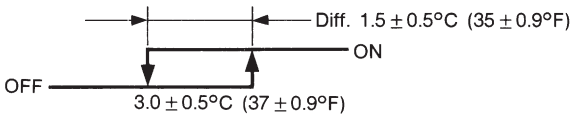
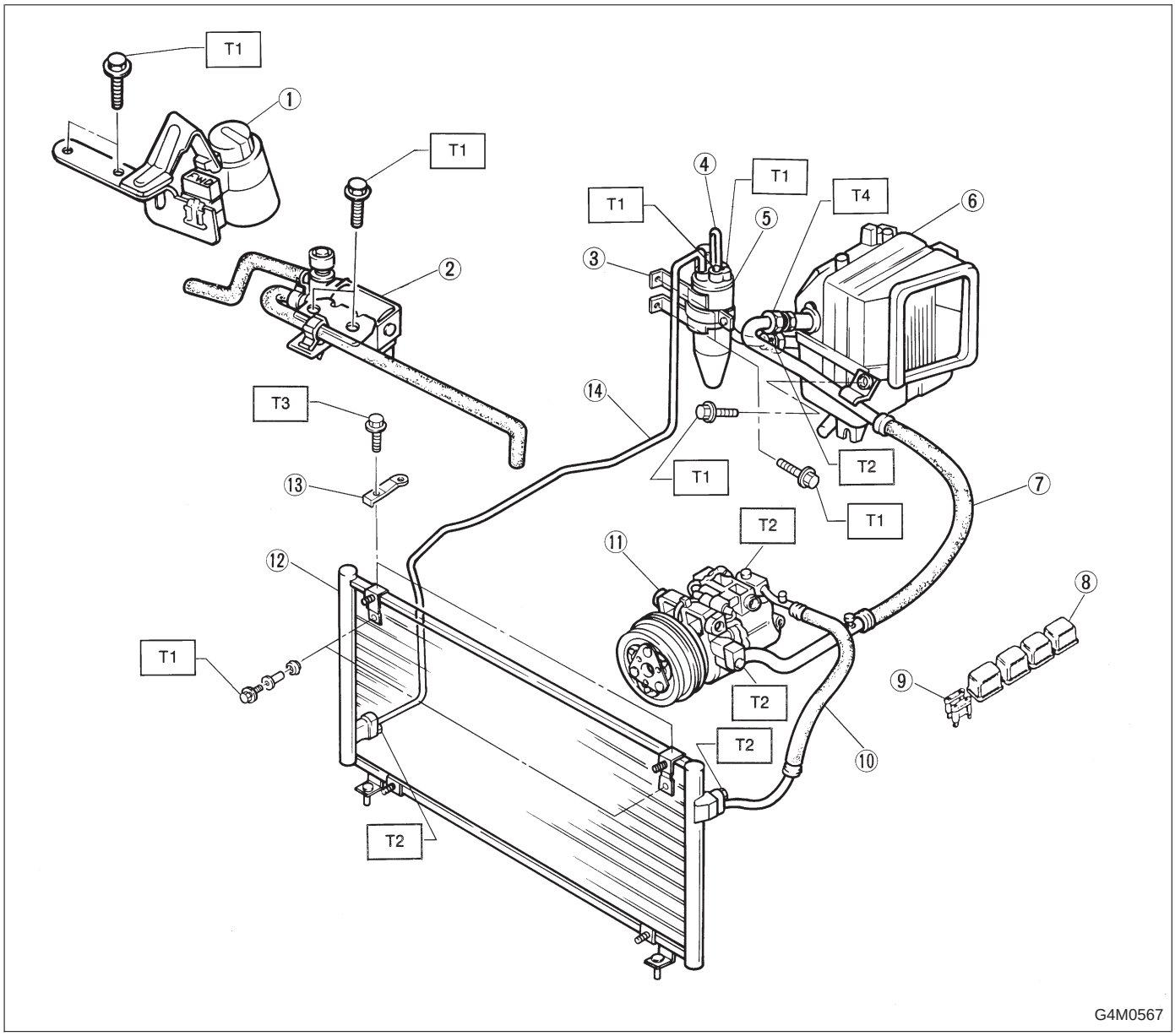
AIR CONDITIONING SYSTEM 4-7

1. Air Conditioning System

Item			Specifications
Type of air conditioner			Reheat air-mix type
Cooling capacity (IMACA)			5.234 kW (4,500 kcal/h, 17,856 BTU/h)
Refrigerant			HFC-134a (CH_2FCF_3) [0.6 — 0.7 kg (1.3 — 1.5 lb)]
Compressor		Type	5-vane rotary, fix volume (CR-14)
		Discharge	144 cm^3 (8.79 cu in)/rev
		Max. permissible speed	7,000 rpm
Magnet clutch		Type	Dry, single-disc type
		Power consumption	47 W
		Type of belt	V-Ribbed 4 PK
		Pulley dia. (effective dia.)	120 mm (4.72 in)
		Pulley ratio	1.8 model: 1.11, 1.6 model: 0.92
Condenser		Type	Corrugated fin (Multi-flow)
		Core face area	0.196 m^2 (2.1 sq ft)
		Core thickness	19 mm (0.75 in)
		Radiation area	4.7 m^2 (51 sq ft)
Receiver drier		Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve		Type	External equalizing
Evaporator		Type	Single tank
		Dimensions (W x H x T)	86 x 222 x 235 mm (3.39 x 8.74 x 9.25 in)
Blower fan		Fan type	Sirocco fan
		Outer diameter x width	150 x 75 mm (5.91 x 2.95 in)
		Power consumption	230 W at 12 V
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	120 W at 12 V
		Fan outer diameter	320 mm (12.60 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	120 W at 12 V
		Fan outer diameter	320 mm (12.60 in)
Idling speed (A/C ON)		MPFI model	850±50 rpm (700±50 rpm “D” range in AT model)
Dual switch (Pressure switch)	Low-pressure switch operating pressure kPa (kg/cm^2, psi)	ON → OFF	176±20 (1.80±0.20, 25.5±2.9)
		OFF → ON	186±29 (1.90±0.30, 27.0±4.2)
	High-pressure switch operating pressure kPa (kg/cm^2, psi)	ON → OFF	2,648±196 (27±2, 384±28)
		DIFF	588±196 (6±2, 85±28)
Compressor relief valve blow-out pressure kPa (kg/cm^2, psi)			3,727±196 (38±2.0, 540±28)
Thermo control amplifier working temperature (Evaporator outlet air)			 G4M0938
Compressor thermocut temperature			140±5°C (284±9°F) Diff. 15±5°C (59±9°F)

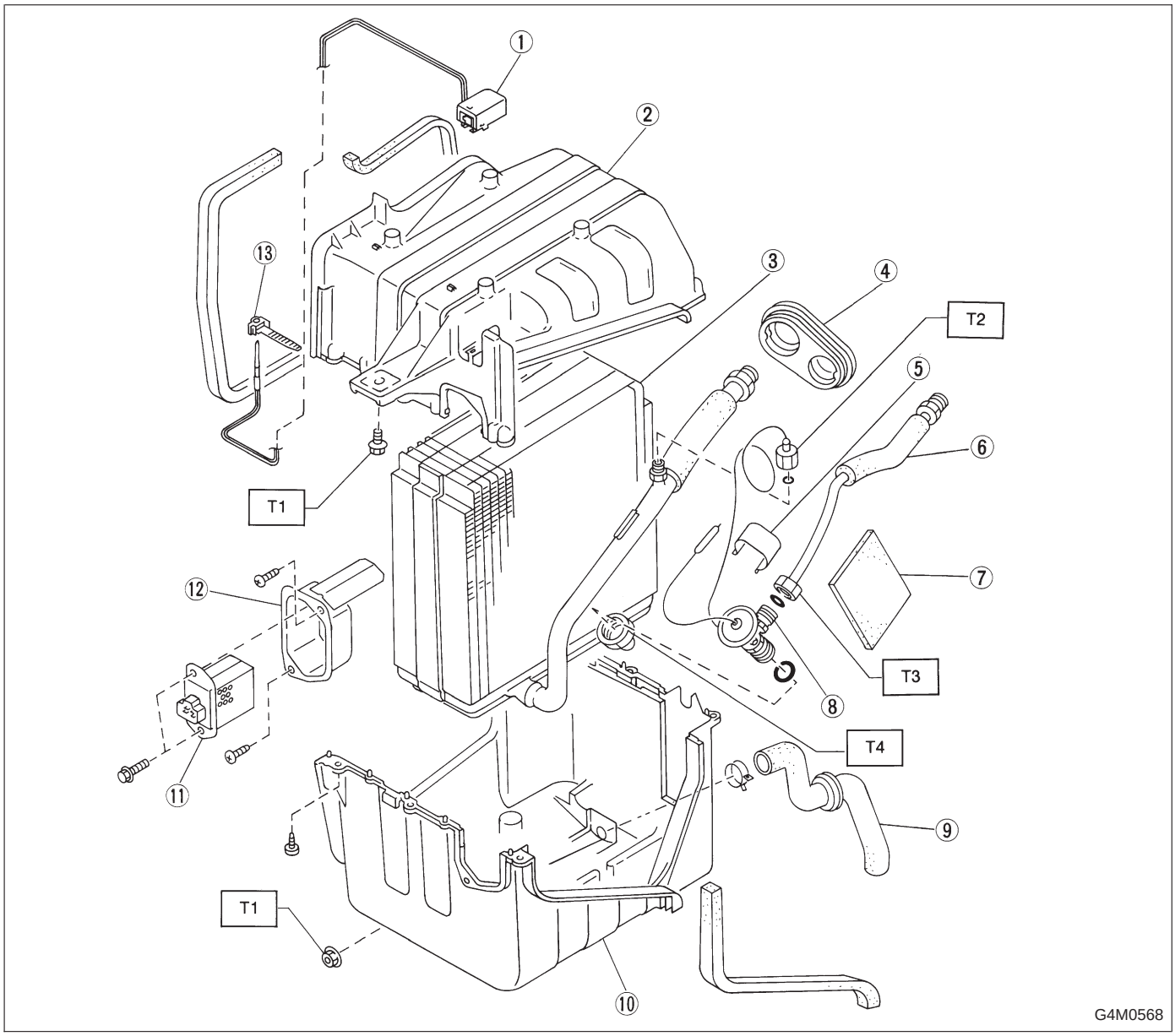
1. Air Conditioning System



① A/C cut relay
② FICD (1800 cc model)
③ Receiver drier bracket
④ Pipe (Receiver drier — C/unit)
⑤ Receiver drier
⑥ Cooling unit
⑦ Hose (Low-pressure)
⑧ A/C relay
⑨ Fuse
⑩ Hose (High-pressure)
⑪ Compressor
⑫ Condenser
⑬ Radiator bracket
⑭ Pipe (Condenser — Receiver drier)

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.39 — 9.31
(0.55 — 0.95, 4.0 — 6.9)
T2: 13 — 23 (1.3 — 2.3, 9 — 17)
T3: 9.8 — 19.6
(1.00 — 2.00, 7.2 — 14.4)
T4: 19.6 — 29.4
(2.00 — 3.00, 14.4 — 21.5)

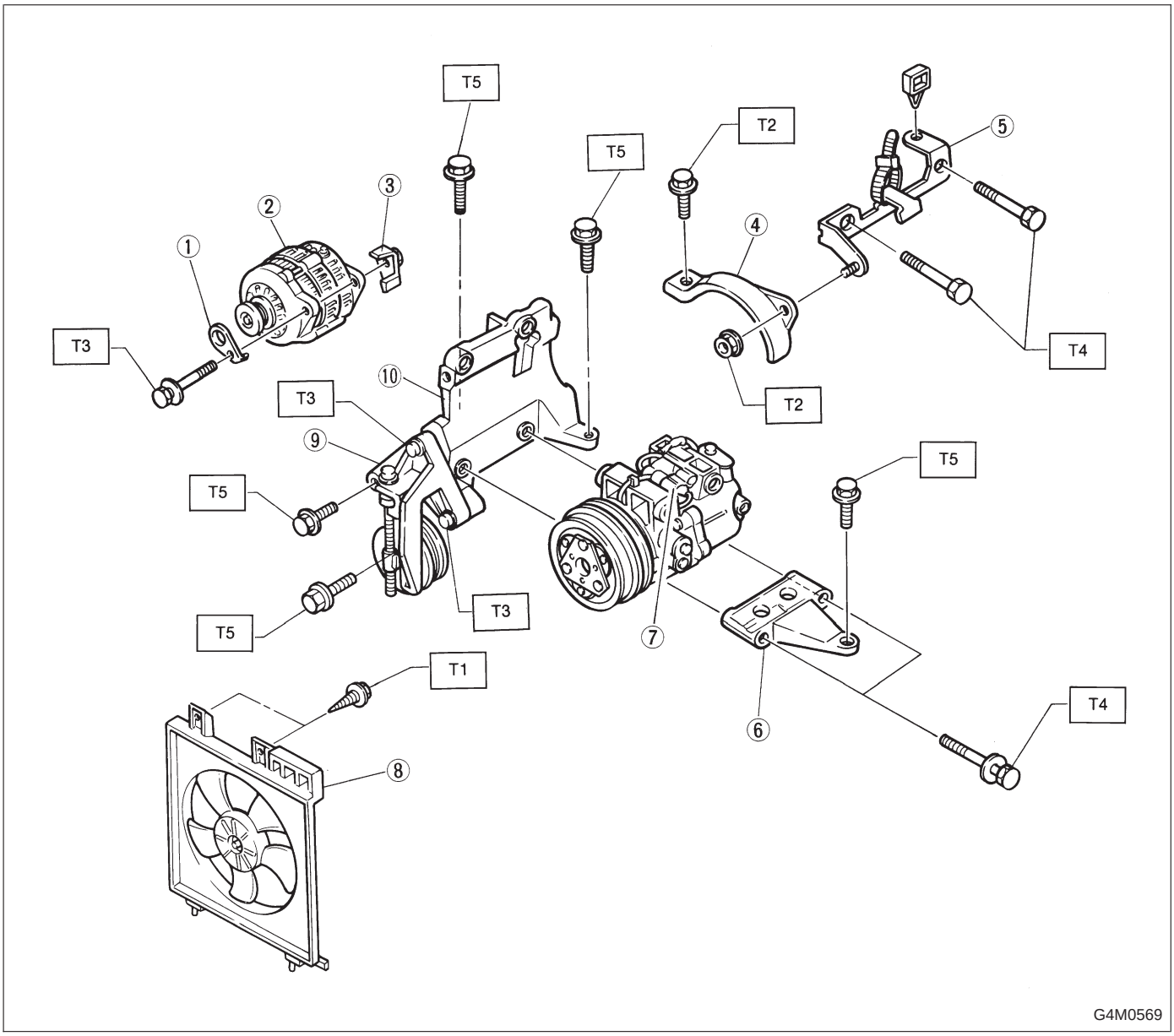
2. Evaporator



① Thermo control amplifier
② Case upper
③ Cooling unit
④ Grommet
⑤ Clip
⑥ Pipe
⑦ Seat
⑧ Expansion valve
⑨ Drain hose
⑩ Case lower
⑪ Resistor
⑫ Resistor bracket
⑬ Thermistor bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.5 — 9.5
(0.56 — 0.97, 4.1 — 7.0)
T2: 13.2 — 16.2
(1.35 — 1.65, 9.7 — 11.9)
T3: 17.6 — 21.6
(1.80 — 2.20, 13.0 — 15.9)
T4: 21.5 — 27.5
(2.20 — 2.80, 15.9 — 20.3)

3. Compressor



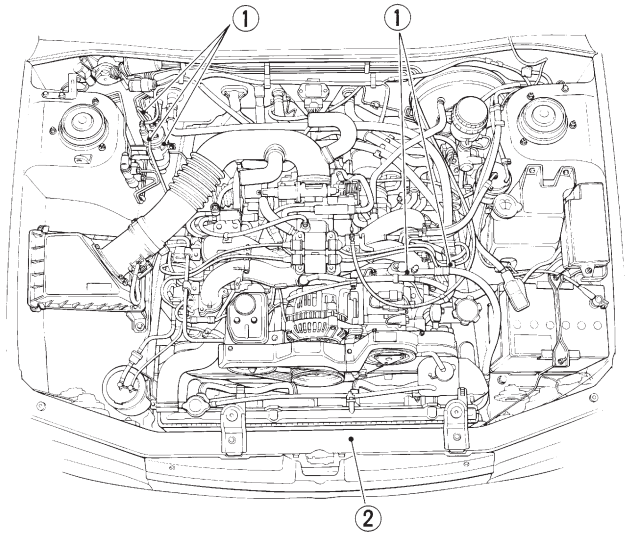
① Alternator bracket
② Alternator
③ Alternator bracket nut
④ Compressor belt cover
⑤ Bracket
⑥ Compressor bracket lower
⑦ Compressor
⑧ Condenser fan motor ASSY
⑨ Idler pulley ASSY
⑩ Compressor bracket upper

Tightening torque: N·m (kg-m, ft-lb)
T1: 3 — 5 (0.3 — 0.5, 2.2 — 3.7)
T2: 5.39 — 9.31
(0.55 — 0.95, 4.0 — 6.9)
T3: 19 — 27 (1.9 — 2.8, 14 — 20)
T4: 24.2 — 33.6
(2.47 — 3.43, 17.8 — 24.8)
T5: 31 — 41 (3.2 — 4.2, 23 — 30)

1. Safety Precautions

1. HFC-134a AIR CONDITIONING SYSTEM

Component parts of the cooling system, refrigerant, compressor oil, and other parts are not the same for the HFC-134a system and the older CFC-12 system. Do not interchange parts or liquid.
Vehicles with HFC-134a air conditioning systems, use only HFC-134a parts that are indicated on a label attached to the vehicle. Before performing any maintenance, verify the type of air conditioning system installed in the vehicle.



