NYAB

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26-NL BRAKE EQUIPMENT
with

26-C BRAKE VALVE and
6-NR DISTRIBUTING VALVE

FOR SWITCH AND ROAD LOCOMOTIVES

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A KNORR BRAKE COMPANY

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26-NL BRAKE EQUIPMENT

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26-C BAKE VALVE

AND

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FOR

SWITCH AND ROAD

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MARCH, 1978

NEW YORK AIR BRAKE
A UNIT OF KNORR BRAKE
WATERTOWN, NEW YORK

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FOREWORD

This Instruction Pamphlet No. 74, Supplement No. 1, has been prepared with the intention of simplifying the understanding of the operation and function of the components described.

Symbolic Diagrams are used together with written descriptions and diagrammatics for each component making up the Equipments described.

The symbolic diagrams have been prepared generally in accordance with standard industry wide accepted "American Standard - ASA Y32.10".

A combination of rules, instructions and standard symbols pertaining to "Graphic Symbols for Fluid Power Diagrams" appears in New York Air Brake Company's General Letter No. 398.

THE EQUIPMENT

The 26-N I, Brake Equipment with 26-C Brake Valve and 6-NR Distributing Valve is the standard arrangement for Switch Locomotives and can be arranged for Safety Control, Overspeed Control, Dynamic Interlock and Multiple-Unit Control for Road Locomotives.

The 26-NL Brake Equipment is a New York Air Brake Company arrangement of modern standard air brake devices resulting in simple, but flexible brake equipment for Switching and Road Locomotive service. As the designation 26-NL implies, the basic equipment utilizes the 26-C Brake Valve as the cab control and the 6-NR Type Distributing Valve provides the automatic and independent brake response.

The 26-C Brake Valve is the present standard on Road Locomotives. This permits the cab arrangement to be the same as for 26-L Equipment.

The 6-NR Distributing Valve, by virtue of its modern construction, employing diaphragm actuated "0" Ring packed Spool Valves, provides greatly improved response at a much less maintenance cost than does its predecessor, the 6-K Distributing Valve.

An H-5-B Relayair Valve is used to permit an independent release of an automatic brake application on the Locomotive.

The fewer individually mounted Valve Portions comprising this equipment reduces both original installation costs and the costs for removal and reapplication at periodic maintenance intervals.

The 26-NL Equipment has the capacity for adequate control of any length train and protection against stuck brakes when Locomotive is shipped dead in the train. This is due to the diaphragm actuation of the 6-NR Distributing Valve which eliminates the leakage and loss of pressure differential of the valve which was the cause of stuck brakes.

FLEXIBILITY OF THE EQUIPMENT

The Basic Equipment for Switch Locomotives is shown in PLATE 1. This Equipment is flexible in that it permits the additional optional functions to be incorporated for use on Road Locomotives as follows:

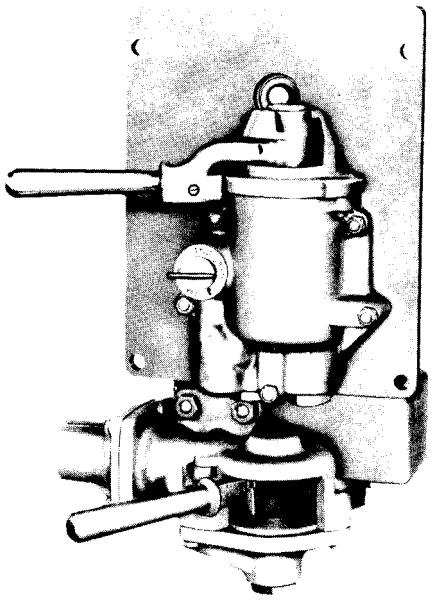
1. MU Control with 26-L, 26-NL and 24-RL Equipments - by adding an MU-2Al Valve (2 position) to the Basic Equipment. See Piping Diagrammatic, PLATE 2.

2. MU Control with 6, 27-LB, 26-L, 26-NL and 24-RL Equipments by adding an MU-2A Valve and an F-1 Selector Valve to the Basic Equipment. See Piping Diagrammatic, PLATE 3.

3. Penalty Type Brake Applications - by adding a P-2-A Brake Application Valve to the Basic Equipment.

4. Break-In-Two-Protection - by adding an A-1 Charging Cut-Off Valve to the Basic Equipment.

26-C BRAKE VALVE
WITH SA-26 INDEPENDENT BRAKE VALVE



26-C BRAKE VALVE

FIG. I

The 26-C Brake Valve with SA-26 Independent Brake Valve incorporates all of the advantages common to the 26-L Brake Equipment for Road Locomotives such as:

1. Self-lapping automatic and independent brake valve portions.

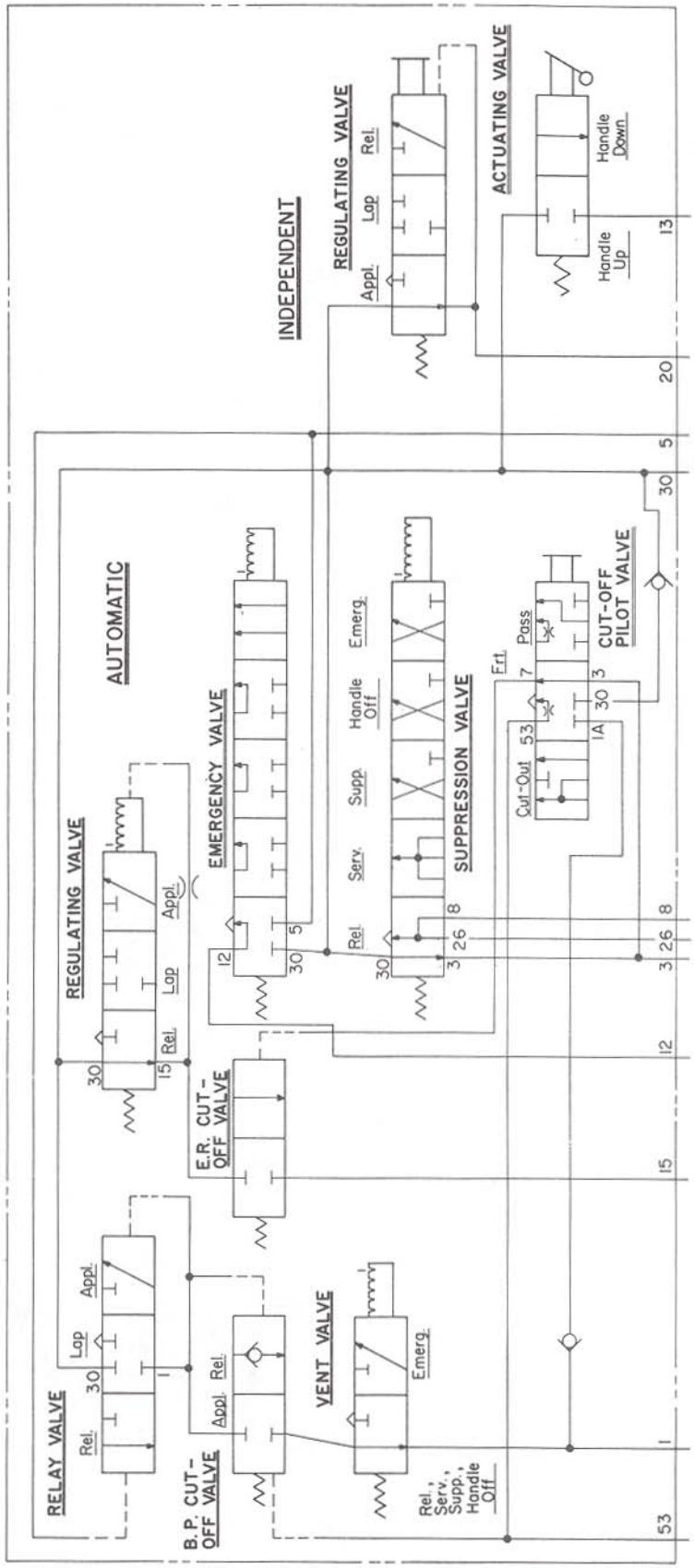
2. Pressure maintaining.

3. Provision for the addition of any type of penalty brake application with the P-2-A Brake Application Valve.

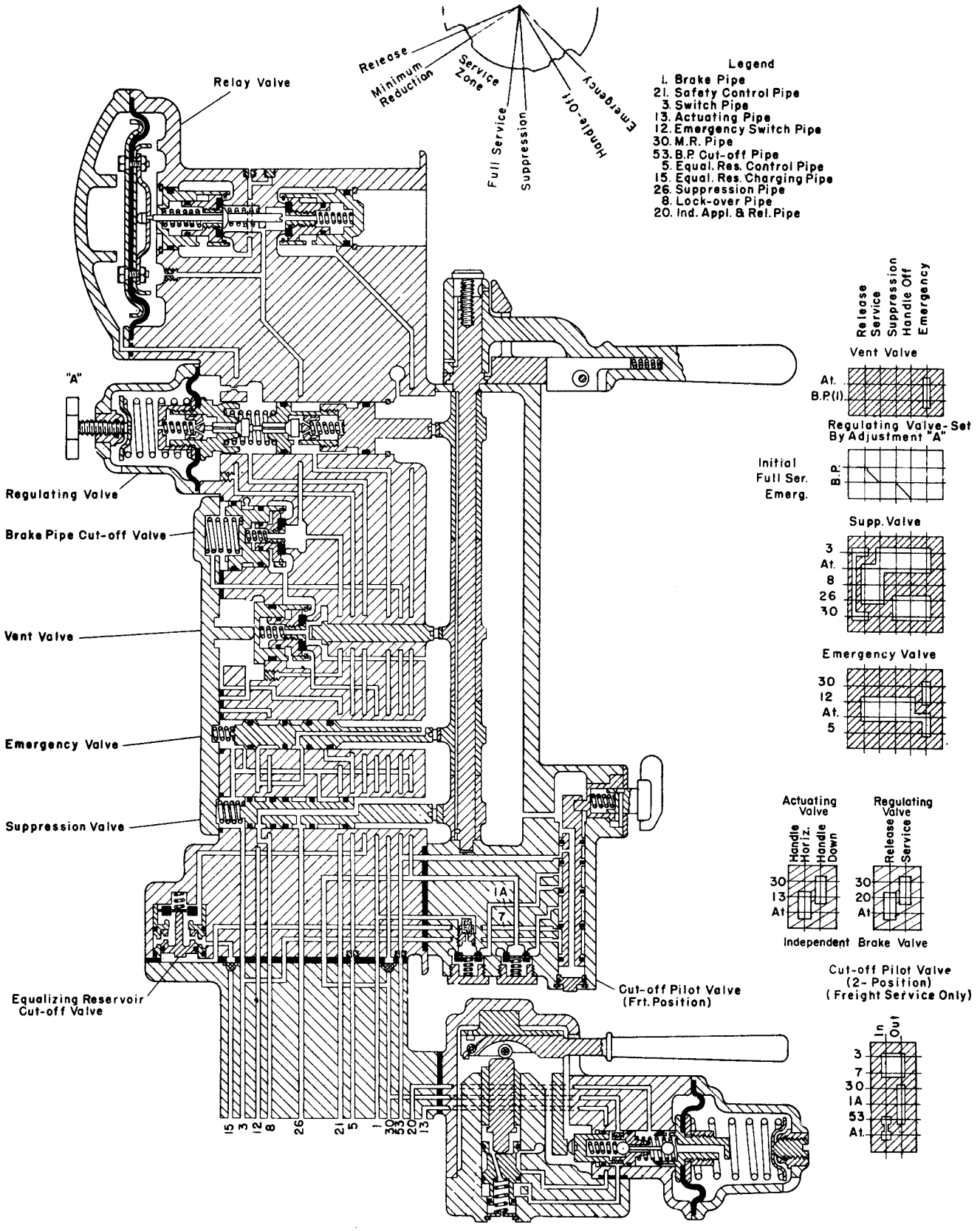
4. Provision for the addition of duplicate cab controls.

5. Elimination of hard-working brake valves.

The 26-C Brake Valve is illustrated and its operation described in the following pages.



26-C BRAKE VALVE
FIG. 2A



26-C BRAKE VALVE

FIG. 2

The 26-C Brake Valve, Figure 2 is a self-lapping type in which have been incorporated many modern design improvements. These include the replacement of the rotary valve by can-operated "O" ring packed spool valves and cam-operated poppet type valves to provide the control over the locomotive and train brakes. Also incorporated in the brake valve design is a cam-operated, self-lapping regulating valve portion which functions to develop or dissipate equalizing reservoir pressure in proportion to the degree of brake valve handle movement in the handle quadrant. In turn, brake pipe pressure is developed and exhausted by a self-lapping type of relay valve that is piloted by equalizing reservoir pressure to maintain in the brake pipe the same pressure condition that exists in the equalizing reservoir.

The 26-C Brake Valve mounts on a pipe bracket to which all pipe connections are made. The pipe connections are identified numerically as follows:

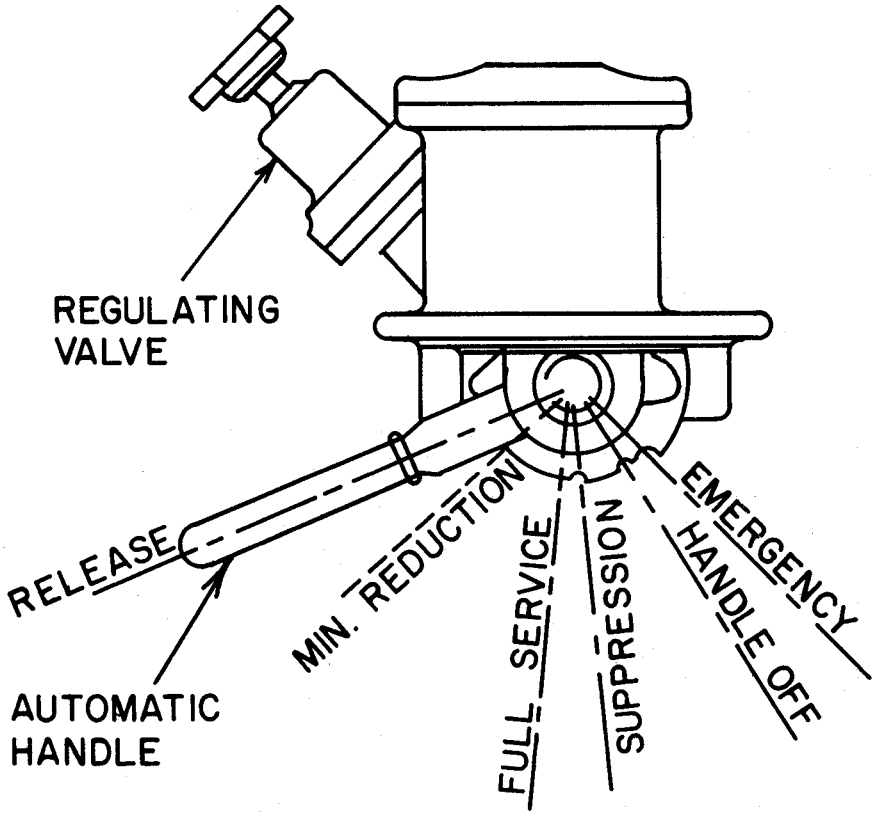
1	Brake Pipe
3	Switch Pipe
5	Equalizing Reservoir Control Pipe
8	Lock-Over Pipe
12	Emergency Switch Pipe
13	Actuating Pipe
15	Equalizing Reservoir Charging Pipe
20	Independent Application and Release Pipe
21	Safety Control Pipe
26	Suppression Pipe
30	Main Reservoir Pipe
53	Brake Pipe Cut-Off Pipe

The brake valve consists of two main portions: the automatic portion for regulating the brake pipe pressure, controlling both the locomotive and train brakes; and the independent portion. The latter is a self-lapping independent brake valve for applying and releasing the locomotive brakes independently of the train brakes and for releasing an automatic brake application on the locomotive independently of the train brakes.

The automatic brake valve portion is mounted on top of the pipe bracket and secured with four studs. The independent portion is attached to the front of the pipe bracket and is secured by three cap screws.

The 26-C Brake Valve is arranged for panel mounting. The entire valvular section is mounted behind the panel resulting in only the handle operating portion and a cut-off pilot valve section appearing on the front face of the panel.

The automatic brake valve handle has six handle positions as shown in Figure 3, arranged from left to right as follows:



HANDLE POSITIONS FOR
26-C BRAKE VALVE
FIG. 3

Release (Running) Position:

This position is for charging the equipment and releasing the locomotive and train brakes. It is located with the brake valve handle at the extreme left of the quadrant.

Minimum Reduction Position:

This position is located with the brake valve handle against the first raised portion on the quadrant to the right of Release position. With the brake valve handle moved to this position, a minimum brake pipe reduction is obtained.

Service Position:

This position consists of a sector of brake valve handle movement to the right of Release position. In moving the brake valve handle from left to right through this sector, the degree of brake application is increased until, with the handle at the extreme right of this sector, the handle is in Full SERVICE position and a full service brake application is obtained. With 80 psig Equalizing Reservoir pressure, maximum brake pressure is obtained in Full Service position. If higher than 80 psig Equalizing Reservoir pressure is used, maximum brake cylinder pressure must be obtained by moving the Brake Valve Handle to Handle-Off position.

Suppression Position:

This position is used to reset a penalty application and to nullify a safety control brake application. Such a penalty brake application can be avoided if the brake valve handle is moved to Suppression position before the expiration of a predetermined delay period which is indicated by an audible warning whistle. However, the 26-C Brake Valve is so designed that whenever the brake valve handle is placed in Suppression position, a full service brake application is obtained. It is not possible to avoid getting a full service brake application by cycling the brake valve handle; that is, by returning the brake valve handle to Release position for a few seconds and then returning it to Suppression position, since the brake valve was originally conditioned for a full service application.

Handle-Off Positions

This position is located by the first quadrant notch to the right of Suppression position. The handle is removable in this position. This is the position in which the handle should be placed on trailing units of a multiple-unit locomotive or on locomotives being towed "dead" in a train.

Emergency Position:

This position is located to the extreme right of the brake valve quadrant. It is the position that must be used for making brake valve emergency brake applications and for resetting after any emergency application if break-in-two feature is available.

