

COMPRESSOR CLUTCHES



**8088
GM-A6
(Includes dust shield
& rear coil seal)**



**12431
GM-A6
(No coil see Pg B-9)**



**Nippondenso
600-3020
600-3025**



**Nippondenso
600-3007
600-3013
600-3017
600-3000**

**Sanden
8311
8450
8470
8440
8455**



**SANDEN
8306
8462
8464
8465
9575C
9676C**



**SANDEN
8297
8298
8299
8411
8412
8420
8425
8435
8445**



**TEC-YORK-TCCI
75R0452
75R3502
75R4502
75R4534
8295**



**TEC-YORK-TCCI
75R1202 HD**



**TEC-YORK-TCCI
75R2552
75R4652
75R1802AM
5063**



CLUTCHES

Part No.	Dia.	No. of Grooves	Groove Width	Type of Comp.	Gauge Line Measurement (See A)	Volts	Notes	Compressor Model
600-9716	4 1/2"	4	Serp.	Sanden	N/A	12 V	3	8148
8311	4 5/8"	7	Serp.	Sanden	1 27/32"	12 V	2 4	5791
8416	4 5/8"	8	Serp.	Sanden	N/A	12 V	3	7492
8450	4 5/8"	6	Serp.	Sanden	1 27/32"	12 V	3, 4	8026
8470	4 5/8"	8	Poly	Sanden	1 13/16"	12 V	3, 4	4711
600-3025	4.9"	8	Serp.	Nipp	1 3/16"	12 V	N/A	CO03120
600-3040	4.9"	8	Serp.	Nipp	N/A	24 V	6	N/A
600-3043	4.9"	8	Serp.	Nipp	N/A	24 V	7	CO03143, CO03121
8411	5"	2	1/2"	Sanden	1 9/16"	12 V	3	7851/7819
8440	5"	6	Serp.	Sanden	1 7/16"	12 V	3, 4	4600
8462	5"	1	1/2"	Sanden	1 9/16"	12 V	2	4504
600-3060	5 1/8"	9	Serp.	Nipp	N/A	12 V	8	CO03290, CO03296
600-9852	5 1/8"	8	Serp.	Sanden	1 11/32"	24 V	3	4726
600-3012	5 1/4"	1	1/2"	Nipp	N/A	24 V	N/A	CO031224/CO03161
600-9003	5 1/4"	2	1/2"	Sanden	1 9/16"	12 V	2, 6	5708
8297	5 1/4"	2	1/2"	Sanden	1 9/16"	12 V	2	8390/9103/9120
8299	5 1/4"	2	1/2"	Sanden	1 9/16"	24 V	2	8399/9105/9674
8412	5 1/4"	2	1/2"	Sanden	1 9/16"	12 V	3	4617
8435	5 1/4"	2	1/2"	Sanden	2 1/8"	12 V	3	4626
8445	5 1/4"	2	1/2"	Sanden	1 9/16"	12 V	3, 6	4664/4643
8455	5 1/4"	8	Serp.	Sanden	1 11/32"	12 V	3, 4	4637/4738
600-3005	5 3/8"	2	1/2"	Nipp	N/A	12 V	6	CO03119
8420	5 1/2"	2	1/2"	Sanden	1 9/16"	12 V	3	8088
8421	5 1/2"	2	1/2"	Sanden	1 9/16"	12 V	3	7952
8465	5 1/2"	1	1/2"	Sanden	1 9/16"	12 V	3, 4	4604
8088 (AM)	5 5/8"	1	1/2"	GM-A6	N/A	12V	5	04005
600-3020	5.7"	8	Serp.	Nipp	1 13/32"	12 V	N/A	CO03140
600-3000 (AM)	5 3/4"	1	1/2"	Nipp	0.69"	12 V	N/A	CO03116
600-3007	5 3/4"	1	1/2"	Nipp	1/2"	12 V	N/A	CO03135
600-3013	5 3/4"	1	1/2"	Nipp	1/2"	12 V	N/A	CO03130
600-3015	5 3/4"	1	1/2"	Nipp	N/A	24 V	7	CO03150
600-3017	5 3/4"	1	1/2"	Nipp	1 1/4"	12 V	N/A	CO03125
600-3045	5 3/4"	8	Serp.	Nipp	N/A	24 V	7	CO03145
8464	5 7/16"	1	1/2"	Sanden	1 9/16"	12 V	3	4661
600-3009	6"	1	5/8"	Nipp	N/A	12 V	7	10PA17C
600-3014	6"	1	1/2"	Nipp	N/A	24 V	N/A	CO031226
600-3018	6"	1	5/8"	Nipp	N/A	24 V	N/A	CO03124
600-9851	6"	8	Serp.	Sanden	N/A	12 V	3	4768
75R0452	6"	2	1/2"	Tec/York	1 5/8"	12 V	1	N/A
75R1202	6"	2	1/2"	Tec/York	1 5/8"	12 V	1	N/A
8295	6"	2	1/2"	Tec/York	2 1/4"	24V	1	N/A
8298	6"	2	1/2"	Sanden	1 9/16"	12 V	2	8387/9571

