



## Service Instructions

**NOTE**  
If 690/691 System fluid has entered the vehicle service brake system, it may be necessary to flush the service brake system and refill.

### SINGLE ACTUATOR

#### DISASSEMBLY

(Refer to Figure 1)

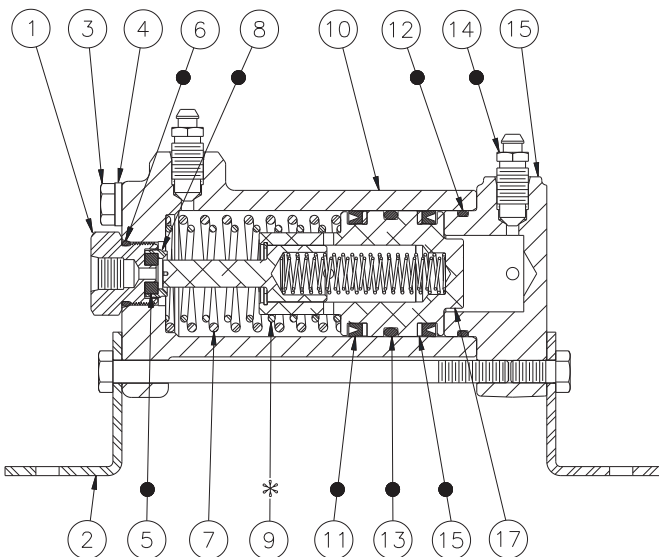
1. Disconnect necessary fluid lines.
2. Remove actuator from vehicle. Drain fluid from the valve before disassembling.
3. Carefully remove end cap (16) by removing four cap screws (3), two lock washers (4), and mounting bracket (2).

**⚠ CAUTION**

Actuator assembly is under tension of springs (7 & 9). Loosen cap screws evenly and in alternate order until spring preload is released.

4. Remove o-ring (12) and bleeder screw (14) from end cap (16).
5. Remove piston assembly (17), springs (7 & 9), and bleeder screw (14) from housing (10). **NOTE: Not all models use spring (9).**
6. Carefully remove two cups (11), two back-up rings (15), and o-ring (13) from piston assembly (17). **NOTE: Be careful not to scratch or mar piston.**
7. Remove end plug (1) from housing (10) bore.
8. Remove o-ring (6), retainer (8), and seat (5) from end plug (1).

- Items included in Repair Kit
- \* Not used in 31.8 mm (1.25 in) diameter bore actuators.



**FIGURE 1**

Model Number	Actuator Type	Repair Kit Number	Bore Diameter	
			mm	(inch)
20-460-012 (SF)	Dual	02-600-034	44.5	(1.75)
20-460-013 (SF)	Single	02-600-035	44.5	(1.75)
20-460-014 (HO)	Single	02-600-036	44.5	(1.75)
20-460-015 (HO)	Dual	02-600-048	44.5	(1.75)
20-460-017 (SF)	Dual	02-600-041	31.8	(1.25)
20-460-018 (SF)	Single	02-600-042	31.8	(1.25)
20-460-022 (SF)	Single	02-600-035	44.5	(1.75)
20-460-023 (SF)	Dual	02-600-041	31.8	(1.25)

SF = Silicone Fluid    HO = Mineral Base Hydraulic Oil

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

#### ASSEMBLY

(Refer to Figure 1)

LUBRICATE ALL RUBBER COMPONENTS FROM **SILICONE FLUID MODEL REPAIR KITS WITH CLEAN DOT 5 OR MIL46176B SILICONE BASE FLUID.**

LUBRICATE ALL RUBBER COMPONENTS FROM **MINERAL BASE HYDRAULIC OIL MODEL REPAIR KITS WITH CLEAN MINERAL BASE HYDRAULIC OIL.**

1. Clean all parts thoroughly before assembling.
2. Install new bleeder screw (14) and new o-ring (12) on end cap (16). Install new bleeder screw in housing (10). Torque bleeder screws 12.2-20.3 N·m (9-15 lb·ft).
3. Install new o-ring (6), new seat (5), and new retainer (8) on end plug (1). Torque retainer 10.9-16.3 N·m (8-12 lb·ft).
4. Carefully install new cups (11), new back-up rings (15), and new o-ring (13) on piston assembly (17). Note the direction and order of cups and backup rings. **NOTE: Be careful not to scratch or mar piston.**
5. Carefully install springs (7 & 9) and piston assembly (17) into housing (10) bore. Note the direction of piston assembly (17). **NOTE: Not all models use spring (9).**
6. Assemble end cap (16) to housing (10) using four cap screws (3), two lock washers (4), and mounting bracket (2). Be sure mounting bracket is in the proper position.

**⚠ CAUTION**

When installing cap screws use Loctite 242 on threads. Tighten cap screws evenly and in sequence. Torque 13.56-20.34 N·m (10-15 lb·ft).

7. Install end plug (1) in housing (10). Torque end plug (1) 54.2-67.8 N·m (40-50 lb·ft).
8. Install actuator on vehicle. Connect necessary fluid lines. Bleed system of air. **Follow Bleeding Instructions in Form No. 81-690-032.** Make several applications to be sure actuator is working properly. **NOTE: All fittings must be inspected for leaks and tightened if leaks occur.**

## NOTE

If 690/691 System fluid has entered the vehicle service brake system, it may be necessary to flush the service brake system and refill.

