



CLASS 47

**TEST PROCEDURE AND MAINTENANCE FAULT GUIDE
FOR
DAVIES & METCALFE BRAKE EQUIPMENT**

**RM & EE TECHNICAL TRAINING CENTRE
THE MILL,
BRISTOL STREET
SWINDON**

DUAL AIR BRAKED LOCOMOTIVES

Procedure to test the operation of the brake.

1. This part of the test to be carried out with the Brake Selector Switch in Air Pass or Air Goods position.
2. Attach the master test gauge to the Air Train pipe flexible connection on Buffer beam, and ensure the Drivers Auto Air Brake valve is adjusted to give 72.5 ± 1 P.S.I. with the brake valve handle in 'Running' position. Compare the test gauge reading with the Locomotive mounted gauge in each cab, change the gauges if necessary, or record the discrepancy on a label stuck above the cab gauge.
3. It is necessary to pause for 4 minutes before continuing the test in order to ensure that all parts of the brake system becomes fully charged.
4. Test the Brake system for leakage as follows: With the Brake valve handle in the 'Running' position and the Air Train pipe charged to 72.5 P.S.I., isolate the feed valve by means of the Isolating cock located behind the feed cut off valve, the Air Train pipe pressure gauge should not register more than a P.S.I. drop in five minutes, leakage in excess of this

must be located and remedied. On completion de-isolate the Feed Cut-off Valve.

5. Move the Brake Valve Handle to the 'Initial' position, the Air Train Pipe Pressure Gauge should read 63-64 P.S.I. and Brake Cylinder Pressure Gauge 18-22 P.S.I. Pause in this position to observe the Brake Cylinder Gauge to note any fall off in pressure; move the Brake Valve Handle to the full service position, the Air Train Pipe Gauge should read 44-48 P.S.I., and the Brake Cylinder gauge approximately 70 P.S.I.
6. Return the Brake Handle to the 'Running' position and pause for 1 minute, then move the handle to 'Initial' and then immediately to the 'Release' position, hold this position for 60 seconds: Air Train Pipe pressure should increase to 76 ± 1 P.S.I. The FOLLOWING MINIMUM leak off times are acceptable:-
 - 78.5 to 77.5 P.S.I. in 18 seconds
 - 78.5 to 76.5 P.S.I. in 44 seconds
 - 78.5 to 75.5 P.S.I. in 76 seconds
 - 78.5 to 74.5 P.S.I. in 113 seconds
7. Carry out this test, i.e. Items 2, 3, 5 and 6 from No. 1 and No. 2 cabs.
8. Move the Brake Selector switch to the Vacuum braked/unbraked position.
9. Fit a Vacuum Test Gauge on the Buffer

Beam Vacuum pipe at No. 2 end, furthest from the exhausters. Adjust the Vacuum Relief valve to give 21" HG with 3/16" leak disc.

10. Pause for 2 minutes to ensure the system becomes fully charged; with the brake handle in 'Running' position.
11. Move the Brake Valve Handle to the 'Initial' position, Air Train Pipe pressure should fall to 63-64 P.S.I., the Vacuum Train Pipe Gauge fall to 15"-17" HG and the Brake Cylinder gauge will not rise.

Move the Brake Handle to 'Full Service' position when Air Train Pipe pressure should fall to 44-48 P.S.I. Brake Cylinder pressure rise to approximately 70 P.S.I. and the Vacuum Train Pipe Gauge should read zero. Carry out this test, i.e. items 10 and 11 from No. 1 and No. 2 cab.

NOTE: It is essential when carrying out this test to use:-

- a) An Air Test Gauge.
- b) A Vacuum Test Gauge.
- c) A Stop Watch.

11a Mark 7 Triple Valves.

An additional or fifth E.P. valve is fitted, energised when the Brake Selector Switch is in the Vacuum position.

A spring fitted to act on the top side of the Vacuum diaphragm, prevents a brake application on the locomotive taking place until vacuum has been destroyed to 14/16" HG. Brake cylinder pressure is proportional to the amount of vacuum destroyed, since the application commences at 14/16" HG, not on an immediate reduction from 21" HG provision had to be made to obtain maximum brake cylinder pressure at zero vacuum. Air from the feed to the relay valves is taken via the fifth E.P. valve to act on a small diaphragm in the triple valve to make this possible.

Mark 7 or 8 Triple Valves.