Note:1. These clutches come complete with 2 Row H.D. Bearing **2.** For Sanden SD508, 510 Compressors **3.** For 7H15 6. 2 wire
4. (A) Measurement is from front mounting ear to center of poly V groove that is farthest from the front mounting ear. **5.** With Dust Cover
(R) Remanufactured **6.** For Nippondenso 10PA15C **7.** For Nippondenso 10PA17C **8.** For Nippondenso 7SBU16C

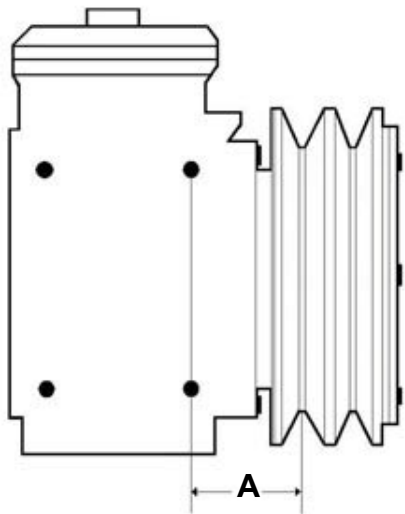
CLUTCHES

Part No.	Dia.	No. of Grooves	Groove Width	Type of Comp.	Gauge Line Measurement (See A)	Volts	Notes	Compressor Model
8306	6"	1	5/8"	Sanden	1 11/32"	12 V	2	8478
8425AM	6"	2	1/2"	Sanden	1 9/16"	12 V	3	4609
9675C	6 1/4"	1	1/2-3/4"	Sanden	1 9/16"	12 V	2	9119/9675
9676C	6 1/4"	1	1/2-3/4"	Sanden	1 9/16"	24 V	2	9122/9676
75R2552	6.7"	1	.60	Tec/York	3 1/8;	12 V	N/A	N/A
75R3002	6 3/4"	1	1/2"	Tec/York	2 3/4"	12 V		
75R1802AM	6 3/4"	1	5/8"	Tec/York	2 3/4"	12 V	N/A	N/A
75R3502	6 3/4"	2	1/2"	Tec/York	2 1/4"	12 V	1	N/A
12431	6 7/8"	1	1/2"	GM-A6	N/A	N/A	No Coil	04008/04016
75R4502	7"	2	1/2"	Tec/York	2"	12 V	N/A	N/A
75R4534	7"	2	1/2"	Tec/York	2"	24 V	Was 8296	N/A
5063	7 3/8"	1	25/32"	Tec/York	2"	12 V	1	N/A

Note:1. These clutches come complete with 2 Row H.D. Bearing **2.** For Sanden SD508, 510 Compressors **3.** For 7H15 6. 2 wire
4. (A) Measurement is from front mounting ear to center of poly V groove that is farthest from the front mounting ear. **5.** With Dust Cover
(R) Remanufactured **6.** For Nippondenso 10PA15C **7.** For Nippondenso 10PA17C **8.** For Nippondenso 7SBU16C

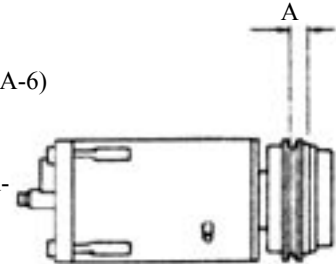
Clutch Identification - For measuring Gauge Lines on Compressors

For measuring clutch on and off vehicle with Tecumseh (Cast Iron) and York (Aluminum) Compressors.

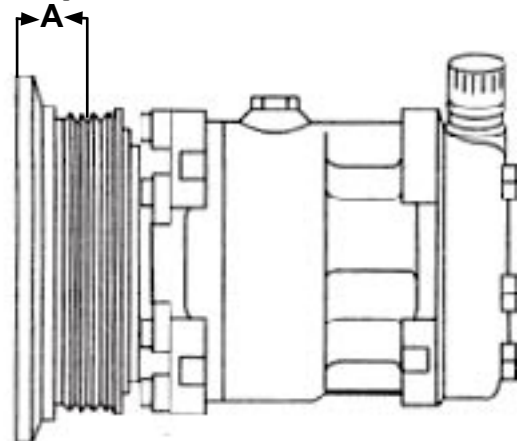
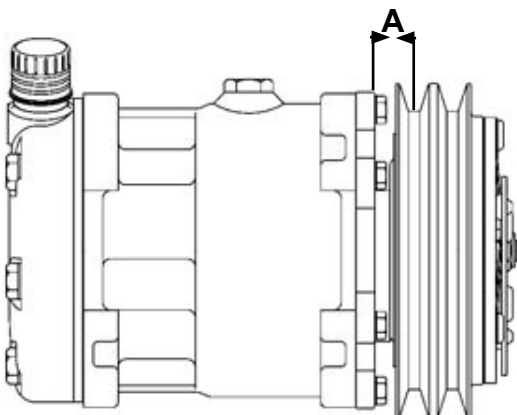