① HFC134a 用
USE FOR
HFC134a

② SUBARU TOKYO JAPAN
AIR CONDITIONER (LI-TYPE)
REFRIGERANT CHARGE :
HFC134a, 21-25 OZ (0.6 - 0.7Kg)
COMPRESSOR OIL : DH-PR
COMPRESSOR BELT : 73013AA000 (1.8L)
73013PA000 (1.6L)
REFRIGERANT UNDER HIGH PRESSURE.
CONSULT SERVICE MANUAL.
CAUTION : SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL.
SAE J639

CAUTION : USE ONLY REFRIGERANT HFC134a AND OIL DH-PR P FOR THIS AIR CONDITIONER. DON'T USE REFRIGERANT CFC12 AND OIL DH-150CX.
ATTENTION : UTILISEZ LE LIQUIDE RÉFRIGÉRANT HFC134a ET L'HUILE DH-PR DANS CE CLIMATISEUR. NE JAMAIS UTILISER LE RÉFRIGÉRANT CFC12 ET L'HUILE DH-150CX.
VORSICHT : NUR KÄL TEMITTEL HFC134a UND ÖL DH-PR FÜR DIESE KLIMAANLAGE VERWENDEN. NIEMALS KÄL TEMITTEL CFC12 UND ÖL DH-150CX.

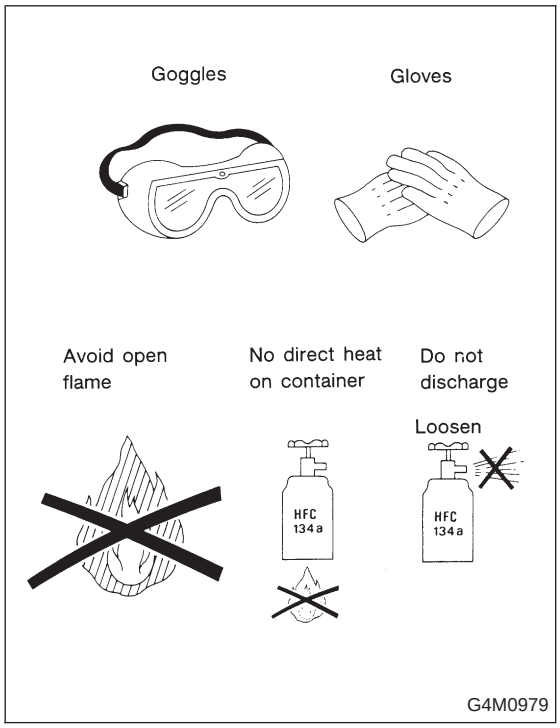
G4M0978

2. COMPRESSOR OIL

Do not use any compressor oil that is not specifically designated for the HFC-134a air conditioning system; only use DH-PR. Also, do not use HFC-134a compressor oil in the CFC-12 air conditioning system. If compression oils are mixed, poor lubrication will result and the compressor itself may be damaged.
Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except when in use. Store compressor oil in a tightly closed steel container.

3. REFRIGERANT

Do not put CFC-12 refrigerant into a HFC-134a air conditioning system. Also, do not put HFC-134a refrigerant into a CFC-12 air conditioning system. If the wrong refrigerant is used, poor lubrication will result and the compressor itself may be destroyed.



4. HANDLING OF REFRIGERANT

Because refrigerant boils at approx. −30°C (−22°F) at sea level, it is cold enough to give you severe frostbite. Always wear goggles to protect your eyes and gloves to protect your hands. Also, even under the pressures normally found in CFC-12 containers, refrigerant will boil with the addition of heat. This could raise the pressure inside the container to a dangerous level.

Never expose a can of HFC-134a to direct sunlight, or to temperatures over 40°C (104°F). One more thing to remember about HFC-134a is that when it is exposed to an open flame or to hot metal, it forms phosgene, a deadly gas. Do not discharge HFC-134a into the atmosphere on purpose. Always read and follow the precautions on the HFC-134a bottle.

2. Basic Information

1) The combination of moisture and refrigerant forms acid, therefore, moisture should not be allowed to enter the refrigerant.
2) Refrigerant oil readily absorbs moisture, therefore, keep refrigerant oil containers tightly capped.
3) The process of evacuating the system is performed to remove small amounts of moisture. This is accomplished by lowering the pressure inside the system, which allows the moisture to boil off, in much the same way that a pot of water will boil away to nothing given enough time. The evacuation process does not suck the moisture out of the system.
4) A minimum level of vacuum must be reached to satisfactorily evacuate the system. This minimum level of vacuum depends on the temperature inside the system. The chart below shows the level of vacuum required to boil water at various temperatures.
Additionally, the vacuum level shown on a gauge will read approx. 4 kPa (25 mmHg, 1 inHg) less for each 304.8 m (1,000 ft) above sea level, due to the decrease in atmospheric pressure at altitude.

Vacuum level required to boil water (at sea level)

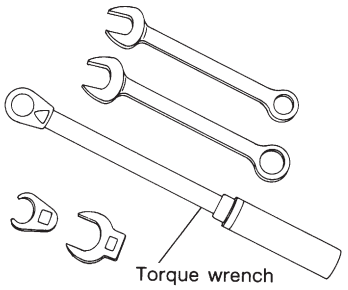
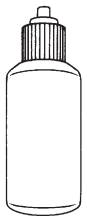
Temperature °C (°F)	Vacuum kPa (mmHg, inHg)
1.7 (35)	100.9 (757, 29.8)
7.2 (45)	100.6 (754, 29.7)
12.8 (55)	99.9 (749, 29.5)
18.3 (65)	99.2 (744, 29.3)
23.9 (75)	98.5 (739, 29.1)
29.4 (85)	97.2 (729, 28.7)
35 (95)	95.8 (719, 28.3)

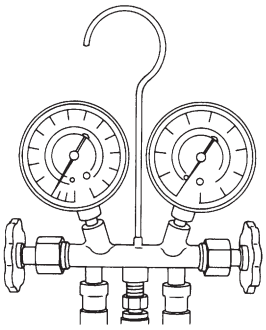
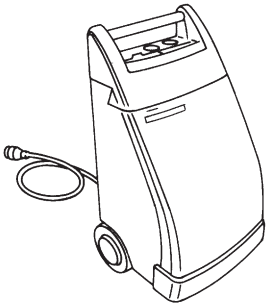
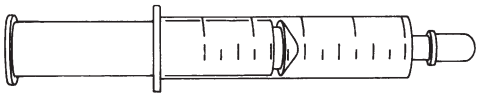
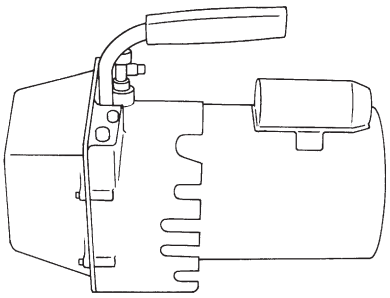
3. Tools and Equipment

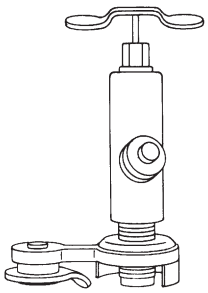
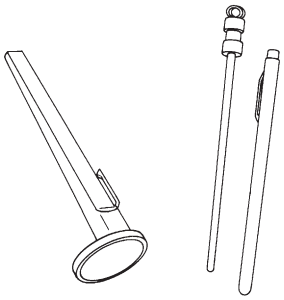
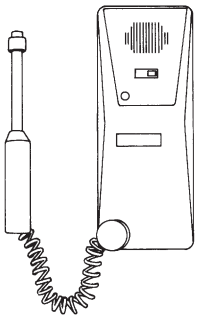
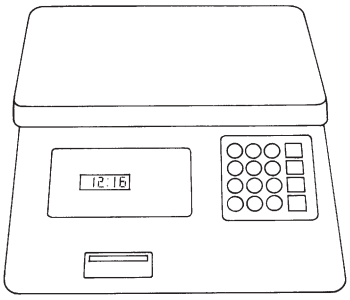
The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.
Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.

CAUTION:
When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed.
In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
● WRENCH Various **WRENCHES** will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.	 G4M0571
● APPLICATOR BOTTLE A small **APPLICATOR BOTTLE** is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.	 G4M0572

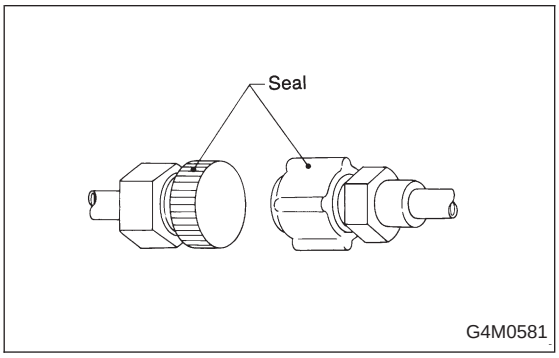
Tools and Equipment	Description
● MANIFOLD GAUGE SET A **MANIFOLD GAUGE SET** (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.	 G4M0573
● REFRIGERANT RECOVERY SYSTEM A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.	 G4M0574
● SYRINGE A graduated plastic **SYRINGE** will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.	 G4M0575
● VACUUM PUMP A **VACUUM PUMP** (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.	 G4M0576

Tools and Equipment	Description
● CAN TAP A **CAN TAP** for the 397 g (14 oz) can is available from an auto supply store.	 G4M0577
● THERMOMETER Pocket **THERMOMETERS** are available from either industrial hardware store or commercial refrigeration supply houses.	 G4M0578
● ELECTRONIC LEAK DETECTOR An **ELECTRONIC LEAK DETECTOR** can be obtained from either a specialty tool supply or an A/C equipment supplier.	 G4M0579
● WEIGHT SCALE A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.	 G4M0580

4. O-ring Connections

1. GENERAL

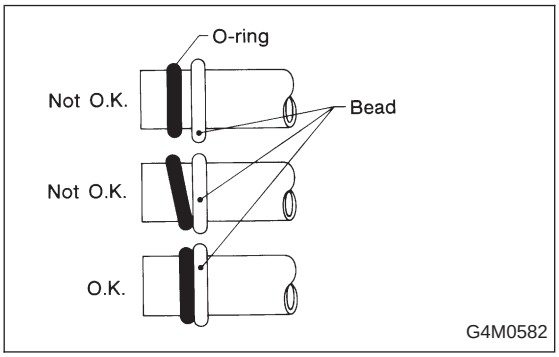
The following points should be kept in mind when assembling O-ring connections:
1) Avoid unnecessary handling and contact of O-rings with your hands, since even clean fingers contain body acids, which can contaminate the O-ring surface.
2) Do not handle O-rings with gloves, shop towels, etc., since lint particles may cling to the O-ring, possibly causing a leak upon assembly.
3) Always lubricate O-rings before assembly to allow the O-ring to seat itself properly.
4) Be certain to use torque wrenches when tightening O-ring fittings, because overtightening can not only damage the O-ring, but it can distort the tube end as well.



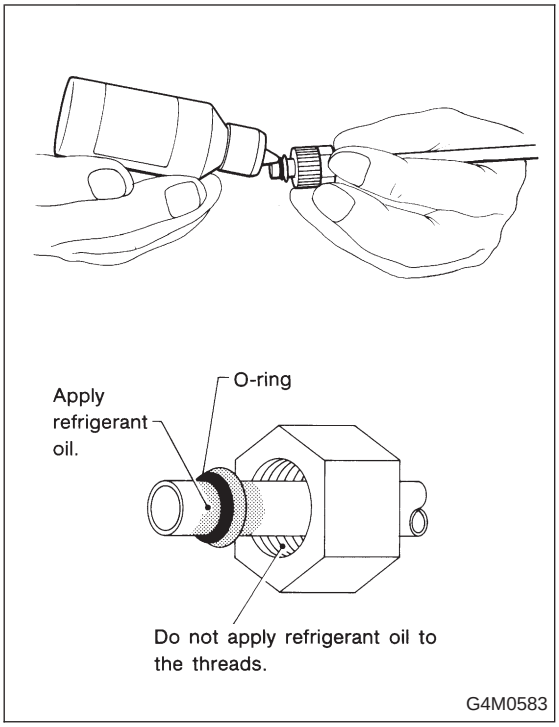
2. REMOVE PROTECTIVE SEALS

Just prior to making the connection, remove the protective seals.

CAUTION:
If for any reason you have to stop before making a connection, recap the tube, component or fitting.

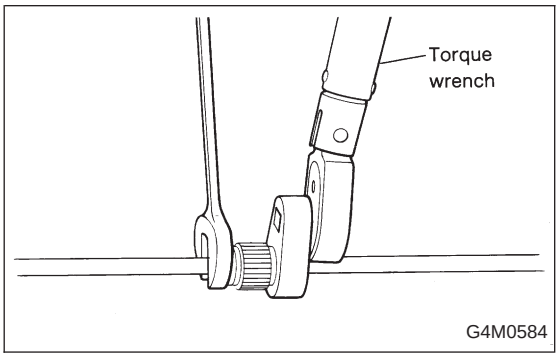


Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it.
The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position **with clean hands**.



