TOYOTA COROLLA
REPAIR MANUAL SUPPLEMENT 1129E
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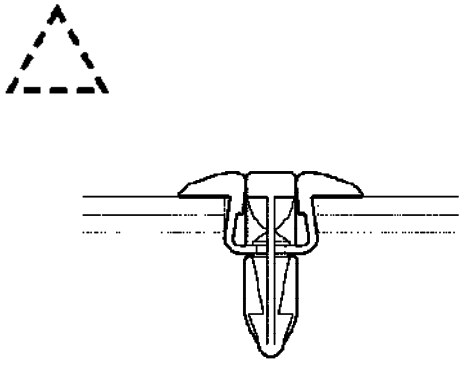
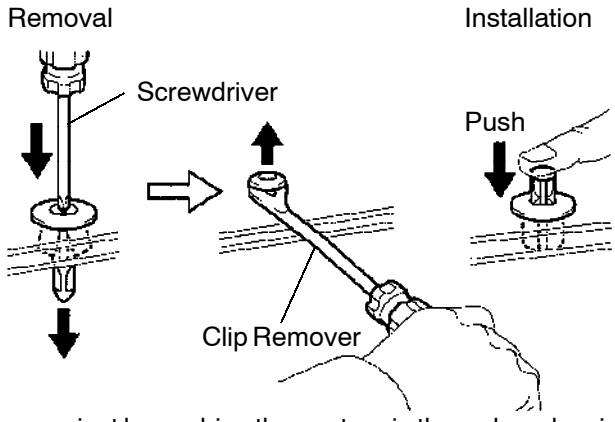
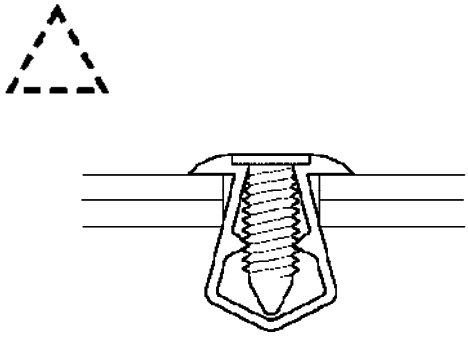
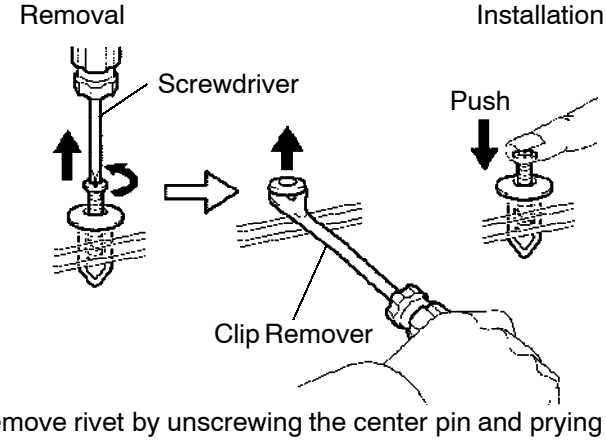
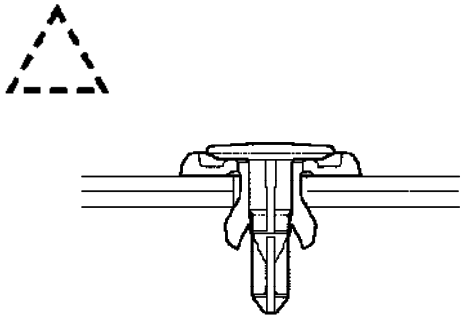
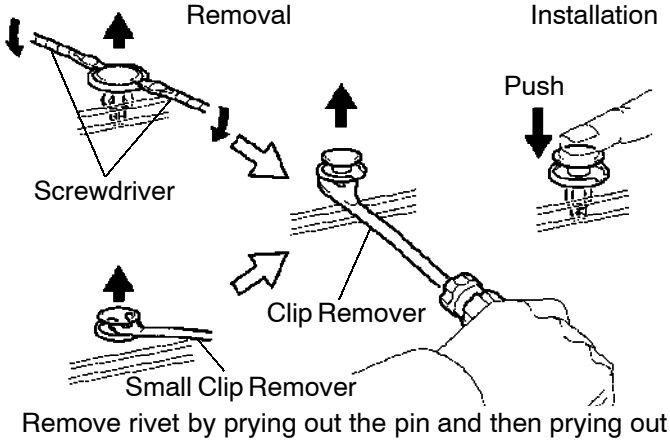
Shape (Example)	Removal/Installation
	 Remove rivet by pushing the center pin through and prying out the rivet shell.
	 Remove rivet by unscrewing the center pin and prying out the rivet shell.
	 Remove rivet by prying out the pin and then prying out the rivet shell.