The Cut-Off Pilot Valve portion provides the function of the familiar double heading cock for cutting in and cutting out the brakes when desired. The two-position type is employed on locomotives intended for freight service only, and its positions are "IN" and "OUT". The cutoff pilot valve handle is positively held in each of its handle positions by spring loading, and it is necessary to first depress the handle before it can be moved from one position to another. With the brake valve cut out by the Cut-Off Pilot Valve , pressure maintaining is cut off and it is then possible to make a brake pipe leakage test which will be covered later in the pamphlet under "OPERATING INSTRUCTIONS".

For all normal operations of the locomotive as a controlling unit, the cut-off pilot valve handle must be placed in the "IN" position. "OUT" position is to be used when hauling the locomotive "dead" or as a trailing unit in a multiple-unit locomotive. The porting in the cut-off pilot valve portion also incorporates two check valves that provide either brake pipe pressure or main reservoir pressure to the brake pipe cut-off valve, depending upon the existing higher pressure.

The 26-C Automatic Brake Valve Portion includes the following details:

1. A self-lapping type of regulating valve is operated by a service cam fastened to, and rotated with, the handle shaft. It regulates the pressure to the equalizing reservoir charging pipe No. 15. This pressure is either piped through the P-2 or P-2-A Brake Application Valve, if one is employed, or directly to the No. S pipe beneath the brake valve. There it is directed through passage 5 of the brake valve to the outer face of the diaphragm of the relay valve portion. Movement of the brake valve handle from Release position into the service sector causes the regulating portion to reduce equalizing reservoir pressure in proportion to the amount of handle movement, until in Full Service position the equalizing reservoir pressure is reduced approximately 23-26 psig. Adjustment of the equalizing reservoir pressure in Release position can be made by turning the adjusting handle at the end of the regulating valve portion.

2. The relay valve portion, consisting of a diaphragm-operated relay valve, establishes pressure in the brake pipe equal to that in the equalizing reservoir at the time. It is capable of either supplying or venting brake pipe pressure and, acts as the supply valve for charging

brake pipe pressure on the locomotive and train with the brake valve handle in Release position. During automatic brake applications, reduction of equalizing reservoir pressure by the regulating valve causes the relay portion to reduce brake pipe pressure correspondingly. The relay valve portion will maintain brake pipe pressure against brake pipe leakage.

3. The brake pipe cut-off valve interrupts the flow of air from the relay valve supply valve to the brake pipe in the event of:

   a. An emergency brake application
   b. Positioning of the cut-off pilot valve in "OUT position.
   c. Operation of auxiliary devices connected to the brake valve which require interruption of air flow to the brake pipe for purposes of break-in-two protection.

4. The vent valve is cam-operated from the brake valve handle shaft in Emergency position to produce a rapid drop in brake pipe pressure.

5. The emergency valve is carp-operated from the brake valve handle shaft in Emergency position. It provides flow of main reservoir air to the No. 12 pipe for operation of power knock-out switches and other auxiliary functions that are required to be operated in Emergency position of the brake valve handle. The emergency valve also operates to vent equalizing reservoir pressure quickly at the brake valve in Emergency position to insure rapid and prompt venting of the brake pipe.

6. The suppression valve is cam-operated from the brake valve handle shaft to provide main reservoir air supply to Port No. 26 in Suppression, Handle-Off and Emergency positions of the brake valve to suppress safety control brake applications. This valve also functions in these handle positions to close the No. 8 pipe for resetting the brake application valve prior to releasing these auxiliary brake applications.

7. The equalizing reservoir cut-off valve. In freight service with the cut-off pilot valve handle in either "FRT" or "IN" position, the equalizing reservoir cut-off valve is held open only in Release position, and only in that position can brake releases be made.

Automatic Brake Operation

Release Position

This is the position of the 26-C Brake Valve for charging the brake pipe and brake system, and for releasing an automatic pneumatic brake, application. Main reservoir air enters Port No. 30 at the pipe bracket, flows to the supply valve in the relay valve portion, to the spool valve of the suppression valve, thence to passage No. 3 and through the spool valve of the cut-off pilot valve to passage 7 and to the underside of the equalizing reservoir cut-off valve piston. Air pressure acting on the face of this piston will move it upward, forcing the charging check valve off its seat to its open position. Main reservoir air also flows from Port No. 30 through the charging valve in the regulating valve portion, past the unseated check valve in the equalizing reservoir cut-off valve to passage 15 as well as to the face of the regulating valve diaphragm. Regulating handle "A" can be adjusted to regulate the value of the equalizing reservoir pressure to be developed by the regulating valve portion. The air pressure in Port No. 15 and Port No. 5 is likewise developed in the equalizing reservoir volume. Port No. 5, in the pipe bracket, is connected to the spool valve of the emergency valve and to the chamber on the outer face of the relay valve diaphragm.

A build-up of equalizing reservoir pressure on the outer face of the relay valve diaphragm will cause the diaphragm assembly and its attached stem to be moved inward to first seat the exhaust valve and then unseat the supply valve. This permits main reservoir air to flow past the unseated supply valve to brake pipe Port No.1 and through the stabilizing choke to the chamber on the inner face of the relay valve diaphragm. Brake pipe air in Port No. 1 also flows to the brake pipe cut-off valve, vent valve and to Port No. 1 in the pipe bracket to which the brake pipe is connected.

Whenever the brake pipe pressure build-up on the inner face of the relay valve diaphragm approaches equalizing reservoir pressure acting on the opposite side of the diaphragm, the diaphragm assembly and stem are positioned to permit the supply valve to become seated and terminate further flow of air from the main reservoir system to the brake pipe. The brake pipe is now fully charged; however, should brake pipe pressure decrease due to brake pipe leakage, the higher equalizing reservoir pressure acting on the outer face of the relay valve diaphragm will move the diaphragm assembly and stem inward to again unseat the supply valve and restore the brake pipe pressure to equalizing reservoir pressure, after which the supply valve will again become seated. This is Lap position of the relay valve portion.

Service Position

This position consists of a sector of handle movement to the right of Release position. As the handle is moved through this sector towards Service position, the brake pipe pressure reduction is increased gradually, until in Full Service position, a full service

brake pipe reduction has been obtained. A minimum reduction notch is located just a few degrees to the right of Release position by a raised portion in the service zone. Movement of the brake valve handle to this position provides a minimum reduction of pressure in the equalizing reservoir resulting in a similar reduction in brake pipe pressure.

When the automatic brake valve handle is moved to an intermediate service position, the suppression cam on the handle shaft positions the suppression valve to connect Port No. 3 to atmosphere. The service
cam on the handle shaft allows the exhaust valve, in the regulating valve, to be unseated to permit equalizing reservoir charging air to reduce. Normally, with Port No. 3 exhausted and the cut-off pilot valve in "FRT" position, the equalizing reservoir cut-off valve is closed, but as soon as a pressure differential is achieved across the cut-off valve check valve by the reduction of equalizing reservoir charging air on top of the check valve, the check valve is unseated and equalizing reservoir air can then flow past the check valve and regulating valve exhaust valve to atmosphere reducing equalizing reservoir pressure in an amount corresponding to brake valve handle position. A reduction in equalizing reservoir pressure creates a pressure differential across the relay valve diaphragm, causing the diaphragm assembly and stem to move outward, unseating the relay valve exhaust valve, allowing brake pipe air to vent to atmosphere at the brake valve. Brake pipe air will continue to vent to atmosphere until its pressure has been reduced sufficiently to cause a pressure equalization across the relay valve diaphragm. When this occurs, the diaphragm assembly and stem, with the aid of the relay valve springs, position the assembly to allow the exhaust valve to become seated. Thus, the brake valve can be said to be in its Lap position, or "Lapped off".

When the automatic brake valve handle is moved to full Service position, the brake valve operates as described above, except to cause the equalizing reservoir and brake pipe pressures to drop sufficiently to produce a full service brake application.

Suppression Position

This position is used to reset a penalty application and to nullify a safety control brake application. Such a penalty brake application can be avoided if the brake valve handle is moved to Suppression position before the expiration of a predetermined delay period which is indicated by an audible warning whistle. However, the 26-C Brake Valve is so designed that whenever the brake valve handle is placed in Suppression position, a full service brake application is obtained. It is not possible to avoid getting a full service brake application by cycling the brake valve handle; that is, by returning the brake valve handle to Release position for a few seconds and then returning it to Suppression position, since the brake valve was originally conditioned for a full service application.

In Suppression position, the suppression cam on the brake valve handle shaft positions the suppression valve to connect Port No. 3 to atmosphere and blank Port No. 8 from the P-2-A Brake Application Valve and connect main reservoir air to Port No. 26 of the P-2-A Valve to suppress or reset a penalty brake application.

Handle-Off Position

The handle can be removed from the brake valve in this position. This handle position is used to condition the brake valve on trailing units of multiple-unit locomotives and on locomotives to be hauled "dead" in a train. Brake pipe pressure within the brake valve is reduced to zero. Also the various valves within the brake valve are positioned to make inoperative the normal operation functions of the brake valve. With the brake valve handle in Handle-Off position, the various brake valve spool valves are positioned the same as in Suppression position. Normally, after moving the brake valve handle to Handle-Off Position, the cut-off pilot valve handle is moved to "OUT" position, wherein main reservoir air is put into Port No. 53 for the purpose of closing the brake pipe cut-off valve against trainline brake pipe pressure. This position may be used for making Equalizing Reservoir reductions in excess of full service.

Emergency Position

This position of the brake valve handle is used to vent brake pipe pressure to zero at the fastest possible rate, to produce an emergency brake pipe reduction and to reset any emergency brake application if break-in-two protection is available. The flow of air to the brake pipe is cut off in this position. The emergency valve is positioned to vent to zero equalizing reservoir air from passage and Pipe No. 5 to supplement the venting at the regulating valve exhaust valve and to allow main reservoir air to flow from Port No. 30 to Port No. 12 and the No. 12 (Emergency Switch) pipe. Also, with equalizing reservoir pressure at the outer face of the relay portion diaphragm reduced to zero, the diaphragm assembly and stem are moved to unseat the relay valve exhaust valve; allowing brake pipe air to vent to zero also. A cam on the brake valve handle shaft functions to unseat a large capacity vent valve to supplement the brake pipe venting, resulting in a rapid or emergency rate of brake pipe pressure reduction at the brake valve.

The suppression valve remains in the same position as in Suppression and Handle-Off positions.

Independent Brake Valve

Operation

The SA-26 Independent Brake Valve, mounted on the front of the pipe bracket of the 26-C Brake Valve, provides independent control of the loco-, motive brake cylinder pressure, irrespective of the train brakes. The brake valve handle has two positions; namely, Release position at the extreme left end of the quadrant and full Application position at the extreme right end of the quadrant. From Release to Full Application position is an application zone or sector and the further the handle is moved to the right into this sector, the greater will be the application until a full application is obtained at the extreme right end of handle movement. Movement of the independent brake valve handle from Release position towards full Application position actuates a cam which in turn positions a supply and exhaust valve assembly to first seat the exhaust valve and then to unseat the supply valve. Main reservoir air will then flow past the unseated supply valve from Port No. 30 to Port No. 20. Port No. 20 from the Brake Valve is connected to Port No. 2a on the 6-NR Distributing Valve via the No. 24-A Double Check Valve. Therefore, pressure developed in Port No. 20 will actuate the relay valve to develop pressure in the locomotive brake cylinders. As air pressure develops in Port No. 20, it also develops on the inner face of the diaphragm in the independent brake valve. The build-up of pressure on the diaphragm is opposed by spring pressure on the opposite side, and when the air pressure and spring pressure become balanced, the valve assembly will move to its lap position in which the supply valve becomes seated to terminate further flow of main reservoir air to Port No. 20. If, as a result of leakage in the No. 20 line, the air pressure should drop, the diaphragm assembly will be moved to again unseat the supply valve and permit main reservoir air to restore the pressure in Port No. 20 to the value of the spring setting. This is the self-lapping pressure maintaining feature of the independent brake valve.

Depression of the independent brake valve handle whenever the handle is in Release position will cause the release of any automatic brake application existing on the locomotive. Main reservoir air will flow into Port No. 13 which, in turn, is connected to Port No. 10 of the H-S-B Relayair Valve. When air pressure in Port No. 10 exceeds the value of the return spring, Port No. 11 is connected to No. 9 and atmosphere. Air in the application chamber Port 2A is exhausted through Port No. 2 at the H-5-B Relayair valve Port No. 9. Air in the brake cylinders will in turn be vented at the 6-NR Distributing Valve B.C. exhaust, as described under the operation of the 6-NR Distributing Valve. Depression of the independent brake valve handle with it somewhere in the application zone will release the automatic application only to the value corresponding to the position of the handle in the application zone.

6-NR DISTRIBUTING VALVE

The 6-NR Distributing Valve consists of an operating portion mounted on the same "R" type reservoir used for many years with 6-KR Distributing Valves. The reservoir contains the application chamber and pressure chamber volumes.

The operating portion contains an equalizing valve portion and an application valve portion. The equalizing portion is a diaphragm-operated piston and slide valve combination which provides increased sensitivity of brake applications and releases, insuring reliability of operation in long MU consists. The application portion includes the function of a J-1 Relay Valve, which it resembles in construction, and its operating reservoirs are included in the combination reservoir and pipe bracket.

The 6-NR Distributing Valve also includes a safety valve to limit brake cylinder pressure to required standards regardless of brake pipe pressure employed.

The operation of the 6-NR Distributing Valve is described as follows: Refer to Figure 4 for diagrammatic drawing.

During charging and release functions, brake pipe air flows first to the outer face of the equalizing piston diaphragm, forcing the piston and slide valve to Release position. Air in the brake pipe then flows through the charging choke and equalizing slide valve to the pressure chamber, charging it to brake pipe pressure. In this position, the equalizing slide valve connects the application chamber through release Port No. 4 to Exhaust. The application cylinder on the outer face of the application piston is exhausted via passage 2a, through the No. 24-A Double Check Valve passages, 2b, 2 then 4 in the distributing valve to exhaust. The release spring holds the application piston in its release position against the application cylinder cover. The inner end of the application piston which is machined to form the exhaust valve seat is moved away from the rubber supply and exhaust valve to vent the brake cylinder passage. Main reservoir air is constantly present in the chamber on the upper side of the rubber supply and exhaust valve.

During a service brake application, brake pipe pressure reduces, causing a difference in pressure between brake pipe and pressure chamber. The higher pressure in the pressure chamber and equalizing slide valve chamber causes the equalizing piston and slide valve to move upward to Service position where slide valve port connections are made, as shown in the auxiliary slide valve position diagram. Upon the first movement towards Service position, the graduating valve severs communication between brake pipe and pressure chamber. Communications between pressure chamber and passage No. 2 is then made, allowing pressure chamber air to flow to this application chamber and to the application cylinder on the outer face of the application piston via passage No. 2, 2b, No. 24-A Double Check Valve, then 2a.

The flow of pressure chamber air is continued until its pressure has been reduced to slightly below brake pipe pressure on the opposite side of the equalizing piston, at which time the piston and graduating valve are moved to Service Lap position (auxiliary view), terminating further flow of pressure chamber air to passage No. 2. Maximum pressure in passage No. 2 is limited by the safety valve which is connected to passage No. 2 by the safety valve control choke. Pressure thus developed in passage No. 2 and the application cylinder on the outer face of the application piston causes the piston to move upward against release spring force to first seal the exhaust seat against the under side of the supply and exhaust valve, and then to raise this valve from its supply seat to allow main reservoir air to flow to brake cylinder cavity B and passage B.C., thus being the Service position of the application portion, as shown in the auxiliary view. Brake cylinder air pressure also builds up in chamber C on the inner face of the application piston and diaphragm via the stabilizing choke. As brake cylinder pressure in chamber C approaches application cylinder pressure on the opposite side of the diaphragm and piston, the application piston is moved downward to allow the supply and exhaust valve to be seated upon its supply valve seat to terminate further flow of main reservoir air to the brake cylinders. This is the Service Lap position, as shown in the auxiliary view where the supply and exhaust valve is in contact with both seats. Whenever brake cylinder leakage reduces brake cylinder pressure, the higher application cylinder pressure will move the application piston upward to unseat the valve from its supply seat, allowing main reservoir air to flow to the brake cylinders to restore pressure equal to application cylinder pressure. This is the brake cylinder "pressure maintaining" feature that has been present in all previous types of distributing valves.

Brake releases are accomplished when an increase in brake pipe pressure moves the equalizing piston and slide valve to Release position to connect the No. 2 passage and the application chamber to exhaust at Port No. 4. Reduction of pressure in passage No. 2 and the application cylinder permits the higher brake cylinder pressure in Chamber C to move the piston out of contact with the exhaust valve seat, allowing brake cylinder air to flow through Chamber B past the exhaust valve seat to atmosphere through the brake cylinder exhaust passage.

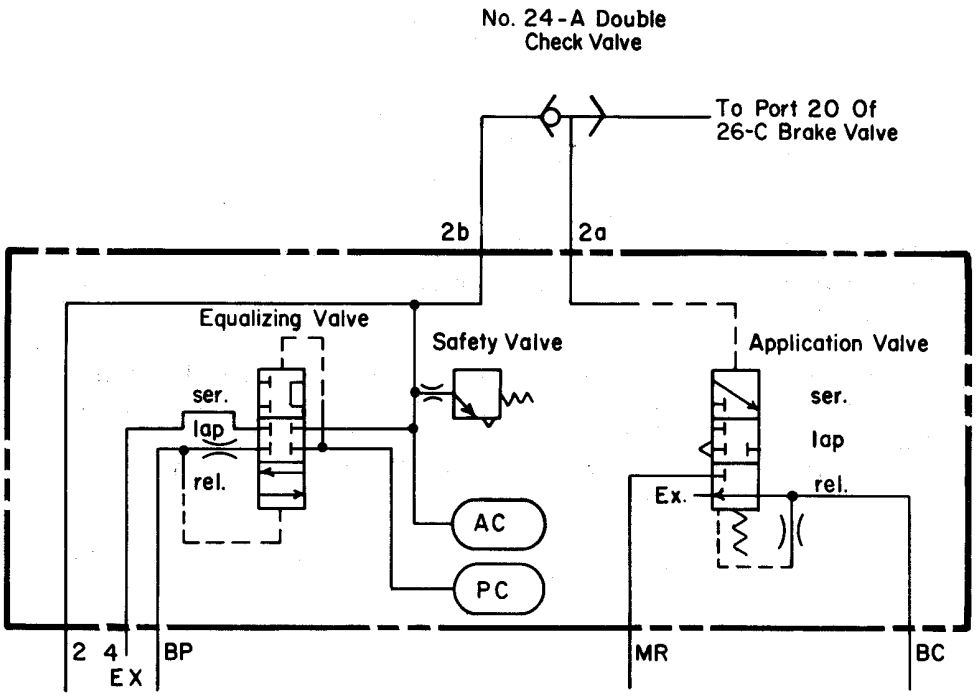
When an Emergency Application occurs, brake pipe pressure is rapidly vented to zero. During an Emergency Application, the 6-NR Distributing Valve operates in the same manner as occurred during a Service Application with the addition of the application chamber pressure maintaining function.

