

**Fan Drive Assemblies**

The front air fan drive assembly shown here consists of a clutch (1090 part number), a hub (1077 part number) and in most cases, an adaptor kit (1096 part number).

**Replacement Clutches**

The 1090-05000 and 06000 series clutches are

obsolete and service parts are no longer supplied. To replace one of them, select a new one from the table on page 2.

**Replacement Hubs**

None of the hubs used in front air 1093 fan drive assemblies are in production. The tapered roller bearing type hub was the most common, and the bearing kits for it are still available.

**CONTENTS**

**Fan Drive Assemblies ..... 1**

**Fan Clutches - Description & Availability .... 2**

**Fan Clutches - Identification & Replacements ..... 2-3**

**Tapered Roller Bearing Design ..... 3**

**Fan Hubs - Identification, Service Parts & Repair ..... 4**

**Cylinder & Front Seals Replacement ..... 5**

**Idler Pulleys - Identification, Service Parts & Repair ..... 6**

**Installation - All clutches ..... 7**

**Installation - Crankshaft & Isolation Mount Clutches ..... 8**

**Preventative Maintenance ..... 8**

**Fan Clutch Lining Maintenance ..... 9**

**Replacing the Lining (1090-08000 only) .... 10**

**Emergency Lockup Procedures ..... 10**

**Troubleshooting ..... 11**

**Fan Clutch Removal & Repair ..... 12**

**7000 Series Overview ..... 13**

**7000 Series Rebuild Procedures ..... 14**

**8000 Series Overview ..... 15**

**8000 Series Rebuild Procedures ..... 16**

**Fan Control System Requirements ..... 17-19**

## Fan Clutches - Description and Availability

The Kysor front air fan clutch is available in two current production models: the 8 horsepower 1090-07050-XX and the 22 horsepower 1090-08000-XX. Both clutches are spring engaged, air pressure disengaged designs, requiring a minimum of 90 psi (6.12 BAR) to achieve a clean disengagement.

Kysor fan drives are modular in design, that is, in most applications it is possible to remove the fan clutch from the hub without removing any other part of the vehicle, which can reduce vehicle down time for repairs.

Finally, these clutches have an idle speed. When the vehicle is stopped, engine running, fan clutch disengaged, the fan will turn at approximately 100-300 rpm. This is a design feature and is normal. It cannot be eliminated. Clutches that are fully warmed up will idle slower than cold clutches. Older clutches will idle slower than new clutches. Front-to-rear play at the fan blade tip with the clutch disengaged is normal and not a cause for concern.

## Fan Clutches - Identification and Replacements

### Current Production Fan Clutches

Old Part#	Diameter	Length	Descriptive Notes
1090-07050-XX	6.8 inches	4.1 inches	Outer housing is die cast aluminum. Access holes on front are oval in shape. Lining plate (one piece) is retained by screws and nuts.
1090-08000-XX	7.9 inches	4 inches	Lining retention is with 3 separate plates

### Obsolete Fan Clutches

No longer sold or produced and service parts & procedures have been discontinued.

Old Part#	Diameter	Length	Descriptive Notes	Replace With
1090-05261-01 1090-05261-02 1090-05261-04	6.8 inches	4.6 inches	Lining retaining plate is a one-piece ring; Piston is copper colored and cup shaped; 3 equal sized O-rings on piston rod.	1090-07050-01 1090-07050-03 1090-07050-02 (May require adapter kit 1096-06914-01 to keep clutch from hitting pulley.)
1090-05262-01 1090-05262-03	8.2 inches	5 inches	Lining retaining plate is a one-piece ring; Piston is copper colored and cup shaped; 3 equal sized O-rings on piston rod.	1090-08000-01 1090-08000-02 (Requires adapter ring 4038-42430-01)
1090-06620-01 1090-06620-02 1090-06620-03	6.8 inches	3.9 inches	Lining retaining plate is a one-piece ring; 1 large and 1 small O-ring on piston rod.	1090-07050-01 1090-07050-03 1090-07050-02
1090-06060-02 1090-06060-03 1090-06060-04	8.2 inches	3.9 inches	Lining retaining plate is a one-piece ring; 1 large and 1 small O-ring on piston rod.	1090-08000-01 1090-08000-01 1090-08000-02

Clutch	Fan B.C./Bolt DIA. (3.500 and 3/8-24 studs unless noted)	Fan Pilot (2.560 unless noted)	Hub B.C./Hole DIA. (3.50 B.C. and .406 holes unless noted)	Hub Pilot (2.001 unless noted)
1090-05261-01				
1090-05261-02				2.563
1090-05261-04	3.25 B.C./ 5/16-24 THDS	requires adapter kit #1097-09115-01*		
1090-06262-01				1.377
1090-05626-03			3.875 B.C./ .343 DIA.	1.377
1090-06060-02				
1090-06060-03				
1090-06060-04			3.875 B.C.	
1090-06620-01				
1090-06620-02				2.563
1090-06620-03	3.25 B.C./ 5/16-24 THDS	requires adapter kit #1097-09115-01*		
1090-07050-01				
1090-07050-02	3.25 B.C./ 5/16-24 THDS	requires adapter kit # 1097-09115-01*		
1090-07050-03				2.563
1090-07050-04	(obsolete)		3.307 B.C./ .343 DIA.	
1090-08000-01				
1090-08000-02			3.875 B.C.	
1090-08000-03	3.25 B.C./ 5/16-24 THDS	requires adapter kit # 1097-09115-01**		
1090-08000-04	3.25 B.C./ 5/16-24 THDS	requires adapter kit # 1097-09115-01**	3.781 B.C./ .50 DIA.	
1090-08000-05				2.563

\*see page 13 \*\*see page 15

## ■ Tapered Roller Bearing Design



1

The Kysor Hub should be overhauled during a major engine overhaul. Disassemble the Hub and replace the seal and two bearings using the service kit.

### Important Overhaul Notes

- Remove and discard the factory installed bearing spacer.
- When removing old bearing cups, do not strike the snap rings that locate them. Pack bearings with a high temperature wheel bearing grease with EP additives, preferably a synthetic. Do not use chassis grease - it will melt.  
(See page 10)
- During reassembly, use the service spacer and shims provided in the overhaul kit to set endplay between .001-.005".
- Reassemble using pulley retaining hardware torques:
  - Locknut and washer type: 170 lbs.-ft.
  - Single socket head capscrew type: 80 lbs.-ft.
  - Double socket head capscrew type: 44 lbs.-ft.
- Make a final endplay check. Allowable endplay is .001- .005". Remove or add shims as necessary to obtain this.
- After final assembly, use a grease gun to lubricate with a high temperature wheel bearing grease only.



