AIR CONDITIONING SYSTEM

PRECAUTIONS

1. **The following precautions should be observed when handling refrigerant(R-12):**
   (a) Always wear eye protection.
   (b) Keep the refrigerant container(service drum)below 40°C(104°F).
   (c) Do not handle refrigerant in an enclosed area where there is an open flame.
   (d) Discharge refrigerant slowly when purging the system.
   (e) Be careful that the liquid refrigerant does not get on your skin.

2. **If liquid refrigerant gets in the eyes or on the skin:**
   (a) Do not rub.
   (b) Wash the area with a lot of cool water.
   (c) Apply clean petroleum jelly to the skin.
   (d) Rush to a physician or hospital for immediate professional treatment.
   (e) Do not attempt to treat yourself.

3. **When tubing:**
   (a) Apply a few drops of compressor oil to the seats of the O-ring fittings.
   (b) Use two wrenches to tighten the nuts to prevent twisting the tube.
   (c) Tighten the O-ring fitting to the specified torque.

Tightening torque for O-ring fittings

Fitting size	Torque
3/8 in.Tube	135 kg-cm (10 ft-lb, 13 N·m)
1/2 in.Tube	225 kg-cm (16 ft-lb, 22 N·m)
5/8 in.Tube	325 kg-cm (24 ft-lb, 32 N·m)

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-9 to 11
	(b) Magnetic clutch faulty	Check magnetic clutch	AC-20
	(c) A/C switch faulty	Check switch	AC-38
	(d) A/C amplifier faulty	Check amplifier	AC-40
	(e) Wiring or ground faulty	Repair as necessary	AC-9 to 11
	(f) Refrigerant empty	Check refrigerant pressure	AC-13
	(g) Heater relay faulty	Check heater relay	AC-9 to 11
	(h) Circuit breaker faulty	Check circuit breaker	AC-9 to 11
	(i) Pressure switch faulty	Check pressure switch	AC-39
	Compressor does not rotate properly		
	(a) Drive belt loose or broken	Adjust or replace drive belt	AC-32
	(b) Compressor faulty	Check compressor	AC-20
	Expansion valve faulty	Check expansion valve	AC-36
	Leak in system	Test system for leaks	AC-15
	Fusible plug on receiver blown or clogged screen	Check receiver	AC-34

TROUBLESHOOTING (Cont'd)

Problem	Possible cause	Remedy	Page
No cooling or warm air (Cont'd)	Blower does not operate		
	(a) A/C fuse blown	Replace fuse and check for short	AC-9 to 11
	(b) A/C switch faulty	Check A/C switch	AC-38
	(c) Circuit breaker faulty	Check circuit breaker	AC-9 to 11
	(d) Heater relay faulty	Check heater relay	AC-9 to 11
	(e) Blower motor faulty	Check blower motor	
	(f) Wiring faulty	Repair as necessary	AC-9 to 11
Cool air comes out intermittently	Magnetic clutch slipping	Check magnetic clutch	AC-20
	Expansion valve faulty	Check expansion valve	AC-36
	Wiring connection faulty	Repair as necessary	AC-9 to 11
	Excessive moisture in system	Evacuate and charge system	AC-14
Cool air comes out only at high speed	Condenser clogged	Check condenser	AC-33
	Drive belt slipping	Check or replace drive belt	AC-32
	Compressor faulty	Check compressor	AC-20
	Insufficient or too much refrigerant	Check refrigerant charge	AC-13
	Air in system	Evacuate and charge system	AC-14
Insufficient cooling	Condenser clogged	Check condenser	AC-33
	Drive belt slipping	Check or replace drive belt	AC-32
	Magnetic clutch faulty	Check magnetic clutch	AC-20
	Compressor faulty	Check compressor	AC-20
	Expansion valve faulty	Check expansion valve	AC-36
	Air conditioner amplifier faulty	Check amplifier	AC-40
	Insufficient or too much refrigerant	Check refrigerant charge	AC-13
	Air or excessive compressor oil in system	Evacuate and charge system	AC-14
	Receiver clogged	Check receiver	AC-34
Insufficient velocity of cool air	Evaporator clogged or frosted	Clean evaporator fins or filters	AC-36
	Air leakage from cooling unit or air duct	Repair as necessary	AC-34
	Air inlet blocked	Repair as necessary	
	Blower motor faulty	Replace blower motor	

Checking of Refrigeration System with Manifold Gauge

Read the manifold gauge pressure with the following established conditions:

(a) Temperature at the air inlet 30 — 35°C(86 — 95°F)

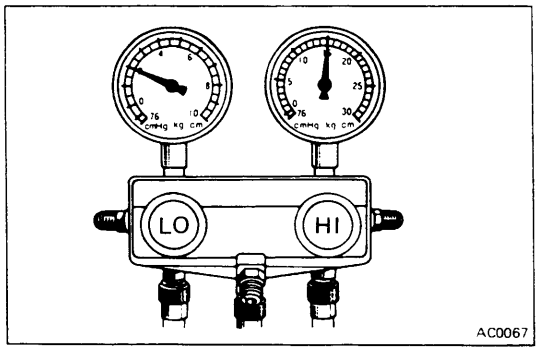
(b) Engine running at 2,000 rpm

(c) Blower speed set at high

(d) A/C switch ON

(e) Temperature control lever set at cool

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



AC0067

1. NORMALLY FUNCTIONING REFRIGERATION SYSTEM

Gauge reading:

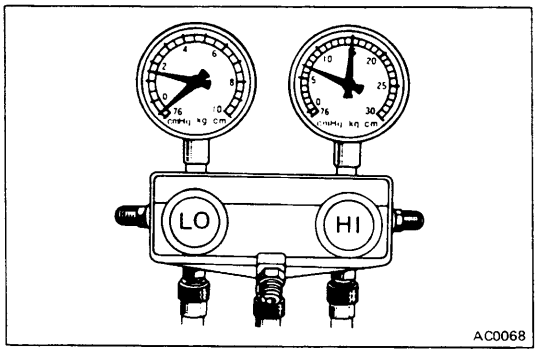
Low pressure side

1.5 — 2.0 kg/cm² (21 — 28 psi, 147 — 196 kPa)

High pressure side

14.5 — 15.0 kg/cm² (206 — 213 psi)

(1,422 — 1,471 kPa)

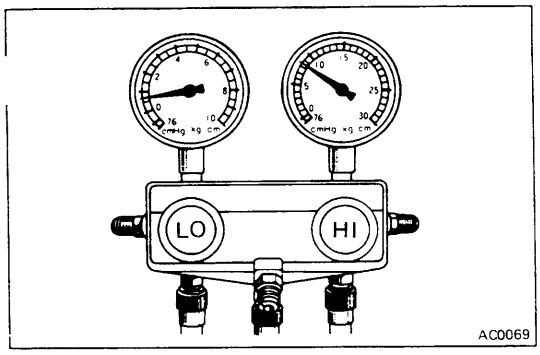


AC0068

2. MOISTURE PRESENT IN REFRIGERATION SYSTEM

Condition: Periodically cools and then fails to cool

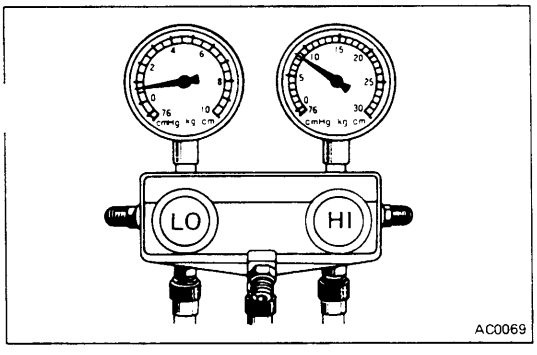
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure at low pressure side sometimes becomes a vacuum and sometimes normal	Moisture entered refrigeration system, freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after a time when the ice melts	Drier in oversaturated state ↓ Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	(1) Replace receiver and drier (2) Remove moisture in cycle through repeated vacuum purging (3) Charge refrigerant to proper amount



3. INSUFFICIENT REFRIGERANT

Condition: Insufficient cooling

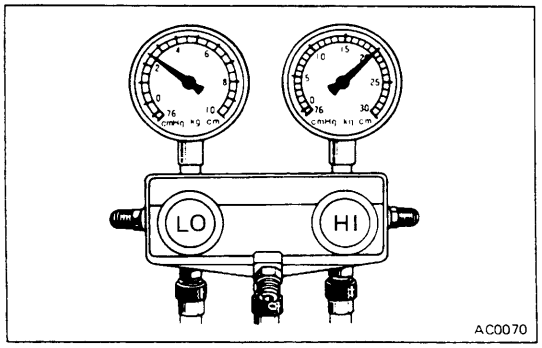
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressure low at both low and high pressure sides Bubbles seen in sight glass Insufficient cooling performance	Gas leakage some place in refrigeration system	Insufficient refrigerant in system ↓ Refrigerant leaking	(1) Check with leak tester and repair (2) Charge refrigerant to proper amount



4. POOR CIRCULATION OF REFRIGERANT

Condition: Insufficient cooling

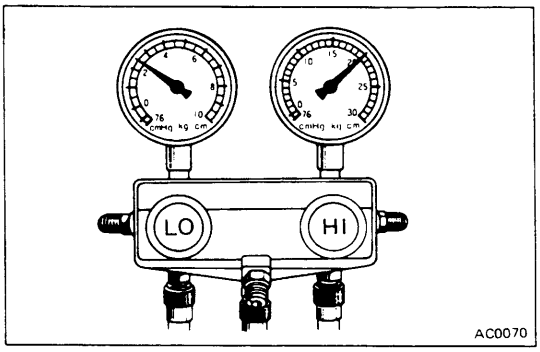
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressure low at both low and high pressure sides Frost on tubes from receiver to unit	Refrigerant flow obstructed by dirt in receiver	Receiver clogged	Replace receiver



5. REFRIGERANT OVERCHARGE OR INSUFFICIENT COOLING OF CONDENSER

Condition: Does not cool sufficiently

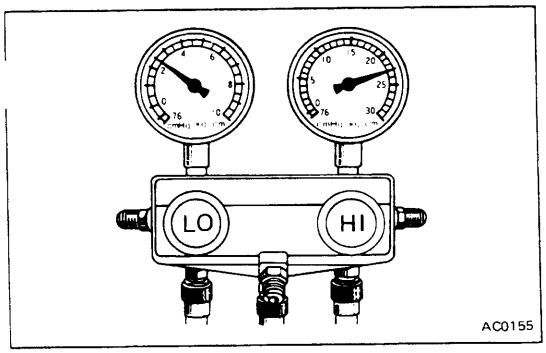
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressures too high at both low and high pressure sides	Unable to develop sufficient performance due to excessive refrigerant in system	Excessive refrigerant in cycle→refrigerant overcharged	(1) Clean condenser (2) Check fan motor operation (3) If (1) and (2) are in normal state, check amount of refrigerant Note: Vent out refrigerant through gauge manifold low pressure side by gradually opening valve.
	Condenser cooling insufficient	Condenser cooling insufficient→condenser fins clogged or fan motor faulty	



6. EXPANSION VALVE IMPROPERLY MOUNTED/ HEAT SENSING TUBE DEFECTIVE (OPENS TOO WIDE)

Condition: Insufficient cooling

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressures too high at both low and high pressure sides	Trouble in expansion valve or heat sensing tube not installed correctly	Excessive refrigerant in low pressure piping	(1) Check heat sensing tube installation (2) If (1) is normal, test expansion valve in unit
		↓	
Frost or large amount of dew on piping at low pressure side	Refrigerant flow out of adjustment	Expansion valve opened too wide	Replace if defective

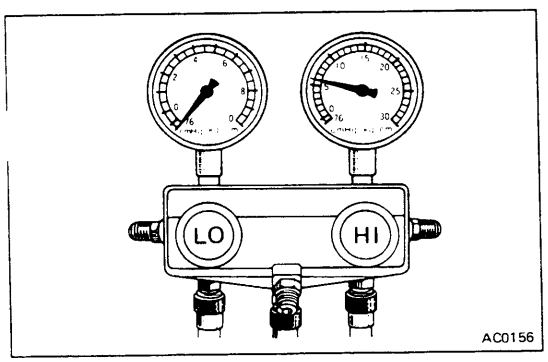


7. AIR PRESENT IN REFRIGERATION SYSTEM

Condition: Does not cool down sufficiently

NOTE: These gauge indications are shown when the refrigeration system has been opened and the refrigerant charged without vacuum purging.

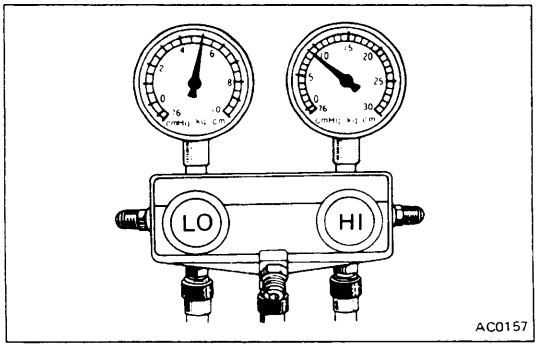
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressures too high at both low and high pressure sides	Air entered refrigeration system	Air present in refrigeration system ↓ Insufficient vacuum purging	(1) Replace receiver and drier (2) Check for dirty or insufficient compressor oil (3) Vacuum purge and charge new refrigerant



8. REFRIGERANT DOES NOT CIRCULATE

Condition: Does not cool (Cools from time to time in some cases)

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Vacuum indicated at low pressure side, very low pressure indicated at high pressure side Frost or dew seen on piping before and after receiver and drier or expansion valve	Refrigerant flow obstructed by moisture or dirt refrigerant freezing or adhering to expansion valve orifice Refrigerant flow obstructed by gas leakage from expansion valve heat sensing tube	Expansion valve orifice clogged ↓ Refrigerant does not flow	Allow to stand for sometime and then restart operation to determine if trouble is caused by moisture or dirt. If caused by moisture refer to step 2 on page AC-4. If caused by dirt, remove expansion valve and clean off dirt by blowing with air. If unable to remove dirt, replace valve. Vacuum purge and charge refrigerant to proper amount. If gas leakage from heat sensing tube, replace expansion valve.



