B.F.GOODRICH AEROSPACE & DEFENSE PRODUCTS
A Division of The B.F.Goodrich Company
Wheel and Brake Plant
Troy, Ohio

MANUAL 6

INSTALLATION, OPERATION, MAINTENANCE, AND OVERHAUL OF B.F.GOODRICH MASTER CYLINDER ASSY., FOR INDUSTRIAL EQUIPMENT

Used on B.F.Goodrich Expander Tube Brake Assemblies

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Note

-1 versions of the basic part numbers are to be used for future procurement. Basic part numbers are retained in this publication for service information only.

1
DESCRIPTION

1–1. The master cylinder assembly consists basically of a housing (19), a mounting bracket (7), an actuation piston (14), and an automatic adjusting piston assembly (10). The unit is available completely assembled ready for installation.

1–2. An air cylinder or similar unit conveys external force into the power piston (14) through a 3/4-in. maximum diameter rod. This master cylinder assembly has a four-in. stroke capacity and its fluid inlet is at the pressure face of the piston when the piston is in the completely retracted position. In the cap end of the housing, the diameter of the bore increases for a distance of about three-in. from the cap end. This increased bore contains the floating automatic adjuster piston (10). An end cap (8) closes the housing.

1–3. Jam nuts (5) attach the actuating rod to the power piston. The nuts are held on the rod by spherical washers (4) ahead of the nuts and a flat washer (6) and retaining ring (3) behind the nuts. The retaining ring is located in the power piston. The piston has two packings (15, 15A) along its cylindrical surface and a ball-check valve (17, 18) in the pressure face. Automatic adjustment is made by a sensing piston backed by a sensing piston spring moving in a housing to open and close a port through which fluid passes into and through the adjuster piston (10). A light spring (12) separates the power and adjuster pistons.

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2
OPERATION

2–1. From the reservoir tank, actuation fluid enters the threaded inlet hole located about midway of the housing (19). When the power piston (14) is fully retracted, fluid fills the housing between power piston and adjuster piston (10). When the power piston moves forward, the adjuster piston also moves forward the length of its available travel, about half the stroke of the power piston. Continued pressure on the power piston causes the sensing piston to open the port, allowing fluid to pass through the automatic adjuster into the brake as long as the piston is under pressure. The fluid leaves the housing through the port in the cap to be conveyed to the brake assembly.

2–2. When the pressure is removed from the power piston, brake pressure decreases until all that remains is the back pressure caused by the brake block retracting springs. All linings are still in contact with the drum. Then the sensing piston closes and both power piston and adjuster piston retract in the housing. The adjuster piston retracts the entire length of its available travel and the power piston retracts to its starting position. Fluid can pass through the ball-check valve (17, 18) into the front of the piston as it retracts, thereby preventing a vacuum lock in front of the power piston.

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3
INSTALLATION

3–1. The master cylinder assembly is shipped from the factory completely assembled.

Note

The 87-97 master cylinder may be shipped assembled into the 221-8 air and hydraulic actuator assembly (see footnote on page 8-6). In this case, start installation procedure with paragraph 3–2.k.

3–2. To mount the master cylinder, proceed as follows:

a. Remove mounting bracket (7) from master cylinder and attach to air cylinder using lock washers under the nuts and tightening securely.

b. Remove retaining ring (3), washer (6), and jam nuts (5) from the rear of the piston.

c. With air cylinder push rod retracted, position jam nuts (5) so that the distance from the face of the mounting bracket (7) to closest face of washer (6) is 9/16 in.; then lock jam nuts (5) together.

d. Apply pressure to air cylinder to extend push rod.

Note

Check to see that the spherical washers (4) are correctly seated in the piston.

e. Insert air cylinder push rod into the end of piston (14), seating the jam nuts against the spherical washers (4).

f. Lock the retaining ring in its groove in the piston.

g. Release the air from the air cylinder.

Note

The springs in the air cylinder should pull mounting bracket and master cylinder firmly together. Forward packing (15) should be visible through the side port in the housing.

h. Align the threaded holes in the mounting bracket with the holes in the master cylinder so that the oil inlet is at the top when the unit is installed.

j. Install lock washers (2) and cap bolts (1) and tighten evenly and firmly to 130 to 140 lb ft.

Note

The entire unit, consisting of the air cylinder, mounting bracket, and master cylinder, is ready to attach to the vehicle through holes in the mounting bracket. This assembly must be mounted horizontally, with the oil inlet at the top of the barrel. Engineering approval is required if the assembly is to be mounted differently.

k. After the master cylinder has been firmly attached, connect the air line to the air cylinder, the brake line to the cap (8), and the reservoir line to the cylinder inlet.

Note

Be sure the inlet fitting does not protrude through the housing wall into the housing because this would cause damage to the power piston packings (15).

m. Bleed the brake system in accordance with the following procedure:

(1). Checking: Before trying to bleed the equipment, check the following:

(a) Reservoir Line Size: Recommended size is 5/16 in. minimum ID.

(b) Reservoir Size: 2 qt. capacity for each brake.

(c) All reservoir lines should drain to the master cylinder.

(d) Bleeder valves should be installed at the highest point in the line between the master cylinder and brake, as near the brake as possible.

(e) Use additional bleeder valves at the master cylinder outlet if supply lines to brakes exceed 4 ft.

(2). Bleeding:

(a) Fill reservoir with oil as noted in paragraph 5–5.

Note

Keep reservoir full throughout the bleeding procedure.

(b) Hold brake pedal down and open bleeder valve to vent air from master cylinder. When fluid stops draining, close bleeder valve and release brake pedal.

(c) Wait two minutes for master cylinder to replenish and repeat the procedure in paragraph 3–2.(2).b.

(d) Actuate brake pedal with the bleeder valve closed, hold pressure for 10 seconds, and release. Wait two minutes and repeat cycle.

(e) Repeat paragraph 3–2.(2).b to clear air from the brake side of the automatic adjuster in the master cylinder, and from the expander tube. Repeat until no air can be detected escaping from the bleeder valve. Wait two minutes between each brake release and the next application.

(f) Repeat paragraph 3–2.(2).d enough times to assure that brake shoes are contacting drum. Test by holding brakes against engine power. (If brakes do not hold, refer to paragraph 4–5).

(g) After operating the vehicle for approximately an hour, open the bleeder with brakes released, to permit the escape of remaining air which may work to the top of the system during operation.

4
MAINTENANCE

4–1. INSPECTION: When the vehicle is available for inspection, examine master cylinder cap (8) end and fluid connections for leakage and the master cylinder **mounting** bracket (7) for tightness or damage.

4–2. REPAIR: Tighten loose cap bolts (1) to assure proper support. Correct any leak at the fluid connections by tightening the fittings.

4–3. REPLACEMENT: If there is a leak in the cap that cannot be stopped by tightening the cap on the housing (19), remove the cap and replace the packing (9). If there is a leak at the fittings that cannot be stopped by tightening, replace the fitting.

4–4. DRAGGING BRAKES: Air in the hydraulic system may cause the brake to drag. If this condition is suspected, with brake released, open bleeder screw and drain all air and fluid that will come out. Then tighten bleeder screw, check the reservoir level, and refill if necessary. Apply the brakes three times allowing at least 30 seconds between applications. Repeat the procedure until removal of all air from brake is assured.

4–5. TROUBLE SHOOTING:

AIR OVER HYDRAULIC ACTUATING SYSTEM

TROUBLE	POSSIBLE CAUSE	CORRECTION
Brakes dragging or running hot.	Air trapped in hydraulic actuating system.	Bleed system and brake in accordance with paragraph 3–2.m.(2).
	Residual air pressure at rotochamber.	Check air system to insure zero pressure at rotochamber.
	Rotochamber retraction obstructed.	Inspect rotochamber to insure full retraction.
	Master cylinder power piston not retracting.	Inspect cylinder bore and power piston OD for burrs, chips, or other obstruction and correct.

AIR OVER HYDRAULIC ACTUATING SYSTEM (Continued)

TROUBLE	POSSIBLE CAUSE	CORRECTION
Brakes dragging or running hot. (Continued)	Master cylinder floating piston not retracting.	Inspect cylinder bore and floating piston OD for burrs, chips, or other obstruction and correct.
	Return spring between master cylinder pistons out of engagement.	Seat spring in groove on end of each piston.
	Broken or flattened brake retracting spring.	Compare spring arch with new spring and replace flattened or broken springs with complete set of twelve.
	Improper oil in system causing vaporization in brake.	Purge system, replace all rubber parts and refill with hydraulic oil as specified in paragraph 5–5.
	Master cylinder adjuster not working.	Remove floating piston assembly and insert blunt tool into small hole in face of piston and push inward. If definite movement cannot be obtained, replace with a new part.
Brakes will not apply.	Brakes not bled of air allowing master cylinder to bottom.	Bleed system and brakes in accordance with paragraph 3–2.m.(2).
	Reservoir located below master cylinder restricting oil flow.	Relocate reservoir above master cylinder to allow gravity feed.
	Feed-line from reservoir restricted or too small.	Insure free flow using 5/16 min. ID line without restriction.
	Master cylinder power piston not retracting to seat, closing off inlet.	Adjust rotochamber push rod attachment as outlined in paragraph 3–2.c.
	Master cylinder power piston stuck in cylinder bore.	Free up piston removing obstruction. If cylinder wall or piston OD is excessively damaged, replace with new part.
	Vacuum trapped in reservoir.	Insure vent air passage in reservoir.
	Insufficient oil reserve.	Keep reservoir filled with hydraulic oil as specified in paragraph 5–5.
	Check valve in master cylinder power piston not closing.	Insure free motion of ball check and remove all foreign particles.
	Master cylinder adjuster not working.	Remove floating piston assembly and blow with mouth into small hole in face of piston. If air passes, replace with new part.
	Packing on master cylinder power piston not sealing.	Replace packing with new B.F.Goodrich replacement part.
	Supply line leaking.	Check lines and fittings to insure sealing.
	Air pressure inadequate.	Air pressure at rotochamber should be not less than 80 psi with brakes applied. Correct air system as required to obtain 80 psi min.

AIR OVER HYDRAULIC ACTUATING SYSTEM (Continued)

TROUBLE	POSSIBLE CAUSE	CORRECTION
Master cylinder leaking at mounting bracket joint.	Packing not sealing.	Replace all master cylinder packings.
Brake leaking.	Expander tube nozzle packing not sealing.	Replace packings and inspect connector block nozzle hole for surface damage. If surface does not appear satisfactory for sealing, replace connector with new part.
	Expander tube leaking.	If tube shows definite leak, replace with a new tube.

4–6. COLD WEATHER MAINTENANCE: When the 221-8 assembly is used at temperatures between -40° to -65°F, the following maintenance procedure is required:

a. Drain all components, including the oil reservoir, master cylinder, hydraulic lines, and brakes, of oil. Allow time for retracting springs in the brakes to retract and exhaust all the oil from the brakes.

b. Rebuild the 221-8 assembly using the cold weather modification kit (Part No. 198-25). This kit includes the following cold weather parts; diaphragm for the Type 36 rotochamber, replacement O-rings for items 9, 11, 15, and 15A, and a replacement piston assembly (10). The 15A O-ring is identified by a molded white dash, this is in addition to the molded orange dash found on each of the O-rings included in this kit. The floating piston assembly (Part No. 116-110) is impression stamped *Cold Weather.*

c. After 221-8 assembly is rebuilt, fill with MIL-H-5606 hydraulic fluid and completely bleed the brake system.

CAUTION

Do not use cold weather parts or maintenance procedure when equipment is to be operated in normal temperatures above 32°F.

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5
OVERHAUL

Note

When the master cylinder requires overhaul, modify it to the latest dash number design in accordance with the Parts Breakdown.

5–1. DISASSEMBLY:

a. Unscrew outlet end cap (8) and remove end cap packing (9).

Note

Be careful not to let the adjuster piston (10) fall out as you remove cap.

b. If adjuster piston does not come out when you remove the cap, tap end of piston with a plastic mallet to loosen it so that the spring (12) can push it out the open end.

c. Remove spring (12) and take cap bolts (1) from bracket end of housing.

d. Apply air to air chamber to extend rod. Then remove lock ring (13) from housing (19).

e. Remove power piston (14).

f. Remove lock ring (16), washer (16A), conical spring (17), and ball (18) from ball-check end of piston.

g. Remove packings (11, 15) from all grooves.

5–2. CLEANING: Clean all parts.

Note

Do not immerse adjuster piston (10) in cleaning fluid.

