UNIT – 3 Heater and air-conditioner trouble shooting.

Troubleshooting and Solutions

A/C system is noisy

The noise heard when the A/C system is first turned on is not due to a defect. In the event of persistent noise, check for the presence of one of the following malfunction causes and apply the corresponding solution.

CAUSE	SOLUTION
1. Belt worn or slipped	1. Check the wear and tension of the belt.
2. Belt idler pulley is noisy	2. Replace it.
3. Electric clutch plate slipping	3. Make sure that the distance between the compressor pulley and electric clutch is 0.3-0.5mm.
4. Vibration and resonance of the compressor support plate.	4. Make sure the bolts are tight and the plate is properly positioned.
5. Expansion valve “whistles”.	5. If the noise persist, replace the valve.
6. Noise caused by hoses or other parts rattling against other components in the engine compartment.	6. Check the routing of the hoses, support brackets, etc., to pinpoint the noise.

Few defective components of the A/C system create an incorrect inlet and outlet pressure. This causes noise in the compressor that is actually due to one of the causes listed below and NOT to the compressor itself.

- Incorrect amount of refrigerant (30-35% more or 70-75% less).
- Expansion valve stuck shut or blocked.
- Compressor displacement regular valve defective (for variable-displacement compressors only).
- Clogging in the A/C system circuit.
- Filter saturated with moisture.

A/C system emits unpleasant smell

Under certain conditions, moulds and bacteria (normally present in the air) may form on the surface of the evaporator core, causing an unpleasant smell inside the vehicle. Besides smelling bad, it can be unhealthy to breathe.

- Various chemicals and antibacterial can be sprayed on the evaporator directly or through the blower ducts or air intake. Many replacement evaporators have a special chemical coating that inhibits the growth of mold and bacteria. The drainage tubes that carry condensation away from the evaporator

should also be inspected and cleaned.

- Advise the customer to turn off the A/C system a few minutes before shutting off the vehicle, leaving the blower fan running (this will dry the evaporator core from the moisture that encourages bacteria growth).

The condenser does not dissipate enough heat (overheated condenser)

CAUSE	SOLUTION
1. Air flow blocked by dirt accumulated on the heat exchangers; water radiator, condenser.	1. Clean the radiator and condenser throughly.
2. The pressure switch or water temperature bulb are not tripped at the correct pressure and temperature levels.	2. Cut out the controls using the appropriate electrical connection. Replace the defective part if necessary.
3. The electric fan does not work	3. Power the electric fan directly. Replace if it still does not work.
4. Incorrect functioning by the electric fan (incorrect rotation direction).	4. The fan must be “suction” type when placed between the heat exchangers and the engine, and “blowing” type if placed between the heat exchangers and outside air intake.
5. Engine water overheated	5. Make sure the original engine cooling system is working properly.
6. Condenser not positioned correctly.	6. Make sure that the distance between the radiator and condenser is 15-20mm, if present the air ducts must be correctly positioned.

Incorrect amount of refrigerant. Air or incondensable gases or moisture in the A/C system

CAUSE	SOLUTION
1. Incorrect refrigerant amount (30-35% excessive or 70-75% lack). 2. Contaminated refrigerant. 3. Filter saturated with moisture.	1. Recover refrigerant from the A/C system. 2. Replace the A/C filter (if filter is saturated with moisture). 3. Evacuate the incondensable gases and moisture from the A/C system. Run the vacuum pump for at least 30 minutes. 4. Check the vacuum seal using a pressure gauge control. 5. Charge the recommended amount of refrigerant to the system as well as any oil recovered together with the refrigerant.

Compressor displacement regulator valve defective (only for variable-displacement compressors)

CAUSE	SOLUTION
1. Valve blocked by impurities (the evaporator tends to freeze) 2. Regulator springs of the valve improperly set	1. Recover refrigerant from A/C system. 2. Replace the displacement regulator valve located in the compressor rear cover. 3. Evacuate the incondensable gases and moisture from the A/C system by letting the vacuum pump run at least 15 minutes. 4. Restore the recommended amount of refrigerant to the system as well as any oil recovered together with the refrigerant.

