MULTIPLE DISC BRAKE
(SAE A size)

Service Instructions

NOTE:

This service sheet covers both 540 Series and 538 Series "A" mount brakes.

REPAIR KITS

(Refer to page 3 for item numbers)

Number	Description	Includes
12-501-246	O-ring and Back-up Ring Kit	Case Gaskets (12) O-rings (17 & 19) Back-up Rings (16 & 18) Loctite
12-501-245	Standard Torque Lining Kit	Case Gaskets (12) Primary Disc (8) Stator Discs (10) Rotor Discs (9) Loctite
12-501-243	High Torque Lining Kit	Case Gaskets (12) Primary Disc (8) Stator Discs (10) Rotor Discs (9) Loctite
12-501-241 (use with 06, 10, 25, code shafts)	Bearing Kit	Case Gaskets (12) Oil Seal (4) Bearing (3) Loctite
12-501-242 (use with 14 code shafts)	Bearing Kit	Case Gaskets (12) Oil Seal (4) Bearing (3) Loctite
12-501-244	Spring Kit	Case Gaskets (12) Springs - red (14) Springs - blue (14) Loctite

NOTE: All repair kits include mounting face gaskets.

ZF Off-Highway Solutions Minnesota Inc.
1911 Lee Boulevard / North Mankato, MN U.S.A. 56003
Tel: +1 507 625 6426 **Fax:** +1 507 625 3212

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DISASSEMBLY

(Refer to Figures 2 and 3)

1. Remove two socket head cap screws (21) from pressure plate (20). A suitable holding fixture is useful to keep the brake in position.
2. Remove pressure plate (20) and spring plate (13) assembly from cover (5).
3. Remove cover (5) and spline shaft (6) assembly from reducer.
4. Remove retaining ring (2) from spline shaft (6).
5. Remove spline shaft (6) from cover (5) by tapping male end of spline shaft with soft mallet.
6. Remove retaining ring (1) from cover (5) and press out oil seal (4) and bearing (3) if required.
7. Remove four socket head shoulder bolts (7). A suitable holding fixture is useful to hold the brake in position.

⚠ CAUTION

Do not remove shoulder bolts without pressurization of brake, approximately 20.7 bar (300 PSI), or damage may result.

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

ASSEMBLY

(Refer to Figures 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. Install back-up rings (16 & 18) on piston (15) toward spring pockets.
3. Install o-rings (17 & 19) on piston (15). Be sure o-rings are flat and all twists removed. **NOTE: Be careful not to scratch or mar piston.**
4. Lubricate piston (15) with clean type fluid used in the system. Carefully press piston into pressure plate (20). Be sure piston is oriented so threaded holes in piston are in alignment with through holes in spring plate (13) when installed.
5. Install springs (14) 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.
6. Affix case gaskets (12) to pressure plate (20) and spring plate (13).
7. Place pressure plate (20) assembly on a press. Using a fixture, depress spring plate (13) and install four socket head cap screws (11). **NOTE: Apply two drops of Loctite #242 to threads.** Torque cap screws 47.5-54.2 N·m (35-40 lb·ft). A suitable holding fixture is useful to hold the brake in position.
8. Install rotor discs (9) and stator discs (10). Begin with a rotor disc (9) and alternate with stator discs (10). For high torque models with four rotors and four stators, the last stator should be assembled next to the primary disc (8).
9. Install primary disc (8).
10. Align discs using spline shaft (6) and partially screw in four socket head shoulder bolts (7). **NOTE: Apply two drops of Loctite #242 to threads.** Inspect for free movement of stack. Pressurize brake release port, approximately 20.7 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 assembly in position.
11. Recheck to be sure that the rotors are in line and centered in assembly with spline shaft (6). The shaft should move smoothly through lining stack.
12. Press oil seal (4) with open side facing pilot end of cover (5) until flush with bearing shoulder.
13. Press bearing (3) into position until it bottoms out on oil seal borestep.
14. Install retaining ring (1) into cover (5).
15. Press spline shaft (6) into bearing (4) until the bearing inner race bottoms on shaft shoulder. Bearing inner race must be supported during this operation.
16. Install retaining ring (2) on spline shaft (6).

