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CHAPTER 7 AIR BRAKE SYSTEM

7.1 General

All HEP single level converted cars are equipped with automatic air brakes. Most cars use the D-22 schedule, but the remainder use the 26-C. Refer to figure 7.1 for brake schedules.

Past features that helped to improve response time for D-22 schedules in application and release, such as electropneumatic devices, HSC equipment, or "straight air" have been removed. Speed governor control equipment, which regulated tread brake shoe forces at high speed for cars with cast iron shoes has also been removed. Similar features used with 26C equipment schedules have also been removed.

All conventional cars have been converted from cast iron to high friction composition brake shoes.

As part of the HEP conversion, a 1" main reservoir pipe was added. This line only passes through the car end to end, not connecting to any car equipment. Its function is to supply auxiliary air to other functions such as air springs and door seals on the Amfleet and Superliner equipment.

While some cars are tread brake, most are disc brake equipped. All disc units are now truck frame mounted, TFM. Many cars were originally C-frame, CF. They were converted to TFM during the HEP upgrade, to reduce maintenance requirements.

All disc brake cars are now equipped with the WABCO E-5 Decelostat wheel slide protection system. Tread brake cars have been wired for the E-5 system, but are equipped with neither the dump valves nor the E-5 control unit. Space for the controller was provided in the electric locker of each of these cars, for possible future installation.

As part of the 27 point trainline, two wires function to give brake applied and released light indication to the locomotive.

Aside from these modifications, and the fact that all cars are now set up for composition shoes, the brake system is similar to when the car was built.

Figure 7.1
BRAKE SCHEDULES

Car Numbers	Brake Type	Modification Kit	Control Valve	Relay Valve	Slack Adj	Cylinder Size	Cylinder F.S.	Press Emg
1126-27	Tread	---	D22					
1128-31	TFM	Yes	D22					
1132	Tread	---	D22					
1133-36	TFM	None	D22					
1137-38	Tread	---	D22					
1139	TFM	None	D22					
1140	Tread	---	D22					
1141-49	Tread	---	D22					
1150-58	Tread	---	D22					
1159-68	Tread	---	D22					
1169	Tread	---	D22					
1170-74	TFM	Yes	D22					
1610-17	Tread	---	D22					
1618	Tread	---	D22					
1619-21	Tread	---	D22					
1622-25	TFM	Yes	D22					
1626-27	Tread	---	D22					
1628-37	Tread	---	D22					
2050-56	Tread	---	D22					
2080-93	TFM	Yes	D22					
2080-93	TFM	Yes	D22					
2430-41	TFM	Yes	D22					
2442-56	TFM	Yes	D22					
2457-60	TFM	Yes	D22					
2461-68	TFM	Yes	D22					
2469-73	TFM	Yes	D22					

Figure 7.1
BRAKE SCHEDULES
(continued)

Car Numbers	Brake Type	Modification Kit	Control Valve	Relay Valve	Slack Adj	Cylinder Size	Cylinder F.S.	Press Emg
2474-78	Tread	---	D22					
2479-81	Tread	---	D22					
2482	TFM	Yes	D22					
2871-79	TFM	Yes	D22					
2880-94	TFM	Yes	D22					
2895-96	Tread	---	D22					
3100-05	Tread	---	D22					
3106-12	Tread	---	D22					
3113-17	TFM	None	D22					
3118-27	TFM	None	D22					
4000-14	TFM	Yes	D22					
4015-26	TFM	Yes	D22					
4600-26	TFM	None	26C					
4627-45	TFM	None	26C					
4646-48	TFM	None	26C					
4649-50	TFM	Yes	D22					
4700-39	TFM	Yes	D22					
4740-41	TFM	Yes	D22					
4742	TFM	Yes	D22					
5000-08	TFM	Yes	D22					
7000-07	TFM	None	D22					
7600	TFM	None	D22					
7601-18	Tread	---	D22					
8500-10	TFM	Yes	D22					
8511-20	Tread	---	D22					
8521-25	Tread	---	D22					
8526-28	TFM	Yes	D22					

7.1 Brake System Operation

The car air brake system has the responsibility of safely stopping the train, and accordingly, it is designed as a fail-safe system. That is, everything must work properly for the brakes to release. Fundamental to this concept is that the brake system on each car is self-sufficient.

Refer to figure 7.2 for a highly simplified air brake system schematic.

The brake pipe (1) is a 1½" pipe which runs the length of the train, starting in the locomotive. Car-to-car connections are via flexible air hoses and the coupling gladhands. At the ends of each car angle cocks are provided to allow the brake pipe to be sealed at the rear of the last car of the train.

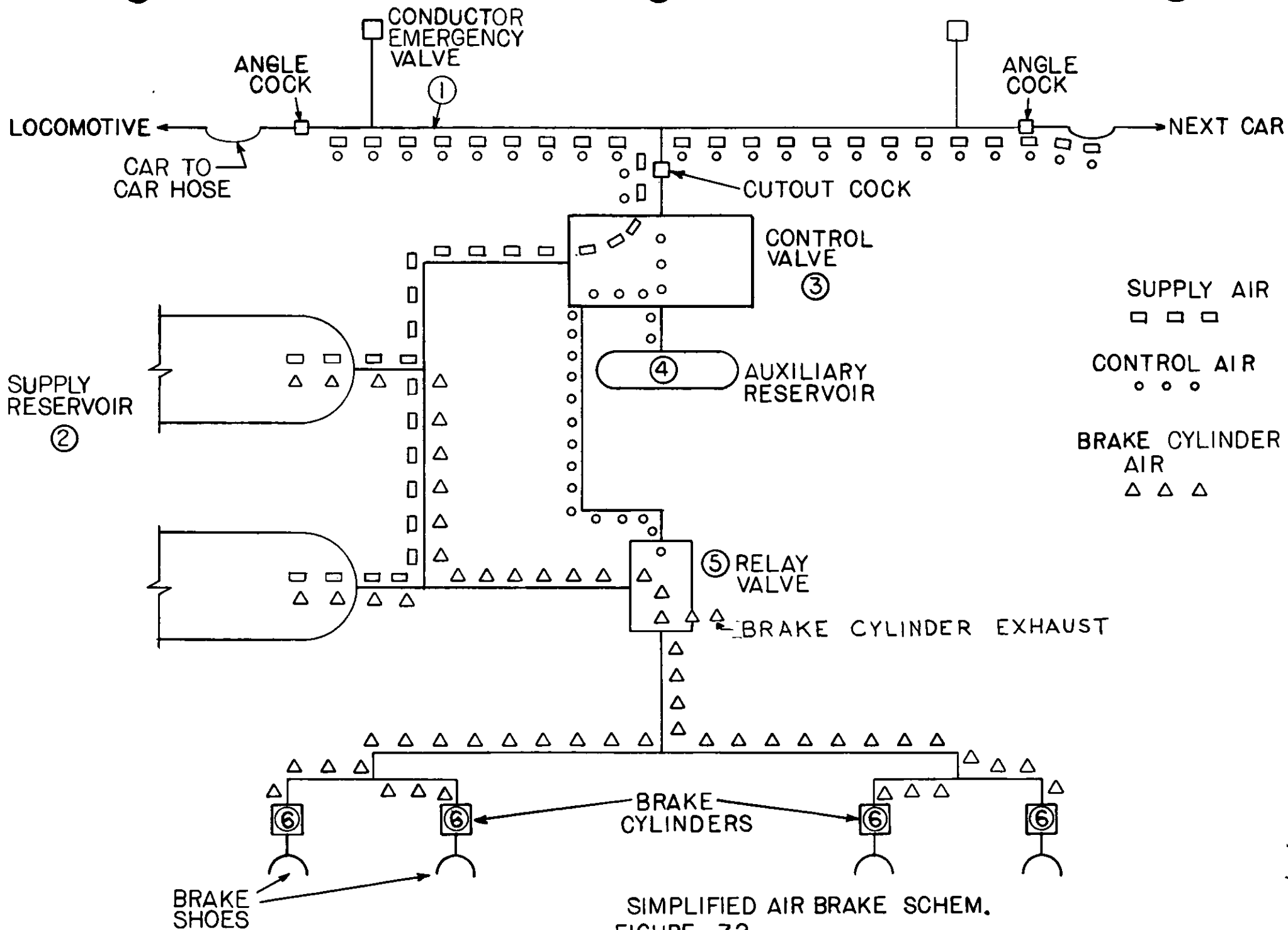
The locomotive feeds compressed air into the brake pipe, nominally at 110 psig, charging until the entire train is at this pressure. To apply train brakes, the brake pipe pressure is reduced from 110 psig. The greater the reduction, the harder the car brakes are applied. For example, a 10 pound reduction gives a mild brake application, 25 pound reduction gives full service, and exhausting to atmosphere gives an emergency application.

The concept of lowering brake pipe pressure makes the brakes essentially fail safe. For example, should the train break in two, the brake pipe hoses will break apart, venting the brake pipe and applying the brakes. As an additional safety feature, each car is equipped with two conductor emergency valves, one at each end. Pulling the handle of this valve will also vent the brake pipe to zero pressure and cause an emergency application. It does not matter where in the train brake pipe air is vented, the brakes will apply, including those on the locomotive.

The supply reservoir (2) is the one or two large air tanks which store compressed air for the car's own brake system. These tanks are charged from the brake pipe by the control valve.

The control valve (3) is the heart of the brake system. The internal components monitor the brake pipe pressure and issue commands to the relay valve to apply, maintain or release the car brakes. It is also responsible for charging the supply reservoir from the brake pipe, as well as the auxiliary reservoir.

Auxiliary reservoir (4) is the name given the small air reservoir used to supply air to the control valve for operation of the valve itself.



SIMPLIFIED AIR BRAKE SCHEM.
 FIGURE 7.2

The relay valve (5) is the device which controls the air flowing to the brake cylinders. It will apply, maintain or release the air pressure in the cylinders in response to the control valve command. To apply the brakes, the relay valve takes air from the supply reservoir and directs it to the brake cylinders. It can control this pressure from only a few pounds up to emergency brake pressure, depending upon the control valve signal. To release the brakes, the relay valve closes off the reservoir supply to the cylinders, and vents the cylinders to the atmosphere, releasing the brakes. Should a brake cylinder leak and thus loose pressure, the relay valve will admit more air in an effort to maintain the pressure.

Brake cylinders (6) are responsible for forcing the brake shoes against the wheels or discs to stop the train. Admitting air into the cylinders applies the brakes. When this air is released, a large spring forces the piston back, releasing the brakes.

The above explanation is highly simplified from a car's actual brake system. The other devices are added to improve the performance of the simple system into that required to smoothly and safely stop a car. The WABCO instruction sheets which follow explain all the brake components in detail: See section 7.6 Refer to figure 7.3 and 7.5 for system undercar piping. Refer to test spec PQ-79-1 tests 7.1 and 7.2 for system test procedures.

7.2 Carbody Brake Components

7.2.1 Carbody Brake Components Common to All Cars

Most of the car air brake system is mounted undercar, hung from the carbody. Both type K copper tubing and extra heavy black iron pipe are used. Copper joints are brazed with BAg7 brazing alloy; refer to section 7.7. Iron pipe is threaded.

The brake pipe itself is 1½" while the main reservoir line is 1". The later line merely passes end to end on these cars. It is required for Amfleet and Superliner trains for operation of door seals, air springs, and to supply the main reservoir tanks.

Flexible lines are provided for coupler swing. Locking angle cocks (handle perpendicular to pipe when valve is closed off) and locking cutout cocks (handle parallel to pipe when valve is closed) are provided at the ends of the car to close off the brake pipe (BP) and main reservoir (MR) pipe respectively. When these valves are closed, they vent the glad hand side of the valve to atmosphere.

Glad hands are used to make the intercar BP and MR brake system connections. When these hoses are properly tightened to the car piping, the open sides of the glad hands face each other. Glad hand hoses are dated in the rubber. If the hose is more than eight

years old, or if the date is unreadable, the hose must be replaced. The replacement hose must be no more than one year old at installation.

The A-2 Quick Service Application Valve is used on the brake pipe to locally bleed air from the brake pipe during a brake pipe reduction. This speeds up brake system application, and on a long train, helps to reduce the time delay between the brakes applying at the front and rear of the train.

The B-3-B Conductor's Emergency Valve is installed at each end of each car, along with its attendant E-3 Brake Application Valve. Pulling the red "emergency brake" handle of the B-3-B valve vents the brake pipe to atmosphere, instituting an emergency brake application. The B-3-B acts as a pilot device for the E-3, which actually vents the brake pipe.

The two supply reservoirs are each equipped with a manual drain cock for use in draining moisture which condenses in the reservoirs. The tanks must be vented periodically to drain out this moisture; water in the brake system can cause the control or relay valve to freeze and thus fail to operate.

Branch Tee fittings are used on all lines which branch from the brake pipe trainline. This device acts to remove water from the air flowing to the components on that branch line. For example, the control valve, quick service valve and application valve are each so protected.

The brakes can be deactivated on either or both trucks through the use of the truck cutout cocks. Located undercar just inboard of each truck, turning the valve handle parallel to the pipe shuts off air flow to the brake cylinders on that truck and vents the cylinders to the atmosphere releasing that truck's brakes.

Immediately behind the control valve is a combined dirt collector and cutout cock used to completely disable the brake system on that car.

Refer to WABCO instruction sheets for further details on these components; see section 7.6.

Completing the list of common carbody mounted components but explained elsewhere are:

1. Brake cylinder pressure switches, one per truck. Part of the brake trainlines and decelostat system, they are discussed in the sections 7.4 and 7.5.
2. Wheel Slide Protection. The WABCO E-5 Decelostat system is used on all disc brake equipped cars. Refer to section 7.4.
3. Brake Applied Indicator - used on disc brake cars to indicate when a car's brakes are applied. Refer to section 7.5.

7.2.2 Carbody Components of the D-22 System

The heart of the D-22 system is the D-22 control valve itself, which consists of the pipe bracket, service portion and emergency portion. Refer to WABCO's instructions for details, Section 7.6.

One of several relay valves is used to control air flow to and from the brake cylinders. Refer to figure 7.1 for the correct relay valve for a given car. It is very important to have the correct relay valve, an incorrect unit can result in either greatly reduced or greatly increased braking. This can cause either excessively long train stopping distances, or result in very short brake shoe life with overheated discs or wheels.

The combined auxiliary, emergency and displacement reservoir is a three chamber air tank which supplies air to the control valve for its functions. Refer to figure 7.7 for a system diagramatic and section 7.6 for WABCO instructions on these components.

7.2.3 Carbody Components of the 26-C System

As in the D-22 system, the heart of the 26-C is the control valve, considerably simplified from the older style D-22. Refer to WABCO's instructions for details.

Similar to the D-22 system, the relay valve is used to control air flow to and from the brake cylinders. Refer to figure 7.1 for the correct relay valve for a given car. Again the correct relay valve must be used or the brakes will severely malfunction as described above.

The 26-C system uses a 2-chamber combined control and selector volume reservoir.

Refer to figure 7.8 for a system diagramatic, and section 7.6 for WABCO instructions on this system components.

FIGURE 7.3
WABCO D-22 SYSTEM PIPING

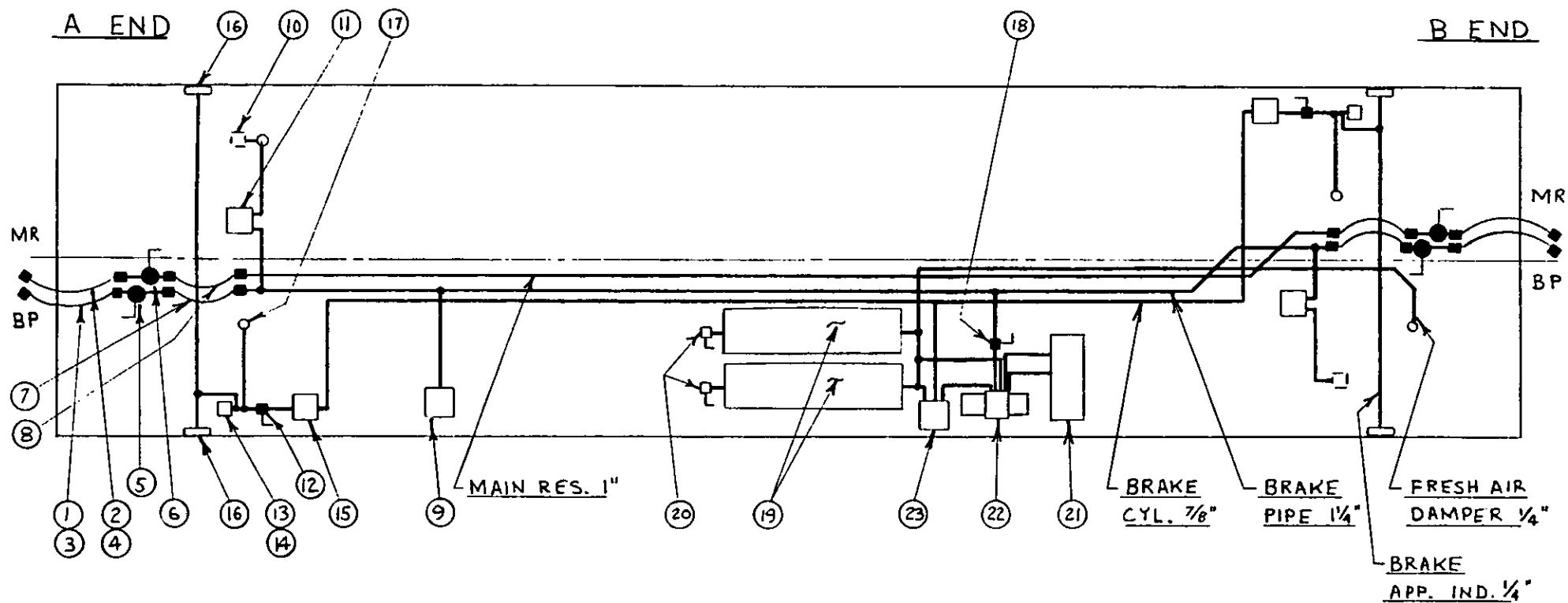


Figure 7.4
D-22 SYSTEM CARBODY PART LIST

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1	2	Brake Pipe Hose & Coupling 1-3/8"x22" with FP-5 Coupling	WABCO	87101	22A900087	
2	2	Main Reservoir Hose & Coupling 1-1/8"x22" with LS-4 Coupling	WABCO	579902	22A4000123	
3	2	Dummy Coupling - Brake Pipe, F-3	WABCO	558554	22A4000146	
4	2	Dummy Coupling - Main Reservoir L	WABCO	558556	22A4000147	
5	2	Brake Pipe Angle Cock, Locking 1-1/4"	WABCO	579831	22A4000072	
6	2	Main Reservoir Cutout Cock, Locking 1"	WABCO	576601	22A4000086	
7	2	Brake Pipe Hose & Union 1-3/8"x38"	WABCO	579905	22A4000122	
8	2	Main Reservoir Hose & Union 1-1/8"x38"	WABCO	579903	22A4000124	
9	1	A-2 Quick Service Valve A2A	WABCO	514040	22A0300013	
			WABCO	517389		
10	2	B-3-B Conductor's Emergency Brake Valve	WABCO	88566	22A2300032	
11	2	E-3 Brake Application Valve	WABCO	505405	22A0300005	
12	2	Cutout Cock, Truck, Locking 3/4"x3/4"x3/8"	WABCO	572360	22A4000095	
13	2	Pressure Switch	SQUARE-D	ACW-21	25P4012286	
14	2	Test Fitting	SALEM	775-3	22A4000130	
15	2	C-3 Dump Valve (Disc Brake Cars Only)	WABCO	579449	22A4000090	
16	2	Brake Applied Indicator (Disc Brake Cars Only)	WABCO	8600195		
17	2	Brake Hose	WABCO			
18	1	Combined Dirt Collector and Cutout Cock	WABCO	94994	22A900017	
19	2	Supply Reservoir (16x72 Standard)	WABCO	508573	22A2300088	
20	2	Drain Cock, Supply Reservoir	WABCO	571089	22A4000050	
21	1	Combined Auxiliary, Emergency and Displacement Reservoir	WABCO	514448 or 539559		
22	1	D-22 AR Control Valve	WABCO	513167		
23A	1	B-3 Relay Valve	WABCO	540928		
23B	1	F-6 Relay Valve	WABCO			
23C	1	F-4 Relay Valve	WABCO			

FIGURE 7.5

WABCO 26-C SYSTEM PIPING

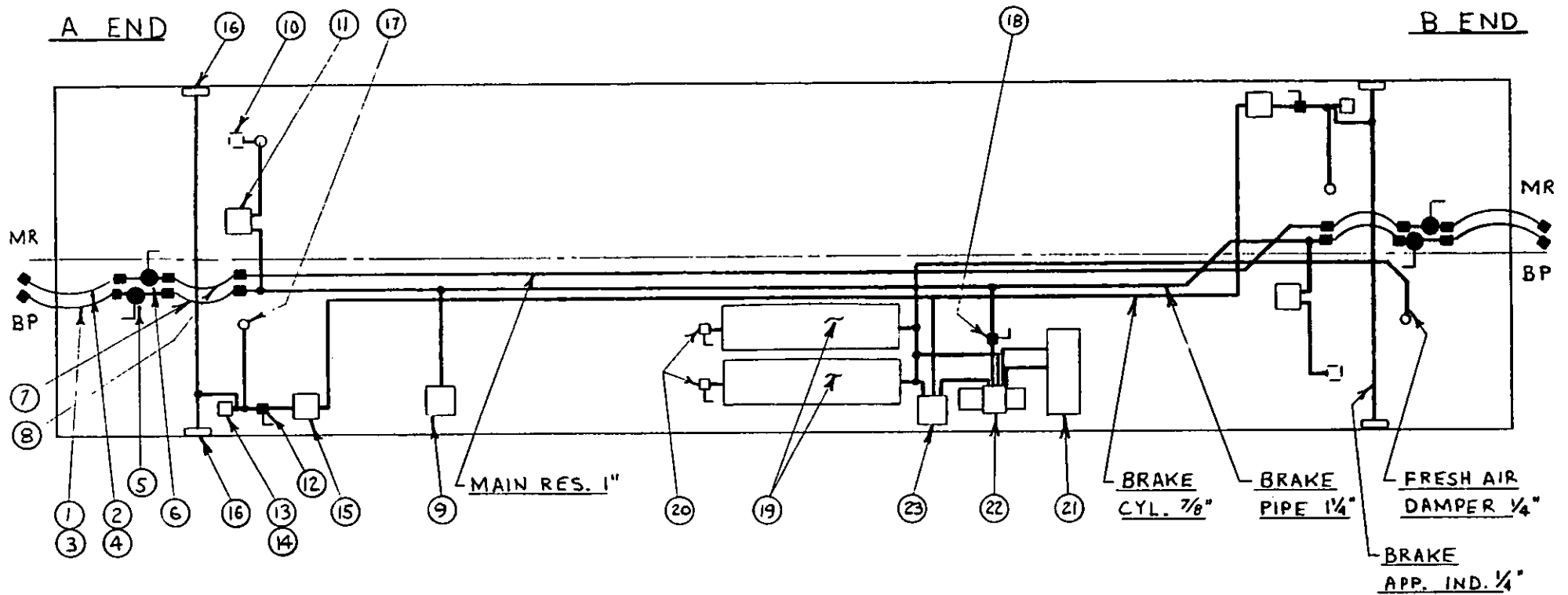
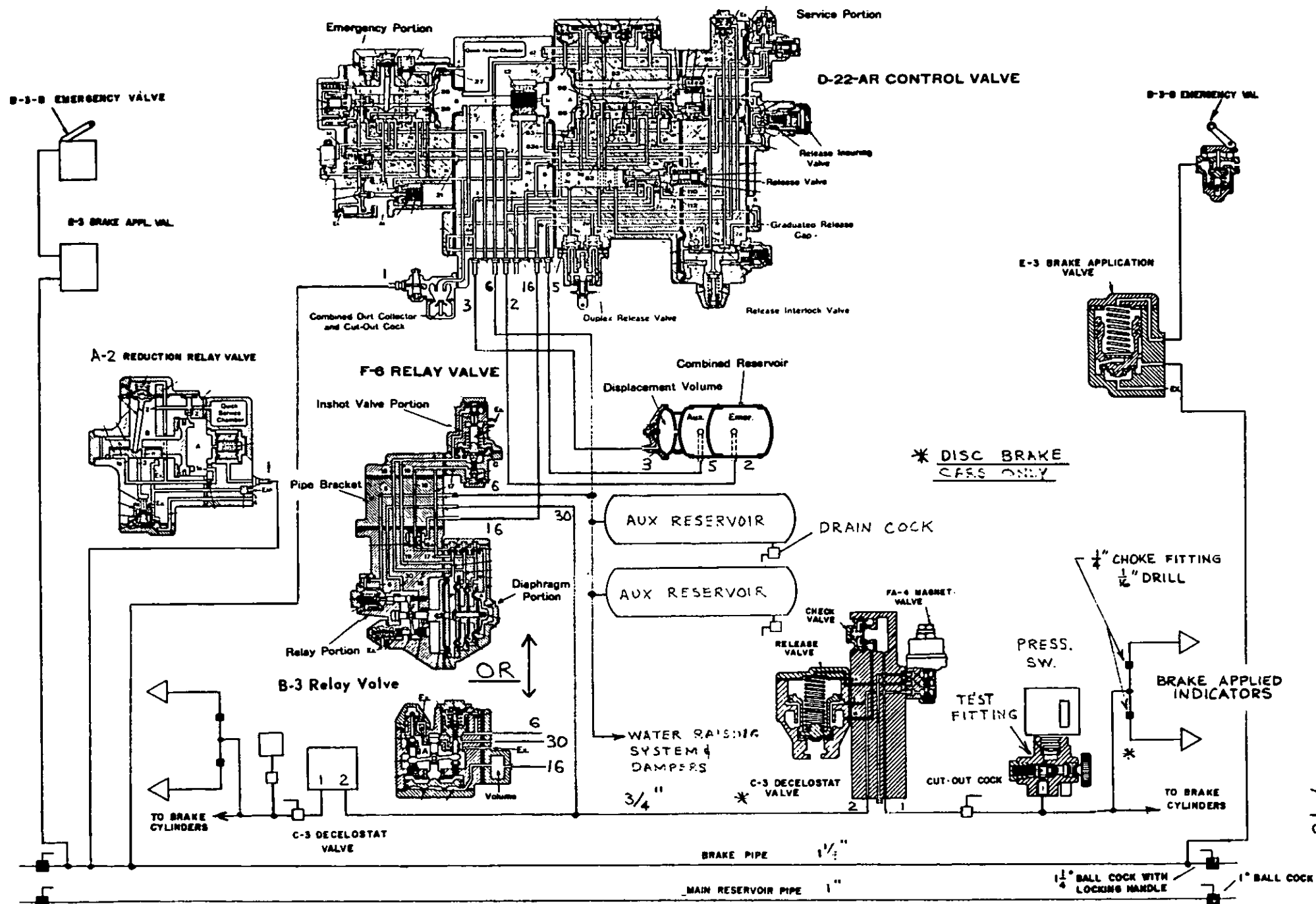


Figure 7.6
26-C SYSTEM CARBODY PART LIST

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1	2	Brake Pipe Hose & Coupling 1-3/8"x22" with FP-5 Coupling	WABCO	87101	22A900087	
2	2	Main Reservoir Hose & Coupling 1-1/8"x22" with LS-4 Coupling	WABCO	579902	22A4000123	
3	2	Dummy Coupling - Brake Pipe, F-3	WABCO	558554	22A4000146	
4	2	Dummy Coupling - Main Reservoir L	WABCO	558556	22A4000147	
5	2	Brake Pipe Angle Cock, Locking 1-1/4"	WABCO	579831	22A4000072	
6	2	Main Reservoir Cutout Cock, Locking 1"	WABCO	576601	22A4000086	
7	2	Brake Pipe Hose & Union 1-3/8"x38"	WABCO	579905	22A4000122	
8	2	Main Reservoir Hose & Union 1-1/8"x38"	WABCO	579903	22A4000124	
9	1	B-1 Quick Service Valve	WABCO	565450		
10	2	B-3-B Conductor's Emergency Brake Valve	WABCO	88566	22A2300032	
11	2	E-3 Brake Application Valve	WABCO	505405	22A0300005	
12	2	Cutout Cock, Truck, Locking 3/4"x3/4"x3/8"	WABCO	572360	22A4000095	
13	2	Pressure Switch	SQUARE-D	ACW-21	25P4012286	
14	2	Test Fitting	SALEM	775-3	22A4000130	
15	2	C-3 Dump Valve	WABCO	579449	22A4000090	
16	2	Brake Applied Indicator	WABCO	8600195		
17	2	Brake Hose	WABCO			
18	1	Combined Dirt Collector and Cutout Cock	WABCO	562834	22A7004046	
19	2	Supply Reservoir (16x72 Standard)	WABCO	508573	22A2300088	
20	2	Drain Cock, Supply Reservoir	WABCO	571089	22A4000050	
21	1	Combined Control - Selector Volume Reservoir	WABCO	559380	22A0100148	
22	1	26-C Control Valve	WABCO	---	---	
23	1	J-1 Relay Valve (when used)	WABCO	557290	22A9000352	

FIGURE 7.7 PIPING DIAGRAM OF THE D-22 PASSENGER CAR BRAKE EQUIPMENT



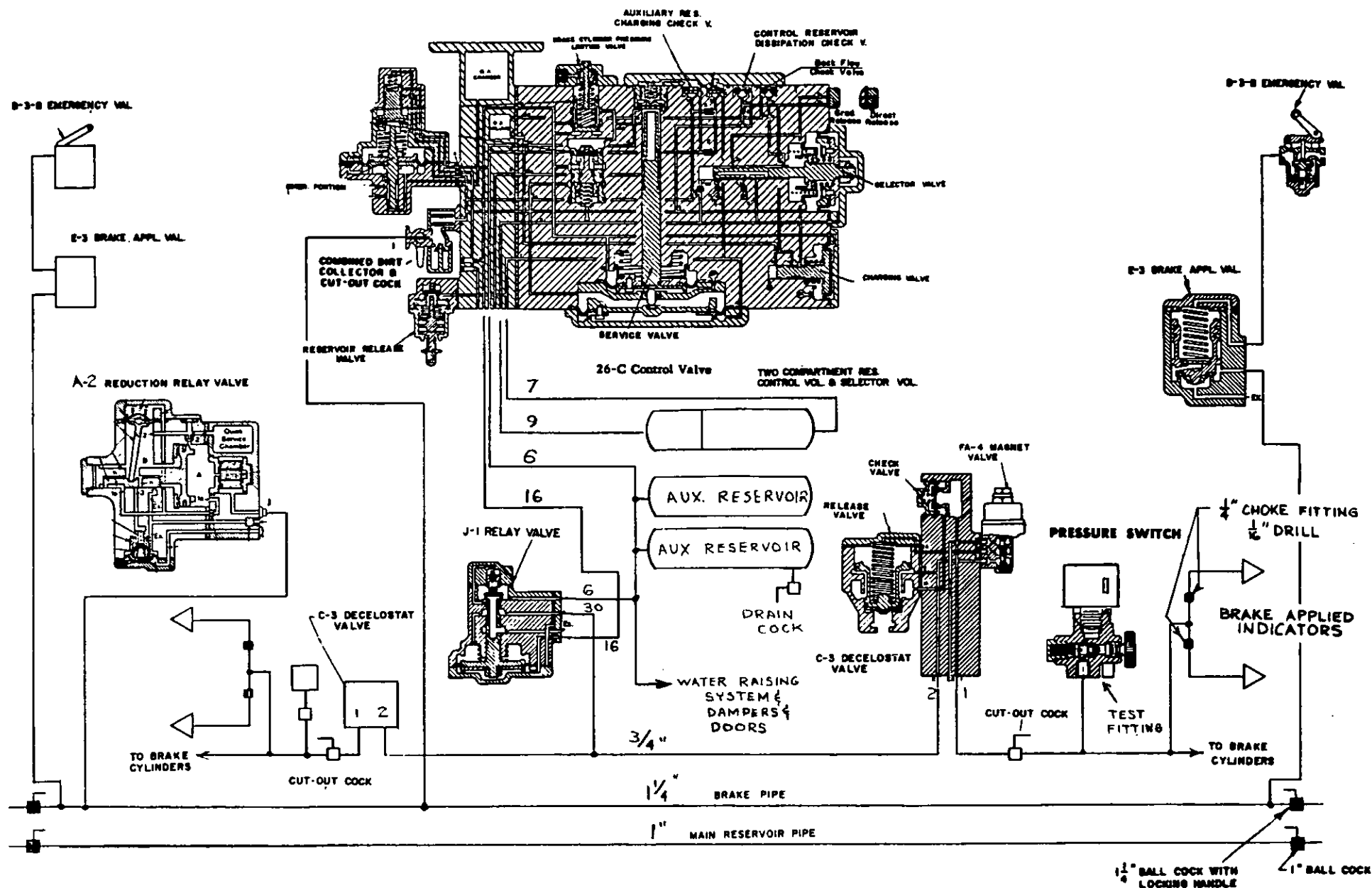


FIGURE 7.8
PIPING DIAGRAM OF THE 26-C PASSENGER CAR BRAKE EQUIPMENT

7.3 Truck-Mounted Components

The brake components ultimately responsible for stopping a car are truck mounted; the brake cylinders, linkages, brake heads, shoes, and brake discs (when used). Truck brake equipment falls into two categories 1) tread brake, and 2) disc brake.

7.3.1 Tread Brake Components

Air flows between the carbody and trucks via a semi-metallic hose, armoured to protect against flying debris, mechanical vibration and chafing. Extra heavy iron pipe is used to distribute the air to the two brake cylinders, one on each side of the truck. Refer to figure 7.9.

On most tread brake cars, the air brake cylinders have been equipped with a bushing kit that reduces the inside diameter of the cylinder. In converting to composition brake shoes, it was necessary to reduce the brake shoe force to about 1/3 original; bushing kits do this. A few cars were originally equipped with small diameter brake cylinders, and thus required no alteration of the brake rigging. Tread brake cars equipped with brake cylinder bushing kits use a F-6 relay valve.

Other tread brake cars may have been converted to high friction composition shoes by removing one of the two brake beams from each pair of wheels, effectively cutting total shoe force in half. With this modification, bushing kits are not installed in the brake cylinders. Instead, a F-4 relay valve is used to lower the brake cylinder pressure to produce overall brake shoe forces and retardation rates consistent with the first conversion method described above. This method was popular with some of the original railroad owners because it was a cheaper method (eliminating the cost of bushing kits).

It is very important that a tread brake car have the proper combination of brake shoe rigging, cylinder size, and relay valve in order that the car is not braking excessively or inadequately. The Mechanical Department should be notified if a car displays chronic brake problems that indicate an improper arrangement in the brake system. Refer to figure 7.1 for brake cylinder size by car.

Air entering the brake cylinder forces the piston out, applying the brake via the brake levers. On release, a large spring retracts the piston and releases the brakes.

On the back of each brake cylinder is a slack adjuster which adjusts the brake levers to keep brake cylinder piston travel low, at a preset level. Minimal piston travel is desirable because it keeps the cars brake air requirements low, and prevents the piston from going solid due to brake shoe wear. The slack adjuster is air operated, and is activated by the brake cylinder piston uncovering a port in the cylinder wall when piston travel is excessive. When brake shoes are to be replaced it is first necessary to "back off" the slack adjuster by rotating the large nut on its non-linkage end. This is necessary to obtain sufficient clearance to install new brake shoes.

The brake shoes are the high friction composition type, attached to the brake head with a crescent-shaped key.

ITEM	DESCRIPTION				AMT#	AMMS#
1	Cobra	V185	2"	Thick Brake Shoe		
2	Cobra	V186	2½"	Thick Brake Shoe	22A9000101	
3	Cobra	V103	2"	Thick Brake Shoe		
4	Tiger	T-160	2"	Thick Brake Shoe		
5	Tiger	T-184-4	2"	Thick Brake Shoe		
6	Tiger	T-184-6	2½"	Thick Brake Shoe	23N9005764	

The handbrake operates the B-end truck brakes by pulling against one of the brake levers, thereby pulling the brake shoes against the wheels. Refer to chapter 8 for handbrake details.

Refer to section 7.6 for WABCO instructions on truck brake parts.

Figure 7.9
Truck Tread Brake Components

To Be Supplied

Figure 7.10
TRUCK TREAD BRAKE COMPONENTS

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMTRAK #	AMMS #
1		Brake Shoe	See Page 21	----	----	
2		Brake Shoe Key				
3		Brake Head				
4A		Brake Cylinder	WABCO			
4B		Brake Cylinder	WABCO			
4C		Brake Cylinder	WABCO			
5A		Slack Adjuster Type B				
5B		Slack Adjuster Type C				

7.3.2 Disc Brake Components

Air flows between the carbody and trucks via a semi-metallic hose, armoured to protect against road damage. Extra heavy iron pipe and hose is used to distribute air to the 4 brake cylinders on each truck, one per disc.

Three sizes of brake cylinders are used as required by car weight. Refer to figure 7.1 for cylinder size by car. The correct cylinder size must be used or braking will be inadequate or excessive.

Air entering the brake cylinder forces the piston out, forcing the brake pads against the disc. On release, a large spring retracts the piston and releases the brakes.

The disc brake units are now all truck-frame mounted, designated TFM. While many cars were originally C-frame mounted CF, they were all converted to TFM during the HEP upgrade. The brake cylinder and caliper assembly is hung from the truck in such a way that it can move laterally to follow the lateral axle-to-truck motion, and can also swivel vertically to follow truck frame-to-axle roll.

The brake lining is a high friction composition material, wired to the brake shoe. The complete pad assembly is attached to the brake head with the spring retainer, spring and brake shoe key.

ITEM	DESCRIPTION MANU	MANU #	AMT#	AMMS#
1A	Brake Lining (28" mainline)	Knorr	Jurid	STU00100
1B	Brake Lining (28" mainline)	Wabco	Cobra	V579552

The brake discs are wheel mounted, bolted to the hub of the wheel. The discs are self-ventilated.

The handbrake applies the brakes on the B-end truck by pulling on the handbrake lever of one brake unit per axle, forcing the pads against these 2 discs. Refer to section 7.6 for WABCO instructions on these truck brake parts. A few cars have 2 handbrakes one on each end.

Disc brake cars are equipped with speed sensors for use with an anti-wheel slide system. One sensor is used on each axle, screwed into the tapped hole near the bottom of the bearing housing. Refer to section 7.4 for further details.

Fig 7.11

Truck Disc Brake Components

To Be Supplied

Figure 7.12
TRUCK BRAKE DISC BRAKE COMPONENTS
Page 1

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1		Frame Assby.	WABCO	584600	23X9009732	
2		Pin, Tong at Cylinder	WABCO	8604173		
3		Pin, Handbrake Crank at Cylinder	WABCO	8604191		
4		Pin, Handbrake Crank Lever at Cylinder	WABCO	8606654		
5		Pin, Handbrake Crank and Lever	WABCO	8605691	18A2300254	
6		Cotter Pin, 3/8" x 2" for item 5	WABCO	576246		
7		Cover, Spring	WABCO	8605061	23X9009665	
8		Spring, Tong Pin	WABCO	8605060	22A9000519	
9		Washer, Flat, 3/4"	WABCO	575988	22P9003935	
10		Nut, Slotted Hex 3/4" - 10"	WABCO	576065	22A9000204	
11		Crank, Handbrake	WABCO	8609717	20A0100174	
12		Lever, Handbrake	WABCO	8606652		
13		Gasket, hose to brake cylinder, 3/4"	WABCO	93841	22A9000108	
14		Brake Head Assby., R.H. Outside	WABCO	8606611	20A0100252	
15		Brake Head Assby., L.H. Outside	WABCO	8606612	20A0100253	
16		Brake Head Assby., R.H. Inside	WABCO	8606613	18A9000022	
17		Brake Head Assby., L.H. Inside	WABCO	8606614	20A0100255	
18		Cover Plate, Pivot Assby.	WABCO	8606603		
19		Tong Assby., R.H.	WABCO	8605688	18A2300252	
20		Tong Assby., L.H.	WABCO	8605689	18A2300253	
21		Bridge Assby.	WABCO	8609324	20A0100144	
22		Fulcrum Pivot Assby	WABCO	8609719	23T9009733	
23		Pin, Fulcrum Pivot	WABCO	8606617	20A0101165	
24		Brake Shoe and Lining R.H.	WABCO	8605116	23E4003457	
25		Brake Shoe and Lining L.H.	WABCO	8605117	23B4003458	
26		Spring, Brake Shoe	WABCO	8604586		
27		Key, Brake Shoe	WABCO	8604901		

Figure 7.12
TRUCK BRAKE DISC BRAKE COMPONENTS
Page 2

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
<u>Brake Head Assemblies</u>						
14		Brake Head Assby., R.H. Outside	WABCO	8606611	20A0100252	---
15		Brake Head Assby., L.H. Outside	WABCO	8606612	20A0100253	---
16		Brake Head Assby., R.H. Inside	WABCO	8606613	18A9000022	
17		Brake Head Assby., L.H. Inside	WABCO	8606614	20A0100255	
28		Stop Pin	WABCO	8605114		
29		Wear Plate	WABCO	8604578		
30		Bushing, Flanged	WABCO	8606516		
31		Bushing, Plain for Guide Pin	WABCO	8601577		
32		Pin, Guide	WABCO	8606599		
<u>Brake Cylinder Assemblies</u>						
33		Brake Cylinder, Complete, 6½"	WABCO	8605080		---
34		Brake Cylinder, Complete, 7"	WABCO	8605050		---
35		Brake Cylinder, Complete, 7½"	WABCO	8605047		---
36		Washer	WABCO	524387	22A0100233	
37		.CLAMP, Piston End	WABCO	8611983		
38		.CLAMP, Cover End	WABCO	8611984	25L9005915	
39		.BOOT, Dust	WABCO	8604186	18A2300225	
40		.COVER, Assby.	WABCO	8605162		
41		.BUSH, Cover	WABCO	8604181	22X9003626	
42		.LUBRICATOR, Felt	WABCO	8604182		
43		.GASKET, Cover	WABCO	8605157		
44		.SPRING, Piston Return	WABCO	8605088	23E9008845	
45		.GUIDE, Spring	WABCO	8606339	22T9004316	
46		Cup, Packing 6½" Cylinder	WABCO	531244		
47		Cup, Packing 7" Cylinder	WABCO	531328	22A2300137	
48		Cup, Packing 7½" Cylinder	WABCO	531329	22A2600006	
49		Piston Assby. 6½" Cylinder	WABCO	8605738		
50		Piston Assby. 7" Cylinder	WABCO	8606419		
51		Piston Assby. 7½" Cylinder	WABCO	8606428	22P9003627	

52	Bushing		WABCO	8504172	18A2300222
53	Cylinder Body	6½" Cylinder	WABCO	8605122	
54	Cylinder Body	7" Cylinder	WABCO	8605161	

55	Cylinder Body	7½" Cylinder	WABCO	8605163	22A0100104

	<u>Tong Assemblies</u>			---	---
19	Tong Assembly, R.H. Complete		WABCO	8605688	18A2300252
20	Tong Assembly, L.H. Complete		WABCO	8605689	18A2300253

56	Pin, Shoe		WABCO	8605087	18A2300241
57	Pin, Fulcrum		WABCO	8604163	18A2300220
58	Key		WABCO	8604901	

59	Retainer		WABCO	8604899	18A2300233
60	Spring		WABCO	8604586	

	<u>Bridge Assembly</u>			---	---
21	Bridge Assembly (w/bushing)		WABCO	8609324	20A0100144
61	Bushing		WABCO	8605637	18A2300251
62	Bridge Bolt		WABCO	8609325	22A9001392

	<u>Fulcrum Pivot Assembly</u>			---	---
22	Fulcrum Pivot Assembly Complete		WABCO	8609719	23T9009733
23	Fulcrum Pivot Pin		WABCO	8606617	20A0101165

63	O-Ring		WABCO	8609344	18A9000652
64	Block, Retainer Rubber		WABCO	8606651	20A9000437
65	Cover Plate		WABCO	8609531	23N9009734

66	Lock Washer		WABCO	514276	23P9010146
67	Bolt		WABCO	514274	11H9003577
68	Stop Pin		WABCO	8609697	18A9000748

69	Plug		WABCO	8610519	23K9009735

Figure 7.12
TRUCK BRAKE DISC BRAKE COMPONENTS
Page 3

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1		<u>Brake Frame</u>		---	---	
2		Brake Frame Complete	WABCO	584600	23X9009732	
		Bushing	WABCO	8606602		
70		<u>Air Hose Assembly-Cylinder</u>		---	---	
71		Fitting, Elbow Air Hose to Cylinder	WABCO	8609735	23T9011465	
72		Fitting, Elbow Air Hose to Cylinder	WABCO	8609736	22X9003732	
		Fitting, Elbow Brake Line to Air Hose	WABCO	8609749	23X9011464	
73		Fitting, Elbow Brake Line to Air Hose	WABCO	8609750	23H9010280	
74		Clamp, Hose, 2 3/4" ID Open End	Punchlock	#11	45A9000322	
75		Gasket, 3/4"	WABCO	93841	22A9000108	
76		Hose, to Brake Cylinder	WABCO	8609753		
77		Lock Washer	WABCO	514281		
78		Cap Screw for Item 72 & 73	WABCO	8605598		
79		Cap Screw for Item 70 & 71	WABCO	8602190		
80		<u>Brake Disc</u>		---	---	
81		Disc, Brake, 28"	WABCO	8609370	20A0100179	2045607200
82		Cap Screw, 3/4" x 1 3/4" Grade 5	WABCO	8606154	18A2300255	
		Locking Plate	WABCO	8610859	23X9007317	
83		<u>Brake Relining Fixture</u>		---	---	
84		Brake Lining Assembly Fixture	WABCO	8610476	22N9004124	
		Lock Washer	WABCO	514415	22A9000205	
24		<u>Brake Shoe and Lining Assemblies</u>		---	---	
25		Brake Shoe and Lining Assby., R.H.	WABCO	8605116	23E4003457	
85		Brake Shoe and Lining Assby., L.H.	WABCO	8605117	23B4003458	
		Brake Shoe and Stud Assby., R.H.	WABCO	8605139	20A0100456	
86		Brake Shoe and Stud Assby., L.H.	WABCO	8605140		
87		Stud	WABCO	8605177	23X9009262	
88		Pad, Rubber	WABCO	8605137	22A9000511	
89		Lining	See Page 7-27	---	---	
90		Wire, Brake Shoe				

7.4 Decelostat Wheel Slide Protection System

7.4.1 System Operation

As part of the HEP upgrade, E-5 decelostat systems were installed on all disc brake equipped cars, replacing the old mechanical pneumatic units. Provisions were made for future installation of the E-5 system on tread brake cars; car wiring is installed on these cars, and space provided for the controller in the electric locker.

The E-5 Decelostat is a more modern anti-wheelslide system used to keep the occurrence of spalled and slid flat wheels low. During heavy braking, especially on slippery rail, the brake system is capable of sliding the wheels. This is especially true of disc brake cars; tread brake cars are less susceptible because the brake shoes have a cleaning effect on the wheel treads making them less likely to slide.

The E-5 unit uses a speed sensor mounted on one journal of each axle to measure axle speed. It does this by counting the teeth on the gear of the EE bearing axle end cap as they pass; each tooth produces an electrical pulse. The E-5 controller is a tiny computer which compares the speeds of the 4 axles and also the rate at which the speeds change. Before a wheel goes into a slide, it creeps along the rail. The E-5 system senses this creep before a slide occurs, and activates the A-end, B-end or both dump valves as required. This reaction must be quick, because the creep condition does not last long before a slide occurs. The E-5 system will respond when it senses:

1. One axle is turning faster than the other (1, 2, or 3 axles are beginning to slide).
2. The rate at which the axle speeds change is too great (all axles are sliding).

While the dump valve is activated, the brake cylinders on the corresponding truck are vented to the atmosphere. The E-5 controller will deactivate the dump valve and thus reapply that truck's brakes whenever:

1. The E-5 senses the wheels are no longer sliding.
2. After 7 seconds (the unit has a safety cutout feature that will reapply full brake cylinder pressure and maintain that pressure until the brakes are released from the locomotive. This time out feature is reset every time the full brake release occurs on the car, restoring the wheel slide controls to the normal state.

The E-5 decelostat system operates under all braking conditions, including emergency. Variations in wheel size within the allowable range for a 36 inch multiple wear wheel will not effect the system.

Using a decelostat system to control wheel slide does two important things:

1. Reduces train stopping distance over that of sliding wheels (contrary to the common belief).
2. Greatly reduces wheel spalling and flat wheels caused by sliding.

Spalling is caused largely by sliding wheels. Small slides produce great temperatures over very small areas of the wheel tread, high enough to cause local heat treating. This heat treating causes these small areas to become brittle, and the constant pounding over the affected spot on the wheel endures causes these areas to fall out, which is spalling. Since the decelostat prevents serious or large wheel slides, it prevents most spalling.

Most flat and spalling wheels have been shown to be related to a defective wheel slide system. When wheel defects of this type occur, try to determine why they occurred -- wheel spalling is very costly to correct, especially if they reoccur. The brake system itself - especially control and relay valves - is the second most likely cause of wheel slide defects.

7.4.2 Decelostat System Components

The E-5 decelostat system consists of:

1. 4 speed sensors, one per axle
2. Controller, located in the electric locker
3. 2 dump valves, one per truck located on the carbody near each truck.
4. 2-brake cylinder line pressure switches, located near the dump valves.
5. interconnecting wiring

Refer to figure 7-13 for component locations.

The speed sensors are mounted in the lower right hand quadrant of one journal box of each axle. Refer to figure 7.15. Integral with the sensor is a short armored cable terminated with a water-proof plug which mates with the truck wiring. The sensors must be set to maintain a gap of .022 nominal (.020 to .030 permissible) between the speed sensor tip and the bearing-mounted speed sensor gear. Note: this gap should be set with the car sitting on the axle; the setting will change if this is not done, and the sensor may become a lathe cutting tool!

The E-5 control unit is located near the bottom of the electric locker. It was installed inside rather than outside the car to protect the unit from road damage, as well as keep the unit dry and fairly clean. The control unit operates on the car's battery system, nominal 72 VDC. It is fed power via the load shed relay by the wheel slide circuit breaker, located in the electric locker. Be careful not to reverse power source polarity; damage may result.

A green pilot light inside the controller is illuminated whenever the power is on. Also, a high pitched hum can be heard, indicating the power supply is operating. The toggle switch can be used to turn the unit off for servicing the system, etc. Two cartridge fuses are used to protect the system:

- 2 Amp internal electronics
- 5 Amp - main fuse - power to dump valves and internal electronics

The E-5 controller has a self-test feature which should be cycled once a month for the 30 day inspection. The procedure is described on the cover of the unit (see figure 7.16 and 7.17). Note: This self-test procedure does not test the speed sensors, only the controller and dump valves. The cover of the controller must be kept closed and secured to keep it clean.

The C-3 dump valves are installed in the brake cylinder line to each truck. When electrically activated by the E-5 controller, the valve immediately opens, venting the brake cylinders on that truck to the atmosphere. When the C-3 is turned off, air is restored to the cylinders, gently through a choke to prevent a jolt which might start a new wheel slide.

The dump valves rarely fail, but there have been occurrences of sluggish action, caused by foreign matter in the brake system piping or pipe brackets at the dump valves.

The two brake pressure switches figure 7.16 are connected one per truck to the brake cylinder lines. They are used to reset the timeout safety feature of the E-5 controller when the train's brakes are fully released. Refer to section 7.5 for further details.

The interconnecting wiring is used to connect each of the speed sensors to the E-5 controller, and it to each of the dump valves. The speed sensor wiring is 2 conductor shielded. The truck-mounted wiring is in the form of a T-shaped harness, with each end terminated in a water-proof military (MS)-type plug. The horizontal legs of the T attach to the mating plug of the speed sensor, while the vertical leg attaches to the car body junction box. The T-cable comes in two sizes to accommodate the various truck designs. When damaged, replace the entire T-cable.

Wiring entering the E-5 controller does so via 2-MS-Type connectors, one for the speed sensors, and one for the power functions. Refer to figure 7.14 for a parts list. Refer to test spec PQ-79-1 test #7.2 for E-5 system tests. Refer to WABCO instructions which follow in section 7.6 for further details on components.

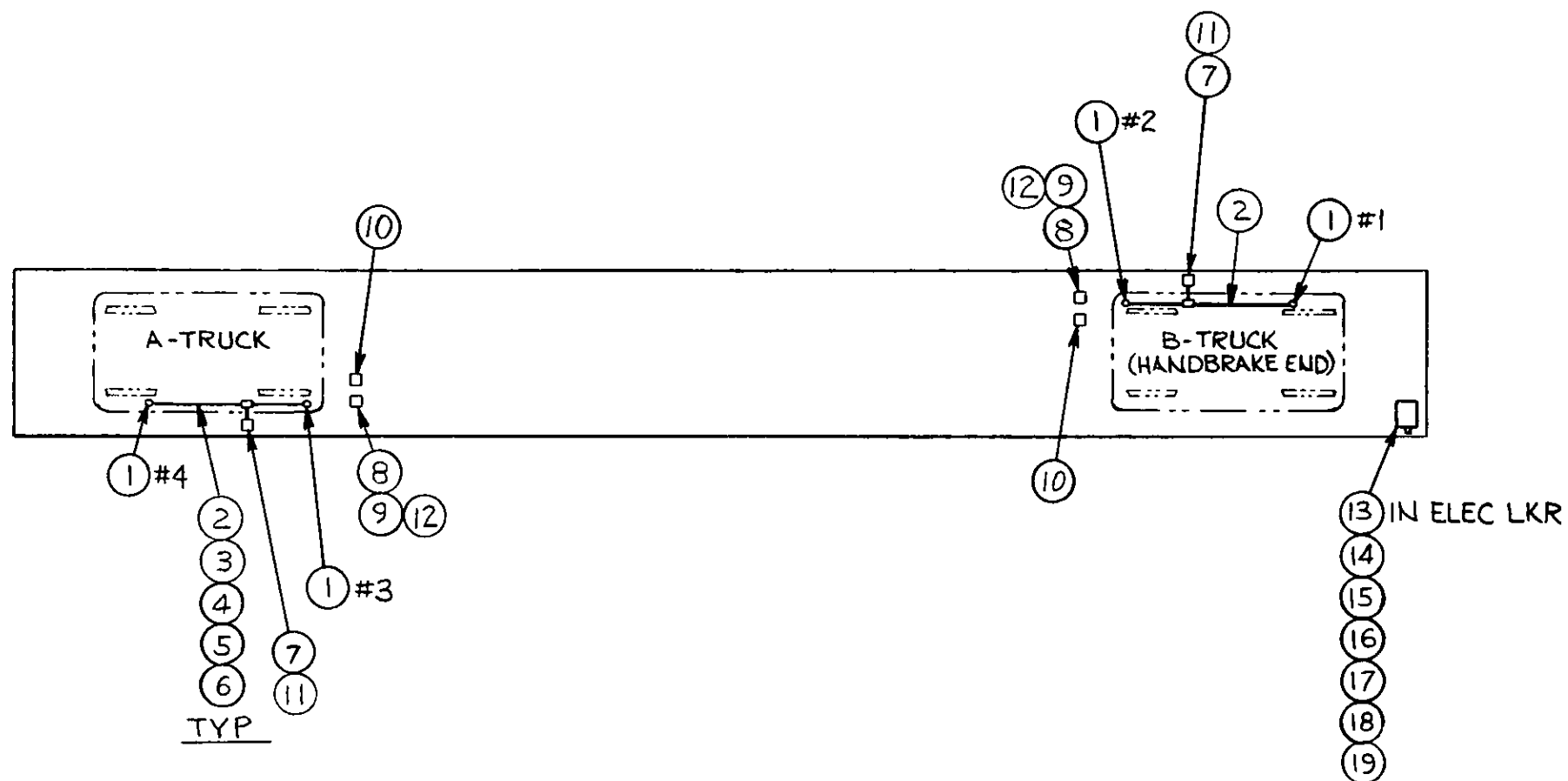


FIGURE 7.13
 DECELOSTAT SYSTEM COMPONENT LOCATIONS

Figure 7.14
E-5 DECELOSTAT SYSTEM COMPONENTS

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1	4	Speed Sensor	Electro	725835	25T9013096	
2A	2	Truck Wiring Harness 124"	CAM-LOK	A-800041-5	---	2052443005
2B	2	Truck Wiring Harness 142"	CAM-LOK	A-800041-4	---	2052443400
3	12	Rubber Sleeve, Cable	IRE	2405		
4	4	Rubber Sleeve, Connector				
5	4	Pipe Clamp - 1"				
		AMT DRW B-00-1379-1				
		AMT DRW B-00-1379-2				
6	16	Pipe Clamp - 3/4"	IRE	2354		
7	2	Connector, Carbody at Truck	Amphenol	MS3102A-20-07P	25X9011962	
8	2	C-3 Dump Valve	WABCO	579449	22A4000090	
9	2	Coil for Dump Valve, 64V	WABCO	525217		
10	2	Pressure Switch	Square-D	ACW-21	25P4012286	
11	--	Cable - 16/2 Shielded, Twisted Pair (Carbody Receipt to E-5 Unit)	Beldon	8719	25T9011686	
12	--	Cable - 16/2 Neoprene, 600V, Type SO (Dump Valves)	Alpha	1935	25P9011647	
13	--	Wire #18/2 PVC	Alpha	3241	25X9012294	
14	1	Connector E-5 Controller Power	Cannon	CA0GEA24-7SF80	22A4000088	
15	1	Connector E-5 Controller Speed Sensor	Cannon	CA06RXA24-28S	22A4000089	
16	1	E-5 Controller Complete	WABCO	579565	22A4000087	
17	1	5 Amp Fuse, AGC (3AG)	Littelfuse	312005		
18	1	2 Amp Fuse, AGC (3AG)	Littelfuse	312002		
19	5	Pilot Light	---	#387		
20	--	Speed Sensor Gap Checking Gage	WABCO	583690	45N4002036	

FIGURE 7.15
SPEED SENSOR IN INSTALLATION

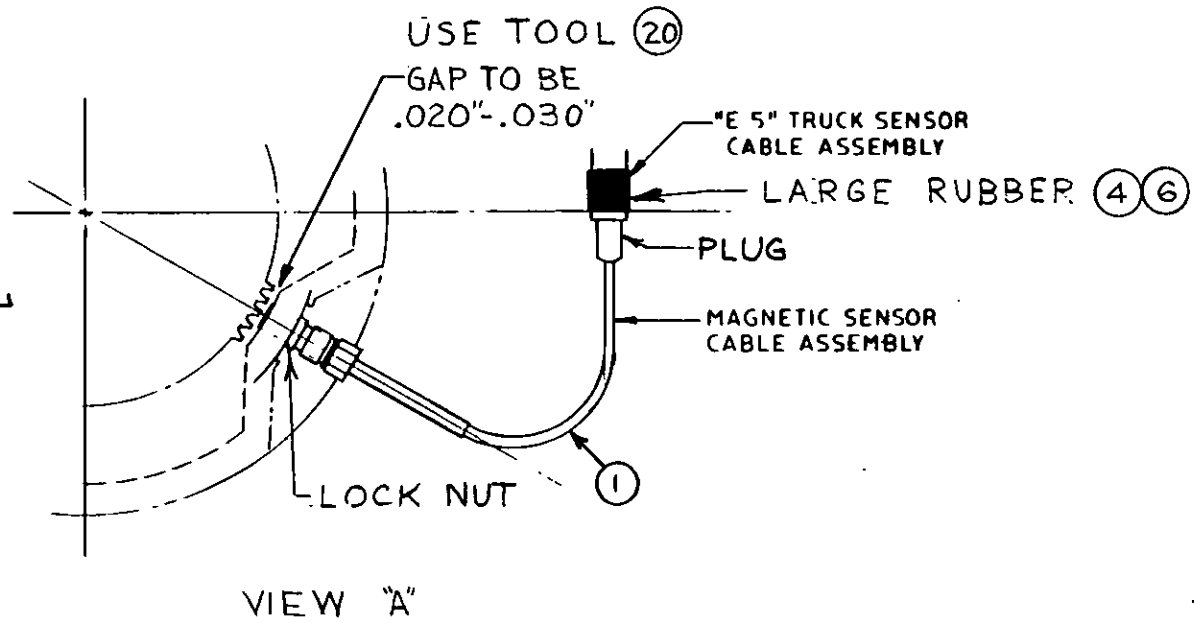
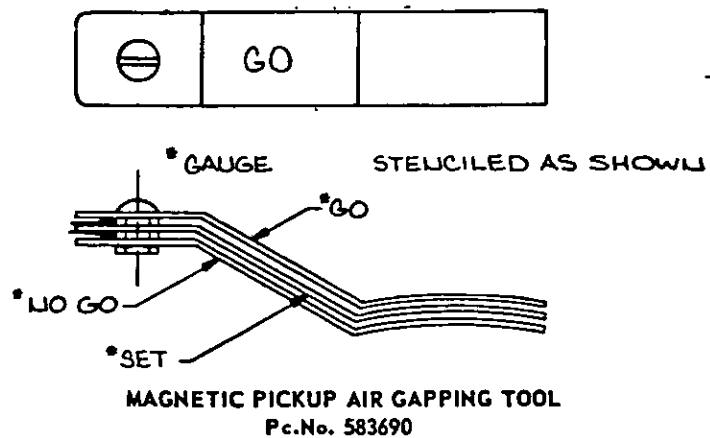
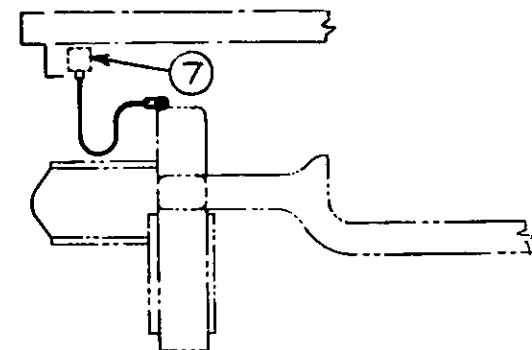
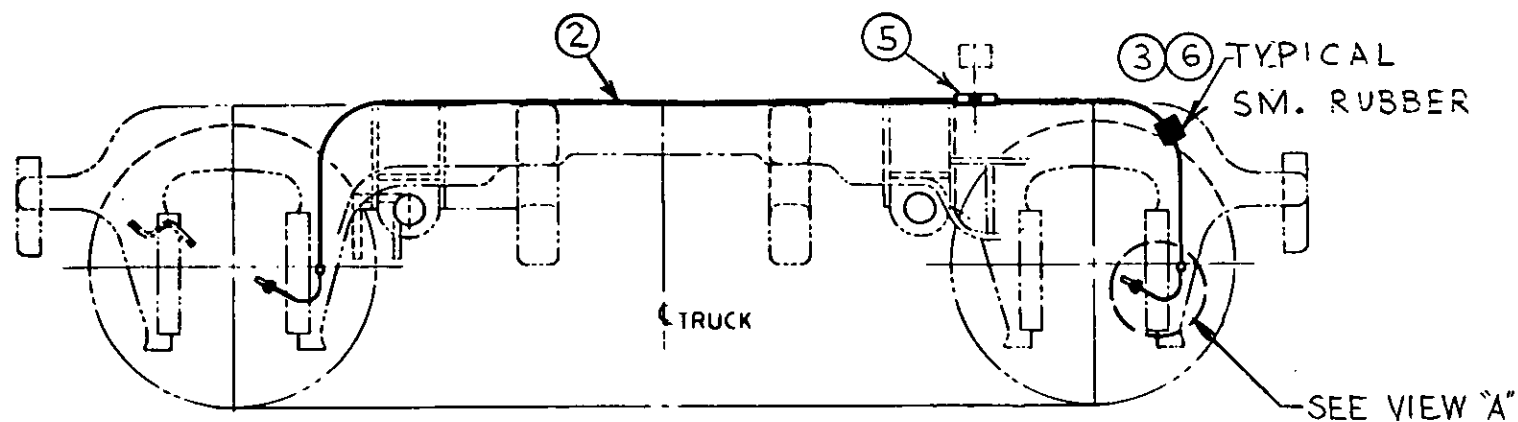
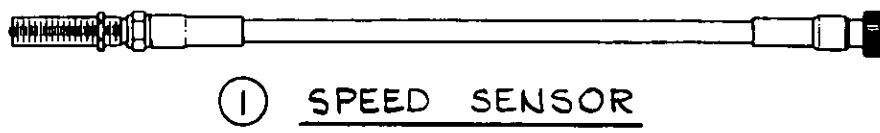
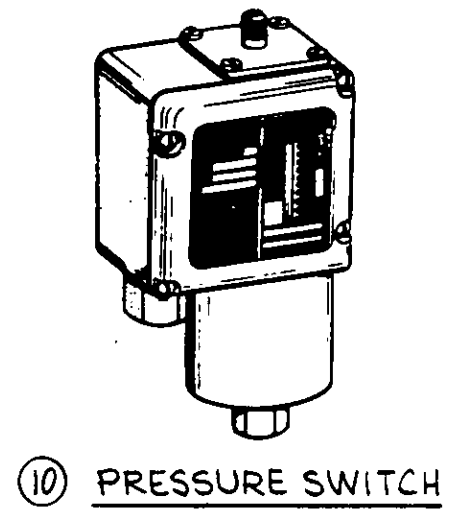
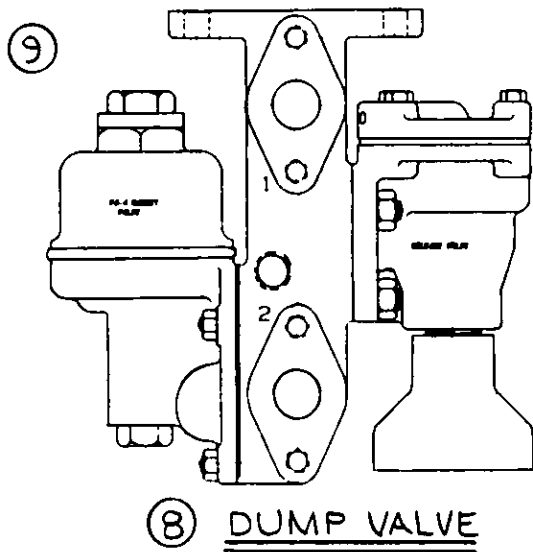
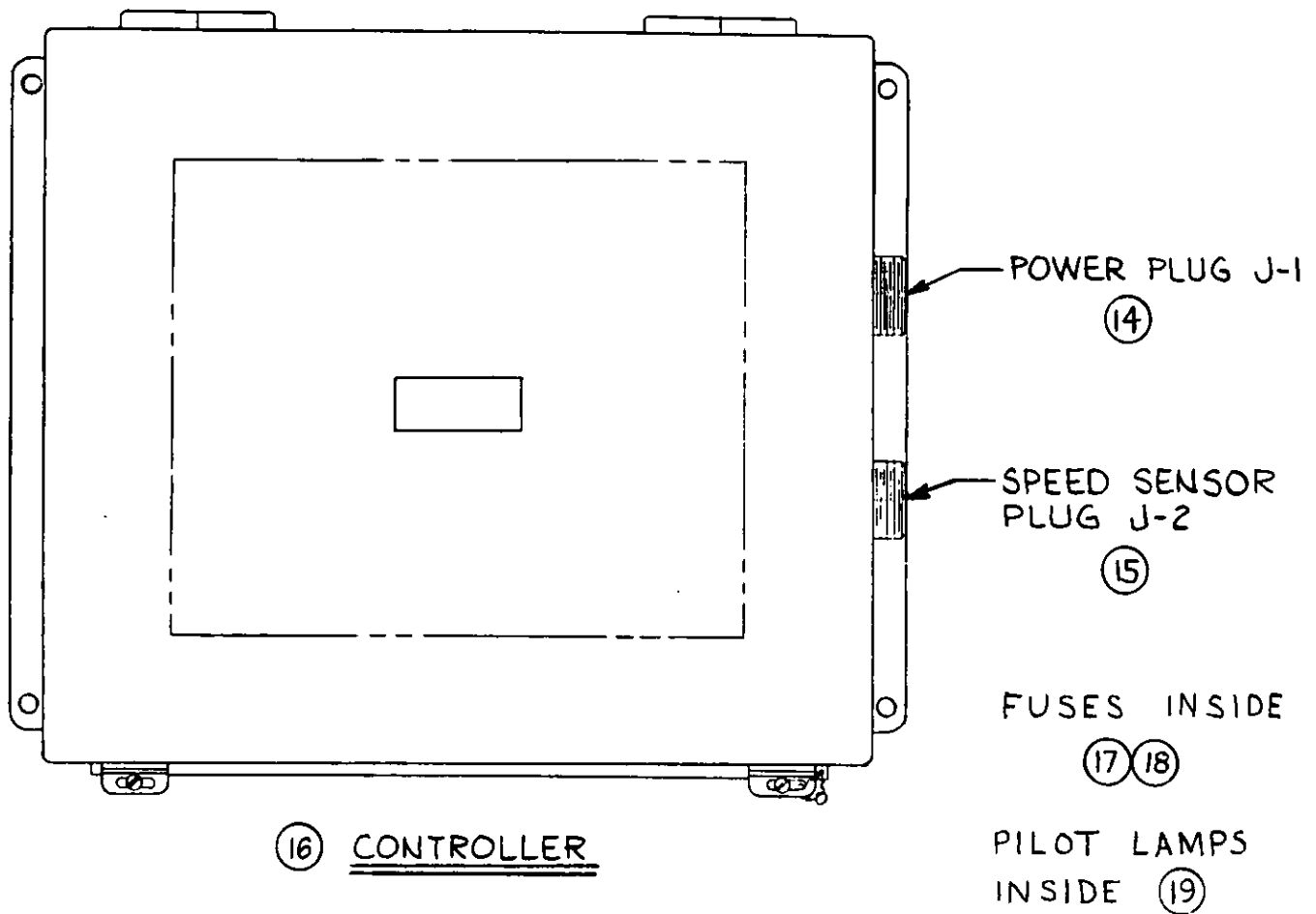


FIGURE 7.16
E-5 SYSTEM COMPONENTS

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7.4.3 General Maintenance

The truck wiring is effectively the only maintenance item of the system. Care must be taken to inspect the truck areas upon arrival of the train at the terminal. Any damaged wiring or sensors should be repaired before dispatching the car. An inoperative wheel slide system can easily cause wheel spalling, which is a very expensive maintenance item. A few minutes of inspection and repair will save many thousands of dollars in wheel costs.

If a car is found with badly spalled or flat wheels, check the decelostat system to determine if it is functioning properly. If the E-5 is functioning, the problem is likely to be the brake system itself, the control or relay valve.

When a car's wheels are to be changed, first disconnect the speed sensor plug on the axles to be removed. Reinstall the speed sensors and gap them to .020-.030 AFTER the car is back on its wheels. If the sensor is adjusted first, the gap will change, and may even contact the sensing gear, gouging it.

The E-5 controller should be periodically checked for proper operation, as described below in section 7.4.4.

Dump valves require little maintenance, however, one may occasionally become sluggish. It is imperative that the valve react quickly for the decelostat system to be effective. Should a sluggish valve be found, remove and examine the valve. If foreign material is found, it is likely that the entire car's brake system is contaminated and must be cleaned. Check the strainers on the control valve, etc. to see. If much contamination is found:

1. Dismount all brake valves (control, relay, dump) and the A-1-A water system governor-reducing valve.
2. Blow out the entire air system.
3. Reinstall the valves removed.
4. Fully test the brake system using the test sequence in test spec PQ-79-1 tests figure 7.1 and 7.2.

The truck pressure switches require little maintenance. Refer to section 7.5 for details.

7.4.4 Periodic Maintenance

On a monthly basis, do the following:

1. Trucks
 - a. Visually inspect the speed sensors and truck wiring.
 - b. Check the speed sensor gap. It must be between .020 and .030.
 - c. Clean this gap with compressed air, about 30 psi maximum pressure.
2. E-5 Decelostat Controller Periodic Maintenance
 - a. Insure 64VDC feed to E-5 Controller.
 - (1) Using a multi-meter, on proper scale, read between TP 14 for Negative and TP 15 for Positive 64VDC (70-80VDC if car is on power).
 - (2) With power switch on, the green lamp should be lit. If lamp is not lit, check the bulb. Replace if needed.
 - (3) If no voltage is present at TP 14 and 15, check the following:
 - (a) Wheel slip ckt. breaker in electric locker-
 - (b) Fuse F1 in E-5. Replace with 5 amp fuse if needed-
 - (c) Fuse F2 in E-5. Replace with 2 amp fuse if needed.
 - (d) Load Shed Relay on Battery Charger.
 - (e) Battery Charger.
 - (f) Low Voltage Relay.
 - b. Once the 64VDC feed is confirmed, run the E-5 box through the test sequence, using the "E-5 Decelostat Test Procedure", figure 7.17. The car must be on air and the brakes applied.
 1. During the test, note that the dump valve activates immediately when the corresponding controller light lights. The dump valve operating sequence should be A-end, B-end, B-end, A-end. which is easily detected with an observer outside the car. Make sure the valve dumps the air on the brakes by watching the linkage or disc brake indicators. Listening from inside is not sufficient.

E-5 DECELOSTAT® TEST PROCEDURE

- 1 **IMPORTANT!!** To prevent roll away, secure vehicle adequately by applying handbrake and/or blocking wheel.
2. Make sure power switch is "ON". "POWER ON" lamp should be illuminated throughout test.
- 3 Push test switch (PWR ON) "IN" and hold securely.
- 4 Operate push buttons in the following sequence noting correct operation of indicating lamps. For each step maintain status of switches for minimum of 10 sec. before going to next step. During sequence, truck #1 & truck #2 DECELOSTAT Valves should operate simultaneously with DCL1 & DCL2 indicating lamps, respectively.

KEY	PUSHBUTTON SWITCHES				INDICATING LAMPS			
	☐ RELEASED	☒ HELD APPLIED			☐ NON-ILLUMINATED	☒ ILLUMINATED	☒ ILLUMINATED FOR 7 SEC. (APPROX) ONLY	
	T1	T2	T3	T4	DCL1	DCL2	0 MPH	5 MPH
STEP 1	☐	☐	☐	☐	☐	☐	☒	☒
STEP 2	☒	☒	☐	☐	☐	☒	☐	☐
STEP 3	☒	☐	☐	☐	☒	☐	☐	☐
STEP 4	☐	☐	☐	☐	☐	☐	☒	☒
STEP 5	☐	☐	☒	☒	☒	☐	☐	☐
STEP 6	☐	☐	☐	☒	☐	☒	☐	☐
STEP 7	☐	☐	☐	☐	☐	☐	☒	☒

- 5 Release test switch (PWR ON).
- 6 Make sure "PWR ON" switch is in "ON" position.
- 7 Attach door & tighten securely making sure seal is intact.
- 8 Remove blocks from wheels.

FIGURE 7.17

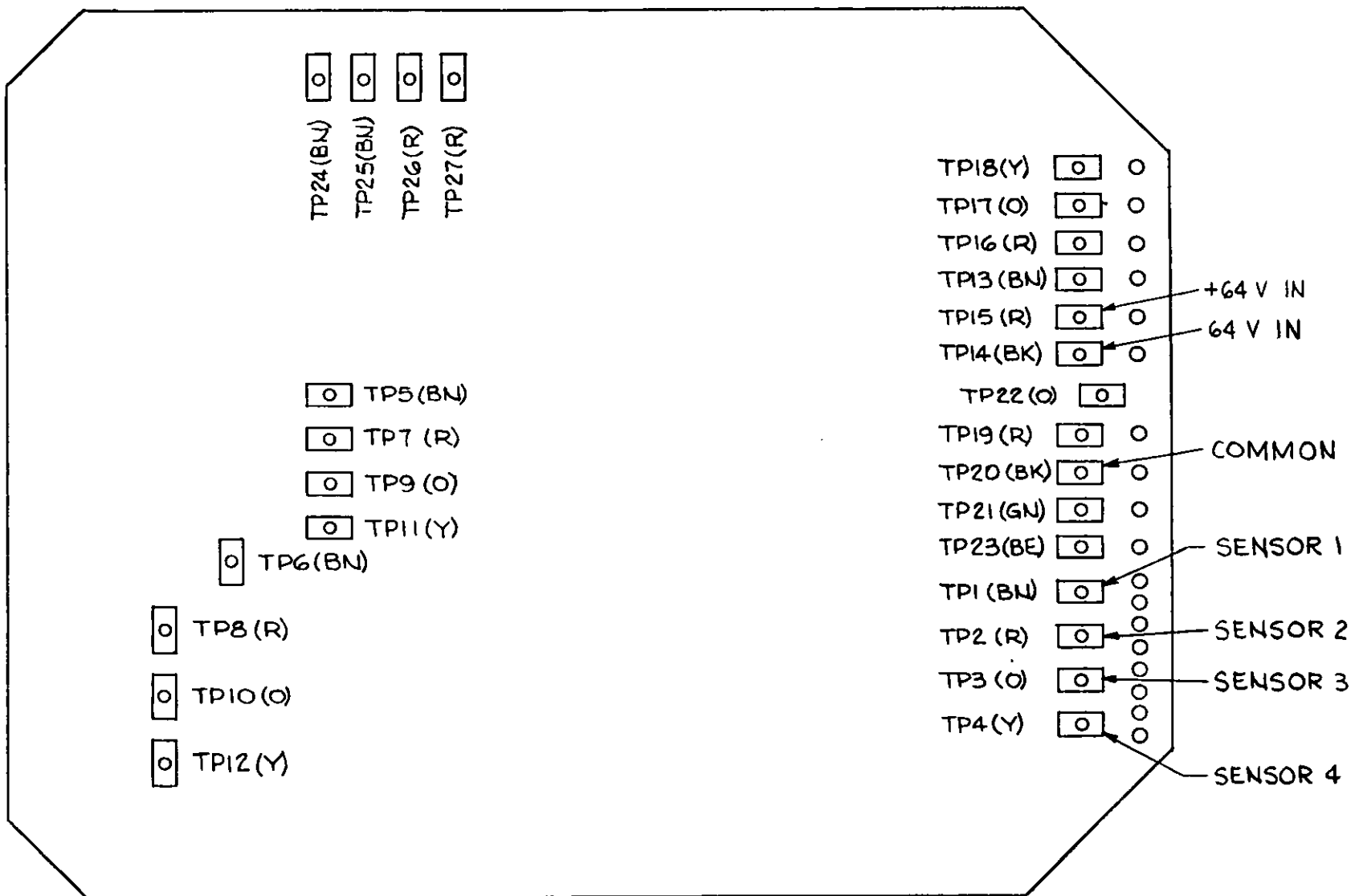


FIGURE 7.18

E-5 CONTROLLER TEST POINTS

2. If the E-5 Controller does not give the proper lamp response, check to make sure all the lamps are good. Replace burnt out lamps as required and retest box.
 3. If the E-5 Controller will not sequence, disconnect the J-2 cable and re-sequence the box. This isolates the speed sensors from the E-5. This will tell you if the problem is; a) in the E-5 box or b) in the sensors.
 4. If the E-5 Controller will not sequence, with J-2 Plug disconnected, then the problem lies within the E-5 box itself. The box should be replaced and the defective E-5 tagged and sent out for repairs.
 5. If the E-5 does sequence with J-2 disconnected, then the problem is in the sensors and must be repaired using a standard trouble shooting procedure. Either a sensor or the wiring is probably grounded.
3. Continuity of Speed Sensors
- a. In addition to maintaining a correct sensor gap, it is just as important to meter the speed sensors for continuity. This may be done inside the E-5 Controller.
 - (1) Using a multi-meter, on the proper scale for resistance, read between TP 20 for Common and TP 1.
 - (2) The DC resistance should be 1000 ohms $\pm$ 200.
 - (3) Using TP 20 as Common, read TP 2, TP 3 and TP 4 for the rest of the sensors.
 - (4) Any variation from the above 1000 ohms spec must be repaired.
 - b. The final resistance reading to be taken is from car body ground as Common to TP 1, 2, 3 and 4. There should be no continuity to ground. A reading of over 100-K is required.
4. Final
- Upon completion of Steps 1, 2, and 3 and assuring decelostat is in proper working condition, be sure the lid on the E-5 is tightly secured so that no foreign material will get into the box. Connectors J1 and J2 should be lock wired so they will not back out. In addition, the J3 connector must be lock wired to the car body receptacle. All four (4) sensor plugs must be wired also.

For further test details, refer to PQ-79-1 test 7.2.
 For more details on the decelostat components, refer to WABCO instructions following.

7.5 Brake Condition Indication System

Converted HEP cars have two types of air brake condition indicators: trainline and local, used by the locomotive engineer and car inspector to show whether the air brakes are applied or released.

All converted HEP cars are equipped with pressure switches (one per truck) which are part of the brake applied and brake released trainlines of the 27 point cable. They function such that when all the brakes are applied throughout the train, a circuit is made which illuminates an amber light in the locomotive. A second circuit is made up when all train brakes are released, giving a green light in the cab. Whether the brakes on a given car are applied or released is sensed by two pressure switches on each car, one per truck, connected into the brake cylinder air line. When the brake cylinder pressure is above 23 psig on both trucks, the switches indicate the brakes are applied on the car. When the pressure on both trucks drops below 10 psig, the switches indicate the brakes are released. The pressure switch is connected after the dump valve and cutout cock on each truck. The loop relay in the last car is the power source for these circuits.

Note: This system does not detect an applied handbrake.

A test fitting is located adjacent to each air pressure switch as an aid in checking and adjusting pressure switches. See figure 7.19.

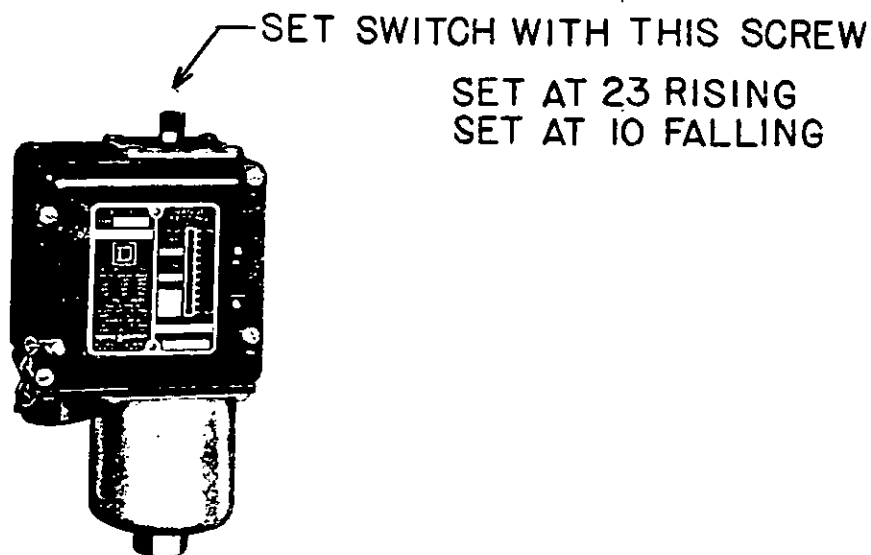
In addition to their function in the trainline brake circuits, the pressure switches are used in the E-5 decelostat system reset the 7 second time-out feature. This reset occurs when the car brakes are fully released (below 10 psig brake cylinder pressure). The pressure switch is shown in figure 7.19. Refer to test spec PQ-79-1 test 2.4 and 7.2 for tests of this switch.

Local air brake indicators are used on all disc brake cars as an aid in checking for applied or released brakes. Only disc brake cars use these devices since the truck brake rigging is difficult to see, whereas the tread brake rigging is easily observed.

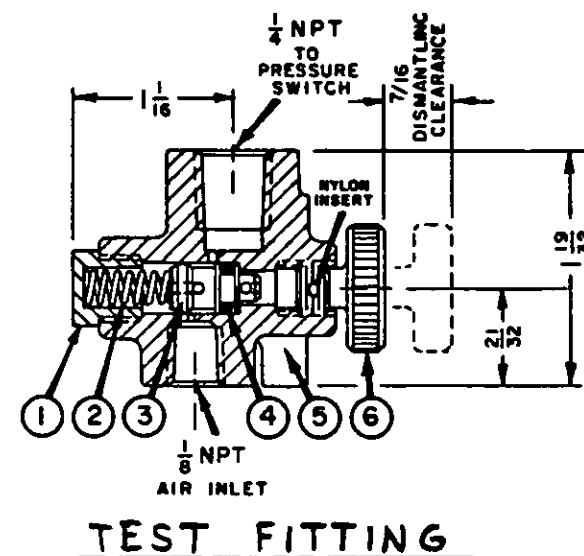
The indicators, 4 per car, are merely a piston and cylinder which expands when air from the brake cylinder line enters it. When expanded, the device causes a red-tipped plunger to protrude from the car side, indicating that the brakes on that truck are applied. When the brakes are released, the bellows contract and the plunger retreats from view. Refer to figure 7.20.

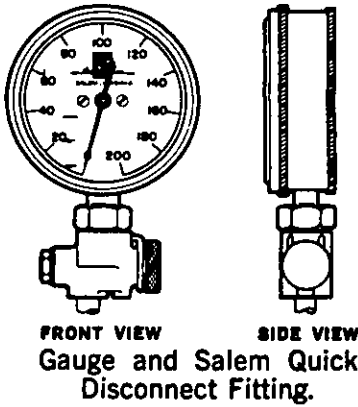
Figure 7.19A
AIR BRAKE PRESSURE SWITCH

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1		Pressure Switch, DPDT	Square-D	ACW-21	25P4012286	
2		Test Fitting (Carbody)	Salem	775-3	22A4000130	
3		Probe Plug (Mating with item 2)	Salem	701-026		
4		Pressure Switch Testor	Salem	700-1		
5		CO ₂ Cartridge for Item 4	Salem	-		



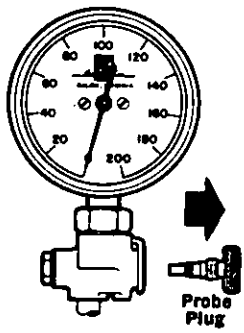
Class 9012 Type ACW-21
PRESSURE SWITCH



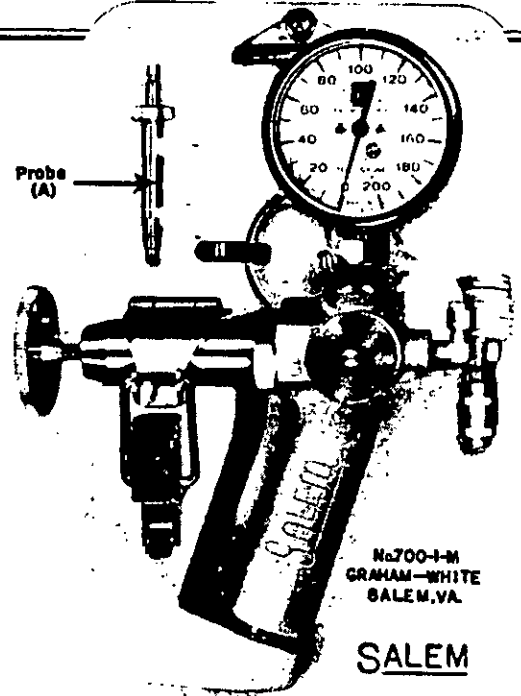


Procedure for testing Air Gauges and Pressure Switches using Salem Tester and the Salem Quick Disconnect Fitting.

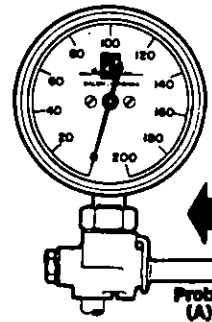
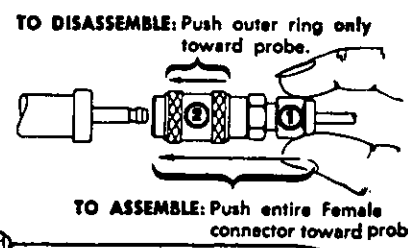
**All Hand Operation
NO TOOLS
NEEDED!**
Saves Time!/Saves Money!



To test gauge - unscrew and remove Probe Plug from Quick Disconnect Fitting. (by hand).
(When the probe plug is removed, the air shuttle automatically seals off pressure to the gauge or pressure switch, therefore, you do not have to blow down the air pressure when using the Salem Test Fitting).

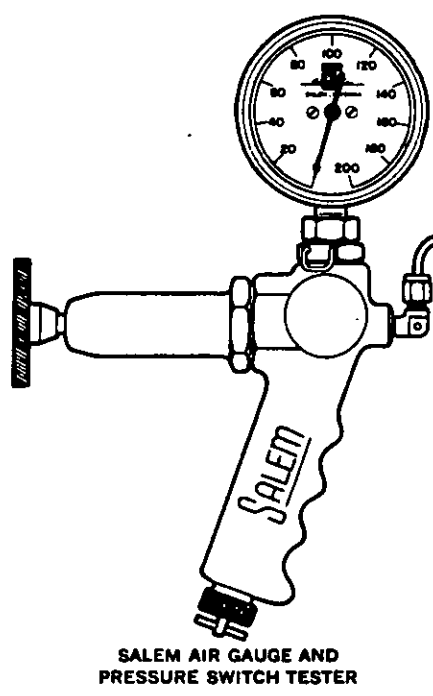


SALEM AIR GAUGE AND PRESSURE SWITCH TESTER WITH HOLSTER

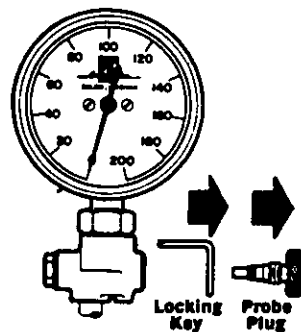


2 Remove Tester Probe (A) from holster and screw into fitting finger tight. (No tools are necessary). Connect female hose connector (1) by pushing the nut on female connector sharply until it snaps.

[To disconnect female connector push forward on outer ring with knurled rings. (2), and unscrew probe (A) and replace on holster.]

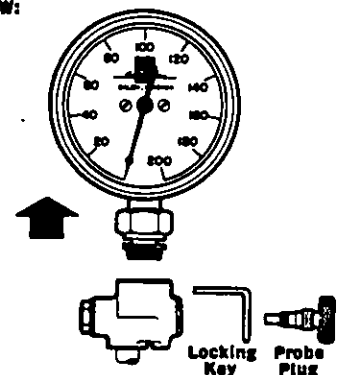


If gauge or pressure switch is found to be defective or if it is necessary to remove for adjustment, returned for major repair, or replaced — follow procedure 3 and 4 below:



3 With Probe Plug unscrewed and removed * — now remove locking key (simply pull out by hand) ...

*With Probe Plug unscrewed and removed, air pressure has been automatically cut off within the Quick Disconnect Fitting.



4 ... Air gauge or Pressure Switch is now free from Salem Quick Disconnect Fitting and may simply be lifted out and repaired or adjusted.

SEE BACK SIDE OF THIS SHEET FOR CO₂ TESTER OPERATION



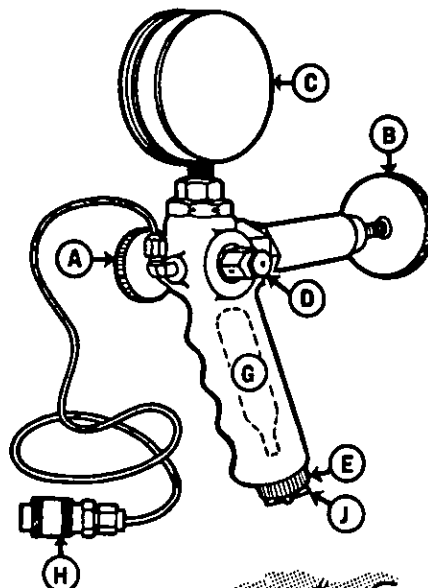
OPERATION OF #700-1 CO₂ TESTER

The Salem 700 -1 CO₂ Gauge and Pressure Switch Tester is an entirely hand operated, self-contained portable tester, mounted on a companion holster using CO₂ as its testing medium. (As shown on front side).

PROCEDURE FOR TESTING:

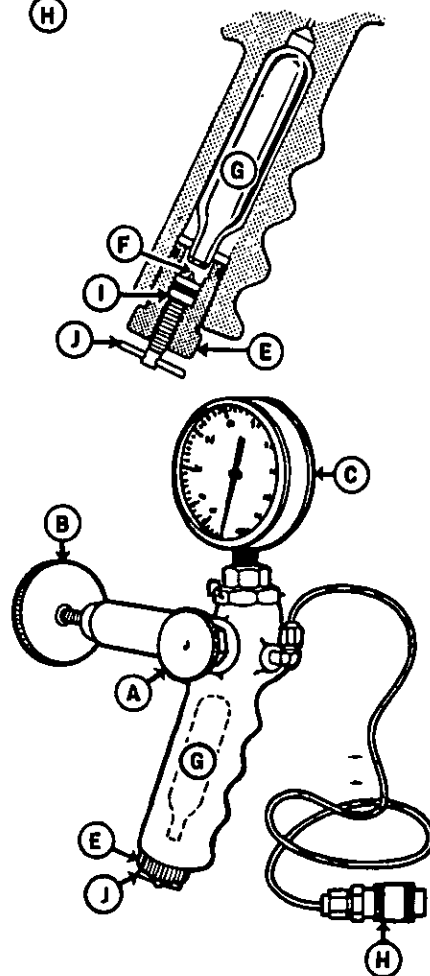
1. Open needle valve (A) very slowly as you are releasing 900 lbs. pressure. If opened too quickly, pressure will build up of 185 psi and vents out the safety relief and manual vent valve. This protects the gauge from damage, but wastes CO₂.
2. When desired pressure is reached, GENTLY CLOSE needle valve (A). Pressure may be manually reduced by pressing safety relief and manual vent valve (D).
3. For fine VERNIER adjustment use displacement valve (B). This can be used for one or more lbs. adjustment throughout the entire 185 lb. range.

If you have no leaks in the gauge complex, one cartridge should test 30 to 50 gauges.



PROCEDURE TO CHARGE TESTER: (Remove from holster.)

1. Depress safety relief and manual vent valve (D) to assure that all pressure is released before removing knurled chamber cap (E).
2. Remove knurled chamber piercing cap (E) which should be screwed out with fingers only - no tools needed.
3. Remove spent CO₂ cartridge (G).
4. Before inserting new CO₂ cartridge, be sure that needle valve (A) is closed.
5. Insert new CO₂ cartridge (G) in handle chamber.
6. Before replacing chamber piercing cap, examine and be sure piercer (F) is backed out against shoulder (I). Turn roll pin handle (J) counter clockwise to accomplish this.
7. Replace chamber piercing cap (E). No Tools needed - Screw in Finger Tight.
8. Again check to make sure that needle valve (A) is closed. If it is not, air will escape out the safety relief and manual vent valve (D).
9. Turn roll pin handle (J) clockwise all the way in to pierce the CO₂ cartridge then back it out against the shoulder (I). (Counter clockwise). This now charges the tester with CO₂.
10. Replace tester on holster. Tester is now charged and ready to test gauges or pressure switches.



GRAHAM-WHITE
SALES CORP.

SALEM, VIRGINIA 24153



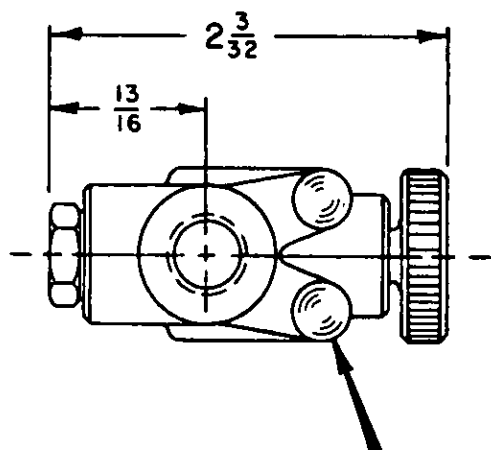
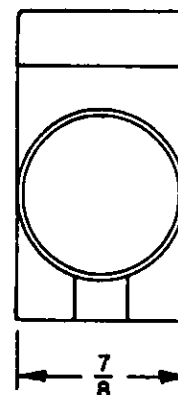
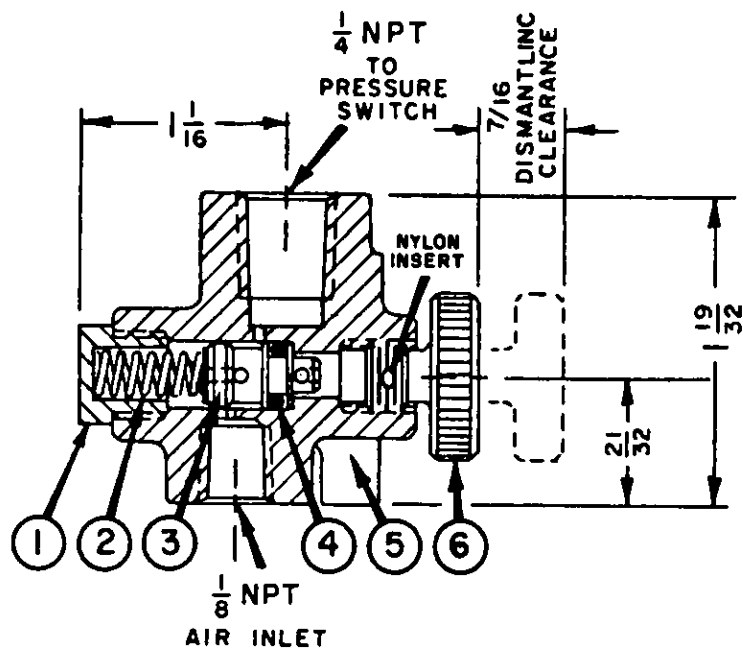
FIG 7.19D
**PRESSURE SWITCH
TEST FITTING**

7-49

No. 775-3

OCTOBER 25, 1972

SYM	DATE	REVISION
A	4-14-76	NYLON INSERT ADDED TO ITEM 6



NON-FUNCTIONAL BOSSES
MAY BE DRILLED AND TAPPED
AT VENDOR'S DISCRETION

P A R T S L I S T			
ITEM	PART No	DESCRIPTION	QTY
1	3552	SHUTTLE CAP	1
2	3555	SHUTTLE SPRING	1
3	3597	SHUTTLE	1
4	2436	SEAL	1
5	3598	BODY	1
6	3599	PROBE PLUG	1

SHIPPING Wt. — 1 lb. APPROX.

U.S. PATENT No. 3,557,602
No. 3,601,142

**GRAHAM-WHITE
SALES CORP.**

FIG 7.19 E
Air Brake Pressure Switch



**SALEM QUICK DISCONNECT
FITTING FOR AIR GAUGES
AND PRESSURE SWITCHES**

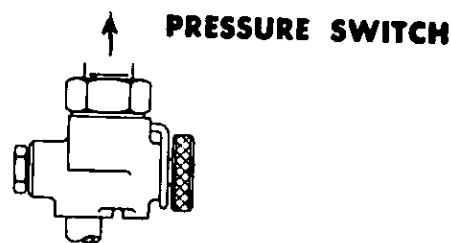
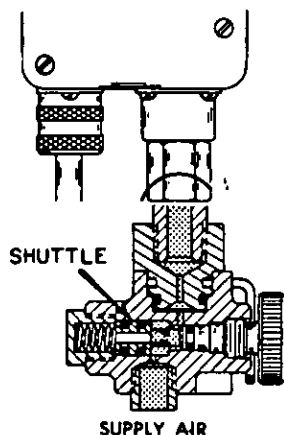


Illustration 1

Illustration 2

PRESSURE SWITCH

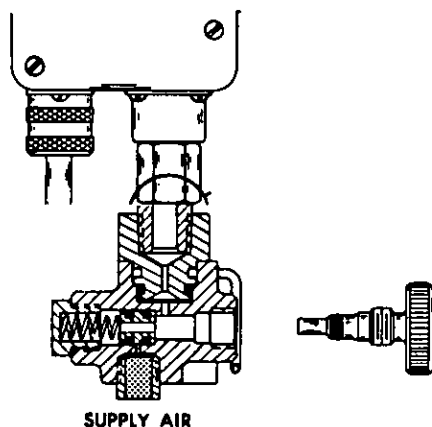


Suggested #775-3 Fitting permits easy and accurate testing of the Pressure Switch without the necessity of shutting off air--done the same as shown in illustration 4.

Pressure Switch In Service

Illustration 2 shows the Salem Test Fitting in service--air is passing through the fitting to the pressure switch. Probe plug moves shuttle--opening air supply to switch.

Illustration 3



**Pressure Switch Out of Service
Ready for Test**

Illustration 3 shows the Probe Plug removed and Shuttle automatically blocking air passage to pressure switch--the gauge is now ready for test. NOTE: THE AIR PRESSURE ON THE BRAKES DOES NOT HAVE TO BE BLOWN DOWN WHEN USING SALEM TEST FITTING.

Testing Pressure Switch

Illustration 4

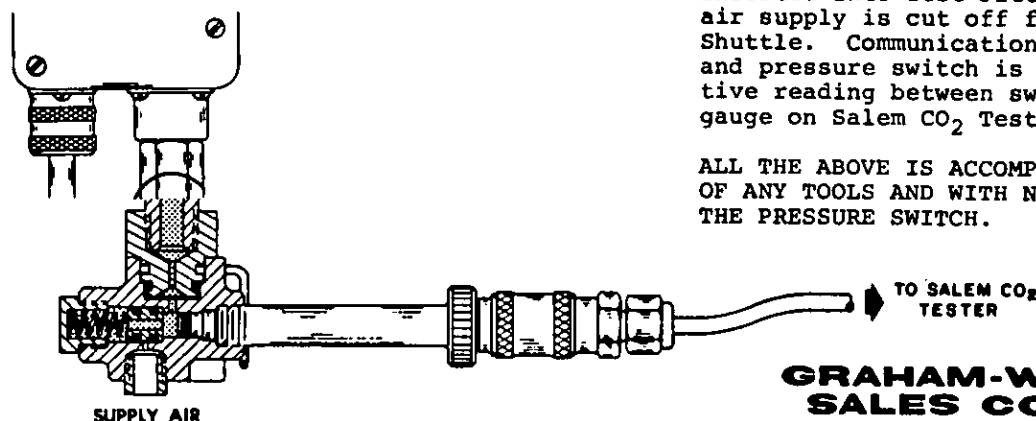


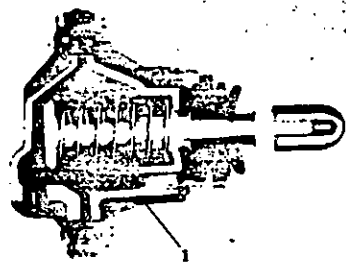
Illustration 4 shows Salem CO₂ tester probe inserted into Test Fitting. Communication from air supply is cut off from pressure switch by Shuttle. Communication between Salem CO₂ Tester and pressure switch is established for comparative reading between switch settings and master gauge on Salem CO₂ Tester.

ALL THE ABOVE IS ACCOMPLISHED WITHOUT THE USE OF ANY TOOLS AND WITH NO DAMAGE OR STRAIN ON THE PRESSURE SWITCH.

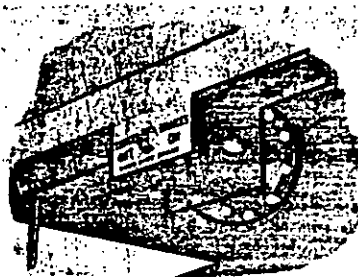
**GRAHAM-WHITE
SALES CORP.**

1209 COLORADO STREET
SALEM, VIRGINIA 24163-1099

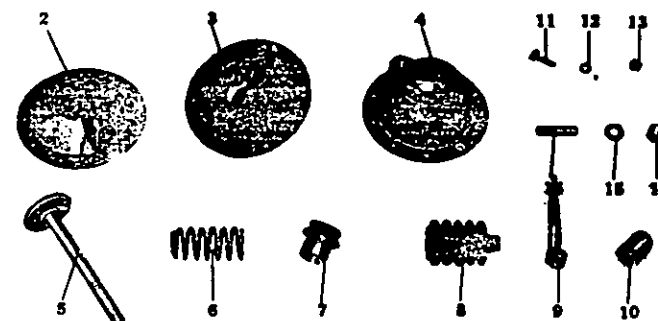




INDICATOR ASSEMBLY



INDICATOR APPLIED TO CAR



PARTS FOR INDICATOR

AIR "ON-OFF" INDICATOR ASSEMBLY

Figure 7.20
BRAKE APPLIED INDICATOR

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #
1		Brake Applied Indicator	WABCO	86-00195		
2		Pressure Plate	WABCO	86-06187		
3		Diaphragm	WABCO	86-06185		
4		Non-Pressure Head	WABCO	86-06186		
5		Push Rod	WABCO	86-06181		
6		Release Spring	WABCO	86-06184		
7		Push Rod Guide	WABCO	86-06183		
8		Boot	WABCO	86-06182		
9		Indicator Stop Nut	WABCO	21A13M		
10		Indicator	WABCO	F86-00167		
11		Pressure Plate Bolt	WABCO	7A0420M		
12		Pressure Plate Washer	WABCO	71B16M		
13		Pressure Plate Nut	WABCO	21A04M		
14		Stud Bolt	WABCO	86-06188		
15		Lockwasher	WABCO	71A22M		
16		Nut	WABCO	21A11M		

Figure 7.21 WABCO Repair & Test Specification Index

Page	Instruction Name	WABCO #				
	D-22 Passenger Car Brake Equipment 26-C Brake Equipment for Passenger Cars	Gg5050-7 5071-8				
PAGE	COMPONENT	WABCO PART NUMBER	INTRODUCTION #	REPAIR PROCEDURE #	TEST PROCEDURE #	PART LIST
	D-22 Control Valve B-3 Relay Valve F Relay Valves 16" Combined Aux, Emg & Disp. Reservoir		Gg 5050-7 " " "			3220-2 G-h 3231-1 3231-2 3206-1
	26-C Control Valve J-1 Relay Valve		4220-5 S.7 26C 4231-12	42C S.6 & S.9		3220-5 S 7 3231-12
	E-3 Application Valve B-3-B Emergency Brake Valve A-2 Reduction Relay Valve		4230-4 E3 4216-5 2389	R-63-C S.1 R-72-C S.1		3230-4 G-h 3216-5 G-h 3211-5
	1½" Angle Cock - Double Locking 1" Main Reservoir Cutout Cock, Locking Brake Cylinder Cutout Cock, Locking		4216-4 S.15 4216-4 S.20	R-30-C S.1 R-80-C S.2		3216-4 S 15 G-h-3216-4S20
	Branch Pipe Tee Combined Dirt Collector & Cutout Cock		Gg 5050-7 4216-2.1			3216-2 S1
	Hose & Fittings Armoured Hose					3216-3 G-h-3216-3 S3
	UAH Type Brake Cylinder Slack Adjuster		4214-4 S.10 Gg 5050-7			G-h 3214-4 S 10 & 3 G-h 3226-2
	TFM Disk Brake Manual Rebuilding Budd Disc Brake Cylinders Locking Plates & Bolts - Brake Discs		Gg 4003 - -	Gg 4003 SMP #03605 -	Gg 4003 - -	Gg 4003
	E-5 Decelostat Controller C-3 Dump Valve		579565 579449	4345-1 4227-11,57A		G-h-3345-2 3227-11 S7

Figure 7.22
WABCO BRAKE COMPONENT PART LISTS

ITEM	QTY	DESCRIPTION	MFG	MFG #	AMT #	AMMS #

TO BE SUPPLIED

MCHSP.12/53



D-22-P PASSENGER CAR BRAKE EQUIPMENT

The functional characteristics of this brake equipment include the proven desirable elements of its predecessors in this class of service with the addition of features that provide a brake of greater flexibility as required for high speed operation of modern trains. Faster and more certain brake action is provided by features which produce improved functions in the following respects:

Improved Quick Service

This improved quick service feature operates during initial service brake application to insure fast transmission with positive movement of the service slide valve to application position regardless of service slide valve friction.

This feature, during initial application, also provides a limited, positive and uniform development of brake cylinder pressure on all cars with a minimum brake pipe reduction, which permits the train slack to adjust promptly without harsh action.

On split reductions, as generally used in passenger service, the quick service activity is continued at each successive reduction so that a fast rate of transmission is obtained on both initial and succeeding service brake pipe reductions.

Improved Service Stability

The possibility of undesired light service applications, resulting from minor fluctuations in brake pipe pressure, is minimized, as the displacement reservoir exhaust remains open until the service slide valve moves to service position. This insures that only a reduction at service rate will develop sufficient differential to move the piston, graduating valve, and slide valve to close the exhaust and permit development of brake cylinder pressure.

Improved Service Release

Positive release is insured regardless of service slide valve friction by a release insuring feature, which operates positively to release the brake when brake pipe pressure exceeds auxiliary reservoir pressure by more than 2 pounds.

Improved Graduated Release

The operation of this feature is such that an exceedingly uniform and flexible brake cylinder pressure release is secured on all cars when graduating off the brake.

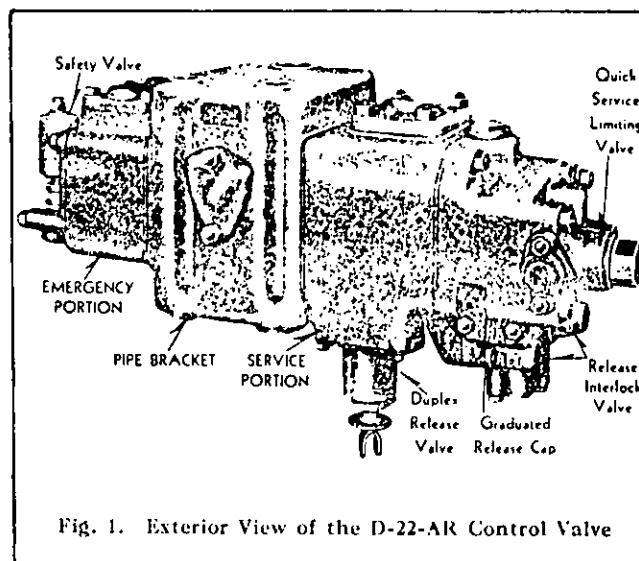


Fig. 1. Exterior View of the D-22-AR Control Valve

Improved Emergency Transmission Speed

This is most important during emergency brake application because it accomplishes a further improvement in control of slack action as compared to previous standard brake equipment.

Improved Release After Emergency

By the use of an accelerated release feature, a faster and more positive release is obtained than with the previous standard passenger brake. This is accomplished by connecting displacement reservoir and auxiliary reservoir air to the brake pipe during initial release to increase brake pipe pressure locally, thereby supplementing air flow from the brake valve to provide a fast rise in brake pipe pressure. This operation also makes a definite reduction of auxiliary reservoir pressure to insure positive and prompt release.

Increased Capacity

The maximum brake cylinder volume for which previous passenger brake control valves were designed is the equivalent of two 16 inch brake cylinders.

The D-22-AR control valve is designed as a piloting device for operation of one or more large capacity relay valves; therefore, one standard control valve may be used with any desired number, size, or arrangement of brake cylinders.

More Uniform Brake Cylinder Pressure

Because of the automatic self-lapping feature of relay valves, the brake cylinder pressure developed for a given brake pipe reduction is not affected by varying brake cylinder piston travel or normal brake cylinder leakage. Air consumption, of course, is held to the desirable minimum with uniform minimum piston travel.



Simplified Construction

The D-22-AR Control Valve is smaller than is the case with the previous standard operating valve. Space required for installation is also less by reason of combining in one structure the volume of the emergency, auxiliary and displacement reservoirs.

Because of more simple construction, the weight of the operating devices comprising this latest equipment is materially reduced as compared to the previous standard equipment.

Harmonious Interchange

The equipment operates in harmony with the previous standard passenger car brake when cars having either the previous or new standard equipment are associated in the same train.

Electro-Pneumatic Conversion

The brake equipment is so designed that it can readily be adapted for electro-pneumatic operation with speed governor control for high speed service by the addition of the necessary available devices.

PARTS OF THE EQUIPMENT

The following is a list of the parts which make up the equipment, with a short description of each. The piping and relative location of the parts are shown on Plate 10, at the back of the book.

1. A *D-22-AR Control Valve* which corresponds in a general way to the universal valve now in common use. It operates to control the admission of air to and exhaust from the relay valve and to charge the reservoirs.
2. A *B-3 or F-6 Relay Valve* which relays the application and release operation of the control valve. The B-3 reproduces in the brake cylinders the equivalent pressure established in the displacement reservoir. The F-6 reproduces brake cylinder pressure in an approximate 60% ratio to displacement reservoir pressure.
3. An *A-2 Quick Service Valve* which transmits local quick service activity from car to car to provide fast transmission of the brake pipe reduction, particularly on successive brake pipe reductions following the initial reduction.
4. A *Combined Auxiliary, Emergency and Displacement Reservoir*. The displacement reservoir provides the required operating volume to develop the proper relation of brake pipe reduction. The auxiliary reservoir provides the air supply for proper functioning of the control valve service portion. The emergency reservoir air is used to provide the quick recharge, graduated release and high emergency pressure features.
5. *Brake Cylinders* with pistons and rods so connected through the brake levers and rods to the brake shoes that when the pistons are forced outward by the air pressure, this force is transmitted through the rods and levers to the brake shoes and applies them to the

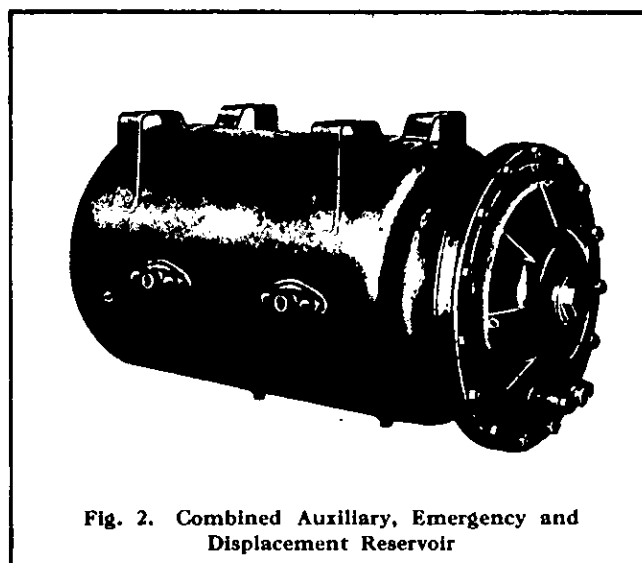


Fig. 2. Combined Auxiliary, Emergency and Displacement Reservoir

wheels.

6. *Two Supply Reservoirs*, which provide the air supply for the brake cylinders.

7. *Two B-3-B Emergency-Brake Valves*, one at each end of the car, permit the conductor to apply the brake in case of accident or emergency.

8. *Two E-3 Brake Application Valves*, one in the brake pipe branch to each Emergency-Brake valve, function to vent the brake pipe when actuated by an Emergency-Brake valve.

9. A *Combined Dirt Collector and Cut-Out Cock* is mounted on the control valve pipe bracket. The purpose of the dirt collector is to prevent entrance into the control valve of pipe scale, sand, cinders, or foreign particles of any kind. The cut-out cock provides a means of closing the pipe connections between the control valve and the brake pipe.

10. *Four Branch Pipe Tees*, which are bolted to the car underframe by means of bolting lugs. The purpose of the branch pipe tee is to prevent the passage of excessive moisture from the brake pipe into the branch pipe fittings.

11. A *Pressure Retaining Valve* which is connected by piping to the control valve exhaust. Its purpose, when the handle is placed in retaining position, is to retard the rate of brake cylinder exhaust while recharging the equipment.

12. An *Automatic Slack Adjuster*, used with each brake cylinder, maintains a predetermined brake cylinder piston travel.

13. *Various cut-out cocks, hose connections, dummy couplings, fittings, etc.*, incidental to the piping, the location and uses of which will be readily understood from the piping diagram of the equipment, and the description which follows.

The train air signal equipment is included on the piping diagram, Plate 10, but is not part of the brake

equipment. It provides a means whereby signals may be transmitted from any part of the train to the locomotive and is described in a separate publication—Instruction Pamphlet No. 5061.

NOT USED

The 3-AP DECELOSTAT® Equipment, shown in dotted line on Plate 10, is not a part of the brake equipment but is recommended for wheel slip control, see page 113.

DESCRIPTION OF THE PARTS

The D-22-AR Control Valve consists of three portions as follows:

1. *A Two Face Pipe Bracket* to which are bolted the service portion and the emergency portion. The bracket is bolted to the car under-framing, all pipe connections being made permanently to the bracket by means of reinforced flanged unions so that no pipe joints need be disturbed when removing or replacing the operating portions.

2. *The Service Portion*, which controls the desired charging of the reservoirs and the service application and release of the brakes. It provides the proven desirable operating features of the universal passenger car service brake with improved quick service transmission, release insuring, release interlock and graduated release features.

3. *The Emergency Portion*, which controls the quick action feature, high emergency brake cylinder pressure and the accelerated emergency release function. It provides the proven desirable operating features of the universal passenger car emergency brake with improved emergency transmission and accelerated release after emergency application.

The PIPE BRACKET contains the quick action chamber, a removable filter element 12, three choke plugs in the service portion face and one choke plug in the emergency portion face. These plugs are identified by reference numbers on Figs. 4 and 6 and Plate 1 as follows:

7. *Exhaust Choke Plug, Fig. 6*, which controls the rate of exhaust from the displacement reservoir when releasing the brake.

8. *Service Choke Plug, Fig. 6*, which controls the rate of displacement reservoir build-up when a service brake application is made.

14. *Preliminary Quick Service Choke Plug, Fig. 6*, which controls the rate of brake pipe flow to the quick service volume during the first stage of preliminary quick service application.

21. *Emergency Choke Plug, Fig. 4*, which controls the rate of displacement reservoir build-up from the emergency reservoir when an emergency brake application is made.

The pipe bracket has the necessary pipe connections for later conversion to electro-pneumatic operation, as

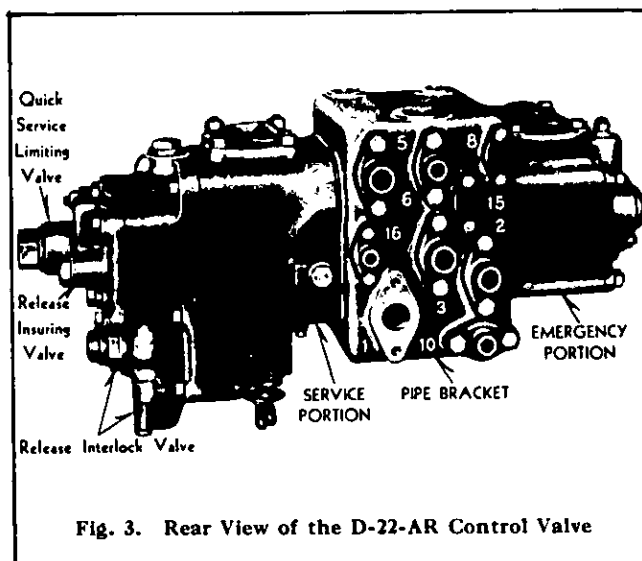


Fig. 3. Rear View of the D-22-AR Control Valve

shown on Plate 10. These connections are Nos. 8 and 15 which have blanking flanges for automatic service. Also, blanking plate 15, on the opposite side of the pipe bracket, is arranged to permit substitution of a check valve portion for electro-pneumatic service.

The three suspension bolt holes through the bracket are protected to prevent accumulation of water and freezing. The two front holes are cut away in the middle while the rear is protected by sealing ring 17, as shown in Fig. 4.

The SERVICE PORTION Parts:

(a) *The service piston 93 with its piston ring 94*, which moves in its bushing in accordance with variations in air pressure across the piston head and thereby controls charging of the auxiliary and emergency reservoirs. An oil reservoir in the piston head, connected to the ring groove by a wick, provides lubrication of the ring and piston bushing between normal cleaning periods.

(b) *The service slide valve 98*, which is attached to the stem of the service piston by pin 102 and lock 103 and held to a seat in its bushing by leaf spring 101.

(c) *The service graduating valve 99*, which is shouldered in the piston and held to a seat on the service slide valve by coil spring 100.

The service slide valve and graduating valve move with the service piston to establish the following port connections in the various positions:

(1) Auxiliary reservoir (service slide valve chamber), as controlled by the graduating valve, to the spring chamber of the release piston in release and preliminary quick service positions for the purpose of holding the release slide valve exhaust *open* in these positions; the service slide valve exhaust to the spring chamber of the release piston in service and service lap positions, and the release interlock slide valve exhaust to the spring chamber of the release piston in

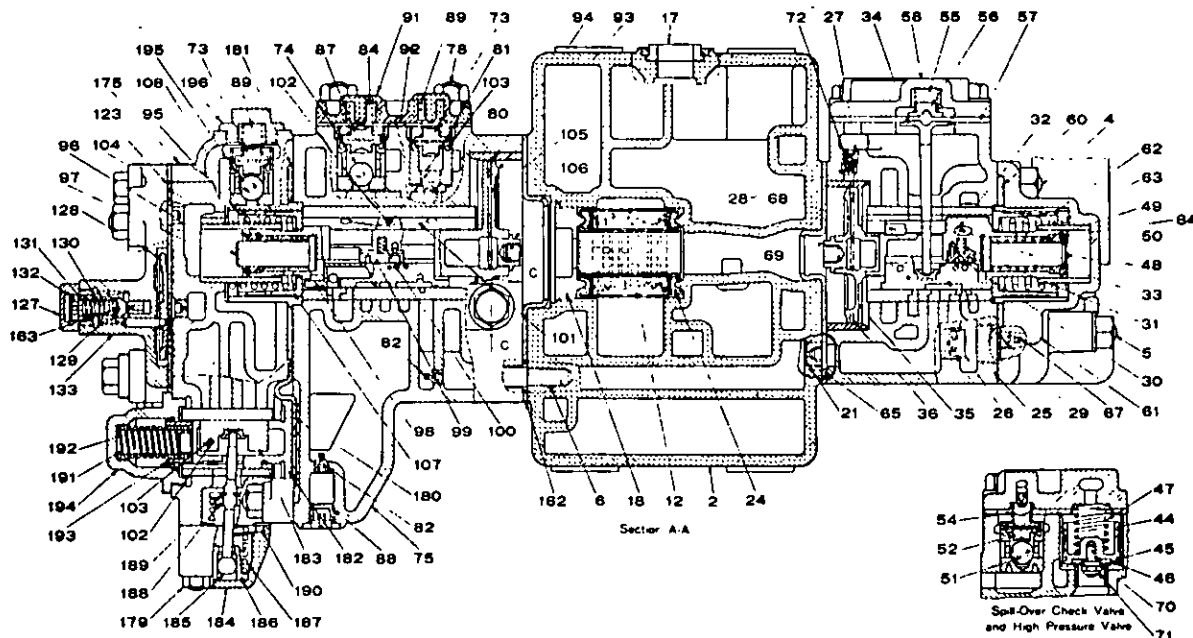


Fig. 4. Sectional View of the D-22-AR Control Valve

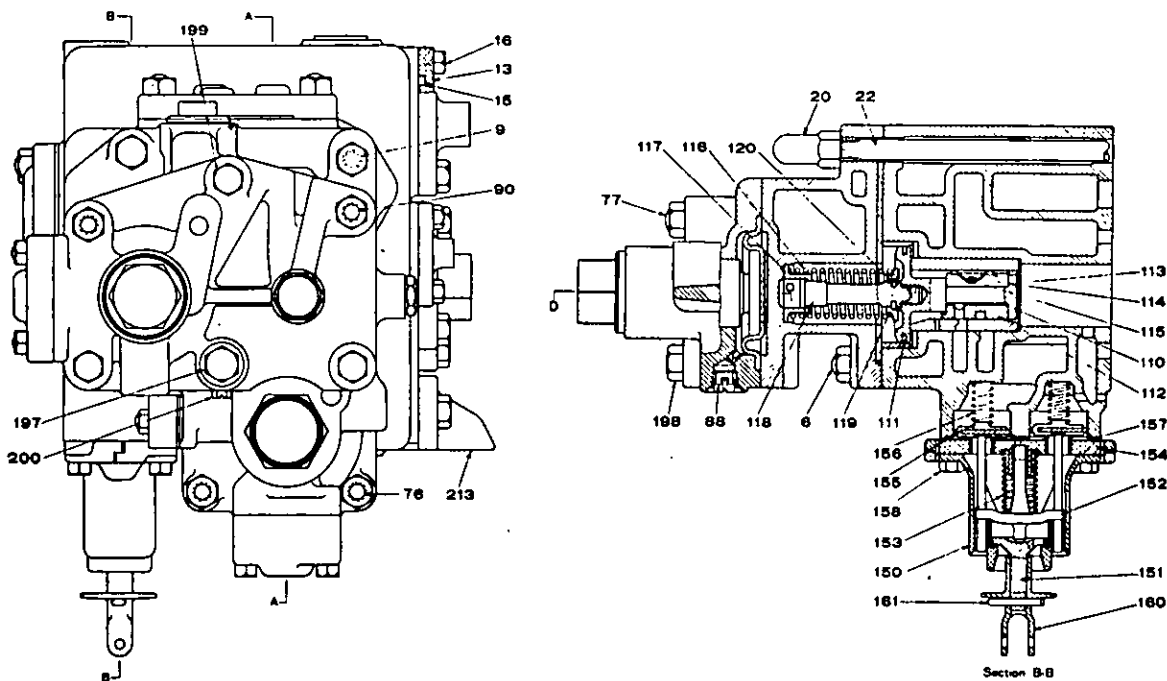


Fig. 5. Outline Service End, Release Piston and Slide Valve, and Duplex Release Valve Assembly.
D-22-AR Control Valve

graduated release lap position, for the purpose of holding the release slide valve exhaust *closed* in these positions.

(2) Brake pipe air through the graduating valve to the Q.S. Vol. in preliminary quick service position to provide a controlled local reduction in brake pipe pressure.

(3) Brake pipe air to the displacement reservoir in service position to transmit quick service application until a predetermined displacement reservoir pressure of approximately 10 pounds is built up.

(4) Auxiliary reservoir air from the service slide valve chamber past the graduating valve to the displacement reservoir to provide a service brake application in service position.

(5) Auxiliary reservoir air from the service slide valve chamber to the release insuring valve with the slide valve in release, preliminary quick service and graduated release lap positions; and the release insuring valve to the service slide valve exhaust in service and service lap positions for the purpose of providing a positive movement of the service piston to release position whenever brake pipe pressure has a 2 pound differential over auxiliary reservoir pressure.

(d) *The service piston return spring 108, and cage 107*, which prevent movement of the service piston beyond release position unless brake pipe pressure is about three pounds higher than auxiliary reservoir. In this event, brake pipe pressure under the graduating valve is cut off by the slide valve to prevent possibility of blowing the graduating valve off its seat.

(e) *The service piston spring 95 and the spring guide 96*, which provide stability of quick service activity by preventing movement of the service piston to preliminary quick service position until a predetermined difference in pressure between the brake pipe and the auxiliary reservoir is attained.

(f) *The supply reservoir charging check valve 87 and ball check valve 74*, which permit charging flow from auxiliary reservoir to the supply reservoir but prevent back flow.

(g) *The auxiliary reservoir charging check valve 73*, which permits brake pipe air to charge the reservoir with the service piston in release position, but prevents any back flow of auxiliary reservoir air.

(h) *The supply reservoir charging check valve 73a and ball check valve 74a*, which permit charging flow from brake pipe to supply reservoir but prevent back flow.

(i) *The back flow check valve 73b and ball check valve 74b*, which prevent flow of displacement reservoir air into the brake pipe, such as during emergency application when displacement reservoir pressure is higher than brake pipe.

(j) *The emergency reservoir charging check valve 73c and ball check valve 195*, which permit charging flow from auxiliary reservoir to emergency reservoir with the release piston and slide valve in release position but prevent back flow from emergency to auxiliary reservoir except as controlled by the release interlock valve during recharge.

(k) *The quick service limiting valve portion* which operates to terminate quick service activity after approximately 10 pounds displacement reservoir pressure is developed. This portion consists of a piston 137 with a slide valve 136 attached to the piston by pin 102 and lock 103. The position of the piston and slide valve on its seat is controlled by displacement reservoir pressure, acting on diaphragm 71, opposed by spring 140. When this pressure is less than approximately 10 pounds, the spring holds the slide valve in its forward position where a slide valve cavity connects two slide valve seat ports, controlling brake pipe air flow to the displacement reservoir during quick service operation. When this pressure exceeds approximately 10 pounds, the spring is overcome, the diaphragm deflects and moves the piston and slide valve to their rear position where the slide valve cavity disconnects the two seat ports. Strut spring 146 exerts its tension through strut 145 to hold the slide valve on its seat. Wasp excluder 88 protects the atmospheric vent to the slide valve chamber, which prevents pressure accumulation.

(l) *The release insuring valve portion* which operates positively to release the brake when brake pipe pressure exceeds auxiliary reservoir by more than 2 pounds. This portion consists of a release insuring cap in which is contained a release insuring valve 129 normally held seated by spring 130, closing a connection from the service slide valve. Follower 128 is in contact with release insuring diaphragm 123. One face of the diaphragm is exposed to brake pipe pressure through choke 177, the other face to service slide valve chamber pressure (auxiliary reservoir) through choke 176. With these pressures substantially equal the diaphragm remains balanced, but if brake pipe pressure exceeds auxiliary reservoir pressure by more than 2 pounds the diaphragm is deflected, moving the follower and unseating the valve 129, which reduces auxiliary reservoir pressure to positively release the brake.

(m) *The release interlock valve portion* which controls the graduated release and quick recharge features. This portion consists of a piston 182 pinned to a slide valve 183 by pin 102 and lock 103, and held to its seat by spring 187 through strut 185. The slide valve has two positions on its seat between interlock diaphragm 180 and spring 191. The face of the diaphragm is connected to displacement reservoir pressure. With less than 7 pounds displacement reservoir pressure, spring 191 holds the piston and slide valve in forward position where the slide valve prevents flow from the emergency reservoir to the auxiliary reservoir. With approximately 10

pounds displacement reservoir pressure the spring is overcome and the diaphragm is deflected, moving the piston and slide valve to the rear position where a slide valve cavity connects the emergency reservoir to the auxiliary reservoir, thus providing quick recharge and graduated release functions. Check valves 73c and 195 in the emergency reservoir charging passage prevent back flow from the emergency to the auxiliary reservoir from this source so that recharge from the emergency reservoir can take place only as controlled by the release interlock slide valve.

This feature stabilizes the service piston, especially where the control valve is used with the electro-pneumatic brake system. During electro-pneumatic straight air brake applications, the auxiliary reservoir pressure is reduced into the straight air pipe, the higher brake pipe pressure thus holding the service piston in release position. With the emergency reservoir positively cut off from the auxiliary reservoir by the release interlock valve the reduction is effectively obtained on the smaller volume of the auxiliary reservoir alone, thereby assuring a high differential of brake pipe pressure to hold the service piston in release position.

(n) *The graduated release cap 121* which conditions the valve for Graduated or Direct Release. The letters REL. are cast on the body below the graduated release cap. The letters DIR. and GRA. are cast on the cap. When the letters DIR. are over the letters REL., the valve is conditioned for Direct Release; when the letters GRA. are over the letters REL. the valve is conditioned for Graduated Release. The cap is set by removing two nuts and turning the cap so that either DIR. or GRA. line up with REL. on the body.

(o) *The release piston 110* which moves its attached release slide valve 112 in conjunction with spring 116 to open and close the displacement reservoir exhaust, and controls charging of the emergency reservoir in accordance with the position assumed by the service slide valve.

(p) *The charging chokes 81 and 83*, which control the charging flow of brake pipe air to the auxiliary reservoir. Choke 83 is located in the piston bushing and controls flow to the slide valve chamber. Choke 81 controls the flow through a number of holes in the bushing to the auxiliary reservoir, thence to the emergency and supply reservoirs.

(q) *The wasp excluder 88*, which protects the service slide valve and Q.S. Vol. exhaust from dirt and entrance of insects.

(r) *The quick service choke plug 82a*, which controls the flow of brake pipe air to the displacement reservoir during the third stage of quick service.

(s) *The duplex release valve*, handle 160 of which controls the opening of auxiliary reservoir release valve 155 and emergency reservoir release valve 155a, permitting manual reduction of auxiliary reservoir pressure alone or both reservoirs together.

(t) *The quick service volume, (Q.S. Vol.)* into

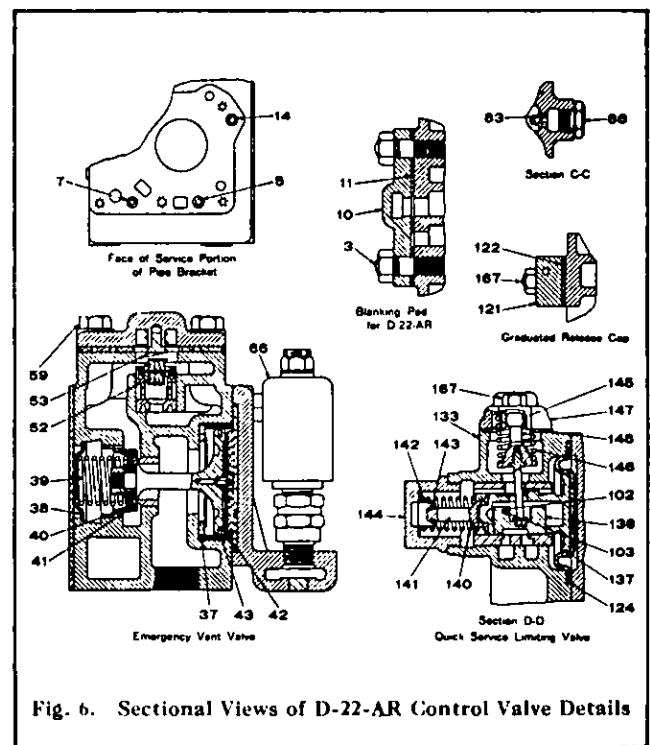


Fig. 6. Sectional Views of D-22-AR Control Valve Details

which brake pipe air flows to initiate preliminary quick service.

(u) *The preliminary quick service exhaust choke plug 82*, which controls the continuous exhaust of quick service volume air to the atmosphere and provides the secondary quick service function.

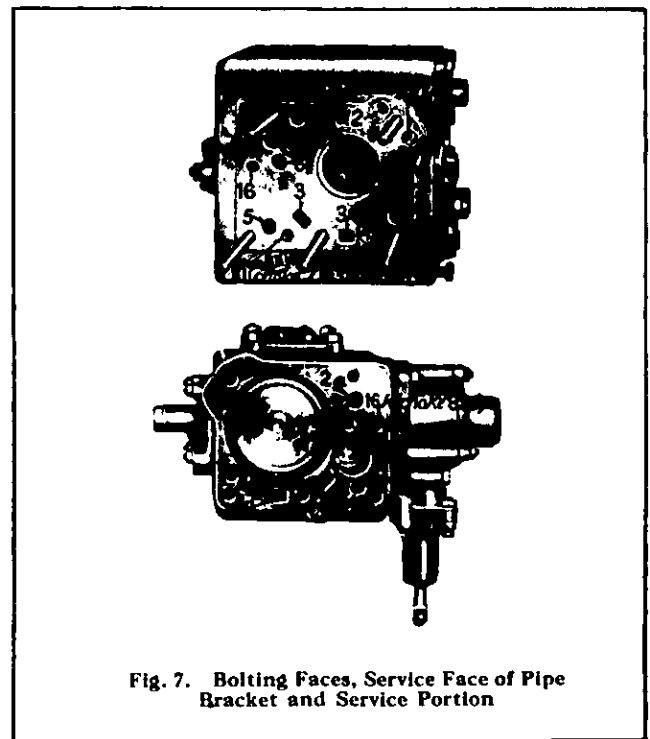


Fig. 7. Bolting Faces, Service Face of Pipe Bracket and Service Portion

The EMERGENCY PORTION Parts:

(a) *The emergency piston 35 with its piston ring 36, which moves in its bushing in accordance with variations in air pressure across the piston head and thereby controls the charging of the quick action chamber in the pipe bracket. An oil reservoir in the piston head, connected to the ring groove by a wick, provides lubrication of the ring and piston bushing between normal cleaning periods.*

(b) *The emergency slide valve 29, which is attached to the emergency piston by two pins 32 and two locks 33.*

(c) *The emergency graduating valve 30, which is shouldered in the piston and held to its seat on the emergency slide valve by coil spring 31.*

The emergency slide valve and graduating valve move with the piston to establish the following port connections in the various positions:

(1) From quick action chamber, through the graduating valve, to atmosphere during service applications.

(2) From quick action chamber to vent valve piston 42 during emergency applications.

(3) From emergency reservoir to the spring side of high pressure valve 44 except during emergency applications.

(4) From spring side of high pressure valve 44 to atmosphere during emergency applications.

(5) From the displacement reservoir, past accelerated release check 52a, to the brake pipe during release after emergency.

(6) From displacement reservoir to the safety valve during a service application, and cuts off this connection during an emergency application.

(d) *Piston 42 and vent valve 40, which vent brake pipe air to atmosphere during an emergency application.*

(e) *The emergency piston return spring 63, and cage 62, which, during release cycles, return the emergency piston from accelerated release to normal release position when quick action chamber pressure recharges to approximately brake pipe pressure.*

(f) *The emergency piston spring 49, and spring guide 48, which stabilize the emergency portion against undesired emergency.*

(g) *The high pressure valve 44, which connects emergency reservoir air to the displacement reservoir during emergency applications.*

(h) *The spillover check valve 52 and ball check 51, which provide against back flow from the emergency reservoir to the quick action chamber.*

(i) *The accelerated release check valve 52a, which prevents flow of brake pipe air into displacement reservoir and relay valve.*

(j) *The diaphragm spring 55 and slide valve strut 34, which serve to keep the slide valve seated in the absence of quick action chamber pressure.*

(k) *The safety valve 66, which limits displacement reservoir pressure during service brake applications to the safety valve setting. Since the safety valve is set to open at approximately 60 pounds and displacement reservoir pressure determines that supplied to the brake cylinders, service brake cylinder pressure is limited to this amount.*

(l) *The charging choke plug 27, which controls the rate of flow from the brake pipe to the quick action chamber. Felt strainer 28 protects the choke port against the possibility of restrictions by fine dust.*

(m) *The choke plug in vent piston 42, and choke 67 in the vent valve cylinder cover, which control the rate of exhaust of quick action chamber air during emergency application, and thus provide the time interval required before release can be effected following an emergency application.*

(n) *Wasp Excluder 26 in the emergency exhaust which prevents the entrance of insects.*

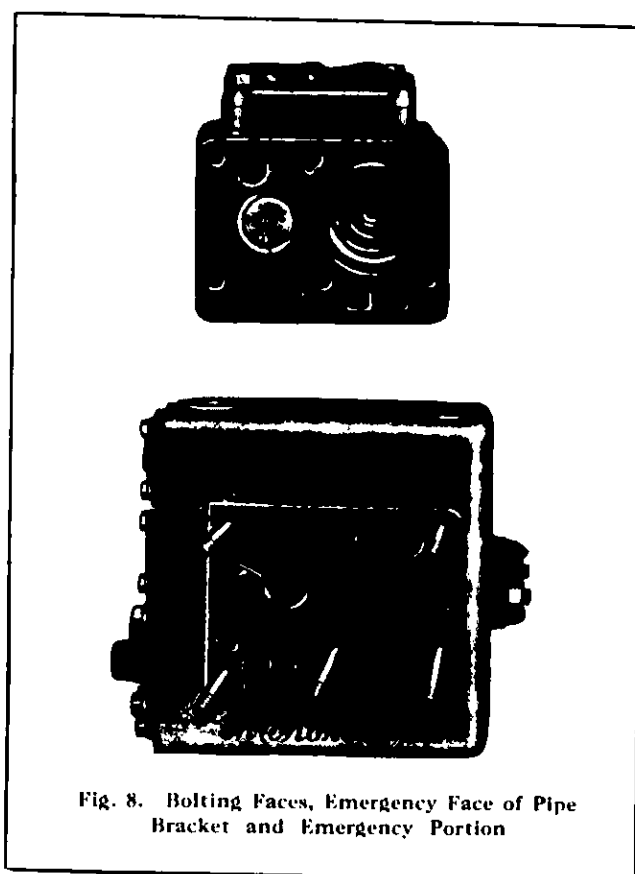


Fig. 8. Bolting Faces, Emergency Face of Pipe Bracket and Emergency Portion



PORT CONNECTIONS

Figs. 9, 10, 11 and 12

Service Graduating Valve:

- k*—Cavity which connects graduating valve seat, ports *c* and *d* in preliminary quick service and service positions.
- m*—Cavity which connects graduating valve seat ports *a* and *b* in graduated release lap position.

Service Slide Valve:

- f*—Service port extending from slide valve face to graduating valve seat. The graduating valve covers this port in release and service lap positions and opens it in all other positions. It registers with slide valve seat port *3b* in service and service lap positions.
- c*—Preliminary quick service port extending from the slide valve face to the graduating valve seat. It registers with slide valve seat port, *Q.S. Vol.* in release, preliminary quick service and graduated release lap positions.
- d*—Brake pipe port extending from the slide valve face to the graduating valve seat. It registers with slide valve seat port *d1* in release, preliminary quick service and graduated release lap positions.
- a*—Release piston control port extending from slide valve face to graduating valve seat. It registers with slide valve seat port *a1* in release, preliminary quick service and graduated release lap positions.
- b*—Release interlock port extending from slide valve face to graduating valve seat. It registers with slide valve seat port *b1* in release, preliminary quick service and graduated release lap positions.
- p*—Two drill-connected cavities. In service, and service lap positions the small cavity registers with seat port *g1*, and the large cavity connects seat ports *a1* and *Ex*. As the two cavities are drill-connected, they form a common exhaust cavity from seat ports *g1* and *a1*.
- n*—Two drilled-connected cavities, the larger of which registers with seat port *3d* in all positions. In service and service lap positions the smaller cavity registers with seat port *d1*, therefore the two seat ports *3d* and *d1* are drill-connected between the two cavities.
- g*—Cavity extending to the cross groove through which auxiliary reservoir air is supplied the cavity from the slide valve chamber at all times. The cavity registers with seat port *g1* in release, preliminary quick service and graduated release lap positions.

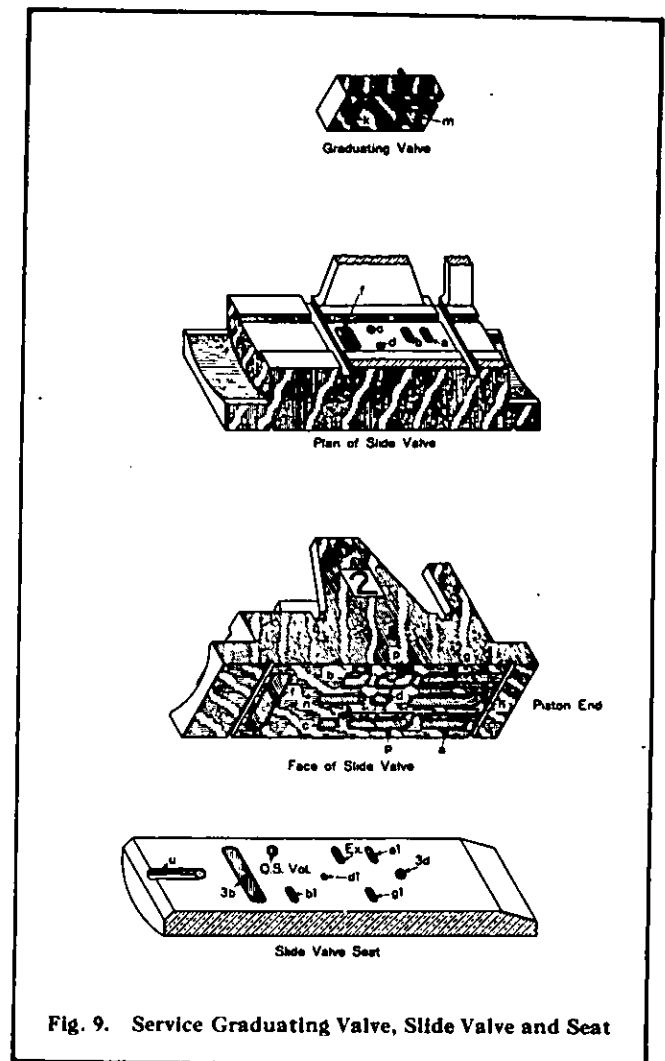


Fig. 9. Service Graduating Valve, Slide Valve and Seat

Service Slide Valve Seat

- Ex*.—Port to the exhaust through wasp excluder.
- a1*—Port to the spring chamber of the release piston.
- b1*—Port to release interlock slide valve seat.
- d1*—Quick service port from brake pipe through choke 14.
- 3d*—Quick service port to displacement reservoir through preliminary quick service choke plug 82a.
- 3b*—Service port to displacement reservoir through service choke plug 8.
- g1*—Release insuring port from chamber *M* of the release insuring valve.
- Q.S. Vol.*—Port to the Quick Service Volume thence through choke 82 and wasp excluder to the exhaust, *Ex*.

u—Tail Port Connecting auxiliary reservoir from the slide valve chamber to the service slide valve port *f* in release, preliminary quick service, and graduated release lap positions.

Emergency Graduating Valve

t—Two slot-ports connecting quick action chamber air from the emergency slide valve chamber to the graduating valve seat on the slide valve. The middle port is smaller than the other *t* port. The middle *t* port permits flow of quick action chamber air to seat port *y* in service applications; the other *t* port permits flow of quick action chamber air to seat port *t1* in emergency applications. The third slot shown acts as a balancing port to balance air pressure uniformly over the entire area of the valve.

Emergency Slide Valve

y—Port extending from slide valve face to graduating valve seat. Registers with seat port *Ex*. in release and accelerated release positions.

t1—Port extending from slide valve face to graduating valve seat. Registers with slide valve seat port *t2* in release and accelerated release positions.

h—Two drill-connected cavities which register with seat ports *2g* and *h1* in release and accelerated release positions.

h2—Two drill-connected cavities. In release and accelerated release positions the small cavity registers with seat port *15*, connecting this port to the large cavity which registers with slide valve *Ex.* port. In emergency position the large cavity connects seat ports *h1* and *Ex*.

t3—Cavity, charged to quick action chamber pressure at all times, which connects to seat port *t2* in emergency position.

S—Cavity which connects seat ports *s1* and *3f* in release position; connects seat ports *s1*, *3f* and *3g* in accelerated release position; connects passages *3f* and *15* in emergency position.

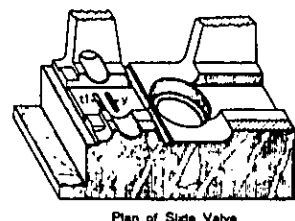
The two cavities that have no designations are balancing ports which maintain balanced air pressure uniformly over the entire area of the slide valve.

Emergency Slide Valve Seat

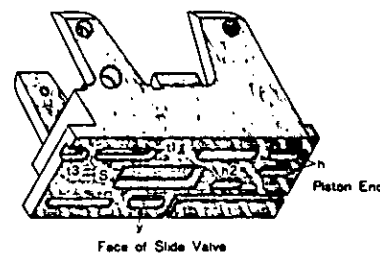
Ex.—Two exhaust ports connecting to wasp excluder 26.



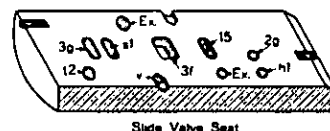
Graduating Valve



Plan of Slide Valve



Face of Slide Valve



Slide Valve Seat

Fig. 10. Emergency Graduating Valve, Slide Valve and Seat

2g—Port to emergency reservoir, outer area of high pressure valve seat and to spillover check valves 51 and 52.

h1—Port to spring chamber of high pressure valve.

3f—Port to displacement reservoir through choke 21 and to inner area of high pressure valve.

15—Port to sanding connection 15 on pipe bracket, the latter being blanked when not used.

s1—Port to safety valve.

t2—Port to vent valve piston face.

3g—Port to accelerated release check valves.

The unnumbered open-end cavities at each end and side are balancing cavities which maintain balanced, uniform air pressure between slide valve and seat.

Release Slide Valve

Q—Cavity connecting seat ports 3 and 10 in release position. The small *Q* port is drilled-connected to the main cavity and connects seat port 10 through the main cavity to seat port *r1* in application position.

r—Port through the slide valve, connecting the slide valve chamber to seat port *r1* in release position.

Release Slide Valve Seat

2c—Charging port to emergency reservoir which is uncovered by the slide valve in release position, and covered in application position.

r1—Charging port to supply reservoirs.

3—Port from displacement reservoir.

10—Port through choke 7 to exhaust (at retaining valve, if used).

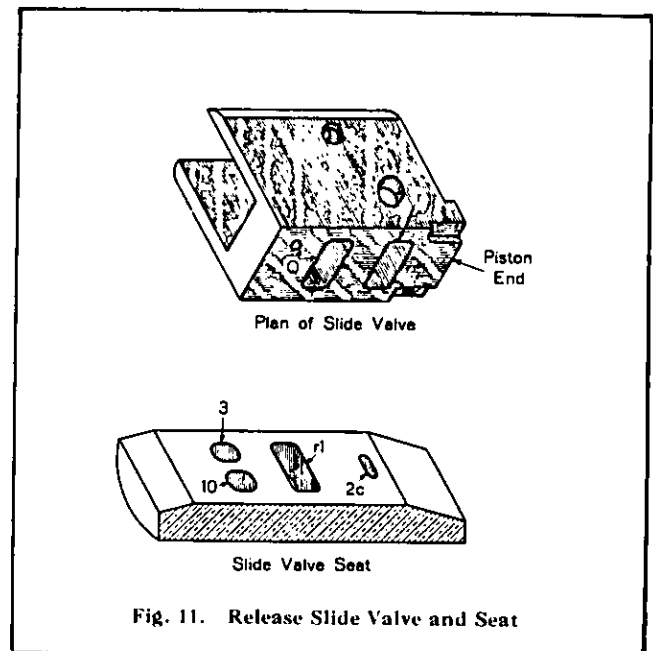


Fig. 11. Release Slide Valve and Seat

Release Interlock Slide Valve

y—Cavity which connects seat port *b1* and *5d* in release position and *b1* to *Ex.*, in application position.

z—Cavity which connects seat ports *2d* and *2c* in application position.

Release Interlock Slide Valve Seat

b1—Port to service slide valve seat.

5d—Port to the rear end of the service slide valve chamber (auxiliary reservoir pressure).

2c—Port to the release slide valve seat.

2d—Port from the emergency reservoir through graduated release cap.

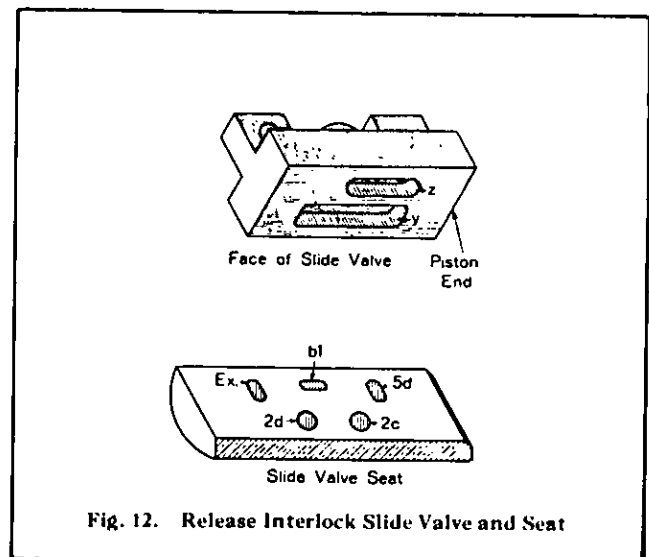


Fig. 12. Release Interlock Slide Valve and Seat

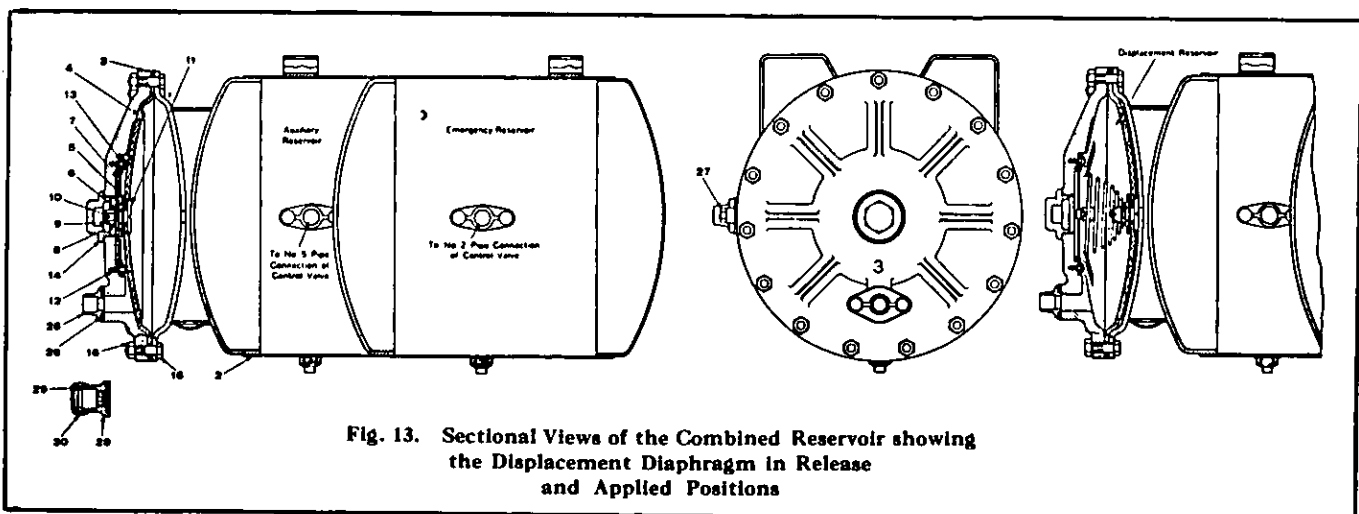


Fig. 13. Sectional Views of the Combined Reservoir showing the Displacement Diaphragm in Release and Applied Positions

Combined Auxiliary, Emergency and Displacement Reservoir

In order to provide for installation in the least possible space and keep weight as low as practical, these three reservoirs are combined in one structure.

The *auxiliary reservoir* is the local air supply used with the control valve to provide for proper functioning of the service portion.

The *emergency reservoir* is the local air supply used with the control valve to provide the quick recharge, graduated release and high emergency pressure features.

The *displacement reservoir* provides the required operating volume to develop the proper relation of brake pipe reduction. As previously described, the control valve operates to admit air to or exhaust air from this reservoir, the application and release rates being controlled by chokes 8 and 7 in the control valve pipe bracket. In this respect the equipment differs from previous equipment as in the latter the triple valve or universal valve applies and releases directly to the brake cylinders. Consequently when a brake application is made with the previous equipment the first few pounds of build-up in the brake cylinder is consumed in replacing the partial vacuum created by movement of the brake cylinder piston from release to application position. The action of diaphragm 4 and spring 7 (Fig. 13) in the displacement reservoir duplicates this condition on the new equipment. When a brake application is made the diaphragm is deflected, Fig. 13, increasing the volume so that the initial rate of pressure development is uniform with that of existing brake equipments.

B-3 Relay Valve

The B-3 relay valve relays the application and release operation of the control valve, reproducing in the brake cylinders, the pressure condition established in the displacement reservoir. It has a high capacity air flow which provides fast application and release rates for any combination, number and sizes of brake cylinders.

As shown in Fig. 14, it consists of a body mounted on a reservoir which also serves as a pipe bracket. Mounting brackets 45, 46 and 52 are reversible, permitting either suspension or floor mounting of the valve. Piston 17 contains lever 19 mounted on ball bearing 20, on which the lever rotates when the piston is moved by pressure changes. The left end of the lever 19 pivots on spring 25 and controls the movements of exhaust valve stem 26, and the latter, in turn, those of exhaust valve piston 29 and exhaust valve 27. The right end of the lever 19 pivots on adjusting screw 24 and controls movements of application valve stem 34 and the latter, in turn, those of application valve 37 and application piston 35.

The application valve 37 opens and closes to control small pressure changes, and the application piston 35

controls large pressure changes. Choke 12 serves to provide quick equalization of air pressure on the piston 35, confining the opening resistance to spring 39 which makes the valve quickly responsive to light application pressure exerted by stem 34.

An oil pad 7 is applied to the bottom of the relay piston chamber. Oil plug 11 permits injection of lubricating oil.

As shown on Plate 10 the connections cast on the pipe bracket are as follows:

M.R.—To the supply reservoir pipe 6

S.A.P.—To the control valve pipe 16

B.C.—To the brake cylinder pipe

Ex.—Open

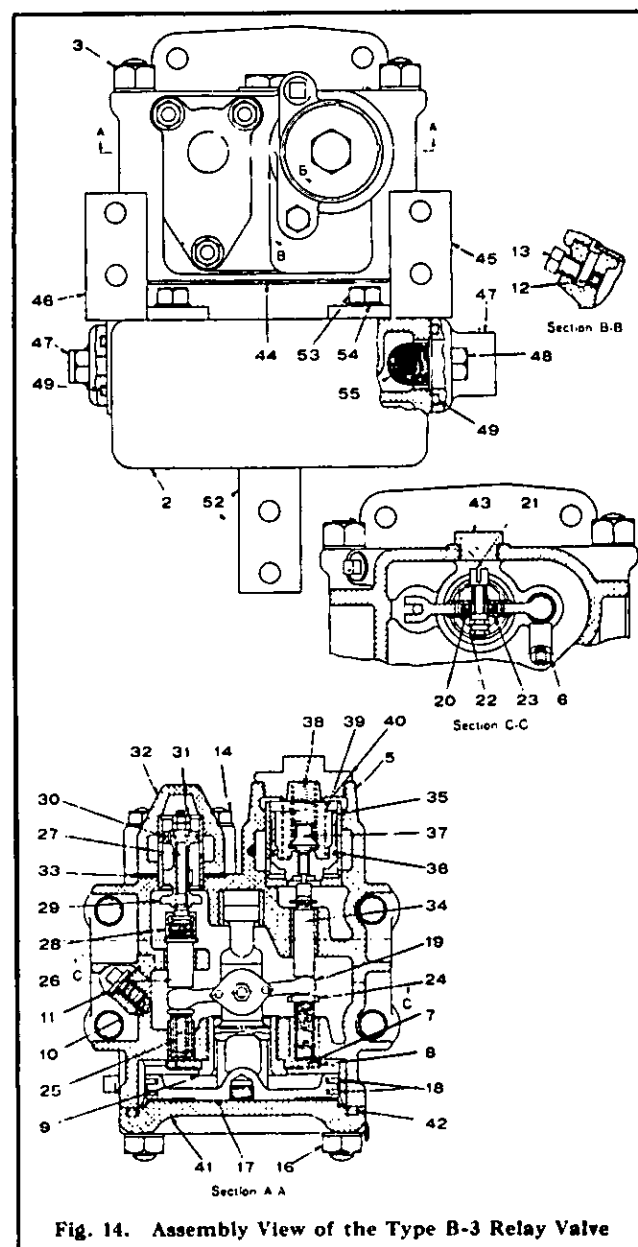


Fig. 14. Assembly View of the Type B-3 Relay Valve

"The pipe bracket contains a volume chamber connected to the face of piston 17. This chamber combines with displacement reservoir during a full service application (and with the emergency reservoir during emergency application) to obtain the proper equalization pressure on the face of piston 17."

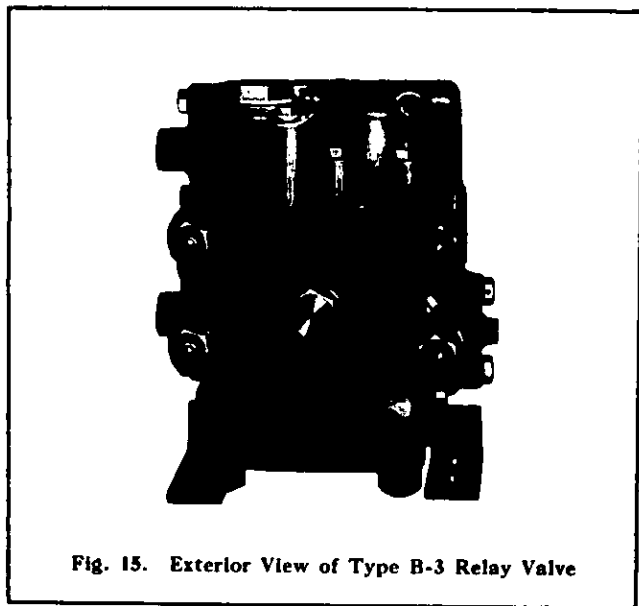


Fig. 15. Exterior View of Type B-3 Relay Valve

F-6 Relay Valve

The F-6 relay valve is used, instead of the B-3 type, on cars having the brake rigging designed to provide the required high braking force for high speed service. It provides the standard maximum braking ratio of 150% for conventional passenger service, but is so designed that available necessary parts can be added to provide governor control of maximum braking pressures for high speed service without any fundamental changes in brake rigging.

The F-6 relay valve consists of Relay Portion 10, Inshot Valve Portion 80, and Magnet Bracket Blanking Plate 4, these portions being bolted to the Pipe Bracket 2, from which they are removable for inspection and cleaning without breaking the pipe connections.

These connections are numbered as indicated by the following figures cast on the pipe bracket:

- 6—To the supply reservoir pipe.
- 16—To the control valve pipe 16.
- 30—To the brake cylinder pipe.

The self-lapping portion is the same as that described for the B-3 relay valve except that a large diaphragm 38 is fitted to the piston, this diaphragm being assembled to the piston by follower 39 and nut 40. The diaphragm is retained between the body casting and diaphragm

ring 71 so that the tension of release spring 42 is exerted on the diaphragm. In the diaphragm portion, three diaphragms 68, 64, and 60 of different areas are assembled on a central bolt between followers 69, 65, 61 and pusher plate 58. These diaphragms have areas of 80%, 60% and 40% in respect to the area of diaphragm 38.

The diaphragms are located centrally in the body between rings 71, 67, 63, and 59, which are doweled to each other so that the diaphragms from a stack in which the central bolt engages nut 40 on the large diaphragm assembly, through which spring 42 exerts its release tension on the complete diaphragm stack. Intermediate and large diaphragm rings 71, 63, and 67 are drilled for port connections to the chambers formed between the diaphragms. There are three check valves 51, weighted by springs 52, and located in the passages to the diaphragm chambers which provide direct release of air from the chambers.

The diaphragm stack as described is arranged to permit speed governor control of braking pressures if the particular car is later used in electro-pneumatic service. The three diaphragms 68, 64, and 60 are thus available for the purpose, but, as used in automatic pneumatic service, only diaphragm 64 is utilized. The area of this diaphragm is 60% of the large diaphragm 38 which operates the self-lapping portion. Therefore, displacement reservoir pressure acting on diaphragm 64 is approximately only 60% effective on diaphragm 38 and the self-lapping portion will operate to reproduce this ratio of brake cylinder pressure. Thus, with a maximum displacement reservoir pressure of 100 pounds the brake cylinder pressure permitted is approximately 60 pounds. Conventional cars have the brake rigging designed for 150% braking ratio at 100 pounds brake cylinder pressure.

New cars, having 250% braking ratio at 100 pounds brake cylinder pressure, are limited by the F-6 relay valve to a maximum of approximately 60 pounds brake cylinder pressure, which is 60% of 250 or 150% braking ratio. This adapts the newer car to harmonious operation in trains with cars having 150% brake rigging.

Spring 42 is used to overcome the resistance of the diaphragm stack and thus insures return of the self-lapping portion to release position and positive release of low brake cylinder pressures. The release force is effective only with application pressure of low value, it being nullified for applications exceeding seven pounds in order to provide a ratio of approximately 60% brake cylinder pressure to displacement reservoir pressure for all applications above this value. This is done by the Inshot Valve Portion which, at the start of an application, permits direct flow from the displacement reservoir to all diaphragm chambers until seven pounds build-up is obtained. This pressure overcomes the resistance of the release spring, and operates the self-lapping portion to provide a low brake cylinder pressure, sufficient to

overcome brake rigging resistance and apply the shoes to the wheels. The inshot valve portion then cuts-off the direct flow to diaphragm chambers P and N (diaphragms 38 and 68), and diaphragm 64 permits brake cylinder pressure build-up to approximately 60% of displacement reservoir pressure.

The Inshot Valve Portion, Section A-A, Fig. 16 consists of a diaphragm 85, supported between the body and bracket castings, to which is assembled a piston 84 with spring 88. The spring normally holds the piston and diaphragm against the stem of a supply valve 92, which is thus held unseated against the tension of its spring 94, permitting flow of displacement reservoir air to the diaphragm stack. A pressure of seven pounds compresses

the spring and deflects the diaphragm sufficiently to permit spring 94 to seat the supply valve, cutting-off the flow to the diaphragm stack. Exhaust valve 93 is normally seated by spring 94. If leakage in the diaphragm stack, or past supply valve 92, should increase the normal, approximate seven pound inshot pressure, the diaphragm 85 will be deflected further, moving piston 84 to engage the stem and unseat the exhaust valve 93, which will open the diaphragm stack to the strainer protected exhaust 82. After the excess pressure is removed, the diaphragm will return to its cut-off position, retaining the seven pound inshot pressure.

A strainer 17 in the pipe bracket protects the valves, as air from the displacement reservoir passes through it.

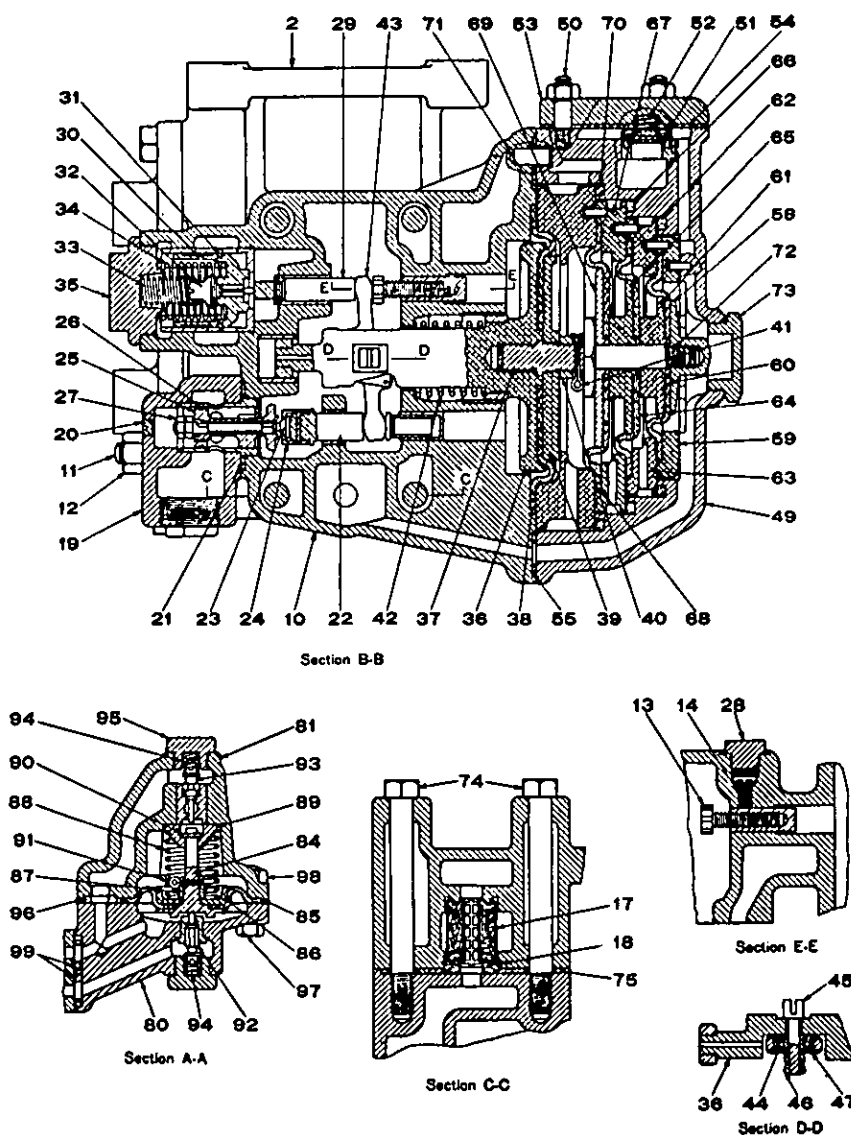


Fig. 16. Assembly Views of the F-6 Relay Valve

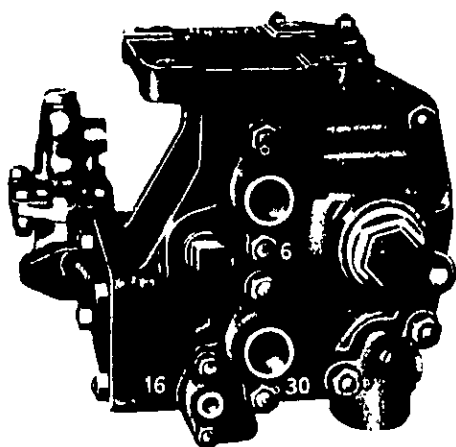
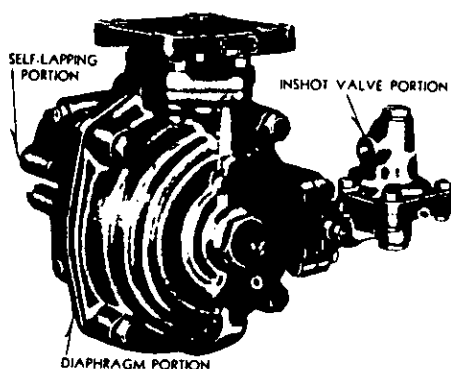


Fig. 17. Exterior Views of the F-6 Relay Valve

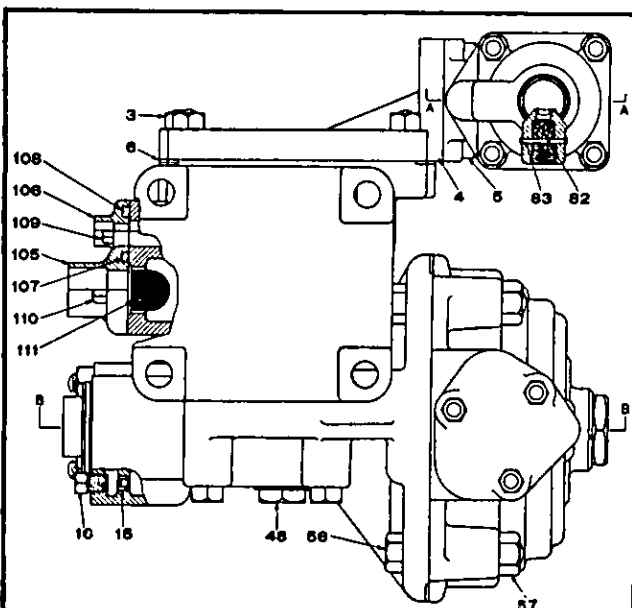


Fig. 18. Outline View of the F-6 Relay Valve

The F-6 relay valve can be converted to electro-pneumatic service by substituting the proper magnet bracket for the magnet bracket blanking plate 4. This will incorporate the necessary magnets and ports to utilize the complete diaphragm stack for speed governor control in which the diaphragms regulate braking ratios to 100%, 80%, 60% or 40% at pre-determined speeds. The conduit connection for this control is provided in the F-6 pipe bracket and is opened by removing the plug shown in Fig. 17, lower view.

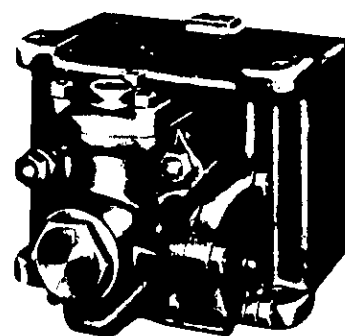


Fig. 19. Exterior View of A-2 Quick Service Valve

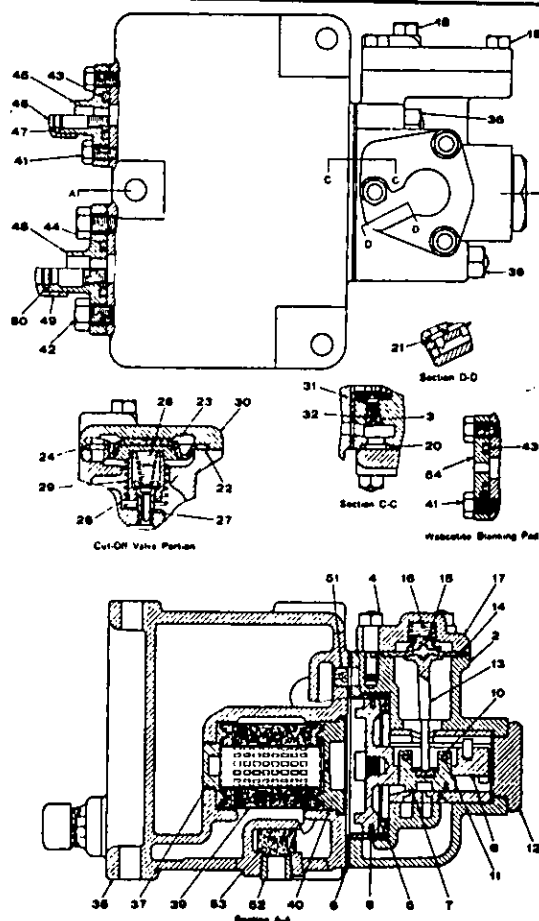


Fig. 20. Assembly View of A-2 Quick Service Valve

A-2 Quick Service Valve

The function of the quick service valve is to propagate local quick service activity from car to car for all service brake pipe reductions and thereby provide fast development of the brake pipe reduction, particularly on successive reductions following the initial brake pipe reduction.

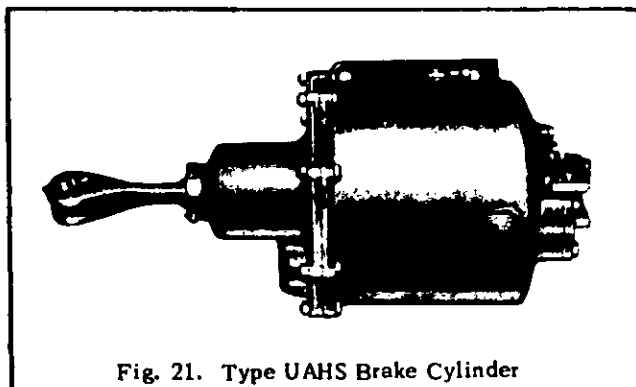
The valve is connected to the brake pipe as shown on Plate 10. It consists of a body 2, Fig. 20, attached to pipe bracket 35 by studs and nuts 36 and 38. The body can be removed from the pipe bracket for cleaning and repairs without disturbing the pipe bracket or pipe connections.

The pipe bracket contains a quick service volume that is charged from the brake pipe through the strainer 39, which is the same as the strainer used in the "AB" valve and D-22-AR control valve. The exhaust opening is protected from dirt and insects by hair strainer 53, retained in place by plug 52. Choke 51, which provides a controlled rate of brake pipe reduction with the valve in application position, is located in the face of the bracket. Both the choke and the strainer are accessible on removal of the body.

The body contains a piston 8 with piston ring 9. Attached to the piston by two pins 10 and locks 11 is slide valve 7, having two ports which establish connections with three seat ports in accordance with the position of the slide valve as moved by the piston. The slide valve is held to its seat by the tension of spring 16, and brake pipe pressure through a port shown in section D-D, transmitted through diaphragm 14 and strut 13.

Choke 3, section C-C controls the charging rate of the quick service chamber. It is protected by a felt filter. In its release position, Fig. 20, the piston seals on seal 5 and permits the quick service chamber to charge through choke 3. In its forward or application position, the piston cuts off the charging choke.

The straight air brake pipe connection to this valve is blanked on the pipe bracket by a blanking flange as shown in the upper view, Fig. 20. The valve, therefore, is quickly convertible to use electric straight air operation merely by removing the blanking flange and connecting the straight air pipe. The cut-off portion then operates to cut off the continuous quick service valve when the electro-pneumatic straight air brake is applied.



Type UAHS Brake Cylinders

The brake cylinders are located on the trucks with piston rod 10 so connected through the brake levers and rods to the brake shoes that when the piston is forced outward by air pressure from the supply reservoir the force so developed is transmitted through the rods and levers to the brake shoes, forcing them against the wheels.

The number, size and location of brake cylinders depend on the weight of the car and the particular installation. The "UAHS" type brake cylinder, Fig. 21, is designed to prevent the entrance of dirt, and the construction is such as to permit the lubrication of the cylinder without dis-assembly.

