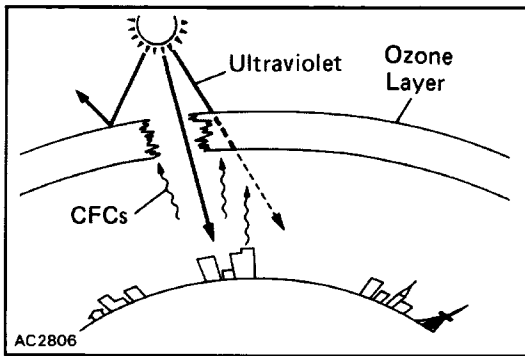


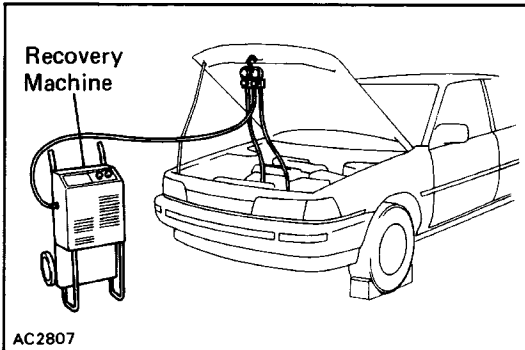
AIR CONDITIONING SYSTEM



GENERAL INFORMATION

REFRIGERATION SYSTEM

Prevention of Refrigerant Release and Excessive quantities Refrigerant (CFCs) for automobile air conditionings is believed to cause harm by depleting the ozone layer which helps to protect us from the ultraviolet rays of the sun. Therefore, it is necessary to prevent release of refrigerant to the atmosphere and to use the minimum amount when servicing the air conditioning.



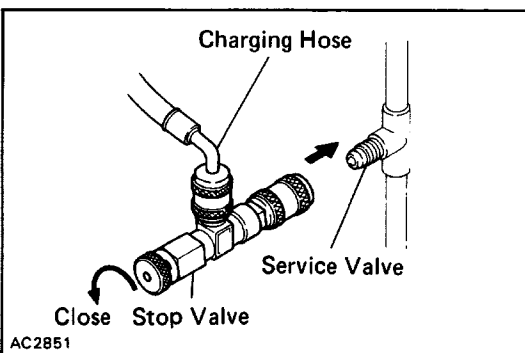
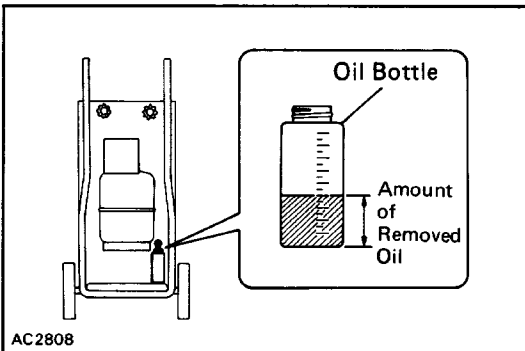
1. USE RECOVERY MACHINE TO RECOVER REFRIGERANT

When discharging refrigerant from the system as follows, use a recovery machine to recover the refrigerant.

- Before replacing parts on the refrigerant line.
- When moisture or air gets in the refrigerant line.
- When excess refrigerant is charged.

NOTICE:

- When handling the recovery machine, always follow the directions given in the instruction manual.
- After recovery, the amount of compressor oil removed must be measured and the same amount added to the system.



2. USE CHARGING HOSES WITH STOP VALVE WHEN INSTALLING MANIFOLD GAUGE SET

To prevent release of refrigerant, using charging hoses with a stop valve when installing the manifold gauge set to the service valves on the refrigerant line.

3. TIGHTEN CONNECTING PARTS SECURELY

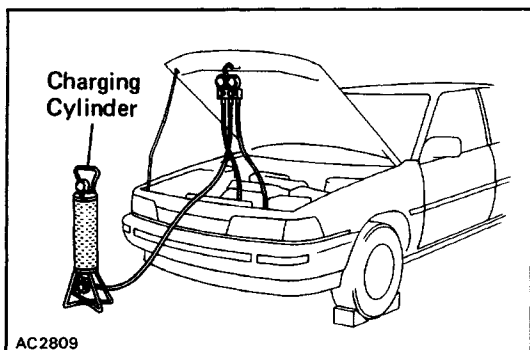
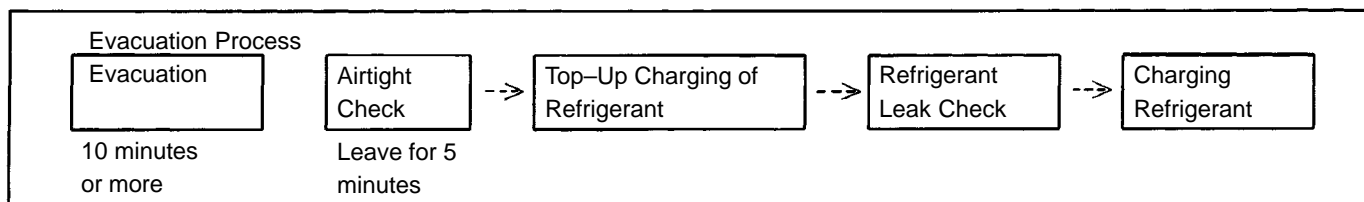
Follow the notices about tightening connecting parts in step 6 on page [AC-4](#).

4. PROPERLY EVACUATE AIR FROM REFRIGERANT SYSTEM

To prevent release and wasteful use of refrigerant, evacuate air with care from refrigeration system as follows;

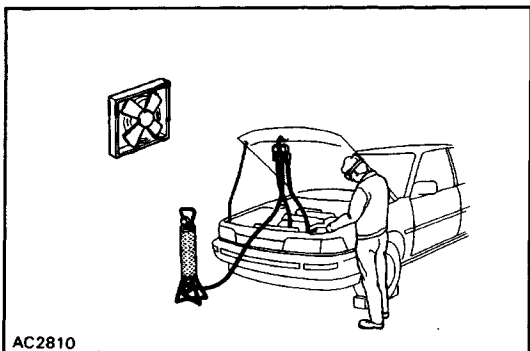
- Do not evacuate before recovering refrigerant in system.

- Do not perform repeat evacuation of system.



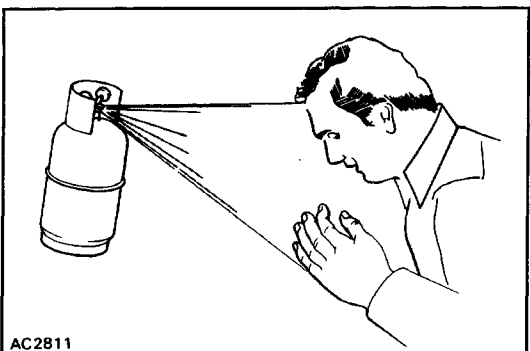
6. USE CHARGING CYLINDER TO CHARGE PROPER AMOUNT OF REFRIGERANT

To prevent excessive use of refrigerant due to overcharging, use a charging cylinder to charge the proper amount of refrigerant.



Handling Precautions for Refrigerant

1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME
2. ALWAYS WEAR EYE PROTECTION



3. BE CAREFUL THAT LIQUID REFRIGERANT DOES NOT GET IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin;

(a) Wash the area with lots of cool water.

CAUTION: Do not rub your eyes or skin.

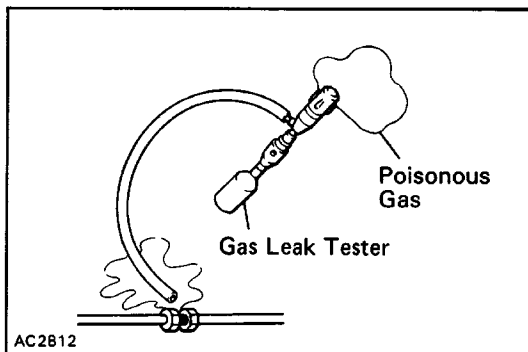
(b) Apply clean petroleum jelly to the skin.

(c) Go immediately to a physician or hospital for professional treatment.

CAUTION: Do not attempt to treat yourself.

Handling Precautions for Refrigerant Container

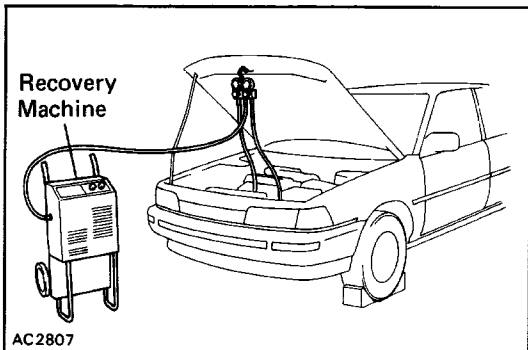
1. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME
2. BE CAREFUL NOT TO DROP CONTAINER AND NOT TO APPLY PHYSICAL SHOCKS TO IT



Handling Precautions for Gas-Cylinder Type Gas Leak Tester

1. BEFORE USING TESTER MAKE SURE THAT THERE ARE NO FLAMMABLE SUBSTANCES NEARBY
2. BE CAREFUL NOT TO INHALE POISONOUS GAS

If refrigerant gas comes in contact with flame, a poisonous gas is produced. During leak tests, do not inhale any gas.

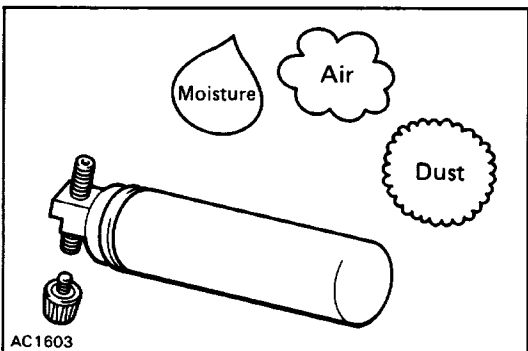


Precautions When Replacing Parts in Refrigerant line

1. RECOVER REFRIGERANT IN SYSTEM BEFORE REMOVING PARTS

Using a recovery machine, recover refrigerant in system before removing the parts.

NOTICE: Do not release refrigerant to atmosphere.



2. INSERT PLUG IMMEDIATELY IN DISCONNECTED PARTS

Insert a plug immediately in the disconnected parts to prevent the entry of moisture and dust.

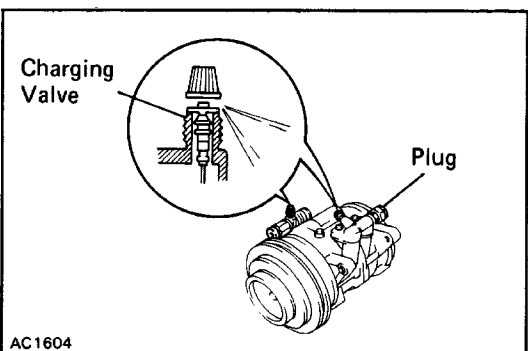
3. DO NOT REMOVE PLUG FROM NEW PARTS UNTIL IMMEDIATELY BEFORE INSTALLATION

4. DO NOT USE BURNER FOR BENDING OR LENGTHENING OPERATIONS ON TUBE

If the tubes are heated with a burner, a layer of oxidation forms inside the tube, causing the same kind of trouble as an accumulation of dust.

5. DISCHARGE GAS IN NEW COMPRESSOR FROM CHARGING VALVE BEFORE INSTALLING IT

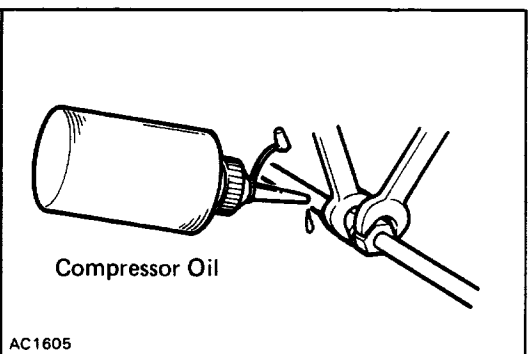
If the gas in new compressor is not discharged first, compressor oil will spray out with gas when the plug is removed.

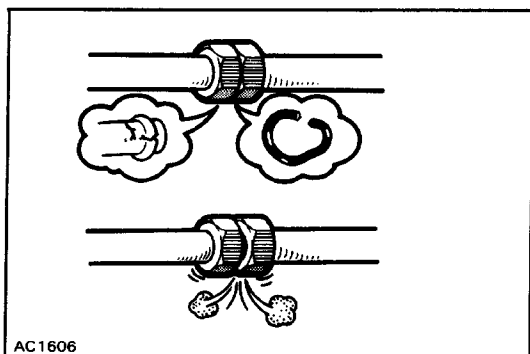


6. TIGHTEN CONNECTING PARTS SECURELY

Securely tighten the connecting parts to prevent leaking of refrigerant gas.

- Apply a few drops of compressor oil to O-ring fittings for easy tightening and to prevent leaking of refrigerant gas.
- Tighten the nuts using two wrenches to avoid twisting the tube.



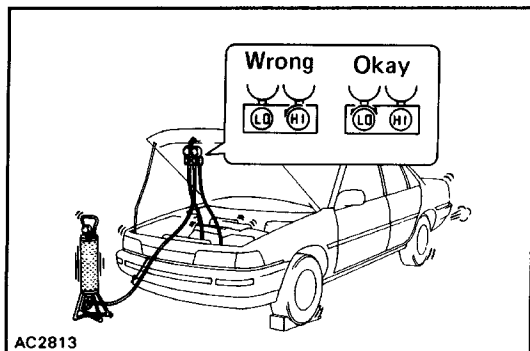


- Tighten the O-ring fittings or the bolted type fittings to the specified torque.

Precautions When Charging Refrigerant

1. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT CYCLE

If there is not enough refrigerant in the refrigerant cycle, oil lubrication will be insufficient and compressor burnout may occur, so take care to avoid this.



2. DO NOT OPEN HIGH PRESSURE VALVE OF MANIFOLD GAUGE WITH COMPRESSOR OPERATING

If the high pressure valve is opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close the low pressure valve only.

