Modular MULTIPLE DISC BRAKE with pressure override (SAE B size)

Service Instructions

TABLE 1

Model Number	Lining Kit Number	Bearing Kit Number	O-ring Kit Number	Spring Kit Number	Red Springs (19) Quantity	Blue Springs (19) Quantity
13-592-002	12-501-342	12-501-340	12-501-339	12-501-341	6	0
13-592-004	12-501-342	12-501-340	12-501-339	12-501-341	6	2
13-592-010	12-501-342	12-501-340	12-501-339	12-501-341	6	0
13-592-022	12-501-343	12-501-340	12-501-339	12-501-341	6	2
13-592-024	12-501-343	12-501-340	12-501-339	12-501-341	6	2
13-592-036	12-501-342	12-501-340	12-501-339	12-501-341	4	2
13-562-042	12-501-342	12-501-340	12-501-339	12-501-341	6	2
13-592-044	12-501-342	12-501-340	12-501-339	12-501-341	0	6
13-592-046	12-501-343	12-501-340	12-501-339	12-501-341	0	10
13-592-048	12-501-343	12-501-340	12-501-339	12-501-341	8	2
13-592-050	12-501-343	12-501-535	12-501-536	12-501-341	8	2

INSTALLATION NOTES: The brake and all repair kits include mounting face gaskets and o-rings. Some motors and gearboxes allow for the use of o-rings to seal the mounting faces on either side of the brake. Do not use the o-ring and face gaskets together to seal a mounting face.

Install this brake using all available through mounting holes, 1/2 inch grade 8 bolts, and appropriate hardened washers where applicable. Install the mounting bolts alternately and snug tighten. Then in an alternating tightening pattern torque the bolts 108-122 N·m (80-90 lb·ft). Use a suitable Loctite on the bolt threads.

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DISASSEMBLY

(Refer to Figures 1, 2, and 3)

1. Remove two flat head assembly bolts (1) and o-rings (2). A suitable holding fixture is useful to keep brake in position.
2. Tap female end of spline shaft assembly (10) and spring plate (18) with soft mallet to separate cover (7). If sections will not separate, use a screwdriver to carefully pry sections apart.
3. Remove retaining ring (4) from spline shaft assembly (10).
4. Remove spline shaft assembly (10) from cover (7) by tapping male end of spline shaft assembly with soft mallet.
5. Remove piston (9) and o-ring (8) from cover (7).
6. Remove retaining ring (3) from cover (7) and press out oil seal (6) and bearing (5) if required.
7. Before removing hex head shoulder bolts (11), note that return springs (13) are under approximately 63.5 kgf (140 lb) of spring load.

⚠ WARNING

To prevent personal injury, reinstall the two flat head assembly bolts (1) through the return springs (13) and hand tighten into spring plate (18).

8. A suitable clamping fixture or hydraulic press is recommended to hold the brake, primary disc (12) and return springs (13) in place.
9. Remove the four socket head shoulder bolts (11).

⚠ CAUTION

Do not remove shoulder bolts without pressurizing brake, approximately 27.6 bar (400 PSI), or damage may result.

10. Remove clamping fixture, then the two flat head assembly bolts (1), primary disc (12) and return springs (13).
11. Remove the three rotor discs (14) and two stator discs (15).
12. Release the pressure to brake before removing the four socket head cap screws (16).
13. Remove spring plate (18). Remove case gasket (17) from spring plate (18).
14. Before removing springs (19), record the spring pattern and color for reassembly purposes.
15. Remove piston (20) by carefully exerting hydraulic pressure through brake release port on pressure plate (25).
16. Remove o-rings (22 & 24) and back-up rings (21 & 23) from piston (20). **NOTE: Be careful not to scratch or mar piston.**
17. Remove case gasket (17) from pressure plate (25).

ASSEMBLY

(Refer to Figures 1, 2, and 3)

LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT WITH CLEAN TYPE FLUID USED IN THE SYSTEM.

