AirSource®

SERVICE BULLETIN

AIR CONDITIONER COMPRESSOR FAILURES

ALSO SEE BULLETIN #SB3-304AS (SYSTEM CONTAMINATION)

Second only to refrigerant hose leaks, compressors have the highest rate of failure of any motor vehicle air conditioner (HVAC) component. Yet compressors very seldom fail on their own and it is imperative that the cause of failure be properly diagnosed and corrected when replacing the compressor. If this is not done, your replacement compressor will also "shoot craps" in a very short time.

A compressor is an engine. Engine failure is almost always caused by a lubrication or a "coolant" problem. Compressors fail for the same reasons.

"COOLANT FAILURE"

Referring to the air conditioner, "coolant failure" means not dissipating heat from the condenser or having too much heat in the condenser. (Similar to a problem in the engine's radiator). Too much heat means too high head pressure. On very hot days this means a high side reading well over 300PSI. High head pressure is caused by:

A) Too much refrigerant. (Overcharge)
B) A dirty bug screen or debris blocking the condenser.
C) A clogged radiator/cooling system.
D) A defective fan clutch or switch that activates the fan clutch.
E) A pinched tube in the condenser or too small of a condenser (if retrofitted or replaced).
F) Improperly operating shutters.
G) Contaminated refrigerant.
H) Excessive air content (non-condensables gas) in system.

"LUBRICATION FAILURE"

Just as this is a common cause of engine problems, so too is lubrication failure that most common cause of compressor problems. Remember, the compressor needs to be lubricated by a special refrigerant compatible oil. The oil is "carried" through the a/c system by the refrigerant. The oil will not circulate without refrigerant. Therefore, compressor failure due to a lubrication problem is caused by:

A. Loss of refrigerant which means no carrier of the oil and no lubrication for the compressor.
B. A blockage in the system. This will keep oil from returning to the compressor and will normally show up as too low a reading on the low pressure gauge. "Too Low" a reading means 0-10 PSI or a vacuum. The blockage may be in the form of:
   1. A clogged filter drier/expansion valve/orifice tube.
   2. Moisture in the system. (If the driver says the air conditioner works okay for a short time then starts blowing hot air and that if he turns it off for a while and then turns it on it works again for a short time, the odds are that there is moisture in the system. (A defective thermostat or clutch cycling switch will cause the same symptoms, however a watery smell will also be present.) Follow steps 1 thru 8 of the "SERVICE PROCEDURES" and make sure the drier/accumulator is replaced, and evacuate for 45 minutes.

3. A mechanically closed expansion valve. Some types may be removed and blown through (with mouth) to check.

Although these parts can be checked and cleaned, the service industry, as a general rule, will replace them.

So, compressor failure is caused by:

I. *"COOLANT FAILURES"*

II. *"LUBRICATION FAILURES"*

A. Loss of refrigerant-no carrier for the oil.

B. A blockage in the system restricting the return of oil.

ONLY EPA CERTIFIED TECHNICIANS MAY SERVICE HVAC SYSTEMS

SERVICE PROCEDURES (SEE OUR CATALOG FOR INFORMATION ON RETROFITTING)

A. Only mechanics certified by an EPA-approved program may service mobile air conditioner systems.

B. Verify correct refrigerant and oil for the system you are servicing. Take care to not contaminate your recycling equipment. Non-approved refrigerants containing flammable materials may ignite during servicing.

C. Each refrigerant (R12 and R134a) requires separate gauges, charging hoses and recycling equipment.

The following procedures should be taken in servicing an air conditioner system for compressor failure:

1. Be absolutely sure that the fan clutch, or electric fan assembly, if there is one or more on the vehicle, is working properly. If not it must be replaced or repaired. Check the switches and controls for the fan and/or shutters.
2. Clean the bug screen (if there is one). Check for debris in the radiator and the condenser fins and/or loose fins.
3. Check for good flow of coolant through the radiator.
4. Check if there is a loss of refrigerant.
5. A refrigerant identifier should be used to prevent equipment contamination and/or possible injury from flammable refrigerants.
6. **If the system contains refrigerant it must be recovered by an approved Recovery or Recovery/Recycling System per Section 609 of the Federal Clean Air Act.**
7. Disconnect the liquid line (the smallest diameter hose or line) at the expansion valve or orifice tube and closely examine for contamination. If any contamination at all is found, whether it is in the form of sludge, powder or grit, rust or metal flake, aluminum oxide or metal shavings from the compressor, the entire system must be flushed. The most effective flush on the market is an approved oil based flush. It is effective because it will remain a liquid as it flushes and scrubs. This scrubbing action will remove all oil, debris, and contamination. It will not leave any harmful or incompatible residue. Truck Air Parts/Mfg. Corp. supplies an approved liquid flush solvent that is environmentally safe. (Part #8811 gal. and #8812 qt. for R134a or R12).