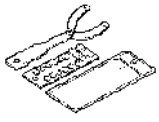
D32182

COOLING

PREPARATION

0249Z-01

SST

	09960-10010	Variable Pin Wrench Set	WATER PUMP ASSY(1ND-TV)
	(09962-01000)	Variable Pin Wrench Arm Assy	WATER PUMP ASSY(1ND-TV)
	(09963-00700)	Pin 7	WATER PUMP ASSY(1ND-TV)

Recommended Tools

	09082-00040	TOYOTA Electrical Tester	COOLING FAN SYSTEM(1ND-TV)
	(09083-00150)	Test Lead Set	COOLING FAN SYSTEM(1ND-TV)

Equipment

Belt tension gauge	
Ohmmeter	
Radiator cap tester	
Torque wrench	
Vernier calipers	

Coolant

Item		Capacity	Classification
Engine coolant	w/ heater	5.5 liters (5.8 US qts, 4.8 Imp. qts)	"TOYOTA SUPER LONG LIFE Antifreeze Coolant" or equivalent
	w/o heater	5.3 liters (5.6 US qts, 4.7 Imp. qts)	

05DVU-11

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

By reading the Data List displayed on an intelligent tester II, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the Data List as the first step of troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Conditions are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch to OFF.
(c) Connect an intelligent tester II to the DLC3.
(d) Turn the ignition switch to ON.
(e) Turn the tester ON.
(f) Select the following menu items: Powertrain / Engine and ECT / Data List.
(g) Check the values by referring to the following table.

Intelligent Tester II Display (Abbreviation)	Measurement Item: Range (Display)	Normal Conditions *	Diagnostic Notes
Injection Volume (INJ VOLUME)	Injection volume: Min.: 0 mm^3, Max.: 1279.98 mm^3	3 to 8 mm^3: Idling	—
Engine SPD (ENGINE SPD)	Engine speed: Min.: 0 rpm, Max.: 16383.75 rpm	720 to 820 rpm: Idling	—
MAF (MAF)	Air flow rate from Mass Air Flow (MAF) meter status: Min.: 0 gm/s, Max.: 655.35 gm/s	• 5.0 to 6.0 gm/s: Idling • 13.1 to 18.9 gm/s: Running without load (2,500 rpm)	If value approximately 0.0 gm/s: • MAF meter power source circuit open • VG circuit open or shorted If valve 135 gm/s or more: • E2G circuit open
PIM (PIM)	Absolute pressure inside intake manifold: Min.: 0 kPa, Max.: 255 kPa	• 85 to 110 kPa: Idling • 90 to 115 kPa: Engine running at 2,000 rpm	—
Coolant Temp (COOLANT TEMP)	Engine coolant temperature: Min.: -40°C, Max.: 215°C	80° to 95°C (176° to 203°F): After warming up engine	If value -40°C or 140°C, sensor circuit open or shorted
Intake Air (INTAKE AIR)	Intake air temperature: Min.: -40°C, Max.: 215°C	Equivalent to temperature at intake manifold	
Accel Position (ACCEL POSITION)	Accelerator position status: Min.: 0 %, Max.: 100 %	• 0 %: Accelerator pedal released • 100 %: Accelerator pedal depressed	Read value with ignition switch ON (Do not start engine)
Vehicle SPD (VEHICLE SPD)	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
Throttle POS (THROTTLE POS)	Throttle step position: Min.: 0 %, Max.: 100 %	• 100 %: Throttle fully closed • 0 %: Throttle fully open	Read value with ignition switch ON (Do not start engine)
Common Rail Pressure (COMN RAIL PRESS)	Common rail pressure: Min.: 0 MPa, Max.: 255 MPa	25 to 36 MPa: Idling	—
Revised Injection Volume #1 (INJ VOL FB #1)	Injection volume correction for cylinder 1: Min.: -10 mm^3, Max.: 40 mm^3	-2.0 to 2.0 mm^3: Idling	—
Revised Injection Volume #2 (INJ VOL FB #2)	Injection volume correction for cylinder 2: Min.: -10 mm^3, Max.: 40 mm^3	-2.0 to 2.0 mm^3: Idling	—

Component	Outline
Clutch Stroke Sensor (Clutch Actuator)	Detects the amount of the clutch stroke from rotational angle of the worm wheel in the clutch actuator and relays and sends information to the transmission control ECU in the form of feedback signals.
LCC (Load Controlled Clutch cover)	Actuated by the clutch motor, the pressure plate height of the LCC is adjusted to a predetermined position, in order to apply a constant load to the clutch motor.
Transmission Revolution Sensor	Detects the input shaft speed of the transaxle and outputs it to the transmission control ECU.
Pattern Select [Es] Switch	Outputs the driving pattern (Normal [E] pattern or Sporty [Es] pattern) in E-mode from the ON/OFF condition to the transmission control ECU.
Kick Down Switch (only for LHD)	Detects beyond the full-throttle opening and outputs it to the transmission control ECU.
Neutral Position Switch	Detects the neutral position and outputs it to the transmission control ECU.
Back Up Lamp Switch	Detects the reverse position and outputs it to the transmission control ECU, and illuminates the back-up lamps.
Stop Lamp Switch	Detects the brake pedal being depressed and outputs it to the transmission control ECU and illuminates the stop lamps.
Parking Brake Switch	Detects the parking brake lever being pulled and outputs it to the transmission control ECU.
Transmission Control ECU	• Controls the multi-mode transmission system; in addition, requests the ECM to effect fuel injection control during up-shift or downshift via CAN (Controller Area Network) communication. • When the transmission control ECU detects a malfunction, the transmission control ECU makes a diagnosis and memorizes the failed section. Furthermore, the multi-mode manual transmission warning light and check engine warning light illuminate or blink to inform the driver.
Transmission Control ECU (Buzzer)	Sounds a built-in buzzer during system warning.
ECM	• Outputs each sensor information via CAN communication to transmission control ECU. • Effects fuel injection control per request from transmission control ECU.
Air Flow Meter (Intake Air Temp. Sensor)	Detects the external air temperature and outputs it to the transmission control ECU via the ECM.
Accelerator Pedal Position Sensor	Detects the accelerator pedal position and outputs it to the ECM.
Crankshaft Position Sensor	Detects the engine speed and outputs it to the transmission control ECU via the ECM.
Water Temp. Sensor	Detects the water temperature and outputs it to the transmission control ECU via the ECM.
Starter Relay	The transmission control ECU restricts operation of the starter relay in accordance with the gear position and the braking conditions, in order to control operation of the starter.

