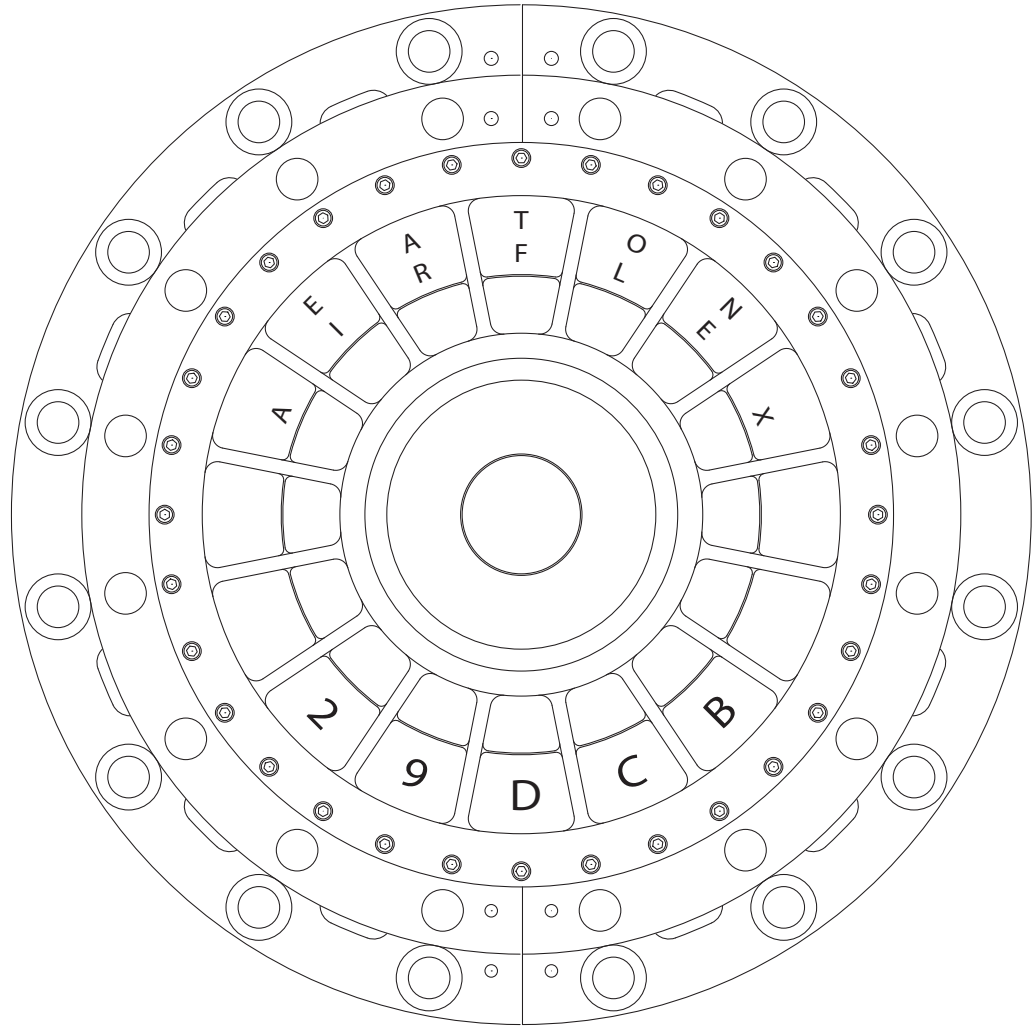


DCB19106 - Installation Guide

Airflex 29DCB clutch/brake assembly drawing LA-11219
(Stolle P/N 094950) - on Standun B6 bodymaker

204194 Rev. B



AN444378025352en-000101

General information

Warning

Forward this manual to the person responsible for Installation, Operation and Maintenance of the product described herein. Without access to this information, faulty Installation, Operation or Maintenance may result in personal injury or equipment damage.

Caution

Use only genuine Airflex replacement parts. The Airflex division of Danfoss recommends the use of genuine Airflex replacement parts. The use of non-genuine Airflex replacement parts could result in substandard product performance, and may void your warranty.

Table of contents

Section	Description	Page no
1.0	Introduction	4
1.1	Description	5
1.2	How it works	5
2.0	Installation	5
2.1	Preparation	5
2.2	Flywheel sub-assembly	5
2.3	29 DCB installation	7
2.4	Start up procedure	8
3.0	Operation	9
3.1	Pressure and speed limits	9
3.2	Initial operation	9
3.3	Periodic maintenance	9
4.0	Maintenance	9
4.1	Wear limits	9
4.2	Air manifold repair	9
4.3	Removal of the DCB	10
4.4	Friction disc replacement	11
4.5	Cylinder seal replacement	13
4.6	Disassembly	13
4.7	Reassembly	14
4.8	Flywheel bearing replacement	14
4.9	Bushing replacement	15
5.0	Technical assistance	15
6.0	Wear limit tables	16
7.0	Parts lists	16
8.0	Revisions	18

1.0 Introduction

Throughout this manual there are a number of HAZARD Warnings that must be read and adhered to in order to prevent possible personal injury and/ or damage to equipment. Three signal words

⚠ **Danger**, ⚠ **Warning** and ⚠ **Caution** are used to indicate the severity of a hazard, and are preceded by the safety alert symbol



Danger

Denotes the most serious injury hazard, and is used when serious injury or death WILL result from misuse or failure to follow specific instructions.



Warning

Used when serious injury or death MAY result from misuse or failure to follow specific instructions.



Caution

Used when injury or product/equipment damage may result from misuse or failure to follow specific instructions.

It is the responsibility and duty of all personnel involved in the installation, operation, and maintenance of the equipment on which this device is used to fully understand the Danger, the Warning and the Caution procedures by which hazards are to be avoided.

