

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles. This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics. Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO)
INTAKE (INDUCTION)	IN(H4SO)
MECHANICAL	ME(H4SO)
EXHAUST	EX(H4SO)
COOLING	CO(H4SO)
LUBRICATION	LU(H4SO)
SPEED CONTROL SYSTEMS	SP(H4SO)
IGNITION	IG(H4SO)
STARTING/CHARGING SYSTEMS	SC(H4SO)
ENGINE (DIAGNOSTICS)	EN(H4SO)(diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SOw/oOBD)
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ENGINE SECTION 1

LUBRICATION

LU(H4SOw/oOBD)

SPEED CONTROL SYSTEMS

SP(H4SOw/oOBD)

IGNITION

IG(H4SOw/oOBD)

STARTING/CHARGING SYSTEMS

SC(H4SOw/oOBD)

ENGINE (DIAGNOSTICS)

EN(H4SOw/oOBD)
(diag)

IGNITION

IG(H4SO)

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General Description

IGNITION

1. General Description

A: SPECIFICATIONS

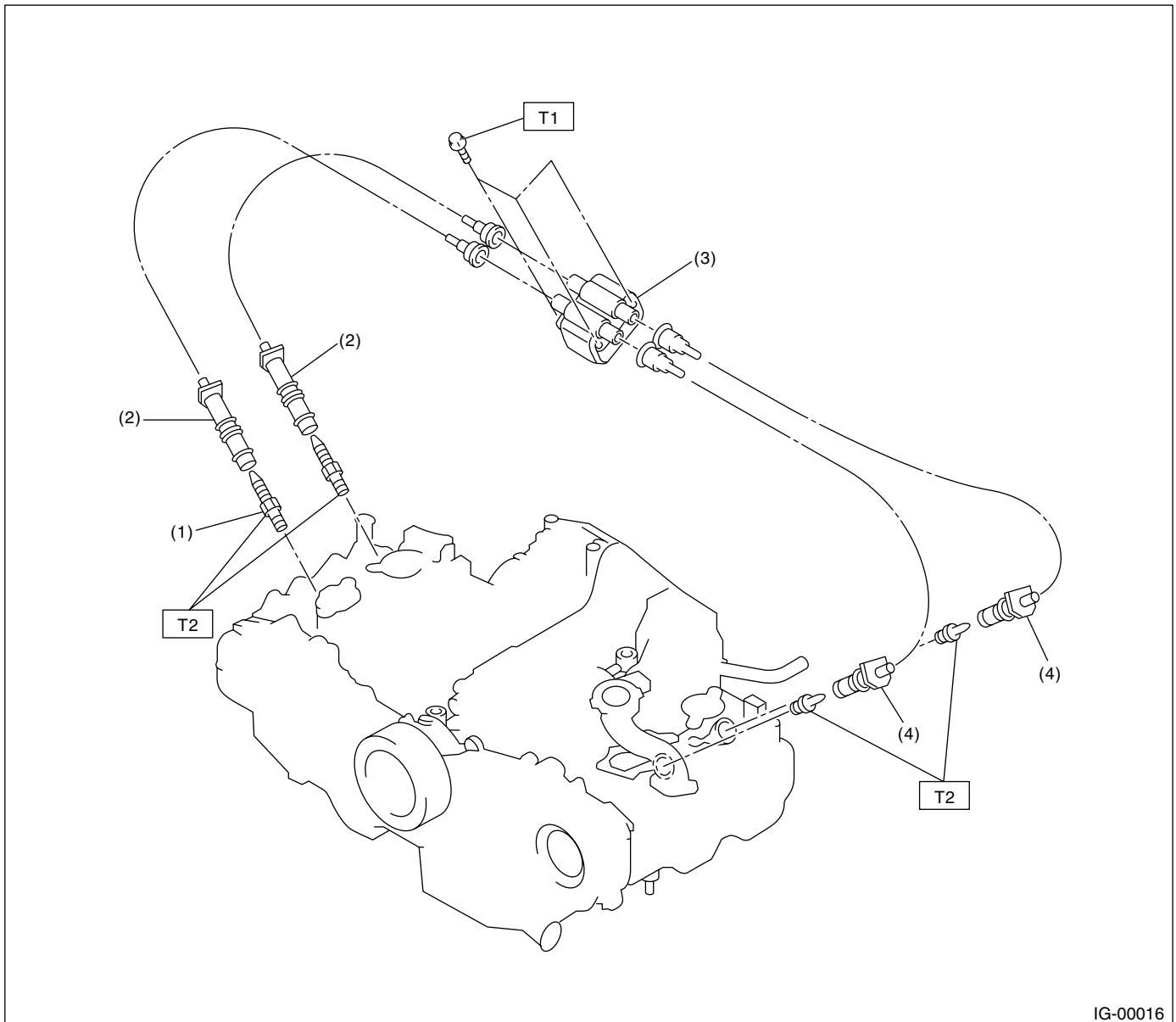
Item			Designation
Ignition coil & ignitor ASSY	Model	1.6 L	CM12 — 100C
		2.0 L	FH0137
		2.5 L	
	Manufacturer	1.6 L	HITACHI
		2.0 L	DIAMOND
		2.5 L	
	Primary coil resistance	1.6 L	0.7 Ω ±10%
		2.0 L	0.73 Ω ±10%
		2.5 L	
	Secondary coil resistance	1.6 L	18.0 k Ω ±20%
		2.0 L	12.8 k Ω ±15%
2.5 L			
Insulation resistance between primary terminal and case			More than 100 M Ω
Spark plug	Type and manufacturer	1.6 L	NGK: BKR6E* CHAMPION: RC8YC4** NGK: BKR6E-11** (Alternate)
		2.0 L	NGK: BKR6E* CHAMPION: RC10YC4** NGK: BKR5E-11** (Alternate)
		2.5 L	
	Thread size	mm	14, P = 1.25
	Spark plug gap	mm (in)	0.7 — 0.8 (0.028 — 0.031)* 1.0 — 1.1 (0.039 — 0.043)**

