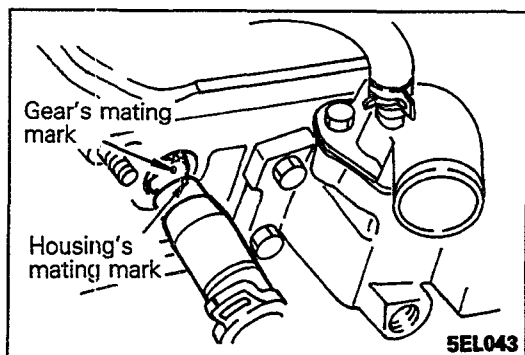
Check the insulation in the space between the segments of the commutator and the armature and coil core. If there is no conductivity this is normal.

**CHECKING CIRCUIT BRAKE BETWEEN ARMATURE AND COIL**

Check conductivity between each segment. If there is conductivity this is normal.

**SERVICE POINTS OF REASSEMBLY****18. INSTALLATION OF STOP RING / 17. SNAP RING**

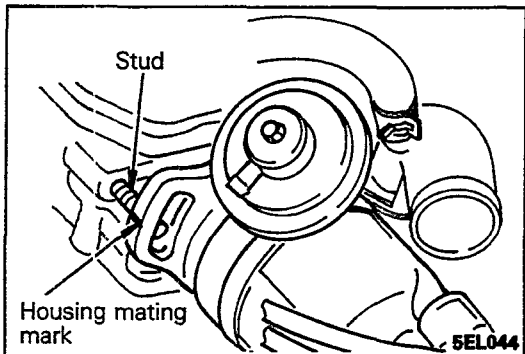
Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.



SERVICE POINTS OF INSTALLATION

5. INSTALLATION OF DISTRIBUTOR

- (1) Turn the crankshaft so that the No. 1 cylinder is at top dead center.
- (2) Align the distributor housing and gear mating marks.

