

PLATE I
 Piping Diagrammatic Of 26-L Brake Equipment Arranged For Complete Multiple-Unit Service And With P-2-A Brake Application Valve To Provide For Safety Control And Overspeed Control.

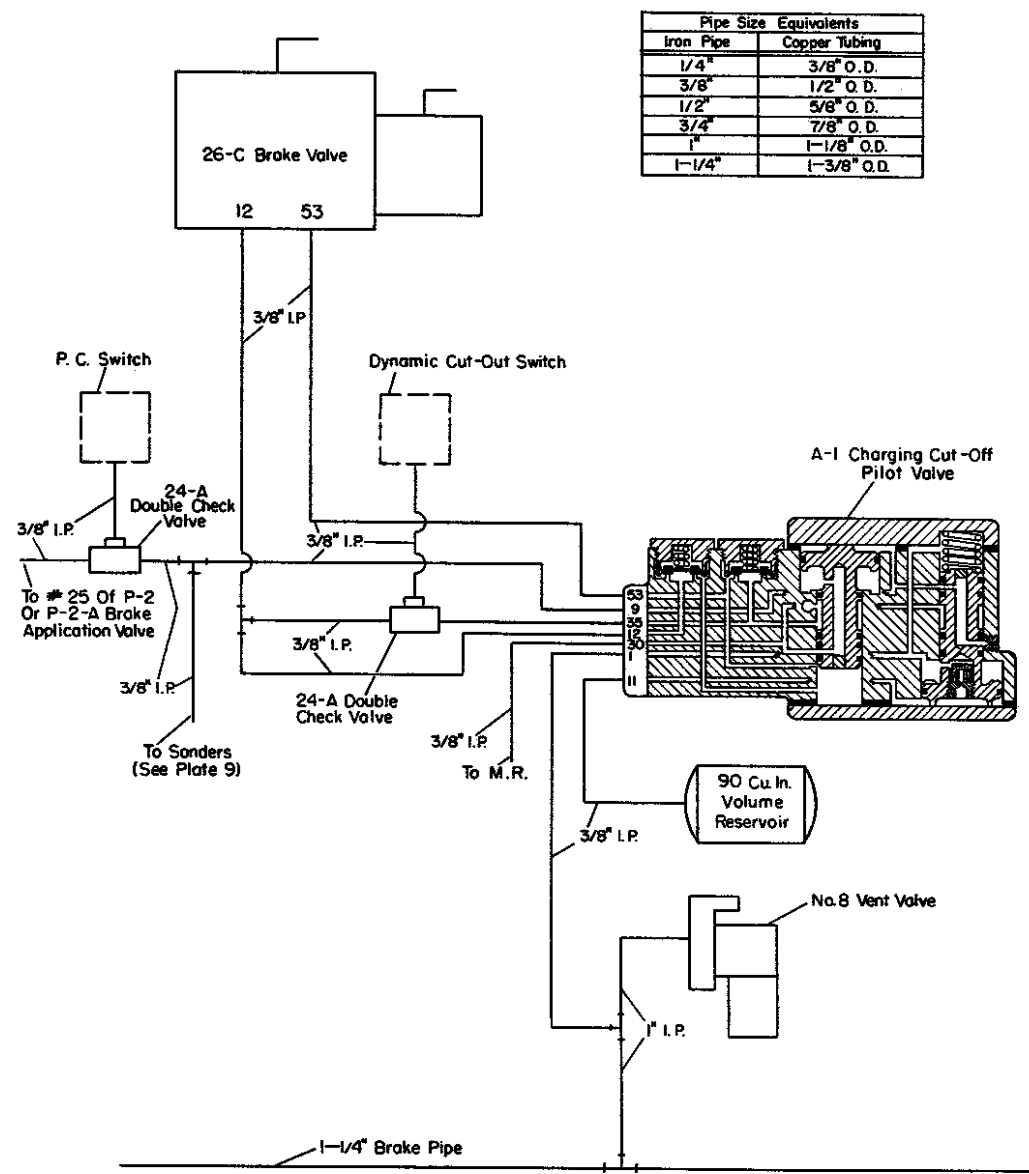


PLATE 2
 Break-In-Two Protection Arrangement Employing
 A-1 Charging Cut-Off Pilot Valve

Pipe Size Equivalents	
Iron Pipe	Copper Tubing
1/4"	3/8" O.D.
3/8"	1/2" O.D.
1/2"	5/8" O.D.
3/4"	7/8" O.D.
1"	1-1/8" O.D.
1-1/4"	1-3/8" O.D.

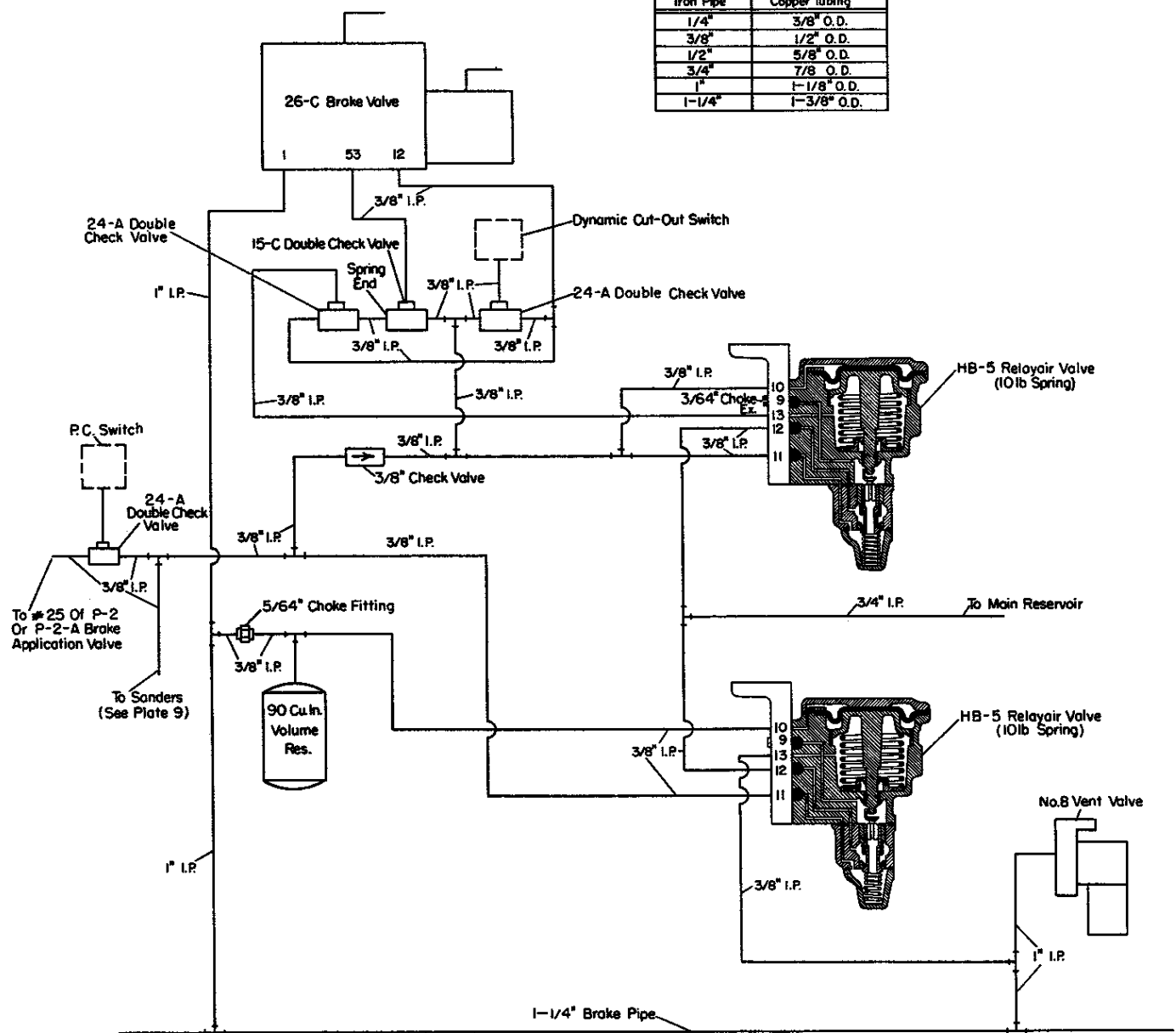


PLATE 3
Break-In-Two Protection Arrangement Employing
Two HB-5 Relayair Units.

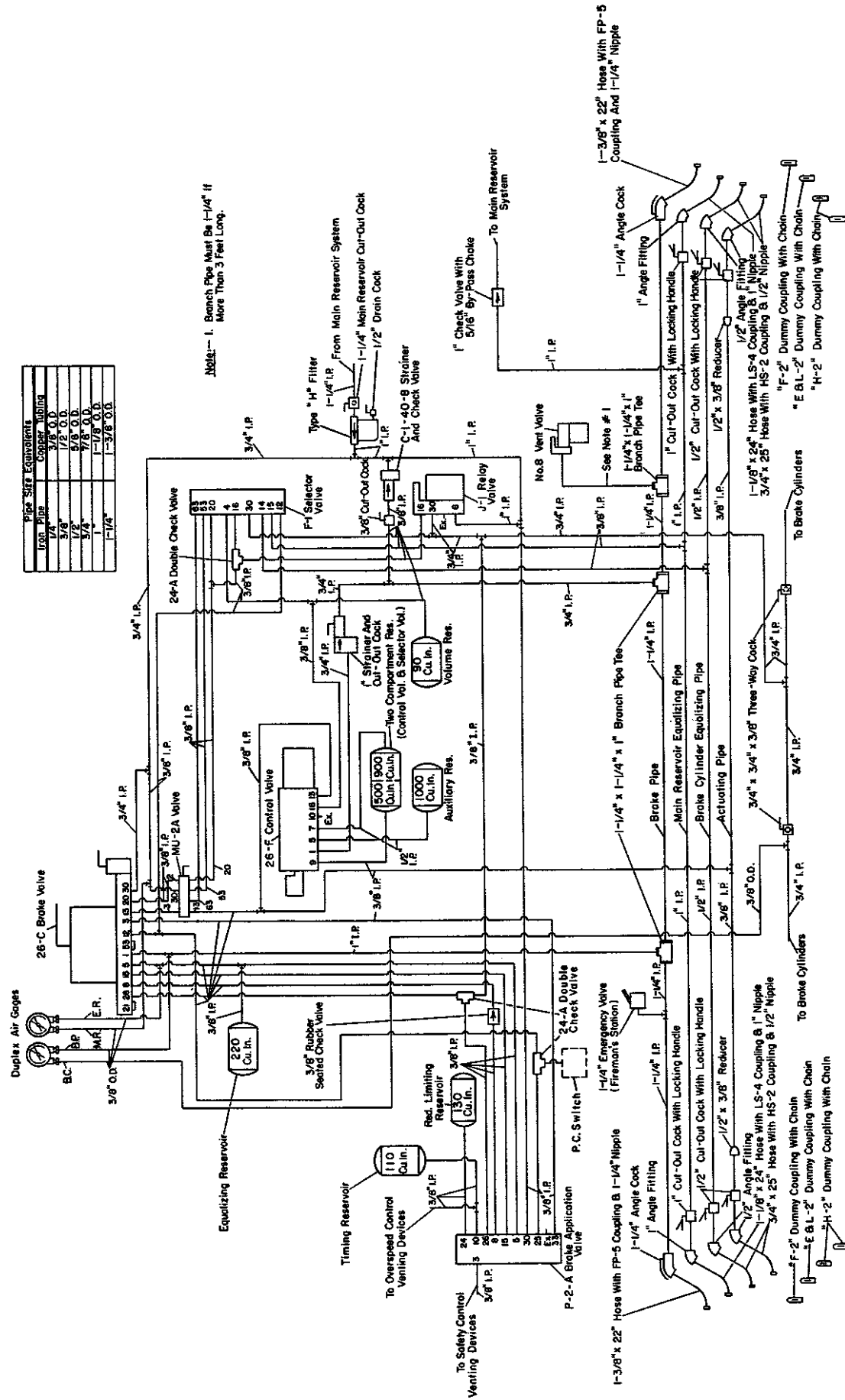


PLATE 5
Piping Diagram Of 26-L Brake Equipment Arranged For Safety Control And Overspeed Control With P-2-A Brake Application Valve
 Universal Multiple-Unit Control

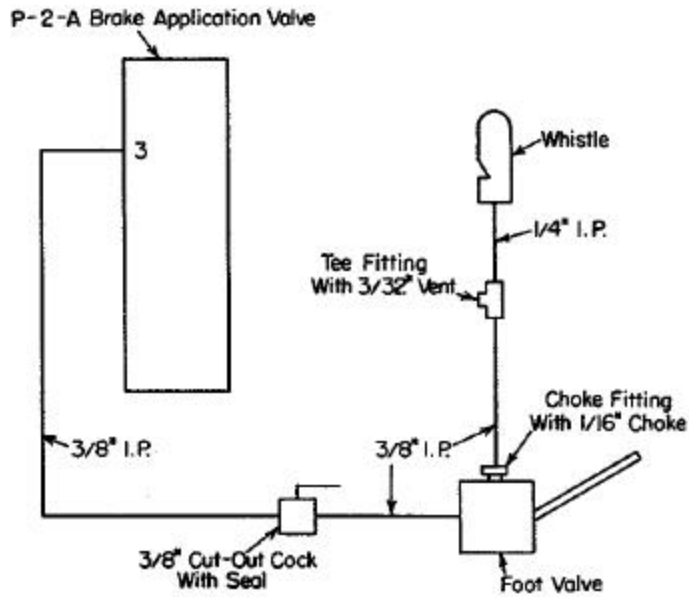


PLATE 6

Piping Arrangement Of Equipment For Providing Safety Control Brake Applications.

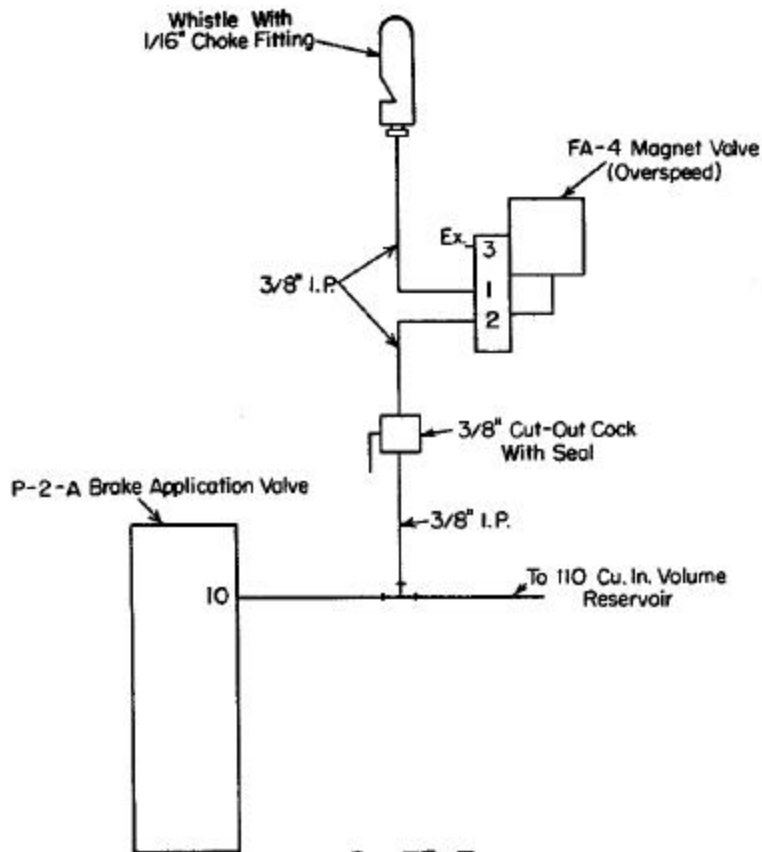


PLATE 7

Piping Arrangement Of Equipment For Providing Overspeed Control Brake Applications.

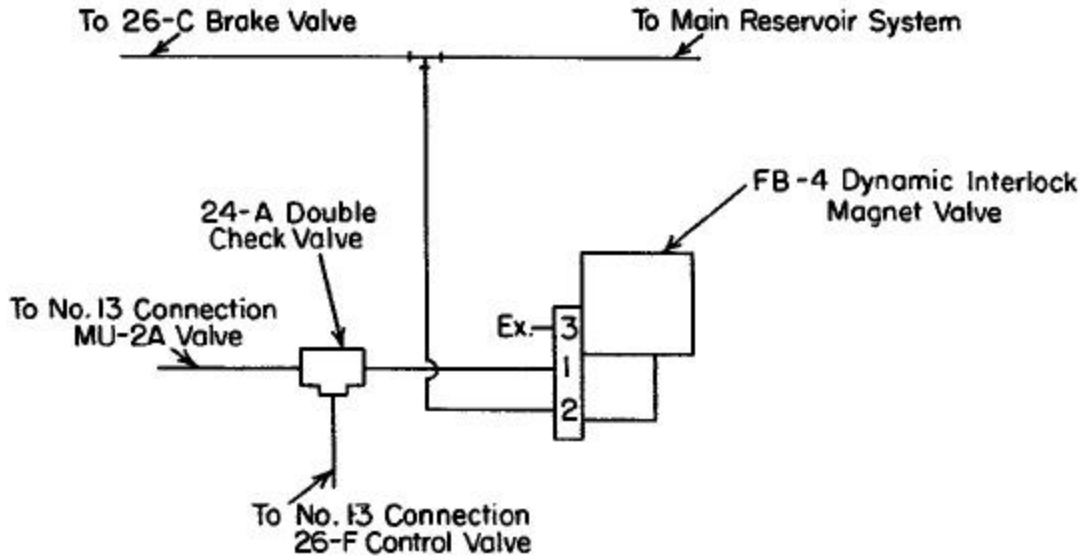
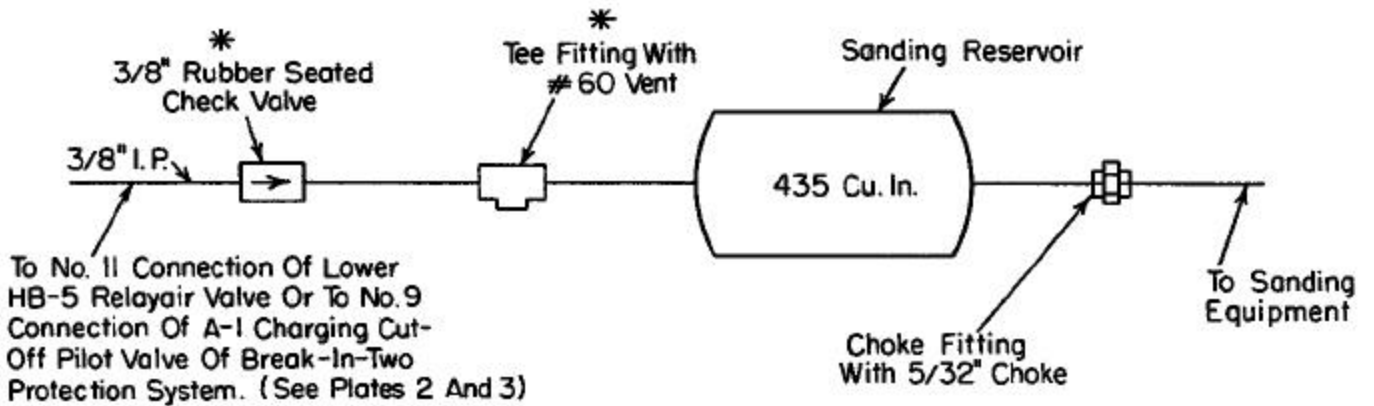


PLATE 8

Piping Arrangement Of Equipment For Providing Dynamic Brake Interlock Feature



NOTE:—When Break-In-Two Protection Feature Employs An A-1 Charging Cut-Off Pilot Valve, Items Marked With An Asterisk (*) Are To Be Omitted And Volume Of Sanding Reservoir Is To Be 90 Cu. In.

PLATE 9

Piping Arrangement Of Equipment For Providing Emergency Sanding

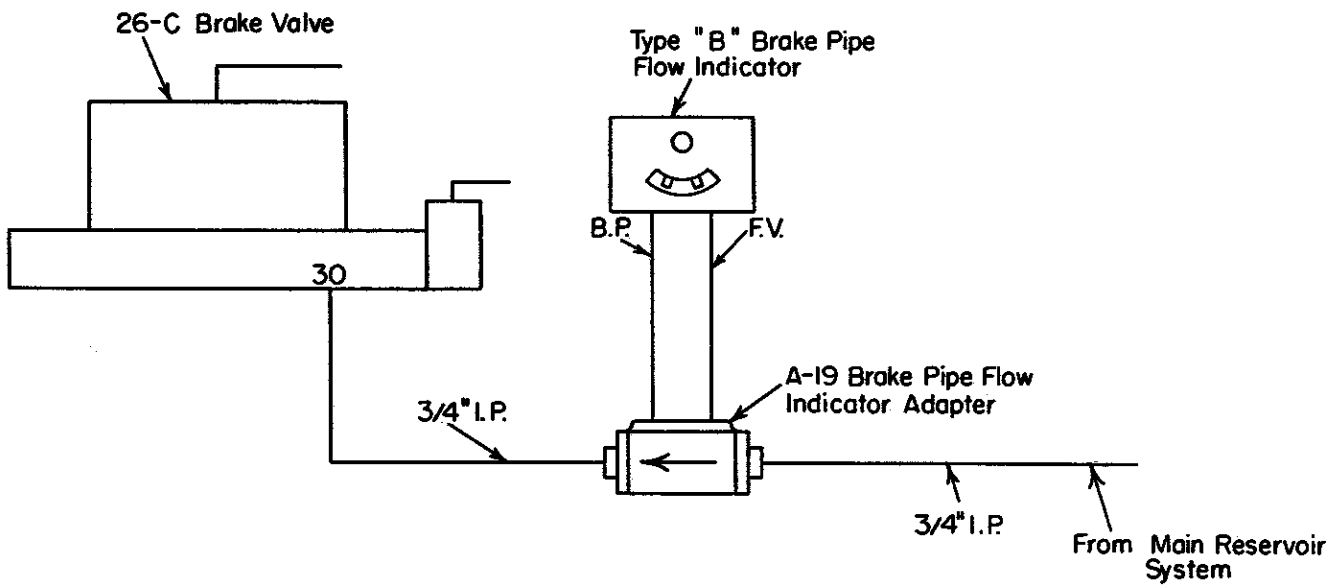


PLATE 10
 Piping Arrangement Of Equipment For Addition
 Of Type "B" Brake Pipe Flow Indicator

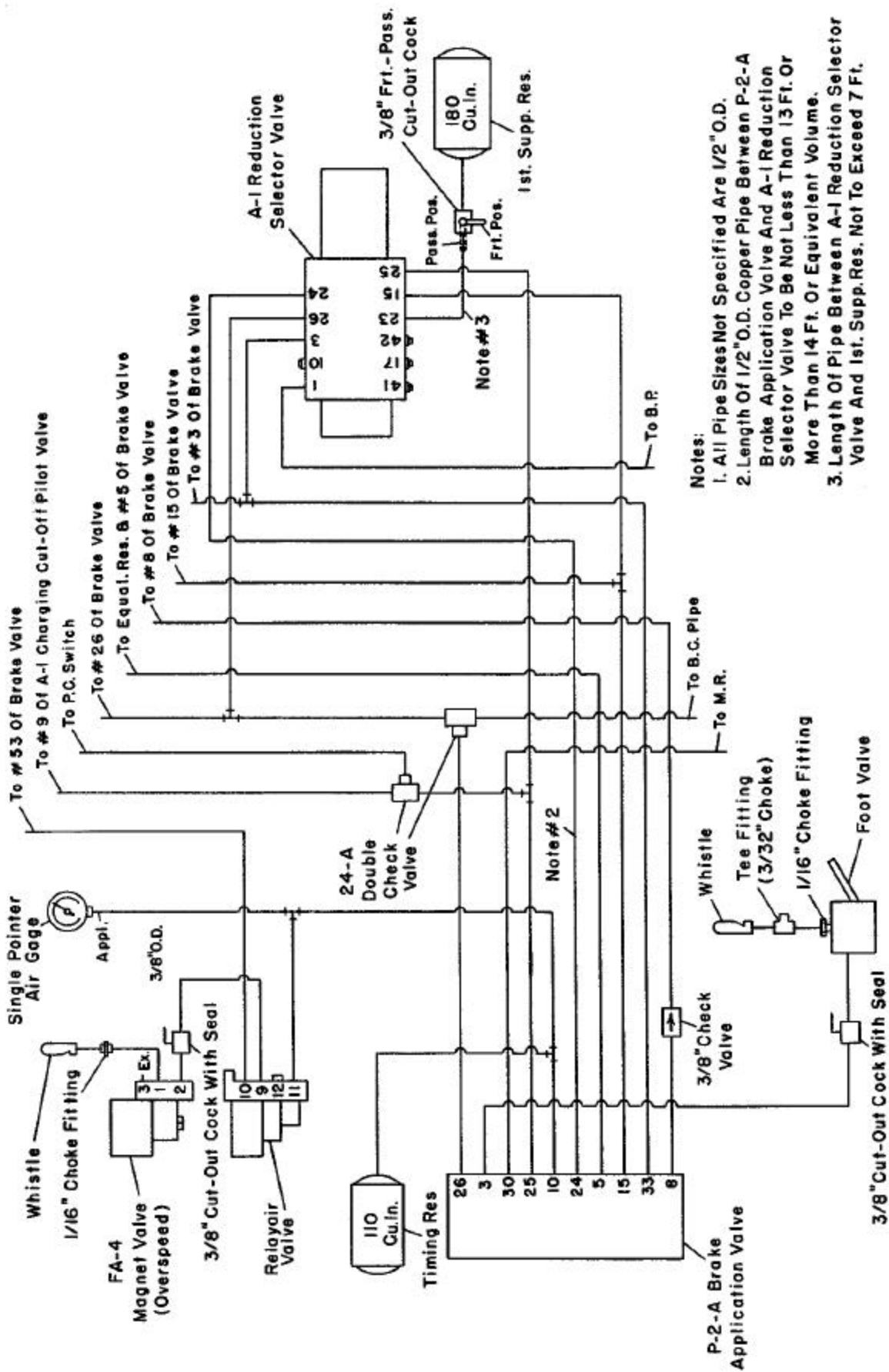


PLATE II

Piping Arrangement Of A-1 Reduction Selector Valve in 26-L Brake Equipment To Provide Automatic Split Reduction During Penalty Brake Application.

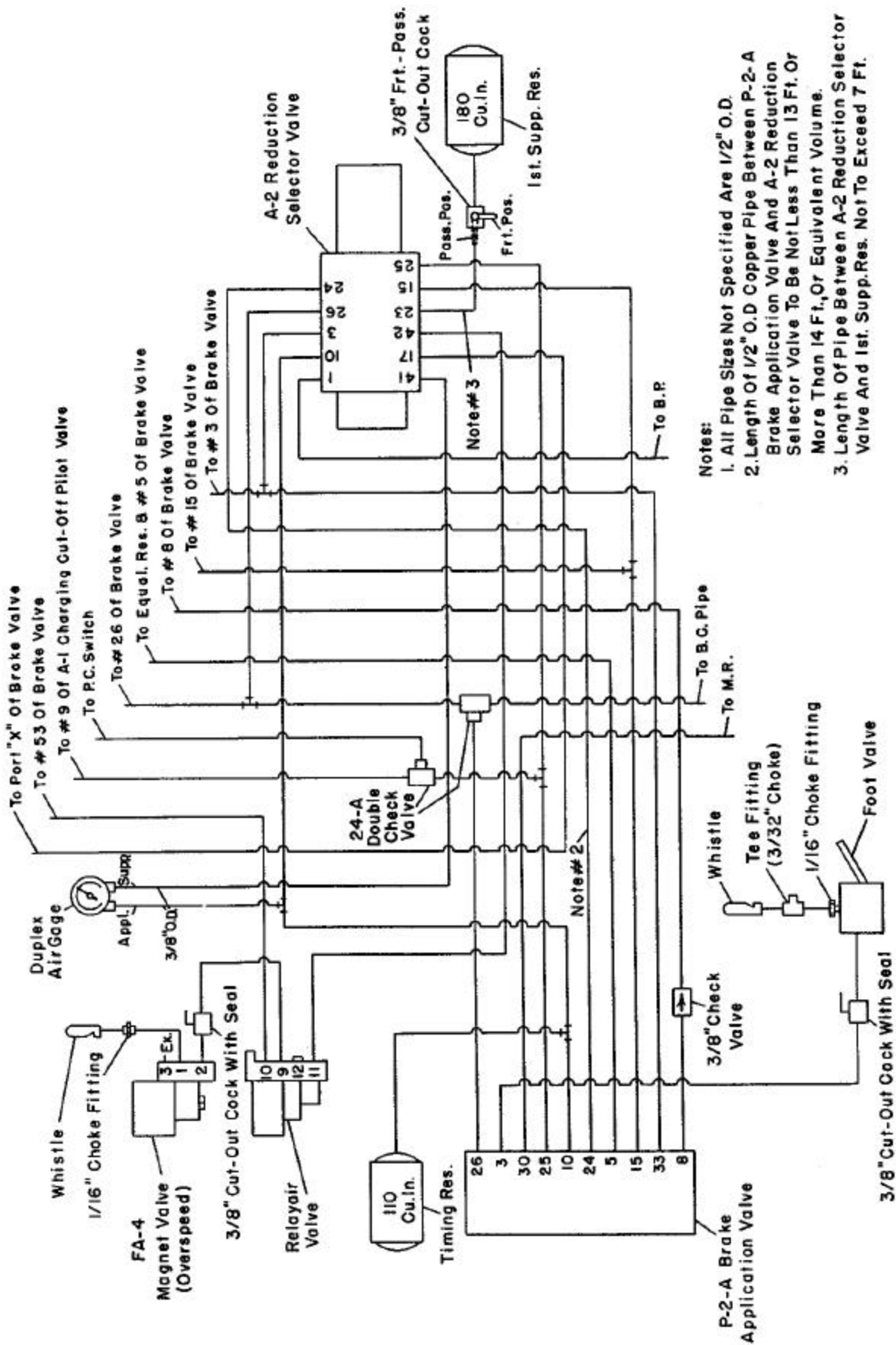
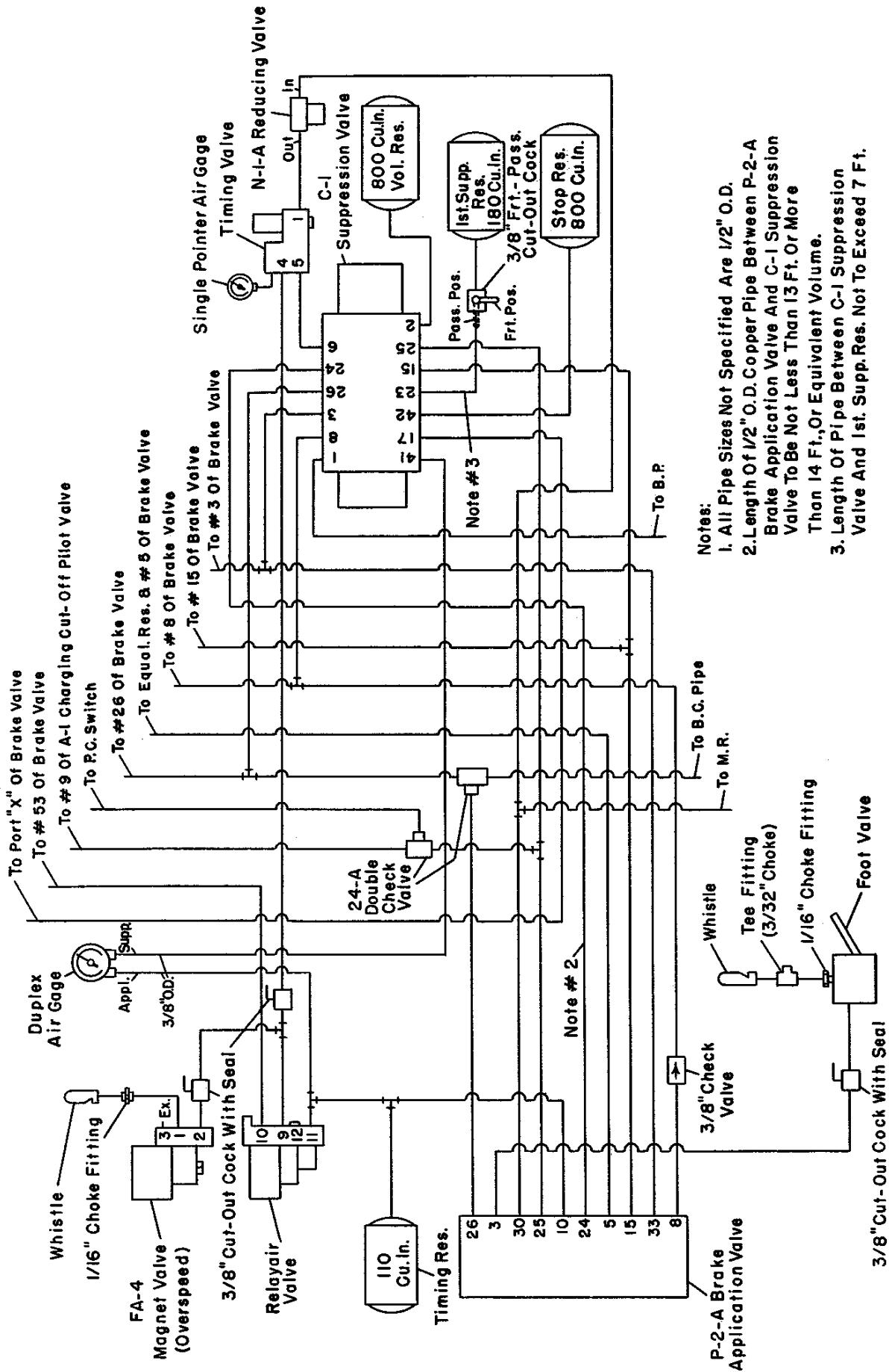


PLATE 12

Piping Arrangement Of A-2 Reduction Selector Valve In 26-L Brake Equipment To Provide Automatic Split Reduction During Penalty Brake Application With Temporary Suppression Of Overspeed Applications.



