

Master Copy

No. G - 97
MAY-1996

MAINTENANCE MANUAL

OF

AIR BRAKE SYSTEM

FOR

FREIGHT STOCK

Shashikumar 2001

ISSUED BY
RESEARCH DESIGNS & STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR, LUCKNOW - 226011

0000000676

SAND. 468

**Amendment No.3 of January 2010 of G-97 for Maintenance
Manual of Air Brake System for Freight Stock.**

1. Add the Annexure-XIX for General guidelines for operation and examination of Twin Pipe Air Brake system of complete train.



Total - 11 pages attached

General guidelines for operation and examination of Twin Pipe Air Brake system of complete train.

1. Intensive Examination

1.1 At Originating Station

- 1.1.1 Ensure that Hand Brakes of all wagons are fully released.
- 1.1.2 Ensure that operating handle of Empty Load Box is in correct position.
- 1.1.3 Ensure that all worn out brake blocks are changed.
- 1.1.4 Ensure that all brake rigging pins are intact and frictional points are lubricated.
- 1.1.5 Ensure that dimension 'A' of Brake Regulator is adjusted to the specified value.
- 1.1.6 Ensure that Empty Tie Rod adjustment is correct.
- 1.1.7 Ensure that Brake Pipe (BP) hose couplings are connected to form a continuous air passage from the locomotive to the last vehicle. For proper identification BP coupling heads are marked with 'BP' and painted in green.
- 1.1.8 Ensure that feed pipe (FP) hose couplings are connected to form a continuous air passage from the locomotive to the last vehicle. For proper identification FP coupling heads are marked with 'FP' and painted in white. In no case, a feed pipe should be connected to the brake pipe any where in the train or vice versa.
- 1.1.9 Ensure that all the cut off angle cocks of brake pipe and feed pipe except those at the rear end of the train are kept open.
- 1.1.10 Ensure that cut-off angle cocks of Brake Pipe and feed pipe at the rear end of train are kept closed.
- 1.1.11 Ensure that BP and FP hose couplings at the rear end of the train are placed on their respective hose coupling supports.
- 1.1.12 Ensure that the isolating cock on distributor valves of all the wagons are in the open position.
- 1.1.13 Ensure that the isolating cock of feed pipe of all the wagons are in the open position.
- 1.1.14 Ensure that pressure gauges for BP and FP are provided in the brake van.
- 1.1.15 Ensure that the gauges in the guard's compartment show pressures not less than of 4.8 kg/cm² in BP and 5.8 kg/cm² in FP after the system is fully charged for train with 58 wagons. And for trains having more than 58 wagons these pressures shall not be less than 4.7 kg/cm² and 5.7 kg/cm² respectively.
- 1.1.16 Ensure that quick couplings for attaching detachable pressure gauges are provided in the brake van.
- 1.1.17 Ensure that the gauges in locomotive show a pressures of 5.0 kg/cm² in BP and 6.0 kg/cm² in FP after the system is fully charged.
- 1.1.18 Ensure that the leakage in the brake system shall be less than 0.25 kg/cm² per minute.

- 1.1.19 Ensure that piston stroke under empty and loaded conditions are within the limits specified.
- 1.1.20 Ensure that The brake shoes of each wagon are mating the wheels when brakes are applied.
- 1.1.21 Ensure that the piston of brake cylinder is fully inside when brakes are released.
- 1.1.22 Ensure that percentage of operating brake cylinders are within prescribed limit .
- 1.1.23 Ensure proper working of Guard's emergency brake valve.

2. Terminal examination

2.1 At Terminating Station

- 2.1.1 Check the percentage operative cylinders.
- 2.2.2 Check the leakage rate and if found excessive than the prescribed, the source of leakage shall be found out and remedial measures taken.
- 2.2.3 Check the brake blocks after full release are away from the wheel.
- 2.2.4 Close angle cocks of adjacent wagons to uncouple hose couplings.
- 2.2.5 Conduct brake continuity test if any vehicle is attached or detached from the train or any rectification has been done which has affected the continuity of the brake system.

3. Procedure for detaching a wagon

- a. The Driver must place and maintain the automatic air brake valve in the EMERGENCY position until the uncoupling operation is completed.
- b. The brake pipe cut off angle cock on the locomotive and first wagon or between wagons must be closed and then the brake pipes hose coupling uncoupled.
- c. The Feed pipe cut off angle cock on the locomotive and first wagon, or between wagons must be closed and then the feed pipe hose couplings uncoupled.
- d. The hose coupling heads of brake pipe & Feed pipe must be placed on the respective hose coupling supports.
- e. The brake pipe cut off angle cocks on both wagons at the point of division must be opened in order to ensure that the brakes are applied.
- f. After uncoupling the centre buffer coupler the brake pipe cut off angle cocks on both wagons must be closed.

Procedure to isolate the brake on a wagon

- g. Close the feed pipe isolating cock (handle to be in line with the pipe).
- h. Move the distributor valve isolating cock handle from vertical to the horizontal position.
- i. Pull the manual release hook in the distributor valve to release the brake.

4. Procedure for Single Wagon Testing

A Schematic lay-out of Single Wagon Test Rig (SWTR) is shown in the attached **Figure 2**. This SWTR is utilized for testing the air brake system fitted on single wagon. The wagon should not be connected with the locomotive at the time of testing. The following procedure shall be followed for testing.

- .1 The wagon under testing is to be coupled at one end with the SWTR coupling head BP & FP respectively and the other end should be closed with dummy coupling heads. Pressure gauge should be fitted on brake cylinder.
- .2 Couple the SWTR to the main line of compressor.
- .3 Check the following on the wagon.
 - 1) Isolating cock of distributor valve should be in open position i.e. the handle should be vertically down wards.
 - 2) Isolating cock in FP line should be in open position i.e, handle should be vertically down wards.
- .4 Set the pressure regulator (1) to 6 +0.1 kg/cm² open the cocks (2), (5) and (11) and also the angle cocks of both FP and BP on both the ends of the wagons. Move the driver's brake valve (6) in charging and release position.
- .5 Wait for about 5 minutes to charge the complete system.
- .6 Check the pressures in FP pressure gauge (3) and BP pressure gauge (7). Pressure should be 6+ 0.1 kg/cm² in FP and 5 +0.1 kg/cm² in BP. If there is pressure drop in any of the gauges detect the source of leakage and eliminate it.
- .7 Close cock (2) and check the leakage in FP for one minute.
- .8 Close cocks (5) and (11) and check the leakage on BP for one minute.
- .9 Open cock (2) and (5), bring Driver's brake valve in full service application position.
- .10 Record the brake cylinder filling time from 0 to 3.6 kg/cm² in brake cylinder pressure gauge.
- .11 Record maximum pressure in brake cylinder.
- .12 Record the pressure drop in BP from pressure gauge (7).
- .13 Record the piston stroke of brake cylinder.
- .14 Bring Driver's brake valve in charging and release position.
- .15 Record the brake cylinder draining time from 3.8 to 0.4 kg/cm² in brake cylinder pressure gauge & check complete release of brakes i.e. piston should reach its initial position.
- .16 Close cock (5) and open cock (11) for charging the reservoir to 5 kg/cm²
- .17 Open cock (9) for checking sensitivity of brakes. Record the time within which brakes applied.
- .18 close cock (9) and open cock (5). Wait till brakes are released.

- .19 Close cock (5) and open cock (10) for checking the insensitivity of brakes.
- .20 Close cock (10) and (11) and open cock (5). BP pressure should rise to 5 Kg/cm².
- .21 Close cock (5) and open cock (8) for emergency application.
- .22 Record the brake cylinder charging time from 0 to 2.6 kg/cm² in BC pressure gauge.
- .23 Record maximum BC pressure.
- .24 Check the leakage in BC for 5 minutes.
- .26 The above tests should be done in both empty and loaded condition.
- .27 The results of test shall be recorded in the test proforma attached herewith.

4.1 Test proforma: attached as Annexure-I.

5. Rake Test Rig

1. A schematic layout of Rake Test Rig (RTR) is shown in the attached **Figure-3**. A rake consisting of 58 wagons can be tested with this test rig. This test Rig eliminates the use of locomotive for testing purposes.
2. Description:
 - 2.1 The rake test rig has air supply and mobile test rig. The mobile test rig is having a cubicle structure and is mounted on wheels. It can be taken to the yards and sick lines.

2.1.1 Air Supply System:

- .1 This consists of a compressor (1), after cooler (2), check valve (3) main reservoir (4), safety valve (5) and filter (6) all these items are to be installed in a room in the yard.
- .2 The compressor generates pneumatic pressure of 10 kg/cm² and compressed air is stored in main air reservoir MR (4). The safety valve (5) opens out if the pressure exceeds 10 kg/cm². The oil and dirt will be separated out in the filter (6). the check valve (3) prevents back flow of air while compressor is off .
- .3 The compressed air line is connected to the pipe line in the sick line/yard. Angle Cock and hose couplings (BP) are provided at various points depending upon the Train formation and check points in sick line.

2.1.2 Mobile Test Rig.

- .1 The rig consists of brake hose coupling BP (8) and isolating cock (13) at the inlet of the mobile test rig. The air connection can be tapped from one of the points of sick line. The mobile test rig is provided with driver's brake valve (10) and an Equalizing reservoir (15).
- .2 Brake pipe in the rake is charged while driver's brake valve (10) is kept in release and running position. The driver's brake valve inlet is connected to MR. It regulates the pressure to 5 kg/cm² through the relay valve (11). Isolating cock (13) is provided to isolate BP from driver's brake valve (10).
- .3 The relay valve has been provided in the system for augmenting the feeding Capacity of driver's brake valve.
- .4 The MR Line is connected to feed valve F2 (12) and regulated pressure of 6 kg/cm² is obtained from the outlet. Feed pipe in the rake will be charged through feed valve (12), isolating cock (13) and brake hose coupling FP (14).

The hose coupling of BP and FP are connected to the respective coupling of the rake.

2.1.3 Testing Procedure

Attach the Rake Test Rig to the rake through the respective couplings. Carry out tests as per the procedure for checking leakage in the train and checking leakages in feed pipe given in M.P. guide No.11.

6. PROCEDURE FOR BRAKE CONTINUITY TEST

1. The Driver and Guard must carry out this test as soon as possible after the locomotive or vehicle is coupled or recoupled to ensure continuity of the brake pipe throughout the fitted portion of the train.
2. The brake continuity test must be carried out on train in the following circumstances without exception:
 - .1 Locomotive or additional locomotive attached to the front of the train.
 - .2 Locomotive or additional locomotive attached to the rear of a fully fitted train.
 - .3 Vehicle attached at any position in the fitted portion of the train.
 - .4 Vehicle in the fitted portion of the train detached from other than the extreme rear.
 - .5 After any brae detect or irregularity which has affected the continuity of the brake has been rectified.
3. A brake continuity test need not be carried out:
 - .1 When the train locomotive is detached from the extreme front of the train.
 - .2 When the train locomotive is used for 'complete' brake test of the whole train and is not thereafter detached before starting.
 - .3 When locomotive or vehicle is detached from the extreme rear of the train.
4. The following procedure shall be followed for the test:
 - 4.1 The driver must move the automatic brake valve to 'RUNNING' in the leading driving compartment and check that approximately 5.0 kg/cm² is registered on the brake pipe pressure gauge.
 - 4.2 The driver must then move the automatic brake valve to HANDLE OFF/ NEUTRAL without a pause and retain partially at least 4.0 kg/cm² on the brake pipe pressure gauge. In the case of A9 automatic brake valve which does not have handle off/neutral position the following procedure shall be followed.
 - 4.2.1 After the brake pipe pressure has been stabilized close the brake pipe isolating cock provided between additional C2 relay valve and brake pipe of locomotive.
 - 4.3 The Guard must then without delay carry out the following:
 - .1 If brake van is the rear vehicle, open the Guard's emergency brake valve until all air is exhausted. The valve must then be closed.
 - .2 If a brake van is not the rear vehicle, open the brake pipe cut off angle cock on the rear vehicle until all air is exhausted. The cock must then be closed.
 - .3 In the case of partly fitted train, the cock must be opened on the rear of the rear vehicle in the fitted portion until all air is exhausted. Before carrying out this part of the test, the guard must have a clear understanding with the driver as to what is to be done to ensure the train is not moved during the test.
 - .4 If any locomotive in the rear of the last vehicle in addition to the driving locomotive in the front of the train, is used and this locomotive is the last vehicle on the train, then the Guard must instruct the Driver of the rear most locomotive to carry out the brake continuity test. Then Driver must move the automatic brake valve to emergency until the brake pipe pressure falls to

zero. He must then move the automatic brake valve to HANDLE OFF / NEUTRAL and observe that the brake pipe pressure does not immediately rise. In the case of A9 automatic brake valve which does not have handle Off / neutral position the isolating cock provided between additional C2 relay valve and Brake pipe of locomotive must be closed and observe that the brake pipe pressure does not immediately rise. The Guard must obtain an assurance from the Driver of the rear most locomotive that this has been done.

4.4 The Driver must observe that the brake pipe pressure has dropped to zero in the leading driving compartment and that does not commence to rise again. If the brake pipe pressure does not fall, this can be due to a brake pipe cut off angle cock being closed or the feed pipe & brake pipe hoses being crossed between vehicles. If the brake pipe pressure does not fall to zero check if locomotive automatic brake valve of brake controller in another cab/control stand is not in the HANDLE OFF/NEUTRAL position. In the case of A9 automatic brake valve which does not have handle off/neutral position check whether the isolating cock provided between additional C2 relay valve and brake pipe of locomotive is not in closed position.

4.5 After correction of any fault a further brake continuity test commencing at clause 4.3 must be carried out.

4.6 The driver must move the automatic brake valve to RUNNING position and check that 5.0 kg/cm² in brake pipe in the last vehicle as stipulated in the operating rules. In case of A9 brake valve, after the cut-out cock between C-2 relay valve and brake pipe is opened the brake pipe pressure should again build up to 5 kg/cm² in the locomotive and to a maximum pressure in the last vehicle as stipulated in the operating rules.

4.7 **Feed pipe Continuity Test:**

Test for feed pipe continuity should be done as under:

4.7.1 Driver should close the angle cock of the feed pipe of the first wagon from locomotive towards the coupling end of locomotive after the feed pipe pressure in the locomotive cab/control stand is registered to 6 kg/cm² and in the rear most vehicle it is stabilized to a level as stipulated in the operating rules. The Guard should then open the angle cock of the last vehicle till the air stops venting from the open angle cock of the last vehicle till the air stops venting from the open angle cock of the rear most vehicle. After feed pipe pressure in the last vehicle has dropped to zero the Driver should then open the feed pipe angle cock of the locomotive. The feed pipe pressure in the locomotive as well as in the last vehicle should be developed to the original level as stipulated in the operating rules.

4.8 The Guard must not give the signal to start the train until he has carried out his duties in the above test.

4.9 The Driver must not start the train unless he has observed the fall of the pressure to zero and that it has remained at zero until he has moved the automatic brake valve or brake controller to RUNNING. He must then observe the subsequent rise of pressure to approximately 5.0 kg/cm² on the locomotive brake pressure gauge.

7. A schematic layout of twin pipe air brake system as provided on a wagon is given in Figure-1.

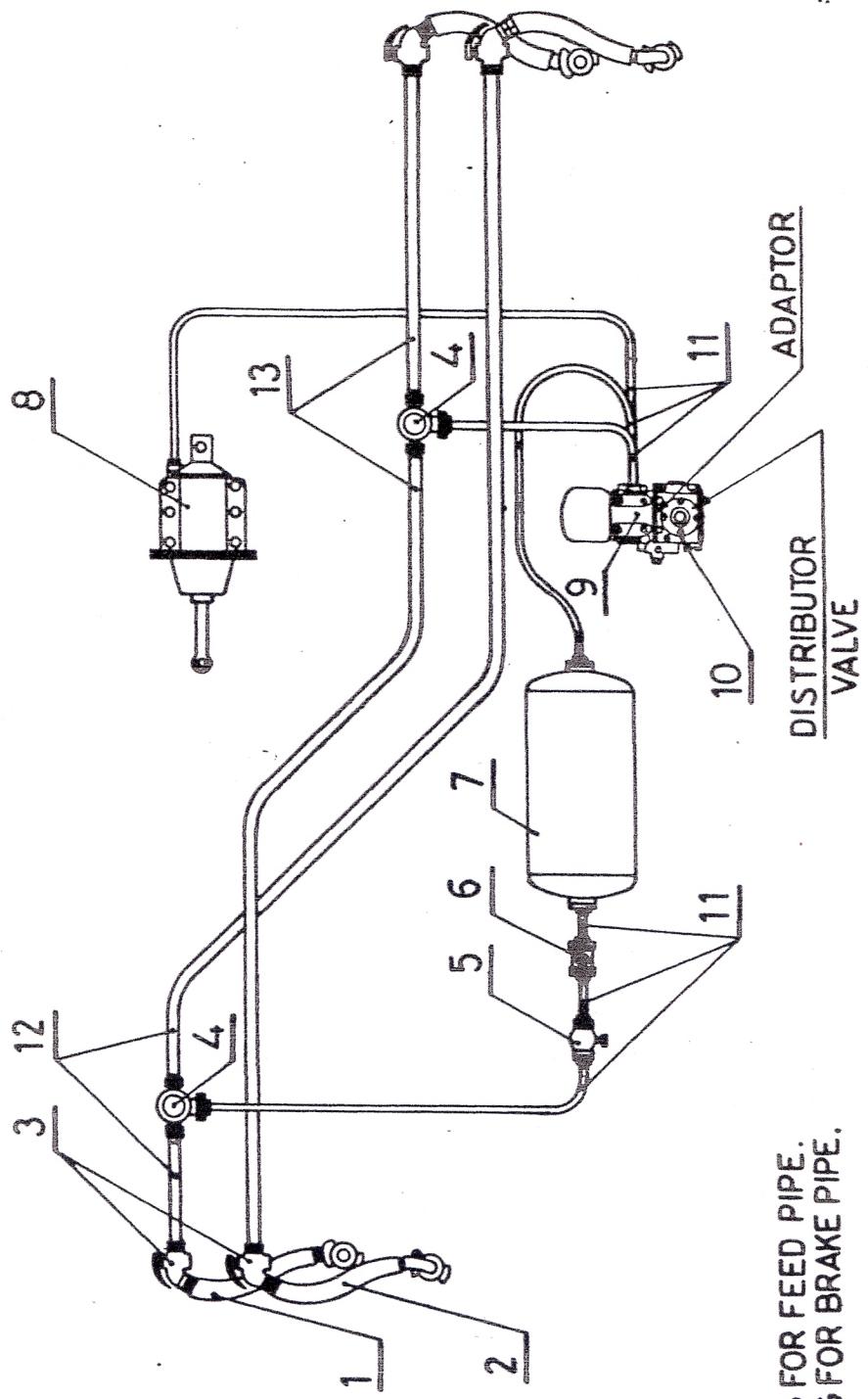
PROFORMA FOR SINGLE WAGON AIR BRAKE TEST

S.No.	Check	Specified	Actual
1	Pressure in BP	$5 \pm 0.1 \text{ kg/sq.cm.}$	
2	Pressure in FP	$6 \pm 0.1 \text{ kg/sq.cm.}$	
3	Pressure in AR	$6 \pm 0.1 \text{ kg/sq.cm.}$	
4	Leakage from the system in one minute.	$0.1 \text{ kg/sq. cm. (max.)}$	
5	Full service application after charging		
5.1	Brake cylinder filling time (Pressure rise from 0 to 3.6 kg/sq.cm.) a) Empty b) Loaded	18 to 30 sec. 18 to 30 sec.	
5.2	Maximum brake cylinder pressure a) Empty b) Loaded	$3.8 \pm 0.1 \text{ kg/sq.cm.}$ $3.8 \pm 0.1 \text{ kg/sq.cm.}$	
5.3	Reduction in BP pressure required for full service application.	$1.3 \text{ to } 1.6 \text{ kg/sq.cm.}$	
6	Release after full service application.		
6.1	Draining time (Brake cylinder pressure to fall from $3.8 \pm 0.1 \text{ kg/sq.cm.}$ to 0.4 kg/sq.cm.) a) Empty b) Loaded	45 to 60 sec 45 to 60 sec.	
7	Sensitivity of brakes. Isolate brake pipes from mainline. Check the response of brakes when brake pipe pressure is reduced at the most equal to 0.6 kg/sq.cm. in 6 sec.	Brake should apply within 6 sec.	
8	Insensitivity of brakes, isolate brake pipe from mainline. Check the pressure of brakes when brake pipe pressure is reduced at least equal to 0.3 kg/sq.cm. in 60 sec.	Brake should not apply	
9	Emergency application:		
9.1	Brake cylinder filling time (Pressure rise from 0 to 3.6 kg/sq.cm.) a) Empty b) Loaded	18 to 30 sec. 18 to 30 sec.	
9.2	Maximum brake cylinder pressure a) Empty b) Loaded	$3.8 \pm 0.1 \text{ kg/sq.cm.}$ $3.8 \pm 0.1 \text{ kg/sq.cm.}$	
10	Piston stroke a) Empty b) Loaded	$85 \pm 10 \text{ mm}$ $120 \pm 10 \text{ mm}$	
11	Leakage from brake cylinder after emergency application.	$0.1 \text{ kg/sq.cm. (max.)}$ within 5 minutes	
12	Automatic exhausting of brake cylinder and control chamber.		
12.1	Apply emergency brakes (i.e. BP=0kg/sq.cm). Check the brake cylinder pressure after giving a brief pull to release hook.	Brake cylinder and control reservoirs should exhaust automatically.	

Date -

Signature & name of Testing Authority

FIG. 1



1) AIR BRAKE HOSE COUPLING FOR FEED PIPE.
2) AIR BRAKE HOSE COUPLING FOR BRAKE PIPE.

3) CUT OFF ANGLE COCK.

4) DIRT COLLECTOR.

5) ISOLATING COCK.

6) CHECK VALVE.

7) AUXILIARY RESERVOIR.

8) PIPE BRACKET WITH CONTROL RESERVOIR.

9) DISTRIBUTOR VALVE WITH ADAPTOR.

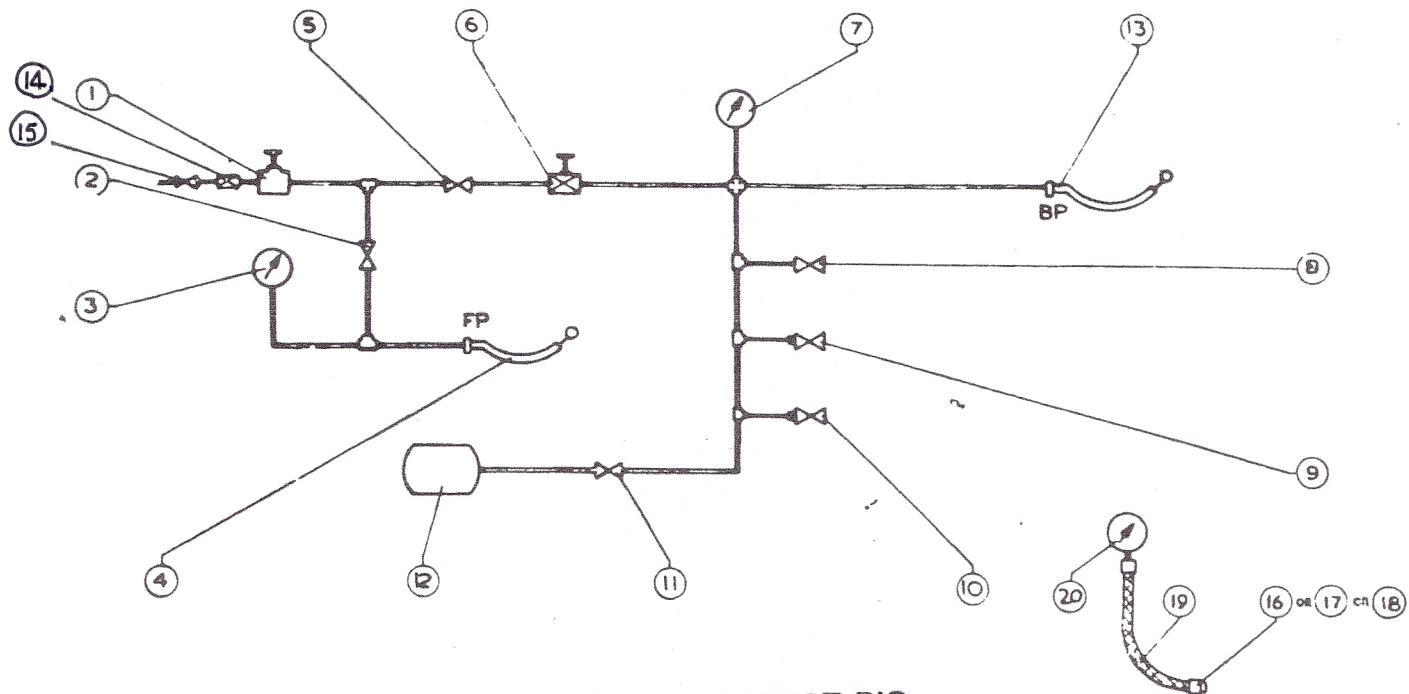
10) PIPES 20 mm. N.B.

11) FEED PIPES 32 mm. N.B.

12) BRAKE PIPES 32 mm. N.B.

SCHEMATIC ARRANGEMENT
OF AIR BRAKE EQUIPMENT

FIG. 2

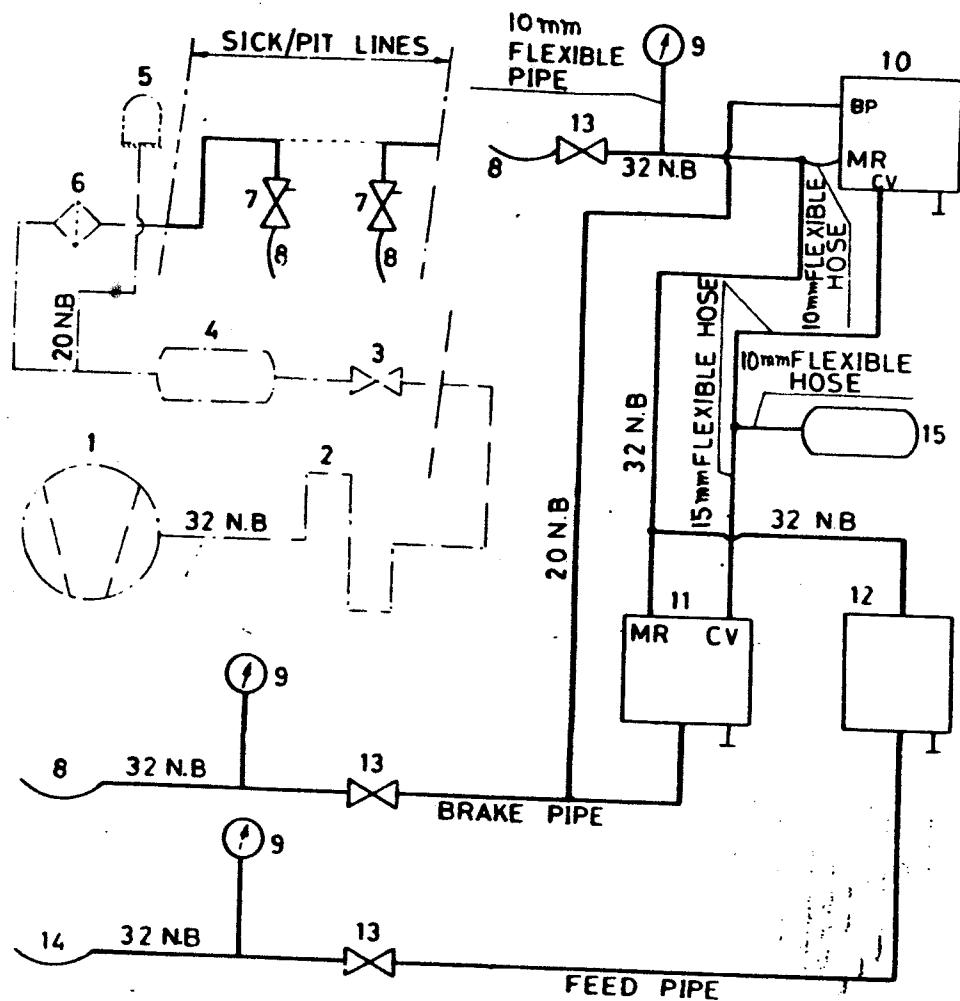


NOMENCLATURE

S. No.	Description	Qty.	S. No.	Description	Qty.
1	Pressure Reducing Valve	1	12	Reservoir 40 L	1
2	Isolating Cock 15 mm.	1	13	Flexible Hose BP 2.5 m. Long	1
3	Pressure Gauge for FP	1	14	Check Valve 15 mm.	1
4	Flexible Hose FP 2.5 m. Long	1	15	Isolating Cock 15 mm.	1
5	Isolating Cock 15 mm.	1	16	Adapter for AR	1
6	Drivers Brake Valve	1	17	Adapter for CR	1
7	Pressure Gauge for BP	1	18	Adapter for BC	1
8	Isolating Cock 15 mm.	1	19	Flexible Hose 15 mm x 2 m Long	3
9	Isolating Cock with Choke 15 mm.	1	20	Pressure Gauge for BC, CR, AR.	3
10	Isolating Cock with Choke 15 mm.	1	21	Trolley (Not Shown)	1
11	Isolating Cock 15 mm.	1			

FIG. 3

**RAKE TEST RIG (RTR)
FOR TWIN PIPE AIR BRAKE SYSTEM**



Note :—The equipments shown after the pit line are the parts of mobile test stand.

Item	Description	No. off	Item	Description	No. off
1. Compressor 2000L/min. pressure 8-10 kg/cm ²			8. Brake hose coupling BP		2
2. After cooler		1	9. Single pressure gauge 6"		3
3. Check valve		1	10. Driver's Brake valve		1
4. Main reservoir 300L.		1	11. Relay valve DU-22		1
5. Safety valve		1	12. Feed valve F-2		1
6. Filter		1	13. Isolating cock		3
7. Angle cock		2	14. Brake hose coupling FP		1
			15. Equalising reservoir 9L		1

Amendment No. 2 of July, 2001 of G-97 for Maintenance Manual of Air Brake System for Freight stock.

1. Add the following items in the POH kit given in Annexure-XIII/1.

S.No.	Description	Knorr Bremse Drawing No.	ESCORTS Part No.	No. off per set
43.	'O' ring	-----	263	1
44.	Filter	4B40415-00	264	1
45.	Fine filter	4B62338-00	82	5
46.	Exhaust plug	4A34520-05	81	5
47.	Sealing Ring 10x13.5		120	
48.	External circlip		95	1
49.	External circlip 5x0.6		102	1

2. Delete items mentioned below in the POH kit given in Annexure-XIII/1.

S.No.	Description	Knorr Bremse Drawing No.	ESCORTS Part No.	No. off per set
33.	Filter	4B40415	118	1

3. Revise the quantity of following items in the POH kit given in Annexure-XIII/3.

S.No.	Description	WABCO Part No.	Figure No.	Item No.	No. off per set
4.	'O' ring	70523903	3	32	6
6.	'O' ring	70524914	3	36	2
16.	Diaphragm	18301900	5	77	2
21	'O' ring	70521203	5	81	2

4. Delete following items mentioned below in the POH kit in Annexure-XIII/3.

S.No.	Description	WABCO Part No.	Figure No.	Item No.	No. off per set
38	'O' ring	70503302	8	50	1

5. Add the item in the POH kit given in Annexure-XIII/3.

S.No.	Description	WABCO Part No.	Figure No.	Item No.	No. off per set
41.	Cup	19027600	7	225	1
42.	Exhausting Ring Protector	78782800	3	93	1

000000677

Amendment No.1 of November,1999 of G-97 for Maintenance Manual of Air Brake System for Freight Stock.

1. Add the Annexure-XVIII for Do's & Don'ts for fitment of 'L' type composition brake block.
2. Replace the MP-11 of October,1987 by the MP-11 of July,1999 (Rev.01) placed at Annexure-XI.

0000000678

'DO's AND DON'Ts FOR FITMENT OF COMPOSITION BRAKE BLOCKS'

1. The following procedure shall be followed to ensure proper fitment of Composition brake blocks:

To be done

- i) Brake Shoe key shall be of spring steel as per RDSO drawing.
- ii) Brake head shall be as per RDSO drawing.
- iii) Brake block taper should match with the wheel taper i.e. lower thickness of brake block towards flange of wheel disc and higher thickness towards other side of wheel flange.
- iv) Sufficient clearance should be created by rotating the barrel of slack adjuster for fitment of brake block.
- v) The brake block should be fitted from the top of wheel and pressed down so that it sits properly on the brake head.
- vi) Key shall be inserted from the top and slightly hammered so that it sits properly with the brake head. Slight hammering requirements indicate that brake shoe key is made of proper material and as per drawing.
- vii) Split pin shall be inserted through the brake head hole passing the edge of brake shoe key and ends of split pin should be bent.

Not to be done

- i) No hammering should be done for fitment of brake blocks.
- ii) Brake block should not be dropped.
- iii) Brake block should be handled properly and carefully to avoid damages such as chipping/cracking.
- iv) Do not store the brake block on radius side (the best way is to store them on the side ways)
- v) Do Not strike Key if stopped by brake block nib.
- vi) Composition and cast iron brake blocks shall not be fitted on same brake beam.
- vii) Avoid fitment of composition and cast iron brake blocks on the same rake to get optimum wear life out of the composition brake blocks.

000000679



भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Procedure For Checking Of Diesel/Electric Locomotive Hauled Air Braked Trains

Report No : MP.Guide No.11

JULY-1999

(Revision-01)

अनुसंधान अभिकल्प एवं मानक संगठन
लखनऊ - 226 011

RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW - 226 011

Preamble

The joint operating procedure contained in this guide is meant for checking of air braked trains consisting of BOXN/BCN wagon hauled by WDM2 diesel electric locomotives fitted with 28 LAV-1/IRAB-1 brake system and WAG5 electric locomotive fitted with IRAVB-2/ IRAB-9 brake system. While following these instruction it should be ensured that relevant GRs and SRs are followed along with specific operating instructions issued by Zonal Railways in force for a particular section.

The joint operating procedure contains the charging capacity and leakage rate specifications for locomotives and wagons and is based upon International specification. Clarification should be obtained from Director General (MOTIVE POWER), R.D.S.O., Manak Nagar, Lucknow-226011.

000000681

1. Introduction

- 1.1 With the introduction of air braked freight stock on Indian Railways, it has become necessary to lay down detailed operating procedure for checking leakage rates in trains and for testing charging capacity of Locomotive to ensure that Locomotive is capable of supply adequate amount of air for charging brake pipe for single pipe working. The detailed procedure for checking the Locomotive and trains have been indicated in this guide, which is applicable to Locomotives and wagons fitted with Air Brake System.

Air brake stocks of Indian Railway have been fitted with single pipe graduated release Brake System generally in conformity with UIC standards. (See Note No-1)

WDM2 WAG5 Locomotives have been fitted with dual Brake Systems, which make them capable for hauling both, vacuum braked and air braked stock. WDM2 Locomotives have been fitted with 28 LAV-1/IRAB-1 twin pipe Brake System and WAG5 electric Locomotives with IRAVB-2/IRAB-9 twin pipe Brake System.

- 1.2 Before proceeding with the checks indicated in para 2 ensure that the Locomotive has been correctly prepared for hauling air braked stock as per operating manual No.MP-572/82 for WDM2 Locomotives and operating manual No.MP-481/84 for WAG5 Locomotive.

2. Procedure for checking capability of Locomotives for charging/releasing of train brakes.

N.B: - This test should be carried out on single Locomotive if only one Locomotive is used for hauling the train or on foremost Locomotive of consist of Locomotives unless otherwise stated.

- 2.1 Place the driver's automatic brake valve handle in emergency position.
- 2.2 In case of WDM2 diesel locomotive start the engine and in case of WAG5 electric locomotive start the compressors for building up of main reservoir pressure.

0000000682

- 2.3 Allow the main reservoir pressure to build up to the maximum stipulated limits for the particular type of Locomotive. The relevant maximum stipulated pressure is given in Table-I

Table-I

Valves	Pressure setting in kg/cm ²	
	WDM2	WAG5
Main reservoir pressure	Cut out	10+0.1
Governor setting	Cut in	8+0.1
Main reservoir pressure safety valve setting		10.5+0.1
		10.5+0.1

- 2.4 Close the angle cock for the brake pipe. Couple 7.5 mm diameter leak hole special test coupling fabricated to R.D.S.O. Drawing No SK.DP-2691 (Annexure-I) with the brake pipe coupling of the locomotive. In case of MU consist test coupling should be fitted on the rear most loco of the consist.
- 2.5 Move the driver's automatic brake valve handle from emergency position to release position to charge the brake pipe to 5 kg/cm².
- 2.6 Open the angle cock for the brake pipe. The brake pipe pressure should fall from 5 kg/cm².
- 2.7 Check the brake pipe pressure with the help of gauge fitted in the Locomotive, which should not fall below 4 kg/cm² within 60 seconds.
- 2.8 The test shall be carried out with all the compressors in working condition for operating the train.
- 2.9 Generally the number of compressors used shall be governed by the number of wagons hauled and the leaking rate. A general guideline is given in Table-II.

TABLE -II

Number of Wagons in train	Less than 50	50-80	80-90	90-100	More than 100
Compressed air requirements in liters/minute	2000	3000	4000	5000	6000

0000000683

3. Procedure for checking leakage in the train

- 3.1 Attach the Locomotive to the train fitted with single pipe air brake system and couple brake pipe. Ensure correct coupling with brake pipe in a manner that there is no leakage of air from coupled joints.
- 3.2 The coupling should be done with angle cock in close position.
- 3.3 Open angle cocks of loco after coupling brake pipe.
- 3.4 Open the angle cocks of the brake pipe on all the wagons. Check for continuity of brake by reducing and rebuilding brake pipe pressure. The verification should invariably be carried out through the pressure gauge provided in Guard's Brake Van.
- 3.5 After the brake pipe pressure has stabilised in the Locomotive and rear most vehicle to the level indicated in table-III move the driver's automatic brake valve handle towards application position to reduce the brake pipe pressure from 5 kg/cm² to 4 kg/cm².

Table-III

Length of Train	Brake pipe pressure in Train(kg/cm ²)	
	Locomotive	Last Wagon
Up to 56 BOXN wagons	5.0	4.8
Beyond 56 BOXN wagons	5.0	4.7

- 3.6 After the brake pipe pressure has been stabilised, close the brake pipe isolating cocks provided between additional C2W relay valve and brake pipe of the Locomotive.
- 3.7 Wait for 60 seconds for temperature and gauge settlement then note the drop in pressure in the brake pipe gauge in the Locomotive for five minutes.
- 3.8 The drop in brake pipe pressure gauge shall not be more than 0.25 kg/cm²/min.
- 3.9 If the leakage rate is more than the value indicated in para 3.8, check for excessive leakage on individual wagons as indicated below:-
 - 3.9.1 A hissing sound would be audible at points where leakage is heavy.
 - 3.9.2 Once the hissing sound is heard from a particular area, pin point the location of leakage by applying soap and water solution.
 - 3.9.3 Use permitted material viz. Teflon tape for arresting the leakage

- 3.10 In case leakage is heavy and can not be arrested the wagon may have to be isolated /detached.
- 3.11 In case where leakage can be arrested temporarily by tape and the nature of leakage is such that it requires attention at Primary Depot, clear marking on the wagon should be done to draw the attention on primary Depot, for adequate attention.
- 3.12 In case the leakage is from the distributor valve and can not be arrested, isolation of the wagon can be carried out by closing the distributor valve isolating cock. In such condition clear marking should be provided on the wagon to indicate this defect to primary depot. Do not close brake pipe angle cocks under any circumstance, either for isolation of wagons or for any purpose whatsoever, except for carrying out shunting operation after which the angle cocks should again be opened to ensure continuity of brake pipe.

4. Brake cylinder operative percentage

- 4.1 The trains originating from primary depot should have a brake cylinder operating percentage of 100%.
- 4.2 Under no circumstances the brake cylinder operative percentage should fall below 85% on route. (See Note No.2)
- 4.3 Train examination staff should check operative percentage by observing gripping of brake blocks on wheels.

5. Procedure to be followed at wayside

- 5.1 If the leakage rate is found more than the value indicated in para 3.8, locate the source and arrest the leakage as the procedure given in para 3.9.
- 5.2 In case where leakage can be arrested temporarily by tape and the nature of leakage is such that it requires attention at Primary Depot, clear marking on the wagon should be done to draw the attention of primary depot for adequate attention.
- 5.3 In case the leakage is from distributor valve, follow the procedure given in para 3.12.
- 5.4 In case leakage is heavy and can not be arrested and wagon has to be detached, contact the control and obtain further advice.
- 5.5 In case the brake cylinder operative percentage is found less than the prescribed limit of 85% contact the control and obtain further advice. (See Note No.2)

Note :-

1. As per Railway Board letter No.85 / M (N) /951/15 Dt. 20.8.1992.Twin pipe brake system has been discontinued and the present standard is single pipe system.
2. The contents of Railway Board letter No.94 / M (N) / 951/57 Dt.20.9.1995. regarding originating brake power of the air braked goods train is reproduced below.

“It is clarified that the minimum originating brake power for air braked goods train running on end to end pattern of examination shall be 85% except wherever local restrictions have specified higher levels of brake power to meet specific requirements. Exception shall only be made after prior personal approval of Chief Rolling Stock Engineer has been obtained for each individual case.”

