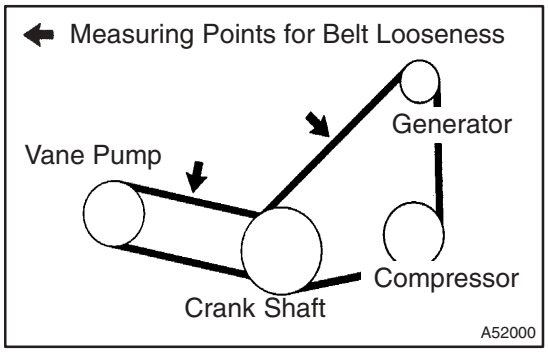
ENGINE (1MZ–FE/3MZ–FE)

141DH–01

INSPECTION

1. **INSPECT COOLANT (See page 16–1)**
2. **INSPECT ENGINE OIL**
3. **INSPECT BATTERY**
   Standard specific gravity: 1.25 to 1.29 at 20°C (68°F)
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB–ASSY**
5. **INSPECT SPARK PLUG (See page 18–3)**



6. **INSPECT V–RIBBED BELT**

(a) Belt deflection:

Pressing force: 98 N (10 kgf, 22 lbf)

	New belt mm (in.)	Used belt mm (in.)
V ribbed belt (For fan and generator)	9.1 to 10.5 (0.358 to 0.413)	11.0 to 13.5 (0.433 to 0.531)
V ribbed belt (for vane pump)	7 to 9 (0.276 to 0.354)	10 to 12 (0.394 to 0.472)

(b) Tension:

	New belt N (kg , lb)	Used belt N (kg , lb)
V ribbed belt (for fan and generator)	617 to 853 (63 to 87 , 139 to 192)	294 to 490 (30 to 50 , 66 to 110)
V ribbed belt (for vane pump)	686 to 784 (70 to 80 , 154 to 176)	343 to 490 (35 to 50 , 77 to 110)

NOTICE:

- **Check the drive belt deflection at the specified point.**
- **When installing a new belt, set its tension value as specified.**
- **When inspecting a belt which is used for over 5 minutes, apply the specification of "Used belt".**
- **When reinstalling a belt which is used for over 5 minutes, adjust its belt deflection and tension to the medium value in each specification of "Used belt".**
- **V–ribbed belt tension and deflection value should be checked after 2 revolutions of engine cranking.**
- **When using a belt tension gauge, confirm the accuracy first by using a master gauge.**

7. **INSPECT IGNITION TIMING**

(a) Warm up engine.

(b) When using hand–held tester.

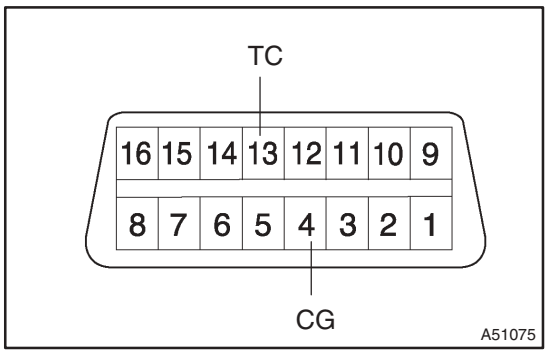
(1) Connect the hand–held tester to the DLC3.

(2) Enter DATA LIST MODE on the hand–held tester.

Ignition timing : 8 to 12° BTDC

HINT:

Please refer to the hand–held tester operator's manual if you need help to select DATA LIST.

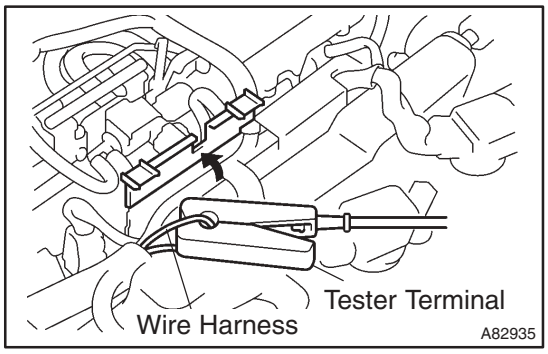


(c) When not using hand–held tester:
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of DLC3.
SST 09843–18040

NOTICE:

- **Make sure of the terminal numbers before connecting them. Connection with a wrong terminal can damage the engine.**
- **Turn OFF all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned OFF.**

(2) Remove the V–bank cover.



