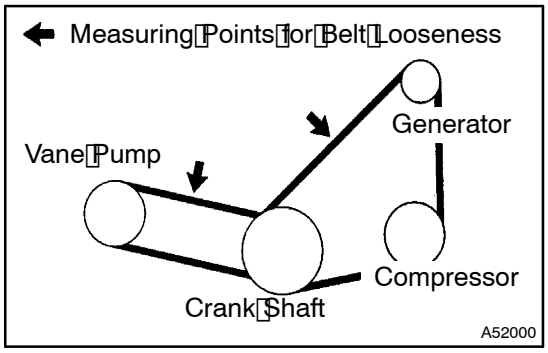
ENGINE (3MZ–FE)

141RI–01

INSPECTION

1. INSPECT ENGINE COOLANT (See page 16–1)
2. INSPECT ENGINE OIL
3. INSPECT BATTERY (See page 19–6)
4. INSPECT AIR CLEANER FILTER ELEMENT SUB–ASSY
5. INSPECT SPARK PLUG (See page 18–3)



6. INSPECT V–RIBBED BELT

(a) Check the drive belt deflection by pressing on the belt at the points indicated by the arrow marks in the illustration with 98 N·m (10 kgf·cm, 22 ft·lbf).

Deflection:

Item	Specified Condition
V–ribbed belt (for fan and generator) New belt	9.1 to 10.5 mm (0.358 to 0.413 in.)
V–ribbed belt (for fan and generator) Used belt	11 to 13.5 mm (0.433 to 0.531 in.)
V–ribbed belt (for vane pump) New belt	8 to 10 mm (0.315 to 0.394 in.)
V–ribbed belt (for vane pump) Used belt	11 to 14 mm (0.433 to 0.551 in.)

If the belt deflection is not as specified, adjust it.

(b) Reference:

Using a tension gauge, check the drive belt tension.

Tension:

Item	Specified Condition
V–ribbed belt (for fan and generator) New belt	637 to 735 N·m (65 to 75 kgf·cm, 143 to 165 ft·lbf)
V–ribbed belt (for fan and generator) Used belt	392 to 588 N·m (40 to 60 kgf·cm, 88 to 132 ft·lbf)
V–ribbed belt (for vane pump) New belt	588 to 686 N·m (60 to 70 kgf·cm, 132 to 154 ft·lbf)
V–ribbed belt (for vane pump) Used belt	245 to 392 N·m (25 to 40 kgf·cm, 55 to 88 ft·lbf)

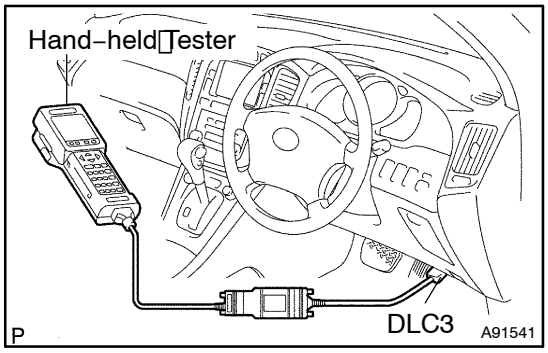
If the belt tension is not as specified, adjust it.

HINT:

- After installing the drive belt, check that it fits properly in the ribbed grooves. Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the crank pulley.
- ”New belt” is a belt which has been used for less than 5 minutes on a running engine.
- ”Used belt” is a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.

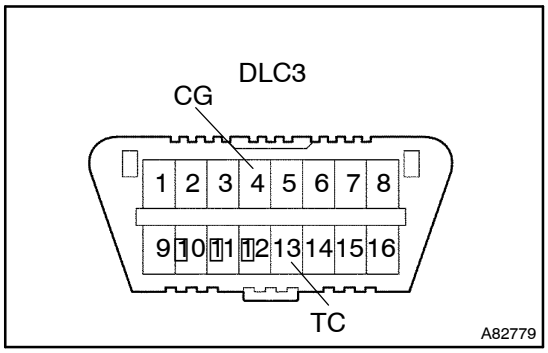
7. INSPECT IGNITION TIMING

(a) Warm up the engine.



