INSTRUCTION LEAFLET

No. 2389

DECEMBER, 1980

(SUPERSEDES ISSUE DATED FEBRUARY, 1956)

SHOP MAINTENANCE

"D-22" TYPE PASSENGER CAR BRAKE EQUIPMENT DEVICES

[redacted] D-22 Brakes

WABCO

WESTINGHOUSE AIR BRAKE DIVISION
AMERICAN STANDARD INC.
Wilmerding, Pennsylvania 15148

CONTENTS

NOTE: DECELOSTAT is a registered Trademark of American Standard Inc.

GENERAL INSTRUCTIONS

It is essential that all brake parts be given attention at each cleaning period to insure their being in serviceable and clean condition and properly lubricated when applied to the car.

The following instructions for cleaning, lubricating and handling the equipment are prepared to the end that the practices and processes for doing this work may be uniform and effective.

The "D-22" Type Passenger Car Brake Equipment consists of various operating portions, some of which are attached to their respective pipe brackets. Pipe connections are semi-permanently made to these pipe brackets and the operating portions may readily be removed and replaced, if necessary.

When operating portions are detached from their respective pipe brackets, the parts are exposed to dirt; therefore, to protect against dirt and damage, special shipping covers are provided which must be attached to the portions immediately after the portions have been tested, approved and removed from the test rack, and the covers must not be removed until each clean portion is about ready to be applied to the car. Even then, special precautions must be taken to avoid damaging the parts or getting dirt into the operating portions when applying them.

All work on the repair track in connection with cleaning and testing "D-22" Type Brake Equipments must be performed in accordance with instructions specified in current issues of Instruction Leaflet No. 2389, Sup. 1 and Instruction Pamphlet No. 5039-4, Sup. 1.

Cleaned and repaired "D-22" Type Control Valve Portions must pass prescribed tests on the AAR standard test rack in accordance with Code of Tests as contained in current issue of Instruction Pamphlet No. 5039-21, other devices in accordance with Code of Tests as contained in their respective test codes.

Operating portions and devices, unless otherwise specified, must never be disassembled or have any parts removed or replaced at the car. All cleaning, repairing and lubricating of the valve portions must be done by a competent workman at a suitable bench in a clean, well lighted location.

When disassembling operating portions, care must be exercised to avoid distortion of bolts, studs, nuts, etc., which can best be done by using wrenches especially adapted for this work. Similar care must be taken to avoid mutilation or damage when disassembling the portion with respect to pistons, springs, gaskets, slide valves, graduation valves, etc.

When reassembling valve portions, 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.

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

⚠ 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.

- 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.

- All air supply and/or electric current to this device and/or to any component part must be cut-off before this device and/or any component part is removed from the equipment arrangement

- "Bottled" up air under pressure (even though air supply is cut-off) may cause gaskets and/or particles

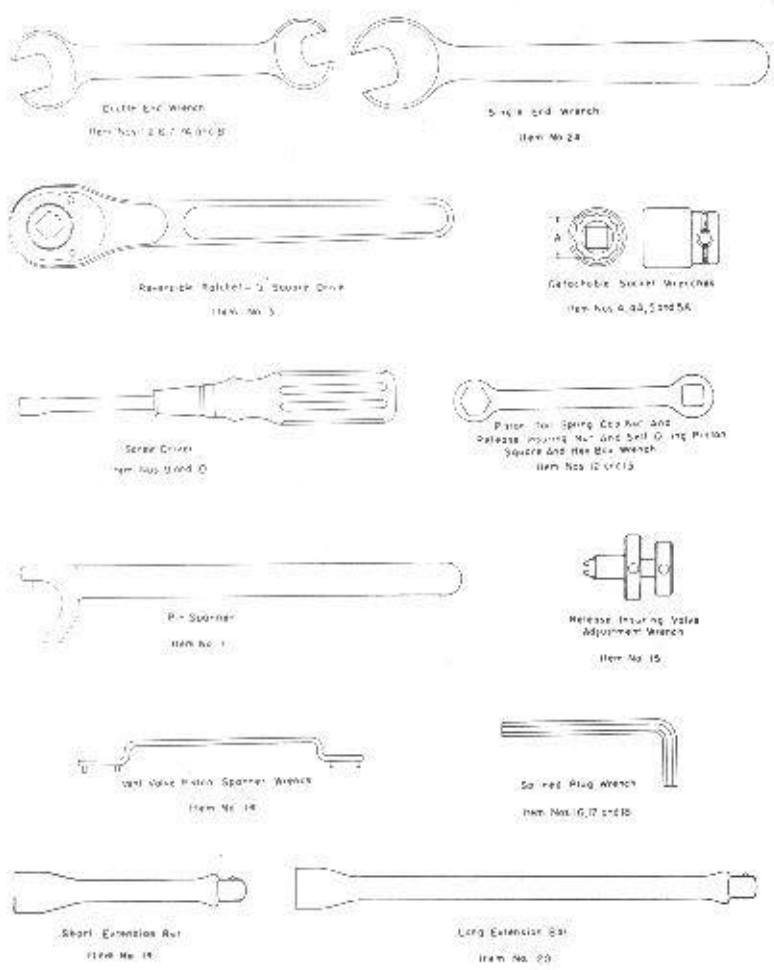


Fig. 1. Shop Tools for use with the D-22 Type Brake Equipment Devices

SHOP TOOLS FOR THE D-22 TYPE BRAKE EQUIPMENT DEVICES
(COMPLETE SET, W.A.B. Pc. 550587)

No.	Tool	Purpose	Principal Dimensions	Piece Number
1	Double End Wrench	Release Interlock & Quick Service Limiting Valve Cap Nuts	2" & 1 3/4" Openings	543168
2	Double End Wrench	3/8" Nut & Cap Screw	1" & 3/8" Openings	98659
2A	Single End Wrench	5/8" Nut & Cap Screw	15/16" Opening	549085
3	Reversible Ratchet	1/2" Drive for all Sockets (Plated)	10 1/2" Long	513090
4	3/8" Socket	3/4" Nuts	3/4" Hexagon	513081
4A	3/4" Socket	3/8" Nuts & 3/8" Cap Screws	9/16" Hexagon	549088
5	15/16" Socket	1/2" Nuts	15/16" Hexagon	513080
5A	3/4" Socket	1/2" Nuts & 1/2" Cap Screws	3/4" Hexagon	549087
6	Double End Wrench	1/2" Cap Screw & Self-Oiling Piston Cap Nut	35/64" & 11/16" Openings	98658
7	Double End Wrench	5/8" & 1/2" Nuts	5/8" & 13/16" Openings	543167
7A	Double End Wrench	3/4" & 1/2" Nuts	7/8" & 3/4" Openings	550399
8	Double End Wrench	1/4" Cap Screw 1/4" Brass & Iron Pipe Plugs	13/16" & 13/32" Openings	98660
9	Screw Driver	1/4" Choke Plug	3/64" x 3/16" Bit	98664
10	Screw Driver	1/8" Choke Plug	3/64" x 3/16" Bit	98665

SHOP TOOLS FOR THE D-22 TYPE BRAKE EQUIPMENT DEVICES

No.	Tool	Purpose	Principal Dimensions	Piece Number
11	Pin Spanner	Piston Spring Cap Nut and Release Insuring Nut & Self-Oiling Piston	1 7/16" Dia., 1/4" Pin	98657
12 & 13	Square & Hex Box Wrench		11/32" Square, 11/32" Hexagon	98654
14	Spanner Wrench	Vent Valve Piston	1 1/2" and 1 3/16" between 1/8" Pins, 1 1/8" Offset	98578
15	Adjusting Wrench	Release Insuring Valve Adjustment	Detail Prints Furnished on Request	98667
16	Splined Plug Wrench	1/8" Choke Plug		517556
17	Splined Plug Wrench	1/4" Choke Plug		517557
18	Splined Plug Wrench	3/8" Plug		517558
19	Short Extension Bar	Used with Ratchet, Sockets and Universal Joint	5 1/4" Long	513088
20	Long Extension Bar		10 1/2" Long	513089

Release insuring valve cap nuts equipped with the fluted socket lock nut must be adjusted by substituting the Splined Plug Wrench (Ref. 18) in place of the 2 pronged adjusting wrench (center portion) of Ref. 15.

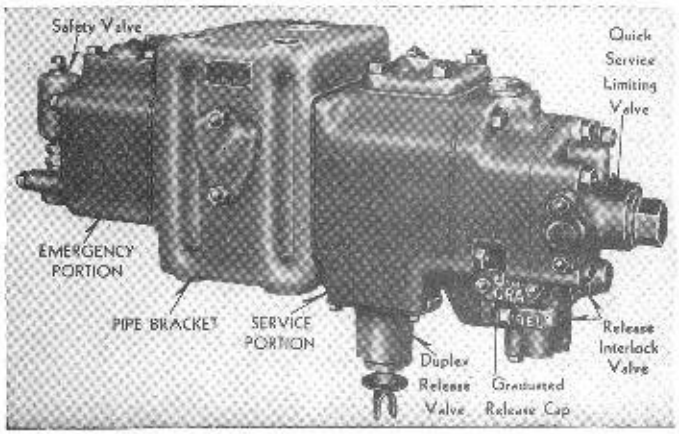


Fig. 2. D-22-AR Control Valve

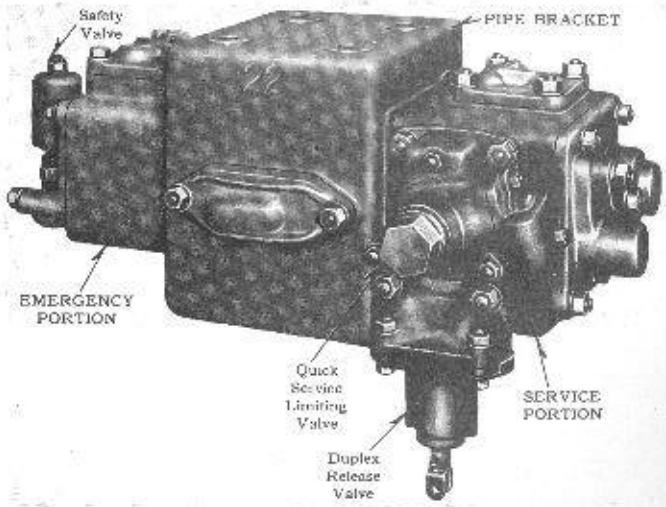


Fig. 3. D-22-A Control Valve

of dirt to become airborne and an increase in sound level when this device and/or any component part is removed from the equipment arrangement. Personal eye and ear protection must be worn and care taken to avoid possible injury when performing any work on this device and/or component part.

SECTION I PNEUMATIC DEVICES

"D-22" Type Control Valves
Service Portion

⚠CLEANING, INSPECTING AND REPAIRING⚠

The service portion must be completely disassembled and all parts inspected and cleaned. When cleaning, the parts (excepting the body) must be washed in a suitable solvent that will dissolve oil or grease and permit all parts to be thoroughly cleaned without abrasion. The exterior of the body must be thoroughly cleaned by wire brushing and by means of a cloth saturated with a suitable solvent.

PISTONS, SLIDE VALVES AND GRADUATING VALVES

All pistons, slide valves and graduating valves must be thoroughly cleaned so as to remove all dirt, oil, gum or grease. To do this, the piston, slide valve and graduating valve assembly must be disassembled. An organic solvent type of

cleaner must be used, but not an alkaline cleaning solution. These parts must be carefully handled to avoid damage to seats and sealing surfaces.

Before cleaning the self-oiling piston, the oil plug must be removed and the oil drained.

If the oil plug is of the hexagon type, before removing, insert a cap screw (or its equivalent) into the outer tapped opening so it will not be distorted by the wrench when being removed. Non-hexagon type oil plugs may be removed without inserting a cap screw.

When removing the oil plug from the piston, care must be taken to avoid twisting the piston stem. If the oil plug has been tightened excessively, tapping or some other means should be used to loosen it rather than by wrench and vise which will cause damage.

The piston ring and its groove must be cleaned without removing the ring from the piston groove. This can be done by dipping the piston in the cleaning fluid, then moving the ring around in the groove. This operation must be repeated until the groove and ring are thoroughly cleaned, after which the excess cleaning fluid can be blown away or dried by a jet of air.