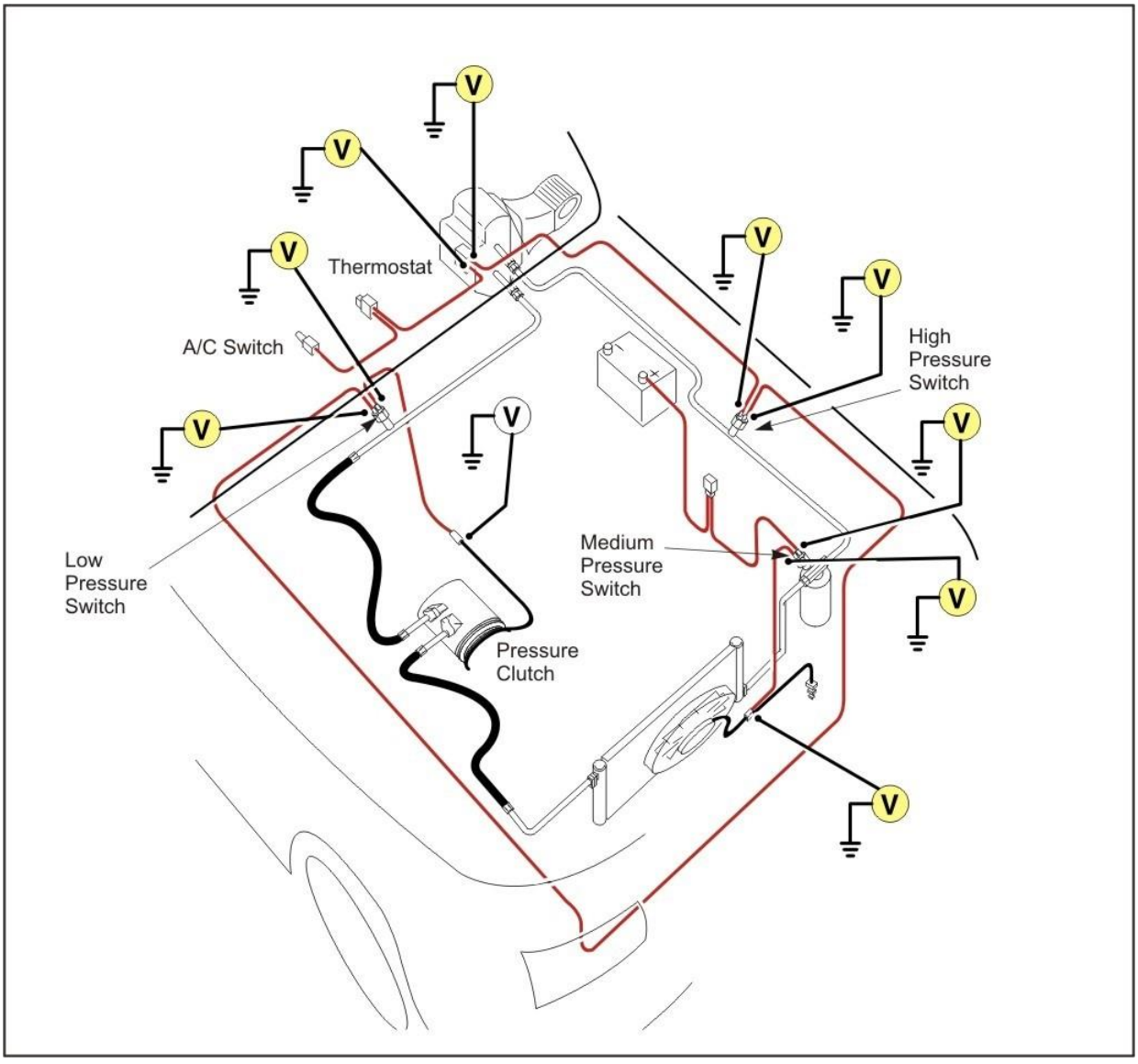
Expansion Valve Defective

CAUSE	SOLUTION
1. Thermostatic capillary of the valve is defective. 2. Mechanics of the valve are jammed.	1. Recover refrigerant from the A/C system. 2. Replace the expansion valve. 3. Evacuate the incondensable gases and moisture from the A/C system by letting the vacuum pump run for at least 15 minutes. 4. Charge the recommended amount of refrigerant to the system as well as any oil recovered together with the refrigerant.

The Electric Compressor Clutch Slips or Does Not Engage

Note: For valves equipped with automatic control (ECC), go to self-diagnostic or software control.

CAUSE	SOLUTION
1. Shortage of refrigerant (70-75% lack)	1. Search for the refrigerant leak
2. Electric clutch coil de-energized or intermittent energized	2. Disconnect the electrical clutch wire from the electrical system and connect it to the positive pole of the battery using a 7.5A fuse. If the clutch does not engage, it must be replaced. if it does engage, check the pressure switch, thermostat, A/C control switch, and miscellaneous electrical connections.
3. Incorrect distance between compressor pulleys and electric clutch plate.	3. The distance must be between 0.3-0.5mm



Ice on the Evaporator Core

Note:

- This may occur even after a few minutes of operation, causing a progressive drop in the air flow at the vents.
- For valves equipped with automatic control (ECC), go to self-diagnostic or software control.