3. LUBRICATE THE COMPONENTS

For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.
Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



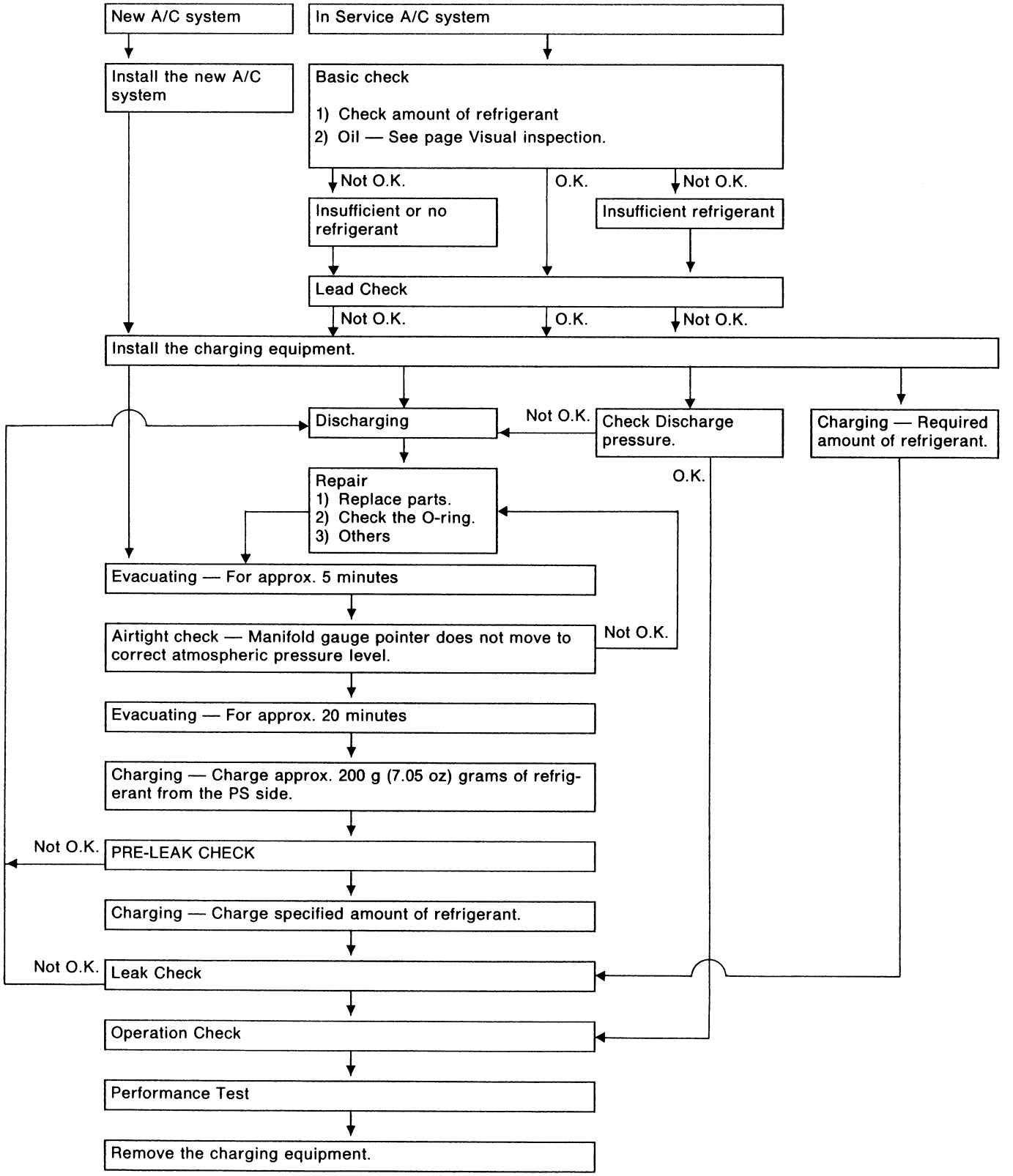
4. TORQUE THE FITTING

Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.
After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

CAUTION:
If a leak is suspected after torquing, do not retighten or retorque the connection. Instead, disassemble the connection, remove the O-ring, and inspect the O-ring, threads, joints and seating surfaces.

5. Refrigerant Service Procedure

1. WORK FLOW



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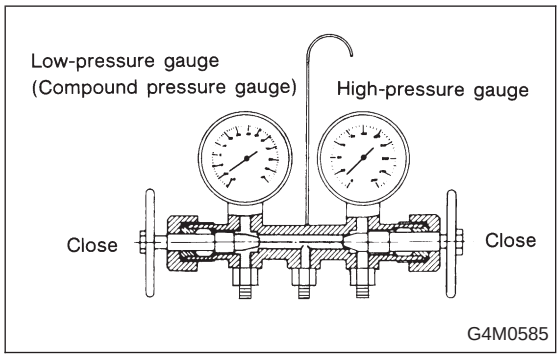
6. Discharge the System

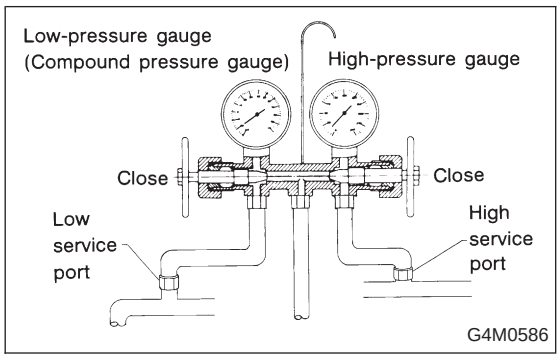
CAUTION:
The following points must be kept in mind when discharging the system.

1) Be certain that goggles and gloves are worn.
2) Connect refrigerant recovery system to manifold gauge set and remove recycle refrigerant from the A/C system.
NOTE:
Refer to that refrigerant recovery system instruction manual for operating procedures.



1. CONNECTING THE MANIFOLD GAUGE SET

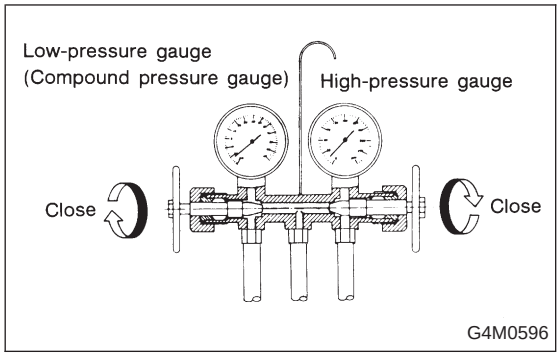
1) Close the high and low side manifold valves



2) Attach the high- and low-pressure manifolds to the high and low services port on the vehicle.

2. PREPARE FOR DISCHARGING

1) Connect center manifold hose to refrigerant recovery system to recycle refrigerant.

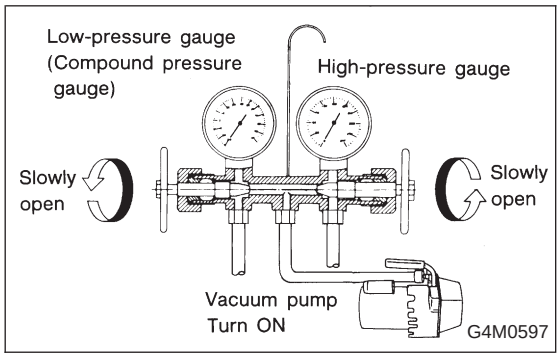


7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set:
1) Be certain that goggles and gloves are worn.
2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.

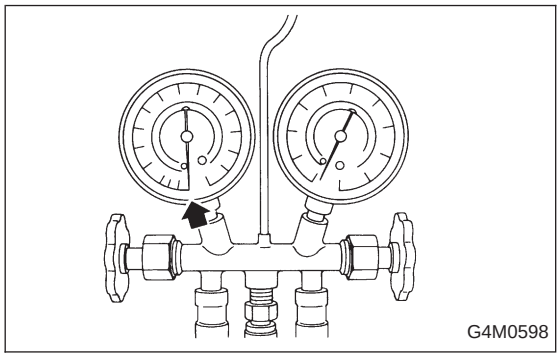
3) The charging procedure described in this section begins by charging **liquid** refrigerant into the high-pressure side of the system **with the engine off.** The procedure is completed by charging refrigerant **vapor** into the low-pressure side of the system with the engine running.

CAUTION:
Never open the high-pressure manifold valve when the engine is running.



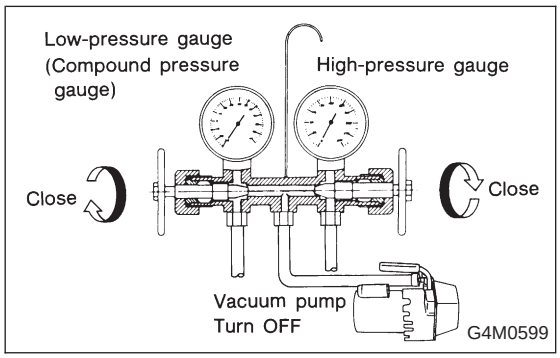
1. CONNECT THE GAUGE SET

1) Close the high- and low-pressure manifold valves
2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm^2, 10 psi) is indicated, discharge the system prior to charging.
3) Attach the high-pressure manifold hose to the high-pressure service port on the vehicle.
4) Connect the center hose from the manifold to the vacuum pump.
5) Turn on the vacuum pump.
6) Slowly open the low-pressure manifold valve.
7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high-pressure manifold valve.



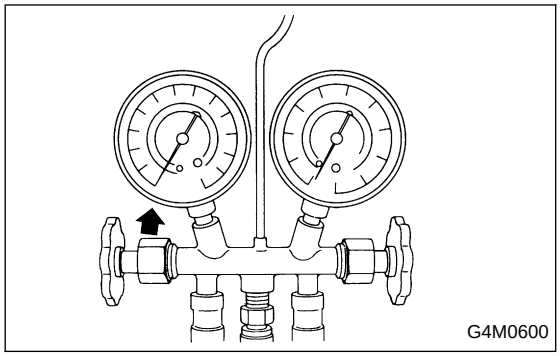
8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

NOTE:
The gauge will read 4 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.

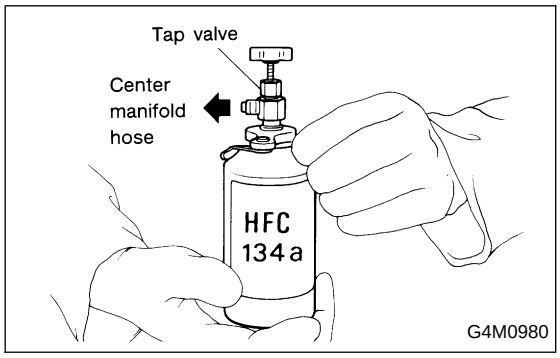


2. PERFORM A VACUUM LEAK TEST

1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
2) Close the low-pressure manifold valve.
3) Turn off the vacuum pump.

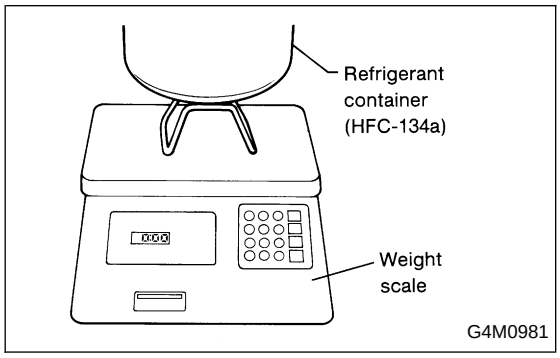

G4M0600

4) Note the low side gauge reading.
5) After 5 minutes, re-check the low-pressure gauge reading.
If the vacuum level has changed more than 4 kPa (25 mmHg, 1 inHg), perform an HFC-134a leak test.
If the vacuum reading is about the same as noted in step 2-4), continue on to step 2-6).



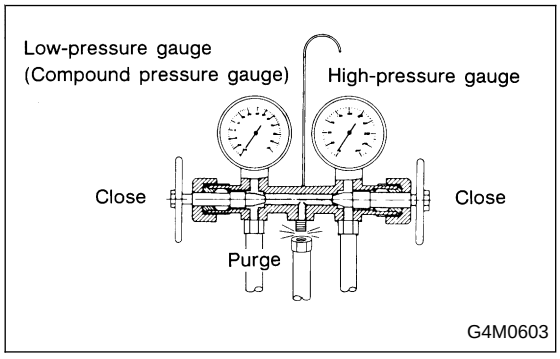
G4M0980

6) Carefully attach the can tap to the refrigerant can by following the can tap manufacturer's instructions.
7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.



G4M0981

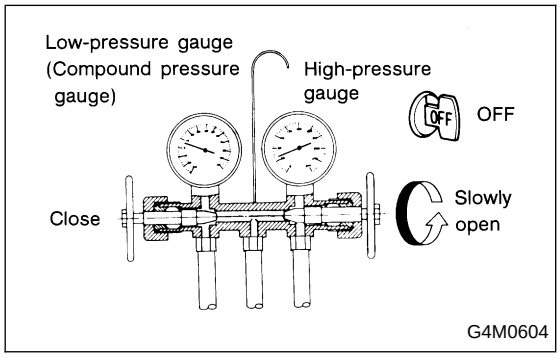
8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used.
Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



G4M0603

3. PURGE THE CENTER HOSE

1) Verify that all three hose connections are tight at the manifold gauge set.
2) Open the valve on the HFC-134a source.
3) **With safety equipment in place (goggles and gloves), use extreme caution** and loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

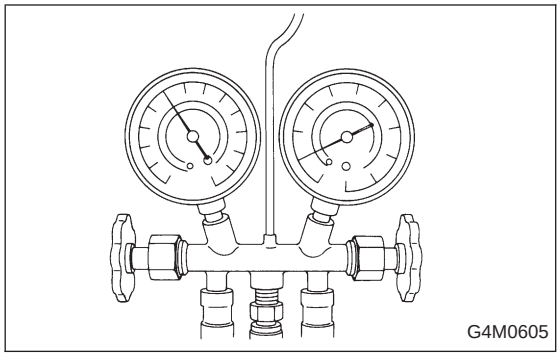


G4M0604

4. INITIAL CHARGING THROUGH THE HIGH SIDE

1) Connect a tachometer to the engine.
2) **With the engine off**, start charging by slowly opening the high-pressure manifold valve.

NOTE:
The initial charge rate can be increased by immersing the can in lukewarm [below 38°C (100°F)] water for a short time.

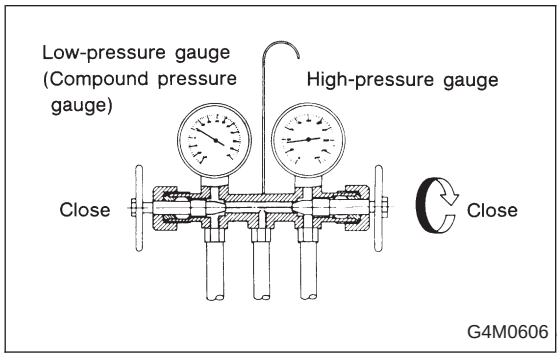

G4M0605

5. CHECK THE GAUGE READINGS

When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high-pressure manifold valve.

6. ADD ADDITIONAL CANS

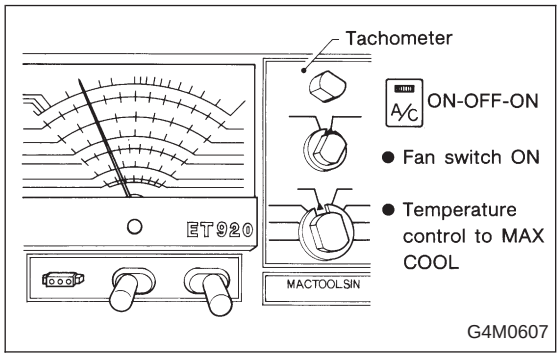
If the HFC-134a source is exhausted, first close the high-pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap. Repeat steps 15 through 19 as necessary.