*: Without catalytic converter

** : With catalytic converter

B: COMPONENT

1. 1.6 L MODEL



- (1) Spark plug
- (2) Spark plug cord (#1, #3)
- (3) Ignition coil & ignitor ASSY

- (4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf·m, ft·lb)

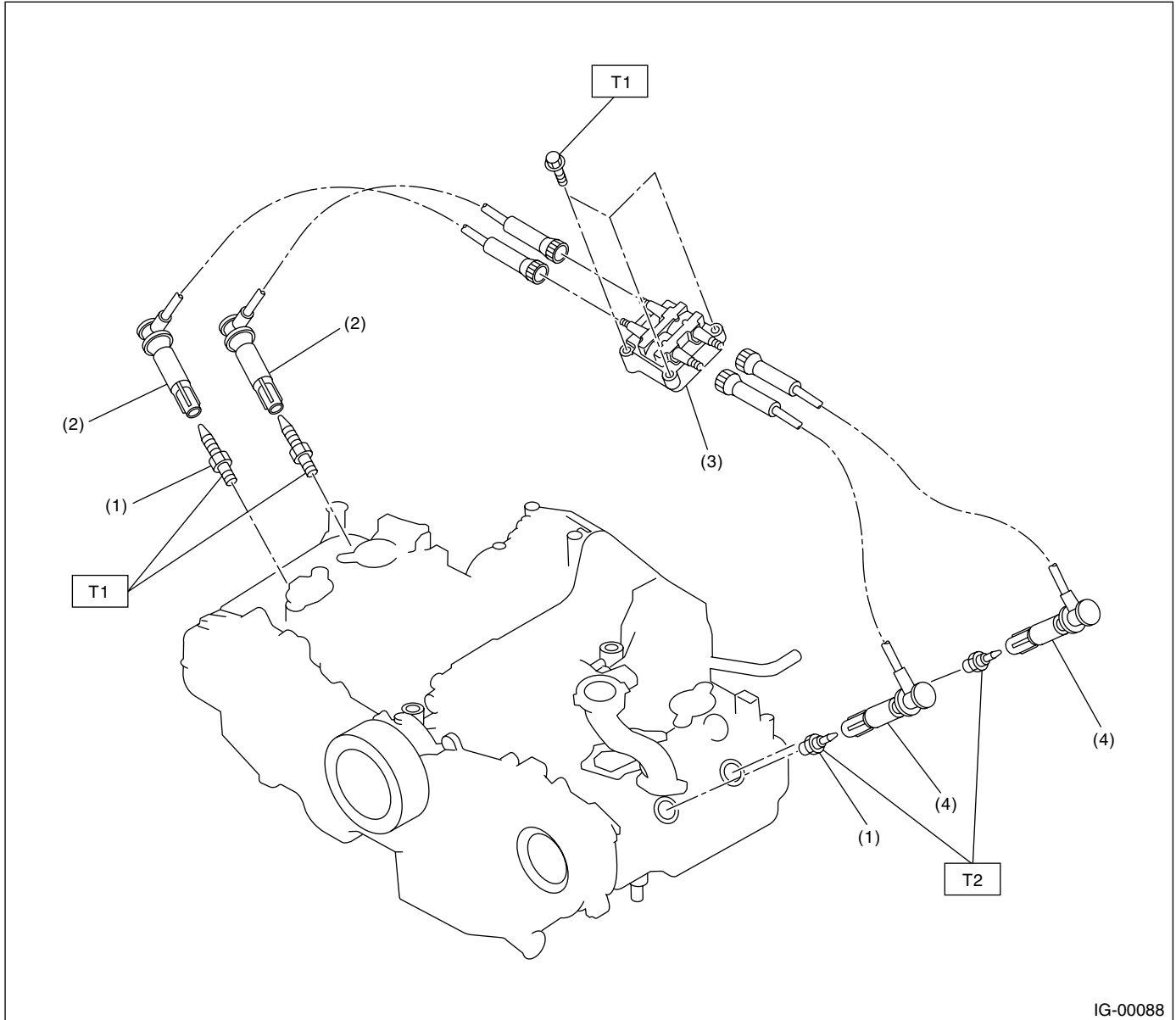
T1: 6.4 (0.65, 4.7)

T2: 21 (2.1, 15.5)

General Description

IGNITION

2. 2.0 L AND 2.5 L MODEL



- (1) Spark plug
- (2) Spark plug cord (#1, #3)
- (3) Ignition coil & ignitor ASSY

- (4) Spark plug cord (#2, #4)

