

# AirSource®

## Heavy Duty A/C Components

### SERVICE BULLETIN

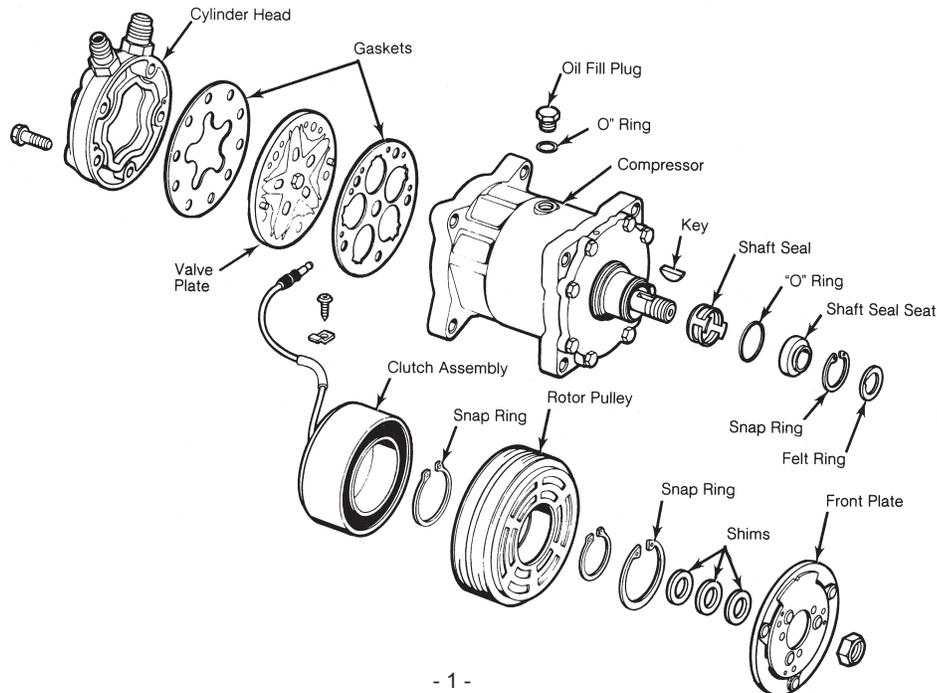
## EXAMINING COMPRESSOR FAILURES IN THE FIELD

This guide can be used as a reference to diagnose compressor failures, and is specifically designed to help you differentiate between unwarrantable failures and those which would normally fall under possible warranty consideration. Next to refrigerant leaks, compressors represent the next highest rate of failure of any a/c component. Use of this guide will enable mechanics to properly diagnose and observe more closely the primary causes of compressor failures. Observance and examination of both the compressor and clutch during diagnosis will greatly improve your analysis in determining exactly what happened. Since subsequent problems or failures often happen as a result of primary failure causes, this guide is divided into the following sections:

- A. COMPRESSOR COMPONENTS & TERMINOLOGY
- B. CLUTCH RELATED FAILURES
- C. COMPRESSOR FAILURES & CAUSES
- D. INSTALLATION RELATED FAILURES
- E. SUMMARY FAILURE CHART

#### A. COMPRESSOR COMPONENTS & TERMINOLOGY

To assist you in analyzing compressor failures, a diagram of a typical compressor & clutch assembly is shown. This diagram should be used as a reference when attempting to determine the cause of failures in the various components of the compressor. The terminology used below will be referred to throughout this Service Bulletin.



## **B. CLUTCH RELATED FAILURES**

Since many compressors are sold as complete assemblies (such as Sanden, Seltec, Ford, CCI, & GMC compressors) the following are the most frequent symptoms and causes of clutch related failures and how they relate to the compressor itself. Many times a compressor is submitted for warranty listed as having only clutch symptoms, such as “bad clutch bearing” or “clutch doesn’t engage” or “clutch locked up”. In most cases the clutch was just a result of a related failure, not the cause.

### **B1. Burnt Clutch Hub, Pulley, and/or Coil**

Inadequate voltage to the coil will result in overheating of the internal winding, and cause the clutch hub to slip against the face of the pulley. A compressor in the stages of failing due to slugging or loss of lubrication, or operating under a high pressure condition will also cause the clutch to slip. The slipping occurs continuously and in just a short time will subject both the clutch and coil to extreme temperatures up to 1,200 degrees F. This will quickly destroy the clutch and its internal components. Visual evidence of this type of failure can be found in the illustrations on page 2. This type of failure affects both the compressor and clutch and subsequently voids the warranty on the entire assembly.

### **B2. Clutch Bearing Failure**

Bearing failures are usually caused by system related problems. Very seldom is a bearing itself the culprit of a failed or locked up compressor. For example, if the clutch slips severely due to a high pressure or low voltage condition, or due to compressor slugging, the excessive heat generated by the slipping will quickly melt and destroy the bearing seal. The bearing then loses its grease and locks up or falls apart, usually destroying the clutch in the process. This type of bearing failure is not covered under warranty, since the bearing was not the root cause of the problem. Manufacturing defects in clutch bearings are rare, and warranty allowances are usually associated with excessive noise symptoms only (see following condition).

### **B3. Noisy Clutch Bearing**

If the complaint is noise related only, a defective clutch bearing could be the source of the problem. Check for a rough or poorly operating bearing by holding the clutch armature hub stationary, and rotating just the pulley. If excessive noise or difficulty in ease of rotation is observed, the bearing may be suspect. However, as with the failed bearing situation described above, several factors can cause the bearing to become noisy or rough in operation. A rough bearing can also be one that is in the early stages of failing due to system problems involving extreme heat. This is usually the case if the compressor clutch has been operating sufficiently for some time and then becomes noisy. Most factory bearing defects become evident in the first hours of compressor operation. Warranty consideration for failed compressors and clutches described as noisy will be provided only if there are no obvious signs that the failure was caused by other factors.