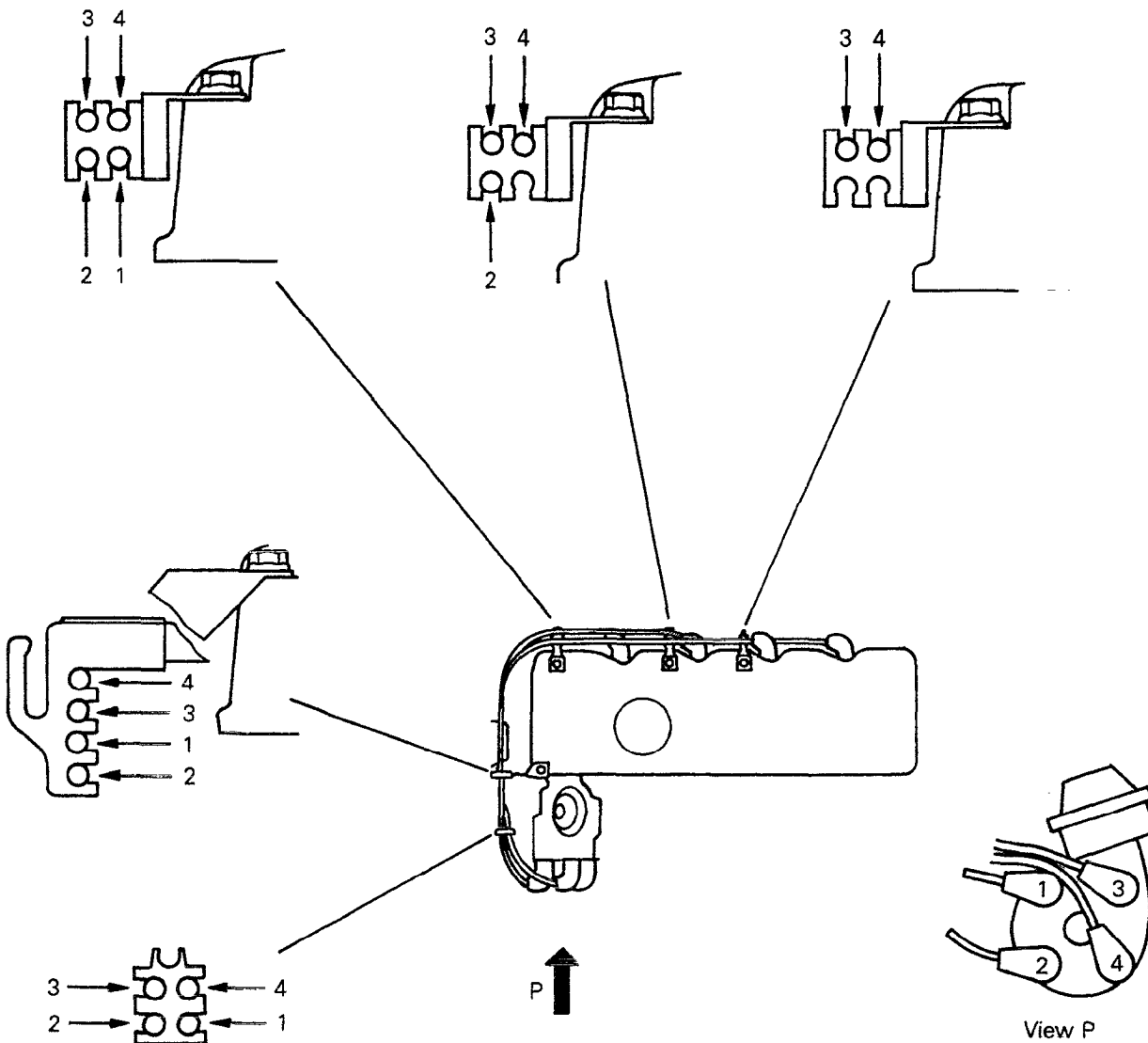


- (3) Install the distributor to the engine while aligning the fine cut (groove or projection) of the distributor's installation flange with the center of the distributor installation stud.

1. INSTALLATION OF SPARK PLUG CABLE

Improper arrangement of spark plug cables will induce voltage between the cables, causing miss firing and developing a surge at acceleration in high-speed operation. Therefore, be careful to arrange the spark plug cables properly by the following procedure.

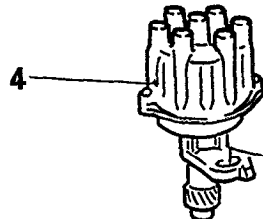
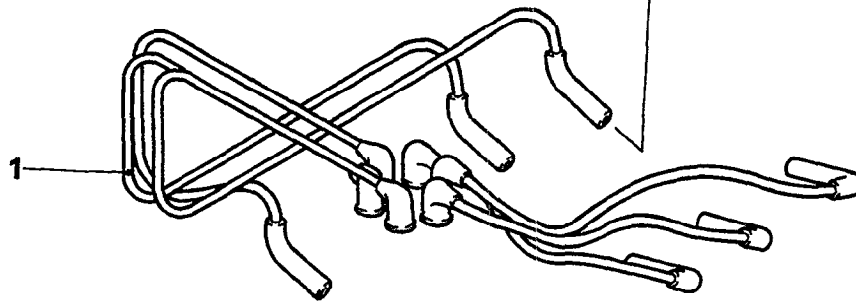
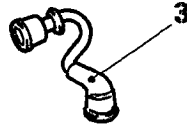
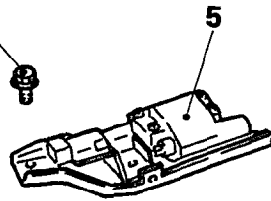
1. Install the spark plug cable clamps as shown in the illustration.
2. The numerals on the support and clamp indicate the spark plug cable No.
3. Pay attention to the following items when the spark plug cables are installed.
 - (1) Install the cables securely to avoid possible contact with metal parts.
 - (2) Install the cables neatly, ensuring they are not too tight, loose, twisted or kinked.



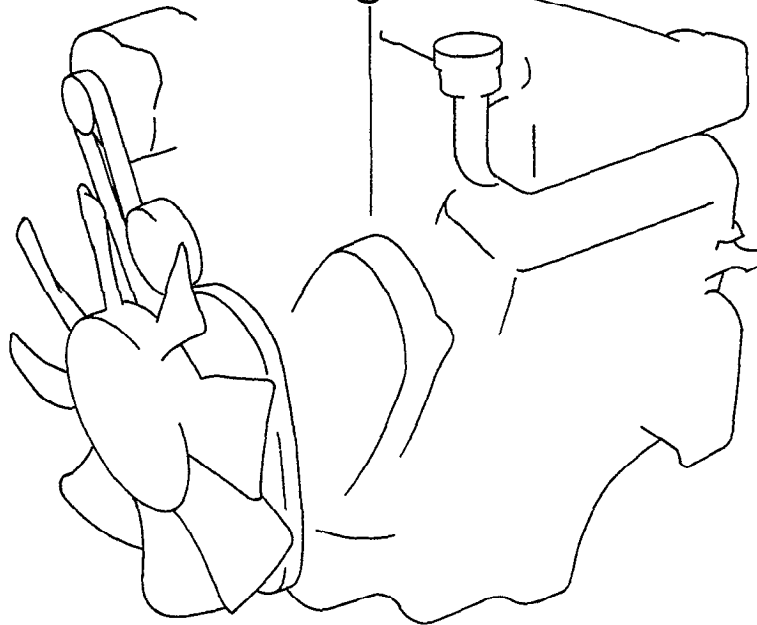
IGNITION SYSTEM <3.0L ENGINE>

REMOVAL AND INSTALLATION

20–30 Nm
15–21 ft.lbs.