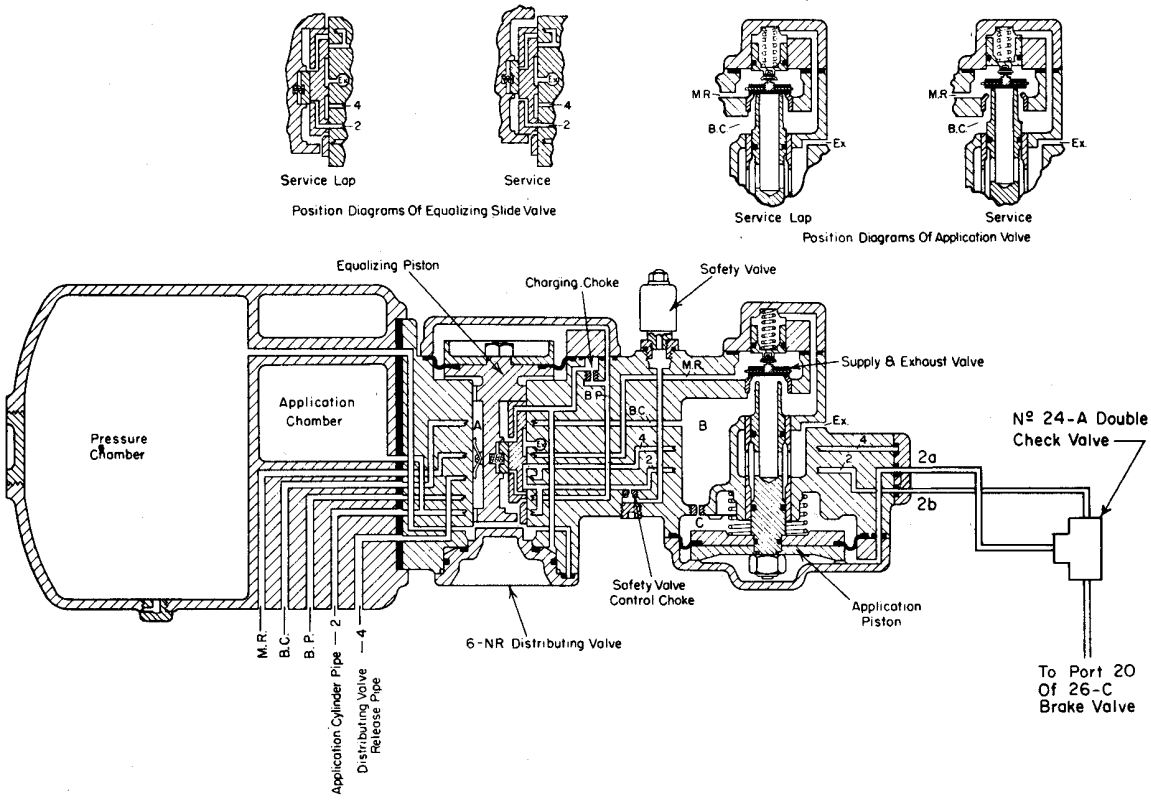
With the 26-C Brake Valve Handle in Emergency Position, Main Reservoir is connected to Port No. 12 via the brake valve Emergency Spool Valve. From Port No. 12,main reservoir air flows through check valve and choke fitting to passage No. 2, past Equalizing Piston to the outer face of the Application Piston via passage 2, 2b, No. 24-A Double Check Valve and passage 2a.

Main Reservoir Pressure will increase to the value of the Safety Valve setting where it is maintained by the Safety Valve Control Choke and blowdown of the Safety Valve.

Should the Brake Valve Handle be moved out of Emergency position, control pressure in passage No. 2 is prevented from escaping out the vented No. 12 pipe by a Check Valve. The No. 12 pipe choke assures a positive brake release when an Emergency Brake application is bailed off.

During an Independent Brake Application, air pressure from passage No. 20 of the 26-C Brake Valve flows directly to the outer face of the Application Piston via the No. 24-A Double Check Valve and passage No. 2a.





6-NR DISTRIBUTING VALVE

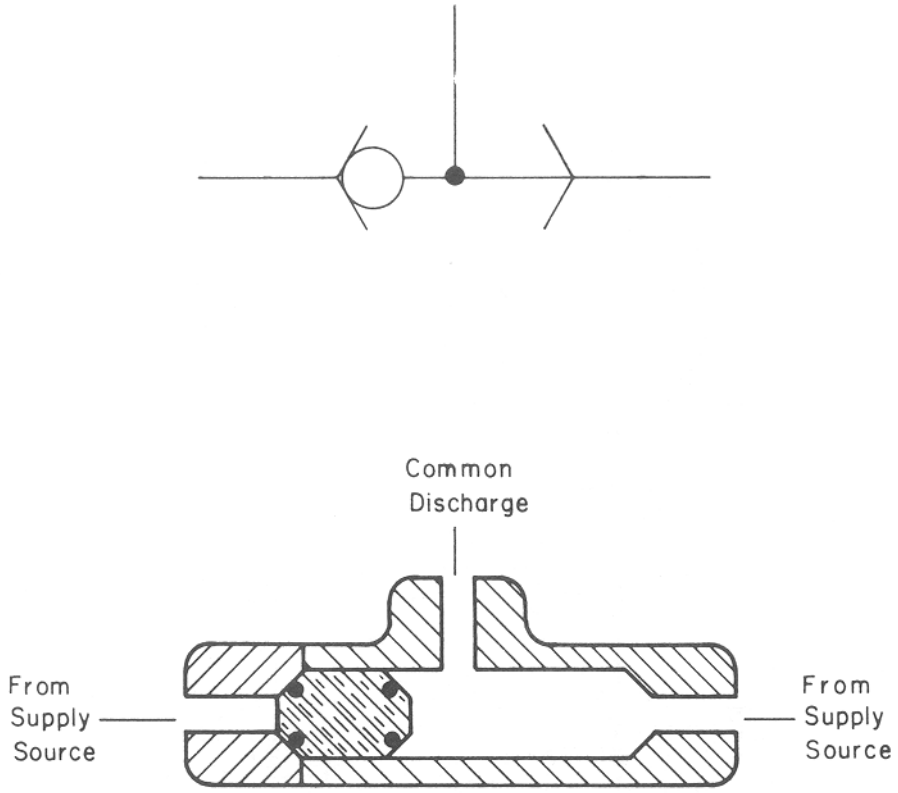
FIG. 4

3/8" NO. 24-A DOUBLE CHECK VALVE

The 3/8" No. 24-A Double Check Valve, shown in Figure 5, is used to control a device from two different sources without any interaction between the sources.

A floating check valve with "0" ring seal automatically directs the flow of air from one or the other of the two controlling devices to a common discharge. If both controlling ports have pressure, the higher pressure will take over. Note, however, that the air cannot pass across from one controlling port to the other controlling port.

H-5-B RELAYAIR VALVE

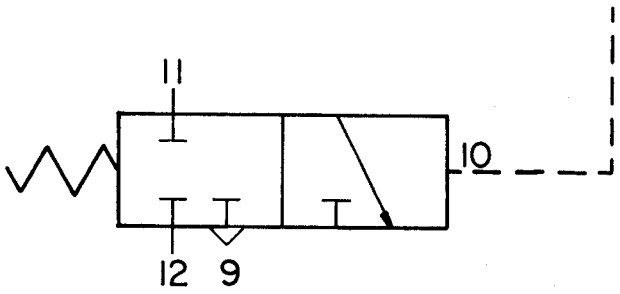


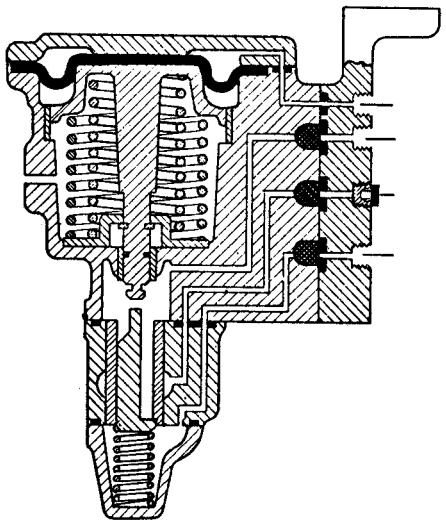
NO. 24-A DOUBLE CHECK VALVE
FIG. 5

The H-S-B Relayair Valve, shown in Figure 6, is a diaphragm actuated, two-way valve. Its purpose is to release an automatic brake application on the locomotive, independent of the train brakes.

When control port 10 is not pressurized, the diaphragm and spool valve are held in the upper position by a return spring. None of the ports are in communication with each other at this time.

When control port 10 is pressurized sufficiently to move the spool against the force of the return spring, port 11 is now in communication with port 9, which is exhaust. Port 12 is still blanked off.



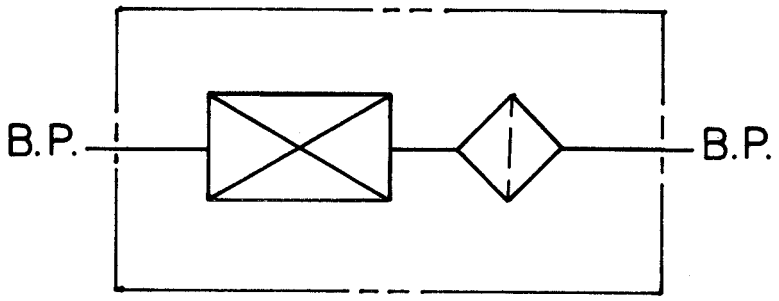


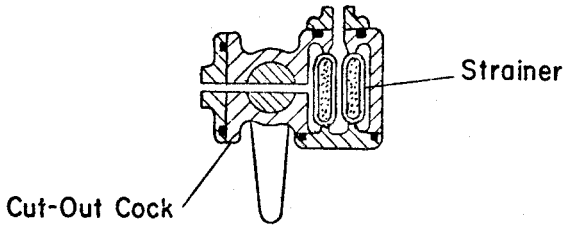
H-5-B RELAYAIR VALVE
FIG. 6

COMBINED STRAINER AND CUT-OUT COCK

The Combined Strainer and Cut-Out Cock shown in Figure 7 protects the 6-NR Distributing Valve against entrance of dirt and any other foreign particles which may prevent the operation of the System.

The Cut-Out Cock is open when its handle is perpendicular to the pipe and closed when its handle is parallel to the pipe.



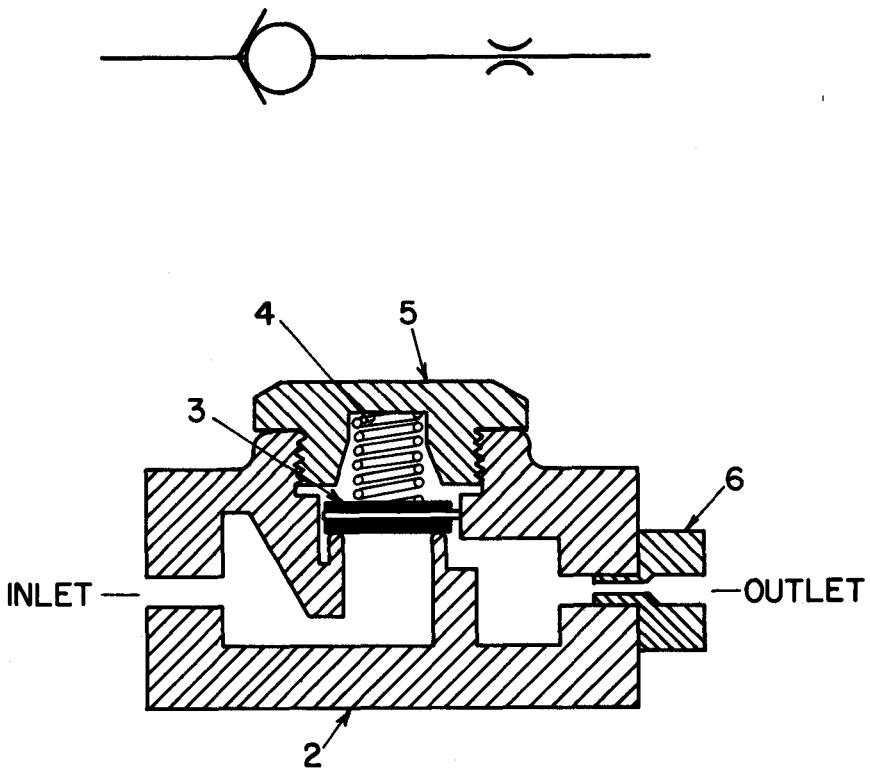


COMBINED STRAINER AND CUT-OUT COCK
FIG. 7

3/8" Check Valve and 3/8" Choke Fitting

The Check Valve and Choke Fitting are located between the No. 12 pipe on the 26-C Brake Valve and the No. 11 pipe on the H-5-B Relayair Valve and also the No. 12 pipe on the 6-NR Distributing Valve. The Check Valve and Choke Fitting permits a restricted flow of air from the 26-C Brake Valve to both the Relayair Valve and the Distributing Valve.

Figure 8 shows a diagrammatic view of the 3/8" Check Valve and 3/8" Choke Fitting. It consists of a Body (2) with inlet and outlet ports as shown. Check Valve (3) is held seated by Spring (4). The Spring (4) is held in place by Cap Nut (5) which is threaded into sealing contact with Body (2). Choke Fitting (6) is secured to the outlet port of the Check Valve. Choke Fitting (6) has a 1/16" diameter drilled hole.



3/8" CHECK VALVE AND 3/8" CHOKE FITTING
FIG. 8

EQUALIZING RESERVOIR

The Equalizing Reservoir is connected to Port 5 and Port 15 of the 26-C Brake Valve. Its purpose is to pilot a self-lapping type of relay valve which develops and exhausts brake pipe pressure at the 26-C Brake Valve.

KM-2 VENT VALVE PORTION

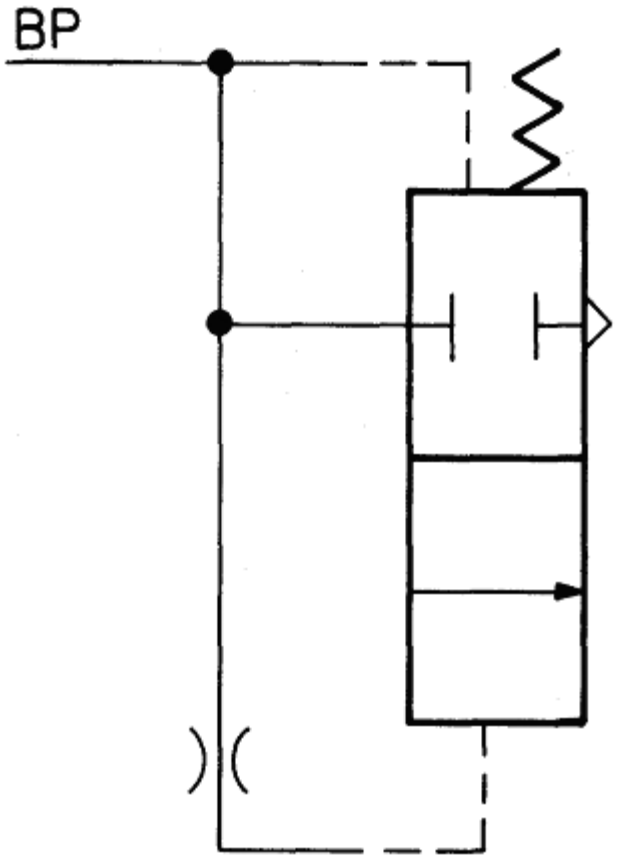
The function of the KM-2 Vent Valve, shown in Figure 9, is to insure an emergency brake application throughout a train of cars so equipped by providing a large capacity local venting of brake pipe air on each car following the initiation of an emergency brake application.

The KM-2 Vent Valve Portion is a compact device having a minimum of moving parts of simple construction. It contains a Body (60) which contains the brake pipe passage and Chamber K. An Exhaust Valve (66) is fulcrumed to Lever (67) which is also fulcrumed to Vent Valve Body (60) at one end. The opposite end of Lever (67) is forced downward by the force of Spring (62) acting between Cover (72) and Spring Seat (63) which seats upon the end of Lever (67). Exhaust Valve Seal (65) is held in assembly with the Exhaust Valve (66) by Seal Retainer (64). The Exhaust Valve is normally held on its Seat Bushing, pressed into the Vent Valve Body (60), by the loading of Spring (62). A diaphragm mounted piston assembly, consisting of Piston (53), Piston Stem (51), Washer (55), Blowdown Choke Seal (52), Filter (56), Diaphragm (54), Diaphragm Follower (57), Nut and Pusher (58), is guided at one end within Diaphragm Housing (50) by Piston Stem (51) and at the other end by Diaphragm (54) which is clamped in assembly between Body (60) and Diaphragm Housing (50). Piston (53), Piston Stem (51), Diaphragm Follower (57), Nut and Pusher (58) are machined to provide a charging passage from the brake pipe side of the diaphragm (Chamber K) to the diaphragm housing chamber (Chamber H) via port "b" in Nut and Pusher (58), through its central passage "c", through passage "d" formed between Piston (53) and Diaphragm Follower (57), through a Felt Filter (56) and out Charging Choke "f". A Stabilizing Choke "h" is drilled into Piston Stem (51) so as to provide stability against undesired emergency venting during service brake applications.

