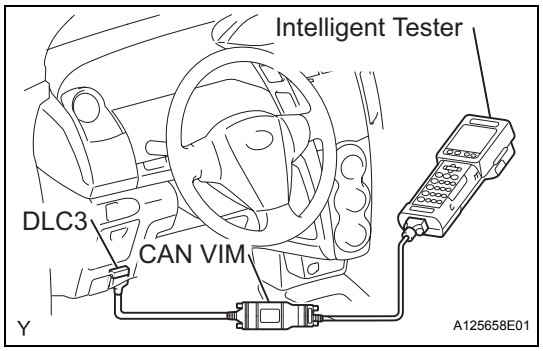
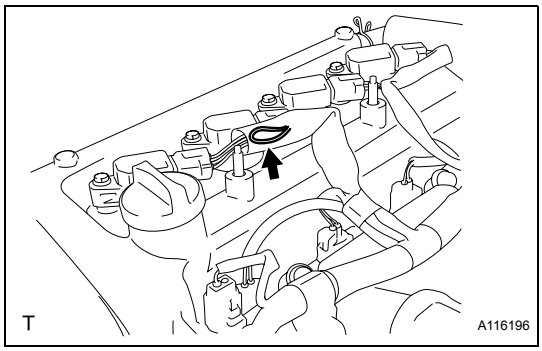
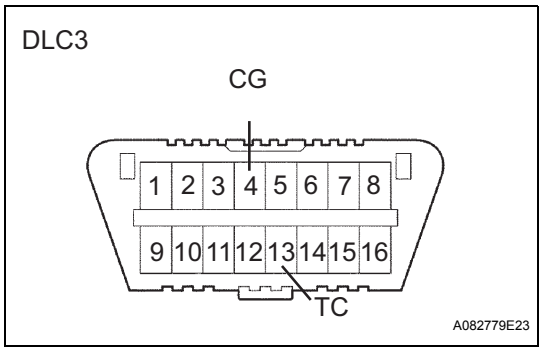
ENGINE

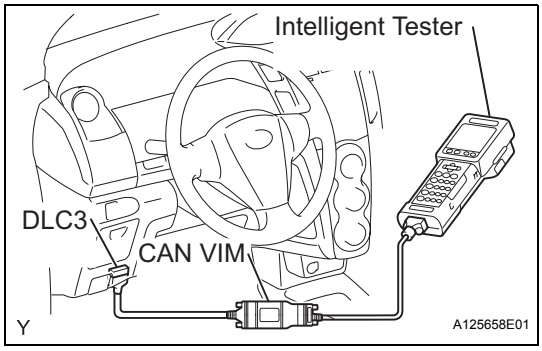
ON-VEHICLE INSPECTION

1. **INSPECT ENGINE COOLANT (See page CO-1)**
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 cleaner filter element sub-assembly.
   (b) Visually check that there is no dirt, blockage, or damage to the air cleaner filter element.
   HINT:
   - If there is any dirt or a blockage in the air cleaner filter element, clean it with compressed air.
   - If any dirt or a blockage remains even after cleaning the air cleaner filter element with compressed air, replace it.
5. **INSPECT SPARK PLUG (See page IG-5)**
6. **INSPECT IGNITION TIMING**
   (a) When using an intelligent tester:
      (1) Warm up and stop the engine.
      (2) Connect the intelligent tester to the DLC3.
      (3) Turn the ignition switch ON.
      (4) Select the following menu items:
      DIAGNOSIS / ENHANCED OBD II/ ACTIVE TEST / TC (TE1) / ON.
      HINT:
      Refer to the intelligent tester operator's manual for further details.
      (5) Inspect the ignition timing during idling.
      Ignition timing:
      8 to 12 degrees BTDC
      NOTICE:
      - **Turn all the electrical systems and the A/C off.**
      - **Inspect the ignition timing with the cooling fan off.**
      - **When checking the ignition timing, shift the transmission to the neutral position.**
      (6) Select the following menu items: TC (TE1) / OFF.
      (7) Turn the ignition switch OFF.
      (8) Disconnect the intelligent tester from the DLC3.
   (b) When not using an intelligent tester:
      (1) Remove cylinder head cover No. 2 (see page IG-9).









(2) Pull out the wire harness (brown) shown in the illustration.
NOTICE:
After checking, wrap the wire harness with tape.
(3) Warm up and stop the engine.
(4) Connect the clip of the timing light to the wire harness.
NOTICE:
Use a timing light that detects the first signal.
(5) Turn the ignition switch ON.
(6) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
NOTICE:
Examine the terminal numbers before connecting them. Connecting the wrong terminals could damage the engine.
(7) Inspect the ignition timing during idling.
Ignition timing:
8 to 12 degrees BTDC
NOTICE:
- **Turn all the electrical systems and the A/C off.**
- **Inspect the ignition timing with the cooling fan off.**
- **When checking the ignition timing, shift the transmission to the neutral position.**

(8) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(9) Turn the ignition switch OFF.
(10) Remove the timing light.
(11) Install cylinder head cover No. 2 (see page IG-10).