3. MULTI-MODE MANUAL TRANSMISSION SYSTEM CONTROL

(a) System start:

The multi-mode manual transmission system starts when the ignition switch is turned on. The shift lever can be operated with the ignition switch on and the brake pedal depressed. The engine starts when the ignition switch is turned on with the brake pedal depressed and the gear in neutral.

(b) Take off/reverse control:

If the brake pedal is not depressed with the gear in 1st, 2nd, or reverse, the clutch is half-engaged, even if the accelerator pedal is not depressed.

[Take off assist control]

If the brake pedal is not depressed with the gear in 1st, 2nd, or reverse, the clutch is half-engaged, even if the accelerator pedal is not depressed. This will assist the vehicle in preparing to move.

The take off assist control is cancelled while the parking brake switch is on.

HINT:

When shifting to reverse at a vehicle speed of 9 km/h (5.59 mph) or more, the reverse warning buzzer sounds, but the gear is not shifted to reverse.

DTC	P0806/29	CLUTCH POSITION SENSOR CIRCUIT (RANGE/PERFORMANCE)

DTC	P0807/25	CLUTCH POSITION SENSOR (LOW)

DTC	P0807/27	CLUTCH POSITION SENSOR (LOW)

DTC	P0808/26	CLUTCH POSITION SENSOR (HIGH)

DTC	P0808/28	CLUTCH POSITION SENSOR (HIGH)

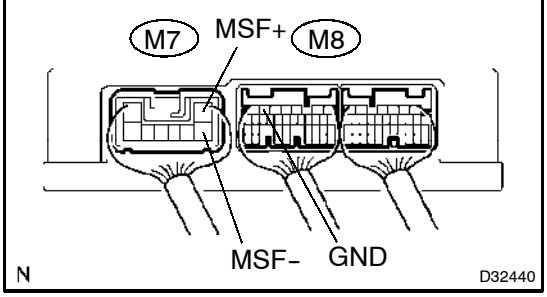
CIRCUIT DESCRIPTION

The clutch stroke sensor rotates the sensor arm when the clutch motor starts.
The transmission control ECU applies a maximum of 5 V to the clutch stroke sensor.
The transmission control ECU determines the strokes of the clutch motor by detecting the change in voltage that occurs with changes in the sensor arm rotation angle.
The clutch stroke sensor utilizes the main sensor and sub sensor to correctly determine the strokes of the clutch motor.
HINT:

- The clutch stroke sensor consists primarily of 2 Hall ICs (main and sub), and a magnetic yoke that rotates together with the rotation of the clutch motor.
- The 2 Hall ICs convert the changes in the magnetic flux that are caused by the rotation of the clutch motor (hence, the rotation of the magnetic yoke) into electric signals, and output them to the transmission control ECU. The transmission control ECU determines the extent of the clutch stroke from these electric signals.
- The main and sub circuits in the clutch stroke sensor have the same output characteristics.

4 INSPECT TRANSMISSION CONTROL ECU ASSY

Wire Harness View:



(a) Reconnect the M7 connector of the transmission control ECU and shift motor connector.

(b) Turn the ignition switch on.

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Symbol (Terminal No.)	Condition	Specified value
MSF+ (M7-1) - GND (M8-6)	Ignition SW OFF → ON	Below 1 V → 5 to 10 V
MSF- (M7-3) - GND (M8-6)	Ignition SW OFF → ON	Below 1 V → 5 to 10 V

NG → **REPLACE TRANSMISSION CONTROL ECU ASSY** **(SEE PAGE 41-33)**

OK

OPERATION CHECK

HINT:

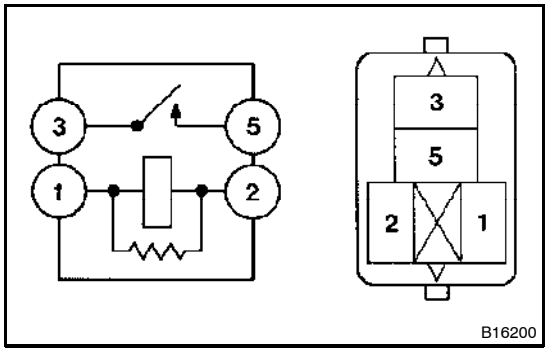
If symptoms still occur even after checking the following parts for dirt, wear, etc. and replacing the defective parts, replace the transmission control ECU.

- Synchronizer Ring
- Shift Fork
- Hub sleeve

Refer to C53A MANUAL TRANSAXLE Repair Manual Pub. No. RM1117E.