Where ring is stuck with dirt too tightly to be moved in the groove, it may be necessary to soak

the ring in penetrating oil and then tap the ring gently with a hard wood block. For this purpose, a maple or hickory block about 1" x 1" x 4" (with square ends) should be used to tap the ring flush with the top edge of the groove. This tapping should start at one side of the ring joint and progress around the piston in short steps until the ring is loosened sufficiently to be moved in the groove. If this procedure will not loosen the ring, it is evident that the ring is binding; in which case the groove must be reconditioned and a new ring fitted.

When necessary to remove re replace the piston ring, suitable tools must be used so as to avoid damage to the groove.

NOTE: When fitting new lap joint rings, install them carefully with the narrow bearing surface of the scarf toward the brake pipe side of the piston.

If the self-oiling piston wick, which runs from the small crescent shaped recess in the bottom of the ring groove to the oil reservoir, is damaged from any cause, such as reconditioning the groove, etc., it must be replaced. A new wick is approximately 5-3/4" long and, to facilitate assembly, a special wick is available having bare wire on one end for about 2-1/4".

If specially prepared wicks are not available, the wire may be bared by burning. The bare wire can

be easily started down through the wick hole and the wick pulled through the hole until about 1/2" is left in the ring groove. The end of the wick in the ring groove is then bent across the middle or breather hole and anchored in the last hole in the recessed section at the bottom of the ring groove. The bare wire must then be cut off the wick, and the wick wound in a counter-clockwise direction around the oil reservoir. The free end of the wick must not obstruct or come in contact with the 1/32" diameter breather hole located adjacent to the wick hole in the oil reservoir.

When the piston ring and its groove are thoroughly cleaned and dried, the end of the ring must be positioned above the lubricating hole which is in the bottom of the ring groove at the top of the self-oiling piston. Raise the end of the ring and

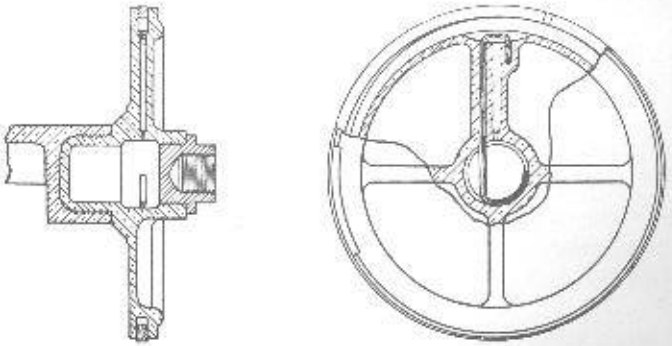


Fig. 4 Sectional Views of the Self-Oiling Piston

see that the lubricating wick is flat on the bottom of the recessed portion of the ring groove. The wick must not touch the ring or the mouth of the breather hole.

To restrict the formation of lead deposits on the surface of cast brass parts, such as pistons and piston rings, they must be given an oil bath treatment before assembly. It must be applied after the ring is lapped and sized to the ring groove. The treatment must be used on all sand cast brass pistons, including self-oiling pistons, but is not required for the forged or die-cast pistons.

The oil bath mixture must consist of equal parts by volume of light lubricating or machine oil and mineral spirits.

The piston and ring must be placed in a tank containing enough of the oil mixture to submerge the piston halfway up the piston stem and must remain in this mixture not less than three (3) minutes.

After the treatment, the piston must be momentarily dipped in a suitable solvent and thoroughly blown off with air. If the ring has been removed or a new ring has been fitted, it must be placed in the ring groove without further lapping or sizing. If it should be necessary to lap or size the ring after the oil bath treatment, the piston and the ring must be given the treatment again.

If it is found necessary to repair the non-metallic graduating valve and seat by lapping, the following method of procedure provides a means of obtaining the most effective results.

For lapping purposes, the items specified below should be available.

(A) Two steel plates (approximately 10" x 12") with the one side having a very smooth, ground surface. The thickness of the plates should be sufficient to prevent distortion in normal use.

(B) The first plate used in the procedure should have a 9" x 11" sheet of #150 emery paper glued to the finished surface of the steel plate. The left half of the emery paper should be left as is, and the right half should be rubbed down with a piece of steel having a ground, finished surface until the original cutting edges of the abrasive are eliminated.

(C) The left half of the finished surface of the second plate should be rubbed in with float emery by using a piece of brass having a ground, finished surface or an old brake valve rotary valve. The right half of this plate should be left as is. The procedure involved in using these plates is as follows:

1. Rough lapping is done on left half of the #150 emery paper until bearing surface is flat.

2. Valve is then lapped on right side of #150 emery paper with the rubbed-down surface until bearing surface is appreciably smoothed.

3. Valve is then lapped on left half of second steel plate until bearing surface develops a finished, smooth surface.

4. Valve is then lapped on right half of the second steel plate until the finished bearing surface is highly polished.

Before graduating valve is placed on the seat, the seat must be properly conditioned by means of lapping it with a metallic graduating valve or preferably with a suitable lapping block or lapping stick.

BUSHINGS

All piston bushings, after they have been cleaned, must be checked for grooving, shoulders, cracks, pitting, hollow ring bearing surfaces, and checked for taper and out-of-round, preferably with a dial indicator gage.

The bushings should be trued up on either a precision grinder, boring machine, or by means of a hand grinder before being gaged for ring size with AAR approved cylinder gage. (See Instruc-

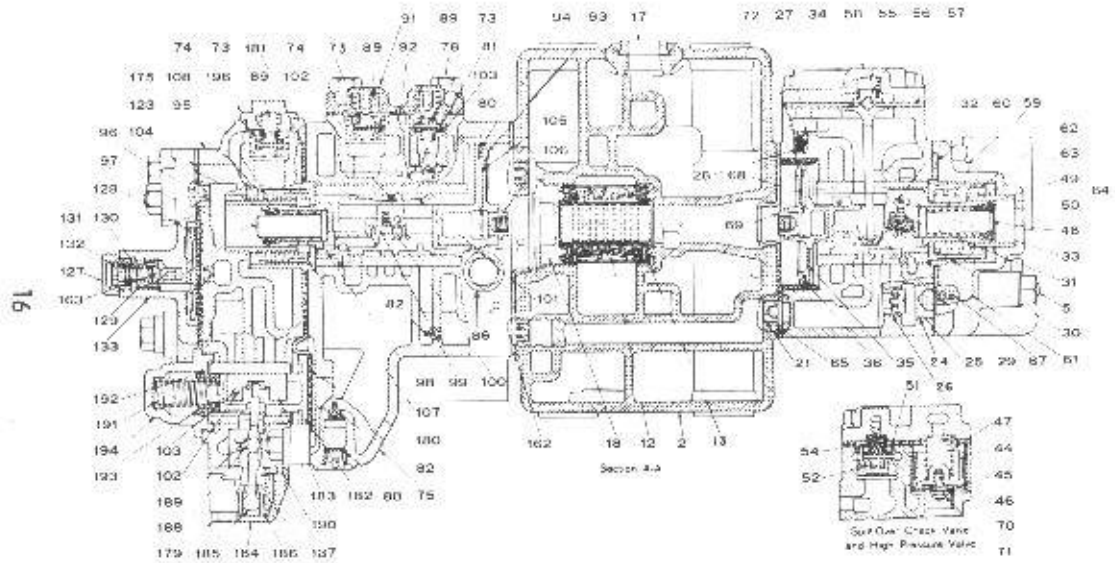


Fig. 5 D-22-AR Control Valve Assembly

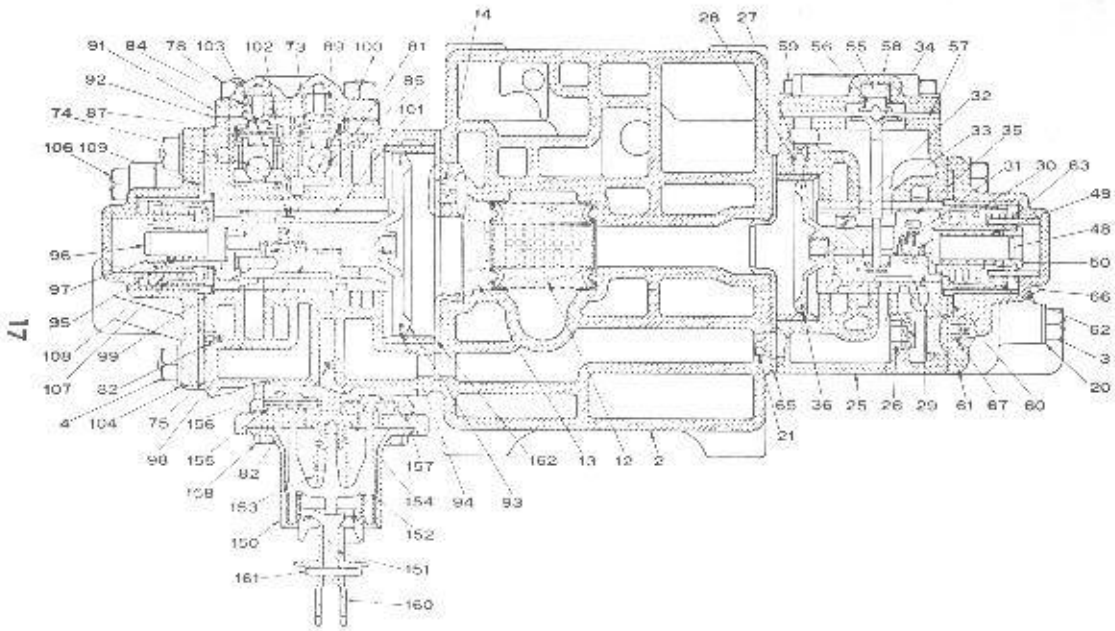


Fig. 6 D-22-A Control Valve Assembly

tion Leaflet No. 2356-4, Instructions on the Use of Condemning Gages for "D-22" Type Control Valves).

After the bushings are so reconditioned, they must be wiped with an oily rag, then wiped clean with a clean dry rag, and finally cleaned with a suitable solvent to remove all traces of powdered bushing material before reassembling.

GASKETS, DIAPHRAGMS, RUBBER SEATED VALVES AND RUBBER PARTS

All gaskets, diaphragms, rubber seated valves and rubber parts (including all o-rings) are to be replaced with NEW Westinghouse Air Brake Division Parts.

STRAINERS AND FILTERS

The pipe bracket cartridge filter must be replaced with a NEW filter. The filters attached to choke plugs must be replaced with NEW parts. All other filters and/or strainers must be thoroughly washed out in a suitable solvent and blown dry with a jet of clean, dry air. If these filters and strainers cannot be easily cleaned they must be replaced.

CHOKES

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 not restricted.

Splined socket choke plugs are supplied in place of the screwdriver slotted type. The splined socket type can be readily applied or removed without damage to the choke plug or to the threads in the tapped hole. Wrenches are listed in the shop tool chart in the General Information Section of this publication.

These chokes must be removed, cleaned and replaced one at a time. Where this procedure 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. As each choke is cleaned, it must be replaced before the next choke is removed. The choke can be cleaned in a suitable solvent and then blown off with a jet of air. Metallic tools must not be used for cleaning chokes as the size must not be changed.

The service portion contains four choke fittings which govern the flow of air through the ports in which they are located. The purpose and location of these choke fittings are as follows:

Charging chokes 81 and 83, control the charging flow of brake pipe air to the auxiliary reservoir. Choke 83, not illustrated, (.078" drill) is located in the piston bushing; choke 81 (.0465" drill) is located underneath the charging check valve.

The quick service choke plug 82a (.031" drill), controls the flow of brake pipe air to the displacement reservoir during the third stage of quick service. It is located in the mounting face of the service portion.

The preliminary quick service exhaust choke plug 82 (.031" drill), controls the continuous exhaust of quick service volume air to the atmosphere and provides the secondary quick service function.

The graduating release choke 105 (.073" drill), only in the "D-22-A" Control Valve, controls the rate of recharging the auxiliary reservoir from the emergency reservoir during release and graduated release. It is located in the face of the service portion where the graduated release cap bolts on.

SPRINGS

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

The service portion has a total of eighteen springs which are identified in the illustrations by reference numbers as follows:

84--SUPPLY RESERVOIR CHARGING CHECK VALVE SPRING, which serves to hold check valve to seat.

89--CHECK VALVE SPRINGS (4 required), which serve to hold check valves on seats to prevent back flow.

95--PISTON SPRING, which is mounted in the piston stem and resists movement of piston and graduating valve after the charging ports are closed and just previous to opening of the preliminary quick service port.

100--GRADUATING VALVE SPRING, which holds the graduating valve to its seat.

101--SLIDE VALVE SPRING, which holds the service slide valve to its seat.