12–15 Nm
9–11 ft.lbs.



- ◀▶▶▶ 1. Spark plug cable
- ▶▶▶▶ 2. Spark plug
- ▶▶▶▶ 3. High tension cable
- ▶▶▶▶ 4. Distributor
- ▶▶▶▶ 5. Ignition coil assembly

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NOTE

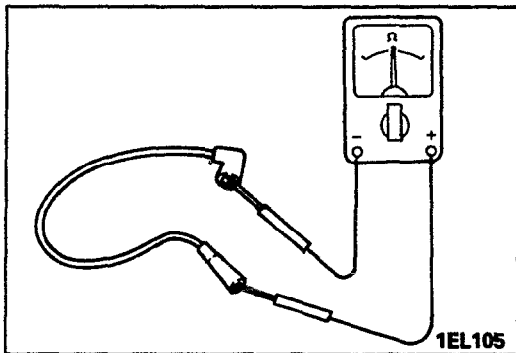
- (1) ▶▶▶▶ : Refer to "Service Points of Removal".
- (2) ▶▶▶▶ : Refer to "Service Points of Installation".

SERVICE POINTS OF REMOVAL**1. REMOVAL OF SPARK PLUG CABLE/3. HIGH TENSION CABLE**

Refer to P.8-151.

INSPECTION**SPARK PLUG**

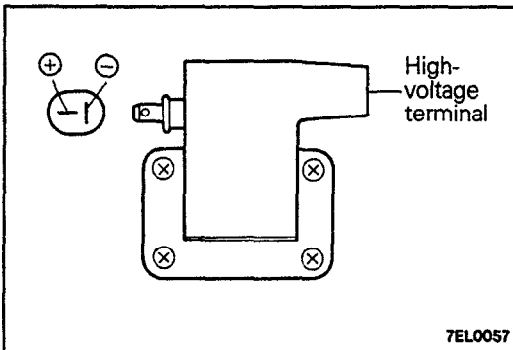
Refer to P.8-152.

**SPARK PLUG CABLE**

- (1) Check cap and coating for cracks.
- (2) Measure resistance.

Unit: kΩ

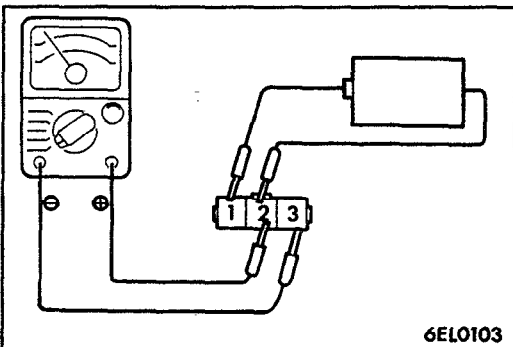
High tension cable	Spark plug cable					
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Approx. 3	9	8.5	10	9	12	10

**IGNITION COIL**

- (1) Measurement of the primary coil resistance
Measure the resistance of the positive (+) terminal and negative (-) terminal of the ignition coil.

Standard value: 0.72–0.88 Ω

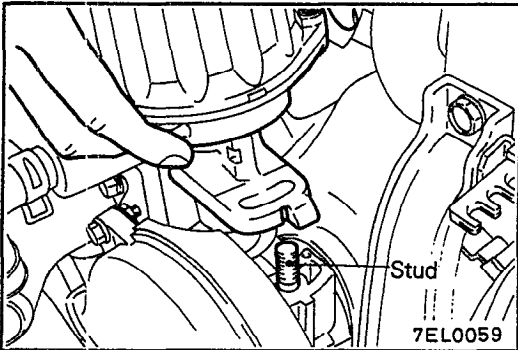
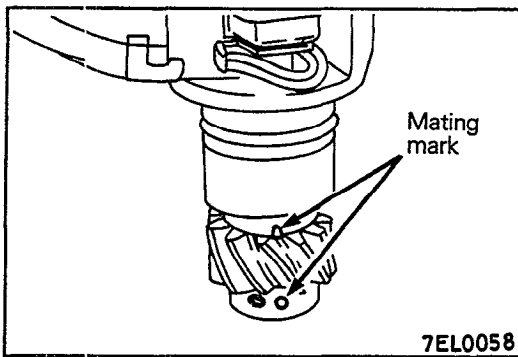
- (2) Measurement of the secondary coil resistance
Measurement the resistance of the positive (+) terminal and the high-voltage terminal.

Standard value: 10.3–13.9 kΩ**POWER TRANSISTOR**

- (1) Connect the negative (-) terminal of the 1.5V power supply to terminal ② of the power transistor, then check whether there is continuity between terminal ③ and terminal ② when terminal ① and the positive (+) terminal are connected and disconnected.

