

TECHNICAL SUPPORT

*Mobile A/C System Overview
and Common Problems*

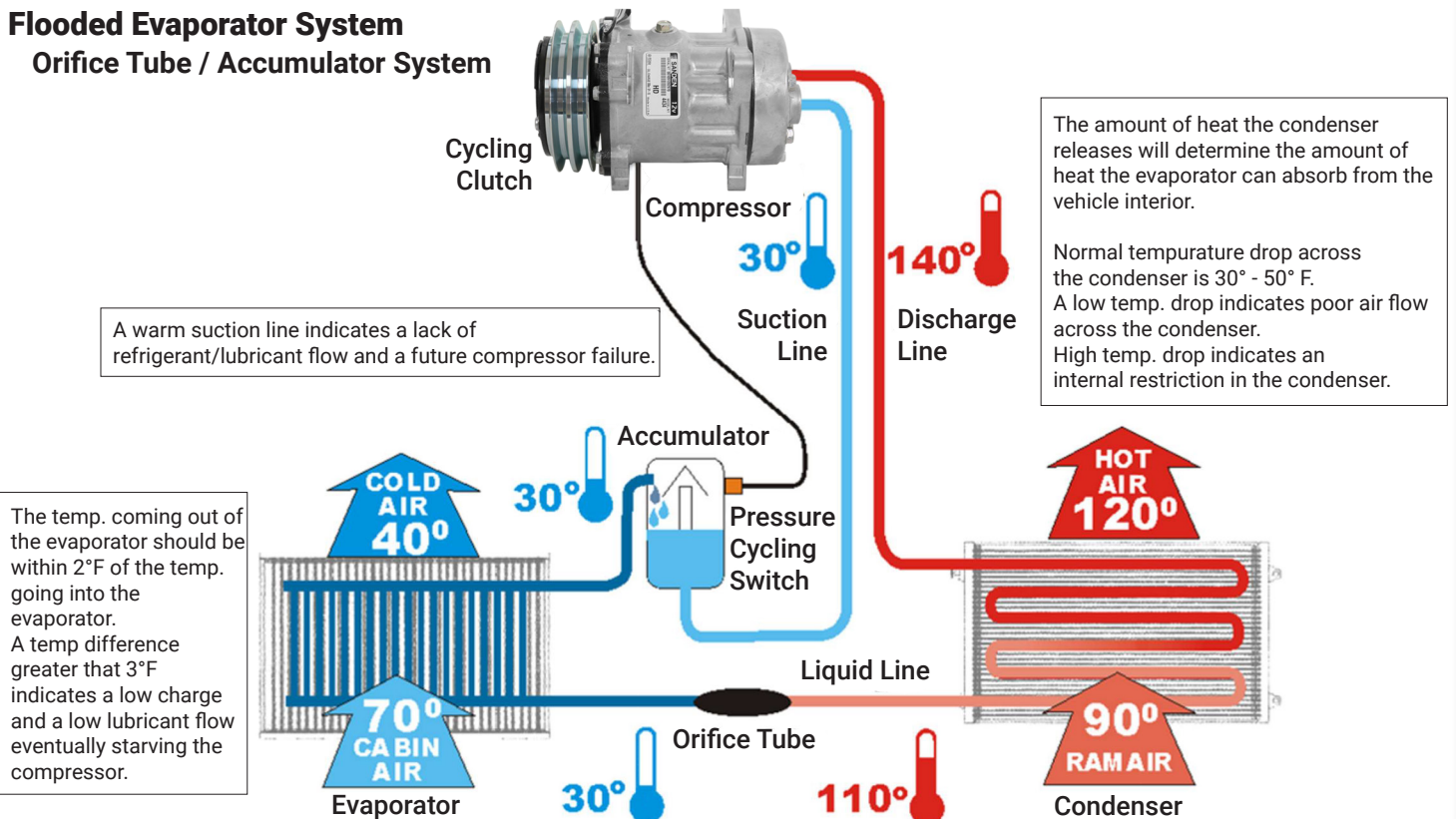
AG • TRUCK • OFF ROAD



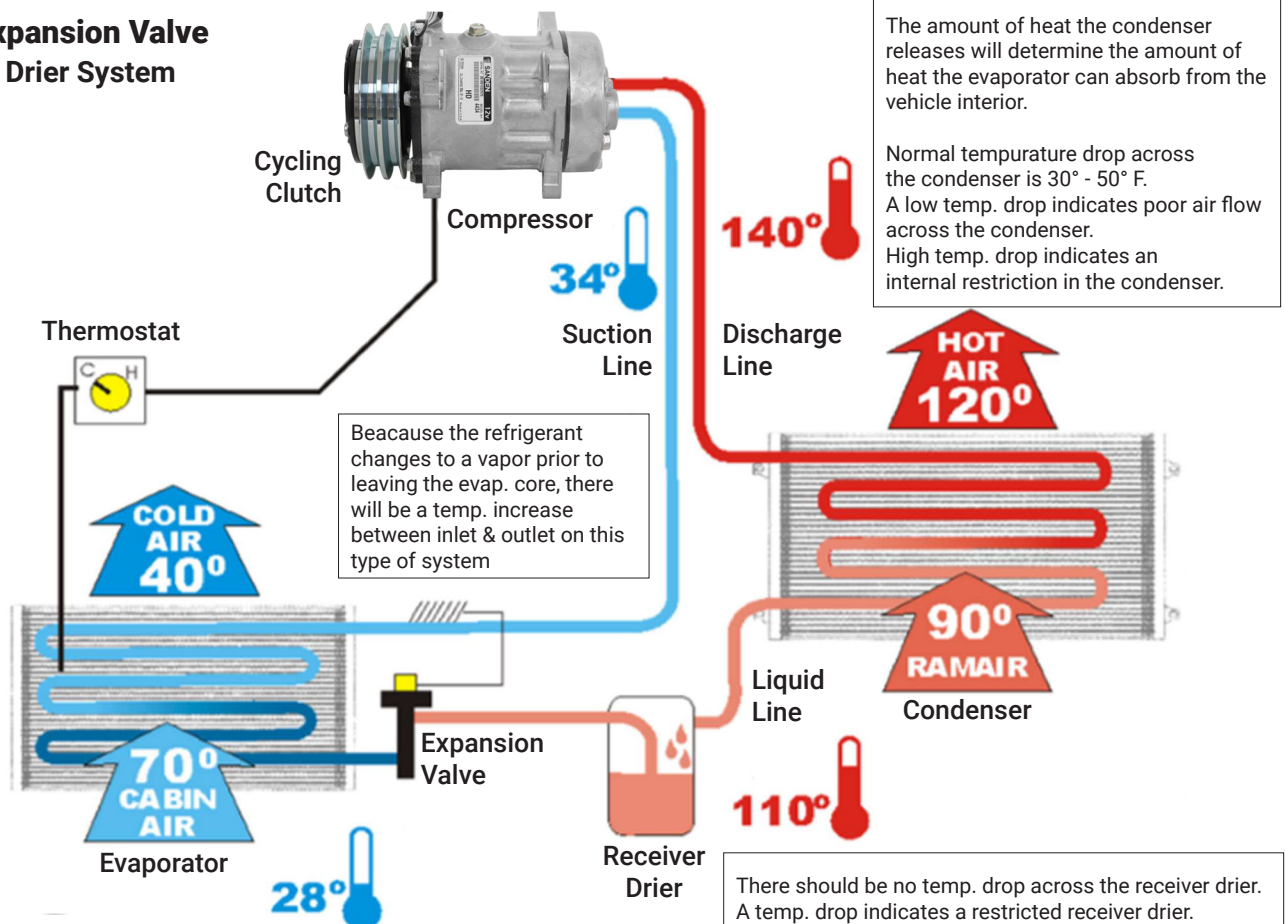
R134a Pressure Temperature Chart

PRESSURE psig (°Hg)	TEMPERATURE °F	PRESSURE psig (°Hg)	TEMPERATURE °F	PRESSURE psig (°Hg)	TEMPERATURE °F
-22	-62.38	68	67.85	275	153.40
-20	-55.02	70	69.24	280	154.70
-18	-48.85	75	72.62	295	156.10
-16	-43.5	80	75.86	300	157.40
-14	-38.76	85	78.98	305	158.70
-12	-34.49	90	81.97	310	160.00
-10	-30.6	95	84.87	315	161.30
-8	-27.02	100	86.66	320	162.50
-6	-23.7	105	90.37	325	163.80
-4	-20.59	110	92.99	330	165.00
-2	-17.67	115	95.53	335	168.60
0	-14.92	120	98.00	340	169.80
5	-3.04	125	100.40	345	171.00
10	6.67	130	102.70	350	172.10
12	10.12	135	105.00	355	173.30
14	13.38	140	107.20	360	174.40
16	16.46	145	109.40	365	175.40
18	19.4	150	111.50	370	176.30
20	22.19	155	113.60	380	178.20
22	24.87	160	115.60	385	179.80
24	27.43	165	117.60	390	180.90
26	29.90	170	119.60	395	181.90
28	32.27	175	121.50	400	183.00
30	34.56	180	123.30		
32	36.77	185	125.20		
34	38.91	190	126.90		
36	40.99	195	128.70		
38	43.00	200	130.40		
40	44.95	205	132.10		
42	46.85	210	133.80		
44	48.70	215	135.50		
46	50.51	220	137.10		
48	52.26	225	138.70		
50	53.98	230	140.20		
52	55.65	235	141.80		
54	57.29	240	143.30		
56	58.89	245	144.80		
58	60.46	250	146.30		
60	62.00	255	147.70		
62	63.50	260	149.20		
64	64.98	265	150.60		
66	66.43	270	152.00		

Flooded Evaporator System Orifice Tube / Accumulator System



Typical Expansion Valve Receiver Drier System



Overview of mobile A/C systems and common problems

THE RIGHT AMOUNT OF REFRIGERANT

A sight glass in an A/C system is no longer used to tell when the system has the right amount of refrigerant. With today's most common refrigerant being R134a, if a system is over or under charged there will be, in most cases, poor lower temperature and premature compressor failure. If the amount of refrigerant in a system is unknown recover the refrigerant, evacuate the system, and add the correct refrigerant charge using the pressure temperature chart (see page 2) or the OEM specs for the correct charge.