CAUSE	SOLUTION
1. Malfunction by the thermostat or “no-frost” probe (if present).	1. Make sure the electrical connection of the thermostat or of “no-frost” probe is in good condition, and that the sensor is properly positioned. Replace any defective parts as needed.
2. Malfunction by the blower fan	2. With the A/C system running, at least the first ventilation speed must work. Otherwise, make sure the electrical system is properly connected.
3. Compressor displacement regulator valve is defective (only for variable displacement compressors).	3. Check the operation of the compressor displacement regulator valve.

Compressor Damaged

CAUSE	SOLUTION
1. Valves bent 2. Seizing	1. Recover refrigerant from A/C system. 2. Replace the compressor from A/C system. 3. If the compressor is seized, flush the A/C system using a specific product and replace the dehydrator filter. 4. Install a new compressor. 5. Evacuate the incondensable gases and moisture from the A/C system by letting the vacuum pump run at least 30 minutes. 6. Restore the recommended amount of refrigerant to the system as well as any oil recovered together with the refrigerant.

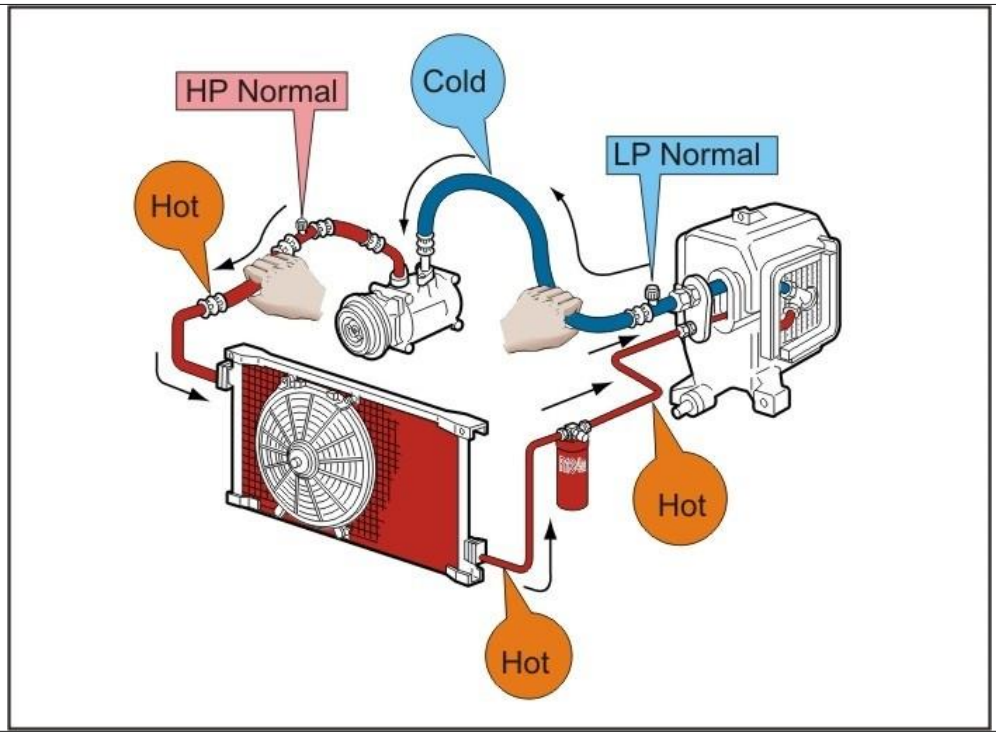
Hot Air Infiltrated in the Passenger CompartmentHot Water Infiltrated in the Heater

CAUSE	SOLUTION
1. The water valve of the heater (if present) does not close properly.	1. Check the lever mechanisms and/or valve control motor. Cut out the heater if necessary.
2. The air mixing and/or re-circulating flaps are not perfectly sealed.	2. Check the lever mechanisms and/or valve control moto

A very useful diagnostic aid is the “Feel Test”. As the test implies it is a matter of quite simply feeling tubes and components for temperature drops, indicating possible blockage location.

By this stage you would be aware of what side of the A/C system should be hot and what side should be cold. But what also happens with the pressure gauge reading, sometimes they don’t make sense.

