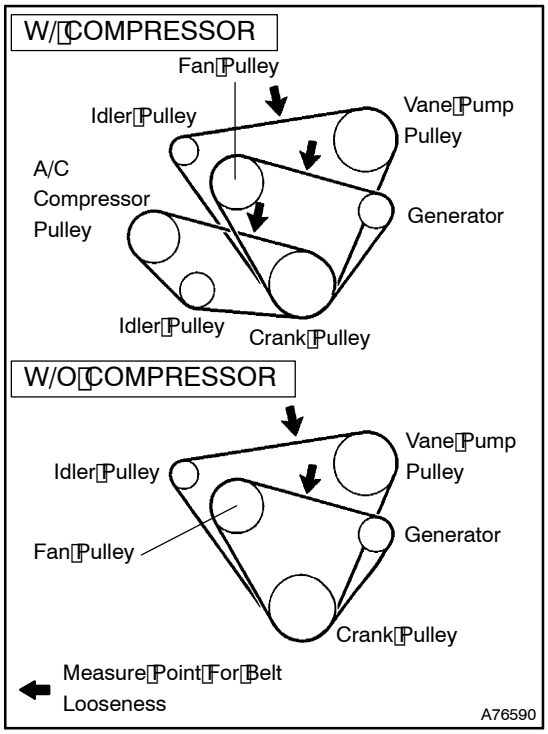
ENGINE (3RZ–FE)

1411W–01

INSPECTION

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



6. INSPECT DRIVE BELT

(a) Belt deflection:

Plessing forse: 98N (10kgf, 221 lbf)

	New belt mm (in.)	Used belt mm (in.)
Drive belt (For fan and generator)	5 – 7 (0.197 – 0.276)	7 – 8 (0.276 – 0.315)
Drive belt (For cooler compressor)	7 – 10 (0.276 – 0.394)	10 – 13 (0.394 – 0.512)
Drive belt (For vane pump)	4.5 – 5.5 (0.177 – 0.216)	6.5 – 7.5 (0.256 – 0.295)

(b) Tension:

	New belt N (kg, lb)	Used belt N (kg, lb)
Drive belt (For fan and generator)	685 – 785 (70 – 80, 154 – 176)	295 – 440 (30 – 45, 66 – 99)
Drive belt (For cooler compressor)	520 – 755 (53 – 77, 117 – 170)	200 – 390 (20 – 40, 44 – 88)
Drive belt (For vane pump)	540 – 640 (55 – 65, 121 – 143)	245 – 390 (25 – 40, 55 – 88)

NOTICE:

- **Check the drive belt deflection at the specified point.**
- **When installing a new belt, set its tension value as specified.**
- **When checking a belt used for over 5 minutes, confirm the deflection value is within the specified one.**
- **When reinstalling a belt used for over 5 minutes, perform the check based on the used deflection value.**
- **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

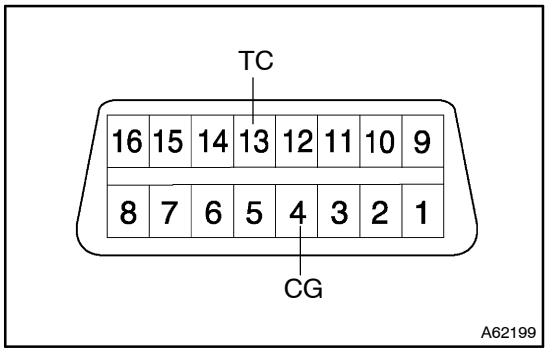
NOTICE:

- **Be sure not to connect incorrectly. It causes breakage of the engine.**
- **Turn OFF all electrical systems.**

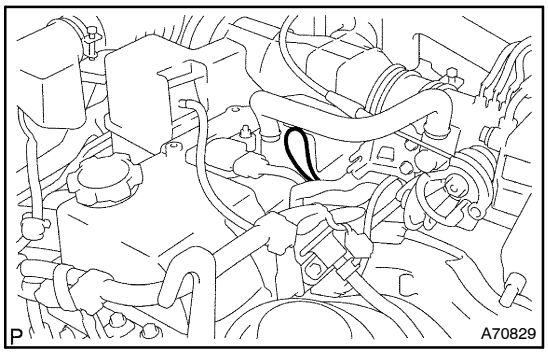
(a) Warm up engine.