9. INSUFFICIENT COMPRESSION

Condition: Does not cool

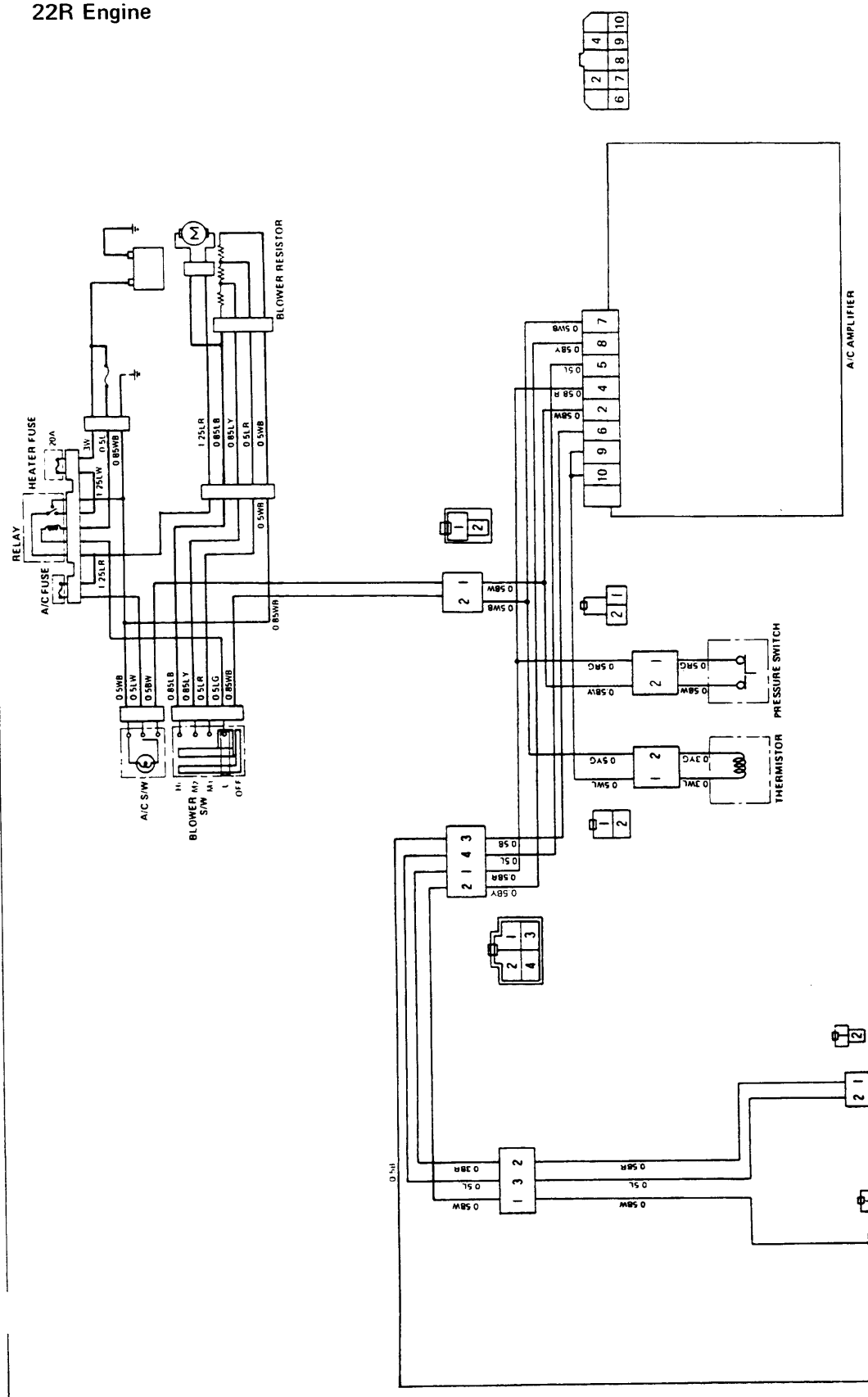
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressure too high at low pressure side Pressure too low at high pressure side	Internal leak in compressor	Compression defective ↓ (Valves, sliding parts piston, cylinder, gasket, etc.)	Replace or repair compressor

SPECIAL TOOLS AND EQUIPMENT

Tool	SST No.	Use
Manifold gauge set	07110-78010	To evacuate and charge system
Ohmmeter		To electrical diagnosis
Testing nozzle	07115-71010	To test expansion valve
Magnetic clutch tool set	07110-77011	Includes all of the following
Pressure plate remover	07112-71010	To remove pressure plate
Snap ring pliers	07114-84020	To remove pressure plate
Key remover	07112-45021	To remove key
Shaft plate remover	07112-15010	To remove shaft plate
Shaft seal remover	07114-15010	To remove shaft seal
Hexagon wrench set	07110-61050	To remove service valves and front housing
Shaft plate installing tool	07112-25010	To install shaft plate
Key press tool	07114-45010	To install key

AIR CONDITIONING SYSTEM CIRCUIT

22R Engine



WIRE COLOR

Wire colors are indicated by an alphabetical code. The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

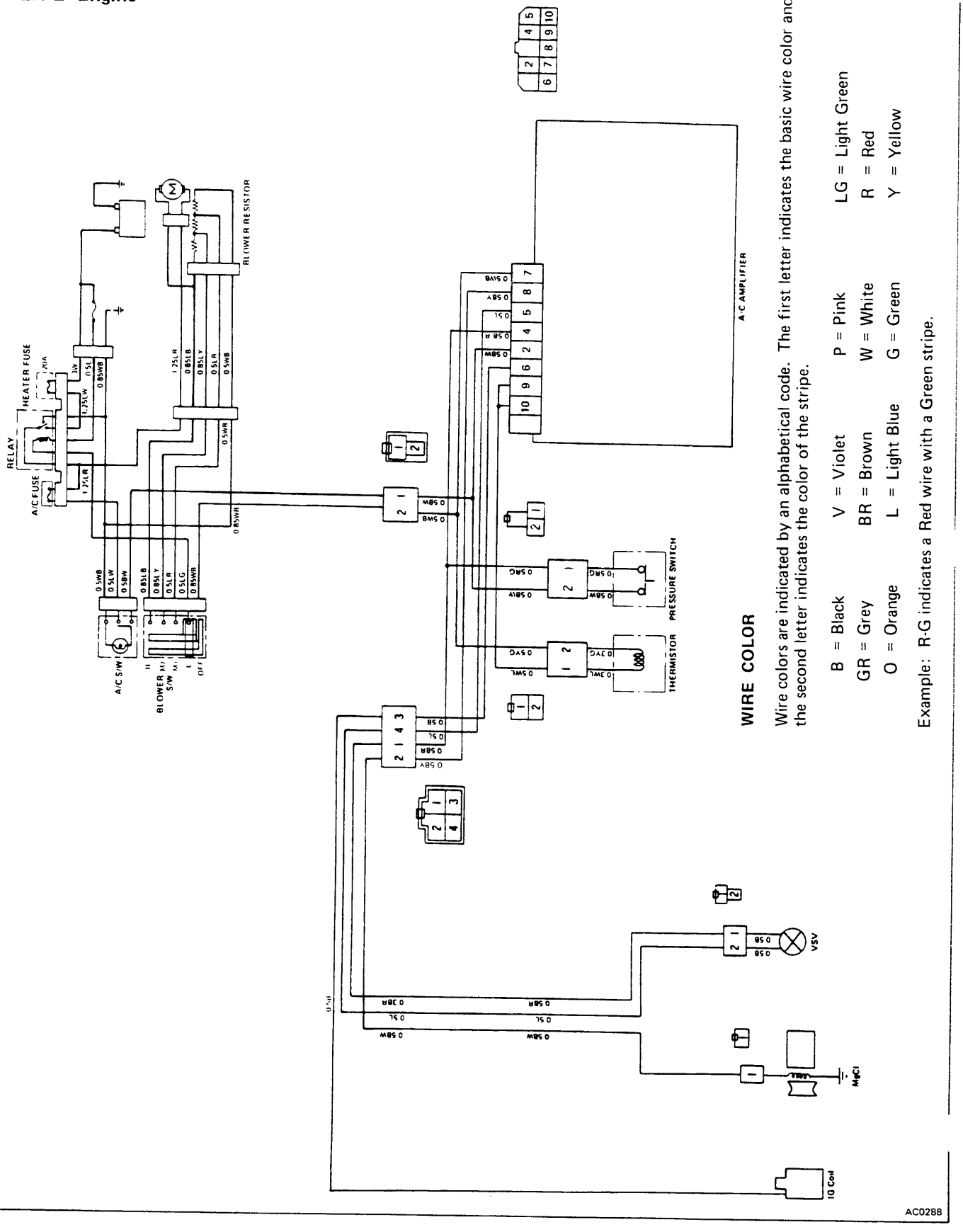
B = Black	V = Violet	P = Pink	LG = Light Green
GR = Grey	BR = Brown	W = White	R = Red
O = Orange	L = Light Blue	G = Green	Y = Yellow

Example: R-G indicates a Red wire with a Green stripe.

AC0287

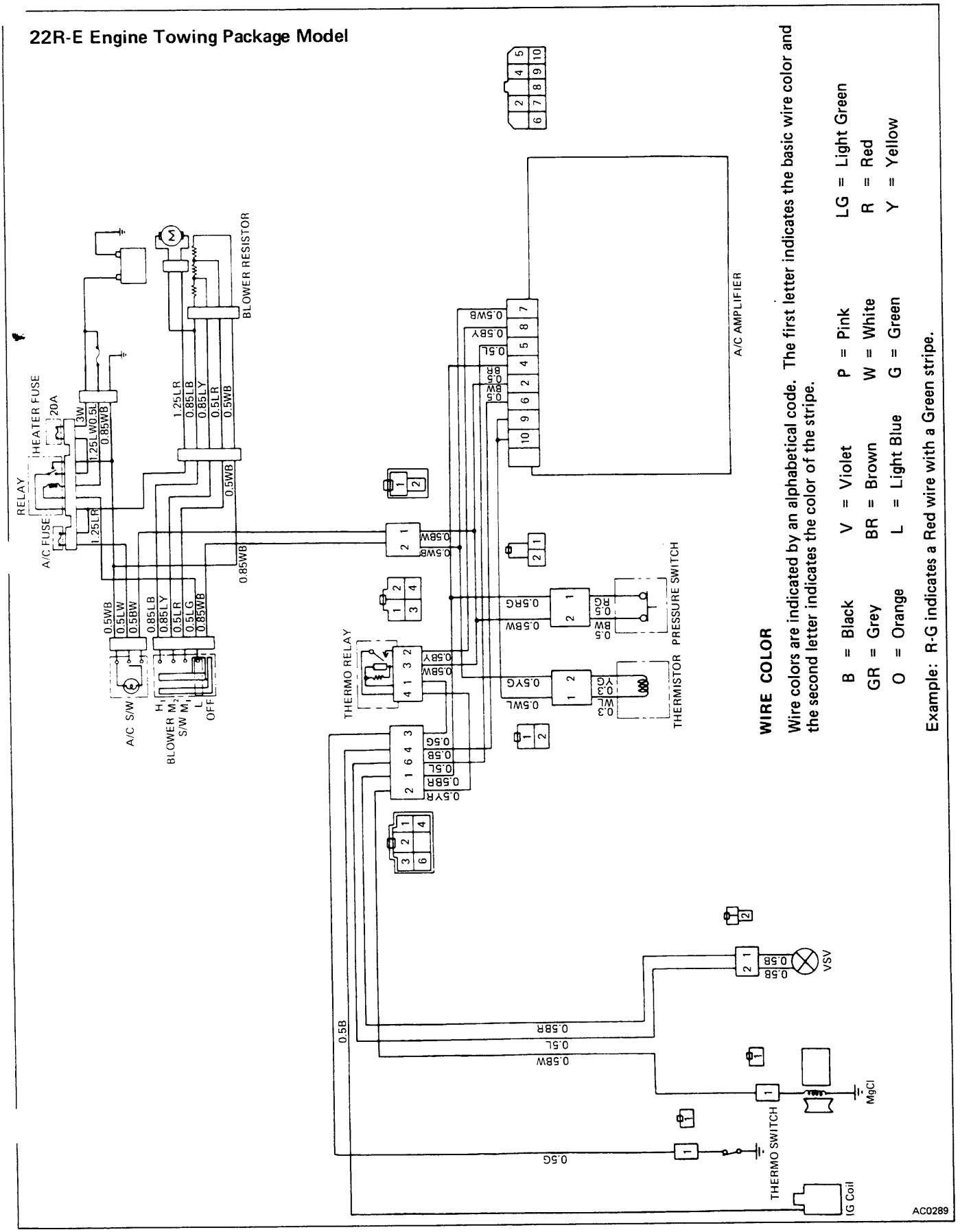
AIR CONDITIONING SYSTEM CIRCUIT (Cont'd)

22R-E Engine



AIR CONDITIONING SYSTEM CIRCUIT (Cont'd)

22R-E Engine Towing Package Model



WIRE COLOR

Wire colors are indicated by an alphabetical code. The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

B = Black	V = Violet	P = Pink	LG = Light Green
GR = Grey	BR = Brown	W = White	R = Red
O = Orange	L = Light Blue	G = Green	Y = Yellow

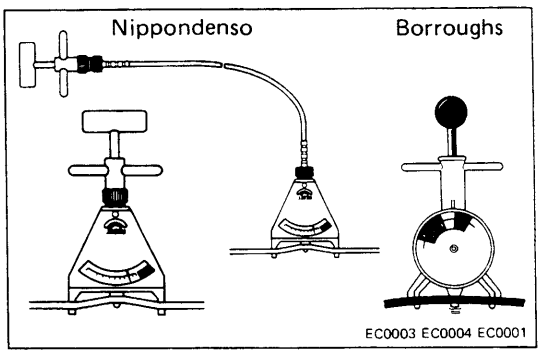
Example: R-G indicates a Red wire with a Green stripe.

ON-VEHICLE INSPECTION

1. **CHECK CONDENSER FINS FOR BLOCKAGE OR DAMAGE**

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

   CAUTION: 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 125±25 lb
   Used belt 80±20 lb

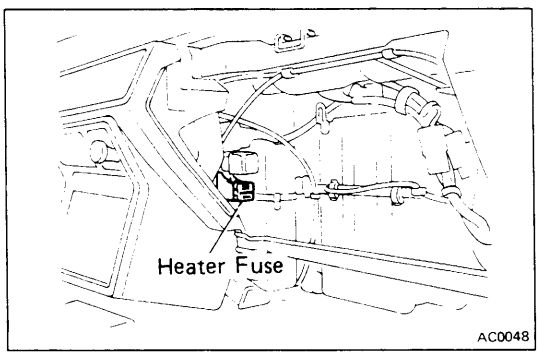
   NOTE:
   - "New belt" refers to a brand new belt which has never before been used.
   - "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.

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.

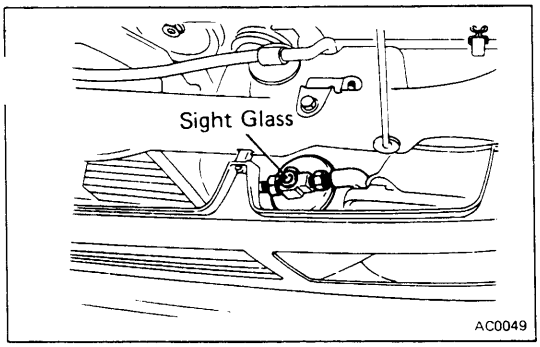
   Standard idle up rpm: 900 — 1,000 rpm

7. **CHECK AMOUNT OF REFRIGERANT**

   If you can see bubbles in the sight glass, additional refrigerant is needed. (See page AC-13)

8. **IF NO OR INSUFFICIENT COOLING, INSPECT FOR LEAKAGE**

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

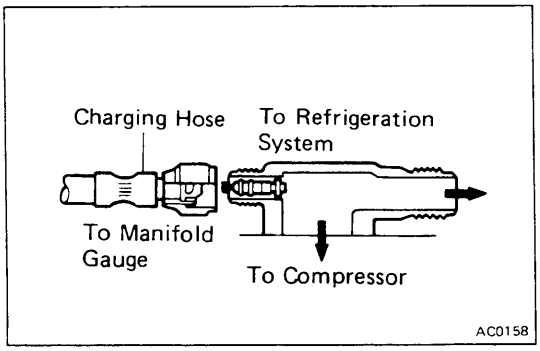


REFRIGERATION SYSTEM
Checking of Refrigerant Charge

1. **RUN ENGINE AT FAST IDLE**
2. **OPERATE AIR CONDITIONER 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	Check for leak with gas leak tester
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	Evacuate and charge system. Then check for leak with gas leak tester
4	Temperature between compressor inlet and outlet is noticeably different	Proper or too much	Refer to items 5 and 6
5	Immediately after air conditioner is turned off, refrigerant in sight glass stays clear	Too much	Discharge excess refrigerant to specified amount
6	When air conditioner is turned off, refrigerant foams and then stays clear	Proper	—



Installation of Manifold Gauge Set

NOTE: Fittings for attaching the manifold gauge set are located on the compressor service valves.

1. **CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET**
2. **INSTALL CHARGING HOSES OF GAUGE SET TO SERVICE VALVES**

   Connect the low pressure hose to the suction service valve and the high pressure hose to the discharge service valve. Tighten the hose nuts by hand.

   NOTE: Do not apply compressor oil to the seat of the connection.

Discharging of Refrigeration System

1. **CONNECT MANIFOLD GAUGE SET TO COMPRESSO**

2. **PLACE FREE END OF CENTER HOSE IN A SHOP TOWEL**

3. **DISCHARGE SYSTEM**

   (a) Slowly open the high pressure hand valve to adjust the refrigerant flow. Do not open the valve very much.

   CAUTION: If refrigerant is allowed to escape too fast, compressor oil will be drawn out of the system.

   (b) Check the shop towel to make sure no oil is being discharged.

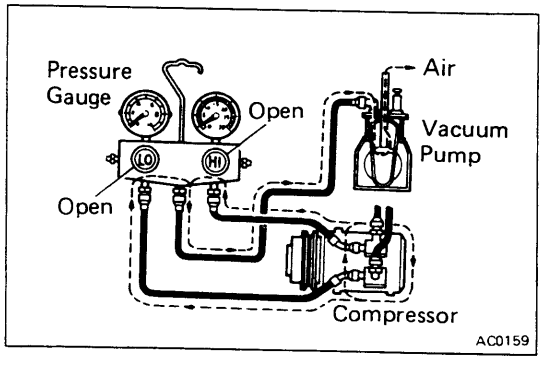
   If oil is present, partially close the hand valve.