- Notes:
1. All Pipe Sizes Not Specified Are 1/2" O.D.
 2. Length Of 1/2" O.D. Copper Pipe Between P-2-A Brake Application Valve And C-1 Suppression Valve To Be Not Less Than 13 Ft. Or More Than 14 Ft., Or Equivalent Volume.
 3. Length Of Pipe Between C-1 Suppression Valve And 1st. Supp. Res. Not To Exceed 7 Ft.

PLATE 13

Piping Arrangement Of C-1 Suppression Valve In 26-L Brake Equipment To Provide Automatic Split Reduction During Penalty Brake Application With Temporary And Permanent Suppression Of Train Control Applications.

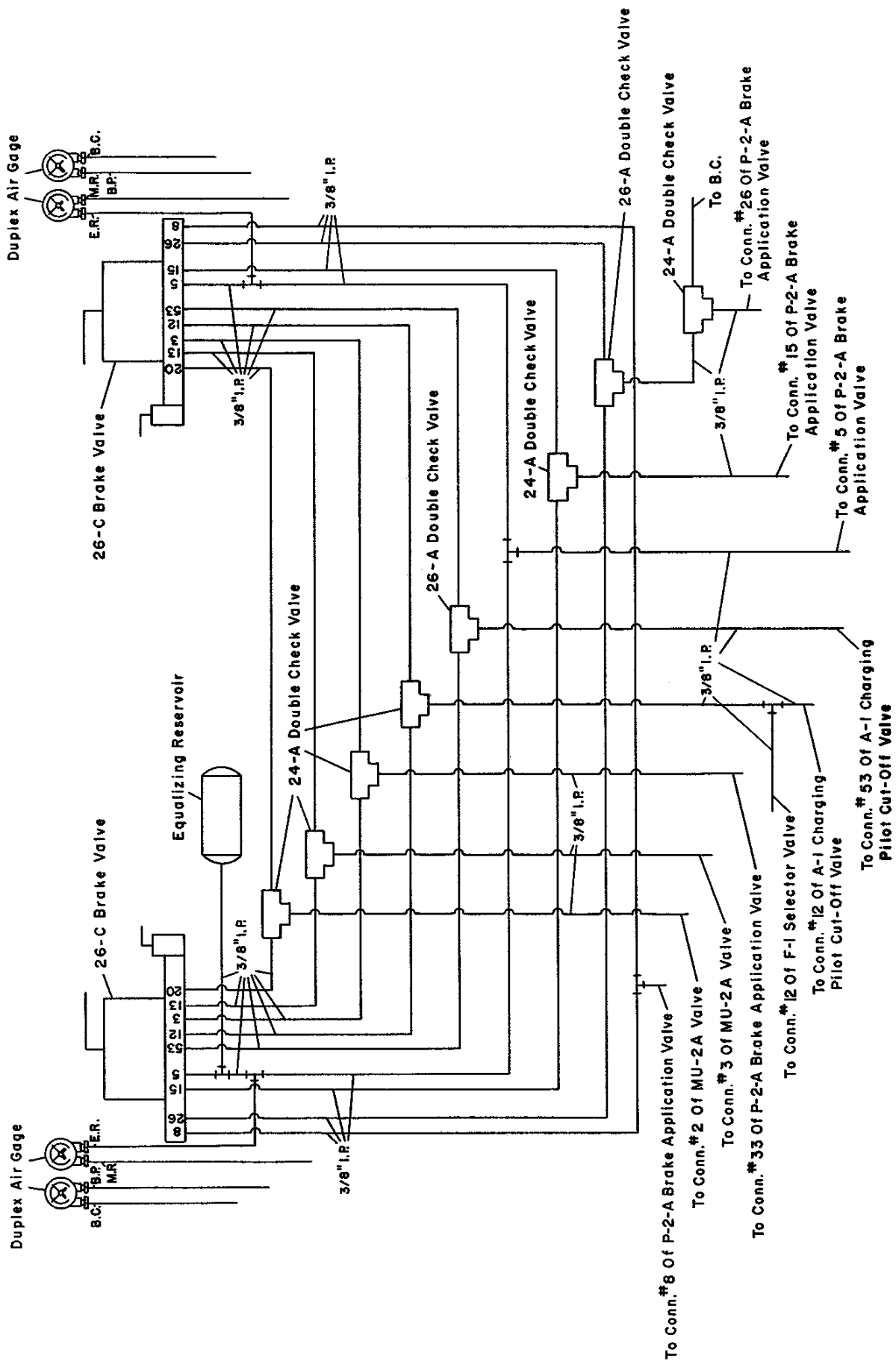


PLATE 14
Piping Arrangement Of 26-L Brake Equipment For
Dual Controls In The Same Locomotive Cab

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

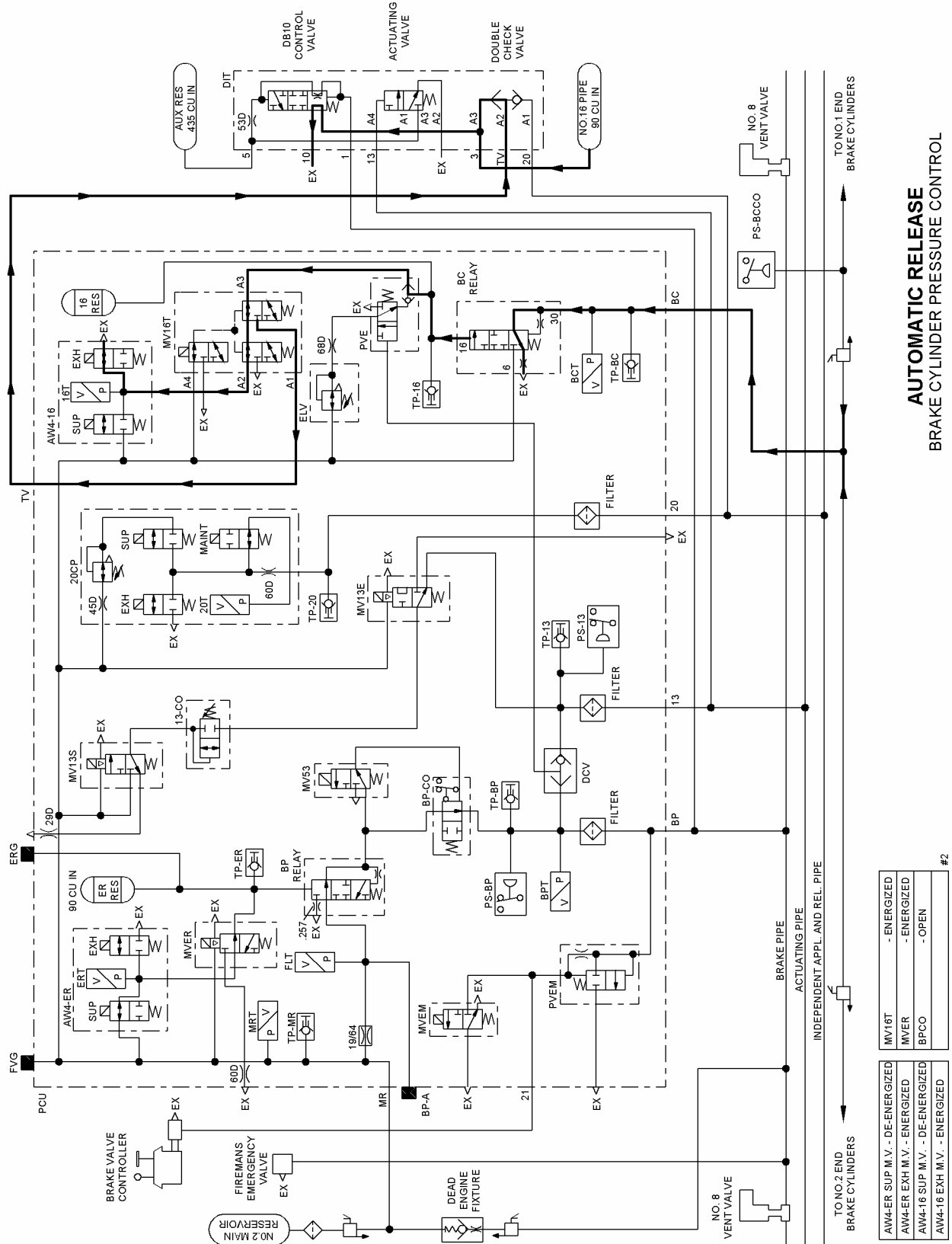
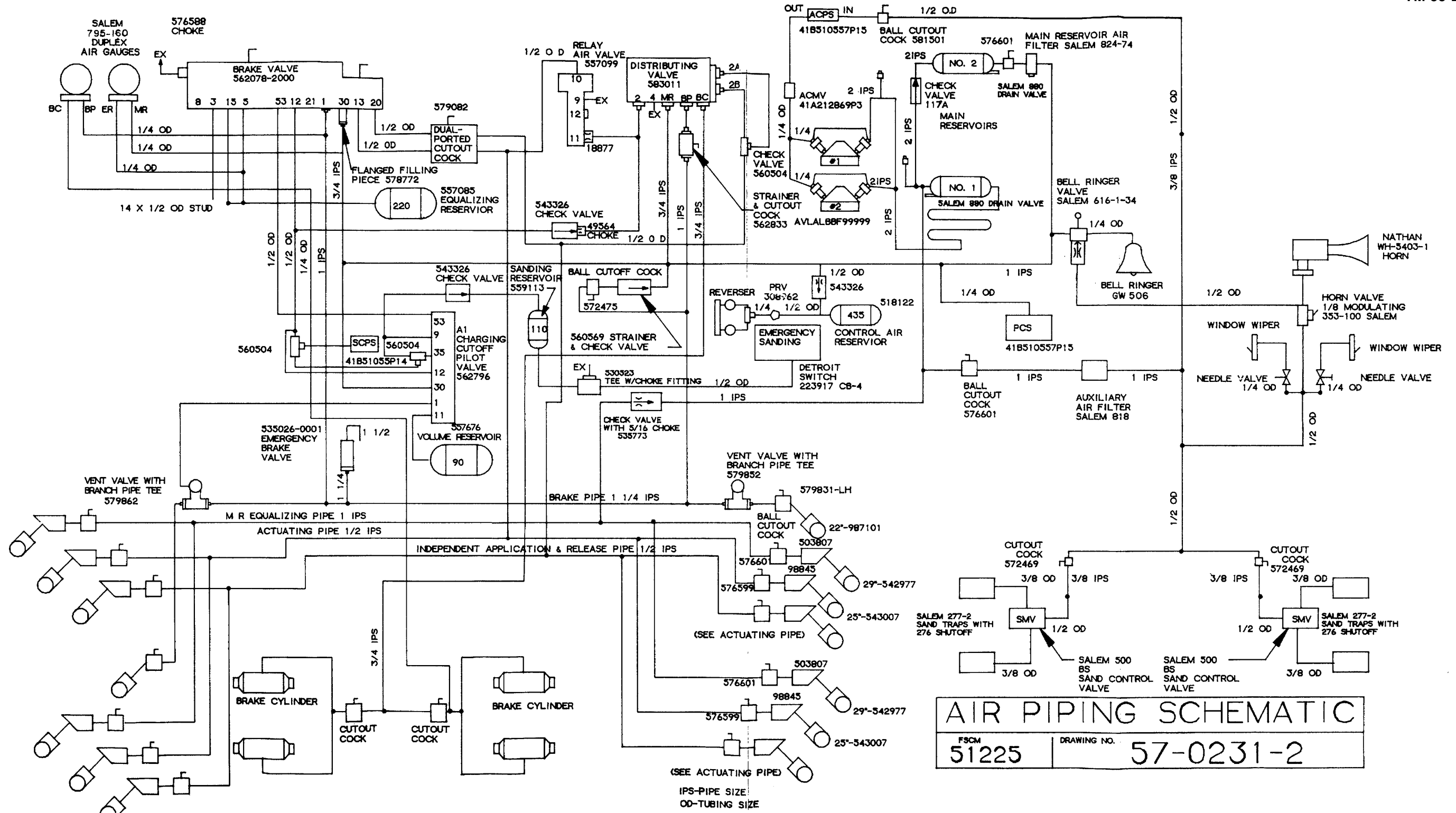


FIGURE 1-21 AUTOMATIC RELEASE BRAKE CYLINDER PRESSURE CONTROL



FO-1 Air Piping Schematic

FP1/(FP-2 Blank)

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

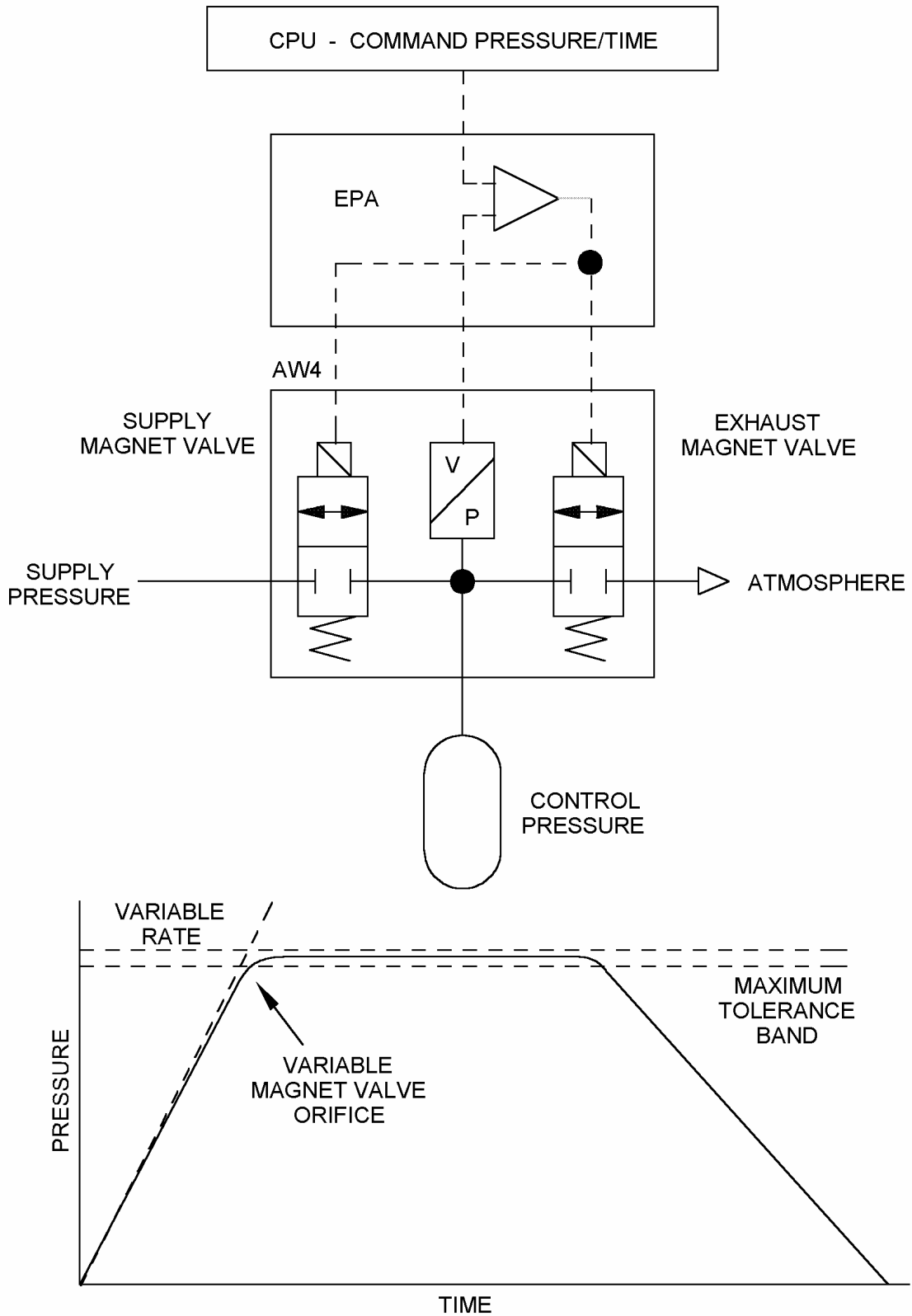


FIGURE 1-22 ANALOG CONVERTER CONTROL

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

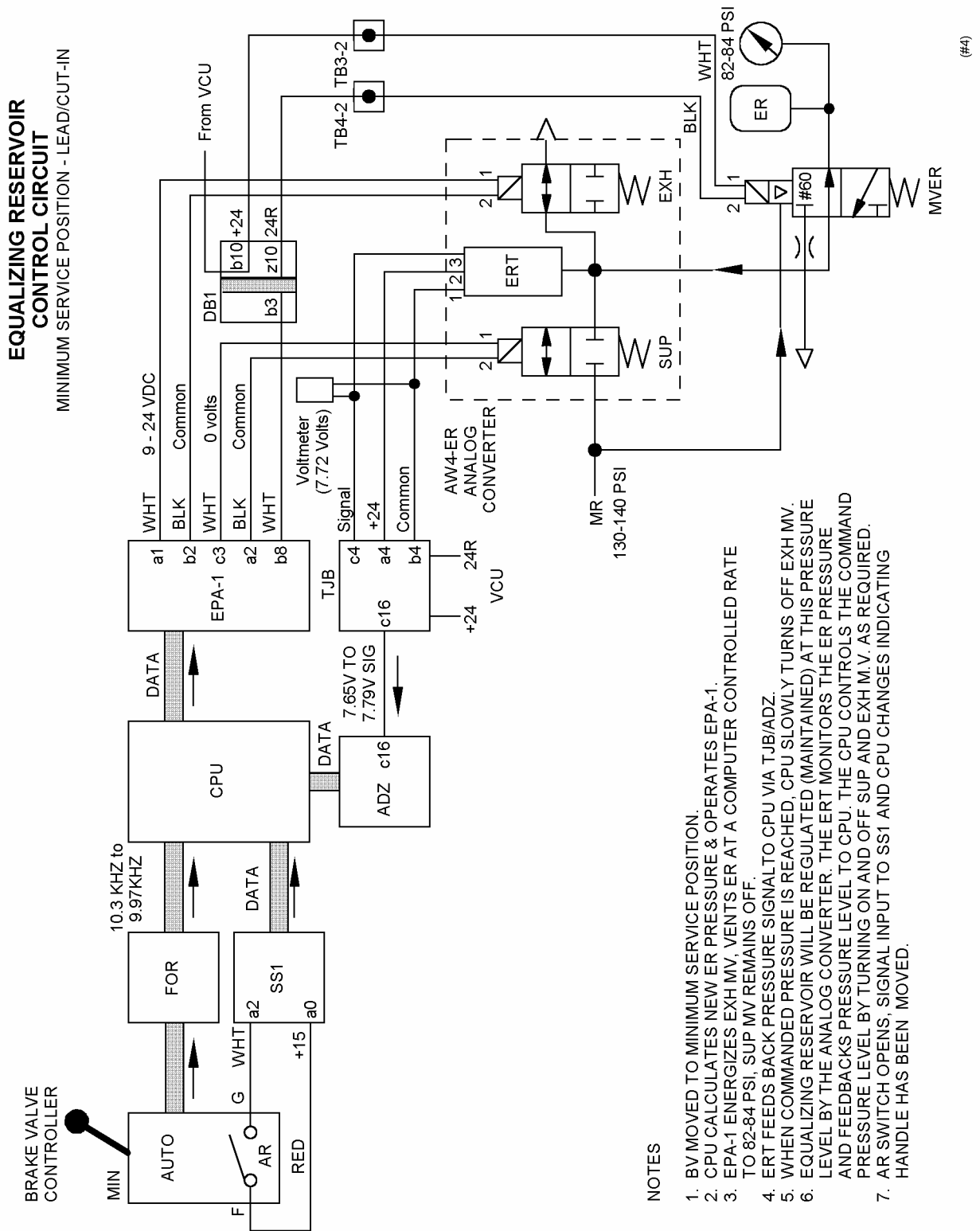
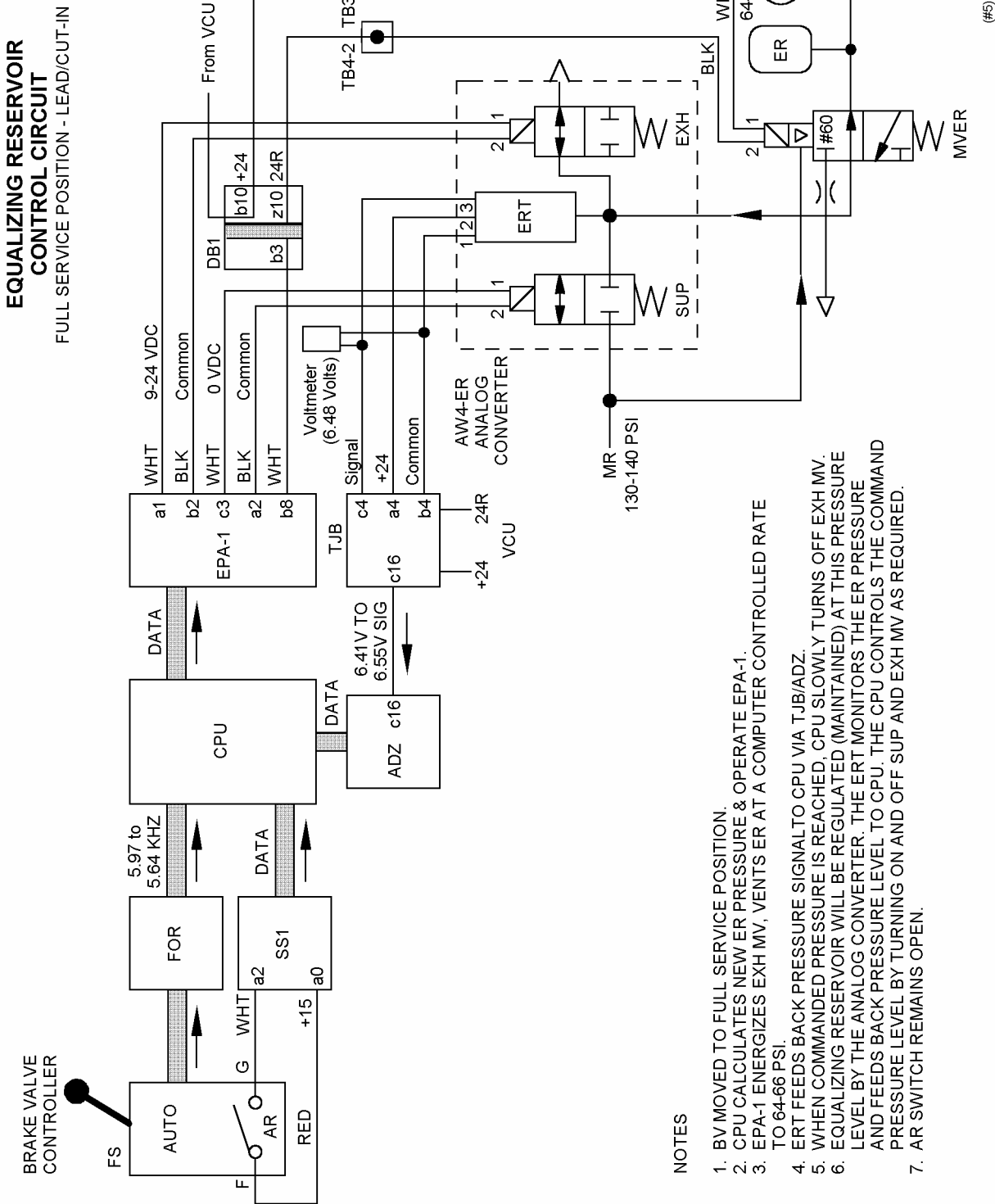


FIGURE 1-23 ER CONTROL CIRCUIT MINIMUM SERVICE POSITION-LEAD/CUT-IN

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL



- NOTES**
1. BV MOVED TO FULL SERVICE POSITION.
 2. CPU CALCULATES NEW ER PRESSURE & OPERATE EPA-1.
 3. EPA-1 ENERGIZES EXH MV, VENTS ER AT A COMPUTER CONTROLLED RATE TO 64-66 PSI.
 4. ERT FEEDS BACK PRESSURE SIGNAL TO CPU VIA TJB/ADZ.
 5. WHEN COMMANDED PRESSURE IS REACHED, CPU SLOWLY TURNS OFF EXH MV.
 6. EQUALIZING RESERVOIR WILL BE REGULATED (MAINTAINED) AT THIS PRESSURE LEVEL BY THE ANALOG CONVERTER. THE ERT MONITORS THE ER PRESSURE AND FEEDS BACK PRESSURE LEVEL TO CPU. THE CPU CONTROLS THE COMMAND PRESSURE LEVEL BY TURNING ON AND OFF SUP AND EXH MV AS REQUIRED.
 7. AR SWITCH REMAINS OPEN.