1. Clean all parts thoroughly before assembling.
2. Press oil seal (6) into bore until it is flush with bearing shoulder.
   DRY DESIGN - Oil seal (6) must be installed with open side facing pilot end of cover (7).
   OIL COOLED DESIGN - Oil seal (6) must be installed with closed side facing pilot end of cover (7).
3. Press bearing (5) into position until it bottoms out on oil seal borestep.
4. Install retaining ring (3) into cover (7).
5. Press spline shaft assembly (10) into bearing (5) until shaft bottoms on shaft shoulder. Bearing inner race must be supported during this operation.
6. Install retaining ring (4) on spline shaft assembly (10).
7. Install o-ring (8) and piston (9) into cover (7).
8. Install back-up rings (21 & 23) on piston (20) toward spring pockets.
9. Install o-rings (22 & 24) on piston (20). Be sure o-rings are flat and all twists removed. **NOTE: Be careful not to scratch or mar piston.**
10. Lubricate piston (20) with clean type fluid used in the system. Carefully press piston into pressure plate (25). Be sure piston is oriented such that threaded holes in piston are in alignment with through holes in spring plate (18) when installed.
11. Install springs (19) according to spring pattern and color recorded during disassembly. Different colored springs must be positioned in a symetrical pattern. Contact ZF Off-Highway Solutions Minnesota Inc. if you have questions regarding spring pattern.
12. Affix case gaskets (17) to pressure plate (25) and spring plate (18).
13. Place unit on a press. Using fixture, depress and install four socket head assembly bolts (16). Apply two drops of Loctite #242 to threads and torque bolts 47.5-54.2 N·m (35-40 lb·ft). A suitable holding fixture is useful to hold brake in position.
14. Install stator discs (15) and rotor discs (14) beginning with a rotor disc (14) and alternate with stator disc (15).
15. Place return springs (13) in the counter bores in spring plate (18).
16. Properly align primary disc (12) over the return springs (13) and install two flat head assembly bolts (1) through return springs (13) and hand tighten into spring plate (18). Refer to Figure 3 for proper spring location and stack arrangement.
17. Using a suitable clamping fixture or hydraulic press, partially depress primary disc (12) to within approximately 3.2 mm (0.125 in) of top rotor disc (14).
18. Apply two drops of Loctite #242 to threads of shoulder bolts (11). Pressurize brake release port, approximately 27.6 bar (400 PSI), align discs and partially screw in four socket head shoulder bolts (11). Inspect for free movement of stack.
19. Fully depress primary disc (12) against lining stack. Torque shoulder bolts (11) to 20.3-24.4 N·m (15-18 lb·ft). Release pressure and remove flat head assembly bolts (1) from brake assembly.
20. Supporting cover (7) with output shaft end facing downward, install brake using flat head assembly bolts (1) and o-rings (2). Apply two drops of Loctite #242 to threads and torque bolts 33.9-40.7 N·m (25-30 lb·ft).

⚠ CAUTION

If hydrostatic bench testing is performed on the brake assembly, release pressure should not exceed 69.0 bar (1000 PSI) unless four additional bolts are used for supplemental clamping.

Special Notes for Oil Cooled ("Z" Option) Brakes

NOTE

Oil Type: Mineral base hydraulic oil such as Mobil DTE 24, Citgo A/W 32 or equivalent.

Flow Through Capacity: 3.8 - 26.5 L/Min. (1.0 - 7.0 GPM)

Maximum Case Pressure: 2.1 bar (30 PSI)

Sump Oil Volume: Horizontal - 88.7 mL (3 fl oz)
Vertical - Contact ZF Off-Highway Solutions Minnesota Inc.

Brakes are shipped dry and the customer is responsible for adding proper type and volume of cooling oil.