G.M. Frigidaire (A-6)








A= From face of rotor to mid-point of pulley groove



For measuring clutch on and off vehicle with Sanden Compressors



CLUTCH BEARINGS




	APPLICATION	O.D.	I.D.	THICK	PART NO.
	Clutch Bearing for Pitts, Ogura Clutches Wider Inner Race than Outside Race	2 7/16"	1 3/16"	5/8"	10908
	Heavy Duty Pitts Clutches	2 7/16"	1 3/16"	1 1/16"	10909
	Visual Comparison 8062, 8296, 04035, 04065	2 7/16"	1 3/16"	5/8"	10912
	Clutch Bearing for 10PA15, 10PA17, 10PA20, TV12C, TV12EC, TV12SC, TV14C, 10S17C Nippondenso Compressors	2 3/64"	1 3/16"	7/8"	10913
	Clutch bearing for John Deere Nippondenso 6E171 Ear Mount Compressor, 50, 55, 60 Series Tractors	2 1/4"	1 1/2"	3/4"	10914
	GM Clutch A-6	2 7/16"	1 9/16"	13/16"	12589 (STD)
					12590 (HD)
	Sanden Clutches For SD5 Compressors	2 7/16"	1 9/16"	15/16"	52560
	Sanden Clutches For SD7 Compressors	2 5/32"	1 3/8"	25/32"	52565






SANDEN CLUTCH PARTS






Clutch No.	Description	Accessory Kit	Bearing	Coil	Dust Shield Clutch
8297	2GrA-12V-5 1/4"	54201	52560	54202	75R5005
8298	2GrA-12V-6"	54201	52560	52976	75R5005
8299	2GrA-24V-5 1/4"	54201	52560	52979	75R5005
8300	2GrA-24V-6"	54201	52560	52980	75R5005
8306	1GrB-12V-6"	54201	52560	52976	75R5005
8307	1GrB-24V-6"	54201	52560	52980	75R5005
8420	2GrV-12V-5 1/2"	--	52565	--	36573
9675C	1GrA-C12V-6 1/4"	54201	52560	52992	440-618
9676C	1GrA-C24V-6 1/4"	54201	52560	52994	440-618
8412	2GrA-12V-5 1/4"		52565	75R5112	
SD709	2GrA-24V-5 1/4"		52565	75R5114	

Sanden Coil Wires
 Black or Blue Wire 12 Volts
 Green Wire 24 Volts

OTHER SANDEN COILS

	APPLICATION	O.D.	I.D.	THICK	PART NO.
	New 12 Volt Coil For Sanden SD508, SD510, With 5.98" 2 Groove Sealed Clutch, with Dust Seal, 2 wire	4 3/64"	2 13/16"	1 1/2"	610-915
	New 12 Volt Coil For Sanden SD709, SD7H15, with 5.98 2 Groove Clutch, 2 Wire	4 3/64"	2 13/16"	1 1/2"	610-985
	New 24 Volt Coil For SD709, SD7H15 with 4.92" and 5.19" 2 Groove Clutch	3.775"	2.525"	1 1/2"	610-972

GM A6 Clutch Parts			
	CLUTCH HUB		PART NO.
	All GM w/1 groove pulley	--	12197
	CLUTCH COIL		
	12 V Coil-Flat Terminals		12417
	24 V Coil-Bullet Terminals	--	12420
	GM Clutch Dust shield	--	12440
	GM Rear Coil Seal	--	12445
	Bearing Seal Kit Fits A6 Compressors on agricultural applications	--	47251

John Deere Nippondenso Clutch Parts					
	DESCRIPTION				PART NO.
	John Deere Ear Mount Compressor Clutch Dust Cover				36574
	DESCRIPTION				PART NO.
	John Deere Direct Mount Compressor Clutch Dust Cover				36577
	DESCRIPTION	O.D.	I.D.	THICK	PART NO.
	New 12 Volt Coil, 10PA17C, 2 Wire	3.812"	2.435"	1.080"	610-300
	DESCRIPTION	O.D.	I.D.	THICK	PART NO.
	New 12 Volt Coil, 10PA15C, 3 Wire	3.3/4"	2 1/2"	1 1/8"	610-305
	DESCRIPTION	O.D.	I.D.	THICK	PART NO.
	New 24 Volt Coil, 10PA17C, 10PA15C	3.812"	2.435"	1.080"	610-310