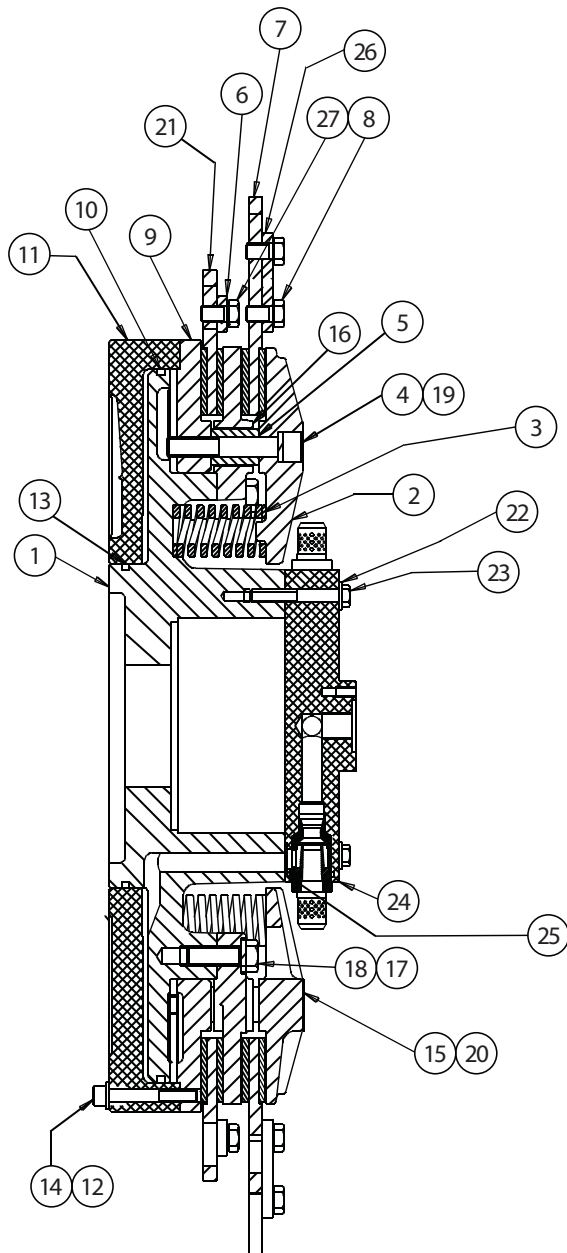


Figure 1

Item	Qty.	Description	Part number	Stolle part number
1	1	Hub	514213	094457
2	1	End plate	513107	
3	16	Spring	000071X0131	
4	16	Socket head cap screw	000030X0720	
5	16	Clamp tube	000153X1105	
6	2	Strap	307918	
7	1	Clutch friction disc assembly	513131	088074
8	12	Hex head screw	000342X0607	094726
9	1	Pressure plate	513109	
10	1	Polypak seal	000402X0015	088072
11	1	Cylinder	513099	090357
12	32	Washer	000153X0990	093168
13	1	Polypak seal	000402X0017	088073
14	32	Socket head cap screw	000030X0417	093169
15	1	Warning label	307577	
16	1	Rotor sub-assembly	513110	
17	16	Lockwasher	000068X0025	
18	16	Hex head screw	000197X0712	
19	16	Hi collar washer	000031X0005	
20	4	Self-tap screw	000153X0644	
21	1	Brake friction disc assembly	513134	088075
22	4	Flatwasher	000067X0009	
23	4	Hex head screw	000197X0716	
24	1	Air manifold sub assembly	415757	090150
25	8	Rubber washer	000350X0014	000350
26	2	Strap	307931	
27	12	Safety washer - 5/8"	000404X0007	072750

1.1 Description

1.1.1 The Airflex® Model 29DCB clutch and brake unit was designed to provide optimal clutch/brake performance required on the Standun B6 Bodymaker.

1.2 How it works

1.2.1 Referring to Figure 1, the hub (1) is secured to the machine drive shaft. The rotor sub-assembly (16) is attached to the hub which are axially stationary. As air pressure is introduced into the cylinder (11) cavity, the cylinder, pressure plate (9) and end plate (2), which are fixed to each other with screws (4) and clamp tubes (5), move away from the machine, clamping the clutch friction disc assembly (7) between the end plate and rotor subassembly and compressing the springs (3). The clutch friction disc is resiliently bushing supported on the flywheel. At the same time, the pressure plate (9), by virtue of its being fixed to the end plate, draws away from the brake friction disc assembly (21). As air pressure is exhausted from the cylinder cavity, the springs (3) force the end plate in the opposite direction, clamping the brake friction disc assembly between the pressure plate and rotor subassembly. The brake friction disc assembly is bushing supported on stationary reaction members bolted to the bearing quill.

2.0 Installation



Caution

Prior to performing any work, read this manual carefully, paying particular attention to the figures and attached drawing LA-11219. Do not risk injury or equipment damage.

Note: All part numbers referred to in this section can be found on Airflex Drawing LA-11219, which is a part of this manual.

2.1 Preparation

2.1.1 Prior to attempting installation, ensure the shaft and reference dimensions compare to those shown on drawing LA-11219. Make sure the shaft is clean and free of nicks or burrs.

2.2 Flywheel sub-assembly

2.2.1 Thoroughly clean the bores in the flywheel (515226) and remove any nicks or burrs.

2.2.2 Install the bearing cups (000348x0078) in the flywheel. It may be necessary to freeze the cups

to ease installation. Refer to drawing LA-11219 for proper orientation of the cups.

Note: The bearing cups may have been pre-installed at the factory.

2.2.3 Carefully tap the grease seals (000113x0461) into the flywheel. Refer to drawing LA-11219 for proper orientation of the seal lips.

2.2.4 Install the SpirOlox® seal retainers (000190x0090) by separating the coils and inserting one end of the ring into the groove. Keep the coil separated and spiral each turn progressively into the housing groove. When the last turn enters the groove there will be a snap indicating that ring is assembled properly.

2.2.5 Install the grease fitting and relief fitting per drawing LA-11219. Use a good quality sealant on all pipe threads.

2.2.5.1 Install pipe plugs in flywheel. Use Loctite® #262.



Caution

Loctite® #262 must be shaken prior to application.



Caution

Loctite® #262 may irritate sensitive skin. Refer to the product label for proper safety precautions.

2.2.6 Install the SpirOlox® seal retainer (000190x0095) in the brake reaction plate by separating the coils and inserting one end of the ring into the groove. Keep the coil separated and spiral each turn progressively into the housing groove. When the last turn enters the groove there will be a snap indicating that ring is assembled properly. Install bearing oil seal (000113x0464) into the brake reaction plate (513361). See drawing LA-11219 for proper orientation.

2.2.7 Insert bushings (308554) into the holes in the brake reaction plate.

2.2.8 Apply Never-Seez® to the first three to four threads and Loctite® #262 to the next three to four threads of the bushing mounting screws (000342x0620). Install and torque to 156 ft. lbs. Because the Loctite will set rapidly, apply Loctite and then tighten one screw at a time. This will avoid the Loctite from setting prior to tightening.

NOTE: Loctite® and Never-Seez® are compatible. Loctite® will provide a removable threadlock & the Never-Seez® prevents corrosion without interfering with the Loctite® holding capabilities.

- 2.2.9 Install flywheel bushing ring (513359) onto the flywheel. Install 16 screws (000197x0720) and safety washers (000404x0005), lubricate the first 3-4 threads with Never-Seez® and the next 3-4 threads apply Loctite® #262 and torque to 245 ft.lbs. Use a crosswise pattern. Because the Loctite will set rapidly, apply Loctite and then tighten one screw at a time. This will avoid the Loctite from setting prior to tightening.



Caution

Use only Airflex-supplied screws.

- 2.2.10 Hand pack one of the bearing cones (000347x0146) with grease (Mobilgrease XHP222 special or equivalent) and slide it onto the bearing quill and against the quill shoulder. See drawing LA-11219 for proper orientation of the bearing cone.
- 2.2.11 Slide the bearing spacer (308507) onto the bearing quill and against the bearing cone.
Note: Bearing spacers are custom fit to length for each flywheel. Do not interchange spacers with those from other flywheels.
- 2.2.12 Grease the bearing cups and the seal surface on the bearing quill. Fill the grease seal lips with grease. Use a grease gun and pre-fill the grease inlet passages. DO NOT fill the relief passage. Fill area between bearing cone and seal surfaces as shown in Figure 2. Rig the flywheel into position and slide it over the shaft until the inner cup is against the cone on the sleeve. Take care not to damage the inner grease seal as it passes over the bearing cone. Hold the flywheel in position.

