26 TYPE
LOCOMOTIVE
BRAKE EQUIPMENT

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INTRODUCTION

26-L LOCOMOTIVE BRAKE EQUIPMENT

The 26-L Brake Equipment is designed to meet present day train handling requirements for freight and passenger locomotives. This equipment can be conditioned for either type of service without altering the piping or devices. Also this equipment is suitable for multiple unit operation with previous types of equipment.

New design characteristics of this equipment includes a simplified structure of internal parts which utilizes diaphragm operated pistons and spool valves. The elimination of ring fitted pistons, slide valves and seats results in substantial maintenance economy.

Important features of this equipment are as follows:

1. Prompt, flexible brake applications and releases for smooth operation.
2. Pressure maintaining of brake pipe and brake cylinder pressures.
3. Safety Control
4. Overspeed Control
5. Train Control with temporary and permanent suppression.
6. Split reduction penalty brake applications.
7. Power and dynamic brake cut-off during penalty brake applications.
8. Break-in-two protection.

GENERAL OPERATION

This section of the pamphlet describes the operation and functions of the 26-L Locomotive Brake Equipment. Detail descriptions of devices referred to in this section are given in the Operation of Devices section.

Prior to using this equipment in service properly set the brake valve cut-off valve, control valve graduated release cap, MU-2-A Valve and split reduction reservoir cut-out cock in accordance with the intended type of service.

Automatic Brake

Charging

To charge the equipment place the brake valve handle in release position. Main reservoir air, reduced to operating pressure by the brake valve, flows through brake pipe to charge the equipment devices and reservoirs.

Service

To apply the brakes move the brake valve handle into the service zone and reduce equalizing reservoir air pressure. A corresponding reduction of brake pipe air pressure will operate the control valve to deliver air through application pipe 16 to the relay valve. The relay valve then supplies air pressure to the brake cylinders equal to the application pipe air pressure. The amount of brake application is directly proportional to the amount of equalizing reservoir reduction up to a full service application.

Leave the brake valve handle in the service zone position at which the desired equalizing reservoir reduction is obtained. After the reduction of brake pipe air pressure has completed the brake valve, control valve and relay valve will lap and maintain the brake application.

Release

To release the brake move the brake valve handle to release position and restore equalizing reservoir air pressure. The corresponding increase in brake pipe air pressure will operate the control valve to exhaust the air pressure in application pipe 16. The relay valve will then exhaust the air pressure in the brake cylinders.

When operating in freight service the brake valve must be moved all the way into release position for a complete release. In passenger service the brakes may be released in graduated steps by partially moving the brake valve handle toward release position.

GENERAL OPERATION

Emergency

When it is desired to make the shortest possible stop move the brake valve handle to emergency position. A direct, rapid exhaust of brake pipe air pressure will cause the control valve to deliver maximum air pressure through the application pipe 16 to the relay valve.

Independent Brake

The independent brake valve provides control of the locomotive brakes regardless of the automatic brake valve handle position.

To apply the brakes move the independent brake valve handle into the application zone. Air pressure is delivered through independent application and release pipe 20 to the relay valve. The relay valve then supplies air to the brake cylinders equal to the air pressure in pipe 20. The amount of brake application is directly proportional th the amount of handle movement into the application zone. To release, move the brake valve handle to release position and exhaust the air pressure in pipe 20.

To release the locomotive brakes during automatic brake applications, depress the independent brake valve handle. Air pressure delivered through actuating pipe 13 will operate the control valve to exhaust application air pressure in application pipe 16. The locomotive brake can be re-applied following this type of release by independent brake valve handle movement.

Brake Pipe Leakage Test

When making a brake pipe leakage test, the pressure maintaining feature must be cut out by setting the brake valve cut-off valve in CUT-OUT position. Allow brake pipe pressure to reduce to the equalizing reservoir level before cutting out the brake valve.

After completing the test reduce equalizing reservoir air pressure to brake pipe level before cutting in the brake valve. This will prevent an unintentional release of the brakes.

Changing Ends

The following procedure covers the changing of control from one brake valve to another on double end or dual control locomotives.

Make a full service application. After completion of the brake pipe reduction set the brake valve cut-off valve in CUT-OUT position and remove the automatic and independent brake valve handles, in handle-off and release positions respectively. Replace these handles on the other brake valve and set the cut-off valve in FRT. or PASS position.

GENERAL OPERATION

Dead Engine

To haul the locomotive dead in a train, move the automatic brake valve handle to Handle Off position and the independent brake valve handle to Release position. After completion of the brake pipe reduction set the brake valve cut-off valve in CUT-OUT position, MU-2-A Valve in LEAD position and then open the dead engine fixture cock. This will allow train line brake pipe air to charge the brake equipment for control valve operation. The main reservoir air pressure should be reduced 40 psi below the brake pipe air pressure to eliminate the danger of slid wheels.

Double Heading

To prepare this equipment for double heading operation behind another unit, move the automatic brake valve handle to Full Service position. After completion of brake pipe reduction set the brake valve cut-off valve in CUT-OUT position, MU-2-A Valve in LEAD position and then move the automatic brake valve handle to suppression position. Also connect the brake pipe between units. The automatic brakes are controlled from the lead unit but the engineman on this second unit can initial an emergency application by moving the automatic brake valve to emergency position. Independent brake operation on the second unit operates as previously described.

Dynamic Interlock

If an automatic service application is made with the dynamic brake cut-in, the dynamic interlock magnet will be energized and prevent the locomotive air brake from applying by delivering air pressure through actuating pipe 13 to the control valve.

During emergency and penalty brake applications the dynamic interlock magnet is de-energized to allow the air brake to apply.

Power and Dynamic Brake Cut-Off

The locomotive power and dynamic brake are automatically cut off by air pressure delivered to pressure switches through (a) pipe 25 during penalty applications, (b) pipe 35 during break-in-two and (c) pipe 12 during brake valve initiated emergency applications.

Break-In-Two with A-1 Charging Cut-Off Pilot Valve

In the event of a break-in-two the rapid drop of brake pipe air pressure will operate the pilot valve to deliver air through (a) pipe 53 to close the brake pipe cut off valve, (b) pipe 35 to cut-off dynamic brake and power (c) pipe 9 to the

sanding equipment.

In order to release after a break-in-two application the automatic brake valve handle must be moved to emergency position to deliver air through emergency switch pipe 12 for resetting the pilot valve.

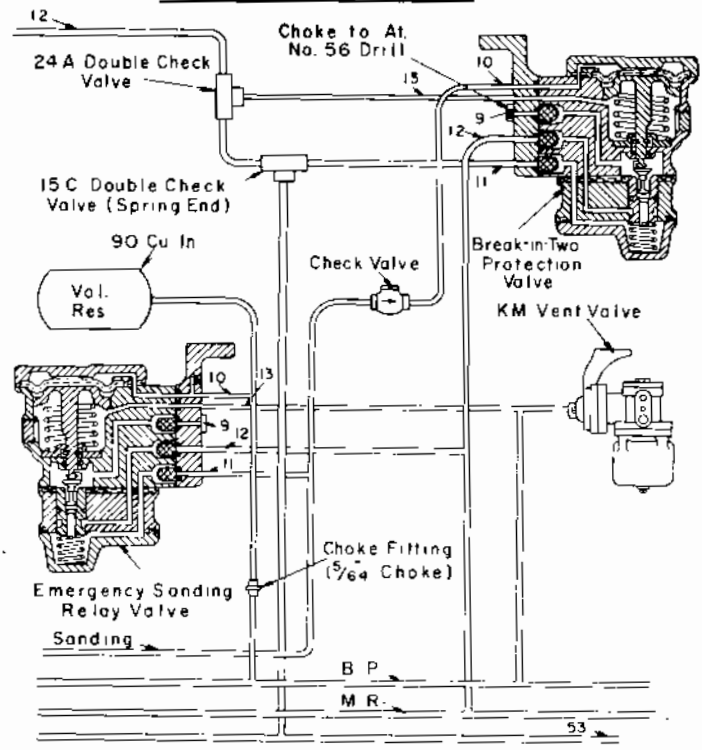
On locomotives conditioned for TRAIL or DEAD operation air pressure is delivered through pipe 53 to prevent operation of the pilot valve except for air delivery to sanding pipe 9. The duration of air supply to sanding pipe 9 is determined by the 90 cu.in. volume connected to pipe 11 and a choke arrangement in the pilot valve. Also during a brake valve initiated emergency brake application, air pressure is delivered through switch pipe 12 and prevents operation of the pilot valve except for sanding air.

Break-In-Two with HB-5 RELAYAIR ® Valves

An alternate break-in-two protection of the previously discussed pilot valve is two HB-5 RELAYAIR Valves, arranged as shown in the diagrammatic view. During a brake-in-two the rapid drop of brake pipe pressure in the spring chamber of the emergency sanding valve will cause pressure in pipe 10 to move the valve down. Supply air in pipe 12 will then flow to pipe 11 and the sanding equipment also the air in pipe 11 flows to the top of the break-in-two valve and moves this valve down to connect supply air from pipe 12 into pipe 53.

In order to release after a break-in-two application the automatic brake valve handle must be moved to emergency position to deliver air through emergency switch pipe 12 to the spring chamber of the break-in-two valve. The valve will then move up and connect pipe 53 to exhaust and allow the release of brakes.

On locomotives conditioned for TRAIL or DEAD operation air pressure is delivered through pipe 53 to prevent operation of the break-in-two valve. The emergency sanding valve will operate, however, and provide air pressure to the sanding equipment. The duration of air supply to sanding pipe 11 is determined by the exhaust of air pressure from the 90 cu.in. volume and choke in pipe 10. Also during a brake valve initiated emergency brake application, air pressure is delivered through the Emergency Switch, pipe 12 and prevents operation of the pilot valve except for sanding air.



Safety Control

The safety control feature will initiate a penalty brake application if for any reason the engineman fails to hold the foot valve pedal down. If the foot pedal is released the air pressure in foot pipe 3 will exhaust, causing the brake application valve to operate and produce a full service brake application. A time delay of 4 to 6 seconds, indicated by a warning whistle, is provided to allow the engineman to step on the pedal and avoid the penalty brake application. This feature is nullified with 25 psi or more Brake cylinder air pressure.

Overspeed

The overspeed feature will initiate a penalty brake application if the locomotive motor speed exceeds a predetermined maximum limit. If the limit is exceeded the overspeed magnet will de-energize and exhaust the air pressure in safety control pipe 10, causing the brake application valve to operate and produce a full service brake application. A time delay of 4 to 6 seconds, indicated by a warning whistle, is provided to allow the engineman to reduce the motor speed and avoid the penalty brake application.

Temporary suppression of an overspeed penalty application is provided on

equipments utilizing the A-2 Reduction Selector Valve. By making successive light brake applications the engineman can avoid the penalty application while reducing the motor speed.

Train Control

The train control feature will initiate a penalty brake application if the train speed exceeds the speed limit. If the speed limit is exceeded the timing valve will exhaust the air pressure in safety control pipe 10, causing the brake application valve to operate and produce a full service brake application. A time delay of 4 to 6 seconds, indicated by a warning whistle, is provided to allow the engineman to reduce the train speed and avoid the penalty application.

The C-1 Suppression Valve is utilized with train control to allow the engineman to temporarily suppress a penalty application by light successive brake applications or permanently suppress the application by moving the brake valve handle to suppression position.

Split Reduction Penalty Brake Application

The selection of split or straight type penalty brake applications is available on brake equipments having the split reduction reservoir. When the reservoir cut-out cock is open and the reservoir cut in, a split reduction penalty brake application will occur. This type of reduction is used on long trains to properly adjust the train slack for smoother stops. The split reduction is cut out by closing the reservoir cock and providing a straight penalty brake application. This reservoir is normally utilized on brake equipment with either A-1 or A-2 Reduction Selector Valves or C-1 Suppression Valves.

Multiple Uniting

The 26-L brake equipment is designed to operate in multiple unit service with No. 6, 24-RL and 26-L brake equipments. The transfer of air pressures for independent brake operation between this equipment and other units of the consist is controlled by the MU-2-A Valve and F-1 Selector Valve.

To operate this locomotive equipment as a lead unit, set the MU-2-A Valve in LEAD position and the brake valve cut-off valve in CUT-IN position. Whenever the independent brake is applied or released the air pressure developed in the brake cylinders is transferred by the F-1 Selector Valve to brake cylinder equalizing pipe and trailing units. This air pressure is then used on the trailing units as a reference air pressure. Also the independent brake release air pressure is ported through the MU-2-A Valve to the actuating pipe to trailing units.

GENERAL OPERATION

Relative pipes of the brake equipments which are connected between units are as follows:

EQUIPMENT	RUN THROUGH PIPES	
	Brake Cylinder Reference Air Pressure Pipe	Independent Brake Release Pipe
26-L	Brake Cylinder Equalizing Pipe 14	Actuating Pipe 13
24-RL	Independent Application & Release Pipe 20	Actuating Pipe 13
6-SL	Equalizing Pipe 12	None

To operate the locomotive as a trailing unit set the MU-2-A Valve in TRAIL and the brake valve cut-off valve in CUT-OUT position. A selection of trail positions of the MU-2-A Valve is necessary to provide the proper air flow from different types of leading brake equipments as follows:

TRAIL 24

When the lead unit has 24-RL brake equipment, the reference air pressure from the independent app. and rel. pipe flows to the brake cylinder equalizing pipe and is transferred by the F-1 Selector Valve to the relay valve. The relay valve will supply air pressure to the brake cylinders equal to the reference air pressure. The actuating pipe air pressure for independent releases of automatic brake applications is connected through the actuating pipes to the control valve.

