MULTIPLE DISC BRAKE

(dry design - SAE B size)

Service Instructions

NOTE:

This service sheet covers model numbers:

13-100-002
13-100-004
13-100-006
13-100-008
13-100-010
13-100-012
13-100-014
13-100-016
13-100-018
13-100-020
13-100-022
13-100-024
13-100-026
13-100-028
13-100-030
13-100-032
13-100-034
13-100-038
13-100-040
13-100-044
13-100-046
13-100-048
13-100-054
13-100-064
13-100-068
13-100-070
407 124 001 0

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.

REPAIR KITS

(Refer to Figure 1 for item numbers)

Number	Description	Includes
12-501-388	Repair Kit for 13-100-002, 13-100-004, 13-100-006, 13-100-008, 13-100-010, 13-100-012, 13-100-014, 13-100-022, 13-100-024, 13-100-026, 13-100-032, 13-100-068	Case Seal (6) O-rings (7 & 10) Back-up Rings (8 & 11) Stator Disc (13) Rotor Disc (14) Return Plate (15) Springs (16) Oil Seal (20) Bearing (21) Retaining Rings (22 & 23)
12-501-390	Repair Kit for 13-100-016	Case Seal (6) O-rings (7 & 10) Back-up Rings (8 & 11) Stator Disc (13) Rotor Disc (14) Return Plate (15) Springs (16) Oil Seal (20) Bearing (21) Retaining Rings (22 & 23)
12-501-402	Repair Kit for 13-100-018, 13-100-028, 13-100-030, 13-100-034, 13-100-038, 13-100-040, 13-100-070	Case Seal (6) O-rings (7 & 10) Back-up Rings (8 & 11) Stator Disc (13) Rotor Disc (14) Return Plate (15) Springs (16) Oil Seal (20) Bearing (21) Retaining Rings (22 & 23)
12-501-405	Repair Kit for 13-100-020, 13-100-044, 13-100-048, 13-100-064, 407 124 001 0	Case Seal (6) O-rings (7 & 10) Back-up Rings (8 & 11) Stator Disc (13) Rotor Disc (14) Return Plate (15) Springs (16) Oil Seals (3 & 20) Bearings (2 & 21) Retaining Rings (1, 22 & 23)
12-501-454	Repair Kit for 13-100-046, 13-100-054	Case Seal (6) O-rings (7 & 10) Back-up Rings (8 & 11) Stator Disc (13) Rotor Disc (14) Return Plate (15) Springs (16) Oil Seal (20) Bearing (21) Retaining Rings (22 & 23)

NOTE

This literature services various models in this brake series. The components shown in Figures 1 and 2 may appear different than what is found in your brake.

DISASSEMBLY

(Refer to Figures 1 and 2)

1. Remove pressure plate (5) from cover (19) by removing two washer head cap screws (4).

⚠ CAUTION

Pressure plate is under spring tension of approximately 907 kgf (2000 lb). The two washer head cap screws must be loosened evenly to relieve this force. If a hydraulic press is available, 1361 kgf (3000 lb) maximum, pressure plate can be held in position while removing washer head cap screws.

2. Remove case seal (6) from cover (19).
3. Remove piston (9) from pressure plate (5).
4. Remove o-ring (7), back-up ring (8), o-ring (10) and back-up ring (11) from piston (9).
5. Remove stack assembly, consisting of stator disc (13), rotor disc (14) and return plate (15) from cover (19).
6. Remove dowel pins (18), springs (16) and spring retainer (17) from cover (19). **NOTE: Not all models use the same number of springs or spring pattern. Record this information for assembly purposes.**
7. Remove retaining ring (22) from shaft (12).
8. Remove shaft by pressing or using a soft mallet on male end of shaft (12).
9. Remove retaining ring (23) from cover (19) and press out oil seal (20) and bearing (21) if required. **NOTE: Oil seal (20) and bearing (21) may not require replacement unless they are damaged.**
10. Remove retaining ring (1) from pressure plate (5) and press out oil seal (3) and bearing (2) if required. **NOTE:Not all models use retaining ring (1), bearing (2) or oil seal (3). Oil seal (3) and bearing (2) may not require replacement unless they are damaged.**

ASSEMBLY

(Refer to Figures 1 and 2)