CAUSES FOR COMPRESSOR FAILURES

Any and all of the below can cause premature compressor failure.

Compressor Oil

- Oil breakdown from overheating.
- Low oil charge in the compressor.
- Oil contamination or debris in oil.
- Liquid slugging (hydraulic locking)

Excessive high head pressure

- An A/C system that has been overcharged will have high head pressure.
- An internal blockage between the compressor and expansion device, condenser, or drier.
- **Condenser with electric fans** - Will have electric motors and fan blades bringing fresh air across the condenser fins to remove heat from the refrigerant. Check for worn or burned out motors or missing fan blades that will slow or stop the air flow and cause high head pressures. Replace broken fan blades and worn or burned out motor(s). Use a clamp on DC amp meter to see if the motor(s) are drawing too many amps.
- Check that the condenser fins are not bent and that they are clean. Even a small amount of dirt on them acts like an insulator and will not properly transfer heat.
- **Condenser mounted at the radiator** - Be sure that the condenser fins are straight and free of any debris. Inspect shrouding and that air dams are in place and not missing. The goal is to have 100% of the air flow go through (and not around) the condenser and radiator. (*Air will take the path of least resistance*). Check to see if the engine fan blades are not damaged. If equipped with a fan clutch, be sure it's working properly. Check the engine fan drive belt to see if it has the proper tension. Do a visual check for cracks, a glazed belt, or the wrong belt width.

Low Head Pressure

- An undercharged A/C system.
- Faulty expansion valve stuck open.
- Evaporator coil freezing up due to plugged or dirty cab air filter
- Thermostat stuck open and not cycling allowing evaporator to freeze.



REFRIGERANT GAUGES

- Have the proper refrigerant manifold gauges for the specific refrigerant being used.
- Before connecting manifold gauges to an A/C system, do a visual check to see they are in good condition and that the refrigerant hoses are not frayed or damaged.
- Be sure that both high and low manifold gauges are calibrated to zero.



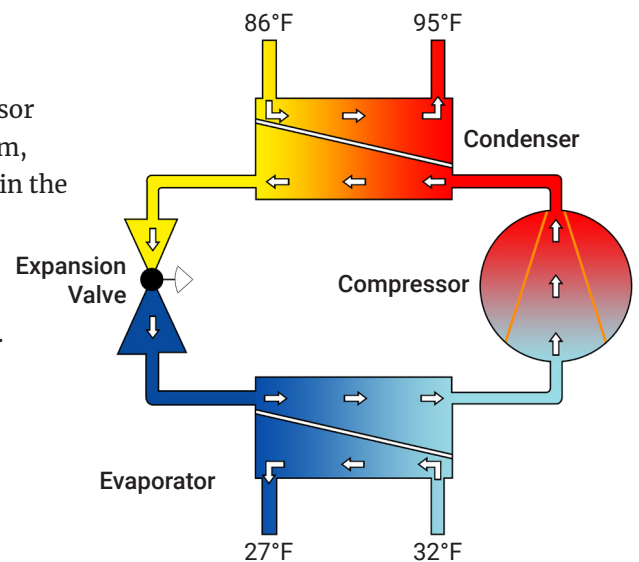
FALSE PRESSURE READINGS

- Valve core depressors and hose gasket may be damaged.
- Are the hoses on the manifold set connected to the correct service ports?
- The system may have more than one type of refrigerant in the system.

Example: R134a mixed with R12. Check the system with a refrigerant identifier.

WHY CHARGE WITH VAPOR AND NOT LIQUID?

Charging with a liquid can cause severe damage to the compressor valves and have premature failure. When charging an A/C system, for example, using a 30lb cylinder of R134a refrigerant, place it in the upright position. Do **NOT** turn the cylinder upside down. An electric tank heater blanket to wrap around the cylinder of refrigerant is available (part# 530-98250). This will help change the liquid to a gas and help speed up the charging times.



COMPRESSOR CLUTCH FAILURE AND COMMON CAUSES



Clutch failure can be caused by many things. It is always best to pinpoint the reason for failure. Failure is most often caused by high pressure, voltage issues, or both.

- **Wrong voltage being supplied at the field coil causing the clutch to slip.**
Make sure to have the proper voltage that is needed for the field coil.
Correct resistance for a 12 volt coil is 3-5 Ω 's. Measure the amp draw of the clutch coil.
- **Air gap between the compressor face plate and pulley is wrong causing the clutch to slip.**
Check with O.E. specs and use a non-magnetic feeler gauge and add or remove a plate shim.
- **Bearing Failure.** High heat caused by clutch slippage melts the grease and seals out of the pulley bearing.
Check for pulley play or listen for noises around the compressor clutch area.
- **Compressor drive belt is the wrong:** Width or miss-aligned, slipping and causing high heat.
- **Locked compressor:** Excessive high head pressure. Make sure the system was not over charged with freon or oil.