108--RETURN SPRING, which prevents movement of the servcie 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.

113--RELEASE SLIDE VALVE SPRING, which holds slide valve to its seat.

116--RELEASE PISTON SPRING, which returns piston to normal position.

130--RELEASE INSURING VALVE SPRING, which holds this valve seated until brake pipe

pressure rises a predetermined amount above auxiliary reservoir pressure.

140--Q. S. LIMITING VALVE PISTON RETURN SPRING, which returns piston to normal position.

146--Q. S. LIMITING VALVE STRUT SPRING, which holds slide valve on its seat.

153--RESERVOIR RELEASE VALVE PLUNGER SPRING, which returns the plunger to normal position when the operating rod is released.

156--RESERVOIR RELEASE CHECK VALVE SPRINGS, which serve to hold the auxiliary and emergency reservoir release check valves to their seats when the release valve plunger is down.

187--RELEASE INTERLOCK SLIDE VALVE STRUT SPRING, which holds the slide valve to its seat.

191--RELEASE INTERLOCK PISTON RETURN SPRING, which returns the piston to its normal position.

The following tabulation gives the data necessary to identify each of the springs described:

D-22 SERVICE PORTION SPRING IDENTIFICATION

Ref. No	Piece Number	Approx. Outside Dia.	Approx. Wire Dia	Approx. Free Height	Approx. No. Turns	Material
84	503671	11/16"	.035"	1 5/16"	5 1/2	Ph. Bz.
89	507206	31/64"	.040"	1 7/16"	7	Ph. Bz.
95	513658	3/20"	.072"	2 1/8"	10	Steel
100	93940	11/64"	.020"	31/32"	12	Ph. Bz.
108	513141	1 7/16"	.177"	3 1/32"	7 1/2	Steel
116	507213	1 3/4"	.148"	4 1/2"	12 1/2	Steel
130	518942	1/2"	.062"	1 1/64"	8 1/2	Steel
140	512528	31/64"	.113"	2 5/8"	10	Steel
146	512156	1 1/2"	.135"	2 1/8"	7	Steel
153	95025	13/16"	.098"	2 15/64"	11	Steel
156	93972	5/16"	.057"	1 13/32"	8	Ph. Bz.
187	513841	1 1/64"	.162"	2 3/8"	10	Steel
191	524014	3/8"	.105"	3"	11 1/2	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

⚠ LUBRICATING AND ASSEMBLING ⚠

Before assembling the slide valve and graduating valve to the self-oiling piston, place the piston in a vise with copper jaws (or its equivalent) and then tighten sufficiently to hold the piston without damage. With the piston head in a horizontal position and the stem down, fill the oil reservoir with oil, current AAR Spec. M-912, until the oil is level with the bottom of the threads located in the center of the piston head. The oil plug (with cap screw still in place, if

used) must be made only tight enough to prevent oil leakage. It is important that this nut makes a seal between its flanged collar and the bearing on the piston, otherwise oil can leak out of the chamber. Remove the cap screw from the oil plug, if used.

The face of slide valves, slide valve seats, the face of graduating valves and their seats (upper surface of slide valves), and the upper portion of the bushing where a slide valve spring bears, should be lubricated with a light coat of lubricating oil, current AAR Spec. M-912. To apply this oil use a stick in the shape of a paddle about 8 inches long and having a small piece of white duck glued to one end. Put a small amount of the oil on the white duck and rub on the surface specified.

Before the cleaned piston is replaced in the piston bushing, press the side of the piston ring opposite the scarf to the bottom of its groove, then introduce three (3) drops of approved lubricating oil, current AAR Spec. M-912, in the groove through the ring scarf opening, after which restore the ring to its normal position and carefully rotate it in its groove to distribute the oil. Position the ring scarf approximately 1" on either side of the piston top center.

Next, place three drops of this oil in the clean, dry bushing and distribute it over the entire surface in a manner to avoid introducing dirt or other grit.

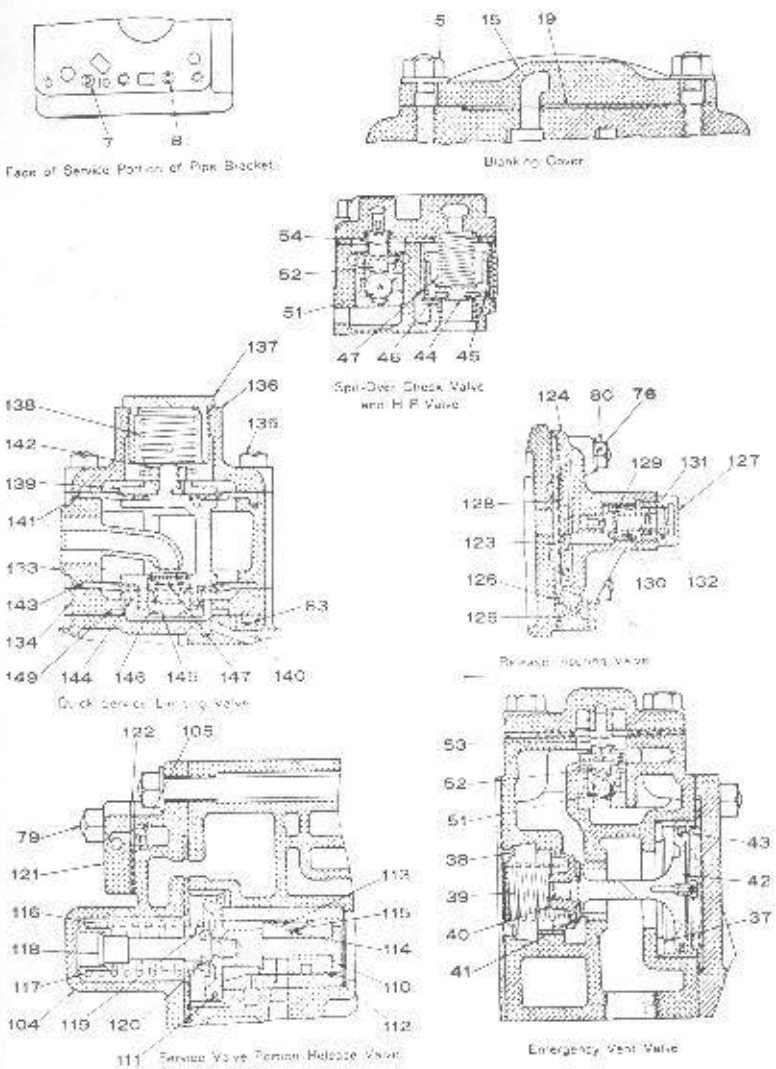


Fig. 7 D-22-A or B Control Valve Details

Evenly spread one (1) drop of lubricating oil, current AAR Spec. M-912, around the piston spring guide (especially at both ends) when it is assembled into the piston.

Apply two (2) drops of lubricating oil, current AAR Spec. M-912, to the return spring cage at the time of assembly; that is, evenly spread one drop of lubricating oil, current AAR Spec. M-912, around each collar at the ends of the cage.

Evenly distribute one drop of lubricating oil, current AAR Spec. M-912, on the collar at the piston spring end of the piston, then insert the piston spring end of the piston, then insert the piston and slide valve in the body, leaving them in release position.

The two short prongs of the reservoir release valve plunger, which fit in the bottom of the reservoir release valve body, must be lubricated with brake cylinder lubricant, current AAR Spec. M-914, when it is mounted on the body.

Before the release valve piston is assembled to the body, two (2) drops of lubricating oil, current AAR Spec. M-912, must be placed in the piston ring groove and the ring moved in the groove to properly distribute the oil. Insert the piston in the body, then evenly spread three (3) drops of lubricating oil, current AAR Spec. M-912, around the piston bush. Move the piston back and forth

several times, after which remove the surplus oil from the outer edge of the piston bush.

The threads of choke plugs and all 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 Spec. M-913, and two parts of SAE-20 oil by weight just before inserting.

All "D-22-AR" and "D-22-BR" Control Valves of the latest vintage are supplied with the ball check valves omitted. If, upon examination, it is found that the present service portion includes the ball check valves, the portion may be modified to exclude them by adhering to the instructions specified in the following paragraph. However, if the service portion is of the latest vintage, or if it has already been modified, these instructions may be disregarded.

Omit all ball check valves. Position rubber seated check valves in place, then mount one check valve stop, Westinghouse Air Brake Division Pc. No. 550912, on each of the auxiliary reservoir charging, brake pipe to supply reservoir, emergency reservoir charging and quick service check valves, and one check valve stop, Westinghouse Air Brake Division Pc. No. 550913, on auxiliary to supply reservoir check valve as shown on Plate I which may be found in the back of this publication. Place the springs in their

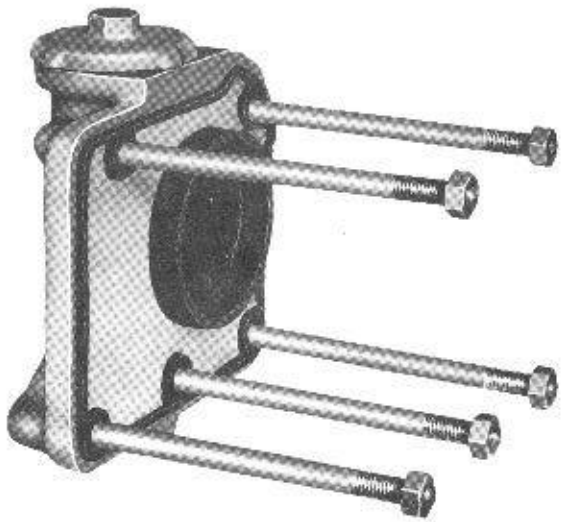


Fig. 8 D-22 Type Control Valve Service Portion Shipping Cover, Pc. No. 525640

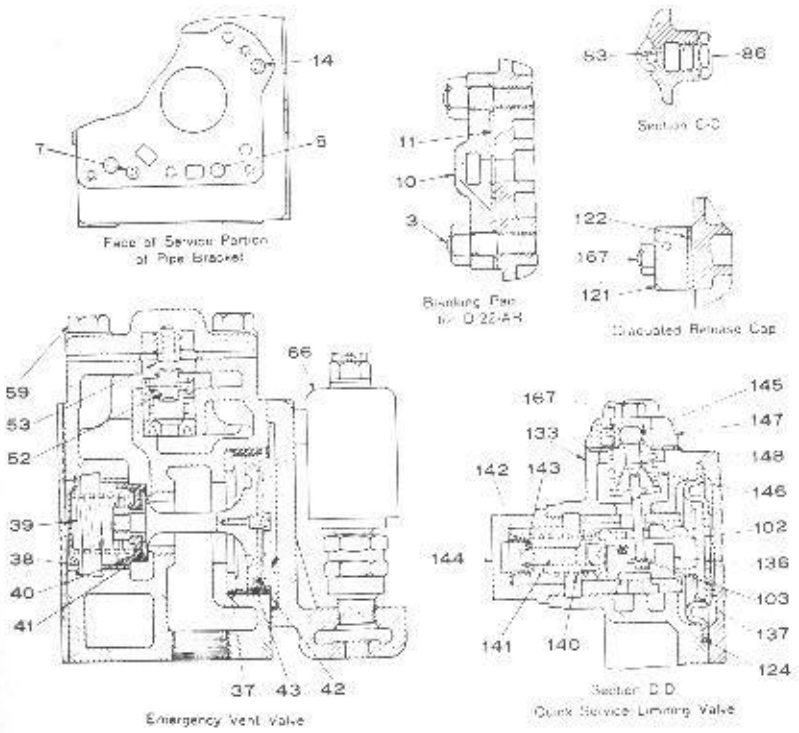


Fig. 9 D-22-AR or BR Control Valve Details

proper position, then attach check valve cover and insert check valve cap nut, Westinghouse Air Brake Division Pc. No. 550911, which replaces the present cap nut, securely in place.

After the service portion passes the specified rack test remove it from the test rack. Secure the respective shipping cover to the portion.

EMERGENCY PORTION
⚠ CLEANING, INSPECTING AND REPAIRING ⚠

The emergency portion must be completely disassembled and all parts inspected and cleaned. When cleaning, the parts (excepting the body) must be washed in a suitable solvent that will dissolve oil or grease and permit all parts to be thoroughly cleaned without abrasion. The exterior of the body must be thoroughly cleaned by wire brushing and by means of a cloth saturated with a suitable solvent.