TRAIL 6

When the lead unit has 6-SL brake equipment, the reference air pressure from the equalizing pipe flows to the brake cylinder equalizing pipe and is transferred by the F-1 Selector Valve to the relay valve. The relay valve will supply air pressure to the brake cylinders equal to the reference air pressure. Since there is no actuating pipe on 6-SL brake equipment, the independent release feature which actuates the control valve of 26-L brake equipment is not available. Therefore, application air pressure delivered by the control valve during automatic brake applications is blanked off at the F-1 Selector Valve. During all brake applications the brake cylinder air pressure is controlled by the reference air pressure.

The following diagram illustrates the arrangements of 6-SL, 24-RL and 26-L brake equipments. In multiple unit consist of more than two units, like units should be coupled together for simplicity.

LEAD UNIT	MU-2-A ROTAIR® Cock Position	MIDDLE TRAIL UNIT	MU-2-A ROTAIR® Cock Position	LAST TRAIL UNIT	MU-2-A ROTAIR® Cock Position
26-L	LEAD	Can be either lead equipment	TRAIL 24	Can be either lead equipment	TRAIL 24
24-RL	LEAD		FRT. or PASS. LAP		FRT. or PASS. LAP
26-L	LEAD	Can be either lead equipment	TRAIL 6	Can be either lead equipment	TRAIL 6
6-SL	OPEN or LEAD		TRAIL or CLOSED		TRAIL or CLOSED

26-LA Brake Equipment

The 26-LA brake equipment is designed to meet present day handling requirements of switcher locomotives. This equipment has the same compact design and operational characteristics as 26-L brake equipment for maximum economy and smooth, flexible operation.

Control of brake applications and releases as well as operation of the overspeed, safety control and multiple unit features are comparable to the 26-L brake equipment previously described.

The 26-D control valve, utilized with 26-LA brake equipment, provides the necessary functions for applying and releasing the automatic brake. Several functions such as quick service, graduated releases and limiting brake cylinder air pressure are not available with brake equipments using the 26-D Control Valve.

Broken Pipes

In the event it becomes necessary to move a locomotive with a broken air pipe, a temporary repair can be made. However, one or more operational functions will be lost and the locomotive should be handled accordingly.

Temporarily repair the broken air pipe to stop air leakage by closing cocks, inserting pipe plugs or crimping (for tubing), depending on the most suitable method. The affect on brake operation for the principal pipes are listed below. It should be noted that any interference with automatic brake operation will affect the train brake operation as well as the locomotives brake unless otherwise noted.

GENERAL OPERATION

MAIN RESERVOIR PIPE. The automatic and independent brakes are inoperative. If the break is located between the main reservoirs, the second main reservoir may be utilized for dead engine operation.

BRAKE CYLINDER PIPE. The locomotive brakes will not apply during brake applications. However, repair of the broken pipe may restore operation of some of the brake cylinders, depending on the location of the break.

BRAKE CYLINDER APPLICATION PIPE (No. 16) The automatic brake on the locomotive will not apply. The train brakes are unaffected and will operate.

EQUALIZING RESERVOIR CHARGING PIPE (No. 15) The automatic brake is inoperative.

EQUALIZING RESERVOIR CONTROL PIPE (No. 5) The automatic brake is inoperative

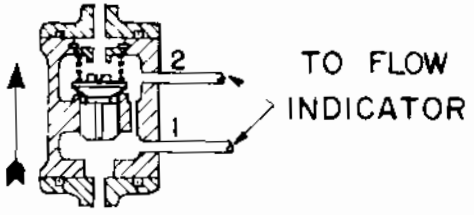
BRAKE PIPE (No. 1) The automatic brake is inoperative unless the break is located in a branch pipe, other than the brake valve branch pipe, whereupon the automatic brake will operate, but the function of the affected device is lost.

INDEPENDENT APPLICATION AND RELEASE PIPE (No. 20) The independent brake is inoperative.

ACTUATING PIPE (No. 13) No independent release of automatic brake applications on locomotive by depressing the brake valve handle.

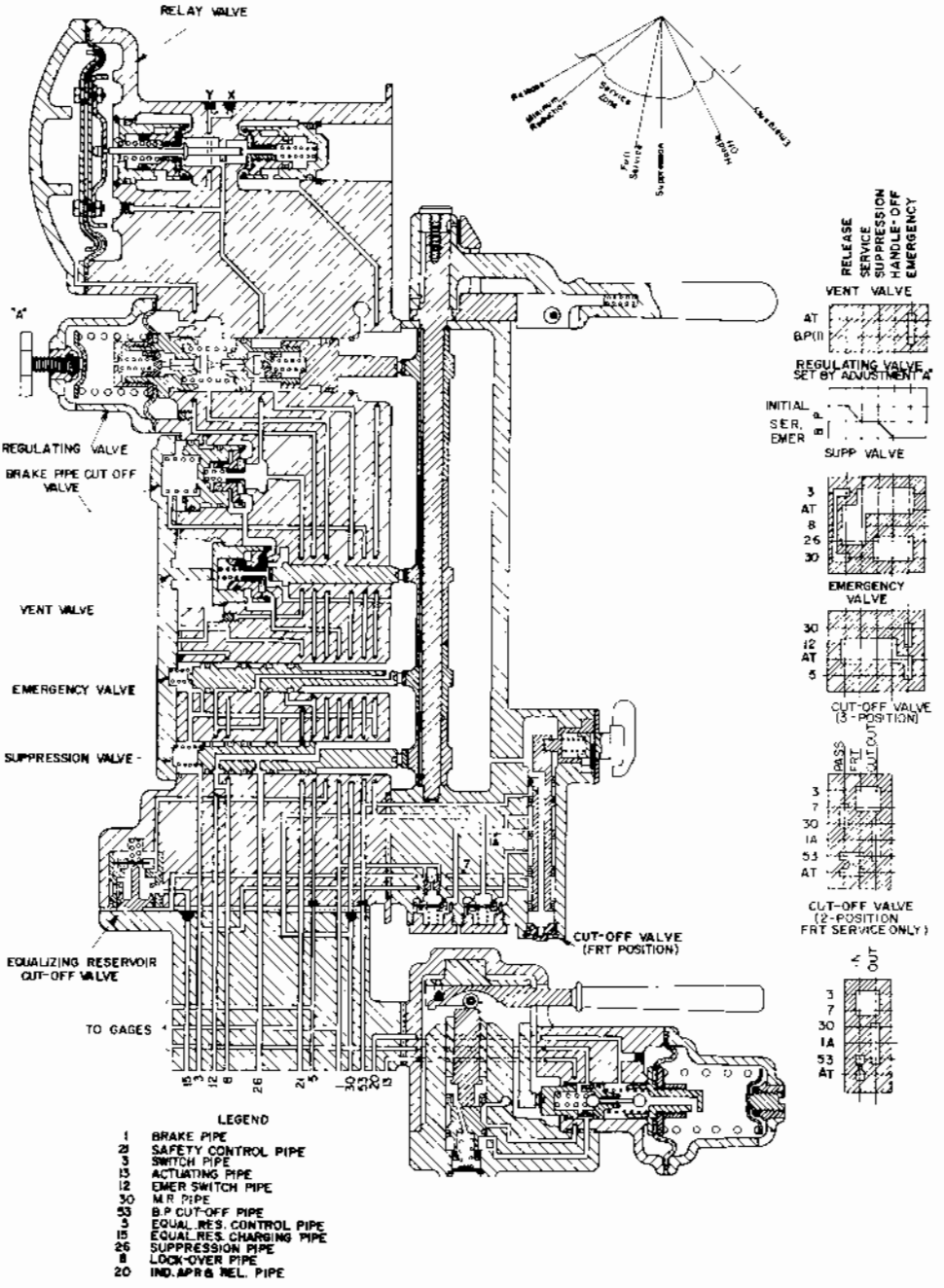
A-19 Flow Indicator Adapter

The A-19 Flow Indicator Adapter, located in the main reservoir supply pipe to the brake valve, has the proper pipe connections for installation of an air flow indicator. The adapter contains a spring loaded check valve with a drilled orifice. During charging the check valve is held open by the air flow to provide unrestricted charging. However, when the equipment becomes sufficiently charged, the reduced air flow will allow the spring to seat the check valve. The drilled ofifice will cause a pressure differential which is used to indicate the condition of the charge during final charging.



OPERATION OF DEVICES

The following sections individually describe the functions of each device as used in the 26-L Brake Equipment.



26-C Brake Valve - Diagrammatic

26-C BRAKE VALVE

The 26-C brake valve is a self-lapping, automatic brake valve designed for use with the 26-L brake equipment. The brake valve, arranged with a pipe bracket, consists of two (2) main portions--the automatic portion designed for regulating the brake pipe pressure controlling both locomotive and train brakes, and the independent portion arranged to apply and release locomotive brakes independent of train brakes and to control the release of a locomotive automatic brake application independent of the train brakes.

The automatic portion is mounted on top of the pipe bracket and secured with four (4) studs, whereas the independent portion is attached to the front of the pipe bracket and secured with three (3) cap screws. All pipe connections are made to the bottom of the pipe bracket and thus provides a compact brake valve installation that occupies a minimum of space and eliminates much of the air piping in the cab. The entire valvular section of the valve is mounted behind the panel, necessitating only the handle operating portion and a cut-off valve section to appear on the face of the panel. The pipe connections to the pipe bracket are designated numerically and are so identified on the diagrammatic drawing.

The cut-off valve portion of the automatic brake valve is provided for purposes of cutting in and cutting out the brake valve, and to permit measurement of brake pipe leakage. The automatic brake valve can be arranged with a three-position or two-position cut-off valve, depending on the intended type of service. The three-position cut-off valve has the positions of "PASS" (Passenger); "FRT" (Freight) and "OUT" while the two-position cut-off valve shows only the positions of "IN" (freight) and "OUT". The two-position cut-off valve is designed for freight service only. The cut-off valve handle is positively held in each of its handle positions by spring load and it is necessary to first press the handle before it can be moved from one position to another.

For all normal operations of the locomotive as a controlling unit, the two or three- position cut-off valve handle must be placed in "PASS" (Passenger); "FRT" (freight); or "IN" (freight) positions respectively, depending on the intended use of the locomotive. "OUT" position is to be used when hauling the locomotive "Dead" or as a trail unit in multiple unit operation. The porting of the cut-off valve incorporates two check valves which provide either brake pipe pressure or main reservoir pressure for the brake pipe cut-off valve, depending upon the existing higher pressure, when the brake valve is cut out.

The Automatic Brake Valve portion consist of the following details:

1. The regulating valve, which is operated by a cam on the brake valve handle shaft, to regulate the air pressure delivered to equalizing reservoir charging pipe No. 15. This pressure is externally connected into equalizing reservoir control pipe No.5 which leads to the outer diaphragm chamber of the relay valve. Movement of the brake valve handle from release position

through the service zone causes the regulating valve to reduce the pressure in pipes No. 15 and 5. The reduction in pressure is proportional to the amount of handle movement, until a full service reduction is obtained in full service position. Adjustment of equalizing reservoir pressure is made in release position by turning adjustment screw "A" of the regulating valve. The self-lapping feature of the regulating valve automatically maintains equalizing reservoir pressure against overcharge and leakage.

2. The relay valve, which is a diaphragm operated valve, establishes a pressure in brake pipe equal to the pressure in equalizing reservoir. It either supplies or exhausts brake pipe pressure in response to changes in equalizing reservoir pressure on the outer face of the diaphragm. During brake applications the equalizing reservoir air pressure on the outer face of the diaphragm is reduced and the relay valve will exhaust brake pipe air pressure an equal amount. The self-lapping feature of the relay valve automatically maintains the brake pipe pressure against overcharges and leakage.

3. The brake pipe cut-off valve blanks the flow of brake pipe air from the relay valve to the equipment when air is delivered into port 53 by (1) positioning the cut-off valve in "OUT" position or (2) an auxiliary device during a break-in-two. Also the spring will close the valve if the brake valve handle is placed in handle off or emergency positions.

4. The emergency valve, which is operated by a cam on the brake valve handle shaft, operates when the handle is moved into emergency position to (1) supply main reservoir air pressure into emergency switch pipe No. 12 and (2) exhaust equalizing reservoir air pressure in pipe 5.

5. The vent valve, which is operated by a cam on the brake valve handle shaft, open when the handle is moved into emergency position and quickly exhausts brake pipe air pressure.

6. The suppression valve, which is cam-operated from the brake valve handle shaft, provides main reservoir air supply to suppression pipe No. 26 in Suppression, Handle-Off, and Emergency positions of the brake valve to suppress penalty brake applications. This valve also functions in these handle positions to blank lock-over pipe No. 8 for resetting the brake application valve prior to releasing a penalty brake application. The suppression valve also functions to supply main reservoir air to switch pipe No. 3 with the brake valve handle in Release Position.

7. The equalizing reservoir cut-off valve is provided to permit operation of trains employing either direct or graduated release type brakes. When the brake valve cut-off valve is positioned for freight service, the equalizing reservoir cut-off valve is held open in release position only. Thus the equalizing reservoir air pressure can only be restored for releases in release position. When the cut-off valve is positioned for passenger service, the equalizing reservoir cut-off valve is held open in all brake valve handle positions. The equalizing reservoir air pressure may be partially restored for graduated releases.