### **B4. Unburnished Clutch**

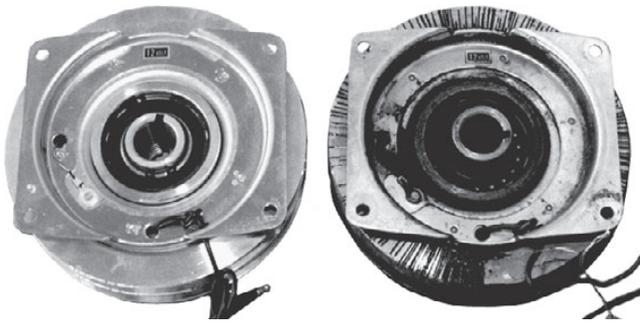
Burnishing is the cycling of the clutch to allow a wearing in of the engagement surface area. The reason for burnishing a clutch is to increase the initial starting torque. Most technicians fail to follow this important procedure when replacing a compressor or clutch. An unburnished clutch can produce a low torque condition, causing the clutch to slip and thereby fail. When replacing a clutch or compressor & clutch assembly, follow this important burnishing procedure. Run the engine at 1,500 to 2,500 RPM. Using the controls on the dash, cycle the clutch ON and OFF at a rate of 10 to 15 times per minute for a total of 50 cycles minimum. This should bring the clutch up to operating torque capacity.

### **B5. Improper Rotor to Hub Air Gap**

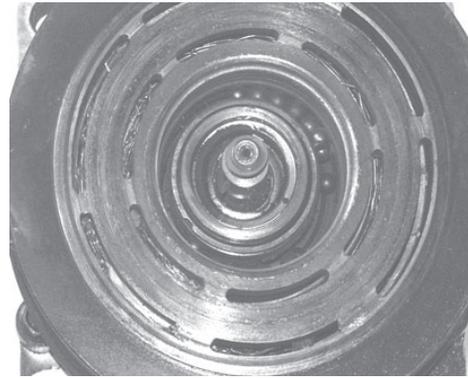
An incorrect air gap can cause a clutch to engage or disengage improperly. This is particularly true on Sanden, Seltec, and Frigidaire/GMC style compressor clutches. Before operating a compressor of this type, check the hub/armature to rotor/pulley air gap. Check the required specifications for your particular type of compressor clutch in the illustrated section of the A/C parts catalog. These clutches may involve adding or removing shims to properly gap the hub. New manufactured compressor & clutch assemblies are properly gapped at the factory. Most clutch failures or problems relating to improper air gap can be traced to improper clutch replacement procedures used in the field. Check to see if this applies before returning possible warranties.

### **B6. Faulty Coil Lead Wire or Inadequate Voltage to Coil**

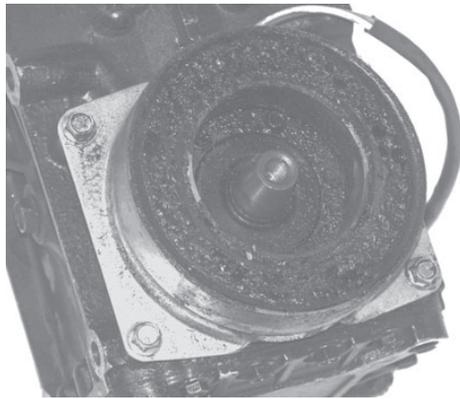
If the lead wire connected to the field coil is faulty, the clutch becomes inoperative. This will be evident at the time of installation, and seldom occurs afterwards. However, evidence of obviously damaged or cut lead wires is not a cause for warranty consideration. There must be adequate voltage to the coil in order for the clutch to function properly. A compressor clutch that fails to engage can usually be traced to an open or faulty circuit. Since many compressor clutches are now equipped with a separate wiring harness to ground the clutch, insufficient grounding of the circuit may be the problem. Compressors returned for warranty which check out to function properly but have evidence of being mounted and cannot be resold as new, will be denied.



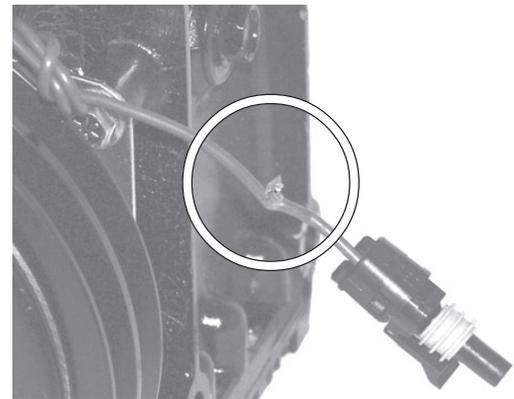
**ILLUSTRATION FOR CONDITION - B1**



**ILLUSTRATION FOR CONDITION - B2**



**ILLUSTRATION FOR CONDITION - B1**



**ILLUSTRATION FOR CONDITION - B6**

### **C. COMPRESSOR FAILURES & CAUSES**

The following are the most frequent types of compressor failures. These can all be traced to a problem in the A/C system. As in the case of the clutch, the compressor is usually not the culprit for the failure.

#### **C1. Seized (Locked Up) Compressor due to Loss of Lack of Lubrication**

Compressor lock-ups also involve the clutch. The clutch's function is to engage and disengage the compressor from the vehicle's accessory drive system. If there is a system problem that prevents proper rotation of the compressor input shaft while the clutch is energized, the clutch will slip. A slipping clutch can generate tremendous heat, up to 1,200 degrees F. In a matter of minutes, components can start to fail. There is a progression of effects generated from slipping, all leading to overall clutch and/or compressor failure.