The cylinder body and pressure head, Fig. 21A, are combined into a single casting which is provided with a bolting flange for mounting and a WABCO[®] fitting for the pipe connection. The piston 4 has a hollow rod which provides for a loose push rod that is attached to the levers and rods of the brake rigging, and a push rod holder 39 is attached to the outer end of the piston rod.

A solid WABCO packing cup 5 snaps onto the pressure face of the piston. The circumference (or perimeter) of the piston is machined to form a shoulder over which the packing cup is fitted, and a groove back of this shoulder contains a piston lubricator. The space back of the heel of the packing cup and in front of the lubricator swab provides a groove around the piston which, when filled with lubricant, serves to spread the lubricant over the cylinder wall with each movement of the piston. With the piston in release position, the grease cavity aligns with four grease ports 3 in the cylinder body which are normally plugged. Lubrication is accomplished from the outside by means of a grease gun at any one of the four connections. The lubricator swab serves a double purpose; prevents overflow from the groove to the non-pressure side of the piston when introducing the lubricant, and, as it becomes saturated with lubricant, results in the cylinder surface being relubricated with each application and release movement of the piston.

To prevent the entrance of dirt, the hollow rod is ground true as to diameter and surface, and the non-pressure head 13 is fitted with an oil saturated felt packing seal ring 63 which serves to lubricate the hollow rod as well as to seal the interior of the cylinder against dirt and moisture. The felt seal ring is installed between tapered surfaces of the non-pressure head and the spring seat and is held firmly against the hollow rod.

A release spring guide, which is an integral part of the non-pressure head, supports the spring and prevents contact with the hollow rod due to vibration.

Since atmospheric air must enter the non-pressure end of the cylinder during the release movement, the non-pressure head is fitted with a curled hair strainer 14. This strainer is of the cartridge type held in place by a spring retainer ring 15, and the opening to the atmosphere is designed to protect the strainer from direct contact with flying dirt and water.

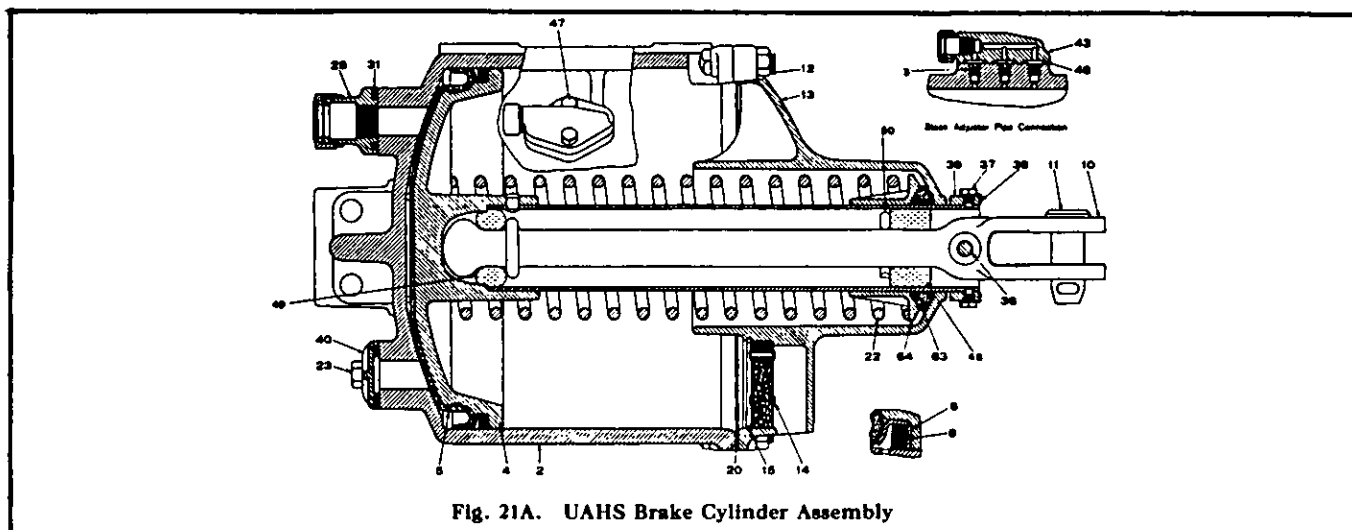


Fig. 21A. UAHS Brake Cylinder Assembly

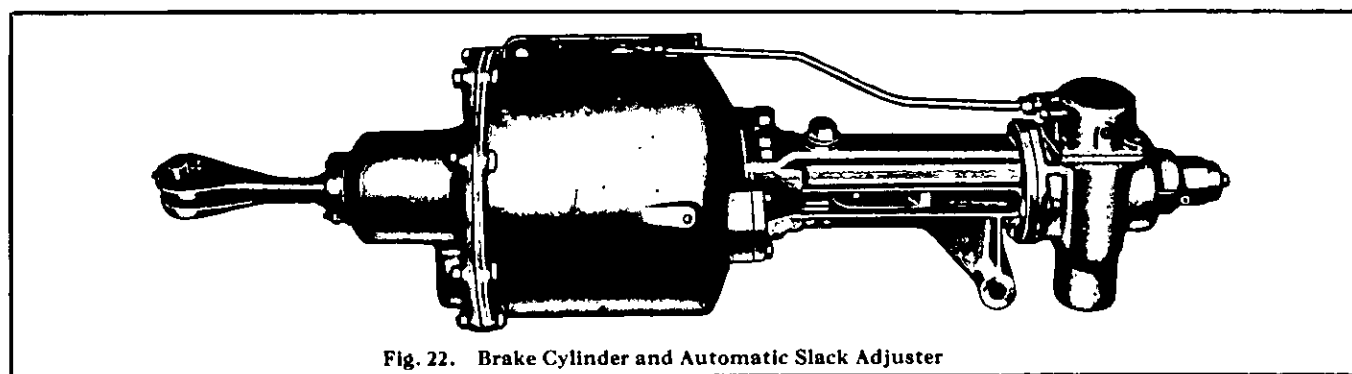


Fig. 22. Brake Cylinder and Automatic Slack Adjuster

Automatic Slack Adjusters

The automatic slack adjuster functions to maintain a predetermined brake cylinder piston travel. The Type "B" for mounting on the pressure head of the brake cylinder is generally used with this equipment, one for each brake cylinder as shown on Plate 10.

Referring to Fig. 23, the slack adjuster body contains a movable crosshead 4 which serves as a fulcrum for the brake rigging cylinder lever. Movement is imparted to the crosshead through adjuster screw 5, combined with ratchet nut 8, and pawl 26, the pawl being operated by piston 23 and spring 31.

The brake cylinder piston and packing cup act as a valve to control the admission and release of brake cylinder pressure to and from the pipe connecting the slack adjuster to the brake cylinder. The port in the brake cylinder to which this pipe is connected is so located that the packing cup uncovers it when the predetermined piston travel is exceeded. Whenever this port is so uncovered, brake cylinder air flows through the pipe into the slack adjuster cylinder where piston 23 is forced outward, compressing spring 31.

Attached to the piston stem is a pawl 26 extending into casing 34, which engages ratchet nut 8, mounted within casing 34 upon adjuster screw 5.

When the brake is released and the brake cylinder piston returns to its normal position, the air pressure in the slack adjuster cylinder escapes to atmosphere through the pipe and the non-pressure head of the brake cylinder, thus permitting spring 31 to force the piston to its normal position. In so doing, pawl 26 turns the ratchet nut upon screw 5 and thereby draws the cylinder lever slightly in the direction of the slack adjuster cylinder, thus shortening the brake cylinder piston travel and forcing the brake shoes nearer the wheels. As the pawl is drawn back to its normal position, a lug on the lever side strikes pawl stop 43, on the cylinder, thus raising the outer end of the pawl, disengaging it from the ratchet nut and permitting the screw to be turned by hand if desired.

Check pawls 15 (mounted on floating ring 14) provide against movement of the ratchet nut due to vibration, the end of one of the two levers being held in contact with a tooth in the slack adjuster casing by spring 17. A trip is provided to disengage the holding lever when making hand adjustment in either direction, a pull of sufficient force being required that, while unlocking is accomplished without undue effort, there is enough movement required and adequate resistance to insure against false movement due to vibration.

A separate pamphlet No. 5041-1, contains a complete description and maintenance instructions for the Types A, B and C slack adjusters. A copy will be supplied upon request to our nearest district office.

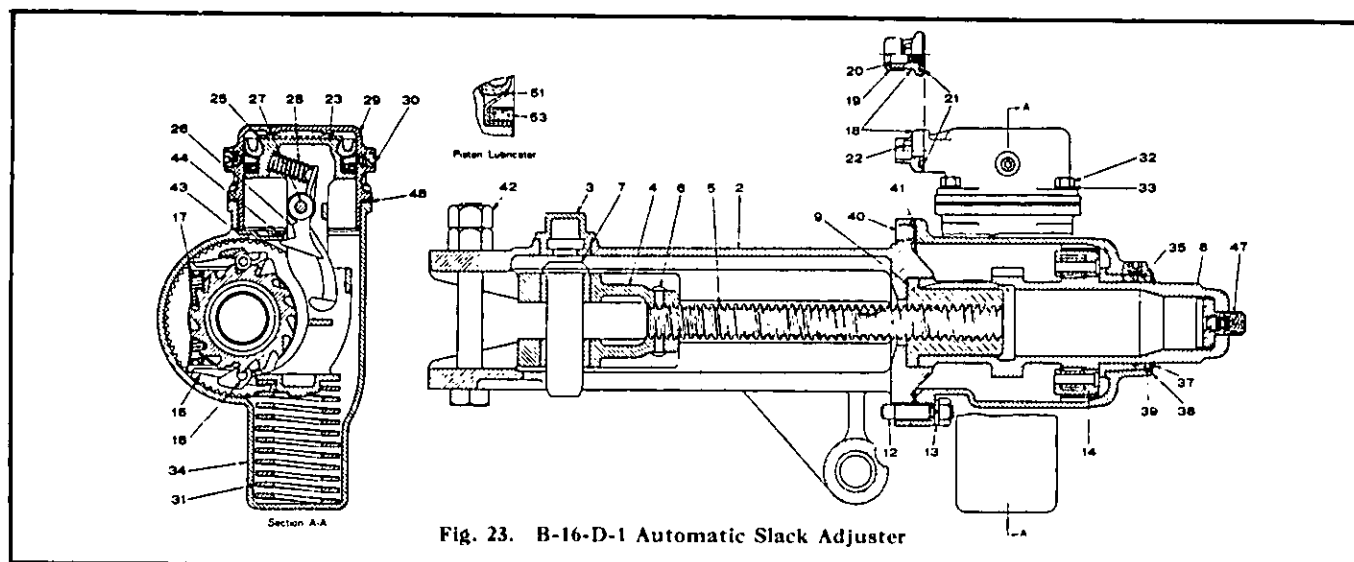


Fig. 23. B-16-D-1 Automatic Slack Adjuster

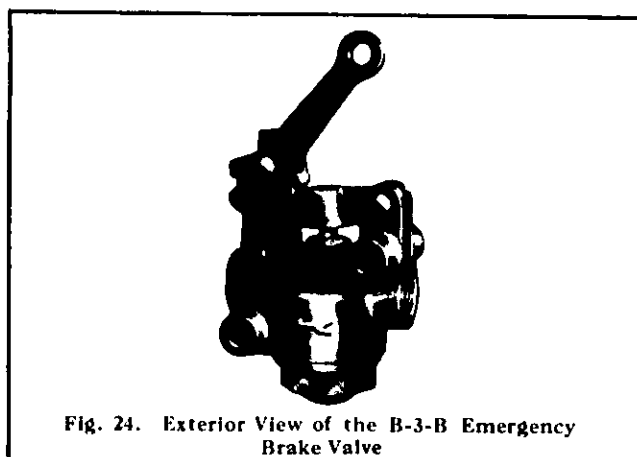


Fig. 24. Exterior View of the B-3-B Emergency Brake Valve

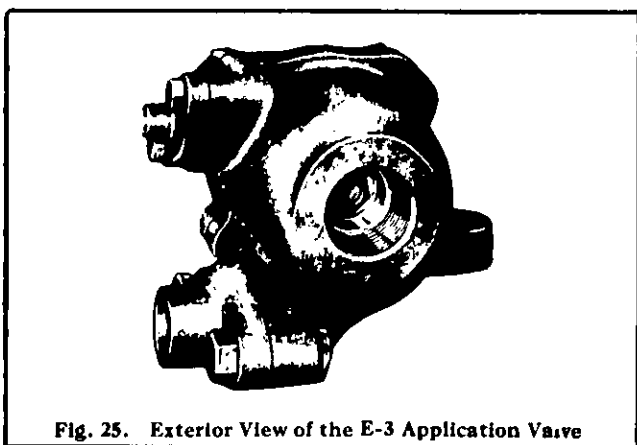


Fig. 25. Exterior View of the E-3 Application Valve

B-3-B Emergency-Brake Valve

E-3 Brake Application Valve

These devices are used to permit the conductor to obtain an emergency brake application.

The B-3-B Emergency-Brake Valve, Fig. 26, with a cord attached is located at the end of a brake pipe branch

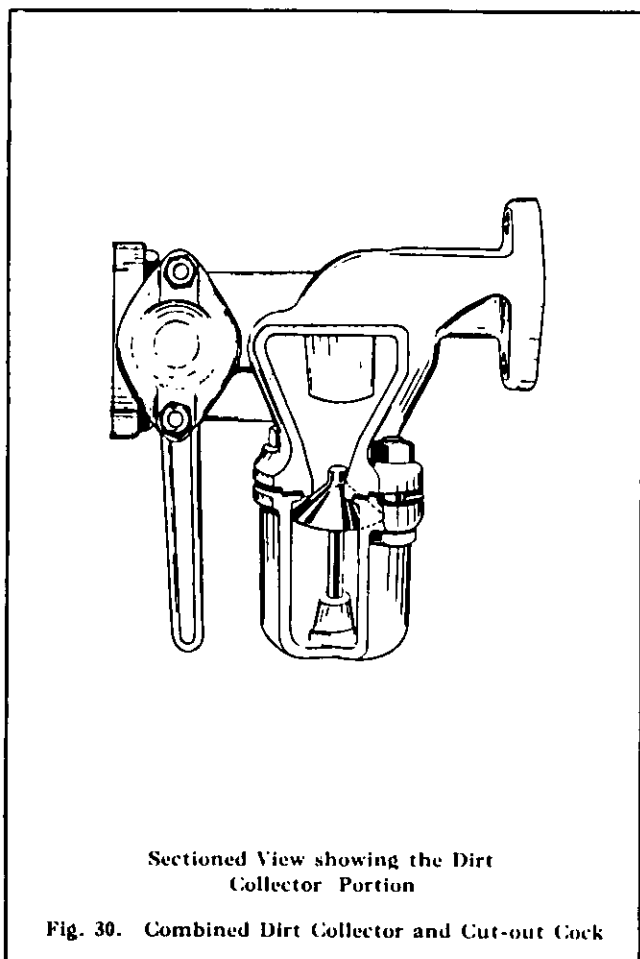
pipe on each end of the car. As shown in Plate 10, its brake pipe opening is connected to the side connection of the E-3 brake application valve. The E-3 brake application valve, Fig. 27, is connected to the brake pipe so that, normally, brake pipe air flows beneath the outer area of piston valve 3, thence through the small port in this valve to the spring chamber, thence out the side connection to the emergency-brake valve. With air pressures equal on both faces of the valve 3, the force of spring 5 holds the valve seated, sealing the atmospheric opening below seat 6.

When the handle of the emergency-brake valve is pulled by means of the cord or otherwise, the handle lever unseats valve 3 and permits the air to escape from the emergency-brake valve pipe faster than it is supplied through the port in the piston valve 3 of the E-3 brake application valve. Consequently, the pressure above the piston valve is quickly reduced and the greater brake pipe pressure on its outer area unseats the valve and makes a large direct opening from the brake pipe to the atmosphere, which permits brake pipe air to escape at an emergency reduction rate and causes emergency brake application of the control valves as described under "Emergency."

The emergency-brake valve should be used only in case of actual danger, and then should be left open until the train stops.

The piston valve 3 of the brake application valve Fig. 27, is fitted with piston ring 4, felt swab 18, which is supported by expander 19, felt oil retainer 17, which is sewed in the piston recess, felt strainer 20 and strainer plate 21. The swab and oil retainer keep the cylinder wall well lubricated while the strainer prevents passage of dirt and clogging of the choke in the piston. These measures are designed to prevent accumulation of dirt on the piston and to keep the piston valve free in its cylinder so that it positively opens and closes when the emergency-brake valve is operated.

the pressure of spring 20 in order to flow to the atmosphere through the vent port in the cap nut. As long as the pressure of the air from the brake cylinder is greater than 10 pounds, valve 4 is unseated and the air exhausts to the atmosphere through the vent port which, being small, makes the release of the brake much slower than when the retaining valve is not set up. When the pressure has been reduced to 10 pounds it is no longer able to hold valve 4 off its seat and the valve then closes and the remaining 10 pounds is exhausted through the small choke in valve 4 to the vent in the cap nut. The purpose of the choke in valve 4 is to prolong the final release and therefore the available recharge time, or allow a complete release if necessitated by grade conditions, without the delay involved in turning down the retaining valve on each car throughout the train



Combined Dirt Collector and Cut-Out Cock

This device is a combination of two of the branch pipe fittings the centrifugal dirt collector which protects the control valve against entrance of dirt, and the cut-out cock which opens (handle vertical) or closes (handle horizontal) communication between the control valve and the brake pipe. Bolting flanges are provided

for both pipe connections, the flange on the dirt collector end bolting direct to the control valve pipe bracket while the flange on the cock end is provided with a WABCO-TITE® union fitting.

The dirt collector is the standard check valve type with the detachable dirt chamber. It is only necessary to remove two nuts to drop the dirt chamber for cleaning.

The purpose of the umbrella shaped check valve is to hold in the dirt chamber the collected dirt under all conditions of air brake operation. The body portion has a machined seat against which the check valve seats when a heavy reduction in pressure occurs above it, such as that during an emergency application, thereby shutting off communication between the dirt chamber and the dirt collector outlet. The check valve is so designed and placed on the valve stem as to permit of a rocking motion whereby any fine dust which may collect on top of the check valve will be shaken off into the dirt chamber.

Double Locking Angle Cock

Fig. 31 illustrates the angle cock, one of which is installed at each end of the brake pipe. The cock is open with the handle parallel to the pipe line, as illustrated and closed with the handle crosswise or at right angles to the pipe line.

This Angle Cock Handle has a double lock that prevents accidental movement of the handle and discourages unauthorized tampering.

A latch, hinged in the handle, must be depressed before the handle can be raised to unlock and turn the cock key. As this requires two distinct and opposite forces, which can only be coordinated manually, the cock is safe against accidental opening from a single force such as that applied by the foot or by a swinging chain.

A spring holds the latch in engagement with the socket, locking the socket and handle together so that the handle cannot be raised to clear the stop lugs on the body. To turn the cock it is necessary to depress the latch while lifting the handle. This is done by gripping the handle in a normal manner and applying light thumb pressure on the latch.

While serving as a lock, the spring also acts to maintain a positive contact between locking surfaces, thus avoiding loose movements and resultant wear.

The handle may be removed independently of the socket. After driving out the hinge pin, the handle may be easily removed by first depressing it and then sliding it forward to permit the web to clear the socket lugs.



A split type socket is used and the rivet pin hole for locking the socket to the key is drilled through the split portion, engaging a notched-out cavity in the square of the key.

An extension with a U bolt groove to the brake pipe end of the angle cock serves to support the brake pipe entering the angle cock while the groove in the extension permits the angle cock to be positively attached to the hanger bracket.

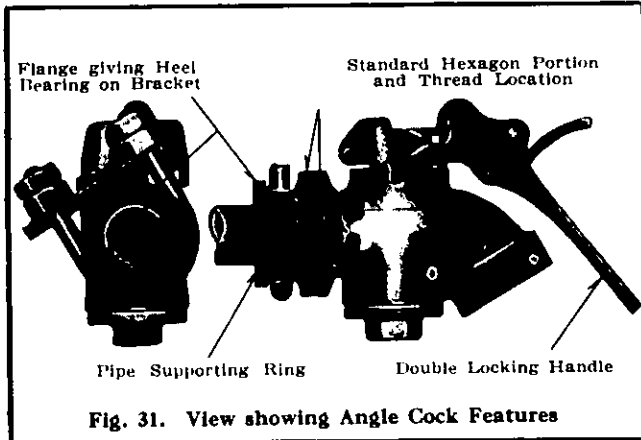


Fig. 31. View showing Angle Cock Features

Brake Cylinder Cut-Out Cocks

A vented cut-out cock with locking handle is located in the brake cylinder pipe to each truck, as shown on the piping diagram of the equipment. This cock is open with the handle in crosswise position, as shown by Fig. 32. In closed position, brake cylinder air is vented through a $\frac{3}{8}$ " pipe tap in the side of the cock body.

The handle locks in both open and closed positions. When so locked, it is necessary to pinch the two arms of the handle together to change the position. Flanged fittings permit convenient removal and re-application of the cock.

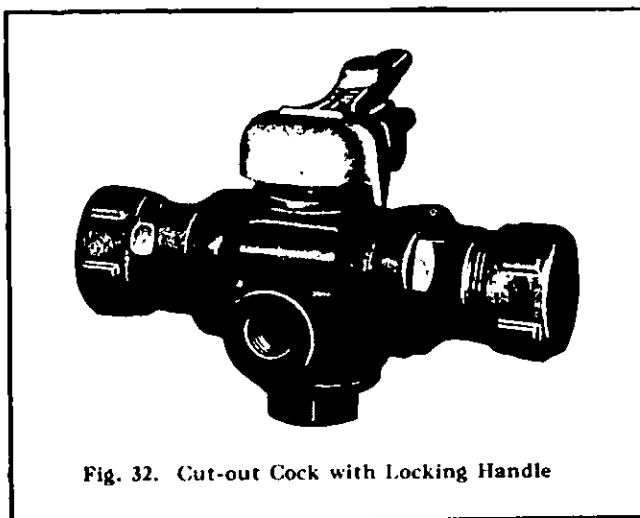


Fig. 32. Cut-out Cock with Locking Handle

WABCOTITE® Fittings

The purpose of the WABCOTITE® fittings is to produce pipe joints which can be made and maintained permanently air tight and at the same time avoid costly failures in road service due to the breakage of pipe or fittings. The fitting is designed to clamp the pipe back of the threaded end so as to relieve the thread of tension stresses, and it is arranged so that removals and re-applications can be conveniently made.

Unless these fittings are correctly installed, the protection against pipe failures at the point of the exposed threads may be lost. To fully accomplish the purpose of these fittings, the piping assembly should be made up as follows:

After slipping the clamping nut and anchor ring over the threaded end of the pipe, the body of the fitting must be screwed on the pipe so as to make a rigid and air tight joint at the threads when the bolt holes are in line with the tapped holes in the face to which it will be bolted. The anchor ring and clamping nut must then be moved into place and the nut firmly tightened so as to solidly close the anchor ring on the pipe.

To insure that the anchor ring will have a full supporting bearing on the pipe, the thread must be straight, that is, cut substantially parallel with the axis of the pipe. This will automatically occur if the pipe threading tools are in proper condition.

The pipe must be so formed and fitted that when it is in place the face of the body fitting, with the gasket removed, will contact squarely with the surface to which it will be clamped, and that the bolt holes are in line to permit application of the cap screws without springing the pipe. The gasket can then be applied and the fitting clamped in place with the cap screws which should be solidly tightened.

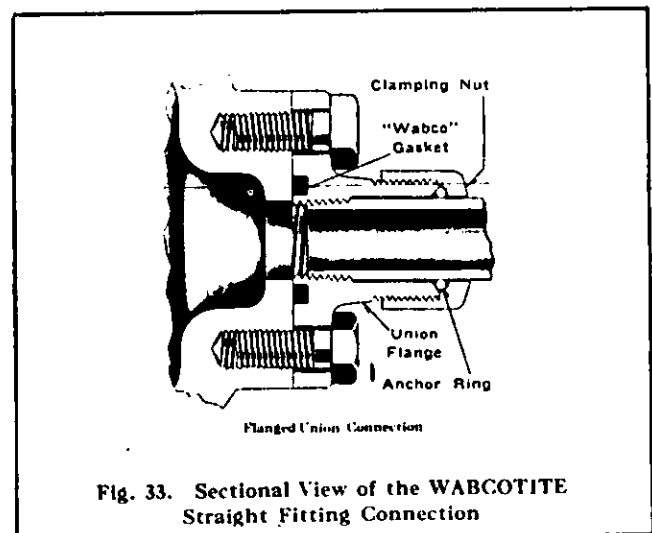


Fig. 33. Sectional View of the WABCOTITE Straight Fitting Connection

The design of the pipe runs between clamping points must be such that the pipe can have sufficient flexibility in itself to take up any small deflections that may be caused by movements in the car body. This flexibility is best secured by designing the pipe run to have one or more easy bends of not less than six inch radius. Where the form of the pipe and the installation of the flanged union is made as described, there will be adequate mechanical strength in the fitting assembly to cause the pipes to deflect sufficiently to compensate for normal maximum car body movements without the production of excessive stresses within the fittings.

Hose Connections

Hose Connections make the brake pipe continuous throughout the train. When cars are being separated, as in switching, the hose should be uncoupled by hand, to prevent rupture or damage.

Flexible semi-metallic armored hose connections are used for brake cylinder connections from car body to trucks and for drawbar connections where car construction requires.

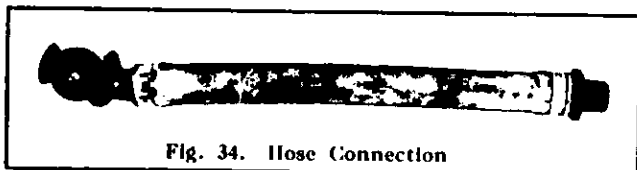


Fig. 34. Hose Connection

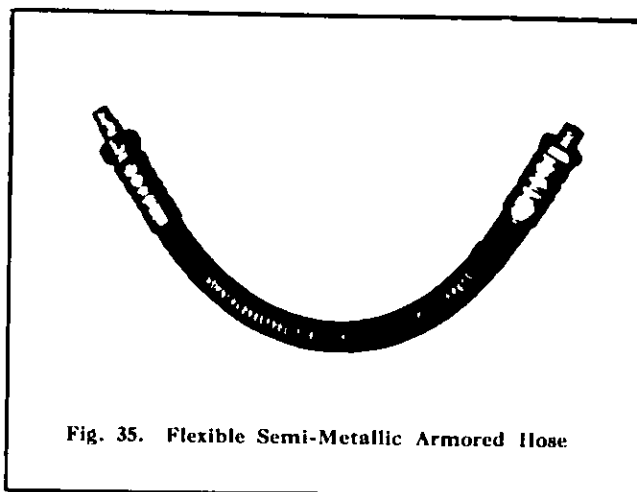


Fig. 35. Flexible Semi-Metallic Armored Hose

Dummy Couplings are provided at each end of the car to which the hose couplings should be attached when not coupled up, to protect against injury to the hose couplings or dirt entering the pipes.

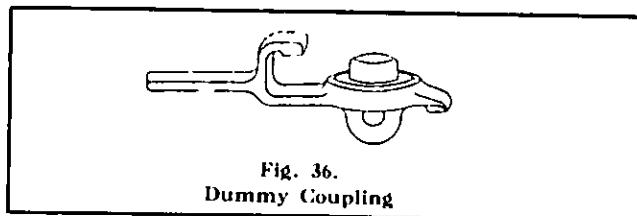


Fig. 36.
Dummy Coupling

OPERATION OF THE EQUIPMENT

As it is impossible to show all the ports and connecting passageways by any single section taken through the control valve, Plates 1 to 9 inclusive have been made to show in a purely diagrammatic way the relation of the various ports to each other, for the different operating positions. The actual proportions and mechanical construction of the parts have been disregarded, where necessary, in order to make the connections and operation more easily understood.

Initial Charging Position—Plate 1

Brake pipe air passes through the branch pipe cut-out cock and dirt collector into passage 1 and thence through filter element 12 to chambers A and B on the faces of service piston 93 and emergency piston 35. Brake pipe air also flows to passage 1b, thence to the spring side of quick action vent valve 40, and through passage 1g to the top of accelerated release check valve 52a.

If the rate of brake pipe pressure rise in chamber A on the face of the service piston is comparatively rapid, as during initial charging, the piston and attached slide valve 98 are moved to their innermost position, compressing return spring 108 and moving return spring cage 107 to the right. In this position the slide valve blanks the brake pipe seat port d1 to avoid blowing the graduating valve 99 off its seat during initial charging.

With the piston in this position the piston head uncovers charging choke 83 and the charging ports X in the piston bushing. Brake pipe air in chamber A charges the auxiliary reservoir through:

(a) Choke 83 to service slide valve chamber c, thence through passage 5g, release slide valve chamber D and passage 5 to the auxiliary reservoir.

(b) Charging ports X, passages 5f, choke 81, past check valve 73, passage 5g, release slide valve chamber D and passage 5 to the auxiliary reservoir. Check valve 73 permits charging in this direction but is seated by spring 89 to prevent back flow from the auxiliary reservoir when the latter pressure in passage 5g is higher than brake pipe pressure in passage 5f.

The service slide valve chamber C and the release slide valve chamber D are connected by passage 5g so that auxiliary reservoir pressure is the same in both chambers at all times. Auxiliary reservoir pressure in chamber C is also connected to the spring side (Chamber K) of release piston 110, through port a in service slide valve 98 and passage a1. With air pressure acting on release piston 110 balanced, spring 116 moves the piston and attached slide valve 112 to release position, where cavity Q in the slide valve connects displacements reservoir passage 3 to exhaust passage 10.

Passage 16a leading to the relay valve is connected through passage W in the blanking pad 15 to passages 3a and 3, and the displacement reservoir. As the latter is open to the release slide valve exhaust 10 the relay valve is in release position, connecting the brake cylinders to atmosphere.

The emergency reservoir is charged simultaneously with the auxiliary reservoir from release slide valve chamber D, through passage 2c at the right end of the release slide valve 112, passage 2f, past ball check valve 195 and flat check valve 73c, passages 2k and 2a and pipe 2 to the emergency reservoir. Spring 89c is overcome and check valves 195 and 73c are unseated, permitting this charging flow as long as auxiliary reservoir pressure is higher than emergency reservoir pressure, but when the emergency reservoir pressure is higher it seats the check valves and prevents back flow from the emergency to the auxiliary reservoir.

The supply reservoirs are charged from two sources:

(a) From auxiliary reservoir through the release slide valve chamber D, port r in the release slide valve, passage r1 in the seat, past ball check valve 74 and flat check valve 87 to passage 6 and the supply reservoirs. Spring 84 is overcome and check valves 74 and 87 are unseated, permitting this charging flow as long as auxiliary reservoir pressure is higher than supply reservoir pressure, but when supply reservoir pressure is higher it seats the check valves and prevents back flow from supply reservoirs to auxiliary reservoir.

(b) From brake pipe air in chamber A on the face of the service piston, through passages 1c and 1d, cavity in the limiting valve slide valve 136, passages 1k and 1f, past ball check valve 74a and flat check valve 73a to the chamber above flat check valve 87, where the flow combines with the charging flow from auxiliary reservoir through passage r1, thence to the supply reservoirs through passage 6. Spring 89a is overcome and check valves 74a and 73a are unseated, permitting this charging flow as long as brake pipe pressure exceeds supply reservoir pressure, but when supply reservoir pressure becomes higher it seats the check valves and prevents back flow from supply reservoirs to brake pipe.

Thus the auxiliary, emergency, and supply reservoirs are charged simultaneously on each car to the existing brake pipe pressure.

Brake pipe air from passage 1k lifts ball check valve 74b and flat check valve 73b and flows through passage d2, choke 14, and passage d1 to the service slide valve seat, where it is blanked.

The outer face of release interlock diaphragm 180 is connected through passages 3k, 3b and 3, cavity Q in the release slide valve 112 and passage 10 to the exhaust. Therefore, interlock slide valve 183 is in its left hand position where cavity y connects auxiliary reservoir air from passage 5d to passage b1, and emergency reservoir

passage 2d is blanked, thus providing for graduated release operation as later described.

Passage 16 is connected to the quick service limiting valve diaphragm 71. As previously explained, passage 16 is open to the release slide valve exhaust, and with no pressure on the face of the quick service limiting valve diaphragm, spring 140 holds the quick service limiting valve slide valve 136 in release position, where its cavity connects passages 1d and 1k, through which the supply reservoirs are charged from brake pipe passage 1c.

Brake pipe air from passage 1c, and auxiliary reservoir air from passages 5c and g1 flow to the release insuring valve to provide the release insuring feature as later described.

In the *emergency portion*, brake pipe air in chamber B on the face of emergency piston 35 flows through the charging choke 27 to chamber E on the slide valve side of the piston and through passage 4 to the quick action chamber.

If the rate of brake pipe pressure rise in chamber B on the face of the emergency piston is comparatively rapid, as during initial charging, the emergency piston 35 and attached slide valve 29 are moved to their innermost position, compressing spring 63 and moving return spring cage 62 to the left. In this position cavity S connects passages 3g, 3f and s1. As passage 3f is connected through passages 3h, 3c, and 3 to the displacement reservoir, which is open to atmosphere through the release slide valve exhaust, spring 53 and brake pipe air from passage 1g will hold check valve 52a seated. Also, the safety valve is connected to the displacement reservoir through passage s1, slide valve cavity S and passage 3f.

Emergency reservoir air is connected to the underside of the emergency slide valve 29 by passages 2 and 2g. In order to prevent the slide valve 29 being unseated when the quick action chamber is not charged, the slide valve is balanced by spring 55 and strut 34. Emergency reservoir air is connected to a small diaphragm area on the upper side of the cover gasket through passage 2g and port 2h, and exerts downward pressure through strut 34 to keep the slide valve seated when there is no air pressure above the slide valve. When the quick action chamber is charged, the pressure in the emergency slide valve chamber holds the slide valve to its seat and the pressure on both sides of the diaphragm area of the cover gasket is the same; consequently, the stem is balanced, removing downward strut pressure except that of the light spring 55 which does not increase slide valve friction materially.

Emergency reservoir air is connected through passages 2 and 2g to the spring chamber above the spillover check valves, ball check 51 and flat check valve 52. The underside of ball check valve 51 is connected by a choked passage to the emergency slide valve chamber E

and the quick action chamber.

On cars located on the head end of a long train, improper use of release position of the brake valve might cause overcharge of the quick action chambers.

When the quick action chamber pressure becomes a small amount higher than emergency reservoir pressure, as determined by the check valve spring 54, ball check 51 and the spring loaded check valve 52 will be unseated, permitting the overcharge in the quick action chamber to flow to the emergency reservoirs and thus prevent emergency application through undesired operation of the emergency portion upon return of the brake valve handle from release to running position. The use of the spring loaded check valve 52 and ball check 51 provides double protection against the quick action chamber charging from the emergency reservoir.

Emergency reservoir air from passage 2 is connected to the outer area of the face of high pressure valve 44. In release position of the emergency slide valve, emergency reservoir air from passage 2g is connected by means of cavity h in the slide valve to the spring side of the high pressure valve through passage h1; therefore, spring force will move the valve to its seat and hold it closed.

As shown in Fig. 37 chamber "B" on the face of the B-3 relay valve piston 17 is connected to the displacement reservoir and the application piston 35 to the supply reservoir. Supply reservoir air flows through choke 12 to the spring chamber, back of the application piston 35, balancing the pressure on both faces of the application piston. With brakes released, there is no pressure in the displacement reservoir and chamber B on the face of the relay piston 17; therefore, the piston is in release position, springs 38 and 39 hold the application valve and piston seated, and exhaust valve 27 and piston 29 are in their lower position, opening chamber A and the brake cylinders to exhaust passage Ex.

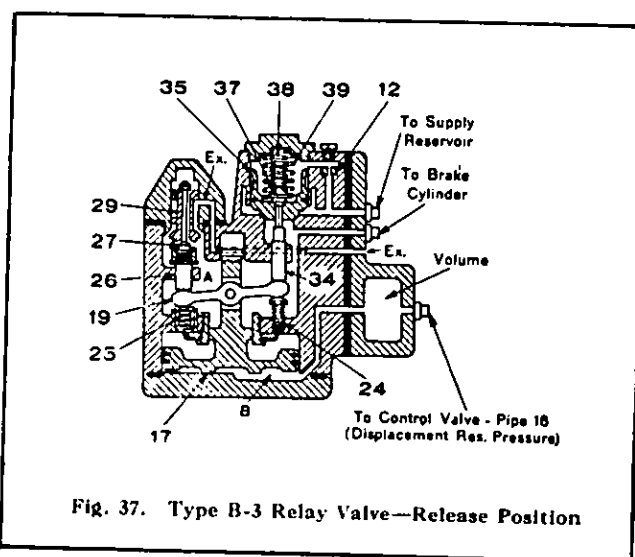


Fig. 37. Type B-3 Relay Valve—Release Position

At the F-6 relay valve, Plate 9, the diaphragm chambers P, N, K, and A are open to the displacement reservoir through passages 16, 17, 18, and 19. These chambers, therefore, are exhausted and release spring 42 holds the diaphragm stack in release position. The self-lapping portion assumes release position as described for the B-3 relay valve, releasing brake cylinder air.

At the quick service valve, Fig. 38, brake pipe air flows through strainer 39 to piston chamber A, moving the piston 8 and attached slide valve 7 to its inner position on its seal. This piston movement uncovers choke 3, through which brake pipe air charges through passage 2 to the quick service chamber and slide valve chamber B.

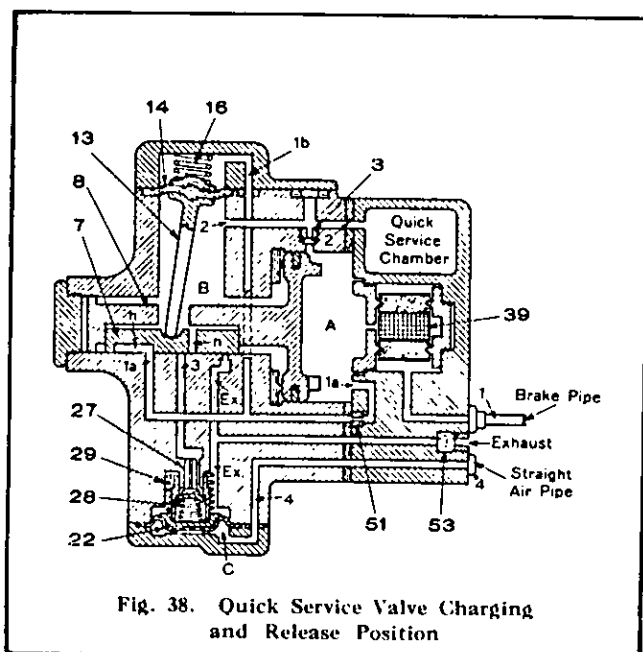


Fig. 38. Quick Service Valve Charging and Release Position

Owing to the restricted charging rate through choke 3 and the volume of the quick service chamber, chamber B will charge somewhat more slowly than chamber A, the greater pressure in the latter meanwhile holding the piston in release position. As the quick service chamber and chamber B become charged to brake pipe pressure, the air pressures on the piston become balanced and the piston remains in release position of its own inertia. Thereafter, as long as the brakes are released, any small fluctuations in brake pipe pressure will equalize with quick service chamber pressure and maintain the piston and slide valve in release position.

In release position no connections are made by the slide valve except brake pipe air from passage 1a is present in slide valve cavity h.

Release Position—Fully Charged—Plate 2

The service piston 93, slide valve 98 and graduating valve 99 remain in their innermost position, as described

under Initial Charging, until pressure in the auxiliary, emergency and supply reservoirs and chamber C is nearly equal to brake pipe pressure on the face of the piston. Return spring 108 then moves the spring cage 107, piston 93, slide valve 98 and graduating valve back to normal Release Position as shown on Plate 2 where the charging connections remain established as described for Initial Charging, and port d in the slide valve registers with seat port d1, connecting brake pipe air to the face of the graduating valve seat.

In the *emergency portion*, after quick action chamber and brake pipe pressures become nearly equal, spring 63 returns cage 62 to its right hand position, moving the piston, slide valve and graduating valve to Release position as shown on Plate 2. In this position the port connections remain established as described for Initial Charging, except that slide valve cavity S cuts off connection between passages 3g and 3f.

The reservoirs continue to charge, as described under Initial Charging, until completely charged, after which check valves 74, 87, 74a, 73a, 195 and 73c are closed by their springs and all the parts remain in release position as shown on Plate 2.

Preliminary Quick Service Position Plate 3

When a service rate of brake pipe reduction is made, to apply the brakes, the air in chamber A on the face of the service piston is reduced. Check valve 73 prevents back flow from auxiliary reservoir to brake pipe. When the pressure in chamber A is thus reduced a predetermined amount below that in chamber C, the higher pressure moves the piston to the left until the spring guide 96 at the end of the piston engages the end of the slide valve. The guide is moved lightly to the right, compressing the service piston spring 95. This movement is sufficient for the piston head to clear the charging choke 83 and ports X in the cylinder, thus cutting off brake pipe air in chamber A from auxiliary reservoir air in chamber C. The service piston spring provides a predetermined resistance to movement beyond this position until sufficient excess of auxiliary reservoir pressure over brake pipe pressure is developed to overcome the spring and move the piston and graduating valve to preliminary quick service position. The spring therefore, stabilizes the service piston and prevents undesired quick service application which otherwise might develop from moderate fluctuations in brake pipe pressure.

As the brake pipe pressure reduction continues, sufficient differential is created to compress the piston spring and move the piston and graduating valve on the slide valve, this movement being limited by the greater

resistance offered by the slide valve. This is Preliminary Quick Service Position in which cavity *k* in the graduating valve connects slide valve ports *c* and *d*. Seat port *d1*, containing brake pipe air, registers with slide valve port *d*. Slide valve port *c* leads to the quick service volume (Q.S. Vol.). Brake pipe air, therefore, flows through passages *1c* and *1d*, cavity in limiting valve slide valve 136, passage *1k*, past check valves 74b and 73b to passage *d2*, through choke 14, passage *d1*, slide valve port *d*, graduating valve cavity *k* and port *c* in the slide valve to the Q.S. Vol., thereby producing a local quick reduction in brake pipe pressure, controlled to a predetermined rate by quick service choke 14 in passage *d1*. This preliminary local reduction of brake pipe pressure, controlled by the graduating valve, is transmitted from car to car by adjacent control valves and quick service valves, which results in rapid serial quick service operation throughout the train.

Second Stage Quick Service

The quick service volume (Q.S. Vol.) is permanently connected to atmosphere through choke 82 and by this means local brake pipe reduction is continued until the slide valve moves. After the quick service volume has been cut off by the movement of the slide valve, remaining air pressure in this volume is exhausted through choke 82.

In Preliminary Quick Service position the service graduating valve 99 uncovers the service port *f* in the slide valve but as this port is blanked on the slide valve seat no air flow takes place in this position. Also, slide valve port *a* is blanked by cavity *m* in the graduating valve, cutting off port *a* from chamber C. However, auxiliary reservoir pressure in passage *a1* and chamber *K* of the release piston is retained equal to auxiliary reservoir pressure in chamber D. Therefore, with auxiliary reservoir air on both sides of the release piston 110, spring 116 continues to hold the release piston and slide valve 112 in release position until the service slide valve moves to service position. By this means the displacement reservoir passage 3 is positively held open to exhaust passage 10, thus holding the brake released until a predetermined brake pipe reduction develops sufficient differential to move the service slide valve to service position. This stabilizes the service action and avoids undesired application from brake pipe pressure fluctuations.

During preliminary quick service, the emergency piston 35 and graduating valve 30 assume service position as described under "Service Position."

Continuous Quick Service

The initial reduction in brake pipe pressure, immediately is effective at the quick service valve, Fig. 39,

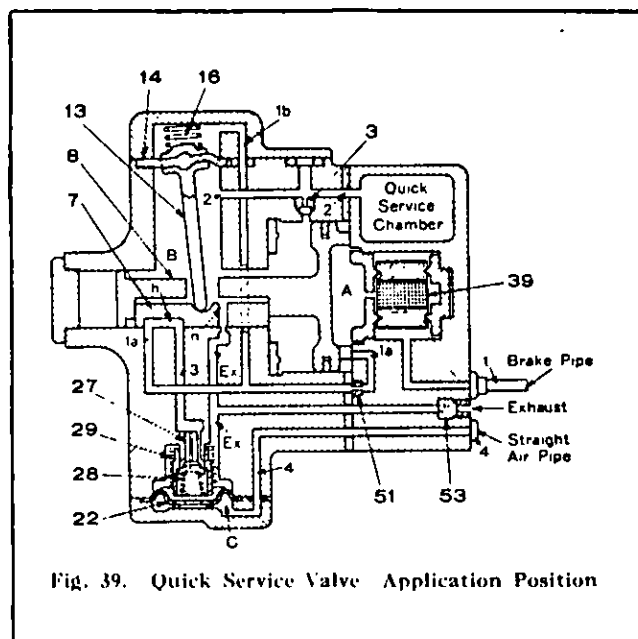


Fig. 39. Quick Service Valve Application Position

closest to the point of origin of the brake pipe reduction. At this valve, chamber A pressure is reduced at a rate that permits the quick service chamber and connected slide valve chamber B to retain a higher pressure, owing to the restricted flow through choke 3 and chamber A. When chamber B pressure thus becomes approximately a half pound higher than chamber A pressure, it moves the piston and slide valve to the right, the lugs on the piston head engaging the pipe bracket face and limiting the movement.

This is application position in which the piston head cuts off choke 3, closing connection between piston chamber A and the quick service chamber; slide valve cavity *h* connects seat ports 3 and *1a* and slide valve port *n* connects slide valve chamber B and the quick service chamber to the Exhaust passage Ex.

Brake pipe air thus flows through the strainer to chamber A, thence through passage *1a*, choke 51, slide valve cavity *h*, passage 3 and past cut-off valve 27 to the exhaust. Meanwhile, quick service chamber air is also reduced through slide valve port *n*, the rate being controlled by a choke in the slide valve seat exhaust passage. Owing to its small volume, the quick service chamber pressure is reduced rapidly so that it quickly becomes less than brake pipe pressure in chamber A. When chamber A pressure thus becomes approximately a half pound higher than quick service chamber pressure, it moves the piston and slide valve back to release position, cutting off further brake pipe reduction.

As the brake pipe reduction continues the quick service valve repeats this movement, each time reducing the brake pipe pressure a small amount and thus continuously propagating the brake pipe reduction from car



to car. For split or successive brake pipe reductions, as generally used in passenger service, the quick service valve operates during each reduction to perform the quick service function as described. It therefore appreciably reduces the time required to obtain service brake application, particularly on long trains.

Service Application—Plate 4

The local reduction in brake pipe pressure created by the preliminary and second stage quick service application increases the differential of auxiliary reservoir pressure in Chamber C over brake pipe air in chamber A of the service piston. This is sufficient to overcome the resistance of the slide valve so that the piston, slide valve and graduating valve move to Service Position.

The forward movement of the slide valve disconnects the preliminary quick service ports *c* and *d* from the Q.S. Vol. and seat port *d1*, thus terminating preliminary quick service, after which the Q.S. Vol. blows down through choke 82 to atmosphere, as previously described. Slide valve ports *a* and *b* are disconnected from seat ports *a1* and *b1*, thus cutting off supply of auxiliary reservoir air to chamber *K* of the release piston; and seat port *a1* is connected to the slide valve exhaust by cavity *p*, thereby exhausting the air in chamber *K* of the release piston. Auxiliary reservoir air in chamber *D* then overcomes spring 116 and moves the release piston 110 and release slide valve 112 to the right, thereby disconnecting the displacement reservoir passage 3 from exhaust passage 10, to permit the development of pressure in the displacement reservoir.

Cavity *n* in the slide valve connects seat ports *d1* and *3d*, permitting brake pipe air from passage 1*c* to flow through passage 1*d*; cavity in the limiting valve slide valve 136, passage 1*k*, past check valves 74*b* and 73*b*, passage *d2*, choke 14, passage *d1*, service slide valve cavity *n*, and passages 3*d*, 3*c* and 3 to pipe 3 and the displacement reservoir. This is the *third* stage of quick service reduction controlled by choke 82*a* in passage 3*d*.

Brake pipe air thus continues to flow to the displacement reservoir, continuing the local reduction in brake pipe pressure until the quick service limiting valve closes. Displacement reservoir air flows through passage 3*a*, passage *W* in blanking plate 15 and passages 16*a* and 16 to the relay valve pipe 16, and to the face of limiting valve diaphragm 71. When the pressure on the face of the limiting valve diaphragm reaches approximately 10 pounds, spring 140 is overcome and the diaphragm is deflected, moving the limiting valve slide valve 136 so that its cavity disconnects passages 1*d* and 1*k*, thus preventing further flow of brake pipe air to the displacement reservoir and thereby terminating all control valve quick service activity. The first stage of service brake application with the limiting valve open is shown on Plate 4. A supplemental view shows the second stage of

service application in which the limiting valve is closed.

Meanwhile, as the slide valve moves to service position, service port *f* registers with seat port 3*b*, permitting auxiliary reservoir air in chamber *C* to flow through passages 3*b* and 3 to the displacement reservoir at a rate controlled by the service choke 8 in passage 3*b*. Displacement reservoir air flows through passage 3*a*, passage *W* in blanking plate 15 and passages 16*a* and 16 to the relay valve which is thereby operated to apply the brakes. The pressure developed in the displacement reservoir is dependent on the amount of brake pipe reduction. If more than full service reduction is made before the brake valve is lapped, pressure in the auxiliary reservoir and displacement reservoir will fully equalize.

Check valves 73*b* and 74*b* in the service portion lift and permit free flow of brake pipe air to the displacement reservoir during quick service reduction, but in the event of an over-reduction or an emergency brake application in which the brake pipe pressure is reduced lower than the pressure in the connected auxiliary and displacement reservoirs, the check valves seat and prevent back flow from these reservoirs to brake pipe.

In the emergency portion, the safety valve passage *s1* is connected through cavity *s* in the emergency slide valve 29 and passages 3*f*, 3*h*, 3*c* and 3 to the displacement reservoir. Thus, displacement reservoir air builds up under the safety valve, which is set to open at approximately 60 pounds, to which maximum displacement reservoir pressure is thereby limited in service brake application.

When the release piston and slide valve move to application position seat passage 2*c* is blanked, preventing further charging from auxiliary reservoir passages 2*c*, 2*f*, past check valves 73*c* and 195, and passages 2*k* and 2*a* to the emergency reservoir. When displacement reservoir pressure builds up through passage 3*k* to approximately 15 pounds, spring 191 of the interlock valve is overcome and the interlock diaphragm 180 is deflected, moving the interlock slide valve 183 to the right. In this position cavity *z* in the slide valve connects emergency reservoir passage 2*d* to auxiliary reservoir passage 2*c*, this connection being established to recharge the auxiliary reservoir from the emergency reservoir during graduated release, as later described. By positively keeping this connection closed until the service slide valve moves to service position the release interlock valve prevents back flow from emergency to auxiliary reservoir during the time the service slide valve is in release position, thereby stabilizing the slide valve. This is especially desirable when the control valve is used in the electro-pneumatic system where the service slide valve is required to remain in release position during service operation of the straight-air brake.

The service reduction in brake pipe pressure also

reduces the pressure in chamber *B* on the face of the emergency piston 35 slightly lower than quick action chamber pressure in chamber *E* on the slide valve side of the piston. The piston and graduating valve 30 move to the right until the piston spring guide 48 contacts the slide valve. In this position the piston closes the charging choke 27, and vent port *t*, (through graduating valve 30), registers with exhaust port *y* in the slide valve. This allows quick action chamber air to flow to atmosphere and reduce pressure in the quick action chamber back of the emergency piston at the same rate that brake pipe pressure is being reduced on the face of the piston. This keeps quick action chamber pressure from attaining a differential over brake pipe pressure sufficient to move the piston and compress the piston spring 49 enough to cause the graduating valve to open port *t* and cause an emergency brake application

By this means the emergency piston is stabilized against undesired emergency, and emergency application is made available any time the system is charged, as described under "Emergency."

When a brake application is made, air from the displacement reservoir builds up in chamber *B* on the face of the relay valve piston 17 of the B-3 relay valve, (Fig. 40) moving the piston and attached piston lever 19 upward. Application valve spring 38 resists the first movement and thus fulcrums lever 19 at the right end, between application valve stem 34 and adjusting screw 24. The left end of piston lever 19 moves upward, lifting exhaust valve stem 26, seating exhaust valve 27 on its valve seat on piston 29 and moving the latter against its bushing seat, thus limiting the upward travel of the left end of lever 19. This closes off the connection between the brake cylinder (chamber *A*) and the exhaust passage *Ex*. As piston movement continues upward, lever 19 now becomes fulcrumed at the left end and application valve stem 34 is lifted, unseating application valve 37. This permits supply reservoir pressure above the application piston 35 to flow into chamber *A* and to

the brake cylinder faster than the rate of supply permitted by choke 12, and the reduced pressure above allows supply reservoir pressure underneath to lift the piston, permitting supply reservoir pressure to flow to brake cylinder. By reducing the force required to open the large application piston 35, the valve 37 and the choke 12 thus function to provide easy, sensitive operation of the application valve.

At the F-6 relay valve, Plate 9, air from the displacement reservoir flows through strainer 17, passages 16 and 16a to diaphragm chamber *A*, and passages 17 and 17a to diaphragm chamber *K*; also through passage 17, past supply valve 92 to the face of diaphragm 85, thence through passages 19 and 18 to diaphragm chambers *P* and *N*. When approximately seven pounds pressure is obtained in chamber *C*, inshot diaphragm 85 is deflected, compressing spring 88 and moving piston 84 sufficiently to permit spring 94a to seat the supply valve 92, cutting off further flow to diaphragm chambers *N* and *P*. The seven pound initial pressure inshot thus obtained in all the diaphragm chambers is directly effective in chamber *P* where it acts on diaphragm 38, overcomes the resistance of spring 42 and deflects the diaphragm, moving the self-lapping portion to application position. The exhaust valve 23 and its piston 25 are seated by the lever 43 and the application valve 32 and its piston 30 are opened, permitting supply reservoir air to flow to the brake cylinders. This provides a low brake cylinder pressure sufficient to take up brake rigging slack and apply the brake shoes to the wheels.

After the inshot supply valve closes, the seven pounds pressure in chamber *P* is retained, thus maintaining this inshot pressure directly on diaphragm 38 while further build-up from the displacement reservoir can take place only through passages 16a and 17a to chambers *K* and *A*. This additional pressure is transmitted through the diaphragm stack to the main diaphragm 38 but, as diaphragm 64 has an area only 60% of diaphragm 38, the effective pressure on the main diaphragm is limited to this ratio. The self-lapping portion will, therefore, develop approximately this ratio of brake cylinder pressure and then lap off. Consequently, the brake cylinder pressure realized from any given reduction in brake pipe pressure will be approximately 60% of the displacement reservoir pressure. For a full service application the displacement reservoir pressure is approximately 60 pounds, as limited by the control valve safety valve. When the B-3 relay valve is used the self-lapping portion will reproduce an equivalent brake cylinder pressure; when the F-6 relay valve is used the self-lapping portion will reproduce brake cylinder pressure in an approximate 60% ratio to displacement reservoir pressure.

Service Lap Position—Plate 5

When the desired amount of brake pipe reduction has been made and auxiliary reservoir pressure is reduced slightly below brake pipe pressure by flowing to

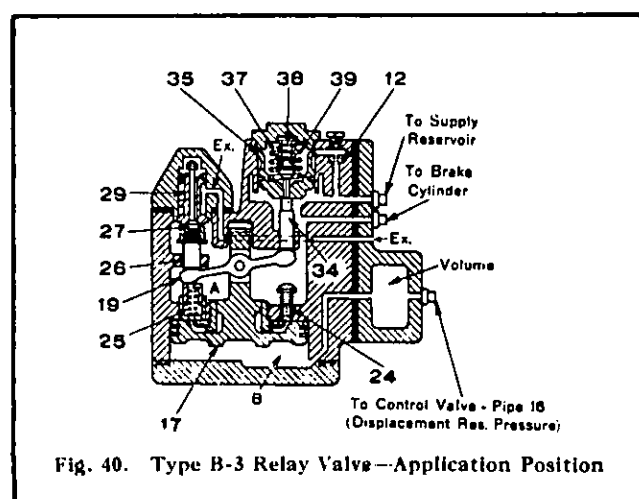


Fig. 40. Type B-3 Relay Valve—Application Position



the displacement reservoir, the service piston 93 and its graduating valve 99 move to the right until the piston stem shoulder engages the slide valve, in which position the graduating valve blanks the service port *f* through the slide valve and cuts off further flow of auxiliary reservoir air to passage *3b* and the displacement reservoir. The release piston 110 and its slide valve 112 remain in application position, holding the exhaust passage *10* closed, and the brake applied.

The emergency piston 35 and graduating valve 30 return to charging position, blanking the vent port *y* in the slide valve, thereby preventing further reduction of quick action chamber pressure.

At the B-3 relay valve, brake cylinder pressure continues to build up in chamber A, Fig. 41, and on the back of piston 17 until it equals displacement reservoir pressure on the face of this piston (chamber B), when springs 39 and 38 return the application piston 35 and its valve 37 to their seats and move stem 34, the right end of lever 19, and piston 17, downward. During this movement the left end of the lever pivots between spring 25 and stem 26 and holds the exhaust valve seated. This is lap position in which the relay valve maintains brake cylinder pressure against leakage, as any reduction in brake cylinder pressure (chamber A) on the back of piston 17 below that in the displacement reservoir on the face of the piston (chamber B) causes lever 19 to move upward, opening the application valve 37 and allowing supply reservoir air to flow to brake cylinder until the balance is restored.

At the F-6 relay valve, Plate 9, the self-lapping portion operates in the same manner, maintaining brake cylinder pressure at approximately 60% of displacement reservoir pressure in diaphragm chamber K.

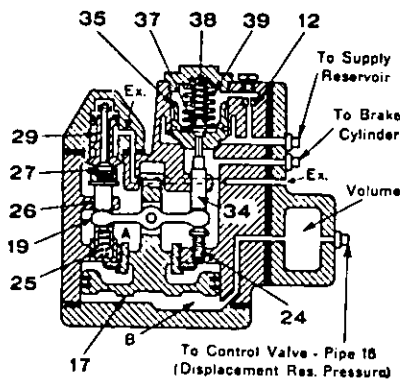


Fig. 41. Type B-3 Relay Valve Lap Position

Release and Recharge After Service Application— Plates 2 and 5

During a service brake application, the emergency reservoir remains at the pressure charged previous to the brake application. When brake pipe pressure in chamber A on the face of the service piston is increased by moving the locomotive brake valve handle to Release or Running position, the higher pressure returns the service piston and slide valve to release position where port *a1* is disconnected from the exhaust port Ex. and connected to auxiliary reservoir air in the slide valve chamber C, through port *a* in the slide valve. Auxiliary reservoir air is thus present on both sides of the release piston 110. The piston spring 116 then moves the release piston and slide valve to the left, the slide valve cavity Q connecting the displacement reservoir passage 3 to the exhaust passage 10, releasing the brake. Passage 2c is uncovered by the release slide valve and emergency reservoir air then flows through passages 2, 2a, 2d, cavity *z* in the interlock slide valve, and passage 2c to release slide valve chamber D, thence to the auxiliary reservoir through passage 5, at a rate controlled by choke R in passage 2a of graduated Release Cap 121. This provides for the Graduated Release and Quick Recharge Features. The quick recharge feature provides positive and prompt release of brakes throughout the train by recharging the auxiliary reservoirs from emergency reservoirs during initial release and permitting a quicker build-up of brake pipe pressure throughout the train than possible if all recharge were from the brake pipe.

When the displacement reservoir pressure on the left of interlock diaphragm 180 is reduced to below seven pounds, spring 191 moves release interlock slide valve 183 to the left where cavity *z* disconnects passages 2c and 2d, preventing further flow from the emergency reservoir to the auxiliary reservoir.

Overcharging the quick action chamber during release and possible undesired operation of the emergency piston is prevented by the spillover check valves 52 and 51, which unseat and allow flow of air from the quick action chamber and emergency slide valve chamber E to the emergency reservoir passage 2g, when quick action chamber pressure slightly exceeds that in the emergency reservoir, but prevent against back flow during brake application.

When displacement reservoir pressure on the face of the B-3 Relay valve piston 17 (Fig. 37) is reduced, brake cylinder pressure on the back of the piston causes it to move downward and, as the lever 19 is fulcrumed at its right end, moves the left end of the lever downward, allowing exhaust valve 27 to open. Brake cylinder pressure flows past the exhaust piston, thus balancing the pressure on the exhaust piston 29 and permitting it to open easily. Brake cylinder air in chamber A then flows to exhaust Ex.

If displacement reservoir pressure is completely released, brake cylinder pressure will also completely release. If only a partial release of displacement reservoir pressure is made, brake cylinder air will continue to flow to exhaust until the pressure on the back of the piston 17 is lower than that on the face, at which time the piston moves upward to lap position, seating the exhaust valve and exhaust piston and cutting off further flow of brake cylinder air to exhaust.

When displacement reservoir pressure is reduced at the F-6 relay valve, Plate 9, the reduction first occurs in passage 16a and the spring chambers of check valves 51, 51a and 51b. The greater pressure in chamber K unseats check valve 51b and flows directly through passages 16a and 16 to the displacement reservoir, thus by-passing the inshot valve portion. The self-lapping portion then operates to release brake cylinder pressure in an approximate 60% ratio to displacement reservoir pressure, and will lap for partial reductions as described for the B-3. When displacement reservoir pressure is reduced below seven pounds, the air in diaphragm chambers N and P lift check valves 51 and 51a and flows directly through passages 19a and 18a to passages 16a and 16 to the displacement reservoir, thus releasing the pressure from diaphragm cavity C of the inshot portion. Inshot spring 88 then opens the supply valve 92 and release spring 42 returns the diaphragm stack to release position. With all pressure removed from the main diaphragm 38, the self-lapping portion releases all brake cylinder pressure.

Release Insuring—Plates 1 and 4

The release insuring feature operates to positively release the brake in the event that excessive friction prevents prompt movement of the service slide valve to release position after brake pipe pressure has built up in excess of 2 pounds over auxiliary reservoir pressure. This function is provided by a release insuring valve 129 which is shown *open* on Plate 1. Chamber F on one face of diaphragm 123 of this valve is connected to brake pipe pressure through passage 1c. Chamber M on the other face of the diaphragm is connected to auxiliary reservoir pressure through passage 5c. Thus, as long as brake pipe pressure does not substantially exceed auxiliary reservoir pressure, the spring 130 keeps valve 129 seated, closing connection between chamber M and passage g1. In service position of the service slide valve, Plate 4, passage g1 registers with the slide valve exhaust cavity P. Should the service slide valve fail to move to release position when the brake pipe pressure exceeds auxiliary reservoir pressure by more than 2 pounds, the greater brake pipe pressure overcomes the release insuring spring 130, deflects diaphragm 123 and unseats valve 129, connecting auxiliary reservoir air from chamber M to passage g1 thence to the exhaust cavity P. This reduces auxiliary reservoir pressure until brake pipe pressure has obtained a sufficient excess to move the service piston to release position. In release position,

Plate 2, the slide valve cuts off the exhaust cavity P, and connects passage g1 to auxiliary reservoir air in slide valve chamber C, (through port g), thus equalizing the pressures on the release insuring diaphragm and terminating the release insuring activity.

Graduated Release—Plates 2 and 6

If it is desired to reduce the brake cylinder pressure in steps, that is, to "graduate it off," the brake valve handle must be returned to Lap position before the brake pipe pressure has been fully restored. In other words, the brake will be entirely released if the brake pipe pressure is fully restored, but if the pressure is only partially restored, the brake will only partially release.

After the brake pipe pressure has been increased by the initial release so that the service piston and slide valve return to release position, port a in the slide valve registers with seat passage a1, and auxiliary reservoir air flows to chamber K on the spring side of release piston 110. With air pressure on each side thus balanced, the release piston and attached slide valve are returned to release position by spring 116, allowing displacement reservoir air to flow to the atmosphere through passage 3, cavity Q in the slide valve and the exhaust passage 10.

While brake pipe pressure in chamber A on the face of the service piston does not increase after the brake valve handle is lapped, auxiliary reservoir pressure in service slide valve chamber C is increasing owing to air flow from the emergency reservoir through passages 2 and 2a, choke R, passage 2d, cavity z in the release interlock slide valve 183, passage 2c and release slide valve chamber D and thence through passage 5g. The release interlock slide valve 183 is held in its right hand position, maintaining connection between passages 2d and 2c through cavity z as long as displacement reservoir pressure on the face of the release interlock diaphragm 180 exceeds approximately seven pounds.

The pressure in chamber C consequently becomes greater than brake pipe pressure in chamber A acting on the piston face, resulting in movement of piston 93 and graduating valve 99 toward service position until stopped by spring guide 96 engaging with slide valve 98. This is *Graduated Release Lap Position*, Plate 6, in which cavity m in the graduating valve connects slide valve ports a and b, thus venting the air from chamber K on the right of the release piston through passage a1, slide valve port a, graduating valve cavity m, slide valve port b, passage b1, and interlock slide valve cavity y to the interlock slide valve exhaust Ex. Auxiliary reservoir pressure in chamber D then moves the release piston and slide valve to the right, cutting off cavity Q connection between the displacement reservoir passage 3 and the exhaust passage 10. This movement also blanks the emergency reservoir seat port 2c, thereby stopping further flow of emergency reservoir air to the auxiliary reservoir.

With the release slide valve exhaust thus closed, the air remaining in the displacement reservoir is retained and can be released in successive steps by graduated release operation. The amount of reduction in displacement reservoir pressure for any given graduation depends on the amount of air pressure that has been restored in the brake pipe, this condition existing until displacement reservoir pressure is reduced to approximately six pounds, at which point the release interlock spring 191 moves the release interlock slide valve 183 to the left.

In this position, Plate 2, the release interlock slide valve cuts off the cavity *z* connection between passages 2*c* and 2*d*, terminating auxiliary reservoir recharge from the emergency reservoir. Brake pipe pressure continues to build up in chamber A on the face of the service piston so that the service piston and slide valve remain in release position, where slide valve port *a* connects auxiliary reservoir air from slide valve chamber C to passage *a1* and chamber K on the spring side of release piston 110. With auxiliary reservoir air also present in chamber D on the opposite face of the piston, spring 116 holds the piston and slide valve 112 in release position where cavity *Q* connects the displacement reservoir passage 3 to the exhaust passage 10, fully releasing the brakes.

In graduated release lap position, the graduating valve is stabilized against movement to preliminary quick service position by service piston spring 95 and thus cuts off connection between slide valve ports *c* (Q.S. Vol.) and *d*; but, if, for any reason, the graduating valve should move far enough to permit cavity *k* to connect these ports, preliminary quick service application is definitely annulled by the limiting valve which closes with approximately 10 pounds displacement reservoir pressure.

As displacement reservoir pressure is graduated off, the B-3 relay valve operates to reduce brake cylinder an equal amount in the manner already described, or, in case of the "F-6" relay valve, an approximate 60% ratio reduction in brake cylinder pressure is made.

Direct Release Plate 2

When the Graduated Release Cap 121 is placed in Direct Release Position as indicated on the supplementary view on Plate 2, passage 2*a* is cut off from passage 2*d*, thereby annulling the Graduated Release and Quick Recharge functions, as recharge from the emergency reservoir is eliminated. Recharging takes place from the brake pipe as described under Release.

Emergency Position Plate 7

When an emergency rate of brake pipe reduction takes place from any cause, quick action chamber pressure cannot reduce through the vent port *t* in the emergency graduating valve 30 and port *y* in the slide valve

to atmosphere at the same rate; therefore, sufficient differential is built up across the emergency piston to compress spring 49 and allow the graduating valve 30 to move far enough on the slide valve to open port *t1* in the slide valve which registers with port *t2* in the seat, allowing quick action chamber air to flow to the face of vent valve piston 42. The resulting movement of this piston unseats the vent valve 40, opening a large and direct passage from brake pipe passage 1*b* to atmosphere. The rapid venting of brake pipe air causes an emergency reduction rate of brake pipe pressure to pass serially and rapidly through the train, due to the same operation of connected valves, and insures the prompt movement of valves on other cars to emergency position.

The rapid reduction of brake pipe pressure causes the emergency piston and slide valve to move to the extreme right position, which carries slide valve port *t1* out of register with seat port *t2*, but port *t2* is now uncovered by the tail port *t3* in the slide valve so that quick action chamber pressure remains connected to the vent valve piston.

The emergency slide valve now connects the spring side of high pressure valve 44 to the exhaust port *Ex.*, through passage *h1* and cavity *h2* in the slide valve 29. This vents air pressure from the spring side of the high pressure valve, and emergency reservoir air in passage 2, acting on the outer area of the face, unseats this valve, permitting emergency reservoir air to flow through passages 3*h*, 3*c* and 3 to the displacement reservoir, the rate of flow being controlled by choke 21 in passage 3*h*. Meanwhile, the emergency rate of reduction in brake pipe pressure has caused the service piston and slide valve to move to the extreme left where the graduating valve uncovers the service port *f*, through which auxiliary reservoir air flows into passage 3*b* and to the displacement reservoir passage 3, combining with the flow from the emergency reservoir.

As both the emergency reservoir and the auxiliary reservoir thus equalize into the displacement reservoir during emergency, and the safety valve passage *s1* is blanked by the emergency slide valve, a higher displacement reservoir pressure is obtained than is possible from a full service application.

While quick action chamber air is reducing through choke 20 in vent valve piston 42 and choke 67 in the cover, the rate of exhaust is such that the vent valve will remain open a definite time until the pressure is reduced to a certain value, when spring 39 will reseat the vent valve. The purpose of this is threefold—first to insure transmission of quick action, second to prevent release of an emergency brake application before the train is at rest (in order to avoid possible damage to the train), and third, to insure closure of the exhaust so that the brake pipe pressure can be restored when desired.

The B-3 or F-6 relay valve operates as described under "Service" to develop pressure in the brake cylinder.

ders, this pressure being equal for the B-3 relay valve, and, approximately, 60% of displacement reservoir pressure for the F-6 relay valve.

Release After Emergency Application

Accelerated Release Position—Plate 8

When brake pipe pressure on the face of the emergency piston is increased at proper rate after emergency application, the piston moves to the left, compressing accelerated release spring 63, and the emergency slide valve connects emergency reservoir pressure to the spring side of the high pressure valve, through cavity *h* in the slide valve and seat passages *2g* and *h1*. With air pressure thus balanced on the high pressure valve, spring 47 moves the valve to its seat, cutting off the supply of emergency reservoir air to the displacement and auxiliary reservoirs, and no further change takes place in emergency reservoir pressure (after emergency application) until the service slide valve moves to release position and connects this pressure to the auxiliary reservoir.

With the emergency slide valve in accelerated release position, the displacement reservoir is connected to the underside of rubber seated check valve 52a, through passages *3c*, *3h* and *3f*, cavity *S* in the slide valve and passage *3g* in the seat.

Since the displacement reservoir and the auxiliary reservoir are connected, through port *f* in the service slide valve (which is still in service position), the pressure of these combined volumes under check valve 52a is greater than brake pipe pressure above from passage *1g*. The check valve, therefore, is unseated and combined displacement reservoir and auxiliary reservoir air is permitted to flow through passages *1g* and *1b* into the brake pipe until these pressures are within a few pounds of equalization, thus providing a quick, serial initial build-up of brake pipe pressure.

Since auxiliary reservoir pressure is being partially reduced while the brake pipe pressure is being initially built up throughout the train, the development of that brake pipe pressure needed to release the brakes is accomplished much sooner than it would be by raising brake pipe pressure through the brake valve alone and, therefore, a very prompt and positive release of the brake is accomplished.

The quick action chamber is being charged through the charging choke 27. Return spring 63 will move the emergency piston and slide valve from accelerated release to charging position as soon as the pressures on both sides of the emergency piston become substantially equal. This slide valve movement blanks port *3g* in the seat thereby preventing further flow of displacement reservoir air past the accelerated release check valves to the brake pipe. The accelerated release check valves seat and prevent brake pipe air from flowing to the displacement reservoir in case the emergency slide valve is forced

to accelerated release position when displacement reservoir pressure is lower than brake pipe pressure.

When brake pipe pressure becomes slightly in excess of auxiliary reservoir pressure the service piston and slide valve are moved to release position and the brake will be released and reservoirs recharged as previously described under "Release and Recharge after Service Application."

Duplex Release Valve

A duplex release valve is attached to the service portion by means of which the auxiliary reservoir air may be drained alone or both auxiliary and emergency reservoir air may be drained at the same time.

The release valve handle 160, Plate 1, may be moved in any direction to open the release checks. The plunger 152 has two stems which are lifted to unseat the release checks 155 and 155a when the handle is moved. There is less clearance between auxiliary reservoir release check 155 and its plunger stem than between emergency reservoir release check 155a and its stem. Therefore, if handle 160 is moved part way the auxiliary reservoir release check 155 is lifted from its seat and the reservoir is drained without opening the emergency reservoir release check 155a. If handle 160 is moved its full travel both release checks are unseated and both reservoirs drained.

GENERAL HINTS

In releasing an individual brake by means of the duplex release valve on the service portion of the control valve, the brake pipe being charged, pull the handle only far enough to open the auxiliary reservoir check but not far enough to open the emergency reservoir check, and then permit auxiliary reservoir pressure to drain only until the brake cylinder exhaust is heard to start.

When there is no air in the brake pipe, drain both auxiliary and emergency reservoirs by pulling the duplex release valve handle its full travel and holding both check valves open until all pressure is depleted.

A cut-out cock which vents brake cylinder pressure when closed is installed in the brake cylinder pipe to each truck. This provides for adjustment of piston travel or brake shoe renewal without the necessity of cutting out the brake by bleeding reservoirs in order to protect against injury due to unexpected brake applications. Thus, the brake on one truck of a car may be cut out if necessary, due to defective brake rigging without affecting normal brake operation on the other truck.

When it is found necessary to cut out the brake on a car, close the branch pipe cut-out cock (which is combined with the dirt collector) and drain both auxiliary and emergency reservoirs by pulling the duplex release valve handle its full travel and holding until the pressure is depleted.



NOT USED
(ON THESE CARS)

3-AP DECELOSTAT[®] EQUIPMENT

While not a fundamental part of the brake equipment, the DECELOSTAT controller is a recommended anti-wheel slip device that modifies the braking force to avert wheel sliding. Its function is to maintain high over-all train retardation by anticipating wheel sliding and momentarily moderating the braking force so that it does not exceed the lowered rail-wheel adhesion existing when wheel slipping occurs.

If a wheel slips, the braking pressure is softened and then restored to the value of existing on the other cars of the train. The operating cycle provides instant moderation—the reduction requires less than a second—followed by a fast but controlled build-up of pressure to that existing on the remainder of the train. If the low adhesion condition persists, the DECELOSTAT controller repeats its function with each wheel slip.

The DECELOSTAT equipment is shown in dotted lines on the brake equipment piping diagram, Plate 10. All apparatus is confined to the truck, eliminating the need for wire or additional pipe connections to the car body.

As indicated on the opposite page, Fig. 43, the DECELOSTAT equipment for a 4-wheel truck comprises a DECELOSTAT controller mounted on the journal cover of each axle, and a DECELOSTAT Valve mounted on the truck transom. A hose connection from each DECELOSTAT controller leads to a common pipe connection to the DECELOSTAT Valve. Thus for a conventional car with two 4-wheel trucks, there is required 4 "P-3" DECELOSTAT controllers, 4 Hose Connections and 2 "B-3" DECELOSTAT Valves.

A separate pamphlet, No. 5067-3, covers the description and the operation of the "3-AP" DECELOSTAT Equipment.

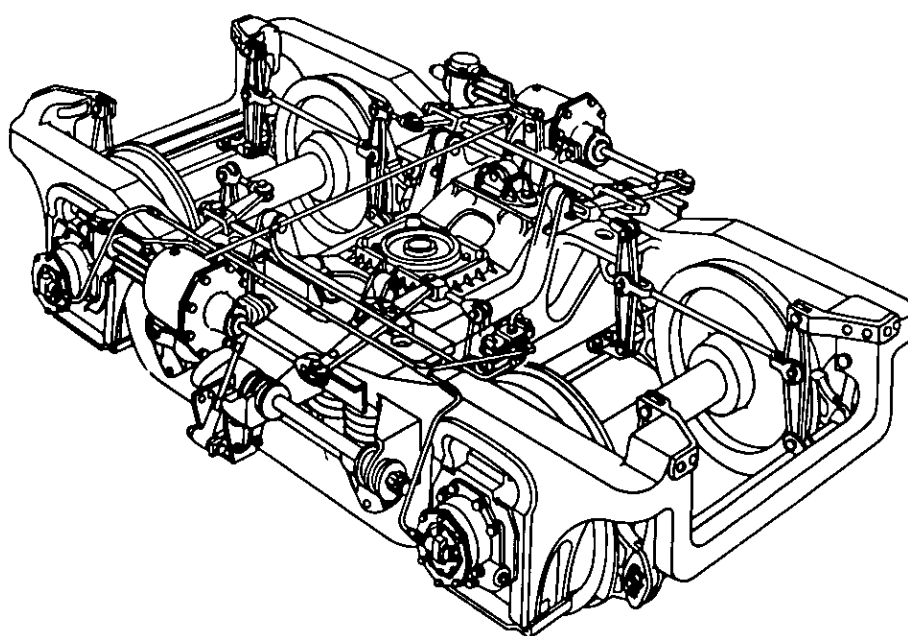


Fig. 42. 3-AP DECELOSTAT® Equipment

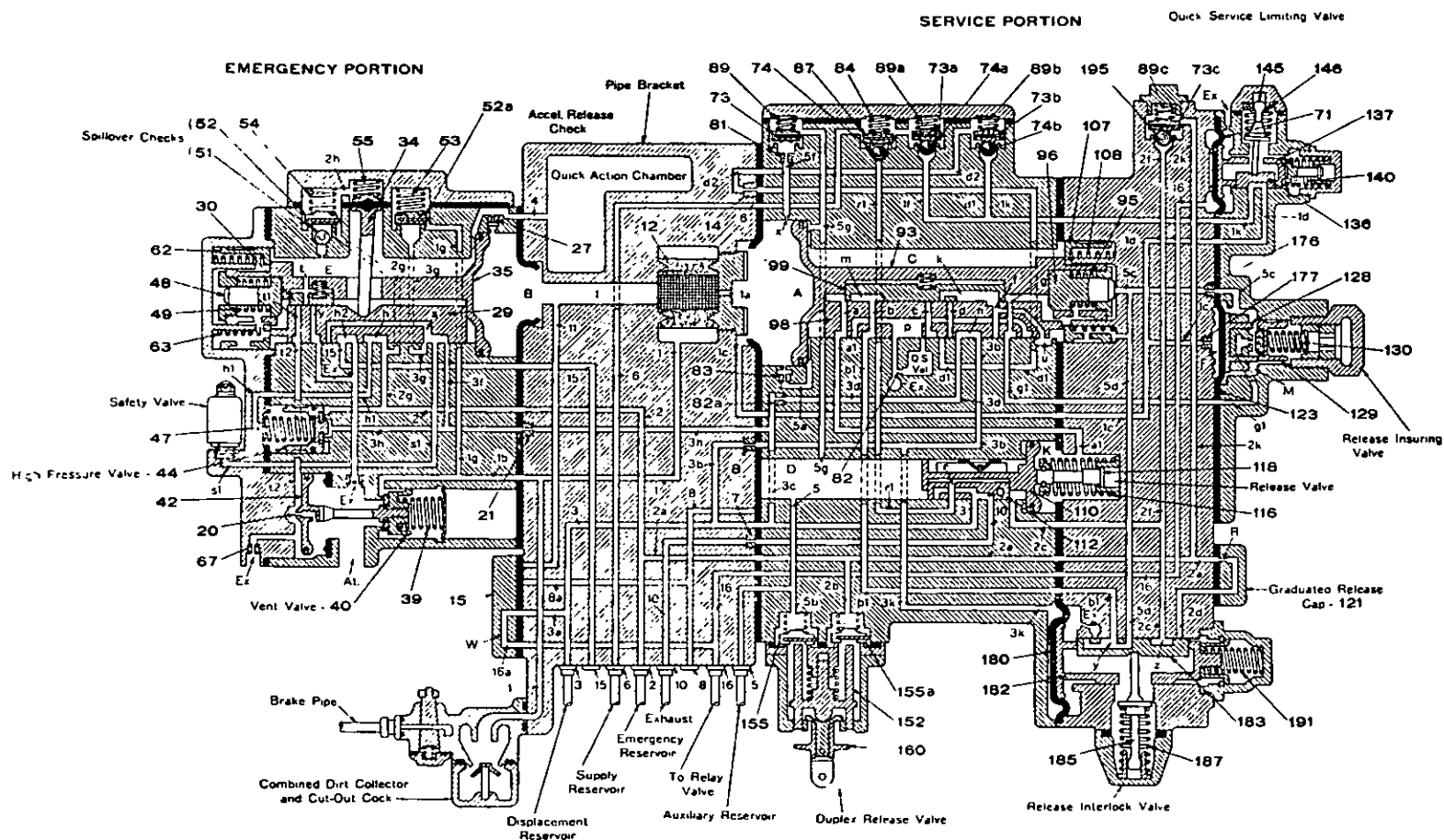


Plate 1. INITIAL CHARGING POSITION - D-22-AR Control Valve

D-22-AR CONTROL VALVE

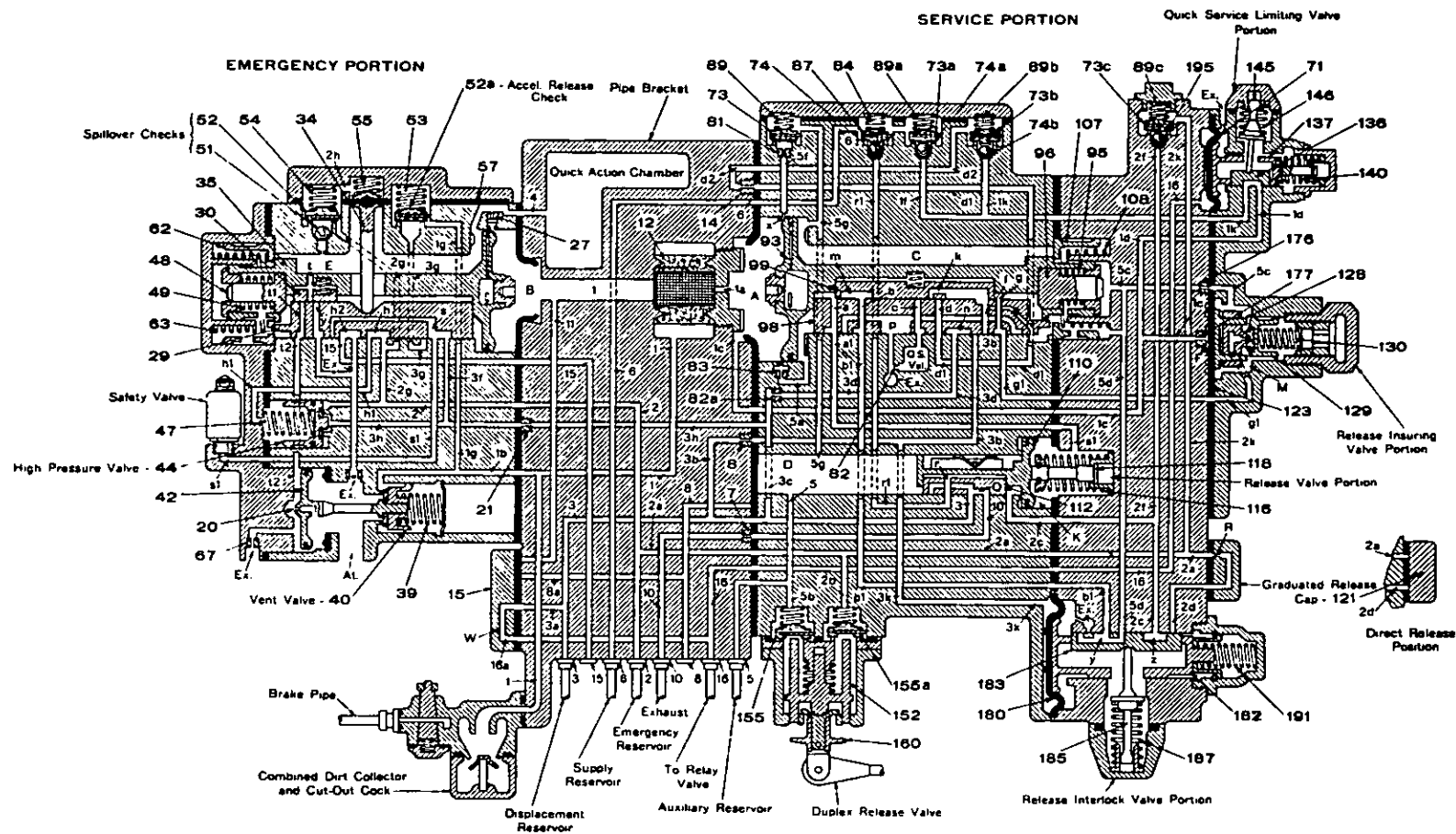


Plate 2. RELEASE POSITION - D-22-AR Control Valve

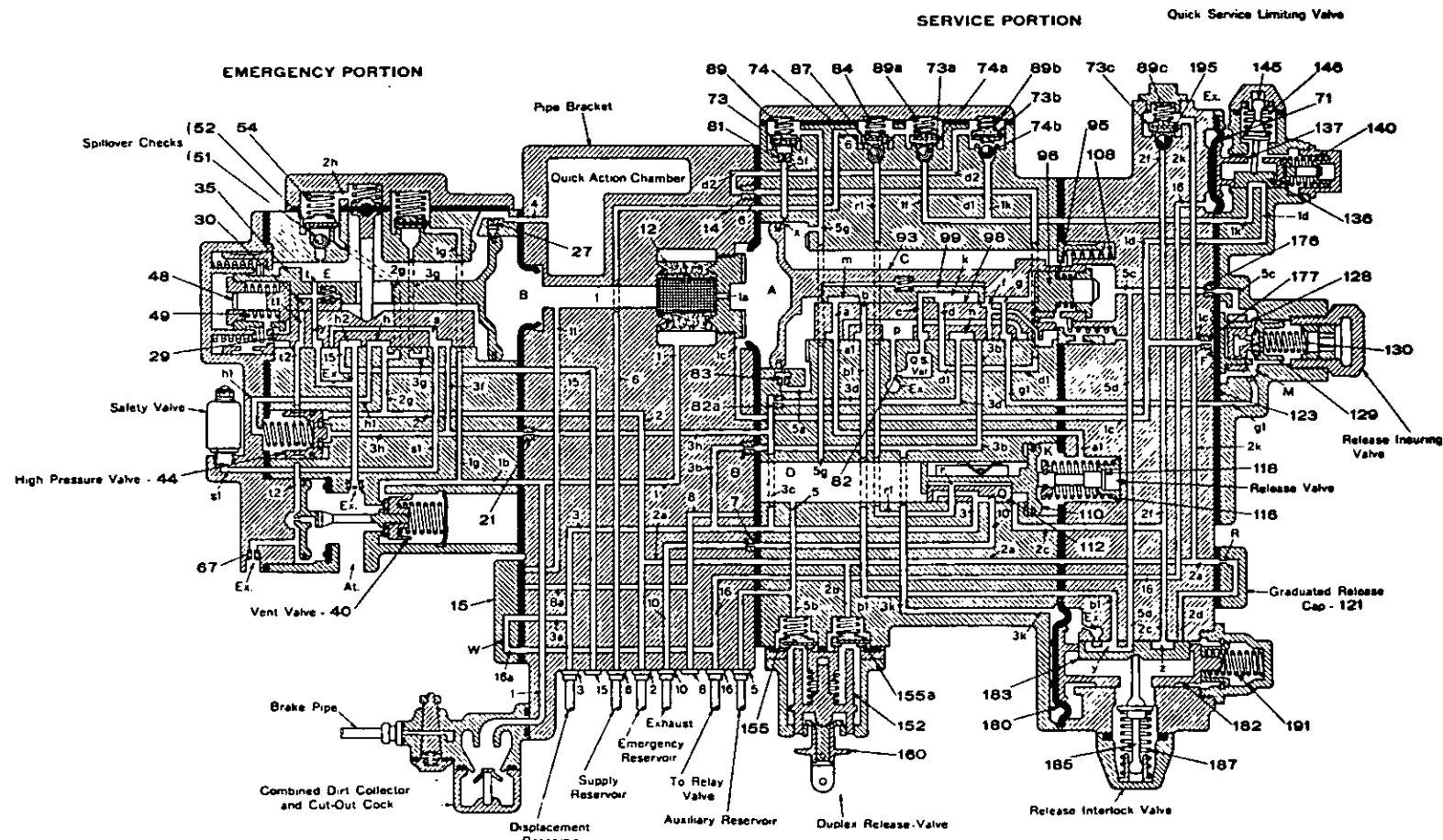


Plate 3. PRELIMINARY QUICK SERVICE POSITION - D-22-AR Control Valve

C-37213

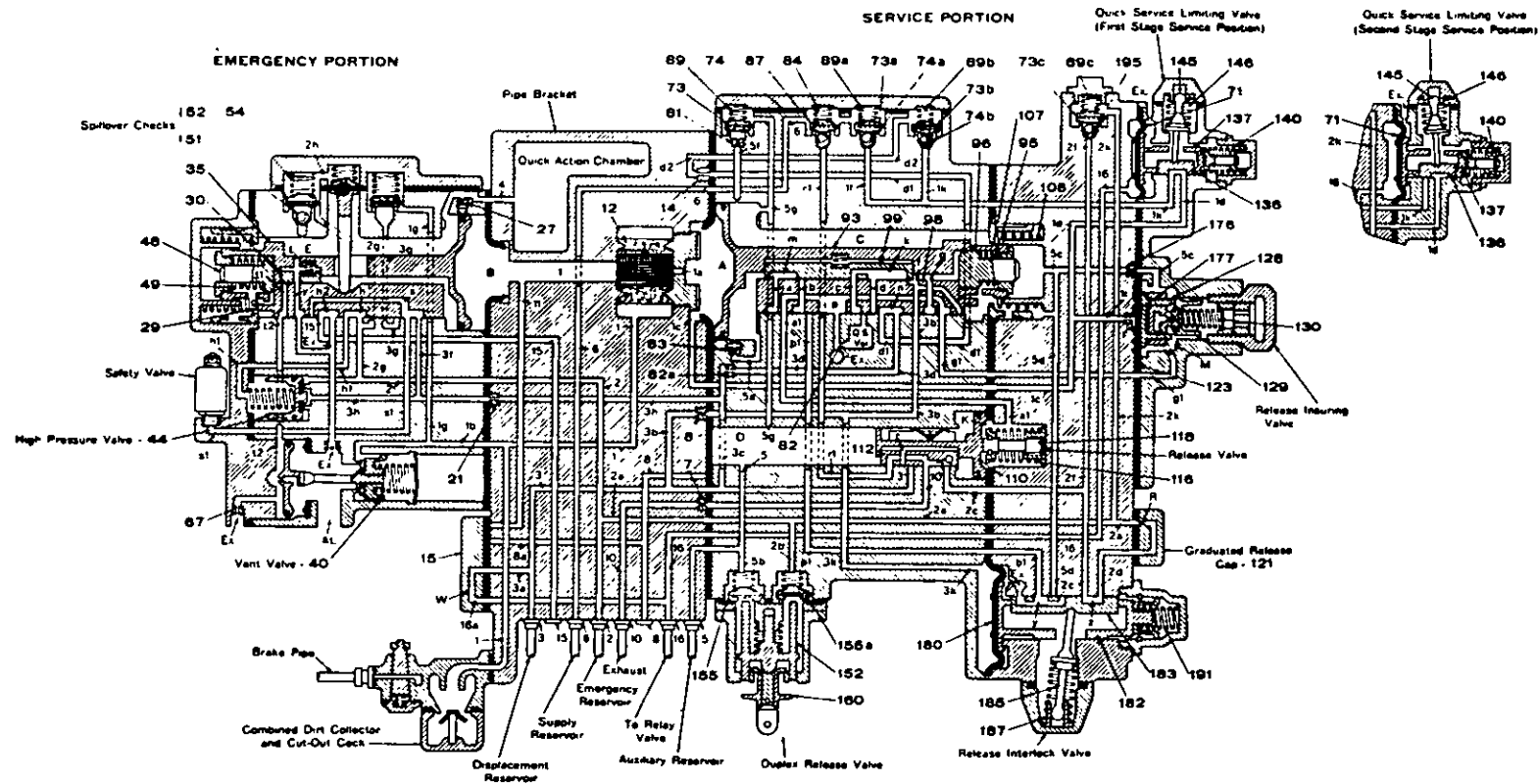


Plate 4. SERVICE POSITION - D-22-AR Control Valve

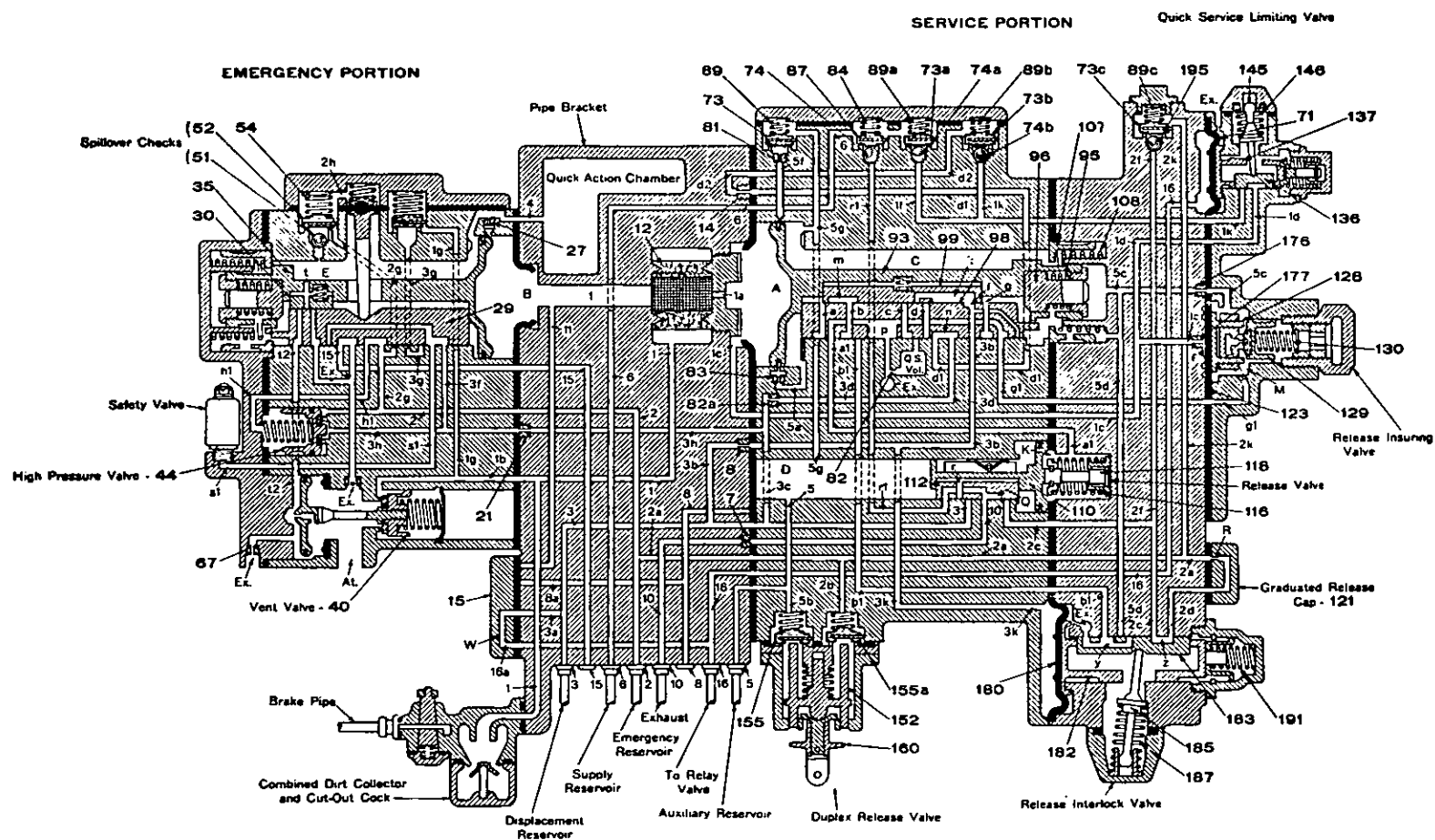


Plate 5. SERVICE LAP POSITION - D-22-AR Control Valve

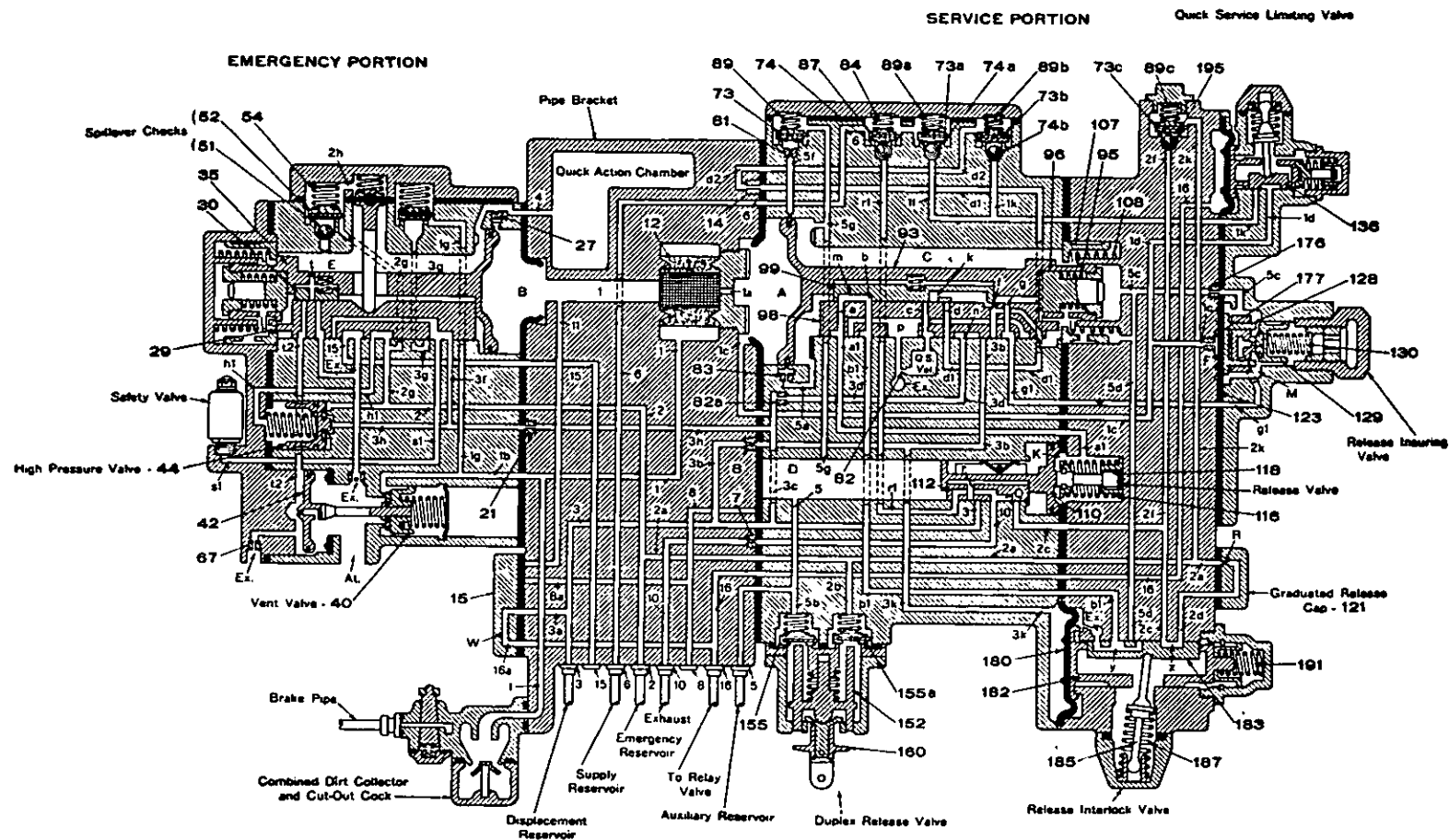


Plate 6. GRADUATED RELEASE LAP POSITION - D-22-AR Control Valve

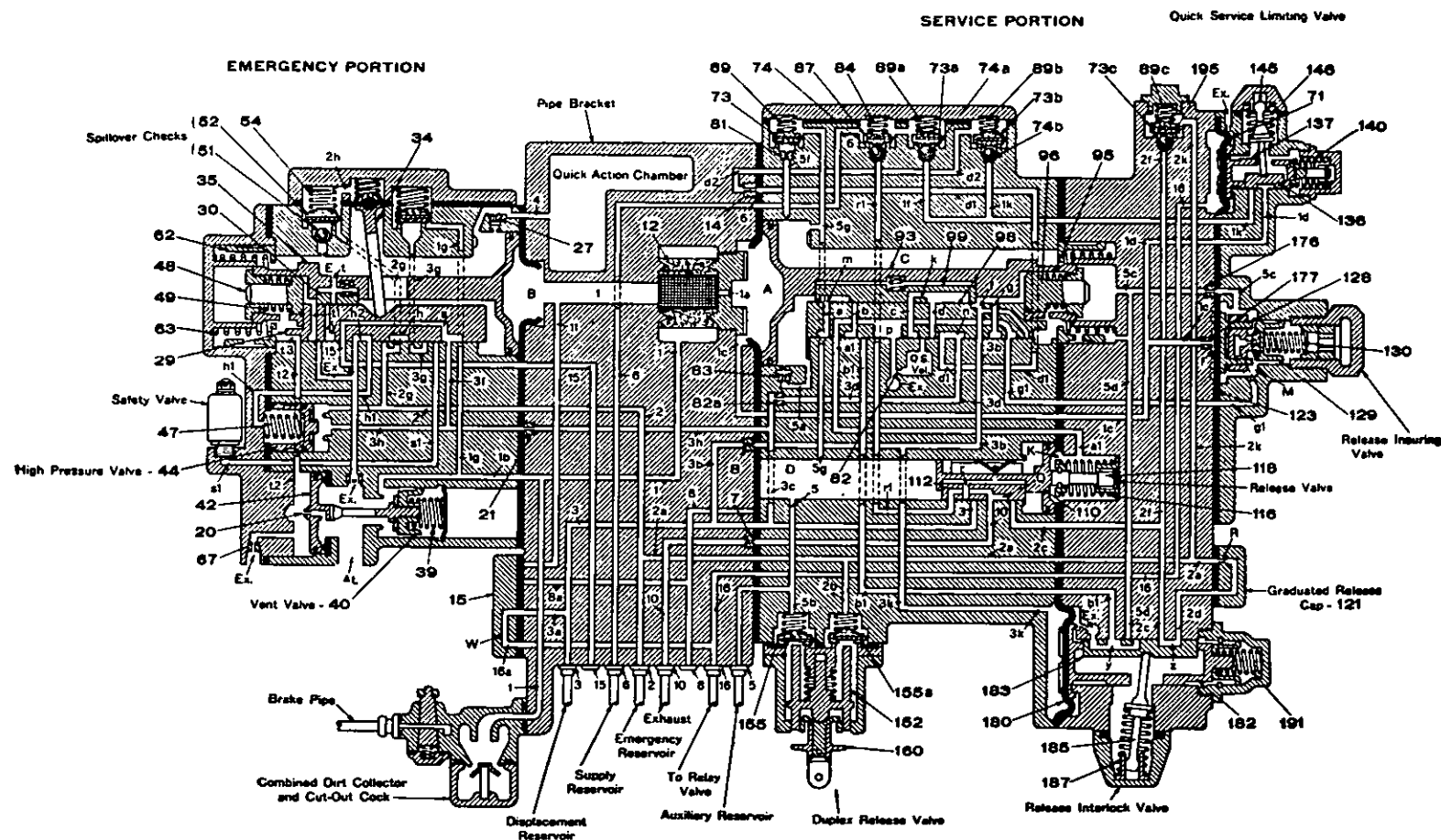


Plate 7. EMERGENCY POSITION - D-22-AR Control Valve

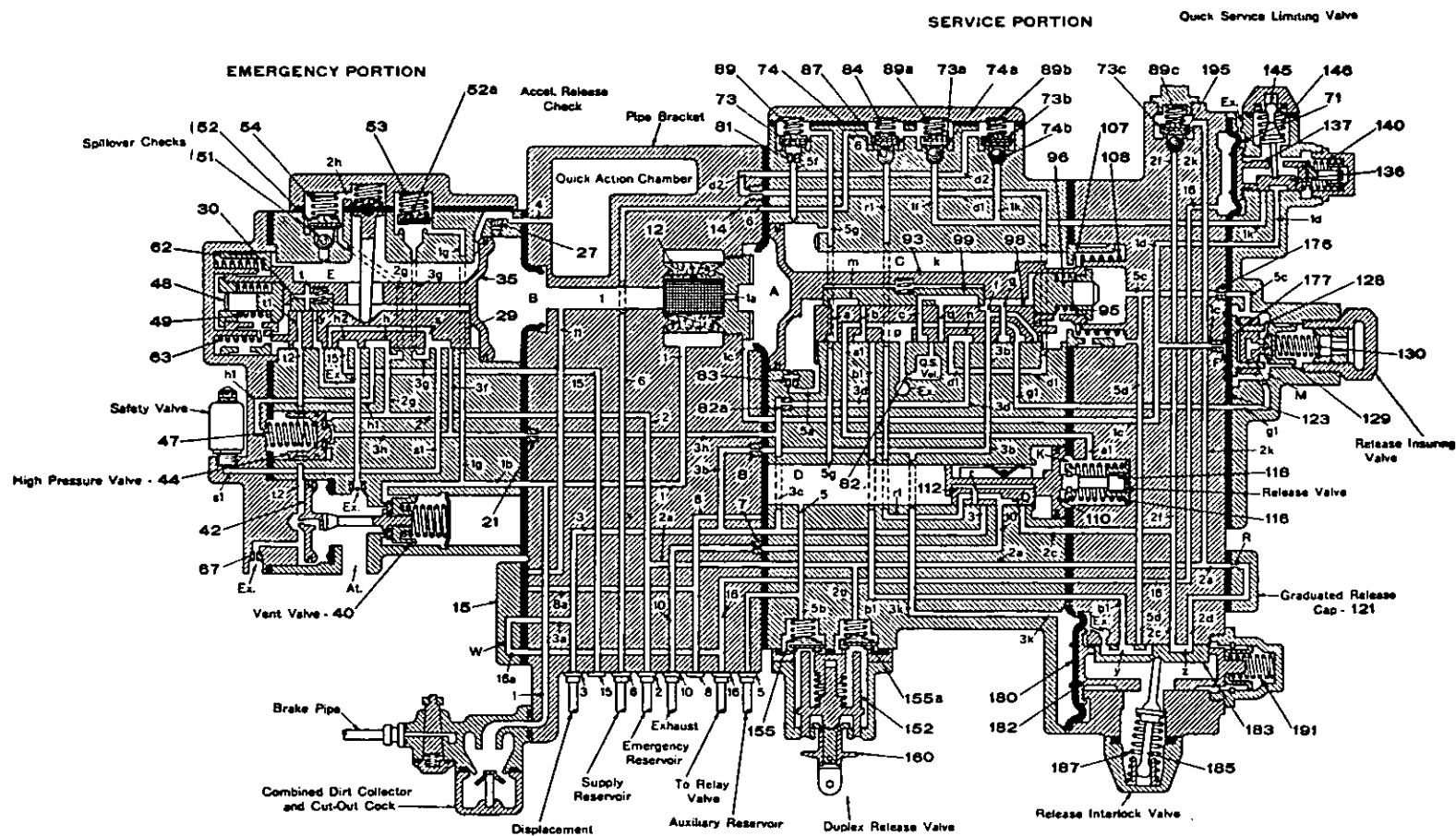


Plate 8. ACCELERATED EMERGENCY RELEASE POSITION - D-22-AR Control Valve

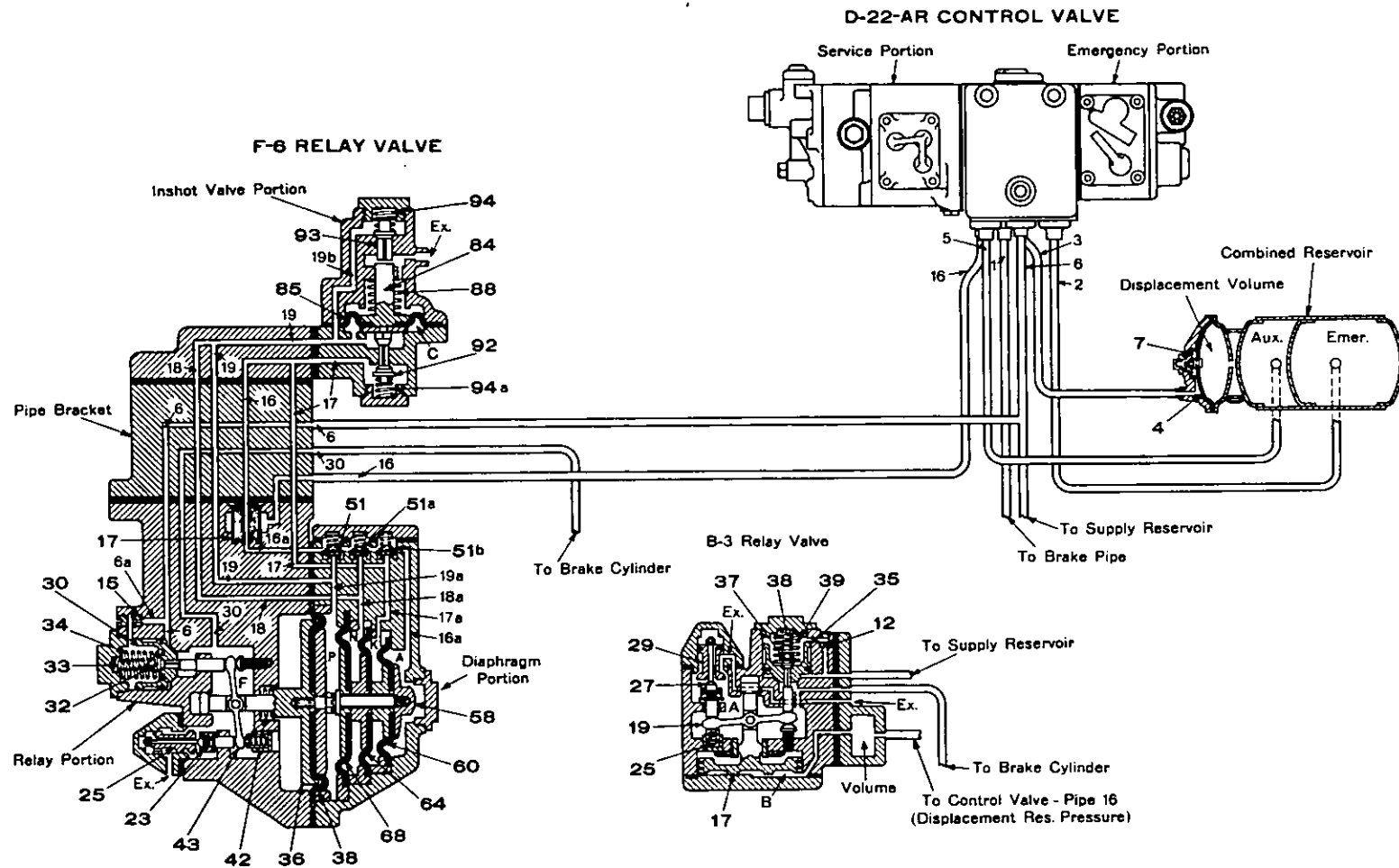


Plate 9. Diagrammatic of F-6 and B-3 Relay Valves

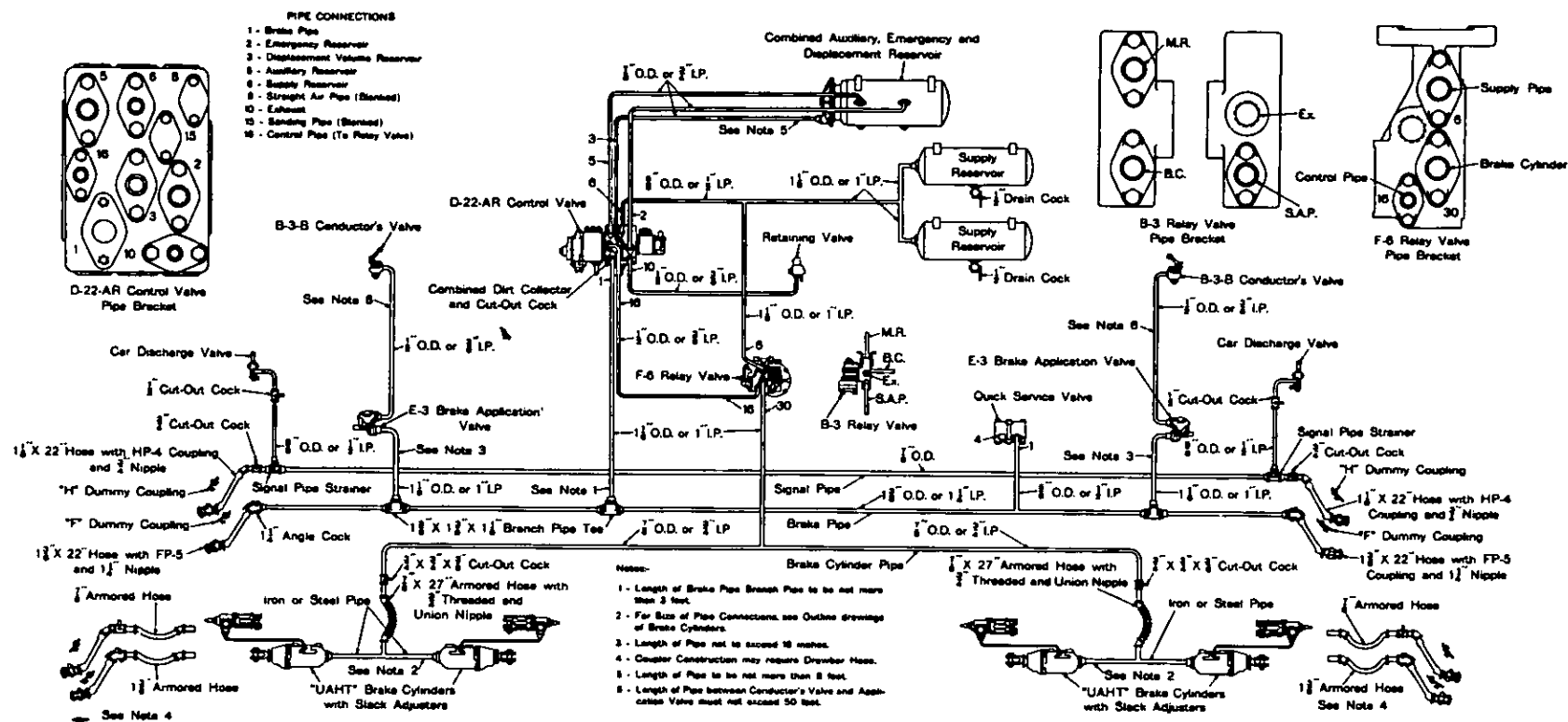


Plate 10. Piping Diagram of the D-22-P Passenger Car Brake Equipment

COMPOSITE INSTRUCTION PAMPHLET

No. 5071-8

DECEMBER 1960

**26-C BRAKE EQUIPMENT
For
Passenger Cars**



**Westinghouse Air Brake
COMPANY**

AIR BRAKE DIVISION  WILMERDING, PA.

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Composite Instruction Pamphlet
No. 5071-8

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INTRODUCTION

**26-C Passenger Car Brake Equipment
with 26-C Control Valve**

The 26-C Passenger Car Brake Equipment is designed to operate in trains of high speed service. The characteristics of this brake equipment includes the desirable features obtained with service-proven elements utilized in the 26-C Control Valve.

Important features of the equipment are as follows:

1. Maximum flexibility during applications and releases for smooth braking.
2. Emergency brake applications with higher braking forces.
3. Brake cylinder pressure is maintained against normal leakage.
4. Automatic adjustment of brake cylinder piston travel.
5. Provision for train signaling. Refer to Instruction Pamphlet 5061.

NOTE: Water raising details, enclosed in a block on the line piping diagram, are not included in the equipment described in this pamphlet. This water raising equipment is covered in Instruction Pamphlet No. 2462.

PARTS OF THE EQUIPMENT

The following is a list of the parts which make up this equipment. The line piping diagram at the end of this pamphlet shows the piping and relative location of these parts.

1. 26-C Control Valve, a modern operating valve, which applies and releases the brakes.
2. Combined Selector Volume and Control Reservoir, and Auxiliary Reservoir. The Selector Volume acts as a stabilizing volume for harmonious operation of the selector valve. The control reservoir functions as a reference volume for the proper development of brake cylinder pressure. The auxiliary reservoir supplies air to brake cylinder during brake applications.
3. A-2 Quick Service Valve transmits local quick service activity from car to car to provide fast transmission of the brake pipe reduction, particularly on successive reductions following the initial reduction.
4. B-3-A Emergency Brake Valve permits the conductor to initiate an emergency application.
5. A-2 Car Discharge Valve permits the conductor to reduce signal pipe pressure.
6. Retaining valve to control the rate of brake cylinder exhaust while the equipment is being recharged.
7. Type "D" Slack Adjuster automatically maintains the nominal brake cylinder piston travel.
8. "UAHT" Brake Cylinder to deliver the braking force through brake levers to the brake shoe.

GENERAL OPERATION OF THE 26-C PASSENGER CAR BRAKE EQUIPMENT

This section of the pamphlet described the fundamental operation of the combined devices of the 26-C car air brake equipment as found in this installation. A detailed description of each device is given in the DESCRIPTION AND OPERATION OF THE PARTS section of the pamphlet.

Charging

When charging main reservoir air, reduced to operating pressure flows through the brake valve, the brake pipe and the 26-C Control Valve to charge the combined selector volume and control reservoir and the auxiliary reservoir. The signal pipe is also charged from the control station.

Service

In service position a brake pipe reduction is made which causes the service piston of the 26-C Control Valve to move to service position. Auxiliary reservoir air is connected to the brake cylinder to apply the brake. The severity of the brake application is dependent upon the amount of brake pipe reduction. A partial brake pipe reduction results in a partial brake cylinder application and full service reduction provides for a full service application.

Lap

In Lap position the brake pipe reduction is terminated and auxiliary reservoir air continues to flow to the brake cylinder until the pressure acting on the 26-C Control Valve service piston moves the service piston to lap position.

The control valve service piston remains in lap as long as the brake pipe and brake cylinder pressures do not change. In case of a further brake pipe reduction or loss of brake cylinder pressure due to leakage, the control reservoir air pressure moves the service piston to service position permitting an additional flow of auxiliary reservoir air to the brake cylinder.

Release

To release a service application the brake pipe is recharged and the increase of this pressure moves the 26-C Control Valve service piston to release position. The auxiliary reservoir is recharged and the brake cylinder exhausts to release the brake. The amount of brake release is proportional to the amount of brake pipe recharge as controlled by the brake valve. A partial recharge of the brake pipe provides for partial release of the brake and a full recharge provides for a total brake release.

GENERAL OPERATION

Emergency

When an emergency rate of brake pipe reduction occurs, the emergency valve of the 26C Control Valve is operated to provide a local brake pipe reduction at the control valve. This rapid drop of brake pipe pressure operates the control valve more quickly and delivers a higher brake cylinder pressure than normally obtained during service brake application.

To release following an emergency application after the 26-C Control Valve quick action chamber has been vented. The brake pipe is recharged to position the 26-C Control Valve in release position. The brake cylinder pressure is now released and the auxiliary reservoir is recharged.

DESCRIPTION and OPERATION of the DEVICES of the EQUIPMENT

The following sections individually describe the functions of each device as used in this installation of the 26-C Car Brake Equipment.

26-C CONTROL VALVE S.55.04-8.2

The 26-C Control Valve is an automatic type of device designed for use on a passenger car to control the flow of air to or from brake cylinders on that car in response to the amount of increase or decrease in brake pipe pressure. The control valve consists of a pipe bracket on which are mounted a service portion, an emergency vent valve portion, a brake pipe cut-out cock and strainer portion, and a reservoir release valve portion. Although not a part of the device itself, an auxiliary reservoir, a control reservoir, and a selector valve volume reservoir are required to complement the functions of the 26-C Control Valve.

The auxiliary reservoir supplies air to the brake cylinders, and to the brake cylinder relay valve when used, during service and emergency brake applications. The size of the auxiliary reservoir is selected to provide the desired emergency equalization pressure.

The function of the control reservoir pressure is to provide a reference force to move the service valve in the service portion of the 26-C Control Valve when a reduction occurs in the opposing brake pipe pressure.

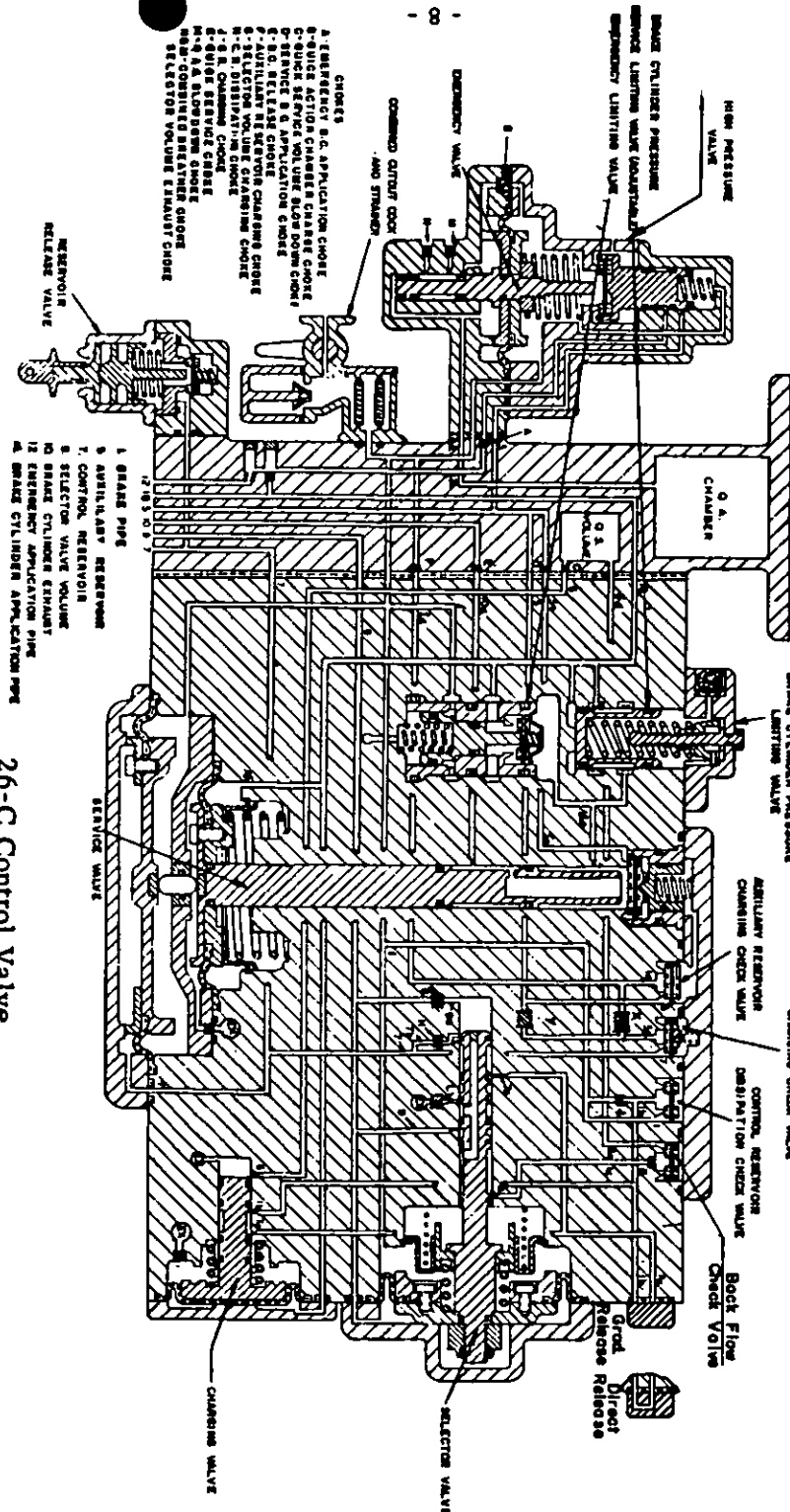
The selector valve reservoir acts as a stabilizing volume during the operation of the selector valve during quick service and graduated release operations.

The pipe connections to the pipe bracket are designated numerically and are so identified on the diagrammatic.

The Service Valve Portion contains a service spool valve, which includes two (2) diaphragms selected for proper reference to provide the development of brake cylinder pressures in accordance with brake pipe reductions. The application and release valve element controls the movement of the air from the auxiliary reservoir to the relay valve. Whenever a reduction in brake pipe pressure occurs, the service spool valve assembly moves upward and thus opens the application valve. The service valve spool element also serves to exhaust, at the control valve, the controlling air pressure of the relay valve, whenever the brake pipe pressure is increased. The diaphragm area ratios, together with the spring arrangement included in the service valve portion, permit stable operation of the automatic brake together with proper development of brake cylinder pressure to operate satisfactorily with other systems of automatic air brake control. The service portion also includes a charging valve that functions to cut off the flow of air from the quick service volume to atmosphere, and also cuts off the dissipation of control reservoir air to the brake pipe during graduated release action of the control valve.

The check valves contained within the valve provide for:

- (1) charging the auxiliary (supply) reservoirs from brake pipe.



26-C Control Valve
Diagrammatic

- (2) rapid dissipation of control reservoir air to brake pipe during direct release action of the control valve.
- (3) dissipation of brake pipe air from the spring chamber of the selector valve to the quick service volume during the quick service function or initial stage of a brake application.

A Graduated Release Cap which positions the valve for Graduated or Direct Release is located on the service valve portion. The letters REL. are cast on the body below the graduated release cap. The letters DIR. and GRA. are cast on the cap. When the letters DIR. are over the letters REL., the valve is set for Direct Release; when the letters GRA. are over the letters REL., the valve is set for Graduated Release. The cap is set by removing the two cap screws and turning the cap so that either DIR. or GRA. line up with REL. on the body.

The Selector Valve (designed into the service portion of the 26-Control Valve) controls the quick service function, provides for the direct release function when required and enables the control valve to be satisfactorily trained with D-22 type brake equipment. There are four (4) positions that this valve may assume during operation of the control valve; these are Release, Service, Lap, and Emergency.

The service valve portion also contains two (2) brake cylinder limiting valves which will limit the maximum brake cylinder pressures in service and emergency applications. These pressures are predetermined by the load setting of the springs within the limiting valves. During emergency applications the emergency limiting valve will open when the brake pipe pressure is reduced to a value of between 10 and 15 psi, which provides a controlled fast build-up to the emergency pressure.

The emergency portion of the 26-C Control Valve is designed to provide a large local opening for exhaust of brake pipe air during an emergency application. The emergency portion contains the operating diaphragm piston and the high pressure vent valve. During emergency application one end of the diaphragm piston unseats the vent valve to locally exhaust the brake pipe air, the other end the diaphragm piston is a spool valve that provides for stability of exhaust of the quick action chamber air.

The Brake Pipe Cut-Out Cock and Strainer Portion provides a means of straining the air that flows into the control valve. It also provides a means of cutting out the control valve when desired.

The Reservoir Release Valve Portion provides a means of manually venting control reservoir air to atmosphere.

CONTROL VALVE OPERATION

In order to make the operation of this valve more easily understood, the diagrammatic in this publication should be used, however, without regard to actual proportion and construction of parts.

Whenever the car is initially charged, brake pipe air passes through the cut-out cock and strainer and into Passage 1 in the pipe bracket. From Passage 1, the air flows to the following passages and chambers in the valve:

- (1) To the emergency valve portion and thus to the spring chamber above the large diaphragm.
 - (a) Brake pipe air flows from the spring chamber above the large diaphragm, through Choke B and thus to the underside of the large diaphragm as well as the quick action chamber in the pipe bracket.
- (2) To the spring chamber of the selector valve.
- (3) To the brake pipe chamber above the large diaphragm in the service valve.
- (4) To the brake cylinder emergency limiting valve, where the brake pipe pressure overcomes the force of the spring and moves the spool valve to its downward position, thus permitting the check valve to become seated.
- (5) Through Choke F and Passage 1a that leads to the auxiliary reservoir charging check valve, where the auxiliary reservoir line is charged.
- (6) From Passage 1, brake pipe air flows through Choke J into Passage 1-b that leads to the graduated release cap and to the charging valve spool. The air continues to flow into Passage 7-a that leads to the selector valve spool and passage 7-b. From here the air may flow to the following passages and chambers:
 - (a) Through Choke H and into passage 7 that leads to the control reservoir chamber under the large diaphragm as well as to Pipe 7 in the pipe bracket where the connection exists to the reservoir release valve and the control volume reservoir.

26-C CONTROL VALVE

- (b) Air flows around the spool valve into Passage 9-a and Choke G that leads to Passage 9. This connection leads to the diaphragm chamber of the selector valve, the selector valve spool as well as to Pipe 9 in the pipe bracket where the connection exists to the selector volume reservoir.

When the air system of the car is fully charged, identical pressures will exist above and below the large diaphragm in the service valve. With the aid of the large spring, the diaphragm assembly will be positioned in its downmost position during Release Position of the automatic brake valve in the locomotive.

Whenever a brake application occurs, the brake pipe pressure in Port 1 will be reduced the amount as determined by the handle position of the automatic brake valve on the controlling unit. The reduction of brake pipe pressure will occur in the brake pipe chamber above the large diaphragm in the service valve. The differential pressure that exists across the diaphragm will initiate a movement of the diaphragm assembly and stem to open the application valve to permit auxiliary (supply) reservoir air to flow to Passage 16a.

Reduction of brake pipe pressure also occurs in the spring chamber of the selector valve. The pressure differential that exists across this diaphragm positions the diaphragm assembly and spool to permit the following to occur:

- (1) Passage 7b that connects control reservoir air with selector volume air, Passage 9, is cut off at the selector spool valve.
- (2) Passage 7a is disconnected from 7b at the selector spool valve. This isolates control reservoir air from brake pipe air.
- (3) Quick service action occurs when brake pipe air in the spring chamber of the selector valve flows into Passage 1c, through Choke K and the backflow check valve. From here, the air flows through Passage 6a to the quick service volume and thus through Choke C into Passage 6 that leads to the charging valve where the exhaust port is located.
- (4) The build-up of pressure, of approximately 3-1/2 to 4-1/2 psi on the diaphragm of the charging valve, positions the spool to close the exhaust of air from the quick service volume.
- (5) The decrease of brake pipe pressure permits the selector valve spool to be moved further to permit selector volume air to flow from Passage 9 through the selector spool and thus to exhaust.

26-C CONTROL VALVE

- (6) As a result of the movement of the selector valve, the service spring in the selector valve is engaged. The force of this spring, coupled with the pressure of the brake pipe, oppose that force of the selector volume air pressure. Whenever the point of equalization of forces across the diaphragm is reached, the spool valve will be positioned to assume a lap position, at which time the selector volume is cut off from exhaust at the selector valve spool.

When the application valve is opened by the upward movement of the service valve stem, auxiliary (supply) reservoir air flows into Passage 16a and thus to the following passages and chambers:

- (1) To the face of the charging valve diaphragm, thus initiating a movement of the charging valve spool that cuts off the exhaust of brake pipe air from the quick service volume. This movement terminates quick service action of the control valve.
- (2) To port 16 in the pipe bracket to which the relay valve is connected.
- (3) To the large spring chamber in the service valve. The force of this pressure, combined with the force of the spring and coupled with the force of the brake pipe pressure in the chamber above the large diaphragm, oppose the force of the control reservoir air pressure in the chamber under the large diaphragm. Whenever the point of equalization of forces across the diaphragm is reached, the service valve will assume a lap position.
- (4) To the underside of the brake cylinder service limiting valve. Whenever this air pressure increases to a point in slight excess of the force of the spring, the spool valve will move upward and thus cut off any further flow of air into Passage 16. The predetermined setting of the spring thus limits the maximum pressure delivered to the relay valve during a service application.

Whenever high brake pipe pressures are employed, it is possible to get over-reductions with the 26-C Control Valve. Over-reductions will not have any serious effect upon brake cylinder pressure, since this pressure is determined by the load settings of the springs within the limiting valves.

An over-charge in the control and selector volume reservoirs can be automatically reduced to brake pipe pressure by the movement of the brake valve handle on the locomotive to give applications and releases. During application, selector volume air flows to exhaust at the selector spool valve, and, during

26-C CONTROL VALVE

release, the control reservoir air is free to flow to the selector volume passage in the selector spool chamber. Several applications and releases may be required, depending upon the severity of the over-charge. Whenever the cap is set in Direct Release, the control reservoir air may also flow into brake pipe through Choke J as well as through the control reservoir dissipation check valve in which case only one application and release will be required to reduce an over-charge.

Graduated or Direct Release function can be obtained with the 26-C Control Valve, depending upon the position of the cap. For Graduated Release, the cap on the control valve is set in "GRA." position. The air will be permitted to flow from the control reservoir through Choke H and thus into Passage 9a, and Choke G which leads to the selector volume reservoir. However, if the cap is positioned for Direct Release, the flow of air from the control reservoir is directed to not only the selector volume, as described above, but also now may flow from Passage 7a to 1-b in the cap that leads to the control reservoir dissipation check valve and Choke J and thus into brake pipe.

In Emergency application, the 26-C Control Valve functions similarly to that previously described; however, several additional features designed into the control valve would be utilized as follows:

- (1) An emergency reservoir is not required with the 26-C Control Valve. The auxiliary (supply) reservoir of a predetermined size is always utilized to provide the higher braking pressures necessary during emergency applications.
- (2) The increased pressure differential across the diaphragm in the selector valve, as a result of the faster rate of drop brake pipe pressure, positions the diaphragm assembly and spool to momentarily provide those functions obtained during a service application, but, as a result of the further travel of the spool, into Emergency Position, the emergency spring is engaged and Passage 9 is lapped to provide a bottled-up condition for the selector volume reservoir.
- (3) The upward movement of the service valve unseats the application valve to permit auxiliary (supply) reservoir air to flow to the brake cylinder limiting valves and into Passage 16 that is connected to the relay valve.
 - (a) Auxiliary (supply) reservoir air flows to the underside of the service limiting valve spool. Whenever this pressure reaches a point in slight excess of the spring load, the spool

26-C CONTROL VALVE

- (a) will move upward, thus cutting off any further flow of air through this valve into the relay valve.
- (b) In the design of the 26-C Control Valve, a chamber is provided for brake pipe air in the emergency limiting valve, and it is this pressure that holds down the limiting valve spool. During initial stages of an emergency brake application, the emergency limiting valve will remain closed. As the brake pipe pressure continues to drop, and is reduced to a value between 10 and 15 psi, the force of the spring within the emergency limiting valve overcomes the force of the brake pipe pressure in the spool valve. The spool will then move upward, unseating the check valve and thus provide an alternate passage for auxiliary (supply) reservoir air to enter into Passage 16 that connects to the relay valve. In emergency application, the brake pipe pressure drop is so rapid that at the time the emergency limiting valve opens the check valve, the service limiting valve is still open and not as yet positioned in its uppermost position. The check valve in the emergency limiting valve will remain open to permit a continued flow of air to the relay valve. The pressure of the air admitted to the relay valve increases and thus the service limiting valve will close. The continued increase of this pressure also effects a downward force on the spool of emergency limiting valve. When this pressure reaches a point in slight excess of the spring within the emergency limiting valve, the spool will be moved downward, permitting the check valve to seat and thus cutting off the flow of all air to the relay valve.

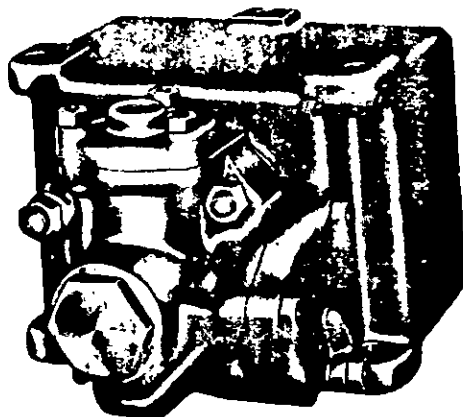
The Emergency Valve Portion of the 26-C Control Valve is so constructed to allow quick action chamber air to exhaust at the same rate that brake pipe air is reduced during a service application. During a service application the drop of brake pipe pressure at a service rate in the spring chamber of the emergency valve creates a pressure differential across the diaphragm. The diaphragm assembly and spool move upward to an intermediate position to establish a connection between quick action chamber and exhaust Chokes M and N. Chokes M and N are of a predetermined size and provide a controlled exhaust of quick action chamber air. The chokes maintain an air pressure that stabilizes the

26-C CONTROL VALVE

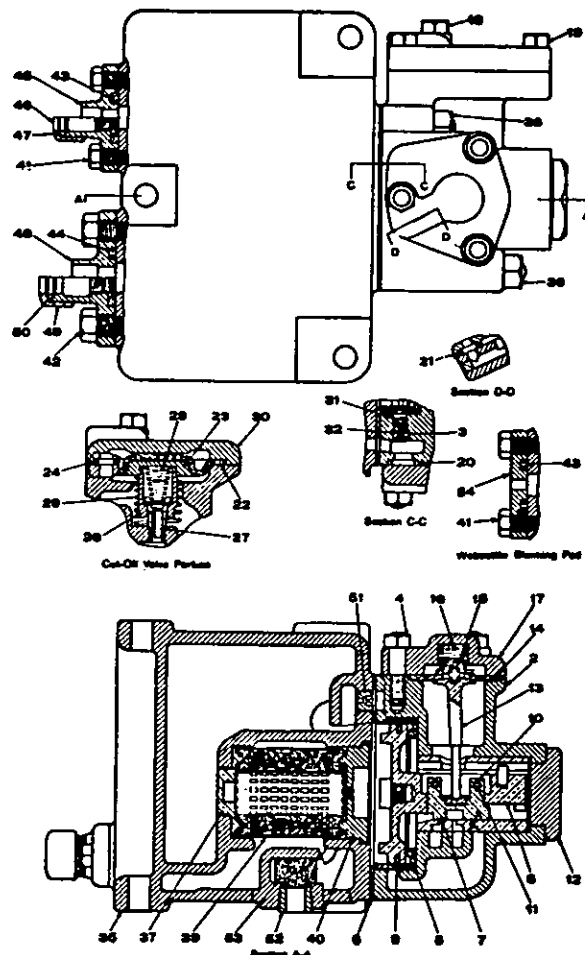
spool and prevents the unseating of the high pressure check valve.

If the brake pipe pressure is reduced at an emergency rate, quick action chamber pressure will position the diaphragm assembly and spool in the extreme upward position. In this extreme upward position, the quick action chamber is now connected only to exhaust Choke N which provides a blowdown of the quick action chamber air. With the spool valve in the upper position, the stem unseats the high pressure check valve and thus allows brake pipe air to flow to a large local exhaust. The diaphragm assembly and spool will remain in the upper position until brake pipe and quick action chamber have been nearly completely exhausted, at which time the force of the large spring within the valve will move the assembly downward, positioning the valve in its normal position.

In Release Position, the brake pipe pressure is increased and this higher pressure is admitted into the brake pipe chamber above the large diaphragm in the service valve. All of the combined downward forces position the diaphragm assembly and stem to permit the air in Passage 16, that leads to the relay valve, to vent to atmosphere through the service valve stem and thus to Passage 10 in the pipe bracket. The continued drop of air pressure in the limiting valves permits the spring within the service limiting valve to move the spool downward and, with the build-up of brake pipe pressure, the emergency limiting valve spool is held down. Both valves provide a means for a rapid exhaust of all air. It must be remembered that the air on the face of the charging valve diaphragm is also vented to atmosphere, which permits the spring to move the charging valve to its normal position.



Exterior View of A-2 Quick Service Valve



A-2 Quick Service Valve Assembly

A-2 QUICK SERVICE VALVE S.81.01-2.2

The function of the quick service valve is to propagate local quick service activity from car to car for all service brake pipe reductions and thereby provide fast development of the brake pipe reduction, particularly on successive reductions following the initial brake pipe reduction.

The valve is connected to the brake pipe as shown on the Piping diagram. It consists of a body 2 attached to pipe bracket 35 by studs and nuts 36 and 38. The body can be removed from the pipe bracket for cleaning and repairs without disturbing the pipe bracket or pipe connections.

The pipe bracket contains a quick service volume that is charged from the brake pipe through the strainer 39. The exhaust opening is protected from dirt and insects by hair strainer 53, retained in place by plug 52. Choke 51, which provides a controlled rate of brake pipe reduction with the valve in application position, is located in the face of the bracket. Both the choke and the strainer are accessible on removal of the body.

The body contains a piston 8 with piston ring 9. Attached to the piston by two pins 10 and locks 11 is slide valve 7, having two ports which establish connections with three seat ports in accordance with the position of the slide valve as moved by the piston. The slide valve is held to its seat by the tension of spring 16, and brake pipe pressure through a port shown in section D-D, transmitted through diaphragm 14 and strut 13.

Choke 3, section C-C controls the charging rate of the quick service chamber. It is protected by a felt filter. In its release position, the piston seals on seal 5 and permits the quick service chamber to charge through choke 3. In its forward or application position, the piston cuts off the charging choke.

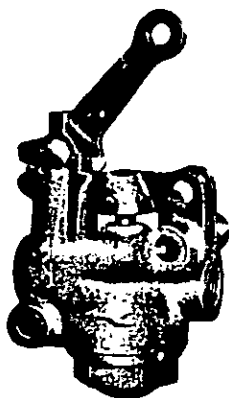
The straight air brake pipe connection to this valve is blanked on the pipe bracket by a blanking flange as shown in the upper view. The valve, therefore, is quickly convertible to use electric straight air operation merely by removing the blanking flange and connecting the straight air pipe. The cut-off portion then operates to cut-off the continuous quick service valve when the electro-pneumatic straight air brake is applied.

B-3-A Emergency Brake Valve
S.09.02-1

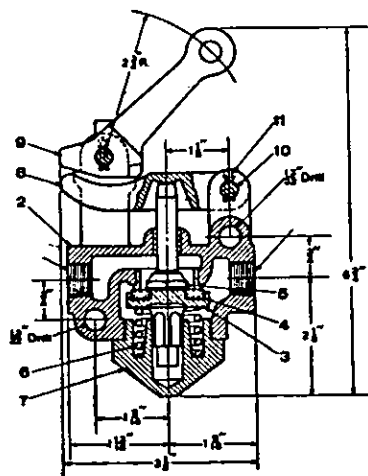
The emergency brake valve, located inside the car, permits the conductor to obtain an emergency brake application.

Body 2, houses vent valve 3, which is held seated by the force of vent valve spring 6. There are two pipe taps; one is open to atmosphere, and one connected to the brake pipe.

When the handle of the emergency brake valve is operated by means of a cord or otherwise, operating lever 9 deflects valve lever 8 downward to unseat valve 3. Air in the brake pipe is vented to atmosphere, at a fast rate to cause an emergency brake application.



Exterior View



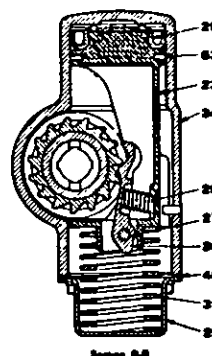
Assembly View

TYPE "D" AUTOMATIC SLACK ADJUSTER
S-79.01-1

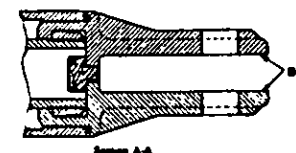
The slack adjuster provides automatic adjustment of brake cylinder piston travel.

The slack adjuster body 34, Section B-B, contains piston 23 with piston packing cup 25, piston spring 31, pawl 26, pawl spring 28, and also adjuster screw nut 8, assembly view, on which the operating ratchet is located. Adjuster screw 5 makes the connection between the adjuster screw nut 8 and adjuster adapter 59. Cover 29, attached to body 34 by cap screws 32, permits assembly of the piston and piston spring. The lever bracket 56, section A-A, attached to body 34 by bracket screws 58, makes the slack adjuster connection to the brake line lever.

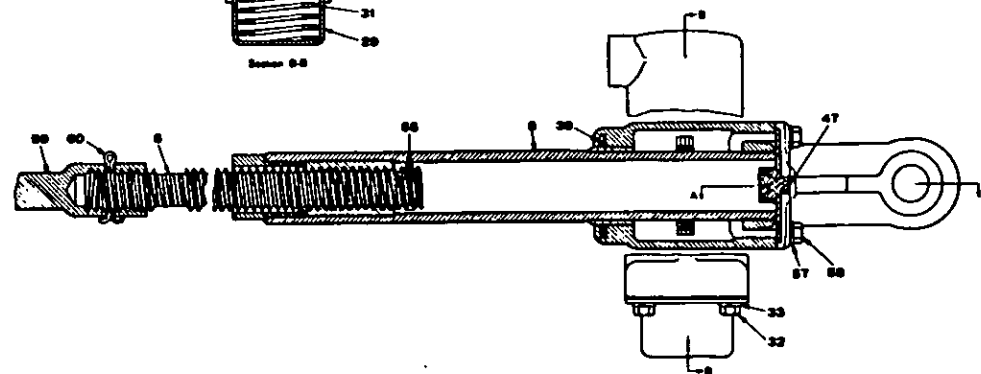
Positive slack take-up is assured since the slack adjuster is operated by air from the brake cylinder when the brake cylinder piston travel exceeds its predetermined limit. Air enters the slack adjuster when the brake is applied, causing piston 23 to move downward against the compression of piston spring 31. Pawl 26 is attached to the piston stem and rides on the ratchet wheel when the piston moves downward. When the brake is released and the brake cylinder piston returns to its normal position, air pressure in the slack adjuster cylinder escapes, and its piston returns to normal position. In so doing, the pawl engages the ratchet wheel and turns adjuster screw nut 8, thereby shortening the tie rod connection to correspondingly shorten the brake cylinder piston travel.



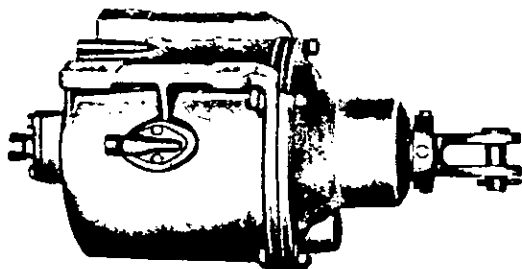
Section B-B



Section A-A

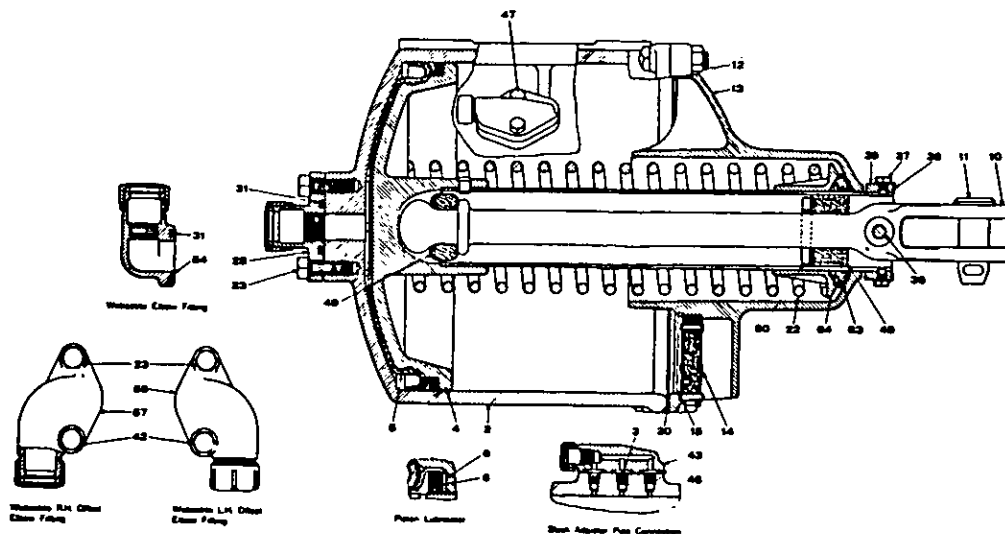


UAHT BRAKE CYLINDER
S.43.03-2.1



Designed to prevent the entrance of dirt, the UAHT Brake Cylinder incorporates features contributing to satisfactory operation and economical maintenance. The cylinder is constructed so that a grease packing provides lubrication of the moving parts for long periods of time without replenishing. The UAHT Brake Cylinder is made in sizes to meet all operating requirements.

The cylinder body and pressure head are combined into a single casting 2, which is provided with a bolting flange for mounting and a WABCO[®] or WABCOSEAL[®] mounting for the pipe connection. Piston 4 has a hollow rod which provides for a loose push rod 10 attached to the levers and rods of the brake rigging. A push rod holder 79 and a hollow piston rod seal 48 are attached to the outer end of the piston rod, with an anti-rattler ring 49 holding the opposite end.



Assembly View of the UAHT Brake Cylinder

UAHT BRAKE CYLINDER
S.43.03-2.2

A solid WABCO[®] packing cup 5 snaps onto the pressure face of the piston. The circumference or perimeter of the piston is machined to form a shoulder over which the packing cup is fitted. A groove behind this shoulder contains a piston lubricator. The space back of the heel of the packing cup and in front of the lubricator swab provides a groove around the piston, which, when filled with lubricant, serves to spread the lubricant over the cylinder wall with each movement of the piston.

To prevent the entrance of dirt, the piston hollow rod is ground true as to diameter and surface, and the non-pressure head 13 is fitted with a packing seal 63, held in place by spring seat 64. Seal 63 is packed in grease and serves to lubricate the hollow rod as well as seal the interior of the cylinder against dirt and moisture.

Since atmospheric air must enter the non-pressure end of the cylinder during the release movement, the non-pressure head is fitted with a curled hair strainer 14. This strainer is of the cartridge type and is held in place by strainer retaining ring 15.

A slack adjuster pipe connection fitting 43 is attached to the cylinder body 2 by two cap screws 47. When the slack in the brake rigging has increased sufficiently, it allows the brake cylinder piston to travel far enough to uncover the small port in the side of the brake cylinder body. Brake cylinder air then passes through the slack adjuster pipe connection and the pipe to operate the slack adjuster.

MAINTENANCE OF 26 TYPE BRAKE EQUIPMENT

It is essential that all brake parts be given attention at each cleaning period to insure proper service-ability.

The 26 type passenger brake equipment consists of various operating portions, some of which are attached to their respective pipe brackets. Pipe connections are permanently made to these pipe brackets, and operating portions may easily be removed and replaced if necessary.

The purpose of these instructions is to avoid unnecessary expense due to careless handling of parts, since it is possible to assemble and disassemble individual portions. If excessive force is required, an investigation should be made immediately as to the cause of the difficulty.

Completely disassemble all portions and wash all parts (except diaphragms, rubber seated check valves, sealed bearings, rubber seals, "O" rings and gaskets) in mineral spirits; then blow clean with air.

BUSHINGS

All bushings, after they have been cleaned, must be examined for grooving, shoulders, cracks, pitting, and checked for taper and out-of-round.

STRAINERS AND FILTERS

Strainers and filters (except those designated to be cleaned in the A-1 strainer cleaning device) must be thoroughly washed in a suitable solvent and blown dry with a jet of clean dry air. Filters attached to choke plugs must be replaced.

CHOKES

The size of chokes is important, and whenever a portion is disassembled, the chokes must be cleaned and inspected to insure that they are not restricted. Metallic tools must not be used for cleaning chokes, as their size must not be changed. While chokes are removed, the passages must be checked for restrictions and blown out if necessary. The chokes can be cleaned in a suitable solvent and dried with a jet of air. The threads of all choke plugs and other removable plugs, as well as all other threaded parts which may later be difficult to remove, must be coated lightly with a compound consisting of one part graphite (current AAR Specification M-913) and two parts oil (SAE-20) by weight.

SPRINGS

All springs must be inspected after cleaning. Any that show rust pits, distortion, or have permanent set, must be replaced with ones known to be correct.

GASKETS, DIAPHRAGMS, RUBBER SEALS, "O" RINGS, AND RUBBER SEATED CHECK VALVES

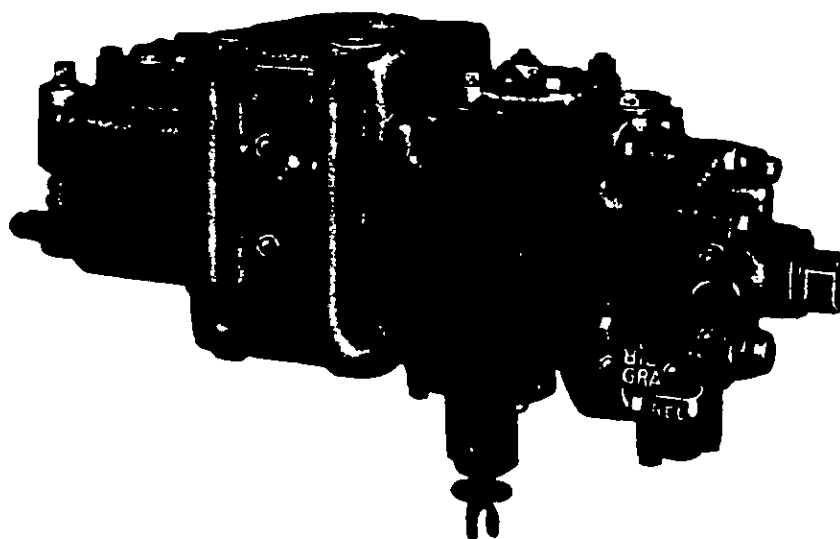
All gaskets, diaphragms, rubber seals, "O" rings, and rubber seated check valves may be dipped in a suitable solvent to assist in the removal of dirt and grease, but these parts must be promptly wiped dry after cleaning and must not be allowed to soak in the cleaning fluid. Gaskets which have broken or flattened beads, cracks or cuts on diaphragms, must be replaced. Serviceable gaskets and diaphragms must be brushed with a soft bristle brush to remove any remaining dirt and to polish them. "O" rings should be replaced at each cleaning period, and when replacing "O" rings, apply a light film of Silicone Grease, MIL-L-4343, generously to both the "O" ring as well as the groove. Care must be exercised when re-assembling so that no parts are damaged. It is important that cap screws and nuts are tightened sufficiently to prevent gasket leakage and yet not excessively to cause distortion of covers and gaskets.

D-22-AR and D-22-BR CONTROL VALVES

Parts Catalog No. 3220-2

April, 1957

(Supersedes Issue of December, 1948)



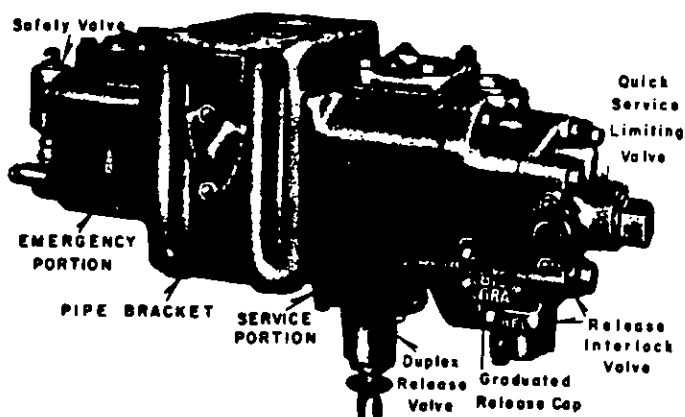
Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION  WILMERDING, PA.

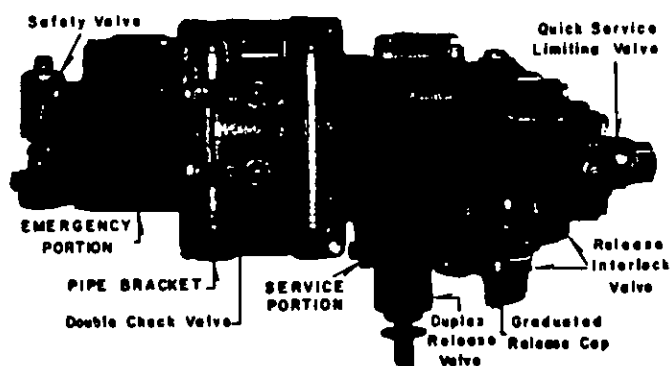
D-22-AR and D-22-BR CONTROL VALVES

	Portion	Page
Domestic Shipping Weights		2
Schedule of Complete Piece Numbers covering CONTROL VALVES and Portion Pc. Nos. required for each		5
Emergency Portion (AR and BR Type)		7
Service Portion (AR and BR Type)		9
Pipe Bracket Portion (AR and BR Type)		5
WABCOSEAL®, WABCOTITE®, AND WABCOTITE Adjustable fittings for application to Pipe Bracket		10
Double Check Valve Portion		11
Wrenches for Splined Socket Choke Plugs.		11
Repair Parts Information for Obsolete D-22-ER Control Valves		12 to 14
Spring Information Table		15

D-22-AR and D-22-BR CONTROL VALVES



Front View of D-22-AR CONTROL VALVE

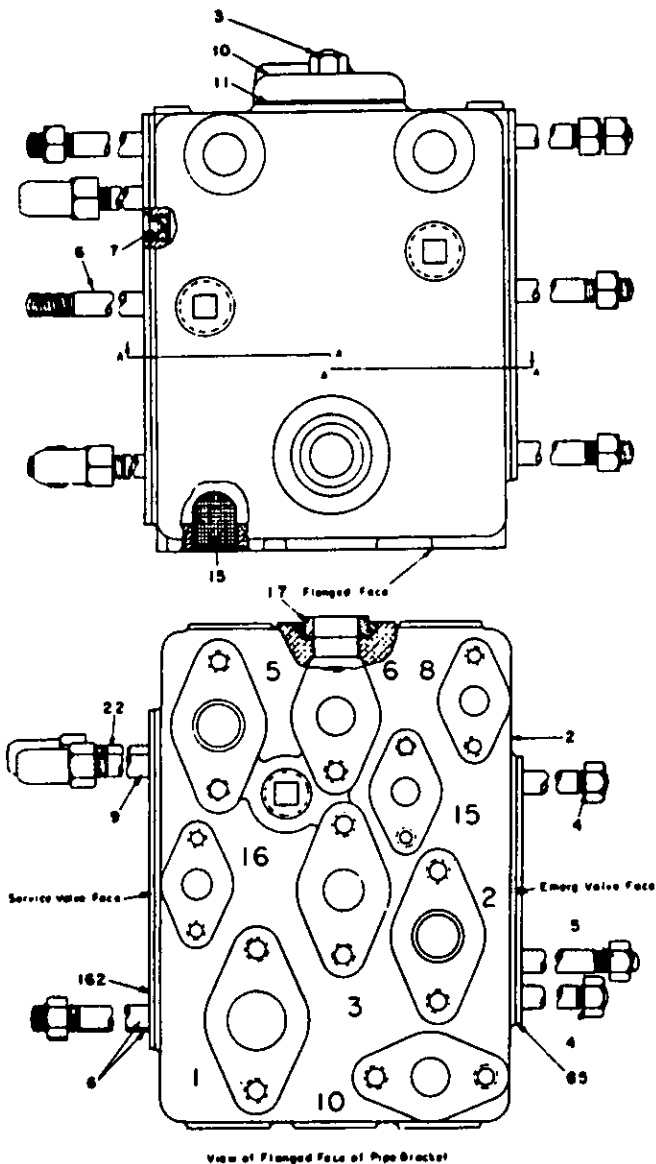


Front View of D-22-BR CONTROL VALVE

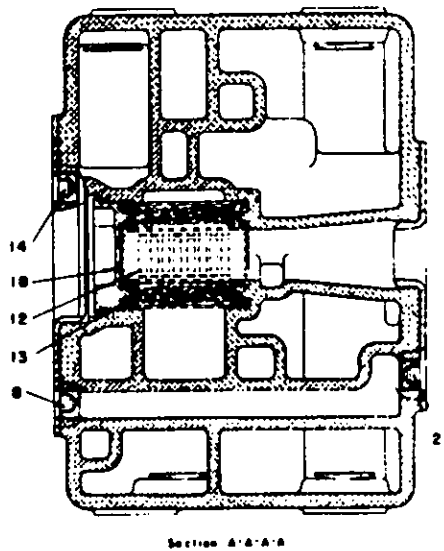
NOTE A: Domestic Shipping Weight for one (1) Equipment

D-22-AR Control Valve, Complete	Approx. 235 lbs.
D-22-BR Control Valve, Complete	Approx. 240 lbs.

D-22-AR and D-22-BR CONTROL VALVES PIPE BRACKET PORTION



Type	Portion Place	Ref. 7	Ref. 8
D-22 AR	513170	7/64" Drill	#44 Drill
D-22 AR	541556	#29 Drill	#44 Drill
D-22 BR	514864	7/64" Drill	#44 Drill
D-22 BR	547765	11/64" Drill	7/64" Drill
D-22 BR	551023	#29 Drill	#44 Drill



D-22-AR PIPE BRACKET PORTION Approx. Net Weight 69 lbs.
D-22-BR PIPE BRACKET PORTION Approx. Net Weight 74 lbs.

D-22-AR and D-22-BR CONTROL VALVES

Control Valve Pc. No. Complete		Portion			
Type	Less Fittings	Pipe Bracket Pc. No.	Emergency Pc. No. With Shipping Cover and Safety Valve	Service Pc. No. With Shipping Cover and Strainer	Double Check Valve Pc. No. (See Note "A")
D-22-AR	551340	541556	550967	525650	Blanked
D-22-AR	551339	513170	550967	525650	Blanked
D-22-BR	550485	551023	550967	525650	532010
D-22-BR	545549	547765	554492	525650	532010
D-22-BR	551341	514864	550967	525650	532010
D-22-BR	554038	514864	554484	525650	532010

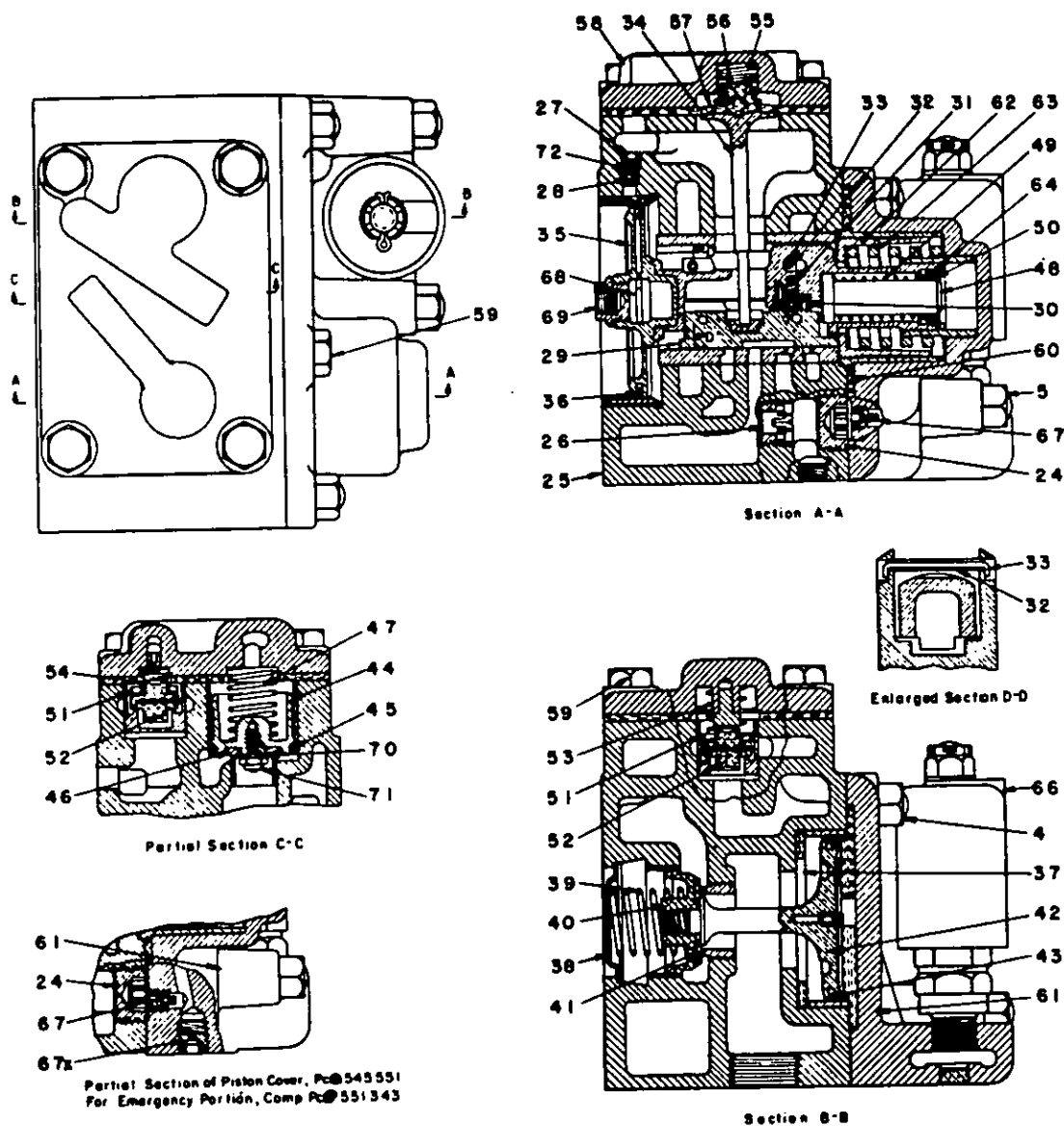
PIPE BRACKET PORTION

Ref. No.	Piece Number	Part Name	No. Req'd	Ref. No.	Piece Number	Part Name	No. Req'd
2	513170	Pipe Bracket Portion, Complete.	1	8	57584	3/8 in. Choke Plug (#44 Dr.) (Port 3A) (for Pipe Bracket Pc. Nos. 513170, 514864, 541556 and 551023).	1
2	541556	Pipe Bracket Portion, Complete.	1	8	56329	3/8 in. Choke Plug (7/16 in. dr.) (Port 3A) (for Pipe Bracket Pc. No. 547765).	1
2	514864	Pipe Bracket Portion, Complete.	1	9a	507232	1/2 x 8-3/16 in. Service Portion Stud	1
2	551023	Pipe Bracket Portion, Complete.	1	9b	516320	1/2 in. Acorn Nut	1
2	547765	Pipe Bracket Portion, Complete.	1	10	514165	Double Check Valve Portion Blanking Pad (for D-22-AR Type only)	1
3a	502674	1/2 x 2 in. Double Check Valve Blanking Pad Stud	2	11	513686	Double Check Valve Portion Blanking Pad Gasket (for D-22-AR Type only)	1
3b	502365	1/2 in. Hex Nut	2	12	502904	Strainer, Complete (includes two of 13)	1
4a	519982	1/2 x 6-1/2 in. Emergency Portion Stud	3	13	99252	Strainer Felt Washer	2
4b	2505	1/2 in. Hex Nut	3	14	68907	3/8 in. Choke Plug (#51 dr.) (Port 31)	1
5a	534506	1/2 x 8-3/8 in. Emergency Portion Stud	2	15	538813	Port Strainer (Ports 2 and 5)	2
5b	2505	1/2 in. Hex Nut	2	17	515572	Sealing Ring	1
6a	507232	1/2 x 8-3/16 in. Service and Release Interlock Portion Stud.	3	18	508155	Strainer Nut	1
6b	2505	1/2 in. Hex Nut	3	19a	58673	1/2 x 4-1/4 in. Double Check Valve Portion Stud (See Page 11)	2
7	78758	1/4 in. Choke Plug (7/64 in. dr.) (Port 10) (for Pipe Bracket Pc. Nos. 513170, 514864 and 551023).	1	19b	2505	1/2 in. Hex Nut (See Page 11).	2
7	84742	1/4 in. Choke Plug (#29 dr.) (Port 10) (for Pipe Bracket Pc. Nos. 541556 and 551023).	1	21	50715	3/8 in. Choke Plug (1/8 in. dr.) (Port #3C)	1
7	54700	1/4 in. Choke Plug (11/64 in. dr.) (Port 10) (for Pipe Bracket Pc. No. 547765)	1	22a	507234	1/2 x 8-1/2 in. Service Portion Stud	1
				22b	516320	1/2 in. Acorn Nut	1

NOTE - A: All D-22-BR Type Control Valves use the Double Check Valve Portion, while all D-22-AR Type Control Valves have the Double Check Valve mounting face blanked.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

D-22-AR and D-22-BR CONTROL VALVES EMERGENCY PORTION



Approx. Net Weight 50 lbs.

D-22-AR and D-22-BR CONTROL VALVES

3220-2
Page 7

EMERGENCY PORTION

Ref. No.	Piece Number	Part Name	No. Req'd	Ref. No.	Piece Number	Part Name	No. Req'd
	554492	Emergency Portion, Complete with Shipping Cover and Safety Valve (for Pc. 545549)		45a	81339	High Pressure Valve Ring (1st Repair)	1
	550967	Emergency Portion, Complete with Shipping Cover and Safety Valve (for Pc. Nos. 551339, 551340, 550485 and 551341)		45b	59405	High Pressure Valve Ring (2nd Repair)	1
	554484	Emergency Portion, Complete with Shipping Cover and Safety Valve (for Pc. 554038)		45c	59406	High Pressure Valve Ring (3rd Repair)	1
25	507269	Emergency Portion Body, Complete (Includes 25, 26 and 27)	1	45d	546509	High Pressure Valve Ring (4th Repair)	1
25a	527799	3/4 in. Choke Plug	1	46	502720	High Pressure Valve Seat	1
26	507270	Wasp Excluder	1	47	* 2616	High Pressure Valve Spring	1
27	506277	Quick Action Chamber Charging Choke, Complete (Includes 72)	1	48	94845	Emergency Piston Spring Guide	1
28	506276	Choke Filter	1	49	*501006	Emergency Piston Spring	1
29	507197	Emergency Slide Valve	1	50	525021	Emergency Piston Spring Seat	1
30	94857	Graduating Valve and Pin	1	51	550912	Check Valve Stop	2
31	* 93940	Graduating Valve Spring	1	52	512050	Check Valve, Complete	2
32	97379	Slide Valve Spring Pin	2	53	* 94952	Accelerated Emergency Release Check Valve Spring	1
33	97378	Slide Valve Spring Pin Lock	2	54	* 94581	Spill-over Check Valve Spring	1
34	507498	Slide Valve Strut	1	55	* 94839	Diaphragm Spring	1
	520619	Emergency Piston, Complete less Ring (Includes 35, 48, 49, 50, 64, 68 and 69)	1	56	94838	Diaphragm Spring Seat	1
35	525020	Emergency Piston	1	57	507062	Check Valve Cover Gasket	1
36a	85811	Emergency Piston Ring (1st Repair)	1	58	507272	Check Valve Cover, Complete	1
36b	85812	Emergency Piston Ring (2nd Repair)	1	59	5951	1/2 x 1-1/2 in. Check Valve Cover and Piston Cover Cap Screw	5
36c	85813	Emergency Piston Ring (3rd Repair)	1	60	503355	Piston Cover Gasket	1
36d	85814	Emergency Piston Ring (4th Repair)	1	61	545551	Piston Cover, Complete (Includes 67 and 67x) (for Pc. 554492 only)	1
37	94886	Large Vent Valve Piston Seal	1	61	507710	Piston Cover, Complete (Includes 67)	1
38	94880	Vent Valve Spring Seat	1	62	507200	Return Spring Cage (for Pc. 554492 only)	1
39	* 81643	Vent Valve Spring	1	62	94850	Return Spring Cage	1
	96080	Small Vent Valve Piston and Seal (Includes 40 and 41)	1	63	*500944	Return Spring	1
40	96056	Small Vent Valve Piston	1	64	525022	Retaining Ring, for Piston Spring seat	1
41	95968	Small Vent Valve Piston Seal	1	65	503357	Emergency Body Gasket (see page 4)	1
42	95053	Large Vent Valve Piston with Choke, less Ring	1	66	512295-0060	Safety Valve, Complete (set for 60 psi) (see Parts Catalog 3216-6)	1
43a	87007	Large Vent Valve Piston Ring (1st Repair)	1	66	554039-0075	Safety Valve, Complete (set for 75 psi) (see Parts Catalog 3216-6) (for Pc. 554484 only)	1
43b	87008	Large Vent Valve Piston Ring (2nd Repair)	1	67	517998	1/8 in. Choke Plug (#55 dr.)	1
43c	87009	Large Vent Valve Piston Ring (3rd Repair)	1	67x	63688	1/4 in. Choke Plug (1/16 in. dr.) (for P. 554492 only)	1
43d	87010	Large Vent Valve Piston Ring (4th Repair)	1	68	518089	Lubricating Wick	1
44	517716	High Pressure Valve, less Ring	1	69	514173	Oil Plug	1
				70	537392	High Pressure Valve Washer	1
				71	519787	1/4 in. Stop Nut	1
				72	525802	Felt Retainer	1
					512134	Shipping Cover (not shown)	1

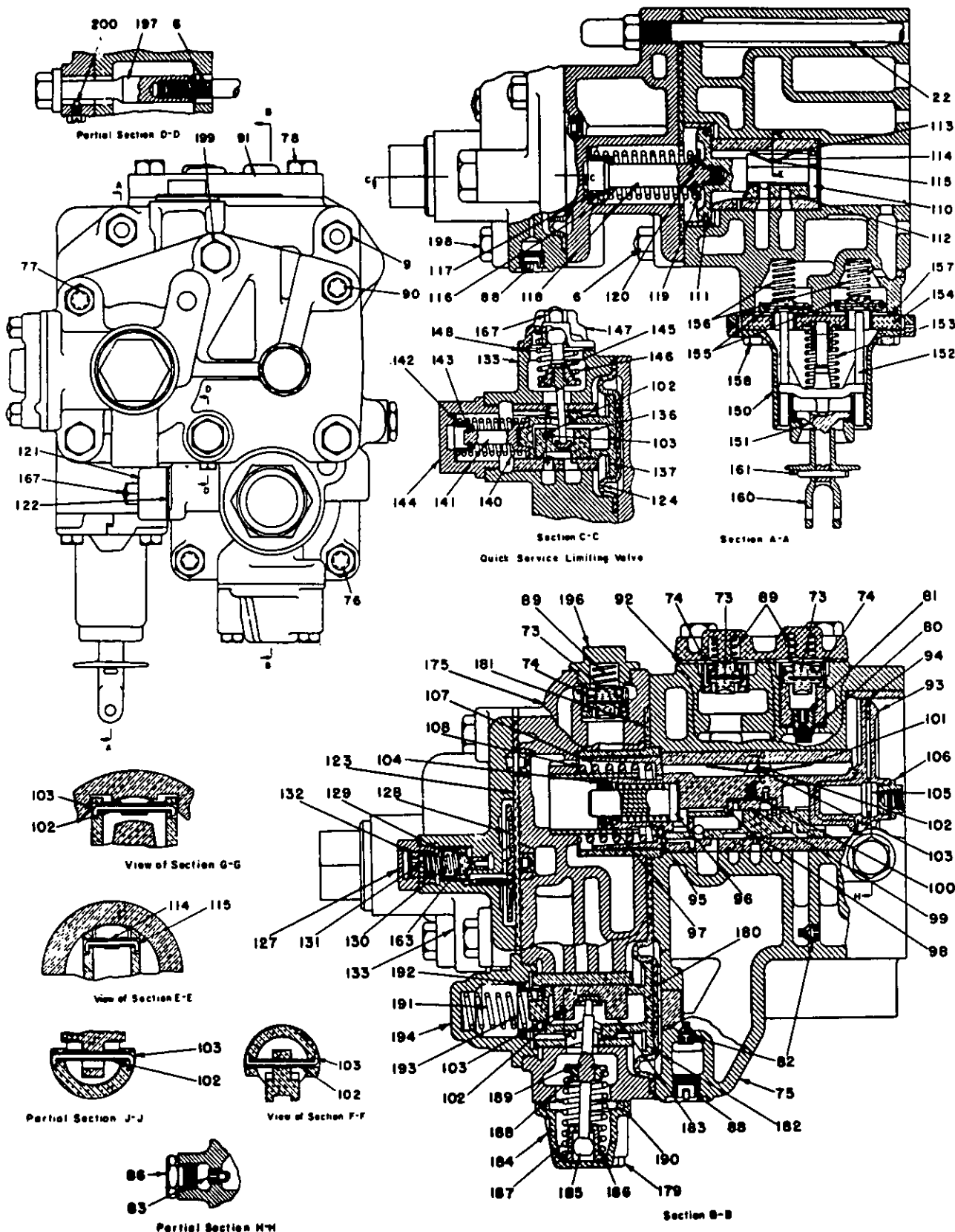
*NOTE A - For Spring Identification Table, see page 15.