NOTE
DO NOT USE FLUSHES CONTAINING OZONE DEPLETING CFCs SUCH AS R-11, 12, 113 OR 115. IT IS ILLEGAL TO VENT THESE REFRIGERANTS PER SECTION 609 OF THE FEDERAL CLEAN AIR ACT. ALSO, MAKE CERTAIN THAT THE FLUSH SOLVENT USED IS COMPATIBLE WITH THE TYPE OF REFRIGERANT YOU ARE SERVICING. ALTHOUGH NO CURRENT EPA GUIDELINES EXIST REGARDING THE TYPE OF SOLVENT USED, IT IS RECOMMENDED THAT A FLUSH SOLVENT WITH LOW FLAMMABILITY AND LOW VOLATILITY BE USED.

8. If no contamination is found, only the discharge line, condenser and liquid line need to be flushed.

SEE SERVICE BULLETIN #SB3-304AS FOR FLUSHING PROCEDURES

9. Depending on the type of system, the orifice tube must be replaced, or the expansion valve should be cleaned and checked or replaced.
10. Again depending on the type of system, the filter drier or the accumulator must be replaced.

VERIFY CORRECT REFRIGERANT AND OIL FOR THE SYSTEM YOU ARE SERVICING.

11. The proper amount of oil must be replaced in the system.
    a. Drain the oil from the replacement compressor (new or remanufactured).
    b. Install the following amount of oil in the compressor:
        1. CCI/York and Tecumseh 2 cyl. compressors - in vertical position oil should stand approximately 1 inch.
        2. Frigidaire (G.M.) A-6 - fill with oil so that when compressor is held in operating position - oil will just start to drip out of the loosened oil filler plug.
        3. GM DA6/R4/HR6HE; FORD FS6, FX15 (FS10); DIESEL KIKI (ZEXEL, SELTEC/TAMA) and SANDEN - install 5 ounces of oil.
12. Install the replacement compressor.
13. For added protection, install an in-line filter between the filter-drier and the expansion valve or orifice tube.
14. Attach hoses, installing the filter drier (or accumulator) last.

IF SYSTEM IS "O-RING" OR FORD SPRING-LOCK,
INSTALL NEW O-RINGS AND/OR GARTER SPRINGS.
MAKE SURE PROPER MATERIAL SEALS AND O-RINGS ARE USED.
LUBRICATE "O-RINGS" WITH R12 TYPE MINERAL OIL OR ESTER OIL WHETHER IN AN R12 OR R134a SYSTEM.

15. Add the following additional amounts of oil:

	SYSTEM COMPLETELY FLUSHED w/o BUNK UNIT	EVAPORATOR NOT FLUSHED	SYSTEM COMPLETELY FLUSHED with BUNK UNIT
CCI/YORK, TECUMSEH ①	3 ounces	2 ounces	5 ounces
FRIGIDAIRE ① (GM) A-6 GM DA6/R4/HR6/HR6HE ① FORD FS-6, FX15 (FS10) ①	3 ounces	2 ounces	5 ounces
DIESEL KIKI (ZEXEL, TAMA) ① SANDEN	3 ounces	2 ounces	5 ounces

① **This additional oil can be poured into the discharge hose. DO NOT POUR IN SUCTION HOSE.**

For various compressor oil capacities, see our current catalog (compressor section).

The a/c system should now be completely assembled, with the proper amount of oil and new drier, new or cleaned expansion valve, and new o-rings if required.

Now for some very important procedures to prevent the shaft seal of the replacement compressor from leaking or blowing out.

16. After installing the compressor on the vehicle, but before installing the belt, turn compressor clutch by hand 10-12 times. This brings oil up to the seal and lubricates it. Note the GM DA6/HR6/HR6HE compressor cannot be turned by hand. Turn it with a socket and ratchet by hand. DO NOT USE AN IMPACT.
17. Your service gauge set should be hooked up. Add about one quarter pound refrigerant. Watch your gauges. They should equalize. The pressure from the refrigerant will help "seat" the lubricated seal.