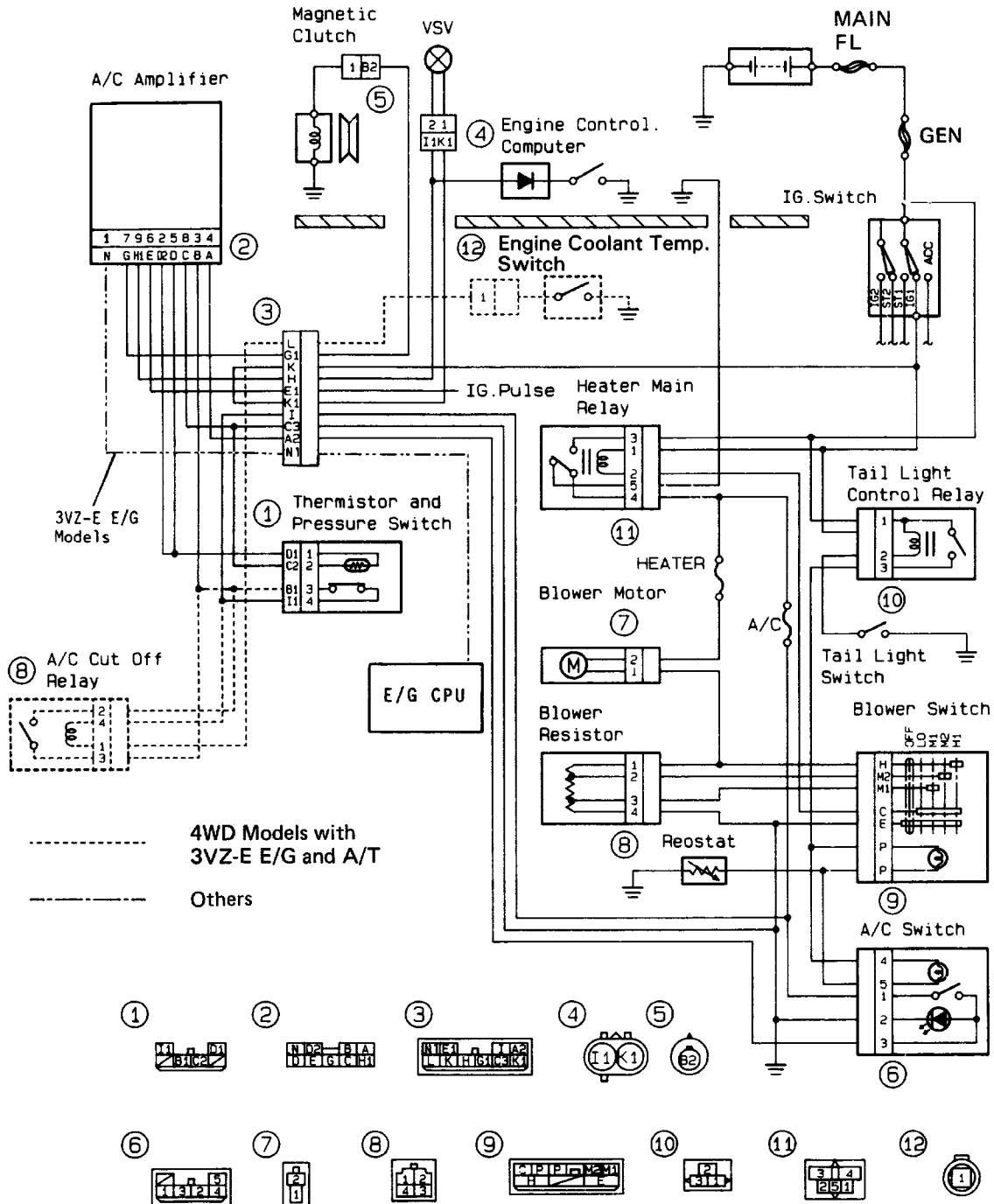
3. BE CAREFUL NOT TO OVERCHARGE WITH REFRIGERANT IN SYSTEM

If refrigerant is overcharged, it causes trouble such as insufficient cooling, poor fuel economy, engine overheating etc.

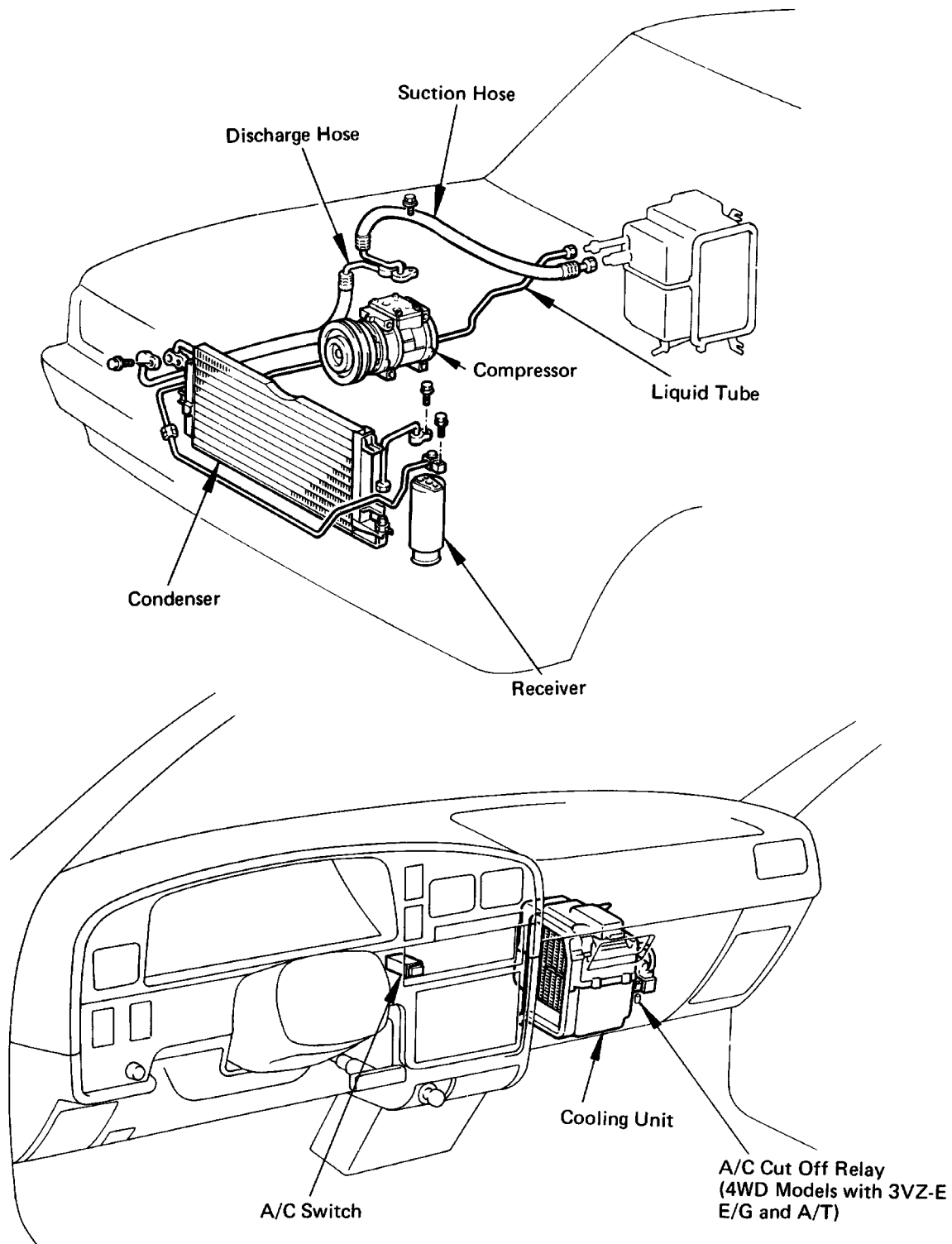
ELECTRICAL PARTS

Before removing and inspecting the electrical parts, set the ignition switch to the LOCK position and disconnect the negative (–) terminal cable from the battery..

AIR CONDITIONING SYSTEM CIRCUIT

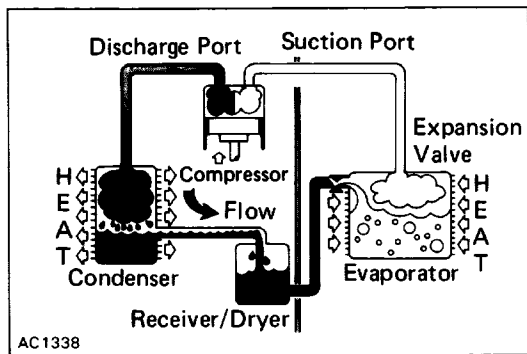


SYSTEM COMPONENTS



Specified Torque N·m (kgf·cm, ft·lbf)

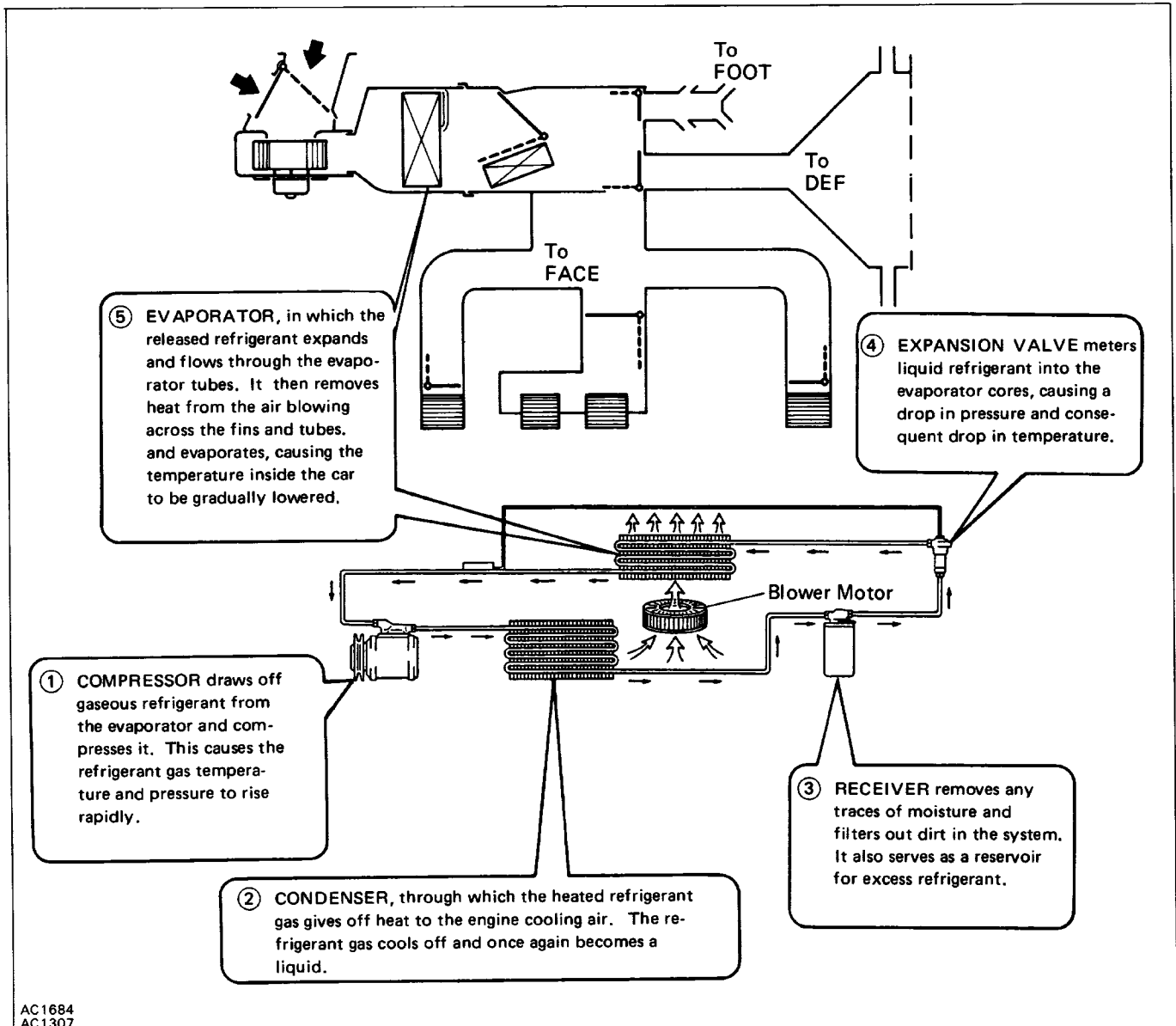
0.31 in. Tube		14 (140, 10)
0.50 in. Tube		23 (230, 17)
0.62 in. Tube		32 (330, 24)
Bolted Type	For Compressor	25 (250, 18)
	For Condenser	13 (130, 9)
	For Receiver	5 (55, 48 in.·lbf)



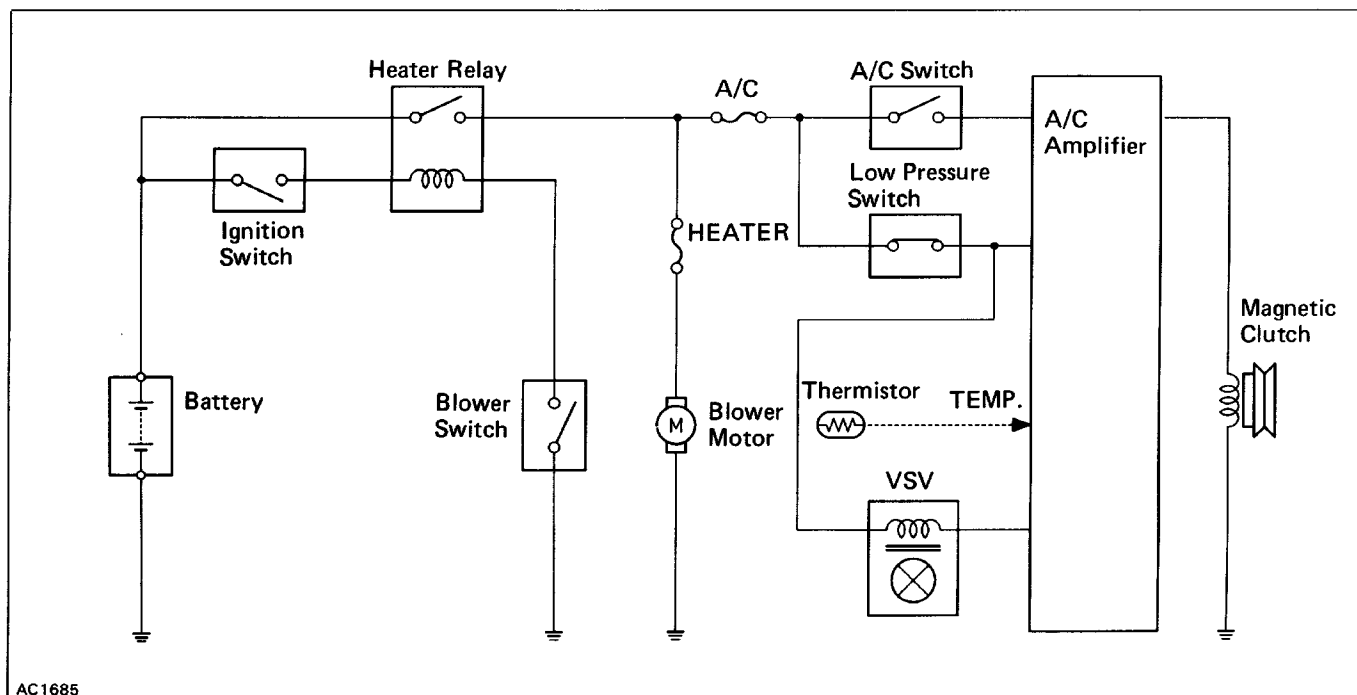
GENERAL DESCRIPTION

REFRIGERATION CYCLE

1. The compressor discharges high temperature and high pressure refrigerant containing the heat absorbed from the evaporator plus the heat created by the compressor in a discharge stroke.
2. This gaseous refrigerant flows into the condenser. In the condenser, the gaseous refrigerant condenses into liquid refrigerant.
3. This liquid refrigerant flows into the receiver which stores and filters the liquid refrigerant till the evaporator requires the refrigerant.
4. The liquid refrigerant is changed by the expansion valve into a low temperature, low pressure liquid and gaseous mixture.
5. This cold and foggy refrigerant flows to the evaporator. Vaporizing the liquid in the evaporator, the heat from the warm air stream passing through the evaporator core is transferred to the refrigerant. All the liquid is changed into the gaseous refrigerant in the evaporator and only heat-laden gaseous refrigerant is drawn into the compressor. Then the process is repeated again.