When disassembling the emergency portion for cleaning, the main piston cannot be removed without first removing the check valve cover and taking out the slide valve strut which serves to hold the slide valve on its seat. Damage will result if force is used to remove the emergency piston from its bushing without first removing the strut.

The spring behind the vent valve is held in place by a circular sheet metal retainer which has lugs on opposite sides. These lugs engage under a lip around the outer end of the cavities in the body casting. To remove the spring and valve, press down on the spring retainer and tilt it so that one lug projects upward. When in this position, the parts can be readily removed. They can be assembled by following this procedure in reverse.

Due to the similarity of the respective parts of the "D-22" Control Valve Emergency Portion to those of the Service Portion, the detailed instructions and method of procedure specified for cleaning, inspecting and repairing the Service Portion parts are also applicable and must, therefore, be adhered to when repairing the Emergency Portion.

CHOKES - SIZE AND LOCATION

The emergency portion contains five chokes which govern the flow of air through the ports in which they are located. The location and purpose of these chokes are as follows:

Charging choke 27 (.024" drill), located in the top of the emergency portion body, controls the rate of flow from the brake pipe to the quick action chamber. Attached to this choke plug is a felt filter which protects the orifice against the possibility of restriction due to dirt. This felt filter must be replaced when repairing emergency portions.

Choke (.029" drill) in large vent valve piston and choke 67 (.052" drill) in the piston cover, control the rate of exhaust of quick action chamber air during emergency, and thus provide the time interval required before release can be affected following an emergency application.

Choke (.047" drill), located in the bushing under the spill-over check valve, serves to protect against excessive spill-over check valve leakage.

Choke (.029" drill), located in the check valve cover in the port between the chamber above the spill-over valve and the chamber above the strut diaphragm, serves to protect against diaphragm leakage.

Choke fittings 27 and 67 must be cleaned and checked in accordance with the instructions specified for chokes under "Service Portion".

The remaining three chokes are not readily removable and must, therefore, be cleaned in place.

SPRINGS - IDENTIFICATION AND PURPOSE

The emergency portion contains a total of eight wire springs which are identified on the illustrations by reference numbers as follows:

31--GRADUATING VALVE SPRING, which

serves to hold the graduating valve to its seat on the slide valve.

39--VENT VALVE SPRING, which holds the emergency vent valve to its seat.

47--HIGH PRESSURE VALVE SPRING, which serves to hold the valve in normal position.

49--EMERGENCY PISTON SPRING, which resists movement of the spring guide in the piston stem.

55--DIAPHRAGM SPRING, which serves to hold the slide valve to its seat in the absence of quick action chamber pressure when the diaphragm is balanced.

53--ACCELERATED RELEASE CHECK VALVE SPRING, which serves to hold check valve 52a to its seat.

54--SPILL-OVER CHECK VALVE SPRING, which serves to hold check valve 52 to it seat.

63--RETURN SPRING, which returns the piston and slide valve to normal release position when brake pipe and quick action chamber pressures are equalized.

The following tabulation gives the data necessary to identify each of the springs described:

D-22 EMERGENCY PORTIONS SPRING IDENTIFICATION

Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
31	93940	31/64"	.020"	31/64"	12	Ph. Bz.
39	81643	1 35/64"	.120"	2 47/64"	7½	Steel
47	2616	3/4"	.095"	2 1/16"	8	Steel
49	501006	53/64"	.062"	2 15/16"	11	Steel
55	94839	11/16"	.065"	1 3/4"	13	Ph. Bz.
53	94952	3/4"	.072"	1 13/16"	6	Ph. Bz.
54	94581	31/64"	.028"	1 1/16"	7	Ph. Bz.
63	95026	1 35/64"	.158"	3 1/16"	8	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

⚠ LUBRICATING AND ASSEMBLING ⚠

Before assembling the emergency piston, slide valve, and graduating valve, check the longitudinal clearance of the graduating valve in the piston stem recess. This clearance must not be less than .003" or more than .009" and must be checked with a feeler gage. Burrs around the edges of the recess must be carefully removed with a file. If this clearance is less than .003", remove the excess from the pin end of the graduating valve only.

For further instructions for lubricating and assembling the self-oiling piston, refer to those specified for application to the service portion piston in the preceding section of this publication.

Before the vent valve piston is assembled to the body, two (2) drops of lubricating oil, current AAR Spec. M-912, must be placed in the piston ring groove and the ring moved in the groove to properly distribute the oil. Assemble the vent valve to the piston stem, then insert the piston in the body. Evenly spread three (3) drops of lubricating oil, current AAR Spec. M-912, around the piston bush. Move the piston back and forth several times, after which remove the surplus oil from the outer edge of the cylinder.

The threads of choke plugs and all 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 Spec. M-913, and two parts of SAE-20 oil by weight just before inserting.

All "D-22-AR" and "D-22-BR" Control Valves of the latest vintage are supplied with the ball check valves omitted. If, upon examination, it is found that the present emergency portion includes the ball check valves, the portion may be modified to exclude them by adhering to the instructions specified in the following paragraph.

However, if the emergency portion is of the latest vintage, or if it has already been modified, these instructions may be disregarded.

Omit all ball check valves. Position rubber-seated check valves in place, then mount one check valve stop, Westinghouse Air Brake Division Pc. No. 550912 on each of the spill-over and accelerated release check valves, as shown on Plate I which may be found in the back of this publication. Place the springs in their proper position, then attach the check valve cover securely in place.

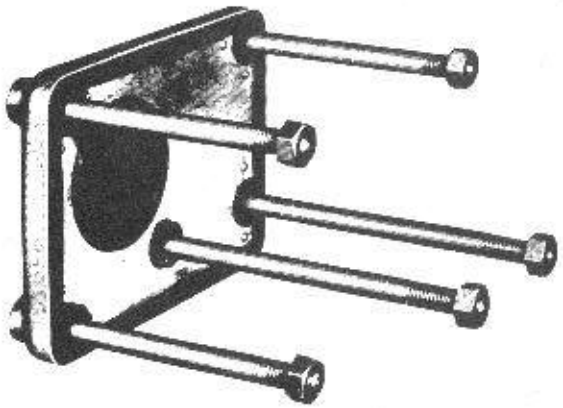


Fig. 10 D-22 Type Control Valve Emergency Portion Shipping Cover, Pc. No. 512134

The function of the supply reservoir charging check valve, that changes auxiliary reservoir pressure to supply reservoir pressure on "D-22" PTE Pneumatic Operated Equipment is unnecessary. Elimination of the check valve, protects the brake pipe against excessive air consumption, through port #6 of the pipe bracket and the supply reservoir charging check. This process of check valve elimination is accomplished by placing a 3/32" drill choke in port #6 of the control valve pipe bracket and installing a plug, Westinghouse Air Brake Division Pc. No. 579860, and an appropriate o-ring in the check valve bush assembly. IMPORTANT: THIS MODIFICATION IS ONLY TO BE APPLIED TO "D-22" CONTROL VALVES THAT ARE NOT ELECTRO-PNEUMATICALLY OPERATED. This modification to the "D-22" Control Valve is shown on Plates 2 and 3 which are found in the back of this publication.

The high pressure valve must be lubricated in the same manner as the vent valve piston.

After the emergency portion has been properly tested and removed from the test rack, secure the respective shipping cover to the portion. A 1" pipe plug, or its equivalent, must also be inserted into the emergency portion vent port.

⚠ QUICK SERVICE VALVE ⚠

Remove and discard the brake pipe filter. Re-

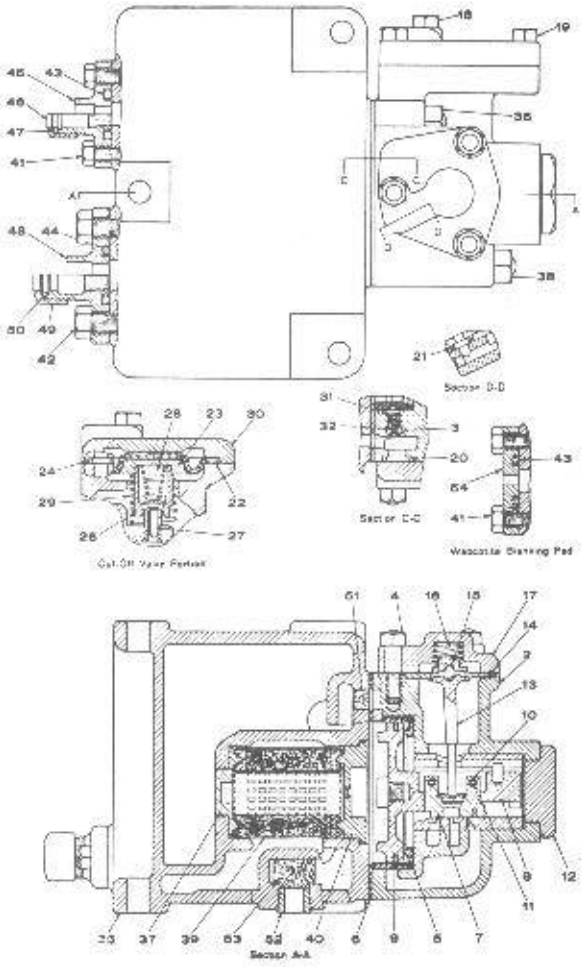


Fig. 16 A-2 Quick Service Valve Assembly

place it with a NEW disposable type filter.

When disassembling the Quick Service Valve, it will be necessary to remove the strut diaphragm cover and the slide valve strut before it is possible to remove the piston and slide valve.

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the Quick Service Valve.

The piston bushing must be checked for ring size by using cylinder gage No. 49614, Westinghouse Air Brake Division Pc. No. 524949. (See Instruction Leaflet No. 2356-4, Instructions on the use of AAR Condemning Gages for "D-22" Type Control Valves).

The Quick Service Valve contains one choke, — charging choke 3 (.024" drill). This choke controls the charging of the quick service volume reservoir and is located in the valve portion body under the strut diaphragm cover. Attached to this choke is a felt filter which serves to prevent restriction of the choke due to dirt, thereby insuring the proper charging rate of the quick service volume reservoir.

The Quick Service Valve contains three (3) springs which are identified on the illustrations by reference numbers as follows:

16--DIAPHRAGM SPRING, which serves to hold the slide valve on its seat.

28--CHECK VALVE SPRING, which serves to seat the cut-off valve check valve.

29--DIAPHRAGM FOLLOWER SPRING, which serves to seat the diaphragm follower.

The following tabulation gives the data necessary to identify each of the springs described:

QUICK SERVICE VALVE SPRING IDENTIFICATION

Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
16	94839	11/16"	.065"	1 3/8"	6½	Ph. Bz.
28	513914	11/16"	.072"	1 1/16"	8	Steel
29	513913	1 1/16"	.072"	1 31/32"	7	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

After the Quick Service Valve has been properly tested and removed from the test rack, secure the shipping cover to the valve.

⚠ "B" RELAY VALVE ⚠

Generally, the instructions for cleaning, inspect-

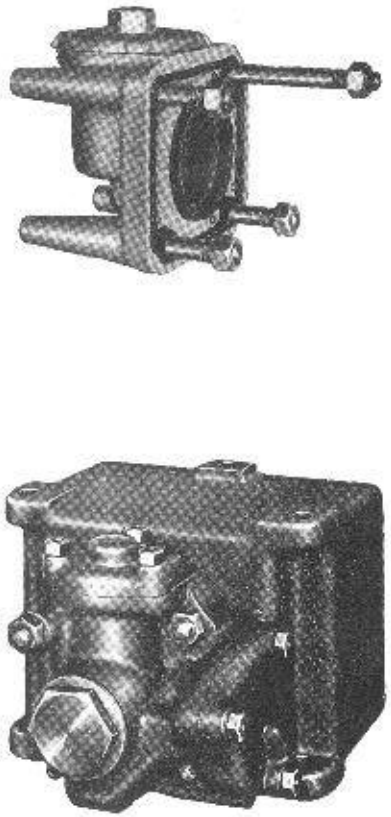


Fig. 17 Views of the Shipping Cover, Pc. No. 53002, and the A-2 Quick Service Valve

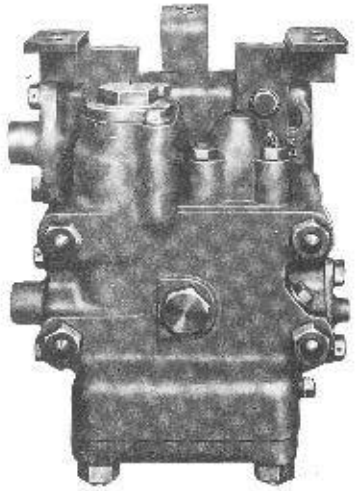


Fig. 18 Type B-3 Relay Valve

ing, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the "B" Relay Valve.

