MULTIPLE DISC BRAKE
(SAE D size)

Service Instructions

TABLE 1

Model Number	Oil Cooled	Lining Kit Number	O-ring Kit Number	Bearing Kit Number	Spring Kit Number	Red Springs Quantity	Blue Springs Quantity
13-552-002	No	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-006	Yes	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-008	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-010	No	12-501-306	12-501-249	12-501-250	12-501-251	12	2
13-552-012	No	12-501-306	12-501-249	12-501-250	12-501-251	2	4
13-552-016	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-018	No	12-501-306	12-501-249	12-501-250	12-501-251	6	2
13-552-020	No	12-501-338	12-501-337	none	12-501-336	10	2
13-552-022	Yes	12-501-306	12-501-292	12-501-250	12-501-251	16	0
13-552-028	Yes	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-032	Yes	12-501-306	12-501-292	12-501-250	12-501-251	10	0
13-552-033	No	12-501-306	12-501-249	12-501-250	12-501-251	4	4
13-552-034	No	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-036	Yes	12-501-306	12-501-249	12-501-250	12-501-251	4	4
13-552-038	No	12-501-306	12-501-249	12-501-250	12-501-251	4	4
13-552-040	No	12-501-306	12-501-249	12-501-250	12-501-251	6	2
13-552-042	No	12-501-306	12-501-249	12-501-250	12-501-251	6	2
13-552-044	No	12-501-306	12-501-249	12-501-250	12-501-251	4	4
13-552-050	No	12-501-338	12-501-337	none	12-501-336	6	4
13-552-052	No	12-501-306	12-501-249	12-501-250	12-501-251	0	4
13-552-054	No	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-056	No	12-501-306	12-501-249	12-501-250	12-501-251	6	2
13-552-060	No	12-501-306	12-501-249	12-501-250	12-501-251	12	2
13-552-062	No	12-501-306	12-501-328	12-501-329	12-501-251	10	0
13-552-064	Yes	12-501-306	12-501-346	12-501-345	12-501-251	16	0
13-552-066	No	12-501-306	12-501-368	12-501-250	12-501-251	16	0
13-552-068	Yes	12-501-306	12-501-249	12-501-333	12-501-251	12	2
13-552-070	No	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-072	No	12-501-306	12-501-249	12-501-383	12-501-251	6	4
13-552-074	No	12-501-306	12-501-249	12-501-250	12-501-251	12	2
13-552-076	No	12-501-306	12-501-249	12-501-333	12-501-251	16	0
13-552-078	No	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-080	No	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-082	No	12-501-306	12-501-249	12-501-250	12-501-251	0	4
13-552-084	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-086	Yes	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-088	Yes	12-501-306	12-501-249	12-501-250	12-501-251	12	2
13-552-090	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-092	Yes	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-094	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-096	No	12-501-460	12-501-457	12-501-458	12-501-459	10	0
13-552-100	No	12-501-306	12-501-249	12-501-250	12-501-251	5	0
13-552-102	Yes	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-104	Yes	12-501-306	12-501-249	12-501-250	12-501-251	6	4
13-552-106	Yes	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-108	No	12-501-306	12-501-474	12-501-475	12-501-251	10	0
13-552-110	No	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-112	Yes	12-501-306	12-501-249	12-501-250	12-501-251	16	0
13-552-114	No	12-501-306	12-501-249	12-501-250	12-501-251	10	0
13-552-116	No	12-501-506	12-501-508	12-501-507	12-501-509	6	4
13-552-118	Yes	12-501-506	12-501-508	12-501-507	12-501-509	6	6
13-552-124	Yes	12-501-306	12-501-249	02-501-333	12-501-251	16	0

NOTES: 1. All repair kits include face gaskets and o-rings. Some motors and gearboxes allow the 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.