INSPECTION PROCEDURE

1 INSPECT RELAY (ST)



(a) Remove the ST relay from the R/B No.3.
(b) Check for continuity of the ST relay.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

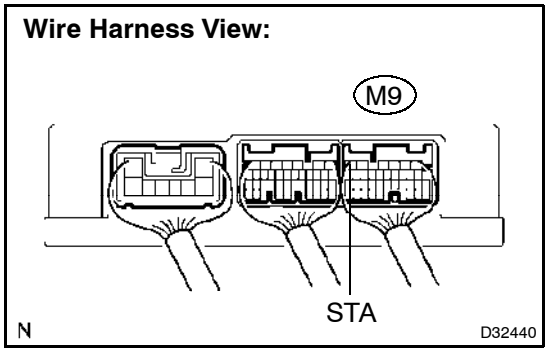
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 - 2)

NG → **REPLACE RELAY**

OK

2 INSPECT TRANSMISSION CONTROL ECU ASSY (STA)

Wire Harness View:



(a) Install the ST relay.
(b) Turn the ignition switch to the START position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

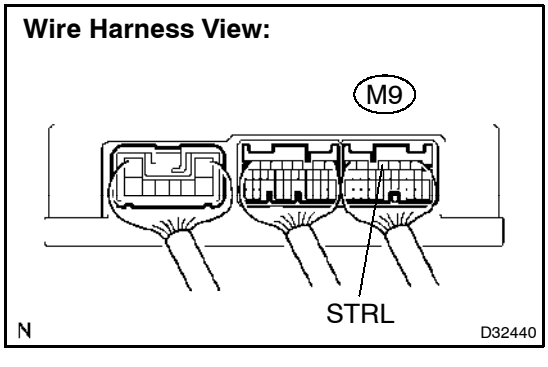
Symbol (Terminal No.)	Condition	Specified value
STA (M9-6) - Body ground	Ignition SW OFF → START	Below 1 V → 10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE** **(SEE PAGE 05-219)**

NG

3 INSPECT TRANSMISSION CONTROL ECU ASSY (STRL)

Wire Harness View:



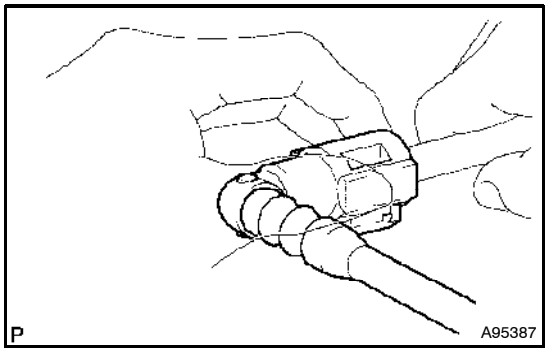
(a) Turn the ignition switch to the START position.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Symbol (Terminal No.)	Condition	Specified value
STRL (M9-4) - Body ground	Ignition SW OFF → START	Below 1 V → 10 to 14 V

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE** **(SEE PAGE 05-219)**

OK



(4) If the fuel tube connector and pipe are stuck, pinch the pipe, then push and pull the fuel tube connector to release and disconnect the fuel tube connector.

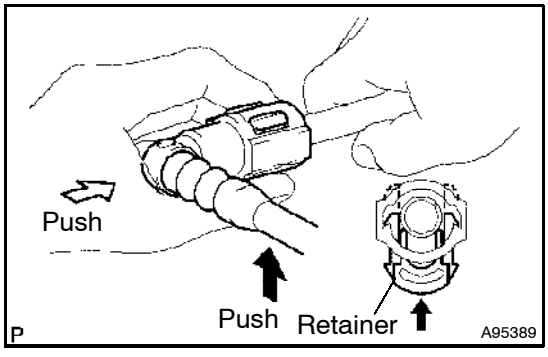
NOTICE:

Perform this work by hand. Never use any tools.

(5) After removing the fuel tube, check the sealing surface of the pipe for dirt and mud.

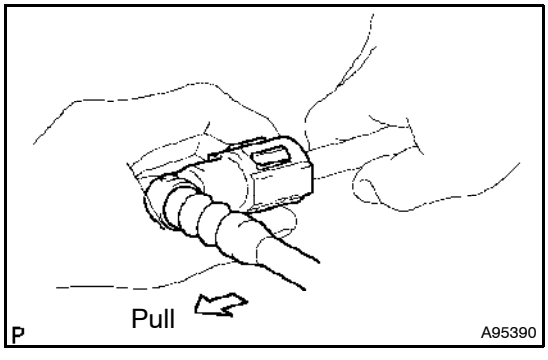
If dirty, wipe it with a shop rag.

(6) Cover the disconnected fuel tube connector and pipe with a vinyl bag to prevent damage and the intrusion of foreign objects.



(c) Take the following precautions when connecting the fuel tube connector (quick type A).

(1) Align the fuel tube connector with the pipe, then push the fuel tube connector in until it comes into contact with the seat, then push the retainer up until the claws lock.

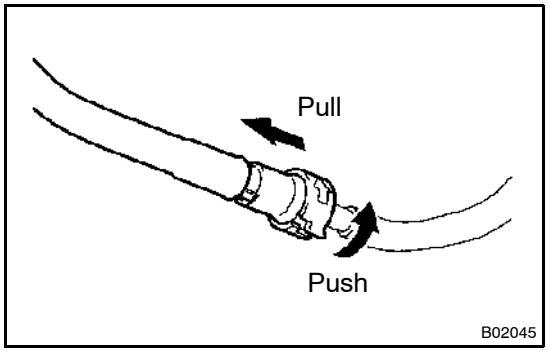


(2) After connecting the fuel tube connector, check that the fuel tube connector and pipe are securely connected by pulling them.

(d) Take the following precautions when disconnecting the fuel tube connector (quick type B).

(1) Check the pipe and around the connector for dirt and mud before disconnecting them. Clean them if necessary.

