
AIR CONDITIONING

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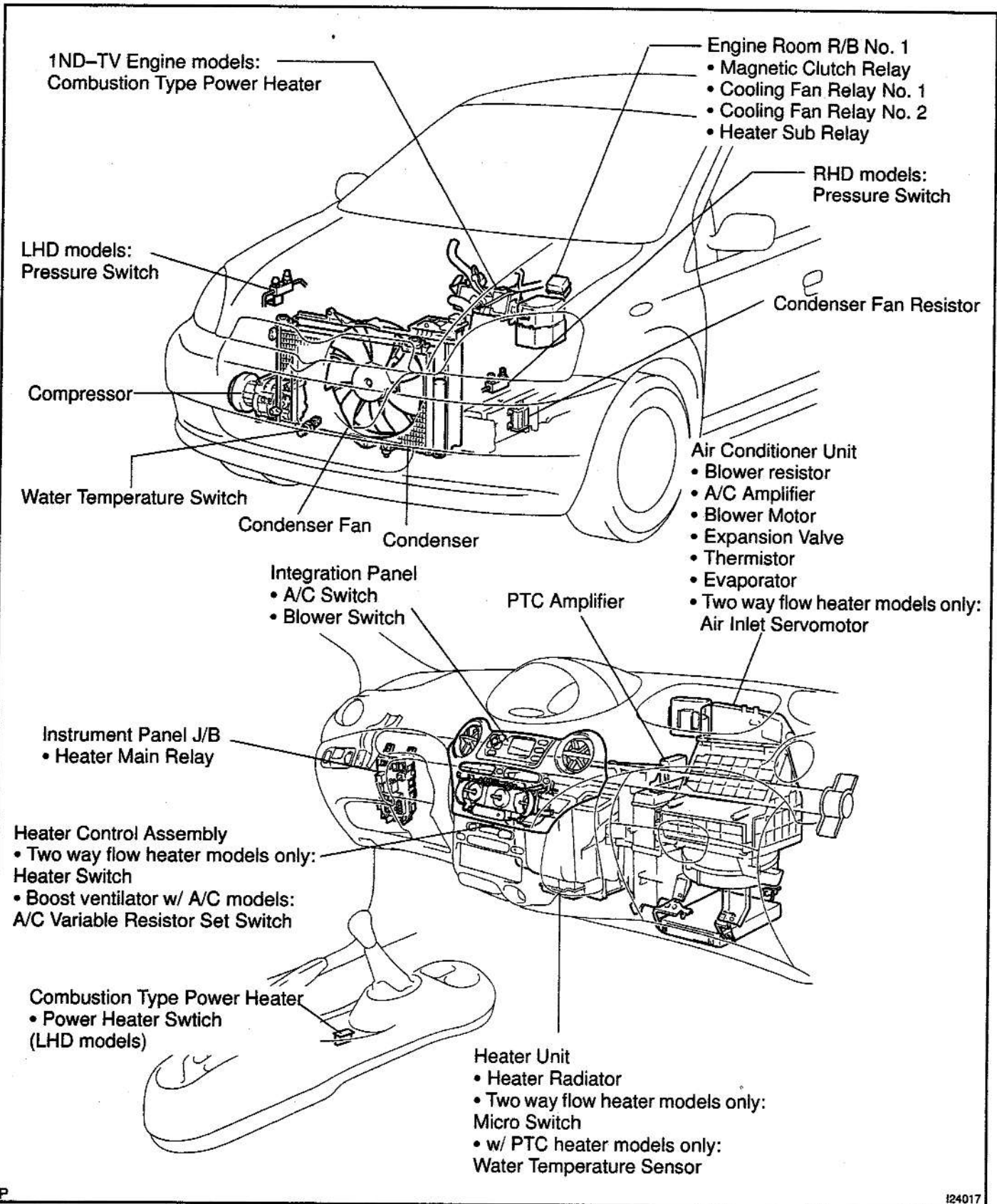
REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

AIR CONDITIONING SYSTEM LOCATION

AC005-13



AC

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

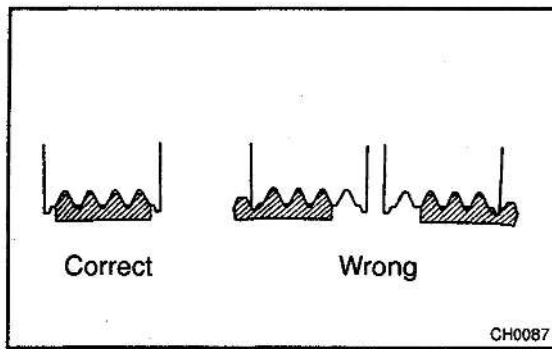
AC27Y-04

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Standard:

Combustion type power heater:

Symptom	Suspect Area	See page
Combustion type power heater does not function.	Combustion power heater	AC-10



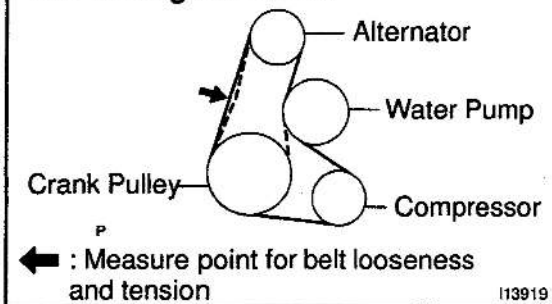
DRIVE BELT ON-VEHICLE INSPECTION

AC3N2-01

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that the drive belt fits properly in the ribbed grooves.

1ND-TV Engine models:



2. INSPECT DRIVE BELT DEFLECTION

(a) Using a belt tension gauge, apply load of 98 N (10 kgf, 22 lbf).

(b) Measure drive belt deflection.

Drive belt deflection:

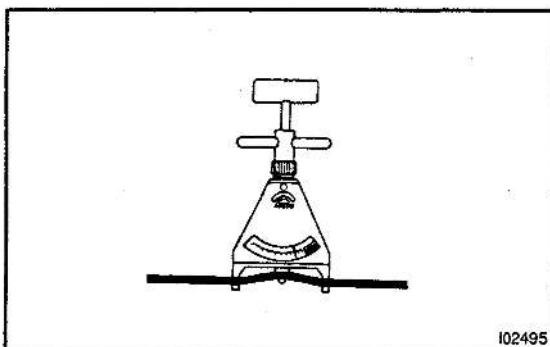
New belt: 7.0 – 8.5 mm (0.28 – 0.33 in.)

Used belt: 11.0 – 13.0 mm (0.43 – 0.51 in.)

HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.

AC



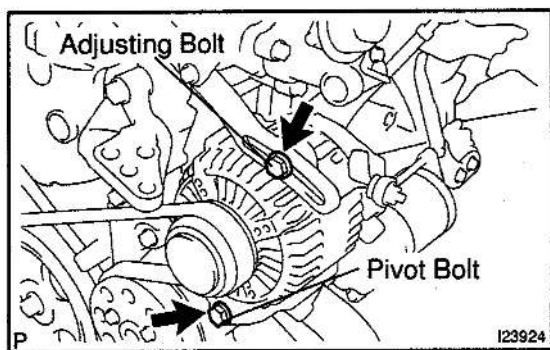
3. INSPECT DRIVE BELT TENSION (Reference)

Using a belt tension gauge, check the drive belt tension.

Drive belt tension:

New belt: 882 – 1078 N (90 – 100 kgf)

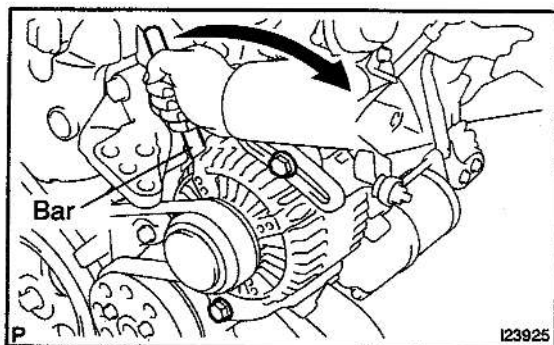
Used belt: 392 – 588 N (40 – 60 kgf)



REMOVAL

REMOVE DRIVE BELT

- (a) Loosen the pivot bolt.
- (b) Loosen the drive belt tension by turning adjusting bolt and remove the drive belt.



INSTALLATION

INSTALL DRIVE BELT

(a) Install the drive belt.

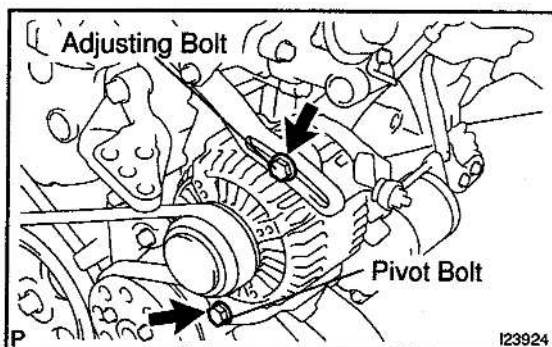
(b) Apply drive belt tension.

Insert the bar between the engine RH mount bracket and the alternator, and pull it forward to make the adjust.

Drive belt deflection:

New belt: 7.0 – 8.5 (0.28 – 0.33 in.)

Used belt: 11.0 – 13.0 (0.43 – 0.51 in.)