#### **Causes and Symptoms of seized compressors are listed below:**

- a.) In some ways a compressor can be likened unto the human heart. A continuous loss of blood will starve the heart of what it needs to provide essential nutrients to the entire body. Without an adequate blood supply, it will continue to pump until it collapses and fails. In like manner, a compressor needs oil to function, and relies on the refrigerant to supply what it needs. It is the refrigerant's job to carry the oil through the entire system. A continuous loss of refrigerant will starve the compressor, preventing oil from returning to it, causing it to bind, lockup and fail. Since refrigerant leaks represent the highest rate of failure in A/C systems, many times a lockup occurs simply because the system has lost some or all of its charge.
- b.) Since a number of compressors are being shipped dry, it is up to the installer to determine the proper amount and type of oil to be added. If the technician does not follow the manufacturer's recommendations, the compressor could be damaged due to lack of lubrication. Use of an oil type not designed for a particular style of compressor can also adversely affect the flow of lubrication throughout the system.
- c.) Just as a restriction or blockage in your bloodstream can bring on a fatal heart attack, a blockage or restriction in your A/C system can be fatal to your compressor. A blockage will inhibit or prevent the adequate return of oil needed to lubricate the compressor, thereby causing the compressor and clutch to slip, bind, or lockup.

**(continued)**

## **C. COMPRESSOR FAILURES & CAUSES (cont.)**

### **C2. Seized (Locked Up) Compressors due to Excessive A/C System Pressure**

Every one of the following conditions will increase system pressure. Just as too high blood pressure causes the heart to overwork, and prematurely fail, excessive A/C system pressure can cause the compressor to overwork and begin to seize. This in turn increases the torque requirements of the clutch. The clutch then begins to slip, producing tremendous heat build-up. The clutch bearing fails, and the clutch seizes. As the compressor attempts to continue operating under this overwhelming condition, failure is eminent.

#### **a.) *Incorrect Amount of Oil in System***

Too much oil can cause compressor slugging and a slipping clutch. The compressor is not designed to pump liquids. Excessive oil will also accumulate in the a/c condenser, causing poor performance, and increase system discharge pressures. Not enough oil will cause compressor binding, clutch slipping, and in most cases, a lockup.

#### **b.) *Inadequate Air Flow across the Condenser***

If the condenser is restricted internally, or has inadequate airflow across it, the result is a higher discharge pressure. This can cause the clutch to slip. An inoperative or faulty radiator or condenser fan could also be suspect. Faulty shutter systems or fan clutches likewise cause problems of this nature. A bug shield can impede airflow as well. Any foreign material blocking airflow through the condenser's cooling coils (such as dirt and bugs) will cause inadequate airflow and increased high side pressure.

#### **c.) *A Blockage in the High Pressure Side of the A/C System***

A blockage anywhere in the system will cause the discharge pressure to increase and cause clutch slipping. A blockage can be pinpointed by an immediate temperature (pressure) drop just after it. Remember that a drop in pressure means a drop in temperature, and vice versa. Check the inlet and outlet temperatures of the condenser with an infrared pyrometer. A difference of over 35 degrees can indicate a problem. Another problematic condition can arise when the condenser has been impacted with a heavy load of contaminants (usually after a compressor failure). The entire system needs to be flushed after such an occurrence. A technician attempts to do the job right, flushes the system, and assumes the condenser is clean because the flush came out clean. However, since many newer designs of condensers feature dual pass flow (having two parallel passages), a blockage may exist in only one of the passages. The solvent he is using will actually take the path of least resistance and clean only the unclogged portion of the condenser. This leaves a significant amount of contaminants left in the condenser. As the system is put back into operation, the contaminants will then make their way to other components and cause the slowing or stoppage of lubricant flowing through the system. In some cases, especially on Ford products with an FS10 style compressor, the condenser must be replaced after a major system failure. The proper installation of an in-line filter can also help to avoid this problem.

#### **d.) *System Overcharge***

An overcharged a/c system will cause pressures to increase and cause slipping. Excessive compressor noise is also a symptom of an overcharged system. When checking for an overcharged system, remember to also check for the presence of non-condensable gasses (air). They will also increase system pressures. Faulty recovery machine vent valves, designed to release non-condensable gasses during refrigerant recovery, are prime suspects. Out of sight and mind, your recovery tank could be filled to capacity with an excessive level of air, which is then charged into the next A/C system you encounter. Using a refrigerant identifier or gauge which measures the percentage of non-condensable gas will prevent this from happening.

#### **e.) *Cross Contamination of Refrigerant Types***

The lubricant inside an A/C system will retain a certain amount of the refrigerant, even after normal evacuation. If the system is then charged with a different refrigerant (as in R12 to R134a), there is a certain amount of refrigerant cross-contamination that occurs. Once the original refrigerant is "out-gassed" from the oil, it combines with the replacement refrigerant. This condition can lead to a reduction in A/C performance, and an increase in high side pressure. The abnormal increase in pressure can cause premature compressor failure. Proper A/C flushing and drain procedures should be performed at the time of retrofit to prevent cross-contamination.

#### **f.) *Use of Blends or Non-Approved Refrigerants***

All compressor warranty is limited to the use of either R12 or R134a, with the correct type of oil used for those refrigerants. Use of any other refrigerant will void the warranty on all system components.

#### **g.) *Use of Non-Approved Dyes***

In some cases, use of certain inappropriate brands of aftermarket UV dyes have proven to be detrimental to the system and will cause high pressure situations. If warranty analysis shows any indication of these dyes being present in the compressor, warranty will be refused.