The automatic brake valve portion is controlled by moving its handle through a zone of six positions, which are indicated on the diagrammatic drawing. The function of each handle position is as follows:

Release

This is the position for charging the brake system and for releasing an automatic 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 valve to passage 7 and 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, 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 pressure developed in Port No. 15 is likewise developed in the equalizing reservoir volume and port No. 5. 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 inwardly 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 the 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 thus to pipe No. 1 in the pipe bracket.

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 to 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 to restore the brake pipe pressure to equalizing reservoir pressure, after which the supply valve will again become seated.

Service

This position consists of the minimum reduction position, the service zone and full service position at the right from Release position. As the handle is moved through this sector, the brake pipe pressure reduction is increased gradually, until in full Service position a full service brake pipe reduction has been obtained. Movement of the brake valve handle to minimum reduction position provides a reduction of approximately 6 to 8 psi pressure in the equalizing reservoir which is in turn reflected in a similar brake pipe pressure reduction by the relay valve portion.

When the automatic brake valve handle is moved to some intermediate service position, the 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 valve in "FRT" position, the equalizing reservoir cut-off valve is closed, but as soon as a pressure differential is set up 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 to reduce 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 be moved outward, thus unseating the relay valve exhaust valve to allow 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.

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

This position is used to nullify or suppress a penalty 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.

Handle-Off

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 and the various valves within the brake valve are positioned to make inoperative the normal operating functions.

Emergency

This position of the brake valve handle is used to vent brake pipe pressure at the fastest possible rate to zero to produce an emergency brake pipe reduction. 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. 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 also vent to zero. A cam on the brake valve handle shaft functions to unseat a large capacity vent valve to supplement the brake pipe venting, thus resulting in a rapid or emergency rate of brake pipe pressure reduction at the brake valve.

Independent Brake Valve Operation

The SA-26 Independent Brake Valve, provides independent control of the locomotive brake cylinder pressure irrespective of the automatic brake. 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 pipe bracket is connected to control port No. 16 at the locomotive relay 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 be moved 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 thus flows into port No. 13 which, in turn, is connected to the quick release portion of the control valve which then functions to release the locomotive brakes. 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.

26-F CONTROL VALVE

The 26-F control valve is an automatic type of control valve consisting of a pipe bracket to which are attached a service portion and a quick release portion. The control valve is capable of responding to service rate or emergency rate of change of the brake pipe pressure and thus develops a brake cylinder pressure from brake pipe reductions with reference to a control reservoir pressure.

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

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

Four check valves are provided for:

(a) Charging the auxiliary reservoir from the brake pipe.

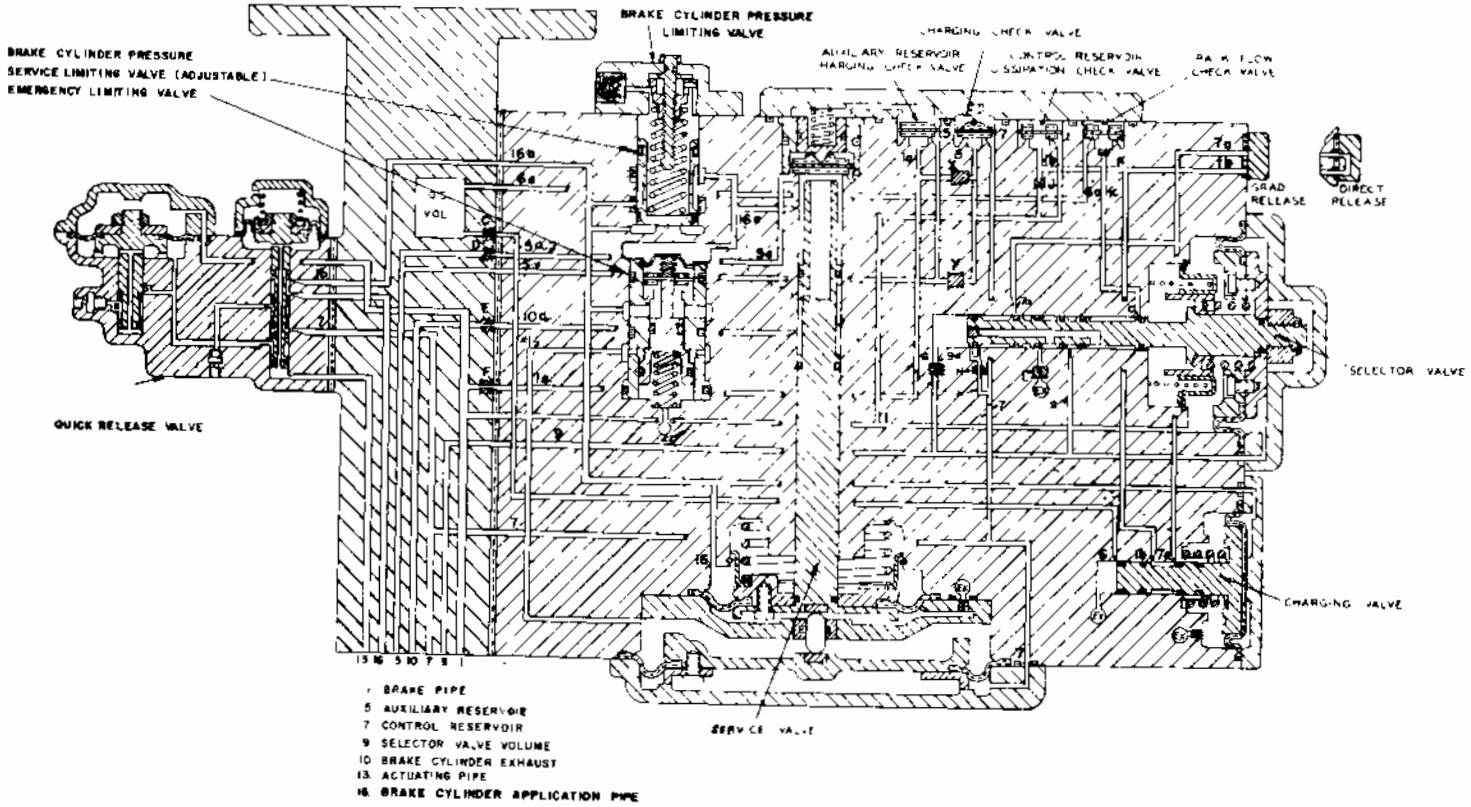
(b) Charging the control reservoir from auxiliary reservoir.

(c) Dissipating control reservoir air into brake pipe during direct release action of the control valve.

(d) Dissipating brake pipe air from the spring chamber of the selector valve to the quick service volume during the initial stages of a brake application.

The direct or graduated release cap determines the type of service in which the control valve is to be used. Direct release position is used for freight service while the graduated release position is used for passenger service.

The selector valve provides the quick service feature and controls the direct and graduated release function.



26-F Control Valve - Diagrammatic

26-F CONTROL VALVE

The service valve portion also contains two (2) brake cylinder limiting valves which will limit the maximum brake cylinder pressure during service and emergency applications. The service limiting valve can be adjusted to meet specific pressure requirements.

The Quick Release Valve Portion of the 26-F control valve is designed to permit release of an automatic brake application. Upon depressing the independent brake valve handle, air pressure developed at the brake valve flows to the control valve, thus causing the operation of the small diaphragm in the quick release valve portion. Movement of this diaphragm and stem interrupts and vents to atmosphere the air pressure developed in the line connected to the brake cylinder. Operation of the small diaphragm in the quick release valve portion initiates the operation of the larger diaphragm and stem. This permits the control reservoir air to vent to atmosphere a sufficient amount to equalize the control reservoir pressure with the brake pipe pressure and thus prevent reapplication of the brakes upon release of the independent brake valve handle.

Control Valve Operation

With the brake valve in Release Position, brake pipe air flows to the brake pipe connection or port No. 1 of the control valve. From port No. 1, the air flows to the following passages and chambers:

1. To the quick release valve and thus to the chamber above the the large diaphragm.

2. To the spring chamber of the selector valve.

3. To the brake pipe diaphragm chamber in the service valve.

4. To the brake cylinder emergency limiting valve, where the brake pipe pressure overcomes the force of the spring and moves the spool valve to its downward position.

5. To the control reservoir dissipation check valve.

6. To the auxiliary reservoir charging check valve.

7. Control reservoir air flows through choke plug H to the spool valve chamber of the selector valve and thus through choke plug G to charge the selector reservoir.

26-F CONTROL VALVE

If the brake system is fully charged, the identical pressures will exist above and below the large diaphragm in the service valve, and, with the aid of the large spring, the diaphragm assembly will be positioned in its downmost position.

When a brake application is made, the brake pipe pressure in Port No. 1 will be reduced. This pressure reduction in brake pipe will occur in the spring chamber of the selector valve and the chamber above the large diaphragm of the service valve. The pressure differential that exsist across the diaphragms will initiate movement of these valves. The selector valve assembly and stem movement will cause the following to occur:

1. Control reservoir air, charging the selector reservoir through choke plugs H and G, is cut off at the selector spool valve.

2. Quick service action occurs when brake pipe air in the spring chamber of the selector valve flows to the backflow check valve and hence to the quick service volume. The air pressure in the quick service volume in the pipe bracket is dissipated through choke plug C and thus to the passage which leads to the charging valve where the exhaust port is located.

When the application valve is opened by the upward movement of the service valve stem, auxiliary reservoir air connected to the port No. 5 in the pipe bracket is admitted into the system. This air flows through the brake cylinder service limiting valve and hence to the following chambers:

1. To the face of the charging valve diaphragm, thus initiating a movement of the charging valve which cuts off the exhaust of brake pipe air from the quick service volume to atmosphere.

2. To port No. 16 in the pipe bracket and hence to the brake cylinder.

3. To the large spring chamber in the service valve where continued build-up of pressure forces the diaphragm assembly downward until the combined forces of the spring, the air pressure in the spring chamber and the brake pipe pressure balance the force of the control reservoir air pressure. Whenever this balance point is reached, the service valve will assume a Lap Position.

4. Auxiliary reservoir air flows to the underside of the brake cylinder service limiting valve. Whenever this air pressure increases to a point in excess of the force of the spring, the spool valve moves upward and thus cuts off any further flow of auxiliary reservoir air

through the control valve. The value of the spring force thus limits the maximum pressure delivered to the relay valve during a service application.

Whenever high brake pipe pressures are employed, it is possible to get over reductions with the 26-F control valve; however, an over reduction will not have any effect upon the brake cylinder pressure, since the brake cylinder pressure is determined by the load of the springs in the service and emergency limiting valves.

In Emergency Position of the brake valve, the 26-F control valve functions similarly to that described above; however, several additional features designed into the control valve would be utilized as follows:

1. The increased pressure differential across the diaphragm in the selector valve, as a result of the greater drop of brake pipe pressure, thus positions the diaphragm to enable the valve to not only momentarily provide those features obtained during a service application, but also now the spool valve is positioned to bottle up the selector volume as well as the control reservoir volume.

2. The auxiliary reservoir air flows from the application check valve to the brake cylinder service limiting valve, and the brake cylinder emergency limiting valve. The brake pipe pressure in the emergency limiting valve drops sufficiently to permit the spring to move the spool valve upward, thus unseating the check valve, permitting the auxiliary reservoir air to flow unrestricted to the brake cylinder as well as the other associated member chambers in the control valve. Whenever brake cylinder pressure reaches a point high enough to overcome the force of the emergency limiting valve spring, the spool valve will be forced downward and thus close the check valve which cuts off any further flow of any air to the brake cylinder.

In Release Position of the brake valve, the brake pipe pressure is increased, and when this higher pressure is admitted into the brake pipe chamber above the large diaphragm in the service valve, all of the combined downward forces position the diaphragm assembly and stem to permit the brake cylinder air to vent to atmosphere through the service valve stem and thus to port No. 10 in the pipe bracket. It must be remembered that the air on the face of the charging valve diaphragm is also vented to atmosphere which permits the spring to move the charging valve to its normal position. The continued build-up of brake pipe pressure in the brake cylinder emergency limiting valve overcomes the force of the spring and thus retains the spool valve down, permitting the check valve to remain seated.

26-F CONTROL VALVE

Direct or graduated release is determined by the position of the cap. During release of the locomotive brakes and with the cap in Direct Release, control reservoir air is directed by the selector valve and cap into brake pipe. This causes the loss of pressure differential across the service piston and causes the piston to return in release position. However, if the cap is in graduated release position, control reservoir is blanked off from brake pipe. The continuance of pressure differential on the service piston will permit graduated release.

The quick release portion of the 26-F control valve functions to release only the locomotive brakes after an automatic brake application has been made. Main reservoir air flows from the independent brake valve when the handle is depressed. This air enters port No. 13 in the pipe bracket of the 26-F control valve and thus to the underside of the small diaphragm of the high pressure valve. The force of the air pressure overcomes that of the spring, and the diaphragm assembly and stem are positioned in an uppermost position. Control reservoir pressure may then flow through the valve stem to the underside of the large diaphragm in the quick release portion. The pressure of the control reservoir being higher than that of brake pipe, positions this diaphragm assembly and stem in its uppermost position. With both diaphragm assemblies and stems now in the uppermost position, the air in port No. 16, which is connected to the brake cylinder, is permitted to vent to atmosphere through an exhaust port, whereas the air in the control reservoir connected to port No.7 is also permitted to vent to atmosphere at a controlled rate through an exhaust port. The control reservoir will continue to vent to atmosphere until the brake pipe pressure exceeds that of control reservoir when at such a time the differential pressure across the large diaphragm will be reversed and the diaphragm assembly and stem will be forced downward, thus cutting off the exhaust of control reservoir air to atmosphere. The decrease of control reservoir air pressure is necessary, since it must be reduced a sufficient amount to equalize with brake pipe pressure and thus prevent reapplication of the locomotive brakes upon the release of the independent brake valve handle.

