
ENGINE ELECTRICAL

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CHARGING SYSTEM

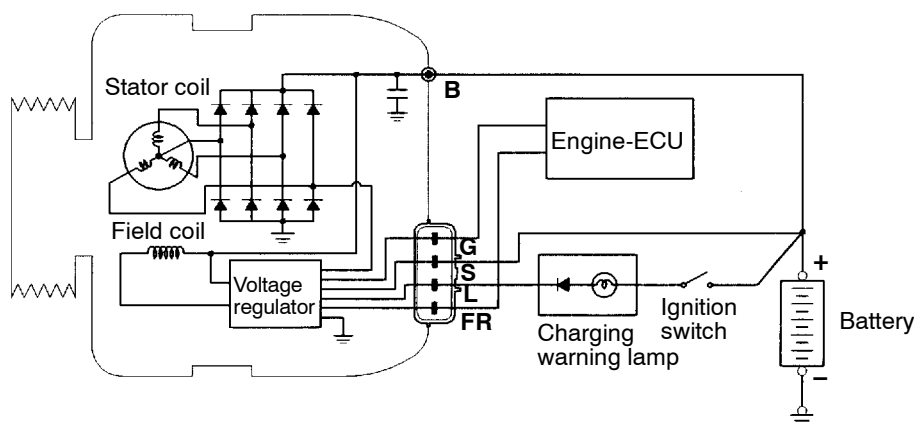
GENERAL

OUTLINE OF CHANGE

The following service procedures have been added to correspond to the introduction of the 4G64-GDI engine. The other service procedures are the same as for the 4G63-MPI engine.

GENERAL INFORMATION

SYSTEM DIAGRAM



9EN0870

ALTERNATOR SPECIFICATIONS

Items	4G64-GDI
Type	Battery voltage sensing
Rated output V/A	12/100
Voltage regulator	Electronic built-in type

ALTERNATOR

16100140286

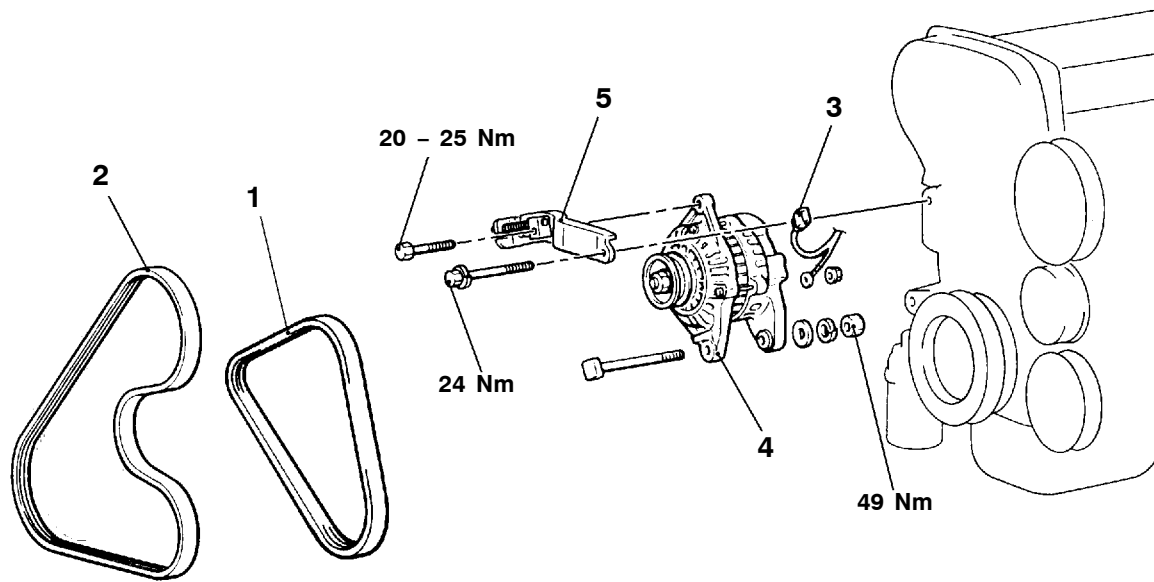
REMOVAL AND INSTALLATION

Pre-removal Operation

Under Cover and Side Cover (R.H. side) Removal

Post-installation Operation

- Drive Belt Tension Adjustment
(Refer to GROUP 11D – On-vehicle Service.)
- Under Cover and Side Cover (R.H. side) Installation



A16I0618

Removal steps

1. Drive belt (Power steering, A/C)
2. Drive belt (Alternator)
3. Alternator connector

4. Alternator
5. Alternator brace

STARTING SYSTEM

GENERAL

OUTLINE OF CHANGE

The following service procedures have been added to correspond to the introduction of the 4G64-GDI engine. The other service procedures are the same as for the 4G63-MPI engine.