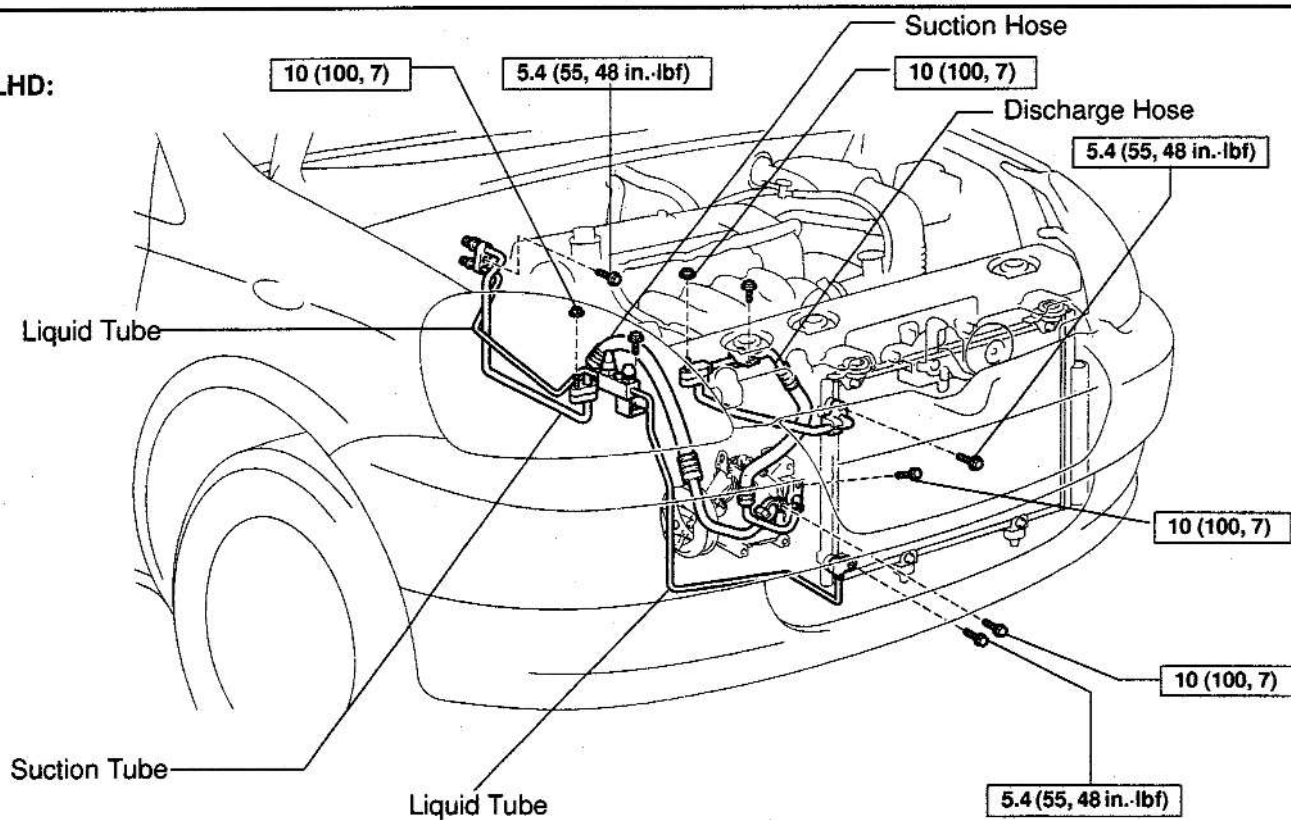
(c) Tighten the pivot bolts.

Torque: 54 N·m (540 kgf·cm, 39 ft·lbf)

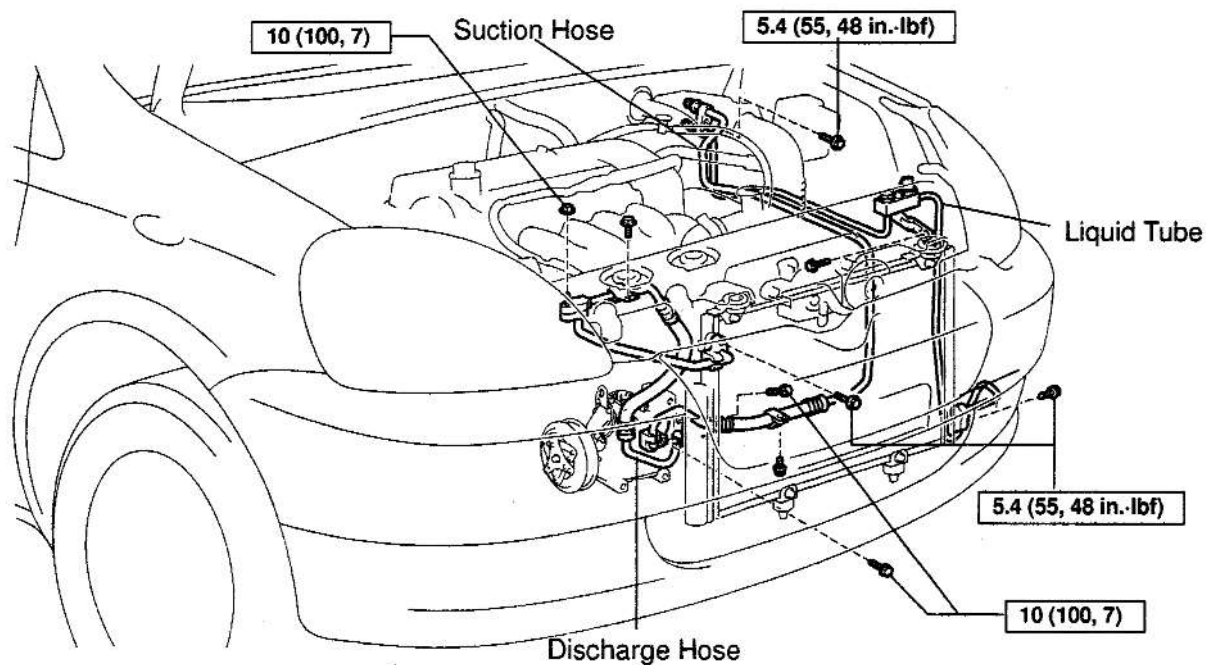
REFRIGERANT LINE COMPONENTS

AC282-05

LHD:



RHD:



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

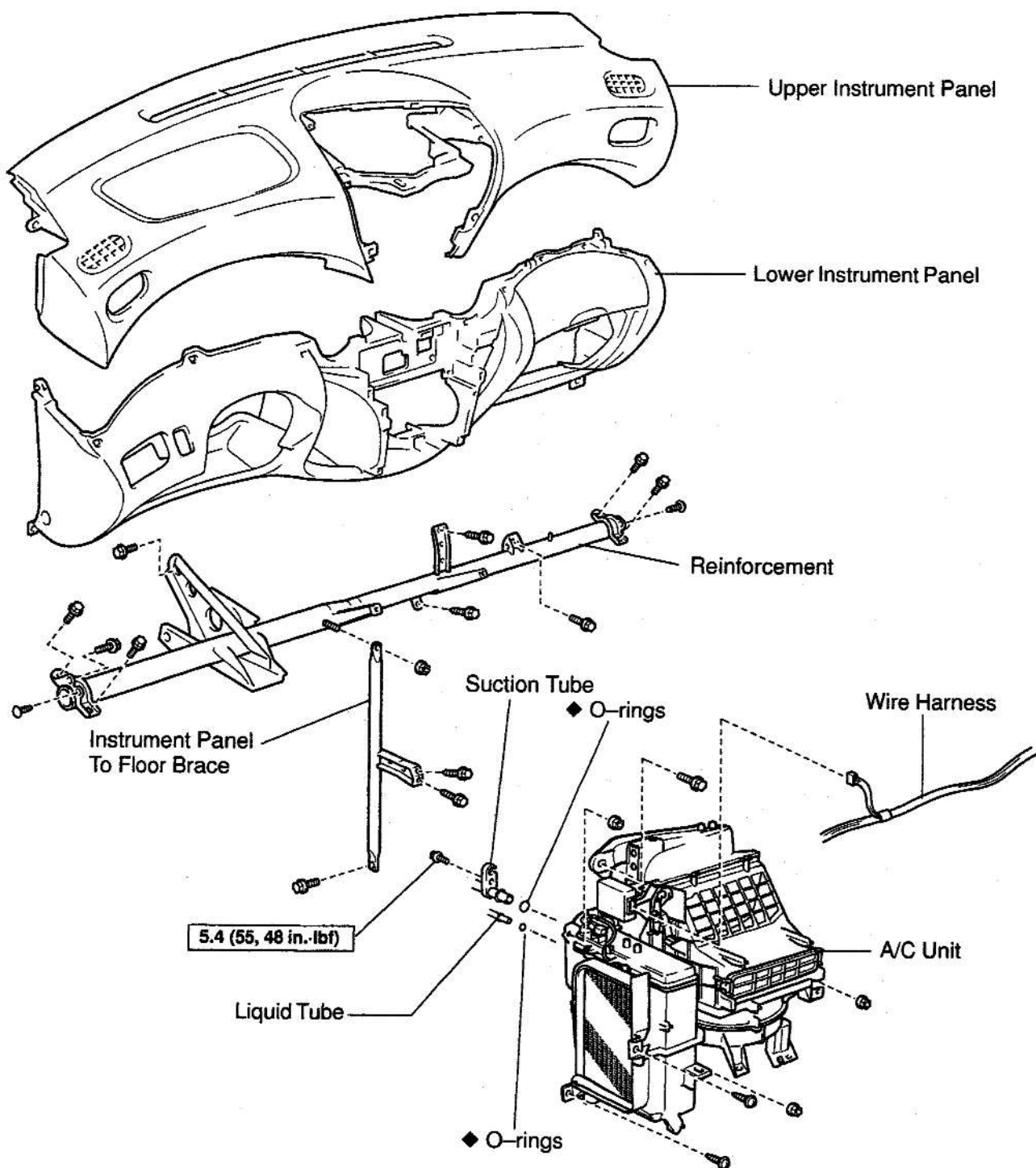
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AIR CONDITIONER UNIT COMPONENTS