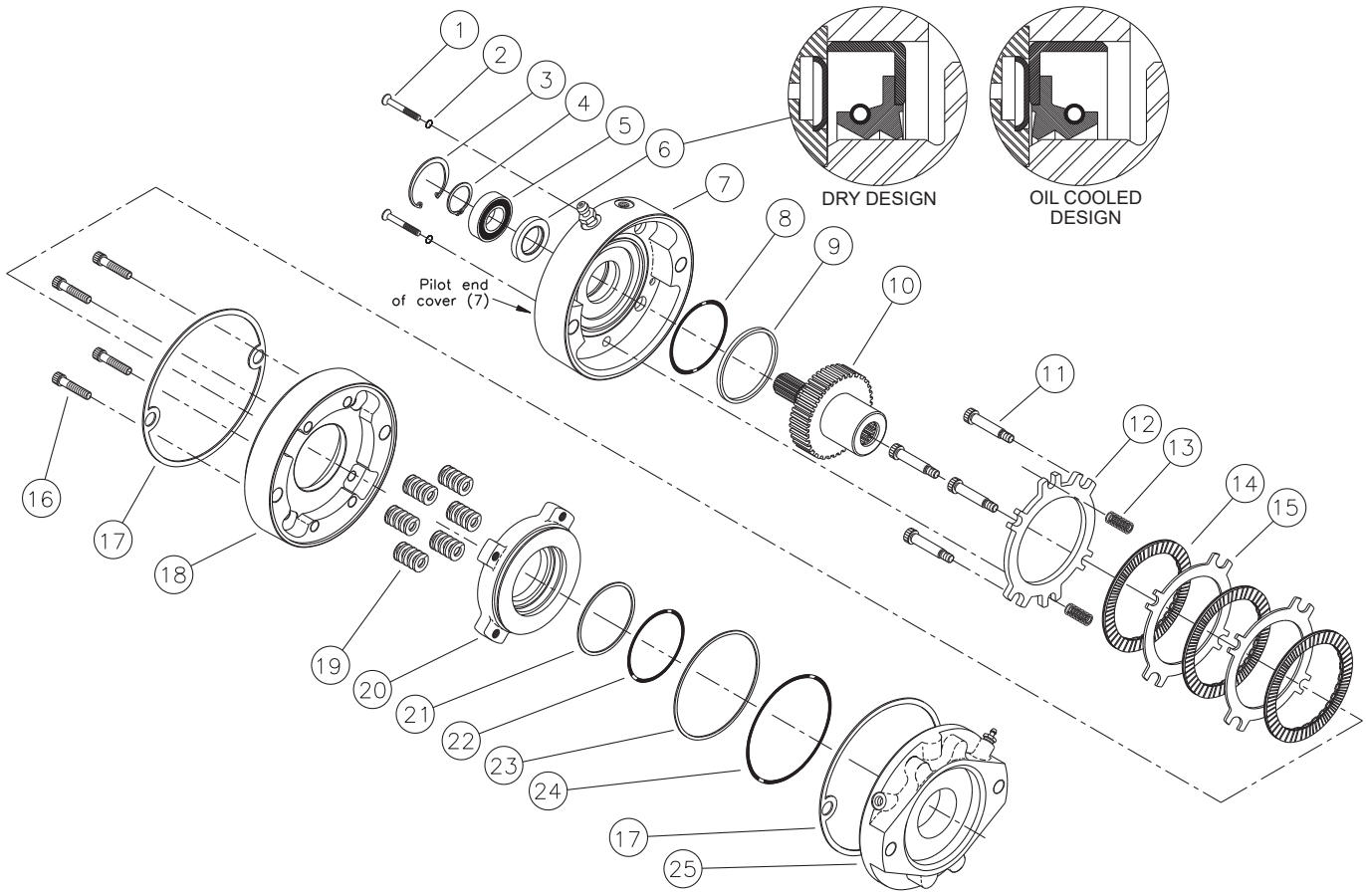

FIGURE 1

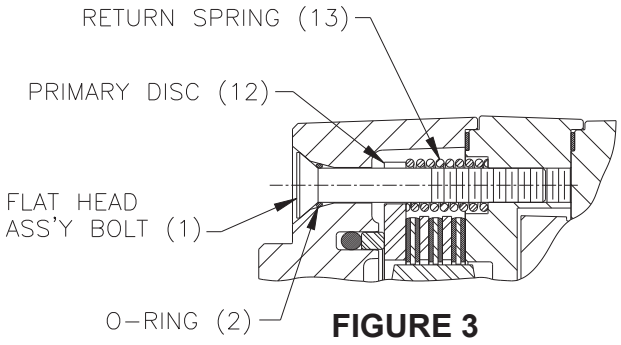

FIGURE 3

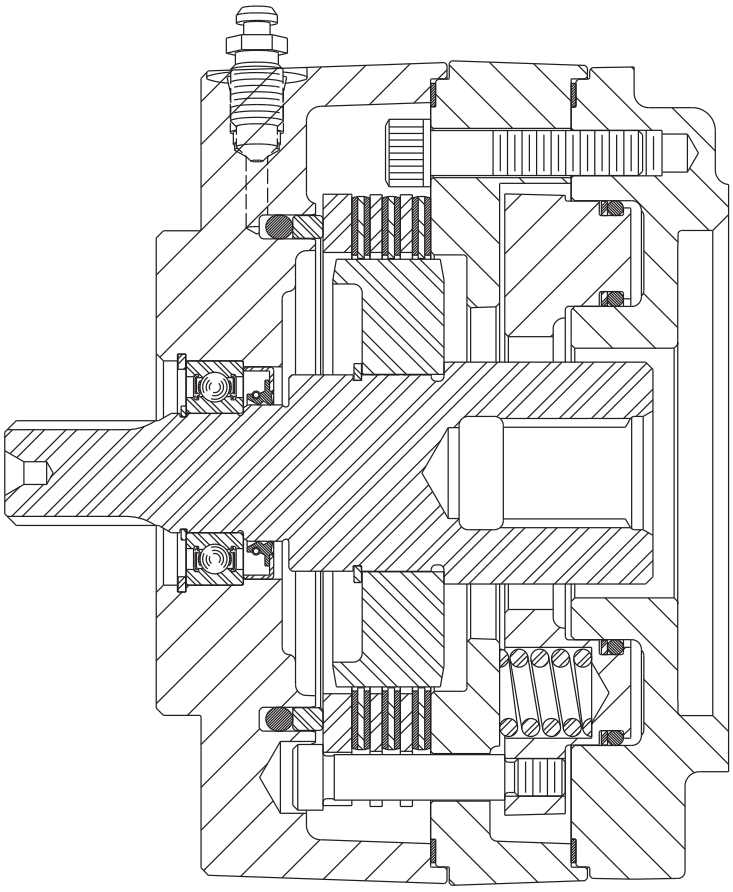

FIGURE 2

BLEEDING

1. Install brake in system and connect pressure lines.
2. Bleed pressure release section of brake by pressurizing side inlet port and allowing air to escape from top port. Pressure should not exceed 6.89 bar (100 PSI) during bleeding.
3. Apply sufficient pressure to release brake and check for proper operation in system.

SERVICE DIAGNOSIS

PROBLEM	CAUSE	EXPLANATION	ACTION
Brake slips	A. Excessive pressure in hydraulic system	If there is back pressure in the actuation line of the brake, holding torque will be reduced.	Check filters, hose size, restrictions in other hydraulic components.
	B. Oil in a brake designed for dry use	Dry linings generate 50% more torque than linings saturated with oil. If the brake has oil in it, check the type of oil. 1. Gearbox oil 2. Hydraulic oil	Replace oil seal in brake. Check motor seal. Check piston seals. **NOTE: Internal components will need to be inspected, cleaned, and replace as required**
	C. Disc plates worn	The thickness of the disc stack sets the torque level. A thin stack reduces torque.	Check disc thickness and contact ZF Off-Highway Solutions Minnesota Inc.
	D. Springs have broken or have taken a permanent set	Broken or set springs can cause reduced torque, a rare occurrence.	Check release pressure and contact ZF Off-Highway Solutions Minnesota Inc. (May need servicing with new spring kit).
Brake drags or runs hot	A. Low actuation pressure	The brake should be pressurized to a minimum of 1.38 bar (20 PSI) over the full release pressure under normal operating conditions. Lower pressures will cause the brake to drag thus generating heat.	Attach pressure gauge to bleed port and check pressure with system on.
	B. Bearing failure	If bearing should fail, a large amount of drag can be generated.	Replace the bearing. Refer to kits on page 1.
	C. Oil in brake	Excess fill of oil in sump condition through wet brakes can cause the unit to run hot. Also excessive RPM in sump condition.	Drain oil and refill as specified for brake. Switch to flow through cooling.
Brake will not release	A. Stuck or clogged valve	Brakes are designed to come on when system pressure drops below stated release pressure. If pressure cannot get to the brake, the brake will not release.	Attach pressure gauge to bleed port. Check for adequate pressure. Replace defective line or component.
	B. Bad o-rings	If release piston will not hold pressure, the brake will not release.	Replace o-rings. Refer to kits on page 1.
	C. Discs frozen	These brakes are designed for only limited dynamic braking. A severe emergency stop or prolonged reduced release pressure operation may result in this type of damage.	Replace disc stack. Refer to kits on page 1.