1. PRINCIPLE OF A/C ELECTRICAL CIRCUIT



2. HOW IS MAGNETIC CLUTCH ENERGIZED?

The general process until the magnetic clutch is energized as shown below.

- ① Ignition Switch "ON"
- ② Blower Switch "ON" → Heater Relay "ON" (Blower Motor "RUN")
- ③ A/C Switch "ON" → A/C Amplifier "ON" (A/C Amp. Main Power Supply)
- ④ Low Pressure Switch "ON":
Refrigerant Condition is more than 206 kPa (2.1 kgf/cm², 30 psi)
- ⑤ Thermistor supplies temperature signal of evaporator to A/C amplifier.
- ⑥ VSV "ON" → E/G Idle-up
- ⑦ Magnetic Clutch "ON"

SPECIAL TOOLS AND EQUIPMENT

Tool	SST No.	Use
Ohmmeter		To diagnosis electrical system
Voltage meter		To diagnosis electrical system
Air conditioning service tool set	07110-58011	To evacuate and charge system
Magnetic clutch remover	07112-66040	To remove pressure plate
Magnetic clutch stopper	07112-76060	To remove and install pressure plate
Snap ring pliers	07114-84020	To remove pressure plate

SSM (SPECIAL SERVICE MATERIALS)

Part Name	Part No.	Use etc.
ND OIL6, SUNISO No.5GS or equivalent	07117-68040	Compressor

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
No cooling or warm air	Magnetic clutch does not engage		
	(a) A/C fuse blown	Replace fuse and check for short	AC-6 AC-17
	(b) Magnetic clutch faulty	Check magnetic clutch	AC-29
	(c) A/C switch faulty	Check switch	AC-31
	(d) A/C amplifier faulty	Check amplifier	AC-6
	(e) Wiring or ground faulty	Repair as necessary	AC-16
	(f) Refrigerant empty	Check refrigerant volume	AC-37
	(g) Heater relay faulty	Check heater relay	AC-29
	(h) Pressure switch faulty	Check pressure switch	
	Compressor does not rotate properly		
	(a) Drive belt loose or broken	Adjust or replace drive belt	AC-15
	(b) Compressor faulty	Check compressor	AC-17
	Expansion valve faulty	Check expansion valve	AC-25
	Leak in system	Test system for leaks	
	Fusible plug on receiver blown or clogged screen	Check receiver	AC-23
	Blower does not operate		
	(a) HEATER fuse blown	Replace fuse and check for short	AC-6 AC-29
	(b) A/C switch faulty	Check switch	AC-37
	(c) Heater relay faulty	Check heater relay	AC-37
	(d) Blower motor faulty	Check blower motor	AC-6
	(e) Wiring or ground faulty	Repair as necessary	
Cool air comes out intermittently	Magnetic clutch slipping	Check magnetic clutch	AC-17
	Expansion valve faulty	Check expansion valve	AC-25
	Wiring connection faulty	Repair as necessary	AC-6
	Excessive moisture in system	Evacuate and charge system	
	A/C amplifier faulty	Check amplifier	AC-31

TROUBLESHOOTING (Cont'd)

Problem	Possible cause	Remedy	Page
Cool air comes out only at high speed	Condenser clogged Drive belt slipping Compressor faulty Insufficient or too much refrigerant Air in system	Check condenser Check or replace drive belt Check compressor Check refrigerant volume Evacuate and charge system	AC-24 AC-15 AC-17 AC-16
Insufficient cooling	Condenser clogged Drive belt slipping Magnetic clutch faulty Compressor faulty Expansion valve faulty Insufficient *or too much refrigerant Air or excessive compressor oil in system Receiver clogged Water valve cable faulty A/C amplifier faulty	Check condenser Check or replace drive belt Check magnetic clutch Check compressor Check expansion valve Check refrigerant volume Evacuate and charge system Check receiver Reset water valve cable Check amplifier	AC-24 AC-15 AC-17 AC-17 AC-25 AC-16 AC-23 AC-36 AC-31
Insufficient velocity of cool air	Evaporator clogged or frosted Air leakage from cooling unit or air duct Air inlet blocked Blower motor faulty A/C amplifier faulty	Clean evaporator fins or filters Repair as necessary Repair as necessary Check blower motor Check amplifier	AC-27 AC-37 AC-31

Inspection of Refrigeration System with Manifold Gauge Set

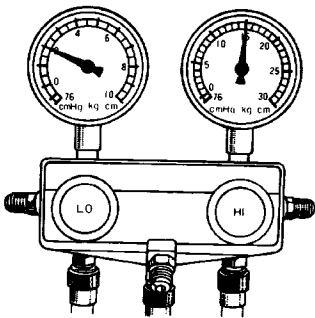
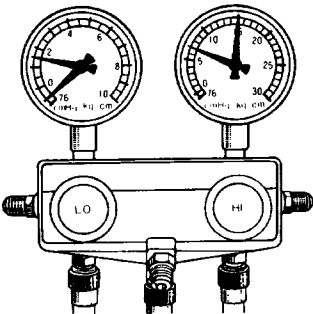
This is a method in which the trouble is located by using a manifold gauge set. (See "Installation of Manifold Gauge Set" on page AC-16.) Read the manifold gauge pressure when the following conditions are established:

- (b) Engine running at 2,000 rpm
- (a) Temperature at the air inlet with the switch set at RECIRC is 30 – 35°C (86 – 95°F)
- (c) Blower fan speed control switch set at high speed
- (d) Temperature control switch set at max. cool side

HINT: It should be noted that the gauge indications may vary slightly due to ambient temperature conditions.

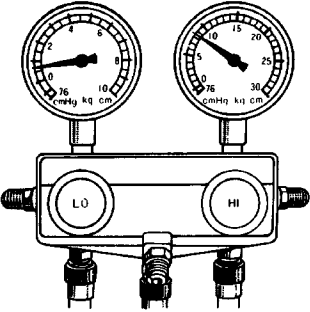
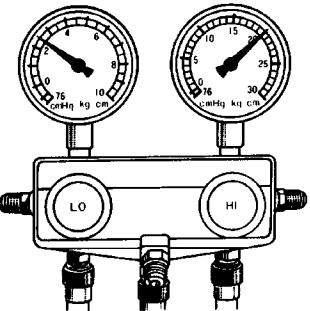
NOTICE:

- Always recover refrigerant before removing the parts in the refrigerant line and evacuating air.
- Evacuate air and charge proper amount of purified refrigerant after installing the parts in the refrigerant line.

No.	Gauge reading kPa (kgf/cm ² , psi)	Condition	Probable cause	Remedy
1	<p>LO: 147 – 196 (1.5 – 2.0, 21 – 28)</p> <p>HI: 1,422 – 1,471 (14.5 – 15.0, 206 – 213)</p>  <p>AC0067</p>	Normal cooling	Normally functioning system	
2	<p>During operation, pressure at low pressure side sometimes becomes a vacuum and sometimes normal</p>  <p>AC0068</p>	Periodically cools and then fails to cool	Moisture present in refrigeration system	<p>(1) Replace receiver</p> <p>(2) Remove moisture in system through repeatedly evacuating air</p>

NOTICE:

- Always recover refrigerant before removing the parts in the refrigerant line and evacuating air.
- Evacuate air and charge proper amount of purified refrigerant after installing the parts in the refrigerant line.

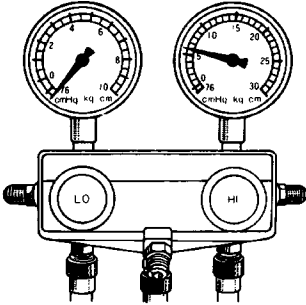
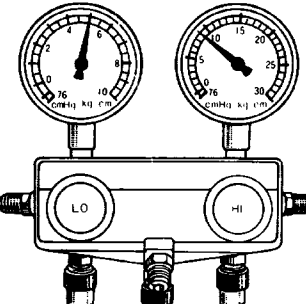
No.	Gauge reading kPa (kgf/cm ² , psi)	Condition	Probable cause	Remedy
3	Pressure low at both low and high pressure sides  AC0069	<ul style="list-style-type: none"> • Insufficient cooling • Bubbles seen in sight glass 	Insufficient refrigerant	(1) Check for gas leakage with gas leak tester and repair if necessary (2) Add refrigerant until bubbles disappear
		<ul style="list-style-type: none"> • Insufficient cooling • Frost on tubes from receiver to unit 	Refrigerant flow obstructed by dirt in receiver	Replace receiver
4	Pressure too high at both low and high pressure sides  AC0070	Insufficient cooling	Insufficient cooling of condenser	(1) Clean condenser (2) Check fan motor operation
5			Refrigerant over-charged	(1) Check amount of refrigerant If refrigerant is over-charged (2) Recover refrigerant (3) Evacuate air and charge proper amount of purified refrigerant
6			Air present in system	(1) Replace receiver (2) Check compressor oil to see if dirty (3) Remove air in system through repeatedly evacuating air
7			<ul style="list-style-type: none"> • Insufficient cooling • Frost or Large amount of dew on piping at low pressure side 	Expansion valve improperly mounted, heat sensing tube defective (Opens too wide) (1) Check heat sensing tube installation condition If (1) is normal (2) Check expansion valve and replace if defective

Hint at 6:

These gauge indications are for when the refrigeration system has been opened and the refrigerant charged without evacuating air.

NOTICE:

- Always recover refrigerant before removing the parts in the refrigerant line and evacuating air.
- Evacuate air and charge proper amount of purified refrigerant after installing the parts in the refrigerant line.

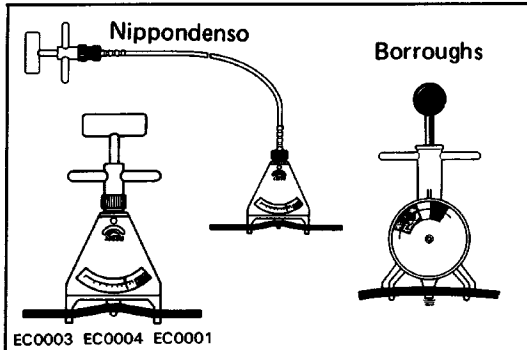
No.	Gauge reading kPa (kgf/cm ² , psi)	Condition	Probable cause	Remedy
8	<p>Vacuum indicated at low pressure side, very low pressure indicated at high pressure</p>  <p>AC0156</p>	<ul style="list-style-type: none"> • Does not cool (Cools from time to time in some cases) • Frost or dew seen on piping before and after receiver or expansion valve 	<p>Refrigerant does not circulate</p>	<p>(1) Check heat sensing tube for gas leakage and replace expansion valve if defective If (1) is normal (2) Clean out dirt in expansion valve by blowing with air If not able to remove dirt, replace expansion valve (3) Replace receiver</p>
9	<p>Pressure too high at low pressure side, pressure too low at high pressure side</p>  <p>AC0157</p>	<p>Does not cool</p>	<p>Insufficient compression</p>	<p>Repair or replace compressor</p>

ON-VEHICLE INSPECTION

7. CHECK CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, clean them with pressurized water.

NOTICE: Be careful not to damage the fins.



2. CHECK DRIVE BELT TENSION

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

Belt tension gauge:

Nippondenso BTG-20 (95506-00020) or

Borroughs No. BT-33-73F

Drive belt tension:

	New belt (lbs)	Used belt (lbs)
3VZ	125 ± 25	80 ± 20
22R-E	125 ± 25	80 ± 20

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.

3. START ENGINE

4. TURN ON A/C SWITCH

Check that the A/C operates at each position of the blower switch.

If blower does not operate, check heater fuse.

5. CHECK MAGNETIC CLUTCH OPERATION

6. CHECK THAT IDLE INCREASES

When the magnetic clutch engages, engine revolution should increase.

Standard idle-up rpm: 900 – 1,000 rpm

7. CHECK AMOUNT OF REFRIGERANT

If you can see bubbles in the sight glass, additional refrigerant is needed. (See page [AC-16](#))

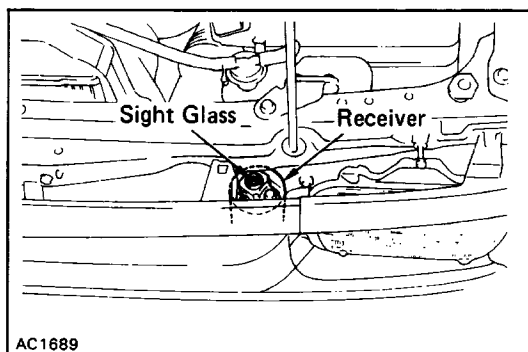
8. IF NO COOLING OR IT IS INSUFFICIENT, INSPECT FOR LEAKAGE

Using a gas leak tester, inspect each component of the refrigeration system.