G4M0606

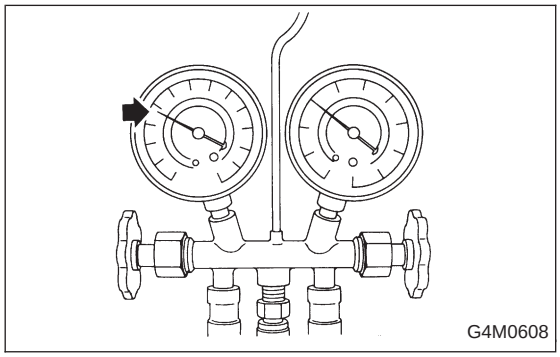
7. COMPLETE CHARGING THROUGH THE LOW SIDE

1) Verify that the high-pressure manifold valve is closed (should have already been closed).
2) Verify that the low-pressure manifold valve is closed (should have already been closed).



G4M0607

3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.
5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to “load shock”. Finish this operation with the A/C switch in the ON position.
6) Raise engine rpm to approximately 1,500 rpm.


G4M0608

8. CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:
The refrigerant source must be positioned for vapor (valve up).

2) Keep the low side pressure below 276 kPa (2.81 kg/cm^2, 40 psi) by using the low-pressure manifold valve to regulate the flow of refrigerant into the system.

3) When the system is fully charged, close the low-pressure manifold valve.
4) Close the valve at the refrigerant source.

● Refrigerant capacity

Unit: kg (lb)

Refrigerant	Minimum	Maximum
HFC-134a	0.6 (1.3)	0.7 (1.5)

9. COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance (refer to performance testing section).
2) Perform leak detection test.

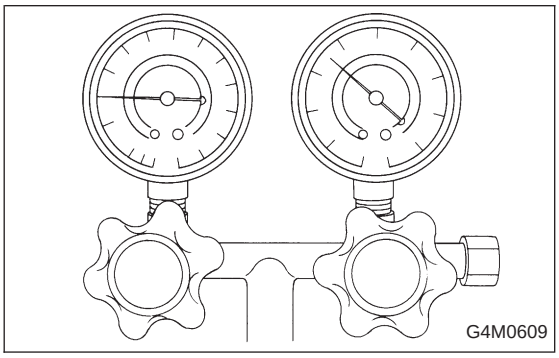
CAUTION:
Always perform leak checking in an environment free of refrigerant pollution.
Do not disconnect the high- or low-pressure hoses from the vehicle before leak checking.

10. DISCONNECT THE MANIFOLD GAUGE SET

1) Remove the high- or low-pressure hoses from the service ports and install the service port caps.

8. Leak Testing

The following points should be kept in mind when conducting a refrigerant leak test.
1) The A/C system to be tested must have an adequate refrigerant charge to begin with.
2) The area where the leak test is conducted must be free of wind and drafts, with still air being the ideal condition.
3) The atmosphere where the leak test is conducted must be free of refrigerant contamination.
4) Operate the A/C system for approx. 10 minutes, then turn the engine off an begin the leak test.
5) Refrigerant gas is heavier than air, therefore always hold the probe below the connection being tested.
6) When checking for a leak along a length of hose or tube, the leak detector probe must be moved slowly, approx. 25 mm (1 in) per second making sure probe does not come in contact with the component being tested.
7) When checking for a leak at a certain point, the leak detector probe must be held at that point for at least 5 seconds.


G4M0609

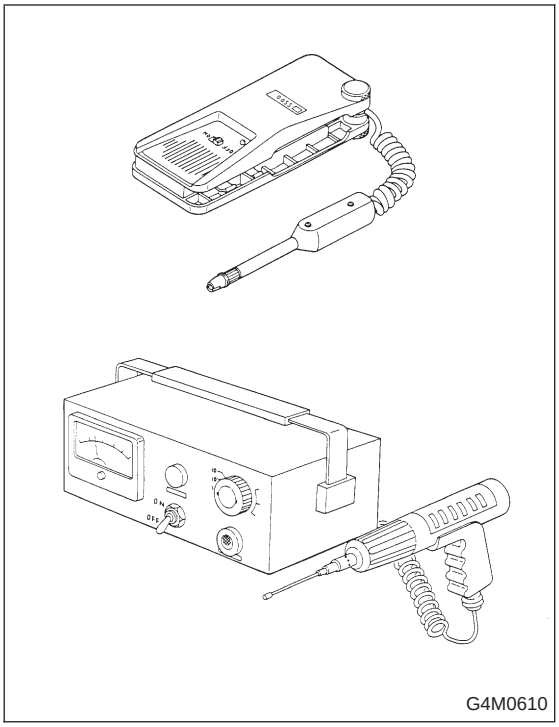
1. CHECK THE SYSTEM PRESSURE

1) With gauges connected to the A/C system, operate the A/C and confirm that the high side pressure is above 690 kPa (7.03 kg/cm^2, 100 psi). If not, evacuate and charge the system before leak checking (refer to evacuation and charging sections).

2. CLEAN CONNECTIONS BEFORE TESTING

Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

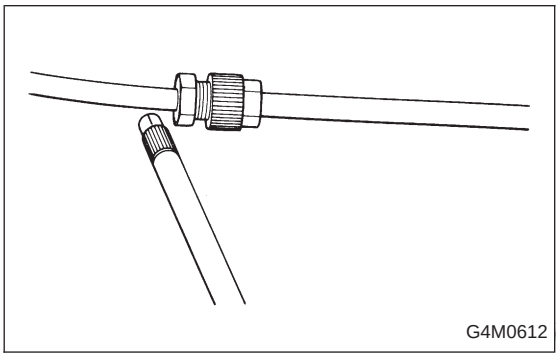
NOTE:
Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.


G4M0610

3. CALIBRATE LEAK DETECTOR

Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:
Always make sure that the probe tip filter is clean and free of contamination.


G4M0612

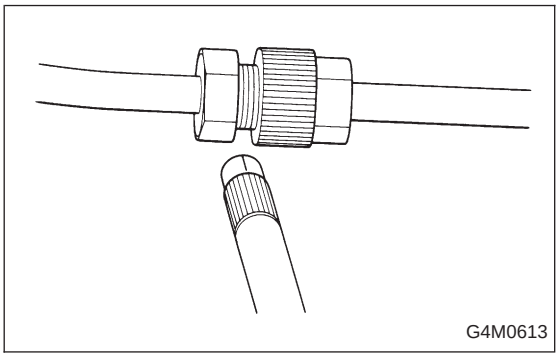
4. LEAK TEST — HIGH-PRESSURE SIDE

Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.

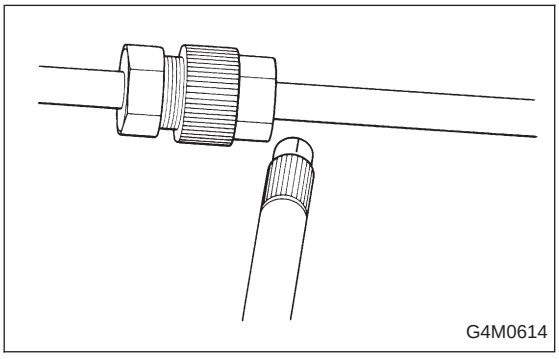
1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high-pressure side of the system to the compressor. There are three places to check each tube connection.

2) Check the area

(1) Check the area where the fitting meets the tube.


G4M0613

(2) Check the area where the two parts of the fitting join each other.


G4M0614

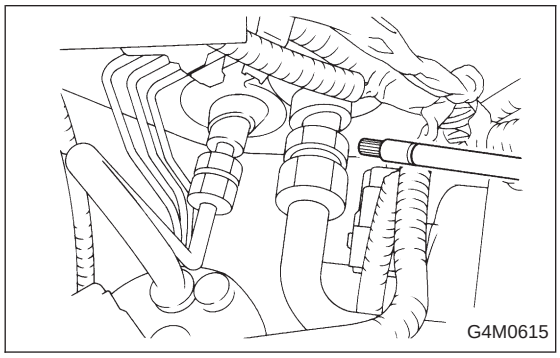
(3) Check the area where the nut meets the tube.

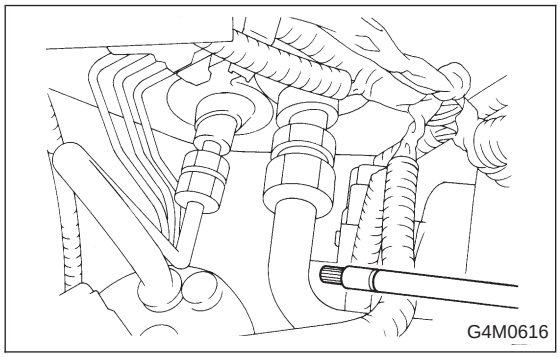
3) Check the area of the pressure switch (dual switch), and also check the seams of the receiver drier.
4) Check the connections of the tubes to the condenser, and also check any welded joints on the condenser.

CAUTION:
An oily area on the fins of the condenser may indicate a leak.

5) Check the area where the hoses attach to the compressor.
6) Check around the machined portions of the compressor (where the compressor sections join each other).
7) If equipped, check the thermal limiter on the compressor housing.
8) Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

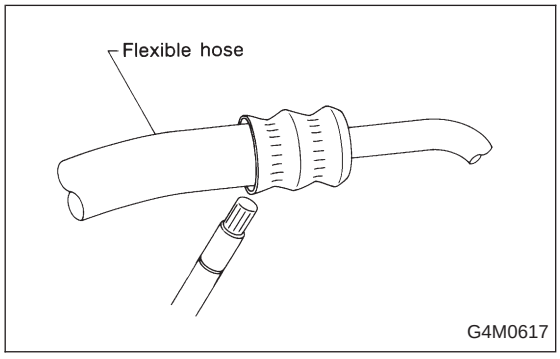
NOTE:
Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].


G4M0615


G4M0616

5. LEAK TEST — LOW-PRESSURE SIDE

1) Begin at the connection of the low pressure tube to the evaporator, and work your way along the low-pressure of the system to the compressor. There are three places to check on each tube connection.
2) Check the area.
   (1) Check the area where the fitting joins the tube.
   (2) Check the area where the two parts of the fitting join each other.
   (3) Check the area where the nut joins the tube.

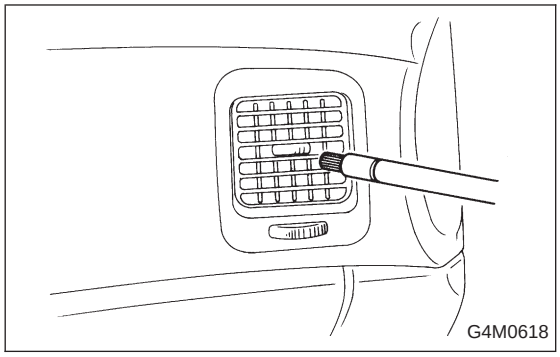


G4M0617

6. CHECK THE FLEXIBLE HOSES

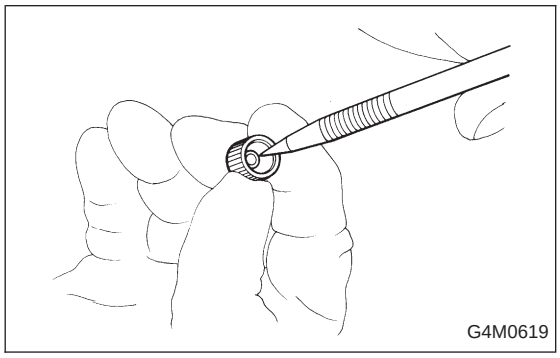
1) Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

NOTE:
Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.



7. CHECK THE EVAPORATOR ASSEMBLY

1) Use one or both of the following methods to check the evaporator assembly.
2) Remove the drain hose from the case drain nipple. Hold the probe at the end of the case drain nipple for at least 10 seconds. Be certain to reconnect the drain hose when finished.
3) With the ignition key in the “ACC” position, run the blower on high speed for 1 minute, then turn the blower off. Place the probe in the center instrument panel vent, an turn the blower on low speed for 1 to 2 seconds, then turn the blower off. Leave the probe in the vent for at least 10 seconds.



8. CHECK THE SERVICE PORT CAPS

Visually inspect the inside of the service port caps. Make sure the rubber seal is in place on the inside of the caps. Disconnect the gauges from the vehicle and install the service port caps.

9. Lubrication

1. SYSTEM OIL STABILIZATION

Prior to opening the refrigerant system for repairs (except compressor seizure) the system must be stabilized for correct oil replenishment.
Follow these procedures:
1) Engine speed set to 1,500 rpm.
2) A/C “ON”.
3) Air source to recirculate
4) Blower 4th or high speed position
   - Make sure the air entering the evaporator is above 26.7°C (80°F).
   - The discharge (high) side pressure must be above 588 kPa (6 kg/cm^2, 85 psi).
5) Operate the A/C for 10 minutes.

2. SYSTEM DISCHARGE

Slowly, discharge the system starting with the high-pressure side until the pressure drops below 345 kPa (3.52 kg/cm^2, 50 psi), then open the low-pressure side.

3. OIL REPLACEMENT

After stabilization and discharge, replace the component, adding the appropriate amount of oil (DH-PR) to the new component before installation.

Evaporator	75 mℓ (2.5 US fl oz, 2.6 lmp fl oz)
Receiver drier	10 mℓ (0.34 US fl oz, 0.4 lmp fl oz)
Condenser	35 mℓ (1.2 US fl oz, 1.2 lmp fl oz)
Hose	1 mℓ (0.03 US fl oz, 0.04 lmp fl oz)

If the compressor is replaced (after stabilization):
1) Drain and measure the oil from the original compressor.
2) Drain the oil from the replacement compressor and refill with the same amount that was drained from the original [20 mℓ (0.7 US fl oz, 0.7 imp fl oz) minimum]. Always use DH-PR for the replacement oil.

10. Performance Test

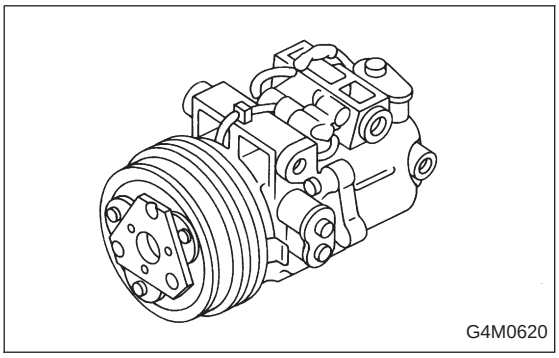
1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions:
1) Vehicle in shade
2) No wind
3) All vehicle doors closed
4) Front windows open
5) Hood open
6) Engine speed set at 1,500 rpm.
7) A/C ON
8) Temperature control lever — Maximum cold
9) Air source — Recirculation
10) Blower speed — 4th position (High)
11) Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

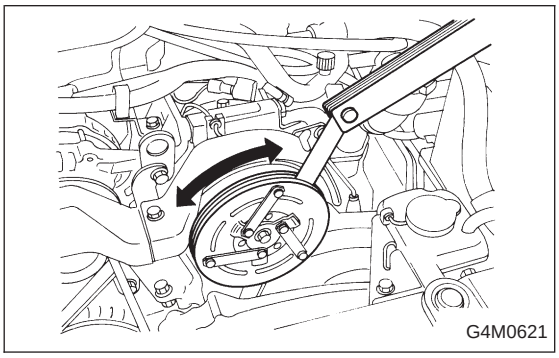
After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order):
1) Evaporator intake air temperature at recirculation door.
2) Evaporator discharge air temperature at center grill.
3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser
4) Suction (Low) side pressure
5) Discharge (High) side pressure

NOTE:
If only one thermometer is available; 1) take the ambient measurement first; then 2) the intake air; and 3) discharge air temperature.


G4M0620

11. Compressor

Compressor is a 5-vane rotary type. When trouble occurs, replace compressor as a single unit.