CORRECT O-RINGS

In the past, only size mattered when choosing the correct o-rings. Nowadays, it's the matter of material. R-12 used a black BUNA-N material. Today's refrigerants use a green, yellow, orange, or red HNBR material because of the higher head pressures and type of oil being used. Use HNBR o-rings for both R-12 and R134a refrigerants



WHY USE A VACUUM PUMP



Moisture and air are two of the most common problems in an A/C system. Moisture mixed with R134a will create hydrofluoric acid that will slowly eat away at metal components. Moisture will also break the lubricant down and cause contamination and icing inside the system forming a blockage restricting refrigerant flow. By using a good vacuum pump it will help eliminate this problem. AP Air recommends using a 2 stage, 6 CFM vacuum pump (part# 530-900662). Always replace the receiver drier/accumulator when an A/C system is opened or when replacing compressor.

RECEIVER DRIER / ACCUMULATOR

The purpose of a receiver drier (filter) is to keep the moisture from mixing with the lubricant and refrigerant while stopping debris from entering the system. Many OEM manufacturers recommend replacing the drier or accumulator annually in addition to evacuation. This will assure better performance. Make sure the new drier/accumulator has XH7 or XH9 desiccant.



BLACK DEATH!



Black Death is a term that is used for a result of the breakdown of refrigerant oil in the system. This causes excessive wear in the compressor and as a result causes a gray or black residue that is made up of solder flux and aluminum shavings from the old compressor. When this mixture cools it hardens in the condenser. Flushing the A/C system several times will not remove this black death. You must replace the condenser or you will cause this mixture to liquefy when warm and flow out to the liquid line restricting the orifice tube or expansion valve thus damaging the new compressor.

WHY FLUSH THE SYSTEM?

- Compressor failure
- Plugged expansion valve or orifice tube
- Drier desiccant let loose

Flushing will remove debris, oil, and moisture that may be in the system bringing it back to ground zero. So when installing that new compressor, expansion valve, or orifice tube it will not fail. Make sure you have the correct amount of new fresh oil in the system when finished.



SAFETY PRESSURE/FAN SWITCHES IN AN A/C SYSTEM



High/low pressure and fan switches are used to protect the compressor from becoming damaged due to excessive head pressure or from too little refrigerant in the system. If not protected, the system would have very high superheat while not lubricating and sufficiently cooling the compressor.

(Do not bypass these switches or severe damage to the A/C system can and will occur.)

THERMOSTAT SWITCH

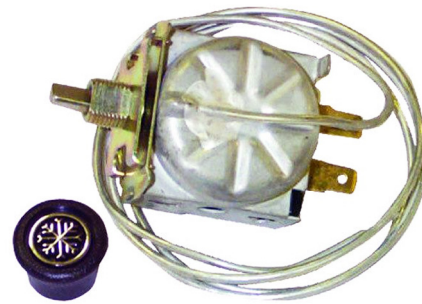
The thermostat switch is used to help regulate the outlet air temperature by cycling the compressor clutch on and off. It is also a safety device to ensure that the evaporator coil does not freeze up on cooler heat load days. If this switch should fail there will be no voltage at the field coil or the compressor may never cycle out and cause the evaporator to freeze up. The thermostat probe should be placed 3 to 6 inches from the expansion valve into the top middle of the evaporator coil. Make sure you have enough probe entering the evaporator coil while making sure the probe does not go too far through the evaporator coil and into the heater coil.

There is typically two types of thermostat switches used in HD A/C systems:



Preset Thermostat

Has no knob or adjustment for temperature control.



Manual Thermostat

Has a knob that can be adjusted to cycle the compressor on and off at different temperatures.

EXPANSION VALVES

Expansion Valves, also called TXV (thermostatic expansion valve), can be one of three types, externally equalized, internally equalized or block style. They can be either right angle or block style. The expansion valve's job is to properly meter the right amount of refrigerant entering the evaporator coil. A receiver drier with these type valves will be used. To troubleshoot problems with the expansion valve will require a set of refrigerant gauges attached to the operating A/C system.

Internally Equalized



Externally Equalized



Block Style

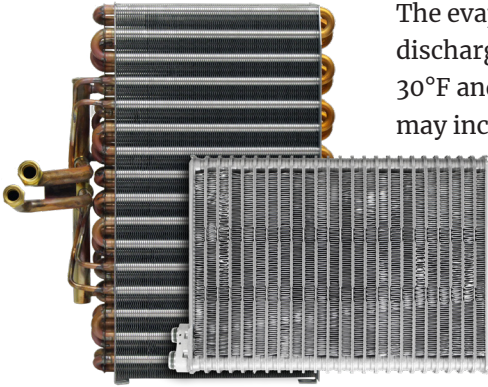


ORIFICE TUBE



An orifice tube is a fixed metering device located inside the liquid line between the condenser and evaporator. The orifice tube is enclosed with a plastic housing and protected by a fine mesh filter. The filter helps prevent debris from entering the system. Orifice tubes are color coded denoting the size of the orifice. An accumulator only or accumulator/receiver drier combination (Cat, Challenger) can be used with an orifice tube.

