SERVICE AND INSTALLATION INSTRUCTIONS

I. GENERAL DESCRIPTION AND OPERATION

The "Power Flo" clutch and brake product line includes numerous models which are all very similar, but each has been adapted for mounting in particular ways to accomplish common power transmission applications. All these units utilize the same expansion component which forces two lined plates axially apart until they seize on two outer constraining plates. This device allows two machine components, which are rotating at different speeds, to be brought to the same speed. When the end speed is the higher of the two, the device is called a clutch; and when the final speed is the lower of the two, the device is called the brake. In many cases, the same physical unit can be used as either a clutch or a brake distinguished only by how it is used in a particular application.

In all units, the above expansion component is called the "inner-outer torque plate assembly." It consists of two iron plates which have internal splines through the bores and have friction linings attached to the outer surfaces. The two plates have an inflatable diaphragm between them to force them apart and four or six return springs to push them back together.

A hub with external spline teeth is inserted in the bore of the inner-outer torque plate assembly to form one element of the clutch or brake. This element is mounted to one of the two machine components which is to be involved in the speed change. This hub may be mounted to a shaft on the case of the CW, CR, CK IM or PM, or to a stationary reaction bracket in the case of a BW, BR or BK.

All units also have two constraining plates which are connected with a series of cap screws around the periphery. These two plates straddle the inner-outer torque plate assembly and provide surfaces for the friction linings to seize against. The cap screws provide a means to restrain the large expansion force of the diaphragm. The two plates are called the pressure plate and the backplate, and they form the other element of the clutch or brake. These inter-connected plates are mounted to the other machine component. In many applications, these plates are mounted to another shaft as with a CK or BK; however, they can also be mounted to a sheave such as an IM or PM.

The BW, CW, BR and CR are units in which customer machine components can perform as the backplate or as the mounting for a backplate.

Compressed air is used to inflate the diaphragm on all units, and the amount of force with which the linings seize the outer plates is proportional to the pressure of the air; The maximum being 120 P.S.I. When the air pressure is released, the return springs push the inner plates back together so they lose contact with the outer constraining plates and the two elements are free to rotate independently. Many applications require that the inner-outer torque plate assembly rotates, which requires an air union to transmit the air from a stationary inlet to the rotating ports of the inner-outer torque plate assembly. In brake applications where the inner-outer torque plate assembly is usually stationary, no air union is required.

II. INSTALLATION - CLUTCHES

All clutch applications can be described as either a coupling clutch or a sheave clutch. A coupling clutch connects two inline machine components, usually two shafts, while a sheave clutch connects offset shafts that are parallel to each other. Installation is critical in both applications, but is especially so in the coupling because both the offset alignment and the angular alignment is defined by how the two machine components are positioned in installation.

COUPLING CLUTCH

To begin a coupling clutch installation such as a CK, measure the two shaft diameters and the bore sizes of the clutch hubs.

The shafts should be free of burrs or swells and should be round within .001".

The bore sizes should fit the shaft metal to metal to .002" clearance. The splined hub must be mounted on the shaft with the air supply.

Check the radial runout of each shaft with a dial indicator. Neither shaft should runout more than .002" T.I.R.

Remove the capscrews from the outer periphery of the clutch and mount only the backplate assembly to the shaft. Axially position the backplate assembly on the shaft so the hub end is flush with the shaft end and setscrew it in place.

Dialing the face of the backplate at the outside diameter should give a reading of less than .010" T.I.R. Mark the position of the high and the reading on the face of the plate. Next, remove the splined hub from the inner-outer torque plate assembly by removing the socket head capscrews which fasten the brackets to the hub and sliding the hub out of the spline teeth. Slide the pressure plate and the inner-outer torque plate assembly on the other shaft and then install the hub on the shaft so that the end is flush with the shaft end.

Position the shaft in line with the other shaft and so that the "F" dimension (see illustration) is obtained. Put the indicator base on the outside diameter of the spline teeth and sweep the face of the backplate by rotating the indicator.

Re-position the shaft until the indicator reading is the same and is high at the mark. With this situation, the two shafts will be in angular alignment. Next dial in the outside diameter of the backplate to check offset or concentric alignment.

These procedures will probably need to be repeated several times while the components are moved and shimmed. The maximum acceptable misalignments are .002" per inch angular and .005" offset.

As an example, sweeping for angular on a 10" diameter would mean a maximum of .020" T.I.R. and dialing in the outside diameter should result in no more than .010" T.I.R. Get the alignments as close as possible and the result will be a smooth running, long-lived application.

To finish the installation, slide the inner-outer torque plate assembly on the hub and re-install the brackets. Install the pressure plate to the backplate keeping the balance alignment marks on the outside diameters of the plates in line. Finally, adjust the locknuts on the brackets so that there is equal clearance between each lining and friction surface.