12401 
7000 Series Allis Chalmers
Compressor Belt Idler Pulley

GM-A6
Shaft Key

41241

York (CCI) Tecumseh
Compressor Shaft Key

41243

Sanden Compressor
Shaft Key

52545

HECO CLUTCH PRICES

Prices are Subject to change without notice

Part No	Price	Comment
10908	\$56.25	
10909	\$35.00	
10912	\$20.00	
10913	\$40.00	
10914	\$43.70	
12197	\$40.00	
12401	\$45.00	
12417	\$49.95	
12420	\$50.00	
12431	\$250.00	
12440	\$13.00	
12445	\$1.00	
12589	\$25.00	
12590	\$0.00	R/B 12589
36573	\$25.00	
36574	\$20.00	
36575	\$30.00	
36577	\$25.00	
41241	\$0.75	
41243	\$0.50	
47251	\$0.00	N/A
5063	\$175.00	
52545	\$0.75	
52560	\$20.00	
52565	\$15.00	
52976	\$60.00	
52979	\$40.00	
52980	\$50.00	
52992	\$50.00	
52994	\$70.00	
54201	\$6.50	
54202	\$50.00	
600-3000	\$275.00	
600-3000AM	\$125.00	
600-3005	\$220.00	
600-3007	\$160.00	
600-3009	\$220.00	
600-3013	\$175.00	
600-3015	\$220.00	
600-3017	\$220.00	
600-3020	\$130.00	
600-3025	\$200.00	
600-3040	\$249.85	
600-3043	\$225.00	
600-3045	\$175.00	
600-3060	\$150.00	
600-3100	\$153.30	
600-9003	\$200.00	
600-9716	\$200.00	
600-9851	\$200.00	

Part No	Price	Comment
600-9852	\$225.00	
610-300	\$70.71	
610-305	\$70.71	
610-310	\$75.00	
610-915	\$102.15	
610-985	\$102.15	
75R0452	\$111.35	
75R1202	\$112.83	
75R2552	\$211.38	
75R3502	\$160.45	
75R4502	\$135.28	
75R4534	\$124.71	
75R4652	\$0.00	R/B 5063
75R5005	\$24.81	
75R5006	\$0.00	R/B 440-618
75R5112	\$78.35	
75R5114	\$90.80	
8088	\$200.00	
8088AM	\$75.00	
8088R	\$0.00	N/A
8279	\$475.00	
8295	\$118.95	
8297	\$100.00	
8298	\$165.00	
8299	\$150.00	
8306	\$200.00	
8311	\$100.00	
8411	\$125.00	
8412	\$130.00	
8416	\$130.00	
8420	\$250.00	
8421	\$178.57	
8425AM	\$105.00	
8435	\$200.00	
8440	\$200.00	
8445	\$150.00	
8450	\$225.00	
8455	\$225.00	
8462	\$275.00	
8464	\$233.75	
8465	\$233.75	
8470	\$125.00	
9676C	\$100.00	
CC10300	\$60.00	

Clutch Section



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(Article in portion is taken from IMACA Shop Talk)

HOW TO AVOID CLUTCH PROBLEMS

What are these applications problems that cause clutch failures? Clutch slippage is the most common complaint, but it's not always readily obvious why the clutch slips. Low voltage and high compressor demands are probably the most troublesome. Unfortunately, these can both be present at the same time.

LOW VOLTAGE

Low voltage has become chronic on many vehicles. Smaller batteries, and conductors, versus more electrical load, are draining the battery so that 9-11 volts is all that most clutches see, even on new vehicles! It's true we have decreased the engagement voltage on all 12 volt clutches, so we're sure they will engage at 10 volts. This does not mean they will operate a compressor under severe conditions at 10 volts.

OVERLOADING

Excessive loads from the compressor comes from both over charging and loss of charge. High discharge pressure is generally the result of extremely high ambient temperatures. This added load on the clutch comes when the high temperature has caused the clutch current to drop as coil resistance increases. This begins to explain why most clutch complaints come about the end of July every year. We call this the July Syndrome.

You would think that with the clutch capable of developing about two or three times the torque required to drive the compressor at normal conditions, there would never be a slipping problem. This is why we don't require clutch burnishing on most installations. A brand new clutch still will develop about 1-1/2 times the torque to drive the compressor and steadily improve as it is cycled until it reaches peak efficiency.

high temperatures and high head pressure combine to whittle away at the reserve and we have a problem.

OTHER PROBLEMS

Other adverse conditions are rare, but still of interest and should be checked. Oil on the clutch face from leaking compressor seals has destroyed many clutches. Grease from the clutch bearing can do the same thing. A grease retainer is designed in the clutch to minimize this, as well as controlled specs on the grease fill in the bearing itself--but, it still can happen. Severe dust on "off-road" applications significantly shortens bearing life.