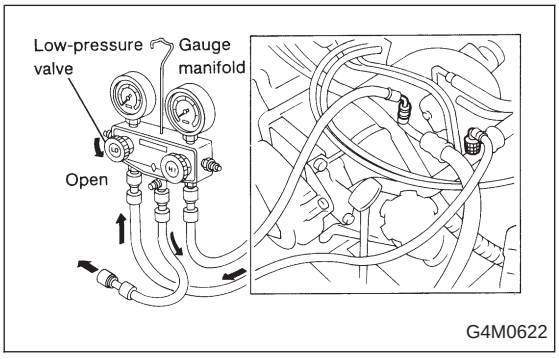

G4M0621

1. COMPRESSOR CLUTCH

Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.
1) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:
0.3 — 0.6 mm (0.012 — 0.024 in)

2) Check that voltage applied to magnetic coil is at least 10.5 volts.
3) When noise is noted, check that it originates in either compressor or pulley bearing.

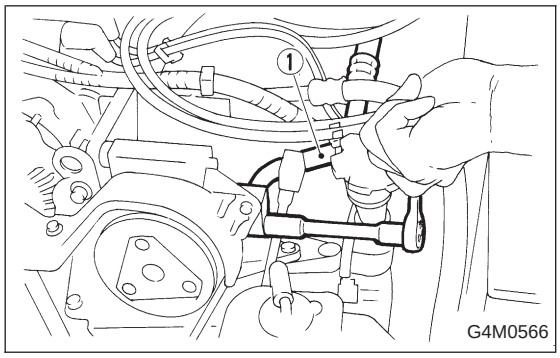


G4M0622

A: REMOVAL

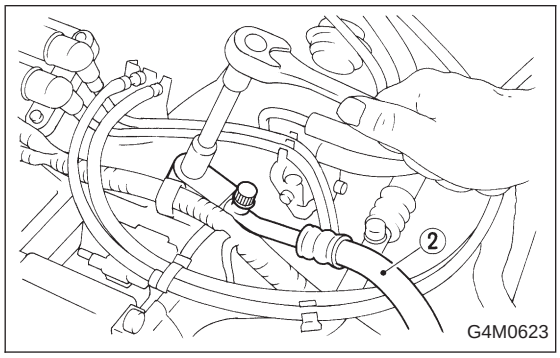
1) Disconnect ground cable from battery.
2) Discharge refrigerant using manifold gauge.
   (1) Fully close low-pressure valve of manifold gauge.
   (2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.
   (3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

CAUTION:
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.



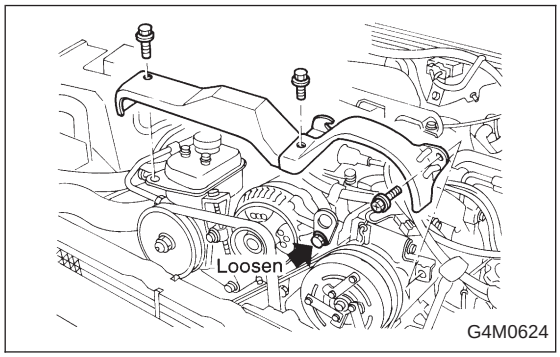
3) Low-pressure hose ① (Flexible hose Ps)

CAUTION:
- **Be careful not to lose O-ring of low-pressure hose.**
- **Plug the opening to prevent foreign matter from entering.**

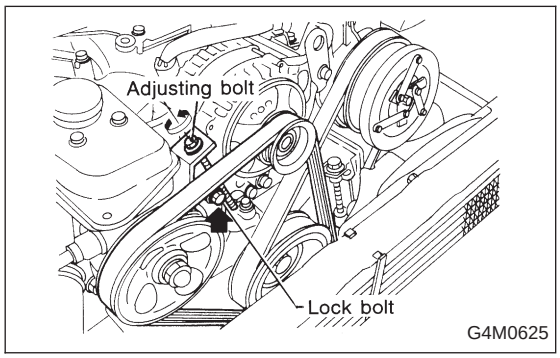


4) High-pressure hose ② (Flexible hose Pd)

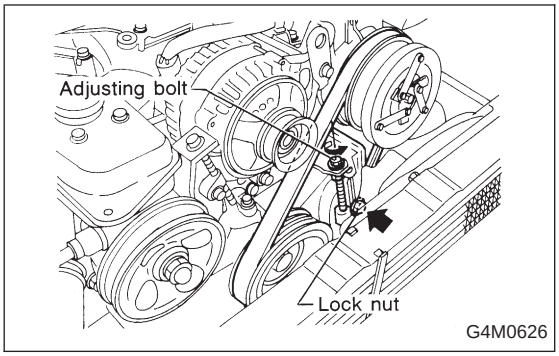
CAUTION:
- **Be careful not to lose O-ring of high-pressure hose.**
- **Plug the opening to prevent foreign matter from entering.**



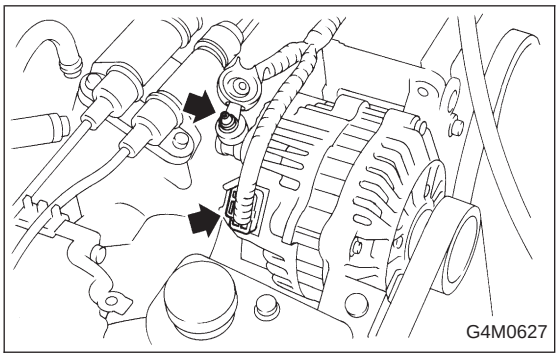
5) Compressor belt cover and generator belt cover
Remove bolts which secure belt covers.



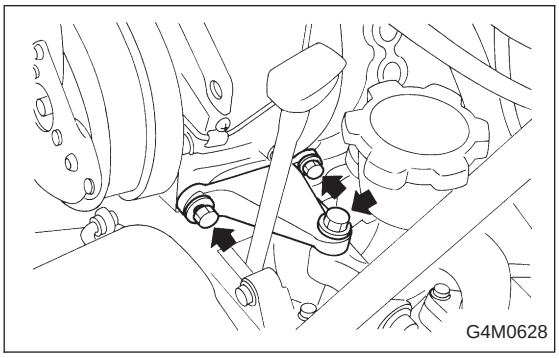
6) Generator V-belt
Loosen lock bolt on generator bracket. Turn adjusting bolt and remove V-belt.



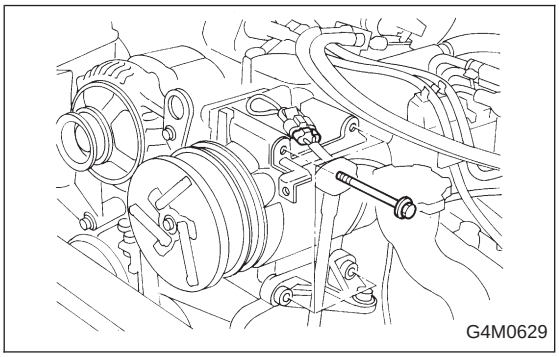
7) Compressor V-belt
Loosen lock bolt on idler pulley. Turn adjusting bolt and remove V-belt.



8) Generator harness

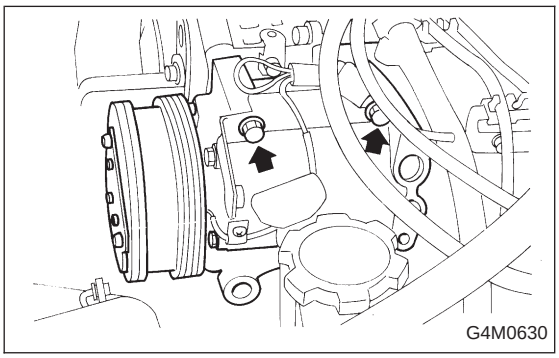


9) Compressor harness
Disconnect compressor harness from body harness.
10) Lower bracket
Remove bolts which secure lower compressor bracket.



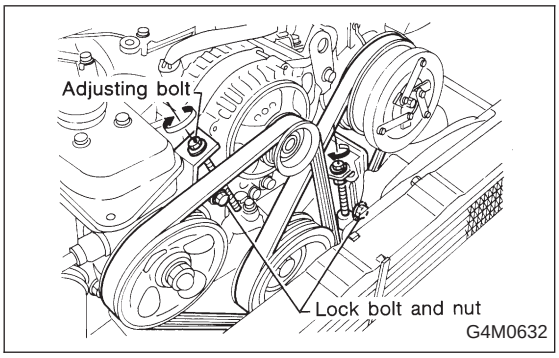
11) Compressor
Remove bolts which secure compressor. Remove compressor from bracket.

B: INSTALLATION



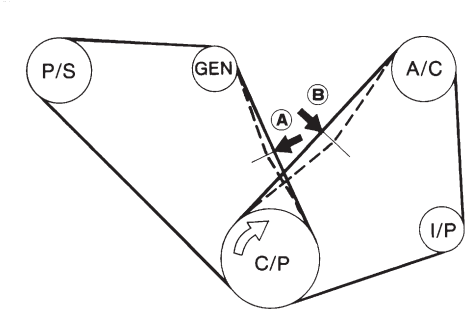
1) Compressor
Install compressor on bracket.

2) Compressor harness
3) Generator harness
4) Compressor V-belt (Rear)
After adjusting belt tension, tighten tension pulley lock bolt securely.



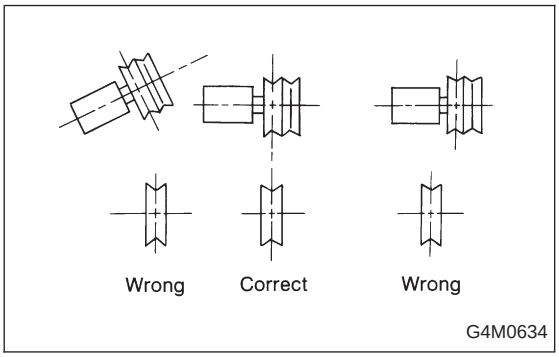
5) Generator V-belt
After adjusting V-belt tension, tighten generator bracket lock bolt securely.

6) Check drive belt tension and adjust it if necessary by changing generator position and/or idler pulley position.

Pulley arrangement	Tension mm (in)/98 N (10 kg, 22 lb)	
	A	B
 G4M0633	*New belt: 7.0 — 9.0 (0.276 — 0.354) Existing belt: 9.0 — 11.0 (0.354 — 0.433)	*New belt: 7.5 — 8.5 (0.295 — 0.335) Existing belt: 9.0 — 10.0 (0.354 — 0.394)

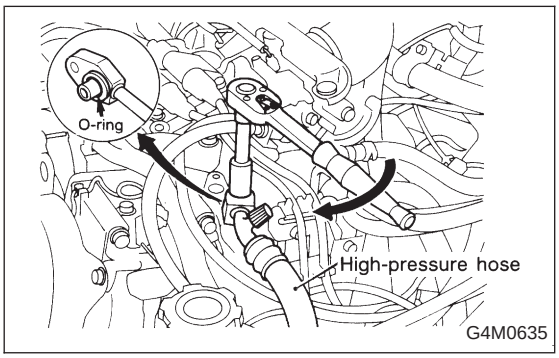
* When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.

Figures in table refer to the number of grooves in pulleys.
C/P : Crankshaft pulley
GEN : Generator pulley
P/S : Power steering oil pump pulley
A/C : Air conditioner compressor pulley
I/P : Idler pulley



G4M0634

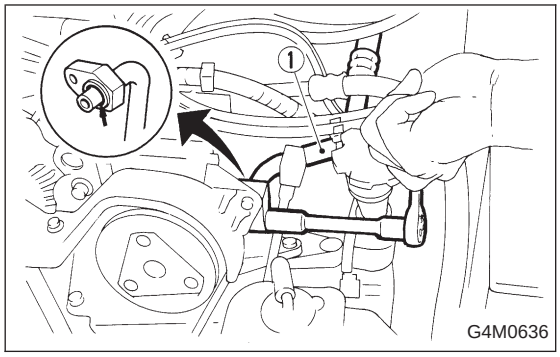
CAUTION:
● Ensure that the V-belt is aligned correctly. If it is not, check for loose bolts.
● The V-belt should not be too tight or too loose.
A belt which is too tight may break bearing or cause gas to leak from the shaft seal. A belt which is too loose slips, thereby causing the belt cut.
● After completing the compressor installation and testing the system operation, check and adjust the tension of both V-belts again.



G4M0635

7) High-pressure hose (Flexible hose Pd)
Connect high-pressure hose with compressor.

CAUTION:
Be sure to apply compressor oil to the periphery of O-ring.



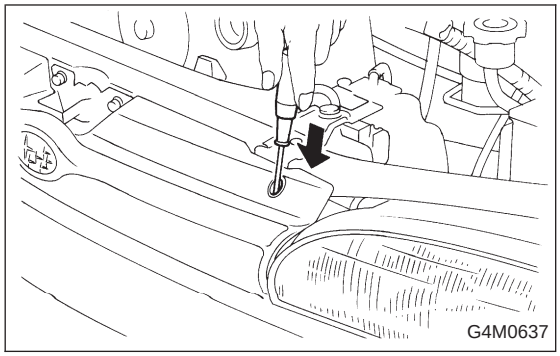
8) Low-pressure hose ① (Flexible hose Ps)
Connect low-pressure hose with compressor.

CAUTION:
Be sure to apply compressor oil to the periphery of O-ring.

9) Install belt cover.

CAUTION:
- **After installing belt cover, make sure it is not misaligned or twisted.**
- **After installing belt cover, check the clearance between pulley and belt cover.**

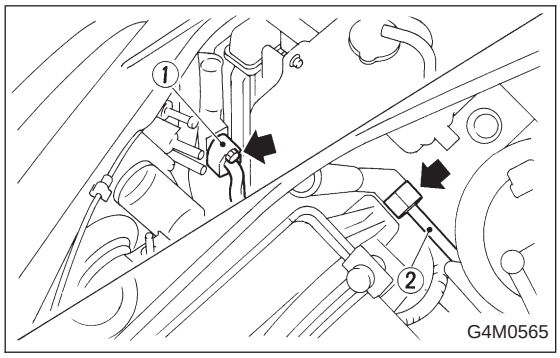
10) Connect ground cable to negative terminal of battery.
11) Charging refrigerant. <Ref. to 4-7 [W700].>


G4M0637

12. Condenser

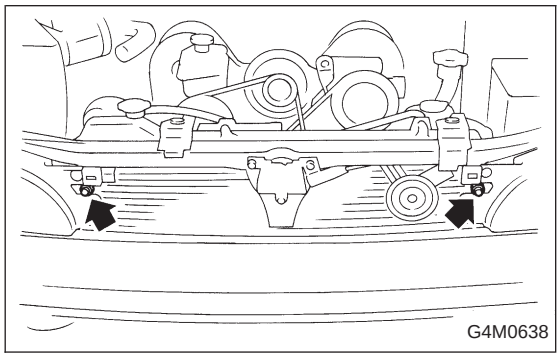
A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Discharge refrigerant from low-pressure side.
3) Remove front grille.

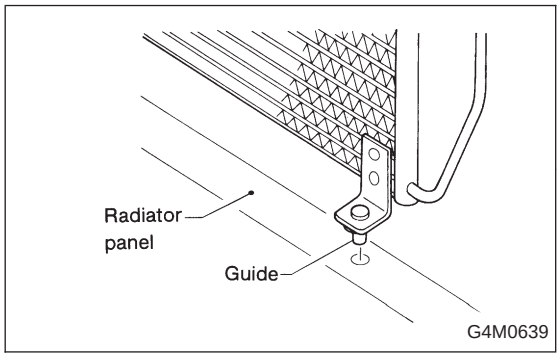


G4M0565

4) Remove the radiator bracket.
5) Disconnect high-pressure hose ① and high-pressure pipe ② from condenser.


G4M0638

6) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.



G4M0639

7) The condenser should be installed in the reverse order in which it was removed.
When installing the condenser, pay attention to the following:

CAUTION:
Before connecting the pipe, be sure to apply oil to the periphery of O-ring.