0003000686

76

CONTENTS

S. No.	DESCRIPTION	PAGE No.
1.	GENERAL INFORMATION	1 TO 8
2.	DESCRIPTION OF EQUIPMENT	9 TO 17
3.	EXAMINATION OF AIR BRAKE SYSTEM OF COMPLETE TRAIN	19 TO 36
4.	ROUTINE OVERHAUL	37 TO 41
5.	TROUBLE SHOOTING ON WAGONS	43 TO 45
6.	PERIODIC OVERHAUL	47 TO 50
7.	ANNEXURE-I OVERHAULING & TESTING OF DISTRIBUTOR VALVE	51 TO 53
8.	ANNEXURE-II OVERHAULING & TESTING OF BRAKE CYLINDER	55 TO 59
9.	ANNEXURE-III OVERHAULING & TESTING OF DIRT COLLECTOR	61 TO 63
10.	ANNEXURE-IV OVERHAULING & TESTING OF ANGLE COCK	65 TO 67
11.	ANNEXURE-V OVERHAULING & TESTING OF AUXILIARY RESERVOIR	69 & 70
12.	ANNEXURE-VI OVERHAULING & TESTING OF HOSE COUPLING	71 & 72
13.	ANNEXURE-VII OVERHAULING & TESTING OF GUARD'S EMERGENCY BRAKE VALVE	73 & 74

14.	ANNEXURE-VIII OVERHAULING & TESTING OF ISOLATING COCK	75 & 76
15.	ANNEXURE-IX OVERHAULING & TESTING OF LOAD SENSING DEVICE	77 TO 80
16.	ANNEXURE-X OVERHAULING & TESTING OF PIPES AND JOINTS	81 TO 83
17.	ANNEXURE-XI MP-GUIDE No.11 PROCEDURE FOR CHECKING OF DIESEL/ELECTRIC LOCOMOTIVE HAULED AIR BRAKED TRAINS	85 TO 93
18.	ANNEXURE-XII PROCEDURE FOR SINGLE WAGON TESTING	95 TO 103
19.	ANNEXURE-XIII POH KIT	105 TO 126
20.	ANNEXURE-XIV MAINTENANCE KIT	127 TO 140
21.	ANNEXURE- XV ADJUSTMENT OF EMPTY LOAD BOX & BRAKE REGULATOR	141 TO 145
22.	ANNEXURE-XVI PROCEDURE FOR REPLACEMENT OF BRAKE BLOCKS	147 & 148
23.	ANNEXURE-XVII DRAWING NO.WD-93003-S-01 -----	

0000000683

AMENDMENTS

Amendment No.	Issuing Authority & Reference	Contents

NOTE :- The maintenance manual holder should keep a record of amendments as and when issued for reference.

4A

0000000689

NOTES

0000000690

15

GENERAL INFORMATION

1. INTRODUCTION:

- 1.1 Instructions for operation and maintenance of Air Brake equipment fitted on wagons was first issued in April 1988 in the form of Pamphlet No. G-78. This issue of this Pamphlet includes all the instructions so far issued on the subject and the amendments No. 1 & 2 of G - 78. This also includes the instructions contained in G-96 of August 1995 for operation and maintenance of Air brake equipment fitted on BOBR/BOBRN wagons. Efforts have been made to bring out all information necessary for the smooth and efficient working of the air brake system and also to educate the TXR and other staff associated in the operation and maintenance of air braked freight stock of Indian Railways.
- 1.2 Twin pipe graduated release air brake system was fitted on all wagons prior to 1993. Railway Board vide letter No. 85/M (N)/951/15 dt.20.8.1992 discontinued with twin pipe system and therefore the wagons manufactured since 1993 are provided with single pipe system only. The following types of wagons are equipped with air brake system on Indian Railways.

- | | |
|-------------|---------------|
| 1. BOXN | 6. BOBR/BOBRN |
| 2. BCN/BCNA | 7. BVZC |
| 3. BTPN | 8. BOY |
| 4. BTPGLN | |
| 5. BRN | |

- 1.3 Wagons type BOBR/BOBRN are fitted with automatic two stage empty load device and therefore certain equipment used for these wagons are different from those fitted on other wagons. Similarly for BVZC brake vans also certain equipments are different and additional arrangement for guard's emergency brake valve and quick coupling for detachable pressure gauge are also provided.

000000691

2. SALIENT FEATURES OF AIR BRAKE SYSTEM:

The brake system provided on the freight stock is single pipe graduated release system and its operating principle is discussed below:

- 2.1 Brake system on BOXN, BCN/BCNA, BTPN, BTPGLN, BRN & BOY type of wagons.
 - 2.1.1 Schematic layout of single pipe graduated release air brake system as provided on above wagons is shown in Fig.1. Brake pipe (9) runs through the length of wagon. Brake pipe on consecutive wagons in a train are coupled to one another by means of hose coupling (1) to form a continuous air passage from the locomotive to the rear end of the train. Brake pipe is charged to 5kg/cm^2 through the compressor of the locomotive.
 - 2.1.2 For application of brake, air pressure in the brake pipe (9) is reduced by venting it to atmosphere from drivers brake valve in the locomotive. The reduction of the brake pipe pressure positions the distributor valve (7) in such a way that the auxiliary reservoir (4) is connected to the brake cylinder (5) thereby applying the brake. The magnitude of brake cylinder pressure is proportional to the reduction of pressure in the brake pipe during the application. During full service brake application, which amounts to a reduction of 1.3 to 1.6 kg/cm^2 maximum brake cylinder pressure of 3.8kg/cm^2 is developed. Any further reduction of brake pipe pressure has no effect on the brake cylinder pressure. However, during emergency brake application, the brake pipe is vented to atmosphere very quickly as a result the distributor valve assumes the full application position also at a faster rate. This results in quicker build up of brake cylinder pressure but the maximum brake cylinder pressure will be the same as that obtained during a full service brake application.
 - 2.1.3 During release, the brake pipe is recharged and the brake pipe pressure positions the distributor valve in such a way that the brake cylinder is connected to exhaust for releasing the brakes. The extend of build up of brake pipe pressure causes a corresponding reduction in the brake cylinder.

2.2 Brake system on BVZC brake van.

0000000692

2.2.1 Schematic lay out of single pipe graduated release air brake system as provided on BVZC Brake Van is shown in fig.2. These Brake Vans are

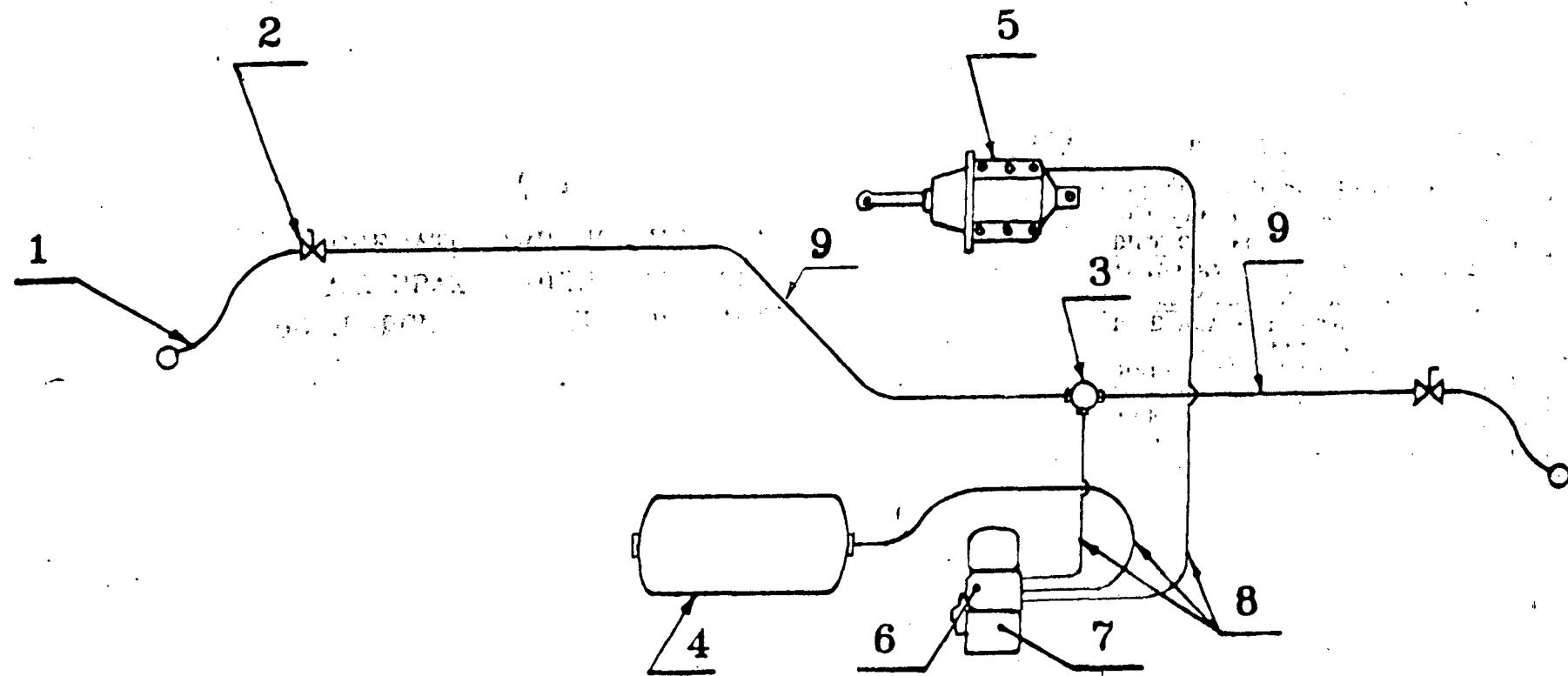


FIG. 1

SCHEMATIC ARRANGEMENT OF
AIR BRAKE EQUIPMENT ON
BOXN, BCN etc. TYPE OF WAGONS.

6900000000

FIG. REF. NO.	DESCRIPTION	QTY.
1	AIR BRAKE HOSE COUPLING	2
2	CUT OFF ANGLE COCK	2
3	DIRT COLLECTOR	1
4	AUXILIARY RESERVOIR 100 lt.	1
5	BRAKE CYLINDER 355 mm	1
6	PIPE BRACKET WITH CONTROL RESERVOIR	1
7	DISTRIBUTOR VALVE WITH ADAPTOR	1
8	PIPES 20 mm. NB.	1SET
9	PIPES 32 mm. NB.	1SET

16900000000

16

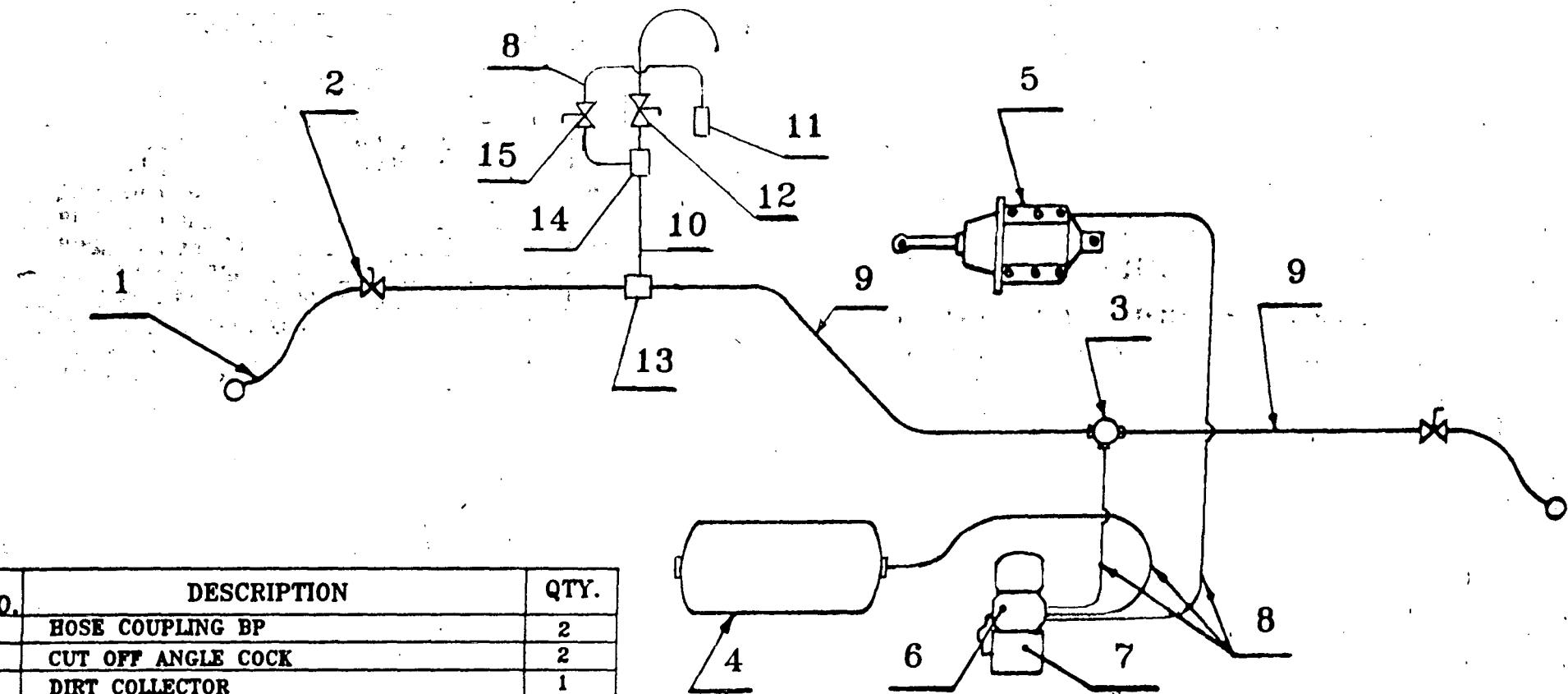


FIG. REF.NO.	DESCRIPTION	QTY.
1	HOSE COUPLING BP	2
2	CUT OFF ANGLE COCK	2
3	DIRT COLLECTOR	1
4	AUXILIARY RESERVOIR 75 LT.	1
5	BRAKE CYLINDER 300 mm.	1
6	PIPE BRACKET WITH CONTROL RESERVOIR	1
7	DISTRIBUTOR VALVE WITH ADAPTOR	1
8	PIPE 20 mm NB	1 SET
9	PIPE 32 mm NB	1 SET
10	PIPE 25 mm NB	1 SET
11	QUICK COUPLING	1
12	GUARD'S EMERGENCY BRAKE VALVE	1
13	TEE FLANGE 32X32X25	1
14	TEE FLANGE 25X25X20	1
15	ISOLATING COCK	1

FIG.2
SCHEMATIC ARRANGEMENT OF AIR BRAKE
EQUIPMENT ON BVZC BRAKE VANS.

provided with additional item of guard's emergency brake valve (12) so that the guard can make brake application by operating this valve. These brake vans are also provided with quick coupling (11) for attaching pressure gauge to check the brake pipe pressure in the brake vans.

2.3 Brake system on BOBR/BOBRN type of wagons.

2.3.1 Schematic lay out of single pipe graduated release air brake system as provided on BOBR/BOBRN wagons is shown in fig.3. These wagons are provided with automatic two stage empty load device to cater for higher brake power in loaded condition instead of the conventional manual empty load device. With the provision of this, brake cylinder pressure of 2.2 kg/cm^2 is obtained in empty condition and 3.8 kg/cm^2 is obtained in loaded condition. So as to obtain this a change over mechanism called "Load Sensing Device" (LSD) is interposed between the bogie bolster and spring plank. The mechanism gets actuated at a pre determined change over weight and the distributor valve which has the additional feature controls the brake cylinder pressure. The following air brake equipment manufacturers have supplied air brake equipment for BOBR/BOBRN wagons.

1. M/s Escorts limited,
plot No. 115, sector 24,
Mathura Road,
Faridabad-121005

2. M/s Railway Products (India) ltd.
Harita, Hosur-635109

3. M/s Greysham & Co.
H.O. 7249 (1/1),
Roop Nagar,
Delhi-110007

2.3.2 The empty load change over device of M/s Escorts make consists of a pressure transformer type DU- 111A attached to the basic distributor valve KE GiSL, Load Sensing Device (LSD) consisting of operating valve and spring buffer mounted on the bogie and pipe with flexible hoses (see fig. 4 for fitment arrangement). Compressed air from auxiliary reservoir enters into the operating valve through the pipe connection and flexible hose. Another flexible hose is connected between EL port of distributor valve pipe bracket and operating valve. The operating valve remains

closed in empty condition. Thus no pneumatic signal is passed on via EL port to the transformer which controls the maximum brake cylinder pressure of $2.2 \pm 0.25 \text{ kg./cm}^2$. In loaded condition the operating valve lets the compressed air signal to EL port of distributor valve pipe bracket and the transformer gets the pneumatic command and the brake system gets adjusted to a max.. brake cylinder pressure of $3.8 \pm 0.1 \text{ kg./cm}^2$.

- 2.3.3 The empty load change over device of M/s RPIL make consists of distributor valve type C3W2, load sensing valve type VN5 and swiveling adaptor mounted on the bogie and pipe with flexible hoses (see fig .5 for fitment arrangement). C3W2 distributor valve has built in feature to provide lower brake cylinder pressure in empty condition and higher brake cylinder pressure in loaded condition and is different from C3W distributor valve fitted on BOXN/BCN type of wagons. Compressed air from auxiliary reservoir enters into the load sensing valve VN5 through the pipe connection and flexible hose. Another flexible hose is connected between EL port of distributor valve pipe bracket and VN5 valve, The VN5 valve remains closed in empty condition. Thus no pneumatic signal is passed on via "EL" port to the distributor valve which controls the brake cylinder pressure of $2.2 \pm 0.1 \text{ kg/cm}^2$. In loaded condition, the VN5 valve lets the compressed air signal to "EL" port of distributor valve pipe bracket and the distributor valve gets the pneumatic command and the brake system gets adjusted to brake cylinder pressure of $3.8 \pm 0.1 \text{ kg/cm}^2$.
- 2.3.4 The empty load change over device presently being supplied by M/s Greysham & Co. also consists of C3W2 distributor valve and VN5 load sensing valve as being supplied by M/s RPIL. However, M/s Greysham & Co. have supplied 256 sets of equipments with EST3f Distributor valve with relay valve attached to this and load empty change over valve LEC4 mounted on the bogie (see fig. 6 & 7 for schematic arrangement and fitment) . In this system two flexible pipe connection are taken direct from the relay valve and are connected directly to the respective ports in the change over valve LEC4. In the empty condition, two ports in the change over valves are connected to obtain lower brake cylinder pressure and in loaded condition, the connection is separated.

3. STANDARDISATION

- 3.1 Air brake equipment for fitment on wagon have been procured as proprietary items from firms who were having UIC approval for their design. The following firms have supplied equipment to Indian Railways.

000000696

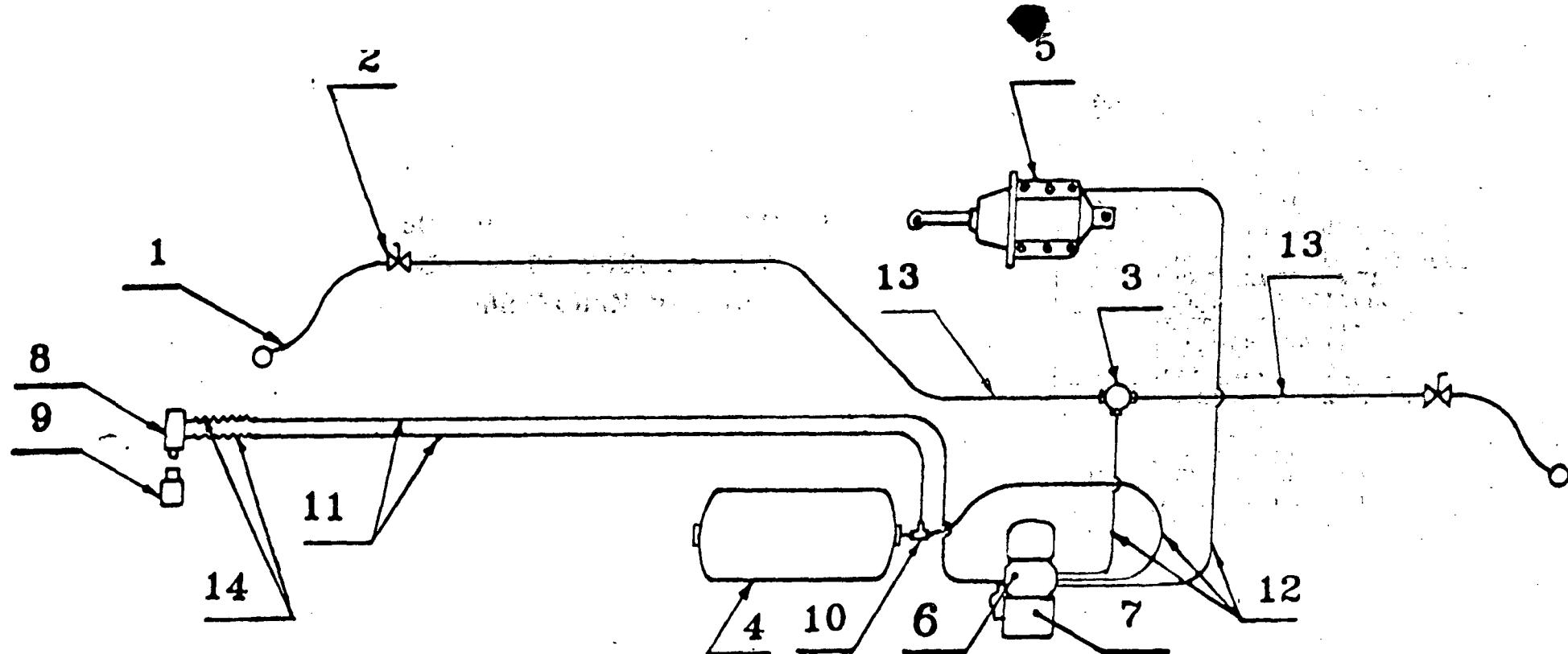


FIG.3

SCHEMATIC ARRANGEMENT OF
AIR BRAKE EQUIPMENT ON
BOBR/BOBRN WAGONS.

FIG. REF.NO.	DESCRIPTION	QTY.
1	AIR BRAKE HOSE COUPLING	2
2	CUT OFF ANGLE COCK	2
3	DIRT COLLECTOR	1
4	AUXILIARY RESERVOIR 100 lt.	1
5	BRAKE CYLINDER 356 mm	1
6	PIPE BRACKET WITH CONTROL RESERVOIR	1
7	DISTRIBUTOR VALVE WITH ADAPTOR AND RELAY VALVE	1
8	OPERATING VALVE OF LSD.	1
9	SPRING BUFFER OF LSD.	1
10	TEE FLANGE	1
11	PIPES 15 mm. NB.	1set
12	PIPES 20 mm. NB.	1set
13	PIPES 32 mm. NB.	1set
14	FLEXIBLE HOSE	2

29

0000000698

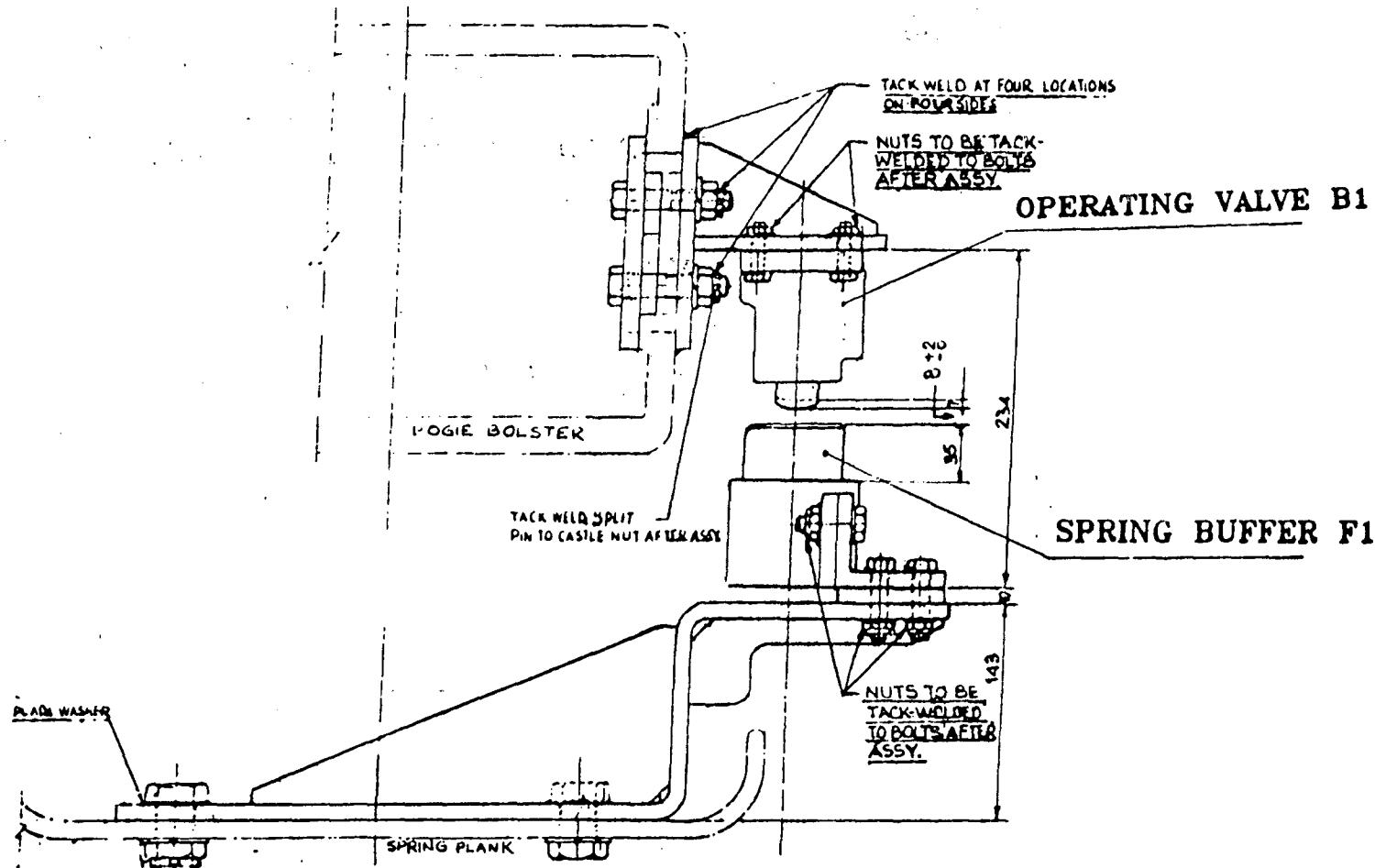
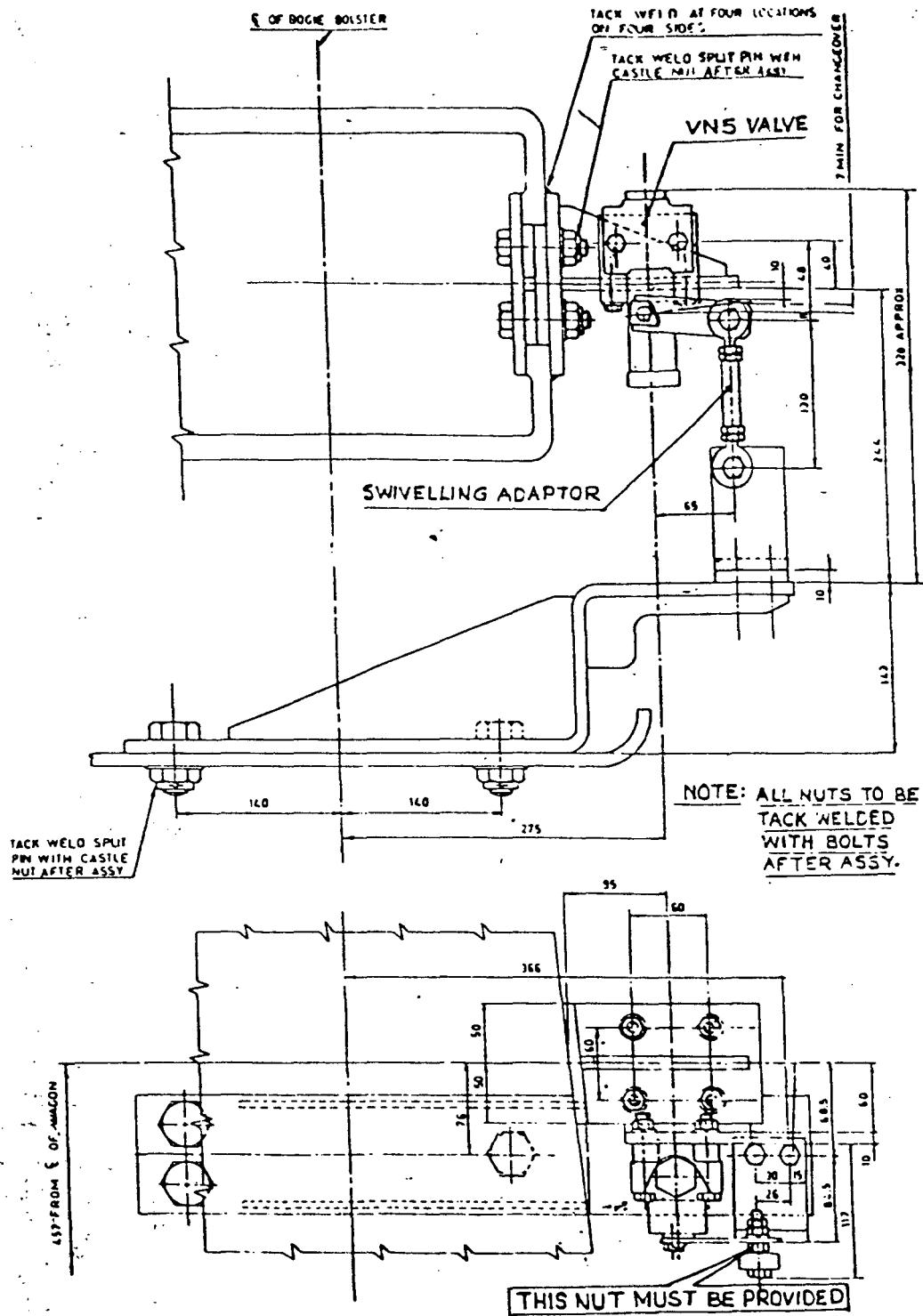


FIG.4

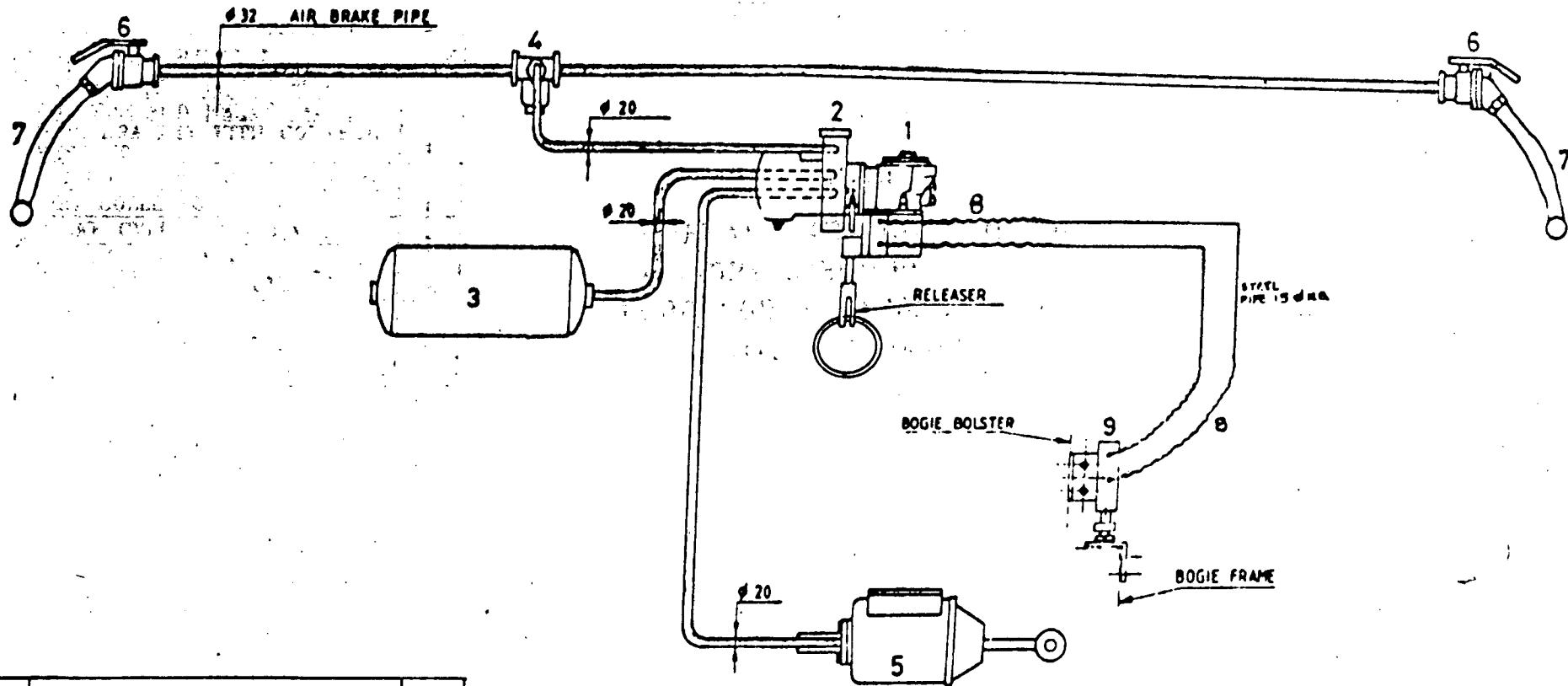
FITMENT OF ESCORTS
LOAD SENSING DEVICE



0000000699

FIG.5

FITMENT OF RPIL & GREYSHAM'S LOAD SENSING DEVICE WITH C3W2 DV.

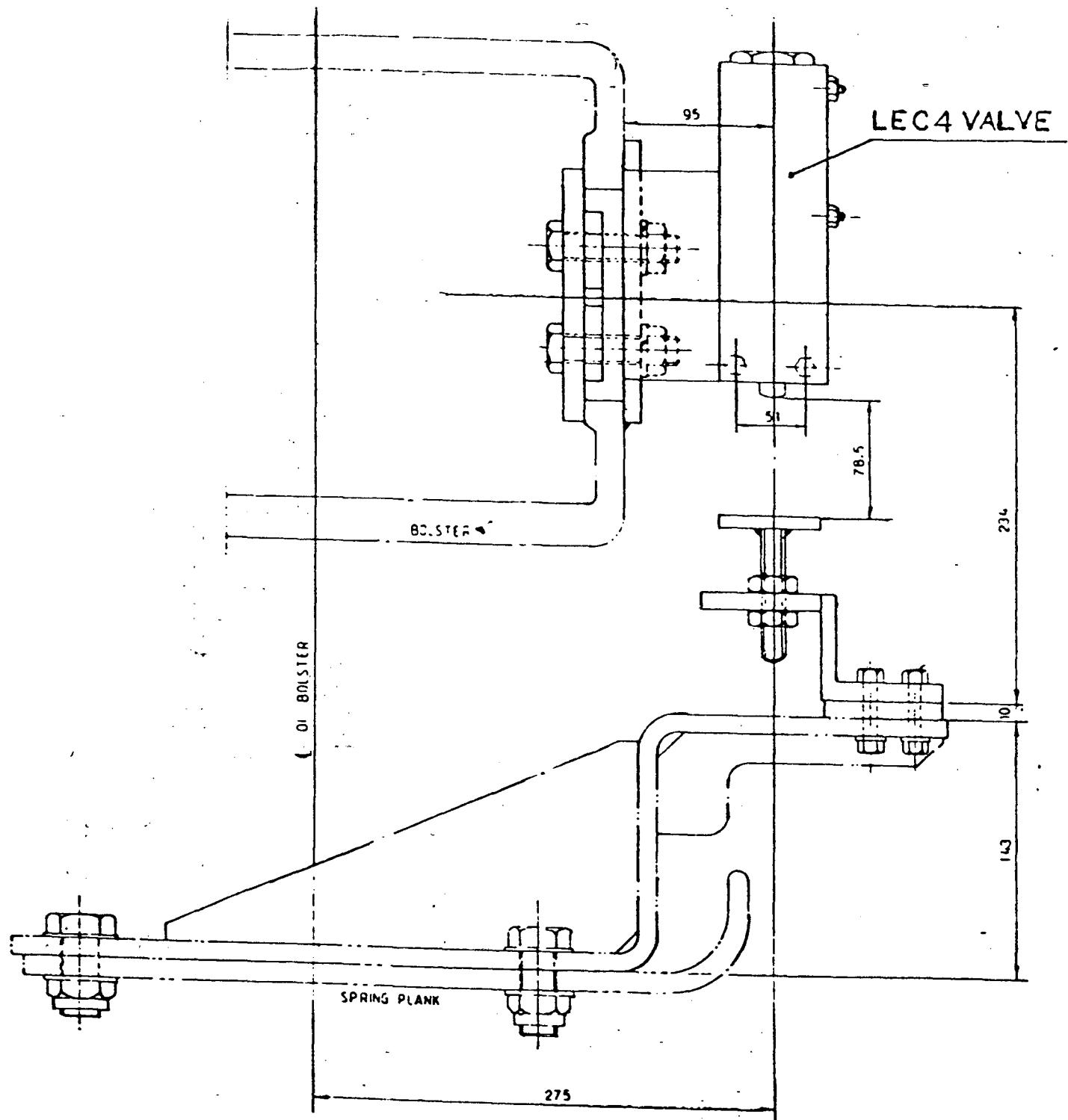


632

FIG. REF. NO.	DESCRIPTION	QTY.
1	DISTRIBUTOR VALVE WITH ADAPTOR AND RELAY VALVE	1
2	PIPE BRACKET WITH CONTROL RESERVOIR	1
3	AUXILIARY RESERVOIR 100 Lt.	1
4	DIRT COLLECTOR	1
5	BRAKE CYLINDER 355 mm	1
6	CUT OFF ANGLE COCK	2
7	AIR BRAKE HOSE COUPLING	2
8	FLEXIBLE HOSE	4
9	OPERATING VALVE OF LSD.	1
10	STOPPER OF LSD.	1

0000000700

FIG.6
SCHEMATIC ARRANGEMENT OF
AIR BRAKE EQUIPMENT ON
BOBR/BOBRN WAGONS FITTED
WITH EST 3F DV.



0000000701

FIG. 7
FITMENT OF GREYSHAM'S
LOAD SENSING DEVICE WITH EST 3F DV.

S.No	Name of supplier	Name of collaborator	Type of DV	When started	Present status
(1)	(2)	(3)	(4)	(5)	(6)
1	M/s Escorts, Faridabad.	M/s Knorr Bremse, Germany	KEO	Started supply in 1972 for BOY wagon with imported valves.	Supplying KEO with valves.
				Supplying since 1982 with indigenous items.	
2	M/s Stone India, Calcutta.	M/s WABCO Westinghouse, France.	C3W	Started supply in 1973 for BOY wagons with imported valves.	Supplying C3W with valves with Cast Iron body.
				Supplying since 1982 with indigenous items except some rubber items of DV.	
3.	M/s Westinghouse, Saxby Farmer, Calcutta.	M/s Westinghouse Brakes and Signal Co UK	P4aG	Started supply in 1973 for BOY wagons with imported valves.	Not supplying.
				Supplied from 1982 to 1987 with imported items.	
4.	M/s Sundaram Clayton, now M/s Railway Products (India) Ltd., Hosur.	M/s WABCO Westinghouse, France.	C3W	Supplying since 1984 with indigenous items.	Supplying C3W with Cast Iron body.
5.	M/s SD Technical Services, New Delhi.	M/s Westinghouse Brakes and Signal Co. U.K.	P4aG	Supplied from 1984 to 1994 with indigenous items except some rubber items.	Not supplying.
					0000000702

(1)	(2)	(3)	(4)	(5)	(6)
6.	M/s Greysham & Co., Delhi.	1. M/s Devis & Metcalfe, U.K. 2. M/s WABCO Westing-house, France.	EST3f C3W	Supplied EST3f DV from 1984 to 1994 with indigenous items except some rubber items. Supplying C3W since 1994 with indigenous items.	Supplying C3W valves with Cast Iron body.
7.	M/s Bharat Brakes & Valves, Calcutta.	M/s Oerlikon Burhle, Switzerland.	EST 302/30 3	Supply started in 1984 with imported items. Indigenous production started in 1989 with imported rubber items and supplied up to 1994.	Not supplying.
8.	M/s Knorr Bremse (India) Ltd., Faridabad.	M/s Knorr Bremse, Germany.	KEO	Started supply since 1994.	Supplying KEO valves.

3.2 Due to proliferation of different designs of air brake equipment it became necessary to standardise the air brake system. This was discussed in the 57th CWSC meeting held in 1991 and Railway Board approved the recommendation of the CWSC. On the basis of the recommendation of the committee constituted to choose the best of the various sub-system of air brake equipment from the existing design in use, RDSO has standardised the following items.

1. Brake cylinder.
2. Cut off angle cock.
3. Dirt collector.
4. Auxiliary reservoir.

These equipments are now being manufactured as per RDSO drawings. The following are list of drawings:-

0000003703

S.No.	Drawing No.	Description
1.	WD-92051-S-06	Brake Cylinder 355 mm.
2.	WD-88123-S-01	Cut Off Angle Cock with vent.
3.	WD-92051-S-03	Dirt Collector Assembly.
4.	WD-92051-S-01	Auxiliary Reservoir (100 Lts.)
5.	WD-92051-S-02	Auxiliary Reservoir (75 Lts.)

3.3 Railway Board vide letter No. 88/M(N)/951/5 dt.4.3.93 standardised KEO & C3W type of distributor valve with cast iron body. The air brake equipment procured since 1993-1994 are with the standardised designs.

3.4 This pamphlet covers procedure of examination, maintenance and testing of all components of air brake system. For the details of items which are proprietary to the air brake manufacturers, maintenance manuals supplied by different manufacturers shall also be followed.

4. FREE SERVICE FROM AIR BRAKE EQUIPMENT MANUFACTURERS

4.1 The manufacturers of air brake equipment are supposed to provide following facilities to Zonal Railways/Workshops as these are covered in RDSO specification for air brake for freight and passenger stock of Indian Railways No. 02-ABR-94 or its all previous versions and all equipments are purchased by Railway Board as per this specification.

4.1.1. Free supply of maintenance manuals.

4.1.2 Free supply of coloured wall charts.

4.1.3 Free supply of cut models of equipment.

4.1.4 Free training to Railway Supervisors and maintenance staff at manufacturer's premises.

4.1.5 A Service Engineer Organisation to help Railways in maintenance of equipments.

Note . Against items at para 4.1.1, 4.1.2 & 4.1.3 Railways may approach Purchaser of equipment i.e. Railway Board for allotment. Railway may directly

approach manufacturers and also take help of manufacturer's service engineering organisation in maintenance of equipment.

5. POH KIT

POH Kit as given in Annexure XIII of this manual covers spares for all type of equipments presently in service i.e. equipment purchased by Railways prior to standardisation and also for standardised equipments.