Tightening torque: N-m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 21 (2.1, 15.5)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

A: REMOVAL

CAUTION:

All spark plugs installed on an engine, must be of the same heat range.

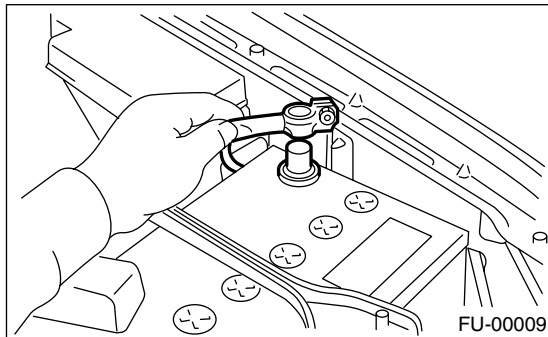
Spark plug	
1.6 L	NGK: BKR6E* CHAMPION: RC8YC4** NGK: BKR6E-11** (Alternate)
2.0 L	NGK: BKR6E*
2.5 L	CHAMPION: RC10YC4** NGK: BKR5E-11** (Alternate)

*: Without catalytic converter

** : With catalytic converter

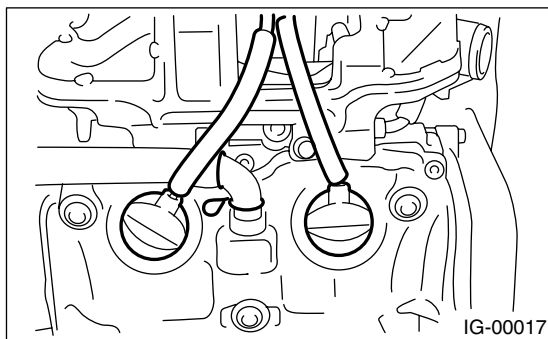
1. RH SIDE

1) Disconnect the ground cable from battery.