FIGURE 1-24 ER CONTROL CIRCUIT FULL SERVICE POSITION - LEAD/CUT-IN

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

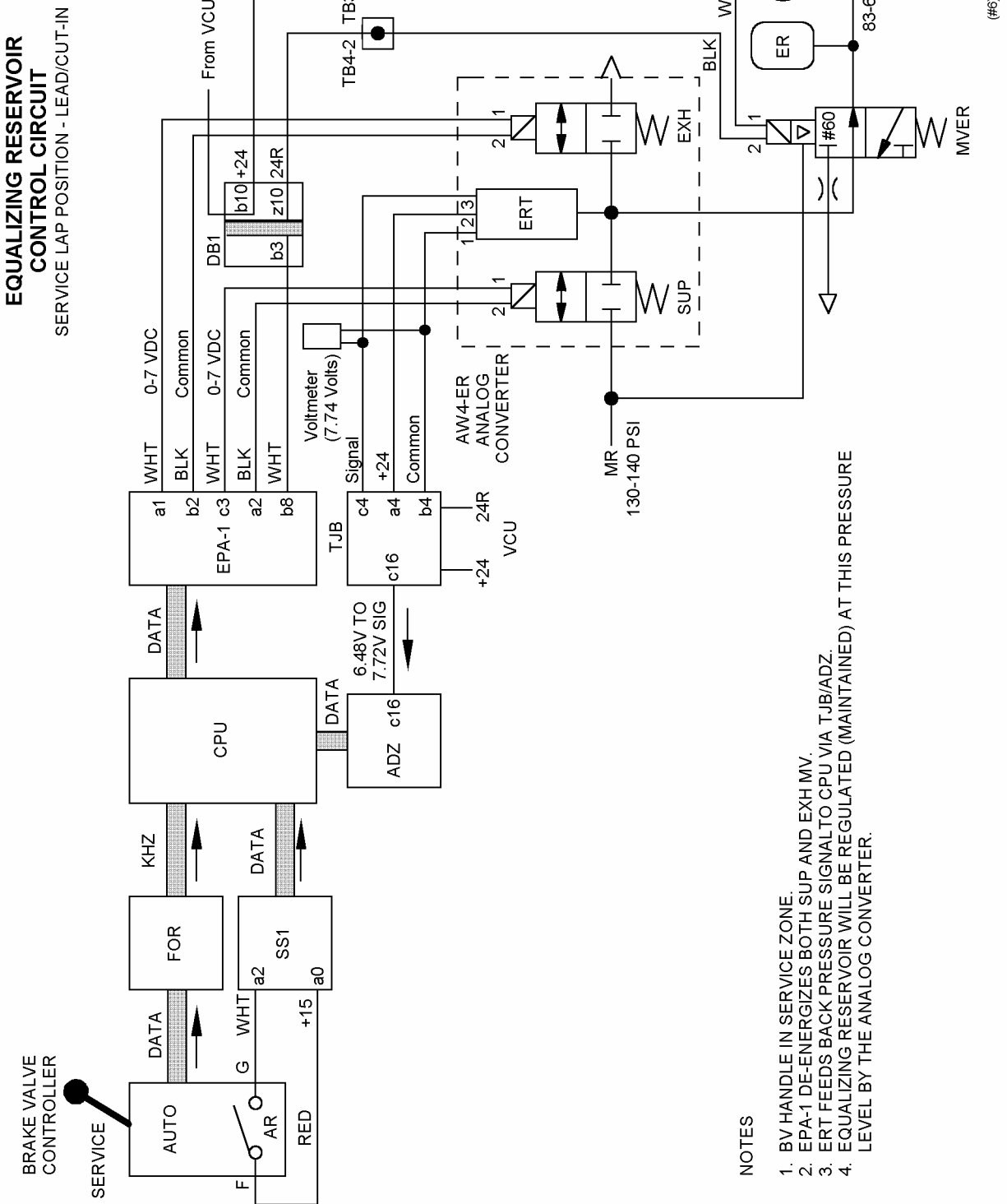


FIGURE 1-25 ER CONTROL CIRCUIT SERVICE LAP POSITION - LEAD/CUT-IN

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

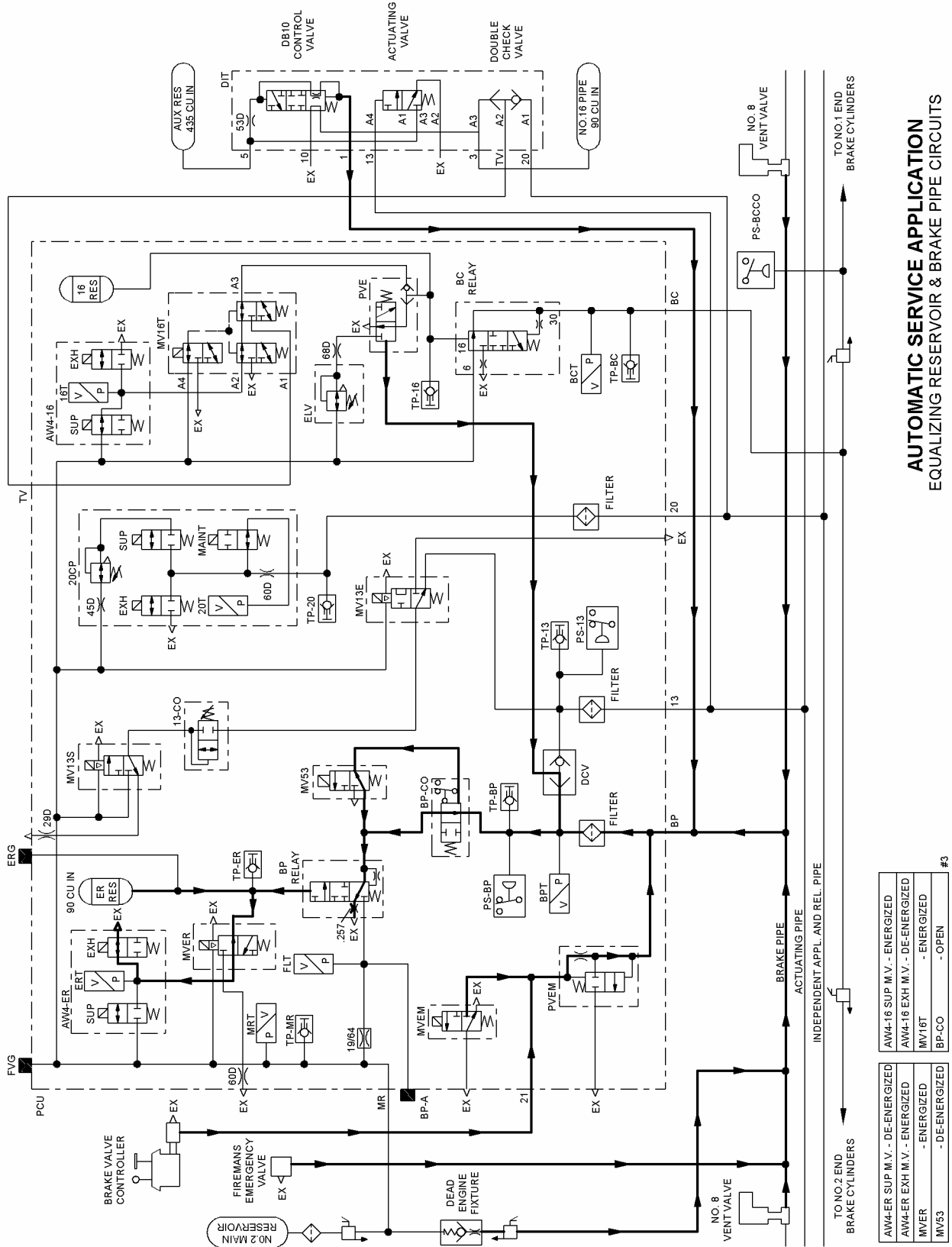
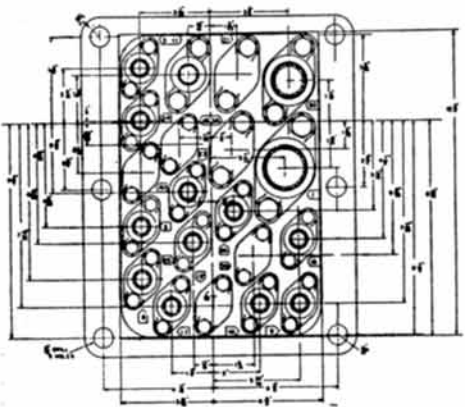


FIGURE 1-26 AUTOMATIC SERVICE APPLICATION EQUALIZING RESERVOIR AND BRAKE PIPE CIRCUITS

- LEGEND**
- 1 BRAKE PIPE (1 1/2" I.P.)
 - 2 SAFETY CONTROL PIPE (1/2" I.P.)
 - 3 EQUALIZING RESERVOIR (1 1/2" I.P.)
 - 4 STOP RESERVOIR (EXHAUST) (1 1/2" I.P.)
 - 5 SANDING PIPE (1 1/2" I.P.)
 - 6 BRAKE APPLICATION VALVE PISTON (1 1/2" I.P.)
 - 7 MAINTENANCE IN EMERGENCY
 - 8 EQUALIZING PISTON EX TO TUNING RESERVOIR (1 1/2" I.P.)
 - 9 SECOND REDUCTION RESERVOIR (1 1/2" I.P.)
 - 10 SUPPRESSION RESERVOIR (1 1/2" I.P.)
 - 11 FEED VALVE
 - 12 FIRST SUPPRESSION RESERVOIR (1 1/2" I.P.)
 - 13 REDUCTION LIMITING RESERVOIR (1 1/2" I.P.)
 - 14 PNEUMATIC RELAY PIPE (1 1/2" I.P.)
 - 15 TEMPORARY SUPPRESSION (1 1/2" I.P.)
 - 16 GOVERNOR
 - 17 MAIN RESERVOIR (1" I.P.)
 - 18 STRAIGHT AIR PIPE
 - 19 ACKNOWLEDGING RELAY SWITCH
 - 20 RELEASE PIPE



- D-24 Control Valve Pipe Connections**
- 1 1" Brake Pipe
 - 2 3/4" Emergency Reservoir Pipe
 - 3 3/4" Displacement Res. Pipe
 - 5 3/4" Auxiliary Reservoir Pipe
 - 6 3/4" Main Reservoir Pipe
 - 8 3/4" Straight-Air Pipe
 - 10 3/4" Exhaust Pipe
 - 13 3/4" Actuating Pipe
 - 15 3/4" Sand Pipe
 - 16 3/4" Relay Valve Pipe
 - 20 3/4" Ind. Appl. and Rel. Pipe
 - 35 3/4" Controlled-Emergency Pipe

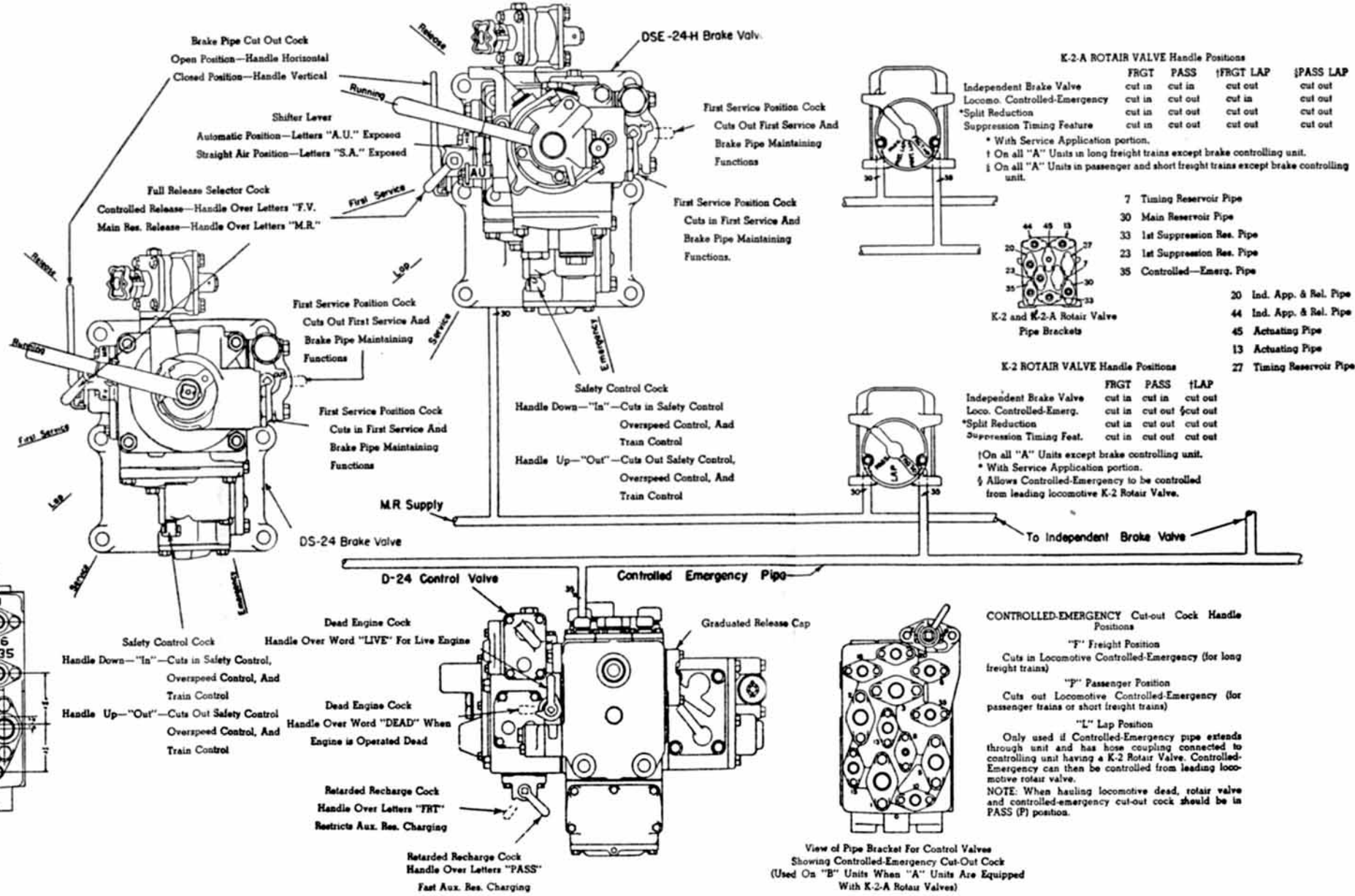
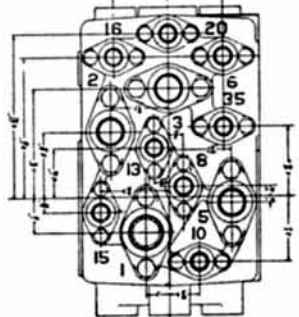
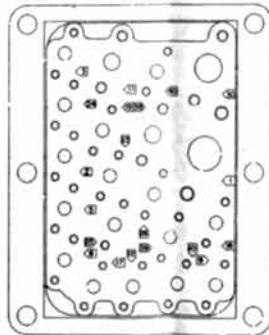
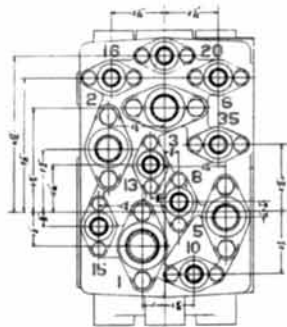


Plate 1 Cock Handle Positions for Operation of 24-RL Equipment in Various Types of Service

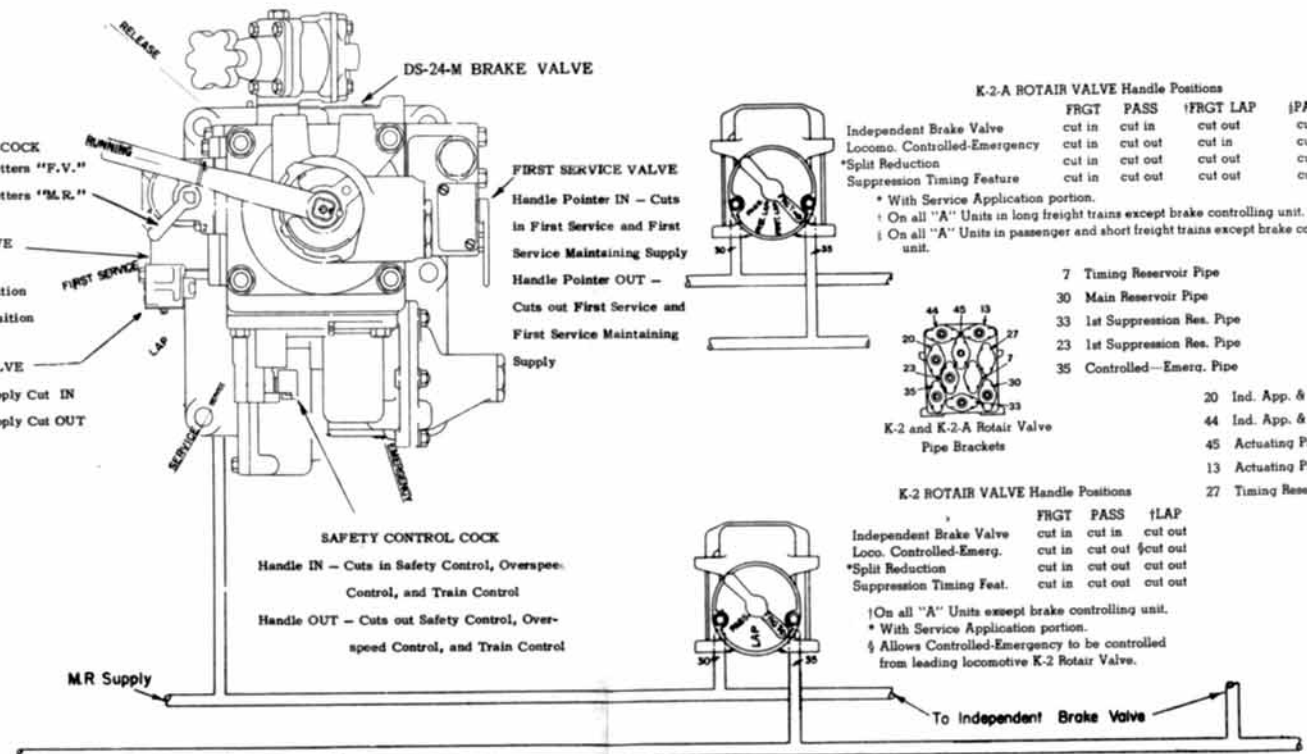
LOCATION OF COCKS AND VALVES

Cocks And Valves	New Brake Valve	Converted Brake Valve
Brake Pipe Cut-Off	Filling Piece Portion	Filling Piece Portion
Safety Control	Application Portion	Application Portion
Maintaining Cut-Off	Application Portion	Filling Piece Portion
First Service	Filling Piece Portion	Filling Piece Portion
Selector Cock	Rotary Valve and Seat	Rotary Valve and Seat

Original Name	Label	Port	Label	Label
1	Brake Pipe	16	Emergency Reservoir Pipe	2
2	Emergency Reservoir Pipe	15	Displacement Res. Pipe	3
3	Displacement Res. Pipe	14	Auxiliary Reservoir Pipe	5
4	Auxiliary Reservoir Pipe	13	Main Reservoir Pipe	6
5	Main Reservoir Pipe	12	Straight-Air Pipe	8
6	Straight-Air Pipe	11	Exhaust Pipe	10
8	Exhaust Pipe	10	Actuating Pipe	13
10	Actuating Pipe	13	Sand Pipe	15
13	Sand Pipe	15	Relay Valve Pipe	16
15	Relay Valve Pipe	16	Ind. Appl. and Rel. Pipe	20
16	Ind. Appl. and Rel. Pipe	20	Controlled-Emergency Pipe	35
20	Controlled-Emergency Pipe	35		
35				



PIPE BRACKET
D-24-M Type Brake Valve



K-2-A ROTAIR VALVE Handle Positions

	FRGT	PASS	FRGT LAP	PASS LAP
Independent Brake Valve	cut in	cut in	cut out	cut out
Locomo. Controlled-Emergency	cut in	cut out	cut in	cut out
*Split Reduction	cut in	cut out	cut out	cut out
Suppression Timing Feature	cut in	cut out	cut out	cut out

* With Service Application portion.
 † On all "A" Units in long freight trains except brake controlling unit.
 ‡ On all "A" Units in passenger and short freight trains except brake controlling unit.

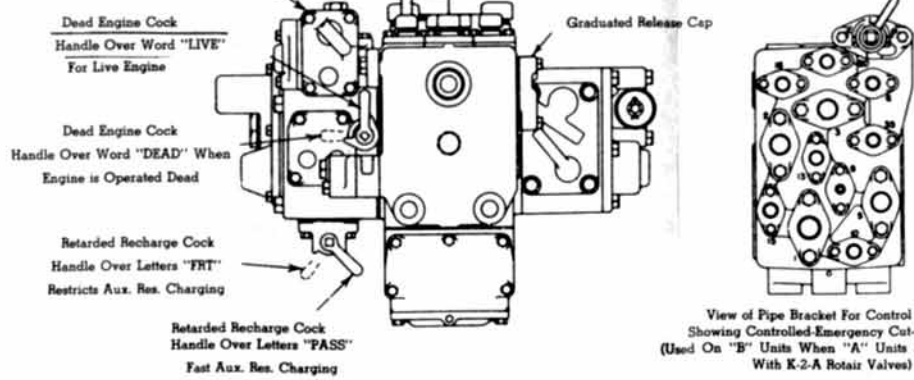
- 7 Timing Reservoir Pipe
- 30 Main Reservoir Pipe
- 33 1st Suppression Res. Pipe
- 23 1st Suppression Res. Pipe
- 35 Controlled-Emerg. Pipe
- 20 Ind. App. & Rel. Pipe
- 44 Ind. App. & Rel. Pipe
- 45 Actuating Pipe
- 13 Actuating Pipe
- 27 Timing Reservoir Pipe

K-2 ROTAIR VALVE Handle Positions

	FRGT	PASS	LAP
Independent Brake Valve	cut in	cut in	cut out
Loco. Controlled-Emerg.	cut in	cut out	cut out
*Split Reduction	cut in	cut out	cut out
Suppression Timing Feat.	cut in	cut out	cut out

† On all "A" Units except brake controlling unit.
 ‡ With Service Application portion.
 § Allows Controlled-Emergency to be controlled from leading locomotive K-2 Rotair Valve.

- D-24 Control Valve Pipe Connections
- 1 1" Brake Pipe
- 2 3/4" Emergency Reservoir Pipe
- 3 3/4" Displacement Res. Pipe
- 5 3/4" Auxiliary Reservoir Pipe
- 6 3/4" Main Reservoir Pipe
- 8 3/4" Straight-Air Pipe
- 10 3/4" Exhaust Pipe
- 13 3/4" Actuating Pipe
- 15 3/4" Sand Pipe
- 16 3/4" Relay Valve Pipe
- 20 3/4" Ind. Appl. and Rel. Pipe
- 35 3/4" Controlled-Emergency Pipe



CONTROLLED-EMERGENCY Cut-out Cock Handle Positions

- "F" Freight Position
Cuts in Locomotive Controlled-Emergency (for long freight trains)
- "P" Passenger Position
Cuts out Locomotive Controlled-Emergency (for passenger trains or short freight trains)
- "L" Lap Position
Only used if Controlled-Emergency pipe extends through unit and has hose coupling connected to controlling unit having a K-2 Rotair Valve. Controlled-Emergency can then be controlled from leading locomotive rotair valve.

NOTE: When hauling locomotive dead, rotair valve and controlled-emergency cut-out cock should be in PASS (P) position.

View of Pipe Bracket For Control Valves
Showing Controlled-Emergency Cut-Out Cock
(Used On "B" Units When "A" Units Are Equipped
With K-2-A Rotair Valves)

Plate 2 Handle Positions, 24-RL Equipment With Pressure Maintaining Brake Valve

LEAD "A" UNIT					"B" UNIT			TRAILING "A" UNIT				
K-2 ROTAIR			K-2-A ROTAIR		No. 35 Pipe Thru No Selector Cock on Control Valve	No. 35 Pipe Thru Selector Cock on C.V.	No. 35 Pipe Not Thru Selector Cock on C.V.	K-2 ROTAIR			K-2-A ROTAIR	
No. 35 Pipe Thru	No. 35 Pipe Thru Selector Cock on C.V.		No. 35 Pipe Not Thru	No. 35 Pipe Thru				Cock Position	Cock Position	No. 35 Pipe Thru	No. 35 Pipe Thru Selector Cock on C.V.	
Rotair Pos.	Rotair Pos.	Cock Pos.	Rotair Pos.	Rotair Pos.			Rotair Pos.	Rotair Pos.	Cock Pos.	Rotair Pos.	Rotair Pos.	
Frnt.					Controlled From Lead Unit		Lap		Lap	Lap	Frnt. Lap 2	Frnt. Lap
Pass.					Controlled From Lead Unit		Lap		Lap	Lap	Pass. Lap 2	Pass. Lap
Frnt.									Lap	Lap	Frnt. Lap 2	Frnt. Lap
Pass.									Lap	Lap	Pass. Lap 2	Pass. Lap
Frnt.						Frnt.	Lap 3	Lap	Frnt.	Frnt. Lap	Frnt. Lap 1	
Pass.						Pass.	Lap 3	Lap	Pass.	Pass. Lap	Pass. Lap	
	Frnt.	Lap			Controlled From Lead Unit		Lap	Lap	Lap	Frnt. Lap 2	Frnt. Lap	
	Pass.	Lap			Controlled From Lead Unit		Lap	Lap	Lap	Pass. Lap 2	Pass. Lap	
	Frnt.	Lap					Lap	Lap	Lap	Frnt. Lap 2	Frnt. Lap	
	Pass.	Lap					Lap	Lap	Lap	Pass. Lap 2	Pass. Lap	
	Frnt.	Lap 1				Frnt.	Lap 3	Lap	Frnt.	Frnt. Lap	Frnt. Lap 1	
	Pass.	Lap 1				Pass.	Lap 3	Lap	Pass.	Pass. Lap	Pass. Lap	
			Frnt.		Control Dependent on		Lap 3 4	Lap	Frnt. 8	Frnt. Lap 8	Frnt. Lap 6	
			Pass.		Trailing "A" Unit		Lap 3	Lap	Pass. 5	Pass. Lap	Pass. Lap	
			Frnt.			Frnt.	Lap 3 7	Lap	Frnt.	Frnt. Lap	Frnt. Lap	
			Pass.			Pass.	Lap 3	Lap	Pass.	Pass. Lap	Pass. Lap	
			Frnt.			Frnt.	Lap 3 7	Lap	Frnt.	Frnt. Lap	Frnt. Lap	
			Pass.			Pass.	Lap 3	Lap	Pass.	Pass. Lap	Pass. Lap	
			Frnt.	Frnt.	Controlled From Lead Unit		Lap	Lap	Lap	Frnt. Lap 2	Frnt. Lap	
			Pass.	Pass.	Controlled From Lead Unit		Lap	Lap	Lap	Pass. Lap 2	Pass. Lap	
			Frnt.	Frnt.			Lap	Lap	Lap	Frnt. Lap 2	Frnt. Lap	
			Pass.	Pass.			Lap	Lap	Lap	Pass. Lap 2	Pass. Lap	
			Frnt. 1	Frnt. 1		Frnt.	Lap 3	Lap	Frnt. 1	Frnt. Lap	Frnt. Lap 1	
			Pass.	Pass.		Pass.	Lap 3	Lap	Pass.	Pass. Lap	Pass. Lap	

- 1 Close No. 35 Cut-out Cock at end of unit.
- 2 Close No. 35 cut-out cock at rear of preceding unit.
- 3 Open No. 35 cut-out cock at end of unit.
- 4 Controlled Emergency available only on Lead Unit.
- 5 Cock may be placed in Lap if No. 35 pipe cut-out cocks are open to At.
- 6 By connecting No. 35 pipes between units, Controlled Emergency is available on "A" Unit. Feature can be annulled from Lead Unit.
- 7 Controlled Emergency not available on Trailing "A" Unit.
- 8 Controlled Emergency available only on Lead and Trailing "A" Units.

Plate 3 ROTAIR® Valve Position Combinations

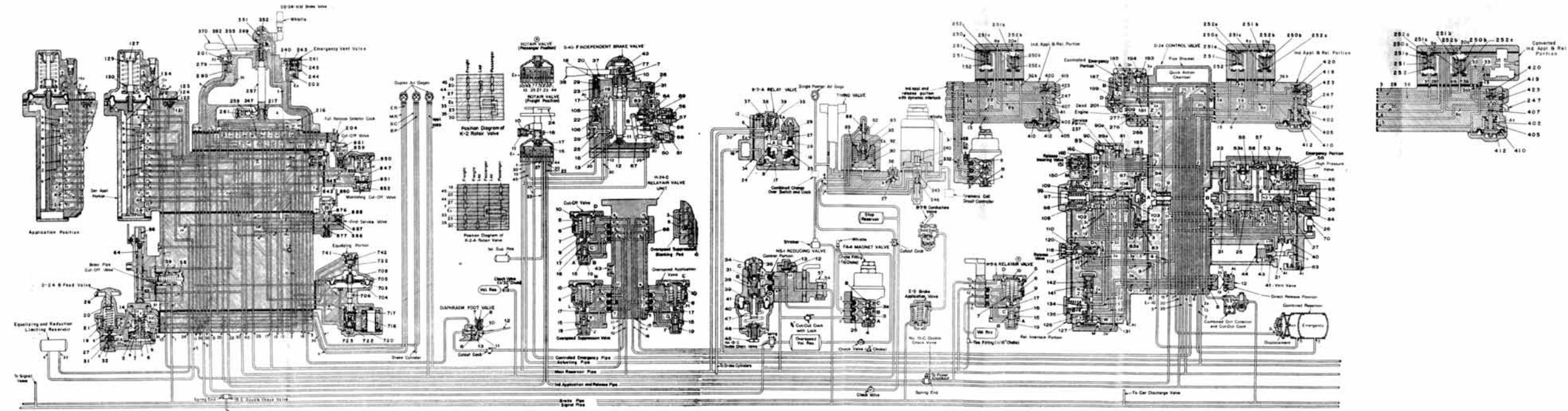


Plate 4 Diagrammatic—24-RL Locomotive Brake Equipment with DS-24-HM Brake Valve and Four-Face RELAYAIR® Valve Unit

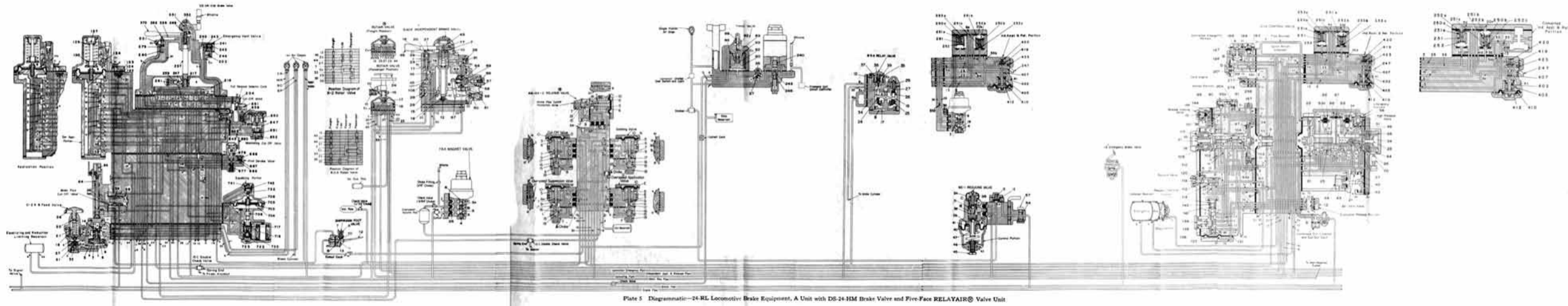


Plate 5 Diagrammatic—24-RL Locomotive Brake Equipment, A Unit with DS-24-HM Brake Valve and Five-Face RELAYAIR® Valve Unit