The spares covered in POH Kit must be replaced during overhauling of equipments in workshops irrespective of condition. Few spares in small quantity may also be required by workshop for replacement on condition basis. These spares may be purchased as and when required. Railways may also stock these spares depending upon the local experience.

6. MAINTENANCE KIT

Maintenance kit as given in Annexure XIV of this manual has been prepared to make store procurement simpler for Railways for maintenance in ROH or in Depot. maintenance. These kits are based on failure pattern of previous year and recommendation of Railways. Railways may purchase and stock maintenance kit and use components as and when required. Few spares not covered in maintenance kit may also be required which can be arranged as non-stock items.

7. RDSO SPECIFICATIONS

RDSO specifications 02 - ABR - 94 and 04-ABR-94 covers technical requirements for complete set of air brake equipments of wagon. However the technical requirement of individual assemblies are given in various Appendices of specifications. Different Appendices alongwith referred drawings covers the total technical requirement of assemblies and drawings alone does not meet all the requirements.

000000705

DESCRIPTION OF EQUIPMENT

1. DISTRIBUTOR VALVE WITH PIPE BRACKET AND CONTROL RESERVOIR:

The distributor valve assembly consists of distributor valve, pipe bracket, adaptor, control reservoir and gasket. All pipe connection to distributor valve are given through the pipe bracket. The distributor valve alongwith the adaptor can be removed from the pipe bracket (fig. 8) without disturbing the pipe connection for maintenance purpose.

The control reservoir of 6 litres volume is directly mounted to the pipe bracket. An isolating cock is provided either on the distributor valve or on the adaptor to isolate the distributor valve when found defective. The handle of the isolating cock will be in vertical position when the distributor valve is in open position and horizontal when the distributor valve in closed position. A manual release handle is provided at the bottom of the distributor valve by which the brake in a particular wagon can be released manually by pulling the handle.

KEO and C3W type distributor valves with cast iron body have been adopted as standard for freight stock of Indian Railways. Operating features of these valves are given below :-

1.1 C3W DISTRIBUTOR VALVE

1.1 .1 OPERATING FEATURES

The brake starts applying within 1 sec. when brake pipe pressure drops by 0.6 kg/cm^2 in 6 sec. The brake does not apply for a slow drop of brake pipe pressure of 0.4 kg/cm^2 in 60 secs. If a facility is provided on the locomotive to quickly overcharge the regime pressure at 5 kg/cm^2 to 6 kg/cm^2 with a view to obtaining a faster brake release a protective feature is incorporated in the Distributor Valve which prevents the overcharging of control reservoir from 5 kg/cm^2 to 6 kg/cm^2 for a period of 50 secs. in freight service.

If the brake pipe regime pressure is set at 5 kg/cm^2 , pressure -limiting device restricts the maximum brake cylinder pressure to 3.8 kg/cm^2 , irrespective of the drop in brake pipe pressure or the auxiliary reservoir pressure (as long as the auxiliary reservoir is at a sufficient higher pressure than 3.8 kg/cm^2 even after repeated brake application, in single pipe system). However, after a brake

application is made, full brake release is not achievable till the brake pipe pressure builds up to 4.83 kg/cm^2 with the BP regime pressure set at 5.0 kg/cm^2 .

Application and release graduations of 0.1 kg/cm^2 are possible. A speed of propagation of around 280m/sec. is achieved due to a built-in Quick Service Valve (optional for use in locomotive service).

Provision is made to "Optimise" the brake release on a vehicle whose full brakes are applied - a feature which comes in handy especially during marshalling operations. In addition, a facility to vent all the brake equipment fully is provided.

It is possible to use the distributor with appropriate attachments with a pneumatic "Empty Load" device, either manually or automatically operated, including an autocontinuous variable load sensing device.

It is also possible to achieve higher braking effort by increasing BP regime pressure. When the BP is set a 6 kg/cm^2 , the corresponding brake cylinder pressure will rise to about 4.7 kg/cm^2 . Such higher brake effort requirements would be applicable to special operating conditions such as descent down a gradient.

See figure 9 for out line and controlling dimensions of C3W Distributor valve.

NOTE:- For other details and operating principles , refer Maintenance manual supplied by the Air Brake Manufacturers.

1.2 C3W2 DISTRIBUTOR VALVE

1.2.1 GENERAL

The C3W2 distributor valve is basically a C3W valve with the 'Empty load' function added to provide two ranges of brake cylinder pressure for a given BP pressure.

C3W2 Distributor valve works in conjunction with an external load sensing device which provide pneumatic signal depending on the 'Loaded' or 'Empty' condition. Based on this signal, C3W2 distributor valve delivers maximum pressure of 3.8 kg/cm^2 ('Loaded' condition) or a lower pressure at 2.2 kg/cm^2 ('Empty' condition). In order to perform this addition function C3W2 distributor valve includes an additional

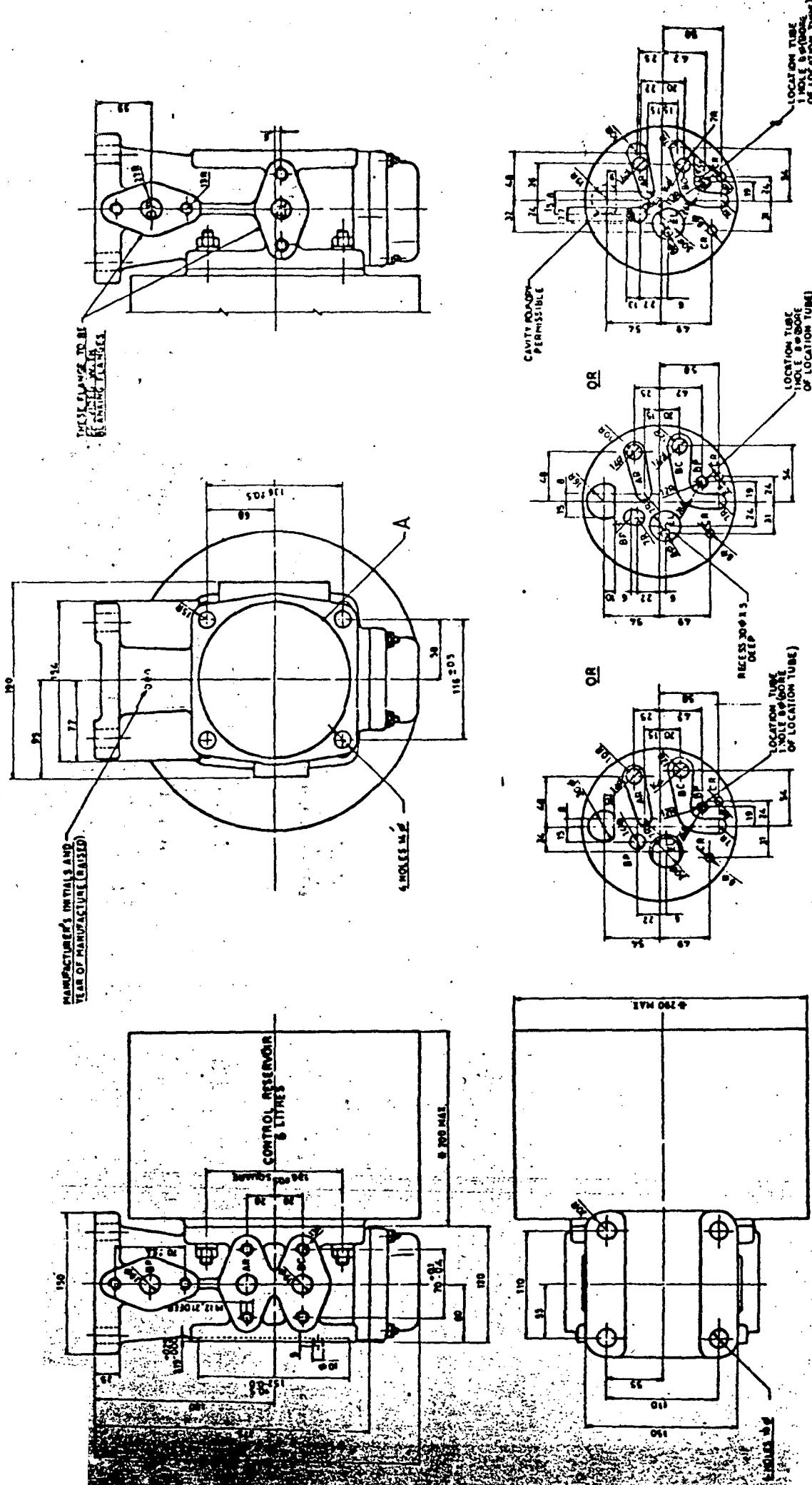


FIG. 8

PIPE BRACKET WITH
CONTROL RESERVOIR

POST CERTIFICATION
AS - AUTHORITY SESSION
BC - BACK CHANNEL
P - PUBLISH
C - CONCLUDING SESSION

NOTE: DIMENSIONS SHOWN ARE OPTIONAL.
2 DIMENSIONS SHOWN IN THIS S AND OTHER IMPORTANT
DIMENSIONS SHALL BE FURNISHED

portion sandwiched between the body and the bottom cover of C3W distributor valve.

1.2.2 OPERATING FEATURES

The brake does not apply with a brake pipe drop of approximately 0.5 kg/cm^2 in one minute.

In 'running' position , with the brake pipe at 5 kg/cm^2 , the distributor valve is insensitive to a release kick of short duration.

When the BP is dropped at the rate of 0.6 kg/cm^2 in 6 seconds ,the brake commence to apply in 0.8 sec.

Maximum brake cylinder pressure will be either 3.8 kg/cm^2 or 2.2 kg/cm^2 as the case may be ,even in emergency condition.

To facilitate faster release of brake , following a full service application , the brake pipe pressure can be increased to 6 kg/cm^2 without any risk of overcharging the control & auxiliary reservoir for a specified period of time.

The brake is released and the distributor valve is re-set when the brake pipe pressure is approximately 4.83 kg/cm^2 .

All other characteristics of C3W distributor valve also remain the same.

See fig. 10 for outline and controlling dimension of C3W2 Distributor valve

NOTE :- For other details and operating principles refer Maintenance Manual supplied by the air brake manufacturer.

1.3 KEO DISTRIBUTOR VALVE

1.3.1 OPERATING FEATURES

Three Pressure Valve

The three pressure valve controls the charging and discharging of the brake cylinder in accordance with the pressure changes in the main brake pipe. It responds to the slightest variations of the control pressures.

U-Controller with U-Chamber

At the start of an application, via U-controller air is tapped off from the brake pipe, thus causing an initial pressure reduction and ensuring simultaneous rapid propagation of the braking impulse throughout the train.

Minimum Pressure Limiter

When application is initiated, the minimum pressure limiter causes rapid charging of the brake cylinder up to a determined pressure to overcome rigging resistance.

Maximum Pressure Limiter

The maximum-pressure limiter works independently of supply air reservoir pressure and time. The air reservoir pressure can exceed the standard operating pressure without causing the brake cylinder pressure to rise above its permissible maximum value. Consequently, there is no change in application and release timing. In addition, the cylinder pressure is independent of the stroke. Leakages in the brake cylinder pipes can be effectively compensated by increasing the air reserve in the auxiliary reservoir.

Choke Cover

The choke cover contains application and release chokes for regulating the application and release times. It is mounted with four screws on the KE valve body.

Quick Release Valve AL V9a

The quick release valve allows the brake of the wagon to be fully released by means of a brief pull of the release handle without any loss of air in the auxiliary reservoir. The brake thus remains ready for reapplication.

The quick release valve is assembled in the bottom cover and bottom cover is mounted on the basic valve body of the distributor valve.

A-Controller

A-controller controls and isolates the control pressure. It also protects the control chamber from over charging.

0000000710

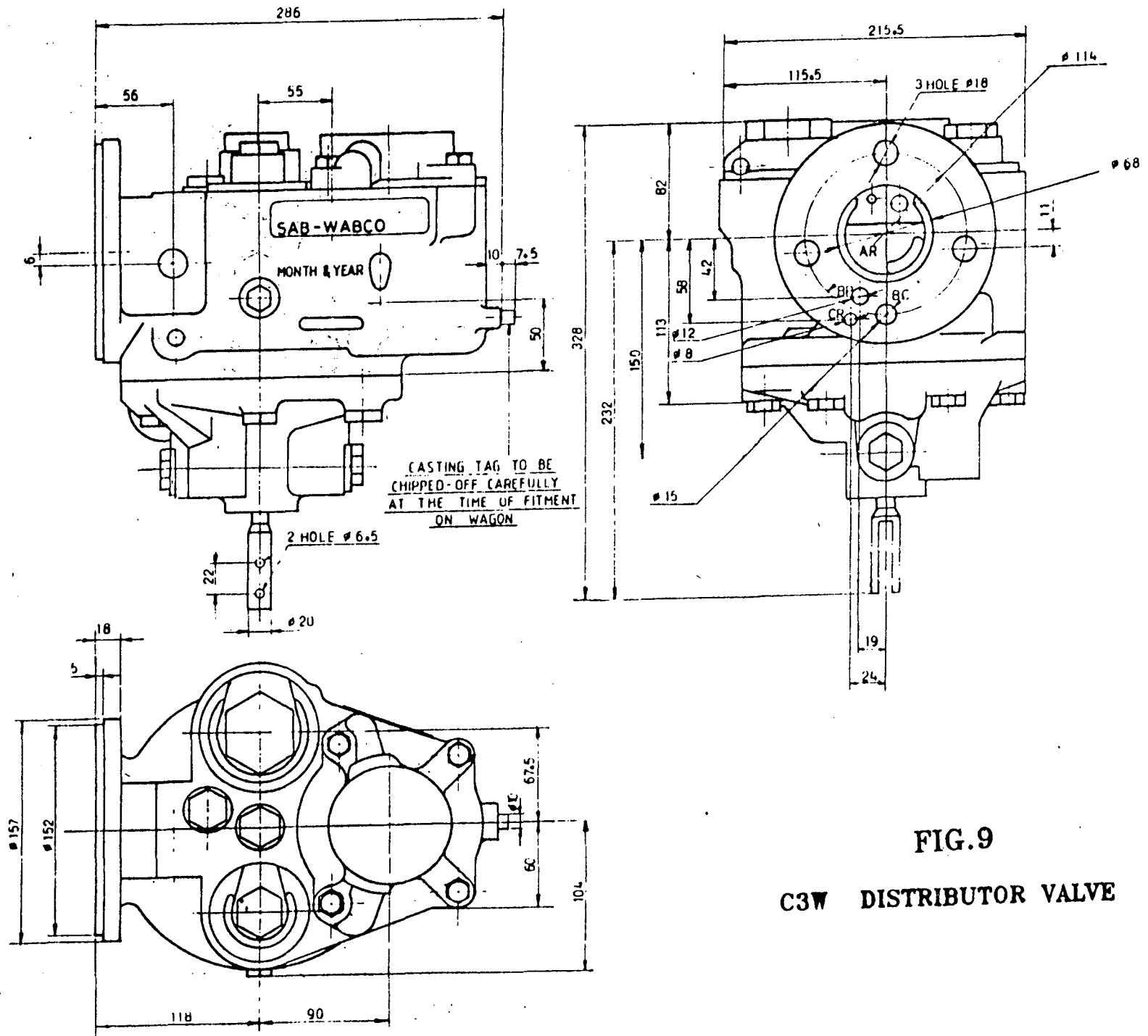


FIG.9
C3W DISTRIBUTOR VALVE

0000000711

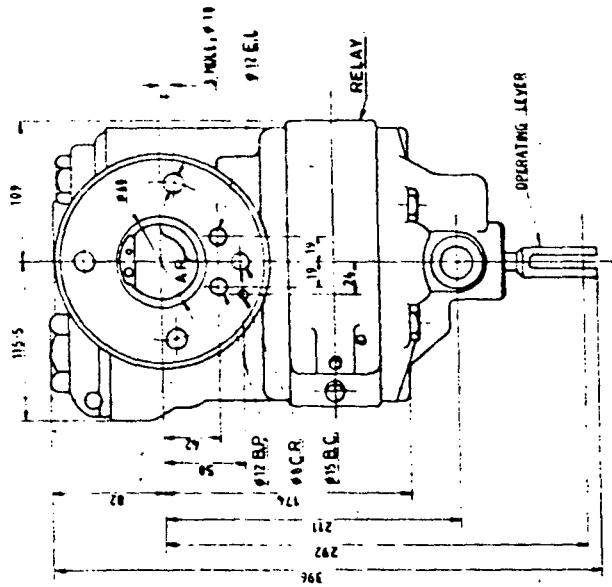
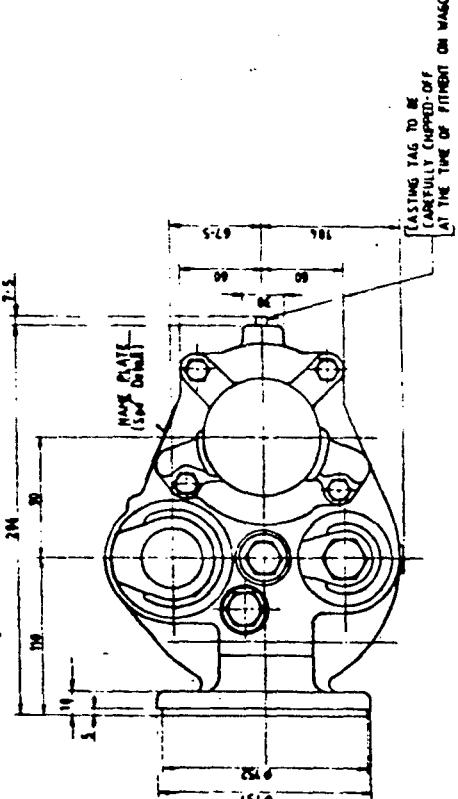
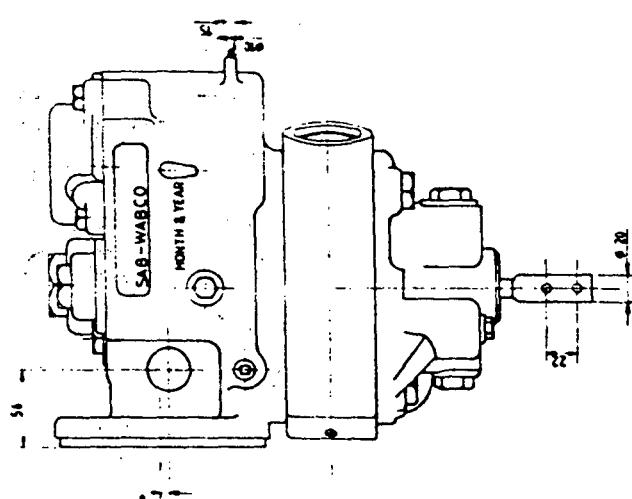


FIG. 10

C3W2 DISTRIBUTOR VALVE



LASTING TAG TO BE
CAREFULLY CHIPPED-OFF
AT THE TIME OF PAYMENT ON MASON



0000000712

37

R-Charger

The supply auxiliary reservoir is filled with air from the brake pipe by the R-charger. The auxiliary reservoir is separated from the brake pipe by a check-valve incorporated in the R-charger.

Isolating Valve

By means of the isolating valve the brake of each wagon can be switched "on" and "Off" and in the latter case it is fully vented.

See fig. 11 for out line & controlling dimension of KEO valve.

NOTE :- For other details and operating principles refer Maintenance Manual supplied by the air brake manufacture.

1.4 PRESSURE TRANSFORMER DU 111 A

1.4.1 GENERAL

This device is attached to the basic KEO distributor valve for application on wagons where automatic two stage load braking is required.

KEO Distributor valve with pressure transformer DU 111 A works in conjunction with an external load sensing device which provides a pneumatic signal depending on the 'loaded' or 'empty' condition. Based on this signal, the distributor valves delivers a maximum pressure of 3.8 kg / cm² ('loaded' condition) or a lower pressure of 2.2 kg / cm² ('empty' condition). In order to perform this addition at function KEO Valve includes an additional portion called pressure transformer is attached on it.

1.4.2 OPERATION (Refer fig. 3)

Compressed air from auxiliary reservoir enters into the operating valve through Tee with choke (item 10) and flexible hose with adapter (14). Another flexible hose with adapter is connected between EL port of distributor valve and operating valve (8). The operating valve (8) remains closed in 'EMPTY' condition . Thus no pneumatic signal is passed on via EL port to the pressure transformer which contains the maximum brake cylinder pressure of 2.2 ± 0.25 kg / cm² . In loaded

0000000713

condition the operating valve lets the compressed air signal to EL port of distributor valve pipe bracket and the transformer gets the pneumatic command the and brake system gets adjusted to a maximum brake cylinder pressure of 3.8 kg / cm².

See fig. 12 for out line & controlling dimension of KEO valve with pressure transformer.

NOTE :- For other details and operating principles refer Maintenance Manuals of air brake manufacturer.

2. BRAKE CYLINDER:

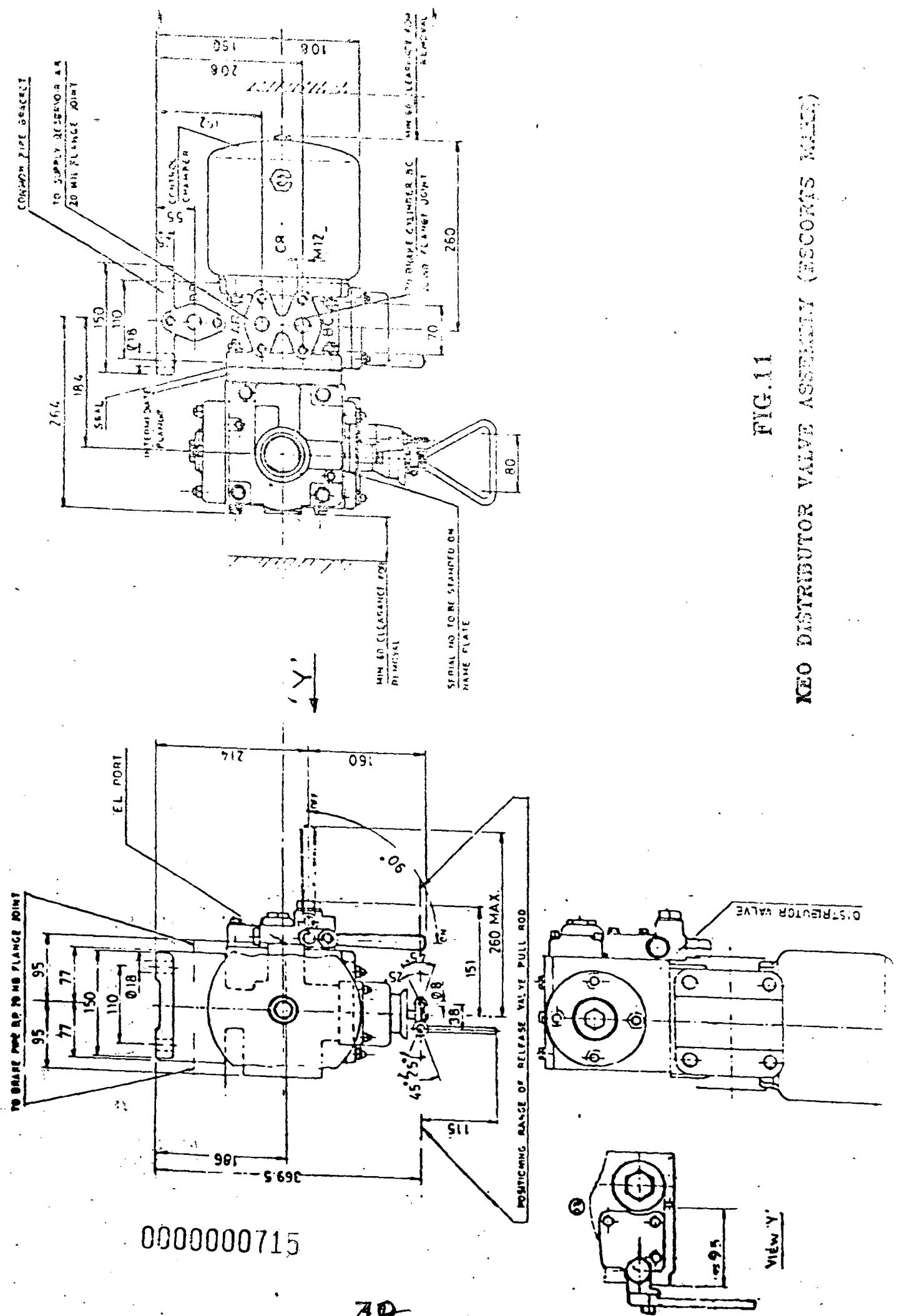
The brake cylinder receives pneumatic pressure from auxiliary reservoir after being regulated by the distributor valve and develops mechanical brake power by outward movement of its piston assembly. The push rod of the piston assembly is connected to the brake shoes through a system of levers to amplify and transmit the brake power. The compression spring provided in the brake cylinder brings back the rigging to its original position when brake is released. General arrangement of brake cylinder is shown in Fig. 13. The cylinder body is made out of sheet metal or cast iron. The cover (9) is bolted to the cylinder body (1) by Tee head bolts and nuts (12 & 14) The piston (3) made out of cast iron has a round groove in which packing (4) is seated. The piston packing is made of oil and abrasion resistance rubber material. The piston (3) also carries a wear ring (5) which prevents the friction between cylinder body (1) and the piston head (3).

The piston rod (7) is connected to the piston (3) by the pin (6) thereby enabling to move freely. The piston trunk (11) is fitted with piston (3) by two CSK Screw (13) to guide the movement of the piston (3) while the brake cylinder pressure is releasing, the spring (10) pushes the piston (3) back to its starting point again.

3. AUXILIARY RESERVOIR

An auxiliary reservoir is provided on each wagon to store compressed air. It is charged to 5 kg/cm² pressure through the distributor valve. General arrangement of auxiliary reservoir is shown in Fig. 14.

The auxiliary reservoir is made out of sheet metal. On both the ends, flanges are provided for pipe connection. One end of the reservoir is kept blanked for



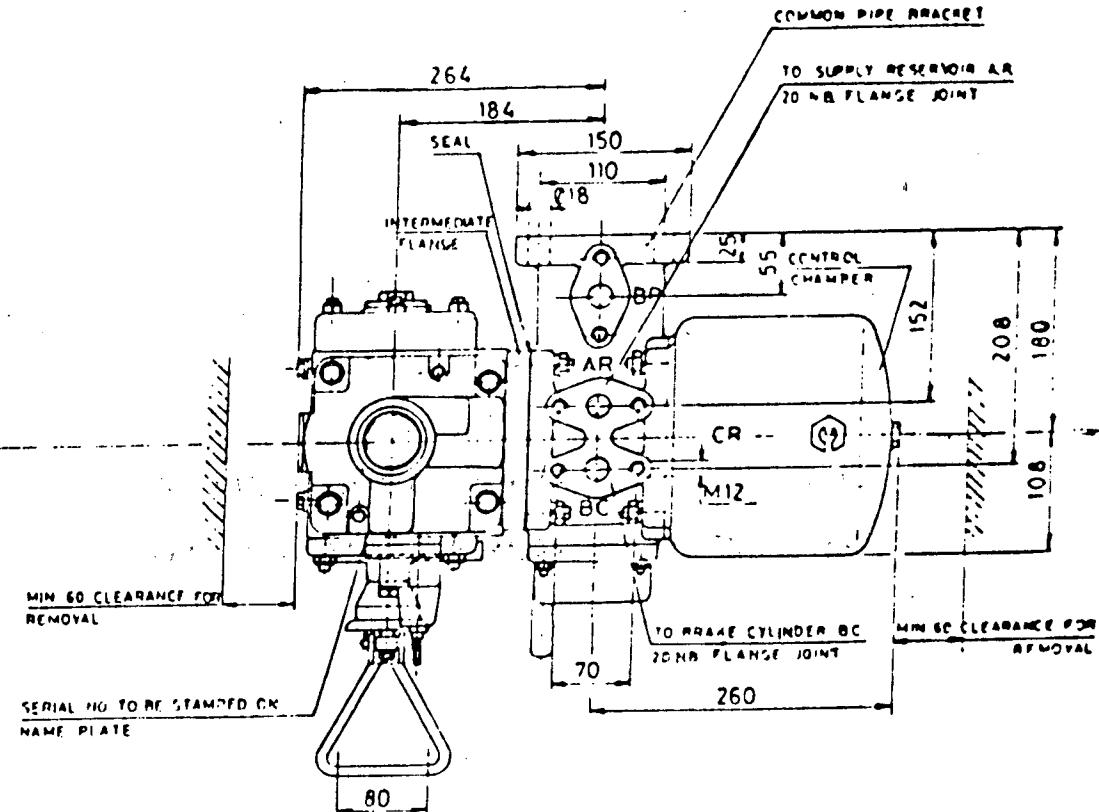
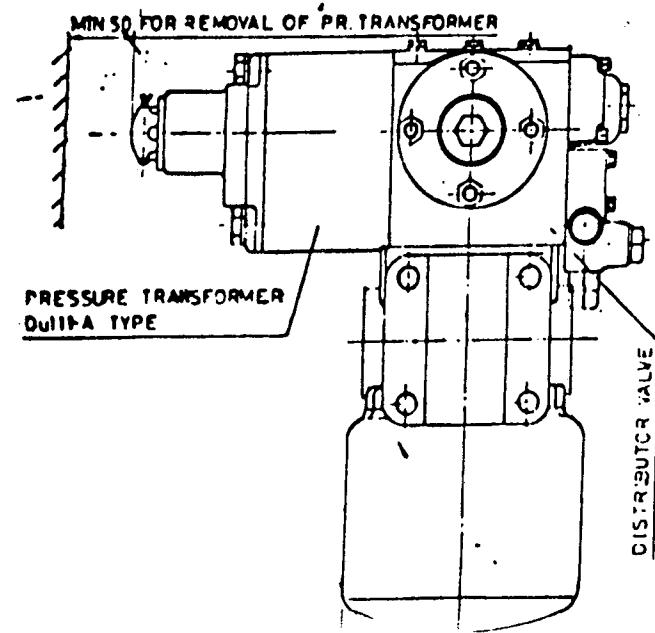
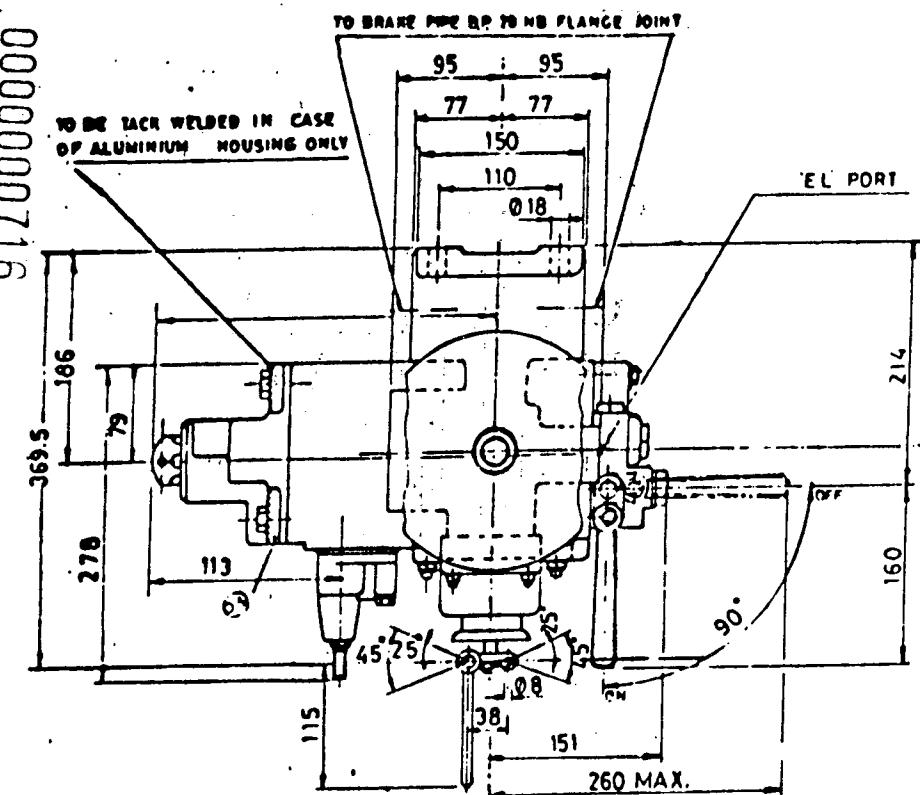


FIG.12

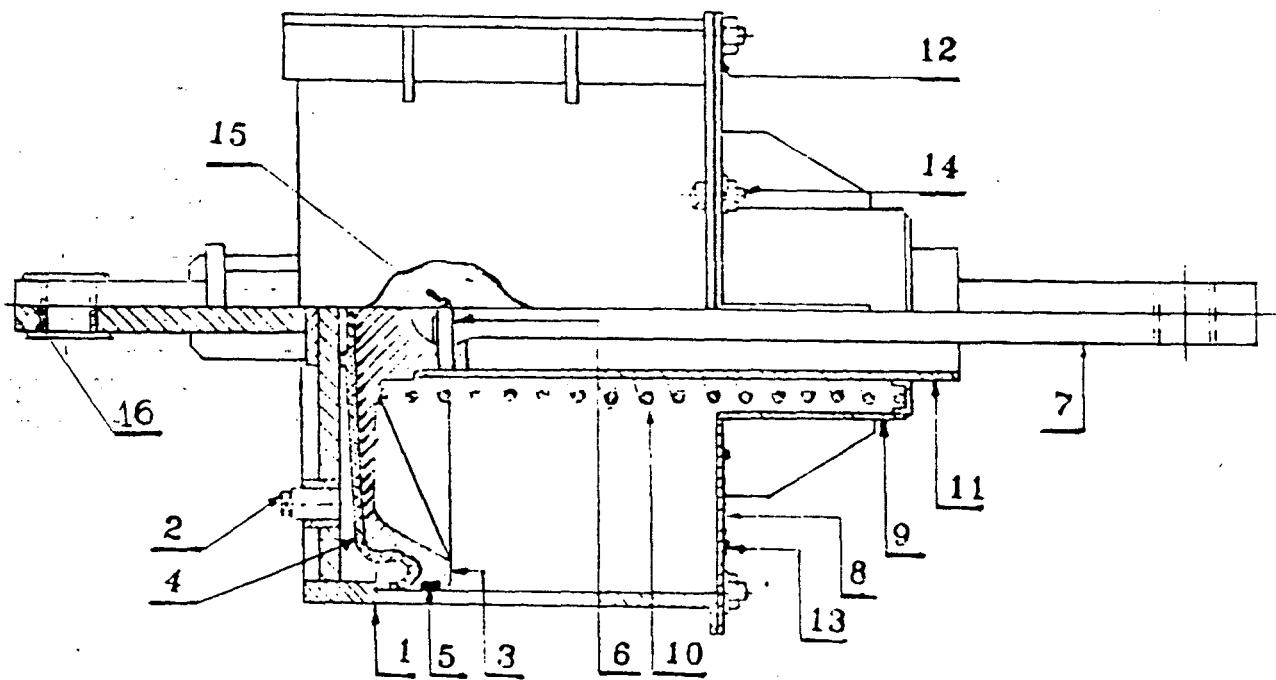


FIG.13

BRAKE CYLINDER

FIG. REF.NO.	DESCRIPTION	QTY.
1	CYLINDER BODY	1
2	SCREWED PLUG P 1/2	1
3	PISTON	1
4	PISTON PACKING	1
5	WEAR RING	1
6	PIN	1
7	PISTON ROD ASSEMBLY	1
8	NAME PLATE	1
9	COVER	1
10	SPRING	1
11	PISTON TRUNK	1
12	HEX NUT & SPRING WASHER M12	8
13	SCREW	2
14	BOLT	6
15	80° CSK. SCREW M8X10	2
16	BUSH	2

0000000717

842

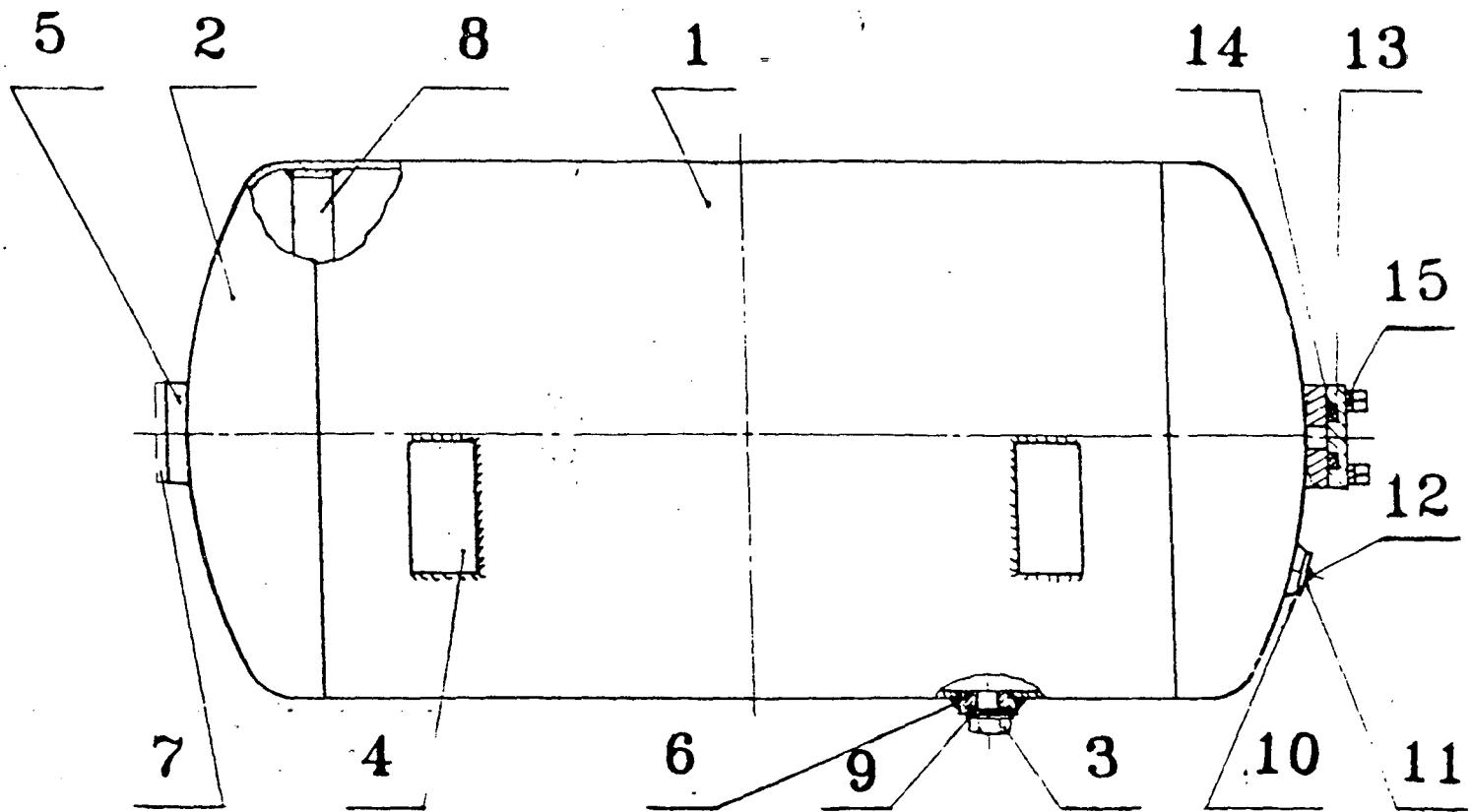


FIG.14

AUXILIARY RESERVOIR 100 Lt. & 75 Lt.

FIG. REF.NO.	DESCRIPTION	QTY.
1	BARREL	1
2	DISHED END	2
3	DRAIN PLUG Bp 1/2	1
4	SUPPORTING LUG 50X6X100	4
5	FLANGE FOR DISHED END	2
6	SOCKET FOR DRAIN PLUG	1
7	PROTECTION COVER	1
8	BACKING STRIP	2
9	LEATHER WASHER	1
10	BRACKET FOR NAME PLATE	1
11	NAME PLATE	1
12	RIVET #2	2
13	BLANKING PIECE	1
14	GASKET	1
15	HEX.HD SCREW M16X30 & SPRING WASHER	2

0000000718

43

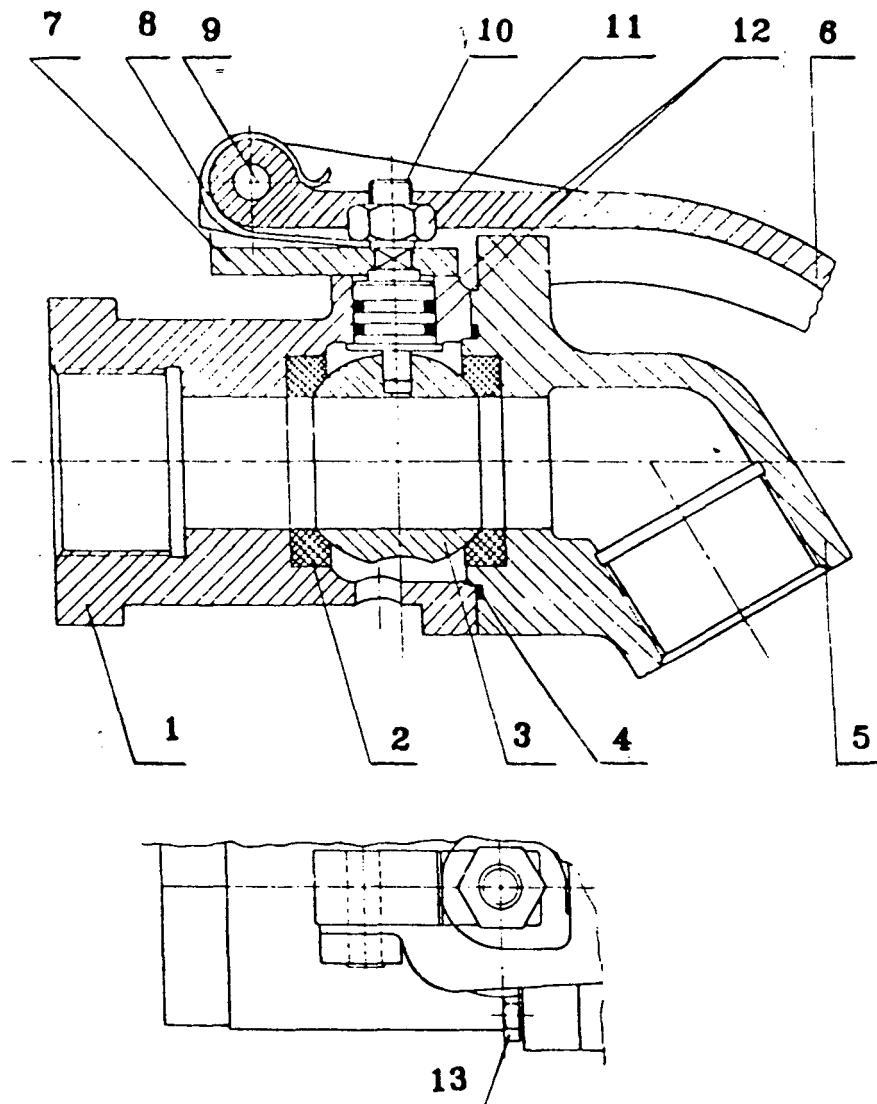


FIG. 15
CUT OFF ANGLE COCK.