Terminal ① and (+) terminal	Terminal ③ and terminal ②
Connected	Continuity
Unconnected	No continuity.

- (2) Replace the power transistor if there is a malfunction.



SERVICE POINTS OF INSTALLATION

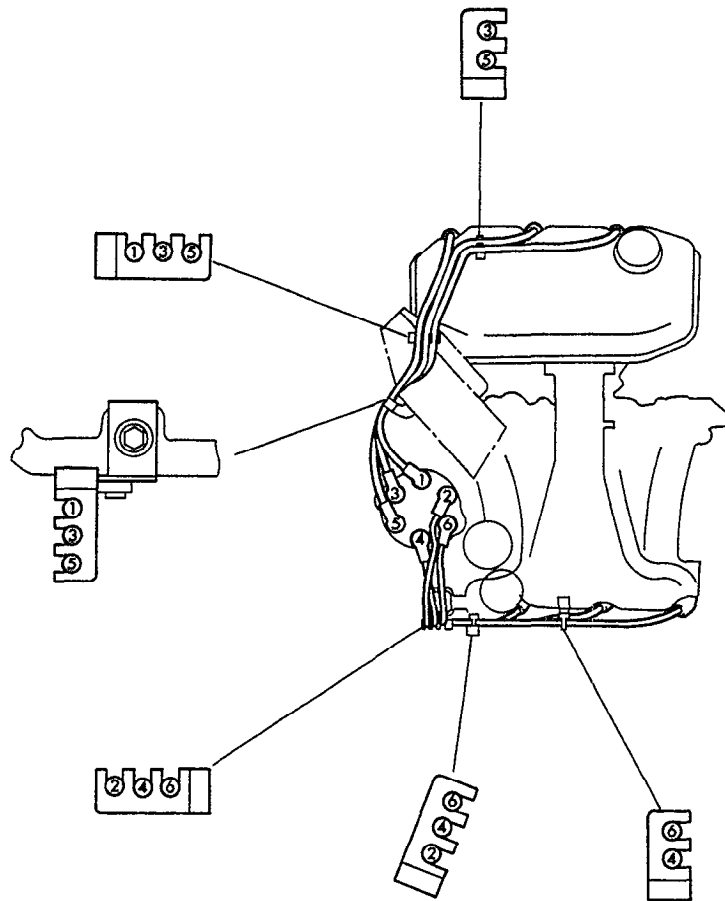
4. INSTALLATION OF DISTRIBUTOR

- (1) Turn the crankshaft so that the No. 1 cylinder is at top dead center.
- (2) Align the distributor housing and gear mating marks.

- (3) Install the distributor to the engine while aligning the fine cut (groove or projection) of the distributor's installation flange with the center of the distributor installation stud.

1. INSTALLATION OF SPARK PLUG CABLE

Refer to P. 8-154.