AC3NS-01

AC



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

◆ Non-reusable part

123916

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

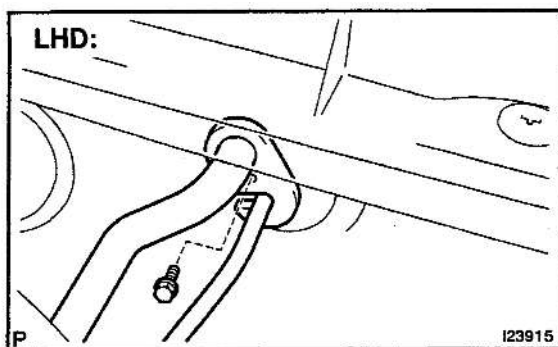
HINT:

At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 430 ± 30 g (15.17 ± 1.06 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBES

- Remove the grommet.
- Remove the bolt and slide the plate, then disconnect the both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)

NOTICE:

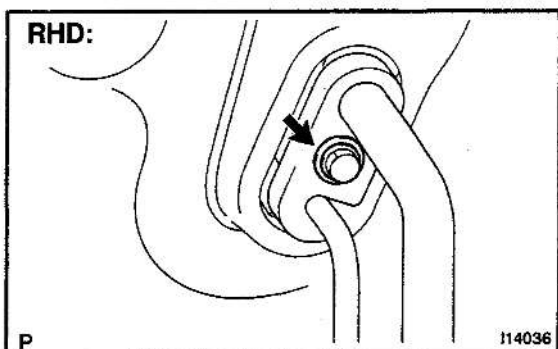
Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, please refer to the following item.

Lubricate 2 new O-rings with compressor oil and install them to the tube.

3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT



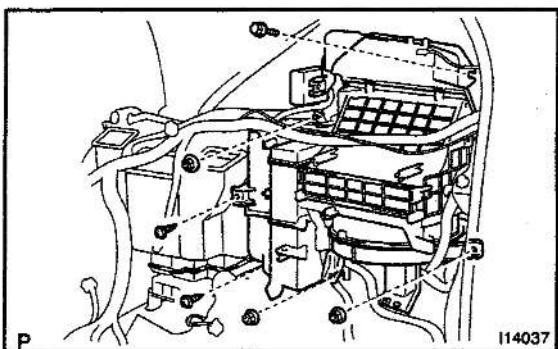
4. REMOVE A/C UNIT

- Disconnect the connectors.
- Disconnect the wire harness clamps.
- Remove the 2 bolts, nut, rivet and A/C unit.

HINT:

At the time of installation, please refer to the following item.

Do not reuse the rivet.



INSTALLATION

Installation is in the reverse order of removal (See page AC-8).

COMBUSTION TYPE POWER HEATER

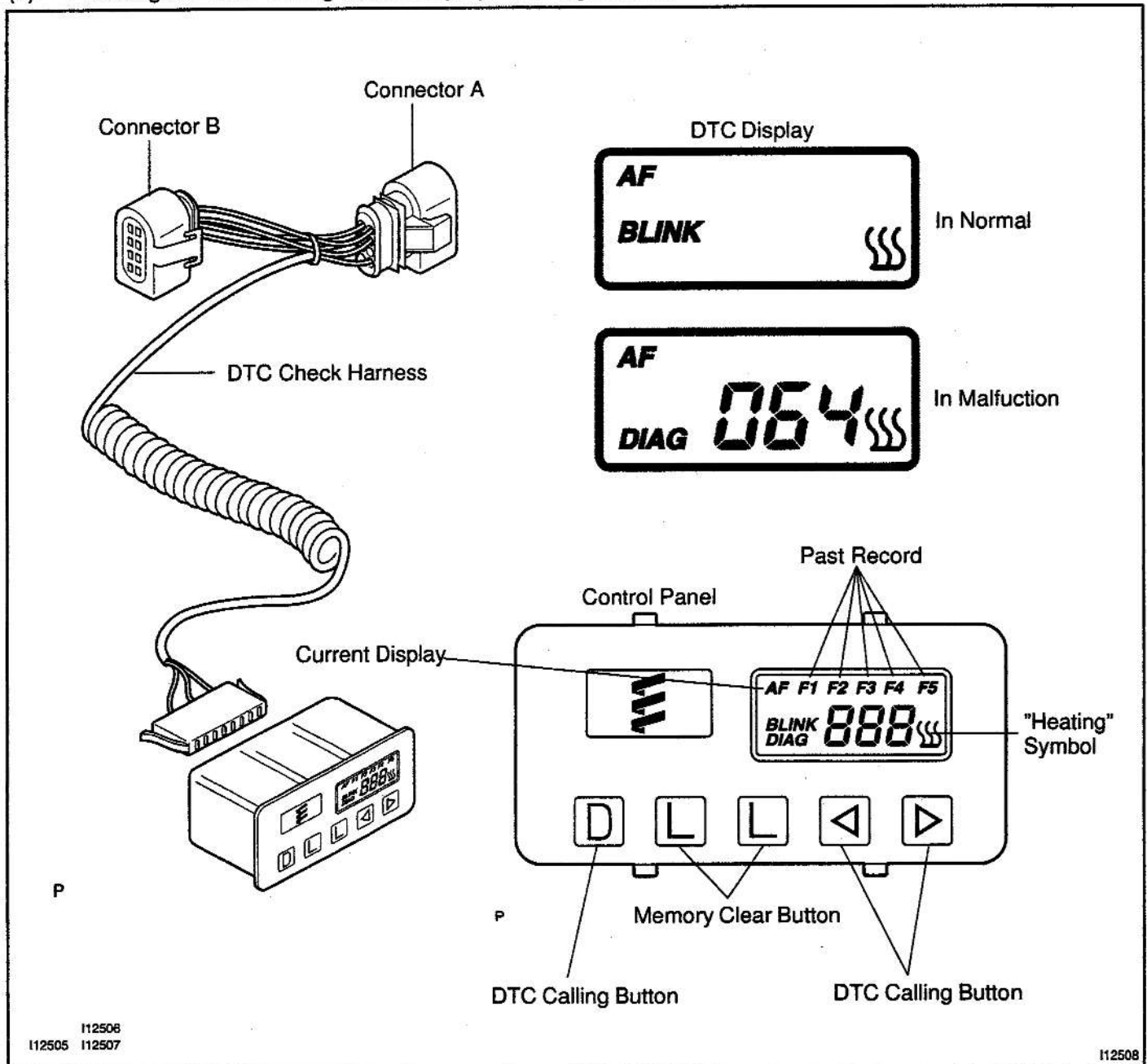
ON-VEHICLE INSPECTION

NOTICE:

- If the glow plug breaks, the ECU detects the breakage and stops the automatic operation, so the burner heater does not activate. (For other failures, similarly activated.)
- The cause of failures (such as voltage malfunction, overheating malfunction, short-circuit or breakage of functional components, etc.) and how to remedy are shown by connecting the DTC tester and reading the DTC.

1. DIAGNOSTICS FUNCTION

- Connect the DTC tester between the connector A (Vehicle harness) of DTC check harness and connector B (Power heater harness).
- Start the engine.
- Pressing the DTC calling button displays a 3-digit number DTC.