## **The following conditions apply to non-seized compressors**

### **C3. Broken or Deformed Reed Valve**

Symptoms will usually be a lack of cooling associated with unusually high suction (low side) pressure and unusually low discharge (high side) pressure. Complaint may be that the compressor won't pump. Insure that a low refrigerant charge is not related to the problem. Reed valves can also be damaged by an assault of liquid refrigerant. If the evaporator becomes flooded with liquid refrigerant due to a stuck open expansion valve or missing orifice, sufficient evaporation will not take place, and a harmful amount of liquid refrigerant will make its way back to the compressor. A technician dumping a liquid refrigerant charge right into the compressor during servicing can also damage reed valves. A broken reed valve will usually cause a clacking sound at idle. A foreign substance under the reed valve or gasket can also cause a problem in cooling. In addition, it is not uncommon to find a corroded reed valve due to excessive moisture present in the system.

### **C4. Leaking Compressor Shaft Seal**

Another failure that can be attributed to a system problem is a failed compressor shaft seal. While shaft seal failure is often blamed on the manufacturer as a factory defect, remember that an excessive heat/pressure condition in the system can cause a shaft seal to fail and leak. Once the seal leaks, compressor oil also escapes and may find its way into the clutch bearing. This oil can contaminate the bearing grease and lead to grease purging through the bearing seal. If the compressor is being used in an environment where dust and dirt are a real problem, the shaft seal's life will be shortened unless it is protected. Off-road vehicles fall under this class, and usually require compressors with dust seals and covers. Make sure the compressor you replaced was designed for the right application. Overall, shaft seal designs have improved dramatically over the last few years, and a leak usually indicates a problem has occurred somewhere in the system. Following the important procedure of turning a replacement compressor clutch by hand 10-12 times (making certain the shaft rotates) before initially starting the compressor into operation will help avoid premature shaft seal leaks. (also see following condition)

### **C5. Blown Head Gasket**

Symptoms will usually be a lack of cooling associated with unusually high suction (low side) pressure and unusually low discharge (high side) pressure at idle. Run the system for 5 minutes at idle and shut off. Observe time for both pressures to equalize. If it takes less than 2 minutes on a TXV system, a gasket may be damaged or blown. CCOT systems will equalize even more quickly. A blown head gasket is usually the result of excessive head pressure. Determine the cause of the high pressure condition and repair.

### **C6. CCI/York Compressors with Oil Leaks**

Sometimes a warranty is claimed if a compressor is found to be soaked with oil before ever being sold or installed onto a system. This is usually the case when someone notices the compressor's box to be discolored, oil stained, and possibly sitting in a pool of oil, while still on the shelf. Sometimes the oil has even penetrated adjoining compressor boxes alongside. What to do? The compressor(s) are not defective. In nearly every case we have found the following to apply. The compressor's shipping caps, which are plastic, unknowingly become cracked or loosened during shipment. The compressors are then stocked on the shelf in a horizontal position, which allows gravity to take effect and leak oil onto the compressor body and box. Should you find this to happen, do not call for RGA's to return them. The problem is limited to CCI/York style compressors and we can supply replacement boxes for any you might have. Stocking these compressors in the upright position they are intended to be stored will help prevent this from happening. Again, this is not a warranty situation.

### **C7. Mis-Machined Compressor Mounting Boss**

If there is a dimensional problem with the mounting bosses used for attaching the field coil assembly to the compressor, an interference condition may be created between the field coil and rotor assembly. This problem seldom occurs, and is usually associated with using poor quality remanufactured compressors.

### **C8. Re-Machined Compressor Shaft**

During the course of remanufacturing a compressor, the taper of the input shaft may be re-machined. As a result, the shaft will be shortened and less clearance will remain between the clutch and the compressor. This can create interference and hinder the rotation of the rotor assembly. Again, this problem is almost always linked to poor quality remanufacturers using poor quality cores.

**Visual Symptoms of the preceding problems are as follows. See the following illustrations**

1.) *Discoloration of Pulley and/or Armature Disc*

The extreme heat generated from slipping will quickly cause the component(s) to take on a discolored appearance. They will appear “frosted”, or “blued”, or even charred.

2.) *Melting of Rubber Spacers in Armature*

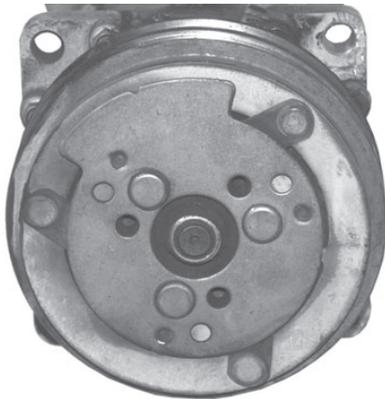
If the slipping continues, the temperature can reach a point where the rubber spacers between the armature plate and disc begin to melt. Not all clutches utilize rubber spacers.

3.) *Melting of Epoxy in Field Coil*

The extreme heat can also affect the field coil, causing the epoxy to show visual signs of melting or “charring”. Under extreme situations, the coil winding will become exposed and/or unseated.

4.) *Melting of Bearing Seal*

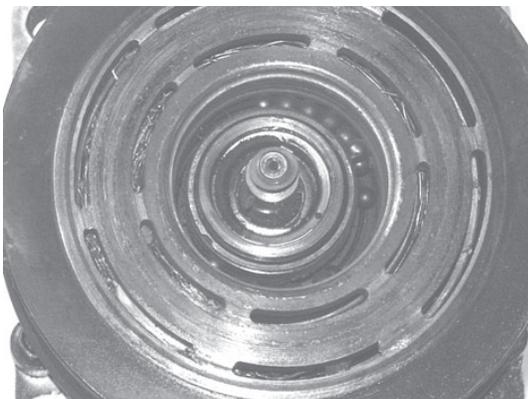
The heat will eventually cause the bearing seal to melt, allowing the grease to escape. Without grease to lubricate the bearing, it is quickly destroyed.