BRAKE VALVE HANDLE	A.A.B.P. GAUGE	VACUUM GAUGE	BRAKE CYLINDER GAUGE
Running	72.5 P.S.I.	21" HG	Zero
Initial	64 P.S.I.	16" HG	Zero
INCHED FORWARD		14" HG	Rising
FULL SERVICE	44 - 48 P.S.I.	Zero	70 P.S.I.

12. Test the brake application and release times as follows:-

WITH BRAKE SELECTOR SWITCH IN:-	APPLICATION	RELEASE
Air/Passenger	8 seconds	11 seconds
Air/Goods	20 - 28 seconds	30 - 45 seconds
Vacuum/Passenger	8 seconds	15 seconds
Vacuum/Goods	28 - 32 seconds	15 seconds
Straight Air Brake	5 seconds	8 seconds

Sympton	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector	Vacuum Gauge
Brake Cyl. Pressure above 73 PSI at FULL SERV. or below 67 PSI.	44-48 PSI	Above 73 PSI or below 67 PSI	AIR	-
No brake or light application.	Normal	Zero	AIR	-
Brake applies but leaks off	Normal	Pressure leaks off and returns to normal	AIR	-
			VAC	Falls to 18" HG but climbs to 21" HG.

Possible Fault	Remedy
Max. limiter valve spring requires strengthening or weakening.	Fit shims to decrease B/Cyl. pressure. Remove shims to increase B/Cyl. pressure.
Triple Valve sealing valve stuck open.	Remove and clean valve or change the Sealing/Limiter valve unit.
Sealing valve or Seat gasket leaking through.	Change the Sealing/Limiter valve unit.
Air Release Valve leaking.	Fit a new valve.
Air/Vac. Isolating Valve leaking.	Prove by fitting a blank between valve and pipe bracket. Fit a new valve.
Air/Vac. relay valve leaking control air.	Check that the press button is not leaking. Check control pressure in Air/Vac. relay valve with Test Gauge for Leak off.

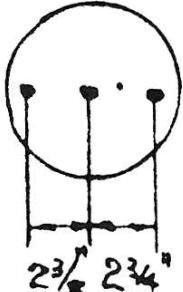
Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector	Vacuum Gauge
Unable to create 21" HG in vac. chamber on Cab Gauge	Normal	Brake application low or nons.	VAC	Train pipe low. Vac. chamber low.
Complete loss of T/P vac. when brake application has commenced.	Normal	Rises to maximum	VAC	Zero
Incorrect brake application and release times.	Normal	Normal	Air/ Goods Pass.	-
			VAC.	Normal

Possible Fault	Remedy
Vacuum Release Valve not closed. No.1 or No. 2 end.	Dismantle Valve, clean, lightly lubricate and reassemble.
Loss of control vac. in Air/Vac. Relay Valve Control reservoir.	Thoroughly clean the valve and Diaphragm or change the valve.
Goods/Pass E.P. valve not operating.	Check that the E.P. Valve energises in 'Pass' position and de-energises in Goods position with a D.S.D. or A.W.S. application.
	Change sub assembly Good/Pass Valve in Triple Valve.
Braked/Unbraked solenoid not operating	Check that the solenoid energises in the braked position.

Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector	Vacuum Gauge
Unable to create 21" HG of vac. in T/P vac. chamber.	Low or none	Brake application	VAC.	ZERO
Initial application does not give a brake application	63-64 P.S.I.	ZERO	VAC. or AIR	21" HG
			VAC.	21" HG

Possible Fault	Remedy
Insufficient Air pressure	Wait for pressure to build up throughout the brake system, i.e. above 87.5 P.S.I.
Air pressure operated Emergency Valve in the Air/Vac. relay valve not closed.	Remove the Valve, clean and replace.
Emergency Vacuum Valve on brake valve stuck open.	Clean, lubricate and check both no. 1 and no. 2 ends.
Insufficient time for system to become completely charged.	Wait 4 minutes.
Overcharge, discharge valve in Air/Vac. Relay valve needs adjusting.	Using the adaptor provided couple the test gauge to ascertain the control pressure in the Air/Vac. relay valve. Increase the control air by shims to give approximate vac. fall to 18" HG. Control press. should not be above T.P. press. The main inlet valve in the Air Vac. valve may be trimmed by the spring adjustment.

Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector Switch	Vacuum Gauge
Unable to obtain DSD applica-	Normal or partial drop.	Zero or light application	AIR or VAC	Normal
Unable to get press. in ATP from one or both ends.	Zero	Zero	AIR or VAC.	Zero
Auto Brake application and release time incorrect	Normal	Press. slow or fast in operation.	AIR & VAC.	Normal
			VAC.	Slow to register
Low pressure over-change pressure incorrect.	Other than 78.5 ± P.S.I.		AIR or VAC.	

Possible Fault	Remedy
Combined Brake Valve isolator & Feed Valve not de-energising.	Check electrical feed from DSD pedal to ensure that current is breaking to the EP Valve & also to the feed Valve Solenoid when A.T.P. pressure commences to fall.
Combined Brake Valve Isolator and Feed Valve not opening.	Ensure Electric current is being fed to the Brake Valve Isolator.
	Remove Feed Valve spindle, clean, lubricate and replace, ensure vent hole is clear.
Chokes in triple valve dirty.	Clean chokes.
Exhausters inefficient	Carry out exhauster efficiency test, using a $\frac{3}{4}$ " dia. leak disc. Check that not less than 7" HG can be obtained.
2 in 1 reservoir incorrectly coupled	<p>Check that Reduction Reservoir is correctly coupled.</p> <p>$2\frac{3}{4}$ measurement no. 1 end nearest to Driving comp. bulkhead. No. 2 nearest to roof.</p> 

Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector Switch	Vacuum Gauge
Low pressure overchange pressure incorrect.	Other than 78.5 ± P.S.I.		AIR or VAC	
In running position a heavy exhaust of air from brake valve. Rapid loss of main reservoir pressure, ATP press approx. 30 P.S.I.	Approx. 30 P.S.I.	Normal	AIR or VAC	Normal or Zero
No Brake applic. or excessively low.	Normal	Zero or Low	AIR or Vac.	Little or no drop.

Possible Fault	Remedy
Leak in pipe-work between reduction reservoir and Brake Valve.	Locate and correct leak.
Worn Sealing Valve Spindle in Brake Valve	Change Sealing Valve assembly. Change the Brake Valve.
0.3 m/m hole in regulating unit blocked.	Remove unit from Brake valve and clean with air.
Quick acting valve or Emergency valve stuck open in driver Brake valve.	Remove the quick acting valve, clean and lubricate and replace.
Non-drive end Brake valve not in NEUTRAL position.	Place the handle in NEUTRAL position.
Insufficient time for systems to fully charge.	Allow 4 minutes to fully charge systems.

Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector Switch	Vacuum Gauge
No AWS application or partial application	Normal	Low pressure	AIR or VAC.	Normal
DSD applic for no apparent reason or blow from DSD T.M.V.7 valve choke.	Normal	Normal	AIR or VAC	Normal
With Brake Handle in RUNNING position no. A.T.P. pressure.	Zero		AIR or VAC	Zero

Possible Fault.	Remedy
AWS Isolator valve stuck open	<p>TEST: Make on AWS application Move the Brake Handle to emergency to destroy T.P. pressure, bring the handle to 'Running' position, if T.P. pressure builds up the Isolator valve is stuck open. Remove and clean the internal parts of the valve, or fit replacement valve.</p>
One of 3 exhaust valves blowing through which build up pressure in the D.S.D. valve (TMV7 valve)	<p>Isolate the D.S.D. at the isolating cock if the blow of air from the TMV7 large chamber vent stops, this proves the D.S.D. Exhaust valve blows through and should be changed. If the blow does not stop it indicates that one of the AWS exhaust valves is blowing through, to ensure correction change both the A.W.S. Exhaust valves.</p>
Defective DSD isolator valve	<p>Move the brake handle from RUNNING to EMERGENCY and back to RUNNING if no exhaust blow of air can be detected the DSD isolator Valve is defective. Fit replacement valve.</p>
Defective Drivers Brake Valve	<p>Move the Brake Handle from RUNNING to EMERGENCY and back to RUNNING. If a blow to exhaust is detected the Brake Valve is defective, change Drivers Brake Valve.</p>

Symptom	A.T.P. Gauge	B/Cyl. Gauge	Brake Selector Switch	Vacuum Gauge
Blow from TM 7 or DSD Valve with no application.	Normal	Normal	AIR or VAC.	Normal

Possible Fault	Remedy
Blow from control air cylinder	Control air inlet valve leaking.
Blow from T.P. cylinder.	1 of 3 exhaust valves blowing through. Re-new exhaust valve and "O" ring sub assembly Cat. No. 70/22493.