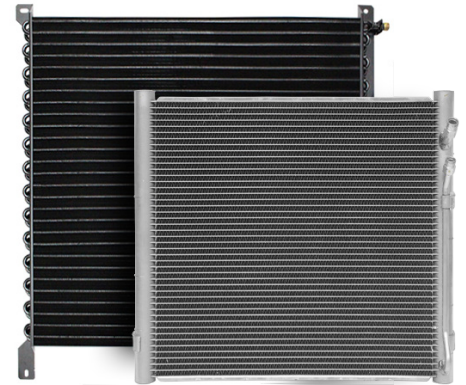
EVAPORATOR COIL



The evaporator coil removes heat from the air that the fan motor(s) pull in and then discharges the cold air out of the louvers. The evaporator usually operates between 30°F and 40°F. Louver temperature should be about 10° warmer than the coil. Long duct work may increase the temperature a few degrees more. If the coil becomes plugged with dirt, mud, ice, or other debris the air being discharged from the louvers will be warmer. Blow out the coil with compressed air (about 60-90 psi) or wash the coil with coil cleaner (part# F5914) to ensure that there is good air flow through the coil. Use a fin comb (part# RW-68) to straighten any bent evaporator coil fins.

CONDENSER COIL

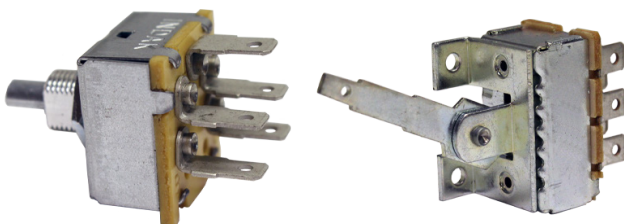
This is also called a heat exchanger that removes heat from refrigerant that is under very high pressure and in a high temperature state. By passing cooler ambient air over the condenser fins this will change the state of the refrigerant from a gas to a liquid. The liquid will then move to the receiver drier and expansion device. If the condenser fins get clogged with mud, debris, or even a fine coating of dirt you will have poor or no cooling out the louvers. Be certain to clean condenser coil with compressed air or wash with water or coil cleaner (part# F5915). Keep coil fins straight with a fin comb.



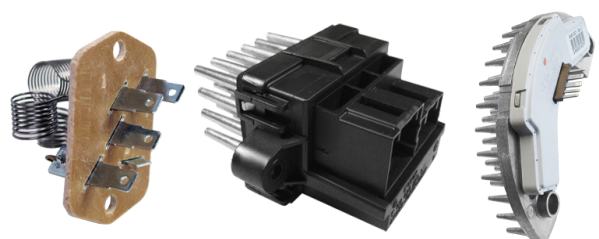
Condensers all work in the same manner but vary in design and fin style. The designs use are tube and fin, serpentine, and multi-flow (parallel flow). The tube and fin style can be flushed out and reused. Serpentine and parallel flow condensers are not flushable and need to be replaced. Debris will stay inside reducing its ability to cool.

BLOWER FAN SWITCH AND RESISTORS

The blower fan switch controls the blower motor speeds. On the back of many blower switches there will be five posts. "B" = power, "C" = clutch, "L" = low speed, "M" = medium speed, "H" = high speed. The resistor is used to cut the amount of current to the blower motor so you will have high, medium, and low. It will be found on the blower unit that houses the motor.



Blower Switches



Blower Resistors

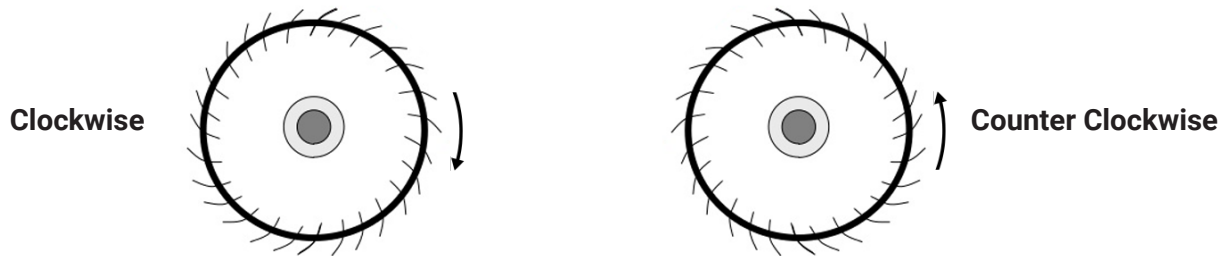
BLOWER MOTORS AND FAN WHEELS

Blower motors control the amount of air flowing across the evaporator coil. If the motor rotation is not correct or the motor, fan wheel, or resistor (if used) malfunctions, not enough air will be drawn across the evaporator coil and it may freeze up. Broken fan wheels or housings will cause the motor assembly to sound very loud and will need to be replaced. There are usually two types motors used in a blower system;

1. **Field wound** – has 4 wires and operated by a fan switch only.
2. **Permanent magnet** – has only two wires and requires a fan switch and a resistor.