†NOTE B - Not a part of the Emergency Portion, but of the Complete Device.

‡NOTE C - See Note "C", page 9.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

SERVICE PORTION



Approx. Net Weight 116 lbs.

D-22-AR and D-22-BR CONTROL VALVES SERVICE PORTION

Ref. Piece No. Number	Part Name	No. Req'd	Ref. Piece No. Number	Part Name	No. Req'd
525650	Service Portion, Complete, with Shipping Cover		103 97378	Slide Valve Pin Lock	3
73 512050	Check Valve (Aux. Reservoir Charging, Supply Reservoir Charging, Displ. Reservoir Back Flow and Em. Res. Charging Checks)	5	104 525022	Service Piston Spring Seat Retaining Ring	1
74 550912	Check Valve Stop	5	105 518089	Service Piston Lubricating Wick	1
75 513171	Service Body (Includes 77, 81, 83, 86, 88, 90, two of 76 and 82)	1	106 514173	Service Piston Oil Plug	1
76a 510095	1/2 x 2 in. Release Interlock Body Stud	2	107 537894	Service Piston Return Spring Cage	1
76b 2505	1/2 in. Hex Nut	2	108 *513141	Service Piston Return Spring	1
77a 519982	1/2 x 6-3/8 in. Q.S. Lim. and Rel. Interlock Body Stud	1	110 §507231	Release Piston	1
77b 2505	1/2 in. Hex Nut	1	111a 505865	2-1/2 in. Release Piston Ring (1st Repair)	1
78 5951	1/2 x 1-1/2 in. Check Valve Cover Cap Screw	4	111b 505866	2-1/2 in. Release Piston Ring (2nd Repair)	1
80 525032	Choke Plug Filter	1	111c 505867	2-1/2 in. Release Piston Ring (3rd Repair)	1
81 554578	1/4 in. Choke Plug (No. 56 dr.) (Port 5A) (Includes 80)	1	111d 505868	2-1/2 in. Release Piston Ring (4th Repair)	1
82 95998	1/8 in. Choke Plug (1/32 in dr.) (Ports 3B and 9)	2	112 507282	Release Slide Valve	1
83 514783	1/8 in. Choke Plug (5/64 in. dr.) (Port 5)	1	113 93946	Slide Valve Spring	1
86 77989	5/8 in. Cap Nut	1	114 500129	Release Slide Valve Spring Pin	1
88 503476	3/8 in. Wasp Excluder	3	115 500130	Release Slide Valve Spring Pin Lock	1
89 *507206	Check Valve Spring	5	531416	Release Piston Spring and Stem (Includes 116, 117, 118, 119 and 120)	1
90a 500781	1/2 x 5-5/8 in. Q.S. Lim. and Rel. Interlock Body Stud	1	116 *507213	Release Piston Spring	1
90b 502365	1/2 in. Hex Nut	1	117 507215	Release Piston Spring Seat	1
91 527110	Check Valve Cover	1	118 507216	Release Piston Spring Cage Stem	1
92 508730	Check Valve Cover Gasket	1	119 507214	Release Piston Spring Follower	1
§525286	Self Oiling Service Piston, Complete, less Ring (Includes 93, 95, 96, 97, 104, 105 and 106)	1	120 74513	Release Piston Spring Follower Retainer	1
93 525222	Service Piston	1	121 513067	Graduated Release Cap	1
94a 86159	4-3/4 in. Service Piston Ring (1st Repair)	1	122 511874	Graduated Release Cap Gasket	1
94b 86160	4-3/4 in. Service Piston Ring (2nd Repair)	1	123 †511850	Q.S. Lim. and Rel. Insuring Valve Portion Body Gasket	1
94c 86161	4-3/4 in. Service Piston Ring (3rd Repair)	1	124 511838	Q.S. Lim. Valve Diaphragm	1
94d 86162	4-3/4 in. Service Piston Ring (4th Repair)	1	511835	Rel. Ins. Cap Nut, Complete (Includes 127, 131 and 132)	1
95 *513658	Service Piston Spring	1	127 96024	Release Insuring Cap Nut	1
96 94845	Service Piston Spring Guide	1	128 94911	Release Insuring Diaphragm Follower	1
97 525021	Service Piston Spring Seat	1	129 94856	Release Insuring Valve (Includes 163)	1
98 513139	Service Slide Valve	1	130 *518942	Release Insuring Valve Spring	1
99 513142	Service Graduating Valve	1	131 96023	Release Insuring Valve Adjusting Nut	1
100 * 93940	Graduating Valve Spring	1	132 96022	Release Insuring Valve Lock Nut	1
101 94860	Service Slide Valve Spring	1			
102 97379	Slide Valve Spring Pin	3			

*NOTE A: For Spring Identification Table, see page 15.

†NOTE B: Not a part of the Quick Service Limiting Portion, but a part of the Complete Service Portion.

§NOTE C: For Sets of Condemning Gages to determine the correct size Ring to be applied to the Bushing being fitted, see L.L. 2356-4. We strongly recommend the use of these gages.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

D-22-AR and D-22-BR CONTROL VALVES **SERVICE PORTION (continued)**

Ref. Piece No. Number	Part Name	No. Req'd	Ref. Piece No. Number	Part Name	No. Req'd
133	513169 Q.S. Limiting and Release Insuring Valve Portion, Complete (Includes 102, 103, 127 thru 148 and 197)	1	167c	513969 3/8 x 1-5/8 in. Stud (for securing Strut Cover)	2
136	512606 Q.S. Limiting Slide Valve	1	167d	502365 3/8 in. Hex Nut	2
137	512609 Q.S. Limiting Valve Piston	1	175	513961 Release Interlock Valve Body, Complete (Includes two of 167) . .	1
140	*512528 Q.S. Limiting Valve Piston Return Spring	1	179	6897 3/8 x 1-7/8 in. Strut Cover Cap Screw	2
141	512610 Spring Cage Pin	1	180	511838 Service and Release Diaphragm . .	1
142	512611 Cage Spring Seat	1	181	511885 Body Gasket	1
143	512612 Spring Seat Retainer	1	182	513101 Release Interlock Piston	1
144	512613 Q.S. Limiting Valve Cap Nut	1	183	513070 Release Interlock Slide Valve . . .	1
145	512541 Slide Valve Strut	1	184	527105 Slide Valve Strut Cover	1
146	*512156 Slide Valve Strut Spring	1		513962 Release Interlock Slide Valve Strut Complete (Includes 185, 186, 187, 188 and 189)	1
147	512614 Limiting Valve Strut Cover	1	185	513938 Slide Valve Strut	1
148	512168 Strut Cover Gasket	1	186	513935 Strut Guide	1
150	95171 Reservoir Release Valve Body . . .	1	187	*513841 Slide Valve Strut Spring	1
151	94963 Reservoir Release Valve End Plate	1	188	513936 Strut Spring Seat	1
152	94945 Reservoir Release Valve Plunger	1	189	512612 Spring Seat Retainer	1
153	* 95025 Reservoir Release Valve Plunger Spring	1	190	93986 Release Interlock Strut Cover Gasket	1
154	95047 Reservoir Release Valve Filling Piece	1	191	*524014 Release Interlock Piston Return Spring	1
155	93971 Reservoir Release Check Valve . .	2	192	513146 Spring Retaining Ring	1
156	* 93972 Check Valve Spring	2	193	513145 Return Spring Seat	1
157	94888 Reservoir Release Valve Body Gasket	1	194	513102 Release Interlock Valve Cap Nut . .	1
158	3210 3/8 x 1-1/4 in. Body Cap Screw . .	4	196	550911 Check Valve Cap Nut	1
160	512708 Reservoir Release Valve Handle	1	197	513660 1/2 in. Special Stud Cap Nut	1
161	94977 3/16 x 1-1/2 in. Cotter	1	198	74529 1/2 x 2-7/8 in. Cap Screw	1
162	1506970 Service Body Gasket (see Page 4) .	1	199	25427 1/2 x 1-7/8 in. Cap Screw	2
163	516617 Release Insuring Valve Seal	1	200	93868 1/4 x 3/8 in. Set Screw	1
167a	522107 3/8 x 1-3/4 in. Stud	2		525651 Service Portion Shipping Cover, Complete, with Strainer (Not Shown)	
167b	1296 3/8 in. Hex Nut	2		525640 Service Portion Shipping Cover, Complete, less Strainer (Not Shown)	
				Emergency Body Gasket (Ref. 65) (shown on page 4)	

* NOTE A: For Spring Identification Table, see Page 15.

† NOTE B: Not included in the Complete Pc. No. of any Portion, but to be a Part of the Control Valve, Complete.

§ NOTE C: Gasket so indicated is a part of the Service Portion Complete.

WABCOSEAL[®] WABCOTITE[®], AND WABCOTITE ADJUSTABLE FITTINGS **APPLIED TO PIPE BRACKET**

The WABCOSEAL, WABCOTITE and WABCOTITE Adjustable Fittings used with these Control Valves are covered by Parts Catalog Nos. 3216-22, 3216-21, and 3216-21, Sup. 1 respectively, which also indicate the Gaskets and Cap Screws to be used with the various Fittings. Any appropriate type of Fitting may be used, for iron pipe or copper tube, or unused ports blanked, by using Fittings or Blanking Pads which fit the Flanges of sizes tabulated below:

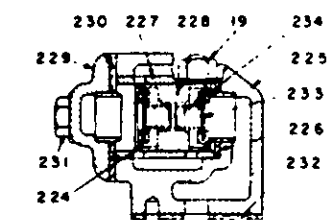
FLANGE SIZES FOR WABCOSEAL FITTINGS

Port No.	Flange Size	Port No.	Flange Size
1	1 in.	8	3/8 in.
2	3/4 in.	10	1/2 in.
3	3/4 in.	15	3/8 in.
5	3/4 in.	16	3/8 in.
6	1/2 in.		

Prices will be quoted upon application
Orders should give **PIECE NUMBER** and **NAME** of part wanted

D-22-AR and D-22-BR CONTROL VALVES
DOUBLE CHECK VALVE PORTION
(For D-22-BR Control Valves Only)

Ref. No.	Piece Number	Part Name	No. Req'd
	532010	Double Check Valve Portion, Complete	
224	536868	Check Valve Retainer Ring	2
225	532011	Double Check Valve Body	1
226	901789	Valve Seal	1
227	901835	Valve Bush	1
	537551	Double Check Valve, Complete (Includes 228, two of 224, 233 and 234)	1
228	523906	Double Check Valve	1
229	532014	Cover	1
230	532013	Cover Gasket	1
231	25427	1/2 x 1-7/8 in. Cover Cap Screw	2
232	†513686	Body Gasket (also shown as Ref. 11, page 5)	1
233	525994	Check Valve	2
234	*535943	Check Valve Spring	2
19		Double Check Valve Portion Stud (see page 5)	



Section View of Double Check Valve

*NOTE A - For Spring Identification Table, see page 15.

†NOTE B - Not a part of the Double Check Valve Portion, Complete, but a part of the Control Valve, Complete.

WRENCHES FOR SPLINED SOCKET CHOKE PLUGS

Pc. 517556	1/8 in. Plug Wrench
Pc. 517557	1/8 in. Plug Wrench
Pc. 517558	3/8 in. Plug Wrench
Pc. 518032	1/2 in. Plug Wrench

Prices will be quoted upon application
Orders should give **PIECE NUMBER** and **NAME** of part wanted

D-22-ER CONTROL VALVES

The D-22-ER Control Valves are OBSOLETE, however a Repair Parts Information is offered as follows.

PIPE BRACKET PORTION

Piece Number	Part Name	No. Req'd	Piece Number	Part Name	No. Req'd
514933	Pipe Bracket Portion, Complete	1	2505	1/2 in. Hex Nut	3
513940	Pipe Bracket, Complete (Includes Pc. 530951)	1	516320	1/2 in. Acorn Nut	1
530951	Retaining Ring	1	514926	1/2 x 10-5/16 in. Stud (for securing Service Portion)	1
502674	1/2 x 1-7/8 in. Stud (for securing Blanking Pad).	2	516320	1/2 in. Acorn Nut	1
502365	1/2 in. Hex Nut	2	78758	1/4 in. Socket Choke Plug (7/64 in. dr.) (Port #10)	1
519982	1/2 x 6-3/8 in. Stud (for securing Emergency Portion)	3	83796	1/2 in. Socket Choke Plug (1/16 in. dr.) (Port #6)	1
2505	1/2 in. Hex Nut	3	515572	Sealing Ring	1
534506	1/2 x 8-3/8 in. Stud (for securing Emergency Portion)	2	502904	Strainer, Complete	1
2505	1/2 in. Hex Nut	4	508155	Strainer Nut	1
514928	1/2 x 10-9/16 in. Stud (for securing Service Portion)	4	513686	Blanking Pad Gasket	1
			515147	Safety Valve Control Blanking Pad, Complete	1

EMERGENCY PORTION, Complete with Safety Valve

Same as covered by Reference Numbers 25 to 72 inclusive, on page 7.
Safety Valve set for 60 psi.

SERVICE PORTION, Complete with Shipping Cover Pc. 525650

Same as covered by Reference Numbers 73 to 200 inclusive, on page 9.

FILLING PIECE PORTION

Piece Number	Part Name	No. Req'd	Piece Number	Part Name	No. Req'd
517072	Filling Piece and Adapter Bracket, Complete (Includes Pc. Nos. 517073, 515547 and 508314) (for Obsolete Pc. 517079)	1	57584	3/8 in. Choke Plug (#44 dr.) (3-C Port)	1
1506970	Filling Piece Gasket	1	88311	1/2 x 6-1/4 in. Stud	1
518925	Filling Piece, Complete (Includes Pc. Nos. 57584, 88311, 78604, 506773, 93839, 517999, two of 27265, 7978, 96184, 502365 and four of 2505) (for Obsolete Pc. 518841)	1	2505	1/2 in. Hex Nut	1
522788	Filling Piece, Complete (Includes Pc. Nos. 57584, 88311, 78604, 506773, 93839, 517999, two of 27265, 7978, 96184, 502365 and four of 2505) (for Obsolete Pc. 522786)	1	78604	1/2 x 6-3/4 in. Stud	1
515816	Filling Piece, Complete (Includes Pc. Nos. 57584, 88311, 517075, 515878, 506773, 93839, two of 27265, 7978 and three of 2505) (for Obsolete Pc. Nos. 514931, 514935, 517789 and 518260)	1	2505	1/2 in. Hex Nut	1
517073	Filling Piece, Complete, less Adapter Bracket (Includes Pc. Nos. 57584, 517075, 515878, 517999, two of 27265, 506773, 96184, 502365 and four of 2505) (for Obsolete Pc. 517070)	1	27265	1/2 x 2 in. Stud (Blanking Pad)	2
			2505	1/2 in. Hex Nut	2
			517075	Controlled Emergency Portion Blanking Pad	1
			515878	Controlled Emergency Portion or Blanking Pad Gasket	1
			507992	Controlled Emergency Portion Blanking Pad Gasket	1
			506773	3/8 in. WABCO TITE® Fitting Blanking Pad	as Req'd
			93839	3/8 in. Blanking Pad Gasket	1
			7978	3/8 x 1 in. Cap Screw	2
			517999	1/8 in. Choke Plug (1/16 in. dr.) (Port 6)	1
			96184	1/2 x 2-3/4 in. Stud	2
			502365	1/2 in. Hex Nut	2
			58763	1/2 x 4-1/4 in. Stud	2
			2505	1/2 in. Hex Nut	2
			515547	Adapter Bracket (Includes Pc. Nos. 88311, 78604 and 2505)	1
			508314	Adapter Bracket Gasket	1
			30989	1/2 x 3-3/4 in. Stud	2
			2505	1/2 in. Hex Nut	2

† NOTE B: Not a part of the Filling Piece Portion, but of the Complete Device.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

D-22-ER CONTROL VALVES

INDEPENDENT APPLICATION AND RELEASE VALVE PORTION

The following are a set of Parts necessary to Convert D-22-ER Control Valves to use D-24 Type Independent Application and Release Valve. †

Pc. No.	Part Name	No. Req'd
536297	Conversion Kit, Complete	
536298	Filling Piece, Complete	1
508314	Gasket (Independent Application and Release Valve)	1
511014	1/2 x 4-3/8 in. Stud (for securing Independent Application and Release Filling Piece to Control Valve Filling Piece	2
2505	1/2 in. Hex Nut	2
535428	Independent Application and Release Valve, Complete	1
523911	Gasket (between Independent Application and Release Valve and Filling Piece)	1
25430	1/2 x 5-1/4 in. Hex Hd. Cap Screw	4

DEAD ENGINE CHECK VALVE PORTION

Pc. No.	Part Name	No. Req'd
517074	Dead Engine Check Valve Portion, Complete	
513428	Valve Body	1
93991	Check Valve	1
* 93992	Check Valve Spring	1
518929	Cap Nut	1
§515870	Body Gasket	1

DEAD ENGINE CHANGE-OVER COCK PORTION

(For Obsolete Pc. No. 522786 and Converted Control Valves)

Pc. No.	Part Name	No. Req'd
522789	Dead Engine Change-Over Cock Portion, Complete	
§515870	Body Gasket	1
522790	Body	1
522794	Cock Key	1
* 2231	Cock Key Spring	1
522795	Cock Cap Nut	1
98031	Cock Handle	1

*NOTE A - For Spring Identification Table, see page 15.

†NOTE B - In converting D-22-ER Independent Application and Release Valves to D-24 Type Independent Application and Release Valves, the converted Portion then becomes Pc. 535428. For Complete coverage of this Portion, see Parts Catalog 3220-4, page 8.

§NOTE C - Not included in the Portion, Complete, but a part of the Control Valve, Complete.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

D-22-ER CONTROL VALVES
CONTROLLED EMERGENCY PORTION
(for Obsolete Pc. Nos. 518841 and 522786)

Piece Number	Part Name	No. Req'd	Piece Number	Part Name	No. Req'd
518926	Controlled Emergency Portion, Complete		518928	Diaphragm Stem with Diaphragm and Follower, Complete	
515818	Controlled Emergency Portion (Includes Pc. 517998)	1		(Includes Pc. Nos. 508480, 508476, 515877, 515836, 508477 and 516758).	1
517998	1/8 in. Choke Plug (No. 55 dr.)	1	508480	Stem	1
527360	Double Check Valve Bush with Piston and Check Valve, Complete (Includes Pc. Nos. 514496, 527346, 514500, 527345, 527352, 38453, 521909 and 527344).	1	508476	Seal Retainer.	1
514496	Double Check Valve Bush	1	515877	Seal	1
527346	Small Check Valve	1	515836	Diaphragm.	1
514500	Small Check Valve Seal	1	508477	Diaphragm Follower.	1
527345	Double Check Valve Piston.	1	516758	Follower Nut	1
527352	Double Check Valve Piston Seal	1	508475	Diaphragm Cover	1
38453	1-3/16 in. Piston Ring (1st & 2nd Repair)	1	91831	Port Gasket.	1
50968	1-3/16 in. Piston Ring (3rd Repair).	1	* 94581	Check Valve Spring.	1
521909	Double Check Valve Piston Nut.	2	514499	Check Valve Cover	1
514501	Double Check Valve Bush Gasket.	1	3207	3/8 x 1-1/2 in. Cover Cap Screw	4
512050	Check Valve	1	15784	3/8 x 1-1/8 in. Cover Cap Screw	4
515878	Controlled Emergency Portion Gasket	1	514497	Check Valve Cover Gasket	1
11760	1/2 x 1-3/8 in. Cap Screw (Controlled Emergency Portion).	2	527344	Piston Seal Retaining Ring.	1
			508776	Diaphragm Spring	1
			550912	Check Valve Stop	1
			546343	1/4 in. Pipe Plug	1

* NOTE A: For Spring Identification Table, see page 15.

† NOTE: Not a part of the Controlled Emergency Portion, but a part of the Complete Device.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

D-22-AR and D-22-BR CONTROL VALVES

SPRING IDENTIFICATION

The following table is shown to enable railroad men, storekeepers, and all Air Brake men to identify the various springs used in the devices cataloged herein. It is based on calculated figures and the actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

						
SPRING IDENTIFICATION						
Piece Number	Approx. Out. Dia. "A"	Approx. Dia. Wire "B"	Approx. Free Ht. "C"	Approx. No. Turns	Material	Name of Spring
81643	1-25/64"	.120"	2-47/64"	7-1/2	Steel	Vent V. Spring
2616	15/16"	.095"	2-1/16"	8	Steel	H.P.V. Spring
501006	53/64"	.062"	2-13/32"	11	Steel	Emer. Piston Spring
94839	11/16"	.065"	1-1/8"	13	Ph. Bz.	Diaphragm Spring
93940	11/64"	.020"	21/32"	12	Ph. Bz.	Graduating V. Spring
94581	31/64"	.028"	1-3/32"	7	Ph. Bz.	Check Valve Spring
507206	35/64"	.040"	1-7/64"	7	Ph. Bz.	Check Valve Spring
513658	27/32"	.972"	2-1/8"	10	Steel	Piston Tail Spring
513141	1-7/8"	.177"	3-7/32"	7-1/2	Steel	Ser. Pist. Ret. Spring
507213	1-5/16"	.148"	4-3/8"	12-1/2	Steel	Rel. Piston Spring
518942	1/2"	.062"	1-9/64"	8-1/2	Steel	Rel. Ins. V. Spring
512528	11/16"	.113"	2-5/8"	10	Steel	Q.S. Lim. V. Spring
512156	1-1/8"	.135"	2-1/8"	7	Steel	Q.S. Lim Slide Valve Strut Spring
95025	15/16"	.098"	2-15/16"	11	Steel	Res. Rel. V Plunger Spring
93972	9/16"	.057"	1-15/32"	8	Ph. Bz.	Check Valve Spring
513841	1-7/64"	.162"	2-7/8"	10	Steel	Rel. Int. S. V. Spring
524014	7/8"	.105"	3"	11-1/2	Steel	Piston Return Spring
94952	47/64"	.072"	1-13/32"	7	Ph. Bz.	Check Valve Spring
500944	1-53/64"	.187" Sq	2-29/64"	6	Steel	Piston Return Spring
535943	35/64"	.035"	59/64"	8	Ph. Bz.	Check Valve Spring
2231	5/8"	.0907"	17/32"	3-1/2	Ph. Bz.	Cock Key Spring

*Number of Turns of Wire on each Spring Counted Between Extreme Ends of the Wire.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

Westinghouse Air Brake Company

Air Brake Division
WILMERDING, PA., U.S.A.

OFFICES

ATLANTA 3	Candler Building
CHICAGO 4	Railway Exchange Building
CLEVELAND 15	Midland Building
DENVER 2	Gas and Electric Building
HOUSTON 2, TEX.	Commerce Building
MEXICO, D. F., MEXICO	Edificio Aztlan
NEW YORK 1	Empire State Building
ST. LOUIS 3	Shell Building
ST. PAUL 1	First National Bank Building
SÃO PAULO, BRASIL	Largo Paisandu, 72
SAN FRANCISCO 5	Matson Building
WASHINGTON 6, D. C.	Ring Building



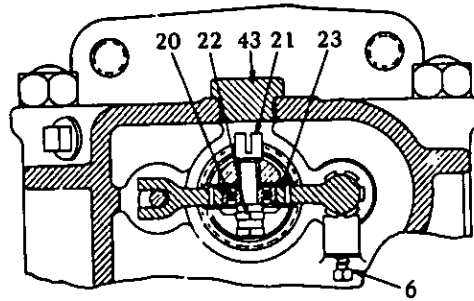
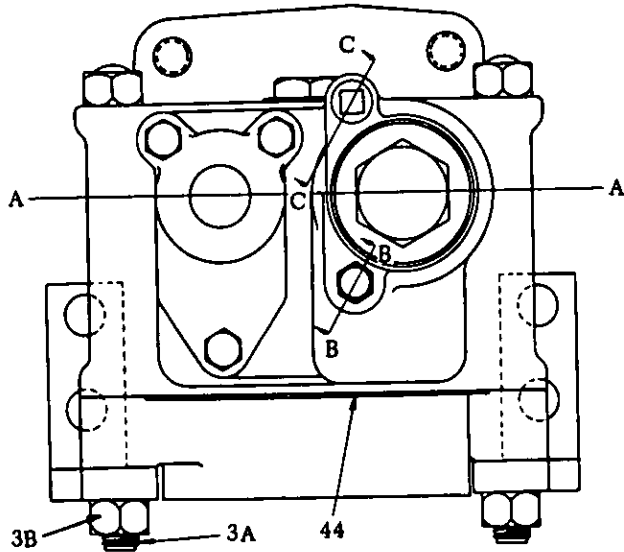
"B" TYPE RELAY VALVES[☆]

Parts Catalog

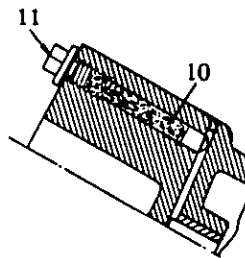
☆ These Complete Devices and ~~certain~~ of their details are now obsolete and no longer available. This Catalog ~~includes~~ repair parts presently available for these devices.

This coverage is temporary ~~and~~ subject to change without notice.

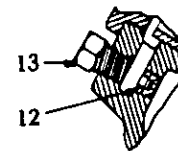
WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA / WESTINGHOUSE AIR BRAKE COMPANY



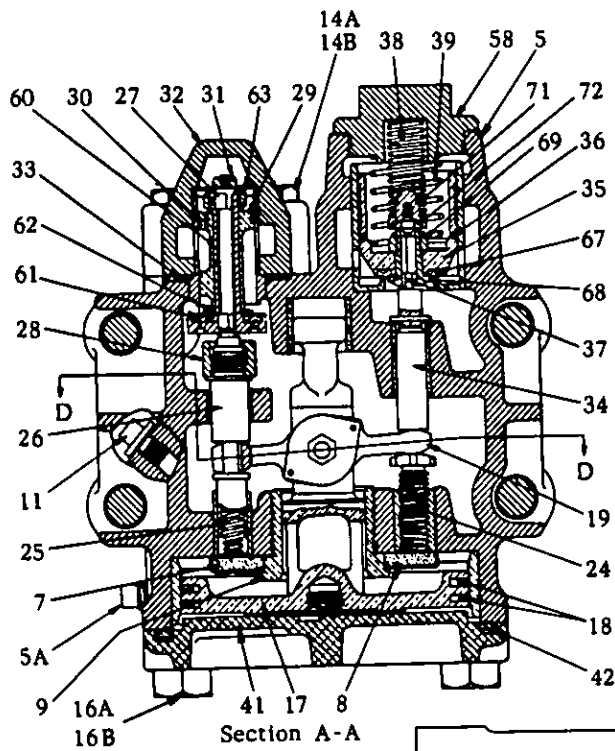
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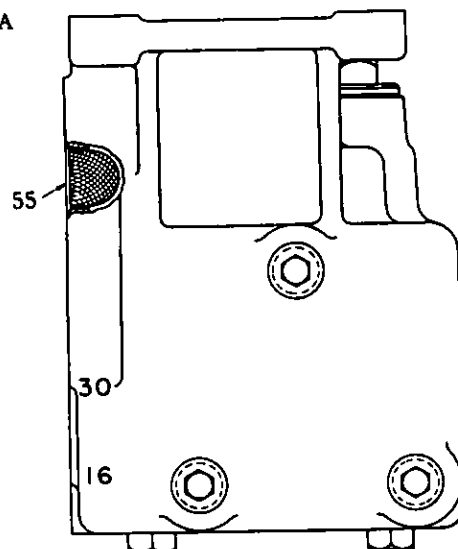
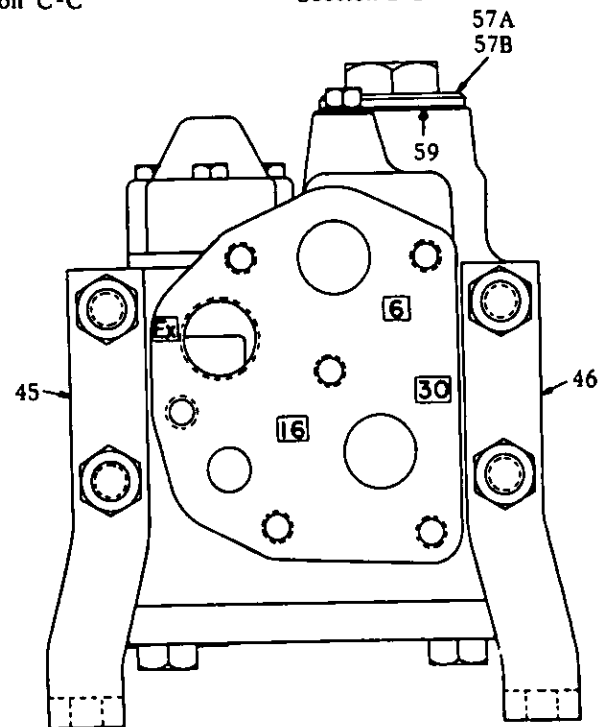
Section C-C



Section B-B



Section A-A



B-3-A Type
View Showing Strainer

"B" TYPE RELAY VALVES

Ref. No.	Pc. No.			Parts Name	No. Req'd
	B	"B" Lt. Wt.	B-3-A	Type	
				RELAY VALVE PORTION, ASSEMBLY	
3A	97376	.....		STUD, 5/8 x 7-3/4 in.	4
3A	.....	500783		STUD, 5/8 x 6-1/4 in.	4
3B	27009	.....		NUT, Hex., 5/8 in.	8
3B	.....	502387		NUT, Hex., 5/8 in.	4
5	540877	.....	540877	RELAY VALVE BODY, Asy. (Includes 5A, 6, 7, 8, 9, 10, 12, 13, and two of 11). . .	1
5	.....	551555	.....	RELAY VALVE BODY, Asy. (Includes 5A, 6, 7, 8, 9, 10, 12, two of 11, three of 14A, 14B, 57A, 57B, four of 16A and 16B)	1
5A		99405		PLUG, Pipe, 1/4 in.	1
6		97359		SCREW, Set, 1/4 x 7/8 in.	1
7		97514		PAD, Oil	1
8		97515		RETAINER, Oil Pad	1
9	97336	551456	97336	BUSH, Small Piston	1
10		97516		WICK, Oil	1
11	97517	551457	97517	NUT, Cap, Oil Filler	2
12	94032	551458	94032	PLUG, Choke, 1/8 in. (3/16 in. Dr.)	1
13	97588	.....	97588	PLUG, Pipe, 1/4 in.	1
14A	6897	.....	6897	SCREW, Cap, H.Hd., 3/8 x 1-7/8 in.	3
14A	....	513969	....	STUD, 3/8 x 1-5/8 in.	3
14B	....	502369	....	NUT, Hex., 3/8 in.	3
16A	1759	.....	1759	SCREW, Cap, H.Hd., 5/8 x 1-1/2 in.	4
16A	....	555274	....	STUD, 5/8 x 2-1/4 in.	4
16B	....	502387	....	NUT, Hex., 5/8 in.	4
17		97345		PISTON, Relay	1
18		86160		RING, Piston, Relay (2nd Repair)	2
18		86161		RING, Piston, Relay (3rd Repair)	2
18		86162		RING, Piston, Relay (4th Repair)	2
		530010		PISTON LEVER and BEARING, Asy. (Includes 19, 20 and two of 23)	1
19		97346		LEVER, Piston	1
20		526455		BEARING, Lever	1
21		97349		SHAFT, Bearing	1
22		97347		NUT, Bearing Shaft	2
23		97348		COVER, Bearing	2
24		97358		SCREW, Adjusting, Appl. V.	1
25		97351		SPRING, Exh. V. Stem	1
26		540880		STEM, Exh. V.	1
27		540881		VALVE, Exhaust	1
28		540882		NUT, Retaining	1
		556258		EXHAUST VALVE PISTON, Asy. (Includes 29, 60, 61, 62 and 63)	1
29		540884		PISTON, Exh. V.	1
30		549184		RING, Piston, Exh. V. (2nd Repair)	1
31		521819		NUT, Elas. Stop, No. 10-32	1
32	540888	540897	540888	COVER, Exh. V.	1
33		97357		GASKET, Cover, Exh. V.	1
34		97344		STEM, Application Valve	1
		556259		APPLICATION VALVE PISTON, Asy., (Includes 35, 67, 68 and 69)	1
35		540890		PISTON, Application Valve	1
36		40765		RING, Piston, Application Valve (2nd Repair)	1
36		45576		RING, Piston, Application Valve (3rd Repair)	1
		542224		APPLICATION VALVE PILOT VALVE, Asy. (Includes 37, 71 and 72)	1
37		94009		VALVE, Pilot	1
38		97381		SPRING, Pilot Valve	1
39		39574		SPRING, Application Piston Valve	1
41		527060		COVER, Relay Piston	1
42		97365		GASKET, Cover, Relay Piston	1
43		36401		NUT, Cap	1
44		97368		GASKET, Body	1

"B" TYPE RELAY VALVES - CONTINUED

Ref. No.	Pc. No.			Parts Name Type	No. Req
	B	"B" Lt. Wt.	B-3-A		
45	97369	97369	.....	BRACKET, Mounting, L.H.	1
46	97923	97923	.....	BRACKET, Mounting, R.H.	1
55			542291	STRAINER	2
57A		98334	.....	STUD, 3/8 x 2-1/4 in.	3
57B		502369	.....	NUT, Hex., 3/8 in.	3
58	540894	.....	540894	NUT, Cap, Application Valve	1
58		551459	.....	COVER, Application Valve	1
59		551198	.....	GASKET, Application Valve	1
60		540883	.....	STEM and SEAT, Exh. V. Piston	1
61		540886	.....	SEAL, Exh. V.	1
62		540887	.....	RETAINER, Seal	1
63		528108	.....	NUT, Elas. Stop, 7/16 in.	1
67		540891	.....	SEAL, Application V. Piston V.	1
68		540892	.....	SEAT, Application V. Piston V.	1
69		528108	.....	NUT, Elas. Stop, 7/16 in.	1
71		540893	.....	STEM, Pilot Valve	1
72		517043	.....	SEAL, Pilot Valve	1

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

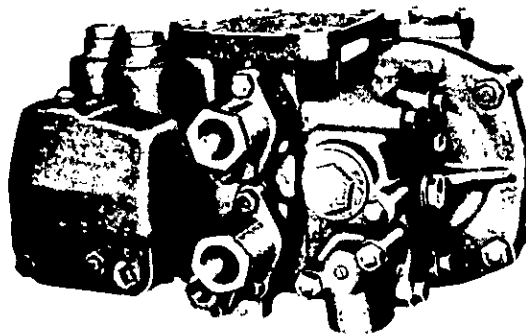


"F" TYPE RELAY VALVES

Parts Catalog No. 3231-2

June, 1955

(Superseding Issue of January, 1950)

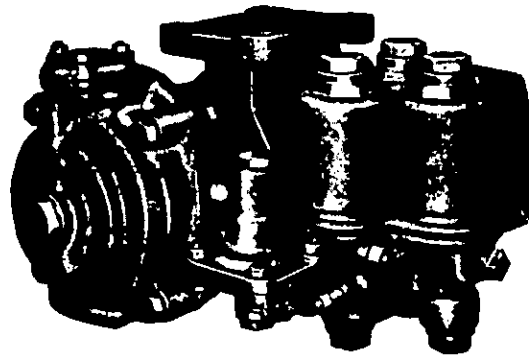


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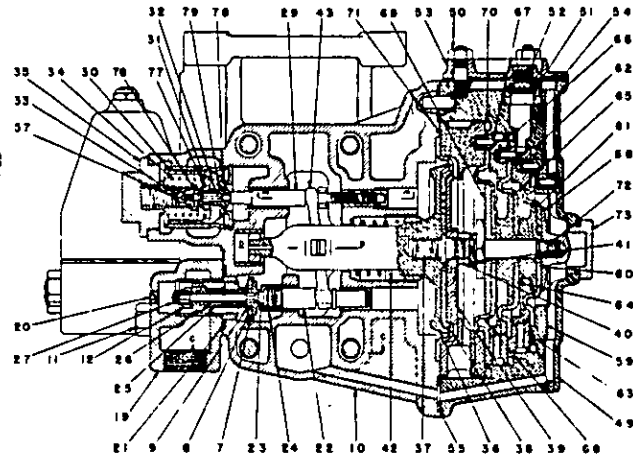
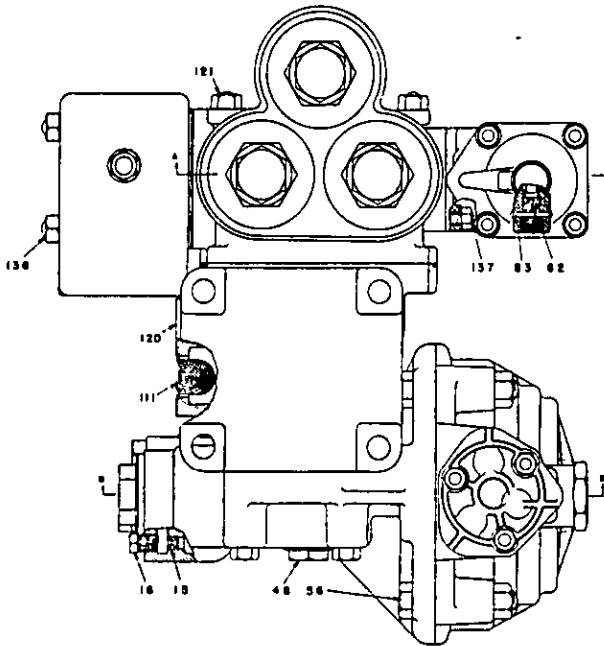
(Type FS-1864)



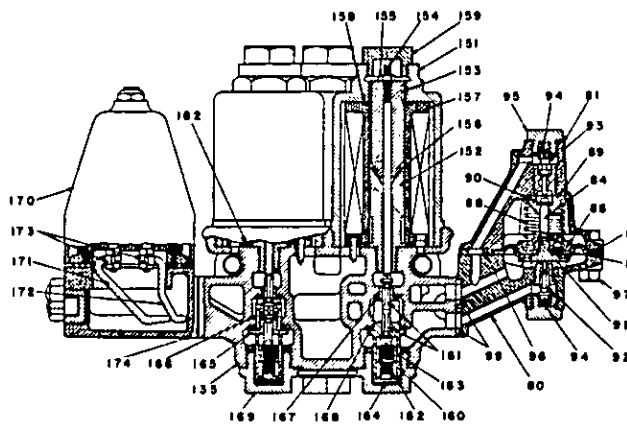
Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION  WILMERDING, PA.

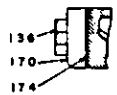
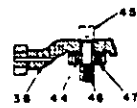
FS-1864 AND F-1864 RELAY VALVES



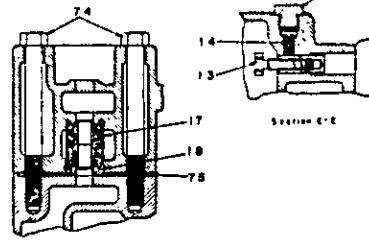
Section B-B



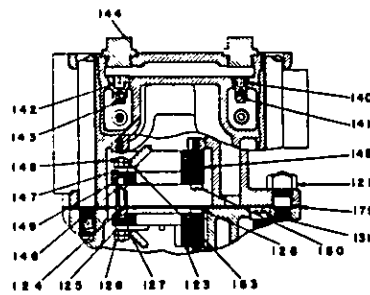
Section A-A

Breaking Plate
for FS-1864

Section D-D



Section C-C

Section Through Impact Bracket and Pin Bracket
Showing Shoeing, Chokes and Terminal Connections

Approx. Net Weights—FS-1864, 160 lbs.
F-1864, 155 lbs.

F-1864 AND FS-1864 RELAY VALVES

Type	Relay Valve Complete*	Magnet Portion		Pipe Bracket Portion		Relay Portion	Inshot Portion	Port Flange Sizes*		
		Pc. No.	Voltage	Pc. No.	Mounting			No. 6 S.P.	No. 30 B.C.	No. 16 C.P.
F-1864	540936	539904	32	513580	Susp.	542510	527315	1"	1"	3/8"
F-1864	540941	539904	32	515575	Floor	542510	527315	1"	1"	3/8"
F-1864	540937	539905	64	513580	Susp.	542510	527315	1"	1"	3/8"
F-1864	540940	539905	64	515575	Floor	542510	527315	1"	1"	3/8"
F-1864	540943	539907	110	513580	Susp.	542510	527315	1"	1"	3/8"
FS-1864	540935	520270	32	513580	Susp.	542510	527315	1"	1"	3/8"
FS-1864	540942	520270	32	515575	Floor	542510	527315	1"	1"	3/8"
FS-1864	540938	520271	64	513580	Susp.	542510	527315	1"	1"	3/8"
FS-1864	540939	520271	64	515575	Floor	542510	527315	1"	1"	3/8"

*The Complete Piece Numbers shown are less Fittings. Any appropriate style of WABCOSEAL® WABCOTITE® or WABCOTITE Adjustable Fitting, of Flange Sizes indicated above, as shown in Part Catalogs 3216-22, 3216-21 or 3216-21, Sup. I respectively, may be applied. These Catalogs also indicate the Cap Screws and Gaskets used in applying these Fittings.

RELAY PORTION

Pc. No.	Ref. No.		Pc. No.	Ref. No.	
542510		Relay Portion, Complete, with Shipping Cover	542224		Application Valve Pilot Valve, Complete (Includes 32, 57 and 76)
540883	7	Exhaust Valve Piston Stem and Seat	540893	32	Application Pilot Valve Stem
540886	8	Exhaust Valve Piston Seal	†97381	33	Application Valve Spring
540887	9	Exhaust Valve Piston Seal Retainer	†39574	34	Application Piston Valve Spring
540907	10	Relay Valve Body (Includes 13, 14, 15, 16, 17 and 18)	540894	35	Application Valve Cap Nut
3211	11	1/2" x 3 1/2" Exhaust Valve Cover Cap Screw (2 Req'd)	515728		Relay Piston, Complete, with Diaphragm (Includes 36, 38, 39, 40 and 41)
528108	12	Exhaust Valve Piston Nut	515729	36	Relay Piston (Includes 37)
507323	13	Application Adjusting Screw	513155	37	Relay Piston Stud
11775	14	Application Adjusting Set Screw	513653	38	Large Diaphragm (100%)
94032	15	1/8" Choke Plug (3/16" Drill)	513156	39	Large Diaphragm Follower (100%)
97588	16	1/4" Special Pipe Plug	79008	40	Relay Piston Castle Nut
514975	17	Strainer	3885	41	1/8" x 3/4" Cotter
513146	18	Strainer Retaining Ring	†511410	42	Release Spring
540900	19	Exhaust Valve Cover (Includes 20)	530010		Piston Lever and Bearing, Complete (Includes 43, 44 and two of 47)
515794	20	1/8" Pipe Plug	97346	43	Piston Lever
505994	21	Exhaust Valve Cover Gasket	526455	44	Lever Bearing
540880	22	Exhaust Valve Stem	97349	45	Bearing Shaft
540881	23	Exhaust Valve	97347	46	Bearing Shaft Nut (2 Req'd)
540882	24	Exhaust Valve Retaining Nut	97348	47	Bearing Cover (2 Req'd)
**550390		Exhaust Valve Piston, Complete, with Ring (Includes 7, 8, 9, 12, 25 and 26b)	36401	48	Bearing Cap Nut
540884	25	Exhaust Valve Piston	513627	49	Diaphragm Housing, Complete (Includes three of 50a and 50b)
540885	26a	1 1/8" Exhaust Valve Piston Ring (1st Repair)	513969	50a	3/8" x 1 1/2" Check Valve Cover Stud (3 Req'd)
549184	26b	1 1/8" Exhaust Valve Piston Ring (2nd Repair)	502369	50b	3/8" Hex Nut (3 Req'd)
521819	27	Exhaust Valve Nut	94891	51	Check Valve (3 Req'd)
77989	28	Cap Nut	†94581	52	Check Valve Spring (3 Req'd)
97344	29	Application Valve Stem	526992	53	Check Valve Cover
**542223		Application Piston Valve, Complete, with Ring (Includes 30, 31b, 77, 78 and 79)	513573	54	Check Valve Cover Gasket
540890	30	Application Valve Piston	513571	55	Diaphragm Housing Gasket
81207	31a	1 1/8" Application Piston Valve Ring (1st Repair)	22588	56a	3/8" x 3 1/8" Diaphragm Housing Bolt (4 Req'd)
40765	31b	1 1/8" Application Piston Valve Ring (2nd Repair)	27009	56b	5/8" Hex Nut (4 Req'd)
45576	31c	1 1/8" Application Piston Valve Ring (3rd Repair)	94009	57	Application Pilot Valve
			513631	58	Small Diaphragm Pusher Plate (40%)
			513632	59	Small Diaphragm Backing Ring (40%)
			513549	60	Small Diaphragm (40%)
			513634	61	Small Diaphragm Follower (40%)

**NOTE A—Unless otherwise specified, the 2nd Repair Ring is furnished with all combinations of Piston with Ring.

†NOTE B—For Spring Identification Table, see page 5.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

F-1864 AND FS-1864 RELAY VALVES (Continued)

Pc. No. Ref. No.

513635	62	2nd Intermediate Diaphragm Ring Gasket (60%)
513636	63	2nd Intermediate Diaphragm Ring (60%)
513654	64	2nd Intermediate Diaphragm (60%)
513638	65	2nd Intermediate Diaphragm Follower (60%)
513639	66	1st Intermediate Diaphragm Ring Gasket (80%)
513640	67	1st Intermediate Diaphragm Ring (80%)
513563	68	1st Intermediate Diaphragm (80%)
513642	69	1st Intermediate Diaphragm Follower (80%)
513643	70	Large Diaphragm Ring Gasket (100%)

Pc. No. Ref. No.

513644	71	Large Diaphragm Ring (100%)
514853	72	Diaphragm Clamping Bolt
513185	73	Diaphragm Housing Cap Nut
§25429	74	1/2" x 4 1/2" Relay Valve Body Cap Screw (4 Req'd)
§513572	75	Relay Valve Body Gasket
517043	76	Application Pilot Valve Seal
528108	77	1/8" Application Pilot Valve Seal Nut
540891	78	Application Piston Valve Seal
540892	79	Application Pilot Valve Seat
519342		Relay Portion Shipping Cover, Complete (See Page 11)

INSHOT VALVE PORTION

Pc. No. Ref. No.

527315		Inshot Valve Portion, Complete
527000	80	Supply Valve Body
527316	81	Exhaust Valve Body (Includes 82 and 83)
513122	82	Exhaust Port Strainer
73875	83	Strainer Pin
527317		Diaphragm Piston, Complete (Includes 84, 85, 86, 87, 88, 89, 90 and 91)
513309	84	Diaphragm Piston
517444	85	Diaphragm
526991	86	Diaphragm Follower
75056	87	Diaphragm Piston Nut
†512902	88	Piston Spring

Pc. No. Ref. No.

513311	89	Piston Guide
513608	90	Retaining Ring
4900	91	3/8" x 3/4" Cotter
513308	92	Supply Valve
513307	93	Exhaust Valve
†513312	94	Supply and Exhaust Valve Spring (2 Req'd)
513313	95	Cap Nut (2 Req'd)
513569	96	Port Seal
25339	97a	3/8" x 1 1/4" Exhaust Valve Body Bolt (4 Req'd)
2220	97b	3/8" Hex Nut (4 Req'd)
§513569	99	Inshot Valve Body Gasket (2 Req'd)

PIPE BRACKET PORTION

Pc. No. Ref. No.

513580		Pipe Bracket Portion for Suspension Mounting, Complete
515575		Pipe Bracket Portion for Floor Mounting, Complete
1751	111	Strainer (Ports #6 and 30) (2 Req'd)
513971	120	Pipe Bracket (Includes two of 121a, 121b, 122a, 122b and 111) (Suspension Mounting)
515576	120	Pipe Bracket (Includes two of 121a, 121b, 122a, 122b and 111) (Floor Mounting)
507748	121a	1/2" x 5 7/8" Magnet Portion Stud (2 Req'd)
10829	121b	1/2" Hex Nut (2 Req'd)

Pc. No. Ref. No.

502674	122a	1/2" x 1 7/8" Magnet Portion Stud (2 Req'd)
10829	122b	1/2" Hex Nut (2 Req'd)
513583		Terminal Block (Socket), Complete (Includes 123, six of 127, eight of 124, 125 and sixteen of 126)
513584	123	Terminal Block
514199	124	Socket Terminal (8 Req'd)
79486	125	Square Nut (8 Req'd)
5741	126	Hex Nut (16 Req'd)
513585	127	Terminal Clip (6 Req'd)
25472	128	#12 x 1 1/4" Terminal Block Screw (3 Req'd)

MAGNET PORTION

Pc. No. Ref. No.

520270		Magnet Portion (32 Volt; with Switch) Complete with Shipping Cover (for FS-1864)
520271		Magnet Portion (64 Volt; with Switch) Complete with Shipping Cover (for FS-1864)
539906		Magnet Portion (110 Volt; with Switch) Complete with Shipping Cover (for FS-1864)
539904		Magnet Portion (32 Volt; without Switch) Complete with Shipping Cover (for F-1864)

Pc. No. Ref. No.

539905		Magnet Portion (64 Volt; without Switch) Complete with Shipping Cover (for F-1864)
539907		Magnet Portion (110 Volt; without Switch) Complete with Shipping Cover (for F-1864)
513589	135	Magnet Bracket (Includes two of 136a, 136b, 137a and 137b) (for FS-1864)
514179	135	Magnet Bracket (Includes two of 137a and 137b) (for F-1864)
5951	136	1/2" x 1 1/4" Blanking Plate Cap Screw (2 Req'd for F-1864)

§NOTE A—The Cap Screws and Gaskets so indicated are not included in the Complete Piece Number of any Portion, but in the Complete Relay Valve.

†NOTE B—For Spring Identification Table, see Page 5.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

F-1864 AND FS-1864 RELAY VALVES (Continued)

Pc. No.	Ref. No.		Pc. No.	Ref. No.	
513567	136a	$\frac{1}{2}$ " x $5\frac{1}{8}$ " Switch Body Stud (2 Req'd) (for FS-1864)	512368		H. and M.S. Check Valve, Complete (Includes 160, 162, 163, 164 and two of 161) (2 Req'd)
2505	136b	$\frac{1}{2}$ " Hex Nut (2 Req'd)	503400	160	H. and M.S. Check Valve Seat (2 Req'd)
188005	137a	$\frac{3}{8}$ " x $1\frac{1}{8}$ " Inshot Valve Body Stud (2 Req'd)	152272	161	Check Valve (6 Req'd)
2220	137b	$\frac{3}{8}$ " Hex Nut (2 Req'd)	153003	162	Check Valve Spring (3 Req'd)
513591	138	H.S. Magnet Choke (Includes 139 and 176)	503402	163	Check Valve Spring Guide (3 Req'd)
506276	139	Filter for H.S. Magnet Choke	503413	164	Check Valve Spring Seat (3 Req'd)
513593	140	M.S. Magnet Choke (Includes 141)	512369		L.S. Check Valve, Complete (Includes 166, Pc. 507373 and two of 161)
513595	141	Filter for M.S. Magnet Choke	507373		L.S. Lower Check Valve Seat, Complete (Includes 162, 163, 164 and 165)
513596	142	L.S. Magnet Choke (Includes 143)	503410	165	L.S. Lower Check Valve Seat
513595	143	Filter for L.S. Magnet Choke	503409	166	L.S. Upper Check Valve Seat
514802	144	Filter Cap Nut (3 Req'd)	503431	167	Small Check Valve Seat Seal (3 Req'd)
513598		Terminal Block (Plug), Complete (Includes 145, 149, eight of 146, 147 and sixteen of 148)	503430	168	Large Check Valve Seat Seal (3 Req'd)
513584	145	Terminal Block	503429	169	Check Valve Cap Nut (3 Req'd)
513600	146	Plug Contact (8 Req'd)	529392	170	K-3-B Pneumatic Switch, Complete (see Part Catalog 3228-6) (for FS-1864) (See Note B)
79486	147	Square Nut (8 Req'd)	503408	170	Switch Blanking Plate (for F-1864)
5741	148	Hex Nut (16 Req'd)	513362	171	Lead, 13" Long (for FS-1864)
513602	149	Shunt	96550	172	Lead, 12 $\frac{1}{2}$ " Long (for FS-1864)
25472	150	#12 x $1\frac{1}{4}$ " Terminal Block Screw (3 Req'd)	54349	173	Terminal Clip (2 Req'd) (for FS-1864)
503487	151	Magnet Housing (3 Req'd)	503349	174	Switch Body or Blanking Plate Gasket
503688	152	Magnet Core (3 Req'd)	513570	175	Magnet Bracket Gasket
507368	153	Armature (3 Req'd)	525802	176	Filter Retainer for H.S. Magnet Choke
512275	154	Armature Stem (3 Req'd)	532503	182	Magnet Spool Lower Gasket (3 Req'd)
76747	155	Armature Stem Nut (3 Req'd)	513585	183	Terminal Clip (6 Req'd)
510353	156	Armature Core Washer (3 Req'd)	519343		Magnet Portion Shipping Cover, Complete (See Page 11)
532506	157	Magnet Coil (64 Volts) (3 Req'd)			
532505	157	Magnet Coil (32 Volts) (3 Req'd)			
532507	157	Magnet Coil (110 Volts) (3 Req'd)			
520902	158	Magnet Spool Upper Gasket (3 Req'd)			
502453	159	Magnet Cap Nut (3 Req'd)			

†NOTE A—The Gasket so indicated is not included in the Complete Piece Number of the Portion, but in the Complete Relay Valve.

NOTE B—For Repair Parts available for the Former Standard K-3 Switch, see Part Catalog 3228-6.

†SPRING IDENTIFICATION

The following table is shown to enable railroad men, storekeepers, and all Air Brake men to identify the various springs used in the Relay Valves catalogued herein. It is based on calculated figures and the actual springs will vary somewhat, due to the small difference in wire diameter, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.



SPRING IDENTIFICATION

Pc. No.	Outside Dia. "A"	Dia. Wire "B"	Free Height "C"	Approx. No. Turns	Material	Name of Spring	Where Used
97381	$2\frac{1}{2}$ "	.054"	$2\frac{3}{4}$ "	15 $\frac{1}{2}$	Steel	Application Valve Spring	Relay Portion
39574	$1\frac{3}{8}$ "	.080"	$2\frac{1}{8}$ "	7	Steel	App. Piston Valve Spring	Relay Portion
511410	$1\frac{5}{8}$ "	.080"	$2\frac{3}{8}$ "	5	Steel	Release Spring	Relay Portion
94581	$1\frac{3}{4}$ "	.028"	1"	7	Phos. Bronze	Check Valve Spring	Relay Portion
512902	$1\frac{1}{2}$ "	.105"	$2\frac{1}{8}$ "	8	Steel	Piston Spring	Inshot Portion
513312	$1\frac{1}{2}$ "	.025"	$2\frac{1}{8}$ "	7	Phos. Bronze	Supply & Exhaust Valve Spring	Inshot Portion
53003	$1\frac{3}{4}$ "	.051"	$1\frac{1}{8}$ "	10	Phos. Bronze	Check Valve Spring	Magnet Portion

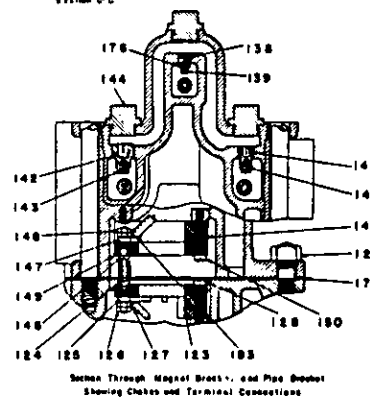
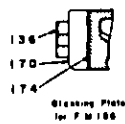
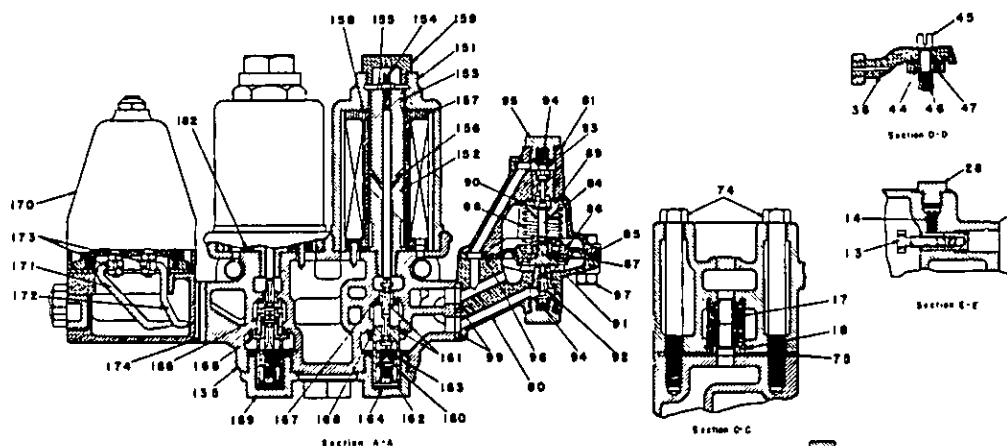
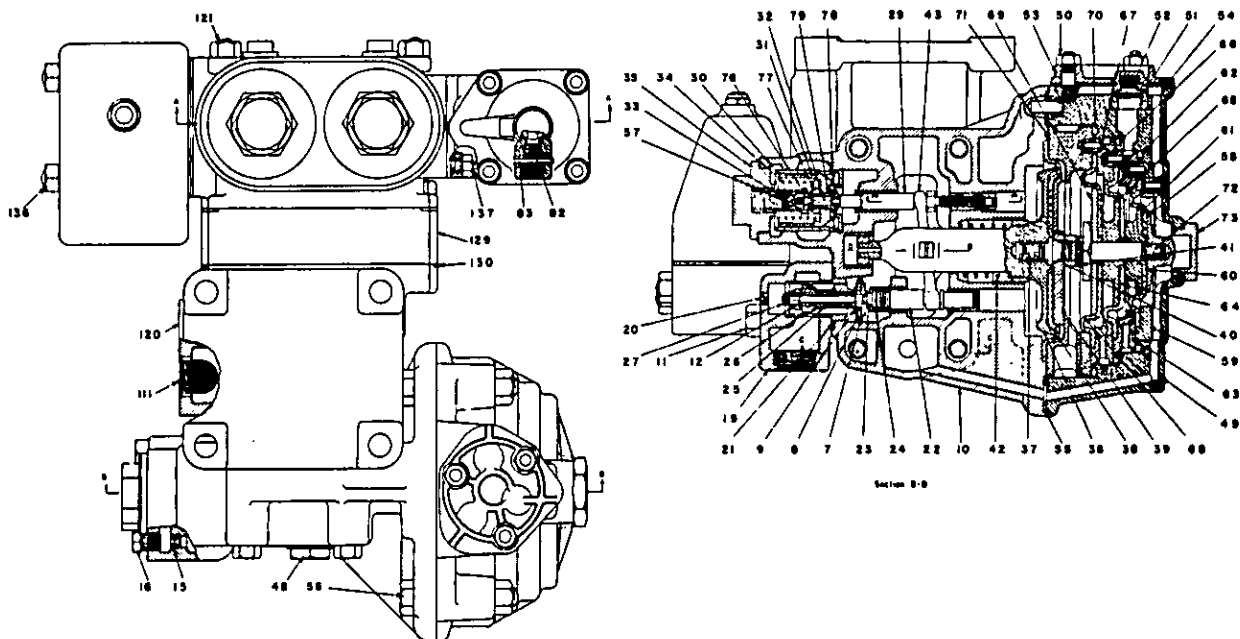
Number of turns for each spring counted between extreme ends of the wire.

WRENCHES FOR SPLINED SOCKET TYPE CHOKE PLUGS
(Including Magnet Choke Plugs)

Pc. No.		
517556	$\frac{3}{8}$ "	Multi-Splined Key Wrench for $\frac{1}{8}$ " Choke Plug (Relay and H.S. Magnet Chokes)
517557	$\frac{1}{2}$ "	Multi-Splined Key Wrench for $\frac{1}{4}$ " Choke Plug (M.S. Magnet Choke)
517558	$\frac{5}{8}$ "	Multi-Splined Key Wrench for $\frac{3}{8}$ " Choke Plug (L.S. Magnet Choke)

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

FMS-186 RELAY VALVE



Approx. Net Weight 186 lbs.

FMS-186 RELAY VALVE

Type	Relay Valve Complete*	Magnet Portion		Pipe Bracket Portion		Relay Portion**	Inshot Portion**	Port Flange Sizes*		
		Pc. No.	Voltage	Pc. No.	Mounting			No. 6 S.P.	No. 30 B.C.	No. 16 C.P.
FMS-186	543383	539910	64	535008	Floor	542510	527315	1"	1"	3/8"

*The Complete Piece Numbers shown are less Fittings. An appropriate style of WABCOSEAL,® WABCOTITE® or WABCOTITE Adjustable Fitting, of Flange Sizes indicated above, as shown in Part Catalogs 3216-22, 3216-21 or 3216-21, Sup. 1 respectively, may be applied. These Catalogs also indicate the Cap Screws and Gaskets used in applying these Fittings.

**For details of Relay and Inshot Portion, see pages 3 and 4.

PIPE BRACKET PORTION

Pc. No.	Ref. No.		Pc. No.	Ref. No.	
535008		Pipe Bracket Portion, Complete	513583		Terminal Block (Socket), Complete (Includes 123, six of 127, eight of 124, 125 and sixteen of 126)
1751	111	Strainers (Ports #6 and 30) (2 Req'd)	513584	123	Terminal Block
535010	120	Pipe Bracket (Includes two of 121a, 121b, 122a, 122b and 111)	514199	124	Socket Terminal (8 Req'd)
500676	121a	1/2" x 7/8" Adapter Plate and Magnet Portion Stud (2 Req'd)	79486	125	Square Nut (8 Req'd)
2505	121b	1/2" Hex Nut (2 Req'd)	5741	126	Hex Nut (16 Req'd)
513825	122a	1/2" x 3/8" Adapter Plate and Magnet Portion Stud (2 Req'd)	513585	127	Terminal Clip (6 Req'd)
10829	122b	1/2" Hex Nut (2 Req'd)	25472	128	#12 x 1 1/4" Terminal Block Screw (3 Req'd)
526458		Adapter Plate, Complete (Includes 129, Pc. 513583 and three of 128)	513796	129	Adapter Plate
			513570	130	Adapter Plate and Pipe Bracket Gasket
			26708	131	5/16" x 1 1/4" Adapter Plate Screw (2 Req'd)

MAGNET PORTION

Pc. No.	Ref. No.		Pc. No.	Ref. No.	
539910		Magnet Portion, Complete with Shipping Cover	502453	159	Magnet Cap Nut (2 Req'd)
535007	135	Magnet Bracket (Includes two of 136a, 136b, 137a and 137b)	512368		M.S. Check Valve, Complete (Includes 160, 162, 163, 164 and two of 161)
513567	136a	1/2" x 5/16" Switch Body Stud (2 Req'd)	503400	160	M.S. Check Valve Seat
2505	136b	1/2" Hex Nut (2 Req'd)	512272	161	Check Valve (2 Req'd)
188005	137a	3/8" x 1 3/8" Inshot Valve Body Stud (2 Req'd)	†53003	162	Check Valve Spring (2 Req'd)
2220	137b	3/8" Hex Nut (2 Req'd)	503402	163	Check Valve Spring Guide (2 Req'd)
513593	140	M.S. Magnet Choke (Includes 141)	503413	164	Check Valve Spring Seat (2 Req'd)
513595	141	Filter for M.S. Magnet Choke	512369		L.S. Check Valve, Complete (Includes 166, Pc. 507373 and two of 161)
513596	142	L.S. Magnet Choke (Includes 143)	507373		L.S. Lower Check Valve Seat, Complete (Includes 162, 163, 164 and 165)
513595	143	Filter for L.S. Magnet Choke	503410	165	L.S. Lower Check Valve Seat
514802	144	Strainer Cap Nut (2 Req'd)	503409	166	L.S. Upper Check Valve Seat
513598		Terminal Block (Plug), Complete (Includes 145, 149, eight of 146, 147 and sixteen of 148)	503431	167	Small Check Valve Seat Seal (2 Req'd)
513584	145	Terminal Block	503430	168	Large Check Valve Seat Seal (2 Req'd)
513600	146	Plug Contact (8 Req'd)	503429	169	Check Valve Cap Nut (2 Req'd)
79486	147	Square Nut (8 Req'd)	529392	170	K-3-B Pneumatic Switch, Complete (see Part Catalog 3228-6) (see Note C)
5741	148	Hex Nut (16 Req'd)	513362	171	Lead, 13" Long
513602	149	Shunt	96550	172	Lead, 12 1/2" Long
25472	150	#12 x 1 1/4" Terminal Block Screw (3 Req'd)	54349	173	Terminal Clip (2 Req'd)
503487	151	Magnet Housing (2 Req'd)	503349	174	Switch Body Gasket
503688	152	Magnet Core (2 Req'd)	†513570	175	Magnet Bracket Gasket
507368	153	Armature (2 Req'd)	532503	182	Magnet Spool Lower Gasket (2 Req'd)
512275	154	Armature Stem (2 Req'd)	513585	183	Terminal Clip (4 Req'd)
76747	155	Armature Stem Nut (2 Req'd)	519343		Magnet Portion Shipping Cover, Complete (see page 11)
510353	156	Armature Core Washer (2 Req'd)			
532506	157	Magnet Coil (2 Req'd)			
502902	158	Magnet Spool Upper Gasket (2 Req'd)			

†NOTE A—The Gasket so indicated is not included in the Complete Piece Number of the Portion, but in the Complete Relay Valve.

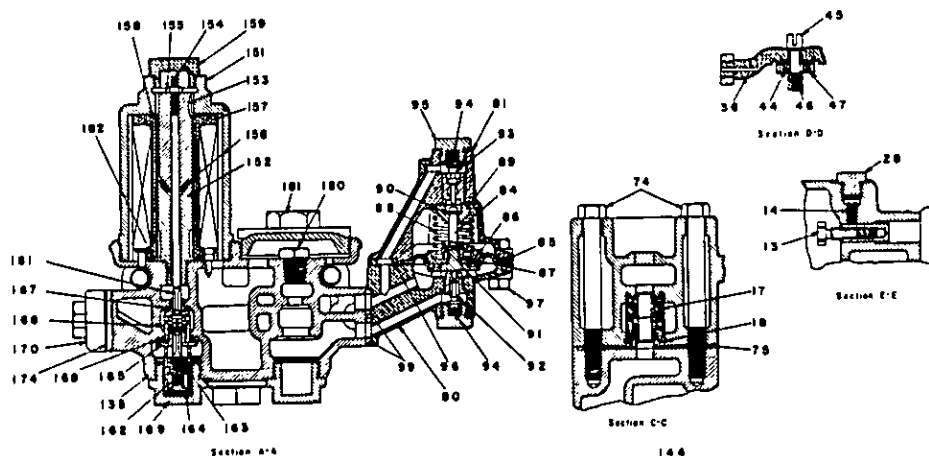
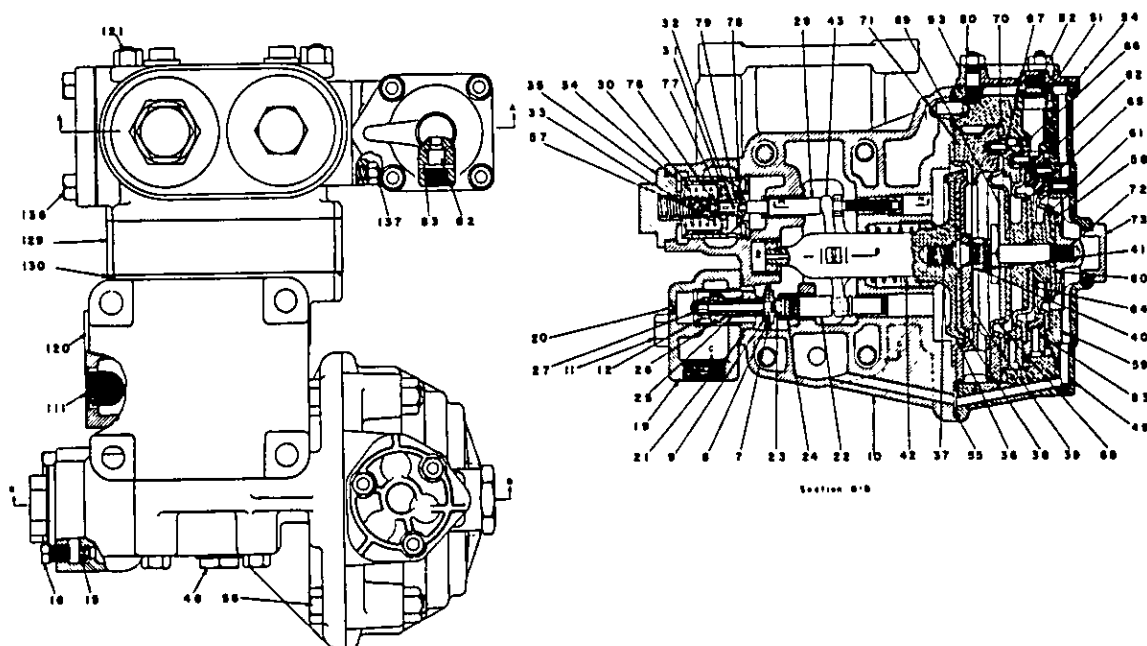
†NOTE B—For Spring Identification Table, see page 5.

NOTE C—For repair parts available for the former standard K-3 Switch, see Part Catalog 3228-6.

Prices will be quoted upon application

Orders should give PIECE NUMBER and NAME of part wanted

FL-16 RELAY VALVES

Section Through Merged Branches and Pipe Branches
Showing Churns and Terminal Connections

Approx. Net Weight 145 lbs.

FL-16 RELAY VALVES

Type	Relay Valve Complete*	Magnet Portion		Pipe Bracket Portion		Relay Portion**	Inshot Portion**	Port Flange Sizes*		
		Pc. No.	Voltage	Pc. No.	Mounting			No. 6 S.P.	No. 30 B.C.	No. 16 C.P.
FL-16	541211	539913	32	517702	Susp.	542510	527315	1"	1"	3/8"
FL-16	540948	539913	32	518889	Floor	542510	527315	1"	1"	3/8"

*The Complete Piece Numbers shown are less Fittings. Any appropriate style of WABCOSEAL® WABCOTITE® or WABCOTITE Adjustable Fitting, of Flange Sizes indicated above, as shown in Part Catalogs 3216-22, 3216-21 or 3216-21, Sup. 1 respectively, may be applied. These Catalogs also indicate the Cap Screws and Gaskets used in applying these Fittings.

**For details of Relay and Inshot Portions, see pages 3 and 4.

PIPE BRACKET PORTION

Pc. No.	Ref. No.		Pc. No.	Ref. No.	
517702		Pipe Bracket Portion for Suspension Mounting, Complete	10829	122b	1/2" Hex Nut (2 Req'd)
518889		Pipe Bracket Portion for Floor Mounting, Complete	517691		Adapter Plate, Complete (Includes 129, Pc. 513583 and three of 128)
1751	111	Strainer (Ports #6 and 30) (2 Req'd)	513583		Terminal Block (Socket), Complete (Includes 123, six of 127, eight of 124, 125 and sixteen of 126)
517703	120	Pipe Bracket (Suspension Mounting) (Includes two of 121a, 121b, 122a, 122b and 111)	513584	123	Terminal Block
518890	120	Pipe Bracket (Floor Mounting) (Includes two of 121a, 121b, 122a, 122b and 111)	514199	124	Socket Terminal (8 Req'd)
500676	121a	1/2" x 7/8" Magnet Portion and Adapter Plate Stud (2 Req'd)	79486	125	Square Nut (8 Req'd)
2505	121b	1/2" Hex Nut (2 Req'd)	5741	126	Hex Nut (16 Req'd)
513825	122a	1/2" x 3 3/8" Magnet Portion and Adapter Plate Stud (2 Req'd)	513585	127	Terminal Clip (6 Req'd)
			25472	128	#12 x 1 1/4" Terminal Block Screw (3 Req'd)
			513797	129	Adapter Plate
			513570	130	Adapter Plate Gasket
			26708	131	3/16" x 1 3/4" Adapter Plate Screw (2 Req'd)

MAGNET PORTION

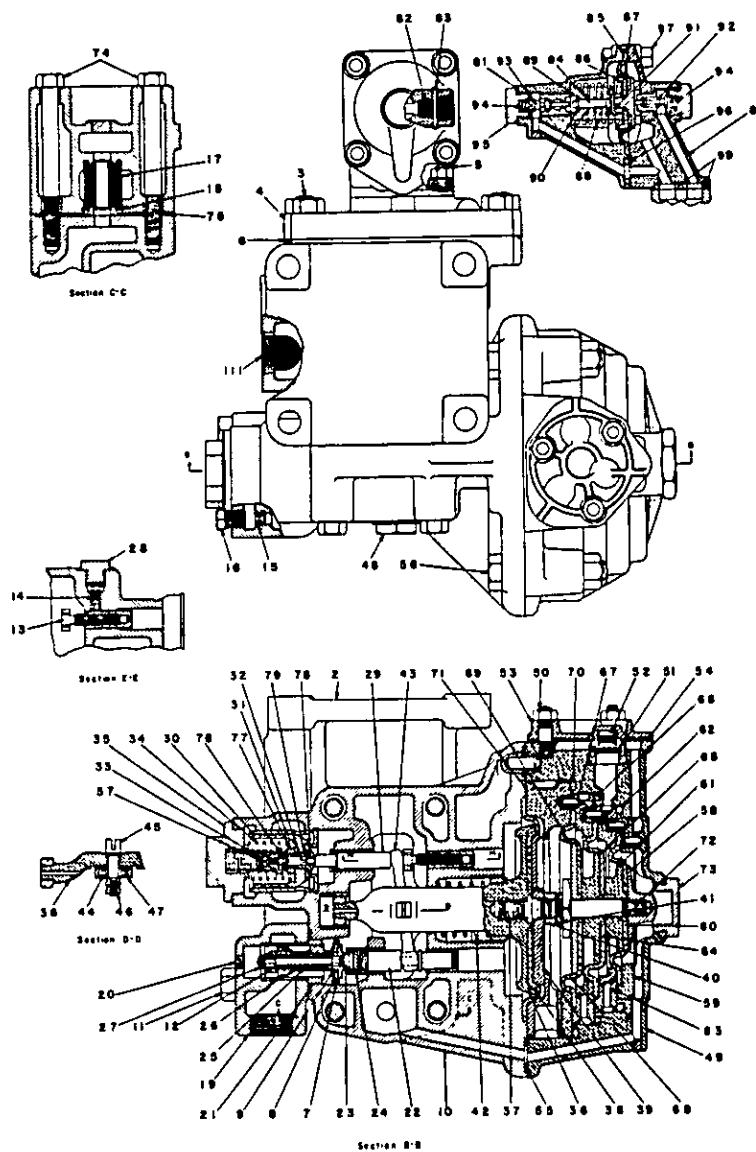
Pc. No.	Ref. No.		Pc. No.	Ref. No.	
539913		Magnet Portion (32 Volt, without Switch), Complete, with Shipping Cover	532505	157	Magnet Coil (32 Volts)
517690	135	Magnet Bracket (Includes two of 137a and 137b)	520902	158	Magnet Spool Upper Gasket
5951	136	1/2" x 1 1/2" Blanking Plate Cap Screw (2 Req'd)	502453	159	Magnet Cap Nut
188005	137a	3/8" x 1 3/8" Inshot Valve Portion Stud (2 Req'd)	512369		L.S. Check Valve, Complete (Includes 166, Pc. 507373 and two of 161)
2220	137b	3/8" Hex Nut (2 Req'd)	507373		L.S. Lower Check Valve Seat, Complete (Includes 162, 163, 164 and 165)
513596	142	L.S. Magnet Choke (Includes 143)	512272	161	Check Valve (2 Req'd)
513595	143	Filter for L.S. Magnet Choke	†53003	162	Check Valve Spring
514802	144	Filter Cap Nut (2 Req'd)	503402	163	Check Valve Spring Guide
513598		Terminal Block (Plug), Complete (Includes 145, 149, eight of 146, 147 and sixteen of 148)	503413	164	Check Valve Spring Seat
513584	145	Terminal Block	503410	165	L.S. Lower Check Valve Seat
513600	146	Plug Contact (8 Req'd)	503409	166	L.S. Upper Check Valve Seat
79486	147	Square Nut (8 Req'd)	503431	167	Small Check Valve Seat Seal
5741	148	Hex Nut (16 Req'd)	503430	168	Large Check Valve Seat Seal
513602	149	Shunt	503429	169	Check Valve Cap Nut (2 Req'd)
25472	150	#12 x 1 1/4" Terminal Block Screw (3 Req'd)	503408	170	Switch Blanking Plate
543085	151	Magnet Housing	§503349	174	Switch Blanking Plate Gasket
503688	152	Magnet Core	513570	175	Magnet Bracket Gasket
507368	153	Armature	516298	179	1/4" Pipe Plug
512275	154	Armature Stem	77989	180	3/8" Cap Nut
76747	155	Armature Stem Nut	508566	181	Magnet Blanking Cap Nut
510353	156	Armature Core Washer	519343		Magnet Portion Shipping Cover (see Page 11)
			532503	182	Magnet Spool Lower Gasket
			513585	183	Terminal Clip (2 Req'd)

†NOTE A—For Spring Identification Table, see page 5.

§NOTE B—The Gasket so indicated is not included in the Complete Piece Number of the Portion, but in the Complete Relay Valve.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

F-6, F-8 AND F-1 RELAY VALVES



Approx. Net Weights—F-6 and F-8, 110 lbs.
F-1, 105 lbs.

F-6, F-8 AND F-1 RELAY VALVES

Type	Relay Valve Complete*	Pipe Bracket Portion		Relay Portion**	Inshot Portion**	Port Flange Sizes*		
		Pc. No.	Mounting			No. 6 S.P.	No. 30 B.C.	No. 16 C.P.
F-6	540944	513823	Susp.	542510	527315	1"	1"	3/8"
F-6	542317	515859	Floor	542510	527315	1"	1"	3/8"
F-8	540945	517131	Susp.	542510	527315	1"	1"	3/8"
F-8	540947	531477	Floor	542510	527315	1"	1"	3/8"
F-1	540946	518919	Susp.	542510	.....	1"	1"	3/8"
F-1	542172	536348	Floor	542510	.....	1"	1"	3/8"

*The Complete Piece Numbers shown are less Fittings. Any appropriate style of WABCOSEAL®, WABCOTITE® or WABCOTITE Adjustable Fitting, of Flange Sizes indicated above, as shown in Part Catalogs 3216-22, 3216-21 or 3216-21, Sup. 1 respectively, may be applied. These Catalogs also indicate the Cap Screws and Gaskets used in applying these Fittings.

**For details of Relay and Inshot Portions, see pages 3 and 4.

PIPE BRACKET PORTION

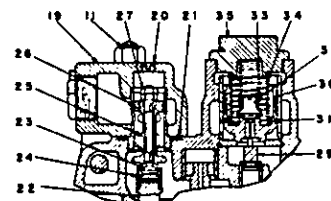
Pc. No.	Ref. No.		Pc. No.	Ref. No.	
531823		Pipe Bracket Portion for Suspension Mounting, Complete, for F-6 Relay Valve	531476	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Floor Mounting) (for F-8)
515859		Pipe Bracket Portion for Floor Mounting, Complete, for F-6 Relay Valve	518920	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Suspension Mounting) (for F-1)
517131		Pipe Bracket Portion for Suspension Mounting, Complete, for F-8 Relay Valve	536349	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Floor Mounting) (for F-1)
531477		Pipe Bracket Portion for Floor Mounting, Complete, for F-8 Relay Valve	27265	3a	1/2" x 2" Magnet Blanking Plate Stud (4 Req'd)
518919		Pipe Bracket Portion for Suspension Mounting, Complete, for F-1 Relay Valve	10829	3b	1/2" Hex Nut (4 Req'd)
536348		Pipe Bracket Portion for Floor Mounting, Complete, for F-1 Relay Valve	513826	4	Magnet Bracket Blanking Plate (Includes two of 5a and 5b) (for F-6)
513972	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Suspension Mounting) (for F-6)	517134	4	Magnet Bracket Blanking Plate (Includes two of 5a and 5b) (for F-8)
515860	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Floor Mounting) (for F-6)	518853	4	Magnet Bracket Blanking Plate (for F-1) (not arranged for Inshot Portion)
517132	2	Pipe Bracket (Includes four of 3a, 3b and two of 111) (Suspension Mounting) (for F-8)	188005	5a	3/8" x 1 3/8" Inshot Valve Portion Stud (2 Req'd)
			2220	5b	3/8" Hex Nut (2 Req'd)
			513570	6	Magnet Bracket Blanking Plate Gasket
			1751	111	Strainer (for Ports #6 and 30) (2 Req'd)

FORMER STANDARD METAL SEATED VALVES

Relay Valves with Metal Seated Application and Exhaust Valves will no longer be furnished complete, and it is recommended that when such valves require repairs, conversion be made to the Rubber Seated design. It is recommended that this conversion be made by the manufacturer, however, for those customers in a position to make such conversion, there is available a Conversion Kit, Pc. 542251, which includes all the detail parts necessary for this conversion.

If it is desired to retain the Metal Seated Valve Structure, the following details are available for repair. All other repairs for the Relay Valves are the same as those shown on page 3 for the corresponding type valve.

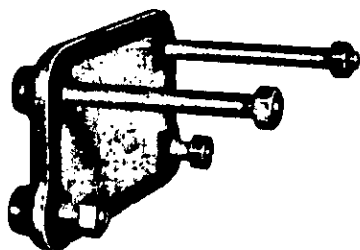
Pc. No.	Ref. No.	
513769	19	Exhaust Valve Cover (Includes 20)
97350	22	Exhaust Valve Stem
97353	23	Exhaust Valve
97352	24	Exhaust Valve Retaining Nut
500543		Exhaust Valve Piston, Complete, with Ring (Includes 25 and 26)
97354	25	Exhaust Valve Piston
531554	26	3/8" Exhaust Valve Piston Ring (1st Repair)
U25238	27	Exhaust Valve Nut (2 Req'd)
500544		Application Piston Valve, Complete (Includes 30 and 31b)
97362	30	Application Piston Valve
81207	31a	1 5/8" Application Piston Valve Ring (1st Repair)



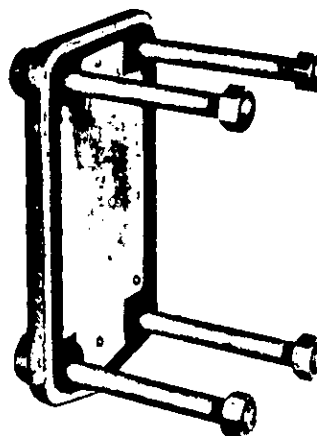
Pc. No.	Ref. No.	
40765	31b	1 5/8" Application Piston Valve Ring (2nd Repair)
45576	31c	1 5/8" Application Piston Valve Ring (3rd Repair)
97361	32	Application Valve
97382	35	Application Valve Cap Nut

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

"F" RELAY VALVES
RELAY AND MAGNET PORTION SHIPPING COVERS



Piece No. 519342—Relay Portion Shipping Cover
Approx. Net Wt. 4¾ lbs.



Piece No. 519343—Magnet Portion Shipping Cover
Approx. Net Wt. 5 lbs.

OFFICES

[illegible]

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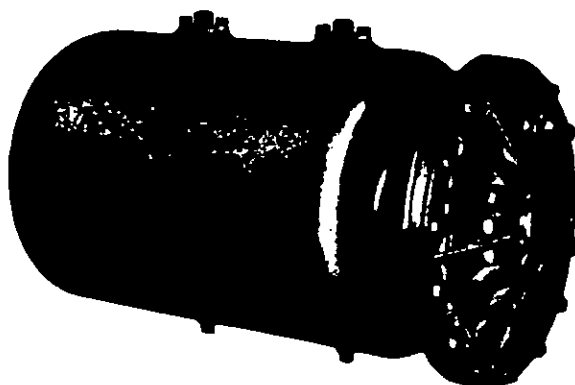
Manager-Equipment Engineering.

16" COMBINED AUXILIARY, EMERGENCY, AND DISPLACEMENT EXPANSION VOLUME RESERVOIRS

Part Catalog No. 3206-1, Sup. No. 3

November 1948

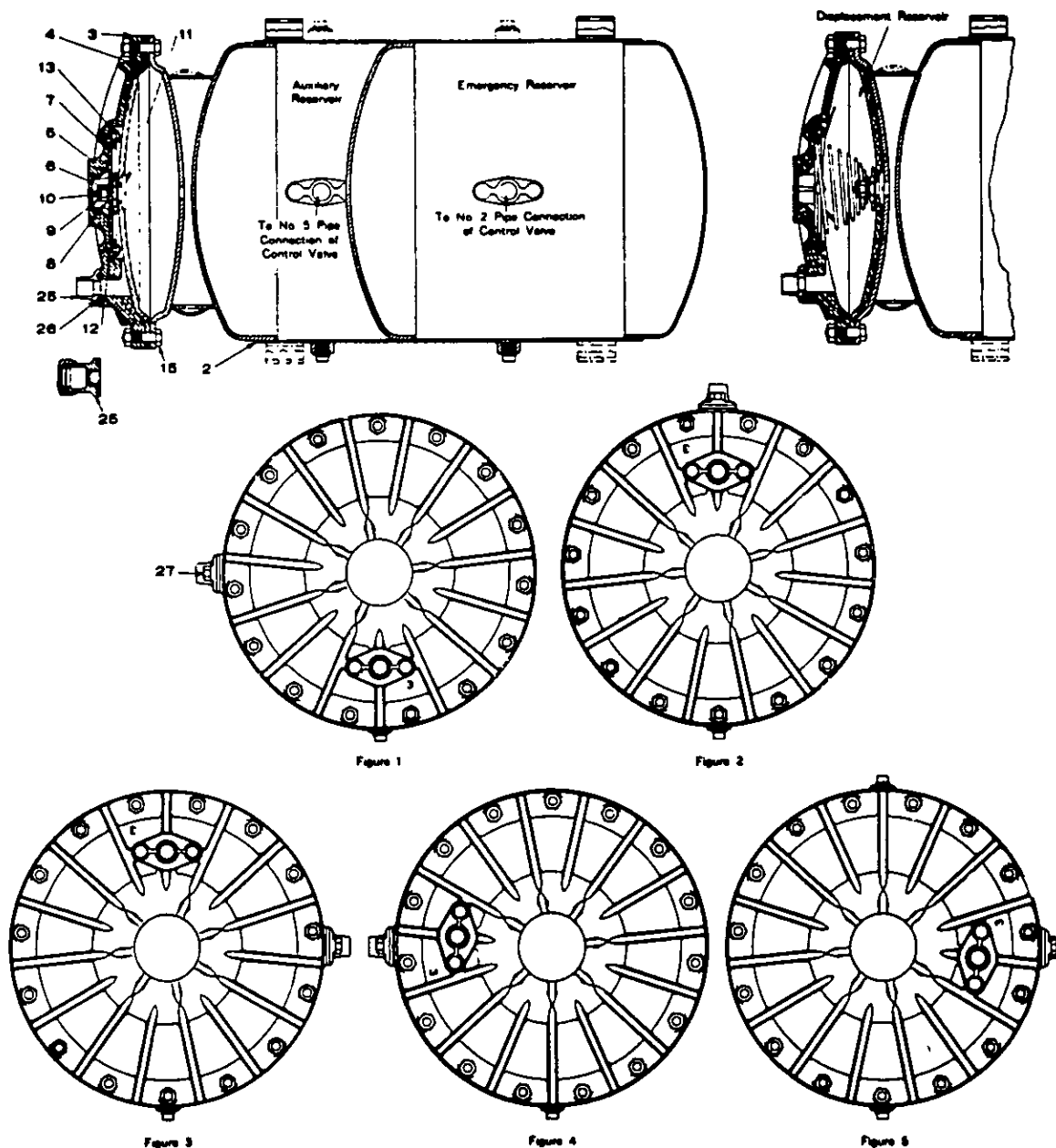
(Superseding Issue of August, 1944)



Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION  WILMERDING, PA.

16' COMBINED AUXILIARY, EMERGENCY, AND DISPLACEMENT EXPANSION VOLUME RESERVOIR



Approx. Net Weight { with Hangers—136 Lbs.
less Hangers—129 Lbs.

16" COMBINED AUXILIARY, EMERGENCY, AND DISPLACEMENT EXPANSION VOLUME RESERVOIRS

Complete Pc. Nos.		Fig. No.	Mounting		Res. Body Pc. No.	Wabcoite Fittings		
With Fittings	Less Fittings		Hangers	Floor Brkts.		No.	Pc. No.	Pipe
514448	514573	1	x	.....	514549	3	502093	1/4" O.D. Cop.
514449	514573	1	x	.....	514549	3	93843	3/4" Iron
531077	514573	1	x	.....	514549	1 2	502093 506341	1/4" O.D. Cop.
535985	535986	4	x	.....	514549	3	93843	3/4" Iron
518854	518969	1	.....	x	518909	3	93843	3/4" Iron
527186	527971	1	.....	.....	527883	3	502093	1/4" O.D. Cop.
514450	514556	2	.....	.....	514550	3	508191	1/2" I.P.S. Cop.
514451	514556	2	.....	.....	514550	3	93843	3/4" Iron
529058	514556	2	.....	.....	514550	1 2	509872 95261	3/4" Iron
533193	514556	2	.....	.....	514550	1 1 1	93843 509872 94019	3/4" Iron
533205	514556	2	.....	.....	514550	3	95261	3/4" Iron
514452	514572	3	.....	.....	514551	3	508191	1/2" I.P.S. Cop.
517934	514572	3	.....	.....	514551	1 2	517508 508191	1/2" I.P.S. Cop.
518782	514572	3	.....	.....	514551	1 2	508191 511136	1/2" I.P.S. Cop.
526669	514572	3	.....	.....	514551	1 2	517508 511136	1/2" I.P.S. Cop.
527185	514572	3	.....	.....	514551	3	93843	3/4" Iron
528577	514572	3	.....	.....	514551	1 2	517507 511136	1/2" I.P.S. Cop.
532250	514572	3	.....	.....	514551	1 2	509872 95261	3/4" Iron
532421	514572	3	.....	.....	514551	1 2	502093 506341	1/4" O.D. Cop.
532582	514572	3	.....	.....	514551	3	506341	3/4" O.D. Cop.
527970	527969	5	.....	.....	527968	3	508191	1/2" I.P.S. Cop.

Pc. No. Ref. No.

527230	2	Reservoir Body (see Schedule)
527130	3	Pressure Head, Complete (includes 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, and four of 12)
513871	4	Diaphragm
514419	5	Diaphragm Follower
514423	6	Diaphragm Stem Nut
1505906	7	Diaphragm Spring
90255	8	Diaphragm Spring Washer
70092	9	1/2" Castle Nut
2377	10	1/2" Cotter
514422	11	Diaphragm Stem
500001	12	1/2" x 1/4" Spring Retainer Stud and Nut (4 Req'd)
527128	13	Spring Retainer
527123	14	1/2" x 1/4" Pressure Head Bolt and Nut (18 Req'd)
508093	25	1/4" Wabcoite Sweat Fitting for 1/4" O.D. Copper Tube (see Schedule)
508191	26	1/4" Wabcoite Sweat Fitting for 1/4" I.P.S. Copper Tube (see Schedule)
511136	25	1/4" Wabcoite Elbow Sweat Fitting for 1/4" I.P.S. Copper Tube (see Schedule)

Pc. No. Ref. No.

506341	25	1/4" Wabcoite Elbow Sweat Fitting for 1/4" O.D. Copper Tube (see Schedule)
517507	25	1/4" Wabcoite R.H. Offset Elbow Sweat Fitting for 1/4" I.P.S. Copper Tube (see Schedule)
517508	25	1/4" Wabcoite L.H. Offset Elbow Sweat Fitting for 1/4" I.P.S. Copper Tube (see Schedule)
93843	25	1/4" Wabcoite Fitting, Complete (see Schedule)
95261	25	1/4" Wabcoite Elbow Fitting, Complete (see Schedule)
94019	25	1/4" Wabcoite R.H. Offset Elbow Fitting, Complete (see Schedule)
909872	25	1/4" Wabcoite L.H. Offset Elbow Fitting, Complete (see Schedule)
90841	26	1/4" Wabcoite Fitting Gasket (3 Req'd)
3124	27	1/2" x 1/4" Wabcoite Fitting Cap Screw (3 Req'd per Fitting, except 1 Req'd per Offset Elbow Fitting)
2305	27	1/2" x 1/4" Wabcoite Fitting Cap Screw (1 Req'd per Offset Elbow)
23310		1/2" Pipe Plug (3 Req'd)

*NOTE—For details of Wabcoite Fittings, see Part Catalog 2216-21.

*NOTE—For Spring Identification Table, see page 4.

Prices will be quoted upon application
Orders should give **PIECE NUMBER** and **NAME** of part wanted

26-C CONTROL VALVE

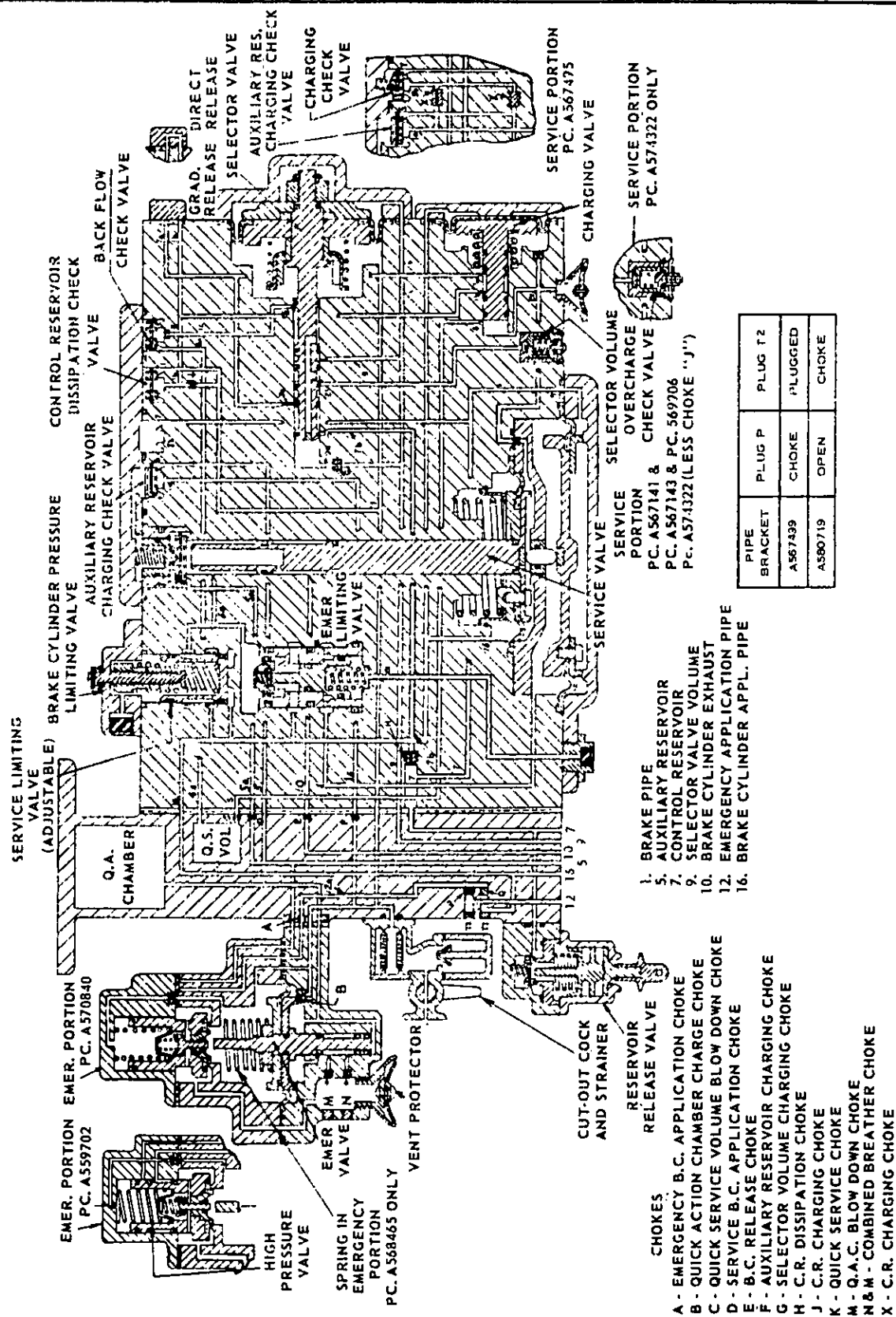
I. DESCRIPTION

- A. The 26-C Control Valve is a pneumatic device designed to function automatically in response to pressure changes to direct a flow of air to or from the brake cylinders or to an intermediate relay valve on passenger carrying vehicles. The 26-C Control Valve is offered for application to passenger cars operating in trains NOT EXCEEDING twenty four (24) - ninety (90) foot long cars. The control valve consists of a pipe bracket on which a service portion, an emergency vent valve portion, a brake pipe cut-out cock and strainer portion, and a reservoir release valve portion, are mounted. Although not a part of the device itself, an auxiliary or main reservoir, a control reservoir, and a selector valve volume reservoir are required to complement the functions of the 26-C Control Valve.
- B. The auxiliary or main reservoir provides air for the brake cylinders, and for the brake cylinder relay valve when used, when properly connected through porting in the Control Valve.
- C. The function of the control reservoir pressure is to provide a reference force to cause movement of the service valve in the service portion of the 26-C Control Valve when a reduction occurs in the opposing brake pipe pressure.
- D. The selector valve reservoir acts as a stabilizing volume during the operation of the selector valve during quick service and graduated release operations.
- E. The pipe connections to the pipe bracket are designated numerically and are so identified on the control valve diagrammatic.
- F. The Service Valve Portion contains a service spool valve, which includes two (2) diaphragms selected for proper reference to permit the development of brake cylinder pressure in accordance with brake pipe reductions.

An application valve controls the movement of the air from the auxiliary or main reservoir to the brake cylinder application pipe. Whenever a reduction in brake pipe pressure occurs in the control valve, the service spool valve assembly moves upward and opens the application valve. The service spool valve also serves to exhaust, through the control valve, the air pressure of the brake cylinder application pipe, whenever the brake pipe pressure is increased at the control valve. The diaphragm area ratios, together with the spring arrangement included in the service valve portion, permit stable operation of the automatic brake together with proper development of brake cylinder pipe pressure to operate satisfactorily with other current equipment arrangements of

automatic brake control. The service portion also includes a charging valve that functions to cut off the flow of air from the quick service volume to atmosphere, and also cuts off the dissipation of control reservoir air in to brake pipe during graduated release action of the control valve.

- G. The check valves contained within the valve provide for:
 1. Directing air to the auxiliary (supply) or main reservoir from brake pipe.
 2. Permitting rapid dissipation of control reservoir air to brake pipe during direct release action of the control valve.
 3. Permitting dissipation of brake pipe air from the spring chamber of the selector valve to the quick service volume during the quick service function or initial stage of a brake application.
- H. A Graduated Release Cap, which is used to manually position the valve for Graduated or Direct Release, is located on the service valve portion. The letters REL. are cast on the body below the graduated release cap. The letters DIR. and GRA. are cast on the cap. When the letters DIR. are over the letters REL., the valve is set for Direct Release; when the letters GRA. are over the letters REL., the valve is set for Graduated Release. The cap is set by removing the two cap screws and turning the cap so that either DIR. or GRA. line up with REL. on the body.
- I. The Selector Valve (designed into the service portion of the 26-C Control Valve) controls the quick service function, provides for the direct release function when required, and enables the control valve to be satisfactorily trained with D-22 Type Brake Equipment if necessary. There are four (4) positions that this valve may assume during operation of the control valve; these are Release, Service, Lap, and Emergency.
- J. The service valve portion also contains two (2) limiting valves for the purpose of limiting the maximum pressure directed to the brake cylinder application pipe during service and emergency applications. These pressures are predetermined by the load setting of the springs within the limiting valves. During emergency applications the emergency limiting valve is designed to open when the brake pipe pressure is reduced to a value of approximately 13 to 18 psi, to permit a controlled fast build-up of the emergency brake cylinder application pipe air pressure, then reset, limiting emergency brake cylinder application pipe air pressure to a predetermined value.



DIAGRAMMATIC DRAWING - (BA-80474-120)

- K. The emergency portion of the 26-C Control Valve is designed to provide a large local opening for exhaust of brake pipe air during an emergency application. The emergency portion contains the operating diaphragm piston and the high pressure vent valve. During an emergency rate of brake pipe air reduction at the control valve, one end of the diaphragm piston unseats the vent valve to locally exhaust the brake pipe air. The other end of the diaphragm piston is a spool valve that provides a stability of exhaust of the quick action chamber air.
- L. The Brake Pipe Cut-Out Cock and Strainer Portion provides a means of straining the air that flows into the control valve. It also provides a means of manually cutting out the control valve when desired.
- M. The Reservoir Release Valve Portion provides a means of manually venting control reservoir air to atmosphere to initiate a brake release.

II. OPERATION

IMPORTANT: THE OPERATION DESCRIBED HEREIN IS PREDICATED ON THIS VALVE AND ALL OTHER RELATED DEVICES HAVING BEEN PROPERLY INSTALLED AND PERIODICALLY MAINTAINED IN ACCORDANCE WITH WABCO RECOMMENDATIONS AND AAR SPECIFICATIONS.

(NOTE: In order to make the operation of this valve more easily understood, the diagrammatic should be used; however, without regard to actual proportion and construction of parts.)

- A. Whenever the car is initially charged, brake pipe air at the Control Valve passes through the cut-out cock and strainer (COCK MUST BE OPEN) and into Passage 1 in the pipe bracket. From Passage 1, the air flows to the following passages and chambers in the valve:
 - 1. To the emergency valve portion and to the spring chamber above the large diaphragm.
 - (a) Brake pipe air flows from the spring chamber above the large diaphragm, through Choke B and to the underside of the large diaphragm as well as the quick action chamber in the pipe bracket.
 - 2. To the spring chamber of the selector valve.
 - 3. To the brake pipe chamber above the large diaphragm in the service valve.
 - 4. To the emergency limiting valve, where the brake pipe pressure overcomes the force of the spring and moves the piston to its downward position permitting the check valve to become seated.

- 5. Through Choke F and Passage 1a that leads to the auxiliary reservoir charging check valve, where the auxiliary reservoir line may be charged.
- 6. From Passage 1, brake pipe air flows through Choke J into Passage 1b that leads to the graduated release cap and to the charging valve spool. The air continues to flow into Passage 7a that leads to the selector valve spool and passage 7b. From here the air may flow to the following passages and chambers:
 - (a) Through Choke H and into Passage 7 that leads to the control reservoir chamber under the large diaphragm of the service valve as well as to Port 7 in the pipe bracket where the connection exists to the reservoir release valve and the control reservoir.
 - (b) Air flows around the selector valve spool valve into Passage 9a and Choke G that leads to Passage 9. This passage leads to the diaphragm chamber of the selector valve, the selector valve spool, as well as to Port 9 in the pipe bracket where the connection exists to the selector volume reservoir.
- B. When the air brake equipment arrangement of the car is fully charged, identical pressure should exist above and below the large diaphragm in the service valve. With the aid of the large spring, the diaphragm assembly will remain in its downmost position as long as brake pipe pressure remains stable.
- C. To effect a brake application, the brake pipe pressure in Port 1 MUST BE reduced. This reduction may be manually initiated by movement of the 26 Type Brake Valve Handle on the controlling car to the "Application" position.
- D. When a reduction of brake pipe pressure occurs in the spring chamber of the selector valve, the pressure differential that is created across the diaphragm positions the diaphragm assembly and spool valve to permit the following to occur:
 - 1. During each initial brake pipe air reduction, brake pipe air in the spring chamber of the selector valve flows into Passage 1c, through Choke K and the backflow check valve. From here, the air flows through Passage 6a to the quick service volume and thus through Choke C into Passage 6 that leads to the charging valve where the exhaust port is located.
 - (a) This is when the service valve will begin to direct air to the brake cylinder application pipe.

2. Passage 7a is disconnected from 7b at the selector spool valve. This isolates control reservoir air from brake pipe air.
 3. Passage 7b that connects control reservoir air with selector volume air, Passage 9, is cut off at the selector spool valve.
 4. The build-up of air pressure of approximately 3-1/2 to 4-1/2 psi on the diaphragm of the charging valve, is intended to position the spool to close the exhaust of air from the quick service volume.
 5. The decrease of brake pipe pressure permits the selector spool valve to be moved further to permit selector volume air to flow from Passage 9 through the selector spool valve and to exhaust.
 6. As a result of the movement of the selector valve, the service spring in the selector valve is engaged. The force of this spring, coupled with the air pressure in the brake pipe, oppose the force of the selector volume air pressure. Whenever the point of equalization of forces across the diaphragm is reached, the spool valve will assume a lap position, at which time the selector volume is cut off from exhaust at the selector spool valve.
- E. When a reduction of brake pipe pressure occurs in the brake pipe chamber above the large diaphragm in the service valve, the differential in pressure that is created across the diaphragm will initiate a movement of the diaphragm assembly and stem to open the application valve to permit auxiliary (supply) or main reservoir air to flow into Passage 16a.
- F. When the application valve is opened by the upward movement of the service valve stem, auxiliary (supply) or main reservoir air flows into Passage 16a and to the following passages and chambers:
1. To Port 16 in the pipe bracket which is connected to the brake cylinder application pipe.
 2. To the face of the charging valve diaphragm initiating movement of the charging valve spool that cuts off the exhaust of brake pipe air from the quick service volume. This movement serves to terminate quick service action of the control valve.
 3. To the large spring chamber in the service valve. The force of this pressure, combined with the force of the spring and coupled with the force of the brake pipe pressure in the chamber above the large diaphragm, oppose the force of the control reservoir air pressure in the chamber under the large diaphragm. Whenever the point of equalization of forces across the diaphragm is reached, the service valve will assume a lap position.
4. To the underside of the service limiting valve. Whenever this air pressure increases to a point in slight excess of the force of the spring, the spool valve is designed to move upward and cut off any further flow of air into Passage 16. The predetermined setting of the spring is intended to limit the maximum pressure delivered to the brake cylinder application pipe during a service rate brake pipe reduction.
- G. Whenever a manual adjustment has been made at the brake valve to permit a high brake pipe pressure, it is possible to get over-reductions with the 26-C Control Valve. Over-reductions should not have any serious effect upon brake cylinder application pipe pressure, since this pressure is restricted by the load settings of the springs within the limiting valves.
- H. An over-charge in the control and selector volume reservoirs can be reduced to brake pipe pressure by manually moving the automatic brake valve handle alternately between Application and Release positions. During application, selector volume air flows to exhaust at the selector spool valve, and, during release, the control reservoir air is free to flow to the selector volume passage in the selector spool chamber. Several applications and releases may be required, depending upon the severity of the over-charge. Whenever the release cap is manually set in Direct Release, the control reservoir may also flow into brake pipe through Choke J as well as through the control reservoir dissipation check valve in which case only one application and release will be required to reduce an over-charge.
- I. A Graduated or Direct Release function can be obtained with the 26-C Control Valve, depending upon the manual positioning of the release cap. For Graduated Release, the cap on the control valve is to be manually set in "GRA" position. Air will be permitted to flow from the control reservoir through choke H and into Passage 9a, and Choke G which leads to the selector volume reservoir. However, if the cap is positioned for Direct Release, the flow of air from the control reservoir is directed to not only the selector volume, as described above, but now may also flow from Passage 7a to 1b in the release cap that leads to the control reservoir dissipation check valve and Choke J, and into brake pipe. (Proper positioning of the cap is dependent on the "make up" of the train consist).
- J. In Emergency application, the 26-C Control Valve functions similarly to that previously described; however, several additional features designed into the control valve are utilized as follows:

1. An Emergency reservoir is not required with the 26-C Control Valve. The auxiliary (supply) or main reservoir is utilized to obtain the higher braking pressures desired during emergency applications.
2. The increased pressure differential across the diaphragm in the selector valve, as a result of the fast rate of drop in brake pipe pressure, positions the diaphragm assembly and spool valve to momentarily provide those functions obtained during a service application; but, as a result of the further travel of the spool valve into Emergency Position, the emergency spring is engaged and Passage 9 is lapped to close the connection to the selector volume reservoir.
3. The upward movement of the service valve unseats the application valve to permit auxiliary (supply) or main reservoir air to flow to the limiting valves and into Passage 16 that is connected to the brake cylinder application pipe.
 - (a) Auxiliary (supply) or main reservoir air flows to the underside of the service limiting valve spool. Whenever this pressure reaches a point in slight excess of the spring load, the spool is designed to move upward, thus cutting off any further flow of air through this valve into the brake cylinder application pipe.
 - (b) In the design of the 26-C Control Valve, a chamber is provided for brake pipe air in the emergency limiting valve, and it is this pressure that holds down the limiting valve piston. During initial stages of an emergency brake application, the emergency limiting valve will remain closed. As the brake pipe pressure continues to drop, and is reduced to a value between 13 and 18 psi in the control valve, the force of the spring within the emergency limiting valve overcomes the force of the brake pipe pressure on the piston. The piston will then move upward, unseating the check valve and provide an alternate passage for auxiliary (supply) or main reservoir air to enter into Passage 16 that connects to the brake cylinder application pipe. During the initiation of an emergency brake application, the brake pipe pressure drop should be so rapid that at the time the emergency limiting valve opens the check valve, the service limiting valve is still open and not as yet positioned in its uppermost position. The check valve in the emergency limiting valve will remain open to permit a continued flow of air to the brake cylinder application pipe. When the pressure of the air admitted to the brake cylinder application pipe increases sufficiently, the service limiting valve will close. The continued increase of this pressure also effects a downward force on the piston of emergency limiting valve. When this pressure reaches a point in slight excess of the spring force within the emergency limiting valve, the piston will be moved downward, permitting the check valve to seat and cut off the flow of all air to the brake cylinder application pipe.
- K. The Emergency Valve Portion of the 26-C Control Valve is so constructed to allow quick action chamber air to exhaust at the same rate that brake pipe air is reduced during a service application. During a service application the drop of brake pipe pressure at a service rate in the spring chamber of the emergency valve creates a pressure differential across the diaphragm. The diaphragm assembly and spool valve move upward to an intermediate position to establish a connection between quick action chamber and exhaust Choke M. Chokes M and B are of a predetermined size and provide a controlled exhaust of quick action chamber air. The chokes are sized to maintain an air pressure that stabilizes the spool valve and prevents the unseating of the high pressure check valve.
- L. If the brake pipe pressure is reduced at an emergency rate in the control valve, quick action chamber pressure will position the diaphragm assembly and spool valve in the extreme upward position. In this position, the quick action chamber is now connected to exhaust Choke M, which provides a blowdown of the quick action chamber air. With the spool valve in the upper position, the stem unseats the pilot valve and exhausts the air pressure on the top of the check valve carrier. Brake pipe pressure below the check valve and carrier forces that valve open, creating a large opening for a rapid brake pipe air exhaust. The check valve in the top cover limits the volume of air that must be exhausted at the pilot valve, thereby permitting fast opening of the large vent valve. The diaphragm assembly and spool valve will remain in the upper position until brake pipe and quick action chamber air has been nearly exhausted, at which time the force of the spring above the check valve and carrier will move the assembly downward, positioning the valve in its normal position.
- M. In Release Position, an increase in the brake pipe pressure is called for and this higher pressure is admitted into the brake pipe chamber above the large diaphragm in the service valve. All of the combined downward forces position the diaphragm assembly and stem to permit the air in Passage 16, that leads to the brake cylinder application pipe to vent to atmosphere through the service valve stem and Passage 10 in the pipe bracket. The continued drop of air pressure in the limiting valves permits

the spring within the service limiting valve to move the spool downward and, with the build-up of brake pipe pressure, the emergency limiting valve piston is held down. Both valves provide a means for a rapid exhaust of air. It must be remembered that the air on the face of the charging valve diaphragm is also vented to atmosphere, which permits the spring to move the charging valve to its normal position when brake cylinder application pipe pressure reduces to a value below 3-1/2 to 4-1/2 psi.

III. CLEANING SOLVENT AND LUBRICANTS

- A. The solvent used for cleaning the parts of the 26-C Control Valve **MUST BE** an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be cleaned without abrasion.
- B. The following lubricants **MUST BE** available.
1. No. 2 Silicone Grease, WABCO Specification M-7680-2 which is used to lubricate all o-rings, o-ring grooves and the bearing surfaces of the bushings into which the o-ring assemblies are installed.
 2. A compound consisting of one part graphite, WABCO Specification M-7695-2, (AAR Specification M-913) and two parts of oil, SAE 20, by weight which is used to lubricate the threads of the choke plugs after cleaning.

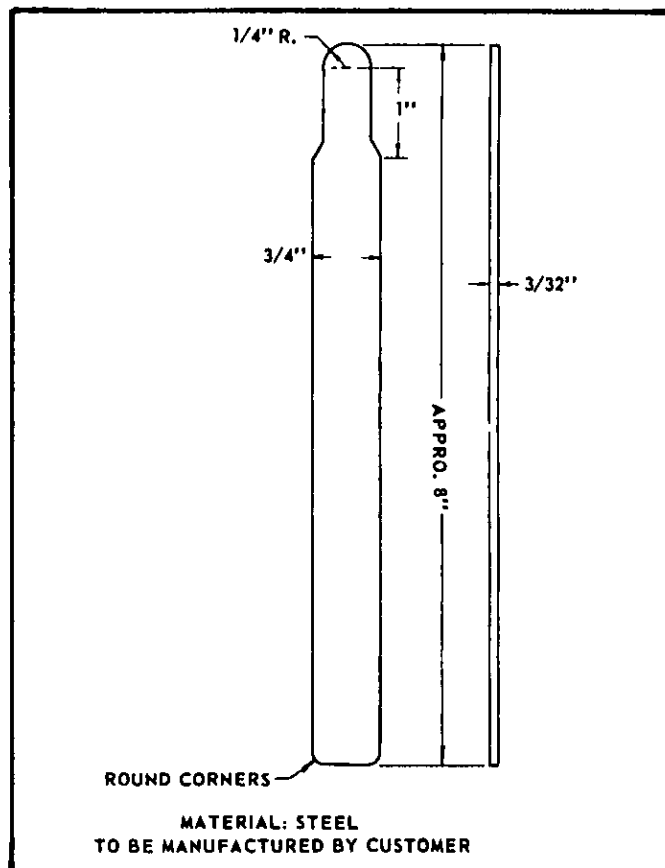
WARNING: THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.

IV. TOOLS

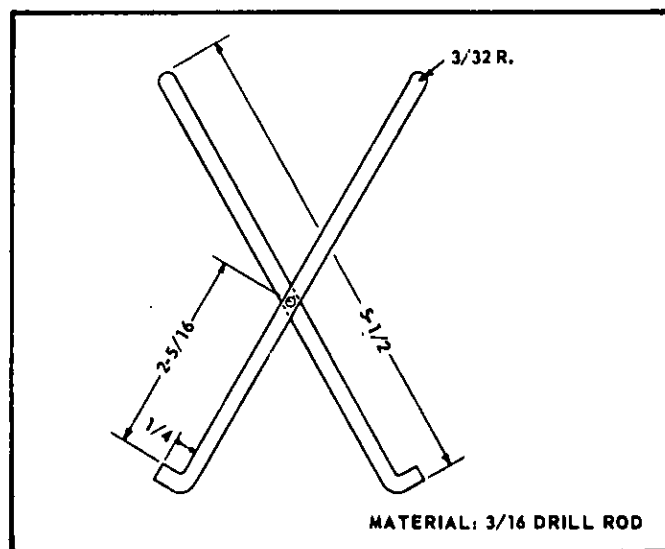
- A. In addition to the regular shop tools, the following tools **MUST BE** available to the repairman.
1. Tool for removing the emergency limiting valve bushing from the service portion. Dimensions for making this tool are shown on drawing R-42-4.
 2. Tool for assembling the charging valve diaphragm and piston into the service portion body. Dimensions for making this tool are shown on drawing R-42-3.
 3. Tool for disassembling and assembling the new style selector valve. Dimensions for making this tool are shown on drawing R-42-5.

4. No. 1 TRUARC Pliers

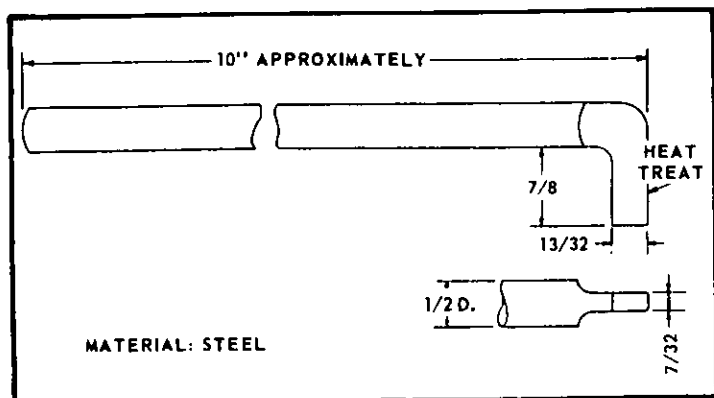
5. No. 3 TRUARC Pliers



DRAWING R42-3



DRAWING R-42-4



DRAWING R-42-5

V. SAFETY PROCEDURES

- A. Regular shop safety procedures **MUST BE** followed when working on the valve or any of the portions.
- B. The work area should be clean and free of debris.
- C. The air jet used to blow parts clean or to blow them dry after being cleaned **MUST BE LESS** than 30 psig.
- D. **WARNING:** THE USE OF AN AIR JET, WHICH **MUST BE LESS** THAN 30 PSIG, TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION **MUST BE WORN** TO PROTECT THE EYES FROM POSSIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.
- E. PERSONAL EYE PROTECTION **MUST BE WORN** WHEN PERFORMING ANY WORK ON THE 26-C CONTROL VALVE OR ANY OF THE PORTIONS.

VI. CLEANING OF CHOKE PLUGS

IMPORTANT: PERSONAL EYE PROTECTION **MUST BE WORN.**

- A. **NOTE:** The size and cleanliness of choke plugs are **IMPORTANT.** Choke plugs **MUST BE REMOVED ONE AT A TIME** for servicing to insure that they are returned to their proper location. The following procedure **MUST BE ADHERED TO** when servicing the choke plugs:

1. Remove only one choke plug and place it in the cleaning solvent described in paragraph III.A. to soak. **WARNING: METALLIC TOOLS MUST NOT BE USED TO CLEAN CHOKE PLUGS AS THE SIZE AND SHAPE OF THE ORIFICE MUST NOT BE CHANGED.**

2. While the choke plug is soaking in the cleaning solvent, the passage from which it was removed **MUST BE** checked for cleanliness and blown out if necessary with a low pressure (less than 30 psig) jet of clean dry air.
3. Remove the choke plug from the cleaning solvent and blow it dry with a low pressure (less than 30 psig) jet of clean, dry air.
4. Inspect the choke plug to insure that it is clean and not restricted. If the plug is damaged in any way it **MUST BE** replaced with a **NEW WABCO Quality Part.**
5. Lightly coat the threads of the choke plug with a compound consisting of one part graphite, WABCO Specification M-7695-2 (AAR Specification M-913) and two parts of oil (SAE 20) by weight. Assemble the choke plug into the passage from which it was removed. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**

IMPORTANT: THE CHOKE PLUG MUST BE ASSEMBLED INTO THE PASSAGE SO THAT IT IS FLUSH OR BELOW THE MACHINED FACE OF THE PART IN WHICH IT IS INSTALLED.
6. Remove the next choke plug and repeat steps 1 to 5 until all choke plugs have been serviced.

VII. EMERGENCY PORTION - MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: THE EMERGENCY PORTION OF THE 26-C CONTROL VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Passenger (Interstate)	36 Months
Transit	36 Months
Multiple Operated Electric Unit	15 Months

(Refer to Figure 1)

(**NOTE:** The Emergency Portion is removed from the Pipe Bracket Portion by removing the four 1/2 inch hex nuts (1). The nuts are not a part of the Emergency Portion but are a part of the Pipe Bracket Portion).

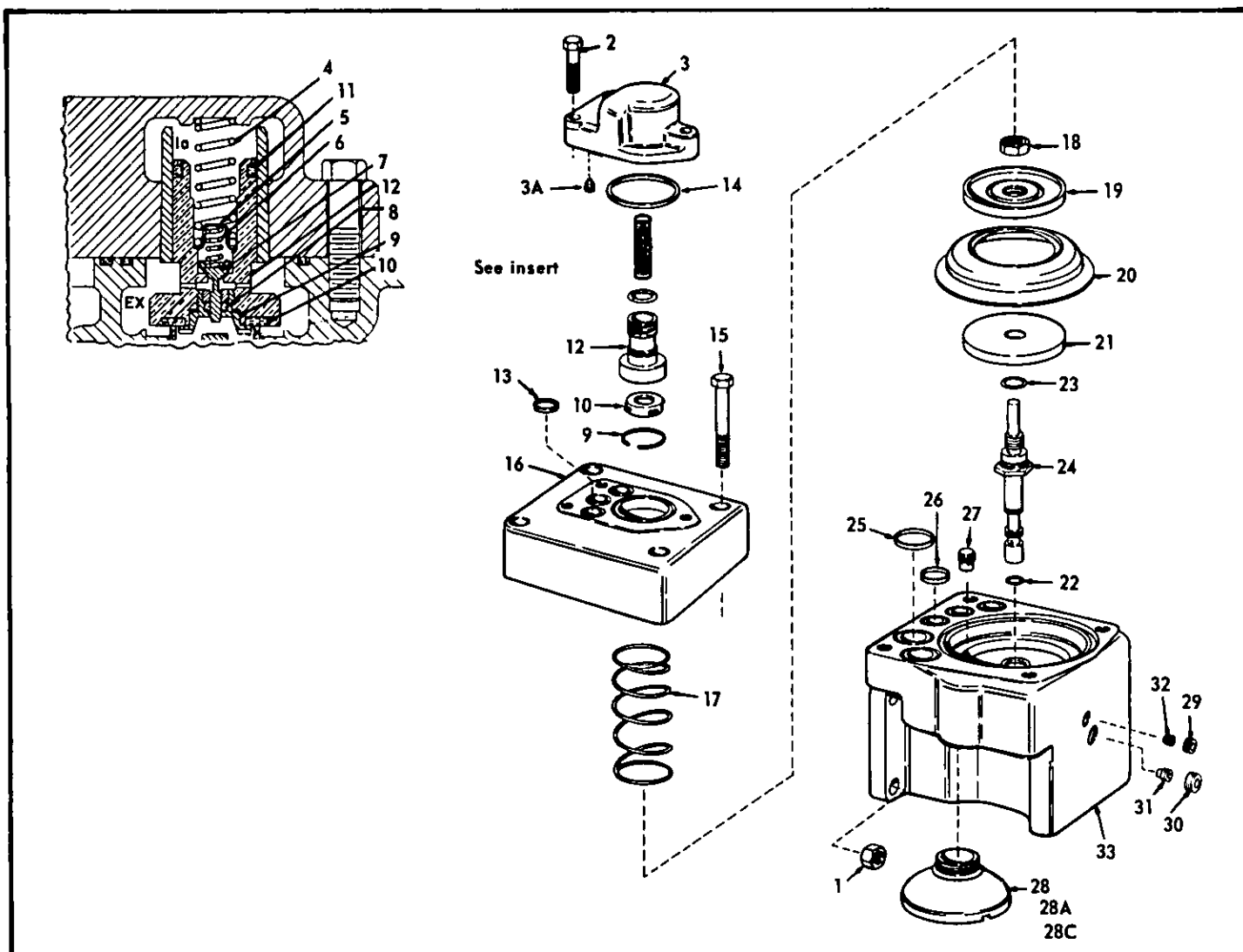


FIGURE 1 - EXPLODED VIEW

VII.A. DISASSEMBLY

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

(Refer to Figure 1)

1. Remove the three 3/8 x 1-1/2 inch cap screws (2) which secure the cover (3) to the emergency valve body (16). **CAUTION:** Exercising care so that no parts "fly-out" of the body and cause an injury, **CAREFULLY** remove the cover (3).
2. Remove the 2-3/8 inch O.D. ring gasket (14) and the three 15/16 inch O.D. ring gaskets (13) from the emergency valve body (16).
3. Remove the exhaust spring (4), pilot valve spring seat (5) and pilot valve spring (6) from the check valve guide (carrier) (12). Remove the check valve

guide (carrier) (12) from the emergency valve body (16).

- a. Remove the pilot valve (7) and the 1-1/16 inch O.D. o-ring (11) from the check valve guide (carrier) (12).
- b. Remove the check valve retainer (9) and check valve (10) from the check valve guide (carrier) (12).
 - (1) Remove the 1/4 inch O.D. o-ring (8) from the check valve retainer (9).
4. Remove the four 1/2 x 3-1/4 inch cap screws (15) which secure the emergency valve body (16) to the diaphragm housing (33), then remove the emergency valve body (16).
5. Remove the diaphragm spring (17) from the diaphragm housing (33).

6. Remove the two 1-3/8 inch O.D. ring gaskets (25) and the three 1 inch O.D. ring gaskets (26) from the diaphragm housing (33).
7. Remove the emergency valve piston assembly (18, 19, 20, 21, 22, 23 and 24) from the diaphragm housing (33).
 - a. Remove the three 5/8 inch O.D. o-rings (22) from the emergency valve piston stem (24).
 - b. Hold the emergency piston stem (24) with an open end wrench applied to the hex wrench flats on the stem, then remove the jam nut (18) from the piston stem (24).
 - (1) Remove the follower (19), diaphragm (20) and piston (21) from the piston stem (24).
 - (2) Remove the 7/8 inch O.D. o-ring (23) from the piston stem (24).
8. Remove the vent protector (28) from the housing (33).
 - a. **NOTE:** If the vent protector (28) is damaged, or if the rivet (28C) is bent or broken, or if the seal (28A) is torn or damaged, the vent protector MUST BE repaired or replaced.
 - (1) A NEW seal, WABCO Part Number 502465, and a NEW pop rivet, WABCO Part Number 571140, MUST BE used.

VII.B. CLEANING, INSPECTING, AND REPAIRING

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

(NOTE: Refer to WABCO Parts Catalog 3220-5, Sup. 7 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.)

I. Metal Parts

- a. The exterior and interior surfaces of the body MUST BE thoroughly cleaned using a soft, clean, lint-free cloth or rag that has been saturated with the cleaning solvent described in paragraph III.A.
- b. After the body is cleaned it MUST BE blown completely dry using a low pressure (less than 30 psig) jet of clean dry air.
- c. **IMPORTANT:** (Refer to Figure 1) THE STRAINER AND CHOKE (3A) LOCATED IN THE COVER (3), THE STRAINER AND CHOKE (27), CHOKE PLUGS (32) AND (31) (ON VALVE PORTIONS SO EQUIPPED) LOCATED IN THE

DIAPHRAGM HOUSING (33) MUST BE SERVICED FOLLOWING THE PROCEDURE FOUND IN PARAGRAPH VI. THIS PROCEDURE MUST BE ADHERED TO. Refer to WABCO Parts Catalog 3220-5, Sup. 7 for plug location and part number.

- d. Wash the remaining metal parts in the cleaning solvent described in paragraph III.A.
- e. The springs may be wire brushed to assist in the removal of rust and scale. **CAUTION:** WIRE BRUSHING MAY CAUSE PARTICLES OF RUST, DIRT, AND SCALE TO BE AIRBORNE.
- f. After the parts are cleaned they MUST BE blown completely dry with a low pressure (less than 30 psig) jet of clean dry air.
- g. Inspect the parts
 - (1) Reject and replace any spring that is rusted, pitted, or has taken a permanent set.
 - (2) Reject and replace any part that is cracked, cut, broken, worn excessively, damaged in any way, or that is in such a condition that would result in unsatisfactory operation.

2. Rubber Parts

(IMPORTANT: IT IS RECOMMENDED THAT ALL RUBBER PARTS BE DISCARDED AND REPLACED WITH NEW WABCO QUALITY PARTS. SERVICEABLE RUBBER PARTS MAY BE REUSED ONLY AFTER THEY HAVE BEEN CLEANED ACCORDING TO THE FOLLOWING PROCEDURE:)

- a. Dip the rubber parts in the cleaning solvent described in paragraph III.A. to assist in the removal of grease and dirt. **WARNING:** RUBBER PARTS MUST NOT BE ALLOWED TO SOAK IN THE CLEANING SOLVENT.
- b. Promptly wipe the parts with a soft, clean, lint-free cloth.
- c. Blow the parts completely dry with a low pressure (less than 30 psig) jet of clean, dry air.
- d. The diaphragm may be brushed with a brush that has soft bristles, such as a shoe brush, to assist in the removal of remaining dirt and to polish the diaphragm surfaces.
- e. Inspect the parts.
 - (1) If necessary, the surface of the rubber seated check valve may be lapped on a fine grade of emery cloth (No. 200 grit) to

obtain a smooth surface. **IMPORTANT:** NOT MORE THAN 1/32 INCH MAXIMUM MAY BE REMOVED FROM THE ORIGINAL THICKNESS OR THE CHECK VALVE MAY FUNCTION ERRATICALLY.

- (2) Reject and replace any part that is cracked, cut, torn, broken, has flattened beads, is worn excessively, damaged in any way or that is in such a condition that would result in unsatisfactory operation.

- f. The following Rubber Part Kits are available from WABCO:

Emergency Portion Part No.	Kit For	Kit Part No.
569465	Total Overhaul	564026
	Moving Parts Only	564027
570840	Total Overhaul	570847
	Moving Parts Only	564027

NOTE: Consult your Westinghouse Air Brake Division Representative for Kits for all other Emergency Portions not listed.

VII.C. LUBRICATING AND ASSEMBLING

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. Just prior to assembling lubricate all o-rings, o-ring grooves, and the bearing surfaces of the bushings into which the o-ring assemblies are installed with No. 2 Silicone Grease, WABCO Specification M-7680-2. The following procedure **MUST BE** followed:

- Coat the o-ring(s) with the grease.
- Fill the groove in which the o-ring is to be installed with the grease.
- Lightly coat the bearing surfaces of the bushing in which the o-ring assemblies will be installed with the grease.

WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.

2. Assemble the piston assembly as follows:

- Install a lubricated 7/8 inch O.D. o-ring (23) into the groove at the upper end of the piston stem (24). Lubrication procedure is found in paragraph VII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth.

WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.

- Place the piston (21), diaphragm (20), and diaphragm follower (19) on the piston stem (24) being careful not to damage the o-ring and secure them in place with the 5/8 inch jam nut (18).
 - Install the three lubricated 5/8 inch O.D. o-rings (22) into their grooves on the lower portion of the piston stem (24). Lubrication procedure is found in paragraph VII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING:** LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
- Insert the piston assembly (18 to 24 incl.) into the diaphragm housing (33).
 - Insert the two 1-3/8 inch O.D. ring gaskets (25) and the three 1 inch ring gaskets (26) into the grooves in the diaphragm housing (33).
 - Position the diaphragm spring (17) in place on the diaphragm follower (19).
 - Make certain that the bead of the diaphragm (20) is in the groove in the diaphragm housing (33) then secure the emergency valve body (16) to the diaphragm housing (33) using the four 1/2 x 3-1/4 inch hex head cap screws (15).
 - Assemble the check valve guide (carrier) assembly as follows:
 - Install a lubricated 1/4 inch O.D. o-ring (8) into the check valve retainer (9). Lubrication procedure is found in paragraph VII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING:** LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
 - Insert the check valve (10) into the check valve guide (carrier) (12) and secure it in place with the retainer (9).
 - Install a lubricated 1-1/16 inch O.D. o-ring (11) in place on the check valve guide (carrier) (12). Lubrication procedure is found in paragraph VII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING:** LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
 - Insert the pilot valve spring (6), pilot valve spring seat (5) and exhaust spring (4) into the check valve guide (carrier) (12).

- e. Install the pilot valve - check valve guide (carrier) assembly (4 to 12 incl.) into the bushing in the emergency valve body cover (3).
8. Insert the three 15/16 inch O.D. ring gaskets (13) and the 2-3/8 inch O.D. ring gasket (14) into the ring grooves in the emergency valve body (16).
9. Secure the cover (3) to the emergency valve body (16) with the three 3/8 x 1-1/2 inch hex. head cap screws (2).
10. Insert the vent protector (28) into the exhaust port in the diaphragm housing.

VII.D. TESTING, AND ADDITIONAL INFORMATION

1. After the Emergency Portion has been assembled BUT BEFORE it is returned to service it MUST PASS a series of tests following the procedure of the current issue of the applicable WABCO Test Specification as listed below:

Emergency Portion Part Number	Test Specification Number
559702	T-2418-0
563267	T-2567-0
567475	T-2904-0
569465	Contact WABCO Rep.
570840	T-2940-0

2. **IMPORTANT:** When a new or repaired and tested Emergency Portion is mounted on the Pipe Bracket Portion a NEW mounting gasket MUST BE used (See Figure - 3 Reference 1).
3. **IMPORTANT:** WHEN THE EMERGENCY PORTION IS REMOVED FROM THE 26-C CONTROL VALVE FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE EMERGENCY PORTION AND THE CONTROL VALVE FUNCTION PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
4. Consult your Westinghouse Air Brake Division Representative if additional information is required.

VIII. SERVICE PORTION - MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: THE SERVICE PORTION OF THE 26-C CONTROL VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Passenger (Interstate)	36 Months
Transit	36 Months
Multiple Operated Electric Unit	15 Months

(Refer to Figures 2A and 2B)

(NOTE: The Service Portion is removed from the Pipe Bracket Portion by removing four 1/2 inch hex nuts (Figure 2B, Ref. 1). The nuts are not a part of the Service Portion but are a part of the Pipe Bracket Portion).

VIII.A. DISASSEMBLY

(NOTE: Refer to Figure 2B)

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. Remove the vent protector assembly (96) from the body (101).
 - a. If the vent protector assembly (96) is damaged or if the vent seal (96B) is torn or cracked or the rivet (96C) is bent, broken or damaged, the vent protector assembly MUST BE replaced or repaired.
 - (1) When replacing the vent seal (96B) use WABCO Part Number 551159.
 - (2) When replacing the pop type rivet, use WABCO Part Number 552384.
2. Remove the cap nut (45) from the service valve bottom cover (46), then remove the limiting valve piston spring (66), spring (67) if used, and shims (65) if used.
3. Remove the five hex head cap screws (44) which secure the service valve bottom cover (46) to the service valve body (101); then remove the bottom cover (46).
4. Remove the 15/16 inch O.D. ring gasket (79) from the bottom cover mounting face of the service valve body (101).
5. Remove the large piston assembly (47 to 50 incl.) from the service valve body (101).
 - a. Remove the eight 1/4 x 1/2 inch hex. socket cap screws (47) which secure the follower (48) and diaphragm (49) to the large piston (50).
 - (1) Remove the diaphragm follower (48).
 - (2) Remove the diaphragm (49).

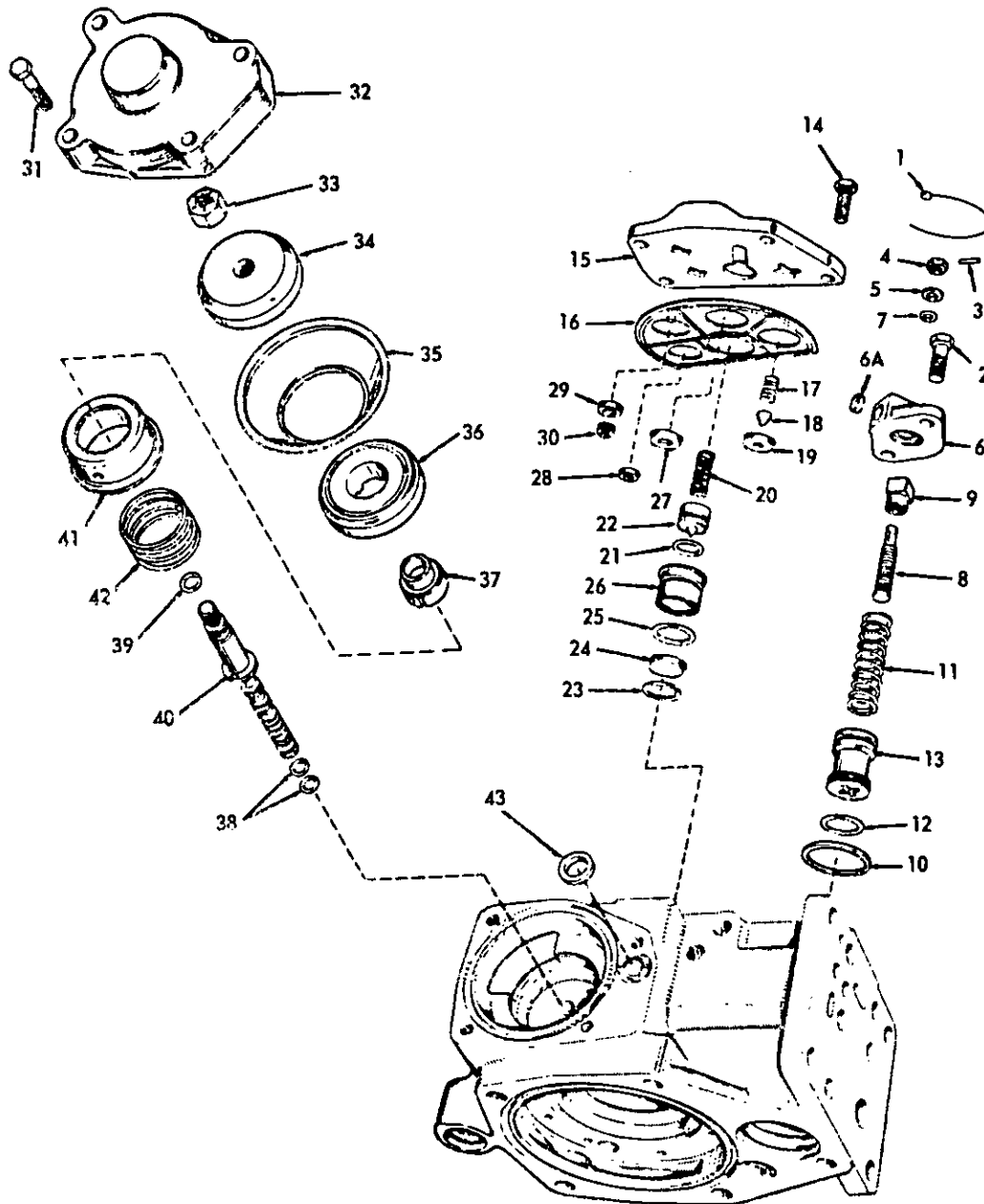


FIGURE 2A - EXPLODED VIEW

6. Remove the eight 1/4 x 1/2 inch hex. socket cap screws (51) which secure the small diaphragm cover (54) to the service valve body (101).

a. To assist in removing the small diaphragm cover (54), insert one of the 1/4 inch hex. socket cap screws into each of the 1/4 inch tapped holes provided in the small cover, then remove the small cover.

(1) Remove the pusher pin (52) from the small diaphragm cover (54).

(2) Remove the 9/16 inch O.D. o-ring (53) from the small diaphragm cover (54).

7. Remove the small piston assembly (55, 56, 57, 58, 59) from the service valve body (101).

a. Remove the two 3/4 inch O.D. o-rings (56) from the piston stem (57).

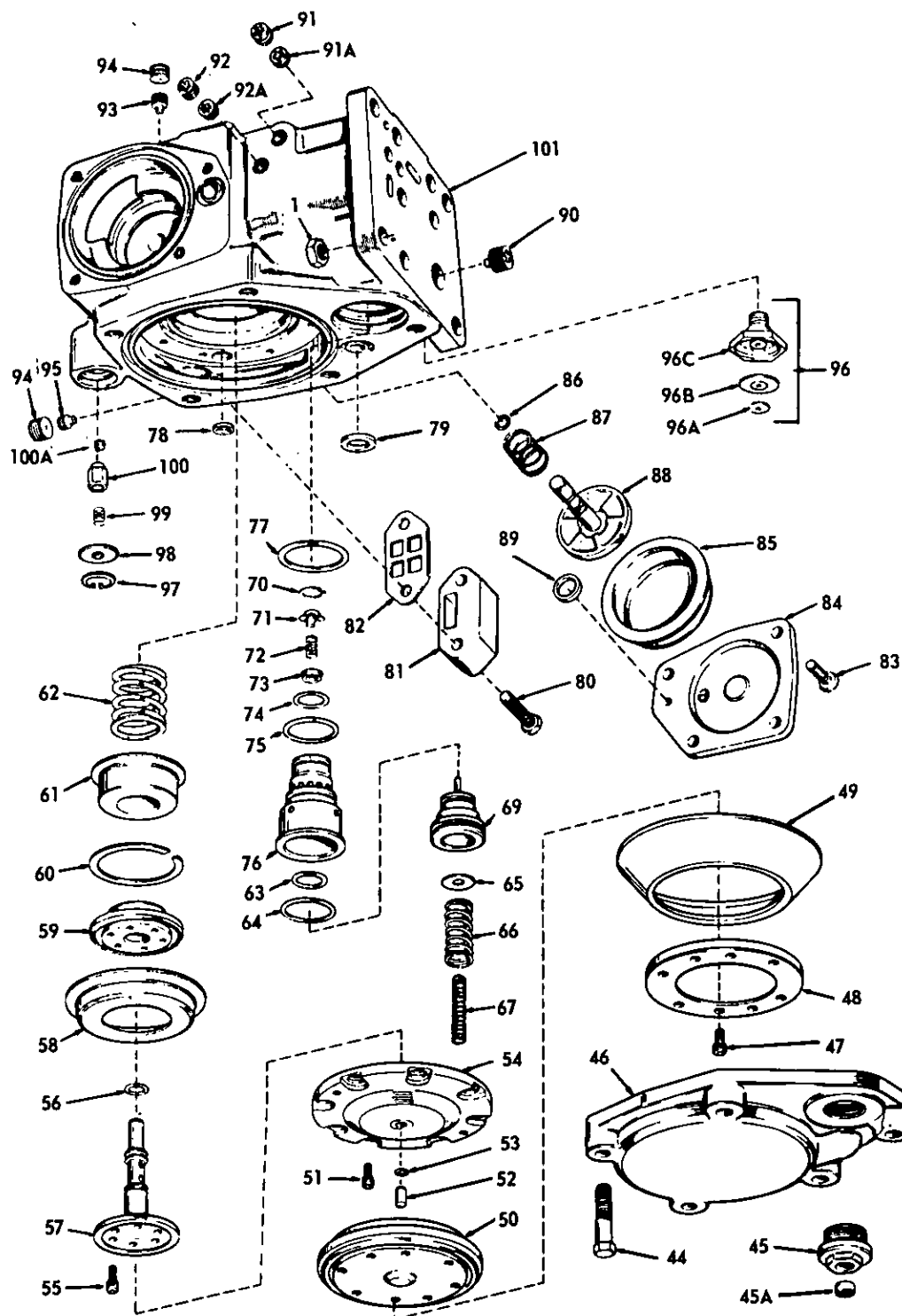


FIGURE 2B - EXPLODED VIEW

- b. Remove the six 1/4 x 1/2 inch hex socket cap screws (55) which secure the diaphragm follower (59) and diaphragm (58) to the small piston (57) then remove the diaphragm follower (59) from the diaphragm (58) from the piston stem side.
 - c. Remove the 3/4 inch O.D. o-ring (56) from the stem of the small piston (57).
8. Remove the 9/16 inch O.D. ring gasket (78) from the service valve body (101).
 9. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, **CAREFULLY** remove the retaining ring (60), spring cage (61), and small diaphragm spring (62) from the service valve body (101).
 10. Remove the emergency limiting valve piston (69) from the emergency limiting valve bushing (76).
 - a. Remove the 1-1/16 inch O.D. o-ring (63) and the 1-3/4 inch O.D. o-ring (64) or the 1-5/16 inch O.D. o-ring (68) if so equipped from the emergency limiting valve piston (69).
NOTE: Refer to WABCO Parts Catalog 3220-5, Sup. 7 for o-ring identification.
 11. Using the tool shown on drawing R-42-4, remove the emergency limiting valve bushing (76) from the service valve body (101). (See paragraph IV.A.1.).
 - a. Remove the 1-1/4 inch O.D. o-ring (74) and the 1-9/16 inch O.D. o-ring (75) from the emergency limiting valve bushing (76).
 - b. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, **CAREFULLY** remove the retaining ring (70), spring retainer (cage) (71), release check valve spring (72), and release check valve (73).
 - c. Remove the 2-3/8 inch O.D. o-ring (77) from the service valve body (101).
- (NOTE: Refer to Figure 2A)
12. Remove the four 3/8 x 1-3/4 inch hex head cap screws (31) which secure the selector valve cover (32) to the service valve body (101).
 13. Remove the 15/16 inch O.D. ring gasket (43) from the service valve body (101).
 14. Remove the selector valve piston assembly (37, 38, 39, 40, 41, 42).
 - a. Remove the six 9/16 inch O.D. o-rings (38) from the piston stem (40).
 - b. Turn the spring retainer (41) on the piston stem (40) until the slot in the stem and slot in the piston stop (37) are in line.
 - c. Insert the selector valve piston tool shown on drawing R-42-5 (see paragraph IV.A.3.) into the slot in the piston stem (40) and piston stop (37), then remove the 1/2 inch stop nut (33), selector valve follower (34), diaphragm (35), selector valve piston (36), selector valve spring (42), spring retainer (41), and piston stop (37) from the piston stem (40).
 - d. Remove the 5/8 inch O.D. o-ring (39) from the piston stem (40).
 - e. **Refer to Figure 2B. CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, **CAREFULLY** lift the edge of the selector volume overcharge check valve vent protector seal assembly (98) and remove the following parts from the service valve body (101).
 - (1) Retaining ring (97).
 - (2) Seal assembly (98)
 - (3) Check valve spring (99)
 - (4) Check valve (100)
 - (a) Remove the rubber plug (100A) from the check valve (100).
- (NOTE: Refer to Figure 2A)
15. Remove the four 3/8 x 1 inch cap screws (14) which secure the top cover (15) to the service valve body (101), then remove the service valve top cover (15).
 16. Remove the top cover gasket (16).
 17. Remove the control reservoir charging check valve spring (17), spring seat (18), and control reservoir charging check valve (19) if the portion is so equipped.
 18. Remove the service application check valve spring (20).
 19. Remove the three rubber check valves (27, 28, 29).
 20. Remove the check valve guide (26).
 - a. Remove the 1-1/4 inch O.D. o-ring (25) from the check valve guide (26).
 - b. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, **CAREFULLY** remove the retainer (23) and check valve (24) from the check valve guide (26).

- c. Remove the spring guide (22) from the check valve guide (26).
 - (1) Remove the 13/16 inch O.D. o-ring (21) from the spring guide (22).
- 21. Remove the seal wire (1) and the two 3/8 x 1 inch hex head cap screws (2) which secure the limiting valve cover-adjusting screw assembly (3 to 9 incl.) to the service valve body (101). Discard the seal wire (1).
 - a. Remove the cover-adjusting screw assembly (3 to 9 incl.) as a unit from the service valve body (101). Disassemble the unit as follows:
 - (1) Remove the 3/32 x 1/2 inch cylindrical spring pin (3) from the adjusting screw (8).
 - (2) Remove the adjusting collar (4) and 1/4 inch spacer (5) from the adjusting screw (8).
 - (3) Remove the adjusting screw (8), spring seat (9), and the 3/8 inch O.D. o-ring (7) from the cover (6).
- 22. Remove the service spring (11) from the service valve body (101).
- 23. Remove the 1-7/8 inch O.D. ring gasket (10) from the service valve body (101).
- 24. Remove the limiting valve, valve piston (13) with shims (if used) from the service valve body (101). (Shims are not illustrated).
 - a. Remove the shims, if used. (Shims are not illustrated).
 - b. Remove the two 1-1/4 inch O.D. o-rings (12).

(NOTE: Refer to Figure 2B)

- 25. Remove the four 3/8 x 1 inch hex head cap screws (83) which secure the charging valve cover (84) to the service valve body (101). Remove the cover (84) from the body (101).
- 26. Remove the charging valve piston diaphragm (85) from the piston (88).
- 27. Remove the charging valve piston (88) and charging valve spring (87) from the service valve body (101).
 - a. Remove the four 1/2 inch O.D. o-rings (86) from the piston (88).
- 28. Remove the 7/8 inch O.D. ring gasket (89) from the service valve body (101).

- 29. Remove the two 3/8 inch hex head cap screws (80) which secure the graduated and direct release housing (cap) (81) and gasket (82) to the body (101).
 - a. Remove the graduated release cap (81) and gasket (82) from the service valve body (101).

VIII.B. CLEANING, INSPECTING, AND REPAIRING

(Refer to WABCO Parts Catalog 3220-5, Sup. 7 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered).

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

I. Metal Parts

- a. Clean the service valve body thoroughly, internally and externally, with a clean, lint-free, rag or cloth that is saturated with the cleaning solvent described in paragraph III.A.
- b. After the body has been cleaned it MUST BE blown completely dry with a low pressure (less than 30 psig) jet of clean dry air.
- c. **IMPORTANT:** THE CHOKE PLUGS LOCATED IN THE SERVICE VALVE BODY (Shown as reference 30 in Figure 2A and as references 90, 92A, 93, and 95 in Figure 2B) MUST BE SERVICED FOLLOWING THE PROCEDURE FOUND IN PARAGRAPH VI. THIS PROCEDURE MUST BE ADHERED TO. Refer to the WABCO Parts Catalog 3220-5, Sup. 7 for plug part number and location.
- d. Wash the remaining metal parts in the cleaning solvent described in paragraph III.A.
- e. The springs may be wire brushed to assist in the removal of rust and scale. **CAUTION:** WIRE BRUSHING MAY CAUSE PARTICLES OF DIRT, RUST, AND SCALE TO BE AIRBORNE.
- f. After all the metal parts are cleaned they MUST BE blown completely dry with a low pressure (less than 30 psig) jet of clean, dry air.
- g. Inspect the parts.
 - (1) Reject and replace any spring that is rusted, pitted, or has taken a permanent set.
 - (2) Reject and replace any retaining ring that is not elastic enough to hold securely.

- (3) Reject and replace any part that is cracked, cut, broken, damaged in any way, worn excessively or that is in such a condition that would result in unsatisfactory operation.

2. Rubber Parts

(IMPORTANT: IT IS RECOMMENDED THAT ALL RUBBER PARTS BE DISCARDED AND REPLACED WITH NEW WABCO QUALITY PARTS. IF SO DESIRED, SERVICEABLE RUBBER PARTS MAY BE REUSED ONLY AFTER THEY HAVE BEEN CLEANED ACCORDING TO THE FOLLOWING PROCEDURE:)

- a. Rubber parts may be dipped in the cleaning solvent described in paragraph III.A. **WARNING: RUBBER PARTS MUST NOT BE ALLOWED TO SOAK IN THE CLEANING SOLVENT.**
- b. Promptly wipe the rubber parts with a soft, clean, lint-free cloth, and then, blow them completely dry with a low pressure, (less than 30 psig) jet of clean, dry air.
- c. Serviceable gaskets and diaphragms may be brushed with a brush that has soft bristles, such as a shoe brush, to remove any remaining dirt and to polish the surfaces of the gaskets and diaphragms.
- d. Inspect the parts.
 - (1) If necessary, the face of the rubber seated check valves may be lapped on a fine grade of emery cloth (No. 200 grit) to obtain a smooth surface. **WARNING: NOT MORE THAN 1/32 INCH MAXIMUM MAY BE REMOVED FROM THE ORIGINAL THICKNESS OR THE CHECK VALVE MAY FUNCTION ERRATICALLY.**
 - (2) Reject and replace any diaphragm that has flattened beads.
 - (3) Reject and replace any part that is cracked, cut, torn, worn excessively, damaged in any way, or that is in such a condition that would result in unsatisfactory operation.

- e. The following Rubber Parts Kits are available from WABCO.

Service Portion Part No.	Kit For	Kit Part No.
559702	Total Overhaul	561121
	Moving Parts Only	561122
567141	Total Overhaul	560724
	Moving Parts Only	560725

NOTE: Consult your Westinghouse Air Brake Division Representative for Kits for Service Portions not listed.

VIII.C. LUBRICATING AND ASSEMBLING

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. **IMPORTANT:** Just prior to assembling lubricate all o-rings, o-ring grooves, and the bearing surfaces of the bushings into which the o-ring assemblies will be installed with No. 2 Silicone Grease, WABCO Specification M-7680-2 according to the following procedure:
 - a. Coat the o-ring with the grease.
 - b. Fill the groove in which the o-ring will be installed with the grease.
 - c. Lightly coat the bearing surface of the bushing into which the o-ring assembly will be installed with the grease.

WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.

(NOTE: Refer to Figure 2B)

2. Place the graduated release housing (cap) gasket (82) and the graduated release cap (81) in position on the service valve body (101) and secure them in place using two 3/8 x 1-1/8 inch cap screws (80).
3. Install four lubricated 1/2 inch O.D. o-rings (86) into the proper grooves on the charging valve piston (88). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**

4. Insert the charging valve spring (87) into the service valve body (101).
 5. Insert the charging valve piston (88) with o-rings (86) into the service valve body (101).
 6. Install a 7/8 inch O.D. ring gasket (89) into the proper groove on the charging valve cover mounting face of the service valve body (101).
 7. Place the service valve diaphragm (85) on the charging valve piston (88) with the bead of the diaphragm toward the groove in the service valve body (101).
 - a. Press the charging valve piston (88) into the service valve body (101), then using the narrow end of the valve diaphragm holding tool, as shown on drawing R-42-3, (See paragraph IV.A.2), push the diaphragm down between the piston and the body until the bead of the diaphragm is in the bead groove in the body. With the piston and diaphragm held in this position, place the wide part of the valve holding tool on the diaphragm and hold it in position. Place the charging valve cover (84) on the body and hold it in place while the tool is removed, then using the four 3/8 x 1 inch hex head cap screws (83) secure the cover (84) to the service valve body (101).
- (NOTE: Refer to Figure 2A)
8. Install two lubricated 1-1/4 inch O.D. o-rings (12) into the grooves on the service limiting valve piston (13). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 9. Insert the service limiting valve piston with o-rings (13, 12) into the service valve body (101).
 10. If shims are used, they should now be inserted into the limiting valve piston (13). Shims are not illustrated.
 11. Install the 1-7/8 inch O.D. ring gasket (10) into the proper groove in the service valve body (101).
 12. Insert the spring (11) into the service limiting valve piston (13).
 13. Assemble the limiting valve cover-adjusting screw assembly (3 to 9 incl.) as follows:
 - a. Install a lubricated 3/8 inch O.D. o-ring (7) in its groove in the limiting valve cover (6). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth.
 - b. Install the adjusting spring seat (9) and adjusting screw (8) in the cover (6) so that the drilled end of the adjusting screw extends out of the top of the cover (6).
 - c. Place the 1/4 inch spacer (5) and the adjusting collar (4) on the adjusting screw (8).
 - d. Install the 3/32 x 1/2 inch cylindrical spring pin (3) through the drilled hole in the adjusting screw (8).
 14. Place the cover-adjusting screw assembly (3 to 9 incl.) in position on the service valve body (101) and secure it in place with the two 3/8 x 1 inch cap screws (2).
 - a. Install a NEW wire (1) in place, BUT DO NOT SEAL. SEALING IS TO BE DONE AFTER THE VALVE PORTION HAS BEEN TESTED. See Paragraph VIII.D.1.
 15. Assemble the check valve guide assembly (23 to 26 incl.) as follows:
 - a. Insert the check valve (24) into the check valve guide (26).
 - b. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, lock the check valve (24) in place by installing the retaining ring (23) in the check valve guide (26).
 - c. Install a lubricated 1-1/4 inch O.D. o-ring (25) into the groove on the check valve guide (26). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 16. Install the check valve guide (26) with o-ring (25) into the service valve body (101).
 17. Install a lubricated 13/16 inch O.D. o-ring (21) into the groove on the spring guide (22). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 18. Insert the spring guide (22) with o-ring (21) into the check valve guide (26).
 19. Install the three rubber check valves (27, 28, 29) into the service valve body (101).
 20. Install the control reservoir charging check valve (19), spring seat (18) and control reservoir charging check valve spring (17) in the service valve body (101) if the portion is so equipped.

21. Place the cover gasket (16) in position on the body (101).
 22. Insert the service application check valve spring (20) into the check valve guide spring guide (22).
 23. Place the service valve top cover (15) on the service valve body (101) and secure it in place with the four 3/8 x 1 inch cap screws (14).
 24. Turn the portion over so that the selector valve cover mounting face is at the top. Assemble the selector valve piston assembly (33 to 42 incl.) as follows:
 - a. Install a lubricated 5/8 inch O.D. o-ring (39) into its groove on the piston stem (40). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 - b. Assemble the selector valve stop (37) spring retainer (41), spring (42), selector valve piston (36), diaphragm (35), diaphragm follower (34) and stop nut (33) on the piston stem (40).
 - c. Insert the control valve selector valve piston assembly tool, shown on drawing R-42-5, (see paragraph IV.A.3.) into the slot in the piston stop (37) and piston stem (40), then tighten the stop nut securely (33).
 - d. Install six lubricated 9/16 inch O.D. o-rings (38) into the proper grooves on the piston stem (40). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 25. Insert the selector valve assembly (33 to 42 incl.) into the body (101).
 26. Insert the 15/16 inch O.D. ring gasket (43) into the groove in the body (101).
 27. **IMPORTANT:** Make certain the bead of the diaphragm (35) fits in the groove of the body (101), then place the selector valve cover (32) in position and secure it to the body (101) using the four 3/8 x 1-3/4 inch hex head cap screws (31).
- (NOTE: Refer to Figure 2B)
28. Assemble the selector volume overcharge check valve - seal - retainer assembly (97 to 101A incl.) into the selector valve body (101) as follows:
 - a. Press the rubber plug (100A) in place in the check valve (100), then insert the check valve with plug (100, 100A) and spring (99) into the service valve body (101).
 - b. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, place the retaining ring (97) between the wing washer and seal of the seal assembly (98). Then install the seal assembly (98) with retaining ring (97) into the service valve body (101). Make certain that the retaining ring (97) is in its proper position in the service valve body (101).
 29. Turn the service portion over so that the bottom cover mounting face is at the top. Install a lubricated 2-3/8 inch O.D. o-ring (77) into its groove in the service valve body (101).
 30. Assemble the emergency limiting valve bushing assembly (70 to 76) and install it in the service valve body (101) as follows:
 - a. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, insert the release check valve (73), check valve spring (72), and spring (cage) retainer (71) into the emergency limiting valve bushing (76). **CAREFULLY** lock the parts in place with the retainer (70). **PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.**
 - b. Install a lubricated 1-1/4 inch O.D. o-ring (74) and a lubricated 1-9/16 inch O.D. o-ring (75) into the proper grooves on the limiting valve bushing (76). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 - c. Insert the limiting valve bushing assembly (70 to 76 incl.) into the service valve body (101).
 31. Install a lubricated 1-1/16 inch O.D. o-ring (63) and a lubricated 1-3/4 inch O.D. o-ring (64) or 1-5/16 inch O.D. o-ring (68) into the proper grooves on the emergency limiting valve piston (69).
(NOTE: Refer to WABCO Parts Catalog 3220-5, Sup. 7 for o-ring identification). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth.
WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
 32. Insert the emergency limiting valve (69) into the emergency limiting valve bushing (76).
 33. **CAUTION:** Exercising care so that no parts "fly-out" and cause an injury, insert the small diaphragm spring (62) and spring cage (61) into the body (101). **CAREFULLY** install the retaining ring (60) to lock the spring and cage (62, 61) in place.

34. Install a 9/16 inch O.D. ring gasket (78) into the groove in the small cover mounting face of the service valve body (101).
35. Assemble the small piston assembly (55 to 59 incl.) as follows:
 - a. Install one of the lubricated 3/4 inch O.D. o-rings (56) into the groove nearest the head of the small piston (57). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth.
WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
 - b. Place the small diaphragm (58) and diaphragm follower (59) on the piston (57) with the bead of the diaphragm in the direction of the end of the piston (57).
 - (1) With the six 1/4 x 1/2 inch hex. socket cap screws (55) secure the diaphragm (58) and the diaphragm follower (59) to the piston (57).
 - (2) Install two lubricated 3/4 inch O.D. o-rings (56) into the grooves on the piston (57). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth.
WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.
36. Install the small piston assembly (55 to 59 incl.) into the service valve body (101).
37. Install a lubricated 9/16 inch O.D. o-ring (53) into the groove in the small diaphragm cover (54). Lubrication procedure is found in paragraph VIII.C.1. Remove the excess grease by wiping with a soft, clean, lint-free cloth. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
38. Position the small piston cover (54) in place in the service valve body (101).
 - a. Remove the two screws which were inserted into the small cover during the disassembling procedure. See paragraph VIII.A.6.a.
 - b. By means of the eight 1/4 x 1/2 inch hex. socket cap screws (47), secure the small cover (54) to the service valve body (101).
39. Insert the pusher pin (52) into the small cover (54).
40. Insert the 15/16 inch O.D. ring gasket (79) into the groove in the bottom cover mounting face of the service valve body (101).
41. Assemble the large piston assembly (47 to 50 incl.) as follows:
 - a. Place the large diaphragm (49) and diaphragm follower (48) on the large piston (50) with the bead of the diaphragm towards the diaphragm follower (48).
 - b. Using the eight 1/4 x 1/2 inch hex. socket screws (47) secure the large diaphragm (49) and diaphragm follower (48) to the large piston (50).
42. Insert the large piston assembly (47, 48, 49, 50) into the service valve body (101) with the bead of the diaphragm towards the bottom cover (46).
43. Place the bottom cover (46) on the service valve body (101), then with the five hex. head cap screws (44) secure the bottom cover (46) to the service valve body (101).
44. Install the spring shims (65) if used, spring (67) if used, and emergency limiting valve piston spring (66) through the bottom cover (46) and into the emergency limiting valve piston (69) which was previously installed in the service valve body (101).
 - a. Using the cap nut (45), secure the springs (66, 67) and shims (65) in place.

VIII.D. TESTING, AND ADDITIONAL INFORMATION

1. After the Service Portion has been assembled BUT BEFORE it is returned to service it MUST PASS a series of tests following the procedure of the current issue of the WABCO Test Specification T-2424-0.
2. **IMPORTANT:** When a new or repaired and tested Service Portion is mounted on the Pipe Bracket Portion a NEW mounting gasket MUST BE used. (See Figure 3 Reference 2).
3. **IMPORTANT:** WHEN THE SERVICE PORTION IS REMOVED FROM THE 26-C CONTROL VALVE FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION AND CONTROL VALVE FUNCTION PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
4. Consult your Westinghouse Air Brake Division Representative if additional information is required.

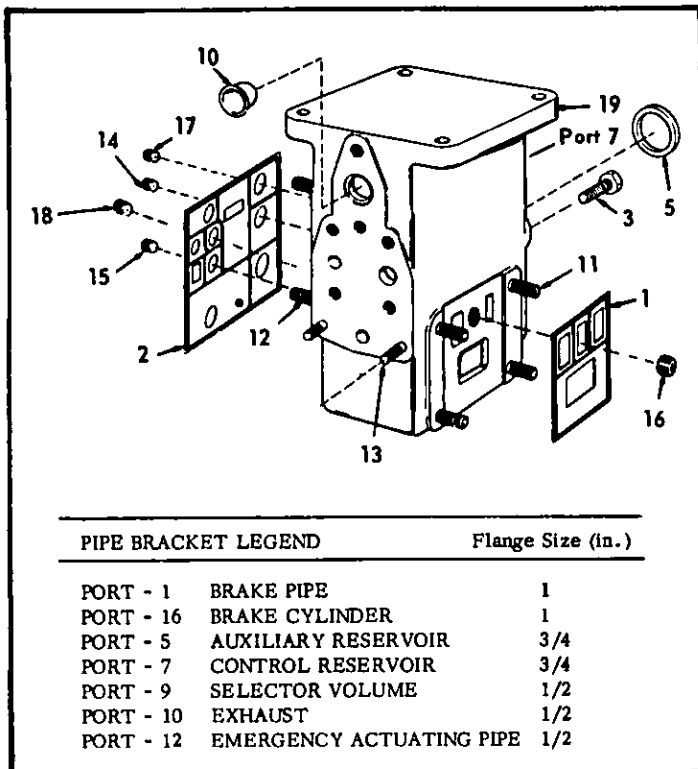


FIGURE 3 - EXPLODED VIEW

IX. PIPE BRACKET PORTION - MAINTENANCE PROCEDURES AND TECHNIQUES

(Refer to Figure 3)

IX.A. CLEANING, INSPECTING, AND REPAIRING

(NOTE: Refer to WABCO Parts Catalog 3220-5, Sup. 7 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered).

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. The exterior surfaces of the Pipe Bracket Portion may be cleaned by wiping with a soft, clean, lint-free cloth or blown clean with a low pressure (less than 30 psig) jet of clean, dry air.
2. The strainers (10) located in ports 5 and 7 **MUST BE** replaced with **NEW WABCO Quality Parts** if they are damaged in any way or if they cannot be easily cleaned.
3. All mounting gaskets **MUST BE** replaced with **NEW WABCO Quality Parts** when any portion or accessory device is removed from the pipe bracket for any reason.
4. The choke plugs (14, 15, 16, 17, 18) located in the pipe bracket **MUST BE** serviced following the procedure of paragraph VI. **IMPORTANT:** Servicing **MUST BE** done when any portion is removed from the pipe bracket for any reason. **THE PROCEDURES OF PARAGRAPH VI. MUST BE ADHERED TO.**

IX.B. TESTING AND ADDITIONAL INFORMATION

1. **IMPORTANT:** WHENEVER ANY PORTION OR ACCESSORY DEVICE IS REMOVED FROM THE 26-C CONTROL VALVE FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, OR ACCESSORY DEVICE, A **STANDING VEHICLE AIR BRAKE TEST** MUST BE MADE TO INSURE THAT THE 26-C CONTROL VALVE, THE PORTIONS, AND ACCESSORY DEVICES FUNCTION PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
2. The maintenance information for the accessory devices may be found in the following publications:
 - a. Reservoir Release Valve - 4220-5, S.7 RRV.
 - b. Cut-Out Cock and Strainer - 4216-2, COS.
3. Consult your Westinghouse Air Brake Division Representative if additional information is required.

WESTINGHOUSE AIR BRAKE DIVISION
WESTINGHOUSE AIR BRAKE COMPANY
WILMERDING, PA.

REPAIR SPECIFICATION

R-42-C, Sup. 6

Issue No. 5

October 16, 1974

SERVICE PORTION OF THE 26-C AND 26-F CONTROL VALVE

1. PARTS CATALOG AND OTHER INFORMATION

1.1 Refer to parts catalog G-h-3220-5 Sups. 3 and 7, for names of parts and their location in the service portion.

1.2 Required tools, solvents and lubricants.

1.2.1 Tool for assembling charging valve diaphragm and piston into service portion body is shown on Dwg. R-42-3.

1.2.2 Tool for removing emergency limiting valve bushing from service portion is shown on Dwg. R-42-4.

1.2.3 Tool for assembling and disassembling new style selector valve is shown on Dwg. R-42-5.

1.2.4 1/4" x 2" x 2" Steel Block (Used to hold spring seat and selector valve piston while disassembling and assembling the old style selector valve).

1.2.5 #1 Truarc Pliers

1.2.6 #3 Truarc Pliers

1.3 The solvent used for cleaning the parts removed from the valve must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.

1.4 No. 2 SILICONE GREASE (Commodity No. 14696) is required for the lubrication of all "O" rings as specified herein.

1.5 The threads of choke plugs and all other removable plugs as well as other threaded parts which may later be difficult to remove, must be coated lightly with a compound consisting of one part graphite, AAR Spec. M-913, and two parts of oil (SAE-20) by weight.

1.6 Removal, cleaning and replacement of choke plugs must be done in accordance with items 3.6 through 3.6.5 inclusive.

2. DISASSEMBLE

2.1 Remove the vent protector assembly from the service valve body as follows:

2.1.1 If service valve body is "new style type" (where the vent protector assembly is basically one piece) refer to item 2.1.3 for removal.

2.1.2 If service valve body is "old style type" (where the vent protector assembly consists of pipe nipple, elbow and vent protector body refer to item 2.1.4 for removal.

2.1.3 Use a suitable wrench to turn the protector body counter-clockwise until it is removed.

2.1.4 Use a suitable wrench to turn the pipe nipple, elbow and vent protector assembly counter-clockwise until they are removed.

2.2 Remove the cap nut and wasp excluder from the bottom cover by turning the cap nut counter-clockwise with a suitable wrench.

2.3 Remove the following from the service valve bottom cover face of the body.

2.3.1 Five hex head cap screws which secure the bottom cover to the body.

2.3.2 Service valve bottom cover.

2.3.3 15/16" O.D. ring gasket.

2.3.4 Large piston and diaphragm assembly.

2.3.4.1 Remove the eight hex. socket head cap screws which secure the diaphragm follower and the diaphragm to the large piston.

2.3.5 Eight hex socket head cap screws which secure the small diaphragm cover to the service valve body.

2.3.6 Remove the small diaphragm cover as follows:

2.3.6.1 Insert one of the 1/4" x 1/2" hex socket head cap screws (which was removed in item 2.3.5) into each of the two tapped holes in the exposed portion of the cover and then remove the cover with the aid of these two screws.

2.3.6.2 Disassemble the small diaphragm cover as follows:

2.3.6.2.1 Remove the pusher pin from the center of the small cover.

2.3.6.2.2 Remove the 9/16" O.D. "O" ring from the bore of the pusher pin hole in the cover.

2.3.7 Small piston and diaphragm assembly.

2.3.7.1 Disassemble the small piston and diaphragm assembly as follows:

2.3.7.1.1 Remove the six hex socket head cap screws which secure the small piston and the small diaphragm to the diaphragm follower.

2.3.7.1.2 Remove the diaphragm follower, small diaphragm and the three 3/4" O.D. "O" ring from the small piston.

2.3.8 9/16" O.D. ring gasket.

2.3.9 Use a screw driver or some other suitable object to compress and remove the retaining ring which secures the spring cage and the small diaphragm spring in the service valve body.

2.3.10 Spring cage

2.3.11 Small diaphragm spring.

2.3.12 Spring

2.3.13 Emergency limiting valve piston spring.

2.3.14 Shims (if present).

2.3.15 Emergency limiting valve piston complete.

2.3.15.1 Remove the 1-1/16" O.D. "O" ring and the 1-3/4" O.D. "O" ring from the emergency limiting valve.

2.3.16 Use the special tool shown on drawing R-42-4 (item 1.2.2) to remove emergency limiting valve bush assembly.

2.3.16.1 Disassemble the emergency limiting valve bush as follows:

2.3.16.1.1 Remove the 1-1/4" O.D. and the 1-9/16" O.D. "O" ring from the emergency limiting valve bushing.

2.3.16.1.2 Use a screw driver or some other suitable object to compress and remove the retainer which secures the spring cage, the check valve spring, and the release check valve in the emergency limiting valve bushing.

2.3.16.1.3 Remove the spring cage, the check valve spring and the check valve from the emergency limiting valve bush.

2.3.17 2-3/8" O.D. "O" ring.

2.4 Remove the following from the selector valve cover face of the service valve body.

2.4.1 Four 3/8" hex head cap screws which secure the selector valve cover to the body.

2.4.2 Selector valve cover.

2.4.3 15/16" O.D. ring gasket.

2.4.4 If service portion body is "new style type" proceed as follows (items 2.4.6 through 2.4.6.5).

2.4.5 If service portion body is "old style type" proceed as follows (items 2.4.7 through 2.4.9.1).

2.4.6 Remove the selector valve piston assembly from the service valve body.

2.4.6.1 Remove the six 9/16" O.D. "O" Rings from the piston stem.

2.4.6.2 Rotate the spring retainer on the selector valve piston stem until the slot in the piston stem and the slot in the piston stop are in alignment.

2.4.6.3 Insert the special tool shown on drawing R-42-5 (item 1.2.3) into the slot in the stem and stop, and then remove the following from the selector valve piston stem:

2.4.6.3.1 1/2" stop nut.

2.4.6.3.2 Selector valve follower.

2.4.6.3.3 Selector valve diaphragm.

2.4.6.3.4 Selector valve piston.

2.4.6.3.5 Service selector valve spring.

2.4.6.3.6 Retainer.

2.4.6.3.7 Selector valve stop.

2.4.6.4 Remove the 5/8" O.D. "O" ring from the selector valve piston stem.

2.4.6.5 Lift the edge of the selector volume overcharge check valve vent protector seal, then remove the square retaining ring (internal type), seal assembly, check valve spring, and check valve.

2.4.7 Remove the selector valve piston assembly from the service valve body.

2.4.7.1 Remove the six 9/16" O.D. "O" Rings from the (selector valve) piston stem.

2.4.7.2 Rotate the spring retainer on the selector valve piston stem until the slot in the spring retainer and the slot in the piston stem are in alignment.

2.4.7.3 Insert a steel block 1/4" x 2" x 2" into the slot in the piston stem and the spring retainer; and then remove the following from the selector valve piston stem.

2.4.7.3.1 1/2" hexagon stop nut.

2.4.7.3.2 Selector valve follower.

2.4.7.3.3 Selector valve diaphragm.

2.4.7.3.4 Selector valve piston.

2.4.7.3.5 Service selector valve spring.

2.4.7.3.6 Retainer.

2.4.7.3.7 Selector valve stop.

2.4.7.4 NOTE: A selector valve stop replaces the emergency spring and spring seat if the selector volume overcharge check valve is used.

2.4.7.5 Remove the 5/8" O.D. "O" ring from the selector valve piston stem.

2.4.7.6 Remove the six (6) 1/4" hex nuts which secure the selector valve follower and the selector valve diaphragm to the selector valve piston, and then remove the diaphragm follower and the diaphragm from the piston.

2.4.8 Remove the retaining ring, spring seat, and spring from the control valve body.

2.4.9 Remove the selector volume overcharge check valve assembly and elbow, if used.

2.4.9.1 Lift the edge of the vent protector seal, then remove the retaining ring, seal assembly, check valve spring, and check valve.

2.5 Remove the following from the top service valve cover face of the service valve body.

2.5.1 Four 3/8" hex head cap screws which secure the top service valve cover to the service valve body.

2.5.2 Top service valve cover.

2.5.3 Cover gasket.

2.5.4 Check valve spring or springs (some service portions have two springs).

2.5.5 Three rubber check valves (some service portions have four check valves).

2.5.6 Spring seat (if so equipped).

2.5.7 Check valve guide assembly complete.

2.5.7.1 Remove the 1-1/4" O.D. "O" ring from the check valve guide.

2.5.7.2 Use a screw driver or some other suitable object to compress and remove the retainer which secures the check valve in the check valve guide.

2.5.7.3 Remove the check valve from the check valve guide.

2.5.7.4 Remove the spring guide from the check valve guide.

2.5.7.4.1 Remove the 13/16" O.D. "O" ring from the spring guide.

2.6 Remove the following from the limiting valve face of the service valve body.

2.6.1 Two 3/8" hex head cap screws which secure the limiting valve cover to the service valve body.

2.6.2 Limiting valve cover assembly.

2.6.2.1 Disassemble the limiting valve cover assembly as follows:

2.6.2.1.1 Cut and remove the seal wire from the hexagon adjusting collar and adjusting screw.

2.6.2.1.2 Use a suitable drift punch to remove the 3/32" diameter cylindrical spring pin from the hexagon adjusting collar and adjusting screw.

2.6.2.1.3 Remove the hexagon adjusting collar from the adjusting screw.

2.6.2.1.4 Remove the following items from the limiting valve cover.

- a) 1/4" spacer
- b) 3/8" O.D. "O" ring
- c) adjusting screw
- d) adjusting spring seat

2.6.3 Service spring

2.6.4 Limiting valve service piston with "O" rings (and shims if used).

2.6.4.1 Remove the two 1-1/4" O.D. "O" ring from the limiting valve service piston.

2.6.5 1-7/8" O.D. ring gasket.