5. DIAGNOSTIC TROUBLE CODE CHART

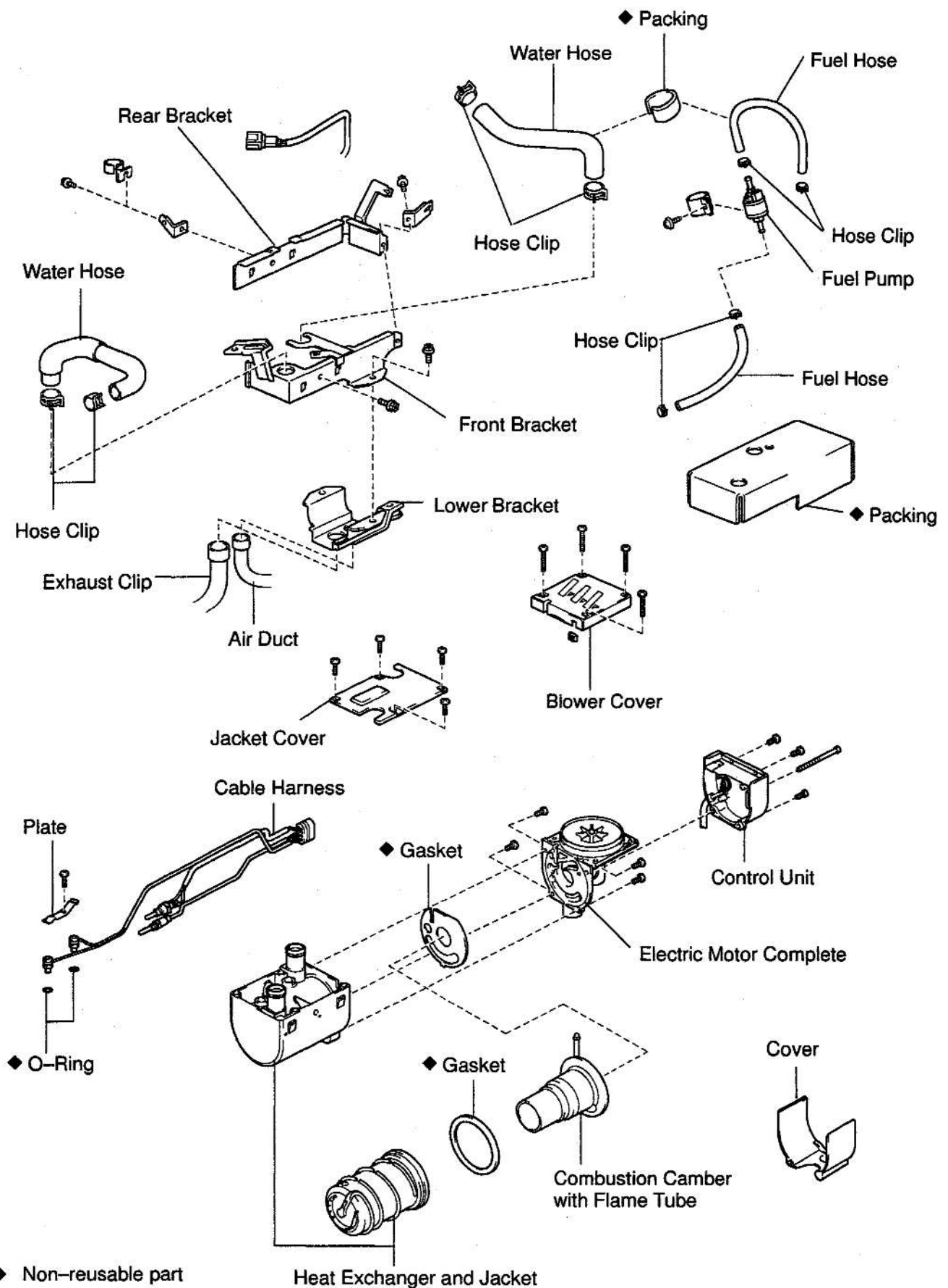
If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

DTC No.	Description of fault	Comment / Remedy
000	No malfunction	—
010	Overvoltage shutoff	Voltage between 1 and 5 at connector A > 16 V
011	Undervoltage shutoff	Voltage between 1 and 5 at connector A < 10.2 V (Voltage values must be present > 20 seconds) Check battery, regulator and electrical leads.
012	Overheating	Check temperature at temperature or overheating sensor > 125°C. Check water circuit.
014	Possible overheating detected (Hardware threshold value)	Difference of measured values at temperature sensor > 15°C (min. 70°C water temperature and metering pump in operation); Check temperature sensor and overheating sensor, replace if necessary.
017	Overheating detected (Hardware threshold value)	Temperature at temperature or overheating sensor > 130°C, emergency OFF if DTC No. 012 or 014 not applicable; Check water circuit, check temperature sensor and overheating sensor, replace if necessary.
020	Glow plug break	Check glow plug, replace if necessary.
021	Glow plug output overload	Check glow plug, replace if necessary.
030	Combustion air blower motor EMF outside perm. range.	Blower impeller or burner motor jammed (frozen solid, dirty, etc.) Remedy jam, replace burner motor if necessary.
031	Combustion air blower motor break	Check lead to combustion air motor (burner motor) for continuity, replace if necessary.
032	Combustion air blower motor short-circuit	Check combustion air blower motor (burner motor), replace if necessary. Check supply lead (chafed, etc.).
047	Metering pump short-circuit	Check supply lead to metering pump for short-circuit, check metering pump, replace if necessary.
048	Metering pump break	Check supply lead to metering pump for continuity, remedy break, replace metering pump if necessary.
051	Cold blow time exceeded	At start, if flame sensor above 70°C > 240 sec.; Check exhaust gas combustion air supply, check flame sensor, replace if necessary.
052	Safety time exceeded	When all perm. start attempts used up; Check fuel delivery and fuel supply. Check exhaust gas and combustion air ducts.
054	Flame cutout, HIGH setting	Check fuel delivery and fuel supply. Check exhaust gas and combustion air ducts.
056	Flame cutout, LOW setting	If combustion OK → Check flame sensor, replace if necessary.
060	Temperature sensor break	Check connecting leads. Resistance value between 6 and 13 at connector B > 2 MΩ (If break)
061	Temperature sensor short-circuit	Check connecting leads. Resistance value between 6 and 13 at connector B < 2 MΩ (If short-circuit)

AIR CONDITIONING - COMBUSTION TYPE POWER HEATER

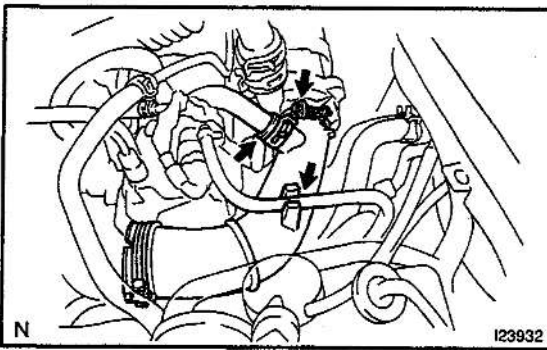
DTC No.	Description of fault	Comment / Remedy
064	Flame sensor break	Check connecting leads. Resistance value between 7 and 14 at connector B > 3,040 Ω (If break)
065	Flame sensor short-circuit	Check connecting leads. Resistance value between 7 and 14 at connector B > 780 Ω (If short-circuit)
071	Overheating sensor break	Check connecting leads. Resistance value between 5 and 12 at connector B > 2M Ω (If break)
072	Overheating sensor short-circuit	Check connecting leads. Resistance value between 5 and 12 at connector B < 50 Ω (If short-circuit)
090 092 093	Control unit detectice (Internal fault / Reset) Control unit detective (ROM error) Control unit detective (RAM error)	Control unit malfunction due to interference voltage from vehicle electrical system; Possible causes low batteries, chargers, other sources of interference; eliminate interference voltages. Internal faults detected in microprocessor / memory detected. Replace control unit.
097	Internal control unit faults	Other faults which cannot lead to DTC No.90, 92 and 93, replace control unit.

COMPONENTS

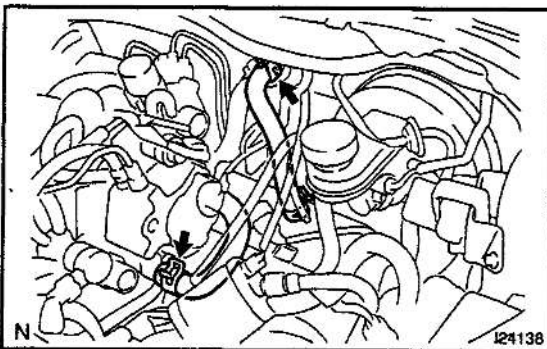


REMOVAL

1. DRAIN ENGINE COOLANT
2. REMOVE HOOD
3. REMOVE WIPER ARM
4. REMOVE COWL TOP VENTILATOR LOUVER
5. REMOVE WIPER MOTOR ASSEMBLY
6. REMOVE OUTER FRONT COWL TOP PANEL
7. REMOVE AIR CLEANER CASE ASSEMBLY WITH AIR HOSE
8. REMOVE BATTERY
9. REMOVE ENGINE UNDER COVER

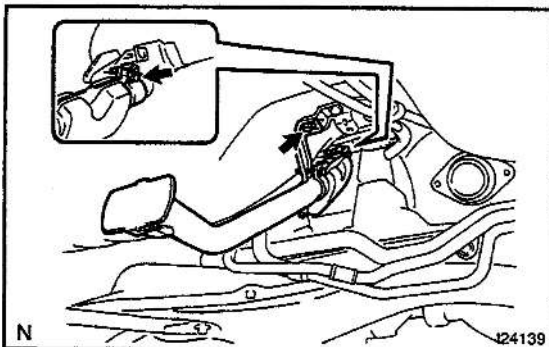


10. REMOVE AIR HOSE



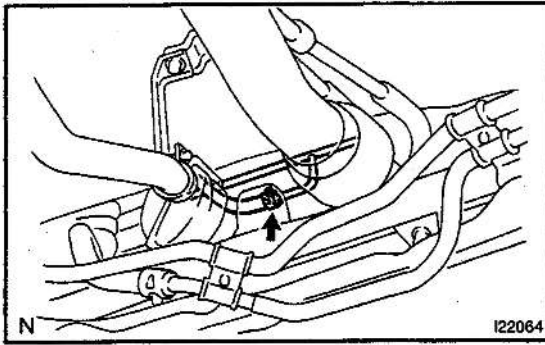
11. DISCONNECT WATER HOSES

- (a) Using pliers, grip the claws of hose clip and slide the hose clip along the hose.
- (b) Disconnect the water hose from heater radiator.
- (c) Disconnect the water hose from cylinder head.