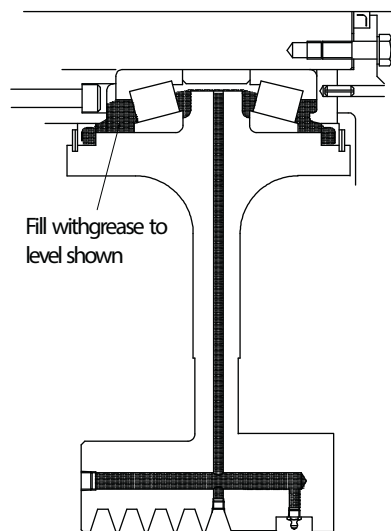


Figure 2

- 2.2.13 Hand pack the remaining bearing cone with grease (Mobilgrease XHP222 special or equivalent) and, while still supporting the flywheel, tap it onto the sleeve.
- 2.2.14 Grease the seal surface ONLY on the bearing retainer (415906) and slide it onto the shaft. Grease the seal and slide the brake reaction plate on to the bearing quill lining up the three roll pins (000382x0041) with the retainer plate. Fasten with clamp ring, and 16 screws (supplied by customer). Tighten the screws until only snug. Remove the flywheel support and, using a crosswise tightening sequence, torque the screws to 75 ft.-lbs. (lubed).
- 2.2.15 Using a depth micrometer through the holes in the brake reaction plate, measure and record the distance from the outer surface of the brake reaction plate to the face of the flywheel bearing quill ("D" on Figure 3).

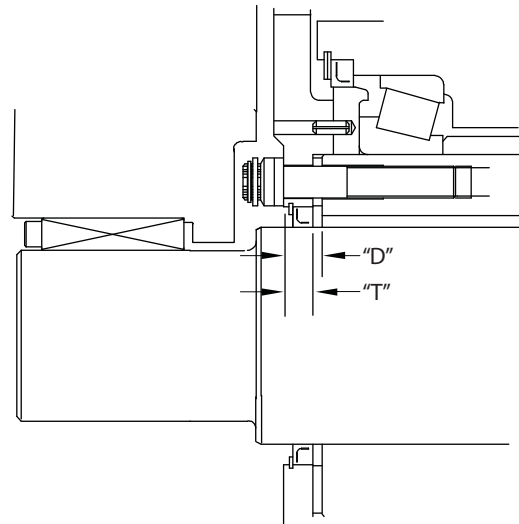


Figure 3

- 2.2.16 Remove the brake reaction plate, making sure the flywheel remains in position, and measure and record the thickness of the brake reaction plate flange ("T" on Figure 3). Use the average of these values.
- 2.2.17 Subtract "T" from "D". Grind the spacer ring (supplied by customer) to achieve total thickness equal to (+.000/-0.001") the difference between "D" and "T". Grind equal amounts of material from both sides of the spacer ring.
- 2.2.18 Reinstall the brake reaction plate with the spacer ring in place. Using a crosswise pattern, uniformly torque the 7/8-14 UNF x 5" Lg. screws (lubed) to 300 ft.lbs. then repeat crosswise pattern to 600 ft.lbs. Install retainers and snap rings after achieving proper orientation of the screws. To achieve proper orientation for retainers, vary screw torque from 550 ft. lbs. to 650 ft.lbs., maximum.



Caution

The Brake Reaction Plate mountingscrews must be Grade 8, minimum.

- 2.2.19 Pump 1 oz. - approximately 20 pumps from a hand grease gun - of (Mobilgrease XHP222 special or equivalent) grease into the flywheel bearing cavity. Remove excess grease from fittings. The bearing cavity should be about 1/3 to 1/2 full. Refer to Figure 2.

2.3 29 DCB Installation

Note: The air manifold (415747) may be attached to the DCB for shipping purposes. If so, remove it prior to installation of the DCB.

- 2.3.1 Make sure the shaft is clean and free of nicks or burrs.



Caution

Ensure that NO moly-based grease contaminates the shaft area where the locking assembly clamps.

- 2.3.2 Apply Molybdenum disulfide grease or equivalent to the shaft between the hub and shaft. Reference note 16 on Danfoss drawing LA-11219.
- 2.3.3 Installation instructions for clutch hub item #1 and B'Loc locking assembly item #2. Reference Stolle Drawing 715081 for the following 11 steps.
1. Clean and lightly oil (D.T.E. light Hyd. oil ISO VG 32 or equal) shaft, hub bore and locking assembly. Make sure to always oil threads and head of SOC head cap screws. It is important not to use molybdenum disulfide, e.g. Molykote, Never-seeze or similar lubricants in any locking assembly installation.
 2. Use installation fixture tool assembly 741042 for following procedures.
 3. Install locking assembly (item #2) into the $\approx 6-1/2$ " bore of the clutch/brake hub (item #1) seating locking assembly on bore shoulder as shown. It may be necessary to secure position of inner wedge during this procedure. Utilize screw positions (view a-a) 1, 6, & 11 as jacking screws to hold inner wedge position. Remove these bolts from current position and thread to appropriate depth on adjacent holes to secure inner wedge.
 4. Attach the tool plate (item #15) 741043 to the clutch/brake hub (item #1) by tightening (4) SOC head cap screws 3/4-10 unc x 2-3/4 long (item #19) to 170 ft-lbs.
 5. Install clutch/brake assembly with locking device and tool plate mounted onto the crank shaft dia. As shown using overhead lifting device fitted slings or other equivalent supporting device, be sure to fully seat the tool plate against the end of the crankshaft by tightening (3) socket head cap screws 5/8-11 unc x 2-1/2" long (item #17) to 30 ft-lb - do not relieve lifting support.

6. Install clutch/brake tool bolt (item #16) in center threaded hole of tooling plate (item #15). Tighten tool bolt (item #16) to 45 ft. lbs. do not relieve lifting support.

7. Measure throughslot provided to determine distance "W" between clutch/brake hub and crankshaft journal at the four positions provided. Center the clutch/brake unit to the crankshaft within .005" or less by adjusting the tooling bolt (item #16) torque and tooling plate mounting bolts (item #17) in combination with clutch/brake support mechanism in use. Complete tightening of (3) socket head cap screws 5/8-11 unc x 2-1/2" long (item #17) to 125 ft. lbs. upon achieving centering specification of "w" dimension variation of .005" or less.

8. Remove slings and other clutch/brake unit lifting devices - recheck "W" dimension in slots through tool plate (item #15) for any movement from centering specification - repeat step 7 if movement is determined.

9. Stages following the sequence shown in the partial end view a-a on sheet 2 of 3. Reference Stolle drawing 715081.

Stage 1: tighten screws evenly and in sequence shown by turning the screws approximately 1/4 turn at a time evenly until 40 ft-lbs. Each is reached as measured with a torque wrench.