   (c) After the manifold gauge reading drops below 3.5 kg/cm² (50 psi, 343 kPa), slowly open the low pressure valve.

   (d) As the system pressure drops, gradually open both high and low valves until both gauges read 0 kg/cm² (0 psi, 0 kPa).

Evacuating and Charging of Refrigeration System

NOTE:
- Whenever the air conditioning system has been exposed to the atmosphere, it must be evacuated.
- After installation of a component, the system should be evacuated for appoximately 15 minutes. A component in service that has been opened for repair should be evacuated for 30 minutes.



1. **EVACUATE SYSTEM**

   (a) Connect the manifold gauge set.

   (b) Install the center hose of the gauge set to the vacuum pump inlet.

   (c) Run the vacuum pump, and then open both hand valves.

   (d) After about ten minutes, check that the low pressure gauge reads more than 600 mmHg (23.62 in.Hg, 80.0 kPa) of vacuum.

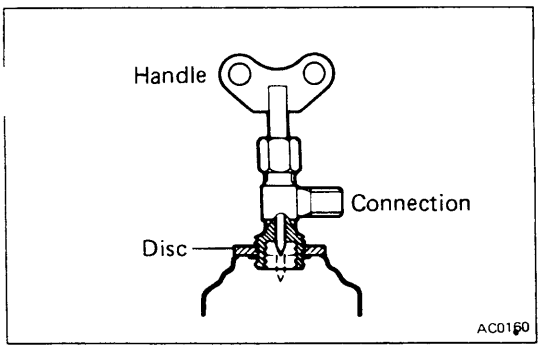
   If the reading is not more than 600 mmHg (23.62 in.Hg, 80.0 kPa), close both valves and stop the vacuum pump. Check the system for leaks and repair as necessary.

   If no leaks are found, continue evacuating the system.

   (e) After the low pressure gauge indicates more than 700 mmHg (27.56 in.Hg, 93.3 kPa) of vacuum, continue evacuating for 15 minutes.

   (f) Close both hand valves, and stop the vacuum pump. Disconnect the hose from the vacuum pump.

The system is now ready for charging.



2. **INSTALL REFRIGERANT CONTAINER TAP VALVE**

CAUTION: Observe the precautions listed in the front of this section.

(a) Before installing the valve on the refrigerant container, turn the handle counterclockwise until the valve needle is fully retracted.

(b) Turn the disc counterclockwise until it reaches its highest position.

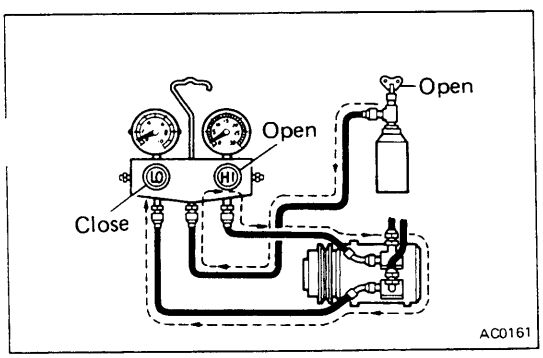
Screw down the valve on the refrigerant container.

(c) Connect the center hose to the valve fitting. Turn the disc fully clockwise by hand.

(d) Turn the handle clockwise to make a hole in the sealed tap.

(e) Turn the handle fully counterclockwise to fill the center hose with gas. Do not open the high and low pressure valves.

(f) Loosen the center hose nut connected to the center fitting of the manifold gauge until a hiss can be heard. Allow air to escape for a few seconds, and then tighten the nut.



3. **TEST SYSTEM FOR LEAKS**

NOTE: After evacuating the system, check for leaks.

(a) Install the refrigerant container tap valve as described in step 2.

(b) Open the high pressure valve to charge the system with refrigerant vapor.

(c) When the low pressure gauge reads 1 kg/cm² (14 psi, 98 kPa), close the high pressure valve.

(d) Using a halide gas leak detector, propane torch, or electric leak detector, check the system for leaks.

If a leak is found, repair the faulty component or connection.

(e) After checking and repairing the system, perform the following:

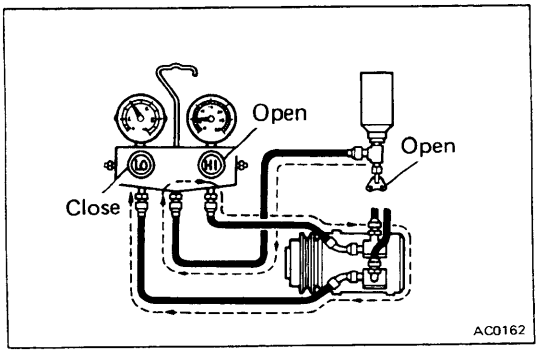
- Turn the can tap handle fully clockwise.
- Disconnect the center hose from the can valve fitting.
- Evacuate the system for at least 15 minutes.

4. **CHARGE EMPTY SYSTEM (LIQUID)**

NOTE: This step is to charge an empty system through the high pressure side with refrigerant in a liquid state. When the refrigerant container is held upside down, refrigerant will enter the system as a liquid.

CAUTION:

- **Never run the engine when charging the system through the high pressure side.**
- **Do not open the low pressure valve when the system is being charged with liquid refrigerant.**



(a) Close both high and low pressure valves completely after the system is evacuated.

(b) Install the refrigerant can tap valve as described in st 2.

(c) Open the high pressure valve fully, and keep the container upside down.

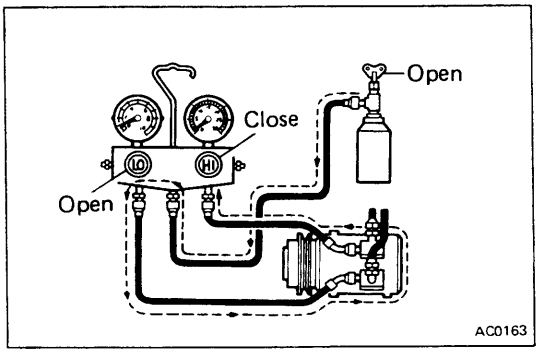
(d) Charge the system with more than one container (400 g, 0.9 lb) to the specified amount. Then, close the high pressure valve.

Specified amount: 600 — 800 g (1.3 — 1.8 lb)

NOTE:
- A fully charged system is indicated by the receiver sight glass being free of any bubbles.
- If the low pressure gauge does not show a reading, the system is clogged and must be repaired.

5. CHARGE EMPTY SYSTEM OR PARTIALLY CHARGED SYSTEM (VAPOR)

NOTE:
- This step is to charge the system through the low pressure side with refrigerant in a vapor state. When the refrigerant container is placed rightside up, refrigerant will enter the system as a vapor.
- Put the refrigerant container in a pan of warm water (maximum temperature 40°C or 104°F) to keep vapor pressure in the container slightly higher than vapor pressure in the system.



(a) Install the refrigerant container tap valve as described in step 2.

(b) Open the low pressure valve. Adjust the valve so that the low pressure gauge does not read over 4.2 kg/cm² (60 psi, 412 kPa)

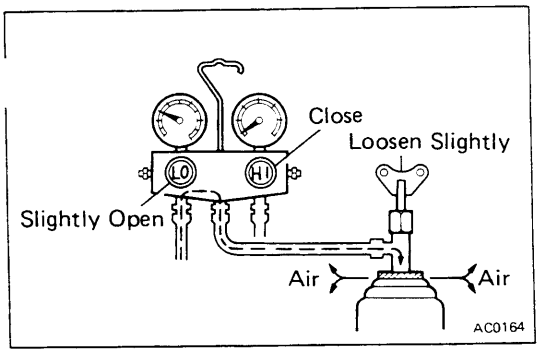
(c) Run the engine at fast idle, and operate the air conditioner.

CAUTION: Be sure to keep the container in the upright position to prevent liquid refrigerant being charged into the system through the suction side, resulting in possible damage to the compressor.

(d) Charge the system with more than one container (400 g, 0.9 lb) to the specified amount. Then, close the low pressure valve.

Specified amount: 600 — 800 g (1.3 — 1.8 lb)

NOTE: A fully charged system is indicated by the receiver sight glass being free of any bubbles.



6. **IF NECESSARY, CHARGE SYSTEM WITH ANOTHER REFRIGERANT CONTAINER**
   (a) When the refrigerant container is empty, close the pressure valves.
   (b) Remove the container tap valve from the container.
   (c) Attach the container tap valve to a new refrigerant container.
   (d) Purge the air from the center hose by slightly opening the low pressure valve and loosening the valve disc.
   (e) Make a hole in the sealed tap of the new container and charge the system.

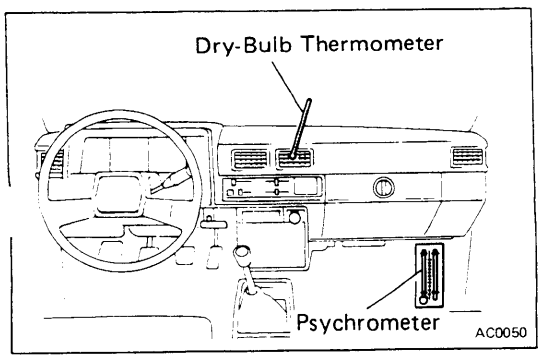
   CAUTION: Be careful not to overcharge the refrigerant as it could cause failure of the bearings and belt.

7. **WHEN SYSTEM IS FULLY CHARGED, DISCONNECT MANIFOLD GAUGE SET**
   (a) Close both low and high pressure valves.
   (b) Close the valve of the refrigerant container. If using one-pound containers of R-12, allow remaining refrigerant to escape by slowly removing the charge line.
   (c) Turn off the engine.
   (d) Using a shop rag, quickly remove both hoses from the compressor service valves.

   WARNING: Care must be taken to protect eyes and skin when removing the high pressure hoses.
   (e) Put the cap nuts on the service valve fittings.

Performance Test

1. **INSTALL MANIFOLD GAUGE SET**
   (a) Close the high pressure and low pressure hand valves.
   (b) Connect the high pressure hose to the discharge service valve of the compressor.
   (c) Connect the low pressure hose to the suction service valve of the compressor.



2. **RUN ENGINE AND OPERATE AIR CONDITIONER**
   (a) Run the engine at 2,000 rpm.
   (b) Set the blower switch at HI, A/C switch ON temperature control at COOL, and air flow control at VENT.
   (c) Keep all windows and doors open.

3. **POSITION THERMOMETERS**
   (a) Place a dry-bulb thermometer in the cool air outlet.
   (b) Place a psychrometer close to the inlet of the cooling unit.

4. **WAIT UNTIL AIR CONDITIONING SYSTEM STABILIZES**

(a) Check that the reading on the high pressure gauge 14.0 — 15.5 kg/cm² (199 — 220 psi, 1,373 — 1,520 kPa)

If the reading is too high, pour water on the condenser. If the reading is too low, cover the front of the condenser.

(b) Check that the reading on the dry-bulb thermometer at the air inlet is 25 — 35°C (77 — 95°F).

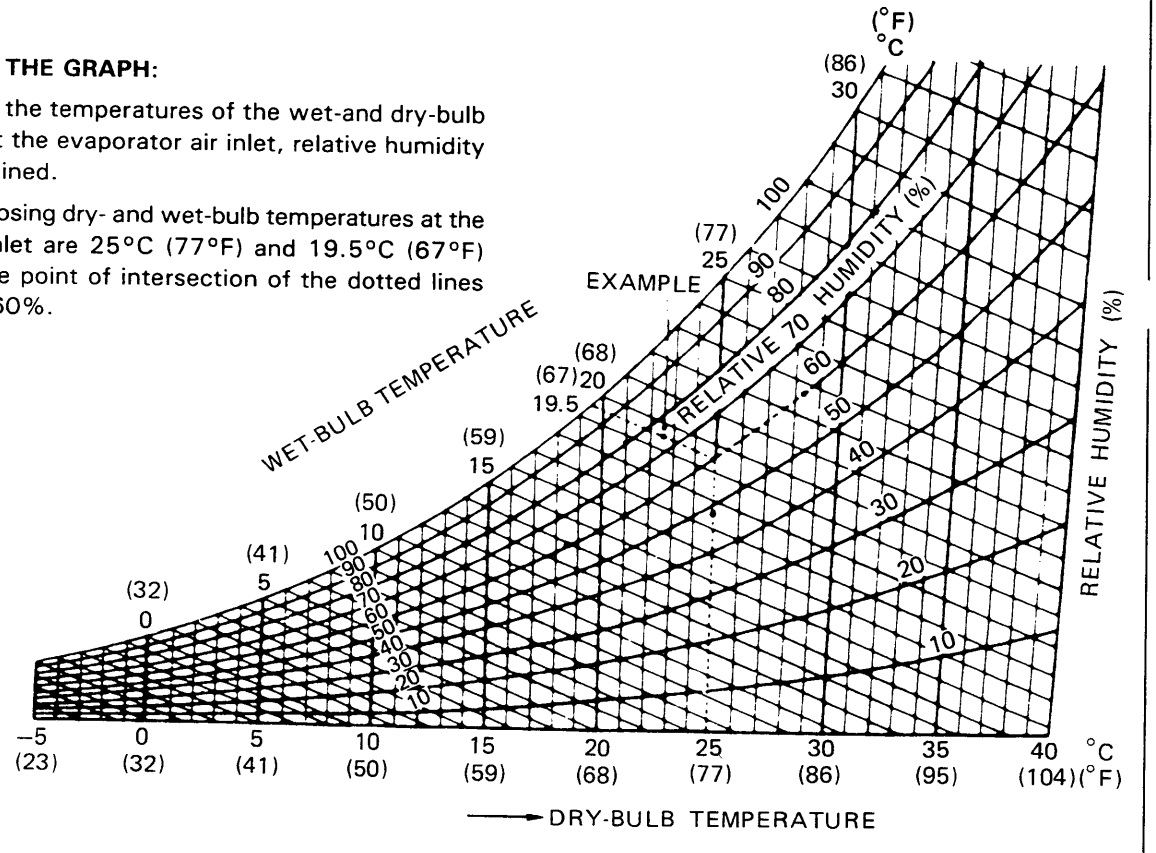
5. **CHECK PERFORMANCE OF AIR CONDITIONING SYSTEM**

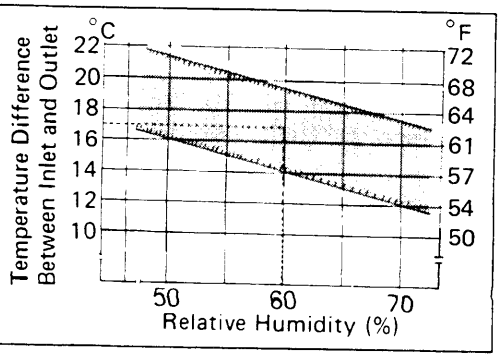
(a) Calculate the relative humidity from the psychrometric graph by comparing the wet- and dry-bulb readings of the psychrometer at the air inlet.

HOW TO READ THE GRAPH:

After measuring the temperatures of the wet-and dry-bulb thermometers at the evaporator air inlet, relative humidity (%) can be obtained.

Example: Supposing dry- and wet-bulb temperatures at the evaporator air inlet are 25°C (77°F) and 19.5°C (67°F) respectively. The point of intersection of the dotted lines in the graph is 60%.