2. If your product number is not listed, contact ZF Off-Highway Solutions Minnesota Inc. for information.

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 four socket head assembly bolts (23). A suitable fixture is useful to keep the brake in position.
2. Tap female end of spline shaft assembly (6) 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 (1) from spline shaft assembly (6). **NOTE: Not all models use retaining ring (1).**
4. Remove spline shaft assembly (6) from cover plate (5) by tapping male end of spline shaft assembly with soft mallet.
5. If oil seal (4) and bearing (3) need to be replaced, remove retaining ring (2) from cover plate (5) and press out oil seal (4) and bearing (3). Do not remove these items if not being replaced.
6. Remove four socket head shoulder bolts (7). A suitable fixture is useful to hold the brake in position.

⚠ CAUTION

Do not remove shoulder bolts (7) without pressurization of brake, approximately 20.7 bar (300 PSI) or damage may result.

7. Before removing primary disc (8), rotor discs (9), and stator discs (10) record the stacking arrangement for reassembly purposes. Remove primary disc (8), rotor discs (9), and stator discs (10). **NOTE: Primary disc (8) is positioned by shoulder bolts (7) and stator discs (10) are positioned on dowel pins (13).**
8. Release the pressure to brake before removing the four socket head cap screws (12).
9. Remove spring plate (14).
10. Remove case gasket (11) from spring plate (14).
11. Before removing springs (15), note pattern and color for reassembly purposes.
12. Remove piston (16) by carefully applying hydraulic pressure to the brake release port in pressure plate (22).
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 (11) from pressure plate (22).
15. For models that use bearing (21), if the bearing is being replaced, press bearing (21) out of pressure plate (22). **NOTE: Not all models use bearing (21).**

ASSEMBLY

(Refer to Figures 1 and 2)

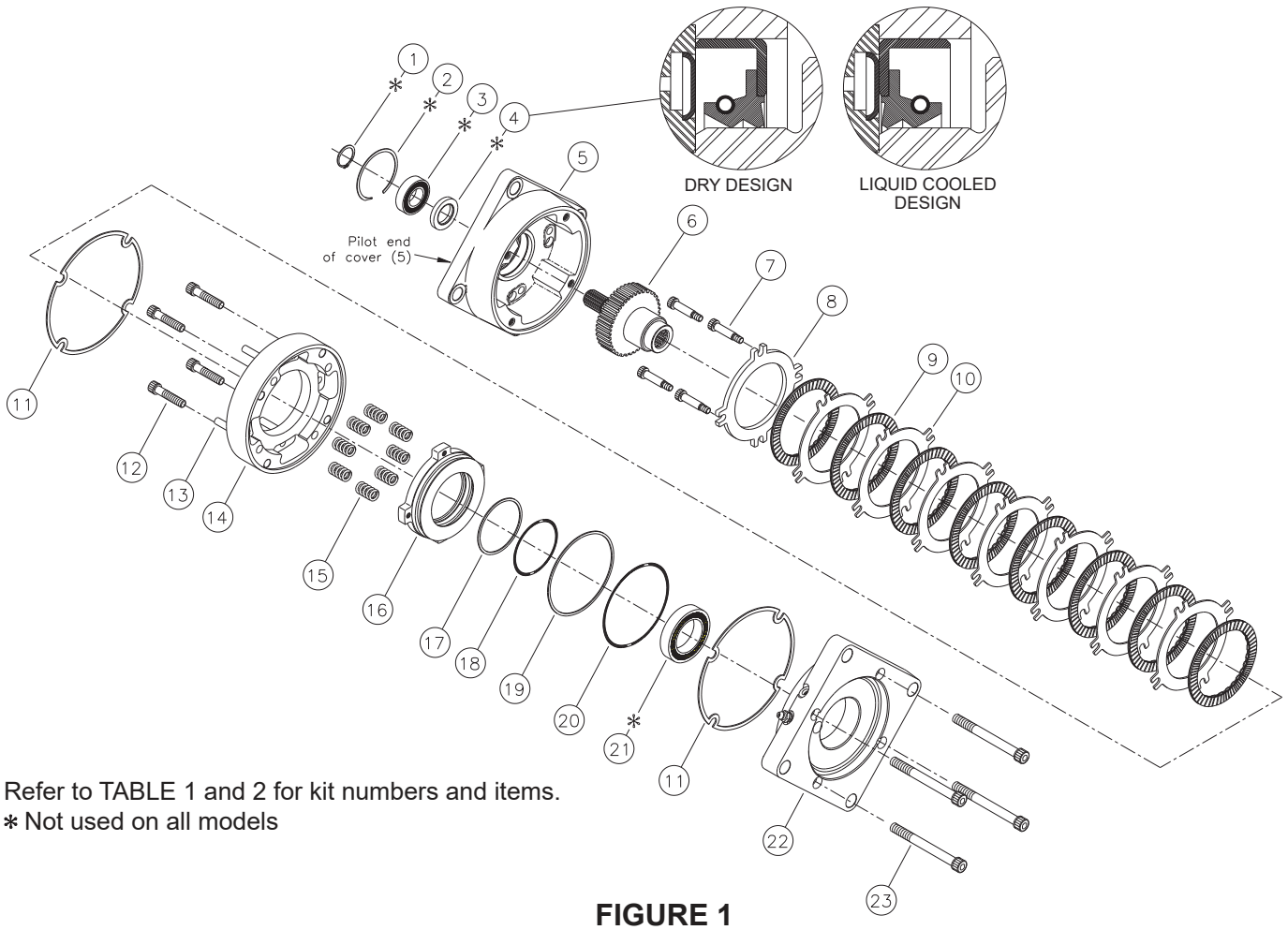
LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT WITH CLEAN TYPE FLUID USED IN THE SYSTEM.