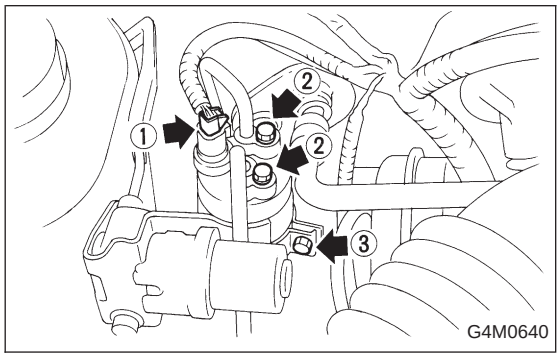
NOTE:
After installing condenser, ensure that guide on lower side of condenser is inserted into hole in radiator panel. Tighten attaching bolts.

B: INSPECTION

1) Make sure the condenser fins are free from dust and insects. If the fins are clogged, clean by blowing air or water through them.

NOTE:
To prevent dust and water from getting into the condenser, this work must be done when the condenser is installed in an actual vehicle.

2) Check the condenser to see if it shows any sign of oil seepage. Should oil ooze or gas leak from the condenser replace it with a new one.



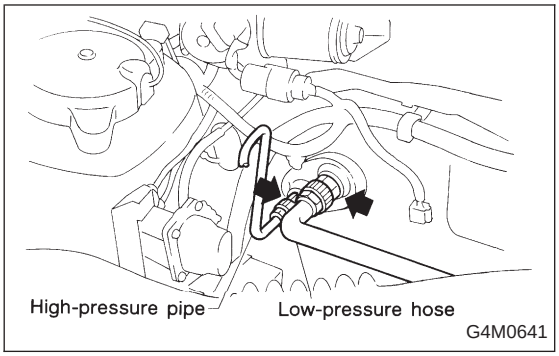
13. Receiver Drier

A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Discharge refrigerant.
3) Disconnect pressure switch harness ①.
4) Disconnect pipes ②.
5) Remove mounting bolt ③ and remove receiver drier.

CAUTION:
The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

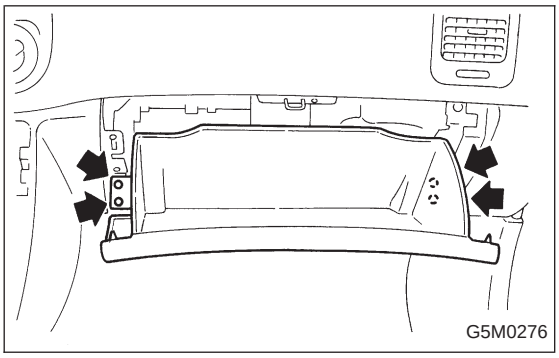
6) Install the receiver drier in the reverse order of removal.



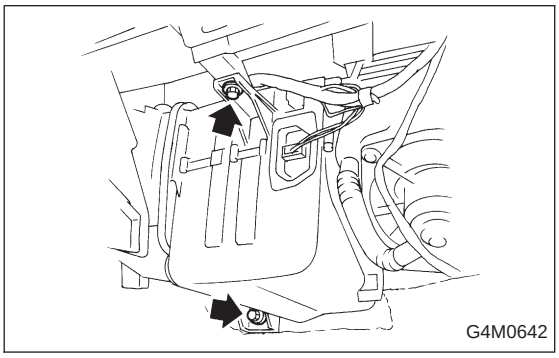
14. Evaporator

A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Discharge refrigerant.
3) Disconnect discharge pipe, suction pipe and grommets.

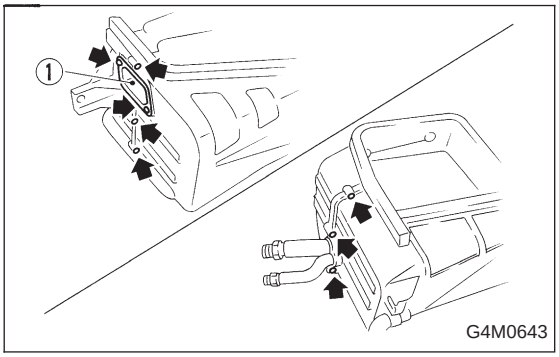


4) Remove glove box.

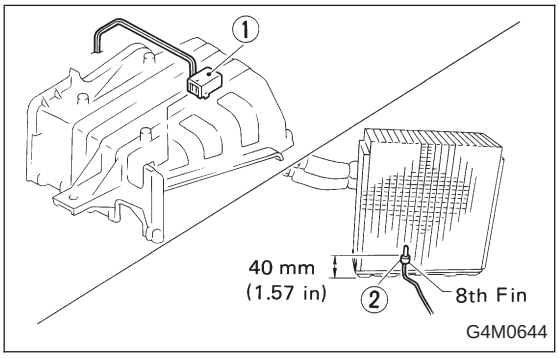


5) Disconnect the harness connector from evaporator.
6) Disconnect drain hose.
7) Remove evaporator mounting bolt and nut.
8) Install the evaporator in the reverse order of removal.

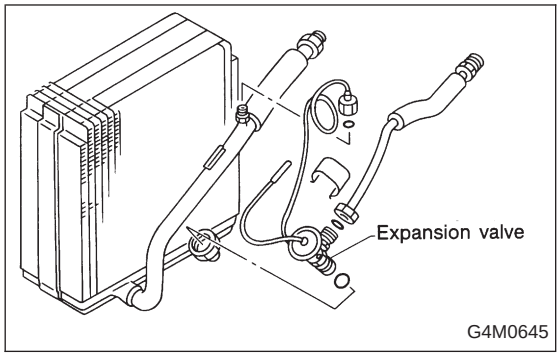
B: DISASSEMBLY AND ASSEMBLY



1) Remove resistor assembly ① and remove six screws from evaporator case.



2) Remove thermostat ① from upper case. (Thermistor ② is inserted into specified evaporator fin position.) When installing thermostat, be sure to insert thermistor into specified fin position.

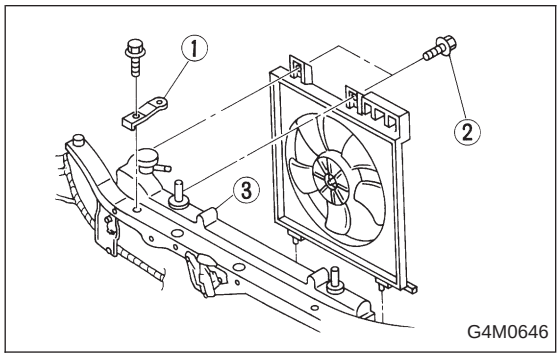


3) Disconnect the connection between the expansion valve and pipe from receiver drier.
4) Remove the expansion valve from pipes.
5) To install expansion valve, reverse removal procedures. Properly wrap capillary tube of expansion valve with seal.
6) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

CAUTION:
Water must never be used to clean the evaporator.

7) Check parts that have been removed for cracks or scratches, and repair or replace them with new ones, if necessary.
8) Reassemble the evaporator in the reverse order of disassembly.

NOTE:
Confirm that the O-ring is inserted in the specified position.



15. Condenser Fan Assembly

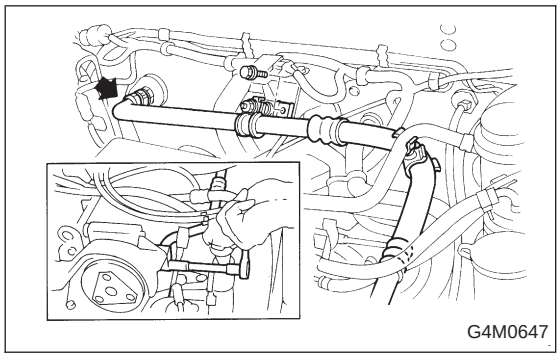
A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Disconnect harness connector from fan motor.
3) Remove radiator bracket (RH) ① and remove condenser fan bolt ② from radiator ③.
4) Pull condenser fan assembly.
5) Install the condenser fan assembly in the reverse order of removal.

16. Flexible Hose

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

(1) The flexible hoses should be free from twists and tension after they have been connected.
(2) The flexible hoses must not be bent or twisted forcibly.

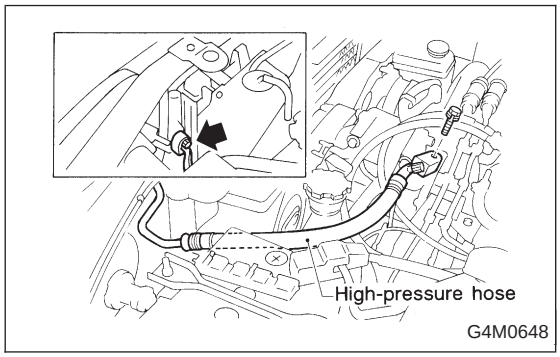

G4M0647

A: REMOVAL

1) Disconnect battery negative terminal.
2) Discharge refrigerant.
3) Remove low-pressure hose.
   (1) Remove hose attaching bolts.
   (2) Remove hose clip.

CAUTION:
Plug the opening to prevent foreign matter from getting in.

   (3) Disconnect the connector at evaporator unit.



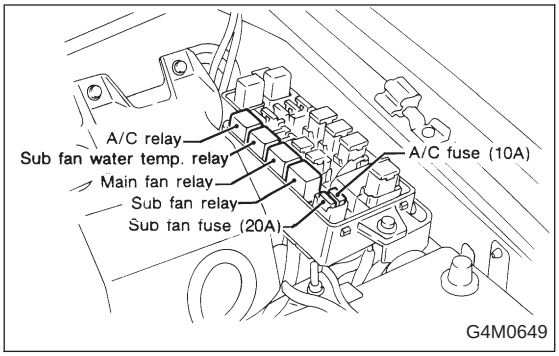
G4M0648

4) Remove high-pressure hose.
   (1) Disconnect hose attaching bolt (compressor side).
   (2) Disconnect hose attaching bolt (condenser side).

CAUTION:
Plug the opening to prevent foreign matter from getting in.

B: INSTALLATION

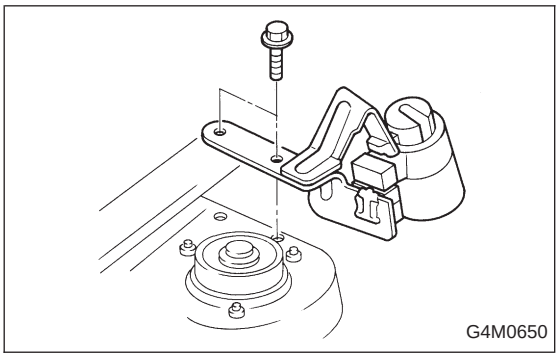
Installation is in the reverse order of removal.



17. Relay and Fuse

A: LOCATION

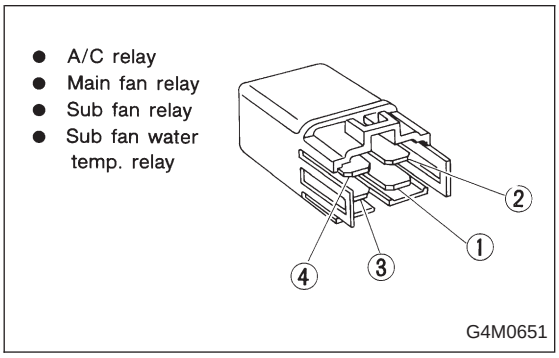
Relays used with A/C system are located as shown in figure.
1) A/C relay
2) Main fan (radiator fan) relay
3) Sub fan (condenser fan) relay
4) Sub fan (condenser fan) water temperature relay
5) Fuses (10 A and 20 A)

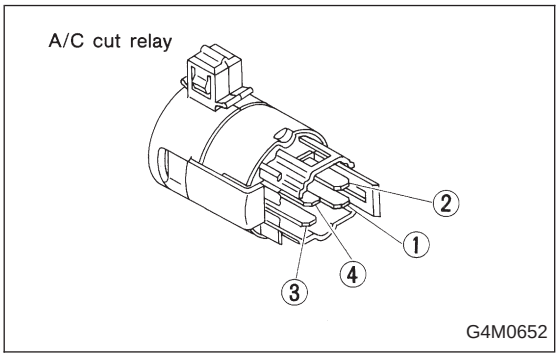


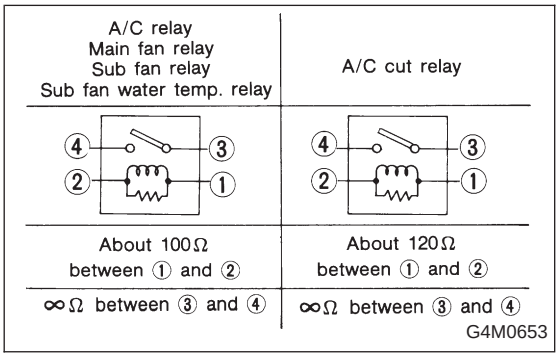
6) A/C cut relay
A/C cut relay is attached by a bolt to top of front suspension bracket (RH) via a bracket.

B: INSPECTION

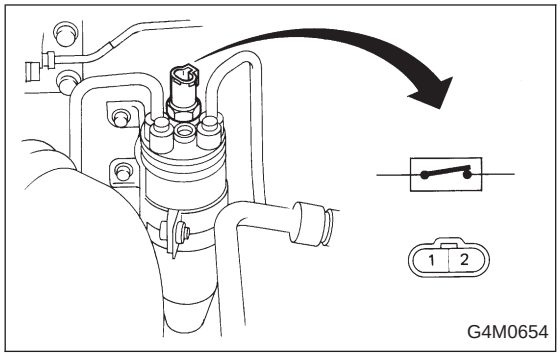
1) Check conduction with a circuit tester (ohm range) according to the following table in figure.







2) Replace relays which do not meet specifications.



18. Pressure Switch (Dual Switch)

Pressure switch is attached to receiver dryer. It has two built-in switches.