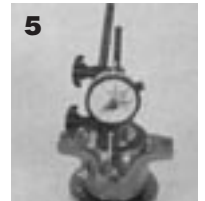
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3



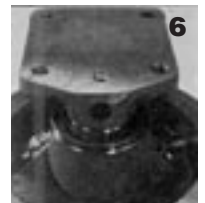
4



5



5

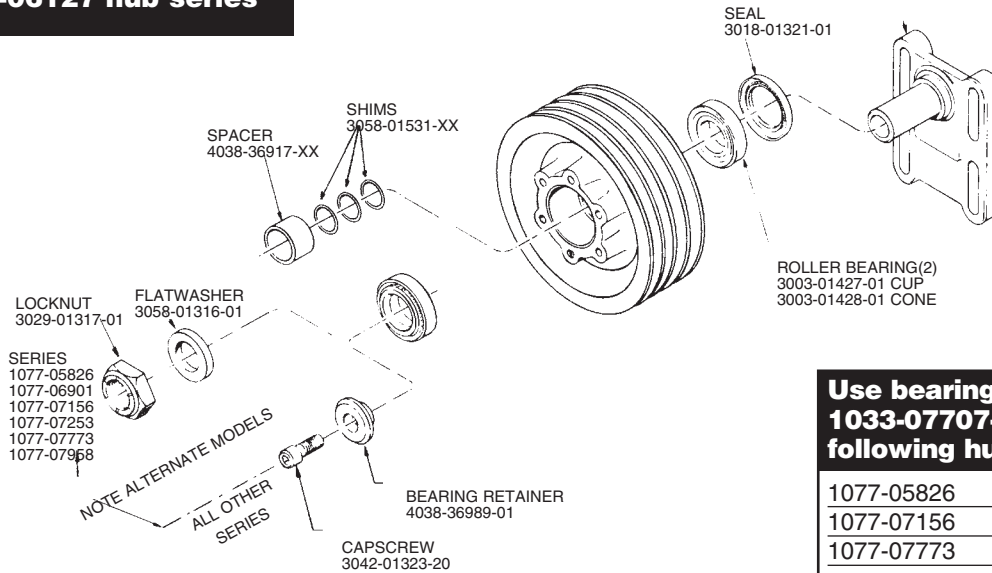


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## Fan Hubs - Identification, Service Parts & Repair

Once you have identified your fan hub from the Product Catalog, determine if a bearing kit is available. Bearing kits are available for the following series hub models:

**Use Bearing Kit**  
**1033-06554-01 for**  
**1077-06127 hub series**

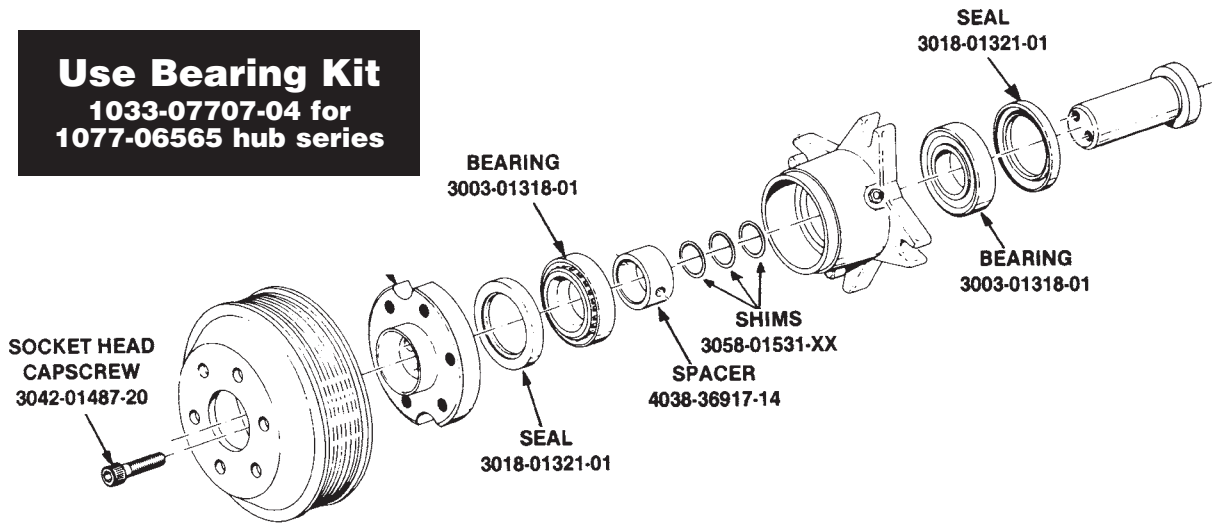


**Use bearing kit**  
**1033-07707-05 for the**  
**following hub series**

1077-05826	1077-06901
1077-07156	1077-07253
1077-07773	1077-07958

**Note: Includes bearings, seal, spacers and shims.**

**Use Bearing Kit**  
**1033-07707-04 for**  
**1077-06565 hub series**



**Note: Includes bearings, seal, spacers and shims.**

## **Cylinder & Front Seals Replacement**



Step 1



Step 2



Step 3



Step 4

<b>Tools &amp; Parts Required</b>
<b>Use kit #4043-41130-01</b>
<ul style="list-style-type: none"> <li>• Seal picks</li> <li>• Rubber mallet</li> <li>• 5/16" flex head ratchet</li> <li>• 5/8" and 1/2" open end wrenches</li> </ul>

1. Disconnect air line from front of fan clutch, remove fan, then remove fan clutch with a flex head ratchet and 5/16" hex bit or a Torx bit (Mack water pump mount). In some cases, it may be necessary to tilt the radiator to gain access.
2. Two 4" long bolts with washers are necessary for compressing the clutch slightly.
3. Alternately tighten the wing nuts until the fan clutch compresses 1/16". Caution: Do not over compress or clutch can be damaged.
4. Remove the cylinder nut, tab washer and cylinder.
5. Remove the large O-ring from the big groove in the piston. Remove the dust seal from the small groove. The dust seal may be one of the three types shown in the photo. You will be using the two piece type shown.
6. Clean and inspect the small groove. It should be no wider than the new, green, square cut seal. If it is wider, replace the fan clutch. If groove is OK, lubricate the O-ring and work it into the small groove. Lubricate the green, square cut seal and carefully work it into the large groove, then out into the small groove. Try not to stretch it.
7. Install the large O-ring in the large piston groove. Liberally grease around the outside of the piston O-ring and the dust seal.
8. Lubricate the small O-ring and place it on the shoulder inside the new cylinder.
9. Place a new tab washer in the cylinder cavity. Align the tab with the key way in the piston rod and then push the cylinder down onto the clutch. Install the nut and torque to 84 pounds inch. remove the compressor bolts and pressurize the clutch too 120 Psi with shop air to check for air leads and proper function. while clutch is disengaged, line up holes in front with bolt holes in rear.