Stage 2: remove tool plate (item #15) by unscrewing all SOC head cap screws from hub and from crankshaft. Remove any slings or straps (crane). Pay attention to the clamp collar split-line and make necessary torque corrections to the screws (position 7 & 8) adjacent to the split-line to ensure no more than .015" offset exists, check "Channel" width "W" at (8) places and enter each measurement to the chart. If difference (W max / -W min) is more than .005", recheck all locking screw torque (40 ft. lbs.), if necessary disassemble, check components for burrs & foreign matter and reassemble per the above procedure, if (W max / -W min) is .005" or less proceed tightening all screws evenly & in sequence shown by turning the screws approx. 1/4 turn at a time until 60/80/100 ft. lbs. each is reached as measured with a torque wrench. Make "Channel" width "W" check after each screw tightening step. Maximum variation acceptable is .005 in.

Stage 3: recheck final screw tightening torque of 100 ft. lbs. in clockwise sequence until no screw can be turned any more. Make final "Channel" width "W" check and enter the measurements to the chart.

10. Remove (item #15) tool plate and re-verify "w" dimension variation less than .005". Repeat step above and correct any deviation.

11. Removal instructions: reference drawing 741042 sheet 2.

A. Use tool bolt (item #16) for removal of clutch/brake unit from crankshaft journal. Remove socket head cap screw (item #17) and install (4) socket head cap screws (item #19).

B. Install proper lifting and support mechanisms (straps & blocks) to support the weight of the clutch/brake unit during removal (850 lbs).

C. Remove (14) locking device mounting screws. Rotate tooling plate (item #15) 90° in either direction and re-install the locking device mounting screws in the adjacent threaded holes to separate locking device wedges. Once screws are seated tighten in clockwise pattern 1/4 turn each until wedges are separated.

D. Turn tool bolt (item #16) to separate clutch/brake unit from crankshaft journal.

2.3.4 Install and tension the drive belts.

2.3.5 Attach the air manifold subassembly (415757) to the DCB hub with four screws (000197x 0716) and flat washers (000067x0009), making sure the rubber washers (000350x0014) are in place at the air inlets. Use Loctite® #262 on the screws and torque to 110 ft.-lb. (lubed)

2.3.6 Attach the 1" RH rotor seal (145488AB) to the air manifold with four screws (000030x0207) and lock washers (000031x0006), making sure the rubber face seal is in place. Using a crosswise pattern, torque the mounting screws to 28 ft. lbs., lubed.

2.3.7 Connect a regulated air supply to the rotor seal and apply enough air pressure to release the brake (80-90 psi).



Warning

Maximum applied air pressure for set up purposes is 90 psi. Air pressure exceeding maximum allowable will result in damage to the DCB components.



Warning

A pinch point exists between the rotor, pressure plate and brake friction disc assembly.

2.3.8 Remove the screws, serrated safety washers and straps attaching the brake friction disc assembly halves together and reinstall with Loctite® #262. Torque the screws to 156 ft.-lb., making sure the brake friction disc slides freely on the bushing assemblies.



Caution

The brake friction disc assembly MUST slide freely on the bushings. If the disc binds, excessive heat will be generated during machine operation.

2.3.9 Exhaust the air pressure and remove the temporary air supply.

2.3.10 Connect the air piping using a flexible hose between the rotor seal and the dual valve.



Warning

Maximum applied air pressure is 90 psi. Maximum operating air pressure is 85 psi. Operation with air pressure greater than the maximum allowable may result in damage to DCB components.

2.3.11 Remove the screws and straps attaching the clutch friction disc assembly halves together and reinstall with Loctite® #262. Torque the screws to 156 ft.-lb., making sure the clutch friction disc slides freely on the bushing assemblies.



Caution

The clutch friction disc assembly MUST slide freely on the bushings. If the disc binds, excessive heat will be generated during machine operation.

2.4 Start up procedure



Warning

Excessive machine cycling or jogging during die set up may cause internal damage to the DCB clutch/brake, and accordingly, degrade clutch/brake performance, with potential subsequent damage to the machine and/or related equipment.

2.4.1 Start the main drive motor and allow it to idle at slow speed (if so equipped) for approximately one hour. Cycle the machine several times during this period to check clutch/brake operation.

Note: Some grease may be thrown out through the relief fitting, which is no cause for alarm.

2.4.2 Turn the main drive motor off and check for excessive temperatures at the flywheel bearing hub (at slow speed the hub should be relatively cool). Check that the clutch & brake friction discs slide freely on the bushings. Correct if necessary by loosening the screws attaching the friction disc halves together, reapplying Loctite® #262 and retightening.

- 2.4.3 Start the main drive motor and allow to idle at full speed for approximately one hour, again cycling the machine periodically. Turn the drive motor off and repeat the above checks.

3.0 Operation

3.1 Pressure and speed limits

- 3.1.1 Maximum applied air pressure is 90 psi. Maximum operating air pressure is 85 psi. Minimum operating air pressure is 80 psi, operation below 80 psi will result in insufficient torque development and possible friction disc slippage.

Warning

Maximum applied air pressure is 90 psi. Maximum operating air pressure is 85 psi. Operation with air pressure greater than the maximum allowable may result in damage to DCB components.

- 3.1.2 Maximum operating speed of the 29 DCB clutch/brake is 750 rpm.

3.2 Initial operation

Warning

Excessive machine cycling or jogging during die set up may cause internal damage to the DCB clutch/brake, and accordingly, degrade clutch/brake performance, with potential subsequent damage to the machine and/or related equipment.

- 3.2.1 Insure that the clutch and brake friction discs slide freely on the bushings. Excessive heat will be generated during machine operation if the disc binds. If binding is evident refer to paragraph 2.3.13 - 2.3.16.

3.3 Periodic maintenance

- 3.3.1 Perform all operations in section 3.2.
- 3.3.2 Inspect the friction material for signs of wear (refer to table 1).
- 3.3.3 Inspect the flywheel bushings and brake reaction plate bushings for signs of wear (fretting).
- 3.3.4 Check drive belts for proper tensioning.
- 3.3.5 Check for air leaks in the air system and at the clutch.
- 3.3.6 Check the rotor seal bearings for freedom of movement.
- 3.3.7 Insure that the guards are free from the flywheel and clutch/brake assembly.
- 3.3.8 Lubricate the flywheel bearings on a weekly basis using 1 oz. - approximately 20 pumps from a hand grease gun - of (Mobilgrease XHP222 special or equivalent) grease.

4.0 Maintenance

Warning

Prior to performing any work on the DCB, make sure the machinery is in, and will remain in, a safe condition.

4.1 Wear limits

- 4.1.1 Wear limits for the normal wearing components of the DCB are listed on Table 1. If any wear limit has been reached or exceeded, that component must be replaced. In addition, if any friction surface has been contaminated with oil or grease, that friction disc assembly must be replaced.

4.2 Air manifold repair

Airflex repair kit 145141DQ is available for repair of the air manifold quick release valves. Each kit contains an end cap, diaphragm, muffler and a tube of Loctite® #222. Item numbers in the following instructions are shown on Figure 4.

NOTE: It is not necessary to remove DCB from shaft to repair the air manifold.

Warning

Follow the repair instructions closely. Improperly installed QRV end caps may work loose during operation resulting in exposure to personal injury or equipment damage.