**ILLUSTRATION FOR CONDITION - C1**



**ILLUSTRATION FOR CONDITIONS - C1, C2**



**ILLUSTRATION FOR CONDITIONS - C1, C2**



**ILLUSTRATION FOR CONDITION - C6**

## **D. Installation Related Failures**

The following are the most frequent causes of installation related clutch failures. Please note that clutch failures resulting from improper installation void all possibilities of warranty.

### **D1. Broken Mounting Ear(s) on Compressor**

If the compressor is mounted improperly, or in any way as would subject it to cross-torque on its mounting ears, one or more of the ears will likely crack or break. This may lead to additional damage of the compressor itself. The same problem can occur if the compressor's engine mounting brackets are cracked, warped, or broken. A vehicle with loose or broken motor mounts can also subject the compressor to additional strain and crack or break off its ears. Excessive noise during compressor operation may be evident during these types of situations. Simply replacing the compressor will not fix the problem. Unless the cause of the problem is found and fixed, the likelihood of another broken compressor is high. Many times ears are broken or cracked simply as a result of excessive torque applied during installation of the mounting hardware, such as from use of an impact wrench.

### **D2. Broken (or Stripped) Fittings on Compressor**

Broken fittings can usually be traced to either excessive torque applied during installation of the service valves or hose fittings, such as from use of an impact or oversize wrench, or cross-torque being applied to the fittings. The most common cause stems from one of the hose assemblies (suction or discharge) being replaced with one shorter in length than the original OE hose. As the driver increases engine RPM, torque is applied to the hose. Because of the decreased distance in hose length between the two fitting attachments, the law of least resistance takes effect and the aluminum compressor head fitting snaps off. This may lead to additional damage of the rest of the compressor. Stripped fittings on the other hand, are always due to incorrect fastening techniques on the part of the installer. In some cases a replacement compressor head is available to salvage the loss.

### **D3. Use of Excessive Torque on Compressor Shaft Mounting Bolt**

Broken or twisted clutch shaft bolts are the result of excessive torque applied during installation, such as from use of an impact wrench. Check manufacturer's torque specifications when installing clutch hardware.

### **D4. Loose Field Coil Mounting Bolts**

If the bolts used to mount the field coil are not tightened adequately, vibration from the vehicle will loosen the bolts and cause the coil to become loose. Eventually the field coil will begin to contact the rotor assembly, as evidenced by rubbing on the field core outer diameter. This rubbing can generate heat that melts the field coil epoxy, leading to an open circuit and inoperative clutch. This condition is specific to CCI/York/Tecumseh style compressors. The replacement clutches for these compressors are now normally supplied with special thread-lock treated fasteners. New CCI Compressor & Clutch assemblies are already equipped with them. Use of the fasteners normally solve this kind of problem, unless a severe vibration problem exists.

### **D5. Short or Open Circuit in Field Coil Wire**

If the clutch lead wire is routed in such a way as to subject it to possible rubbing or cutting by another object, the wire's insulation can be rubbed through and the bare wire exposed. A short circuit or open circuit will likely develop, causing the clutch to become inoperative. This type of failure is evidenced by a lead wire worn down to bare metal in one or more locations along its length, or a lead wire that gets cut in half.

### **D6. Improperly Installed Coil Ground Wire**

On CCI/York/Tecumseh style field coils, the ground wire terminal should be installed on top of the coil mounting flange. If the terminal is improperly installed underneath the flange (touching the compressor), the alignment of the outer coil and inner pulley interface will be adversely affected and create the potential for rubbing between the rotor and coil assemblies.

### **D7. Shaft Key not Seated Properly in Armature Hub**

If the key is not properly inserted into the keyway on the compressor input shaft during a clutch installation, a severe misalignment of the pulley relative to the shaft will occur. This misalignment will create interference between the rotor and field coil assemblies. Evidence of severe rubbing of the pulley on the field coil will be present.

### **D8. Improperly Installed or Wrong Snap Ring**

Use of a wrong snap ring, or an improperly installed snap ring on the field coil or pulley can cause the clutch to be noisy, fail to disengage, or in some cases come completely off. Resultant clutch damage can follow. This is especially true on some Ford FS6 compressor clutches, where several types and thicknesses of snap rings were originally used. Consult manual for further instructions.

*(continued)*

## D. Installation Related Failures (cont.)

### D9. Mismatched Clutch Components

Especially in the case of Ford FS6 and FX15/FS10 type clutches, complete replacement of the clutch and coil assembly is required. Original or replacement Ford O.E. clutch components cannot be mixed with aftermarket type clutch components (such as a Ford O.E. coil and an aftermarket pulley and hub). Mixing these different types of components together can cause clutch failure and/or faulty clutch operation.

### D10. Failure to Service A/C System Properly

All compressor manufacturer warranty policies stipulate that in order for the compressor to be eligible for warranty, all proper A/C procedures must be followed, and the following items must be replaced: Accumulator or Receiver Drier, Orifice Tube (if equipped). If a compressor failure was involved, the system must be flushed with an approved liquid flush solvent, and the expansion valve should be checked for contamination or replaced. Proof of replaced parts and copy of invoice showing all services performed are required.