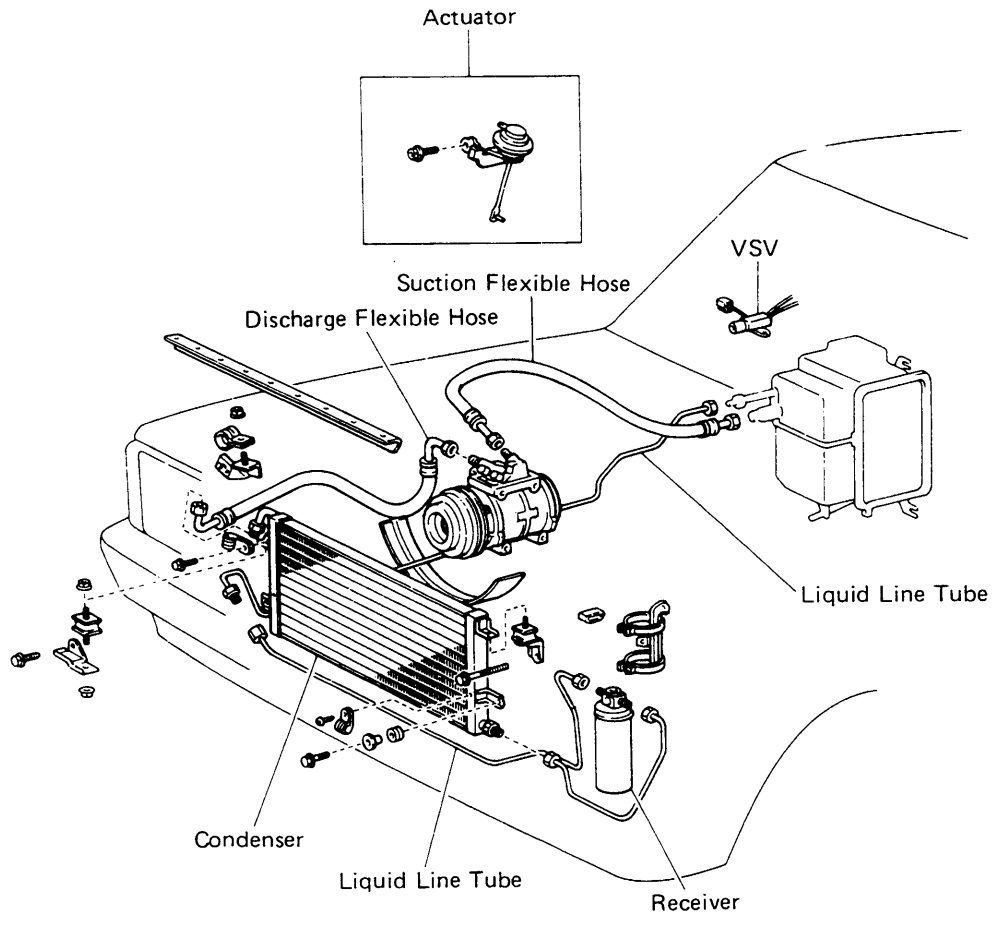


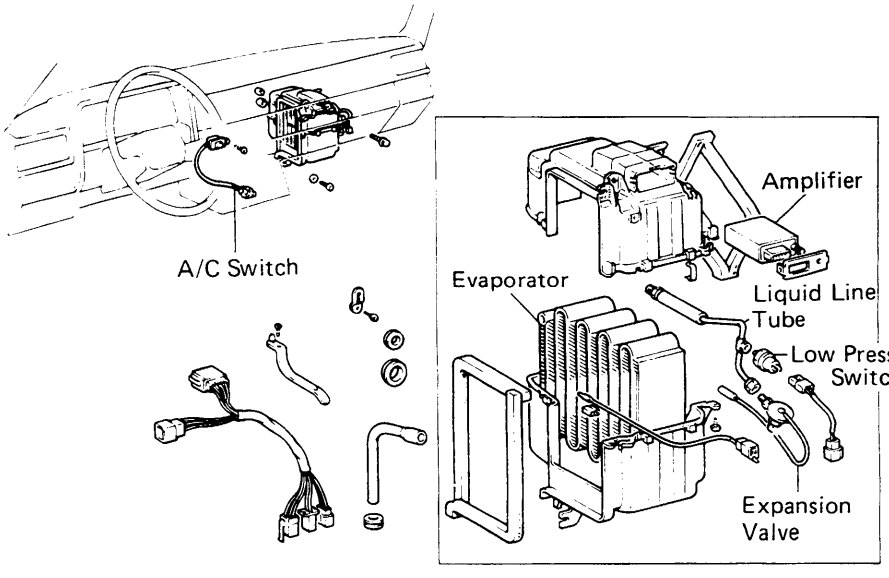
(b) Measure the dry-bulb temperature at the cool air outlet, and calculate the difference between the inlet dry-bulb and outlet dry-bulb temperatures.

(c) Check that the intersection of the relative humidity and temperature difference is between the two hatched lines.

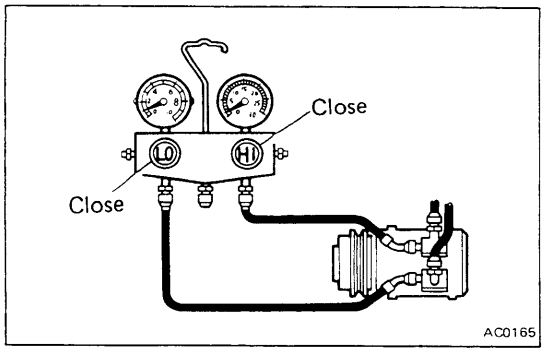
If the intersection is within the two lines, cooling performance is satisfactory.

SYSTEM COMPONENTS





AC0051
AC0052



COMPRESSOR

ON-VEHICLE INSPECTION

1. INSTALL MANIFOLD GAUGE SET

(a) Close the HI and LO hand valves.

(b) Connect the high pressure hose to the discharge service valve of the compressor.

(c) Connect the low pressure hose to the suction service valve of the compressor.

2. RUN ENGINE AT FAST IDLE

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

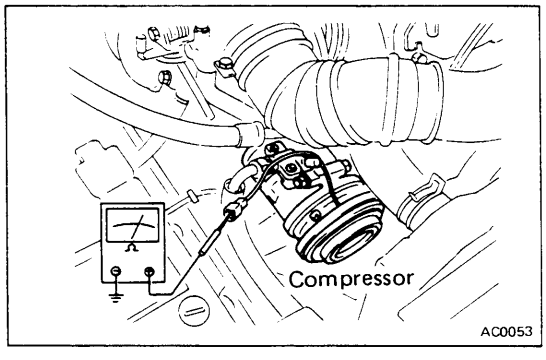
(c) Leakage from shaft seal

If defects are found, repair the compressor.

4. CHECK MAGNETIC CLUTCH

(a) Inspect the pressure plate and the rotor for signs of oil.

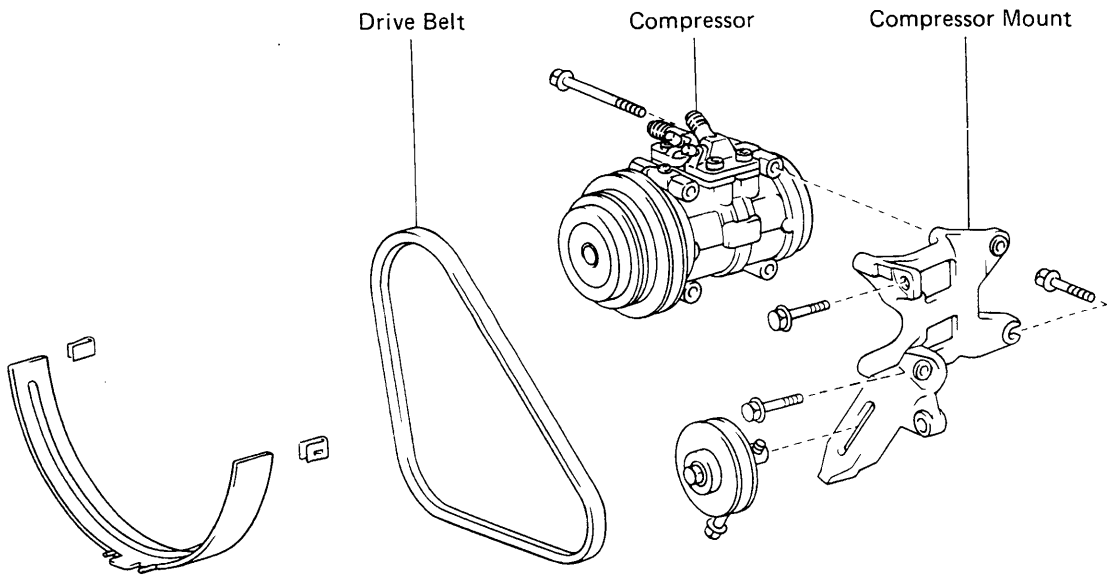
(b) Check the clutch bearings for noise and grease leakage.



(c) Using an ohmmeter, measure the resistance of the stator coil between the clutch lead wire and ground.

If the resistance is not within tolerance, replace the coil.

Standard resistance: 3.7 ± 0.2 Ω at 20°C (68°F)

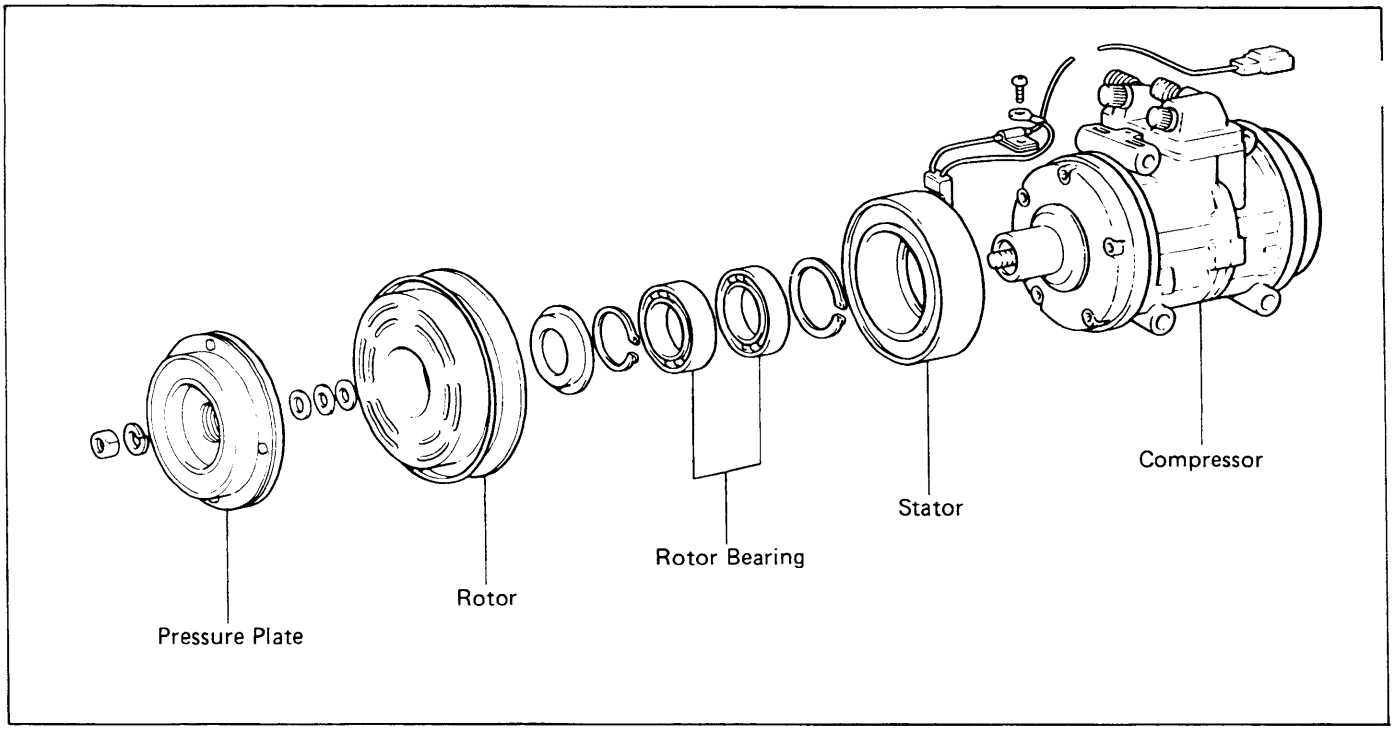


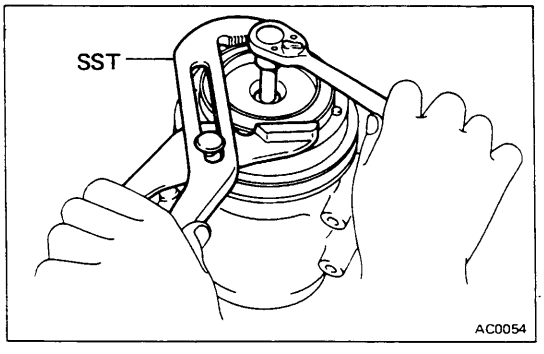
REMOVAL OF COMPRESSOR

1. **RUN ENGINE AT IDLE FOR 10 MINUTES WITH AIR CONDITIONING ON**
2. **DISCONNECT NEGATIVE CABLE FROM BATTERY**
3. **DISCONNECT CLUTCH LEAD WIRE FROM WIRING HARNESS**
4. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-14)**
5. **DISCONNECT TWO FLEXIBLE HOSES FROM COMPRESSOR SERVICE VALVES**

   Cap the open fitting immediately to keep moisture out of the system.

6. **REMOVE COMPRESSOR**
   (a) Remove the fan shroud.
   (b) Loosen the drive belt.
   (c) Remove the compressor mounting bolts and the compressor.

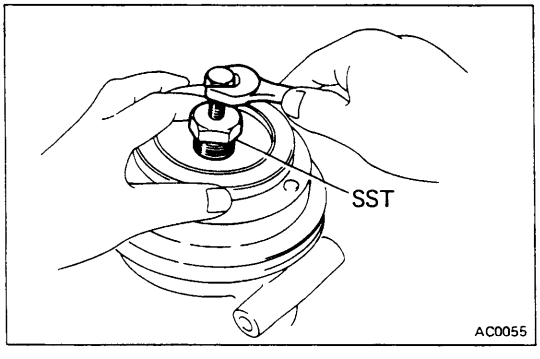




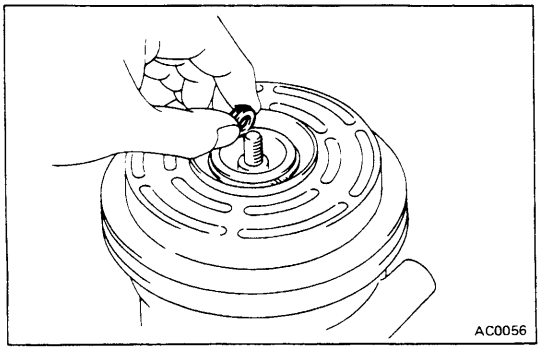
DISASSEMBLY OF MAGNETIC CLUTCH

1. **REMOVE PRESSURE PLATE**

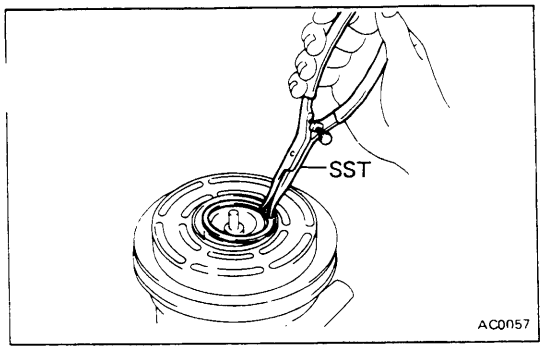
(a) Using SST and a socket, remove the shaft nut.
SST 07110-77011



(b) Using SST and socket, remove the pressure plate.
SST 07112-71010



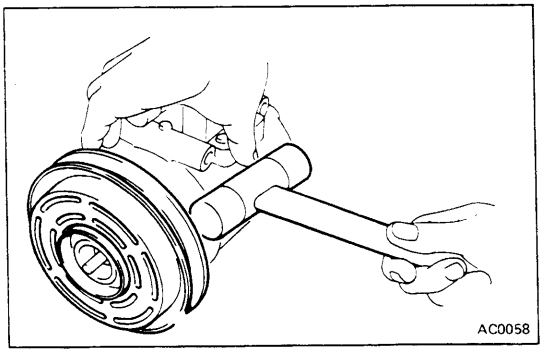
(c) Remove the shims from the shaft.



2. REMOVE ROTOR

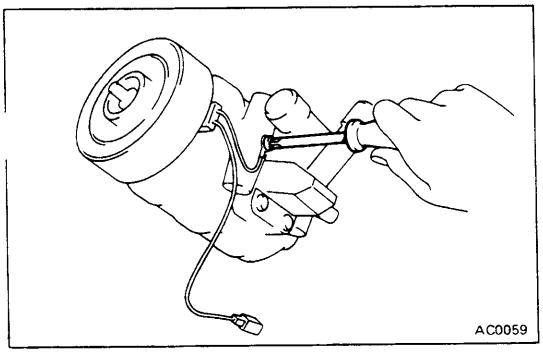
(a) Using SST, remove the snap ring.