5–3. INSPECTION:

a. Inspect adjuster piston (10) by inserting a smooth, blunt tool into the small hole in the face of the piston and pushing inward. If definite movement cannot be obtained, replace with a new part. If definite movement occurs, blow with mouth into the small hole. If air passes through the assembly, replace with a new part.

b. Inspect housing (19) bore for surface condition. If unsatisfactory for packing seal, replace with a new part.

c. Inspect ball-check seat surface in piston (14) for lodged foreign particles and remove if found.

5–4. REPLACEMENT: If replacement of parts is necessary, use only those parts listed for the latest dash number assemblies. Replace all packings.

Note

All packings (15A) used at the low pressure end of the power piston (14) are identified with a white slash on the OD of the packing.

5–5. HYDRAULIC OIL: Check level of oil in reservoir, daily.

a. Only mineral oils meeting the following specifications should be used in expander tube brakes and master cylinders covered in this manual.

CAUTION

Do not use **any other** types of oil or fluid. ***Avoid the use of automotive brake fluid, as it is especially destructive to the brake system components.***

b. PHYSICAL PROPERTIES:

Saybolt Universal Viscosity at 210°F	43 seconds, minimum
Saybolt Universal Viscosity at 100°F	145 to 155 seconds
Viscosity Index (Dean and Davis)	90 minimum
Pour Point (ASTM)	-25°F minimum
Color (ASTM)	No. 2 or lighter
Neutralization Number (ASTM)	0.10 or less
Copper Strip Test (Corrosion) 3 Hrs. at 212°F	Negative
Emulsion Test at 130°F, Distilled Water, Time for Complete Separation	30 minutes, maximum
Rust Test (ASTM) Distilled Water	No rust
Oxidation Test (ASTM) Time to Neutralization Number 2.0	1500 hrs, minimum
Foam Test (ASTM) Sequence 1, 2, 3 ML foam after 10 minutes standing	None
Flash Point	370°F minimum
Aniline Point Additives	200°F or more

Additives harmful to Buna N and neoprene rubber compounds will not be used.

c. For military vehicles, oil in accordance with MIL-L-2104 has been approved for the 87-97 master cylinder and the 2-907 brake. MIL-H-5606 hydraulic fluid may be used, with engineering approval, at ambient temperatures below the operating range of MIL-L-2104.

5–6. REASSEMBLY: Reassemble in reverse order of disassembly, replacing all packings. Dry torque cap (8) to 50 lb ft minimum.

Note

Inlet fitting must not extend through the housing wall.

a. Adjust rotochamber rod attachment to piston (14) in accordance with paragraph 3–2.c.

b. Modify Bendix Westinghouse rotochamber No. 222855 (Type 50) and No. 222897 (Type 36) by adding inner retracting spring No. 237843. New or replacement rotochambers should be procured from Bendix-Westinghouse as follows:

(1). Type 50 Rotochamber: Same as No. 275244 but with neoprene diaphragm.

(2). Type 36 Rotochamber (No. 276948): Same as No. 2752 43 but with neoprene diaphragm.

Note

When the B.F.Goodrich 87-97 master cylinder is assembled to the Bendix-Westinghouse Type 36 Rotochamber (No. 276948), the part number for the assembled units become B.F.Goodrich 221-8 Air and Hydraulic Actuator Assembly.

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6
SPECIAL TOOLS

6–1. Waldes Truarc pliers No. 1 with 45° tips, used to remove ball check retaining ring (16).

6–2. Waldes Truarc pliers No. 5 with 45° tips, used to remove piston retaining ring (13).

6–3. Waldes Truarc pliers No. 3 with 45° tips, used to remove attaching parts from piston.

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7
SPARES

(SPARES RECOMMENDED FOR AVERAGE CONSTRUCTION SERVICE FOR 10 MASTER CYLINDER ASSEMBLIES ON YEARLY OVERHAUL BASIS)

INDEX NO.	ITEM	QUANTITY
1	BOLT	10
2	LOCKWASHER	10
3	RING, Retaining (Waldes-Kohinoor)	5
4	WASHER, Spherical	5
5	NUT, Jam	10
6	WASHER, Flat	5
7	BRACKET	2
8	CAP	2
* 9	GASKET, Cap	5
10	PISTON ASSEMBLY	5
*11	PACKING, O-ring	5
12	SPRING, Helical compression	2
13	RING, Retaining (Waldes-Kohinoor)	2
14	PISTON, Master cylinder	2
*15	PACKING, O-ring	5
*15A	PACKING, O-ring	5
16	RING, Retaining (Waldes-Kohinoor)	5
16A	WASHER	5
17	SPRING, Conical	5
18	BALL-CHECK	2
19	HOUSING	2

***Included in parts kits listed in parts catalog. Order kits for packing stock.**

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8
PARTS CATALOG

The following pages make up the Parts Catalog.

87-75-1 Master Cylinder Assembly
87-76-1 Master Cylinder Assembly
87-83-1 Master Cylinder Assembly
87-84-1 Master Cylinder Assembly
87-97 Master Cylinder Assembly

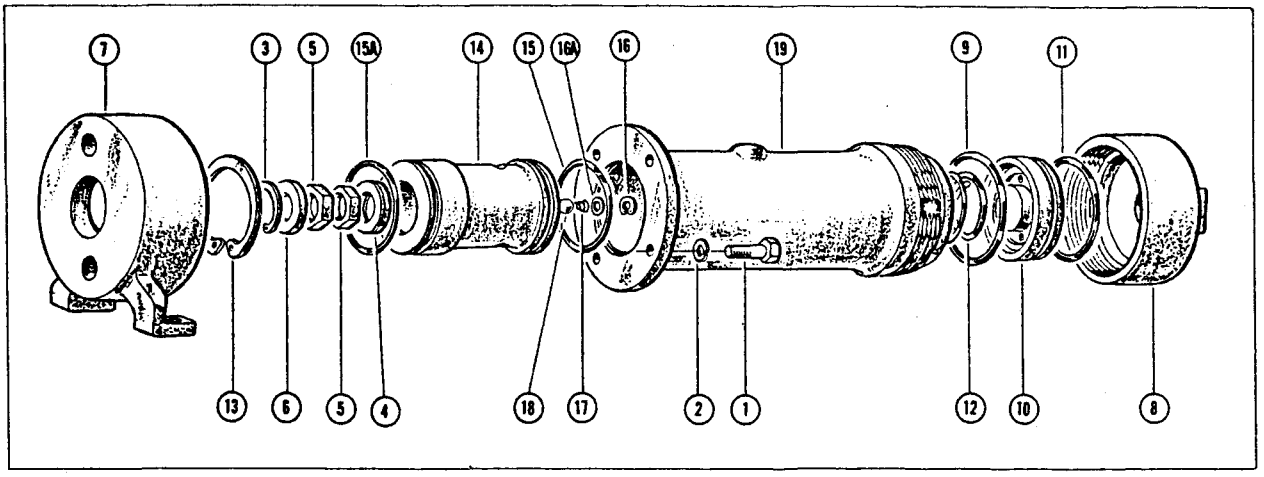

Figure 8–1. Exploded View, 87-75-1 Master Cylinder Assembly

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Quantity Per Assy.
*1-	87-75	MASTER CYLINDER ASSY., 3.75 dia	1
1-	87-75-1	MASTER CYLINDER ASSY., 3.75 dia	1
-1	43-498	. BOLT, Machine	4
-2	80-322	. WASHER, Spring lock	4
-3	85-289	. RING, Retaining, 1.786 dia	1
-4	80-250	. WASHER, Spherical 1.625 OD x 0.781 ID x 0.375	1
-5	63-202	. NUT, Jam, 3/4-16 UNF Thd. (SAE Std.)	2
-6	80-251	. WASHER, FLAT	1
-7	148-60	. BRACKET, Mounting, Master cylinder	1
-8	32-255	. CAP, Master cylinder	1
-9	68-294	. PACKING, O-ring hydraulic	1
-10	116-52-2	. PISTON ASSY., 4.000 dia	1
-11	68-298	. PACKING, O-ring hydraulic	1
-12	40-223	. SPRING, Helical, compression, 2.75 OD	1
-13	85-290	. RING, Retaining, 4.025 dia	1
-14	74-293	. PISTON, Master cyl., 3.750 dia	1
-15	68-297	. PACKING, O-ring, hydraulic	1
**-15A	68-308	. PACKING, O-ring, hydraulic	1
-16	85-259	. RING, Retaining, 0.592 dia	1
-16A	80-305	. WASHER, FLAT	1
-17	40-201-1	. SPRING, Conical	1
-18	130-10	. BALL, 0.500 dia (Bearings Inc., Dayton, Ohio)	1
-19	260-30	. HOUSING, Piston, master cylinder	1
***-	328-8	PARTS KIT, Master cylinder, packing	1

For use with Rotochamber, Type 50 (Bendix Westinghouse Company No. 275244) but with a neoprene diaphragm.

* Service 87-75 Master Cylinder with parts listed above.

** 68-308 is identified with a white paint slash on the OD.

*** The parts kit consists of one each of items 9, 11, 15, and 15A.

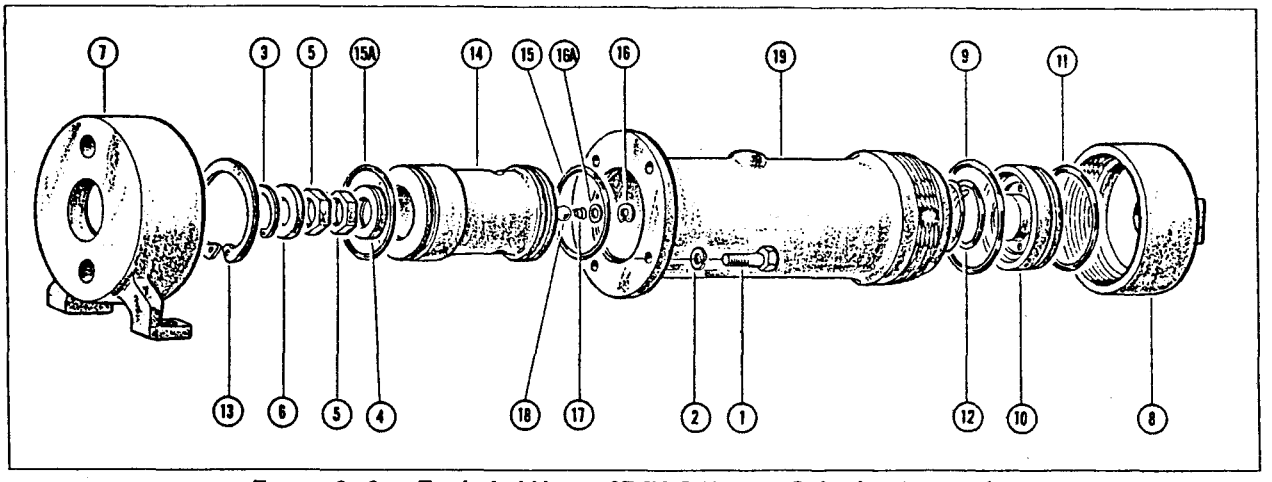

Figure 8–2. Exploded View, 87-76-1 Master Cylinder Assembly

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Quantity Per Assy.
*2-	87-76	CYLINDER ASSEMBLY, Hydraulic brake, master 3.000 dia	1
2-	87-76-1	CYLINDER ASSEMBLY, Hydraulic brake, master 3.000 dia	1
-1	43-498	. BOLT, Machine	4
-2	80-322	. WASHER, Spring lock	4
-3	85-289	. RING, Retaining, 1.786 dia	1
-4	80-250	. WASHER, Spherical, 1.625 OD x 0.781 ID x 0.375	1
-5	63-202	. NUT, Jam, 3/4-16 Thd. (SAE Std.)	2
-6	80-251	. WASHER, FLAT	1
-7	148-60	. BRACKET, Mounting, master cylinder	1
-8	32-260	. CAP, Iron, 4.250 8N-2B thd	1
-9	68-293	. PACKING, O-ring hydraulic	1
-10	116-34-2	. PISTON ASSY., 3.250 dia	1
-11	68-296	. PACKING, O-ring hydraulic	1
-12	40-224	. SPRING, Helical, compression 2.25 OD Dia	1
-13	85-257	. RING, Retaining, 3.165 dia	1
-14	74-292	. PISTON, Hydraulic brake, master cylinder	1
-15	68-295	. PACKING, O-ring, hydraulic	1
**-15A	68-309	. PACKING, O-ring, hydraulic	1
-16	85-259	. RING, Retaining, 0.592 dia	1
-16A	80-305	. WASHER, FLAT	1
-17	40-201-1	. SPRING, Conical	1
-18	130-10	. BALL, 0.500 dia (Bearings Inc., Dayton, Ohio)	1
-19	260-34	. CYLINDER, Hydraulic brake, master, 3.000 ID	1
***-	328-7	PARTS KIT, Master cylinder, packing	1

For use with Rotochamber, Type 50 (Bendix Westinghouse Company No. 275244) but with a neoprene diaphragm.
* Service 87-76 Master Cylinder with parts listed above.
** 68-309 is identified with a white paint slash on the OD.
*** The parts kit consists of one each of items 9, 11, 15, and 15A.