⚠ CAUTION

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

MOUNTING INSTRUCTIONS

(Refer to Figure 1)

1. Install cover/shaft assembly on gearbox using either two or four 1/2-13UNC x 1.00 inch socket head cap screws, depending on brake module being used. Lubricate screw threads and torque 115.3-122.4 N·m (85-90 lb·ft). **NOTE: Earlier 540 Series Brakes required 1/2-13UNC flat head cap screws to be torqued 88.1-94.9 N·m (65-70 lb·ft).**
2. Carefully assemble brake module to cover/shaft assembly with (2) bolts provided. Lubricate bolt threads and torque 115.3-122.4 N·m (85-90 lb·ft). **NOTE: Earlier 540 Series Brakes required two 9/16-12UNC bolts to be torqued 149.2-162.7 N·m (110-120 lb·ft). NOTE: Be sure cover and brake module are seated properly prior to installing 1/2-13UNC assembly bolts. Damage will occur to rotor stack or shaft retaining ring if not properly seated.**

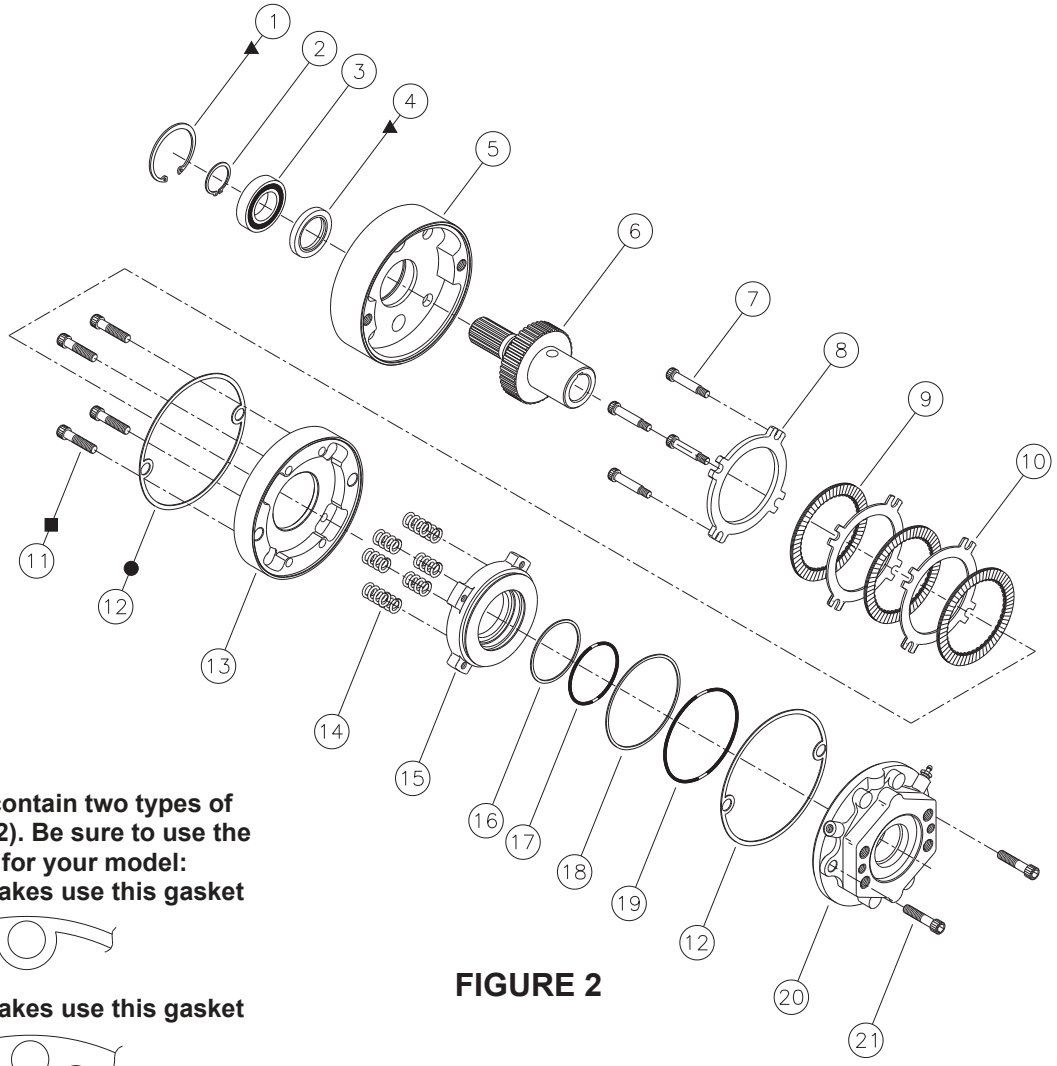
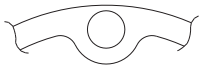


