

# ENGINE ASSEMBLY (1AZ-FE)

## INSPECTION

1. INSPECT COOLANT (See page 16-6)
2. INSPECT ENGINE OIL
3. INSPECT BATTERY

Standard specific gravity: 1.25 – 1.29 at 20°C (68°F)

4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY
5. INSPECT IGNITION COIL ASSY  
(See page 18-1)
6. INSPECT V-RIBBED BELT

### 7. INSPECT IGNITION TIMING

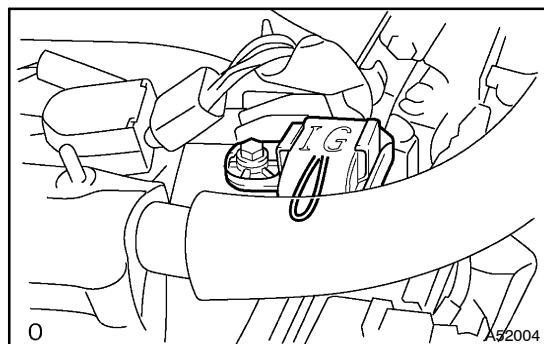
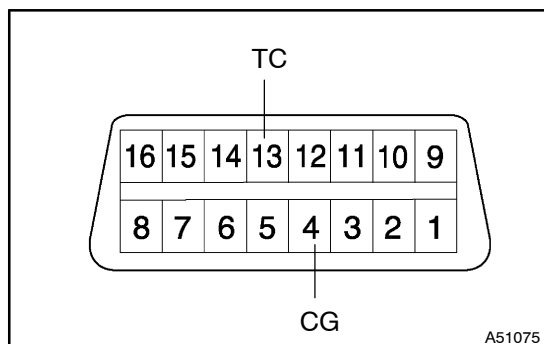
- (a) Warm up engine.
- (b) When using hand-held tester.
  - (1) Connect the hand-held tester to the DLC3.

Ignition timing:  $3 \pm 12^\circ$  BTDC

#### HINT:

Please refer to the hand-held tester operator's manual for further details.

- (c) When not using hand-held tester.



- (1) Using SST, connect terminals 3 (TC) and 4 (CG) of DLC3.

SST 09843-18040, 09843-18020

#### NOTICE:

- Be sure not to connect incorrectly. It causes breakage of the engine.
- Turn OFF all electrical systems.
- Operate the inspection when the cooling fan motor is turned OFF.

- (2) Remove the cylinder head cover No. 2.
- (3) Pull out the wire harness as shown in the illustration. Connect the clip of the timing light to the engine.

#### NOTICE:

- Use a timing light which can detect the first signal.
- After checking, be sure to tape the wire harness.

- (4) Inspect ignition timing at idle.

Ignition timing:  $3 \pm 12^\circ$  BTDC

#### NOTICE:

When checking the ignition timing, the transmission is at neutral position.

#### HINT:

After engine rpm is kept at 1,000 – 1,300 r/min. for 5 seconds, check that it returns idle speed.

- (5) Disconnect terminals 13 (TC) and 4 (CG) of DLC3.
- (6) Inspect ignition timing at idle.

**Ignition timing: 5 – 15° BTDC**

- (7) Confirm that ignition timing moves to advanced angle side when the engine rpm is increased.
- (8) Remove the timing light.

**8. INSPECT ENGINE IDLE SPEED**

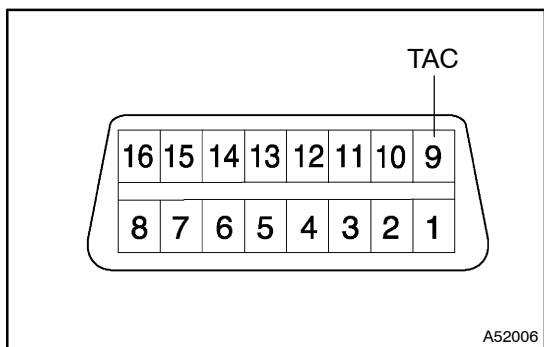
- (a) Warm up engine.
- (b) When using hand-held tester.
  - (1) Connect the hand-held tester to the DLC3.