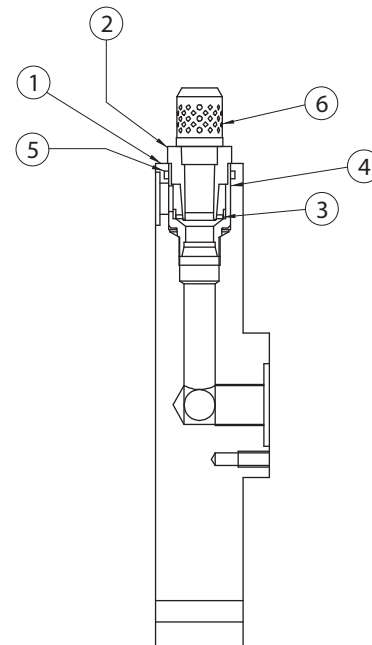


Figure 4

- 4.2.1 Remove the rotor seal from the manifold. It may be necessary to disconnect the air supply line.
- 4.2.2 Remove the air manifold assembly and transport to a clean work area.
- 4.2.3 Remove the mufflers (6), end caps (2) and diaphragms (3), taking care not to damage the sealing surfaces in the QRV housings (4). If a QRV housing comes loose when removing the end caps, replace per the following instructions.
 - 4.2.3.1 Thoroughly clean all holes in the manifold housing (1).
 - 4.2.3.2 Install the end cap (2) into the QRV housing (4) hand tight. Do not use any Loctite® on the end cap threads.
 - 4.2.3.3 Install the o-ring (5), lubricated with Parker O-Lube®, into the manifold housing.
 - 4.2.3.4 Apply Loctite® #271 to the external threads on the QRV housing and screw it into the manifold until the QRV housing is flush with the O.D. of the manifold. Align the air inlet holes.
 - 4.2.3.5 Allow the Loctite® #271 to cure for 24hrs. For faster cure allow the Loctite® to cure at 200°F for a minimum of one hour.
- 4.2.4 With the end caps removed, thoroughly clean the internal threads in the QRV housings.
- 4.2.5 Place a diaphragm in the housing and install the end cap and muffler using Loctite® #222 on the threads. Torque the end cap to no more than 10 ft.-lb.
- 4.2.6 After the Loctite® has cured minimum 24hrs (for faster cure allow the Loctite® to cure at 200°F for a minimum of one hour), apply counter-clockwise torque of 15 ft.-lb. to each end cap and muffler. If any end cap or muffler comes loose, remove and repeat 4.2.5.
- 4.2.7 Reinstall per 2.3.5 and 2.3.6.

4.3 Removal of the DCB

Note: It is not necessary to remove either of the friction disc assemblies to remove and overhaul the DCB.

- 4.3.1 Disconnect the air supply and remove the rotor seal and QRV manifold assembly from the DCB hub.
- 4.3.2 Attach an overhead support to the DCB.
- 4.3.3 Refer to Figure 5. Loosen the shaft locking assembly screws gradually in a diametrically opposed sequence (crosswise pattern). Remove all of the screws. Install screws into push-off threads provided in the outer clamp collar (A), until they bottom against the center collar (B). Tighten the screws crosswise in 1/4 turn increments until the outer clamp collar loosens. Remove the outer clamp collar. Install screws into push-off threads provided in the center collar. Tighten the screws crosswise in 1/4 turn increments until the center collar loosens from the inner clamp collar (C).

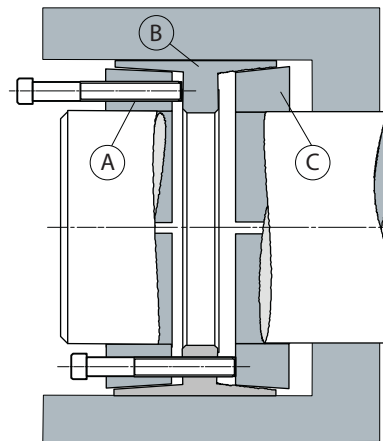


Figure 5

- 4.3.4 Carefully slide the DCB off of the shaft and transport to a clean work area.
- 4.3.5 Remove the remaining clamp collars from the DCB hub and re-assemble the shaft locking assembly for later use.

4.4 Friction disc replacement

Note: Removal of the DCB Clutch/Brake is required to remove clutch & brake friction discs (see section 4.3). The shaft locking assemblies may be removed, allowing the DCB to be slid away from the machine to obtain the required clearance to remove the clutch friction disc halves. When using this procedure, make sure the DCB is supported to avoid personal injury. Refer to the INSTALLATION section of this manual for reassembly. Note the orientation of the offset on the friction disc's metal core, and remember to install the straps attaching the friction disc halves.

Note: The wear limit for the clutch/brake friction disc surfaces, shown on Table 1, is approximately .060" per surface. Due to the offset on the disc cores, a direct measurement of friction material thickness is not possible. Figure 6 shows the measurements to be taken between the outboard clutch friction surface (measured with air on) and the end plate, and between the inboard brake friction surface (measured with air off) and the pressure plate.



Warning

Operation of the DCB with the friction material worn to less than the gap measurements shown on Figure 6 will result in a significant reduction of clutch and/or brake torque.

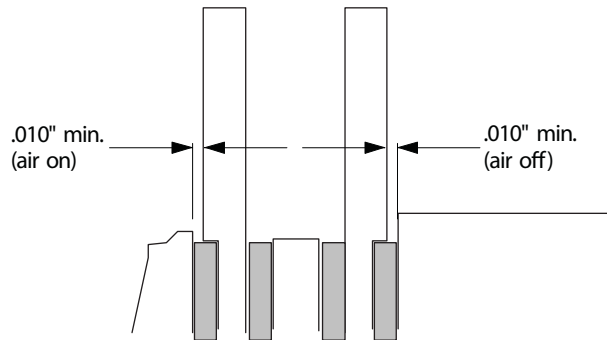


Figure 6

4.4.1 Remove the screws attaching the straps to the clutch friction disc assembly halves and remove the clutch friction disc assembly. If not replacing, set aside in a clean area.

4.4.2 Apply air regulated (90 psi Max.) pressure to the DCB to release the brake.



Warning

Pressure above 90 psi may cause internal damage to the components of the clutch/brake.

4.4.3 Remove the screws attaching the straps to the brake friction disc assembly halves and remove the brake friction disc assembly. If not replacing, set aside in a clean area.

4.4.4 Exhaust the air to release the clutch.



Warning

With the brake friction disc assembly removed, a pinch point exists between the pressure plate and rotor.

4.4.5 Friction lining replacement: If the bushing holes in the Clutch/Brake disc have not worn to the limit shown on Table 1 and the friction disc cores are in good condition, the cores may be relined with new friction material. Airflex lining kit 146293YF contains enough friction material and rivets to repair one clutch or brake friction disc assembly. Replace the friction linings per the following instructions.



Warning

Before beginning replacement of parts supplied in the friction disc kit, carefully read the following instructions and make sure what is stated in each step is understood. Failure to follow these instructions may result in personal injury.



Caution

Use only Airflex supplied replacement friction material. Use of material not of Airflex origin may result in reduced clutch or brake torque or accelerated wear of the iron components.

4.4.5.1 Drill out the old rivets using a .250" drill. Remove and discard the used friction discs.

4.4.5.2 Refer to Figure 7 and carefully examine the counterbored holes in the friction disc segments (513084). One set of counterbored holes is tapered and designed to accept the rivet head, while the other set of counterbored holes is flat-bottomed and designed to accept the clinched end of the rivet.

