

## ENGINE

Ignition System [1AR-FE] - Sienna

### IGNITION SYSTEM

#### PARTS LOCATION

#### ILLUSTRATION

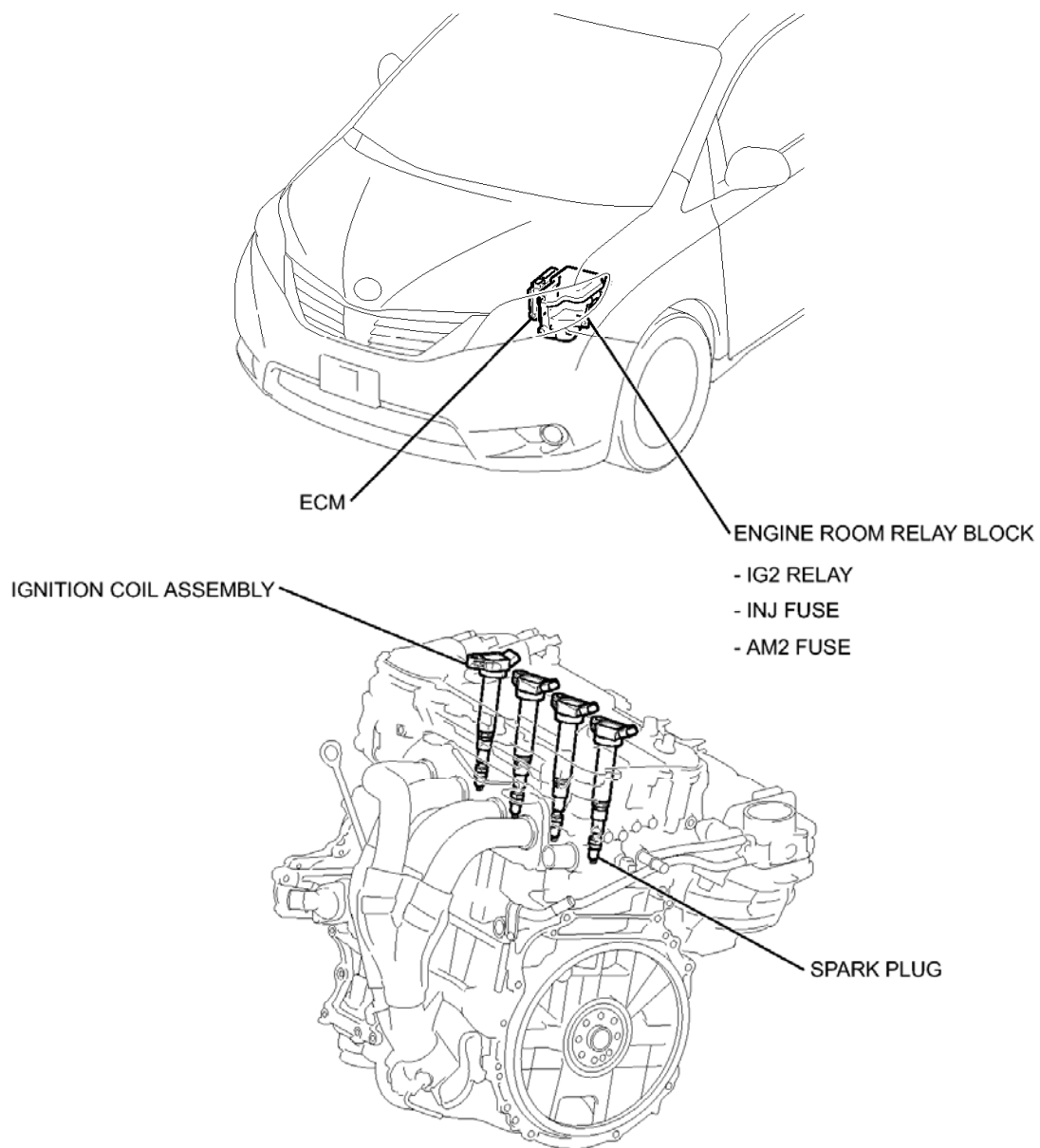
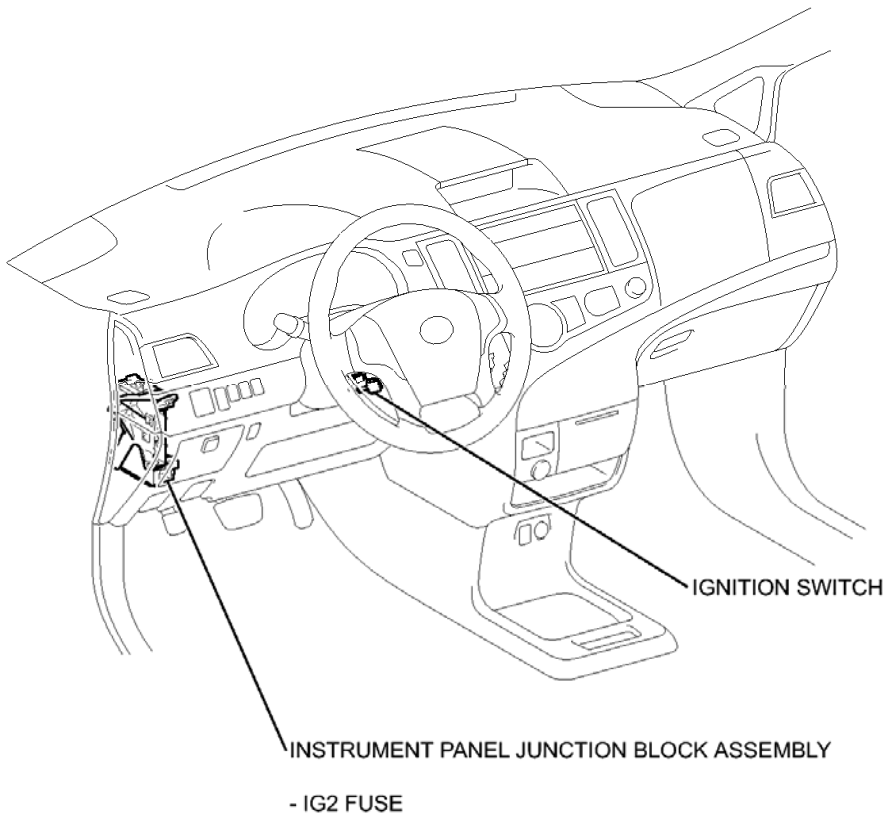