Step 5



Step 6



Step 7



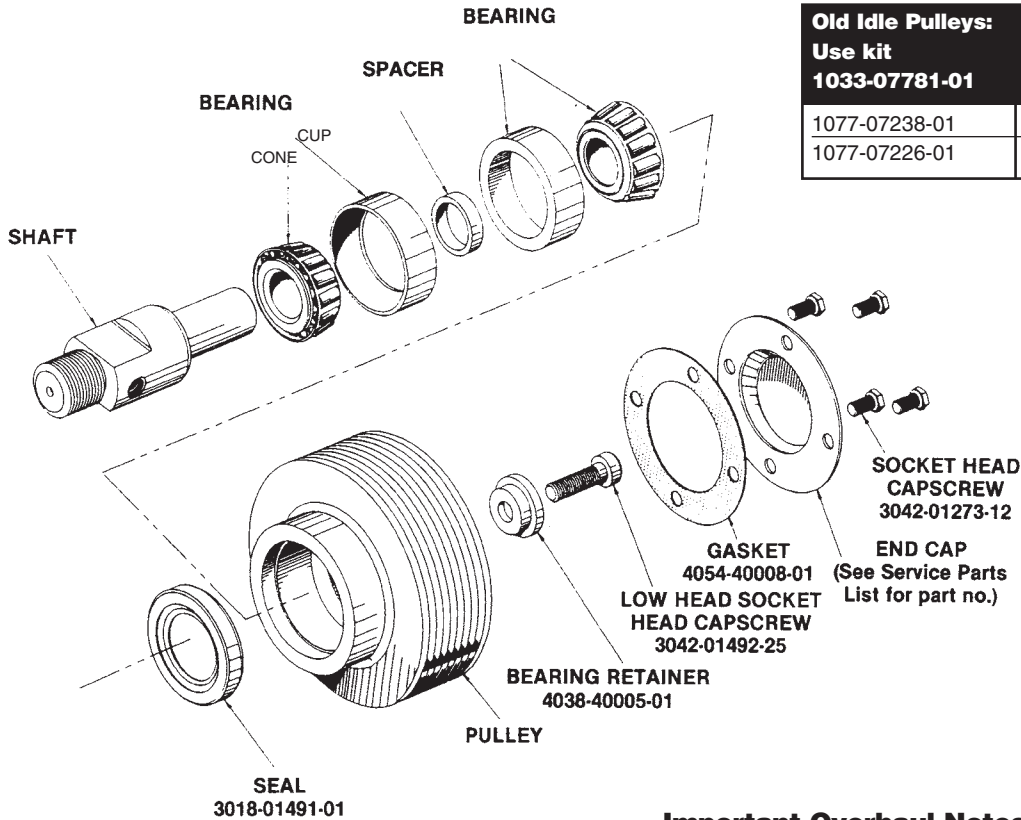
Step 8



Step 9

## Idler Pulleys - Identification, Service Parts And Repair

Bearing kits for tapered roller bearing type idler pulleys are also available. Note that these idlers are also currently available under a new part number. (Sealed ball bearing type.)

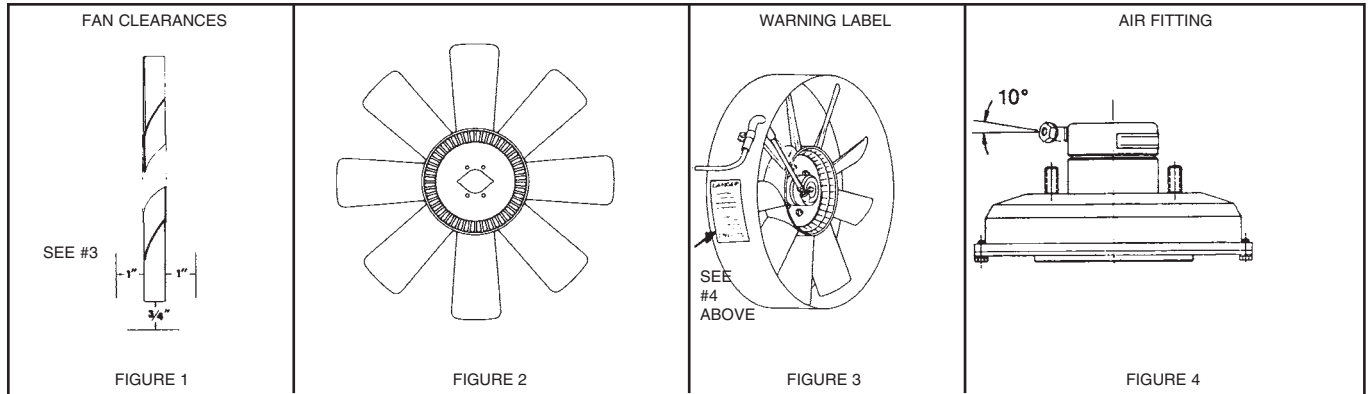


Old Idle Pulleys: Use kit 1033-07781-01	New Idle Pulleys: Use kit 1033-07783-01 (sealed bearing)
1077-07238-01	1077-07756-02
1077-07226-01	1077-07756-01

### Important Overhaul Notes:

1. During reassembly, use the service spacer and shims provided in the overhaul kit to set endplay between .001- .005". (figure 3 on page 7)
2. Torque idler pulley low head socket head cap-screws to 25 lbs.-ft.
3. Make a final endplay check. Allowable endplay is .001-.005".
4. There is no grease fitting for idler pulleys, therefore pack grease cavity and bearings 50% - 60% full prior to assembly. Take caution not to over pack with grease. Use only high temperature wheel bearing grease. (See page 8)

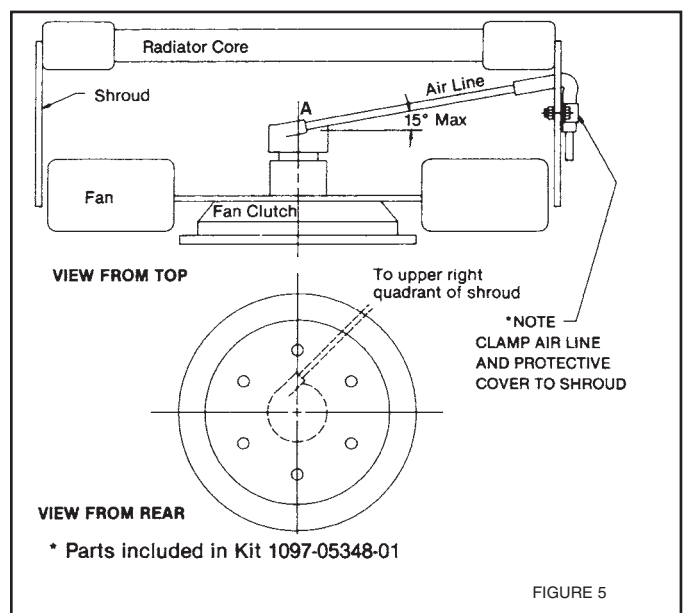
## Installation - All clutches



1. Before putting the fan clutch into position, the fan may have to be put onto the front of the clutch or set into the shroud. Do not permanently mount the fan to the clutch until the clutch is mounted to the hub.
2. To mount the fan clutch to the hub, use self-locking 3/8" - 16 socket head cap screws that are 1" longer than the adapter for proper thread engagement. Torque these screws to 45 lbs/ft. Do not use washers of any kind.
3. Attach the fan allowing for 1" clearances, front and back, and 3/4" tip clearance. See figure 1. It's the installer's responsibility to prevent contact between the fan and other parts of the vehicle.
4. Attach the WARNING label in a prominent and easily seen place at eye level, on the fan shroud as shown in figure 3.
5. Install the air fitting into the cylinder of the fan clutch so that the inlet is angled approximately 10 degrees forward. See figure 4.
6. Use installation kit 1097-05348-01 to install the air supply to the fan clutch. Use of any other hardware may result in damage to the fan, fan clutch and or radiator.
7. Run the air line and its protective cover through a 1/2" hole drilled in the fan shroud and attach to the front of the clutch at the cylinder inlet. Do not

tie the air line to the radiator core. Using the clamp, place enough tension on the air line to assure that front to rear or side to side play does not exceed 1/2". See figure 5.

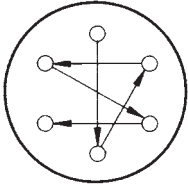
8. The air line should not be angled forward anymore than 15 degrees and should exit the fan shroud in the upper right hand quadrant when viewed from the rear. See figure 5.
9. Important: be sure to recheck the 1" front and back and the 3/4" fan tip clearances.