(b) When using hand–held tester.
(1) Connect the hand–held tester to the DLC3.
Ignition timing: 3 – 7° 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 terminal 13 (TC) and 4 (CG) of the DLC3.
SST 09843–18040



(2) Pull out the wire harness as shown in the illustration.
(3) 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 – 7° BTDC

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

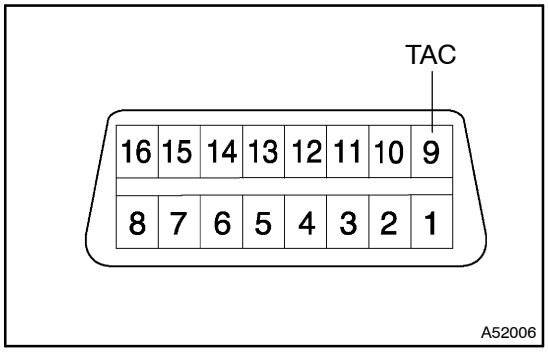
(5) Disconnect the terminal 13 (TC) and 4 (CG) of the DLC3.
(6) Inspect ignition timing at idle.
Ignition timing: 7 – 13° BTDC
(7) Confirm that ignition timing moves to advanced angle side when the engine rpm is increased.
(8) Remove the timing light.

8. INSPECT ENGINE IDLE SPEED

NOTICE:
Turn OFF all electrical systems.

(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. (Unlead gasoline)
Idle speed: 750 – 850 r/min. (Lead gasoline)

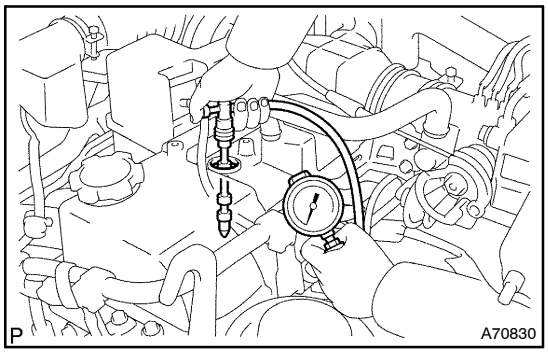
HINT:
Please refer to the hand–held tester operator's manual for further details.



(c) When not using head–held tester.
(1) Using SST, connect techometer test prove to terminal 9 (TAC) of DLC3.
SST 09843–18040
(2) Check the idle speed.
Idle speed: 650 – 750 r/min. (Unlead gasoline)
Idle speed: 750 – 850 r/min. (Lead gasoline)

9. INSPECT COMPRESSION

(a) Warm up and stop engine.
(b) Disconnect the injector connectors.
(c) Remove the spark plugs.



(d) 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:
1.23 MPa (12.5 kgf/cm^2, 178 psi)
Minimum pressure:
0.88 MPa (8.9 kgf/cm^2, 127 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 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 helps 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 is improper, or there may be leakage past the gasket.

10. INSPECT CO (W/O TWC)

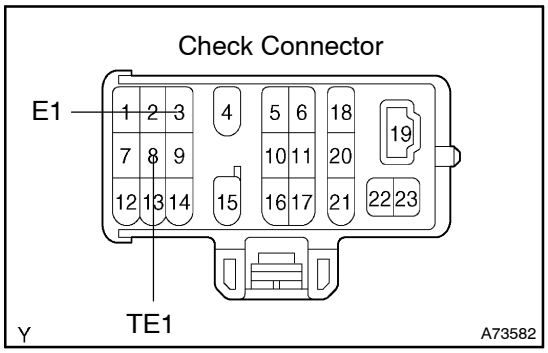
HINT:

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

(a) Check and adjust CO concentration at idle.

