

ENGINE

ON-VEHICLE INSPECTION

1. INSPECT VALVE LASH ADJUSTER NOISE

- (a) Rev up the engine several times. Check that the engine does not emit unusual noises.
If unusual noises occur, warm up the engine and idle it for over 30 minutes. Then perform the inspection above again.
If any defects or problems are found during the inspection above, perform a lash adjuster inspection.

2. INSPECT IGNITION TIMING

- (a) Warm up the engine and stop the engine.

NOTICE:

A warmed up engine should have an engine coolant temperature of over 80°C (176°F), have an engine oil temperature of 60°C (140°F), and the engine rpm should be stabilized.

- (b) When using the intelligent tester:
 - (1) Connect the intelligent tester to the DLC3.
 - (2) Start the engine and idle it.
 - (3) Push the intelligent tester main switch ON.
 - (4) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / IGN ADVANCE.

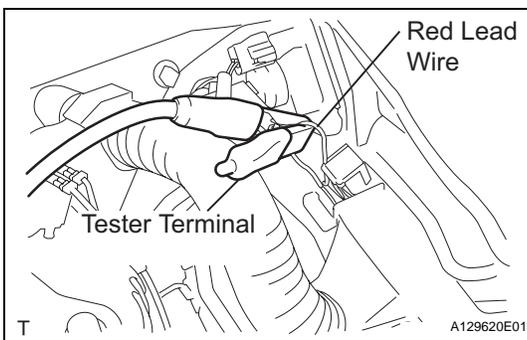
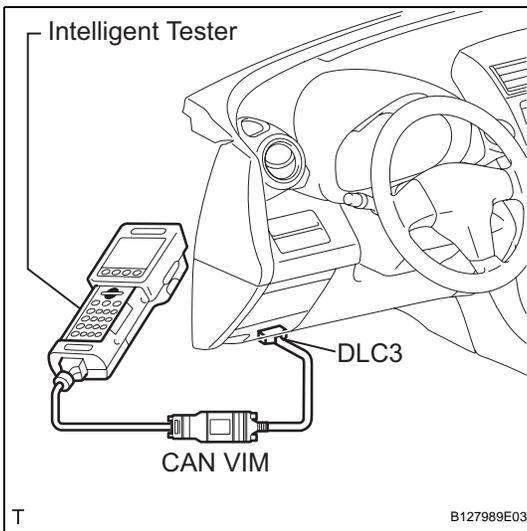
Standard ignition timing:

8 to 12° BTDC @ idle

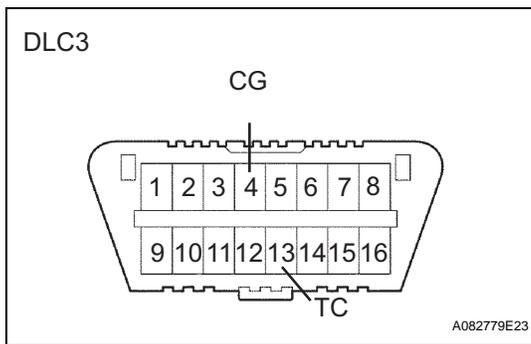
HINT:

Please refer to the intelligent tester operator's manual for further details.

- (c) When not using the intelligent tester:
 - (1) Remove the V-bank cover (see page [EM-21](#)).



- (2) Connect the tester terminal of a timing light to the red lead wire as shown in the illustration.
HINT:
Use a timing light that detects primary signals.



- (3) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST 09843-18040

NOTICE:

- **Confirm the terminal numbers before connecting them. Connecting the wrong terminals can damage the engine.**
- **When checking the ignition timing, the transmission should be in the neutral position.**

- (4) Using a timing light, check the ignition timing.

Standard ignition timing:

8 to 12° BTDC @ idle

NOTICE:

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

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.

- (5) Remove the SST from the DLC3.

- (6) Check the ignition timing.

Standard ignition timing:

5 to 15° BTDC @ idle

- (7) Check that the ignition timing advances immediately when the engine speed is increased.

- (8) Disconnect the timing light from the engine.

- (9) Install the V-bank cover (see page [EM-42](#)).

3. INSPECT ENGINE IDLE SPEED

- (a) Warm up and stop the engine.

NOTICE:

A warmed up engine should have an engine coolant temperature of over 80°C (176°F) and an engine oil temperature of 60°C (140°F), and the engine rpm should be stabilized.

- (b) When using the intelligent tester:

- (1) Connect the intelligent tester to the DLC3.

NOTICE:

Switch off all accessories and A/C before connecting the intelligent tester.

- (2) Race the engine at 2,500 rpm for approximately 90 seconds.

- (3) Push the intelligent tester main switch ON.