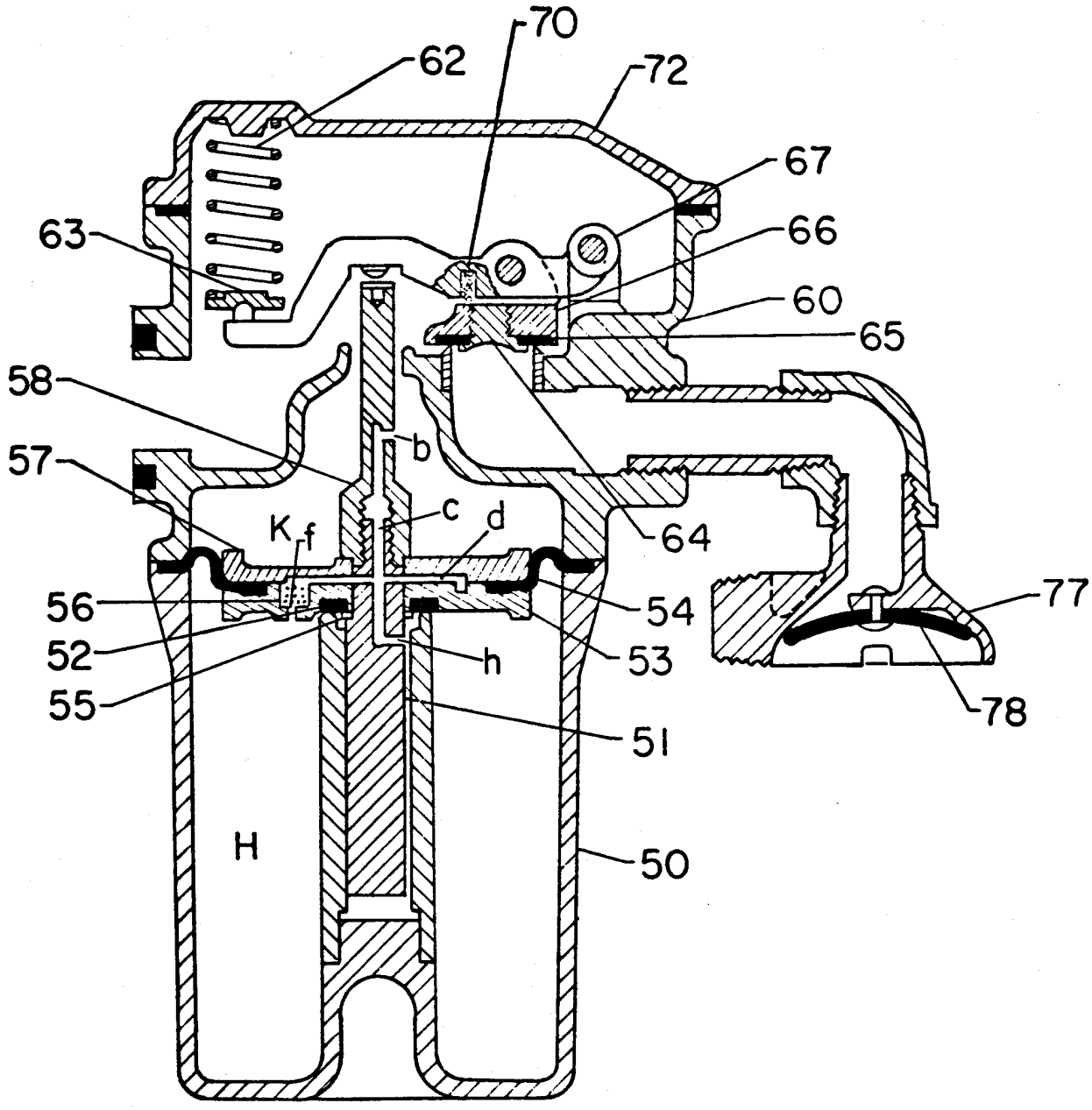
During a service brake pipe reduction, the capacity of Charging Choke "f" is not sufficient to cause the pressure reduction in Chamber H to keep pace with that in Chamber K. Therefore, Piston (53) moves, carrying Blowdown Choke Seal (52) out of seating contact with its seat which is formed on the end of the piston stem guide. This is enough to allow air in Chamber H to flow through Stabilizing Choke "h" to Chamber K via passage "c" and port "b". The capacity of Stabilizing Choke "h" is sufficient to prevent a pressure bias to be developed across Diaphragm (54) to cause an undesired emergency during a service application. The vent valve exhaust is protected against entrance of foreign materials by a Bell-Shaped Housing (77) supporting a flexible Diaphragm (78) across its opening.

During emergency brake applications, the rate of brake pipe reduction in Chamber K overcomes the combined capacity of Charging Choke "f" and Stabilizing Choke "h". Consequently, air pressure in Chamber H moves Diaphragm (54) and Piston Assembly upward. Nut and Pusher (58) contacts Lever (67), moving it upward against Spring (62). This causes the Exhaust Valve (66) and its Seal (65) to be unseated, exposing a large opening to atmosphere through the vent protector. A high capacity local venting of brake pipe air at each car in the train results. Venting of brake pipe air through the vent protector will continue until air has also been discharged from Chamber H after which the force of Spring (62) will cause Lever (67) to push the Diaphragm Assembly downward to allow Exhaust Valve (66) and its seal (65) to be reseated against the Exhaust Valve Seat. As the Exhaust Valve is reseated, small Spring (70), acting between Lever (67) and Exhaust Valve (66) causes the latter to be seated squarely on its seat to pre~ent any possibility of misalignment.

When the brakes are released and the brake system is recharged, brake pipe air will flow into Chamber K, through port "b", through passages "c" and "d", through Charging Choke (56) and out Charging Choke "f" to charge Chamber H to brake pipe pressure.



KM-2 VENT VALVE PORTION
FIG. 9A

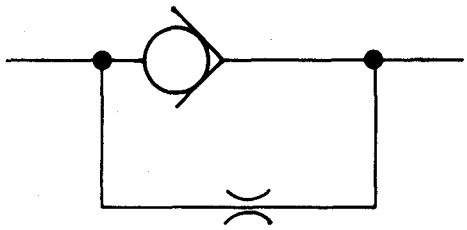


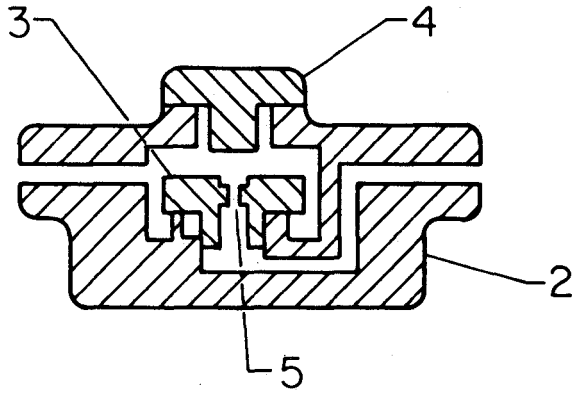
KM-2 VENT VALVE PORTION
FIG. 9

CHECK VALVE WITH BY-PASS CHOKE

The 1" Check Valve with 5/16" By-Pass Choke allows air to flow unrestricted in one direction and restricted in the opposite direction.

Figure 10 shows a diagrammatic view of the subject valve. It consists of a Body (2) with an inlet port and an outlet port as shown. Check Valve (3) is held seated by pressure differential. Cap Nut 4 is threaded into sealing contact with Body (2). By-Pass Choke (5) allows air to pass from outlet through valve to inlet.





CHECK VALVE WITH BY-PASS CHOKE
FIG. 10

COMBINED STRAINER AND CHECK VALVE

The Combined Strainer and Check Valve, shown in Figure 11, enables the brakes on a locomotive being hauled dead in a train to operate.

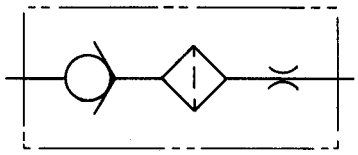
Normally Check Valve (1) is held seated by Spring (2) and also by main reservoir pressure. This is to insure zero (0) leakage past Check Valve (1).

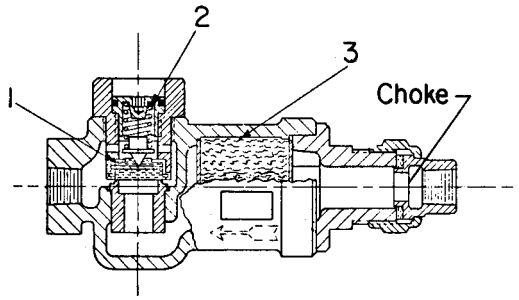
With the absence of main reservoir pressure, and when brake pipe pressure overcomes the force of Spring (2), Check Valve (1) opens allowing brake pipe pressure to flow to main reservoir, thus providing air pressure for operating the brakes on the dead locomotive.

The Choke within the Check Valve-prevents a sudden drop in brake pipe pressure and the application of the train brakes which would otherwise occur when an uncharged main reservoir is cut into a charged brake pipe.

The Strainer (3) prevents any dirt or foreign particles, from entering the system.

Since the Combined Strainer and Check Valve are not required at all times, a Cut-Out Cock is provided in the same line. The Cut-Out Cock is to be kept closed except when a locomotive is being hauled dead.





COMBINED STRAINER AND CHECK VALVE
FIG. 11

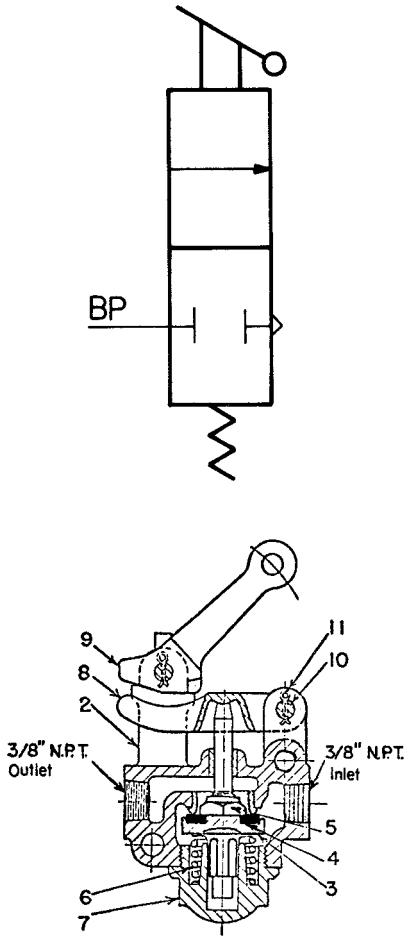
EMERGENCY BRAKE VALVE

The Emergency Brake Valve is used on the locomotive unit and is usually located near the Fireman's position. It is installed at the end of a branch pipe from the brake pipe. It provides a means of obtaining an automatic emergency brake application from a point other than the Brake Valve.

The Emergency Brake Valve should be used only in case of actual danger, and then should be left open until the train stops. After the operating lever has been pulled, it must be manually reset before brake pipe can be charged.

Referring to Figure 12, brake pipe air flows into the Emergency Brake Valve and is trapped under Vent Valve (3) which is held seated by Vent Valve Spring (6). Brake pipe pressure helps hold Vent Valve (3) seated to help prevent brake pipe air leakage.

When the Operating Lever (9) is pulled by means of the cord, or otherwise, Valve Lever (8) is moved downward unseating Vent Valve (3) permitting brake pipe air to be vented to atmosphere.



EMERGENCY BRAKE VALVE
FIG. 12

MU-2A VALVE

The MU-2A Valve, as shown in Figure 13,is a three-positioned cam-operated spool valve, arranged with a pipe bracket. It is employed to enable a 26-NL equipped locomotive to be multiple-united with a 6,. 27-LB, 26-L, 26-NL and 24-RL equipped locomotives. The MU-2A Valve pilots an F-1 Selector Valve which is a device that enables the equipment of a trailing locomotive to be controlled by the equipment of a lead locomotive in multiple-unit operation.

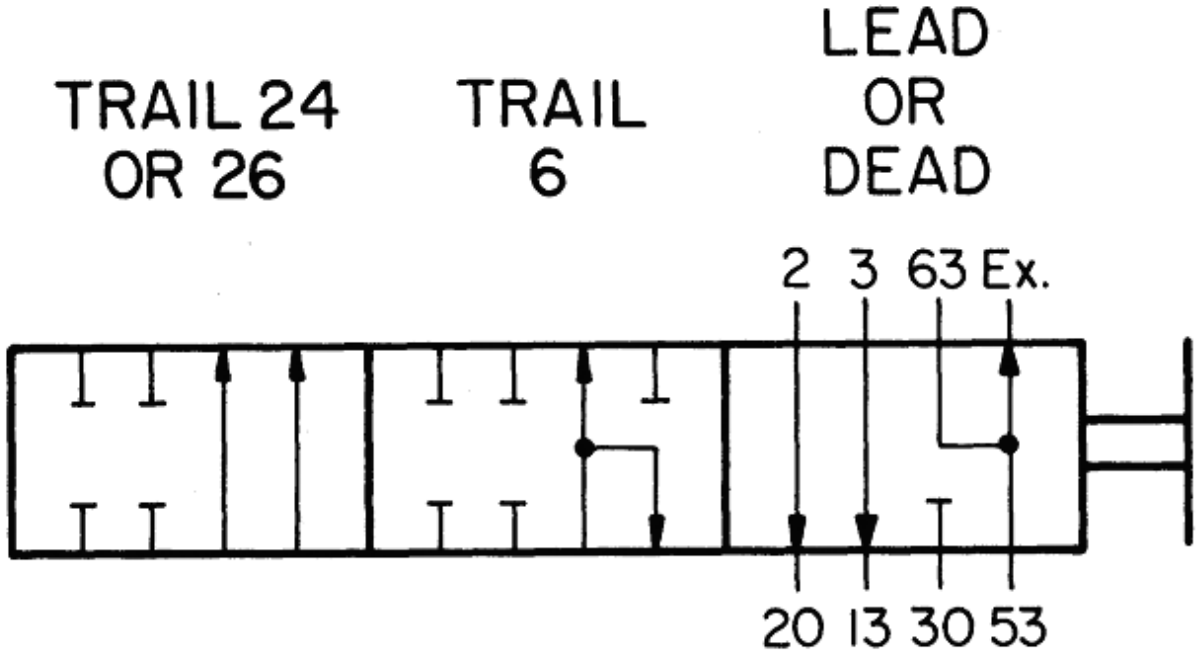
Pipe connections are made at the pipe bracket and they are as follows:

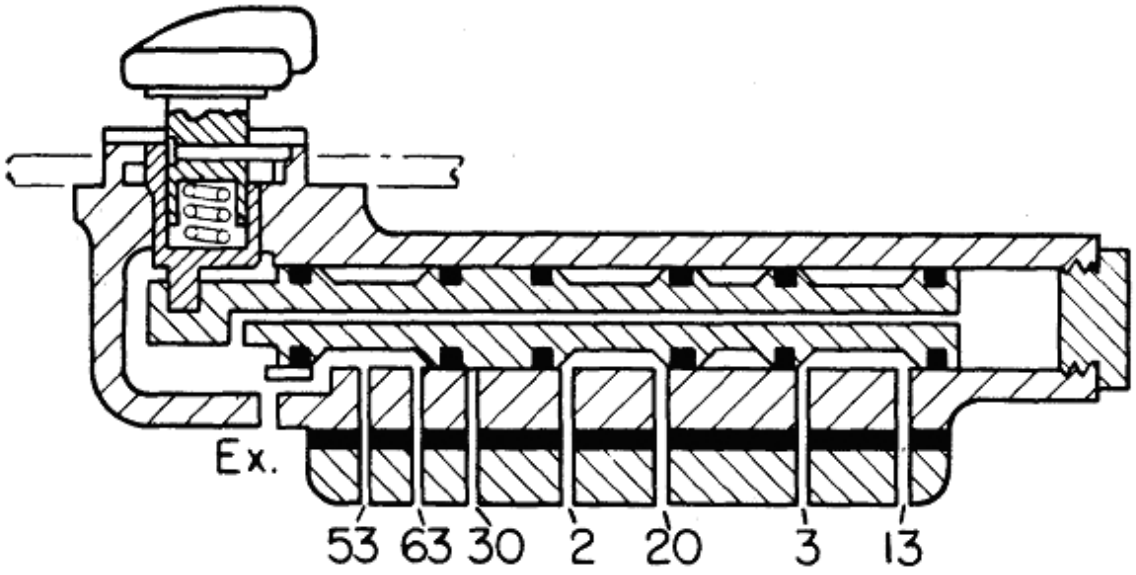
2 Independent Application f Release Pipe (from B.V.)
3 Actuating Pipe (from B.V.)
13 Actuating Pipe
20 Independent Application & Release Pipe
30 Main Reservoir
53 Multiple-Unit Control Pipe
63 Multiple-Unit Interlock Pipe

Two escutcheon plate faces are available for use with this valve. Porting arrangement is not affected by the type of escutcheon plate employed. The markings on the two escutcheon plates are as follows:

3 Position Red Lettering	2 Position Black Lettering
Lead or Dead Trail 6 Trail 24-26.	Lead or Dead ---------- Trail 24-2.&

The positions of the MU-2A Valve are selected by the positioning of the handle. To do this, the handle must first be depressed to overcome spring loading to permit its being moved. The handle should be positioned with its arrow pointing to whichever position is chosen.





MU-2A VALVE
FIG. 13

Operation

The following description covers the operation of the MLJ-2A Valve when using the 3-Position escutcheon plate with red lettering.