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

1. Use an alkaline wash to clean parts before assembly.
2. Press oil seal (20) into cover (19) until it is flush with bearing shoulder. See Figure 1a for direction of oil seal.
3. Press bearing (21) into position until it bottoms out on cover (19) borestep.
4. Install retaining ring (23) in cover (19).
5. Press shaft (12) into bearing (21) until it bottoms on shoulder. Bearing (21) inner race must be supported during this operation.
6. Install retaining ring (22) on shaft (12).
7. Insert dowel pins (18), spring retainer (17) and springs (16) in cover (19). **NOTE: Be sure to use the same number of springs and spring pattern as recorded during disassembly. Contact ZF Off-Highway Solutions Minnesota Inc.if you have questions regarding the spring pattern.**
8. Position return plate (15) on springs (13). **NOTE: Discs 13 &14) and return plate (15) must remain dry during installation. No oil residue must be allowed to contaminate disc surfaces.**
9. Install rotor disc (14) and stator disc (13).
10. Install o-ring (7), back-up ring (8), o-ring (10) and back-up ring (11) on piston (9). Note order of o-rings and back-up rings. Insert piston (9) into pressure plate (5). **NOTE: Be careful not to shear o-rings or back-up rings. Do not scratch or mar piston.**
11. Install new case seal (6) in cover (19).
12. Press new oil seal (3) into pressure plate (5) bore until it is flush with bearing shoulder. See Figure 1b for direction of oil seal. **NOTE: Not all models use oil seal (3).**
13. Install new bearing (2) in pressure plate (5) by pressing on bearing outer race until it bottoms out on oil seal bore step. Install new retaining ring (1) in pressure plate (5). **NOTE: Not all models use bearing (2) or retaining ring (1).**
14. Position pressure plate (5) on cover (19) aligning dowel pins (18) with holes in pressure plate. Apply pressure to inner race of bearing (2) during this procedure.
15. Install washer head cap screws (4) and tighten evenly to draw pressure plate (5) to cover (19). Torque washer head cap screws 74.6 N·m (55 lb·ft). **NOTE: A hydraulic press will simplify installation of pressure plate on cover. Clamp pressure plate in position while tightening the washer head cap screws.**

⚠ CAUTION

If hydrostatic bench testing is performed on the brake assembly, release pressure must not exceed 137.9 bar (2000 PSI) unless two additional bolts are used for supplemental clamping.

SPRING CHART

Model Number	Red Springs (16)	Blue Springs (16)	Yellow Springs (16)	Model Number	Red Springs (16)	Blue Springs (16)	Yellow Springs (16)
13-100-002	2	2	0	13-100-030	8	2	0
13-100-004	3	0	0	13-100-032	11	0	0
13-100-006	0	9	0	13-100-034	8	2	0
13-100-008	4	2	0	13-100-038	10	2	0
13-100-010	6	0	0	13-100-040	10	2	0
13-100-012	6	4	0	13-100-044	0	0	14
13-100-014	8	2	0	13-100-046	6	0	0
13-100-016	0	8	0	13-100-048	12	0	0
13-100-018	11	1	0	13-100-054	6	4	0
13-100-020	14	0	0	13-100-064	0	0	10
13-100-022	4	4	0	13-100-068	4	4	0
13-100-024	4	2	0	13-100-070	6	0	0
13-100-026	4	2	0	407 124 001 0	10	0	4
13-100-028	4	2	0				