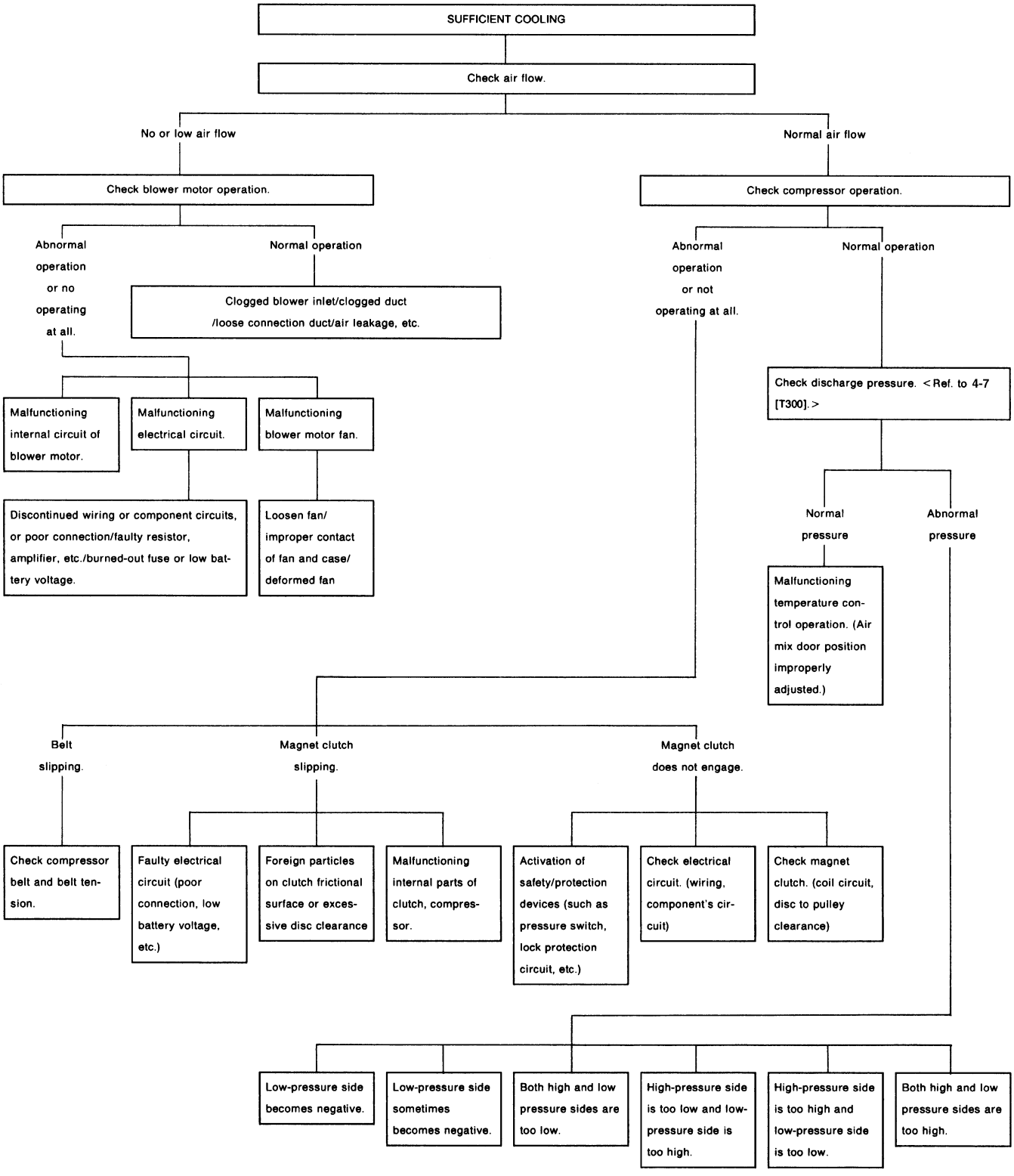
- High and low pressure switch

A: INSPECTION

1) Remove cap from high-pressure line service valve, and connect gauge manifold to service valve.
2) Disconnect pressure switch harness connector, and check pressure switch for proper ON-OFF operation. Use a circuit tester.

	Terminal	Operation	High-pressure side line pressure kPa (kg/cm^2, psi)
High and low pressure switch	① — ②	Turns OFF.	Increasing to 2,648±196 (27±2, 384±28)
			Decreasing to 176±20 (1.8±0.2, 25.5±2.8)
		Turns ON.	Increasing to 186±29 (1.9±0.3, 27.0±4.2)
			Decreasing to 2,059±196 (21±2, 299±28)

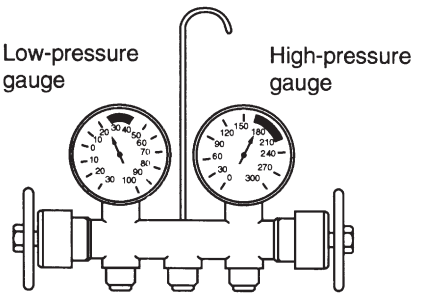
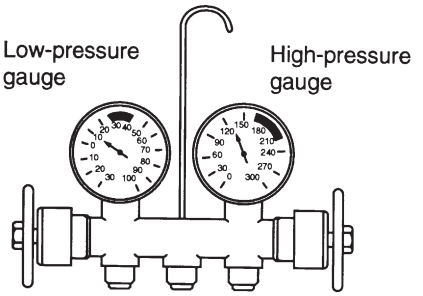
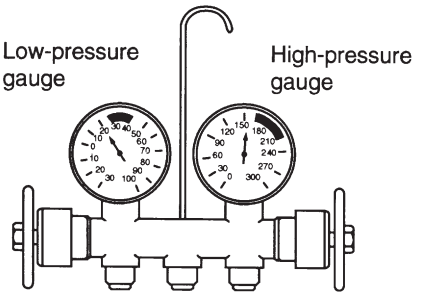
1. Air Conditioning System Diagnosis

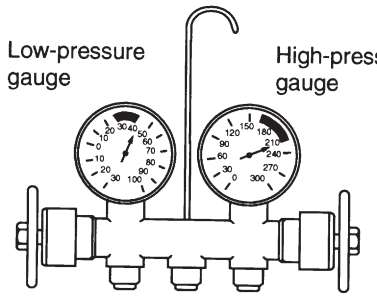
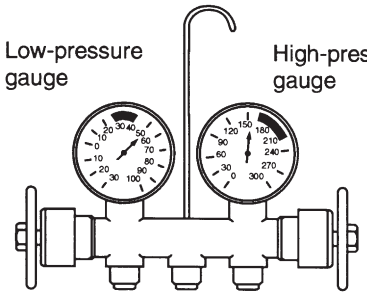
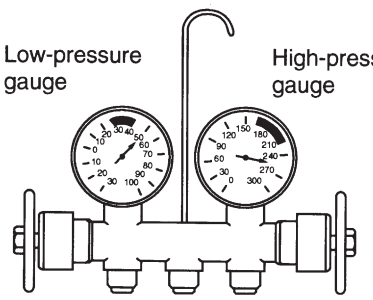
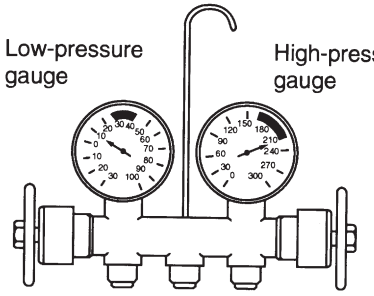


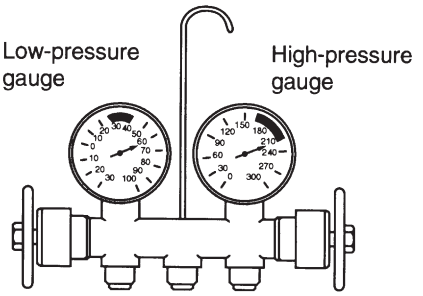
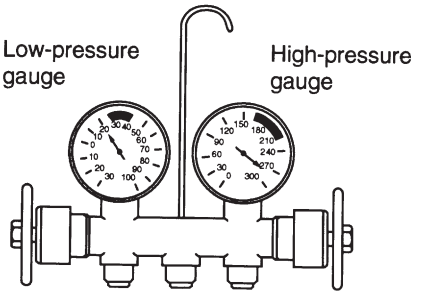
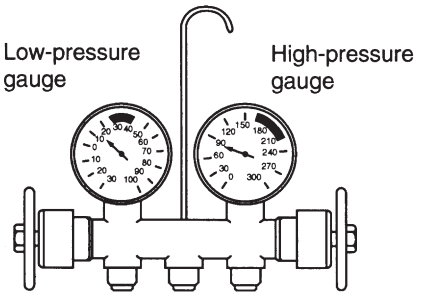
EPA0115

2. Performance Test Diagnosis

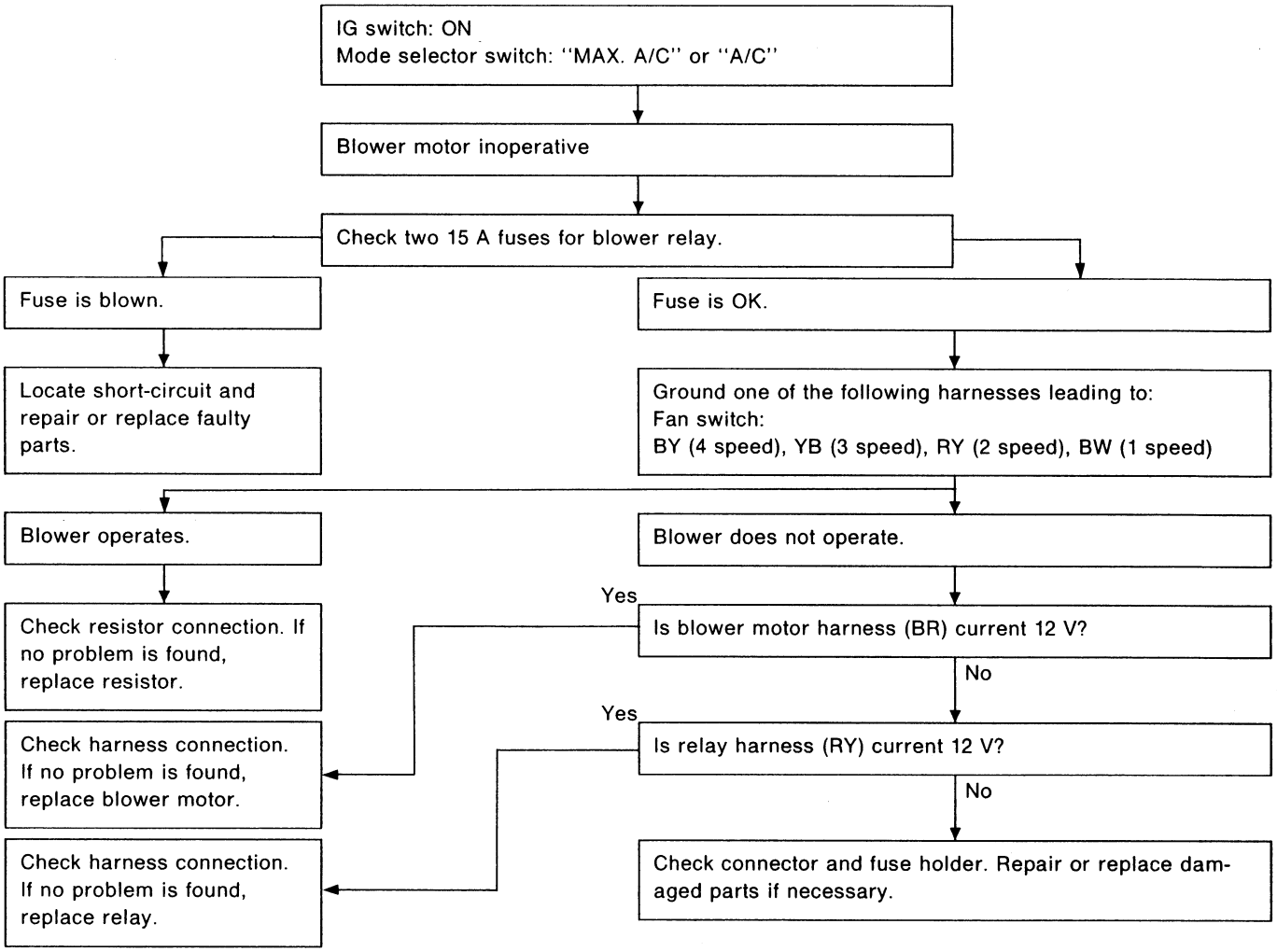
If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.
As to the method of a performance test, refer to the item of “Performance Test”.
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition		Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  G4M0673	Insufficient cooling.	Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. **Evacuate, as necessary, and recharge system.**
ALMOST NO REFRIGERANT  G4M0674	No cooling action.	Serious refrigerant leak.	**Stop compressor immediately.** 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
FAULTY EXPANSION VALVE  G4M0675	Slight cooling. Sweating or frosted expansion valve inlet.	Expansion valve restricts refrigerant flow. ● Expansion valve is clogged. ● Expansion valve is inoperative. Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

Condition		Probable cause	Corrective action
 G4M0676  G4M0677	Insufficient cooling. Sweated suction line. No cooling. Sweating or frosted suction line.	Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.	Check valve for operation. If suction side does not show a pressure decrease, replace valve. 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.
AIR IN SYSTEM  G4M0678	Insufficient cooling.	Air mixed with refrigerant in system.	1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
MOISTURE IN SYSTEM  G4M0679	After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 39 kPa (0.4 kg/cm^2, 6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30 minute evacuating three times.) 4. Recharge system.

Condition		Probable cause	Corrective action
FAULTY CONDENSER  G4M0680	No cooling action. Engine may overheat. Suction line is very hot.	Condenser is often found not functioning well.	• Check condenser cooling fan. • Check condenser for dirt accumulation. • Check engine cooling system for overheat. • Check for refrigerant overcharge. **If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.**
HIGH-PRESSURE LINE BLOCKED  G4M0681	Insufficient cooling. Frosted high-pressure liquid line.	Drier clogged, or restriction in high-pressure line.	1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
FAULTY COMPRESSOR  G4M0682	Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

3. Blower Motor Diagnosis



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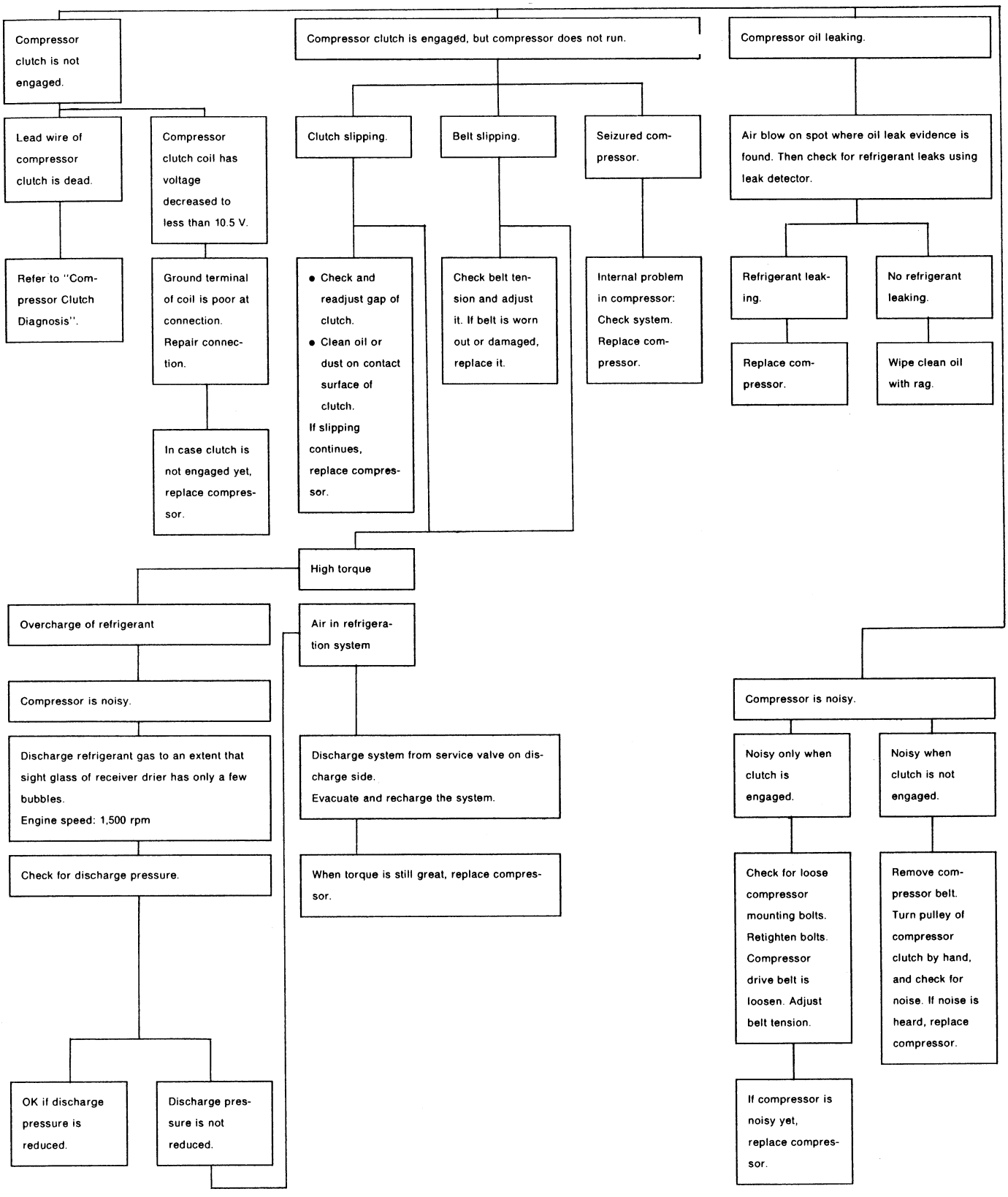
4. Compressor Diagnosis