**Fig. 1: Ignition System Components Location (1 of 2)**  
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



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**Fig. 2: Ignition System Components Location (2 of 2)**  
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**SYSTEM DIAGRAM**

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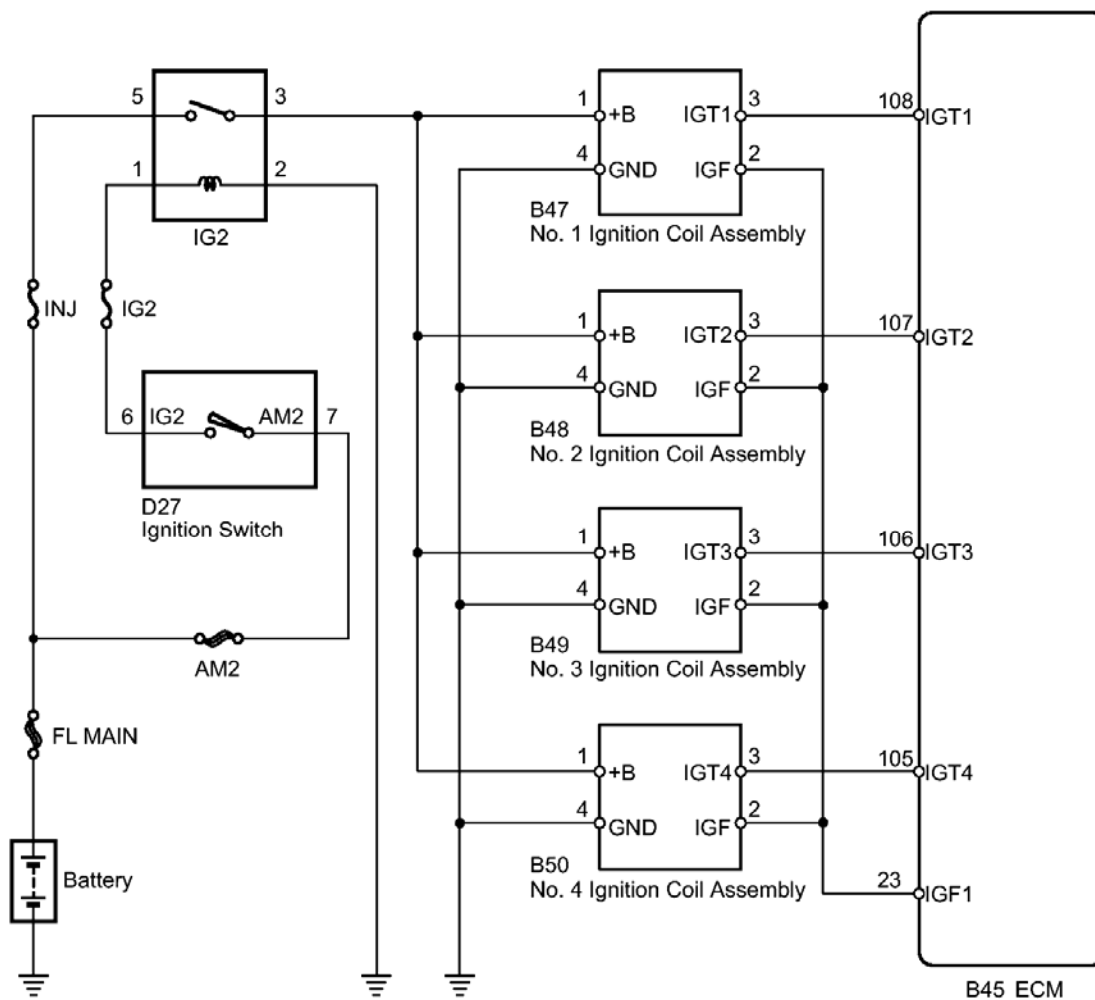