FIG. REF.NO.	DESCRIPTION	QTY.
1	BODY	1
2	SEAT	2
3	BALL	1
4	'O' RING	1
5	CAP	1
6	HANDLE	1
7	STOP PLATE	1
8	SPRING	1
9	SNAP HEAD RIVET	1
10	STEM	1
11	LOCK NUT M10	1
12	'O' RING	1
13	HEX. HD. BOLT M8X30 WITH SPRING WASHER	4

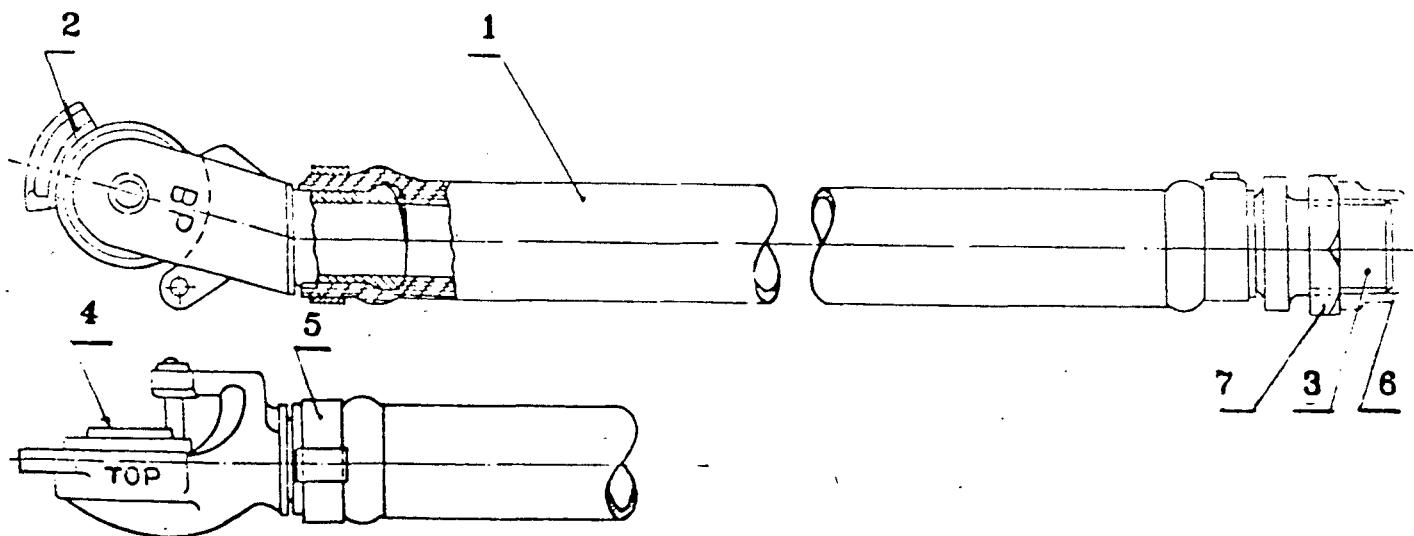


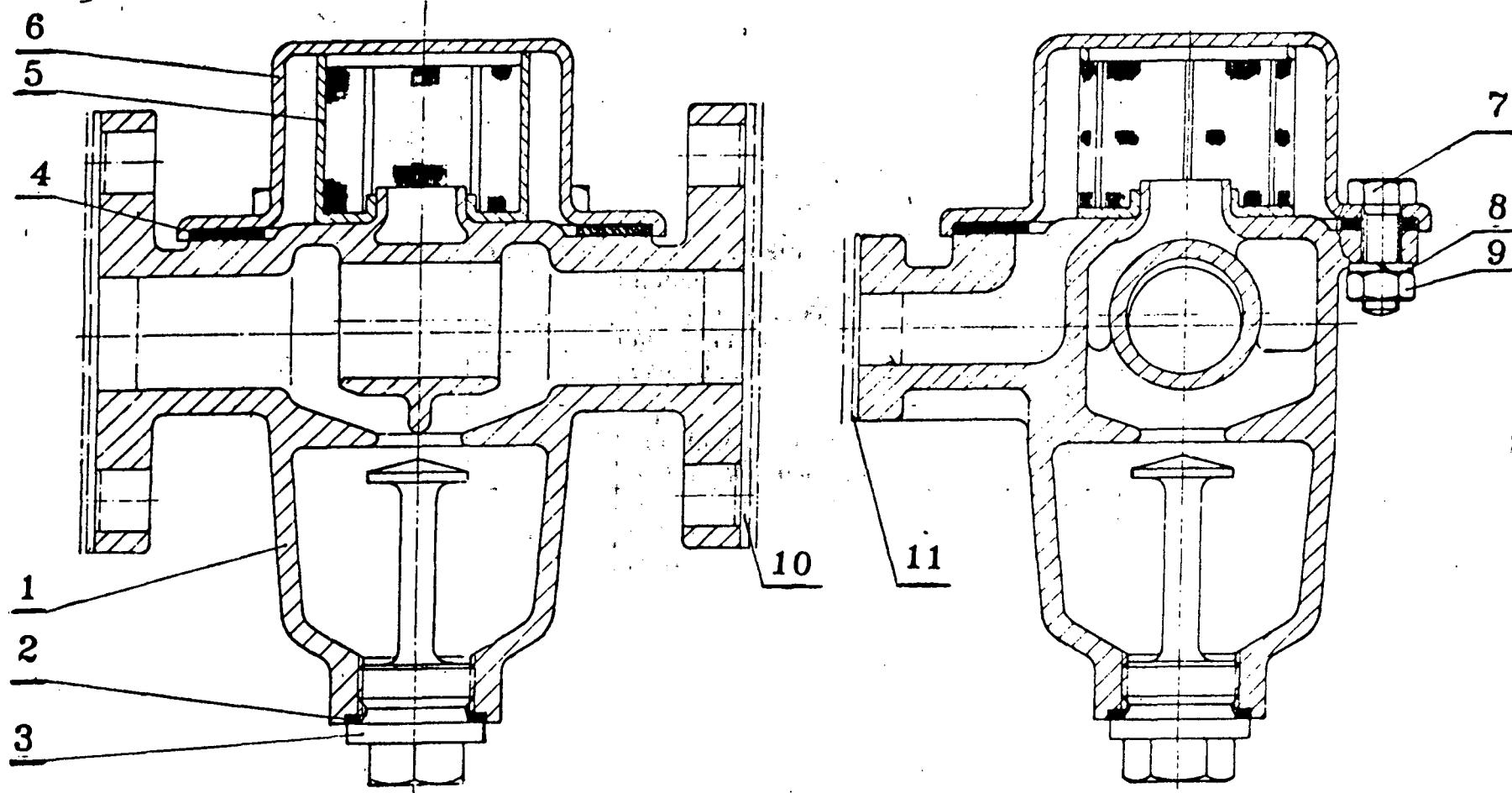
FIG. 16

AIR BRAKE HOSE COUPLING
FOR BRAKE PIPE

FIG. REF. NO.	DESCRIPTION	QTY.
1	HOSE PIPE	1
2	COUPLING HEAD PIN TYPE	1
3	HOSE NIPPLE	1
4	GASKET	1
5	HOSE CLAMP	2
6	THREAD PROTECTION CAP	1
7	HEX PIPE NUT Rp 1 1/4	1

0000000720

45



46
FIG.17
DIRT COLLECTOR

FIG.REF.NO.	DESCRIPTION	QTY.
1	HOUSING	1
2	LEATHER WASHER	1
3	DRAIN PLUG	1
4	GASKET	1
5	FILTER	1
6	COVER	1
7	HEX.HD.BOLT M10X30	4
8	SPRING WASHER M10	4
9	HEX.NUT M10	4
10	PROTECTION CAP	2
11	PROTECTION CAP	1

0000000721

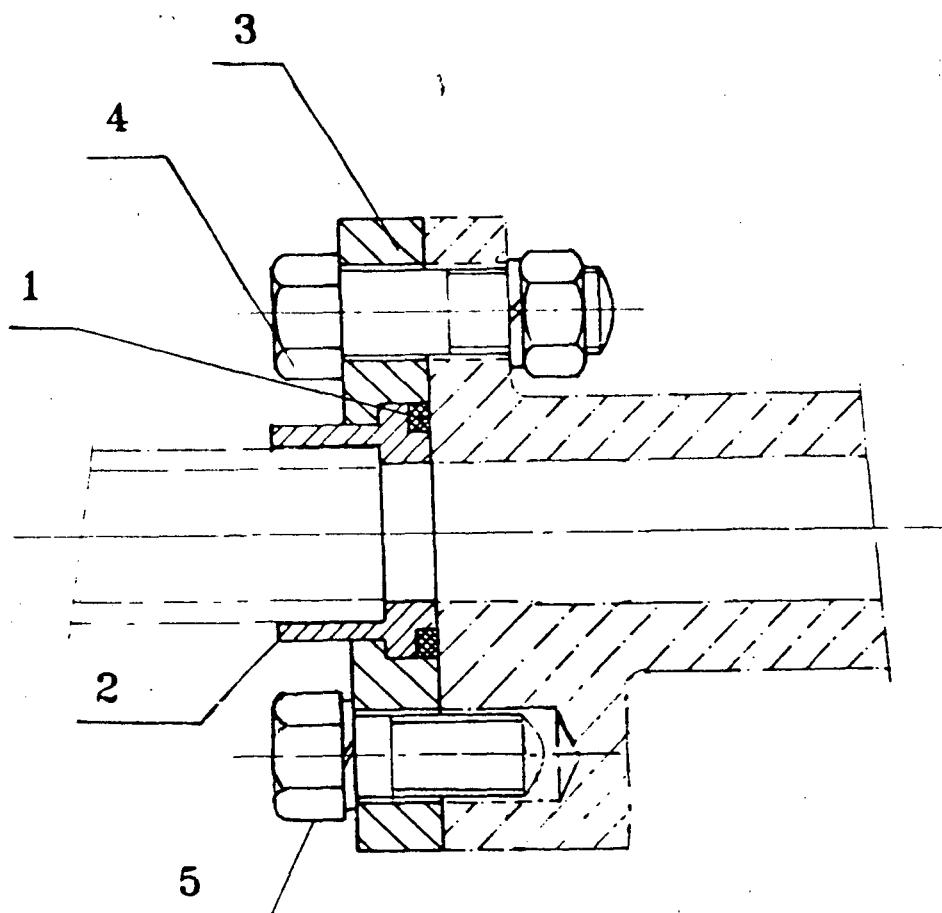


FIG. 18
PIPE TO EQUIPMENT JOINT

FIG. REF. NO.	DESCRIPTION	QTY.
1	GASKET	1
2	SOCKET	1
3	FLANGE	1
4	BOLT, NUT & SPRING WASHER	2
5	BOLT & SPRING WASHER	2

000000722

47

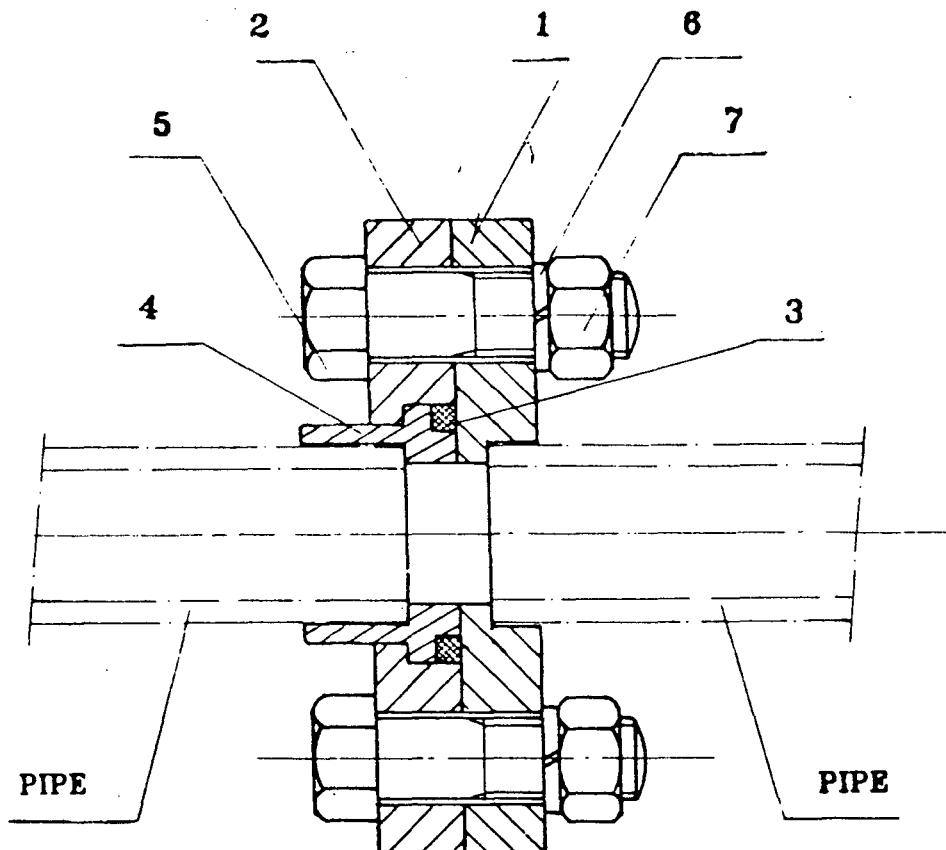
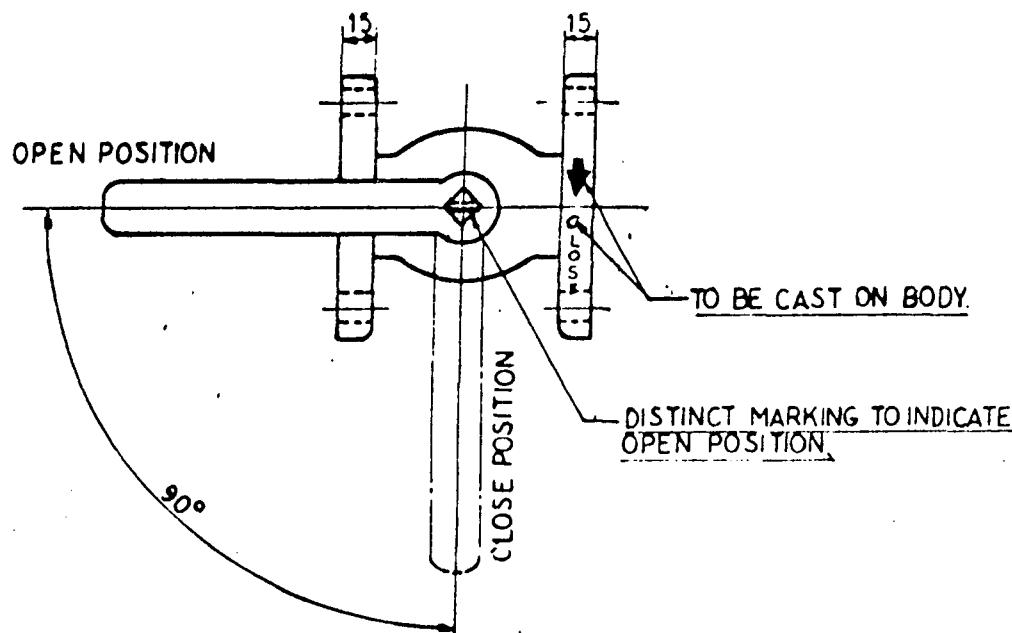
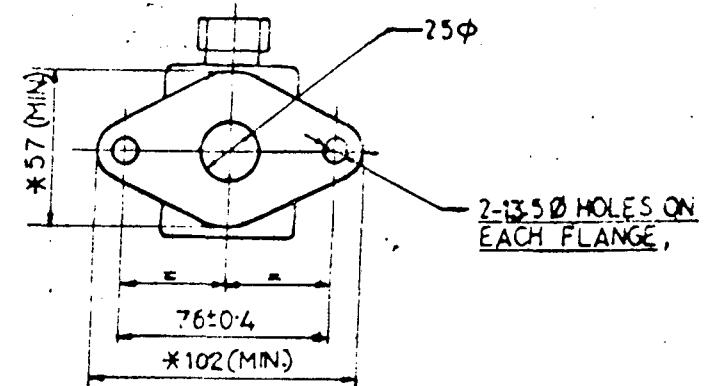
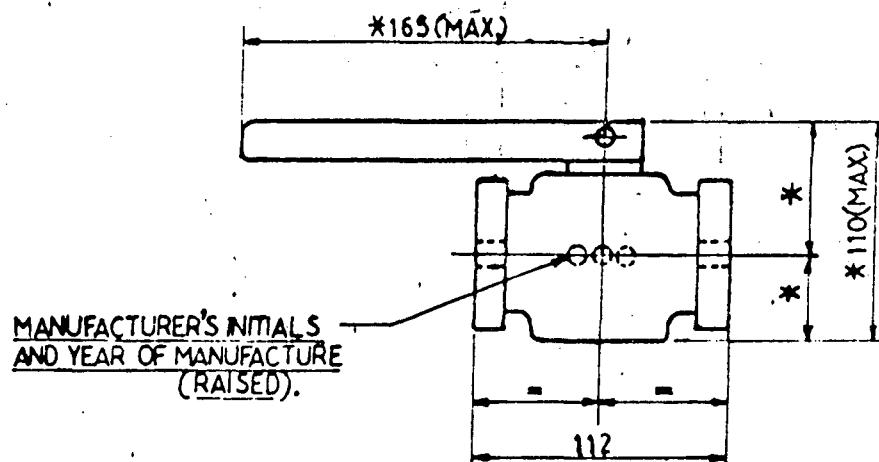


FIG. 19
PIPE TO PIPE JOINT

FIG. REF. NO.	DESCRIPTION	QTY.
1	FIXED FLANGE	1
2	SWIVEL FLANGE	1
3	GASKET	1
4	SOCKET	1
5	HEX.BOLT	2
6	SPRING WASHER	2
7	HEX.NUT	2

48

0300000723



NOTE:-

1. DIMENSIONS SHOWN ARE OBLIGATORY.
2. DIMENSIONS SHOWN THUS * AND OTHER IMPORTANT DIMENSIONS SHALL BE FURNISHED.
3. THE VALVE SHALL BE BALL AND O.L.P. TYPE.
4. THE FLOW AREA OF VALVE SHALL MATCH 25 mm. OPENING.

FIG. 20
GUARD'S EMERGENCY BRAKE VALVE

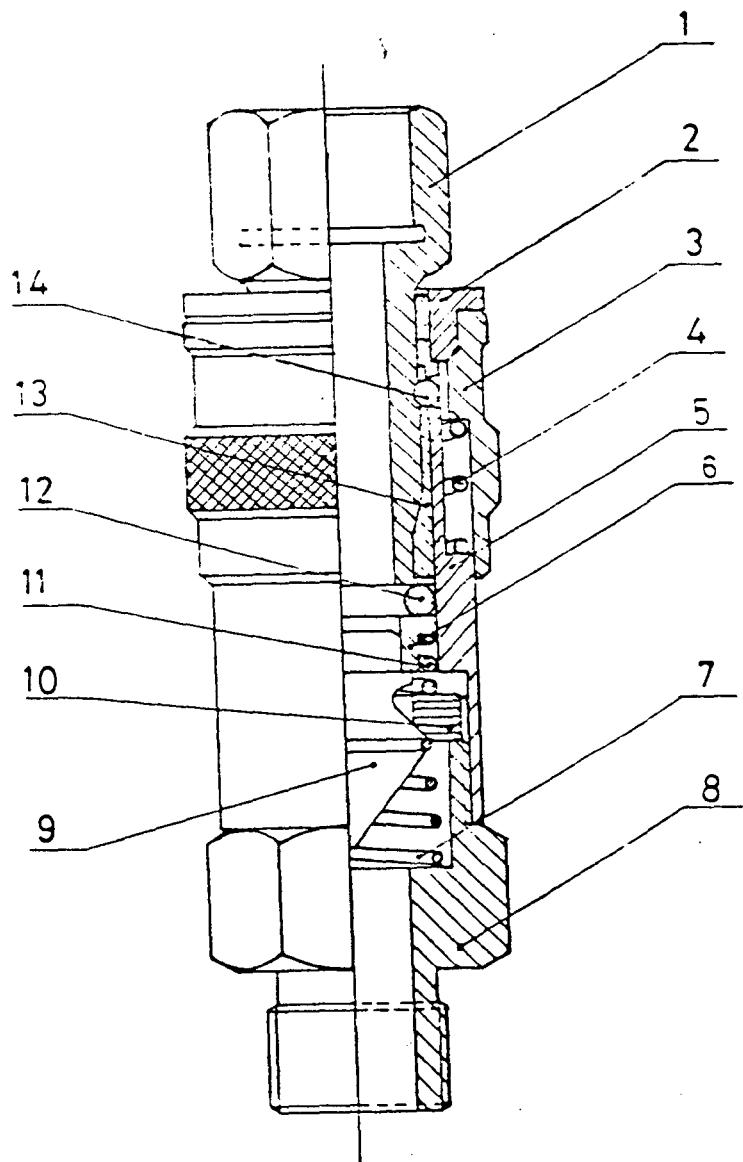


FIG. 21
QUICK COUPLING

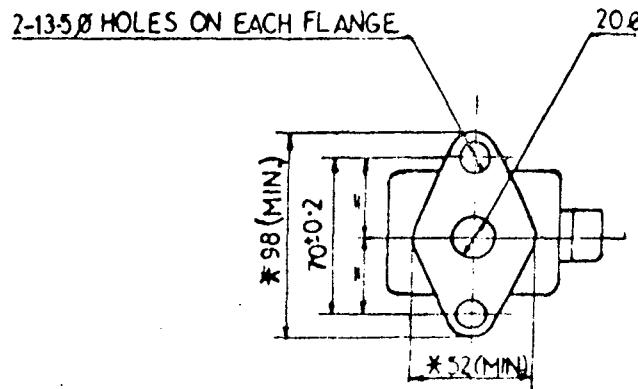
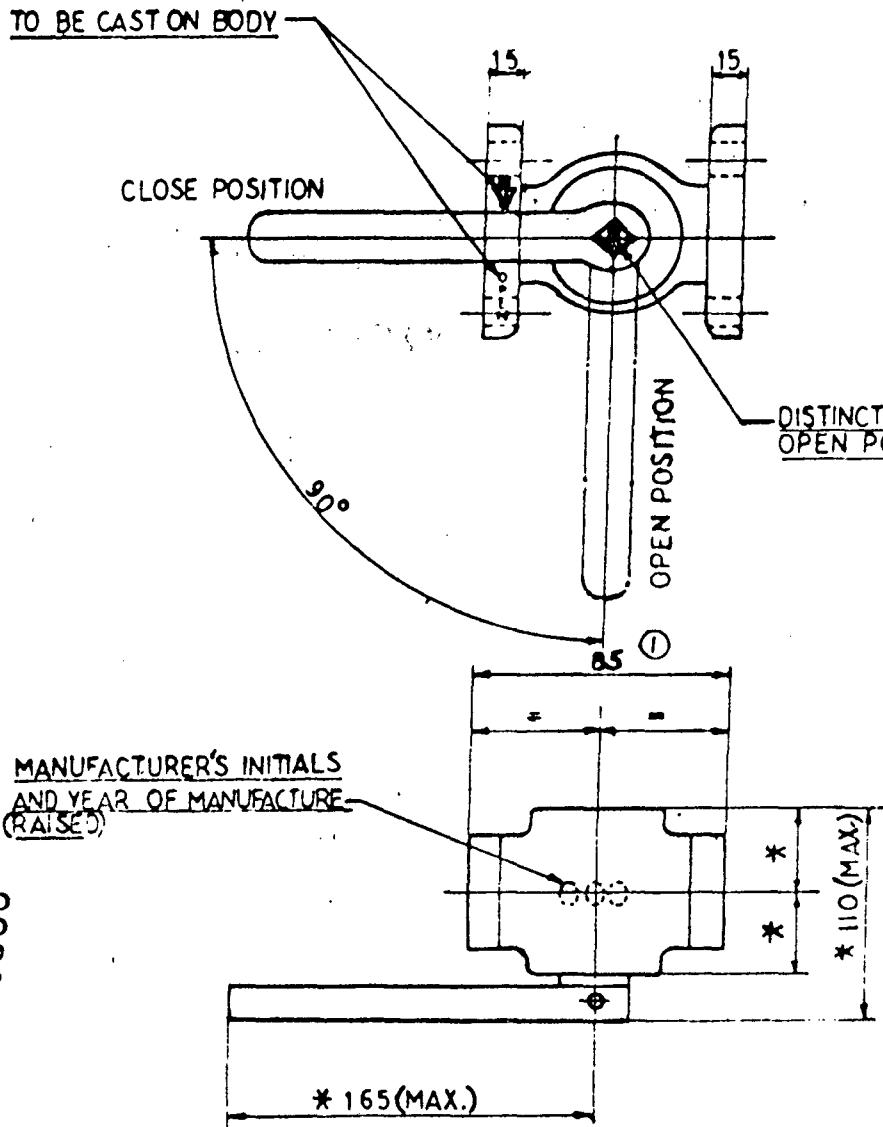
FIG. REF. NO.	DESCRIPTION	QTY.
1	PLUG	1
2	LOCKING NUT	1
3	LOCKING RING	1
4	SPRING	1
5	BODY UPPER	1
6	VALVE	1
7	SPRING	1
8	LOWER BODY	1
9	VALVE	1
10	VALVE SEAT	1
11	SPRING	1
12	SEAL	1
13	LOCKING BUSH	1
14	BALL 3.5	6

0000000725

50

51
48

00000000726



NOTE :-

1. DIMENSIONS SHOWN ARE OBLIGATORY.
2. DIMENSIONS SHOWN THUS * AND OTHER IMPORTANT DIMENSIONS SHALL BE FURNISHED.
3. THE ISOLATING COCK SHALL BE BALL VALVE C.L.P. TYPE.
4. THE FLOW AREA OF ISOLATING COCK SHALL MATCH 20 mm. OPENING.

FIG. 22
ISOLATING COCK

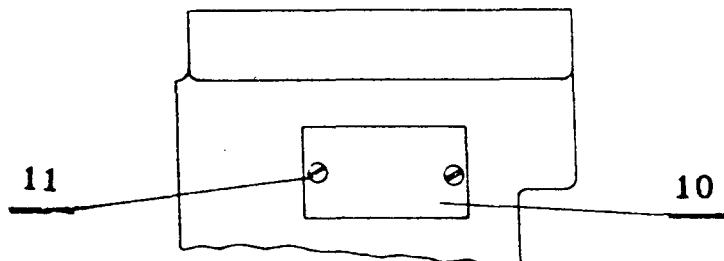
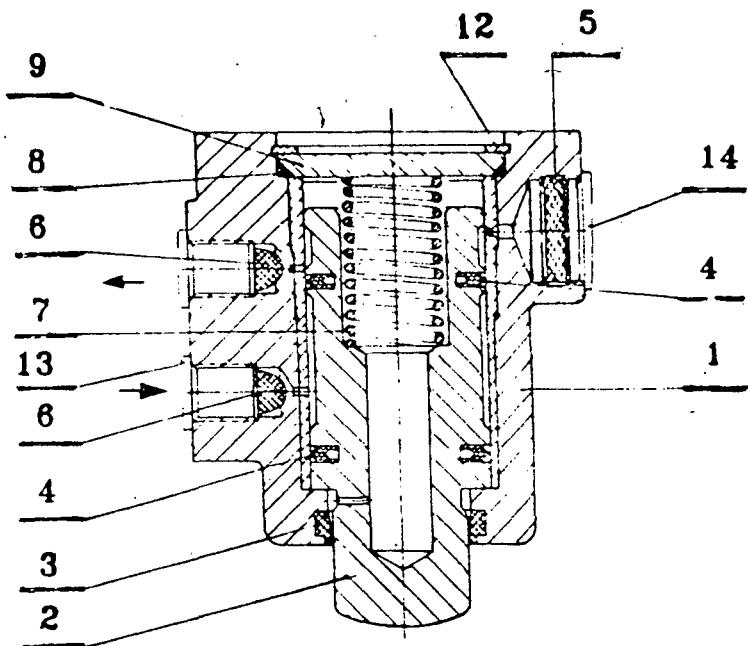


FIG.23
OPERATING VALVE

FIG. REF.NO.	DESCRIPTION	QTY.
1	HOUSING ASSY.	1
2	PISTON	1
3	SEALING RING	1
4	EXTERNAL K-RING	2
5	FILTER	1
6	FILTER	2
7	COMP. SPRING	1
8	O-RING	1
9	WASHER	1
10	NAME PLATE	1
11	COUNTER SUNK SCREW M3X6	2
12	INTERNAL CIRCLIP 50X2N	1
13	THREAD PROTECTION CAP	2
14	THREAD PROTECTION CAP	1

0000000727

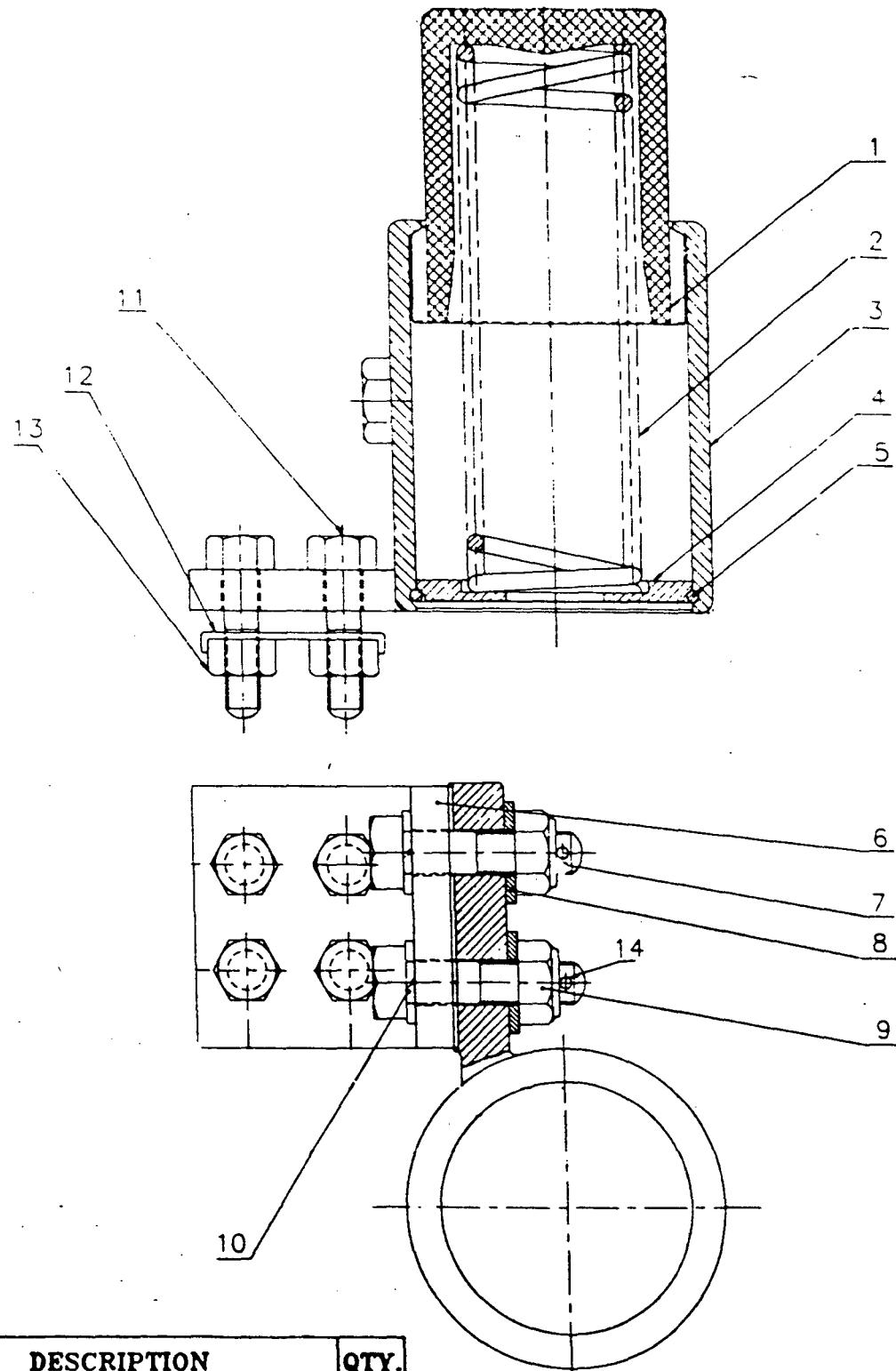


FIG. REF.NO.	DESCRIPTION	QTY.
1	COVER	1
2	COMPRESSION SPRING	1
3	HOUSING	1
4	RING	1
5	SNAP RING	1
6	TOOTH PLATE S.A.	1
7	HEX.BOLT M12X50 LONG	2
8	LEAF SPRING	2
9	NYLOCK NUT M12	2
10	SPRING WASHER	2
11	HEX.BOLT M10X50 LONG	4
12	LOCK PLATE	2
13	HEX.NUT M10	4
14	SPLIT PIN 6.2 mm	2

FIG. 24
SPRING BUFFER

0000000728

operation with single pipe system. A drain plug is provided at the bottom for draining the condensate.

4. CUT- OFF ANGLE COCK:

Cut off angle cocks are provided at the end of brake pipe on each wagon. These cocks are closed at the time of uncoupling of wagons. The vent provided in the cock facilitates easy uncoupling of hose coupling by venting the air trapped in the hose coupling when the cock is closed. The handle of angle cock is of self locking type to avoid any inadvertent movement from open to close position or vice versa. When the handle is parallel to the pipe the cock is in open position and when at right angles to the pipe it is in closed position. General arrangement of angle cock is shown in Fig. 15.

The angle cock body consists of two parts i.e. the cap (5) and the body (1) which are held together by bolts (13). The ball (3) has special profile with provision of groove at the bottom portion for venting the air to atmosphere when in closed position. The handle (6) is spring loaded (8) and has to be lifted to operate. On either sides of ball have rubber seats (2) to prevent leakage. Similarly stem (10) has been provided with ' O ' ring (4) to prevent leakage.

5. HOSE COUPLING FOR BRAKE PIPE:

The hose couplings are provided to connect brake pipe line throughout the train. General arrangement of hose coupling is shown in Fig.16.

The rubber hose (1) is connected to the coupling head (2) and hose nipple (3) by "Band it" type clamps (5). Rubber gasket (4) is used in the coupling head to make the joint leakproof after coupling.

6. DIRT COLLECTOR

Dirt Collector is provided at the junction of the main brake pipe and branch pipe. This is meant for removing dust from the air prior to entering the distributor valve. This is achieved by centrifugal action. General arrangement of dirt collector is shown in Fig. 17. The dirt collector has provided with an additional filter element (5) at the out let on the branch pipe side to provide dust proof air to distributor valve/auxiliary reservoir after arresting fine dust particles. The dust particles accumulated in the dirt chamber are removed by opening the Drain plug (3). Rubber gasket (4) has been provided between cover (6) and housing (1) to prevent leakages. Similarly leather washer (2) has been provided between housing (1) and drain plug (3) to prevent leakages.

7. PIPES

Black heavy duty pipes are used for the piping of air brake system. No special treatment is provided except descaling and cleaning with compressed air and painting out side. Pipes of 32, 25, 20 & 15 mm nominal bores are generally employed. The pipes are cold bend with the help of bending equipment, but without use of sand or similar material. The radius of bends are kept to the maximum possible so as to reduce restriction of air flow.

8. PIPE FITTINGS

Welded and Swivel flange fittings are used for pipe joints. Welded flanges are rigidly welded to pipes, whereas Swivel flanges are provided at location where mis-alignment between pipes to the joints can occur. Rubber gaskets are used to seal the joints. General arrangement of pipe fittings is shown in Fig. 18 & 19.

9. GUARD'S EMERGENCY BRAKE VALVE.

This valve is provided in the brake van for use by the guard for application of brake during emergency. Out line and controlling dimensions of guard's emergency brake valve is shown in Fig. 20.

10. QUICK COUPLING

Quick coupling is provided in the brake van for attaching detachable pressure gauge to the brake van. General arrangement is shown in fig. 21. Once the gauge is removed the quick coupling automatically closes the outlet passage.

The Quick coupling consists of a plug (1) and Socket consisting of items 2 to 14 of fig. 21 . The plug (1) shall be a part of pressure gauge and will be kept as Gaurd's property. It works on single push & pull principle . The plug when pushed into socket is securely held by the self locking arrangement resulting in a positive and leak proof connection . This connection simultaneously opens the valve and air flow starts. To disconnect, pull back the locking ring (3) of the socket, the plug eject out and valve shuts off automatically.

11. ISOLATING COCK

Isolating cock is provided in pipe line leading to Quick Coupling of brake van. This is provided to facilitate closing of brake pipe in case the Quick Coupling is

found defective. Out line and controlling dimensions of Isolating cock is given in fig. 22.

12. LOAD SENSING DEVICE (LSD)

Load sensing device is interposed between bogie bolster and spring plank of casnub bogie of wagons fitted with automatic two stage empty load device. This equipment consist of an operating valve (fig 23) fitted on bogie bolster and a spring buffer (fig 24) fitted on the spring plank. This mechanism gets actuated at a predetermined change over weight and the Distributor valve which has the additional feature will control the brake cylinder pressure.

The operating valve (fig.23) consists of a housing (1) and piston (2). The inlet and outlet on the housing is separated by an external 'K' ring (4). The piston is working against a compressing spring (7). When the piston is pressed the inlet and outlet on the housing gets connected.

The spring buffer (fig.24) consists of a housing (3) compression spring (2) and cover (1). The housing is attached to the tooth plate Sub-assembly (6) by means of two bolts (7). The assembly is fitted on the spring plank by means of four bolts (11). Lock plate.(12) has been provided to prevent the nut from falling down.

000000731

EXAMINATION OF AIR BRAKE SYSTEM OF COMPLETE TRAIN

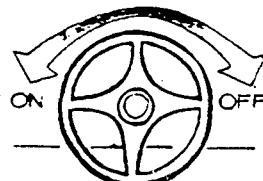
The complete train examination is done at different maintenance depot as nominated by Railways in Joint Procedure issued by GM(M) & GM (Optg.) of the Railways. Two types of train examination i.e. Intensive examination and examination at terminating stations are generally done to ensure proper working of system.

1. INTENSIVE EXAMINATION.

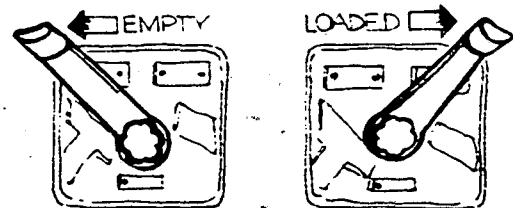
Following examination/test must be carried out during intensive examinations.

1.1 During examination at originating station ensure that:

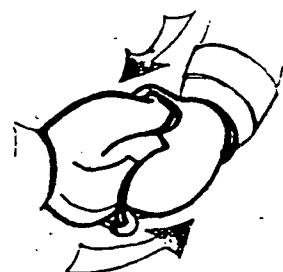
(a) Hand Brakes of all wagons are fully released.



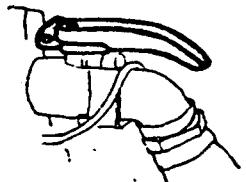
(b) Operating handle of empty load box is in correct position i.e. 'Empty' position when wagon is empty or lightly loaded and in 'Loaded' position when wagon is loaded beyond the specified value.



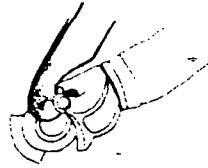
(c) Hose couplings of brake pipe on consequent wagons are coupled to one another to form a continuous air passage from the locomotive to the rear end of train.



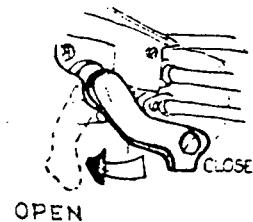
(d) All the angle cocks except those at the rear end of the train are kept OPEN



- (e) Hose coupling at the rear end of the train is placed on hose coupling support.



- (f) Isolating cock of Distributor Valve on all wagons are in OPEN position.



1.2 Carry out following check after charging / brake application/release by rake test rig or by Engine (Refer Para 4 for details of Rake test rig).

- (a) After full charging of the system, Brake pipe pressure should be as below:

No.of wagons	Engine	Brake Vans
Upto 56 wagons	5.0 kg/cm ²	4.8 kg/cm ²
More than 56 wagons	5.0 kg/cm ²	4.7 kg/cm ²

- b) The leakage in the train shall be less than 0.25 kg/cm² per minute.
- c) Piston stroke in empty end loaded condition are within the specified limit after service brake application (See Annexure XII for piston strokes for different types of wagons).
- d) Brake blocks on wagons are mating the wheels after brake application.
- e) After the release of brake, the piston of brake cylinder is fully inside and brake blocks are away from the wheels.
- f) Minimum percentage of operating cylinders are within the limit specified and wagons with brake cylinders found inoperative are marked sick and detached. (Refer Annexure XI)
- g) The brake pipe connection is continuous from engine to the rear end of train and brake continuity test has been conducted.

000000733

1.3 Additional items for BOBR/BOBRN wagons:-

The following additional items shall be ensured for train of BOBR/BOBRN wagons.

a) Load sensing device (LSD) fitted on the bogie is working properly and the clearance between operating valve and spring buffer is within the specified limits of 8 +2 mm.