**Idle speed: 650 – 750 r/min****NOTICE:**

- **Check idle speed with cooling fan OFF.**
- **Switch off all accessories and air conditioning.**

**HINT:**

Please refer to the hand-held tester operator's manual for further details.



- (c) When not using hand-held tester.
  - (1) Using SST, connect tachometer test probe to terminal 9 (TAC) of DLC3.

SST 09843-18040

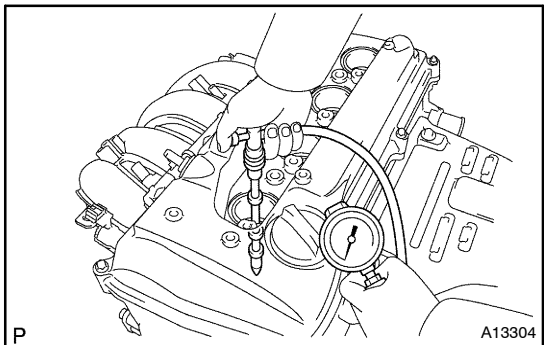
- (2) Check the idle speed.

**Idle speed: 650 – 750 r/min****9. INSPECT COMPRESSION**

- (a) Warm up and stop engine.
- (b) Disconnect the injector connectors.
- (c) Remove ignition coil.
- (d) Remove spark plugs.
- (e) Inspect cylinder compression pressure.

SST 09992-00500

- (1) Insert a compression gauge into the spark plug hole.
- (2) Fully open the throttle.



- (3) While cranking the engine, measure the compression pressure.

**Compression pressure:**

**1270 MPa (13 kgf/cm<sup>2</sup>, 184 psi)**

**Minimum pressure:**

**1 MPa (10 kgf/cm<sup>2</sup>, 145 psi)**

**Difference between each cylinder:**

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

**NOTICE:**

- **Always use a fully charged battery to obtain engine speed of 250 rpm or more.**
- **Check other cylinder's compression pressure in the same way.**
- **This measurement must be done in as short a time as possible.**

- (4) 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, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating improperly, or there may be leakage past the gasket.

## **10. INSPECT CO/HC**

- (a) Start the engine.
- (b) Race engine at 2,500 rpm for approx. 180 seconds.
- (c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
- (d) Immediately check CO/HC concentration at idle and/or 2,500 r/min.

**HINT:**

- Complete the measuring within 3 minutes.
- When doing the 2 mode (idle and 2,500 r/min.) test, these measuring orders are prescribed by the applicable local regulations.

(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.

(1) Check heated oxygen sensor operation. (See page 2-1)

(2) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

| CO     | HC   | Problems                                 | Causes  |
|--------|------|--|---|
| Normal | High | Rough idle                               | 1. Faulty ignitions: <ul style="list-style-type: none"> <li>• Incorrect timing</li> <li>• Fouled, shorted or improperly gapped plugs</li> </ul> 2. Incorrect valve clearance<br>3. Leaky intake and exhaust valves<br>4. Leaky cylinders  |
| Low    | High | Rough idle<br>(Fluctuating HC reading)   | 1. Vacuum leaks: <ul style="list-style-type: none"> <li>• PCV hoses</li> <li>• Intake manifold</li> <li>• Throttle body</li> <li>• ISC valve</li> <li>• Brake booster line</li> </ul> 2. Lean mixture causing misfire   |
| High   | High | Rough idle<br>(Black smoke from exhaust) | 1. Restricted air filter<br>2. Plugged PCV valve<br>3. Faulty EFI systems: <ul style="list-style-type: none"> <li>• Faulty pressure regulator</li> <li>• Defective water temperature sensor</li> <li>• DEFECTIVE Air-flow meter</li> <li>• Faulty ECU</li> <li>• Faulty injectors</li> <li>• Faulty throttle position sensor</li> </ul> |