**Fig. 3: Ignition System Diagram**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

## ON-VEHICLE INSPECTION

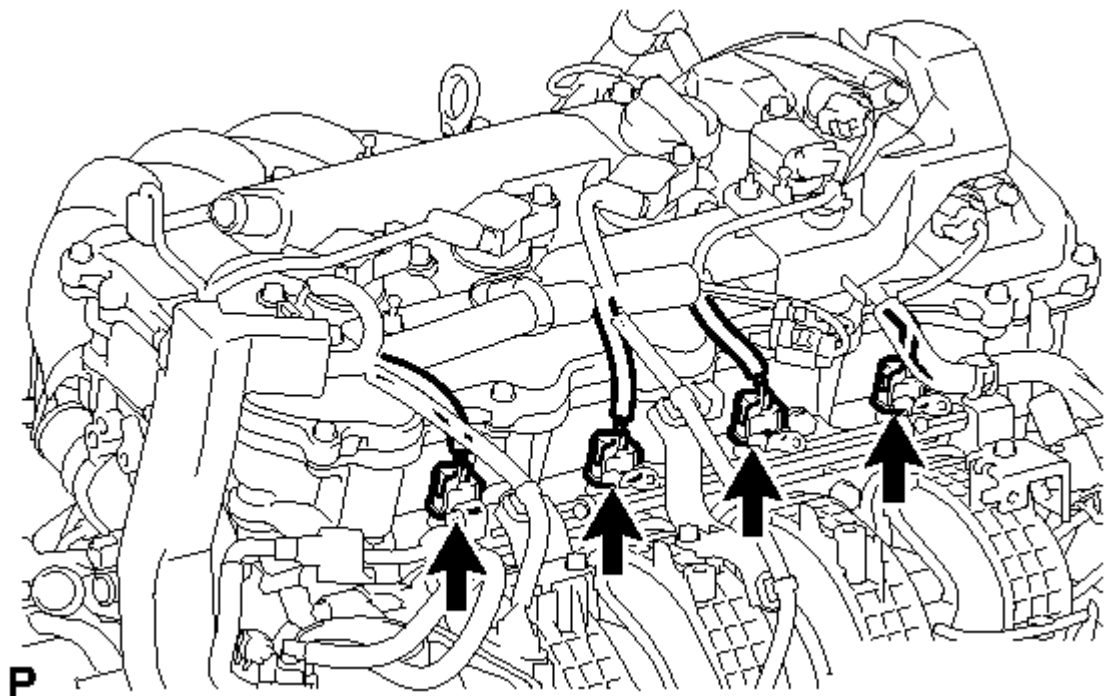
### ON-VEHICLE INSPECTION

#### 1. INSPECT IGNITION COIL ASSEMBLY AND PERFORM SPARK TEST

- Check for DTCs. Refer to **DTC CHECK / CLEAR** .

**NOTE:** If any DTC is output, perform troubleshooting procedures for that DTC.

- Check that spark occurs.
  - Remove the 4 ignition coils and 4 spark plugs. Refer to **REMOVAL** .
  - Disconnect the 4 injector connectors.

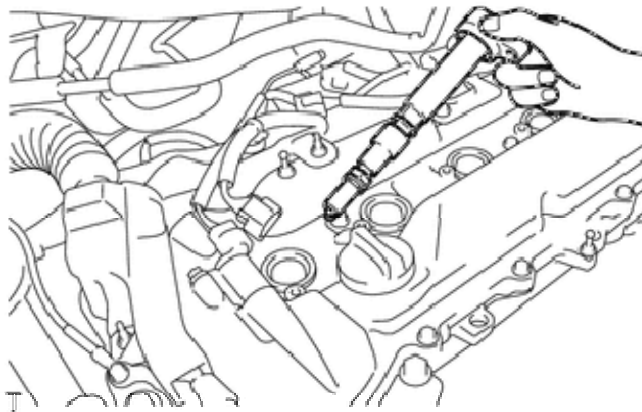


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**Fig. 4: Identifying Injector Connectors**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Install the spark plug into the ignition coil, and then connect the ignition coil connector.
4. Ground the spark plug.



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**Fig. 5: Checking Spark Occurs At Each Spark Plug While Engine Is Being Cranked**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Check that spark occurs at each spark plug while the engine is being cranked.

**NOTE:**

- Be sure to ground the spark plugs when checking them.
- If an ignition coil has been struck or dropped, replace it.
- Do not crank the engine for more than 2 seconds.

If spark does not occur, perform the following procedure.

c. Perform the following spark test procedure.

1. Check that the wire harness side connector of the ignition coil with igniter is securely connected.

**RESULT**

| <b>Result</b> | <b>Proceed to</b> |
|---------------|-------------------|
| NG            | Connect securely  |
| OK            | Go to next step   |

2. Perform a spark test on each ignition coil.
  - a. Replace the ignition coil with a known good one.
  - b. Perform the spark test again.

**RESULT**

| <b>Result</b> | <b>Proceed to</b>     |
|---------------|-----------------------|
| NG            | Go to next step       |
| OK            | Replace ignition coil |

3. Perform a spark test on each spark plug.
  - a. Replace the spark plug with a known good one.
  - b. Perform the spark test again.

**RESULT**

| <b>Result</b> | <b>Proceed to</b>  |
|---------------|--------------------|
| NG            | Go to next step    |
| OK            | Replace spark plug |