-0

b) Bolts and nuts of load sensing device have been tack welded.

c) Piston stroke in empty and loaded condition are within the specified limit (See Annexure XII for piston stroke).

1.4 Additional items for BVZC Brake Vans.

The following additional items shall be ensured for BVZC Brake Vans.

a) Proper working of guard's emergency brake valve.

b) Proper working of quick coupling.

1.5 Additional items other than pneumatic system.

The following items shall also be ensured.

a) Correct working of slack adjuster and dimension 'A' is proper.

b) Empty tie rod adjustment is correct.

c) Worn and damaged brake block are replaced.

d) Brake rigging, pins & safety brackets are in proper working condition.

Note: For details of checks on items other than pneumatic system see Annexure- XV & XVI .

2. TERMINAL EXAMINATION

During examination at terminating station ensure that:

- a) Wagons with inoperative cylinders are marked sick and percentage of operative cylinders are noted.
- b) The leakage rate is within the prescribed limit and if found excessive the source shall be found out and remedial action taken.
- c) The air brake equipments are free from visual damages and sick mark the wagon if found necessary.
- d) Piston stroke in empty end loaded condition are within the specified limit
- e) The brake pipe connection is continuous from engine to the rear end of train and brake continuity test has been conducted.
- f) Handle of empty load box is in correct position.
- g) Brake blocks are in good condition.

2.1 Additional items for BOBR/BOBRN wagons:-

During examination at terminating station ensure the following additional items for BOBR/BOBRN wagons.

- a) Load sensing device (LSD) fitted on the Bogie are in good working condition.
- b) The clearance between the spring buffer and operating valve of LSD is as specified.

2.2 Additional items for BVZC Brake Vans.

During examination at terminating stations ensure the following additional items for BVZC Brake Vans.

- a) Guard's emergency brake valve is in good working condition.
- b) Quick coupling is in good working condition.

000000735

3. ATTACHMENT OF ENGINE ON TRAIN:

3.1 Following works/check should be done after attachment of engine on train after intensive examination.

- a) Connect the hose coupling of engine with the train.
- b) Open the angle cock of engine & the leading end of wagon towards engine and close the same at the other end.
- c) Conduct brake continuity test.
- d) Conduct leakage test (if not done with rake test rig).
- e) Charge the brake system and see that the brake pipe pressure in engine & brake vans are within the specified limit.

3.2 Following work/checks should be done after attachment of engine on train at terminating station:-

- a) Connect the hose coupling of engine with the train.
- b) Open the angle cock of engine & the leading end of wagon towards engine and close the same at the other end.
- c) Conduct brake continuity test.
- d) Conduct leakage test (if not done with rake test rig).
- e) Charge the brake system and see that the brake pipe pressure in engine & brake vans are within the specified limit.

3.3 Check to be carried out by Driver & Guard on attachment of engine at road side.

- a) Connect the hose coupling of engine with the train.
- b) Open the angle cock of engine & the leading end of wagon towards engine and close the same at the other end.

000000736

- c) Conduct brake continuity test.
- d) Charge the brake system and see that the brake pipe pressure in engine & brake vans are within the specified limit.

0000000737

4.0 RAKE TEST RIG

4.1 A schematic layout of rake test rig (RTR) is shown in fig. 25. A rake consisting of 56 wagons can be tested with this rig. This rig may be used for testing the train in yard before attaching the engine.

4.2 Description:

4.2.1 The rake test rig has air supply and mobile test rig. The mobile test rig is having a cubical structure and is mounted on wheels. It can be taken to the yards and sick lines.

4.2.1.1 Air Supply System:

1 This consists of a compressor (1), after cooler (2), check valve (3) main reservoir (4), safety valve (5) and filter (6). All these items are to be installed in a room in a yard.

2 The compressor generates pneumatic pressure of 10 kg./cm^2 and compressed air is stored in main air reservoir MR (4). The safety valve (5) opens out if the pressure exceeds 10 kg./cm^2 . The oil and dirt will be separated out in the filter (6). The check valve (3) prevents back flow of air while compressor is off.

3 The compressed air line is connected to the pipe line in the sickline/yard. Angle cock and hose couplings (BP) are provided at various points depending upon the train formation and check points in sickline.

4.2.1.2 Mobile Test Rig.

1 The rig consists of brake hose coupling BP (8) and isolating cock (12) at the inlet of the mobile test rig. The air connection can be tapped from one of the points of sickline. The mobile test rig is provided with driver's brake valve (10).

2 Brake pipe in the rake is charged while driver's brake valve (10) is kept in released and running position. The driver's brake valve inlet is connected to MR. It regulates the pressure to 5 kg./cm^2 through the relay valve (11).

Isolating cock (12d) is provided to isolate BP from driver's brake valve (10).

- .3 The relay valve (11) has been provided in the system for augmenting the feeding capacity of driver's brake valve.
- .4 The hose coupling of BP is connected to the brake pipe coupling of the rake.

4.1.3 Testing Procedure:

Attach the rake test rig to the rake through the couplings. Carry out tests as per the procedure given in para 3 of M.P. Guide No.11 placed at Annexure-XI.

Note: In case rake test rig is not available testing shall be done by engine.

000000737

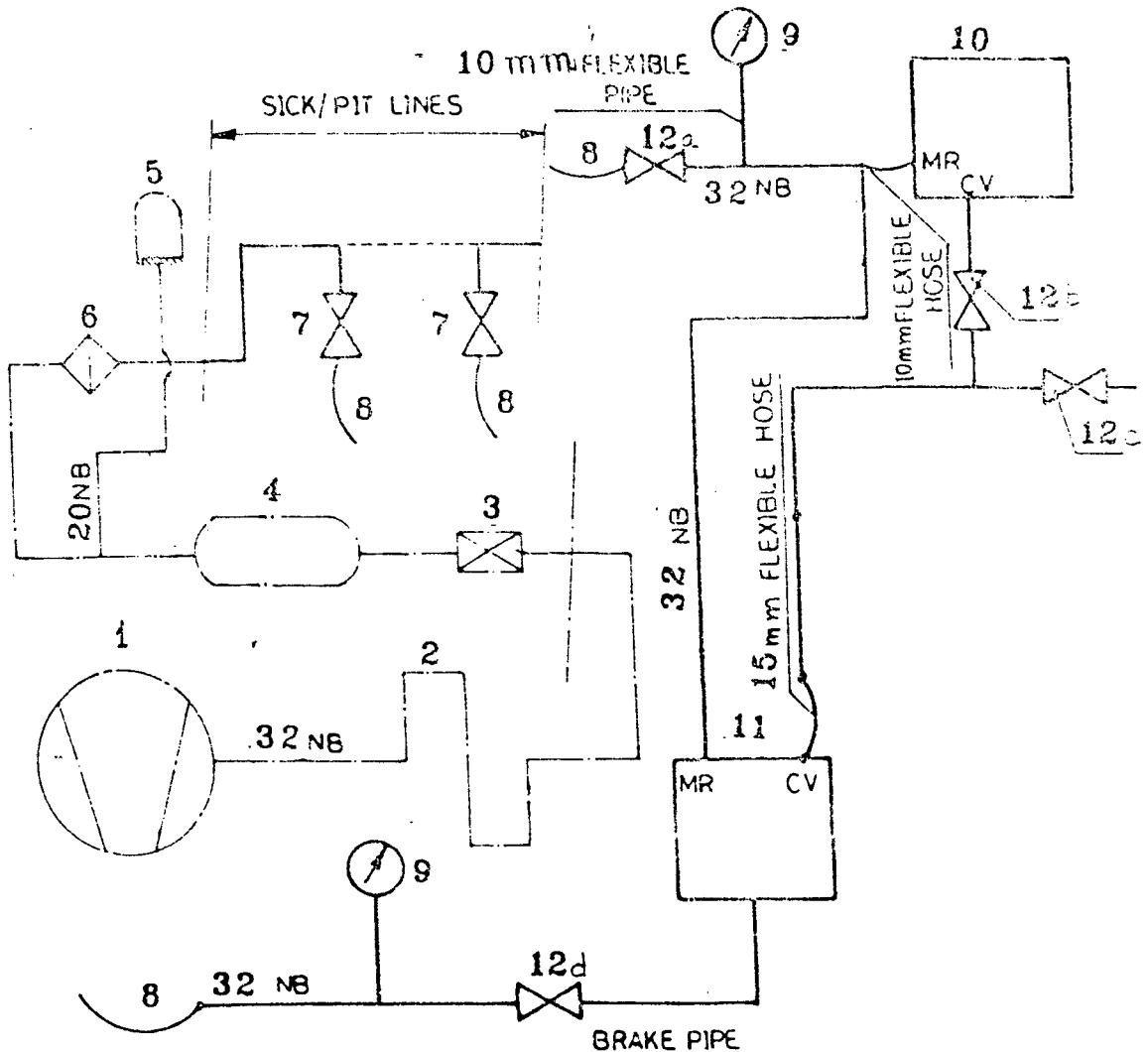


FIG.25
RAKE TEST RIG.

FIG. REF.NO.	DESCRIPTION	QTY.
1	COMPRESSOR 2000 L/MIN. PRESSURE 8-10 Kg/Cm ²	1
2	AFTER COOLER	1
3	CHECK VALVE	1
4	MAIN RESERVOIR 300 L	1
5	SAFETY VALVE	1
6	FILTER	1
7	CUT OFF ANGLE COCK	2
8	BRAKE HOSE COUPLING BP.	4
9	PRESSURE GAUGE	2
10	DRIVER'S BRAKE VALVE	1
11	RELAY VALVE	1
12	ISOLATING COCK a,b,c,d	4

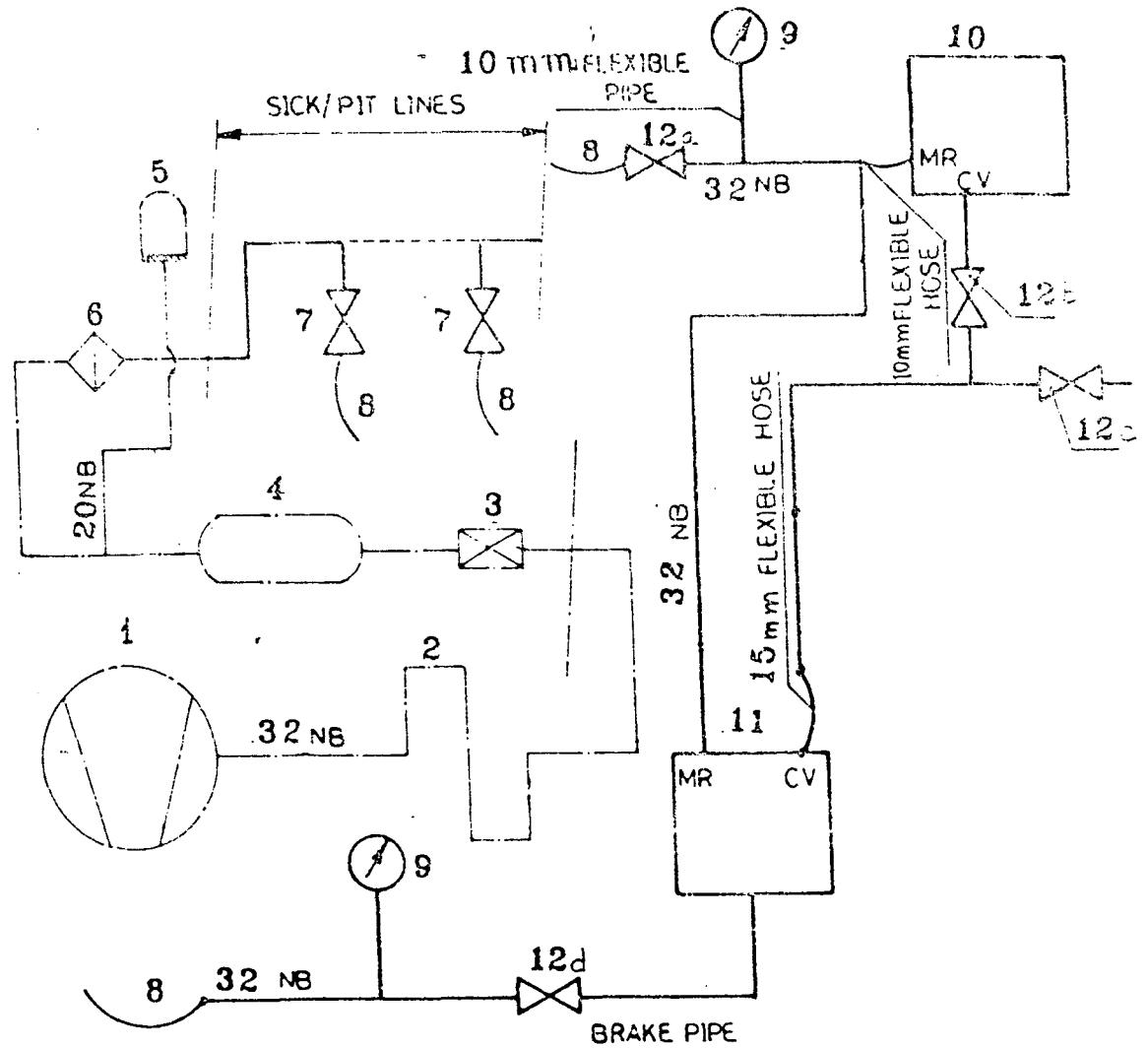


FIG. 25 RAKE TEST RIG.

FIG. REF.NO.	DESCRIPTION	QTY.
1	COMPRESSOR 2000 L/MIN. PRESSURE 5-10 Kg/Cm ²	1
2	AFTER COOLER	1
3	CHECK VALVE	1
4	MAIN RESERVOIR 300 L	1
5	SAFETY VALVE	1
6	FILTER	1
7	CUT OFF ANGLE COCK	2
8	BRAKE HOSE COUPLING BP.	4
9	PRESSURE GAUGE	2
10	DRIVER'S BRAKE VALVE	1
11	RELAY VALVE	1
12	ISOLATING COCK a,b,c,d	4

5.0 PROCEDURE FOR BRAKE CONTINUITY TEST

- 5.1 The Driver and Guard must carry - out this test as soon as possible after the locomotive or vehicle is coupled or recoupled to ensure continuity of the brake pipe throughout the fitted portion of the train.
- 5.2 The brake continuity test must be carried out on train in the following circumstances without exception.
 - .1 Locomotive or additional locomotive attached to the front of the train.
 - .2 Locomotive or additional locomotive attached to the rear of a fully fitted train.
 - .3 Vehicle attached at any position in the fitted portion of the train.
 - .4 Vehicle in the fitted portion of the train detached from other than the extreme rear.
 - .5 After any brake defect or irregularity which has affected the continuity of the brake has been rectified.
- 5.3 A brake continuity test need not be carried out:
 - .1 When a locomotive other than train locomotive is detached from the extreme front of the train.
 - .2 When the train locomotive is used for 'complete' brake test of the whole train and is not thereafter detached before starting.
 - .3 When locomotive or vehicle is detached from the extreme rear of the train.
- 5.4 The following procedure shall be followed for the test:
 - 5.4.1 The Driver must move the automatic brake valve to 'RUNNING' in the leading driving compartment and check that approximately 5.0 Kg/cm^2 is registered on the brake pipe pressure gauge.
 - 5.4.2 The Driver must then move the automatic brake valve to HANDLE OFF/NEUTRAL without a pause and retain initially at least 4.0 Kg/cm^2 on the brake pipe pressure gauge. In the case of A-9 automatic brake valve

000000741

26

10/11/11

which does not have handle off/neutral position the following procedure shall be followed.

5.4.2.1 After the brake pipe pressure has been stabilised close the brake pipe isolating cock provided between additional C-2 relay valve and brake pipe of locomotive.

5.4.3 The Guard must then without delay carry out the following:

- .1 If brake van is the rear vehicle, open the Guard's emergency brake valve until all air is exhausted. The valve must then be closed.
- .2 If a brake van is not the rear vehicle, open the brake pipe cut off angle cock on the rear vehicle until all air is exhausted. The cock must then be closed.
- .3 In the case of partly fitted train, the cock must be opened on the rear vehicle in the fitted portion until all air is exhausted. Before carrying out this part of the test, the Guard must have a clear understanding with the Driver as to what is to be done to ensure the train is not moved during the test.
- .4 If any locomotive in the rear of the last vehicle, in addition to the driving locomotive in the front of the train, is used and this locomotive is the last vehicle on the train, then the Guard must instruct the Driver of the rear most locomotive to carry out the brake continuity test. Then Driver must move the automatic brake valve to Emergency until the brake pipe pressure falls to Zero. He must then move the automatic brake valve to HANDLE OFF/NEUTRAL and observe that the brake pipe pressure does not immediately rise. In the case of A-9 automatic brake valve which does not have handle off/neutral position, the isolating cock provided between additional C-2 relay valve and brake pipe of locomotive must be closed and observe that the brake pipe pressure does not immediately rise. The Guard must obtain an assurance from the Driver of the rear most locomotive that this has been done.

5.4.4 The Driver must observe that the brake pipe pressure has dropped to Zero in the leading driving compartment and that does not commence to rise again. If the brake pipe pressure does not fall, this can be due to a brake pipe cut off angle cock being closed. If the brake pipe pressure does not fall to Zero check if locomotive automatic brake valve or brake controller in another cab /control stand is not the HANDLE OFF / NEUTRAL

000000742

position. In the case of A9 automatic brake valve which does not have handle off/neutral position, check whether the isolating cock provided between additional C-2 relay valve and brake pipe of locomotive is not in closed position.

- 5.4.5 After correction of any fault a further brake continuity test commencing at Clause 5.4.3 must be carried out.
- 5.4.6 The Driver must move the automatic brake valve to RUNNING position and check that 5.0 Kg/cm² in brake pipe is registered in the locomotive cab and maximum level in the last vehicle as stipulated in the operating rules. In case of A-9 brake valve, after the cut -out cock between C-2 relay valve and brake pipe is opened the brake pipe pressure should again build up to 5 kg/Cm² in the locomotive and to a maximum pressure in the last vehicle as stipulated in the operating rules.

6.0 GENERAL GUIDELINES FOR MAINTENANCE OF WAGONS OTHER THAN BOBR/BOBRN DOS AND DONTS.

6.1 AT ORIGINATING STATIONS:

DOS

- .1 DO ENSURE THAT HAND BRAKES ON ALL WAGONS ARE FULLY RELEASED.
- .2 DO ENSURE THAT OPERATING HANDLE OF EMPTY LOAD BOX IS IN CORRECT POSITION.
- .3 DO ENSURE THAT ALL WORN OUT BRAKE BLOCKS ARE CHANGED.
- .4 DO ENSURE THAT ALL BRAKE RIGGING PINS ARE INTACT AND FRICTIONAL POINTS ARE LUBRICATED.
- .5 DO ENSURE THAT DIMENSION 'A' OF BRAKE REGULATOR IS ADJUSTED TO THE SPECIFIED VALUE.
- .6 DO ENSURE THAT EMPTY TIE ROD AJUSTMENT IS CORRECT.
- .7 DO ENSURE THAT BRAKE PIPE HOSE COUPLINGS ARE CONNECTED TO FORM A CONTINUOUS PASSAGE FROM LOCOMTIVE TO THE LAST VEHICLE.
- .8 DO ENSURE THAT CUT OFF ANGLE COCKS EXCEPT AT THE REAR OF TRAIN ARE KEPT OPEN.
- .9 DO ENSURE THAT CUT OFF ANGLE COCK AT REAR END OF TRAIN IS KEPT CLOSED.
- .10 DO ENSURE THAT HOSE COUPLINGS AT THE REAR END OF TRAIN IS PLACED ON HOSE COUPLING SUPPORTS.
- .11 DO ENSURE THAT ISOLATING COCK ON DISTRIBUTOR VALVES OF ALL WAGONS ARE IN OPEN POSITION.

- .12 DO ENSURE THAT QUICK COUPLING IS PROVIDED IN THE BRAKE VAN.
- .13 DO ENSURE THAT BP PRESSURE IN BRAKE VAN IS NOT LESS THAN 4.8 kg/Cm² FOR 56 WAGON TRAIN AND 4.7 kg/Cm² FOR TRAINS WITH MORE THAN 56 WAGONS AFTER THE SYSTEM IS FULLY CHARGED.
- .14 DO ENSURE THAT BP GAUGES IN LOCOMOTIVE SHOW A PRESSURE OF 5.0 kg./Cm² AFTER THE SYSTEM IS FULLY CHARGED.
- .15 DO ENSURE THAT THE LEAKAGE IN THE BRAKE SYSTEM IS LESS THAN 0.25 kg/Cm² PER MINUTE.
- .16 DO ENSURE THAT PISTON STORKE UNDER EMPTY AND LOADED CONDITIONS ARE WITHIN THE LIMITS SPECIFIED.
- .17 DO ENSURE THAT BRAKE SHOES OF EACH WAGON ARE MATING THE WHEELS WHEN BRAKES ARE APPLIED.
- .18 DO ENSURE THAT PISTON OF BRAKE CYLINDER IS FULLY INSIDE WHEN BRAKES ARE RELEASED.
- .19 DO ENSURE PROPER WORKING OF GUARD'S EMERGENCY BRAKE VALVE.
- .20 DO ENSURE THAT PERCENTAGE OF OPERATING BRAKE CYLINDERS ARE WITHIN THE PRESCRIBED LIMIT.

DON'Ts

- .1 DONT ALLOW A TRAIN TO LEAVE WITH LESS THAN PRESCRIBED BRAKE POWER.
- .2 DONT LEAVE HAND BRAKES PARTIALY APPLIED.
- .3 DONT TAMPER WITH 'A' DIMENSION OF BRAKE REGULATOR ONCE SET.

- .4 DON'T ALLOW THE HOSE COUPLING AT REAR END TO DANGLE.
- .5 DON'T ALLOW TRAIN TO LEAVE WITH LEAKAGE HIGHER THAN SPECIFIED.
- .6 DON'T ALLOW A TRAIN TO LEAVE WITH BRAKE PIPE PRESSURE IN LOCO AND BRAKE VAN LESS THAN SPECIFIED.

6.2 AT TERMINATING STATIONS

DOs

- .1 DO CHECK THE PERCENTAGE OPERATIVE CYLINDERS AND SICK MARK WAGONS WITH INOPERATIVE BRAKE CYLINDERS.
- .2 DO CHECK LEAKAGE RATE AND IF FOUND EXCESSIVE TAKE REMEDIAL MEASURES.
- .3 DO CHECK THAT BRAKE BLOCKS AFTER RELEASE ARE AWAY FROM THE WHEEL.
- .4 DO CHECK ALL THE AIR BRAKE EQUIPMENTS FOR ANY VISUAL DAMAGE AND SICK MARK IF FOUND NECESSARY.
- .5 DO CLOSE ANGLE COCKS OF ADJACENT WAGONS TO UNCOUPLE HOSE COUPLINGS.
- .6 DO CONDUCT BRAKE CONTINUITY TEST IF ANY VEHICLE IS ATTACHED OR DETACHED FROM THE TRAIN OR ANY RECTIFICATION HAS BEEN DONE WHICH HAS AFFECTED THE CONTINUITY OF THE BRAKE SYSTEM.

DON'Ts

- .1 DON'T ALLOW WAGONS TO PULL APART FOR UNCOUPLING HOSES.
- .2 DON'T ALLOW THE HOSE COUPLINGS TO DANGLE.
- .3 DON'T HAMMER QUICK RELEASE VALVE TO RELEASE BRAKE.

7. GENERAL GUIDELINES FOR MAINTENANCE OF BOBR/BOBRN WAGONS DOS AND DONTS.

7.1 AT ORIGINATING STATIONS:

DOS

- .1 DO ENSURE THAT HAND BRAKES ON ALL WAGONS ARE FULLY RELEASED.
- .2 DO ENSURE THAT LOAD SENSING DEVICE FITTED ON BOGIE IS WORKING PROPERLY.
- .3 DO ENSURE THAT ALL BOLTS & NUTS OF LOAD SENSING DEVICE HAVE BEEN TACK WELDED.
- .4 DO ENSURE THAT NUTS HAVE BEEN PROVIDED BETWEEN LEVER OF VNS VALVE AND SWIVELLING ADAPTOR AND BETWEEN SWIVELLING ADAPTOR AND FIXING BRACKET ON SPRING PLANK.
- .5 DO ENSURE THAT WAGONS FITTED WITH C3W2 DV ARE FITTED WITH LSD TYPE VNS & SWIVELLING ADAPTOR AND KEO DV WITH OPERATING VALVE B1 & SPRING BUFFER F1.
- .6 DO ENSURE THAT ALL WORN OUT BRAKE BLOCKS ARE CHANGED.
- .7 DO ENSURE THAT ALL BRAKE RIGGING PINS ARE INTACT AND FRICTIONAL POINTS ARE LUBRICATED.
- .8 DO ENSURE DIMENSION 'A' OF BRAKE REGULATOR IS ADJUSTED TO 27 + 2mm (FOR BOBRN WAGONS ONLY).

- 0

- .9 DO ENSURE THAT BRAKE PULL RODS OF BOBR WAGONS WITHOUT SLACK ADJUTER ARE PROPERLY ADJUSTED TO OBTAIN SPECIFIED PISTON STROKES IN EMPTY AND LOADED CONDITIONS.
- .10 DO ENSURE THAT PISTON STROKE UNDER EMPTY AND LOADED CONDITIONS ARE 100 ± 10 mm & 110 ± 10 mm RESPECTIVELY.
- .11 DO ENSURE THAT BRAKE SHOES OF EACH WAGON ARE MATING THE WHEELS WHEN BRAKES ARE APPLIED.
- .12 DO ENSURE THAT PISTON OF BRAKE CYLINDER IS FULLY INSIDE WHEN BRAKES ARE RELEASED.
- .13 DO ENSURE THAT BRAKE PIPE HOSE COUPLING ARE CONNECTED TO FORM A CONTINUOUS PASSAGE FROM LCOMOTIVE TO THE LAST VEHICLE.
- .14 DO ENSURE THAT CUT OFF ANGLE COCKS OF BRAKE PIPE EXCEPT AT THE REAR OF TRAIN ARE KEPT OPEN.
- .15 DO ENSURE THAT CUT OFF ANGLE COCKS OF BRAKE PIPE AT REAR END OF TRAIN ARE KEPT CLOSED.
- .16 DO ENSURE THAT HOSE COUPLING AT THE REAR END OF TRAIN IS PLACED ON HOSE COUPLING SUPPORT.
- .17 DO ENSURE THAT ISOLATING COCK ON DISTRIBUTOR VALVES OF ALL WAGONS ARE IN OPEN POSITION.
- .18 DO ENSURE THAT BP PRESSURE IN BRAKE VAN SHOW NOT LESS THAN 4.8 kg./cm^2 FOR 56 WAGONS TRAIN AND 4.7 kg/cm^2 FOR TRAINS WITH MORE THAN 56 WAGONS AFTER THE SYSTEM IS FULLY CHARGED.
- .19 DO ENSURE THAT GAUGES IN LOCOMOTIVE SHOW A PRESSURE OF 5.0 kg./cm^2 IN BP AFTER THE SYSTEM IS FULLY CHARGED.
- .20 DO ENSURE THAT THE LEAKAGE IN THE BRAKE SYSTEM IS LESS THAN 0.25 kg/cm^2 PER MINUTE.

- .21 DO ENSURE THAT BRAKE PIPE CONTINUITY TEST HAS BEEN CONDUCTED ON THE TRAIN.
- .22 DO ENSURE PROPER WORKING OF GUARD'S EMERGENCY BRAKE VALVE.
- .23. DO ENSURE THAT PERCENTAGE OF OPERATING BRAKE CYLINDERS ARE WITHIN THE PRESCRIBED LIMIT.
- .24 DO ENSURE THAT ONLY LEC 4 LOAD SENSING DEVICE HAS BEEN PROVIDED ON WAGONS FITTED WITH EST 3F DV.

DON'Ts

- .1 DON'T ALLOW A TRAIN TO LEAVE WITH LESS THAN PRESCRIBED BRAKE POWER.
- .2 DON'T LEAVE HAND BRAKES PARTIALLY APPLIED.
- .3 DON'T TAMPER WITH 'A' DIMENSION OF BRAKE REGULATOR ONCE SET (FOR BOBRN ONLY).
- .4 DON'T CONNECT THE FLEXIBLE PIPES TO GIVE THROUGH CONNECTION OF LSD..
- .5. DON'T ALLOW THE HOSE COUPLINGS AT REAR END TO DANGLE.
- .6 DON'T ALLOW TRAIN TO LEAVE WITH LEAKAGE HIGHER THAN SPECIFIED.
- .7 DON'T ALLOW A TRAIN TO LEAVE WITH BRAKE PIPE PRESSURE IN LOCO AND BRAKE VAN LESS THAN SPECIFIED..
- .8 DON'T ALLOW A WAGON HAVING EST 3F DV WITH LOAD SENSING DEVICE OTHER THAN LEC 4 AND C3W2 & KEO DISTRIBUTOR VALVE WITH LOAD SENSING DEVICE OF LEC4 TYPE.

774
25 000000749

.9 DON'T ALLOW A TRAIN WITHOUT CONDUCTING CONTINUITY TEST.

7.2 AT TERMINATING STATIONS

DOs

.1 DO CHECK THE PERCENTAGE OPERATIVE CYLINDERS AND SICK MARK WAGONS WITH INOPERATIVE BRAKE CYLINDERS.

.2 DO CHECK LEAKAGE RATE AND IF FOUND EXCESSIVE TAKE REMEDIAL MEASURES.

.3 DO CHECK THAT BRAKE BLOCKS AFTER RELEASE ARE AWAY FROM THE WHEEL.

.4 DO CHECK ALL THE AIR BRAKE EQUIPMENTS FOR ANY VISUAL DAMAGE AND SICK MARK IF FOUND NECESSARY.

.5 DO CLOSE ANGLE COCKS OF ADJACENT WAGON TO UNCOUPLE HOSE COUPLING.

.6 DO CONDUCT BRAKE CONTINUITY TEST IF ANY VEHICLE IS ATTACHED OR DETACHED FROM THE TRAIN OR ANY RECTIFICATION HAS BEEN DONE WHICH HAS AFFECTED THE CONTINUITY OF THE BRAKE SYSTEM.

DON'Ts

.1 DON'T ALLOW WAGONS TO PULL APART FOR UNCOUPLING HOSES.

.2 DON'T ALLOW THE HOSE COUPLINGS TO DANGLE.

.3 DON'T HAMMER QUICK RELEASE VALVE TO RELEASE BRAKE.

ROUTINE OVERHAUL OF AIR BRAKES OF WAGONS

1. In routine overhaul first test the brake system using single wagon test rig as per procedure given in Annexure (XII). Following action should be taken for the defects / discrepancies identified during testing.
 - 1.1 Replace DV by a DV tested in test bench if any of the following defects identified: (Ref. test proforma at Annexure-XII)
 - (a) AR pressure not as specified.
 - (b) CR pressure not as specified.
 - (c) Maximum brake cylinder pressure in full service application/ Emergency application not as specified.
 - (d) Brake cylinder filling time / draining time after full service and / or emergency application not as specified.
 - (e) Insensitivity/sensitivity parameters are not as specified.
 - (f) Leakages through distributor valve.
 - (g) Brake cylinder pressure in empty & loaded condition are not within the specified limit for BOBR / BOBRN wagons.
 - 1.2 Replace brake cylinder by tested brake cylinder if following defects are identified:
 - (a) Leakage from brake cylinder rafter emergency application is not as specified.
 - (b) If any visual damage is noticed on the brake cylinder.
 - 1.3 Examine and repair or replace Seals / Gaskets of pipe and joint fittings if leakage rate of system is not within specified limits.

- 1.3.1 Replace the angle cock if it is leaking or damaged
- 1.3.2 Replace leaking Guard's Emergency Brake valve, isolating cock, and quick coupling of brake Van.
- 1.4 Examine rigging / Slack Adjuster if Piston Stroke is not as specified. (See Annexure -XV & XVI)

2. Carry out following checks and examinations:

- 2.1 **Cut off Angle Cock** (Fig. 15)

- 2.1.1 Check for easy operation of cut-off angle cock. If found jammed put a few drops of light lubricating oil on top of the cock and give light hammer shocks on the top of the cock and simultaneously trying to operate the handle. Operate handle 10-12 times to ensure smooth movement. In working of angle cock even after lubrication is not smooth replace by tested angle cock.

- 2.2 **Dirt Collector** (Fig. 17)

- 2.2.1 Open the drain plug(3) and drain out the Condensate and replace the drain plug. If the leather washer (2) is found defective it should be changed.
 - 2.2.2 Remove the filter by opening the cover (item 6). Clean the filter by dipping in Soap Solution Tank. Blow dry with compressed air and refit.

- 2.3 **Brake Cylinder** (Fig. 13)

- 2.3.1 Check the brake cylinder for smooth movement of piston. Lubricate the piston by injecting 2 cc of lubricating grease through the gauge point. Brake cylinder movement even after lubrication is not smooth replace by tested brake cylinder.

- 2.3.2 Clean filter of M/s. ESCORTS and M/s. RPIL make cylinders.

- 2.4 **Auxiliary Reservoir/Control Reservoir** (Fig. 14)

- 2.4.1 Open the drain plug (3) and drain out the condensate and replace the drain plug. If the Leather Washer (9) is found defective it should be changed.

78
15

00000000753

FIGURE A



Hose with hole in outer cover and fabric at hole torn. When the fabric at the hole is torn or rotten, the hose should be removed from service.

FIGURE B



Hose with hole in outer cover and fabric at hole in good condition. Hose of this sort should not be removed until there is some indication of damage to fabric.

FIGURE C



Hose with bad longitudinal crack in outer casing. This hose should be removed from service. Hose with a spiral crack of the same sort should be removed from service.

FIGURE D



Hose with slight longitudinal crack. The crack in this hose is not bad enough to justify removal of the hose.

FIG.26

SERVICIABILITY OF HOSE COUPLING

2.5 Hose Coupling (Fig. 16)

- 2.5.1 Check serviceability of hose coupling. (See figure 26 for checking serviceability).
- 2.5.2 Check the Gasket for any visual damage and replace if found necessary.

2.6 Guard's Emergency Brake Valve (Fig. 20)

- 2.6.1 Check easy operation of Valve. Operate 5 to 6 times. Defective valve should be replaced.

2.7 Isolating Cock (Fig. 22) for BVZC Brake Vans

- 2.7.1 Check easy operation of cock. Operate 5 to 6 times. Replace defective isolating cock.

2.8 Quick Coupling (Fig. 21) for BVZC Brake Vans

- 2.8.1 Check for proper working and replace if defective.

2.9 Load Sensing Device (Fig. 4,5,7,23 & 24) for BOBR/BOBRN Wagons

- 2.9.1 Check that wagons fitted with C3W2 DVs are provided with LSD type VN5 and Swiveling Adapter and KEO DV with Operating Valve B1 and Spring Buffer F1.

- 2.9.2 Check that nuts have been provided between lever of VN5 Valve and Swiveling Adapter and between Swiveling Adapter and fixing Bracket on Spring Plank.

- 2.9.3 Check proper working of load sensing device fitted on bogie. For checking the proper working of LSD in loaded condition press the piston of operating valve by inserting a bar in case of equipment of M/s Escorts & M/s Greysham with EST 3f DV. In the case of equipment supplied by M/s RPIL & M/s Greysham with C3W2 valves, the swiveling adaptor may be disconnected from the spring plank and operate the valve manually to simulate loaded condition of wagons and observe higher brake cylinder pressure.

0000000754

3. Ensure the following:-

- 3.1 Hose coupling support at both ends are fitted properly.
- 3.2 All mounting nuts and bolts of various equipments, pipe fitting and pipe joints are secured and tight in position.
- 3.3 APD of the followings are as per RDSO drawings and specifications:
 - (a) DV including additional APD.
 - (b) Angle cock
- 3.4 Examine and ensure that the Air Brake equipments are not physically damaged from outside.
- 3.5 Hose coupling fittings are proper and correct clamp (band- it type) has been used.
4. After carrying out all the work, test the brake system in single wagon test rig for all parameters as per procedure given in Annexure(XII). Rectify the defects if identified during testing. In no case wagon with brake system not meeting requirement be allowed to come out from ROH repair.
5. Attend to special modifications, as ordered from time to time in the nominated Depots.
6. Touch up paint and lettering where necessary.
7. Details of replacement of DV shall be marked on the sole bar as indicated in RDSO drg. No. WD - 93003 - S - 01.
8. Defective equipments replaced should be taken to test bench for repair and after repair use them as spare unit for further ROH of wagons.

8. General

- 8.1 For the repair of Air Brake Equipment necessary spares shall be readily available with the Depot. A maintenance kit for different equipments is given at Annexure - (XII). The Depot shall make assessment of the total quantity required and procure the same in Kit form. Small quantity of

spares which are not covered in maintenance kit may also be required. Such spares can be purchased as non stock item or by cash imprest.

- 8.2 Only spare parts procured from approved Air Brake Supplier shall be used for repairs. Under no circumstances Shop made/duplicate spares shall be used. The marking on items shall be seen to verify the Supplier.
- 8.3 ROH Maintenance Depot. should have sufficient Nos. of various spare assemblies for unit exchange.
- 8.4 ROH Maintenance Depot. should have following Repair & Maintenance facilities for various assemblies.
 - .1 Facilities for opening , repair, assembly and testing of all type of DVS.
 - .2 Facilities for Opening , Repair, Assembly and Testing of Angle cock ,Dirt collector, Brake Cylinder, Isolating Cock, Guard's emergency brake valve isolating cock and quick coupling.
- 8.5 The maintenance facilities for repair of various assemblies should be similar for what has been recommended for POH.
- 8.6 Do not allow wagon to come out from ROH repair without APD & additional APD of DV and APD of angle cock.

TROUBLE SHOOTING ON WAGONS

S.NO.	PROBLEM	CAUSE/FAULT	REMEDY/ACTION
1.	Brake pipe and auxiliary reservoir not charging	1. Brake pipe cut- off angle cock handle perpendicular to the pipe line (Closed). 2. DV isolating cock handle in horizontal position.(Closed) 3. Drain plug of auxiliary reservoir missing or leaking.	1.Bring cut - off angle cock handle in line With the brake pipe i.e. open position. 2.Bring the handle in vertically downward i.e. open position. 3. Replace drain plug or sealing washer and ensure pressure tightness.
2.	Brake not applied properly i.e. BC gets exhausted.	1. Leakage in BC Pipeline. 2. leakage in Control Reservoir (CR).	1.Check the leakage at both the joints of BC Pipe line at pipe bracket end, brake cylinder end at the test point with soap solution. Remove leakage by using teflon tape and tightening the joints. 2.Check the leakage in plugs of CR & joint replace sealing washer if necessary and ensure pressure tightness.
3.	Max.Brake Cylinder pressure (3.8 ± 0.1 kg/cm ²) not achieved.	1. Auxiliary reservoir not fully charged. 2.Leakage in brake Cylinder line	1.Check the AR pressure, It should be 5 ± 0.1 kg/cm ² . Eliminate leakage , if any, from drain plug of AR. 2.Eliminate the leakage by using teflon tape and proper tightening of all the joints in the pipe line and at the test point.

3. Control Reservoir not charged fully.
3. Wait till the Control Reservoir pressure reaches 5 kg/cm^2 and retest.
4. Brake Cylinder pressure rising slowly
1. Leakage in brake cylinder line
 1. Eliminate the leakage by using teflon tape and proper tightening of all the joints in the line and at the test point.
 2. Application choke blocked.
 2. Open choke cover, clean application choke and reinstall.
5. Brake cylinder pressure releasing slowly
1. Brake pipe pressure not achieved fully.
 1. Ensure $\text{BP} = 5 \pm 0.1 \text{ kg/cm}^2$ by bringing independent driver's brake valve to running position.
 2. Release choke blocked.
 2. Open choke cover, clean release choke and reinstall.
 3. Seal between pipe bracket and distributor valve fitted wrongly.
 3. Refit it correctly.
6. Brake shoes binding at the time of release.
1. Rigging jammed or excessive friction in the rigging.
 1. Lubricate all pins & ensure smooth operation.
 2. Hand brakes partially on.
 2. Ensure full release of hand brake.
 3. BP pressure build up to 5 kg/cm^2 is very slow due to insufficient supply or leak in BP.
 - 3.1 Check whether inlet air pressure for single car test equipment is adequately around 8 kg/cm^2

0000000758

44

83

and that there is no leak in the pipe line connecting it to the compressor.

3.2 In the case of a train ensure Driver's brake valve in the loco is in release position and BP. gauge indicated 5 kg/ cm².

3.3 Check for leak in BP of train. Detect source and rectify

4. Piston trunk loose.

4. Remove the cylinder/ piston from wagon and rectify.

PERIODIC OVERHAUL OF AIR BRAKES OF WAGONS

The following procedure shall be followed for the POH of Air Brake Equipment:

1. Remove APD of DV & Angle Cocks from wagon.
2. Remove all assemblies i.e. DV, Brake cylinder, Angle Cock, Auxiliary Reservoir and Dirt Collector from wagon.
3. Remove Guard's emergency brake valve, Isolating cock and quick coupling also from brake van.
4. Remove automatic load changeover device also from wagon in case of BOBR/BOBRN Wagons.
5. Remove pipe bracket, pipe clamps, pipe joints and strip all pipes.
6. The pipes should be slightly hammered to loosen the rust and scale.
7. After descaling, pipe must be blown with dry compressed air to ensure complete cleaning of rust and scale.
8. Clean the out side of all pipes thoroughly.
9. Examine all pipes for damage, cut, corrosion etc. Damaged and heavily corroded pipe must be replaced.
10. Examine joints for the following damages:
 - a) Sockets for cracks.
 - b) Fixed Flanges for straightness.
 - c) Sockets and flanges for Corrosion/damages & replace defective parts.
11. Replace all rubber items of pipe joints irrespective of conditions of old items.

0000000760

12. Assemble pipe joints. Tight bolts properly and secure them by spring washer and nut.
13. Fit, properly overhauled and tested, following assembly.
 - a) DV. In case new DV is fitted it should be ensured that casting tag is available on DV.
 - b) Pipe bracket
 - c) Dirt Collector
 - d) Both Angle Cocks
 - e) Brake cylinder
 - f) Auxiliary Reservoir
 - g) Guard's emergency brake valve in case of Brake Van.
 - h) Isolating cock in case of Brake Van.
 - i) Quick Coupling in case of Brake Van.
 - j) Automatic empty load change over device in case of BOBR/BOBRN Wagons.