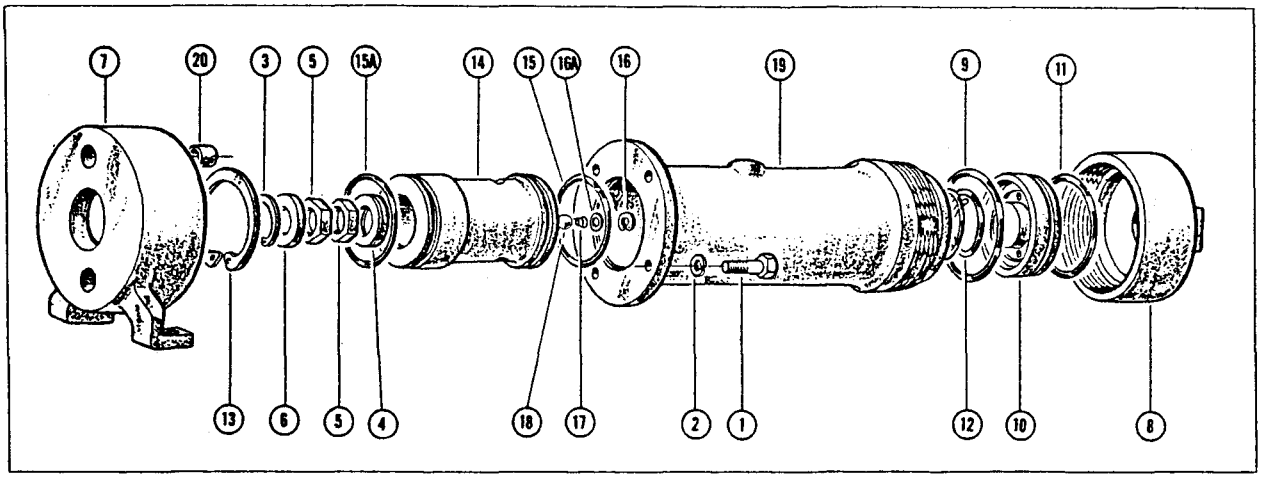

Figure 8–3. Exploded View, 87-83-1 Master Cylinder Assembly

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Quantity Per Assy.
*3-	87-83	MASTER CYLINDER ASSY., 3.75 dia	1
3-	87-83-1	MASTER CYLINDER ASSY., 3.75 dia	1
-1	43-498	. BOLT, Machine	4
-2	80-322	. WASHER, Spring lock	4
-3	85-289	. RING, Retaining, 1.786 dia	1
-4	80-250	. WASHER, Spherical 1.625 OD x 0.781 ID x 0.375	1
-5	63-223	. NUT, Jam, regular (SAE Std. 5/8-18)	2
-6	80-265	. WASHER, Flat	1
-7	148-60	. BRACKET, Mounting, Master cylinder	1
-8	32-255	. CAP, Master cylinder	1
-9	68-294	. PACKING, O-ring hydraulic	1
-10	116-52-2	. PISTON ASSY., 4.000 dia	1
-11	68-298	. PACKING, O-ring hydraulic	1
-12	40-223	. SPRING, Helical, compression, 2.75 OD	1
-13	85-290	. RING, Retaining, 4.025 dia	1
-14	74-293	. PISTON, Master cyl., 3.750 dia	1
-15	68-297	. PACKING, O-ring hydraulic	1
**-15A	68-308	. PACKING, O-ring hydraulic	1
-16	85-259	. RING, Retaining, 0.592 dia	1
-16A	80-305	. WASHER, FLAT	1
-17	40-201-1	. SPRING, Conical	1
-18	130-10	. BALL, 0.500 dia (Bearings Inc., Dayton, Ohio)	1
-19	260-30	. HOUSING, Piston, master cylinder	1
-20	26-90	. BUSHING, Steel, 0.75 OD	2
***-	328-8	PARTS KIT, Master cylinder, packing	1

For use with Rotochamber Type 36 (Bendix Westinghouse Company No. 276948).

* Service 87-83 Master Cylinder with parts listed above.

** 68-308 is identified with a white paint slash on the OD.

*** The parts kit consists of one each of items 9, 11, 15, and 15A.

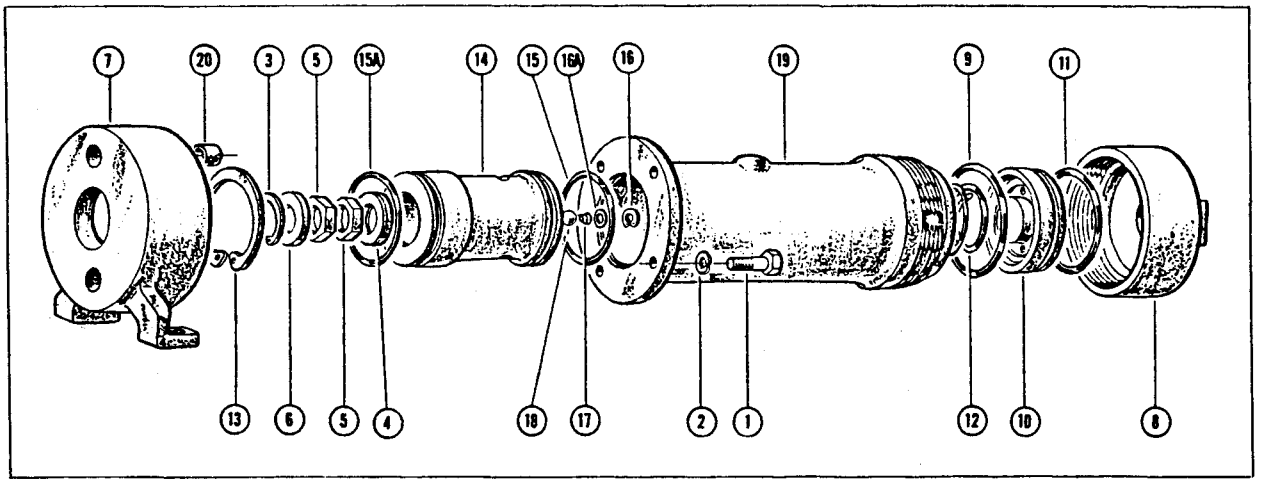

Figure 8–4. Exploded View, 87-84-1 Master Cylinder Assembly

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Quantity Per Assy.
*4-	87-84	CYLINDER ASSEMBLY, Hydraulic brake, master, 3.000 ID	1
4-	87-84-1	CYLINDER ASSEMBLY, Hydraulic brake, master, 3.000 ID	1
-1	43-498	. BOLT, Machine	4
-2	80-322	. WASHER, Spring lock	4
-3	85-289	. RING, Retaining, 1.786 dia	1
-4	80-250	. WASHER, Spherical, 1.625 OD x 0.781 ID x 0.375	1
-5	63-223	. NUT, Jam (SAE Std. 5/8-18)	2
-6	80-265	. WASHER, Flat	1
-7	148-60	. BRACKET, Mounting, master cylinder	1
-8	32-260	. CAP, Iron, 4.250 8N-2B thd	1
-9	68-293	. PACKING, O-ring hydraulic	1
-10	116-34-2	. PISTON ASSY., 3.250 dia	1
-11	68-296	. PACKING, O-ring hydraulic	1
-12	40-224	. SPRING, Helical, compression 2.25 OD dia	1
-13	85-257	. RING, Retaining, 3.165 dia	1
-14	74-292	. PISTON, Hydraulic brake, master cylinder	1
-15	68-295	. PACKING, O-ring, hydraulic	1
**-15A	68-309	. PACKING, O-ring, hydraulic	1
-16	85-259	. RING, Retaining, 0.592 dia	1
-16A	80-305	. WASHER, FLAT	1
-17	40-201-1	. SPRING, Conical	1
-18	130-10	. BALL, 0.500 dia (Bearings Inc., Dayton, Ohio)	1
-19	260-34	. CYLINDER, Hydraulic brake, master, 3.000 ID	1
-20	26-90	. BUSHING, Steel, 0.7 5 OD	2
***-	328-7	PARTS KIT, Master cylinder, packing	1

For use with Rotochamber Type 36 (Bendix Westinghouse Company No. 276948).
* Service 87-84 Master Cylinder with parts listed above.
** 68-309 is identified with a white paint slash on the OD.
*** The parts kit consists of one each of items 9, 11, 15, and 15A.

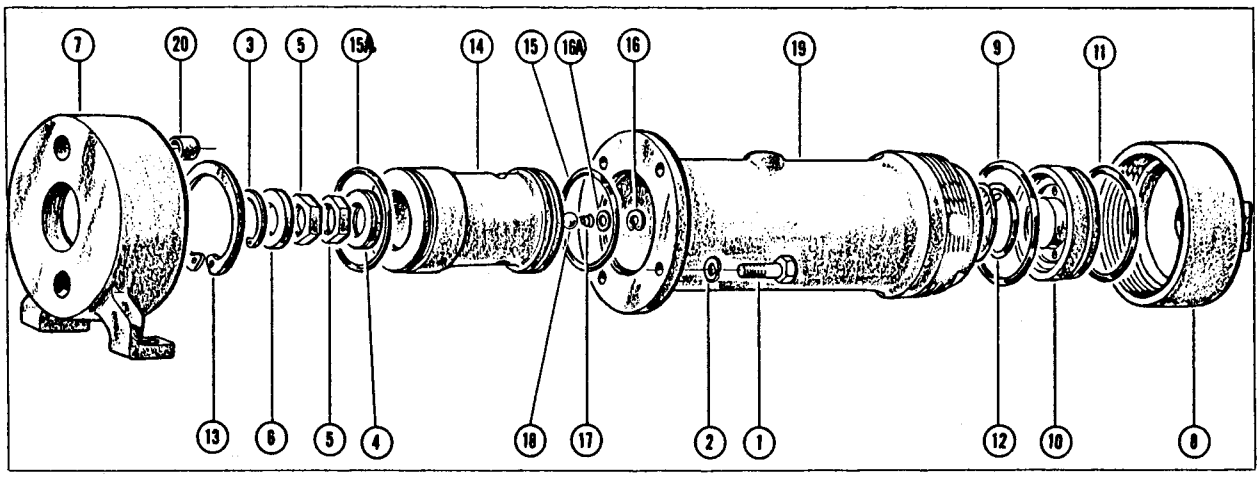

Figure 8–5. Exploded View, 87-97 Master Cylinder Assembly

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Quantity Per Assy.
5-	87-97	CYLINDER ASSY., Hydraulic brake, master, 3.000 ID	1
-1	43-498	. BOLT, Machine	4
-2	80-322	. WASHER, Spring lock	4
-3	85-289	. RING, Retaining, 1.786 dia	1
-4	80-250	. WASHER, Spherical, 1.625 OD x 0.781 ID x 0.375	1
-5	63-223	. NUT, Jam (SAE Std 5/8-18 thd)	2
-6	80-265	. WASHER, Flat	1
-7	148-60	. BRACKET, Mounting, master cylinder	1
-8	32-326	. CAP, Iron, 4.250-8N-2B thd	1
-9	68-293	. PACKING, O-ring, hydraulic	1
-10	116-34-2	. PISTON ASSY., 3.250 dia	1
-11	68-296	. PACKING, O-ring, hydraulic	1
-12	40-224	. SPRING, Helical compression, 2.25 OD	1
-13	85-257	. RING, Retaining, 3.165 dia	1
-14	74-292	. PISTON, Hydraulic brake, master cylinder	1
-15	68-295	. PACKING, O-ring, hydraulic	1
*-15A	68-309	. PACKING, O-ring, hydraulic	1
-16	85-259	. RING, Retaining, 0.592 dia	1
-16A	80-305	. WASHER, Flat	1
-17	40-201-1	. SPRING, Conical	1
-18	130-10	. BALL, 0.500 dia (Bearings Inc., Dayton, Ohio)	1
-19	260-222	. CYLINDER, Hydraulic brake, master, 3.000 ID	1
-20	26-90	. BUSHING, Steel, 0.75 OD	2
-	328-7	PARTS KIT, Master cylinder, packing (consists of one each of items 9, 11, 15, and 15A)	1

For use with Rotochamber, Type 36 (Bendix Westinghouse Company No. 276948). When the 87-97 Master Cylinder is assembled to the Rotochamber (No. 276948) the assembly is identified as B.F.Goodrich Part No. 221-8 Air and Hydraulic Actuator. For operation below -40°F, the Rotochamber should be equipped with a Bendix Westinghouse natural rubber diaphragm.