## Installation - Crankshaft & Isolation Mount Clutches

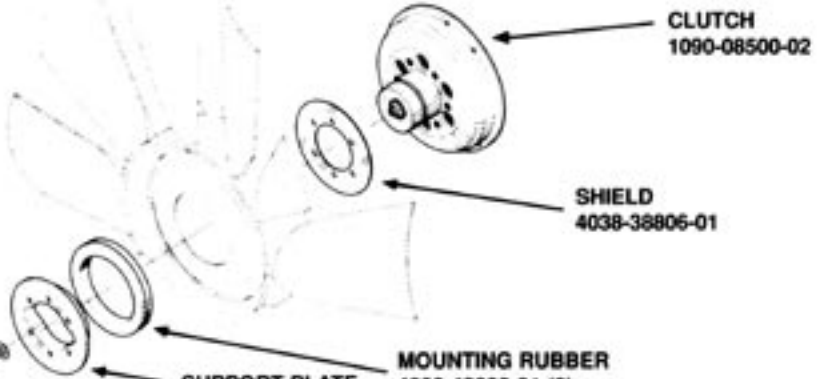
**Note: Written engineering approval is required for all crankshaft applications.**

**Cross Torque fan mounting screws to 15 lbs/ft  
Repeat process to 25 lbs/ft**



Fan mounting screw torque pattern for both isolation or crankshaft mount.

**MOUNTING SCREWS (INCLUDED WITH CLUTCH)**



Note: Kit number 1097-09115-01 includes necessary crankmount parts.

**MOUNTING RUBBER 4082-43892-01 (2) pcs.  
BUSHING 4038-43893-01  
MUST BE REPLACED IF SYSTEM IS DISASSEMBLED FOR ANY REASON**

## Preventative Maintenance

### Fan Hubs

Grease at every PM using a high quality, high temperature bearing grease with EP additives such as

AeroShell 5 or Chevron SRI-2. Do not use ordinary chassis grease. It will melt under the temperatures generated by fan drives.

### Fan Clutches (Every PM)

What to do	How to do it
Check operations	Turn on key or jumper control system so that 120 psi air gets to clutch. It should disengage and turn freely. Turn off key. clutch should lock up and be difficult to turn by hand.
Check for air leaks and cylinder problems	Turn on key or jumper control system so that 120 psi air get to clutch. Feel front of clutch (cylinder) for air leaks. Turn cylinder back and forth to limit of air line. It should not bind or catch. (Remove clutch to repair if either problem is found.) Check that air line has some tension and cannot get into fan.
Lining wear check	1090-07050. When clutch has no air pressure, fan should be very difficult to turn. If it seems easy, remove clutch and replace lining or rebuild as described in repair section.  1090-08000. See use of lining wear gauge. (See page 9)

## **Fan Clutch Lining Maintenance**

**This fan clutch requires 90-120 PSI air pressure to DISENGAGE (6.2-8.2 bar). The air pressure is vented to ENGAGE the fan. Any interruption of the air supply will allow the fan to run, keeping it in fail-safe mode.**

Fan clutch maintenance should be performed at every "A" PM schedule, at every oil drain, or every 25,000 miles (40,225 KM), which ever comes first.

1. Verify clutch operation. Turn key or jump the control system so that 90-120 psi air is supplied to the clutch. It should disengage and turn freely. Remove air supply. Clutch should lock up and be difficult to turn by hand.
2. Check electrical and air connections at solenoid.
3. Examine wire and airline routing for damage and chafing. Repair as required.
4. Check exhaust port on solenoid for restrictions and debris. Remove any obstructions to insure positive engagement.

### **Clutch Lining Maintenance**

It is very important to check fan clutch lining condition on a regular basis.

First Check	100,000 miles (160,930KM)
Subsequent Checks	Every 50,000 miles (80,465KM)

### **System Alert Tool**

This tool is a "go/no-go" gauge that will indicate whether the lining is close to wearing out and needs replacing.

1. Start with the fan clutch engaged. (No air to the clutch.) If necessary, disconnect the air line from the fan clutch.

- The clutch in the top image has a brand new lining. Notice how the tool sits down in the pocket, below the surface of the lining retention plate.
  - The clutch in the bottom image has a lining that is worn to the point where it should be replaced. Note how the tool protrudes above surface of the lining plate.
2. Order a new lining when the tool is exactly flush with the plate, and change it at the next scheduled service. Instructions for changing the lining are included in the lining kit, part# 1033-08250-01.



Note: Rapid lining wear indicates a problem in the fan drive control system. See page 18 and 19 for control system specifications and types. Call Technical Service for troubleshooting assistance, 800-927-7811.



Step 1



Step 2



Step 3



Step 4



Step 5

## ■ Replacing the Lining (1090-08000 only)

The Fan Drive is easy to reline without removing it from the vehicle.

### Tools & Parts Required

- Inch pound or Newton Meter torque wrench
- 1/4" drive ratchet
- 1/4" drive 5/16" socket
- Clutch lining kit #1033-08250-01

**Caution: The fan clutch must have air pressure (90-120 psi; 6.2-8.2 bar) during this procedure**

1. Remove the six lining plate screws and the three lining retainer plates.
2. Remove the old lining. If the lining sticks, use a hammer and a screwdriver to free it by tapping on the dividing cut in the lining.
3. Inspect clutch shaft. If lining residue is present or if surface appears glazed over (non-metallic), temporarily release air pressure from the clutch to get a little more room, and use crocus cloth or sandpaper to break the glaze.
4. Re-apply air pressure to the clutch, and install the new lining as shown. Some applications may be too tight to spread the lining and slip over the pulley. If necessary the lining can be cut in half with a hacksaw for installation.
5. Replace the plates and screws using the new screws supplied in the kit and torque screws to 30lbs-in. (3.4 Newton Meters).

## ■ Emergency Lockup Procedures



**If the lining wears to the point where the fan clutch will not engage, the fan clutch can be locked up by doing the following:**

1. Remove the air supply from the fan clutch. (Usually disconnecting solenoid valve electric plug will work)
2. Remove the lock nut and cylinder from the front of the clutch. The clutch will remain engaged.

## ■ Troubleshooting

Note that lining and seal life is dependent on a clean, dry air supply and proper control of clutch engagement. If liner of seal life is less than expected and inspection of the air supply and control system does not reveal any problems, contact Technical Service for assistance.

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Front air leaks	Dirty or worn seals	Rebuild or replace clutch
Air leak in clutch	Internal O-ring damaged	Rebuild or replace clutch
Clutch will not engage when air pressure is removed	Worn out lining or dust seal hanging up on cylinder wall	Rebuild the clutch
Lining worn	Over cycled caused by bad temperature or A/C switch	1090-8000 only: Supply air pressure to clutch and remove and replace lining. Clean out back of clutch. 1090-07050 only: remove to repair Both clutches: Replace switches if necessary.
	Air line leaks	Check for leaks in air line and fittings. Repair and replace lining.
	Stationary vehicle or PTO over cycling the fan clutch	Install an override device. Replace lining.
	Insufficient air pressure or debris in solenoid valve restricting airflow	Air pressure 90-120psi. Check air supply. Replace lining and solenoid valve if necessary.
Clutch will not disengage	Over cycling caused by bad temperature or A/C switch or clutch lining rusted to shaft.	1090-08000 only: Supply air pressure to clutch and remove and replace lining. clean out back of clutch. 1090-07050 only: Remove to repair. Both clutches: Replace switches if necessary

## Fan Clutch Removal & Repair

Pressurize clutch to disengage so that holes can be lined up with 3/8" allen screws. If clutch will not disengage, put fan back on studs and manually rotate clutch to line up holes.