● Items included in Repair Kit

✻ Not used in all model numbers

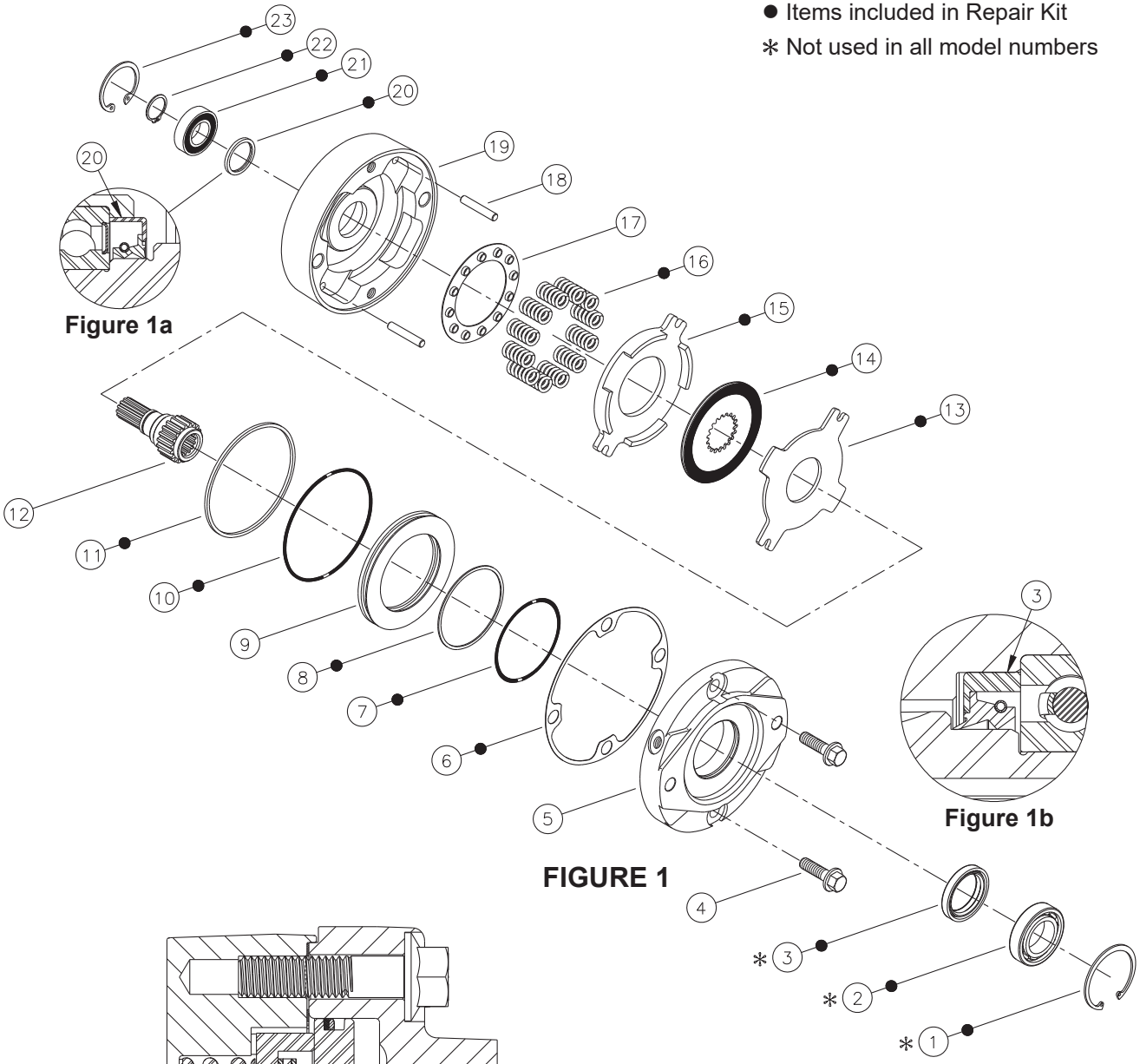

Figure 1a

Figure 1b

FIGURE 1

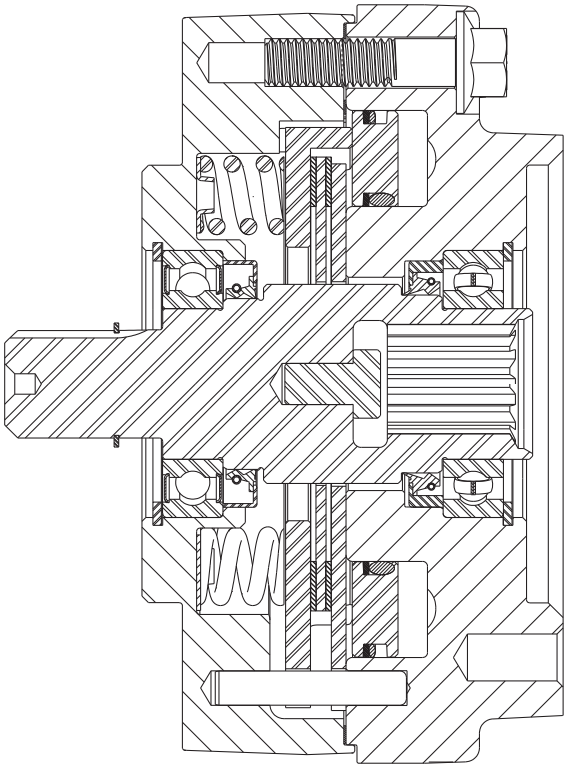

FIGURE 2
(13-100-048 shown)

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 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.
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.
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.

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