26-D CONTROL VALVE

The 26-D control valve is an automatic type of control valve consisting of a common pipe bracket to which are attached a service valve portion and a quick release valve portion. The control valve is capable of responding to the service rate of change of the brake pipe pressure and thus develops brake cylinder pressure from brake pipe reductions with reference to a control reservoir pressure.

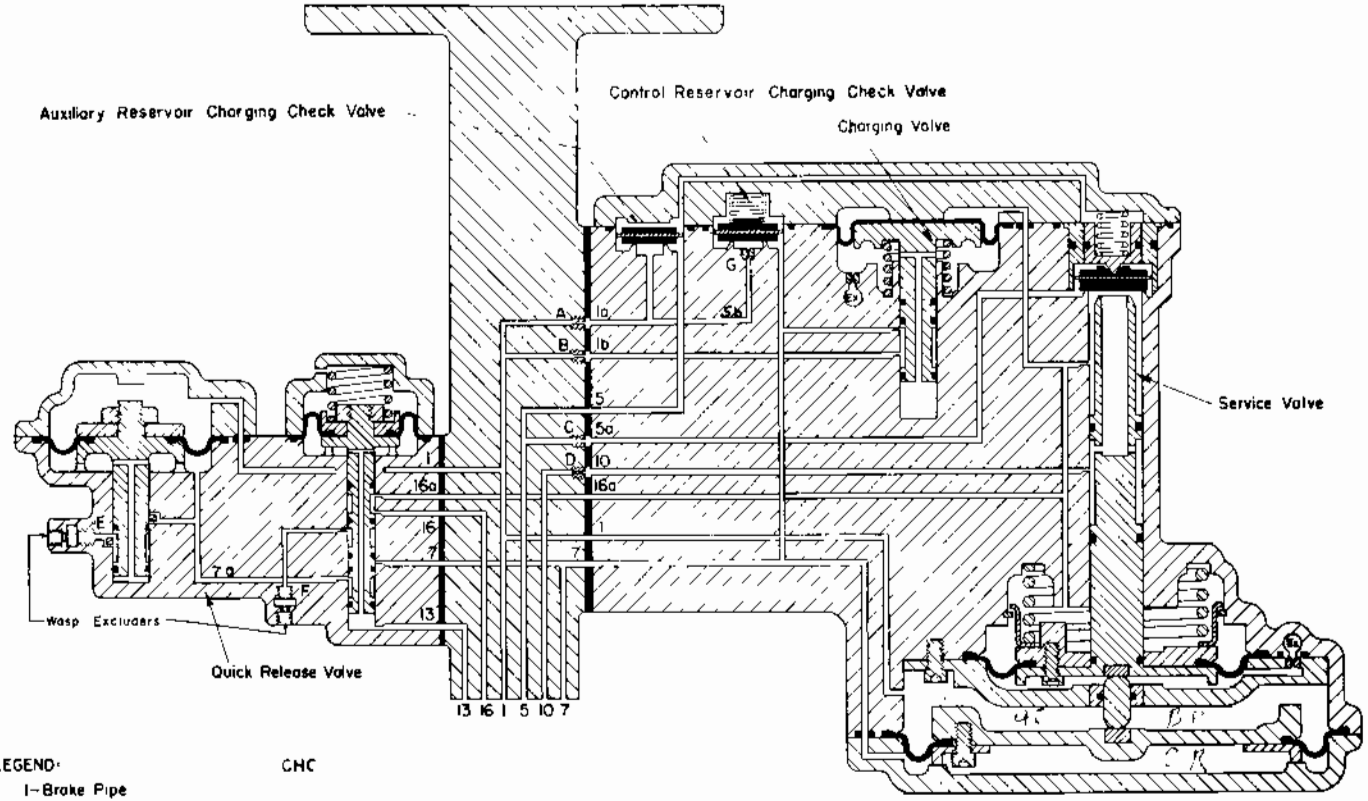
The pipe connections to the pipe bracket are designated numerically and are so identified on the diagrammatic drawing.

The Service Valve Portion contains the service valve, which consists of two (2) diaphragms selected for proper reference of brake cylinder development guided by reduction in brake pipe pressure. The service valve portion of the control valve includes an application and release valve element which controls the movement of air pressure from the auxiliary reservoir to the relay valve and the movement of air pressure from the relay valve to exhaust at the control valve. A reduction in brake pipe pressure causes the valve assembly to open the auxiliary reservoir port and thus supply and regulate the air pressure to the relay valve with reference to brake pipe reduction. An increase in brake pipe pressure causes operation of the exhaust valve to control and exhaust the release of air pressure from the relay valve to atmosphere at the control valve. The diaphragm area ratios, together with the spring arrangement included in the service valve, permit stable operation of the automatic brake together with proper development of brake cylinder pressure to operate satisfactorily with other systems of automatic air brake control. The service portion also includes a charging valve to permit charging of the control reservoir pressure to brake pipe pressure during release operation of the automatic brake valve and to cut off this charge on the initial application of the automatic brakes.

The two (2) check valves are provided for:

(a) Charging the auxiliary reservoir from the brake pipe.
(b) Charging the control reservoir from auxiliary reservoir.

The Quick Release Valve Portion in the 26-D control valve is arranged to permit release of an automatic brake application developed by the service portion upon actuation of the independent brake valve. Depression of the independent brake valve handle develops air pressure at the brake valve to flow to the control valve and thus causes the operation of the small diaphragm of the quick release portion. Operation of this diaphragm interrupts and vents pressure developed in the line connected to the relay valve. Operation of this small diaphragm also operates the larger diaphragm to reduce the control reservoir to atmosphere a sufficient amount to equalize the control reservoir with brake pipe pressure and prevent reapplication of the brakes upon release of the independent brake valve handle.



26-D Control Valve Diagrammatic

26-D CONTROL VALVE

Control Valve Operation

With the brake valve in Release Position, brake pipe air flows to the brake pipe connection or Port No. 1 of the control valve. From port No. 1 the air flows to the following passages and chambers:

1. To and through choke "A" to the auxiliary reservoir charging check valve. The valve is unseated and air continues to flow to not only the spring side of the service application check valve but also to passage No. 5, which connects to port No.5 and the auxiliary reservoir and to the underside of the control reservoir charging check valve.

2. Air flows from port No. 1, to and through choke "B" to the spool valve of the charging valve and thus to the top of the control reservoir charging check valve and also to the control reservoir diaphragm chamber as well as the control reservoir.

3. Air flows to the brake pipe diaphragm chamber in the service portion.

4. Air flows to the top of the large diaphragm located in the quick release valve portion.

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

When the brake valve is positioned in service position, the brake pipe pressure in port No. 1 will be reduced the amount as is determined by the position of the brake valve handle. This reduction of brake pipe pressure will also occur in the brake pipe chamber above the large diaphragm in the service valve portion. The differential pressure that now exists across the diaphragm will initiate a movement of the diaphragm assembly and stem to open the application valve.

With the opening of the application valve, auxiliary reservoir air connected to port No. 5 is admitted into the system. Auxiliary reservoir air flows to not only the top of the diaphragm of the charging valve, thus sealing off the control reservoir air pressure, but auxiliary reservoir air also flows to the large spring chamber in the service valve portion as well as passage 16a, which leads to the spool valve of the quick release valve and thus to port No. 16 in the pipe bracket, which is connected to the relay valve. The continued build-up of pressure in the spring chamber in the service valve portion forces the diaphragm assembly down until the com-

bined forces of the spring, as well as the air pressure in the spring chamber and the brake pipe pressure, balance the force of the control reservoir pressure. Whenever this balance point is reached, the service valve will assume a lap position. Any further drop of brake pipe pressure will allow the diaphragm assembly to move upward again, thus admitting more auxiliary reservoir air into the system until the balance point is again reached.

In Emergency Position of the brake valve, the 26-D control valve functions as described above. However, the function occurs at an emergency rate instead of a service rate.

In Release or Recharge Position of the brake valve, the brake pipe pressure is increased; and when this higher pressure is admitted into the brake pipe chamber above the large diaphragm, all of the combined downward forces position the diaphragm assembly and stem to permit the relay valve air to vent to atmosphere through the service valve and thus to port No. 10.

It must be remembered that the air above the charging valve diaphragm is also vented to atmosphere, which permits the charging valve to assume its uppermost position. The air in the spring chamber in the service valve is also vented to atmosphere during the release and recharge of the brake system.

The quick release portion functions to release only the locomotive brakes after an automatic brake application has been made. Main reservoir air flows from the independent brake valve when the handle is depressed. The air enters port No. 13 in the pipe bracket of the 26-D control valve and thus to the underside of the small diaphragm piston of the quick release portion. The force of the air pressure overcomes that of the spring and the diaphragm assembly and stem are moved upward.

Control reservoir pressure may then flow through the valve stem to the underside of the large diaphragm in the quick release portion. The pressure of the control reservoir being higher than that of brake pipe positions this diaphragm assembly and stem in its uppermost position.

With both diaphragm assemblies and stems now in the uppermost position, the air in port No. 16 connected to the relay valve is permitted to vent to atmosphere through choke "F", whereas the air in the control reservoir connected to port No. 7 is also permitted to vent to atmosphere at a controlled rate through choke "E". The control reservoir will continue to vent to atmosphere until the brake pipe pressure exceeds that of control reservoir when at such times the differential across the large diaphragm in the quick release portion will be reversed and the diaphragm assembly and stem will be forced downward, thus shutting off the escape of control reservoir air to atmosphere. The decrease of control reservoir air pressure is necessary, since it must be reduced a sufficient amount to equalize

with brake pipe pressure and thus prevent reapplication of the release of the independent brake valve handle.

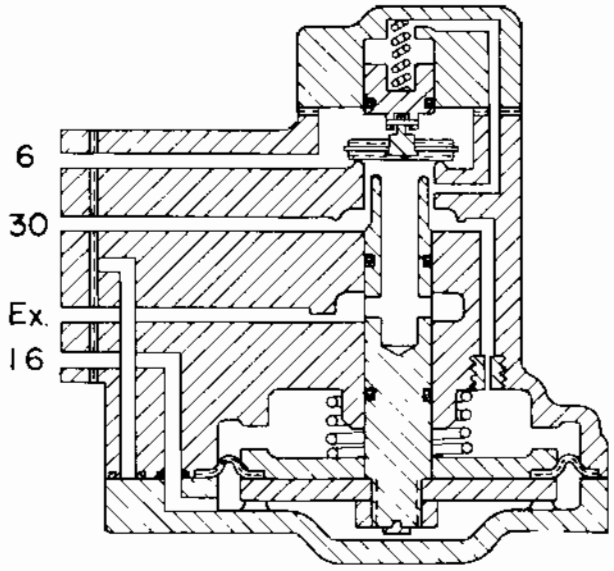
J-1 RELAY VALVE

The J-1 Relay Valve is a diaphragm-operated, self-lapping valve that functions to supply and exhaust air to the brake cylinders during brake applications.

The relay valve consists of a single valve portion which is attached to a pipe bracket that may be arranged for either suspension or floor mounting.

The valve portion is designed to contain a single diaphragm assembled with followers and a spool valve. The movement of this assembly unseats a check valve to admit air throughout passages and chambers within the valve portion as well as to the pipe bracket.

The pipe bracket is arranged with pipe connections that are designated numerically, and these are so identified on the diagrammatic.



LEGEND

6 Supply
16 Control
30 Delivery

J-1 Relay Valve - Diagrammatic

RELAY VALVE

Controlled air pressure admitted to Port 16 in the pipe bracket flows to the face of the large diaphragm, initiating a movement of the diaphragm assembly and stem. The stem engages the check valve which is opened to allow supply air from Port 6 to enter into the passage leading to Port 30 in the pipe bracket that is connected to the brake cylinders. Passage 30 is also connected to the chamber on the spring side of the large diaphragm. The build-up of brake cylinder air pressure, coupled with the force of the spring within the valve, oppose the movement of the diaphragm assembly as initiated by the controlled air pressure admitted into Port 16. An equalization of forces across the diaphragm positions the diaphragm assembly to allow the check valve to seat and also allows the valve to remain in lap position.

The maintaining feature of the J-1 relay valve operates if an air leak exists in the brake cylinders. The pressure in Port 30 as well as that pressure in the spring chamber of the valve would drop and thus the diaphragm assembly would move upward to open the check valve. Supply air would again flow into Port 30 as well as the spring chamber until an equalization of forces across the diaphragm again would be reached. The diaphragm assembly would again be positioned to permit the valve to attain a lap position.

A reduction of controlled air pressure would initiate the movement of the diaphragm assembly to permit brake cylinder air to exhaust from the relay valve. A graduated release of brake cylinder air may also be obtained whenever the controlled air pressure in Port 16 is intermittently released. The pressure differential across the diaphragm positions the stem to exhaust the brake cylinder air. Whenever brake cylinder air pressure is reduced sufficiently in the spring chamber of the valve, an equalization of forces across the diaphragm occurs again and the valve would assume a lap position.

The complete reduction of the controlled air pressure in Port 16 would initiate a downward movement of the diaphragm assembly to permit brake cylinder air to exhaust from the relay valve. With the valve in this position, brake cylinder air connected to Port 30 flows unrestricted through the valve portion and is completely exhausted at the pipe bracket.