"Lead or Dead" Position

With the MU-2A Valve handle in "LEAD OR DEAD" position, main reservoir air in Port No. 30 is blanked by the spool valve, and Ports No. 53 and 63 are connected to exhaust. Independent brake control pressure originating at the independent brake valve (Port No. 20) is connected to Port No. 2 at the MU-2A Valve and through the spool valve to Port No. 20. Port No. 20 at the MU-2A Valve is connected to Port No. 20 of the F-1 Selector Valve where further passage is blanked and also to the No. 24-A Double Check Valve at the Distributing Valve to provide for independent brake applications on the lead locomotive. The actuating pipe at the brake valve (Port No. 13) is connected to Port No. 3, at the MU-2A Valve, through the spool valve to Port No. 13 in the MU-2A Valve. Port No. 13 is connected to the No. 24-A Double Check Valve at the FB-4 Magnet Valve and to the trainlined Actuating Pipe if one exists on the locomotive.

"Trail 6" Position

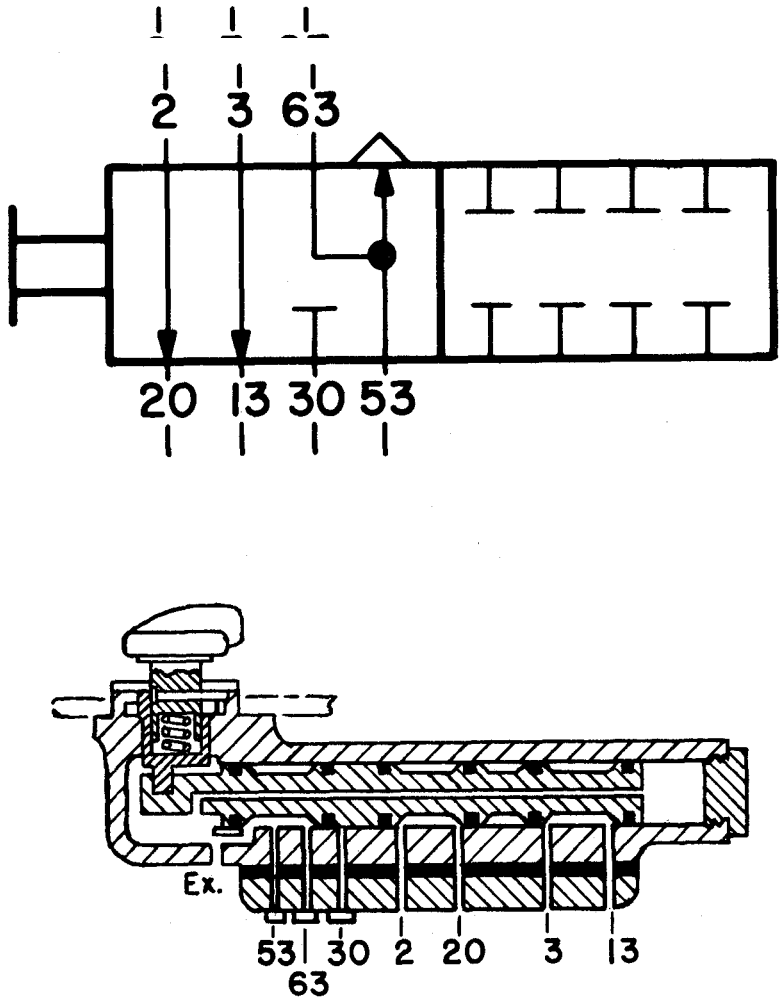
When a 26-NL equipped locomotive is trailed behind a locomotive equipped with 6 or 27-LB brake equipment, the handle of the MU-2A Valve is positioned in "TRAIL 6" position. The spool valve blanks Ports Nos. 2, 3, 13 and 20. Port No. 3, which is connected to the actuating pipe (No. 13 at the brake valve), is exhausted at the independent brake valve with its handle in Release position. Main reservoir air is connected by the spool valve to ports No. 53 and 63 which are connected to Ports 53 and No. 63, respectively, at the F-1 Selector Valve.

"Trail 24-26" Position

When a 26-NL equipped locomotive is trailed behind a locomotive equipped with 24-RL, 26-L or 26-NL Brake Equipment, the handle of the MU-2A Valve is positioned in "TRAIL 24-26" position. The spool valve blanks Ports Nos. 2, 3, 13 and 20. Port No. 53 is connected to exhaust at the MU-2A Valve. As in "TRAIL 6" position, Port 3 is exhausted at the independent brake valve with its handle in Release position. Main reservoir air is connected to Port No. 63, which in turn is connected to Port No. 63 of the F-1 Selector Valve.

MU-2A1 VALVE

The MU-2A1 Valve, as shown in Figure 14, is a two-position valve. Ports 53, 63 and 30 are blanked off in both positions. This valve is either open or closed. With regard to Ports 2, 20, 3 and 13, this valve operates the same as the MU-2A Valve. Unlike the MU-2A, three-position valve, the MU-2A1 cannot be moved into a third position.

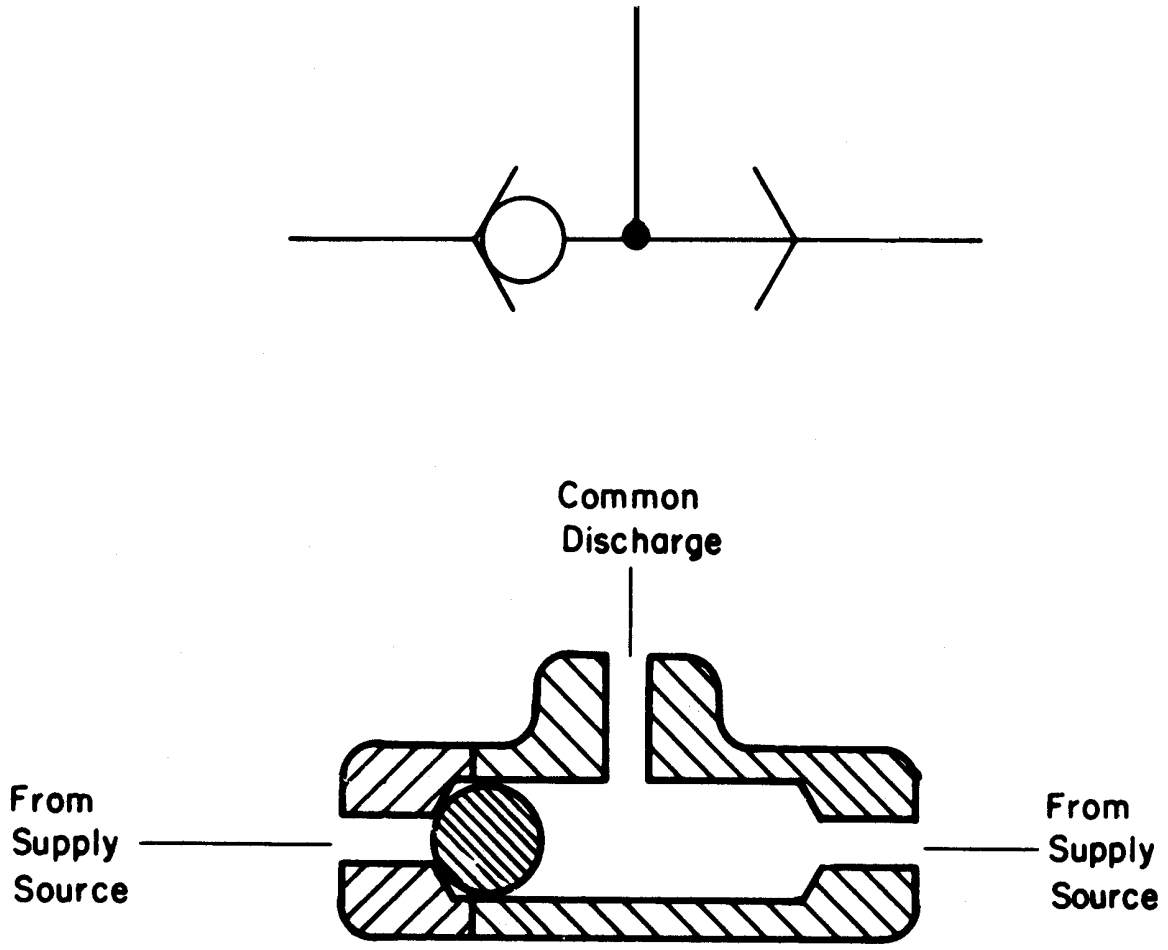


MU-2A1 VALVE
FIG. 14

DT-3 DOUBLE CHECK VALVE

The DT-3 Double Check Valve as shown in Figure 15 is used to control a device from two different sources without any interaction between the sources.

An internal floating ball automatically directs the flow of air from one or the other of the two controlling devices to a common discharge. If both controlling ports have pressure, the higher pressure will take over. Note, however, that the air cannot pass from one controlling port to the other controlling port.



DT-3 DOUBLE CHECK VALVE
FIG. 15

F-1 SELECTOR VALVE

The F-1 Selector Valve, as shown in Figure 16, responds to piloting-from the MU-2A Valve to condition to the brake equipment on the locomotive to perform satisfactorily as a lead or dead unit, or as a trailing unit in a multiple-unit locomotive. It also performs the function of protecting a trailing locomotive brake equipment by automatically re-setting the brake control to "LEAD" position in the event a separation (break-in-two) occurs between locomotive units.

The selector valve portion is mounted on a pipe bracket to which all pipe connections are made and identified as follows:

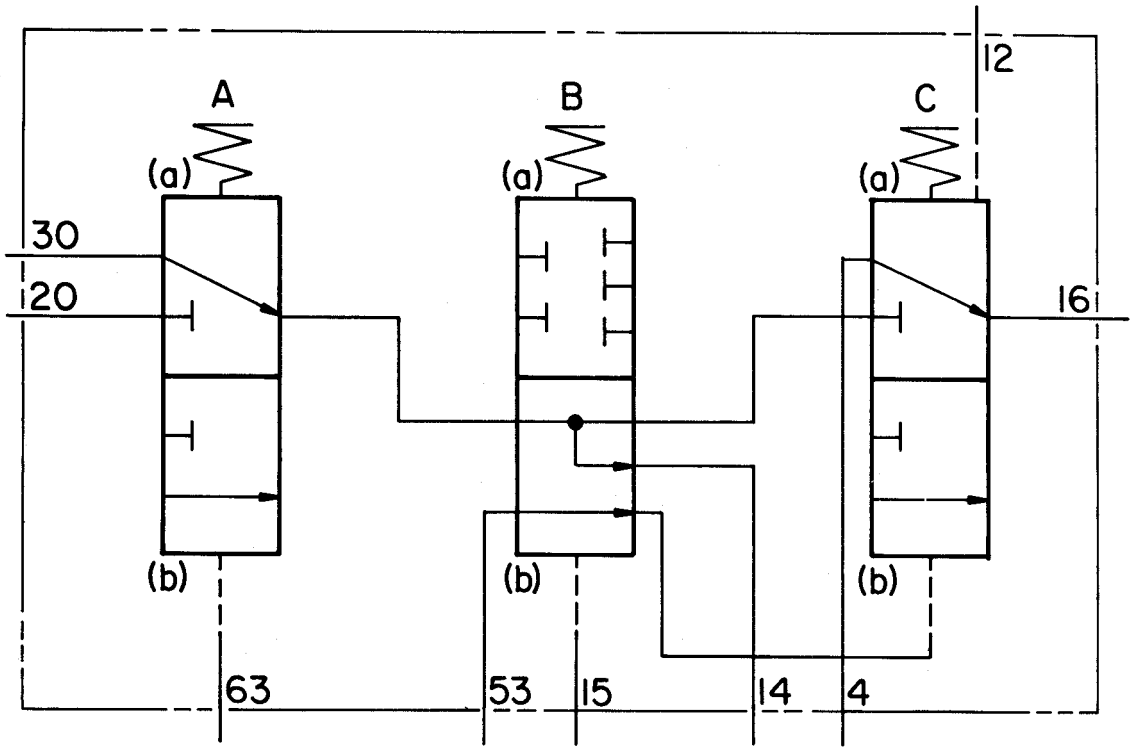
4 Automatic Brake Control Pipe
12 Emergency Pipe
14 Brake Cylinder Equalizing Pipe
15 Main Reservoir Equalizing Pipe
16 Application Pipe (To Relay Pipe)
20 Independent Application E Release Pipe
30 Brake Cylinder Pipe
53 Multiple-Unit Control Pipe
63 Multiple-Unit Interlocking Pipe

The F-1 Selector Valve consists of three sections, each consisting of a spool valve. One of them, the protection valve, is controlled by air pressure from the Main Reservoir Equalizing Pipe and in the event of a break-in-two, this spool valve is automatically positioned to provide lead unit braking conditions. The other two, the transfer sections, are controlled by air pressure in the multiple-unit control pipe and the multiple-unit interlocking pipe. Connections are made as shown in the diagrammatic drawings, Figure 15, for the positions "LEAD OR DEAD", "Trail 6", "Trail 24 or 26" and "Break-in-Two".

OPERATION

"Lead or Dead" Position

When a 26-NL equipped locomotive is leading a 6, 27-LB, 26-L or 26-NL equipped locomotive, air pressure to Ports No. 53 and 63 of the F-1 Selector Valve is vented at the MU-2A Valve. Control valve air flows from connection No. 2 at the 6-NR Distributing Valve where it is blanked. Air in passage 2 also flows to Port 2b, No. 24-A Double Check Valve, Port 2a, then to the application piston at the 6-NR Distributing Valve to develop brake cylinder pressure at the lead locomotive. Brake cylinder air from the 6-NR Distributing Valve BC Port is connected to Port No. 30 at the Selector Valve where it is connected by the spool valve to Port No. 14 and the Brake Cylinder Equalizing Pipe of the lead locomotive for control of the brakes on the trailing locomotive.



SPOOL VALVES POSITIONS

VALVE "A"	VALVE "B"	VALVE "C"
Envelope (a)	Envelope (a)	Envelope (a)
TRAIL 6	LEAD OR DEAD	TRAIL 6
TRAIL 24 OR 26	TRAIL 6	
BREAK-IN-TWO	TRAIL 24 OR 26	
Envelope (b)	Envelope (b)	Envelope (b)
LEAD OR DEAD	BREAK-IN-TWO	LEAD OR DEAD
		TRAIL 24 OR 26
		BREAK-IN-TWO

F-1 SELECTOR VALVE
FIG. 16A

"Trail 6" Position

When a 26-NL equipped locomotive is trailing a 6 or 27-LB equipped locomotive, main reservoir air pressure is supplied to Port.Nos. 53 and 63 at the MU-2A Valve to position the spool valves of the F-1 Selector Valve as shown in the diagrammatic as arranged for "Trail 6" position. In this position air from the Brake Cylinder Equalizing Pipe is connected to Port No. 16 and then to the relay valve to develop brake cylinder pressure. Also Brake Cylinder Equalizing Pipe air is connected to Port No. 20 and the Independent Application and Release Pipe which is closed at the MU-2A Valve. Thus, brakes are applied on the trailing unit in the same manner as they are applied on the lead unit.

"Trail 24-26" Position

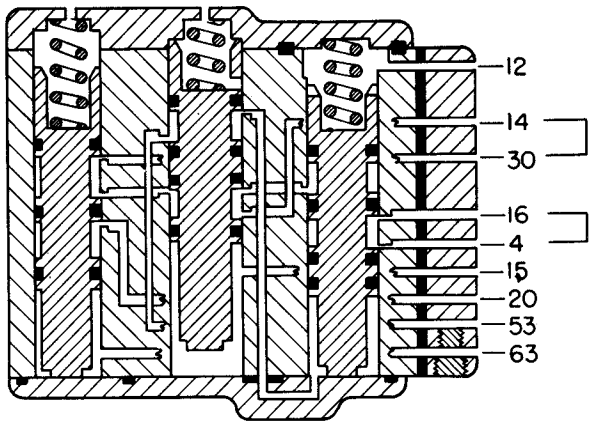
When a 26-NL equipped locomotive is trailing a 24-RL, 26-L or 26-NL equipped locomotive, main reservoir pressure is supplied to Port No. 63 at the MU-2A Valve to position the spool valve of the F-1 Selector Valve as shown in the diagrammatic as arranged for "TRAIL 24-26" position. In this position, air flows from connection No. 2 at the 6-NR Distributing Valve to Port No. 16 at the Selector Valve where it is blanked. Air in passage 2 also flows to Port 26, No. 24-A Double Check Valve, Port 2a, then to the application piston at the 6-NR Distributing Valve to develop brake cylinder pressure at the lead locomotive. Air pressure also enters Port No. 14 at the Selector Valve from the Brake Cylinder Equalizing Pipe and flows through the spool valve to Port No. 20. This air also actuates the 6-NR Distributing Valve application piston. The brakes on the trailing locomotive are thus actuated by either an automatic brake application or by an independent brake application initiated at the leading 24-RL, 26-L or 26-NL equipped locomotive.

"Break-In-Two" Position

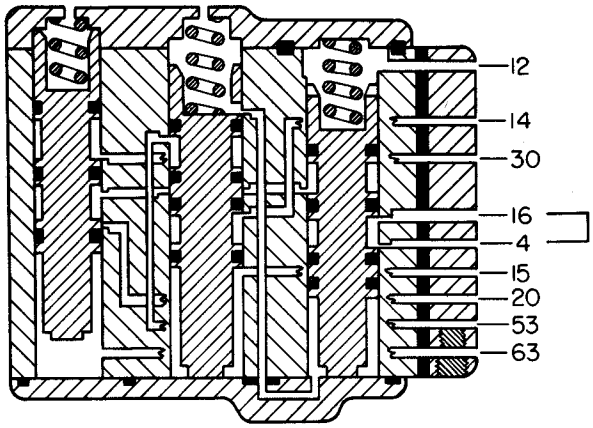
If a break-in-two occurs and pressure is lost in the Main Reservoir Equalizing Pipe, air is also vented from connection No. 15 of the F-1 Selector Valve and the chamber beneath the protection spool valve and the spool valve is forced to its lower position by spring force.

Then on a lead locomotive, brake cylinder air flow to the Brake Cylinder Equalizing Pipe (connection No. 14) is cut-off by the protection spool valve.