GENERAL INFORMATION

STARTER MOTOR SPECIFICATIONS

Items	4G64-GDI
Type	Reduction drive with planetary gear
Rated output kW/V	1.4/12
No. of pinion teeth	8

IGNITION SYSTEM

GENERAL

OUTLINE OF CHANGE

The following service procedures have been added to correspond to the introduction of the 4G64-GDI engine.

GENERAL INFORMATION

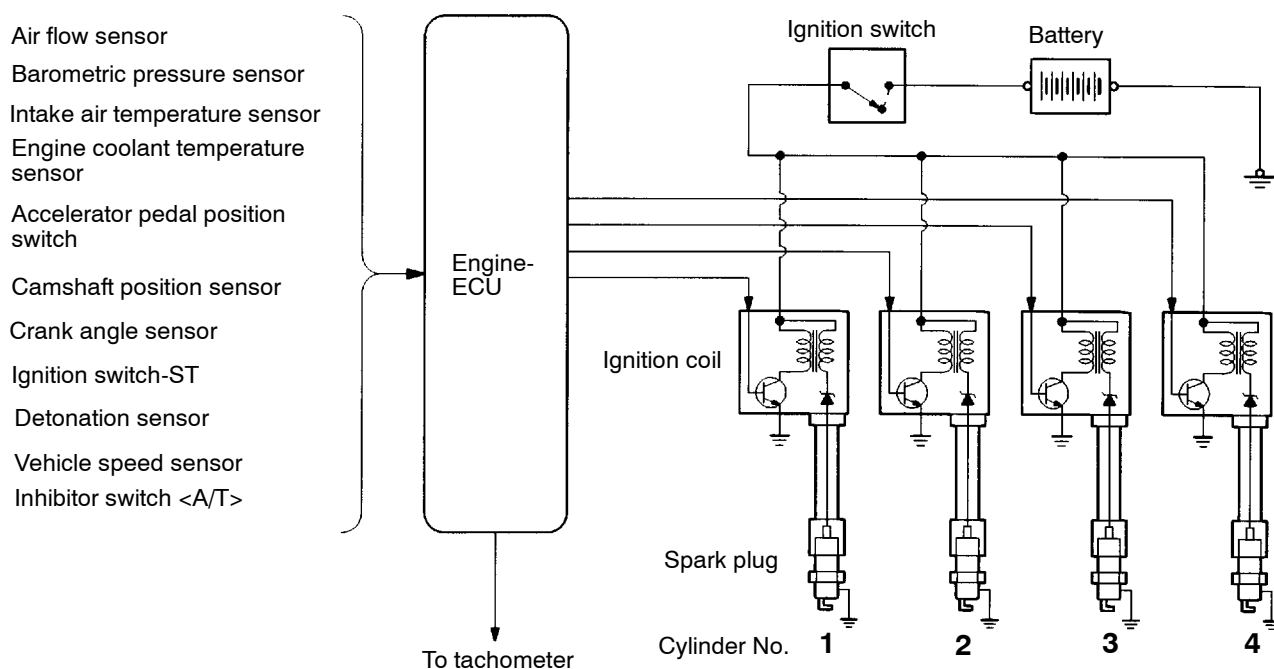
This system is equipped with four ignition coils with built-in power transistors for each of the cylinders. Interruption of the primary current flowing in the primary side of an ignition coil generates a high voltage in the secondary side of the ignition coil. The high voltage thus generated is applied to the spark plugs to generate sparks.

The engine-ECU turns the power transistors inside the ignition coils alternately on and off. This causes the primary currents in the ignition coils to be alternately interrupted and allowed to flow to fire the cylinders in the order 1 – 3 – 4 – 2.

The engine-ECU determines which ignition coil should be controlled by means of the signals from the camshaft position sensor and the crank angle sensor. It also detects the crankshaft position, in order to provide ignition at the most appropriate timing in response to the engine operation conditions.

When the engine is cold or running at high altitudes, the ignition timing is slightly advanced to provide optimum performance. Furthermore, if knocking occurs, the ignition timing is gradually retarded until knocking ceases.