MU-2-A VALVE

The MU-2-A valve is a manually operated valve, arranged with a pipe bracket, and is used to enable a 26-L equipped locomotive to be multiple-united with not only 6 or 26 type equipment but also with a 24-RL equipped locomotive. The MU-2A valve pilots the F-1 selector valve which is a device that enables the equipment of one locomotive to be controlled by the equipment of another.

The three escutcheon plates available for this valve are listed in the following table.

3 Position Black Lettering	3 Position Red Lettering	2 Position Black Lettering
LEAD	LEAD	LEAD
TRAIL 6-26	TRAIL 6	------
TRAIL 24	TRAIL 26-24	TRAIL 24-26

The porting arrangement covered in the following description is not affected by the type of escutcheon plate.

In "LEAD" position, main reservoir pressure in port No. 30 is blanked, and ports Nos. 53 and 63 are connected to exhaust at the MU-2A valve. Independent brake control pressure emanating from the independent brake valve is connected to port No. 2 of the MU-2-A valve through the spool valve and to port No. 20. Port No. 20 at the MU-2-A valve is connected to not only port No. 20 of the F-1 selector valve where the air is blanked but also to port No. 16 of the locomotive relay valve to provide for independent brake applications on the lead locomotive. The actuating pipe at the independent brake valve (port No. 13) is connected to port No. 3 of the MU-2-A valve through the spool valve and to port No. 13, the actuating pipe, to the control valve.

When the 26-L equipped locomotive is trailed behind a locomotive using No. 6 or 26 brake equipment, the MU-2-A valve is positioned in "TRAIL-6 or 26" position. Ports Nos. 2, 3, 13 and 20 are blanked at the MU-2-A valve. Main reservoir pressure flowing to the MU-2-A valve to port No. 30 is connected through the spool valve to ports Nos. 53 and 63, which are, in turn, connected to ports Nos. 53 and 63, respectively, at the F-1 selector valve. This positions the F-1 selector valve to allow brake cylinder equalizing pipe air, port No. 14, to be connected to port No. 16 and to port No. 20, both of which are connected through the double check valve and thus to port No. 16 in the locomotive relay valve during a brake application from the lead locomotive.

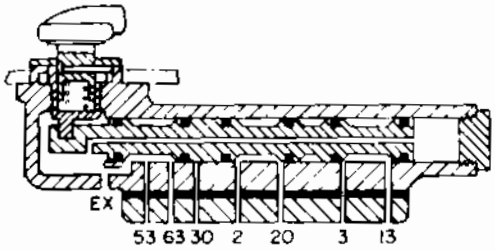
When the 26-L equipped locomotive is trailed behind a locomotive using 24-RL brake equipment, the MU-2-A valve is positioned in "TRAIL-24" position.

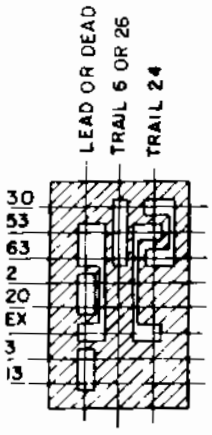
MU-2-A VALVE

Ports Nos. 2, 3, 13 and 20 are blanked and port No. 53 is connected to exhaust at the MU-2-A valve. Main reservoir pressure entering port No. 30 is connected to port No. 63, which, in turn, is connected to port No. 63 of the F-1 selector valve. This positions the F-1 selector valve to permit brake cylinder equalizing pipe air to flow to port No. 14 and thus to port No. 20 in the F-1 selector valve, the double check valve and thus to port No. 16 in the locomotive relay valve during brake application initiated from the lead locomotive.

LEGEND

2 Ind. App. and Rel. Pipe
3 Actuating Pipe
13 Actuating Pipe
20 Ind. App. and Rel. Pipe
30 Main Res.
53 Mult. Unit Control Pipe
63 Mult. Unit Interlock Pipe





MU-2 Valve - Diagrammatic

F-1 SELECTOR VALVE

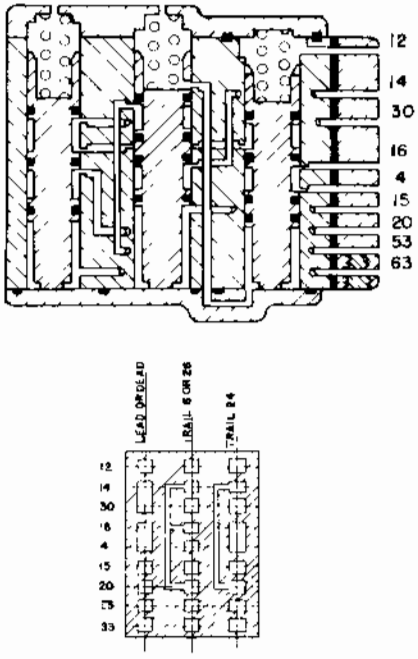
The F-1 selector valve performs the function of arranging the brake equipment on the locomotive to lead or trail other types of brake equipment. It performs the function of protecting a trailing locomotive brake equipment by automatically re-setting the brake control to lead position in the event of a separation between locomotive units. The selector valve consists of three sections. The protection valve is controlled by pipe No. 15. The transfer sections are controlled by pressure in pipes Nos. 53 and 63. Connections are made as shown in the positioning charts for the positions "LEAD", "TRAIL-6 or 26 Equipment" and "Trail-24 Equipment". Operation of the selector valve is under control of the MU valve located in the locomotive cab.

Lead Position

When 26-L equipped locomotive is leading a 6 or 26 equipped locomotive, pressure to ports Nos. 53 and 63 of the selector valve are vented and connections made as shown under lead position of the positioning diagrammatic. Control valve pressure flows from port No. 4 to No. 16 and from there to the relay valve of the locomotive. Pressure from the brake cylinder line flows from port No. 30 to port No. 14 and hence to the brake cylinder equalizing pipe of the lead locomotive. The brake cylinder equalizing pipe is used to control brakes on trailing units.

LEGEND

4 Auto. Brake Control Pipe
12 Emergency Pipe
14 Brake Cyl. Equalizing Pipe
15 Main Res. Equalizing Pipe
16 Application Pipe
20 Ind. App. and Rel. Pipe
30 Brake Cyl. Pipe
53 Mult. Unit Control Pipe
63 Mult. Unit Interlock Pipe



F-1 Selector Valve - Diagrammatic

F-1 SELECTOR VALVE

Trail-6 or 26 Equipped Locomotives

When the 26-L equipped locomotive is trailing a 6 locomotive, operation of the selector valve is performed by applying pressure to ports Nos. 53 and 63 of the selector valve, causing the selector valve to assume position as shown in the position diagrammatic under Trail-6 or 26 locomotive. Under this condition, air pressure from the brake cylinder equalizing pipe enters port No. 14 and flows to ports Nos. 16 and 20, and thus to the relay valve of the trailing locomotive. Brakes are thus applied on the trailing locomotive in the same manner as brakes are applied to the lead locomotive.

Trail-24 Equipped Locomotives

When a 26-L equipped locomotive is trailing a locomotive equipped with 24 type brake equipment, the F-1 selector valve is positioned by applying air pressure to port No. 63 of the selector valve, and the selector valve makes the connections as shown on the position diagrammatic under Trail - 24. Under this condition, pressure from the control valve enters port No. 4 and flows directly to port No. 16, actuating the relay valve of the locomotive equipment. Air pressure also enters port No. 14 from the brake cylinder equalizing line and flows to port No.20 of the selector valve. This air pressure also actuates the relay valve of the locomotive brake equipment. The brakes on the trailing locomotive are thus actuated by either an automatic brake application or an independent brake application initiated by the leading 24-RL brake equipment.

P-2-A BRAKE APPLICATION VALVE

The P-2-A Brake Application valve operates to cause a full service brake application when actuated by one of the following features:

1. Overspeed Control
2. Train Control
3. Safety Control

The P-2-A Brake Application valve is mounted on a separate pipe bracket with the pipe connections numerically designated as shown on the diagrammatic view.

During normal release operation, main reservoir air flows through port 30 to the spool valve side of the application valve diaphragm and through a choke to safety control port 10 and spring chamber side of the diaphragm.

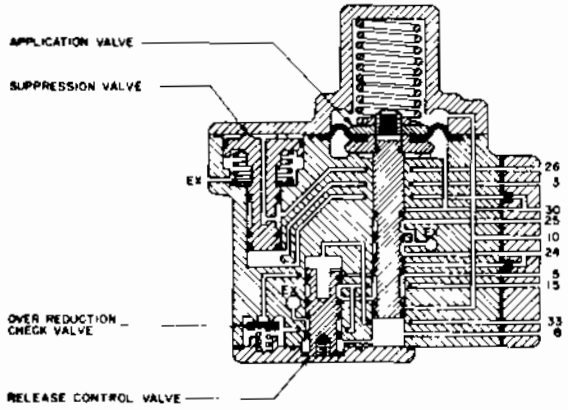
The application valve diaphragm and spool valve are held in release position by the spring to make the following port connections:

1. Equalizing reservoir air in port 5 to the release control valve and over reduction check valve.

2. Reduction limiting reservoir, port 24, and power knockout switch, port 25, to exhaust.

3. Main reservoir air in port 30 and safety control air in port 10 are air blanked off.

The release control valve is held in release position by air pressure in switch pipe 33. In release position the release control valve spool connects equalizing reservoir air in port 5 to equalizing reservoir charging, port 15. The suppression valve is held in release position by the piston spring. In release position the suppression valve spool connects safety control air in port 10 to the foot valve port 3.



LEGEND

3 Fout Valve
5 Equalizing Reservoir
8 Lock-over Pipe
10 Safety Control
15 Equalizing Res. Charging
24 Reduction Limiting Res.
25 Power Knock-Out
26 Suppression Pipe
30 Main Res.
33 Switch Pipe

P-2-A Brake Application Valve Diagrammatic

P-2-A BRAKE APPLICATION VALVE

During a penalty application, the air pressure is reduced in either port 3 or port 10 of the application valve. Subsequently, the air pressure in the spring chamber is also reduced. The diaphragm assembly and spool valve are then positioned upward to a penalty application position as a result of the differential that exists across the diaphragm.

In penalty application position, the application valve spool valve makes the following port connections:

1. Main reservoir air from port 30 into power knockout port 25.

2. Safety control air in port 10 and the spring side of the diaphragm are connected to lock-over port 8.

3. Equalizing reservoir air in port 5 into reduction limiting reservoir port 24.

The connection of port 5 into port 24 will result in a reduction of equalizing reservoir air pressure and thus produce a brake application.

Following a penalty application, the suppression valve will be forced downward by brake cylinder pressure in suppression port 26 and blank off foot valve, port 3, from safety control port 10.

To release a penalty application the brake valve handle must be moved to suppression position. In this position air in switch pipe 33 is connected to exhaust and lock-over port 8 is blanked off.

Continual supply of main reservoir air through the choke in the pipe bracket will cause a pressure build up in safety control port 10, application valve spring chamber, lock-over port 8 and the end chamber of the release control valve.

The release control valve will move upward and cut-off equalizing reservoir air in pipe 5 from equalizing reservoir charging, pipe 15, to prevent releasing of the brakes while the brake valve is in suppression position.

The application valve will move to release position to blank equalizing reservoir air in port 5 and connect ports 24 and 25 to exhaust.

The over reduction check valve permits a further reduction of equalizing reservoir when the release control valve is in its upward position.

To prevent a safety control penalty application within the allowable time delay, one of the following conditions must be met;

1. The cause of the penalty corrected to stop the loss of pressure in foot valve pipe 3.

2. The brake valve handle moved to suppression position before the penalty application is in effect. This will supply air pressure to suppression port 26 and move the suppression valve downward to blank off foot valve port 3 from safety control pipe 10.

P-2 BRAKE APPLICATION VALVE

A previous design of the P-2-A brake application valve is the P-2 brake application valve. This valve also operates to cause a full service brake application when actuated by one of the following features:

1. Overspeed Control
2. Train Control
3. Safety Control

The P-2 brake application valve is mounted on its own separate pipe bracket. The pipe connections to the pipe bracket are designated numerically and are so identified on the diagrammatic drawing.

The P-2 brake application valve is adapted to provide brake applications when auxiliary braking devices are conditioned for stopping a train. With the locomotive equipment charged and operating normally, main reservoir air enters Port No. 30 in the pipe bracket and the integral passages of the application valve. Here the air positions the diaphragm assembly and spool valve to permit the flow of air to the ports in the pipe bracket, which are connected to the auxiliary braking devices.

The application valve diaphragm and spool valve are held in normal, or release position, by the action of the piston spring. In release position, the spool valve makes the following connections:

1. Main reservoir air from Port No. 30 enters the chamber on the spool valve side of the diaphragm.

2. Main reservoir air passes through the choke, in the body to passage 10a that connects to Port No. 10 or the safety control pipe. The air also enters the chamber on the spring side of the diaphragm and also flows to the passage that leads to Port No. 3 or the foot valve pipe.

3. Equalizing reservoir charging pipe, Port No. 15, is connected with the equalizing reservoir pipe, Port No. 5. This permits the equalizing reservoir charging air flowing from the brake valve to pass through the application valve and thus charge not only the equalizing reservoir but also the equalizing reservoir chamber in the relay valve located in the brake valve.