SST 07114-84020



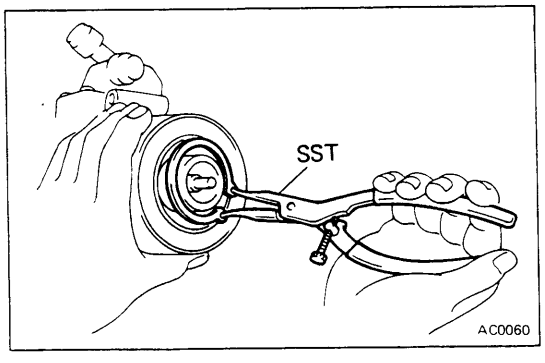
(b) Using a plastic hammer, tap the rotor off the shaft.

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



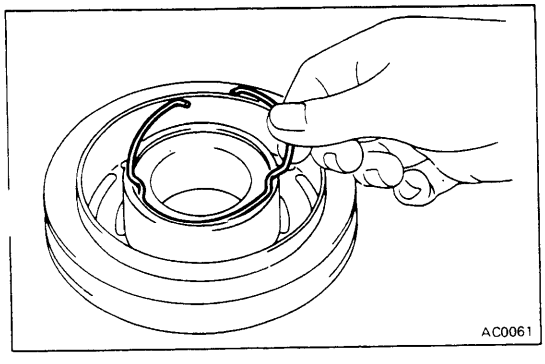
3. REMOVE STATOR

(a) Disconnect the stator lead wires from the compressor housing.



(b) Using SST, remove the snap ring. Remove the stator.

SST 07114-84020



4. REMOVE ROTOR BEARINGS

NOTE: Press the bearings out only if they are to be replaced.

(a) Remove the bearing snap ring from the rotor.

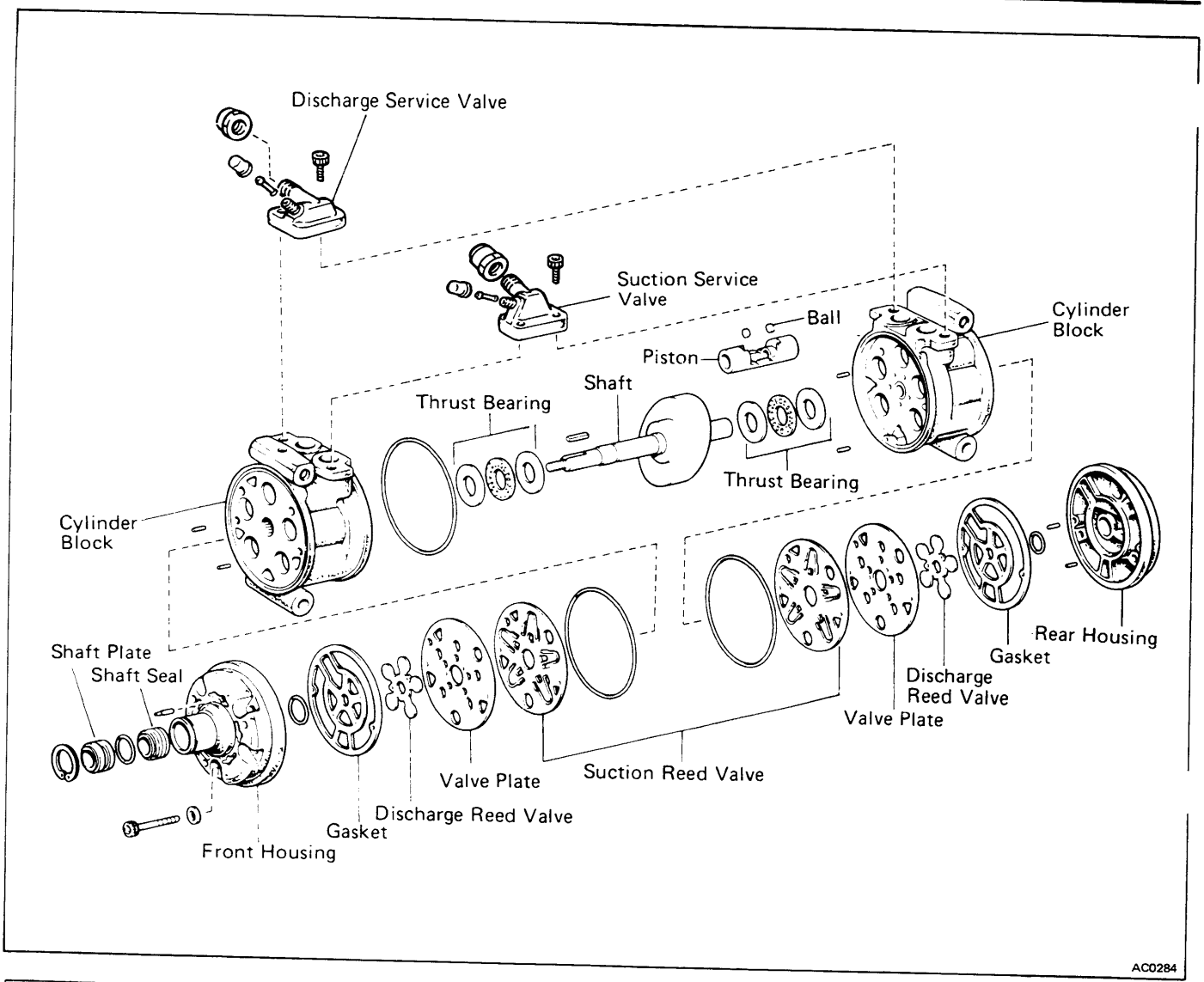
(b) Using SST, press out two bearings.

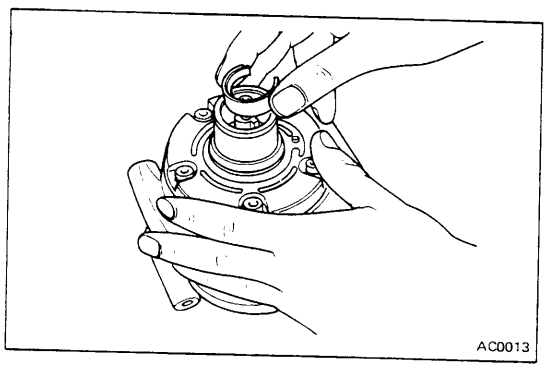
SST 07110-77011

5. INSPECT PRESSURE PLATE AND ROTOR

(a) Inspect the pressure plate and rotor surfaces for wear and scoring. Replace if necessary.

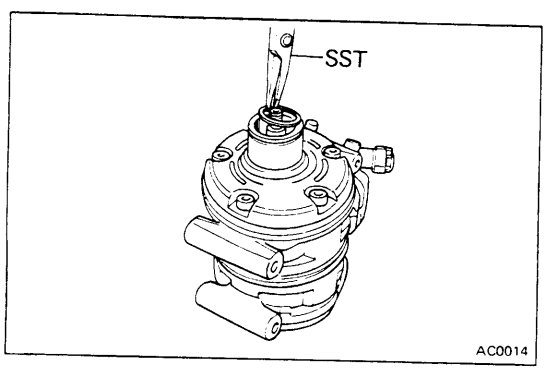
(b) Check the rotor bearings for wear and leakage of grease. Replace if necessary.





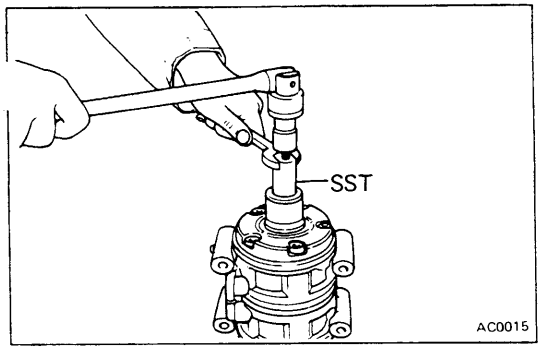
DISASSEMBLY OF COMPRESSOR

1. REMOVE FELT



2. REMOVE CIRCLIP

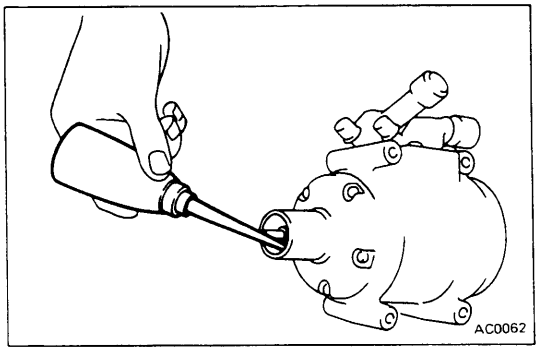
Using SST, remove the circlip.
SST 07714-84020



3. REMOVE KEY

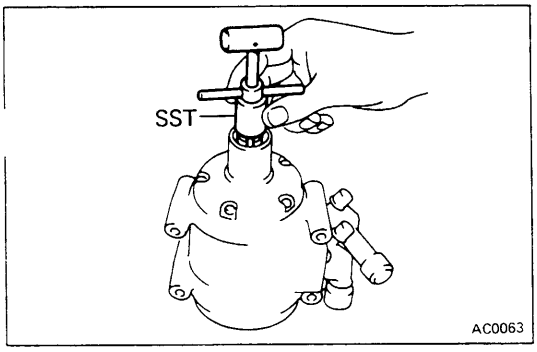
Remove the key from the shaft.

SST 07112-45021



4. APPLY COMPRESSOR OIL TO INNER BORE

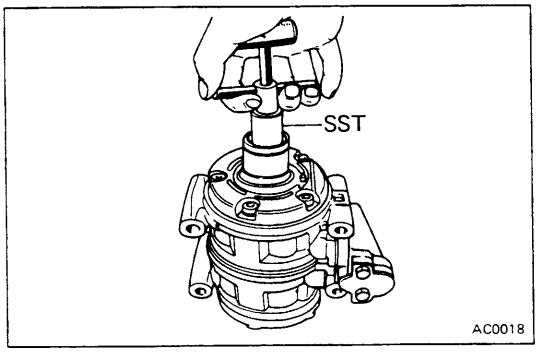
Apply compressor oil to the inner bore of the compressor.



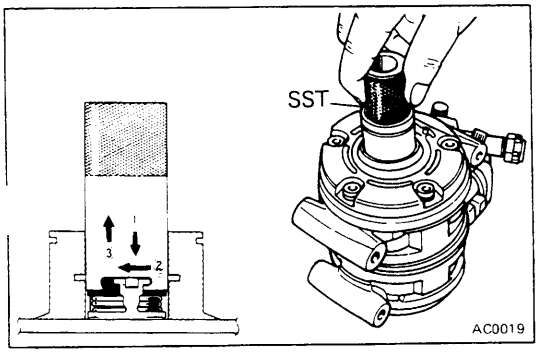
5. REMOVE SHAFT PLATE

(a) Insert SST against the shaft. Then push the holder ring downward.

SST 07112-15010



(b) Pull up the remover bar, and remove the shaft plate.

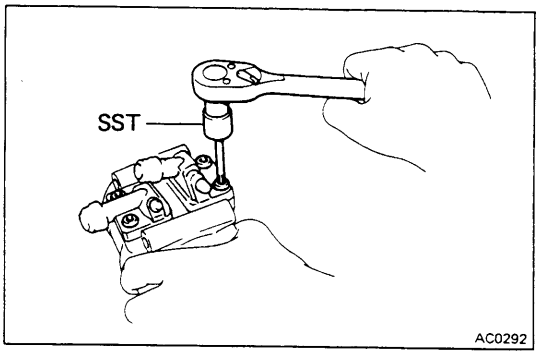


6. REMOVE SHAFT SEAL

Insert SST against the shaft, and turn it to the right while pressing on the remover.

Then remove the shaft seal.

SST 07114-15010

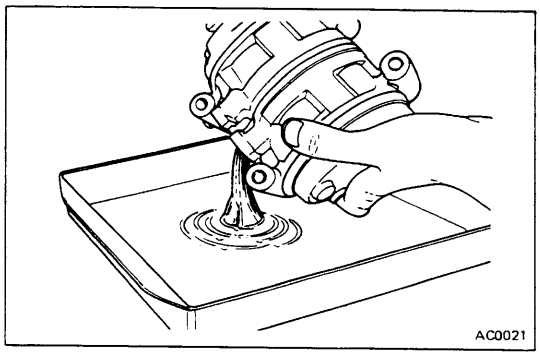


7. REMOVE SERVICE VALVE

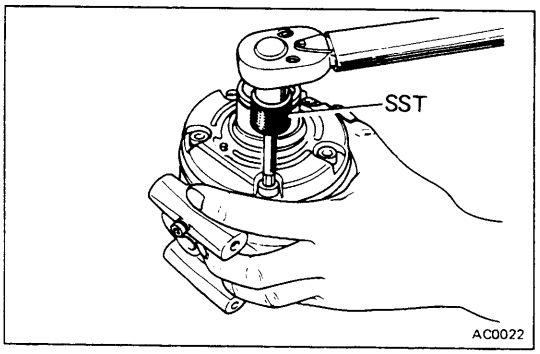
(a) Using SST, remove the bolts holding the service valve.

SST 07110-61050

(b) Remove the O-rings from the service valves and discard them.



8. DRAIN OIL INTO CONTAINER

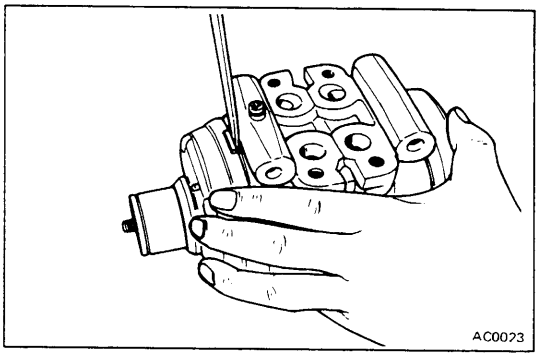


9. REMOVE FRONT HOUSING

(a) Using SST, remove the six through bolts.

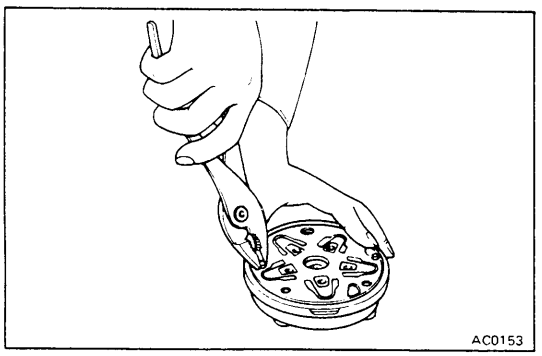
NOTE: Do not reuse the six washers.

SST 07110-61050



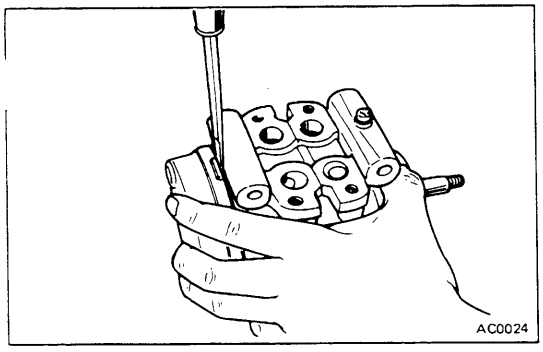
(b) Using a hammer and punch, remove the front housing by tapping on the protrusion.

CAUTION: Be careful not to scratch the sealing surface of the front housing.



10. REMOVE FRONT VALVE PLATE

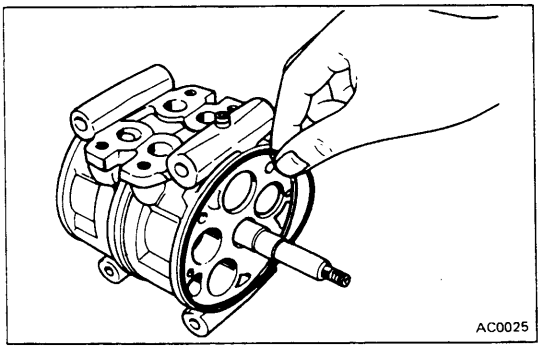
Remove the two pins from the front housing. Discard the pins.