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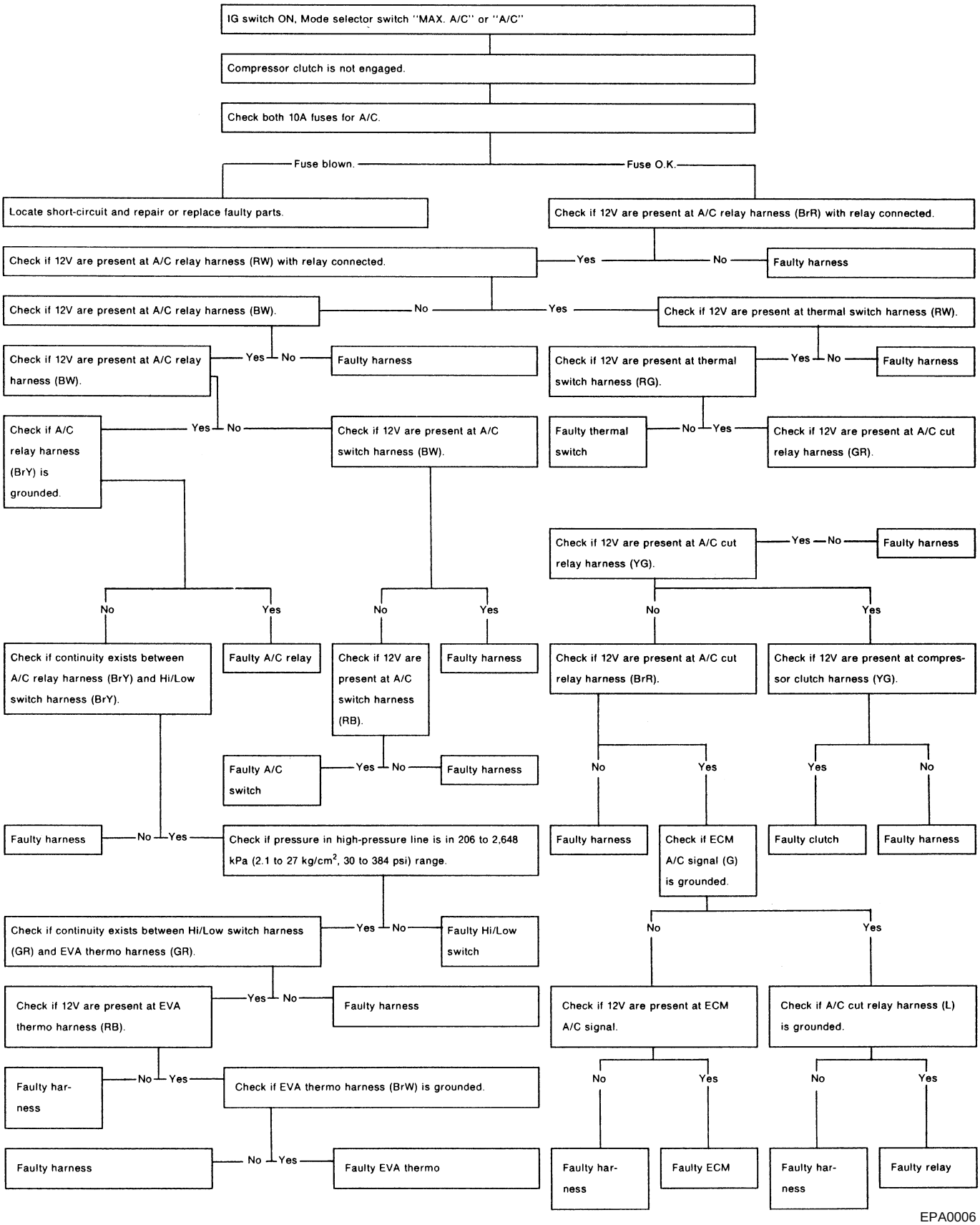
5. Compressor Clutch Diagnosis



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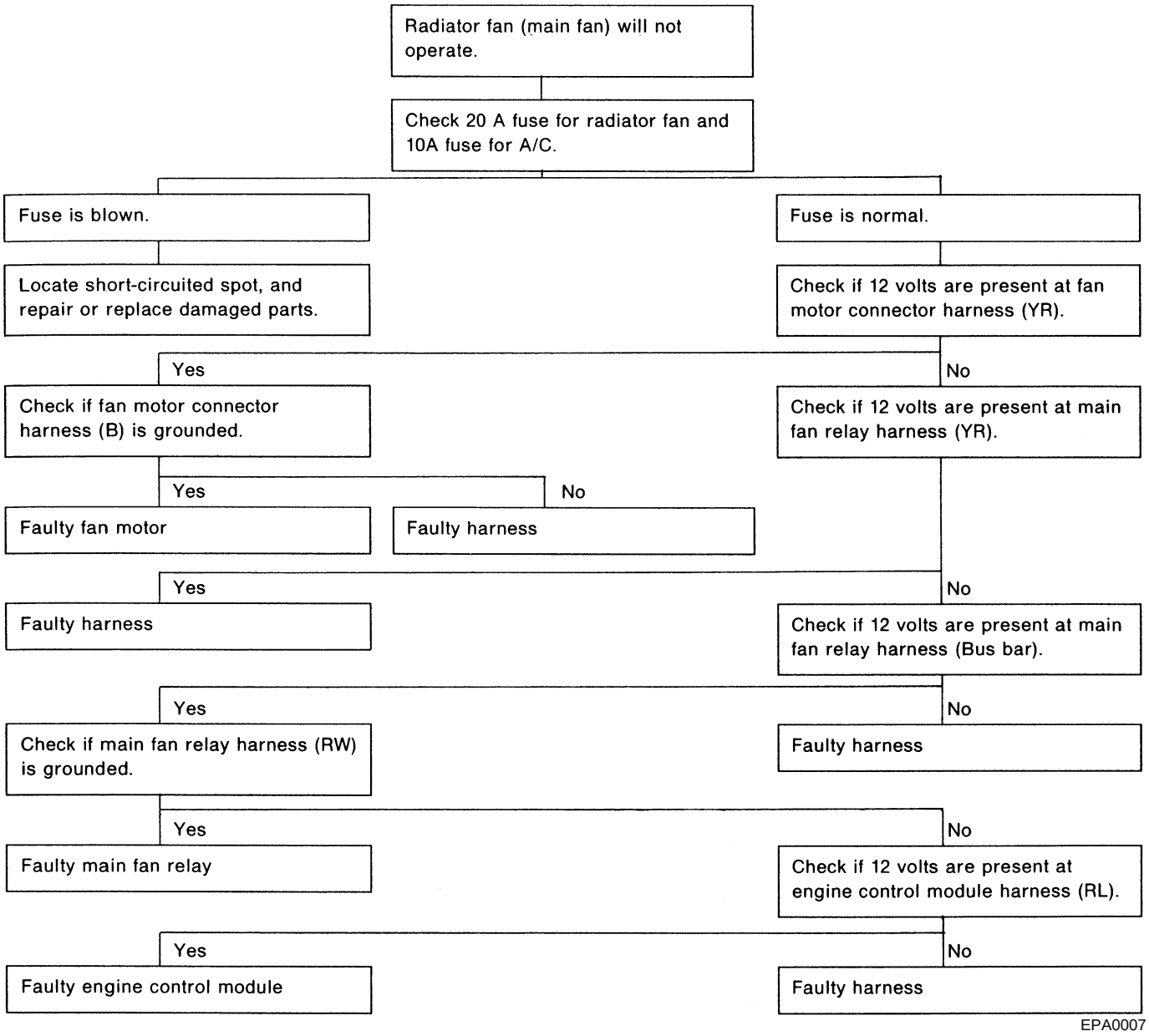
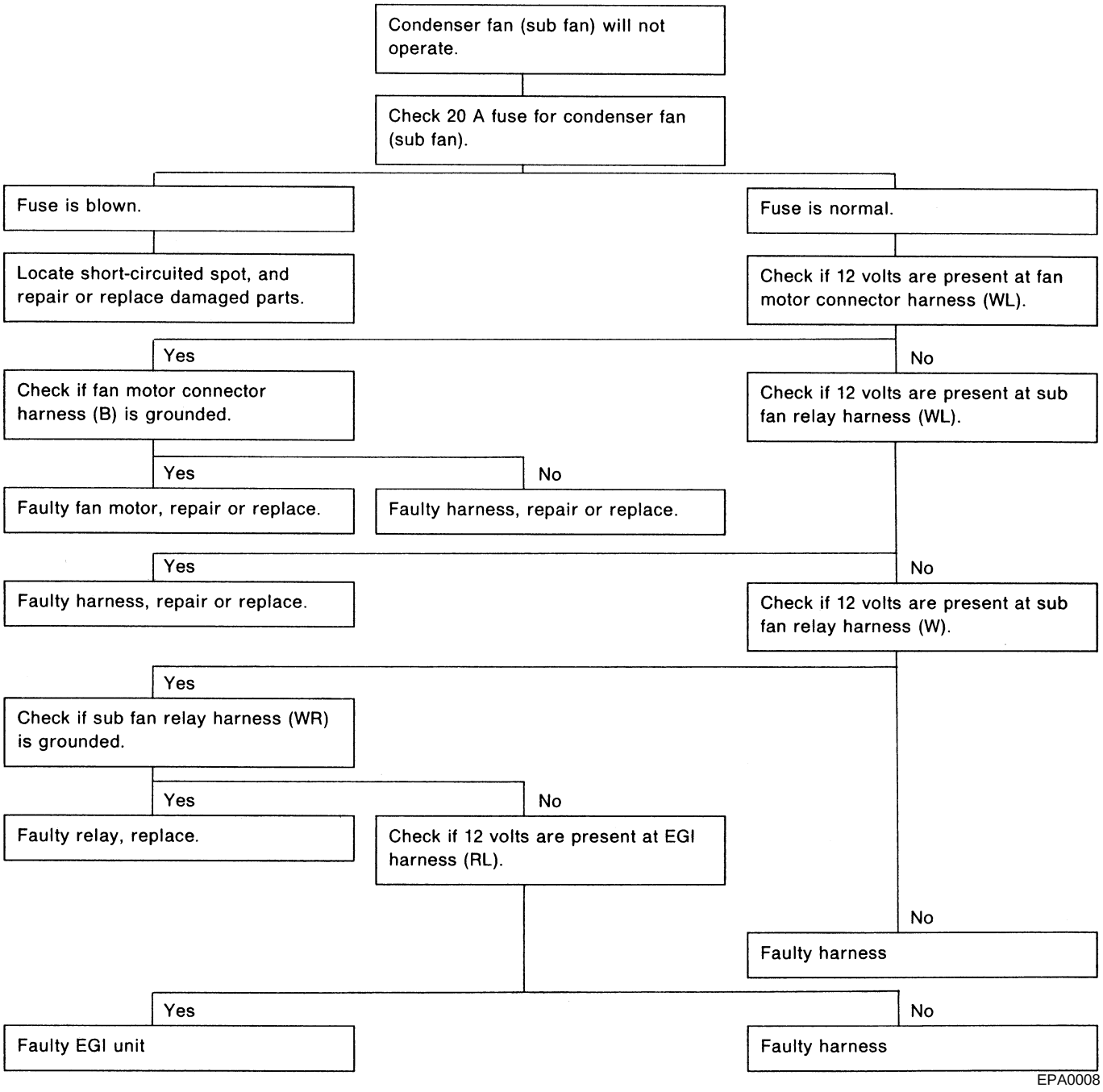
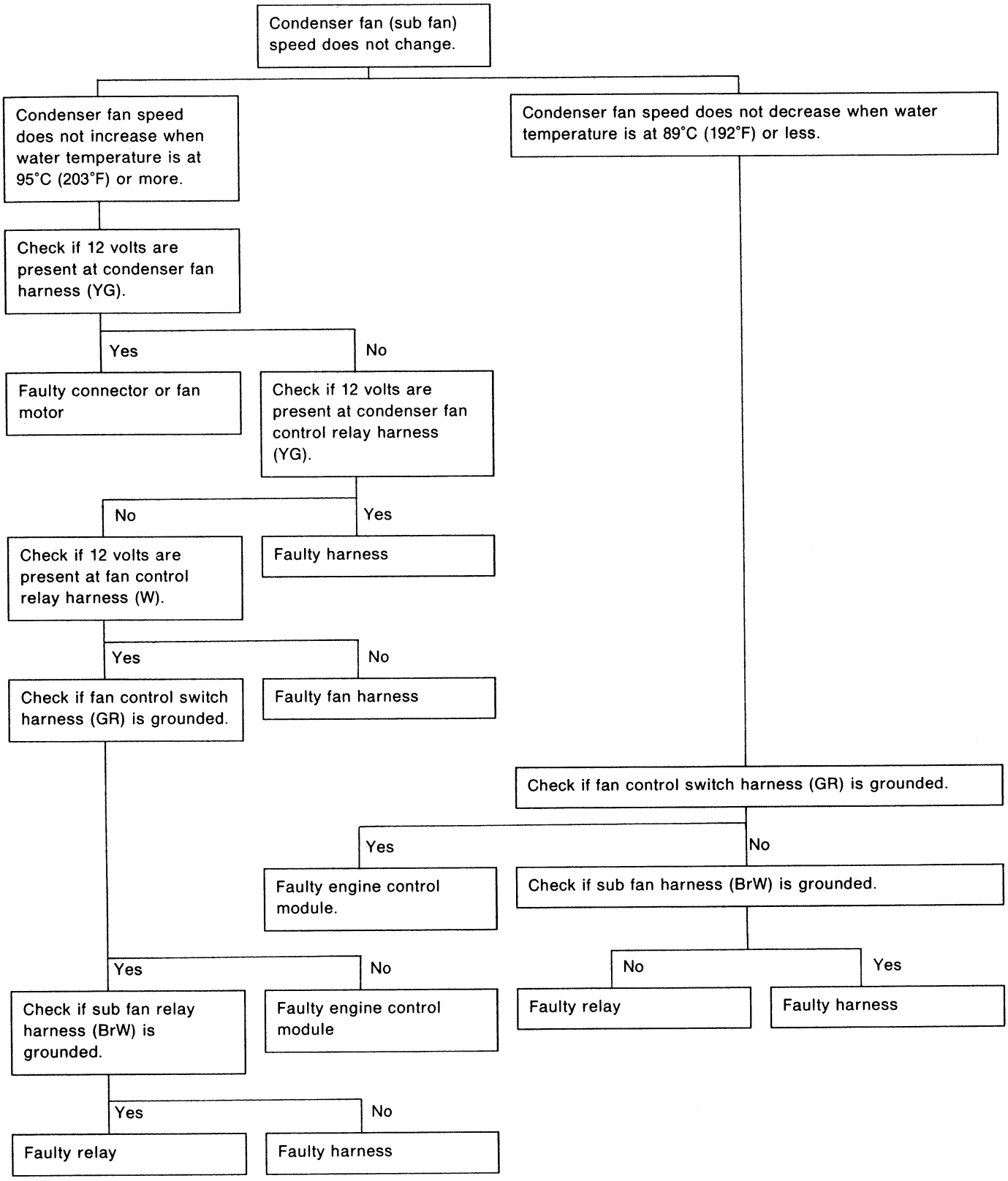
6. Radiator Fan (Main Fan) Diagnosis



7. Condenser Fan (Sub Fan) Diagnosis (I)



8. Condenser Fan (Sub Fan) Diagnosis (II)



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