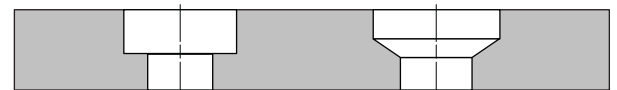


Figure 7

4.4.5.3 Position the friction discs on both sides of the friction disc core, as shown on figures 8, 9 & 10, and align the rivet holes in the friction discs with the rivet holes in the core plate.



Caution

Each friction disc (513084) is molded in a continuous ring and saw cut prior to shipment from Airflex. Matching friction disc segments are wired together after cutting. Make sure each friction disc set is riveted to the same face of the clutch or brake disc core.



Caution

Manual setting of the rivets using a punch very frequently results in splitting of the clinched end of the rivet. When this occurs, the rivet will ultimately fail in service due to fatigue. It is therefore recommended that rivets be set using an automatic rivet setting machine.

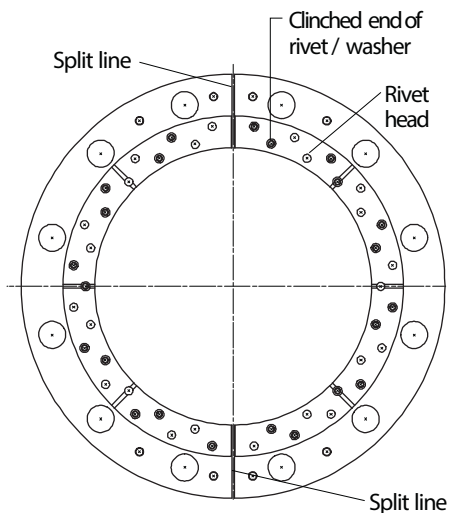


Figure 8

4.4.5.4 Insert the first rivet (000130x0090) through any hole adjacent to the split line (end of lining segment). Be sure to note the type of counterbored hole to determine the position of the rivet head. See Figure 7.



Caution

When working with any friction material, regardless of material type, always wear approved safety equipment.

4.4.5.5 Set the rivet using a washer (000153x0985) on the clinched end of the rivet. See figures 9 and 10. Figure 9 shows machine-setting and Figure 10 shows setting the rivet manually. When setting manually, use an arbor press and keep the setting tool square to avoid splitting the rivet. The rivet setting tool optional and available from Airflex as part number 000153X1092. (Stolle part # 089800).



Caution

The clinched end of the rivet must have a washer (000153x0985) in place prior to clinching. Failure to use the washer will allow the rivet to fracture the friction lining. Also, use of excessive force to clinch the rivet will fracture the friction lining.

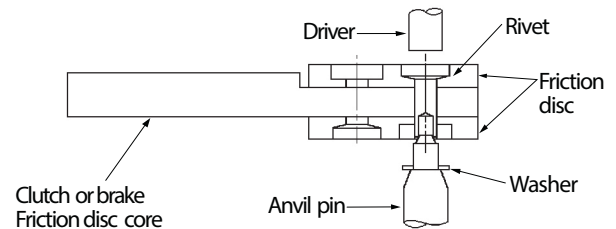


Figure 9

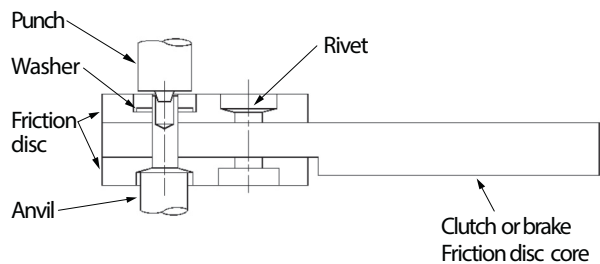


Figure 10

4.4.5.6 Insert a second rivet on the opposite end of the friction lining and repeat 4.4.5.5.

4.4.5.7 Insert a third rivet at the center of the friction lining and repeat 4.4.5.5.

4.4.5.8 The remaining rivets may be installed in any reasonable sequence following 4.4.5.5.

4.4.5.9 After all rivets are clinched, check to make sure that a washer has been used on each rivet. Inspect the clinched end of each rivet and replace any that are cracked or split. Look closely at the lining and make sure there are no cracks. If a .005" feeler gauge can be inserted further than .375" between the friction discs and core plate, the rivets in that area must be reclinched.

- 4.4.6 Apply air regulated pressure to the DCB to release the brake. (90 psi Max.)



Warning

Pressure above 90 psi may cause damage to the components of the clutch/brake.

- 4.4.7 Install the brake friction discs, straps washers and screws. Hand tight screws.
- 4.4.8 Exhaust the air to release the clutch.
- 4.4.9 Install the clutch friction discs, straps washers and screws. Hand tight screws.
- 4.4.10 Inspect the bushings for wear. Replace if necessary per section 4.9.
- 4.4.11 Re-install the DCB per section 2.3.

4.5 Cylinder Seal Replacement

Note: Remove the DCB per section 4.3.

Refer to Figure 1 for location of the following numbered items.

- 4.5.1 Match-mark the cylinder (11) to the pressure plate (9) and remove the cylinder attaching screws (14) and lockwashers (12).
- 4.5.2 Carefully slide the cylinder (11) off of the DCB.



Warning

DO NOT use air pressure to force the cylinder off of the DCB. Application of air pressure with the cylinder attaching screws (14) removed will result in exposure to personal injury or equipment damage.

- 4.5.3 Check the seal surfaces on the cylinder (11). If the wear reaches or exceeds the specification on Table 1, the cylinder (11) must be replaced.
- 4.5.4 Remove the PolyPak® seals (10)(13) from the hub (1) Install new seals (10)(13) noting the orientation of the seal lips.
- 4.5.5 Lubricate the seal surfaces on the cylinder (11) with a light coat of Parker O- Lube® and slide the cylinder (11) into position.
- 4.5.6 Align the match marks and attach the cylinder (11) to the pressure plate (9). Torque the screws to 70 ft.-lb., lubed. Use Loctite® #272 on the screws.

4.6 Disassembly

Note: Remove the DCB per section 4.3.

Refer to Figure 1 for location of the following numbered items.



Danger

High spring forces exist within the DCB. Read the following instructions carefully before attempting to disassemble the unit.

- 4.6.1 Lay the DCB on a clean, flat work surface, cylinder (11) down.
- 4.6.2 Remove four equally spaced screws (4) and lockwashers (19) attaching the end plate (2) to the pressure plate (9) and reinstall without the lockwashers (19) in place.
- 4.6.3 Remove the remaining 12 screws (4) and lockwashers (19).
- 4.6.4 Loosen the four screws (4) in a crosswise pattern, one turn at a time, until all of the spring force has been relieved.



Danger

The four screws (4) must be loosened gradually. Failure to follow this procedure will result in over stressing and possible failure of the end plate (2).

- 4.6.5 Lift the end plate (2) off of the springs (3) and check the friction surface. See Table 1.



Danger

The wear surface on the end plate (2) cannot be renewed by machining. If the wear limit shown on Table 1 has been reached or exceeded, the end plate (2) MUST be replaced.