11. REMOVE REAR HOUSING

Using a hammer and punch, remove the rear housing by tapping on the protrusion.

CAUTION: Be careful not to scratch the sealing surface of the rear housing.

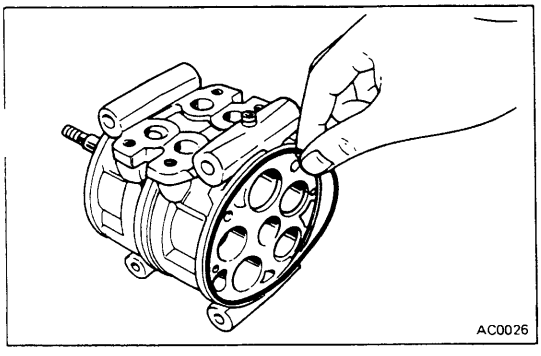


12. REMOVE FRONT AND REAR O-RINGS FROM CYLINDER BLOCK

Discard the O-rings.

ASSEMBLY OF COMPRESSOR

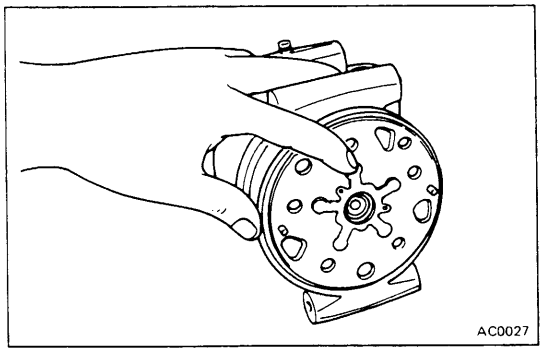
(See page AC-24)



1. INSTALL REAR VALVE PLATE ON REAR CYLINDER

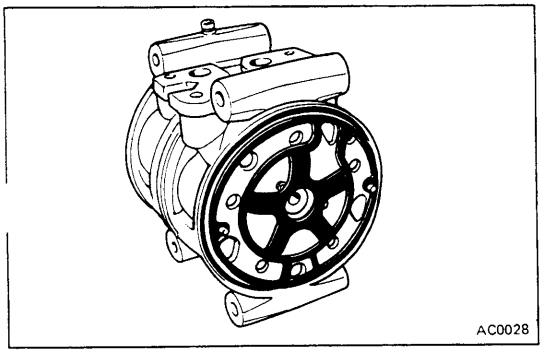
(a) Install the two pins in the rear cylinder.

(b) Lubricate a new O-ring with compressor oil. Install the O-ring in the rear cylinder.



(c) Install the rear suction valve over the pins on the rear cylinder.

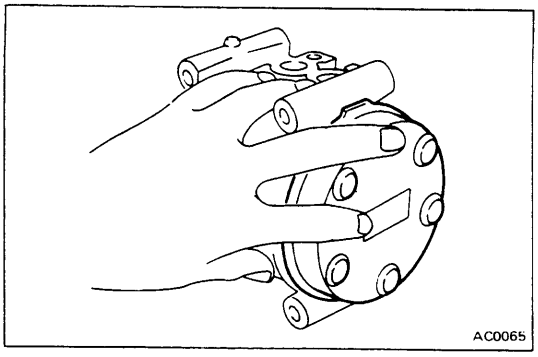
NOTE: The front and rear suction valves are identical.



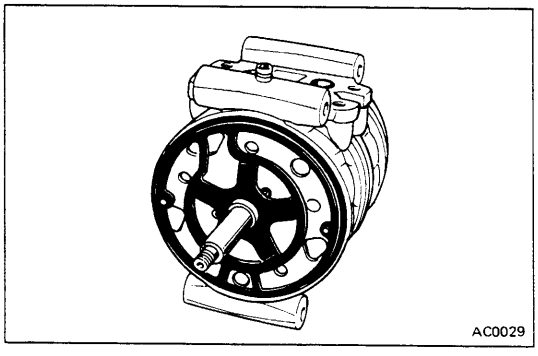
(d) Install the rear valve plate together with the discharge valve over the pins on rear cylinder.

NOTE: The rear valve plate is marked with an "R".

(e) Lubricate the gasket with compressor oil. Install the gasket on the valve plate.



2. INSTALL REAR HOUSING ON REAR CYLINDER



3. INSTALL FRONT VALVE PLATE ON FRONT CYLINDER

(a) Install the two pins in the front cylinder.

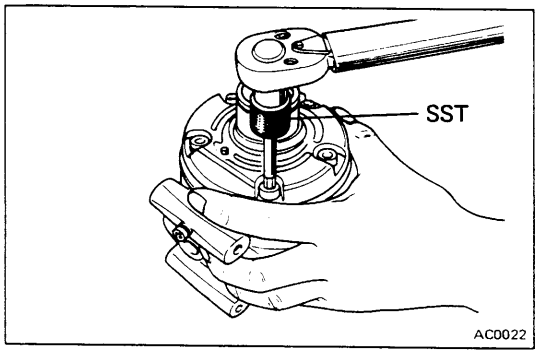
(b) Lubricate a new O-ring with compressor oil. Install the O-ring in the rear housing.

(c) Install the front suction valve over the pins on the front cylinder.

(d) Install the front valve plate together with the discharge valve over the pins on the front cylinder.

NOTE: The front valve plate is marked with an''R''.

(e) Lubricate the gasket with compressor oil. Install the gasket on the valve plate.

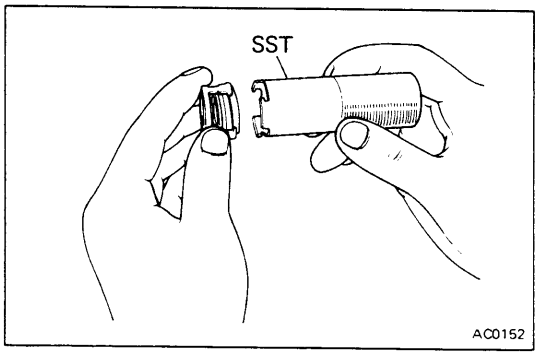


4. INSTALL FRONT HOUSING ON FRONT CYLINDER AND TIGHTEN SIX THROUGH BOLTS

Using a torque wrench and SST, gradually tighten the s.. through bolts in two or three passes.

SST 07110-61050

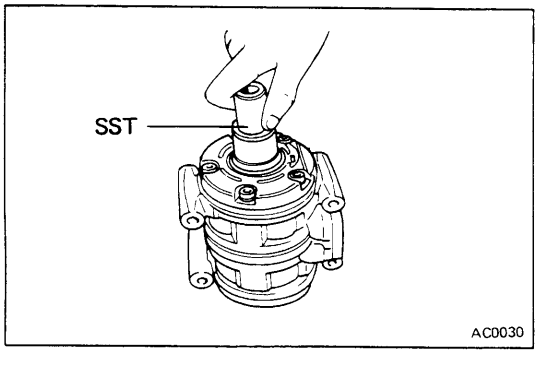
Torque: 260 kg-cm (19 ft-lb, 25 N·m)



5. INSTALL SHAFT SEAL

(a) Fit the shaft seal onto SST.

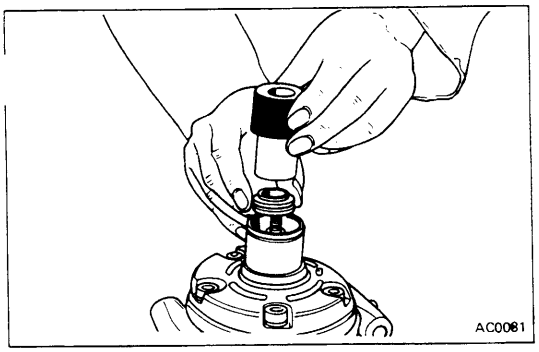
SST 07114-15010



(b) Apply oil to the bore.

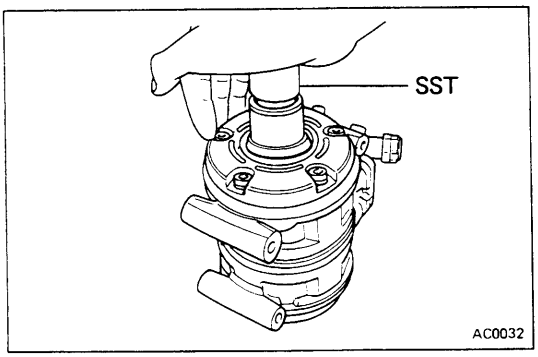
Insert SST, and turn it counterclockwise while lightly pressing in.
Then pull up the SST.

SST 07114-15010



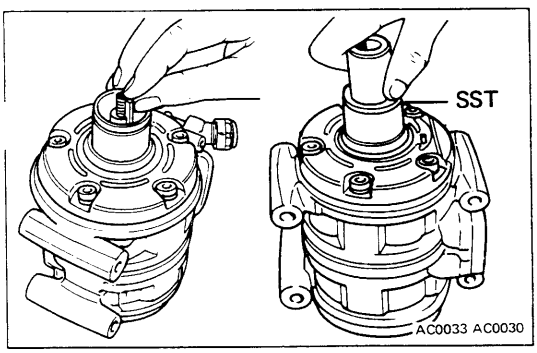
6. INSTALL SHAFT PLATE

(a) Put in the shaft plate.



(b) Press in SST.

SST 07112-25010

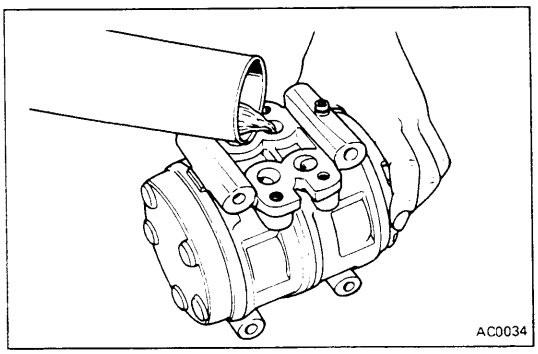


7. INSTALL KEY IN SHAFT GROOVE

Using a plastic hammer and SST, tap the key lightly.

SST 07114-45010

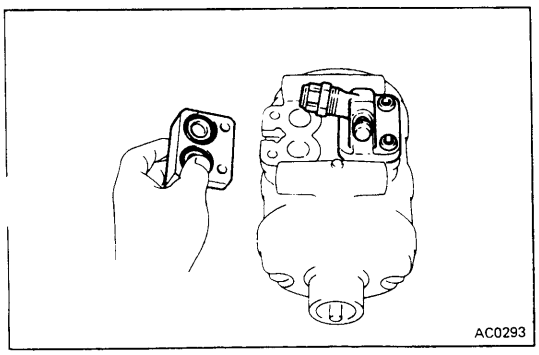
Place the felt inside the bore.
(See page AC-24)



8. POUR COMPRESSOR OIL INTO COMPRESSOR

Compressor oil: DENSOOIL 6, SUNISO No.5 GS or equivalent

Compressor oil capacity: 60 — 100 cc (2.0 — 3.4 oz)



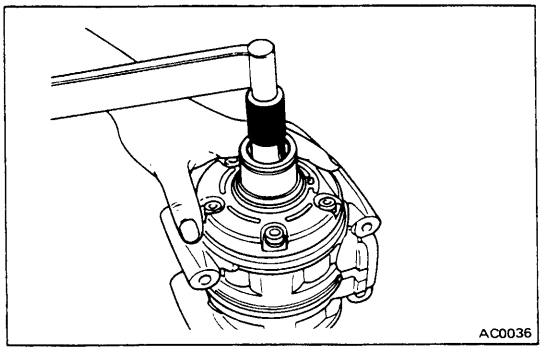
9. INSTALL SERVICE VALVES

(a) Lubricate new O-rings with compressor oil. Install the O-rings in the service valves.

(b) Install the service valves on the compressor. Using a torque wrench and SST, tighten the bolts.

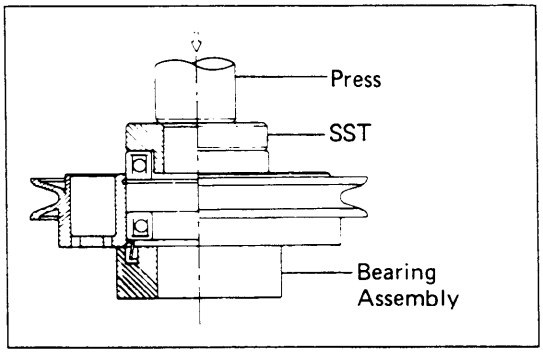
Torque: 260 kg-cm (19 ft-lb, 25 N·m)

SST 07110-61050



10. CHECK SHAFT ROTATING TORQUE

Torque: 30 kg-cm (26 in.-lb, 2.9 N·m)



ASSEMBLY OF MAGNETIC CLUTCH

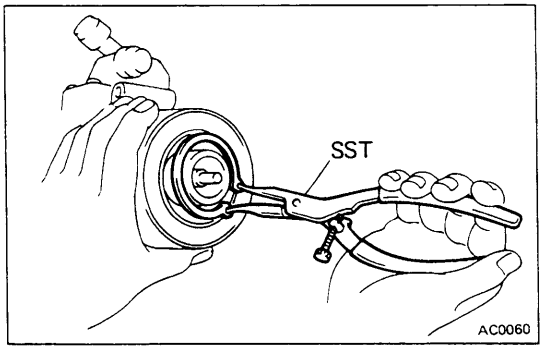
(See page AC-22)

1. INSTALL TWO BEARINGS IN ROTOR

(a) Using SST, press a shield ring and two new bearings into the rotor boss until they are fully seated.

SST 07110-77011

(b) Install the bearing snap ring into the rotor groove.



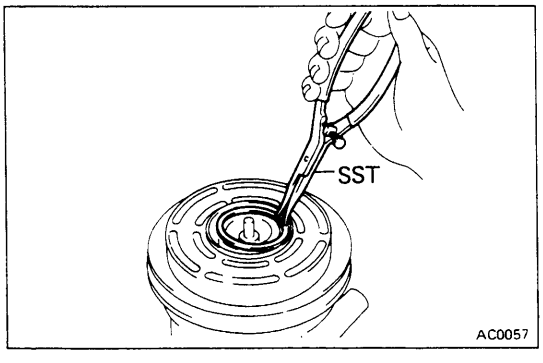
2. INSTALL STATOR

(a) Install the stator on the compressor.

(b) Using SST, install the snap ring.

SST 07110-77011

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

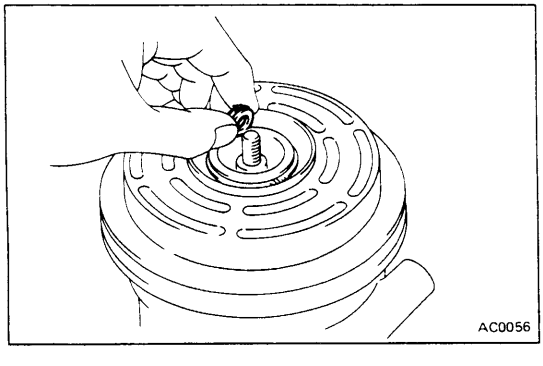


3. INSTALL ROTOR

(a) Install the rotor on the compressor shaft.

(b) Using SST, install the snap ring.

SST 07110-77011

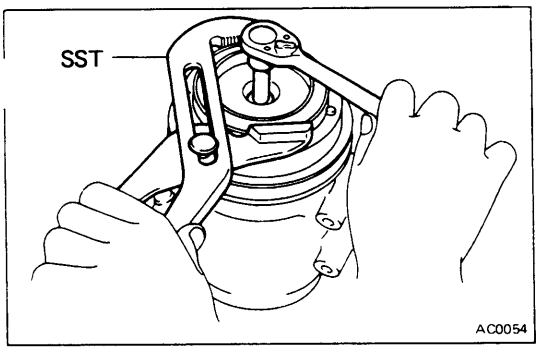


4. INSTALL PRESSURE PLATE

(a) Adjust the clearance between the pressure plate and rotor by putting shims on the compressor shaft.

Standard clearance: 0.8±0.2 mm (0.032±0.008 in.)