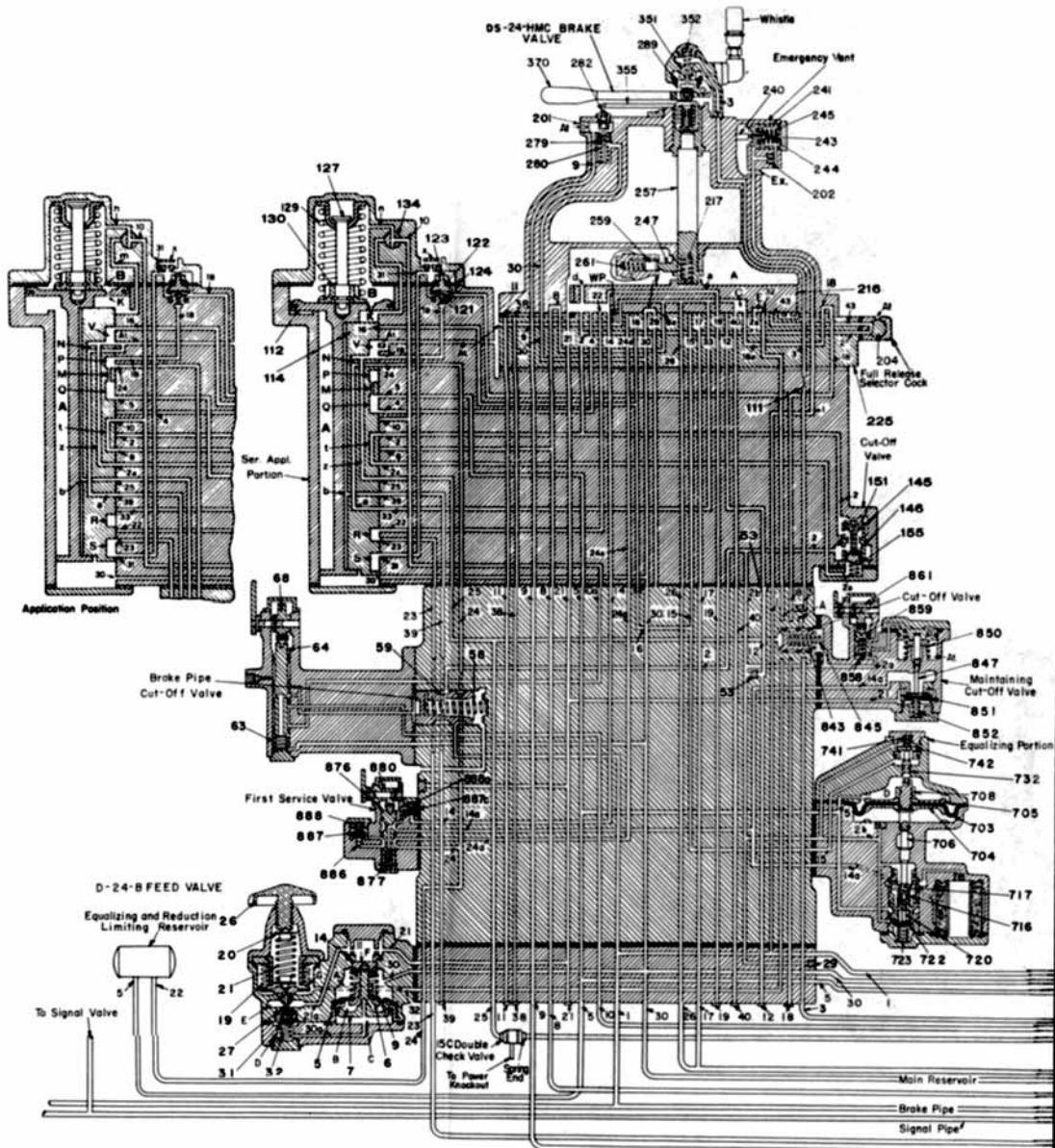


Plate 5A Overlay—DS-24-HMC Brake Valve

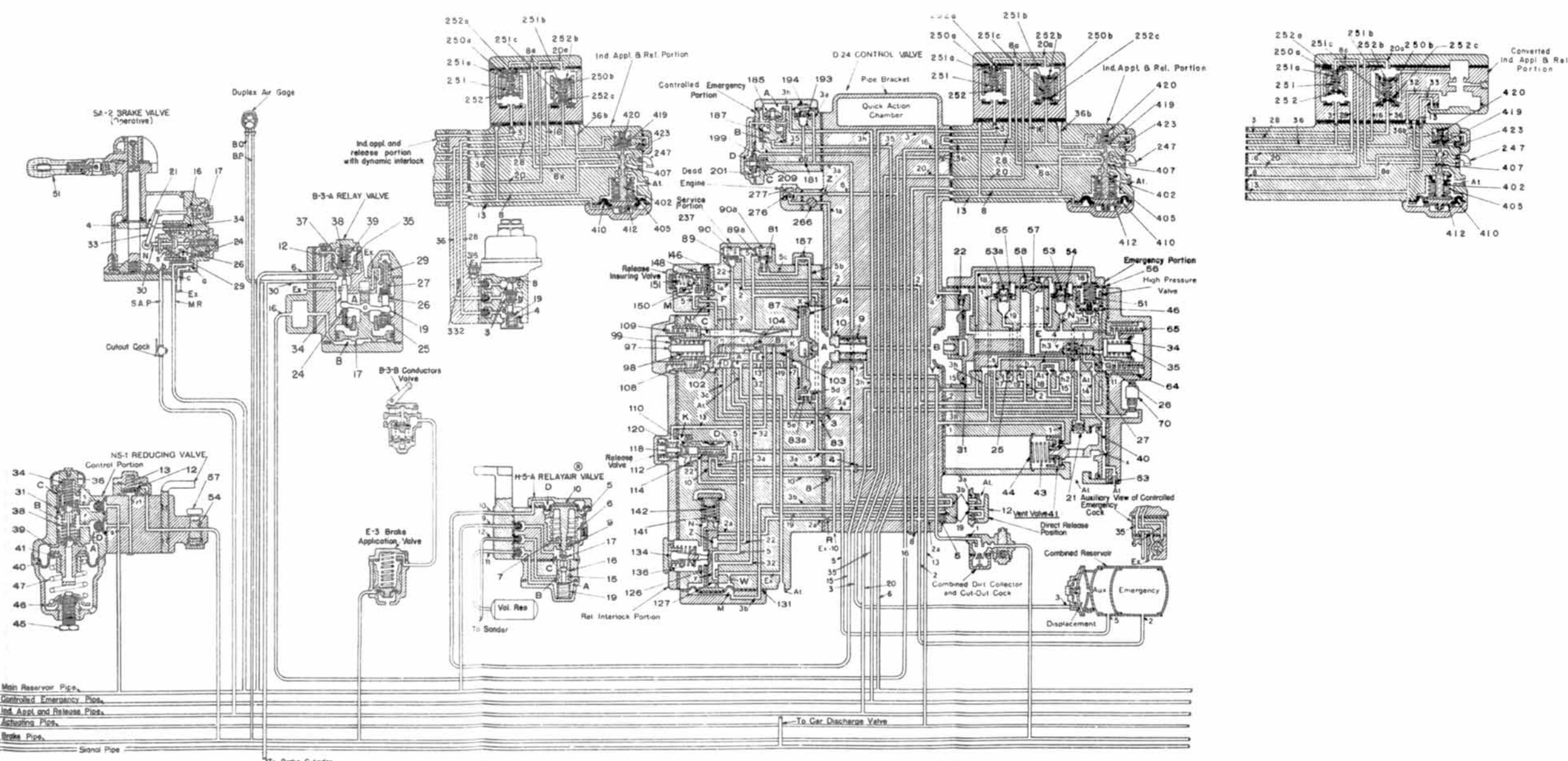


Plate 8 Diagrammatic—24-RL Locomotive Brake Equipment, B Unit of Freight Locomotive.

DS-24 BRAKE VALVE

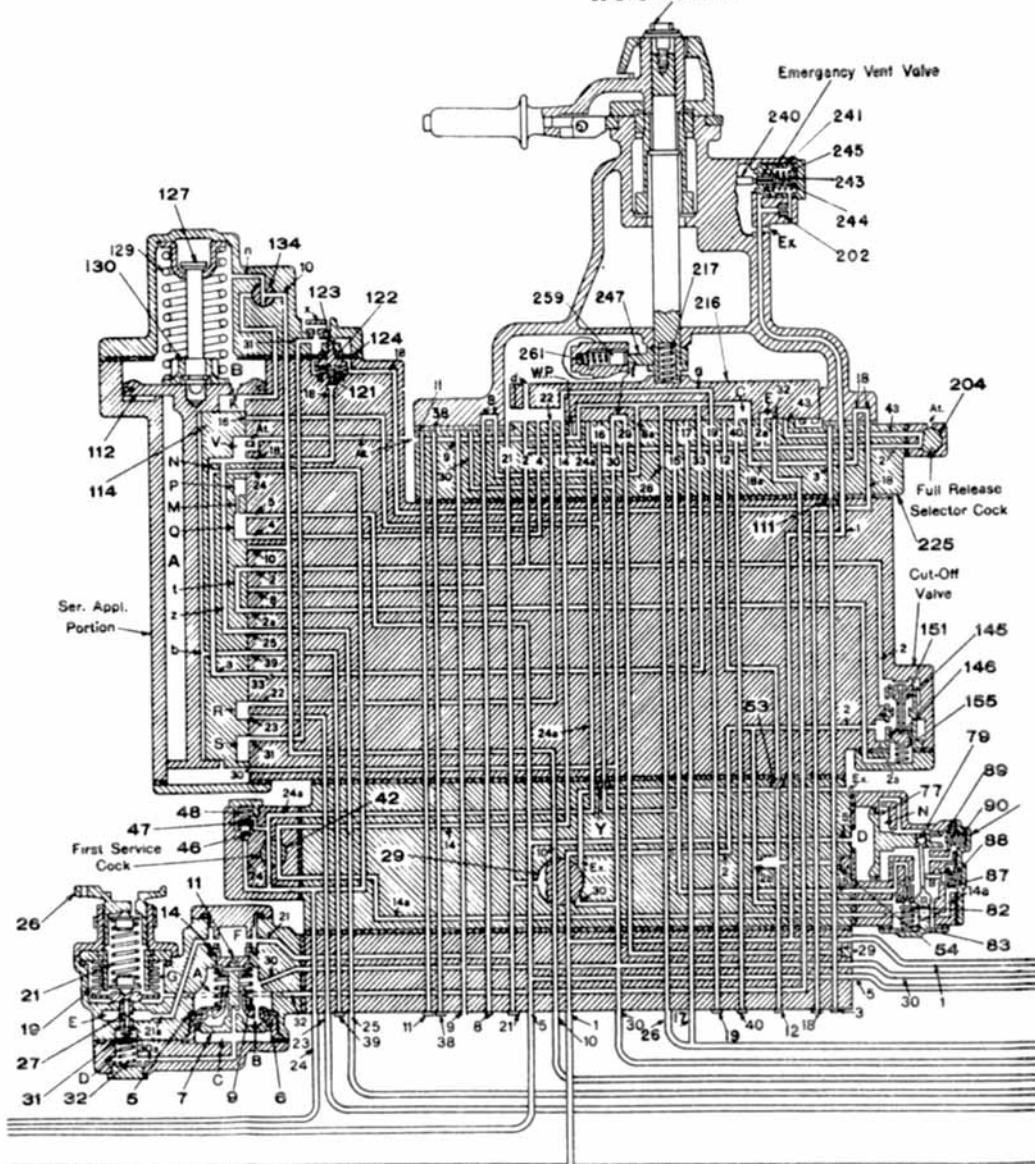


Plate 9 Diagrammatic—Supplemental View of DS-24 Brake Valve for Freight Service

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

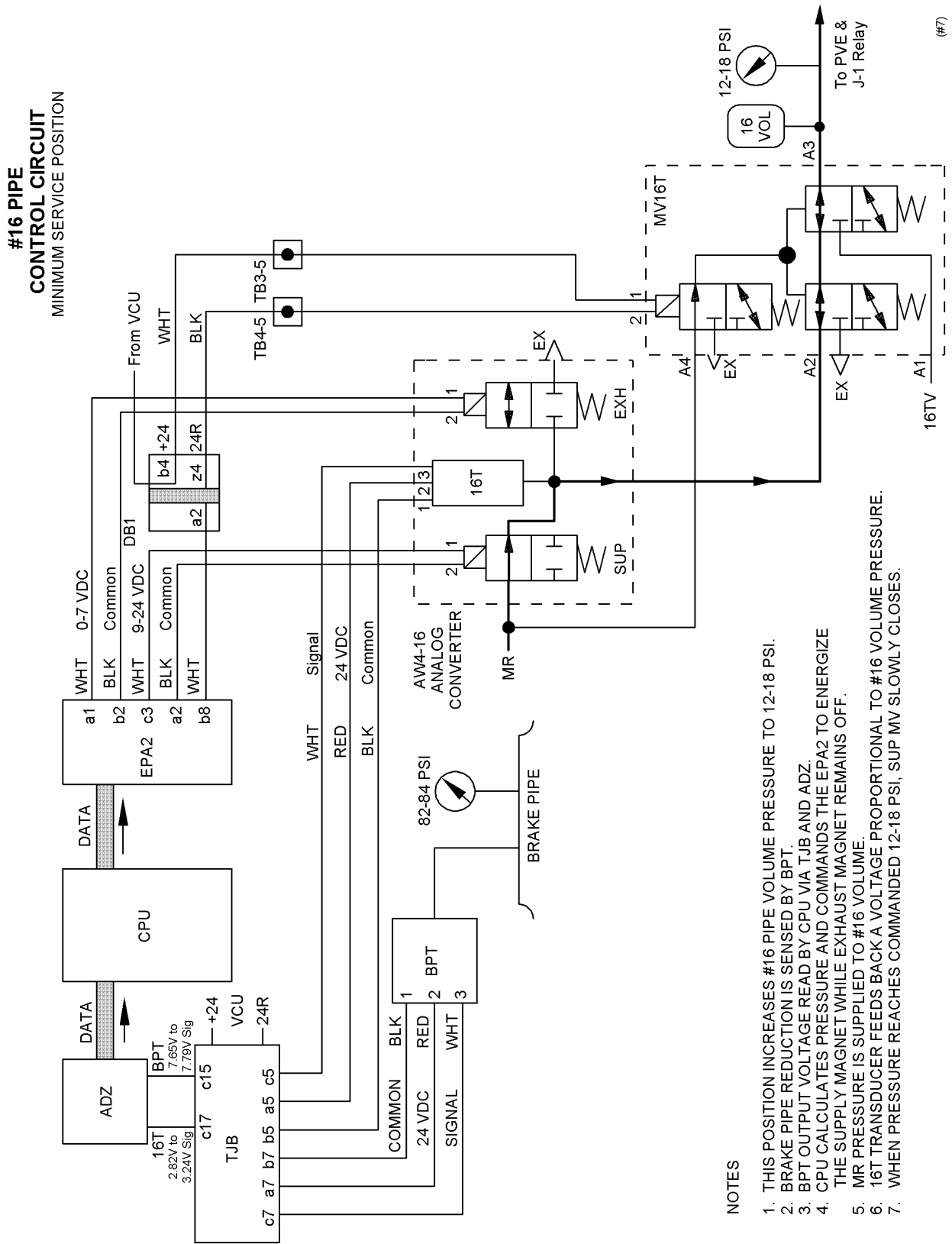


FIGURE 1-27 #16 PIPE CONTROL CIRCUIT MINIMUM SERVICE POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

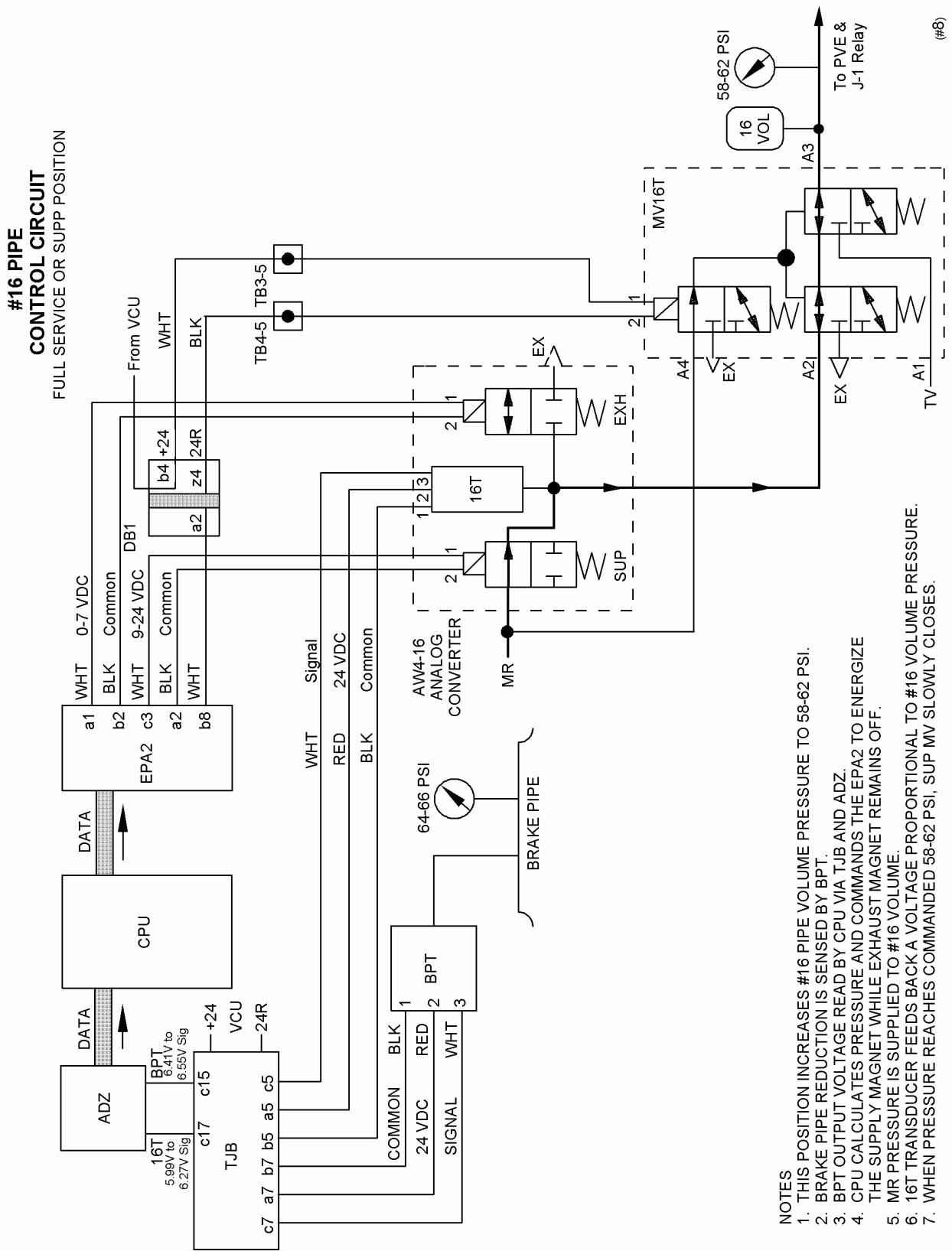
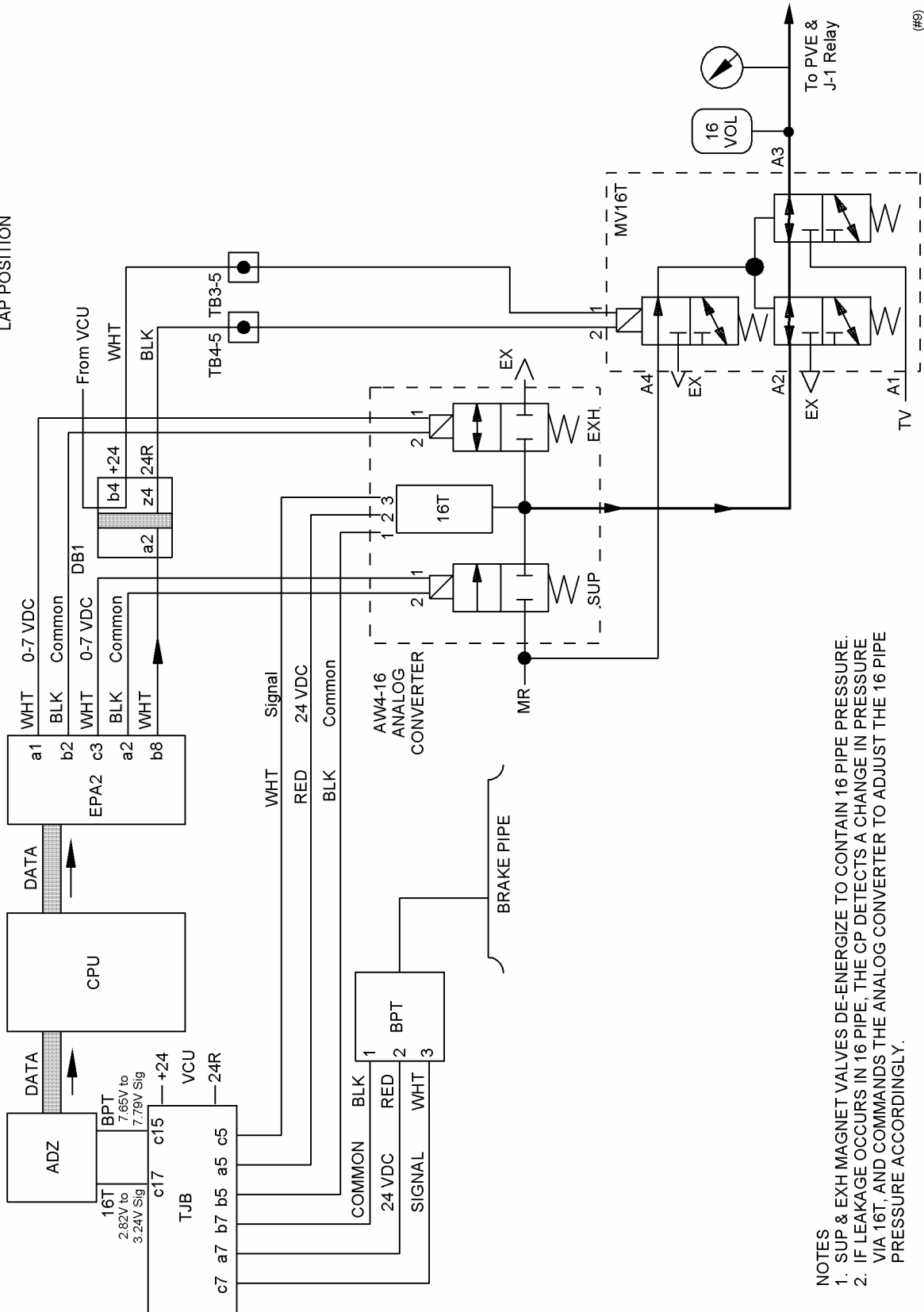


FIGURE 1-28 #16 PIPE CONTROL CIRCUIT FULL SERVICE OR SUPPRESSION POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

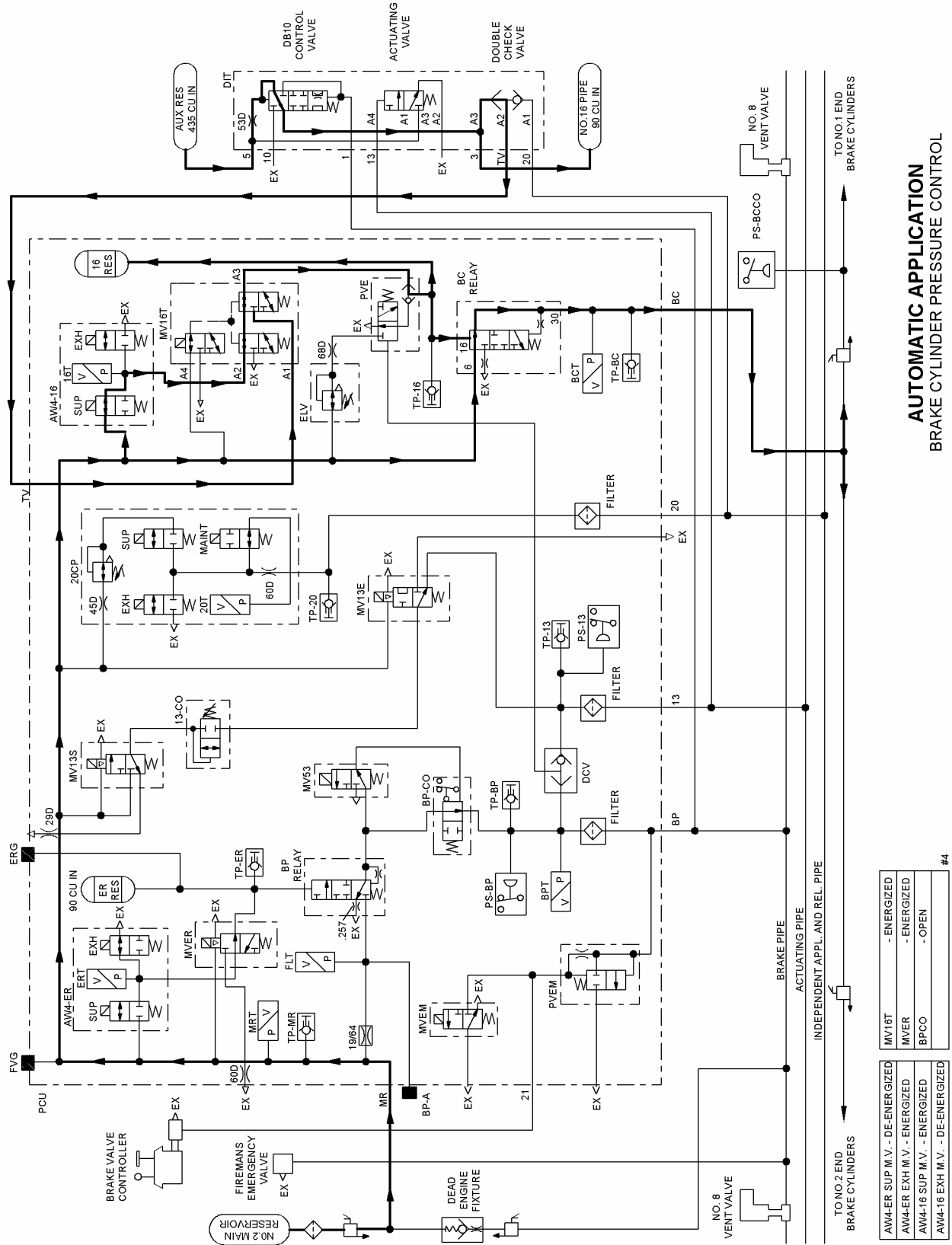
#16 PIPE CONTROL CIRCUIT LAP POSITION



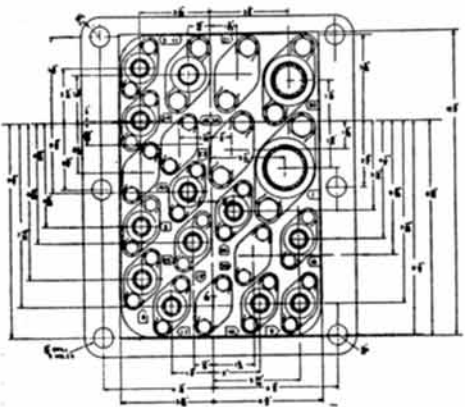
- NOTES
1. SUP & EXH MAGNET VALVES DE-ENERGIZE TO CONTAIN 16 PIPE PRESSURE.
 2. IF LEAKAGE OCCURS IN 16 PIPE, THE CP DETECTS A CHANGE IN PRESSURE VIA 16T, AND COMMANDS THE ANALOG CONVERTER TO ADJUST THE 16 PIPE PRESSURE ACCORDINGLY.