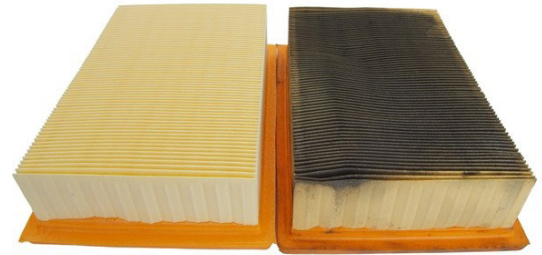
Always make sure to have the right motor and resistor for the voltage.

Blower wheel rotation is determined by facing the hub



RECIRCULATION AIR FILTER

The recirculation air filter(s) will be found inside the operator's cab located at the evaporator box. It is very important to keep this filter very clean. Most of these filters are made of open cell foam though some of the newer filters are made of paper. Most foam and paper filters can be blown out with 20 to 30 pounds of air pressure. Most foam filters can be washed out with water. Failure to service these filters will cause the evaporator coil to plug up with dirt, mud, and other debris which causes poor or no cooling.



FRESH AIR FILTER

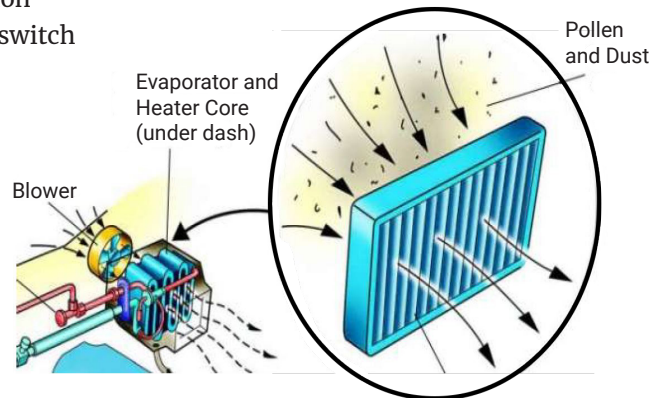


Fresh air filters will be found outside the operator's cab. It allows clean fresh air to enter the cab area. Most of these filters are made of paper and filter particles down to about 19 microns. They must be removed and cleaned daily if the machine is operated for more than 10 hours or in dusty conditions. Remember that the equipment has the capabilities of bringing in fresh air into the cab it also brings in the ambient temperature as well.

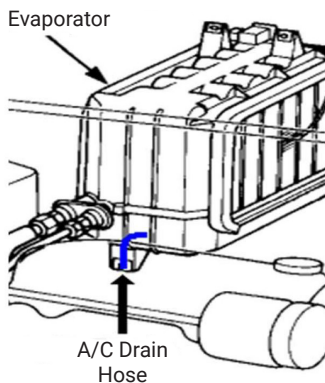
LOW AIR FLOW

Complaint “It used to blow harder!” - Things to check are:

- Obstruction at the air return; plugged or dirty filter
- Debris in the evaporator coil that blocks air circulation
- Icing of the evaporator coil due to a bad thermostat switch
- Air leak or obstruction in air duct hose
- Defective blower relay
- Blower wheel loose on motor shaft
- Blower wheel rotation wrong
- Blower motor shaft rotation wrong
- Blower motor worn out, turning slower
- Low blower motor voltage due to poor ground
- Using a 24 volt motor on a 12 volt system



DRAIN PAN AND DRAIN LINES



The drain pan collects water from the evaporator coil and channels it out of the cab. If the pan leaks or drain lines become plugged with debris the water that has condensed off the evaporator coil will enter the cab area. The drain tubes should be flushed with water and or compressed air. Check drain lines for kinks, holes, sharp bends, flat runs, or uphill runs

THE REFRIGERANT OIL

The internal components of an A/C system must be properly lubricated with the correct refrigerant oil. There are several types on the market today; PAG, Ester, and Mineral oil. Make sure you choose the right one for the type of refrigerant that is in the system.

R-12: The oil is absorbed into the refrigerant that carries it through the compressor as a mist.

R134a, YF1234a: The oil is pushed along the system flowing with the refrigerant.

A system oil charge that is over charged or undercharged can damage the compressor. Compatibility of refrigerant oil is determined by its ability to remain oil when mixed with the refrigerant and not become separated by a chemical reaction. R-12 refrigerant uses a mineral oil made for that refrigerant and is not compatible with R134a systems. R134a systems use either PAG oil or Ester oil.

Note the following: PAG oils absorb moisture 100 times greater than mineral oil (in effect absorbing 1% water within 15 hours). Ester oil will mix up to 50% with all PAG types.