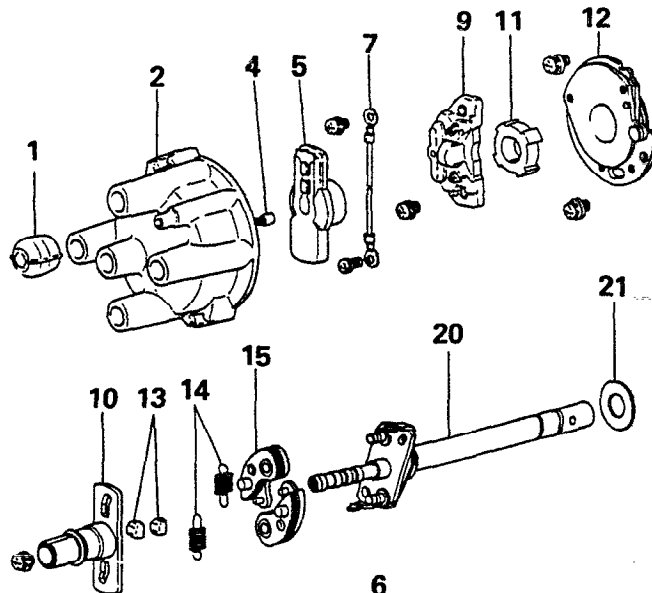


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DISTRIBUTOR <2.6L ENGINE>

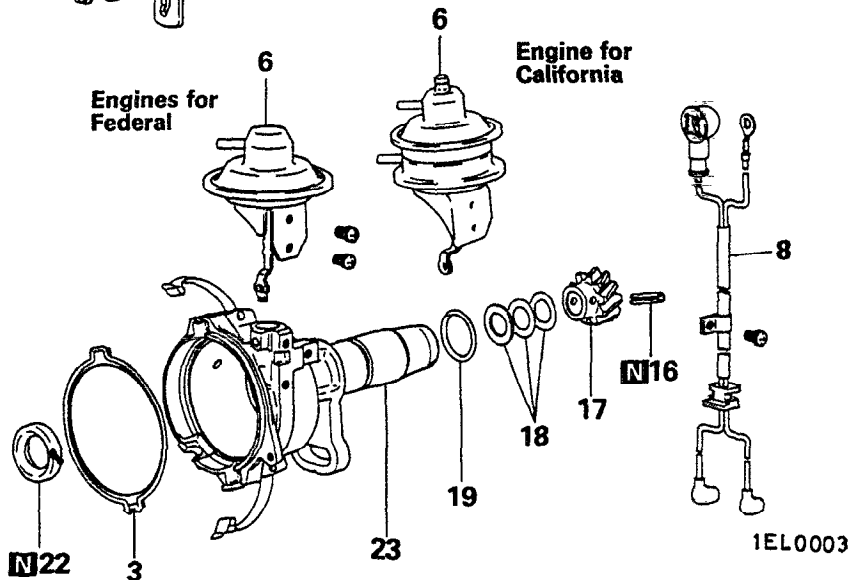
N69GKDBa

DISASSEMBLY AND REASSEMBLY



Disassembly steps

- 1. Breather
- 2. Distributor cap
- 3. Packing
- 4. Contact carbon
- 5. Rotor
- 6. Vacuum control
- 7. Ground wire
- 8. Lead wire
- ◆◆ Adjustment of air gap
- ◆◆◆ 9. Igniter
- ◆◆◆◆ 10. Rotor shaft
- ◆◆◆◆◆ 11. Signal rotor
- ◆◆◆◆◆◆ 12. Breaker plate
- ◆◆◆◆◆◆◆ 13. Spring retainer
- ◆◆◆◆◆◆◆◆ 14. Governor spring
- ◆◆◆◆◆◆◆◆◆ 15. Governor weight
- ◆◆◆◆◆◆◆◆◆◆ 16. Lock pin
- ◆◆◆◆◆◆◆◆◆◆◆ 17. Driven gear
- ◆◆◆◆◆◆◆◆◆◆◆◆ 18. Washer
- ◆◆◆◆◆◆◆◆◆◆◆◆◆ 19. O-ring
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆ 20. Distributor shaft
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ 21. Washer
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ 22. Oil seal
- ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ 23. Distributor housing



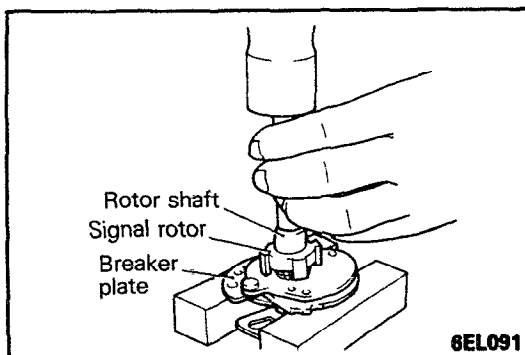
NOTE

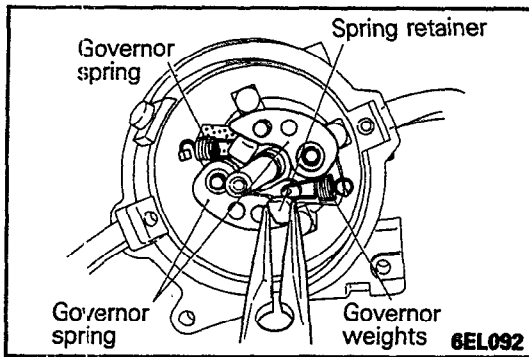
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆◆ : Refer to "Service Points of Disassembly".
- (3) ◆◆◆◆ : Refer to "Service Points of Reassembly".
- (4) N : Non-reusable parts

SERVICE POINTS OF DISASSEMBLY

10. REMOVAL OF ROTOR SHAFT/11. SIGNAL ROTOR

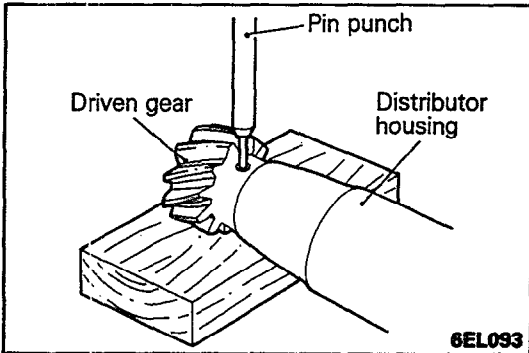
Place igniter base on soft base (wooden block) and lightly tap rotor shaft to remove it from signal rotor.