1. Clean all parts thoroughly before assembling.
2. Press oil seal (4) into bore of cover plate (5) until it is flush with bearing shoulder. **NOTE: Not all models use oil seal.**
   DRY DESIGN BRAKE: Oil seal (4) must be installed with open side facing pilot end of cover plate (5).
   LIQUID COOLED DESIGN BRAKE: Oil seal (4) must be installed with closed side facing pilot end of cover plate (5).
3. Press bearing (3) into cover plate (5) until it bottoms out on oil seal borestep. **NOTE: Not all models use bearing (3).**
4. Install retaining ring (2) into cover plate (5). **NOTE: Not all models use retaining ring (2).**
5. For models that use bearing (21), if necessary, press new bearing in pressure plate (22) until it bottoms on borestep. **NOTE: Not all models use bearing (21).**
6. Press spline shaft assembly (6) into bearing (3) until the shaft bottoms on the shaft shoulder. Bearing inner race must be supported during this operation.
7. Install retaining ring (1) on spline shaft assembly (6). **NOTE: Not all models use retaining ring (1).**
8. Install back-up rings (17 & 19) in piston (16) grooves on the spring pocket side of piston.
9. Install o-rings (18 & 20) in piston (16) grooves. Be sure o-rings are flat and all twists removed. **NOTE: Be careful not to scratch or mar piston.**
10. Lubricate piston (16) with clean type fluid used in the system. Carefully press piston into pressure plate (22). Be sure piston is oriented so threaded holes in piston are in alignment with through holes in spring plate (14) when installed.
11. 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.
12. Affix case gaskets (11) to pressure plate (22) and spring plate (14).
13. Place unit on a press. Using a fixture, depress and install four socket head assembly bolts (12). Torque bolts 74.6-81.4 N·m (55-60 lb·ft). A suitable holding fixture is useful to hold the brake in position. **NOTE: Apply two drops of Loctite #242 to threads of bolts (12).**
14. Install stator discs (10) and rotor discs (9). in the same arrrangement as recorded during disassembly. Begin with a rotor disc (9) and alternate with stator discs (10). **NOTE: Slots in stator discs (10) are positioned on dowel pins (13) in spring plate (14). Refer to VIEW A-A for proper stack assembly detail.**
15. Install primary disc (8). Align tabs on primary disc (8) with through holes in spring plate (14) and partially screw in four socket head shoulder bolts (7). Inspect for free movement of stack. Pressurize brake release port, approximately 27.6 bar (400 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 the brake in position. **NOTE: Apply two drops of Loctite #242 to threads of bolts (7).**
16. Install cover plate (5) using four socket head bolts (23) and tighten evenly. Torque bolts (23) 74.6-81.4 N·m (55-60 lb·ft). **NOTE: Apply two drops of Loctite #242 to threads of bolts (23).**