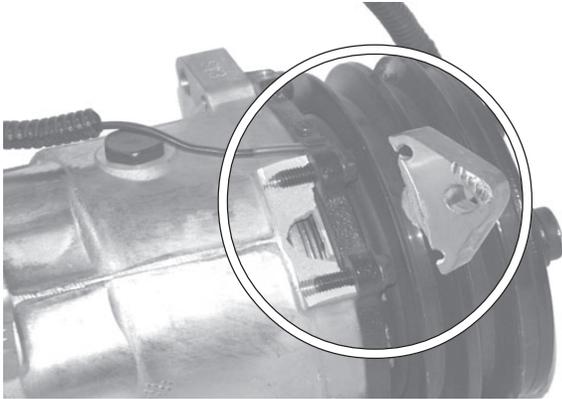


ILLUSTRATION FOR CONDITION - D1

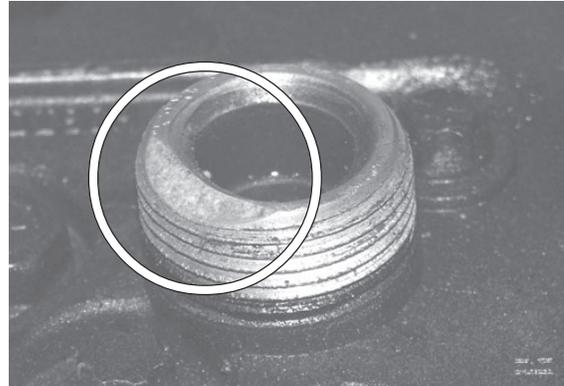


ILLUSTRATION FOR CONDITION - D2



ILLUSTRATION FOR CONDITION - D3



ILLUSTRATION FOR CONDITION - D4

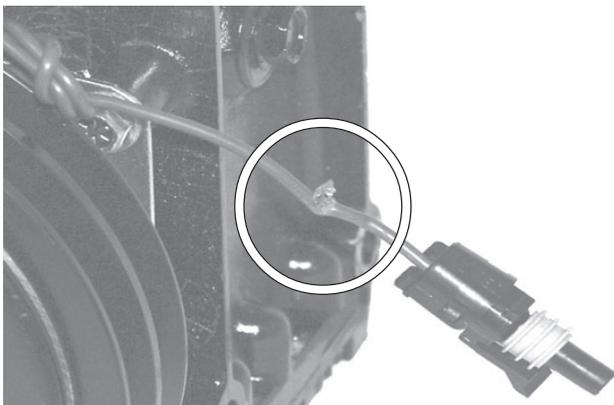


ILLUSTRATION FOR CONDITION - D5

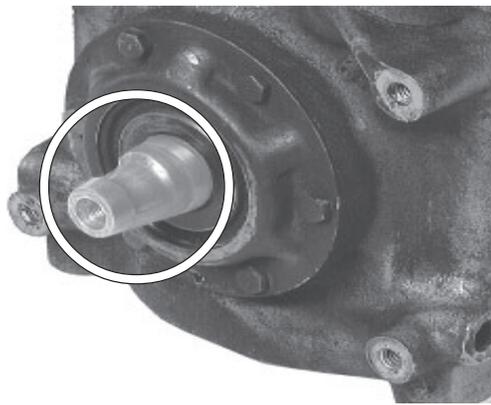


ILLUSTRATION FOR CONDITION - D7

**E . Failure Summary Chart - Use this chart to compare possible warranty compressors you have to return**  
**IMPORTANT-ANSWER ALL QUESTIONS 1-19 BEFORE PROCEEDING TO EXPLANATION CHART**  
**(If any listed condition exists, answer YES)**

Refer to the Failure Explanation(s) indicated on the following page.

1. Are there obvious signs of discoloration (frosting, blueing, or charring) on the clutch?  
**Yes** Go to A                      **No** proceed to next question
2. Is the compressor locked up?  
**Yes** Go to A                      **No** proceed to next question
3. Does the clutch show any signs of melting, or missing parts?  
**Yes** Go to B                      **No** proceed to next question
4. Is the clutch bearing seal deteriorated? Has grease escaped? Is it stiff or seized or gritty?  
**Yes** Go to B                      **No** proceed to next question
5. Is the clutch's condition similar to any of the photos on the previous pages?  
**Yes** Go to C                      **No** proceed to next question
6. Are any of the ears broken or cracked?  
**Yes** Go to D                      **No** proceed to next question
7. Are either of the fittings on the rear (or top) head broken, cracked, damaged, or stripped?  
**Yes** Go to E                      **No** proceed to next question
8. Was the compressor received back without any oil in it?  
**Yes** Go to F                      **No** proceed to next question
9. Is the oil inside the compressor black or discolored, gritty, or show signs of contamination?  
**Yes** Go to G                      **No** proceed to next question
10. Does the nature of defect have to do with the clutch not engaging/disengaging, or slipping?  
**Yes** Go to K, O, & P              **No** proceed to next question
11. Is the nature of defect associated with either "not pumping" or "insufficient pressure"?  
**Yes** Go to L                      **No** proceed to next question
12. Is the shaft seal leaking?  
**Yes** Go to H                      **No** proceed to next question
13. Was the failed compressor put on as part of a retrofit installation (R12 to R134a)?  
**Yes** Go to I                      **No** proceed to next question
14. Is the compressor an unsold/uninstalled CCI/York style upright and is the box oil soaked?  
**Yes** Go to J                      **No** proceed to next question
15. Is the compressor a remanufactured unit? Does the clutch show signs of interference?  
**Yes** Go to L & O                  **No** proceed to next question
16. Did you check the date on the ID tag? Does it indicate the compressor is over 24 months old?  
(see illustration on page 12)  
**Yes** Go to M                      **No** proceed to next question
17. Is the problem noise related, with all the clutch components (incl. bearing) appearing to be OK?  
**Yes** Go to N                      **No** proceed to next question
18. Does the clutch fail to engage or disengage properly?  
**Yes** Go to O & K                  **No** proceed to next question
19. Does the manufacturer' tag indicate this to be the OE compressor? (see illustration page 11)  
**Yes** Go to Q                      **No** go to R