Bearing failures can also be started from excess belt tension and from brinnelling upon installation to the shaft. When the clutch hub is placed off the key, sometimes a bolt will be run in forcing the key into the side of the hub. This causes hub expansion and bearing brinnelling. Obviously, the clutch won't turn without rubbing on the field coil, but even if it is corrected and the keyway lined up properly, the bearing may fail early. Incidentally, this "key-off" condition is a major cause of coil failure although the total numbers are very low. Many coil failures are really a result of excessive clutch slippage transferring heat to the coil face thus burning the potting compound and winding.

When a compressor locks up, the clutch has to slip. This cause of failure is hard to analyze except by the technician who replaces both assemblies. A service report with the clutch can help in analyzing the conditions.

Excessive vibration of the engine causes clutch failures. Some engines create a "G" force of 15 G's, or more, at the clutch. This may cause a rattle of the armature against the pulley when the clutch is disengaged. Usually, this happens at a high speed and it is not noticed when checking out an A/C unit in the shop. Driving a diesel truck down the highway all winter with the clutch rattling will wear the armature so that when it has to engage it has lost torque and slips. This rattling is also the cause of spring breakage, another rare occurrence, but when it happens there may be an epidemic. Six spring clutches are available to eliminate these problems.

TROUBLESHOOTING

Some tips that will help the technician diagnose or prevent problems:

1. One tool we recommend be available, and used regularly is a good voltmeter. Check the clutch voltage to ground when the system is operating; **everything** is on lights, engine running, fans, etc. If it's around 11 volts or less, better check some more installations. You may need an 11 volt clutch.
2. When installing a clutch, be sure it seats on the shaft and key and use a torque wrench to properly torque the field coil and shaft bolts.
3. Cycle a new clutch as much as practical after installation (as much as 200 cycles). This increases the torque greatly.
4. On diesel engines and four-cylinder engines, run the engine speed up and down while watching the disengaged clutch.
5. The cause of rubbing of the pulley on the field coil is often loose field coil screws. Elongated holes, broken tabs, etc. are the result of loose screws. These must be torqued as specified.

In conclusion please remember, things are not always as they appear and just because a failure has occurred does not always justify blaming the part that failed.

SOME CAUSES OF BURNED CLUTCHES

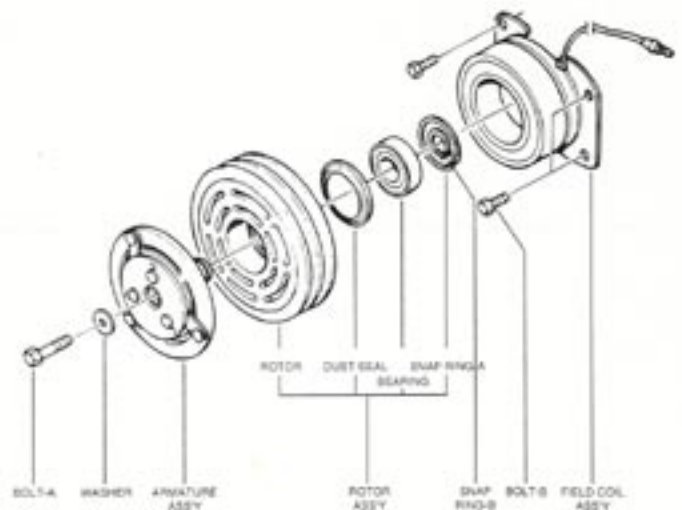
When a clutch is removed from a compressor and set aside for examination, most of the clues to cause of failure are lost. A pulley assembly, separated from the coil and compressor, cannot yield as many clues as being able to analyze the application before it is removed. Nevertheless, we have searched out enough clues to establish a pattern in these "burned clutches".

The usual explanation for a slipping clutch is "lack of torque." Of course, this is the obvious answer, as the clutch wouldn't slip if it transmitted more torque than the load. At the factory the clutch is torque tested after rigid inspection of face flatness, electrical characteristics, and dimensions of the magnetic paths. With all this, why do we still see some clutch failures?

Two things happen in these rare cases. (1) The clutch torque decreases due to application problems, or (2) the compressor load increases. A normal clutch has about twice the torque capacity to drive a compressor under high load conditions. A normal clutch is one operating from a full 12 volts, cycling under a hood on a warm engine in fairly clean compressor installation. The normal compressor does not purge oil or operate over 350 p.s.i.g. head pressure. These severe conditions can become more severe. The voltage can decrease, the temperature under the hood can increase, head pressure increase, etc. Even then, it is unlikely that a clutch would slip because of the safety factor built in.

We believe that a combination of severe conditions must be superimposed, and our studies indicate this to be the case. Consider the following: Low voltage - a loss of 1 volt will drop torque 9%, 2 volts may cause partial engagement and drag. High temperature - a 50°F increase in temperature will drop torque 10%. A new clutch, before being cycled- has 1/3 less torque than after it is cycled for a few hours. Vibration such as from a diesel engine can cause severe wear, reducing torque drastically.