SHEAVE CLUTCH

A sheave clutch installation, such as a PM, is much easier because the two elements of the clutch are bearing-mounted to each other so alignment is assured. The shaft outside diameter must be free of burrs or swells and should be round within .001" and have no taper. The bore size should fit metal to metal to .002" clearance.

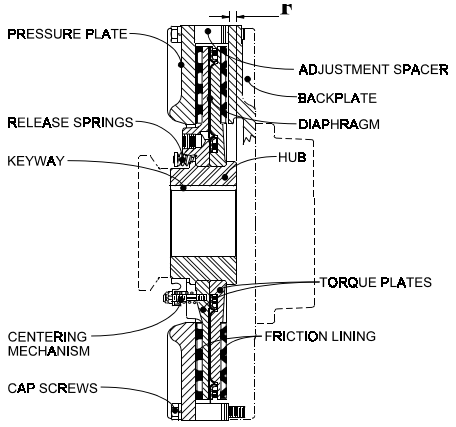
Shaft radial runout must be less than .002" T.I.R. Most sheave clutch applications produce heavy side loads so the hub to shaft fit is critical. If the fit is too loose, it will quickly become worse due to fretting corrosion.

To install the clutch on the shaft, first remove the air union adapter from the end of the hub. Apply "Anti-Seize" to the shaft and push the clutch on the shaft using the exposed face of the hub and setscrew it in place. The runout of the hub measured at the inside diameter of the exposed end should be less than .004" T.I.R.

Next install the air union and adapter to the hub and connect the hoses to the clutch ports. Adjust the locknuts on the centering mechanism brackets so that there is equal clearance between each friction lining and friction surface.

After starting up an application of a clutch, check for excessive vibrations as this can cause fretting wear that will shorten the life of the application. Misalignment is many times the cause of vibration, but also problems in the design of belt systems and unbalance in high speed components are frequent causes.

The temperature of the pressure plate should be checked frequently in the start up period of an application to be sure the chosen unit has enough thermal capacity. If the temperature is above 350° F, the application should be re-evaluated.



Size	8.5	10	12	14	16	18	20	22	25	28	32	36
F - Dimension	1/4		1/4		3/8		1/2		5/8		1 1/4	

III. INSTALLATION - BRAKES

Brake applications are less difficult than clutch applications as only one element rotates; therefore, alignment is not as critical. An application using a BK brake requires a mounting bracket for the flanged hub. This bracket must be made carefully, as it will determine the alignment for the brake.

First, check the shaft in the area where the backplate assembly will be mounted. The shaft should be free of burrs or swells and should be round within .001" The bore should fit the shaft metal to metal to .002" clearance. Remove the capscrews from the periphery of the brake and remove the pressure plate.

Put the pressure plate and the inner-outer torque plate assembly with the hub over the shaft and slide them back to the bracket. After fastening the flanged hub to the bracket, put an indicator on the shaft and dial in the outside diameter of the hub. The maximum acceptable reading for this off-set misalignment is .030" T.I.R.

Next, check the angular alignment by dialing in the face of the hub. It should have a reading of no more than .006" per inch of diameter.

Next, put the backplate assembly on the shaft and position it over the hub to obtain the "F" dimension (see illustration). Install the pressure plate to the backplate keeping the balance alignment marks on the outside diameters of the plates in line. Finally, adjust the locknuts on the centering mechanism brackets so that there is equal clearance between each lining and friction surface.

After starting a brake application, check for excessive vibration due to alignment or unbalance. Also, frequently check the temperature of the pressure plate to be sure the unit chosen has enough thermal capacity. If the temperature is above 350°F, the application should be re-evaluated.

IV. MAINTENANCE

Periodic maintenance is required on all units to adjust for lining wear. The capscrews around the periphery of the unit use tube spacers to set the gap between the two outer plates. As the lining wears, the clearance between the lining and the plate increases. When the total of the two clearances is greater than .19", one of the thin spacers should be removed from each capscrew. This will reduce the travel required of the diaphragm and prolong its life. The total clearance must not become greater than .25" for damage can occur to the return bolts or to the diaphragm. After the adjustment spacers have been removed, the locknuts on the brackets should be adjusted to obtain equal clearance between the friction linings and the friction surfaces.

V. REPAIR

Periodically, the clutch or brake should be checked for situations requiring repair. These might include excessive lining wear, air leakage, spline wear and bearing failure. If these or any other problem situations are remedied early, many times further damage can be prevented.

VI. LINING REPLACEMENT

The most common repairable problem encountered in a normal application will be lining wear. When the total clearance gap is greater than 1/4" and there are no more adjustment spacers to be removed, the lining should be replaced.

This can be accomplished by replacing the inner-outer torque plate assembly, or by purchasing linings only and bonding.

If bonding is chosen, the torque plates must be disassembled, including removal of the diaphragm, and the present lining must be removed on a lathe.

To bond new linings, use B.F. Goodrich Plastiloc Adhesive. This adhesive Is a heat and pressure curing agent and is available from the Carlson Company. Apply the adhesive to one side of the lining with a saw tooth trowel and allow it to air cure for 24 hours before bonding.