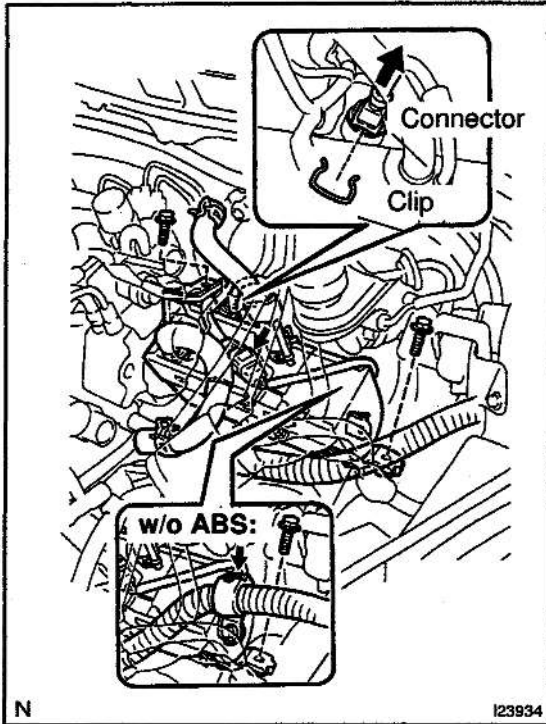


12. REMOVE EXHAUST PIPE

Remove the 2 bolts and exhaust pipe.

**13. DISCONNECT FUEL HOSES**

- (a) Using pliers, grip the claws of hose clip and slide the hose clip along the hose.
- (b) Disconnect the fuel hose.

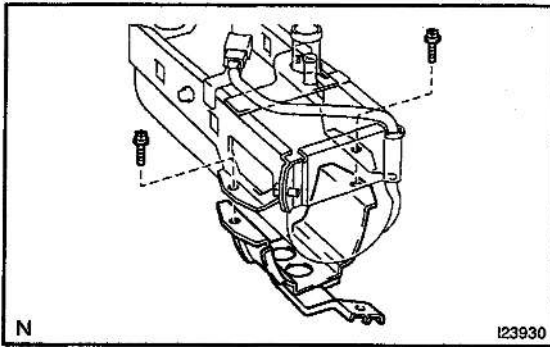
14. DISCONNECT INTAKE HOSE**15. REMOVE COMBUSTION TYPE POWER HEATER**

- (a) Disconnect the wire harness clamp.
- (b) Disconnect the connectors.
- (c) Disconnect the air duct
- (d) Remove the 2 nuts and combustion type power heater.

DISASSEMBLY

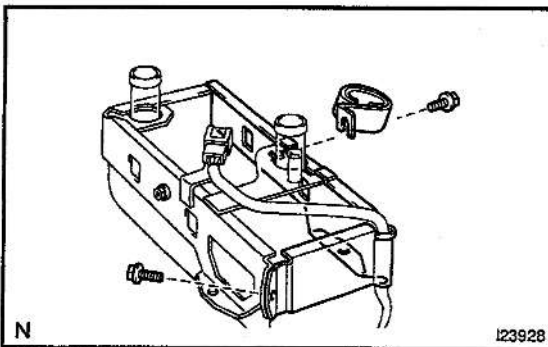
1. REMOVE WATER HOSES

- (a) Remove the packing.
- (b) Using pliers, grip the claws of the hose clip and slide the hose clip along the hose.
- (c) Pull out the water hoses.



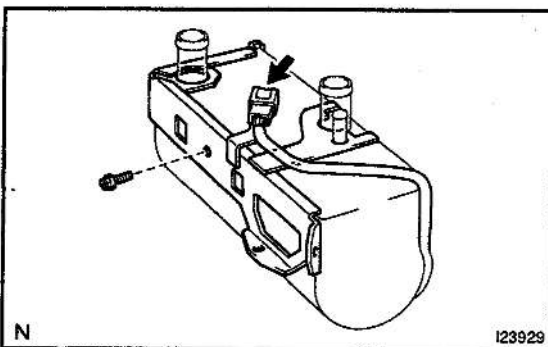
2. REMOVE LOWER BRACKET

Remove the 2 bolts and lower bracket.



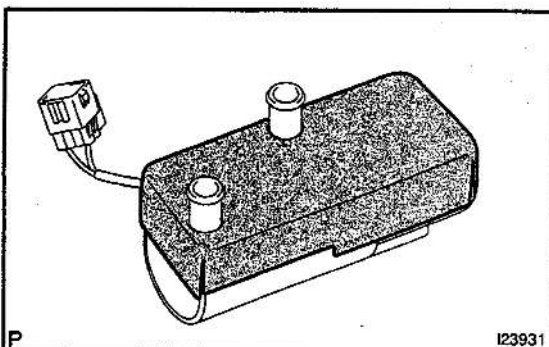
3. REMOVE REAR BRACKET

Remove the 2 bolts and rear bracket.

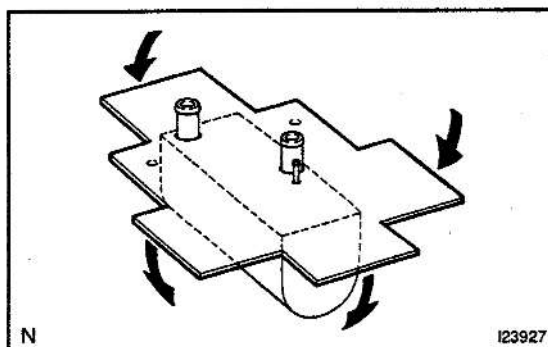


4. REMOVE FRONT BRACKET

- (a) Disconnect the connector clamp.
- (b) Remove the 2 bolts and front bracket.

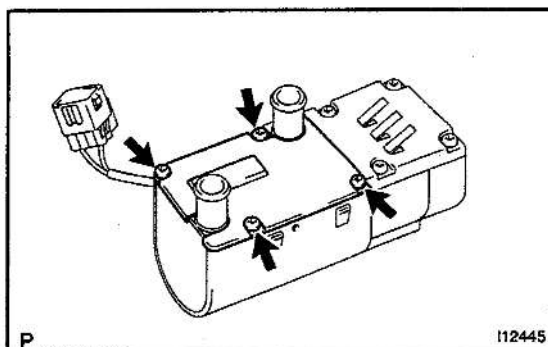


5. REMOVE PACKING

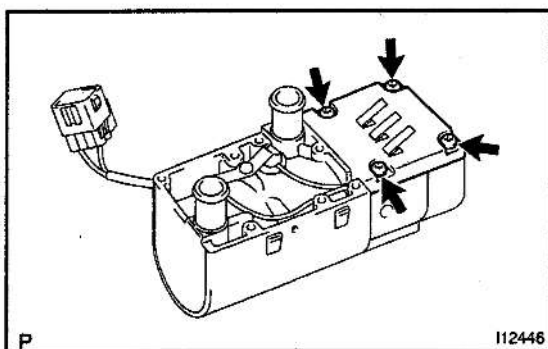
**HINT:**

At the time of reassembly, please refer to the following items.

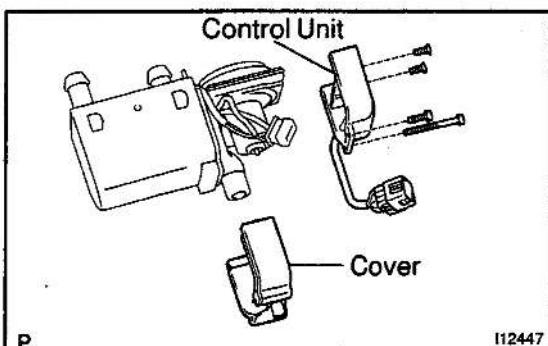
- Clean the face of combustion type power heater.
- Install a new packing on combustion type power heater upper face.
- Following the procedures shown in the illustration, apply the packing to side face of combustion type power heater.

**6. REMOVE JACKET COVER**

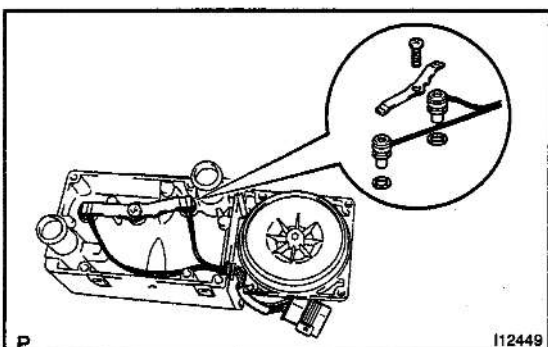
Remove the 4 screws and jacket cover.

**7. REMOVE BLOWER COVER**

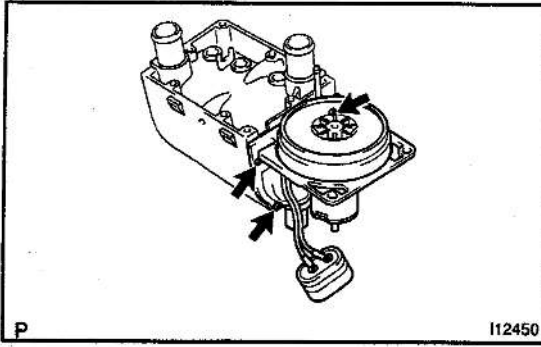
Remove the 4 screws and blower cover.

**8. REMOVE CONTROL UNIT AND COVER**

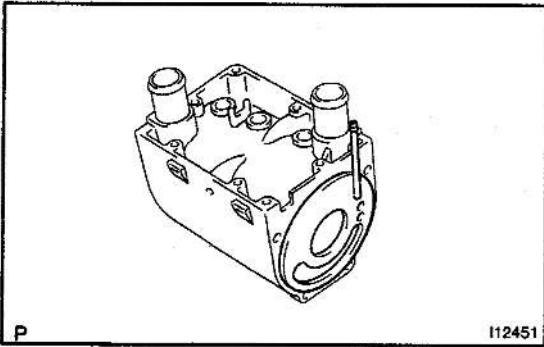
- Remove the 2 screws.
- Remove the 2 hexagon screws.
- Remove the control unit and cover.