2.7 Remove the following from the charging valve face of the service valve body.

2.7.1 Four 3/8" hex head cap screws which secure the charging valve cover to the service valve body.

2.7.2 Charging valve cover.

2.7.3 Charging valve diaphragm.

2.7.4 Charging valve piston.

2.7.4.1 Remove the four 1/2" O.D. "O" rings from the charging valve piston stem.

2.7.5 Charging valve spring.

2.7.6 7/8" O.D. ring gasket.

2.8 Remove the following from the graduated release cap face of the service valve body.

2.8.1 Two 3/8" hex head cap screws which secure the graduated release cap to the service valve body.

2.8.3 Cap gasket

3. CLEAN, INSPECT AND REPAIR

3.1 Metal parts

3.1.1 Wash all metal parts except the service valve body and the various covers in the prescribed cleaning solution (item 1.3).

3.1.2 Parts thus cleaned must be dried with a low pressure jet of clean air.

3.1.3 Springs may be wire brushed.

3.1.4 The service valve body and the various covers must be thoroughly cleaned internally and externally with a cloth saturated in the prescribed cleaning solution.

3.1.5 Parts cleaned as in item 3.1.4 must be dried with a low pressure jet of clean air.

3.2 Rubber parts

3.2.1 NOTE: Rubber parts must not be permitted to soak in the cleaning solution.

3.2.2 Rubber parts such as gaskets, diaphragms, check valves and "O" rings may be dipped in the prescribed cleaning solution to remove grease and/or dirt.

3.2.3 Cleaned rubber parts must be immediately wiped and dried with a low pressure jet of clean air when removed from the cleaning solution.

3.2.4 Reject and replace all gaskets and diaphragms which have broken or flattened beads or any that reveal cracks or cuts.

3.2.4.1 Serviceable gaskets and diaphragms must be brushed with a soft bristle brush (such as a shoe brush) to remove any remaining dirt and to polish.

3.2.5 Reject and replace all "O" rings which are cut or otherwise damaged.

3.3 Replace any retaining ring which is not elastic enough to clamp securely.

3.4 Inspect all springs for rust pits, distortion or permanent set. Replace where necessary.

3.5 Replace all parts that are cracked, broken, worn excessively, damaged, or in such a condition as would result in unsatisfactory operation.

3.6 The size and cleanliness of chokes are important. To avoid misplacement of chokes during assembling, only one choke plug at a time should be removed for servicing. The following procedure should be adhered to for servicing choke plugs:

3.6.1 Remove the choke plug and place it in the prescribed cleaning solution. Metallic tools must not be used for cleaning chokes as their size and shape must not be changed.

3.6.2 While the choke plug is soaking in the cleaning solution, the passage from which it was removed must be checked for cleanliness and blown out if necessary.

3.6.3 Remove the choke plug from the solution and blow it off with a low pressure jet of clean compressed air.

3.6.4 Inspect the choke plug to insure that it is clean and not restricted.

3.6.5 Coat the threads of the choke plug lightly with lubricating compound (item 1.5) and assemble into the port from which it was removed.

3.7 If necessary, the face of the rubber sealed check valves may be lapped on #200 grade emery cloth to obtain a smooth surface. Guides must be free of burrs.

4. LUBRICATE AND ASSEMBLE

4.1 The installation of "O" rings requires that the lubricant specified in item 1.4 be used according to the following procedure: Fill the "O" ring(s) grooves with the grease. Coat the "O" ring(s) with the grease. Install the "O" ring(s) into their grooves. Wipe off the excess grease with a lint free cloth. Coat the bearing surfaces of the bushings with grease.

4.2 Install the graduated release cap on the proper face of the service valve body as follows:

4.2.1 Place the cap gasket and the graduated release cap in position on the proper face of the service valve body such that the two mounting holes in each are in alignment with the tapped holes in the proper face on the service valve body.

4.2.2 Insert a 3/8 x 1-3/8 inch hex head cap screw through each of the two mounting holes in the cap gasket and the graduated release cap and into the tapped holes in the service valve body.

4.2.3 Equally tighten the two cap screws inserted in item 4.2.2 to secure the graduated release cap in place.

4.3 Install a lubricated 1/2" O.D. "O" ring into each of the four grooves on the charging valve piston.

4.4 Install the following into the charging valve face of the service valve body.

4.4.1 Charging valve spring

4.4.2 Charging valve piston with "O" rings.

4.4.3 7/8" O.D. ring gasket.

4.4.4 Place the charging valve diaphragm (with the bead toward the groove in the service valve body) over the charging valve piston.

4.4.5 Press the charging valve piston into the body, then using the narrow end of the tool (item 1.2.1 shown on Dwg. - R-42-3) push the diaphragm down between the piston and the body until the bead of the diaphragm is in the bead groove in the body. With the piston and diaphragm held in this position, place the wide part of the tool on the diaphragm and hold in position. Place the charging valve cover on the body and hold it in place till the tool is removed.

4.4.6 With the charging valve cover held in place as in item 4.4.5, insert a 3/8 x 1 inch hex head cap screw through each of the four mounting holes in the charging valve cover and into the tapped holes in the service valve body.

4.4.7 Equally tighten the four cap screws inserted in item 4.4.6 to secure the charging valve cover in place.

4.5 Install a lubricated 1-1/16" O.D. "O" ring and a lubricated 1-3/4" O.D. "O" ring into their proper grooves on the outer diameter of the (Emer.) limiting valve piston.

4.6 Insert the (Emer.) limiting valve piston (small diameter end first) into the larger bore end of the emergency limiting valve bush.

4.7 Insert the following into the smaller bore end of the emergency limiting valve bush:

4.7.1 (Release) check valve.

4.7.2 Check valve spring.

4.7.3 Spring cage(wing end first).

4.7.4 Depress the spring cage and then compress and insert an internal type retainer into the proper groove in the smaller diameter bore of the emergency limiting valve bush.

4.8 Install a lubricated 1-1/4" O.D. "O" ring and a lubricated 1-9/16" O.D. "O" ring into their proper grooves on the outer diameters of the emergency limiting valve bushing.

4.9 Insert a lubricated 2-3/8" in O.D. "O" ring into the proper groove in the (Emer.) limiting valve cavity on the service valve cavity on the service valve bottom cover face of the service valve body.

4.10 Carefully insert the (Emer.) limiting valve piston and emergency limiting valve bushing assembly (small diameter end first) into the proper cavity in the service valve body.

4.11 Insert a lubricated 9/16" O.D. "O" ring into the proper groove in the bore at the center of the small diaphragm cover.

4.12 Insert a pusher pin into the bore at the center of the small diaphragm cover.

4.13 Insert a small diaphragm spring and a spring cage (flanged end first) into the larger cavity in the service valve bottom cover face of the service valve body.

4.14 Place a 2-5/8 bore x 1/16 inch internal type retaining ring over the smaller diameter of the spring cage.

4.15 Depress the spring cage and then compress the retaining ring allowing it to become seated in the proper groove in the service valve body and securing the small diaphragm spring and spring cage in place.

4.16 Install a lubricated 3/4" O.D. "O" ring into each of the three grooves on the smaller diameter of the small piston stem.

4.17 Place the small diaphragm (small diameter end first with the markings away from the piston) and the diaphragm follower (side with the tapped holes first) over the small diameter end of the small piston stem.

4.18 Insert a 1/4 x 1/2 inch hex socket head cap screw through each of the six holes in the small piston and into the tapped holes in the diaphragm follower.

4.19 Equally tighten the six hex socket head cap screws which were inserted in item 4.18. to secure the small piston assembly.

4.20 Insert the small piston assembly (smaller diameter end first) through the spring cage and spring in the larger cavity in the service valve bottom cover face of the service valve body.

4.21 Install a 9/16 inch O.D. ring gasket into the proper recess in the larger cavity in the service valve bottom cover face of the service valve body.

4.22 Make certain that the bead of the small diaphragm is properly positioned in the groove in the service valve body.

4.23 Place the assembled small diaphragm cover (recessed side first) over the small diaphragm assembly in the service valve body such that the eight mounting holes are in alignment with those in the service valve body.

4.24 Remove the two 1/4" x 1/2" hex socket head cap screws which were inserted during item 2.3.6.1 of disassembly.

4.25 Insert a 1/4" x 1/2 inch hex socket head cap screw through each of the 8 holes in the small diaphragm cover and into the tapped holes in the service valve body.

4.26 Equally tighten the eight socket head cap screws which were inserted in item 4.25 to secure the small diaphragm cover in place.

4.27 Pre-assemble the larger piston and diaphragm as follows:

4.27.1 Position the large piston with the 8 tapped holes facing upward.

4.27.2 Place the large diaphragm (small diameter end first with markings facing upward) upon the large piston such that the bead on the diaphragm is properly positioned in the groove on the piston.

4.27.3 Place the diaphragm follower (flat side down) on the large diaphragm such that the eight mounting holes are in alignment with those in the piston.

4.27.4 Insert a 1/4 x 1/2 inch hex socket head cap screw through each of the 8 holes in the diaphragm follower and into the tapped holes in the large piston.

4.27.5 Equally tighten the eight socket head cap screws which were inserted in item 4.27.4 to secure the large diaphragm assembly.

4.28 Carefully place the large diaphragm assembly (large piston wearing tip end first) over the small diaphragm cover in the service valve body.

4.29 Insert a 15/16" O.D. ring gasket into the proper groove on the service valve bottom cover face of the service valve body.

4.30 Install the following into the exposed opening of the emergency limiting valve piston:

4.30.1 Shims (if used).

4.30.2 Emergency limiting valve piston spring.

4.30.3 Spring

4.31 Carefully position the service valve bottom cover over the assembled parts and onto the service valve body such that the five mounting holes are in alignment with those in the service valve body.

4.32 Insert a 1/2" x 1-3/4" long hexagon head cap screw through each of the 5 holes in the service valve bottom cover and into the tapped holes in the service valve body.

4.33 Equally tighten the five hex head cap screws which were inserted in item 4.32 to secure the service valve bottom cover in place.

4.34 Insert and tighten the cap nut and wasp excluder into the tapped opening in the service valve bottom cover.

4.35 Install the vent protector assembly in the tapped opening on the side of the service valve body (opposite the selector valve cover face) as follows:

4.35.1 If service valve body is "new style type", refer to item 4.35.3 for vent protector installation.

4.35.2 If service valve body is "old style type", refer to item 4.35 for vent protector installation.

4.35.3 Insert the vent protector body and tighten with a suitable wrench.

4.35.4 Insert the proper pipe nipple, elbow and vent protector assembly and tighten with a suitable wrench.

4.36 Install the selector volume over charge check valve into the proper cavity at the bottom of the bottom cover face of the service body in the following manner:

4.36.1 Insert the check valve (rubber plug end first).

4.36.2 Insert the check valve spring.

4.36.3 Insert the vent protector seal.

4.36.4 Place the retaining ring on the seal assembly.

4.36.5 Compress the retaining ring and place it into the proper groove in the service body to secure the selector volume overcharge check valve assembly in place.

4.37 Install the limiting valve into the proper cavity on the limiting valve cover face of the service valve body in the following manner:

4.37.1 Install a lubricated 1-1/4" O.D. "O" ring into each of the two grooves on the outer diameter of the limiting valve service portion.

4.37.2 Pre-assemble the limiting valve cover as follows:

4.37.2.1 Insert the adjusting screw (end with 1/8" diameter hole first) into the cylindrical end of the adjusting spring seat and then run it over all of the threaded portion.

4.37.2.2 Insert the adjusting screw (end with 1/8" diameter hole first) into the hole in the machined face of the limiting valve cover such that the square end of the adjusting spring seat is properly seated in the square opening in the cover.

4.37.2.3 Assemble the following over the exposed end of the adjusting screw (the end with 1/8" diameter hole).

4.37.2.3.1 Lubricated 3/8" O.D. "O" ring.

4.37.2.3.2 1/4" spacer.

4.37.2.3.3 Hexagon adjusting collar.

4.37.2.4 Position the hexagon adjusting collar on the adjusting screw such that the lateral holes in each are in alignment and then insert the 3/32 x 1/2 inch cylinder pin in place to hold the adjusting screw.

4.37.3 Install the 1-7/8" O.D. ring gasket into the proper groove on the limiting valve cover face of the service valve body.

4.37.4 Install the following into the limiting valve cavity of the service valve body:

4.37.4.1 Limiting valve service piston and "O" rings (closed end of piston first).

4.37.4.2 Service spring.

4.37.5 Place the assembled limiting valve cover on the proper face of the service valve body such that its mounting holes are in alignment with the two tapped holes in the body and the wasp excluder is facing toward the top service valve cover.

4.37.6 Insert a hex head cap screw through each of the two holes in the limiting valve cover and into the tapped holes in the service valve body.

4.37.7 Equally tighten the two cap screws which were inserted in item 4.37.5 to secure the limiting valve assembly in the service body.

4.38 Install the following into their proper cavities on the top service valve cover face of the service valve:

4.38.1 Backflow check valve.

4.38.2 Control reservoir dissipation check valve.

4.38.3 Auxillary reservoir charging check valve.

4.38.4 Control reservoir charging check valve(if required).

4.38.5 Spring seat (pointed end first) and control reservoir charging check valve spring (if required).

4.38.6 Preassemble the service valve check valve assembly as follows:

4.38.6.1 Insert the service valve check valve into the larger diameter bore of the check valve guide.

4.38.6.2 Compress and insert the 1-1/32 bore x 1/16 inch retainer over the service valve check valve and into the proper groove in the bore of the check valve guide.

4.38.6.3 Install a lubricated 13/16 inch O.D. "O" ring in the groove on the outer diameter of the spring guide.

4.38.6.4 Insert the spring guide (solid end first) into the open end of the check valve guide.

4.38.6.5 Install a lubricated 1-1/4 inch O.D. "O" ring into the groove on the outer diameter of the check valve guide.

4.38.7 Carefully install the assembled service valve check valve (check valve end first) into the center cavity on the top service valve cover face of the service valve body.

4.38.8 Insert the service application check valve spring into the exposed open end of the spring guide.

4.38.9 Place the cover gasket (side with the positioning stud down) on the top service valve cover face of the service valve body.

4.38.10 Place the top service valve cover over the assembled check valves, springs, etc., - on the service valve body such that the four mounting holes are in alignment with the tapped holes in the service valve body.

4.38.11 Insert a 3/8 x 1 inch hex head cap screw through each of the four holes in the top service valve cover and into the tapped holes in the service valve body.

4.38.12 Equally tighten the four hex head cap screws which were inserted in item 4.38.11 to secure the top service valve cover in place.

4.39 Install the following into the large cavity on the selector valve cover face of the service valve body.

4.39.1 If service valve body is "new style type", follow the instructions of items 4.39.3 through 4.39.3.11 inclusive.

4.39.2 If service valve body is "old style type", follow the instructions of items 4.39.4 through 4.39.11 inclusive.

4.39.3 Carefully assemble the following items over the threaded end of the service valve piston stem:

4.39.3.1 5/8" O.D. "O" ring into its proper groove.

4.39.3.2 Selector valve stop (larger diameter end first and with the slot on the outer diameter aligned with the slot in the selector valve piston stem).

4.39.3.3 Spring retainer (larger diameter end first).

4.39.3.4 Assemble the selector valve spring over the spring retainer such that the spring comes to rest against the outer flange of the spring retainer.

4.39.3.5 Selector valve piston (with the 2" diameter recessed area facing downward).

4.39.3.6 Place the selector valve diaphragm (small diameter bead end first) with the Pc. number on the large diameter bead end facing upward.

4.39.3.7 Place the selector valve follower (larger diameter face downward) upon the selector valve diaphragm making certain that the bead is properly seated in the groove on the selector valve piston.

4.39.3.8 Assemble the 1/2 inch stop nut onto the exposed threaded end of the selector valve piston stem.

4.39.3.9 Insert the tool (item 1.2.3) shown on Dwg. R-42-5 into the slot in the piston stop and piston stem, and then tighten the stop nut securely.

4.39.3.10 Insert a lubricated 9/16" O.D. "O" ring into each of the six grooves on the selector valve piston stem.

4.39.3.11 Carefully insert the selector valve assembly ("O" ring end first) into the proper cavity in the service valve body.

4.39.4 Insert the selector valve spring and the spring retainer (flanged end first) into the proper cavity in the service valve body.

4.39.5 Depress and insert the retaining ring over the spring retainer and into the proper groove in the service valve body.

4.39.6 Assemble the diaphragm and diaphragm follower to the selector valve piston and secure in place with the six(6) 1/4" nuts.

4.39.7 Carefully insert a lubricated 5/8" O.D. "O" ring over the threaded end of the service valve piston stem and into the proper groove.

4.39.8 Place the spring seat, with the milled slot toward the bottom end of the piston stem selector valve emergency spring, and diaphragm piston assembly onto the piston stem, then secure in place with the 1/2" hex stop nut.

NOTE: To assist in assembling the piston, insert the 1/4" x 2" x 2" steel block into the slot in the spring seat and piston stem.

4.39.9 Insert a lubricated 9/16" O.D. "O" ring into each of the six grooves on the selector valve piston stem.

4.39.10 NOTE: A selector valve stop replaces the emergency spring and spring seat if the selector volume overcharge check valve is used, in which case the steel block is inserted in the slot in the valve stop and piston stem.

4.39.11 Carefully insert the selector valve assembly ("O" ring end first) into the proper cavity in the service valve body.

4.40 Install a 15/16" O.D. ring gasket in the proper groove on the selector valve cover face of the service valve body.

4.41 Make certain that the large diameter bead of the selector valve diaphragm is seated in the proper groove in the service valve body and then place the selector valve cover over the selector valve assembly such that the four mounting holes are aligned with the tapped holes in the service valve body.

4.42 Insert a 3/8" x 1-3/4" hex. head cap screw through each of the four holes in the selector valve cover.

4.43 Equally tighten the four cap screws which were inserted in item 4.42 to secure the selector valve cover in place.

5. TEST

5.1 The assembled control valve service portion must be tested in accordance with the current issue of T-2424-0 prior to being placed into service.

D. Brown
Supervisor - Technical
Services

APPROVED:

J. M. Thomas
Manager - Engineering
Services

RFB:bao

REVISION SHEET

Revised 4-28-60
Issue No. 1
RFB:lat

Revised IV Assembling paragraph E. to
clarify assembling of charging valve.

Issue No. 2
August 2, 1960
CLB:lat

Omitted reference to 26-D Control Valve
and added the 26-C.

Issue No. 3
November 9, 1961
RFB:mlo

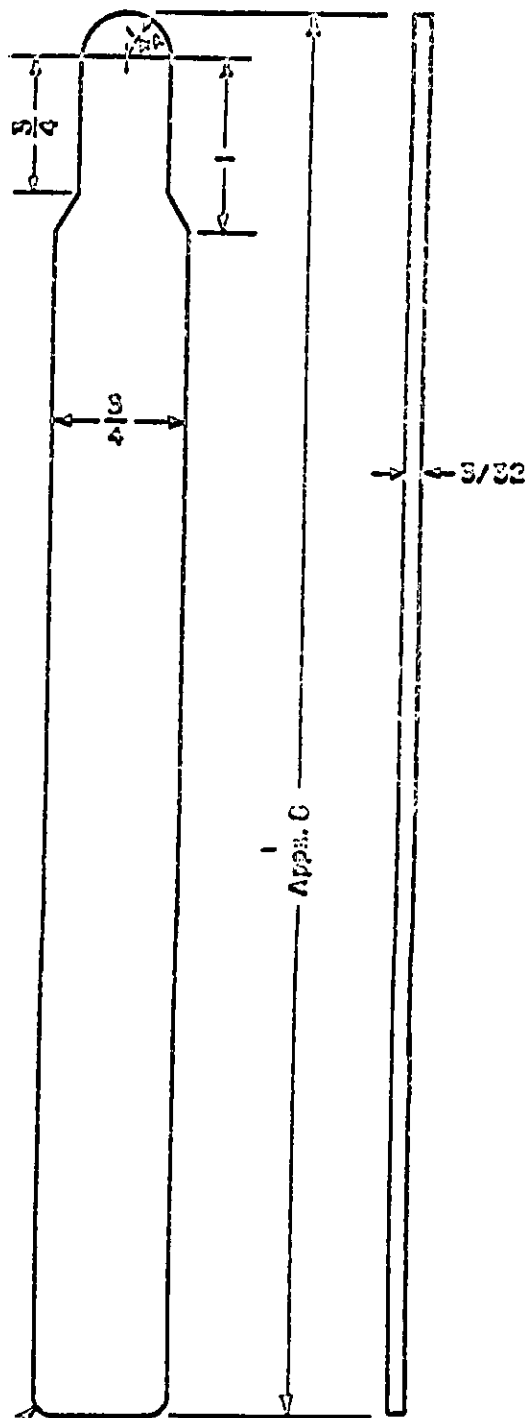
Added instructions for assembling turncated
cone shape diaphragm.

Issue No. 4
Febreary 28, 1964
RGM:bao

Added instructions for new style service
portions and modified old style portions.

Issue No. 5
October 16, 1974
WCH:cao

Changed format of entire specification.
Included reference to Parts Cat. No. 3220-5
Sup. 7 for 26-C Control Valve service portion.



Round Corners

Material: Steel

Revised 7-16-64 W.B.

WESTINGHOUSE AIR BRAKE CO.
AIR BRAKE DIVISION, PITTSBURGH, PA.

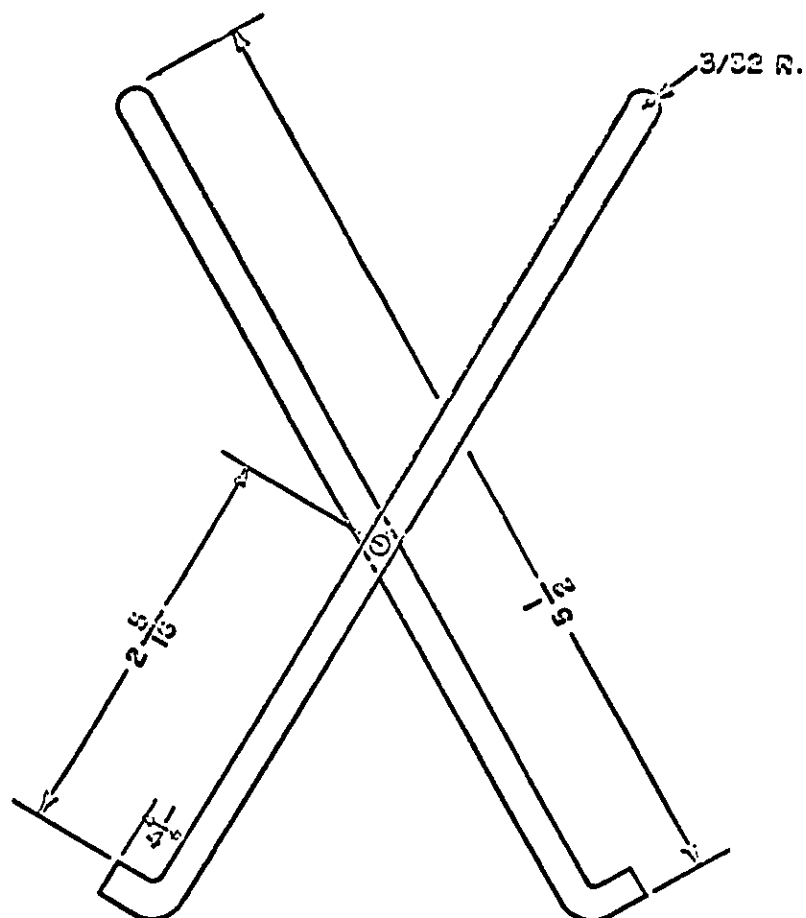
HAND TOOL FOR USE IN
ASSEMBLING DIAPHRAGMS

BY W.B.

DATE 8-25-59

APPROVED

R-42-3

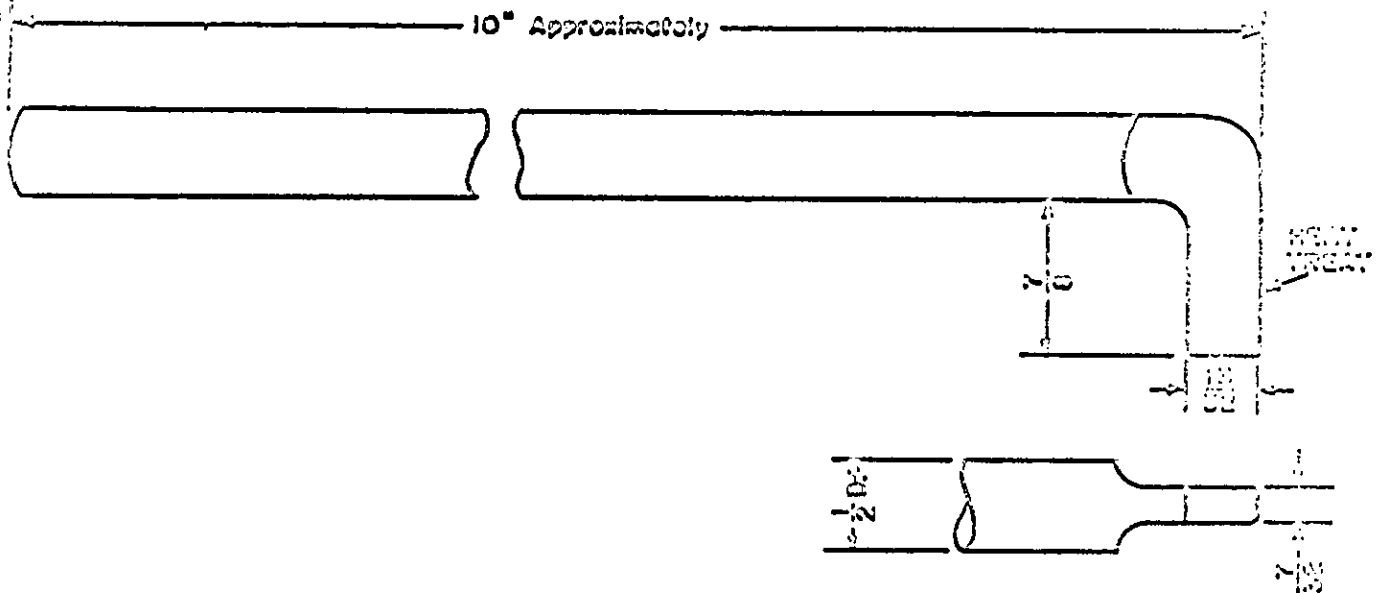


Material: 3/16 Drill Rod

WESTINGHOUSE AIR BRAKE CO.
AIR BRAKE DIVISION, WILMERSBURG, PA.
TOOL FOR REMOVING 26-F CONTROL
VALVE EMERGENCY LIMITING VALVE
BUSHING FROM SERVICE PORTION

BY W.B. _____ DATE 9-25-59

APPROVED _____ R-92-6



Material: Steel

WESTINGHOUSE AIR BRAKE CO.
 AIR BRAKE DIVISION, WILMERDING, PA.
 26-C AND 26-F CONTROL VALVE
 SELECTOR VALVE PISTON
 ASSEMBLY TOOL

BY W.E. _____ DATE 2-24-64

APPROVED *A. J. Roman* R-42-5

W.D. 2000

WESTINGHOUSE AIR BRAKE DIVISION
WESTINGHOUSE AIR BRAKE COMPANY
WILMERDING, PA.

REPAIR SPECIFICATION R-42-C, Sup. 9
Issue No. 2 March 25, 1965

INSTRUCTIONS FOR DISASSEMBLING, CLEANING, REPAIRING AND
ASSEMBLING THE EMERGENCY PORTION OF THE 26-C CONTROL VALVE

Reference may be made to Parts Catalog No. 3220-5, Sup. 2 for names of parts and their location in the emergency portion.

I. DISASSEMBLING

- A. For Emergency Portion Complete, Pc. A567475, Only
 - 1. Remove cap nut, check valve, and spring from cover.
 - a. Remove 3/4" O.D. "O" Ring from cap nut.
- B. Remove the three (3) cap screws which secure the cover to the emergency valve body, then remove the cover.
- C. Remove the 2-3/8" O.D. Ring Gasket and the three (3) 15/16" O.D. Ring Gaskets from the emergency valve body.
- D. For Emergency Portions With Piloted Emergency Check Valve Only
 - 1. Remove check valve spring, pilot valve spring seat, and pilot valve spring from the check valve guide (carrier). Remove check valve guide (carrier) from the emergency valve body.
 - a. Remove the pilot valve and the 1-1/16" O.D. "O" Ring or "O" Rings from check valve guide (carrier).

NOTE: There are two types of check valve guides (carriers) in service in the emergency portion. The difference between the two types of check valve guides (carriers) is the use of either one or three "O" Rings. When port #5 to the emergency portion high pressure valve is plugged which eliminates the high pressure function, only one "O" Ring is used. If port #5 is not plugged, then the three "O" Ring type check valve guide (carrier) must be used.

When assembling Emergency portion, Pc. A559702, of 26-C Control Valve Complete, Pc. A560695, the three "O" Ring Check Valve guide (carrier) must be used.

- b. Remove check valve retainer and check valve from check valve guide (carrier).

- 1. Remove the 1/4" O.D. "O" Ring from check valve retainer.

E. For Emergency Portions Without Piloted Emergency Check Valve Only

- 1. Remove the exhaust spring from the check valve guide (carrier), then remove the check valve guide (carrier) from the emergency valve body.

- a. Remove the "O" Ring or "O" Rings from the check valve guide (carrier).

NOTE: There are two types of check valve guides (carriers) in service in the emergency portion. The difference between the two types of check valve guides (carriers) is the use of either one or three "O" Rings. When port #5 to the emergency portion high pressure valve is plugged, which eliminates the high pressure function, only one "O" Ring is used. If port #5 is not plugged, then the three "O" Ring type check valve guide (carrier) must be used.

- 2. Remove check valve retainer ring and check valve from the check valve guide (carrier).

F. Remove the four (4) cap screws which secure the emergency valve body to the diaphragm housing, then remove the emergency valve body.

G. For Emergency Portions Without Piloted Emergency Check Valve Only

- 1. Remove the diaphragm spring from the emergency valve piston.

H. Remove the two (2) 1-3/8" O.D. Ring Gaskets and the three (3) 1" O.D. Ring Gaskets from the diaphragm housing.

I. Remove the emergency valve piston complete from the diaphragm housing.

1. Remove the three (3) 5/8" O.D. "O" Rings from the emergency valve piston stem.

2. Hold the emergency piston stem with an open end wrench, then remove the jam nut from the piston stem.

a. Remove the follower, diaphragm, and piston from the piston stem.

b. Remove the 7/8" O.D. "O" Ring from the piston stem.

J. Remove the vent protector from the diaphragm housing.

II. CLEANING, INSPECTING, AND REPAIRING

A. With the Emergency portion completely disassembled, all the parts must be cleaned and inspected.

B. All the parts (except the body) must be washed in a suitable solvent that will dissolve oil or grease and permit all the parts to be thoroughly cleaned without abrasion. The exterior of the body must be thoroughly cleaned by means of a cloth or rag saturated with a suitable solvent.

C. All gaskets, diaphragms, and rubber seated valves may be dipped in a suitable solvent to assist in the removal of greasy dirt. These parts must be promptly wiped dry after cleaning and must not be allowed to soak in the cleaning fluid.

D. Gaskets and diaphragms which have broken or flattened beads or any that reveal cracks or cuts must be rejected and replaced.

E. All "O" Rings and check valves which are cut, cracked, or otherwise damaged must be rejected and replaced.

F. If necessary, the face of the rubber check valves can be refinished by lapping on a piece of medium weight emery paper.

G. Serviceable gaskets and diaphragms must be brushed with a soft bristle brush (such as a shoe brush) to remove any remaining dirt and to polish.

H. The size of chokes is important and whenever a portion is disassembled, the choke fittings must be cleaned and inspected to insure that they are clean and not restricted.

- I. These chokes must be removed, cleaned, and replaced one at a time. Where this process is followed, misplacement of chokes will be impossible. While the chokes are removed, the passages must be checked for cleanliness and blown out if necessary. The chokes can be cleaned in a suitable solvent and then blown off with a jet of compressed air. Metallic tools must not be used for cleaning chokes as their size must not be changed.
- J. After the choke plugs have been thoroughly cleaned, the threads of the choke plugs must be coated lightly with a compound consisting of one part graphite, AAR Spec. M-913, and two parts of oil (SAE-20) by weight before being assembled into the emergency portion.
- K. Clean all springs using a wire brush and suitable solvent, then inspect for rust pits, distortion, or permanent set, and replace where necessary.
- L. Replace all parts that are cracked, broken, worn excessively, damaged, or in such a condition as would result in unsatisfactory operation.
- M. Retaining rings should be replaced if they are broken or not elastic enough to clamp securely.

III. LUBRICATING AND ASSEMBLING

- A. During assembling, lubricate all "O" Rings, the grooves, and the bushings into which they fit with No. 2 Silicone Grease, Commodity No. 14696. Coat the "O" Ring and fill the groove with grease. After the "O" Ring is installed in the groove, remove the excess grease by wiping with a finger. Coat the bearing surface of the bushing with grease before the "O" Ring assembly is inserted.
- B. Piston Assembly
 1. Insert the 7/8" O.D. "O" Ring into the groove at the upper end of the piston stem.
 2. Place the piston, diaphragm, and diaphragm follower on the piston stem, being careful not to damage the "O" Ring, and secure in place with the 5/8" jam nut.
 3. Insert the three (3) 5/8" O.D. "O" Rings into the grooves on the piston stem.
- C. Insert the piston assembly into the diaphragm housing.

- D. Insert the two (2) 1-3/8" O.D. Ring Gaskets and the three (3) 1" O.D. Ring Gaskets into the grooves in the diaphragm housing.
- E. For Emergency Portions Without Piloted Emergency Check Valve Only
 - 1. Place the diaphragm spring on the emergency valve piston.
- F. Make certain that the head of the diaphragm is in the groove in the diaphragm housing, then secure the emergency valve body to the diaphragm housing.
- G. For Emergency Portions With Piloted Emergency Check Valve Only
 - 1. Check Valve Guide (Carrier) Assembly
 - a. Insert the 1/4" O.D. "O" Ring into check valve retainer, then insert check valve into check valve guide (carrier) and secure in place with the retainer.
 - b. Apply the 1-1/16" O.D. "O" Ring or "O" Rings to the check valve guide (carrier).
 - c. Insert pilot valve into check valve guide (carrier), then insert guide (carrier) into the emergency valve body.
 - 2. Insert pilot valve spring, pilot valve spring seat, and check valve spring into check valve guide (carrier).
- H. For Emergency Portions Without Piloted Emergency Check Valve Only
 - 1. Check Valve Guide (Carrier) Assembly
 - a. Insert the check valve into the check valve guide (carrier) and secure in place with the retainer ring.
 - b. Apply the "O" Ring or "O" Rings to the check valve guide (carrier).
 - 2. Insert the check valve guide (carrier) into the emergency valve body.
 - 3. Insert the exhaust spring into the check valve guide (carrier).

- I. Insert the three (3) 15/16" O.D. Ring Gaskets and the 2-3/8" O.D. Ring Gasket into the ring grooves in the emergency valve body.
- J. Secure the cover to the emergency valve body.
- K. For Emergency Portion Complete Pc. A567475 Only
 - 1. Insert the 3/4" O.D. "O" Ring into its groove on the cap nut.
 - 2. Insert the check valve spring, check valve, and cap nut into cover.
- L. Insert the vent protector into the exhaust port in the diaphragm housing.

A. J. P.

RFB:bao

REVISION SHEET

Issue No. 1
February 2, 1961
RFB

Issue No. 2
March 25, 1965
RGM

Added information for emergency portions with
piloted emergency check valve.



"26-C" CONTROL VALVES

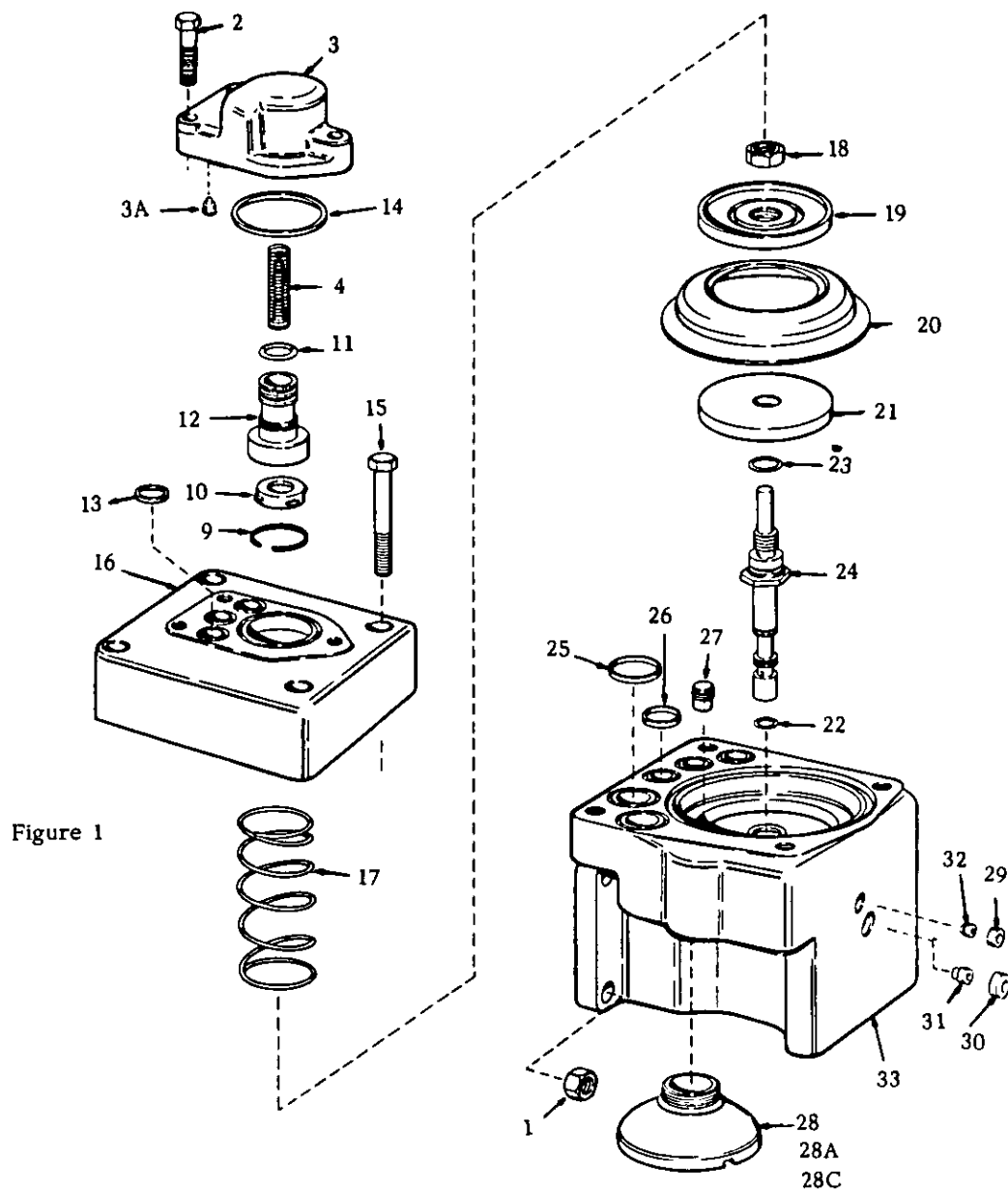
parts catalog

(SUPERSEDES ISSUE DATED FEBRUARY, 1977)

Piece Number		Portions			Remarks
Assembly	Assembly less Acc.	Emergency	Service	Pipe Bracket	
559335	560216	570840	567143	560215	Pipe Bracket for 4800 cu. in. Aux. Res. Volume
560695	560696	559702	567142	560701	Pipe Bracket for 1000 cu. in. Aux. Res. Volume
560675	560676	570840	567141	560691	For Relay Equipment. Choked for 435 cu. in. Dummy Br. Cyl.
561493	561494	570840	567141	561495	Pipe Bracket for 2150 cu. in. Aux. Res. Volume
562626	562627	570840	567141	562630	Pipe Bracket for 13,000 cu. in. Aux. Res. Volume 810 to 1280 cu. in. Brake Cylinder Volume
562773	562935	570840	567141	562825	Without Relay Equipment, Pipe Bracket for 19,900 cu. in. Aux. Res. Volume, 1280 to 1600 cu. in. Brake Cylinder Volume
562774	562936	570840	567141	562826	With Relay Equipment. Pipe Bracket for 23,500 cu. in. Aux. Res. Volume, 435 cu. in. Br. Cyl. Disp. Vol., Br. Cyl. Vol. above 1600 cu. in.
564445	564446	569465	567495	564519	With Relay Equipment. Pipe Bracket for 3100 cu. in. Aux. Res. Vol. and 435 cu. in. Br. Cyl. Disp. Vol. for Brake Cylinder Volume above 1600 cu. in.
565641	565866	570840	567141	565642	With Relay Equipment, Pipe Bracket for 1000 cu. in. Aux. Res. Volume
569889	569905	570840	569906	562630	Pipe Bracket for 13,000 cu. in. Aux. Res. Volume 810 to 1280 cu. in. Brake Cylinder Volume
573926	574321	559702	574322	574323	Without Relay Equipment with Pipe Bracket for M.R. Supply to B.C. Approx. 650 cu. in. Brk. Cyl. Volume
578906	578907	570840	567143	562630	Pipe Bracket for 13,000 cu. in. Aux. Res. Volume 810 to 1280 cu. in. Brake Cylinder Volume
580718	580721	559702	567143	580719	For M.R. Supply to Brake Cylinder

⚠ WARNING: AT THE TIME ANY PART IS REPLACED IN THIS DEVICE, THE OPERATION OF THE COMPLETE DEVICE MUST PASS A SERIES OF TESTS AS PRESCRIBED IN THE LATEST ISSUE OF THE APPLICABLE WESTINGHOUSE AIR BRAKE DIVISION TEST SPECIFICATION. AT THE TIME THIS DEVICE IS APPLIED TO THE BRAKE EQUIPMENT ARRANGEMENT, A STATIONARY VEHICLE TEST MUST BE MADE TO INSURE THAT THIS DEVICE FUNCTIONS PROPERLY IN THE TOTAL BRAKE EQUIPMENT ARRANGEMENT. (Consult your local Westinghouse Air Brake Division Representative for identity of the test specifications, with latest revision date, that cover this device.)

WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
 Wilmerding, Pennsylvania 15148



INDEX

Part or Portion	Weight	Page
26-C Control Valves	175 lbs.	1
26-C Control Valves, less Accessories	175 lbs.	1
Emergency Portion	43 lbs.	3
Service Portion	75 lbs.	4 & 6
Pipe Bracket Portion	44-1/2 lbs.	11
Cut-Out Cock and Strainer	10-1/2 lbs.	
(See P.C. No. 3216-2)		
Reservoir Release Valve	4-1/2 lbs	11
Spring Identification Table		12



EMERGENCY PORTION — COMMON DETAILS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-1	502365	NUT, Hex., 1/2 in. (Part of Pipe Bracket, Asy.)	4
1-	♦	EMERGENCY PORTION, ASSEMBLY	1
1-2	523365	.SCREW, Cap, H.Hd., 3/8 x 1-1/2 in.	3
1-3	♦	.COVER, Body, Emer. Valve . . . ♦	♦
1-3A	♦	..STRAINER and CHOKE ♦	♦
1-4	♦	.SPRING, Exhaust	1
1-5	♦	.SEAT, Pilot Valve Spring ♦	♦
1-6	♦	.SPRING, Pilot Valve ♦	♦
1-7	♦	.VALVE, Pilot ♦	♦
1-8	♦	.O-RING, 1/4 in. O.D. ♦	♦
1-9	♦	.RETAINER	1
1-10	♦	.VALVE, Check	1
1-11	♦	.O-RING, 1-1/16 in. O.D. . . . ♦	♦
1-12	♦	.CARRIER, Check Valve	1
1-13	532092	.GASKET, Ring, 15/16 in. O.D. . .	3
1-14	533417	.GASKET, Ring, 2-3/8 in. O.D. . .	1
1-15	557879	.SCREW, Cap, H.Hd., 1/2 x 3-1/4 in.	4
1-16	559711	.BODY, Emergency Valve	1
1-17	♦	.SPRING, Diaphragm ♦	♦

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-18	568622	.NUT, Jam, Hex., 5/8 in.	1
1-19	559709	.FOLLOWER	1
1-20	564210	.DIAPHRAGM	1
1-21	559708	.PISTON, Emergency Valve	1
1-22	523842	.O-RING, 5/8 in. O.D.	3
1-23	523734	.O-RING, 7/8 in. O.D.	1
1-24	559707	.STEM, Piston	1
1-25	545094	.GASKET, Ring, 1-3/8 in. O.D. . .	2
1-26	533212	.GASKET, Ring, 1 in. O.D.	3
1-27	554543	.STRAINER and CHOKE, (1/4 in. (Port ID to 1) No. 73 Dr.)	1
1-28	502574	.VENT PROTECTOR, Asy.	1
1-28A	502465	..SEAL	1
1-28C	571140	..RIVET, 3/16 x 1/2 in.	1
1-29	56992	.PLUG, Pipe, 3/8 in.	1
1-30	56992	.PLUG, Pipe, 3/8 in.	1
1-31	♦	.PLUG, 1/4 in. (N)	1
1-32	♦	.PLUG, Choke, 1/8 in. (M)	1
1-33	♦	.DIAPHRAGM HOUSING, Asy. (Incl. Ref. 27, 29, 30, 31 & 32) .	1

♦ NOTE: See Variable Details Schedule Below.

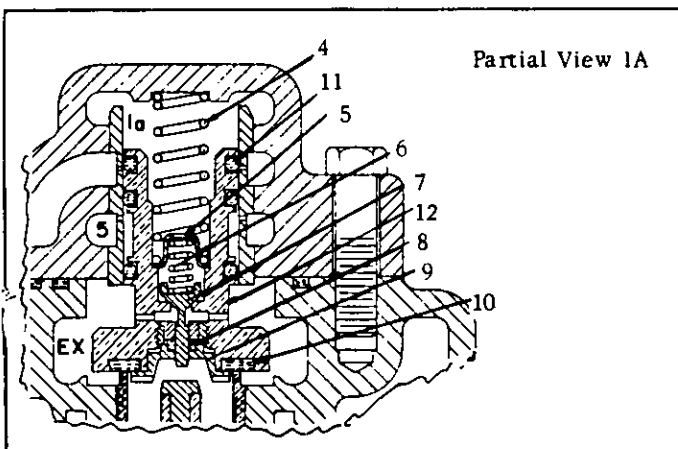
♦ NOTE: See Page 12 for Spring Identification Table.

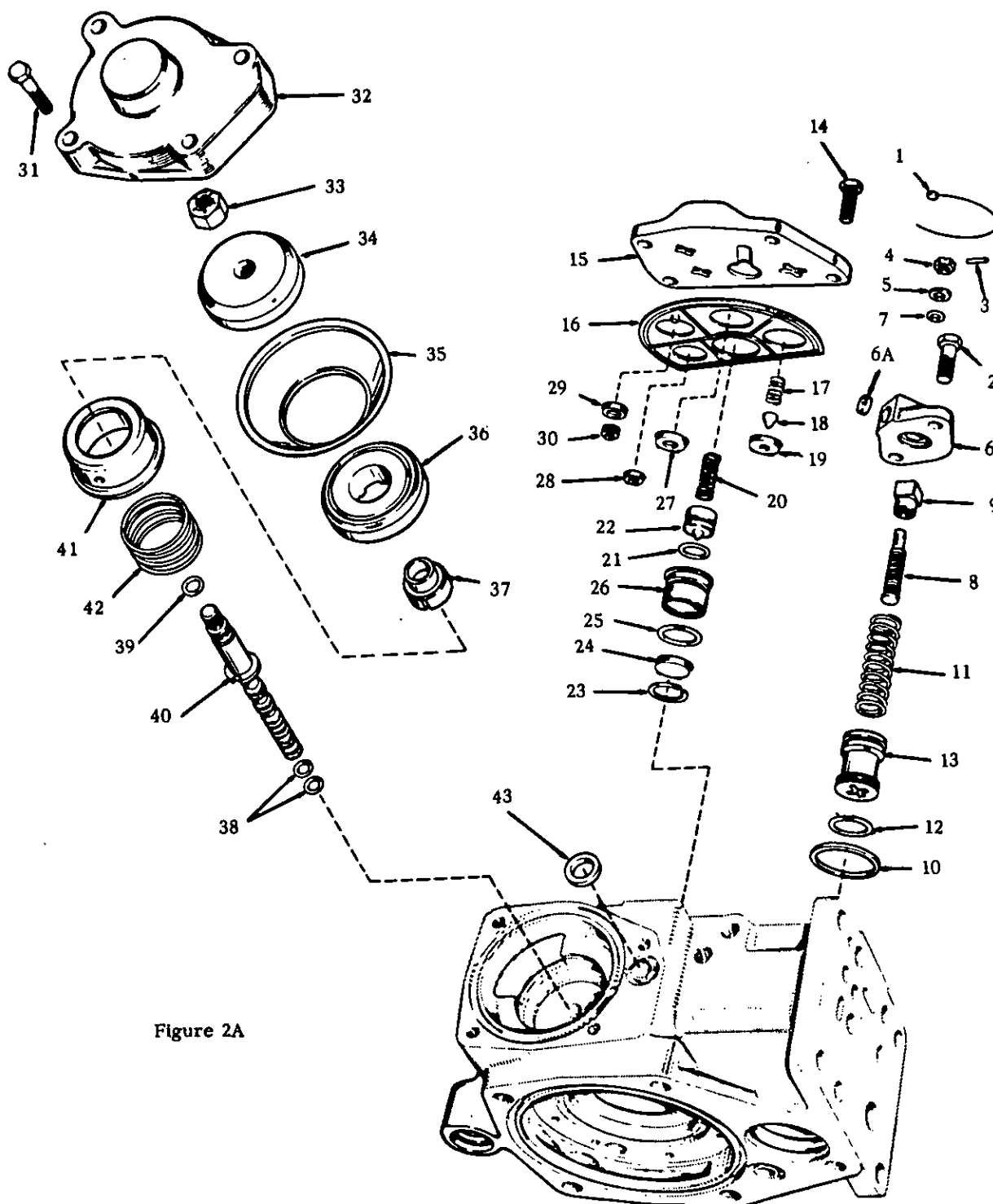
EMERGENCY PORTION — VARIABLE DETAILS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	559702	569465 570840 EMERGENCY PORTION, ASSEMBLY	1
1-3	570397	563262 570398 .COVER, Body, Emer. V. 1	1
1-3A	570221	-- 570221 ..STRAINER and CHOKE, 3/8 in. (No. 65 Dr.) . .	1
1-4	570234	559715 570254 .SPRING, Exhaust	1
1-5	570197	-- 570197 .SEAT, Pilot Valve	1
1-6	560410	-- 560410 .SPRING, Pilot Valve.	1
1-7	570199	-- 570199 .VALVE, Pilot	1
1-8	524609	-- 524609 .O-RING, 1/4 in. O.D.	1
1-9	570252	570903 570252 .RETAINER	1
1-10	564808	554827 564808 .VALVE, Check	1
1-11	523759	-- -- .O-RING, 1-1/16 in. O.D. 3	3

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-11	--	523759 523759 .O-RING, 1-1/16 in. O.D. 1	1
1-12	559714	563261 570233 .CARRIER, Check Valve 1	1
1-17	--	564018 -- .SPRING, Diaphragm . 1	1
1-31	516298	-- 516298 .PLUG, Solid, 1/4 in. (N) 1	1
1-31	--	569467 -- .PLUG, Choke, 1/4 in. (No. 70 Dr.) (N)	1
1-32	82410	-- 82410 .PLUG, Choke, 1/8 in. (.059 Dr.) (M)	1
1-32	--	523225 -- .PLUG, Choke, 1/8 in. (No. 60 Dr.) (M)	1
1-33	559703	569466 559703 .DIAPHRAGM HOUSING, Asy. (Incl. Ref. Nos. 1-27, -29, -30, -31 & -32) . 1	1

■ NOTE: See Partial View 1A at left.







SERVICE PORTION — COMMON DETAILS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2B-1	502365	NUT, Hex., 1/2 in. (Part of Pipe Bracket)	4
2A	- ♦	SERVICE VALVE PORTION, Asy.	1
2A-1	552506	.WIRE, Seal	1
2A-2	7978	.SCREW, H.Hd., Cap, 3/8 x 1 in.	2
2A-3	566635	.PIN, Cylinder, 3/32 x 1/2 in.	1
2A-4	569047	.COLLAR, Hex. Adjusting	1
2A-5	5724	.SPACER, 1/4 in.	1
2A-6	567073	.COVER, Limiting Valve	1
2A-6A	567247	.EXCLUDER, Wasp	1
2A-7	534662	.O-RING, 3/8 in. O.D.	1
2A-8	562642	.SCREW, Adjusting	1
2A-9	562640	.SEAT, Adjusting Spring	1
2A-10	540542	.GASKET, Ring, 1-7/8 in. O.D.	1
2A-11	♦ 562639	.SPRING, Service	1
2A-12	524719	.O-RING, 1-1/4 in. O.D.	2
2A-13	560377	.PISTON, Lim. Valve Service	1
2A-14	7978	.SCREW, H.Hd. Cap, 3/8 x 1 in.	4
2A-15	♦	.COVER, Top Service Valve	1
2A-16	557929	.GASKET, Cover	1
2A-17	♦	.SPRING, Cont. Res. Charging C.V. ♦	♦
2A-18	♦	.SEAT, Spring	♦
2A-19	♦	.VALVE, Check, Cont. Res. Charging ♦	♦
2A-20	♦ 558172	.SPRING, Ser. Appl. C.V.	1
2A-21	524935	.O-RING, 13/16 in. O.D.	1
2A-22	558171	.GUIDE, Spring	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2A-23	558170	.RETAINER, 1-1/32 Bore x 1/16 in.	1
2A-24	578336	.VALVE, Check (Service Valve)	1
2A-25	524719	.O-RING, 1-1/4 in. O.D.	1
2A-26	558169	.GUIDE, Check Valve	1
2A-27	508371	.VALVE, Check (Aux. Res. Charging)	1
2A-28	533140	.VALVE, Check (Cont. Res. Dissipation)	1
2A-29	529009	.VALVE, Check (Back Flow)	1
2A-30	♦	.PLUG, Choke, 1/8 in. (Q.S. Vol.) (K)	1
2A-31	17140	.SCREW, H.Hd. Cap, 3/8 x 1-3/4 in.	4
2A-32	559754	.COVER, Selector Valve	1
2A-33	520517	.NUT, Stop, 1/2 in.	1
2A-34	567124	.FOLLOWER, Selector Valve	1
2A-35	566641	.DIAPHRAGM, Selector Valve	1
2A-36	567125	.PISTON, Selector Valve	1
2A-37	567123	.STOP, Selector Valve	1
2A-38	523732	.O-RING, 9/16 in. O.D.	6
2A-39	523842	.O-RING, 5/8 in. O.D.	1
2A-40	560532	.STEM, Piston (Selector Valve)	1
2A-41	567140	.RETAINER, Spring	1
2A-42	♦ 559744	.SPRING, Service Sel. V.	1
2A-43	532092	.GASKET, Ring, 15/16 in. O.D.	1

♦ NOTE: For Spring Identification Table, see Page 12.

♦ NOTE: For Variable Details, see Page 8.

NOTE: Rubber Parts Maintenance Kits are listed on Page 9

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

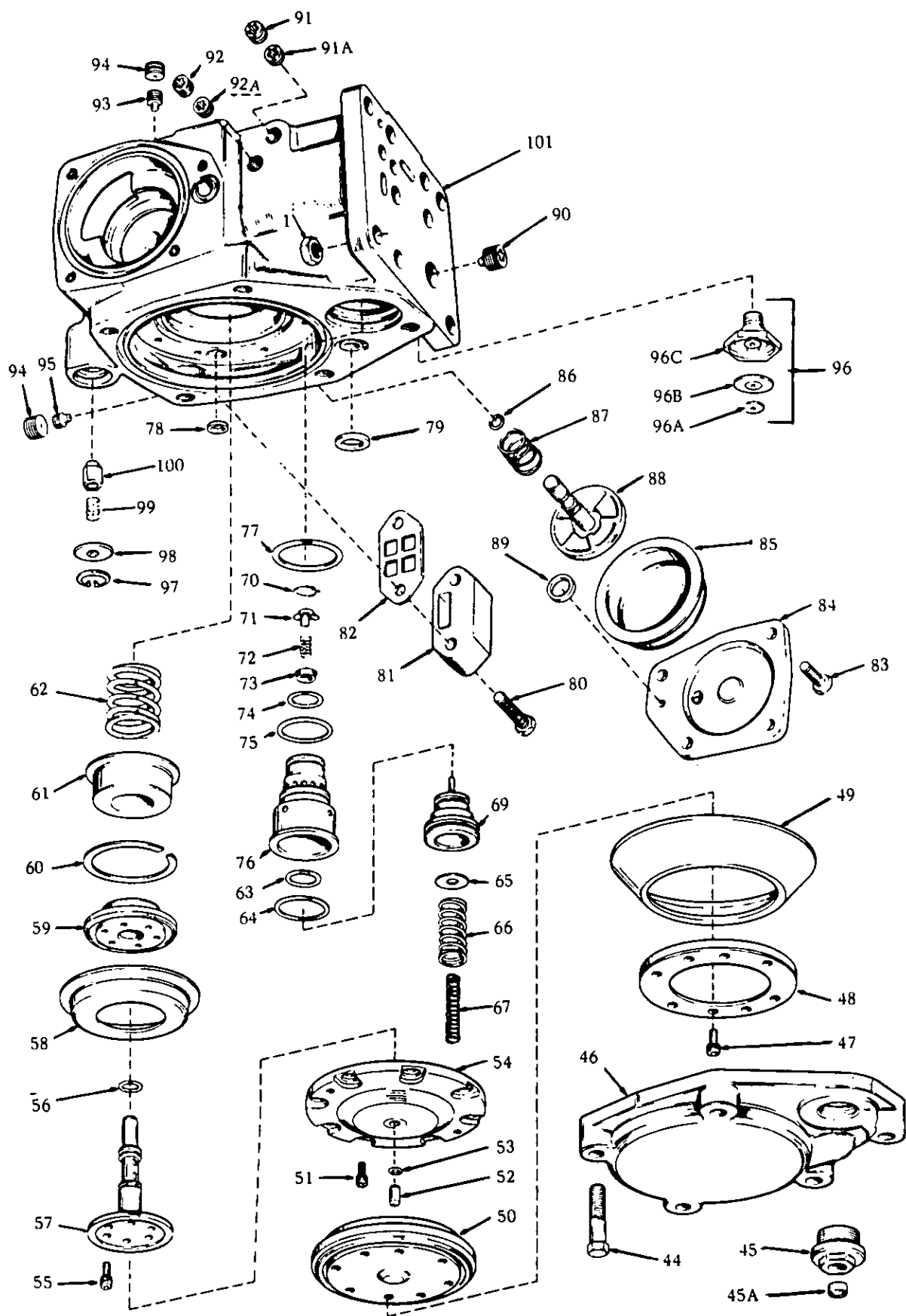


Figure 2B



SERVICE PORTION COMMON DETAILS (continued)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd	Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2B-44	3205	.SCREW, H.Hd. Cap	5	2B-77	536584	.O-RING, 2-3/8 in. O.D.	1
2B-45	560375	.CAP NUT with Excluder	1	2B-78	527717	.GASKET, Ring, 9/16 in. O.D. . . .	1
2B-45A	567248	.EXCLUDER, Wasp, 5/8 in.	1	2B-79	532092	.GASKET, Ring, 15/16 in. O.D. . . .	1
2B-46	560374	.COVER, Bottom, Service Valve . . .	1	2B-80	15784	.SCREW, H.Hd. Cap, 3/8 x 1-3/8 in. .	2
2B-47	543490	.SCREW, H.Hd. Cap, 1/4 x 1-1/2 in. .	8	2B-81	560860	.CAP, Graduated Release	1
2B-48	558161	.FOLLOWER, Diaphragm	1	2B-82	511874	.GASKET, Cap	1
2B-49	564081	.DIAPHRAGM, Large	1	2B-83	7978	.SCREW, H.Hd. Cap, 3/8 x 1 in. . . .	4
2B-50	558211	.PISTON, Large	1	2B-84	559733	.COVER, Charging Valve	1
2B-51	543490	.SCREW, H.Soc. Cap, 1/4 x 1/2 in.. .	8	2B-85	566640	.DIAPHRAGM, Charging Valve	1
2B-52	558159	.PIN, Pusher.	1	2B-86	524612	.O-RING, 1/2 in. O.D.	4
2B-53	523732	.O-RING, 9/16 in. O.D.	1	2B-87	562895	.SPRING, Charging Valve	1
2B-54	567118	.COVER, Small Diaphragm	1	2B-88	558413	.PISTON, Charging Valve	1
2B-55	543490	.SCREW, H.Soc. Cap, 1/4 x 1/2 in. .	6	2B-89	534031	.GASKET, Ring, 7/8 in. O.D.	1
2B-56	531868	.O-RING, 3/4 in. O.D.	3	2B-90	545604	.PLUG, Choke, 3/8 in. (No. 60 Dr.)	
2B-57	559727	.PISTON, Small	1		(H)	1	
2B-58	564217	.DIAPHRAGM, Small	1	2B-91	♦	.PLUG, Pipe, 1/4 in.	♦
2B-59	558156	.FOLLOWER, Diaphragm	1	2B-91A	♦	.PLUG, Pipe, 1/8 in. (Y).	♦
2B-60	559746	.RING, Retaining, 2-5/8 Bore x 1 in. .	1	2B-92	♦	.PLUG, Pipe, 1/4 in. (X).	♦
2B-61	558152	.CAGE, Spring	1	2B-92A	♦	.PLUG, Choke, 1/8 in. (Y)	♦
2B-62	558151	.SPRING, Diaphragm, Sm.	1	2B-93	♦	.PLUG, Choke, 1/4 in. (J)	♦
2B-63	523759	.O-RING, 1-1/16 in. O.D.	1	2B-94	56992	.PLUG, Pipe, 3/8 in. (G & J)	2
2B-64	♦	.O-RING, 1-3/4 in. O.D.	♦	2B-95	560207	.PLUG, Choke, 1/8 in. (No. 59 Dr.)	
2B-65	518173	.SHIM (as required)	4		(G)	1	
2B-66	♦	.SPRING, Lim. V. Piston (Emer.) . . .	♦	2B-96	552378	.VENT PROTECTOR, Asy.	1
2B-67	♦	.SPRING	♦	2B-96A	552381	.WASHER	1
2B-68	♦	.O-RING, 1-5/16 in. O.D.	♦	2B-96B	551159	.SEAL, Vent	1
2B-69	♦	.PISTON, Lim. V. (Emer.)	1	2B-96C	552384	.RIVET, 3/32 x 1/2 in.	1
2B-70	560371	.RETAINER, 21/32 Bore x 1/16 in. . .	1	2B-97	557626	.RING, Retaining, 1.023 x .042 In. Sq. .	1
2B-71	560370	.CAGE, Spring	1	2B-98	♦	.SEAL, Assembly.	1
2B-72	560369	.SPRING, Check Valve	1	2B-99	♦	.SPRING, Check Valve	1
2B-73	533140	.VALVE, Check (Release)	1	2B-100	566758	.VALVE, Check	1
2B-74	524719	.O-RING, 1-1/4 in. O.D.	1	2B-100A	565430	.PLUG, Rubber	1
2B-75	536580	.O-RING, 1-9/16 in. O.D.	1	2B-101	♦	.BODY, Service Valve	1
2B-76	♦	.BUSH, Emergency Lim. Valve	1				

♦ NOTE: For Variable Details, see Page 8

♦ NOTE: For Spring Identification Table, see Page 12.

NOTE: Rubber Parts Maintenance Kits are listed on Page 12.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



SERVICE PORTION – VARIABLE DETAILS

Fig. & Ref.No.	Pc.No.					Parts Name	No. Req'd
2A-	567141	567142	--	567495	569906	574322 SERVICE VALVE PORTION, ASY., 35-60 P.S.I. Ser. Lim., 95 P.S.I. Emer. Lim.	1
2A-	--	--	567143	--	--	-- SERVICE VALVE PORTION, ASY., 52 P.S.I. Ser. Lim., 76 P.S.I. Emer. Lim.	1
2A-15	566697	559730	566697	559730	566697	566697 .COVER, Service, Top	1
2A-17	--	513312	--	513312	--	-- .SPRING, Cont. Res. Charging C.V.	1
2A-18	--	554909	--	554909	--	-- .SEAT, Spring	1
2A-19	--	505782	--	505782	--	-- .VALVE, Check, Cont. Res. Charging	1
2A-30	91149	--	91149	91149	91149	91149 .PLUG, Choke, 1/8 in. (No. 50 Dr.) Q.S. Vol. (K).	1
2A-30	--	520478	--	--	--	-- .PLUG, Choke, 1/8 in. (No. 44 Dr.) Q.S. Vol. (K).	1
2B-64	524413	524413	524413	524413	524413	-- .O-RING, 1-3/4 in. O.D.	1
2B-66	560373	--	92491	--	560373	560373 .SPRING, Lim. V. Piston (Emer.)	1
2B-67	560506	--	--	--	560506	560506 .SPRING	1
2B-68	--	--	536579	--	536579	536579 .O-RING, 1-5/16 in. O.D. (Not Shown)	1
2B-69	560381	560700	562746	560381	560381	562746 .PISTON, Lim. V. (Emer.)	1
2B-76	560368	560368	562745	560368	560368	562745 .BUSH, Emer. Lim. V.	1
2B-91	--	523178	--	523178	--	-- .PLUG, Pipe, 1/4 in. (U)	1
2B-91A	--	--	--	523437	--	-- .PLUG, Pipe, 1/8 in. (Y)	1
2B-92	--	523178	--	523178	--	-- .PLUG, Pipe, 1/4 in. (Y)	1
2B-92A	--	--	--	555876	--	-- .PLUG, Choke, 1/8 in. (No. 37 Dr.) (X)	1
2B-92A	--	523437	--	--	--	-- .PLUG, Solid, 1/8 in. (X)	1
2B-93	900969	--	900969	900969	--	-- .PLUG, Choke, 1/4 in. (No. 65 Dr.) (J)	1
2B-93	--	--	--	--	528323	-- .PLUG, Choke, 1/4 in. (No. 56 Dr.) (J)	1
2B-98	566752	574836	566752	566752	566752	574836 .SEAL, Assembly	1
	565402	574824	565402	565402	565402	574824 .SEAL	1
2B-99	520824	574825	520824	520824	520824	574825 .SPRING, Check Valve (See Below).	1
2B-101	567135	567137	567135	567494	567135	575761 .BODY, Service Valve	1

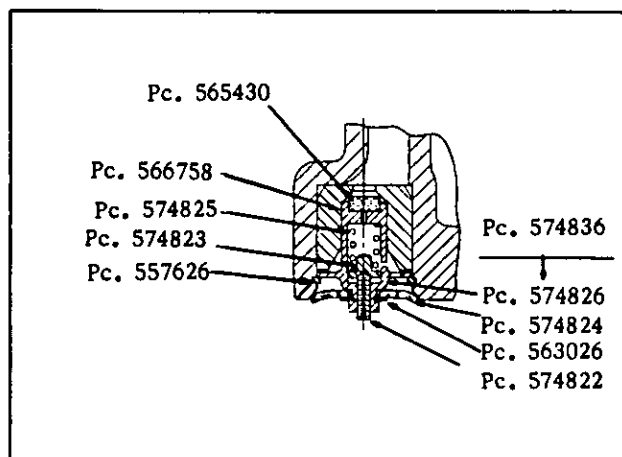
■ Requires 2

● NOTE: For Spring Identification, See Page 12.

NOTE: Rubber Parts Maintenance Kits are listed on Page 9

CONVERSION KIT

KIT COMP. Pc. 574821



26C Control Valve Selector Vol. Overcharge-Adjustable
Check Valve for 26C Control Valves Comp. Pc.Nos.
560695 and 573926.



RUBBER PARTS MAINTENANCE

We are prepared to furnish the following KITS for servicing the "26-C" Control Valve Portions.

KIT, Complete, Rubber Parts for Overhaul Maintenance, Emergency Portion Pc. 569465	Pc. 564026
KIT, Complete, Rubber Parts for Moving Parts Maintenance, Emergency Portion Pc. 569465 & Pc. 570840	Pc. 564027
KIT, Complete, Rubber Parts for Overhaul Maintenance, Emergency Portion Pc. 559702	Pc. 561121
KIT, Complete, Rubber Parts for Moving Parts Maintenance, Emergency Portion Pc. 559702	Pc. 561122
KIT, Complete, Rubber Parts for Overhaul Maintenance, Service Portion Pc. 567141	Pc. 560724
KIT, Complete, Rubber Parts for Moving Parts Maintenance, Service Portion Pc. 567141	Pc. 560725
KIT, Complete, Rubber Parts for Overhaul Maintenance, Emergency Portion Pc. 570840	Pc. 570847



▼ NOTE: Accessories Include: Release Handle, Pc. 512708, Ref. 3-8 and Cotter Pin, Pc. 94977, Ref. No. 3-7.

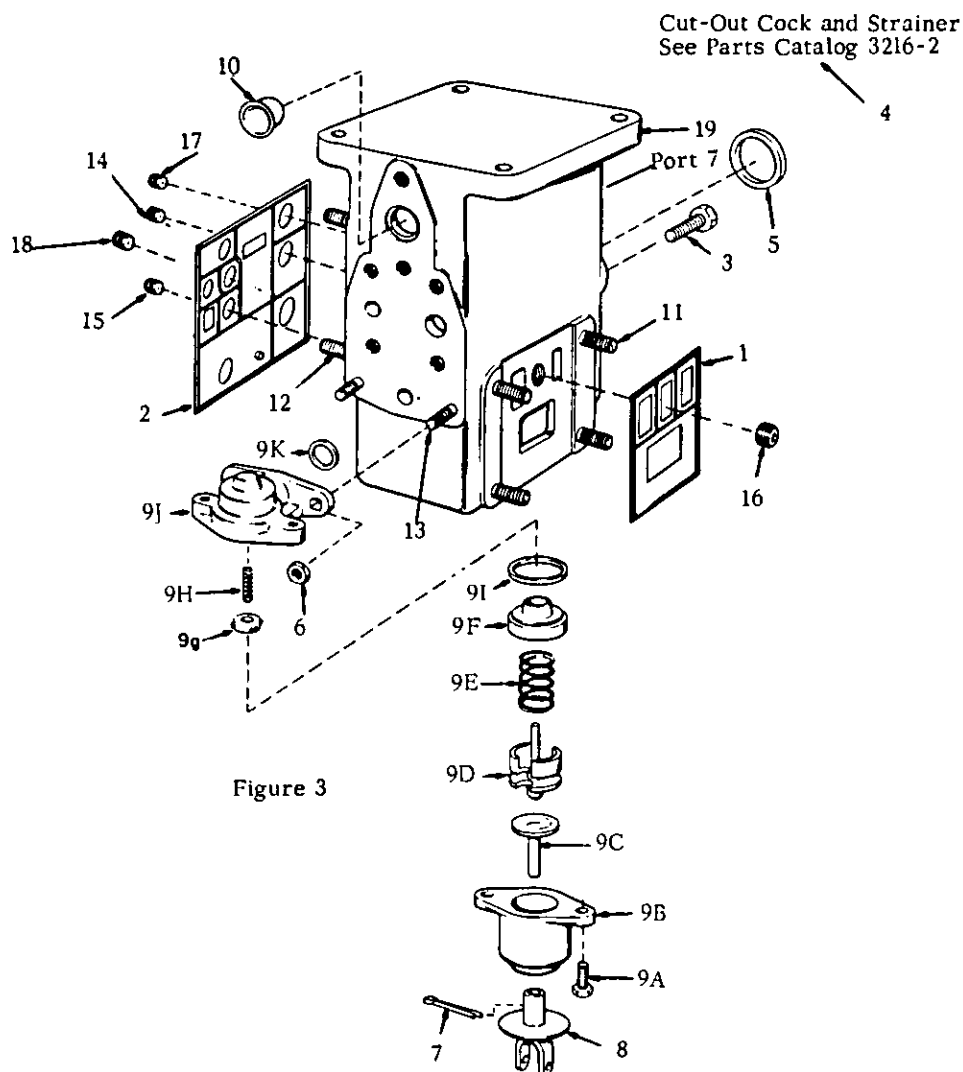


Figure 3

PIPE BRACKET LEGEND

Flange Size (in.)

PORT - 1	BRAKE PIPE	1
PORT - 16	BRAKE CYLINDER	1
PORT - 5	AUXILIARY RESERVOIR	3/4
PORT - 7	CONTROL RESERVOIR	3/4
PORT - 9	SELECTOR VOLUME	1/2
PORT - 10	EXHAUST	1/2
PORT - 12	EMERGENCY ACTUATING PIPE	1/2

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



PIPE BRACKET PORTION COMMON DETAILS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-1	557925	GASKET, Body	1
3-2	557924	GASKET, Body	1
3-	♦	PIPE BRACKET PORTION, ASY.	1
3-3	5951	.SCREW, H.Hd.Cap, 1/2 x 1-1/2 in.	2
3-4	♦	.CUT-OUT COCK and STRAINER, Asy. (See P.C. 3216-2)	1
3-5	93986	.GASKET, Ring, 1 in. O.D.	1
3-6	502369	.NUT, Hex., 3/8 in.	2
3-7	▲ 94977	.COTTER, 3/16 x 1-1/2 in.	1
3-8	▲ 512708	.HANDLE, Release	1
3-9	559695	.RESERVOIR RELEASE VALVE, Asy.	1
3-9A	7978	..SCREW, H.Hd.Cap, 3/8 x 1 in.	2
3-9B	559698	..COVER, Release Valve	1
3-9C	94963	..STEM and END PLATE	1
3-9D	558167	..PLUNGER, Release	1
3-9E	♦ 558168	..SPRING, Plunger	1

♦ NOTE: See Variable Detail Table for Pc.No.

▲ NOTE: For Spring Information, see Page 12

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-9F	558162	..SEAT, Rel. Valve Check Valve	1
3-9G	508371	..VALVE, Check	1
3-9H	♦ 569676	..SPRING, Rel. Valve Check Valve	1
3-9I	540542	..GASKET, Ring, 1-7/8 in. O.D.	1
3-9J	559696	..BODY, Release Valve	1
3-9K	533212	..GASKET, Ring, 1 in. O.D.	1
3-10	527583	.STRAINER, (Ports 5 & 7)	2
3-11	554353	.STUD, 1/2 x 1-7/8 in.	4
3-12	554353	.STUD, 1/2 x 1-7/8 in.	4
3-13	188005	.STUD, 3/8 x 1-3/8 in.	2
3-14	♦	.PLUG, Choke, (Port 6)	1
3-15	♦	.PLUG, Choke, (Port 10)	1
3-16	♦	.PLUG, Choke, (Port 12A)	1
3-17	♦	.PLUG, Choke, (Port 5A)	1
3-18	♦	.PLUG, Choke, (Port 1A)	1
3-19	♦	.PIPE BRACKET BODY, Asy., (Incl. Ref. Nos. 3-14 to -18, 1-1 & 2B-1)	

▲ NOTE: Accessories

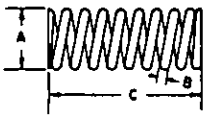
VARIABLE DETAILS

Pipe Bracket Portion Asy. Pc.No.	Pipe Bracket Body Pc.No.	CHOKE PLUG (Pc.No.)					Cut-Out Cock & Strainer
Port No.		1A	5A	6	10	12A	
Ref. No.	3-19	3-18	3-17	3-14	3-15	3-16	3-4
560215	560213	68907 3/8 (No. 51 Dr.)	83017 3/8 (5/16 Dr.)	555384 3/8 (No. 71 Dr.)	78370 3/8 (No. 15 Dr.)	--	562834
560691	560692	502488 3/8 (No. 30 Dr.)	538384 3/8 (No. 26 Dr.)	555384 3/8 (No. 71 Dr.)	552288 3/8 (No. 32 Dr.)	--	562834
560701 less Emer. Lim. V.	560702	-- 3/8 (No. 43 Dr.)	560208 3/8 (No. 26 Dr.)	536568 3/8 (No. 33 Dr.)	-- 3/8 (No. 33 Dr.)	536568 3/8 (No. 33 Dr.)	562834
561495	561496	-- 3/8 (No. 13 Dr.)	56648 3/8 (No. 13 Dr.)	555384 3/8 (No. 71 Dr.)	552288 3/8 (No. 32 Dr.)	--	562834
562630	562629	536568 3/8 (No. 33 Dr.)	64785 3/8 (9/32 Dr.)	555384 3/8 (No. 71 Dr.)	538383 3/8 (No. 20 Dr.)	--	562834
562825	562824	538384 3/8 (No. 26 Dr.)	562823 3/8 (21/64 Dr.)	555384 3/8 (No. 71 Dr.)	562822 3/8 (No. 8 Dr.)	--	562834
562826	562827	538384 3/8 (No. 26 Dr.)	538384 3/8 (No. 26 Dr.)	555384 3/8 (No. 71 Dr.)	552288 3/8 (No. 32 Dr.)	--	562834
564519	564273	504858 3/8 (No. 52 Dr.)	538384 3/8 (No. 26 Dr.)	555384 3/8 (No. 71 Dr.)	552288 3/8 (No. 32 Dr.)	--	565124
565642	565443	79967 3/8 (3/64 Dr.)	538389 3/8 (No. 48 Dr.)	555384 3/8 (No. 71 Dr.)	528790 3/8 (5/64 Dr.)	--	565124
574323	574324	56992 (Solid)	50716 3/8 (1/4 Dr.)	555384 3/8 (No. 71 Dr.)	50716 3/8 (1/4 in. Dr.)	56992 (Solid)	562834
580719	580720	56992 (Solid)	50716 3/8 (1/4 Dr.)	555384 3/8 (No. 71 Dr.)	50716 3/8 (1/4 in. Dr.)	--	562834

■ NOTE: For Details of Cut-Out Cock and Strainer, see P.C. 3216-2.

NOTE: Rubber Parts Maintenance Kits are listed on Page 9.

SPRING INFORMATION



The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

Pc.No.	Approx. Out. Dia. "A" in.	Approx. Wire Dia. "B" in.	Approx. Free Height "C" in.	Approx. No. Turns ☆	Material
92491	3/4	7/64	2-3/8	11	Steel
513312	11/32	1/32	21/32	7-1/2	Bronze
520824	3/4	3/64	23/64	8-3/4	Steel
558151	2-5/16	1/8	2-47/64	5	Steel
558168	1-3/32	3/32	1-11/16	5	Steel
558172	15/32	3/64	1-11/64	8-1/2	Steel
559715	1/2	1/16	2-7/64	16-1/2	Steel
559744	2	7/64	4	6	Steel
560369	5/16	1/32	9/16	7-1/2	Steel
560373	7/8	1/8	2	8-3/4	Steel
560410	7/32	1/32	15/16	14	St'less St.
560506	9/16	1/16	2-1/4	14-1/2	Steel
562639	25/32	7/64	2-1/2	10-1/2	Steel
562895	15/16	3/32	7/8	4	Steel
564018	1-29/32	5/64	2-1/2	6-1/2	Steel
569676	11/32	1/32	1-1/32	9-1/2	Steel
570234	33/64	5/64	1-61/64	14	Steel
570254	33/64	5/64	1-31/32	15	Steel
574825	11/32	3/64	5/8	7	St'less St.

☆ Number of turns for each spring counted between extreme ends of wire.



WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
Wilmerding, Pennsylvania 15148

operation & maintenance information

"J-1" RELAY VALVE PORTION, Pc.No. 556441 (Single Diaphragm Type)

NOTE: The following description of operation is based on this device and its components being new or this device and its components having been repaired, tested, installed and maintained in accordance with instructions issued by the appropriate governing bodies and this and any other applicable WABCO publications.

I. DESCRIPTION

The "J-1" Relay Valve Portion Pc. No. 556441 is a diaphragm operated, self-lapping valve that functions to direct or exhaust air pressure in the brake cylinder pipe during air brake operation in accordance with a brake cylinder control pressure. The portion is designed to be mounted on a manifold, or to a pipe bracket that may be arranged for either suspension or floor mounting. Consult your Westinghouse Air Brake Division Representative for correct style of mounting for specific installations.

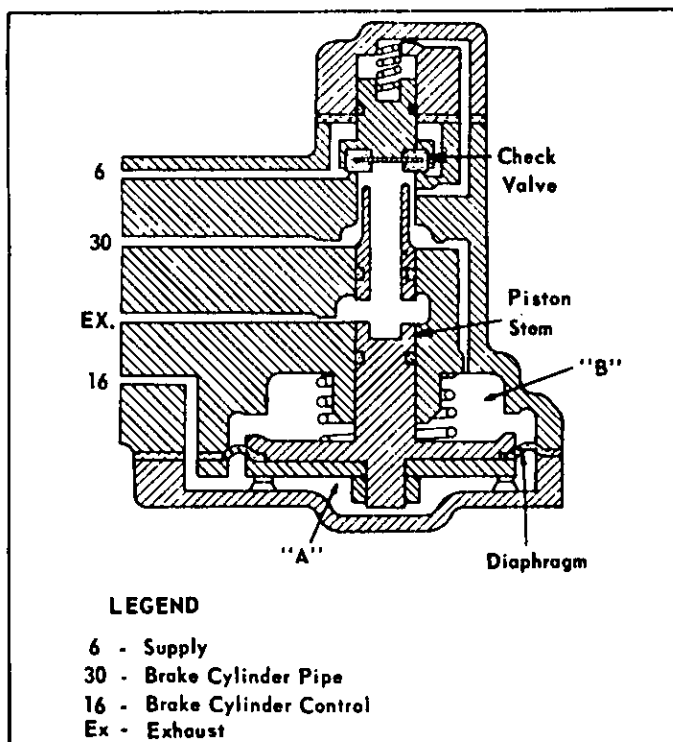


FIGURE 1 - DIAGRAMMATIC VIEW

II. OPERATION

(Refer to the diagrammatic view Figure 1)

A controlled air pressure build-up in passage 16 results in a corresponding build-up in pressure on the relay valve diaphragm in chamber "A" which causes a movement of the diaphragm assembly and piston stem. The piston stem is forced to close against the check valve which blanks off passage 30 (brake cylinder) from exhaust. The check valve is then lifted from its seat by the piston

stem permitting supply air (passage 6) to flow into passage 30 that is connected to the brake cylinder pipe. Passage 30 is also connected to chamber "B" on the spring side of the diaphragm. The build-up of air at brake cylinder pipe pressure in chamber "B" along with the spring force oppose the movement of the diaphragm assembly initiated by the controlled air pressure admitted into passage 16. An equalization of forces across the diaphragm positions the diaphragm assembly to allow the check valve to seat and remain in a lap position.

The maintaining feature of the relay valve portion will function if pressure fluctuates in the brake cylinder pipe. If the pressure in passage 30 as well as the pressure in chamber "B" drops, the piston stem will move to open the check valve. Supply air will then again flow into passage 30 as well as chamber "B" until an equalization of forces across the diaphragm is again reached. The diaphragm assembly is then positioned to permit the valve to reassume a lap position.

A decrease of air pressure in passage 16 (brake cylinder control) results in a corresponding decrease in pressure in the relay valve diaphragm chamber "A" which causes a movement of the diaphragm assembly and piston stem. The piston stem is forced to unseat from the check valve, permitting air at brake cylinder pipe pressure (passage 30) to flow to atmosphere at the exhaust port. A graduated release of brake cylinder air out of passage 30 can be obtained if control pressure in passage 16 is intermittently depleted. When an equalization of forces exists across the diaphragm, the valve will again assume a lap position. The amount of air pressure available for braking is a function of the pressure in chamber "A".

III. MAINTENANCE PROCEDURES AND TECHNIQUES



The following statements of warning apply all or in part wherever this symbol  appears in the maintenance procedures. Failure to observe these precautions may result in serious injury to those performing the work and/or bystanders.

- The use of an air jet, which must be less than 30 p.s.i.g., to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. Wire brushing may also cause particles of dirt, rust, and scale to become airborne. These conditions may cause skin and/or eye irritation.
- When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.



- Personal eye protection must be worn when performing any work on this device or its component parts to avoid any possible injury to the eyes.
- The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data (such as OSHA Form OSHA-20 or its equivalent). The recommended precautions and procedures of the manufacturers should be followed.
- When performing any test or work on devices or equipment while they are on the vehicle (on car test etc.) special precautions must be taken to insure that vehicle movement will not occur which could result in injury to personnel and/or damage to equipment.
- Assembly may be under a spring load. Exercise caution during disassembly so that no parts "Fly Out" and cause bodily injury.

IMPORTANT

THE "J-1" RELAY VALVE PORTION SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED, AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

<u>RECOMMENDED TYPE OF APPLICATION</u>	<u>FREQUENCY AT LEAST ONCE EVERY</u>
Locomotive	12 Months
Freight Cars	144 Months
Passenger (Interstate)	36 Months
Transit	24 Months
Multiple Operated Electric Unit	15 Months

III.A. CLEANING SOLVENT AND LUBRICANT

1. The solvent used for cleaning the parts of the Relay Valve Portion MUST BE an aliphatic organic solution such as mineral spirits or naphtha that will dissolve oil or grease and that will permit all parts to be cleaned without abrasion.
2. No. 2 Silicone Grease, WABCO Specification M-7680-2 is used to lubricate all o-rings, o-ring grooves and the bearing surface of the bushings into which o-ring assemblies are installed.
3. A compound consisting of one part graphite, WABCO Specification M-7695-2 (AAR-913) and two parts of oil (SAE-20) by weight is used to coat the threads of choke plug(s) after the plug(s) has been cleaned.

III.B. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the valve portion.
2. The work area is to be clean and free of debris.

III.C. DISASSEMBLY

(Refer to the exploded view Figure 2)

IMPORTANT: Removal, cleaning and replacement of choke plugs MUST BE done in accordance with paragraph III.D.3.

1. WARNING

THE CARRIER SPRING (3) MAY BE UNDER A COMPRESSED LOAD. EXERCISE CARE DURING THE FOLLOWING PROCEDURE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY.

Remove the three 3/8" x 1" hex head cap screws (1) which secure the top cover (2) to the body (18). Then remove the top cover (2).

2. Remove the carrier spring (3) from the check valve and carrier assembly (4).
3. Remove the check valve and carrier assembly (4) from the body (18).
 - a. Remove and DISCARD the 1-1/8" O.D. o-ring (5) from the carrier (4C).
 - b. Remove the 1/8" x 15/16" cylindrical roll pin (4A) which secures the check valve (4B) to the carrier (4C), then remove the check valve (4B) from the carrier (4C).
4. Remove the cover gasket (6).

5. WARNING

THE PISTON RETURN SPRING (13) MAY BE UNDER A COMPRESSED LOAD. EXERCISE CARE IN THE FOLLOWING PROCEDURE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY.

Remove the five 1/2" x 1-3/4" hex cap screws (7) which secure the bottom cover (8) to the valve body (18). **CAREFULLY** remove the bottom cover (8).

6. Remove the diaphragm piston assembly (9, 10, 11, 12, 14, 15, 16) from the body (18) as a unit.

RELAY VALVE PORTION

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
	556441	RELAY VALVE PORTION, ASY.	
1-1	7978	.SCREW, Cap, H.Hd., 3/8 x 1 in.	3
1-2	564689	.COVER, Check Valve	1
1-3	■545053	.SPRING, Carrier	1
1-4	564045	.CHECK VALVE and CARRIER, Asy.	1
1-4A	550419	..PIN, Cylindrical Roll, 1/8 x 15/16 in.	1
1-4B	■564050	..VALVE, Check	1
1-4C	564051	..CARRIER	1
1-5	■527555	.O-RING, 1-1/8 in. O.D.	1
1-6	■553823	.GASKET, Check Valve Cover. . . .	1
1-7	3205	.SCREW, Cap, H.Hd., 1/2 x 1-3/4 in.	5
1-8	556446	.COVER, Diaphragm (Bottom)	1
1-9	569171	.NUT, Hex., 3/4 in.	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-10	556309	.FOLLOWER	1
1-11	■564081	.DIAPHRAGM	1
1-12	556308	.HEAD, Piston	1
1-13	■556305	.SPRING, Piston Return.	1
1-14	■523734	.O-RING, 7/8 in. O.D.	1
1-15	■527555	.O-RING, 1-1/8 in. O.D.	2
1-16	556306	.STEM, Piston	1
1-17	■528764	.GASKET, Ring, 3/4 in. O.D.	3
1-18	556442	.BODY, Portion, Asy., (also includes -1 and -7)	1
1-18A	78758	..PLUG, Choke, 1/4 in., (7/64 in. Dr.)	1
1-19	◆97368	GASKET, PIPE BRACKET.	1

■NOTE: For Spring Identification Chart, See Page 4.

●NOTE: Contained in RUBBER PARTS MAINTENANCE KIT, Pc. 560728 (Includes Pipe Bracket Gasket, Ref. 1-19).

□NOTE: Contained in RUBBER PARTS MAINTENANCE KIT, Pc. 581343 (Less Pipe Bracket Gasket, Ref. 1-19).

◆NOTE: Not a part of the Relay Valve Portion, Complete, but of the Complete Device.

CONVERSION KITS

Pc.No.	Parts Name	No. Req'd
561312	 B to J-1 TYPE	
.....	561313 B-3 or B-3-A to J-1-A TYPE	
556441	.RELAY VALVE PORTION	1
97368	.GASKET, Pipe Bracket.	1
557379	STUD, 5/8 x 3-11/16 in. . . .	4
.....	514963 .STUD, 5/8 x 2-1/4 in.	4

J-1 RELAY VALVE PORTION WITH SHIPPING COVER

Pc.No.	Parts Name	No. Req'd
560678	J-1 RELAY VALVE PORTION WITH SHIPPING COVER, ASSEMBLY	
556441	.VALVE PORTION	1
560677	.COVER, SHIPPING.	1
561216	..STUD, 5/8 x 2-7/8 in.	4
502387	..NUT, Hex., 5/8 in.	4
561214	..GASKET, Cover	1

▲NOTE: Pipe Bracket does not include Mounting Brackets.

OTE: Common mounting straps are used for both floor or suspension mounted "J" Type Relay Valves, their complete piece numbers have been coded and the addition of a suffix code number will indicate the mounting. Code suffix numbers are as follows:-

-0001 indicating suspension mounted valve, and -0002 the floor mounted valve.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



- b. The interior and exterior surfaces of the body MUST BE completely cleaned by wiping with a clean, lint-free cloth or rag that has been saturated with the prescribed cleaning solvent (paragraph III.A.1.).
- c. Springs may be wire brushed to assist in the removal of rust and scale.
- d. After cleaning, blow all of the parts dry with a low pressure (less than 30 psig) jet of clean, dry air.
- e. Inspect the parts.
 - (1) Reject and replace any spring that is rusted, distorted, pitted or has taken a permanent set. The carrier spring (3) Pc. No. 545053 has an approximate free height of 1-49/64". The piston return spring (13) Pc. No. 556305 has an approximate free height of 2-3/16".
 - (2) Reject and replace any cylindrical spring (roll) pin that is broken or not "elastic" enough to hold securely.
 - (3) Reject and replace any part that is cracked, cut, damaged in any way, worn excessively, or that is in such a condition that may result in unsatisfactory operation.
- e. Inspect the choke to insure that it is clean and unrestricted.
- f. Coat the threads of the choke plug lightly with a compound consisting of one part graphite WABCO Specification M-7695-2 (AAR-913) and two parts of oil (SAE-20) by weight and assemble it into the port from which it was removed.
- g. Go to the next choke and repeat steps b. to f. until all choke plugs have been serviced.

▲ III.E. LUBRICATING AND ASSEMBLING ▲

- 1. Just prior to assembling, lubricate all o-rings, o-ring grooves and the bearing surface of the bushings into which the o-ring assemblies are installed with No. 2 Silicone Grease, WABCO Specification M-7680-2 as follows.
 - a. Coat the o-rings with the grease.
 - b. Fill the groove in which the o-ring is to be installed with the grease.
 - c. Lightly coat the bearing surface of the bushing into which the o-ring assembly is installed with the grease.
- 2. Insert the return spring (13) into the body (18).
- 3. Insert the three 3/4" O.D. ring gaskets (17) into the grooves in bottom cover mounting face of the relay body (18).
- 4. Diaphragm piston assembly
 - a. Install the two lubricated 1-1/8" O.D. o-rings (15) into their proper grooves on the piston stem. Install a lubricated 7/8" O.D. o-ring (14) into the groove in the piston stem (16) at the nut end. Lubrication procedure may be found in paragraph III.E.1. Remove the excess grease by wiping with a clean, lint-free cloth.
 - b. Place the piston head (12) on the piston stem (16) with the diaphragm bead groove of the piston head in the direction of the nut end of the piston.
 - c. Place the diaphragm (11) on the piston head (12) with the diaphragm bead in the direction of the nut end of the piston.
 - d. Place the diaphragm follower (10) on the piston (16) and secure in place with the 3/4" self-locking nut (9). Tighten with a torque value of sixty to sixty-five foot pounds. (IMPORTANT: If the hex nut (9) used is not the self-locking type, it MUST be replaced with a self-locking nut, Pc. No. 569171).

▲ 3. Choke Plugs ▲

(IMPORTANT: The size and cleanliness of choke plugs are important. The choke plugs MUST BE removed one at a time for servicing to avoid misplacement. The following procedure MUST BE adhered to when servicing choke plugs).

- a. Remove one choke only. Perform all the following operations, screw the choke back in place and then remove the next choke for cleaning.
- b. Soak the plug in the cleaning solvent as described in paragraph III.A.1. IMPORTANT: Metallic tools MUST NOT be used to clean chokes as their size and shape MUST NOT BE CHANGED.
- c. While the choke plug is soaking in the solvent, the passage from which it was removed should be checked for cleanliness and blown out if necessary with a low pressure (less than 30 psig) jet of clean, dry air.
- d. Remove the choke plug from the solvent and blow it off with a low pressure (less than 30 psig) jet of clean, dry air.



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operation & maintenance information

- e. Insert the diaphragm piston assembly into the body making sure that the bead of the diaphragm is toward the bottom cover.
5. Place the bottom cover (8) on the body (18) and secure in place with the five 1/2" x 1-3/4" hex head cap screws (7).
6. Check valve and carrier assembly (4).
 - a. Place the check valve (4B) on the carrier (4C) and secure in place with the 1/8" x 15/16" roll pin (4A).
 - b. Insert a lubricated 1-1/8" O.D. o-ring (5) into the groove in the check valve carrier (4C). Lubrication procedure may be found in paragraph III.E.1. Remove the excess grease by wiping with a clean, lint-free cloth. Adhere to the WARNING of paragraph III.A.4.
7. Place the gasket (6) on the top cover mounting face of the body (18).
8. Place the check valve and carrier assembly (4A, 4B, 4C) into the body (18).
9. Insert the carrier spring (3) into the check valve carrier (4C).

10. Place the top cover (2) on the body (18) and secure in place with the three 3/8" x 1" hex head cap screws (1).

IV. TESTING AND ADDITIONAL INFORMATION

IMPORTANT: After the "J-1" Relay Valve Portion Pc. No. 556441 has been assembled BUT BEFORE it is returned to service, it MUST PASS a series of tests following the procedure of the current issue of the WABCO Test Specification T-2513-0 or T-2362-0. Consult the test specifications for "J-1" Relay Valve Portion piece number. When remounting the portion, a NEW mounting gasket (22) Pc. No. 97368 MUST BE used.

IMPORTANT: WHENEVER A "J-1" RELAY VALVE PORTION IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON, AND IT IS REINSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.

Consult your Westinghouse Air Brake Division Representative if additional information is required.



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"J-1" RELAY VALVE PORTION, Pc.No. 556298 **(Single Diaphragm Type)**

NOTE: The following description of operation is based on this device and its components being new or this device and its components having been repaired, tested, installed and maintained in accordance with instructions issued by the appropriate governing bodies and this and any other applicable WABCO publications.

I. DESCRIPTION

The "J-1" Relay Valve Portion Pc. No. 556298 is a diaphragm operated, self-lapping valve that functions to direct or exhaust air pressure in the brake cylinder pipe during air brake operation in accordance with a brake cylinder control pressure. The portion is designed to be mounted on a manifold, or to a pipe bracket that may be arranged for either suspension or floor mounting. Consult your Westinghouse Air Brake Division Representative for correct style of mounting for specific installations.

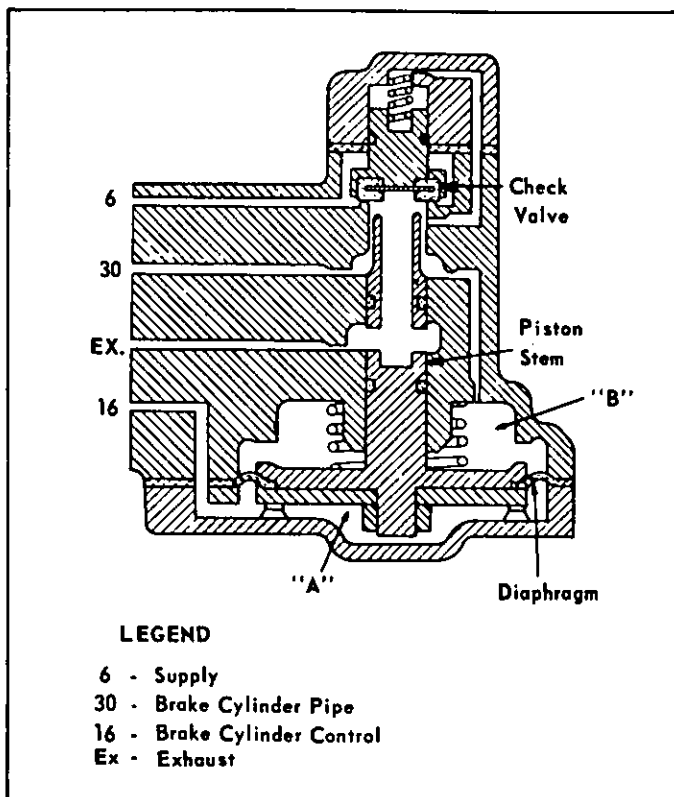


FIGURE 1 - DIAGRAMMATIC VIEW

II. OPERATION

(Refer to the diagrammatic view Figure 1)

A controlled air pressure build-up in passage 16 results in a corresponding build-up in pressure on the relay valve diaphragm in chamber "A" which causes a movement of

the diaphragm assembly and piston stem. The piston stem is forced to close against the check valve which blanks off passage 30 (brake cylinder) from exhaust. The check valve is then lifted from its seat by the piston stem permitting supply air (passage 6) to flow into passage 30 that is connected to the brake cylinder pipe. Passage 30 is also connected to chamber "B" on the spring side of the diaphragm. The build-up of air at brake cylinder pipe pressure in chamber "B" along with the spring force oppose the movement of the diaphragm assembly initiated by the controlled air pressure admitted into passage 16. An equalization of forces across the diaphragm positions the diaphragm assembly to allow the check valve to seat and remain in a lap position.

The maintaining feature of the relay valve portion will function if pressure fluctuates in the brake cylinder pipe. If the pressure in passage 30 as well as the pressure in chamber "B" drops the piston stem will move to open the check valve. Supply air will then again flow into passage 30 as well as chamber "B" until an equalization of forces across the diaphragm is again reached. The diaphragm assembly is then positioned to permit the valve to reassume a lap position.

A decrease of air pressure in passage 16 (brake cylinder control) results in a corresponding decrease in pressure in the relay valve diaphragm chamber "A" which causes a movement of the diaphragm assembly and piston stem. The piston stem is forced to unseat from the check valve, permitting air at brake cylinder pipe pressure (passage 30) to flow to atmosphere at the exhaust port. A graduated release of brake cylinder air out of passage 30 can be obtained if control pressure in passage 16 is intermittently depleted. When an equalization of forces exists across the diaphragm, the valve will again assume a lap position. The amount of air pressure available for braking is a function of the pressure in chamber "A".

III. MAINTENANCE PROCEDURES AND TECHNIQUES



The following statements of warning apply all or in part wherever this symbol  appears in the maintenance procedures. Failure to observe these precautions may result in serious injury to those performing the work and/or bystanders.

- The use of an air jet, which must be less than 30 p.s.i.g., to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be air-borne. Wire brushing may also cause particles of dirt,

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rust, and scale to become airborne. These conditions may cause skin and/or eye irritation.

- When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.
- Personal eye protection must be worn when performing any work on this device or its component parts to avoid any possible injury to the eyes.
- The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data (such as OSHA Form OSHA-20 or its equivalent). The recommended precautions and procedures of the manufacturers should be followed.
- To prevent receiving electrical shock when performing electrical tests, hands must be clear of electrical components, contacts and housing and there must be no bodily contact with the work bench. Failure to heed this warning could result in severe injury or death.
- When performing any test or work on devices or equipment while they are on the vehicle (on car test etc.) special precautions must be taken to insure that vehicle movement will not occur which could result in injury to personnel and/or damage to equipment.
- Assembly may be under a spring load. Exercise caution during disassembly so that no parts "Fly Out" and cause bodily injury.

IMPORTANT

THE "J-1" RELAY VALVE PORTION SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED, AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

<u>RECOMMENDED TYPE OF APPLICATION</u>	<u>FREQUENCY AT LEAST ONCE EVERY</u>
Locomotive	12 Months
Freight Cars	144 Months
Passenger (Interstate)	36 Months
Transit	24 Months
Multiple Operated Electric Unit	15 Months

III.A. CLEANING SOLVENT AND LUBRICANT

1. The solvent used for cleaning the parts of the Relay Valve Portion MUST BE an aliphatic organic solution such as mineral spirits or naphtha that will dissolve oil or grease and that will permit all parts to be cleaned without abrasion.
2. No. 2. Silicone Grease, WABCO Specification M-7680-2 is used to lubricate all o-rings, o-ring grooves and the bearing surface of the bushings into which o-ring assemblies are installed.
3. A compound consisting of one part graphite, WABCO Specification M-7695-2 (AAR-913) and two parts of oil (SAE-20) by weight is used to coat the threads of choke plugs after the plug has been cleaned.

III.B. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the valve portion.
2. The work area is to be clean and free of debris.

III.C. DISASSEMBLY

(Refer to the exploded view Figure 2)

IMPORTANT: Removal, cleaning and replacement of choke plugs MUST BE done in accordance with paragraph III.D.3.

I. WARNING

THE CARRIER SPRING (3) MAY BE UNDER A COMPRESSED LOAD. EXERCISE CARE DURING THE FOLLOWING PROCEDURE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY.

Remove the three 3/8" hex nuts (1) which secure the top cover (2) to the body (18). Then remove the top cover (2).

2. Remove the carrier spring (3) from the check valve and carrier assembly (4).
3. Remove the check valve and carrier assembly (4) from the body (18).
 - a. Remove the 1-1/8" O.D. o-ring (5) from the carrier (4C).
 - b. Remove the 1/8" x 15/16" cylindrical roll pin (4A) which secures the check valve (4B) to the carrier (4C), then remove the check valve (4B) from the carrier (4C).



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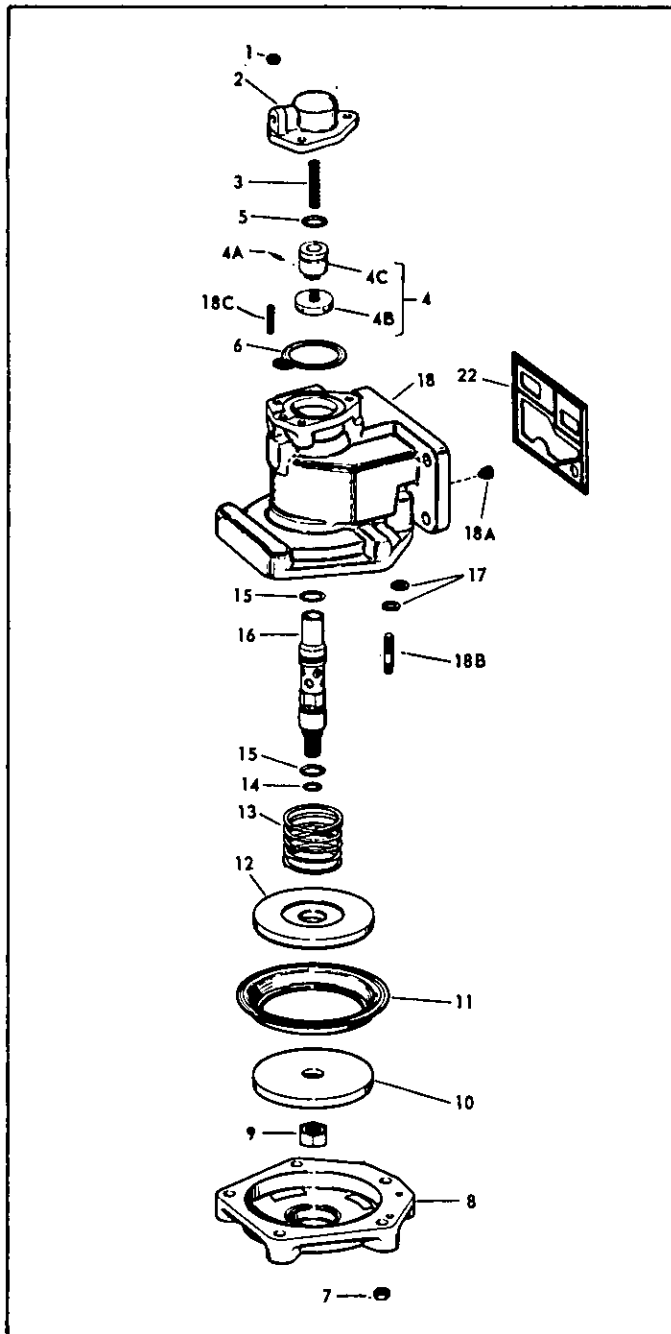


FIGURE 2 - EXPLODED VIEW

4. Remove the cover gasket (6).

⚠ 5. WARNING

THE PISTON RETURN SPRING (13) MAY BE UNDER A COMPRESSED LOAD. EXERCISE CARE IN THE FOLLOWING PROCEDURE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY.

Remove the five 1/2" hex nuts (7) which secure the bottom diaphragm cover (8) to the valve body (18). CAREFULLY remove the bottom cover (8).

6. Remove the diaphragm piston assembly (9, 10, 11, 12, 14, 15, 16) from the body (18) as a unit.
 - a. Remove the two 1-1/8" O.D. o-rings (15) from the piston stem (16).
 - b. To disassemble the piston assembly, hold the piston with an open end wrench, then remove the 3/4" self-locking hex nut (9), follower (10), diaphragm (11), and piston head (12). Remove the 7/8" O.D. o-ring (14) from the piston stem (16).
7. Remove the return spring (13) from the body (18).
8. Remove the three 3/4" O.D. ring gaskets (17) from the bottom cover mounting face of the body (18).

⚠ III.D. CLEANING, INSPECTING AND REPAIRING ⚠

IMPORTANT: Refer to the following WABCO Parts Catalog 3231-12, Sup. 1 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.

1. Rubber Parts

- a. **IMPORTANT:** All rubber parts including gaskets, diaphragms and rubber seated check valves are to be discarded and replaced with NEW Parts ordered from the Westinghouse Air Brake Division of WABCO.
- b. The following Rubber Parts Replacement Kits are available from the Westinghouse Air Brake Division of WABCO: Kit-Pc. No. 560728 includes PipeBracket Gasket; Kit-Pc. No. 58143 - without Pipe Bracket Gasket.

⚠ 2. Metal Parts ⚠

- a. Wash all remaining metal parts in the cleaning solvent described in paragraph III.A.1.
- b. The interior and exterior surfaces of the body MUST BE completely cleaned by wiping with a clean, lint-free cloth or rag that has been saturated with the prescribed cleaning solvent (paragraph III.A.1.).
- c. Springs may be wire brushed to assist in the removal of rust and scale.

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d. After cleaning, blow all of the parts dry with a low pressure (less than 30 psig) jet of clean, dry air.

e. Inspect the parts.

(1) Reject and replace any spring that is rusted, distorted, pitted or has taken a permanent set. The carrier spring (3) Pc. No. 545053 has an approximate free height of 1-49/64". The piston return spring (13) Pc. No. 556305 has an approximate free height of 2-3/16".

(2) Reject and replace any cylindrical spring (roll) pin that is broken or not "elastic" enough to hold securely.

(3) Reject and replace any part that is cracked, cut, damaged in any way, worn excessively, or that is in such a condition that may result in unsatisfactory operation.

3. Choke Plugs

(IMPORTANT: The size and cleanliness of choke plugs are important. The choke plugs MUST BE removed one at a time for servicing to avoid misplacement. The following procedure MUST BE adhered to when servicing choke plugs).

a. Remove one choke only. Perform all the following operations, screw the choke back in place and then remove the next choke for cleaning.

b. Adhering to the WARNING of paragraph III., soak the plug in the cleaning solvent as described in paragraph III.A.1. IMPORTANT: Metallic tools MUST NOT be used to clean chokes as their size and shape MUST NOT BE CHANGED.

c. While the choke plug is soaking in the solvent, the passage from which it was removed should be checked for cleanliness and blown out if necessary with a low pressure (less than 30 psig) jet of clean, dry air.

d. Remove the choke plug from the solvent and blow it off with a low pressure (less than 30 psig) jet of clean, dry air.

e. Inspect the choke to insure that it is clean and unrestricted.

f. Adhering to the WARNING of paragraph III., coat the threads of the choke plug lightly with a compound consisting of one part graphite WABCO Specification M-7695-2 (AAR-913) and two parts of oil (SAE-20) by weight and

assemble it into the port from which it was removed.

g. Go to the next choke and repeat steps b. to f. until all choke plugs have been serviced.

III.E. LUBRICATING AND ASSEMBLING

1. Just prior to assembling, lubricate all o-rings, o-ring grooves and the bearing surface of the bushings into which the o-ring assemblies are installed with No. 2 Silicone Grease, WABCO Specification M-7680-2 as follows.

a. Coat the o-rings with the grease.

b. Fill the groove in which the o-ring is to be installed with the grease.

c. Lightly coat the bearing surface of the bushing into which the o-ring assembly is installed with the grease.

2. Insert the return spring (13) into the body (18).

3. Insert the three 3/4" O.D. ring gaskets (17) into the grooves in bottom cover mounting face of the body (18).

4. Diaphragm piston assembly

a. Install the two lubricated 1-1/8" O.D. o-rings (15) into their proper grooves on the piston stem. Install a lubricated 7/8" O.D. o-ring (14) into the groove in the piston stem (16) at the nut end. Lubrication procedure may be found in paragraph III.E.1. Remove the excess grease by wiping with a clean, lint-free cloth.

b. Place the piston head (12) on the piston stem (16) with the diaphragm bead groove of the piston head in the direction of the nut end of the piston.

c. Place the diaphragm (11) on the piston head (12) with the diaphragm bead in the direction of the nut end of the piston.

d. Place the diaphragm follower (10) on the piston (16) and secure in place with the 3/4" self-locking nut (9). Tighten with a torque value of sixty to sixty-five foot pounds. (IMPORTANT: If the hex nut (9) used is not the self-locking type, it MUST be replaced with a self-locking nut, Pc. No. 569171).

e. Insert the diaphragm piston assembly into the body making sure that the bead of the diaphragm is toward the bottom cover.

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5. Place the bottom cover (8) on the body (18) and secure in place with the five 1/2" hex nuts (7).
6. Check valve and carrier assembly (4).
 - a. Place the check valve (4B) on the carrier (4C) and secure in place with the 1/8" x 15/16" roll pin (4A).
 - b. Insert a lubricated 1-1/8" O.D. o-ring (5) into the groove in the check valve carrier (4C). Lubrication procedure may be found in paragraph III.E.1. Remove the excess grease by wiping with a clean, lint-free cloth.
7. Place the gasket (6) on the top cover mounting face of the body (18).
8. Place the check valve and carrier assembly (4A, 4B, 4C) into the body (18).
9. Insert the carrier spring (3) into the check valve carrier (4C).
10. Place the top cover (2) on the body (18) and secure in place with the three 3/8" hex nuts (1).

IV. TESTING AND ADDITIONAL INFORMATION

- A. **IMPORTANT:** After the "J-1" Relay Valve Portion Pc. No. 556298 has been assembled BUT BEFORE it is returned to service, it MUST PASS a series of tests following the procedure of the current issue of one of the following WABCO Test Specifications; T-2513-0 for use with the AB Test Rack, T-2332-0 for use with the 4D Test Rack, and T-2381-0 for use with the 4C Test Rack. Consult the Test Specification for portion piece number. When remounting the portion, after it has passed the required tests, a NEW mounting gasket (22) Pc. No. 97368 MUST BE used.
- B. **IMPORTANT:** WHENEVER A "J-1" RELAY VALVE PORTION IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON, AND IT IS REINSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
- C. Consult your Westinghouse Air Brake Division Representative if additional information is required.

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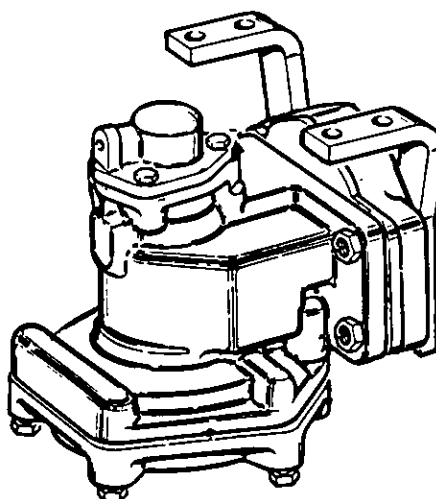
An American-Standard Company

"J" TYPE RELAY VALVES

Single Diaphragm Type

(SUPERSEDES ISSUE DATED OCTOBER, 1968)

PARTS CATALOG



WARNING: AT THE TIME ANY PART IS REPLACED IN THIS DEVICE, THE OPERATION OF THE COMPLETE DEVICE MUST PASS A SERIES OF TESTS AS PRESCRIBED IN THE LATEST ISSUE OF THE APPLICABLE WABCO TEST SPECIFICATION. AT THE TIME THIS DEVICE IS APPLIED TO THE BRAKE EQUIPMENT ARRANGEMENT, A STANDING TEST MUST BE MADE TO INSURE THAT THIS DEVICE FUNCTIONS PROPERLY IN THE TOTAL BRAKE EQUIPMENT ARRANGEMENT. (Consult your local WABCO Representative for identity of the test specifications that cover this device).

Westinghouse Air Brake Division

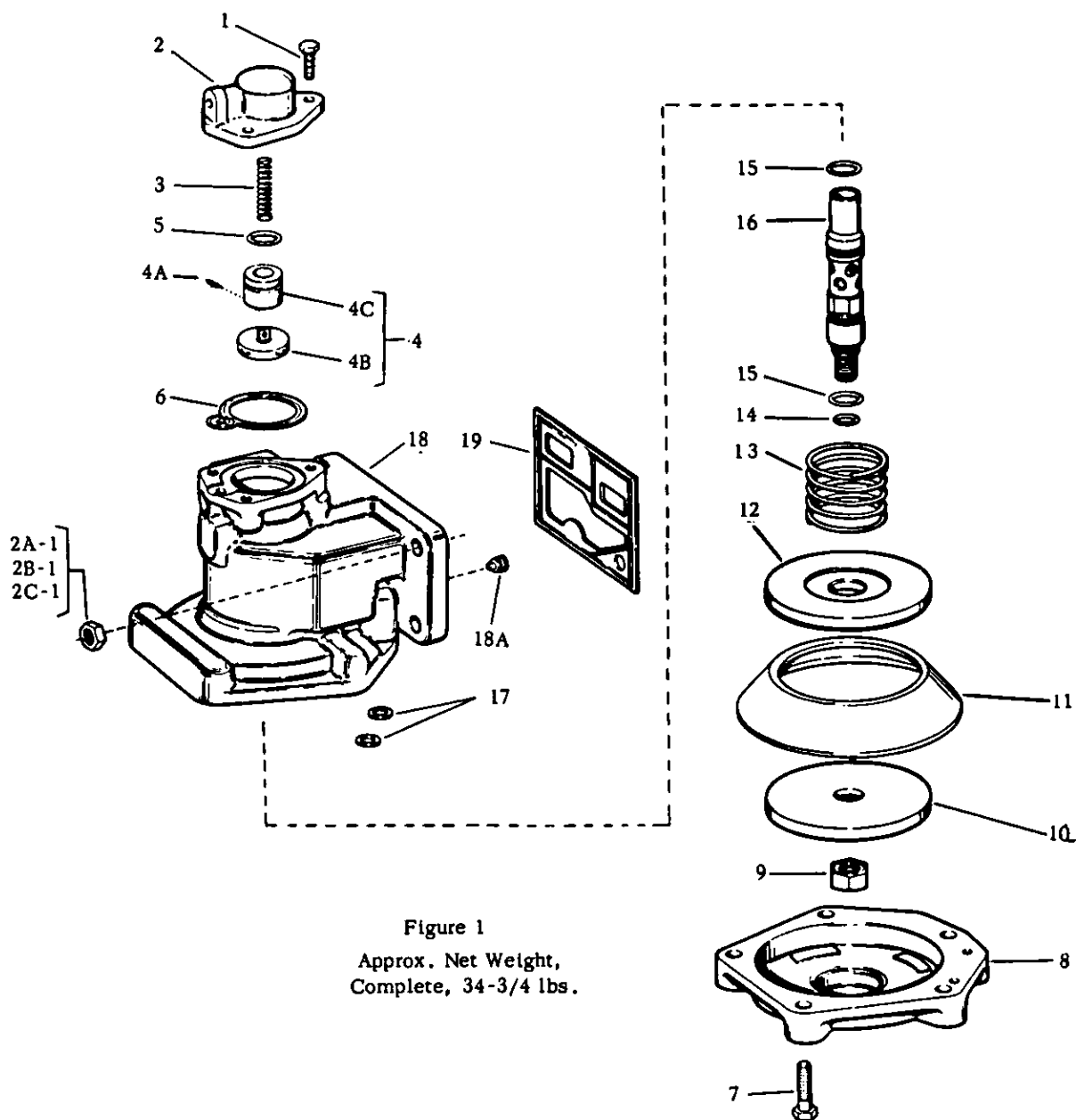
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"J" TYPE RELAY VALVES - INDEX

Type	Assembly Pc. Nos.	Portions		Mounting Brackets		Approx. Net Weight lbs.
		Relay Valve	Pipe Bracket	Right	Left	
J-1	■557290	556441	▲557673	97923	97369 (Fig. 2B)	47-3/4
J-1-A	556440	556441	556296	Suspension Mtg. (Fig. 2A)		76
	558551	556441	558563	Floor Mounting (Fig. 2C)		

NOTES: See page 3

RELAY VALVE PORTION





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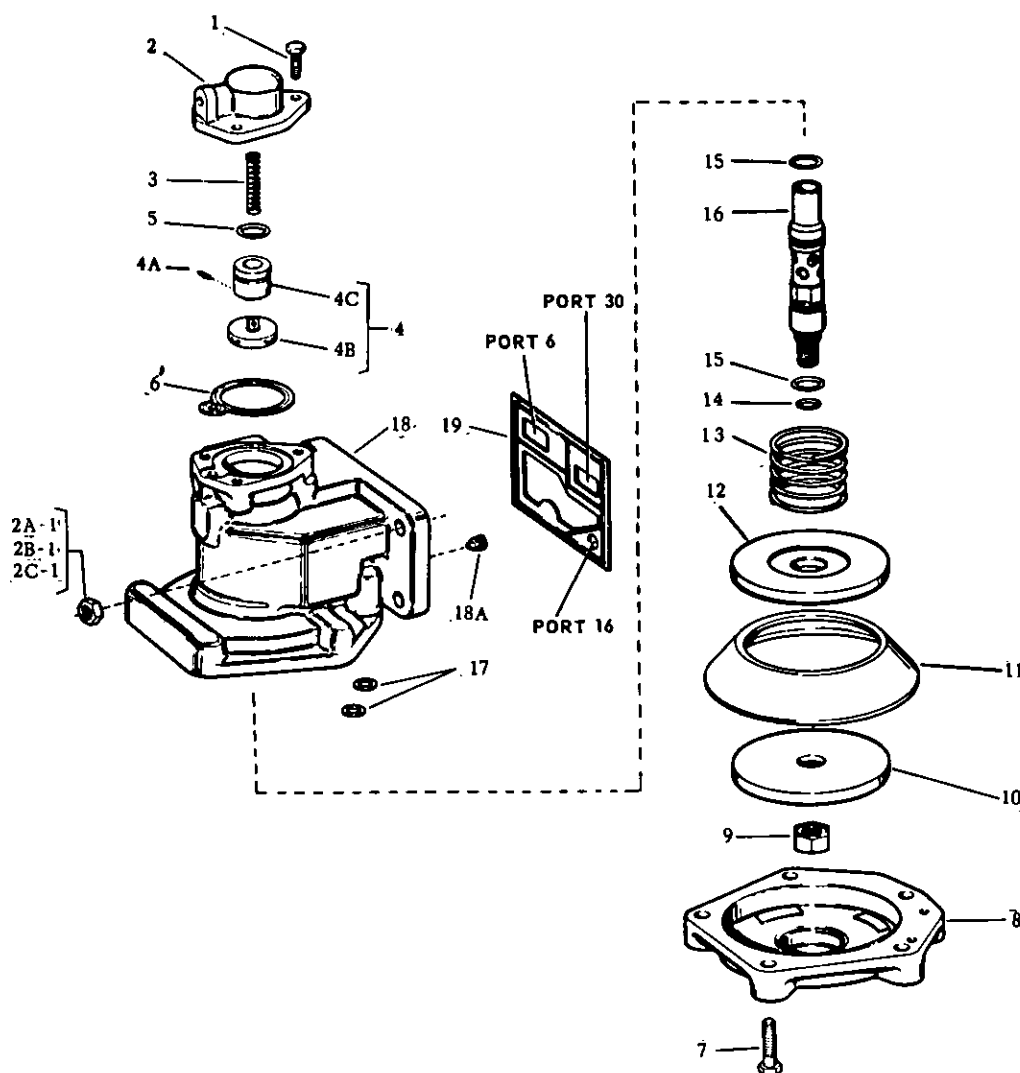


FIGURE 2 - EXPLODED VIEW

- a. Remove and DISCARD the two 1-1/8" O.D. o-rings (15) from the piston stem (16).
- b. To disassemble the piston assembly, hold the piston with an open end wrench, then remove the 3/4" self-locking hex nut (9), follower (10), diaphragm (11), and piston head (12). Remove and DISCARD the 7/8" O.D. o-ring (14) from the piston stem (16).
7. Remove the return spring (13) from the body (18).
8. Remove and DISCARD the three 3/4" O.D. ring gaskets (17) from the bottom cover mounting face of the body (18).

reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.

1. Rubber Parts

- a. All rubber parts including gaskets, diaphragms, and rubber seated check valves are to be discarded and replaced with NEW parts obtained from the Westinghouse Air Brake Division of American Standard Inc.
- b. A Rubber Parts Replacement Kit which includes replacement rubber parts and a NEW Pipe Bracket Gasket may be obtained by ordering Pc. No. 560728.

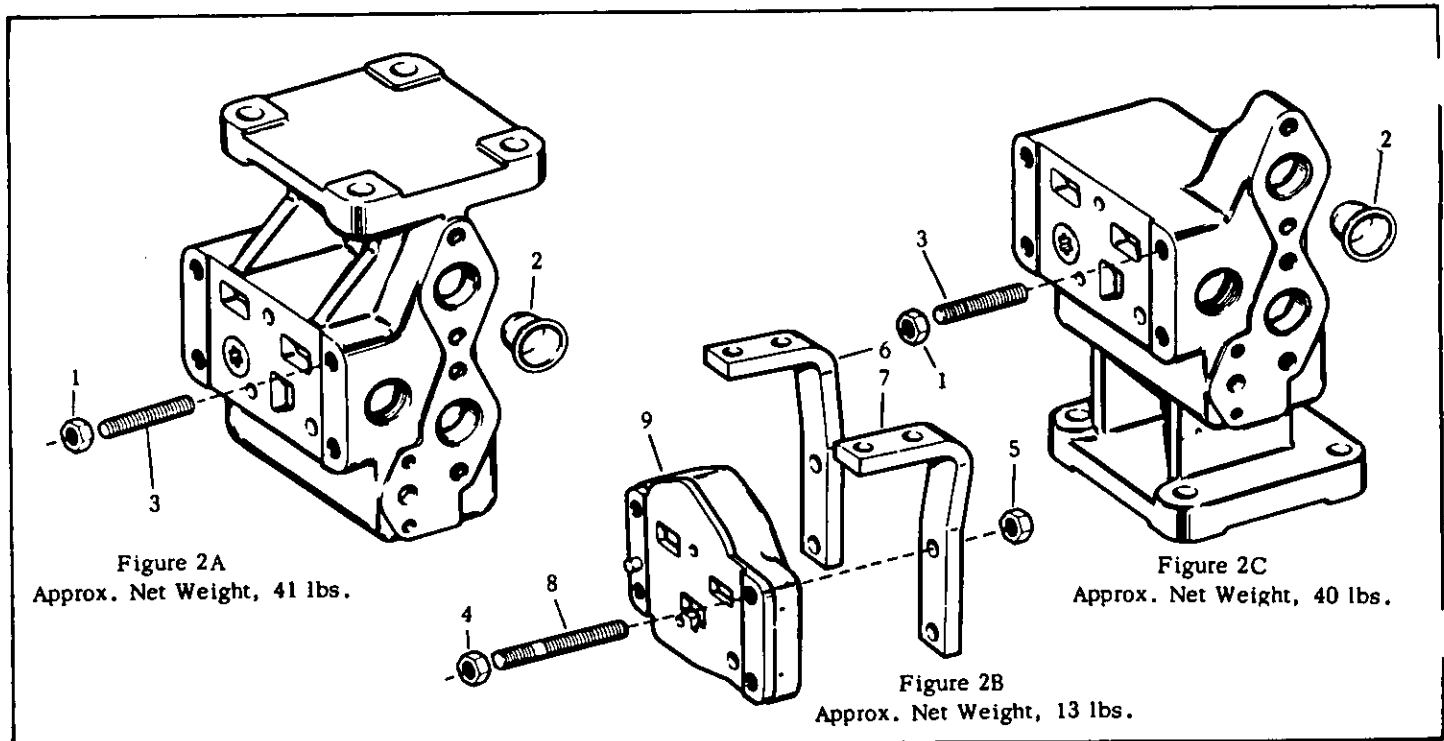
III.D. CLEANING, INSPECTING AND REPAIRING

IMPORTANT: Refer to WABCO Parts Catalog 3231-12, when ordering replacement parts. **CAUTION:** The

August, 1979

2. Metal Parts

- a. Wash all metal parts in the cleaning solvent described in paragraph III.A.1.



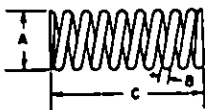
PIPE BRACKET PORTION AND MOUNTING BRACKETS

Type	Susp. J-1-A	Floor J-1-A	x J-1	x		No Req'
Figure	2A	2C	2B	2B		
Ref.No.	Piece Numbers				Parts Name	
2-	556296	558563	.....	.....	PIPE BRACKET PORTION, ASSEMBLY	
2-1	27009	27009	.....	.....	.NUT, Hex., 5/8 in.	4
2-2	542291	542291	.....	.....	.STRAINER	2
2-3	514963	514963	.....	.....	.STUD, 5/8 x 2-1/4 in.	4
2-4	.....	.....	569170	569170	.NUT, Hex., 5/8 in.	4
2-5	.....	.....	569170	569170	.NUT, Hex., 5/8 in.	4
2-6	.....	.....			.BRACKET, Mounting, L.H.	
2-7	.....	.....			.BRACKET, Mounting, R.H.	
2-8	.....	.....	557379	557379	.STUD, 5/8 x 3-11/16 in.	4
2-9	.....	.....	557673	562444	.BODY, (Includes Ref.Nos. 2-4, 2-5 and 2-8)	

x NOTE: Does not include Mounting Bracket Ref.Nos. 2-6 and 2-7, which are a part of the Complete Device.

□ NOTE: For Mounting Bracket Piece Numbers, see schedule, page 2.

SPRING IDENTIFICATION TABLE

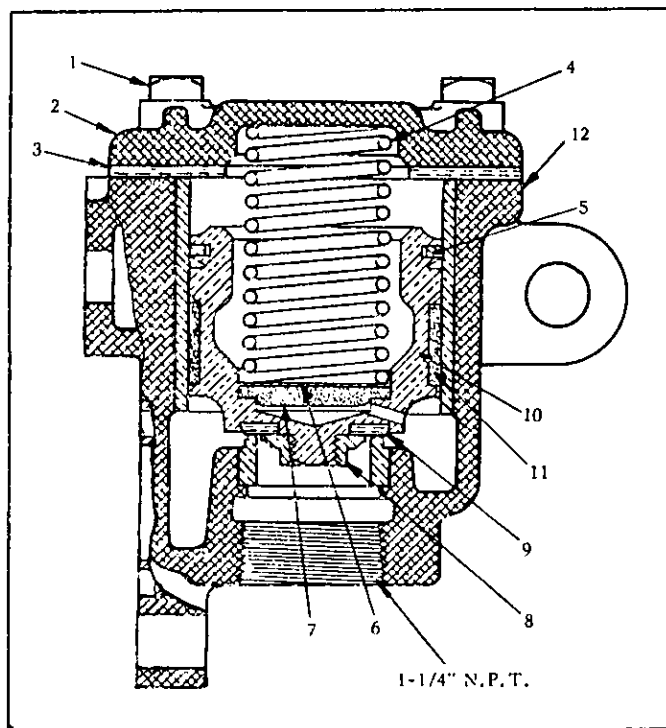


The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

Pc.No.	Approx. Out. Dia. "A" in.	Approx. Wire Dia. "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Material
545053	1/2	5/64	1-49/64	11	Steel
556305	2-5/8	1/8	2-3/16	5-3/4	Steel

*NOTE: Number of turns for each spring counted between extreme ends of wire.

E-3 BRAKE APPLICATION VALVE



ASSEMBLY VIEW

I. DESCRIPTION

The E-3 Brake Application Valve operates when actuated by air pressure from the conductor's or emergency brake valve to quickly vent brake pipe air to atmosphere at an emergency rate initiating an emergency brake application. The valve consists of a body in which a piston valve and piston spring are assembled. The piston is fitted with a piston ring, felt oil retainer, strainer, and strainer plate. When properly lubricated, the oil retainer maintains a coating of oil on the cylinder wall. The strainer is designed to restrict accumulation of dirt on the piston.

II. OPERATION

(Refer to the assembly view)

With the brake application valve properly connected to the brake pipe, brake pipe air normally flows around the outer face of the piston valve (10), thence through a small port in this valve to the spring chamber. From the spring chamber, the air flows through the side connection to the emergency brake valve. With air pressure equal on both faces of the piston valve 10, spring 4 holds the piston valve seated, sealing the atmospheric opening below the seal 9.

When the emergency brake valve is placed in emergency position, it permits the air in the spring chamber of the E-3 Brake Application Valve to escape faster than it can be supplied through the port in the piston valve 10. This rapid change in brake pipe pressure moves the piston valve 10 off its seat providing a large direct opening from brake pipe to atmosphere so that brake pipe air exhausts at an emergency rate which, in turn, signals for an emergency application of the brakes.

III. MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: THE E-3 BRAKE APPLICATION VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED, AND TESTED, AT A MINIMUM OF ONCE EVERY TWENTY-FOUR (24) MONTHS, OR MORE OFTEN IF SERVICE EXPERIENCE SO DICTATES.

III.A. GAGES

1. The correct size piston ring for use on the E-3 Brake Application Valve piston is determined by using the following ring selector gage:
 - a. WABCO part no. 524952, (approved by the AAR).
 - b. WABCO part no. 88624, (alternate set of four gages).

III.B. SAFETY PROCEDURES

1. General shop safety procedures MUST BE followed when working on the valve.
2. The work area should be clean and free of debris.
3. The air jet used to blow parts clean or to blow them dry after being cleaned MUST BE LESS than 30 psig.
4. **WARNING:** THE USE OF AN AIR JET TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.

III.C. CLEANING SOLVENT AND LUBRICANT

1. The solvent used for cleaning the parts removed from the valve must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.
2. The lubricant used to lubricate the piston with retainer and the piston bush is Triple Valve Oil, AAR Specification M-912, WABCO Specification M-7611-20.

WARNING: THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.

III.D. DISASSEMBLY

1. Remove the four 3/8 x 1-3/8 inch square head machine screws (1) which secure the cover (2), then remove the cover (2), and cover gasket (3) from the body (12).

CAUTION: Machine screws must be backed out evenly to gradually uncage spring (4) prior to removal of the cover. Stand clear of opening as a protection against spring flying loose. **PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.**

- a. Remove the piston spring (4), strainer plate (6), strainer (7) and piston assembly (10).
2. Disassemble the piston by removing the oil retainer (11), then remove the seal nut (8) and the seal (9).
 - a. If it is necessary to remove the piston ring (5) due to damage or excessive wear, repair rings are available. The correct size of repair ring must be determined by the use of the ring selector gage (see paragraph III.A.1.).

III.E. CLEANING, INSPECTING AND REPAIRING

NOTE: When ordering replacement parts, refer to parts catalog 3230-4. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the parts name (description) to insure that the desired part is ordered.

1. Metal Parts

- a. Thoroughly clean the interior and exterior of the body (12) using a lint-free cloth or rag which has been saturated with the cleaning solvent prescribed in paragraph III.B.1.
- b. Wash the remaining metal parts in the prescribed cleaning solvent, (paragraph III.B.1.).
- c. The spring may be wire brushed to assist in the removal of rust and scale. **WARNING: WIRE BRUSHING MAY CAUSE PARTICLES OF RUST, SCALE, AND DIRT TO BECOME AIRBORNE. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.**
- d. After cleaning, completely dry all of the parts, including the body, with a low pressure (less than 30 psig) jet of clean, dry air. **PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.**
- e. Inspect the metal parts. Replace the spring if it is pitted, rusted, distorted, or has taken a permanent set. Replace any part that is cracked, broken, worn excessively, damaged, or in such a condition that would result in unsatisfactory operation.

2. Rubber Parts

- a. Rubber parts may be dipped in the prescribed cleaning solution described in paragraph III.B.1. **CAUTION: RUBBER PARTS MUST NOT BE ALLOWED TO SOAK IN THE CLEANING SOLUTION.**
- b. Promptly wipe the rubber parts with a soft, clean, lint-free cloth and blow them dry with a low pressure (less than 30 psig) jet of clean, dry air. **PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.**
- c. Serviceable gaskets may be brushed, using a brush that has soft bristles, such as a shoe brush, to remove any remaining dirt and to polish.
- d. Inspect the rubber parts. Replace any part that is cracked, cut, nicked, broken, worn excessively, damaged or in such a condition that would result in unsatisfactory operation.

3. Oil Retainer (11)

- a. The oil retainer (11) must be washed in the prescribed cleaning solution, paragraph III.B.1. and thoroughly cleaned.
- b. The oil retainer **MUST BE** dried completely.
- c. Inspect the oil retainer. Replace it if it is cracked, cut, torn, worn, or damaged in any way.

III.F. LUBRICATION AND ASSEMBLING

CAUTION: THE OIL RETAINER (11) MUST BE DRIED THOROUGHLY BEFORE INSTALLING IT ON THE PISTON.

1. Install the oil retainer (11) on the piston (10).
 - a. Soak the piston with retainer in Triple Valve Oil AAR Specification M-912, WABCO Specification M-7611-20. The piston with retainer should be allowed to drain for ten minutes after soaking then promptly installed in the valve. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
2. Apply a light film of Triple Valve Oil, AAR Specification M-912, WABCO Specification M-7611-20 to the piston bush. **WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.**
 - a. If the piston ring was removed from the piston (10) install the proper size ring (5) on the piston (10). (See paragraph III.A.).
 - b. Place the seal (9) in position on the piston (10) and secure it with the seal nut (8). Then insert the piston assembly (5, 8, 9, 10, 11) into the piston bush.



Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY / Wilmerding, Pennsylvania 15148

*operation &
maintenance
information*

3. Insert the strainer (7), strainer plate (6) and piston spring (4).
4. Place the cover gasket (3) and cover (2) on the body (12) and secure them in place using the four 3/8 x 1-3/8 inch square head machine screws (1). Tighten the four machine screws evenly to prevent cocking or binding of the spring.

IV. TESTING AND ADDITIONAL INFORMATION

- A. After the E-3 Brake Application Valve has been assembled, BUT BEFORE it is returned to service, it MUST PASS a series of tests following the procedure of

the current issue of the WABCO Test Specification T-785-0.

- B. **IMPORTANT:** WHEN THE E-3 BRAKE APPLICATION VALVE IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED VALVE, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE E-3 BRAKE APPLICATION VALVE FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
- C. Consult your Westinghouse Air Brake Division Representative if additional information is required.

REPAIR SPECIFICATION

WABCO



An American-Standard Company

WESTINGHOUSE AIR BRAKE DIVISION

WILMERDING, PA. 15148 / Westinghouse Air Brake Company

R-63-C, Sup. 1

ISSUE NO. 3

DATE 11-12-76

INSTRUCTIONS FOR THE REPAIR AND MAINTENANCE OF "E" AND "E"-3" BRAKE APPLICATION VALVE

1. PARTS CATALOG

1.1 Refer to Parts Catalogs No. 3230-4 and 3230-4A for (E-3) and No. 3230-4, Sup. 1 for ("E") for the names of parts and for their locations in the respective valve.

2. NOTES AND CAUTIONS

2.1 The solvent used for cleaning the parts removed from the valve must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.

2.1.1 CAUTION: THE USE OF SOLVENTS AS CLEANING AGENTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURER OF THE SOLVENT USED SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR IT'S EQUIVALENT). THE MANUFACTURER'S RECOMMENDED PROCEDURES AND PRECAUTIONS ARE TO BE FOLLOWED.

2.2 Triple Valve Oil (WABCO Specification No. M-7611-20, AAR Specification No. M-913) is required for the lubrication of the piston and piston bush.

2.2.1 CAUTION: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.

2.3 The following must be included among the tools, gages, etc. - required to maintain the application valve.

2.3.1 AAR approved gage Pc. 524252.

2.3.2 Alternate set of four gages Pc. 94307.

2.3.3 9/16 open end wrench.

3. DISASSEMBLE

3.1 Remove the four 3/8" x 1-3/8" square head machine screws which secure the cover to the valve body.

3.2 Remove the following from the valve body:

3.2.1 Cover.

3.2.2 Gasket.

3.2.3 Piston spring.

3.2.4 Piston assembly.

3.3 Remove the following from the inner bore of the piston assembly:

3.3.1 Strainer plate.

3.3.2 Strainer.

3.4 Remove the following from the piston assembly:

3.4.1 Seal nut.

3.4.2 Piston seal.

3.4.3 Oil retainer.

3.5 NOTE: If piston ring removal is necessary due to damage or excessive wear, repair rings are available. To determine the correct size for the repair ring use either of the gages identified under (item 2.3.1 or 2.3.2). Consult parts catalog (item 1.1) for the piece number of the repair rings.

4. CLEAN, INSPECT, AND REPAIR

4.1 CAUTION: THE USE OF SOLVENTS AS CLEANING AGENTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURER OF THE SOLVENT USED SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE MANUFACTURER'S RECOMMENDED PROCEDURES AND CAUTIONS ARE TO BE FOLLOWED.

4.2 The solvent used as a cleaning solution must be in accordance with the requirements of item 2.1 and must be used as directed below.

4.3 Metal parts.

4.3.1 Wash all metal parts in the prescribed cleaning solution.

4.3.1.1 Spring may be wire brushed to assist in removing any excess dirt and/or corrosion. WEAR PERSONAL EYE PROTECTION.

4.3.2 Parts thus cleaned must be dried with a low pressure jet of clean air. WEAR PERSONAL EYE PROTECTION.

4.4 Rubber and felt parts.

4.4.1 NOTE: RUBBER AND FELT PARTS MUST NOT BE PERMITTED TO SOAK IN THE CLEANING SOLUTION.

4.4.2 Rubber and felt parts may be dipped in the prescribed cleaning solution to remove grease and/or dirt.

4.4.3 Cleaned rubber and felt parts must be wiped and immediately dried with a low pressure jet of clean air. WEAR PERSONAL EYE PROTECTION.

4.4.4 Serviceable gaskets must be brushed with a soft bristled brush (such as a shoe brush) to remove any remaining dirt and to polish.

4.5 Inspect all springs for rust pits, distortion, or permanent set. Replace where necessary.

4.6 Replace all parts that are cracked, broken, worn excessively, damaged, or in such a condition as would result in unsatisfactory operation.

5. LUBRICATE AND ASSEMBLE

5.1 Piston assembly.

5.1.1 Install the oil retainer on the piston.

5.1.1.1 Immerse the entire piston with oil retainer in triple valve oil, (item 2.2) until the retainer is saturated. LUBRICANTS MAY CAUSE SKIN AND/OR EYE IRRITATION.

5.1.1.2 NOTE: The piston with oil retainer must be allowed to drain for 10 minutes after the soaking is complete. then promptly install the remaining parts on the piston.

5.1.2 Place the piston ring, if removed in item 3.5, into the piston groove.

5.1.3 Insert the piston seal into the recess on the threaded end of the piston.

5.1.4 Insert the seal nut onto the threaded end of the piston.

5.1.4.1 Tighten the seal nut so that the piston seal is lightly compressed.

5.2 Lightly apply a film of triple valve oil, item 2.2, to the piston bush. LUBRICANTS MAY CAUSE SKIN AND/OR EYE IRRITATION.

5.3 Install the piston assembly, seal nut end first, into the valve body. Press the piston assembly into the valve body until it comes to rest on the stop.

5.4 Insert the strainer, small diameter first, into the inner bore of the piston assembly in the valve body.

5.4.1 Insert the strainer plate on top of the strainer.

5.4.2 Insert the piston spring into the valve body so that it rests against the strainer plate.

5.5 Place the gasket on top of the valve body so that the four holes are properly aligned with the tapped holes in the body.

5.5.1 Carefully position the top cover over the valve body and gasket such that the four mounting holes are properly aligned with the tapped holes in the valve body.

5.5.2 Insert a 3/8" x 1-3/8" square head machine screw through each of the four mounting holes in the cover and into the four tapped holes in the valve body.

5.5.2.1 Equally tighten the four 3/8" x 1-3/8" square head machine screws which were inserted in item 5.5.2.

6. TESTING

6.1 Prior to being placed in service, the repaired device must be tested in accordance with a current issue of test specification T-785-0.

D. Brown
Supervisor - Technical
Services

APPROVED:

JM Thomas
Manager - Engineering
Services

JGB:dlm

REVISION SHEET

Issue No. 1
August 24, 1967
JGB:dlm

Issue No. 2
June 9, 1975
PEJ:njc

Changed entire format of code, Changed the lubrication to triple valve oil, WABCO Specification No. M-7611-20 or AAR Specification No. M-913 from SAE 20 journal oil, AAR Specification No. M-906 because the SAE 20 journal oil was obsoleted.

Issue No. 3
November 12, 1976
WCH:njc

Revised to include reference to Parts Catalog 3230-4A and various caution notes. Added reference to wrench in item 2.3.3 Deleted requirement that body not be washed in solvent.



WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
 Wilmerding, Pennsylvania 15148

parts catalog

"E-3" BRAKE APPLICATION VALVE, Pc.No. 505405

Figure 1

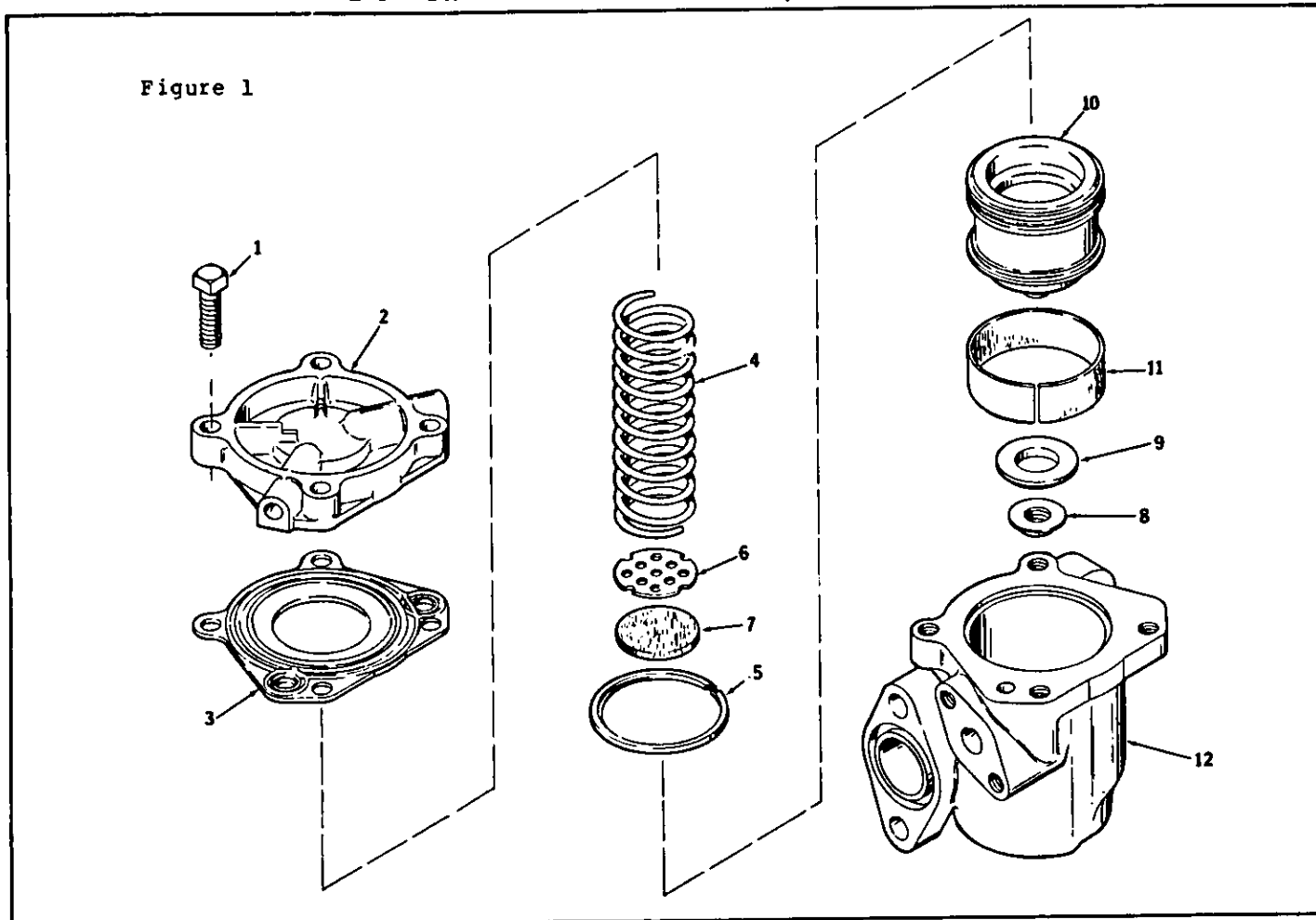


Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	505405	"E-3" BRAKE APPLICATION VALVE, Asy.	
1-1	25410	.BOLT, Mch.Sq.Hd., 3/8 x 1-3/8"	4
1-2	527076	.COVER	1
1-3	84656	.GASKET	1
1-4	▲85954	.SPRING, Piston	1
1-5	•	.RING, Piston, 2-3/4" Dia.	1

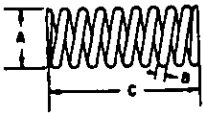
Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-6	513010	.PLATE, Strainer	1
1-7	513009	.STRAINER	1
1-8	72322	.NUT, Seal	1
1-9	78521	.SEAL, Piston	1
1-10	513021	.PISTON	1
1-11	513007	..RETAINER, Oil	1
1-12	505404	.BODY, Valve	1

▲NOTE: See Back Page for Spring Identification
 •NOTE: See Back Page for Repair Piston Rings

⚠WARNING: AT THE TIME ANY PART IS REPLACED IN THIS DEVICE, THE OPERATION OF THE COMPLETE DEVICE MUST PASS A SERIES OF TESTS AS PRESCRIBED IN THE LATEST ISSUE OF THE APPLICABLE WABCO TEST SPECIFICATION. AT THE TIME THIS DEVICE IS APPLIED TO THE BRAKE EQUIPMENT ARRANGEMENT, A STATIONARY VEHICLE TEST MUST BE MADE TO INSURE THAT THIS DEVICE FUNCTIONS PROPERLY IN THE TOTAL BRAKE EQUIPMENT ARRANGEMENT. (Consult your local WABCO Representative for identity of the test specifications, with latest revision date, that cover this device.)

(SUPERSEDES ISSUE DATED JANUARY, 1971)

SPRING IDENTIFICATION



The following table is shown to enable identification of the spring used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

Pc.No.	Approx. Out Dia. "A" in.	Approx. Wire Dia. "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Material
85954	1-19/32	1/8	4-29/32	10	Steel

*NOTE: Number of turns counted between extreme ends of wire.

PISTON REPAIR RINGS

Use	Pc.No.	Description
Standard and First Repair	86829	RING, Piston
Second Repair	86830	RING, Piston

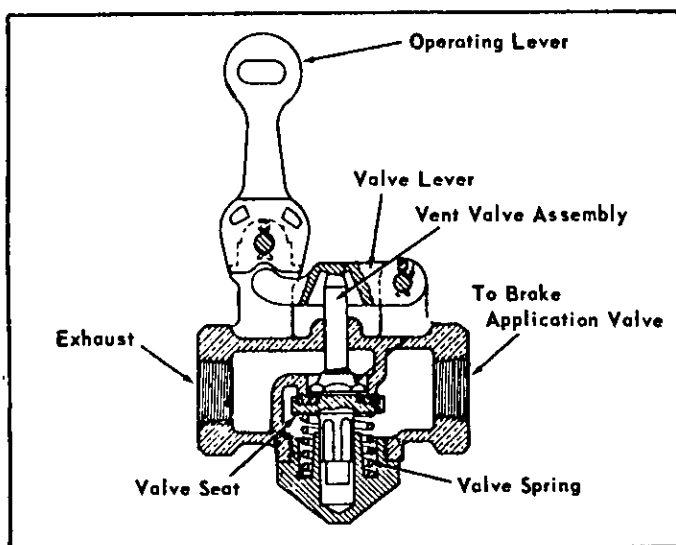
Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

B-3-C EMERGENCY BRAKE VALVE

I. DESCRIPTION

When properly installed and maintained, the B-3-C Emergency Brake Valve, located inside the passenger car, permits a means of manually initiating an emergency brake application.

Referring to the assembly view, the body houses the vent valve assembly which is normally seated by the force of the vent valve spring. Two pipe taps are provided - one is open to atmosphere (exhaust) while the other provides a connection for a pipe leading to a brake application valve or vent valve.



ASSEMBLY VIEW

II. OPERATION

(Referring to the assembly view)

When the operating lever of the B-3-C Emergency Brake Valve is manually rotated to its full operating position by means of a cord or other device, and held in this position, the valve lever is forced downward to unseat the valve assembly. Unseating of the valve assembly causes air from the brake application pipe to be vented to atmosphere which in turn signals the brake application valve or vent valve to function for the purpose of exhausting brake pipe air at an emergency rate.

III. MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: THE B-3-C EMERGENCY BRAKE VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

RECOMMENDED TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Passenger (Interstate)	24 Months
Transit	24 Months
Multiple Operated Electric Unit	15 Months

III.A. CLEANING SOLVENT AND LUBRICANT

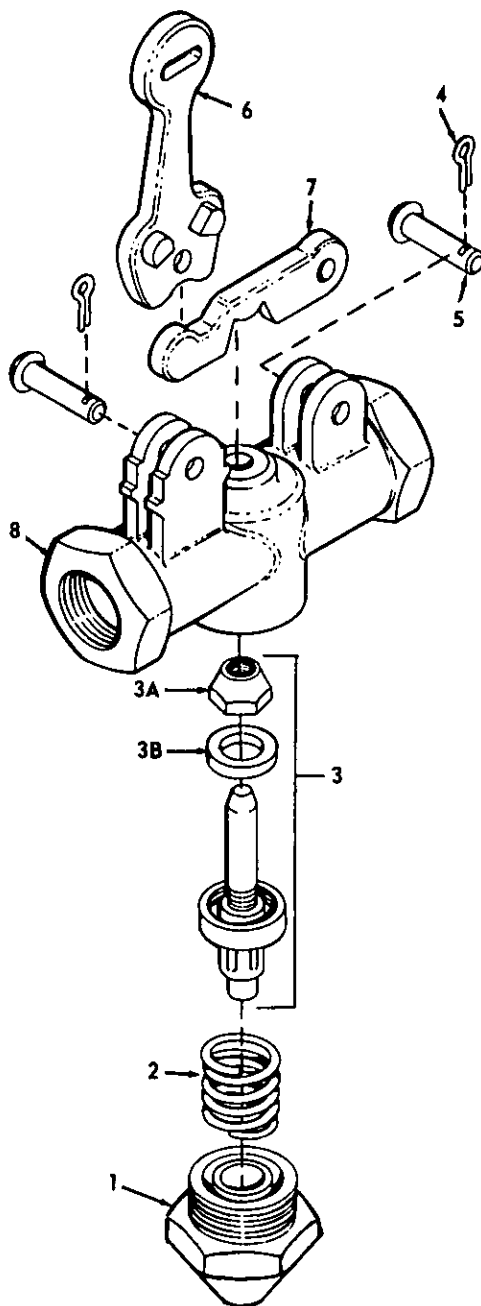
1. The solvent used for cleaning the parts of the B-3-C Emergency Brake Valve must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.
2. Brake cylinder lubricant, WABCO Specification M-7651-2 (AAR Specification M-914) MUST BE available to lubricate the upper and lower parts of the valve stem, the cottered rivets, and valve spring.

WARNING: THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.

III.B. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the valve.
2. The work area should be clean and free of debris.
3. **WARNING:** THE USE OF AN AIR JET, WHICH MUST BE LESS THAN 30 PSIG, TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.
4. Personal eye protection MUST BE worn when working on the valve.

(SUPERSEDES ALL PREVIOUS ISSUES OF G-g-4216-5)



EXPLODED VIEW

III.C. DISASSEMBLY

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

(Refer to the exploded view)

1. **CAUTION:** Exercising care so that no parts are inadvertently expelled and cause an injury, carefully remove the following parts from the bottom of the body (8):

- a. Large cap nut (1)
 - b. Spring (2)
 - c. Vent valve assembly (3, 3A, 3B) as a unit.
2. Disassemble the vent valve assembly (3, 3A, 3B) as follows:
 - a. Remove the vent valve nut (3A) and vent valve seal (3B) from the vent valve (3). **DISCARD** the seal (3B).
 3. Remove the two cotter pins (4) from the two rivets (5).
 - a. **DISCARD** the cotter pins (4)
 4. Remove the operating lever (6) and valve lever (7) from the body (8).

III.D. CLEANING, INSPECTING, AND REPAIRING

(Refer to WABCO Parts Catalog 3216-5 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description, (parts name) to insure that the desired part is ordered).

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. Metal Parts

- a. Wash all of the metal parts, with the exception of the cotter pins which **MUST BE** replaced, in the cleaning solvent as described in paragraph III.A.1.
- b. The spring may be wire brushed to assist in the removal of rust and scale.
WARNING: WIRE BRUSHING WILL CAUSE PARTICLES OF DIRT, RUST, AND SCALE TO BE AIRBORNE.
- c. After the parts are cleaned, they **MUST BE** blown completely dry using a low pressure (less than 30 psig) jet of clean, dry air.
- d. Inspect the metal parts. Replace the spring if it is rusted, pitted, or has taken a permanent set. Replace any part that is cracked, broken, worn excessively, damaged, or in such a condition that may result in unsatisfactory operation.

2. Rubber Part

- a. The seal (3B) **MUST BE** discarded and replaced with a **NEW WABCO Quality Seal**.

III.E. LUBRICATING AND ASSEMBLING

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. Just prior to assembling, lubricate the following parts with a thin film of brake cylinder lubricant, WABCO Specification M-7651-2 (AAR Specification M-914):

- a. The two cotttered rivets (5)
- b. The upper and lower portions of the valve stem (3).
- c. Valve spring (2)

WARNING: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION.

2. Place the valve lever (7) in position on the body (8).
3. Using one of the 5/16 x 1 inch cotttered rivets (5), secure the valve lever (7) to the body (8).
4. Using a NEW 5/8 inch cotter pin (4), secure the rivet (5) in place.
5. Place the operating lever (6) in position on the valve lever (7).
6. Using the remaining 5/16 x 1 inch cotttered rivet (5), secure the operating lever (6) to the body (8).
7. Secure the rivet (5) in place with a NEW 5/8 inch cotter pin (4).
8. Assemble the vent valve assembly as follows:
 - a. Assemble a NEW VENT VALVE SEAL (3B) on the lubricated vent valve stem (3). Lubrication procedure is shown in paragraph III.A.2.
 - b. Secure the seal (3B) in place with the vent valve nut (3A).

9. Install the vent valve assembly (3, 3A, 3B) into the body (8).

- a. **IMPORTANT: BE SURE THAT THE UPPER AND LOWER PORTIONS OF THE VALVE STEM HAVE BEEN LUBRICATED PER PARAGRAPH III.A.2.**

10. Install the lubricated valve spring (2) in place in the body (8).

11. **CAUTION: EXERCISING CARE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY, CAREFULLY secure the vent valve assembly (3, 3A, 3B) and valve spring (2) in place with the large cap nut (1).**

III.F. TESTING AND ADDITIONAL INFORMATION

1. After the "B-3-C" Emergency Brake Valve has been assembled, BUT BEFORE it is returned to service, it MUST PASS a series of tests following the procedure of the current issue of one of the following WABCO Test Specifications:
 - a. T-1063-0 for use with the AB Test Rack.
 - b. T-1489-0 for use with the 4C Test Rack.
 - c. T-428-0 for use with the Individual Test Rack.
2. **IMPORTANT: WHEN A B-3-C EMERGENCY BRAKE VALVE IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON AND IT IS REINSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED VALVE, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE VALVE FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.**
3. Consult your Westinghouse Air Brake Division Representative if additional information is required.

WESTINGHOUSE AIR BRAKE DIVISION
WESTINGHOUSE AIR BRAKE COMPANY
WILMERDING, PA.

REPAIR SPECIFICATION R-72-C, SUP. 1
Issue No. 1 August 22, 1967

INSTRUCTIONS FOR DISASSEMBLING, REPAIRING, AND ASSEMBLING
THE "B" TYPE EMERGENCY BRAKE VALVE

Reference may be made to Parts Catalog No. G-h-3216-5 for names of parts and their location in the emergency brake valve.

I. DISASSEMBLING

- A. Remove the large cap nut from the bottom of the valve body, then remove the spring and vent valve assembly.
 - 1. Disassemble the vent valve by removing the valve nut and seal.
- B. Remove the two (2) cotters and two (2) rivets, then remove the valve lever and operating lever.

II. CLEANING, INSPECTING, AND REPAIRING

- A. Wash all parts, including rubber parts, in a suitable solvent that will dissolve oil or grease and permit all the parts to be thoroughly cleaned without abrasion, except the spring which must be wire brushed. The rubber parts must be promptly wiped dry after cleaning and must not be allowed to soak in the cleaning fluid.
- B. Replace all parts, including rubber parts, that are cracked, broken, cut, worn excessively, damaged, or in such a condition as would result in unsatisfactory operation.
- C. Replace the spring if it is rusted, distorted, or has taken a permanent set.

III. LUBRICATING AND ASSEMBLING

- A. While assembling, apply a thin film of AAR Spec. M-914 brake cylinder lubricant to the upper and lower valve stem.
- B. Install the valve seal on the valve and secure with the valve nut.

- C. Insert the valve assembly into the body, then apply the spring and secure in place with the cap nut.
- D. Install the valve lever and operating lever using the two (2) rivets, then secure them with the two (2) cotters.

A.J. Pommeroy
Specification and
Licensee Engineer
Test Code Unit

APPROVED:

W.B. Park
Director - Railroad
Equipment Engineering

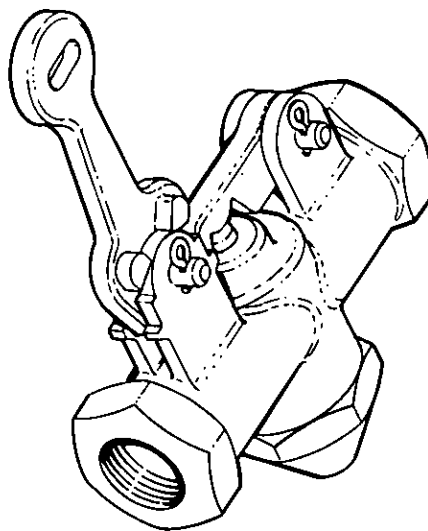
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EMERGENCY BRAKE VALVES

(Supersedes Issue dated March, 1959)

Parts Catalog



WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA / WESTINGHOUSE AIR BRAKE COMPANY

1 1/4 in. EMERGENCY BRAKE VALVES*

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd

1-	535026-0001	1-1/4 in. EMERGENCY BRAKE VALVE, ASY. (R.H.)	
	535026-0002	1-1/4 in. EMERGENCY BRAKE VALVE, ASY. (L.H.)	
1-1	535708	.NUT, Cap, 2-3/8 in. Hex.Hd.	1
1-2	547806	.SPRING, Valve	1
1-3	535705	.VALVE	1
1-3A	502365	.NUT, Valve, 1/2 in. Hex.Hd.	1
1-3B	92273	.SEAL, Valve, 1-53/64 O.D.	1
1-3C	535707	.WASHER, 1-3/16 O.D.	1
1-4	2958	.COTTER, 5/8 in.	2
1-5	535710	.RIVET, Cottered, 5/16 x 1-1/4 in.2	
1-6	535709	.LEVER, Operating	1
1-7	13574	.LEVER, Valve	1
1-8	535704	.BODY, Valve	1

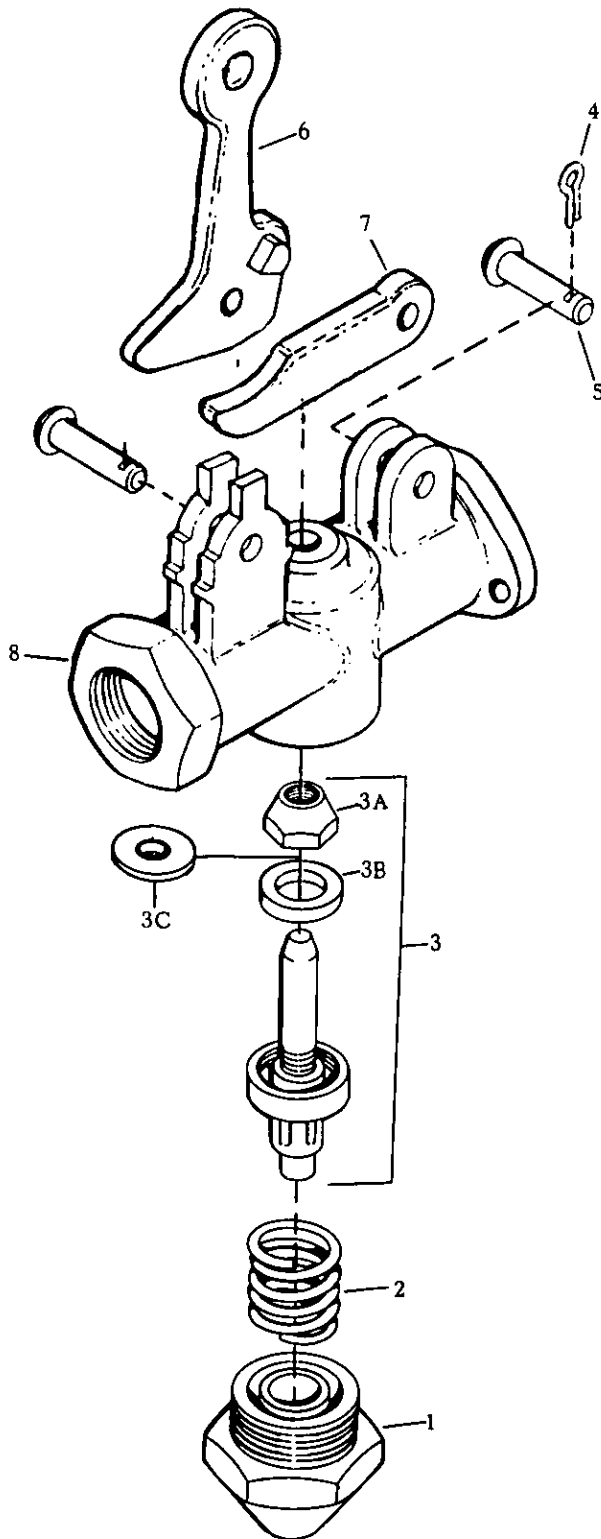
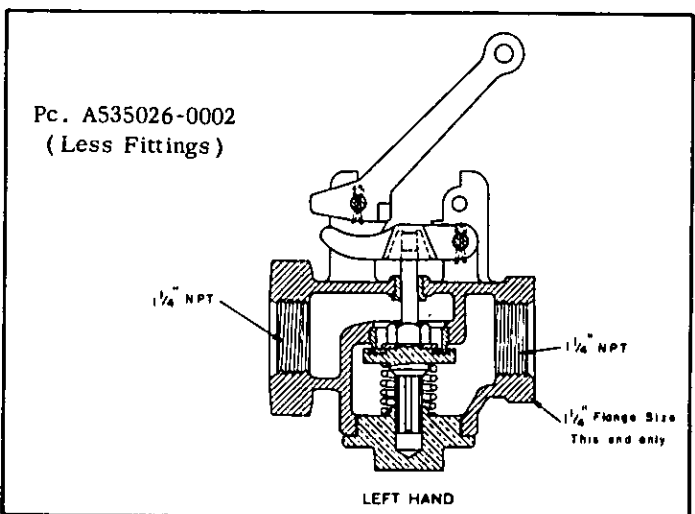
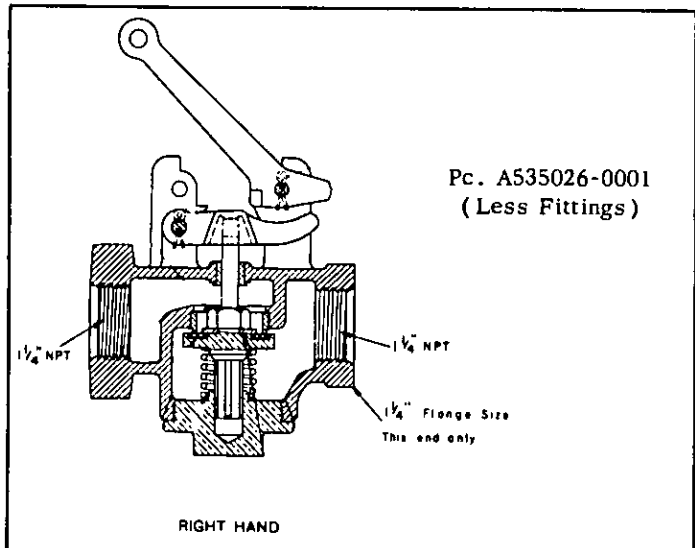


Figure 1

Approx. Net Weight 10 lbs.



* NOTE: RECOMMENDED STANDARD for Locomotive Installation

† For Spring Identification, see page 6

"B-3-B" EMERGENCY BRAKE VALVE **

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	88566	B-3-B EMERGENCY BRAKE VALVE, ASY.	
2-1	544833	.NUT, Cap, 5/8 in. Hex.Hd.	1
2-2	547806	.SPRING, Valve	1
2-3	1735	.VALVE, Vent	1
2-3A	1738	.NUT, Valve, 7/16 in. Hex.Hd.	1
2-3B	72433	.SEAL, Valve, 1.353 O.D.	1
2-4	2958	.COTTER, 5/8 in.	2
2-5	13576	.RIVET, Cottered, 5/16 x 1 in.	2
2-6	13575	.LEVER, Operating	1
2-7	13574	.LEVER, Valve	1
2-8	88565	.BODY, Valve	1

** NOTE: RECOMMENDED STANDARD for Passenger Car Equipment

† For Spring Identification, see page 6

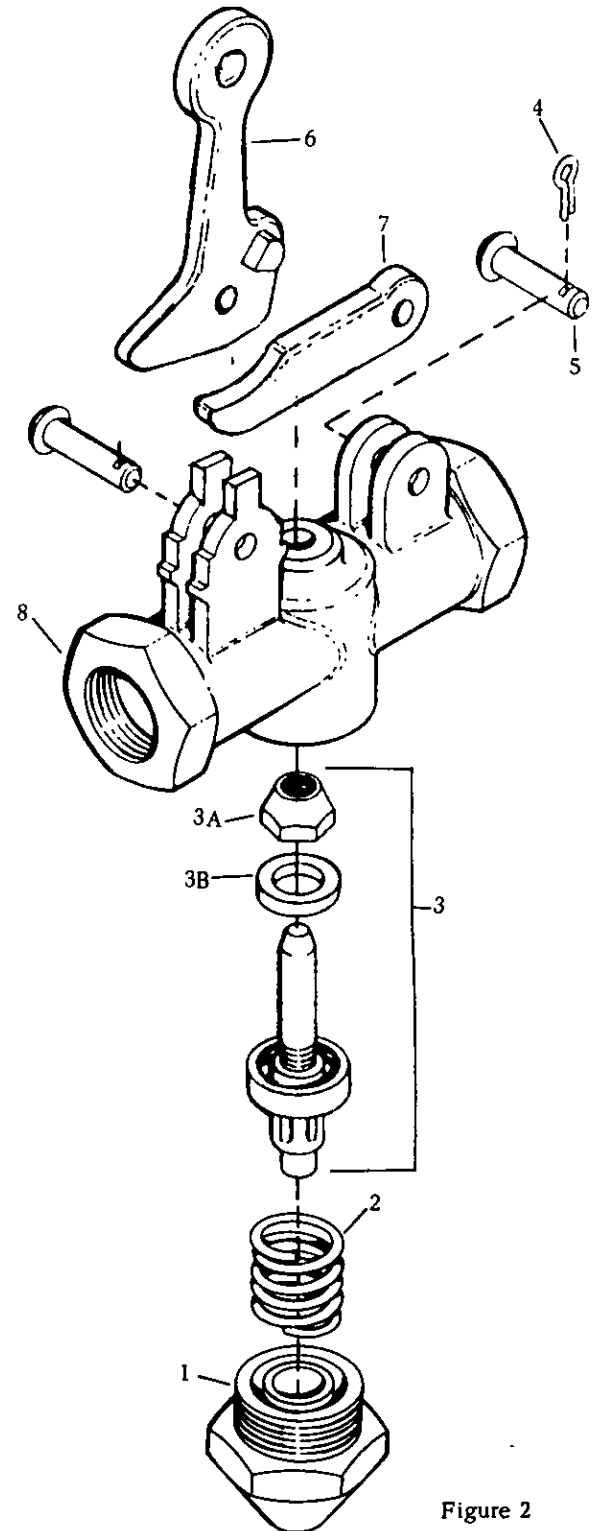


Figure 2

Approx. Net Weight 3-1/2 lbs

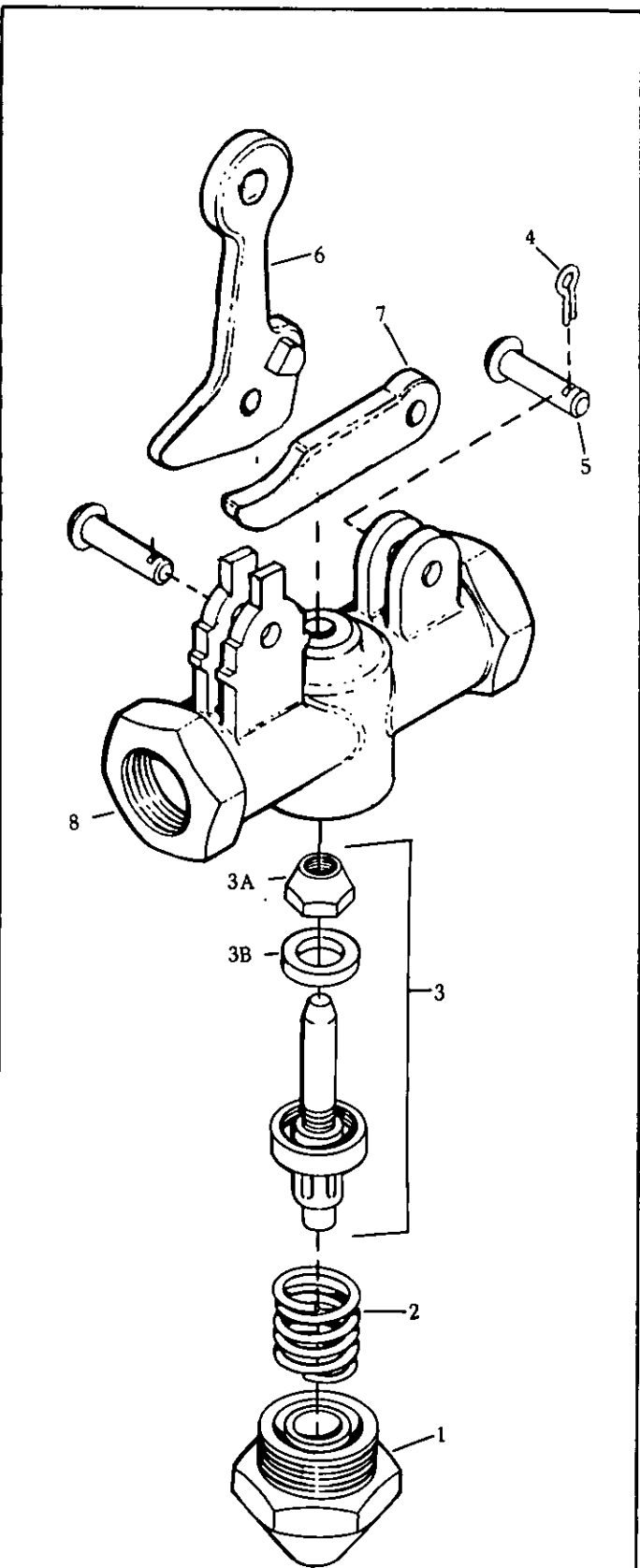


Figure 3

Approx. Net Weight 4 lbs.