To bond, apply 100-150 P.S.I. clamping pressure over the entire lining area and heat the lining and torque plate assembly to 400°F for 30 minutes.

VII. DIAPHRAGM REPLACEMENT

In most cases, the diaphragm should be replaced when the linings are replaced so that future down time is avoided. Included with a replacement diaphragm will be two segments of o-ring material. These seal the diaphragm to the torque plate.

Put the o-rings in the grooves of the torque plate and cut them to length to form a butt joint. Place the diaphragm on the torque plate with black marks on the periphery up and in line with the air bosses. In this position all the holes in the diaphragm should be aligned with the holes in the torque plate.

DIAPHRAGM REPLACEMENT CONTINUED...

Place the inner and outer clamp rings on the diaphragm and install the screws. The screws must not be over-torqued as deformation of the clamp ring could occur, which could cause air leakage. Tighten the screws of the 8.5" through 14" to 18 in./lb., 16" through 22" to 22 in./lb. And 25" through 36" to 40 in./lb.

When all the screws are tightened, trim the inner and outer edges of the diaphragm with a sharp knife. It is important that the diaphragm does not extend beyond the clamp rings at the outside diameter and inside diameter.

Do not inflate the diaphragm until the inner-outer torque plate assembly is completely assembled and is bolted between the two pressure plates. Unrestrained inflating of the diaphragm will damage it so that it will have to be replaced.

VIII. SPLINE WEAR

Spline wear can be a problem in applications with a lot of torsional shock such as diesel engine drives or on reciprocating pump loads. It can also be caused by excessive angular misalignment or by vibration.

Some of the early signs may be a rattling noise when the clutch or brake is idling. Many times, the centering mechanism studs or the return spring bolts will break off when spline wear is present.

The only remedy is replacement of both the inner-outer torque plate assembly and the splined hub. The spline life of the hub can be extended by using a hardened hub which is available for models CW, CR and CK.

IX. BEARING FAILURE

Bearing failure is a problem limited to IM or PM models of clutches. These models have the outer plates of the clutch bearing mounted to the hub.

Since the bearings rotate only when the clutch is disengaged; noise or vibration, which is only present when the clutch is disengaged, is probably due to bearing problems.

Once the bearing problem has been identified, remove the unit from the shaft. The complete unit can be sent back to the factory for repair; or, after disassembly, the damaged parts can be replaced.

To disassemble, first remove the capscrews from the periphery of the pressure plate. Once the pressure plate is removed, Take out the capscrews holding the centering mechanism brackets to the adaptor hub which will allow the inner-outer torque plate assembly to slide up and off the hub.

Next, remove the snap ring from the back side of the clutch which retains the bearing inner race. Now set the unit on a press with the splined end of the adapter hub down so that the pressure will be reacted on the backplate friction surface.

Press on the setscrew end of the adaptor hub until it is out of both bearings.

Knock the bearings out of the backplate and then remove the snap rings which are between them.

Inspect the adapter hub for spline wear and for evidence of damage to the bearing fit areas. There should be a light press fit between the bearing inner face and the adapter hub outside diameter. If the bearing fit area of the adapter hub is undersize, it should be replaced.

Check the bearing fit area on the backplate. It should have a slight clearance fit with the bearing outside diameter. If it is over oversize by .002" or more, it should be replaced.

Also, check the bore size on the adapter hub. It should fit the shaft metal to metal to .001" clearance. If the bore is worn so that it is .003" oversize in places, it should be replaced.

After obtaining replacement bearings and other required parts, begin assembly by installing the snap rings in the grooves in the backplate. Press the bearings in the backplate, one from each side until each bottoms on its snap ring.

Apply pressure only to the outer race of the beating when installing it in the backplate. Next, obtain two 150 Watt heat lamps and set one up on

each side of the backplate in order to heat the inner races of the bearings.

Heat the bearing for 45 minutes before assembly.

Put the adapter hub in a freezer about 4 hours before assembly.

When ready, quickly assemble the adapter hub in the bearings. It should slip through the bearings with no pressure, due to the temperature differential.

Install the snap ring in the adapter hub. Install the inner-outer torque plate assembly and the pressure plate. Mount the clutch on the shaft as per the previous installation instructions.

X. ORDERING INFORMATION

Replacement parts can be obtained from and authorized "POWER FLO" distributor or from THE CARLSON COMPANY, INC., 6045 North Broadway, Wichita, Kansas 67219, Phone number (316) 744-0481, FAX number (316) 744-2144. Any service problems should be handled through the original equipment manufacturer or the distributor from whom the equipment was purchased. When ordering parts or requesting service information, give the serial number of the unit. When ordering parts, state how shipments are to be routed.

An identification plate with the serial number can be found on all inner-outer torque plate assemblies near the air boss.

The Carlson Company, Inc. will not be responsible for any charges incurred by this procedure. All shipments will be made F.O.B. Wichita, Kansas.