(b) When using the hand–held tester:
Check the ignition timing.
(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 @ idle

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

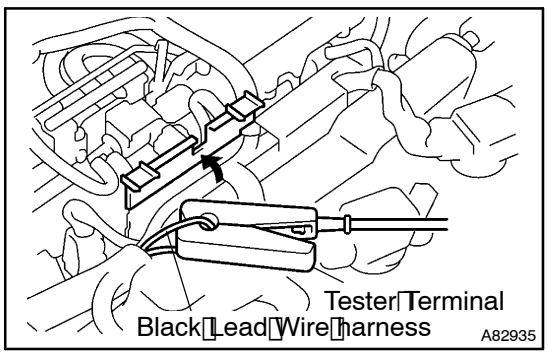


(c) When not using the hand–held tester:
Check the ignition timing.
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843–18040

NOTICE:

- **Confirm 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 (see page 14–24).



(3) Pull out the black lead 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 can detect the first signal.

(5) Check the ignition timing at idle.
Ignition timing: 8 to 12° BTDC @ idle

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

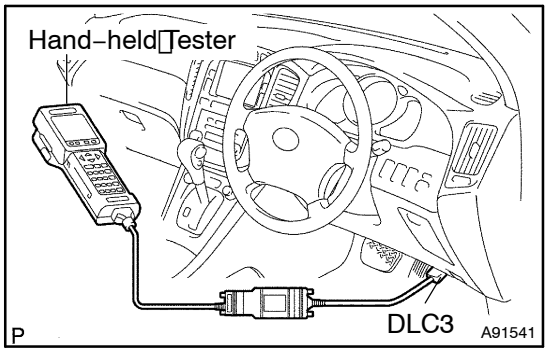
NOTICE:
When checking the ignition timing, the transmission should be in the neutral position.

(6) Remove SST from the DLC3.
(7) Check the ignition timing at idle.
Ignition timing: 7 to 24° BTDC @ idle
(8) Confirm that the ignition timing moves to the advanced angle side when the engine rpm is increased.

(9) Remove the timing light.

8. INSPECT ENGINE IDLE SPEED

(a) Warm up the engine.

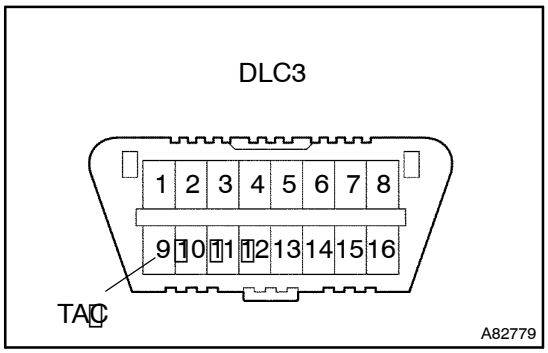


(b) When using the hand–held tester:
Check the idle speed.
(1) Connect the hand–held tester to the DLC3.
(2) Enter DATA LIST mode on the hand–held tester.
Idle speed: 650 to 750 rpm

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

NOTICE:

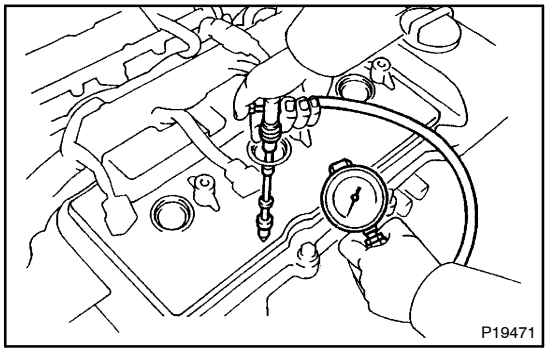
- **When checking the idle speed, the transmission should be in the neutral position.**
- **Check the idle speed with the cooling fan off.**
- **Switch off all accessories and air conditioning before connecting the hand–held tester.**



(c) When not using the hand–held tester:
Check the idle speed.
(1) Using SST, connect tachometer tester probe to terminal 9 (TAC) of the DLC3.
SST 09843–18030
(2) Check the idle speed.
Idle speed: 650 to 750 rpm

9. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the intake air surge tank (see page 14–24).
(d) Remove the 6 ignition coils.
(e) Remove the 6 spark plugs.



(f) Check the 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 as quickly 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 stuck or seated improperly, or there may be leakage in the gasket.

10. INSPECT CO/HC

HINT:

This check is used only to determine whether or not the idle CO/HC complies with specifications.

(a) Start the engine.

(b) Rev 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 the tailpipe during idling.

(d) Check CO/HC concentration at idle.

Idle CO concentration: 0.5 % or less

Idle HC concentration: Applicable local regulation

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

(1) Check A/F sensor operation.

(2) See the table below for possible causes, and then inspect and repair.

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 SFI system: • Faulty fuel pressure regulator • Defective ECT sensor • Defective MAF meter • Faulty ECM • Faulty injectors • Faulty throttle position sensor