The location of the charging ports in relation to the A/C system MUST be taken into consideration. A pressure gauge reading could be high or low depending on what side of the charge port the blockage is located. Use the “Feel Test” as well as the pressure gauges readings.

Normal System **HIGH SIDE - Hot** **LOW SIDE - Cold**	

METHODS OF REFRIGERANT LEAK DETECTION

One of the most difficult areas of sealed system servicing can be trying to find a refrigerant leak. The leak may exist within a series of tubing that may be up to hundreds of feet long or in a component that is not readily accessible or may even be, totally concealed. It could be in an operating or safety control such as a pressure switch or possibly right under your nose and you wouldn’t even suspect it. As we all know, refrigerant leak detection can sometimes be a serviceman’s nightmare. Having the proper test equipment is at least half of the battle. Unfortunately there are so many methods of leak detection and so many types of test equipment and unfortunately, not just one fits every situation. Decisions need to be made as to the method used and the type of equipment needed for every leak you need to find.

The sole purpose of this section is to help make you aware of the different methods available and to help you decide on which method is most appropriate to use in different situations.

All of these conditions make leak testing one of the most challenging tasks faced by service technicians today. The newer EPA rules are now requiring service technicians to find leaks that are excessive of the law, thus not allowing technicians the choice of just adding refrigerants every so often to keep the system in operation. Add to this the cost of refrigerants today and it became imperative that refrigerant leaks must now be found.

As you know, there are several methods used to find leaks. Some of the most popular are methods are listed below. They are not in any particular order because each leak is unique to the situation at large.

LEAK DETECTOR:-

A tester that can detect leakage of refrigerant gas is called a leak detector.

To locate gas leakage points, an important point is “to search with patience”. No matter how precise may be, gas leakage may be missed unless searched for carefully and thoroughly, especially in the case of gas leakage of a degree where more than ten days will

have to elapse before it can be felt that the cooling has become somewhat bad. All connection, rotating parts, welded places, and the like must be searched with greatest care; otherwise it will not be founded.

There are the following types of gas leak detectors:

- Halide torch type leak detector.
- Electric leak type detector.

The method most widely used at present is to detect leak by using a halide torch leak detector. By this method, it is possible to detect leaks small enough to make cooling capacity insufficient within one season.

Use of an electric leak tester has recently grown. With this type of apparatus, it is possible to detect leaks about 1/15 the size that can be detected by the halide torch type.

HALIDE TORCH TYPE LEAK DETECTOR:

The use of a halide leak detector (see illustration below) is the most positive method of detecting leaks in a refrigerant system using halogen refrigerants (R-12, R-22, R-11, R-502, etc.). Such a detector consists essentially of a torch burner, a copper reactor plate, and a rubber exploring hose.

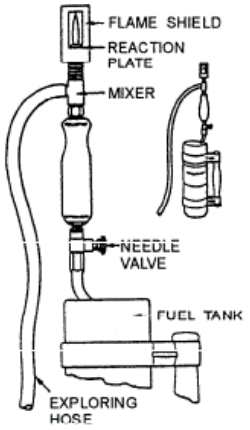


Figure 6-54.—Halide leak detector.

Detectors use acetylene gas, alcohol, or propane as a fuel. A pump supplies the pressure for a detector that uses alcohol. If a pump-pressure type of alcohol-burning detector is used, be sure that the air pumped into the fuel tank is pure.

An atmosphere suspected of containing a halogen vapor is drawn through the rubber exploring hose into the torch burner of the detector. Here the air passes over the copper reactor plate, which is heated to incandescence. If there is a minute trace of a halogen refrigerant present, the color of the torch flame changes from blue (neutral) to green as the halogen refrigerant contacts the reactor plate. The shade of green depends upon the amount of halogen refrigerant; a pale green color shows a small concentration and a darker green color, a heavier concentration. Too much of a halogen refrigerant causes the flame to burn with a vivid purple color. Extreme concentrations of a halogen refrigerant may extinguish the flame by crowding out the oxygen available from the air.

A halide torch is an inexpensive leak detector that is fast and reliable, but can only be used to detect chlorinated refrigerants. It can be used to detect leaks as small as ½ ounce per year.

A halide torch works on the principle that air is drawn over a copper element heated by a hydrocarbon fuel. If halogenated refrigerant vapours are present, the flame changes from blue pictures of halide torch colour to a bluish green colour.

It is not as sensitive as electronic leak detectors and is somewhat awkward and could be dangerous because of the open flame.