Use new rubber items for joints between pipe and equipments irrespective of condition of old items.

14. Properly secure nut and bolts of joints between pipe and equipments.
15. Examine all pipe and pipe fittings and brackets and properly secure them.. Pipes should not be loose inside the pipe clamps.
16. Fit following APD:
 - a) Additional APD of DV
 - b) APD of DV
 - c) APD of Angle Cock
0000000761

17. Fit overhauled Hose Couplings at both ends of Brake Pipe.

18. Testing of wagon brake equipments:

1. Single Wagon Test:

This test shall be conducted on the wagon with Single Wagon Test Rig. The procedure and the specified values are given in Annexure XII.

2. If the values obtained are not within the specified limits, identify the defects (see chapter on ROH for trouble shooting) and rectify the defects. Single Wagon Test shall be carried out once again after rectification.

Wagons with air brake system not meeting the complete requirements of single wagon test should not be allowed to come out from POH. In case of new DV, the casting tag shall be removed after the wagon has passed the test.

19. Painting

All items shall be painted black as per standard practice.

20. Marking

Besides standard marking, details shown in Drg. No. WD- 93003-S-01 (placed at Annexure- XVIII) shall also be stencilled on the sole bar.

21. For overhauling of various assemblies removed from wagon follow the procedure given in various Annexures as mentioned below:

<u>S.No.</u>	<u>ASSEMBLY</u>	<u>ANNEXURE</u>
1.	Distributor Valve	I
2.	Brake Cylinder	II
3.	Dirt Collector	III
4.	Angle Cock	IV
5.	Auxiliary Reservoir	V

0000000762

6.	Hose Coupling	VI
7.	Guard's emergency brake valve	VII
8.	Isolating Cock	VIII
9.	Load Sensing Device	IX
10.	Pipes & joints	X

22. Precautions:

- a) It must be ensured that rubber items of pipe to pipe joints and pipe to equipments joint do not get damaged during fitment.
- b) It must be ensured that pipes are properly secured so that these do not vibrate on run and consequently result in leakages from joints.
- c) During assembly, it must be ensured that foreign particles or dust etc. are prevented from entering inside the pipes and equipments.
- d) It must be ensured that POH wagons coming out of workshop are fitted with hose coupling support at both ends.

0000000763

**OVER HAULING AND TESTING
OF
DISTRIBUTOR VALVE INCLUDING ADAPTOR
WITH ISOLATING COCK, PIPE BRACKET
WITH CONTROL RESERVOIR**

1. GENERAL INFORMATION

1. Distributor valves ... assembly are proprietary items of air brake manufacturers ... and are purchased in accordance with Appendix A1 of RDSO Specification No.02-ABR-94. Presently following designs are in service.

Design	Indian Manufacturer
1. KEO of Knorr Bremse Germany	(a) M/s Escorts Ltd. (b) M/s Knorr Bremse (India) Ltd.
2. C3W of Westinghouse	(a) M/s Stone India (b) M/s RPIL (c) M/s Greysham & Co.
3. EST3f of Davis & Metcalfe	(a) M/s Greysham & Co.
4. EST 302/303 of Oerlikon	(a) M/s BBVL
5. P4aG of Westinghouse Brake & Signal Co.	(a) M/s SD Technical Service Ltd.
6. KEO with pressure transformer for BOBR/BOBRN wagons.	(a) M/s Escorts Ltd.
7. C3W2 for BOBRN	(a) M/s RPIL (b) M/s Greysham & Co.
8. EST3f with pressure transformer for BOBR	(a) M/s Greysham & Co.

0000000764

ANNEXURE-I

2. With the standardisation of distributor valve in 1993-94 only following two designs (cast iron version) are now being manufactured.
 1. KEO design of M/s Knorr Bremse, Germany
 - ✓ (a) M/s Escorts Ltd.
 - (b) M/s Knorr Bremse (India) Ltd.
 2. C3W
 - (a) M/s Stone India
 - (b) M/s RPIL
 - (c) M/s Greysham & Co.
3. The spares of Distributor valve of a particular design from different sources are interchangeable.

2. OVERHAULING

- 1 For dismantling/assembly of distributor valve assembly and pipe bracket, Follow the procedure as given in the maintenance manual of respective manufacturer.
- 2 During overhauling replace all the components given in POH kit (Annexure XII) irrespective of conditions.

3. TESTING

- 1 Distributor valve must be tested for all parameters as covered in Annexure XII in Test bench.
- 2 Pipe bracket shall be tested for leakages with 10 kg/cm² air pressure.
- 3 DV of BOBR/BOBRN wagons shall be tested for parameters as covered in Annexure XII.
- 4 The distributor valves not meeting any of the requirement must be attended as per procedure covered in manufacturers maintenance manual and retested for all parameters.

000000765

90

4. MARKING

The overhauled distributor valve shall be stencilled with the following particulars:

- a) Workshop & Railway.
- b) Month & Year.

5. STORING

- .1 The overhauled and tested distributor valve shall be stored in a clean and dry place.
- .2 All inlet ports of distributor valve and pipe bracket shall be covered with protective caps to prevent entry of dust / moisture inside.

6. TOOLS

Specified tools recommended by the various manufacturers shall be used for overhauling.

7. EQUIPMENTS

Testing equipments shall be as recommended by the manufacturers.

8. PRECAUTION

Overhauling shall not be undertaken with untrained persons.

0000000766

OVERHAULING AND TESTING OF BRAKE CYLINDER

1. DRAWING AND SPECIFICATION :-

Following are the RDSO manufacturing drawings and specification of Brake cylinder.

.1 BRAKE CYLINDER 355 mm.	WD - 92051 - S - 06
.2 CYLINDER BODY (FOR 355 mm BC)	WD - 92051 - S - 07
.3 CYLINDER BODY CAST IRON VERSION (FOR 355 mm. BC)	WD - 94048 - S - 01
.4 PISTON AND PISTON ROD	WD - 92051 - S - 08
.5 DETAILS OF BRAKE CYLINDER	WD - 92051 - S - 09
.6 PISTON PACKING	WD - 92051 - S - 10
.7 SPECIFICATION	Appendix B of 02-ABR-94

2 OVERHAULING (Refer Fig.13)

2.1 Dismantling

- .1 Fit 12 dia., 25 mm long round headed pin on the hole provided in the extended portion of piston trunk before loosening the cover bolts.
- .2 Remove the bolts.
- .3 Remove the complete piston.
- .4 Take out piston packing and wear ring.
- .5 Place the piston head down on a clean table.

0000000767

92

58

- .6 Force the dome cover down against the release spring and take out the 12 dia., 25 mm. long round headed pin from the piston trunk. Slowly withdraw the force on the cover and finally take out the cover, release spring etc. from the piston head.
- .7 Remove the bush on piston rod and brake cylinder.
- .8 Thoroughly clean and degrease all the components.

2.2 Examination of the following components:

- .1 Cylinder body for any damage, cracks on welding or any other places damaged holes etc.
- .2 Cover for damage, damaged hole etc.
- .3 Release spring for free height. The free height of spring should not be less than 610mm.
- .4 Piston trunk for damages.
- .5 Piston and piston rod for damages , bent etc.

THE DAMAGED COMPONENT SHOULD BE REPLACED

2.3 Replace following components:

Description	Item
.1 Piston packing	4
.2 Wear ring	5
.3 Bush	16

2.4 Assembly

- .1 Assemble the spring on piston head and insert the cover over the piston trunk.
- .2 Fit the new piston packing and wear ring.
- .3 Clean the piston head . Inside of the cylinder body may be applied with small amount of grease and enter the lowest part of the piston and packing obliquely.

- .4 Ease the piston into the cylinder with a dull edged thin bladed tool.
- .5 As soon as the piston has been entered, the piston assembly should be pushed into approximately central position and the whole assembly worked in and out and turned a few time to distribute the grease.
- .6 Tighten the dome cover and take 12 dia., 25mm round headed pin from the hole in the piston trunk.
- .7 The brake cylinders which are not manufactured as per RDSO design and are proprietary items of manufacturers the procedure of overhauling given in the respective maintenance manual supplied by the manufacturers may be followed. However the component covered in POH kit as given in Annexure XIII must be replaced irrespective of condition during overhauling.

3. TESTINGS

Arrangement as shown in Fig. 27 may be used for testing.

3.1 Strength test.

Follow the following procedure.

- .1 Place the brake cylinder on base (4) and connect the line to brake cylinder. Brake cylinder stroke should be free.
- .2 Close the safety guard , close the cock (1c).
- .3 Open cock (1 b) and let reservoir pressure reach 10 kg/cm^2 Check the pressure in MR gauge (3a).
- .4 Open cock.(2) till the pressure reaches 6 kg/cm^2 in pressure gauge (3b).
- .5 Close the cock (2) and wait for 2 minutes.
- .6 Open cock (1c).

The above test should be done with the safety guard.

0000000769

94
-69

3.2 Pressure tightness test.

Follow the following procedure.

- .1 Mount the cylinder on the test stand and tighten the mounting bolts & nuts.
- .2 Set the brake cylinder stroke at $85 \pm 10\text{mm}$.
- .3 Open cock (2) and let the pressure gauge (3b) reaches 0.8 kg/cm^2 .
- .4 Close the cock (2) and wait for 1 minute till the pressure stabilise in gauge (3b).
- .5 Check for the pressure drop which should not be more than 0.1 kg/cm^2 in 10 minutes.
- .6 Open cock (1c)
- .7 Repeat the test at $130 \pm 10\text{mm}$ piston stroke and 3.8 kg/cm^2 pressure. Close cock (2) open cock (1c). Remove the brake cylinder.
- 3.3 If operation is not correct or leakage rate is higher, dismantle the brake cylinder and examine piston packing wear ring for proper fitment, examine plug for leakages. Reassemble the components and retest.

4. PAINTING

The exterior of the brake cylinder shall be painted with black enamel paint.

5. STORING

- 5.1 Assembled or dismantle brake cylinder should be stored in such a way to prevent the following.

- .1 Flange surface should be prevented from damages.
- .2 Inlet and outlet port should be plugged with protective cap to prevent the entry of dust and moisture inside the brake cylinder.

6. EQUIPMENTS FOR TESTING.

Equipment as shown in Figure No. 27 shall be used.

000000770

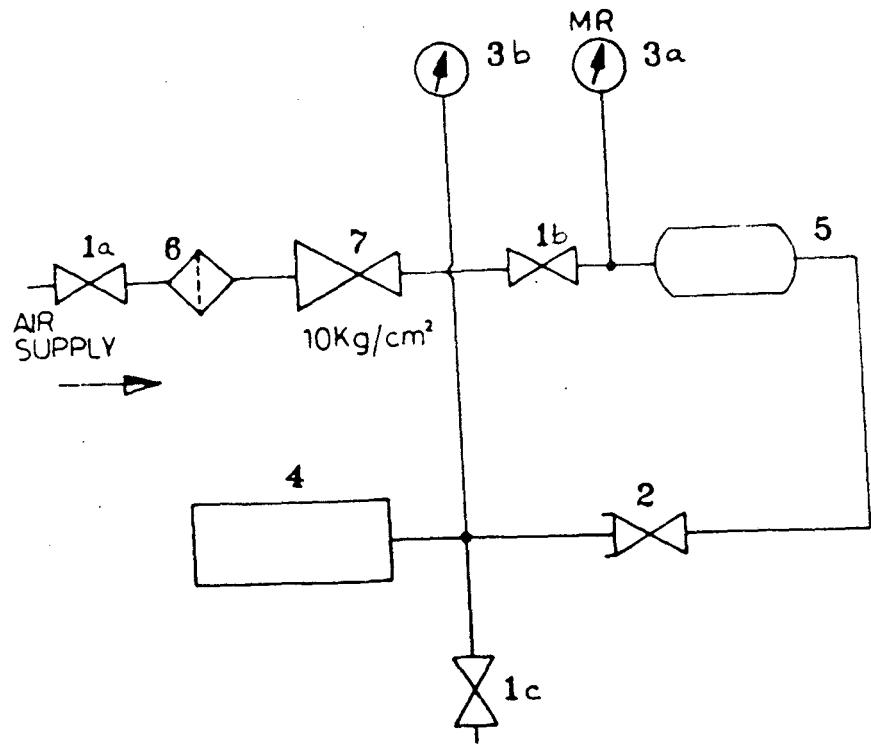


FIG.27
TEST STAND FOR BRAKE CYLINDER

FIG. REF.NO.	DESCRIPTION	QTY.
1a,1b,1c	ISOLATING COCK	3
2	ISOLATING COCK WITH CHOCK #1.0 mm	1
3a 3b	PRESSURE GAUGE	2
4	BRAKE CYLINDER MOUNTING BASE WITH SAFETY GUARD	1
5	AIR RESERVOIR	1
6	PIPE LINE FILTER	1
7	PRESSURE REDUCING VALVE	1

0000000771

7.PRECAUTION

- .1 Avoid damage to piston packing by dull edged thin bladed tool.
- .2 Fit 12 dia., 25 mm. long round headed pin on the hole provided in the extended portion of trunk before loosening the cover bolts.
- .3 Excessive lubrication of the cylinder must be avoided.

0000000772

975

OVER HAULING AND TESTING OF DIRT COLLECTOR

1. DRAWINGS & SPECIFICATION

Followings are the RDSO manufacturing Drawings & Specification of Dirt Collector

1. Dirt Collector Assembly WD-92051-S-03
2. Details of Dirt Collector WD-92051-S-04
3. Details of Dirt Collector WD-92051-S-05
4. Specification - Appendix-E of 02-ABR-94

2. OVER HAULING:- (Refer Fig. 17)

2.1 Dismantling

- .1 Open 4 bolts and nuts (item 7, 8 & 9) and remove cover (item 6) and gasket (item 4).
- .2 Take out filter (item 5).
- .3 Open drain plug (item 3).

2.2 Clean all parts properly. There should not be any dirt & other particles.

2.3 Replace the following components & old should be scrapped

- | | |
|-------------------|--------------|
| .1 Gasket | - Item No. 4 |
| .2 Leather washer | - Item No.2 |

2.4 Examine following components

- .1 Housing for any damage or damage on thread or missing thread.
- .2 Drain plug for damage or missing thread.
- .3 Filter for damage , cut or blocking of air passage.

0000000773

.4 All fastener for damage on missing thread.

THE DAMAGED COMPONENTS SHOULD BE REPLACED

2.5 Assembly

.1 Assemble the dirt collector in reverse manner of dismantling.

.2 During assembly properly tighten the fasteners.

2.6 The dirt collector which are not manufactured as per RDSO design and are proprietary item of manufacturer the procedure of overhauling given in respective maintenance manual supplied by manufacturers may be followed. However the components covered in POH kit as given in Annexure-XIII must be replaced irrespective of condition during overhauling.

3. TESTING

Arrangement as shown in Fig. 28 shall be used for testing.

3.1 Follow the following procedure

- .1 Mount the dirt collector on base (7).
- .2 Keep cock (1f) and (1c) close.
- .3 Open cock (1a) and (1b).
- .4 Charge the reservoir (4) to 10 kg/cm².
- .5 Close to opening on dirt collector using dummy flanges.
- .6 Open cock (1e).
- .7 Check the pressure on gauge (5c), it should be 10kg/cm².
- .8 Close cock (1e) and check the leakage with soap solution and also pressure drop in gauge (5c). There should be no leakage.
- .9 Open cock (1f) and exhaust the pressure to zero.
- .10 Remove dirt collector from test stand.

3.2 In case of leakage, reassemble the joints after replacing defective components and retest.

4. EQUIPMENT FOR TESTING

Equipments as shown in fig. 28 shall be used for testing.

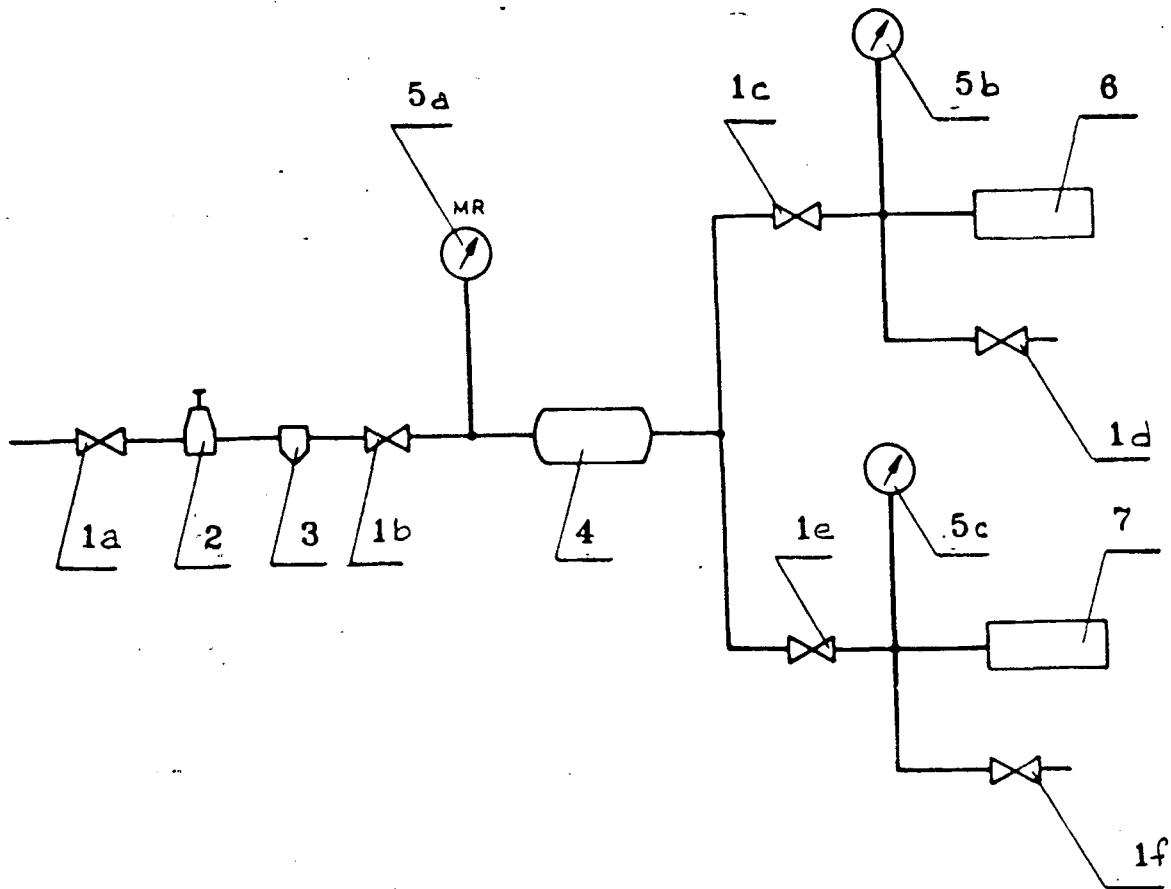


FIG.28

TEST STAND FOR CUT OFF ANGLE COCK
AND DIRT COLLECTOR

FIG. REF.NO.	DESCRIPTION	QTY.
1, 2, 3, 4, 5a, 5b, 5c, 6, 7	ISOLATING COCK 20 mm	6
2	PRESSURE REGULATOR	1
3	OIL SEPARATOR	1
4	AIR RESERVOIR 40 LT.	1
5a, 5b, 5c	PRESSURE GAUGE	3
6	BASE FOR CUT OFF ANGLE COCK	1
7	BASE FOR DIRT COLLECTOR	1

NOTE:- ALL PIPES ARE 20 NB.

0000000775

5. STORING:

After testing and overhauling the tested dirt collector must be stored in dry & clean space. It should be ensured that during storing & handling it does not get damaged. Inlet and outlet ports should be plugged with protective caps to prevent entry of dust and moisture inside the dirt collector.

6. PRECAUTIONS.

- 1 During removal from wagon, transportation or overhoul. damage to dirt collector should be prevented.

0000000776

101

OVERHAULING AND TESTING OF ANGLE COCK

1. DRAWINGS & SPECIFICATION

Following are the RDSO manufacturing Drgs. & Specification of Angle Cock:

- 1. General arrangement WD-88123-S-01
- 2. Details WD-88123-S-02
- 3. Specification Appendix-D of 02-ABR-94.

2. OVERHAULING (REFER FIG.15)

2.1 Dismantling

- .1 Open the nut & handle (item No. 11 & 6)
- .2 Open the Hexagonal bolts 4 Nos. (Item No.13)
- .3 Take out cap (Item 6) from body (Item No.1)
- .4 Take out stop plate (Item No.7) and Spring (Item No.8)
- .5 Remove rubber items 'O' Ring (Item No.12) seat (Item No.2) and 'O' Ring (Item No.4)

2.2 Clean all items properly

2.3 Replace following items and old should be scrapped.

O Ring - Item No. 12 & 4

Seat - Item No. 2 0000000777

2.4 Examination of following components

- .1 Cap for damage or damaged thread, seats for rubber items for proper cleaning and any sharp edge etc.

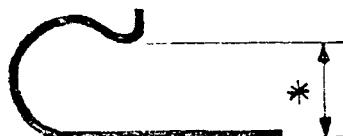
102 ~~475~~

102-0000000777

65

- .2 Body for damage or damaged thread, seats for rubber item for proper cleaning & any sharp edge etc.
- .3 Stem for damage or damaged thread.
- .4 Stop plate and handle for damage, crack etc.
- .5 Spring (Item No.8) for tension and any damage.

The dimension of spring as shown * should not be more than 12mm



- .6 Ball for any damage, and smoothness of surface. There should not be any dent mark on surface. Grooves should be free from damage or distortion

THE DAMAGED COMPONE~TS SHOULD BE REPLACED.

2.5 Assembly

- .1 Assemble Angle Cock in reverse manner of dismantling.
- .2 During assembly properly tighten the fasteners.
- .6 The Angle cock which are not manufactured as per RDSO design and are proprietary item of manufacture, the procedure of overhauling given in respective maintenance manuals supplied by manufacture may be followed. However the components covered in POH kits as given in Annexure must be replaced irrespective of condition during overhauling.

3. TESTING

Arrangement as shown in Fig. 28 shall be used for testings.

3.1 Follow the following procedure

- .1 Mount the angle cock on base (6).
- .2 Tighten the locking plug with seal on the out let of angle cock.
- .3 Close cock (1e).
- .4 Open cock (1a) & (1b).
- .5 Charge the reservoir (4) to 10kg/cm^2 .

- .6 Open cock (1c).
- .7 Check the pressure on gauge (5b), it should be 10kg/cm^2 .
- .8 Close cock (1e) and check leakage with soap solution and also pressure drop in gauge (5b). There should be no leakage.
- .9 Open cock (1d) and exhaust the pressure to zero.
- .10 Remove the angle cock from test stand.

4. EQUIPMENT FOR TESTING

Equipment as shown in fig. 28 shall be used for testing.

5. STORING

Overhauled and tested cut-off angle cock must be stored in dry and clean space. It should be ensured that during storing and handling it does not get damaged.

6. PRECAUTIONS.

- .1 Threaded portion of body and cap should not be damaged at the time of dismantling.
- .2 Ball should be handled carefully to avoid any damage on it's surface.
- .3 Inlet and outlet port should be plugged with protection cap to prevent entry of dust and moisture inside the cut-off angle cock.

0000000779

104

OVERHAULING AND TESTING OF AUXILIARY RESERVOIR

1. DRAWINGS AND SPECIFICATION.

Following are RDSO manufacturing drawing specification of auxiliary reservoir.

- 1.1 Auxiliary Reservoir 100 Lt. , WD - 92051 - S - 01
- 1.2 Auxiliary Reservoir 75 Lt. , WD - 92051 - S - 02
- 2. Specification Appendix-C of 02-ABR-94.

2. OVERHAULING: (REFER FIG. 14)

- 1 Remove the drain plug (item 3) and clean the auxiliary reservoir. Exterior should be cleaned by wire brush and interior by dry air jet after properly draining.
- 2 Examine for visual damages. The auxiliary reservoir having deep cuts on surfaces may be rejected.
- 3 Apply rust preventive on inside surface of reservoir.
- 4 Paint out side with Black enamel paint.
- 5 Examine drain plug and reject for damaged thread.
- 6 Replace leather washer (item-9)
- 7 Fit drain plug, Teflon tape over the drain plug should be used for making leak proof joint.
- 8 The auxiliary reservoir which are not manufactured as per RDSO' designs and are proprietary item of manufacturers, the procedure of overhauling given in respective maintenance manuals supplied by manufacturers may be followed.

0000000780

105

~~27~~
~~65~~

3. TESTING :

Auxiliary Reservoir are tested for leakages at 10 kg/cm^2 hydraulic & air pressure.

1. Test auxiliary reservoir for five minutes at 10 kg/cm^2 hydraulic pressure. Lightly hammer the welds. There should be no leakage from drain plug, weld joints & flange etc.
2. Retest with an air pressure of 10 kg/cm^2 and there should be no leakages.
3. In case of leakages repair to stop the leakages & retest.

4. EQUIPMENTS FOR TESTING :

1. Hydraulic pressure facility with 10 kg/cm^2 .
2. Air pressure facility at 10 kg/cm^2 .
3. Isolating cock for closing and opening.

5. STORING:

Auxiliary reservoir should be stored in such a way to prevent the following.

- a) Damages due to hitting each other.
- b) The flange surfaces should be prevented from damages.
- c) Out side paint should not be damaged.
- d) Dust and moisture should not go inside the auxiliary reservoir and the ports shall be closed with protection caps

6. PRECAUTIONS :

1. During removal from wagon, transportation or during overhaul, damage to auxiliary reservoir should be prevented. Any cut mark may result in failure in future.
2. Anti rust treatment should be carefully applied to inside so that all surfaces are covered.

OVER HAULING AND TESTING OF HOSE COUPLING

1. DRAWINGS & SPECIFICATION

Hose coupling assembly is purchased in accordance with the following drawings & specifications.

1. RDSO Drg. No. SK-73547
2. RDSO Specification Appendix F of 02-ABR-94

2. OVER HAULING (Refer fig. 16)

- 1 Visually inspect the general condition the coupling head, hose, nipple and quality of clamping (See Fig. 25 for checking serviceability of hose).
- 2 Coupling head and nipple damaged / badly corroded shall not be used. In that case the complete assembly of hose coupling shall be rejected.
- 3 Remove the gasket and thoroughly clean the coupling head specially the internal groove for housing gasket.

3. TESTING

- 1 Use a dummy coupling head to block the out let port of hose coupling.
- 2 Apply 10kg/cm² air pressure through the inlet.
- 3 Check the leakage through the gasket, and all over by immersing the assembly in a tub of water.
- 4 Observe no leakage.
- 5 In case of leakage through coupling head replace the gasket and test again.

0000000782

167 ~~78~~
71

- .6 If leakage persist even after change of gasket the coupling head is unserviceable and complete assembly shall be rejected.

4. EQUIPMENT FOR TESTING

- .1 Compressed air supply at 10kg/cm².
- .2 Tub for immersing the hose coupling assembly.
- .3 Dummy coupling head.

5. STORING

After testing, the hose assembly shall be stored in dry clean space. The inlet and out let ports must be plugged with protective cap to prevent entry of dust and foreign particles inside the hose coupling.

6. PRECAUTIONS

- .1 Hose shall not be assembled on coupling head and nipple if facilities such as crimping tools for clamping and testing the assembly for pull-off test are not available.

0000000783

OVER HAULING AND TESTING OF GUARDS EMERGENCY BRAKE VALVE

1. GENERAL INFORMATION

- 1.1 Guard's emergency brake valve is fitted in brake vans and M/s Escorts is the only supplier till now.
- 1.2 Guard' emergency brake valve is proprietary item of M/s Escorts and their part no. is 1210.
- 1.3 Purchase specification & drawings

RDSO Drawing No. SK - 73549

RDSO Specification Appendix -G of 02 - ABR-94.

2. OVERHAULING:

- 2.1 Clean the valve with the help of wire brush remove all dirt etc.
- 2.2 Dismantle the valve completely. Use procedure given in M/s Escorts Maintenance manual.
- 2.3 Replace following components

<u>Item</u>	<u>Escorts Part No.</u>
O - Ring	1002
Sealing Ring SA	1003
O - Ring	1005

VIBRATING

- 2.4 Examine other components for damage, cut etc. and replace as and when required on condition basis.
- 2.5 Examine housing (Part No. 1016) for damage thread etc.

109

0000000784

2.6 Assemble the valve using procedure given in M/s Escorts Maintenance Manual.

3. TESTING

For testing the procedure as covered in manufacturer maintenance manual be followed.

4. EQUIPMENTS FOR TESTING

Use equipments given in M/s Ecorts maintenance manual.

5. STORING

Assembled or disassembled valve should be stored in such a way to prevent the following:

1. Flange surface should be prevented from damages.
2. Inlet and outlet port should be plugged with protective caps to prevent the entry of dust and moiture inside the valve.

0000000785

OVER HAULING AND TESTING OF ISOLATING COCK

1. GENERAL INFORMATION

- 1.1 The isolating cocks (other than DV isolating cock) are not fitted with single pipe brake system of wagons except on brake van.
- 1.2 In brake van (BVZC), isolating cocks one fitted on air circuit of pressure gauge.

The Drawing & Specification are WD - 83062 - S - 04 & Appendix -I of 02 - ABR-94.

- 1.3 In reference to instructions contained in Railway Board's letter No. 85/M(N)/951/15 dated 26.11.93 . RDSO have issued instructions vide letter No. MW/APB/TP/M dated 3/6.12.93 to carryout modification in brake van to provide facilities for detachable pressure gauge. This arrangement requires an isolating cock and , the isolating cock which were used on feed pipe system was made use for this purpose.

Hence following make isolating cock may also be in service.

- .1 Greysham
- .2 RPIL
- .3 Stone India
- .4 SD Technical
- .5 WSF.
- .6 BBVL.

MURTHY

- 1.4 In new BVZC only Escorts make isolating cocks are fitted:

2.OVERHAULING

For overhauling, the procedure as covered in manufacturer's maintenance manual may be followed.

11
7

0000000186

ANNEXURE-VIII

3. TESTING

For testing, the procedure as covered in manufacturer's maintenance manual may be followed.

4. EQUIPMENT FOR TESTING

Use equipments given in M/s Escort's maintenance manual.

5. STORING

Isolating cock should be stored in such a way to prevent the following:

- 1 The flange surfaces should be prevented from damages.
- 2 Dust and moisture should not go inside the isolating cock.

0000000787

OVER HAULING AND TESTING OF LOAD SENSING DEVICE

1. GENERAL:

1.1 There are following four designs of load sensing devices in service (fitted in BOBR/BOBRN wagons).

- (a) Escorts designs
- (b) RPIL design
- (c) M/s. Greysham design with EST3f DV
- (d) M/s. Greysham design with C3W2 DV

1.2 For overhauling and testing of above designs which are proprietary to air brake manufacturers, follow the procedure given in Manufacturer's Maintenance Manual.

1.3 RDSO has designed a standard load sensing device in 1995. The future supply will be as per RDSO design. The overhauling and testing of RDSO design of load sensing device are given below:

2. DRAWINGS AND SPECIFICATIONS

1. SPRING BUFFER.

- 1. General arrangement Drg.No. WD-95030-S-13

2. OPERATING VALVE

- 1. General arrangement Drg.No. WD-95030-S-01

3. SPECIFICATIONS - APPENDIX-P OF 02-ABR-94.

0000000788

113

3. OVERHAULING

3.1 SPRING BUFFER (Refer Fig. 24)

- .1 Remove snap ring (item-5) carefully. Proper precaution to be taken against injury as components may come out due to spring force.
- .2 Remove all components from housing one by one .
- .3 Clean the metal parts by any cleaning agents. Housing to be cleaned by Soap Solution.
- .4 Examine components for demage, corrosion etc. Damaged components or heavily corroded housing may be replaced.
- .5 Examine threads on housing and tooth plate for damage. Replace if threads are damaged.
- .6 Examine spring for free height

The minimum free height = 225mm

Replace the spring if free height is less than minimum prescribed. Examine spring for surface defects i.e. cracks etc. and replace if defective.

- .7 Replace following components irrespective of condition.

Leaf spring item No.8

- .8 Examine fastners for damage or damaged thread and replace if damaged.
- .9 Assemble the spring buffer and properly secure snap ring.
- .10 Fasten toothed plate properly. Do not tighten the bolted joints fully untill the assembly is installed in the wagon.

0009000789

114

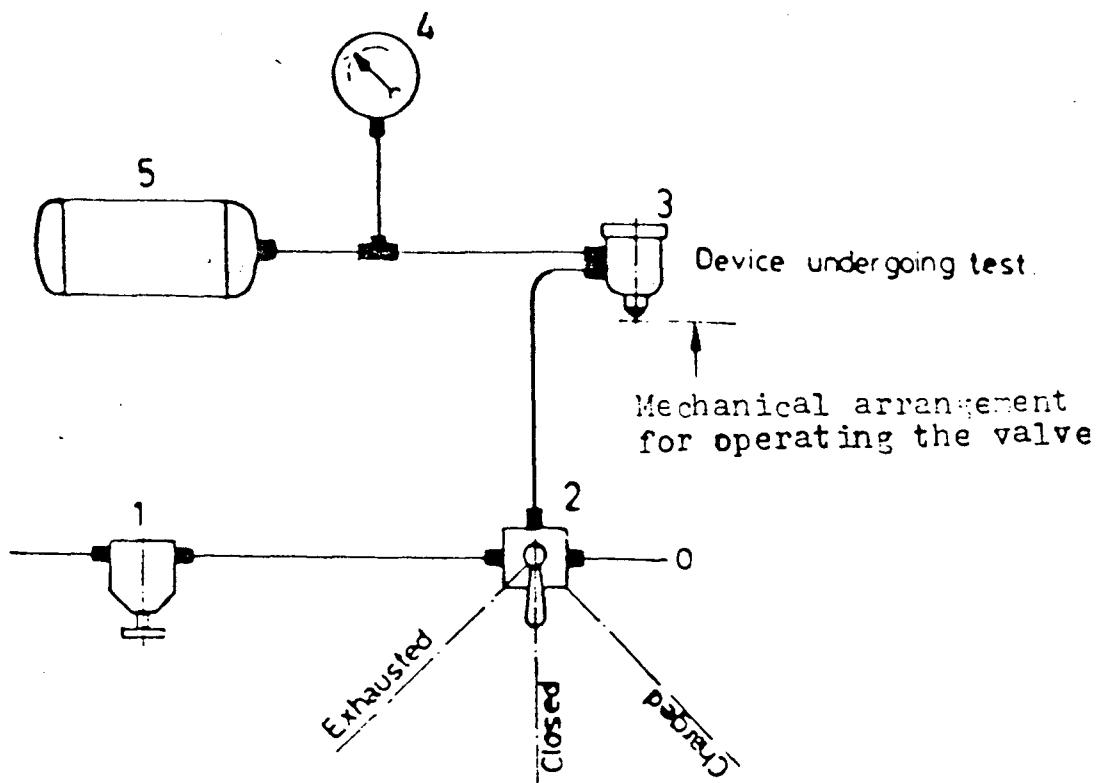


FIG.29

DIAGRAM OF TEST SET UP
FOR OPERATING VALVE

FIG. REF.NO.	DESCRIPTION	QTY.
1	PRESSURE REDUCING VALVE	1
2	MULTIWAY COCK	1
3	OPERATING VALVE	1
4	PRESSURE GAUGE	1
5	AIR RESERVOIR 1 Ltr.	1

115

0000000790

3.2 OPERATING VALVE (Refer Fig. 23)

- .1 Remove the dirt from assembly.
- .2 Remove circlip (Item -12) with proper precaution against injury.
- .3 Remove all components from the housing.
- .4 Clean all components by any cleaning solutions.
- .5 Filters should be cleaned by thinner or Kerosene and air blow.
- .6 Clean the housing by Soap Solution.
- .7 Examine all components for damage and replace damage components.
- .8 Housing should be examined for damaged thread,corrosion etc. Replace heavily corroded housing or housing having damaged thread.
- .9 Replace following irrespective of conditions
 - .1 Sealing ring item 3
 - .2 K-Ring item 4
- .10 Apply small quantity of grease to housing.
- .11 Assemble the housing carefully. Fit circlip (Item 12).

4. TESTING

4.1 Spring Buffer

The spring buffer may be tested for the following:

Minimum Stroke of cover 71mm before stop.

Minimum force against Cover retraction 22kg.

0000000791

116

~~88~~

75

75

4.2 Operating Valve: (Refer Fig. 23)

4.2.1 Leakage test

- 1 Mount the valve on the test rig and open cock (2). With valve unactuated no pressure should build up in pressure guage (4).
- 2 Bring the handle of the cock to charging position and operate the valve by means of mechanical arrangement. Charging of 1 litre reservoir (5) must take place within 10 ± 2 sec.
- 3 Close the cock (2). Keeping the valve in operative position. The pressure drop in 1 litre reservoir (5) shall not exceed 0.2 kg/cm^2 in one minute.

5. EQUIPMENT FOR TESTING

Equipment as shown in Fig. 29 may be used for testing.

6. STORING

Overhauled and tested spring buffer and operating valve must be stored in dry and clean space. It should be ensured that during storing and handling it does not get damaged.

7. PRECAUTION

- 1 Inlet and out of operating valve shall be plugged with protective caps to prevent entry of dust and moisture inside.

0000000792

**OVERHAULING AND TESTING
OF
PIPES, JOINTS & PIPE SUPPORT BRACKETS**

1. RDSO DRAWINGS AND SPECIFICATION

1.1 DRAWINGS

1.1.1 Pipe layout and pipe details:

S.No.	Wagons	Drg. Nos.
1	BOXN	WD - 80007 - S - 12 WD - 80007 - S - 11
2	BCN	WD - 84014 - S - 05 WD - 84014 - S - 08
3	BCNA	WD - 90030 - S - 71 WD - 90030 - S - 72
4	BRN	WD - 84013 - S - 05 WD - 84013 - S - 08
5	BOBRN	WD - 91071 - S - 74 WD - 91071 - S - 75
6	BTPN	WD - 86081 - S - 71 WD - 86081 - S - 72
7	BOY	WD - 81074 - S - 02 WD - 81074 - S - 04
8	BTPGLN	WD - 93047 S - 62 WD - 93047 S - 63
9	BOBR	WD - 86013 - S - 74 WD - 86013 - S - 75

.2 Pipe joints

- 1 WD - 83062-S-06
- 2 WD - 83062-S-07
- 3 WD - 94056-S-01

Note:-

The drgs. of flange welded joints is common to all type of wagons.

1.2 SPECIFICATION

RDSO Specification No. 04-ABR-94.

2. OVERHAULING:

1. Remove gasket from flange joints and scrap all the removed gaskets.
2. Clean the outsides of all pipes and joints.
3. Clean the inside of all pipes & joints by jet of dry air. All dust & other particles must be removed.
4. Examine all pipes for outside damage dents porosity etc.
5. Scrap the pipes having cuts and porosity.
6. Clean properly the gasket grooves of flange joints.
7. Examine all nut & bolts for damage . Scrap nut & bolts having damaged thread.
8. Paint outside.
9. Reclean the inside by dry air atleast for 5 minutes.
10. Plug the ends of pipe by protection caps. These caps should only be removed at the time of fitting and testing on wagons.

0000000794

3. TESTING:

TESTING ON PIPES AND JOINTS IS DONE FOR LEAKAGES
AT 10 kg/cm² AIR PRESSURE. AIR MUST BE DRY.

Testing to be done before removal and after refitment of pipes for
leakages.

4 EQUIPMENT FOR TESTING

- 1 Facility for dry compressed air at 10 kg/cm² pressure.

5. STORING:

- 1 Removed pipes should be kept and stored in set and should be fitted
on same wagon.
- 2 During storing & handling damage to pipe & flange joints should be
prevented.

6. PRECAUTIONS:

- 1 Pipes removed from the wagons only shall be refitted on the same
wagons.
- 2 All the gasket shall be new.

0000000795

120

85

ANNEXURE-XI

FOR OFFICAL USE

**BHARAT SARKAR
(RAIL MANTRALAYA)**

**PROCEDURE FOR CHECKING OF
DIESEL / ELECTRIC LOCOMOTIVE
HAULED AIR - BRAKED TRAINS**

M.P. GUIDE No. 11

OCTOBER 1987

ISSUED BY

ANUSANDHAN ABHIKALP AUR MANAK SANGATHAN

RAIL MANTRALAYA.

MUG 100

0000000796

121

88

PREAMBLE

The joint operating procedure contained in this guide is meant for checking air-braked trains consisting of BOXN / BCN wagons hauled by WDM2 diesel electric locomotives fitted with 28- LAV-1 brake system and WAG5 electric locomotives fitted with IRAVB-2/IRAB-9 brake system. While following these instructions it should be ensured that relevant CRs and SRs are followed along with specific operating instructions issued by zonal railways in force for a particular section.

The joint operating procedure contains the charging capacity and leakage rate specifications for locomotives and wagons and is based upon international specifications. Clarification should be obtained from Director General (Motive Power), R.D.S.O., Manak Nagar, Lucknow-226011.

000000797

122
~

1. INTRODUCTION

1.1 With the introduction of air-braked freight stock on Indian Railways it has become necessary to lay down detailed operating procedure for checking leakage rates in trains and for testing the charging capacity of locomotive to ensure that locomotive is capable of supplying adequate amount of air for charging brake pipe and feed pipes of the trailing stock. The detailed procedure for checking the locomotive and trains have been indicated in this Guide, which is applicable to locomotives and wagons.

Wagon stock on Indian Railways have been fitted with twin pipe graduated release system generally in conformity with UIC standards.

WDM2/WAG5 locomotives have been fitted with dual brake systems which make them capable of hauling both vacuum braked and air braked stock. WDM2 locomotives have been fitted with 28 LAV-1 twin pipe dual brake system and WAG5 locomotives with IRAVB-2 twin pipe dual brake system. Limited number of WAG5 E locos have been fitted with IRAB-9 pure air brake system.

1.2 Before proceeding with the checks indicated in para 2 ensure that the locomotive has been correctly prepared for hauling air braked stock as per operating manual No. MP 572/82 for WDM2 locos and operating manual No. MP 481/84 for WAG5 locos.

2. PROCEDURE FOR CHECKING CAPABILITY OF LOCOMOTIVES OR CHARGING/RELEASING OF TRAIN BRAKES.

N.B.: This test should be carried out on single locomotive if only one locomotive is used for hauling the train or on foremost loco of consist of locomotives unless otherwise stated.