During a penalty application, the air pressure is reduced in Port No. 3 of the application valve. Subsequently, the air pressure in the spring chamber is also reduced. The diaphragm assembly and spool valve are then positioned to a penalty application position as a result of the differential that exists across the diaphragm. This action connects the integral passages in the spool valve to the other passages in the body of the application valve that lead to ports in the pipe bracket.

P-2 BRAKE APPLICATION VALVE

In penalty application position, the movement of the diaphragm assembly and spool valve makes the following connections:

1. Main reservoir air in Port No. 30 and in the diaphragm chamber on the spool valve side enters into the passage that connects Port No. 25 and thus to the power knockout switch.

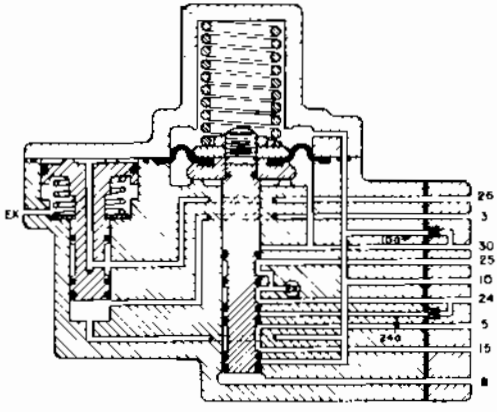
2. Main reservoir air, which passes through the choke, in the body and through the integral passage 10a in the application valve body, is thus connected to Port No. 8. The chamber on the spring side of the diaphragm, as well as the timing reservoir that is connected to Port No. 10, is also integrally connected to Port No. 8. Port No. 8 is connected to the lock-over pipe which extends to the brake valve.

3. Equalizing reservoir charging air, Port No. 15, is blanked at the spool valve.

4. Equalizing reservoir air, Port No. 5, is connected through the spool valve to passage 24a, containing a choke plug, and thus to Port No. 24 to which is connected a reduction limiting reservoir. Equalizing reservoir air is now also connected to the reduction limiting reservoir.

To prevent a penalty application within the allowable delay time, the brake valve handle is moved to suppression position and the following action occurs:

1. The exhaust of air at the brake valve as a result of the open passage provided in Port No. 8 is not cut off.



LEGEND

3 Foot Valve
5 Equalizing Res.
8 Lock-over Pipe
10 Safety Control
15 Equalizing Res. Charging
24 Reduction Limiting Res.
25 Power Knock-Out
26 Suppression Pipe
30 Switch Pipe

P-2 Brake Application Valve - Diagrammatic

2. Main reservoir air supplied from the suppression valve in the brake valve flows through the connecting pipe to Port No. 26 in the application valve. The large piston in the application valve is actuated and thus cuts off the flow of air from the chamber of the spring side of the diaphragm to Port No. 3.

3. Main reservoir air, however, is continuously supplied to the chamber on the spring side of the diaphragm, through the choked port in the application valve body, The continued build-up of this pressure once again positions the diaphragm assembly and spool valve in normal or release position.

A-1 CHARGING CUT-OFF PILOT VALVE

The A-1 Charging Cut-off Pilot Valve operates during a break-in-two to provide the following features:

1. Automatic Sanding

2. Power knockout

3. Dynamic Cut-off

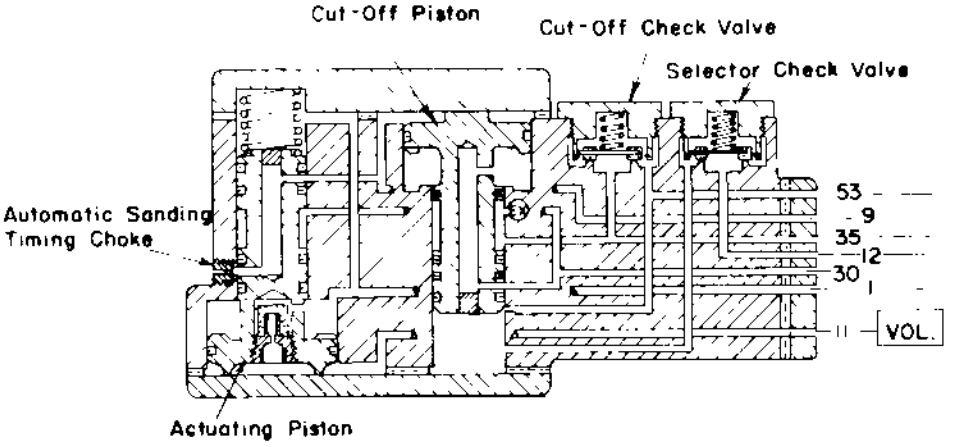
4. Brake Pipe Cut-off

This valve is mounted on a seperate pipe bracket with the pipe connections numerically designated as shown on the diagrammatic view.

During normal release operation, main reservoir air flows through port 30 to the under side of the cut-off piston and to the actuating piston spool. Brake pipe air in port 1 flows to the under side of the actuating piston and thence through a choke to port 11 and the volume.

LEGEND

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



A-1 CHARGING CUT-OFF PILOT VALVE

If a break-in-two occurs, brake pipe air in port 1 and the upper side of the actuating piston is rapidly exhausted. Restriction of air pressure in port 11 by the piston choke causes a differential in pressure across the actuating piston, causing the piston to move into applied position.

In applied position, the actuating piston spool valve makes the following port connections:

1. Main reservoir air in port 30 to the upper side of the cut-off piston and to port 9.

2. Actuating piston chamber air to automatic sanding timing choke exhaust.

The actuating piston will remain in applied position until the air pressure in the port 11 volume has exhausted through the piston choke and automatic sanding timing choke at which time the piston spring will reset the piston to release position. The air pressure in port 9 is then connected to exhaust.

Delivery of main reservoir air pressure to the upper side of the cut-off piston will move the cut-off piston to applied position. In applied position, the cut-off piston spool valve makes the following port connections:

1. Main reservoir air in port 30 to dynamic cut-off port 35 and also through the cut-off check valve to the brake pipe cut-off port 53.

2. The underside of the cut-off piston to exhaust.

3. Emergency switch port 12 to the under side of the cut-off piston.

The cut-off piston will remain in applied position until the brake valve handle is moved to emergency position. When the brake valve handle is moved to emergency position compressed air is delivered through emergency switch port 12 and selector check valve to the under side of the cut-off piston. The cut-off piston will move to release position and make the following port connections.

1. Dynamic cut-off port 35 to exhaust.

2. Main reservoir port 30 to the underside of the cut-off piston.

3. Emergency switch port 12 to brake pipe cut-off port 53.

When an emergency brake application is made at the brake valve, the actuating piston will function as described during a brake-in-two. The cut-off piston, however, will be prevented from moving to applied position by main

reservoir air delivered from the brake valve to pipe 12 and through the selector check valve to the under side of the cut-off piston.

Also when the brake valve is cut-out and non-operative, the function of the cut-off piston is prevented by air pressure delivered through brake pipe cut-off pipe 53 to the under side of the cut-off piston.

HB-5 RELAYAIR ® VALVE

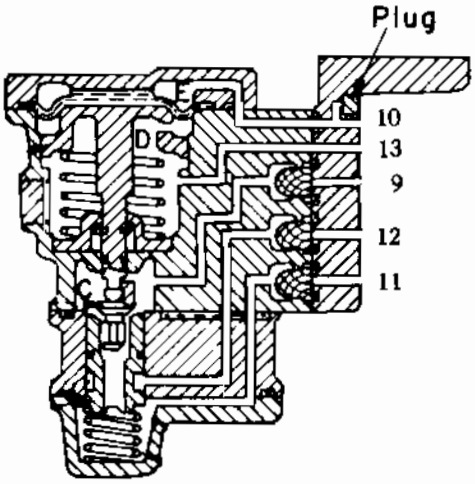
The HB-5 RELAYAIR Valve is a pneumatic, double piloted, three-way valve that changes the air passages through it when air pressure of a predetermined amount or more is in the control chamber. It is used in a number of ways for a variety of purposes. The three basic uses are:

1. As a non-graduated relay to provide a large flow of air from a separate source when piloted by a small amount of control air and to stop this flow of air when the control pressure is vented.

2. As an interlock to govern the flow of air in one circuit by placing its control in another independent air circuit .

3. As a sequence valve for such circuit functions as timing, cycling, etc.

Referring to the diagrammatic view, piloting or control air pressure enters through port 10 to the chamber above the diaphragm. When this air pressure reaches the spring setting, the diaphragm and follower move downward, compressing the large spring. The upper valve is seated to blank off port 9 from port 11. As the downward movement continues the lower valve is unseated and connects port 11 into port 12.



LEGEND

9 Supply or Exhaust
10 Control
11 Delivery
12 Supply or Exhaust
13 Nullifying

HB-5 RELAYAIR ® Valve Diagrammatic

HB-5 RELAYAIR ® Valve

When the control pressure above the diaphragm is vented, the large spring will return the diaphragm and follower to the upward position. Ports 9 and 11 are then reconnected and port 12 is blanked off.

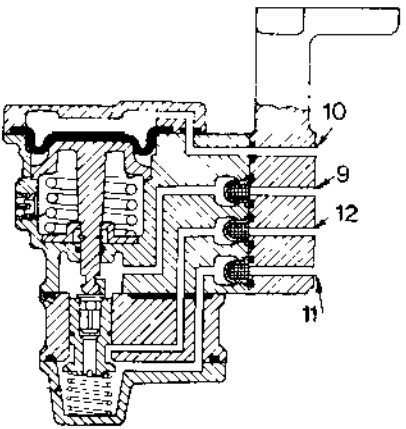
Also nullifying air pressure may be supplied through port 13. Pressure build-up beneath the large diaphragm will return the diaphragm to its upward position against the control pressure.

H-5-A RELAYAIR ® Valve

The H-5-A RELAYAIR Valve is similar in construction and operation to the HB-5 RELAYAIR Valve except that the spring chamber under the diaphragm is vented to atmosphere through a wasp excluder in the body, and thus port No. 13 is entirely eliminated from the pipe bracket.

LEGEND

9 Supply or Exhaust
10 Control
11 Delivery
12 Supply or Exhaust



H-5-A RELAYAIR ® Valve Diagrammatic

A-1 REDUCTION SELECTOR VALVE

The A-1 Reduction Selector Valve provides an automatic split reduction during a penalty brake application.

The A-1 Reduction Selector valve is mounted on a separate pipe bracket with the pipe connections numerically designated as shown on the diagrammatic view.

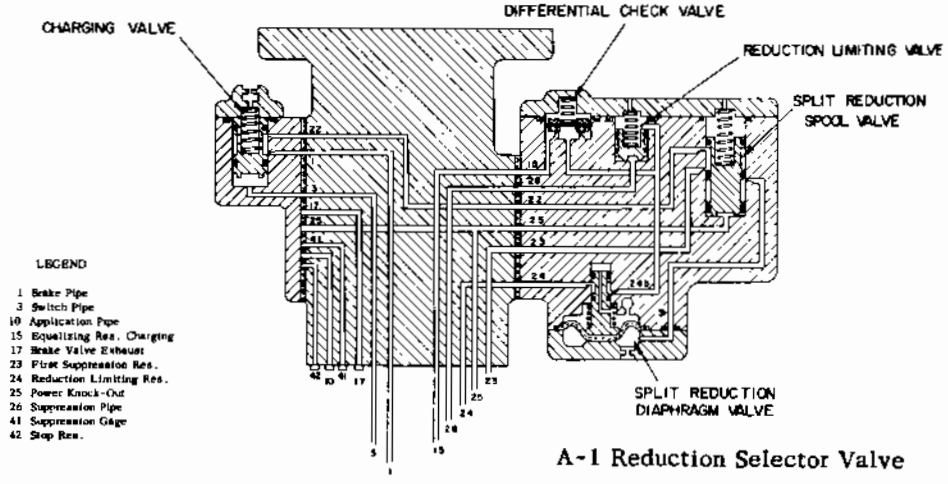
During normal release operation, air pressure in port 3 holds the charging valve in release position. The remaining spool valves are held in release position by springs. Brake pipe air in port 1 flows through the charging valve spool valve to port 22 and thence through the split reduction spool valve to the first suppression reservoir, port 23. Equalizing reservoir air in port 15 flows to the differential check valve which is held seated by a spring.

During a penalty brake application air is delivered to the A-1 Reduction Selector valve by an auxiliary device as follows:

1. Reduction limiting reservoir air (equalizing reservoir) in port 24 to the split reduction diaphragm valve.

2. Power knockout air in port 25 to the underside of the split reduction spool valve.

The admission of equalizing reservoir air into connecting pipe 24 by an auxiliary device causes a reduction in equalizing reservoir pressure for the first part of the split reduction.



A-1 Reduction Selector Valve
Diagrammatic View

A-1 REDUCTION SELECTOR VALVE

The split reduction spool valve is moved upward by air pressure in port 25 to make the following connections:

1. First Suppression reservoir air in port 23 to port 31 and the split reduction diaphragm chamber.

2. Brake pipe air in port 22 is blanked off.

The split reduction diaphragm valve will be moved upward by air pressure in port 31, causing the spool valve to blank off reduction limiting reservoir air in port 24 and retain this pressure at the first reduction level of a split reduction.

The time delay between the first and second parts of the split reduction is determined by the exhausting of the first suppression reservoir through the diaphragm cover choke.

After the pressure in the first suppression reservoir is depleted, the split reduction diaphragm valve will be forced downward by the spring. The spool valve will connect reduction limiting reservoir air in port 24 to port 24b and the reduction limiting valve exhaust.