REFRIGERANT LEAKS

Refrigerant leaks can cost lots of down time and money if not found and quickly repaired. A good halogen leak detector will pick up leaks under static conditions. However, some may only leak when the system is in operation. There are other ways of finding a refrigerant leak. Use a visual inspection. Look around the refrigerant fittings and hoses for spots of refrigerant oil and dirt. Check the front clutch plate of the compressor for oil and dirt. If the air conditioning system is completely empty use dry nitrogen to pump up the system to try and hear a leak or check with bubbling leak detector spray. Also, florescent dye can be used to detect a leak.

Note: to see the dye stain you need a UV lamp and the leak must be where the light can reach it.

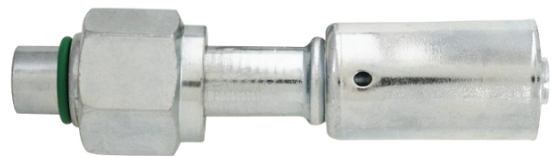


HOSES AND FITTINGS

Refrigerant hoses carry the refrigerant from one component to the next. The hose should be a barrier type for R134a refrigerants and the specific style hose for the specific style fittings. Most air conditioning systems use the #6 (5/16" ID), #8 (13/32" ID) or #10 (1/2" ID) refrigerant hose. Hoses need to be inspected occasionally for blistering, bulges, dry rot, chaffing, swelling, and hardening. Check around hose fittings for traces of oil and dirt that may indicate a refrigerant leak. Keep hoses away from hot spots, moving parts, sharp edges, and oil leaks. Watch hose routings on machines that articulate.



Standard Barrier Beadlock Fitting



Reduced Barrier Beadlock Fitting



Quick Clip Fittings



EZ Clip Fittings

Quick clip and EZ clip fittings are interchangeable with reduced barrier and EZ clip hoses. They can be used to repair a hose using reduced barrier beadlock fittings. Both Quick clip and EZ clip fittings are the easiest to use in field repairs and building new lines.

Reduced barrier hose, EZ clip hose, and fittings have the same ID as standard barrier A/C hoses. However, the wall thickness of a reduced barrier hose and EZ clip hose are thinner which creates a smaller OD hose. This allows for a cleaner look that takes less space and can make tighter bends than standard barrier A/C hoses.

REFRIGERANT RECOVERY



The EPA has issued regulations under Section 609 of the Clean Air Act establishing standards and requirements regarding the servicing of mobile vehicle air conditioners (MVAC). Technicians who repair or service “Mobile Vehicle Air Conditioners” must recover the refrigerant and either recycle it on-site, or send it off-site to a reclamation facility. Technicians must use EPA-approved equipment to perform the refrigerant recovery and recycling. Technicians who service MVAC or MVAC-like appliances (“Farm & Heavy Equipment”) must be properly trained and certified by an EPA-approved technician certification program.

CHARGING AN A/C SYSTEM

After following the rules set by EPA Section 609 and the repair is made a refrigerant manifold set or AC Machine is needed. Attach the low and high side manifold couplings to the service ports on the A/C system. Attach the middle hose to a good 2-stage vacuum pump, turn it on, and open both the low and high side manifold knobs. Check the low side gauge to make sure it is going into a vacuum which is achieved when the needle goes below -0. Draw the system down to or be close to 29.9 inches of vacuum. Let the pump run for at least 30 to 45 minutes. Note that at higher altitudes it will not achieve -29.9 inches of vacuum. If above 3,000 feet, let the vacuum pump run at least 15 minutes longer. After it has achieved a good vacuum, close both high and low side manifold knobs. Check the low side gauge and note where the needle is. After at least 5 minutes recheck the needle. If it is losing vacuum the gauge will be moving back to zero. That will indicate a leak in the A/C system (repair and start evacuation again). When repaired and ready to charge, remove the center hose from the vacuum pump and attach it to the refrigerant keg. Make sure to purge the center hose at the manifold gauge to let any trapped air out (just crack open and close). Charge with vapor only NOT liquid. Next open the low side manifold knob. Notice that the high side gauge needle will start to move up (away from zero). After the low and high side needle are equalize, or close to it, it is now ready to charge. Start the engine and turn the A/C switch on and the fan speed on high. Check with the A/C system manufacturer for how much refrigerant the system requires. If that information can not be obtained, see the section below on charging an A/C system using a pressure temperature chart.



CHARGING AN A/C SYSTEM USING PRESSURE TEMPERATURE CHART

After following the steps in the section **CHARGING AN A/C SYSTEM** measure the fresh air intake at the condenser. Make sure it is reading the cool air coming in and not the warm air leaving the condenser. Add 35°F-40°F to the temperature measured at the condenser. For example, let's use R-134a and the temperature reading at 90°F, add 40°F, which results in 130°F. Then look at a R-134a temperature pressure chart (see page 2) and find 130°F. On the chart 130°F is approximately 200 PSIG when your high side gauge reads 200 PSI. Close the low side manifold knob which will stop the refrigerant flow from entering the system. Take the louver temperature then check the high side gauge. If its below 200 PSI keep adding a little more refrigerant to the system until it reaches 200 PSI. Be careful not to overcharge the system. Keep checking your louver temperature. If the temperature rises with the compressor engaged, that could indicate the system is overcharged and can cause damage to the compressor.