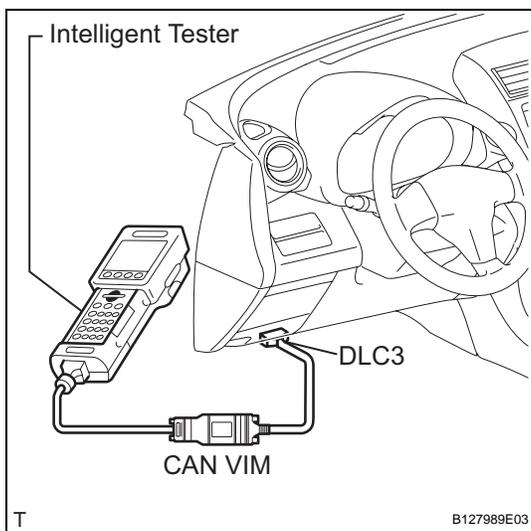
- (4) Select the tester menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.

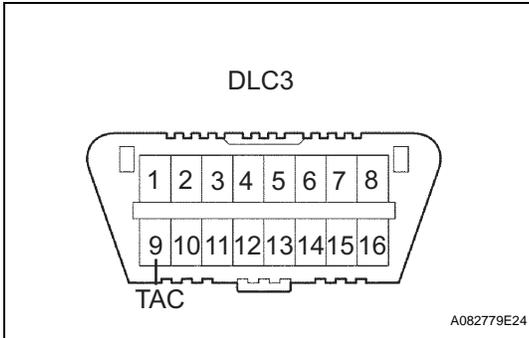
Standard idle speed:

600 to 700 rpm

NOTICE:

When checking the idle speed, the transmission should be in the neutral position.



**HINT:**

Please refer to the intelligent tester operator's manual for further details.

If the idle speed is not as specified, check the air intake system.

- (5) Disconnect the intelligent tester from the DLC3.

- (c) When not using the intelligent tester:

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

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NOTICE:

Confirm the terminal numbers before connecting them. Connecting the wrong terminals can damage the engine.

- (2) Race the engine at 2,500 rpm for approximately 90 seconds.
 (3) Check the idle speed.

Standard idle speed:

600 to 700 rpm (Transmission neutral position)

If the speed is not as specified, check the air intake system.

- (4) Disconnect the tachometer from the DLC3.

4. INSPECT COMPRESSION

- (a) Warm up and stop the engine.

NOTICE:

A warmed up engine should have an engine coolant temperature of over 80°C (176°F) and an engine oil temperature of 60°C (140°F), and the engine rpm should be stabilized.

- (b) Disconnect the injector connectors.
 (c) Remove the intake air surge tank (see page [EM-27](#)).
 (d) Remove the 6 ignition coils (see page [EM-28](#)).
 (e) Remove the 6 spark plugs.

- (f) Inspect the cylinder compression pressure.

- (1) Insert a compression gauge into the spark plug hole.
 (2) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain an engine speed of 250 rpm or more.

NOTICE:

The measurement must be done as quickly as possible.

Compression pressure:

1,400 kPa (14 kgf/cm², 199 psi) or more

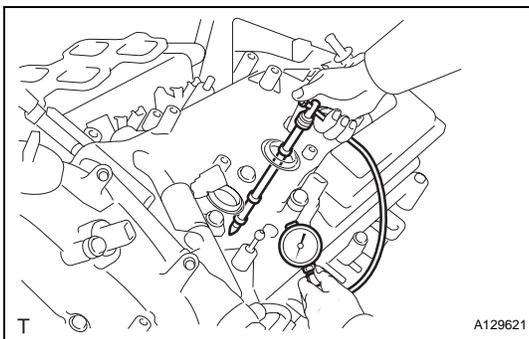
Minimum pressure:

980 kPa (10.0 kgf/cm², 142 psi)

Difference between each cylinder:

100 kPa (1.0 kgf/cm², 15 psi) or less

- (3) Perform the inspection above for each cylinder.



- (4) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole. Then perform the first 3 steps under "Inspect the cylinder compression pressure" for the cylinders with low compression.

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 stuck or seated improperly, or there may be leakage in the gasket.

- (g) Install the 6 spark plugs.
 (h) Install the 6 ignition coils (see page [EM-34](#)).
 (i) Install the intake air surge tank (see page [EM-34](#)).
 (j) Connect the injector connectors.

5. INSPECT CO/HC

HINT:

This check is for determining whether or not the idle CO / HC complies with regulations.

- (a) Start the engine.
 (b) Keep the engine speed at 2,500 rpm for approximately 180 seconds.
 (c) Insert a 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 / or 2,500 rpm.

HINT:

- When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order 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 air fuel ratio sensor and heated oxygen sensor operation.
 (2) See the table below for the possible cause, then inspect and correct the applicable causes if necessary.

CO	HC	Symptom	Causes
Normal	High	Rough idle	1. Faulty ignitions <ul style="list-style-type: none"> – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Leaky intake and exhaust valves 3. Leaky cylinder
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks <ul style="list-style-type: none"> – PCV hose – Intake manifold – Throttle body 2. Lean mixture causing misfire

CO	HC	Symptom	Causes
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty fuel SFI system – Faulty pressure – Defective ECT sensor – Faulty ECM – Faulty injector – Faulty throttle position sensor – Faulty MAF sensor