The main component of the halide torch detector is:

- Cylinder
- Valve Body
- Suction Tube
- Nozzle
- Flame Nose

- Combustion Tube

GAS LEAK DETECTING METHOD:

- Check the cylinder to see that it contains gas (propane gas) and then screw on the cylinder to the valve body. When screwed on tight, the inside valves in the cylinder tip opens and the places the gad in the stand to flow out. Turning the handle counter clockwise at this time will allow the gas to discharge.

- To ignite, insert lighted match or lighter through combustion tube ignition hole and turn the hand counter clockwise.

- Adjust the valve opening so that the flame length will be between the upper line and lower line. If the flame is made longer than the upper limit, it will make only the combustion tube hotter, and will also prevent detecting small refrigerant gas

- Leakage. To smaller the flame, the more sensitive it will be against leaks.

- After adjusting the flame length, slowly bring the suction tube tip near to the places where leaks are most likely to occur and watch for change in flame colour.

Therelationship between flame colour and degree of refrigerant leakage is shown below. When checking for leakage, always hold the leak detector vertically.

ELECTRIC TYPE LEAK DETECTOR:

The electric leak detector consists of amplifier and detector. This detector can detect negligible 20g per year flow of gas with a high degree of reliability. An alarming buzzer and lamp indicate leak.

PREPARATION BEFORE USE:

- Connect the detector code to the plug receptacle on the back of the amplifier body. Then connect the source code to the 12v battery of the vehicle.

- Preheat the detector for about ten minutes with the “selector” set at “stand by”

position and power switch on.

- Operate the detector by setting the “selector” at check position. Then check the

buzzer and alarm light using test liquid.

- The test liquid beings to leak when the cap is the removed. Bring the aspirator close to the liquid and make sure the busser and alarm light operate normally.

- When the buzzer or alarm light does not operate, adjust the “alarm setting dial”. The sensitive decreases when the dial is turn to “0” and increases when turned to “10”. Do not turn the dial more than one scale mark at a time. Turn one scale at a time and wait 20 second each time before testing.

GAS LEAK DETECTING METHOD:

- Set the selector dial at “leak test – 1” or at “leak test – 2”. Bring the aspirator close to the possible leaking place. Leaking place is indicated either by buzzer or by alarm light.

- Buzzer or alarm light stops after detecting the leakage in five to ten seconds depending on the amount. Keep the detector away for a few seconds from the leaking place and then bring the detector again to the place for confirmation.

- It becomes difficult to detect the exact leaking place when the leak is heavy because the detector beings to sound away from the leaking place. In this case, blow away the floating gas and check again.

- For a temporary stop of the work, turn the selector dial to “stand by”. For a long

stop, be sure to tureen off the power switch.

The leak detector is a delicate devise that detects small amount of halogen.

If a gas leak is detected, proceed as follows:

- Check the torque on the connection fitting and, if necessary, tighten to the proper torque, check for leakage with the leak detector.

- If leakage continuous even after the fitting has been retightened, discharge the refrigerant from the system. Disconnect the fitting, and check the seat or damage. Replace the fitting, even if the damage is slight.

- Check compressor oil and add oil if required.

- Charge the system and recheck for leaks. If no leaks are found, evacuate and charge the system.

Robin air 16600 Electronic Leak Detector, an electronic leak detector used to detect refrigerant leaks in air conditioning and refrigeration systems. It features a sensitivity selection switch which allows it to be used with CFCs and HCFCs at one setting and HFCs at the other. The unit is able to detect leaks smaller than 1/2 ounce per year. Other features include audible and visual leak indicators, a volume control, a threshold balancing control and a 16 inch gooseneck probe, which holds its position for one-handed operations. When the unit is not being used, the probe wraps into a retaining clip on the back of the case.

BUBBLE TEST (SOAP SOLUTION):-

A soap solution can be used when you know the approximate area where a leak may exist because of sealed service repair recently done or an electronic leak detector has indicated a leak exists in a particular area of the sealed system.

For example, if you repaired a leak, or replaced a component, or know that a system has a leak somewhere and/or you observe an area of the system that is oil coated, you would probably use a soap solution, in that area, to test for and pinpoint a leak. It is the simplest and least expensive (material wise) method known today. It may however be more expensive to use, because of labor costs, if the technician does not have any idea where the leak could be.

Soap solutions are available in many different types. Some have a brush applicator and others have a dabber (an absorbent ball attached to a stiff wire inside of the cap.) Some

brands may even have a spray applicator to quickly cover large areas of tubing in a short amount of time. This is an advantage but is also messy and time consuming to clean up.

Some soap solutions even have an antifreeze base to prevent them from freezing in the winter time. Others may have a lower density to make them even more sensitive to very tiny leaks.