1. Place the driver's automatic brake valve handle in emergency position.
2. In case of WDM2 diesel locomotives start the engine and in case of WAG5 electric locomotive start the compressors for building up of main reservoir pressure.

0000000798

123

■■■

- 3 Allow the main reservoir pressure to build up to the maximum stipulated limits for the particular type of locomotive. The relevant maximum stipulated pressure is given in Table - 1.

TABLE - I Pressure setting - (kg/cm²)

Valve	WDM2	WAG5
MAIN RESERVOIR CUT OUT PRESSURE	10±0.1	10±0.1
GOVERNOR SETTING CUT IN	8±0.1	8.5±0.1
MAIN RESERVOIR PRESSURE SAFETY VALVE SETTING	10.5 ±0.1	10.5 ±0.1

- 4 Close the angle cock for the brake pipe. Couple 7.5 mm diameter leak hole special test coupling fabricated to RDSO design SK.DP-2691 (Annexure-I) with the brake pipe coupling of the locomotive. In case of MU consist test coupling should be fitted on the rear most locomotive of the consist.
- 5 Move the driver's automatic brake valve handle from emergency position to release position to charge the brake pipe to 5 kg/cm².
- 6 Open the angle cock for the brake pipe. The brake pipe pressure should fall from 5 kg/cm².
- 7 Check the brake pipe pressure with the help of gauge fitted in the locomotive which should not fall below 4 kg/cm² within 60 seconds.
- 8 The test shall be carried out with the number of compressors considered adequate by the driver for operating the train.
- 9 Generally the number of compressors used shall be governed by the number of wagons hauled and the leakage rate. A general guideline is given in Table-II.

000000799

124

TABLE-II

Number of wagons in train.	Less than 50	50 - 80	80 - 90	90 - 100	More than 100	
Compressed air requirement in litres/min.		2000	3000	4000	5000	6000

3. PROCEDURE FOR CHECKING LEAKAGE IN THE TRAIN

- 1 Attach the locomotive to the train and couple brake pipes and feed pipes. Ensure correct coupling with brake and feed pipe in a manner that there is no leakage of air from coupled joints.
- 2 The coupling should be done with angle cocks in closed position.
- 3 Open the angle cocks of loco after coupling feed pipe and brake pipe.
- 4 Open the angle cock of the brake pipes and the feed pipes on all the wagons. Check for continuity of brake pipe and feed pipe by reducing and rebuilding brake pipe pressure and feed pipe pressure. The verification should invariably be carried out through the pressure gauge provided in Gaurd's Brake Van.
- 5 After the brake pipe pressure has stabilised in the locomotive and rear most vehicle to the level indicated in Table III move the driver's automatic brake valve handle towards application position to reduce the brake pipe pressure from 5 kg/cm^2 to 4 kg/cm^2 .

TABLE - III

BRAKE PIPE PRESSURE IN TRAIN (kg/cm²)

Length of the train	Loco	Last wagon
UP TO 56 BOXN WAGONS	5.0	4.8
BEYOND 56 BOXN WAGONS.	5.0	4.7

- .6 After the brake pipe pressure has been stabilised close the brake pipe isolating cocks provided between additional C-2 realy valve and brake pipe of the locomotive.
- .7 Wait for 60 seconds for temperature and gauge settlement then note the drop in pressure in the brake pipe gauge in the locomotive for five minutes.
- .8 The drop in brake pipe pressure gauge shall not be more than 0.25kg/cm² /min.
- .9 If the leakage rate is more than the value indicated in para 3.8 check for excessive leakage on individual wagon as indicated below:-
- 3.9.1 A hissing sound would be audible at points where leakage is heavy.
- 3.9.2 Once the hissing sound is heard from a particular area, pin point the location of leakage by applying soap water solution.
- 3.9.3 Use of permitted material viz. cotton tape arresting the leakage.
- 3.10 In case leakage is heavy and cannot be arrested the wagon may have to be isolated/detached.
- 3.11 In case where leakage can be arrested temporarily by tape and the nature of leakage is such that it requires attention at Primary Depot. clear marking on the wagon should be to draw attention of Primary Depot., for adequate attention.

0000000801

3.12 In case the leakage is from the distributor valve and cannot be arrested, isolation of the wagon can be carried out by closing the distributor valve isolating cock. In such condition clear marking should be provided on the wagon to indicate this defect to primary depot. Do not close brake pipe/feed pipe angle cocks under any circumstances, either for isolation of wagons or for any purpose whatsoever, except for carrying out shunting operation after which the angle cocks should again be opened to ensure continuity of brake pipe and feed pipe.

4. PROCEDURE FOR CHECKING LEAKAGES IN FEED PIPE (See note 1)

- 1 Couple the locomotive feed pipe with the first vechicle of the train.
- 2 Open all the angle cocks of the feed pipe at the coupled end of locomotive as well as in all the wagons.
- 3 Check for countinuity of the feed pipe by checking the feed pipe pressure in the Guard's Brake Van.
- 4 After the feed pipe pressure gauge needle has stabilised in the locomotive and rear most vechicle to the levels indicated in Table-IV close the isolating cock in the locomotive provided between feed valve and the feed pipe.

TABLE-IV

FEED PIPE PRESSURE IN TRAIN (kg/cm²)

length of train	loco	last wagon
UPTO 56 BOXN WAGONS	6.0	5.8
BEYOND 56 BOXN WAGONS	6.0	5.7

- 5 Wait for 60 seconds and note the drop in pressure in feed pipe for 5 mintues

- .6 The drop in feed pipe pressure should not be more than 0.25 kg/cm²/minutes as indicated by feed pipe pressure gauge in the locomotive.

5. BRAKE CYLINDER OPERATIVE PERCENTAGE

- .1 The trains originating from Primary Depot should have a brake cylinder operating percentage of 100%. (see note No.2)
- .2 Under no circumstances the brake cylinder operative percentage should fall below 90% enroute (see note No.2).
- .3 Train examination staff should check the operative percentage by observing gripping of brake blocks on wheels.

6. PROCEDURE TO BE FOLLOWED AT WAYSIDE

- .1 If the leakage rate is found more than the value indicated in para 3.8 locate the source and arrest the leakage as per the procedure given in para 3.9.
- .2 In case the leakage can be arrested temporarily by tape and the nature of leakage is such that it requires attention at Primary Depot clear marking on the wagon should be done to draw the attention of Primary Depot. for adequate attention.
- .3 In case the leakage is from distributor valve follow the procedure given in para 3.12.
- .4 In case the leakage is heavy and can not be arrested and wagon has to be detached, contact the control and obtain further advice.
- .5 In case the brake cylinder operative percentage is found less than the prescribed limit of 90% contact the control and obtain further advice. (See note 2)

NOTE:- (Note part of MP-11)

1. As per Railway Board letter No. 85/ M (N) /951/15 Dt. 20.8.1992. Twin pipe brake system has been discontinued and the present standard is single pipe system.

✓ 000000803

2. The contents of Railway Board letter No. 94/M(N)/951/57 Dt. 20.9.1995.regarding originating brake power of the air braked goods train is reproduced bellow.

“ It is clarified that the minimum originating brake power for air braked goods trains running on end to end pattern of examination shall be 85% except wherever local restrictions have specified higher levels of brake power to meet specific requirements. Exception shall only be made after prior personal approval of Chief Rolling Stock Engg. has been obtained for each individual .”

129

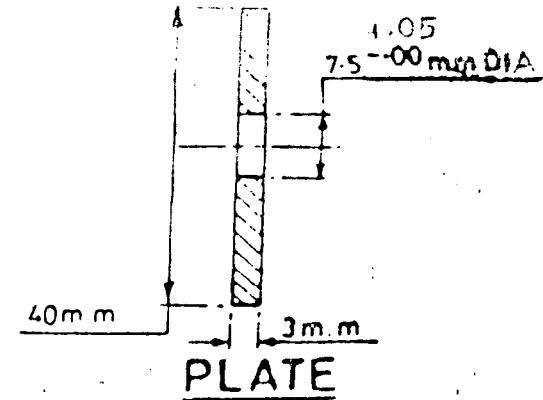
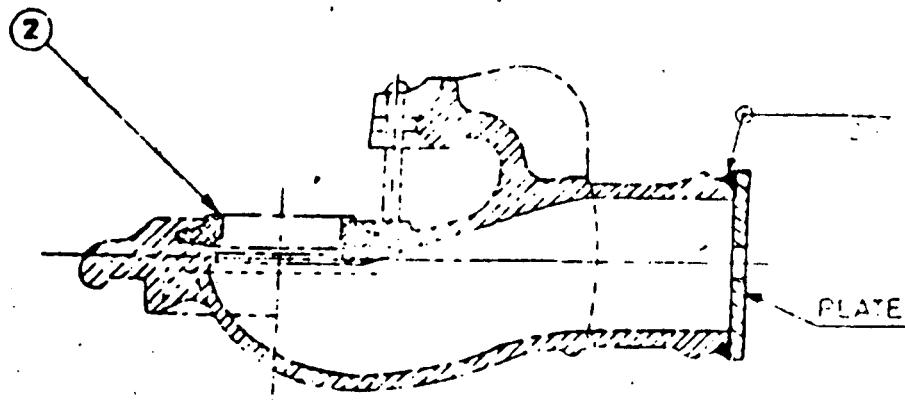
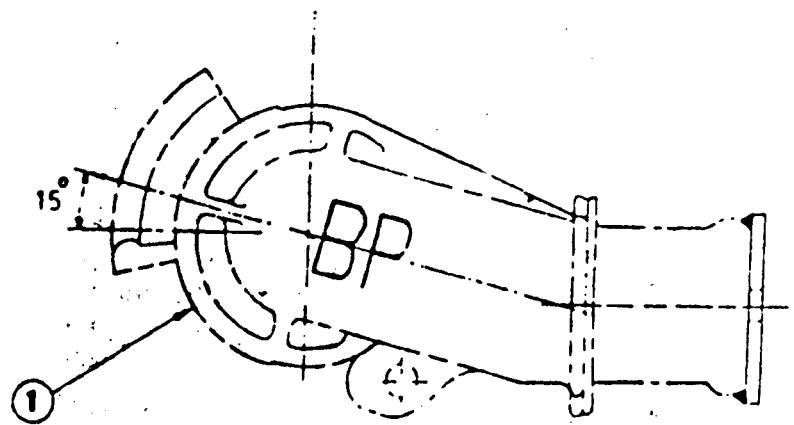
000000804

132

0000000005

NOTE—

- COUPLING HEAD(ITEM 1) SHALL BE PAINTED WITH MID BRUNSWICK GREEN PAINT TO IS: C NO 226 OF IS:5 AND READY MIXED FAINT TO IS:119.
- TEST PRESSURE 10kg/cm²



ITEM	DESCRIPTION	NO OF PART NOS
2	SEALING WASHER	1
1	COUPLING HEAD (BP)	1

COUPLING FOR TESTING LOCO.

BRAKE VALVE CAPACITY

R.D.S.O

SK.DP-2691

PROCEDURE FOR SINGLE WAGON TESTING

A Schematic lay-out of Single Wagon Test Rig (SWTR) is shown in fig 30. This SWTR is utilised for testing the air brake system fitted on single wagon. The wagon should not be connected with the locomotive at the time of testing. The following procedure shall be followed for testing.

- 1 The wagon under testing is to be coupled at one end with the SWTR coupling head BP and the other end should be closed with dummy coupling head. Pressure gauge should be fitted on brake cylinder.
- 2 Couple the SWTR to the main line of compressor.
- 3 Place the isolating cock of distributor valve on the wagon in open position i.e. the handle should be vertically down wards.
- 4 Set the pressure reducing valve (1) to 5 ± 0.1 kg/cm² Open the cocks (2) and (8) and so the angle cocks on the both ends of the wagons. Move the driver's brake valve (3) in the charging and release position.
- 5 Wait for about 5 minutes to charge the complete system.
- 6 Check the pressure in BP pressure gauge (7). Pressure should be 5 ± 0.1 kg/cm² in BP. If there is pressure drop in the gauge (7) detect the source of leakage and eliminate it.
- 7 Close cocks (2) and (8) and check the leakage on BP for one minute.
- 8 Open cock (2). Bring Driver's brake valve in full service application position.
- 9 Record the brake cylinder filling time from 0 to 3.6 kg/cm² in brake cylinder pressure gauge.
- 10 Record maximum pressure in brake cylinder.

0000000806

- .11 Record the pressure drop in BP from pressure gauge (4).
- .12 Record the piston stroke of brake cylinder.
- .13 Bring Driver's brake valve in the charging and release position.
- .14 Record the brake cylinder draining time from 3.8 ± 0.1 to 0.4 kg/cm^2 in brake cylinder pressure gauge & check complete release of brakes i.e. piston should reach its initial position.
- .15 Open cock (8) for charging the reservoirs to 5 kg/cm^2 and close cock (2).
- .16 Open cock (6) for checking sensitivity of brakes. Record time with in which brakes get applied.
- .17 Close cock (6) and open cock (2). Wait till brakes are released.
- .18 Close cock (2) and open cock (7) for checking the insensitivity of brakes. The brakes should not apply.
- .19 Close cock (7) and (8) and open cock (2) , BP pressure should rise to 5 kg/cm^2 .
- .20 Close cock (2) and open cock (5) for emergency application.
- .21 Record the brake cylinder charging time from 0 to 3.6 kg/cm^2 in BC pressure gauge.
- .22 Record maximum BC pressure.
- .23 Check the leakage in BC for 5 minutes.
- .24 Pull the manual release lever of distributor valve for about 10 sec. Brake cylinder pressure should become zero automatically.
- .25 The above tests should be done in both empty and loaded condition.
- .26 The results of test shall be recorded in the test proforma attached herewith.

000000807

8080000000000000

FIG. REF. NO.	DESCRIPTION	QTY.
1	PRESSURE REDUCING VALVE	1
2	ISOLATING COCK 15 mm	1
3	DRIVERS BRAKE VALVE	1
4	PRESSURE GAUGE FOR BP	1
5	ISOLATING COCK 15 mm	1
6	ISO.COCK 15 mm WITH CHOKE	1
7	ISO.COCK 15 mm WITH CHOKE	1
8	ISOLATING COCK 15 mm	1
9	AIR RESERVOIR 40 L	1
10	FLEXIBLE HOSE BP 1M LONG	1
11	CHECK VALVE 15 mm	1
12	ISOLATING COCK 15 mm	1
13	ADAPTER FOR AR	1
14	ADAPTER FOR CR	1
15	ADAPTER FOR BC	1
16	FLEXIBLE HOSE 10 mmx2M LONG	3
17	PRESSURE GAUGE	3
18	TROLLY (NOT SHOWN)	1

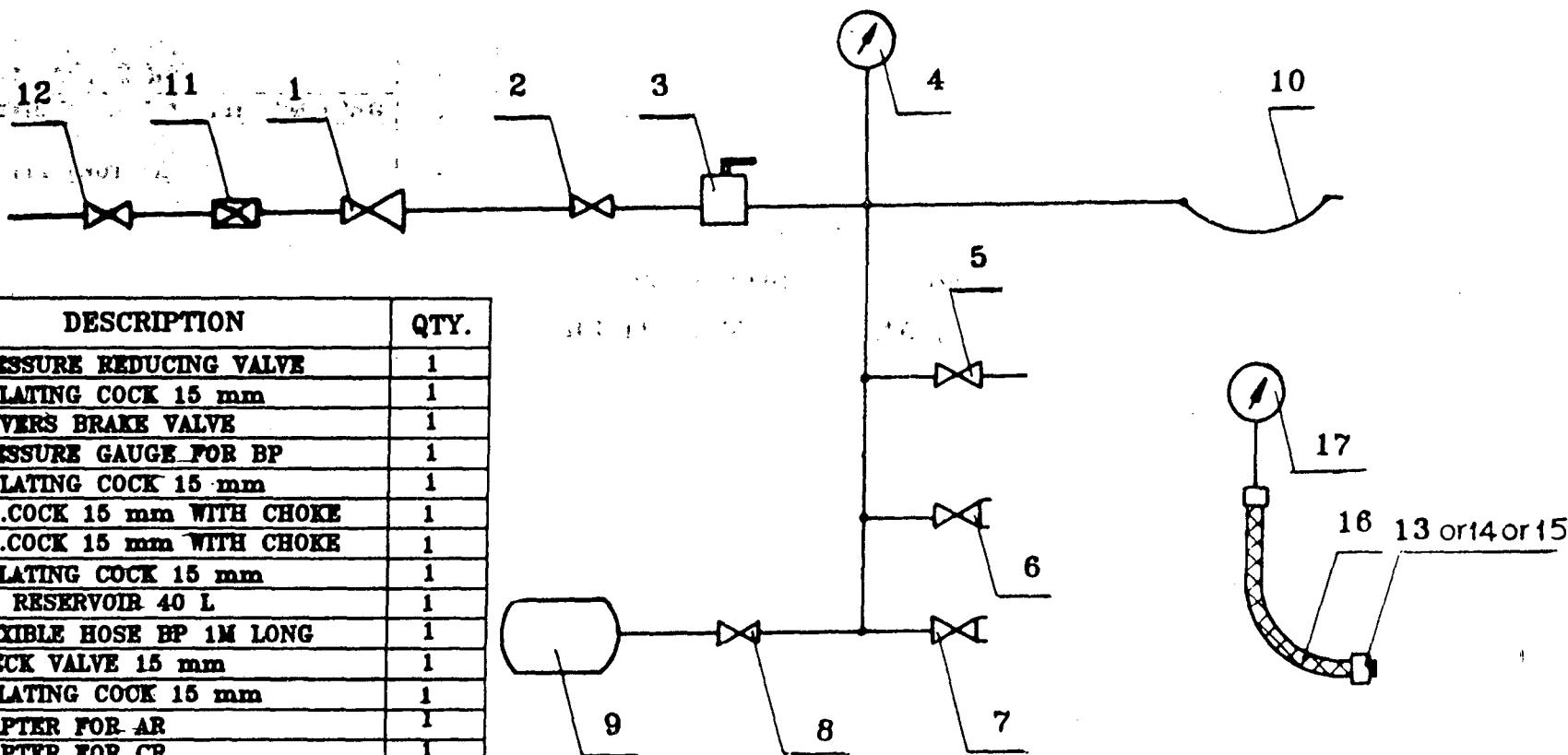


FIG.30

SCHEMATIC LAYOUT OF
SINGLE WAGON TEST RIG (SWTR)

**PROFORMA FOR SINGLE WAGON TEST FOR WAGONS OTHER
THAN BOBR/BOBRN**

S.No.	Check	Specified
	Actual	
1.	Pressure in BP	$5 \pm 0.1 \text{ kg/cm}^2$
2.	Pressure in AR	$5 \pm 0.1 \text{ kg/cm}^2$
3.	Leakage from the system after charging.	0.1 kg/cm^2 in one minute
4.	Full service application.	
4.1	Brake cylinder filling time (Pressure rise from 0 to 3.6 kg/cm^2)	
	a) Empty	18 to 30 sec.
	b) Loaded	18 to 30 sec.
4.2	Maximum brake cylinder pressure	
	a) Empty	$3.8 \pm 0.1 \text{ kg/cm}^2$
	b) Loaded	$3.8 \pm 0.1 \text{ kg/cm}^2$
4.3	Reduction in BP pressure required for full service application.	1.3 to 1.6 kg/cm^2
5.	Release after full service application.	
5.1	Draining time (Brake cylinder pressure to fall from $3.8 \pm 0.1 \text{ kg/cm}^2$ to 0.4 kg/cm^2).	45 to 60 sec.
6.	Sensitivity of brakes Isolate brake pipe from mainline. Check the response of brakes when the brake pipe pressure is reduced at the most equal to 0.6 kg/cm^2 in 6 sec.	Brake should apply within 6 sec.

0180000000

134

0000000809

ANNEXURE-XII

7. Insensitivity of brake. Isolate brake pipe from mainline. Check the response of brakes when brake pipe pressure is reduced at least equal to 0.3 kg/cm^2 in 60 seconds. Brake should not apply.
8. Emergency application.
- 8.1 Brake cylinder filling time (Pressure to rise from 0 to 3.6 kg/cm^2)
- a) Empty 18 to 30 sec.
- b) Loaded 18 to 30 sec.
- 8.2 Maximum brake cylinder pressure.
- a) Empty $3.8 \pm 0.1 \text{ kg/cm}^2$.
- b) Loaded $3.8 \pm 0.1 \text{ kg/cm}^2$.
9. Piston stroke
- a) Empty See note below
10. Leakage from brake cylinder after emergency application 0.1 kg/cm^2 within 5 minutes.
11. Automatic exhausting of brake cylinder and control chamber
12. Apply emergency brakes (i.e. $\text{BP} = 0 \text{ kg/cm}^2$). Check the brake cylinder pressure after giving a brief pull to release hook. Brake cylinder and control reservoirs should exhaust automatically

Date

0800000810

Signature & Name of testing authority

ANNEXURE-XII

Note: The piston strokes for different types of wagons shall be as given below.

S.No.	Type of wagons	Piston Stroke	
1.	BOXN, BCN/BCNA, BRN, BTPGLN.	Empty	85 ± 10 mm.
		Loaded	130 ± 10 mm.
2.	BTPN.	Empty	87 ± 10 mm.
		Loaded	117 ± 10 mm.
3.	BOY	Empty	90 ± 10 mm
		Loaded	135 ± 10 mm.
4.	BVZC	=	70 ± 10 mm

000000811

136

PROFORMA FOR SINGLE WAGON TEST FOR BOBR / BOBRN WAGONS

S.No.	Check	Specified
	Actual	
1.	Pressure in BP	$5 \pm 0.1 \text{ kg/cm}^2$
2.	Pressure in AR	$5 \pm 0.1 \text{ kg/cm}^2$
3.	Leakage from the system after charging.	0.1 kg/cm^2 in one minute
4.	Full service application.	
4.1	Brake cylinder filling time (Pressure rise from 0 to 3.6 kg/cm^2)	
	a) Empty	18 to 30 sec.
	b) Loaded	18 to 30 sec.
4.2	Maximum brake cylinder pressure	
	a) Empty	$2.2 \pm 0.25 \text{ kg/cm}^2$
	b) Loaded	$3.8 \pm 0.1 \text{ kg/cm}^2$
4.3	Reduction in BP pressure required for full service application.	1.3 to 1.6 kg/cm^2
5.	Release after full service application.	
5.1	Draining time (Brake cylinder pressure to fall from $3.8 \pm 0.1 \text{ kg/cm}^2$ to 0.4 kg/cm^2 .)	45 to 60 sec.
6.	Sensitivity of brakes. Isolate brake pipe from mainline. Check the response of brakes when brake pipe pressure is reduced at the most equal to 0.6 kg/cm^2 in 6 sec.	Brake should apply within 6 sec.

0000000812

ANNEXURE-XII

7. Insensitivity of brake. Isolate brake pipe from mainline. Check the response of brakes when brake pipe pressure is reduced at least equal to 0.3 kg/cm^2 in 60 seconds. Brake should not apply.
8. Emergency application.
- 8.1 Brake cylinder filling time
(Pressure to rise from 0 to 3.6 kg/cm^2)
- | | |
|-----------|---------------|
| a) Empty | 18 to 30 sec. |
| b) Loaded | 18 to 30 sec. |
- 8.2 Maximum brake cylinder pressure.
- | | |
|-----------|--------------------------------|
| a) Empty | $2.2 \pm 0.25 \text{ kg/cm}^2$ |
| b) Loaded | $3.8 \pm 0.1 \text{ kg/cm}^2$ |
9. Piston stroke
- | | |
|-----------|-------------------------|
| a) Empty | $100 \pm 10 \text{ mm}$ |
| b) Loaded | $110 \pm 10 \text{ mm}$ |
10. Leakage from brake cylinder after emergency application. 0.1 kg/cm^2 within 5 minutes.
11. Automatic exhausting of brake cylinder and control chamber.
- 11.1 Apply emergency brakes (i.e. $BP = 0 \text{ kg/cm}^2$). Check the brake cylinder pressure after giving a brief pull to release hook. Brake cylinder and control reservoirs should exhaust automatically

Date

0003000813

Signature & Name of
Testing Authority.

Procedure for detaching a wagon:

1. The driver must place and maintain the automatic air brake valve in the EMERGENCY position until the uncoupling operation is completed.
2. The brake pipe cut-off angle cock on the locomotive and first wagon or between wagons must be closed and then the brake pipes hose couplings uncoupled.
3. The hose coupling heads of brake pipe must be placed on the hose coupling supports.
4. The brake pipe cut off angle cocks on both wagons at the point of division must be opened in order to ensure that the brakes are applied.
5. After uncoupling the centre buffer coupler, the brake pipe cut off angle cocks on both wagons must be closed.

Procedure to isolate the brake on a wagon

1. Move the Distributor isolating cock handle from vertical to the horizontal position (i.e. close the DV isolating cock).
2. Pull the manual release hook in the distributor valve to release the brake.

000000081

139

POH KIT FOR KEO DISTRIBUTOR VALVE

S.No.	Description	KNORR BREMSE *	ESCORTS	No.off per set
		Drg.No.	Part No.	
1.	Filter	4A95867	4	1
2.	Sealing Ring	4A27763/13	5	1
3.	Valve Plate	4B58167	19	1
4.	"O"-Ring	4A27763/14	12	1
5.	Diaphragm	4B67908	16	1
6.	Seal	3B67907	19	1
7.	Grooved Ring	4A18294/8	23	2
8.	Seal	4A30826	26	1
9.	Sealing Ring	4A27763/12	27	1
10.	Diaphragm	4A26918	31	1
11.	Valve Head	4A30509	33	3
12.	Grooved Ring	4A18294/17	35	4
13.	Flat Sealing Ring	4A31340/1	36	1
14.	Flat Sealing Ring	-	42	1
15.	Sealing Ring	4A27763/15	44	1
16.	Sealing Ring	4A27763/16	46	1
17.	Flat Sealing Ring	4A31340/3	47	3
18.	Grooved Ring	4A18294/5	49	2
19.	Control Sleeve	4B58159	53	1
20.	"K"-Ring	N894/06.8	54	1
21.	Supporting Ring	4A88407	55	1
22.	Valve Plate	4B58168	56	1
23.	Toothed Ring	-	57	2
24.	Valve Head	4A31334	65	1
25.	Diaphragm	3A30507	69	1
26.	Fine Filter S.A.	4B63336	72	1
27.	Flat Sealing Ring	4A31340/2	75	1
28.	Seal	3B69999	77	1

0000000815

ANNEXURE - XIII/1

S.No.	Description	KNORR BREMSE Drg.No.	ESCORTS Part No.	No.off per set
29.	Sealing Ring	4A27763/9	85	2
30.	Diaphragm	4A30487	99	1
31.	"K"-Ring	4B53653	101	1
32.	Grooved Ring	1A18294/39	103	1
33.	Filter	4B40415	118	1
34.	Flat Sealing Ring	4A31340/8	127	1
35.	Valve Rod	3B64806	129	1
36.	Sealing Cap	4B25854	133	1
37.	Flat Sealing Ring	4A31340/12	140	1
38.	Seal	4A31653	142	1
39.	Flat Sealing Ring	4A31340/14	148	1
40.	Valve Tappet	3B61808	149	1
41.	Sealing Ring	4A27763/10	170	3
42.	Seal	3B28281	174	1

* This office letter number MW/APB/STD dated 8/13-2-96 may be referred.
The confirmation regarding interchangeabilities of components of DV's
from two different manufacturers will be advised separately.

0000000816

141

ANNEXURE - XIII/2

**POH KIT FOR AIR BRAKE EQUIPMENTS OTHER
THAN DV SUPPLIED BY M/s ESCORTS**

.....

S.No.	Description	Part No.	Fig.No.	No. off per set
-------	-------------	----------	---------	-----------------

I. PIPE BRACKET

1.	Seal	192	6	1
2.	Seal	196	6	1
3.	"O"-Ring	182	6	1

II. BRAKE CYLINDER 355 mm.

1.	Filter	515	12	1
2.	Sealing Ring A 21 x 26	523	12	1
3.	Piston Rubber Packing 14"	539	12	1
4.	Filter Cover	514	12	1

III. GUARD'S EMERGENCY BRAKE VALVE

1.	"O"-Ring	1002	17	1
2.	Sealing Ring	1003	17	1
3.	"O"-Ring	1005	17	1

IV. BRAKE CYLINDER 300 mm

(For BVZC Wagons)

1.	Filter	515	11	1
2.	Piston Rubber Packing 12"	517	11	1
3.	Sealing Ring A 21 x 26	523	11	1

142

0000000817

ANNEXURE - XIII/2

S.No.	Description	Part No.	Fig. No.	No. off per unit
-------	-------------	----------	----------	------------------

V. DIRT COLLECTOR

1.	Sealing Ring	1052	19	1
2.	Gasket	1054	19	1

VI. CUT-OFF ANGLE COCK

1.	Sealing Ring	853	14	1
2.	Sealing Ring	856	14	1

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S ESCORTS and are in service.

2. Refer M/S ESCORTS Description & Maintenance Manual 1994 Edition for figures.

0000000818

108
143

ANNEXURE - XIII/3

POH KIT FOR C3W DISTRIBUTOR VALVE

.....

S.No.	Description	WABCO Part No.	Fig. No.	Item No.	No.Off Per set
1.	Diaphragm	19185800	3	6	1
2.	Diaphragm	19184900	3	7	1
3.	Lip Seal	70581800	3	24	2
4.	'O'-Ring	70523903	3	32	5
5.	Valve body Assy	19022000	3	37	1
6.	'O'-Ring	70524914	3	36	1
7.	'O'-Ring	70501278	3	9	2
8.	'O'-Ring	70513278	3	4	1
9.	'O'-Ring	70513478	3	5	1
10.	'O'-Ring	70501178	3	29	1
11.	'O'-Ring	70481903	3	15	1
12.	Check Valve	19187400	3	11	1
13.	Check Valve	19187300	3	18	1
14.	Sealing Ring	19187900	3	20	2
15.	Seal	19196400	5	83	1
16.	Diaphragm	18301900	5	77	1
17.	Valve Assy.	19194200	5	75	1
18.	Jet valve Assy.	18988800	5	68	1
19.	Valve Assy.	18988700	5	71	1
20.	'O'-Ring	70521578	5	80	1
21.	'O'-Ring	70521203	5	81	1
22.	'O'-Ring	70525578	5	45	1
23.	'O'-Ring	70525278	7	226	1
24.	Valve	19011600	7	223	1
25.	Valve Assy.	19011500	6	43	1
26.	Diaphragm	19189400	6	214	1
27.	Seal	19191400	6	208	1

144

0000000819

ANNEXURE - XIII/3

S.No.	Description	WABCO Part No.	Fig. No.	Item No.	No.of per set
28	Valve Assy.	19191700	6	204	1
29	Seat	70581700	6	218	2
30.	'O'-Ring	70516478	6	210	1
31.	'O' Ring	70512878	6	211	1
32.	'O' Ring	70509178	6	205	1
33.	Washer	19192001	6	57	1
34.	Cap	19192100	6	58	1
35.	'O'-Ring	70037803	6	213	1
36.	Valve Assembly	19192301	6	59	1
37.	Main gasket	11746000	8	35	1
38.	'O'-Ring	70503302	8	50	1
39.	Filter	19181001	8	33	1
40.	Filter	78768600	8	47	1

0000000820

145

ANNEXURE -XIII/4

**POH KIT FOR AIR BRAKE EQUIPMENTS
OTHER THAN DV SUPPLIED BY
M/s STONE INDIA LIMITED**

S.No.	Description	Part No.	Fig. No.	Item No.	No.Off Per.set
-------	-------------	----------	----------	----------	----------------

I. COMMON PIPE BRACKET - FIG. AT PAGE 7 OF MANUAL

1.	Common pipe bkt.Gasket	08276481	Page 7	2	1
2.	Valve Gasket	08480121	Page 7	6	1
3.	'O' Ring Gasket	08287521	Page 7	8	1
4.	Gasket	08288901	Page 7	15	1

II. ISOLATING COCK FOR DV.- FIG. AT PAGE 8 OF MANUAL

1.	'O'-Ring	08270364	Page 8	4	2
2.	Valve assembly	08379721	Page 8	5	1
3.	Ring Gasket	08082241	Page 7	27	2

III. BRAKE CYLINDER - FIG. AT PAGE 12 OF MANUAL

1.	Piston Cup	08082441	Page 12	19	1
----	------------	----------	---------	----	---

IV. CUT OF ANGLE COCK-FIG. AT PAGE 14&15 OF MANUAL

per unit

1.	Valve Seat	08279441	Page 14&15	8	2
2.	'O'-Ring'	08279921	,,	13	1

ANNEXURE - XIII/4

S.No.	Description	Part No.	Fig. No.	Item No.	No. off per unit
-------	-------------	----------	----------	----------	------------------

V. CENTRIFUGAL DIRT COLLECTOR - FIG. AT PAGE 22 OF MANUAL.

1.	Gasket	08277641	Page 22	3	1
2.	Filter assembly	08591501	„	8	1
3.	'O'-Ring	08482632	„	9	1

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S STONE INDIA Ltd. and are in service.

2. Refer Maintenance Manual issued by M/s Stone INDIA Ltd. for figures.

0000000822

**POH KIT FOR AIR BRAKE EQUIPMENT
OTHER THAN DV SUPPLIED BY
M/s RAILWAY PRODUCTS (INDIA) LIMITED.**

.....

No.	Description	Part No.	Fig. No.	Item No.	No.Off Per.set
-----	-------------	----------	----------	----------	----------------

I. COMMON PIPE BRACKET

1.	Common pipe Gasket	601702000	4	2	1
2.	Joint	501710000	4	6	1
3.	Sealing Ring	604701000	4	8	1
4.	Gasket	601703000	4	15	1

II. ISOLATING COCK FOR DV.

1.	'O'-Ring	603701000	5	4	2
2.	Valve	603401000	5	5	1
3.	'O'-Ring	501708000	4	26	2

III. BRAKE CYLINDER

1.	Piston Lining	606702000	11 & 12	6	1
2.	Joint (Type 6)	606701000	12 & 13	14	1

IV. CUT OFF ANGLE COCK

			per unit	
Ball Seat	607701000	24	5	2
Gland Packing	607602000	24	8	2

ANNEXURE -XIII/5

S.No.	Description	Part No.	Fig. No.	Item No.	No. off per unit
-------	-------------	----------	----------	----------	------------------

V. CENTRIFUGAL DIRT COLLECTOR

1.	Gasket	609701000	7,8 & 9	7	1
2.	'O' Ring	501704000	9	9	1

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S RAILWAY PRODUCTS (INDIA) Ltd. and are in service.

2. Refer Maintenance Manual issued by M/S RAILWAY PRODUCTS (INDIA) Ltd. for figures.

0000000824

**POH KIT FOR AIR BRAKE EQUIPMENT OF
M/S S.D.TECHNICAL SERVICES LTD.**

S.No.	Description	Phamlet No.	Fig. No.	Ref. No.	Part No.	No. off per sei
-------	-------------	-------------	----------	----------	----------	-----------------

1. DISTRIBUTOR VALVE TYPE P4aG & ISOLATING COCK FOR DV.

1.	Valve Seat, Charging Check Valve	SDA-795/2SB	1	2,41	J71811/2	1
2.	Ball Seat	..	1	3	J75871/8	1
3.	Strainer Disc	..	1	6	J74173/2	1
4.	Retainer Plug	..	1	7	J70526/55	1
5.	Inlet/Exhaust Valve	..	1	8	J75933/20	1
6.	Gasket	..	1	9	J74688/1	
7.	'O'-Ring	..	1	11,57	J72070/19	2
8.	'O'-Ring	..	1	14	J72070/17	1
9.	Limiting Valve	..	1	16	J75171/3	1
10.	Inshot Valve	..	1	20	A87561/24	1
11.	'O'-Ring	..	1	21	J72070/22	1
12.	'O'-Ring	..	1,2,3	25,76,	J72070/20	5
					89,138,147	
13.	'O'-Ring	..	1	26	J72070/29	1
14.	Control/Release/ Initial charging valve	..	1&3	28,139	J75171/1	3
				& 146		
15.	Diaphragm	..	1	35	B79464/7	1
16.	Quick Service Cut Off Valve	..	1	44	A87561/1	1
17.	Gasket	..	1	45	J74687/1	1
18.	Strainer Disc	..	1,2,	55,92,	J74173/7	5
			3&4	154,162,173		
19.	Quick Service Valve	..	1	58	J74662/1	1
20.	Valve Cap	..	1	29	J75174/3	1
21.	Circlip	..	1	48	J70517/1	1
22.	'O'-Ring	..	2	70	J72070/18	1

ANNEXURE-XIII/6

S.No.	Description	Pamphlet No.	Fig. No.	Ref. No.	Part No.	No. off per set
23.	Circleclip	..	2	73&96	J70517/25	2
24.	Diaphragm	..	2	98	B79463/2	1
25.	Diaphragm	..	2	99	B79462/1	1
26.	Restrictor Valve	..	2	105	B74678/1	1
27.	Strainer Disc	..	2	107	J74173/1	2
28.	'O'-Ring	..	2	108	J74220/1	2
29.	Bonded Seal	..	2	111	J70502/6	1
30.	Gasket	..	3	122	B80312/1	1
31.	Diaphragm	..	3	123	J75929/1	1
32.	'O'-Ring	..	3	126	J72070/36	2
33.	'O'-Ring	..	3	133	J72070/21	1
34.	Bonded Seal	..	3	119	J70502/12	1
35.	Valve Seat	..	3	142	J75871/1	1
36.	Gasket	..	4	175	J75628/1	1
37.	'O'-Ring	..	4	177	J72070/33	1
38.	Diaphragm	..	4	183	J74639/1	2

II. COMMON PIPE BRACKET

1.	Gasket	SDA-795/25B	5	212	J74647/1	1
2.	'O'-Ring	..	5	219	J72070/40	1
3.	'O'-Ring	..	5	232	D76151/207	1
4.	Gasket	..	5	237	B81844/001	1

III. BRAKE CYLINDER

1.	Piston Packing	SDA-545/74	1	4	SD-824-08	1
2.	Wear Ring	..	1	5	SD-828-09	1

0000000826

ANNEXURE-XIII/6

S.No.	Description	Pamphlet No.	Fig. No.	Ref. No.	Part No.	No.off per unit
-------	-------------	--------------	----------	----------	----------	-----------------

IV. CUT OFF ANGLE COCK

1.	Vent Seal	SUB-A-534/7	3	6	CC-106	1
2.	Valve Seat		3	17	CC-118	1

NOTE: 1. The POH KIT given above pertains to items which are proprietary to M/S S.D.TECHNICALS and are in service.

2. Refer Maintenance Manual issued by M/S S.D.TECH. for figures and drawings.

0000000827

ANNEXURE - XIII/7

**POH KIT FOR AIR BRAKE EQUIPMENT OF
M/S GREYSHAM & CO.**

.....

S.No.	Description	Part Drg. No.	Assembly Drg. No.	Ref. No.	No.Off Per.set
I. DISTRIBUTOR VALVE - TYPE EST 3F.					
1.	Control Diaphragm	G/006/3	G/AB11-S.18	5	1
2.	Gasket	G/AB11-103	„	7	2
3.	Joint	G/0016/117	„	8	1
4.	Joint	G/0016/119	G/AB11-W30	2	1
5.	Diaphragm	G/004/1	G/AB11-W30&W43	3&74	2
6.	Gasket	G/0016/13	G/AB11-W14	4	1
7.	Diaphragm	G/005/19	G/AB11-W30	6	1
8.	Control Air - Release valve	G/AB11-265	„	11	1
9.	Equalising Diaphragm	G/004/4	G/AB11-W43	7	1
10.	Seal	G/009/22	„	62	3
11.	Gasket	G/AB11-13	„	9	1
12.	'O'-Ring	G/0015/144	„	60	1
13.	Joint	G/0016/1	„	38	1
14.	Non-Return valve	G/AB11-56	„	42	1
15.	Joint	G/0016/13	„	44	2
16.	Locking Member Diaphragm	G/004/8	„	61	2
17.	Joint	G/0016/2	„	40	1
18.	'O'-Ring	G/0015/114	„	77	1
19.	Sealing Valve Stem & Rubber Assembly	G/AB11-W4	„	78	1
20.	Sealing Valve Diaphragm	G/005/2	„	72	1
21.	Joint	G/0016/29	„	23	1
22.	Joint	G/0016/8	„	21	1
23.	Diaphragm	G/004/2	„	19	1
24.	Check Valve Stem	G/AB11-W3	„	50	1

0000000828

ANNEXURE - VIII/7

S.No.	Description	Part Drg. No.	Assembly Drg. No.	Ref. No.	No. off Per set
25.	Filling Valve Stem	G/AB11-W29	G/AB11-W43	40	1
26.	Locking Member Diaphragm	G/AB11-224	„	59	1
27.	Initial Admission Valve Stem	G/AB11-W5	„	28	1
28.	Joint	G/0016/17	„	49	1
29.	Accelerating Valve Diaphragm	G/004/7	G/AB11-W27	7	1
30.	Valve Stem & Insert	G/AB11-W26	„	4	1
31.	Limiting Valve Head Assembly	G/AB-259-W2	G/AB-259-S2	1	1
32.	Exhaust Valve Head Assembly	G/AB-259-W5	„	2	1
33.	'O'-Ring	G/0015/146	„	3	1
34.	Diaphragm	G/AB17/61	G/AB-259-S2	8 & 20	2
35.	'O'-Ring	G/0015/7	„	15	1
36.	Diaphragm	G/005/16	„	17	1
37.	Joint	G/0016/41	„	18	1
38.	'O'-Ring	G/0015/115	„	21	1
39.	Seal	G/009/3	G/AB11-W12/1	3	1
40.	Joint	G/0016/49	G/AB11-W43&W27	25&6	3

II. COMMON PIPE BRACKET

1.	Gasket	G/AB-1089/3	G/AB-1089-SII	3	1
2.	'O'-Ring	G/0015/181	„	10	1
3.	Gasket	G/AB-1089/17	„	17	1
4.	Gasket	G/AB-1089/12	„	12	1

III. ISOLATING COCK FOR DV.

1.	'O'-Ring	G/0015/42	G/AB-1160	6	1
2.	'O'-Ring	G/0015/143	„	7	3
3.	'O'-Ring	G/0015/8	„	8	3

IV. AIR BRAKE CYLINDER

1.	Piston Sealing Ring	G/008-5	G/AB-1071-S-1	23	1
2.	Spring Ring	G/003-2	„	8	1
3.	Sponge Rubber Seal	G/AB-1017/18	„	18	1

0000000829

154

100 ~~100~~

ANNEXURE - VIII/7

S.No.	Description	Part Drg. No.	Assembly Drg.No.	Ref. No.	No.off Per set
4.	Felt Seal	G/AB-1017/11	"	11	1
5.	Filter Insert	G/AB-1017/16	"	16	1
6.	Filter Plate	G/AB-1017/15	"	15	2
7.	O'-Ring	G/0015-176	"	9	1
8.	Rubber Bung	G/AB-1017/22	"	22	1

V. CENTRIFUGAL AIR STRAINER per unit

1.	Joint	G/0016/27	G/AB-1090-S-1	6	1
2.	Joint	G/0016/28	"	7	1
3.	Strainer	G/AB-1090/5A	"	5A	1

VI. CUT OFF ANGLE COCK

1.	O'-Ring	G/AB-0015/18	G/AB-1047-S	7	2
2.	O'-Ring	G/AB-0015/183	"	8	1
3.	Seat	G/AB-1047/6	"	6	1

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S GREYSHAM & CO. and are in service.