4. Check that power is supplied to the ignition coil.

\*a

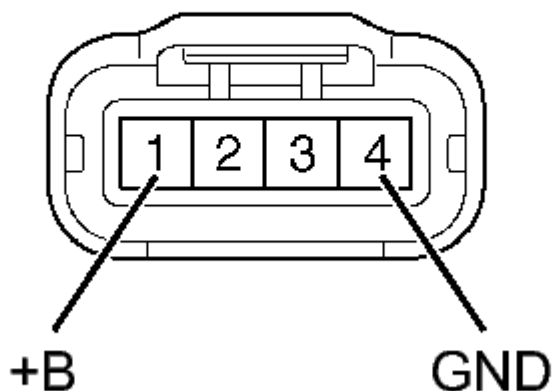


**Fig. 6: Identifying Ignition Coil +B & Ground On Wire Harness Connector**  
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**TEXT IN ILLUSTRATION**

|                                                                                          |
|------------------------------------------------------------------------------------------|
| Front<br>view of<br>wire<br>harness<br>connector<br>(to<br>Ignition<br>Coil<br>Assembly) |
|------------------------------------------------------------------------------------------|

- Disconnect the ignition coil connector.
- Turn the ignition switch to ON.
- Measure the voltage according to the value(s) in the table below.

Standard Voltage

| Tester<br>Connection | Switch<br>Condition      | Specified<br>Condition |
|----------------------|--------------------------|------------------------|
| 1 (+B) - 4<br>(GND)  | Ignition<br>switch<br>ON | 11 to 14 V             |

## RESULT

| Result | Proceed to                                                                                   |
|--------|----------------------------------------------------------------------------------------------|
| NG     | Check wiring between ignition switch and ignition coil with igniter and check ground circuit |
| OK     | Replace the ECM. Refer to <b><u>REMOVAL</u></b>                                              |

5. Connect the 4 fuel injector connectors.
6. Install the 4 spark plugs and 4 ignition coils. Refer to **INSTALLATION** .
7. Clear the DTCs. Refer to **DTC CHECK / CLEAR** .
8. Check for DTCs. Refer to **DTC CHECK / CLEAR** .

### HINT:

Reinstall the sensors, connectors, etc. and restore the previous vehicle conditions before rechecking for DTCs.

## 2. INSPECT SPARK PLUG

### NOTE:

- Do not use a wire brush for cleaning.
- Do not attempt to adjust the electrode gap of a used spark plug.

- a. Check the electrode using a megohmmeter:

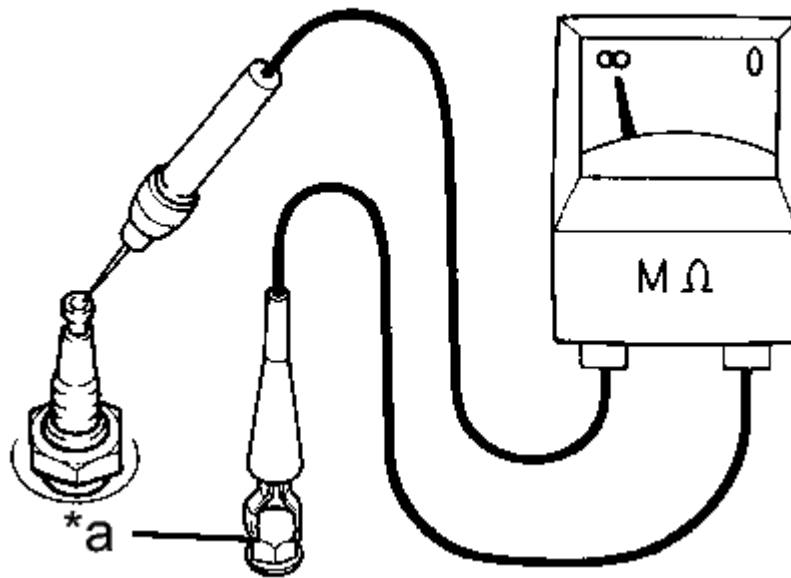


**Fig. 7: Inspecting Spark Plug**  
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**TEXT IN ILLUSTRATION**

\*a Ground

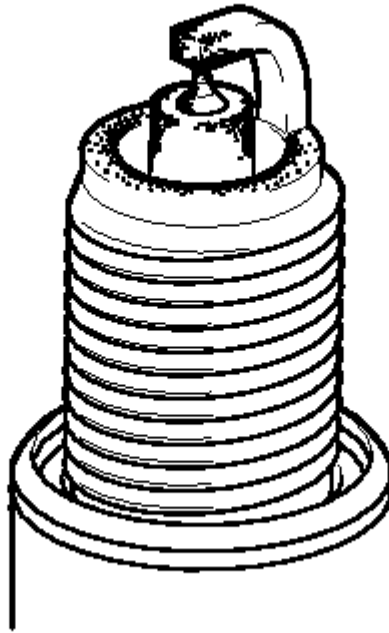
1. Using a megohmmeter, measure the insulation resistance.