NOTE: The following instructions apply only to "B" Type Relay Valves equipped with rubber seated application and exhaust valves.

Before assembling the relay valve, place a small amount of No. 1 Lime Base Grease on the bearing surfaces of the piston lever. Also, place one drop of oil, current AAR Spec. M-912 on

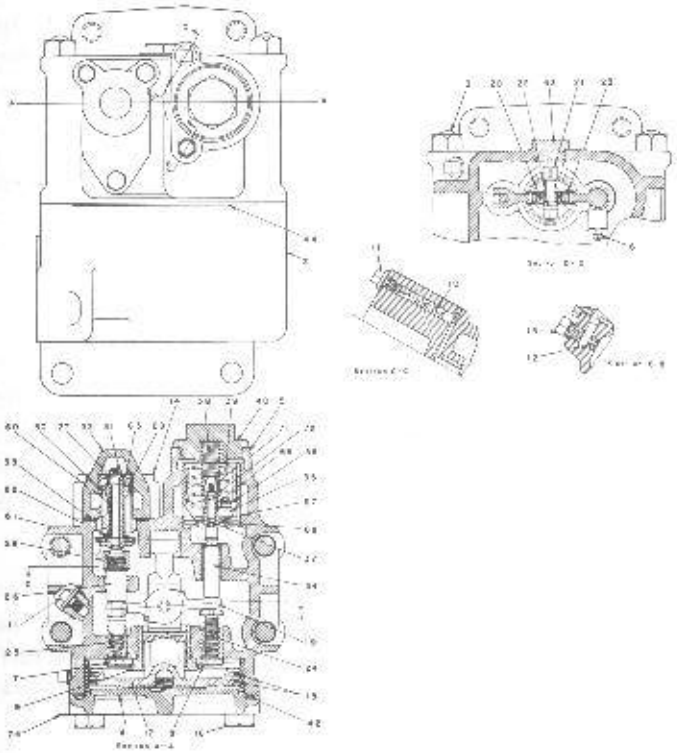


Fig. 19 B-3 Relay Valve Assembly

each of the bushings and spread it evenly over the surface.

The circular oil pad and the square oil wick must be submerged in a tank of a suitable solvent for a few minutes, then dried with air. Submerge the clean oil pad in a container (tank) of oil, current AAR Spec. M-906, and allow to soak for at least 10 minutes, then drain for 10 minutes.

Before the relay valve is completely assembled, the exhaust valve and piston lever must be adjusted in the following manner.

⚠EXHAUST VALVE⚠

With the exhaust valve on its seat, adjust the exhaust valve retaining nut so that, when it is locked in position, there is not less than .005" nor more than .010" clearance between the retaining nut and the exhaust valve piston.

NOTE: When assembling the elastic stop nuts on the exhaust valve pilot valve, care must be exercised to insure that there is sufficient friction to keep them tight, otherwise they must be replaced.

⚠PISTON LEVER⚠

The piston lever stop must be adjusted so as to obtain a clearance of .025" to .030" between the

piston lever and application valve stem. This adjustment must be made with the application valves on their seats. Note that the piston lever moves freely.

One choke and three springs are used in the valve and are identified in the sectional view by reference numbers as follows:

Choke Plug 12, with 1/8" choke (.187" drill) which controls flow of supply reservoir air to the spring chamber, back of the application piston.

25--EXHAUST VALVE STEM SPRING, which serves to hold the exhaust valve on its seat.

38 and 39--APPLICATION VALVE SPRING AND APPLICATION PISTON VALVE SPRING, which serve to hold the application valve and piston seated.

The following tabulation gives the data necessary to identify each of the springs described:

"B" RELAY VALVE SPRING IDENTIFICATION

Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
25	97351	13/16"	.043"	1 1/8"	17	Ph. Bz.
38	97381	1 1/16"	.054"	2 3/4"	16	Steel
39	39574	1 3/16"	.080"	2 7/8"	7	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

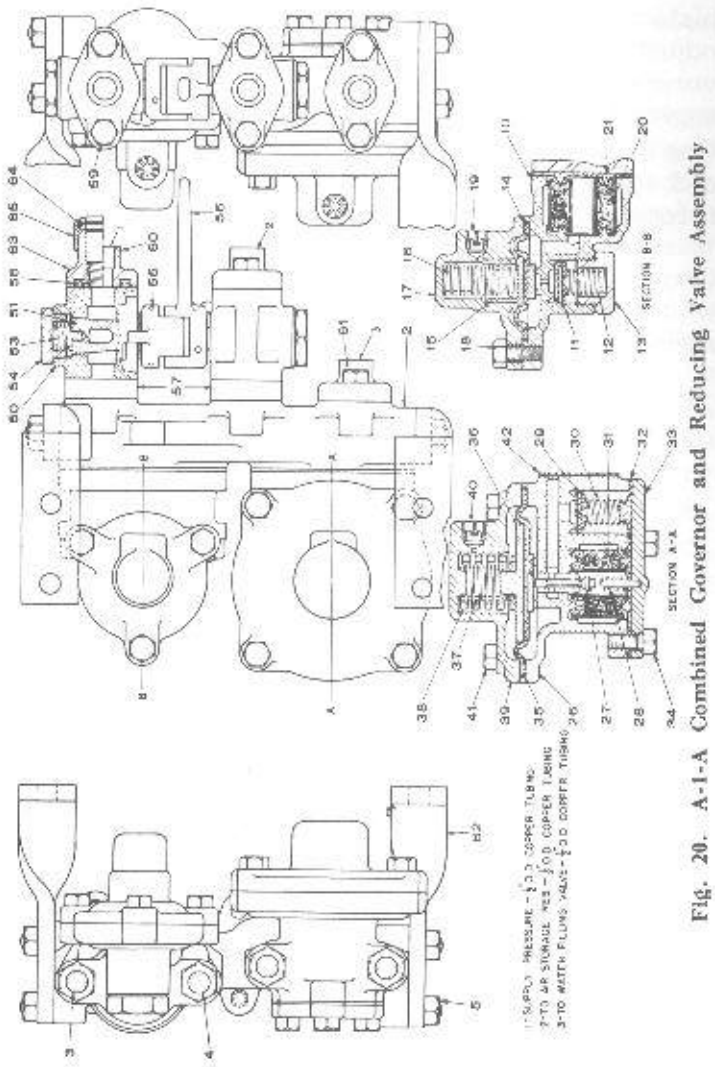


Fig. 20. A-1-A Combined Governor and Reducing Valve Assembly

⚠ WATER RAISING EQUIPMENT ⚠

The Water Raising Equipment includes a governor, reducing valve and an "E-1" Safety Valve.

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the devices comprising the Water Raising Equipment.

Five springs are contained in the combined governor and reducing valve and are identified in the sectional view by reference numbers as follows:

12--CHECK VALVE SPRING, which serves to keep the check valve seated.

16--GOVERNOR SPRING, which serves to hold the diaphragm in its normal position.

28--VALVE SPRING, which tends to hold valve 27 on its seat.

30--CHECK VALVE SPRING, which serves to hold check valve 29 on its seat.

37 and 38--DIAPHRAGM SPRINGS, which serve to hold diaphragm down and valve 27 unseated.

The following tabulation gives the data necessary to identify each of the springs described:

GOVERNOR AND REDUCING VALVE SPRING IDENTIFICATION

Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
30½ 12	94581	31/64"	.0285"	1 1/16"	7	Ph. Bz.
16	515482	13/16"	.125"	2 3/4"	11	Steel
28	21085	5/16"	.04"	1 3/4"	17 1/2	Ph. Bz.
37	77953	3/16"	.122"	1 5/8"	7 1/2	Steel
38	77954	1 1/4"	11/64"	1 5/8"	5	Steel

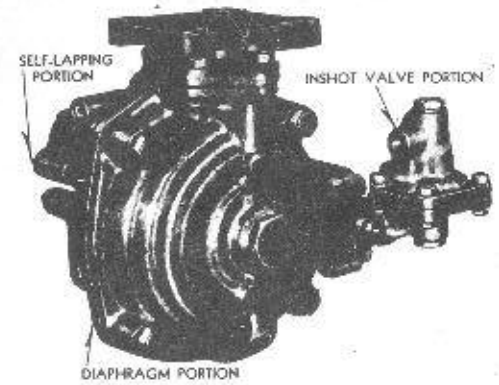
This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, etc. This tabulation is intended for identification only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

⚠"A-2" CAR DISCHARGE VALVE⚠

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the "A-2" Car Discharge Valve.

⚠SLACK ADJUSTER⚠

The necessary instructions required for the repair and maintenance of slack adjusters are outlined in the respective slack adjuster repair specification.



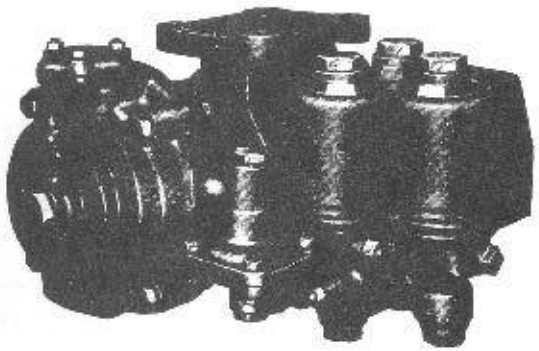


Fig. 21 Exterior Views of the F-6 and F-1864 Relay Valves

"P-3" DECELOSTAT CONTROLLER AND "B-3" DECELOSTAT CONTROL VALVE

A separate pamphlet, IL-2612-1, has been issued for the repair and maintenance of DECELOSTAT equipment and the instructions contained therein must be strictly adhered to.

SECTION II - ELECTRO-PNEUMATIC DEVICES

⚠"F" TYPE RELAY VALVES⚠

The "F" Type Relay Valve consists of a relay portion, inshot valve portion, and magnet portion. These portions are bolted to the pipe bracket from which they are removable for inspection and cleaning without breaking the pipe connections.

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined, for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the respective portions of the "F" Type Relay Valves.

NOTE: The following instructions apply only to "F" Type Relay Valves equipped with rubber seated application and exhaust valves.

Before assembling the relay valve, place a small

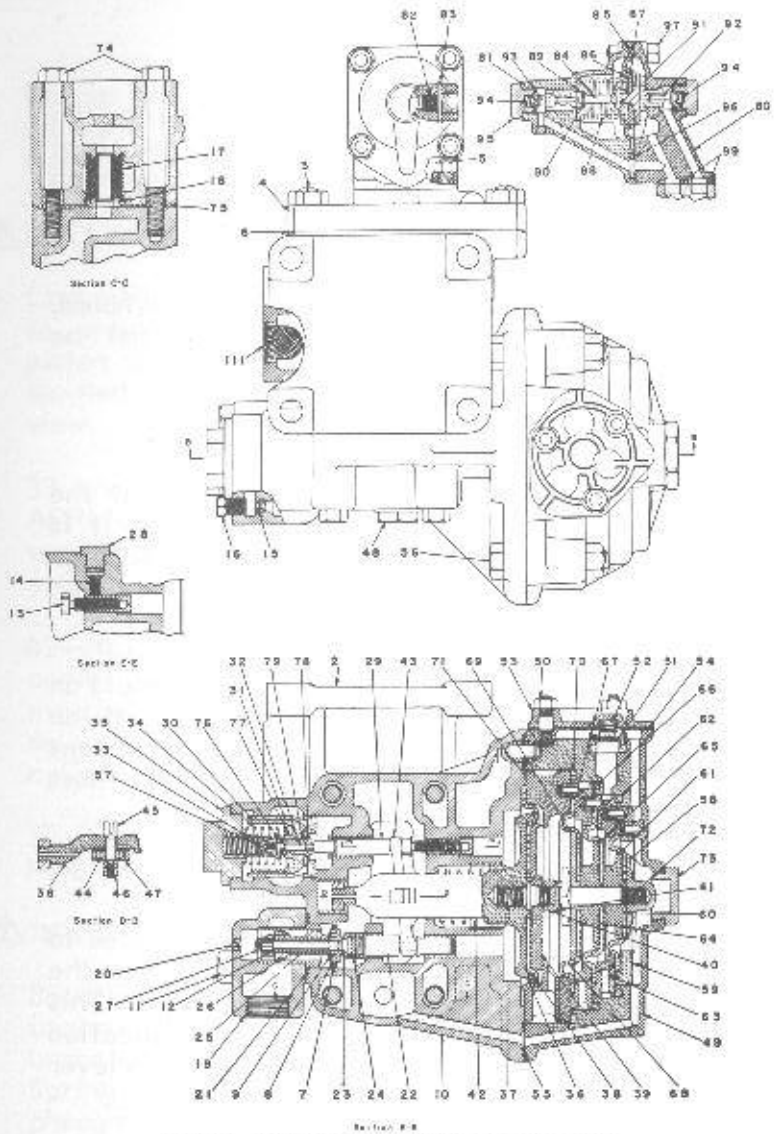


Fig. 22 F-6 Relay Valve Assembly Views

amount of No. 1 Lime Base Grease on the bearing surfaces of the piston lever. Also place one drop of oil current AAR Spec. M-912 on each of the bushings, except the large piston bushing, and spread it evenly over the surface.