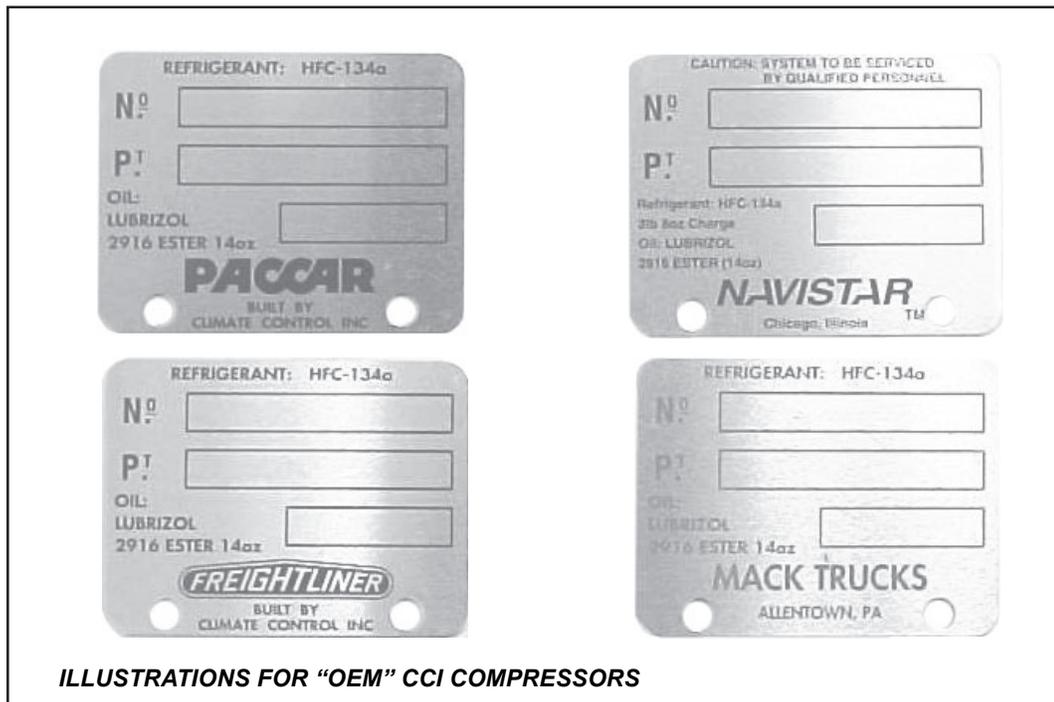
**F. Failure Explanations (refer to Failure Summary Chart on previous page)**

- A. Failure of clutch and/or compressor is due to (1) a seized or slugging compressor and/or (2) may be the result of excessive a/c system pressure, and/ or (3) insufficient voltage to coil. Clutch may be seized or burnt, or slipping. Evidence of extreme heat build-up. **No warranty allowed. Read all of Section B and C. (both causes and symptoms). Note: If the problems which caused the clutch to fail are not remedied, the probability is high that simply installing another compressor will result in a repeated failure.**
- B. Failure of clutch and/or compressor is due to (1) slippage caused by loss/lack of lubrication, and/or (2) excessive pressure in system, and/or (3) insufficient voltage to coil, and/or (4) improper procedures used during repair/installation, and/or (5) a seized-up compressor, and/or (6) mismatched clutch components used during installation of compressor. The clutch was subjected to extreme heat. **No warranty allowed. Read all of Section B, and Section C1a-c, and C2a-f.**
- C. Failure of clutch does not meet warranty conditions. See A & B explanations above. **No warranty allowed. Read all of Sections B and C.**
- D. There is no warranty for compressors returned with broken or cracked mounting ears. This is a result of an installation or mounting bracket problem. **No warranty allowed. Read Section D1.**
- E. There is no warranty for compressors returned with broken, cracked, damaged, or stripped fittings. This is a result of either faulty installation procedures, or having been dropped and damaged. It may be related to a cross-torque condition being applied to the fitting under high RPM's. **No warranty allowed. Read Section D2.**
- F. Failure of compressor is due to loss or severe lack of lubrication. Possibly lost most or all of refrigerant charge. A blockage in the system may exist. Even if not totally seized, compressor was operated for an undetermined period of time in an oil-starved condition. It likely has internal damage and/or advanced stages of wear. Determine problem and fix before installing another compressor. **No warranty allowed. Read Sections C1a thru C1c, and C2a.**
- G. Failure of compressor is due to contamination in the system. May not have been properly flushed when compressor was initially installed. Drier may have not been replaced. System may have been cross contaminated if retrofitted. Condition may also be due to use of incorrect type of oil or use of unapproved UV dyes. **No warranty allowed. Read Sections C2c, C2e, f,g and D10.**
- H. **Possible warranty.** Make sure the compressor was not operating under excessive pressures. Determine if this is an off-road application. **Read Section C4 before returning. See R below.**
- I. **Possible warranty.** Determine who performed the initial repair. Were all the proper procedures performed? What are the symptoms if all the other tests passed OK? **Read all of Sections C and D10 before returning. See R below.**
- J. **This is not a warranty related problem.** The shipping caps are either cracked or loose. The box is being stored in a horizontal position, rather than upright as it should. The compressor is still good and usable. Do not return! **Read Section C6.**
- K. An open circuit may exist in the field coil. Possibility exists that A/C thermostat or pressure switch has a malfunction. **Possible warranty.** Check the circuit for continuity to positively identify the coil as the source of the problem. Resistance will be infinite if coil has "open circuit". If coil has a "short circuit", resistance value will be between zero and 3.16 to 3.5 on 12-volt coils; and between zero and 13.3 on 24-volt coils. An ohmmeter with temperature compensation should be used for resistance specification tests. **Read Section B6 before returning. See R below.**
- L. Insure that the clutch is actually engaging. If not, fix problem. If it still won't engage, the compressor has possible failed internal parts, a blown or damaged reed valve, or leaking gaskets/seals. If originally attached with clutch and signs of clutch interference are evident, the possibility of defective workmanship may apply. If all other outward observations have proven OK, make sure there are no system problems responsible for the problem. Read the causes of blown reed plates or gaskets and how to check for these in **Section C3 & C5.** If tests reveal one of these conditions, warranty may be void. **Possible warranty only. Also read Sections C8 and D10 before returning. See R below.**
- M. Compressors with date tags indicating the unit is over 24 months old may not be returned. Except under rare circumstances where proof can be submitted showing the unit was recently sold & installed, the 1 warranty period has graciously expired. **No warranty allowed.**