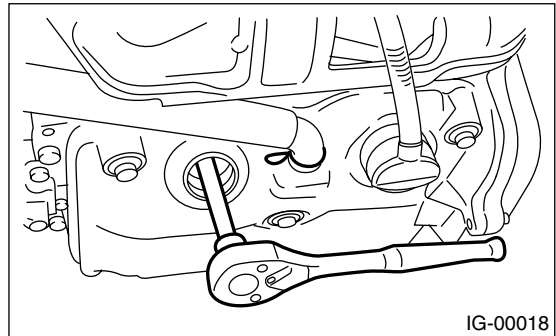


2) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>

3) Remove the spark plug cords by pulling the boot, not cord itself.

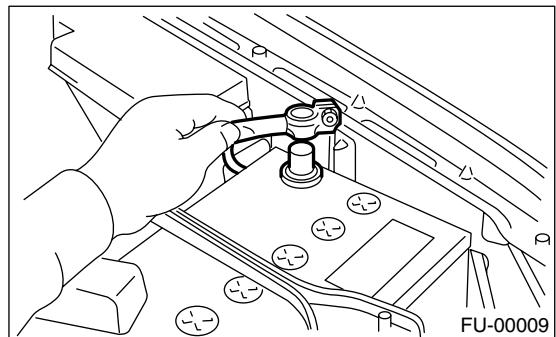


4) Remove the spark plugs using spark plug sockets.

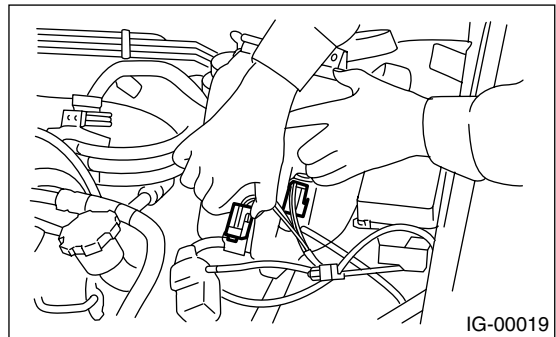


2. LH SIDE

1) Disconnect the ground cable from battery.

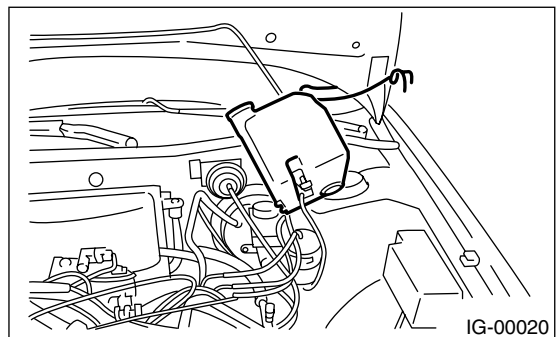


2) Disconnect the washer motor connector.



3) Disconnect the rear window glass washer hose from washer motor, then plug the connection with a suitable cap.

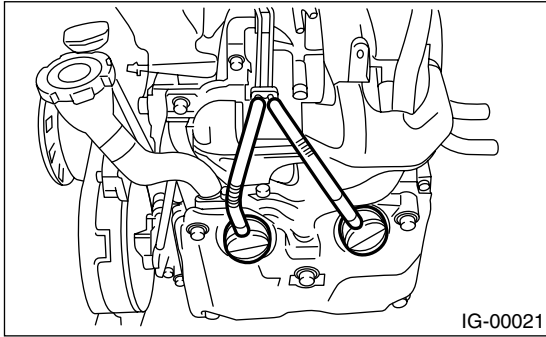
4) Remove the two bolts which hold the washer tank, then take the tank away from working area.