REFRIGERATION SYSTEM

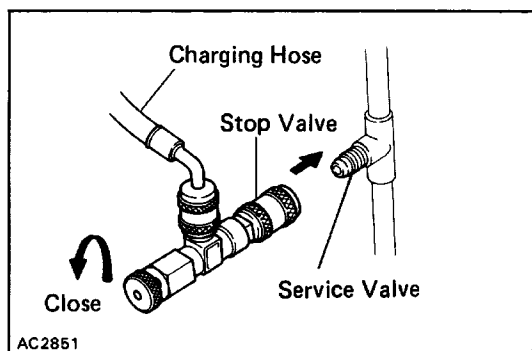
Checking of Refrigerant Volume

1. RUN ENGINE AT APPROX. 1,500 RPM
2. OPERATE AIR CONDITIONING AT MAXIMUM COOLING FOR A FEW MINUTES
3. CHECK AMOUNT OF REFRIGERANT
Observe the sight glass on the receiver.



Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles present in sight glass	Insufficient *	(1) Check for gas leakage with gas leak tester and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles present in sight glass	None, sufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak tester and repair if necessary (2) Add refrigerant until bubbles disappear
4	Temperature between compressor inlet and outlet is noticeably different	Proper or too much	Refer to items 5 and 6
5	Immediately after air conditioning is turned off, refrigerant in sight glass stays clear	Too much	(1) Recover refrigerant (2) Evacuate air and charge proper amount of purified refrigerant
6	When air conditioning is turned off, refrigerant foams and then stay clear	Proper	—

*: Bubbles in the sight glass with ambient temperatures higher can be considered normal if cooling is sufficient



Installation of Manifold Gauge Set

HINT: To prevent releasing refrigerant, use charging hoses with a stop valve when installing the manifold gauge set to service valves on the refrigerant line.

Part No. of charging hoses with a stop valve

1. CONNECT CHARGING HOSES WITH A STOP VALVE TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

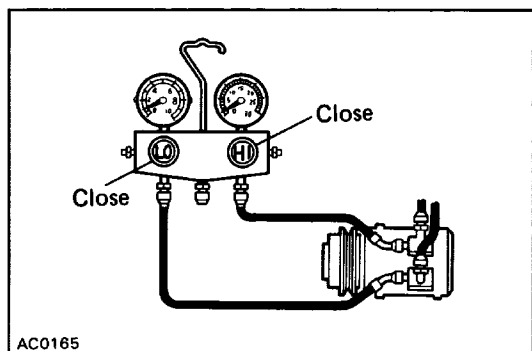
CAUTION:

- Do not connect the wrong hoses to the high pressure and the low pressure sides.
- To prevent loosening the nuts, do not apply compressor oil to seat of the connection.

2. CLOSE HAND VALVES OF BOTH STOP VALVES

3. CLOSE BOTH HAND VALVES OF GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINE



5. CONNECT STOP VALVES TO SERVICE VALVES

Tighten the nuts by hand.

CAUTION:

- Do not connect the wrong valves to the high pressure and the low pressure sides.
- To prevent loosening the nuts, do not apply compressor oil to seat of the connection.

6. OPEN HAND VALVES OF BOTH STOP VALVES**REMOVAL OF MANIFOLD GAUGE SET****1. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET****2. CLOSE HAND VALVES OF BOTH STOP VALVES****3. DISCONNECT STOP VALVES FROM SERVICE VALVES ON REFRIGERANT LINE****4. INSTALL CAPS TO SERVICE VALVES**

COMPRESSOR

ON-VEHICLE INSPECTION

1. INSTALL MANIFOLD GAUGE SET

(See page [AC-16](#))

2. RUN ENGINE AT APPROX. 1,500 RPM**3. CHECK COMPRESSOR FOR FOLLOWING:**

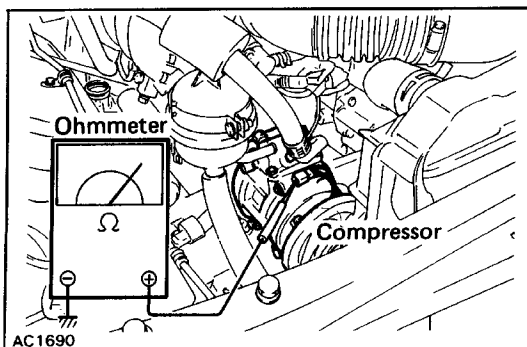
- (a) High pressure gauge reading is not low and low pressure gauge reading is not higher than normal.
 - (b) Metallic sound
 - (e) Leakage from shaft seal
- If defects are found, repair the compressor.

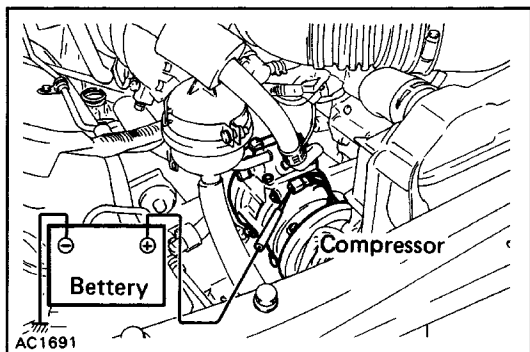
4. CHECK MAGNETIC CLUTCH

- (a) Inspect the pressure plate and the rotor for signs of oil.
- (b) Check the clutch bearings for noise and grease leakage.
- (c) Using an ohmmeter, measure the resistance of the stator coil between the clutch lead wire and ground.

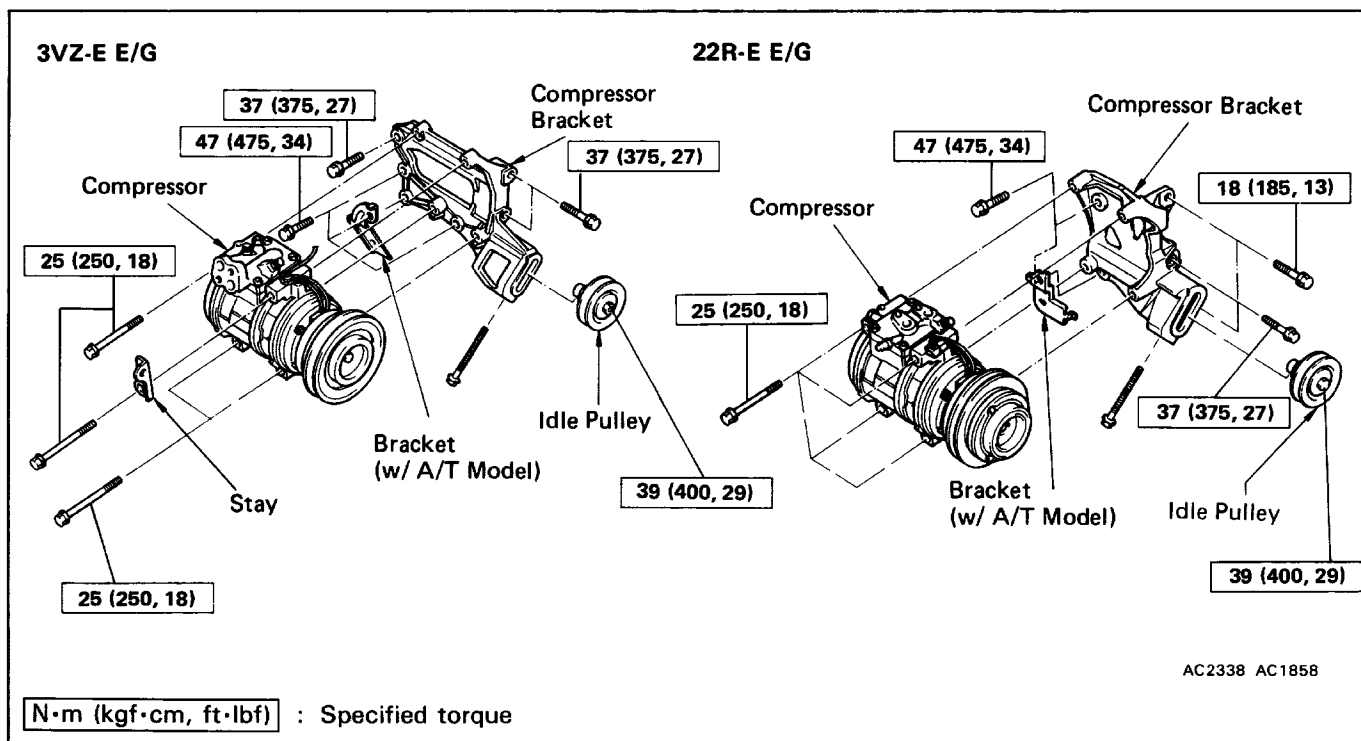
Standard resistance: $3.6 \pm 0.2 \Omega$ at 200C (680F)

If resistance value is not as specified, replace the coil.



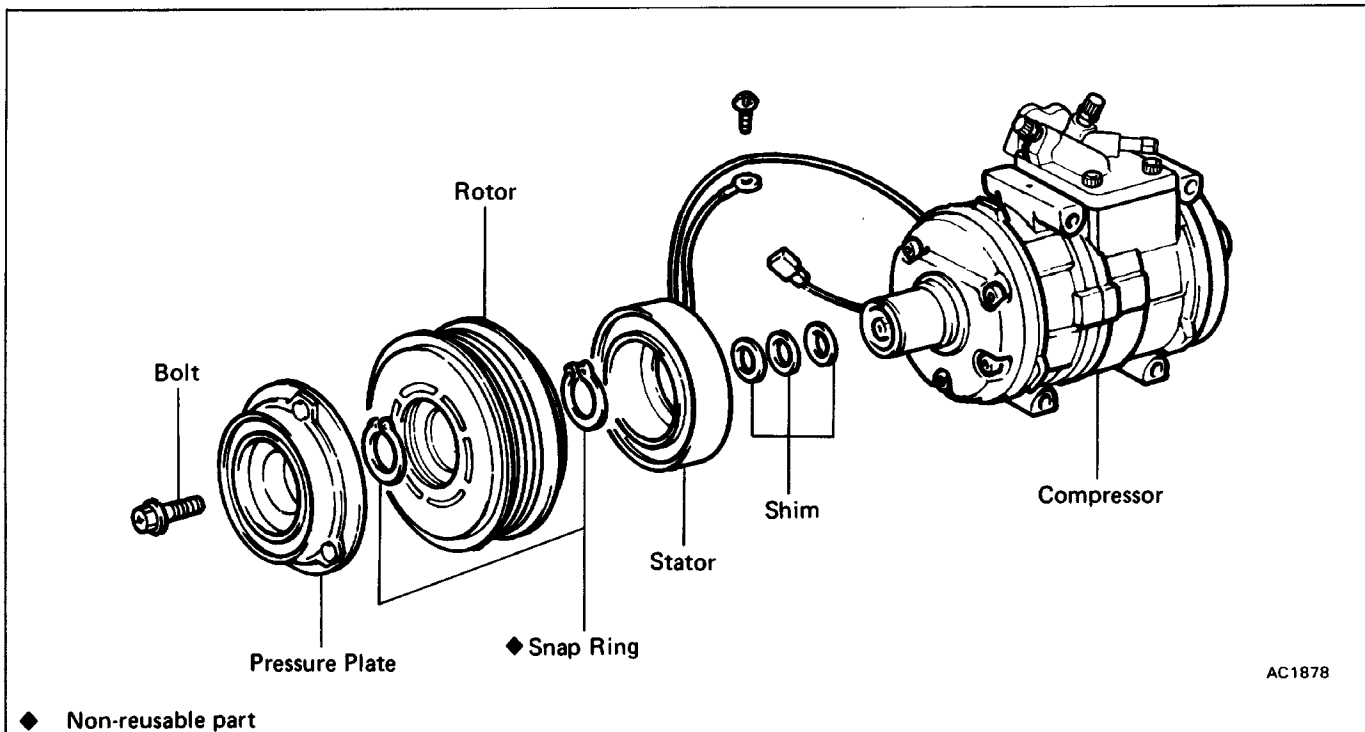


- (d) Connect the positive (+) lead from the battery to terminal and the negative (-) lead to ground, check that the magnetic clutch is energized. If magnetic clutch is not energized, replace the coil.
NOTICE: Do not short the positive (+) lead wire on the vehicle by applying battery positive voltage.



REMOVAL OF COMPRESSOR

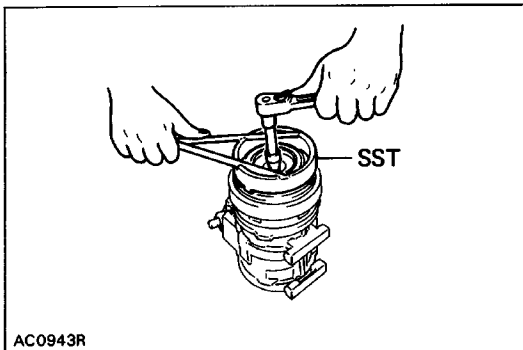
1. RUN ENGINE AT IDLE SPEED FOR 10 MINUTES WITH AIR CONDITIONING ON
2. STOP ENGINE
3. DISCONNECT NEGATIVE CABLE FROM BATTERY
4. REMOVE POWER STEERING PUMP (3VZ EG ONLY)
5. DISCONNECT CLUTCH LEAD WIRE FROM WIRING HARNESS
6. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM
7. DISCONNECT TWO HOSES FROM COMPRESSOR SERVICE VALVES
 Cap the open fitting immediately to keep moisture out of the system.
8. REMOVE COMPRESSOR
 - (a) Remove the fan shroud.
 - (b) Loosen the drive belt.
 - (c) Remove the compressor mounting bolts and the compressor.