TABLE 2 (Items included in kits)

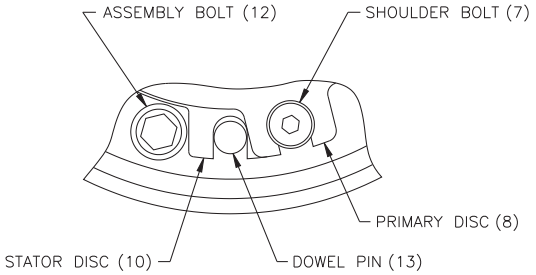
Lining Kit	O-ring Kit	Bearing Kit	Spring Kit
Primary Disc (8) Rotor Disc (9) Stator Disc (10) Case Seals (11)	Oil Seal (4*) Back-up Rings (17 & 19) O-rings (18 & 20) Case Seals (11)	Bearings (3* & 21*) Oil Seal (4*) Case Seals (11)	Red Springs (15) Blue Springs (15) Case Seals (11)

* Not used on all models



Refer to TABLE 1 and 2 for kit numbers and items.
* Not used on all models

FIGURE 1



VIEW A-A
Stack Assembly Detail

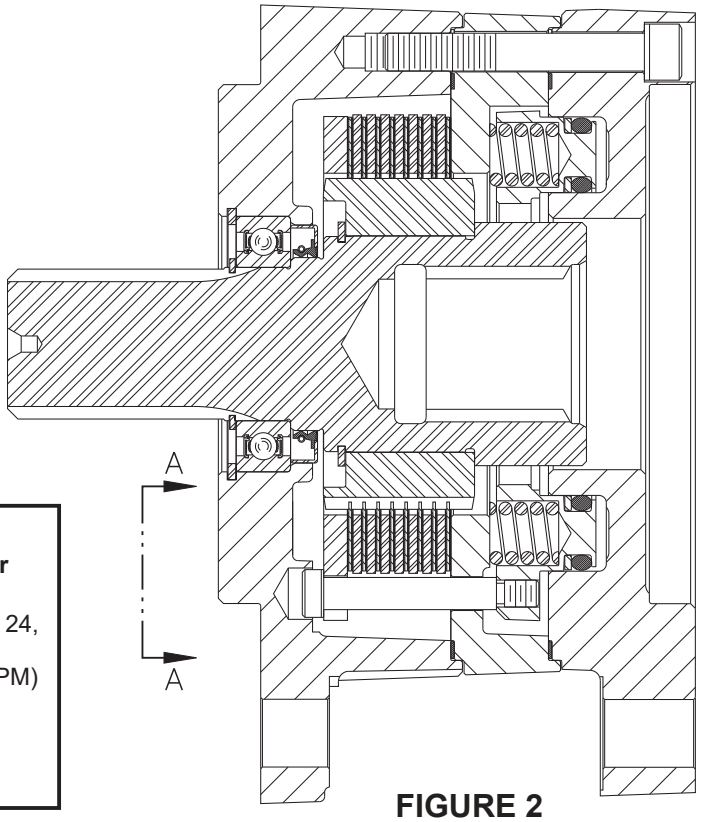


FIGURE 2
(13-552-008 shown)

Notes for Oil Cooled Brakes ("Z" option)

NOTE

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

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 - 148 mL (5 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	Wet linings generate 67% of the dry torque rating. If the brake has oil in it, check the type if oil. 1. Gearbox oil 2. Hydraulic oil	Replace oil seal in brake. Refer to kits on page 1 and 2. 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 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.
	A. Oil in brake pressure	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.

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