"B-3-A" EMERGENCY BRAKE VALVE **

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-	51497	"B-3-A" EMERGENCY BRAKE VALVE, ASY.	
3-1	544833	.NUT, Cap, 5/8 in. Hex. Hd.	1
3-2	547806	.SPRING, Valve	1
3-3	1735	.VALVE, Vent	1
3-3A	1738	..NUT, Valve, 7/16 in. Hex.Hd. . . .	1
3-3B	72433	..SEAL, Valve, 1.353 O.D.	1
3-4	2958	.COTTER, 5/8 in.	2
3-5	13576	.RIVET, 5/16 x 1 in.	2
3-6	13575	.LEVER, Operating	1
3-7	13574	.LEVER, Valve	1
3-8	51539	.BODY, Valve.	1

** NOTE: RECOMMENDED STANDARD for Passenger Car Equipment

† NOTE: For Spring Identification, see Page 6

"B-3-C" EMERGENCY BRAKE VALVE

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
4-	93510	"B-3-C" EMERGENCY BRAKE VALVE, Asy. (Operative from either side)	
4-1	544833	.NUT, Cap, 5/8 in. Hex.Hd.	1
4-2	547806	.SPRING, Valve	1
4-3	1735	.VALVE, Vent	1
4-3A	1738	.NUT, Valve, 7/16 in. Hex.Hd.	1
4-3B	72433	.SEAL, Valve, 1.353 O.D.	1
4-4	2958	.COTTER, 5/8 in.	2
4-5	13576	.RIVET, Cottered, 5/16 x 1 in.	2
4-6	93495	.LEVER, Operating	1
4-7	93610	.LEVER, Valve	1
4-8	93496	.BODY	1

NOTE: For Spring Identification, see Page 6

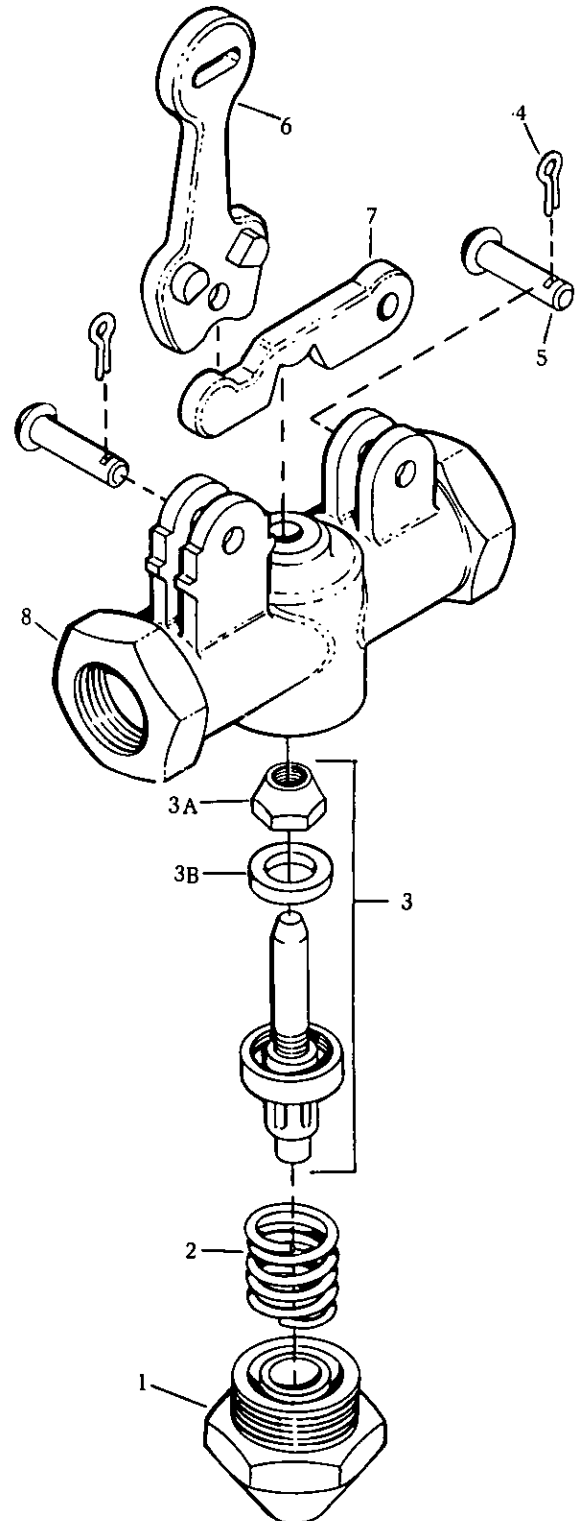


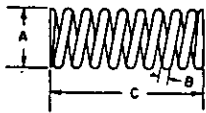
Figure 4

Approx. Net Weight 4-1/2 lbs.



SPRING IDENTIFICATION TABLE

The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

SPRING IDENTIFICATION					
Pc.No.	Approx. Out. Dia. "A" in.	Approx. Dia. Wire "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Material
547806	1-13/64	1/8	1-11/16	5-1/4	Steel

*Number of turns for each spring counted between extreme ends of the wire.



WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PA. / Westinghouse Air Brake Company



"A-2"

REDUCTION RELAY VALVE

(SUPERSEDES ISSUE DATED JANUARY, 1972)

PARTS CATALOG

Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY / Wilmerding, Pennsylvania 15148



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Approx. Net Weights

"A-2" Reduction Relay Valve, Asy.	55 lb.
"B-1" Quick Service Valve, Asy.	34 lb.
Emergency Valve Portion	16-1/2 lb.
Filling Piece Portion	5 lb.

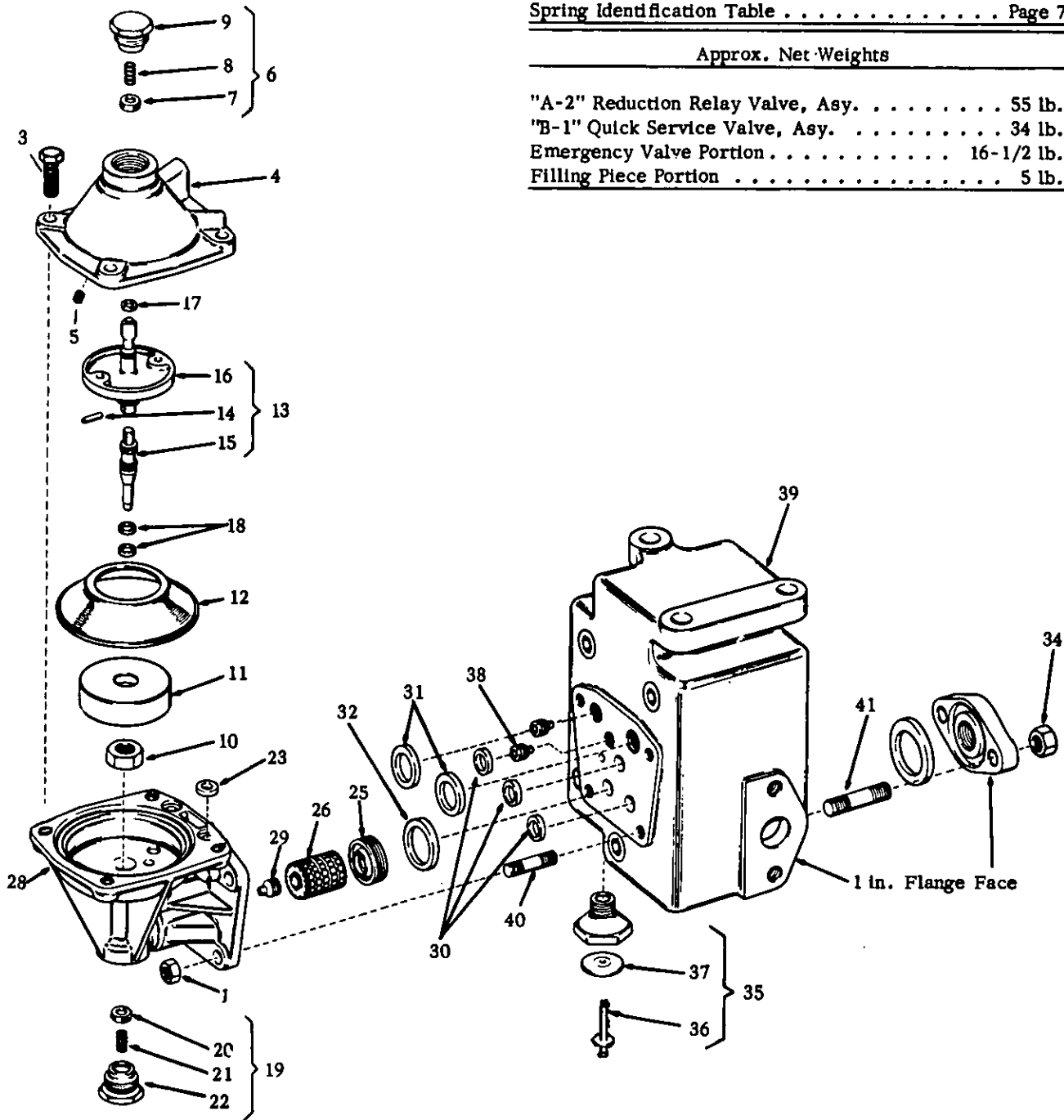


Figure 1



"A-2" REDUCTION RELAY VALVE

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
	573568	"A-2" REDUCTION RELAY VALVE ASY. (Incl. Figures 1, 2 and 3)	
1-2	565453	.QUICK SERVICE VALVE PORTION (See Figure 1)	1
1-30	• 527560	.GASKET, Ring, 5/8 in. O.D.	3
1-31	• 533212	.GASKET, Ring, 1 in. O.D.	2
1-32	• 540542	.GASKET, Ring, 1-7/8 in. O.D.	1
1-33	573571	.PIPE BRACKET PORTION	1
2-	573575	.FILLING PIECE PORTION (See Figure 2)	1
3-	569711	.EMERGENCY VALVE PORTION (See Figure 3)	1
3-10	• 565825	.GASKET, Emergency Valve	1
3-11	• 93986	.GASKET, Ring, 1 in. Pipe Size(ID)	1
3-12	• 93840	.GASKET, Ring, 1/2 in. Pipe Size (I.D.)	1

"B-1" QUICK SERVICE VALVE PORTION

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-1	502369	.NUT, HEX., 3/8 in. (Part of Pipe Bracket, Ref. 33)	4
1-2	565453	"B-1" QUICK SERVICE VALVE PORTION ASY. (Incl. Ref. Nos. 3 to 29)	
1-3	514274	.SCREW, Cap, Hex.Hd., 3/8 x 1 in.	4
1-4	565469	.COVER, Asy. (Incl. Ref. No. 5)	1
1-5	91149	..PLUG, Choke, 1/8 NPT (.070 Dr.)	1
1-6	565462	.CHECK VALVE CAP NUT Asy. (Incl. Ref. Nos. 7 to 9)	1
1-7	538445	..VALVE, Check	1
1-8	■ 568760	..SPRING, Check Valve, Cover.	1
1-9	565463	..NUT, Cap.	1
1-10	568626	.NUT, Lock, 3/4 in. (Jam)	1
1-11	566924	.FOLLOWER, Diaphragm	1
1-12	574796	.DIAPHRAGM, Piston	1
1-13	565465	.DIAPHRAGM PISTON Asy. (Incl. Ref. Nos. 14 to 16)	1
1-14	559060	..PIN, Cylindrical Spring, 3/32 x 7/16 in.	1
1-15	565467	..STEM, Piston	1

PIPE BRACKET PORTION

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-33	573571	PIPE BRACKET PORTION ASY. (Incl. Ref. Nos. 1 and 34 to 41)	
1-34	502365	.NUT, Hex., 1/2 in.	4
1-35	552378	.VENT PROTECTOR Asy. (Incl. Ref. Nos. 36 and 37)	1
1-36	571140	..POP RIVET, 3/16 x 1/2 in. (Aluminum)	1
1-37	551159	..SEAL, Vent Protector.	1
1-38	578254	.PLUG, Choke, 1/8 NPT (#54-.0550 Drill) "B"	1
1-39	573572	.BODY, Pipe Bracket (Incl. Ref. Nos. 1, 34, 40 and 41)	1
1-40	502671	..STUD, 3/8 x 1-1/2 in.	4
1-41	502674	..STUD, 1/2 x 1-7/8 in.	4

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-16	565466	..PISTON, Diaphragm.	1
1-17	534662	.O-RING, 3/8 in. O.D.	1
1-18	524612	.O-RING, 1/2 in. O.D.	2
1-19	565462	.CHECK VALVE CAP NUT Asy. (Incl. Ref. Nos. 20 to 22)	1
1-20	538445	..VALVE, Check	1
1-21	■ 568760	..SPRING, Check Valve Body	1
1-22	565463	..NUT, Cap.	1
1-23	527560	.GASKET, Ring, 5/8 in. O.D.	2
1-24	565454	.QUICK SERVICE VALVE BODY Asy. (Incl. Ref. Nos. 25 to 29)	1
1-25	565461	..NUT, Strainer Retainer	1
1-26	559980	..STRAINER Asy. (Incl. Ref. No. 27)	1
1-27	514976	...FELT (Strainer) (Not Shown)	2
1-28	565477	..BODY with CHOKE (Incl. Ref. 29).	1
1-29	578253	...PLUG, Choke, 1/8 NPT (#76-.0200 Drill)	1
1-30	• 527560	GASKET, Ring, 5/8 in. O.D.	3
1-31	• 533212	GASKET, Ring, 1 in. O.D.	2
1-32	• 540542	GASKET, Ring, 1-7/8 in. O.D.	1

• NOTE: The indicated Gaskets are not a part of any portion and must be ordered separately.

NOTE: Refer to the indicated Figure for Detail Parts and their location.

■ NOTE: For Spring Identification Table, see page 7.



EMERGENCY VALVE PORTION

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	569711	EMERGENCY VALVE PORTION ASY. (Incl. Ref. Nos. 1 to 44)	
2-1	2505	.NUT, Hex., 1/2 in. (Part of Body, Ref. 39)	4
2-2	569722	.COVER, Asy. (Incl. Ref. No. 3) .	1
2-3	567247	..EXCLUDER, Wasp	1
2-4	532092	.GASKET, Ring, 15/16 in. O.D. . .	1
2-5	534526	.GASKET, Ring, 1-1/2 in. O.D. . .	1
2-6	569739	.SPRING, Check Valve	1
2-7	532257	.O-RING, 11/16 in. O.D.	1
2-8	569972	.CHECK VALVE Asy. (Incl. Ref. Nos. 9 to 11)	1
2-9	54999	..SCREW, Mch., Rd. Hd., #6 x 3/16 in.	1
2-10	569734	..WASHER, 9/16 in. O.D.	1
2-11	514500	..SEAL, Check Valve	1
2-12	568965	.NUT, Elastic Stop, 9/16 in. . . .	1
2-13	569721	.FOLLOWER, Diaphragm.	1
2-14	564210	.DIAPHRAGM, Piston	1
2-15	569720	.PISTON	1
2-16	523842	.O-RING, 5/8 in. O.D.	1
2-17	539155	.NUT, Elastic Stop, 5/16 in. . . .	1
2-18	531868	.O-RING, 3/4 in. O.D.	7
2-19	569719	.VALVE, Lower Spool	1
2-20	569718	.VALVE, Upper Spool	1
2-21	569717	.STEM, Piston.	1
2-22	1296	.NUT, Hex., 3/8 in.	4

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-23	569724	.COVER, Vent Valve	1
2-24	527560	.GASKET, Ring, 5/8 in. O.D. . . .	1
2-25	564586	.DIAPHRAGM, Vent Valve	1
2-26	567218	.PISTON, Vent Valve (Large). . . .	1
2-27	570676	.RING, Int. Ret., .866 Bore Dia. x .042 in.	1
2-28	569727	.RETAINER, Piston	1
2-29	504931	.SPRING, Piston	1
2-30	569726	.NUT, Cap.	1
2-31	94880	.RETAINER, Spring.	1
2-32	567222	.SPRING, Vent Valve Piston. . . .	1
2-33	570014	.SCREW, Cap, Hex. Hd., 3/8 x 5/8 in. (Special).	1
2-34	95968	.SEAL, Vent Valve Piston.	1
2-35	567220	.PISTON, Vent Valve (Small)	1
2-36	502574	.VENT PROTECTOR Asy. (Incl. Ref. Nos. 37 and 38)	1
2-37	571140	..POP RIVET 3/16 x 1/2 in. (Alum.)	1
2-38	502465	..SEAL	1
2-39	569714	.BODY Asy. (Incl. Ref. Nos. 1, 22 and 40 to 44).	1
2-40	523178	..PLUG, Pipe, Hex. Soc. 1/4 NPT .	1
2-41	571153	..PLUG, Choke, 1/8 NPT (#58 Dr.)	1
2-42	549585	..STUD, 3/8 x 1/8 in.	4
2-43	500871	..STUD, 1/2 x 1-3/4 in.	3
2-44	551201	..STUD, 1/2 x 2-1/4 in.	1

NOTE: For Spring Identification Table, see page 7.

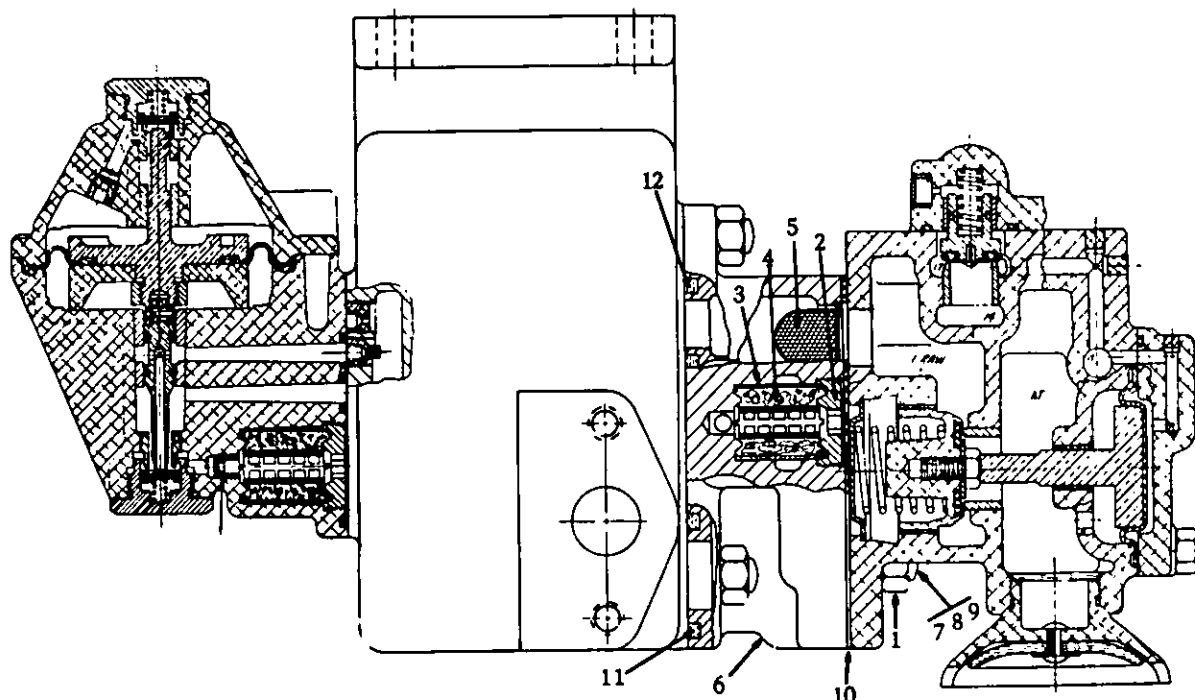


Figure 3

FILLING PIECE PORTION

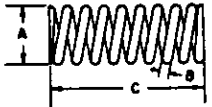
Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-	573575	FILLING PIECE PORTION ASY. (Incl. Ref. Nos. 1 to 9)	
3-1	502365	.NUT, Hex., 1/2 in. (Part of Body, Ref. 6).	5
3-2	565461	.NUT, Strainer Retainer	1
3-3	559980	.STRAINER Asy. (Incl. Ref. No. 4).	1
3-4	514976	..FELT (Strainer) Ring	2
3-5	551442	.STRAINER (Wire Mesh)	1
3-6	573577	.BODY, Filling Piece (Incl. Ref. Nos. 1 and 7 to 9)	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-7	502675	..STUD, 1/2 x 5-3/4 in.	2
3-8	59502	..STUD, 1/2 x 2-1/2 in.	2
3-9	502674	..STUD, 1/2 x 1-7/8 in.	1
3-10	565825	GASKET (Emergency Valve Face)	1
3-11	93986	GASKET, Ring, 1 in. Pipe Size(I.D.)	1
3-12	93840	GASKET, Ring, 1/2 in. Pipe Size (I.D.)	1

NOTE: The indicated Gaskets are not a part of any Portion and must be ordered separately.

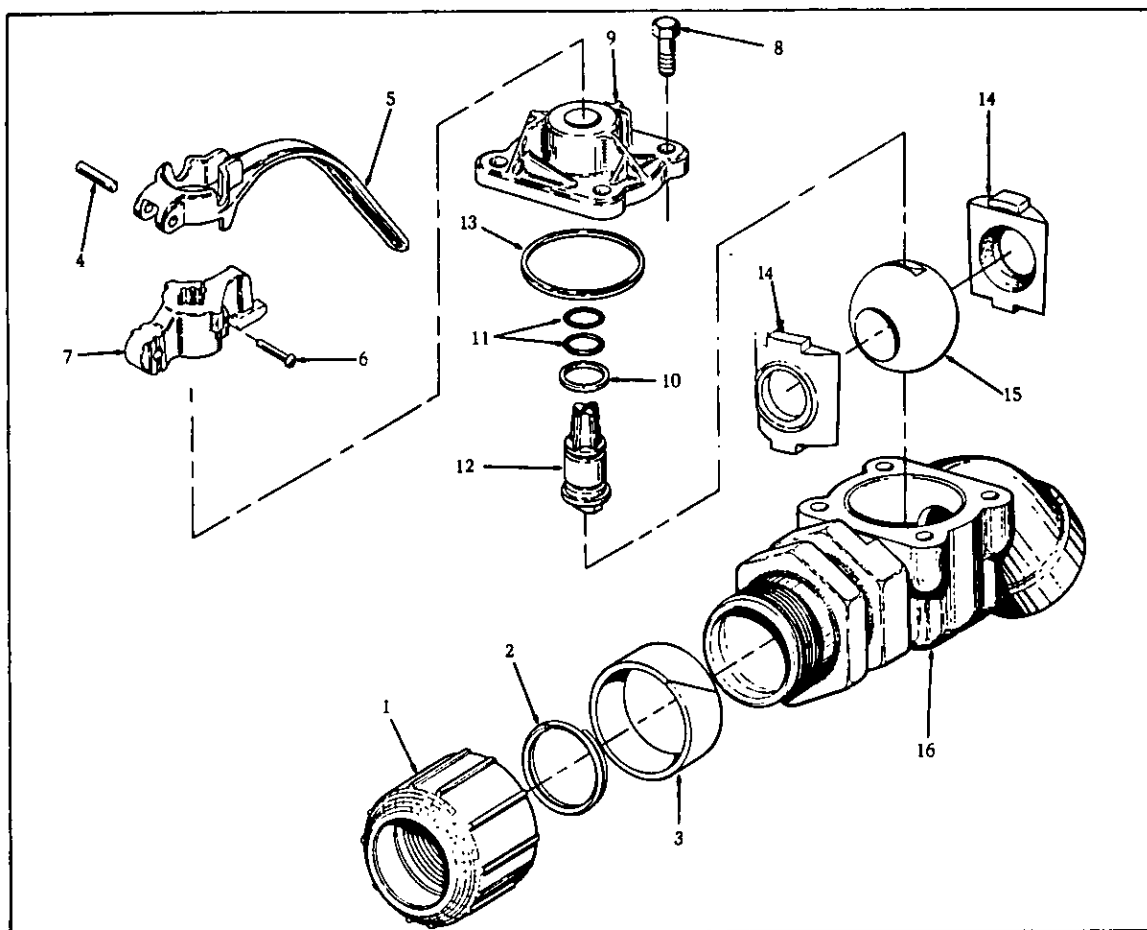
SPRING IDENTIFICATION

The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

			SPRING IDENTIFICATION		
Pc.No.	Approx. Out. Dia. "A" in.	Approx. Wire Dia. "B" in.	Approx. Free Height "C" in.	Approx. No. Turns ▲	Material
504931	39/64	3/64	13/32	8	Steel
567222	1-23/64	7/64	2-9/16	6	Steel
569739	25/64	1/16	1-19/64	12	Steel
568760	19/64	1/64	33/64	6	Steel

▲ NOTE: Number of turns for each spring counted between extreme ends of wire.

1-1/4 inch BALL STYLE ANGLE COCK



I. DESCRIPTION

The 1-1/4 inch Ball Style Angle Cock features a smoothly finished teflon coated ball, superior rubber seals, easy operation, and simple servicing. The angle cock is designed for application to the ends of the brake pipe on each railroad car. The cock provides for a means of closing the brake pipe (as on the end of the last car of a train) and for the attachment of a hose to permit the brake pipe to be connected between coupled cars.

II. OPERATION

- A. The angle cock is open when the handle is parallel to the brake pipe line and closed when the handle is crosswise or at right angles to the brake pipe line.
- B. The handle is designed to lock in both open and closed positions. When so locked, it is necessary to raise the handle slightly before it can be turned. The self-locking feature restricts the accidental opening or closing.

III. MAINTENANCE PROCEDURES AND TECHNIQUES

III.A. CLEANING SOLVENT AND LUBRICANTS

1. The solvent used for cleaning the parts of the ball angle cock must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.
2. No. 2 Silicone Grease, WABCO Specification M-7680-2 is used to lubricate the "D" ring key seals and their grooves.
3. Brake Cylinder Lubricant, AAR Specification M-914, (WABCO Specification M-7651-2) used to lubricate the outer surface of the seals which contact the body cavity.

WARNING: THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA

(SUPERSEDES ISSUE DATED JUNE, 1976)

FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.

III.B. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the angle cock.
2. The work area should be clean and free of debris.
3. **WARNING:** THE USE OF AN AIR JET TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. SAFETY GOGGLES MUST BE WORN TO PROTECT THE EYES FROM INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.

III.C. DISASSEMBLING

(Referring to the Exploded View)

1. CAUTION: WHEN DISASSEMBLING, CLEANING AND ASSEMBLING THE BALL ANGLE COCK, CARE MUST BE EXERCISED TO PREVENT SCRATCHING OR DAMAGING THE COATING ON THE BALL.
2. If the angle cock is removed from the brake pipe for servicing, the compression ring (3) MUST BE discarded. A NEW split compression ring (3) MUST BE used when installing the angle cock on the brake pipe.
3. The handle (5) may be removed from the handle socket (7) by removing the 5/16 x 1-1/2 inch pin (4).
4. Remove the cover (9) by removing the four 3/8 x 7/8 inch hex head cap screws (8) from the body (16), then remove the cover (9), handle socket (7) and key assembly (10, 11, 12) as a unit from the body (16).
5. Remove the cover gasket (13) and discard.
6. EXERCISING CARE in order to prevent scratching or damage to the coating on the ball, insert a suitable "hook type" tool in the slot opening of the ball (15) and carefully pull the ball (15) and the two rubber seats (14) from the cock body (16). DISCARD THE TWO RUBBER SEATS.
7. Remove the key assembly (10, 11, 12) from the handle socket (7) and cover (9) as follows:
 - a. See paragraph III.C.3. for handle removal from socket.
 - b. EXERCISING CARE so that there is no damage or bending of the key (12), remove the 1/4 x 1-3/8 inch round head rivet (6) which secures the key (12) to the socket (7).

- c. Remove the socket (7) from the key (12) and the key assembly (10, 11, 12) from the cover (9).
- d. Remove the bearing washer (10) and the two "D" ring seals (11) from the key (12). DISCARD THE SEALS (11).

III.D. CLEANING, INSPECTING AND REPAIRING

NOTE: Refer to WABCO parts catalog 3215-4, Sup. 15 for Pc. No. 572869 and catalog 3216-4, Sup. 15A for Pc. No. 581213.

1. Metal Parts

- a. THE BALL MUST BE HANDLED WITH CARE AS IT IS COATED WITH A SPECIAL SELF-LUBRICATING MATERIAL WHICH, IF MISTREATED, COULD POSSIBLY BE CHIPPED OR SCRATCHED OFF. The ball MUST BE thoroughly cleaned internally and externally with a clean, soft, lint-free cloth saturated with the cleaning solvent described in paragraph III.B.1. After cleaning the ball MUST BE blown dry with a low pressure jet of clean, dry air. SAFETY GOGGLES ARE TO BE WORN.

WARNING: UNDER NO CIRCUMSTANCES SHOULD ANY ABRASIVE MATERIAL OR ANY TOOL BE USED TO CLEAN THE BALL.

- b. Wash the remaining metal parts in the prescribed cleaning solvent as described in paragraph III.B.1.
- c. After the parts have been cleaned, they MUST BE blown dry with a low pressure (less than 30 psig) jet of clean, dry air. SAFETY GOGGLES MUST BE WORN TO PROTECT THE EYES FROM INJURY.
- d. Inspect the metal parts.
 - (1) The ball MUST BE replaced if it is nicked or has deep scratches.
 - (2) Replace any part that is cracked, broken, nicked, worn excessively, damaged, or is in such a condition that would result in unsatisfactory operation.

2. Rubber Parts and Gasket

- a. The rubber parts and cover gasket MUST BE replaced with NEW WABCO replacement parts.

III.E. LUBRICATING AND ASSEMBLING

1. To facilitate assembling and before installing the ball (15) and NEW seats (14), apply a thin film of brake cylinder lubricant, current AAR Specification M-914, WABCO Specification M-7651-2, to the outer seat seal surface (the surface which contacts the body cavity). DO NOT LUBRICATE THE INNER BALL SEAT SURFACE (BALL SIDE) OR THE BALL PROPER.

CAUTION: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION. Exercise care when working with lubricants.

2. Position the ball (15) between the two seats (14). Insert the ball (15) and seats (14) as one unit into the body (16) cavity making certain that the lugs of the rubber seats and the grooves of the body cavity are properly aligned. The slot opening of the ball **MUST** BE positioned to accept the tongue of the cock key.
3. Install the bearing washer (10) in position on the key (12).
4. Coat the two NEW "D" ring seals (11) with No. 2 Silicone Grease WABCO Specification M-7680-2, and fill the ring grooves on the key (12) with the grease. Install the lubricated "D" ring seals (11) in their grooves on the key (12).

- a. Remove the excess grease by wiping with a clean, lint-free cloth.

CAUTION: LUBRICANT MAY CAUSE SKIN AND/OR EYE IRRITATION. Exercise care when working with lubricants.

5. Install the key (12) with "D" rings (11) in the cover (9).
6. Place the handle socket (7) in place on the key (12) and cover (9).
7. BEING CAREFUL NOT TO DAMAGE OR BEND THE KEY (12), secure the socket (7) to the key (12) using a NEW 1/4 x 1-3/8 inch rivet (6).
8. Place a NEW cover gasket (13) in place.

9. Align the tongue of the key (12) with the slot opening of the ball (15), and carefully install the socket (7), cover (9) and key (12) assembly to the body (16). Secure the assembly in place with the four 3/8 x 7/8 inch hex head cap screws (8).
10. If removed, install the handle (5) on the socket (7) and secure it in place with a NEW 5/16 x 1-1/2 inch pin (4).

III.D. TESTING

1. After the angle cock has been assembled, it must be tested for correct operation. Note the following:
 - a. That the opening in the ball is in full alignment with the body opening when the handle is in "open" position.
 - b. That air under pressure of 80 psi does not leak past the seals to the "outlet" connection in "closed" position or past the key to atmosphere at the top cover.
 - c. That the handle turns with low resistance with and without air pressure applied and drops into "lock" position at both extremities of its movement.

NOTE: When installing the ball angle cock on the brake pipe, a NEW split compression ring (3) **MUST** BE used along with the pipe lock ring (2) and compression nut (1).

2. Consult your Westinghouse Air Brake Division Representative if additional information is required.

WESTINGHOUSE AIR BRAKE DIVISION
WESTINGHOUSE AIR BRAKE COMPANY
WILMERDING, PA.

REPAIR SPECIFICATION R-30-C, SUP. 1
Issue No. 2 April 5, 1968

INSTRUCTIONS FOR DISASSEMBLING, REPAIRING, AND ASSEMBLING 1-1/4"
BALL TYPE ANGLE AND CUT-OUT COCKS

NOTE: When disassembling, cleaning, and assembling ball cocks, care must be exercised to prevent scratching or damaging the coating on the ball.

I. DISASSEMBLING

- A. If necessary, the handle may be removed by removing the riveted hinge pin.
- B. Remove the four 3/8" cap screws from the cock bonnet, then remove the bonnet and large bonnet "O" ring gasket.
- C. Remove the "TRU-ARC" type retainer ring from the stem, then remove the washer, stem (from bonnet), and the two (2) "O" rings from the stem.
- D. Insert a 3/8" cap screw or bolt into the tapped opening in the top of the ball, then pull the ball and two (2) rubber valve seats from the cock body.

II. CLEANING, INSPECTING, AND REPAIRING

- A. Wash all metal parts including the body in a suitable solvent that will dissolve oil or grease and permit the parts to be thoroughly cleaned without abrasion.

NOTE: The ball should be handled with care as it is coated with a special self-lubricating material which, if mistreated, could possibly be chipped or scratched off. Do not use a wire brush or any type of scraper to assist in cleaning the ball.

- B. The rubber seats and "O" rings may be dipped in a suitable solvent to assist in the removal of greasy dirt. These parts must be promptly wiped dry and not allowed to soak in the solvent.
- C. Replace any part which is cracked, broken, damaged, or in such a condition as would result in unsatisfactory operation.

III. LUBRICATING AND ASSEMBLING

- A. Lubricate all "O" rings and the grooves into which they fit with #2 Silicone Grease, Comm. No. 14696. This can best be accomplished by filling the groove with this grease, then, after the "O" ring is installed, remove the excess grease by wiping with a finger.

- B. To facilitate assembling and before installing the ball and seats, apply a thin film of brake cylinder lubricant, current AAR Spec. M-914, to the outer seal surface (that which contacts the body cavity), but not that of the inner surface or ball proper.
- C. Insert the ball and seat-seals as one unit into the body cavity making certain that the lugs of the rubber seats and the grooves of the body cavity are properly aligned.
- D. Install the two (2) stem "O" rings, then insert the stem into the bonnet. Place the stem washer and secure in place using the "TRU-ARC" type retaining ring.
- E. Align the stem key properly with the ball slot, install the large bonnet gasket, then insert the cock bonnet assembly and secure with the four (4) 3/8" cap screws.
- F. If removed, install the cock handle, then re-rivet the hinge in place.

A. J. Pomeroy
Specification and
Licensee Engineer
Test Code Unit

APPROVED:

W. B. Rieck
Director - Railroad
Equipment Engineering

JGB:dlm

REVISION SHEET

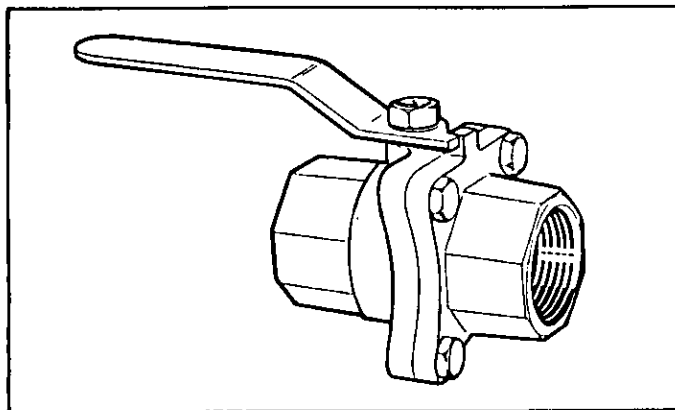
Issue No. 1
February 1, 1967
JGB

Issue No. 2
April 5, 1968
JGB

Updated repair specification to include latest
design ball cocks.

R-30-C, SUP. 1

WABCO® "BALL" CUT-OUT COCKS



EXTERIOR VIEW

I. DESCRIPTION

The WABCO "Ball" Cut-Out Cock, when properly applied and not mistreated, is designed to give long continuous service under pressures up to 250 psig maximum, at temperatures ranging from -50°F to +150°F. The construction of the cock consists of a bolted body and cap design incorporating o-ring seals, which permits ease of maintenance. The ball is precision machined, operating against seats of a special rubber compound to provide positive, slippery, non-galling surfaces.

WABCO "Ball" Cut-Out Cocks are available in a number of styles and sizes with various handle locations, handle rotations, various pipe taps, and vented or non-vented bodies etc. Consult your Westinghouse Air Brake Division Representative for the style suited for your desired application.

II. MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: THE BALL CUT-OUT COCK SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE

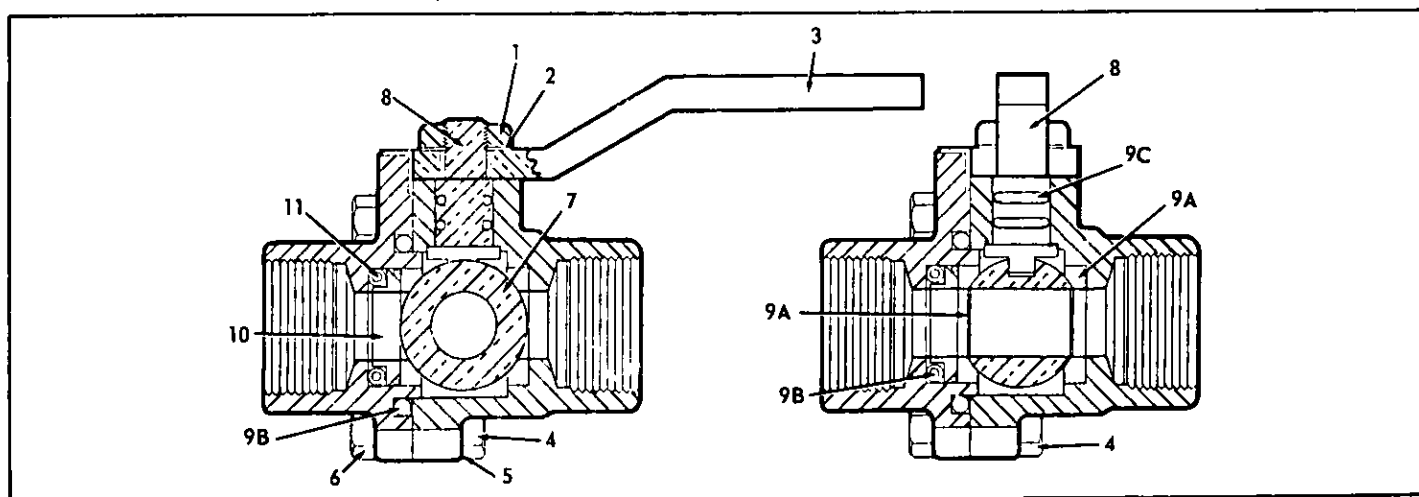
SHOP, THOROUGHLY CLEANED, LUBRICATED AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

RECOMMENDED TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Freight Cars	144 Months
Locomotives	24 Months
Passenger (Interstate)	36 Months
Transit	24 Months
Multiple Operated Electric Unit	15 Months

II.A. CLEANING SOLVENT AND LUBRICANT

1. The solvent used for cleaning the parts of the cut-out cock MUST BE an aliphatic organic solution, such as mineral spirits or naphtha that will dissolve oil or grease and that will permit all parts to be cleaned thoroughly without abrasion.
2. No. 2 Silicone Grease, WABCO Specification M-7680-2 is used to lubricate the o-rings and the grooves in which the o-rings are installed.

WARNING: THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND THE LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.



ASSEMBLY VIEW

(SUPERSEDES ALL PREVIOUS ISSUES OF 4216-4, S.20)

II.B. SAFETY PROCEDURES

1. Regular shop safety procedures **MUST BE** followed when working on the cut-out cock.
2. The work area should be clean and free of debris.
3. **WARNING:** THE USE OF AN AIR JET, WHICH **MUST BE LESS THAN 30 PSIG**, TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION **MUST BE WORN** TO PROTECT THE EYES FROM POSSIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.
4. **IMPORTANT:** PERSONAL EYE PROTECTION **MUST BE WORN** WHEN WORKING ON THE BALL CUT-OUT COCK.

II.C. DISASSEMBLY

IMPORTANT: PERSONAL EYE PROTECTION **MUST BE WORN** TO PROTECT THE EYES FROM FOREIGN MATERIAL THAT MAY BECOME AIRBORNE WHILE WORKING ON THE BALL COCK.

1. Remove the four hex nuts (4), lock washers (5) and cap screws (6), then separate the two valve body halves.
2. Remove the ball (7) from its cavity, then remove both ball seats (9A), o-ring (9B), disc (10) and spring (11).
3. Remove the handle lock nut (1), and tooth lock washer (2) that secures the handle to the stem (8). Remove the handle (3) and handle stem (8) from the valve body.
4. Remove the two o-rings (9C) from the stem (8).

II.D. CLEANING, INSPECTING AND REPAIRING

IMPORTANT: Consult your Westinghouse Air Brake Division Representative for the correct WABCO Parts Catalog covering your specific WABCO "Ball" Cut-Out Cock. The WABCO Parts Catalog should be used when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.

IMPORTANT: PERSONAL EYE PROTECTION **MUST BE WORN.**

1. Metal Parts

- a. Wash all of the metal parts using the prescribed cleaning solvent. See Paragraphs II.A.1. and II.A.3.
- b. After cleaning, the parts **MUST BE** thoroughly dried using a low pressure (less than 30 psig) jet of clean, dry air. See Paragraph II.B.3.
- c. Inspect the metal parts.
- d. Shallow scratches may be removed from the surface of the ball using a fine grade (No. 200 grit) emery cloth. Should a ball have deep scratches, that cannot be easily removed using a fine grade of emery cloth (No. 200 grit), it **MUST BE** replaced.
- e. Replace any part that is cracked, broken, nicked, worn excessively, damaged or in such a condition that may result in unsatisfactory operation.

2. Rubber Parts

- a. **IMPORTANT:** It is recommended that all rubber parts be replaced with NEW WABCO Quality Parts. If so desired, serviceable rubber parts may be reused **ONLY AFTER** they have been cleaned and inspected according to the following procedure:
 - (1) Rubber parts may be dipped in the prescribed cleaning solvent as described in paragraph II.A.1. **WARNING:** RUBBER PARTS **MUST NOT BE ALLOWED** TO SOAK IN THE CLEANING SOLUTION. See Paragraph II.A.1. and II.A.3.
 - (2) Promptly wipe the rubber parts with a soft, clean, lint-free cloth and immediately blow them dry with a low pressure (less than 30 psig) jet of clean, dry air. See Paragraph II.B.3.
- b. Inspect the rubber parts. Replace any part that is cracked, broken, cut, torn, nicked, worn excessively, damaged or in such a condition that may result in unsatisfactory operation.
- c. **IMPORTANT:** A kit of Rubber Replacement Goods, containing all rubber parts for a given ball cut-out cock is available from WABCO. Consult the parts catalogs listed in paragraph II.D. or your Westinghouse Air Brake Division Representative for the correct Kit Part Number for each specific application.



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Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY/Wilmerding, Pennsylvania 15148

operation & maintenance information

II.E. ASSEMBLING

IMPORTANT: PERSONAL EYE PROTECTION MUST BE WORN.

1. Just prior to assembling, lubricate the o-rings and fill the o-ring grooves in the stem with No. 2 Silicone Grease WABCO Specification M-7680-2.
CAUTION: LUBRICANT MAY CAUSE SKIN OR EYE IRRITATION. EXERCISE CARE WHEN WORKING WITH LUBRICANT. See Paragraph II.A.3.
2. Install the lubricated o-rings (9C) in the grooves on the stem (8). Remove the excess grease by wiping with a clean, lint-free cloth.
 - a. Insert the stem (8) into position in the valve body from which it was removed.
3. Install the handle (3) and tooth lock washer (2) on the stem and secure them in place with the lock nut (1).
4. Insert the spring (11), disc (10), o-ring (9B) and ball seats (9A) in place.
5. Insert the ball (7), then place both halves of the body together, (making sure of the proper handle alignment), then secure the two halves of the body together with the four cap screws (6), lock washers (5) and hex nuts (4).

II.F. TESTING

1. After the WABCO "Ball" Cut-Out Cock has been reassembled, it must be tested for correct operation. Note the following:
 - a. That the opening in the ball is in full alignment with the body opening when the handle is in "open" position.
 - b. The air does not leak past the seals to the "outlet" connection or at the handle stem in "closed" position.
 - c. That air does not leak out the vent hole when the handle is in the fully "open" position (vented Ball Cocks only).
 - d. That air does vent through the vent hole when the handle is in the fully "closed" position (vented Ball Cocks only).
2. **IMPORTANT: WHENEVER A WABCO "BALL" CUT-OUT COCK IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED COCK, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE COCK FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.**
3. Consult your Westinghouse Air Brake Division Representative for testing or additional information.

WESTINGHOUSE AIR BRAKE COMPANY
WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PA.

REPAIR SPECIFICATION R-80-C, Sup. 2
Issue No. 1 November 11, 1969

INSTRUCTIONS FOR DISASSEMBLING, REPAIRING, AND ASSEMBLING
WABCO "BALL" CUT-OUT COCKS (GENERAL)

Refer to Parts Catalog No. 3216-4, Sup. 20 for names of parts and their location in the cocks.

I. DISASSEMBLING

- A. Remove the four (4) hex-nuts and cap screws, then separate the two (2) valve body halves.
- B. Remove the ball from its cavity, then remove both ball seats, all "O" rings, disc and spring.
- C. Remove the handle lock nut, then remove the handle and handle stem.
 1. Remove the two (2) "O" rings from the stem.

II. CLEANING, INSPECTING AND REPAIRING

- A. Wash all parts except rubber parts in a suitable solvent that will dissolve oil and grease and permit all parts to be thoroughly cleaned without abrasion. Rubber parts may be dipped in a suitable solvent to aid in the removal of greasy dirt. These parts must be promptly wiped dry and not allowed to soak in the cleaning fluid.

NOTE: Replacement rubber goods kits are available which include all rubber parts for a given valve.

- B. Balls which have deep scratches that cannot be removed by using a fine grade of emery cloth must be replaced.
- C. Replace all parts which are cracked, broken, worn excessively or damaged in any way.

III. LUBRICATING AND ASSEMBLING

- A. Insert the stem "O" rings, then insert the stem and secure the handle in place with the lock nut.

B. Insert the spring, disc, "O" rings, and ball seats.

1. Insert the ball, place both body halves together (making sure of proper handle alignment), then secure the two (2) halves with the four (4) cap screws and hex-nuts.

A. J. Parnell
Specifications and
Licensee Engineer
Test Code Unit

APPROVED:

C. P. Wright
Manager - Railroad
Equipment Engineering

JGB:bao



An American-Standard Co.

Westinghouse Air Brake Division

Wilmerding, Pennsylvania

PARTS CATALOG

WABCO® "PLUG-TYPE" CUT-OUT COCKS INDEX

The following is a Descriptive-Parts Catalog Index of WABCO "PLUG TYPE" CUT-OUT COCKS for quick identification.

This Index identifies both by Description (Index No. 1 lists CUT-OUT COCKS by Description to Parts Catalog) and by Parts Number (Index No. 2 lists CUT-OUT COCKS by Obsolete Piece Number to Superseding Piece Number to Parts Catalog).

INDEX NO. 1

The following is a list of WABCO PLUG TYPE CUT-OUT COCKS by Description and Parts Catalog No. Coverage:

Non-Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Straight Handles	3216-40, Sup. 1
Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Straight Handles	3216-40, Sup. 2
Non-Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Tee Handle	3216-40, Sup. 3
Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Tee Handle	3216-40, Sup. 4
Non-Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Locking Handle	3216-40, Sup. 5
Vented PLUG TYPE CUT-OUT COCK, Tapped Body, Locking Handle	3216-40, Sup. 6
Non-Vented PLUG TYPE CUT-OUT COCK, Flanged Body, Straight Handles	3216-40, Sup. 11
Vented PLUG TYPE CUT-OUT COCK, Flanged Body, Straight Handles	3216-40, Sup. 12
Non-Vented PLUG TYPE CUT-OUT COCK, Flanged Body, Locking Handles	3216-40, Sup. 15
Non-Vented PLUG TYPE CUT-OUT COCK, Flanged and Tapped Body, Locking Handles	3216-40, Sup. 25
Non-Vented PLUG TYPE CUT-OUT COCK (Drain Cock) Straight Handles	3216-40, Sup. 31
Vented PLUG TYPE CUT-OUT COCK (Drain Cock) Straight Handles	3216-40, Sup. 32
Non-Vented Plug Type Siphon Drain Cock, Straight Handle	3216-40, Sup. 33
Non-Vented PLUG TYPE CUT-OUT COCK (Drain Cock) Locking Handle	3216-40, Sup. 35
Plug Type Drain Cocks, Integral Handles (1/4 in. Size)	3216-40, Sup. 37
Non-Vented PLUG TYPE CUT-OUT COCK (Aux. Emergency)	3216-40, Sup. 40
Non-Vented PLUG TYPE CUT-OUT COCK with Escutcheon Plate	3216-40, Sup. 41
Vented PLUG TYPE CUT-OUT COCK, for Panel Mounting.	3216-40, Sup. 42
DOUBLE CUT-OUT COCKS, PLUG TYPE	3216-40, Sup. 50

(Supersedes Issue of April, 1969)



INDEX NO. 2

Description CUT-OUT COCKS	Pc. No.		P. C. No.
	Obsolete	Superseding	
1/4 in. Size			
Non-Vented, Tapped Body		51320 501103	3216-40, S1 3216-40, S1
Vented, Tapped Body		501101	3216-40, S2
Non-Vented, Tapped Body & Tee Handle		520647	3216-40, S3
Vented, Tapped Body & Tee Handle		520850	3216-40, S4
Non-Vented Drain Cock		2811 16623 19410 32818 561786 900964	3216-40, S37 3216-40, S37 3216-40, S37 3216-40, S37 3216-40, S37 3216-40, S37
Vented, Panel Mounted		544780	3216-40, S42
3/8 in. Size			
Non-Vented, Tapped Body	9053 570823 570824 570807 570809 570831 570832 570815 902073	570822 ● 572468 ● 572463 ● 572475 ● 572795 ● 572463 ● 572463 ● 572795 570811	3216-40, S1 3216-4, S20 3216-4, S20 3216-4, S20 3216-4, S20 3216-4, S20 3216-4, S20 3216-4, S20 3216-40, S1
Vented, Tapped Body	501065 536824 555404 561806 562215	570825 570808 570812 570833 570814	3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2
Non-Vented, Tapped Body & Tee Handle	523370	570828	3216-40, S3
Vented, Tapped Body & Tee Handle	523369	570827	3216-40, S4

Description	Pc. No.		P. C.
CUT-OUT COCKS	Obsolete	Superseding	No.
Non-Vented, Tapped Body & Locking Handle	570826 570830	• 572470 • 572470	3216-4, S20 3216-4, S20
Non-Vented, Flanged Body	510904 512515 519882 519883	570817 569293 570818 570819	3216-40, S11 3216-40, S11 3216-40, S11 3216-40, S11
Vented, Flanged Body	535189 542942	570820 570821	3216-40, S12 3216-40, S12
Non-Vented, Escutcheon Plate	561862	570816	3216-40, S41
1/2 in. Size			
Non-Vented, Tapped Body	15213 59089 70472 571071 513931 571078	571068 571069 571070 • 572464 571075 • 572464	3216-40, S1 3216-40, S1 3216-40, S1 3216-4, S20 3216-40, S1 3216-4, S20
Vented, Tapped Body	501084 501086 561788	571072 571073 571079	3216-40, S2 3216-40, S2 3216-40, S2
Non-Vented, Tapped Body & Tee Handle	526382	571076	3216-40, S3
Non-Vented, Tapped Body & Locking Handle	571074 570964 508626	• 572471 • 572471 571560	3216-4, S20 3216-4, S20 3216-40, S5
Vented, Tapped Body & Locking Handle	535343	571077	3216-40, S6
Non-Vented, Flanged Body	508861 533669 558318	571100 569294 571098	3216-40, S11 3216-40, S11 3216-40, S11

• NOTE: Indicates a WABCO "BALL" CUT-OUT COCK



Description CUT-OUT COCKS	Pc. No.		P. C. No.
	Obsolete	Superseding	
Non-Vented, Flanged Body, Locking Handle	526483 543373 561789 567774	571101 571097 571099 571102	3216-40, S15 3216-40, S15 3216-40, S15 3216-40, S15
Non-Vented, Drain Cock	7716 68950 571082 523052 544822 571087	571080 571081 ● 572476 571084 571085 ● 572476	3216-40, S31 3216-40, S31 3216-4, S20 3216-40, S31 3216-40, S31 3216-4, S20
Non-Vented Drain Cock, Tapped & Threaded Body	512011 558837	571083 571083	3216-40, S32 3216-40, S32
Non-Vented, Siphon Drain Cock	516932 525257 525411 535628 549096 551732	571091 571092 571093 571094 571095 571096	3216-40, S33 3216-40, S33 3216-40, S33 3216-40, S33 3216-40, S33 3216-40, S33
Non-Vented, Drain Cock Locking Handle	561811	571089	3216-40, S35
3/4 in. Size			
Non-Vented, Tapped Body	2233 67128 570286 524487 570300 564409	570281 570285 ● 572465 570302 ● 572465 570303 571813	3216-40, S1 3216-40, S1 3216-4, S20 3216-40, S1 3216-4, S20 3216-40, S1 3216-40, S1
Vented, Tapped Body	30436 501077 501078	570282 570288 570290	3216-40, S2 3216-40, S2 3216-40, S2
Non-Vented, Tapped Body & Tee Handle	530793	570292	3216-40, S3
Non-Vented Tapped Body & Locking Handle	570294 570291 570295	● 572469 ● 572472 ● 572472	3216-4, S20 3216-4, S20 3216-4, S20

Description CUT-OUT COCKS	Pc. No.		P. C. No.
	Obsolete	Superseding	
Vented, Tapped Body & Locking Handle	542055	570293	3216-40, S6
Non-Vented, Flanged Body	507138 533668 548365 548366 562507	569297 569295 570297 570298 570301	3216-40, S11 3216-40, S11 3216-40, S11 3216-40, S11 3216-40, S11
Vented, Flanged Body	557051	570299 573212	3216-40, S12 3216-40, S12
Non-Vented, Flanged Body, Locking Handle	526484 567775	570296 570304	3216-40, S15 3216-40, S15
1 in. Size			
Non-Vented, Tapped Body	2135 19991 570481 561792 570494	570478 570704 ● 572466 570711 ● 572466	3216-40, S1 3216-40, S1 3216-4, S20 3216-40, S1 3216-4, S20
Vented, Tapped Body	528828 43004 50772 536187 544824 561793 570489 561803	570703 570479 570708 570482 570485 570490 ● 572473 570492	3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-4, S20 3216-40, S2
Non-Vented, Tapped Body & Locking Handle	570480 561791	● 572473 570489	3216-4, S20 3216-40, S5
Vented, Tapped Body & Locking Handle		540479 546152 561794 562663	3216-40, S6 3216-40, S6 3216-40, S6 3216-40, S6
Non-Vented, Flanged Body	530727 551252 566443	570495 570499 570502 563160	3216-40, S11 3216-40, S11 3216-40, S11 3216-40, S11

● NOTE: Indicates a WABCO "BALL" CUT-OUT COCK

Description CUT-OUT COCKS	Pc. No. Obsolete	Superseding	P. C. No.
Vented, Flanged Body	569296 569298		3216-40, S12 3216-40, S12
1-1/4 in. Size			
Non-Vented, Tapped Body	2092 84458 571568 566374	571576 571550 • 572467 571576	3216-40, S1 3216-40, S1 3216-4, S20 3216-40, S1
Vented, Tapped Body	27415 97290 530537 554035	571541 571555 571561 571564 518235 563113	3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2 3216-40, S2
Non-Vented Tapped Body & Locking Handle	571547 508625 517302 571571 561802 565338 565339	• 572474 571560 571574 • 572474 571572 571574 571572	3216-4, S20 3216-40, S5 3216-40, S5 3216-4, S20 3216-40, S5 3216-40, S5 3216-40, S5
Vented, Tapped Body & Locking Handle		521825	3216-40, S6
Non-Vented, Flanged Body	516465 530992 571590 566457 566479	571591 571592 • 572467 571591 571592	3216-40, S11 3216-40, S11 3216-4, S20 3216-40, S11 3216-40, S11

Description CUT-OUT COCKS	Pc. No. Obsolete	Superseding	P. C. No.
Vented, Flanged Body	515374	571578	3216-40, S12
Non Vented, Flanged & Tapped Body, Locking Handle	551226 565336 565337	571584 571584 571587	3216-40, S25 3216-40, S25 3216-40, S25
Non-Vented Tapped Body)		75653	3216-40, S40
1-1/2 in. Size			
Non-Vented, Tapped Body	18409	571927	3216-40, S1
Vented, Tapped Body	84234	517923	3216-40, S2
2 in. Size			
Non-Vented, Tapped Body	9530	571931	3216-40, S1
Vented, Tapped Body	541482 561800	571935 571938	3216-40, S2 3216-40, S2
Double Cut-Out Cocks	9517 51018 84628 508325 540551 543430 552466 555999 562108	571971 571970 571965 571969 571966 571967 571972 571973 571968	3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50 3216-40, S50

• NOTE: Indicates a WABCO "BALL" CUT-OUT COCK



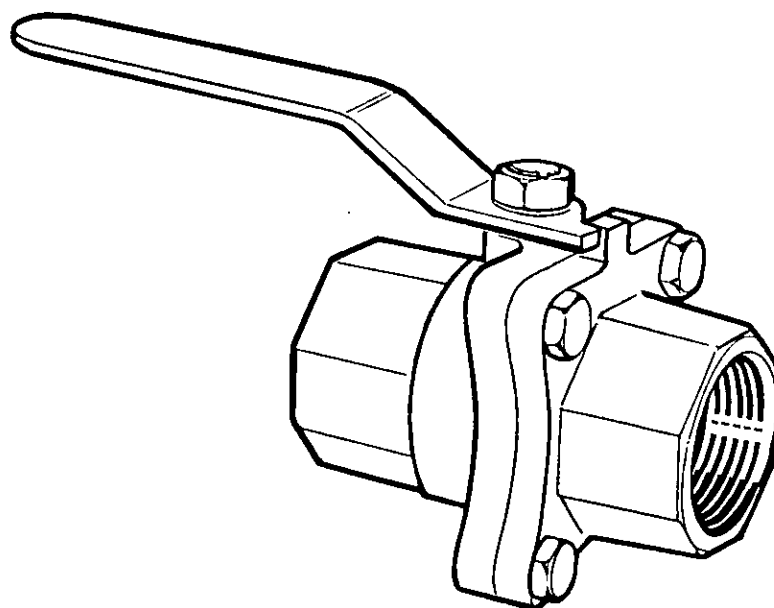
An American-Standard Company



WABCO® "BALL" CUT-OUT COCKS

(Supersedes Issue dated May, 1969)

Parts Catalog



WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA



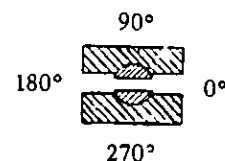
PIECE NUMBER AND DESCRIPTION INDEX

PIPE SIZE (N. P. T.)	PORTING	HANDLE TYPE	OPERATION (HANDLE PARALLEL TO PIPE)	BALL COCK PIECE NUMBER (Cock Classification) □	BODY VENT (in.)	PAGE
3/8 - 18	FULL	PLAIN	OPEN	572795 (0-270)		3
3/8 - 18	FULL	PLAIN	CLOSED	572463 (270-0)		3
3/8 - 18	FULL	SHORT	CLOSED	572468 (270-0)		3
3/8 - 18	FULL	SEALED	CLOSED	572475 (270-0)		3
3/8 - 18	FULL	LOCKING	CLOSED	572470 (270-0)		3
3/8 - 18	FULL	LOCKING	CLOSED	576598 (270-0)	5/64	5
1/2 - 14	STANDARD	PLAIN	CLOSED	572459 (270-0)		6
1/2 - 14	FULL	PLAIN	CLOSED	572464 (270-0)		3
1/2 - 14	FULL	LOCKING	CLOSED	572471 (270-0)		3
1/2 - 14	FULL	LOCKING	CLOSED	576599 (270-0)	3/32	5
3/4 - 14	STANDARD	PLAIN	OPEN	572796 (0-270)		6
3/4 - 14	STANDARD	PLAIN	CLOSED	572460 (270-0)		6
3/4 - 14	FULL	PLAIN	CLOSED	572465 (270-0)		4
3/4 - 14	FULL	LOCKING	OPEN	572469 (0-270)		4
3/4 - 14	FULL	LOCKING	CLOSED	572472 (270-0)		4
3/4 - 14	FULL	LOCKING	CLOSED	576600 (270-0)	3/32	5
3/4 - 14	FULL	SPECIAL	▲	577410 (225-315)		4
3/4 - 14	FULL	SPECIAL	▲	577411 (135-45)		4
3/4 - 14	FULL	LOCKING	OPEN	577583 (0-90)		4
1 - 11-1/2	STANDARD	PLAIN	CLOSED	572461 (270-0)		6
1 - 11-1/2	FULL	PLAIN	CLOSED	572466 (270-0)		4
1 - 11-1/2	FULL	LOCKING	CLOSED	572473 (270-0)		4
1 - 11-1/2	STANDARD	LOCKING	CLOSED	575634 (270-0)	3/32	7
1 - 11-1/2	STANDARD	PLAIN	CLOSED	576030 (270-0)	3/32	7
1 - 11-1/2	FULL	LOCKING	CLOSED	576601 (270-0)	1/8	5
1-1/4 - 11-1/2	FULL	PLAIN	OPEN	574257 (0-90)		4
1-1/4 - 11-1/2	STANDARD	PLAIN	CLOSED	572462 (270-0)		6
1-1/4 - 11-1/2	FULL	PLAIN	CLOSED	572467 (270-0)		4
1-1/4 - 11-1/2	FULL	LOCKING	CLOSED	572474 (270-0)		4
DRAIN COCKS						
1/2 - 14	STANDARD	PLAIN	OPEN	572797 (0-270)		7
1/2 - 14	STANDARD	PLAIN	CLOSED	572476 (270-0)		7
1/2 - 14	STANDARD	SEALED	OPEN	578235 (0-270)		7
3-WAY COCK 3/4 x 3/4 x 1/4	STANDARD	PLAIN	CLOSED	576029 (270-0)		7

□ COCK CLASSIFICATION

The first number denotes position in degrees of handle when cock is open. The second number denotes position in degrees of handle when cock is closed:

Example: Pc. 572795 is a 3/8 in. Ball Cut-Out Cock, classified 0-270, indicating the cock is open at 0° (handle parallel with pipe) and closed at 270°.



▲ NOTE: Pc.No. 577410 is open when Handle is at 225° and closed at 315°. Pc.No. 577411 is open when Handle is at 135° and closed at 45°.

• NOTE: Full Porting indicates Full Capacity of Pipe - Standard Porting indicates less than Pipe Capacity.

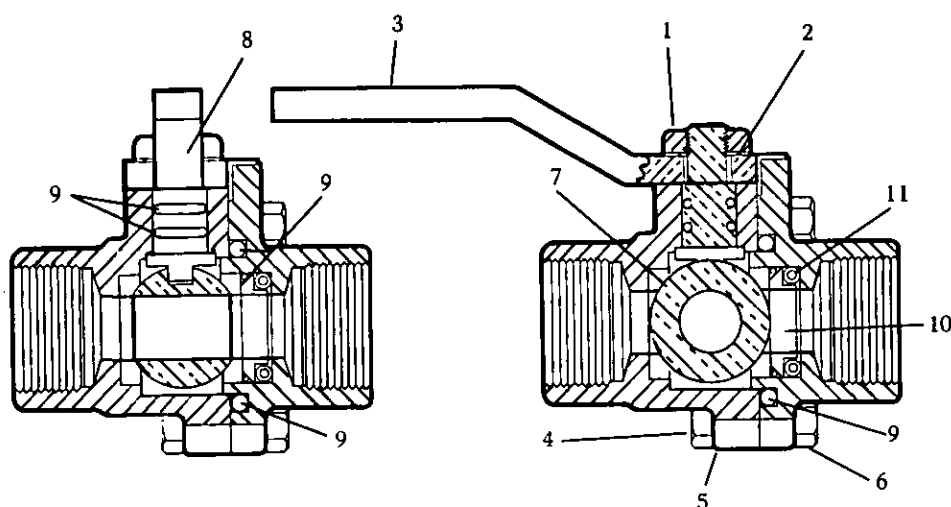


Figure 1

WABCO® "BALL" CUT-OUT COCKS, Full Port, Non-Vented

3/8 in. ASSEMBLY Pc.No's. and VARIABLE DETAILS

ASY. Pc.No.	COCK CLASSIFICATION	HANDLE, [□] Ref. 3 Pc.No.	Style	STEM Ref. 8
572463	(270-0)	574282	Plain	574275
572468	(270-0)	574281	Short	574275
572470	(270-0)	574291	Locking	574275
572475	(270-0)	574283	Sealed	574275
572795	(0-270)	574284	Plain	574279

Approx. Net Wt. 7/8 lb.

COMMON DETAILS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	♦	3/8 in. WABCO "BALL" CUT-OUT COCK, ASY.	
1-1	522417	.NUT, Jam, 5/16 in.	1
1-2	574394	.WASHER, Lock, .314 I.D.	1
1-3	♦ □	.HANDLE	1
1-4	574393	.NUT, Hex., #10-32	4
1-5	519821	.WASHER, Lock, #12 Int. Tooth . . .	4
1-6	574391	.SCREW, Mch. Hex. Hd., #10-32 x 3/4 in.	4
1-7	574270	.BALL	1
1-8	♦	.STEM	1
1-9	574159	.KIT, Rubber Parts	1
1-10	574491	.DISC	1
1-11	574486	.SPRING	1

♦ NOTE: See Schedule above.

1/2 in. (Approx. Net Weight 1-1/4 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	572464|572471	1/2 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)	
1-1	517054	.NUT, Jam, 3/8 in.	1
1-2	574395	.WASHER, Lock, .380 I.D.	1
1-3	□ 574285|	.HANDLE, Plain	1
1-3	— 574291	.HANDLE, Locking!	1
1-4	502349	.NUT, Hex., 1/4 in.	4
1-5	506591	.WASHER, Lock, 1/4 in.	4
1-6	193337	.SCREW, Hex.Hd.Mch., 1/4 x 1in, 4	
1-7	574271	.BALL	1
1-8	574276	.STEM	1
1-9	574160	.KIT, Rubber Parts	1
1-10	574492	.DISC	1
1-11	574487	.SPRING	1

□ NOTE: For Handle Identification, See Page 8

Repair Specification R-80-C, Sup. 2 covering

WABCO "BALL" CUT-OUT COCKS is available on request.



WABCO® "BALL" CUT-OUT COCKS, Full Port, Non-Vented

3/4 in. ASSEMBLY Pc.No's. and Variable Details

ASY. Pc. No.	COCK CLASSIFICATION	HANDLE, [□] Ref. 3 Pc. No.	Style	STEM Ref. 8
572465	(270-0)	574285	Plain	574276
572469	(0-270)	574291	Locking	574280
572472	(270-0)	574291	Locking	574276
577410	(225-315)	577539	Special	574276
577411	(135-45)	577539	Special	574276
577583	(0-90)	577582	Locking	574280

Approx. Net Wt. 2-1/8 lb.

COMMON DETAILS

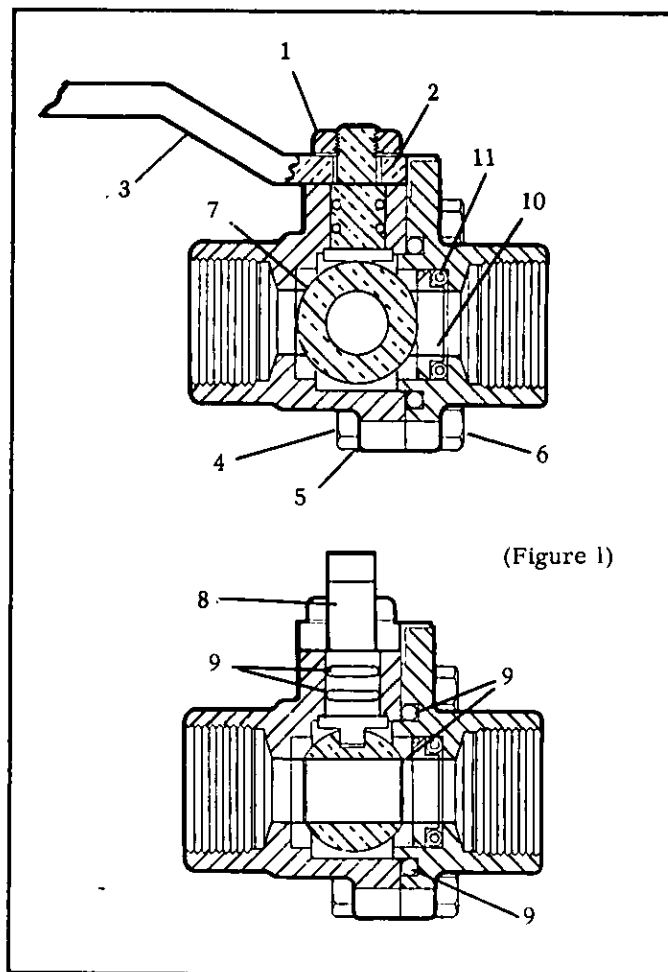
Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	♦	3/4 in. WABCO "BALL" CUT-OUT COCK, ASY.	
1-1	517054	.NUT, Jam, 3/8 in.	1
1-2	574395	.WASHER, Lock, .380 I.D.	1
1-3	♦ □	.HANDLE	1
1-4	502349	.NUT, Hex., 1/4 in.	4
1-5	506591	.WASHER, Lock, 1/4 in. Int. Tooth.	4
1-6	193337	.SCREW, Mch. Hex.Hd., 1/4 x 1 in.	4
1-7	574272	.BALL	1
1-8	♦	.STEM	1
1-9	574161	.KIT, Rubber Parts	1
1-10	574493	.DISC	1
1-11	574488	.SPRING	1

♦ NOTE: See Schedule above.

□ NOTE: For Handle Identification, See Page 8

1 in. (Approx. Net Weight 4-3/8 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	572466|572473	1 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)	
1-1	521217	.NUT, Jam, 7/16 in.	1
1-2	574396	.WASHER, Lock	1
1-3	□ 574288| —	.HANDLE, Plain.	1
1-3	— 574292	.HANDLE, Locking	1
1-4	96500	.NUT, Hex., 5/16 in.	4
1-5	574394	.WASHER, Lock, .314 Int. Tooth	4
1-6	574392	.SCREW, Hex.Hd.Mch., 5/16 x 1-1/8 in.	4
1-7	574273	.BALL	1
1-8	574277	.STEM	1
1-9	574162	.KIT, Rubber Parts	1
1-10	574494	.DISC	1
1-11	574489	.SPRING	1



1-1/4 in. (Approx. Net Weight 4-3/4 lb.)

Fig & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	572467|572474|574257	1-1/4 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)' (270-0)' (0-90)	
1-1	521217	.NUT, Jam, 7/16 in.	1
1-2	574396	.WASHER, Lock, .440 I.D. Int. Tooth	1
1-3	□ 574288| — |574401	.HANDLE, Plain	1
1-3	— 574293 —	.HANDLE, Locking	1
1-4	96500	.NUT, Hex., 5/16 in.	4
1-5	574394	.WASHER, Lock, .314 I.D. Int. Tooth	4
1-6	574392	.SCREW, Hex.Hd.Mch., 5/16 x 1-1/8 in.	4
1-7	574274	.BALL	1
1-8	574278	.STEM	1
1-9	574163	.KIT, Rubber Parts	1
1-10	574495	.DISC	1
1-11	574490	.SPRING	1



WABCO® "BALL" CUT-OUT COCKS, Full Port, Vented

3/8 in. (Approx. Net Weight, 7/8 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576598	3/8 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (5/64 in. Vent in Body) (270-0)	
1-1	522417	.NUT, Jam, 5/16 in.	1
1-2	574394	.WASHER, Lock, 3/4 in. I.D. Int. Tooth	1
1-3	□ 574291	.HANDLE, Locking	1
1-4	..	.NUT	4
1-5	519821	.WASHER, Lock, #12 Int. Tooth	4
1-6	..	.SCREW, Hex. Hd.	4
1-7	576775	.BALL	1
1-8	574275	.STEM	1
1-9	576776	.KIT, Rubber Parts	1
1-10	574491	.DISC	1

1/2 in. (Approx. Net Weight, 1-1/4 lbs.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576599	1/2 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (3/32 in. Vent in Body) (270-0)	
1-1	517054	.NUT, Jam, 3/8 in.	1
1-2	574395	.WASHER, Lock, .380 Int. Tooth	1
1-3	□ 574291	.HANDLE, Locking	1
1-4	502349	.NUT, Hex., 1/4 in.	4
1-5	506591	.WASHER, Lock, 1/4 in. Int. Tooth.	4
1-6	193337	.SCREW, Mch., Hex. Hd., 1/4 x 1 in.	4
1-7	576777	.BALL	1
1-8	574276	.STEM	1
1-9	576531	.KIT, Rubber Parts	1
1-10	574492	.DISC	1

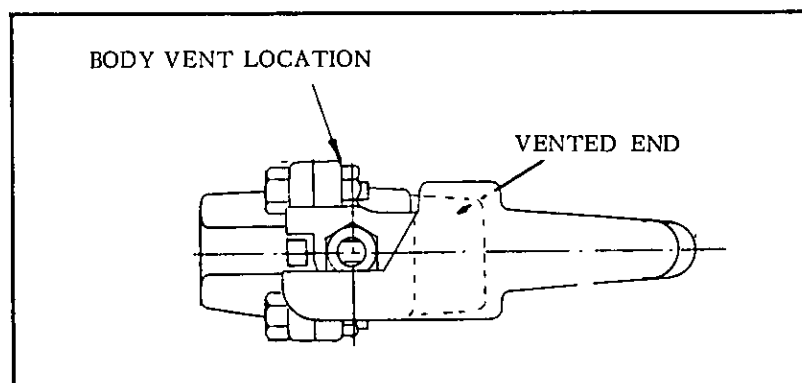
□ NOTE: For Handle Identification, See Page 8

3/4 in. (Approx. Net Weight, 2-1/8 lbs.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576600	3/4 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (3/32 in. Vent in Body) (270-0)	
1-1	517054	.NUT, Jam, 3/8 in.	1
1-2	574395	.WASHER, Lock, .380 I.D. Int. Tooth	1
1-3	□ 574291	.HANDLE, Locking	1
1-4	502349	.NUT, Hex., 1/4 in.	4
1-5	506591	.WASHER, Lock, 1/4 in. Int. Tooth.	4
1-6	193337	.SCREW, Mch. Hex. Hd., 1/4 x 1 in.	4
1-7	576527	.BALL	1
1-8	574276	.STEM	1
1-9	576528	.KIT, Rubber Parts	1
1-10	574493	.DISC	1

1 in. (Approx. Net Weight 4-3/8 lbs.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576601	1 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (1/8 in. Vent in Body) (270-0)	
1-1	521217	.NUT, Jam, 7/16 in.	1
1-2	574396	.WASHER, Lock, .440 I.D. Int. Tooth	1
1-3	□ 574292	.HANDLE	1
1-4	96500	.NUT, Hex., 5/16 in.	4
1-5	574394	.WASHER, Lock, .314 Int. Tooth	4
1-6	574392	.SCREW, Mch. Hex. Hd., 5/16 x 1-1/8 in.	4
1-7	576778	.BALL	1
1-8	574277	.STEM	1
1-9	576779	.KIT, Rubber Parts	1
1-10	574494	.DISC	1



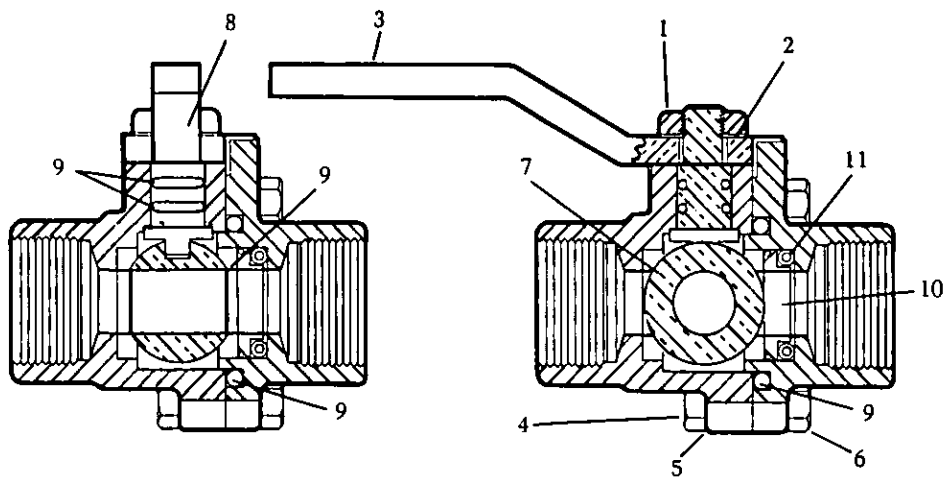


Figure 2

WABCO® "BALL" CUT-OUT COCK, Standard Port, Non-Vented

1/2 in. (Approx. Net Weight 7/8 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	572459	1/2 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)	
2-1	522417	.NUT, Jam, 5/16 in.	1
2-2	574394	.WASHER, Lock, .314 I.D.	1
2-3	□ 574287	.HANDLE, Plain	1
2-4	574393	.NUT, Hex., #10-32	4
2-5	519821	.WASHER, Lock, #12 Int. Tooth	4
2-6	574391	.SCREW, Hex.Hd.Mch., #10-3/4 in.	4
2-7	574270	.BALL	1
2-8	574275	.STEM	1
2-9	574159	.KIT, Rubber Parts	1
2-10	574491	.DISC	1
2-11	574486	.SPRING	1

3/4 in. (Approx. Net Weight 2-1/8 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	572460|572796	3/4 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0) (0-270)	
2-1	517054	.NUT, Jam, 3/8 in.	1
2-2	574395	.WASHER, Lock, .380 I.D.	1
		Int. Tooth	1
2-3	□ 574289|574400	.HANDLE, Plain	1
2-4	502349	.NUT, Hex., 1/4 in.	4
2-5	506591	.WASHER, Lock, 1/4 Int. Tooth	4
2-6	193337	.SCREW, Hex.Hd. Mch., 1/4 x 1 in.	4
2-7	574271	.BALL	1
2-8	574276|574280	.STEM	1
2-9	574160	.KIT, Rubber Parts	1
2-10	574492|574493	.DISC	1
2-11	574487|574488	.SPRING	1

1 in. (Approx. Net Weight 4-3/8 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	572461	1 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)	
2-1	517054	.NUT, Jam, 3/8 in.	1
2-2	574395	.WASHER, Lock, .380 I.D. Int. Tooth	1
2-3	□ 574289	.HANDLE, Plain	1
2-4	502349	.NUT, Hex., 1/4 in.	4
2-5	506591	.WASHER, Lock, 1/4 Int. Tooth	4
2-6	193337	.SCREW, Hex.Hd.Mch., 1/4 x 1 in.	4
2-7	574272	.BALL	1
2-8	574276	.STEM	1
2-9	574161	.KIT, Rubber Parts	1
2-10	574493	.DISC	1
2-11	574488	.SPRING	1

1-1/4 in. (Approx. Net Weight 4-3/4 lb.)

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	572462	1-1/4 in. WABCO "BALL" CUT-OUT COCK, ASY. (270-0)	
2-1	521217	.NUT, Jam, 7/16 in.	1
2-2	574396	.WASHER, Lock, Int. Tooth	1
2-3	□ 574290	.HANDLE, Plain	1
2-4	96500	.NUT, Hex., 5/16 in.	4
2-5	574394	.WASHER, Lock, Int. Tooth	4
2-6	574392	.SCREW, Hex.Hd.Mch., 5/16 x 1-1/8 in.	4
2-7	574273	.BALL	1
2-8	574277	.STEM	1
2-9	574162	.KIT, Rubber Parts	1
2-10	574494	.DISC	1
2-11	574489	.SPRING	1

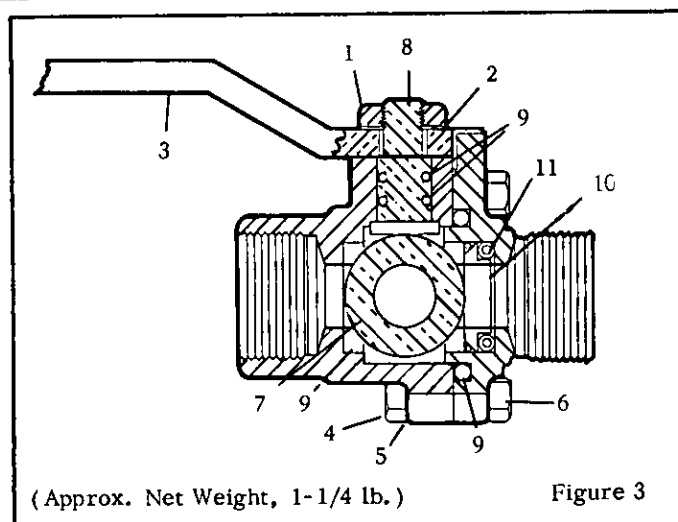
□ NOTE: For Handle Identification, See Page 8



WABCO® "BALL" CUT-OUT COCK, Standard Port, Vented

1 in. (Approx. Net Weight 4-3/8 lbs.)

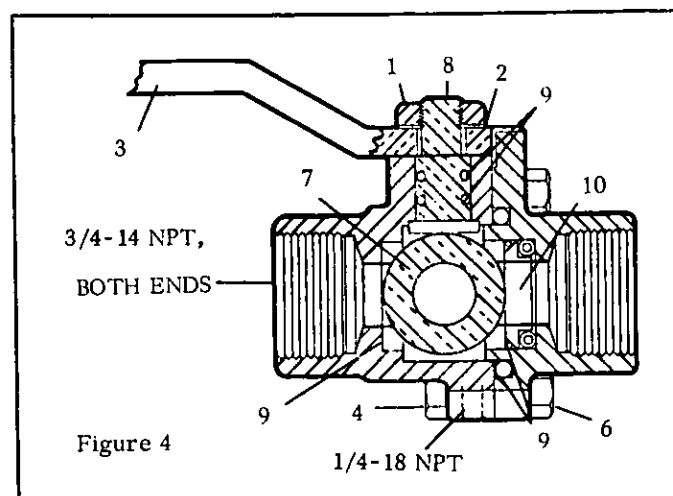
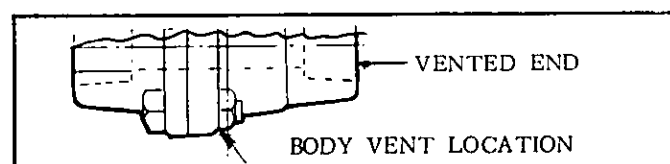
Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
2-	575634	1 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (3/32 in. Vent in Body) (270-0)	
2-	—	576030 1 in. VENTED WABCO "BALL" CUT-OUT COCK, ASY. (3/32 in. Vent in Body) (270-0)	
2-1	517054	.NUT, Jam, 3/8 in.	1
2-2	574395	.WASHER, Lock, .380 I.D. Int. Tooth	1
2-3	□ 574291	— .HANDLE, Locking	1
2-3	—	576529 .HANDLE, Plain	1
2-4	502349	.NUT, Hex., 1/4 in.	4



(Drain Valve) Standard Port

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
3-	572476 (270-0)	572797 (0-270) 578235 (0-270) 1/2 in. WABCO "BALL" CUT-OUT COCK (Drain Valve) ASY.	
3-1	522417	.NUT, Jam, 5/16 in.	1
3-2	574394	.WASHER, Lock, 3/4 I.D. Int. Tooth	1
3-3	□ 574287	574286 — .HANDLE, Plain	1
3-3	—	— 578271 .HANDLE, Sealed	1
3-4	574393	.NUT, Hex. #10-32	4
3-5	519821	506591 | 506591 .WASHER, Lock, Int. Tooth	4
3-6	574391	.SCREW, Mch. Hex. Hd., #10-3/4 in.	6
3-7	574270	.BALL	7
3-8	574275	574279 | 574279 .STEM	1
3-9	574159	.KIT, Rubber Parts	1
3-10	574491	.DISC	1
3-11	574486	.SPRING	1

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
2-5	506591	.WASHER, Lock, 1/4 in.	4
2-6	193337	.SCREW, Mch. Hex. Hd., 1/4 x 1 in.	4
2-7	—	576527 .BALL	1
2-8	574276	.STEM	1
2-9	575838	576528 .KIT, Rubber Parts	1
2-10	574493	.DISC	1
2-11	574488	— .SPRING	1



3-WAY, WABCO® "BALL" CUT-OUT COCK, Standard Port, Vented

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
4-	576029 (270-0)	3/4 x 3/4 x 1 in., 3-WAY VENTED WABCO "BALL" CUT-OUT COCK, ASY.	
4-1	517054	.NUT, Jam, 9/16 in.	1
4-2	574395	.WASHER, Lock, .380 Int. Tooth	1
4-3	□ 576532	.HANDLE Plain	1
4-4	502349	.NUT, Hex. 1/4 in.	4
4-6	193337	.SCREW, Cap, Hex. Hd., 1/4-20 x 1 in.	4
4-7	576530	.BALL	1
4-8	574276	.STEM	1
4-9	576531	.KIT, Rubber Parts	1
4-10	574492	.DISC	1

□ NOTE: For Handle Identification, See Page 8

HANDLE IDENTIFICATION

Pc. No.	Handle Color	Fig. No.	Dim. "A" (in.)	Arrow Orientation	Dia. "D"	Pc. No.	Handle Color	Fig. No.	Dim. "A" (in.)	Arrow Orientation	Dia. "D"
574281		6	1-1/2			574290	BLUE	2	5-13/16	B	
574282	YELLOW	1	3-3/4	B		574291		3	3-1/8		
574283	YELLOW	1	3-3/4	B	5/64	574292		5	3		
574284	YELLOW	1	3-3/4	C		574393		4	6-7/8		
574285	YELLOW	2	4-7/16	B		574400	BLUE	2	4-7/16	C	
574286	BLUE	1	3-3/4	C		574401	YELLOW	7	5-13/16	C	
574287	BLUE	1	3-3/4	B		576529	WHITE	2	3-1/4	B	
574288	YELLOW	2	5-13/16	B		576532	WHITE	2	3-3/4	B	
574289	BLUE	2	4-7/16	B		577539		8	4-1/2		
578271		6	1-3/4	C	5/64	577582		9	3-1/8	C	

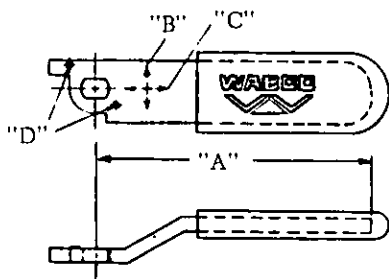


Figure 1

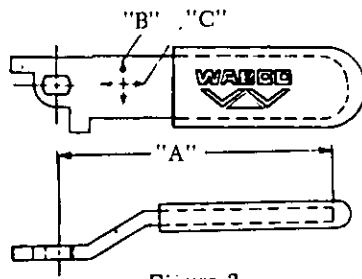


Figure 2

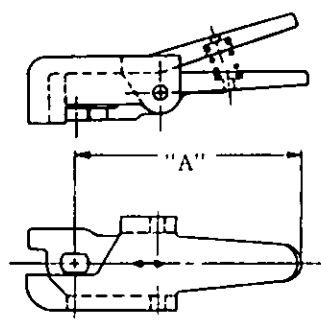


Figure 3

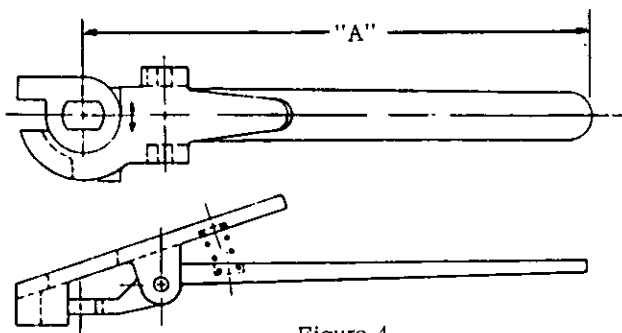


Figure 4

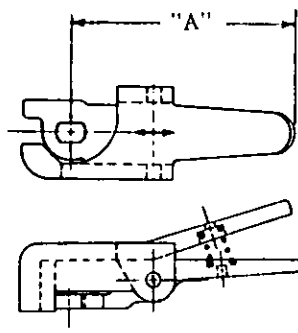


Figure 5

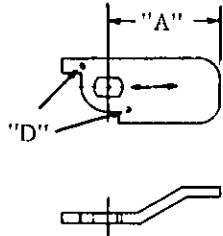


Figure 6

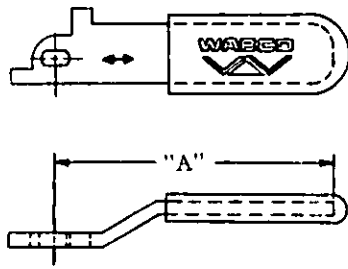


Figure 7

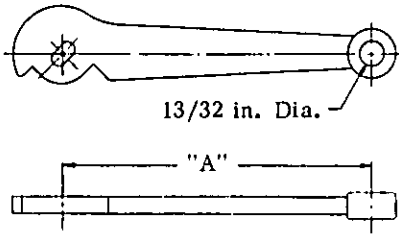


Figure 8

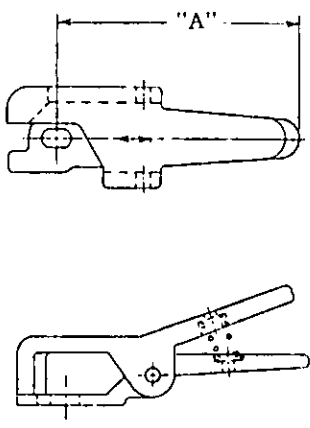


Figure 9



WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
Wilmerding, Pennsylvania 15148

operation & maintenance information

1" COMBINED CUT-OUT COCK AND STRAINER PORTION

(Pc.Nos. 562756, 562757, 562832, 562833, 562834 and 565124)

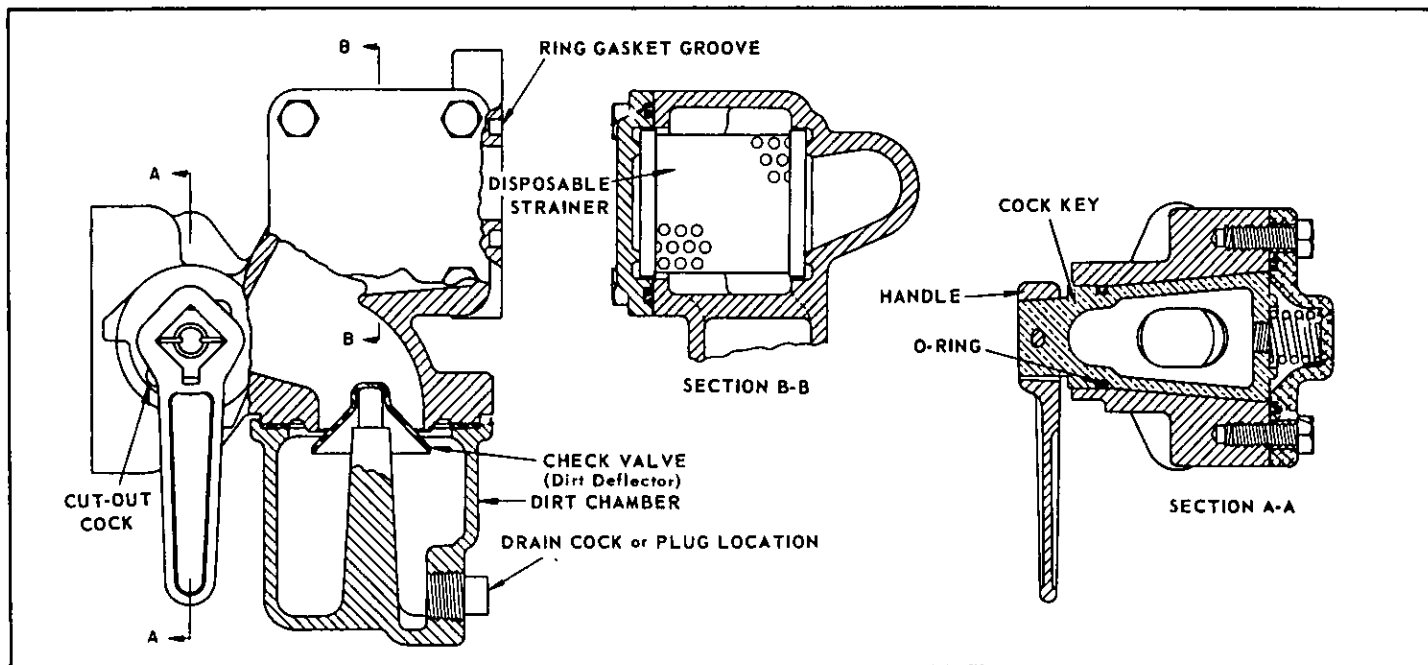


FIGURE 1 - ASSEMBLY VIEW

NOTE: THE FOLLOWING DESCRIPTION AND/OR OPERATION IS BASED ON THIS DEVICE BEING NEW OR THIS DEVICE HAVING BEEN REPAIRED, TESTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH INSTRUCTIONS ISSUED BY THE APPROPRIATE GOVERNING BODIES AND THIS AND ANY OTHER APPLICABLE WABCO PUBLICATIONS.

I. GENERAL DESCRIPTION AND OPERATION

(Refer to Figure-1 Assembly View)

The 1" Combined Cut-Out Cock and Strainer Portion, when properly installed and maintained, functions to assist in preventing the entrance of dirt and/or moisture, which may be carried by air from the brake pipe into the air line, device, or unit on which it is mounted. The portion consists of a sealed key type cut-out cock, used to open or close the communication between the piping and the portion, a removable (disposable type) air strainer, a dirt chamber, and body.

The cut-out cock is a "sealed key" type which includes an o-ring as part of the key. The o-ring provides a seal against air leakage.

The dirt chamber, which can easily be removed from the strainer body, contains an umbrella shaped check valve (dirt deflector). The purpose of the check valve (dirt deflector) is to hold collected dirt and moisture in the dirt chamber. When a heavy reduction of air pressure occurs above the check valve, the check valve will seat

against the machined seat of the body shutting off communication between the dirt chamber and the outlet. The check valve (dirt deflector) is installed on the valve stem so that a rocking motion will be permitted. This allows any fine dirt which may be collected on top of the check valve (dirt deflector) to be shaken off into the dirt chamber.

Provision is made in the dirt chamber for installing a drain cock if so desired. The drain cock is not a part of the Cut-Out Cock and Strainer Portion and MUST BE ordered as a separate item.

II. MAINTENANCE PROCEDURES AND TECHNIQUES

IMPORTANT: IT IS RECOMMENDED THAT ONCE EVERY SIX MONTHS, OR MORE OFTEN IF SERVICE EXPERIENCE SO DICTATES, THAT THE DISPOSABLE AIR STRAINER BE REPLACED AND THE DIRT CHAMBER WITH A NEW STRAINER REMOVED FROM THE DEVICE, THOROUGHLY CLEANED AND RE-INSTALLED.

IMPORTANT: THE 1" COMBINED CUT-OUT COCK AND STRAINER PORTION SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED, AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

(SUPERSEDES ALL PREVIOUS ISSUES OF 4216-2, COS)



RECOMMENDED
TYPE OF APPLICATION FREQUENCY -
AT LEAST ONCE EVERY

Freight Cars	144 Months
Locomotives	24 Months
Passenger (Interstate)	36 Months
Multiple Operated Electric Unit	15 Months

II.A. CLEANING SOLVENT AND LUBRICANTS

1. The solvent used for cleaning the parts of the Combined Cut-Out Cock and Strainer Portion MUST BE an aliphatic organic solution, such as naphtha or mineral spirits, that will dissolve oil or grease and that will permit all parts to be cleaned without abrasion.
2. No. 4 Zinc Base Grease, WABCO Specification M-7675-4, MUST BE available to lubricate the o-ring, o-ring groove of the cock key, cock key, and the cock key bushing of the body.

3. WARNING

THE USE OF SOLVENTS AS CLEANING AGENTS AND THE USE OF LUBRICANTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURERS OF THE SOLVENTS AND LUBRICANTS SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE RECOMMENDED PRECAUTIONS AND PROCEDURES OF THE MANUFACTURERS SHOULD BE FOLLOWED.

II.B. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the Combined Cut-Out Cock and Strainer Portion.

2. WARNING

THE USE OF AN AIR JET, WHICH MUST BE LESS THAN 30 PSIG, TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POS-

SIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.

3. WARNING

THE USE OF A WIRE BRUSH TO CLEAN THE SPRING WILL CAUSE PARTICLES OF DIRT, RUST, AND SCALE TO BECOME AIRBORNE. THESE PARTICLES CAN CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.

4. The work area should be clean and free of debris.

II.C. TOOLS AND DRAWINGS

1. In addition to the regular shop tools the following MUST BE available to the repairman.
 - a. Repair size key selection gage. Dimensions and specifications for making this tool are shown in Figure-2, WABCO Drawing R-32.
 - b. O-ring applicator as shown in Figure-3, WABCO Drawing AA-80676-2 which is used when installing the o-ring on the cock key.
 - c. Hand Reaming Kit - Pc. No. 553591 for reaming of body for sealed key. Directions for use of this kit are shown in Figure-5, WABCO Drawing BA-79625-16.
 - d. Machine Reaming Kit - Pc. No. 552228 for reaming of body for sealed key. Directions for using this kit are shown in Figure-6, WABCO Drawing FA-79625-15.
 - e. WABCO Drawing AA-55796-52 Figure-4, which lists the available Standard and Repair Size Sealed Cock Keys.
 - f. Reamer tool - Pc. No. 4661 used to ream the cock body.

II.D. DISASSEMBLY

WARNING

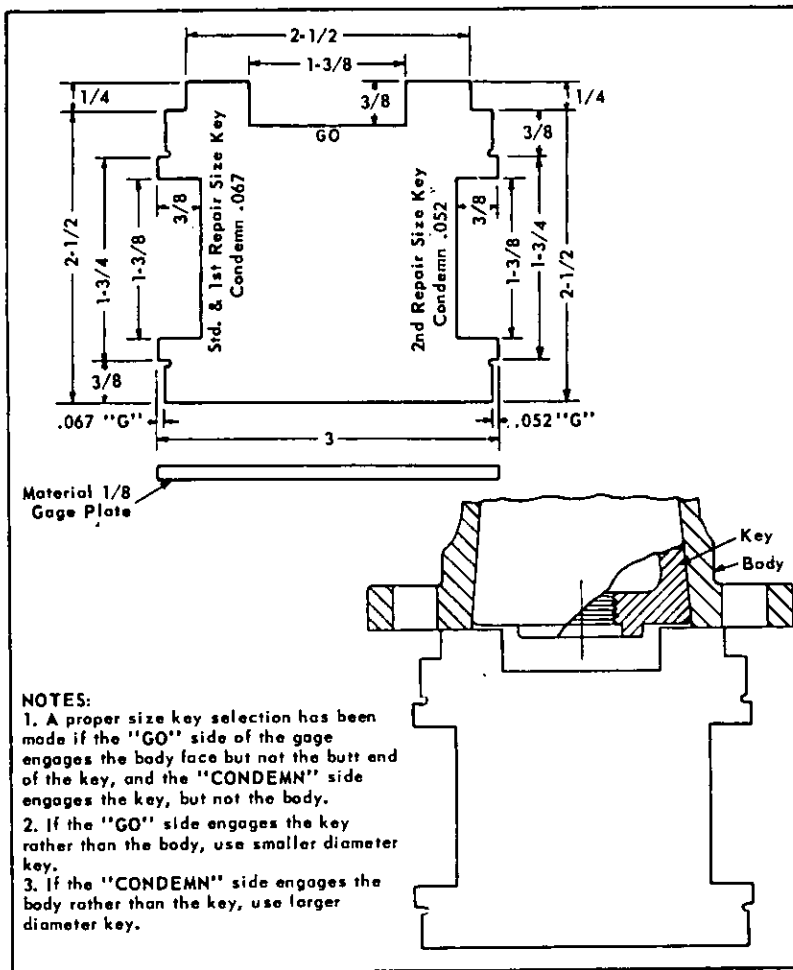
PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.

(Refer to the Exploded View Figure-7)



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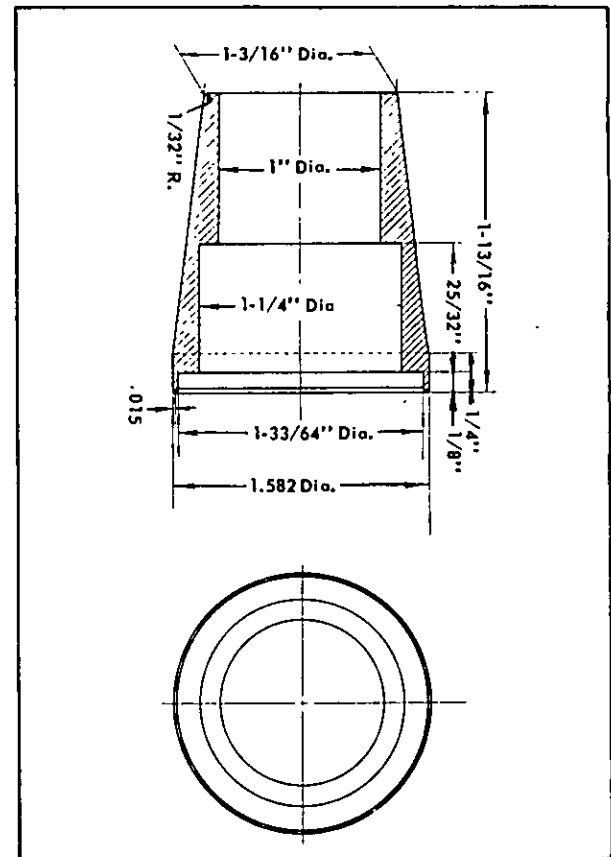
REPAIR KEY SELECTION GAGE - FIGURE 2
Drawing R-32

1. If the 1" Combined Cut-Out Cock and Strainer Portion is equipped with a drain cock, the drain cock should be removed and repaired according to applicable repair procedure. NOTE: The drain cock is not a part of the portion and it is not illustrated.
2. CAUTION: Exercising care so that the cock key (7) is not bent or damaged, CAREFULLY remove the 3/16" x 1-5/8" pin (1) which secures the handle (2) to the cock key (7).
3. Remove the handle (2) from the cock key (7).

WARNING

EXERCISING CARE SO THAT NO PARTS "FLY OUT" AND CAUSE AN INJURY, CAREFULLY remove the following parts from the body (19).

- a. Two 3/8" x 1" hex head cap screws (3) which secure the cock key cover (5) to the body (19).
- b. Cock key cover (5)



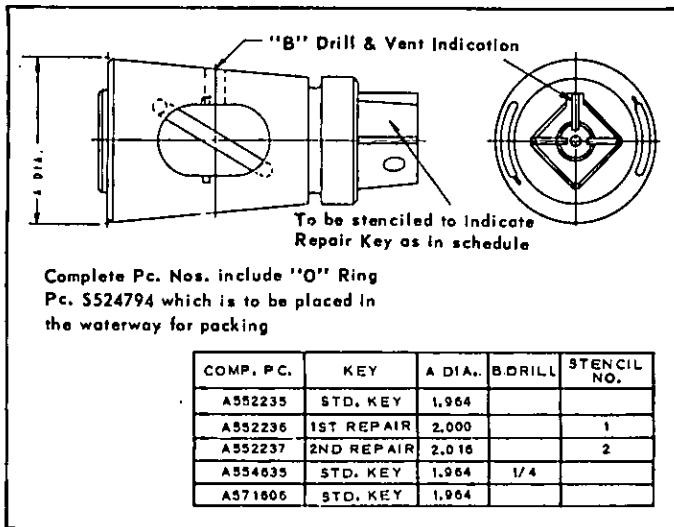
O-RING APPLICATOR - FIGURE 3
Drawing AA-80676-2

- c. Cover gasket (4)
 - d. Key spring (6)
 - e. Cock key with o-ring (7, 8)
5. Remove the o-ring (8) from the cock key (7).
- CAUTION: EXERCISE CARE SO THAT THE SURFACE OF THE COCK KEY IS NOT SCRATCHED OR DAMAGED. THIS IS EXTREMELY IMPORTANT WHEN WORKING WITH PLASTIC COATED (PL) KEYS.
6. Remove the following parts from the body (19).
 - a. Four 3/8" x 1" hex head cap screws (9) which secure the strainer cover (10) to the body (19).
 - b. Strainer cover (10)
 - c. 3" O.D. cover gasket (11)
 - d. Strainer (12). DISCARD the strainer.
 7. Remove the two 1/2" nuts (13) and 1/2" x 1-3/4" hex head bolts (14) which secure the dirt chamber

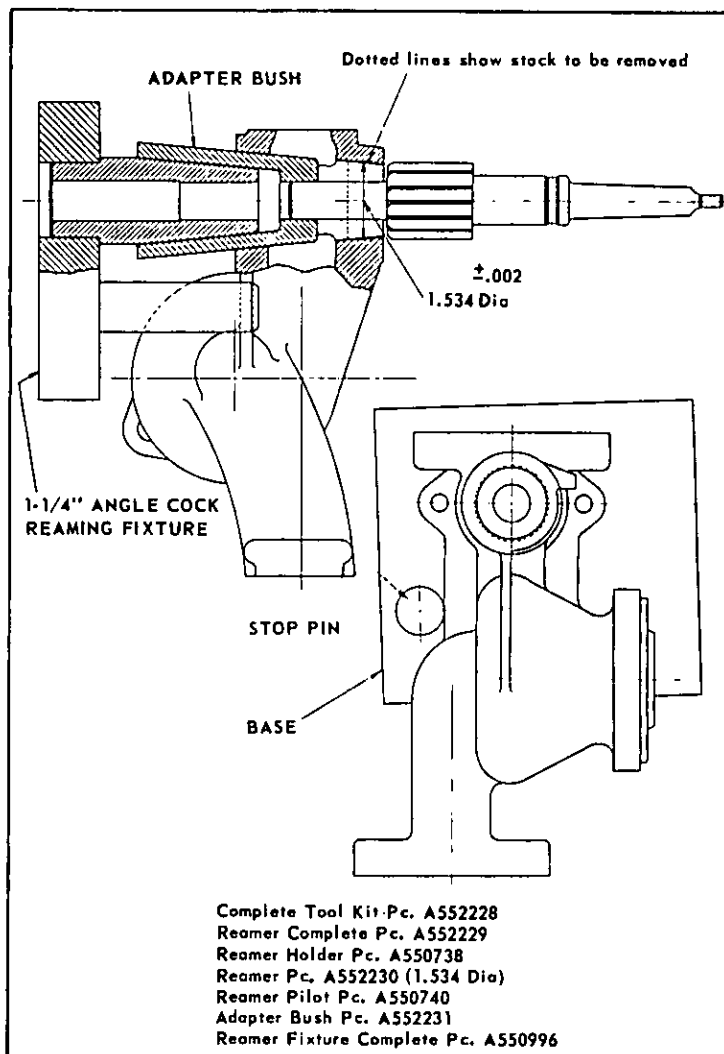
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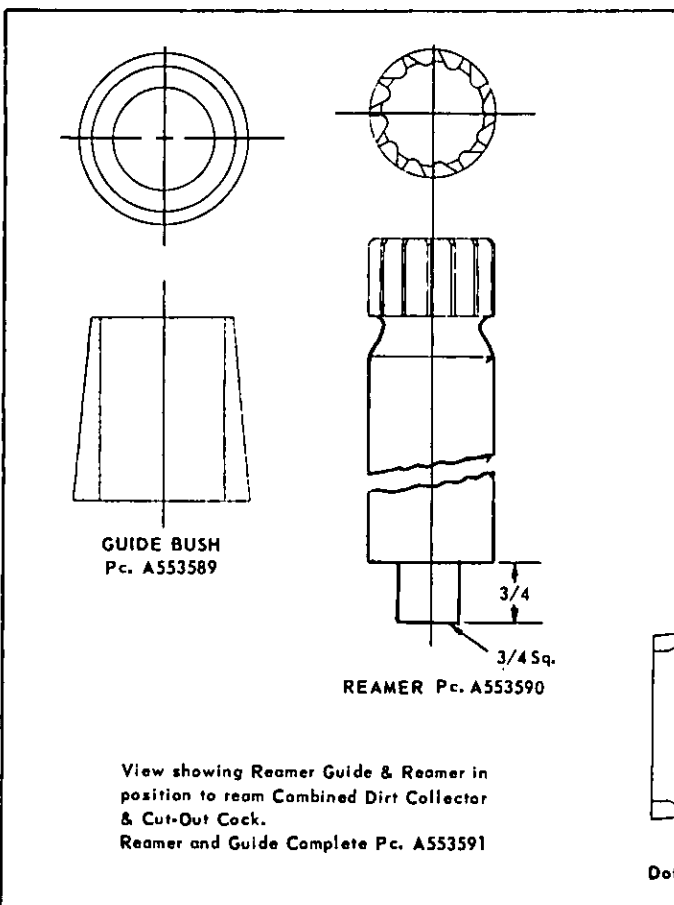
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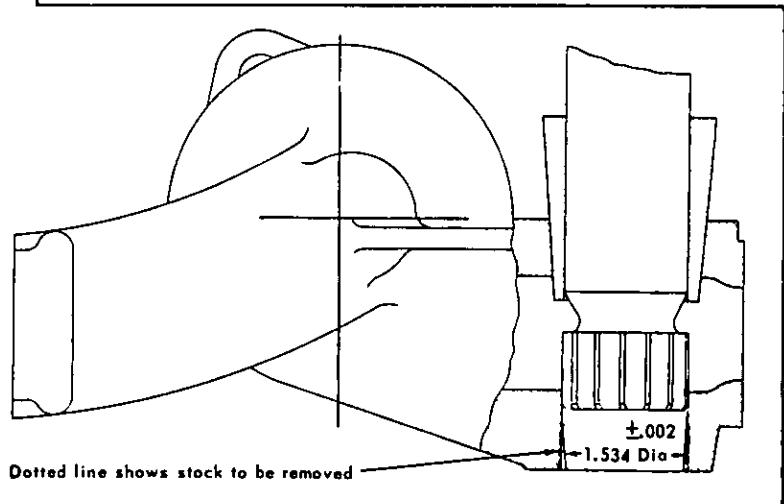
STANDARD & REPAIR KEYS (outline) - FIGURE 4
Drawing AA-55796-52



HAND REAMING KIT Pc. 553591 - FIGURE 5
Drawing BA-79625-16



MACHINE REAMING KIT Pc. 552228 - FIGURE 6
Drawing FA-79625-15





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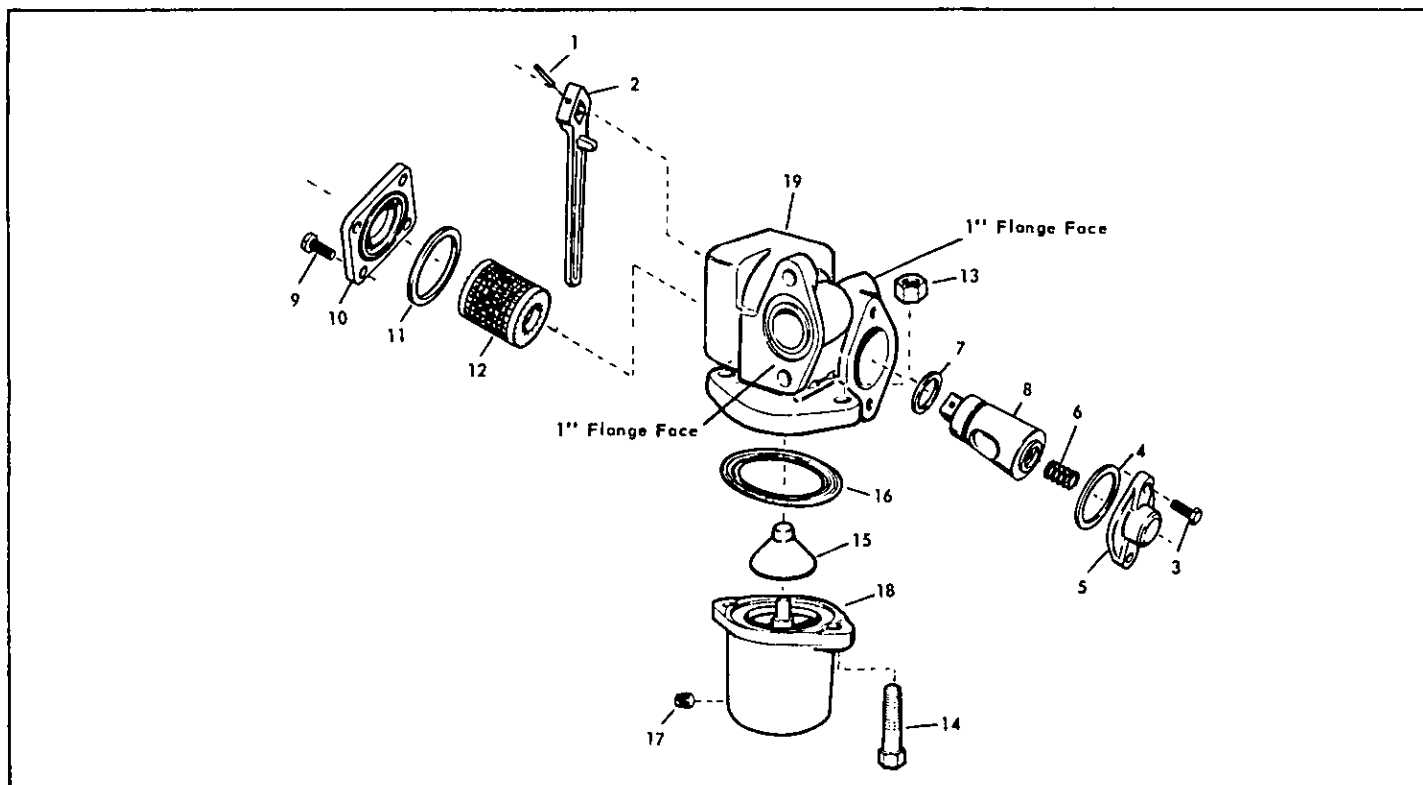


FIGURE 7 - EXPLODED VIEW

assembly (15 to 18 incl.) to the body (19). **NOTE:** The 1" Combined Cut-Out Cock and Strainer Portion Pc. No. 562757 and Pc. No. 562832 do not have the dirt chamber assembly but are equipped with a blanking pad Pc. No. 562839 and gasket Pc. No. 75932 (16). The blanking pad is not illustrated.

8. Remove the dirt chamber assembly (15 to 18 incl.) from the body (19).
9. Remove the following parts from the dirt chamber (18).
 - a. Dirt chamber gasket (16)
 - b. Check valve (dirt deflector) (15)

II.E. CLEANING, INSPECTING, AND REPAIRING

NOTE: Refer to WABCO Parts Catalog 3216-2 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.

WARNING

PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.

I. Metal Parts

- a. Wash all of the metal parts in the cleaning solvent described in paragraph II.A.1. Adhere to the WARNING of paragraph III.A.3.
- b. **CAUTION:** When cleaning the cock key exercise care so that the surface of the key is not scratched or damaged. THIS IS EXTREMELY IMPORTANT IF THE KEY IS PLASTIC COATED (PL).
- c. The spring may be wire brushed to assist in the removal of rust and scale. Adhere to the WARNING of paragraph II.B.3.
- d. After the parts are cleaned they MUST BE blown dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph II.B.2.
- e. Inspect the parts.
 - (1) Reject and replace the spring if it is rusted, distorted, pitted or has taken a permanent set. The spring (6) Pc. No. 2098 has an approximate free height of 1-7/32".
 - (2) Reject and replace any part that is cracked, nicked, damaged, worn excessively, or is in such a condition that may result in unsatisfactory operation.



- f. The following procedure for fitting brass keys to the body MUST BE adhered to. **IMPORTANT: THIS PROCEDURE IS NOT TO BE USED ON PLASTIC COATED (PL) KEYS.**

- (1) Check the key with repair key selection gage (see paragraph II.C.1.) as shown on drawing R-32 in Figure-2.
- (2) If the key is condemned, a repair size key MUST BE used. See Figure-4 WABCO Drawing AA-55796-52 for repair keys.
- (3) Reamer tool, Pc. No. 4661 can be used for reaming bodies.
- (4) Brass keys MUST BE lapped to the body using a reciprocating motion with "KWIK-AK-SHUN" valve grinding compound grade 19, or its equivalent. **IMPORTANT: WHEN LAPPING IN A KEY BE SURE THAT THE O-RING IS NOT IN PLACE.**
- (5) After the lapping operation has been completed, the body and key MUST BE washed clean of abrasive material under a stream of clean, hot water. Blow the body and key completely dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph II.B.2.
- (6) Repeat the gaging of the key.

- g. Plastic Coated (PL) keys may be refitted to existing cock bodies if the body is first lapped clean using a brass lapping plug and "KWIK-AK-SHUN" valve grinding compound grade 19, or its equivalent. Use a reciprocating motion to lap. **IMPORTANT: DO NOT LAP THE PLASTIC COATED (PL) KEY.**

- (1) After the body is lapped, remove the lapping plug, then wash the body with a stream of hot water.
- (2) Blow the body completely dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph II.B.2.

NOTE: See WABCO Drawing AA-55796-52 Figure-4, for standard size replacement key.

- h. Older style Combined Cut-Out Cock and Strainer Portions equipped with plug type keys (no o-ring) may be modified to use a sealed key as follows:

- (1) Ream the body using the Hand Reaming Kit, Pc. No. 553591 as shown on WABCO Drawing BA-79625-16, Figure-5, or Ma-

chine Reaming Kit, Pc. No. 552228 as shown on WABCO Drawing FA-79625-15, Figure-6.

- (2) A NEW sealed key MUST BE used and lapped to the body following the procedure described in paragraph II.E.1.f.

IMPORTANT: MODIFICATION OF THE OLDER STYLE PLUG KEY TO INCLUDE A GROOVE FOR AN O-RING IS PROHIBITED BY THE A.A.R. RULING DATED APRIL 26, 1963.

2. Rubber Parts

- a. **IMPORTANT:** It is recommended that ALL rubber parts be discarded and replaced with NEW Parts obtained from the Westinghouse Air Brake Division of WABCO. If so desired, serviceable rubber parts may be reused ONLY AFTER they have been cleaned and inspected according to the following procedure:

- (1) Rubber parts may be dipped in the cleaning solvent described in paragraph II.A.1. to assist in the removal of grease and dirt. Adhere to the WARNING of paragraph II.A.3. **IMPORTANT: RUBBER PARTS MUST NOT BE PERMITTED TO SOAK IN THE CLEANING SOLVENT.**
- (2) Promptly wipe the rubber parts with a soft, clean, lint-free cloth and then blow them completely dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph II.B.2.
- (3) Serviceable gaskets may be brushed, using a brush that has soft bristles like a shoe brush, to remove any remaining dirt and to polish the gasket surfaces.
- (4) Inspect the parts. Reject and replace any part that is cracked, cut, torn, worn excessively, damaged in any way, or that is in such a condition that may result in unsatisfactory operation.

3. Air Strainer

- a. The air strainer is to be DISCARDED and replaced with a NEW disposable type strainer Pc. No. 569146 obtained from the Westinghouse Air Brake Division of WABCO.

II.F. LUBRICATING AND ASSEMBLING

WARNING

PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY.



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1. Just prior to assembling, lubricate the cock key, key bushing, and o-ring with No. 4 Zinc Base Grease, WABCO Specification M-7675-4 as follows. Adhering to the WARNING of paragraph II.A.3.
 - a. Lubricate the brass key and key bushing of the body with the grease.
 - b. Coat the o-ring and fill the o-ring groove with the grease.

NOTE: Only the o-ring and the o-ring groove of the key need to be lubricated when a Plastic Coated (PL) key is used.
 2. Install the check valve (dirt deflector) (15) in place on the stem in the dirt chamber (18).
 3. Place the dirt chamber gasket (16) in position on the dirt chamber (18).
 4. Secure the dirt chamber assembly (15 to 18) in position on the body (19) using the two 1/2" x 1-3/4" hex head bolts (14) and the two 1/2" hex nuts (13). NOTE: For units not equipped with a dirt chamber install the blanking pad (not illustrated) using the screws (14) and nuts (13) to secure it in place.
 5. Install a NEW strainer (12) in place in the body (19).
 6. Place the 3" O.D. ring cover gasket (11) and strainer cover (10) in position and secure them to the body (19) using the four 3/8" x 1" hex head cap screws (9). Equally tighten the screws (9).
 7. Install a lubricated 1-1/2" O.D. o-ring (8) in its groove on the cock key (7). Lubrication procedure is found in paragraph II.F.1. Adhere to the WARNING of paragraph II.A.3. NOTE: The o-ring applicator tool as shown on WABCO Drawing AA-80676-2 Figure-3, may be used as an aid when installing the o-ring on the key. CAUTION: Exercise care so that the surface of the key is not scratched or damaged. This is EXTREMELY IMPORTANT when working with Plastic Coated (PL) keys.
 8. Install the cock key with o-ring assembly (7, 8) in place in the body (19).
 9. Insert the key spring (6) in place in the body (19).
 10. Position the cover gasket (4) and cover (5) on the body (19) and secure them in place using the two 3/8" x 1" hex head cap screws (3).
 11. Place the handle (2) on the key (8).
 12. CAUTION: Exercising care so as not to damage or bend the key (7), secure the handle (2) in place with the 3/16" x 1-5/8" pin (1). Use the proper tool to install the pin.
 13. If a drain cock was removed in paragraph II.D.1., it should now be installed. NOTE: The drain cock is not a part of the Combined Cut-Out Cock and Strainer Portion.
- ### II.G. TESTING AND ADDITIONAL INFORMATION
1. After the 1" Combined Cut-Out Cock and Strainer Portion has been assembled, BUT before it is returned to service it MUST pass a series of tests following the procedures of the current issue of the WABCO Test Specification T-3534-0.
 - a. IMPORTANT: Check the Test Specification for the assembly piece number of portion to be tested.
 2. IMPORTANT: WHENEVER THE 1" COMBINED CUT-OUT COCK AND STRAINER PORTION IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON AND IT IS RE-INSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION NEW MOUNTING GASKETS MUST BE USED.
 - a. Two 1" O.D. ring gaskets Pc. No. 93986 are required.
 3. IMPORTANT: WHENEVER A COMBINED CUT-OUT COCK AND STRAINER PORTION IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON AND IT IS REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.
 4. Consult your Westinghouse Air Brake Division Representative if additional information is required.



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PARTS CATALOG

1" COMBINED DIRT COLLECTOR AND DYNABALL CUT-OUT COCK

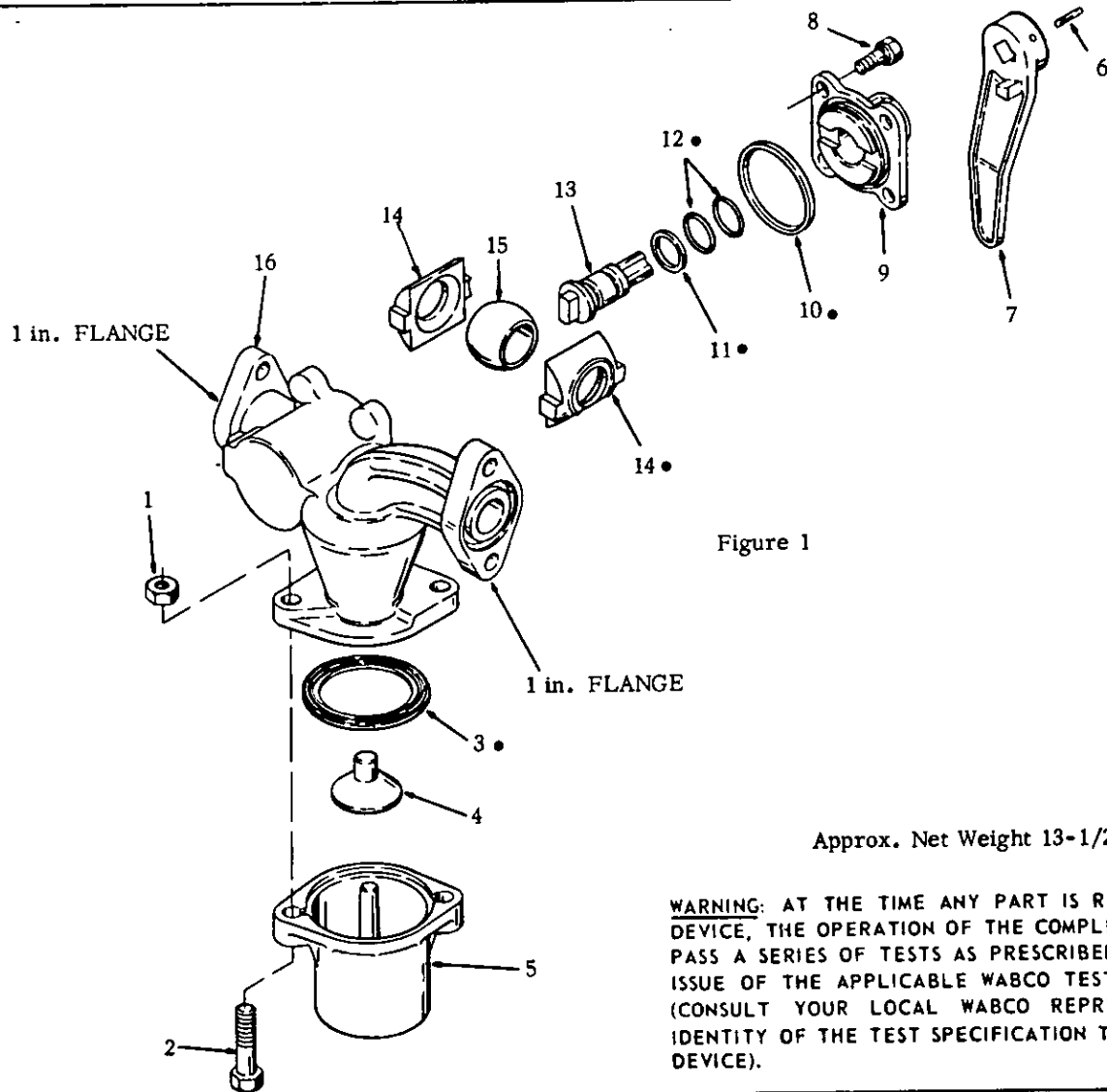


Figure 1

Approx. Net Weight 13-1/2 lbs.

WARNING: AT THE TIME ANY PART IS REPLACED IN THIS DEVICE, THE OPERATION OF THE COMPLETE DEVICE MUST PASS A SERIES OF TESTS AS PRESCRIBED IN THE LATEST ISSUE OF THE APPLICABLE WABCO TEST SPECIFICATION. (CONSULT YOUR LOCAL WABCO REPRESENTATIVE FOR IDENTITY OF THE TEST SPECIFICATION THAT COVERS THIS DEVICE).

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	577071	COMBINED DIRT COLLECTOR and DYNABALL CUT-OUT COCK, ASY.	
1-1	2505	.NUT, Hex., 1/2 in.	2
1-2	540468	.SCREW, Spl. Hex. Hd., 1/2 x 1-7/8 in.	2
1-3	• 75932	.GASKET, Chamber, Dirt	1
1-4	75551	.VALVE, Check	1
1-5	78421	.CHAMBER, Dirt	1
1-6	564459	.PIN, Handle, 3/16 x 1-7/8 in.	1
1-7	577137	.HANDLE	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-8	512422	.SCREW, Cap, H. Hd., 3/8 x 7/8 in.	4
1-9	576126	.COVER	1
1-10	• 575145	.GASKET, Cover	1
1-11	• 576127	.WASHER, Bearing	1
1-12	• 576128	.SEAL, O-Ring	2
1-13	576124	.KEY, Cock	1
1-14	• 572871	.SEAT, Ball	2
1-15	573023	.BALL, Cock	1
1-16	577072	.BODY	1

• NOTE: Rubber Repair Kit, Pc. 582129, contains the indicated parts.

(SUPERSEDES ISSUE DATED MARCH, 1975)



HOSE AND FITTINGS

(SUPERSEDES ISSUE DATED FEBRUARY, 1972)

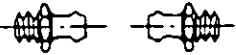
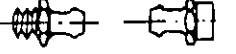
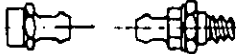
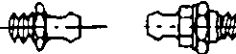
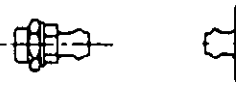
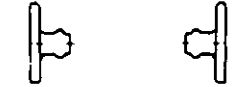
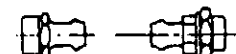
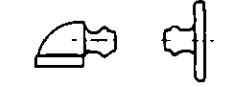
PARTS CATALOG

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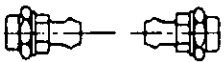
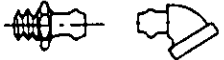
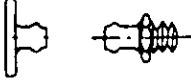
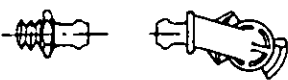
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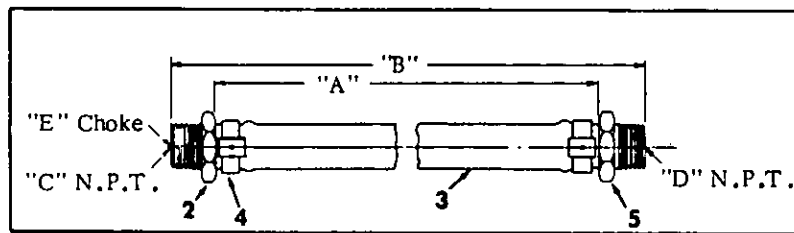
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WEIGHT OF HOSE (per 100 ft.)

Size	Weight
1/4 in.	16#
5/16 in.	21#
3/8 in.	21#
1/2 in.	36#
5/8 in.	50#
3/4 in.	60#
7/8 in.	73#
1 in.	80#
1-1/8 in.	93.5#
1-3/8 in.	110#

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	HOSE FITTINGS	14 & 15
	DUMMY COUPLINGS and MISC. FITTINGS	16
	CLEANING TOOL (COUPLING GROOVE)	16
	HAND CLAMPING TOOL Pc. 552439	(Not Shown)

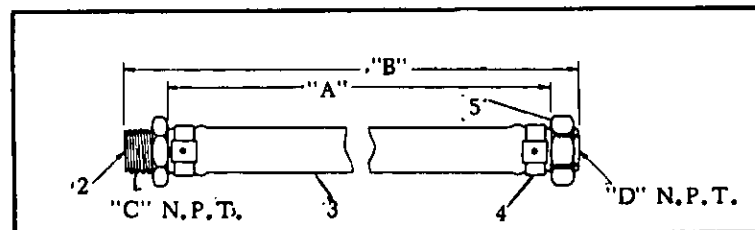


HOSE WITH THREADED NIPPLES

HOSE DIAMETER (inches)	COMPLETE Pc. No.	OVERALL LENGTH "B" in.	FITTING Pc. No.	Ref. 2 Size "C" inches	HOSE Pc. No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc. No.	Ref. 5 Size "D" inches	"E"
1/4	549877	20-3/8	38021	1/4	549876	18	547779	38021	1/4	
3/8	549843	17-3/8	96826	1/4	544894	15	542883	96826	1/4	
	545975	24-3/8	96826	1/4	31067	22	542883	96826	1/4	
	549844	26-3/8	96826	1/4	56440	24	542883	96826	1/4	
	549845	32-3/8	96826	1/4	544896	30	542883	96826	1/4	
	539917	38-3/8	96826	1/4	52695	36	542883	96826	1/4	
	539916	98-3/8	96826	1/4	96962	96	542883	96826	1/4	
	570645	12-1/8	53975	3/8	570967	11-1/2	542883	53975	3/8	
	51043	28-1/8	53975	3/8	56128	26	542883	53975	3/8	
	567644	62-3/8	53975	3/8	544899	60	542883	53975	3/8	
	575468	302-3/8	96826	1/4	575467	300	542883	96826	1/4	
1/2	542109	26-1/4	6390	1/2	21507	24	547040	6390	1/2	
	542110	30-1/4	6390	1/2	544903	28	547040	6390	1/2	
5/8	547091	26-1/4	532838	1/2	547795	24	541051	532838	1/2	
	554370	28-1/4	532838	1/2	544227	26	541051	532838	1/2	
3/4	547670	21-3/8	543138	1/2	21839	19	541051	8417	1/2	3/16
	545451	24-3/8	543138	1/2	8643	22	541051	8417	1/2	3/16
	543001	27-3/8	8417	1/2	35422	25	541051	8417	1/2	
	547662	31-3/8	8417	1/2	547665	29	541051	8417	1/2	
	543000	32-3/8	8417	1/2	20092	30	541051	8417	1/2	
	547676	32-3/8	543138	1/2	20092	30	541051	8417	1/2	3/16
	547678	33-3/8	8417	1/2	544934	31	541051	8417	1/2	
	542927	36-3/8	8417	1/2	49389	34	541051	8417	1/2	
	549772	58-3/8	8417	1/2	37696	56	541051	8417	1/2	
	547673	26-3/8	543138	1/2	33289	24	541051	7968	3/4	3/16
	543004	26-3/8	8417	1/2	33289	24	541051	7968	3/4	
	45525	22-3/8	7968	3/4	19179	20	541051	7968	3/4	
	21549	24-3/8	7968	3/4	8643	22	541051	7968	3/4	
	548532	26-3/8	7968	3/4	33289	24	541051	7968	3/4	
	548533	27-3/8	7968	3/4	35422	25	541051	7968	3/4	
	25789	28-3/8	7968	3/4	21883	26	541051	7968	3/4	
	549267	29-3/8	7968	3/4	19300	27	541051	7968	3/4	
	25750	30-3/8	7968	3/4	22155	28	541051	7968	3/4	
	543409	32-3/8	7968	3/4	20092	30	541051	7968	3/4	
	548534	35-3/8	7968	3/4	544936	33	541051	7968	3/4	

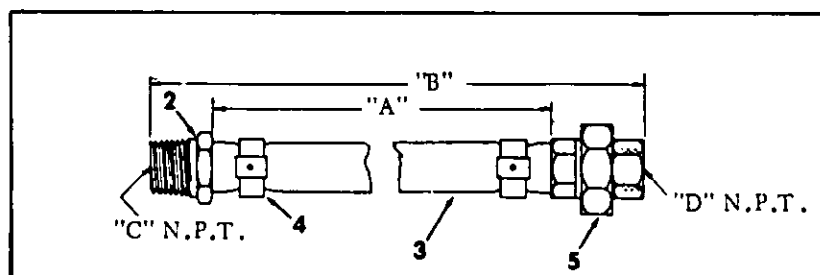
HOSE WITH THREADED NIPPLES (Cont'd.)

HOSE DIAMETER	COMPLETE Pc. No.	OVERALL LENGTH "B" in.	FITTING Pc. No.	Ref. 2 Size "C" inches	HOSE Pc. No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc. No.	Ref. 5 Size "D" inches	"E"
1-1/8 -- -- --	516188 536353 542982 542983 547338 547733 533921 542981 569534 46661 46680 46682 542976 46683 547618 46681 549252 542975 542926	11 23 24 26 29 32 33 36 23-3/8 25-3/8 18-5/8 22-5/8 23-5/8 25-5/8 26-5/8 27-5/8 31-5/8 32-5/8 37-5/8	46169 46169 46169 46169 46169 46169 46169 46169 46175 46175 46175 46175 46175 46175 46175 46175 46175 46175 46175	3/4 3/4 3/4 3/4 3/4 3/4 3/4 3/4 1 1 1 1 1 1 1 1 1 1 1 1	5089 20890 41310 544963 20438 65594 19539 544967 20890 545022 21332 20373 20890 545022 544963 18282 19450 65594 49388	8 20 21 23 26 29 30 33 20 22 15 19 20 22 23 24 28 29 34	539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322 539322	46169 46169 46169 46169 46169 46169 46169 46169 46169 46169 46175 46175 46175 46175 46175 46175 46175 46175 46175	3/4 3/4 3/4 3/4 3/4 3/4 3/4 3/4 3/4 3/4 1 1 1 1 1 1 1 1 1 1	
1-3/8	47087 47094 547759 547092 47088 49829 47085 47086 547761 524464 86734 542990 47090	13-5/8 17-5/8 21-5/8 22-5/8 23-5/8 24-5/8 25-5/8 27-5/8 30-5/8 32-5/8 33-5/8 35-5/8 57-5/8	46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223	1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4	35421 22716 21233 19311 20303 44872 545023 20638 544976 544977 21705 544978 31732	10 14 18 19 20 21 22 24 27 29 30 32 54	539321 539321 539321 539321 539321 539321 539321 539321 539321 539321 539321 539321 539321	46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223 46223	1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4 1-1/4	



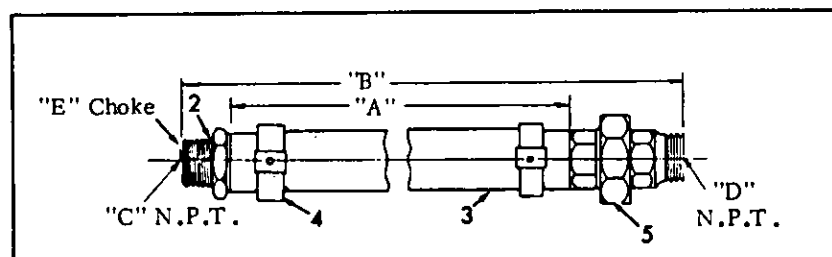
HOSE WITH THREADED AND TAPPED NIPPLES

HOSE DIAMETER (inches)	COMPLETE Pc. No.	OVERALL LENGTH "B" inches	FITTING Pc. No.	Ref. 2 Size "C" inches	HOSE Pc. No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc. No.	Ref. 5 Size "D" inches
3/4	515258	14-1/4	7968	3/4	19180	12	541051	14773	3/4



HOSE WITH THREADED NIPPLE AND TAPPED UNION NIPPLE

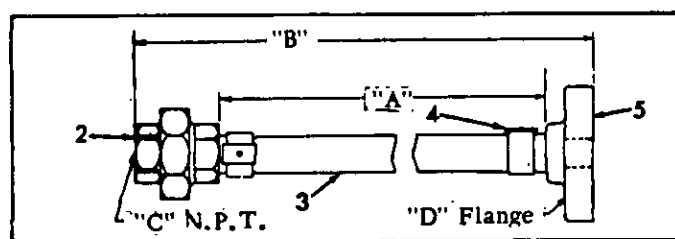
HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
3/8	545238	14-3/4	53975	3/8	544893	12	542883	544803	3/8
	545241	26-3/4	53975	3/8	56440	24	542883	544803	3/8
1/2	545255	29-1/8	6390	1/2	41303	26	547040	544806	1/2
3/4	545281	19-1/8	8417	1/2	19886	16	541051	544808	1/2
	545284	25-1/8	8417	1/2	8643	22	541051	544808	1/2
	545283	25-1/2	7968	3/4	8643	22	541051	541765	3/4
	545292	33-1/2	7968	3/4	20092	30	541051	541765	3/4
1-1/8	546896	25-3/4	46169	3/4	545022	22	539322	544810	3/4
	547632	26-3/4	46169	3/4	544963	23	539322	544810	3/4
	546901	33-3/4	46169	3/4	19539	30	539322	544810	3/4
	546904	39-3/4	46169	3/4	4893	36	539322	544810	3/4
	545320	34-1/4	46175	1	19539	30	539322	544814	1
1-3/8	571201	22-5/8	46223	1-1/4	21233	18	539321	547960	1-1/4
	545324	26-5/8	46223	1-1/4	545023	22	539321	547960	1-1/4
	545326	34-5/8	46223	1-1/4	21705	30	539321	547960	1-1/4
	545327	40-5/8	46223	1-1/4	29089	36	539321	547960	1-1/4
	573311	46-9/16	46223	1-1/4	30357	42	539321	532844	1-1/4



HOSE WITH THREADED NIPPLE AND THREADED UNION NIPPLE

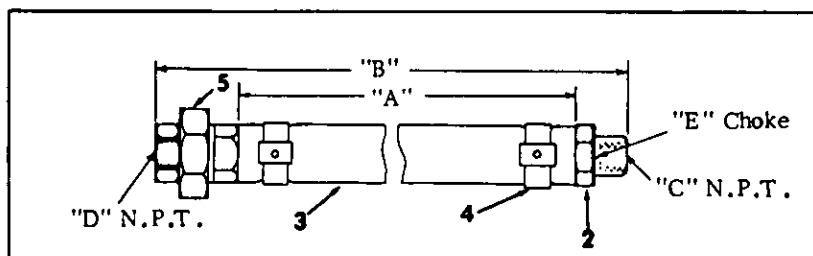
HOSE DIAMETER (inches)	COMPLETE Pc. No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc. No.	Ref. 5 Size "D" inches
3/4	550199	29-7/8	8417	1/2	21883	26	541051	545657	1/2
	547695	48-7/8	8417	1/2	21489	45	541051	545657	1/2
	548535	33-3/8	7968	3/4	547665	29	541051	534318	3/4
	545617	64-3/8	7968	3/4	35365	60	541051	534318	3/4
7/8	546836	31-5/8	532839	3/4	546833	27	541052	537001	3/4
1-1/8	547041	27-5/8	46169	3/4	544963	23	539322	544811	3/4
	547724	29-5/8	46169	3/4	544964	25	539322	544811	3/4
	547637	30-5/8	46169	3/4	20438	26	539322	544811	3/4
	547636	32-5/8	46169	3/4	19450	28	539322	544811	3/4
	545337	33-5/8	46169	3/4	65594	29	539322	544811	3/4
	547726	34-5/8	46169	3/4	19539	30	539322	544811	3/4
	547640	34-1/8	46175	1	65594	29	539322	534317	1
1-3/8	547751	24-5/8	46223	1-1/4	19311	19	539321	537003	1-1/4
	547752	32-5/8	46223	1-1/4	544976	27	539321	537003	1-1/4
	545341	33-5/8	46223	1-1/4	29649	28	539321	537003	1-1/4
	547635	34-5/8	46223	1-1/4	544977	29	539321	537003	1-1/4
	559283	47-5/8	46223	1-1/4	30357	42	539321	537003	1-1/4
	•569513	48-5/8	46223	1-1/4	569511	43	539321	537003	1-1/4
	579905	43-5/8	46223	1-1/4	579904	38	539321	537003	1-1/4

•NOTE: Winterized Hose



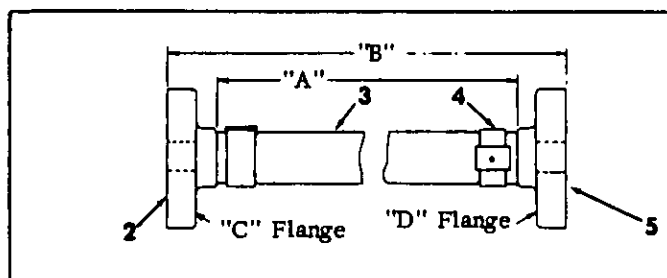
HOSE WITH TAPPED UNION NIPPLE AND STRAIGHT FLANGE.

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
3/8	556602	21-1/2	557361	1/2	56216	18	542883	530856	3/8



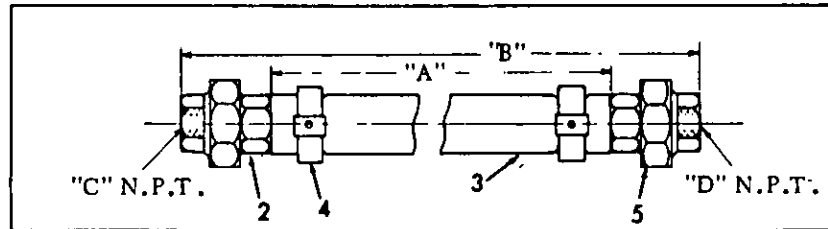
HOSE WITH TAPPED NIPPLE AND TAPPED UNION NIPPLE

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches	"E"
3/4	545174	25-1/4	14773	3/4	8643	22	541051	541765	3/4	
7/8	541910 565776	25-1/4 37-1/4	532837 565775	3/4 3/4	544956 544960	22 34	541052 541052	533508 533508	3/4 3/4	17
1-1/8	545200 545212	25-3/8 39-3/8	46178 46178	3/4 3/4	545002 4893	22 36	539322 539322	544810 544810	3/4 3/4	
1-3/8	545219 545222 545223	26-1/8 34-1/8 40-1/8	46273 46273 46273	1-1/4 1-1/4 1-1/4	545023 21705 29089	22 30 36	539321 539321 539321	547960 547960 547960	1-1/4 1-1/4 1-1/4	



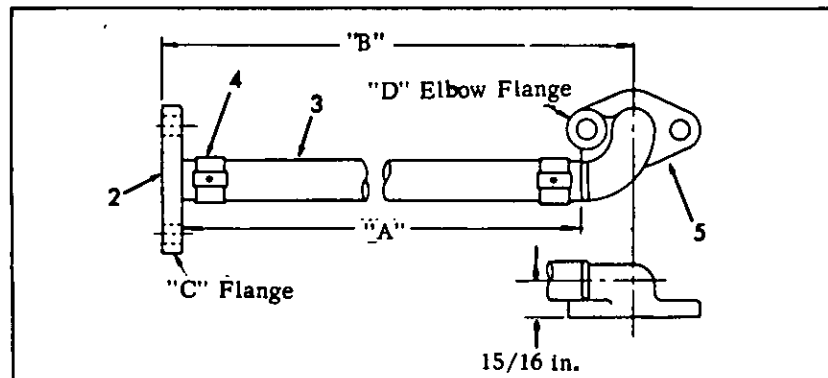
HOSE WITH TWO STRAIGHT FLANGE FITTINGS

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
1/2	503146 537330 542128 548906	27-1/2 36-1/2 43-1/2 47-1/2	504091 504091 504091 504091	3/8 3/8 3/8 3/8	41303 544905 19577 548905	26 35 42 46	547040 547040 547040 547040	504091 504091 504091 504091	3/8 3/8 3/8 3/8
1-3/8	575670	58-1/4	532843	1-1/4	575681	57	539321	532843	1-1/4



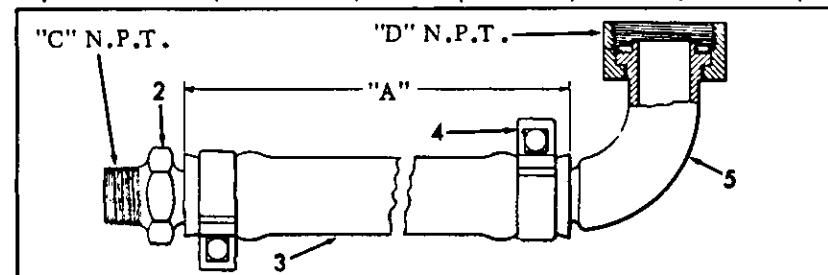
HOSE WITH TAPPED UNION NIPPLES

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Size "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
1-1/8	545373	26-1/2	544812	1/2	545022	22	539322	544812	1/2
	545375	28-1/2	544812	1/2	18282	24	539322	544812	1/2
1-3/8	545388	27-1/2	547960	1-1/4	545023	22	539321	547960	1-1/4



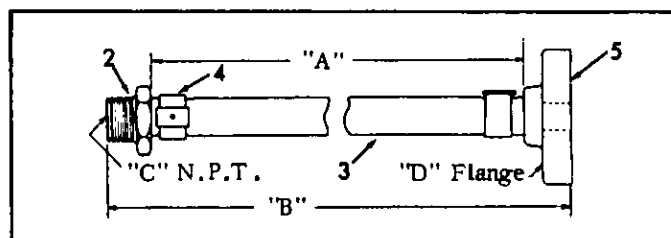
HOSE WITH STRAIGHT FLANGE AND OFFSET ELBOW FLANGE

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches	PIPE SIZE (in.)
3/4	567831	29-13/16	566572	3/4	569168	28	541051	563211	1/2	3/4
3/4	578219	30-3/16	565276	3/4	569168	28	541051	563211	1/2	3/4



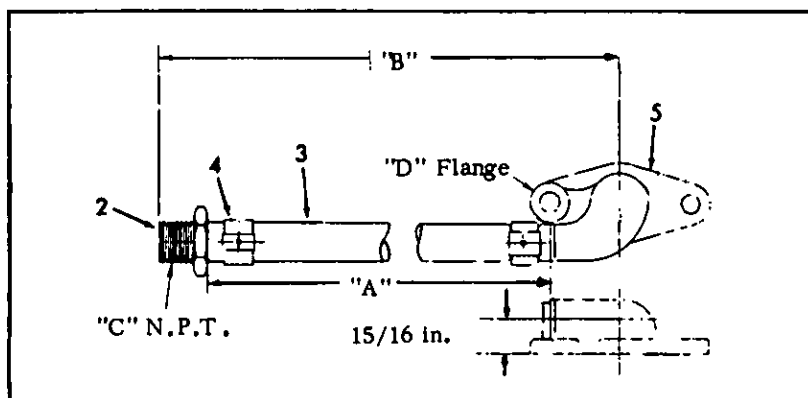
TEST RACK HOSE AND CONNECTIONS

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
3/4	64723	-----	7968	3/4	21883	26	541051	64705	1
	64731	-----	7968	3/4	19316	36	541051	64705	1



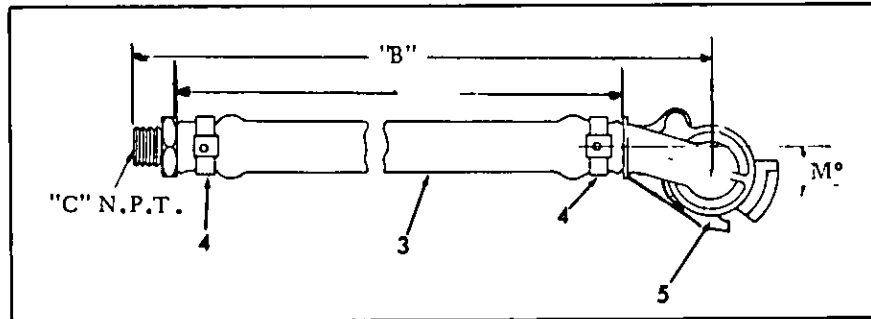
HOSE WITH THREADED NIPPLE AND STRAIGHT FLANGE

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
7/8	562924	21-11/16	532839	3/4	547801	20	541052	532842	3/4
	562545	37-11/16	532839	3/4	562531	36	541052	532842	3/4
1-3/8	570336	46-1/2	46223	1-1/4	54859	44	539321	532843	1-1/4
3/4	575745	30-1/8	7968	3/4	569168	28	541051	575746	1/2



HOSE WITH THREADED NIPPLE AND OFFSET ELBOW FLANGE

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Size "D" inches
3/4	563632	31-5/16	7968	3/4	569168	28	541051	563211	1/2



HOSE WITH THREADED NIPPLE AND "P" TYPE COUPLING

HOSE DIAMETER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	FITTING Pc.No.	Ref. 2 Size "C" inches	HOSE Pc.No.	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 5 Coupler Type	OFF-SET "M"
3/4	583381	34-1/8	564871	3/4	20092	30	541051	556407	HP-3	+15
1-1/8	544553	26-3/8	46169	3/4	545022	22	539322	86760	HP-4	+15
	87079	26-3/8	46169	3/4	2243	22	539322	86760	HP-4	+15
	46256	30-3/8	46169	3/4	20438	26	539322	86760	HP-4	+15
	520724	32-3/8	46169	3/4	19450	28	539322	86760	HP-4	+15
	527553	35-3/8	46169	3/4	544966	31	539322	86760	HP-4	+15
	536059	40-3/8	46169	3/4	4893	36	539322	86760	HP-4	+15
	87183	26-3/4	46175	1	545022	22	539322	86760	HP-4	+15
	46276	26-3/4	46164	1-1/4	545022	22	539322	86760	HP-4	+15
1-3/8	544552	26-3/4	46223	1-1/4	545023	22	539321	86739	FP-5	+15
	87101	26-3/4	46223	1-1/4	2463	22	539321	86739	FP-5	+15
	46288	30-3/4	46223	1-1/4	19608	26	539321	86739	FP-5	+15
	89099	32-3/4	46223	1-1/4	29649	28	539321	86739	FP-5	+15
	63877	34-3/4	46223	1-1/4	21705	30	539321	86739	FP-5	+15
	559282	36-3/4	46223	1-1/4	544978	32	539321	86739	FP-5	+15
	549928	38-3/4	46223	1-1/4	41312	34	539321	86739	FP-5	+15

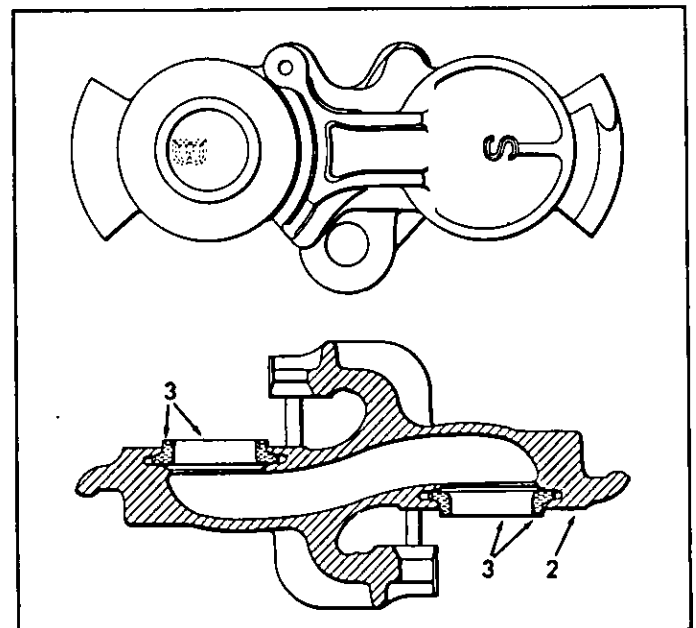
◆NOTE: For Coupling Gaskets, see Page 12

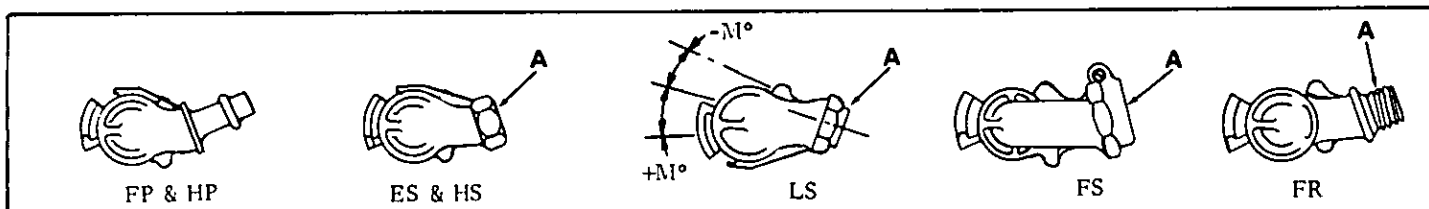
"HUF" HOSE COUPLING

The HUF Coupling consists of a jumper or double end coupling with gaskets, one end suitable for coupling with the standard Signal Coupling, the other end suitable for coupling with the standard Brake Pipe Coupling, and was designed for the purpose of providing means for temporarily connecting the brake pipe and signal pipe in cases of emergency.

Pc.No.	Ref. No.	Parts Name	No. Req'd
46150	2	HUF Hose Coupling, complete,	
563952	3	.Hose Coupling Gasket.	2

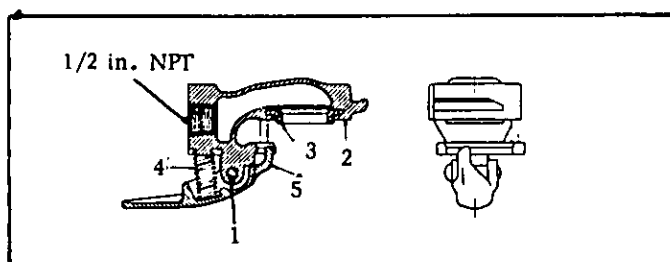
Approx. Net Weight,
each 4-1/4 lbs.





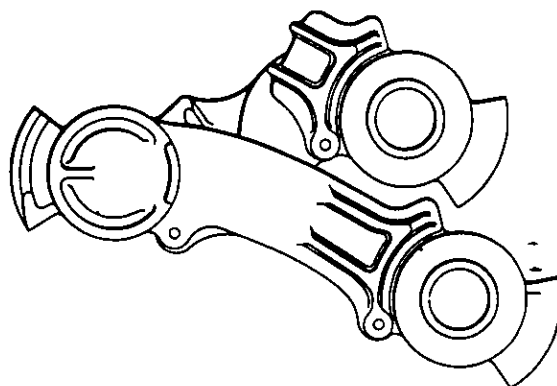
HOSE COUPLINGS

COUPLING Pc. No.	GASKET Pc. No. Ref. 3	"A" TAP or THREAD	APPROX. NET WT. LBS.	"M"°	DESCRIPTION
505490	563952	1/2	1-5/8	+15°	ES-2 HOSE COUPLING
49163	563952	3/4	1-1/2	+15°	ES-3 HOSE COUPLING
514296	563952	1	1-1/2	+15°	ES-4 HOSE COUPLING
536285	563952	3/4	2	-20°	LS-3 HOSE COUPLING
505508	563952	1	2	-15°	LS-4 HOSE COUPLING
506388	563952	1/2	2-1/4	+15°	HS-2 HOSE COUPLING
504511	563952	3/4	2-1/4	+15°	HS-3 HOSE COUPLING
46983	563952	3/4	2-3/8	0°	HS-3 HOSE COUPLING
556407	563952	3/4	2	+15°	HP-3 HOSE COUPLING
73301	563952	1	2-1/2	0°	HS-4 HOSE COUPLING
86760	563952	1	2	+15°	HP-4 HOSE COUPLING
73303	563952	1-1/4	2-3/4	0°	HS-5 HOSE COUPLING
552009	563952	1-1/4	2-3/4	+20°	HS-5 HOSE COUPLING
87737	563952	3/4	2-1/4	0°	FS-3 HOSE COUPLING
87817	563952	3/4	2-1/4	+15°	FS-3 HOSE COUPLING
552603	563952	3/4	2-1/4	+15°	FS-3 HOSE COUPLING, WITH CHOKE & CHAIN
89020	563952	1	2-1/4	+15°	FS-4 HOSE COUPLING
88983	563952	1	2-1/4	0°	FS-4 HOSE COUPLING
504513	563952	1-1/4	2-1/4	+15°	FS-5 HOSE COUPLING
86739	563952	1-1/4	2-1/4	+15°	FP-5 HOSE COUPLING
96943	563952	1-1/4	2-1/4	-35°	FP-5 HOSE COUPLING
97306	563952	1/2	2		FR-2 HOSE COUPLING



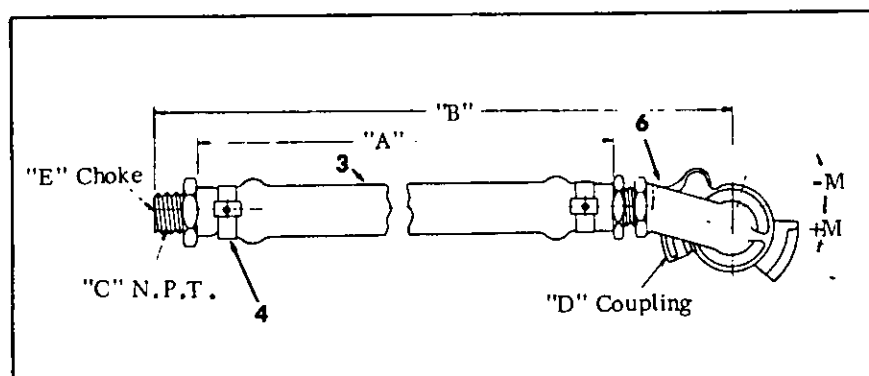
Pc. No.	Ref. No.	Parts Name	No. Req'd
538551		EYS-2 Hose Coupling, Complete with Locking Handle	
545404	1	.PIN, 1/4 x 1/8 in.	1
536952	2	.Coupling Case	1
538976	3	.Coupling Gasket	1
540464	4	.Handle Spring	1
540458	5	.Handle	1

Approx. Net Wt. - 3 lbs.



Piece No. 46322 One HP-4 and Two FP-4 Combination
Hose Coupling, complete, used with Brake
Test Truck, see Part Catalog 3219-1 Sup. 6.

Approx. Net Weight, each 6-1/2 lbs.



HOSE WITH THREADED NIPPLES AND COUPLING

HOSE DIA-METER (inches)	COMPLETE Pc.No.	OVERALL LENGTH "B" inches	HOSE COMBINATION Pc.No. (See pages 4, 5 & 6)	HOSE	Ref. 3 Length "A" inches	CLAMP Ref. 4	FITTING Pc.No.	Ref. 6 TYPE	"C"	"D"	"E"	OFF-SET "A1"°
1/2	577791 527682	31-1/2 33-1/2	577792 542110	41303 544903	26 28	547040 547040	506388 506388	HS-2 HS-2	1/2 1/2	1/2 1/2		+15 +15
5/8	540568 548317	27-1/2 28-5/8	----- 547091	544929 547795	22 24	541051 541051	506388 505490	HS-2 ES-2	1/2 1/2	1/2 1/2		+15 +15
3/4	545413 545414 543007 547663 543006 548540 520489 548149 543408	27 27 30-5/8 34-5/8 35-5/8 35-5/8 125-5/8 26-5/8 34-5/8	8641 545451 543001 547662 543000 543409 520561 21549 543409	8643 8643 35422 547665 20092 20092 35424 8643 20092	22 22 25 29 30 30 120 22 30	541051 541051 541051 541051 541051 541051 541051 541051 541051	538551 538551 506388 506388 506388 504511 46983 49163 49163	EYS-2 EYS-2 HS-2 HS-2 HS-2 HS-3 HS-3 ES-3 ES-3	1/2 1/2 1/2 1/2 1/2 3/4 3/4 3/4 3/4	1/2 1/2 1/2 1/2 1/2 3/4 3/4 3/4 3/4	3/16	0 0 +15 +15 +15 +15 0 +15 +20
1-1/8	542985 542986 562651 547661 542979 542977 542987 542978 569529 577790	31-1/4 39-1/4 28 29 30 35 27-1/4 26 27-3/4 34-3/4	542980 542981 46683 547618 46681 542975 542982 542976 46661 549252	544964 544967 545022 544963 18282 65594 41310 20890 545022 19450	25 33 22 23 24 29 21 20 22 28	539322 539322 539322 539322 539322 539322 539322 539322 539322 539322	504511 504511 505508 505508 505508 505508 504511 505508 514296 89020	HS-3 HS-3 LS-4 LS-4 LS-4 LS-4 HS-3 LS-4 ES-4 FS-4	3/4 3/4 1 1 1 1 3/4 1 3/4 1	3/4 3/4 1 1 1 1 3/4 1 1 1		+15 +15 -15 -15 -15 -15 +15 -15 +15 +15
1-3/8	552087 543158 547791 547792 547793	28-3/4 29-1/4 31 36 39	47085 545512 47086 524464 542990	545023 545023 20638 544977 544978	22 22 24 29 32	539321 539321 539321 539321 539321	552009 73303 504513 504513 504513	HS-5 HS-5 FS-5 FS-5 FS-5	1-1/4 1-1/4 1-1/4 1-1/4 1-1/4	1-1/4 1-1/4 1-1/4 1-1/4 1-1/4		+20 0 +15 +15 +15

◆NOTE: To Identify Couplings, See Page 12.



HOSE FITTINGS

1/4 WABCO Hose

Pc. No.	Description	A
38021	1/4 in. Threaded Nipple	1-3/16
547779	Punch Lok Clamp	

3/8 WABCO Hose

Pc. No.	Description	A
53975	3/8 in. Threaded Nipple	1-1/16
557188	1/4 in. Threaded Union Nipple	2-3/16
530856	3/8 in. Flanged Nipple	7/8
557361	1/2 in. Threaded Union Nipple	2-11/16
96826	1/4 in. Threaded Nipple	1-3/16
542883	Punch Lok Clamp	

1/2 WABCO Hose

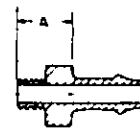
Pc. No.	Description	A
6390	1/2 in. Threaded Nipple	1-1/8
71979	3/8 in. Threaded Nipple	1-1/8
504091	3/8 in. Flanged Nipple	23/32
44277	1/2 in. Tapped Nipple	1
544806	1/2 in. Tapped Union Nipple	1-15/16
547040	Punch Lok Clamp	

5/8 WABCO Hose

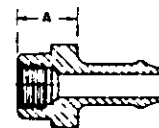
Pc. No.	Description	A
532836	1/2 in. Tapped Nipple	1
532838	1/2 in. Threaded Nipple	1-1/8
533446	1/2 in. Tapped Union Nipple	1-15/16
546405	1/2 in. Threaded Union Nipple	2-11/16
533041	3/4 in. Flanged Nipple	1/2
541051	Punch Lok Clamp	

3/4 WABCO Hose

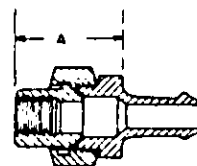
Pc. No.	Description	A	B
7968	3/4 in. Threaded Nipple	1-3/16	
8417	1/2 in. Threaded Nipple	1-3/16 (casting)	
14773	3/4 in. Tapped Nipple	1	
15229	1 in. Tapped Nipple	1-3/16	
534318	3/4 in. Threaded Union Nipple	3-3/32	
541765	3/4 in. Tapped Union Nipple	2-1/4	
543138	1/2 in. Thrd. Nipple & Choke	1-3/16	
544808	1/2 in. Tapped Union Nipple	1-15/16	
545657	1/2 in. Thrd. Union Nipple	2-11/16	
563211	1/2 in. Offset Elbow Flange	1-3/8	15/16
566572	3/4 in. Flange Nipple	1/2	
564871	1/2 in. Threaded Nipple	1-3/16 (bar stock)	
541051	Punch Lok Clamp		



THREADED STUD NIPPLE



TAPPED NIPPLE



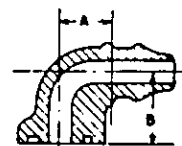
TAPPED UNION NIPPLE



THREADED UNION NIPPLE



FLANGED NIPPLE



FLANGE ELBOW NIPPLE



HOSE FITTINGS

7/8 WABCO Hose

Pc. No.	Description	A
532839	3/4 in. Threaded Nipple	1-3/16
533508	3/4 in. Tapped Union Nipple	2-1/4
532837	3/4 in. Tapped Nipple	31/32
532842	3/4 in. Flanged Nipple	1/2
537001	3/4 in. Threaded Union Nipple	3-3/32
565775	3/4 in. Tapped Nipple (17/64 Choke)	31/32
541052	Punch Lok Clamp	1-1/16

1-1/8 WABCO Hose

Pc. No.	Description	A
46164	1-1/4 in. Threaded Nipple	1-25/32
46169	3/4 in. Threaded Nipple	1-1/2
46175	1 in. Threaded Nipple	1-25/32
46178	3/4 in. Tapped Nipple	1-1/8
46180	1 in. Tapped Nipple	1-3/16
534317	1 in. Thrd. Union Nipple	3-11/32
544810	3/4 in. Tapped Union Nipple	2-3/16
544811	3/4 in. Thrd. Union Nipple	3-1/32
544812	1/2 in. Tapped Union Nipple	2-1/4
544814	1 in. Tapped Union Nipple	2-7/16
539322	Punch Lok Clamp	

1-3/8 WABCO Hose

Pc. No.	Description	A	B
46223	1-1/4 in. Threaded Nipple	1-13/16	
46273	1-1/4 in. Tapped Nipple	1-3/8	
532843	1-1/4 in. Flanged Nipple	5/8	
532844	1-1/4 in. Tapped Union Nipple	2-3/4	
533523	1-1/4 in. Flanged Elbow Nipple	1-3/8	2-5/8
534679	1-1/4 in. Tapped Nipple	1-3/8	
537003	1-1/4 in. Thrd. Union Nipple	3-3/4	
547960	1-1/4 in. Thrd. Union Nipple	2-3/4	
534679	1-1/4 in. Tapped Nipple	1-3/8	
579461	Punch Lok Clamp		

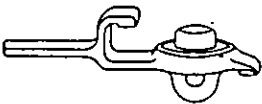
Prices will be quoted upon
application

Orders should give PIECE
NUMBER and NAME of part wanted

DUMMY COUPLINGS

Dummy Couplings can be used with any size of Hose Couplings in which the first letter in the designation is the same as the type letter of the dummy coupling.

VENTED DUMMY COUPLINGS			Approx. Net Wt. (lbs.)
Pc. No.	Type		
558556	E & L-3		1
558554	F-3		5/8
558555	H-3		1
558553	H-3		1-1/8
558596	M-3		1



For Brake Pipe Hose Coupling
with Eye on back of Coupling

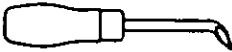
VENTED DUMMY COUPLINGS with CHAIN

Pc.No.	Type	Pc.No. less Chain	(in.) Chain Length	Approx. Net Wt. (lbs.)
559994	E & L-3		7-1/2	
561490	E & L-3		16	
559995	F-3	558554	7-1/2	
559996	F-3	558554	9	
559997	F-3	558554	18	
559998	H-3		7-1/2	1-1/2
559999	H-3		14	
561489	H-3		16	
560000	H-3		7-1/2	
560001	M-3		7-1/2	
564398	E & L-3		6	
564399	F-3	558554	11	
562546	F-3, E&L-2			
564400	H-3		12-7/8	
574474	H-3			



NOTE: Chain and Hook
For Signal Pipe Hose Coupling
with Eye on end of handle

CLEANING TOOL



Piece No. 46096 Coupling Groove Cleaning Tool

Approx. Net Weight 1/4 lb.

UNVENTED DUMMY COUPLING with CHAIN (Plated)

Pc. No.	Type	(in.) Chain Length	Approx. Net Wt. (lbs.)
20817	E & L-2	7-1/2	
20809	F-2	7-1/2	
20811	H-2	7-1/2	1-1/8
18657	H-2	7-1/2	
20819	M-2	7-1/2	

UNVENTED DUMMY COUPLINGS (Plated)

Pc. No.	Type	Approx. Net Wt. (lbs.)
20816	E & L-2	1
20806	F-2	5/8
20810	H-2	1
2134	H-2	1
20818	M-2	1

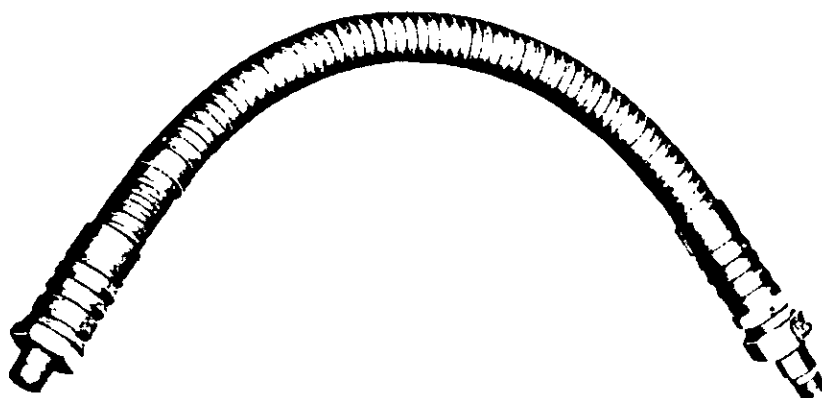


An American-Standard Co

ARMORED HOSE

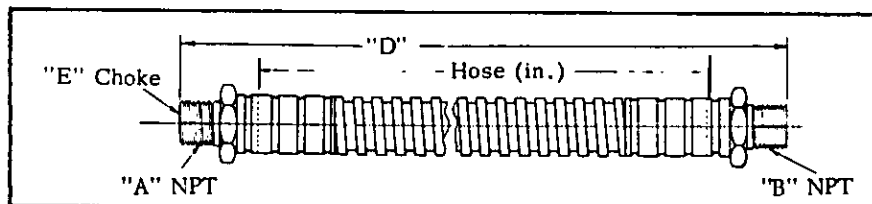
(SUPERSEDES ISSUE DATED JANUARY, 1967)

PARTS CATALOG



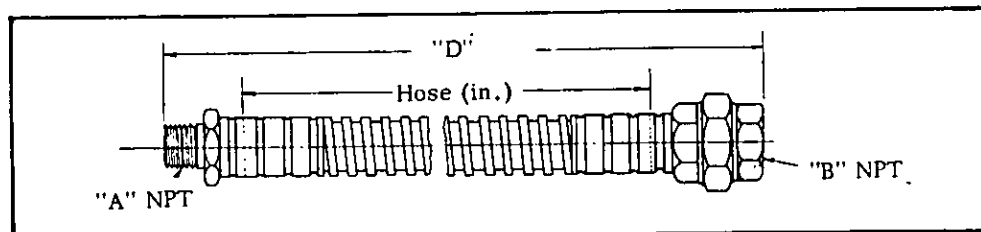
Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY / Wilmerding, Pennsylvania 15148



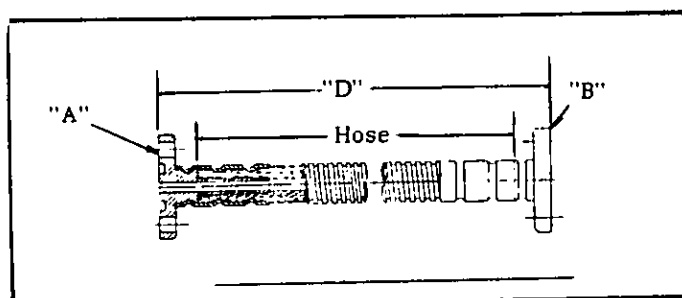
ARMORED HOSE WITH THREADED NIPPLES

HOSE DIAMETER (in.)	COMPLETE Pc. No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	N.P.T.		CHOKE "E" (in.)
				"A"	"B"	
3/8	554588	28-3/4	26-3/32	3/8	3/8	
5/8	534948	15-5/8	12	1/2	1/2	
	543198	18-5/8	15	1/2	1/2	
	505780	22-5/8	19	1/2	1/2	
	503045	24-5/8	21	1/2	1/2	
	539813	24-5/8	21	1/2	1/2	3/16
	558013	25-5/8	22	1/2	1/2	
	539810	26-3/4	23	3/4	1/2	3/16
	520120	27-5/8	24	1/2	1/2	
	514472	28-5/8	25	1/2	1/2	3/16
	520199	28-5/8	25	1/2	1/2	
	503046	29-5/8	26	1/2	1/2	
	503047	31-5/8	28	1/2	1/2	
	545142	33-5/8	30	1/2	1/2	
	520206	36-5/8	33	1/2	1/2	
	557948	47-5/8	44	1/2	1/2	
7/8	529629	16-1/8	12	3/4	3/4	
	557997	20-1/8	16	3/4	3/4	
	503039	24-1/8	20	3/4	3/4	
	505779	26-1/8	22	3/4	3/4	
	524720	28-1/8	24	3/4	3/4	
	529857	29-1/8	25	3/4	3/4	
	503040	30-1/8	26	3/4	3/4	
	540163	32-1/8	28	3/4	3/4	
	530962	36-1/8	32	3/4	3/4	
	529334	48-1/8	44	3/4	3/4	
1-1/8	529630	16-3/4	12	1	1	
	519486	21-3/4	17	1	1	
	539795	23-3/4	19	1	1	
	539796	26-3/4	22	1	1	
	520203	27-3/4	23	1	1	
	539797	32-3/4	28	1	1	
	545140	33-3/4	29	1	1	
	572354	36-3/4	32	1	1	
	529153	48-3/4	44	1	1	
1-3/8	539800	15-7/8	11	1-1/4	1-1/4	
	565173	17-7/8	13	1-1/4	1-1/4	
	557998	20-7/8	16	1-1/4	1-1/4	
	539801	21-7/8	17	1-1/4	1-1/4	
	529631	22-7/8	18	1-1/4	1-1/4	
	520202	23-7/8	19	1-1/4	1-1/4	
	549925	25-7/8	21	1-1/4	1-1/4	
	520326	26-7/8	22	1-1/4	1-1/4	
	519475	27-7/8	23	1-1/4	1-1/4	
	539802	30-7/8	26	1-1/4	1-1/4	
	557999	33-7/8	29	1-1/4	1-1/4	
	520204	35-7/8	31	1-1/4	1-1/4	
	527349	48-7/8	44	1-1/4	1-1/4	
	519485	54-7/8	50	1-1/4	1-1/4	



ARMORED HOSE WITH TAPPED UNION AND THREADED NIPPLE

HOSE DIA. (in.)	COMPLETE Pc. No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	PIPE	
				"A"	"B"
5/8	558005	18-11/16	14	1/2	1/2
	516225	28-11/16	24	1/2	1/2
	516848	30-11/16	26	1/2	1/2
	518536	40-11/16	36	1/2	1/2
	519001	51-11/16	47	1/2	1/2
7/8	539705	18-15/16	14	3/4	3/4
	539704	19-15/16	15	3/4	3/4
	539699	26-15/16	22	3/4	3/4
	539700	28-15/16	24	3/4	3/4
	540742	34-15/16	30	3/4	3/4
	539701	40-15/16	36	3/4	3/4
	539702	48-15/16	44	3/4	3/4
	540741	49-15/16	45	3/4	3/4
	539703	55-15/16	51	3/4	3/4
1-1/8	539748	19-7/16	14	1	1
	539749	27-7/16	22	1	1
	539745	32-7/16	27	1	1
	539746	34-7/16	29	1	1
	539747	35-7/16	30	1	1
	539750	49-7/16	44	1	1
1-3/8	539768	19-13/16	14	1-1/4	1-1/4
	539780	27-13/16	22	1-1/4	1-1/4
	539769	29-13/16	24	1-1/4	1-1/4
	540058	32-13/16	27	1-1/4	1-1/4
	539770	40-13/16	35	1-1/4	1-1/4
	539771	41-13/16	36	1-1/4	1-1/4
	539772	49-13/16	44	1-1/4	1-1/4
	539790	50-13/16	45	1-1/4	1-1/4
	564376	67-13/16	62	1-1/4	1-1/4

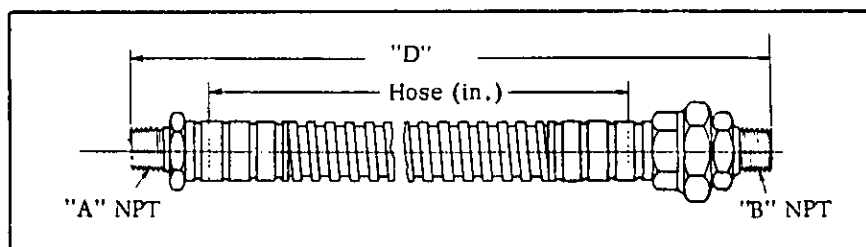


ARMORED HOSE WITH FLANGED FITTINGS

HOSE DIA. (in.)	COMPLETE Pc. No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	FLANGE	
				"A"	"B"
3/8	▲ 533397	28-3/4	27	3/8	3/8
	▲ 543778	33-3/4	32	3/8	3/8
	● 553528	28-3/4	27	3/8	3/8

NOTES:

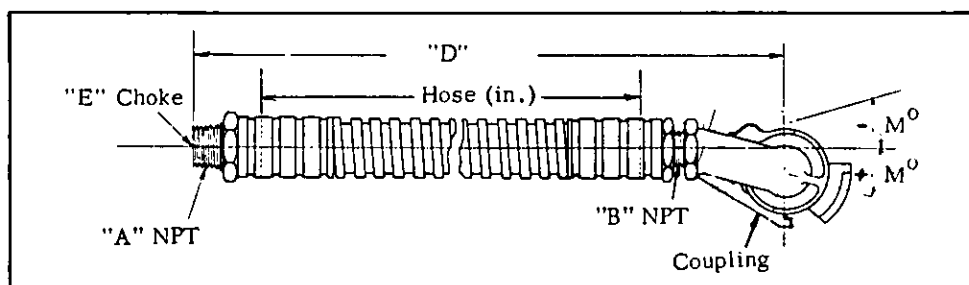
- ▲ One Flange with Bolt Holes Vertical; One Flange with Bolt Holes Horizontal.
- Both Flanges with Bolt Holes Vertical.