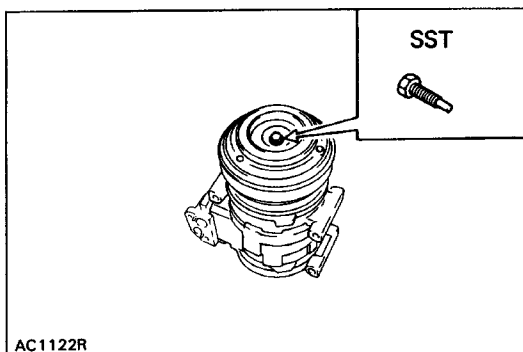
DISASSEMBLY OF MAGNETIC CLUTCH

1. REMOVE PRESSURE PLATE

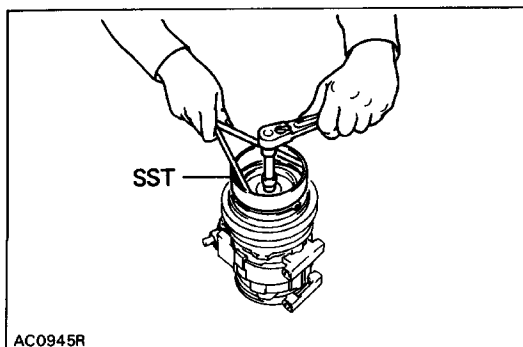
- (a) Using SST and a socket, remove the shaft bolt.
SST 07112-76060

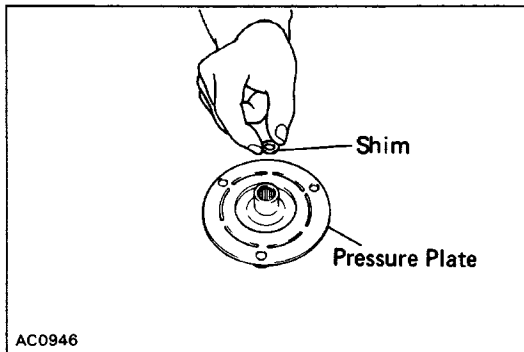


- (b) Install SST to the pressure plate.
SST 07112-66040

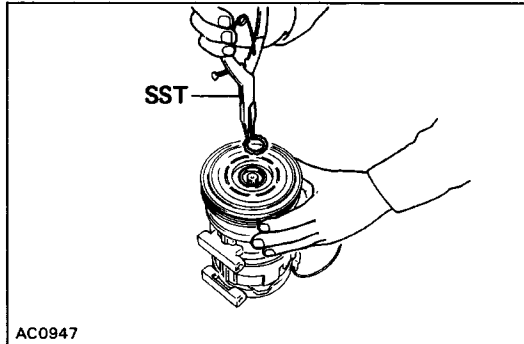


- (c) Using SST and a socket, remove the pressure plate. SST 07112-76060



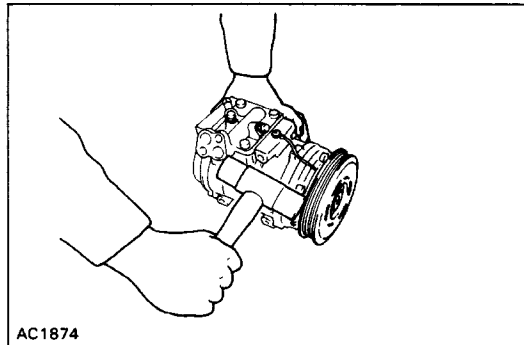


- (d) Remove the shims from the pressure plate.



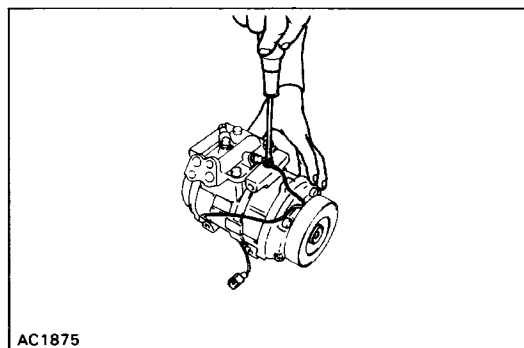
2. REMOVE ROTOR

- (a) Using SST, remove the snap ring.
SST 07114-84020



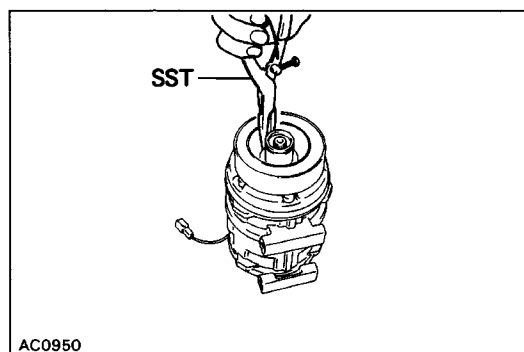
- (b) Using a plastic hammer, tap the rotor off the shaft.

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

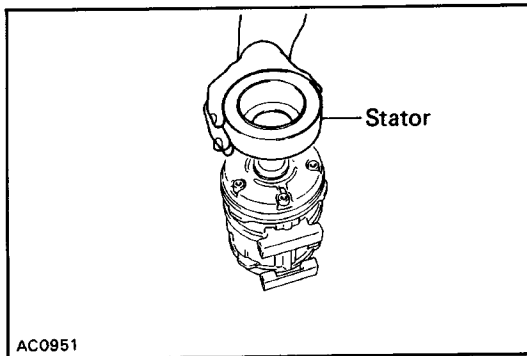


3. REMOVE STATOR

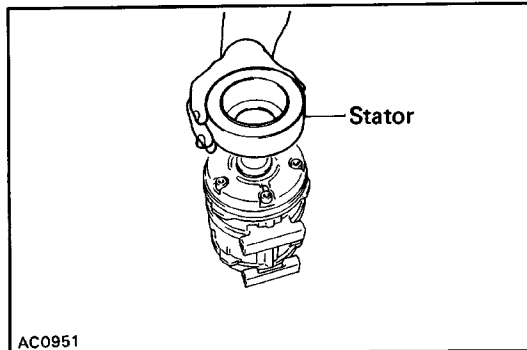
- (a) Disconnect the stator lead wire from the compressor housing.



- (b) Using SST, remove the snap ring.
SST 07114-84020



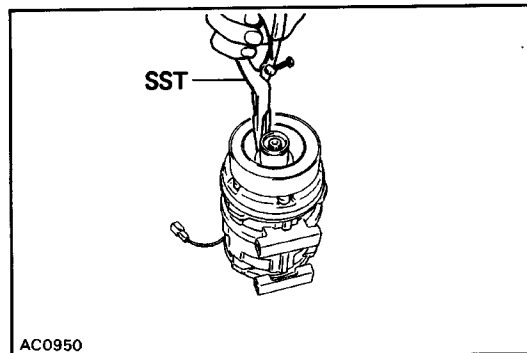
(c) Remove the stator.



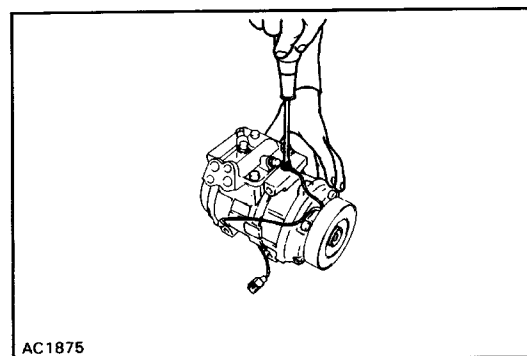
ASSEMBLY OF MAGNETIC CLUTCH

1. INSTALL STATOR

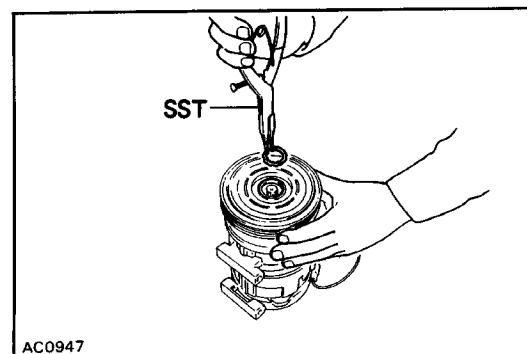
(a) Install the stator on the compressor.



(b) Using SST, install the new snap ring.
SST 07114-84020



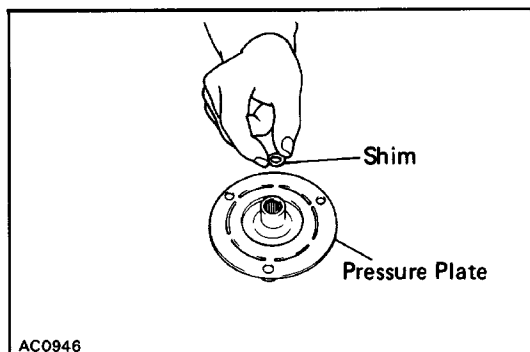
(c) Connect the stator lead wires to the compressor housing.



2. INSTALL ROTOR

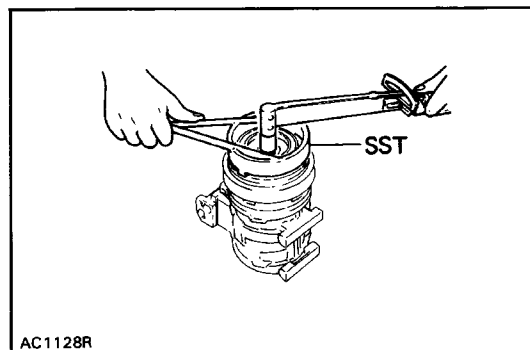
(a) Install the rotor on the compressor shaft.

(b) Using SST, install the snap ring.
SST 07114-84020



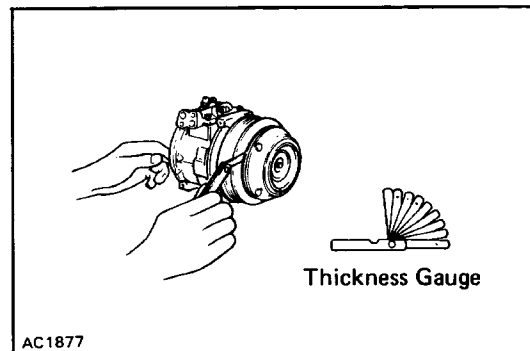
3. INSTALL PRESSURE PLATE

- (a) Put the shims to the pressure plate.



- (b) Using SST and torque wrench, install the shaft bolt. SST 07112-76060

Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)



4. CHECK CLEARANCE OF MAGNETIC CLUTCH

Check the clearance between the pressure plate and rotor using thickness gauge.

Standard clearance:

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

If the clearance is not within tolerance, change the number of shims to obtain the standard clearance.

INSTALLATION OF COMPRESSOR

(See page [AC-17](#))

1. INSTALL COMPRESSOR WITH THREE MOUNTING BOLTS

Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

2. INSTALL DRIVE BELT

(See step 2 and 3 and on page [AC-14](#))

3. CONNECT TWO HOSES TO COMPRESSOR SERVICE VALVES

Torque: Discharge line 25 N·m (250 kgf·cm, 18 ft·lbf)

Suction line 25 N·m (250 kgf·cm, 18 ft·lbf)

4. CONNECT CLUTCH LEAD WIRE TO WIRING HARNESS

5. CONNECT NEGATIVE CABLE TO BATTERY

6. EVACUATE AIR FROM AIR CONDITIONING SYSTEM

7. CHARGE AIR CONDITIONING SYSTEM WITH

REFRIGERANT AND CHECK FOR GAS LEAKAGE

Specified amount: 700 – 800 g (1.5 – 1.8 lb)

RECEIVER

(See page [AC-7](#))

ON-VEHICLE INSPECTION

CHECK SIGHT GLASS, FUSIBLE PLUG AND FITTINGS FOR LEAKAGE

Use a gas leak tester. Repair as necessary.

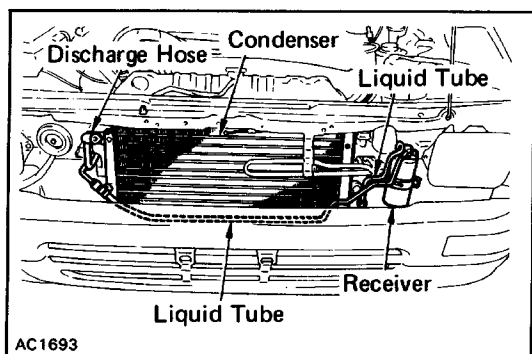
REMOVAL OF RECEIVER

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

2. DISCONNECT TWO LIQUID TUBES FROM RECEIVER

HINT: Cap the open fittings immediately to keep moisture out of the system.

3. REMOVE RECEIVER FROM RECEIVER HOLDER



INSTALLATION OF RECEIVER

1. INSTALL RECEIVER IN RECEIVER HOLDER

HINT: Do not remove the caps until ready for connection.

2. CONNECT TWO LIQUID TUBES TO RECEIVER

Torque: 5.4 N·m (55 kgf·cm, 43 in.·lbf)

3. IF RECEIVER WAS REPLACED, ADD COMPRESSOR OIL TO COMPRESSOR

Add 20 cc (0.7 fl. oz.)

Compressor oil: ND OIL6,

SUNISO No.5GS or equivalent

4. EVACUATE AIR FROM AIR CONDITIONING SYSTEM

5. CHARGE AIR CONDITIONING SYSTEM WITH REFRIGERANT AND CHECK FOR GAS LEAKAGE

Specified amount: 700 – 800 g (1.5 – 1.8 lb)

CONDENSER

ON-VEHICLE INSPECTION

1. CHECK CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, wash them with water and dry with compressed air.

NOTICE: Be careful not to damage the fins.

If the fins are bent, straighten them with a screwdriver or pliers.

2. CHECK CONDENSER FITTINGS FOR LEAKAGE

Repair as necessary.

REMOVAL OF CONDENSER

(SEE PAGE [AC-7](#))

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

2. REMOVE FRONT GRILLE AND HOOD LOCK BRACE

3. DISCONNECT DISCHARGE HOSE FROM CONDENSER INLET FITTING

4. DISCONNECT LIQUID TUBE FROM RECEIVER OUTLET FITTING

HINT: Cap the open fittings immediately to keep moisture out of the system.

5. REMOVE CONDENSER

Remove the four bolts.

INSTALLATION OF CONDENSER

(SEE PAGE [AC-7](#))

1. INSTALL CONDENSER

Install the four bolts making sure the rubber cushions fit on the mounting flanges correctly.

2. CONNECT LIQUID TUBE TO RECEIVER AND DISCHARGE HOSE TO CONDENSER

Torque:

Liquid tube 5.4 N·m (55 kgf·cm, 48 in.·lbf)

Discharge hose 18.5 N·m (185 kgf·cm, 14 ft·lbf)

3. INSTALL FRONT GRILLE AND HOOD LOCK BRACE

4. IF CONDENSER IS REPLACED, ADD COMPRESSOR OIL TO COMPRESSOR

Add 40 – 50 cc (1.4 – 1.7 fl.oz.)