- 4.6.6 Remove the clutch friction disc assembly (7), note the wear on the friction surfaces and set aside.
- 4.6.7 Remove the springs (3) and check the free height. If any one of the springs (3) has a free height less than the value shown on Table 1, the entire complement of springs (3) must be replaced.
- 4.6.8 Lift the clamp tubes (5) out of the holes in the rotor (16) and check for wear. If any clamp tube (5) has worn to the specification on Table 1, it is advised that the entire set be replaced.

- 4.6.9 Remove the screws (18) and lockwashers (17) attaching the rotor (16) to the hub and lift off the rotor (16). Inspect the friction surfaces and bushing bores. If any of the wear limits on Table 1 have been reached or exceeded, the rotor subassembly (16) must be replaced.



Caution

If the wear limits on the rotor friction surfaces have been reached or exceeded, the rotor subassembly must be replaced. The friction surfaces cannot be renewed by machining.



Caution

If the wear limit for the bushings in the rotor has been reached or exceeded, the rotor must be replaced. The bushings are normally not replaceable items. Consult the factory prior to attempting replacement of the bushings.

- 4.6.10 Remove the brake friction disc assembly (21), note the wear on the friction surfaces and set aside.
- 4.6.11 Note the wear on the friction surface on the pressure plate. (9) If the wear exceeds the limit shown on Table 1, the pressure plate (9) must be replaced. To replace, remove the cylinder (11) per 4.5.



Caution

If wear of the friction surface on the pressure plate (9) exceeds the value shown on Table 1, the pressure plate (9) must be replaced.

4.7 Reassembly

Refer to Figure 1 for location of the following numbered items.

- 4.7.1 With the cylinder (11) assembled to the pressure plate (9) and hub (1), lay the unit on a flat work surface, cylinder (11) down.
- 4.7.2 Place the brake friction disc assembly (21) on the pressure plate (9), noting the orientation of the step on the friction disc core.
- 4.7.3 Position the rotor (16) onto the hub (1) so the two sets of holes are aligned and the register on the rotor (16) engages the DCB hub (1).
- 4.7.4 Attach the rotor (16) to the hub (1) with screws (18) and lockwashers (17). Coat the screws (18) with an Never-seez[®] and, using a crosswise pattern, torque the screws (18) to 245 ft.-lb.
- 4.7.5 Coat the O.D. of the clamp tubes (5) with a light coat of Never-seez[®] and insert into the holes in the rotor (16).
- 4.7.6 Insert the springs (3) into the pockets in the hub (1).

- 4.7.7 Place the clutch friction disc assembly (7) on the rotor (16), noting the orientation of the step on the disc core.
- 4.7.8 Place the end plate (2) over the springs (3) so the mounting holes are aligned and the springs (3) engage the bosses on the end plate (2).
- 4.7.9 Apply a coat of Never-seez[®] to the threads and under the heads of four end plate mounting screws (4) and install evenly spaced. Do not install the lockwashers (19) at this time.
- 4.7.10 Tighten the four screws (4) one turn at a time, in an alternating sequence, until the springs (3) are fully compressed.



Danger

The four screws (4) must be tightened gradually. Failure to follow this procedure will result in over stressing and possible failure of the end plate (2).

- 4.7.11 Install the remaining end plate mounting screws (4) and lockwashers (19). Apply a coat of Never-seez[®] to the screw threads and, using a crosswise pattern, torque the screws (4) to 245 ft.-lb.
- 4.7.12 Remove the four screws (4) installed in 4.7.9 and reinstall and torque with the lockwashers (19) in place.
- 4.7.13 Install the DCB per section 2.3.

4.8 Flywheel bearing replacement



Caution

The flywheel bearing cups and cones must be replaced in sets. It is not a good practice to install a new cone against a worn cup. Also, when replacing bearings, it is extremely important that the bearing spacer length be checked to ensure proper bearing clearance.

- 4.8.1 Remove the DCB from the shaft per 4.3 and remove the drive belts.
- 4.8.2 While supporting the flywheel, remove the screws, clamp rings, retainers and snap rings attaching the brake reaction plate (513361) to the bearing quill. Remove the brake reaction plate. Examine the seal surface on the quill bearing retainer (415906). Insure it is free from nicks and burrs. Replace if necessary.
- 4.8.3 Carefully slide the flywheel off of the bearing quill. The bearings and spacer will pull off the quill along with the flywheel.
- 4.8.4 Slide the bearing cones (000347x0146) and spacer (308507) out of the bore.
- 4.8.5 Examine the grease seal surface of the quill. Insure it is free of nicks and burrs. Repair or replace if necessary.

- 4.8.6 Remove the SpirOlox[®] seal retainers and carefully tap the grease seals (000113x0461) and the bearing cups (000348x0078) out of the flywheel.
- 4.8.7 Remove any nicks or burrs from the flywheel bore and carefully tap in the new bearing cups. Freezing the cups will ease insertion. See LA-11219 for proper orientation.
- 4.8.8 Replacement of the bearings requires that the spacer length be re-evaluated. Determine the spacer length per the following instructions:
 - 4.8.8.1 Allow the bearing cups to warm to ambient temperature if they have been chilled during assembly.
 - 4.8.8.2 Apply a light coat of grease to the cups and insert the cones into the flywheel, holding them into position with a three pronged fixture, similar to that shown on Figure 11.
 - 4.8.8.3 Rotate the fixture while tightening the fixture clamp screw. Tighten just until the rollers are seated in the cups so that no rollers are loose.
 - 4.8.8.4 Measure the space between the inner bearing races ("M" on Figure 11) at three positions approximately 120 degrees apart. If the difference between the three readings is less than 0.010", calculate the average of the three readings. If the difference between the three readings is greater than 0.010", the bearings are not seated. Loosen the fixture and re-seat the cones, tightening the fixture per 4.8.8.3.

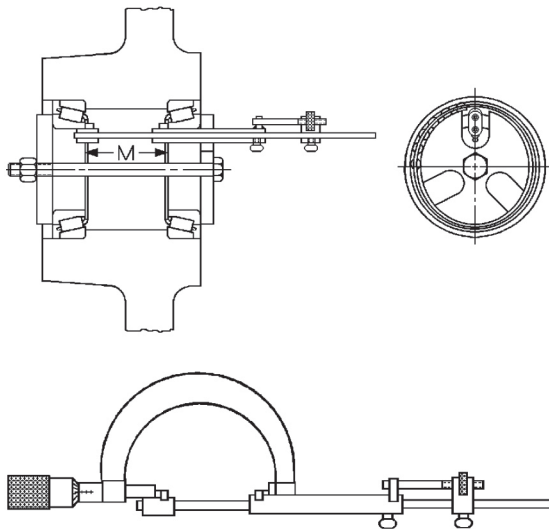


Figure 11

- 4.8.8.5 Calculate the spacer width:
 Minimum spacer width = $M + 0.014"$.
 Maximum spacer length = $M + 0.015"$.

- 4.8.8.6 Grind the spacer to the proper length. If necessary, weld and re-grind the spacer, or replace the spacer and grind to length as required.
- 4.8.9 Reinstall per Section 2.0.