FIGURE 1-29 #16 PIPE CONTROL CIRCUIT LAP POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL



- LEGEND**
- 1 BRAKE PIPE (1 1/2" I.P.)
 - 2 SAFETY CONTROL PIPE (1/2" I.P.)
 - 3 EQUALIZING RESERVOIR (1 1/2" I.P.)
 - 4 STOP RESERVOIR (EXHAUST) (1 1/2" I.P.)
 - 5 SANDING PIPE (1 1/2" I.P.)
 - 6 BRAKE APPLICATION VALVE PISTON (1 1/2" I.P.)
 - 7 STRAIGHT AIR PIPE TO MASTER CONTROLLER (1 1/2" I.P.)
 - 8 MAINTENANCE IN EMERGENCY
 - 9 EQUALIZING PISTON EX TO TUNING RESERVOIR (1 1/2" I.P.)
 - 10 SECOND REDUCTION RESERVOIR (1 1/2" I.P.)
 - 11 SUPPRESSION RESERVOIR (1 1/2" I.P.)
 - 12 FEED VALVE
 - 13 FIRST SUPPRESSION RESERVOIR (1 1/2" I.P.)
 - 14 REDUCTION LIMITING RESERVOIR (1 1/2" I.P.)
 - 15 PNEUMATIC RELAY PIPE (1 1/2" I.P.)
 - 16 TEMPORARY SUPPRESSION (1 1/2" I.P.)
 - 17 GOVERNOR
 - 18 MAIN RESERVOIR (1" I.P.)
 - 19 STRAIGHT AIR PIPE
 - 20 ACKNOWLEDGING RELAY SWITCH
 - 21 RELEASE PIPE



- D-24 Control Valve Pipe Connections**
- 1" Brake Pipe
 - 3/4" Emergency Reservoir Pipe
 - 3/4" Displacement Res. Pipe
 - 3/4" Auxiliary Reservoir Pipe
 - 3/4" Main Reservoir Pipe
 - 3/4" Straight-Air Pipe
 - 3/4" Exhaust Pipe
 - 3/4" Actuating Pipe
 - 3/4" Sand Pipe
 - 3/4" Relay Valve Pipe
 - 3/4" Ind. Appl. and Rel. Pipe
 - 3/4" Controlled-Emergency Pipe

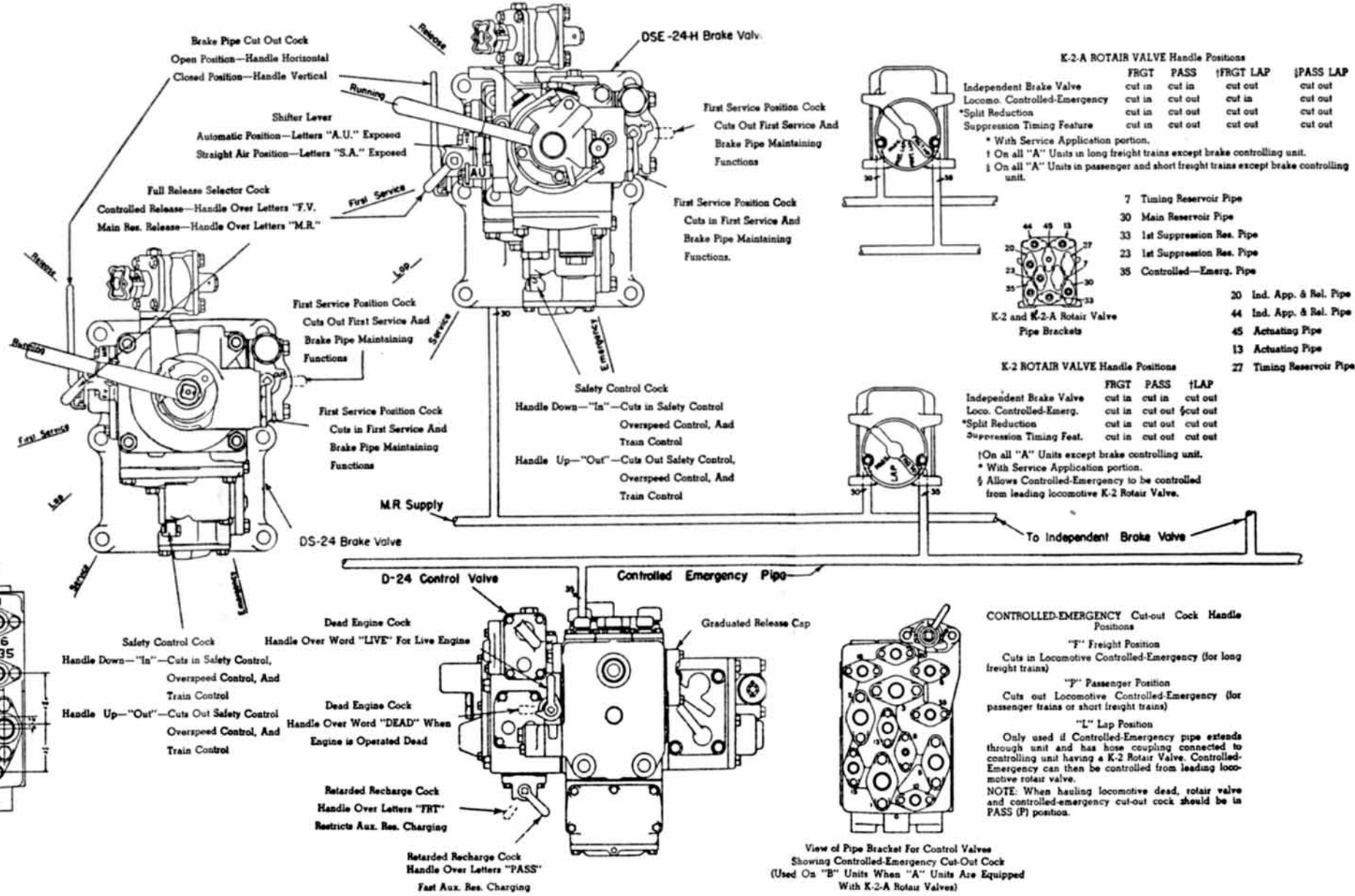
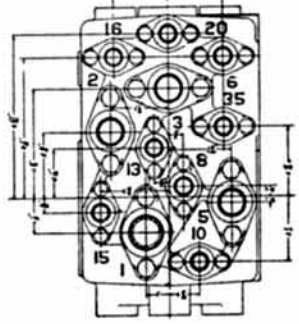
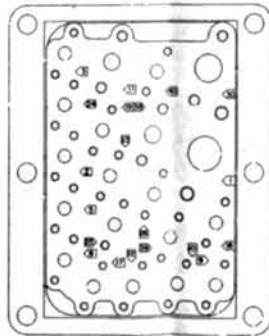
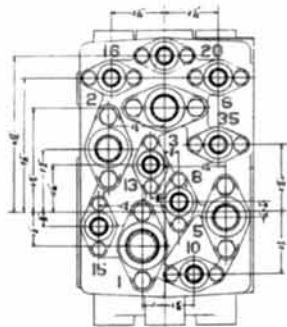


Plate 1 Cock Handle Positions for Operation of 24-RL Equipment in Various Types of Service

LOCATION OF COCKS AND VALVES

Cocks And Valves	New Brake Valve	Converted Brake Valve
Brake Pipe Cut-Off	Filling Piece Portion	Filling Piece Portion
Safety Control	Application Portion	Application Portion
Maintaining Cut-Off	Application Portion	Filling Piece Portion
First Service	Filling Piece Portion	Filling Piece Portion
Selector Cock	Rotary Valve and Seat	Rotary Valve and Seat

Original Name	Label	Original Name	Label
1	Brake Pipe	15	Exhaust Pipe
2	Emergency Reservoir Pipe	16	Relay Valve Pipe
3	Displacement Res. Pipe	17	Ind. Appl. and Rel. Pipe
4	Auxiliary Reservoir Pipe	18	Controlled-Emergency Pipe
5	Main Reservoir Pipe	19	Controlled-Emergency Pipe
6	Straight-Air Pipe	20	Controlled-Emergency Pipe
8	Exhaust Pipe	21	Controlled-Emergency Pipe
10	Actuating Pipe	22	Controlled-Emergency Pipe
13	Sand Pipe	23	Controlled-Emergency Pipe
15	Relay Valve Pipe	24	Controlled-Emergency Pipe
16	Ind. Appl. and Rel. Pipe	25	Controlled-Emergency Pipe
20	Controlled-Emergency Pipe	26	Controlled-Emergency Pipe
35	Controlled-Emergency Pipe	27	Controlled-Emergency Pipe

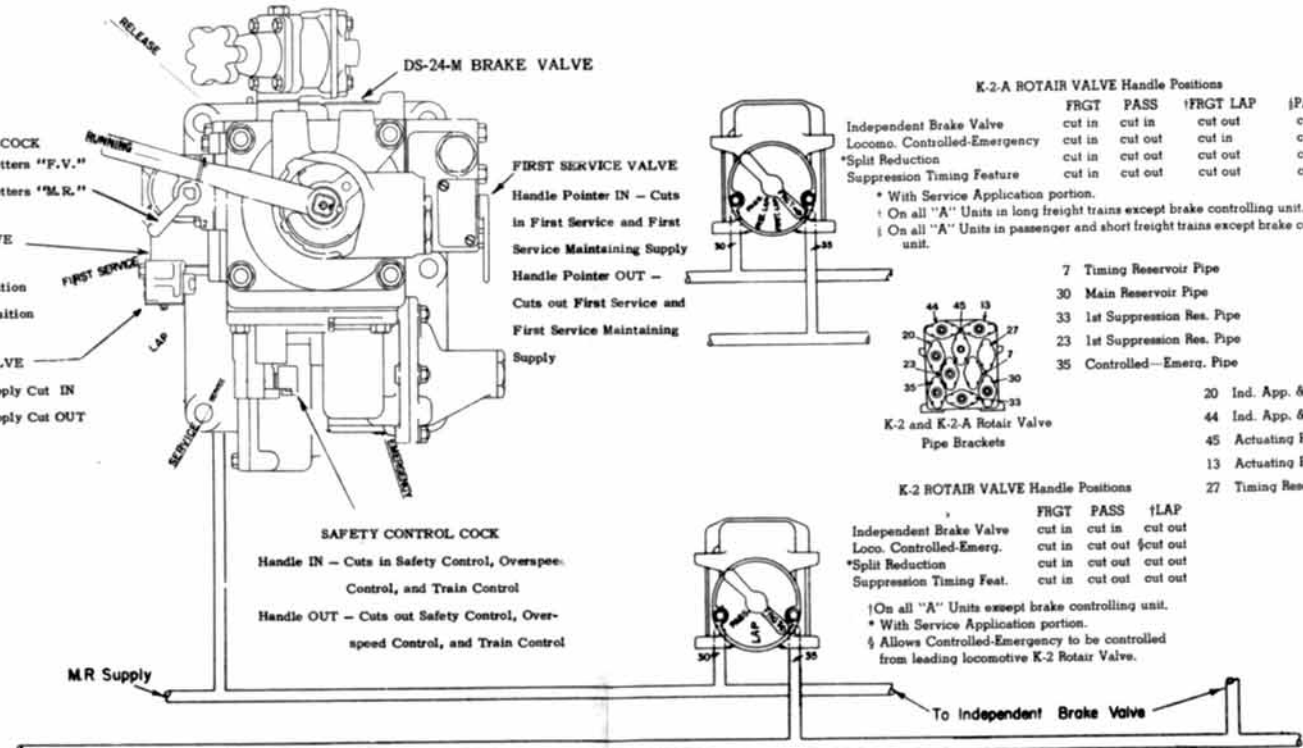


PIPE BRACKET D-24-M Type Brake Valve

FULL RELEASE SELECTOR COCK
Controlled Release - Handle Over Letters "F.V."
Main Res. Release - Handle Over Letters "M.R."

BRAKE PIPE CUT-OFF VALVE
(Not Visible)
Handle Pointer IN - Open Position
Handle Pointer OUT - Closed Position

MAINTAINING CUT-OFF VALVE
Handle Pointer IN - Maintaining Supply Cut IN
Handle Pointer OUT - Maintaining Supply Cut OUT



K-2-A ROTAIR VALVE Handle Positions

	FRGT	PASS	FRGT LAP	PASS LAP
Independent Brake Valve	cut in	cut in	cut out	cut out
Locomo. Controlled-Emergency	cut in	cut out	cut in	cut out
*Split Reduction	cut in	cut out	cut out	cut out
Suppression Timing Feature	cut in	cut out	cut out	cut out

* With Service Application portion.
† On all "A" Units in long freight trains except brake controlling unit.
‡ On all "A" Units in passenger and short freight trains except brake controlling unit.

- 7 Timing Reservoir Pipe
- 30 Main Reservoir Pipe
- 33 1st Suppression Res. Pipe
- 23 1st Suppression Res. Pipe
- 35 Controlled-Emerg. Pipe

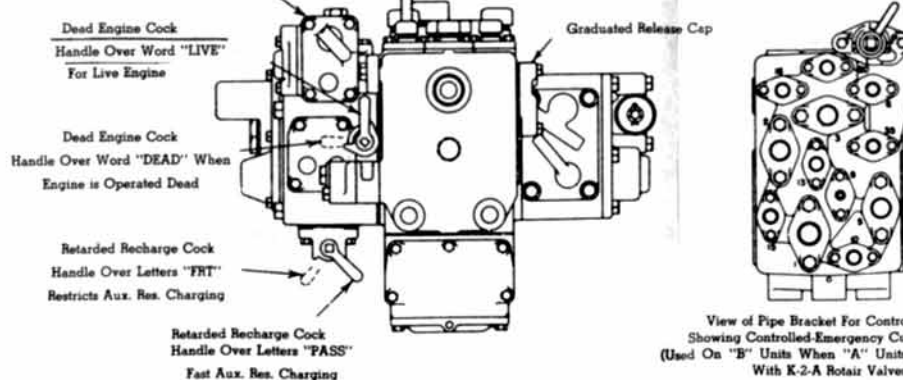
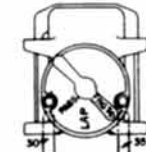
K-2 and K-2-A Rotair Valve Pipe Brackets

- 20 Ind. App. & Rel. Pipe
- 44 Ind. App. & Rel. Pipe
- 45 Actuating Pipe
- 13 Actuating Pipe
- 27 Timing Reservoir Pipe

K-2 ROTAIR VALVE Handle Positions

	FRGT	PASS	LAP
Independent Brake Valve	cut in	cut in	cut out
Loco. Controlled-Emerg.	cut in	cut out	cut out
*Split Reduction	cut in	cut out	cut out
Suppression Timing Feat.	cut in	cut out	cut out

† On all "A" Units except brake controlling unit.
‡ With Service Application portion.
§ Allows Controlled-Emergency to be controlled from leading locomotive K-2 Rotair Valve.



CONTROLLED-EMERGENCY Cut-out Cock Handle Positions

"F" Freight Position
Cuts in Locomotive Controlled-Emergency (for long freight trains)

"P" Passenger Position
Cuts out Locomotive Controlled-Emergency (for passenger trains or short freight trains)

"L" Lap Position

Only used if Controlled-Emergency pipe extends through unit and has hose coupling connected to controlling unit having a K-2 Rotair Valve. Controlled-Emergency can then be controlled from leading locomotive rotair valve.
NOTE: When hauling locomotive dead, rotair valve and controlled-emergency cut-out cock should be in PASS (P) position.

Plate 2 Handle Positions, 24-RL Equipment With Pressure Maintaining Brake Valve

LEAD "A" UNIT					"B" UNIT			TRAILING "A" UNIT				
K-2 ROTAIR			K-2-A ROTAIR		No. 35 Pipe Thru No Selector Cock on Control Valve	No. 35 Pipe Thru Selector Cock on C.V.	No. 35 Pipe Not Thru Selector Cock on C.V.	K-2 ROTAIR			K-2-A ROTAIR	
No. 35 Pipe Thru	No. 35 Pipe Thru Selector Cock on C.V.		No. 35 Pipe Not Thru	No. 35 Pipe Thru				Cock Position	Cock Position	No. 35 Pipe Thru	No. 35 Pipe Thru Selector Cock on C.V.	
Rotair Pos.	Rotair Pos.	Cock Pos.	Rotair Pos.	Rotair Pos.			Rotair Pos.	Rotair Pos.	Cock Pos.	Rotair Pos.	Rotair Pos.	
Frnt.					Controlled From Lead Unit		Lap		Lap	Lap	Frnt. Lap 2	Frnt. Lap
Pass.					Controlled From Lead Unit		Lap		Lap	Lap	Pass. Lap 2	Pass. Lap
Frnt.									Lap	Lap	Frnt. Lap 2	Frnt. Lap
Pass.									Lap	Lap	Pass. Lap 2	Pass. Lap
Frnt.									Lap 3	Lap	Frnt.	Frnt. Lap 1
Pass.									Lap 3	Lap	Pass.	Pass. Lap
	Frnt.	Lap			Controlled From Lead Unit				Lap	Lap	Frnt. Lap 2	Frnt. Lap
	Pass.	Lap			Controlled From Lead Unit				Lap	Lap	Pass. Lap 2	Pass. Lap
	Frnt.	Lap							Lap	Lap	Frnt. Lap 2	Frnt. Lap
	Pass.	Lap							Lap	Lap	Pass. Lap 2	Pass. Lap
	Frnt.	Lap 1							Lap 3	Lap	Frnt.	Frnt. Lap 1
	Pass.	Lap 1							Lap 3	Lap	Pass.	Pass. Lap
			Frnt.		Control Dependent on				Lap 3 4	Lap	Frnt. 8	Frnt. Lap 8
			Pass.		Trailing "A" Unit				Lap 3	Lap	Pass. 5	Pass. Lap
			Frnt.				Frnt.		Lap 3 7	Lap	Frnt.	Frnt. Lap
			Pass.				Pass.		Lap 3	Lap	Pass.	Pass. Lap
			Frnt.						Lap 3 7	Lap	Frnt.	Frnt. Lap
			Pass.				Pass.		Lap 3	Lap	Pass.	Pass. Lap
				Frnt.	Controlled From Lead Unit				Lap	Lap	Lap	Frnt. Lap 2
				Pass.	Controlled From Lead Unit				Lap	Lap	Lap	Pass. Lap 2
				Frnt.					Lap	Lap	Lap	Frnt. Lap 2
				Pass.					Lap	Lap	Lap	Pass. Lap 2
				Frnt. 1					Lap 3	Lap	Frnt. 1	Frnt. Lap 1
				Pass.					Lap 3	Lap	Pass.	Pass. Lap

- 1 Close No. 35 Cut-out Cock at end of unit.
- 2 Close No. 35 cut-out cock at rear of preceding unit.
- 3 Open No. 35 cut-out cock at end of unit.
- 4 Controlled Emergency available only on Lead Unit.
- 5 Cock may be placed in Lap if No. 35 pipe cut-out cocks are open to At.
- 6 By connecting No. 35 pipes between units, Controlled Emergency is available on "A" Unit. Feature can be annulled from Lead Unit.
- 7 Controlled Emergency not available on Trailing "A" Unit.
- 8 Controlled Emergency available only on Lead and Trailing "A" Units.

Plate 3 ROTAIR® Valve Position Combinations

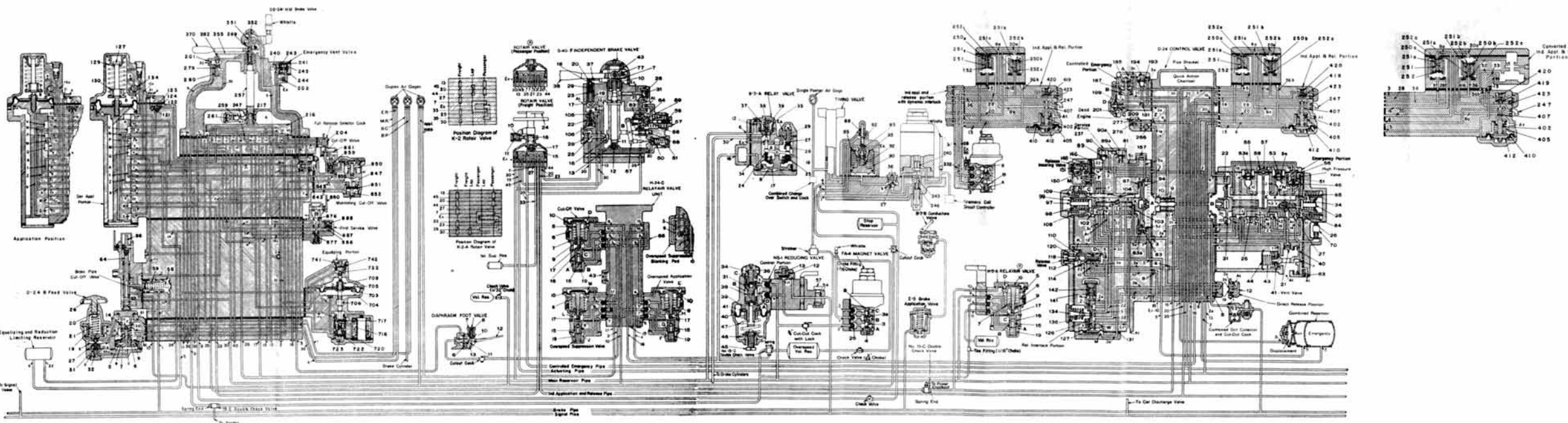


Plate 4 Diagrammatic—24-RL Locomotive Brake Equipment with DS-24-HM Brake Valve and Four-Face RELAYAIR® Valve Unit

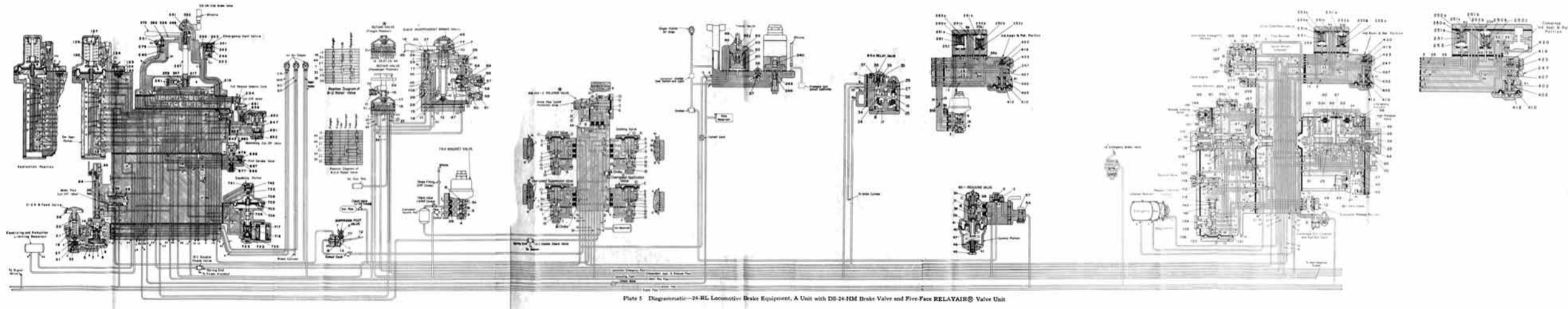


Plate 5 Diagrammatic—24-RL Locomotive Brake Equipment, A Unit with DS-24-HM Brake Valve and Five-Face RELAYAIR® Valve Unit

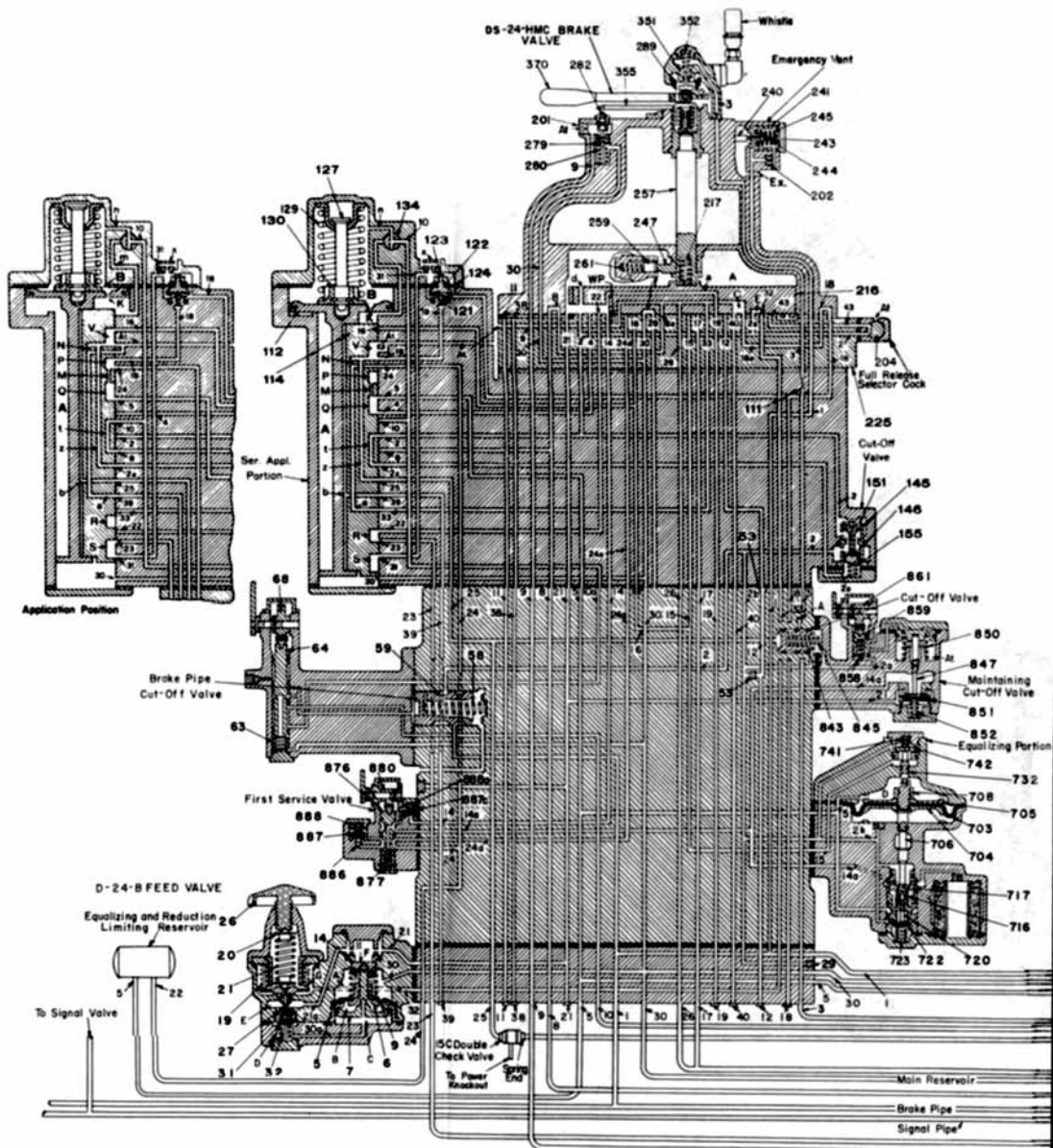


Plate 5A Overlay—DS-24-HMC Brake Valve

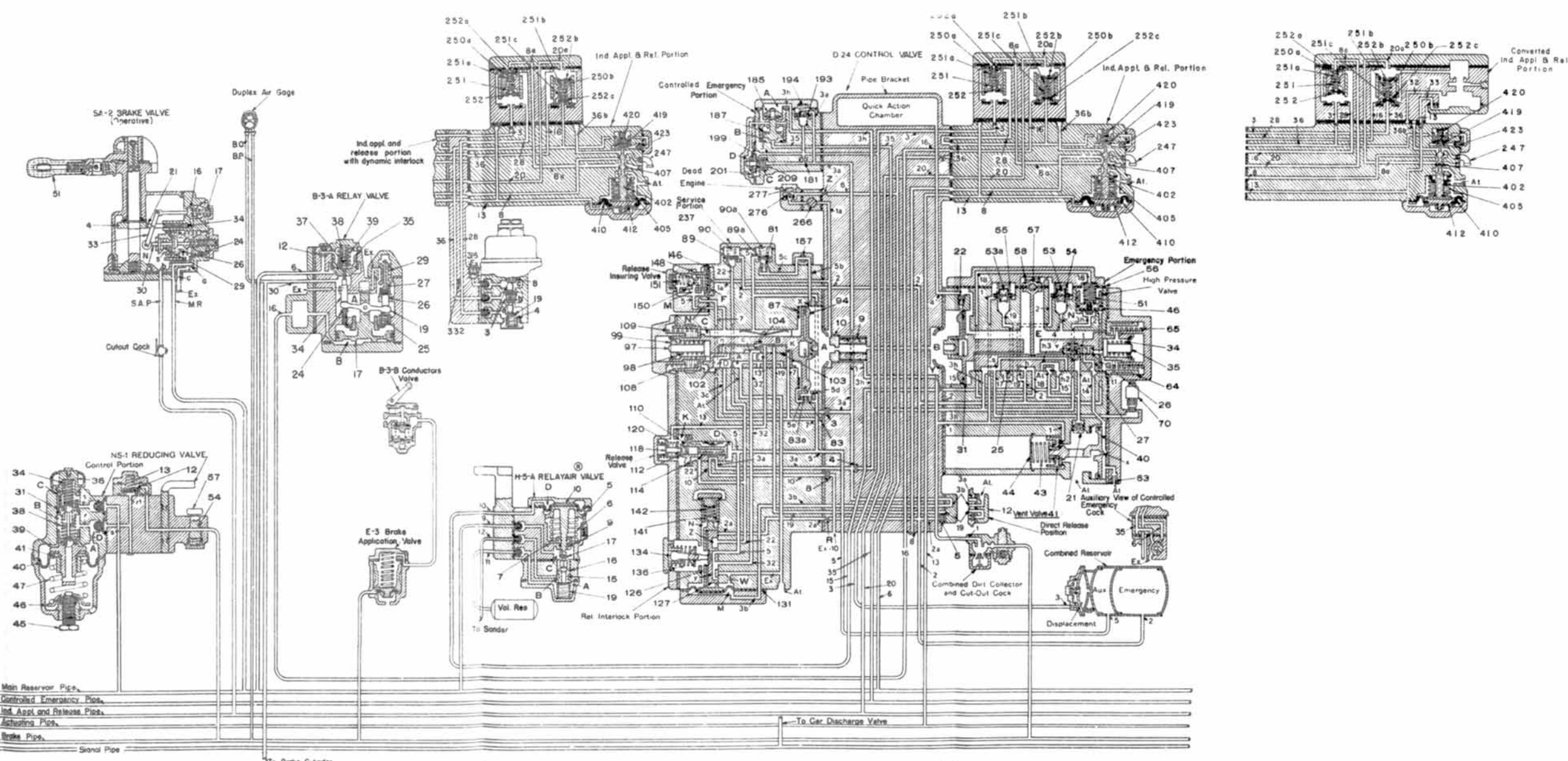


Plate 8 Diagrammatic—24-RL Locomotive Brake Equipment, B Unit of Freight Locomotive.