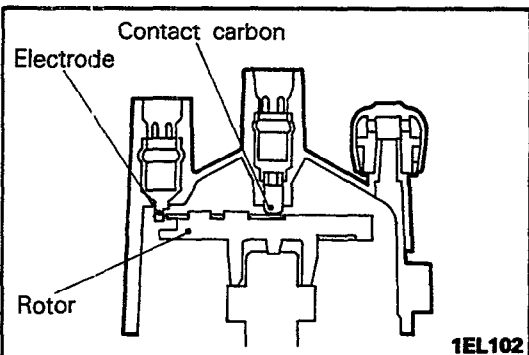
13. REMOVAL OF SPRING RETAINER/14. GOVERNOR SPRING

Remove two spring retainers with pliers and then remove two governor springs.



17. REMOVAL OF DRIVEN GEAR

- (1) Mark location of driven gear on distributor shaft.
- (2) Place driven gear on soft base (wood block) so that spring pin can be removed.
- (3) Using a pin punch, remove spring pin.

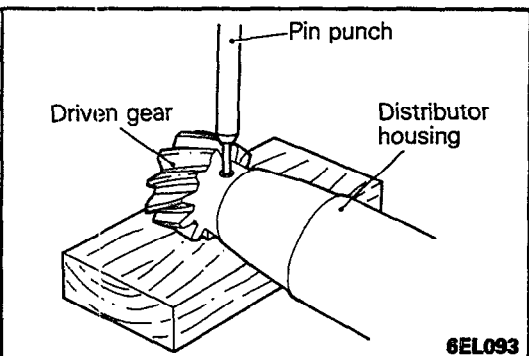


INSPECTION

Check according to the following provisions and repair or replace anything faulty.

CAP ROTOR

- (1) Ensure there are no cracks in the cap.
- (2) Ensure that the electrodes of the cap and of the rotor are undamaged.
- (3) Wipe off any dirt from the cap or the rotor.

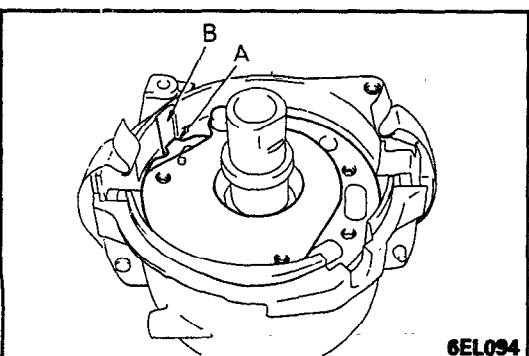


SERVICE POINTS OF REASSEMBLY

Before servicing be sure to clean and inspect all parts.

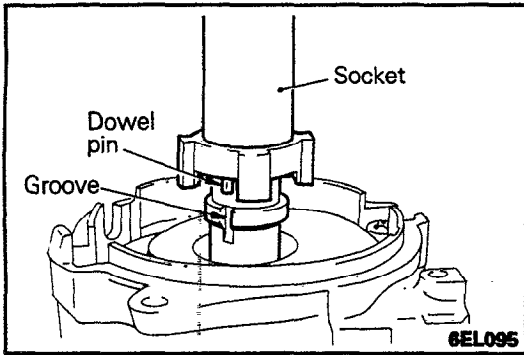
17. INSTALLATION OF DRIVEN GEAR

Install driven gear into distributor shaft at previously marked location.



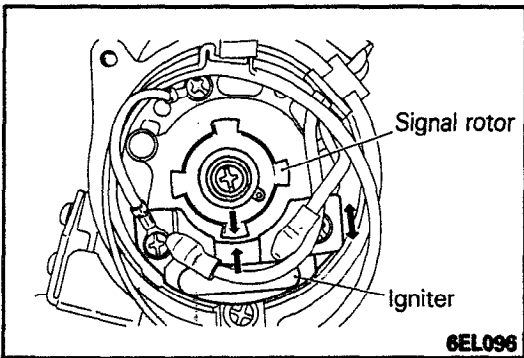
12. INSTALLATION OF BREAKER PLATE

Install igniter base to housing. Position the igniter base so that the projection (A) fits into the groove (B).



11. INSTALLATION OF SIGNAL ROTOR

Install signal rotor to rotor shaft. Position the signal rotor so that the dowel pin fits into the groove.