ARMORED HOSE WITH THREADED UNION AND NIPPLE

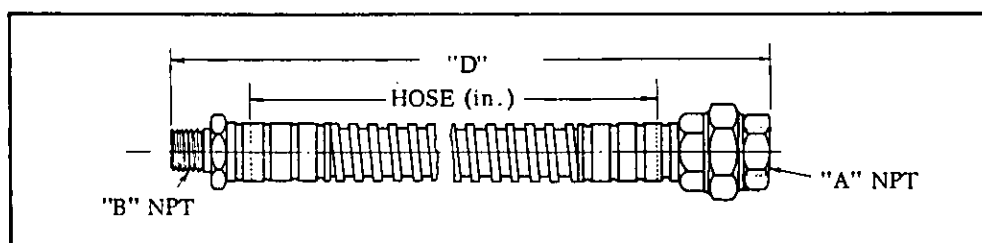
HOSE DIA. (in.)	COMPLETE Pc. No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	N.P.T.	
				"A"	"B"
5/8	511177	18-13/32	13	1/2	1/2
	545704	25-13/32	20	1/2	1/2
	511894	26-13/32	21	1/2	1/2
	98476	28-13/32	23	1/2	1/2
	511895	29-13/32	24	1/2	1/2
	509960	30-13/32	25	1/2	1/2
	511896	31-13/32	26	1/2	1/2
	511897	33-9/16	28	1/2	1/2
	99087	34-13/32	29	1/2	1/2
	511898	35-13/32	30	1/2	1/2
	546978	36-13/32	31	1/2	1/2
	548307	37-13/32	32	1/2	1/2
	553885	40-13/32	35	1/2	1/2
	553828	44-13/32	39	1/2	1/2
	558001	45-13/32	40	1/2	1/2
	502822	48-13/32	43	1/2	1/2
	548314	49-13/32	44	1/2	1/2
	511899	52-13/32	47	1/2	1/2
	509961	54-13/32	49	1/2	1/2
	511900	56-13/32	51	1/2	1/2
	513875	60-13/32	55	1/2	1/2
	544851	84-13/32	79	1/2	1/2
7/8	539679	17-13/16	12	3/4	3/4
	539680	23-13/16	18	3/4	3/4
	539681	26-13/16	21	3/4	3/4
	539682	27-13/16	22	3/4	3/4
	539683	28-13/16	23	3/4	3/4
	539697	29-13/16	24	3/4	3/4
	539684	30-13/16	25	3/4	3/4
	539685	32-13/16	27	3/4	3/4
	539692	33-13/16	28	3/4	3/4
	539686	34-13/16	29	3/4	3/4
	539687	40-13/16	35	3/4	3/4
	558002	41-13/16	36	3/4	3/4
	539688	47-13/16	42	3/4	3/4
	539695	49-13/16	44	3/4	3/4
	539779	50-13/16	45	3/4	3/4
	539689	51-13/16	46	3/4	3/4

HOSE DIA. (in.)	COMPLETE Pc. No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	N.P.T.	
				"A"	"B"
	539696	53-13/16	48	3/4	3/4
	539690	55-13/16	50	3/4	3/4
	539691	59-13/16	54	3/4	3/4
1-1/8	539714	18-3/8	12	1	1
	539715	26-3/8	20	1	1
	539716	28-3/8	22	1	1
	539744	29-3/8	23	1	1
	539717	30-3/8	24	1	1
	539718	32-3/8	26	1	1
	539742	33-3/8	27	1	1
	539719	34-3/8	28	1	1
	539741	42-3/8	36	1	1
	539720	47-3/8	41	1	1
	539721	51-3/8	45	1	1
	539743	53-3/8	47	1	1
	539738	55-3/8	49	1	1
	539739	59-3/8	53	1	1
	539740	61-3/8	55	1	1
1-3/8	539647	17-13/16	11	1-1/4	1-1/4
	544687	20-13/16	14	1-1/4	1-1/4
	539634	24-13/16	18	1-1/4	1-1/4
	539635	26-13/16	20	1-1/4	1-1/4
	539636	28-13/16	22	1-1/4	1-1/4
	539637	30-13/16	24	1-1/4	1-1/4
	539638	32-13/16	26	1-1/4	1-1/4
	539639	34-13/16	28	1-1/4	1-1/4
	539640	35-13/16	29	1-1/4	1-1/4
	558003	41-13/16	35	1-1/4	1-1/4
	548315	42-13/16	36	1-1/4	1-1/4
	539641	47-13/16	41	1-1/4	1-1/4
	548316	48-13/16	42	1-1/4	1-1/4
	539642	51-13/16	45	1-1/4	1-1/4
	539643	52-13/16	46	1-1/4	1-1/4
	539644	55-13/16	49	1-1/4	1-1/4
	539645	59-13/16	53	1-1/4	1-1/4
	539646	61-13/16	55	1-1/4	1-1/4



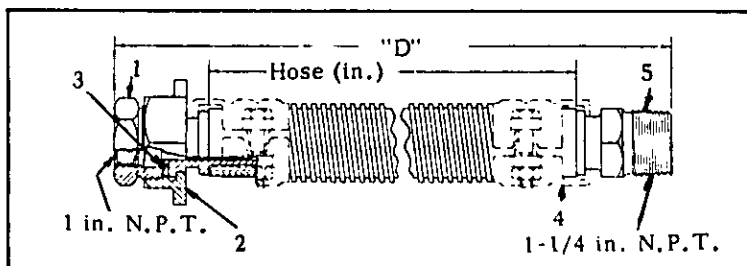
ARMORED HOSE WITH HOSE COUPLING AND NIPPLE

HOSE DIAMETER (in.)	COMPLETE Pc.No.		LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	N.P.T.		CHOKE "E" (in.)	COUPLING		
	With Coupling	Less Coupling			"A"	"B"		Pc.No.	TYPE	OFFSET "M" °
5/8	505298	539813	27	21	1/2	1/2	3/16 3/16	505490	ES-2	+15
	511890	514472	31	25	1/2	1/2		505490	ES-2	+15
	544202	520199	31	25	1/2	1/2		505490	ES-2	+15
	505427	520120	30-7/8	24	1/2	1/2		506388	HS-2	+15
7/8	504454	503039	27-5/16	20	3/4	3/4		504511	HS-3	+15
	505235	524720	31-5/16	24	3/4	3/4		504511	HS-3	+15
	515866	530962	39-5/16	32	3/4	3/4		504511	HS-3	+15
	521604	505779	28-3/8	22	3/4	3/4		49163	ES-3	+20
	539863	540163	34-3/8	28	3/4	3/4		49163	ES-3	+20
1-1/8	541141	539796	30-3/16	22	1	1		73301	HS-4	0
	526162	539796	29-1/8	22	1	1		505508	LS-4	-15
	505428	520203	30-1/8	23	1	1		505508	LS-4	-15
	537547	539797	35-1/8	28	1	1		505508	LS-4	-15
1-3/8	504453	520202	27-1/4	19	1-1/4	1-1/4		504513	FS-5	+15
	505247	519475	31-1/4	23	1-1/4	1-1/4		504513	FS-5	+15
	515867	520204	39-1/4	31	1-1/4	1-1/4		504513	FS-5	+15



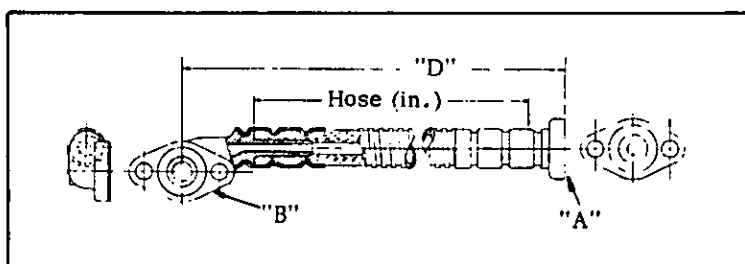
ARMORED HOSE WITH TAPPED NIPPLE AND TAPPED UNION NIPPLE

HOSE DIA. (in.)	COMPLETE Pc.No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	FLANGE	
				"A"	"B"
7/8	539706	25-7/16	21	3/4	3/4
	539707	34-7/16	30	3/4	3/4



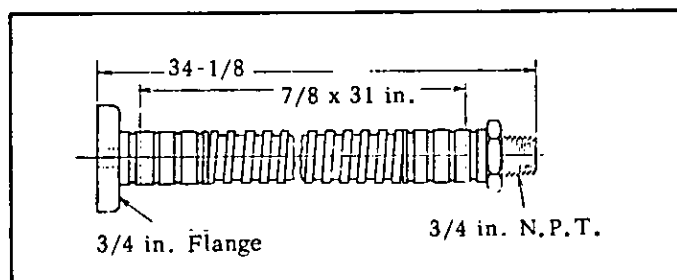
ARMORED HOSE AND FITTINGS

Pc.No. Complete	LENGTH HOSE (in.)	APPROX. LENGTH OVERALL "D" (in.)	Ref. 1 Union Stud Tapped	Ref. 2 Swivel Nut	Ref. 3 Gasket	Ref. 4 Union Nipple	Ref. 5 Threaded Nipple
551190	22	27	511183	500535	71565	500536	500534



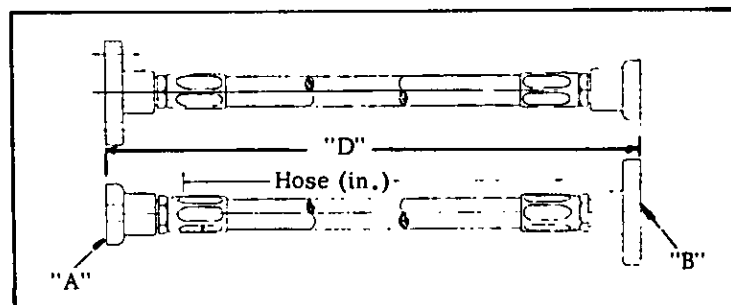
ARMORED HOSE WITH STRAIGHT AND OFFSET ELBOW FLANGED FITTINGS

HOSE DIA. (in.)	COMPLETE Pc.No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	FLANGE	
				"A"	"B"
3/8	544066	50-3/4	48	3/8	3/8



ARMORED HOSE WITH THREADED NIPPLE AND FLANGE FITTING

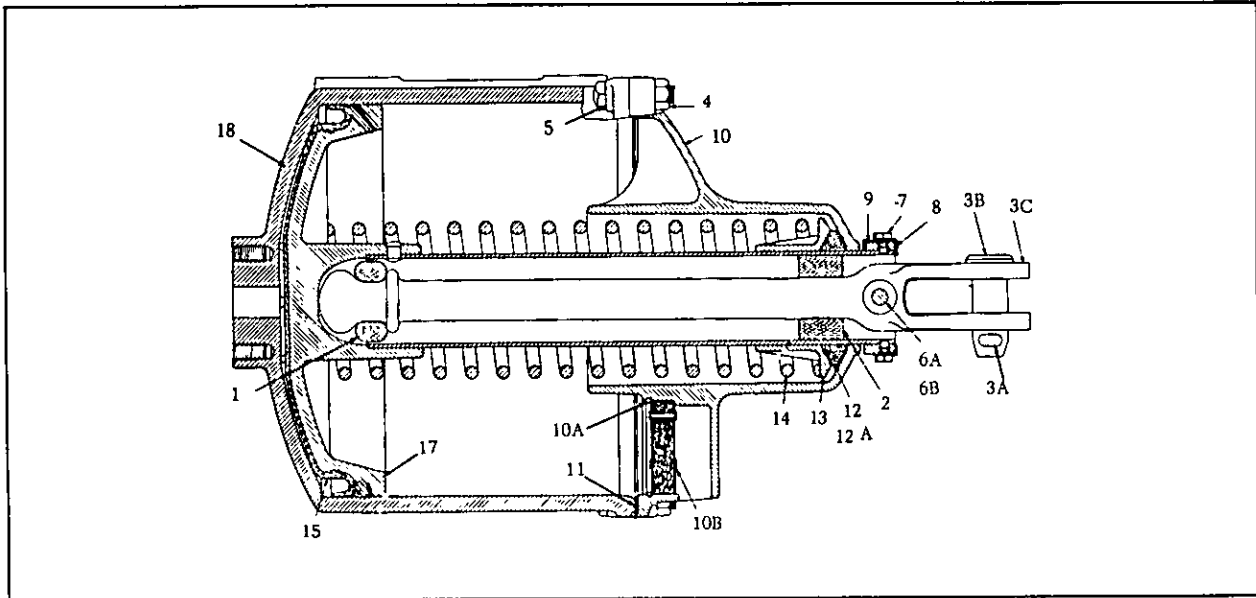
Pc. No.	Parts Name
570102	7/8 x 31 in. ARMORED HOSE with 3/4 in. THREADED NIPPLE and 3/4 in. FLANGE NIPPLE, Asy. 34-1/8 in. overall length.



ARMORED HOSE WITH THREADED STRAIGHT FLANGE FITTINGS

HOSE DIA. (in.)	COMPLETE Pc.No.	LENGTH OVERALL "D" (in.)	LENGTH HOSE (in.)	FLANGE	
				"A"	"B"
3/8	554078	30-1/16	26-3/32	3/8	3/8

UAH TYPE BRAKE CYLINDER



I. DESCRIPTION

The UAH Brake Cylinder includes a piston and rod so designed that when it is connected to suitable brake rigging will provide force through the rigging to the brake shoes in an amount proportional to the air pressure admitted to the pressure side of the piston. The cylinder body and pressure head are combined in one casting. The non-pressure head is bolted to the cylinder by means of a bolting flange. This cast type construction resists external damage and retains lubrication to reduce cylinder wear. The cylinder is equipped with mounting flanges for bolting to the rail vehicle and flange faces for making air connections. The non-pressure head and piston together with the caged return spring can be removed as a unit. (CAUTION: DO NOT ATTEMPT TO DISASSEMBLE THE SPRING FROM THE PISTON AND ROD WITHOUT THE USE OF A SPECIAL FIXTURE TO COMPRESS AND HOLD THE SPRING IN PLACE WHILE REMOVING THE PUSH ROD HOLDER. RELEASE SPRING GRADUALLY). This feature permits cylinder lubrication or replacement of the snap-on type piston packing cup without disassembly of the heavy, piston return spring.

Repairs to the non-pressure head and piston assembly must be made in a shop where facilities are available for safely removing the caged spring. The non-pressure head includes a strainer in a breather opening to restrict the entrance of dirt in the cylinder when the piston returns to its normal position.

II. OPERATION

When a brake application is made, air pressure forces the piston and hollow rod (17) and push rod assembly (1, 2, 3A, 3B, 3C) outward applying force to the attached brake rigging.

When air is released from the brake cylinder, the pressure of the release spring (14) which is coiled around the hollow piston rod, returns the piston and hollow rod assembly (17) to its normal position.

III. MAINTENANCE PROCEDURES AND TECHNIQUES

III.A. CLEANING SOLVENT, LUBRICANT AND SPECIAL TOOLS

1. Cleaning Solvent

- a. The solvent used for cleaning the parts of the brake cylinder must be an aliphatic organic solution, such as naphtha or mineral spirits, that will dissolve oil or grease, and that will permit all parts to be cleaned without abrasion.

2. Lubricant

- a. Brake Cylinder Lubricant, AAR Specification 914, WABCO Specification M-7651-2, is recommended to lubricate the hollow-rod, cylinder walls, and the piston packing cup.

3. Special Tools

- a. A holding fixture must be available for safely holding the brake cylinder piston and hollow rod assembly, and non-pressure head assembly during disassembly and assembly.
- b. A wooden tool approximately 1 inch wide and 3/32 inch thick with rounded edges is recommended to be used as an aid in the removal of the piston packing cup.

III.B. DISASSEMBLING

1. Remove the push rod assembly (1 to 3C) from the brake cylinder by first removing the 1/8 x 3/4 inch cotter pin 6A and push rod holder pin 6B, and then pulling the push rod assembly 1 to 3C from the brake cylinder.
 - a. Remove the anti-rattler ring (1) and hollow rod piston seal (2) if they are worn or damaged.
2. Remove the piston assembly with non-pressure head (7 to 17) from the brake cylinder body (18) by removing the four 1/2 inch hex. nuts (4) and the four 1/2 x 2-1/8 inch Tee head bolts (5).
3. Carefully remove the piston packing cup (15) from the piston (17).
 - a. A suitable wooden tool approximately 1 inch wide and 3/32 inches thick with rounded edges may be used to assist in the removal of the piston packing cup.

(NOTE: The non-pressure head assembly with the piston and hollow rod assembly must be taken to the shop for disassembly.)
4. Place the piston and hollow rod assembly with the non-pressure head assembly in a holding fixture which will hold the release spring partially compressed and proceed as follows:
 - a. Remove the two 5/16 inch dog point locking set screws (7) and lock washers (8) which secure the push rod holder (9) to the piston and hollow rod assembly (17).
5. Special care must be taken in removing the piston and hollow rod assembly from the holding fixture to insure the spring is fully decompressed. Disassemble by removing the following:
 - a. Hollow rod packing seal and retainer (12, 12A).
 - b. Spring seat (13).
 - c. Spring (14).
6. Remove the strainer (10B) from the non-pressure head (10) by removing the retainer ring (10A).

Use proper tool to prevent retaining ring from springing free.
7. Remove the non-pressure head gasket (11).

III.C. CLEANING, INSPECTING AND REPAIRING

1. Metal Parts

- a. Wash all of the metal parts in the cleaning solvent as described in paragraph III.A.1.

- b. The spring may be wire brushed to assist in the removal of rust and scale.
- c. After cleaning, blow the parts dry with a low pressure jet of clean, dry air. **SAFETY GOGGLES ARE TO BE WORN.**
- d. Inspect the metal parts.
 - (1) Reject and replace the release spring if it has rust pits, has become distorted or has taken a permanent set.
 - (2) Reject and replace any part that is cracked, broken, damaged, worn excessively, or is in such a condition as would result in unsatisfactory operation.
 - (3) Check the Piston Rod Diameter - Condemn at 2-3/4 inch.
 - (4) Check the Guide End Bore of the Non-Pressure Head--condemn at 3-1/16 inch.
 - (5) Check the Cylinder Bore--condemn at 5/64 inch more than nominal.

2. Rubber Parts

- a. The rubber parts may be dipped in the cleaning solvent described in paragraph III.A.1. to assist in the removal of grease and dirt.

CAUTION: RUBBER PARTS MUST NOT BE ALLOWED TO SOAK IN THE CLEANING SOLUTION.

- b. Wipe the rubber parts with a soft, lint-free cloth and blow them dry with a low pressure jet of clean, dry air. **SAFETY GOGGLES ARE TO BE WORN.**
- c. Brush all gaskets and the piston packing cup with a brush which has soft bristles, such as a shoe brush, to remove any remaining dirt and to polish.
- d. Inspect the rubber parts.
 - (1) Replace any part that is cracked, dried out, cut, broken, damaged, worn excessively, or is in such a condition that would result in unsatisfactory operation.
 - (2) Reject and replace any gasket or the piston packing cup that have flattened heads.

3. Non-Pressure Head Breather Strainer

- a. Using a low pressure jet of compressed air, blow out any loose dirt in the strainer. **SAFETY GOGGLES ARE TO BE WORN.**
- b. Inspect the strainer.
 - (1) If it is found to be in good condition, it may be reused.

- (2) If the strainer is too dirty to be cleaned easily or is damaged in any way, it must be replaced.

III.D. LUBRICATING AND ASSEMBLING

1. Assemble the Piston and Hollow Rod and Non-Pressure Head Assembly as follows:
 - a. Completely coat the hollow rod with brake cylinder lubricant, current AAR Specification M-914 (WABCO Specification M-7651-2).
 - b. Install the strainer (10B) in the non-pressure head (10) and secure it in place with the retaining ring (10A). Use proper tool to prevent retaining ring from springing free.
 - c. Place the piston and hollow rod (17) in the holding fixture used during disassembly.
 - d. Place the release spring (14), spring seat (13), hollow rod seal and seal retainer (12, 12A) and the non-pressure head (10) over the hollow piston rod. CAUTION: DO NOT ATTEMPT THIS ASSEMBLY WITHOUT THE USE OF A SPECIAL HOLDING FIXTURE.
 - e. Force the non-pressure head (10) downward to partially compress the release spring (14). Hold the non-pressure head and release spring in this position with the holding fixture.
 - f. Install the push rod holder (9) and secure it in place with the two lock washers (8) and the two 5/16 inch dog point locking set screws (7).
SLOWLY RELEASE THE HOLDING FIXTURE.
 - g. Remove the hollow rod and piston assembly with the non-pressure head assembly from the holding fixture.
 - h. Carefully install the piston packing cup (15) on the head of the piston. Note that the cup properly fits on the head and it is not cracked or chipped on the skirt.
2. Lubricate the inside walls of the cylinder body (18) and the piston packing cup (15) thoroughly with brake cylinder lubricant, AAR Specification M-914, WABCO Specification M-7651-2.
3. Install the non-pressure head gasket (11) in place.
4. Place the head of the piston with the packing cup across the cylinder body opening and press the piston into the cylinder body (18) until the packing cup (15) clears the top of the cylinder body (18), then raise the hollow rod until it is perpendicular to the bore of the cylinder body. Continue to press the piston and hollow rod assembly (17) into the body (18).

5. Secure the non-pressure head (10) to the cylinder body (18) with the four 1/2 x 2-1/8 Tee head bolts (5) and the four 1/2 inch hex. nuts (4). Make sure all nuts are tightly torqued.
6. Install the push rod (3C) with the anti-rattler ring (1) and hollow rod seal (2) in place in the hollow rod.
 - a. Secure the push rod (3C) by inserting the push rod pin (3B) through the push rod holder (9) and push rod (3C). Then secure the push rod pin (3B) in place with a new 3/8 x 2-1/4 inch cotter pin (3A). DO NOT REUSE THE OLD COTTER PIN.

IV. TESTING

- A. Place the assembled brake cylinder in a test fixture which will limit the piston travel and permit a pressure test for packing cup leakage. This leakage must not exceed the specified limit for repaired brake cylinders.

CAUTION: PRESSURE IN THE BRAKE CYLINDER MUST BE LIMITED TO NO MORE THAN 25 PSI AND ADEQUATE PROTECTION PROVIDED THE TESTER IN THE WORK CHAMBER.

1. Connect the brake cylinder to a local air supply with piping which includes a cutout cock and a pressure gauge--with the gauge located between the cutout cock and brake cylinder.
2. Charge the brake cylinder to 15 psi.
3. Allow fifteen (15) seconds for temperature effect.
4. Isolate the brake cylinder from the air supply by closing the cutout cock.
5. After isolation, there should be no pressure drop in five (5) seconds.
- B. Consult your Westinghouse Air Brake Division Representative if additional information on the UAH Brake Cylinders is desired.



An American-Standard Co.

BRAKE CYLINDER CONVERSION KITS

(Passenger)

(Supersedes Issue dated July, 1969)

Parts Catalog

WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA



BRAKE CYLINDER CONVERSION KITS — INDEX

Original Cylinder Size (in.)	Type and Conversion Size (in.)	Pc. No.	Page	
8 x 8	"U"	5 x 7	559026	3
9 x 8	"U"	5-1/2 x 7	558713	3
9 x 8	"U"	6 x 7	558561	3
10 x 8	"U"	6-1/2 x 7	559158	3
10 x 10	"U"	6 x 9	552878	3
11 x 10	"U"	6-1/2 x 9	570956	3
10 x 8	"U"	6 x 7	555581	3
10 x 8	"U"	7 x 7	559924	3
10 x 10		7 x 7	560284	5
10 x 12	"UAHT"	7 x 9	553872	2
10 x 12	"UAHT"	7 x 9	566613	7
10 x 12	"AB"	7 x 12	566879	8
10 x 8	"U"	9 x 8	561335	3
16 x 12	"Q"	9 x 12	570452	4
18 x 12	"Q"	10 x 12	571051	4
18 x 12	"Q"	12 x 12	569792	6
12 x 8		7 x 7	556060	5

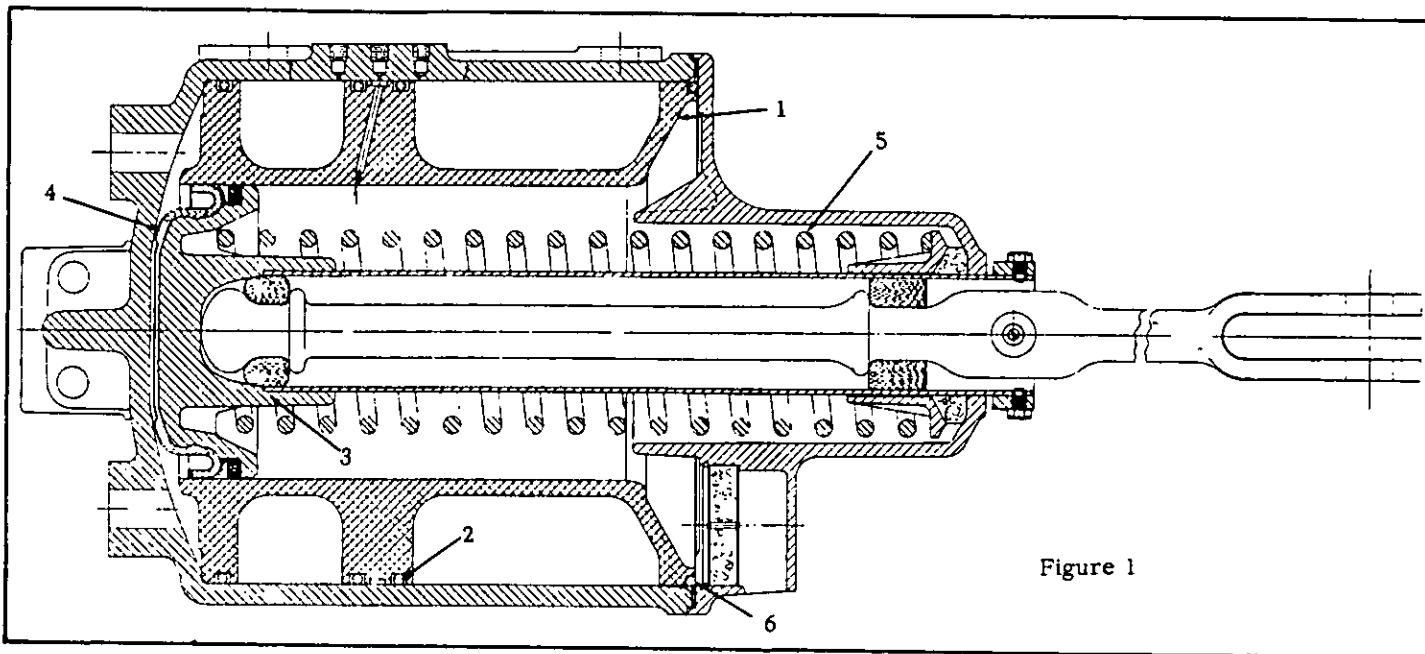


Figure 1

"UAHT" BRAKE CYLINDER CONVERSION KIT (10 x 12 to 7 x 9 CONVERSION)

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
1-	553872	BRAKE CYLINDER CONVERSION KIT, COMPLETE	
1-1	554314	.SLEEVE, Reducing, 12 x 10 in. to 7 x 9 in.	1
1-2	553903	.O-RING, 12 in. O.D.	3
1-3	554315	.PISTON and ROD	1
1-4	99174	.CUP, Piston Packing	1
1-5	1110	.SPRING, Release	1
1-6	525290	.GASKET, Ring, 11-7/8 in. O.D. . .	1

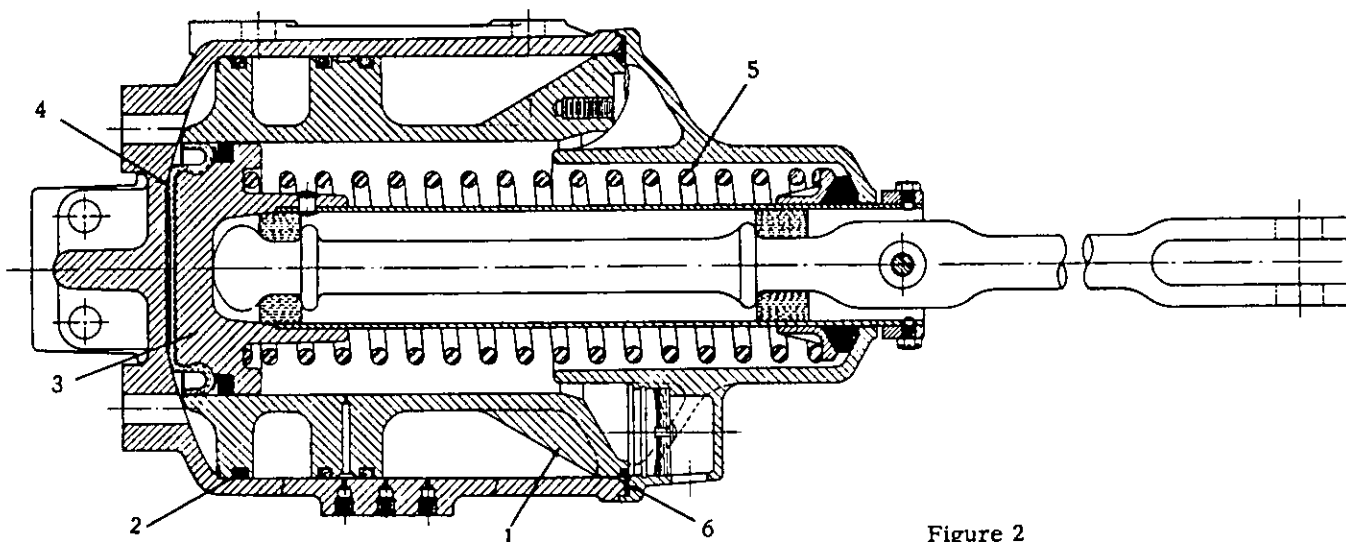


Figure 2

"U" BRAKE CYLINDER CONVERSION KIT

8 x 8 to 5 x 7		9 x 8 to 5-1/2 x 7		9 x 8 to 6 x 7		10 x 8 to 6 x 7		10 x 8 to 6-1/2 x 7		CONVERSION		
Fig. & Ref. No.		Pc. No.				Parts Name				No. Req'd		
2-	559026	558713	558561	555581	559158	BRAKE CYLINDER CONVERSION KIT, COMPLETE						
2-1	559510	559415	559407	555582	560055	.SLEEVE, Reducing						1
2-2	525115	559391	559391	545459	545459	.O-RING						3
2-3	559506	559416	559417	555583	560052	.PISTON and ROD						1
2-4	513750	513751	501530	501530	559159	.CUP, Piston Packing						1
2-5	559913	559414	559405	1239	560054	.SPRING, Release						1
2-6	559089	504277	504277	511325	511325	.GASKET, Ring						1
10 x 8 to 7 x 7		10 x 8 to 9 x 8		10 x 10 to 6 x 9		11 x 10 to 6-1/2 x 9		CONVERSION				
Fig. & Ref. No.		Pc. No.				Parts Name				No. Req'd		
2-	559924	561335	552878	570956	BRAKE CYLINDER CONVERSION KIT, COMPLETE							
2-1	560181	561337	552879	570959	.SLEEVE, Reducing							
2-2	545459	545459	545459	525116	.O-RING							
2-3	560180	561336	552880	570957	.PISTON and ROD							
2-4	99174	506957	501530	559159	.CUP, Piston Packing							
2-5	5877	■	5877	570958	.SPRING, Release							
2-6	511325	511325	511325	511301	.GASKET, Ring							

■NOTE: Release Spring from Original Brake Cylinder is used.

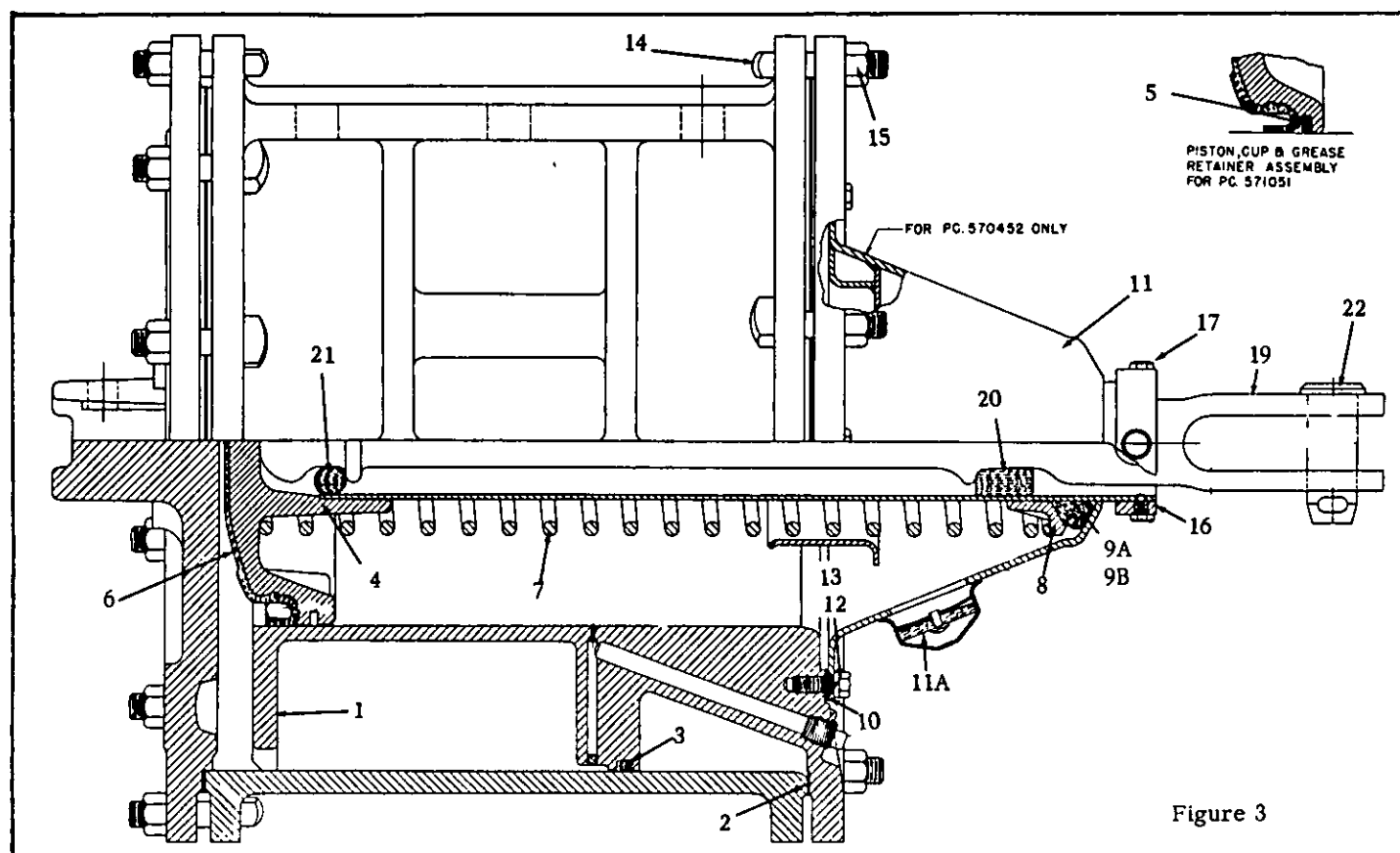


Figure 3

"Q" BRAKE CYLINDER CONVERSION KIT

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
3-	570452	.. BRAKE CYLINDER CONVERSION KIT, COMPLETE (16 x 12 to 9 x 12 Conversion)	
3-	..	571051 BRAKE CYLINDER CONVERSION KIT, COMPLETE (18 x 12 to 10 x 12 Conversion)	
3-1	570453	572357 .SLEEVE, Reducing	1
3-2	1083	12779 .GASKET, Sleeve	1
3-3	570381	.. .O-RING, 16 in. O.D.	1
3-3	..	570382 .O-RING, 18 in. O.D.	1
3-4	570455	571053 .PISTON and ROD	1
3-5	..	94801 .RETAINER, Grease	1
3-6	506957	94800 .CUP, Piston, Packing	1
3-7	1110	.SPRING, Release	1
3-8	519989	.SEAT, Spring	1
9-9	562813	.HOLLOW ROD PACKING SEAL and RETAINER, Asy.	1
3-9A	562812	..SWAB	1
3-9B	562811	..RETAINER	1
3-10	94820	.GASKET, Head, Non-Pressure	1

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
3-11	570456	569028 .HEAD, Non-Pressure	1
3-11A	94814	..STRAINER	1
3-12	17173	.WASHER, Lock, 3/8 in.	8
3-13	7978	.SCREW, Cap, Hex. Hd., 3/8 x 1 in.	8
3-14	1084	.. .BOLT, Tee, Hd., 5/8 x 2-5/8 in.	5
3-14	..	12782 .BOLT, Tee, Hd., 5/8 x 3 in.	6
3-15	27009	.. .NUT, Hex., 5/8 in.	5
3-15	..	27009 .NUT, Hex., 5/8 in.	6
3-16	502829	.COLLAR	1
3-17	571207	.SCREW, Locking, 5/16 x 17/32 in.	2
3-18	..	565393 .BUSHING, Pin, Push Rod (Not Shown)	1
3-19	570459	.. .PUSH ROD	1
3-19	..	571055 .PUSH ROD	1
3-20	..	511677 ..SEAL, Hollow Rod	1
3-21	..	506400 ..RING, Anti-Rattler	1
3-22	..	514313 ..PIN with COTTER	1
3-22	504379	.. .PIN with COTTER	1

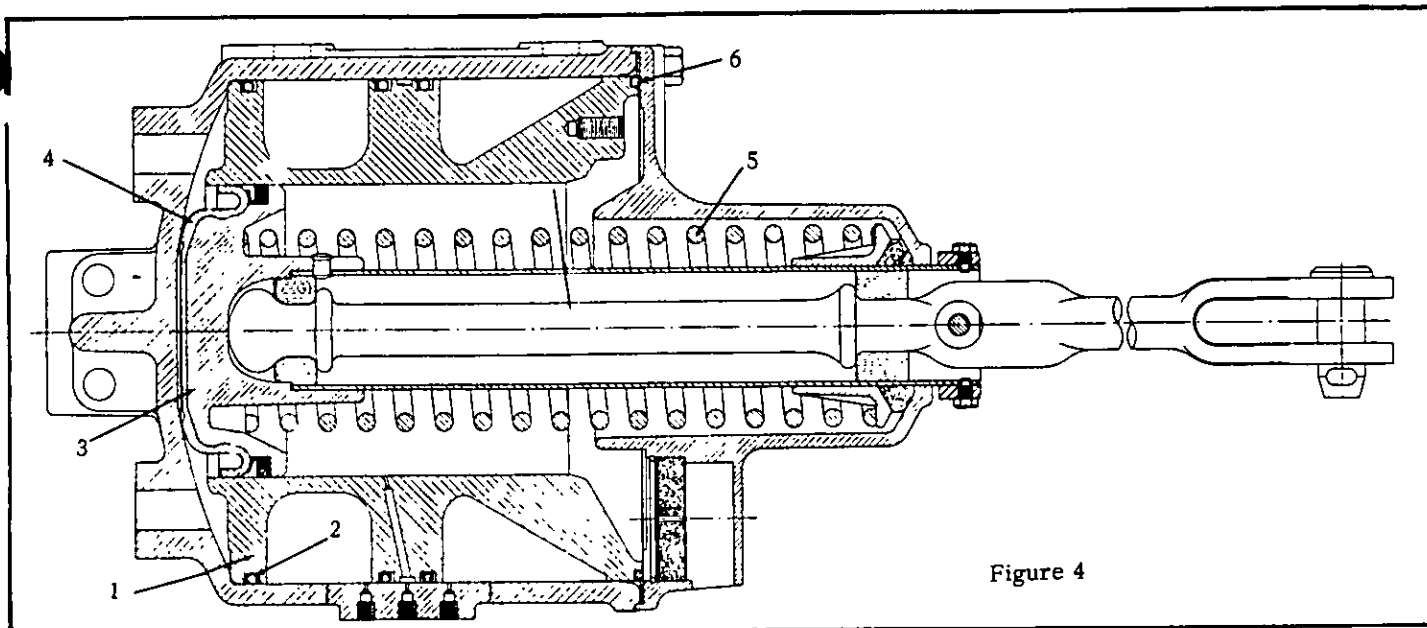


Figure 4

BRAKE CYLINDER CONVERSION KIT (12 x 8 in. to 7 x 7 in. CONVERSION)

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
4-	556060	BRAKE CYLINDER CONVERSION KIT, COMPLETE	
	556062	.SLEEVE, Reducing, 12 x 8 in. to 7 x 7 in.	1
4-2	553903	.O-RING, 12 in. O.D.	3

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
4-3	556061	.PISTON and ROD	1
4-4	99174	.CUP, Piston Packing	1
4-5	1110	.SPRING, Release	1
4-6	525290	.GASKET, Ring, 11-7/8 in. O.D. . .	1

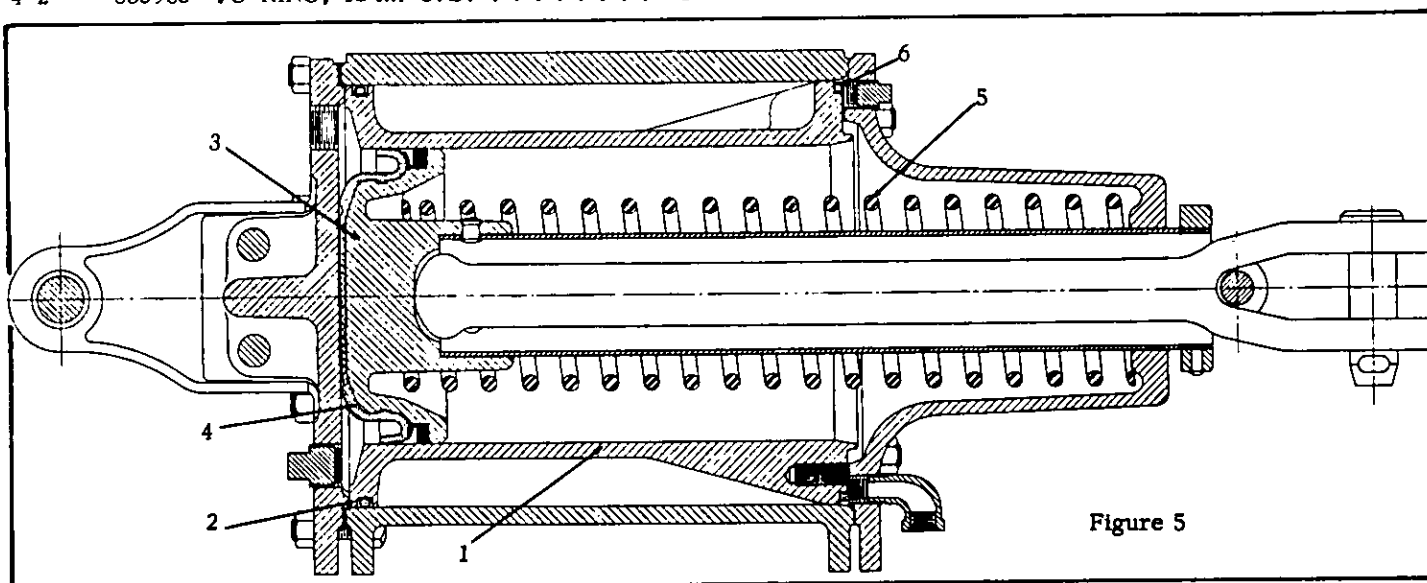


Figure 5

BRAKE CYLINDER CONVERSION KIT (10 x 10 in. to 7 x 10 in. CONVERSION)

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
	560284	BRAKE CYLINDER CONVERSION KIT, COMPLETE	
5-1	561223	.SLEEVE, Reducing	1
5-2	545459	.O-RING, 10 in. O.D.	1

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
5-3	561221	.PISTON and ROD.	1
5-4	99174	.CUP, Piston Packing	1
5-5	99995	.SPRING, Release	1
5-6	511325	.GASKET, Ring, 9-7/8 in. O.D. . .	1

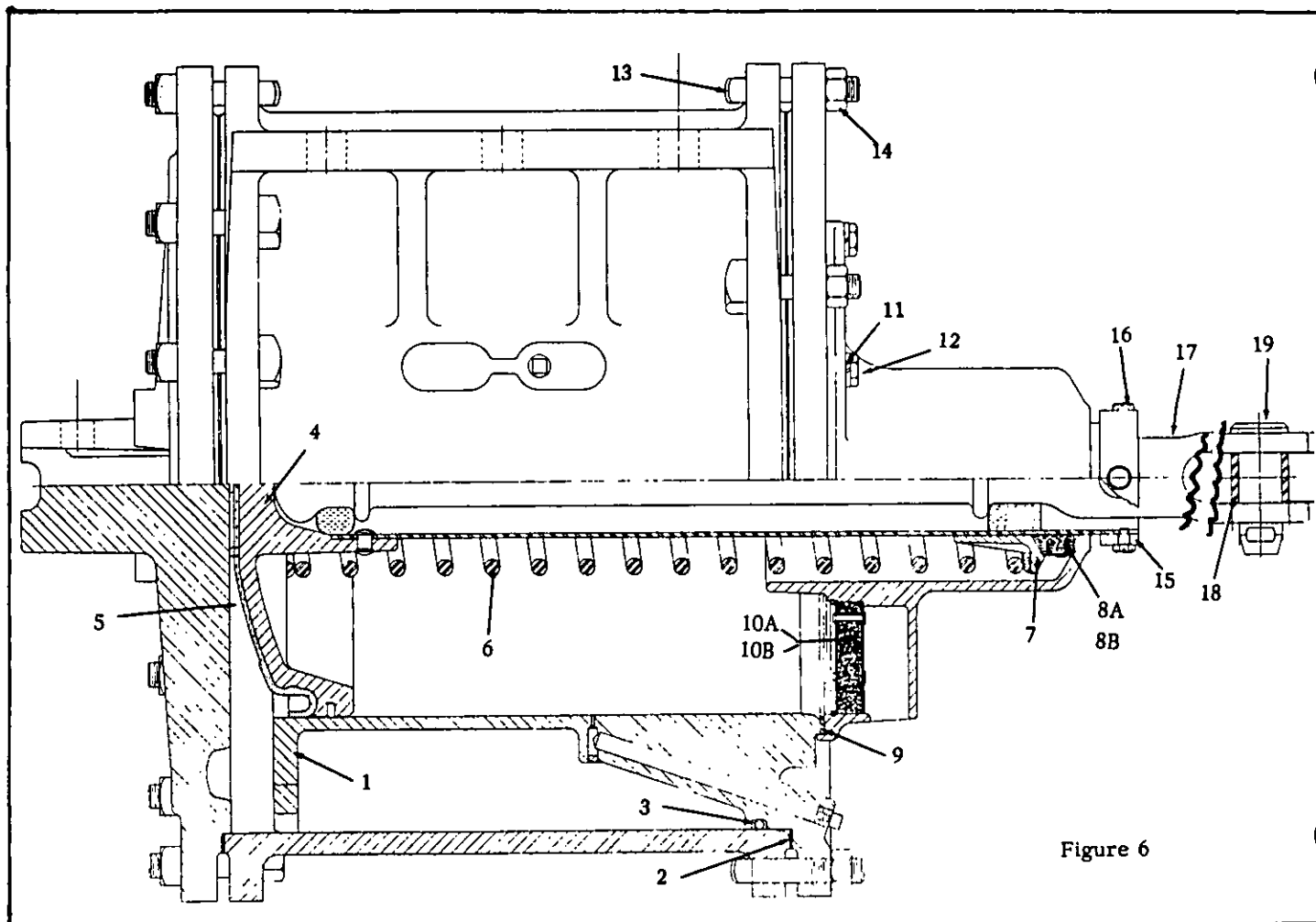
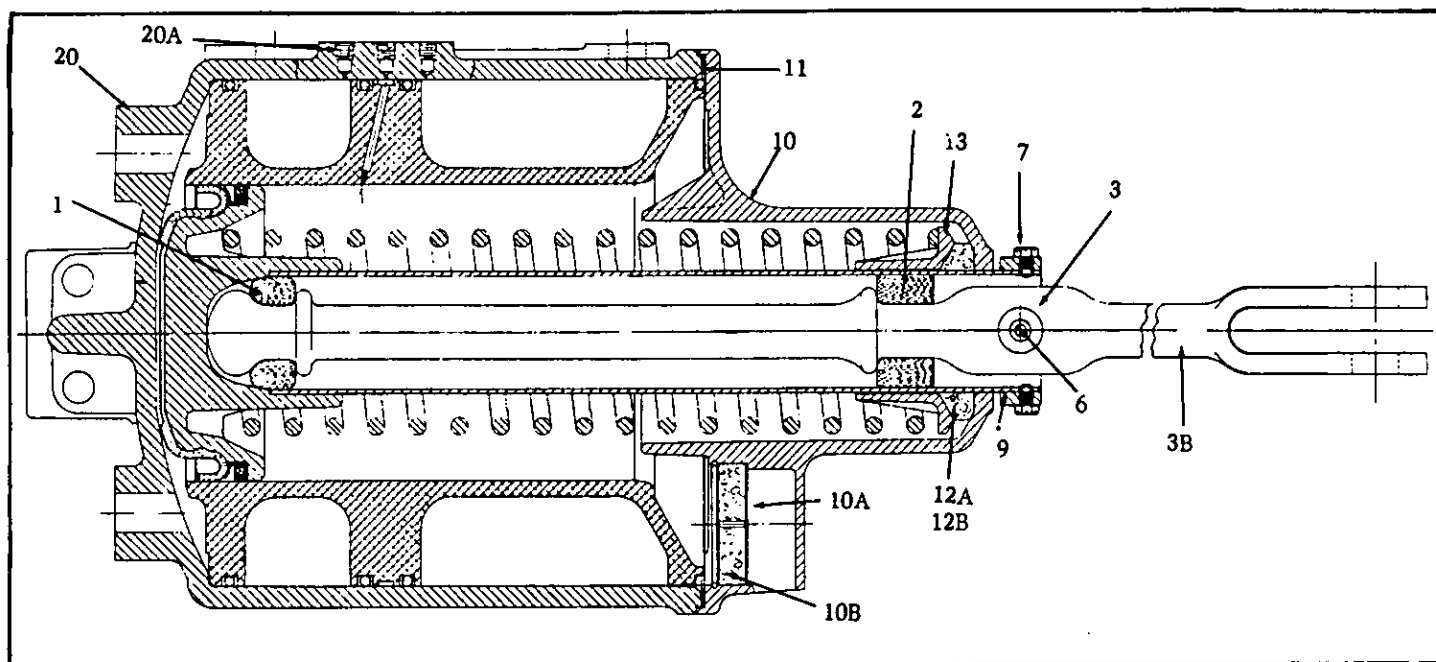


Figure 6

"Q" BRAKE CYLINDER CONVERSION KIT (18 x 12 to 12 x 12 in. "Q" Type Conversion)

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
6-	569792	BRAKE CYLINDER CONVERSION KIT, COMPLETE	
6-1	570341	.SLEEVE, Reducing	1
6-2	12779	.GASKET, Sleeve	1
6-3	570382	.O-RING, 18 in. O.D.	1
6-4	570435	.PISTON and ROD	1
6-5	99882	.CUP, Piston Packing	1
6-6	510569	.SPRING, Release	1
6-7	530894	.SEAT, Spring	1
6-8	562813	.HOLLOW ROD PACKING SEAL and RETAINER, Asy.	1
6-8A	562812	..SWAB	1
6-8B	562811	..RETAINER	1

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
6-9	99890	.GASKET, Non-Pressure Head	1
6-10	531738	.HEAD, Non-Pressure	1
6-10A	99196	..STRAINER	1
6-10B	99195	..RING, Retaining	1
6-11	15951	.WASHER, Lock, 1/2 in.	8
6-12	3205	.SCREW, Cap, Hex.Hd., 1/2 x 1-3/4 in.	8
6-13	12782	.BOLT, Tee Hd., 5/8 x 3 in.	6
6-14	27009	.NUT, Hex., 5/8 in.	6
6-15	502829	.COLLAR, Hollow Rod	1
6-16	571207	.SCREW, Lock, 5/16 x 17/32 in.	2
6-17	565391	.PUSH-ROD	1
6-18	565393	.BUSHING, Pin, Push-Rod	1
6-19	504379	.PIN with COTTER	1



"UAHT" BRAKE CYLINDER CONVERSION KIT (10 x 12 in. Cylinder Converted to 7 x 9 in. Brake Cylinder)

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
8-	566613	"UAHT" BRAKE CYLINDER, ASY.	
	540976	.PUSH ROD, Asy.	1
		(Push Rod Length, 23-1/16 in.)	
8-1	506400	..RING, Anti-Rattler	1
8-2	511677	..SEAL, Hollow Rod	1
8-3	503071	..PUSH ROD with PIN and COTTER .	1
8-3A	▲ 505242	...PIN with COTTER, Push Rod . .	1
8-3B	508687	...ROD, Push, 23-1/16 in.	1
8-4	▲ 2505	.NUT, Hex., 1/2 in.	8
8-5	▲ 1039	.BOLT, Tee Hd., 1/2 x 2-1/8 in. . .	8
8-6	504379	.PIN with COTTER, Holder, Push Rod	1
8-7	571207	.SCREW, Locking, 5/16 x 17/32 in. .	2
8-9	502829	.HOLDER Rod, Push	1

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
8-10	531738	.HEAD, Non-Pressure	1
8-10A	99195	..RING, Retaining	1
8-10B	99196	..STRAINER	1
8-11	99890	.GASKET, Head, Non-Pressure . . .	1
8-12	562813	.HOLLOW ROD PACKING SEAL and RETAINER, Asy.	1
8-12A	562812	..SWAB	1
8-12B	562811	..RETAINER	1
8-13	530894	..SEAT, Spring.	1
8-	553872	.BRAKE CYLINDER CONVERSION KIT, COMPLETE (Also Shown as Fig. 1	1
		Page 2)	
8-20	99877	.BODY, Cylinder	1
8-20A	515794	..PLUG, Pipe, Fluted Socket, 1/8 in.	6

▲ (Not Shown)

Prices will be quoted upon application
Orders should give **PIECE NUMBER** and **NAME** of part wanted

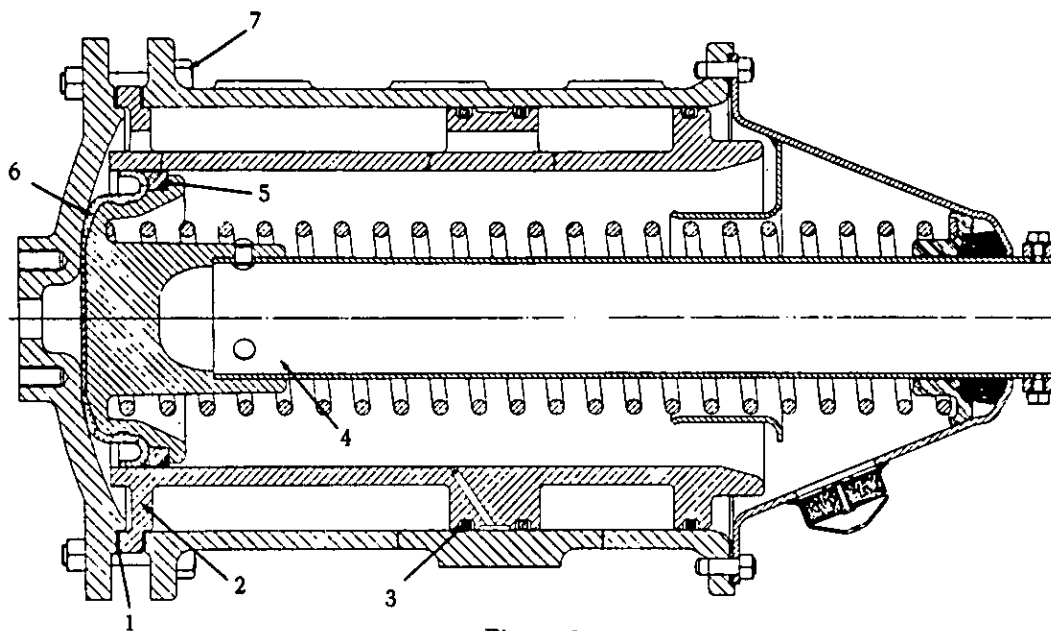


Figure 9

"AB" BRAKE CYLINDER CONVERSION KIT

Fig. & Ref. No.	Pc. No.	Parts Name	No. Req'd
9-	566897	BRAKE CYLINDER CONVERSION KIT, COMPLETE	
9-1	1114	.GASKET, Head, Pressure	2
9-2	566890	.SLEEVE, Reducing	1
9-3	545459	.O-RING, 10 in. O.D.	3
9-4	566896	.PISTON and ROD	1
9-5	560881	.RING, Guide	1
9-6	99174	.CUP, Piston Packing	1
9-7	25006	.BOLT, Tee Head, 1/2 x 2-7/8 in.	8



An American-Standard Company



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"UAH" BRAKE CYLINDERS

(Supersedes Previous Issues of 3214-4C1, 3214-4C2, 3214-4C3, 3214-4C4, 3214-4C5, 3214-4C6, 3214-4C7, 3214-4C8, 3214-4C9 and 3214-4E3)

Parts Catalog

WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA

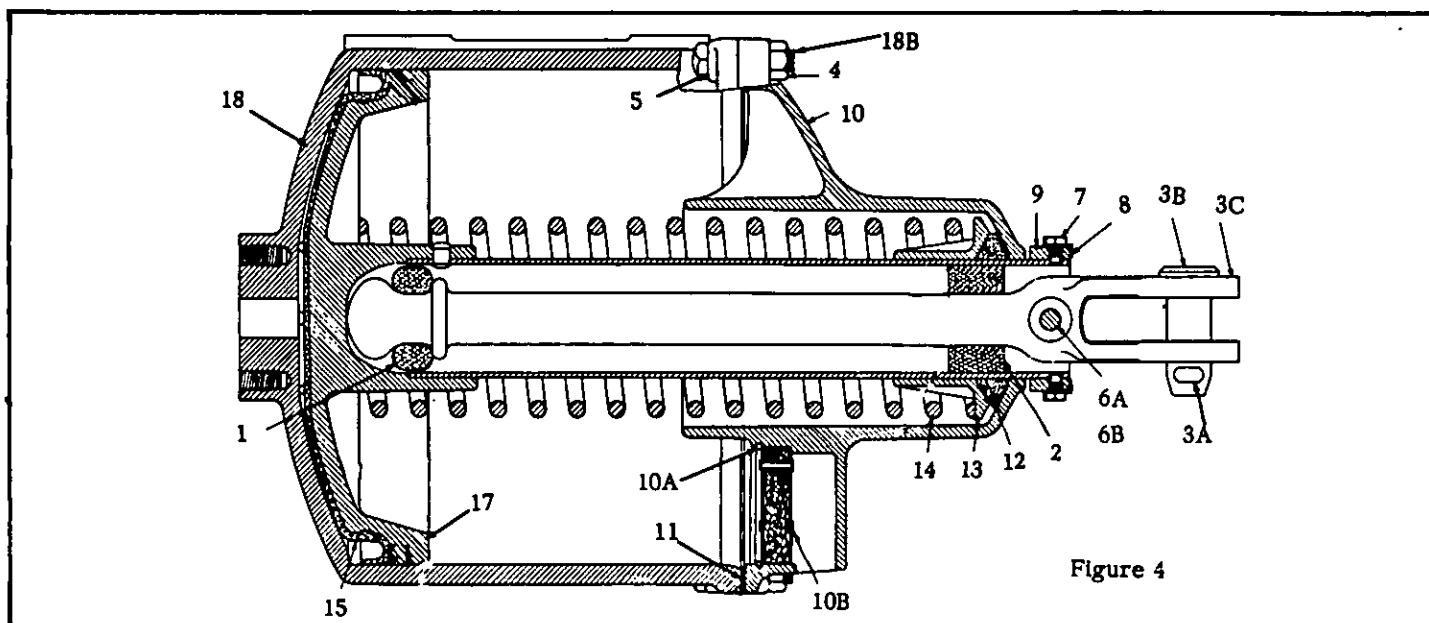


Figure 4

"UAH" BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.				Parts Name	No. Req'd
	6 x 6	6 x 8	6-1/2 x 8	6-1/2 x 8	7 x 6	Brake Cylinder Size (in.)
4-	..	518979	562672	562828	552751	"UAH" BRAKE CYLINDER, ASSEMBLY
4-	541004	541007	562715	562841	540650	..PUSH ROD, Asy. 1
4-	15-5/8	17-5/8	19-13/16	34	16-3/8	Push Rod Length (in.)
4-1	506401	506401	506401	506401	506400	..RING, Anti-Rattler 1
4-2	540378	540378	540378	540378	511677	..SEAL, Hollow Rod Piston 1
4-3	533587	539156	..	..	533445	..ROD with Cottered Pin 1
4-3A	503061	503061	503061	503061	503061	...COTTER 1
4-3B	505242	505238	505238	505238	505238	...PIN, Push Rod 1
4-3C	533588	510297	▲562717	562829	533438	...ROD, Push 1
4-	553911	522215	562671	562671	554646	..BRAKE CYLINDER, Asy., less Push Rod 1
4-4	2505	2505	..	2505	2505	..NUT, Hex., 1/2 in. 4
4-5	..	..	..	1039	11005	..BOLT, Tee Hd., 1/2 x 2-1/8 in. 4
4-6	506470	506470	..	506470	504379	..PIN with Cotter, Push Rod Holder 1
4-6A	3885	3885	..	3885	4411	...COTTER, 1/8 x 3/4 in. 1
4-6B	506469	506469	..	506469	502685	...PIN, Holder 1
4-7	571207	571207	..	94988	571207	..SCREW, Set, Dog Point Locking, 5/16 in. 2
4-8	..	..	..	500163	..	..WASHER, Lock 2
4-9	506468	506468	..	506468	502829	..HOLDER, Push Rod 1
4-10	533580	533580	..	562712	533444	..HEAD, Non-Pressure 1
4-10A	99821	99821	..	99821	..	...RING, Retainer 1
4-10B	99820	99820	..	99820	94814	...STRAINER 1
4-11	501529	501529	..	553057	99120	..GASKET, Head, N-P 1
4-12	530911	530911	..	530911	517342	..SEAL, Hollow Rod Packing 1
4-13	530892	530892	..	562714	519989	..SEAT, Spring 1
4-14	506463	506463	..	562711	1239	..SPRING, Release 1
4-15	501530	501530	..	559159	99174	..CUP, Piston Packing 1
4-17	533585	510108	..	562709	533443	..PISTON and Hollow Rod 1
4-18	554160	518991	..	562708	552752	..BODY, Cylinder 1
4-18B	554353	554353	..	..	..	...STUD, 1/2 x 1-7/8 in. 4

▲NOTE: Requires one, Roll Pin, Pc. 547510, 1/4 x 1-3/4 in.



"UAH" BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.				Parts Name	No. Req'd
7 x 8	8 x 6	8 x 8	8 x 8	8 x 8	Brake Cylinder Size (in.)	
4-	568316	509063	534328	512384	"UAH" BRAKE CYLINDER, ASY.	
4-	541058	541059	541073	□ 541062	..PUSH ROD, Asy.	1
4-	16-7/8	18-7/8	19-5/8	19-7/8	Push Rod Length (in.)	
4-1	506400	506400	506400	506400	..RING, Anti-Rattler	1
4-2	511677	511677	511677	511677	..SEAL, Hollow Rod Piston	1
4-3	503354	505418	534329	512365	..ROD with Cottered Pin	1
4-3A	503061	503061	503061	503061	...COTTER	1
4-3B	505238	505238	16074	505238	...PIN, Push Rod	1
4-3C	503256	504792	534330	512366	...ROD, Push	1
4-	507784	550432	506449	506449	..BRAKE CYLINDER, Asy., less Push Rod	1
4-4	2505	502365	2505	2505	..NUT, Hex.	4
4-5	1039	524076	1039	1039	..BOLT, Tee Hd.	1
4-6	504379	504379	504379	504379	..PIN with Cotter, Push Rod Holder	1
4-6A	4411	4411	4411	4411	...COTTER	1
4-6B	502685	502685	502685	502685	...PIN, Holder	1
4-7	571207	571207	571207	571207	..SCREW, Set, Dog Pt. Locking, 5/16 in.	2
4-9	502829	502829	502829	502829	..HOLDER, Push Rod	1
4-10	533444	531448	531448	531448	..HEAD, Non-Pressure	1
4-10B	94814	94814	94814	94814	...STRAINER	1
4-11	99120	99109	99109	99109	..GASKET, Head	1
4-12	562813	562813	562813	562813	..SEAL and RETAINER, Hollow Rod Packing	1
4-12A	562812	562812	562812	562812	...SEAL, Packing	1
4-13	519989	519989	519989	519989	..SEAT, Spring	1
4-14	1239	1239	5877	5877	..SPRING, Release	1
4-15	99174	96556	96556	96556	..CUP, Piston Packing	1
4-17	507837	507861	505528	505528	..PISTON and Hollow Rod	1
4-18	507689	524397	509060	509060	..BODY, Cylinder	1

□ NOTE: Also Requires Cotter 515664

NOTE: Cylinder Coding is shown on Page 10.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



"UAH" BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.					Parts Name	No. Req'd
	8 x 8	8 x 8	8 x 8	8 x 8	8 x 8	Brake Cylinder Size (in.)	
4-	526965	562818	540139	546088	565478	536695 "UAH" BRAKE CYLINDER, ASY.	
4-	▲ 541065	561820	541072	546089	540688	540682 .PUSH ROD, Asy.	
4-	28-1/8	28-5/8	35	36-7/8	46-5/8	20 Push Rod Length (in.)	
4-1	506400	506400	506400	506400	506400	506400 ..RING, Anti-Rattler	1
4-2	511677	511677	511677	511677	511677	511677 ..SEAL, Hollow Rod Piston	1
4-3	526963	..	540140	546090	527385	513894 ..ROD with Cottered Pin	1
4-3A	503061	17163	503061	17163	503061	503061 ...COTTER	1
4-3B	505238	19697	505238	19697	505238	505238 ...PIN, Push Rod	1
4-3C	526962	561821	540141	546031	527364	514263 ...ROD, Push	1
4-	506449	506449	506449	506449	506449	557792 .BRAKE CYLINDER, Asy., less P. Rod	1
4-4			2505			2505 ..NUT, Hex., 1/2 in.	4
4-5			1039			1039 ..BOLT, Tee Hd., 1/2 x 2-1/8 in.	4
4-6			504379			504379 ..PIN with Cotter, Push Rod Holder	1
4-6A			4411			4411 ...COTTER	1
4-6B			502685			502685 ...PIN, Holder	1
4-7			571207			571207 ..SCREW, Set, Dog Pt. Locking 5/16 in.	2
4-9			502829			502829 ..HOLDER, Push Rod	1
4-10			531448			531448 ..HEAD, Non-Pressure	1
4-10B			94814			94814 ...STRAINER	1
4-11			99109			99109 ..GASKET, Head	1
4-12			562813			562813 ..SEAL and RETAINER, Hollow Rod Pkg.	1
4-12A			562812			562812 ...SEAL, Packing	1
4-13			519989			519989 ..SEAT, Spring	1
4-14			5877			5877 ..SPRING, Release	1
4-15			96556			96556 ..CUP, Piston Packing	1
4-17			505528			505528 ..PISTON and Hollow Rod	1
4-18			509060			537544 ..BODY, Cylinder	1

▲ NOTE: Also Requires Cotter Pc. 515664.

NOTE: Cylinder Coding is shown on Page 10.

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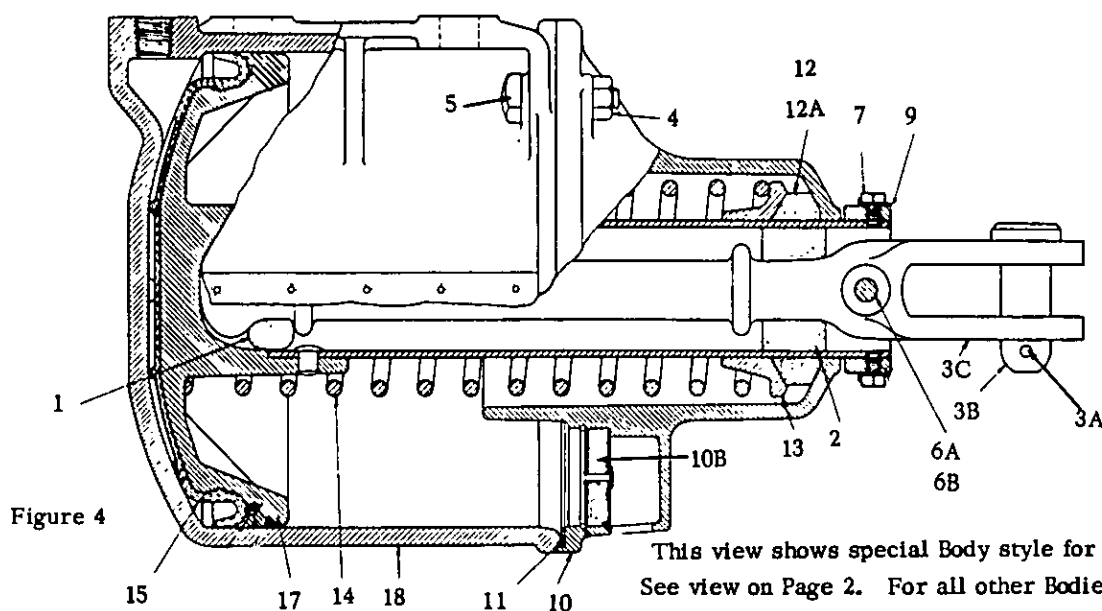


"UAH" BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.					Parts Name	No. Req'd
	8 x 10	9 x 8	9 x 8	9 x 8	9 x 8	Brake Cylinder Size (in.)	
4-	511150	562808	513891	544117	535033	"UAH" BRAKE CYLINDER, ASY.	
4-	540687	541059	540682	541067	540693	..PUSH ROD, Asy.	
4-	20-7/8	18-7/8	20	23-5/8	34-5/8	Push Rod Length (in.)	
4-1	506400	506400	506400	506400	506400	..RING, Anti-Rattler	1
4-2	511677	511677	511677	511677	511677	..SEAL, Hollow Rod	1
4-3	503051	505418	513894	530906	535034	..ROD with Cottered Pin	1
4-3A	503061	503061	503061	503061	503061	...COTTER	1
4-3B	505238	505238	505238	505238	505238	...PIN, Push Rod	1
4-3C	502955	504792	514263	530743	535035	...ROD, Push	1
4-	557793	514368	514368	514368	514368	..BRAKE CYLINDER, Asy., less Push Rod . . .	1
4-4	2505		2505			..NUT, Hex.	4
4-5	1039		11003			..BOLT, Tee Hd.	4
4-6	504379		504379			..PIN with Cotter, Push R. Holder	1
4-6A	4411		4411			...COTTER	1
4-6B	502685		502685			...PIN, Holder	1
4-7	571207		571207			..SCREW, Set, Dog Pt. Locking, 5/16 in. . . .	2
4-9	502829		502829			..HOLDER, Push Rod	1
4-10	531448		533275			..HEAD, Non-Pressure	1
4-10B	94814		94814			...STRAINER	1
4-11	99109		506975			..GASKET, Head	1
4-12	562813		562813			..SEAL and RETAINER, Hollow Rod Packing . .	1
4-12A	562812		562812			...SEAL, Packing	1
4-13	519989		519989			..SEAT, Spring	1
4-14	529958		529958			..SPRING, Release	1
4-15	96556		506957			..CUP, Piston Packing	1
4-17	503050		513893			..PISTON and Hollow Rod	1
4-18	510936		513885			..BODY, Cylinder	1

NOTE: Cylinder Coding is shown on Page 10.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



"UAH" BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.					Parts Name	No. Req'd
	9 x 8	9 x 8	9 x 8	9 x 10	9 x 10	10 x 6	Brake Cylinder Size (in.)
4-	517300	565643	563076	518076	..	512463	"UAH" BRAKE CYLINDER, ASY.
4-	540686	553529	563142	540687	..	540763	..PUSH ROD, Asy. 1
4-	31-5/8	35-1/4	48	20-7/8	..	18	Push Rod Length (in.)
4-1	506400	506400	506400	506400	..	506400	..RING, Anti-Rattler 1
4-2	511677	511677	511677	511677	..	511677	..SEAL, Hollow Rod 1
4-3	517305	553527	..	502955	..	503361	..ROD with Cottered Pin 1
4-3A	503061	503061	503061	503061	..	503061	..COTTER 1
4-3B	505238	505238	505238	505238	..	505238	..PIN, Push Rod 1
4-3C	517297	553530	563143	502955	..	503260	..ROD, Push 1
4-	514368	514368	514368	550484	562369	557795	..BRAKE CYLINDER, Asy., less Push Rod 1
4-4		2505		2505	2505	2505	..NUT, Hex., 1/2 in. 4
4-5		11003		11003	11003	1039	..BOLT, Tee Hd. 4
4-6		504379		504379	504379	504379	..PIN with Cotter, Push Rod Holder . . 1
4-6A		4411		4411	4411	4411	..COTTER 1
4-6B		502685		502685	502685	502685	..PIN, Holder 1
4-7		571207		571207	571207	571207	..SCREW, Set, Dog Point Locking . . . 2
4-9		502829		502829	502829	502829	..HOLDER, Push Rod 1
4-10		533275		533275	533275	531671	..HEAD, Non-Pressure 1
4-10B		94814		94814	94814	94814	..STRAINER 1
4-11		506975		506975	506975	99121	..GASKET, Head 1
4-12		562813		562813	562813	562813	..SEAL and RETAINER, Hollow Rod Pkg. 1
4-12A		562812		562812	562812	562812	..SEAL, Packing 1
4-13		519989		519989	519989	519989	..SEAT, Spring 1
4-14		529958		500213	500213	502712	..SPRING, Release 1
4-15		506957		506957	506957	94800	..CUP, Piston Packing 1
4-17		513893		517479	517479	502753	..PISTON and Hollow Rod 1
4-18		513885		518051	562368	512401	..BODY, Cylinder
				13/16	13/16		Mounting Holes



'UAH' BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.						Parts Name	No. Req'd
	10 x 8	10 x 8	10 x 8	10 x 8	10 x 8	10 x 10	10 x 12 Brake Cylinder Size (in.)	
4-	511148	564145	526257	535825	514272	511147	511146 "UAH" BRAKE CYLINDER, ASY.	
4-	540776	548324	540787	540768	540774	540777	540766 ..PUSH ROD, Asy.	1
4-	20	22-5/8	30-3/8	31-7/8	39-3/8	22	24 Push Rod Length (in.)	
4-1	506400	506400	506400	506400	506400	506400	506400 ..RING, Anti-Rattler	1
4-2	511677	511677	511677	511677	511677	511677	511677 ..SEAL, Hollow Rod	1
4-3	514426	548421	533280	509921	514273	514780	505539 ..ROD with Cottered Pin, Push . . .	1
4-3A	503061	503061	503061	503061	503061	503061	503061 ...COTTER, 3/8 x 2-1/4 in.	1
4-3B	505238	505238	505238	505238	505238	505238	505238 ...PIN, Push Rod	1
4-3C	508875	548301	526244	509883	506279	514778	504794 ...ROD, Push	1
4-	514369	514369	514369	514369	514369	557796	533378 ..BRAKE CYLINDER, Asy., less P. Rod	1
4-4			2505			2505	2505 ..NUT, Hex., 1/2 in.	4
4-5			1039			1039	1039 ..BOLT, Tee Hd., 1/2 x 2-1/8 in. . .	4
4-6			504379			504379	504379 ..PIN with Cotter Push Rod Holder . .	1
4-6A			4411			4411	4411 ...COTTER, 3/16 x 1 in.	1
4-6B			502685			502685	502685 ...PIN, Holder	1
4-7			571207			571207	571207 ..SCREW, Set, Dog Pt. Locking . . .	2
4-9			502829			502829	502829 ..HOLDER, Push Rod	1
4-10			531671			531671	531671 ..HEAD, Non-Pressure	1
4-10B			94814			94814	94814 ...STRAINER	1
4-11			99121			99121	99121 ..GASKET, Head	1
4-12			562813			562813	562813 ..SEAL and RETAINER, Hollow Rod Pkg.	1
4-12A			562812			562812	562812 ...SEAL, Packing.	1
4-13			519989			519989	519989 ..SEAT, Spring	1
4-14			99995			529928	529959 ..SPRING, Release	1
4-15			94800			94800	94800 ..CUP, Piston Packing.	1
4-17			505431			503064	505540 ..PISTON and Hollow Rod	1
4-18			500887			508412	508411 ..BODY, Cylinder	1

NOTE: Cylinder Coding is shown on Page 10

Prices will be quoted upon application
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'UAH' BRAKE CYLINDERS

Fig. & Ref. No.	Pc. No.					Parts Name	No. Req'd
	11 x 8	12 x 8	12 x 8	12 x 8	12 x 12	14 x 10	Brake Cylinder Size (in.)
4- 563565	511165	563658	571941	511168	511161	"UAH" BRAKE CYLINDER, ASY.	
4- 540776	540977	561859	570909	540978	540603	..PUSH ROD, Asy.	
4- 20	21-1/16	33-7/8	26	25-1/16	25-9/16	Push Rod Length (in.)	
4-1 506400	506400	506400	506400	506400	537310	..RING, Anti-Rattler	1
4-2 511677	511677	511677	511677	511677	511678	..SEAL, Hollow Rod	1
4-3 514426	503367	..	570910	505254	505243	..ROD with Cottered Pin	1
4-3A 503061	503061	503061	503061	503061	503061	...COTTER	1
4-3B 505238	505238	505238	505238	505238	505239	...PIN, Push Rod	1
4-3C 508875	503265	561860	570911	519279	504804	...ROD, Push	1
4- 548305	514370	514370	514370	508958	510717	..BRAKE CYLINDER, Asy., less P. Rod	1
4-4 ▲2505		2505		2505	2505	..NUT, Hex., 1/2 in.	8
4-5 ▲1039		1039		1039	11005	..BOLT, Tee Hd., 1/2 x 2-1/8 in.	8
4-6 504379		504379		504379	505637	..PIN with Cotter, Push R. Holder	1
4-6A 4411		4411		4411	4411	...COTTER, 3/16 x 1 in.	1
4-6B 502685		502685		502685	503052	...PIN, Holder	1
4-7 571207		571207		571207	571207	..SCREW, Set, Dog Pt. Locking, 5/16 in.	2
4-9 502829		502829		502829	503055	..HOLDER, Push Rod	1
4-10 531772		531738		531738	533640	..HEAD, Non-Pressure	1
4-10A		99195		99195	99195	...RING, Retainer	1
4-10B 94814		99196		99196	99196	...STRAINER	1
4-11 505862		99890		99890	99122	..GASKET, Head, N.P.	1
4-12 562813		562813		562813	562813	..SEAL and RETAINER, Hollow RodPkg.	1
4-12A 562812		562812		562812	562812	...SEAL, Packing	1
4-13 519989		530894		530894	530894	..SEAT, Spring	1
4-14 99995		510571		510569	99767	..SPRING, Release	1
4-15 506018		99882		99882	99166	..CUP, Piston Packing	1
4-17 531773		505572		505253	503072	..PISTON and Hollow Rod	1
4-18 548303		508543		508545	508031	..BODY, Cylinder	1

▲ Requires 4 only

NOTE: Cylinder Coding is shown on Page 10.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted



"UAH" BRAKE CYLINDERS

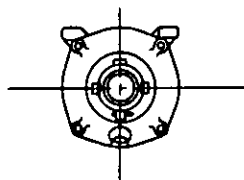
Fig. & Ref. No.	Pc. No.			Parts Name	No. Req'd
	14 x 12	16 x 12	18 x 12	Brake Cylinder Size (in.)	
4-	511163	511157	..	"UAH" BRAKE CYLINDER, ASY.	
4-	540604	540636	..	..PUSH ROD, Asy.	
4-	27-9/16	27-11/16		Push Rod Length (in.)	
4-1	537310	537311	..	..RING, Anti-Rattler	1
4-2	511678	511679	..	..SEAL, Hollow Rod	1
4-3	505650	505356	..	..ROD with Cottered Pin	1
4-3A	503061	17150	..	...COTTER, 3/8 x 2-1/4 in.	1
4-3B	505239	505240	..	...PIN, Push Rod	1
4-3C	504805	504811	..	...ROD, Push	1
4-	512164	508540	509895	..BRAKE CYLINDER, Asy., less P. Rod	1
4-4	2505	27009	27009	..NUT, Hex., 1/2 in.	8
4-5	11005	13171	13171	..BOLT, Tee Hd., 1/2 x 2-3/8 in.	8
4-6	505637	505388	505739	..PIN with Cotter, Push R. Holder	1
4-6A	4411	4411	4411	...COTTER, 3/16 x 1 in.	1
4-6B	503052	505387	505745	...PIN, Holder	1
4-7	571207	571207	571207	..SCREW, Set, Dog Pt. Locking, 5/16 in.	2
4-9	503055	505357	501307	..HOLDER, Push Rod	1
4-10	533640	534547	534693	..HEAD, Non-Pressure	1
4-10A	99195	501302	501302	...RING, Retainer	1
4-10B	99196	501305	501305	...STRAINER	1
4-11	99122	502912	501301	..GASKET, Head	1
4-12	562813	534548	534548	..SEAL and RETAINER, Hollow Rod Packing	1
4-12A	562812	..	..	...SEAL, Packing	1
4-13	530894	530893	530893	..SEAT, Spring	1
4-14	99746	505351	501317	..SPRING, Release	1
4-15	99166	502913	501293	..CUP, Piston Packing	1
4-17	505649	505343	501338	..PISTON and Hollow Rod	1
4-18	508032	508409	508549	..BODY, Cylinder	1

NOTE: Cylinder Coding is shown on Page 10.

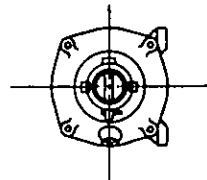
Prices will be quoted upon application
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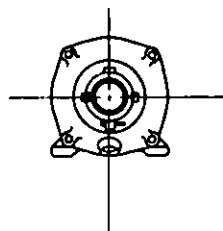
CODING INFORMATION



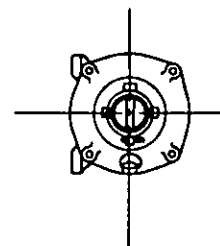
MOUNTING (-2300)



MOUNTING (-2400)



MOUNTING (-2500)



MOUNTING (-2600)

NOTES:

Coding should be determined looking at Cylinder from Non-Pressure Head End.

First two digits of Code indicate relation of Body to Non-Pressure Head.

Last two digits of Code indicate relation of Pressure Head to Non-Pressure Head.

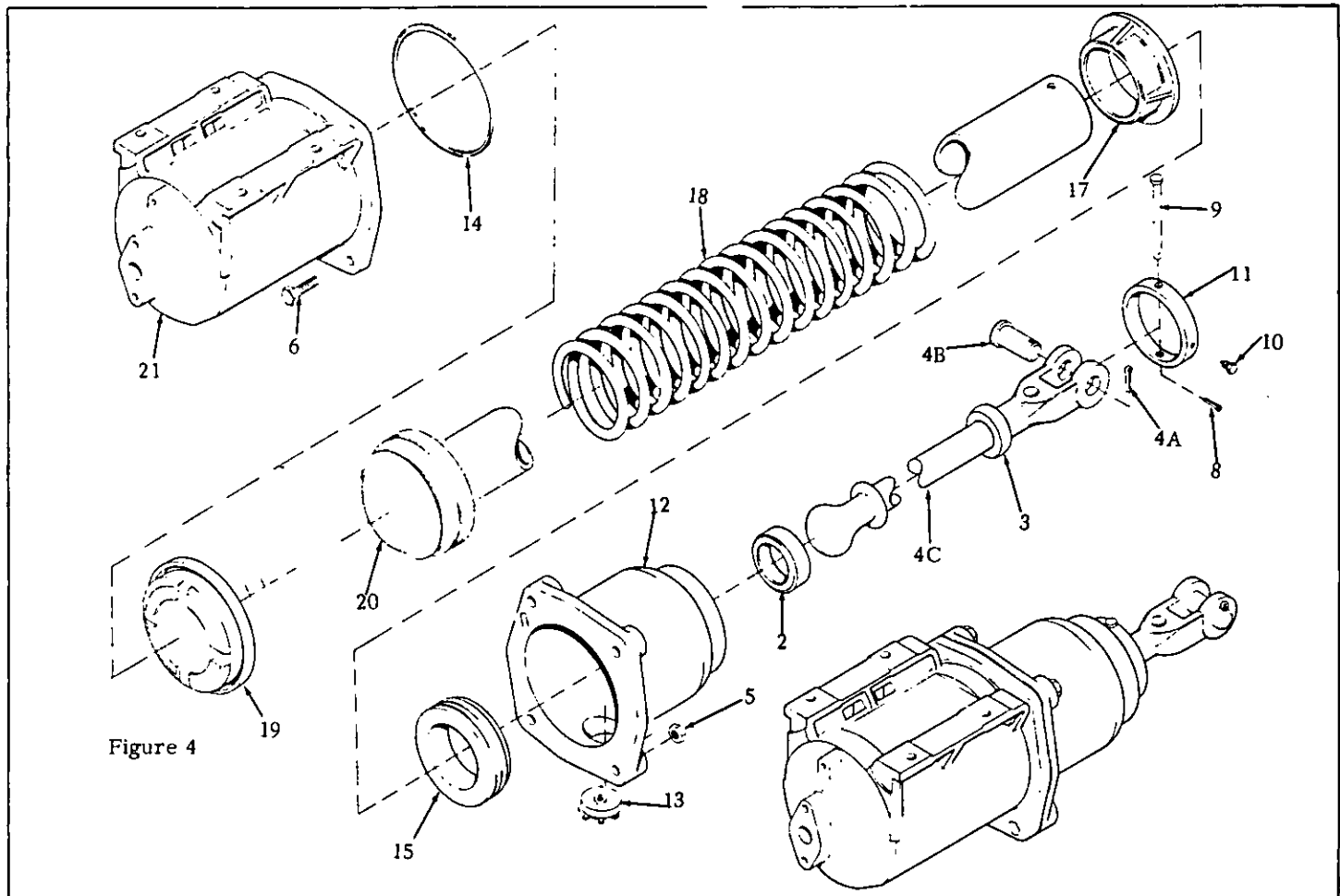


Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY / Wilmerding, Pennsylvania 15148

PARTS CATALOG

"UAH" TYPE BRAKE CYLINDER



10'' x 8'' UAH BRAKE CYLINDERS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
4-	577351	"UAH" BRAKE CYLINDER, 10 x 8, Asy.	
4-	577237	..PUSH ROD, Asy. (Incl. Ref. Nos. 2 thru 4C)	1
4-	34	Push Rod Length (in.)	
4-2	506400	..RING, Anti-Rattler	1
4-3	511677	..SEAL, Hollow Rod	1
4-4	577316	..ROD with Cottered Pin, Push (Incl. Ref. 4A thru 4C)	1
4-4A	503061	...COTTER, 3/8 x 2-1/4 in.	1
4-4B	505238	...PIN, Push Rod	1
4-4C	577315	...ROD, Push	1
4-	514369	..BRAKE CYLINDER, Asy., less P. Rod (Incl. Ref. 5 thru 21).	1
4-5	2505	..NUT, Hex., 1/2 in.	4
4-6	11003	..BOLT, Tee Hd., 1/2 x 2-1/4 in.	4
4-7	504379	..PIN with Cotter Push Rod Holder (Incl. Ref. 8 & 9)	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
4-8	4411	...COTTER, 3/16 x 1 in.	1
4-9	502685	...PIN, Holder	1
4-10	571207	..SCREW, Set, Dog Pt. Locking	2
4-11	502829	..HOLDER, Push Rod	1
4-12	531671	..HEAD, Non-Pressure (Incl. 13)	1
4-13	94814	...STRAINER	1
4-14	99121	..GASKET, Head	1
4-15	562813	..SEAL and RETAINER, Hollow Rod Pkg. (Incl. Ref. 16)	1
4-16	562812	...SEAL, Packing	1
4-17	519989	..SEAT, Spring	1
4-18	99995	..SPRING, Release	1
4-19	94800	..CUP, Piston Packing	1
4-20	505431	..PISTON and Hollow Rod	1
4-21	500887	..BODY, Cylinder	1

NOTE: Cylinder Coding is shown on Page 10, P.C. 3214-4, Sup. 10.

(SUPERSEDES ISSUE DATED JANUARY, 1976)

8" x 10" UAH BRAKE CYLINDERS

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
	22 in.	33-5/8 in.	
4-	579191	"UAH" BRAKE CYLINDER, 8 x 10 ASY. (22 in. P. Rod)	
4-	-	579192 "UAH" BRAKE CYLINDER, 8 x 10 ASY. (33-5/8 in. P. Rod)	
4-	540696	544569 .PUSH ROD, Asy. (Incl. Ref. Nos. 2 thru 4C)	1
4-1	515664	-- .COTTER, 5/16 x 2-1/2 in.	1
4-2	506400	506400 ..RING, Anti-Rattler	1
4-3	511677	511677 ..SEAL, Hollow Rod.	1
4-4	538952	544594 ..ROD with Cottered Pin, Push (Incl. Ref. 4A thru 4C)	1
4-4A	503061	503061 ...COTTER, 3/8 x 2-1/4 in.	1
4-4B	505238	505238 ...PIN, Push Rod	1
4-4C	538951	544571 ...ROD, Push	1
4-	557793	.BRAKE CYLINDER, Asy., less Push Rod (Incl. Ref. 5 thru 21)	1
4-5	2505	..NUT, Hex, 1/2 in.	4
4-6	1039	..BOLT, Tee Hd., 1/2 x 2-1/8 in.	4

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
4-7	504379	..PIN with Cotter, Push Rod Holder (Incl. Ref. 8 & 9)	1
4-8	4411	...COTTER, 3/16 x 1 in.	1
4-9	502685	...PIN, Holder.	1
4-10	571207	..SCREW, Set, Dog Pt. Locking	2
4-11	502829	..HOLDER, Push Rod	1
4-12	531448	..HEAD, Non-Pressure (Incl. Ref. 13)	1
4-13	94814	...STRAINER	1
4-14	99109	..GASKET, Head	1
4-15	562813	..SEAL and RETAINER, Hollow Rod, Pkg. (Incl. Ref. 10)	1
4-16	562812	...SEAL, Packing	1
4-17	519989	..SEAT, Spring	1
4-18	529958	..SPRING, Release	1
4-19	96556	..CUP, Piston Packing	1
4-20	503050	..PISTON and Hollow Rod	1
4-21	510936	..BODY, Cylinder	1

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

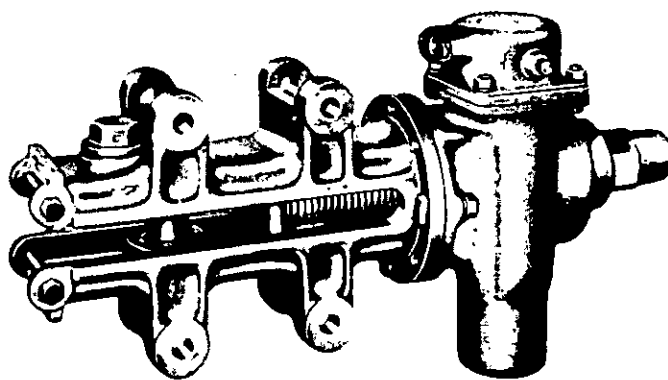




PASSENGER CAR, LOCOMOTIVE AND FREIGHT CAR SLACK ADJUSTERS (A, B, C, & D TYPES)

Parts Catalog

(Supersedes issue dated October, 1955 and Part Catalog 3226-2A dated March, 1963)



WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING, PENNSYLVANIA / WESTINGHOUSE AIR BRAKE COMPANY



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GENERAL INFORMATION

The slack adjusters described herein are known as divided engine types because the piston and its spring are located on opposite sides of the ratchet assembly. The A, B and C types are used on passenger cars and locomotives, the type D is for freight cars.

The A type is designed for mounting on the end of the truck frame and is generally used as a middle fulcrum point.

The B type is designed for mounting on the pressure head of the brake cylinder and is generally used on the end of a lever. This method of mounting requires a brake cylinder with lugs cast on the pressure head.

The C type is designed for mounting on either the side or top of the truck frame. It may be used on the end of a lever or as a middle fulcrum point.

These adjusters are made with both large and small engine portions. The large engine is generally used where fulcrum pin loads exceed 35,000 pounds.

The large engine has a one tooth take-up on the ratchet. This provides about 1/64" movement of the crosshead for each return stroke of the slack adjuster piston. The small engine has a two tooth take-up, providing about 1/32" movement of the crosshead. This eliminates the danger of taking up false travel, which would cause the shoes to bind on the wheels.

The Type D Slack Adjuster is designed to be mounted on the pull rod, which results in a floating-type mounting. The engine is cast integral with the body and is made only in the small size with two tooth (1/32 of an inch) take-up.

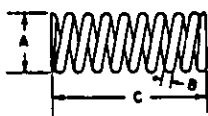
This slack adjuster is available in four sizes for the following ratings, based on A.A.R. stress limits:

D-112-D	18,000 lbs.	D-312-D	26,000 lbs.
D-212-D	22,000 lbs.	D-412-D	36,000 lbs.

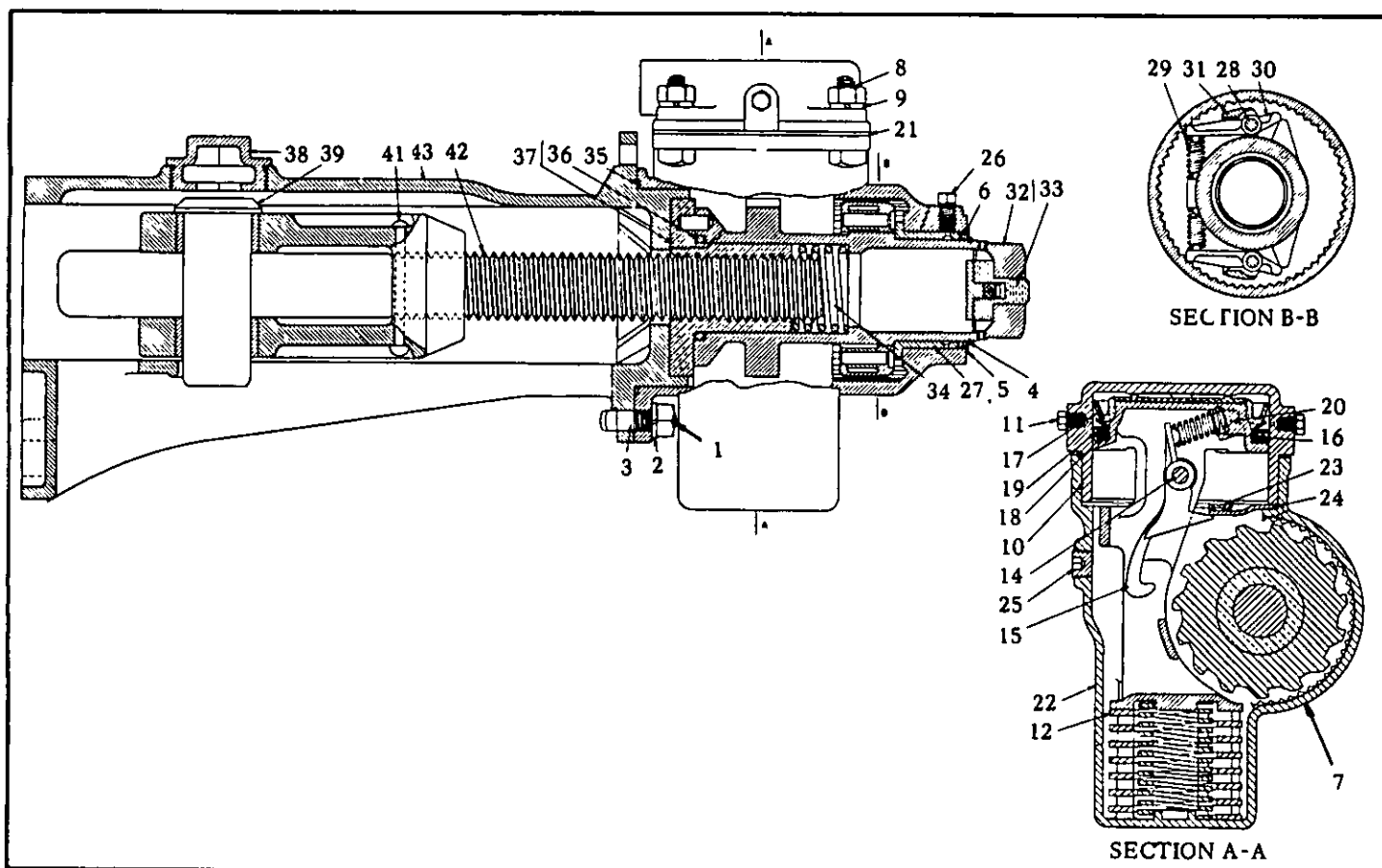
The only differences in these various sizes are in the adjuster screw adapter, lever brackets, and lever bracket pin. All other details are identical.

SPRING IDENTIFICATION TABLE

The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

						SPRING IDENTIFICATION					
Pc.No.	Approx. Out. Dia. "A" in.	Approx. Dia. Wire "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Material	Pc.No.	Approx. Out. Dia. "A" in.	Approx. Dia. Wire "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Material
18469	1/2	1/16	1-17/32	12	Ph. Bz.	504893	3-3/8	5/8 x 9/64	5-1/16	8	Steel
543552	2-7/32	7/32	1-23/32	5	Steel	504894	2-3/32	3/8 x 7/64	4-23/32	10	Steel
502420	39/64	7/64	1-15/16	12-1/2	Ph. Bz.	88952	5/8	5/64	1-3/4	10	Steel
515272	2-5/8	9/16 x 1/8	5-1/2	11	Steel	533464	2-1/8	1/8 x 1/2	4-3/4	12-1/2	Steel
70985	1-3/4	9/64	2-11/16	7	Steel	565421	5/8	3/32	2	12	Steel

Number of turns for each spring counted between extreme ends of the wire.



"A" TYPE AUTOMATIC SLACK ADJUSTERS (Small Engine)

Ref. No.	Pc.No.	Parts Name	No. Req'd
A-16-D Type			
	548587	AUTOMATIC SLACK ADJUSTER, ASY.	
1	26809	.NUT, Hex., 7/16 in.	3
2	78490	.WASHER, Lock, 7/16 in.	3
3	553372	.SCREW, T.Hd., 7/16 x 1-3/4 in.	3
4	512471	.RING, Retainer	1
5	512472	.RETAINER, Felt	1
6	512470	.FELT, Ratchet Nut	1
7	508091	.ENGINE, Assembly	1
8	15784	.SCREW, Cap, H.Hd., 3/8 x 1-3/8 in..	4
9	17173	.WASHER, Lock, 3/8 in.	4
10	511394	.CYLINDER, Assembly	1
11	551274	.PLUG, Pipe	2
12	515272	.SPRING, Piston	1
13	508946	.PISTON and PAWL, Asy.	1
14	503925	.PIN, Pawl	1
15	506852	.PAWL	1
16	565421	.SPRING, Pawl	1
17	501863	.CUP, Packing	1
18	505016	.LUBRICATOR, Assembly	1
19	527978	.SWAB	1
20	508092	.PISTON	1
21	523075	.GASKET, Cylinder	1

Ref. No.	Pc.No.	Parts Name	No. Req'd
A-16-D Type			
22	511393	.CASING, Assembly	1
23	25521	.SCREW, Fl. Hd., .164 x 1/2 in.	2
24	523076	.STOP, Pawl	1
25	551275	.PLUG, Pipe	1
26	551274	.PLUG, Pipe	2
27	506883	.BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl	2
29	18469	.SPRING, Pawl	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl	1
32	541677	.RATCHET NUT, Assembly	1
33	523417	.PLUG, Stop	1
34	70985	.SPRING, Ratchet Nut	1
35	511983	.GASKET, Body	1
36	536583	.O-RING, 2-1/8 in. O.D.	1
37	541643	.NUT, Adj. Screw	1
38	501894	.CAP, Crosshead Pir.	1
39	501952	.PIN, Crosshead	1
40	502033	.ADJUSTER SCREW, Assembly	1
41	501886	.RIVET, Crosshead	1
42	502037	.SCREW, Adjuster	
43	503459	.BODY, Adjuster	

NOTE: Part of Body, Ref. No. 43.

'A' TYPE AUTOMATIC SLACK ADJUSTERS (Large Engine)

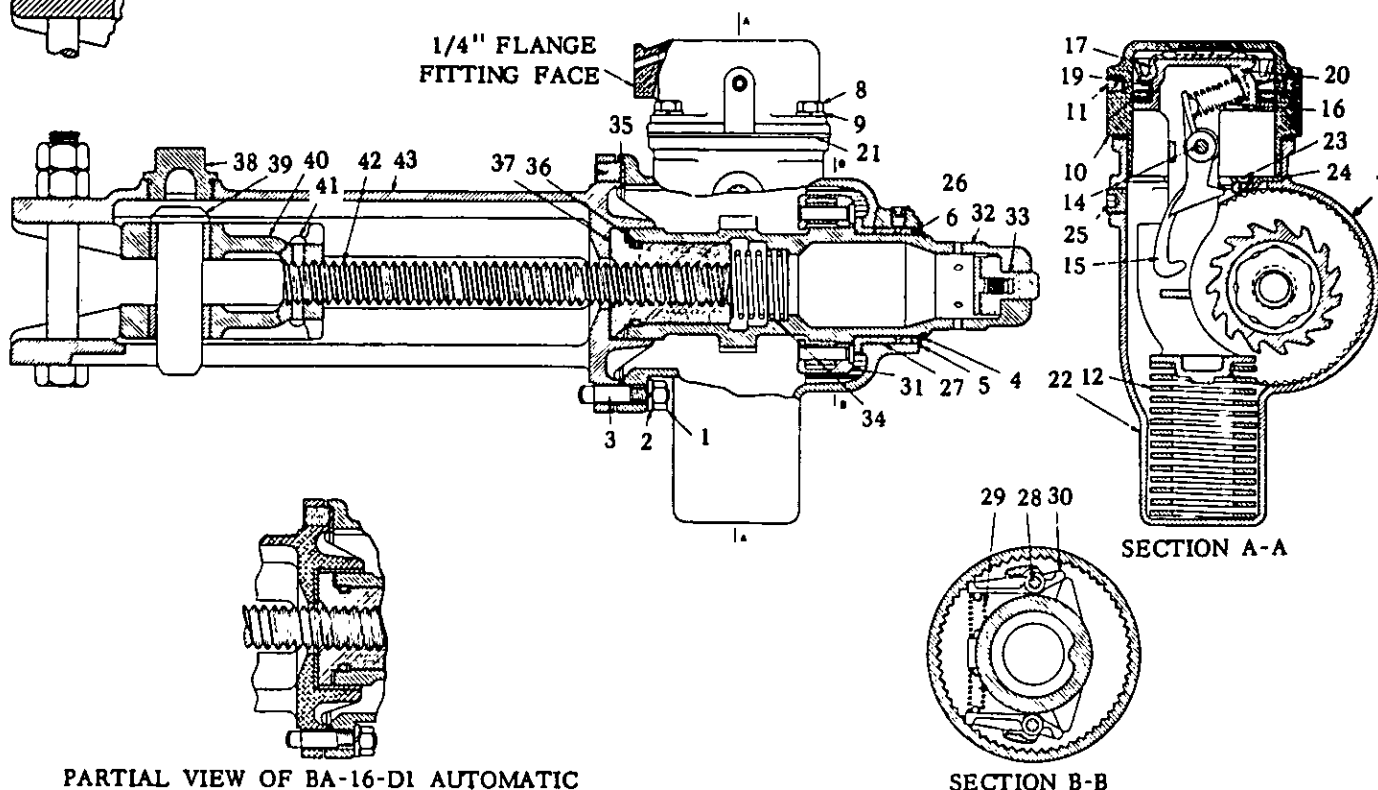
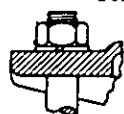
Ref. No.	Pc.No.	Parts Name	No. Req'd
A-54-C Type			
	548581	AUTOMATIC SLACK ADJUSTER, ASY.	
1	2505	.NUT, Hex., 1/2 in.	3
2	15951	.WASHER, Lock, 1/2 in.	3
3	547520	.SCREW, T.Hd., 1/2 x 1-5/8 in.	3
4	512471	.RING, Retainer	1
5	543554	.RETAINER, Felt	1
6	543555	.FELT, Ratchet Nut	1
7	543545	.ENGINE, Assembly	1
8A	26809	..NUT, Hex., 7/16 in.	4
8B	553372	..SCREW, Cap, T.Hd., 7/16 x 1-3/4 in.	4
9	78490	..WASHER, Lock, 7/16 in.	4
10	502417	..CYLINDER, Assembly	1
11	502700	..PLUG, Pipe	2
12A	504893	..SPRING, Piston, Large	1
12B	504894	..SPRING, Piston, Small	1
13	504895	..PISTON and PAWL, Assembly	1
14	503925	...PIN, Pawl.	1
15	504127	...PAWL	1
16	502420	...SPRING, Pawl.	1
17	99808	...CUP, Packing	1
18	99827	...LUBRICATOR, Assembly.	1
19	530135	...SWAB	1
20	504892	...PISTON	1
21	524628	..GASKET, Cylinder	1
22	543559	..CASING, Assembly.	1
23	25521	...SCREW, Fl.Hd., .164 x 1/2 in.	2
24	524629	...STOP, Pawl.	1
25	520379	...PLUG, Pipe	1
26	502700	...PLUG, Pipe	2
27	543546	...BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl.	2
29	18469	.SPRING, Pawl.	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl.	1
32	543548	.RATCHET NUT, Assembly.	1
33	523417	..PLUG, Stop	1
34	543552	.SPRING, Ratchet Nut	1
35	512499	.GASKET, Body	1
36	524618	.O-RING, 2-5/8 in. O.D.	1
37	543551	.NUT, Adj. Screw	1
38	502305	.CAP, Crosshead Pin	1
39	502307	.PIN, Crosshead	1
40	502327	.ADJUSTER SCREW, Assembly	1
41	502297	..RIVET, Crosshead	1
42	502298	..SCREW, Adjuster	1
43	502329	.BODY, Adjuster	1

Ref. No.	Pc.No.	Parts Name	No. Req'd
A-64-C Type			
	548591	AUTOMATIC SLACK ADJUSTER, ASY.	
1	2505	.NUT, Hex., 7/16 in.	3
2	15951	.WASHER, Lock, 7/16 in.	3
3	547520	.SCREW, T. Hd., 7/16 x 1-3/4 in.	3
4	512471	.RING, Retainer	1
5	543554	.RETAINER, Felt	1
6	543555	.FELT, Ratchet Nut	1
7	543545	.ENGINE, Assembly	1
8A	26890	..NUT, Hex., 7/16 in.	4
8B	553372	..SCREW, Cap, H. Hd., 3/8 x 1-3/8 in.	4
9	78490	..WASHER, Lock, 7/16 in.	4
10	502417	..CYLINDER, Assembly	1
11	502700	...PLUG, Pipe	2
12A	504893	..SPRING, Piston, Large	1
12B	504894	..SPRING, Piston, Small	1
13	504895	..PISTON and PAWL, Assembly	1
14	503925	...PIN, Pawl.	1
15	504127	...PAWL	1
16	502420	...SPRING, Pawl.	1
17	99808	...CUP, Packing	1
18	99827	...LUBRICATOR, Assembly.	1
19	530135	...SWAB	1
20	504892	...PISTON	1
21	524628	..GASKET, Cylinder	1
22	543559	..CASING, Assembly.	1
23	25521	...SCREW, Fl. Hd., .164 x 1/2 in.	2
24	524629	...STOP, Pawl.	1
25	520379	...PLUG, Pipe	1
26	502700	...PLUG, Pipe	2
27	543546	...BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl.	2
29	18469	.SPRING, Pawl.	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl.	1
32	543548	.RATCHET NUT, Assembly.	1
33	523417	..PLUG, Stop	1
34	543552	.SPRING, Ratchet Nut	1
35	512499	.GASKET, Body	1
36	524618	.O-RING, 2-1/8 in. O.D.	1
37	543551	.NUT, Adjusting Screw	1
38	502305	.CAP, Crosshead Pin	1
39	515531	.PIN, Crosshead	1
40	515543	.ADJUSTER SCREW, Assembly	1
41	502297	..RIVET, Crosshead	1
42	515531	..SCREW, Adjuster	1
43	502329	.BODY, Adjuster	1

NOTE: Part of Body, Ref. No. 43

NOTE: Rotation of Engine

PARTIAL VIEW SHOWING CROSSHEAD
STOP BOLT AND LOCK WASHER



PARTIAL VIEW OF BA-16-D1 AUTOMATIC
SLACK ADJUSTER WITH ALUMINUM BODY

SECTION B-B

"B" TYPE AUTOMATIC SLACK ADJUSTERS (Small Engine)

Ref. No.	Pc.No.	Parts Name	No. Req'd
B-16-D | B-16-D1 Type			
	548437	548476	AUTOMATIC SLACK ADJUSTER, ASY.
1	26809	.NUT, Hex., 7/16 in.	3
2	78490	.WASHER, Lock, 7/16 in.	3
3	553372	.SCREW, T.Hd., 7/16 x 1-3/4 in.	3
4	512471	.RING, Retainer	1
5	512472	.RETAINER, Felt	1
6	512470	.FELT, Ratchet Nut	1
7	508091	.ENGINE, Assembly	1
8	15784	..SCREW, Cap, H.Hd., 3/8 x 1-3/8 in.	4
9	17173	..WASHER, Lock, 3/8 in.	4
10	511394	..CYLINDER, Assembly	1
11	551274	..PLUG, Pipe	2
12	515272	..SPRING, Piston	1
13	508964	..PISTON and PAWL, Assembly	1
14	503925	..PIN, Pawl	1
15	506852	..PAWL	1
16	565421	..SPRING, Pawl	1
17	501863	..CUP, Packing	1
18	505016	..LUBRICATOR, Assembly	1
19	527978	...SWAB	1
20	508092	..PISTON	1
21	523075	..GASKET, Cylinder	1
22	511393	..CASING, Assembly	1
23	25521	...SCREW, Fl.Hd., .164 x 1/2 in.	2

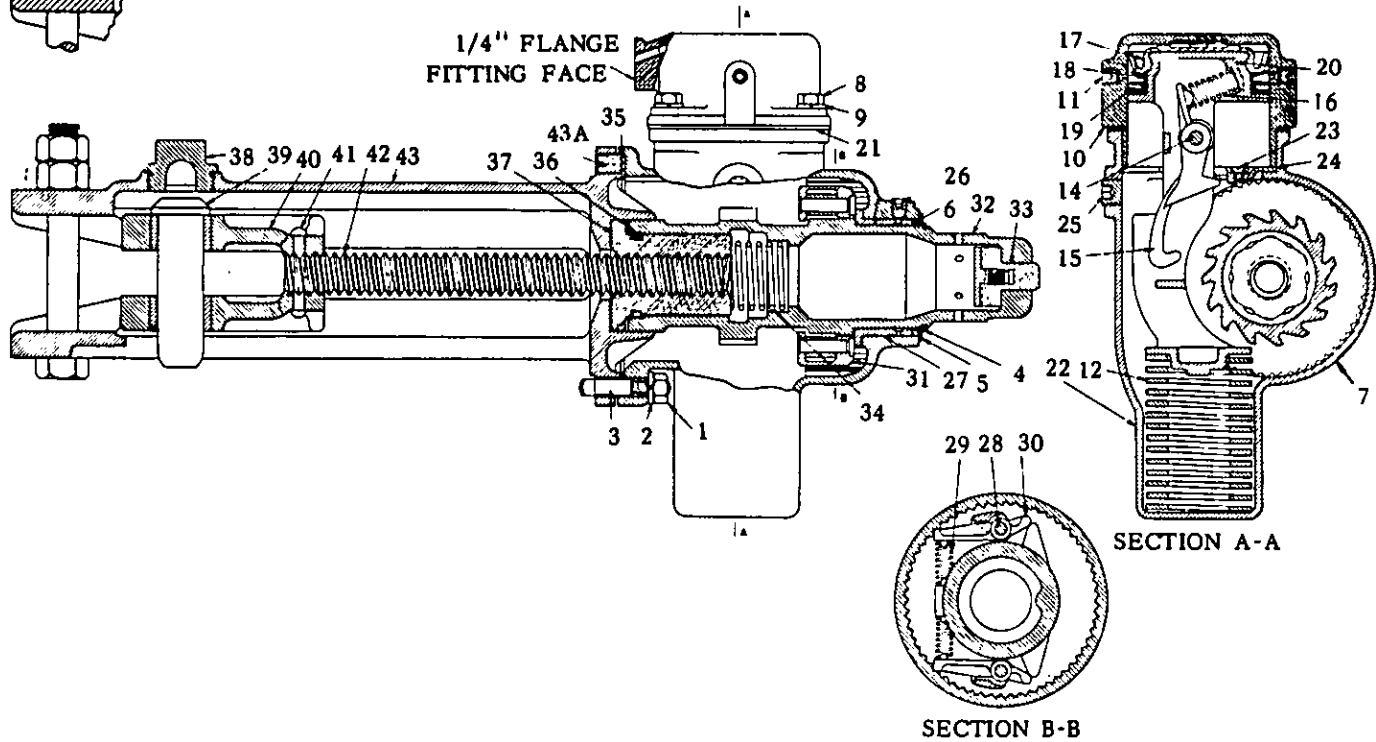
Ref. No.	Pc.No.	Parts Name	No. Req'd
B-16-D | B-16-D1 Type			
24	523076	...STOP, Pawl	1
25	551275	...PLUG, Pipe	1
26	551274	...PLUG, Pipe	2
27	506883	...BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl	2
29	18469	.SPRING, Pawl	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl	1
32	541677	.RATCHET NUT, Assembly	1
33	523417	..PLUG, Stop	1
34	70985	.SPRING, Ratchet Nut	1
35	511983	.GASKET, Body	1
36	536583	.O-RING, 2-1/8 in. O.D.	1
37	541643	.NUT, Adj. Screw	1
38	501953	.CAP, Crosshead Pin	1
39	501952	.PIN, Crosshead	1
40	502033	.ADJUSTER SCREW, Assembly	1
41	5668	..RIVET, Crosshead	1
42	502037	..SCREW, Adjuster	1
43	502240	512764 .BODY, Adjuster	1
	506714	WASHER, Body	1
	92309	NUT, Hex.	2
	512398	PLUG, Hole	5
	538165	BOLT, H.Hd.	2

"B" TYPE AUTOMATIC SLACK ADJUSTERS (Small Engine)

Ref. No.	Pc.No.	Parts Name	No. Req'd
B-210-D Type			
	544122	AUTOMATIC SLACK ADJUSTER, ASY.	
1	26809	.NUT, Hex., 7/16 in.	3
2	78490	.WASHER, Lock, 7/16 in.	3
3	553372	.SCREW, T.Hd., 7/16 x 1-3/4 in.	3
4	512471	.RING, Retainer	1
5	512472	.RETAINER, Felt	1
6	512470	.FELT, Ratchet Nut	1
7	516746	.ENGINE, Assembly	1
8	15784	.SCREW, Cap, H.Hd., 3/8 x 1-3/8 in.	4
9	17173	.WASHER, Lock, 3/8 in.	4
10	511394	.CYLINDER, Assembly	1
11	551274	.PLUG, Pipe	2
12	506880	.SPRING, Piston	1
13	508946	.PISTON and PAWL, Assembly	1
14	503925	.PIN, Pawl	1
15	506852	.PAWL	1
16	565421	.SPRING, Pawl	1
17	501863	.CUP, Packing	1
18	505016	.LUBRICATOR, Assembly.	1
19	527978	.SWAB	1
20	508092	.PISTON	1
21	523075	.GASKET, Cylinder	1
22	511393	.CASING, Assembly	1
23	25521	.SCREW, Fl. Hd., .164 x 1/2 in.	2
24	523076	.STOP, Pawl	1
25	551275	.PLUG, Pipe	1
26	551274	.PLUG, Pipe	2
27	506883	.BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl	2
29	18469	.SPRING, Pawl	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl	1
32	541678	.RATCHET NUT, Asy.	1
33	523417	.PLUG, Stop	1
34	70985	.SPRING, Ratchet Nut	1
35	511983	.GASKET, Body	1
36	536583	.O-RING, 2-1/8 in. O.D.	1
37	541642	.NUT, Adj. Screw	1
38	501894	.CAP, Crosshead Pin	1
39	501893	.PIN, Crosshead	1
40	502361	.ADJUSTER SCREW, Assembly	1
41	501886	.RIVET, Crosshead	1
42	501887	.SCREW, Adjuster	1
43	543786	.BODY, Adjuster	1
	92309	.NUT	4
	538165	.BOLT	2
	512398	.PLUG, Hole.	1

Ref. No.	Pc.No.	Parts Name	No. Req'd
B-410-D1 Type			
	548500	AUTOMATIC SLACK ADJUSTER, ASY.	
1	26809	.NUT, Hex., 7/16 in.	3
2	78490	.WASHER, Lock, 7/16 in.	3
3	553372	.SCREW, T. Hd., 7/16 x 1-3/4 in.	3
4	512471	.RING, Retainer	1
5	512472	.RETAINER, Felt	1
6	512470	.FELT, Ratchet Nut	1
7	516746	.ENGINE, Assembly	1
8	15784	.SCREW, Cap, H.Hd., 3/8 x 1-3/8 in.	4
9	17173	.WASHER, Lock, 3/8 in.	4
10	511394	.CYLINDER, Assembly	1
11	551274	.PLUG, Pipe	2
12	506880	.SPRING, Piston, Small	1
13	508946	.PISTON and PAWL, Assembly	1
14	503925	.PIN, Pawl	1
15	506852	.PAWL	1
16	565421	.SPRING, Pawl	1
17	501863	.CUP, Packing	1
18	505016	.LUBRICATOR, Assembly.	1
19	527978	.SWAB	1
20	508092	.PISTON	1
21	523075	.GASKET, Cylinder	1
22	511393	.CASING, Assembly	1
23	25521	.SCREW, Fl. Hd., .164 x 1/2 in.	2
24	523076	.STOP, Pawl	1
25	551275	.PLUG, Pipe	1
26	551274	.PLUG, Pipe	2
27	506883	.BUSH, Ratchet Nut	1
28	506889	.PIN, Pawl	2
29	18469	.SPRING, Pawl	2
30	506888	.PAWL, Check	2
31	506887	.RING, Pawl	1
32	541678	.RATCHET NUT, Assembly	1
33	523417	.PLUG, Stop	1
34	70985	.SPRING, Ratchet Nut	1
35	511983	.GASKET, Body	1
36	536583	.O-RING, 2-1/8 in. O.D.	1
37	541642	.NUT, Adj. Screw	1
38	501379	.CAP, Crosshead Pin	1
39	501378	.PIN, Crosshead	1
40	518786	.ADJUSTER SCREW, Assembly	1
41	501368	.RIVET, Crosshead	1
42	501887	.SCREW, Adjuster	1
43	519185	.BODY, Adjuster	1
	547786	.BOLT.	2
	8183	.NUT	4
	512398	.HOLE, Plug, Bolt	1

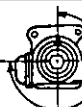
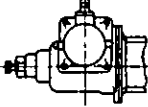
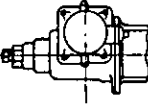
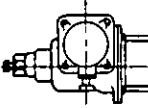
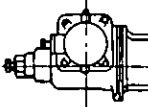
PARTIAL VIEW SHOWING CROSSHEAD
STOP BOLT AND LOCK WASHER



"C" TYPE AUTOMATIC SLACK ADJUSTERS (Small Engine)

Ref. No.	Pc.No.	Parts Name	No. Req'd
C-15-D	C-15-D1	C-16-D	Type
548457	560670	548439	AUTOMATIC SLACK ADJUSTER, ASSEMBLY
1	26809		.NUT, Hex., 7/16 in. 3
2	78490		.WASHER, Lock, 7/16 in. 3
3	553372		.SCREW, T. Hd., 7/16 x 1-3/4 in. 3
4	512471		.RING, Retainer 1
5	512472		.RETAINER, Felt 1
6	512470		.FELT, Ratchet Nut 1
7	508091		.ENGINE, Assembly. 1
8	15784		.SCREW, Cap, H.Hd., 3/8 x 1-3/8 in. 4
9	17173		.WASHER, Lock, 3/8 in. 4
10	511394		.CYLINDER, Assembly 1
11	551274		.PLUG, Pipe 2
12	515272		.SPRING, Piston 1
13	508946		.PISTON and PAWL, Assembly 1
14	503925		.PIN, Pawl 1
15	506852		.PAWL 1
16	565421		.SPRING, Pawl 1
17	501863		.CUP, Packing 1
18	505016		.LUBRICATOR, Assembly 1
19	527978		.SWAB 1
20	508092		.PISTON 1
21	523075		.GASKET, Cylinder. 1
22	511393		.CASING, Assembly 1
23	25521		.SCREW, Fil. Hd., .164 x 1/2 in. 2
24	523076		.STOP, Pawl 1
25	551275		.PLUG, Pipe 1

Ref. No.	Pc.No.			Parts Name	No. Req'd
	C-15-D	C-15-D1	C-16-D	Type	
26		551274		...PLUG, Pipe	2
27		506883		...BUSH, Ratchet Nut	1
28		506889		.PIN, Pawl	2
29		18469		.SPRING, Pawl	2
30		506888		.PAWL, Check	2
31		506887		.RING, Pawl	1
32		541677		.RATCHET NUT, Assembly	1
33		523417		..PLUG, Stop	1
34		70985		.SPRING, Ratchet Nut	1
35		511983		.GASKET, Body	1
36		536583		.O-RING, 2-1/8 in. O.D.	1
37		541643		.NUT, Adjuster Screw	1
38	501953	501953	504011	.CAP, Crosshead Pin	1
39	501952	501952	509689	.PIN, Crosshead	1
40	502033	502033	544110	.ADJUSTER SCREW, Assembly	1
41		5668		..RIVET, Crosshead.	1
42	502037	502037	544109	..SCREW, Adjuster	1
43	533000	560672	509051	.BODY, Adjuster	1
43A		512398		..PLUG, Hole	5
43B		504509		..NUT, Hex., 7/16 in.	2
43C		510467		..BOLT, H.Hd., 7/16 in.	2
43D		78490		..WASHER, 7/16 in.	2

STANDARD SLACK ADJUSTER - ENGINE ROTATION (LAST THREE DIGITS)									
									
	-000	045	090	135	180	225	270	315	
CYLINDER PIPE CONNECTION (1 st DIGIT)		-1000	-1045	-1090	-1135	-1180	-1225	-1270	-1315
		-2000	-2045	-2090	-2135	-2180	-2225	-2270	-2315
		-3000	-3045	-3090	-3135	-3180	-3225	-3270	-3315
		-4000	-4045	-4090	-4135	-4180	-4225	-4270	-4315

Note 1. All Complete Slack Adjuster Piece Numbers Require A Double Coding : One To Denote The Four Different Positions Of The Cylinder Cap Pipe Connection, And One To Denote The Position Of The Slack Adjuster Engine. A Four Digit (-0000) Suffix Divided Into A Single And Triple Digit Code Will Serve This Purpose

Note 2. Bolting Flange Of Cylinder And Casing Arranged For Four Bolts Permit Turning Of Cylinder For Choice Of Four Positions Of Pipe Connection Shown As (1), (2), (3), Or (4). These Numerals Are Used As The First Digit In The Suffix After The Basic Piece Number.

Note 3. The Standard Adjuster Bodies Have Eight Drilled Mounting Holes Located 45° Apart, Permitting Engine Location In 45° Increments In Clockwise Rotation From Normal Top Vertical Position Shown As (000), (045), (090), (135), (180), (225), (270), Or (315). These Numerals Are Used As The Last Three Digits (Following Those Mentioned In Note 2) Of The Four Digit Suffix After The Basic Piece Number. The Last Three Digits Will Therefore Indicate The Exact Angular Location Of The Engine.

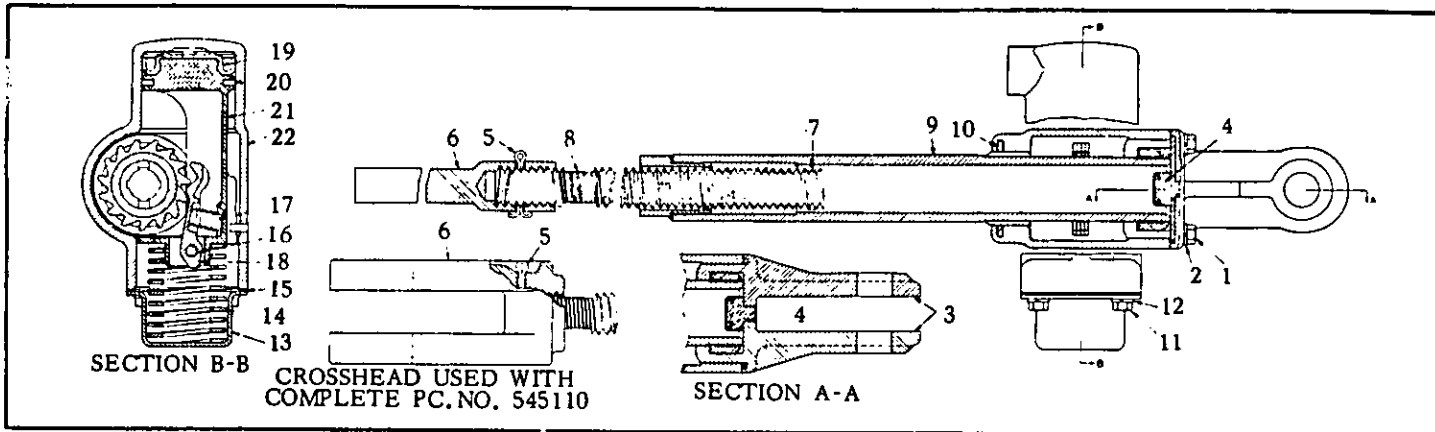


"C" TYPE AUTOMATIC SLACK ADJUSTERS (Small Engine)

Ref. No.	Pc.No.	Parts Name	No. Req'd
C-26-D Type			
	548441	AUTOMATIC SLACK ADJUSTER, ASY.	
1	26809	..NUT, Hex., 7/16 in.	3
2	78490	..WASHER, Lock, 7/16 in.	3
3	553372	..SCREW, T.Hd., 7/16 x 1-3/4 in.	3
4	512471	..RING, Retainer	1
5	512472	..RETAINER, Felt	1
6	512470	..FELT, Ratchet Nut	1
7	508091	..ENGINE, Assembly	1
8	15784	..SCREW, Cap, H.Hd., 3/8 x 1-3/8 in.	4
9	17173	..WASHER, Lock, 3/8 in.	4
10	511394	..CYLINDER, Assembly	1
11	551274	..PLUG, Pipe	2
12	515272	..SPRING, Piston	1
13	508946	..PISTON and PAWL, Assembly	1
14	503925	..PIN, Pawl.	1
15	506852	..PAWL	1
16	565421	..SPRING, Pawl.	1
17	501863	..CUP, Packing	1
18	505016	..LUBRICATOR, Assembly.	1
19	527978	..SWAB	1
20	508092	..PISTON	1
21	523075	..GASKET, Cylinder	1
22	511393	..CASING, Assembly.	1
23	25521	..SCREW, Fl.Hd., .164 x 1/2 in.	2
24	523076	..STOP, Pawl.	1
25	551275	..PLUG, Pipe	1
26	551274	..PLUG, Pipe	2
27	506883	..BUSH, Ratchet Nut.	1
28	506889	..PIN, Pawl.	2
29	18469	..SPRING, Pawl.	2
30	506888	..PAWL, Check	2
31	506887	..RING, Pawl.	1
32	541680	..RATCHET NUT, Assembly.	1
33	523417	..PLUG, Stop	1
34	70985	..SPRING, Ratchet Nut.	1
35	511983	..GASKET, Body	1
36	536583	..O-RING, 2-1/8 in. O.D.	1
37	541642	..NUT, Adj. Screw	1
38	504011	..CAP, Crosshead Pin	1
39	509693	..PIN, Crosshead	1
40	503457	..ADJUSTER SCREW, Assembly	1
41	501886	..RIVET, Crosshead	1
42	502631	..SCREW, Adjuster	1
43	509051	..BODY, Adjuster	1
44	504509	..NUT, H.Hd.	2
45	510467	..BOLT, Hex. Hd.	2
46	78490	..WASHER, Body	2
47	512398	..PLUG, Hole	5

Ref. No.	Pc.No.	Parts Name	No. Req'd
C-26-D3 | C-36-D Type			
	548451	548450 AUTOMATIC SLACK ADJUSTER, ASSEMBLY	
1	26809	..NUT, Hex., 7/16 in.	3
2	28490	..WASHER, Lock, 7/16 in.	3
3	553372	..SCREW, T.Hd., 7/16 x 1-3/4 in.	3
4	512471	..RING, Retaining.	1
5	512472	..RETAINER, Felt	1
6	512470	..FELT, Ratchet Nut	1
7	508091	..ENGINE, Assembly	1
8	15784	..SCREW, Cap, H.Hd., 3/8 x 1-3/8 in.	4
9	17173	..WASHER, Lock, 3/8 in.	4
10	511394	..CYLINDER, Assembly	1
11	551274	..PLUG, Pipe	2
12	515272	..SPRING, Piston	1
13	508946	..PISTON and PAWL, Asy.	1
14	503925	..PIN, Pawl.	1
15	506852	..PAWL	1
16	565421	..SPRING, Pawl.	1
17	501863	..CUP, Packing	1
18	505016	..LUBRICATOR, Assembly.	1
19	527978	..SWAB	1
20	508092	..PISTON	1
21	523075	..GASKET, Cylinder	1
22	511393	..CASING, Assembly.	1
23	25521	..SCREW, Fl.Hd., .164 x 1/2 in.	2
24	523076	..STOP, Pawl.	1
25	551275	..PLUG, Pipe	1
26	551274	..PLUG, Pipe	2
27	506883	..BUSH, Ratchet Nut.	1
28	506889	..PIN, Pawl.	2
29	18469	..SPRING, Pawl.	2
30	506888	..PAWL, Check	2
31	506887	..RING, Pawl.	1
32	541680	..RATCHET NUT, Asy.	1
33	523417	..PLUG, Stop	1
34	70985	..SPRING, Ratchet Nut	1
35	511983	..GASKET, Body	1
36	536583	..O-RING, 2-1/8 in. O.D.	1
37	541642	..NUT, Adj. Screw	1
38	504011	..CAP, Crosshead Pin	1
39	509693	..PIN, Crosshead	1
40	510568	..ADJUSTER SCREW, Asy.	1
41	501886	..RIVET, Crosshead	1
42	509688	..SCREW, Adjuster	1
43	512709	..BODY, Adjuster	1
43A	504509	..NUT, H.Hd.	2
43B	78490	..WASHER, Lock	2
43C	510467	..BOLT, H.Hd.	2
43D	512398	..PLUG, Hole	5

NOTE: Part of Body Ref. No. 43.



"D" TYPE AUTOMATIC SLACK ADJUSTERS

Assembly Piece Numbers and Variable Details

Ref. No.	Pc. No.		Parts Name					No. Req'd
	D-112-D	D-112-D1	D-212-D1					Type
	533396	545110	555268	559979	562723	562762	573746	ASSEMBLY
3	533479	533479	561737	561737	536317	536317	536317	.BRACKET, Lever 2
5	540587	538662	540587	540587	540587	.....	540587	.COTTER 1
6	533475	.....	.....	561738	561738	.....	573747	.ADAPTER, Adj. Screw 1
6	.....	545115	561740	.....	.....	555282	.....	.CROSSHEAD 1

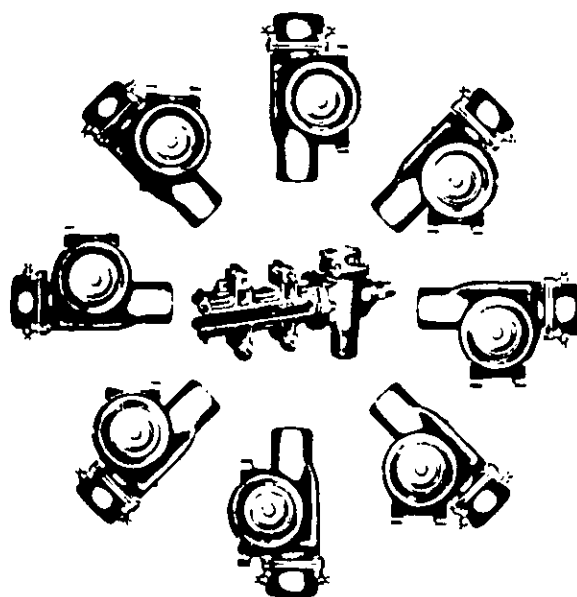
Ref. No.	Pc. No.			Parts Name		No. Req'd
	D-212-D	D-312-D	D-312-D1	D-412-D1	Type	
	536199	542962	552201	543333	ASSEMBLY	
3	561737	542133	542133	543809	.BRACKET, Lever	2
5	540587	540587	540587	545161	.COTTER	1
6	536198	542129	561739	.....	.ADAPTER, Adj. Screw	1
6	.....	.....	.....	561735	.CROSSHEAD	1

Common Details

Ref. No.	Pc. No.	Parts Name	No. Req'd	Ref. No.	Pc. No.	Parts Name	No. Req'd
1	562052	.SCREW, Cap, H.Hd., 3/8 x 1 in.	4	11	24286	.SCREW, Cap, H.Hd.	4
2	506603	.WASHER, Lock, 3/8 in.	4	12	17173	.WASHER, Lock	4
3	@	.BRACKET, Lever	2	13	533480	.COVER, Spring	1
4	532698	.STOP, Adjuster Screw	1	14	533464	.SPRING, Piston	1
5	@	.COTTER	1	15	533481	.GASKET, Cover	1
6	@	.ADAPTER, Adjuster Screw	1	16	533463	.PIN, Pawl	1
	533465	.ADJUSTER SCREW NUT, Asy.	1	17	88952	.SPRING, Pawl	1
7	540586	.PIN, Screw	1	18	533462	.PAWL	1
8	533474	.SCREW, Adjuster	1	19	543205	.CUP, Packing	1
9	559203	.NUT, Adjuster Screw	1	20	543211	.SWAB, Lubricator	1
10	533476	.RING, Felt	1	21	533461	.PISTON	1
				22	558872	.BODY, Adjuster, (3/8 in. Flange)	1

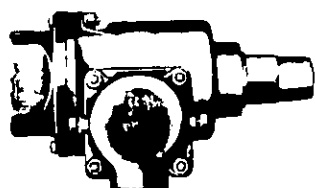
Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

VIEWS SHOWING THE EIGHT STANDARD 45° MOUNTING LOCATIONS OF THE ENGINE PORTION

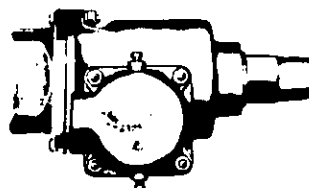


The standard adjuster bodies have eight drilled mounting holes located 45 degrees apart. This provides for eight standard mounting locations in 45 degree increments from the normal vertical position.

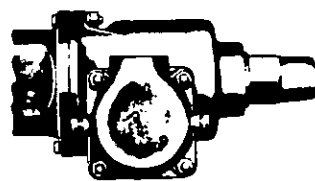
VIEWS SHOWING THE FOUR OPTIONAL POSITIONS OF THE AIR CONNECTIONS



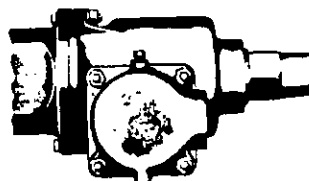
POSITION 1



POSITION 2



POSITION 3



POSITION 4



WESTINGHOUSE AIR BRAKE DIVISION
WILMERDING PA / Westinghouse Air Brake Company



WABCO TFM DISC BRAKES

SERVICE MANUAL

AND

PARTS CATALOG

Westinghouse Air Brake Division

WESTINGHOUSE AIR BRAKE COMPANY / Wilmerding, Pennsylvania 15148

PREFACE

This manual is prepared for the information and guidance of Railroad personnel in the Mechanical and Stores Departments who are responsible for the maintenance of the Model TFM Disc Brake.

The manual is divided into two main parts:-

Sections 1 through 8 describes the major components, their functions and suggestions on maintenance procedures, limits of wear and repairs.

Section 9 serves as a PARTS CATALOG. This identifies all replacement parts by illustration. It gives the PARTS NUMBER and PART NAME for full ordering information.

Satisfactory performance of the TFM Disc Brake at minimum expense depends much on proper maintenance. This in turn depends upon sufficient familiarity with the construction of the various parts, their functions and maintenance.

Because the TFM Brake is applied to passenger cars subject to use in interchange service, the cars may at times require some maintenance at remote off-line terminals where personnel are less familiar with Disc Brakes than personnel of the owning Railroad. For assistance to such off-line forces the descriptions and functions of some components are more detailed than may otherwise be necessary.

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DESCRIPTION OF WABCO TFM DISC BRAKE

Briefly, the WABCO Disc Brake per axle unit consists of:

- A) Two Brake Discs securely attached, one to each wheel.
- B) The Brake Assembly composed of the Brake Frame, Fulcrum Pivot Assembly, Brake Tongs, Cylinders, Brake Heads and Brake Shoes with replaceable brake linings.

A typical installation is illustrated in Figures 1 and 2. The application of a truck frame mounted disc brake is simplified over the more conventional car frame mounting by eliminating the three-point rubber frame supports, and mounting the brake frame rigidly as an integral part of the truck frame. To provide vertical alignment of the brake shoes with the braking surfaces of the brake discs when the horizontal plane of the axle changes with respect to the truck frame due to uneven track, on curves, car roll or other truck frame tilting - the fulcrum pivot assembly is attached to the brake frame by means of a pivot pin. The floating cylinder principle and remaining features of the car frame mounted brake are retained.

SECTION - 1

BRAKE SHOE AND LINING ASSEMBLIES

Refer to Figures 6 and 7.

Each Brake Shoe and Lining Assembly is comprised of a replaceable brake lining assembly and mounted over studs on a re-usable brake shoe. The composition lining segments are bonded to a thin steel stamping. This brake lining assembly is mounted on the brake shoe over rubber pads and secured to the shoe with locking wires through the studs.

The combination of frictional materials used and the uniform unit pressures obtained by use of the resilient rubber backing makes possible high thermal capacity and long lining life.

The Brake Shoe and Lining Assembly is held in position by the stop pin at the bottom of the brake head and at the top by the self-locking spring loaded wedge type key.

A) Brake Lining Condemning Limit

Brake Lining must be replaced when thickness reaches 1/4 inch nominal. Possible damage to the brake disc and brake shoes can result if the linings are continued in service.

B) Brake Shoe and Lining Removal

1. For safety, release and cut out the air supply to the unit.
2. Using hammer, remove brake shoe key. Remove spring retainer and spring from shoe pin.
3. Remove brake shoe assembly by lifting off the shoe pin.

C) Brake Shoe and Lining Installation

It is recommended that spare Shoe and Linings be available for quick replacement when required.

Brake shoes are installed in reverse order of removal:-

1. Install brake shoe on brake head by lowering over the shoe pin.
2. Install retainer spring over pin.
3. Install spring retainer over pin and spring.
4. Drive the shoe key into the shoe pin slot until the head of the key contacts the spring retainer. Notched surface of key must be down to properly engage, and be locked by the spring retainer.

Check that the key has a tight feel, indicating that the retainer spring is under proper compression. Looseness will result in rapid wear on the key and related parts.

D) Relining Brake Shoes

For economy in maintenance, the brake shoe assembly was designed so that only the worn lining portion requires replacement.

The brake shoe may be re-used over and over again. Recommended handling in relining a brake shoe assembly is as follows:-

Stripping and Inspection

Position brake shoe assembly (with lining face up) solidly on bench to give steady bearing on back of shoe.

Cut the wires holding the lining assembly to brake shoe, then pull wires out of brake shoe studs.

Lift off and scrap the worn lining assembly. Remove the three rubber pads. Clean pads with a stiff bristle brush. Do not clean or soak the rubber pads in kerosene or any similar petroleum base

cleaner. Save the good condition pads for re-use. Scrap only the pads that may be badly torn or badly burned.

Clean brake shoe thoroughly with a wire brush and inspect. Check for flatness and excessive wear on bottom surface and hole of hanger portion and at stop pin slot. Inspect studs for looseness and wear, plus enlarged wire holes. Tighten any loose studs and when installing new studs, place studs loosely in holes in brake shoe, insert a new brake shoe wire through the holes in each pair of studs. Securely rivet over studs, using rivet set shown on sketch FIG. 8, then remove temporary stud alignment wire.

NOTE: Rivet Set, FIG. 8, has a flat relief milled on one side. This relief is needed for clearance of the punch with the shoe hanger when riveting the one stud located on the inner stud radius center and immediately below hanger portion at shoe upper end.

This tool is not sold. It may be made in the shop tool room.

Applying Lining to Brake Shoe

Fixture 8610476 and Wire Guide Keys 8610478 and 8610475 were developed to facilitate fast and easy application of brake lining assembly to the brake shoe.

To assembly lining and brake shoe:-

1. Lay brake lining face down on bench.
2. Place one rubber pad in each of three recesses, or pockets of lining steel back plate.
3. Set brake shoe on top of lining and rubber pads, inserting the eight studs of brake shoe into the matching stud holes of lining back plate.
4. Grasp above parts as a unit with both hands and turn unit over. Place on the sliding carriage of fixture. The hanger arm of brake shoe must be inserted into slot at ends of carriage - this to allow full area of shoe back to bear on carriage, also for safety, this position prevents shoe from "kicking up" when pressures are applied at the wire guide key.
5. Slide carriage with shoe along fixture base to position one of two center pair of brake shoe studs in line under fixture pressure spindle.
6. Place wire guide key 8610478 or 8610475 over studs, with wire slot on bottom and studs nested in key counterbores.

7. Screw down on handwheel just enough to permit inserting locking wire through the holes of that one pair of studs.

IMPORTANT - Compression travel of the key should be limited as specified to prevent bending of lining steel back plate which could result in loose wires. Wire size MUST be #10 gage (.135 in. plus or minus .002 in. dia.) and dead soft iron wire. If thinner wire is used, the lining will chatter on brake shoe, resulting in damaging wear on stud body, elongation of wire holes in studs, and possible breakage of lining back plate.

8. Repeat steps 5, 6 and 7 for each of remaining 3 pairs of studs.
9. Lock wires in place by hammer, bending ends of wire downward over edge of brake shoe and away from lining segments.

While the Brake Lining Assembly Fixture is recommended, at locations where only a small quantity of linings are replaced, an available press or clamping device may be adapted for this use. Wire guide keys 8610475 or 8610478 however, should be used to facilitate insertion of the locking wires.

SECTION - 2

BRAKE SHOE SPRING, SPRING RETAINER AND KEY

Because it is so important in preventing rapid wear and damage to brake shoes, brake heads, and parts of tong and carriage assemblies, in addition to fast wear on the key, spring and spring retainer, we must again emphasize - BRAKE SHOE KEY MUST BE HELD TIGHT IN SHOE PIN SLOT BY SPRING COMPRESSION.

A) Brake Shoe Spring 8604586

The nominal free height of a new spring is 1-1/32 in. Never apply a spring with free height of 29/32 in. or less. Scrap such springs and replace with a new spring.

B) Spring Retainer 8604899

Normally, wear on this part occurs only on top surface by working against the shoe key. The metal thickness at this wearing surface should be measured at points of maximum wear and when worn to 3/32 in. or thinner, the retainer should be scrapped. Replace with a new retainer.

E) Cylinder Body

1. Thoroughly clean the brake cylinder inside and outside. Using a dull round scraper remove all heavy grease and dirt. Wash in a suitable solvent, then wipe inside of cylinder clean and dry with rags.
2. Examine cylinder wall in packing cup working area for scratches, grooves or ridges.

Light scratches or small ridges may be smoothed out, using emery cloth over a rounded wood block.

Deep cut grooves, etc., may be removed by honing or on a lathe with a very light cut, no deeper than needed to just remove the sharp grooves.

Suggested limits on rebore and limits of wear are:

Nominal Cyl. - Size	Limit Last Rebore Dia.	Limit of Wear, Largest Dia.
6-1/2	6-5/8	6-11/16
7	7-1/8	7-3/16
7-1/2	7-5/8	7-11/16
8	8-1/8	8-3/16

3. Inspect tong pin bushings at cylinder ends for excessive wear or damage. Replace if required.

To remove bushings:-

- (a) Insert scrap tong pin or a bolt of suitable diameter in bushing and arc weld head to bushing flange.
- (b) Put in arbor press and apply pressure to protruding end of pin or bolt until bushing is removed.
- (c) Press out remaining bushing in conventional manner.

New bushings should be pressed in on an arbor press.

F) Cylinder Cover Assembly (Non-Pressure Head)

1. Remove felt piston rod lubricating ring. If felt ring is not worn, submerge in a tank of suitable solvent for a time sufficient to dissolve all old grease. Brushing the outer surface of the lubricating swab with an ordinary hand brush while in the solvent will aid in removing the old grease and clean the surface of grit or other foreign

substance. Hang up felt ring to allow solvent to drip out, then dry with a jet of air. Store cleaned felt swabs in clean, dry container.

2. After the felt ring is removed, scrape and wash off all old grease and dirt, then thoroughly dry the cover assembly.
3. Inspect bronze bushing - see that it is tight. Gauge I.D. of bushing - if worn to 3.65 in. or more largest diameter, remove worn bushing and replace with new bushing. To remove old bushing, first make two or three lengthwise slits thru thickness of bushing - be careful not to damage bore in aluminum cover casting. (This slitting may be done with a hack saw or a thin round nosed chisel). Then "peel" out bushing segments.

New bushing should be pressed, not hammer driven, into cover. After bushing is pressed into the cover, the bushing must be finish machined on the inside diameter to 3.604 in. - 3.607 in., finish must be very smooth to 63 Micro inch. This machining operation is required because bushing is supplied "rough bored" and undersized on inside diameter and also because it is possible to get distortion on the inside diameter when bushing is pressed in. Another precaution - when finish-machining the inside dia. of bushing, this should be concentric with diameter of counterbore for cylinder body fit in cover (should be within .005 in. total indicator reading).

G) Piston Release Spring

Thoroughly clean the spring of all dirt, grease and corrosion.

Free height of spring should be not less than 15-1/2 inches, and carry a load of 135 to 165 lbs. when compressed to a height of 8-5/8 inches.

Inspect spring for cracks and corrosion pitting of the wire - if deep corrosion pitting over a large area or any deep cracks in the spring wire, scrap the spring. If light corrosion pitting over a large area or any deep cracks in the spring wire, scrap the spring. If light corrosion pitted, and spring otherwise in service condition - apply one good coat of rust preventive or a coat of Waterproof Aluminum Enamel.

H) Spring Guide

Clean spring guide and examine for condition.

Slight wear on the guide caused by the release spring is not harmful.

If damaged or distorted, repair or scrap. If only the longitudinal welded butt joint is split - reweld with stainless steel rod. Grind weld smooth on both faces of flange. The outside diameter of cylindrical portion should be held to a nominal 4-21/32 inches.

I) Piston Assembly

Clean the piston head and hollow piston rod assembly on all exposed surfaces. In cleaning this piston assembly, do not soak or dip the assembly in solvent or similar cleaner. Care must be taken to avoid saturating the hair filter inside the hollow piston rod.

Remove any corrosion or rough surfaces from outside diameter of hollow piston rod using fine grit emery cloth. This may be done by hand or while revolving assembly in a rotating fixture.

Blow out possible air passage restriction in hair filter with a jet of air applied at all three breather ports in the hollow rod, one port at a time.

J) Assembling Cylinder

1. Wipe inside of cylinder clean and dry.
2. Coat inside surface completely with recommended brake cylinder lubricant. Refer to SECTION 8 LUBRICATION - BRAKE CYLINDERS.
3. Apply packing cup to piston by starting the cup over one edge of piston and, while holding cup in this position, work the cup into place with the hands. If the cup does not seat properly due to trapped air, the air can be removed by raising one side of the cup, using the wooden tool, and pushing cup into place with the hands.

Coat the cylinder wall bearing surface of the packing cup and outside diameter surface of piston with recommended brake cylinder lubricant.

Insert piston assembly (prepared per above) into the brake cylinder. (At this time have air inlet port of cylinder open to permit escape of air while piston is applied). Rotate and move piston slightly to check against binding of piston cylinder and to avoid later damage to packing cup.

Coat outside diameter of piston rod full length with brake cylinder lubricant. Also apply coat of brake cylinder lubricant again on exposed brake cylinder wall where previous lubricant was wiped down by packing cup in application of piston.

4. To a clean good conditioned cylinder cover assembly apply the oil saturated felt ring lubricator, a well greased cylinder cover gasket, and well greased stainless spring guide with the piston release spring.

Holding these parts as a unit, slide unit over piston rod into place against cylinder. (Do not let cylinder cover gasket kink or get out of place).

5. With these components in a clamping fixture, using the three bolts with flat washer and Elastic Stop Nut (this is a composition insert lock nut), securely bolt cylinder cover to cylinder body.

CAUTION ON BOLT TIGHTENING. Tighten the 3 bolts progressively and evenly - tighten to about 35 to 40 lbs. (420 to 480 inch pounds) torque. In some instances a very narrow gap may be noticed between the outside fits of cylinder body and cylinder cover. This outside joint is not a seal joint - the seal joint is made at the cylinder gasket face area. The gap may result from dimensional build-up of tolerances in gasket thickness and machining tolerances of cylinder cover and cylinder body. If bolts are tightened excessively, this may distort or crack bolting ears on either or both the cylinder body and cylinder cover.

6. Remove cylinder from clamping fixture after bolted together and make leakage test.

Place cylinder on a suitable fixture limiting piston stroke to about 3-3/4 in.

Leakage should not exceed 2 lbs. per minute from 50 lbs. pressure.

7. After cylinder passes leakage test, apply boot.

First, line up the tong pin holes of bushings at end of cylinder and piston so center lines of holes are parallel. Rotate piston if necessary.

Second, wipe exposed end of piston tube clean and dry of all lubricant.

Then set boot on cylinder assembly. Turn boot so the 1/16 inch vent holes are top and bottom of cylinder as cylinder will be used on the unit.

Position boot clamp on cylinder cover with the "LOK" end on bottom of cylinder. Position piston end boot clamp so the "LOK" end is on same side of cylinder as the air inlet port, or in other words farthest away from disc when cylinder is on the unit.

The clamps are 3/8 inch wide Open-End Punch-Lok.

Because of close clearances with boot walls, Punch-Lok Model P-38 Clamp-Master Locking Tool is recommended to use in making application of clamp at piston (small) end of boot.

Figure 28 illustrates the P-38 tool and how it is to be used.

Figure 27 illustrates recommended "lacing-up" of the open-end type clamps preparatory to use of P-38 tool for final tightening of clamp.

Figure 28 illustrates and instructs the use of tool P-38 in a normal manner for locking the clamp by means of hammer blow punch indentation lock. Where punching is difficult because of restricted clearance for a good, clean hammer blow (like possible obstruction by the boot wall) many users prefer an alternate method of locking the clamp and obtain better results. This alternate method omits steps 6 and 7 illustrated in Figure 28 and substitutes the following:

After desired tension is obtained by step 5:

- (a) raise Clamp-Master tool P-38 to bend clamp tail pieces at right angle
- (b) remove winder and withdraw tool part way out
- (c) clip off tail piece about 1/4" above the bend
- (d) fold the 1/4" projection down over the Lok.

The Model P-38 Clamp Master Locking Tool, also 3/8" wide open-end clamps Punch-Lok #0-332 and Punch-Lok #0-358, may be purchased from:

PUNCH-LOK COMPANY
321 North Justine Street
Chicago, Illinois 60607

or

through Punch-Lok distributors

Cover the air inlet boss on cylinder with masking tape or equivalent to prevent dirt and other foreign matter entering cylinder and prevent damage to tapped holes and gasket seat.

8. Clean air fitting thoroughly before installation on cylinder.

To insure seal between cylinder and air fitting a new gasket, Pc. 8600955, should be applied at each removal.

SECTION - 5

TONGS

The brake tongs are the same in all applications of WABCO Disc Brakes. There is a separate right hand and left hand assembly, however.

A) Tong Removal

To remove the brake tongs from a complete brake assembly on a truck with wheels in place, the following procedure is recommended:

1. Remove brake shoes and brake heads.
2. Remove hand brake lever and hand brake crank (where used).
3. Remove brake cylinder.
4. Support the brake unit by blocking (or jacking) underbridge assembly to relieve weight off fulcrum pivot pin.
5. Remove fulcrum pivot pin. To do this, remove retaining ring from end nearest cylinder, screw a 3/4 in. - 10 Thd. bolt or an old tong pin into the tapped hole of the fulcrum pivot pin then remove pivot pin by pulling on the bolt.
6. Lower the unit consisting of the fulcrum pivot assembly, the two tongs, the bridge assembly, the two bridge bolts and the bolt safety tie bar.
7. Remove the tie bar from the two bridge bolts by chipping or grinding off the welds.
8. Remove the two bridge bolts.
9. Slip the bridge assembly off tong fulcrum pins.
10. Remove tongs out of fulcrum pivot.

B) Special Warning Note

On cars using free lateral type journal boxes and having brake frames fitted with stop pin (8609697),

it is important that a flat be ground away from the edge of the fulcrum pin thrust washers, also the flange of bushing in bridge assembly and the fulcrum pin bushing in the fulcrum pivot assembly. This is required only on the surfaces adjacent to the wheel. It assures ample clearance to prevent rubbing on the wheel rim when lateral displacement comes in that direction.

The depth of flat to be ground away from each specific thrust washer and flange of bridge or fulcrum pivot bushing is shown on the brake assembly drawings. Usually, on truck frame mounted disc brakes in trucks with free lateral type boxes, the depth of grind always is:

1. 1/8 in. min. off the upper thrust washer (8605690) of tong assembly, and the tong fulcrum bushing (8605635) of fulcrum pivot assembly; also,
2. 1/4 in. min. off the lower thrust washer (8605690) of tong assembly and the bushing (8605637) of bridge assembly.

C) Installation

To install, reverse procedure used in removal after all pins and bushings are properly lubricated. Installation of fulcrum pivot pin may be made easier by first removing the retainer rubber (8606657) and its cover plate.

D) Lubrication of Tong Assembly

Lubricate all exposed surfaces of pins, bushings and thrust washers with dry lubricant (refer to Section 8). All pins and bushings should be lubricated at least once a year. Just prior to installing the fulcrum pivot pin and its bushings, carefully clean both the pin and its bushings, also remove and clean both o-rings. Apply a generous coat of #2 grease - general purpose cup grease (AAR M-917 Journal roller bearing grease is also suitable) over entire bearing surfaces of the three fulcrum pin bushings, making sure the grease reservoir or groove in fulcrum pivot bushing is well filled. Carefully apply o-rings home in their grooves of the fulcrum pivot bushing - replace any damaged or poor condition o-rings with new ones. Now install the pivot pin after coating entire surface with clean grease, and lock in place with the retaining rings.

E) Bridge Assembly

On WABCO Disc Brakes, the bridge assembly is bolted to the bottom of the fulcrum pivot assembly. Its primary function is to support and keep in pro-

per alignment the two brake tongs with all working parts attached to these tongs.

Removal and installation is covered in a previous section under heading "Tongs". In normal usage, the only wearing parts are the two flanged bushings which are pressed in the bridge body. For special clearance provision on flanges of these bushings, see "Special Warning Note" under "Tongs".

F) Fulcrum Pivot Assembly

This fulcrum pivot assembly allows for vertical rotation of the individual brake units for the purpose of keeping the braking surfaces of the discs and shoes in vertical alignment when variation takes place between the horizontal plane of the axle and the plane of the truck frame due to tilting, curves, car roll, truck unevenness, etc.

The fulcrum pivot assembly is attached to the fulcrum support of the brake frame by means of the pivot pin. To prevent this pivot assembly "bouncing" on its pivot pin and the pivot pin "bouncing" on its bushings in the frame fulcrum support, the connection is resiliently preloaded by means of a rubber retainer (8606651). Simultaneously, this retainer resiliently restricts lateral free "pendulum" movement of the brake unit about the pivot pin, and holds unit vertically centered when brakes are in released position, thus, preventing toes of shoes dragging on discs.

Two styles of fulcrum pivot assemblies are in general use:

Style #1 is used in brakes on cars with conventional non-free lateral journal boxes. This style utilizes replaceable wear plates (8604112) against which tongs bear laterally when brakes are in released position, thereby preventing shoe linings "dragging" and wearing.

Style #2 is used in brakes on cars with free-lateral journal boxes. This style does not use wear plate, 8604112. In lieu thereof, this style uses a stop pin, 8609697, which works through bushed holes in the fulcrum pivot. This arrangement permits positioning of brake linings free of disc while allowing for general lateral displacement of wheels with respect to the truck frame. In this style, overall nominal length of stop pin when new is 6-3/16 in.; when worn, below 6-1/8 in., replace with new pin. Check stop pin bushings, 8606370, for excessive wear or worked out of position - outside edge of this bushing is to be flush with outside surface of its lug on fulcrum pivot casting. After bushing is pressed in place, tack weld bushing to casting with about 1/2 in. long head at back side of lug.

Style #2 also requires grinding a 1/8 in. deep flat on flange of tong pin bushing for sufficient wheel rim clearance to accommodate full travel in the free-lateral box. This remark applies only to the 8605635 Tong Pin Bushing on Wheel Side of Fulcrum Pivot Assembly.

For both Style #1 and Style #2, following comments apply when fulcrum pivot assemblies are worked on:

1. Tong bushings, 8605635. Replace when worn excessively either in the bore or in thickness of flange. Nominal bore dia. of this bushing new is 1.510 in. Replacement is recommended when worn beyond 1-9/16 in. at its largest diameter. Bushing should also be replaced if thickness of flange is worn to 1/8 in. or thinner, or if distance from bottom of bushing flange to bottom surface of fulcrum pivot casting reaches 5-7/16 in. or more.
2. Pivot Pin Bushing, 8606648, in fulcrum pivot. Nominal inside diameter of this bushing new is 2-7/32 in. Replacement is recommended when worn to 2-5/16 in. or more at its largest diameter.

SECTION - 6

BRAKE FRAME ASSEMBLY

In truck-mounted disc brakes, the brake frame becomes an integral part of the truck frame and in normal service requires no special maintenance, except replacement of bushings, 8606602, in which the fulcrum pivot pin works (See Fig. 18).

Bushing, 8606602, is 2-1/4 inch nominal I.D. new. These should be replaced when I.D. is worn to 2-11/32 inch or more at largest I.D. When new bushings are applied, care should be taken that bushings are installed with locking ring groove at outside ends and that inside end of bushing be flush with inner faces of the fulcrum support casting. Bushings should then be tack-welded with three tack welds at outer edge of bushing to fulcrum support casting.

SECTION - 7

BRAKE DISC

Refer to Figures 25 and 26.

The Brake Disc Assembly as used is an integral unit whose braking surfaces and cooling fins are of a special grade of cast iron which is cast into a bell shaped steel back plate that has a series of keystone along its outer

periphery to more securely interlock with the cast iron portion.

New brake discs as received are fully finished ready for application, no further machining is required.

A) Scratches

It is common for the braking surfaces of the discs to become scratched in normal service. Such surface scratches are not cause for removal and will not interfere with braking. We do not recommend machining to remove such scratches.

B) Wear

There is very little wear on the disc braking surfaces. We do not recommend that discs be removed or machined for reasons of any wear that will be found in normal service.

C) Thermal Cracks

It is possible under conditions of unusual overload for a disc to be thermal cracked. In practically all cases, a thermal cracked brake disc will be preceded by abnormally rapid shoe lining wear. If this condition of rapid lining wear is noticed and corrective measures applied to the cause, it should be possible to prevent serious thermal cracks.

When they do appear, thermal cracks will usually be in small darkened clusters and will develop radially. We recommend that a disc be removed only if length of crack exceeds one-half the width of the disc braking surface.

D) Machining

We do not recommend machining brake discs to remove thermal cracks. There are two reasons for this:

1. By reducing the thickness of the braking surface, it reduces the thermal capacity of the brake. Thus more harm than good may result even though some small thermal cracks may have been removed by machining.
2. Brake discs have continued providing satisfactory service for years after thermal cracks have appeared without the cracks necessarily progressing. The important thing is to correct the condition that caused the small thermal cracks.

In unusual cases, such as a badly scored disc resulting from a missing brake shoe, the disc face may be machined by taking a thin cut to return the face to a more satisfactory surface. Under this condition, the disc face does not have to be abso-

lutely smooth as it will be smoothed ultimately by the action of the brake lining. In no case should the thickness of the disc face be made less than 7/16 inch.

E) Welding

The material of the brake disc is not suitable for satisfactory welding. Repairing a brake disc by welding is not recommended.

F) Rust Protection

While in service, discs require no attention for preventing harmful corrosion.

When new discs are shipped from source of supply, the machined surfaces are protected against rusting by a coating of paint. This paint need not be removed before placing discs in service.

After discs are once in service and are removed for handling, storage, or shipment, the disc braking surfaces should be completely coated with a rust preventive, such as a mixture of paint and oil or some proprietary product, which will not wash away but which may be wiped off easily.

Before returning coated disc to service, the coating must be carefully removed with a suitable solvent.

If preferred, the protective coating used may be aluminum paint. In such cases, this coating need not be cleaned off when discs are placed in service, but care must be taken not to coat the area of the fins between the braking surfaces of the disc.

parts - mating parts may freeze if assembled while lubricant is wet.

Several "dry type" lubricants have been used successfully over the past years. Any one of the following when applied as recommended by the manufacturer, have given satisfactory service and protection against wear and corrosion -

1. Dag Dispersion No. 35 made by Acheson Colloids Corp. of Port Huron, Michigan.
2. Graferitt No. 22462 made by Ohio Brass Co. of Mansfield, Ohio.
3. Joseph Dixon Crucible Co's. No. 1924 Graphite Paste. (This must be mixed in quantities as required for immediate use in proportions of 5 lbs. No. 1924 Graphite Paste and one quart of thinner. The thinner to be 60% naphtha and 40% carbon tetrachloride or a non-greasy carbon-tet substitute).

B) Brake Cylinders

Molytube 80-18 Grease is recommended for lubrication of the Brake Cylinders.

Obtain from:

BEL-RAY CO. INC.
Farmingdale, N. J.

SECTION - 8 LUBRICATION

A) Pins, Bushings, Thrust Washers, etc.

Dry type lubricant is recommended for all metal to metal wearing surfaces (interior of cylinder excluded) such as pins, bushings, thrust washers, etc.

These parts should be lubricated at each brake overhaul, and in addition when any of these parts are exposed for pin removal, brake head removal, brake shoe change, etc.

Surfaces to be lubricated must first be thoroughly cleaned of all dirt, corrosion, grease or oily film and must be dry. A thin coat of lubricant should be applied, making sure entire wearing surface is completely covered. Allow sufficient time for lubricant to dry fully before installing or assembling

SECTION 9 CONTENTS

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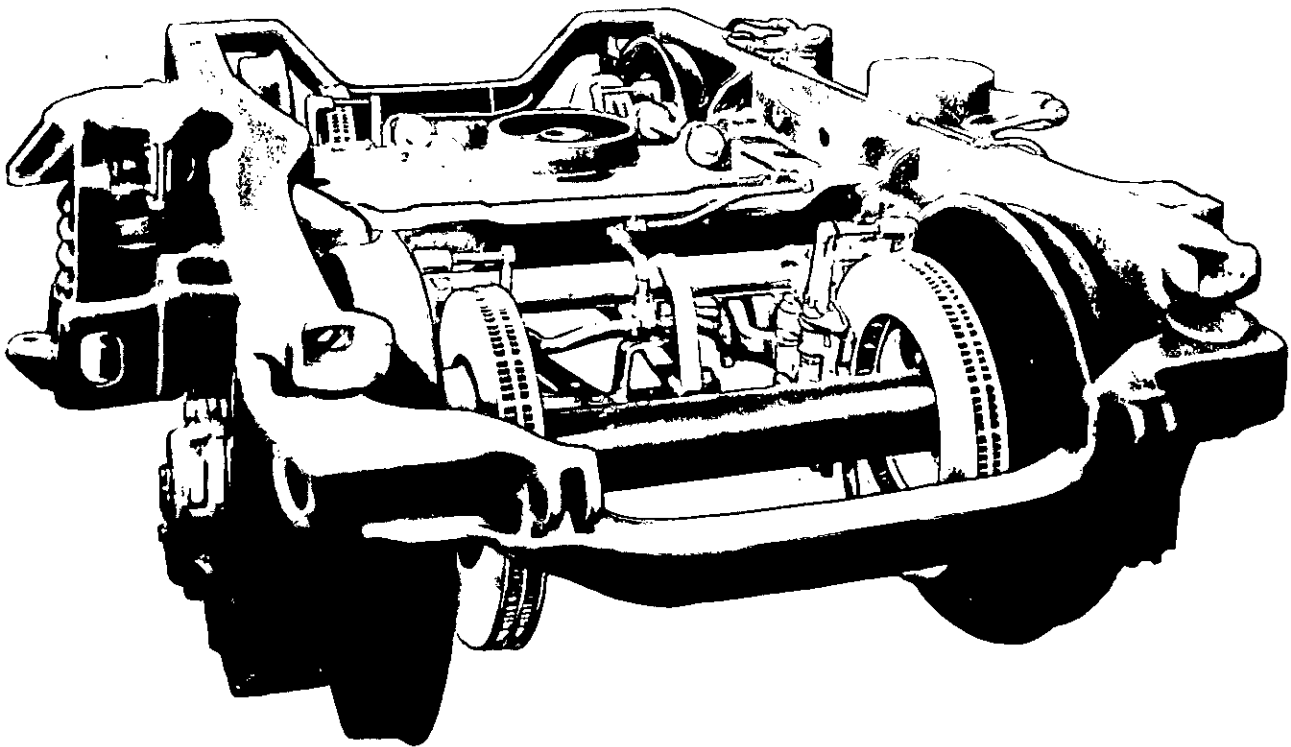


FIGURE 1

TYPICAL INSTALLATION
TRUCK FRAME MOUNTED STYLE
WABCO DISC BRAKE

Handbraked truck shown, non-handbrake installation, similar (omitting handbrake parts).

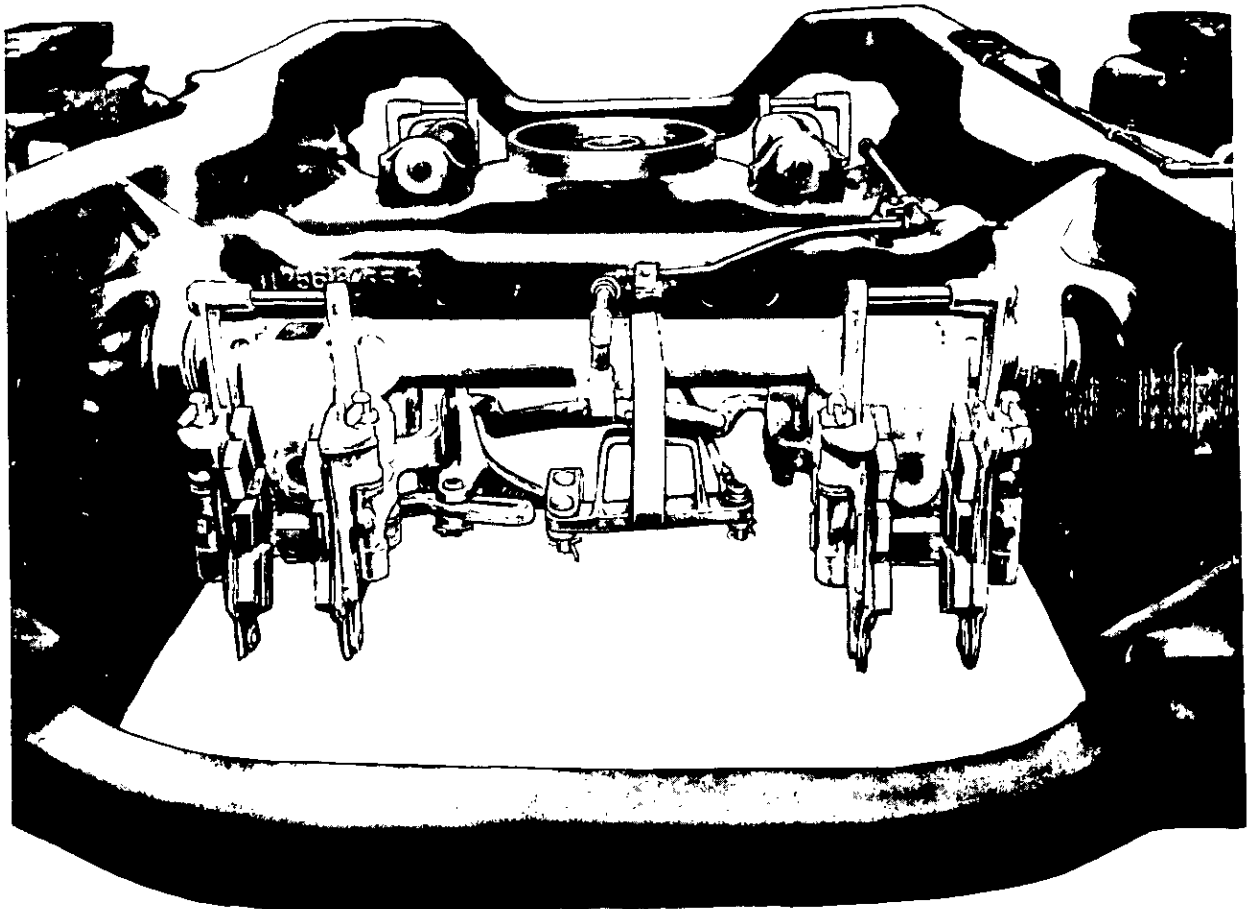


FIGURE 2

TYPICAL INSTALLATION
TRUCK FRAME MOUNTED STYLE
WABCO DISC BRAKE

Outboard end of handbraked truck (less wheels) shown.
Handbrake parts are omitted on non-handbraked truck.