8 Warning Signs Which Indicate Trouble

Train your drivers/operators to recognize warning signs of an impending climate control disaster. The following conditions require the immediate attention of a qualified service professional:

- **Vibration or noise from engine compartment**
Vibration or noise from engine compartment when A/C is on can indicate a compressor or mount problem.
- **Vibration or noise from evaporators**
Vibration or noise from the evaporator area indicates a blower or motor problem.
- **Oil residue**
Oil found around the refrigeration hose connections can indicate a refrigerant leak.
- **Dripping Water inside cab**
Condensate is not draining due to plugged or kinked drain lines.
- **Poor Performance**
Noticeable decrease in performance is usually attributable to freon leaks or motor failures.
- **Warning Lights**
Warning lights, indicators reflective of high- or low-pressure system shutdown.
- **Poor Air Flow**
Reduced airflow is indicative of clogged filters, evaporator coil or failed blower motor.
- **Unusual Odors**
Can be caused by failing belts, hoses too close to heat source, or possibly electrical problems.

10 Ideas to Upgrade Existing A/C System Performance

Tried everything and still not happy with your climate control?
Here are some ideas to try to improve your system:

- **Upgrade condensers**
Upgrade undersized condensers, add a second condenser, or change to a cleanable fin design.
- **Add evaporator**
Add supplemental evaporator to improve air flow. Add an evaporator just for the operator.
- **Add fast idle kit**
Additional RPM's spin compressor faster and increase volume of refrigerant flowing.
- **Upgrade compressor**
Additional displacement improves capacity 10 CID to 13 CID - **or** - 13 CID to 15 CID.
- **Add air diverters**
Add downward air diverters to evaporator to cool below the unit.
- **Open up the air inlet**
Move, relocate or modify anything that restricts air to evaporator.
- **Seal condenser to skirt**
Sealing or baffling condenser to the skirts stops capacity robbing recirculation of air.
- **Insulate refrigerant lines**
Keep engine heat out of refrigerant. Insulate hoses in engine compartment.
- **Duct Extension**
Add an additional driver's duct extension to keep the driver cooler.
- **Add insulation**
Engine heat makes your system work overtime. Add insulation to your dog box.

A/C Troubleshoot Data Sheet

TXV Valve System with Receiver Drier

1. Refrigerant charge amount installed? _____
2. Test is being done with cab doors opened and/or closed? _____
3. Engine RPM (recommended 1500 rpm) _____RPM
4. Engine operating temperature _____
5. Percent humidity outside _____%
6. Blower fan speed setting _____
7. Ambient air temperature 2" (50mm) in front of condenser _____
8. Compressor low side and high side pressure
High side _____psi
Low side _____psi
9. Compressor suction line temperature _____
10. Convert high side to temperature (use temperature chart, page 2) _____
11. Compressor housing temperature _____
12. Condenser inlet line temperature _____
13. Condenser outlet line temperature _____
14. Temperature drop across the receiver drier _____
15. Evaporator inlet line temperature _____
16. Evaporator outlet line temperature _____
17. Evaporator air inlet temperature _____
18. Evaporator air outlet (vent) temperature _____

A/C Troubleshoot Data Sheet

TXV Valve System with Desiccant Bag

1. Refrigerant charge amount installed? _____
2. Test is being done with cab doors opened and/or closed? _____
3. Engine RPM (recommended 1500 rpm) _____RPM
4. Engine operating temperature _____
5. Percent humidity outside _____%
6. Blower fan speed setting _____
7. Ambient air temperature 2" (50mm) in front of condenser _____
8. Compressor low side and high side pressure
High side _____psi
Low side _____psi
9. Compressor suction line temperature _____
10. Convert high side to temperature (use temperature chart, page 2) _____
11. Compressor housing temperature _____
12. Condenser inlet line temperature _____
13. Condenser outlet line temperature _____
14. Evaporator inlet line temperature _____
15. Evaporator outlet line temperature _____
16. Evaporator air inlet temperature _____
17. Evaporator air outlet (vent) temperature _____

A/C Troubleshoot Data Sheet

Orifice Tube System

1. Refrigerant charge amount installed? _____
2. Test is being done with cab doors opened and/or closed? _____
3. Engine RPM (recommended 1500 rpm) _____RPM
4. Engine operating temperature _____
5. Percent humidity outside _____%
6. Blower fan speed setting _____
7. Ambient air temperature 2" (50mm) in front of condenser _____
8. Compressor low side and high side pressure
High side _____psi
Low side _____psi
9. Compressor suction line temperature _____
10. Convert high side to temperature (use temperature chart, page 2) _____
11. Compressor housing temperature _____
12. Condenser inlet line temperature _____
13. Condenser outlet line temperature _____
14. Evaporator inlet line temperature _____
15. Evaporator outlet line temperature _____
16. Evaporator air inlet temperature _____
17. Evaporator air outlet (vent) temperature _____
18. Suction accumulator inlet line temperature _____
19. Suction accumulator outlet line temperature _____



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