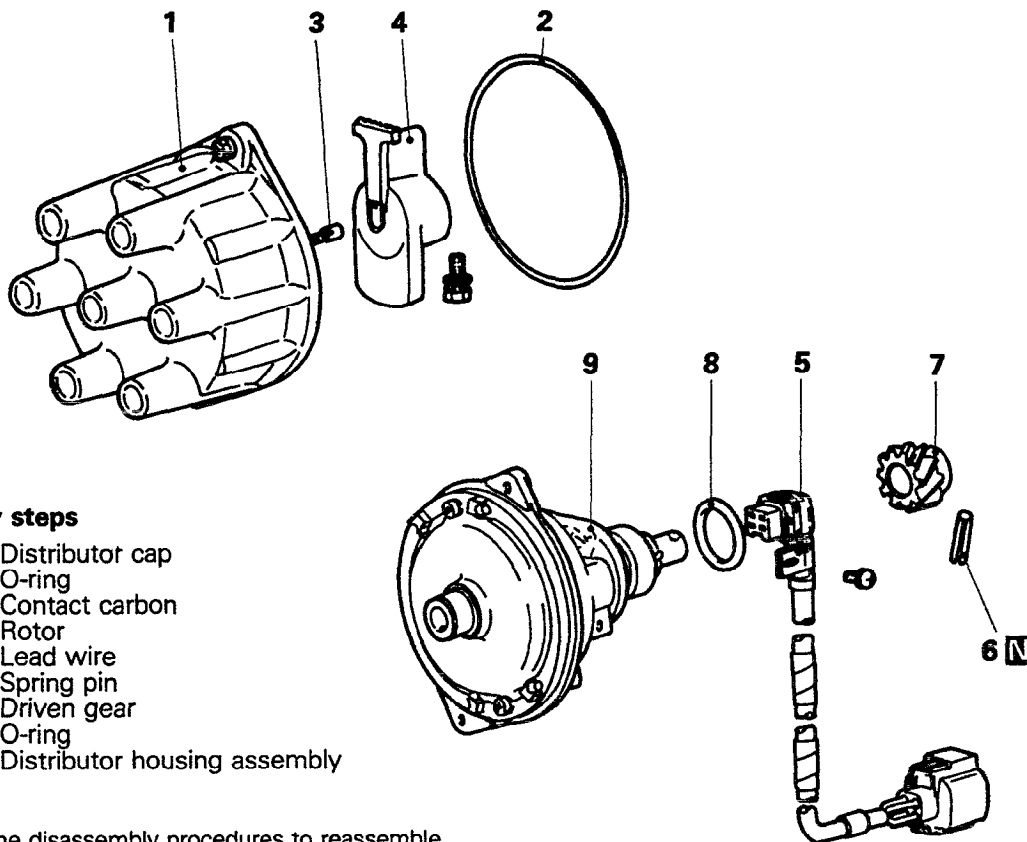
• **ADJUSTMENT OF AIR GAP**

Adjust air gap between signal rotor and pick-up or igniter.
Standard value: 0.8 mm (.0315 in.)

DISTRIBUTOR <3.0L ENGINE>

N08GKGA

DISASSEMBLY AND REASSEMBLY



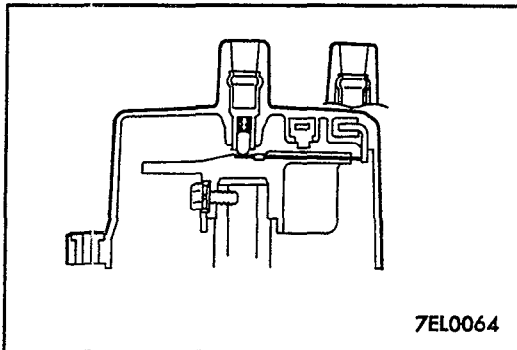
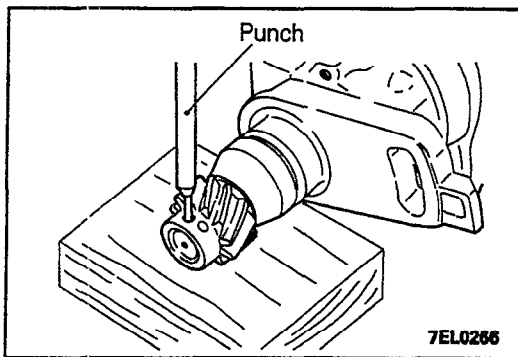
Disassembly steps

1. Distributor cap
2. O-ring
3. Contact carbon
4. Rotor
5. Lead wire
6. Spring pin
7. Driven gear
8. O-ring
9. Distributor housing assembly



NOTE

- (1) Reverse the disassembly procedures to reassemble.
- (2) : Refer to "Service Points of Disassembly".
- (3) : Refer to "Service Points of Reassembly".
- (4) : Non-reusable parts



SERVICE POINTS OF DISASSEMBLY

7. REMOVAL OF DRIVEN GEAR

- (1) Make a position identification mark (for the drive gear) on the distributor shaft.
- (2) Place the drive gear on a soft base (wooden block) so that the spring pin can come out.
- (3) Punch out the spring pin by using a pin punch.

INSPECTION

Check the following points; repair or replace if a problem is found.