Before the relay valve is completely assembled, the exhaust valve and piston lever must be adjusted in the following manner:

⚠EXHAUST VALVE⚠

With the exhaust valve on its seat, adjust the exhaust valve retaining nut so that when it is locked in position there is not less than .005" nor more than .010" clearance between the retaining nut and the exhaust valve piston.

NOTE: When assembling the elastic stop nuts on the exhaust valve pilot valve, care must be exercised to insure that there is sufficient friction to keep them tight, otherwise they must be replaced.

⚠PISTON LEVER⚠

The piston lever stop must be adjusted so as to obtain a clearance of .025" to .030" between the piston lever and application valve stem. This adjustment must be made with the application valves on their seats. Note that the piston lever moves freely.

Springs and chokes used in the various portions are identified in the sectional views by reference numbers as follows:

⚠RELAY PORTION:⚠

Choke Plug 15, with 1/8" choke (.187" drill) acts to provide quick equalization of pressure on piston 30, after application valve opens. It is located under pipe plug 16, as shown on assembly view.

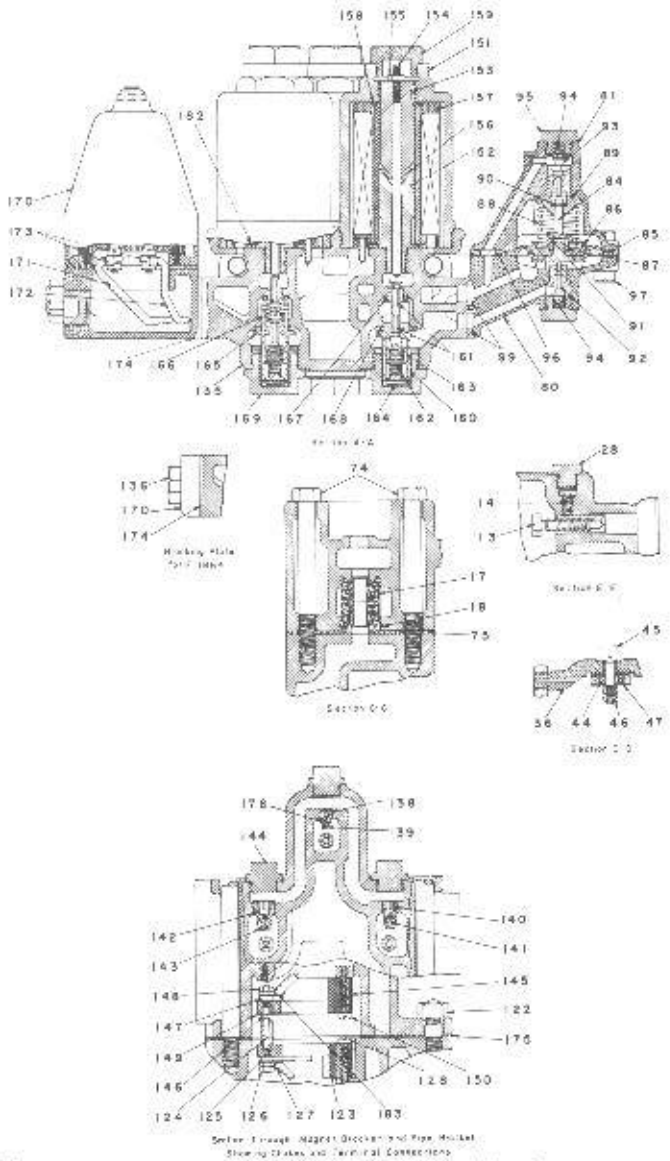
33 and 34--APPLICATION VALVE SPRING and APPLICATION PISTON VALVE SPRING, which serve to hold the application valve and piston seated.

42--RELEASE SPRING, which is used to overcome the resistance of the diaphragm stack, insuring return of the self-lapping portion to release position and positive release of low brake cylinder pressures.

52--CHECK VALVE SPRINGS, which serve to hold the check valves seated.

⚠INSHOT VALVE PORTION:⚠

88--PISTON SPRING, holds piston and diaphragm against stem of supply valve which is thus held unseated against the tension of the Supply Valve Spring 94, permitting flow of air to the diaphragm stack.



54 Fig. 23 F-1864 Relay Valve Detail Sections

94--EXHAUST VALVE SPRING, which serves to keep exhaust valve 93 normally seated.

94--SUPPLY VALVE SPRING, which serves to seat the supply valve when the diaphragm piston moves upward.

⚠MAGNET PORTION:⚠

High Speed Magnet Choke 138, 1/8" Choke (.033" drill) with filter, controls flow of air between inshot valve and diaphragm chamber.

Medium Speed Magnet Choke 140, 1/4" Choke (.046" drill) with filter, controls flow of air between inshot valve and diaphragm chamber.

Low Speed Magnet Choke 142, 3/8" Choke (.067" drill) with filter, controls flow of air between inshot valve and diaphragm chamber.

162--CHECK VALVE SPRINGS, which serve to seat the check valves located in the diaphragm portion.

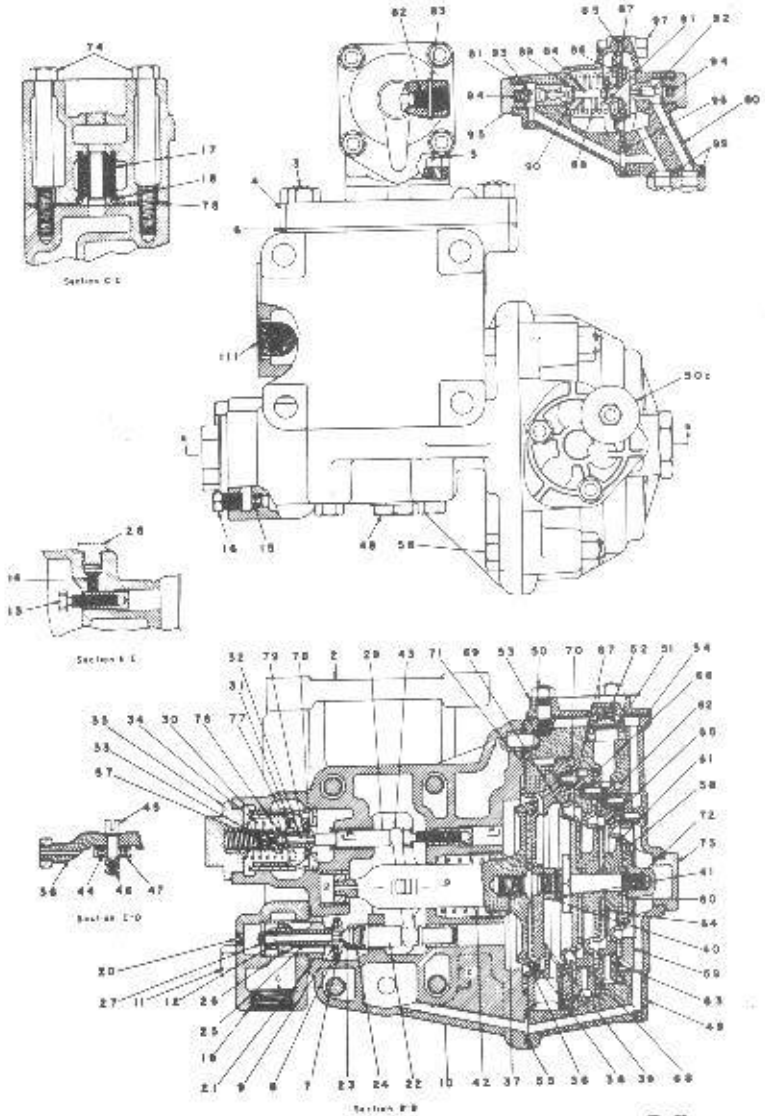


Fig. 24 F-1864 Relay Valve outline and Section B-B

The following tabulation gives the data necessary to identify each of the springs described:

"F" TYPE RELAY VALVE SPRING IDENTIFICATION

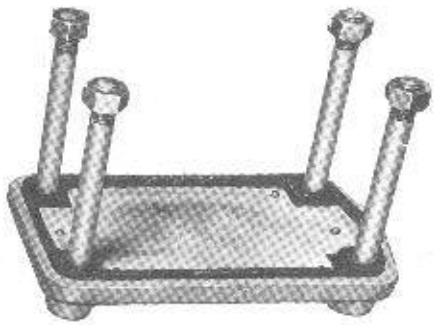
Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
33	97381	31/32"	.054"	2 3/4"	15	Steel
34	39574	1 1/2"	.080"	2 7/8"	7	Steel
42	511410	1 5/8"	.080"	2 15/16"	5	Steel
52	94581	31/32"	.028"	1"	7	Ph. Bz.
88	512902	1 1/4"	.105"	2 7/8"	6 1/2	Steel
94	513312	11/32"	.025"	5/16"	7	Ph. Bz.
162	53003	15/32"	.051"	1 3/8"	10	Ph. Bz.

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

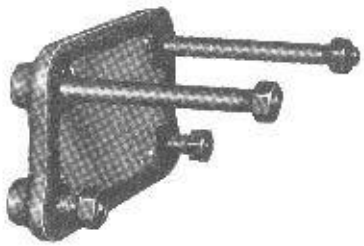
After the relay valve portions have been properly tested and removed from the rack, attach the respective shipping cover to the portions.

⚠"21-B" MAGNET VALVE⚠

The "21-B" Magnet Valve consists of a pipe bracket and magnet valve portion. Included with the magnet valve portion is a cut-off valve portion, which protects against the loss of auxiliary reservoir air in the event of abnormal magnet valve operation or broken straight air pipe.



Pc. No. 519342 for Relay Portion



Pc. No. 519343 for Magnet Portion

Fig. 25 Shipping Covers for "F" Relay Valves

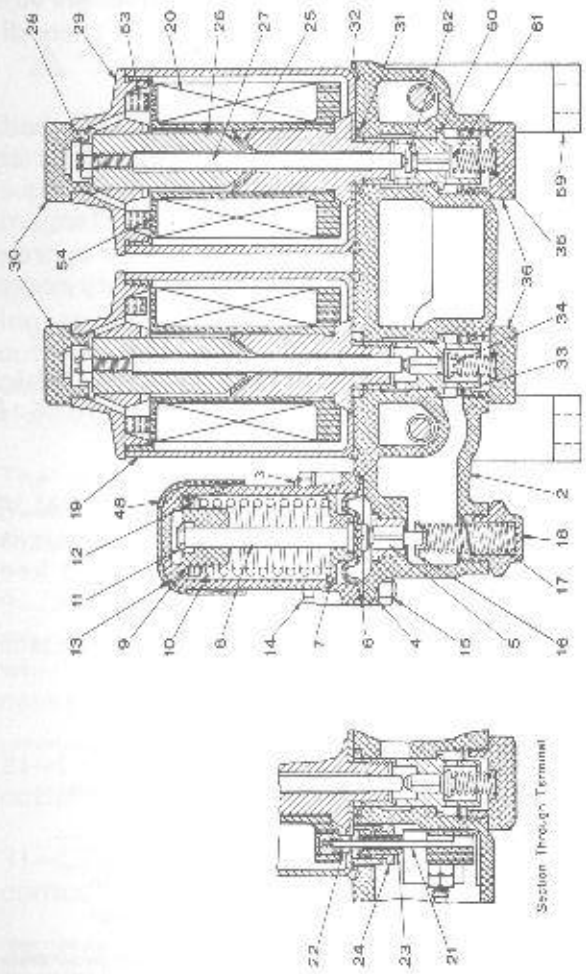


Fig. 26 21-B Magnet Valve horizontal section

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the "21-B" Magnet Valve.

