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

Service Instructions

TABLE 1

Model Number	Oil Cooled	Lining Kit Number	Bearing Kit Number	O-ring Kit Number	Spring Kit Number	Complete Kit Number	Red Springs Quantity	Blue Springs Quantity	Yellow Springs Quantity
13-597-002	No	12-501-320	12-501-322	12-501-323	12-501-324	none	6	4	0
13-597-004	No	12-501-320	12-501-322	12-501-323	12-501-324	none	8	4	0
13-597-008	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	4	0
13-597-010	No	12-501-320	12-501-322	12-501-323	12-501-324	none	12	2	0
13-597-012	Yes	12-501-321	12-501-326	12-501-327	12-501-324	none	6	4	0
13-597-014	No	12-501-320	12-501-322	12-501-323	12-501-324	none	4	2	0
13-597-016	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	6	4	0
13-597-018	No	12-501-320	12-501-322	12-501-323	12-501-324	none	8	6	0
13-597-022	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	12	2	0
13-597-024	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	6	0
13-597-026	No	12-501-320	12-501-322	12-501-323	12-501-324	none	8	6	0
13-597-030	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	6	0	0
13-597-032	No	12-501-320	12-501-325	12-501-323	12-501-324	none	8	6	0
13-597-034	No	12-501-320	12-501-322	12-501-323	12-501-324	none	6	0	0
13-597-040	No	12-501-320	12-501-322	12-501-323	12-501-324	none	4	2	0
13-597-042	No	12-501-320	12-501-322	12-501-323	12-501-324	none	4	2	0
13-597-044	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	4	0
13-597-046	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	12	2	0
13-597-048	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	4	0
13-597-050	Yes	none	none	none	none	12-501-400	*6	4	0
13-597-052	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	16	0	0
13-597-054	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	4	0
13-597-056	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	12	2	0
13-597-058	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	16	0	0
13-597-060	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	12	2	0
13-597-062	Yes	12-501-321	12-501-322	12-501-323	12-501-476	none	0	0	16
13-597-064	No	12-501-320	12-501-322	12-501-323	12-501-324	none	4	2	0
13-597-066	No	12-501-320	12-501-322	12-501-323	12-501-324	none	6	0	0
13-597-070	Yes	12-501-321	12-501-478	12-501-479	12-501-324	none	8	6	0
13-597-072	No	12-501-320	12-501-322	12-501-323	12-501-324	none	6	0	0
13-597-076	Yes	12-501-321	12-501-322	12-501-323	12-501-520	none	16	0	0
13-597-078	Yes	12-501-321	12-501-322	12-501-323	12-501-324	none	8	6	0
13-597-080	Yes	12-501-320	12-501-322	12-501-323	12-501-324	none	8	4	0

*Earlier design of 13-597-050 uses 8 red springs.

TABLE 2 (items included in kits)

Lining Kit	Bearing Kit	O-ring Kit	Spring Kit
Case Gaskets (17) Primary Disc (12) Stator Discs (15) Rotor Discs (14) O-rings (2)	Case Gaskets (17) Oil Seal (6) O-rings (2) Bearing (5) Bearing (25)	Case Gaskets (17) O-rings (2, 8, 22 & 24) Oil Seal (6) Back-up Rings (27 & 29) O-rings (21 & 23)	Case Gaskets (17) Return Springs (13) Spring (19) O-rings (2)

NOTES
1. Complete Kit 12-501-400 includes items listed in above kits.
2. Bearing (25) is only provided in Bearing Kit 12-501-325.
3. Bearing Kit 12-501-326 does not include oils seals (6).
4. O-ring Kit 12-501-327 does not include o-ring (8).

NOTE

All repair kits include mounting face gaskets and face seals. 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.

NOTE

This literature services various models in this brake series. The components shown in Figures 1-3 may appear different than what is found in your brake. See Table 2 on page 1 for items included in kits.

DISASSEMBLY

1. Remove two flat head assembly bolts (1) and o-rings (2). A suitable holding fixture is useful to keep brake in position.
2. Using a soft mallet, tap on spring plate (18) and, if possible the female end of shaft assembly (10) to separate from 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. **NOTE: Not all models use oil seal (6).**
7. Before removing four socket head shoulder bolts (11), note that return springs (13) are under approximately 64 kgf (140 lb) of spring load.

⚠ WARNING

To prevent personal injury, install 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.