* 68-309 is identified with a white paint slash on the OD.

B.F.GOODRICH AEROSPACE & DEFENSE PRODUCTS
A Division of The B.F.Goodrich Company
Wheel and Brake Plant
Troy, Ohio

MANUAL 1

OPERATION, MAINTENANCE, AND OVERHAUL OF B.F.GOODRICH EXPANDER TUBE BRAKES FOR INDUSTRIAL EQUIPMENT

THIS EDITION REPLACES ALL PREVIOUS ISSUES

ISSUED: 24 April 1957
REVISED: 15 November 1962

THIS MANUAL SUPERSEDES AND REPLACES:

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PART NUMBER	SIZE	PAGE	PART NUMBER	SIZE	PAGE	PART NUMBER	SIZE	PAGE
2-669-2	22 x 7	7-12	*2-777-1	17¼ x 4	7-22	2-851	20¼ x 5	7-9
2-669-3	22 x 7	7-12	2-791	17¼ x 4	7-4	*2-851-1	20¼ x 5	7-22
2-669-5	22 x 7	7-12	2-794	26 x 5	7-15	2-853	20¼ x 5	7-10
2-701	26 x 7	7-16	2-794-1	26 x 5	7-15	*2-853-1	20¼ x 5	7-23
2-701-2	26 x 7	7-16	2-794-2	26 x 5	7-15	2-855	20¼ x 5	7-10
2-701-4	26 x 7	7-16	2-799-2	26 x 5	7-16	*2-855-1	20¼ x 5	7-23
2-704	20¼ x 7	7-11	2-800	20¼ x 3	7-20	2-856	22 x 5	7-24
2-704-2	20¼ x 7	7-11	2-806-2	26 x 7	7-17	2-857	22 x 5	7-25
2-732	22 x 7	7-13	2-806-3	26 x 7	7-17	*2-857-1	22 x 5	7-25
2-732-2	22 x 7	7-13	2-807	17¼ x 4	7-5	2-858	26 x 5	7-26
2-733	20¼ x 3	7-7	2-809	22 x 7	7-13	2-862	17¼ x 4	7-6
2-734	20¼ x 5	7-8	2-810-1	22 x 7	7-14	*2-879	17¼ x 4	7-6
2-734-1	20¼ x 5	7-8	2-812-1	22 x 7	7-14	*2-881	17¼ x 4	7-19
2-738	20¼ x 5	7-8	2-813-1	22 x 7	7-15	*2-886	17¼ x 4	7-7
2-738-1	20¼ x 5	7-8	2-814-1	26 x 7	7-17	*2-898	20¼ x 5	7-24
2-758	17¼ x 4	7-2	*2-816-1	26 x 7	7-18	*2-900	26 x 7	7-27
2-771	17¼ x 4	7-3	2-822	17¼ x 4	7-5	*2-902	26 x 7	7-27
2-776	17¼ x 4	7-3	2-831	20¼ x 5	7-9	*2-906	26 x 7	7-28
*2-776-1	17¼ x 4	7-21	2-839	20¼ x 7	7-11	*2-912	22 x 5	7-26
2-777	17¼ x 4	7-4	2-842	22 x 5	7-12			

* These brakes have been added to the manual since the last revision (31 March 1961).

1
DESCRIPTION

The expander tube brake is of the 360° segmented, shoe type, actuated by an expander tube. Its components include a cast torque plate (10) upon which the expander tube (7) is mounted and an inlet connection (8) into which the nozzle of the expander tube is inserted. Steel side frames with welded steel torque bars (6) are attached to both sides of the torque plate and are held in position by bolts (4). Brake linings mounted on steel shoes (2) are inserted between the torque bars and side frames and held in position by retracting springs (1). This steel shield (3) bridges the gap between shoes and protects the expander tube. The springs inserted under the center of the linings and over the steel brake shoes withdraw the block and shoe assemblies from the surface of the brake drum after the actuation pressure has been released.

INTENTIONAL
BLANK

2
OPERATION

The brake is actuated by hydraulic pressure which enters through a fitting in the threaded inlet hole of the inlet connection (8) and flows through the nozzle into the expander tube (7). Pressure is exerted 360° around the expander tube, forcing the block and shoe assemblies (2), which are bearing against the expander tube, to move radially against the inside diameter of the brake drum. At the release of actuation pressure, the retracting springs (1) force the hydraulic fluid from the expander tube and insure fast positive retraction of the block and shoe assemblies.

CAUTION

Use only approved oils. See paragraph 4.2 for information about hydraulic oils.

INTENTIONAL
BLANK

3
ASSEMBLY

The brake is shipped from the factory completely assembled and ready to install on the vehicle, except for the 2-858 and 2-912 brakes which are shipped disassembled at customer request. Assemble the 2-858 and 2-912 brakes in reverse order of the applicable exploded view and parts breakdown.

CAUTION

Do not apply pressure to the brake when it is not in a drum.

INTENTIONAL
BLANK

4
MAINTENANCE

4.1 PREVENTATIVE MAINTENANCE:

4.1.1 Inspect daily to assure that visible frame bolts have not loosened and to check for broken retracting springs. At the end of each shift, check drums for overheating and open the bleeders to check for trapped air or vaporized oil. If these conditions exist, refer to the trouble shooting chart below.

4.1.2 Frequent inspection should also be made to check lining wear. To check wear, apply brakes and look into the spring openings in the brake frames. If the brake shoes tend to shear the springs at a point between the frame and shoes (approximately 1/8 in. space between the top of the spring opening and the ledge of the shoe upon which the spring rests), travel is at a maximum. Replace linings and springs before this condition is reached. Continued operation in this condition will damage the brake structure.

4.2 HYDRAULIC OIL: Use only mineral oils to specifications outlined below to actuate B.F. Goodrich expander tube brakes.

WARNING

Do not use other fluids, especially avoid using automotive brake fluid as it is destructive to brakes, master cylinders, and adjusters.

PHYSICAL PROPERTIES	
Saybolt Universal Viscosity at 210°F.	43 seconds, minimum
Saybolt Universal Viscosity at 100°F.	145 to 155 seconds
Viscosity Index (Dean and Davis)	90 minimum
Pour Point (ASTM)	-25°F. minimum
Color (ASTM)	No. 2 or Lighter
Neutralization Number (ASTM)	0.10 or less
Copper Strip Test (Corrosion) 3 Hours at 212°F.	Negative

PHYSICAL PROPERTIES (Continued)	
Emulsion Test at 130°F., Distilled Water:	
Time for Complete Separation	30 minutes, maximum
Rust Test (ASTM) Distilled Water	No Rust
Oxidation Test (ASTM):	
Time to Neutralization Number 2.0	1500 hours, minimum
Foam Test (ASTM):	
Sequence 1, 2, 3 ML Foam After 10 Minutes Standing	None
Flash Point	370°F. minimum
Additives	Additives harmful to Buna N and neoprene rubber compounds will not be used.
Aniline Point	200°F. or more

4.3 TROUBLE SHOOTING:

Note

This chart covers trouble shooting for master cylinders and in-line adjusters used with expander tube brakes as well as the expander tube brakes covered in this manual.

AIR OVER HYDRAULIC ACTUATING SYSTEM

TROUBLE	POSSIBLE CAUSE	CORRECTION
Brakes dragging or running hot.	Air trapped in hydraulic actuating system.	Bleed system and brake in accordance with paragraph 4.4.
	Residual air pressure at rotochamber.	Check air system to insure zero pressure at rotochamber.
	Rotochamber retraction obstructed.	Inspect rotochamber to insure full retraction.
	Master cylinder power piston not retracting.	Inspect cylinder bore and power piston OD for burrs, chips, or other obstruction and correct.
	Master cylinder floating piston not retracting.	Inspect cylinder bore and floating piston OD for burrs, chips, or other obstruction and correct.
	Return spring between master cylinder pistons out of engagement.	Seat spring in groove on end of each piston.
	Broken or flattened brake retracting spring.	Compare spring arch with new spring and replace flattened or broken springs with complete set of twelve.
	Improper oil in system causing vaporization in brake.	Purge system, replace all rubber parts and refill with hydraulic oil as specified in paragraph 4.2.

AIR OVER HYDRAULIC ACTUATING SYSTEM (Continued)

TROUBLE	POSSIBLE CAUSE	CORRECTION
Brakes dragging or running hot. (Continued)	Master cylinder adjuster not working.	Remove floating piston assembly and insert blunt tool into small hole in face of piston and push inward. If definite movement cannot be obtained, replace with new part.
Brakes will not apply.	Brakes not bled of air allowing master cylinder to bottom.	Bleed system and brakes in accordance with paragraph 4.4.
	Reservoir located below master cylinder restricting oil flow.	Relocate reservoir above master cylinder to allow gravity feed.
	Feed-line from reservoir restricted or too small.	Insure free flow using 5/16 min. ID line without restriction.
	Master cylinder power piston not retracting to seat, closing off inlet.	Adjust rotochamber push rod attachment as outlined in Manual 6.
	Master cylinder power piston stuck in cylinder bore.	Free piston by removing obstruction. If cylinder wall or piston OD is excessively damaged, replace with new part.
	Vacuum trapped in reservoir.	Insure vent air passage in reservoir.
	Insufficient oil reserve.	Keep reservoir filled with hydraulic oil as specified in paragraph 4.2.
	Check valve in master cylinder power piston not closing.	Insure free motion of ball in check valve and remove all foreign particles.
	Master cylinder adjuster not working.	Remove floating piston assembly and blow with mouth into small hole in face of piston. If air passes, replace with new part.
	Packing on master cylinder power piston not sealing.	Replace packing with new B.F.Goodrich replacement part.
	Supply line leaking.	Check lines and fittings to insure sealing.
	Air pressure inadequate.	Air pressure at rotochamber should be not less than 80 psi with brakes applied. Correct air system as required to obtain 80 psi min.
Master cylinder leaking at mounting bracket joint.	Packing not sealing.	Replace all master cylinder packings.
Brake leaking.	Expander tube nozzle packing not sealing.	Replace packings and inspect connector block nozzle hole for surface damage. If surface does not appear satisfactory for sealing, replace connector with new part.
	Expander tube leaking.	If tube shows definite leak, replace with a new tube.

STRAIGHT HYDRAULIC ACTUATING SYSTEM

TROUBLE	POSSIBLE CAUSE	CORRECTION
Brakes dragging or running hot.	Air trapped in hydraulic actuating system.	Bleed system and brakes in accordance with paragraph 4.5.
	Residual hydraulic pressure trapped in brake system.	Inspect control valve to insure complete release.
	In-line adjuster not working.	Remove floating piston assembly and insert blunt tool into small hole in face of piston and push inward. If definite movement cannot be obtained, replace with a new part.
	Broken or flattened brake retracting springs.	Compare spring arch with new spring and replace flattened or broken springs with complete set of twelve.
	Improper oil in system causing vaporization in brakes.	Purge system, replace all rubber parts, and refill with hydraulic oil as specified in paragraph 4.2.
Brakes will not apply.	Control valve not letting oil pressure enter brakes.	Insure proper oil pressure in brake supply line.
	In-line adjuster not working.	Remove the floating piston assembly and insert blunt tool into small hole in face of piston and push inward. If definite movement cannot be obtained, replace with a new part.
	Supply line leaking.	Check lines and fittings to insure sealing.
Brake leaking.	Expander tube nozzle packing not sealing.	Replace packings and inspect connector block nozzle hole for surface damage. If surface does not appear satisfactory for sealing, replace the connector with a new part.
	Expander tube leaking.	If tube shows definite leak, replace with a new tube.

4.4 MASTER CYLINDER BRAKE SYSTEM BLEEDING PROCEDURE:

4.4.1 Fill reservoir with hydraulic oil as specified in paragraph 4.2.

Note

Keep reservoir full throughout the bleeding procedure.