More unusual causes' include low voltage feedback from permanent magnet blowers causing drag and wear of the clutch and reduced torque, oil from a compressor seal leak can reduce the friction drastically, and severe dust can destroy bearings and cause heat and slippage.



Schematic Diagram of Typical Clutch Assembly

Failed Mounting Flange Welds

The field coil assembly consist of a field core that encloses the coil and a flange which is mounted to the compressor. The field core and flange are joined by resistance (spot) welds. Failure to those welds will cause rubbing between the field core and pulley, and eventually an open circuit and inoperative clutch.

Open circuit in Field

The field coil is held in the field core with an epoxy resin. If the bond between the epoxy and the field core fails, the coil may be allowed to move, which could lead to a break in the coil wire, and an inoperative clutch. With the exception of a fine crack around the outer diameter of the epoxy, there is no outward indication of a problem. However, the open circuit can be found with a resistance (ohm) meter.

Bearing Failure

Bearing failures can be caused by several factors. If the clutch slips severely due to the compressor slugging, the heat generated can cause the bearing to fail.

Noisy Bearing

If the complaint is noise related, a rough rotor bearing could be the source of the problem. Rough bearings can be felt when holding the armature hub stationary, and rotating the pulley. As with the failed bearing situation, several factors can cause a bearing to become rough. A rough bearing is one that may be in the early stages of failing completely. If the bearing is found to be rough, and there are no obvious signs that the problem was caused by factors other than the clutch.

Failed Lead Wire

If the lead wire connected to the field coil fails, the clutch becomes inoperative. While the cause of this failure is not definite, it may be due to a weak lead wire connection.

Seized or Slugging Compressor

The clutch's function is to engage and disengage the compressor from the vehicle's accessory drive system. If there is a problem that prevents the proper rotation of the compressor input shaft while the clutch is energized, the clutch will slip. The heat generated by the clutch slipping is tremendous, and in a matter of seconds components can start to fail. There is a progression of effect from slipping, leading up to overall clutch failure. These are listed below:

- A. Discoloration of Armature Assembly Disc-The extreme heat from slipping will quickly cause the disc to take on a discolored appearance. The disc will appear frosted.
- B. Melting of epoxy in Field Coil Assembly-The extreme heat may also effect the field coil, causing the epoxy to show signs of melting. Under extreme situations, the coil, which under normal circumstances is completely imbedded in the epoxy, will become exposed.
- C. The heat will eventually cause the bearing seals to melt, which allows the grease to escape. Without grease to lubricate the bearing, it soon fails completely.

Leaking Compressor Input Shaft Seal

A second clutch failure mode that can be attributed to a system problem is a failed bearing due to oil leaking from the compressor. This may occur if the seal on the compressor shaft leaks compressor oil, and it finds its way into the clutch rotor bearing. The oil may contaminate the bearing grease, causing it to be less effective, and also lead to grease purging through the bearing seals. The result is a gritty or failed bearing.

Compressor Field Mounting Boss Dimensional Problem

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.

Re-machined Compressor Input Shaft

During the course of re-manufacturing a compressor, the taper on 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 may create interference and hinder the rotation of the rotor assembly.

Loose Field Coil Mounting Flange Bolts

If the bolts used to mount the field coil are not tightened adequately, vibration in the vehicle will cause the mounting flange bolts to elongate. Eventually the field coil will begin to contact the rotor assembly, as evidenced by rubbing on the field coil outer diameter. This rubbing may generate heat that melts the field coil epoxy, leading to an open circuit and inoperative clutch.

Short or Open Circuit in Field Coil Lead Wire

If the clutch is installed on a vehicle in a way that the field coil lead wire rubs against something in the engine compartment, a short circuit or open circuit will likely develop over time that causes the clutch to become inoperative. This type of failure mode is evidenced by a lead wire worn down to bare metal in one or more locations along its length, or a lead wire that somehow gets cut in two while in the vehicle.

Key Not Seated Properly in Armature Assembly Hub

If the key and key ways of the compressor input shaft and armature hub are not lined up correctly during clutch installation, a severe misalignment of the armature and rotor assemblies relative to the shaft will occur. This misalignment will create interference between the rotor and field coil assemblies. Evidence of severe rubbing of the rotor on the field coil will be present.

Coil Ground Wire Under Mounting Flange

Some field coil assemblies have a ground wire terminal that is installed on the top of the coil mounting flange (this may require the use of a longer bolt). If the terminal is improperly installed under the flange, the coil will be cocked, and create the potential for rubbing between the rotor and coil assemblies.