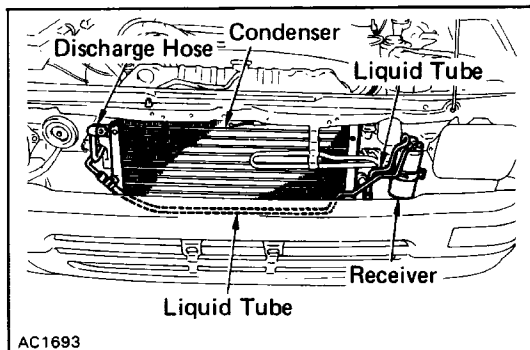
Compressor oil: ND OIL6,

SUNISO No.5GS or equivalent

5. EVACUATE AIR FROM AIR CONDITIONING SYSTEM

6. CHARGE AIR CONDITIONING SYSTEM WITH REFRIGERANT AND CHECK FOR GAS LEAKAGE

Specified amount: 700 – 800 g (1.5 – 1.8 lb)



COOLING UNIT

(SEE PAGE [AC-7](#))

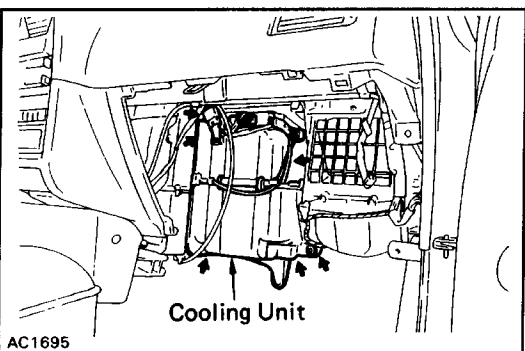
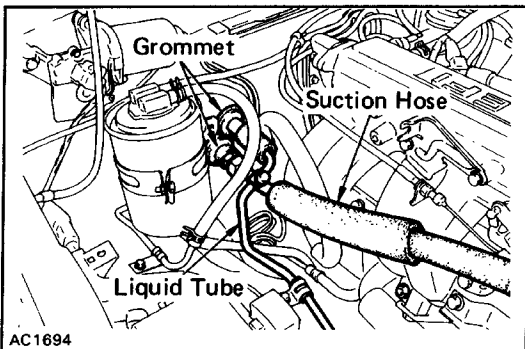
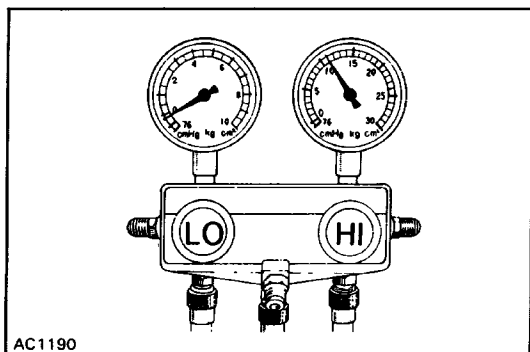
ON-VEHICLE INSPECTION OF EXPANSION VALVE

1. CHECK QUANTITY OF REFRIGERANT GAS DURING REFRIGERATION CYCLE
2. INSTALL MANIFOLD GAUGE SET
(See page [AC-16](#))
3. RUN ENGINE

Run the engine at 2,000 rpm for at least 5 minutes.

4. CHECK EXPANSION VALVE

If the expansion valve is clogged, the low pressure reading will drop to 0 kPa (0 kgf/cm², 0 psi) otherwise it is OK.

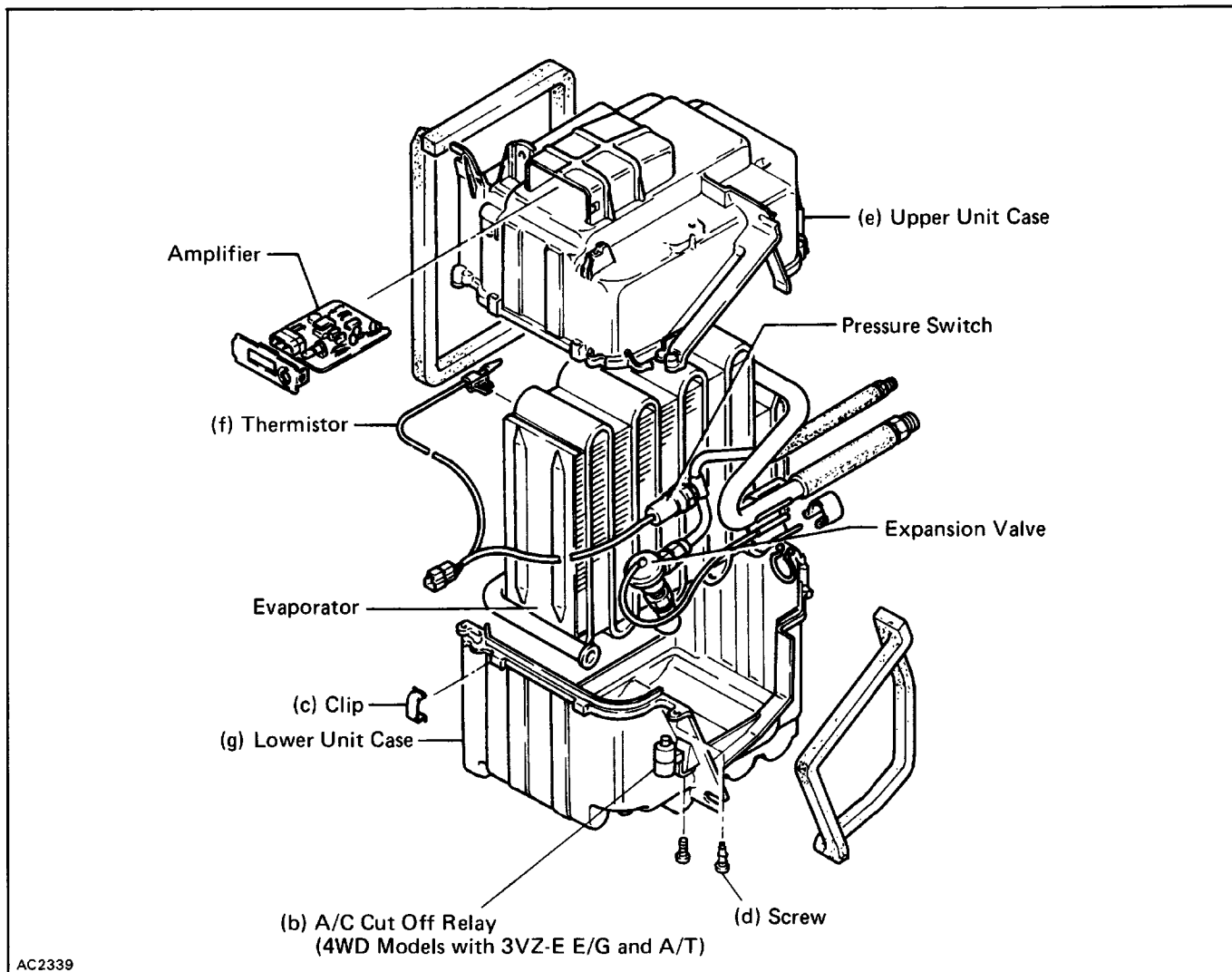


REMOVAL OF COOLING UNIT

1. DISCONNECT NEGATIVE CABLE FROM BATTERY
2. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM
3. DISCONNECT SUCTION TUBE FROM COOLING UNIT OUTLET FITTING
4. DISCONNECT LIQUID TUBE FROM COOLING UNIT INLET FITTING
5. REMOVE GROMMETS FROM INLET AND OUTLET FITTINGS
6. REMOVE GLOVE BOX
7. DISCONNECT CONNECTOR
8. REMOVE COOLING UNIT

Remove the five screws and a nut.

DISASSEMBLY OF COOLING UNIT

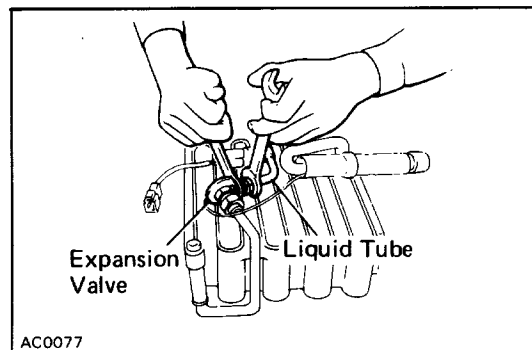


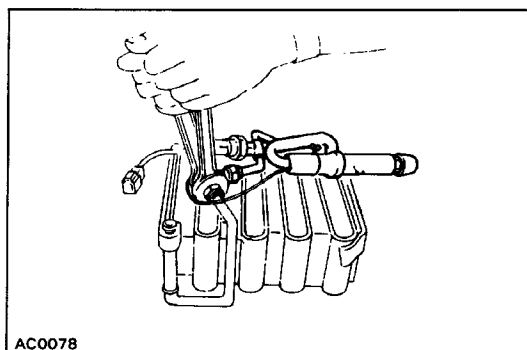
1. REMOVE LOWER AND UPPER UNIT CASES

- Disconnect connector.
- Remove A/C cut off relay (4WD with 3VZ-E E/G and A/T)
- Remove four clips.
- Remove four screws.
- Remove upper unit case.
- Remove thermistor with thermistor holder.
- Remove lower unit case.

2. REMOVE EXPANSION VALVE

- Disconnect the liquid tube from the inlet fitting of the expansion valve.
- Remove the packing and heat sensing tube from suction tube of evaporator.





(c) Remove expansion valve.

Evaporator

INSPECTION OF EVAPORATOR

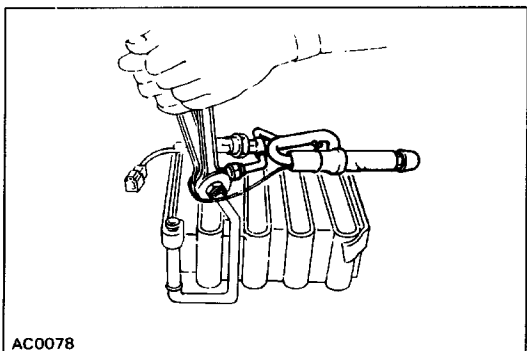
1. CHECK EVAPORATOR FINS FOR BLOCKAGE

If the fins are clogged, clean them with compressed air.

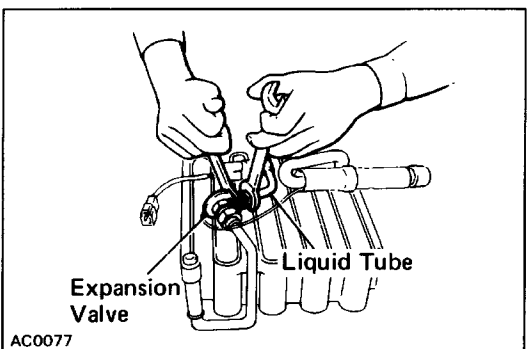
NOTICE: Never use water to clean the evaporator.

2. CHECK FITTINGS FOR CRACKS OR SCRATCHES

Repair as necessary.



AC0078



AC0077

ASSEMBLY OF COOLING UNIT

INSTALL COMPONENTS ON EVAPORATOR

(a) Connect the expansion valve to the inlet fitting of the evaporator. Torque the nut.

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

HINT: Be sure that the O-rings are positioned on the tube fitting.

(b) Install the holder to the suction tube with heat sensitizing tube.

(c) Connect the liquid tube to the inlet fitting of the expansion valve. Torque the nut.

Torque: 13 N·m (135 kgf·cm, 10 ft·lbf)

(d) Install lower unit case to the evaporator.

(e) Install thermistor to the evaporator.

(f) Install upper unit case

(g) Install four screws.

(h) Install four clips.

(i) Install A/C cut off relay.

(j) Connect connectors.

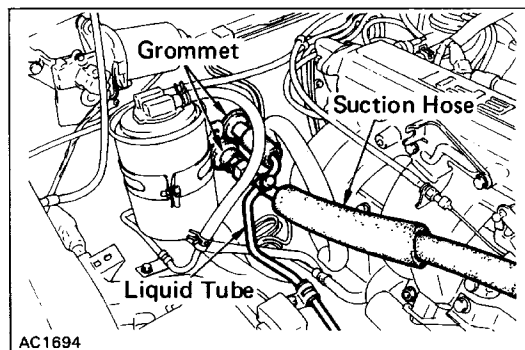
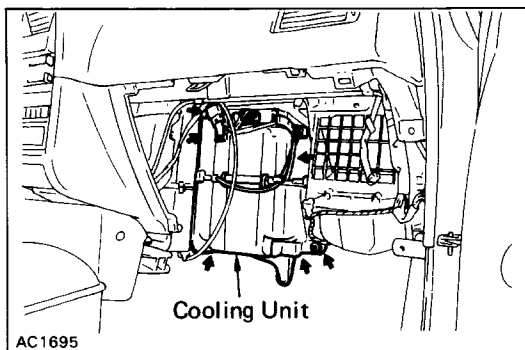
INSTALLATION OF COOLING UNIT

1. INSTALL COOLING UNIT

Install the cooling unit with four screws and a bolt.

2. CONNECT CONNECTOR

3. INSTALL GLOVE BOX AND REINFORCEMENT

**4. INSTALL GROMMETS ON INLET AND OUTLET FITTINGS****5. CONNECT LIQUID TUBE TO COOLING UNIT INLET FITTING**

Torque: 13 N·m (135 kgf·cm, 10 ft·lbf)

6. CONNECT SUCTION TUBE TO COOLING UNIT OUTLET FITTING

Torque: 32 N·m (325 kgf·cm, 24 ft·lbf)

7. IF EVAPORATOR WAS REPLACED, ADD COMPRESSOR OIL TO COMPRESSOR

Add 40 – 50 cc (1.4 – 1.7 fl.oz.)

Compressor oil: ND OIL6,

SUNISO No.5GS or equivalent

8. CONNECT NEGATIVE CABLE TO BATTERY**9. EVACUATE AIR FROM AIR CONDITIONING SYSTEM****10. CHARGE AIR CONDITIONING SYSTEM WITH REFRIGERANT AND CHECK FOR GAS LEAKAGE**

Specified amount: 700 – 800 g (1.5 – 1.8 lb)

REFRIGERANT LINES

ON-VEHICLE INSPECTION

1. INSPECT HOSES AND TUBES FOR LEAKAGE

Use a gas leak tester. Replace, if necessary.