Three springs are used in the magnet valve body and are identified in the sectional view by reference numbers as follows:

10--CONTROL SPRING, with a value of approximately 75 pounds, which opposes auxiliary reservoir air beneath diaphragm.

17--CONTROL CHECK VALVE SPRING, which holds valve 5 unseated when diaphragm 6 is deflected.

35--APPLICATION AND RELEASE VALVE SPRINGS, one of which serves to keep release valve unseated, the other which serves to keep the application valve seated.

The following tabulation gives the data necessary to identify each of the springs described:

21-B MAGNET SPRING IDENTIFICATION

Piece Number	Approx. Outside Diameter	Approx. Wire Diameter	Approx. Free Height	Approx. No. Turns	Material
98797	1 5/16"	.175"	4 1/4"	10	Steel
501458	1/2"	.073"	3 1/2"	20	Steel
512985	3/4"	.047"	1 1/4"	11 1/2	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

The "21-B" Magnet Valve MUST pass the specified rack tests before being returned to service.

⚠ "K-3" TYPE PNEUMATIC SWITCHES ⚠

The "K-3" Type Pneumatic Switch operates during brake application to establish battery supply to the relay cabinet and relay valve magnets.

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the "K-3" Type Pneumatic Switches.

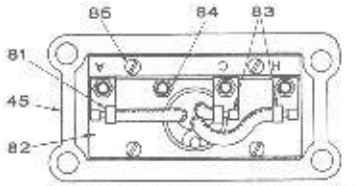
The springs used in the "K-3" Type Pneumatic Switches are identified by reference numbers as follows:

9--DIAPHRAGM SPRING, with a value of 11 pounds (a 60 pound spring is also available), which controls movement of collar 6, which opens and closes the contact finger.

21--LEVER SPRING, which serves to control the action of the contact lever.

31--CONTACT SPRING, which serves to seat the contact holder.

35--COVER SPRING, which serves to hold cover screw in place. (Not used with "K-3-B" Switch).



View of Plug with Contact Protector Removed

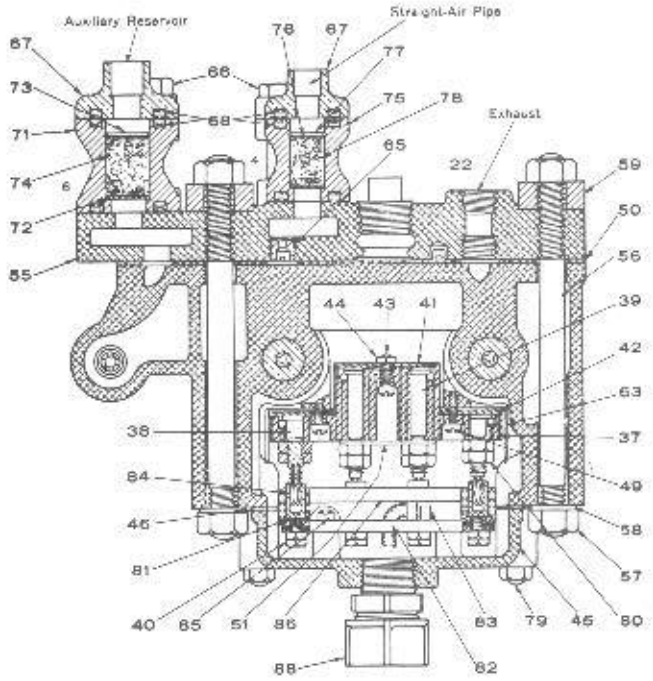
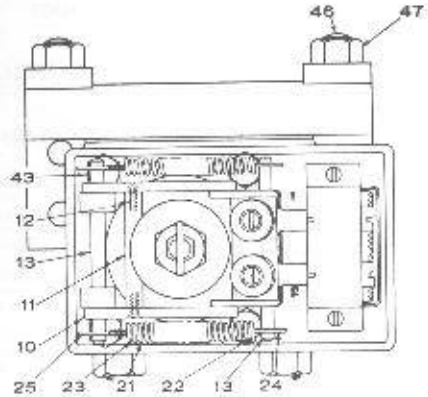


Fig. 27 21-B Magnet Valve vertical section



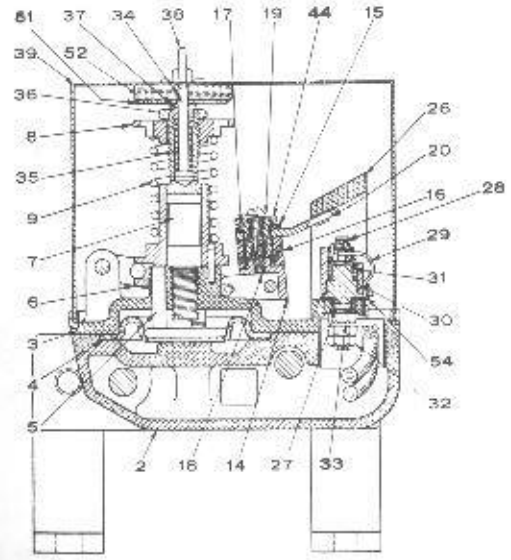


Fig. 28 K-3 Pneumatic Switch Assembly

The following tabulation gives the data necessary to identify each of the springs described:

K-3 TYPE PNEUMATIC SWITCH SPRING IDENTIFICATION

Ref. No.	Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material
9	504293	1 1/16"	.141"	2 1/16"	9 1/2	Steel
9	170184	1 3/4"	.225"	2 5/8"	6 1/2	Steel
21	515171	5/16"	.054"	4 1/2"	36 1/4	Steel
31	504257	21/64"	.025"	11/32"	7	Steel
35	504256	9/64"	.054"	1 1/32"	12	Steel

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

The "K-3" Type Pneumatic Switch must pass the specified rack test before being returned to service.

⚠ BACK-UP VALVES ⚠

Generally, the instructions for cleaning, inspecting, repairing and lubricating the various parts as outlined for the "D-22" Control Valve Service and Emergency Portions also apply when reconditioning the Back-Up Valves.

⚠"DE-1" BACK-UP VALVE⚠

Care must be used in assembling to make proper connections of terminals to contact block.

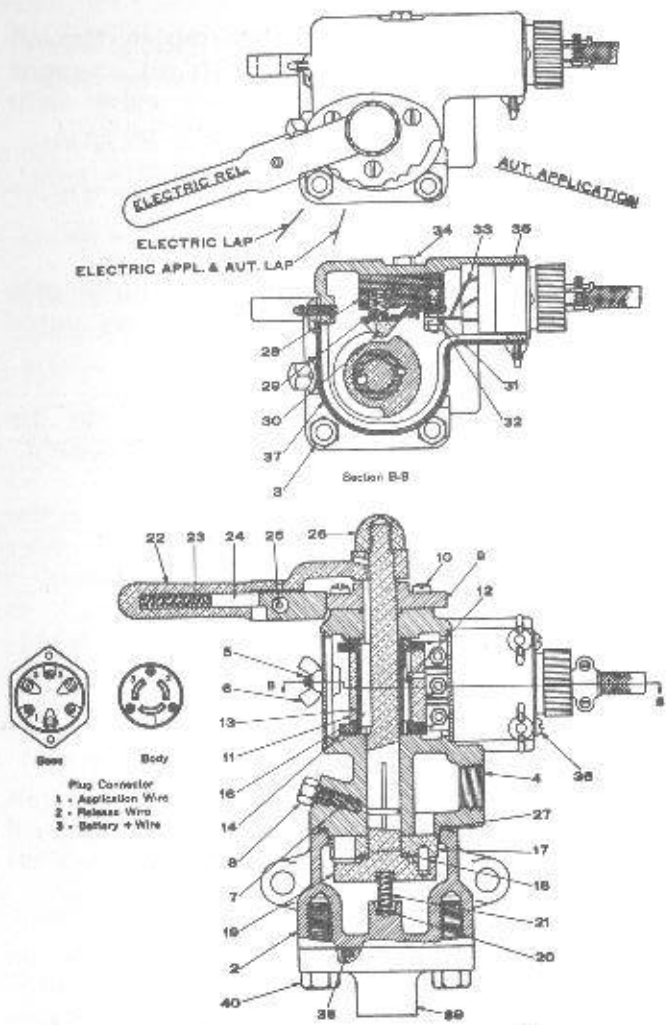


Fig. 29 DE-1 Back-up Valve Assembly

During assembling, the felt packing in the oil plug hole must be lubricated with oil, current AAR Spec. M-912, and the rotary valve with grease, current AAR Spec. M-913.

Three different springs are used in the "DE-1" Back-Up Valve, namely:

21--VALVE SPRING, located in the automatic portion, which serves to hold the rotary valve seated.

23--HANDLE LATCH SPRING, located in the handle, which serves to hold the latch in place.

29--CONTACT FINGER SPRINGS, located in the electric portion, which serve to hold the contact fingers against the cam in application position.

The "DE-1" Back-Up Valve must pass the specified rack test before being returned.

⚠ "B" TYPE BACK-UP VALVE ⚠

When disassembling the back-up valve, the pin holding the handle to the key must be removed before the valve, valve bush and key may be removed.

During assembling the contact surfaces should be lubricated with a few drops of oil, current AAR Spec. M-912, distributed evenly over the entire surface.

Three springs are used in the "B" Type Back-Up Valve, namely:

7--VALVE SPRING, which is used to hold the valve seated.

8--KEY SPRING, which holds the key in place.

17--WHISTLE VALVE SPRING, (for "B" and "B-2" Back-Up Valves) which is used to seat the whistle valve.

The following tabulation gives the data necessary to identify each of the springs described:

BACK-UP VALVE SPRING IDENTIFICATION

Piece Number	Approx. Outside Dia.	Approx. Wire Dia.	Approx. Free Height	Approx. No. Turns	Material	Where Used
13109	11/16"	.055"	1 1/16"	9 1/2	Steel	DE-1
9810	5/8"	.0475"	1 3/4"	18 1/2	Steel	DE-1
96899	5/8"	.047"	1 7/16"	5 1/2	Steel	DE-1
51551	1/2"	.064"	1 1/16"	8	Ph. Bz.	"B" Type
85781	1/2"	.072"	3/4"	8	Ph. Bz.	"B" Type
75305	11/16"	.035"	1 3/4"	16	Ph. Bz.	"B" Type

This table is shown to enable railroad men, storekeepers and all Air Brake men to identify the various springs used in the Valve. The actual springs will vary somewhat, due to small differences in wire diameter, coil diameter, number of coils, 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.

The "B" Type Back-Up Valve(s) must pass the specified rack test before being returned to service.

