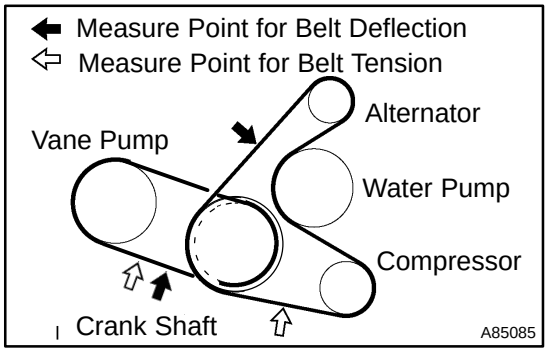
ENGINE

141FM–01

INSPECTION

1. **INSPECT ENGINE COOLANT (See page 16–1)**
2. **INSPECT ENGINE OIL (See page 17–1)**
3. **INSPECT BATTERY (See page 19–13)**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB–ASSY**
5. **INSPECT SPARK PLUG (See page 18–3)**



6. INSPECT V–RIBBED BELT

(a) Check the V–ribbed belt deflection.

(1) Measure the belt deflection.

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

	New belt mm (in.)	Used belt mm (in.)
V–ribbed belt (For fan and Generator)	7.0 to 8.5 (0.28 to 0.33)	11.0 to 13.0 (0.43 to 0.51)
V–ribbed belt (for vane pump)	8.0 to 10.0 (0.31 to 0.39)	11.0 to 13.0 (0.43 to 0.51)

(2) Tension

	New belt N (kg, lb)	Used belt N (kg, lb)
V–ribbed belt (for fan and Generator)	490 to 690 (50 to 70, 110 to 155)	340 to 440 (35 to 45, 76 to 99)
V–ribbed belt (for vane pump)	445 to 667 (45 to 68, 100 to 150)	267 to 445 (27 to 45, 60 to 100)

NOTICE:

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

7. INSPECT IGNITION TIMING

(a) Warm up the engine.

(b) When using the hand–held tester or OBDII scan tool.

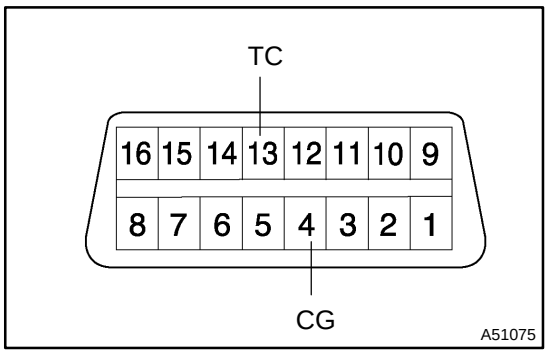
(1) Connect the hand–held tester or OBDII scan tool to the DLC3.

(2) Enter DATA LIST MODE on the hand–held tester or OBDII scan tool.

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.

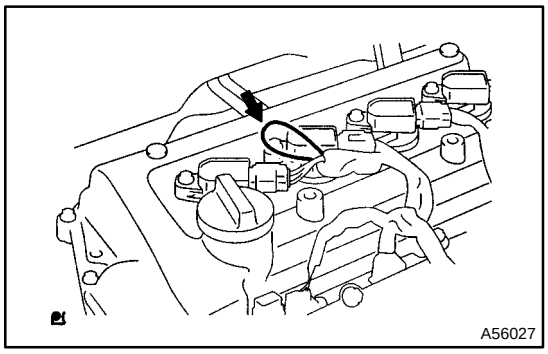


(c) When not using the hand–held tester or OBDII scan tool:
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of DLC3.
SST 09843–18040

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 cylinder head cover No. 2.



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

NOTICE:

- **Use a timing light which detects the first signal.**
- **After checking, be sure to wrap the wire harness with tape.**

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

NOTICE:

When checking the ignition timing, shift the transmission to the neutral or parking position.

HINT:

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

(6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(7) Inspect the ignition timing at idle.
Ignition timing: 0 to 14° 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 the hand–held tester or OBDII scan tool:
(1) Connect the hand–held tester or OBDII scan tool to the DLC3.
(2) Enter DATA LIST MODE on the hand–held tester or OBDII scan tool.
Idle speed:

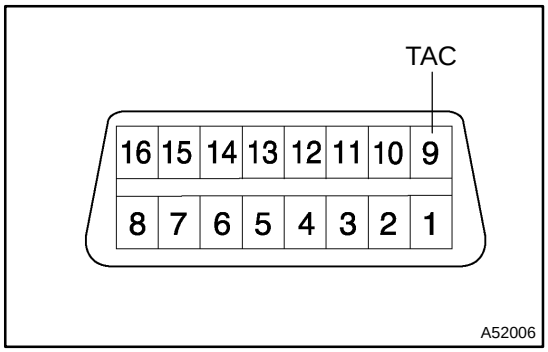
M/T	650 ± 50 rpm
A/T	700 ± 50 rpm

NOTICE:

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

HINT:

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



(c) When not using the hand–held tester or OBDII scan tool:

(1) Using SST, connect the tachometer test prove to terminal 9 (TAC) of the DLC3.

SST 09843–18040

(2) Check the idle speed.

Idle speed:

M/T	650 ± 50 rpm
A/T	700 ± 50 rpm

NOTICE:

- **When checking the idle speed, the transmission is in the neutral or parking position.**
- **Check idle speed with the cooling fan OFF.**
- **Switch off all accessories and air conditioning before connecting the test prove to the terminal.**

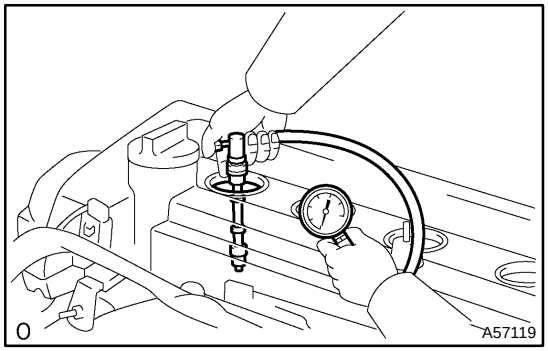
9. INSPECT COMPRESSION

(a) Warm up and stop the engine.

(b) Disconnect the injector connectors.

(c) Remove the ignition coils.

(d) Remove the spark plugs.



(e) Inspect the cylinder compression pressure.

(1) Insert a compression gauge into the spark plug hole.

(2) Fully open the throttle.

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

SST 09992–00500

Compression pressure:
1,471 kPa (15.0 kgf/cm^2, 213 psi)
Minimum pressure:
1,079 kPa (11.0 kgf/cm^2, 156 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi)

NOTICE:

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

HINT:

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If the 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 the CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe during idling.

(d) Immediately check the CO/HC concentration at idle and 2,500 rpm.

HINT:

When doing the 2 mode (with the engine is at idle and 2,500 rpm) test, these measuring orders are prescribed by the applicable local regulations.

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

(1) Check the heated oxygen sensor operation (See page 12–8).

(2) See the table below for possible causes, and then inspect the applicable causes and repair it 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 • ISCV • 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 water temperature sensor • Defective mass air flow meter • Faulty ECM • Faulty injectors • Faulty throttle position sensor