MODEL TFM

TYPICAL DISC BRAKE ASSEMBLY - OUTBOARD HANDBRAKE

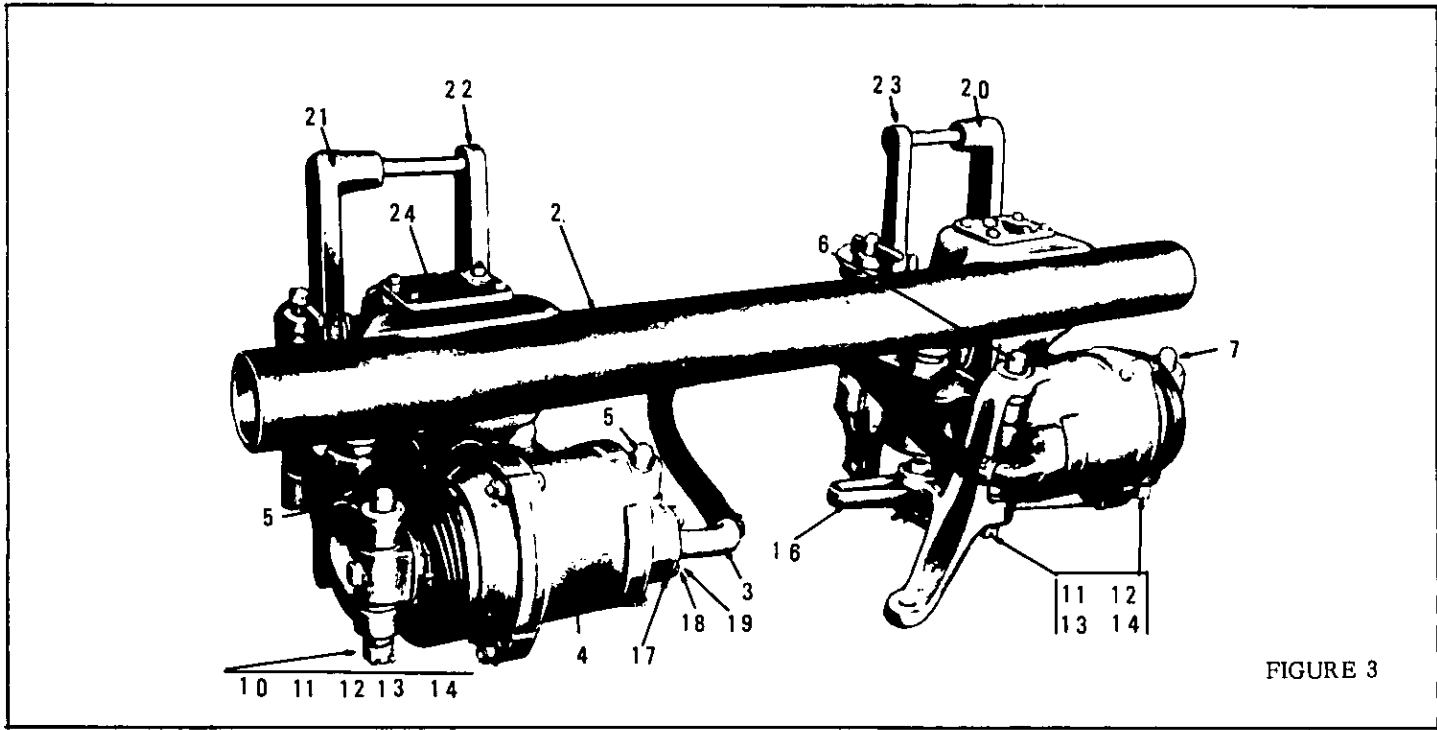


FIGURE 3

Item No.	Part No.	Part Name	Item No.	Part No.	Part Name
1	Varies	Brake Assembly Complete	13	576065	Slotted Hex Nut, 3/4-10
2	Varies	Brake Frame Assy.	14	8609550	Angle Wire (Nut Safety)
3	Varies	Air Hose Assy.	15	Varies	H.B. Crank
4	Varies	Brake Cylinder Assy.	16	8606652	H.B. Lever Assy.
5	8604173	Tong Pin-Tong at Cyl.	17	93841	Gasket (Air Hose Fitting)
6	8604191	H.B. Crank Pin at Cyl.	18	8602190	Cap Screw
7	8606654	H.B. Lever Pin at Cyl.	19	514281	Lock Washer, 1/2
8	8605691	Pin-H.B. Crank and Lever	20	8606611	Brake Head Assy. (R.H. Outside)
9	576246	Cotter, 3/8 x 2 (For Item 8)	21	8606612	Brake Head Assy. (L.H. Outside)
10	8605061	Spring Cover	22	8606613	Brake Head Assy. (R.H. Inside)
11	8605060	Spring at Tong Pin	23	8606614	Brake Head Assy. (L.H. Inside)
12	575988	Flat Washer, 3/4	24	8606603	Cover Plate, Pivot Assy.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

MODEL TFM

TYPICAL DISC BRAKE ASSEMBLY - INBOARD HANDBRAKE

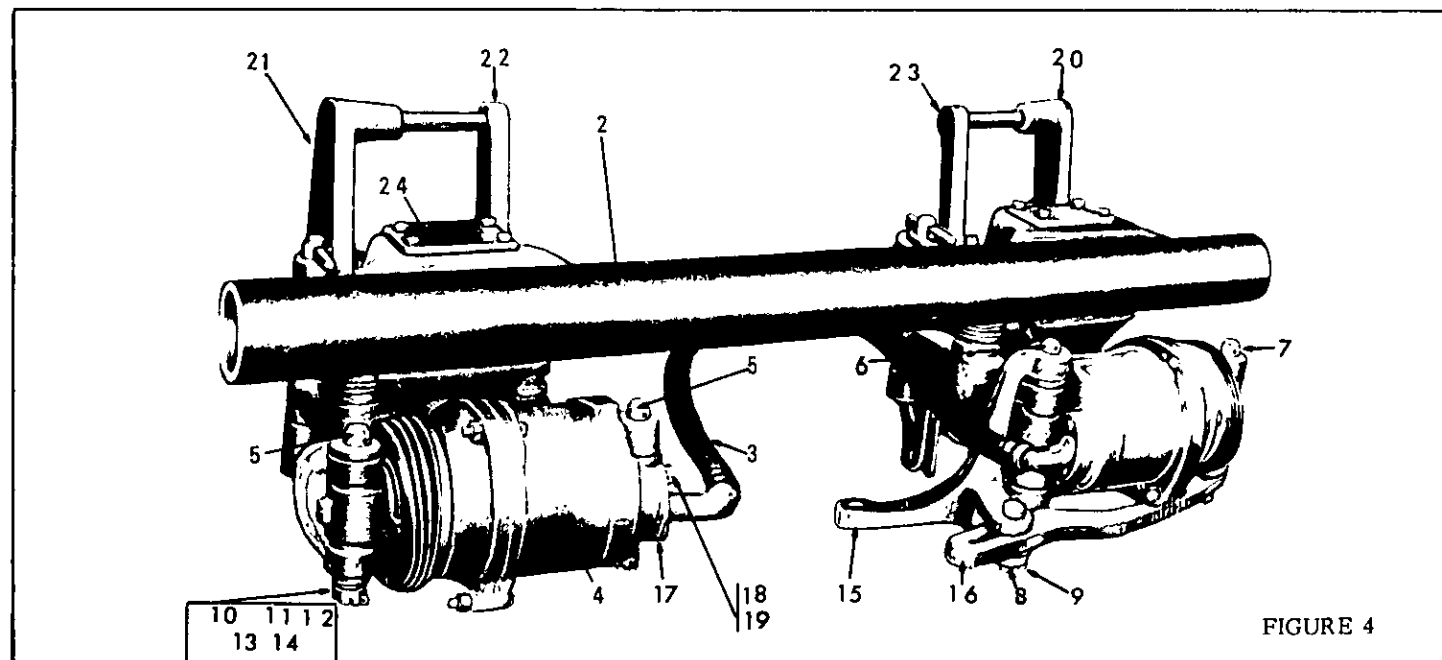


FIGURE 4

Item No.	Part No.	Part Name	Item No.	Part No.	Part Name
1	Varies	Brake Assembly Complete	13	576065	Slotted Hex Nut, 3/4-10
2	Varies	Brake Frame Assy.	14	8609550	Angle Wire (Nut Safety)
3	Varies	Air Hose Assy.	15	Varies	H.B. Crank
4	Varies	Brake Cylinder Assy.	16	8606652	H.B. Lever Assy.
5	8604173	Tong Pin-Tong at Cyl.	17	93841	Gasket (Air Hose Fitting)
6	8604191	H.B. Crank Pin at Cyl.	18	8602190	Cap Screw
7	8606654	H.B. Lever Pin at Cyl.	19	514281	Lock Washer, 1/2
8	8605691	Pin - H.B. Crank and Lever	20	8606611	Brake Head Assy. (R.H. Outside)
9	576246	Cotter, 3/8 x 2 (For Item 8)	21	8606612	Brake Head Assy. (L.H. Outside)
10	8605061	Spring Cover	22	8606613	Brake Head Assy. (R.H. Inside)
11	8605060	Spring at Tong Pin	23	8606614	Brake Head Assy. (L.H. Inside)
12	575988	Flat Washer, 3/4	24	8606603	Cover Plate, Pivot Assy.

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

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MODEL TFM

TYPICAL DISC BRAKE ASSEMBLY (Non-Handbrake)

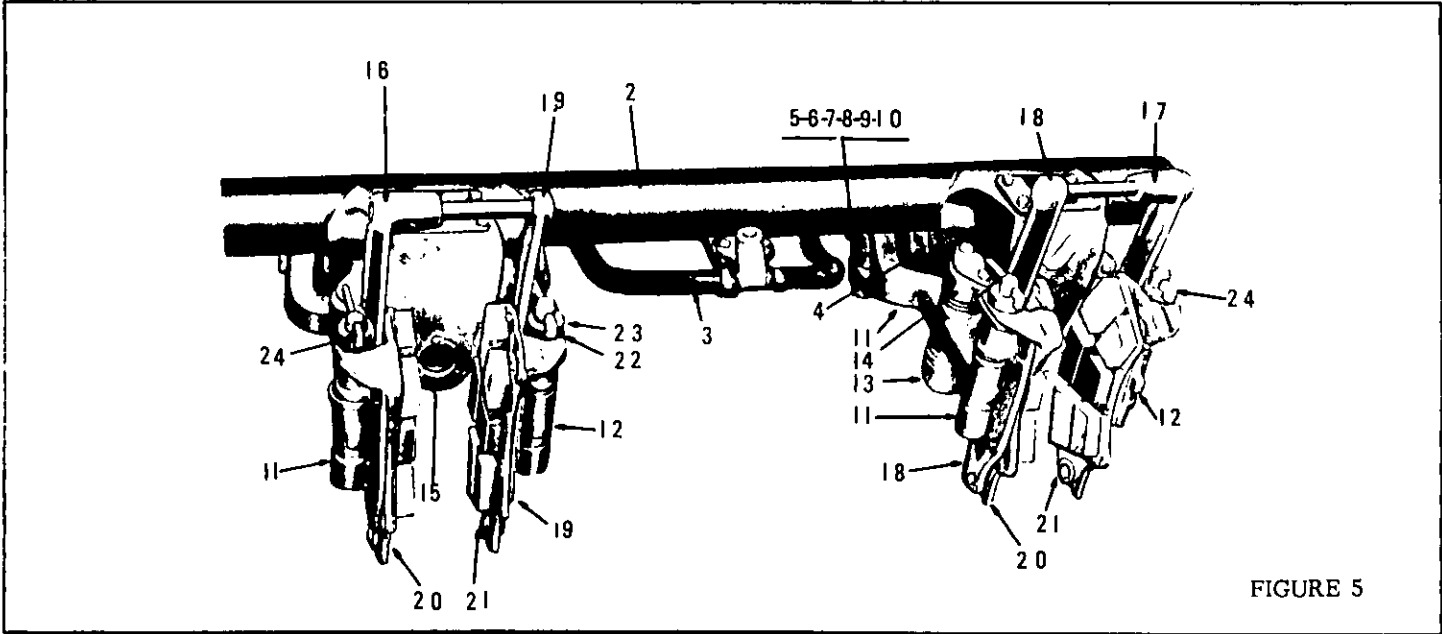
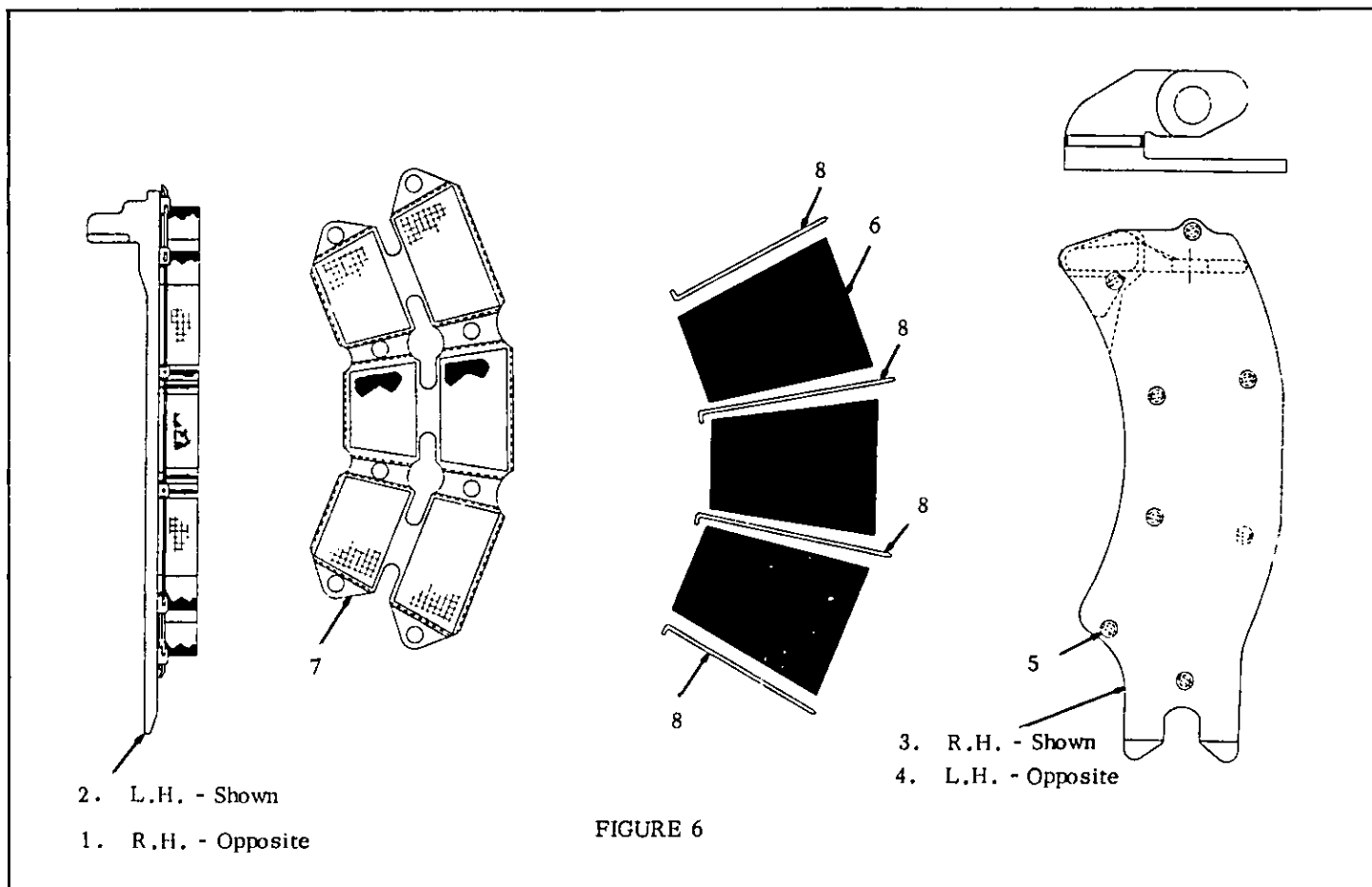


FIGURE 5

Item			Item		
No.	Part No.	Part Name	No.	Part No.	Part Name
1	Varies	Brake Assy. - Complete	13	8609324	Bridge Assembly
2	Varies	Brake Frame Assy.	14	Varies	Fulcrum Pivot Assy.
3	Varies	Air Hose Assy.	15	8606617	Fulcrum Pivot Pin
4	Varies	Brake Cylinder Assy.	16	8606611	Brake Head Assy. (R.H. Outside)
5	8604173	Tong Pin - Cyl. Both Ends	17	8606612	Brake Head Assy. (L.H. Outside)
6	8605061	Spring Cover	18	8606613	Brake Head Assy. (R.H. Inside)
7	8605060	Spring-Tong Pin	19	8606614	Brake Head Assy. (L.H. Inside)
8	575988	Flat Washer, 3/4	20	8605116	Brake Shoe & Lining Assy. (R.H.)
9	576065	Slotted Hex Nut, 3/4-10	21	8605117	Brake Shoe & Lining Assy. (L.H.)
10	8609550	Wire Angle (Nut Safety)	22	8604899	Spring Retainer - Brake Shoe
11	8605688	Tong Assembly (R.H.)	23	8604586	Spring - Brake Shoe
12	8605689	Tong Assembly (L.H.)	24	8604901	Brake Shoe Key

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

BRAKE SHOE AND LINING ASSEMBLIES



Ref. No.	24 inch M.U. All Weather	24 in. Metal Toe	24 inch Mainline	26 inch Mainline M.U. All Weather	26 in. Metal Toe	28 inch Mainline M.U.	28 in. Metal Toe	Part Name	No. Req'd
1	8611265	8612452	8612330	8605771	— —	8605116	— —	Brake Shoe & Lining Asy. R.H.	— —
2	8611266	8612453	8612331	8605770	— —	8605117	— —	Brake Shoe & Lining Asy. L.H.	— —
3	8609830	8609830	8609830	8605758	8605758	8605139	8605139	Brake Shoe & Stud Asy. R.H.	1
4	8609831	8609831	8609831	8605759	8605759	8605140	8605140	Brake Shoe & Stud Asy. L.H.	1
5	8605177	8605177	8605177	8605177	8605177	8605177	8605177	Stud	8
6	8609832	8609832	8609832	8600183	8600183	8605137	8605137	Rubber Pad	3
7	579549	579551	579548	579545	579546	579552	579544	Lining Asy.	1
8	8608990	8608990	8608990	8608990	8608990	8608990	8608990	Brake Shoe Wire	

NOTE: #10 Gage (.135 Dia.) soft iron wire, cut to required length from 10 foot length as furnished on P.C. No. 8608990.

WABCO DISC BRAKE LINING ASSEMBLIES
(Obsolete and Replacement Piece Numbers)

FIGURE 7

OBSOLETE PIECE NO.	DESCRIPTION	NEW PIECE NO.
8605134	28 inch Mainline	579552
8613021	28 inch Mainline	579552
8611900 (A)	28 inch M.U.	579552
8608869	28 inch Metal Toe	579544
8605772	26 inch Mainline	579545
8612345 (A)	26 inch M.U.	579545
8612550 (A)	26 inch All Weather	579545
8612334	26 inch Metal Toe	579546
8608800 (A)	26 inch Metal Toe	579546
8612329	24 inch Mainline	579548
8611123 (A)	24 inch Mainline	579548
8611264	24 inch M.U.	579549
8612492 (A)	24 inch All Weather	579549
8612440	24 inch M.U. Metal Toe	579551

Note:

- (A) For these obsolete piece numbers, no direct replacement piece number will be available. However, suitable substitute piece numbers are shown for the basic line of seven (7) brake lining assemblies.

HAND RIVETING SET

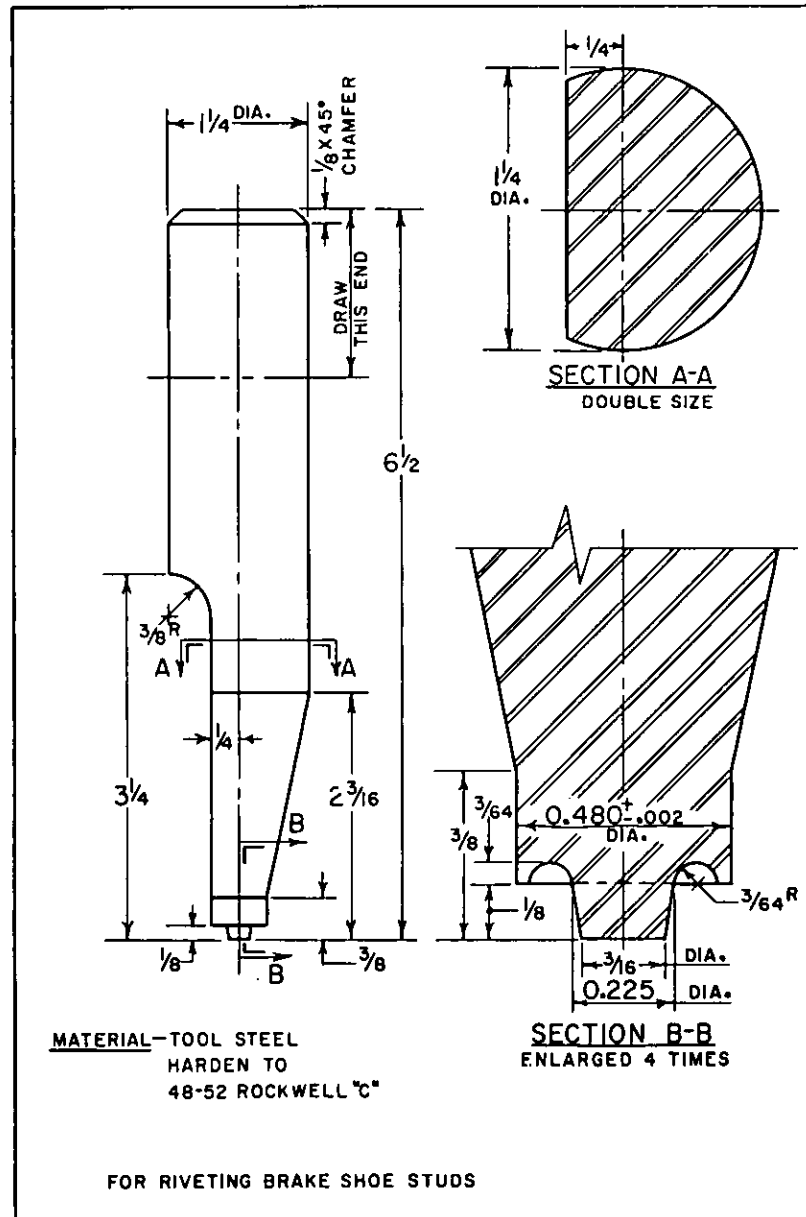
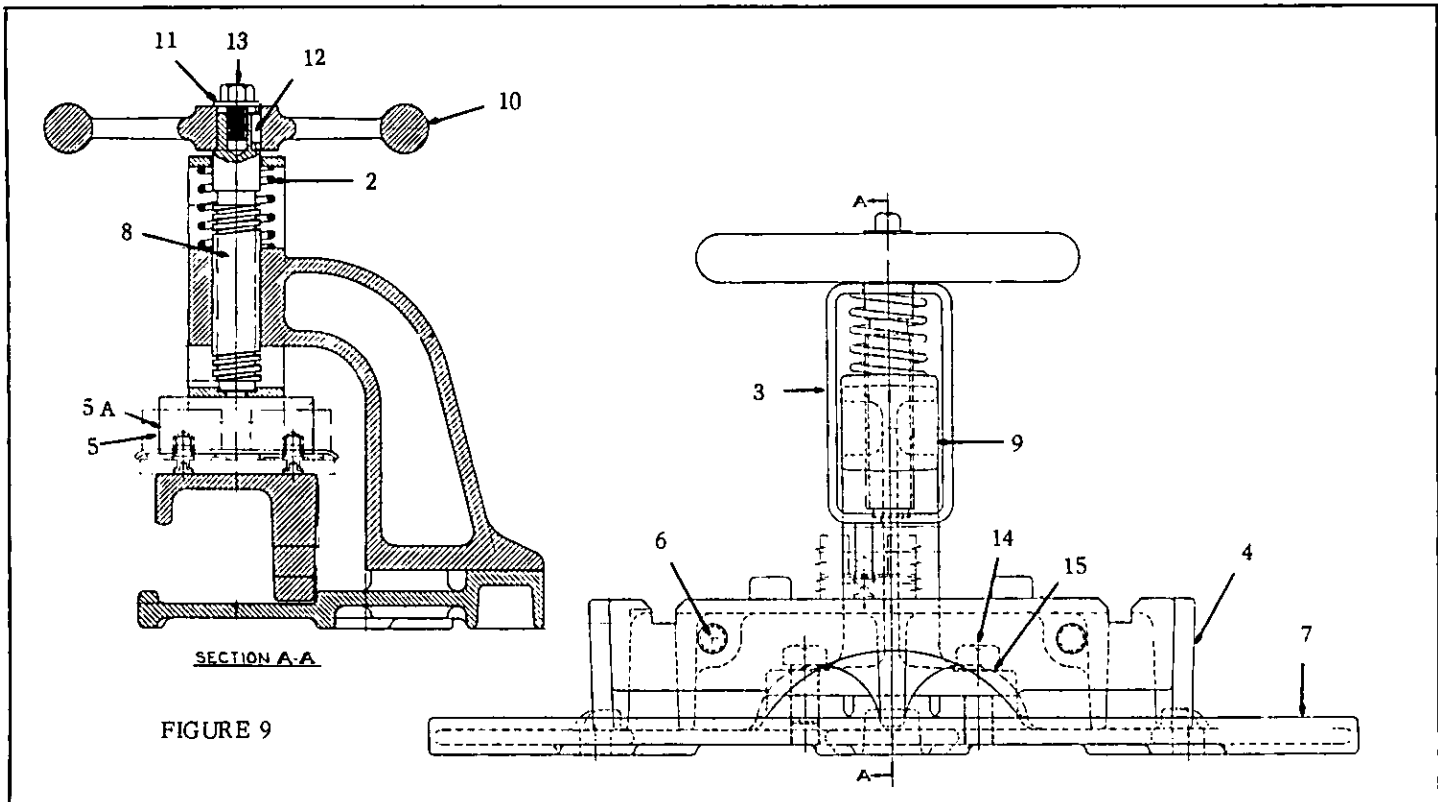


FIGURE - 8

BRAKE LINING ASSEMBLY FIXTURE



Ref.No.	Pc.No.	Parts Name	No. Req'd
	8610476	LINING ASSEMBLY FIXTURE	
2	8605627	.SPRING, Coil	1
3	8605625	.COLLAR	1
4	8610477	.CARRIAGE	1
5	8610475	.KEY, Center Stud Wire Guide .	1
5A	8610478	.KEY, End Stud Wire Guide . .	1
6	8605624	.HANDLE.	2
7	8605621	.BASE	1
8	8600194	.SPINDLE.	1
9	8606225	.FRAME	1
10	8605628	.HANDWHEEL	1
11	524387	.WASHER.	1
12	8605631	.KEY, Handwheel	1
13	5328	.BOLT, Handwheel	1
14	576052	.BOLT, Frame to Base.	2
15	514415	.WASHER, Lock	2

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

C) Brake Shoe Key 8604901

Wear on this key occurs only at portions of two surfaces, (1) on top rounded edge where key bears against top of key slot in shoe pin, and (2) on bottom flat edge face which bears against spring retainer. When measuring for effective height between the two wear surfaces, always measure between and at deepest worn spots.

Do not use a key in service that is worn to 5/8 inch or less in effective height.

SECTION - 3

BRAKE HEADS

Installation of Brake Heads on the brake tongs utilizes the tong and shoe pin for support. Brake heads are held in position by the brake shoe and lining assemblies, the retainer springs, spring retainers and the brake shoe keys.

A) Brake Head Removal

To remove brake heads, first remove the brake shoes. Lift the pair of brake heads from the shoe pins. Brake heads must be removed in pairs as the heads are interlocked by the guide pin.

Clean heads and inspect for defects. Shoe mounting surface must be straight and flat within 1/32 in. Slight straightening, if required, may be done cold in a press. Use heat forging for heavy straightening.

B) Brake Head Installation

Before installing brake heads, lubricate the following with recommended "dry" type lubricant. Refer to Section 8, Lubrication.

- a) Shoe pin shank and bushings
- b) Shoe pin head contact surface for wear plate and also wear plate
- c) Guide pins and bushings
- d) Exposed surface of tong thrust washers

Assemble the outside and inside brake heads in pairs by engaging the guide pin. The inside brake heads are R.H. and L.H.

Care must be taken that proper brake head is used at the location worked on. This is because the inside brake heads have offset guide arms to obtain maximum clearance at center sill; if wrong head is

applied, the offset would ride the brake disc when brakes are in the applied position. Also, if wrong inside brake head is used, some difficulty may be experienced in applying brake shoes.

Brake heads should be removed and wear parts lubricated at least once a year. Some railroads find it advantageous to do this each time brake shoes are changed.

C) Brake Head Repairs

To salvage brake heads that have damaged arms, replacement arms are available from WABCO. They may be applied per illustration on Figure 11. First remove damaged arm from brake head and grind head smooth. Provide suitable surface for welding on new arm assembly. Weld new arm to brake head with mild steel rod per illustration, and holding fixture to assure proper alignment of parts.

SECTION - 4

BRAKE CYLINDERS

Brake Cylinders used on WABCO disc brakes are light and compact yet rugged, to withstand with long life the amount of abuse encountered in high speed service. One cylinder is used for each disc location.

Brake cylinders are made in several sizes. The size used on each truck is in proper proportion to the weight carried by that truck. All cylinders on one truck are the same size diameter. In some cases, the trucks of a common car may have different size cylinders to obtain proper "braking ratios" without special "brake lever drilling". The same tongs, which are in effect brake levers, are used in all locations.

A) Description of Cylinder

The brake cylinder is a unit that does not breathe directly to the outside atmosphere from its non-pressure end on the brake application stroke, and does not draw in water and dirt on the release stroke. On brake application stroke, air from the non-pressure end is moved thru the ported hollow piston rod into the bellows type rubber boot, one end of which moves outward with the piston rod. On release stroke the non-pressure chamber is replenished with air from the collapsing bellows boot, and most of this air is drawn in thru the hair filter inside the ported hollow piston rod.

Sketch FIGS. 12 and 13 show a sectional illustration of the cylinders. This sketch shows the packing cup applied to the piston head and also the hollow piston rod which slides within the replaceable bronze bush-

ing that is pressed into the cylinder cover (non-pressure head). A groove in the cylinder cover holds an oil saturated felt swab ring which wipes and lubricates the piston rod. The correct application of piston release spring is also shown.

The cylinder cover is attached to the cylinder body with three bolts. A gasket seals the joint between cylinder body and cylinder cover against dirt and water.

The piston return spring is positioned with one end in piston head counterbore, the other end over a stainless steel spring guide which helps prevent spring buckling and prevents spring wearing into piston bushing boss of cylinder cover.

The bellows type boot protects the piston rod from dirt and water when cylinder is in air applied position, thus preventing corrosion of piston rod and prolongs life of the bronze bushing, also prevents dirt and water being drawn into cylinder on release stroke. A steel clamp fastens large end of boot to the cylinder cover; another steel clamp fastens the small boot end to a groove in piston rod end.

Two case hardened steel flanged bushings at outer ends of cylinder body and piston rod provide long-life vertical wear surfaces for cylinder support and bearing surfaces for the tong connection pins.

B) Cylinder Removal

To remove the Cylinder from brake unit:

1. For safety, release and cut out air supply to the brake.
2. Disconnect the air hose fitting from cylinder by removing the two cap screws.
3. Cover air inlet to prevent possible entry of water or dirt.
4. Remove the two pins which connect the cylinders to the forked end of tongs.
5. Spread tongs and remove cylinder.

C) Cylinder Installation

Before installing the cylinder, lubricate the tong pins and bushings with recommended "dry" type lubricant. Refer to Section 8 "LUBRICATION" - pins, bushings, thrust washers, etc.

1. Place cylinder between tong and align pin holes on one side. Insert tong pins and install fastener.

2. Apply tong pin to other end of cylinder. Drive pin in with hammer to move piston against return spring pressure.
3. Blow out air supply line to cylinder to remove possible dirt or moisture.
4. Connect air fitting to cylinder. Check that mating surfaces are clean and gasket is in good condition. Proper length cap screws and lockwasher must be used.
5. Apply safety wire to cap screws.

D) Cylinder Dismantling, Inspection and Overhaul

All disassembled parts must be kept clean and must be protected against damage in handling:-

1. Remove rubber boot from piston and cylinder cover.
2. Remove cylinder cover. To avoid personal injury, this should be done in a suitable holding fixture which will hold the piston return spring in compressed position, then remove the three bolts attaching cylinder cover to cylinder body. Slowly relieve clamping pressure to gradually relieve spring compression and allow cylinder cover to slide off piston and away from cylinder body.

Carefully remove gasket between cylinder body and cylinder cover. Normally this gasket is suitable for re-use. Check condition and if torn, or otherwise defective, discard.

3. Remove release spring and the stainless steel flanged guide sleeve (spring guide).
4. Remove the piston assembly with the packing cup.
5. Remove packing cup from piston head. DO NOT use chisel or other sharp tools - use a hard wood tool about 3/32 in. thick and 1 in. wide with rounded nose and edges to prevent damaging the packing cup. Clean the packing cup thoroughly, using a suitable solvent.

Examine cleaned packing cup carefully - if worn thin, cut, brittle or otherwise defective it must not be re-used. With careful handling and in normal service, packing cups give many years of continuous service.

BRAKE HEAD ASSEMBLIES

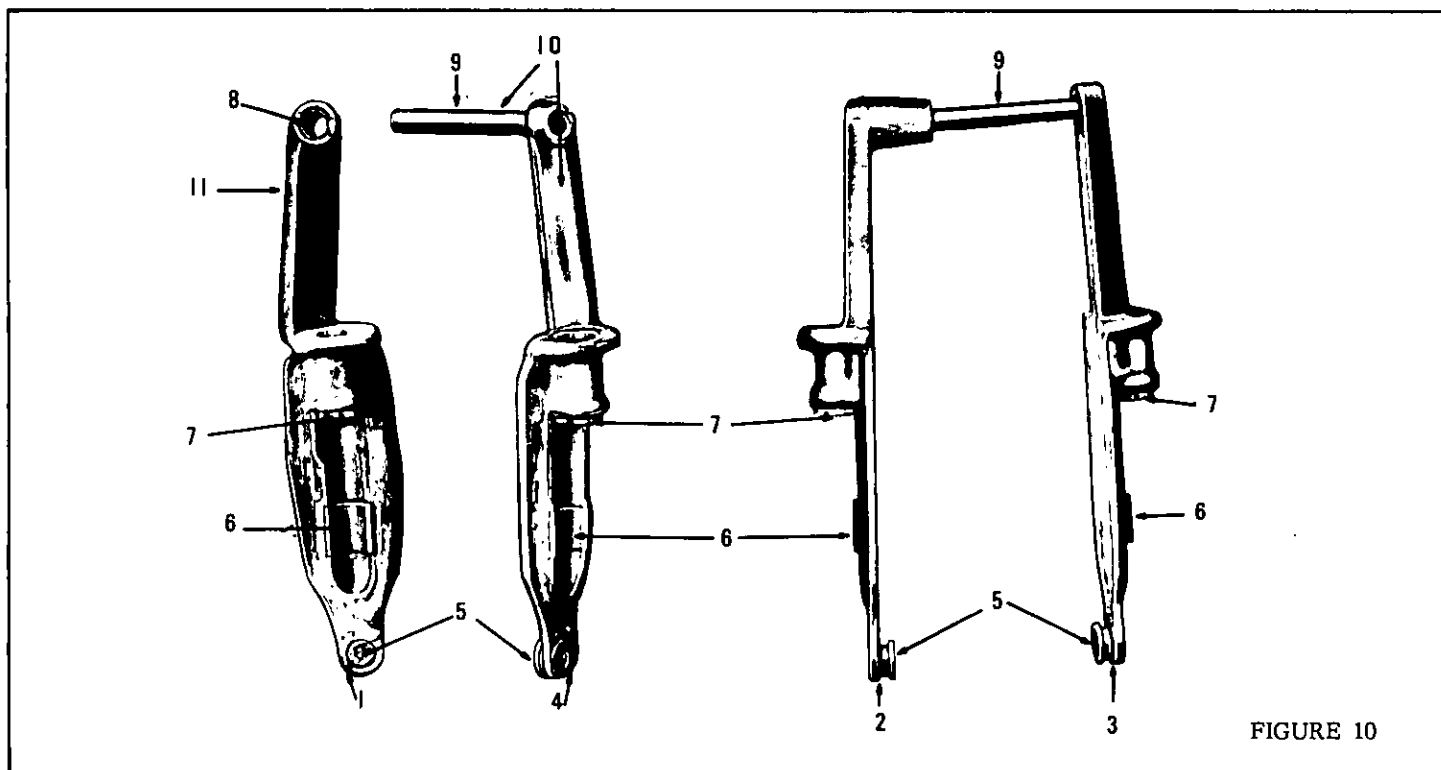
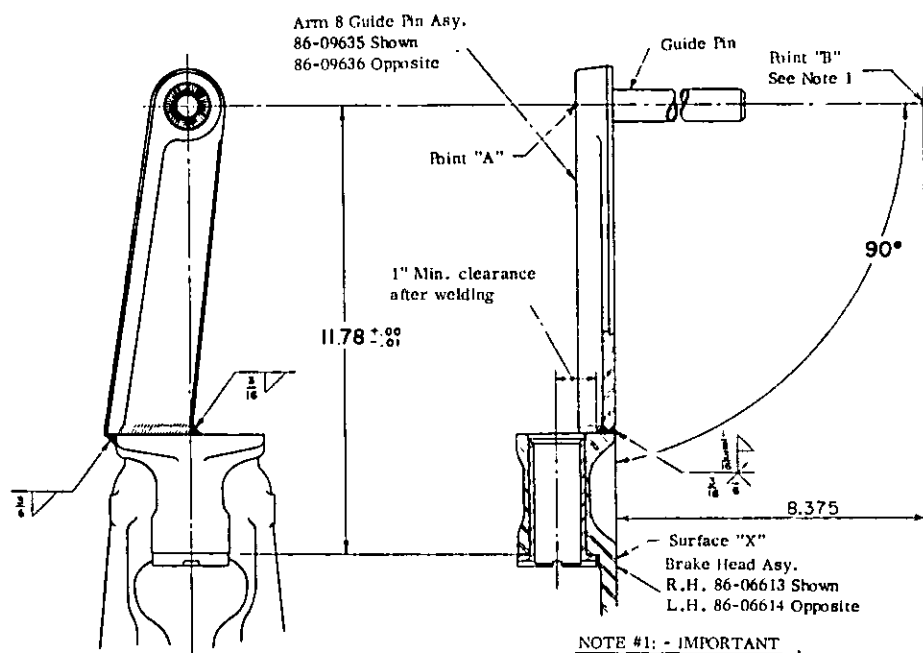


FIGURE 10

Item No.	Part No.	Part Name
1	8606611	Brake Head Asy. - Outside (R.H.)
2	8606612	Brake Head Asy. - Outside (L.H.)
3	8606613	Brake Head Asy. - Inside (R.H.)
4	8606614	Brake Head Asy. - Inside (L.H.)
5	8605114	Stop Pin
6	8604578	Wear Plate
7	8606516	Flanged Bushing (For Shoe Pin)
8	8601577	Plain Bushing (For Guide Pin)
9	8606599	Guide Pin
10	8609635	Arm & Guide Pin Asy. (R.H.)
		For Repairs
10	8609636	Arm & Guide Pin Asy. (L.H.)
		For Repairs
11	8609637	Arm Asy. (Incl. Bushings) (R.H.)
11	8609638	Arm Asy. (Incl. Bushings) (L.H.)

Prices will be quoted upon application
Orders should give **PIECE NUMBER** and **NAME** of part wanted

LONG TYPE BRAKE HEAD ASSEMBLY

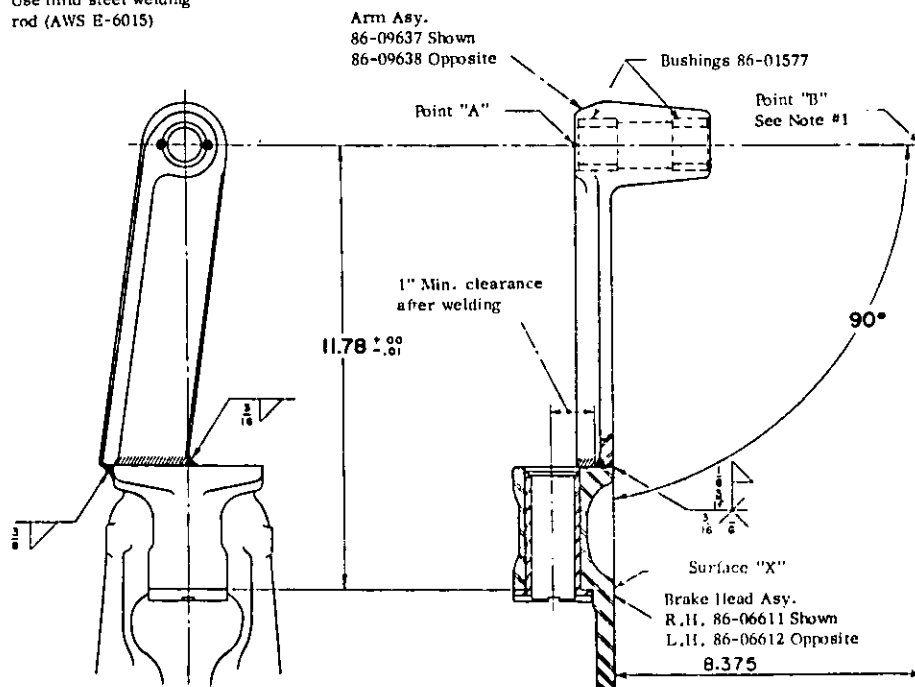


(Inside)

NOTE #1: - IMPORTANT

Point "B" of Guide Pin $\frac{1}{4}$ and point "B" of bushings 86-01577 must be within .030 of true location of point "A" with respect to perpendicularity to milled surface "X" on brake heads.

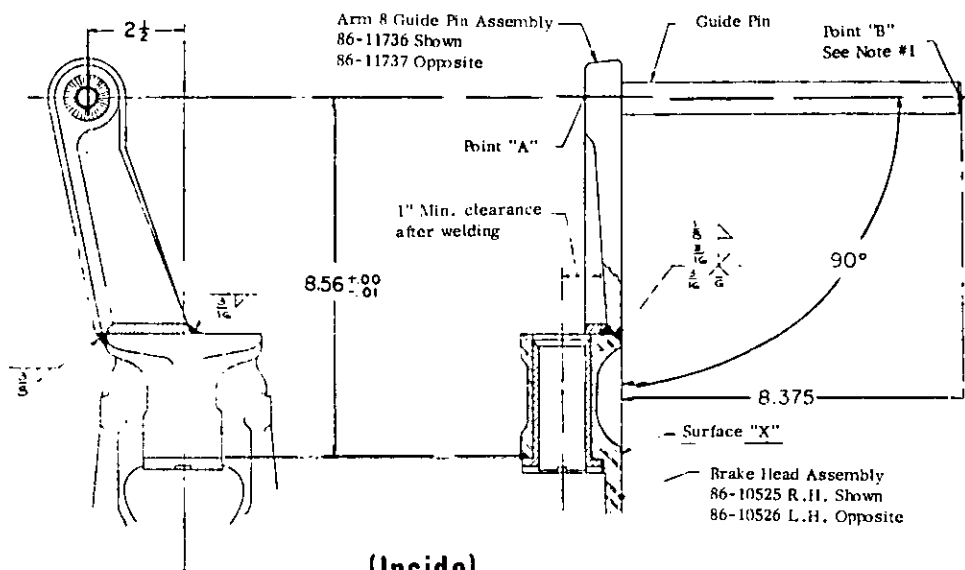
Note:
Use mild steel welding
rod (AWS E-6015)



(Outside)

FIGURE 11

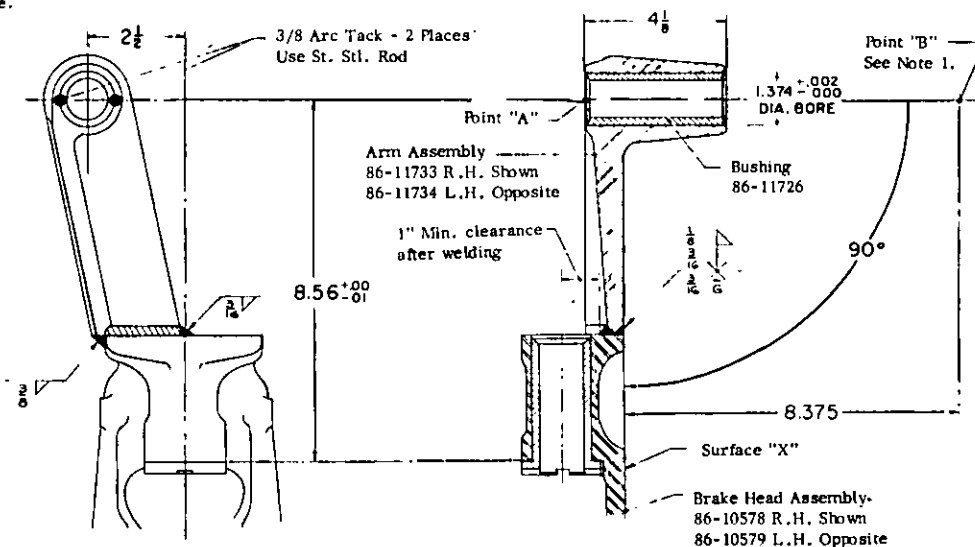
SHORT TYPE BRAKE HEAD ASSEMBLY



(Inside)

Note 1.
Point "B" of guide pin and point "B" of bushing 86-11726 must be within .030 of true location of point "A" with respect to perpendicularity to milled surface "X" on brake.

Note
Use mild steel welding rod (E-6015)



(Outside)

FIGURE 12

AIR CYLINDER ASSEMBLIES - OLD STYLE (Use with Shoulder Type Pins)

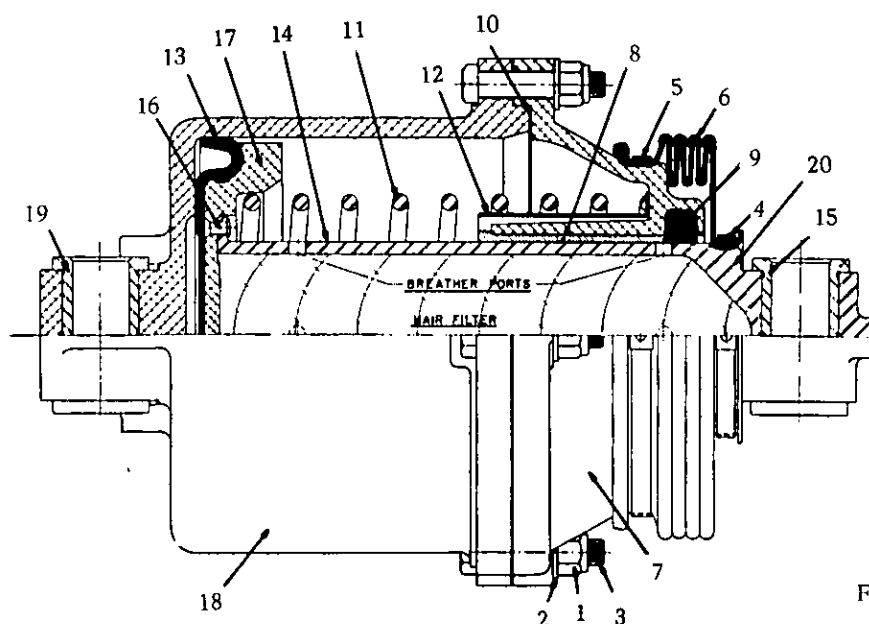


FIGURE 13

Ref.No.	Pc.No.			Parts Name	No. Req'd
	6-1/2	7	7-1/2	8	Cylinder Size - (in.)
	8605080	8605050	8605047	8608844	AIR CYLINDER, ASY.
1		575978			.NUT 3
2		524387			.WASHER 3
3		565193			.BOLT 3
4		8611983			.CLAMP, Piston End 1
5		8611984			.CLAMP, Cover End 1
6		8604186			.BOOT, Dust 1
7		8605162			.COVER, Asy. 1
8		8604181			..BUSH, Cover 1
9		8604182			.LUBRICATOR, Felt 1
10		8605157			.GASKET, Cover 1
11		8605088			.SPRING, Piston Return 1
12		8606339			.GUIDE, Spring 1
13	531244	531328	531329	549903	.CUP, Packing 1
14	8605738	8606419	8606428	8608842	.PISTON, Asy. 1
15	8604172	8604172	8604172	8604172	..BUSH. 2
16		576025			..RIVET 6
17	9705733	8606377	8606376	8608841	..HEAD, Piston 1
18	8605122	8605161	8605163	8608843	.CYLINDER BODY. 1
19	8604172	8604172	8604172	8604172	..BUSH. 2
20		8605728			..TUBE, Piston 1

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

AIR CYLINDER ASSEMBLIES NEW STYLE (Use with Straight Pins)

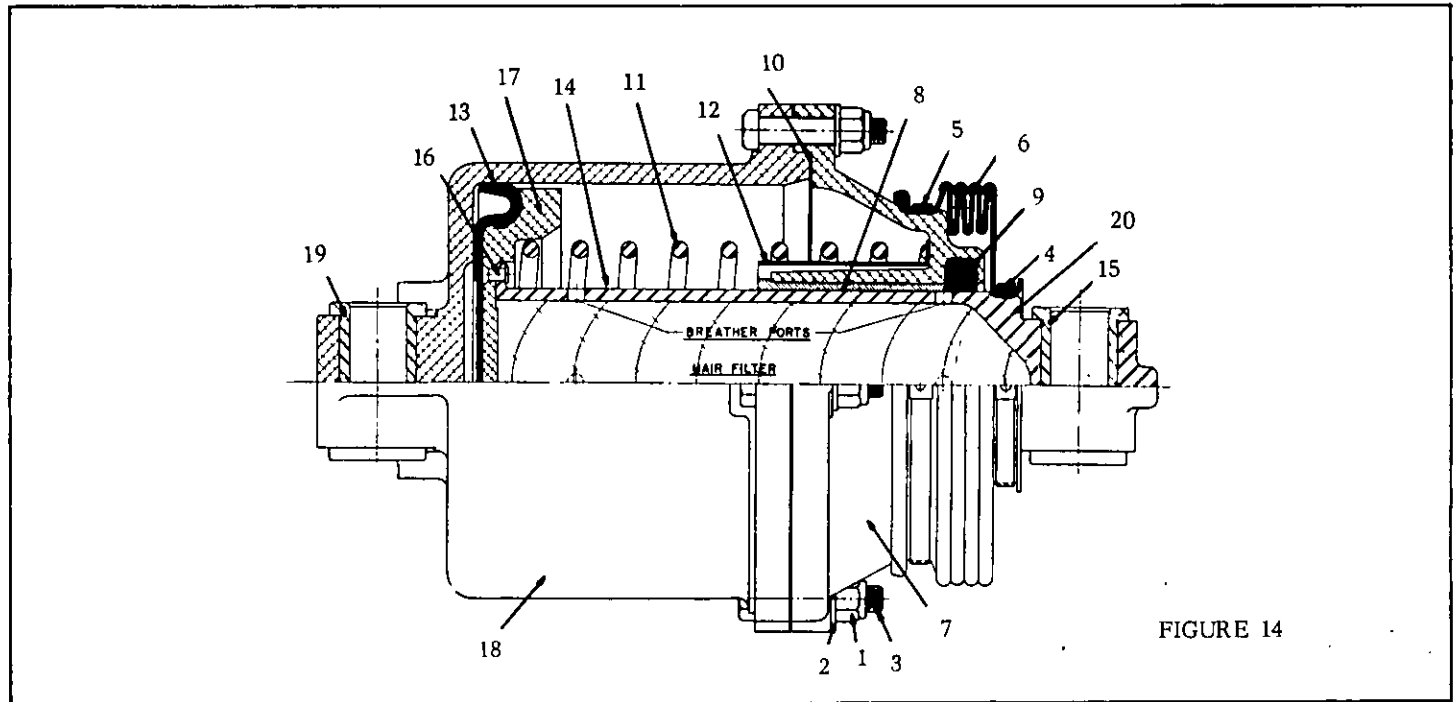
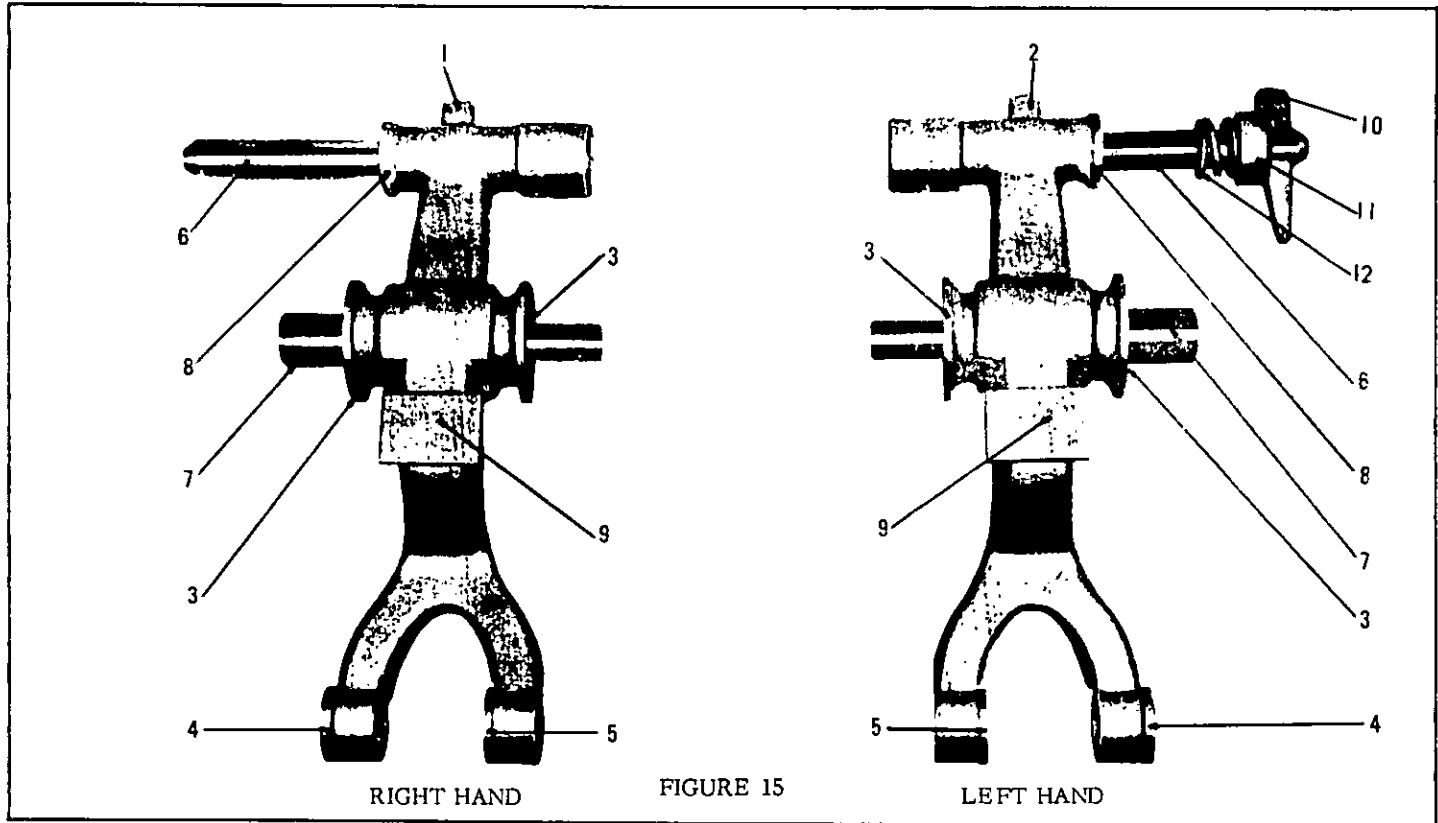


FIGURE 14

Ref. No.	Pc. No.			Parts Name	No. Req'd
	6-1/2	7	7-1/2	8	Cylinder Size - (in.)
1	8612048	8612051	8612054	8612057	AIR CYLINDER, ASY.
2		575978			.NUT. 3
3		524387			.WASHER 3
4		565193			.BOLT 3
5		8611983			.CLAMP, Piston End 1
6		8611984			.CLAMP, Cover End 1
7		8604186			.BOOT, Dust. 1
8		8605162			.COVER, Asy. 1
9		8604181			.BUSH, Cover 1
10		8604182			.LUBRICATOR, Felt 1
11		8605157			.GASKET, Cover 1
12		8605088			.SPRING, Piston Return 1
13		8606339			.GUIDE, Spring 1
14	531244	531328	531329	549903	.CUP, Packing 1
15	8612050	8612053	8612056	8612059	.PISTON, Asy. 1
16	8612030	8612030	8612030	8612030	.BUSH 2
17		576025			.RIVET 6
18	9705733	8606377	8606376	8608841	.HEAD, Piston 1
19	8612049	8612052	8612055	8612058	.CYLINDER BODY. 1
20	8612030	8612030	8612030	8612030	.BUSH. 2
		8605728			.TUBE, Piston 1

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

TONG ASSEMBLIES



Ref.No.	Pc.No.	Parts Name	No. Req'd
1	8612062	TONG, ASSEMBLY (R.H.)	
2	8612063	TONG, ASSEMBLY (L.H.)	
3	8605690	.WASHER, Thrust	2
4	8604171	.BUSH, Upper	1
5	8612030	.BUSH, Lower	1
6	8605087	.PIN, Shoe	1
7	8604163	.PIN, Fulcrum	1
8	8605636	.WASHER, Thrust	1
9	8604112	.PLATE, Wear	1
10	8604901	KEY	1
11	8604899	RETAINER	1
12	8604586	SPRING	1

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

BRIDGE ASSEMBLY

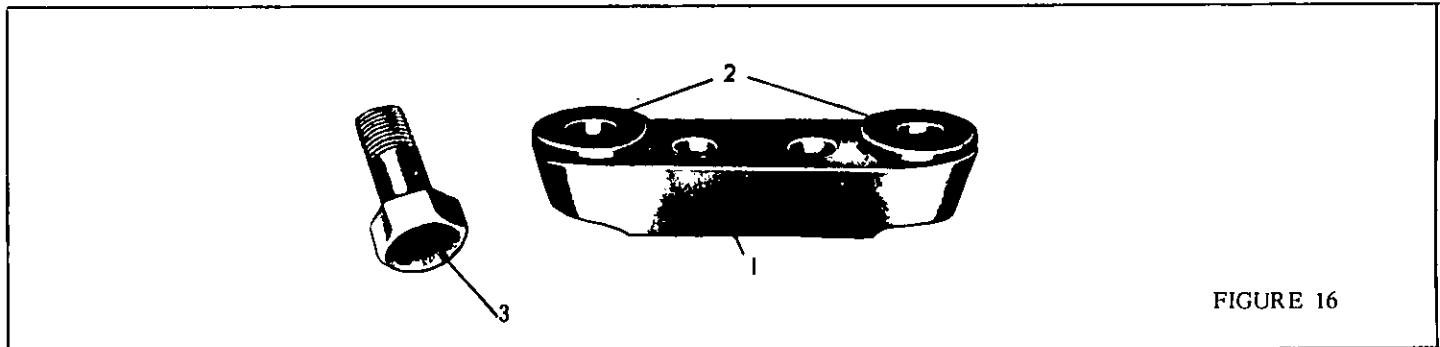


FIGURE 16

Item No.	Part No.	Part Name
1	8609324	Bridge Asy. (Bridge with Bushings)
2	8605637	Bushing
3	8609325	Bridge Bolt

FULCRUM PIVOT ASSEMBLY STYLE - 1

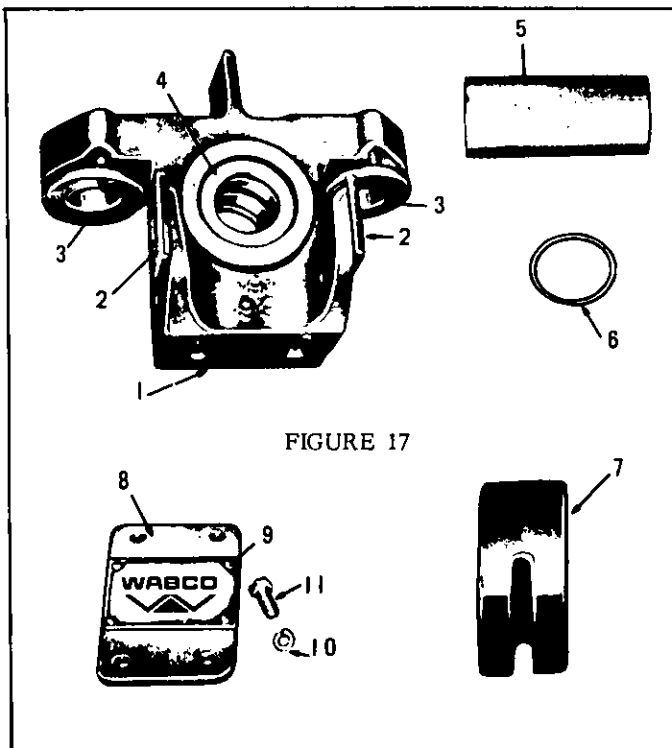
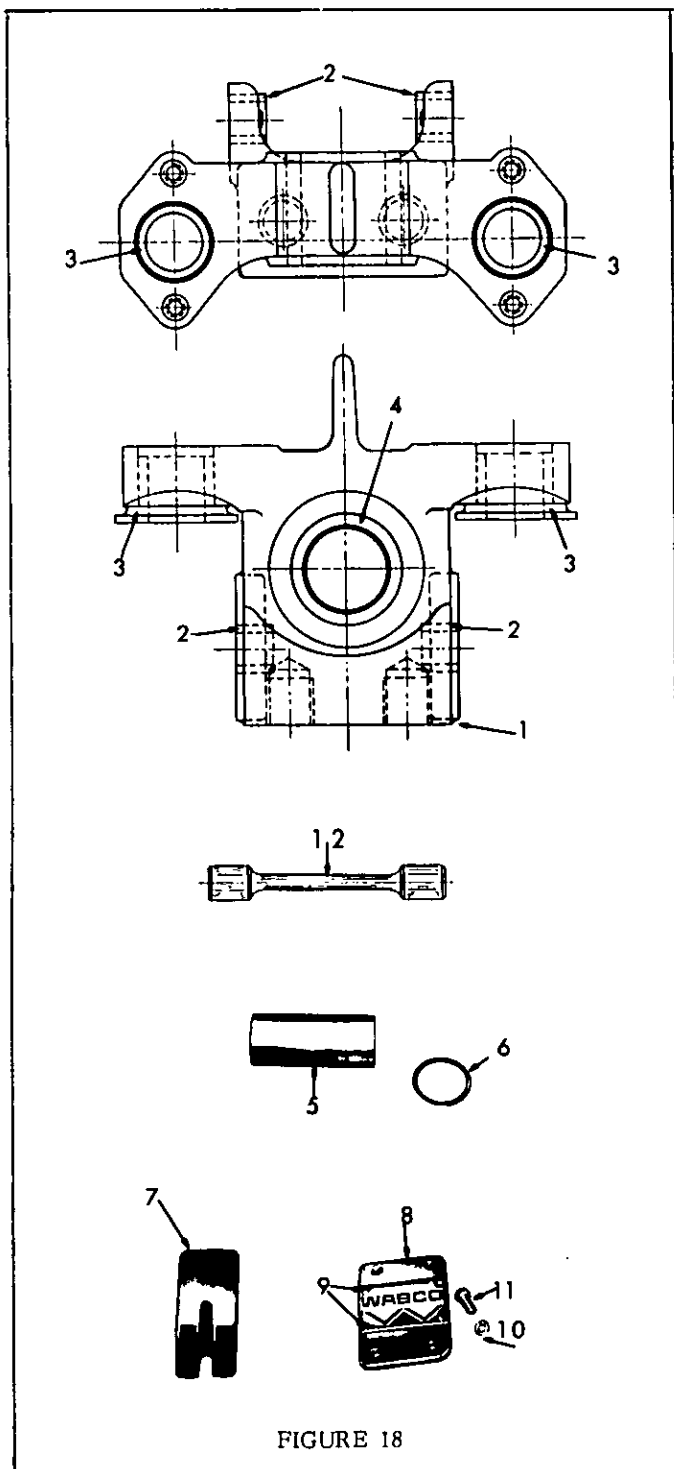


FIGURE 17

Item No.	Part No.	Part Name
1	8606616	Fulcrum Pivot Asy.
2	8604112	Wear Plate
3	8605635	Bushing - Tong Fulcrum Pin
4	8606648	Bushing - Pivot Pin
5	8606617	Fulcrum Pivot Pin
6	8609344	O-Ring
7	8606651	Retainer Rubber
8	8606603	Cover Plate
9	552710	Drive Screw
10	514276	Lock Washer
11	514274	Bolt

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

FULCRUM PIVOT ASSEMBLY STYLE - 2



Item No.	Part No.	Part Name

1	8609719	Fulcrum Pivot Asy.
2	8606370	Bushing - Stop Pin
3	8605635	Bushing - Tong Fulcrum Pin
4	8606648	Bushing - Pivot Pin
5	8606617	Fulcrum Pivot Pin
6	8609344	O-Ring
7	8606651	Retainer Rubber
8	8606603	Cover Plate
9	552710	Drive Screw
10	514276	Lock Washer
11	514274	Bolt
12	8609697	Stop Pin

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

BRAKE FRAME ASSEMBLY AND BRAKE FRAME SUPPORT

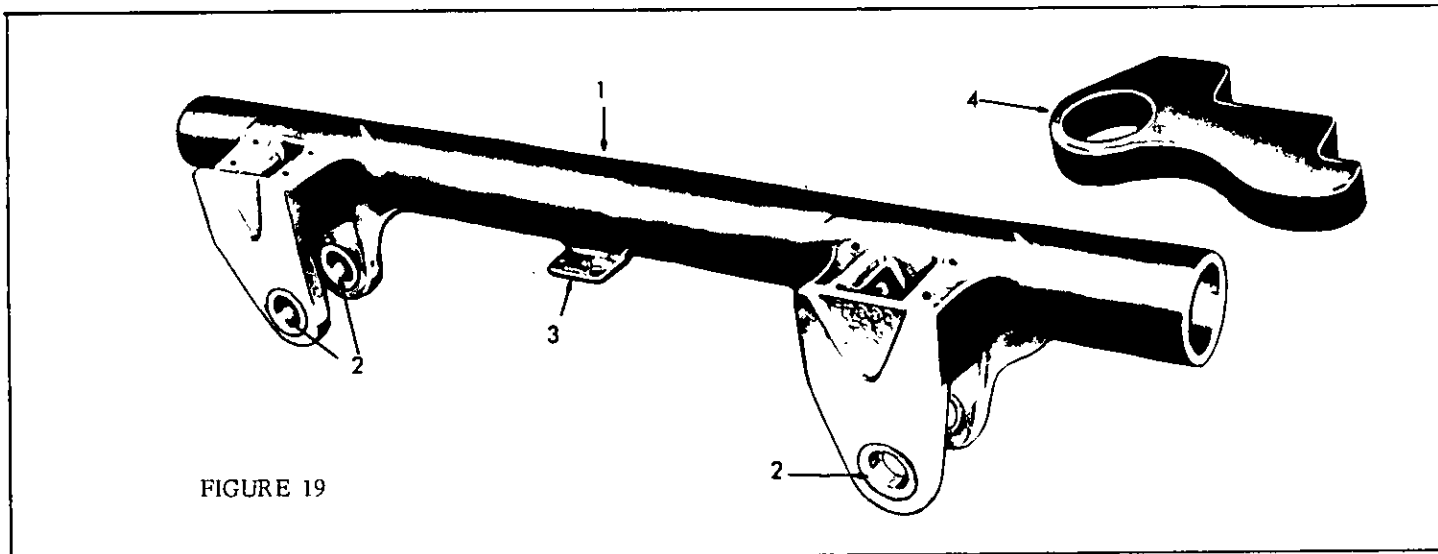


FIGURE 19

Item No.	Part No.	Part Name

1	Varies	Brake Frame Asy. (Item 4 not incl.)
2	8606602	Bushing

Item No.	Part No.	Part Name

3	Varies	Support-Air Hose
4	8606662	Support-Brake Frame

HANDBRAKE LIVER ASSEMBLY

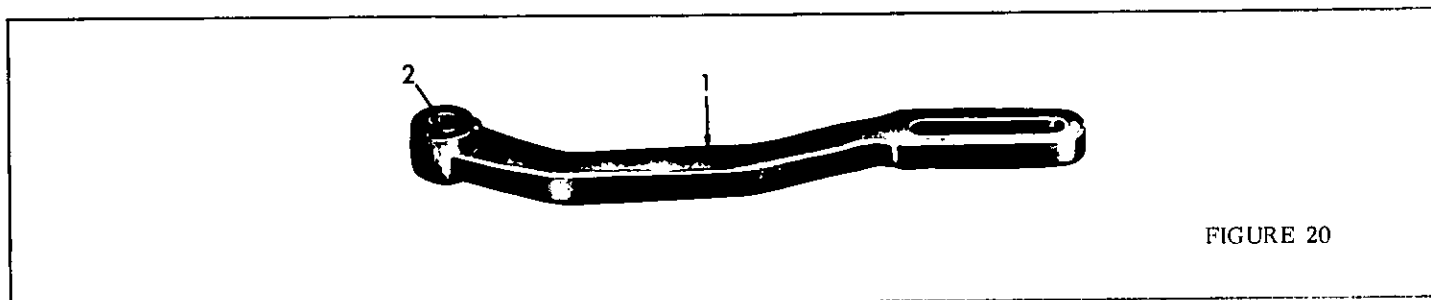


FIGURE 20

Item No.	Part No.	Part Name

1	8606652	H.B. Lever & Bushing Asy.
2	8612031	Bushing

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

HANDBRAKE CRANK ASSEMBLIES

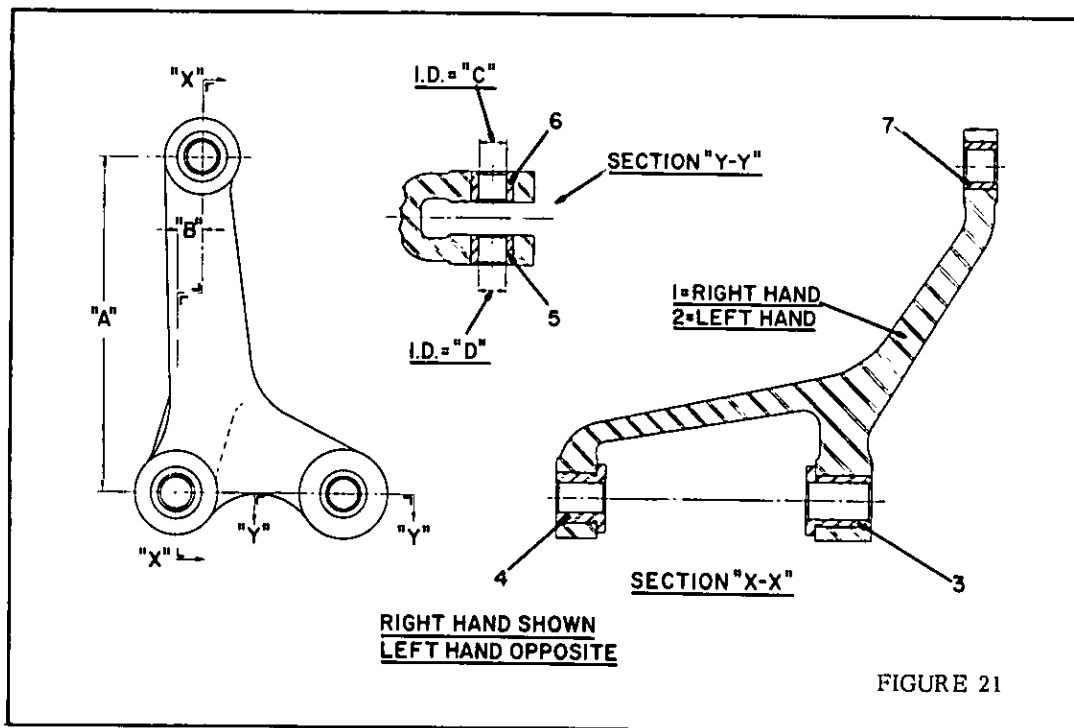
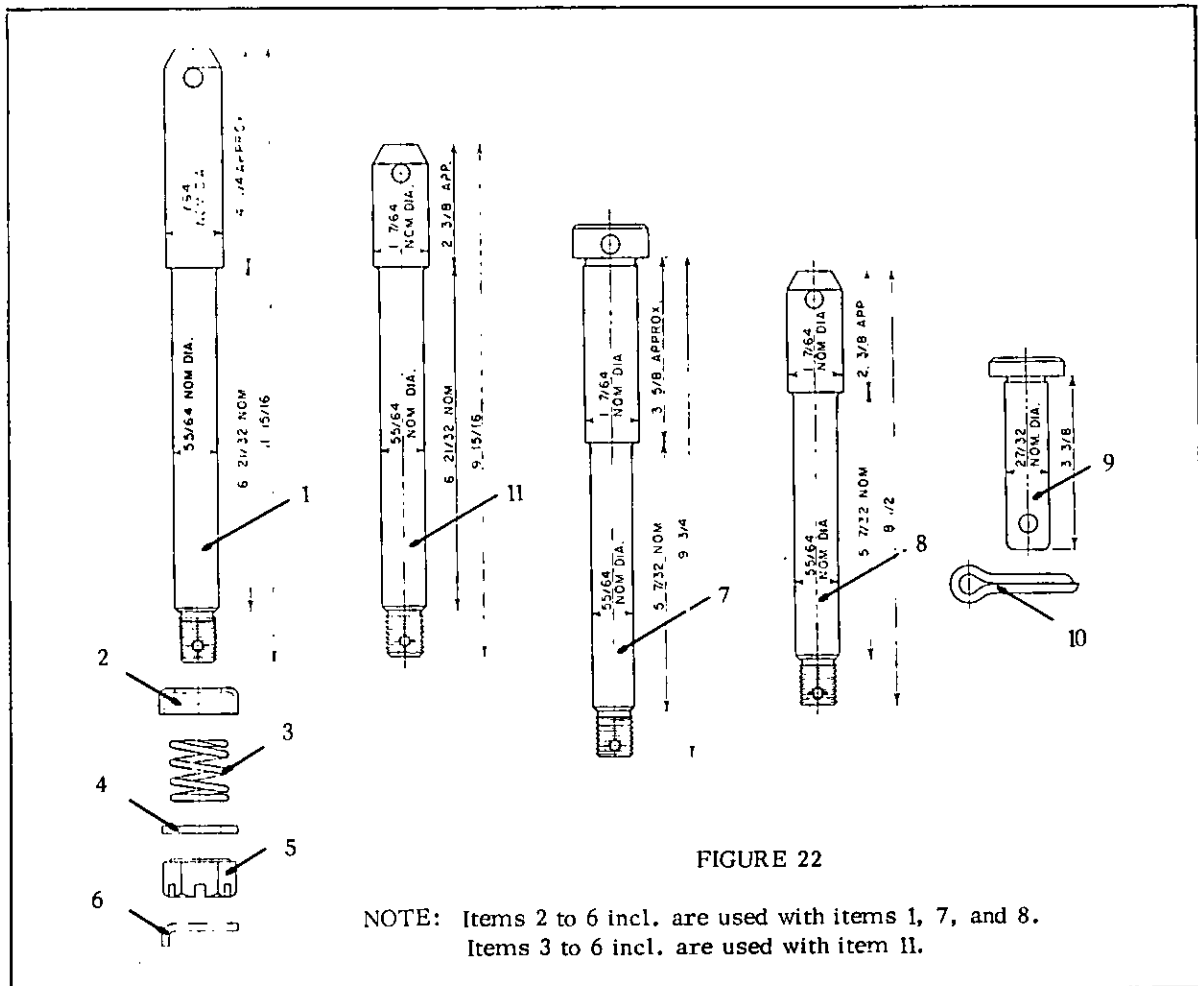


FIGURE 21

Dimensions (in.)				PART NUMBERS						
"A"	"B"	"C" Inside Dia.	"D" Inside Dia.	Asy. R.H. Item 1	Asy. L.H. Item 2	Bushing Item 3	Bushing Item 4	Bushing Item 5	Bushing Item 6	Bushing Item 7
8-1/4	0	1-1/8	7/8	8605045	8605046	8601746	8612030	8604192	8605081	8601577
8-1/4	0	7/8	7/8	8605686	8605687	8601746	8612030	8604192	8604192	8601577
10	3/4	7/8	7/8	8605785	8605786	8601746	8612030	8604192	8604192	8601577
6	0	7/8	7/8	8606266	8606267	8601746	8612030	8604192	8604192	8605011 (2)
8-1/2	3-21/32	7/8	7/8	8608812	8608813	8601746	8612030	8604192	8604192	8601577
10	3/4	7/8	7/8	8606658	8606659	8612030	8612030	8604192	8604192	8601577
10	3/4	7/8	7/8	8609716	8609717	8612030	8612030	8604192	8604192	8601577

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

BRAKE PINS - (For Old Style Cylinder Assemblies)



Item No.	Part No.	Part Name
1	8604191	Pin (Hand Brake Crank)
2	8605061	Spring Cover
3	8605060	Spring (Tong Pin)
4	575988	Flat Washer, 3/4
5	576065	Slotted Hex Nut, 3/4-10
6	8609550	Angle Wire
7	8604196	Pin (Hand Brake Lever)
8	8604173	Pin (Tong)
9	8605691	Pin (Hand Brake Crank & Lever)
10	576246	Cotter Pin
11	8606654	Pin (Hand Brake Lever)

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

BRAKE PINS - (For New Style Cylinder Assemblies)

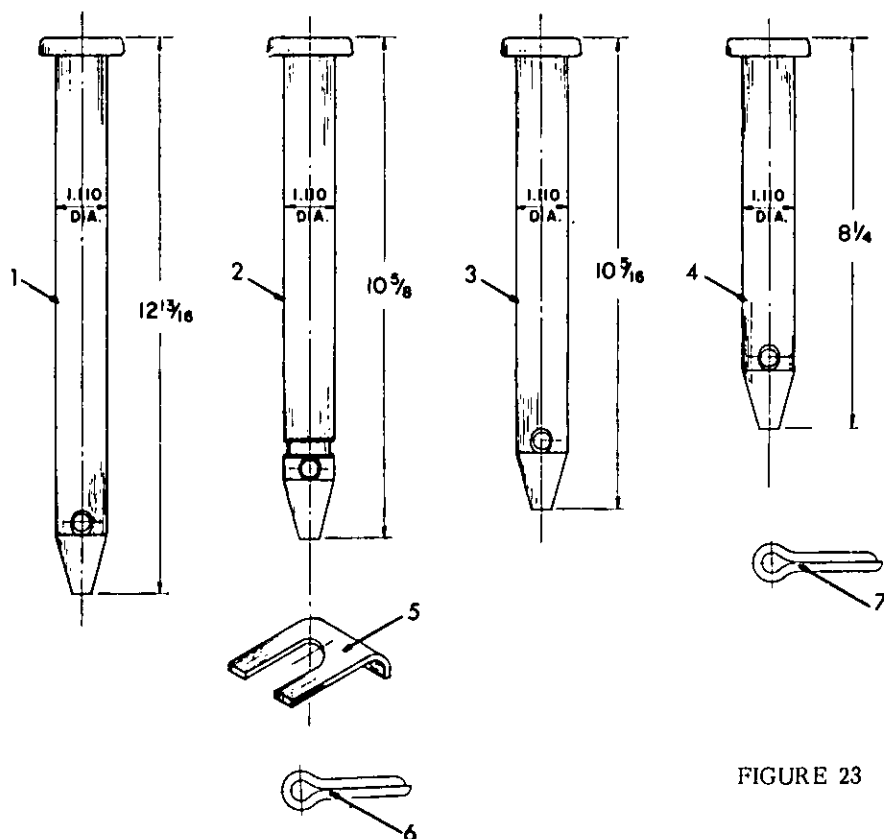
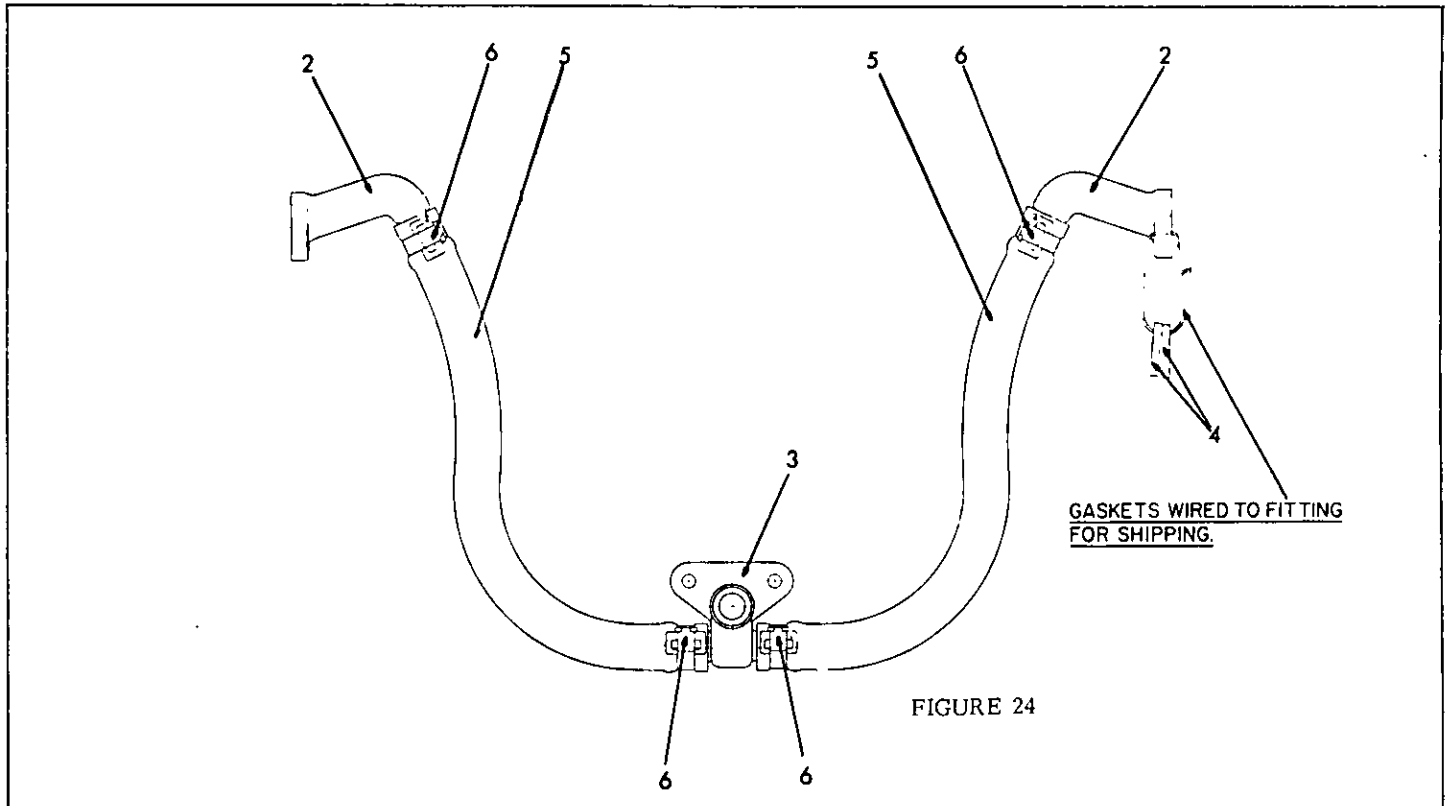


FIGURE 23

Item No.	Part No.	Part Name
1	8612036	Pin (CF & TFM Handbrake Crank)
2	8612035	Pin (TFM Handbrake Lever)
3	8612034	Pin (CF Handbrake Lever)
4	8612033	Pin (CF & TFM Tong)
5	8612032	Retainer
6	579538	Cotter Pin 3 inch (Used only with Items 2 and 5)
7	576044	Cotter Pin 2-1/2 inch (Used only with Items 1, 3 and 4)

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

AIR HOSE ASSEMBLIES - CYLINDER



PART NUMBERS					
Air Hose Asy. Item 1	Air Fitting Item 2	Air Fitting Item 3	Gasket Item 4	Hose Item 5	Band Item 6
8608829	8600179	8606597	93841	8608797	541051
8606596	8600179	8606597	93841	8606593	541051

CAP SCREWS, BOLTS, NUTS & LOCKWASHERS FOR AIR HOSE ASSEMBLIES				
Air Hose Asy. No.	Cap Screws for Fitting Item 2	Bolts for Fitting Item 3	Lock Nuts for Fitting Item 3	Lockwashers Fitting Item 2
8608829	523690	542640	575978	514281
8606596	523690	542640	575978	514281

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

AIR HOSE ASSEMBLIES - CYLINDER

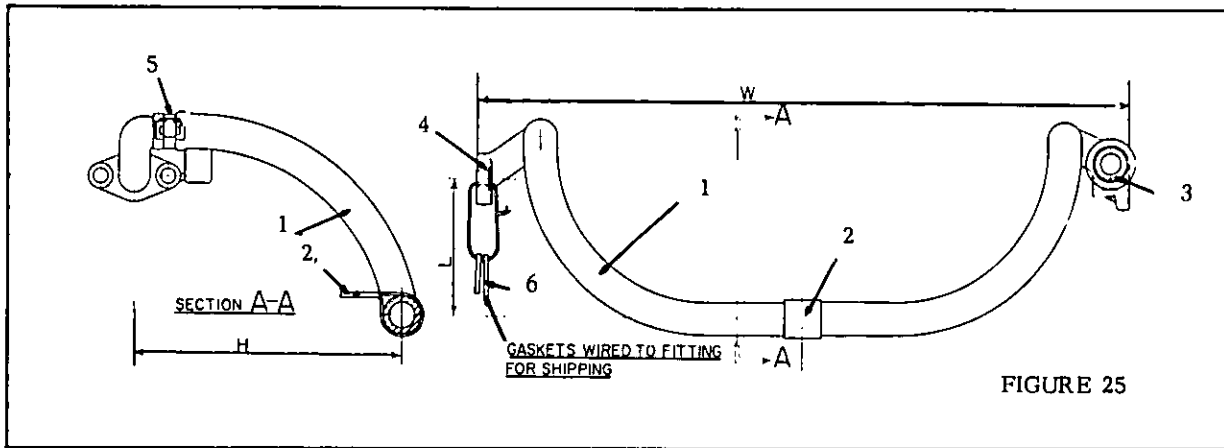


FIGURE 25

Hose Applied Air Released Dimensions			PART NUMBERS							
H	L	W	Air Hose Asy. Hand Shown Oppos. Hand		Hose Item 1	Clamp Item 2	Air Ftg. Item 3	Air Ftg. Item 4	Band Item 5	Gasket Item 6
10-7/8	5-1/2	26-3/4	8609751	---	8609753	8604949	8609749	8609736	541051	93841
10-7/8	5-1/2	26-3/4	---	8609752	8609753	8604949	8609735	8609750	541051	93841

CAP SCREWS, BOLTS, NUTS & LOCKWASHERS FOR AIR HOSE ASSEMBLIES					
Air Hose Asy. No.	Cap Screws for Fitting Item 3	Cap Screws for Fitting Item 4	Bolts for Clamp Item 2	Nut for Clamp Item 2	Lockwashers for Items 3 & 4
8609751	8605598	8602190	8602190	575978	514281
8609752	8602190	8605598	8602190	575978	514281

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

DISC ASSEMBLIES

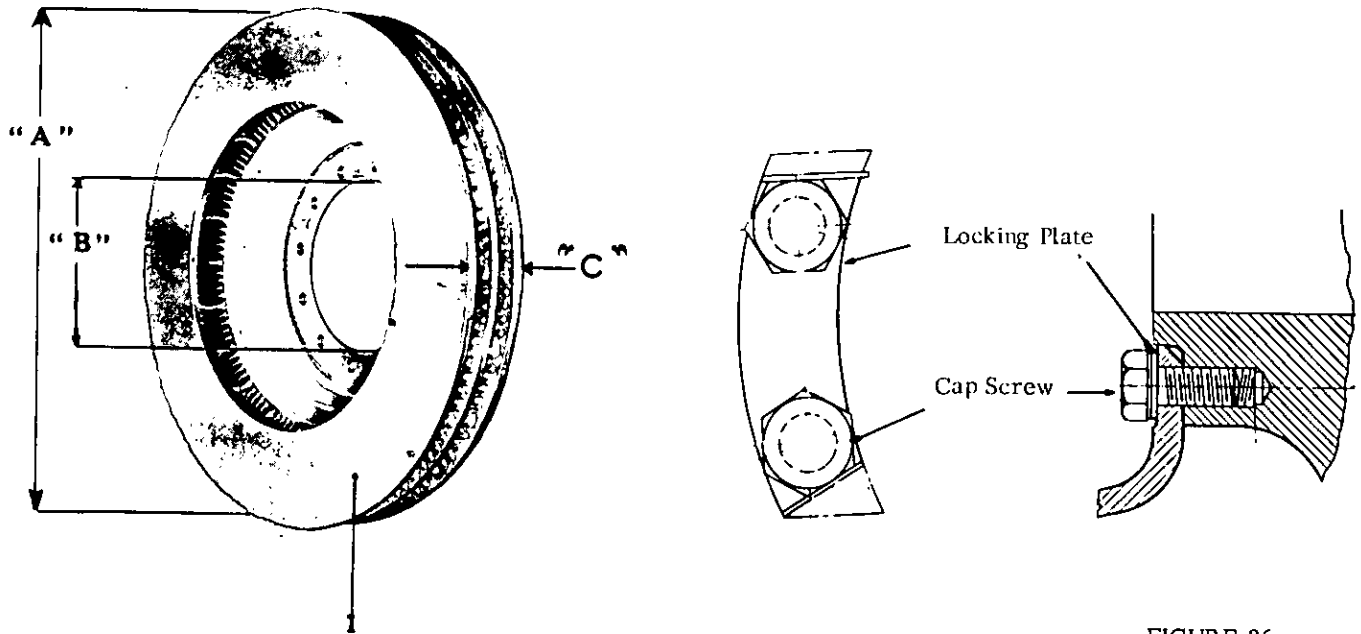
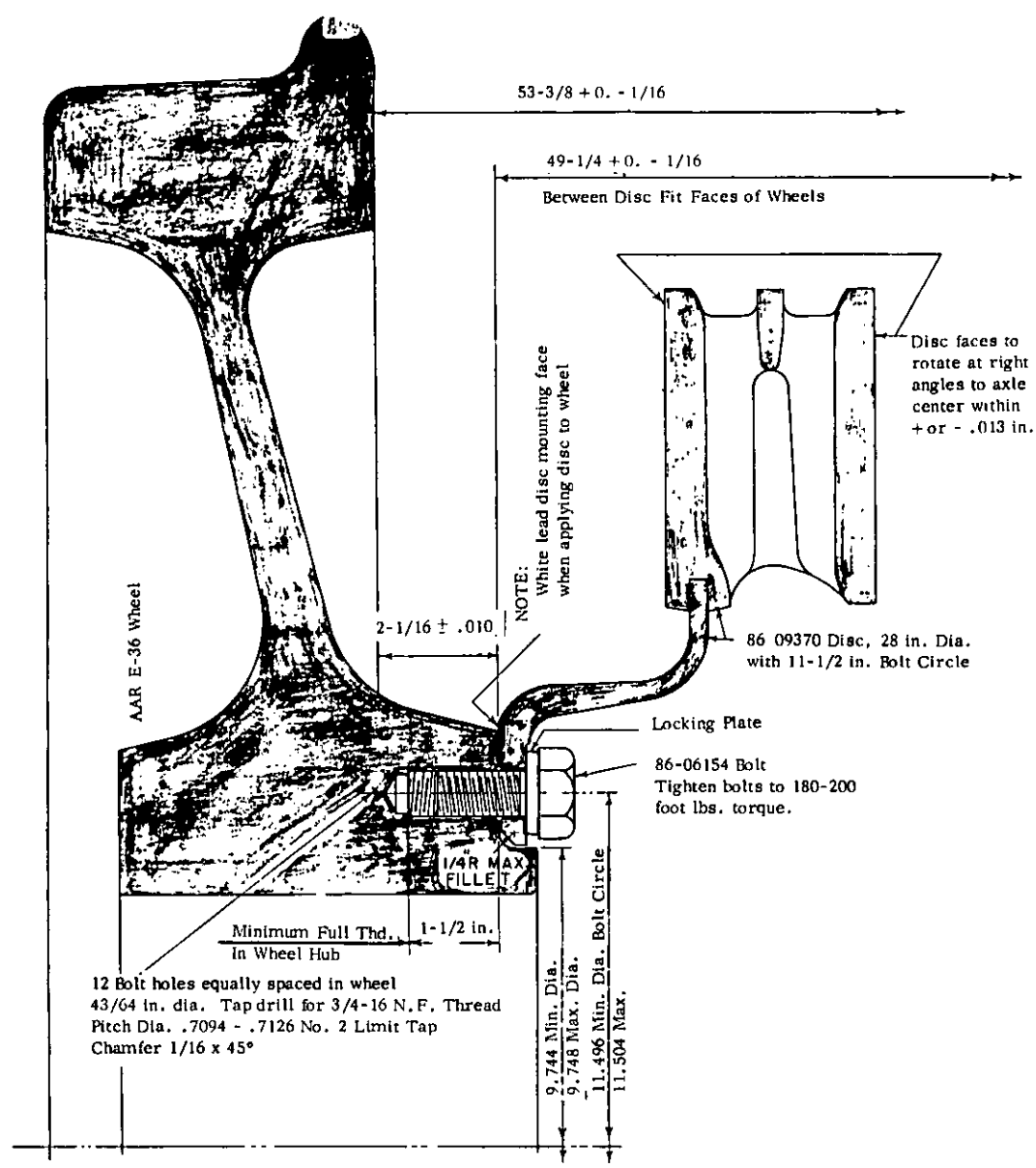


FIGURE 26

Disc Item 1	Dimensions (NOM.)			PART NUMBERS	
	"A"	"B"	"C"	Cap Screw	Locking Plate
8611254	24 in.	7-3/8 in.	3-3/4 in.	8606154	8611253
8609360	26 in.	8-5/8 in.	3-1/2 in.	8606154	8610855
8609370	28 in.	9-3/4 in.	3-1/2 in.	8606154	8610859

Prices will be quoted upon application
Orders should give PIECE NUMBER and NAME of part wanted

APPLICATION OF DISC 8609370 TO 36 in. WHEEL



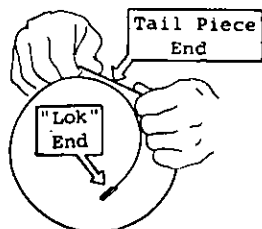
NOTE:
If balanced wheels are used,
apply disc to wheel with heavy side of disc
at approx. 180° to heavy side of wheel.
(Disc heavy side is marked with red paint)

FIGURE 27

INSTRUCTION NOTICE

LACING PUNCH-LOK OPEN END, HEAVY DUTY CLAMPS

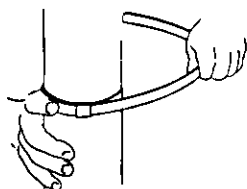
To do this "lacing up" the easiest way:



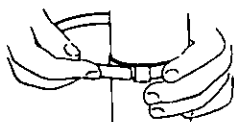
1. Straighten out the curved tail piece for at least 3-1/2 inches.



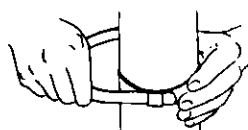
2. Put clamp around and "lace" first wrap through the "LOK".



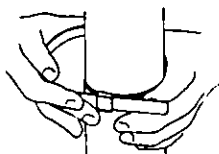
3. Pull up tight and don't let it slip while "lacing up" to complete second wrap.



4. Using the extra length of steel to get a hand hole of the tail piece --



5. Push second wrap through lok with one hand while holding both wraps with the other hand.



6. Work the tail piece through lok. Ready for the tool.

Do not try to save any steel in the tail piece by ordering a smaller size clamp. The extra length makes an easier and faster application.

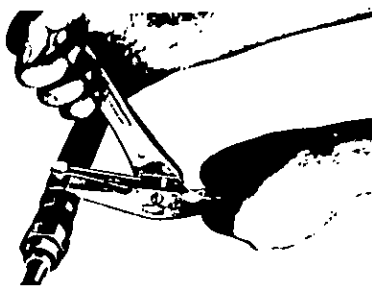
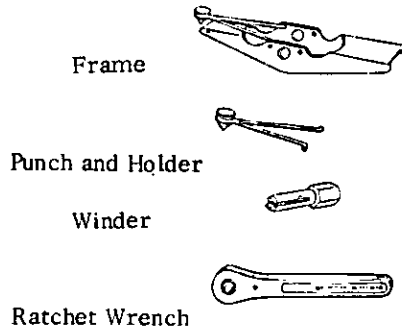
FIGURE 28

INSTRUCTION NOTICE

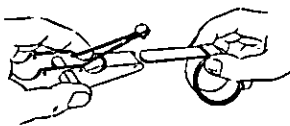
How to Use the Clamp-Master

FIGURE 29

1. The Clamp-Master is an assembly unit consisting of four parts that will apply any size clamp:



2. Model P-38 Clamp-Master Tool

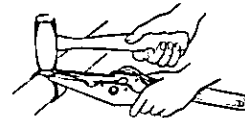


3. Push end of Clamp completely into slotted end of Clamp-Master. For 3/8 inch width Clamp use narrow slotted end.

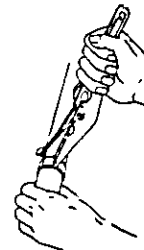


4. Push Winder into Frame with slot engaging Clamp end.

5. Apply Ratchet Wrench to Winder. Push forward with sufficient strokes until desired tension is obtained.



6. Push punch down on LOK and while holding tension with Wrench, strike firm blow with hammer, thus locking Clamp.



7. Raise punch and while holding tension with Wrench, swing Frame forward and up against edge of LOK, breaking off tail piece. Peen corners of LOK smooth. Twist up tail and when it is free, pull out the Winder. To move punch from one end to the other end, squeeze legs of punch holder and re-engage in holes at opposite end.

8. To use Open End Clamp, wrap and lace the clamp twice around, threading each wrap through LOK, then apply and use P-38 tool.

See Figure-28 for clamp lacing instructions.

SMP NO. : 03605
ISSUE DATE : 09-22-81
REVISION DATE :
TITLE : Rebuilding Budd Disc Brake Cylinders
EQUIPMENT TYPE: Conventional and HEP

Subject: Conventional and HEP Budd Disc Brakes Cylinder
Rebuilding

A. Description of Operation

1. Cylinders are made in several sizes. The size used on each truck is in proper proportion to the weight carried by the truck. All cylinders on one truck are the same size diameter.
2. The cylinder is a sealed unit that does not breathe to the outside atmosphere. The air in the non-pressure area is displaced into the bellows-type boot which extends as the brakes are applied. The air is moved through the hollow-rod portion of the piston which is packed with filter material which provides added protection against dirt and moisture.

B. Description of Cylinder

Figure 1 shows a sectional illustration of the cylinders. Mounting bushings (ref. no. 15 & 19, figure 1) should have a nominal dimension of 1.125 in. Bushings other than that size should be changed per The Budd Company (original designer and manufacturer) Service Bulletin No. 30 (attached).

Figure 1 shows the packing cup applied to the piston head and also the hollow piston rod which slides within the replaceable bronze bushing that is pressed into the cylinder cover (non-pressure head). A groove in the cylinder cover holds an oil saturated felt swab ring which wipes and lubricates the piston rod.

The cylinder cover is attached to the cylinder body with three bolts. A gasket seals the joint between cylinder body and cylinder cover against dirt and water.

The piston return spring is positioned with one end in piston head counterbore, the other end over a stainless

steel spring guide which helps prevent spring buckling and prevents spring wearing into piston bushing loss of cylinder cover.

The bellows type boot protects the piston rod from dirt and water when cylinder is in air applied position, thus preventing corrosion of piston rod and prolongs life of the bronze bushing, also prevents dirt and water being drawn into cylinder on release stroke. A steel clamp fastens large end of boot to the cylinder cover; another steel clamp fastens the small boot end to a groove in piston rod end.

Two case hardened steel flanged bushings at outer ends of cylinder body and piston rod provide long-life vertical wear surface for cylinder support and bearing surface for the tong connection pins.

C. Cylinder Dismantling, Inspection and Overhaul

All disassembled parts must be kept clean and must be protected against damage in handling:-

1. Remove rubber boot from piston and cylinder cover.
2. Remove cylinder cover. To avoid personal injury, this should be done in a suitable holding fixture which will hold the piston return spring in compressed position, then remove the three bolts attaching cylinder cover to cylinder body. Slowly relieve clamping pressure to gradually relieve spring compression and allow cylinder cover to slide off piston and away from cylinder body.

Carefully remove gasket between cylinder body and cylinder cover. Normally this gasket is suitable for re-use. Check condition and if torn or damaged, replace.

3. Remove release spring and the stainless steel flanged guide sleeve (spring guide).
4. Remove the piston assembly with the packing cup.
5. Remove packing cup from piston head. DO NOT use chisel or other sharp tools - use a hard wood tool about 3/32 inch thick and 1 inch wide with rounded nose and edges to prevent damaging the piston. Packing cup may be reused if they are inspected per the following prints which are attached:

6- $\frac{1}{2}$ packing cup
 7-0 packing cup E-68313-6
 7- $\frac{1}{2}$ packing cup E-68313-7
 8-0 packing cup

Otherwise packing cups must not be reused.

D. Cylinder Body

1. Thoroughly clean the brake cylinder inside and outside. Using a dull round scraper remove all heavy grease and dirt on outside surface. Wash in a suitable solvent, then wipe inside of cylinder clean and dry with rags.
2. Examine cylinder wall in packing cup working area for scratches, grooves to ridges.

Light scratches or small ridges may be smoothed out, using emery cloth over a rounded wood block.

Deep cut grooves, etc., may be removed by honing or on a lathe with a very light cut, no deeper than needed to just remove the sharp grooves.

Limits on rebores and limits of wear are:

All dimensions are in inches.

Nominal	Max-New	Min-New	Limit Last Rebore Dia.	Limit of Wear, Largest Dia.	Finish
6.500	6.508	6.500	6.625	6.656	40 micro in.
7.000	7.008	7.000	7.125	7.156	40 micro in.
7.500	7.508	7.500	7.625	7.656	40 micro in.
8.000	8.006	8.000	8.125	8.156	40 micro in.

E. Cylinder Cover Assembly (Non-Pressure Head)

1. Remove felt piston rod lubricating ring. If felt ring is not worn, submerge in a tank of suitable solvent for a time sufficient to dissolve all old grease. Brushing the outer surface of the lubricating swab with an ordinary hand brush while in the solvent will aid in removing the old grease and clean the surface of grit or other foreign substance. Hang up felt ring to allow solvent to drip out, then dry with a jet of air. Store cleaned felt swabs in clean, dry container.

2. After the felt ring is removed, scrape and wash off all old grease and dirt, then thoroughly dry the cover assembly.
3. Inspect bronze bushing - see that it is tight. Gauge I.D. of brushing - if worn remove bushing and replace. Limits of wear (inches) for cover bushing:

<u>Nominal</u>	<u>Max-New</u>	<u>Min-New</u>	<u>Limits of Wear</u>	<u>Finish</u>
3.605	3.607	3.604	3.625	63 micro. in.

New bushing should be pressed, not hammer driven, into cover. After bushing is pressed into the cover, the bushing must be finish machined on the inside diameter to 3.604 inch - 3.607 inch, finish must be very smooth to 63 Micro inch. This machining operation is required because bushing is supplied "rough bored" and undersized on inside diameter and also because it is possible to get distortion on the inside diameter when bushing is pressed in.

Another precaution - when finish-machining the inside dia. of bushing, this should be concentric with diameter of counterbore for cylinder body fit in cover (should be within .005 inch total indicator reading).

4. Use a 3.650/3.652 "no go" gage shown in figure 1 to check bushing.

F. Piston Release Spring

Thoroughly clean the spring of all dirt, grease and corrosion.

Free height of spring should be not less than 15-1/2 inches, and carry a load of 135 to 165 lbs. when compressed to a height of 8-5/8 inches.

Inspect spring for cracks and corrosion pitting of the wire - if deep corrosion pitting over a large area or any deep cracks in the spring wire, scrap the spring. If light corrosion pitting over a large area or any deep cracks in the spring wire, scrap the spring. If light corrosion pitted, and spring otherwise the suitable condition - apply one good coat of rust preventive or a coat of Waterproof Aluminum Enamel.

G. Spring Guide

Clean spring guide and examine for condition. Slight wear on the guide caused by the release spring is not harmful.

If damaged or distorted, repair or scrap. If only the longitudinal welded butt joint is split - reweld with stainless steel rod. Grind weld smooth on both faces of flange. The outside diameter of cylindrical portion should be held to a nominal 4-21/32 inches.

H. Piston Assembly

Clean the piston head and hollow piston rod assembly on all exposed surfaces. In cleaning this piston assembly, do not soak or dip the assembly in solvent or similar cleaner. Care must be taken to avoid saturating the hair filter inside the hollow piston rod.

Remove any corrosion or rough surfaces from outside diameter of hollow piston rod using fine grit emery cloth. This may be done by hand or while revolving assembly in a rotating fixture.

Blow out possible air passage restriction in hair filter with a jet of air applied at all three breather ports in the hollow rod, one port at a time.

Inspect the mounting end bushings for excessive wear or damage. Replace if required, use a 1.157/1.160 in. "No Go Gage" shown in figure (2) to check bushing.

To remove bushings refer to D-3 for the procedures.

I. Assembling Cylinder

1. Wipe inside of cylinder clean and dry.
2. Coat inside surface completely with Molyube 850 grease. Grease can be obtained from Bel-Ray Company, Inc., P.O. Box 526, Farmingdale, New Jersey 07727, phone 201/938-2421.
3. Apply packing cup to piston by starting the cup over one edge of piston and, while holding cup in this position, work the cup into place with the hands. If the cup does not seat properly due to trapped air, the air can be removed by raising one side of the cup, using the wooden tool, and pushing cup into place with the hands.

Coat the cylinder wall bearing surface of the packing cup and outside diameter surface of piston with recommended brake cylinder lubricant.

Insert piston assembly (prepared per above) into the brake cylinder. (At this time have air inlet port of cylinder open to permit escape of air while piston is applied). Rotate and move piston slightly to check against binding of piston cylinder and to avoid later damage to packing cup.

Coat outside diameter of piston rod full length with brake cylinder lubricant. Also apply coat of brake cylinder lubricant again on exposed brake cylinder wall where previous lubricant was wiped down by packing cup in application of piston.

4. To a clean good conditioned cylinder cover assembly apply the oil saturated felt ring lubricator, a well greased cylinder cover gasket, and well greased stainless spring guide with the piston release spring.

Holding these parts as a unit, slide unit over piston rod into place against cylinder. (Do not let cylinder cover gasket kink or get out of place).

With these components in a clamping fixture, using the three bolts with flat washer and Elastic Stop Nut (this is a composition insert lock nut), securely bolt cylinder cover to cylinder body.

CAUTION ON BOLT TIGHTENING. Tighten the 3 bolts progressively and evenly - tighten to about 35 to 40 FT-lbs. (420 to 480 inch pounds) torque. In some instances a very narrow gap may be noticed between the outside fits of cylinder body and cylinder cover. This outside joint is not a seal joint - the seal joint is made at the cylinder gasket face area. The gap may result from dimensional build-up of tolerances in gasket thickness and machining tolerances of cylinder cover and cylinder body. If bolts are tightened excessively, this may distort or crack bolting ears on either or both the cylinder body and cylinder cover.

6. After assembly rotate piston 3 revolutions and actuate cylinder twice to seat the packing cup and distribute the grease.

Remove cylinder from clamping fixture after bolted together and make leakage test.

Place cylinder on a suitable fixture limiting piston stroke to about 3-3/4 inch.

Leakage should not exceed 1/4 lb. per minute from 50 lbs. pressure.

7. After cylinder passes leakage test, apply boot.

First, line up the tong pin holes of bushings at end of cylinder and piston so center lines of holes are parallel. Rotate piston if necessary.

Second, wipe exposed end of piston tube clean and dry of all lubricant.

Then set boot on cylinder assembly. Turn boot so the 1/16 inch vent holes are top and bottom of cylinder as cylinder will be used on the unit.

Position boot clamp on cylinder cover with the "LOK" end on bottom of cylinder. Position piston end boot clamp so the "LOK" end is on same side of cylinder as the air inlet port, or in other words farthest away from disc when cylinder is on the unit.

The clamps are 3/8 inch wide Open-End Punch-Lok.

Because of close clearances with boot walls, Punch-Lok Model P-38 Clamp-Master Locking Tool is recommended to use in making application of clamp at piston (small) end of boot.

Figure 29 illustrates the P-38 tool and how it is to be used.

Figure 28 illustrates recommended "lacing-up" of the open-end type clamps prepared to use of P-38 tool for final tightening of clamp.

The Model P-38 Clamp Master Locking Tool, also 3/8" wide open-end clamps Punch-Lok #0-332 and Punch-Lok #-358, may be purchased from:

PUNCH-LOK COMPANY
321 North Justine Street
Chicago, IL 60607

or

through Punch-Lok distributors

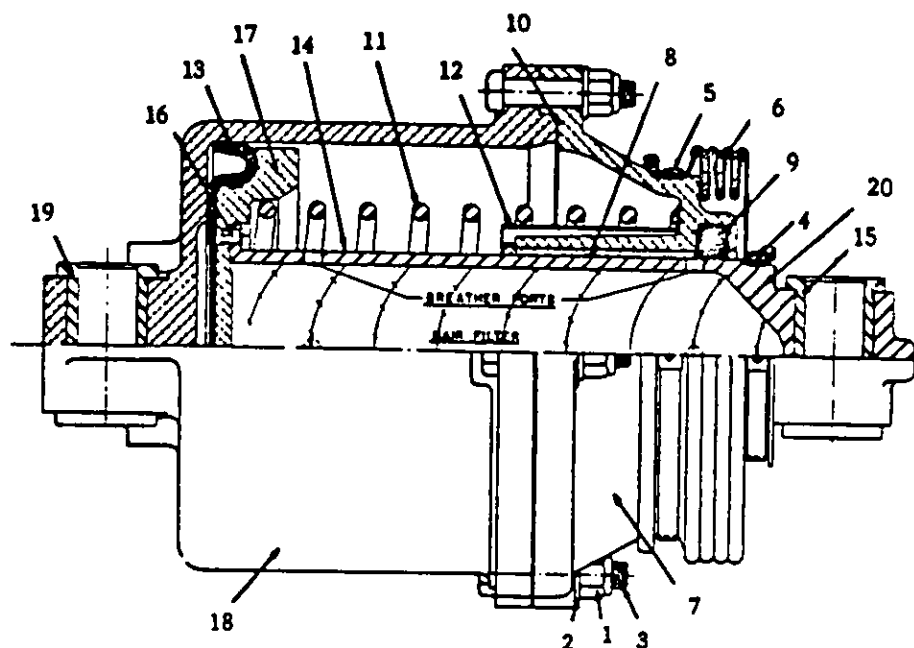
Cover the air inlet boss on cylinder with masking tape or equivalent to prevent dirt and other foreign matter entering cylinder and prevent damage to tapped holes and gasket seat.

8. Clean air fitting thoroughly before installation on cylinder.

To insure seal between cylinder and air fitting a new gasket, Pc. 8600955, should be applied at each removal.

MCHRE.166

AIR CYLINDER ASSEMBLIES NEW STYLE (Use with Straight Pins)



Ref.No.	Pc.No.			Parts Name	No. Req'd	
6-1/2	7	7-1/2	8	Cylinder Size - (In.)		
8612048	8612051	8612054	8612057	AIR CYLINDER, ASY.		
1	575978			.NUT.	3	
2	524387			.WASHER	3	
3	565193			.BOLT	3	
4	8611983			.CLAMP, Piston End	1	
5	8611984			.CLAMP, Cover End	1	
6	8604186			.BOOT, Dust.	1	
7	8605162			.COVER, Asy.	1	
8	8604181			..BUSH, Cover	1	
9	8604182			.LUBRICATOR, Felt	1	
10	8605157			.GASKET, Cover	1	
11	8605088			.SPRING, Piston Return	1	
12	8606339			.GUIDE, Spring	1	
13	531244	531328	531328	549903	.CUP, Packing	1
14	8612050	8612053	8612056	8612059	.PISTON, Asy.	1
15	8612030	8612030	8612030	8612030	..BUSH	2
16		576025			..RIVET	6
17	9705733	8606377	8606376	8608847	..HEAD, Piston	1
18	8612049	8612052	8612055	8612058	.CYLINDER BODY.	1
19	8612030	8612030	8612030	8612030	..BUSH.	2
20		8605728			..TUBE, Piston	1

Prices will be quoted upon application
 Orders should give PIECE NUMBER and NAME of part wanted

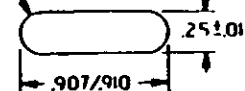
FIGURE 1

68E1-00-3

REVISIONS

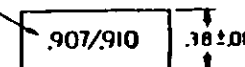
REV	ZONE	DESCRIPTION	DATE	APP'D

FULL RADIUS



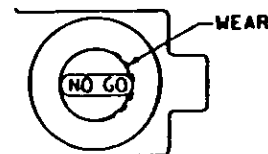
NOTE: 1. IF GAGE GOES IN, SCRAP BUSHING & REPLACE.
2. GAGE MUST BE POSITIONED AS SHOWN.

PERMANENT STAMP
".907/.910" NEAR SIDE
".TFM" FAR SIDE

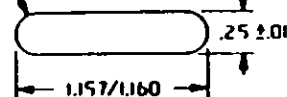


GAGE FOR .875 MOUNTING BUSHING

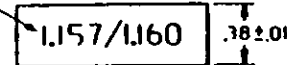
(1)



FULL RADIUS

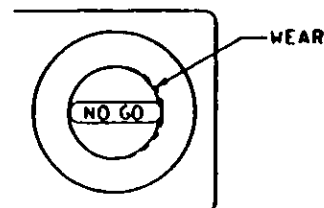


PERMANENT STAMP
".1157/1.160" NEAR SIDE
".TFM" FAR SIDE

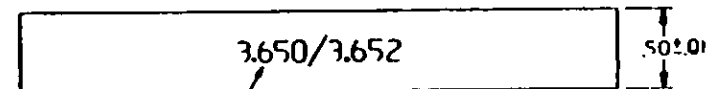
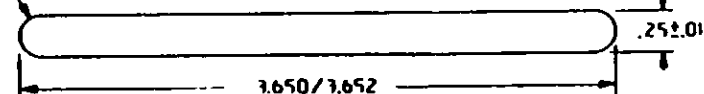


GAGE FOR 1.125 MOUNTING BUSHING

(2)



FULL RADIUS



PERMANENT STAMP
".3.650/3.652" NEAR SIDE
".GAGE FOR 3.604/3.607 COVER BUSHING" FAR SIDE

GAGE FOR 3.604/3.607 COVER BUSHING

(3)

	-3	GAGE, 3.604/3.607 COVER BUSHING	HARDENED STL		3
	-2	GAGE, 1.125 MOUNTING BUSHING	HARDENED STL		2
	-1	GAGE, .875 MOUNTING BUSHING	HARDENED STL		1
QTY	PART NUMBER	DESCRIPTION	MATERIAL	WFO/SPEC	ITEM

LIST OF MATERIAL

REFERENCE DRAWINGS:

EQUIPMENT ENGINEERING

Amtrak
National Railroad Passenger Corporation
1000 N. Capitol St., Washington, D.C. 20001

NO GO CONDEMNING GAGES
FOR CONVENTIONAL & H.E.P.
DISC BRAKE CYLINDERS

DATE: 2/1
BY: [Signature]
C-00-1389

FIGURE 2

SMP d 02605

LOCKING PLATES AND BOLTS - BRAKE DISCS

It has been recently found that the brake discs on a number of cars were loose due to the corroded condition of the bolt locking plates resulting in the bolts becoming loose and backing out.

In view of the above, it is desired that all brake discs be immediately inspected and the following practices shall be placed into effect at this inspection and also when any wheel work or brake work is performed in the future on Amtrak cars.

All points shall carefully inspect locking plates, bolts, locking wires, etc. and those found loose, worn, not properly applied, excessively corroded, etc. shall have wheel and axle units removed from service and have necessary corrective repairs made to insure safe operation of this equipment.

Heavy repair shops shall carefully inspect all locking plates, bolts, locking wires, etc., and those found loose, worn not properly applied, etc., shall be replaced. Locking plates corroded to the extent that none of the original smooth surface metal is visible shall have all locking plates on that disc replaced with new locking plates and new bolts.

Locking plates once used or removed from any disc shall not be reused but shall be scrapped.

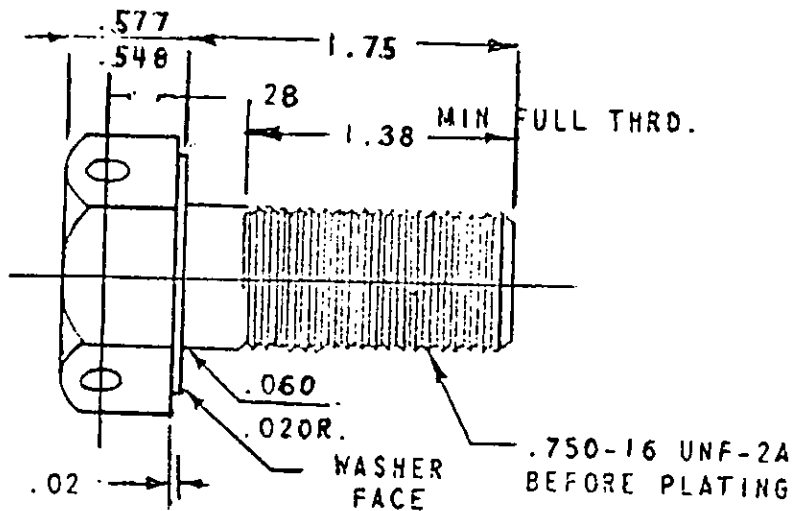
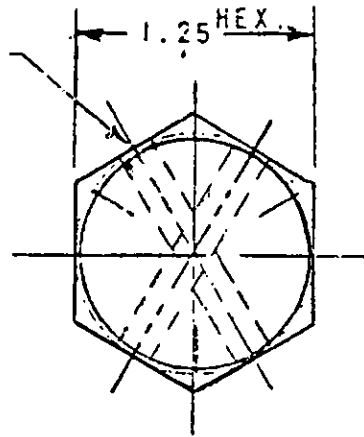
Only locking plates per attached Wabco drawings F86-10855 (for 26" disc) and F86-10859 (for 28" disc) shall be used. Ends of locking plates shall be bent up so they are in full contact with the flat surface of the bolt head.

All bolts on each disc shall be individually inspected for tightness and any found that may be loose, excessively corroded, etc. shall be removed and replaced with new bolts and new locking plates. Bolts once used or removed from any disc shall not be reused but shall be scrapped.

Only Wabco PC No. 86-11257 (or equivalent) Grade 5 bolt. (Basically this indicates bolt head drilled two ways for safety wire.) Bolts other than above shall be replaced.

Bolts must be tightened with a torque wrench to a torque value of 200 ft. lbs.

"A" DRILL
TO BE DRILLED
THROUGH HEX TWO
WAYS AS SHOWN



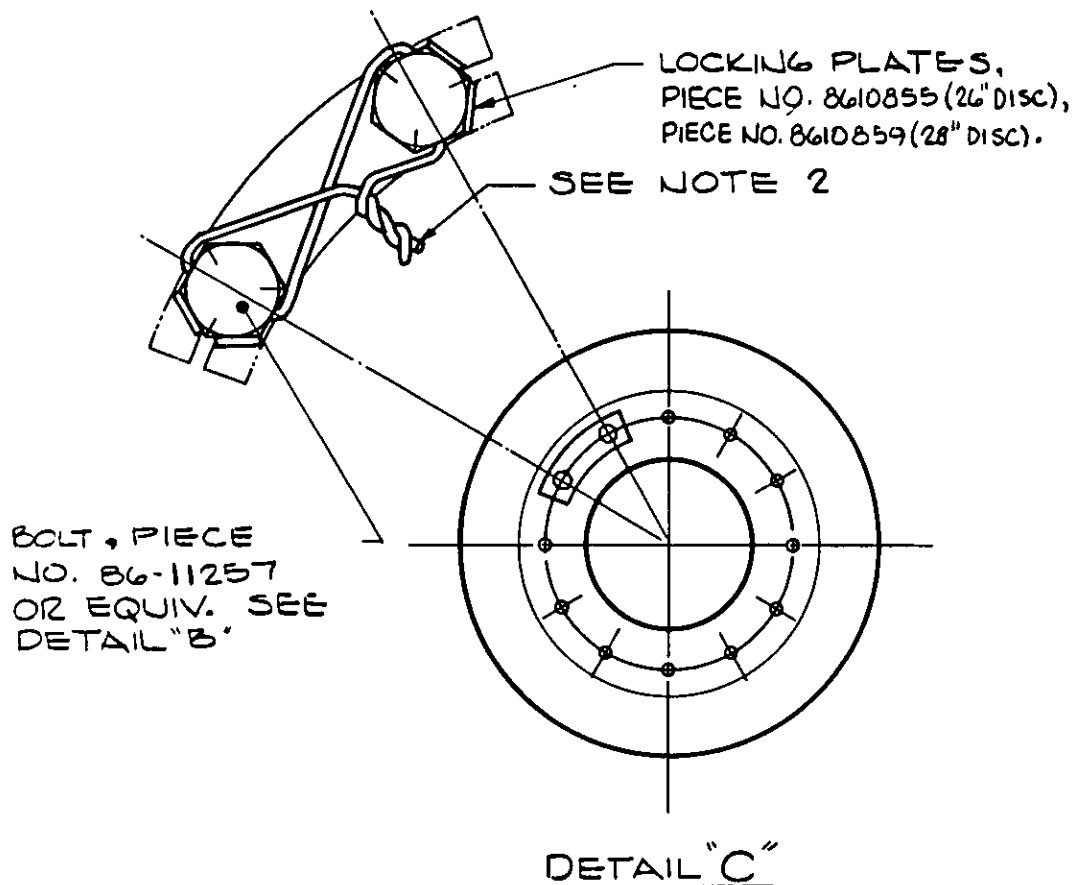
PC. NO.	"A"
86-06154	_____
86-11257	.1875

HEAVY HEX. SAE J105
HI-HD SAE SPEC. J971a
SAE GRADE 5



DEBURR ALL EDGES



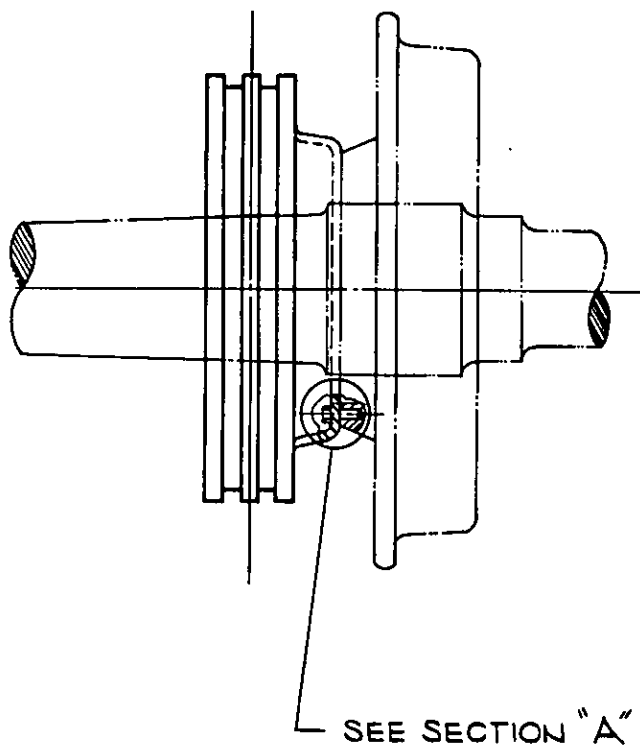


- APPLICATION OF LOCKING PLATE & LOCKWIRE -

USE BOLT PIECE NO. 86-11257, OR EQUIVALENT (GRADE 5), WITH LOCK PLATE. TIGHTEN BOLTS TO 200 $\pm$ 20 FOOT LBS., TORQUE; BEND UP LOCKPLATE TABS AS SNUGLY AS POSSIBLE ON TWO (2) FLATS ON EACH BOLT. APPLY LOCKWIRE AS SHOWN IN DETAIL "C".

REFERENCE DRAWINGS:

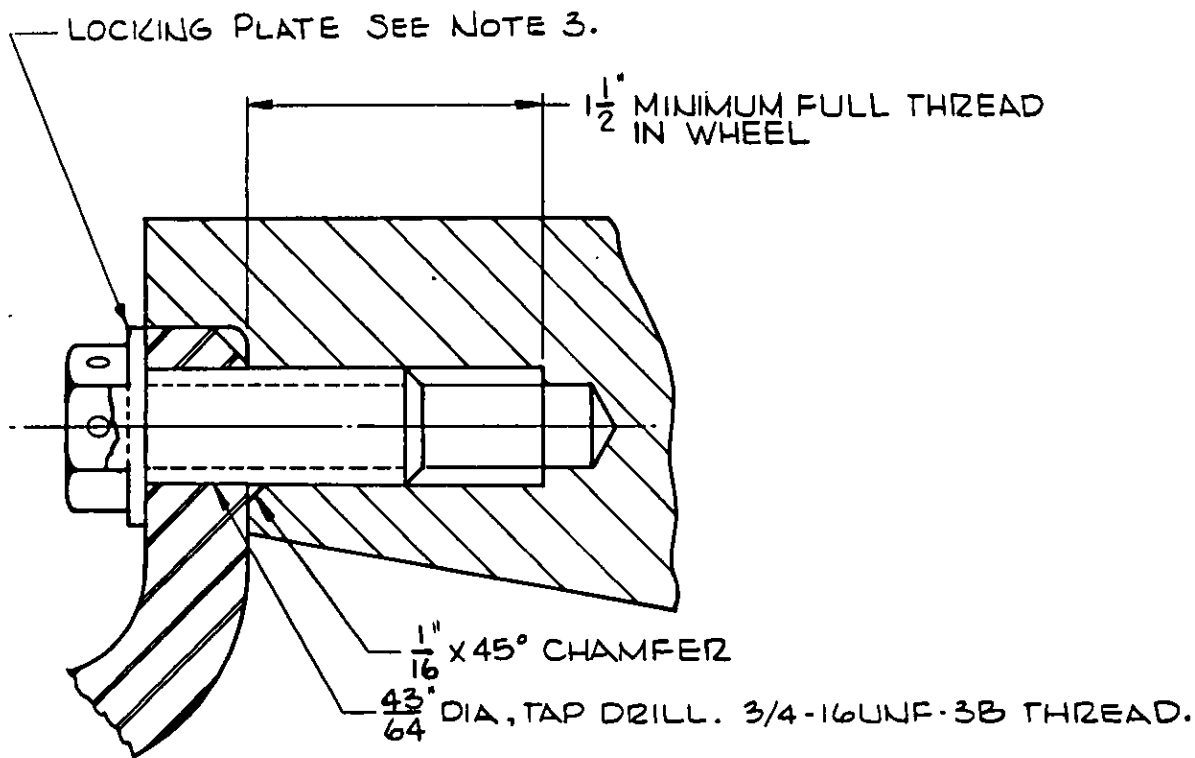
WESTINGHOUSE AIR BRAKE DRAWING NO G970.
BUDD CO. DRAWING NO F 86-10855
BUDD CO. DRAWING NO F 86-10859
BUDD CO. DRAWING NO 86-06154



IDENTIFICATION SYMBOL
OF SAE GRADE 5 BOLT
DETAIL "B"

~ WHEEL THREAD GAGING PROCEEDURE ~

TAPPED HOLES IN WHEEL SHOULD BE CHECKED WHEN DISC IS REPLACED, WHEN BOLTS ARE FOUND MISSING OR WHEN A BOLT CANNOT BE TORQUED TO SPECIFIED VALUE. A STANDARD 3/4-16UNF-3B TAP SHOULD BE USED TO CLEAN UP THREADS BEFORE USING A 3/4-16UNC-3B NO-GO THREAD GAGE. IF NO-GO GAGE CAN BE SCREWED INTO THREADS BY HAND, THE PITCH DIA. IS OVERSIZE. IF GAGE CANNOT BE INSERTED, A PLAIN NO-GO PLUG GAGE .690 DIA. SHOULD BE INSERTED. IF IT GOES INTO THREADS, MINOR DIA. IS TOO LARGE. IF THREADS FAIL EITHER OF THESE TESTS THEY SHOULD BE RECONDITIONED PER THE INSTRUCTIONS IN NOTE 1.



SECTION "A"
TYPICAL 12 PLACES

NOTES:

1. HELI-COIL INSERT APPLICATION INSTRUCTIONS FOR RECLAIMING TAPPED HOLE IN WHEEL.
 - a) DRILL $\frac{49}{64}$ (.766) DIA. HOLE X $1.875 \pm .030$ DEEP AND COUNTERSINK $120^\circ \pm 5^\circ$ TO .82-.85 DIA. ROUGH TAP USING HELI-COIL TAP #12 FRU AND FINISH TAP USING HELI-COIL STI TAP #9193-12 H3 (CLASS 3B) TO A MINIMUM FULL THREAD DEPTH OF 1.560". GAGE WITH HELI-COIL GAGE #1694-12, INSTALL HELI-COIL #1191-120N-1500 WITH INSERTING TOOL #535-12, BREAK OFF DRIVING TANG WITH TOOL #1196-12.
2. FOR LOCKWIRE USE #14 (.083) SOFT IRON WIRE, IN A FIGURE EIGHT PATTERN, AS SHOWN IN DETAIL "C".



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WABCO "E-5" DECELOSTAT® EQUIPMENT

NOTE: The following description of operation is based on this device and its components being new or this device and its components having been repaired, tested, installed and maintained in accordance with instructions issued by the appropriate governing bodies and this and any other applicable WABCO publications.

I. DESCRIPTION

(Refer to Figure 1, Cable Diagram, Drawing BA-84775-306)

A. A set of WABCO "E-5" DECELOSTAT Equipment designated for one non-propelled car of the Amtrak Equipment consists of the following devices which may be obtained from the Westinghouse Air Brake Division of WABCO.

1. The "E-5" DECELOSTAT Controller Pc. No. 579565.
2. Four Magnetic Pickup Kits

3. Four one hundred tooth Gears,

a. Part of EE Bearing

4. Two "C-3" DECELOSTAT Control Valves, Pc. No. 579449.

B. The WABCO "E-5" DECELOSTAT Equipment is designed to provide the means for wheel slip control for a four axle, two truck, passenger carrying rail vehicle. By a momentary release of braking effort, which is in excess of that which available adhesion will support during friction braking, the equipment serves to restrict flat spotting and other damage to wheel treads caused by braking in excess of wheel-rail adhesion. Braking effort adjustment is on a per truck basis, and may be fully operational for both service and emergency braking. Adjustment of effective frictional retardation on a per truck basis is initiated by each "C-3" DECELOSTAT Control Valve.

C. The "E-5" DECELOSTAT Equipment also provides "zero speed" and "five mile per hour" indications.

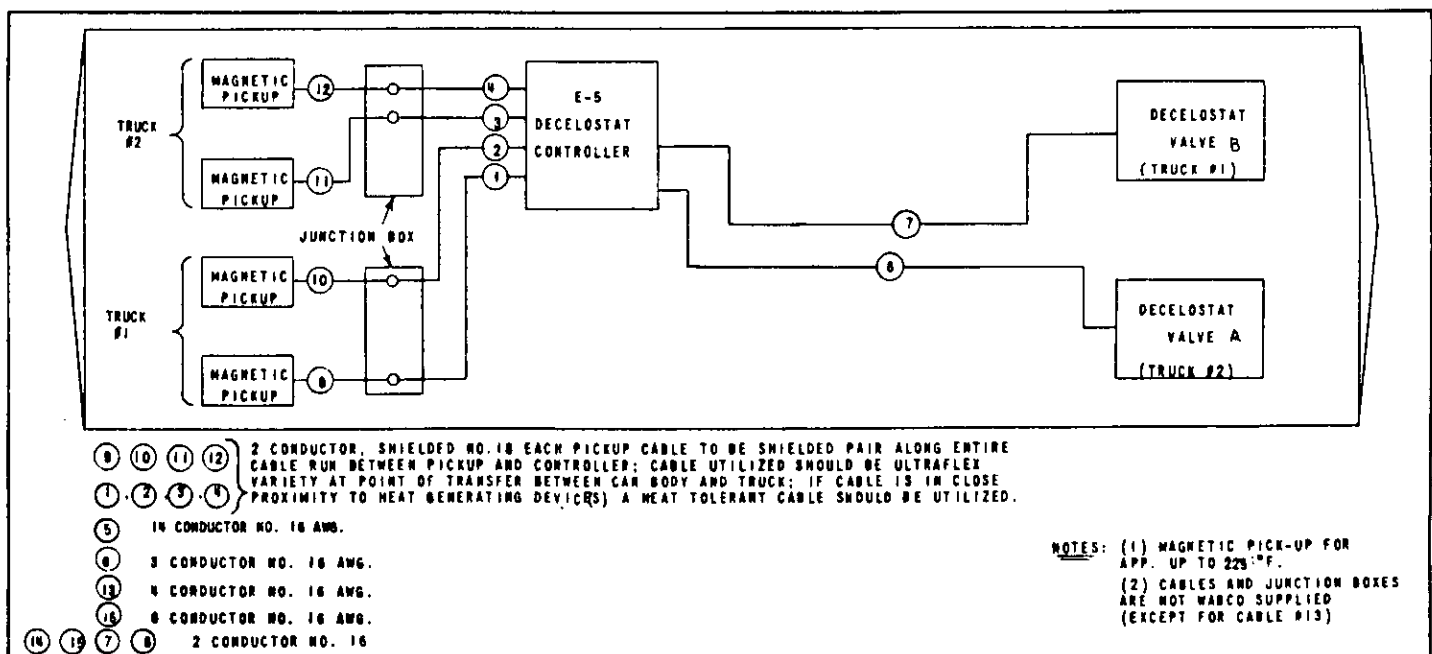


FIGURE 1 - CABLE DIAGRAM (BA-84775-306)



II. METHOD OF OPERATION

(Refer to Figure 2, the Functional Block Diagram, CA-84775-406)

A. PICKUP SIGNAL CONVERSION

1. The velocities of each of the four axles are registered by inboard, journal mounted, magnetic pickups. By sensing movement of teeth on a rotating gear, each pickup is intended to produce an A.C. signal output whose frequency is proportional to velocity.
2. The shaper and F/A (frequency to analog) converter portions of the "E-5" Electronics accepts the four frequency signals and converts them to D.C. analog voltage signals proportional to axle velocities. The differentiator portion of the electronics provides four additional D.C. analog voltage signals proportional to the rate of change (deceleration or acceleration) of the axle velocities.

B. SLIP CORRECTION

1. Rate Detection

- a. When any axle decelerates (slips) sufficiently so that the corresponding deceleration voltage signal exceeds a preset value equivalent to approximately -8 mphps, the "C-3" DECELOSTAT Control Valve for the affected truck should be automatically energized. "C-3" DECELOSTAT Control Valve energization signals a release of braking effort air on that truck.
- b. If the affected axle accelerates quickly through a regain of wheel to rail adhesion and the resultant acceleration voltage exceeds a preset value equivalent to approximately +6 mphps, termination of energization of the "C-3" DECELOSTAT Control Valve should occur, permitting jerk rate limited reapplication of braking effort air on that truck.
- c. Regardless, if the affected axle does not accelerate quickly enough to produce an acceleration voltage of sufficient magnitude (i.e. approximately +6 mphps) after a small time period (nominally one second) has elapsed, the circuitry is designed to terminate energization of the "C-3" DECELOSTAT Control Valve provided a velocity differential detection signal is not present.

2. Velocity Differential Detection During Braking

- a. The D.C. velocity voltage signals are compared, the highest (of all four) against each individually. If a velocity difference is detected by Westinghouse Air Brake Division electronics between any two axles that exceeds an established threshold value, the difference in velocity voltage signals will be of sufficient magnitude to energize the "C-3" DECELOSTAT Control Valve on the truck experiencing the low axle velocity, thus permitting a release of braking effort on that truck.
- b. When a sufficient adhesion is regained to cause the difference in velocity to reduce sufficiently below an established threshold value, and this change is transmitted to Westinghouse Air Brake Division electronics, termination of the "C-3" DECELOSTAT Control Valve energization should occur, permitting a jerk rate limited reapplication of braking air.
- c. Operation of the "C-3" DECELOSTAT Control Valve due to velocity differential detection takes precedence over an operation due to rate detection. However, when both occur simultaneously, the velocity differential must reduce below the established threshold before "C-3" DECELOSTAT Control Valve de-energization is permitted to occur.
- d. The established threshold velocity difference is a variable value determined by the maximum wheel diameter variance (due to wheel wear) translated into "mile per hour" figures. For an installation with new 36 inch diameter wheels and possible 3 inch diameter tread wear, the velocity difference threshold varies from approximately 14 mph at 120 mph car velocity to approximately 3 mph near zero car velocity.

3. Safety Interlocking

- a. The "E-5" DECELOSTAT Controller is protected by time relay interlocking. If for any reason, "C-3" DECELOSTAT Control Valve energization is requested for a time period exceeding six to eight seconds, a relay in series with the "C3" DECELOSTAT Control Valve is provided for the purpose of responding to this excessive delay by becoming de-energized for the purpose of effecting positive lockout and de-energization of the "C-3" DECELOSTAT Control Valve. Once the relay times out, subsequent energization of the "C-3" DECELOSTAT Control Valve is permitted.



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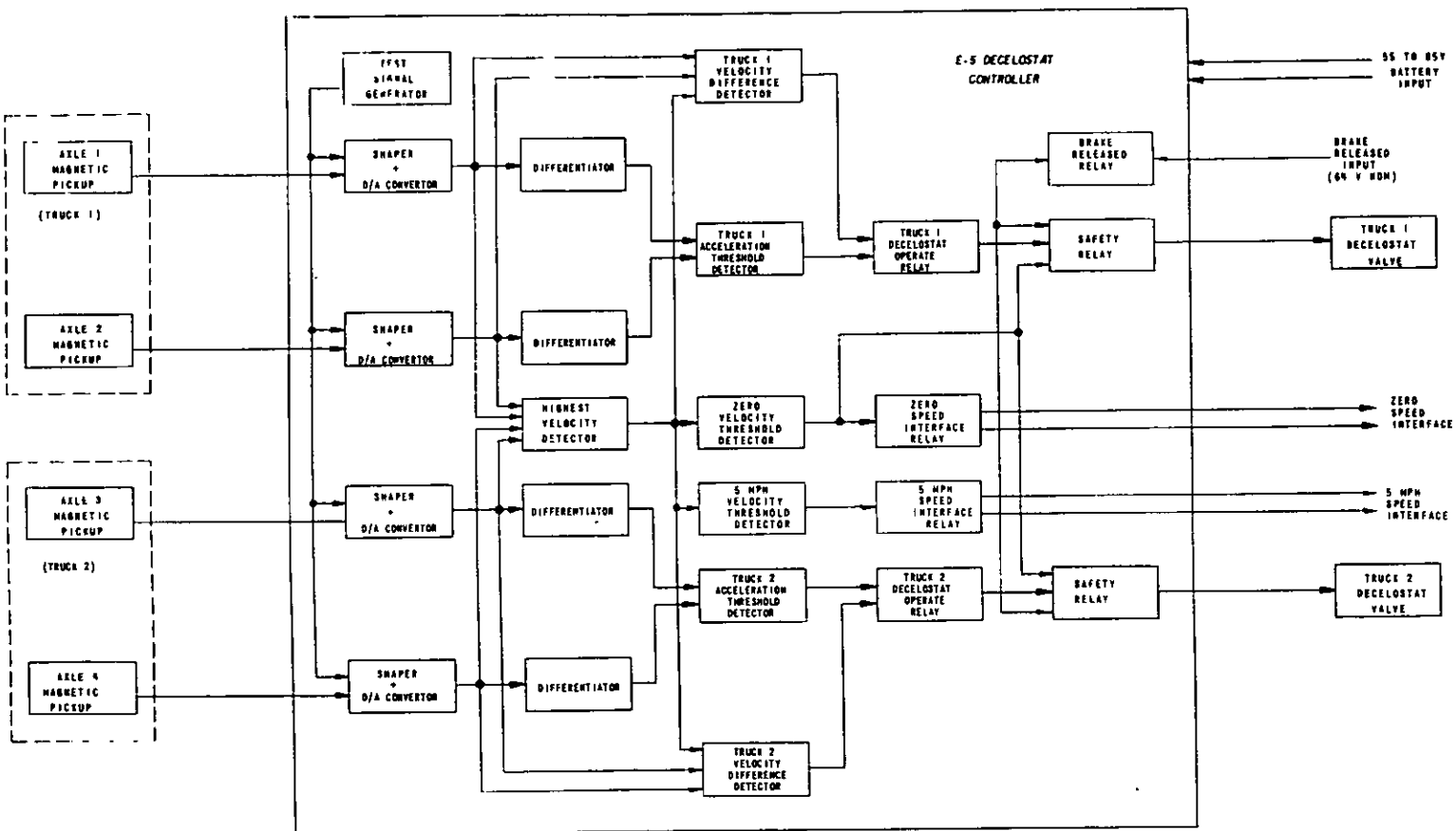


FIGURE 2 - "E-5" DECELOSTAT® CONTROLLER FUNCTIONAL DIAGRAM (CA-84775-406)



OSTAT Control Valve is inhibited until a brake release is initiated or a stop is made.

- b. A separate relay is provided in each DECELOSTAT Control circuit so that lockout is performed on a per truck basis. Lockout of one truck does not effect the operation of the "C-3" DECELOSTAT Control Valve on the other truck.
4. Zero Speed and Five M.P.H. Indication
- a. The Equipment has available a "zero speed" indication via a relay contact closure. Relay energization occurs when all four velocity voltage signals become less than a value equivalent to approximately three miles per hour.
 - b. The Equipment provides an approximate five mile per hour speed indication via a relay contact closure. Relay energization occurs when all four velocity voltage signals become less than a value equivalent to approximately five miles per hour.

III. GENERAL INFORMATION

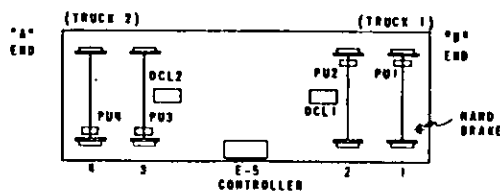
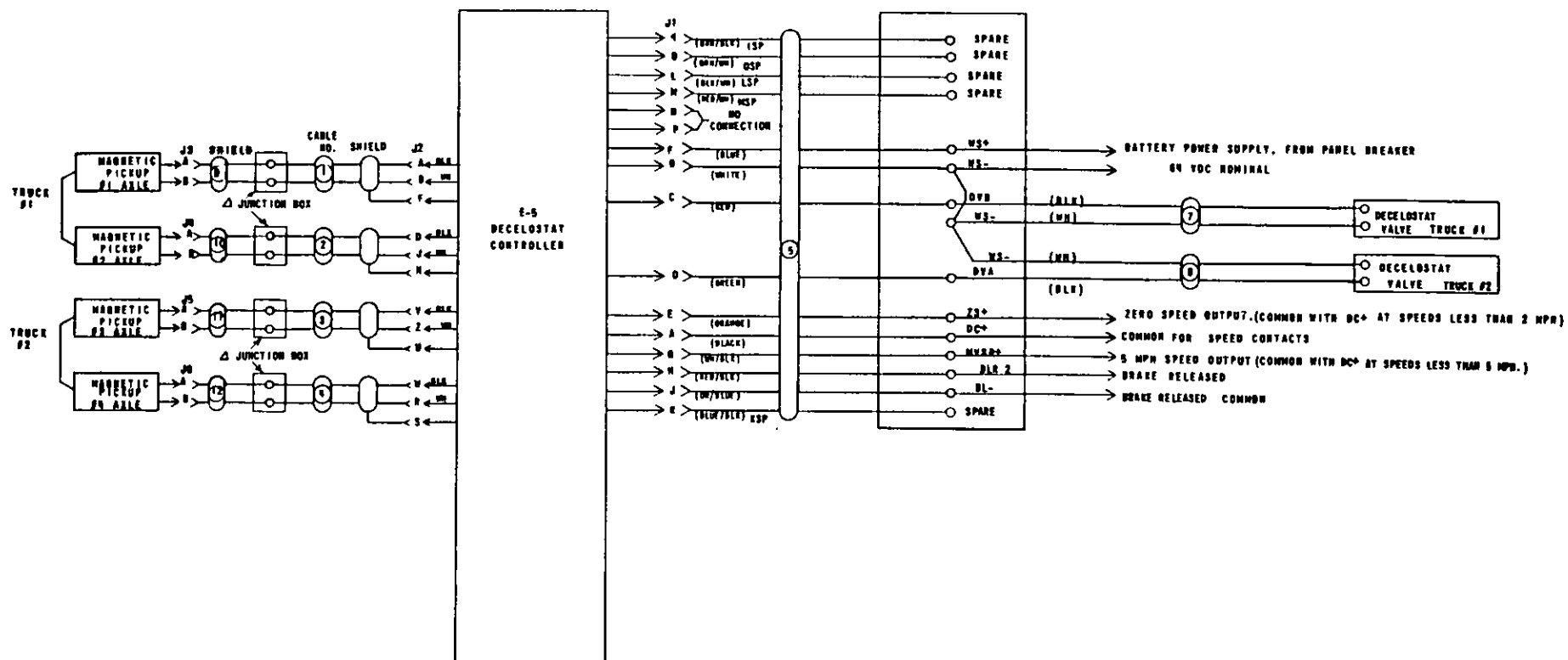
- A. The "E-5" DECELOSTAT Equipment operates on 64 volt nominal car battery supply, with 55 volt to 85 volt being the maximum acceptable voltage range.
- B. The "E-5" DECELOSTAT Controller is capable of operating in ambient temperatures of -40°F to $+150^{\circ}\text{F}$.
- C. Output impedance of zero and five mile per hour contacts is one ohm, since a current limiting resistor is provided in series with each contact. A 50 watt resistive contact output rating is provided for operation of the car interlock relays which are NOT supplied by the Westinghouse Air Brake Division of WABCO. The interlock relays are to be arc suppressed by the car builder.

- D. "E-5" DECELOSTAT Controller axle input impedance is 10K ohms. The Controller is insensitive to voltage of the incoming signal and can accept signals with voltages from one volt to several hundred volts peak to peak.

IMPORTANT

ALL PICKUP CABLES MUST BE SHIELDED FROM THE "E-5" DECELOSTAT CONTROLLER TO MAGNETIC PICKUP TO RESTRICT ANY POSSIBLE MALFUNCTION CAUSED BY STRAY CURRENTS.

- E. "E-5" DECELOSTAT Controller input impedance for the brake released signal is 2K ohms. The load is inductive and is arc suppressed.
- F. A self-contained test feature is included within the "E-5" DECELOSTAT Controller so that the integrity of the equipment may be readily tested. Five test switches within the controller are operated in simple sequence to perform the test. On-car testing information may be found in WABCO publication 4345-1 which covers the Operation and Maintenance Information on the "E-5" DECELOSTAT Controller Pc. No. 579565.
- G. Installation and Maintenance Procedure for the Magnetic Pickup Pc. No. 577907 as used in conjunction with the "E-5" DECELOSTAT Controller may be found in WABCO Publication 4345-1.1.
- H. Operation and Maintenance Information for the "C-3" DECELOSTAT Control Valve Pc. No. 579449 may be found in WABCO Publication 4227-11, S. 7A.
- I. Consult your Westinghouse Air Brake Division Representative for any additional information that may be required.



NOTES:

- 1-FOR CABLE CONSTRUCTION REFER TO DWG. 9A-84775-308
- 2-UNLESS OTHERWISE INDICATED ALL CONNECTOR DIAS. ARE #10 AWG.
- 3-Δ INTEGRITY OF SHIELD MUST BE MAINTAINED THROUGH JUNCTION BOXES.
- 4 - MAGNETIC PICK-UP FOR APP. UP TO 225°F.
- 5 - 1 OHM OUTPUT IMPEDANCE, 50 WATT CONTACT RATING.
- 6 - *CONTACTS RATED 125V DC - 10 AMPS.
- 7 - ONLY CONNECTORS SHOWN ARE SUPPLIED BY WABCO.
- 8 - INDICATED CABLES, JUNCTION BOXES, ELECTRICAL LOCKER, AND INDICATING LAMPS, ARE NOT SUPPLIED BY WABCO.

WABCO

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"E-5" DECELOSTAT® CONTROLLER, Pc.No. 579565

NOTE: THE FOLLOWING DESCRIPTION AND/OR OPERATION IS BASED ON THIS DEVICE BEING NEW OR THIS DEVICE HAVING BEEN REPAIRED, TESTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH INSTRUCTIONS ISSUED BY THE APPROPRIATE GOVERNING BODIES AND THIS AND ANY OTHER APPLICABLE WABCO PUBLICATIONS.

I. DESCRIPTION

- A. The "E-5" DECELOSTAT Controller is the principal component of the WABCO "E-5" DECELOSTAT wheel slip control equipment. Incorporating high quality solid state electronics, the Controller provides functional interlocking for accepting signals from the magnetic pickups on the vehicle axles and relaying these signals to call for specific pressure adjustments in braking effort during the time vehicle is in braking mode. The Controller, which is secured in place on the vehicle by four bolts or studs and nuts, has a dust resistant enclosure with a removable cover. Electrical connection to the car wiring may be made via two side mounted "MS" style environmental connectors.
- B. A functional description of the operation of the "E-5" DECELOSTAT Controller may be found in WABCO Publication 4345.
- C. **IMPORTANT:** The paragraphs on maintenance which follow will deal with on-car maintenance ONLY. If on-car testing indicates that electrical repair of the Controller is necessary, DO NOT ATTEMPT THE REPAIR ON THE CAR. REMOVE THE CONTROLLER FROM THE CAR AND TRANSPORT IT TO THE ELECTRICAL LABORATORY WHERE PROPER UTILIZATION CAN BE MADE OF NECESSARY TEST INSTRUMENTS AND REPAIR TOOLS.
- D. It is beyond the scope of this publication to consider the detailed electronic theory and operation within the controller.

**II. MAINTENANCE, AND TEST PROCEDURE
 (ON-CAR CHECK ONLY)**

⚠WARNING⚠

TO AVOID SEVERE ELECTRICAL SHOCK WHEN PERFORMING ELECTRICAL TESTS, HANDS MUST BE CLEAR OF TERMINAL CONTACTS AND ALL ELECTRICALLY ACTUATED DEVICES, AND THERE MUST BE NO BODY CONTACT WITH AREAS THAT COULD CAUSE A GROUND CONNECTION THROUGH THE BODY.

(SUPERSEDES ALL PREVIOUS ISSUES OF WABCO PUBLICATION 4345-1E5)

- A. The test procedures that follow will determine if the wheel slip detection equipment is operational and controlled by the "E-5" DECELOSTAT Controller.
- B. **IMPORTANT:** The following procedures MUST BE followed on a regular basis EVERY 120 DAYS, or when an "E-5" DECELOSTAT Controller is replaced, or whenever a malfunction is suspected, to prove the integrity of on-car operation of the "E-5" DECELOSTAT Controller as well as the operation of the "C-3" DECELOSTAT Valve(s) and the door lock interface. THE TEST IS TO BE MADE WITH AIR PRESSURE AND POWER APPLIED TO THE CAR.

C. GENERAL INFORMATION

I. ⚠WARNING⚠

PRIOR TO PERFORMING ANY TEST, DO THE FOLLOWING:

- a. APPLY A FULL SERVICE BRAKE APPLICATION TO THE CAR TO BE TESTED.
- b. APPLY HAND BRAKE FULLY AND CHOCK THE WHEELS TO PREVENT CAR MOVEMENT WHEN THE AIR BRAKE IS RELEASED IN ORDER TO PREVENT POSSIBLE PERSONAL INJURY CAUSED BY VEHICLE MOVEMENT.
2. The "E-5" DECELOSTAT Controller is equipped with a built-in test circuit. This circuit simulates output from the axle pickups as would be experienced on a moving car. It provides a convenient means of performing a functional checkout of the Controller under static conditions.
3. Activation and control of the test circuit is by operation of push buttons. Release of all push buttons should result in the equipment reverting to normal operational status.

IMPORTANT

DO NOT ATTEMPT TO DEFEAT THE ESTABLISHED, NORMAL, FINGER-OPERATED METHOD FOR-OPERATING THE PUSH BUTTONS.

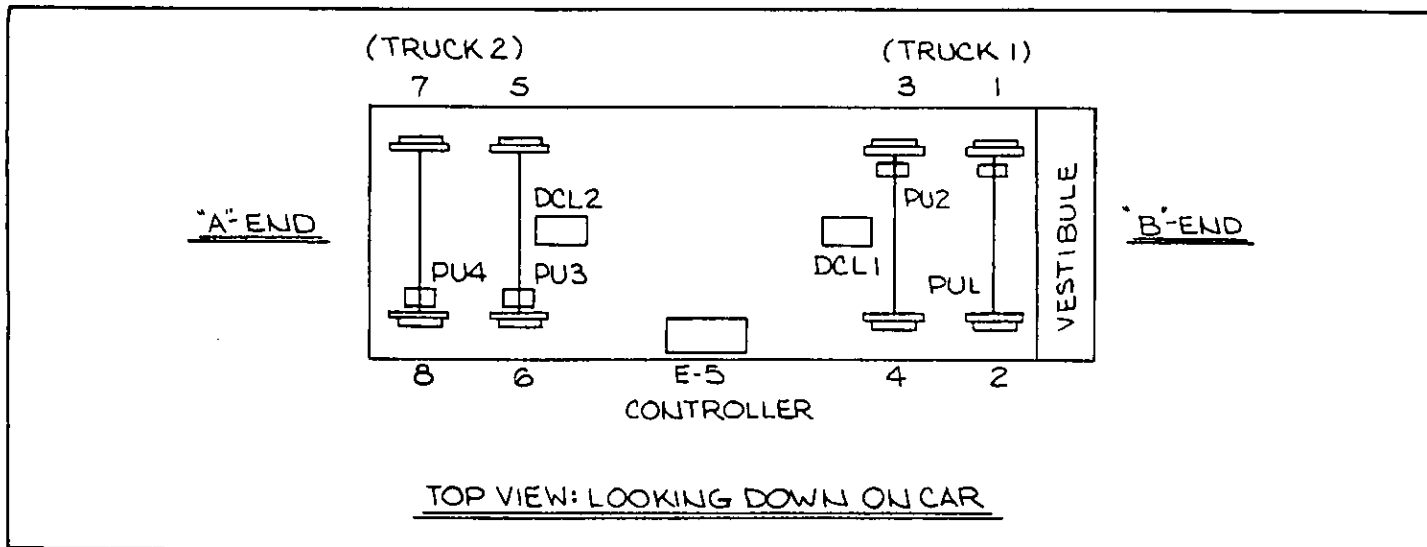


**FIGURE 1 - SUGGESTED LOCATION OF "E-5" DECELOSTAT WHEEL SLIP
EQUIPMENT ON AN AMFLEET CAR (AA-85082-416)**

Utilization of any auxiliary device to clamp or hold push buttons "IN" nullifies normal operation of the DECELOSTAT and is prohibited.

4. **NOTE:** If the "E-5" DECELOSTAT Controller is replaced with a known good unit and the same problem(s) exists the problem is probably in the vehicle wiring or elsewhere in the equipment arrangement.

2. Insure that power is applied to the equipment. On-car circuit breaker feeding power to the "E-5" Equipment should be "ON".

- a. Power switch on the "E-5" DECELOSTAT Controller should be "ON".
- b. "POWER ON" indicating lamp should be illuminated.

D. TEST PROCEDURE

NOTE: IF DURING THE TEST PROCEDURE, THE RESPONSE OF THE EQUIPMENT IS OTHER THAN THAT INDICATED, REFER TO SECTIONS II.E. OF THIS PUBLICATION.

⚠ WARNING ⚠

TO AVOID SEVERE ELECTRICAL SHOCK WHEN PERFORMING ELECTRICAL TESTS, HANDS MUST BE CLEAR OF TERMINAL CONTACTS AND ALL ELECTRICALLY ACTUATED DEVICES, AND THERE MUST BE NO BODY CONTACT WITH AREAS THAT COULD CAUSE A GROUND CONNECTION THROUGH THE BODY.

1. Remove the cover from the "E-5" DECELOSTAT Controller. Visually inspect the interior of the unit noting that no foreign material, water, etc. has entered the enclosure. Observe that all components, brackets, etc. are mechanically secured. Check integrity of gasket seal in the door lid.

3. Push test switch (PWR ON) "IN" and hold securely throughout the entire push button test (through step 7 of paragraph II.D.4.).
4. Operate the "E-5" DECELOSTAT Controller push button test switches in the following sequence observing correct response of the equipment. If during the test, the response of the equipment is other than that indicated, refer to Sections II.E. which follows the test procedure.

NOTE: A decal located on the inside of the lift-off cover presents, in diagram form, the same test sequence as follows:

STEP 1

0 mph lamp should be illuminated indicating that zero miles per hour output is "ON". (0 mph lamp illuminated indicates that the circuit should be made to door interlocks permitting doors to open upon request). 5 mph lamp should be illuminated indicating that five miles per hour output is "ON" (5 mph lamp illuminated indicates that the circuit should be made to door seal interlocks permitting door seals to deflate).



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For any given step, hold test switches T1, T2, T3, T4, "ON" in combination specified for a minimum of twelve seconds before proceeding to the next step.

STEP 2

Push test switches T1 and T2 simultaneously. 0 mph and 5 mph indicating lamps should extinguish. Indicating lamp DCL2 and the DECELOSTAT Valve on truck #2 should operate for approximately eight seconds and then terminate. (DECELOSTAT Valve actuation should be detected by the sound of a momentary exhaust of air).

STEP 3

Release T2 switch while holding T1 switch "ON". Indicating lamp and the DECELOSTAT Valve on truck #1 should operate for approximately eight seconds and then terminate.

STEP 4

Release T1 so that T1 through T4 are all in the "OUT" position. Indicating lamps 0 mph and 5 mph should illuminate.

STEP 5

Push test switches T3 and T4 simultaneously. Indicating lamp DCL1 and the DECELOSTAT Valve on truck #1 should operate for approximately eight seconds then terminate.

STEP 6

Release T3 while holding T4 "ON". Indicating lamp DCL2 and the DECELOSTAT Valve on truck #2 should operate for approximately eight seconds.

STEP 7

Release T4 so that T1 through T4 are all in the "OUT" position. Indicating lamps 0 mph and 5 mph should illuminate.

NOTE: Step 7 concludes the normal test sequence as would be utilized during car maintenance to check the operation of the "E-5" DECELOSTAT Equipment.

5. Release test switch (PWR ON).

6. **IMPORTANT:** Turn the power switch on the "E-5" DECELOSTAT Controller "OFF". Failure to implement may cause improper indications for subsequent tests.

7. Using an ohmmeter make the following checks. Insert one lead of the ohmmeter into test point (TP) 20 (Black) and insert the other lead into the test point listed in the tabulation which follows.

IMPORTANT: Be sure that the J2 connector is connected to "E-5".

Refer to Figure 1 for pick up locations.

a. To check Pick-Up #1 - connect lead from TP 20 (Black) to TP1 (Brown). Resistance reading to be 1,000 ohms, $\pm$ 200 ohms.

b. To check Pick-Up #2 - connect lead from TP 20 (Black) to TP2 (Red). Resistance reading to be 1,000 ohms, $\pm$ 200 ohms.

c. To check Pick-Up #3 - connect lead from TP 20 (Black) to TP3 (Orange). Resistance reading to be 1,000 ohms $\pm$ 200 ohms.

d. To check Pick-Up #4 - connect lead from TP 20 (Black) to TP4 (Yellow). Resistance reading to be 1,000 ohms, $\pm$ 200 ohms.

e. To check equipment installation - connect lead from TP 20 (Black) to the "E-5" DECELOSTAT Controller chassis. Resistance reading to be 1 megohm or greater.

f. Remove ohmmeter leads.

8. Turn the "E-5" DECELOSTAT Controller Power Switch "ON".

9. Make sure the J1 and J2 connectors are screwed on fully and fastened with lockwires Pc. No. 531741.

10. Attach the cover and tighten securely. Make sure the cover seal is intact and that both hinge pins are properly engaged.

11. Check the Magnetic Pickup for proper installation in accordance with WABCO publication 4345-1.1. After this check has been satisfactorily completed and the "E-5" DECELOSTAT Controller has passed all of the preceding tests, the "E-5" DECELOSTAT Equipment is ready to be put in service.

12. **CAUTION:** WHEEL CHOCKS ARE TO BE REMOVED BEFORE ATTEMPTING TO MOVE THE VEHICLE.

E. WHAT TO DO IF THE TEST SEQUENCE DOES NOT PRODUCE PROPER RESULTS

(Problem/Cause/Remedy)

NOTE: All Parts listed in this tabulation may be ordered from the Westinghouse Air Brake Division of WABCO.

PROBLEM	PROBABLE CAUSE	REMEDY
Visual inspection reveals foreign material in enclosure.	1. Damaged box areas especially at corners and/or around seal. 2. Gasket seal in door lid worn, damaged or destroyed. Both hinge pins not properly engaged. 3. Latches on enclosure and cover were loose before opening.	1. TURN POWER-SWITCH "OFF". Reinstall cover securely, remove J1 and J2 connectors and replace the Controller with a known good Controller. Reconnect the J1 and J2 connectors, secure connectors with NEW lockwires, Pc. No. 531741. TURN POWER-SWITCH "ON". 2. Same as Number 1. 3. TURN POWER-SWITCH "OFF". Dry any water and remove loose dirt and/or foreign material. Use a vacuum if available. TURN POWER-SWITCH "ON".
Loose components, etc.	Undetermined	1. TURN POWER-SWITCH "OFF". Reinstall the cover securely, remove the J1 and J2 connectors and replace the Controller with known to be good or new. Reconnect the J1 and J2 connectors, secure with NEW lockwires Pc. No. 531741. TURN POWER-SWITCH "ON".
"Power On" indicator not illuminated.	1. Bad Bulb 2. Fuse F-1 5A Bad 3. Voltage NOT correct at TP15 to TP14.	1. TURN POWER-SWITCH "OFF". Remove suspect bulb and replace with a bulb that is known to be good or a NEW bulb Pc. No. 579804. TURN POWER-SWITCH "ON". 2. TURN POWER-SWITCH "OFF". Remove the suspect F-1 fuse and replace it with a known good fuse of the exact same rating 5A(3AG) or a NEW fuse, Pc. No. 574084. TURN POWER-SWITCH "ON". 3. WITH THE POWER-SWITCH "ON", check the battery voltage between TP15 positive (red) and TP14 negative (black). Voltage should be between 55 to 85 volts DC. If no voltage is present, the problem is probably in the car wiring. If correct voltage is obtained, TURN THE POWER-SWITCH "OFF", reinstall the cover

		securely, remove the J1 and J2 connectors and replace the Controller with one that is known to be good or a NEW Controller. Reconnect the the J1 and J2 connectors, secure the connectors with NEW lockwires, Pc. No. 531741. TURN POWER-SWITCH "ON".
1. 0mph and 5mph lamps do not illuminate.	1. Bad Bulb(s) 2. Fuse F-2 2A. 3. Undetermined	1. TURN POWER-SWITCH "OFF". Remove suspect bulb(s) and replace with a known to be good or NEW bulb(s) Pc. No. 579804. Take care NOT to interchange caps. TURN POWER-SWITCH "ON". 2. TURN POWER-SWITCH "OFF". Remove the suspect fuse and replace with a known to be good or NEW F-2 2A fuse of the exact same rating, 2A (3AG) Pc. No. 576663. TURN POWER-SWITCH "ON". 3. TURN POWER-SWITCH "OFF". Reinstall cover securely, remove the J1 and J2 connectors and replace the Controller with a known to be good or NEW Controller. Reconnect the J1 and J2 connectors, secure the connectors with NEW lockwires, Pc. No. 531741. TURN POWER-SWITCH "ON".
0mph and 5mph lamps stay illuminated.	1. Malfunction in Controller.	1. TURN POWER-SWITCH "OFF". Reinstall cover securely, remove J1 and J2 connectors and replace the Controller with a known good or NEW Controller. Reconnect the J1 and J2 connectors, secure the connectors with NEW lockwires, Pc. No. 531741. TURN POWER-SWITCH "ON".
Proper DCL lamp does not operate.	1. Bad Bulb 2. Malfunctioning Magnetic Pick-Up. 3. Undetermined	1. TURN POWER-SWITCH "OFF". Remove the suspect bulb and replace it with a known good or NEW bulb, Pc. No. 579804. Take care NOT to interchange caps. TURN POWER-SWITCH "ON". 2. Remove the J2 Connector from the Controller. Return to the test procedure paragraph II.D.4. step 1 of this publication. 3. TURN POWER-SWITCH "OFF". Reinstall the cover securely, remove the J1 and J2 connectors. Replace the Controller with a known good or NEW Controller. Reconnect the



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		J1 and J2 connectors, secure the connectors with NEW lockwires, Pc. No. 531741. TURN POWER-SWITCH "ON".
Proper DECELOSTAT Valve did not operate simultaneously with proper DCL lamp.	1. Air not applied to car. 2. Undetermined	1. Apply air to car. WARNING: MAKE SURE ALL PERSONNEL ARE CLEAR OF CAR TO PREVENT POSSIBLE BODILY INJURY FROM AIR OPERATED DEVICES. 2. It is probable that the "E-5" DECELOSTAT Controller is operating properly and that the difficulty is either with the car wiring interface or other car devices, such as the "C-3" DECELOSTAT Valves, etc.
Improper resistance reading obtained at TP1, TP2, TP3 or TP4.	1. Malfunctioning Magnetic Pick-Up. 2. Suspect Wiring	1. Disconnect the cable from the Magnetic Pick-Up. Measure the resistance of the Pick-Up. Resistance reading should be 1,000 ohms, $\pm$ 200 ohms. a. If the resistance reading is 1,000 ohms $\pm$ 200 ohms the problem is NOT in the Magnetic Pick-Up. b. If the resistance reading is not 1,000 ohms $\pm$ 200 ohm the Magnetic Pick-Up should be replaced. If the Magnetic Pick-Up used in the equipment is Pc. No. 577907 refer to WABCO Publication 4345-1.1 for correct installation procedure. 2. Locate suspect wiring and replace or repair. WARNING: MAKE SURE POWER IS "OFF" BEFORE STARTING REPAIRS TO PREVENT ELECTRICAL SHOCKS.
Improper resistance reading obtained at chassis.	1. Suspect Wiring	1. Check car wiring and/or check to see if Pick-Up Shield is shorted to car body. Correct and/or replace.
Problems NOT previously covered.	1. Undetermined	1. WARNING: TO AVOID SEVERE ELECTRICAL SHOCK WHEN PERFORMING ELECTRICAL TESTS, HANDS MUST BE CLEAR OF TERMINAL CONTACTS AND ALL ELECTRICALLY ACTUATED DEVICES, AND THERE MUST BE NO BODY CONTACT WITH AREAS THAT COULD CAUSE A GROUND CONNECTION THROUGH THE BODY. TURN THE POWER-SWITCH "OFF". Reinstall the cover securely. Remove J1 and J2 Con-



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nectors and replace the Controller with a known good or NEW Controller. Reconnect the J1 and J2 Connectors, secure the connectors with NEW lockwires Pc. No. 531741. TURN POWER-SWITCH "ON".

F. ADDITIONAL INFORMATION

- I. Consult your Westinghouse Air Brake Division Representative if additional information is required or when service is required on the "E-5" DECELOSTAT Controller.



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INSTALLATION AND MAINTENANCE PROCEDURE FOR MAGNETIC PICKUP Pc.No. 577907, AS USED IN CONJUNCTION WITH THE "E-5"/"E-5-A" DECELOSTAT® CONTROLLER

NOTE: THE FOLLOWING DESCRIPTION AND/OR OPERATION IS BASED ON THIS DEVICE BEING NEW OR THIS DEVICE HAVING BEEN REPAIRED, TESTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH INSTRUCTIONS ISSUED BY THE APPROPRIATE GOVERNING BODIES AND THIS AND ANY OTHER APPLICABLE WABCO PUBLICATIONS.

I. GENERAL INFORMATION

NOTE: All Piece Numbers (Pc. No.) used in this publication indicate parts which may be obtained from the Westinghouse Air Brake Division of WABCO.

A Magnetic Pickup - Pc. No. 577907, Connector - Pc. No. 579533, a Pickup Housing, and a Gear comprise one of the axle speed detection sources utilized by the "E-5"/"E-5-A" DECELOSTAT Controller. (Consult your Westinghouse Air Brake Division Representative for piece numbers for specific installations). Attention to the procedures that follow will assist in extending the life and performance of the Magnetic Pickup Assembly.

II. PROCEDURE FOR INSTALLING OR REPLACING MAGNETIC PICKUP, Pc. No. 577907

⚠ WARNING ⚠

PORTIONS OF THIS PROCEDURE REQUIRE THE WORKMAN TO BE UNDER THE VEHICLE. THE WHEELS OF THE VEHICLE MUST BE CHOCKED AND THE HAND BRAKE MUST BE FULLY APPLIED TO PREVENT MOVEMENT OF THE VEHICLE SHOULD THE BRAKES RELEASE DURING TESTING. ALL POSSIBLE PRECAUTIONS MUST BE TAKEN TO INSURE THE SAFETY OF INDIVIDUALS AND EQUIPMENT.

⚠ WARNING ⚠

PERSONAL EYE PROTECTION MUST BE WORN WHEN PERFORMING ANY PROCEDURE TO PREVENT POSSIBLE INJURY TO THE EYES.

A. TOOLS

1. The following tools MUST BE available:

- 3/4" twelve point deep well socket wrench
- Insertion tool - Pc. No. 582059
- Gapping tool - Pc. No. 583690

(SUPERSEDES ALL PREVIOUS ISSUES OF 1345-1E5, Sup. 1)

d. Simpson Meter or equivalent

B. CAUTION: Exercising care so that the wire eye of the MS Connector, Pc. No. 579533 is not sheared off, cut and remove the old sealing wire from the Connector.

1. IMPORTANT: If the Connector has the identification number MS3106F-10SL-4S stamped on it, it will require no modification.

2. IMPORTANT: If the Connector has the identification number MS3106E-10SL-4S a new o-ring, Pc. No. 583487 MUST BE added to the barrel of the MS Connector.

C. PICKUP REPLACEMENT

- Using the 3/4" deep-well socket wrench, loosen the lock nut and remove the pickup from the housing.
- Place a NEW pickup with lock nut in place on the insertion tool, Pc. No. 582059, and proceed to screw the pickup and lock nut onto the pickup housing.

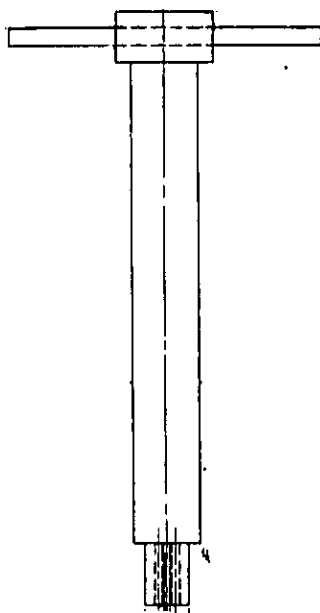
CAUTION

CAREFULLY CHECK AND PROTECT THE DOUBLE PINNED CONNECTOR CAVITY OF THE MAGNETIC PICKUP FROM DIRT AND/OR METALLIC MATERIAL. DIRT AND/OR METALLIC MATERIAL COULD LEAD TO A MALFUNCTION OF THE PICKUP CIRCUIT BY ALLOWING ELECTRICAL "SHORT CIRCUITS" TO OCCUR.

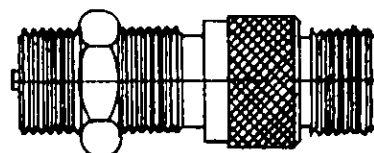
- Insert the 0.030" blade marked "SET" of the Magnetic Pickup Air Gapping Tool, Pc. No. 583690, between the toothed gear and pickup location while continuing to run the Magnetic Pickup down into the housing.
- Once the gapping tool feels snug, place a 3/4" deep well socket wrench down over the Magnetic Pickup and tighten the lock nut with the gapping tool still in position.
- Insert the 0.020" blade, marked "GO", of the Magnetic Pickup Air Gapping tool. If the blade slides between the Magnetic Pickup and Gear



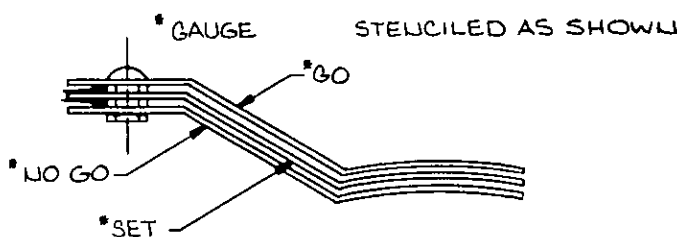
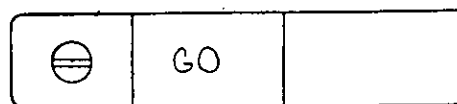
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MAGNETIC PICKUP INSERTION TOOL
Pc.No. 582059



MAGNETIC PICKUP
Pc.No. 577907



MAGNETIC PICKUP AIR GAPPING TOOL
Pc.No. 583690

FIGURE 1

proceed to step 6. If the blade DOES NOT slide between the Magnetic Pickup and the Gear loosen the lock nut with a 3/4" deep well socket wrench and back out the Magnetic Pickup until the 0.030" blade marked "SET" can be inserted. Return to step 3 and repeat procedures.

6. Insert the 0.035" blade, marked "NO GO", of the Magnetic Air Gapping tool between the Magnetic Pickup and Gear. If the blade can be inserted loosen the lock nut with a 3/4" deep well socket wrench and back out the Magnetic Pickup. Return to step 3 and repeat procedure. If the blade CANNOT be inserted continue procedure.

D. Add the MS Connector and tighten the coupling nut to seal properly.

1. If there is any question as to the correct wiring of the Magnetic Pickups, one (1) connector per truck can be left off. During the continuity test, the connector can be attached to the pickup momentarily and the meter should respond accordingly. The pickup in question should correspond with the "Test Point (TP) - Pickup (PU) and/or Test Lug (TL)" on the circuit card.

- a. For example, if the Connector to Pickup Number 1 on Axle Number 1 is temporarily

disconnected, the meter would indicate infinity, since no continuity is made. Once the connector is attached to the Magnetic Pickup, a resistance reading of 800 to 1200 ohms should be noted. The meter will swing back to infinity when the connection is broken.

- b. After it is established that the car wiring is correct, the MS Connector can be securely fastened, and a NEW lockwire added as per the procedure of paragraph E.

- E. Using a NEW lock wire WABCO Part Number 534542, secure the Coupling Nut by twisting the wire around the connector body in the direction of tightening, and "tie" the wire to the top hole of the Cannon Connector. **CAUTION:** Exercise care to prevent breaking of the "eye" on the Connector by over tightening the lock wire.

- F. Perform an "ON CAR" Test of the "E-5"/"E-5-A" DECELOSTAT Controller. Consult your Westinghouse Air Brake Division Representative for current testing information.

- G. **IMPORTANT:** The Cannon Connector MUST NOT be removed from the pickup once the preceding procedures have been completed unless the Magnetic Pickup malfunctions. The Magnetic Pickup and the Connector end of the Pickup will attract all ferrous



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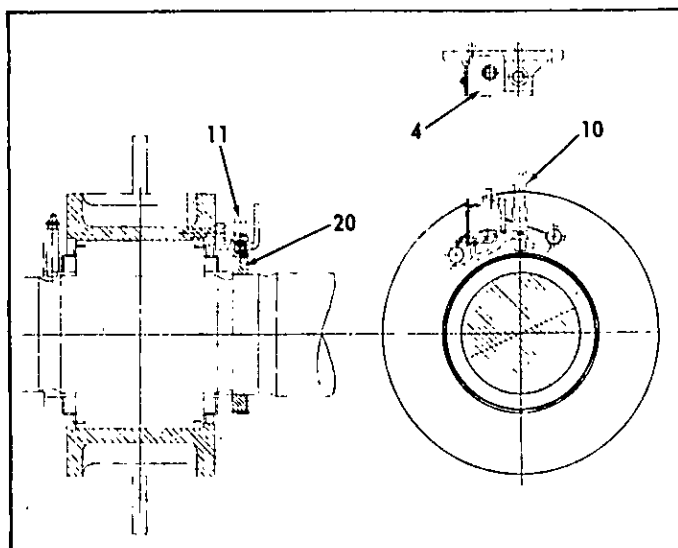


FIGURE 2

material. Any foreign material introduced in this area could cause a "short-out" from any one pin to the body (case), or even between pins. Maintenance in this area MUST BE limited to checking the 0.030" gap and blowing off any excessive buildup of dirt on the ring gear between the teeth.

⚠ WARNING ⚠

A LOW PRESSURE (LESS THAN 30 PSIG) JET OF CLEAN, DRY AIR IS TO BE USED TO BLOW PARTS CLEAN. ANY OTHER PROCEDURE WILL ONLY CONTRIBUTE TO EQUIPMENT MALFUNCTION BY CONTAMINATION OF PARTS. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY. DO NOT DIRECT THE AIR JET TOWARD ANOTHER PERSON.

H. Consult your Westinghouse Air Brake Division Representative if additional information is required.

III. MAINTENANCE PROCEDURE FOR THE MAGNETIC PICKUP Pc. No. 577907

A. General Information

(Refer to Figure 2, reference numbers shown in brackets)

1. The Magnetic Pickup (11); Connector (10); Pickup Housing (4); and a Gear (20) comprise one of the axle speed detection sources utilized by the "E-5"/"E-5-A" DECELOSTAT Controller.

2.

⚠ WARNING ⚠

THE MAINTENANCE PROCEDURE REQUIRES THE WORKMAN TO BE UNDER THE VEHICLE. THE WHEELS OF THE VEHICLE MUST BE CHOCKED AND THE HAND BRAKE MUST BE FULLY APPLIED TO PREVENT MOVEMENT OF THE VEHICLE SHOULD THE BRAKES RELEASE DURING MAINTENANCE. ALL POSSIBLE PRECAUTIONS MUST BE TAKEN TO INSURE THE SAFETY OF INDIVIDUALS AND EQUIPMENT.

3. IMPORTANT

THE MAINTENANCE INTERVAL MUST BE ON A SUSTAINED PERIODIC BASIS (NO GREATER THAN 120 DAYS) TO COINCIDE WITH THAT OF THE "E-5" OR "E-5-A" DECELOSTAT CONTROLLER OF THE VEHICLE.

4. CAUTION

THE CANNON CONNECTOR MUST NOT BE REMOVED FROM THE MAGNETIC PICKUP DURING MAINTENANCE TESTING UNLESS THE PICKUP MALFUNCTIONS.

5.

⚠ WARNING ⚠

PERSONAL EYE PROTECTION MUST BE WORN WHEN PERFORMING ANY WORK OR TEST PROCEDURE TO PROTECT THE EYES FROM POSSIBLE INJURY.

B. Maintenance Procedure

1. IMPORTANT: The Magnetic Pickup and the connector end of the Pickup will attract any ferrous material. These two components must remain together with the lockwire intact to prevent foreign material from getting "inside" to cause a "short-out" between the body (case) and connector pins or between pins.
2. IMPORTANT: Maintenance in this area MUST BE limited to checking the 0.030" (+ 0.005", -0.010") gap and using a low pressure (less than 30 psig) jet of clean, dry air to blow off any excessive buildup of dirt. ANY OTHER PROCEDURES WILL ONLY CONTRIBUTE TO EQUIPMENT MALFUNCTION BY CONTAMINATION OF PARTS.

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C. Gear Inspection

1. If the gear is found misaligned or bent during visual inspection it **MUST** be replaced.
2. Undesirable tooth wear will be indicated during visual inspection by broken or marred teeth. Each tooth which looks as if it has undesirable wear **MUST** be measured from the base of the tooth to the top of the tooth. If the tooth depth is less than 0.1775" the tooth **MUST** be condemned.
3. If two or more teeth on one gear are condemned the whole gear **MUST** be replaced or the gear may be turned down to a tooth height of **NOT LESS** than 0.14".
4. A gear with two or more teeth less than 0.14" in depth **MUST** be replaced.