**9. REMOVE CABLE HARNESS**

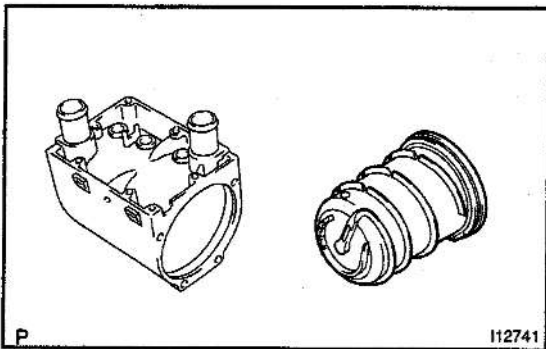
- Remove the screw and plate.
- Remove the water temperature sensor and overheat sensor.

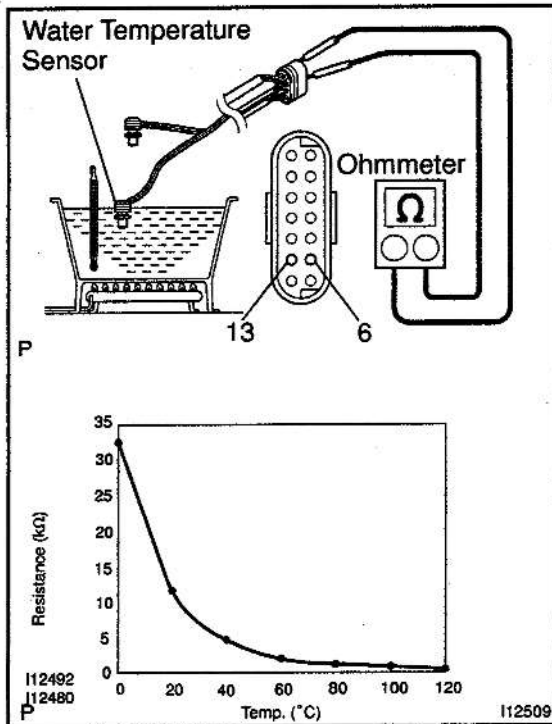
**10. REMOVE ELECTRIC MOTOR**

- (a) Remove the 3 screws and the electric motor.
- (b) Remove the gasket.

**11. REMOVE COMBUSTION CHAMBER WITH FLAME TUBE**

Remove the combustion chamber and gasket.

**12. REMOVE HEAT EXCHAMBER**



INSPECTION

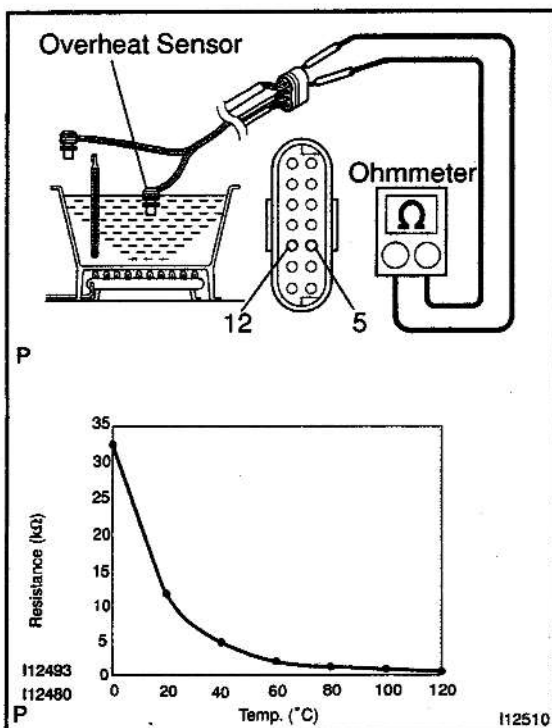
1. INSPECT WATER TEMPERATURE SENSOR

Measure the resistance between the terminals 6, 13.

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the water temperature sensor.



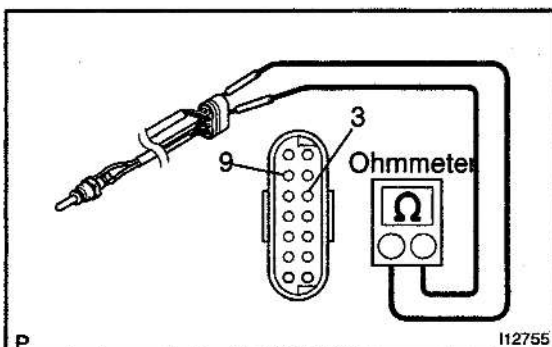
2. INSPECT OVERHEAT SENSOR

Measure the resistance between the terminal 5, 12.

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the over heat sensor.

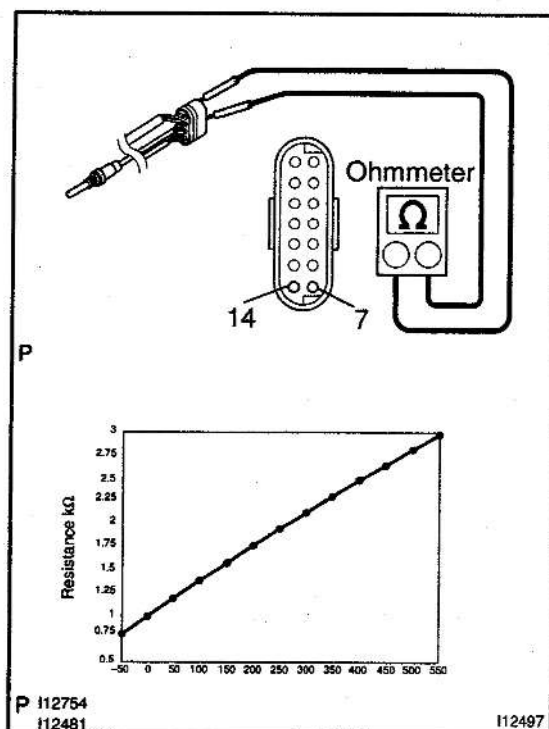


3. INSPECT GLOW PLUG

Using an ohmmeter, check that there is continuity, between the glow plug terminal 3, 9.

Standard resistance: about 0.5 Ω (20°C, reference valve)

If resistance is over 1Ω, replace the glow plug.

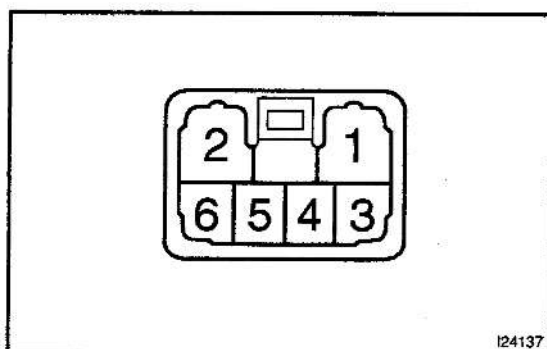


4. INSPECT FLAME SENSOR

Measure the resistance between the terminal 7, 14.

Resistance: Refer to the graph

If the resistance is not as specified, replace the water temperature sensor.



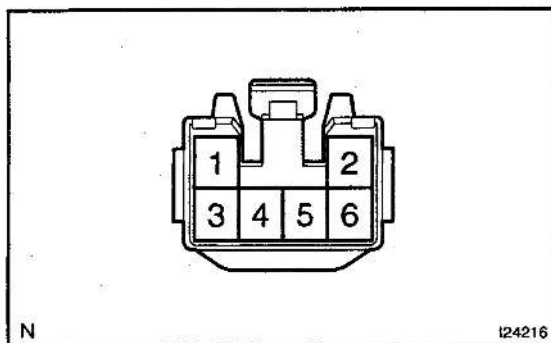
5. INSPECT POWER HEATER SWITCH CIRCUIT

- (a) Disconnect the connector from the power heater switch and inspect the connector on the wire harness side, as shown in the chart.

Tester connection	Condition	Specified condition
2 - Ground	Constant	Continuity
4 - Ground	Constant	Continuity
1 - Ground	Turn ignition switch ON	Battery voltage
1 - Ground	Turn ignition switch OFF	No voltage
3 - Ground	Turn light control switch TAIL or HEAD	Battery voltage
3 - Ground	Turn light control switch OFF	No voltage

If the circuit is as specified, replace the power heater switch.

If the circuit is not as specified, inspect the circuits connected to other parts.



- (b) Connect the connector to the power heater switch and inspect the connector from the back side, as shown in the chart.

Tester connection	Condition	Specified condition
6 – Ground	Turn ignition switch ON and power heater switch ON	Battery voltage
6 – Ground	Turn ignition switch ON and power heater switch ON	No voltage

If the circuit is not as specified, replace the power heater switch.

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC-17).

INSTALLATION

Installation is in the reverse order of removal (See page AC-15).

COMPRESSOR AND MAGNETIC CLUTCH

ON-VEHICLE INSPECTION

AC2ND-01

1. INSPECT COMPRESSOR FOR METALLIC SOUND

Check there is abnormal metallic sound from the compressor when the A/C switch is ON.