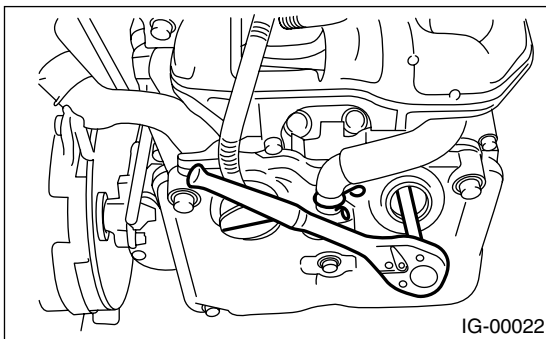
Spark Plug

IGNITION

5) Remove the spark plug cords by pulling the boot, not cord itself.



6) Remove the spark plugs with spark plug sockets.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

NOTE:

- For tightening torque, refer to "COMPONENT". <Ref. to IG(H4SO)-3, COMPONENT, General Description.>
- The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

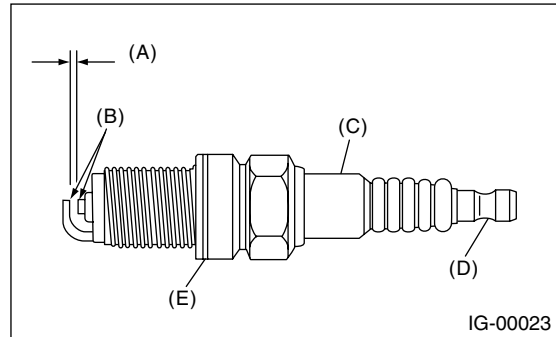
Install in the reverse order of removal.

NOTE:

- For tightening torque, refer to "COMPONENT". <Ref. to IG(H4SO)-3, COMPONENT, General Description.>
- The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

C: INSPECTION

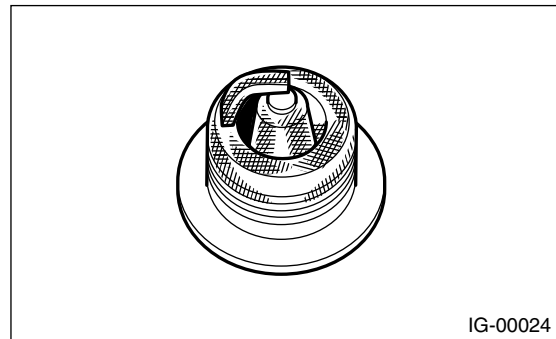
Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.



- (A) Spark plug gap
- (B) Carbon accumulation or wear
- (C) Cracks
- (D) Damage
- (E) Damaged gasket

1) Normal:

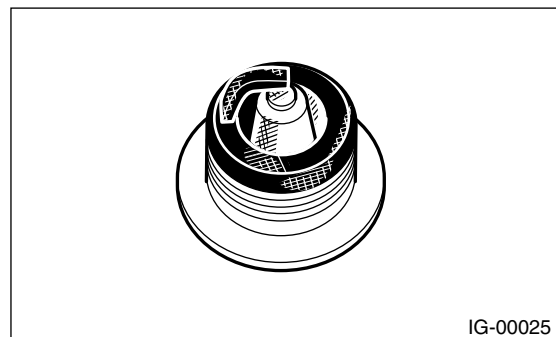
Brown to grayish-tan deposits and slight electrode wear indicates correct spark plug heat range.



2) Carbon fouled:

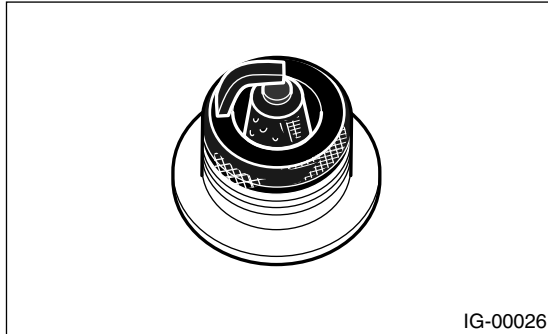
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

It is advisable to replace with plugs having hotter heat range.