CAP ROTOR

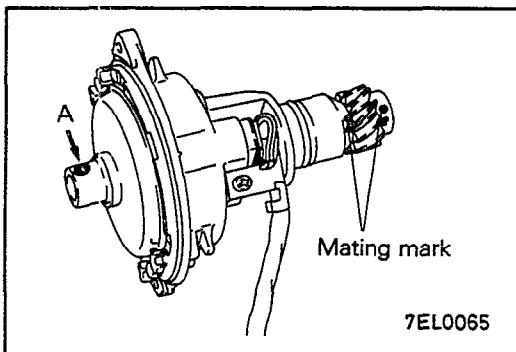
- (1) There must be no cracking in the cap.
- (2) There must be no damage to the cap's electrode or the rotor's electrode.
- (3) Clean away any dirt from the cap and rotor.

SERVICE POINTS OF REASSEMBLY

Take out and clean the disassembled parts. Do not use cleaning oil or similar product for cleaning.

7. INSTALLATION OF DRIVEN GEAR

- (1) Align with the mark made at the time of disassembly, and install the drive gear to the distributor shaft.



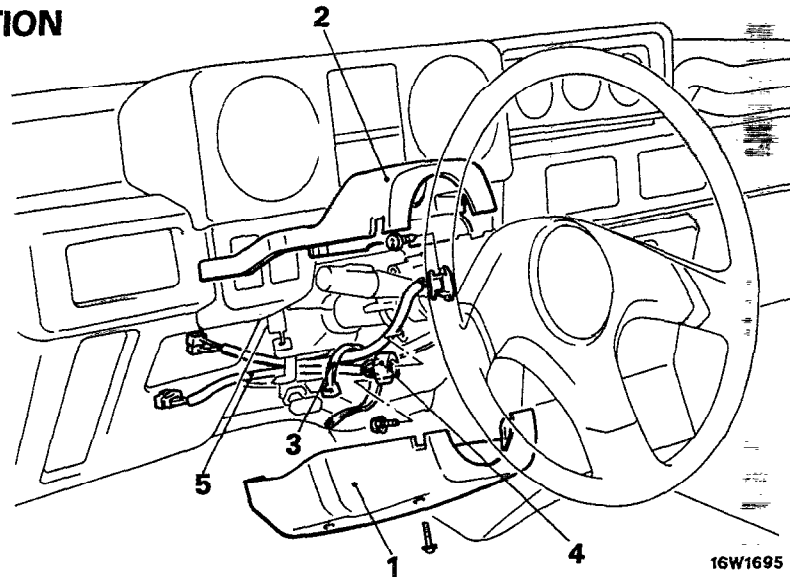
- (2) When aligning the driven gear's mating mark and the housing's mating mark, make the combination so that "A" (rotor mounting threaded hole) at the shaft end is at the position shown in the figure, and then align the spring pin hole and drive in a new spring pin.

Caution

Drive in the spring pin so that the slits are at a right angle relative to the shaft.

IGNITION SWITCH

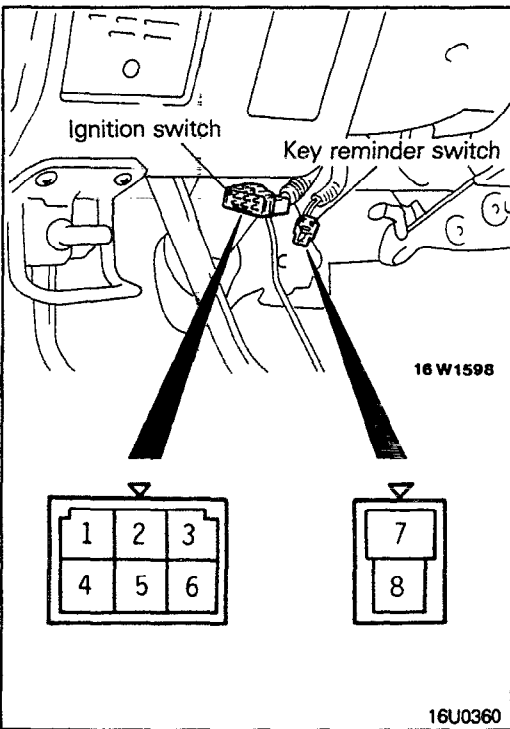
REMOVAL AND INSTALLATION



Removal steps

1. Lower column cover
2. Upper column cover
3. Cable band
4. Ignition switch
5. Key remind switch

NOTE
Reverse the removal procedures to reinstall.



INSPECTION

- (1) Disconnect the wiring connector from the ignition switch, and connect an ohmmeter to the switch side connector.
- (2) Operate the switch, and check the continuity between the terminals.

Position	Terminal	Ignition switch					Key remind switch		
		Key	4	2	3	6	1	5	7
LOCK	Removed								
	Inserted	ACC			○—○				
ON		○—○	○—○	○—○				○—○	
START		○—○	○—○	○—○	○—○	○—○			

NOTE
○—○ indicates that there is continuity between the terminals.