4.4.2 Hold brake pedal down and open bleeder valve to vent air from the master cylinder. Close bleeder valve after fluid stops draining and release brake pedal.

4.4.3 Repeat cycle after waiting two minutes to let master cylinder replenish the fluid supply.

4.4.4 Actuate brake pedal with bleeder valve closed, hold pressure for 10 seconds, then release pedal. Allow two minutes for replenishing fluid supply then repeat the cycle.

4.4.5 Repeat paragraph 4.4.2 to vent air from the brake side of the automatic adjuster in the master cylinder and from the expander tube. Repeat venting cycle until no air can be detected escaping from the bleeder valve. Allow two minutes between cycles to replenish fluid supply.

4.4.6 Repeat paragraph 4.4.4 until brake shoes contact the drum. Test by holding brakes against engine power. If brakes fail to hold, refer to paragraph 4.5.

4.4.7 After operating vehicle for one hour, open bleeder valve with brakes released, to vent air which may have worked to the top of the system during vehicle operation.

4.5 STRAIGHT HYDRAULIC BRAKE SYSTEM BLEEDING PROCEDURE:

4.5.1 With engine idling, open each bleeder valve and depress brake pedal until oil flows free of air.

Note

Use bleeder hose to keep oil off braking surfaces. Bleed each valve separately.

4.5.2 Close bleeder valves after complete venting of air from brake lines is assured.

Note

Approximately one-half gallon of fluid should be flushed from each bleeder valve.

4.5.3 Apply brakes, holding pedal down for at least 10 seconds. Repeat this cycle three times, allowing 30 seconds between applications.

4.5.4 Release brakes and open all four bleeder valves located on the brake side of each of the automatic adjusters. Bleed air from fluid until flow stops then close bleeder valves.

4.5.5 Repeat paragraphs 4.5.3 and 4.5.4 until no air can be detected escaping from the fluid.

4.5.6 Repeat the entire bleeding procedure if the brakes show any evidence of dragging or overheating during the first few hours of operation after bleeding.

INTENTIONAL
BLANK

5
OVERHAUL

5.1 DISASSEMBLY:

5.1.1 Hold the brake either vertically or horizontally so that both frames (6) are exposed.

5.1.2 Place a screwdriver against the hook of the retracting spring (1) and, with a sharp blow, disengage the spring from the frame (6). Drive the springs through the brake and out of the assembly. On brakes of seven-in. width, this method may damage the lining blocks. If it is desired to salvage the lining blocks of seven-in. wide brakes, use a curved plate (an old or extra brake shoe will serve) and a C-clamp to support the lining as shown in Figure 1.

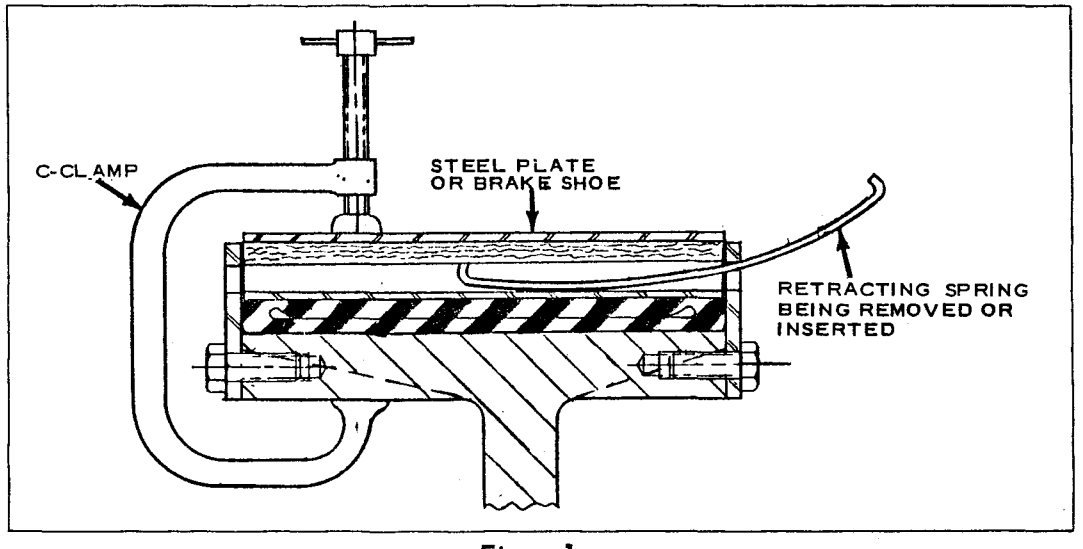

Figure 1.

5.1.3 After all retracting springs have been removed, lift the block and shoe assemblies (2) from their position.

Note

Brakes may be relined without further disassembly. Relining should be done in full sets of 12 linings only, and each block should be installed with a new retracting spring and shield. If old springs are re-used, they may break because of fatigue. Before relining brakes, remove all dirt from between the expander tube and the side frames so that the tube will have space to flatten out again. Follow relining procedure in paragraph 5.5.6.1. Shields should be reinstalled as indicated in paragraph 5.5.6.1.

5.1.4 Remove nuts (5A), bolts (4) and washers or bushings (5) if used. Bushings may be removed by driving with a drift pin. Disassemble the frame assemblies (6) from the torque plate (10).

5.1.5 Slip the expander tube (7) and inlet connection (8) from the torque plate (10).

5.1.6 Remove the inlet connection from the nozzle of the expander tube.

5.2 INSPECTION:

5.2.1 Inspect the expander tube for signs of leakage, excessive heat as shown by brittleness, or loose fabric or rubber around the base of the nozzle that might permit leakage of fluid. Discard expander tube nozzle packings.

5.2.2 Inspect the brake block and shoe assemblies (2) for damage and separation of lining from shoe.

5.2.3 The friction or braking surface of the lining may develop ridges and grooves. The leading edge, that which is in the direction of rotation, tends to wear slightly uneven. Either of these conditions is normal.

5.2.4 Inspect frame assembly (6) for unusual wear or distortion on the torque bars, cracks at the welds of the torque bars, and for cracks or elongation of the frame bolt holes. Frames used with bushings should have no elongation of the bolt holes. Frames of 26 in. dia. brakes should not have more than 1/16 in. elongation of the bolt holes. All other brake frames should not be used when the elongation of the bolt holes exceeds 1/32 in. Frame bolt hole elongation is an indication that frame bolts have not remained tight during operation. Check frame bolt torque carefully during brake reassembly.

5.2.5 Check for broken or distorted retracting springs (1).

5.2.6 Inspect the inlet connection block (8) bore where packings (9) seal for scratches and grooves. Replace if bore is scratched or grooved.

5.3 REPAIR:

5.3.1 If any linings have come loose from the shoe, re-rivet them.

5.3.2 Replace frame assembly (6) if cracked, broken, or distorted. In an emergency, end drill and *V* the crack; weld with AWS7016 rod. Replace repaired frames at first opportunity.

5.4 REPLACEMENT:

5.4.1 Replace expander tube (7) if cracked, charred, or if the nozzle has been leaking. Expander tubes are expendable parts and they will not last the life of the vehicle. Life is a function of the service conditions as with a tire. Through experience with each vehicle, operators can determine the useful service life of the expander tubes. To avoid excessive down time, it is suggested that the tubes be replaced on a schedule established by service experience.

5.4.2 Replace brake lining if worn beyond the usable thickness as specified in paragraph 4.1.2, if torque bar forms ridges on the face of the lining that may cause the block and shoe assemblies to hang up, or if excessive cracking or chipping is evident. New linings are available in brake relining kits (see applicable parts breakdown). Do not intermix new and used linings.

5.4.3 Replace the frames (6) if inspection in accordance with paragraph 5.2.4 requires replacement.

5.4.4 Replace retracting springs (1) if they are broken or (2) distorted or (3) when new linings are installed to replace worn out linings. Replace all twelve springs to insure uniform retraction. New springs are available in brake relining kits (see applicable parts breakdown).

5.4.5 Replace the packing (9) in the expander tube nozzle.

5.4.6 Replace expander tube shields if cracked or broken or if lining is being renewed. New shields are available in brake relining kits (see applicable parts breakdown).

5.5 REASSEMBLY:

5.5.1 Install two new packings (9) on the expander tube nozzle, lubricating them with vaseline before installation to avoid damaging the packing.

5.5.2 Lubricate inlet connection (8) nozzle bore and insert the nozzle of the expander tube (7).

CAUTION

Be sure that the inlet connection faces the vehicle and that the inlet connection drum bolt clearance notch where applicable, faces the wheel side of the torque plate.

5.5.3 Slip the expander tube (7) and the inlet connection (8) over the torque plate (10).

5.5.4 Slide the frames (6) over the expander tube and torque plate, making sure that the inlet connection lines up with the frame cut-out and all frame bolt holes line up. If misalignment occurs, the frame is on backward and should be turned around.

5.5.5 Install the frame bolts (4) and washers or bushings (5) where used. Dry torque self-locking place bolts in accordance with the chart below. If through bolts and nuts (5A) are used, the nuts should be torqued to the torque values listed in the chart, and the threads lubricated with engine oil.

BRAKE DIA. IN.	BOLT DIA. IN.	DRY BOLT TORQUE (LB.FT.)		NUT TORQUE (lb.ft.) (Threads Lubricated with Engine Oil)
		Mild Steel With Lockwasher	Self Locking Without Lockwasher	
17¼	3/8	20 to 25	38 to 42	23 to 26
20¼	1/2	55 to 60	95 to 100	56 to 60
22	1/2	55 to 60	95 to 100	56 to 60
26	5/8	95 to 100	170 to 185	115 to 125

5.5.6 Assemble block and shoe assemblies (2), springs (1), and shields (3) by either of the two methods below:

5.5.6.1 Applicable to 3, 4, and 5 in. Wide Brakes of Any Dia.: Place a block and shoe assembly (2) between the torque bars. Insert retracting spring inserting tool (Part No. 114-38) through the frame assembly spring window. Insert a retracting spring (1) through the opposite window so that the tool blade is between the spring and the brake lining material. Partially insert the spring far enough to

hold the lining assembly in place. Apply a smear of Permatex No. 2 or equivalent across the face of the expander tube shield to be placed next to the expander tube. Slip the shield approximately one in. under the steel shoe. Install second lining assembly in same manner as the first except drive retracting spring (1) fully into position. Place shield for next lining assembly. Continue this procedure until all lining assemblies have been installed. Then remove the first lining assembly which was installed and hold in place with the retracting spring and install shield for this shoe. Replace lining assembly and drive spring into place.

Note

Replace all shields when lining is being replaced. Relining kits used for brake repair contain 12 shields (see applicable parts breakdown).

5.5.6.2 On 7 in. wide brakes of all dia., it is suggested that the method shown in Figure 1 be used to install retracting springs to avoid lining damage. Install shields in accordance with paragraph 5.5.6.1.

6
SPARES

6.1 SPARES RECOMMENDED FOR AVERAGE CONSTRUCTION SERVICE FOR 10 BRAKE ASSEMBLIES ON YEARLY OVERHAUL BASIS:

INDEX NO.	ITEM	QUANTITY
-1	SPRING, Retracting	*
-2	BLOCK AND SHOE ASSEMBLY	*
-3	SHIELD	*
-4	BOLT, Frame	56
-5	WASHER (when used)	56
-5	BUSHING (when used)	56
-5A	NUT (when used)	56
-6	FRAME ASSEMBLY	4
-7	EXPANDER TUBE ASSEMBLY	10
-8	INLET CONNECTION	2
-9	PACKING	20
-10	TORQUE PLATE	1

*These parts are available in brake relining kits listed at the end of each parts breakdown. Each kit includes 12 block and shoe assemblies, shields, and retracting springs.

INTENTIONAL
BLANK

7
PARTS CATALOG

7.1 In the *Used on Code* column, a code letter is placed after the part to designate the brake in which the part is used. If no code letter appears in the *Used on Code* column, that part is used in all assemblies listed.

7.2 The availability column shows the latest parts that may be ordered for spares. Notes at the bottom of each parts breakdown list explain interchangeability with discontinued parts.