NOTICE:

Always use a CO meter when adjusting the idle mixture. It is not necessary to adjust with the idle mixture screw in most vehicles is they are in good condition. If a CO meter is not available, Do NOT ATTEMPT TO ADJUST IDLE MIXTURE.

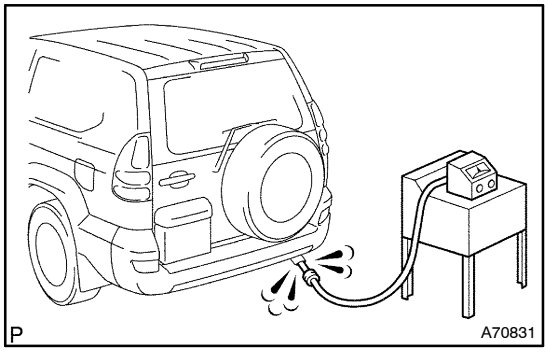


(b) Using SST, connect terminals to TE1 and E1 of the DLC3.
SST 09843–18040

HINT:

After engine rpm is kept at 1,000 – 1,500 rpm for 5 seconds, check that it returns to idle speed.

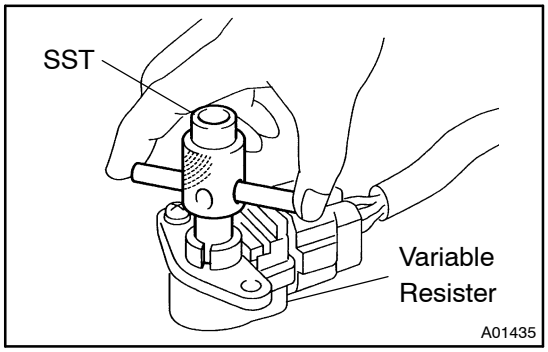
(c) Race the engine at 2,500 rpm for approx. 180 seconds.



(d) Insert a tester probe at least 40 cm (1.3 ft) into the tailpipe.

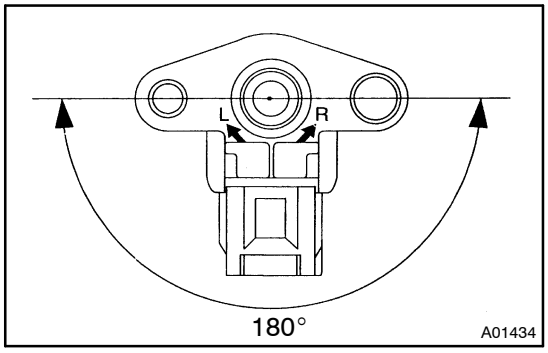
(e) Wait at least 1 minute before measuring to allow the concentration to stabilize. Complete the measuring within 3 minutes.

Idle CO concentration: 1.5 ± 0.5 %



If the CO concentration dose not conform to regulations, adjust by turning the idle mixture adjusting screw in the variable resister with SST.

SST 09243–00020



HINT:
The idle mixture adjusting screw can be tightened through on angle of 180°.
- If the CO concentration is within specification, this adjustments is complete.
- If the CO concentration can not be corrected by idle mixture adjustment, see the table below for other possible causes.

(f) Remove the SST.
SST 09843–18020

CO	Problems	Causes
High	Rough idle (Black smoke from exhaust)	1. Clogged air filter 2. Plugged PCV valve 3. Faulty EFI system: • Faulty pressure regulator • Clogged fuel return line • Defective water temperature sensor • Faulty ECM • Faulty injectors • Faulty throttle position sensor • Faulty air flow meter

11. INSPECT CO/HC (W/ TWC)
HINT:
This check is used only to determine whether or not the idle CO/HC complies with specifications.
(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 rpm.
HINT:
- Complete the measuring within 3 minutes.
- When doing the 2 mode (idle and 2,500 rpm) 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 12–5)
(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: • Incorrect timing • Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • ISC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke form 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