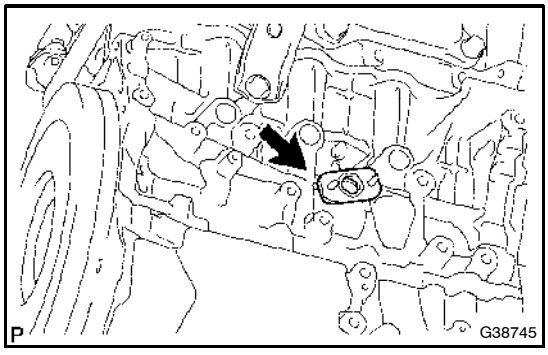
(2) Disconnect the connector from the pipe by hand.



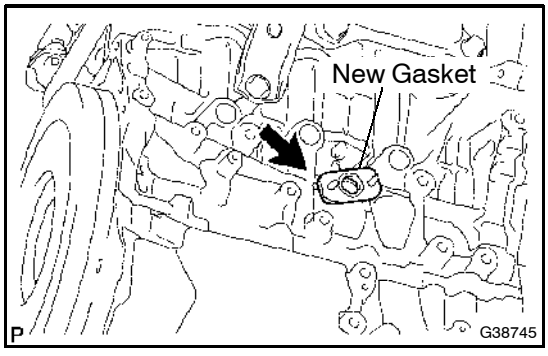
(3) When the connector and pipe are stuck, push and pull the connector to release it. Disconnect the connector carefully. Do not use any tool.

(4) Check the sealing surface of the disconnected pipe for dirt and mud. If dirty, wipe it with a shop rag.

(5) Cover the disconnected pipe and connector with a vinyl or plastic bag to prevent damage and the intrusion of foreign objects.

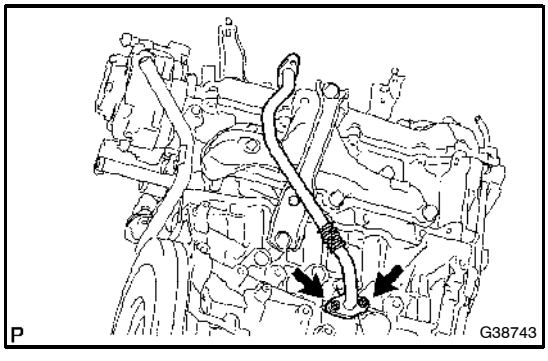


(b) Remove the gasket from the cylinder block.

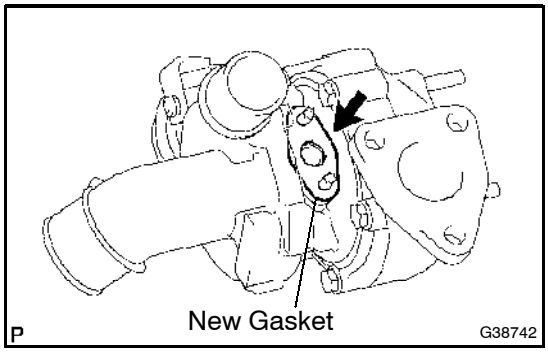


18. INSTALL TURBO OIL OUTLET PIPE

(a) Install a new gasket onto the cylinder block.

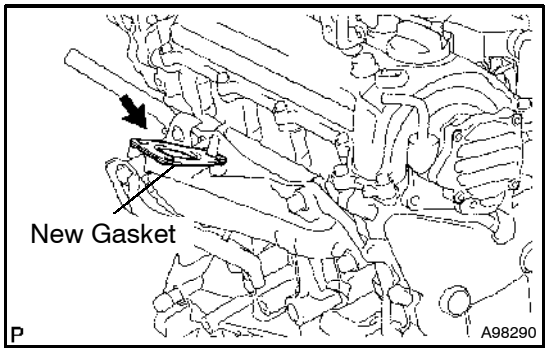


(b) Temporary install the turbo oil outlet pipe with the 2 new nuts.

