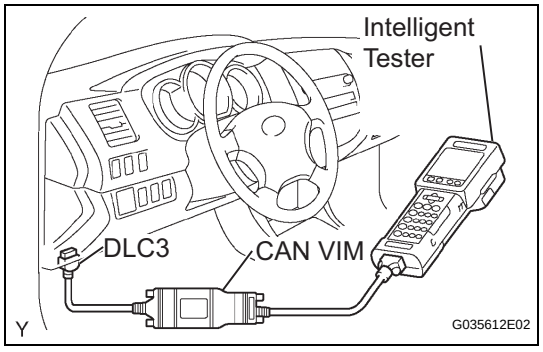
ENGINE

ON-VEHICLE INSPECTION

1. **INSPECT ENGINE COOLANT (See page CO-2)**
2. **INSPECT ENGINE OIL**
   (See page LU-1)
3. **INSPECT BATTERY (See page CH-4)**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
   (a) Remove the air filter.
   (b) Visually check that the air filter is not excessively damaged or oily. If necessary, replace the air filter.
5. **INSPECT SPARK PLUG**
   (See page IG-3)
6. **INSPECT V-RIBBED BELT TENSIONER ASSEMBLY**
   (a) Idle the engine and then stop the engine. Check that the drive belt is between the edges of the tensioner pulley.
   (b) Remove the drive belt from the tensioner pulley.
   (c) Turn the pulley, and check that the tensioner bearing moves smoothly and quietly.
   If necessary, replace the tensioner.
7. **INSPECT VALVE LASH ADJUSTER NOISE**
   (a) Rev up the engine several times. Check that the engine does not make any abnormal noises [*a].
   If abnormal noises are heard, warm up the engine and idle it for more than 30 minutes. Then repeat step [*a].
   HINT:
   If any defects or problems are found during the inspection above, perform the lash adjuster inspection.



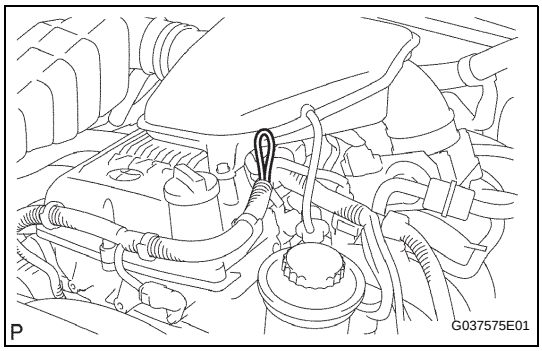
8. **INSPECT IGNITION TIMING**
   (a) When using a intelligent tester:
      (1) Connect the intelligent tester to the DLC3.
      (2) Turn the ignition switch to ON.
      (3) Turn the intelligent tester ON.
      (4) Start the engine and warm it up.
      (5) Select the following menu items:
      DIAGNOSIS / ENHANCED OBDII / DATA LIST / PRIMARY / IGN ADVANCE.
      Ignition timing:
      3 to7°BTDC (during idling)
      NOTICE:
      Turn all electrical systems OFF.
      HINT:
      Refer to the intelligent tester operator's manual for further information regarding the selection of DATA LIST.

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

(b) When not using a intelligent tester:

(1) Turn the ignition switch to ON.

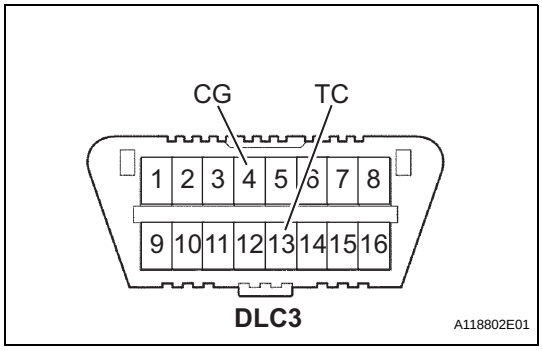
(2) Start the engine and warm it up.



(3) Install the tester terminal of a timing light in the position shown in the illustration.

NOTICE:

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



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

SST 09843-18040

NOTICE:

Be careful not to connect the wrong terminals. It may damage the engine.

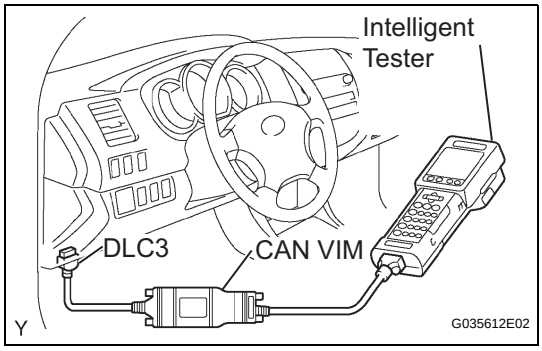
(5) Check that the ignition timing is within the specification.