## DUAL ACTUATOR

### DISASSEMBLY

(Refer to Figure 2)

1. Disconnect necessary fluid lines.
2. Remove actuator from vehicle. Drain fluid from valve before disassembling.
3. Carefully separate actuator halves by removing eight cap screws (3), four lock washers (4) and both mounting brackets (2).

### ⚠ CAUTION

Actuator assembly is under tension of springs (7 & 9). Loosen cap screws evenly and in alternate order until spring preload is released.

4. Remove o-rings (12) and bleeder screw (14) from adaptor (16).
5. Remove piston assembly (17), springs (7 & 9), and bleeder screw (14) from housing (10). **NOTE: Not all models use spring (9).**
6. Carefully remove cups (11), back-up rings (15), and o-ring (13) from piston assembly (17). **NOTE: Be careful not to scratch or mar piston.**
7. Remove end plug (1) from housing (10) bore.
8. Remove o-ring (6), retainer (8), and seat (5) from end plug (1).
9. Repeat these procedures for the other half of actuator.

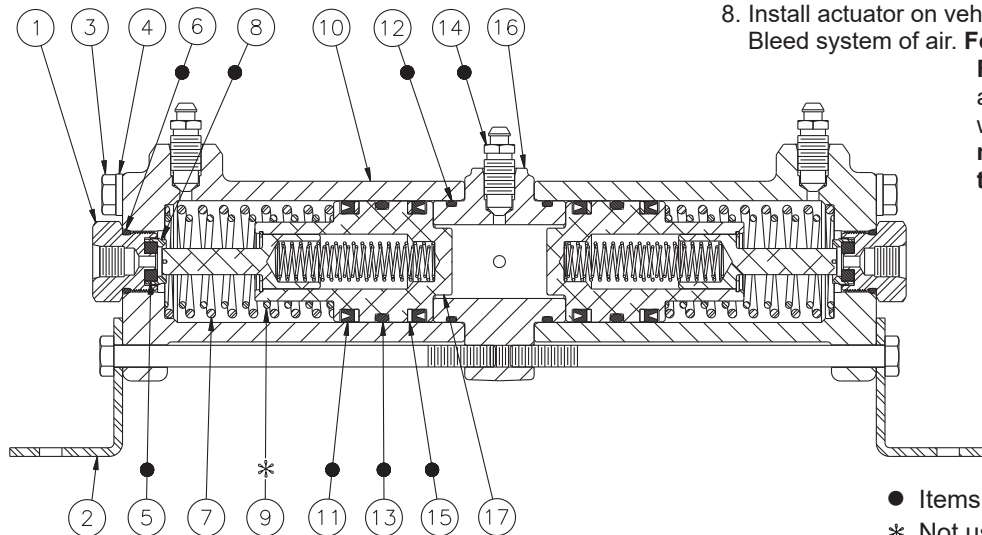


FIGURE 2

## ASSEMBLY

(Refer to Figure 2)

LUBRICATE ALL RUBBER COMPONENTS FROM **SILICONE FLUID MODEL REPAIR KITS WITH CLEAN DOT 5 OR MIL46176B SILICONE BASE FLUID.**

LUBRICATE ALL RUBBER COMPONENTS FROM **MINERAL BASE HYDRAULIC OIL MODEL REPAIR KITS WITH CLEAN MINERAL BASE HYDRAULIC OIL.**

1. Clean all parts thoroughly before assembling.
2. Install new bleeder screw (14) and new o-rings (12) on adaptor (16). Install new bleeder screws in housings (10). Torque bleeder screws 12.2-20.3 N·m (9-15 lb-ft).
3. Install new o-rings (6), new seats (5), and new retainers (8) on end plugs (1). Torque retainers 10.9-16.3 N·m (8-12 lb-ft).
4. Carefully install new cups (11), new back-up rings (15), and new o-rings (13) on piston assemblies (17). Note the direction and order of cups and back-up rings. **NOTE: Be careful not to scratch or mar pistons.**
5. Carefully install springs (7 & 9) and piston assemblies (17) into housing (10) bores. Note the direction of piston assemblies. **NOTE: Not all models use spring (9).**
6. Assemble housings (10) to adaptor (16) using eight cap screws (3), four lock washers (4), and both mounting brackets (2). Be sure mounting brackets are in proper position.

### ⚠ CAUTION

When installing cap screws use Loctite 242 on threads. Tighten cap screws evenly and in sequence. Torque 13.56-20.34 N·m (10-15 lb-ft).

7. Install end plugs (1) in housings (10). Torque end plugs 54.2-67.8 N·m (40-50 lb-ft).
8. Install actuator on vehicle. Connect necessary fluid lines. Bleed system of air. **Follow Bleeding Instructions in Form No. 81-690-032.** Make several applications to be sure actuator is working properly. **NOTE: All fittings must be inspected for leaks and tightened if leaks occur.**

- Items included in Repair Kit
- \* Not used in 31.8 mm (1.25 in) diameter bore actuators.

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