D. Corrective Maintenance Procedure

CONDITION OBSERVED	CAUSE	REMEDY
1. Dirt on Gear and Magnetic Pickup	1. Over the road operation, i.e., trackbed dust, rain spray, oil vapor, grease. 2. Dirt sticks to Gear and Magnetic Pickup after being blown off.	1. Blow off any buildup of dirt on gear and Magnetic Pickup with a hand held air pump (basketball pump). 2. Clean the Gear by brushing across the teeth with a soft brush. DO NOT USE A METAL (WIRE) BRUSH. Clean the Magnetic Pickup by brushing with a soft brush. DO NOT USE A METAL (WIRE) BRUSH. Repeat step 1.
2. Gear teeth missing, damaged, or Gear showing signs of marking by Magnetic Pickup.	1. Gear struck by roadbed debris. 2. Improper clearance adjustment between Gear and Magnetic Pickup initially.	1. Replace Gear if more than one tooth is missing. Replace Gear if more than one tooth has a depth (height) less than 0.1775". 2. See Installation Procedure Section II. of this Publication.
3. Loose Magnetic Pickup locknut.	1. Improperly tightened at assembly.	1. See Section II of this publication for correct gapping of Magnetic Pickup and assembly procedure.
4. Loose connector or lockwire missing.	1. Lockwire not installed at assembly. 2. Connector loosened by road vibration with lockwire missing. 3. Lockwire broken by debris allowing connector to loosen.	1. See Section II of this publication for correct procedure for tightening connector and lockwire replacement.
5. Gap between Gear and Magnetic Pickup does not measure between "GO" (0.020") and "NO GO" (0.035").	1. Improperly set at assembly. 2. Loose Magnetic Pickup locknut allows Pickup to move.	1. See Section II of this publication for correct procedure for setting gap and tightening Connector and Magnetic Pickup.



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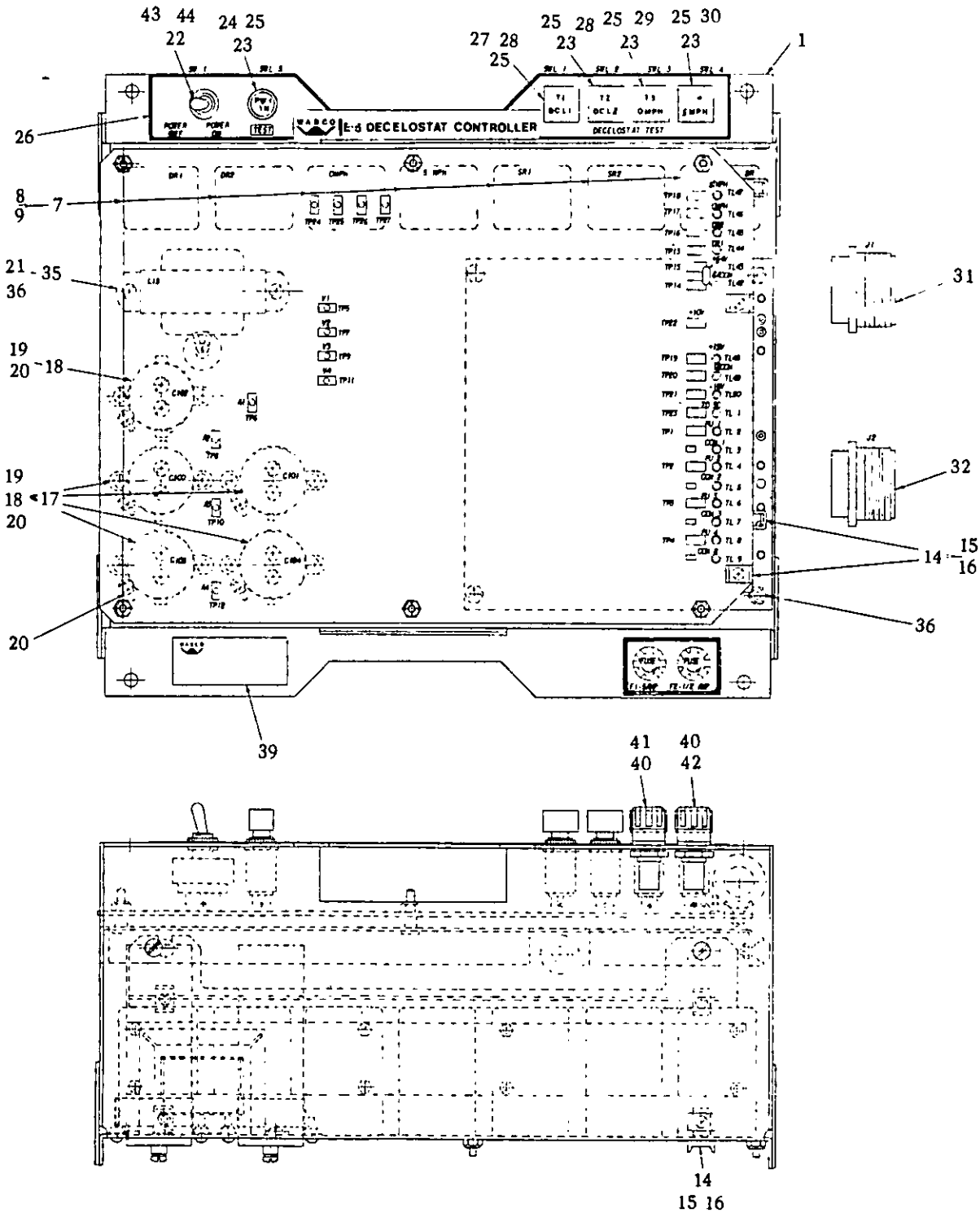
An American-Standard Co

"E-5" **DECELOSTAT[®] CONTROLLER**

PARTS CATALOG

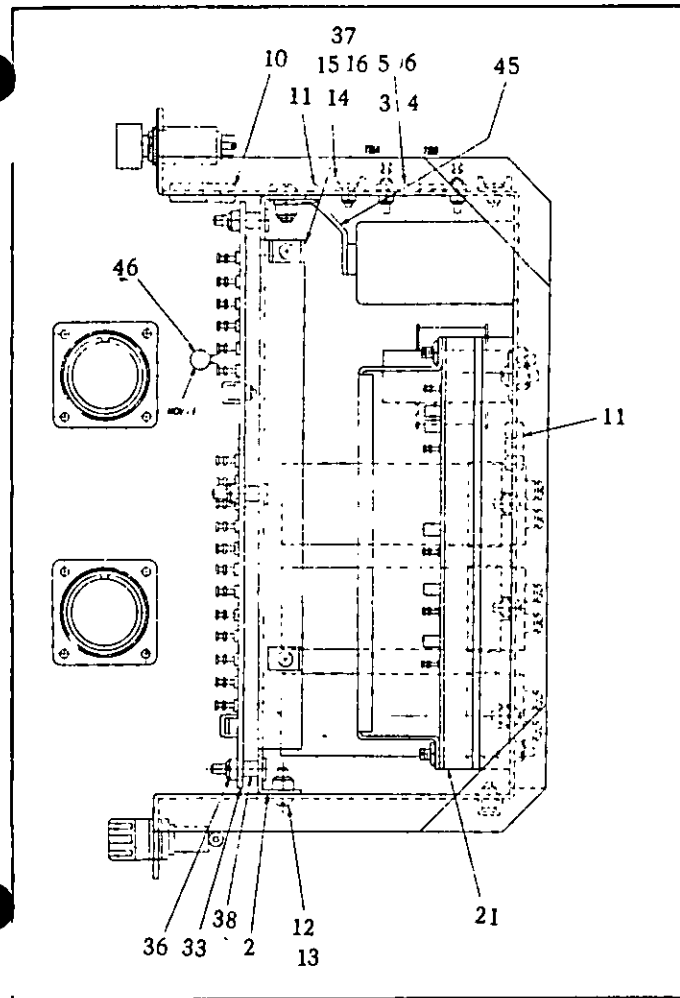
Westinghouse Air Brake Division

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'E-5' DECELOSTAT® CONTROLLER - INDEX



'E-5' DECELOSTAT® CONTROLLER

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	579640	"E-5" CONTROLLER PORTION, ASY.	
1-1	579698	.CHASSIS (Incl. Ref. 2, 12 & 13) . .	1
1-2	579697	.PLATE, Chassis	1
1-3	579695	.BOARD, Terminal	1
1-4	579696	.INSULATION, Board	1
1-5	553636	.SCREW, Mach. Rd. Hd., #4 x 1/2 in..	8
1-6	558631	.NUT, Stop, #4	8
1-7	579610	.RELAY, with Mounting Hardware .	7
1-8	578086	.COVER, Relay	7
1-9	579611	.CLIP, Cover	7
1-10	578136	.GROMMET, 7/8 in. Dia. Hole. . .	1
1-11	577271	.GROMMET, 9/16 in. Dia. Hole . .	2
1-12	568868	.SCREW, Rd. Hd. Mach., #10-32 x 5/8 in.	4
1-13	520514	.NUT, Stop, #10-32.	4
1-14	579798	.MOUNT, Tie, Panduit - TM258 . .	10
1-15	558631	.NUT, Stop, #4	10
1-16	42521	.SCREW, Fl. Hd. Mach., #4 x 5/16 in.	10
17	579633	.CAPACITOR, 1000 MFD, 100 VDC (C-100, C101, C103 and C104) . .	4
18	578416	.CLAMP, Capacitor	5
1-19	568872	.SCREW, Rd. Hd. Mach., #6-32 x 1/2 in.	10
1-20	527798	.NUT, Stop, #6-32	10

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
	579565	"E-5" DECELOSTAT CONTROLLER, Asy.	
	579640	.CONTROLLER PORTION, Asy. See Fig. 1	1
	579700	.CABINET (Not Shown)	1
	574080	.NUT, Stop, 1/4 in. (Not Shown) . .	4
■	579613	.GASKET, Receptacle, J-1 & J-2 . .	2
■	568855	.SCREW, Rd. Hd. Mch., #6 x 5/8 in.	8
■	527798	.NUT, Stop, #6	8
	579642	.PLATE, Name (Not Shown).	1
	556255	.THREAD PROTECTOR	2
	580044	.DECAL, Test Procedure	1
	539160	.WIRE, Sealing	1
		.INSULATION, Fish paper (15.75 x 13.75 x .010 Thk)	1

■ NOTE: Used to attach "J-1" and "J-2" Receptacle (Ref. 31 & 32) to Controller, Not Shown.

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-21	579838	.POWER SUPPLY (EWC Inc.)	1
1-22	579837	.SWITCH, Toggle, Arrowhart #82606 SW1	1
1-23	579817	.SWITCH, Push Button.	5
1-24	579803	.CAP, Round, Push Btn., Green (PWR-ON)	1
1-25	579804	.LAMP, T-1-3/4 28 V.	5
1-26	579833	.PLATE, Identification	1
1-27	579799	.CAP, 3/4 in. Sq. Push Btn., White (T1-DCL1).	1
1-28	579800	.CAP, 3/4 in. Sq. Push Btn., White (T2-DCL2).	1
1-29	579801	.CAP, 3/4 in. Sq. Push Btn., White (T3-0 MPH)	1
1-30	579802	.CAP, 3/4 in. Sq. Push Btn., White (T4-5 MPH)	1
1-31	579608	.RECEPTACLE, J-1 MS3102E-24-7P	1
1-32	577987	.RECEPTACLE, J-2 MS3102E-24-28P	1
1-33	579830	.PRINTED CIRCUIT BOARD, Asy. (See NOTE ▲)	1
1-35	568854	.SCREW, Rd. Hd. Mch., #8-32 x 1/2 in.	2
1-36	542070	.NUT, Stop, #8-32	12
1-37	573445	.STRAP, Wire Bundling	59
1-38	578582	.SPACER, #8 x 1/4 in.	6
1-39	579641	.PLATE, Name	1
1-40	575122	.HOLDER, Fuse.	2
1-41	574084	.FUSE, 5 AMP - F-1	1
1-42	576663	.FUSE, 2 AMP - F-2	1
1-43	579834	.WASHER, Lock.	1
1-44	579835	.RING, Locating.	1
1-45	579845	.BRACKET, Relay, Hold-down . . .	1

NOTE: 2 are part of Printed Circuit Board, Ref. 33



THE FOLLOWING ELECTRICAL ITEMS ARE NOT SHOWN

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
▲	578258	.RESISTOR, 1 OHM - 3-1/4 W (R-300, R-303, R-306, R-307)	4
▲	579754	.RESISTOR, 2K-5W-5% (R-313). . .	1
▲	575369	.RESISTOR, 100 OHM - 3-1/4 W (R-302, R-305)	2
▲	579755	.RESISTOR, 1.2K-5W-5% (R-308, R-309, R-310, R-311, R-312) . .	5
▲	576188	.DIODE, Zener, IN3046 (D-108, D109)	2
▲	575135	.DIODE, IN4004 (D-105, D-106, D-107)	3
▲	575135	.DIODE, IN4004 (D101, D102, D103, D104 for Relays DR1, DR2, 0 MPH & 5 MPH)	4
▲	579718	.RESISTOR, 5.11 K - 1/8 W - 1% (R5, R11, R21, R27, R37, R43, R53, R59, R69, R78, R86, R95, R102, R158, R109, R118, R126, R135, R148, R155, R168, R175, R182, R163, R190, R151, R171, R178, R184, R192, R142 and R258)	32
▲	579719	.RESISTOR, 100K-1/8W-1% (R6, R22, R38, R54, R67, R84, R107 and R124)	8
	579706	.RESISTOR, 1K-1/8W-1% (R7, R12, R23, R28, R39, R44, R55, R60, R164, R65, R80, R82, R97, R105, R120, R122, R101, R137, R141, R200, R207, R210, R213, R216, R236 and R237)	26
▲	579720	.RESISTOR, 10K-1/8W-1% (R8, R9, R10, R24, R25, R26, R40, R41, R42, R56, R57, R58, R71, R73, R79, R88, R90, R96, R111, R113, R119, R128, R130, R136, R145, R146, R160, R161, R162, R165, R166, R252, R253, R254, R255, R257, R153, R154, R173 and R174)	40
▲	579707	.RESISTOR, 820 OHM - 1/2 W-5% (R259)	1
▲	579721	.RESISTOR, 4.22K - 1/8W - 1% (R15, R31, R47, R63, R68, R85, R108, R125)	8
▲	579708	.RESISTOR, 8.25K - 1/8W - 1% (R70, R87, R110, R127)	4
▲	579722	.RESISTOR, 196K - 1/8W - 1% (R72, R89, R112 and R129)	4
▲	579709	.RESISTOR, 1.1K - 1/8W - 1% (R76, R93, R116 and R133)	4
▲	579710	.RESISTOR, 5.62K - 1/8W - 1% (R180 and R188)	2
	579711	.RESISTOR, 162K - 1/8W - 1% (R81, R98, R121 and R138)	4
▲	579712	.RESISTOR, 21.5K - 1/8W - 1% (R99, R100, R139 and R140)	4
▲	579891	.RESISTOR, 2K - 1/8W - 1% (R196 and R199)	2

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
▲	579895	.RESISTOR, 61.9K - 1/8W - 1% (R181)	1

▲ NOTE: Part of Printed Circuit Board, Ref. 33.

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
▲	579717	.RESISTOR, 38.3K-1/8W-1% (R3, R4, R19, R20, R35, R36, R51 and R52)	8
▲	579723	.RESISTOR, 2K-1/2W-5% (R260) . .	1
▲	579714	.RESISTOR, 14.7K-1/8W-1% (R147, R167, R198 & R238)	4
▲	579713	.RESISTOR, 511 OHM - 1/8W-1% (R103, R143, R186 and R194) . .	4
▲	579715	.RESISTOR, 46.4K-1/8W-1% (R150, R157, R170, R177, R183 and R191) .	6
▲	579724	.RESISTOR, 147 OHM-1/8 W-1% (R152, R159, R172 and R179) . . .	4
▲	579892	.RESISTOR, 522 OHM-1/8W-1% (R261 thru R268)	8
▲	579725	.RESISTOR, 221 OHM-1/8W-1% (R185)	1
▲	579726	.RESISTOR, 332 OHM-1/8W-1% (R193)	1
▲	579727	.RESISTOR, 1.5M-1/8W-1% (R244, R245, R246 and R247)	4
▲	579757	.RESISTOR, 52.3K-1/8W-1% (R189) .	1
▲	579733	.RESISTOR, 1.47K-1/8W-1% (R202 and R234)	2
▲	579729	.RESISTOR, 3.16K-1/8W-1% (R204, R74, R91, R114, R131 & R273) . .	6
▲	579731	.RESISTOR, 19.6K-1/8W-1% (R233) .	1
▲	579728	.RESISTOR, 47.5 OHM-1/8W-1% (R235)	1
▲	579753	.RESISTOR, 121K-1/8W-1% (R248, R249, R250 and R251)	4
▲	579758	.RESISTOR, 619K-1/8W-1% (R149, R156, R169 and R176)	4
▲	579732	.RESISTOR, 6.34K-1/8W-1% (R77, R94, R117 and R134)	4
▲	579759	.RESISTOR, 82.5K-1/8W-1% (R14, R30, R46 and R62)	4
▲	579730	.RESISTOR, 19.6K, 1/2W, 1% (R205, R208, R211 and R214) . . .	4
▲	579705	.RESISTOR, 10K-1/2W-1% (R1, R2, R17, R18, R33, R34, R49 & R50) .	8
		.RESISTOR, SOT Type (R13, R29, R45, R61, R75, R92, R115, R132 and R203)	9
▲	579765	.CAPACITOR, .01MFD-100V (CK-05BX-103K) (C1, C5, C9, C13, C27 and C47 thru C67 & C84) . . .	26
▲	579766	.CAPACITOR, 220PF-200V (CK-05BX-221K) (C2, C6, C10 & C14) .	4



Fig. & No.	Pc.No.	Parts Name	No. Req'd
▲	579767	.CAPACITOR, .22 MFD-100V (C3, C7, C11 and C15)	4
▲	579768	.CAPACITOR, 10MFD-25V -10+75% (C4, C8, C12 and C16)	4
▲	577955	.CAPACITOR, 10 MFD-20V-10% (C17, C19, C22 and C24)	4
▲	579769	.CAPACITOR, .033 MFD-100V-10% (C18, C20, C23, C25 & C46)	5
▲	579893	.RESISTOR, 464 OHM-1/8W-1% (R269, R270, R271 & R272).	4
▲	577958	.CAPACITOR, .0022 MFD-10% (C68 thru C75).	8
▲	579770	.CAPACITOR, 100MFD-25V- 10-75% (C32, C33, C36, C37, C40, C41, C78, C79, C82 and C83)	10
▲	579771	.CAPACITOR, .0047 MFD-100V(C28)	1
▲	579772	.CAPACITOR, 100PF-1000V-10%(C29)	1
▲	579773	.CAPACITOR, .1 MFD -100V-10% C30, C31, C34, C35, C38, C39, C76, C77, C80, C81)	10
▲	579774	.CAPACITOR, 56 MFD-15V-10% (C21 and C26)	2
▲	579806	.INDUCTOR, 470 Micro Henry (L1, L10, L11, L8 and L9).	5
▲	579775	.TRANSISTOR, 2N2907 (Q1, Q2, Q3, Q4, Q28)	5
▲	579776	.TRANSISTOR, 2N2222 (Q18, Q19, Q5, Q8, Q11, Q12, Q15 and Q26).	8
▲	575126	.TRANSISTOR, 2N699 (Q21, Q22, Q23 and Q24)	4
▲	579777	.TRANSISTOR, 2N4851 (Q25)	1
▲	579778	.DIODE, IN485B (D1 thru D76 & D87)	77
▲	579779	.DIODE, IN751 (D78, D80, D82 and D84)	4

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
▲	579780	.DIODE, IN758 (D79, D81, D83 and D85)	4
▲	579788	.CIRCUIT, Integrated, MC 672P (NA1, NA2, NA3, NA4, NA5, NA6 and NA7)	7
▲	579789	.CIRCUIT, Integrated, MC663P (FF1 thru FF5)	5
▲	579790	.CIRCUIT, Integrated, VR1, MC1723CG.	1
▲	579791	.CIRCUIT, Integrated, 4N25 (PCI-1, PCI-2, PCI-3 & PCI-4)	4
▲	579792	.CIRCUIT, Integrated, SC70076GH (OP1, 3, 5, 7, 10, 11, 13, 14, 16, 17, 19 thru 27)	19
▲	579805	.CRYSTAL, 115.807 KHZ XTAL1	1
▲	579797	.LUG, Turret	72
▲	579781	.POINT, Test, Brown (TP1, TP5, TP6, TP13, TP24 & TP25).	6
▲	579782	.POINT, Test, Red (TP2, TP7, TP8, TP15, TP16, TP19, TP26 & TP27).	8
▲	579783	.POINT, Test, Orange (TP3, TP9, TP10, TP17 and TP22).	5
▲	579784	.POINT, Test, Yellow (TP4, TP11, TP12 and TP18)	4
▲	579785	.POINT, Test, Black (TP14 & TP20).	2
▲	579786	.POINT, Test, Green (TP21)	1
▲	579787	.POINT, Test, Blue (TP23)	1
▲	578241	.CIRCUIT, Integrated (SC12222G) OP2, 4, 6, 8, 9, 12, 15 & 18).	8
▲	579928	.CAPACITOR, 250 MFD-15V-CD Type HNHL 250-15 (C85)	1
▲	532352	.CLIP, Terminal, #6 (SW.SW1).	3
▲	578133	.CLIP, Terminal, #10 (C101 thru C104).	17
1-46	580375	.VARISTOR, V100ZA15 -MOV-1.	1



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"C-3" DECELOSTAT® VALVE, Pc.No. 579449

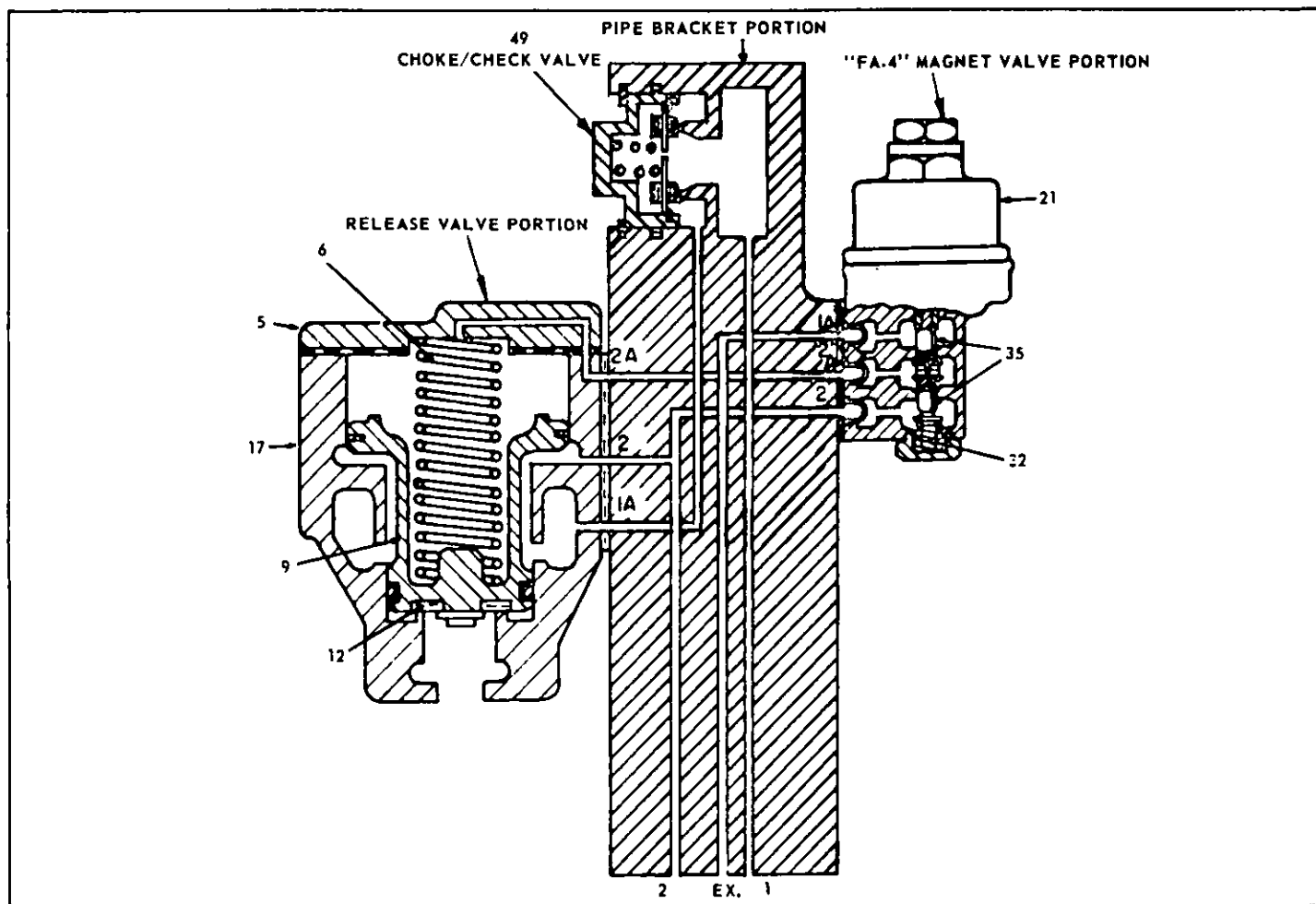


FIGURE 1 - "C-3" DECELOSTAT VALVE - DIAGRAMMATIC VIEW

NOTE: The following description of operation is based on this device and its components being new or this device and its components having been repaired, tested, installed and maintained in accordance with instructions issued by the appropriate governing bodies and this and any other applicable WABCO publications.

I. DESCRIPTIONS

The "C-3" DECELOSTAT Valve when properly installed and maintained in the brake equipment arrangement is designed to function to vent and restore brake cylinder air pressure by responding to electrical signals received from an external wheel slip sensing device.

When a wheel slip occurs, the external wheel slip sensing device should transmit an electrical signal to energize the "C-3" DECELOSTAT Valve to vent brake cylinders air pressure which should result in a reduction in the

braking effort on the slipping axle. When the "C-3" DECELOSTAT Valve is de-energized, air, under pressure, is once again permitted to flow into the brake cylinder(s).

The "C-3" DECELOSTAT Valve Pc. No. 579449 consists of a Release Valve Portion (Pc. No. 533334) and an "FA-4" Magnet Valve Portion (Pc. No. 527702) mounted on a Pipe Bracket Portion (Pc. No. 579634). A brief description of each portion follows:

A. Release Valve Portion (Pc. No. 533334)

(Refer to Figures 1 and 2) The Release Valve Portion is a pneumatic type valve consisting of a body (17), which houses a piston assembly (7 to 12 incl.) and a top cover (5).

Under normal operating conditions, the piston assembly (7 to 12 incl.) is held on its seat by the force of spring (6). When the air pressure applied through port 2

(SUPERSEDES ISSUE DATED SEPTEMBER, 1977)

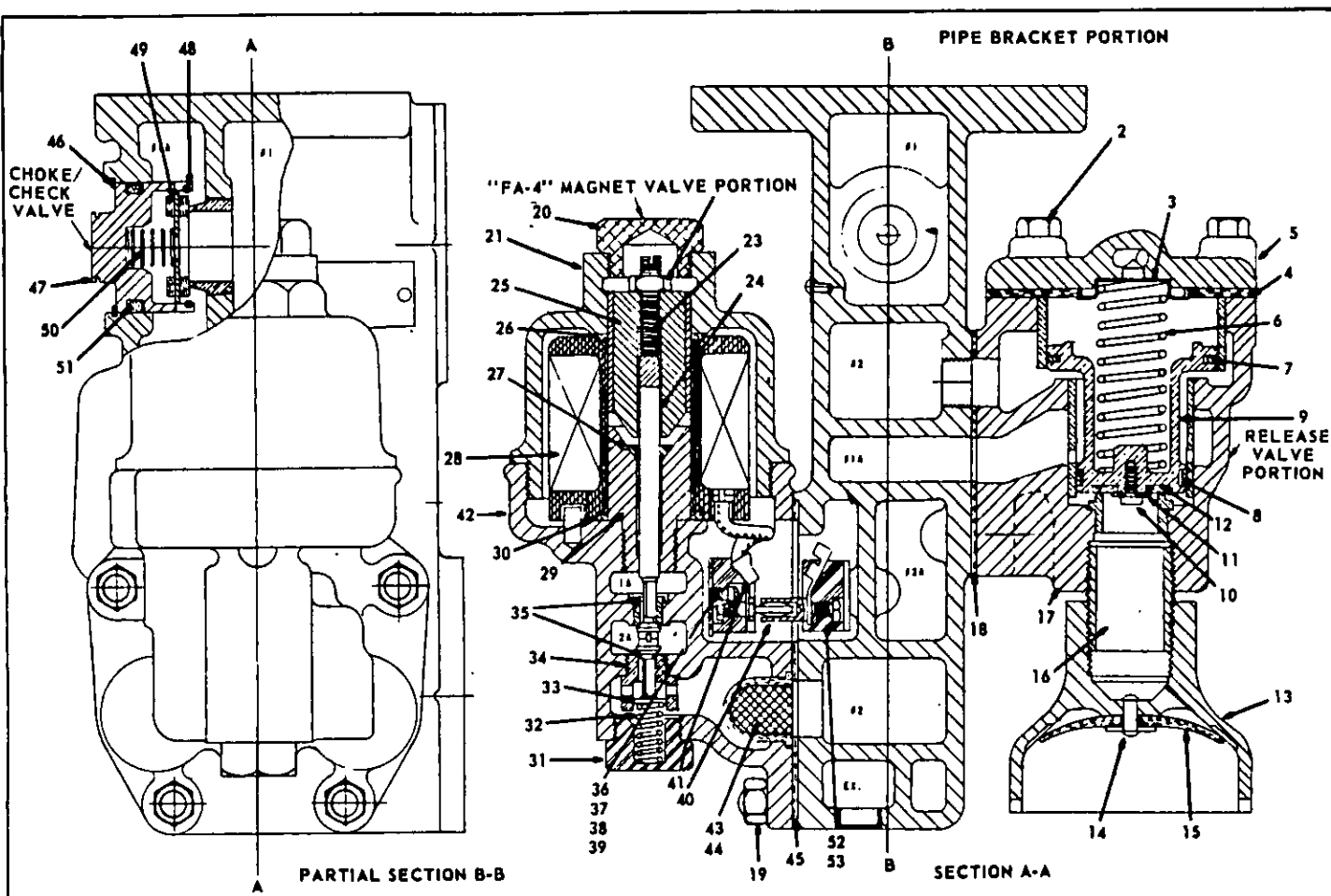


FIGURE 2 - "C-3" DECELOSTAT VALVE - ASSEMBLY VIEW

overcomes the force of spring (6), the piston assembly (7 to 12 incl.) will move upward to seal off port 2 and air from port 1A will be vented to atmosphere.

B. "FA-4" Magnet Valve Portion (Pc. No. 527702)

(Refer to Figures 1 and 2) The "FA-4" Magnet Valve Portion, Pc. 527702, is an electro-pneumatic valve with a voltage range of 45 to 85 volts. The nominal voltage is 64 volts, and the maximum operating air pressure is 150 psig. The electric portion of the valve portion consists of a magnet coil housing (21) containing a magnet coil (28), magnet core (29), armature (25), armature stem (24), and stem adjusting screw (23). The pneumatic portion of the valve portion contains the upper and lower valves (35) and the valve spring (32).

When the magnet valve portion is de-energized, the force of the valve spring (32) holds the lower valve (35) OFF its seat and connects port 2 with port 2A. The upper valve (35) is seated and seals OFF port 1A.

When the magnet valve is energized, the armature (25) and stem (24) are pulled downward to unseat the upper valve (35) and connect port 2A to port 1A. The lower valve (35) is seated to seal OFF port 2.

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C. Pipe Bracket Portion (Pc. No. 579634)

(Refer to Figures 1 and 2) The Pipe Bracket Portion is bolted to the truck body and is designed to allow for the removal and replacement of the valve portions without disturbing any pipe connections. The Pipe Bracket Portion is normally installed in the brake cylinder air line so that port 1 is connected to the brake cylinder side and port 2 to the air supply source.

A check/choke valve is incorporated in the Pipe Bracket Portion. This valve restricts the flow of air to brake cylinder output (port 1A to 1). This permits timing of the normal brake application and reapplication after a wheel slip "dump". The check/choke valve permits a free flow of air when the brakes are normally released.

II. OPERATION

(NOTE: Figure 1 shows the "C-3" DECELOSTAT Valve diagrammatically to make air passage connections and valve operation more easily understood. The diagrammatic view is not intended to show the actual construction of the valve.)



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Supply air under pressure enters port 2 of the Pipe Bracket Portion and flows to the underside of the piston (9) of the Release Valve Portion and to port 2 of the Magnet Valve Portion. With the lower valve (35) of the Magnet Valve Portion held off its seat by the force of the spring (32), air also flows through port 2A to the top of the release valve piston (9). Since the pressure is balanced on both faces of the piston, the force of spring (6) will hold the piston (9) seated. Supply air under pressure also flows to the spring side of the check valve (49), located in the Pipe Bracket Portion, by means of port 1A of the Release Valve Portion. A drilled passage in the check valve (49) allows a controlled build-up of air pressure to the Brake Cylinders through port 1 of the Pipe Bracket Portion.

When a wheel slip occurs and the external wheel slip sensing device transmits an electrical signal to energize the "FA-4" Magnet Valve Portion, the armature and stem of the Magnet Valve Portion are pulled downward. The lower valve (35) will be seated and the upper valve (35) will be unseated to connect port 2A to port 1A. This exhausts the air on top of the release valve piston (9) by means of ports 2A and 1A and also through the exhaust passage EX in the Pipe Bracket Portion. Air pressure build-up under the piston (9) will overcome the force of the spring (6) and move the piston upward. This action cuts off supply air under pressure at port 2 of the Release Valve Portion and opens port 1A to exhaust. Brake Cylinder air under pressure can, therefore, vent rapidly through port 1 of the Pipe Bracket Portion, through the Check Valve (49) and out port 1A of the Release Valve Portion.

When the wheel slip ceases, the external wheel slip sensing device should signal the "FA-4" Magnet Valve Portion to de-energize. This will permit the spring (32) to return the armature and stem of the Magnet Valve Portion to the upper position. The upper valve (35) will be seated and the lower valve (35) will be unseated to reconnect port 2 to port 2A. This redirects the flow of supply air from port 2 to the top of the Release Valve Portion piston (9) through port 2A and balances the air pressure on both faces of piston (9) to allow the force of the spring (6) to move the piston downward. The downward movement of the piston cuts off the exhaust of brake cylinder air from port 1A and permits supply air under pressure at port 2 to flow through port 1A; through the drilled passage in the check valve (49); out port 1 of the Pipe Bracket Portion; and restores brake cylinder air pressure at a controlled rate.

III. CLEANING SOLVENT AND LUBRICANT

- A. The cleaning solvent used for cleaning the parts of the portions of the "C-3" DECELOSTAT Valve, with the exception of the magnet valve coil, MUST BE an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be cleaned without abrasion.

CAUTION: DO NOT USE ANY CLEANING SOLVENT TO CLEAN THE MAGNET COIL. Solvents will cause unreparable damage to the coil.

- B. The following lubricant **MUST BE** available when working on the Relay Valve Portion.
1. Triple Valve Oil - WABCO Specification M-7611-20 (AAR Specification M-912), is used to lubricate the piston rings.
- C. The following lubricant **MUST BE** available when working on the Pipe Bracket Portion.
- a. No. 2 Silicone Grease, WABCO Specification M-7680-2, which is used to lubricate the o-ring and o-ring groove of the check valve housing.
- D. **IMPORTANT:** NO LUBRICANTS ARE TO BE USED ON THE "FA-4" MAGNET VALVE PORTION.

IV. SPECIAL TOOLS

- A. In addition to the regular shop tools, the following tools **MUST BE** available to the repairman when working on the various portions of the "C-3" DECELOSTAT VALVE as follows:

1. Release Valve Portion

- a. Ring Selector Gage No. 48156, Pc. No. 517169 which is used to gage the large piston bushing. (See Figure 3)
- b. Push Pull Resistance Indicator, Pc. No. 540100 which is used to measure the resistance to movement of the piston. (See Figure 4.)

2. "FA-4" Magnet Valve Portion

- a. Magnet Core Removal Tool used to assist in the removal and installation of the magnet core. Specifications for making this tool are shown in Figure 5.
- b. Valve Seat Removal Tool used to assist in the removal and installation of the valve seat. Specifications for making this tool are shown in Figure 6.
- c. An electrical instrument, capable of indicating 500 ohms, which is used to check the coil resistance.

IMPORTANT: THE INFORMATION SHOWN IN THE DRAWINGS FOR MAKING TOOLS, FIGURE 5, AND FIGURE 6 ARE FURNISHED AS A CONVENIENCE. THE WESTINGHOUSE AIR BRAKE DIVISION OF AMERICAN STANDARD INC. SHALL HAVE NO RESPONSIBILITY FOR TOOLS WHICH THEY DO NOT MANUFACTURE.

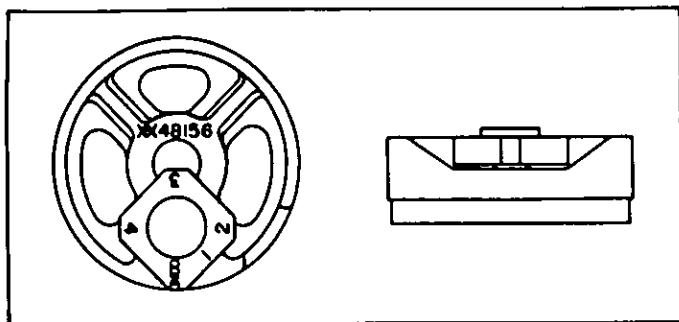


FIGURE 3 - RING SELECTOR GAGE, Pc.No. 48156

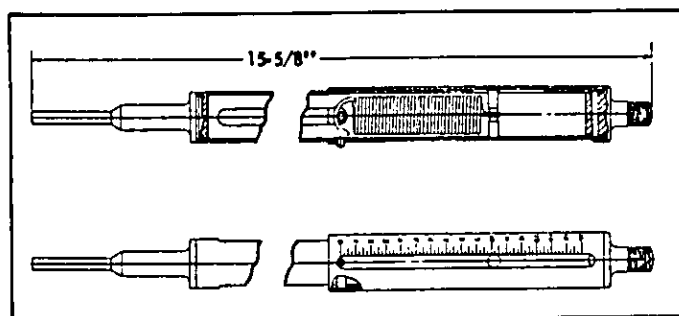


FIGURE 4 - RESISTANCE INDICATOR, Pc.No. 540100

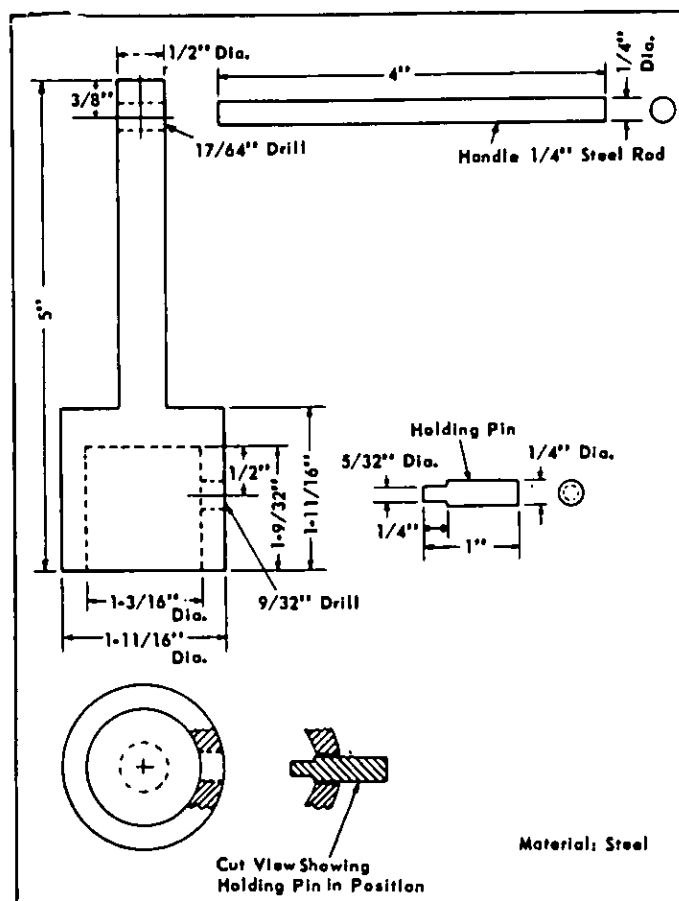


FIGURE 5 - MAGNET CORE REMOVAL TOOL

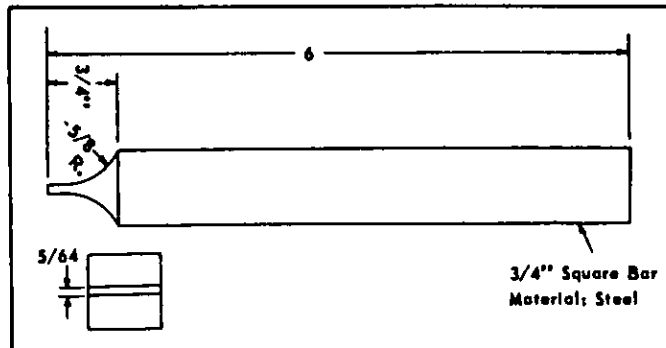


FIGURE 6 - VALVE SEAT REMOVAL TOOL

THE WESTINGHOUSE AIR BRAKE DIVISION OF AMERICAN STANDARD INC. WILL NOT BE RESPONSIBLE FOR RESULTS OF THE USE OF TOOLS THEY DO NOT MANUFACTURE INCLUDING CLAIMS BY THIRD PARTIES.

3. Pipe Bracket Portion

- a. None

V. SAFETY PROCEDURES

1. Regular shop safety procedures MUST BE followed when working on the valve or any valve portion.
2. The work area should be clean and free of debris.

⚠ WARNING

The following statements of warning apply all or in part wherever this symbol **⚠** appears in the maintenance procedures. Failure to observe these precautions may result in serious injury to those performing the work and/or bystanders.

- The use of an air jet, which must be less than 30 p.s.i.g., to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. Wire brushing may also cause particles of dirt, rust, and scale to become airborne. These conditions may cause skin and/or eye irritation.
- When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.
- Personal eye protection must be worn when performing any work on this device or its component parts to avoid any possible injury to the eyes.



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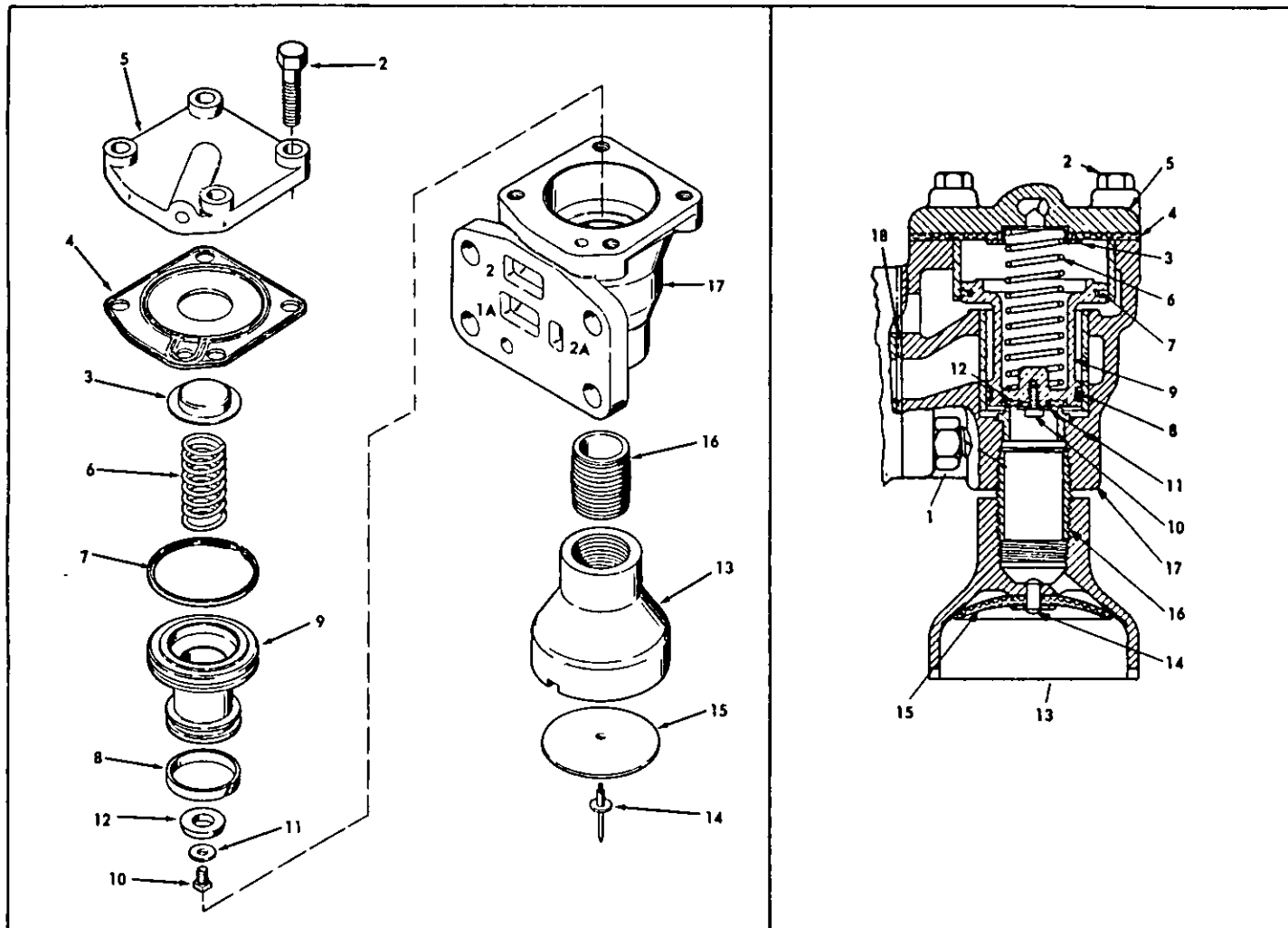


FIGURE 7 - RELEASE VALVE PORTION - EXPLODED AND ASSEMBLY VIEWS

- The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data (such as OSHA Form OSHA-20 or its equivalent). The recommended precautions and procedures of the manufacturers should be followed.
- To prevent receiving electrical shock when performing electrical tests, hands must be clear of electrical components, contacts and housing and there must be no bodily contact with the work bench. Failure to heed this warning could result in severe injury or death.
- When performing any test or work on devices or equipment while they are on the vehicle (on car test etc.) special precautions must be taken to insure that vehicle movement will not occur which could result in injury to personnel and/or damage to equipment.

- Assembly may be under a spring load. Exercise caution during disassembly so that no parts "Fly Out" and cause bodily injury.

VI. MAINTENANCE PROCEDURES AND TECHNIQUES

VI.A. RELEASE VALVE PORTION

(Refer to Figure 7 Assembly and Exploded View)

IMPORTANT: THE RELEASE VALVE PORTION OF THE "C-3" DECELOSTAT VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED, AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

RECOMMENDED TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Passenger (Interstate)	36 Months
Transit	24 Months
Multiple Operated Electric Unit	15 Months



1. DISASSEMBLY



- a. Remove the Release Valve Portion from the Pipe Bracket Portion by removing the four 1/2" hex nuts (1).

(1) Remove and DISCARD the body gasket (18).

- b. Remove the four 3/8" x 1-5/8" hex head cap screws (2) which secure the top cover assembly (3 to 5 incl.) to the body (17).

c. **⚠ WARNING ⚠**

DURING THE FOLLOWING PROCEDURE EXERCISE CARE SO THAT NO PARTS "FLY OUT" OF THE BODY AND CAUSE AN INJURY.

CAREFULLY remove the top cover assembly (3 to 5 incl.) from the body (17). Remove the gasket retainer (3), and gasket (4) from the cover (5).

- d. Remove the piston spring (6) and piston assembly (9 to 12 incl.) from the body (17).
- e. Remove the piston rings (7, 8), retainer screw (10), washer (11) and seal (12) from the piston (9).
- f. Remove the vent protector assembly (13) from the pipe nipple (16).
- g. Unscrew the 1" pipe nipple (16) from the body (17).

2. CLEANING, INSPECTING AND REPAIRING



(NOTE: Refer to WABCO Parts Catalog 3227-11, Sup. 7 when ordering replacement parts. CAUTION: The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.)

a. Vent Protector Assembly

- (1) Clean the interior and exterior surfaces of the vent protector assembly by wiping with a soft, clean, lint-free cloth that has been saturated with the cleaning solvent described in paragraph III.A.
- (2) Blow the vent protector assembly completely dry with a low pressure (less than 30 psig) jet of clean, dry air.
- (3) Inspect the vent protector assembly. If it is damaged in any way, it MUST BE

repaired or replaced with NEW parts obtained from the Westinghouse Air Brake Division of American Standard Inc.

- a. When a NEW seal is installed a NEW rivet MUST BE used.
- b. Use a chisel to cut off the peened head of the rivet (14).
- c. Remove and DISCARD the rivet (14) and seal (15).
- d. Place a NEW seal (15) in position on the vent protector (14). Then using a NEW 3/16" x 1/2" pop rivet (14) and the proper tool secure the seal (15) in place.

b. Metal Parts

- (1) Wash all of the remaining metal parts in the cleaning solvent described in paragraph III.A.
- (2) The spring may be wire brushed to assist in the removal of rust and scale.
- (3) After the parts are cleaned they MUST BE blown completely dry with a low pressure (less than 30 psig) jet of clean, dry air.
- (4) Inspect the parts.
- (a) The spring (6) MUST BE replaced if it is rusted, pitted, or has taken a permanent set. The spring (6) Pc. No. 569160 has an approximate free height of 3-9/16".
- (b) Replace any part that is cracked cut, broken, damaged in any way, worn excessively or that is in such a condition that may result in unsatisfactory operation.
- (5) IMPORTANT: The release valve portions large piston bushing MUST BE gaged with the ring selector gage No. 48156, Pc. No. 517169, (see Figure 3) to determine if an oversize piston ring is necessary. See Parts Catalog 3227-11, Sup. 7 for correct Pc. No. of repair rings. Apply the gage BUT DO NOT use pressure and observe the following:
- (a) If bushing gage does not enter the cylinder, the bushing is condemned.
- (b) If Mark "2" does not clear cylinder, 1st repair ring is required.



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- (c) If Mark "2" clears and Mark "3" does not, 2nd repair ring is required.
- (d) If Mark "3" clears and "4" does not, 3rd repair ring is required.
- (e) If Mark "4" clears and Mark "COND" does not, 4th repair ring is required.
- (f) If Mark "COND" clears cylinder, the cylinder bushing **MUST BE CONDEMNED**.
- (g) **IMPORTANT:** Repair piston rings of other than the size indicated by the gage **MUST NOT** be used. If the piston ring is undersize, insufficient wall pressure will result in ring leakage. If the piston ring is oversize, the operation of the valve will be interfered with because of butted ends and increased resistance to movement under many service conditions.

c. Rubber Parts

- (1) All rubber parts are to be **DISCARDED** and replaced with **NEW** parts obtained from the Westinghouse Air Brake Division of American Standard Inc.

△ 3. LUBRICATING AND ASSEMBLING

- a. Screw the 1" pipe nipple (16) into the body (17).
- b. Install the vent protector assembly (13 to 15 incl.) on the pipe nipple (16).
- c. Install the seal (12) in place on the piston (9), then secure it in place with the 9/16" O.D. washer (11) and retainer screw (10).
- d. Just prior to installing the piston rings (7, 8) in their grooves in the piston (9) lubricate the rings and piston with triple valve oil, WABCO Specification M-7611-20 (AAR Specification M-912).
- e. **CAREFULLY** fit the lubricated piston rings (7, 8) into the proper grooves on the piston (9). **IMPORTANT:** The large piston ring (7) **MUST BE** fitted in its groove in the piston (9) with the narrow bearing edge of the lap joint upward.
- f. Install the piston assembly (9 to 12 incl.) into the piston bushing of the body (17).
- g. **IMPORTANT:** The resistance to movement of the piston must be measured by means of the

push-pull type resistance indicator, Pc. No. 540100 (Figure 4) before the valve is completely assembled and after the piston is lubricated. To measure the resistance, force the piston against the lower piston seal, then with the piston in a horizontal position, place the end of the resistance indicator against the piston seal end of the piston and force the piston inward. The force required to move the piston will be indicated on the resistance indicator and **MUST NOT** exceed 8 pounds. If the force required to move the piston exceeds 8 pounds, the piston assembly **MUST BE** removed from the body and the bushing re-gaged following the procedure of paragraph VI.2.b.(5).

- h. Install the spring (6) into the piston (9).
- i. Install the cover gasket (4) in place on the cover (5) and secure it in position with the gasket retainer (3).
- j. Place the cover assembly (3 to 5 incl.) on the body (5) and secure it in place with the four 3/8" x 1-5/8" hex head cap screws (2).

4. TESTING AND ADDITIONAL INFORMATION

- a. After the Release Valve Portion has been assembled **BUT BEFORE** it is returned to service, it **MUST PASS** a series of tests following the procedures of the current issue of the WABCO Test Specification T-1583-0.
- b. **IMPORTANT:** When installing a **NEW** or **REPAIRED** AND **TESTED** Release Valve Portion on the Pipe Bracket Portion, a **NEW** body gasket Pc. No. 533336 (Figure 2-18) **MUST BE** used.
- c. **IMPORTANT:** **WHEN THE RELEASE VALVE PORTION IS REMOVED FROM THE "C-3" DECELOSTAT VALVE FOR ANY REASON AND IT IS RE-INSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE RELAY VALVE PORTION AND THE "C-3" DECELOSTAT VALVE FUNCTION PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.**

VI.B "FA-4" MAGNET VALVE PORTION

IMPORTANT: THE "FA-4" MAGNET VALVE PORTION OF THE "C-3" DECELOSTAT VALVE SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, AND TESTED ACCORDING TO THE FOLLOWING APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

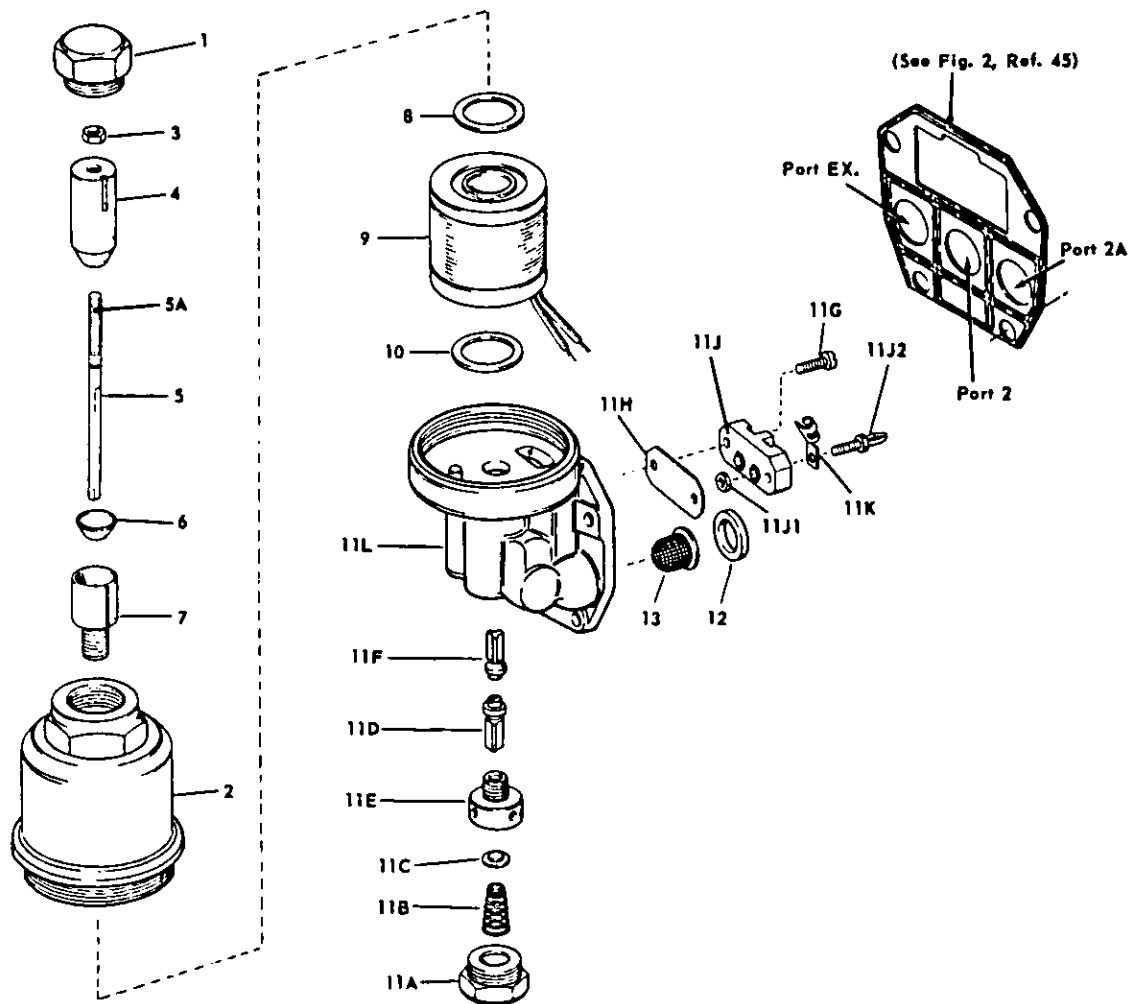


FIGURE 8 - "FA-4" MAGNET VALVE PORTION - EXPLODED VIEW

**RECOMMENDED
TYPE OF APPLICATION**

**FREQUENCY -
AT LEAST ONCE EVERY**

Passenger (Interstate)
Transit
Multiple Electric
Operated Unit

36 Months
24 Months
15 Months

Valve Portion but are a part of the device on which the Magnet Valve Portion is mounted.

- b. Remove the magnet cap nut (1), armature (4) and armature core washer (6).

(1) Remove the armature stem nut (3), armature stem adjusting screw (5A) and armature stem (5) from the armature (4).

- c. Remove the two terminal block screws (11G).
d. Remove the two plug contacts (11J2) to release the two terminal clips (11K). Then remove the terminal block (11J), two contact nuts (11J1) and terminal block insulation plate (11H).
e. Remove the magnet coil housing (2). Then remove the magnet coil (9) from the magnet body (11L).
(1) Remove the two magnet spool gaskets (8, 10).

1. DISASSEMBLY



- a. (Refer to Figure 2) Remove the "FA-4" Magnet Valve Portion from the Pipe Bracket Portion by removing the four 3/8" hex nuts (19). Remove and DISCARD the magnet portion mounting gasket (45).

(Refer to Figure 8)

- a. Remove the three port filters (13) and gasket (12) from the mounting face of the magnet body (11L). DISCARD the gasket. NOTE: The port filters and gasket are not a part of the Magnet



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operation & maintenance information

- f. Remove the magnet core (7) by using the tool shown in Figure 5. (NOTE: Figure 5 contains the required information for making this tool.)
- g. Remove the magnet valve cap nut (IIA). Then remove the valve spring (IIB) and spring seat (IIC).
- h. Remove the lower valve seat (IIE) from the magnet body (IIL) by using the valve seat removal tool (Figure 6). (NOTE: Figure 6 contains the required information for making this tool.)
- i. Remove the two valves (IID, IIF) from the magnet body (IIL).

2. CLEANING, INSPECTING AND REPAIRING

(NOTE: Refer to WABCO Parts Catalog 3228-1, Sup. 3 when ordering replacement parts. CAUTION: The reference numbers used in this publication and those used in the Parts Catalog may differ. Check the parts name (description) to insure that the correct part is ordered.)

a. Coil

- (1) **IMPORTANT: DO NOT USE ANY CLEANING SOLVENT TO CLEAN THE COIL.** Solvent will cause unrepairable damage to the coil.
- (2) Clean the dirt from the coil by brushing with a brush that has soft bristles, such as a shoe brush.
- (3) After cleaning, check the coil resistance and make certain that it is within the limits specified in the following tabulation: (NOTE: An electrical instrument capable of indicating 500 ohms MUST BE available).

FA-4 Magnet Valve Portion Pc. No.	Coil Pc. No.	Nominal Service Operating Voltage	Coil Resistance 25°C 77°F Tolerance ± 5% ohms
527702	525217	64	387

- (4) Check magnet coil leads for any fraying of insulation. Apply electrical tape where required to provide insulation.

b. Metal Parts

- (1) Wash all of the remaining metal parts in the cleaning solvent as described in paragraph III.A. Adhere to the WARNING of paragraph III.E.

- (2) The spring may be wire brushed to aid in removal of rust and scale. Adhere to the WARNING of paragraph V.4.
- (3) Blow all of the parts dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph V.3.
- (4) Inspect the parts.
- (5) Reject and replace the spring if it is rusted, pitted, distorted or has taken a permanent set. The spring (IIB) Pc. No. 551262 has an approximate free height of 1-25/64".
- (6) Reject and replace any part that is cracked, broken, damaged, worn excessively or in such a condition that may result in unsatisfactory operation.

c. Gaskets.

- (1) All gaskets are to be DISCARDED and replaced with NEW parts obtained from the Westinghouse Air Brake Division of American Standard Inc.

3. ASSEMBLING

IMPORTANT: USE NO LUBRICANT WHILE ASSEMBLING THE MAGNET VALVE PORTION.

- a. Install the upper valve (IIF) so that the head of the valve faces the cap nut face of the body (IIL).
- b. Install the lower valve (IID) into the valve seat (IIE) tail end first.
 - (1) Install the valve seat (IIE) with the lower valve (IID) into the body (IIL). Tighten the valve seat securely using the valve seat tool shown in Figure 6.

WARNING

EXERCISE CARE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY DURING THE FOLLOWING PROCEDURE.

- c. Insert the spring seat (IIC), valve spring (IIB) and cap nut (IIA).
- d. Insert the magnet core (7) into the magnet body (IIL) and tighten securely with the tool shown in Figure 5.



- e. Insert the two spool gaskets (8, 10) into the magnet coil (9).
 - f. Insert the magnet coil (9) into the magnet body (11L) making certain the dowel pin in the magnet body (11L) is in the hole in the magnet coil (9) and the magnet coil leads are in their proper location.
 - g. Insert the magnet coil housing (2) into the magnet body (11L) and tighten securely.
 - h. Secure the two magnet coil lead terminal clips (11K) to the terminal block with the two plug contacts (11J2) and two contact nuts (11J1).
 - i. Secure the terminal block insulation plate (11H) and terminal block assembly (11J) to the magnet body (11L) with the two terminal block screws (11G).
 - j. Insert the armature stem (5) and adjusting screw (5A) into the armature (4). Turn the armature stem nut (3) onto the armature stem adjusting screw (5A).
 - k. Place the core washer (6) on the armature core (7), then insert the armature (4) with stem (5), stem adjusting screw (5A) and nut (3) into the magnet valve body (11L).
- (1) Adjust the air gap which must be .015".
- (2) To adjust the air gap, depress the armature, then with the armature stem turned backwards to allow the armature to seat firmly against the core washer and core, measure the distance from the top of the armature to the cap nut seat. Turn the armature stem inward until the armature rises the specified amount, then tighten the armature stem nut on the stem.
- l. Measure the lift or valve travel of the magnet which MUST be .032" + .005" - .000".
- (1) If the travel is too short, the valve heads MUST be filed off square to increase the travel. If valve travel is too long, it will be necessary to replace the valve seats and possibly the valves to obtain correct valve travel.
- m. Insert the magnet cap nut (1) into the magnet coil housing (2) and tighten securely.

Install the three port filters (13) in the mounting face of the magnet valve body (11L).

4. TESTING AND ADDITIONAL INFORMATION

- a. After the "FA-4" Magnet Valve Portion has been assembled BUT BEFORE it is returned to service, it MUST PASS a series of tests following the current issue of the WABCO Test Specification T-14150.
- b. IMPORTANT: When installing a NEW or REPAIRED AND TESTED "FA-4" Magnet Valve Portion on the Pipe Bracket Portion, a NEW mounting face gasket Pc. No. 527375 (Figure 2-45 or Figure 8-12) MUST BE used.
- c. IMPORTANT: WHEN THE "FA-4" MAGNET VALVE PORTION IS REMOVED FROM THE "C-3" DECELOSTAT VALVE FOR ANY REASON AND IT IS RE-INSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE "FA-4" MAGNET VALVE PORTION AND THE "C-3" DECELOSTAT VALVE FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.

VI.C. PIPE BRACKET PORTION

IMPORTANT: WHENEVER ANY ONE OR BOTH OF THE PORTIONS ARE REMOVED FROM THE PIPE BRACKET PORTION FOR ANY REASON THE FOLLOWING PROCEDURES MUST BE FOLLOWED.

(Refer to Figures 2 and 9)

- 1. The exterior surfaces of the Pipe Bracket Portion (55) may be cleaned by wiping with a soft, clean, lintfree cloth or blown clean with a low pressure (less than 30 psig) jet of clean, dry air.
- 2. Whenever any portion is removed from the Pipe Bracket Portion (55), for any reason, air passages of the Pipe Bracket Portion MUST BE INSPECTED TO SEE THAT THEY ARE CLEAN AND UNRESTRICTED. The ports should be blown out, if necessary, with a low pressure (less than 30 psig) jet of clean, dry air.

3. WARNING

EXERCISE CARE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY DURING THE FOLLOWING PROCEDURE.



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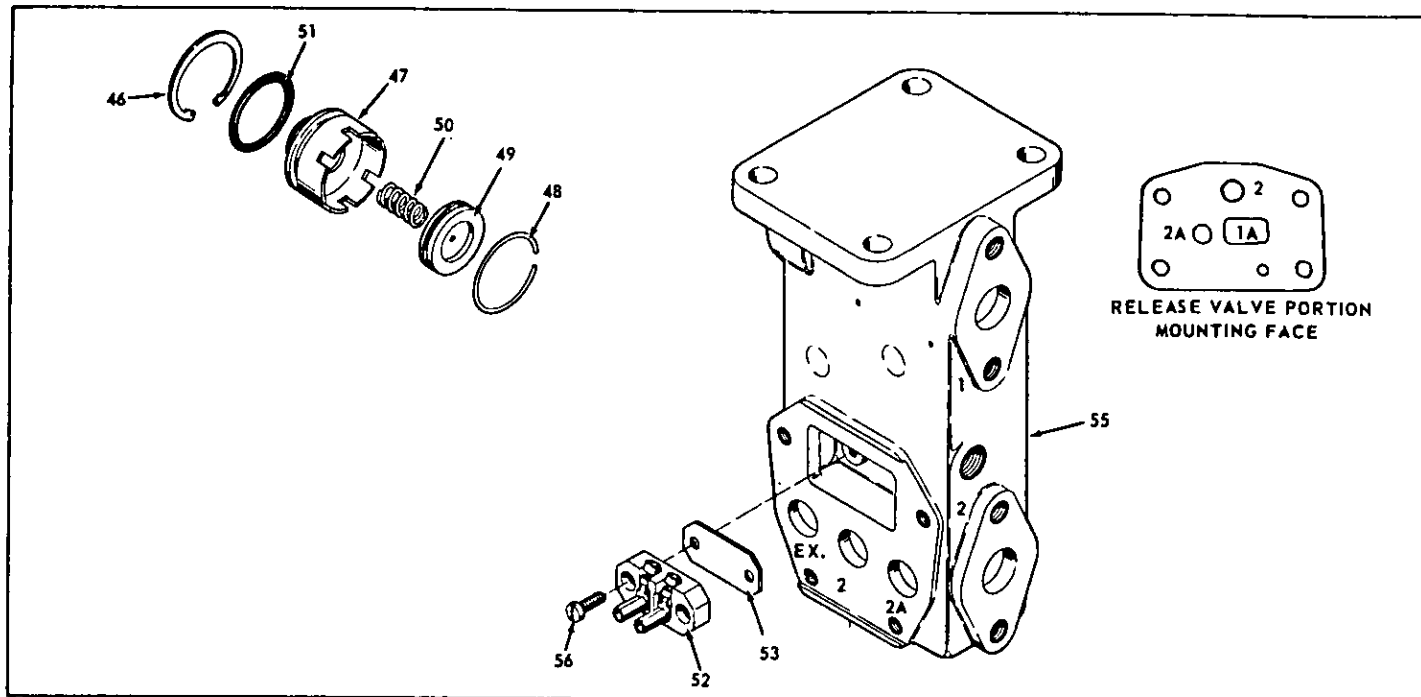


FIGURE 9 - PIPE BRACKET PORTION - EXPLODED VIEW

CAREFULLY disassemble the check valve assembly (46 to 51) as follows:

- a. Remove the 1-7/8" retaining ring (46) which secures the check valve housing assembly (47 to 51) in the pipe bracket portion (55).
- b. Remove the check valve housing (47 to 51) from the Pipe Bracket Portion (55) and disassemble as follows:
 - (1) CAREFULLY remove the check valve retaining ring (48), check valve (49) and check valve spring (50) from the housing (47).
 - (2) Remove the 1-7/8" O.D. o-ring (51) from the housing (47).
 - (3) DISCARD the check valve (49) oring (51) and retaining rings (46, 48).
4. Wash the housing (47) and spring (50) in the cleaning solvent described in paragraph III.A. Adhere to the WARNING of paragraph III.E.
 - (a) The spring may be wire brushed to assist in the removal of rust and scale. Adhere to the WARNING of paragraph V.4.
5. After the parts are cleaned, blow them dry with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph V.3.
6. Inspect the parts. Reject and replace the spring if it is rusted, pitted or has taken a permanent set. The spring (50) Pc. No. 552190 has an approximate free height of 1". Reject and replace any part that is cracked, cut, broken, damaged in any way or that is in such a condition that may result in unsatisfactory operation.
7. Inspect the Pipe Bracket Portion orifice to see that it is clear and unrestricted. **IMPORTANT: DO NOT USE METAL TOOLS TO CLEAN THE ORIFICE AS ITS SIZE AND SHAPE IS CRITICAL.** If necessary, the orifice may be blown out with a low pressure (less than 30 psig) jet of clean, dry air. Adhere to the WARNING of paragraph V.3.
8. Inspect the electrical components of the pipe bracket portion (55). The terminal block, socket assembly (52) and insulation plate (53) may be removed from the pipe bracket portion (55) by removing the two machine screws (56). After the necessary repairs are made reassemble the components in reverse of disassembly.



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⚠ WARNING ⚠

EXERCISE CARE DURING THE FOLLOWING ASSEMBLY PROCEDURE SO THAT NO PARTS ARE INADVERTENTLY EXPELLED AND CAUSE AN INJURY.

9. Assemble the check valve housing assembly (46 to 51) as follows: (NOTE: Refer to WABCO Parts Catalog 3227-11, Sup. 7 when ordering replacement parts. CAUTION: The reference numbers used in this publication and those used in the parts catalog may differ. Check the description (parts name) to insure that the desired part is ordered.)

a. Install the spring (50) and a NEW check valve (49) in the check valve housing (47). CAREFULLY secure the spring (50) and check valve (49) in place with a NEW retaining ring (48).

b. Just prior to assembling lubricate a NEW 1-7/8" O.D. o-ring (51) and the o-ring groove of the housing (47) WITH No. 2 Silicone Grease, WABCO Specification M-7680-2, as follows:

- (1) Coat the o-ring with the grease.
- (2) Fill the o-ring groove with the grease.

c. Install a NEW lubricated 1-7/8" O.D. o-ring (51) into the groove in the check valve housing (47). Remove the excess grease by wiping with a soft, clean, lint-free cloth.

10. Install the check valve housing assembly (47 to 51) in place in the Pipe Bracket Portion (55).

11. CAREFULLY secure the check valve housing assembly (47 to 51 incl.) in place with a NEW 1-7/8" retaining ring (46).

VII. ADDITIONAL INFORMATION

A. IMPORTANT: WHEN ANY PORTION OF THE "C-3" DECELOSTAT VALVE IS REMOVED FROM THE PIPE BRACKET PORTION FOR ANY REASON AND IT IS RE-INSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, NEW MOUNTING GASKETS MUST BE USED.

B. IMPORTANT: WHEN ANY PORTION OR DEVICE OF THE "C-3" DECELOSTAT VALVE IS REMOVED FROM THE PIPE BRACKET PORTION FOR ANY REASON AND IT IS RE-INSTALLED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, OR DEVICE, A STATIONARY VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION, DEVICE, AND "C-3" DECELOSTAT VALVE FUNCTION PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.

C. Consult your Westinghouse Air Brake Division Representative if additional information is required.



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Westinghouse Air Brake Division

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PARTS CATALOG

"C-3" DECELOSTAT® VALVE

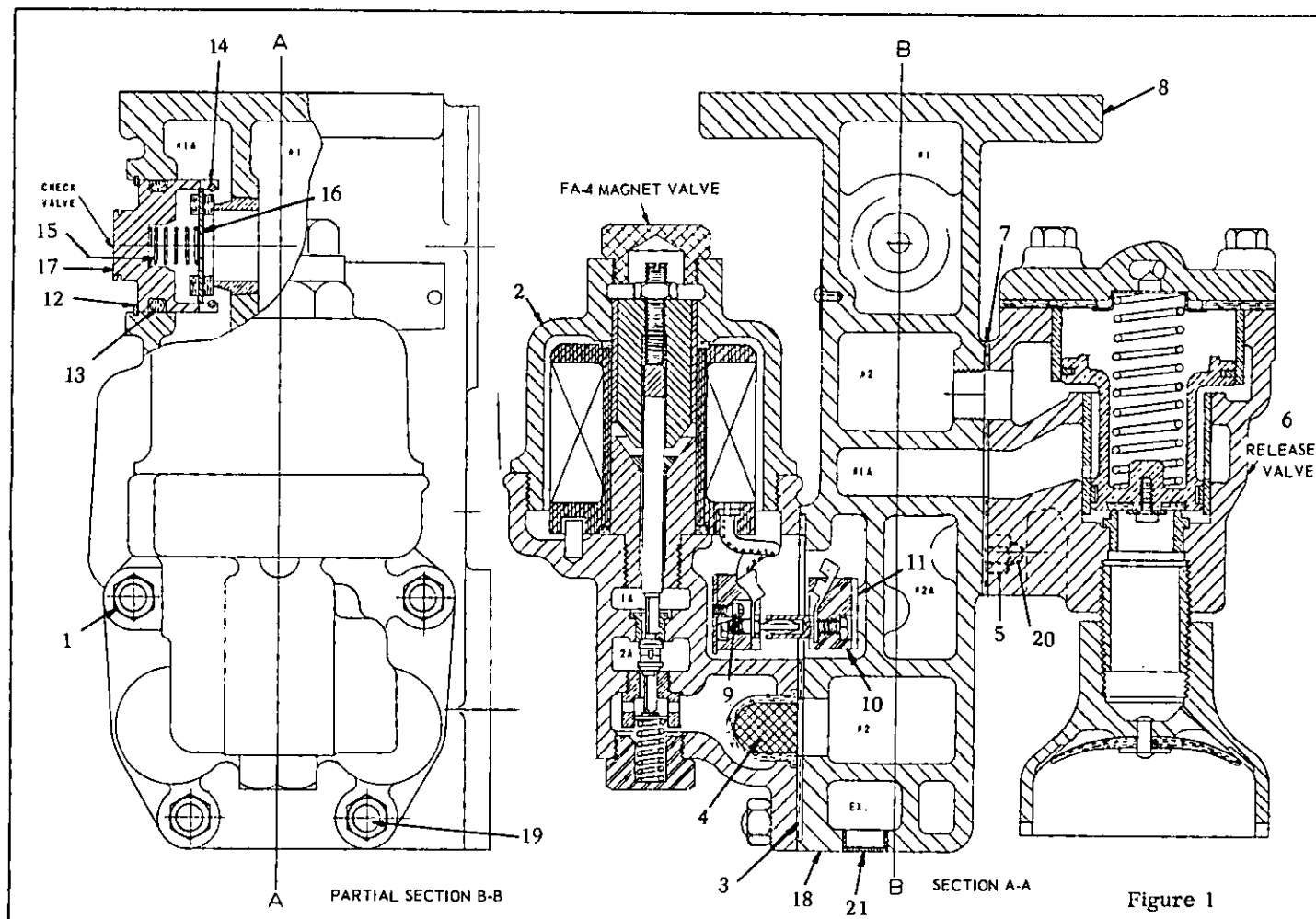


Figure 1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd	Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576997	"C-3" DECELOSTAT VALVE ASY, (Incl. Ref. 1 - 21) 32 Volt		1-9	3380	..SCREW, Fil.Hd.Mch. 190 x 5/8 in.	2
1-	579449	"C-3" DECELOSTAT VALVE, ASY., (Incl. Ref. 1 - 21) 64 Volt		1-10	578381	..BLOCK, Terminal (Socket).	1
1-1	502369	..NUT, Hex., 3/8 in.	4	1-11	514992	..PLATE, Insulation	1
1-2	529417 | 527702	..FA-4" MAGNET VALVE POR- TION, Asy. (See P.C. 3228-1, Sup. 3)	1	1-12	544134	..RING, Retaining, 1-7/8 . . .	1
1-3	527375	..GASKET, Magnet Valve . . .	1	1-13	536581	..O-RING, 1-7/8 in. O.D. . .	1
1-4	521663	..ELEMENT, Filter	3	1-14	577014	..RING, Retaining	1
1-5	2505	..NUT, Hex., 1/2 in.	4	1-15	552190	..SPRING, Check Valve . . .	1
1-6	533334	..RELEASE VALVE PORTION, Asy.(See P.C. 3225-1, S. 20)	1	1-16	577228 | 579630	..VALVE, Check	1
1-7	533336	..GASKET, Release Valve. . .	1	1-17	577013	..HOUSING, Check Valve. . .	1
1-8	577016 | 579634	..PIPE BRACKET PORTION ASY. (Incl. Ref. 9 - 21)	1	1-18	577017	..PIPE BRACKET, Asy. (Incl. Ref.Nos. 19 - 21, 1 & 5) . .	1
				1-19	502671	...STUD, 3/8 x 1-1/2 in. . .	4
				1-20	500871	...STUD, 1/2 x 1-3/4 in. . .	4
				1-21	552072	...EXCLUDER, Wasp, 5/8 in.	1
					.2968 | .221(#2)	Check Valve Choke Size	

REPAIR SPECIFICATION



An American-Standard Company

WESTINGHOUSE AIR BRAKE DIVISION

WILMERDING, PA. 15148 / Westinghouse Air Brake Company

R-113-C, Sup. 1

ISSUE NO. 3

DATE 10-23-75

C-3 DECELOSTAT VALVE

1. PARTS CATALOG AND OTHER INFORMATION

1.1 Parts Catalog No. G-h3227-11, Sup. 7, No. G-h3228-1, Sup. 3 and No. G-h3227-11, Sup. 4 may be referred to for names of parts and for their location in the DECELOSTAT Valve, the FA-4 magnet valve portion and the release valve portion.

1.2 The following repair specification and Instruction Leaflet (when applicable) must be used in conjunction with this specification.

1.2.1 R-48-C, Sup. 2 FA-4 Magnet Valve.

1.2.2 I.L. 2612-1 Release Valve

D. Brown

Supervisor - Technical
Services

APPROVED:

J. M. Thomas

Manager - Engineering
Services

NJH:bao

REVISION SHEET

Issue No. 1
December 3, 1970

Issue No. 2
March 19, 1975
WCH

Changed format of entire specification and omitted reference to voltage of FA-4 Magnet Valve per publicity request.

Issue No. 3
October 23, 1975
WCH

Revised to include P.C. G-h3227-11, Sup. 7 for the C-3 DECELOSTAT VALVE complete.

R-113-C, Sup. 1

R-48-C, Sup. 2



An American-Standard Company

WESTINGHOUSE AIR BRAKE DIVISION

WILMERDING, PA. 15148 / Westinghouse Air Brake Company

ISSUE NO. 3

DATE 11-22-77

FA TYPE MAGNET VALVES

1. PARTS CATALOGS

1.1 Parts Catalog Nos. 3228-1 and 3228-1, Sup. 3 may be referred to for names of parts, for their location in the magnet valve, and when ordering replacement parts.

2. NOTES AND CAUTIONS

2.1 CAUTION: THE USE OF SOLVENTS AS CLEANING AGENTS CAN INVOLVE HEALTH AND/OR SAFETY HAZARDS. THE MANUFACTURER OF THE SOLVENT USED SHOULD BE CONTACTED FOR SAFETY DATA (SUCH AS OSHA FORM OSHA-20 OR ITS EQUIVALENT). THE MANUFACTURER'S RECOMMENDED PROCEDURES AND PRECAUTIONS ARE TO BE FOLLOWED.

2.2 The solvent used for cleaning the parts removed from the valve must be an aliphatic organic solution, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit all parts to be thoroughly cleaned without abrasion.

2.3 The following must be included among the tools required for maintenance of the magnet valve:

2.3.1 Magnet Core Removal Tool dwg. R-48-4

2.3.2 Valve Seat Removal Tool dwg. R-48-1

2.3.3 0" - 1" depth micrometer

3. DISASSEMBLY

3.1 For FA-4 Magnet Valves only, remove the three filters from the mounting face of the body assembly.

3.2 For FA-2 Magnet Valves only, remove the exhaust port excluder from the body.

3.3 Remove the upper cap nut from the magnet coil housing.

3.4 Remove the armature, armature stem, and core washer from the center of the magnet coil.

3.5 Remove the 5/16" hex. nut and the armature from the armature stem.

3.6 For FA-4 Magnet Valves only, remove the terminal block assembly as follows:

3.6.1 Remove the two oval fillister head machine screws which secure the terminal block assembly to the body.

3.6.2 Remove the two male contacts from the terminal block assembly, and then remove the magnet coil lead terminal clips, varistor (if so equipped), terminal block, two hex. nuts, and the insulation from the body.

3.7 For FA-2 Magnet Valves only, remove the four #10 fillister head machine screws, the cover, and the cover gasket from the body.

3.8 Remove the magnet coil housing from the body assembly.

3.9 Remove the top gasket, magnet coil, and bottom gasket from the body assembly.

3.10 Using the magnet core removal tool (item 2.3.1), remove the magnet core from the body assembly.

3.11 CAUTION: SPRING IS UNDER COMPRESSIVE LOAD. EXERCISE CARE WHEN DISASSEMBLING TO AVOID PHYSICAL INJURY FROM PARTS INADVERTENTLY EXPELLED BY SPRING FORCE. WEAR PERSONAL EYE PROTECTION.

3.12 Remove the lower cap nut from the body, and then remove the spring and spring seat.

3.13 Using the valve seat removal tool (item 2.3.2), remove the valve seat from the body.

3.14 Remove the lower valve from the valve seat.

3.15 Remove the upper valve from the body.

4. CLEANING, INSPECTION, AND REPAIR

4.1 Electrical Components

4.1.1 CAUTION: DO NOT ALLOW THE MAGNET COIL, TERMINAL BLOCK, OR INSULATION TO COME INTO CONTACT WITH THE CLEANING SOLVENT. AS DAMAGE TO THESE COMPONENTS MAY RESULT.

4.1.2 CAUTION: BRUSHING CAN RESULT IN PARTICLES OF DIRT, RUST, SCALE, ETC. BEING THROWN FROM THE PART. THESE PARTICLES CAN CAUSE EYE IRRITATION AND/OR INJURY. WEAR PERSONAL EYE PROTECTION.

4.1.3 Clean the magnet coil, terminal block, and insulation by brushing with a soft bristled brush (such as a shoe brush). or wiping with a soft, clean cloth.

4.1.4 Coil Resistance

4.1.4.1 Check coil resistance and make certain that it is within the limits specified in the following tabulation.

4.1.4.1.1 Tabulation -

<u>FA-2 MAGNET PC. NO.</u>	<u>NOMINAL OPERATING VOLTAGE</u>	<u>COIL RESISTANCE AT 25°C-77°F</u>
529272	32	96 - 106
528871	64	368 - 406
562190	80	566 - 626
534994	230	3520 - 3890
<u>FA-4 MAGNET PC. NO.</u>		
533938	12	15 - 16
566760	24	59 - 65
536553	32	96 - 106
529417	32	96 - 106
527702	64	368 - 406
562187	80	566 - 626
531879	115	960 - 1061
531879	125	1340 - 1481
537820	230	3520 - 3890

4.1.5 Inspect magnet coil leads for any fraying of insulation.

4.1.5.1 Should such fraying be in evidence, it is recommended that the magnet coil be replaced.

4.2 Metal Parts

4.2.1 NOTE: The solvent used as a cleaning solution must be in accordance with the requirements of item 2.2.

4.2.2 Wash all metal parts except the body and the magnet coil housing in the prescribed cleaning solution.

4.2.3 CAUTION: THE USE OF AN AIR JET TO DRY PARTS CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT, SCALE, RUST ETC. OR DROPLETS OF THE SOLVENT TO BE BLOWN FROM THE PARTS. THESE PARTICLES OR DROPLETS CAN CAUSE EYE IRRITATION AND/OR INJURY. WEAR PERSONAL EYE PROTECTION. DO NOT DIRECT THE AIR JET TOWARD ANY OTHER PERSON.

4.2.4 Parts thus cleaned must be dried with a LOW pressure (30 psi maximum) jet of clean air.

4.2.5 CAUTION: WIRE BRUSHING CAN RESULT IN PARTICLES OF DIRT, RUST, SCALE, ETC. BEING THROWN FROM THE PART. THESE PARTICLES CAN CAUSE EYE IRRITATION AND/OR INJURY. WEAR PERSONAL EYE PROTECTION.

4.2.6 Springs may be wire brushed.

4.2.7 The magnet valve body and the magnet coil housing must be thoroughly cleaned internally and externally with a cloth saturated with the prescribed cleaning solution.

4.2.8 CAUTION: THE USE OF AN AIR JET TO DRY PARTS CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT, SCALE, RUST, ETC. OR DROPLETS OF THE SOLVENT TO BE BLOWN FROM THE PARTS. THESE PARTICLES OR DROPLETS CAN CAUSE EYE IRRITATION AND/OR INJURY. WEAR PERSONAL EYE PROTECTION. DO NOT DIRECT THE AIR JET TOWARD ANY OTHER PERSON.

4.2.9 Parts thus cleaned must be dried with a LOW pressure (30 psi maximum) jet of clean air.

4.3 Gaskets

4.3.1 NOTE: Gaskets must not be allowed to soak in the cleaning solution.

4.3.2 Gaskets may be dipped in the prescribed cleaning solution to remove grease and/or dirt.

4.3.3 CAUTION: THE USE OF AN AIR JET TO DRY PARTS CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT, SCALE, RUST, ETC. OR DROPLETS OF THE SOLVENT TO BE BLOWN FROM THE PARTS. THESE PARTICLES OR DROPLETS CAN CAUSE EYE IRRITATION AND/OR INJURY. WEAR PERSONAL EYE PROTECTION. DO NOT DIRECT THE AIR JET TOWARD ANY OTHER PERSON.

4.3.4 Cleaned gaskets must be wiped and immediately dried with a LOW pressure (30 psi maximum) jet of clean air.

4.3.5 Reject and replace all gaskets which have broken or flattened beads or any that reveal cracks or cuts.

4.4 Inspect all springs for rust pits, distortion, or permanent set. Replace where necessary.

4.5 Replace all parts that are cracked, broken, worn excessively, damaged, or in such a condition as would result in unsatisfactory operation.

5. ASSEMBLY

5.1 NOTE: Use no lubricant while assembling the magnet valve portion.

5.2 Insert the upper valve (tail end first) into the lower cavity of the body.

5.3 Insert the lower valve (tail end first) into the threaded end of the valve seat.

5.4 Insert the valve seat into the lower cavity of the body and tighten securely using the valve seat removal tool (item 2.3.2).

5.5 CAUTION: SPRING IS TO BE ASSEMBLED UNDER COMPRESSIVE LOAD. EXERCISE CARE WHEN ASSEMBLING TO AVOID PHYSICAL INJURY FROM PARTS INADVERTENTLY EXPELLED BY SPRING FORCE. WEAR PERSONAL EYE PROTECTION.

5.6 Insert the following into the lower cavity of the body:

5.6.1 Spring seat

5.6.2 Spring

5.6.3 Lower cap nut

5.7 Securely tighten the lower cap nut.

5.8 Insert the magnet core into the body and tighten securely using the magnet core removal tool (item 2.3.1).

5.9 Insert the top and bottom gaskets into the gasket grooves in the magnet coil.

5.10 Insert the magnet coil into the body assembly, making certain that the dowel pin in the body is aligned with the hole in the bottom of the magnet coil and the magnet coil leads are in the proper position.

5.11 Securely tighten the magnet coil housing.

5.12 For FA-4 Magnet Valves only, proceed as follows:

5.12.1 Secure the two magnet coil lead terminal clips and the two varistor terminal clips (if so equipped) to the terminal block using the two male contacts and the two hex. nuts.

5.12.2 Secure the insulation and terminal block assembly to the body using the two oval fillister head machine screws.

5.13 For FA-2 Magnet Valves only, proceed as follows:

5.13.1 Place the cover gasket and cover in place over the function box opening in the body.

5.13.2 Secure the cover gasket and cover to the body using the four #10 fillister head machine screws.

5.14 Insert the armature stem into the armature, then loosely turn the 5/16" hex. nut onto the armature stem.

5.15 Place the magnet core washer into the armature core, then fully insert the armature stem into the center of the magnet coil.

5.16 Adjust the armature air gap as follows:

5.16.1 Fully depress the armature.

5.16.2 Using a screwdriver, rotate the armature stem counter-clockwise (as viewed from above the magnet valve) until the armature is firmly seated against the armature core.

5.16.3 Using the depth micrometer (item 2.3.3) measure the distance from the top of the armature to the upper cap nut seating surface.

5.16.4 Rotate the armature stem clockwise until the armature rises .015".

5.16.5 Tighten the 5/16" hex. nut on the armature stem.

5.17 Measure the lift or valve travel of the magnet, which should be .032" to .037".

5.17.1 If valve travel is too short, valve heads must be filed off square to increase the travel. If valve travel is too long it will be necessary to replace valve seats and possibly the valves to obtain correct valve travel.

5.18 Insert the upper cap nut into the magnet coil housing and tighten securely.

5.19 For FA-4 Magnet Valves only, insert the three filters into the ports in the mounting face of the body assembly.

5.20 For F-2 Magnet Valves only, insert the exhaust port excluder into the body.

6. TESTING REQUIREMENTS.

6.1 Before being placed in service, the assembled FA Type Magnet Valve must be tested, and meet all the requirements of the current issue of the pertinent test specification as detailed in the tabulation of item 6.2.

6.2 Tabulation

<u>TEST SPEC. NO.</u>	<u>APPLICABLE FA-2 MAGNET VALVE PC. NOS.</u>	<u>TEST RACK</u>
T-1510-0	528871, 529272, 562190	AB/ETP
T-1773-0	528871, 529272, 562190 534994	AB/IWC
<u>TEST SPEC. NO.</u>	<u>APPLICABLE FA-4 MAGNET VALVE PC. NOS.</u>	<u>TEST RACK</u>
T-1415-0	527702	AB/ETP
T-1858-0	527702	AB/IWC
T-1513-0	529417, 531879, 533938, 537820 562187, 566760	AB/ETP
T-1772-0	529417, 531879, 533938, 537820 562187, 566760	AB/IWC
T-3181-0	536553	AB/ETP

D. Brown
Supervisor - Technical
Services

APPROVED:

JM Thomas
Manager - Engineering
Services

RGM

REVISION SHEET

Issue No. 1
September 12, 1962
RGM

Issue No. 2
November 4, 1963
RGM

Corrected method of obtaining correct valve travel.

Issue No. 3
November 22, 1977
CMF:bac

Changed title of spec. from "F" TYPE MAGNET VALVES" to "FA TYPE MAGNET VALVES." "FB" Type Magnet Valves transferred to R-48-C, Sup. 13. Revised format of specification. Added pertinent CAUTION notes.



"C-3" DECELOSTAT® VALVE

Pc.No. 576997 (32 Volts)

Pc.No. 579449 (64 Volts)

(SUPERSEDES ISSUE DATED APRIL, 1977)

PARTS CATALOG

WARNING: AT THE TIME ANY PART IS REPLACED IN THIS DEVICE, THE OPERATION OF THE COMPLETE DEVICE **MUST** PASS A SERIES OF TESTS AS PRESCRIBED IN THE LATEST ISSUE OF THE APPLICABLE WABCO TEST SPECIFICATION. AT THE TIME THIS DEVICE IS APPLIED TO THE BRAKE EQUIPMENT ARRANGEMENT, A STATIONARY VEHICLE TEST **MUST** BE MADE TO INSURE THAT THIS DEVICE FUNCTIONS PROPERLY IN THE TOTAL BRAKE EQUIPMENT ARRANGEMENT. (Consult your local WABCO Representative for identity of the test specifications, with latest revision date, that cover this device).

**WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
Wilmerding, Pennsylvania 15148**

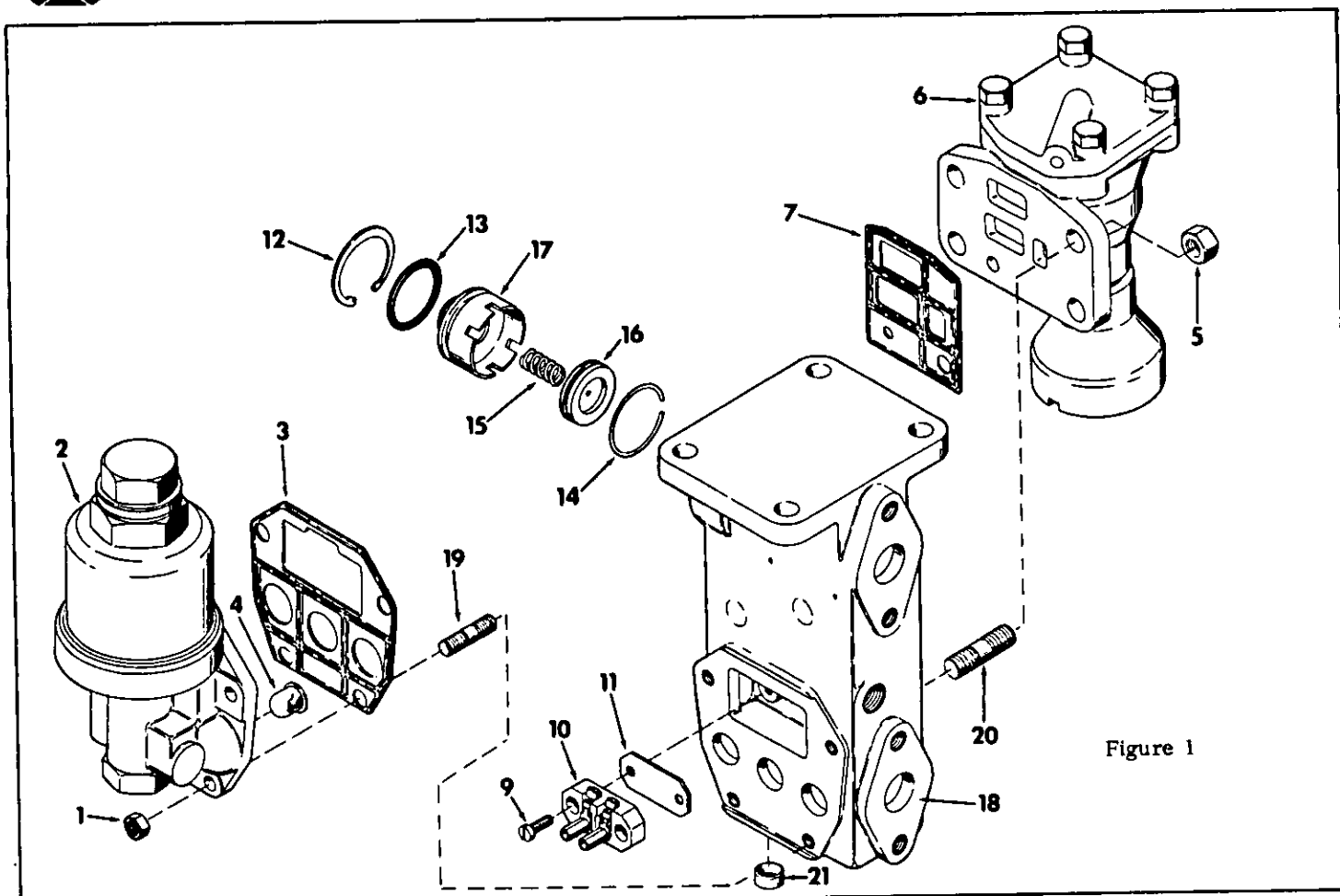


Figure 1

"C-3" DECELOSTAT® VALVE

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-	576997	"C-3" DECELOSTAT VALVE, ASY., 32 Volt, (Incl. Ref.No. 1-21)	
1-	579449	"C-3" DECELOSTAT VALVE, ASY., 64 Volt, (Incl. Ref.No. 1-21)	
1-1	502369	.NUT, Hex., 3/8 in.	4
1-2	529417 | 527702	."FA-4" MAGNET VALVE PORTION, Asy. (See Fig.2) . .	1
1-3	527375	.GASKET, Magnet Valve. . . .	1
1-4	521663	.ELEMENT, Filter.	3
1-5	2505	.NUT, Hex., 1/2 in.	4
1-6	533334	.RELEASE VALVE PORTION, Asy. (See Figure 3)	1
1-7	533336	.GASKET, Release Valve . . .	1
1-	577016 | 579634	.PIPE BRACKET PORTION ASY. (Incl. Ref. 9 thru 21)	1

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
1-9	3380	..SCREW, Fil.Hd.Mch. 190 x 5/8 in.	2
1-10	578381	..BLOCK, Terminal (Socket) .	1
1-11	514992	..PLATE, Insulation.	1
1-12	544134	..RING, Retaining, 1-7/8 . . .	1
1-13	536581	..O-RING, 1-7/8 in. O.D. . .	1
1-14	577014	..RING, Retaining	1
1-15	●552190	..SPRING, Check Valve	1
1-16	577228 | 579630 .2968 .221 (#2)	..VALVE, Check. Check Valve Choke Size	1
1-17	577013	..HOUSING, Check Valve . . .	1
1-18	577017	..PIPE BRACKET, Asy. (Incl. Ref. Nos. 1, 5 & 19 thru 21) .	1
1-19	513969	...STUD, 3/8 x 1-5/8 in. . . .	4
1-20	523182	...STUD, 1/2 x 2 in.	4
1-21	552072	...EXCLUDER, Wasp, 5/8 in. .	1

●NOTE: For Spring Identification, See Page 4.



"FA-4" MAGNET VALVE PORTION

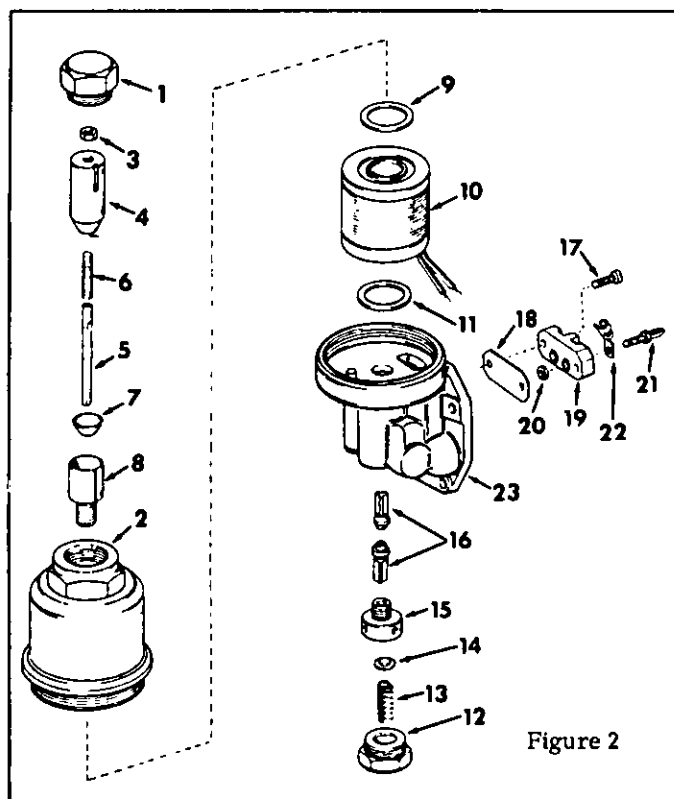


Figure 2

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
2-	529417	"FA-4" MAGNET VALVE PORTION, ASY., 32 Volts (Voltage Range, 25-44)	
2-	527702	"FA-4" MAGNET VALVE PORTION, ASY. 64 Volts (Voltage Range, 45-85)	
2-1	502453	..NUT, Cap	1
2-2	521287	..HOUSING, Magnet Coil . . .	1
2-3	96500	..NUT, Hex., 5/16 in.	1
2-4	521284	..ARMATURE	1
2-5	574403	..STEM, Armature	1
2-6	574404	..SCREW, Adjusting.	1
2-7	574402	..WASHER, Core	1
2-8	521282	..CORE, Magnet.	1
2-9	520902	..GASKET, Top	1
2-10	528928 | 525217	..COIL, Magnet	1
2-11	520902	..GASKET, Bottom.	1
2-	529341	..BODY, Asy. (Incl. Ref. Nos. 12 thru 23).	1
2-12	528078	..NUT, Cap.	1
2-13	●551262	..SPRING	1
2-14	527389	..SEAT, Spring.	1
2-15	527373	..SEAT, Valve	1
2-16	521280	..VALVE	2
2-17	3380	..SCREW, Ov. Fil. Hd. Mch. 190 x 5/8 in.	2
2-18	514992	..PLATE, Term. Block Insulation	1
2-19	534086	..BLOCK, Terminal, Asy. (Incl. Ref. Nos. 20 & 21) . .	1
2-20	5741	...NUT, Hex	2
2-21	533933	...CONTACT, Male	2
2-22	533086	..CLIP, Terminal.	2
2-23	541057	..BODY	1

●NOTE: For Spring Identification, See Page 4.

Repair Specification R-48-C, Sup. 2, covering the "F" Type Magnet Valves is available on request.

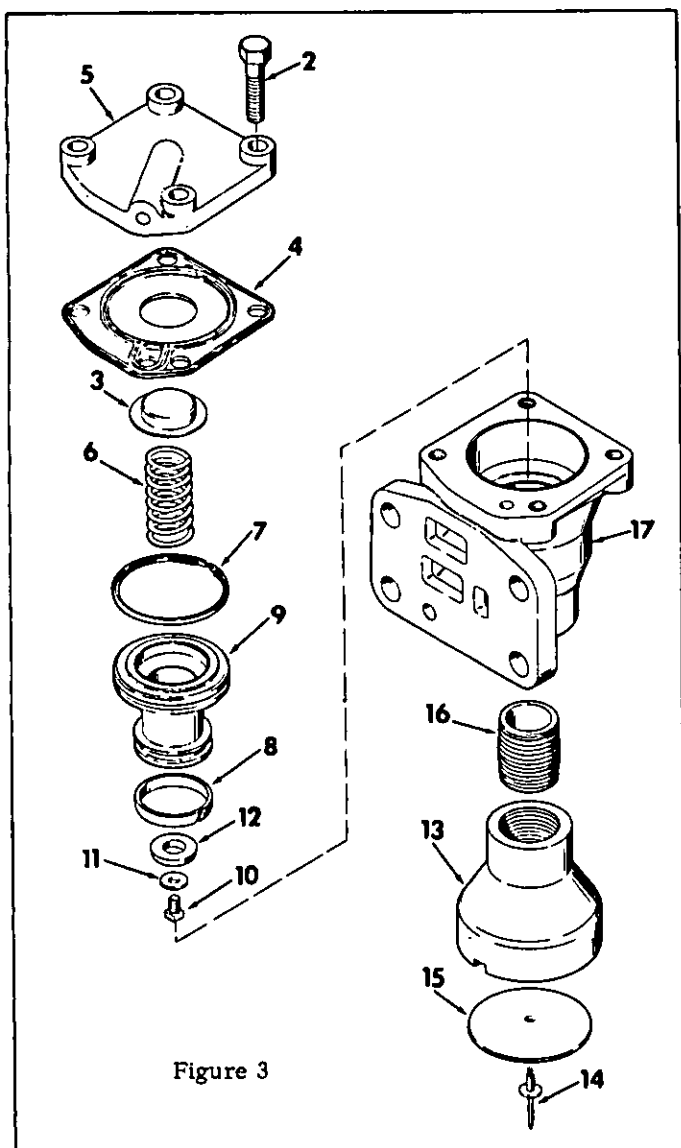


Figure 3

◆NOTE: We are prepared to furnish the following Repair Rings for the Release Valve Piston:

Fig. & Ref.No.	Size O.D.	Pc.No.	Remarks
3-7	2-1/2 in.	505865	Standard and 1st Repair
		505866	2nd Repair
		505867	3rd Repair
		505868	4th Repair
3-8	1-5/8 in.	504236	Standard and 1st Repair
		530728	2nd Repair

Prices will be quoted upon application

Orders should give PIECE NUMBER and NAME of part wanted

RELEASE VALVE PORTION

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
3-	533334	RELEASE VALVE PORTION, ASY. (Incl. Ref. Nos. 1 thru 17)	
3-2	17129	.SCREW, Hex.Hd.Cap, 3/8 x 1-5/8 in.	4
3-3	552346	.RETAINER, Gasket	1
3-4	533333	.GASKET, Top Cover	1
3-5	533331	.COVER, Top.	1
3-6	569160	.SPRING, Piston.	1
3-7	◆	.RING, Piston, 2-1/2 in.Dia. .	1
3-8	◆	.RING, Piston, 1-5/8 in.Dia. .	1
3-9	520320	.PISTON, Asy. (Incl. Ref. 10 thru 12)	1
3-10	500430	.SCREW, Retainer.	1
3-11	27660	.WASHER, 9/16 in. O.D. . . .	1
3-12	501331	.SEAL, Piston	1
3-13	532456	.VENT PROTECTOR, Asy. (Incl. Ref. Nos. 14 & 15) . . .	1
3-14	571140	.RIVET, Pop, 3/16x1/2 in. . .	1
3-15	502465	.SEAL, Vent.	1
3-16	536419	.NIPPLE, Pipe, 1x1-1/2 in. . .	1
3-17	533329	.BODY, Release Valve	1

◆NOTE: See Spring Identification Chart Below.

FITTINGS KIT

Fig. & Ref.No.	Pc.No.	Parts Name	No. Req'd
	580287	FITTINGS KIT	
	503685	.FITTING, WABCO, Sweat . . .	2
	93986	.GASKET, Fitting.	2
	562054	.SCREW, Self-Locking, Cap, 1/2 x 1-1/4 in.	4

SPRING IDENTIFICATION

The following table is shown to enable identification of the springs used in the devices cataloged herein. It is based on calculated figures and the actual spring will vary somewhat, due to the small difference in wire, coil diameter, number of turns, etc. This tabulation is intended for identification only and should not be used for any other purpose. It does not represent a specification for the springs mentioned.

		SPRING IDENTIFICATION			
Pc.No.	Approx. Out Dia. "A" in.	Approx. Wire Dia. "B" in.	Approx. Free Height "C" in.	Approx. No. Turns *	Mat'l.
551262	7/16	3/64	1-25/64	9	Steel
552190	1/2	3/64	1	6	Steel
569160	1-1/32	7/64	3-9/16	9-1/2	St. Steel

◆NOTE: Number of turns counted between extreme ends.

7.7 Brazing Piping

Materials Required:

1. Dry nitrogen tank with regulator set for 2 psig.
2. Flux
3. Brazing Alloy AWS Classification Bag 7, such as Braze 560 or Unibraze 1550. Do not use a 95/5 solder - it is not sufficiently strong.

WARNING

Never apply heat to a line under pressure. The line may rupture, and the escaping pressure may throw blazing oil or molten solder through the air.

Air brake systems must be leak free, and the ability to properly braze joints in tubing is an essential skill of the pipefitter.

Tubing should be cleaned and burnished bright before brazing. Do not use steel wool - the slivers may get into the valves, and damage them. Care in cleaning is essential for good gas-tight connections. Particular attention should be given to preventing metal particles or abrasive material from entering the tubing.

A suitable low temperature brazing flux that is fully liquid and active below the flow point of the brazing alloy is required. Because of their nature, brazing fluxes are quite active chemically, and must be kept out of the system. Only the male connection should be fluxed, and only enough flux should be used to adequately cover the surface. Keep the flux back from the end of the tubing so none will get inside.

When heat is applied to copper in the presence of air, copper oxide is formed. This oxide can be extremely harmful to an air brake system. To prevent its formation, dry nitrogen must be swept through the line a low pressure (1 to 2 psig). Always use a pressure regulating valve in the line connecting the nitrogen cylinder to the system.

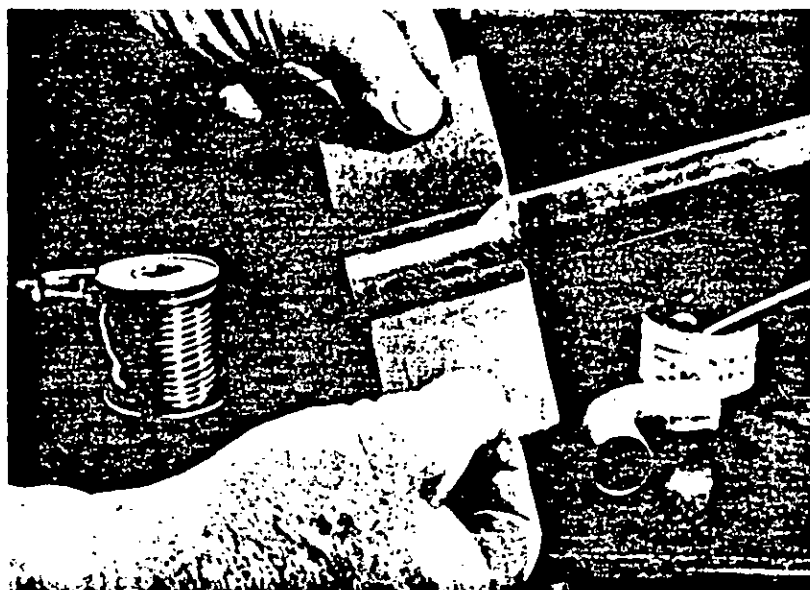
The tubing should be properly supported so that no strain is placed on the joints during brazing and cooling, and so that expansion and contraction will not be restricted.

Use only Braze-560 or unibraze-1550 brazing alloy. This is important for strength and vibration resistance.

Apply heat evenly to the tube and fitting until the flux begins to melt. The way heat is applied can either draw flux into the joint or prevent its entry. Apply heat around the circumference of the fitting to draw the brazing alloy into the joint to make a mechanically strong and tight joint. See figure 7.23 and 7.24.

Use care to not overheat the tubing and fittings. Be especially careful of the brake valves, etc. If brazing is required near a valve, remove it to avoid damage. Brake valves are quite expensive.

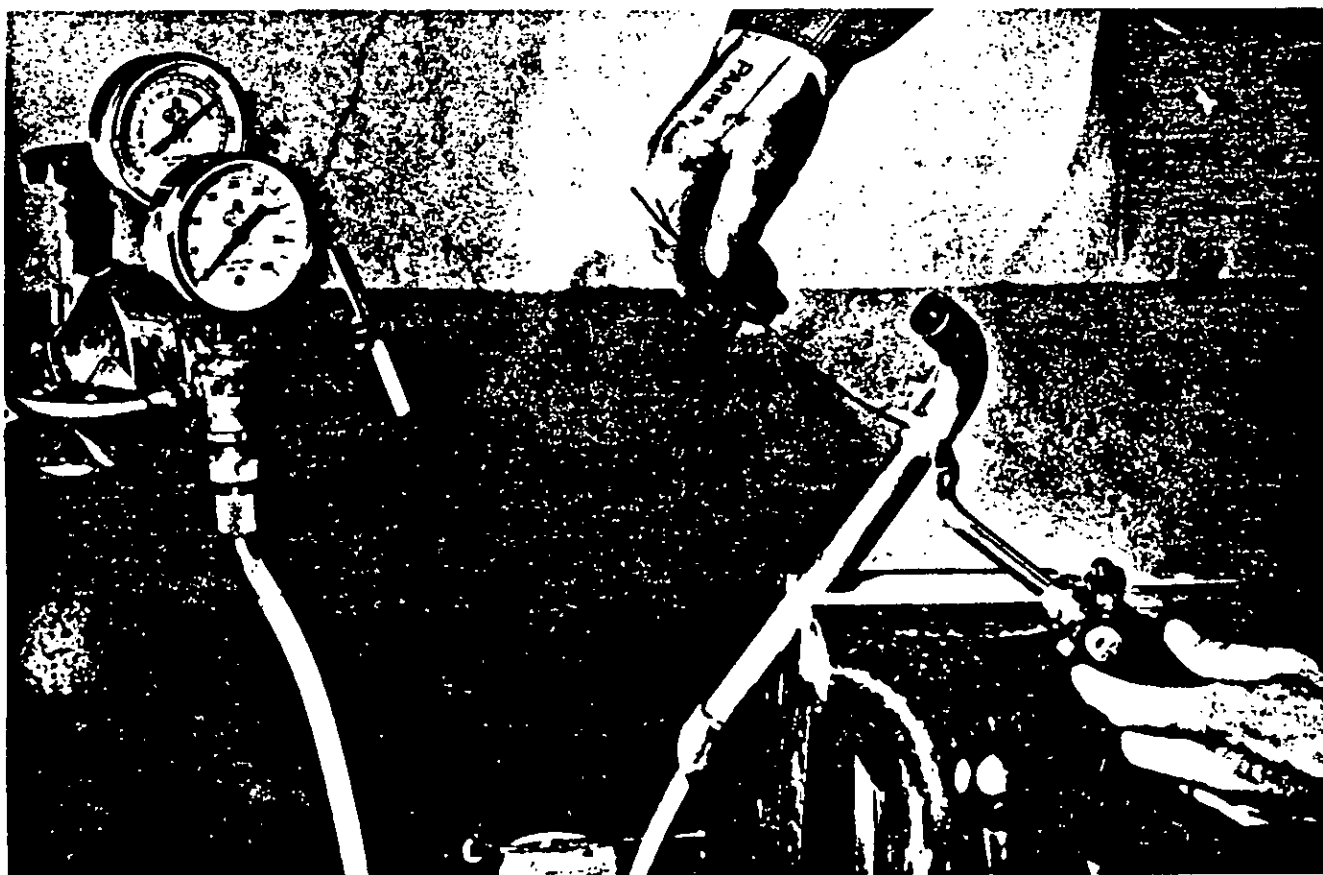
Immediately after the brazing alloy has set, apply a wet brush or cloth to the joint to wash off the flux. All flux must be removed for inspection and pressure testing.



CLEANING PROCEDURE Figure 7-23

Courtesy E. I. DuPont de Nemours & Co.

Copper tube and fittings should be thoroughly cleaned down to bare metal before making soldered or brazed joint. Care in cleaning will largely insure good, gas-tight connections. Note tubing is pitched downward to prevent entry of abrasive particles.



APPLYING ALLOY Figure 7-24

Courtesy E. I. DuPont de Nemours & Co.

Making brazed joint with fitting looking down. Whenever possible, brazed joints should be made in this manner to keep flux and alloy from getting inside. Note also that dry nitrogen is being swept through the tubing while brazing to prevent oxide formation.

END OF PROCEDURE

Section 7.8
DRAWING LIST

D22 Air Brake Schematic - Tread	_____
D22 Air Brake Schematic - Disc	_____
26C Air Brake Schematic - Disc	_____
Truck Speed Sensor Application	~~E-04-828~~ ~~D-04-1369~~
Decelostat Electrical Schematic	D-01-527
27 Point Trainline Schematic	E-01-526
27 Point Trainline Schematic	E-01-602
Disc Brake Bolt Locking Plate & Wire	D-211

CHAPTER 8 HANDBRAKETable of Contents

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LIST OF ILLUSTRATIONS

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8.2	Model 800 Brake Instructions	8-5
8.3	Model 850 Brake Instructions	8-16
8.4	Model 860 Brake Instructions	8-20

CHAPTER 8 HANDBRAKE

8.0 General

All cars are equipped with a handbrake on one end only. The handbrake mechanism is located on the vestibule end of all cars having a vestibule. The handbrake end of the car is designated the B end.

The handbrake unit requires little maintenance, but should be inspected periodically for proper operation. See manufacturer's instructions in this section.

For test of the handbrake, refer to test spec PQ-79-1, Test.

8.1 Maintenance Instructions

This section includes Ellcon National maintenance instructions for the Model 800, 850 and 860 handbrake units.

Some parts for the original 800-L (Left Hand) and 800-R (Right Hand) models, as shown on Drawing D-1373-A, are no longer available, as these models have been obsolete for more than thirty years.

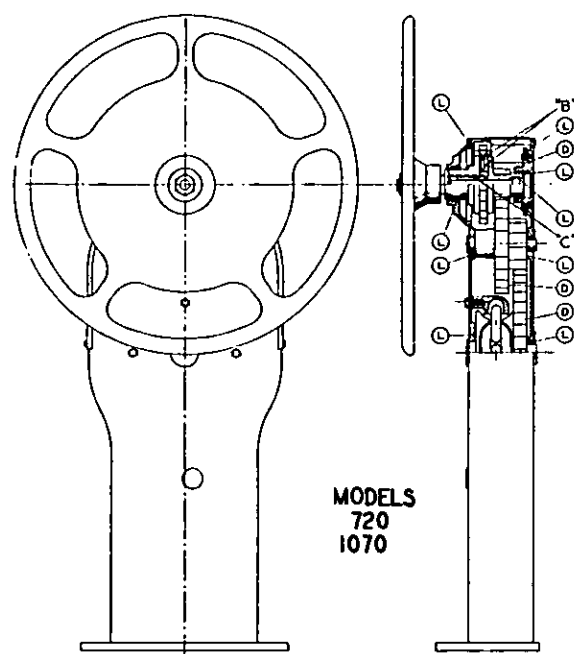
The "E" series has been replaced by, and most parts are interchangeable with the "G" series, which is currently being produced.

The 850 and 860 models are also currently in production.

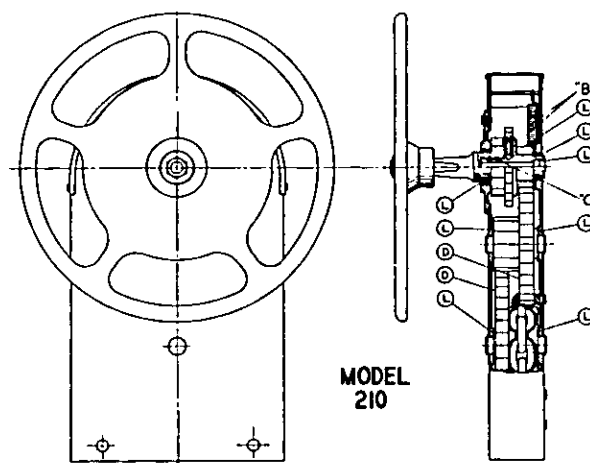
FIG 8.1

LUBRICATION CHART

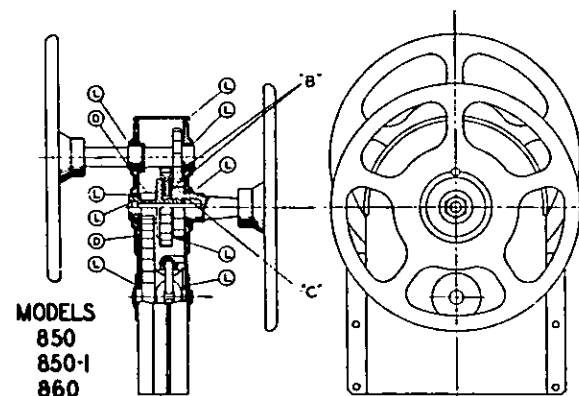
PEACOCK BRAKES



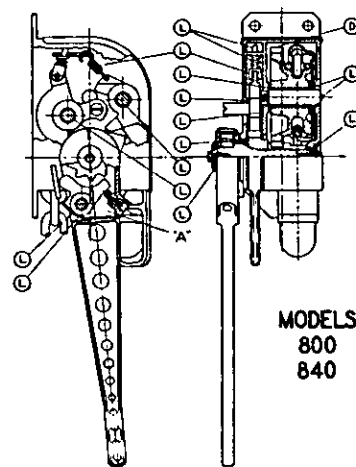
MODELS
720
1070



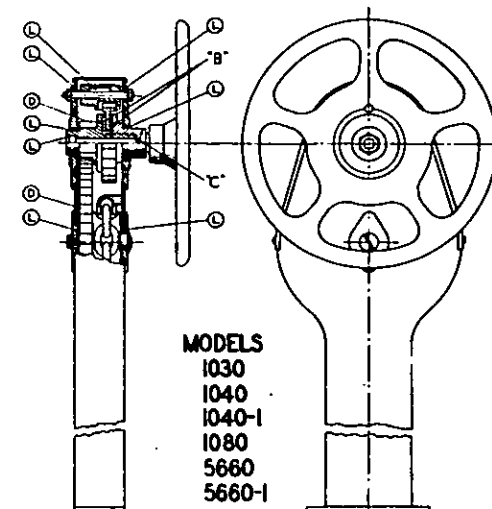
MODEL
210



MODELS
850
850-1
860



MODELS
800
840



MODELS
1030
1040
1040-1
1080
5660
5660-1

GENERAL DATA

IN ORDER TO PRESERVE THE EFFICIENCY OF HAND BRAKES THEY SHOULD BE PERIODICALLY CLEANED AND LUBRICATED AS FOLLOWS:

CLEANING

MOST BRAKES ARE PROVIDED WITH SOME FORM OF REMOVABLE COVER OR INSPECTION PLATE. THESE, WHEN USED, SHOULD BE REMOVED AND ALL FOREIGN MATTER THOROUGHLY BLOWN OUT WITH AN AIR HOSE. AFTER WHICH, THEY SHOULD BE LUBRICATED BY USING THE LUBRICANTS SUGGESTED BELOW. THE LUBRICANT CAN BE APPLIED WITH ANY FORM OF SQUIRT GUN, BUT PREFERABLY ONE WHICH REDUCES THE LUBRICANT TO A MIST OR FOG, OR IT CAN BE APPLIED WITH AN ORDINARY OIL CAN.

LUBRICATING

THE LUBRICATION OF ALL BRAKES FALLS INTO TWO GENERAL CATEGORIES, THOSE APPLIED INSIDE OF CARS OR LOCOMOTIVES, AND THOSE APPLIED ON THE OUTSIDE.

BRAKES APPLIED ON THE INSIDE OF CARS OR LOCOMOTIVES

THESE BRAKES GENERALLY CONSIST OF MODELS 210, 800, 850, 860, 1030, 1040, 1080, 1070 AND 720. THEY ARE MORE OR LESS PROTECTED FROM THE ELEMENTS AND REMAIN SOMEWHAT CLEANER THAN THOSE WHICH ARE ON THE OUTSIDE AND EXPOSED. THEREFORE, THEY SHOULD BE LUBRICATED WITH ANY GOOD GRADE OF LUBRICATING OIL, SUCH AS SAE 20.

BRAKES APPLIED ON THE OUTSIDE OF CARS OR LOCOMOTIVES

THESE BRAKES GENERALLY CONSIST OF MODELS 210, 800, 850, 860, 720 AND 1070. THEY ARE SUBJECT TO A CONSIDERABLE AMOUNT OF GRIT, DUST, RUST AND OTHER FOREIGN MATTER. THEREFORE, THEY SHOULD BE LUBRICATED WITH AN EXTREMELY LIGHT OIL OR KEROSENE, OR A COMBINATION OF BOTH.

DETAIL DATA

PARTICULAR ATTENTION IN BOTH CLEANING AND LUBRICATING SHOULD BE PAID TO ALL POINTS MARKED (L).

POCKET "A" OF THE 800 SERIES BRAKES.

THIS POCKET IS INCLINED TO BE CLOGGED WITH FOREIGN MATTER. PARTICULAR ATTENTION SHOULD BE PAID TO BLOWING IT FREE OF ALL DIRT, GRIT, ETC.

CLUTCHES "B"

THE CLUTCH FACINGS OF THESE UNITS DO NOT REQUIRE LUBRICATION. THEREFORE, OIL OR GREASE SHOULD NOT BE APPLIED DIRECTLY TO THEM. HOWEVER, NO HARM WILL BE DONE SHOULD A MIST OR FOG OF OIL SPRAYED IN THE HOUSINGS REACH THESE SURFACES.

THREADS "C"

THESE THREADS SHOULD BE FREELY LUBRICATED, WHENEVER NECESSARY TO DISMANTLE THE PINION ASSEMBLY.

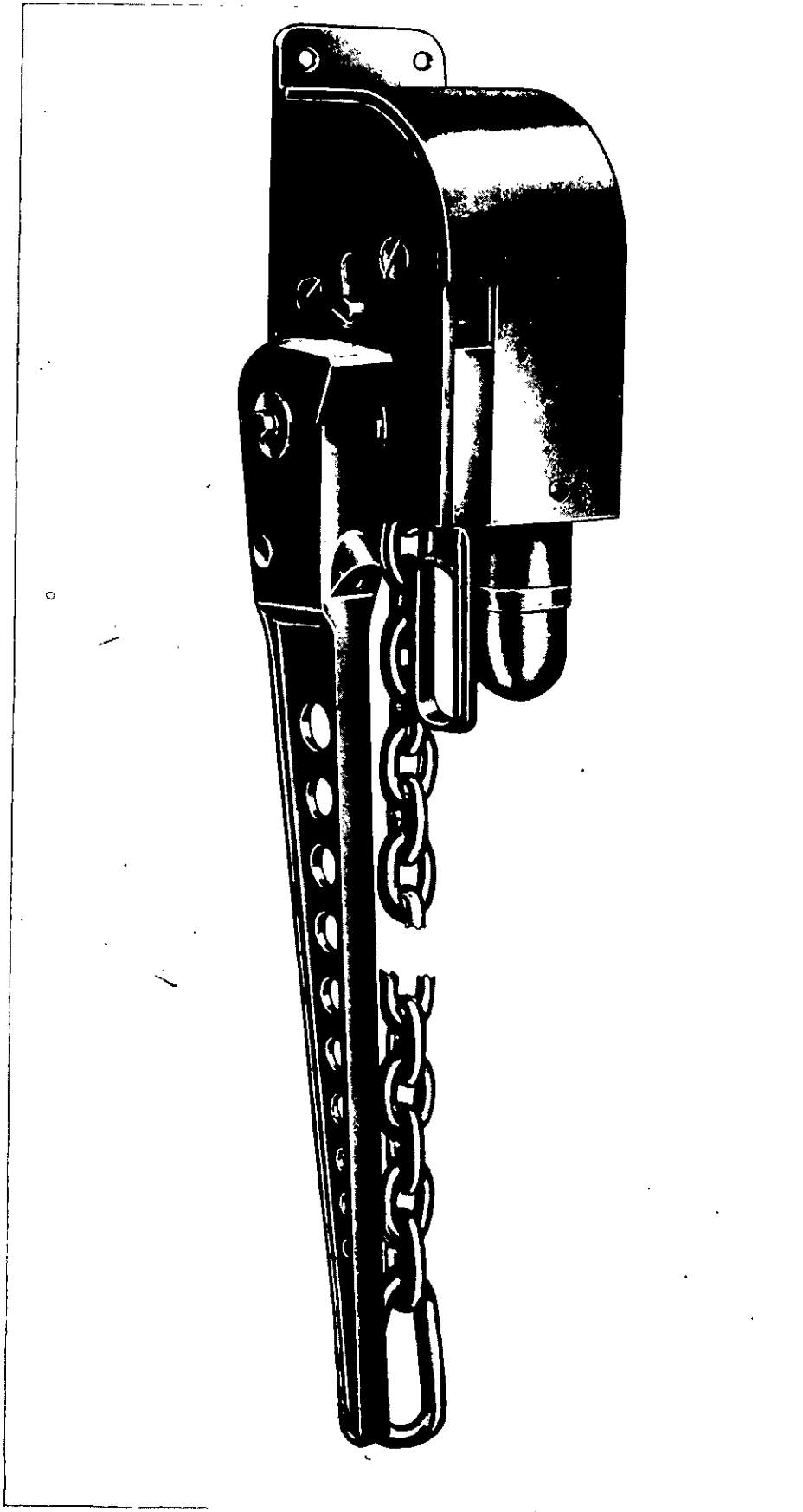
GEAR TEETH "D"

SPRAY WITH DRY LUBRICANT.

ELLCON-NATIONAL INC.
30 KING ROAD
TOTOVA, N. J.

FORM NO. 473

FIG 8.2
MODEL 800-LG BRAKE



MAINTENANCE INSTRUCTIONS

PEACOCK NO. 800-G BRAKES

00
1
0

LUBRICATION - All rotating or moving parts should be periodically lubricated with a normal grade of oil for interior mounted brakes and an extremely light grade of oil or kerosene, or a combination of both, for exterior mounted brakes. Length of time between lubrications will depend on use of brakes, operating conditions, etc., but, in any event, brakes should be lubricated. By removing #1097 cover, internal mechanism will be in full view. The rust, dirt, etc., can be blown out with an air hose. After this has been done, lubricant can be sprayed into housing directly on all visible rotating points.

SCREWS, NUTS- BOLTS, ETC. Brakes should be periodically inspected for, and all loose screws, nuts or bolts should, of course, be tightened. EXCEPTION - Hand Lever adjusting screw, part #1076, located in the front edge of the hand lever near the top, should not be turned except as outlined in the following paragraph.

HAND LEVER CLEARANCE - The top front edge of the hand lever is equipped with an adjusting screw which by turning adjusts the hand lever clearance between the handle and the nearest part of the car structure. Turning this screw clockwise increases the clearance and counter-clockwise decreases it. It will seldom, if ever, be necessary to move this screw once the car is built. However, should it be necessary, the screw should be respiked by center-punching the threads into the slot extending across the head of the screw.

CAUTION - Brake rigging should be equipped with a suitable return spring in order to effect a full release of hand brake and also to prevent chain slack from jamming around sheaves and brackets or interfering with other components.

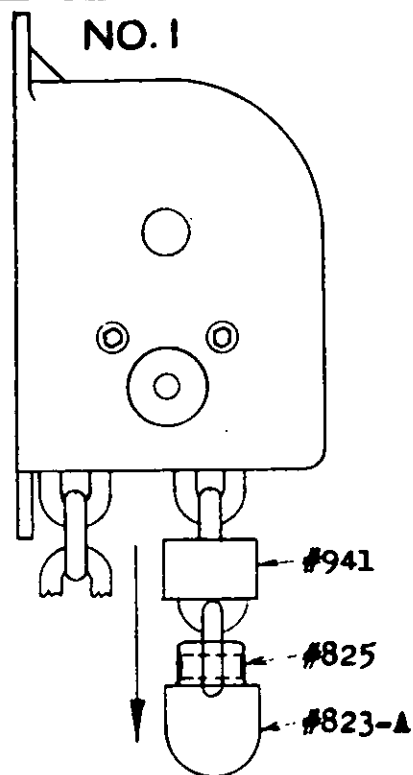
REPLACEMENT OF CHAIN - See Sheet No. 2, Drawing A-1209 attached.

SHEET NO. 1

ELLCON-NATIONAL, INC.
TOTOWA, NEW JERSEY 07512

Revised September 1, 1970

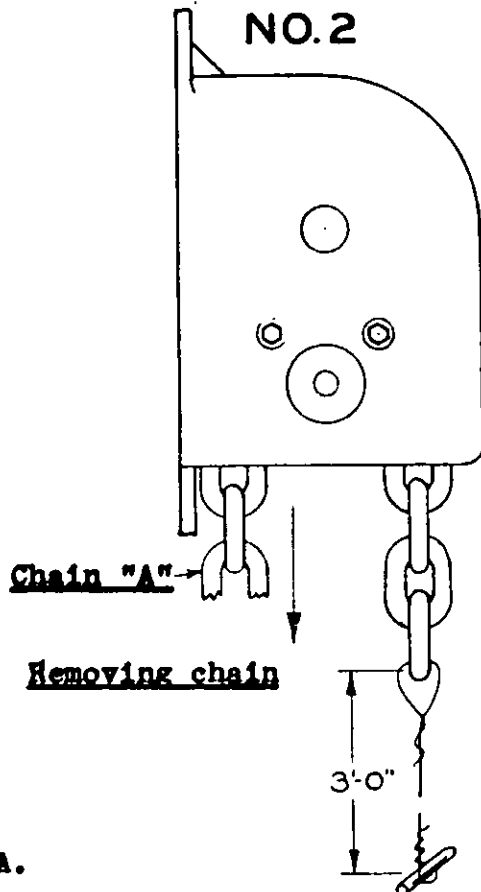
A-1608



Pull down weighted end of chain #823-A.

Slide rubber snubber #941 up chain as shown.

Remove chain snubber pin #825.



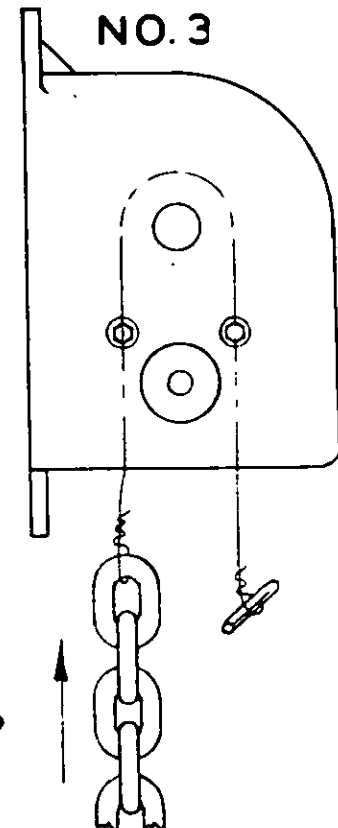
Attach piece of bale wire approximately 3 feet long to loose end of chain with a loop or other means of preventing the wire from passing through the housing.

Pull down on chain "A" until the wire hangs about evenly on both sides of the drum as shown.

Disconnect wire from old chain and attach to new chain.

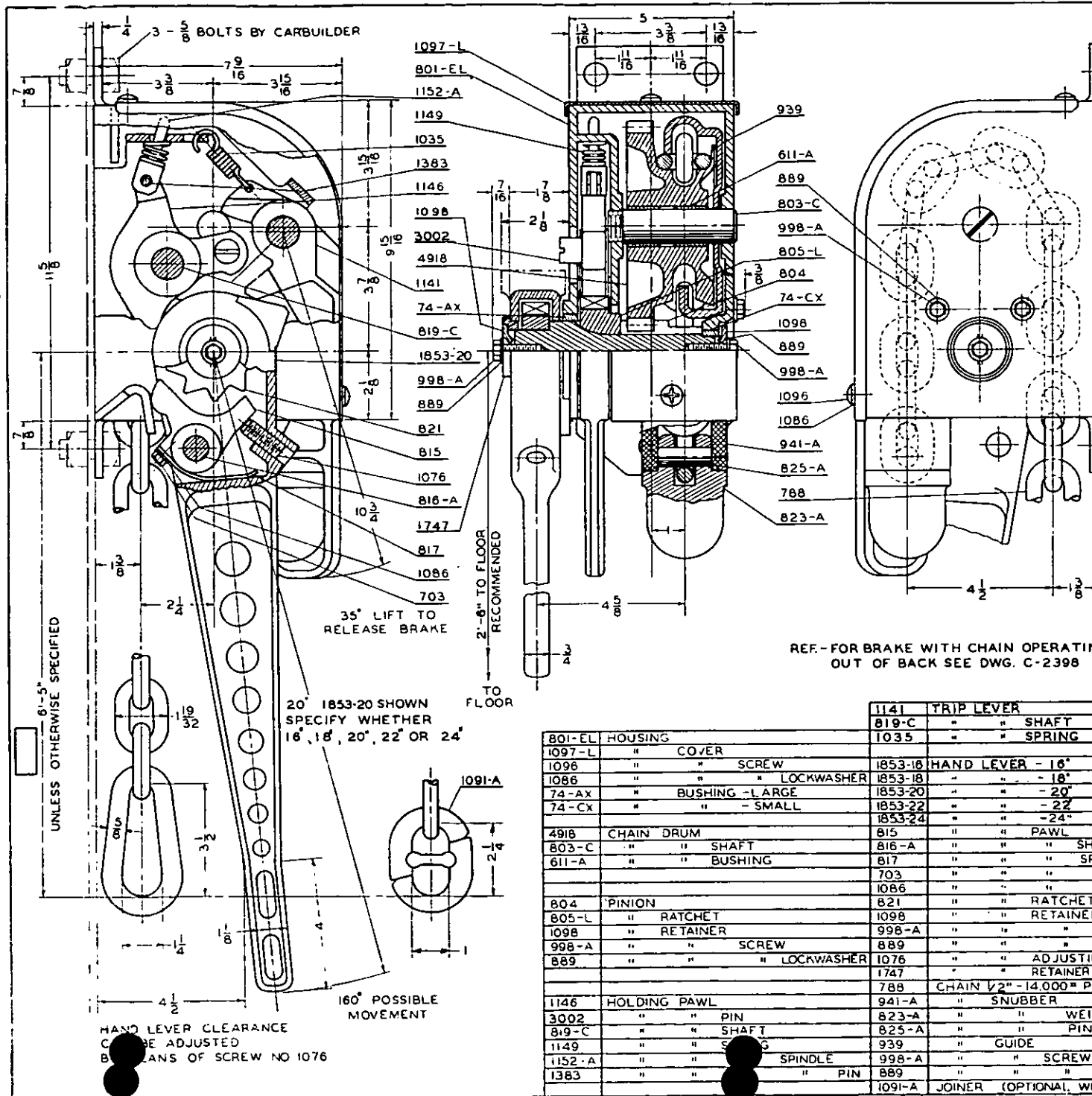
Pull down on the handle end of wire at the same time assisting the operation by raising chain up and starting it through the bottom of the housing. Continue this operation until chain has been drawn entirely through housing and hanging as shown in Sketch 1.

Slide snubber #941 up chain, attach weight #823-A by inserting pin #825, slide snubber down over the end of the weight #823-A, and connect the far end of chain to brake rigging.



MAINTENANCE INSTRUCTIONS

METHOD OF CHANGING CHAINS
PEACOCK NO. 800 BRAKES



GENERAL DATA

MADE IN MALLEABLE & STEEL
CONSTRUCTION WITH PAINTED,
CADMIUM, OR CHROME FINISH.

WEIGHT - MALL & STEEL CONSTR
24" HAND LEVER - 75 LBS

GEAR RATIO 5 : 1

CHAIN TRAVEL - UNLIMITED

FORCES

HAND LEVERS

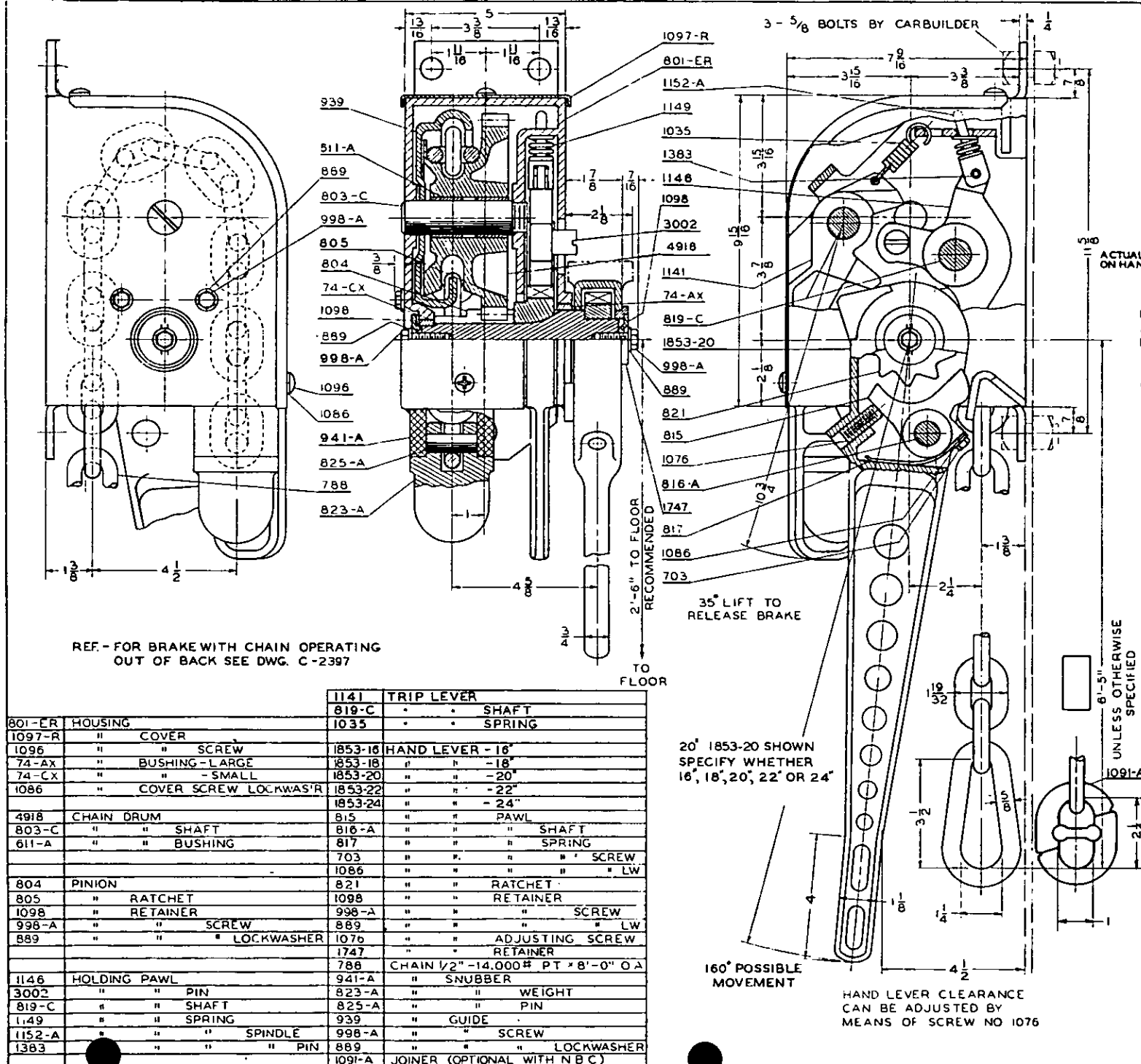
ACTUAL 125*
ON HAND 3000* 3300* 3600* 3890* 4180*

LUBRICATION - INTERNAL MECHANISM SHOULD BE THOROUGHLY BLOWN FREE OF ALL GRIT, DUST, ETC, AND LUBRICATED BY SPRAYING WITH A LIGHT OIL AT LEAST ONCE A YEAR

BRAKE RIGGING TO BE EQUIPPED WITH A SUITABLE RETURN SPRING IN ORDER TO EFFECT A FULL RELEASE OF HAND BRAKE.

NOTE

ALL DIMENSIONS SHOWN
ARE NOMINAL, AND ARE SUB-
JECT TO COMMERCIAL TOL-
ERANCES. IF ANY DIMENSIONS
ARE CRITICAL TO THE INSTAL-
LATION, CONTACT ELCON-
NATIONAL ENGINEERING DE-
PARTMENT.



E	12-28-73	REMOVED NR 1063
D	4-28-71	4918 WAS 802-A
C	1-25-70	HOUSING PICTURE CHANGED
B	1-5-70	REMOVED FORCES ADDED 2 VS DIM
A	1-8-65	PART NO. 3002 WAS 1147-B

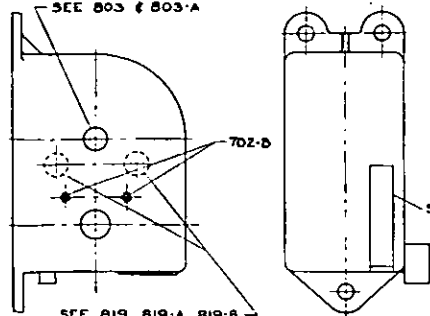
PEACOCK BRAKE

ELLCON - NATIONAL, INC.
30 KING ROAD
TOTOWA, N.J.

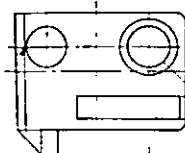
NO. 800 - RG BRAKE
(RIGHT HAND TYPE)

SCALE 6" = 1' - 0"					
DATE 11-17-64			E		
DRAWN <i>R</i>	C-2395				
APPROVED					

SEE 803 & 803-A

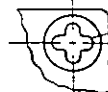


SEE 819, 819-A, 819-B



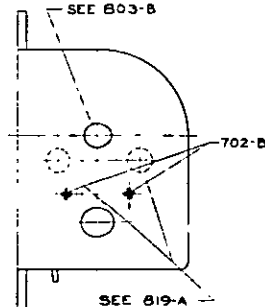
801-A 801-B
HOUSINGS

SEE 941

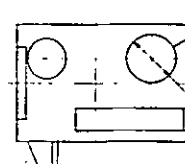


SEE 801-A & 801-LA

SEE 803-B



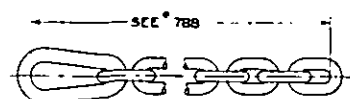
SEE 819-A



SEE 941, 941-A

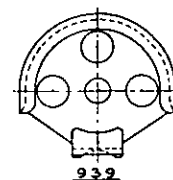
801-C
HOUSING

2 1/8

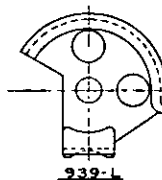


788
CHAIN

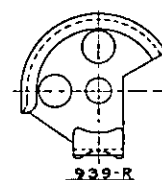
REF. DWGS. C-1034 & C-1091



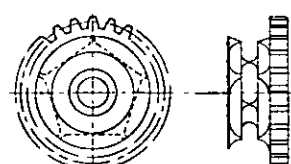
939



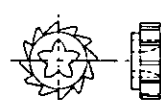
939-L
CHAIN GUIDES



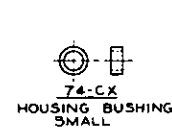
939-R



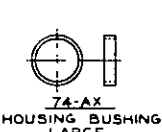
802-A
CHAIN DRUM



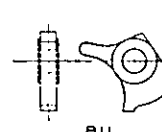
805
PINION RATCHET



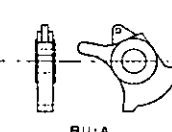
74-CX
HOUSING BUSHING
SMALL



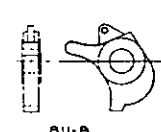
74-AX
HOUSING BUSHING
LARGE



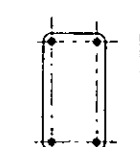
811



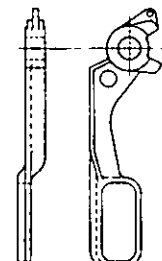
811-A
HOLDING PAWL



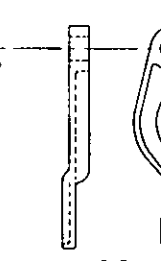
811-B



809
HOUSING
INSPECTION PLATE

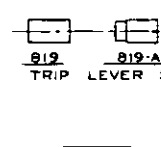


818-A



818

TRIP LEVERS

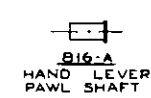


819

TRIP LEVER SHAFTS



815
HAND LEVER
PAWL



816-A
HAND LEVER
PAWL SHAFT



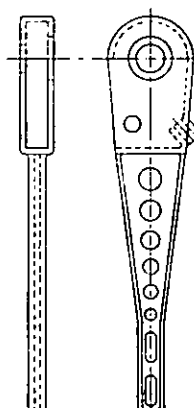
817
HAND LEVER
PAWL SPRING



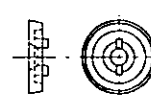
1035
HOLDING PAWL &
TRIP LEVER SPRING



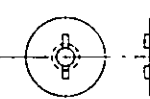
1065
OIL CUP



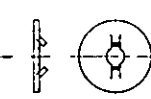
814-16 (SHOWN)
HAND LEVER



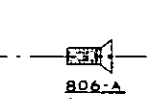
807, 807-B, 807-C
PINION RETAINER



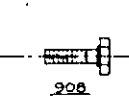
822, 822-A, 822-B
HAND LEVER
RETAINER



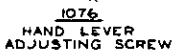
1098
UNIVERSAL RETAINER



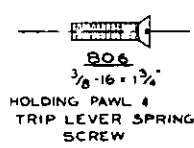
806-A
3/8-16 x 1"
RETAINER SCREW



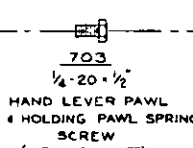
908
REPLACEMENT SCREW
(WITH LOCKWASHER)



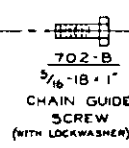
1076
HAND LEVER
ADJUSTING SCREW



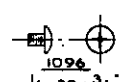
806
3/8-16 x 1 1/4"
HOLDING PAWL &
TRIP LEVER SPRING
SCREW



703
1/4-20 x 1/2"
HAND LEVER PAWL
& HOLDING PAWL SPRING
SCREW
(WITH LOCKWASHER)

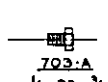


702-B
5/16-18 x 1"
CHAIN GUIDE
SCREW
(WITH LOCKWASHER)

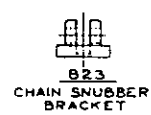


1096
1/4-20 x 3/8"

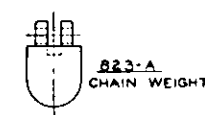
INSPECTION PLATE
SCREWS
(WITH LOCKWASHER)



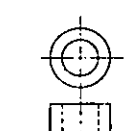
703-A
1/4-20 x 3/8"



823
CHAIN SNUBBER
BRACKET



823-A
CHAIN WEIGHT

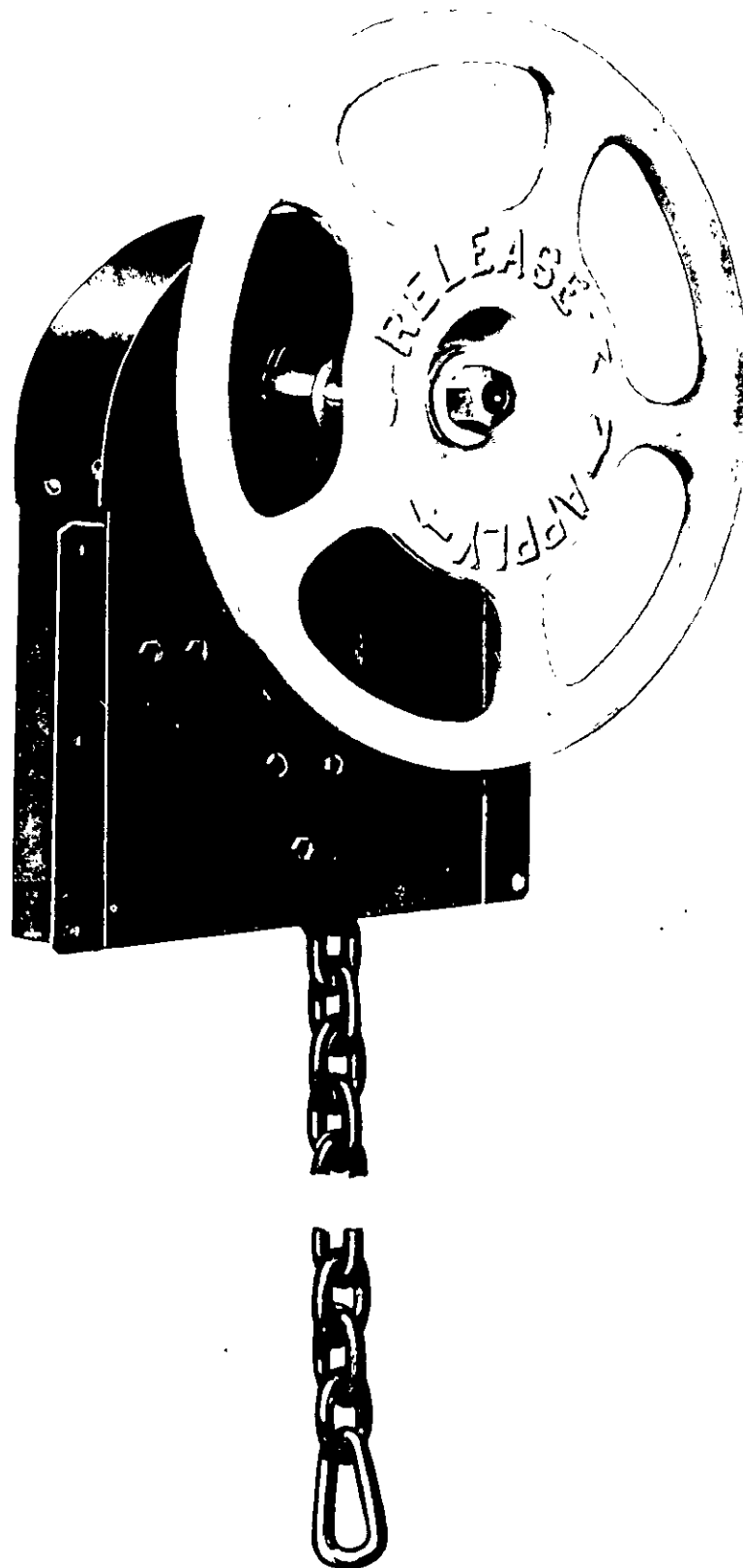


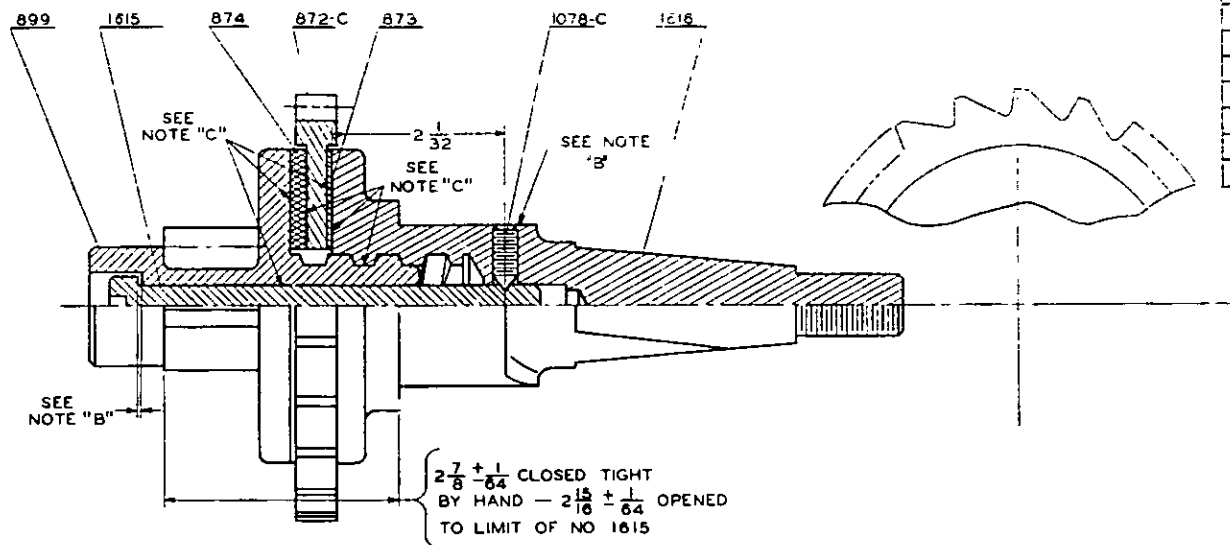
941-A
CHAIN SNUBBER

A10127470EN REVISIONS E.W.P.	
PEACOCK BRAKE	
NATIONAL BRAKE CO., INC.	
30 CHURCH ST.	
NEW YORK, N.Y.	
MAINTENANCE CHART	
NO 800 BRAKE	
SCALE	
DATE 2-28-49	
APPROVED	
D-1373	

8-1-5

FIG 8.3
NO. 850 BRAKE





BILL OF MATERIAL		
PART NO	QTY PER BRAKE	NAME
1616	1	PINION HAND WHEEL SHAFT
899	1	" GEAR
872-C	1	" RATCHET
973	1	" RELEASE DISC
874	1	" FRICTION "
1615	1	" SCREW
1078-C	1	" " RETAINING SCREW

TO DISMANTLE

1. UNLOCK AND PARTIALLY REMOVE NO. 1078-C RETAINING SCREW
2. REMOVE NO 1615 PINION SCREW.
3. HOLDING THE PINION ASSEMBLY IN A VERTICAL POSITION, TAPERED END DOWN, UNSCREW NO. 899 PINION, LIFT OFF PARTS NO. 874 FRICTION DISC, NO. 872-C RATCHET AND NO. 873 RELEASING DISC,

(NOTE "B" CONT'D.)
THE METAL AROUND THE SCREW HOLE IS TO BE PEENED OVER THE HEAD OF THIS SCREW TO PREVENT IT FROM WORKING LOOSE.

LUBRICATION

NOTE "C" - THE SHANK OF 1 : NO 1615 AND THE LARGE THREADS OF PARTS NO. 1616 AND NO 899, AND THE CLUTCH FACES OF PARTS NO 899, 874, 872-C, 873, AND 1616 SHOULD BE FREELY COATED WITH MOLYB-DENUM DISULFIDE LUBRICANT.

TO ASSEMBLE

REVERSE THE DISMANTLE PROCEDURE

NOTE "A" - THE BRONZE DISC PART NO. 873 IS ALWAYS APPLIED NEXT TO THE HAND WHEEL SHAFT PART NO. 1616 I.E. THE HAND WHEEL SIDE OF PART NO. 872-C RATCHET.

NOTE "B" - AFTER RE-ASSEMBLY, SCREW PINION GEAR PART NO. 899 AND HAND WHEEL SHAFT PART NO. 1616 AGAINST RATCHET PART NO. 872-C HAND TIGHT. TIGHTEN PINION SCREW PART NO. 1615 SNUGLY. THEN BACK OFF PINION SCREW 1/2 TURN. THIS SHOULD PERMIT APPROXIMATLY 1/16" END PLAY BETWEEN GEAR AND HAND WHEEL SHAFT ALLOWING RATCHET TO TURN FREELY. AFTER ABOVE STEPS HAVE BEEN TAKEN, RETAINING SCREW PART NO. 1078-C MUST BE DRIVEN HOME AS HARD AS POSSIBLE.

C 11-9-79 REVISED NOTE "B"		M/O/S
B 3-31-67	2 1/2" & 2 1/4" WAS 2 1/2" & 2 1/4"	
A 12-30-65	872-C WAS 872	
PEACOCK BRAKE		
ELLCON - NATIONAL, INC.		
30 KING ROAD		
TOTOWA N.J.		
NO. 1370 PINION ASSY.		
SCALE	FULL	
DATE	3-10-80	C 1980
850/-1	MADE	
USED ON	APPROVED	
		C-1980

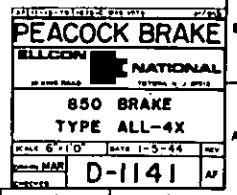
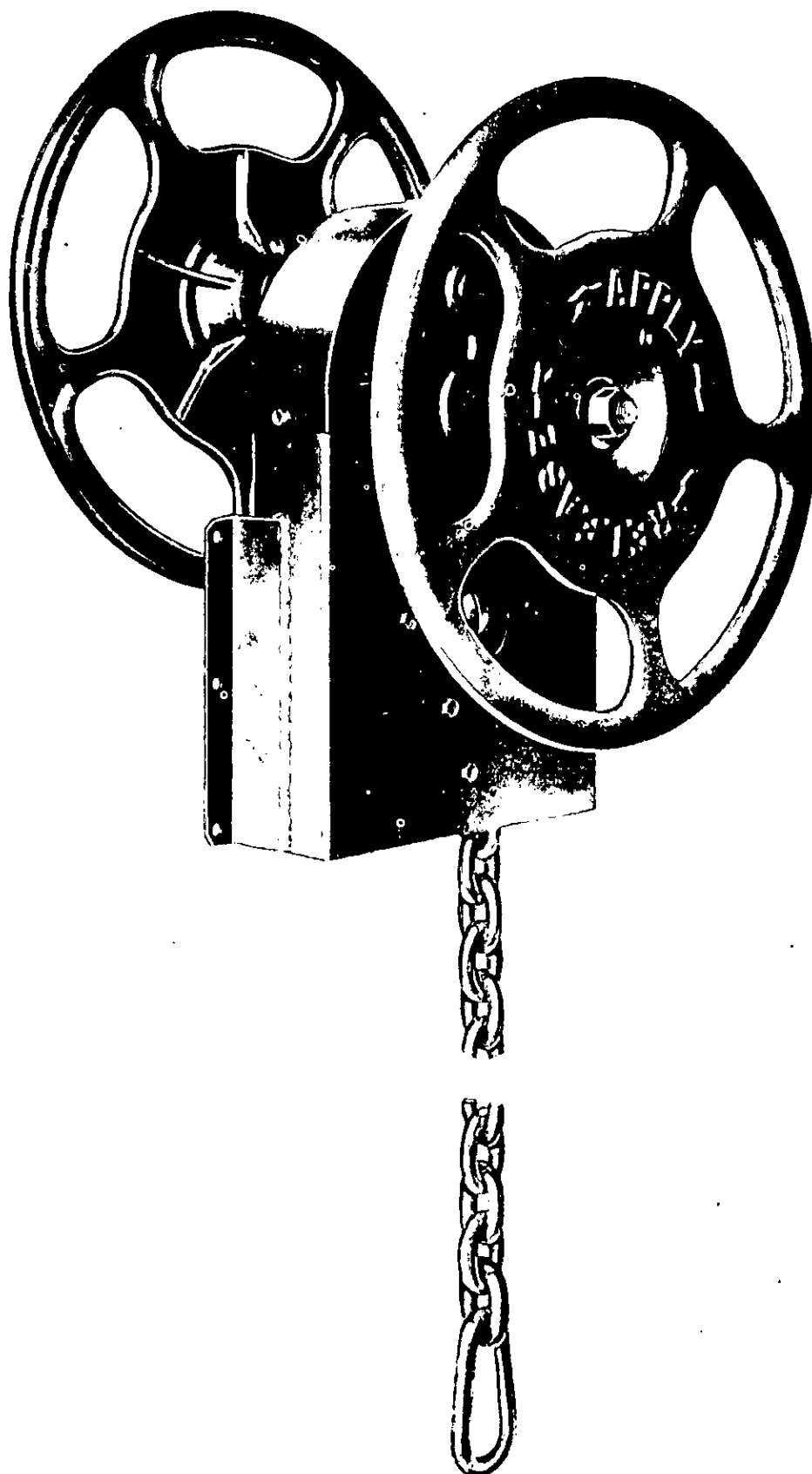
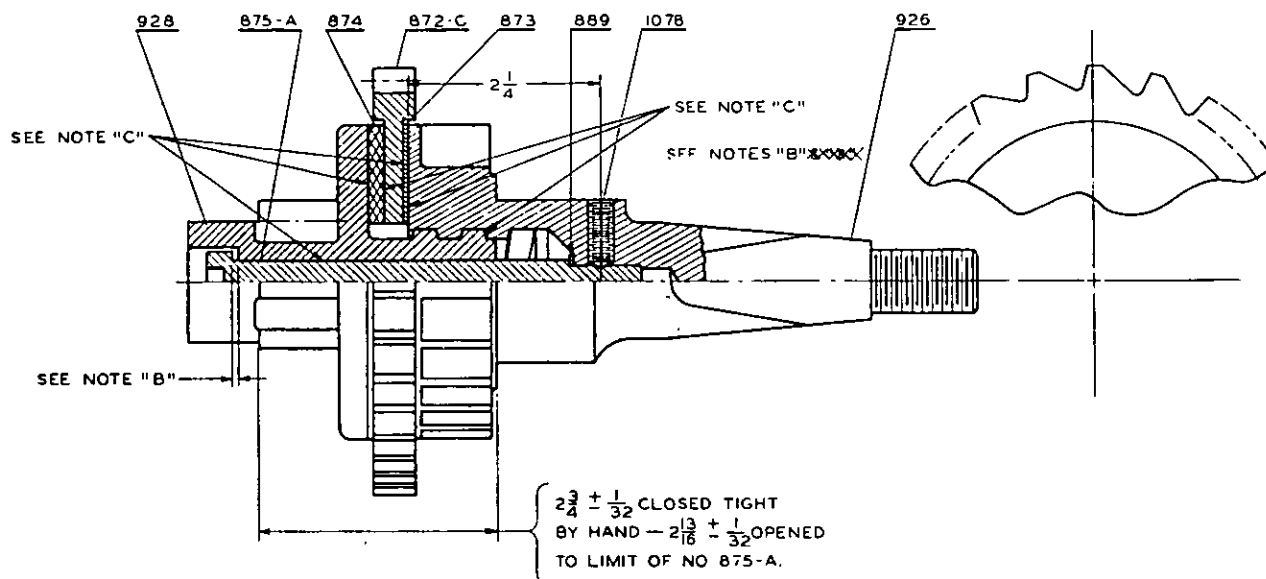


FIG 8.4
NO. 860-NS BRAKE





BILL OF MATERIAL		
PART NO	NO PER BRAKE	NAME
926	1	PINION HAND WHEEL SHAFT
928	1	" GEAR
872-C	1	" RATCHET
873	1	" RELEASE DISC
874	1	" FRICTION "
875-A	1	" SCREW
889	1	" " LOCKWASHER
1078	1	" " RETAINING SCREW

NOTE "A" - EARLY MODELS OF CERTAIN BRAKES WERE NOT EQUIPPED WITH THE NO 1078-A RETAINING SCREW. SHOULD IT BE DESIRED TO ADD THIS SCREW, DRILL $\frac{1}{8}$ " AND TAP $\frac{1}{16}$ "-18 AND APPLY AN "ALLEN" TYPE SOCKET HEADLESS CONE POINTED SET SCREW $\frac{1}{2}$ " LONG.

TO DISMANTLE

1. UNLOCK AND PARTIALLY REMOVE NO 1078 RETAINING SCREW.
2. REMOVE NO 875-A PINION SCREW
3. HOLDING THE PINION ASSEMBLY IN A VERTICAL POSITION, TAPERED END DOWN; UNSCREW NO. 928 PINION, LIFT OFF PARTS NO 874 FRICTION DISC, NO 872-C RATCHET, AND NO 873 RELEASING DISC BEING CAREFUL NOT TO LOSE NO 889 LOCKWASHER.

TO ASSEMBLE

REVERSE THE DISMANTLE PROCEDURE.

NOTE "A" - THE BRONZE DISC PART NO. 873 IS ALWAYS APPLIED NEXT TO THE HAND WHEEL SHAFT PART NO 928 i.e. THE HAND WHEEL SIDE OF PART NO. 872-C RATCHET.

NOTE "B" - AFTER RE-ASSEMBLY, SCREW PINION GEAR PART NO. 928 AND HAND WHEEL SHAFT PART NO. 926 AGAINST RATCHET PART NO. 872-C HAND TIGHT. TIGHTEN PINION SCREW PART NO. 875-A SNUGLY. THEN BACK OFF PINION SCREW 1/2 TURN. THIS SHOULD PERMIT APPROXIMATELY 1/16" END PLAY BETWEEN GEAR AND HAND WHEEL SHAFT ALLOWING RATCHET TO TURN FREELY. AFTER ABOVE STEPS HAVE BEEN TAKEN, RETAINING SCREW PART NO. 1078 MUST BE DRIVEN HOME AS HARD AS POSSIBLE.

TE "B" CONT'D.)
THE METAL AROUND THE SCREW HOLE IS TO BE PEENED OVER THE HEAD OF THIS SCREW TO PREVENT IT FROM WORKING LOOSE.

LUBRICATION

NOTE "C" - THE SHANK OF PART NO 875-A AND THE LARGE THREADS OF PARTS NO 926 AND 928 SHOULD BE FREELY LUBRICATED.
CLUTCH FACES, PARTS NO. 874, 872-C 873 AND 926 TO HAVE EXTREME LIGHT FILM OF LUBRICANT.
USE EITHER GRAPHITE GREASE OR PLAIN GREASE OF MEDIUM DENSITY.

J 11-12-79	REVISED NOTE "B", DELETED NOTE "A"
M 5-21-70	2 1/32 TOLERANCE WAS 2 1/8"
G 1-12-66	872-C WAS 872-A
F 10-26-53	1078 WAS 1078-A
E 11-15-50	2 1/4 WAS 2 13/16, 2 1/8 WAS 2 1/8, LUBRICATION NOTE CHANGED CRP
D 10-20-49	2 1/8 WAS 2 3/4 - 2 7/8 WAS 2 13/16
C 8-22-49	2 3/4 WAS 2 7/8, 2 13/16 WAS 2 1/8
B 2-7-49	TRACED FROM "B" SIZE

PEACOCK BRAKE

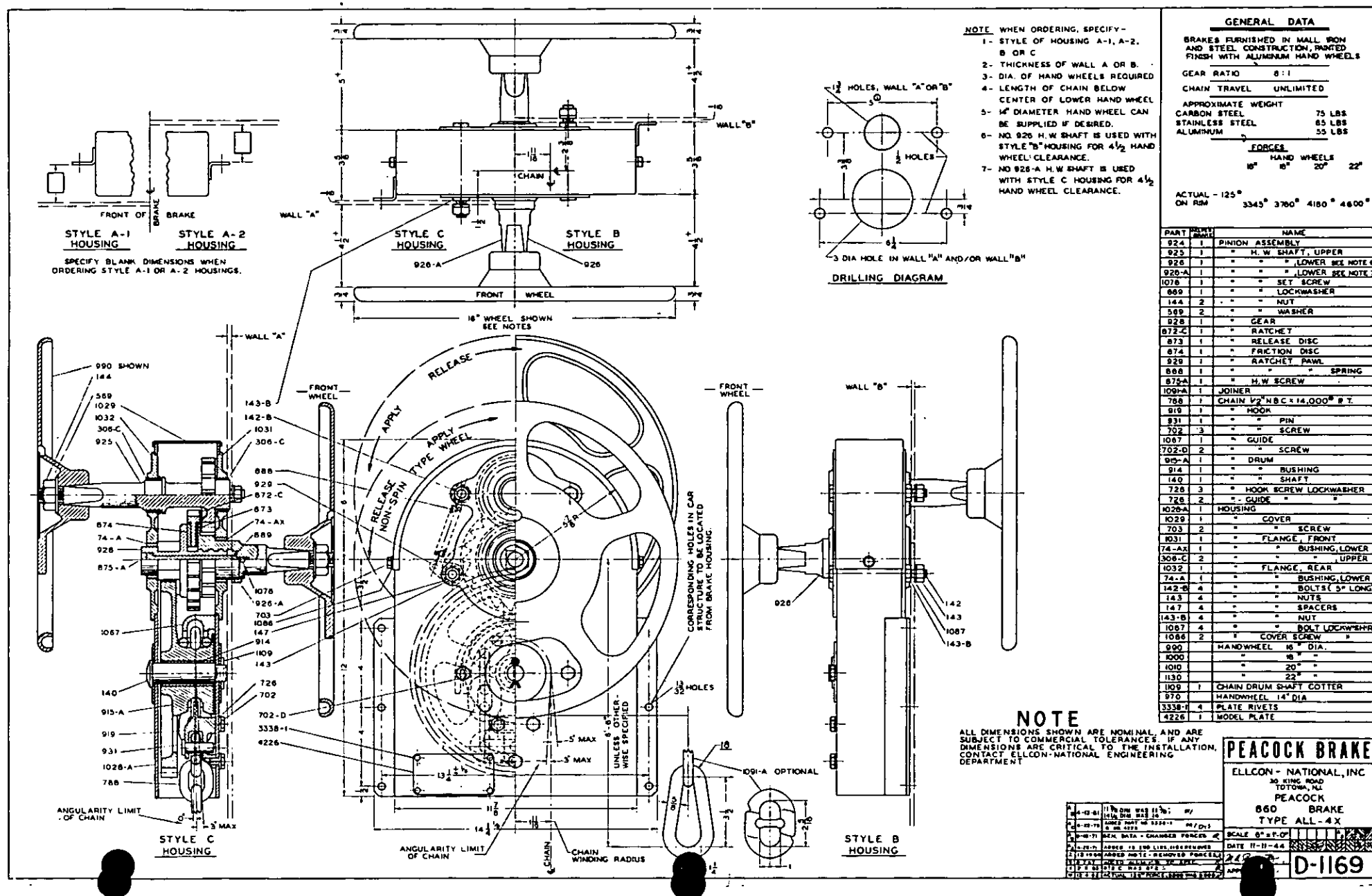
ELLCON - NATIONAL, INC.
30 KING ROAD
TOTOVA, N.J.

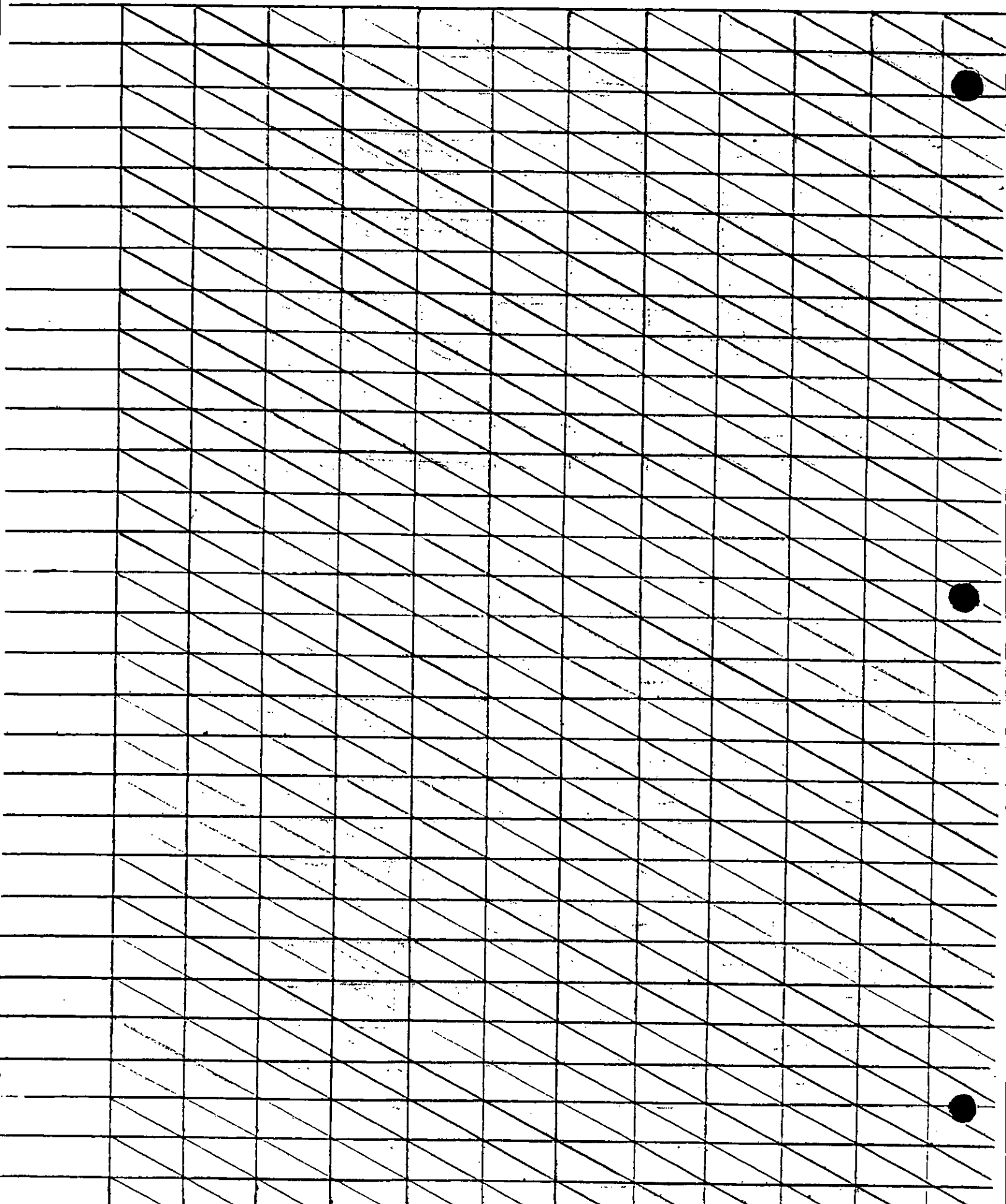
NO. 924 PINION ASSY.

SCALE	FULL
DATE	2-7-49

860/-1	MADE	...
USED ON	APPROVED	

C-1291





CAR

1

2

3

4

5

6

7

8

9

10

11

12