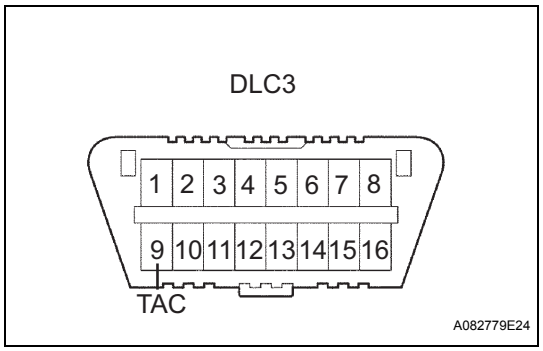
7. INSPECT ENGINE IDLING SPEED

(a) When using an intelligent tester:
(1) Warm up and stop the engine.
(2) Connect the intelligent tester to the DLC3.
(3) Turn the ignition switch ON.
(4) Select the following menu items:
DIAGNOSIS / ENHANCED OBD II/ DATA LIST / PRIMARY / ENGINE SPD.
HINT:
Refer to the intelligent tester operator's manual for further details.
(5) Inspect the engine idling speed.
Idling speed:
550 to 650 rpm for manual transaxle
650 to 750 rpm for automatic transaxle
NOTICE:
- **Turn all the electrical systems and the A/C off.**

- **Inspect the idling speed with the cooling fan off.**
- **When checking the idling speed, shift the transmission to either the neutral position or the parking position.**

(6) Turn the ignition switch OFF.
(7) Disconnect the intelligent tester from the DLC3.

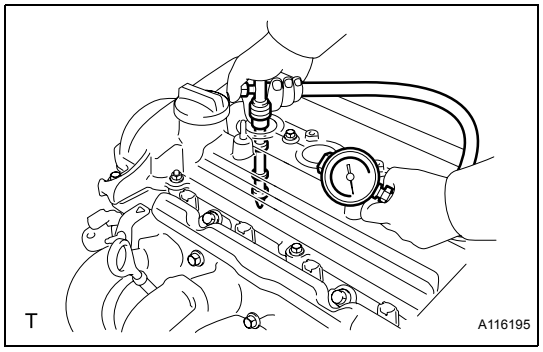
(b) When not using an intelligent tester.
(1) Warm up and stop the engine.



(2) Install SST to terminal 9 (TAC) of the DLC3, then connect a tachometer.
SST 09843-18040
NOTICE:
Examine the terminal numbers before connecting them. Connecting the wrong terminals could damage the engine.
(3) Turn the ignition switch ON.
(4) Inspect the engine idling speed.
Idling speed:
550 to 650 rpm for manual transaxle
650 to 750 rpm for automatic transaxle
(5) Turn the ignition switch OFF.
(6) Disconnect the tachometer.
(7) Remove SST from terminal 9 (TAC).

8. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Remove cylinder head cover No. 2 (see page IG-9).
(c) Remove the 4 ignition coils (see page IG-9).
(d) Remove the 4 spark plugs.
(e) Disconnect the 4 fuel injector connectors.



(f) 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.
Compression:
1,471kPa (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) 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 in as short a time as possible.**

(4) If the cylinder compression is low, pour a light coat of engine oil into the cylinder through the spark plug hole, then 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, the valve may be stuck or seated improperly, or there may be leakage from the gasket.

(g) Connect the 4 fuel injector connectors.
(h) Install the 4 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)
(i) Install the 4 ignition coils (see page IG-9).
(j) Install cylinder head cover No. 2 (see page IG-10).

EM

9. 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 while idling.
(d) Check the CO/HC concentration during idling and when running at 2,500 rpm.
HINT:
When doing the 2 mode (with the engine idling/ running at 2,500 rpm) test, the measuring procedures are determined by applicable local regulations.
If the CO/HC concentration does not comply with the regulations, troubleshoot in the order given below.
(1) Check the heated oxygen sensor operation (see page ES-276).
(2) See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

CO	HC	Problems	Possible Causes
Normal	High	Rough idling	1. Faulty ignition: – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leakage from intake and exhaust valves 4. Leakage from cylinders
Low	High	Rough idling (Fluctuating HC reading)	1. Vacuum leaks: – 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 cleaner filter element 2. Plugged PCV valve 3. Faulty EFI systems: – Faulty pressure regulator – Faulty engine coolant temperature sensor – Faulty mass air flow meter – Faulty ECM – Faulty injectors – Throttle body