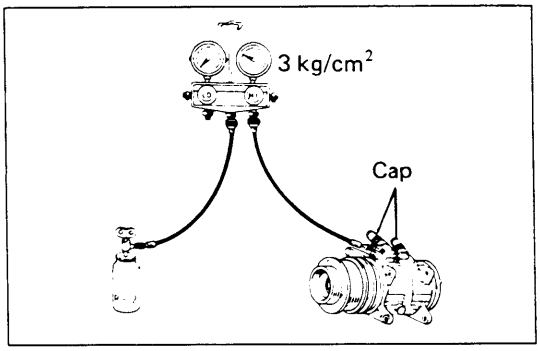
If the clearance is not within tolerance, add or reduce tl number of shims to obtain the standard clearance.



(b) Using a torque wrench and SST, install the shaft nut.

Torque: 165 kg-cm (12 ft-lb, 16 N·m)

SST 07110-77011



PERFORMANCE TEST OF COMPRESSOR

1. PERFORM GAS LEAKAGE TEST

(a) Put cap on service valve.

(b) Charge the compressor with refrigerant through the charge valve until the pressure is 3 kg/cm² (43 psi, 294 kPa).

(c) Using gas leak detector, check the compressor for leaks.

If leaks are found, check and replace the gasket, O-ring, or shaft seal.

2. FILL COMPRESSOR WITH CLEAN COMPRESSOR OIL

Remove the service valve and drain the compressor oil. Fill with new oil.

Compressor oil: DENSOOIL 6, SUNISO No.5 GS or equivalent

Compressor capacity: 60 — 100 cc (2.0 — 3.4 oz)

3. EVACUATE COMPRESSOR AND CHARGE WITH REFRIGERANT (See page AC-11)

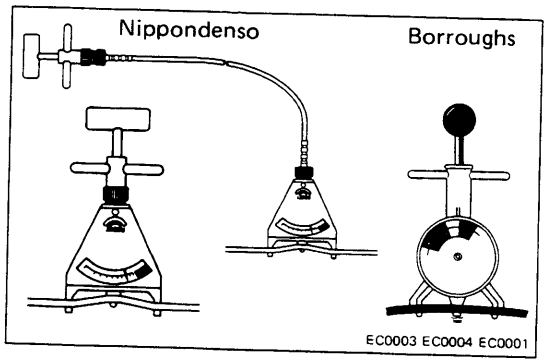
Make sure the caps are tight and free from moisture and contamination.

NOTE: When storing a compressor for an extended period, charge the compressor with refrigerant or dry nitrogen gas to prevent corrosion.

INSTALLATION OF COMPRESSOR

(See page AC-21)

1. INSTALL COMPRESSOR WITH THREE MOUNTING BOLTS



2. INSTALL DRIVE BELT

3. 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 125±25 lb
Used belt 80±20 lb

NOTE:

- "New belt" refers to a brand new belt which has never before been used.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.

4. CONNECT TWO FLEXIBLE HOSES TO COMPRESSOR SERVICE VALVES

Torque: Discharge line 225 kg-cm (16 ft-lb, 22 N·m)
Suction line 325 kg-cm (24 ft-lb, 32 N·m)

5. CONNECT CLUTCH LEAD WIRE TO WIRING HARNESS

6. CONNECT NEGATIVE CABLE TO BATTERY

7. EVACUATE AND CHARGE REFRIGERATION SYSTEM (See page AC-14)

CONDENSER

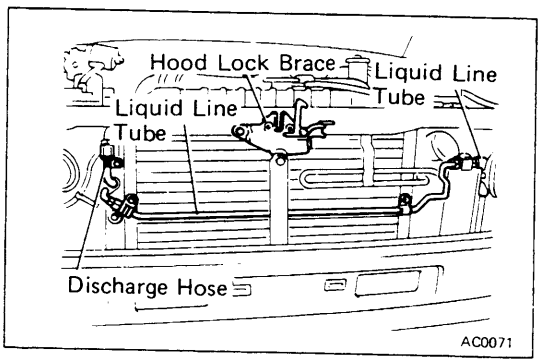
ON-VEHICLE INSPECTION

1. **CHECK CONDENSER FINS FOR BLOCKAGE OR DAMAGE**

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

   CAUTION: 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-19)

1. **DISCHARGE REFRIGERATION SYSTEM**
   (See page AC-14)

2. **REMOVE FRONT GRILLE AND HOOD LOCK BRACE**

3. **DISCONNECT DISCHARGE FLEXIBLE HOSE FROM CONDENSER INLET FITTING**

4. **DISCONNECT LIQUID LINE TUBE FROM RECEIVER OUTLET FITTING**

   NOTE: 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-19)

1. **INSTALL CONDENSER**

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

2. **CONNECT LIQUID LINE TUBE TO RECEIVER AND DISCHARGE FLEXIBLE HOSE TO CONDENSER**

   Torque:

Liquid line tube	**135 kg-cm (10 ft-lb, 13 N·m)**
Discharge flexible hose	**225 kg-cm (16 ft-lb, 22 N·m)**

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 oz)

5. **EVACUATE, CHARGE AND TEST REFRIGERATION SYSTEM (See page AC-14)**

RECEIVER

ON-VEHICLE INSPECTION

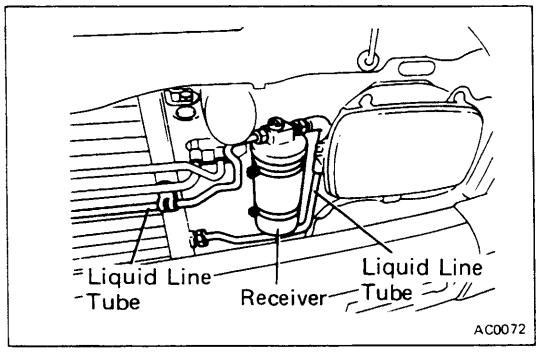
CHECK SIGHT GLASS, FUSIBLE PLUG AND FITTINGS FOR LEAKAGE

Use a gas leak tester. Repair as necessary.

REMOVAL OF RECEIVER

(See page AC-19)

1. **DISCHARGE REFRIGERATION SYSTEM (See page AC-14)**



2. **DISCONNECT TWO LIQUID LINE TUBES FROM RECEIVER**

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

3. **REMOVE RECEIVER FROM RECEIVER HOLDER**

INSTALLATION OF RECEIVER

(See page AC-19)

1. **INSTALL RECEIVER IN RECEIVER HOLDER**

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

2. **CONNECT TWO LIQUID LINE TUBES TO RECEIVER**

   Torque: 135 kg-cm (10 ft-lb, 13 N·m)

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

   Add 20 cc (0.7 oz)

4. **EVACUATE, CHARGE AND TEST REFRIGERATION SYSTEM (See page AC-14)**

COOLING UNIT

ON-VEHICLE INSPECTION OF EXPANSION VALVE

1. **CONNECT MANIFOLD GAUGE TO COMPRESSOR**

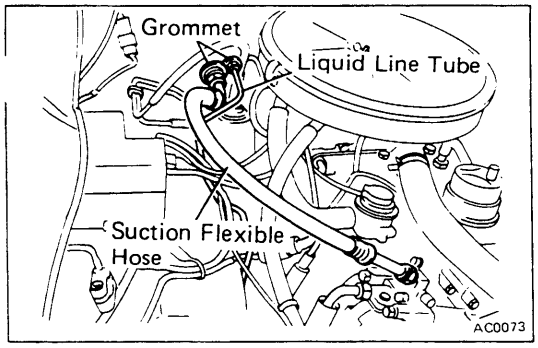
2. **CHECK EXPANSION VALVE OPERATION**

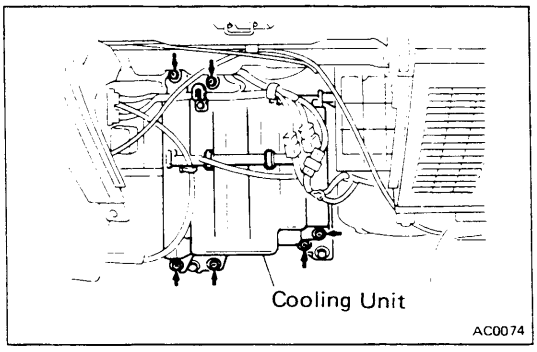
   (a) Run the engine at fast idle with the air conditioning on.

   (b) Check that the low pressure reading is between 0.5—5.0 kg/cm² (7 — 71 psi, 49 — 490 kPa).

   If the reading is too low, check and replace the expansion valve and/or receiver.

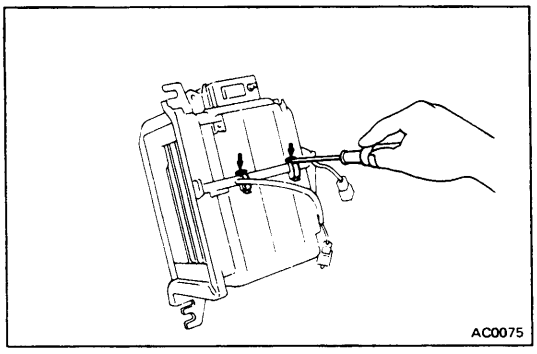
   If the reading is too high, tighten the remote bulb holders and/or replace the expansion valve.

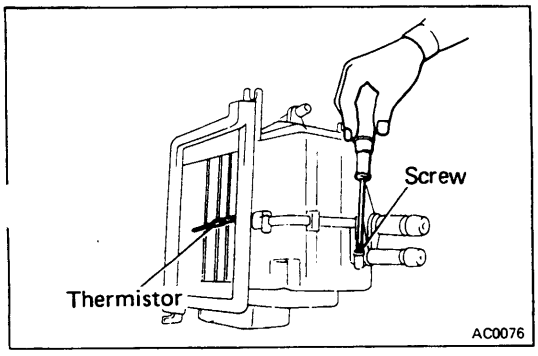




REMOVAL OF COOLING UNIT

1. **DISCONNECT NEGATIVE CABLE FROM BATTERY**
2. **DISCHARGE REFRIGERATION SYSTEM**
   (See page AC-14)
3. **DISCONNECT SUCTION FLEXIBLE HOSE FROM COOLING UNIT OUTLET FITTING**
4. **DISCONNECT LIQUID LINE TUBE FROM COOLING UNIT INLET FITTING**
   NOTE: Cap the open fittings immediately to keep moisture out of the system.
5. **REMOVE GROMMETS FROM INLET AND OUTLET FITTINGS**
6. **REMOVE FOLLOWING COMPONENTS:**
   (a) Glove box
   (b) Glove box stay
7. **DISCONNECT FOLLOWING CONNECTORS:**
   (a) A/C switch connector
   (b) Connector connected to vehicle wire harness
8. **REMOVE COOLING UNIT**
   Remove the four tapping screws and the bolt.
9. **REMOVE A/C WIRE HARNESS FROM COOLING UNIT**

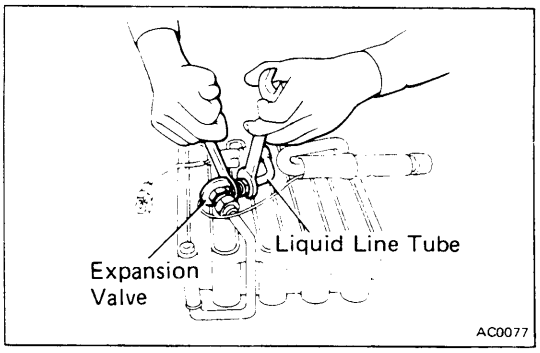




DISASSEMBLY OF COOLING UNIT

(See page AC-19)

1. **REMOVE LOWER AND UPPER CASE FROM EVAPORATOR**
   (a) Using a screwdriver, remove the four clamps, and four screws.
   (b) Remove the two packings.
2. **REMOVE THERMISTOR**
   Pull off the clamp.



3. **REMOVE COMPONENTS FROM EVAPORATOR**
   (a) Remove the heat insulator and the clamp from the outlet tube.
   (b) Disconnect the liquid line tube from inlet fitting of the expansion valve.
   (c) Disconnect the expansion valve from the inlet fitting of the evaporator.
   (d) Remove the pressure switch, if necessary.

Evaporator

INSPECTION OF EVAPORATOR

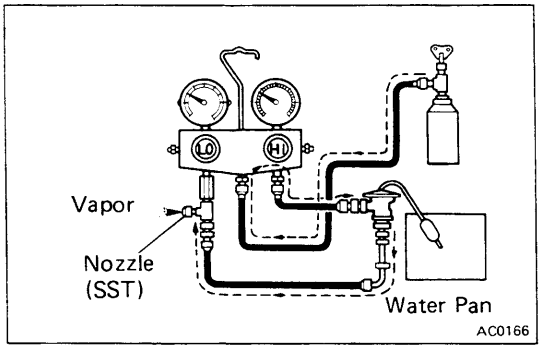
1. **CHECK EVAPORATOR FINS FOR BLOCKAGE**
   If the fins are clogged, clean them with compressed air.
   CAUTION: Never use water to clean the evaporator.

2. **CHECK FITTINGS FOR CRACKS OR SCRATCHES**
   Repair as necessary.

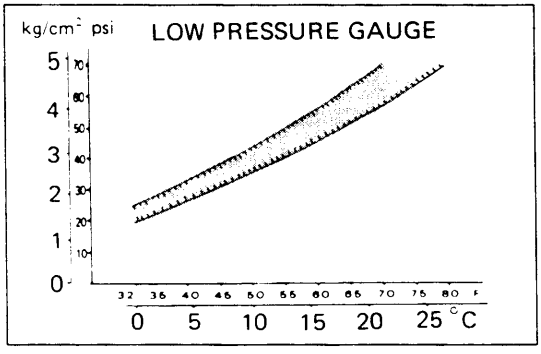
Expansion Valve

INSPECTION OF EXPANSION VALVE

1. **CONNECT MANIFOLD GAUGE**
   Connect the manifold gauge set to the expansion valve, testing nozzle (SST) and refrigerant container as shown
   SST 07115-71010



2. **CHECK EXPANSION VALVE**
   (a) Close both manifold gauge hand valves.
   (b) Pierce the refrigerant container to release the pressure.
   (c) Open the high pressure hand valve and adjust the high side pressure to approximately 5 kg/cm² (71 psi, 490 kPa).
   (d) Dip the heat sensing tube of the expansion valve in a pan of water. While varying the temperature of the water, read the low pressure gauge and, at the same time, measure the temperature of the water with a thermo meter.
   (e) Compare the two readings on the chart.

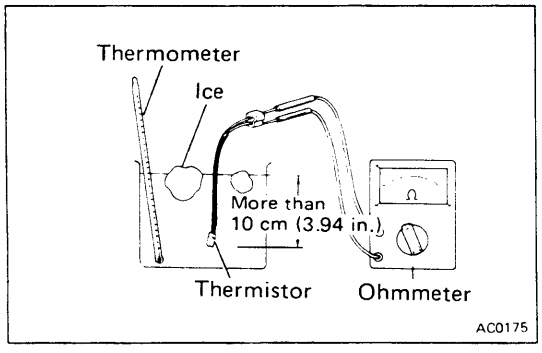


If the intersection is not between the two lines, replace the expansion valve.

Thermistor

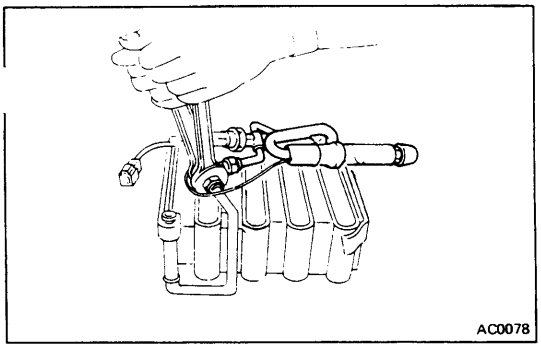
INSPECTION OF THERMISTOR

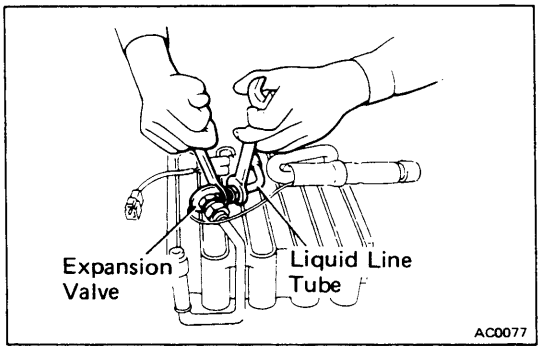
CHECK THERMISTOR OPERATION



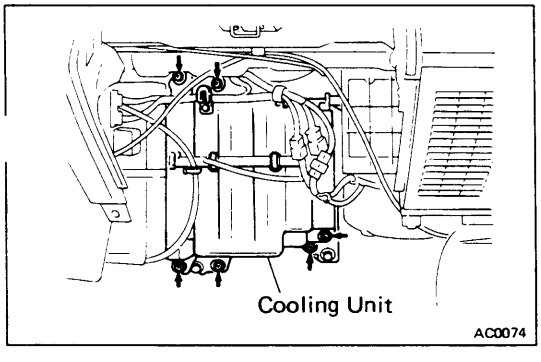
(a) Place the thermistor in cold water. While varying the temperature of the water, measure the resistance at the connector and, at the same time, measure temperature of the water with a thermo meter.
(b) Compare the two readings on the chart.