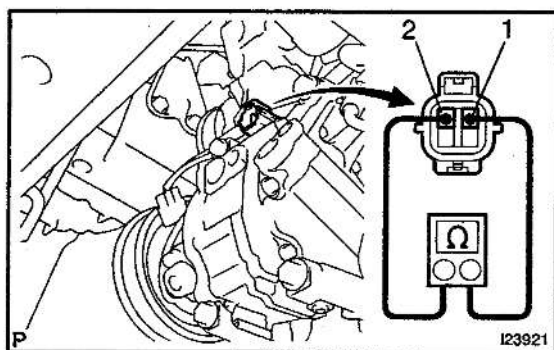
If abnormal metallic sound is heard, replace the compressor assembly.

2. INSPECT REFRIGERANT PRESSURE

(See Pub. No. RM RM685E on page AC-3)

3. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant. If there is any leakage, replace the compressor assembly.



4. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure resistance between terminals 1 and 2.

Standard resistance: 65 – 125 Ω at 20 °C (68 °F)

If resistance is not as specified, replace the sensor.

5. CHECK FOR LEAKAGE OF GREASE FROM CLUTCH BEARING

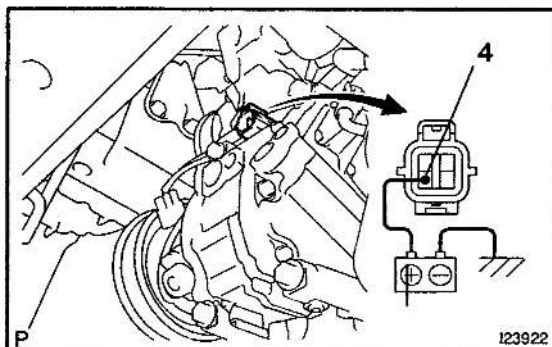
6. CHECK FOR SIGNS OF OIL ON PRESSURE PLATE OR ROTOR

7. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start engine.

(b) Check for abnormal noise from the compressor when the A/C switch is OFF.

If abnormal noise is being emitted, replace the magnetic clutch.



8. INSPECT MAGNETIC CLUTCH OPERATION

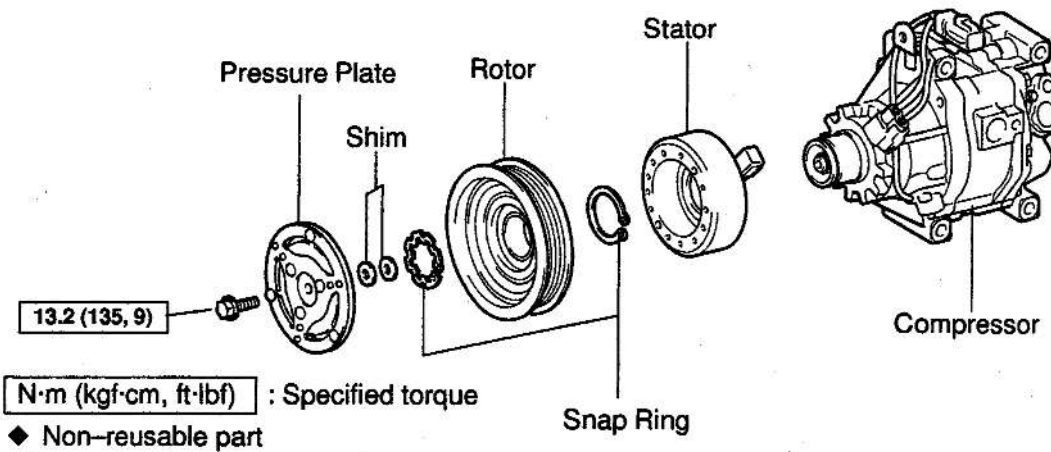
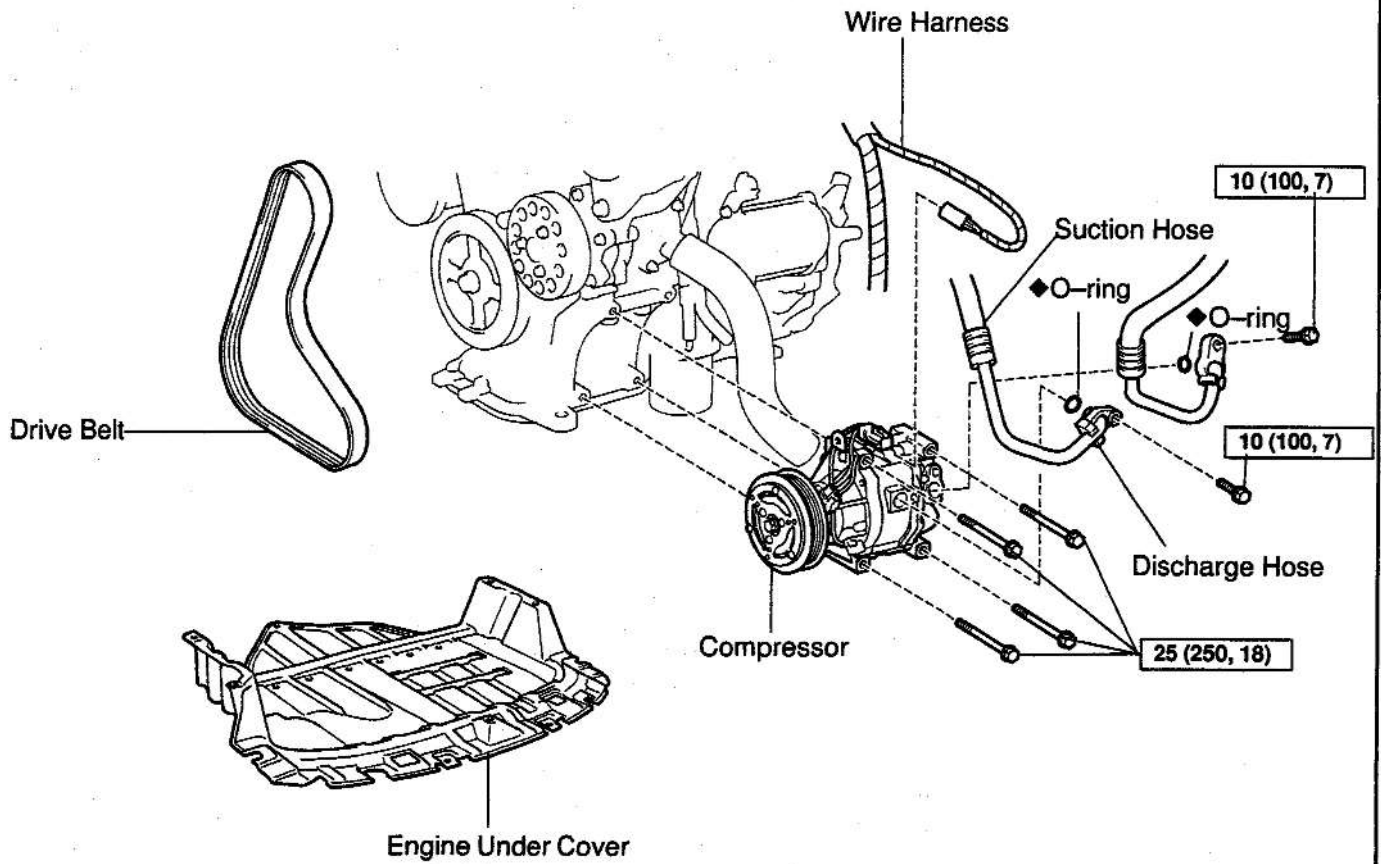
(a) Disconnect the connector.

(b) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to the body ground.

(c) Check that the magnetic clutch energized.

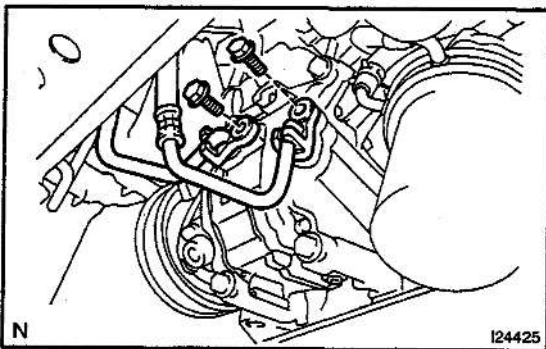
If operation is not as specified, replace the magnetic clutch.

COMPONENTS



REMOVAL

1. RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES
2. STOP ENGINE
3. DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY
4. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM
5. REMOVE ENGINE UNDER COVER
6. DISCONNECT DRIVE BELT (See page AC-4)

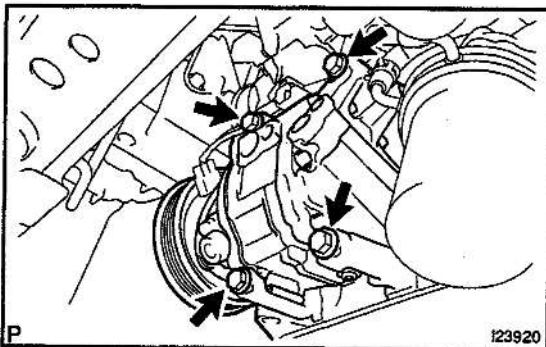


7. DISCONNECT DISCHARGE AND SUCTION HOSES FROM COMPRESSOR

Remove the 2 bolts and disconnect the both hoses.

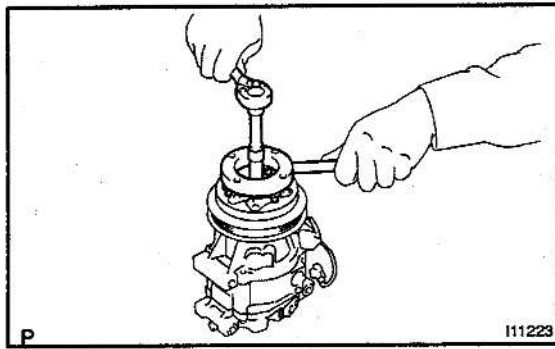
NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.