CHANGE OIL IN YOUR VACUUM PUMP ON A REGULAR BASIS (APPROXIMATELY EVERY 20 USAGES DEPENDING ON HOW "DIRTY" SYSTEMS ARE). USE VACUUM PUMP OIL.

18. Purge system using your refrigerant recovery/recycling equipment. Follow your machine's instructions to insure complete recovery of refrigerant. Evacuate system for 30 sec. to a minute so that low side gauge reads a vacuum. Close valves on gauge set and turn off vacuum pump. If vacuum bleeds off, find and repair leak. If not, or after repair, proceed to next step.
19. Now evacuate the system for a minimum of 45 minutes. A minimum 4 CFM dual stage pump is recommended for servicing heavy duty systems. Although you are working with a clean system and clean non-acidic oil, 45 minutes is necessary to insure a moisture free system. Regular change of vacuum pump oil is recommended.
20. Switch your charging hoses to the refrigerant source (if required). Purge the hoses of air and add one pound of refrigerant. Your gauges should have equalized, i.e. same readings on each gauge, from 70 PSI to 120 PSI depending on the ambient temperature.
21. Finish charging the system.

MAKE SURE SYSTEM IS NOT OVERCHARGED.

22. Check gauge readings. Disconnect charging hoses in accordance with proper service procedures.

If the preceding service procedures are followed, you will find that you have virtually eliminated "comebacks".

COMPRESSOR REPLACEMENT REQUIRES THE INSTALLATION OF A NEW RECEIVER-DRIER/ACCUMULATOR AND FLUSHING THE SYSTEM!

PER THE FEDERAL CLEAN AIR ACT OF 1990, APPROVED RECOVERY/RECYCLING EQUIPMENT IS REQUIRED TO SERVICE AIR CONDITIONER SYSTEMS. REFRIGERANT MUST NOT BE VENTED TO THE ATMOSPHERE.

EFFECTIVE NOVEMBER 15, 1995, ALL SUBSTITUTE (FOR R12) REFRIGERANTS (INCLUDING R134a) MUST BE RECOVERED AND RECYCLED AND MAY NOT BE VENTED.

CHARGING (SERVICE) HOSES MUST HAVE "SHUT-OFFS" WITHIN 12 INCHES OF THE HOSE END.

PLEASE NOTE THAT OUR COMPRESSOR WARRANTY REQUIRES THE FLUSHING OF THE SYSTEM, THE REPLACEMENT OF THE DRIER/ACCUMULATOR AND THECLEANING OR REPLACEMENT OF THE EXPANSION VALVE/ORIFICE TUBE.

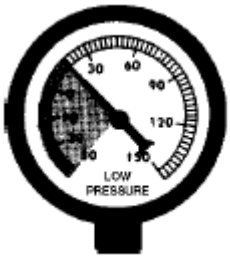
"Normal" Gauge Readings for R-12 systems.
R-134a systems may run approximately 10% higher on the high side.

LOW SIDE
12-28

HIGH SIDE
150-285

LOW SIDE
LOW OR IN A VACUUM

HIGH SIDE
NORMAL OR SLIGHTLY BELOW NORMAL



1. Blockage (contamination) in liquid side. Check filter drier or accumulator, check expansion valve or orifice tube.
2. Moisture freezing at EXP valve.
3. Defective thermostat or clutch cycling switch. Not cycling off.

LOW SIDE
HIGH*

HIGH SIDE
LOW*

1. Clutch not on.
2. Compressor not pumping internally
3. Blown reed valves or valve plate gaskets.

***** VIRTUALLY EQUAL READINGS

LOW SIDE
HIGH

HIGH SIDE
VERY HIGH

1. Overcharge system.
2. Internal restriction from discharge line to filter drier.
3. Defective fan clutch or fan clutch switch.
4. Air flow restriction at condenser.
5. Non-condensable gases (air) in system.
6. Too much oil in system.
7. Insufficient cooling from radiator. Check coolant and tube blockage.

LOW SIDE
HIGH

HIGH SIDE
NORMAL

1. Defective expansion valve. (Open too much)
2. Capillary tube of expansion valve cracked or not clamped and insulated properly.

REFRIGERATION CYCLE SCHEMATIC