Standard Insulation Resistance

| Tester Connection                        | Condition | Specified Condition |
|------------------------------------------|-----------|---------------------|
| Spark plug (terminal part) - Body ground | Always    | 10 Mohms or higher  |

**HINT:**

- If the result is not as specified, clean the spark plug with a spark plug cleaner and measure the resistance again.
  - If a megohmmeter is not available, perform the following simple inspection instead.
- b. Alternative inspection method:
1. Quickly accelerate the engine to 4000 RPM 5 times.
  2. Remove the spark plug.
  3. Visually check the spark plug.



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**Fig. 8: Identifying Spark Plug Condition**

**Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**

If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

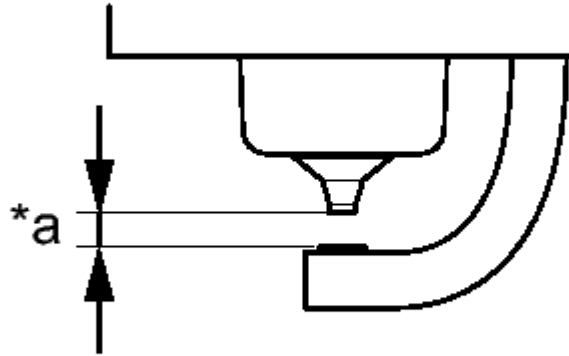
- c. Check the spark plug for any damage to its thread and insulator.

If there is any damage, replace the spark plug.

Recommended Spark Plug

| Manufacturer | Spark Plug Type |
|--------------|-----------------|
| DENSO        | SK16HR11        |

- d. Reference:
  - 1. Check the spark plug electrode gap.



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**Fig. 9: Inspecting Spark Plug Electrode Gap**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**TEXT IN ILLUSTRATION**

|    |                  |
|----|------------------|
| *a | Electrode<br>gap |
|----|------------------|

Maximum Electrode Gap for a Used Spark Plug

1.3 mm (0.0512 in.)

If the gap is more than the maximum, replace the spark plug.

**NOTE:**        **Never attempt to adjust the gap of a used plug.**

Electrode Gap for a New Spark Plug

1.0 to 1.1 mm (0.0394 to 0.0433 in.)

- e. Clean the spark plugs.

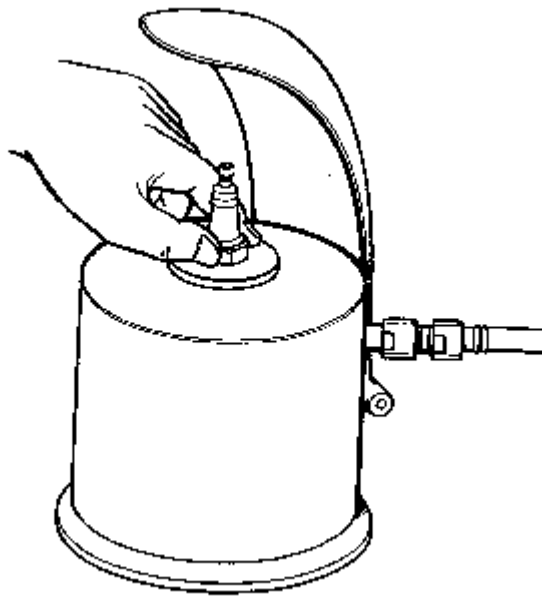


**Fig. 10: Cleaning Electrode With Spark Plug Cleaner**  
**Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**

If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.

Standard air pressure

588 kPa (6 kgf/cm<sup>2</sup> , 85 psi)

Standard duration

20 seconds or less

**HINT:**

Only use a spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.