DS-24 BRAKE VALVE

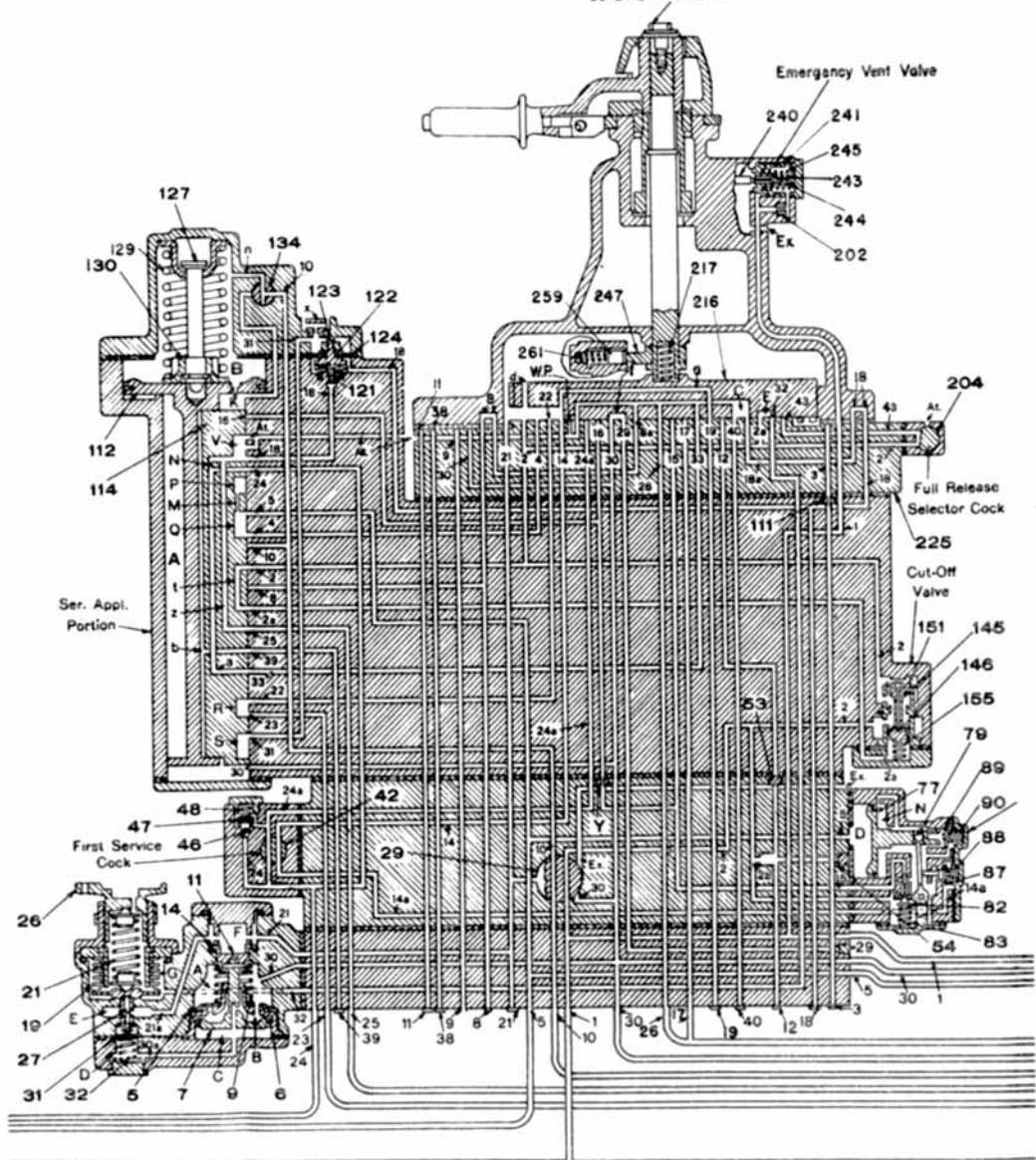


Plate 9 Diagrammatic—Supplemental View of DS-24 Brake Valve for Freight Service

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

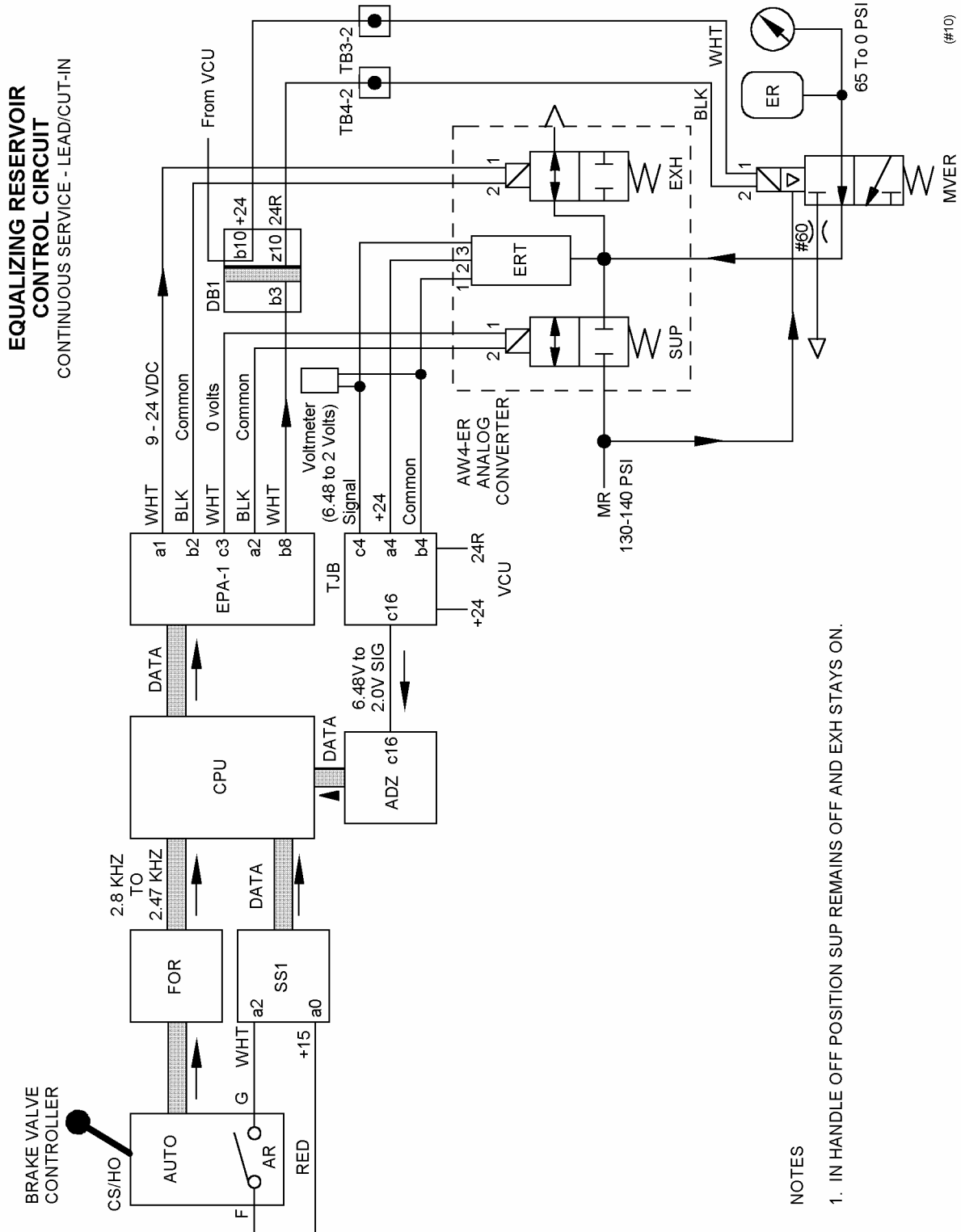


FIGURE 1-31 ER CONTROL CIRCUIT CONTINUOUS SERVICEHANDLE OUT
POSITION - LEAD/CUT-IN

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

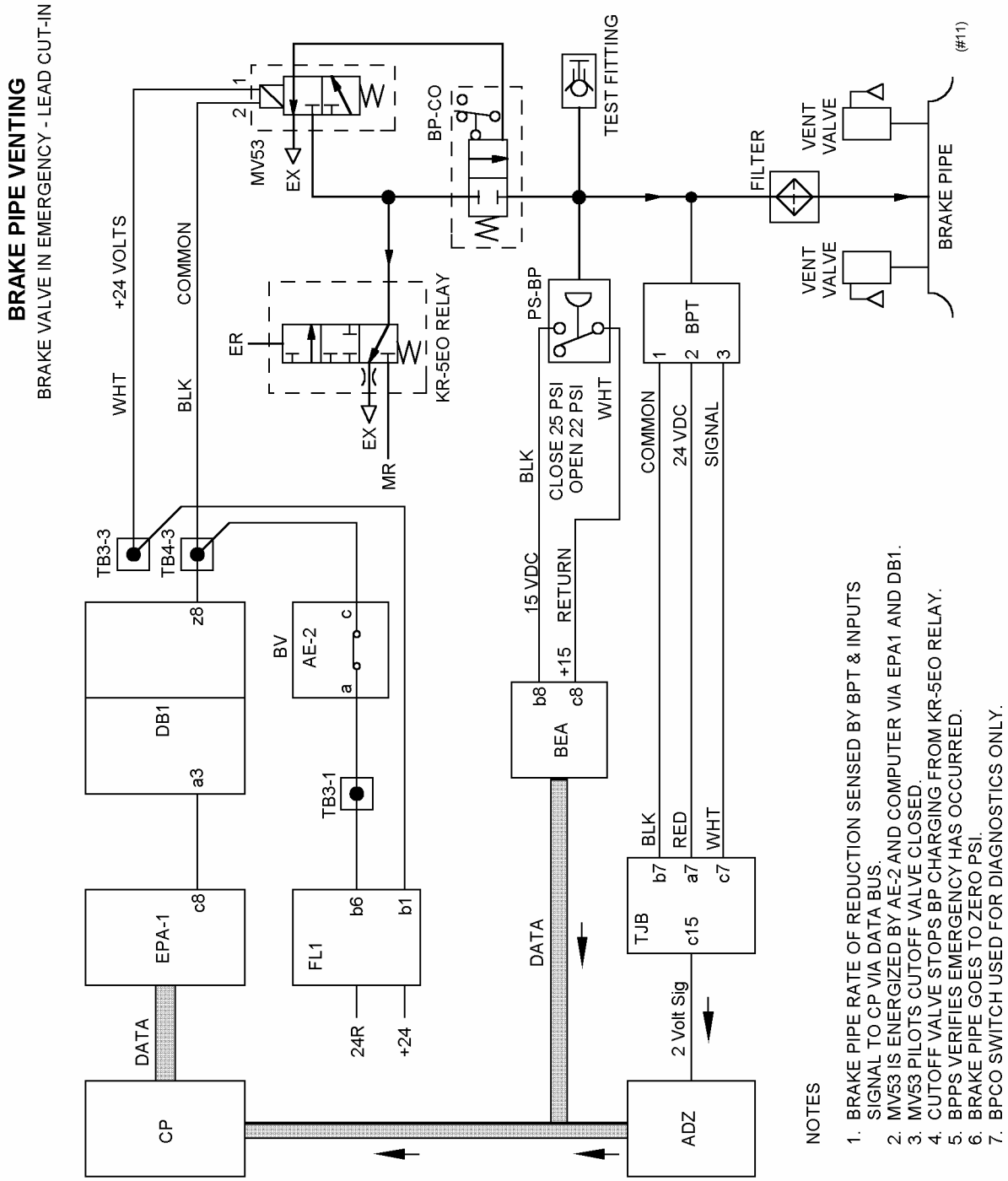


FIGURE 1-32 BP VENTING - LEAD CUT-IN BRAKE VALVE IN EMERGENCY

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

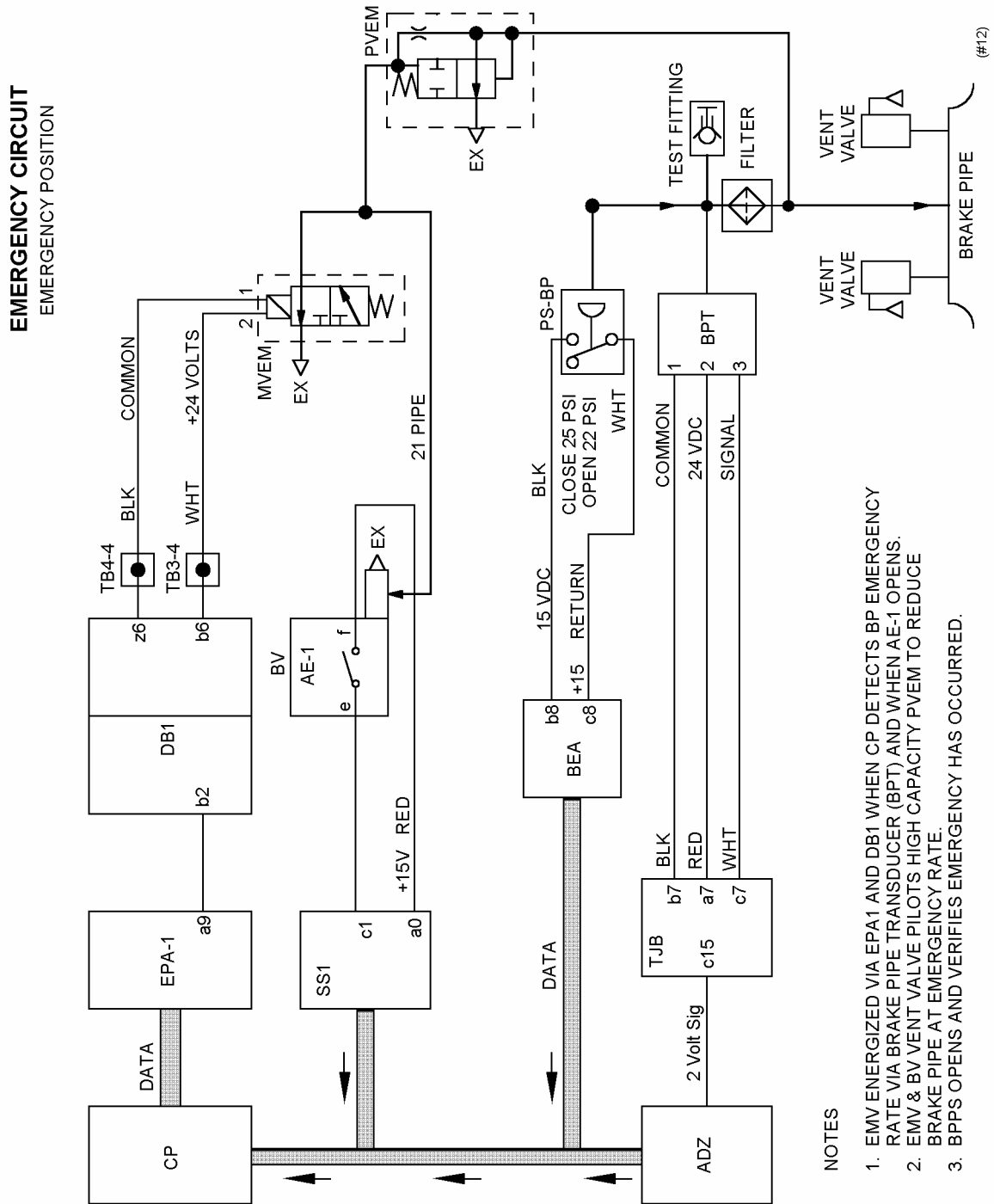
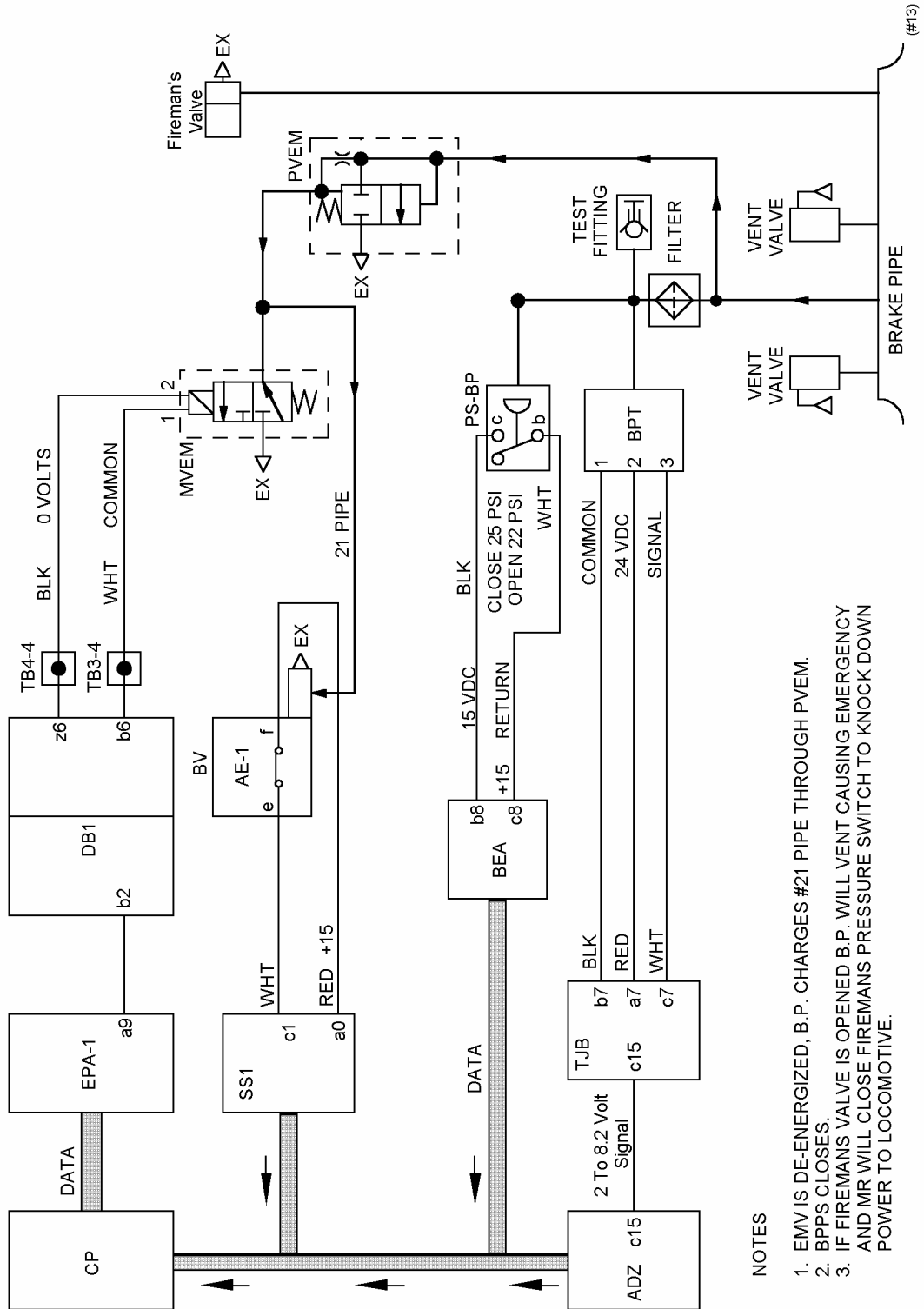


FIGURE 1-33 EMERGENCY CIRCUIT - EMERGENCY POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

EMERGENCY CIRCUIT RELEASE TO C.S.



NOTES

1. EMV IS DE-ENERGIZED, B.P. CHARGES #21 PIPE THROUGH PVEM.
2. BPPS CLOSES.
3. IF FIREMANS VALVE IS OPENED B.P. WILL VENT CAUSING EMERGENCY AND MR WILL CLOSE FIREMANS PRESSURE SWITCH TO KNOCK DOWN POWER TO LOCOMOTIVE.

FIGURE 1-34 EMERGENCY CIRCUIT - RELEASE TO C.S.

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

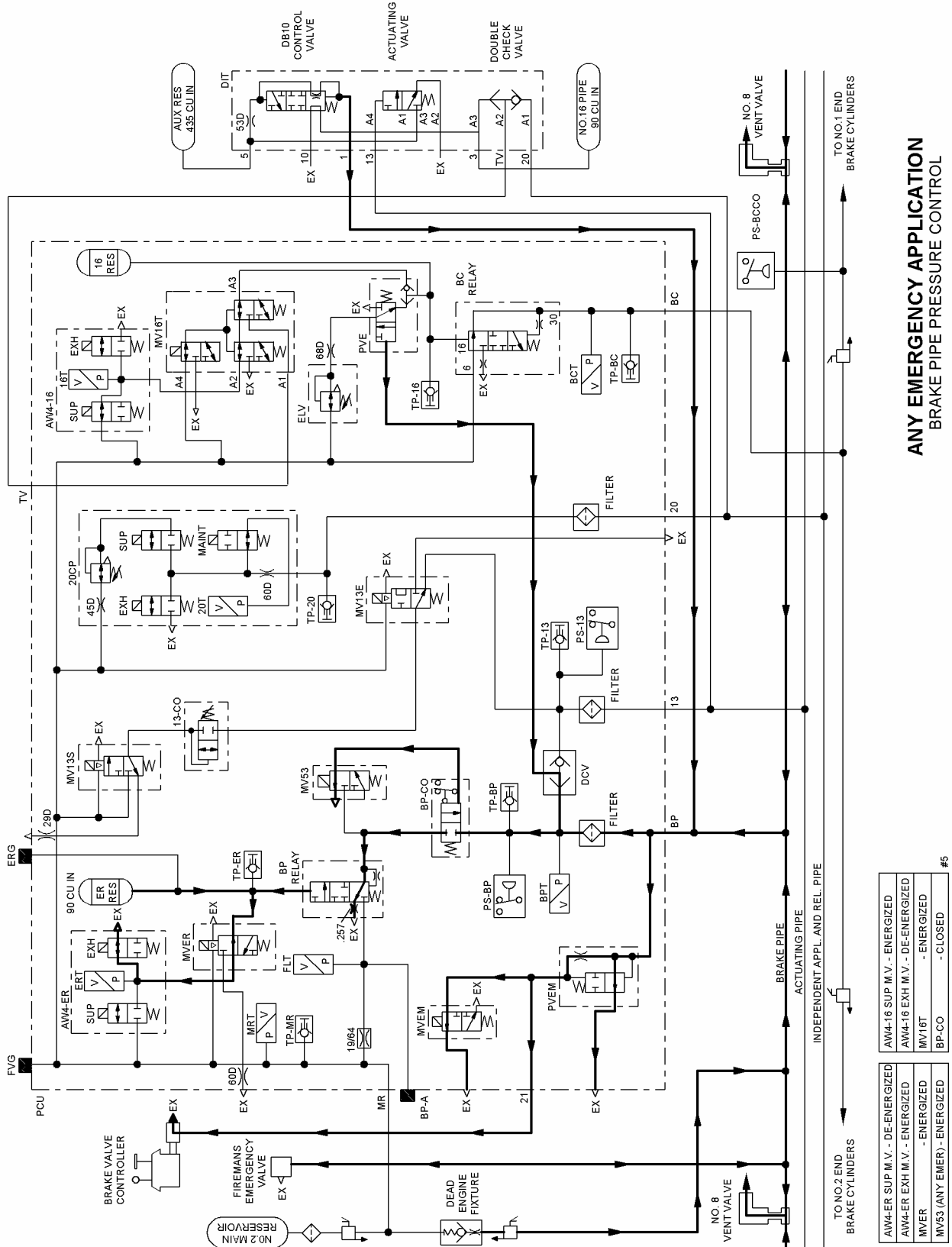


FIGURE 1-35 ANY EMERGENCY APPLICATION BRAKE PIPE PRESSURE CONTROL

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

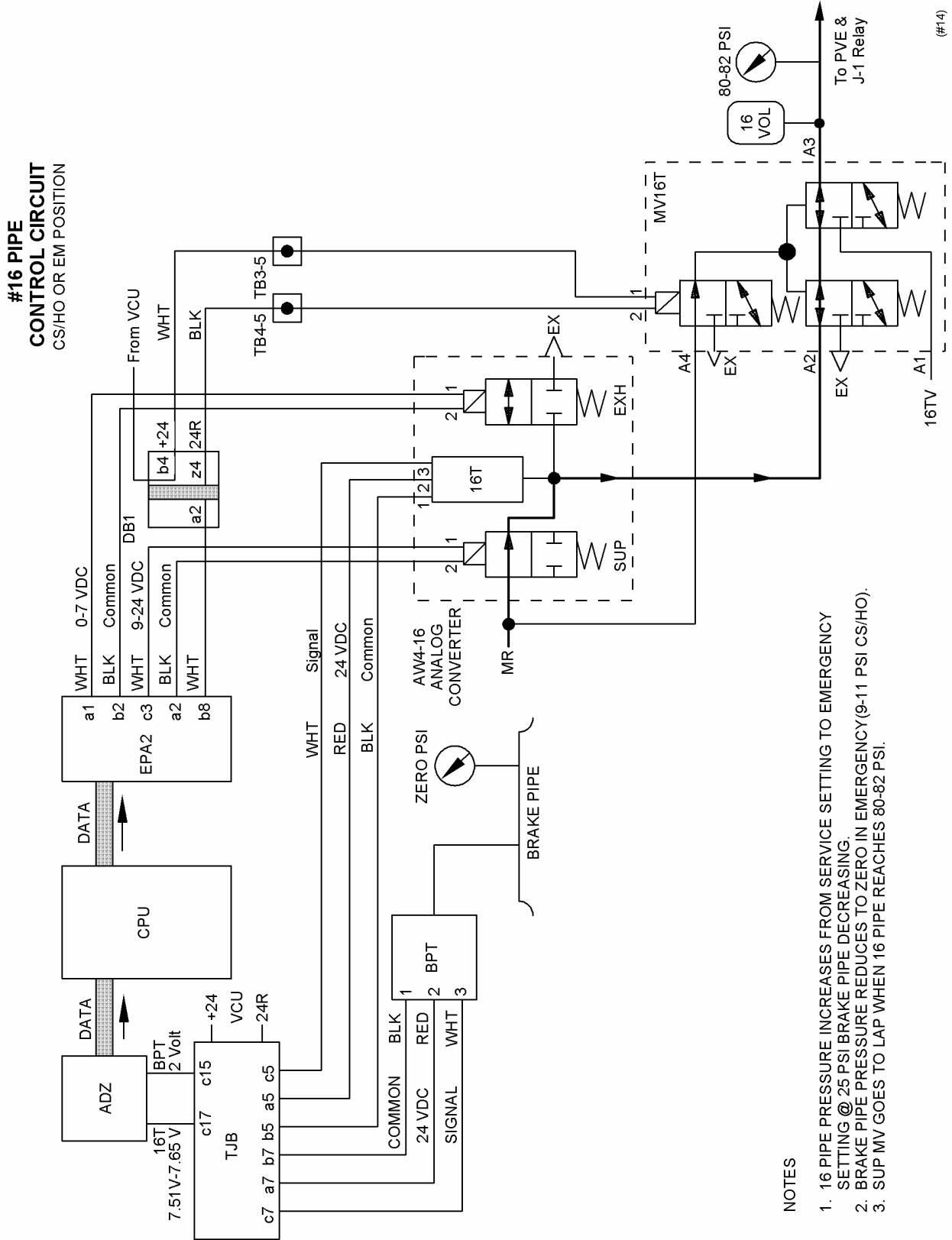
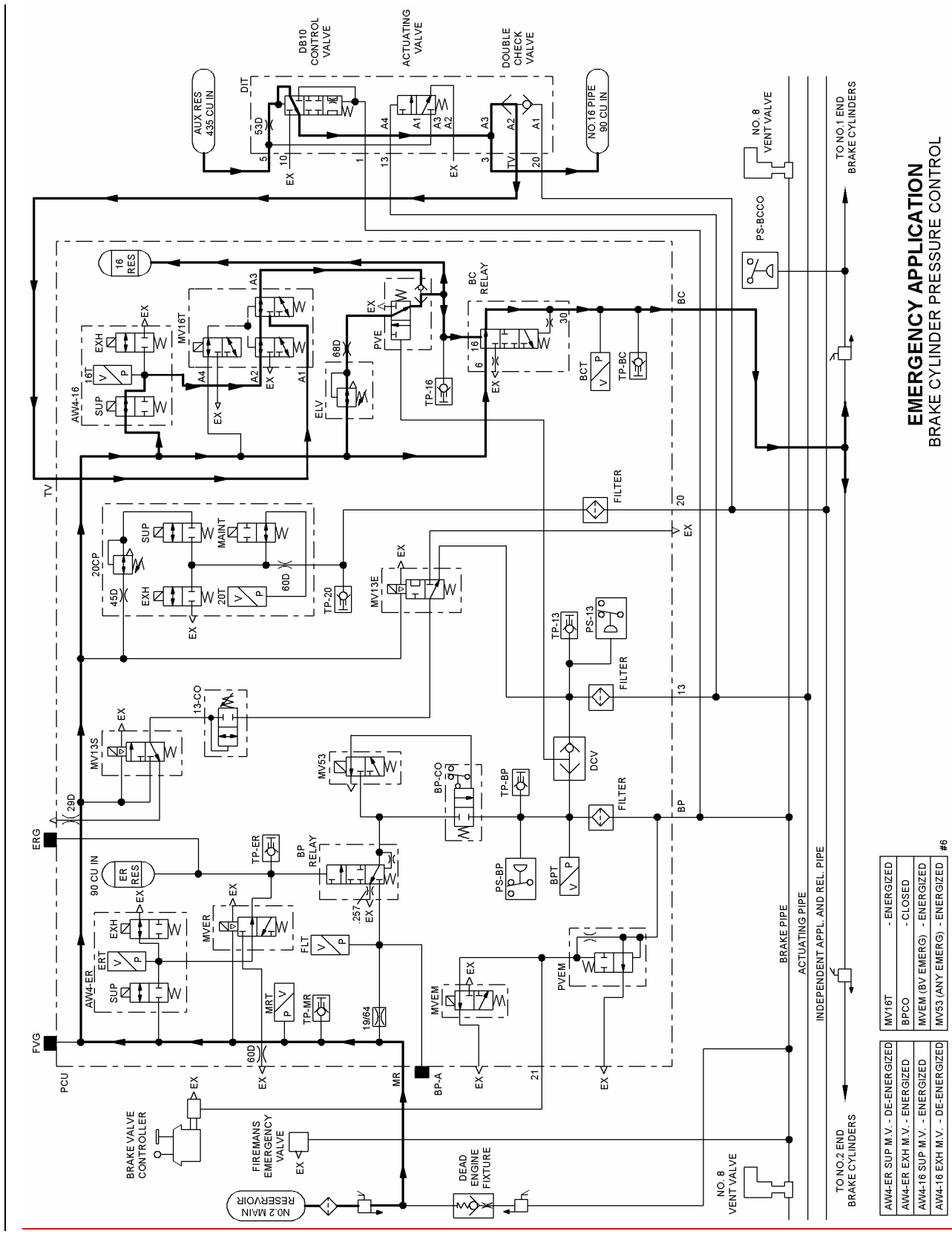


FIGURE 1-36 #16 PIPE CONTROL CIRCUIT CS/HO OR EMERGENCY POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL



**EMERGENCY APPLICATION
BRAKE CYLINDER PRESSURE CONTROL**

FIGURE 1-37 EMERGENCY APPLICATION BRAKE CYLINDER PRESSURE CONTROL

AV4-ER SUP M.V. - DE-ENERGIZED	MV16T	- ENERGIZED
AV4-ER EXH M.V. - ENERGIZED	BPCO	- CLOSED
AV4-16 SUP M.V. - ENERGIZED	MVEM (BY EMERG)	- ENERGIZED
AV4-16 EXH M.V. - DE-ENERGIZED	MV53 (ANY EMERG)	- ENERGIZED

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

FIREMAN'S EMERGENCY AND/OR TRAIN SEPARATION

BRAKE VALVE IN RELEASE, SERVICE OR SUPPRESSION

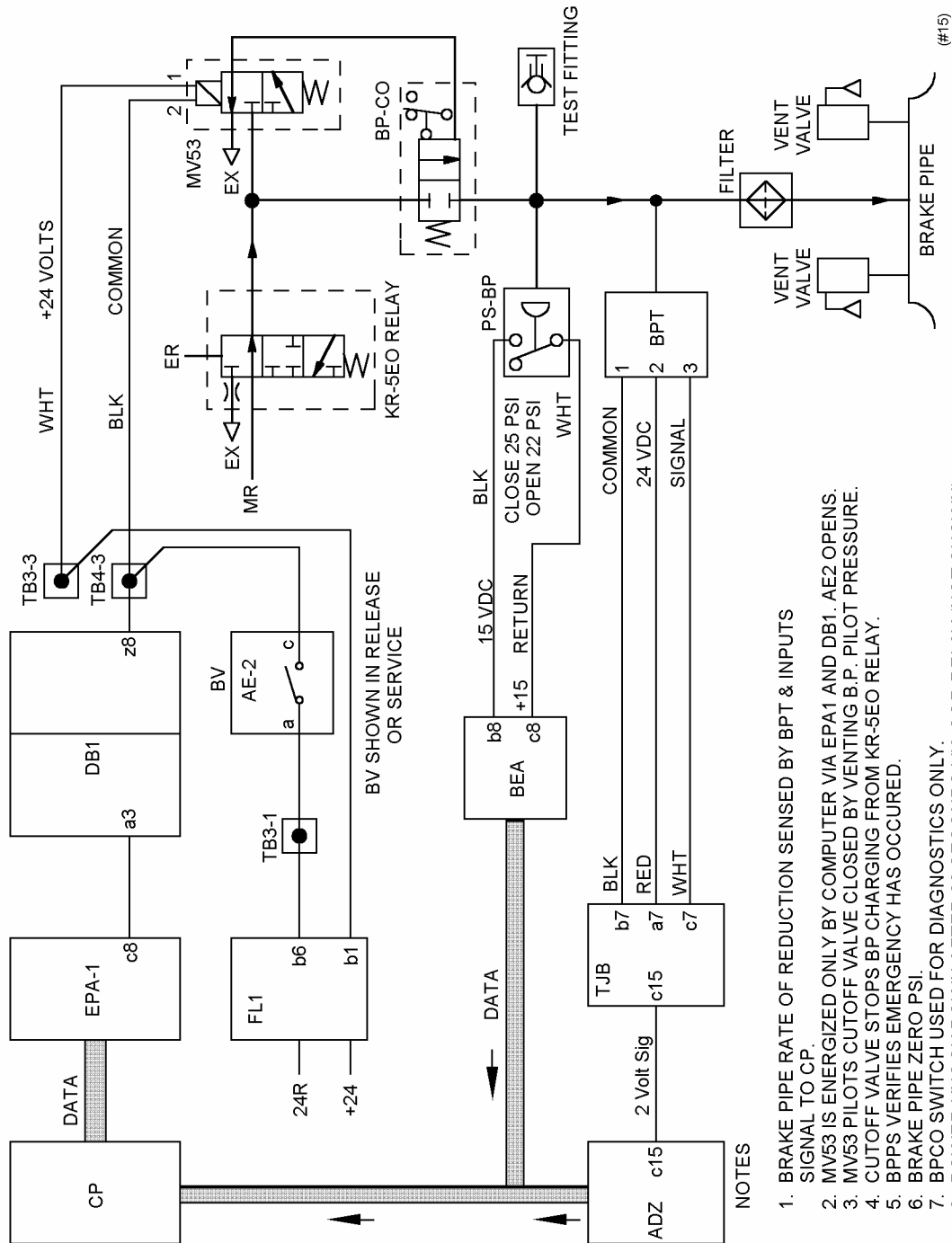


FIGURE 1-38 FIREMAN'S EMERGENCY AND/OR TRAIN SEPARATION – BRAKE VALVE IN RELEASE, SERVICE, OR SUPPRESSION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