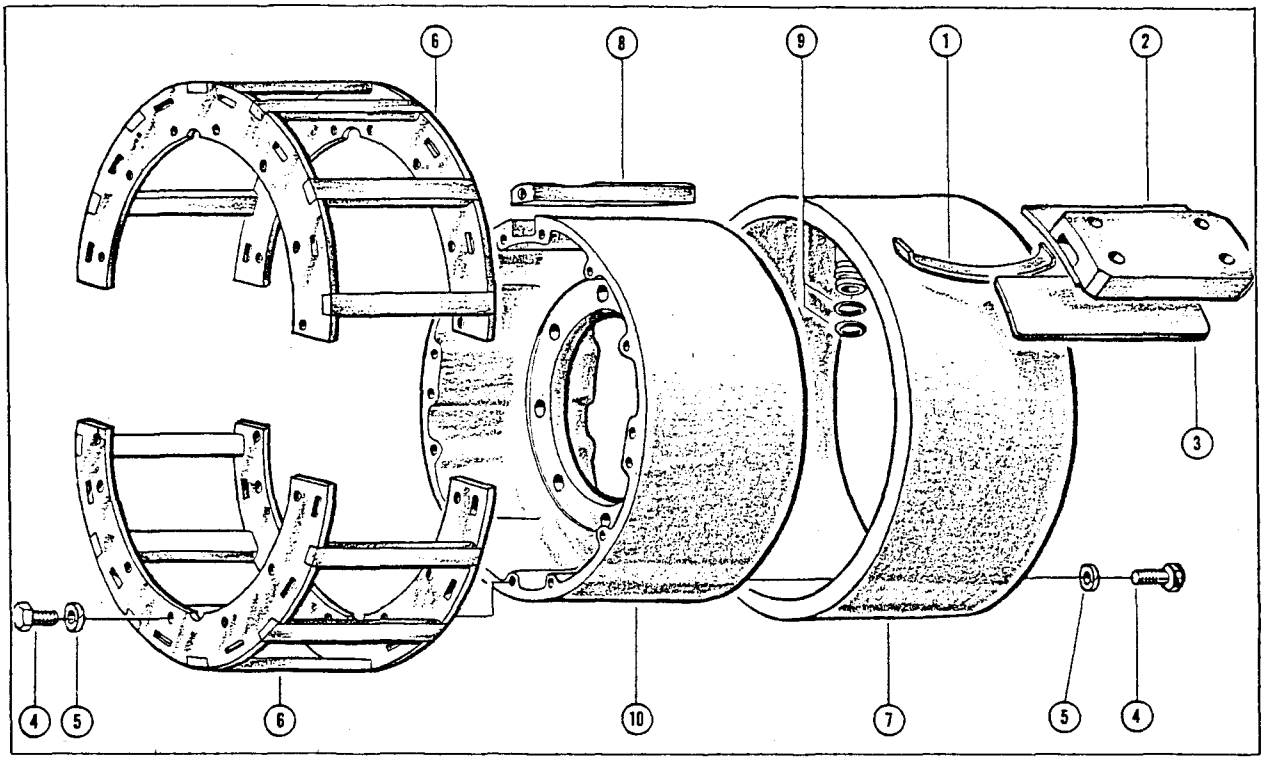

Figure 2. Expander Tube Brake

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Availability
2-	2-758	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
**-4	BOLT	. BOLT, 0.375-16 UNC-2A Thd.	28		
**-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
**-5	WASHER	. WASHER, Spring lock, 0.375, medium	28		
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-276	. INLET CONNECTION	1		
*-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-88	. TORQUE PLATE.....	1		√

* These parts are interchangeable and should be replaced by the latest part number (as indicated in the availability column) when necessary.

** 43-491 Bolt replaces the regular type 0.375 bolt and lockwasher previously furnished.

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-771	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
**-4	BOLT	. BOLT, 0.375-16 UNC-2A Thd.	28		
**-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
**-5	WASHER	. WASHER, Spring lock, 0.375, medium	28		
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-278	. INLET CONNECTION	1		
*-8	57-301	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-91	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-776	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
**-4	BOLT	. BOLT, 0.375-16 UNC-2A Thd.	28		
**-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
**-5	WASHER	. WASHER, Spring lock, 0.375, medium	28		
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-276	. INLET CONNECTION	1		
*-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-96	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns listed on this page.

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced with the latest part number (as indicated by the availability column) when necessary.

** 43-491 Bolt replaces the regular type 0.375 bolt and lockwasher previously furnished.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-777	BRAKE, EXPANDER TUBE, 17¼ x 4	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE	12		√
**-4	BOLT	. BOLT, 0.375-16 UNC-2A Thd.	28		
**-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.	28		√
**-5	WASHER	. WASHER, Spring lock, 0.375, medium	28		
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-276	. INLET CONNECTION	1		
*-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-97	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-791	BRAKE, EXPANDER TUBE, 17¼ x 4	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE	12		√
-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-283	. INLET CONNECTION	1		√
*-8	57-297	. INLET CONNECTION	1		
*-8	57-300	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-110	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.
** 43-491 Bolt replaces the regular type 0.375 bolt and lockwasher previously furnished.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-807	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-283	. INLET CONNECTION	1		
*-8	57-297	. INLET CONNECTION	1		
*-8	57-300	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-96	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-822	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
*-2	8-119	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE	12		√
-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-276	. INLET CONNECTION	1		
*-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-130	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Availability
2-	2-862	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
*-4	43-491	. BOLT, Self locking, 0.375-16 UNC-2A Thd.....	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-276	. INLET CONNECTION	1		
*-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-153	. TORQUE PLATE	1		√

* **These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.**

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Availability
2-	2-879	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-491	. BOLT, Self-locking, 0.375-16 UNC Thd.....	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSY.....	1		√
-8	57-300	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-160	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-886	BRAKE, EXPANDER TUBE, 17¼ x 4	1		
-1	21-193	. SPRING, Retracting	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE	12		√
-4	43-491	. BOLT, Self-locking, 0.375-16 UNC Thd	28		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSY.	1		√
-8	57-306	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	1		√
-10	184-162	. TORQUE PLATE	1		√

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-733	BRAKE, EXPANDER TUBE, 20¼ x 3	1		
-1	21-192	. SPRING, Retracting	12		√
-2	8-118-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-151	. SHIELD, EXPANDER TUBE	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd	28		√
-6	59-51	. FRAME ASSEMBLY	2		√
-7	22-231	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-275	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-66	. TORQUE PLATE	1		√

328-32 Parts Kit, Brake Relining, 20¼ x 3, Standard Drum Size
328-23 Parts Kit, Brake Relining, 20¼ x 3, 0.125 Oversize Drum
328-24 Parts Kit, Brake Relining, 20¼ x 3, 0.250 Oversize Drum
328-25 Parts Kit, Brake Relining, 20¼ x 3, 0.275 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
2-	2-734	BRAKE, EXPANDER TUBE, 20¼ x 5	1	A	
2-	2-734-1	BRAKE, EXPANDER TUBE, 20¼ x 5		B	
*-1	21-186	. SPRING, Retracting	12		√
*-1	21-190	. SPRING, Retracting	12	A	
*-2	8-112	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
**-4	43-435	. BOLT	18		
**-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd	28		√
**-5	80-257	. WASHER, LOCK	28		
**-5	80-334	. WASHER, FLAT	28		√
-6	59-52	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-69	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
2-	2-738	BRAKE, EXPANDER TUBE, 20¼ x 5	1	A	
2-	2-738-1	BRAKE, EXPANDER TUBE, 20¼ x 5	1	B	
*-1	21-186	. SPRING, Retracting	12		√
*-1	21-190	. SPRING, Retracting	12	A	
*-2	8-112	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd	28		√
-5	80-334	. WASHER, FLAT	28		√
-6	59-52	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-72	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

** 43-487 Self locking bolt and 80-334 washer replace 43-435 bolt and 80-257 lockwasher.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-831	BRAKE, EXPANDER TUBE, 20¼ x 5.....	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd.	28		√
-6	59-64	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-139	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-851	BRAKE, EXPANDER TUBE, 20¼ x 5.....	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd.....	28		√
-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.043 .	28		√
-6	59-52	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-147	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-853	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd	28		√
-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.043	28		√
-6	59-52	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-129	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-855	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd	28		√
-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.043	28		√
-6	59-52	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-150	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-704	BRAKE, EXPANDER TUBE, 20¼ x 7.....	1	A	
2-	2-704-2	BRAKE, EXPANDER TUBE, 20¼ x 7.....	1	B	
*-1	21-189	. SPRING, Retracting	12	A	
*-1	21-189-1	. SPRING, Retracting	12		√
*-2	8-111	. BLOCK AND SHOE ASSEMBLY	12	A	
*-2	8-111-1	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-111-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
**-4	43-435	. BOLT	28	A	
**-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd	28		√
**-5	80-257	. WASHER, LOCK	28	A	
-6	59-48	. FRAME ASSEMBLY	2		√
-7	22-226	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-266	. INLET CONNECTION	1		√
+-	206-22	. SHIM-INLET CONNECTION (Use as required to bring top of inlet flush with torque plate) ...	1	B	√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-68	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-839	BRAKE, EXPANDER TUBE, 20¼ x 7.....	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-111-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd	28		√
-6	59-48	. FRAME ASSEMBLY	2		√
-7	22-226	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-295	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-142	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-9-1 Parts Kit, Brake Relining, 20¼ x 7, Standard Drum Size
328-4-1 Parts Kit, Brake Relining, 20¼ x 7, 0.125 Oversize Drum
328-5-1 Parts Kit, Brake Relining, 20¼ x 7, 0.250 Oversize Drum
328-6-1 Parts Kit, Brake Relining, 20¼ x 7, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.
** 43-487 Self locking bolt replaces 43-435 bolt and 80-257 lockwasher.
+ Not illustrated.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-842	BRAKE, EXPANDER TUBE, 22 x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-160	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd.	28		√
-6	59-65	. FRAME ASSEMBLY	2		√
-7	22-240	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-303	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-144	. TORQUE PLATE	1		√

328-35 Parts Kit, Brake Relining, 22 x 5, Standard Drum Size
328-36 Parts Kit, Brake Relining, 22 x 5, 0.125 Oversize Drum
328-37 Parts Kit, Brake Relining, 22 x 5, 0.250 Oversize Drum
328-38 Parts Kit, Brake Relining, 22 x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-669-2	BRAKE, EXPANDER TUBE, 22 x 7.....	1	A	
2-	2-669-3	BRAKE, EXPANDER TUBE, 22 x 7.....	1	B	
2-	2-669-5	BRAKE, EXPANDER TUBE, 22 x 7.....	1	C	
*-1	21-189	. SPRING, Retracting	12	A,B	
*-1	21-189-1	. SPRING, Retracting	12		√
*-2	8-109	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
**-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd.	28		√
**-4	43-435	. BOLT, 0.500-13 UNC Thd.....	28	B,C	
**-5	80-257	. WASHER, Lock	28	B,C	
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-65	. TORQUE PLATE	1	A,B	√
-10	184-74	. TORQUE PLATE	1	C	√

328-33 Parts Kit, Brake Relining, 22 x 7, Standard Drum Size
328-26 Parts Kit, Brake Relining, 22 x 7, 0.125 Oversize Drum
328-27 Parts Kit, Brake Relining, 22 x 7, 0.250 Oversize Drum
328-28 Parts Kit, Brake Relining, 22 x 7, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

** 43-487 Self locking bolt replaces 40-435 bolt and 80-257 lockwasher.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-732	BRAKE, EXPANDER TUBE, 22 x 7.....	1	A	
2-	2-732-2	BRAKE, EXPANDER TUBE, 22 x 7.....	1	B	
*-1	21-189	. SPRING, Retracting	12		
*-1	21-189-1	. SPRING, Retracting	12		√
*-2	8-109	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
**-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd.	28		√
**-4	43-435	. BOLT, 0.500-13 UNC Thd.	28		
**-5	80-257	. WASHER, Lock	28		
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-65	. TORQUE PLATE	1		√

328-33 Parts Kit, Brake Relining, 22 x 7, Standard Drum Size
328-26 Parts Kit, Brake Relining, 22 x 7, 0.125 Oversize Drum
328-27 Parts Kit, Brake Relining, 22 x 7, 0.250 Oversize Drum
328-28 Parts Kit, Brake Relining, 22 x 7, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-809	BRAKE, EXPANDER TUBE, 22 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd.....	28		√
*-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.093 .	28		√
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-123	. TORQUE PLATE	1		√

328-33 Parts Kit, Brake Relining, 22 x 7, Standard Drum Size
328-26 Parts Kit, Brake Relining, 22 x 7, 0.125 Oversize Drum
328-27 Parts Kit, Brake Relining, 22 x 7, 0.250 Oversize Drum
328-28 Parts Kit, Brake Relining, 22 x 7, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