(3) Pull out the black–colored wire harness as shown in the illustration.
(4) Connect the tester terminal of the timing light to the engine.

NOTICE:

Use a timing light which detects the first signal.

(5) Inspect ignition timing at idle.
Ignition timing : 8 to 12° BTDC

NOTICE:

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

HINT:

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

(6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(7) Inspect ignition timing at idle.
Ignition timing : 7 to 24° BTDC
(8) Confirm that the ignition timing advances when the engine rpm is increased.
(9) Remove the timing light.

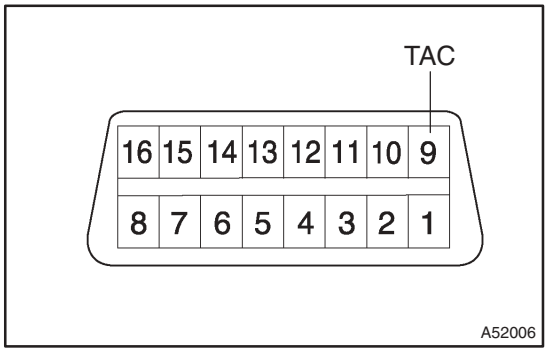
8. INSPECT ENGINE IDLE SPEED

(a) Warm up the engine.
(b) When using hand–held tester:
(1) Connect the hand–held tester to the DLC3.
(2) Enter DATA LIST MODE on the hand–held tester.
Idle speed: 650 to 750 rpm.

NOTICE:

- **When checking the idle speed, the transmission is in the neutral position.**
- **Check the idle speed with the cooling fan OFF.**
- **Switch off all accessories and air conditioning before connecting the hand–held tester.**

HINT:
Please refer to the hand–held tester operator's manual for further details.

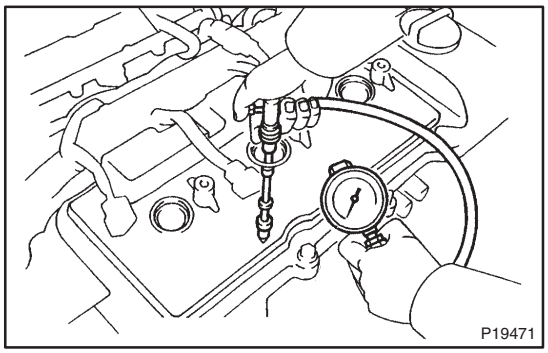


(c) When not using hand–held tester:
(1) Using SST, connect the tachometer test prove to terminal 9 (TAC) of DLC3.
SST 09843–18040
(2) Check the idle speed.
Idle speed: 650 to 750 rpm.

NOTICE:
- **When checking the idle speed, the transmission is in the neutral position.**
- **Check the idle speed with the cooling fan OFF.**
- **Switch off all accessories and air conditioning before connecting the hand–held tester.**

9. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the intake air surge tank. (See page 14–7)
(d) Remove the ignition coil.
(e) Remove the spark plugs.



(f) 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:
1.5 MPa (15.3 kgf/cm^2, 218 psi)
Minimum pressure:
1.0 MPa (10.2 kgf/cm^2, 145 psi)
Difference between each cylinder:
100 kPa (1.0 kgf/cm^2, 15 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, the piston rings and/or cylinder bore may be 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) Run the engine at 2,500 rpm for approximately 180 seconds.
(c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
(d) Check CO/HC concentration .

If the CO/HC concentration does not conform to specifications, perform trouble shooting in the order given below.

(1) Check heated oxygen sensor operation. (See page 12–5)
(2) 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 ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaks in intake and exhaust valves 4. Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty EFI systems: • Faulty pressure regulator • Defective engine coolant temperature sensor • Defective mass air–flow meter • Faulty ECM • Faulty injectors • Faulty throttle position sensor