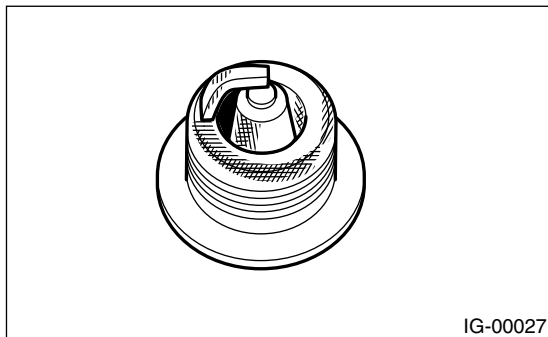
3) Oil fouled:

Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.



4) Overheating:

White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicates engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



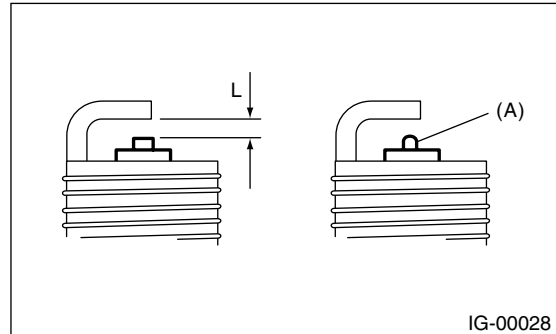
Spark plug gap: L

With catalyst:

1.0 — 1.1 mm (0.039 — 0.043 in)

Without catalyst:

0.7 — 0.8 mm (0.028 — 0.031 in)



NOTE:

Replace with a new spark plug if this area (A) is worn to “ball” shape.

D: CLEANING

Clean the spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove the carbon or oxide deposits, but do not wear away ceramic insulator.

If deposits are too stubborn, replace the plugs.

E: ADJUSTMENT

Correct it if the spark plug gap is measured with a gap gauge, and it is necessary.

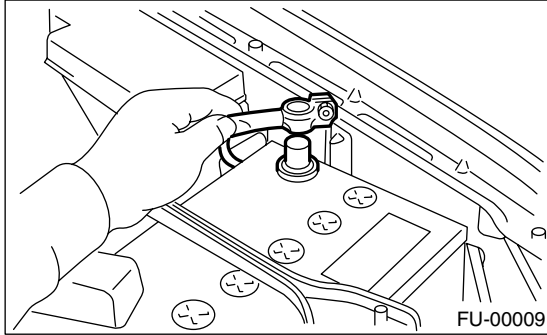
Ignition Coil & Ignitor ASSY

IGNITION

3. Ignition Coil & Ignitor ASSY

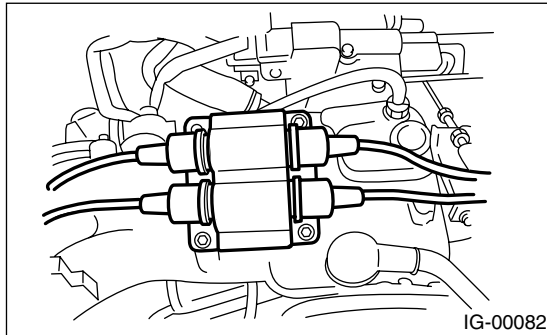
A: REMOVAL

1) Disconnect the ground cable from battery.

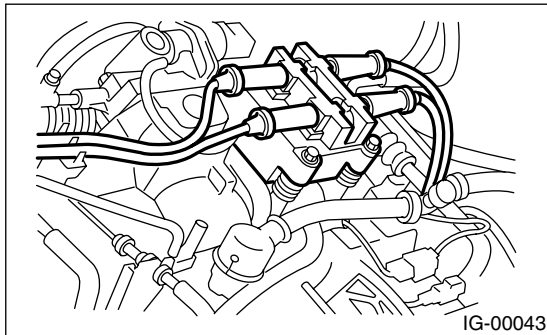


2) Disconnect the spark plug cords from ignition coil and ignitor ASSY.