2. CHECK THAT HOSE AND TUBE CLAMPS ARE NOT LOOSE

Tighten or replace, as necessary.

REPLACEMENT OF REFRIGERANT LINES

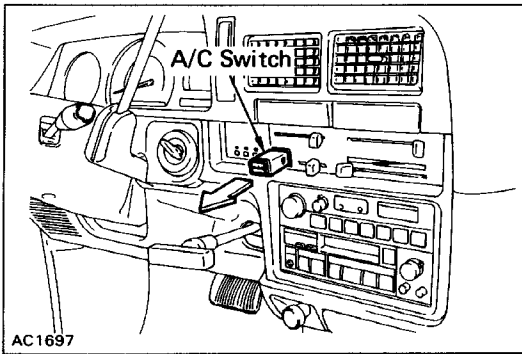
(SEE PAGE [AC-7](#))

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM**2. REPLACE FAULTY TUBE OR HOSE**

HINT: Cap the open fittings immediately to keep moisture out of the system.

3. TIGHTENING TORQUE FOR O-RING FITTINGS AND BOLTED TYPE FITTINGS (See page [AC-7](#))**4. EVACUATE AIR FROM AIR CONDITIONING SYSTEM****5. CHARGE AIR CONDITIONING SYSTEM WITH REFRIGERANT AND CHECK FOR GAS LEAKAGE**

Specified amount: 700 – 800 g (1.5 – 1.8 lb)



AC SWITCH

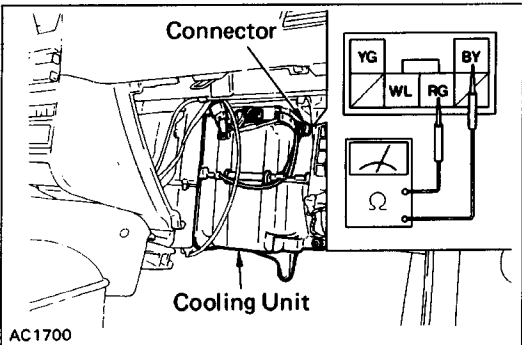
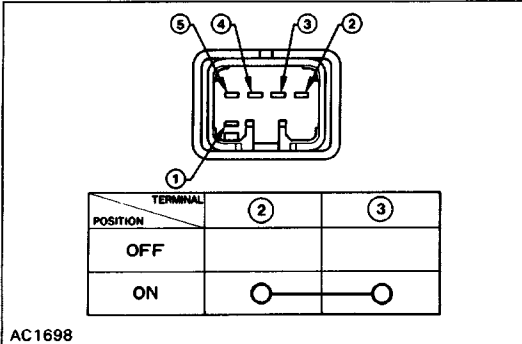
ON-VEHICLE INSPECTION

1. DISCONNECT NEGATIVE CABLE FROM BATTERY
2. REMOVE GLOVE BOX
3. REMOVE A/C SWITCH
4. CHECK A/C SWITCH FOR CONTINUITY

Using an ohmmeter, check for continuity between the terminals for each switch position shown in the table.

If there is no continuity, replace the A/C switch.

5. INSTALL A/C SWITCH
6. INSTALL GLOVE BOX
7. CONNECT NEGATIVE CABLE TO BATTERY



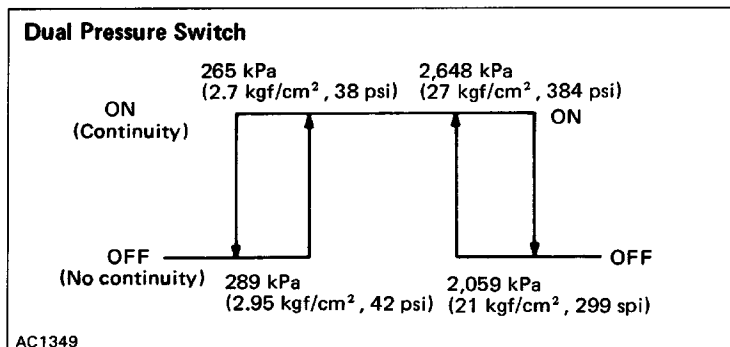
PRESSURE SWITCH

INSPECTION OF DUAL PRESSURE SWITCH

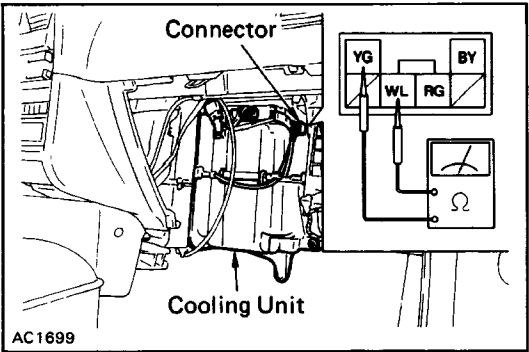
ON-VEHICLE INSPECTION

1. DISCONNECT NEGATIVE CABLE FROM BATTERY
2. REMOVE GLOVE BOX
3. INSPECT PRESSURE SWITCH

- (a) Install the manifold gauge set.
- (b) Observe the gauge reading.
- (c) Check the continuity between the two terminals of the pressure switch shown in the below.



If defective, replace the pressure switch.

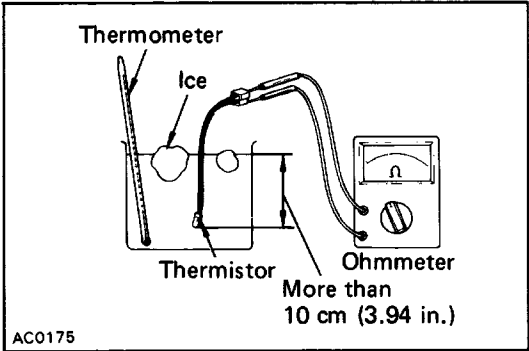


THERMISTOR

ON-VEHICLE INSPECTION

1. DISCONNECT NEGATIVE BATTERY CABLE
2. REMOVE GLOVE BOX
3. DISCONNECT CONNECTOR OF THERMISTOR
4. CHECK RESISTANCE OF THERMISTOR

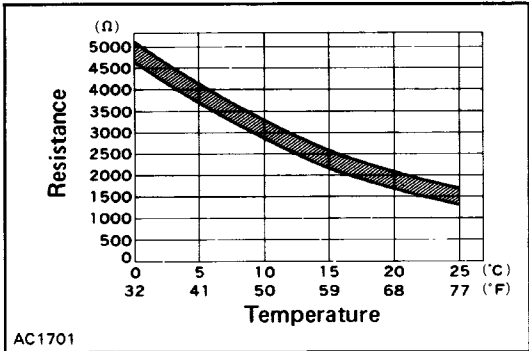
Measure the resistance between terminals.
Standard resistance: 1,500 at 25°C (77°F)
If resistance is not as specified, replace the thermistor.



REMOVAL AND INSPECTION OF THERMISTOR

1. REMOVE AND DISASSEMBLE COOLING UNIT (SEE PAGE AC-25)
2. REMOVE THERMISTOR FROM EVAPORATOR
3. CHECK THERMISTOR OPERATION

- (a) Place the thermistor in cold water. While varying the temperature of the water, measure the resistance at the connector and at the same time; measure the temperature of the water with a thermometer.
- (b) Compare the two readings on the chart.
- If the intersection is not between the two lines, replace the thermistor.



INSTALLATION OF THERMISTOR

1. INSTALL THERMISTOR TO EVAPORATOR
2. ASSEMBLE AND INSTALL COOLING UNIT

RELAY

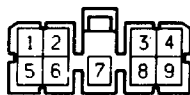
INSPECTION OF A/C CUT OFF RELAY

4WD Models with 3VZ-E E/G and AM
INSPECT A/C CUT OF RELAY CONTINUITY

<p>BE1647 BE1841</p>	Terminal	1	2	3	4
	Condition				
	Constant	○	○	○	
Apply battery positive voltage to terminals 1 and 3.			○		○

If continuity is not as specified, replace the relay.

Wire Harness Side



K-9-1

AIR CONDITIONING AMPLIFIER

INSPECTION OF AMPLIFIER

INSPECT AMPLIFIER CIRCUIT

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

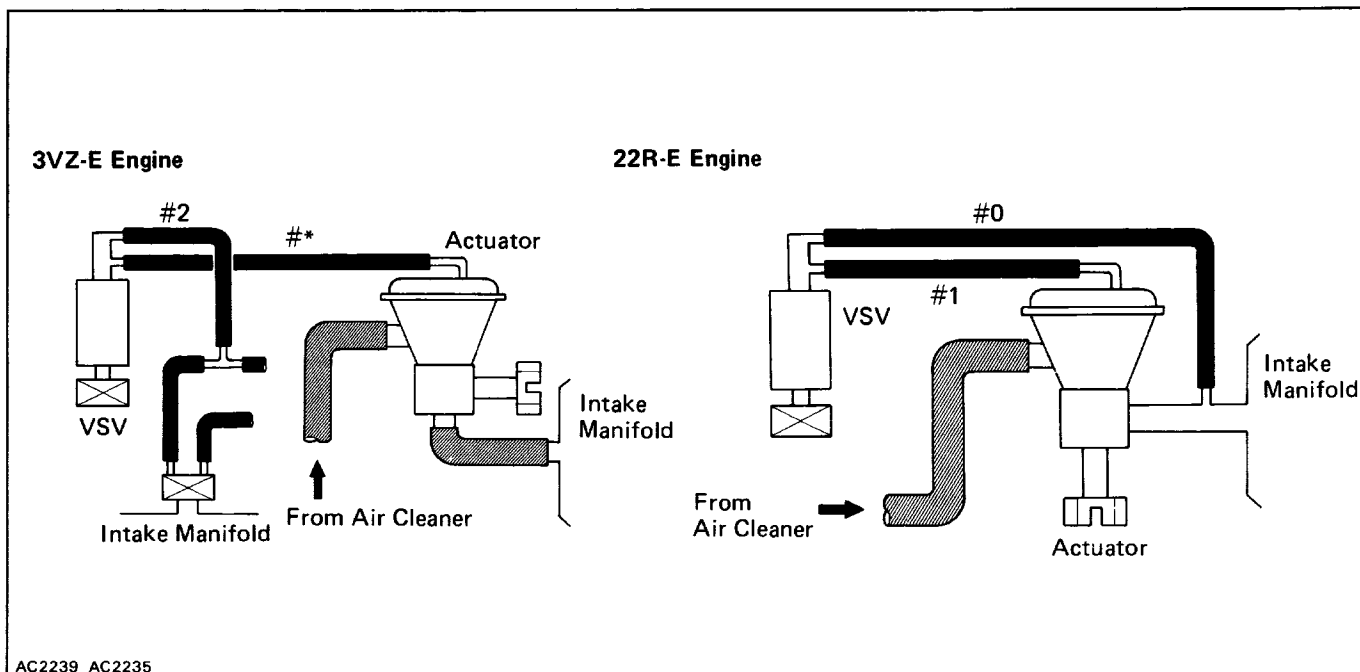
Test conditions:

- (1) Ignition switch: ON
- (2) Temperature control lever: MAX COOL
- (3) Blower switch: HI

Check for	Tester connection	Condition	Specified value
Continuity	7 – 8	Constant	Continuity
	8 – Ground	Constant	Continuity
Voltage	3 – 8	Turn A/C switch on.	Battery positive voltage
		Turn A/C switch off.	Battery positive voltage
	4 – 8	Turn A/C switch on.	Battery positive voltage
		Turn A/C switch off.	No voltage
	6 – 8	Start the engine.	Approx. 10 to 14 V
		Stop the engine.	No voltage
	8 – 9	Turn A/C switch on.	Battery positive voltage
		Turn A/C switch off.	Battery positive voltage
Resistance	5 – 8	Constant	Approx. 1.5 k Ω at 25°C (77°F)
	2 – 5	MAX COOL	Approx. 0 Ω
		MIN COOL	Approx. 3 k Ω

If circuit is correct, replace the amplifier.

VACUUM HOSE CIRCUIT

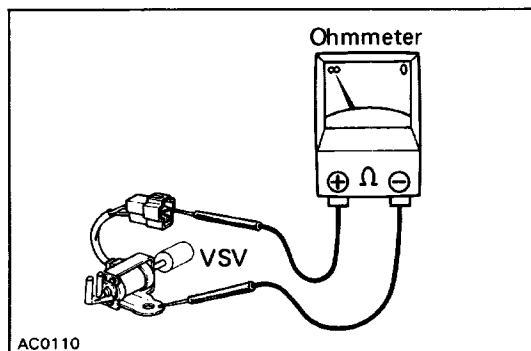
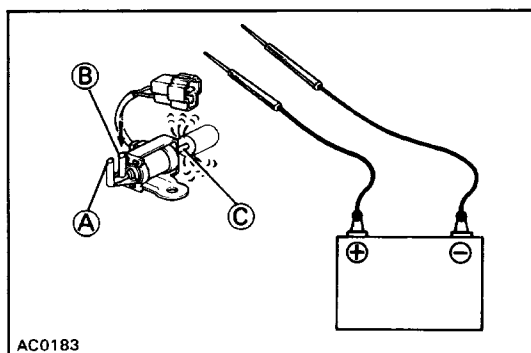
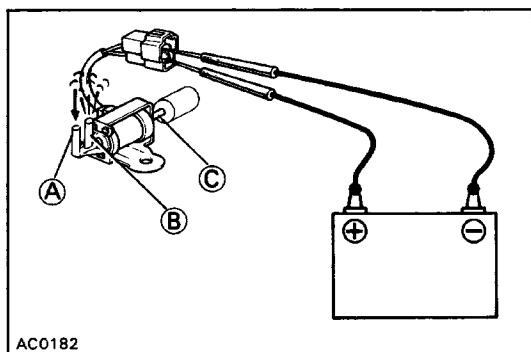


VACUUM SWITCHING VALVE (VSV) INSPECTION OF VSV

1. DISCONNECT VACUUM HOSES AND CONNECTOR FROM VSV

2. CHECK VACUUM CIRCUIT CONTINUITY IN VSV BY BLOWING AIR INTO PIPE

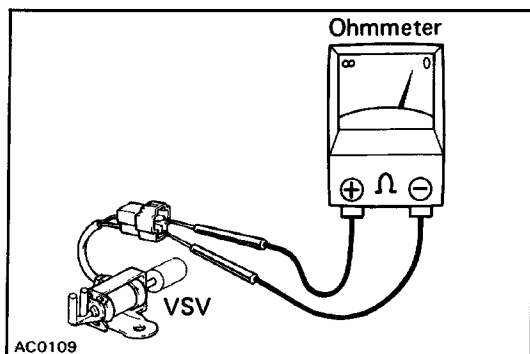
- Connect the VSV terminals to the battery terminals as shown.
 - Blow into pipe (A), and check that air comes out of pipe (B), but does not come out of filter (C).
 - Disconnect the battery.
 - Blow into pipe (B) and check that air comes out of filter (C), but does not come out of pipe (A).
- If a problem is found, replace the VSV.



3. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.

If a short circuit is found, repair or replace the VSV.



4. CHECK FOR OPEN CIRCUIT

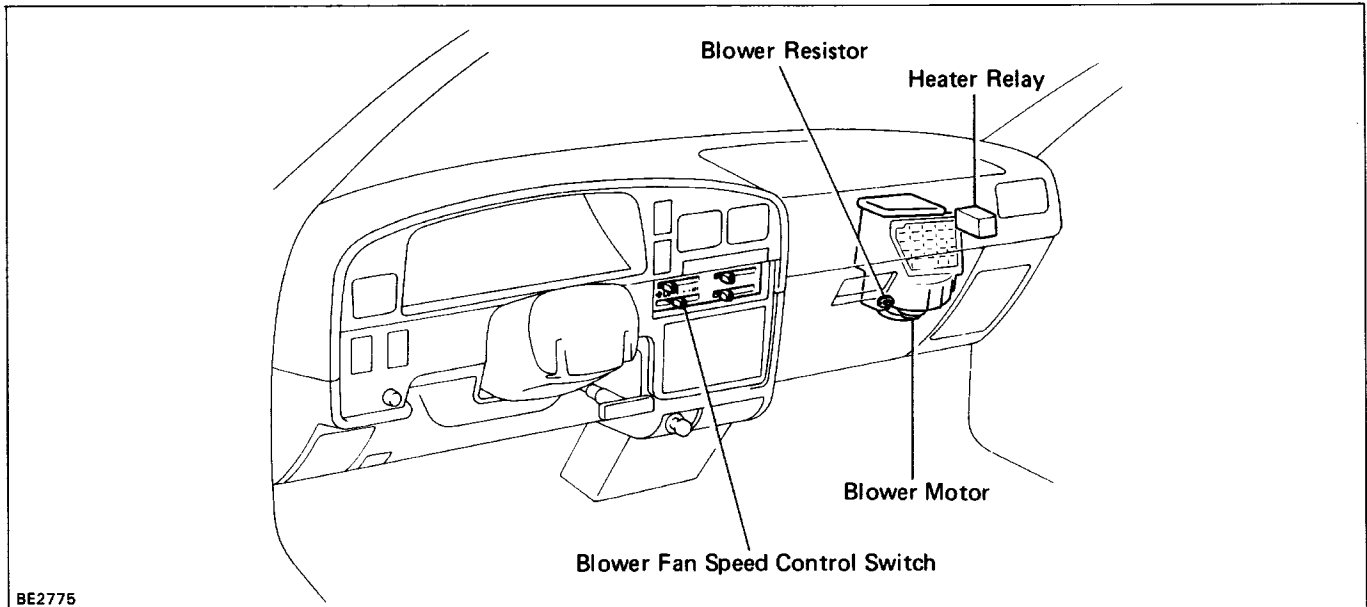
Using an ohmmeter, measure the resistance between two terminals of the VSV.

Specified resistance: 37 – 42 Ω at 200C (680F)

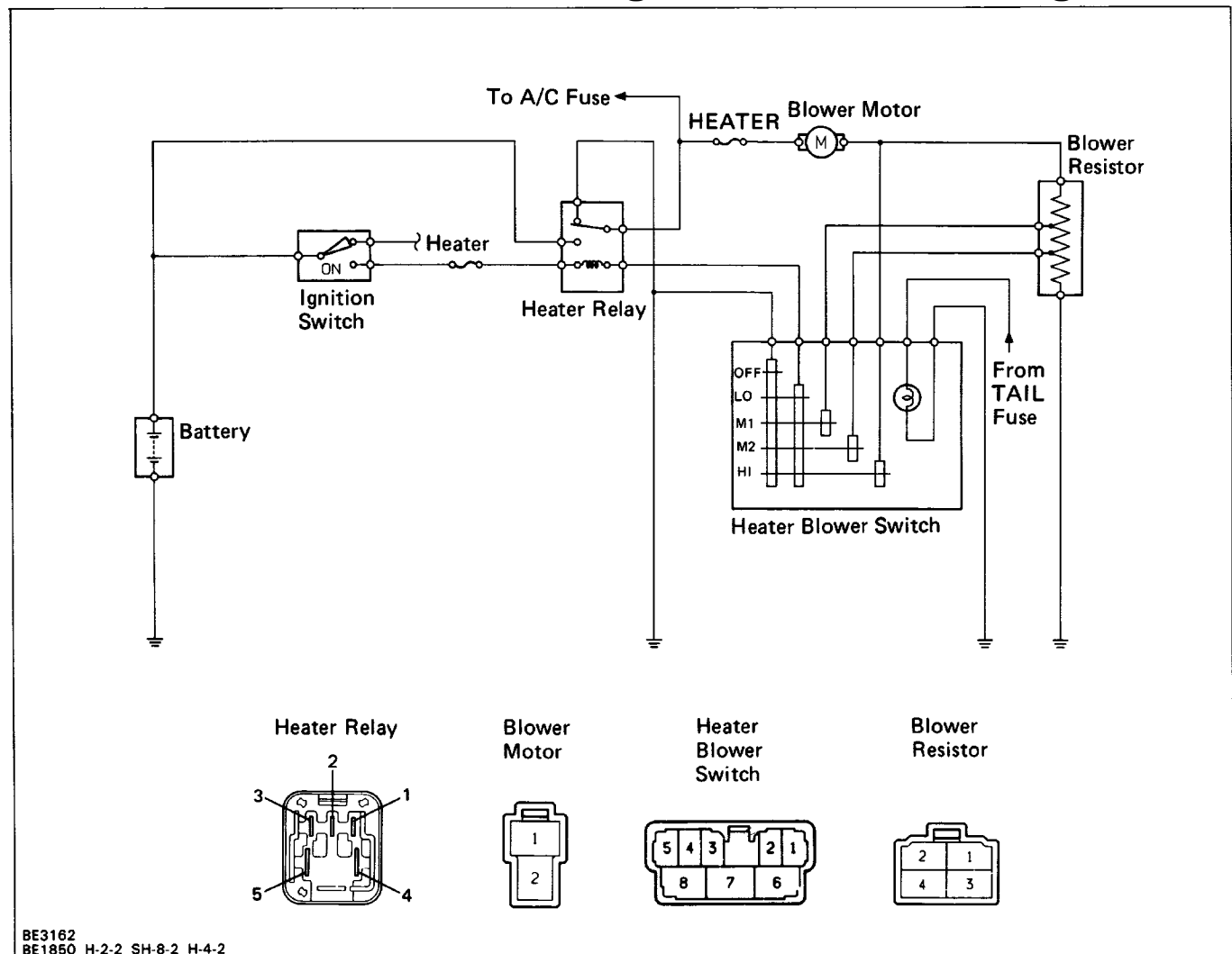
If resistance value is not as specified, replace the VSV.

HEATER

Parts Location



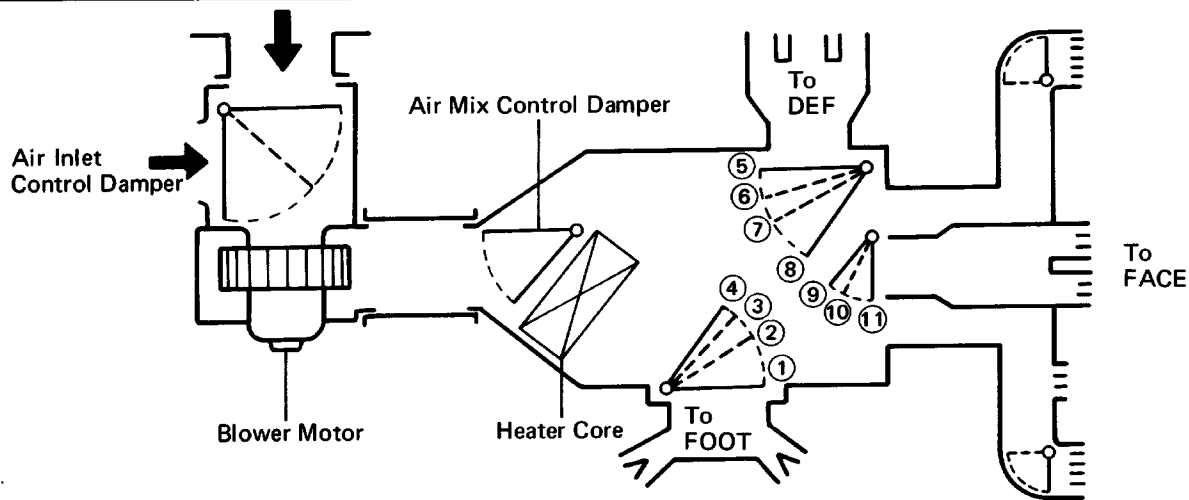
Wiring and Connector Diagrams



Troubleshooting

Problem	Possible cause	Remedy	Page
Blower does not work when fan switch is on	HEATER fuse blown Heater relay faulty Heater blower switch faulty Heater blower resistor faulty Heater blower motor faulty Wiring or ground faulty	Replace fuse and check for short Check relay Check switch Check resistor Check motor Repair as necessary	AC-37 AC-37 AC-37 AC-37
Incorrect temperature output	Control cables broken or adjustment faulty Heater hoses leaking or clogged Water valve faulty Air dampers broken	Check cables Replace hose Replace valve Repair dampers	AC-36

Damper Positions



Mode	Air Flow Mode Control Damper Positions	Air Flow Vents					Center of Driver's Seat
		Center	Side	Foot	Def.		
Face	① ⑤ ⑨	○	○				○
Bi-Level	② ⑤ ⑩	○	○	○			○
Foot	④ ⑥ ⑪		○	○	○		○
Foot/Def.	③ ⑦ ⑪		○	○	○		○
Def.	① ⑧ ⑪		○		○		○

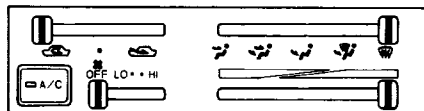
BE2777 00018E The size of circle (○) indicates the proportion of the air flow volume.

Inspection and Adjustment

1. INSPECT HEATER CONTROL PANEL

(Heater Control Cable Position)

Move the control levers left and right and check for stiffness and binding through the full range of the levers.

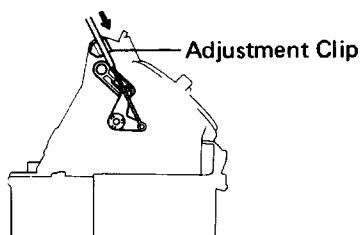


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2. ADJUST CONTROL DAMPER

(Air Inlet Control Damper)

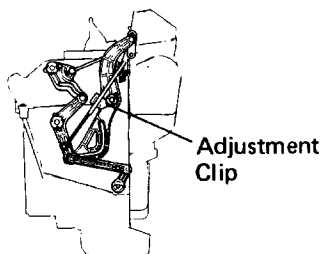
Set the air inlet control damper and lever to "FRESH".



BE2779R

(Air Flow Control Damper)

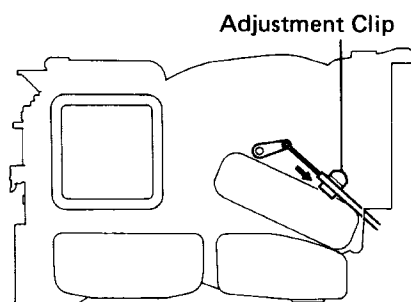
Set the air flow control damper and lever to "DEF".



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(Air Mix Control Damper)

Set the air mix control damper and lever to "COOL".



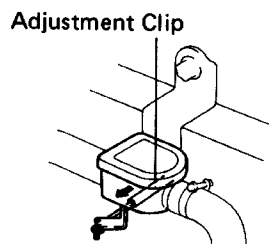
BE2781

3. ADJUST WATER VALVE

(Water Valve)

Set the water valve and control lever to "COOL".

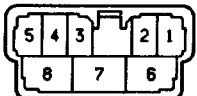

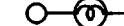






HINT: Place the water valve lever on "COOL" and while pushing the outer cable in the "COOL" direction, clamp the outer cable to the water valve bracket.



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Part Inspection

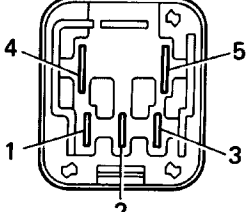
1. INSPECT HEATER BLOWER SWITCH (Continuity)

	Terminal					Illumination		
	Switch position	1	2	5	6	8	3	4
	OFF							
	LO							
	o (M 1)							
	O (M 2)							
	HI							

SH-8-2

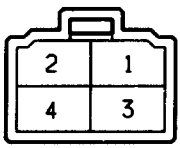
If continuity is not as specified, replace the switch.

2. INSPECT HEATER RELAY (Continuity)

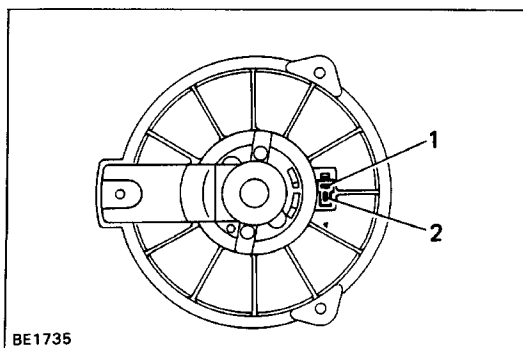
	Terminal				
	Condition				
	Constant	1	2	3	4
Apply battery positive voltage to terminals 1 and 3.					

If continuity is not as specified, replace the relay.

3. INSPECT HEATER BLOWER RESISTOR (Continuity)

	Terminal			
	Condition			
	Constant	2	1	3

If continuity is not as specified, replace the resistor.



4. INSPECT HEATER BLOWER MOTOR (Operation)

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor operation is smooth.

If operation is not as specified, replace the motor.