The exhaust of reduction limiting reservoir air (equalizing reservoir) is the second part of the split reduction. This reduction of pressure will continue until the brake valve handle is moved to suppression position.

When the brake valve handle is moved to suppression position the following occurs:

1. Air is delivered through suppression port 26 to the reduction limiting valve.

2. Air in switch pipe 3 and power knockout port 25 is exhausted.

Air pressure in suppression port 26 moves the reduction limiting valve upward to blank off port 24b from exhaust to terminate the reduction.

The exhaust of air pressure in port 25 permits the split reduction spool valve to be moved downward by the spring and connect port 22 with port 23.

The exhaust of air pressure in port 3 permits the charging valve to be moved downward by the spring and blank off brake pipe air in port 1. Also port 22 is connected to exhaust.

The differential check valve insures a full service reduction in reduction limiting reservoir (equalizing reservoir) air pressure during a penalty brake appli-

cation. Moving the brake valve handle to suppression position will reduce equalizing reservoir charging air, port 15, to a full service reduction pressure. Any reduction limiting reservoir air pressure in excess of the full service reduction pressure will flow through ports 24, 24b and the differential check valve to port 15.

When a penalty brake application occurs after a brake valve initiated application, the first part of the split reduction is eliminated and a direct reduction of reduction limiting reservoir air (equalizing reservoir) is provided. When the brake valve handle is moved to service position the air pressure in switch pipe 3 is exhausted. The charging valve will be forced downward by the spring and make the following connections:

1. Brake pipe air in port 1 is blanked off.

2. First suppression reservoir air in port 22 to exhaust.

The exhuasting of first suppression reservoir air will nullify the time delay provided by the split reduction diaphragm and allows reduction limiting reservoir air to flow directly to exhaust.

A-2 REDUCTION SELECTOR VALVE

The A-2 Reduction Selector Valve provides an automatic split reduction during a penalty brake application, with temporary suppression of overspeed applications.

The A-2 Reduction Selector valve is mounted on a separate pipe bracket with the pipe connections numerically designated as shown on the diagrammatic view.

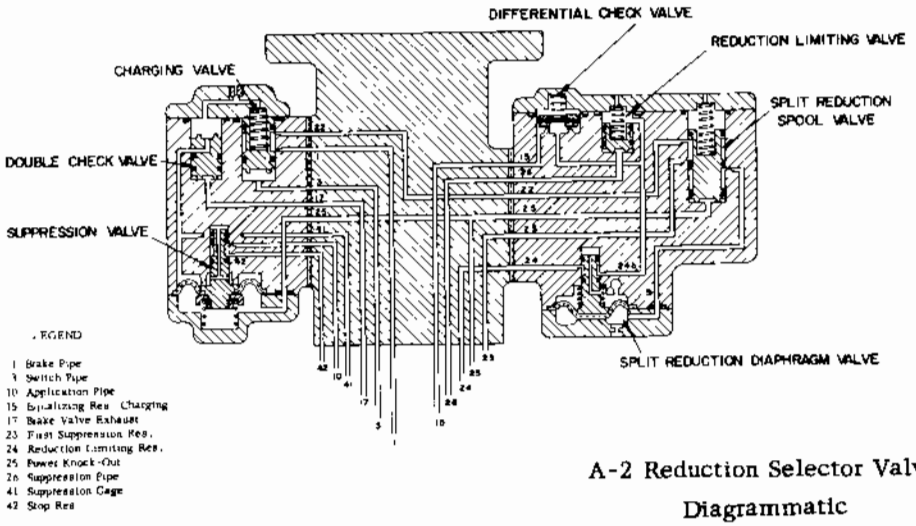
During normal release operation, air pressure in port 3 holds the charging valve in release position. The remaining spool valves are held in release position by springs. Brake pipe air in port 1 flows through the charging valve spool valve to port 22 and thence through the split reduction spool valve to the first suppression reservoir, port 23. Equalizing reservoir air in port 15 flows to the differential check valve which is held seated by a spring.

During a penalty brake application air is delivered to the A-2 Reduction Selector valve by an auxiliary device as follows:

1. Reduction limiting reservoir air (equalizing reservoir) in port 24 to the split reduction diaphragm valve.

2. Power knockout air in port 25 to the underside of the split reduction spool valve.

The admission of equalizing reservoir air into connecting pipe 24 by an auxiliary device causes a reduction in equalizing reservoir pressure for the first part of the split reduction.



A-2 Reduction Selector Valve Diagrammatic

A-2 REDUCTION SELECTOR VALVE

The split reduction spool valve is moved upward by air pressure in port 25 to make the following connections:

1. First Suppression reservoir air in port 23 to port 31 and the split reduction diaphragm chamber.

2. Brake pipe air in port 22 is blanked off.

The split reduction diaphragm valve will be moved upward by air pressure in port 31, causing the spool valve to blank off reduction limiting reservoir air in port 24 and retain this pressure at the first reduction level of a split reduction.

The time delay between the first and second parts of the split reduction is determined by the exhausting of the first suppression reservoir through the diaphragm cover choke.

After the pressure in the first suppression reservoir is depleted the split reduction diaphragm valve will be forced downward by the spring. The spool valve will connect reduction limiting reservoir air in port 24 to port 24b and the reduction limiting valve exhaust.

The exhaust of reduction limiting reservoir air (equalizing reservoir) is the second part of the split reduction. This reduction of pressure will continue until the brake valve handle is moved to suppression position.

When the brake valve handle is moved to suppression position the following occurs:

1. Air is delivered through suppression port 26 to the reduction limiting valve.

2. Air in switch pipe 3 and power knockout port 25 is exhausted.

Air pressure in suppression port 26 moves the reduction limiting valve upward to blank off port 24b from exhaust to terminate the reduction.

The exhaust of air pressure in port 25 permits the split reduction spool valve to be moved downward by the spring and connect port 22 with port 23.

The exhaust of air pressure in port 3 permits the charging valve to be moved downward by the spring and blank off brake pipe air in port 1. Also port 22 is connected to exhaust.

The differential check valve insures a full service reduction in reduction

limiting reservoir (equalizing reservoir) airpressure during a penalty brake application. Moving the brake valve handle to suppression position will reduce equalizing reservoir charging air, port 15, to a full service reduction pressure. Any reduction limiting reservoir air pressure in excess of the full service reduction pressure will flow through ports 24, 24b and the differential check valve to port 15.

When a penalty brake application occurs after a brake valve initiated application, the first part of the split reduction is eliminated and a direct reduction of reduction limiting reservoir air (equalizing reservoir) is provided. When the brake valve handle is moved to service position the air pressure in switch pipe 3 is exhausted. The charging valve will be moved downward by the spring and make the following connections:

1. Brake pipe air in port 1 is blanked off.

2. First suppression reservoir air in port 22 to exhaust.

The exhausting of first suppression reservoir air will nullify the time delay provided by the split reduction diaphragm and allows reduction limiting reservoir air to flow directly to exhaust.

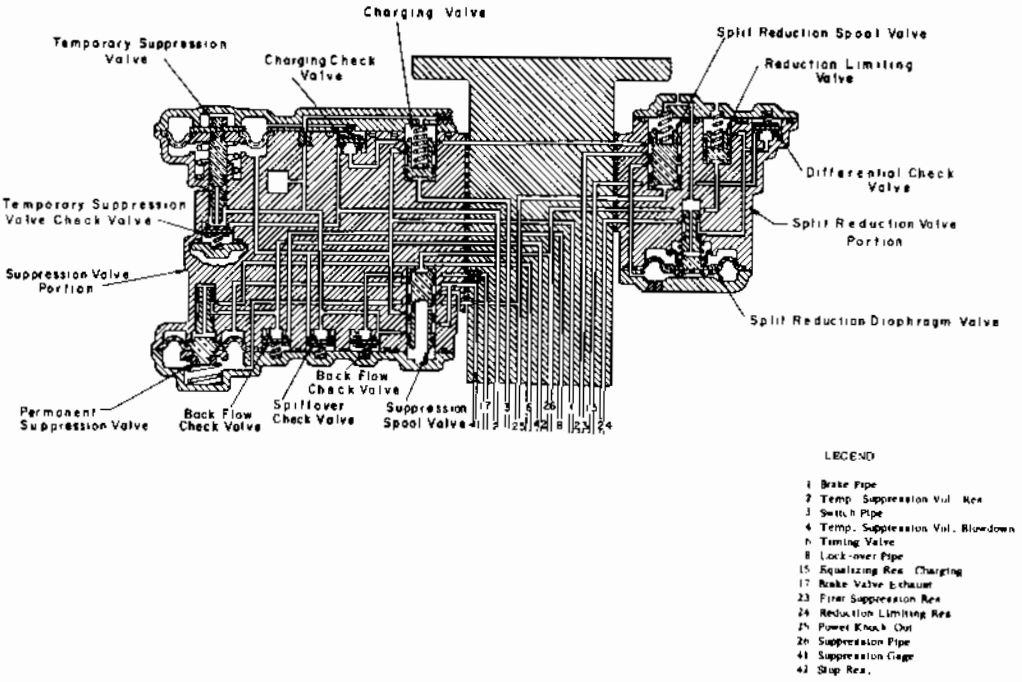
An overspeed initiated penalty brake application may be temporarily suppressed by making a light service reduction at the brake valve. The exhaust of air pressure from switch pipe 3 will cause the charging valve to move downward and connect first suppression reservoir air in port 22 through the double check valve to gage port 41 and the suppression valve diaphragm chamber. The suppression valve will then move down to blank off application port 10 from port 42 and prevent the penalty application. The suppression valve will remain down until first suppression reservoir air pressure exhausts through the charging valve cover at which time the spring will move the valve up and reconnect application port 10 to port 42. Additional suppression on successive reductions are obtained from brake valve exhaust air pressure in pipe 17 which flows through the double check valve to gage port 41 and the suppression valve diaphragm chamber.

C-1 SUPPRESSION VALVE

The C-1 Suppression valve provides an automatic split reduction during penalty brake applications with temporary and permanent suppression of train control applications.

The C-1 Suppression valve is mounted on a separate pipe bracket with the pipe connections numerically designated as shown on the diagrammatic view.

During normal release operation, air pressure in switch pipe 3 holds the charging valve up in release position. The remaining spool valves and diaphragms are held in release position by springs. Brake pipe air in port 1 flows to the diaphragm chamber of the temporary suppression valve, the spill-over check valve and the charging valve. From the charging valve brake pipe air flows through (a) port 22 and the split reduction spool valve to port 23 and charges the first suppression reservoir and (b) the charging check valve to the temporary suppression valve diaphragm and check valve and to port 2 and charges the temporary suppression reservoir. Equalizing reservoir charging air, Port 15, flows to the differential check valve which is held seated by the spring.



C-1 Suppression Valve

Diagrammatic

C-1 SUPPRESSION VALVE

During a penalty brake application air is delivered to the C-1 Suppression valve by an auxiliary device as follows:

1. First reduction reservoir (equalizing reservoir) air in pipe 24 to the split reduction diaphragm valve.

2. Power knockout air in pipe 25 to the underside of the split reduction spool valve.

The admission of equalizing reservoir air into connecting pipe 24 by an auxiliary device causes a reduction in equalizing reservoir air pressure for the first part of the split reduction.

The split reduction spool valve is moved upward by air pressure in port 25 to make the following connections:

1. First suppression reservoir air in port 23 to port 31 and the split reduction valve diaphragm chamber.

2. Brake pipe air in port 22 is blanked off.

The split reduction diaphragm valve will be moved upward by air pressure in port 31, causing the spool valve to blank off reduction limiting reservoir air in port 24 and retain this pressure at the first reduction level of a split reduction.

The time delay between the first and second parts of the split reduction is determined by the exhaust of the first suppression reservoir air through the diaphragm cover choke.

After the pressure of the first suppression reservoir is depleted, the split reduction valve will be forced downward by the spring. The spool valve will connect reduction limiting reservoir air in port 24 to port 24b and reduction limiting valve exhaust.

The exhausting of first reduction reservoir air in port 24 is the second part of the split reduction and will continue to reduce until the brake valve handle is moved to suppression position.

When the brake valve handle is moved to suppression position the following occurs:

1. Air is delivered through suppression pipe 26 to the reduction limiting valve.

2. Air in switch pipe 3 and power knockout port 25 is exhausted.

C-1 SUPPRESSION VALVE

Air pressure in suppression port 26 moves the reduction limiting valve upward to blank off port 24b from exhaust to terminate the reduction.

The exhaust of air pressure in port 25 permits the split reduction spool valve to be moved downward by the spring and connect port 22 with port 23.

The exhaust of air pressure in port 3 permits the charging valve spool valve to be moved downward by the spring and blank off brake pipe air in port 1. Also port 22 is connected to exhaust.

The differential check valve insures a full service reduction in reduction limiting reservoir (equalizing reservoir) air pressure during penalty brake applications. Moving the brake valve handle to suppression position will reduce equalizing reservoir charging air, port 15, to a full service reduction. Any reduction limiting reservoir air pressure in excess of the full service reduction pressure will flow through ports 24, 24b and the differential check valve to exhaust.

When a penalty brake application occurs after a brake valve initiated application, the first part of the split reduction is eliminated and a direct reduction of reduction limiting reservoir air (equalizing reservoir) is provided. When the brake valve handle is moved to service position the air pressure in switch pipe 3 is exhausted. The charging valve will be moved downward by the spring and make the following connections.