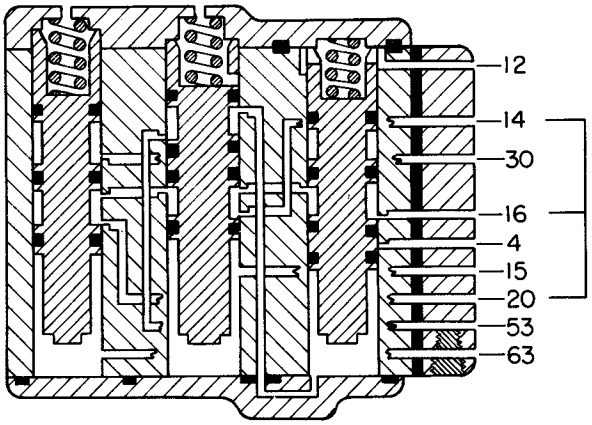
On a trailing locomotive where the F-1 Selector Valve is positioned in "TRAIL 6", the protection spool valve will vent air from the chamber beneath the right-hand spool valve which will be forced to its lower position as in the "LEAD" position to blank port No. 14 to port No. 16 and port No. 20 connection. If the F-1 Selector Valve is positioned in "TRAIL 24-26", the port No. 14 to port No. 20 connection is cut off by the protection spool valve. This position isolates the brake cylinders from the broken brake cylinder equalizing pipe permitting development of brake cylinder pressure by the 6-NR Distributing Valve.



LEAD OR DEAD



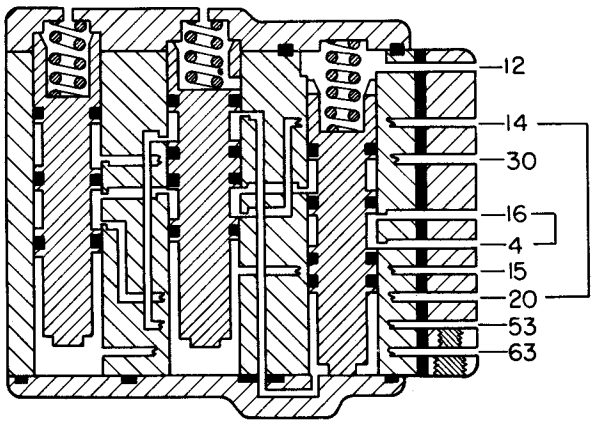
BREAK-IN-TWO



TRAIL 6

Legend

4	Automatic Brake Control Pipe
12	Emergency Pipe
14	Brake Cylinder Equalizing Pipe
15	Main Reservoir Equalizing Pipe
16	Application Pipe
20	Independent Application & Release Pipe
30	Brake Cylinder Pipe
53	Multiple-Unit Control Pipe
63	Multiple-Unit Interlock Pipe



TRAIL 24 OR 26

F-1 SELECTOR VALVE

FIG. 16

OVERSPEED CONTROL AND SAFETY CONTROL FUNCTIONS WITH P-2-A BRAKE APPLICATION VALVE

The overspeed control and safety control feature consists of a P-2-A Brake Application Valve which is piloted by venting devices comprising an Overspeed Magnet Valve for overspeed control and a Foot Valve for safety control. The Overspeed Magnet Valve is normally energized. Whenever the authorized maximum speed limit is exceeded, the overspeed magnet valve becomes de-energized and it then functions to vent to atmosphere the pressure from the spring chamber of the P-2-A Brake Application Valve. Foot pressure must be maintained on the foot pedal of the Foot Valve at all times unless a brake cylinder pressure of approximately 30 psig is already in effect. Whenever foot pressure is removed from the foot pedal, the Foot Valve functions to also vent to atmosphere the pressure from the spring chamber of the P-2-A Brake Application Valve. In being vented, the air pressure is dissipated through a system of chokes and whistles, the latter providing an audible warning over a timed delay period before the pressure has become reduced sufficiently to cause the brake' application valve to apply.

The P-2-A Brake Application Valve, Figure 17, functions automatically in response to the operation of overspeed control and safety control venting devices to produce a full service brake application, unless the brake valve handle has been moved to Suppression position within a predetermined time interval after the start of the audible warning whistle.

The P-2-A Brake Application Valve, consisting of a main diaphragm controlled spool valve, over reduction check valve, release control valve, and a suppression valve, is mounted on its pipe bracket to which the pipe connections are made and identified as follows:

3 Foot Valve
5 Equalizing Reservoir
8 Lock Over Pipe
10 Safety Control Pipe
15 Equalizing Reservoir Charging (from Brake Valve)
25 Power Knock-Out
26 Suppression Pipe
30 Main Reservoir Pipe
24 Reducing_ Limiting Reservoir
33 Switch Pipe

With the locomotive equipment charged and operating normally, main reservoir air enters port No. 30 in the pipe bracket, flows to the underside of the diaphragm and also through port No. l0a to the spring chamber above the diaphragm and also to port No. 10 to the timing reservoir volume, and overspeed control magnet valve which is in closed (inoperative) position. Main reservoir air from port No. 10 also flows past the lower end of the suppression valve to

port No. 3 and to the Foot Valve which is held closed by foot pressure on the foot pedal. With the chamber on both sides of the diaphragm charged to main reservoir pressure, the diaphragm spring will position the diaphragm assembly and attached spool valve in their normal or release position. In this position the spool valve makes the following connections:

1. The reduction limiting reservoir is exhausted to atmosphere via port No. 24 and the Power Knock-Out (P.C.) Switch is vented to atmosphere via port No. 25.

2. The equalizing reservoir port No. 5 is connected through to the release control valve to permit charging the equalizing reservoir and equalizing reservoir chamber in the release valve portion of the brake valve from the equalizing reservoir charging port No. 15.

With the automatic brake valve handle in "Release" position, port No. 33 and the chamber above the release control valve is charged with air at main reservoir pressure and the chambers below the release control valve and application spool valve are vented through port No. 8 and the suppression valve at the brake valve via the No. 8 pipe. Hence, the release control valve is held in its downward position as shown in Figure 17 to connected the No. 5 port with the No. 15 port.

During a penalty brake application that can be initiated by the venting of the No. 3 pipe through the Foot Valve or by venting of the No. 10 pipe through the Overspeed Magnet Valve, air pressure is vented from the spring chamber above the diaphragm faster than it can be restored through the choke in port No. 10a. Consequently, a pressure differential is established across the diaphragm sufficient to cause it and its attached spool valve to be moved upward to its application position. In this position, the spool valve makes the following connections:

1. Main reservoir air in port No. 30 and in the chamber beneath the diaphragm is connected to port No. 25 and then to the Power Cut-Off (P.C.) Switch and Dynamic Cut-Off Switch.

2 Main reservoir air which normally flows through the choke and port No. 10a is connected to port No. 8. Therefore, the chamber on the spring side of the diaphragm, as well as the timing reservoir volume that is connected to port No. 10, is also integrally connected to port No. 8 which is connected to the lock-out (No. 8) pipe to the brake valve. This pipe is normally vented at the brake valve by the suppression valve spool valve with the automatic brake valve handle in Release position.

3. Equalizing reservoir charging from port No. 15 is cut off.

4. Equalizing reservoir air in port No. 5 is connected through the spool valve to port No. 24a, through a calibrated choke and thus through port No. 24 to the Reduction Limiting Reservoir. Equalizing reservoir air is thereby allowed to equalize at a controlled rate with a Reduction Limiting Reservoir to produce a full service equalizing reservoir pressure reduction.

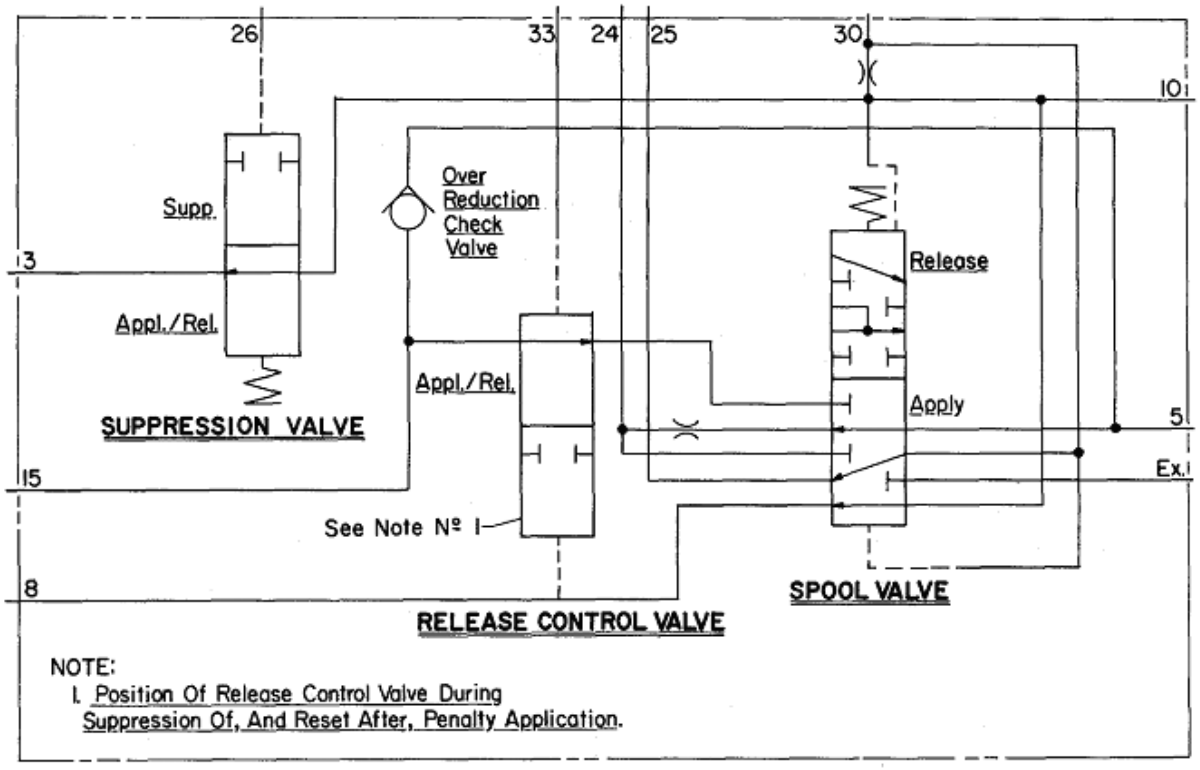
A safety control brake application can be suppressed by moving the automatic brake valve handle to Suppression position before the expiration of the predetermined timed delay period after the warning whistle commences to sound. With the brake valve handle in Suppression position, the suppression valve spool valve at the brake valve is positioned to close the venting of the lock-out (No. 8) pipe, thereby preventing the venting of air from the spring chamber through this pipe. Main reservoir air, supplied by the suppression valve, flows through port No. 26 and connecting pipe to port No. 26 at the P-2-A Brake Application Valve where it flows through port No. 26 to the face of the suppression valve piston, forcing the piston downward, where its spool valve cuts off connections between ports Nos. 3 and 10. Thus the spring chamber above the diaphragm is cut off from port No. 3 and the Foot Valve. Main reservoir air is continuously supplied through port No. l0a and its choke to the spring chamber above the diaphragm, keeping the diaphragm assembly and its attached spool valve in release position. Thus, the functioning of the safety control venting device (Foot Valve) cannot cause the application valve to apply so long as the automatic brake valve handle has been moved to Suppression position.

An overspeed control brake application can be suppressed only by reducing the speed of the locomotive below the maximum authorized speed limit, before the expiration. of the predetermined delay period after the warning whistle commences to sound. Such action avoids venting the No. 10 pipe through the overspeed venting device (Magnet Valve).

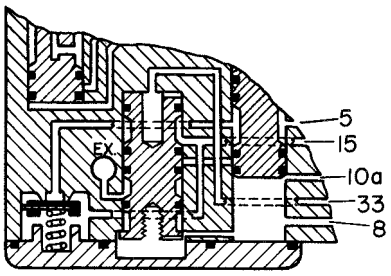
To reset and release a safety control or overspeed control brake application, the engineman must first move the automatic brake valve handle to Suppression position. This results in the closing of No. 8 pipe venting at the brake valve. The spring chamber of the brake application valve will then be recharged through port No. 10a to main reservoir pressure. As soon as the pressure in this chamber approaches a predetermined value, the diaphragm assembly and its spool valve will be reset to their normal or release position. With the brake valve handle in Suppression position, port No. 33 and the chamber above the release control valve is vented through the suppression valve spool valve at the brake valve and, with the No. 8 vent closed, main reservoir being supplied to port No. 10 is allowed to flow past the application valve spool valve to the chamber beneath the release control valve.

The release control valve is, therefore, actuated to cut off the No. 15 to No. 5 port charging. Hence, after the application valve is reset, it is necessary to-move the automatic brake valve handle to Release position to reset the release control valve to re-establish the equalizing reservoir charging and release of the brakes.

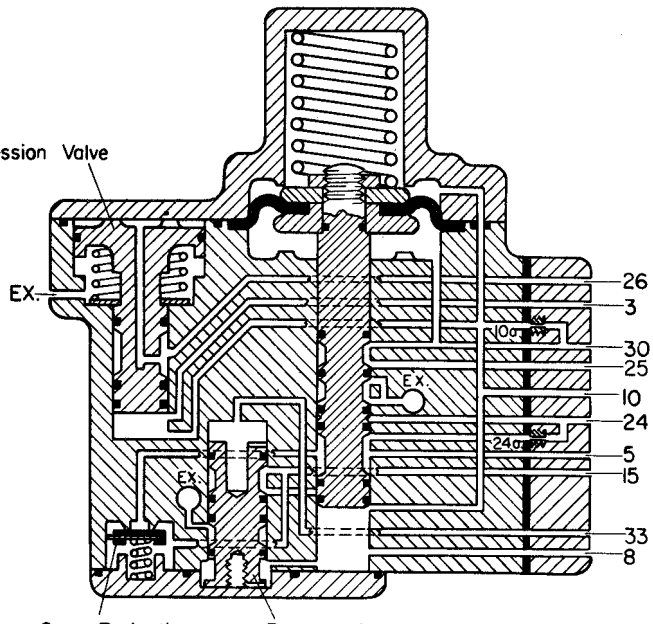
An over-reduction can be made if desired after a penalty brake application, by moving brake valve handle beyond "Service" position or the "Handle-Off" position. The over-reduction valve in the P-2-A Brake Application Valve will open to permit equalizing reservoir air to flow from port No. 5 to port No. 15 and the brake valve.



P-2-A BRAKE APPLICATION VALVE
FIG. 17A



Auxiliary View Showing Position Of Release Control Valve During Suppression Of And Reset After Penalty Application



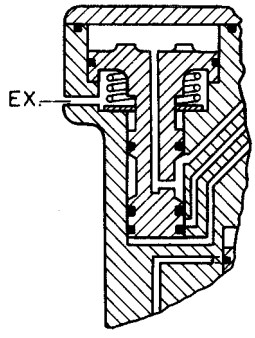
Over Reduction Check Valve

Release Control Valve

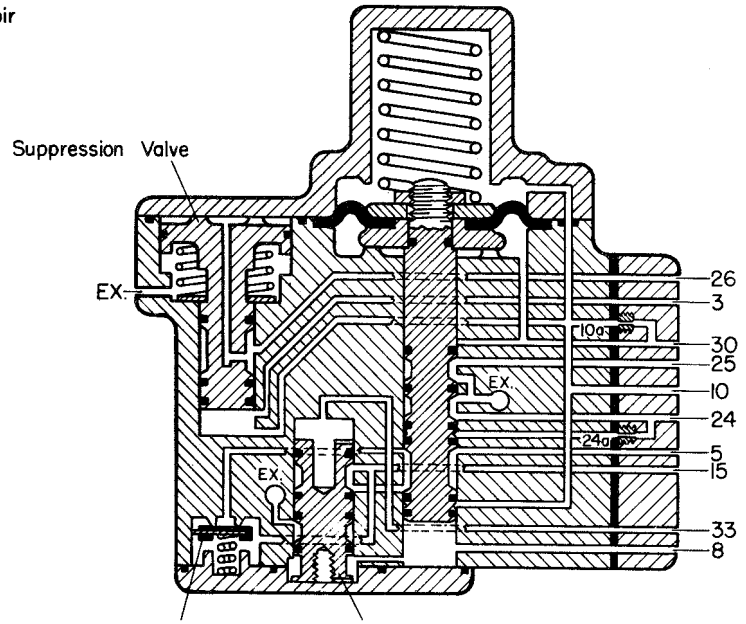
Application Position

LEGEND

3—Foot Valve
5—Equalizing Reservoir
8—Lock Over Pipe
10—Safety Control Pipe
15—Equalizing Reservoir Charging Pipe
25—Power Knock-Out
26—Suppression Pipe
30—Main Reservoir Pipe
24—Reduction Limiting Reservoir
33—Switch Pipe



Auxiliary View Showing Suppression Valve In Suppression Position



Over Reduction Check Valve

Release Control Valve

Release Position

P-2-A BRAKE APPLICATION VALVE

FIG. 17

BREAK-IN-TWO PROTECTION FEATURE

WITH A-1 CHARGING CUT-OFF PILOT VALVE

The break-in-two protection features employs an A-1 Charging Cut-Off Pilot Valve.

During normal brake operation, the A-1 Charging Cut-Off Valve will be in its normal Release position, Figure 18, and main reservoir air will be present in Chamber A beneath the cut-off piston head to hold it in its upper position as shown. Chamber B beneath the cut-off piston spool valve will be connected to exhaust via port No. 53 and the cut-off pilot valve exhaust in the 26-C Brake Valve on leading units. On trailing units where the cut-off pilot valve is in "Out" position, this chamber is charged with main reservoir air. Chamber C above the cut-off piston and port No. 9 is connected to exhaust via the actuating piston spool valve and automatic sanding timing choke. Brake pipe air flows through port No. 1 to Chamber D surrounding the back side of the actuating piston, through the choke in the piston to Chamber E at the outer face of the piston and through port No. 11 to the 90 cu. in. volume reservoir, charging the volume reservoir and both sides of the actuating piston to brake pipe pressure. This piston is, therefore, held in its down position by spring force as shown. Port No. 35 and the chamber beneath the Dynamic Cut-Out Switch are exhausted through the cut-off piston spool valve.