** 43-487 Self locking bolt replaces 40-435 bolt and 80-257 lockwasher.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-810-1	BRAKE, EXPANDER TUBE, 22 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. PLACE BOLT, Self locking, 0.500-13 UNC Thd.	28		√
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-44	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-812-1	BRAKE, EXPANDER TUBE, 22 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd.....	28		√
-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.093 .	28		√
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-126	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-33 Parts Kit, Brake Relining, 22 x 7, Standard Drum Size
328-26 Parts Kit, Brake Relining, 22 x 7, 0.125 Oversize Drum
328-27 Parts Kit, Brake Relining, 22 x 7, 0.250 Oversize Drum
328-28 Parts Kit, Brake Relining, 22 x 7, 0.375 Oversize Drum

* **These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.**

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-813-1	BRAKE, EXPANDER TUBE, 22 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-109-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-487	. BOLT, Self locking, 0.500-13 UNC Thd.....	28		√
-5	80-334	. WASHER, FLAT, 1.062 OD x 0.531 ID x 0.093 .	28		√
-6	59-43	. FRAME ASSEMBLY	2		√
-7	22-222	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-294	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-125	. TORQUE PLATE	1		√

328-33 Parts Kit, Brake Relining, 22 x 7, Standard Drum Size
328-26 Parts Kit, Brake Relining, 22 x 7, 0.125 Oversize Drum
328-27 Parts Kit, Brake Relining, 22 x 7, 0.250 Oversize Drum
328-28 Parts Kit, Brake Relining, 22 x 7, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-794	BRAKE, EXPANDER TUBE, 26 x 5	1	A	
2-	2-794-1	BRAKE, EXPANDER TUBE, 26 x 5	1	B	
2-	2-794-2	BRAKE, EXPANDER TUBE, 26 x 5	1	C	
*-1	21-190	. SPRING, Retracting	12	A	
*-1	21-190-1	. SPRING, Retracting	12		√
+-	60-252	. SPACER, SPRING.....	12	A	
*-2	8-116	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-116-1	. BLOCK AND SHOE ASSEMBLY	12		
*-2	8-116-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE.....	12		√
*-4	BOLT	. BOLT, 0.625-11 UNC Thd.....	28		
*-4	43-492	. PLACE BOLT, Self locking, 0.625-11 UNC Thd	28		√
*-5	WASHER	. WASHER, Lock, Med., 0.62 Dia.....	28		
*-5	80-331	. WASHER, FLAT, 1.31 OD x 0.656 ID x 0.093...	28		√
-6	59-49	. FRAME ASSEMBLY	2		√
-7	22-229	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-292	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-112	. TORQUE PLATE	1		√

328-31 Parts Kit, Brake Relining, 26 x 5, Standard Drum Size
328-20 Parts Kit, Brake Relining, 26 x 5, 0.125 Oversize Drum
328-21 Parts Kit, Brake Relining, 26 x 5, 0.250 Oversize Drum
328-22 Parts Kit, Brake Relining, 26 x 5, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated by the availability column) when necessary.

+ Not illustrated. Do not use when the 21-190-1 spring is used as part of the brake assembly.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-799-2	BRAKE, EXPANDER TUBE, 26 x 5	1		
-1	21-190-1	. SPRING, Retracting	12		√
-2	8-116-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-492	. PLACE BOLT, Self locking, 0.625-11 UNC Thd.	28		√
-5	80-331	. WASHER, FLAT, 1.31 OD x 0.656 ID x 0.093Dia.	28		√
-6	59-49	. FRAME ASSEMBLY	2		√
-7	22-229	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-282	. INLET CONNECTION	1		
*-8	57-292	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-114	. TORQUE PLATE	1		√

328-31 Parts Kit, Brake Relining, 26 x 5, Standard Drum Size
328-20 Parts Kit, Brake Relining, 26 x 5, 0.125 Oversize Drum
328-21 Parts Kit, Brake Relining, 26 x 5, 0.250 Oversize Drum
328-22 Parts Kit, Brake Relining, 26 x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-701	BRAKE, EXPANDER TUBE, 26 x 7	1	A	
2-	2-701-2	BRAKE, EXPANDER TUBE, 26 x 7	1	B	
2-	2-701-4	BRAKE, EXPANDER TUBE, 26 x 7	1	C	
*-1	21-189	. SPRING, Retracting	12	A	
*-1	21-189-1	. SPRING, Retracting	12		√
*-2	8-113	. BLOCK AND SHOE ASSEMBLY	12	A	
*-2	8-113-1	. BLOCK AND SHOE ASSEMBLY	12	A,B	
*-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
**-4	43-436	. BOLT	28	A,B	
**-4	43-493	. PLACE BOLT, Self locking, 0.625-18 UNF Thd.	28		√
**-5	80-255	. WASHER, LOCK	28	A,B	
**-5	80-331	. WASHER, FLAT	28		√
-6	59-46	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-293	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
*-10	184-39	. TORQUE PLATE	1	A,B	
*-10	184-39-1	. TORQUE PLATE	1		√

328-10-1 Parts Kit, Brake Relining, 26 x 7, Standard Drum Size
328-1-1 Parts Kit, Brake Relining, 26 x 7, 0.125 Oversize Drum
328-2-1 Parts Kit, Brake Relining, 26 x 7, 0.250 Oversize Drum
328-3-1 Parts Kit, Brake Relining, 26 x 7, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (as indicated in the availability column) when necessary.

** 43-493 Bolt and 80-331 washer replaces 43-436 bolt and 80-255 washer.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-806-2	BRAKE, EXPANDER TUBE, 26 x 7	1	A	
2-	2-806-3	BRAKE, EXPANDER TUBE, 26 x 7	1	B	
-1	21-189-1	. SPRING, Retracting	12		√
*-2	8-113-1	. BLOCK AND SHOE ASSEMBLY	12	A	
*-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
**-4	43-436	. BOLT	28	A	
**-4	43-493	. PLACE BOLT, Self locking, 0.625-18 UNF Thd.	28		√
**-5	80-255	. WASHER, LOCK	28	A	
**-5	80-331	. WASHER, FLAT	28		√
-6	59-46	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-293	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-121	. TORQUE PLATE	1		√

* These parts are interchangeable and should be replaced by the latest part number (as indicated in the availability column) when necessary.

** 43-493 Bolt and 80-331 washer replaces 43-436 bolt and 80-255 washer.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
2-	2-814-1	BRAKE, EXPANDER TUBE, 26 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-492	. BOLT, Self locking, 0.625-11 UNC Thd.....	28		√
-5	80-331	. WASHER, FLAT	28		√
-6	59-46	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
*-8	57-266	. INLET CONNECTION	1		
*-8	57-293	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-127	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-10-1 Parts Kit, Brake Relining, 26 x 7, Standard Drum Size
328-1-1 Parts Kit, Brake Relining, 26 x 7, 0.125 Oversize Drum
328-2-1 Parts Kit, Brake Relining, 26 x 7, 0.250 Oversize Drum
328-3-1 Parts Kit, Brake Relining, 26 x 7, 0.375 Oversize Drum

* These parts are interchangeable and should be replaced by the latest part number (57-293) when necessary.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
2-	2-816-1	BRAKE, EXPANDER TUBE, 26 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE	12		√
-4	43-492	. PLACE BOLT, Self locking, 0.625-11 INC Thd	28		√
-5	80-331	. WASHER, FLAT	28		√
-6	59-46	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-293	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-128	. TORQUE PLATE	1		√

328-10-1 Parts Kit, Brake Relining, 26 x 7, Standard Drum Size
328-1-1 Parts Kit, Brake Relining, 26 x 7, 0.125 Oversize Drum
328-2-1 Parts Kit, Brake Relining, 26 x 7, 0.250 Oversize Drum
328-3-1 Parts Kit, Brake Relining, 26 x 7, 0.375 Oversize Drum

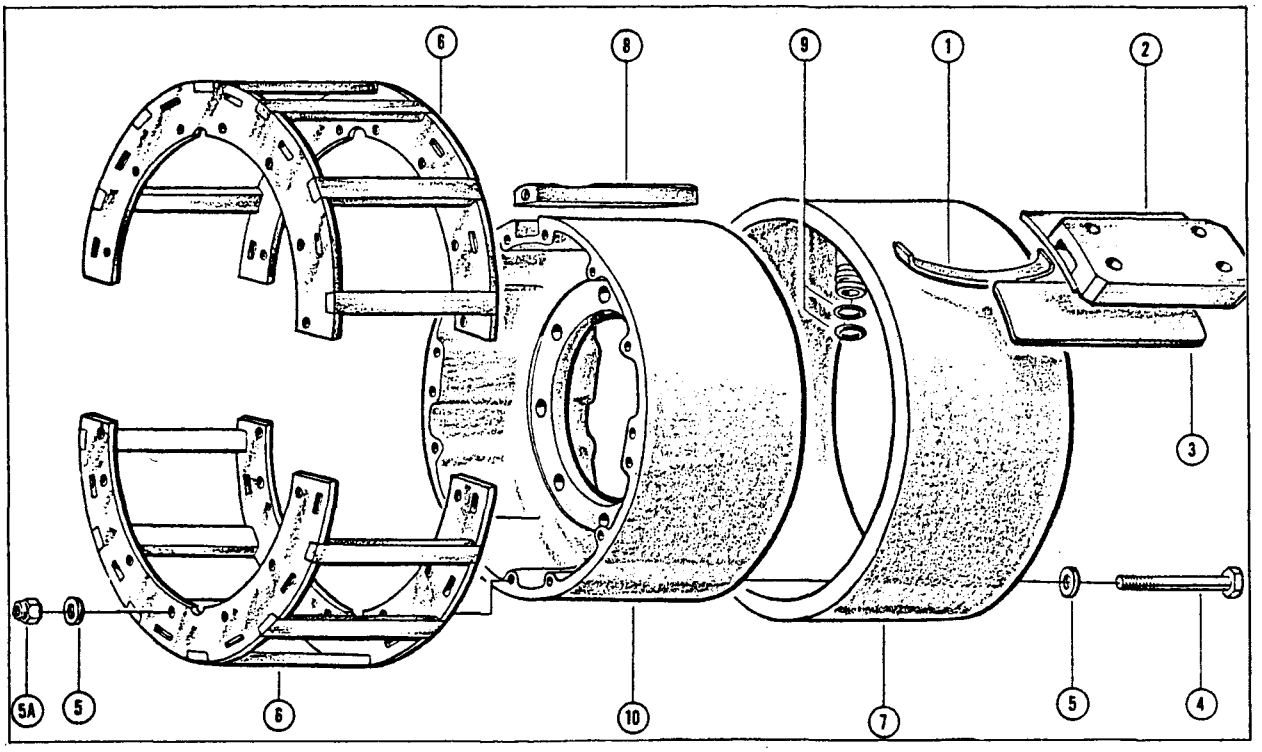

Figure 3. Expander Tube Brake

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
3-	2-881	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting.....	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-548	. BOLT, 0.375-24 UNF-2A Thd.	14		√
-5	80-356	. WASHER, FLAT	28		√
-5A	63-244	. NUT, Self locking, 0.375-24 UNF-2B Thd.	14		√
-6	59-56	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSY.....	1		√
-8	57-306	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-161	. TORQUE PLATE	1		√

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
3-	2-800	BRAKE, EXPANDER TUBE, 20¼ x 3	1		
-1	21-192	. SPRING, Retracting	12		√
-2	8-118-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-151	. SHIELD, EXPANDER TUBE	12		√
-4	AN8-41A	. BOLT, MACHINE, AIRCRAFT	14		√
-5	AN960-816	. WASHER, FLAT	28		√
-5A	AN363-820	. NUT, Self locking	14		√
-6	59-58	. FRAME ASSEMBLY	2		√
-7	22-231	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-302	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-115	. TORQUE PLATE	1		√

328-32 Parts Kit, Brake Relining, 20¼ x 3, Standard Drum Size
328-23 Parts Kit, Brake Relining, 20¼ x 3, 0.125 Oversize Drum
328-24 Parts Kit, Brake Relining, 20¼ x 3, 0.250 Oversize Drum
328-25 Parts Kit, Brake Relining, 20¼ x 3, 0.375 Oversize Drum

