Modular
MULTIPLE DISC BRAKE
(SAE B size)

Service Instructions

NOTE:

This service sheet covers both 540 Series and 542 Series "B" mount brakes.

REPAIR KITS

(Refer to page 3 for item numbers)

Number	Description	Includes
12-501-058	O-ring and Back-up Ring Kit	Case Gaskets (13) Back-up Rings (17 & 19) O-rings (18 & 20) Loctite
12-501-090	Standard Lining Kit	Case Gaskets (13) Primary Disc (9) Stator Discs (11) Rotor Discs (10) Loctite
12-501-060	High Torque Lining Kit	Case Gaskets (13) Primary Disc (9) Stator Discs (11) Rotor Discs (10) Loctite
12-501-228 (use with 48, 56, 70, and 90 torque codes)	High Torque Lining Kit	Case Gaskets (13) Primary Disc (9) Stator Discs (11) Rotor Discs (10) Loctite
12-501-064	Spring Kit	Case Gaskets (13) Springs - red (15) Springs - blue (15) Loctite
12-501-062 (use with 13 and 15 code shafts)	Bearing Kit	Case Gaskets (13) Oil Seal (5) Bearing (4) Loctite
12-501-230 (use with 14 code shaft)	Bearing Kit	Case Gaskets (13) Oil Seal (5) Bearing (4) Loctite
12-501-229 (use with 06, 10, and 25 code shaft)	Bearing Kit	Case Gaskets (13) Oil Seal (5) Bearing (4) Loctite

NOTE: 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 gasket together to seal a mounting face.

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DISASSEMBLY

(Refer to Figures 1 and 2)

1. Remove two socket head assembly bolts (1). A suitable holding fixture is useful to keep brake in position.
2. Tap female end of spline shaft assembly (7) and spring plate (14) with soft mallet to separate cover. If sections will not separate, use a screwdriver to carefully pry sections apart.
3. Remove retaining ring (3) from spline shaft assembly (7).
4. Remove spline shaft assembly (7) from cover (6) by tapping male end of spline shaft assembly with soft mallet.
5. If oil seal (5) and bearing (4) need to be replaced, remove retaining ring (2) from cover (6) and press out oil seal (5) and bearing (4). Do not remove these items if not being replaced.
6. Remove four socket head shoulder bolts (8). A suitable holding fixture is useful to hold brake in position.

⚠ CAUTION

Do not remove shoulder bolts (8) without pressurization of brake, approximately 20.68 bar (300 PSI) or damage may result.

7. Remove primary disc (9), rotor discs (10), and stator discs (11).
8. Release the pressure to brake before removing the four socket head cap screws (12).
9. Remove spring plate (14).
10. Remove case gasket (13) from spring plate (14).
11. Before removing springs (15), note pattern and color for reassembly purposes.
12. Remove piston (16) by carefully exerting hydraulic pressure through brake release port on pressure plate (21).
13. Remove o-rings (18 & 20) and back-up rings (17 & 19) from piston (16). **NOTE: Be careful not to scratch or mar piston.**
14. Remove case gasket (13) from pressure plate (21).

ASSEMBLY

(Refer to Figures 1 and 2)

LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT WITH CLEAN TYPE FLUID USED IN THE SYSTEM. IF BEARING (4) AND OIL SEAL (5) ARE NOT BEING REPLACED DISREGARD STEPS 2 THROUGH 4.