## Repair

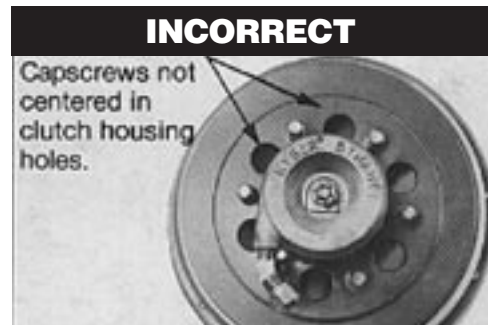
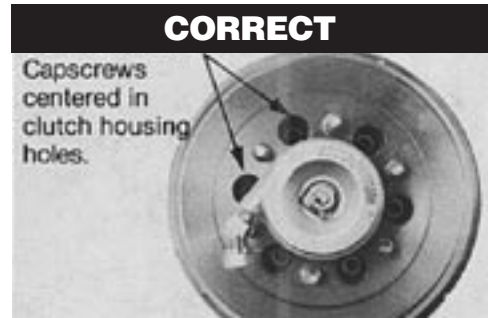
Parts Required			
Product #	Repair Kit	Cylinder Assy	Piston Rod
1090-07050	1033-05434-02	4043-40639-01	4079-40642-01
1090-08000	1033-05435-02	4043-41130-01	4079-41133-01

### Tools Required

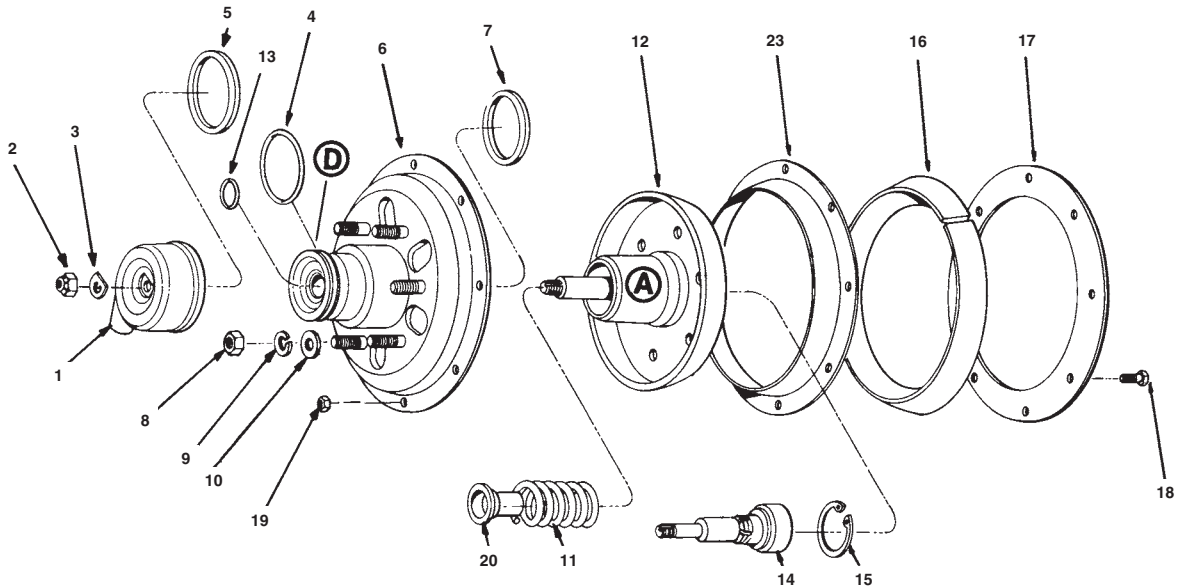
1. Two carriage bolts with wing nuts and washers. These must be about 4" long, as shown. Install them and compress the clutch slightly while loosening the cylinder nut (item 2) and the lining plate screws and nuts (items 17 and 18) then back them off evenly to allow the clutch halves to separate. During reassembly, tighten the carriage bolts evenly to compress the clutch before you install and tighten the cylinder nut and the lining plate nuts and screws.
2. Inch pound torque wrench with 5/16" and 1/2" sockets, 5/16" box wrench
3. LocTite® 640
4. Internal snap ring pliers

### Cylinder Installation

The photo indicates the correct tab washer (item 3) position in relation to the cylinder.



**7000 Series “D-8” Series Design 1090-07050-XX**



Key	Description	Part#
1	Cylinder Assembly	4043-40639-01
2	Cylinder Nut	3029-01371-01
3	Tab Washer	3058-01264-02
4	O-Ring	9002-00781-68
5	Dust Seal	3018-01453-01
6	Housing Assembly	4040-40640-01 (-01,-03, -04)
7	Grease Seal	3018-01334-01
8	Fan Nut	3030-00364-01
9	Lock Washer	3059-00870-06
10	Flat Washer	3058-00843-07
11	Spring	4088-39197-01
12	Shaft Assembly	4079-40641(-01,-02)
		4079-40641-02 (-03 only)
		4079-40641-03 (-04 only)
13	O-Ring	1 of 9002-00561-58
14	Piston Rod Assembly	4079-40642-01
15	Snap Ring	3038-01268-01
16	1 Pc. Lining	4026-35868-01
17	Retaining Plate	1 of 4073-35867-01
18	Screw	3042-01282-12
19	Nut	3029-01516-01
20	Spring End Cap	4038-41098-01
21	Wear Plate	4073-39008-01
22	Spring Carrier	Included w/item 14
	Grease Packet	2035-01353-01
	Repair Kit*	1033-05435-02
23	Lining Wear Plate	

\* Items in gray areas are included in the repair kit.

## 7000 Series Rebuild Procedures

1. Compress clutch about 1/16". Remove lining plate screws and nuts, lining plate, lining and wear plate. Discard lining.
2. Remove the 1/2" nut from the cylinder. Release pressure from clutch so that it comes all the way up.
3. Remove cylinder and cylinder tab washer and discard. Separate the shaft assembly (inner part) from the bearing housing (outer part). Remove front spring cap and spring. Discard spring. Remove large O-ring from outside of piston and discard. Remove small O-ring from inside of piston and discard.
4. Inspect needle bearing inner race on shaft (item A in previous diagram). It may be discolored and streaked, but as long as you can feel no damage with a finger nail, it's OK. It may be cleaned with a Scotch Brite pad to make inspection easier. If damaged, discard clutch. Inspect the fan studs on the bearing housing (outer part). If any are loose or missing, discard clutch. If any are damaged and cannot be repaired with a thread die, discard clutch. Inspect piston bearing by rotating piston (brass). If bearing feels rough or spins freely, discard clutch. If needle bearing inner race, studs and piston bearing are OK, proceed with rebuild.