FAILURE MODE SUMMARY CHART

Ref. No.	Failure Mode	Armature Assembly	Rotor Assembly	Field Coil Assembly	Comments
1	Failed Field Mounting Flange Welds	No obvious problem	Possibly some signs of the rotor rubbing on the field coil outer diameter	Mounting flange missing or starting to separate due to failed resistance (spot) welds Outer diameter of field coil shows signs of rubbing	Clutch will probably be inoperative
2	Open Circuit in Field Coil	No obvious problem	No obvious problem	Possible small crack running along outer diameter of field coil epoxy	Resistance check will show open circuit
3	Bearing Failure	No obvious problem, especially no signs of severe heat exposure on disc	Bearing either seized or tight Seals and balls may be missing	Possible some signs of rubbing on the outer diameter of the field coil	Warranty analyst must distinguish this failure from seized or slugging compressor
4	Noisy Bearing	No obvious problem	Bearing feels "rough"	No obvious problem	Defective bearing -or- Leaking compressor seal caused bearing grease to purge
5	Failed Lead Wire	No obvious problem	No obvious problem	Missing lead wire	Fatigue failure of connection -or- improper installation or damaged during removal
6	Seized or Slugging Compressor	Discoloration on disc caused by heat from slipping Rubber spacers on armature backing plate may be melted or missing	bearing seals melted or missing, grease purged bearing stiff or seized	Epoxy shows signs of heat exposure, possibly exposing coil	Probably most frequent failure mode leading to warranty claims
7	Compressor Boss Dimension Problem	No obvious problem	Bearing Ok, rotates smoothly Signs that the rotor has rubbed on field coil	Some evidence of rubbing against rotor on O.D. and I.D. of field coil	Complaint may be due to noise or inoperative clutch from open circuit
8	Re-Machined Compressor Input Shaft	No obvious problem	Some wear on top of bearing bore pocket from contacting compressor bolts	Possibly some wear on top of field coil from contacting rotor	Complaint could be "seized" clutch
9	Loose Field Flange Mounting Bolts	No obvious problem	Possibly some signs of rubbing against field coil on inside of rotor	Mounting flange bolt holes elongated O.D. and I.D. of field coil shows signs of rubbing against rotor	Field coil will probably have open circuit
10	Short/Open Circuit in Field Coil Lead Wire	No obvious problem	No obvious problem	Insulation on lead wire worn down to bare metal in one or more spots Lead wire may be severely kinked or cut	Complaint may be erratic operation or inoperative clutch
11	Key Not Sealed Properly in Armature Hub	Armature Hub is damaged in area of key way	Some evidence of rubbing on I.D. of rotor	Evidence of severe rubbing against rotor on O.D. of field coil	Complaints may include inoperative clutch
12	Coil Ground Wire Under Mounting Flange	No obvious problem	Some evidence of rubbing on field coil on I.D. of rotor	Imprint of ground wire terminal on bottom side of mounting flange Evidence of rubbing against rotor on O.D. of field coil	Complaints may include inoperative clutch

HECO CLUTCH CROSS REFERENCE NUMBERS

OEM Cross X	HECO PART #
10761	5063
75R4652	5063
502400	5063
L50-2400	5063
2329091	5063
1MXA1279	5063
1MXA3268	5063
CA-315	5063
600-5045	5063
K332-25	5063
K332-15	5063
RE10975	600-3000
04027C	600-3000
AH119048	600-3000
CA-157	600-3000AM
AZ48479	600-3005
CA-140	600-3005
RE53408	600-3007
RE58348	600-3013
5020	600-3013
CA-145	600-3013
5017	600-3015
CA-145-24V	600-3015
R128825	600-3017
5018	600-3017
CA146	600-3017
CA-146	600-3017
RE52508	600-3020
CL-1776C	600-3020
CL1776	600-3020
CA-143DS	600-3020
AL78494	600-3025
22-11303	600-3025
5022	600-3025
CA-147	600-3025
AT221651	600-3040
CL003043	600-3043
5024	600-3043
CA-141-24V	600-3043
447100-5070	600-3043
4471005070	600-3043
CL003045	600-3045
5023	600-3045
CA-143-24V	600-3045
CL003100	600-3100
CL033100	600-3100
FONN19N688AA	600-9003
FONN19D649AA	600-3100
CL009716	600-9716
87334407	600-9716
403585A1	600-9716
CL09852	600-9852

OEM Cross X	HECO PART #
AH79301	75R0452
C7AZ-2884-B	75R0452
D5NN19D649A	75R0452
D8NN19D847AA	75R0452
RD-5-4967-0	75R0452
274224	75R0452
30-302345	75R0452
30-3353680	75R0452
3317V002	75R0452
332639	75R0452
400-036	75R0452
402400	75R0452
402918	75R0452
600-5000	75R0452
65338C91	75R0452
7020704	75R0452
72540774	75R0452
904408	75R0452
7531	75R0452
47531	75R0452
D42H2981BA	75R0452
86529809	75R0452
25-029	75R0452
165338C91	75R0452
1MX242	75R0452
ABPN83303002	74R1202
K332-14	74R1202
RD-5-5183-0	74R1202
02-3002	74R1202
031104973	74R1202
10884	74R1202
274226	74R1202
30-3032345	74R1202
3117v004	74R1202
3918268	74R1202
400-221	74R1202
402044	74R1202
402915	74R1202
433177	74R1202
600-5002	74R1202
904326	74R1202
904327	74R1202
165129C91	74R1202
1647566C91	74R1202
IMX240	74R1202
18-01210	74R1202
47551	74R1202
47907	74R1202
k332-24	74R1202
501939	74R1202
024-21590	74R1202
A-8567	75R1802AM