1. Clean all parts thoroughly before assembling.
2. Press oil seal (5) into bore until it is flush with bearing shoulder.
   DRY DESIGN BRAKE: oil seal (5) must be installed with open side facing pilot end of cover (6).
   LIQUID COOLED BRAKE: oil seal (5) must be installed with closed side facing pilot end of cover (6).
3. Press bearing (4) into position until it bottoms out on oil seal borestep.
4. Install retaining ring (2) into cover (6).
5. Press spline shaft assembly (7) into bearing (4) until shaft bottoms on shaft shoulder. Bearing inner race must be supported during this operation.
6. Install retaining ring (3) on spline shaft assembly (7).
7. Install back-up rings (17 & 19) on piston (16) toward spring pockets.
8. Install o-rings (18 & 20) on piston (16). Be sure o-rings are flat and all twists removed. **NOTE: Be careful not to scratch or mar piston.**
9. Lubricate piston (16) with clean type fluid used in the system. Carefully press piston into pressure plate (21). Be sure piston is oriented so threaded holes in piston are in alignment with through holes in spring plate (14) when installed.
10. Install springs (15) according to pattern and color noted during disassembly. Different colored springs must be alternated. Contact ZF Off-Highway Solutions Minnesota Inc. if you have questions regarding spring pattern.
11. Affix case gaskets (13) to pressure plate (21) and spring plate (14).
12. Place unit on a press. Using fixture, depress and install four socket head assembly bolts (12). Torque bolts 47.5-54.2 N·m (35-40 lb·ft). A suitable holding fixture is useful to hold brake in position. **NOTE: Apply two drops of Loctite #242 to threads of bolts (12).**
13. Install stator discs (11) and rotor discs (10). Begin with a rotor disc (10) and alternate with stator discs (11). For high torque models with four rotors and four stators the last stator should be assembled next to the primary disc (9).
14. Install primary disc (9).
15. Align discs and partially screw in four socket head shoulder bolts (8). Inspect for free movement of stack. Pressurize brake release port, approximately 20.68 bar (300 PSI), to release discs. Torque shoulder bolts 20.3-24.4 N·m (15-18 lb·ft) and release pressure. A suitable holding fixture is useful to hold brake in position. **NOTE: Apply two drops of Loctite #242 to threads of bolts (8).**
16. Install cover (6) using socket head assembly bolts (1). Torque bolts (1) 12.2-14.9 N·m (9-11 lb·ft). **NOTE: Apply two drops of Loctite #242 to threads of bolts (1).**

⚠ CAUTION

If hydraulic bench testing is performed on the brake assembly, release pressure should not exceed 69 bar (1000 PSI) unless two additional bolts are used for supplemental clamping.

See page 1 for items included in kits.