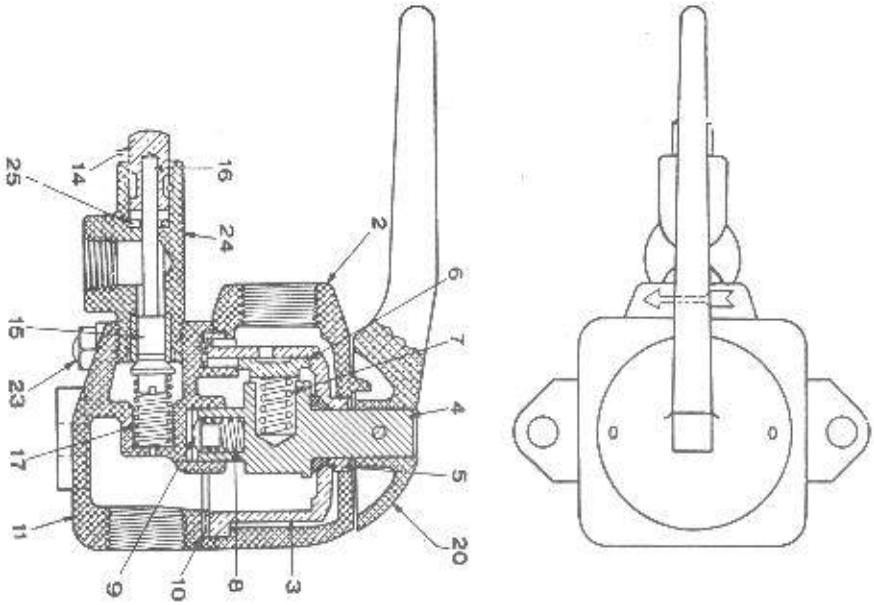


Fig. 30 B-2 Back-Up Valve Assembly

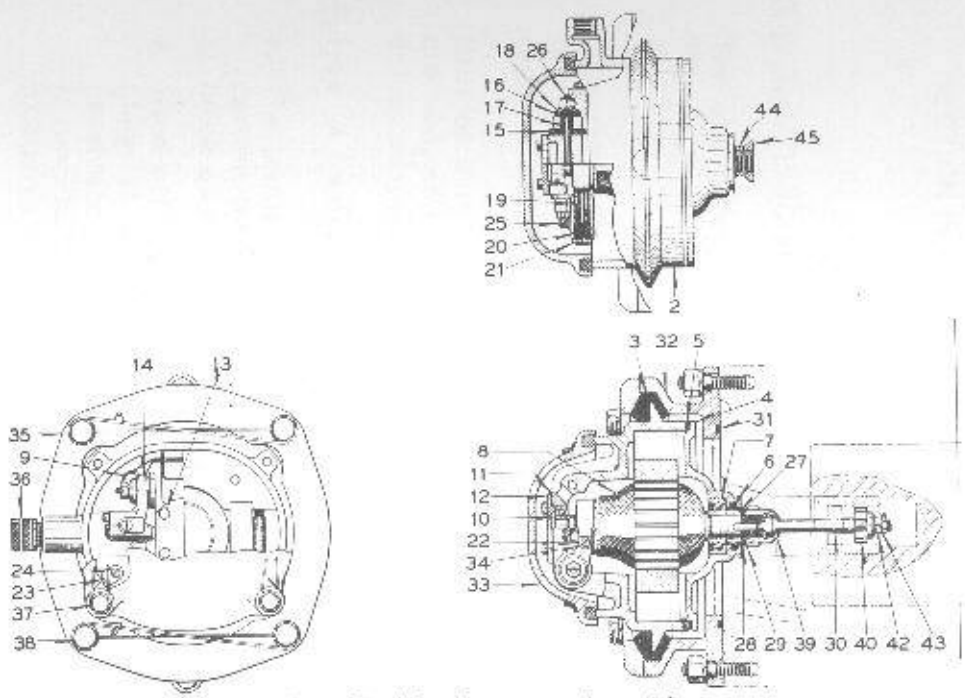


Fig. 31 Axle Generator—Assembly

NOTES

SECTION III ELECTRIC BRAKE EQUIPMENT DEVICES

AXLE GENERATORS

⚠ DISMANTLING AND INSPECTING ⚠

The axle generators must, when first received in the shop, be cleaned and the excess dirt blown off.

Disassemble the axle generator using care not to damage any part. The individual parts must be cleaned and inspected.

Brushes that are under 3/8" in length, chipped, or cracked, and brush springs which are broken or deformed must be replaced with new parts.

⚠Type "A" Axle Generators:⚠

1. The brush holders must be inspected to make certain the brushes slide freely and that the brush spring cups are securely in place.
2. Wipe off the commutator and, if necessary, clean it with No. 00 sandpaper after the generator is mounted on the rack and while it is running. If the commutator shows signs of excessive wear, it must be reconditioned.
3. If there is any evidence of bearing wear, the worn bearing must be replaced before damage occurs to the armature.

4. Remove the 1/4" pipe plug at the bottom of the generator housing and check for leakage of journal box oil into the generator. If there are signs of oil leakage, repack the rear bearing and grease cavity using Atlantic Wheel Bearing Grease or its equivalent and replace the felt oil ring in the rear end bell. At all times maintain the rear bearing cavity well filled with specified grease as this is important in the prevention of oil leakage.

5. Remove the pipe plug over the front bearing and make certain that the front bearing is properly lubricated.

6. Note that there is no end play in the armature. If the spline drive for Hyatt bearing is used, the drive shaft must be free to move in its socket without any end play. The Oldham coupling drive, when used, must be inspected to make certain that the forged plate slides freely on its supporting members. With either driving means, the lock nut must be drawn up tightly and the teeth of the lock washer bent down to engage the slot in the nut.

⚠ Type "B" Axle Generators: ⚠

1. The brush holders must be inspected to make certain the brushes slide freely and that the brush spring cups are securely in place.

2. Wipe off the commutator and, if necessary, clean it with No. 00 sandpaper after the generator is mounted on the rack and while it is running. If the commutator shows signs of excessive wear, it must be reconditioned.

3. If there is any evidence of bearing wear, the worn bearing must be replaced before damage occurs to the armature.

4. Determine the end play of the armature. This end play must not be less than .001" or more than .004".

5. If the spline drive for Hyatt bearing is used, the drive shaft must be free to move in its socket without end play. The Oldham coupling drive, when used, must be inspected to make certain that the forged plate slides freely on its supporting members. With either driving means, the lock nut must be drawn up tightly and the teeth of the lock washer bent down to engage the slot in the nut.

⚠ REASSEMBLING ⚠

If the axle generator is disassembled or any of the generator parts are removed for repair or replacement, the instructions listed below must be followed when reassembling the generator.

Type "A" Axle Generators:

1. Place the rear bearing in the end bell and bolt the retainer plate securely in place.

2. Connect the heads of the retaining screws with wire and make certain that the twisted ends of the wire do not extend beyond the head of the retaining bolts.

3. Assemble the front bearing, spacer, lock washer and nut to the commutator end of the armature, then place the armature in the rear end bell.

4. When assembling the end bell to the armature, apply pipe thread compound between the face of the sleeve and the inner race of the bearing. Also apply the compound between the armature shaft and the inside diameter of the inner race of the bearing. Care must be exercised to prevent excess compound from reaching the interior of the bearing.

5. Secure the end bell to the body. Lock the bolts by wiring the two top bolts together and two bottom bolts together. Care must be exercised that the bolts are locked in the manner described so that the lock wires are parallel to the pole pieces, thus insuring against short-circuiting the field.

6. Assemble the brushes to the generator.

7. Attach the drive mechanism to the generator and lock in place.

With the spline type drive, the drive shaft must be drawn up tightly and must move freely in its socket without end play in the armature shaft. If any end play exists, it may by compensated for by the use of shims, Pc. No. U440331, placed underneath the shaft lock washer.

When assembling the plate drive coupling, note that the felt packing is properly positioned in the groove in the coupling drive plate, then assemble the coupling to the generator. This assembly can be most successfully made if the coupling is rotated as it is being moved into the end bell bore.

After the plate drive coupling has been properly assembled to the generator, and the lock nut tightened, rotate the coupling and armature by hand, and if there is any indicattion of exceptional resistance to rotation or binding at certain points, the coupling and felt must be removed to determine the cause of tightness and make corrections.

The "A" Axle Generator must pass the specified rack test before being returned to service.

Type "B" Axle Generators:

1. Assemble both ball bearings to the armature.

Cover the balls in the bearings with Atlantic Wheel Bearing Grease or its equivalent.

2. With the gasket and felt packing ring in place in the end bell, assemble the armature and end bell to the body and securely tighten the bolts.

   Lock the bolts by wiring the two top bolts together and two bottom bolts together. Make certain that the bolts are locked in the manner described so that the lock wires are parallel to the hole pieces, thus insuring against short-circuiting the field.

3. Securely fasten the bearing retainer to the generator body. Check the end play of the armature. The end play must not be less than .001" or more than .004" and may be compensated for by the use of .003" laminated shims, Pc. No. U440594, placed underneath the bearing retainer.

4. After the armature end play has been properly adjusted, remove the bearing retainer and half fill the cavity on top of the bearing with Atlantic Wheel Bearing Grease or its equivalent, then replace the bearing retainer, and tighten in place. Wire the heads of the retainer bolts together, then recheck the armature end play.

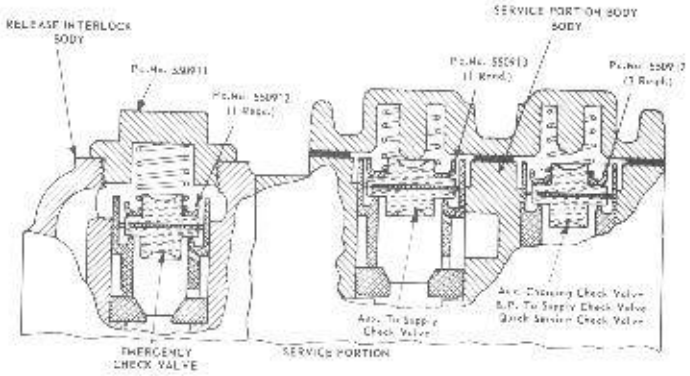
5. Assemble the brushes to the generators.

6. Attach the drive mechanism to the generator and lock in place. The drive shaft must be free to move in its socket without any end play.

NOTE: Refer to the instructions for assembling the plate drive coupling as specified under the preceding Section for Type "A" Axle Generators.

The "B" Axle Generator must pass the specified rack test before being returned to service.

REMOVAL OF BALL CHECK VALVES
D-22-AR AND D-22-BR CONTROL VALVES



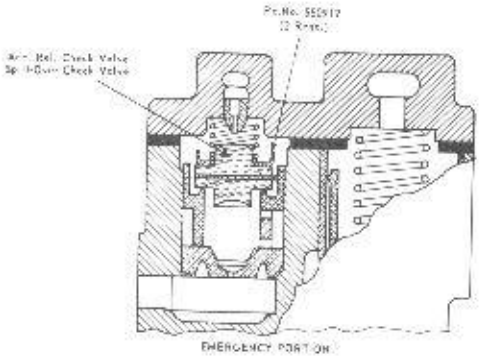


PLATE 1 TC-11180

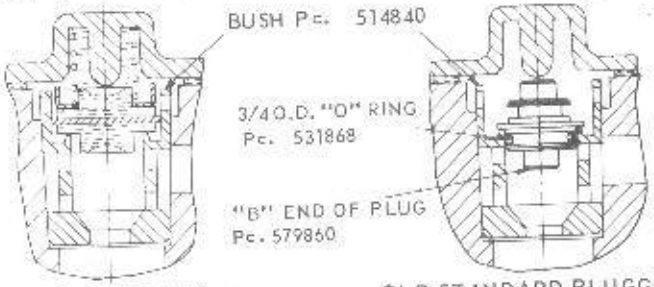
"D-22-AR" and "D-22-BR" Control Valve

Supply Reservoir Charging Check Valve Elimination

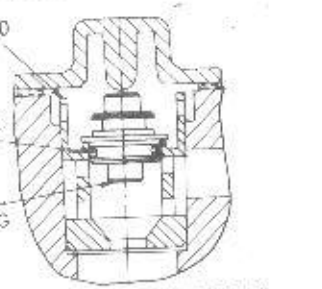
A 1/2" choke plug (3/32" drill) should be placed in port 56 located in the service valve face of the pipe bracket. The 1/2" x (3/32") choke plug may be obtained by ordering Pc. No. 79966. The pipe bracket is drilled and tapped to accept a 1/2" choke plug.

PLATE 2
(G-907)

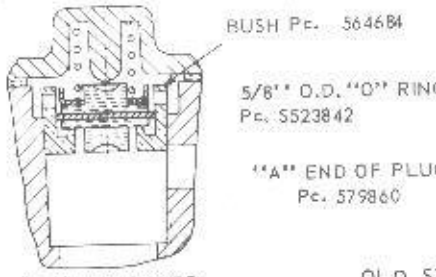
"D-22-AR" and "D-22-BR" Control Valve Supply Reservoir Charging Check Valve Elimination



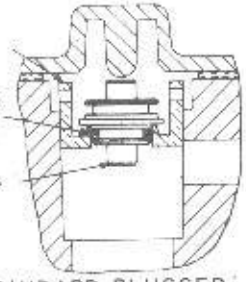
OLD STANDARD
USING BUSH Pc. 514840



OLD STANDARD PLUGGED
WITH "B" END OF PLUG DOWN



OLD STANDARD
USING BUSH Pc. 564684



OLD STANDARD PLUGGED
WITH "A" END OF PLUG DOWN

After removing the check valve and its spring the check valve bush (seat) should be plugged. "D-22" Control Valves were built with two vintages of check valve bush -- one was slightly larger than the other. Either vintage of check valve bush may be plugged using the double ended plug Pc. No. 579860 as shown in the illustration.

An o-ring is required when installing the double end plug. Pc. No. 531868 covers a 3/4" O.D. o-ring which is to be used when plugging bush Pc. No. 514840 (see illustration). Pc. No. 523842 covers a 5/8" O.D. o-ring which is used when plugging bush Pc. No. 564684.

The spring guide in the check valve cover holds the plug in place in either vintage of check valve bush.

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