8. REMOVE COMPRESSOR

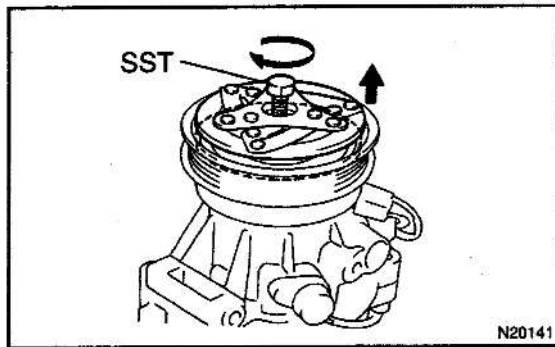
- (a) Disconnect the connector.
- (b) Disconnect the wire harness clamp.
- (c) Remove the 4 bolts and compressor.



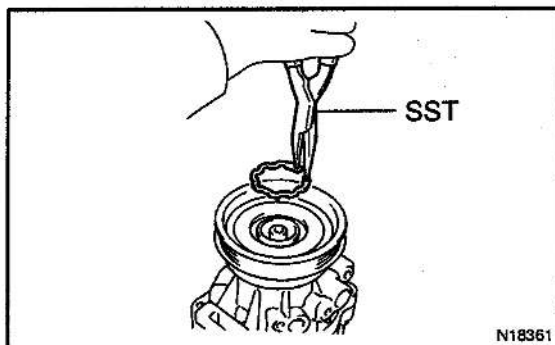
DISASSEMBLY

1. REMOVE PRESSURE PLATE

- (a) Using SST and a socket wrench, remove the shaft bolt.
SST 07112-76050
Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)

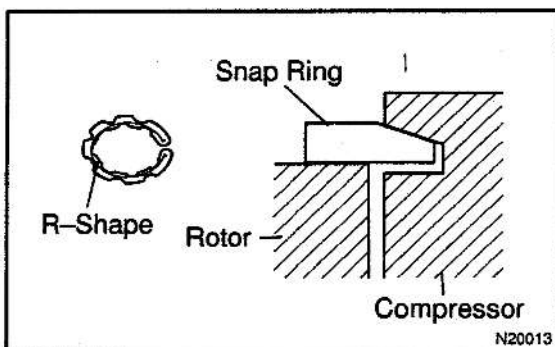


- (b) Install SST to the pressure plate.
SST 07112-66040
(c) Using SST and a socket wrench, remove the pressure plate.
SST 07112-76050, 07112-66040
(d) Remove the shims from the shaft.



2. REMOVE ROTOR

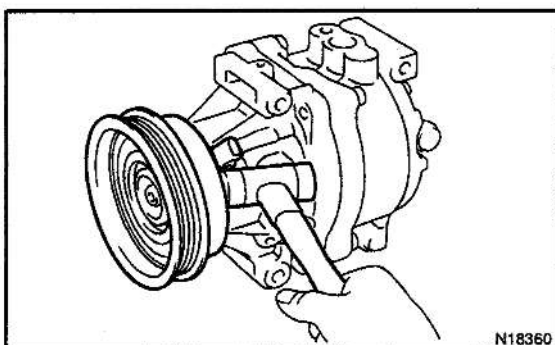
- (a) Using SST, remove the snap ring.
SST 95994-10020



NOTICE:

At the time of reassembly, please refer to the following item.

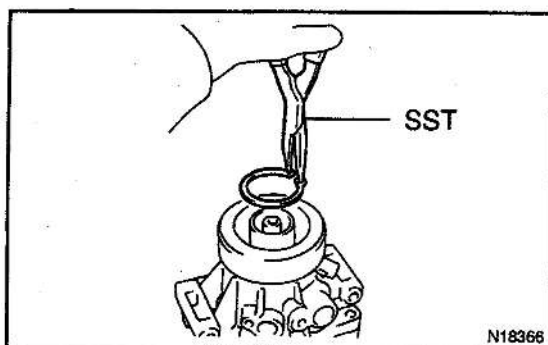
The snap ring should be installed so that its beveled side faces up.



- (b) Using a plastic hammer, tap the rotor off the shaft.

NOTICE:

Be careful not to damage the pulley when tapping on the rotor.



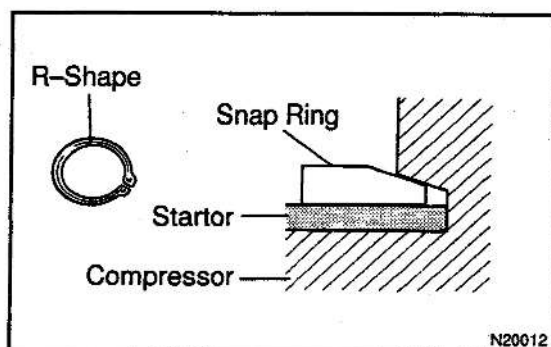
3. REMOVE STATOR

- (a) Disconnect the connector from the stator.
- (b) Using SST, remove the snap ring.
SST 95994-10020

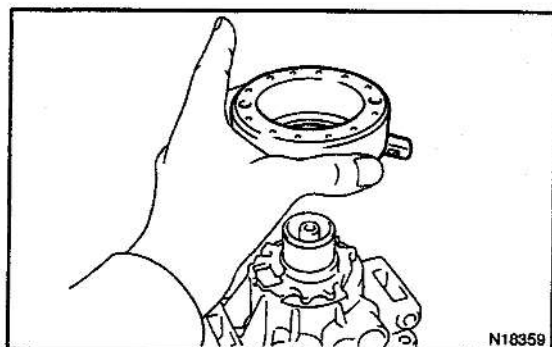
NOTICE:

At the time of reassembly, please refer to the following item.

The snap ring should be installed so that its beveled side faces up.

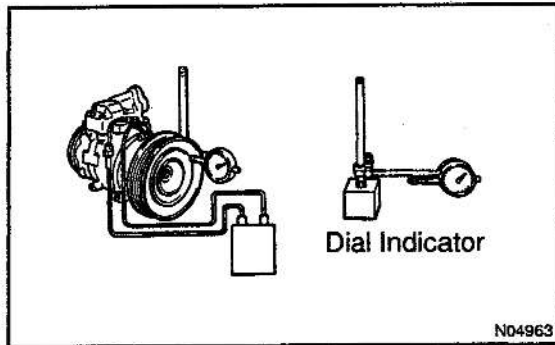


- (c) Remove the stator.



REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC-28).



CHECK CLEARANCE OF MAGNETIC CLUTCH

HINT:

After reassembly, check the magnetic clutch clearance.

- Set the dial indicator to the pressure plate of the magnetic clutch.
- Connect the magnetic clutch lead wire to the positive (+) terminal of the battery.
- Check the clearance between the pressure plate and rotor when connecting the negative (–) terminal to the battery.

Standard clearance:

$0.5 \pm 0.15 \text{ mm}$ ($0.020 \pm 0.0059 \text{ in.}$)

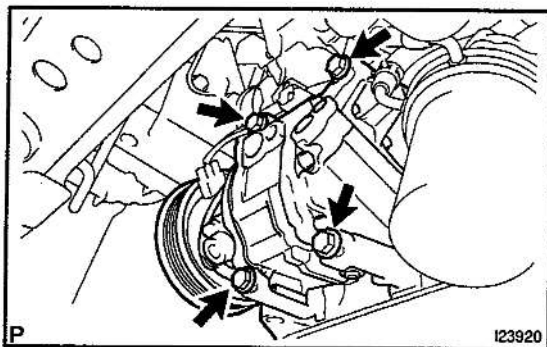
If the clearance is not within the standard clearance, adjust the clearance using shims to obtain the standard clearance.

Shim thickness:

0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

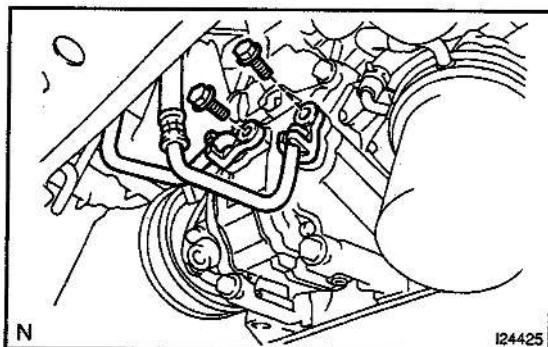
0.5 mm (0.020 in.)



INSTALLATION

1. INSTALL COMPRESSOR

- (a) Install the compressor with 4 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Connect the connector.



2. CONNECT DISCHARGE AND SUCTION HOSES FROM COMPRESSOR

- (a) Lubricate 2 new O-rings with compressor oil and install them to the both hoses.
- (b) Connect the both hoses with 2 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:

Hoses should be connected immediately after the caps have been removed.

3. CONNECT DRIVE BELT (See page AC-5)

4. INSTALL ENGINE UNDER COVER

5. CHARGE SYSTEM WITH REFRIGERANT

- (a) Evacuate air from refrigeration system.
- (b) Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 430 ± 30 g (15.17 ± 1.06 oz.)

6. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant. If there is leakage, check the tightening torque at the joints.

7. INSPECT A/C OPERATION