FIGURE 2

NOTES:

- **All Repair Kits contain two types of case gaskets (12). Be sure to use the correct gaskets for your model:**
  - **538 Series Brakes use this gasket**

  - **540 Series Brakes use this gasket**



- ▲ **Some 540 Series Brakes do not include retaining ring (1) and oil seal (4).**
- ■ **Some 540 Series Brakes required only two 3/8-16UNC bolts (11).**

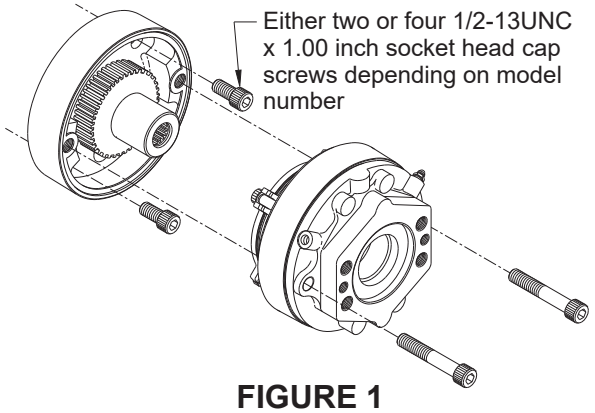


FIGURE 1

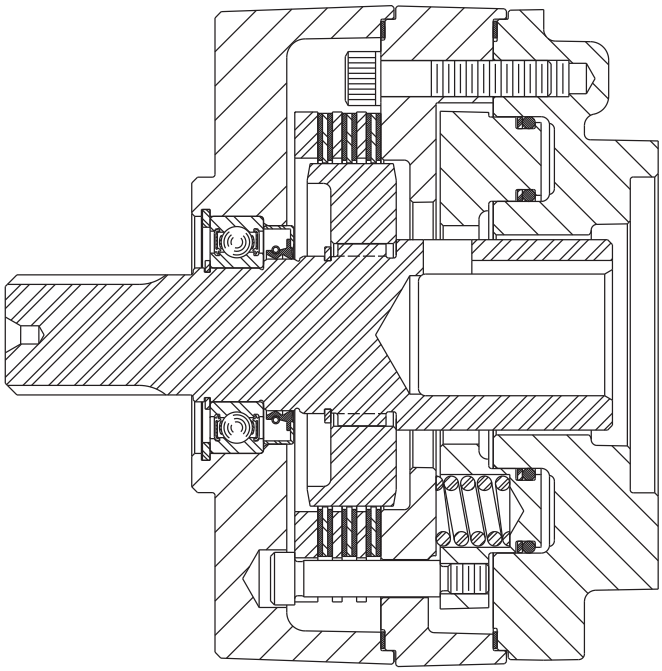


FIGURE 3

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 6.9 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 designed for dry use	Wet linings generate 67% of the dry torque rating. If the brake has oil in it, check the type of oil. 1. Gearbox oil 2. Hydraulic oil	Replace oils seal in brake. Check motor seal. Check piston seals. **NOTE: Internal components will need to be inspected, cleaned, and replaced 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. Refer to kits on page 1.
	D. Springs 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.
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 a pressure gauge to bleed port and check pressure with system on.
	B. Bearing failure	If the 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 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 apply 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.