4.9 Bushing replacement

- 4.9.1 Remove DCB from Shaft per 4.3
- 4.9.2 Remove the screws (000197X0720) and washers (000404X0005) attaching the flywheel bushing ring to the flywheel and remove bushing ring.
- 4.9.3 Support the flywheel and remove customer supplied screws (7/8-14 UNF x 5.00) from the brake reaction plate and remove. Do not remove overhead support from the flywheel.
- 4.9.4 Removal of the bushings from the flywheel bushing ring and brake reaction plate requires Airflex Kit #146220XE, which includes two screws (000032x0612 & 307657) and a pin (307654-01).
- 4.9.5 Remove each bushing per the following instructions:
 - 4.9.5.1 Remove the (000342x0620) securing the bushing to the flywheel bushing ring and/or brake reaction plate.
 - 4.9.5.2 Slide the pin (307654-01) into the bushing and thread the screw (307657) into the tapped hole in the end of the bushing until it seats.
 - 4.9.5.3 Apply Never-Seez[®] to the threads of the screw (000032x0612) and thread it into the tapped bushing mounting hole.
 - 4.9.5.4 Tighten the screw to push the bushing out.
 - 4.9.5.5 Repeat the above procedure for the remaining bushings.
- 4.9.6 Re-install the bushings per section 2.0 and DCB per section 2.3.

5.0 Technical information

- 5.1 In any correspondence regarding Airflex equipment, refer to the part number and description on the product nameplate.

Loctite is a registered trademark of Henkle Consumer Adhesives.
 Molykote is a registered trademark of Dow Corning Corporation.
 Mobilgrease is a registered trademark of Mobil Oil Corporation.
 PolyPak and Parker O-Lube are registered trademarks of Parker Hannifin Corporation.
 Never-Seez is a registered trademark of Bostik, Inc.
 SpirOlox is a trademark of Ramsey Corporation.

6.0 Wear limits

TABLE 1 (See figure 1 for Item Numbers)

Item	Description	Wear limit	Remarks
11	Cylinder	Visual	Replace when aluminum is visible.
7, 21	Friction disc assembly Friction material Exceeding wear limit will result in clutch/brake failure.	Minimum friction disc assembly overall thickness is **.785".	Replace friction disc assembly when overall thickness is worn to wear limit. New friction disc assembly is approximately .850 - .880" thick.
2, 9 16	Friction Disc Gap Exceeding wear limit will result in clutch/ brake failure.	Maximum friction disc gap not to exceed **.815" Both discs removed.	End plate to rotor gap measured with air applied. Pressure plate to rotor gap measured without air applied. Inspect components for wear if gap limit is exceeded. A pinch point exists when air is applied or released.
3	Spring	4.500" free height	Original spring free height is 4.455".
2	End plate friction surface	.020" on surface	Wear will be evident as a step worn into the friction surface along with some grooving.
5	Clamp tube	.010" on diameter	Wear will typically be in the form of a notch in the driving direction. Original diameter is 1.366".
16	Rotor bushing	.015" on diameter	Wear will be in the form of elongation of the bushing. Original bushing I.D. is 1.377".
16	Rotor friction surfaces	.020" per surface	Wear will be evident as a step worn into the friction surface along with some grooving.
9	Pressure plate friction surface	.020" on surface	Wear will be evident as a step worn into the friction surface along with some grooving.
7	Friction disc metal core	.030" on diameter	Wear will be in the form of elongation of the holes which mate with the flywheel bushings. Original hole diameter is 1.655/1.660".
*	Bushings 308554	.020" on diameter	Wear will be in the form of a groove on the O.D. of the bushing. New diameter 1.613/1.623"

* Shown on drawing LA-11219 at end of this manual.

** The friction disc gap includes a combination of iron surface wear of the End Plate, Rotor and Pressure Plate. The friction disc must be at least .010" thicker than the friction disc gap.

7.0 Recommended spare parts list

Standun bodymaker per Airflex drawing LA-11219 (108100A) / (Stolle 094950)

Quantity	Description	Airflex part number	Stolle part number
1	29DCB clutch/brake assembly	146293E	089346
1	Piston polypak seal	000402X0015	088072
1	Piston polypak seal	000402X0017	088073
16	Brake apply spring	000071X0131	088765
1	Bearing retainer, grease seal wear surface	415906	088766
1	Clutch friction disc assembly	513131	088074
1	Brake friction disc assembly	513134	088075
2	Friction disc and rivet replacement kit	146293YF	088767
2	Flywheel grease seal	000113X0461	088077
2	Flywheel bearing (Cone)	000347X0146	094951
2	Flywheel bearing (Cup)	000348X0078	094952
1	Flywheel bearing spacer	308507	094953
1	1" RH rotor seal	145488AB	095580
1	1" RH rotor seal rebuild kit	145488XA	088768
8	Manifold mounting seal washers	000350X0014	088769
8	Manifold QRV repair kits	145141DQ	090032
32	Bushings	308554	095148
1	Shaft seal	000113X0464	088071
1	Shaft locking assembly	000403x0105	715066
8	Rubber washers	000350x0014	086712

DCB19106

29DCB clutch/brake application material list Standun bodymaker per Airflex drawing LA-11219 (108100A) / (Stolle 094950)

Quantity	Description	Airflex part number	Stolle part number
2	Pipe Plug, countersunkhex, steel, 1/8"	000077X0001	
2	Pipe Plug, countersunkhex, steel, 3/8"	000077X0004	
2	Oil seal	000113X0461	088077
1	Oil seal	000113X0464	088071
1	Grease fitting	000145X0002	
1	Relief fitting	000145X0005	
2	Snap ring	000190X0090	088080
1	Snap ring	000190X0095	
16	Hex headscrew, GR8, 3/4-10NC2 x 4.5 long	000197X0720	090363
16	Hex headscrew, GR8, 5/8-18NC2 x 4.5 long	000342X0620	089835
2	Bearing cone	000190x0090	094951
2	Bearing cup	000190x0095	094952
1	Locking assembly	000403X0105	715066
16	Serrated safety washer, 3/4	000404X0005	038600
1	1" RH rotorseal	145488AB	095580
1	Bushing installation and removal kit	146220XE	089854
1	29DCB clutch/brake assembly	146293E	089346
1	Flywheel bushing ring and bushing sub-assembly	146367	090027
1	Bearing spacer	308507	094953
1	Bushing sub-assembly	308554	095148
1	Bearing retainer	415906	090000
1	Brake reaction plate	513361	715058
1	Flywheel	515226	094954

Products we offer:

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1[®] controllers
- PLUS+1[®] displays
- PLUS+1[®] joysticks and pedals
- PLUS+1[®] operator interfaces
- PLUS+1[®] sensors
- PLUS+1[®] software
- PLUS+1[®] software services, support and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

Go to www.danfoss.com for further product information.

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Local address:

Hydro-Gear

www.hydro-gear.com

Daikin-Sauer-Danfoss

www.daikin-sauer-danfoss.com

Danfoss Power Solutions (US) Company
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

Danfoss Power Solutions GmbH & Co. OHG
Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

Danfoss Power Solutions ApS
Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

Danfoss Power Solutions Trading (Shanghai) Co., Ltd.
Building #22, No. 1000 Jin Hai Rd
Jin Qiao, Pudong New District
Shanghai, China 201206
Phone: +86 21 2080 6201