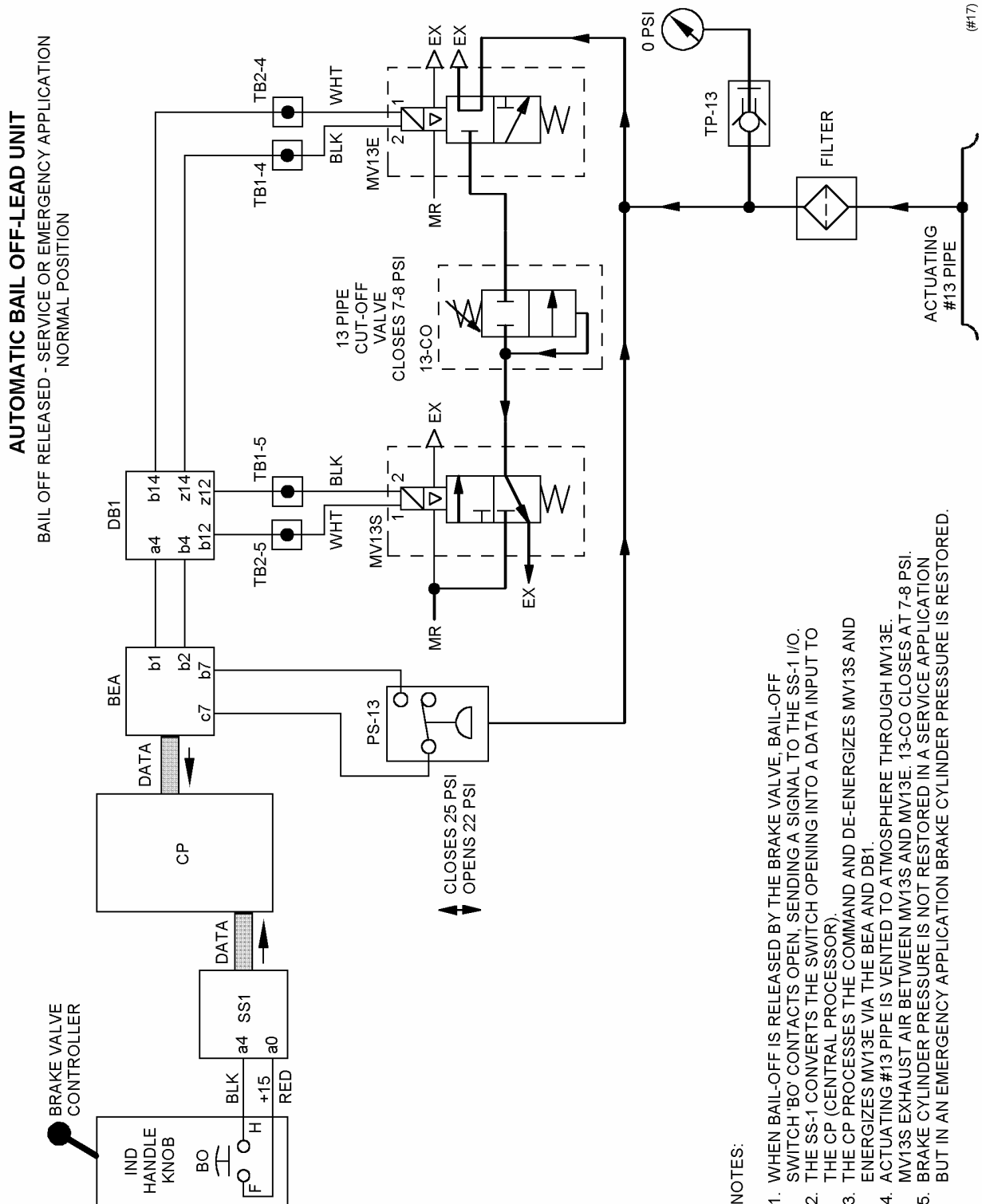
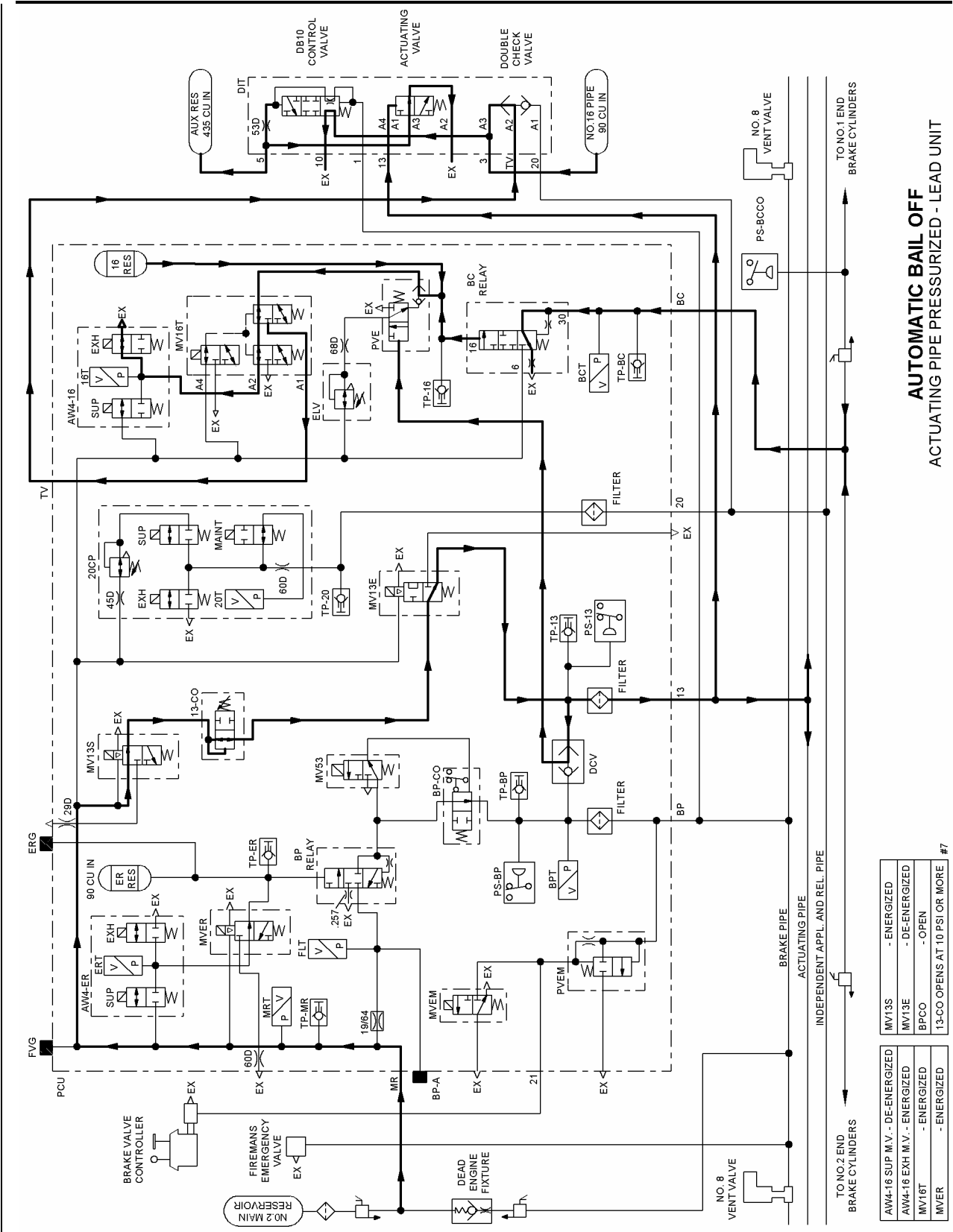


FIGURE 1-40 AUTOMATIC BAIL OFF - LEAD UNIT - BAIL OFF RELEASED-
SERVICE OR EMERGENCY APPLICATION - NORMAL POSITION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL



AUTOMATIC BAIL OFF
ACTUATING PIPE PRESSURIZED - LEAD UNIT

AW4-16 SUP M.V. - DE-ENERGIZED	MV13S - ENERGIZED
AW4-16 EXH M.V. - ENERGIZED	MV13E - DE-ENERGIZED
MV16T - ENERGIZED	BPCCO - OPEN
MVER - ENERGIZED	I3-CO OPENS AT 10 PSI OR MORE #7

FIGURE 1-41 AUTOMATIC BAIL OFF ACTUATING PIPE PRESSURIZED - LEAD UNIT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

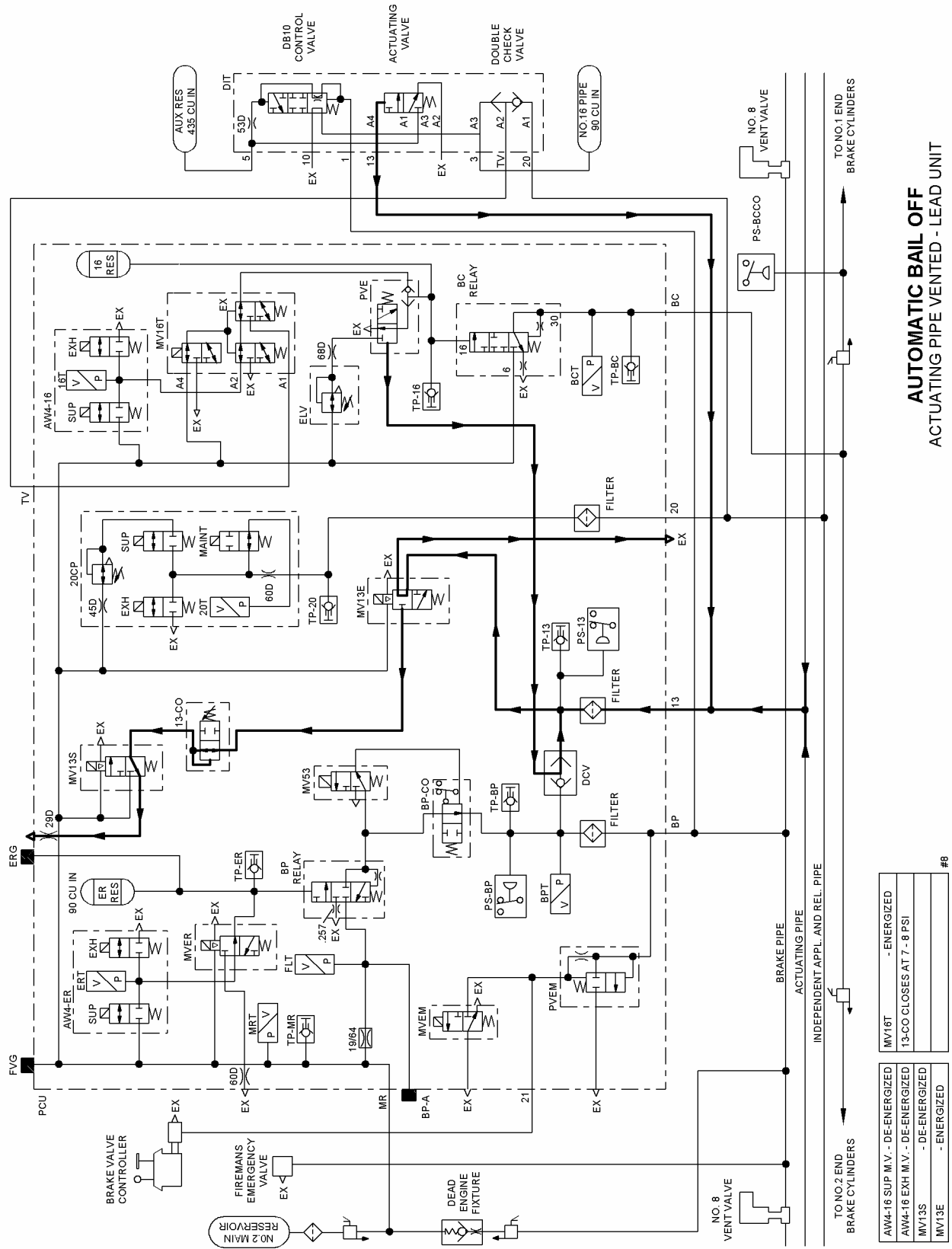
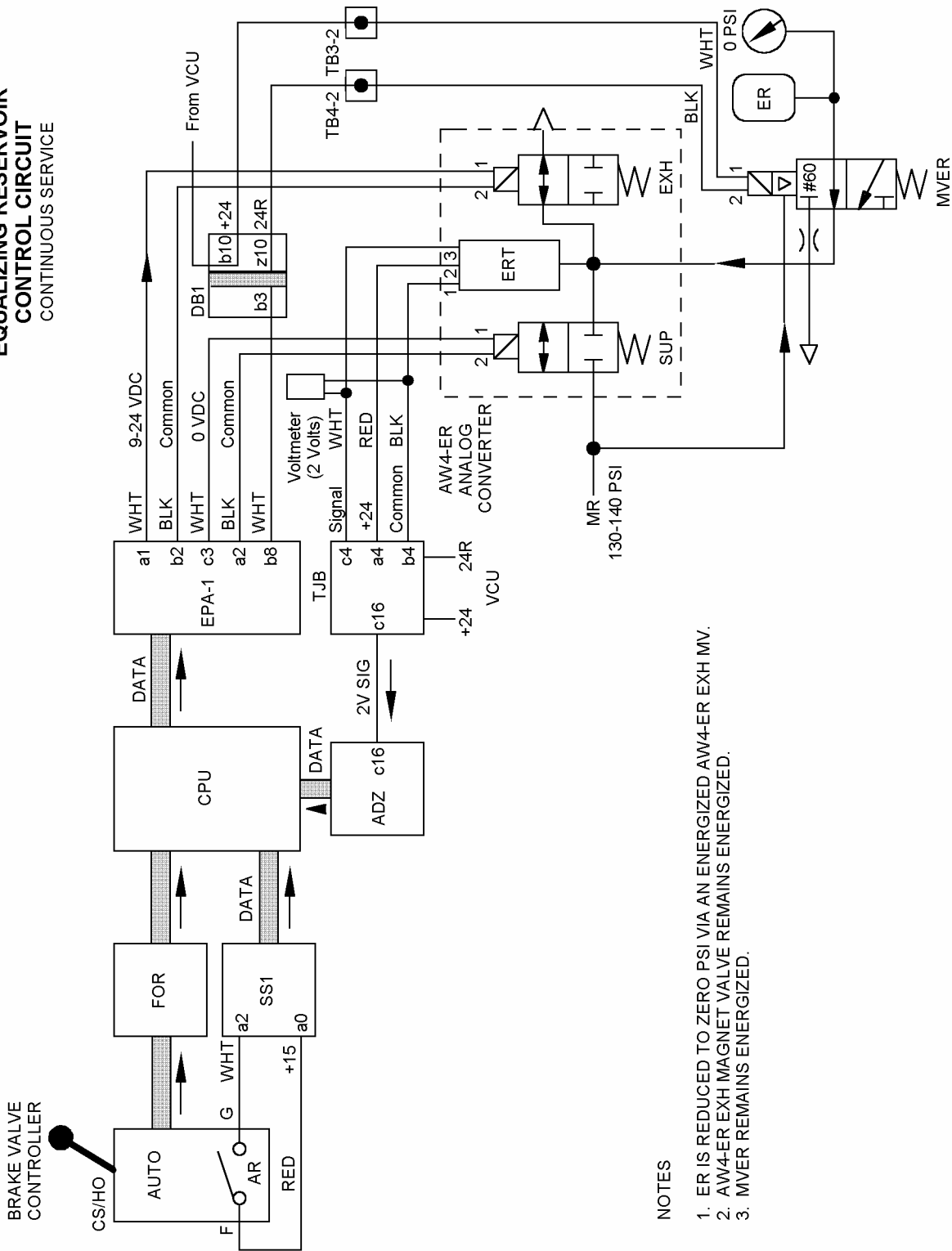


FIGURE 1-42 AUTOMATIC BAIL OFF ACTUATING PIPE VENTED - LEAD UNIT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

EQUALIZING RESERVOIR CONTROL CIRCUIT CONTINUOUS SERVICE



(#18)

NOTES

1. ER IS REDUCED TO ZERO PSI VIA AN ENERGIZED AW4-ER EXH MV.
2. AW4-ER EXH MAGNET VALVE REMAINS ENERGIZED.
3. MVER REMAINS ENERGIZED.

FIGURE 1-44 ER RESERVOIR CONTROL CIRCUIT - CONTINUOUS
SERVICE/HANDLE OUT

AUTOMATIC BAIL OFF - TRAIL UNIT
BAIL OFF RELEASED - SERVICE APPLICATION

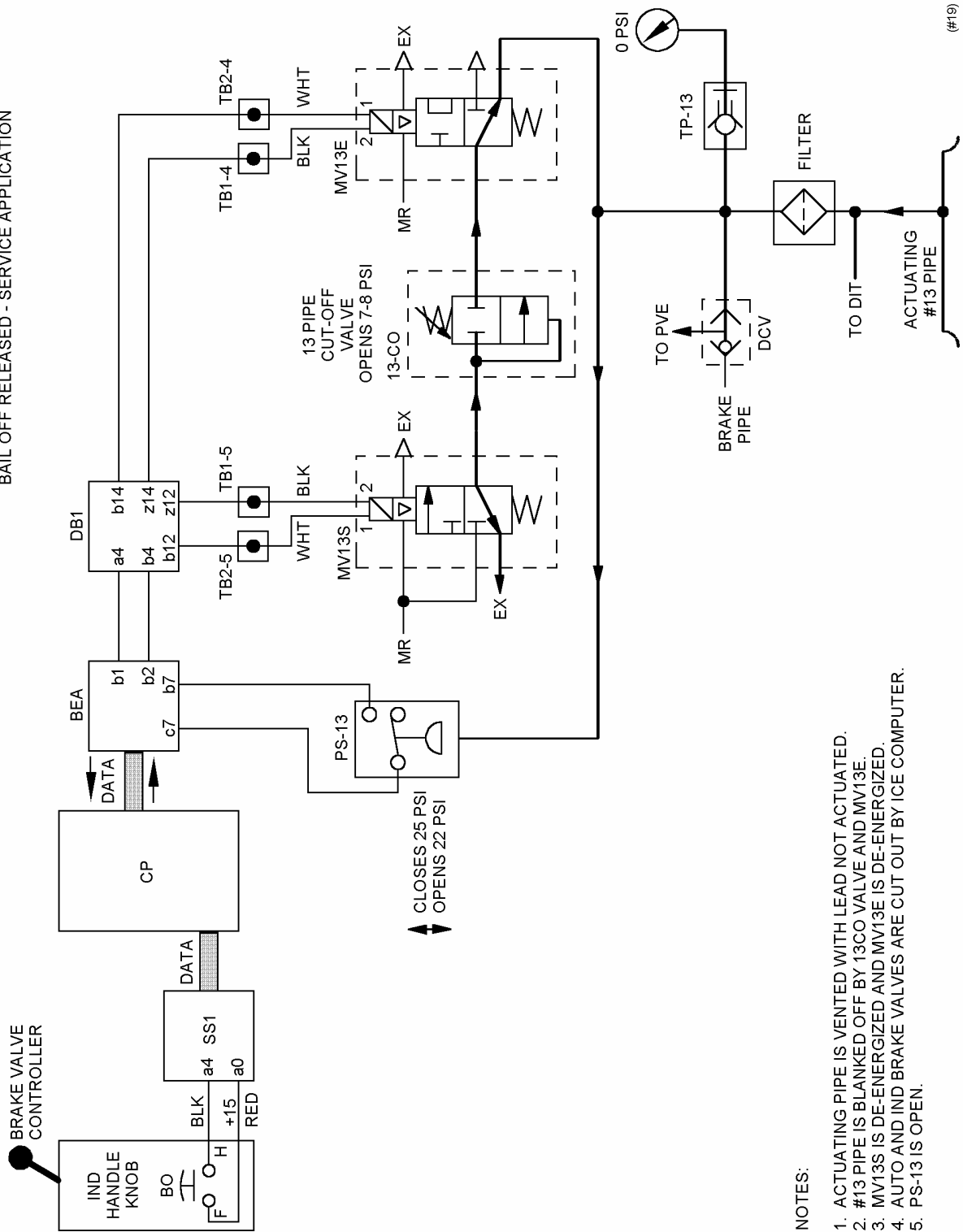


FIGURE 1-45 AUTOMATIC BAIL OFF - TRAIL UNIT - BAIL OFF RELEASED - SERVICE APPLICATION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

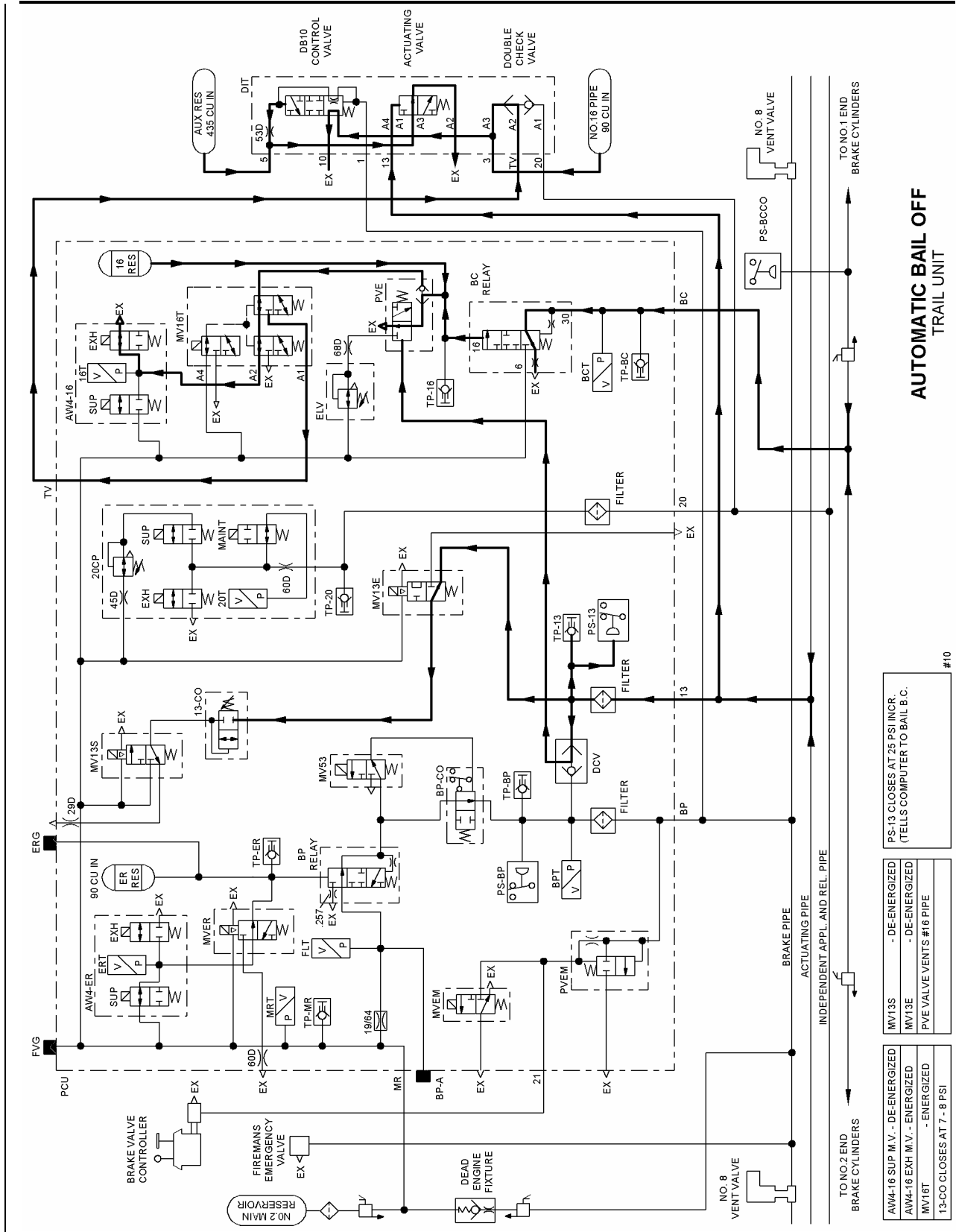


FIGURE 1-46 AUTOMATIC BAIL OFF - TRAIL UNIT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