⚠ CAUTION

Do not remove shoulder bolts without pressurization of brake, approximately 21 bar (300 PSI), or damage may result.

9. Remove the four socket head shoulder bolts (11).
10. Remove clamping fixture. Remove two flat head assembly bolts (1), primary disc (12) and return springs (13).
11. Remove rotor discs (14) and stator discs (15).
12. Release the pressure to brake before removing four socket head cap screws (16).
13. Remove spring plate (18).
14. Remove case gasket (17) from spring plate (18).
15. Before removing springs (19), note pattern and color for reassembly purposes.
16. Remove piston (20) by carefully applying hydraulic pressure through brake release port on pressure plate (26).
17. Remove o-rings (22 & 24) and back-up rings (21 & 23) from piston (20). **NOTE: Be careful not to scratch or mar piston.**
18. Remove case gasket (17) and bearing (25) from pressure plate (26). **NOTE: Not all models use bearing (25).**

ASSEMBLY

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. **NOTE: Not all models use oil seal (6).**
   DRY DESIGN BRAKE; oil seal (6) must be installed with open side facing pilot end of cover (7).
   LIQUID COOLED BRAKE; 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. Install bearing (25) on shaft (10) until inner bearing race bottoms on shaft shoulder.
6. Install retaining ring (4) on spline shaft assembly (10).
7. Install o-ring (8) and piston (9) 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 type fluid used in the system. Care-fully press piston into pressure plate (26). 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 pattern end color noted during disassembly. Different colored springs must be alternated. Contact ZF Off-Highway Solutions Minnesota Inc. if you have questions regarding the spring pattern.
12. Affix case gaskets (17) to pressure plate (26) and spring plate (18).
13. A suitable holding fixture is useful to hold brake in position. Place spring plate (18) and pressure plate (26) on a press, depress and install four socket head assembly bolts (16). Torque bolts 48-54 N·m (35-40 lb·ft). **NOTE: Apply two drops of Locite #242 to threads.**
14. Install stator discs (15) and rotor discs (14).
15. Place return springs (13) over the 3/8 inch tapped holes 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 1 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. Pressurize brake release port, approximately 21 bar (300 PSI), align discs and partially screw in four socket head shoulder bolts (11). **NOTE: Apply two drops of Loctite #242 to threads.** Inspect for free movement of stack.
19. Fully depress primary disc (12) against lining stack. Torque shoulder bolts (11) 20-24 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). Torque bolts 34-41 N·m (25-30 lb·ft). **NOTE: Apply two drops of Loctite #242 to threads.**

⚠ CAUTION

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

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: 2.07 bar (30 PSI)