- 1.6 L MODEL



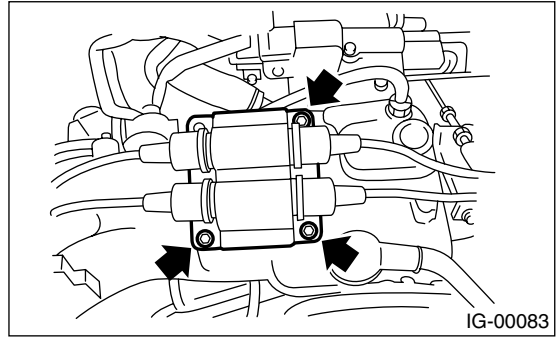
- 2.0 L and 2.5 L MODEL



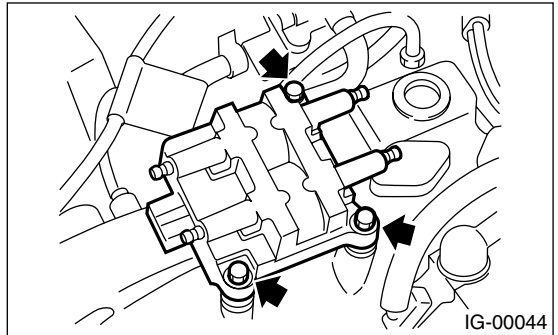
3) Disconnect the connector from ignition coil and ignitor ASSY.

4) Remove the ignition coil and ignitor ASSY.

- 1.6 L MODEL



- 2.0 L and 2.5 L MODEL



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

For tightening torque, refer to "COMPONENT".
<Ref. to IG(H4SO)-3, COMPONENT, General Description.>

CAUTION:

Connect the spark plugs to correct position. Misconnection may damage the unit.

C: INSPECTION

Using the accurate tester, inspect the secondary coil resistance, and replace if defective.

CAUTION:

If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance: (1.6 L model)

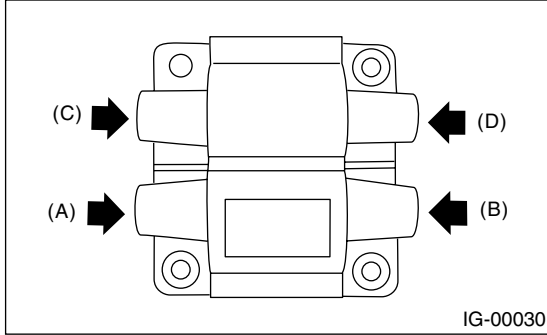
[Secondary side]

Between (A) and (B)

18.0 kΩ±20%

Between (C) and (D)

18.0 kΩ±20%



Specified resistance: (2.0 L and 2.5 L model)

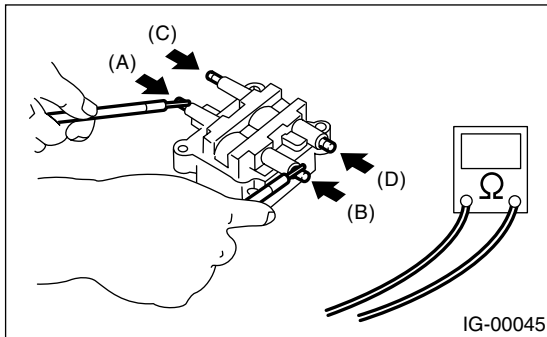
[Secondary side]

Between (A) and (B)

12.8 kΩ±15%

Between (C) and (D)

12.8 kΩ±15%



Insulation between primary terminal and case:
100 MΩ or more.

4. Spark Plug Cord

A: INSPECTION

Check for:

- 1) Damage to cords, deformation, burning or rust formation of terminals
- 2) Resistance values of cords

Resistance value:

#1 cord: 6.1 — 10.5 k Ω

#2 cord: 8.0 — 13.5 k Ω

#3 cord: 6.4 — 11.1 k Ω

#4 cord: 8.3 — 13.9 k Ω