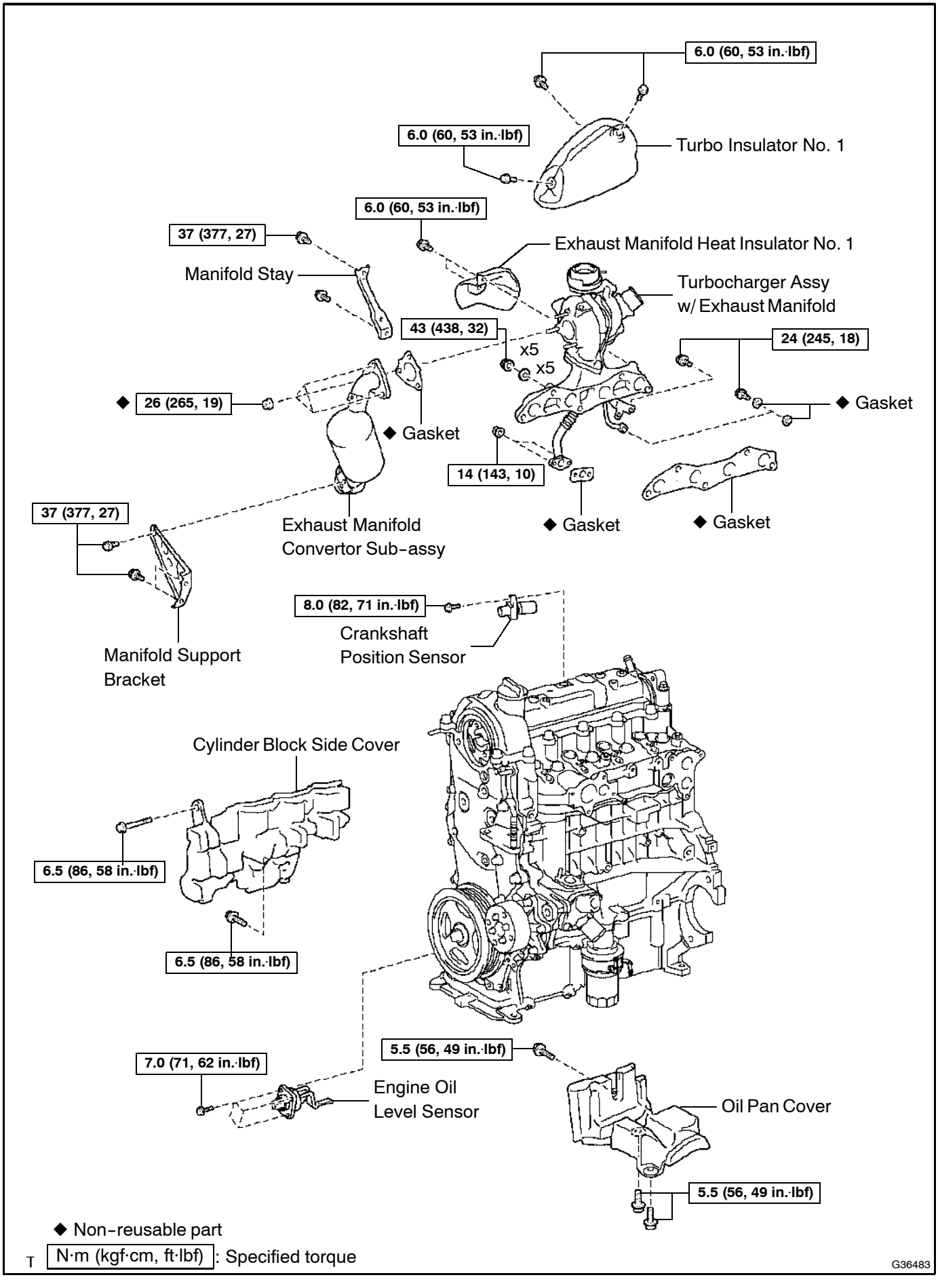


19. INSTALL TURBOCHARGER SUB-ASSY

(a) Install a new gasket onto the turbocharger



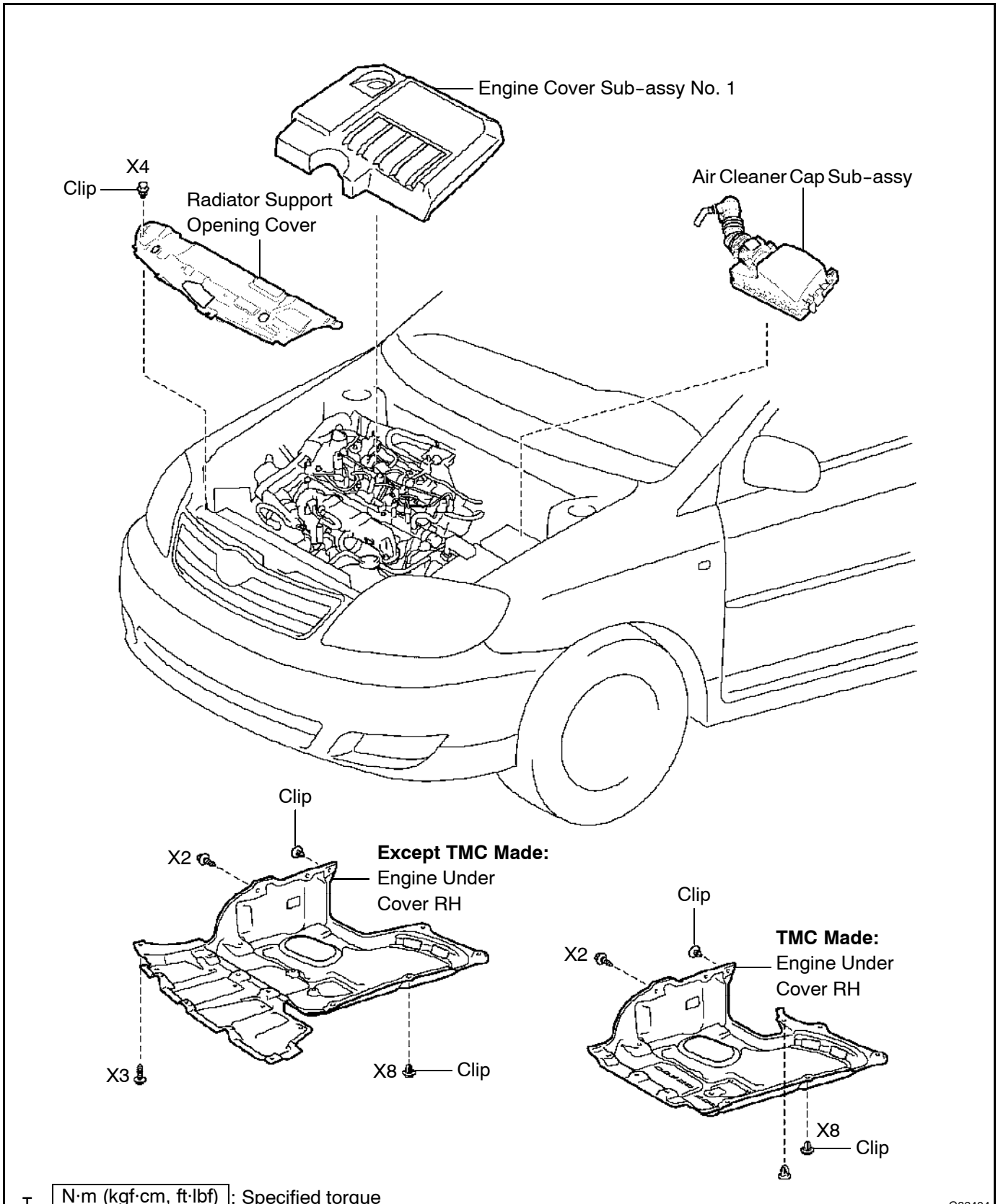
(b) Install a new gasket onto the exhaust manifold.