Whenever a break-in-two occurs, brake pipe air pressure drops faster from Chamber D than it can from Chamber E via the choke. The resultant pressure differential across the actuating piston causes it and its spool valve to be moved upward against spring loading as shown in the lower view of Figure 18. In this position, main reservoir air is connected through the actuating piston spool valve to Chamber C at the outer face of the cut-off piston and also to port No. 9 and the Power Cut-Off (P.C.) Switch and Sanding Reservoir. With Chamber B beneath the cut-off spool valve normally exhausted, as mentioned above, the presence of main reservoir pressure in Chamber C at the outer face of the cut-off piston will cause the piston and its spool valve to be forced inward to its lowermost position, wherein Chamber A beneath the cut-off piston head is then exhausted. In this position, main reservoir air is connected through the cut-off piston spool valve No. 35 and to the Dynamic Cut-Off Switch and also past the unseated cut-off check valve to port No. 53 and to the brake pipe cut-off valve in the 26-C Brake Valve.

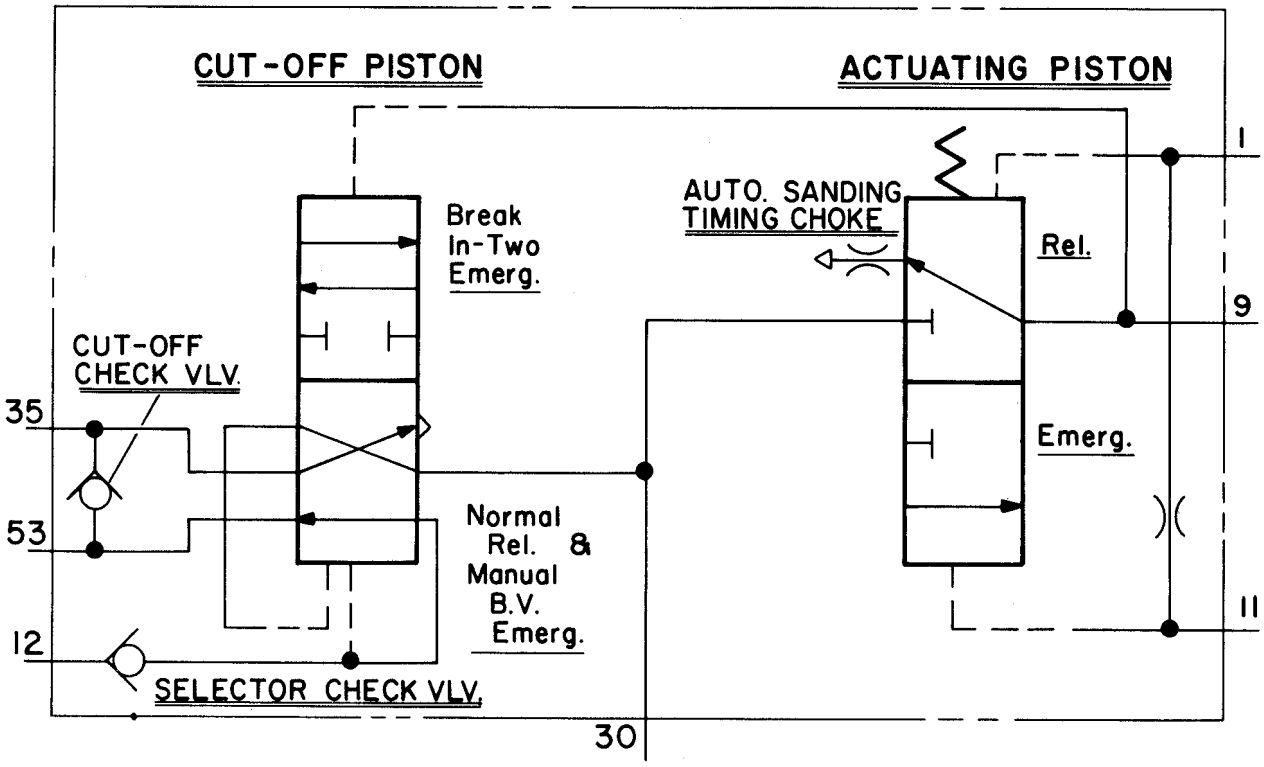
Air pressure in the 90 cu. in. volume reservoir, port No. 11, and Chamber E beneath the actuating chamber continue to reduce to zero through the piston choke and port No. 1 to brake pipe exhaust. When this pressure has been reduced to a predetermined value, spring tension will move the actuating piston and its spool valve to its lowermost position as shown in the auxiliary view of Figure 18. Air

pressure at the Power Cut-Off Switch and in the Sanding Reservoir will then exhaust through the automatic sanding timing choke via port No. 9 and the actuating piston spool valve. Air pressure likewise exhausts from Chamber C at the outer face of the cut-off piston.

In order to reset, the engineman must move the automatic brake valve handle to Emergency position. Main reservoir air is then connected to port No. 12 from the brake valve and flows past the unseated selector check valve to Chamber B beneath the cut-off piston to force the cut-off piston and its spool valve upward to their normal release positions. The No. 53 pipe, being supplied with air flow from port No. 12, cannot be dissipated through the cut-off pilot valve at the brake valve. The brake valve handle must be moved to Release position before the No. 53 pipe air pressure can be drained and then the brakes released. Thus a slight inherent delay in releasing the brakes has been introduced with the use of this arrangement of break-in-two protection.

On a trailing unit, main reservoir air is supplied to the No. 53 pipe by the cut-off pilot valve when positioned in "Out" position and, therefore, Chamber B beneath the cut-off piston spool valve is charged to main reservoir pressure. With both Chambers A and B charged to main reservoir pressure, the presence of main reservoir pressure in Chamber C, as supplied through the actuating piston spool valve, does not provide the force to move the cut-off piston inward as described for a break-in-two on a lead unit. The P.C. Switch and automatic Sanding are actuated by main reservoir air being supplied to port No. 9.

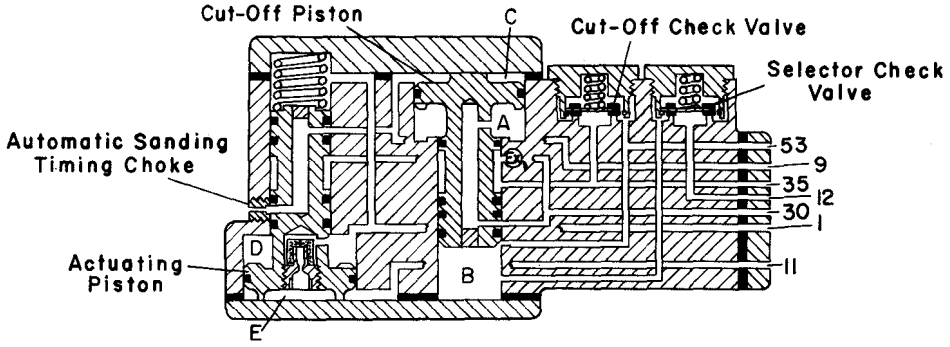
During a manual brake valve emergency brake application on a lead unit, Chamber B beneath the cut-off piston spool valve is charged to main reservoir pressure via port No. 12 and the No. 12 pipe from the automatic brake valve. Thus with Chambers A, B and C all charged to main reservoir pressure, the cut-off piston and spool valve remain in their upper position as shown in the piston diagrammatic on Figure l8. The P.C. Switch and automatic sanding are actuated by main reservoir air flowing through port No. 9. The Dynamic Cut-Out Switch is actuated by main reservoir air supplied directly from the brake valve emergency valve via the No. 12 pipe and No. 24-A Double Check Valve. When it is desired to release the brakes, the brake valve handle should be moved to Release position. There will be an inherent delay, as governed by the time required to exhaust the No. 53 pipe through the cut-off pilot valve, before the brake pipe cut-off valve can open to permit recharging the system and releasing the brakes.



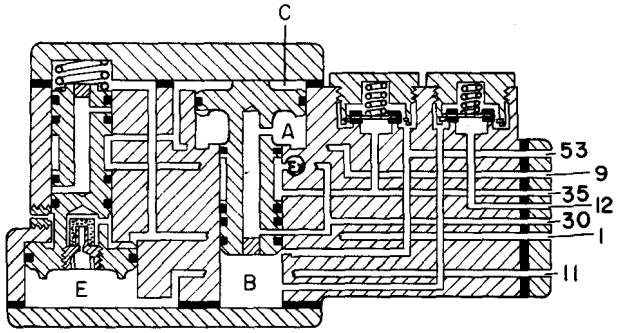
A-1 CHARGING CUT-OFF PILOT VALVE
FIG. 18A

Legend

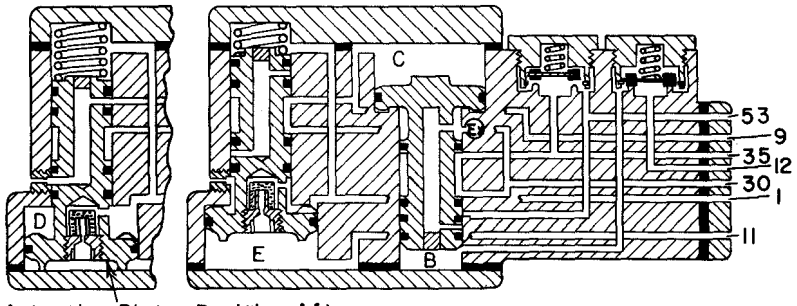
1 Brake Pipe
11 Volume
12 Emergency Switch & Reset Pipe
9 Auto. Sanding & Power Knock-Out
30 Main Res.
53 Brake Pipe Cut-Off Pipe
35 Dynamic Cut-Off



Lead or Trailing Locomotive - Normal Release



Lead Locomotive - Manual Brake Valve Emergency
Trailing Locomotive - Any Emergency



Actuating Piston Position After
*11 Pipe Volume Reservoir Exhausts
Though Timing Choke

Lead Locomotive - Break-In-Two Emergency

A-1 CHARGING CUT-OFF PILOT VALVE
FIG. 18

DYNAMIC BRAKE INTERLOCK FEATURE

The dynamic brake interlock feature functions during dynamic braking to release or prevent an automatic service brake application on the locomotive.

It consists of an FB-4 Magnet Valve installed in the brake system between the main reservoir supply to the 26-C Brake Valve and the main reservoir supply to the 6-NR Distributing Valve.

The FB-4 Magnet Valve consists of two opposed check valves, a coil and an armature. The coil has two wire connections which are connected into the dynamic brake electric circuit.

The coil is normally de-energized. Its upper Check Valve is unseated to vent the Actuating Pipe to atmosphere by connecting port 1 to port 3. Its lower check valve is seated by spring force to cut-off main reservoir air supply at port 2 from port 1.

Upon the initiation of a dynamic brake operation, the dynamic brake circuit energizes the coil in the magnet valve. The coil armature then seats the upper check valve, cutting off the communication from the actuating pipe to atmosphere. It also unseats the lower check valve, permitting main reservoir air to flow to the No. 10 port on the H-5-B Relayair Valve which in effect, releases an automatic brake or prevents the development of an automatic brake in the locomotive so long as dynamic braking is in effect. Independent application and release of the locomotive brake is available at all times, irrespective of dynamic brake operation.

During an emergency brake application, the dynamic brake is nullified, allowing the automatic pneumatic brake to operate. This is accomplished through the use of a Dynamic Cut-Out Switch suitably installed to de-energize the FB-4 (Dynamic Interlock) Magnet Valve during emergency brake operations. Also, some equipments are arranged to permit dynamic brake nullification during safety control and overspeed control brake applications.

OPERATING INSTRUCTIONS

The following instructions are intended to cover, in a general way, the proper method of handling the 26-NL brake equipment in service, and does not apply rigidly to all individual cases or conditions. Specific instructions are usually issued by each railroad to cover its own recommended practice in accordance with the local operating conditions.

Before starting the air compressor (the locomotive not being coupled to a train), close the drain cocks in the reservoirs, the end cocks at each end of the locomotive, and the dead engine cut-out cock. Assure all of the following cocks are open: main reservoir cut-out cock, brake cylinder cocks, cut-out cock in supply line to signal device, and cut-out cock in brake pipe branch pipe to 6-NR Distributing Valve.

CUT-OFF PILOT VALVE PORTION (DOUBLE-HEADING COCK)

The handle of the cut-off pilot valve first must be depressed against a spring-loading before it can be moved from one position to another. The valve must be positioned to "In", depending upon the type of service to which the locomotive is assigned. It must be positioned in "OUT" position when the locomotive is operating "Dead" or as a Trailing Unit in a multiple-unit consist.

When making initial terminal brake pipe leakage tests, as will be described later, the cut-off pilot valve handle must be positioned in "OUT" position, to nullify the pressure-maintaining feature. To restore control of the brake valve, the handle must be returned to "In" position, depending upon the type of service in which the locomotive is to he operated.

INDEPENDENT BRAKE VALVE

When applying the locomotive brake with the SA-26 Independent Brake Valve, move the handle to the right (full independent application-extreme right), and when releasing, move the handle to the left. The brake valve, being of the self-lapping type, will lap-off automatically at any point in the application zone where handle movement has been stopped.

To make an independent release of an Automatic brake application, depress the independent brake valve handle.

The independent brake valve handle should always be in RELEASE position (extreme left) when the unit is a trailing unit in a multiple-unit consist or is being towed DEAD.

AUTOMATIC BRAKE VALVE

When charging a train or releasing an Automatic brake application, the automatic brake valve handle should be placed in RELEASE (running) position, which is at the extreme left of the quadrant.

When making a Service brake application, move the automatic brake valve handle to the right against the first raised position on the quadrant. This is a minimum reduction position which will provide a 6 to 8 psig reduction. If necessary to increase the reduction, move the handle progressively to the right, bearing in mind that the further the handle is moved into the Service Zone, the greater will be the reduction. The brake valve will lap-off at any point where movement of handle is stopped in the Service Zone and automatically maintain against brake pipe leakage.

A Full Service brake application, is obtained by moving the brake valve handle to the extreme right of the Service Zone against the second position on the quadrant.

An emergency brake application is obtained by moving the brake valve handle to the extreme right of the quadrant, which is EMERGENCY position.

The automatic brake valve handle should be moved to HANDLE-OFF position when the locomotive is a trailing unit in a multiple-unit consist or is being towed DEAD.

MU-2 VALVE

The handle of the MU-2A valve first must be depressed against a spring force before it can be moved from one position to another.

When the locomotive is operated as a single unit, or a lead unit in a multiple-unit consist, the handle of the MU-2A valve must be placed in LEAD or DEAD position.

When a 26-NL equipped locomotive is operated trailing a 24-RL, standard 26-L or standard 26-NL brake-equipped locomotive, the handle of the MU-2A valve must be placed in TRAIL 24-26 position. When the locomotive is operated trailing a 27-LB or 6 type equipped locomotive, the handle must be placed in TRAIL-6 position.

> NOTE: When a 26-NL equipped locomotive is operated as a trailing unit and its actuating pipe is coupled to the actuating pipe of the leading locomotive, the fastest possible rate of an independent release of an Automatic application will be obtained if the MU-2A valve on the trailing unit is positioned in TRAIL-24, regardless of type of equipment employed on the leading locomotive.

GENERAL OPERATIONS

Multiple-Unit Operation

When a locomotive unit with 26-NL equipment is operated in multiple (lead or trailing) with 24-RL equipped units, or with units equipped with brakes of the No. 6 type, the following hose connections must be made:

26-NL	24-RL or 26-L	No. 6 or 27-LB
Brake Pipe	to Brake Pipe	to Brake Pipe
M. R. Equalizing Pipe	to M. R. Equalizing Pipe	to M. R. Equalizing Pipe
Actuating Pipe	to Actuating Pipe	
Ind. Appl. & Rel. Pipe	to Ind. Appl. & Rel. Pipe	to B. C. Equalizing Pipe
Sanding Pipe	to Sanding Pipe	to Sanding Pipe

26-NL Standard and 24-RL or 26-L equipped locomotive units can be operated together in any combination.

26-NL Universal equipped locomotives may operate with 6 Type, 27-LB, 26-L, 24-RL and 26-NL leading or trailing these equipments.

Changing Ends

To change the controls from the cab of one locomotive to the cab of another, first make a Full Service brake pipe reduction, then depress the handle of the brake valve cut-off valve and move it to CUT-Out position. Place the automatic brake valve handle in HANDLE OFF position and the independent brake valve handle in RELEASE position. Depress the handle of the MU-2A Valve, and move it to TRAIL 24-26 position, or TRAIL-6 position, depending on the type of equipment employed on the lead locomotive unit. This locomotive is now set up as a trailing unit.

Proceed to the cab of the other locomotive. Insert the automatic brake valve handle in HANDLE OFF position, if removed, and move the independent brake valve handle to FULL APPLICATION position. Move the automatic brake valve handle to RELEASE position. Depress the handle of the MU-2A valve and move it to LEAD OR DEAD position.

Depress the handle of the brake valve cut-off valve and move it to OUT position, as required by the service in which the locomotive is to be operated. When ready to release the locomotive brake, depress the foot pedal of the foot valve and move the independent brake valve to RELEASE position. Test the brake equipment to verify it functions properly on all units.

Towing Locomotive Dead-In-Train

When a locomotive equipped with 26-NL brake equipment is to be towed dead-in-train, place the independent brake valve handle in RELEASE position and the automatic brake valve handle in HANDLE OFF position. Depress the brake valve cut-off valve handle and move it to OUT position. Depress the handle of the MU-2A valve, and move it to LEAD or DEAD position. Open the dead engine fixture cut-out cock.

Locomotive Brake Pipe Leakage Test

With the brake system fully charged and with the Pilot Cut-Off Valve in "In" position, make a 15 psig brake pipe reduction. After the exhaust of brake pipe pressure ceases, move the Pilot Cut-Off Valve to "OUT" position. Time the reduction of brake pipe pressure as indicated by the locomotive brake pipe gage. The brake pipe leakage should not exceed S psig drop in a one minute time period. Inspection of the Brake Cylinders should be made to assure that the brakes have applied.

At the completion of the test, move the Pilot Cut-Off Valve to the "In" position and the brake valve handle to the RELEASE position to recharge the brake system.

Train Air Brake Terminal Test

With the brake system fully charged and with the brake valve cut-off valve in "In" position, move the automatic brake valve handle promptly towards SERVICE position, until the equalizing reservoir pressure has been reduced to 15 psig, then stop and leave the handle in this position.