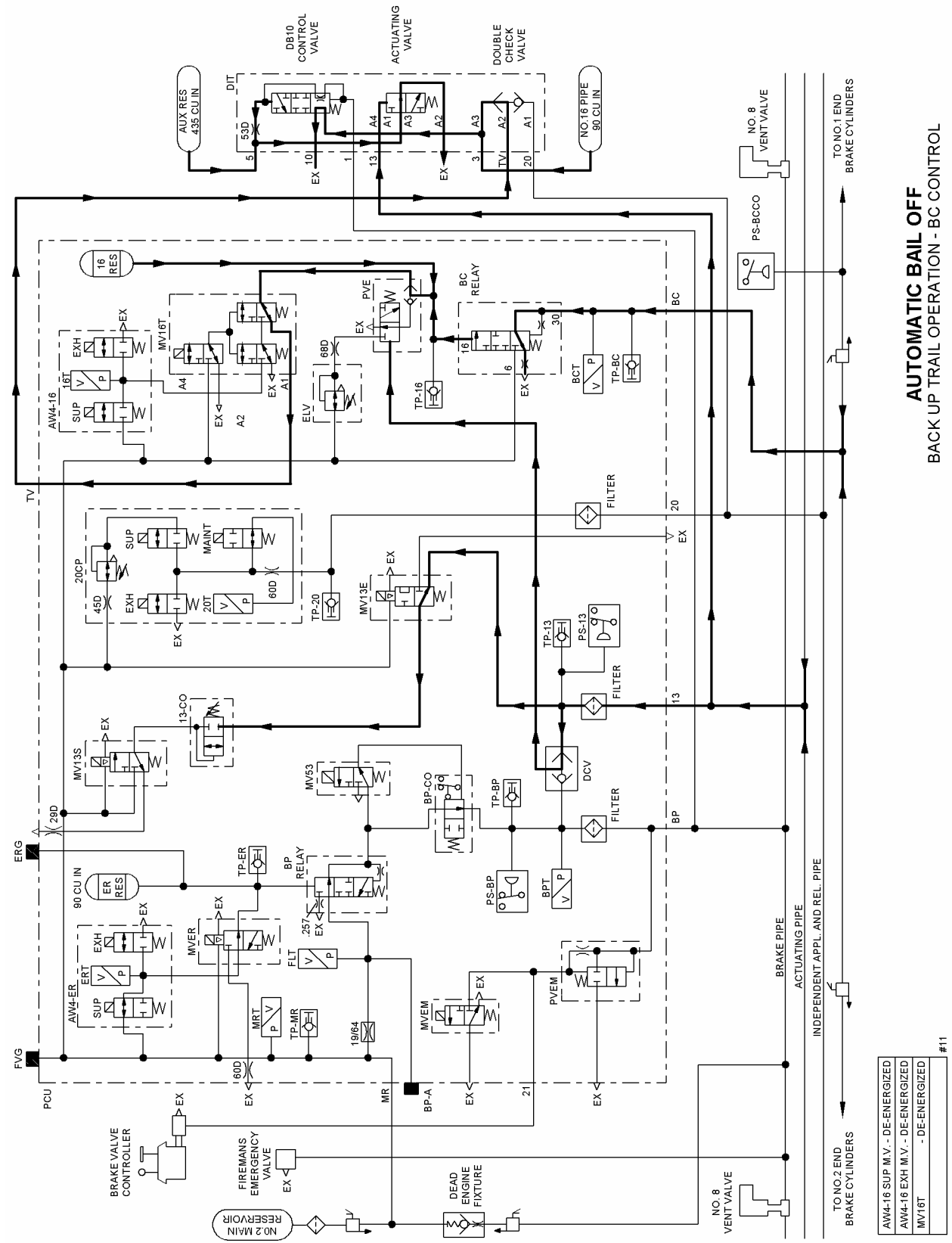


FIGURE 1-47 AUTOMATIC BAIL OFF - BACK UP TRAIL OPERATION - BC CONTROL

New York Air Brake
CCB Brake System

**EMD CONTRACT
CCB BRAKE EQUIPMENT
MAINTENANCE MANUAL**

IP-148-C

For the
SD 70MAC LOCOMOTIVE

DECEMBER 2001

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

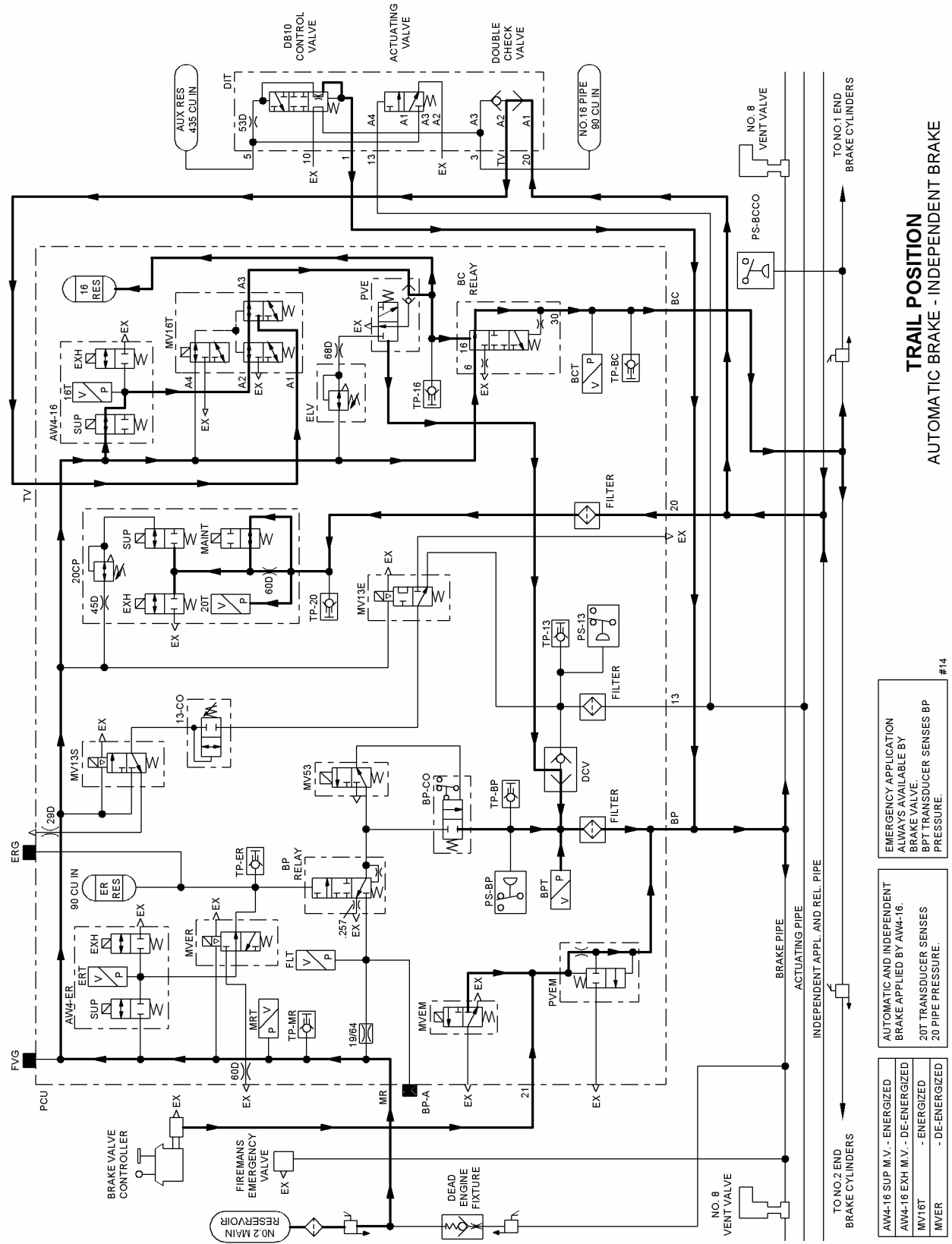


FIGURE 1-56 TRAIL POSITION AUTOMATIC BRAKE - INDEPENDENT BRAKE

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

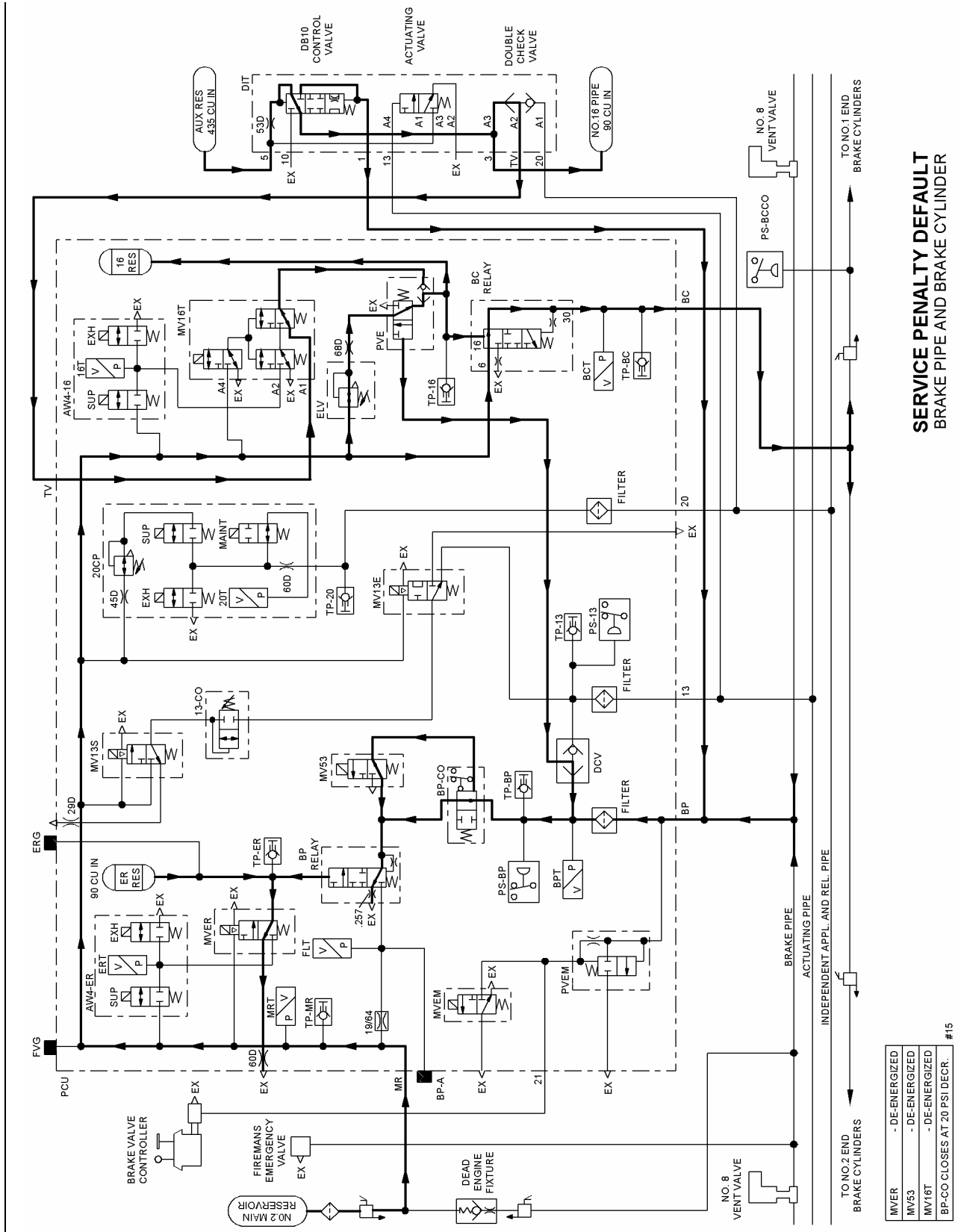


FIGURE 1-57 SERVICE PENALTY DEFAULT - BRAKE PIPE AND BRAKE CYLINDER

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

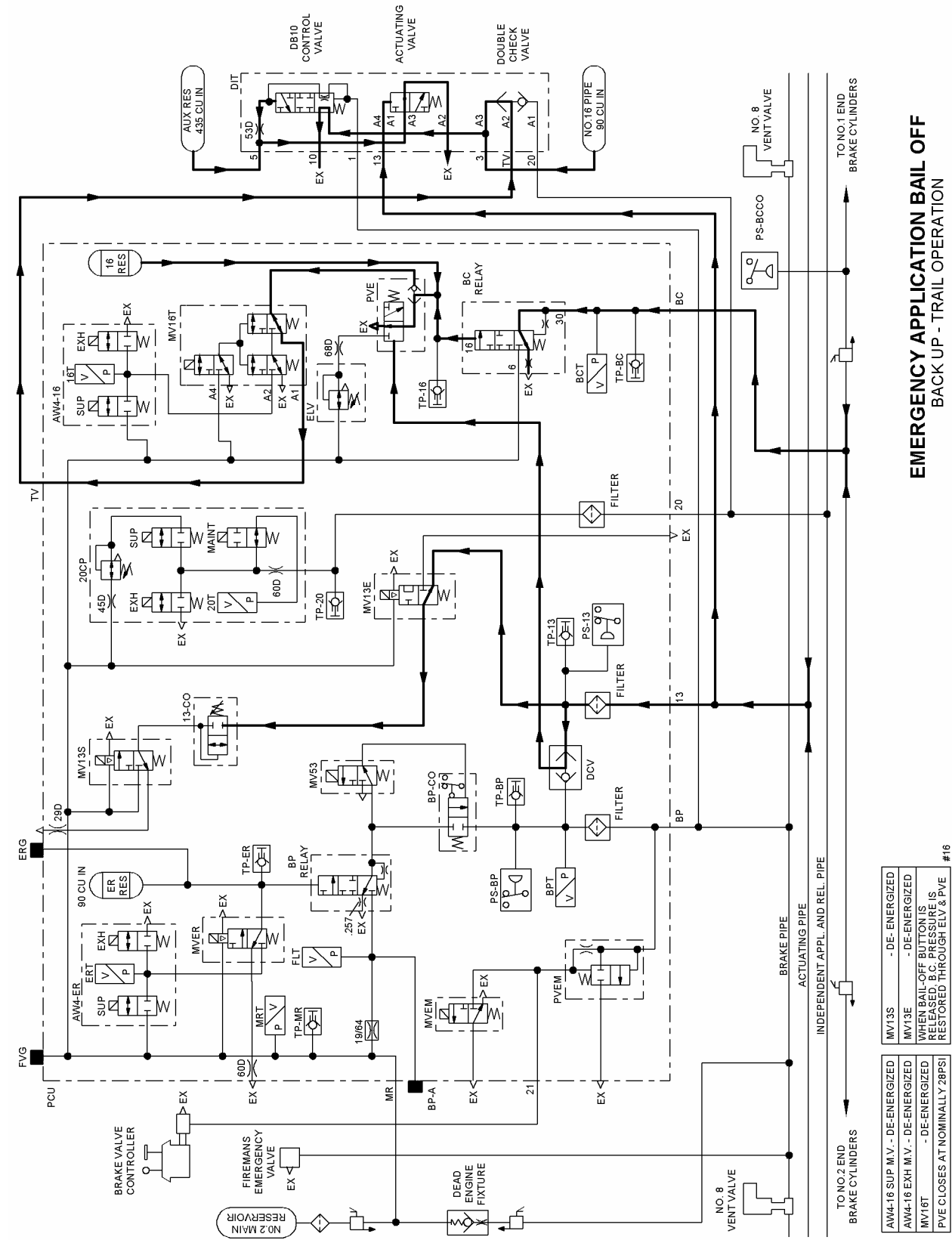


FIGURE 1-58 EMERGENCY APPLICATION BAIL OFF - BACK UP - TRAIL OPERATION

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

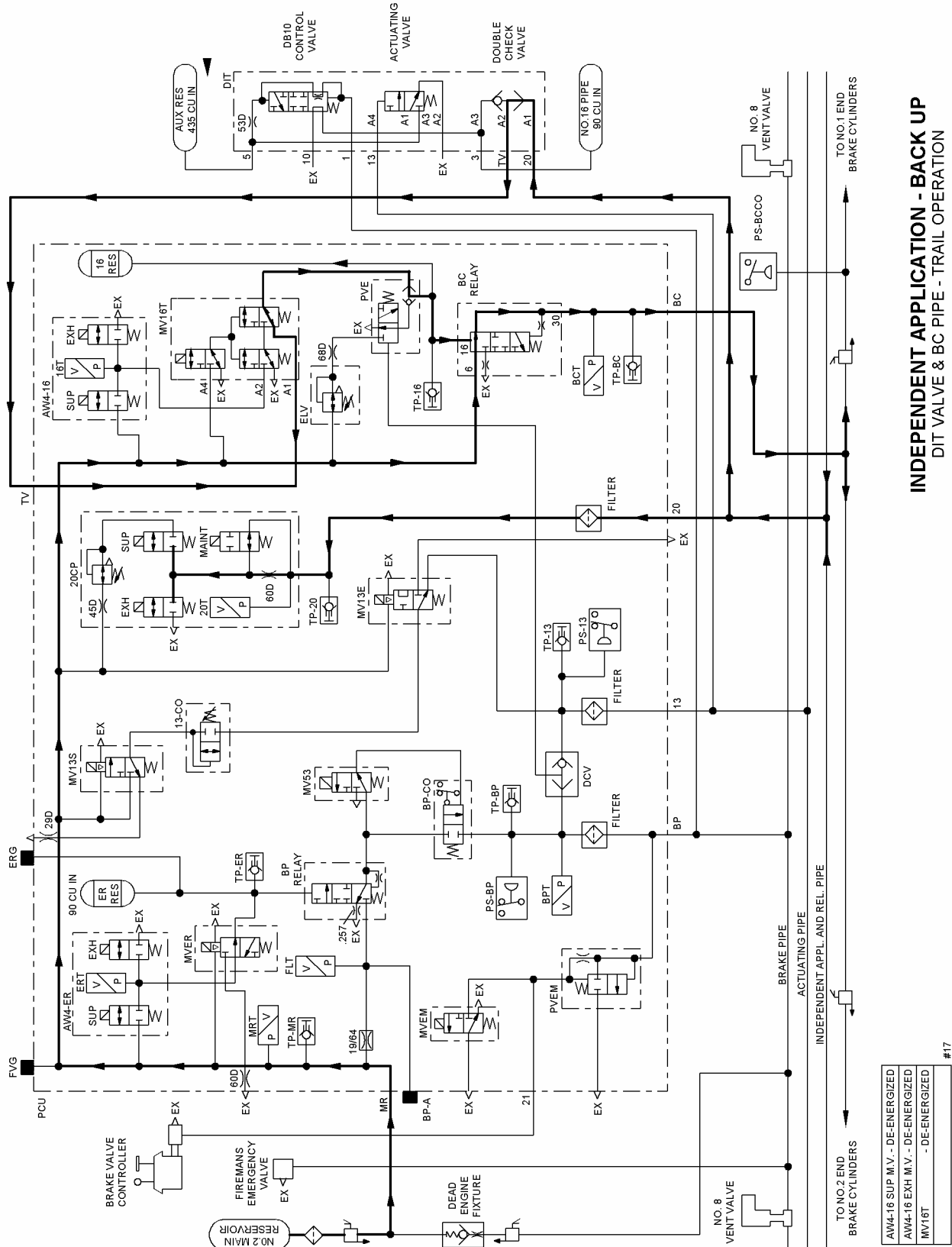
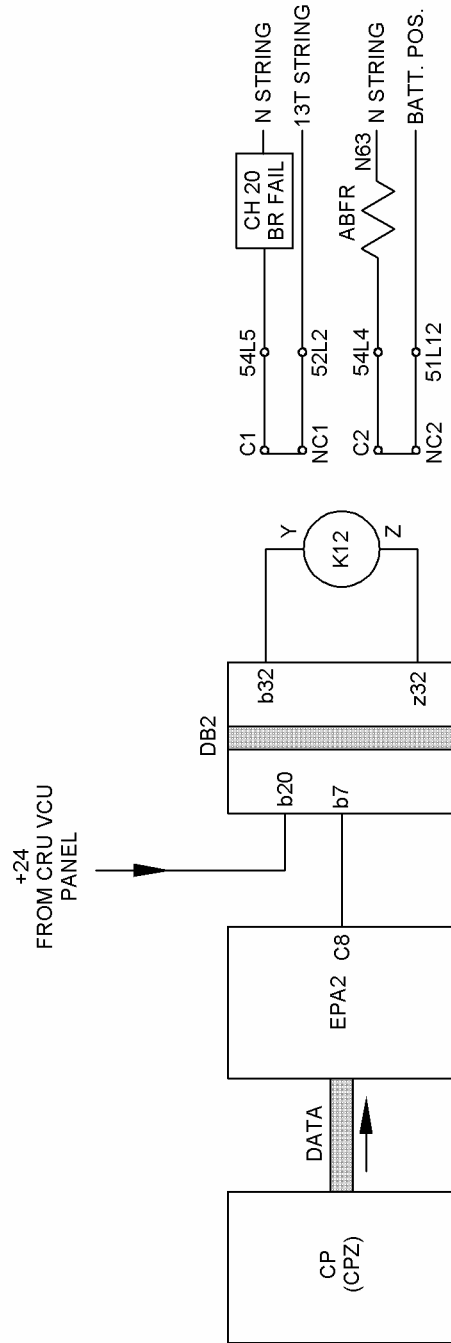


FIGURE 1-59 INDEPENDENT APPLICATION - BACK UP - TRAIL OPERATION -
DIT VALVE AND BC PIPE

**AIR BRAKE ALARM
OUTPUT**



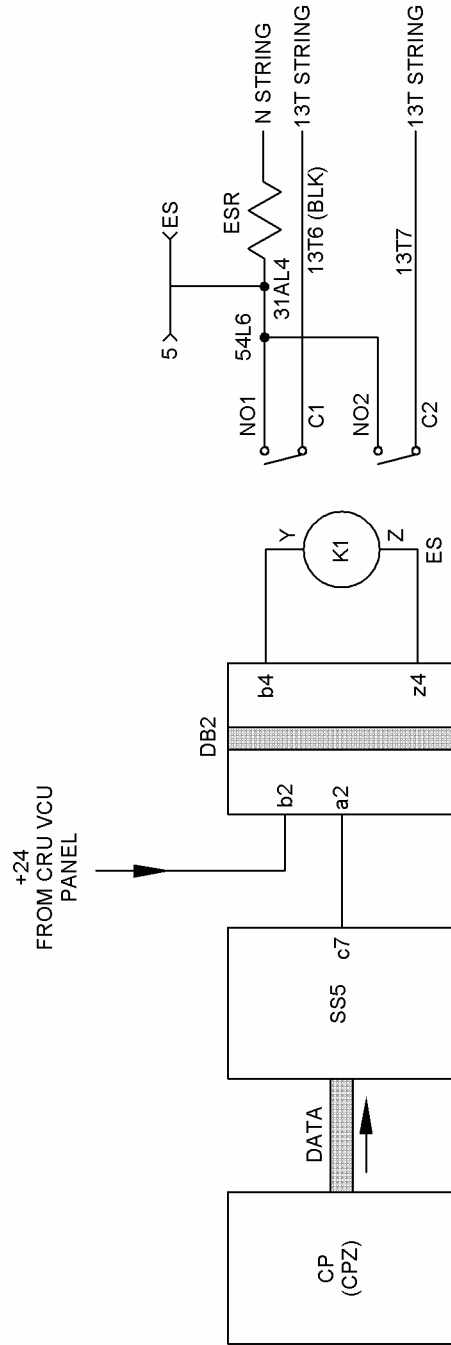
NOTES: K12 NORMALLY ENERGIZED
DE-ENERGIZES WITH A CRITICAL FAULT OR CCB POWERLOSS.

(#26)

FIGURE 1-60 AIR BRAKE ALARM OUTPUT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

EMERGENCY SAND OUTPUT



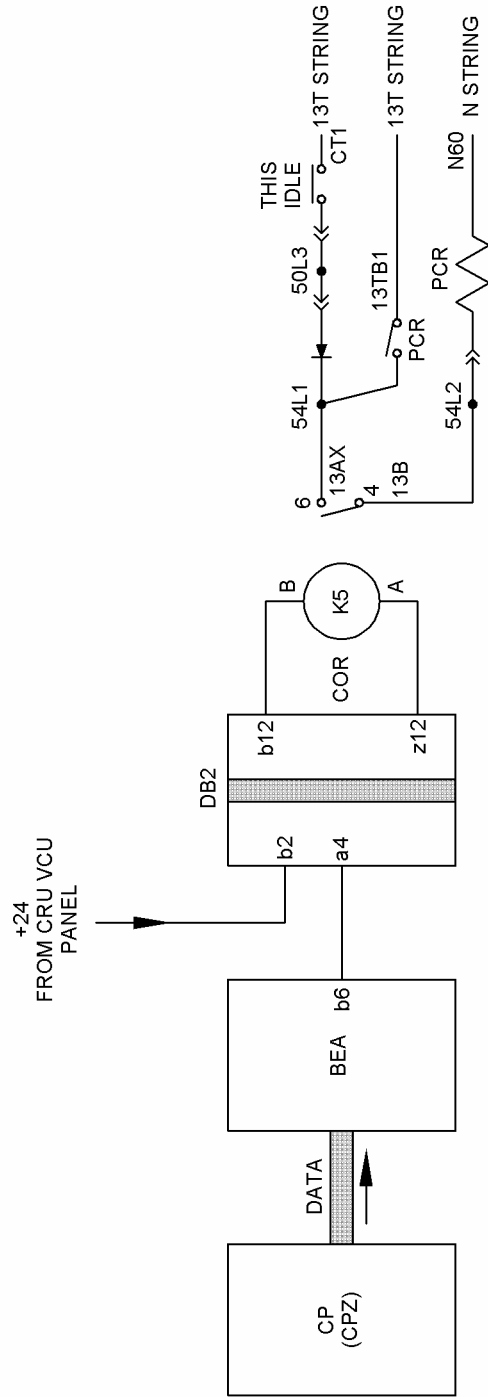
NOTES:
1. EMERGENCY SAND FOR 60 SECONDS - LEAD AND TRAIL

(#27)

FIGURE 1-61 EMERGENCY SAND OUTPUT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

PC RESET OUTPUT



NOTES:

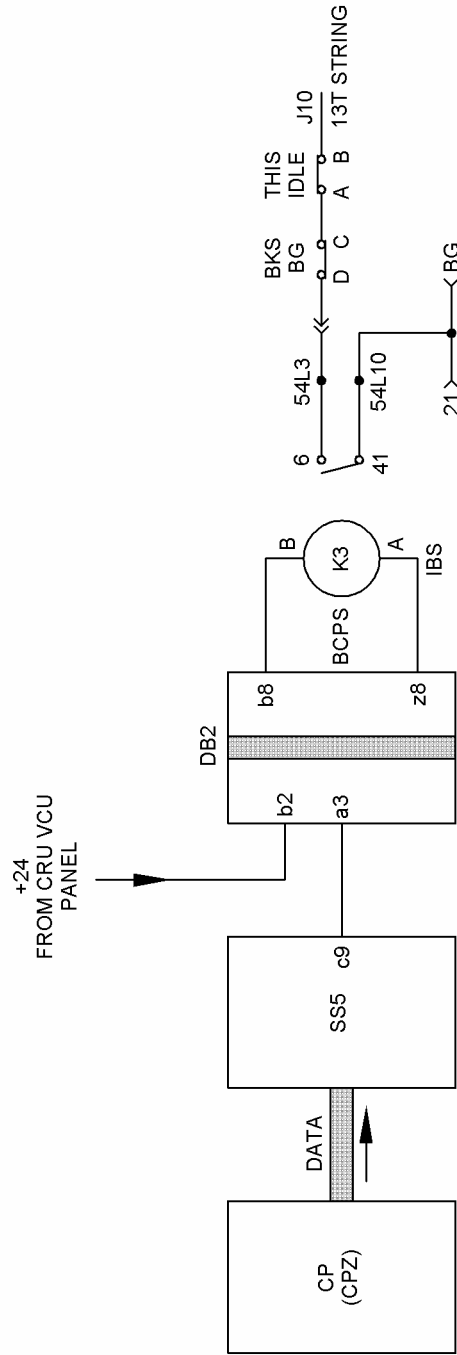
1. OPENS CIRCUIT TO PCR IN EMERGENCY BRAKE APPLICATION THROUGH K5 CONTACTS TO PROVIDE POWER KNOCK DOWN.

(#28)

FIGURE 1-62 PC RESET OUTPUT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

BRAKE CYLINDER PRESSURE OUTPUT



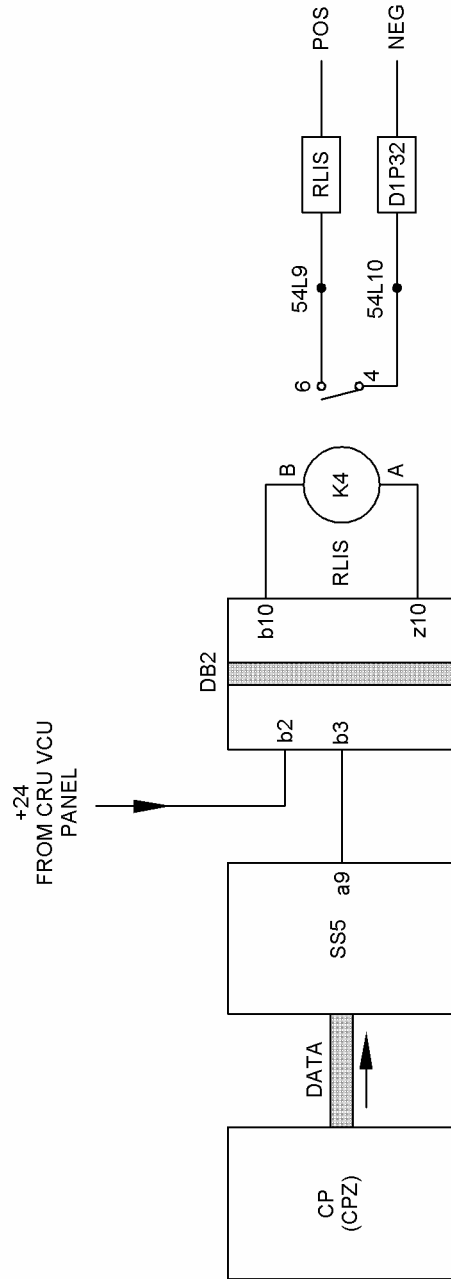
NOTES:

1. REMOVES 74 VDC FROM DYNAMIC WIRE WITH 25 PSI OR GREATER BRAKE CYLINDER PRESSURE.
2. DYNAMIC BRAKING IS REDUCED TO IDLE.

(#29)

FIGURE 1-63 BRAKE CYLINDER PRESSURE OUTPUT

RAIL LUBRICATION INDICATOR
OUTPUT



NOTES:

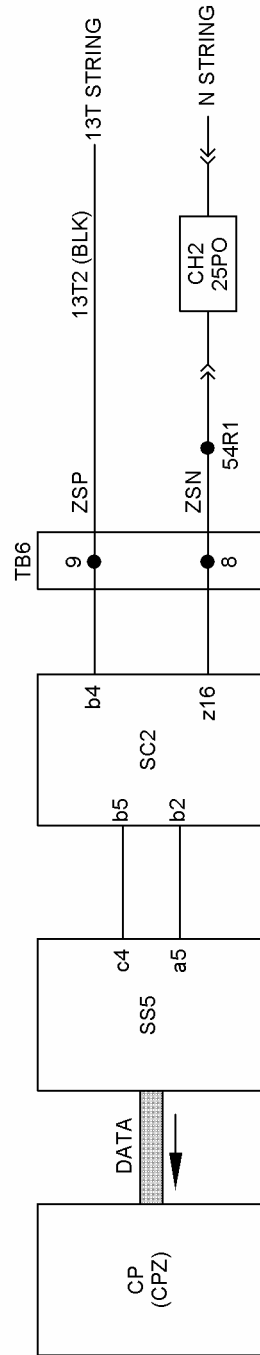
1. PREVENTS RAIL LUBRICATION WHEN BRAKES ARE APPLIED.
BASED ON CONTROLLER HANDLE MOVEMENT.

(#30)

FIGURE 1-64 RAIL LUBRICATION INDICATOR OUTPUT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

ZERO SPEED INDICATOR INPUT



NOTES:

1. PROVIDES ZERO SPEED TO CCB COMPUTER.
2. USED TO TERMINATE SANDING AND FOR DIAGNOSTICS.

(#31)

FIGURE 1-65 ZERO SPEED INDICATOR INPUT

CCB EMD CONTRACT LOCOMOTIVE MAINTENANCE MANUAL

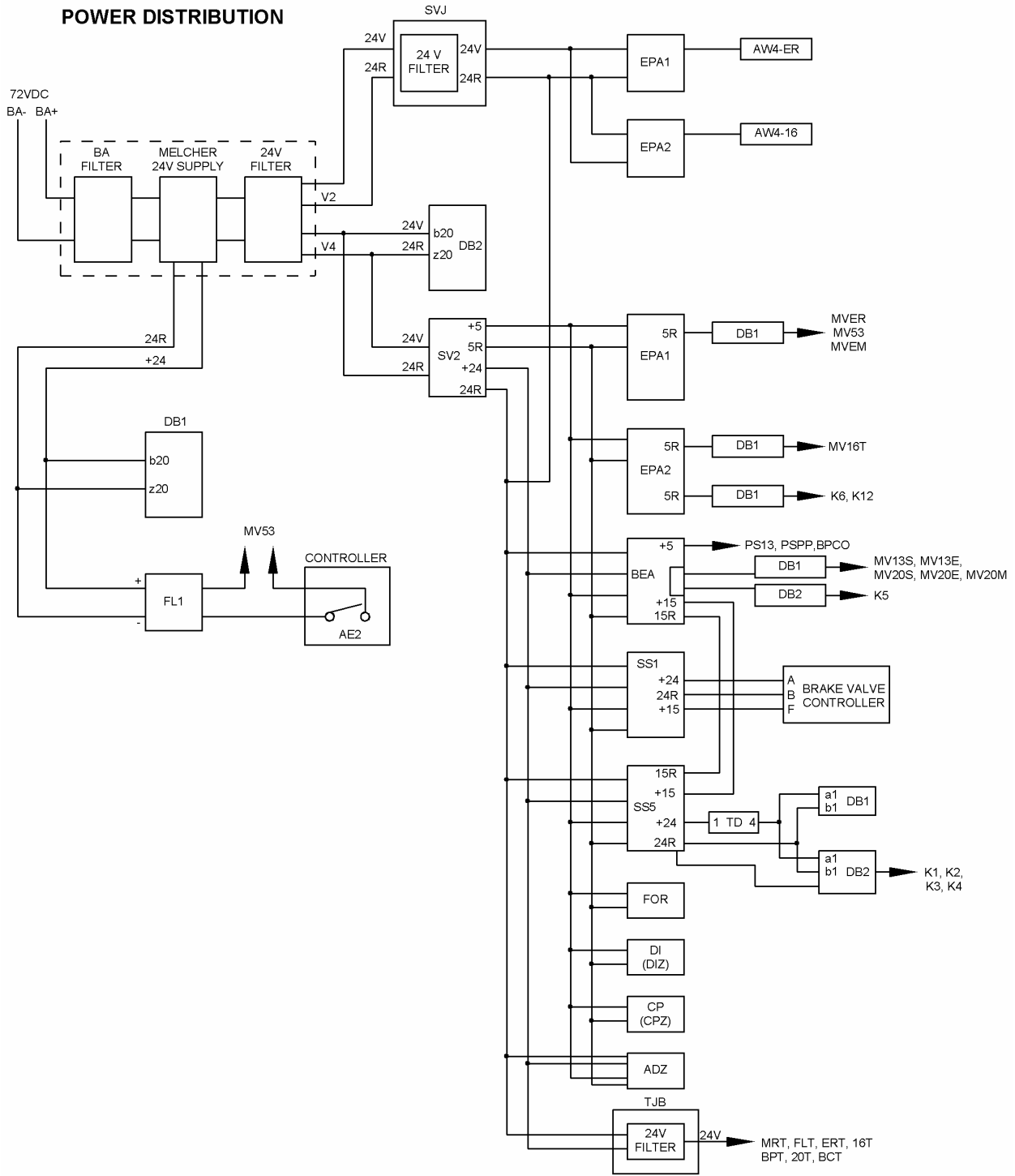


FIGURE 1-66 POWER DISTRIBUTION