

# ENGINE

## ON-VEHICLE INSPECTION

1. **INSPECT ENGINE COOLANT**
2. **INSPECT ENGINE OIL**
3. **INSPECT BATTERY**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
  - (a) Remove the air cleaner cap.
  - (b) Remove the air filter element.
  - (c) Visually check that the air filter is not excessively damaged or oily.  
If necessary, replace the air filter.

### 5. **INSPECT SPARK PLUG**

### 6. **INSPECT FAN AND GENERATOR V BELT**

#### HINT:

You do not need to check the belt deflection because the auto tensioner has been adopted.

### 7. **INSPECT IGNITION TIMING**

#### NOTICE:

- Turn all the electrical systems and the A/C OFF.
- Inspect the ignition timing with the cooling fan OFF.
- When checking the ignition timing, shift the transmission to the neutral position.

(a) Warm up and stop the engine.

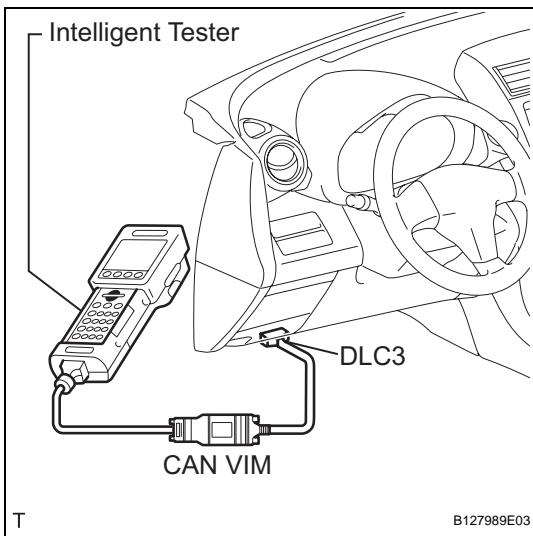
(b) When using intelligent tester:

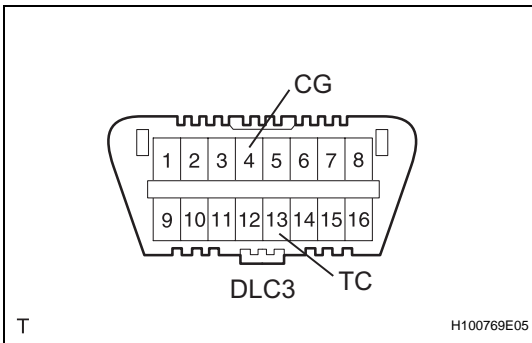
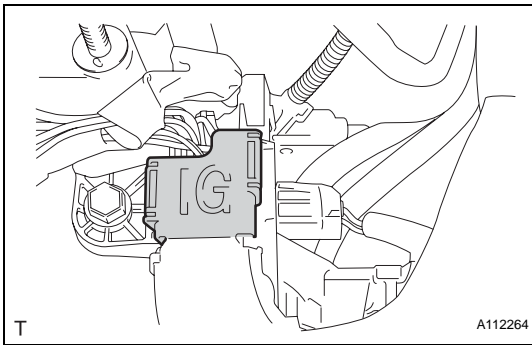
- (1) Connect the intelligent tester to the DLC3.
- (2) Allow the engine to idle.
- (3) Select the following menu items:  
DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / IGN ADVANCE.
- (4) Read IGN ADVANCE to check the ignition timing.

#### Standard ignition timing:

**5 to 15° BTDC @ idle**

- (5) Check that the ignition timing advances immediately when the engine speed is increased.
  - (6) Turn the ignition switch OFF.
  - (7) Disconnect the intelligent tester from the DLC3.
- (c) When not using intelligent tester:
- (1) Remove the No. 1 engine cover (see page [EM-22](#)).





- (2) Open the ignition cover located to the right of the No. 4 ignition coil.
- (3) Pull out the wire harness from the IG cover.
- (4) Connect a timing light to the wire harness.

**NOTICE:**

**Use a timing light that detects the first signal.**

- (5) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

**SST 09843-18040**

- (6) Allow the engine to idle and check the ignition timing.

**Standard ignition timing:**

**8 to 12° BTDC @ idle**

**HINT:**

Run the engine at 1,000 to 1,300 rpm for 5 seconds, then check that the engine speed returns to the idling speed.

- (7) Remove SST from the DLC3.
- (8) Allow the engine to idle and check the ignition timing.

**Standard ignition timing:**

**5 to 15° BTDC**

- (9) Check that the ignition timing advances immediately when the engine speed is increased.

- (10) Turn the ignition switch OFF.

- (11) Remove the timing light.

- (12) Close the IG cover.

- (13) Install the No. 1 engine cover (see page [EM-43](#)).

**8. INSPECT ENGINE IDLE SPEED**

- (a) When using intelligent tester:

- (1) Turn OFF all the accessories and air conditioning.

- (2) Move the shift lever to P or neutral.

- (3) Connect the intelligent tester to the DLC3.

- (4) Warm up the engine.

- (5) Select the tester menus:

DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.

- (6) Read ENGINE SPEED to check the idle speed while the radiator-cooling fan is not rotating.