Wait 45 to 60 seconds, then time the reduction of brake pipe pressure as indicated by the locomotive brake pipe gage. The brake pipe leakage should not exceed 5 psig drop in one minute time period.

Optional: During the inspection of the train, the brake valve handle may be moved toward Full Service position to reduce Equalizing Reservoir slightly below brake pipe pressure and the Pilot Cut-Off Valve returned to "In" position. This action will prevent excessive loss of brake pipe pressure while maintaining a Service Brake Application during train inspection.

Upon completion of the train inspection and after a signal is received to release the brakes, move the brake valve handle to RELEASE position, and if not already there, place the Pilot Cut-Off Valve in the "In" position to release the train brakes.

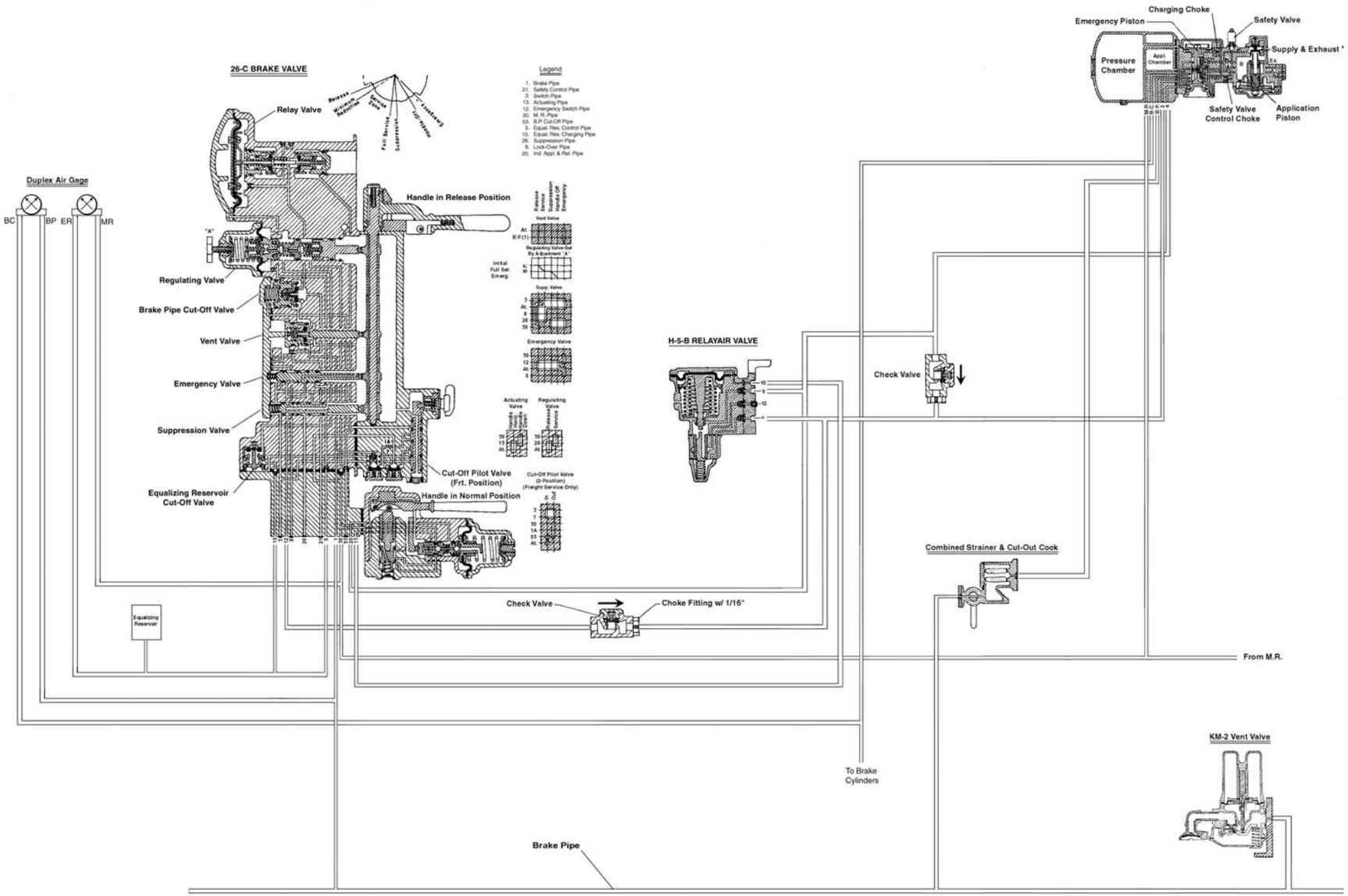


PLATE 1

Piping Diagrammatic Of Standard 26-NL Type Brake Control Group For Basic Switching Locomotives W/26-C Brake Valve & 6-NR Distributing Valve for Non-Multiple Unit Service

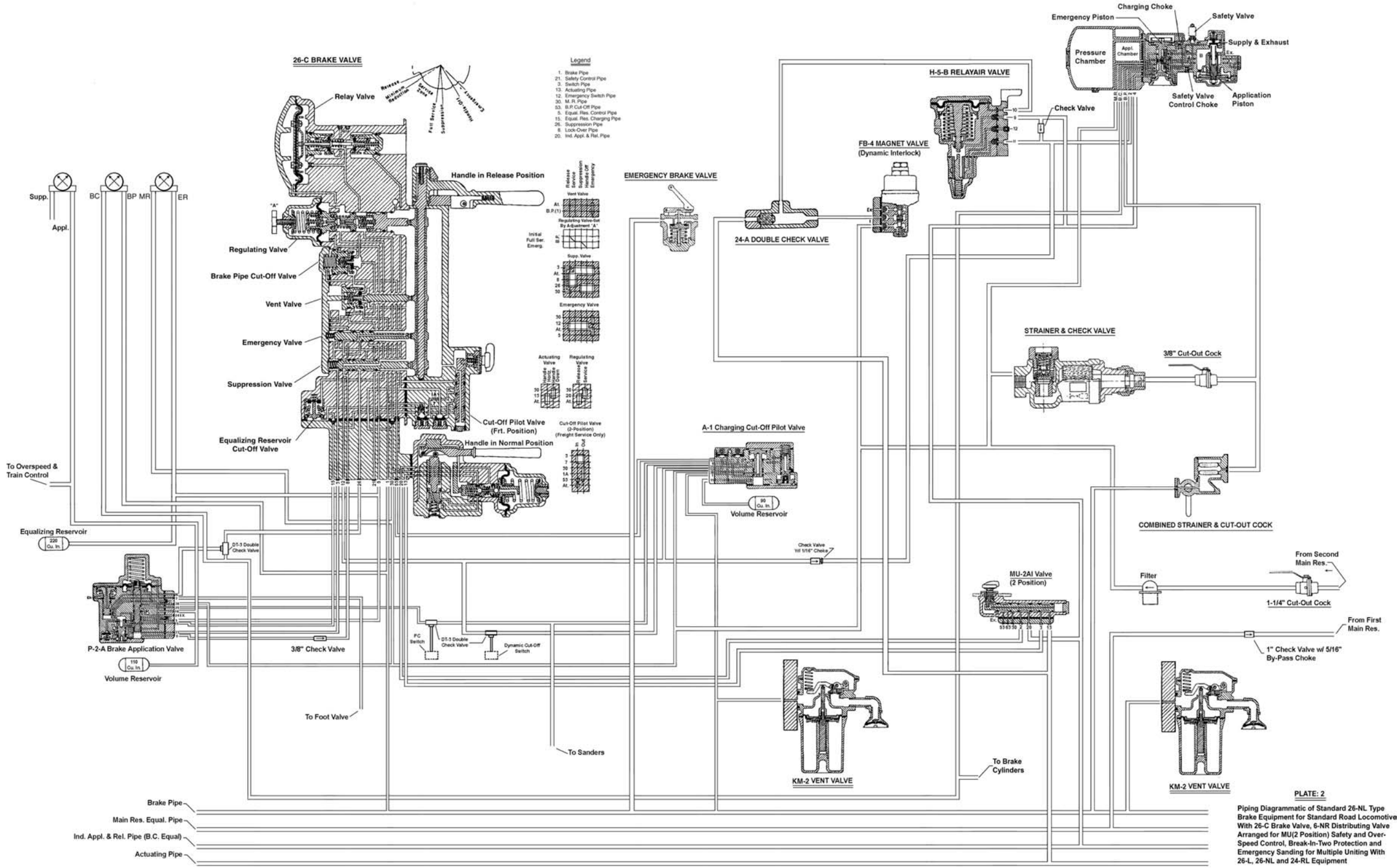


PLATE: 2

Piping Diagrammatic of Standard 26-NL Type Brake Equipment for Standard Road Locomotive With 26-C Brake Valve, 6-NR Distributing Valve Arranged for MU(2 Position) Safety and Over-Speed Control, Break-In-Two Protection and Emergency Sanding for Multiple Uniting With 26-L, 26-NL and 24-RL Equipment

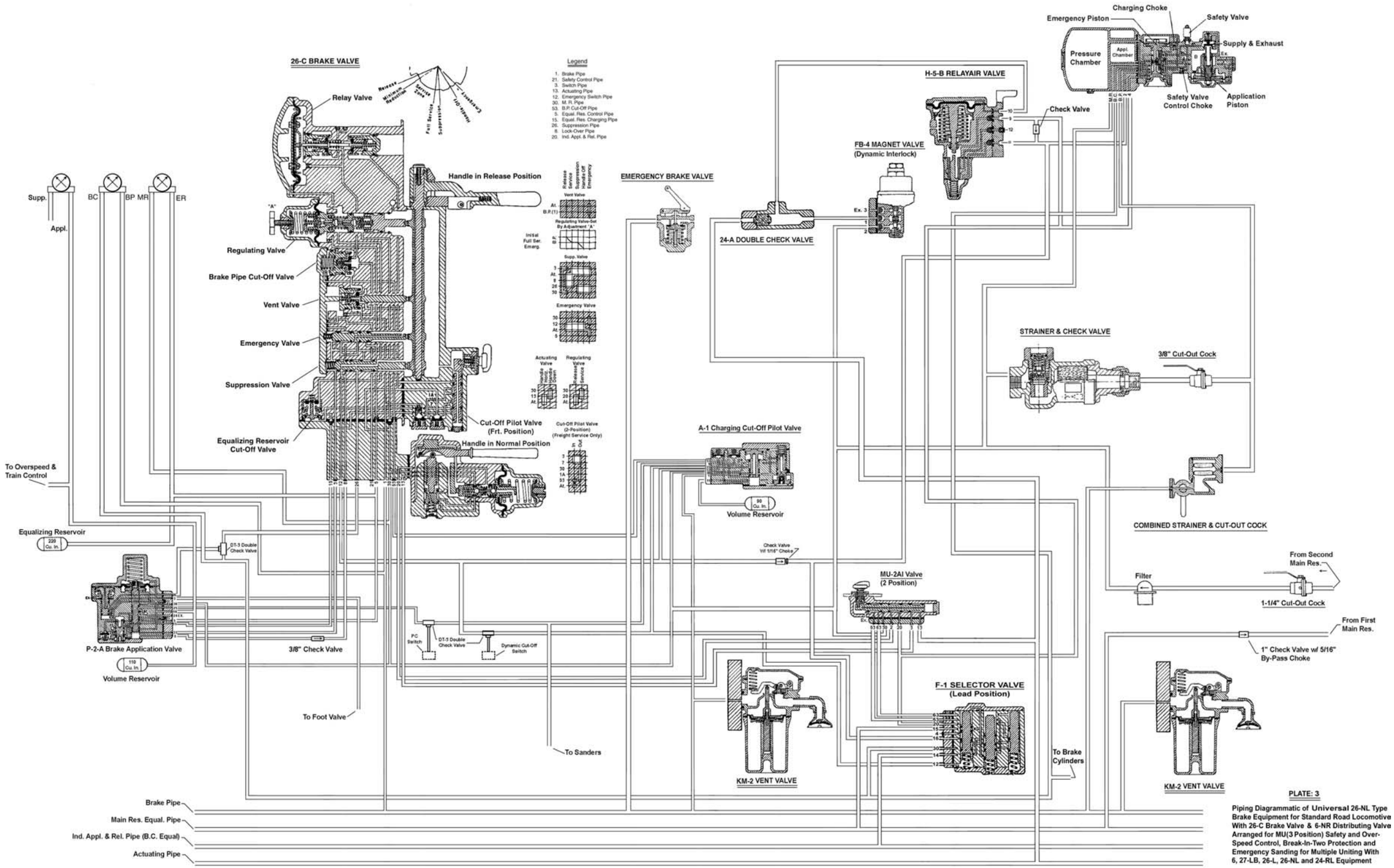


PLATE: 3

Piping Diagrammatic of Universal 26-NL Type Brake Equipment for Standard Road Locomotive With 26-C Brake Valve & 6-NR Distributing Valve Arranged for MU(3 Position) Safety and Over-Speed Control, Break-In-Two Protection and Emergency Sanding for Multiple Uniting With 6, 27-LB, 26-L, 26-NL and 24-RL Equipment

DRAWN 11-23-77 JWY
REV: 4-19-78 HWC

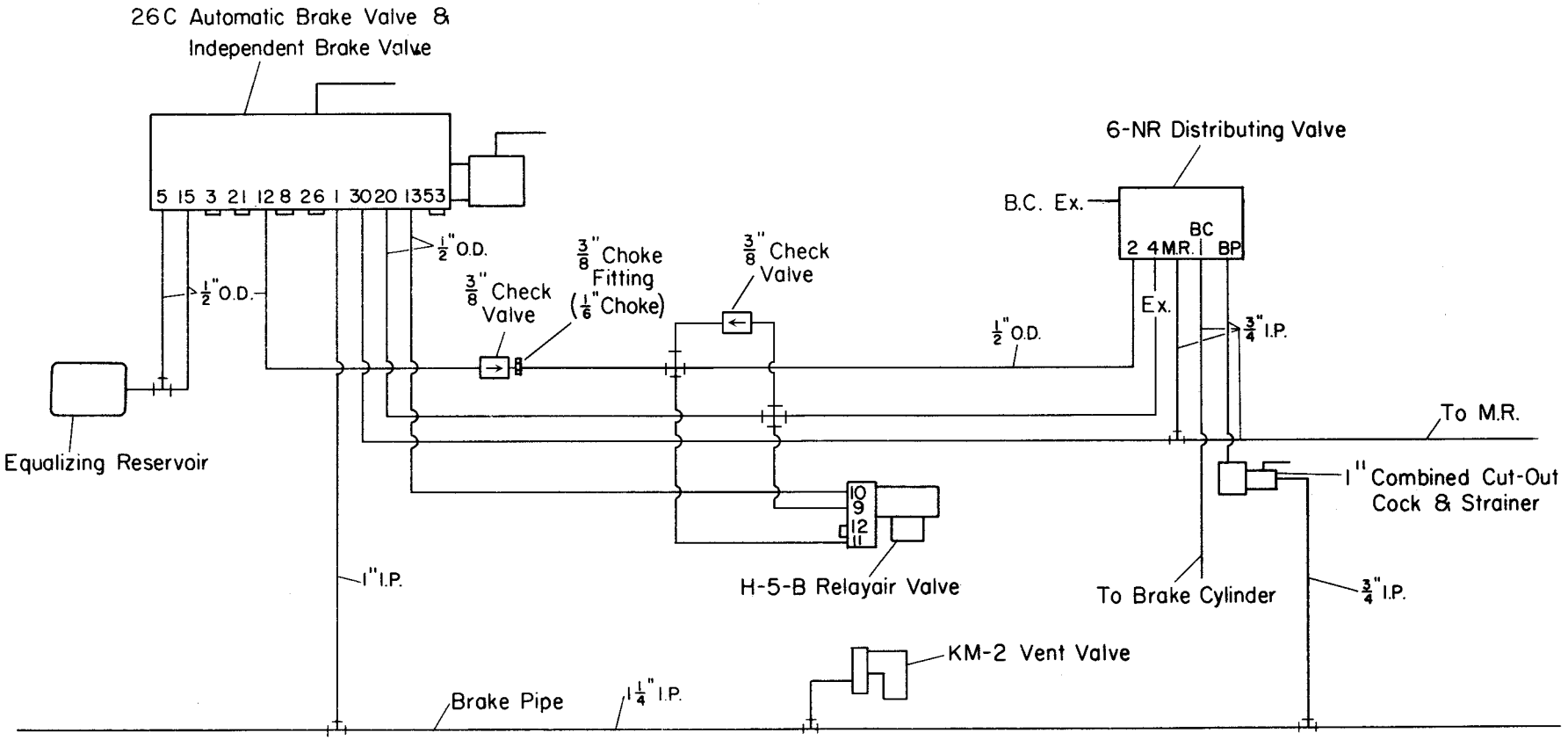


PLATE 4

Piping Diagram Of Standard 26-NL Type Of Brake Control Group For Basic Switching Locomotives With 26-C Brake Valve & 6-NR Distributing Valve For Non-Multiple Unit Service

LIST OF COUNTRIES WHERE REPRESENTATIVES ARE LOCATED

AFRICA
ARGENTINA
AUSTRALIA
AUSTRIA

BANGLADESH
BELGIUM
BRAZIL
BURMA

CAMEROON
CANADA
CHILE
CHINA
COLUMBIA
CZECHOSLOVAKIA

DENMARK
EGYPT

FINLAND
FRANCE

GABON
GERMAN DEMOCRATIC REPUBLIC
GREAT BRITAIN
GREENLAND

HONG KONG
HUNGARY

INDIA
INDONESIA
IRAN
ISRAEL
ITALY

JAPAN
JORDAN

LUXEMBOURG

MALAYSIA
MEXICO
MOROCCO

NETHERLANDS
NEW ZEALAND
NIGERIA
NORWAY

PAKISTAN
POLAND
PERU
PORTUGAL

ROMANIA

SOUTH AFRICA
SOUTH KOREA
SPAIN
SRI LANKA
SWEDEN
SWITZERLAND
SUDAN
SYRIA

TAIWAN

TANZANIA
THAILAND
TURKEY
TUNISIA

USSR
USA

VENEZUELA

YUGOSLAVIA

ZAMBIA
ZIMBABWE

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