SYSTEM DIAGRAM



9FU0931

IGNITION COIL SPECIFICATION

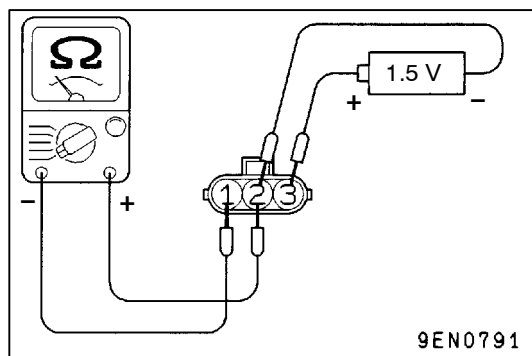
Items	Specification
Type	Molded 4-coil

SPARK PLUG SPECIFICATION

Items	Specification
NGK	IZFR5B

SERVICE SPECIFICATIONS**SPARK PLUG**

Items	Standard value	Limit
Spark plug gap mm	0.5 – 0.6	0.75
Spark plug insulation resistance MΩ	–	1

**ON-VEHICLE SERVICE****IGNITION COIL (WITH BUILT-IN POWER TRANSISTOR) CHECK****PRIMARY COIL AND POWER TRANSISTOR CONTINUITY CHECK****NOTE**

1. An analogue-type circuit tester should be used.
2. Connect the negative (-) probe of the circuit tester to terminal 1.

Caution

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

Voltage: 1.5V	Terminal No.		
	1	2	3
When current is flowing	○	⊖	⊕
When current is not flowing			

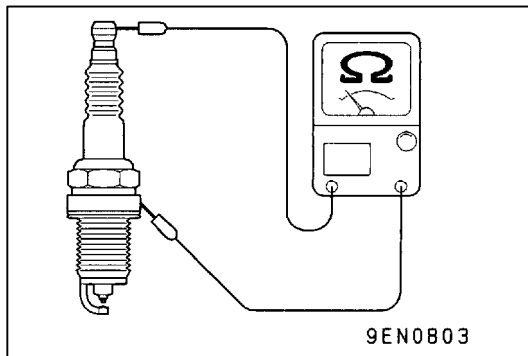
SECONDARY COIL CHECK**NOTE**

It is impossible to check the secondary coil through the continuity check as a diode is integrated in the secondary coil circuit of this ignition coil. So, check the secondary coil in the following procedure.

1. Disconnect the ignition coil connector.
2. Remove the ignition coil and install a new spark plug to the ignition coil.
3. Connect the ignition coil connector.
4. Earth the side electrode of the spark plug and crank the engine.
5. Check that spark is produced between the electrodes of the spark plug.
6. If no spark is produced, replace the ignition coil with a new one and recheck.
7. If spark is produced with the new ignition coil, replace the old one as it is faulty. If no spark is produced again, the ignition circuit is suspected as faulty. Check the ignition circuit.

SPARK PLUG CHECK AND CLEANING**Caution**

1. The spark plug gap for iridium plugs should not be adjusted.
2. Cleaning iridium plugs may result in damage to the iridium tip. Therefore, if cleaning is necessary because the plug is sooty, use a plug cleaner, and do not clean the plug for more than 20 seconds in order to preserve the electrodes. A wire brush should never be used.
3. The spark plugs in GDI engines are special iridium plugs in which the electrodes can become black even when the plugs are working normally. Carbon which may become deposited on these plugs burns off more readily than with conventional plugs, and so should not cause any problems with spark plug performance. Judgement of whether a spark plug is operating normally or not should be made by checking the insulation resistance.



1. Remove the ignition coils.
2. Remove the spark plugs.
3. Check the spark plug gap. Replace the spark plug if the gap exceeds the limit.

Limit: 0.75 mm

Standard value: 0.5 – 0.6 mm

4. Measure the spark plug insulation resistance. Replace the spark plug if the measured value is lower than the limit value.

Limit: 1 MΩ

5. Clean the spark plug holes.
6. Install the spark plugs.
7. Install the ignition coils.

CAMSHAFT POSITION SENSOR CHECK

Refer to GROUP 13I – Troubleshooting.

CRANK ANGLE SENSOR CHECK

Refer to GROUP 13I – Troubleshooting.

DETONATION SENSOR CHECK

Check the detonation sensor circuit if self-diagnosis code, No. 31 is shown.

NOTE

For information concerning the self-diagnosis codes, refer to GROUP 13I – Troubleshooting.