OEM Cross X	HECO PART #
RD-5-4976-0	75R1802AM
5037	75R1802AM
10591	75R1802AM
600-5038	75R1802AM
47973	75R1802AM
502736	75R1802AM
V19107	75R1802AM
CL-0634	75R1802AM
2329068	75R1802AM
75R1802	75R1802AM
CA-314	75R1802AM
600-5035	75R2552
274363M91	75R2552
2329076	75R2552
A2211669	75R2552
A-7677	75R3502
RD-5-10370-0	75R3502
10795	75R3502
1669746C91	75R3502
17B013183	75R3502
17906	75R3502
31-1607760	75R3502
502742	75R3502
47979	75R3502
511199	75R3502
MA-N01	75R3502
2329083	75R3502
A2210795	75R3502
A2222498	75R3502
425450C92	75R3502
ZGG11565	75R3502
1MXA1281	75R3502
11153	75R3502
47908	75R3502
A-7685	75R4502
A-8534	75R3502
A167419	75R3502
A64956	75R3502
A55057	75R3502
A66058	75R3502
A66077	75R3502
D2NN19D649A	75R3502
MA7A	75R3502
143405C91	75R3502
600-5010	75R3502
71159661	75R3502
71182664	75R3502
72084050	75R3502
7534	75R3502
47534	75R3502
1411-72	75R3502
A162008	75R3502

HECO CLUTCH CROSS REFERENCE NUMBERS

OEM Cross X	HECO PART #	OEM Cross X	HECO PART #	OEM Cross X	HECO PART #
603441	75R3502	600-9005	8297	85817171	8445
134547C91	75R3502	700709771	8297	5064	8445
AH85847	75R3502	72162176	8297	CL-8104C	8445
25-160	75R3502	CL-1005C	8297	6511-6210	8445
31-1819903	75R3502	72215919	8297	65116210	8445
2329089	75R3502	72262178	8297	1081455M91	8445
1411-44	75R3502	01-3759	8297	72507683	8445
8296	75R4534	SFD013764	8297	4639-9931	8445
501075	75R4534	916199	8297	600-9845	8450
MA7A 24V	75R4534	3478416M91	8297	82008824	8450
2329090	75R4534	837510M91	8297	82008826	8450
ABPN83303342	75R4534	01-3764	8297	82025334	8450
1140568C91	75R4534	V55302	8297	600-9850	8455
22-11017	75R4534	6519-6010	8297	8600-2087	8455
RD-5-8382-0	75R4534	FONN19B649BA	8297	600-9815	8462
600-1105	8088	72162178	8297	CL-4661	8464
73-003S	8088	1981779C1	8298	600-9800	8464
AR71287	8088	4327654	8298	6590-6210	8464
70256789	8088	600-9006	8298	600-9765	8465
533719M91	8088AM	600-9008	8298	6506-6010	8464
7N4300	8088AM	72085285	8298	CL-1047	8470
7N4401	8088AM	83935C1	8298	600-9728	8470
70269743	8088AM	4338893	8298	8460	8470
72-0038	8088AM	8518-6012	8298	600-9865	8470
4330737	8088AM	CL-1025	8298	87334399	8470
8088R	8088AM	700712768	8298	CL-1047C	8470
PB-501	8088AM	433893	8298	600-9024	9676C
ABPN83303212	8295	1AF9ZNM	8299	CL-1007-24VC	9676C
E-802592	8295	600-9840	8306	CL-1007-24V	9676C
KA1275	8295	SFD013761	8306		
K332-41	8295	600-9700	8411		
RD-5-4964-0	8295	71386436	8411		
02-3051	8295	72276952	8411		
1-3304	8295	9967658	8411		
400-390	8295	1055450M91	8411		
402359	8295	773299M92	8411		
4379-RD549690	8295	CL-1010	8411		
501076	8295	CL-1010C	8411		
75R0754	8295	CA-206	8411		
904328	8295	CL-1036C	8412		
5045	8295	600-9835	8412		
22-11012	8295	86001192	8412		
75R4734	8295	22-04617	8412		
RD-5-9659-0	8295	600-9710	8420		
MA6A-24	8295	3902115M91	8412		
2329049	8295	600-9709	8421		
MA61-2	8295	CA-209	8425AM		
AR9676	8297	600-9825	8435		
1-3759	8297	600-9830	8440		
1069215M91	8297	CL-1035	8440		
30-3373177	8297	CL1035	8440		
509285	8297	600-9705	8445		