### Bearing Housing & Cylinder Service

1. Pry out the grease seal with a very large screwdriver. Use a rag wet with Brake Clean to thoroughly clean needle bearings and bearing housing. Do not let Brake Clean get into piston Bearing. Do not use safety solvent.
2. Press the grease seal in, lip down. Press until flush with edge of hole. Lubricate large piston O-ring with grease and install in groove on outside of piston. Liberally smear grease around outside of O-ring after installation. Lubricate small piston O-ring with grease and install into inner piston groove.
3. Apply grease from kit to the needle bearings and pack the groove in front of the needle bearings (down in the bottom near the snap ring) and the groove between the needle bearing and the seal. Push the cleaned shaft (inner part) into the housing. Turn it a few times to work the grease into the needles. Remove it and wipe off any grease on the front. If no excess grease came out, you didn't have enough. Do this a couple times until there are no signs of excess grease. The

goal is to have a layer of grease from front to rear, even with the needles and with plenty of grease worked in behind the needles, without excess. Make sure no grease is on the outside of the grease seal where it could get slung into the lining.

4. Use sandpaper, crocus cloth or Scotch Brite on a grinder to break the glaze on the inside of the war plate (item 21) where the lining touches. Use Brake Clean to clean afterwards.
5. Apply ample amounts of grease around the shoulder on the inside of the cylinder and lubricate the cylinder dust seal.

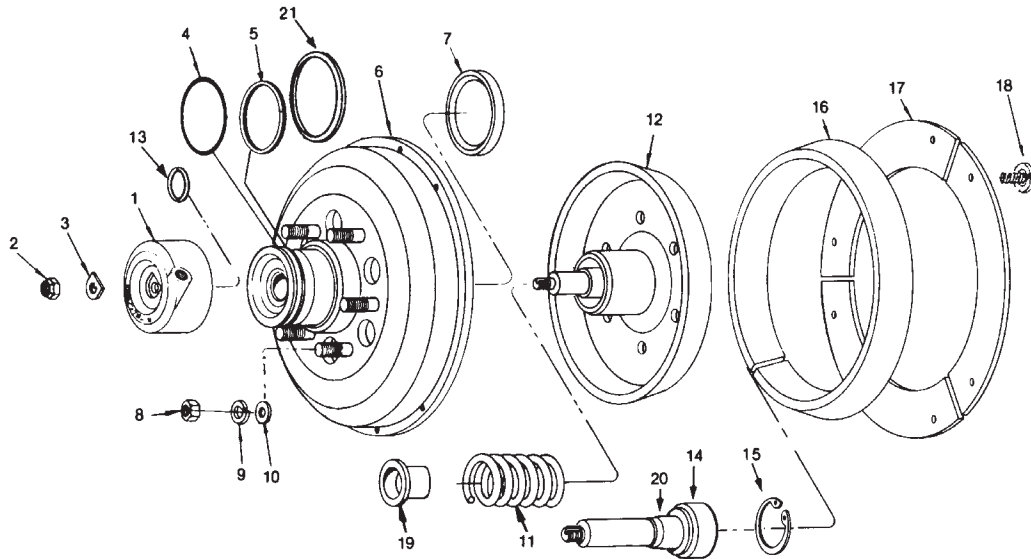
### Shaft Assembly Service

1. Wash shaft and lining plate with Brake Clean and dry. Use crocus cloth, sandpaper or Scotch Brite on a grinder to break the glaze on the shaft and plate where the lining touches. Use only Scotch Brite by hand to clean the needle bearing inner race on the shaft. Rewash.
2. Place rear spring cap (small) onto the piston rod. Place new spring on piston rod. Liberally lubricate inside rear of front spring cap and place on the piston rod. Use Brake Clean to remove any grease or fingerprints from shaft where lining touches.

### Final Assembly

1. Insert shaft assembly into bearing housing. Lay wear plate into back of housing. Place new lining into pocket. Lay lining plate on top of lining. Compress clutch slowly while pushing down on plate. Stop when plate becomes flush with outer edge of clutch. Tighten screws and nuts until they bottom out, but do not torque.
2. Place new tab washer into cylinder cavity. align tab and keyway in piston rod and push cylinder onto clutch. Start the nut.
3. Slowly compress clutch until it disengages and can be turned. Restrain cylinder from turning and torque the cylinder nut to 84 lbs/inch.
4. Pressurize clutch to 90 psi several times to test free movement and to center wear plate and lining in housing. While clutch is pressurized, torque lining plate screws and nuts to 30 lbs/inch. Check for leaks. while clutch is pressurized, line up access holes in front with bolt holes in rear.

**8000 Series K22FA 1090-08000-XX**



Key	Description	Part#
1	Cylinder Assembly	4043-41130-01
2	Cylinder Nut	3029-01371-01
3	Tab Washer	3058-01264-02
4	O-Ring	9002-00491-68
5	Dust Seal O-Ring	3018-01703-01
6	Housing Assembly	4040-40640-01 (-02,-05)
		4040-41131-02 (-03,-04)
7	Grease Seal	3018-01507-01
8	Fan Nut	3030-00364-01
9	Lock Washer	3059-00870-06
10	Flat Washer	3058-00843-07
11	Spring	4088-40615-01
12	Shaft Assembly	4079-41132-01 (-03)
		4079-41132-02 (-02 only)
		4079-41132-04 (-04 only)
		4079-41132-05 (-05 only)
13	O-Ring	9002-00741-58
14	Piston Rod Assembly	4079-41133-01
15	Snap Ring	3038-01510-01
16	1 Pc. Lining	4026-36900-01
17	Retaining Plate	3 of 4073-38444-01
18	Screw	3042-01684-01
19	Spring End	4001-340690-01
20	Spring Carrier*	4001-340691-01
21	Dust Seal	3018-01702-01
	Grease Packet	2035-01353-01
	Repair Kits	1033-05435-02

\* Included in Piston Rod Assembly  
 Items in gray areas are included in the repair kit.

## 8000 Series Rebuild Procedures

1. Compress clutch about 1/16". Remove lining plate screws and nuts, lining plate, lining and wear plate. Discard lining.
2. Remove the 1/2" nut from the cylinder. Release pressure from clutch so that it comes all the way up.
3. Remove cylinder and cylinder tab washer and discard. Separate the shaft assembly (inner part) from the bearing housing (outer part). Remove front spring cap and spring. Inspect front of spring cap for signs of rubbing (it will be shiny). If found, stop and replace fan clutch.
4. Inspect needle bearing inner race on shaft (item A in previous diagram). It may be discolored and streaked, but as long as you can feel no damage with a fingernail, it's OK. It may be cleaned with a Scotch Brite pad to make inspection easier. If damaged, discard clutch. Inspect the fan studs on the bearing housing (outer part). If any are loose or missing, discard clutch. If any are damaged and cannot be repaired with a thread die, discard clutch. Inspect piston bearing by rotating piston (brass). If bearing feels rough or spins freely, discard clutch. If needle bearing inner race, studs and piston bearing are OK, proceed with rebuild.