If the intersection is not between the two lines, replace the thermistor.

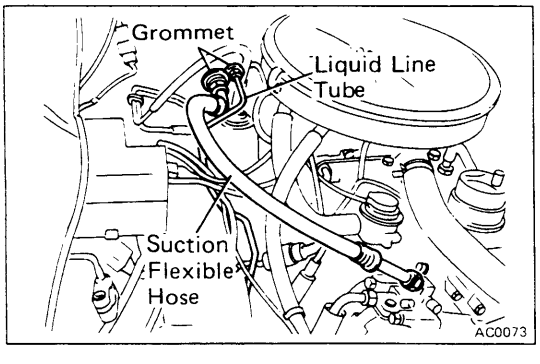

AC0078



AC0077



AC0074



AC0073

ASSEMBLY OF COOLING UNIT

(See page AC-19)

1. INSTALL COMPONENTS ON EVAPORATOR

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

   Torque: 235 kg-cm (17 ft-lb, 23 N·m)

   NOTE: Be sure that the O-ring is positioned on the tube fitting.

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

   Torque: 135 kg-cm (10 ft-lb, 13 N·m)

   (c) Install the pressure switch, if removed.

   Torque: 135 kg-cm (10 ft-lb, 13 N·m)

   (d) Install the clamp and heat insulator to the outlet tube.

2. INSTALL THERMISTOR ON EVAPORATOR

3. INSTALL UPPER AND LOWER CASES ON EVAPORATOR

INSTALLATION OF COOLING UNIT

1. INSTALL A/C WIRE HARNESS TO COOLING UNIT

2. INSTALL COOLING UNIT

   Install the cooling unit with the four tapping screws and the bolt.

   CAUTION: Be careful not to pinch the wire harness while installing the cooling unit.

3. INSTALL GLOVE BOX

4. INSTALL GROMMETS ON INLET AND OUTLET FITTINGS

5. CONNECT LIQUID LINE TUBE TO COOLING UNIT INLET FITTINGS

   Torque: 135 kg-cm (10 ft-lb, 13 N·m)

6. CONNECT SUCTION FLEXIBLE HOSE TO COOLING UNIT OUTLET FITTING

   Torque: 325 kg-cm (24 ft-lb, 32 N·m)

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

   Add 40 — 50 cc (1.4 — 1.7 oz)

8. CONNECT NEGATIVE CABLE TO BATTERY

9. EVACUATE, CHARGE AND TEST REFRIGERATION SYSTEM (See page AC-14)

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

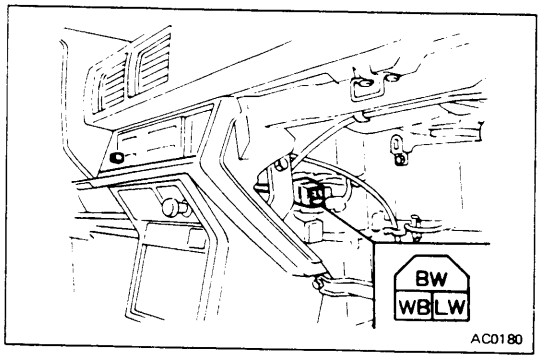
(See page AC-19)

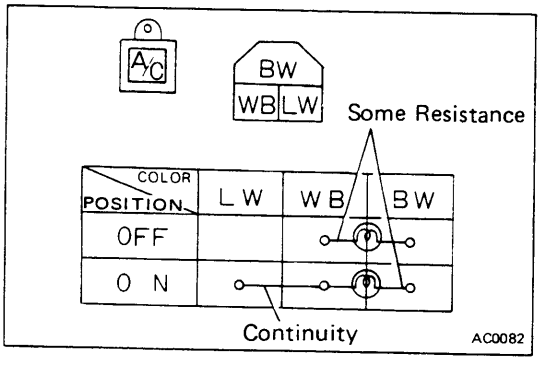
1. **DISCHARGE REFRIGERATION SYSTEM**
   (See page AC-14)
2. **REPLACE FAULTY TUBE OR HOSE**
   NOTE: Cap the open fittings immediately to keep moisture out of the system.

Tightening torques for O-ring fittings

Fitting size	Torque
3/8 in. tube for liquid line	135 kg-cm (10 ft-lb, 13 N·m)
1/2 in. tube for discharge line	225 kg-cm (16 ft-lb, 22 N·m)
5/8 in. tube for suction line	325 kg-cm (24 ft-lb, 32 N·m

3. **EVACUATE, CHARGE AND TEST REFRIGERATION SYSTEM** **(See page AC-14)**





A/C SWITCH

ON-VEHICLE INSPECTION

1. **DISCONNECT NEGATIVE CABLE FROM BATTERY**
2. **REMOVE GLOVE BOX**
3. **DISCONNECT A/C SWITCH CONNECTOR**
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. **CONNECT A/C SWITCH CONNECTOR**
6. **INSTALL CENTER CLUSTER**
7. **CONNECT NEGATIVE CABLE TO BATTERY**

LOW PRESSURE SWITCH

(See page AC-19)

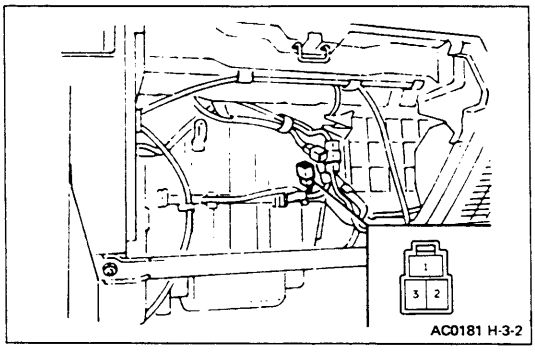
INSPECTION OF LOW PRESSURE SWITCH

1. CHECK REFRIGERANT PRESSURE

   (a) Connect the hoses of the manifold gauge set to the compressor service valves and observe the gauge reading.

   (b) The gauge reading must be more than 2.1 kg/cm² (30 psi, 206 kPa) when the ambient temperature is higher than 0°C (32°F).

   If the pressure is less than 2.1 kg/cm² (30 psi, 206 kPa), charge the refrigerant. (See page AC-15)



2. CHECK LOW PRESSURE SWITCH

   (a) Remove the glove box.

   (b) Disconnect the lead wires of the A/C harness.

   (c) Using an ohmmeter, check the continuity between the two terminals of the low pressure switch.
   The ohmmeter must indicate zero ohm.

   If there is no continuity, replace the low pressure switch. (See page AC-19)

3. REINSTALL REMOVED PARTS IN REVERSE ORDER

THERMO SWITCH(TOWING PACKAGE)

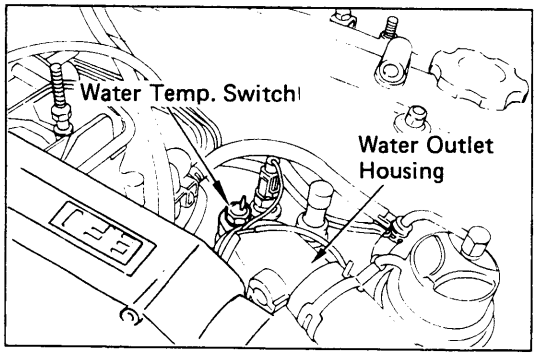
INSPECTION OF THERMO SWITCH

1. CHECK THERMO SWITCH

   (a) Disconnect the lead wire of thermo switch.

   (b) Using an ohmmeter, check the continuity between the terminal of thermo switch and ground.
   The ohmmeter must indicate zero ohm when engine coolant temperature is less than 101°C (213°F).

   If there is no continuity, replace the thermo switch.



2. REINSTALL REMOVED PARTS IN REVERSE ORDER

THERMO RELAY (TOWING PACKAGE)

INSPECTION OF THERMO RELAY

1. REMOVE THERMO RELAY

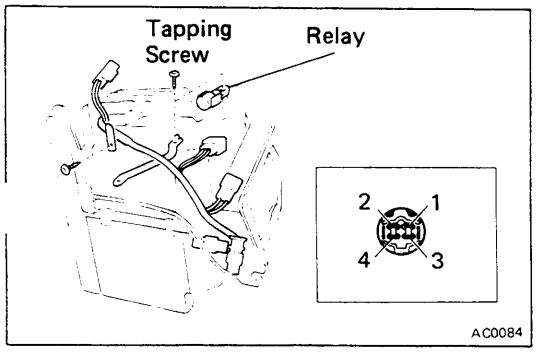
2. CHECK THERMO RELAY

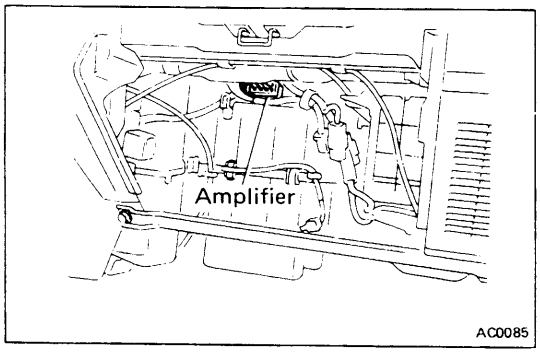
   Using an ohmmeter, check the continuity between terminals 2 and 4.

   Normal ..... No continuity

   With 12V battery applied across terminals 1 and 3
   Terminals 2 and 4 ..... Continuity

   If defective, replace the thermo relay.





AIR CONDITIONER AMPLIFIER

(See page AC-19)

INSPECTION OF AIR CONDITIONER AMPLIFIER

1. CHECK ENGINE SPEED DETECTING CIRCUIT

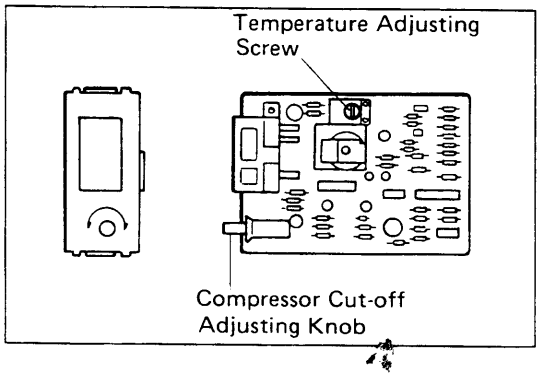
(a) Run the engine, and operate the air conditioner.

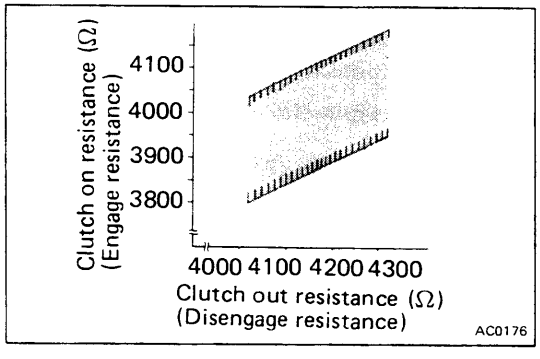
(b) Check that the magnetic clutch disengages at the specific engine revolution.

Cut-off rpm: 600 — 700 rpm

If the cut-off rpm is too high, turn the adjusting knob clockwise to adjust.

If the cut-off rpm is too low, turn the adjusting knob counterclockwise to adjust.





2. CHECK TEMPERATURE DETECTING CIRCUIT

(a) Remove the glove box.

(b) Disconnect the thermistor connector and connect the variable resistor.

(c) Run the engine and operate the air conditioner to get maximum cooling.

- Air intake control: RECIRC
- Air flow control: VENT
- Temperature control: COOL
- Blower control: HI

(d) Measure the resistance of the variable resistor when the magnetic clutch engages and disengages.

If the resistance is not between the two lines, adjust the amplifier.

If the resistance is too high, turn the temperature adjusting screw clockwise.

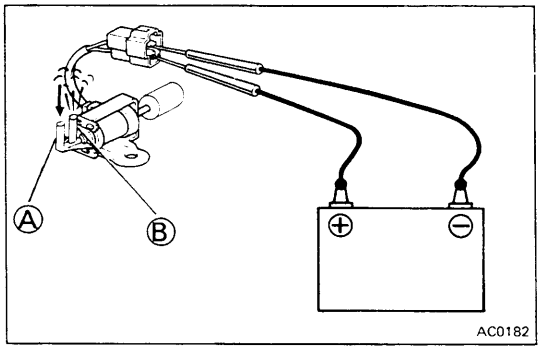
If the resistance is too low or the evaporator is frosted, turn the temperature adjusting screw counterclockwise until the magnetic clutch engages at the standard resistance.

VACUUM SWITCHING VALVE (VSV)

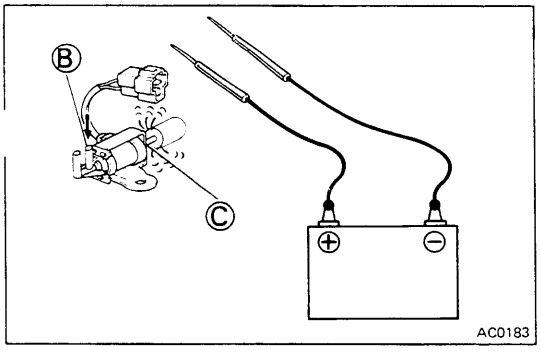
(See page AC-19)

INSPECTION OF VSV

1. **DISCONNECT VACUUM HOSES AND CONNECTOR FROM VSV**

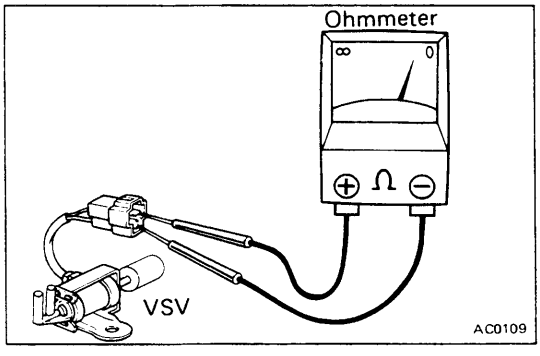


2. **CHECK VACUUM CIRCUIT CONTINUITY IN VSV BY BLOWING AIR INTO PIPE**
   (a) Connect the VSV terminals to the battery terminals as shown.
   (b) Blow into pipe Ⓐ, and check that air comes out of pipe Ⓑ.



   (c) Disconnect the battery.
   (d) Blow into pipe Ⓑ and check that air comes out of filter Ⓒ — not out of pipe Ⓐ.

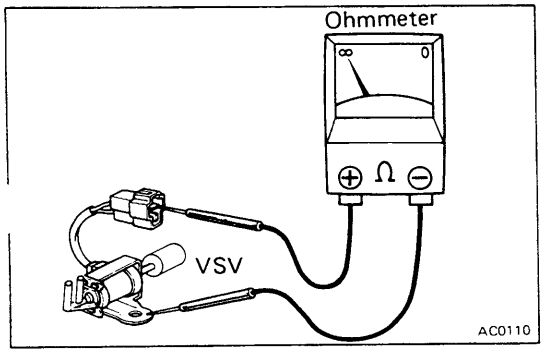
   If a problem is found, replace the VSV.



3. **CHECK FOR SHORT CIRCUIT**

   Using an ohmmeter, check that there is no continuity between two terminals.

   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: 38 — 43 Ω at 20°C (68°F)

   If the resistance is not within specification, replace the VSV.