**Standard idle speed:**

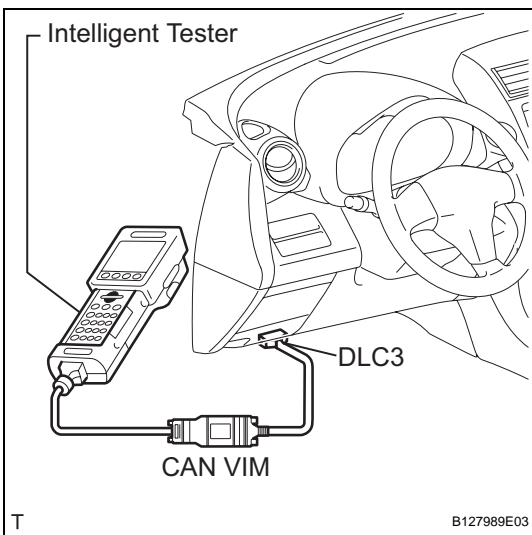
**600 to 700 rpm**

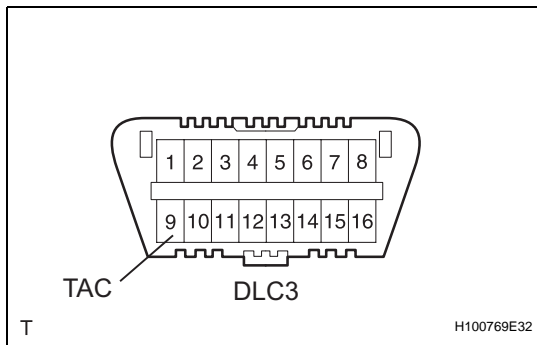
- (7) Turn the ignition switch OFF.

- (8) Disconnect the tester from the DLC3.

- (b) When not using intelligent tester:

- (1) Turn OFF all the accessories and air conditioning.





- (2) Move the shift lever to P or neutral.
- (3) Connect SST to 9 (TAC) of the DLC3 terminal, and then connect a tachometer to SST.  
**SST 09843-18030**
- (4) Warm up the engine.
- (5) Check the idle speed while the radiator-cooling fan is not rotating.  
**Standard idle speed:**  
**600 to 700 rpm**
- (6) Turn the ignition switch OFF.
- (7) Remove the tachometer and disconnect SST from the DLC3.

## 9. INSPECT COMPRESSION

- (a) Warm up and stop the engine.
- (b) Remove the No. 1 engine under cover.
- (c) Remove the 4 ignition coils (see page IG-9).
- (d) Remove the 4 spark plugs.
- (e) Disconnect the 4 fuel injector connectors.
- (f) Set SST and a compression gauge.  
**SST 09992-00500**
- (g) Insert the compression gauge into the spark plug hole.
- (h) While cranking the engine, measure the compression pressure.

**Standard compression pressure:**

**1,300 kPa (13.8 kgf/cm<sup>2</sup>, 196 psi)**

**Minimum pressure:**

**1,000 kPa (10 kgf/cm<sup>2</sup>, 142 psi)**

**Standard difference between each cylinder:**

**100 kPa (1.0 kgf/cm<sup>2</sup>, 14 psi)**

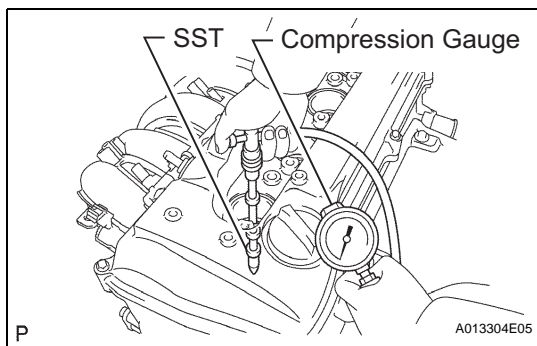
**NOTICE:**

- Always use a fully charged battery to obtain an engine speed of 250 rpm or more.
- Check the other cylinders' compression pressures in the same way.
- This measurement must be done as quickly as possible.

If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.

**HINT:**

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
  - If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.
- (i) Connect the 4 fuel injector connectors.
  - (j) Install the 4 spark plugs.  
**Torque: 25 N\*m (255 kgf\*cm, 18 ft.\*lbf)**
  - (k) Install the 4 ignition coils (see page IG-9).
  - (l) Install the No. 1 engine under cover.



**10. INSPECT CO/HC****HINT:**

The ECM properly controls the CO/HC concentration in the emission gas.

- (a) Start and warm up the engine.
- (b) Run the engine at 2,500 rpm for approximately 180 seconds.
- (c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe while idling.
- (d) Inspect the CO/HC concentration while idling and/or at 2,500 rpm.

If the CO/HC concentration is not as specified, perform troubleshooting.

**HINT:**

See the table below for possible causes, and then inspect and repair the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignition: <ul style="list-style-type: none"> <li>- Incorrect timing</li> <li>- Plugs are contaminated, shorted, or gaps are defective</li> </ul> 2. Incorrect valve clearance 3. Leaks in intake and exhaust valve 4. Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leakage: <ul style="list-style-type: none"> <li>- Ventilation hoses</li> <li>- Intake manifold</li> <li>- Throttle body</li> <li>- Brake booster line</li> </ul> 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: <ul style="list-style-type: none"> <li>- Faulty pressure regulator</li> <li>- Faulty engine coolant temperature sensor</li> <li>- Faulty mass air flow meter</li> <li>- Faulty ECM</li> <li>- Faulty injectors</li> <li>- Faulty throttle body</li> </ul>