1. Brake pipe air in port 1 is blanked off.

2. First suppression reservoir air in port 22 connected to exhaust.

The exhausting of first suppression reservoir air will nullify the time delay provided by the split reduction diaphragm and allows reduction limiting reservoir air to flow directly to exhaust.

A train control initiated penalty brake application may be temporarily suppressed by making light service applications at the brake valve. When a service application is made brake pipe air pressure under the temporary suppression valve is reduced. The pressure differential on the diaphragm will move the piston downward to unseat the check valve and allow temporary suppression reservoir air to flow into suppression gage port 41. When the air pressure reduction of the reservoir is sufficient to remove the differential across the diaphragm, the spring will move the piston up and close the check valve.

The air pressure delivered into gage port 41 will move the permanent suppression valve down to blank off the flow of timing valve air in pipe 6 and prevent a penalty application. This valve will remain down until air pressure in gage pipe 41 exhausts through the cover exhaust at which time the spring will move the valve

up and reconnect timing valve air to exhaust. Also brake pipe exhaust air in pipe 17 flows through the back flow check valve to gage port 41 for additional suppression air pressure. The pending penalty appreciation may be suppressed several times through successive service applications in the above manner.

Permanent suppression is obtained by moving the brake valve handle to suppression position. In this position the following will occur:

1. Lock-over port 8 is blanked at the brake valve.

2. Air pressure is supplied through suppression pipe 26 to the suppression spool valve.

The air pressure in suppression pipe 26 will move the suppression spool valve down and connect brake pipe air in port 1 to suppression pipe 41 and the permanent suppression valve diaphragm, thus, the flow of timing valve air in pipe 6 is blanked.

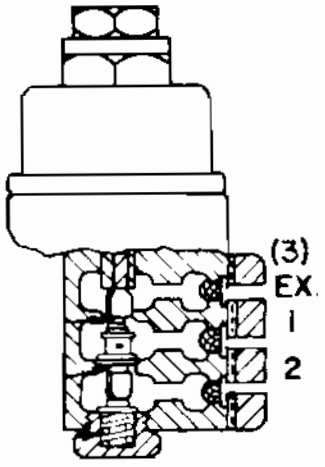
FA-4 MAGNET VALVE

An FA-4 Magnet Valve is included in this equipment to initiate an overspeed application. The overspeed feature provides protection against excessive speed by automatically applying the brakes when the locomotive speed exceeds a predetermined limit. A release cannot be made until the train speed has been reduced below the speed limit.

The magnet valve contains an upper valve, lower valve and valve spring. The magnet coil housing contains a magnet coil, a magnet core, an armature and an armature stem.

With the equipment operating normally and the train speed below the predetermined limit, the magnet valve is energized, which pulls the armature and stem downward to seat lower valve. This allows the brake application valve control pipe to be charged, permitting the brake application valve to move to release position.

When the train speed exceeds the predetermined speed limits, the circuit to the overspeed magnet is broken and de-energized, permitting the spring to move the lower valve off its seat and seat the upper valve. The brake application valve control pipe now is vented past the unseated valve through the choke and whistle to atmosphere. The exhausting of air in the brake application valve control pipe causes the application valve to move to applied position, applying the brakes. Brake release cannot be brought about until the train speed is reduced below the predetermined limit, when the overspeed magnet is again energized and the lower valve is seated, preventing any further discharge of air from the control pipe



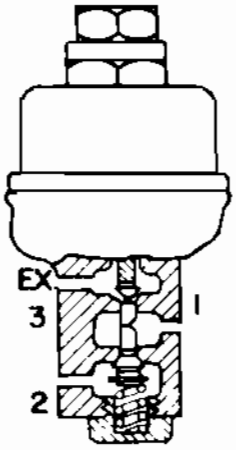
FA-4 Magnet Valve - Diagrammatic

FB-4 MAGNET VALVE

An FB-4 Magnet Valve is included in this equipment to withhold an automatic air brake application when the dynamic brake is used. However, the independent brake may be applied during operation of the FB-4 Magnet Valve.

The magnet valve contains an upper valve, lower valve and valve spring. The magnet coil housing contains a magnet coil, a magnet core an armature and an armature stem.

When the dynamic brake is applied during an automatic air brake application, the magnet valve is energized, which pulls the armature and stem downward to seat the upper valve and unseat the lower valve. This allows air flow into the actuating pipe and causes the control valve to release the brake. When only an automatic air brake application is used, the magnet valve will remain de-energized. The spring will hold the lower valve seated and unseat the upper valve and prevent air flow to the actuating pipe.



FB-4 Magnet Valve - Diagrammatic

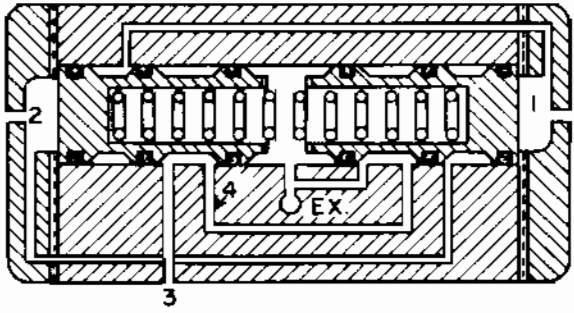
26-A DOUBLE CHECK VALVE FOR DOUBLE END LOCOMOTIVES

The No. 26-A Double Check Valve is used on double end control locomotives to direct the flow of brake pipe cut off pipe air to the controlling brake valve and prevent this air from flowing to the cut out brake valve.

The double check valve is located in the brake pipe cut off pipe with ports 1 and 2 connecting to the brake valves and port 3 connected to a pilot valve (see piping diagram).

When the brake valve connected with port 1 is the controlling brake valve, pressure is delivered by the cut-out brake valve into port 2. The left spool valve is forced to the right and port 3 connects through the left spool valve to port 1 and the controlling brake valve.

When the brake valve connected with port 2 is the controlling brake valve, pressure is delivered by the cut-out brake valve into port 1. The right spool valve is forced to the left and port 3 connects through port 4 and the spool valves to port 1 and the controlling brake valve.



No. 26-A Double Check Valve - Diagrammatic View

LUBRICATION

Brake Valve

The brake valve should be tested for leakage at regular intervals, which can be done without removing the valve from service.

With the brake valve handle in release position, test all exhaust openings with soap suds. Then move the brake valve handle to full service position and again test all exhaust openings with soap suds.

If any excessive leakage is discovered, the brake valve should be removed from the pipe bracket and replaced with one in good condition.

At regular intervals the brake valve should be dismantled, cleaned and lubricated in accordance with proper maintenance instructions.

Control Valve

Never remove movable parts of the control valve while it is on the car. If the service portion is not working properly or needs cleaning and oiling, remove it from the pipe bracket and replace it with a service portion in good condition. All cleaning and oiling should be done at a bench, by a competent man, where the possibility of damaging the internal parts of the valve is at a minimum. Any attempt to take the valve portion apart while it is still on the car is almost certain to result in a large percentage of valves being damaged by careless handling or dirt getting inside the valve. If repairs are necessary, such valves should be returned to the shops for that purpose.

Cleanliness is of primary importance when handling dissassembled air brake devices. All air brake devices, or parts thereof, while being transported to and from the shop, must be properly protected to avoid entrance of dirt or water, or damage to internal parts.

The proper specified cleaning period of the control valve is best determined for each particular case by careful inspection and trial. Where conditions are severe and the control valve is exposed to extremes of weather, dirt and so on, the cleaning, oiling and testing must be carried on at shorter intervals than where conditions are more favorable.

Gaskets, Diaphragms, and Rubber Seated Valves

Gaskets, diaphragms, and rubber seated valves may be dipped in a suitable solvent to assist in the removal of greasy dirt, but these parts must be promptly wiped dry after cleaning and must not be allowed to soak in the cleaning fluid.

Gaskets which have broken or flattened beads, or any that reveal cracks or

cuts on diaphragms or sealing surfaces, must be replaced. Serviceable gaskets must then be brushed with a soft bristle brush (such as a shoe brush) to remove any remaining dirt and to polish them.

"O" Rings and Packing Rings

"O" rings and packing rings may be cleaned as described above and must be replaced if cracked or worn. All rings should be lubricated with No. 2 silicon grease per United States Government Agency, Specification MIL-L-4343. The lubricant should be applied sparingly to the "O" rings and their associate parts.

Caution: When using No. 2 Silicon grease, care should be taken to avoid contact with the eyes or open cuts, as in such cases the grease is an irritant.

Strainers

Strainers must be thoroughly washed in a suitable solvent and blown dry with a jet of clean dry air.

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 used in the control valve. They can be readily applied or removed without damage to the choke plug or to the threads in the tapped hole.

These chokes must be removed, cleaned and replaced one at a time, making misplacement of chokes 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 dry with a jet of air. Metallic tools must not be used for cleaning chokes as the size must not be changed.

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.

LUBRICATION

Threads

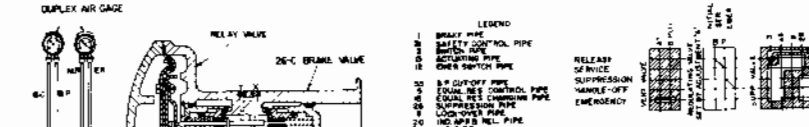
The threads of choke plugs and all other removable plugs, as well as all other threaded parts which may later be difficult to remove, must be coated lightly just before inserting with a compound consisting of one part graphite (current AAR Spec. M-913) and two parts of oil (SAE-20) by weight.

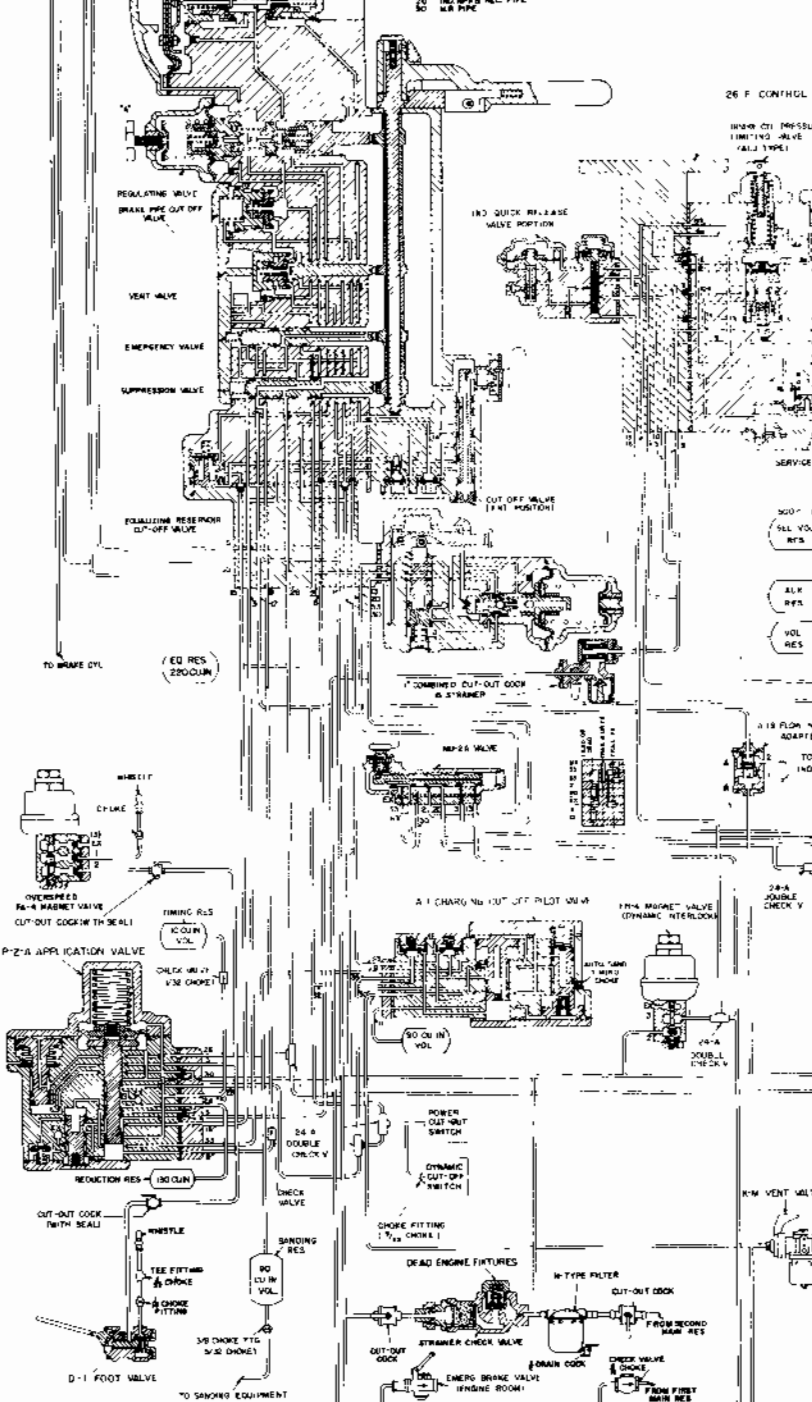
General

The above listed procedures should be used wherever they apply in the equipment. For example, all diaphragms should be cleaned and checked as explained under "Gaskets, Diaphragms, and Rubber Seated Valves."

Those valves in the equipment having metal to metal seats may, if defective, be reseated with valve grinding compound. Pistons operating through metal bushings should be lubricated after cleaning with light oil (current AAR Spec. M-912).

SM-2
Printed in U.S.A.





26-L Brake Equipment Arranged for Multiple Unit Servic