### Bearing Housing & Cylinder Service

1. Remove O-ring from piston and discard. Remove dust seal from front groove of bearing housing. It may be the steel type, which has to be spiraled out like a piston ring. It may be the white Teflon type which is cut and comes out easily. It may be the two piece, O-ring and square cut seal type which are removed one at a time. Discard the dust seal.
2. Pry out the grease seal with a very large screwdriver. Use a rag wet with Brake Clean to thoroughly clean needle bearings and bearing housing. Do not let Brake Clean get into piston Bearing. Do not use safety solvent.
3. Using specified grease, lubricate the two piece dust seal. (Black O-ring and blue square-cut seal). Being careful not to stretch, first install the O-ring into the front groove on the stud side of the bearing housing then the blue seal on top of it. Make sure the blue

seal sits down in the groove squarely and does not get rolled over. (It will be necessary to first work each piece of the seal into the piston (brass) groove then out into the second groove. Blue seal may be warmed with a hair dryer to ease installation.)

4. Use a flat plate to press the grease seal in, lip down. Press until flush with edge of hole.
5. Liberally lubricate the piston O-ring, the blue dust seal and the nose of the clutch. Apply grease from the kit to the needle bearings and pack the groove in front of the needle bearings (down in the bottom near the snap ring) and the groove between the needle bearings and the seal. Push the cleaned shaft (inner part) into the housing. Turn it a few times to work the grease into the needles. Remove it and wipe off any grease on the front. If no excess grease came out, you didn't have enough. Do this a couple times until there are no signs of excess grease. The goal is to have a layer of grease from front to rear, even with the needles and with plenty of grease worked in behind the needles, without excess. Make sure no grease is on the outside of the grease seal where it could get slung into the lining.
6. Use Brake Clean to clean any grease or fingerprints from inside of bearing housing where lining touches. Make sure no grease is on the outside of the grease seal where it could get slung into the lining.
7. Set bearing housing aside.

### Shaft Assembly Service

1. Wash shaft and lining plate with Brake Clean and dry. Use crocus cloth, sandpaper or Scotch Brite on a grinder to break the glaze on the shaft and plate where the lining touches. Use only Scotch Brite by hand to clean the needle bearing inner race on the shaft. Rewash.
2. Place rear spring cap (small) onto the piston rod. Place spring on piston rod. Liberally lubricate inside rear of front spring cap and place on the piston rod. Use Brake Clean to remove any grease or fingerprints from shaft where lining touches.

## 8000 Series Rebuild Procedures *continued*

### Final Assembly

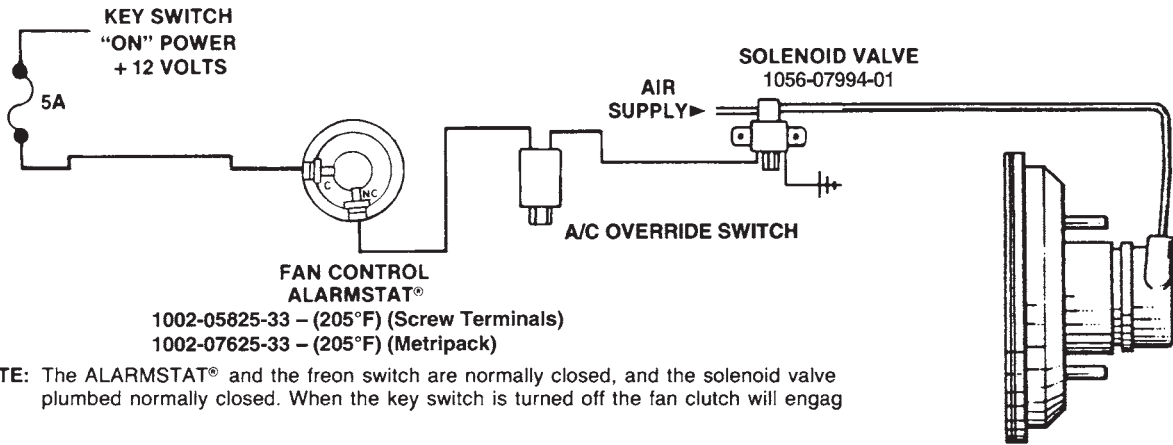
1. Insert shaft assembly into bearing housing. Place new lining into pocket. Compress clutch slowly while pushing down on lining. Stop when lining becomes flush with outer edge of clutch. Install lining plates, sharp edge down. Tighten screws to 30 lbs-inch.
2. Use grease from kit to hold small O-ring in place on shoulder on rear inside of cylinder. Lubricate the rest of the shoulder in front of the O-ring. Place new tab washer into cylinder cavity. Align tab and keyway in piston rod and push cylinder onto clutch. Start the nut.
3. Restrain cylinder from turning and torque the cylinder nut to 84 lbs/inch. Turn cylinder. It may have a slight gritty feel due to the additives in the grease but if it feels real notchy or turns hard, you most likely lost the small O-ring. If this is the case, disassemble and correct.
4. Pressurize clutch to 90 psi several times to test free movement. Check for leaks. While clutch is disengaged, line up access holes in front with bolt holes in rear.

### Fan Control System

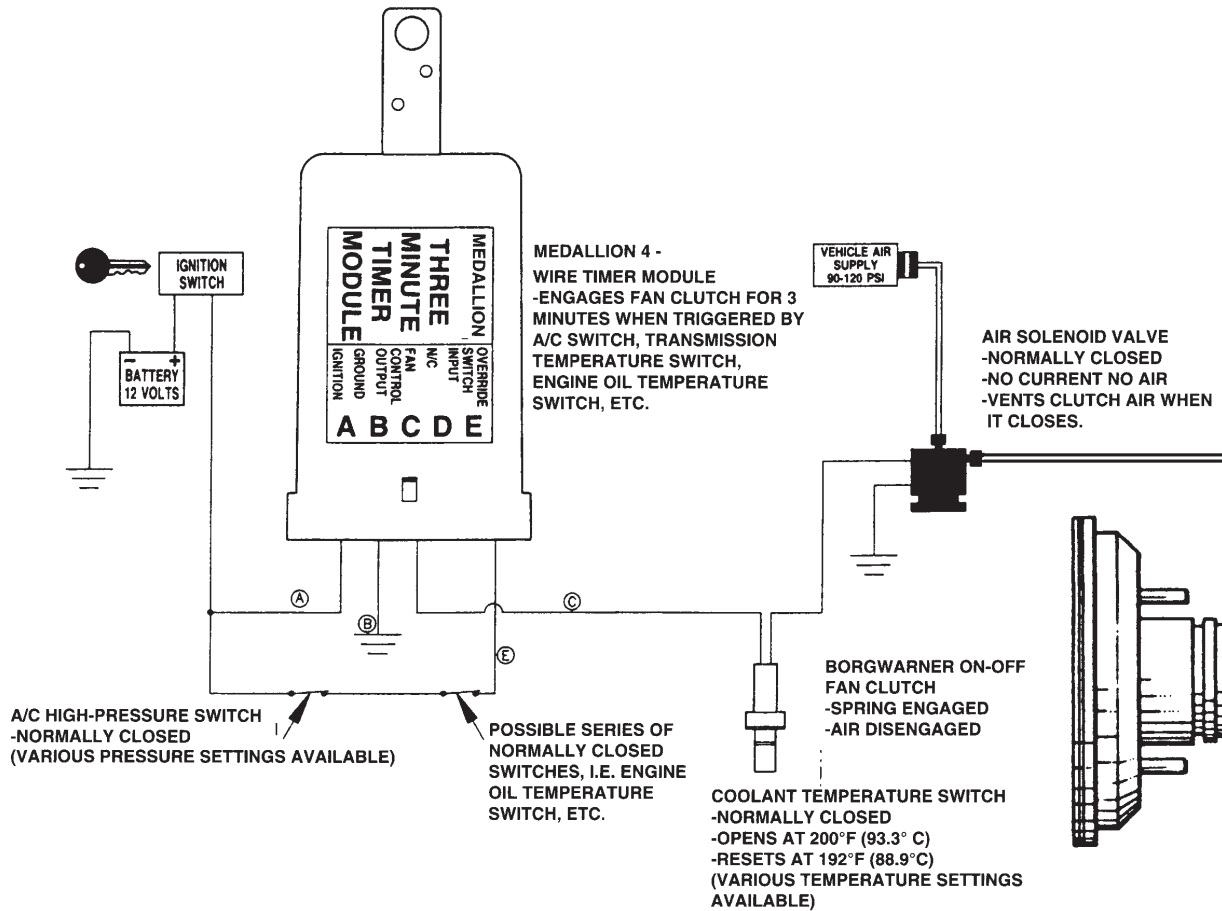
1. As a minimum, control systems must be thermal switches controlling solenoid valves. Mechanical thermal valves such as the old Shutterstat® are not permitted.
2. Air conditioning override pressure switches must have a built in hysteresis of 50 psi (3.4 bar) minimum.
3. If the vehicle is used in any kind of stationary operation involving a PTO or turbo unloader, there must be a provision in the control system to automatically lock the fan clutch on whenever the PTO or unloader is being operated. Failure to provide this will void all warranties.
4. If the vehicle is a sleeper cab and the engine is fast idled with the AC on, a timed AC override circuit must be provided so the fan clutch will not be over cycled. (The Medallion TTM® system is an example of a timed control system.
5. The preferred system is engine ECM Control. Contact the engine distributor for assistance.