6.0 (60, 53 in.·lbf)
6.0 (60, 53 in.·lbf)
Turbo Insulator No. 1
6.0 (60, 53 in.·lbf)
37 (377, 27)
Exhaust Manifold Heat Insulator No. 1
Manifold Stay
Turbocharger Assy
w/ Exhaust Manifold
43 (438, 32)
x5
x5
24 (245, 18)
◆ 26 (265, 19)
◆ Gasket
◆ Gasket
14 (143, 10)
◆ Gasket
◆ Gasket
37 (377, 27)
Exhaust Manifold
Convertor Sub-assy
8.0 (82, 71 in.·lbf)
Crankshaft
Position Sensor
Manifold Support
Bracket
Cylinder Block Side Cover
6.5 (86, 58 in.·lbf)
6.5 (86, 58 in.·lbf)
7.0 (71, 62 in.·lbf)
5.5 (56, 49 in.·lbf)
Engine Oil
Level Sensor
Oil Pan Cover
5.5 (56, 49 in.·lbf)
◆ Non-reusable part
T N·m (kgf·cm, ft·lbf): Specified torque
G36483

CAMSHAFT (1ND-TV)

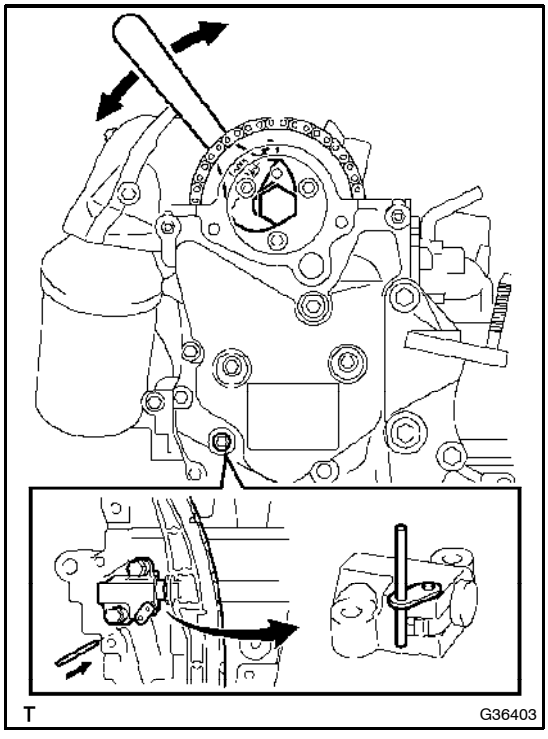
COMPONENTS

141ZT-01



T N·m (kgf·cm, ft·lbf): Specified torque

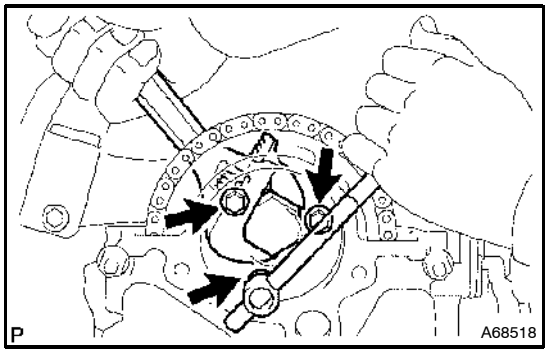
G36404



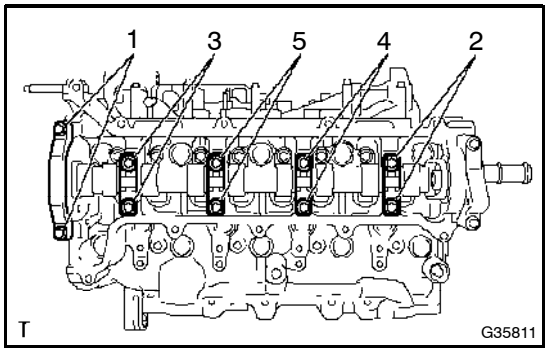
(f) Remove the flathead screwdriver from the chain tensioner service hole. Insert a 2.5 mm (0.098 in.) diameter bar into the hole of the stopper plate with the stopper plate lowered.

HINT:

- The stopper plate can be easily pulled down and an hexagon key wrench can be easily inserted by turning the camshaft counterclockwise slightly and then turning it clockwise again.
- Secure the 2.5 mm (0.098 in.) diameter bar using tape or equivalent to keep it from falling off.



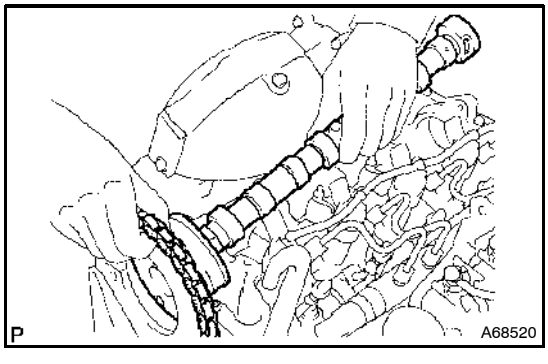
(g) While holding the hexagonal service portion of the camshaft with a wrench, loosen the 3 bolts.