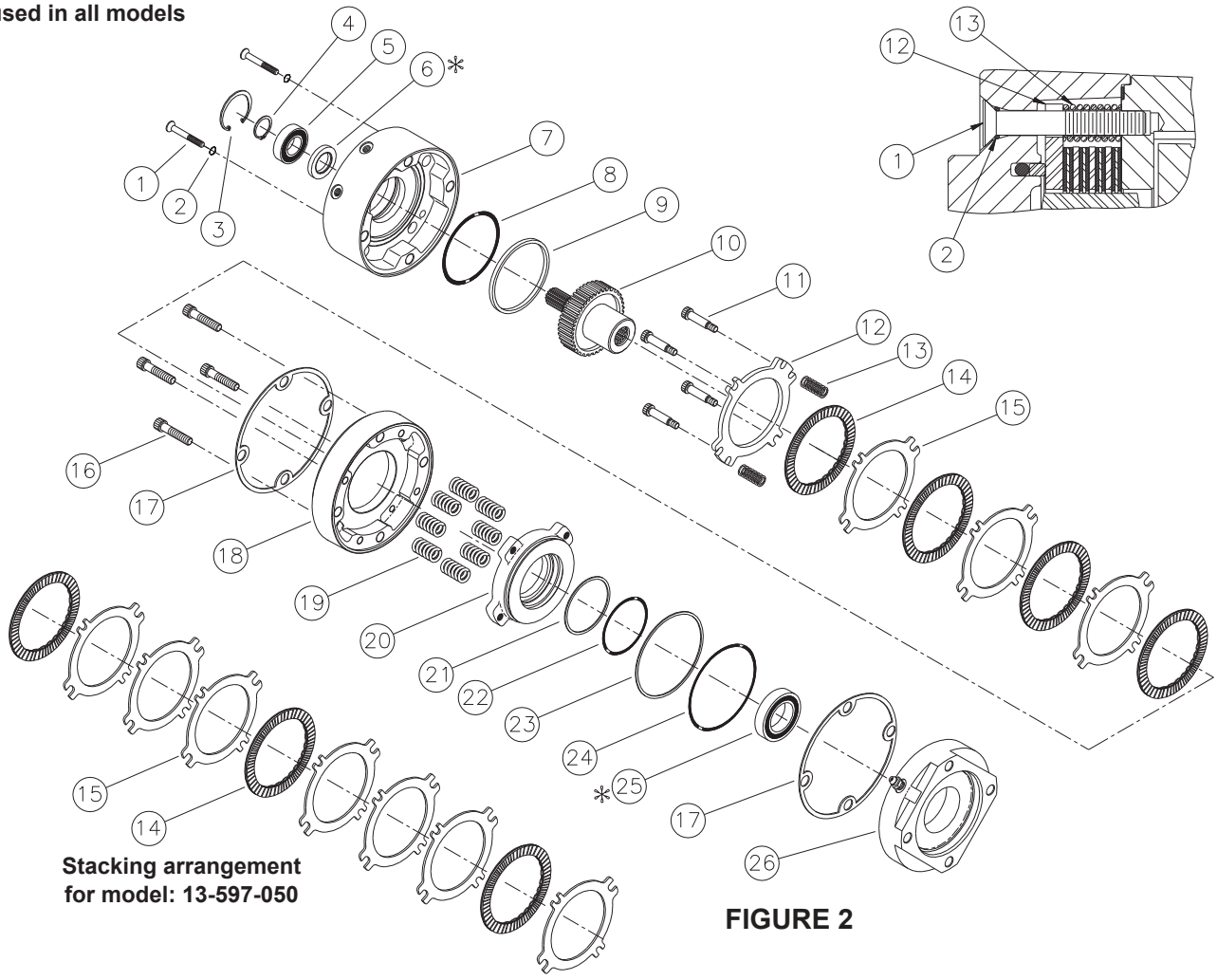
Sump oil fluid volume: Horizontal: 118.3 mL (4 oz)
Vertical: Contact ZF Off-Highway Solutions Minnesota Inc.

NOTE

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

See TABLE 2 on page 1 for items included in kits.

✻ Not used in all models



Stacking arrangement for model: 13-597-050

FIGURE 2

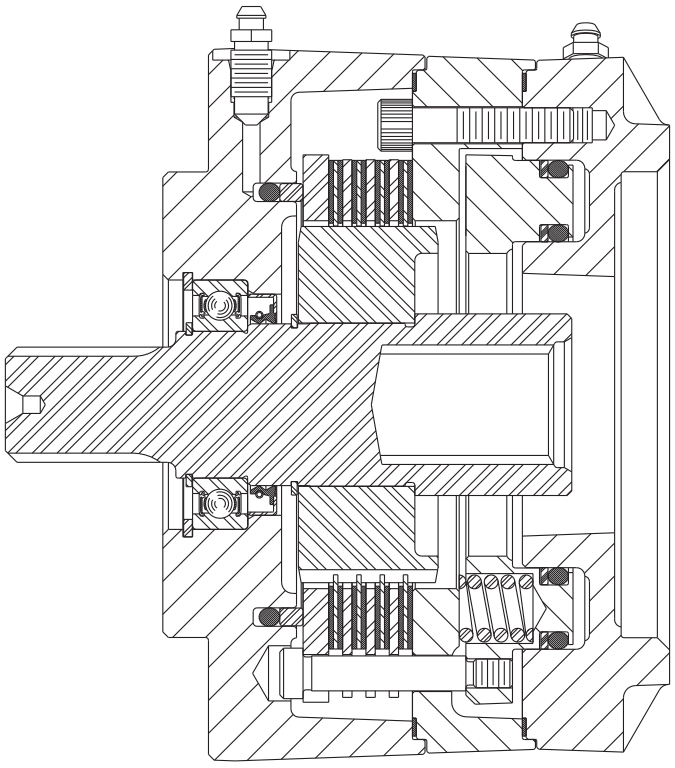


FIGURE 3
(13-597-002 shown)

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 the 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	Wet linings generate 67% of the dry torque rating. If the brake has oil it, check the oil type: 1. Gearbox oil. 2. Hydraulic oil.	Replace oil seal the 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 have 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 a new 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. Change 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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