Torque Specs	
Clutch to Hub	45lbs-ft (61 Newton Meters)
Fan to Clutch	26lbs-ft (35.3 Newton Meters)
Front Piston Nut	84lbs-in (9.5 Newton Meters)
Lining Plate Screws	30lbs-in (3.4 Newton Meters)

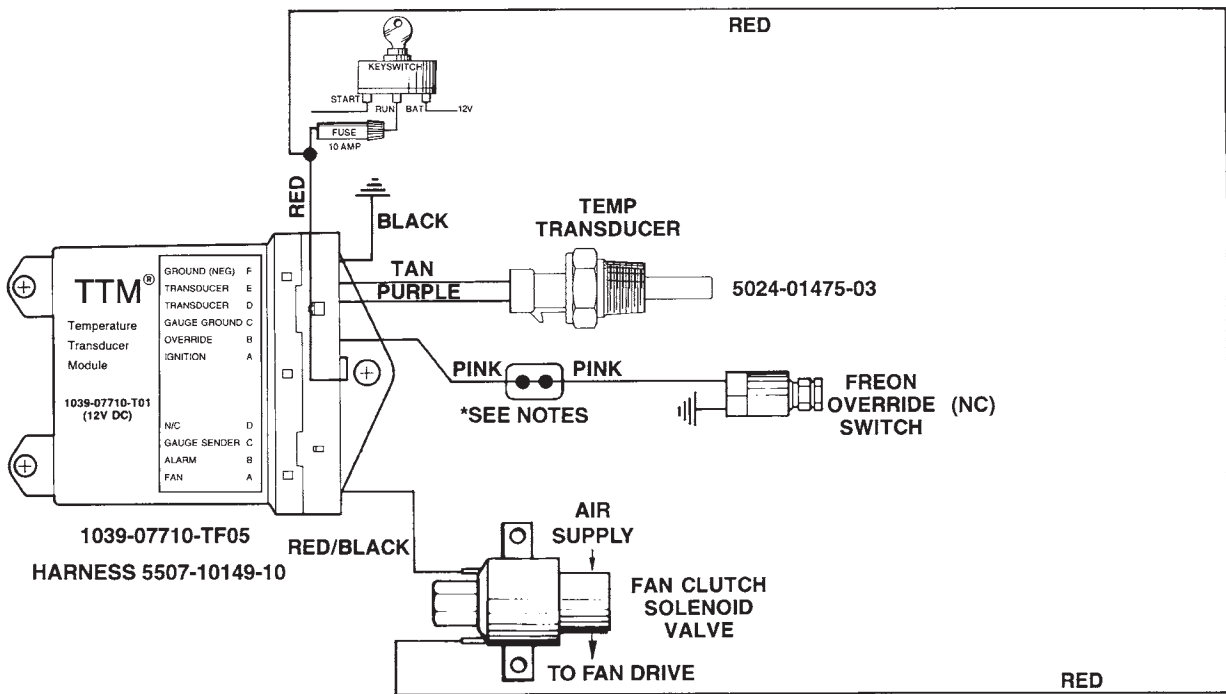
**Normally Closed Fan Clutch Control Circuit**



**Normally Closed System With 3-Minute Timer (Ford Trucks)**



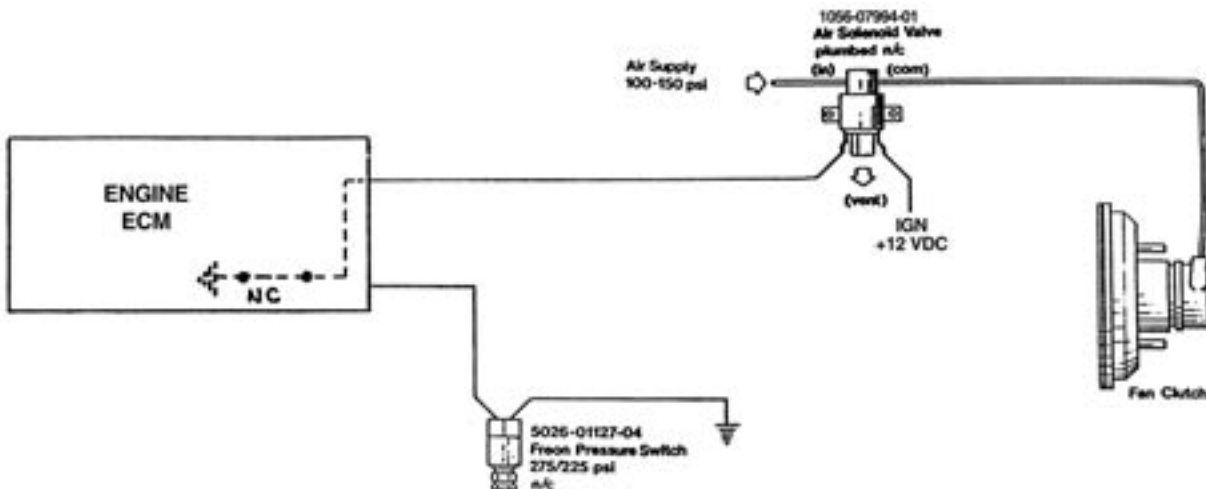
**TTM® Timed Control System**



**Note**

PTO/Turbo Unloader Switch: Use a pressure switch in the control circuit that will open the pink wire when the PTO or Unloader is engaged.  
 If required by engine manufacturer, install a normally closed charge air temperature override Alarmstat® 1002-04880-22.

**Typical Electronic Engine Control System**





231-779-7500 phone

231-775-5749 fax

800-927-7811 Customer Service

231-779-7528 Tech Service & Troubleshooting

1100 Wright Street • Cadillac, MI 49601