(h) Remove the 10 bolts of the camshaft bearing caps in the sequence shown in the illustration, and then remove the 5 camshaft bearing caps.

NOTICE:

- **Using several steps, uniformly loosen the bolts while keeping the camshaft level.**
- **Take care not to remove the camshaft bearing cap No. 3.**

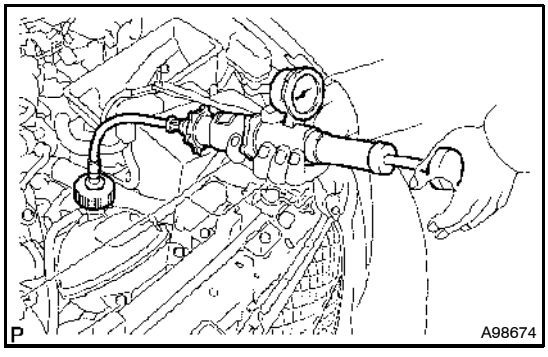


(i) Separate the camshaft timing gear together with the chain in one piece, and remove the camshaft.

COOLING SYSTEM (1ND-TV)

ON-VEHICLE INSPECTION

160ZR-01



1. INSPECT COOLING SYSTEM FOR LEAKS

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Fill the radiator with coolant, then attach a radiator cap tester.

(c) Warm up the engine.

(d) Pump it to 108 kPa (1.1 kgf/cm^2, 15.7 psi), then check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leakage. If there are no signs or traces of external coolant leaks, check the heater core, cylinder block and head.

(e) Reinstall the radiator cap.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant should be between the LOW and FULL lines when the engine is cold.

If low, check for leakage and add Toyota Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology up to the FULL line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check if there are any excessive deposits of rust or scale around the radiator cap and radiator filler hole the coolant should be free of oil.

If excessively dirty, replace the coolant.

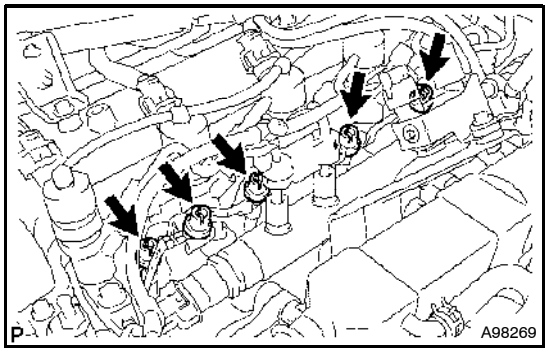
(c) Reinstall the radiator cap.

GLOW PLUG ASSY (1ND-TV)

19125-01

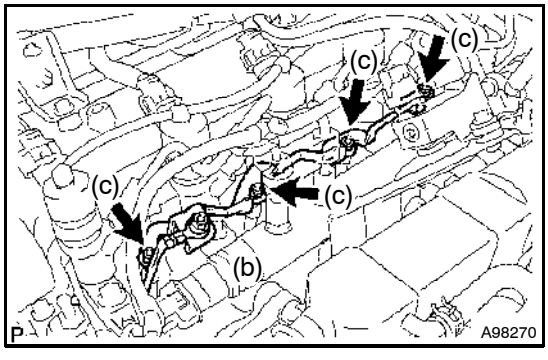
REPLACEMENT

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE ENGINE COVER SUB-ASSY NO.1 (See page 13-17)



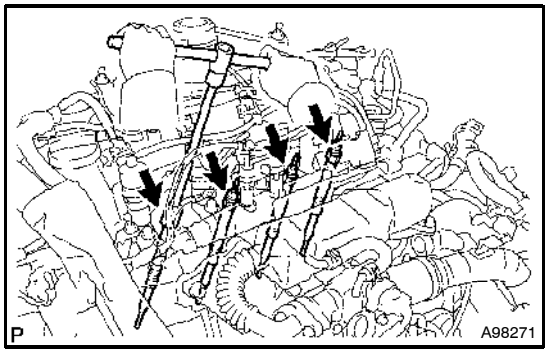
3. REMOVE GLOW PLUG NO.1 CONNECTOR

(a) Remove the 5 screw grommets.



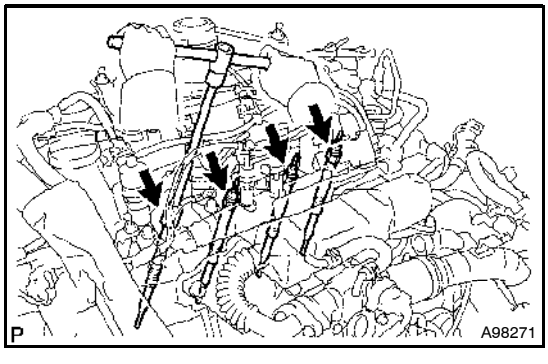
(b) Remove the nut and disconnect the glow terminal.

(c) Remove the 4 nuts and glow plug connector No. 1.



4. REMOVE GLOW PLUG ASSY

(a) Using a deep socket wrench 10 mm, remove the 4 glow plugs.



5. INSTALL GLOW PLUG ASSY

(a) Clean the installation hole of the glow plug of the cylinder head.

(b) Using a deep socket wrench 10 mm, install the 4 glow plugs.

Torque: 12.5 N·m (125 kgf·cm, 9 ft·lbf)