Ignition timing:

3 to7° BTDC (during idling)

NOTICE:

Turn all electrical systems OFF.



9. INSPECT ENGINE IDLING SPEED

(a) When using a intelligent tester:

(1) Connect the intelligent tester to the DLC3

(2) Turn the ignition switch to ON.

(3) Turn the intelligent tester ON.

(4) Start the engine and warm it up.

(5) Select the following menu items:
DIAGNOSIS / ENHANCED OBDII / DATA LIST / PRIMARY / ENGINE SPD.

Idling speed:

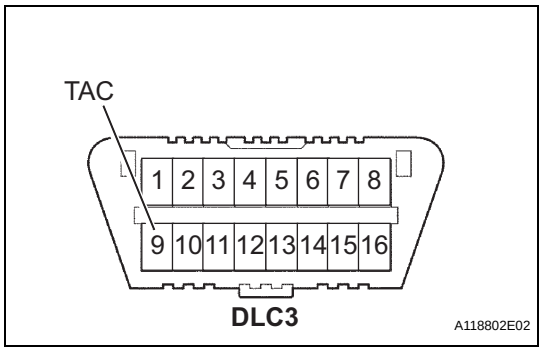
600 to 700 rpm

NOTICE:

- **Turn all electrical system OFF.**
- **When checking the idling speed, the transmission is in the neutral position.**

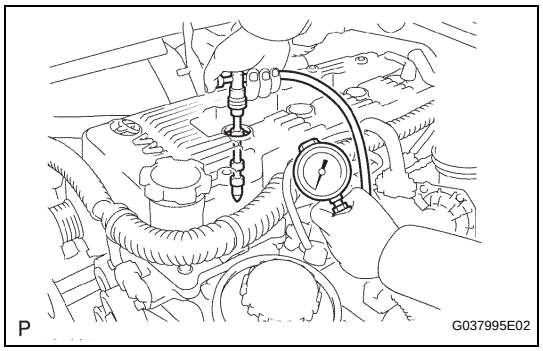
HINT:

Refer to the intelligent tester operator's manual for further information regarding the selection of DATA LIST.



(b) When not using a intelligent tester:
(1) Turn the ignition switch ON.
(2) Start the engine and warm it up.
(3) Install SST onto terminal 9 (TAC) of the DLC3. Connect a tachometer, then measure the engine idling speed.
SST 09843-18030
Idling speed:
600 to 700 rpm
NOTICE:
- **Turn all electrical systems OFF.**
- **When checking the idling speed, the transmission should be in the neutral position.**

10. INSPECT COMPRESSION
(a) Warm up the engine, then stop it.
(b) Remove the intake air connector
(c) Remove the ignition coils.
(d) Remove the spark plugs.
(e) Disconnect the fuel infector connector.



(f) Inspect the compression.
(1) Insert a compression gauge into the plug hole.
(2) Crank the engine, then measure the compression pressure.
Compression pressure:
1230 kPa (12.5 kgf/cm^2, 178 psi)
Minimum pressure:
880 kPa (9.0 kgf/cm^2, 128 psi) or more
Difference between each cylinder:
68 kPa (0.7 kgf/cm^2, 10psi) or less
NOTICE:
- **Use a fully-charged battery so the engine speed can be increased to 250 rpm or more.**
- **Inspect the other cylinders in the same way.**
- **Measure the compression pressure in as short a time as possible.**

(3) If the compression pressure is low, pour a small amount of engine oil into the cylinder block, then measure it again.
HINT:
- If the compression pressure increases after adding the engine oil, the piston rings may be worn.
- If the compression pressure does not charge after pouring engine oil, defects may be occurring around the valves.

11. INSPECT CO/HC
HINT:
This inspection is for checking whether the CO/HC concentration in the emission gas while idling complies with the regulations.

EM

(a) Start the engine.
(b) Keep the engine speed 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 while idling.
(d) Immediately check the CO/HC concentration while idling and/or at 2,500 rpm.
HINT:
When performing the 2 mode (2,500 rpm and idle) test, follow the applicable local regulations. If the CO/HC concentration does not comply with the regulations, troubleshoot in the order given below.
(1) Check the A/F sensor and heated oxygen sensor operation.
(2) See the table below for possible causes, then inspect and correct the applicable parts if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idling	1. Faulty ignition: – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leakage in intake and exhaust valves 4. Leakage in cylinders
Low	High	Rough idling (Fluctuation HC reading)	1. Vacuum leakage: – PCV hoses – Intake manifold – Throttle body – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idling (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI systems: – Faulty pressure regulator – Faulty engine coolant temperature sensor – Faulty mass air flow meter – Faulty ECM – Faulty injectors – Faulty throttle body