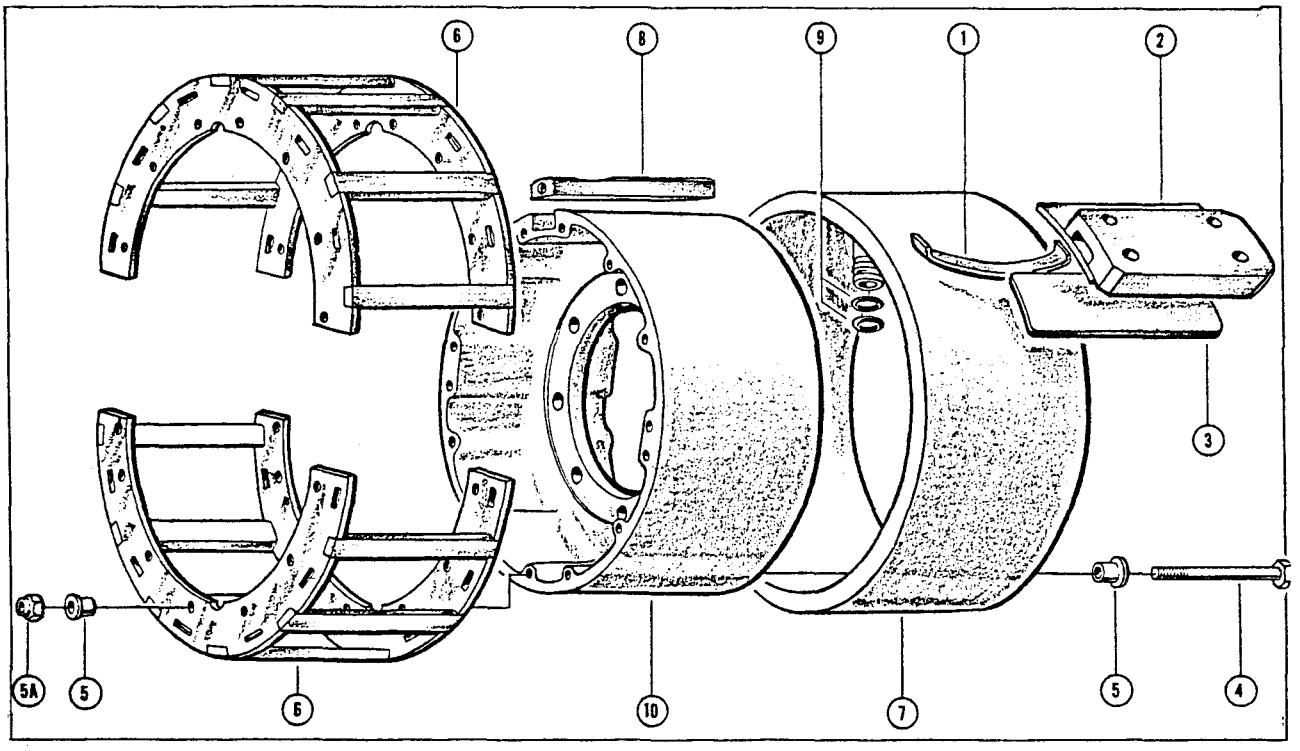

Figure 4. Expander Tube Brake

Figure & Index No.	Part Number	Description 1 2 3 4 56 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-776-1	BRAKE, EXPANDER TUBE, 17¼ x 4.....	1		
-1	21-193	. SPRING, Retracting	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE.....	12		√
-4	43-574	. BOLT, 0.375-24 UNF-2A Thd.	14		√
-5	26-118	. BUSHING	28		√
-5A	63-244	. NUT, Self locking, 0.375-24 UNF-2B Thd.	14		√
-6	59-56-1	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED.....	2		√
-10	184-96-1	. TORQUE PLATE	1		√

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
4-	2-777-1	BRAKE, EXPANDER TUBE, 17¼ x 4	1		
-1	21-193	. SPRING, Retracting	12		√
-2	8-119-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-152	. SHIELD, EXPANDER TUBE	12		√
-4	43-574	. BOLT, 0.375-24 UNF-2A Thd.	14		√
-5	26-118	. BUSHING	28		√
-5A	63-244	. NUT, Self locking, 0.375-24 UNF-2B Thd.	14		√
-6	59-56-1	. FRAME ASSEMBLY	2		√
-7	22-230	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-291	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-97-1	. TORQUE PLATE	1		√

328-30 Parts Kit, Brake Relining, 17¼ x 4, Standard Drum Size
328-17 Parts Kit, Brake Relining, 17¼ x 4, 0.125 Oversize Drum
328-18 Parts Kit, Brake Relining, 17¼ x 4, 0.250 Oversize Drum
328-19 Parts Kit, Brake Relining, 17¼ x 4, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-851-1	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF-2A Thd.	14		√
-5	26-105	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF-2B Thd.	14		√
-6	59-52-1	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-147-1	. TORQUE PLATE	1		√

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-853-1	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	2		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	2		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF-2A Thd.	14		√
-5	26-117	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF-2B Thd.	14		√
-6	59-52-1	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-129-1	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
4-	2-855-1	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF-2A Thd.	14		√
-5	26-117	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF-2B Thd.	14		√
-6	59-52-1	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-150-1	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
4-	2-898	BRAKE, EXPANDER TUBE, 20¼ x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-112-1	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	14		√
-4	43-516	. BOLT, 0.500-20 UNF-2A Thd.	14		√
-5	26-117	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF-2B Thd.	14		√
-6	59-52-1	. FRAME ASSEMBLY	2		√
-7	22-227	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-296	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-166	. TORQUE PLATE	1		√

328-29 Parts Kit, Brake Relining, 20¼ x 5, Standard Drum Size
328-11 Parts Kit, Brake Relining, 20¼ x 5, 0.125 Oversize Drum
328-12 Parts Kit, Brake Relining, 20¼ x 5, 0.250 Oversize Drum
328-13 Parts Kit, Brake Relining, 20¼ x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units Per Assy.	Usable On Code	Avail-ability
4-	2-856	BRAKE, EXPANDER TUBE, 22 x 5	1		
+-	43-519	. SCREW, MACHINE	8		√
+-	80-338	. WASHER, LOCK, Medium	8		√
+-	72-178	. SHIELD, DUST	2		√
-1	21-186	. SPRING, Retracting	12		√
-2	8-160	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF Thd.	14		√
-5	26-105	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF Thd.	14		√
-6	59-68	. FRAME ASSEMBLY	2		√
-7	22-240	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-304	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-151	. TORQUE PLATE	1		√

328-35 Parts Kit, Brake Relining, 22 x 5, Standard Size Drum
328-36 Parts Kit, Brake Relining, 22 x 5, 0.125 Oversize Drum
328-37 Parts Kit, Brake Relining, 22 x 5, 0.250 Oversize Drum
328-38 Parts Kit, Brake Relining, 22 x 5, 0.375 Oversize Drum

+ Not illustrated.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-857	BRAKE, EXPANDER TUBE, 22 x 5	1	A	
4-	2-857-1	BRAKE, EXPANDER TUBE, 22 x 5	1	B	
-1	21-186	. SPRING, Retracting	12		√
-2	8-160	. BLOCK AND SHOE ASSEMBLY	12	A	√
-2	8-177	. BLOCK AND SHOE ASSEMBLY	12	B	√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF Thd.	14		√
-5	26-105	. BUSHING	28	A	√
-5	26-117	. BUSHING	28	B	√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF Thd.	14		√
-6	59-68	. FRAME ASSEMBLY	2	A	√
-6	59-72	. FRAME ASSEMBLY	2	B	√
-7	22-240	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-304	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-152	. TORQUE PLATE	1	A	√
-10	184-152-1	. TORQUE PLATE	1	B	√

KITS FOR 2-857 BRAKE

328-35 Parts Kit, Brake Relining, 22 x 5, Standard Size Drum
328-36 Parts Kit, Brake Relining, 22 x 5, 0.125 Oversize Drum
328-37 Parts Kit, Brake Relining, 22 x 5, 0.250 Oversize Drum
328-38 Parts Kit, Brake Relining, 22 x 5, 0.375 Oversize Drum

KITS FOR 2-857-1 BRAKE

328-60 Parts Kit, Brake Relining, 22 x 5, Standard Size Drum
328-61 Parts Kit, Brake Relining, 22 x 5, 0.125 Oversize Drum
328-62 Parts Kit, Brake Relining, 22 x 5, 0.250 Oversize Drum
328-63 Parts Kit, Brake Relining, 22 x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-912	BRAKE, EXPANDER TUBE, 22 x 5	1		
-1	21-186	. SPRING, Retracting	12		√
-2	8-177	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-516	. BOLT, 0.500-20 UNF-2A Thd.	14		√
-5	26-117	. BUSHING	28		√
-5A	63-228	. NUT, Self locking, 0.500-20 UNF-2B Thd.	14		√
-6	59-72	. FRAME ASSEMBLY	2		√
-7	22-240	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-309	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
*-		. TORQUE PLATE	1		

328-60 Parts Kit, Brake Relining, 22 x 5, Standard Drum Size
328-61 Parts Kit, Brake Relining, 22 x 5, 0.125 Oversize Drum
328-62 Parts Kit, Brake Relining, 22 x 5, 0.250 Oversize Drum
328-63 Parts Kit, Brake Relining, 22 x 5, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-858	BRAKE, EXPANDER TUBE, 26 x 5	1		
-1	21-190-1	. SPRING, Retracting	12		√
-2	8-116-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-142	. SHIELD, EXPANDER TUBE	12		√
-4	43-517	. BOLT, 0.625-18 UNF Thd.	14		√
-5	26-106	. BUSHING	28		√
-5A	63-227	. NUT, Self locking, 0.625-18 UNF Thd.	14		√
-6	59-69	. FRAME ASSEMBLY	2		√
-7	22-229	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-309	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
*-		. TORQUE PLATE	1		

328-31 Parts Kit, Brake Relining, 26 x 5, Standard Drum Size
328-20 Parts Kit, Brake Relining, 26 x 5, 0.125 Oversize Drum
328-21 Parts Kit, Brake Relining, 26 x 5, 0.250 Oversize Drum
328-22 Parts Kit, Brake Relining, 26 x 5, 0.375 Oversize Drum

Note

These brakes are shipped unassembled in kit form.

* Not illustrated. Furnished by the customer.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-900	BRAKE, EXPANDER TUBE, 26 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE	12		√
-4	43-561	. BOLT, 0.625-18 UNF-2A Thd.	14		√
-5	26-106	. BUSHING	28		√
-5A	63-227	. NUT, Self locking, 0.625-18 UNF-2B Thd.	14		√
-6	59-71	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-293	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-167	. TORQUE PLATE	1		√

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-abi lity
4-	2-902	BRAKE, EXPANDER TUBE, 26 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE	12		√
-4	43-561	. BOLT, 0.625-18 UNF-2A Thd.	14		√
-5	26-106	. BUSHING	28		√
-5A	63-227	. NUT, Self locking, 0.625-18 UNF-2B Thd.	14		√
-6	59-71	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-266	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-168	. TORQUE PLATE	1		√

Note

Parts Kits listed below are applicable to both Parts Breakdowns on this page.

328-10-1 Parts Kit, Brake Relining, 26 x 7, Standard Drum Size
328-1-1 Parts Kit, Brake Relining, 26 x 7, 0.125 Oversize Drum
328-2-1 Parts Kit, Brake Relining, 26 x 7, 0.250 Oversize Drum
328-3-1 Parts Kit, Brake Relining, 26 x 7, 0.375 Oversize Drum

Figure & Index No.	Part Number	Description 1 2 3 4 5 6 7	Units PerAssy.	Usable On Code	Avail-ability
4-	2-906	BRAKE, EXPANDER TUBE, 26 x 7	1		
-1	21-189-1	. SPRING, Retracting	12		√
-2	8-113-2	. BLOCK AND SHOE ASSEMBLY	12		√
-3	72-137	. SHIELD, EXPANDER TUBE	12		√
-4	43-561	. BOLT, 0.625-18 UNF-2A Thd.	14		√
-5	26-106	. BUSHING	28		√
-5A	63-227	. NUT, Self locking, 0.625-18 UNF-2B Thd.	14		√
-6	59-71	. FRAME ASSEMBLY	2		√
-7	22-228	. EXPANDER TUBE ASSEMBLY	1		√
-8	57-266	. INLET CONNECTION	1		√
-9	68-280	. PACKING, PREFORMED	2		√
-10	184-171	. TORQUE PLATE	1		√

328-10-1 Parts Kit, Brake Relining, 26 x 7, Standard Drum Size
328-1-1 Parts Kit, Brake Relining, 26 x 7, 0.125 Oversize Drum
328-2-1 Parts Kit, Brake Relining, 26 x 7, 0.250 Oversize Drum
328-3-1 Parts Kit, Brake Relining, 26 x 7, 0.375 Oversize Drum