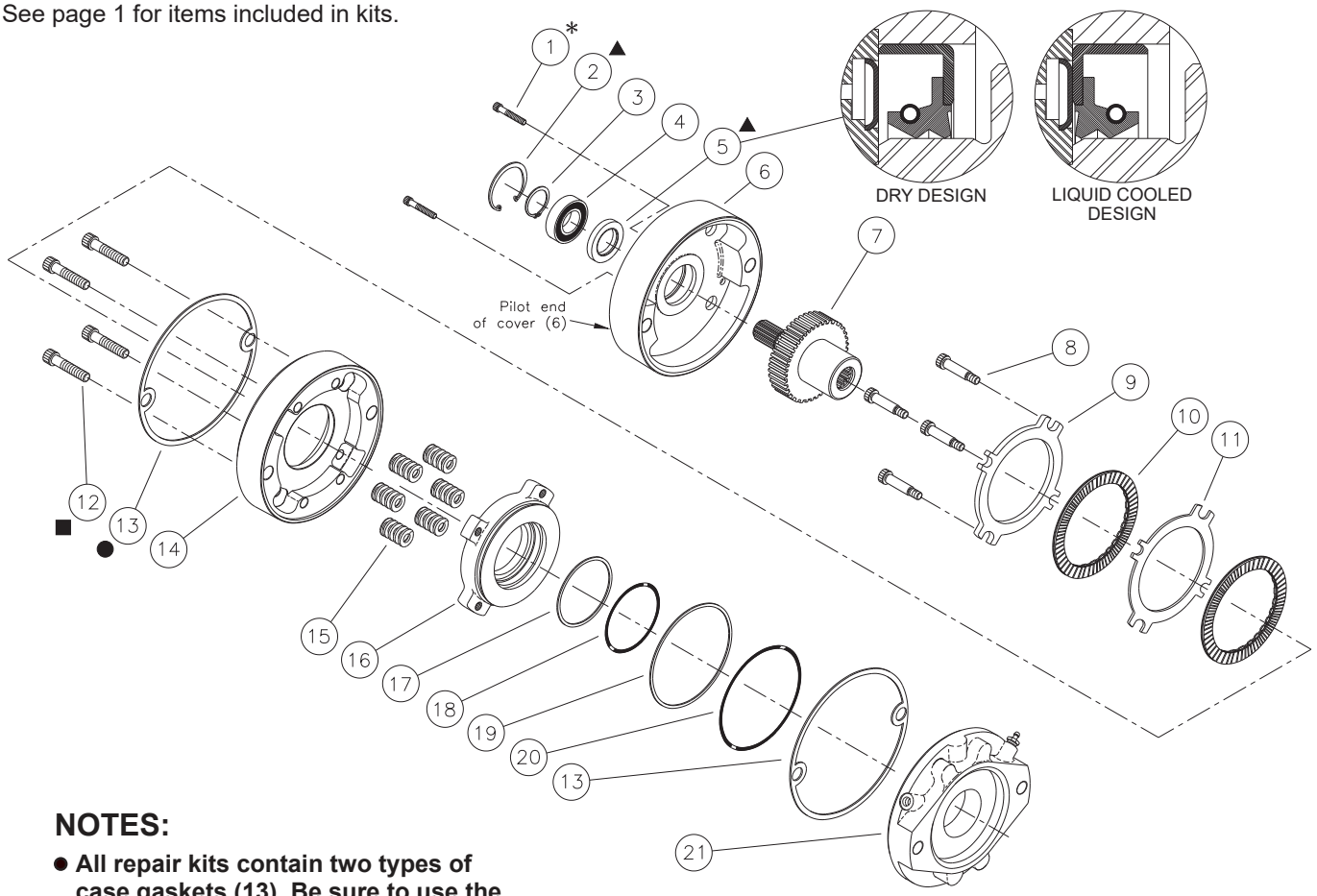

FIGURE 1

NOTES:

- **All repair kits contain two types of case gaskets (13). Be sure to use the correct gaskets for your model:**
  - **542 Series Brakes use this gasket**

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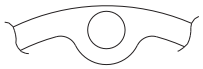

- ∗ **540 Series Brakes require two 3/8-16 flat head bolts and o-rings to be torqued to 33.9-40.7 N·m (25-30 lb·ft).**
- ▲ **Some 540 Series Brakes do not include retaining ring (1) and oil seal (5).**
- ■ **Some 540 Series Brakes required only two 3/8-16UNC bolts (12).**

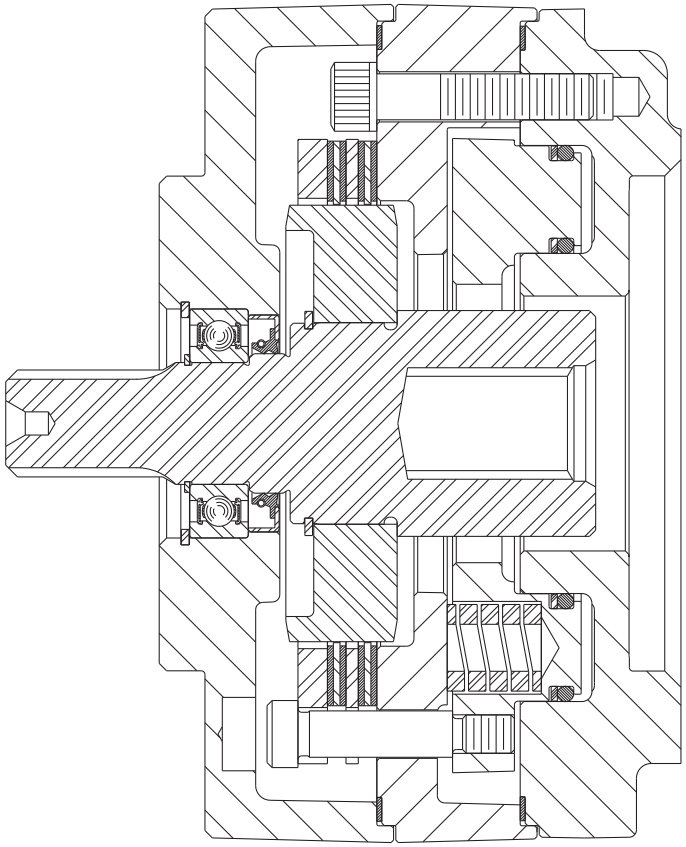

FIGURE 2

COOLING OIL RECOMMENDATIONS

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: 1.03 bar (15 PSI)
Sump Oil Volume: Horizontal - 88.7 mL (3 fl oz)
Vertical - Contact ZF Off-Highway Solutions Minnesota Inc.

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 brake if 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 broken or haven taken 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.