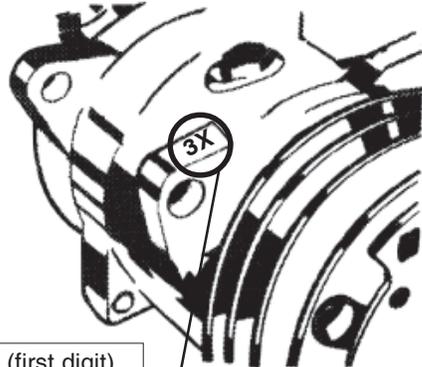
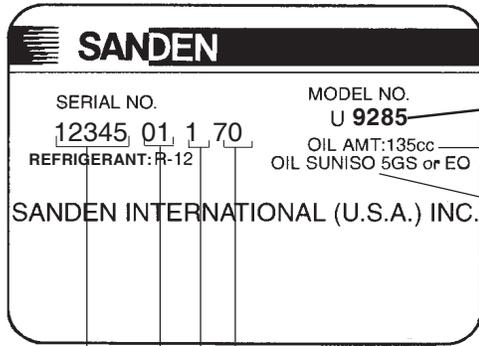
- N. Noise associated problems can vary. The noise may be due to a misaligned, improperly tensioned, or slipping belt, or failing idler pulley. Or the possibility exists that either the clutch is incorrect or contains improperly installed components. Also check for a loose or cracked compressor mounting bracket. Noise problems can also be due to low oil level (compressor will be very hot to touch) or an overcharged system (a rumbling noise or vibration in the high pressure line usually present). A broken reed valve will also cause excessive noise). **No warranty allowed. Read Sections D1, D4, D7, D8, D9, and D10. Also see Belt Tension chart on page 11.**
- O. Clutch rotor/pulley and hub/armature may not be properly gapped. Clutch may have been improperly installed with wrong snap ring, or contain mismatched components. Follow proper installation procedures to gap the hub before submitting for warranty. Also check for adequate voltage to coil if either procedure does not fix problem. **Possible warranty. Read Sections B5, B6, D4, and D5 before returning. See R below.**
- P. Clutch slippage can be contributed to a number of problems. Check first for proper voltage to coil. Diagnose electrical system and repair. **No warranty allowed. Read Sections B4, B5, B6, and B7.; and all of Section C (both causes and symptoms); and D5. Also see Belt Tension chart.**
- Q. This is the original compressor that was installed from the factory. It is not a part that was sold or installed in the field. **No warranty allowed. Do not return.**
- R. If all visual checks are OK, and all questions on page 9 have been answered No, possibility of warranty is good. However, all warranty determination shall be made according to the compressor manufacturer's warranty policy. Any warranty given shall be for the part only and will not include any related expense such as freight, labor, refrigerant, or otherwise. No liability or responsibility is accepted resulting from any consequential or incidental damages pertaining to warranties. Please note that all compressors returned for warranty must have the shipping caps in place to prevent moisture, dirt, and foreign substances from entering the compressor. Compressors returned with open non-capped ports will most likely void any warranty otherwise due.

<b>Belt Tention Specifications</b> (recommended for maximum clutch bearing life)					
Grooves	Belt Wdth	Tention (lbs.)	Grooves	Grv Wdth	Tention (lbs.)
1 or 2	1/2"	121 (+ -) 5	6 Multi	1/8"	180 (+ -) 5
1 variable	1/2" - 9/16"	132 (+ -) 5	7 Multi	1/8"	210 (+ -) 5
1	5/8"	132 (+ -) 5	8 Multi	1/8"	240 (+ -) 5
			10 Multi	1/8"	300 (+ -) 5

(Tolerance + - 4.95 lb: Multi Grooves bases on 30 lb per groove)



**ILLUSTRATIONS FOR COMPRESSOR DATE CODES**



Serial Number \_\_\_\_\_  
 Month of Manufacture \_\_\_\_\_  
 Year of Manufacture \_\_\_\_\_  
 Country Code \_\_\_\_\_

00-06	Japan
70-79	USA
80-89	Singapore

**Part Number**

Lubricant Amount

Lubricant Type

Year of Manufacture (first digit)  
 Month of manufacture (last digit)  
 Jan-Sept.: 1-9  
 Oct.: X  
 Nov.: Y  
 Dec.: Z



Lubricant Type \_\_\_\_\_

Refrigerant Type \_\_\_\_\_

Designates Year of Manufacture:  
 0 Represents 2000

Type and Model

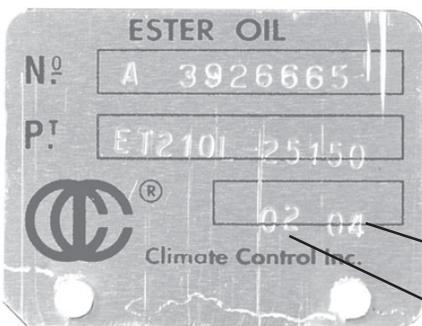
Seltec Body Assembly Number

Serial Number

Lubricant Amount

Month Produced:  
 1-6 January thru June  
 7-12 July thru December

Decade Code:  
 4 Represents first half of 1980's  
 5 Represents second half of 1980's  
 6 Represents first half of 1990's  
 7 Represents second half of 1990's  
 8 Represents first half of 2000's



Year of Manufacture

Month of Manufacture