2. Refer Maintenance Manual issued by M/S GREYSHAM & CO. for drawings.

0000000830

ANNEXURE -XIII/8,

**POH KIT FOR AIR BRAKE EQUIPMENT OF
M/s BHARAT BRAKES AND VALVES Ltd.**

.....

S.No.	Description	Part No.	Fig. No.	Item No.	No.Off Per.set
-------	-------------	----------	-------------	-------------	-------------------

DISTRIBUTOR VALVE -TYPE EST 302.

Main Control Member

1. Diaphragm	9	H-14/Fig.2	WB-400752	1
2. Flat Packing	15	„	WB-400260A	1
3. Diaphragm	21	„	WB-400751	1

Initial Admmision Member

4. Diaphragm	37	„	WB-400750	1
5. Flat Sealing	40	„	W-4088379x	1
6. Flat Sealing	43	„	W-4088436x	1

Accelarator

7. Diaphragm	53	„	WB-400952	1
--------------	----	---	-----------	---

Sealing Member

8. Valve Seat	61	H-16/Fig.4	WB-400178A	1
9. Diaphragm	68	„	WB-400749	1
10. Diaphragm	73	„	WB-400745	1

Check Valve

11. Flat Sealing	83	„	W-4088209x	1
------------------	----	---	------------	---

0000000831

156

ANNEXURE - XIII/8

S.No.	Description	Part No.	Fig. No.	Item No.	No.Off Per.set
Filling Valve					
12.	Flat Sealing	104	..	W-4088285x	1
13.	Rubber Plate	106	..	WB-400275	1
14.	Flat Sealing	109	..	W-4088323x	1
Locking Member					
15.	Sealing	115	H-15/Fig.3	W-4083017EG	1
16.	Diaphragm	119	..	WB-400082	1
17.	Diaphragm	121	..	WB-400269	1
18.	'O'-Ring	123	..	W-40704805	1
Automatic Release Valve					
19.	Diaphragm	16	H-17	WB-400749	1
20.	Sealing	32	..	WB-400316	2
21.	Flat Sealing	33	..	W-4088051x	1
High Pressure Limiter HBG 300					
22.	Valve head Pre-assy.	1	H-8	WB-401909U	1
23.	Valve Head Pre-assy.	1	..	WB-401910U	1
24.	'O'-Ring	3	..	WB-40702715	1
25.	Diaphragm	8	..	WB-402969	2
26.	'O'-Ring	9	..	W-40703805	1
27.	'O'-Ring	16	..	WB-40701045	1
28.	Diaphragm	18	..	WB-401906	1
29.	Flat Sealing	19	..	W-4088378x	1
II. COMMON PIPE BRACKET					
1.	Seal Ring	4	D-2079-7	1	
2.	'O'-Ring	5	..	1	
3.	Seal Ring	8	..	1	
4.	Gasket	13	..	1	

0000000832

ANNEXURE-XIII/8

S.No.	Description	Part No.	Fig. No.	Item No.	No.Off Per.set
-------	-------------	----------	----------	----------	----------------

III. AIR BRAKE CYLINDER

1. Piston Packing	8	C-2069	1
2. Gasket	16	„	1
3. Friction Ring	7	„	1

IV. B.P.ISOLATING COCK

1. 'O'-Ring	9	WB-201505z	1
2. 'O'-Ring	11	„	1
3. 'O'-Ring	12	„	2
4. 'O'-Ring	13	„	1
5. 'O'-Ring	15	„	1

V. CUT OFF ANGLE COCK

1. Valve Seal	9	C-2071	1
2. Rubber Gasket	10	„	1

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S BHARAT BRAKES AND VALVES Ltd. and are in service.

2. Refer Maintenance Manual issued by M/S BHARAT BRAKES AND VALVES Ltd. for figures and drawings

0000000833

**POH KIT FOR AIR BRAKE EQUIPMENT OF
STANDARD DESIGN**

S.No.	Description	Fig. No.	Ref. No.	No. off per set
-------	-------------	----------	----------	-----------------

I. BRAKE CYLINDER 355 mm.

1.	Piston Packing	13	4	1
2.	Wear Ring	13	5	1

II. CUT-OFF ANGLE COCK No. off per unit

1.	Seat	15	2	2
2.	O-Ring	15	4	1
3.	O-Ring	15	12	2

III. DIRT COLLECTOR

1.	Leather Washer	17	2	1
2.	Gasket	17	4	1

IV. AUXILIARY RESERVOIR No. off per set

1.	Leather Washer	14	9	1
2.	Gasket	14	14	1

0000000834

LIST OF ADDITIONAL ITEMS TO BE STOCKED IN THE FORM OF KIT FOR POH OF ESCORTS AIR BRAKE EQUIPMENT IN DEPOT.

S.No.	Description	Part No.	Qty. per **kit
-------	-------------	----------	----------------

I. PRESSURE TRANSFORMER DU 111A- PART NO.300

1.	K-Ring	307	5
2.	Diaphragm	312	10
3.	O-Ring	314	10
4.	O-Ring	316	15
5.	K-Ring	326	10
6.	O-Ring	327	5
7.	O-Ring	334	5
8.	K-Ring	335	5
9.	K-Ring	339	5
10.	O-Ring	344	5
11.	K-Ring	345	5
12.	O-Ring	350	5

II. OPERATING VALVE B1 PART No. 2571

1.	Sealing Ring	2574	5
2.	K-Ring	2575	5
3.	O-Ring	2578	5

III. SPRING BUFFER F1 PART No. 2551

1.	Leaf Spring	2556	10
----	-------------	------	----

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S ESCORTS and are in service.

2. Refer M/S ESCORTS Description & Maintenance Manual 1994 Edition for figure.

168

0000000835

**LIST OF ADDITIONAL ITEMS TO BE
STOCKED IN THE FORM OF KIT FOR POH
OF RPIL AIR BRAKE EQUIPMENT IN DEPOT.**

S.No.	Description	Item No.	Part No.	Qty. per **kit
-------	-------------	----------	----------	----------------

I. DISTRIBUTOR VALVE TYPE C3W2

1.	O-Ring	32	705 239 03 08	10
2.	O-Ring	36	705 249 99 08	10
3.	O-Ring	34	704 813 99 08	5
4.	O-Ring	243	704 808 03 08	5
5.	O-Ring	258	705 308 03 08	5
6.	O-Ring	262	704 811 03 08	5
7.	O-Ring	263	704 806 03 08	5
8.	O-Ring	266	704 814 03 08	5
9.	O-Ring	267	704 807 03 08	5
10.	Diaphragm	208	191 914 00 08	5
11.	O-Ring	46	705 010 78 08	5

II. VN5 LOAD SENSING VALVE ASSEMBLY

PART No. 531 0022 00

1.	O-Ring	6	531 7010 00	5
2.	Collar	14	531 6010 00	5
3.	Felt Washer	16	531 9010 00	5
4.	O-Ring	22	531 7020 00	10
5.	O-Ring	25	531 7040 00	5
6.	O-Ring	31	531 7050 00	5
7.	Lever	9	531 8030 00	5
8.	Rect. Tab Washer	10	938 0011 00	10

NOTE:- 1. The POH KIT given above pertains to items which are proprietary to M/S RPIL and are in service.

2. Refer Maintenance Manual issued by M/S RAILWAY PRODUCTS (INDIA) Ltd. for figures.

0000000836

ANNEXURE - XIV/1

LIST OF SPARES TO BE STOCKED IN THE
FORM OF KIT FOR MAINTENANCE OF AIR,
BRAKE EQUIPMENT IN DEPOT.

M/S ESCORTS AIR BRAKE EQUIPMENT

1. DISTRIBUTOR VALVE MAINTENANCE KIT - TYPE KIGSL

S.NO.	DESCRIPTION	PART NO.	QTY. PER ** KIT
1.	Valve Plate	10	10
2.	'O' Ring	12	5
3.	Diaphragm	16	10
4.	Seal	19	5
5.	Grooved Ring	25	10
6.	Seal	26	10
7.	Sealing Ring	27	2
8.	Diaphragm	31	10
9.	Valve Head	33	10
10.	Grooved Ring	35	10
11.	Flat Sealing Ring	36	5
12.	Flat Sealing Ring	42	5
13.	Sealing Ring	44	10
14.	Sealing Ring	46	2
15.	Flat Sealing Ring	47	10
16.	Grooved Ring	49	5
17.	Control Sleeve	53	2
18.	K- Ring	54	10
19.	Valve Plate	56	2
20.	Valve Head	65	2
21.	Diaphragm	69	2
22.	Toothed Ring	57	5
23.	Seal	77	10
24.	Sealing Ring	85	5
25.	Diaphragm	99	25
26.	Pin	92	20
27.	K-Ring	101	15

162

0000000837

ANNEXURE - XIV/1

S.NO.	DESCRIPTION	PART NO.	QTY. PER ** KIT
28.	External Circlip	102	2
29.	Grooved Ring	103	10
30.	Spring	104	2
31.	Flat Sealing Ring	127	5
32.	Valve Rod	129	1
33.	Sealing Cap	133	15
34.	Flat Sealing Ring	140	10
35.	Seal	142	10
36.	Flat Sealing Ring	148	10
37.	Valve Tappet	149	1
38.	Seal	174	5
39.	Handle	150	2
40.	Seal	196	2
41.	Release Choke (BOXN)	172	1
42.	Brake Choke (BOXN)	175	1

2. BRAKE CYLINDER MAINTENANCE KIT

1.	Piston Rubber Packing '14"	539	1
----	-------------------------------	-----	---

3. CUT OFF ANGLE COCK MAINTENANCE KIT

1.	Sealing ring	853	5
2.	Sealing ring	856	1
3.	Handle	863	2
4.	Stopper	864	1
5.	Compression spring	855	1

**NOTE:-1. One Kit includes quantity of spares required for maintenance of 100 DV/other equipment per year.

2. This Kit does not include items which are required for replacement due to theft etc. as spares and their quantity may vary significantly depot to depot. Depending upon trend Railway/Depot can make their own kit for spare required against theft.

0000000838

LIST OF SPARES TO BE STOCKED IN THE
FORM OF KIT FOR MAINTENANCE OF AIR
BRAKE EQUIPMENT IN DEPOT

M/S. S.D.TECH. SERVICE'S AIR BRAKE EQUIPMENT

1. DISTRIBUTOR VALVE MAINTENANCE KIT - TYPE P4aG

S.NO.	DESCRIPTION	REF. NO.	PART NO.	QTY. PER ** KIT
1.	Strainer Disc	6	J74173/2	2
2.	Inlet Exhaust Valve	8	J70517/25	10
3.	Gasket	9	J74688/1	5
4.	O- Ring	11	J72070/19	5
5.	O- Ring	14	J72070/17	5
6.	O- Ring	24	J72070/22	5
7.	O- Ring	25	J72070/20	5
8.	O- Ring	26	J72070/29	5
9.	Diaphragm	35	B79464/7	5
10.	Gasket	45	J744687/1	5
11.	Strainer Disc	55	J74173/7	2
12.	O- Ring	70	J72070/18	5
13.	Circlip	93	J70517/25	20
14.	Diaphragm	98	B79463/2	7
15.	Diaphragm	99	B79462/1	7
16.	Bottom Cover	121	D75563/1	5
17.	Gasket	122	B80312/1	20
18.	Diaphragm	123	J75929/1	40
19.	O- Ring	126	J72070/36	5
20.	O- Ring	133	J72070/21	5
21.	Stem	134	J73928/1	2
22.	Circlip	151	J70517/22	2
23.	O- Ring	177	J72070/33	5
24.	Spring lever	179	J74688/1	2
25.	Diaphragm	183	J74639/1	10

0000000839

ANNEXURE - XIV/2

S.NO.	DESCRIPTION	REF. NO.	PART No.	QTY. PER KIT
-------	-------------	----------	----------	--------------

2. BRAKE CYLINDER MAINTENANCE KIT

1.	Piston Rubber Packing	2	SD-821-08	1
----	-----------------------	---	-----------	---

3. CUT OFF ANGLE COCK MAINTENANCE KIT

1.	Vent seal	6	CC-106	10
2.	Handle with Washer	10&15	CC-110&115	2
3.	Spring	3	CC-103	5
4.	Flange	18	CC-119	2
5.	Valve Seat	17	CC-116	10
6.	Cam Follower F	5	CC-105	5

** NOTE:- 1. One Kit includes quantity of spares required for maintenance of 100 DV/other equipment per year.

2. This Kit does not include items which are required for replacement due to theft etc as spares & their quantity may vary significantly depot to depot. Depending upon trend Railway/Depot can make their own kit of spare required against theft.

000000840

**LIST OF SAPRE TO BE STOCKED IN THE FORM
OF KIT FOR MAINTENANCE OF AIR BRAKE
EQUIPMENT IN DEPOT**

M/s R.P.I.L. AIR BRAKE EQUIPMENT

1. DISTRIBUTOR VALVE MAINTENANCE KIT - TYPE C3W

S.NO.	DESCRIPTION	FIG NO.	ITEM NO.	PART NO.	QTY. PER ** KIT
1.	Diaphragm	3	6	19185800	5
2.	Diaphragm	3	27	19184900	10
3.	Lip Seal	3	24	70581800	10
4.	O- Ring	3	4	70513278	10
5.	O- Ring	3	5	70713478	10
6.	O- Ring	3	29	7501178	10
7.	O- Ring	3	32	70523903	10
8.	O- Ring	3	36	70524914	10
9.	Operating lever	3	13	19187500	5
10.	Spring seat & Valve Operator	3	14	19187813	5
11.	Lever Seat	3	16	19188000	5
12.	Internal Circlip	3	17	70133000	5
13.	Valve	3	37	19022000	5
14.	O- Ring	5	45	70525578	10
15.	O- Ring	5	80	70521578	5
16.	O- Ring	5	81	70521203	5
17.	Diaphragm	5	77	18301900	5
18.	Seal	5	83	19196400	10
19.	Sealing Washer	6	57	19192001	5
20.	Seal	6	58	19192100	5
21.	O- Ring	6	205	70509178	5
22.	O- Ring	6	210	70516478	5
23.	O- Ring	6	211	70512878	5
24.	O- Ring	6	213	70037803	5
25.	Seal	6	208	19191400	5
26.	Seal	6	218	70581700	5

ANNEXURE - XIV/3

S.NO.	DESCRIPTION	FIG No.	ITEM No.	PART	QTY. PER **
				No.	KIT
27.	Diaphragm	6	214	19189400	2
28.	O- Ring	7	236	70525278	5
29.	Spring	8	12	19188100	2
30.	O- Ring	8	9	70501278	10
31.	Joint	8	35	11746000	20

2. ISOLATING COCK FOR DV MAINTENANCE KIT

1.	Valve	5	5	603401000	15
2.	O- Ring	5	4	603701000	10

3. BRAKE CYLINDER MAINTENANCE KIT

1.	Piston lining 11 & 12		606702000	5
----	-----------------------	--	-----------	---

4. CUT OFF ANGLE COCK MAINTENANCE KIT

1.	Ball Seat	24	5	607701000	8
2.	Gland Packing	24	8	607602000	8
3.	Handle Assembly	-	9,10	(607810000)	
			13 & 14	(607804000)	5
				(904004000)	
				(906008000)	

** NOTE:-1. One kit include quantity of spares required for maintenance of 100 DV/other equipment per year.

2. This kit does not include items which are required for replacement due to theft, etc. as spares & their quantity may vary significantly depot to depot. Depending upon trend Railway/Depot can make their own kit of spare required against theft.

0000000842

LIST OF SPARES TO BE STOCKED IN THE
FORM OF KIT FOR MAINTENANCE OF AIR
BRAKE EQUIPMENT IN DEPOT

M/s S.I.L. AIR BRAKE EQUIPMENT

1. DISTRIBUTOR VALVE MAINTENANCE KIT - TYPE C3W

S.NO.	DESCRIPTION	FIG NO.	ITEM NO.	PART NO.	QTY. FOR ** KIT
1.	Diaphragm	3	6	19185800	5
2.	Diaphragm	3	27	19184900	10
3.	Lip Seal	3	24	70581800	10
4.	O- Ring	3	4	70513278	10
5.	O- Ring	3	5	70713478	10
6.	O- Ring	3	29	7501178	10
7.	O- Ring	3	32	70523903	10
8.	O- Ring	3	36	70523903	10
9.	Operating lever	3	13	19187500	5
10.	Spring seat & valve Operator.	3	14	19187813	5
11.	Lever Seat	3	16	19188000	5
12.	Internal Circlip	3	17	70133000	5
13.	Valve	3	37	19022000	5
14.	O- Ring	5	45	70525578	10
15.	O- Ring	5	80	70521578	5
16.	O- Ring	5	81	70521203	5
17.	Diaphragm	5	77	18301900	5
18.	Seal	5	83	19196400	10
19.	Sealing Washer	6	57	19192001	5
20.	Seal	6	58	19192100	5
21.	O- Ring	6	205	70509178	5
22.	O- Ring	6	210	70516478	5
23.	O- Ring	6	211	70512878	5
24.	O- Ring	6	213	70037803	5
25.	Seal	6	208	19191400	5
26.	Seal	6	218	70581700	5

0000000843

ANNEXURE - XIV/4

S.NO.	DESCRIPTION	FIG No.	ITEM No.	PART No.	QTY. FOR ** KIT
27.	Diaphragm	6	214	19189400	2
28.	O- Ring	7	236	70525278	5
29.	Spring	8	12	19188100	2
30.	O- Ring	8	9	70501278	10
31.	Joint	8	35	11746000	20

2. ISOLATING COCK FOR DV. MAINTENANCE KIT

1.	Valve	-	5	08290941	5
2.	O- Ring	-	4	08270364	5

3. BRAKE CYLINDER MAINTENANCE KIT

1.	Piston cup	-	19	08278501	5
----	------------	---	----	----------	---

4. CUT OFF ANGLE COCK MAINTENANCE KIT

1.	Valve Seat	-	8	08279441	5
2.	O- Ring	-	13	08279901	5
3.	Handle Assembly	-	4	08297501	5

** NOTE:-1. One kit include quantity of spares for maintenance of 100 DV / other equipment per year.

2. This kit does not include items which are required for replacement due to theft etc. as spares & their quantity may vary significantly depot to depot. Depending upon trend Railway/Depot can make their own kit of spare required against theft.

0000000844

169

134

ANNEXURE - XIV/5

LIST OF SPARES TO BE STOCKED IN THE
FORM OF KIT FOR MAINTENANCE OF AIR
BRAKE EQUIPMENT IN DEPOT

M/S GREYSHAM'S AIR BRAKE EQUIPMENT

1. DISTRIBUTOR VALVE MAINTENANCE KIT- TYPE EST 3F

S.NO.	DESCRIPTION	PART DRG.	ASSEMBLY NO.	REF. DRG.NO.	QTY. NO.	PER ** KIT
1.	Control Diaphragm	G/006/3	G/AB11.S.18	5	2	
2.	Gasket	G/AB11-103	-do-	7	10	
3.	Joint	G/0016/117	-do-	8	5	
4.	Diaphragm	G/004/1	G/AB11-W30,43	3&74	2	
5.	Release lever	G/AB11-41	G/AB11-W14	2	5	
6.	Retaining Nut	G/AB11-42	-do-	3	5	
7.	Seal	G/009/3	G/AB11-W12/1	3	5	
8.	Equil. Diaphragm	G/004/4	G/AB11-W43	7	2	
9.	L.M. Diaphragm	G/004/8	-do-	61	2	
10.	L.M. Seal	G/009/22	-do-	62	20	
11.	Joint	G/006/13	G/AB11-W43	44	5	
12.	Joint	G/0016/1	-do-	38	5	
13.	Gasket	G/AB-1089/3	G/AB1089.SII	3	2	
14.	Handle	G/AB-1160/4	G/AB-1160	4	2	
15.	O- Ring	G/0015/42	-do-	6	5	
16.	O- Ring	G/0015/143	-do-	7	5	
17.	O- Ring	G/0015/8	-do-	8	5	

2. BRAKE CYLINDER MAINTENANCE KIT

1.	Piston Sealing Ring	G/008/5	G/AB-1071-S-1	23	5
2.	O- Ring	G/0015/176	-do-	9	5
3.	Sponge Rubber Seal	G/AB-1017/18	-do-	18	5

0000000845

ANNEXURE - XIV/5

S.NO.	DESCRIPTION	PART DRG.	ASSEMBLY	REF.	QTY. PER
		NO.	DRG NO.	NO.	**KIT

3. CUT OFF ANGLE COCK MAINTENANCE KIT

1.	Handle	G/AB-1047/3	G/AB-1047-S	3	5
2.	Seat	G/AB-1047/6	-do-	6	5
3.	O- Ring	G/AB-0015/183	-do-	8	5
4.	O- Ring	G/AB-0015/18	-do-	7	5

** NOTE:-1. One kit include quantity of spares required for maintnace of 100 DV/other equipment per year.

2. This kit does not include items which are required for replacement due to theft etc. as spare & their quantity may vary significantly depot to depot. Depending upon trend Railway/Depot can make their own kit of spare required against theft.

0000000846

LIST OF ADDITIONAL ITEMS TO BE STOCKED IN THE FORM OF KIT FOR MAINTENANCE OF ESCORTS AIR BRAKE EQUIPMENT IN DEPOT.

S.No.	Description	Part No.	Qty. per **kit
-------	-------------	----------	----------------

I. PRESSURE TRANSFORMER DU 111A- P (1) NO.300

1.	K-Ring	307	5
2.	Diaphragm	312	10
3.	O-Ring	314	10
4.	O-Ring	316	10
5.	K-Ring	326	10
6.	O-Ring	327	5
7.	O-Ring	334	5
8.	K-Ring	335	5
9.	K-Ring	339	5
10.	O-Ring	344	5
11.	K-Ring	345	5
12.	O-Ring	350	5

II. OPERATING VALVE B1 PART No. 2571

1.	Sealing Ring	2574	5
2.	K-Ring	2575	5
3.	O-Ring	2578	5

III. SPRING BUFFER F1 PART No. 2551

1.	Leaf Spring	2556	10
----	-------------	------	----

** NOTE: 1. One kit includes quantity of spares required for

0000000847

ANNEXURE - XIV/6

maintenance of 100 DV/other equipments per year.

2. This kit does not include items which are required for replacement due to theft etc. as spares and their quantity may vary significantly depot to depot. Depending upon treno, Railway/Depot can make their own kit for spares required against theft.

0000000848

LIST OF ADDITIONAL ITEMS TO BE STOCKED IN THE FORM OF KIT FOR MAINTENANCE OF RPIL AIR BRAKE EQUIPMENT IN DEPOT.

S.No.	Description	Item No.	Part No.	Qty. per **kit
-------	-------------	----------	----------	----------------

I. DISTRIBUTOR VALVE TYPE C3W2

1.	O-Ring	32	705 239 03 08	10
2.	O-Ring	33	705 249 99 08	10
3.	O-Ring	34	704 813 99 08	5
4.	O-Ring	243	704 808 03 08	5
5.	O-Ring	258	705 308 03 08	5
6.	O-Ring	262	704 811 03 08	5
7.	O-Ring	263	704 806 03 08	5
8.	O-Ring	266	704 814 03 08	5
9.	O-Ring	267	704 807 03 08	5
10.	Diaphragam	208	191 914 00 08	5
11.	O-Ring	46	705 010 78 08	5

II. VN5 LOAD SENSING VALVE ASSEMBLY

PART No. 531 0022 00

1.	O-Ring	6	5317010 00	5
2.	Collar	14	531 6010 00	5
3.	Felt Washer	16	531 9010 00	5
4.	O-Ring	22	531 7020 00	10
5.	O-Ring	25	531 7040 00	5
6.	O-Ring	31	531 7050 00	5
7.	Lever	9	531 8030 00	5
8.	Rect. Tab Washer	10	938 0011 00	10

** NOTE: 1. One kit includes quantity of spares required for

0000000849

ANNEXURE -XIV//

maintenance of 100 DV/other equipments per year.

2. This kit does not include items which are required for replacement due to theft etc. as spares and their quantity may vary significantly depot to depot. Depending upon trend, Railway/Depot can make their own kit for spares required against theft.

0000000850

ADJUSTMENT OF EMPTY LOAD BOX AND BRAKE REGULATOR (ABSTRACT FROM C-70)

1. Empty Load Box

1.1 SAB empty load box type LCF-4 (same as in BOX Wagon) is provided in the brake rigging, by means of which lower leverage ratio for tare condition and higher leverage ratio for loaded condition of the wagon can be obtained by a simple manual operation of a handle, provided on side of the wagon. In the empty load box horizontal levers, two tie rod, viz tare tie-rod and loaded tie rod are provided. The former, when brought into operation provides a lower leverage ratio corresponding to a wagon having a gross load not exceeding 42.5t and the latter, a higher leverage ratio corresponding to a wagon exceeding 42.5t gross load. General arrangement of the equipment is shown in Fig. 31.

1.2 For efficient performance of this equipment the following instructions must be followed rigidly.

a) Ensure that empty load box operating handle is set in 'empty' position when a wagon is either empty or partially loaded upto a gross load not exceeding 42.5t. It should also be ensured that the operating handle is set in the 'empty' position before commencing unloading of the wagon.

For convenience of Operating Staff, the sign plate is painted yellow to indicate 'empty' position and black to indicate 'loaded' position to which the operating handle is to be set (See Part Drg.IRS W/BG 6186).

b) Do not tamper with tare tie-rod adjustment. Interference with the coupling nut may either increase or decrease dimension 'Sx', which would result in the horizontal lever pivoting around load tie-rod pins and thus brake power for tare condition of the wagon will not be obtained. This dimension 'Sx' for efficient functioning of the empty load box is 10mm.

000000851

1.3 In case, tare tie-rod needs replacement the following procedure should be followed to ensure its correct adjustment.

- a) Ensure that the brake cylinder piston rod is restored to its original "brake release" position by checking the distance between centres of brake cylinder fulcrum bracket and the piston rod eye which shall be $782 \pm 5\text{mm}$.
- b) Move changeover handle to "loaded position".
- c) Unscrew both lock-nuts to the extreme ends of tie- rod threads and rotate coupling nut to shorten the tie-rod as far as it will go.
- d) Now lengthen the tare tie-rod by rotating coupling nut in the other direction, so that pins of both tare and load tie-rod reach their end-positions in their respective slots. Stop rotating the coupling nut as soon as the 'live' horizontal floating lever just starts to move.

Note: If both the pins are not at the ends of slots when "live" horizontal lever starts to move, this indicates faulty condition requiring attention (e.g. brake not fully released or "dead" horizontal floating lever jammed).

- e) Lock the coupling nut in this position by tightening lock-nuts on either side, and bend the washer over sleeve nut and check-nut in Z form. In addition, one bridge plate is to be tack-welded over the coupling nut in securing two pieces of tare tie-rod.

To check correctness of tare tie-rod adjustment, apply and release brakes fully two or three times at correct air pressure with empty load box operating handle in 'empty' position and measure piston strokes. Also check that tare tie-rod is tight and load tie-rod is loose by tapping pins of both rods with a hammer.

Move operating handle from 'empty' to 'loaded' position; apply and release brakes two or three times as above and measure piston strokes. Also check that the load tie-rod is tight and tare tie-rod loose in the manner

0000000852

indicated above. This tapping test would indicate whether the empty load box is functioning correctly or not.

The piston strokes obtained under the above tests should be as laid down for different types of wagons.

Attention: Once the tare tie-rod is set correctly, it should never be altered while the wagon is in service.

- f) Ensure that empty-load box links and link-pins connecting empty load box arm to the operating handle are intact. In case of missing link or pin, the empty-load box becomes ineffective i.e. the braking ratio cannot be changed.
- g) Ensure that the hand brake is in fully released position in the formation of a train.
- h) Ensure that the horizontal floating levers are free in their brackets.

2 Brake Regulator

- 2.1 SAB regular (Slack Adjuster), type DRV 2-600/IRSA-600 (as in case of BOX wagons) has been provided in the main pull rod. It is a device for automatic adjustment of slack between brake blocks and wheels thereby restricting travel of the piston to the minimum. General arrangement of this equipment is shown in Fig. 32.
- 2.2 The brake regulator is double acting, i.e. it automatically takes up and pays out slack, as such, manual adjustment of brake gear is not required.
- 2.3 For efficient performance of the brake regulator, the following instructions should be followed:
 - a) Ensure that control dimension 'A' between the control rod head and brake regulator barrel (Fig. 32) is 70mm except for BOBRN wagons which corresponds exactly to the total amount of slack in the brake rigging. (between brake blocks/wheels). Tolerance permitted on this dimension is + 2 mm. In order to check this dimension 'A',

-0

0000000853

it is essential that the horizontal floating levers of the empty load box are in the normal 'brake release' position with the hand brake fully 'off' and the correct position of the piston rod is ensured (Ref. para 1.3). If these levers are not in their normal 'brake release' position due to restoring spring not functioning properly or excessive frictional resistance coming into play between horizontal levers and bracket a wrong reading of the dimension 'A' will be measured. In such a case, therefore, the horizontal floating levers should be brought to the normal position by pushing the central rod head as far away as possible from the barrel with the help of a wooden scotch block to ensure correct measurement of the dimension 'A'.

Attention: Once dimension 'A' is set correctly, it should never be altered while the wagon is in service.

To avoid unauthorised interference with dimension 'A', ensure that M20 anchor pin nut is secured by welding to the pin (Ref. Fig. 32).

- b) Replace brake blocks, when worn out to a thickness of 10mm. For fitting new brake blocks, rotate brake regulator barrel by hand, clock-wise, the facing towards horizontal levers to pay out necessary clearances. No further action is required as the brake regulator automatically corrects the clearances, when brakes are applied two or three times.
- c) Ensure that the brake gear is manually adjusted to correspond to the wheel diameter, whenever wheel-set is changed at major sicklines/shops, after machining. For limits of wheel diameters necessitating manual adjustment of brake gear (Ref. Fig. 33). This can be done by shortening bogie push rod and bogie pull rod, details of which are given in Fig. 33. This is essential as the capacity available for adjustment by brake regulator, which is represented by dimension 'e' (Fig. 32) is between 555 and 575 mm. when all the brake blocks, pins and bushes are new and manual adjustment of brake gear corresponds to wheel diameter.

0000000354

EMPTY LOAD BOX FOR 'BOX N' WAGON

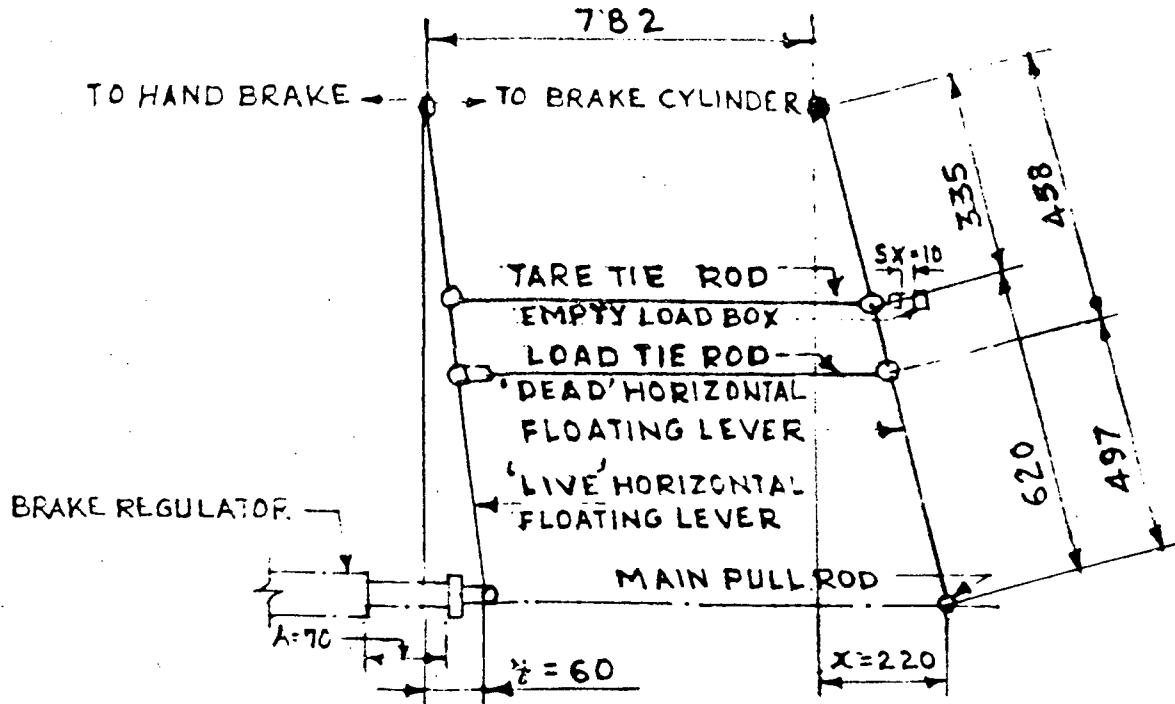
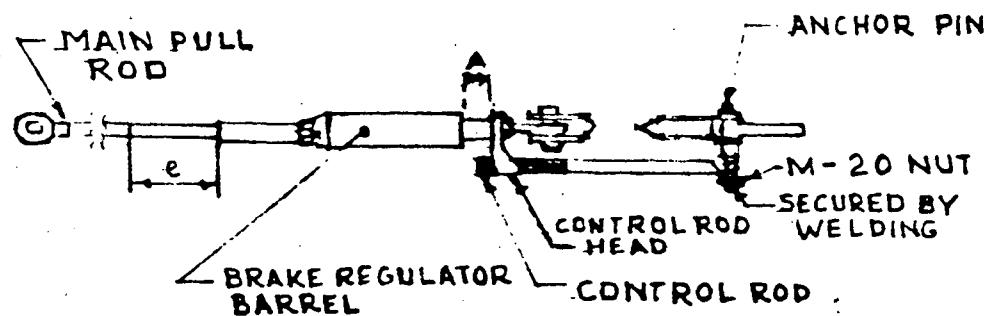


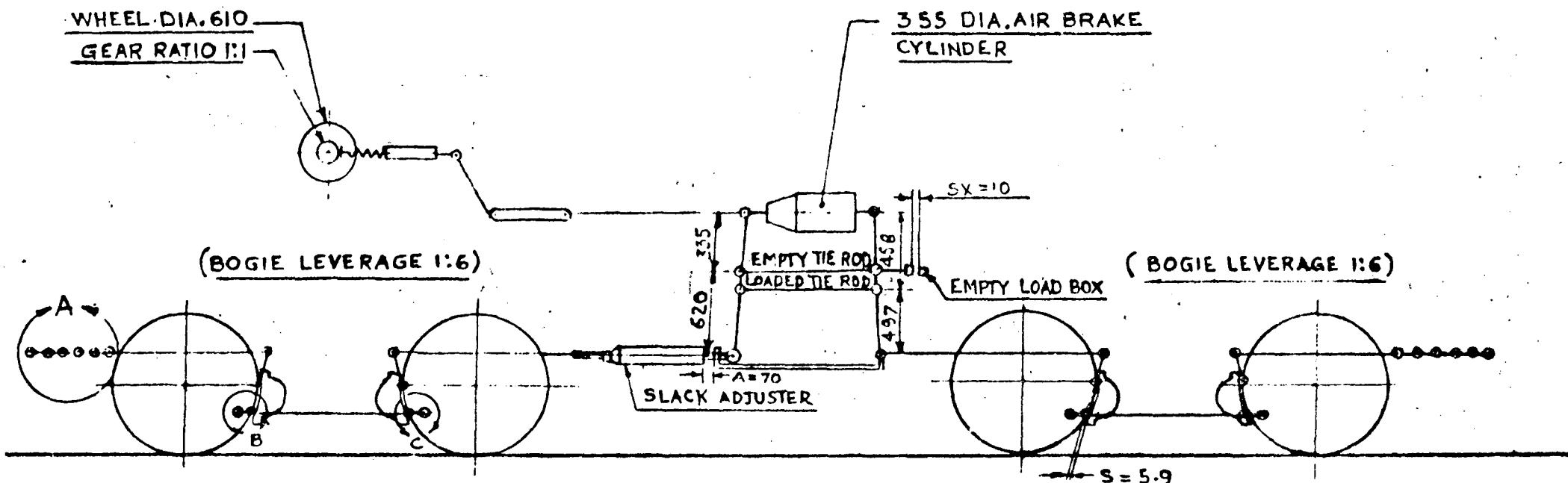
FIG-31

BRAKE REGULATOR FOR 'BOX N' WAGON

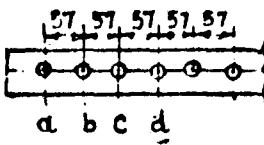


0000000855

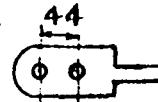
FIG-32



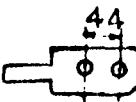
18/



END PULL ROD



BOGIE BRAKE PUSH ROD



DETAIL AT 'C'

DETAIL AT 'A'

DETAIL AT 'B'

LIMITS OF WHEEL DIAMETER FOR MANUAL ADJUSTMENT OF BRAKE GEAR ON 'BOXN' WAGON.				
HOLES TO BE USED FOR BRAKE ADJUSTMENT.	WHEEL DIA ON TREAD			
	BETWEEN 1000 & 982	BETWEEN 981 & 963	BETWEEN 962 & 944	BETWEEN 943 & 92
	a	b	c	d

0000000356

MANUAL ADJUSTMENT OF BRAKE GEAR ON 'BOXN' WAGON
(CASNUB-22 W/22 W (M) BOGIE)

FIG-33

ANNEXURE -XV

- 2.4 The brake regulator will normally function efficiently over extended period without any need of servicing. Detailed instructions for installation and maintenance of this equipment are given in a booklet entitled 'SAB Brake Regulator Type DRV 2-600 and Load Brake Device Type LCF-4 (in case of BOX Wagons) - Installation, Maintenance and Operation in Service issued to all the Railways by M/s J.Stone & Co. and RDSO pamphlet No. G-92 for IRSA- 600 slack adjuster.

0000000351

182

PROCEDURE FOR REPLACEMENT OF BRAKE BLOCKS

1. Brake blocks should be replaced on reaching condemning thickness. The condemning thickness criteria is given in S.No.5.
2. Use C.I. brake blocks as per RDSO drawing No.WA/BG-6158 latest alteration. (on March, 1996 latest alteration is 11)
3. To ensure correct fitment of brake blocks, use only spring steel key as per RDSO Drg. No.W/BG-6150. In no case mild steel key should be used as the consequential loss/damages are very high.
4. After fitment of brake block and key on brake head ensure fitment of split pin otherwise brake block will fall down in tippling can be easily taken out by miscreants.

5. Condemning thickness criteria

1. RDSO vide their letter No.MW/BB dt.4.8.94 circulated to all railways the following decisions of Railway Board on the recommendations of 59th CWSC meeting regarding cast iron brake blocks for implementation.
 - a) As a general guideline the intensive examination points should ensure that the yard leaving thickness of brake blocks for air braked stock (other than BOY) is a minimum 20mm.
 - b) However, depending on the known pattern of Traffic (if any) the railways in their system may decide the minimum yard leaving thickness of brake block based on kilometers to be run till next examination.
2. RDSO vide letter No.MW/BB dt.20.9.94 circulated a guideline to arrive at the yard leaving thickness of brake block for different types of wagons when pattern of Traffic is known. The details are given below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	10010	10011	10012	10013	10014	10015	10016	10017	10018	10019	10020	10021	10022	10023	10024	10025	10026	10027	10028	10029	10030	10031	10032	10033	10034	10035	10036	10037	10038	10039	10040	10041	10042	10043	10044	10045	10046	10047	10048	10049	10050	10051	10052	10053	10054	10055	10056	10057	10058	10059	10060	10061	10062	10063	10064	10065	10066	10067	10068	10069	10070	10071	10072	10073	10074	10075	10076	10077	10078	10079	10080	10081	10082	10083	10084	10085	10086	10087	10088	10089	10090	10091	10092	10093	10094	10095	10096	10097	10098	10099	100100	100101	100102	100103	100104	100105	100106	100107	100108	100109	100110	100111	100112	100113	100114	100115	100116	100117	100118	100119	100120	100121	100122	100123	100124	100125	100126	100127	100128	100129	100130	100131	100132	100133	100134	100135	100136	100137	100138	100139	100140	100141	100142	100143	100144	100145	100146	100147	100148	100149	100150	100151	100152	100153	100154	100155	100156	100157	100158	100159	100160	100161	100162	100163	100164	100165	100166	100167	100168	100169	100170	100171	100172	100173	100174	100175	100176	100177	100178	100179	100180	100181	100182	100183	100184	100185	100186	100187	100188	100189	100190	100191	100192	100193	100194	100195	100196	100197	100198	100199	100200	100201	100202	100203	100204	100205	100206	100207	100208	100209	100210	100211	100212	100213	100214	100215	100216	100217	100218	100219	100220	100221	100222	100223	100224	100225	100226	100227	100228	100229	100230	100231	100232	100233	100234	100235	100236	100237	100238	100239	100240	100241	100242	100243	100244	100245	100246	100247</
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	----------

yard leaving thickness of brake block, when pattern of traffic is known, following guidelines may be followed.

$$T_m = \frac{WL \times KML}{100} + \frac{WE \times KME}{100} + 10$$

Where

T_m = Minimum Yard leaving thickness of brake block in mm.

WL = Wear rate per 100 km in loaded condition.

WE = Wear rate per 100 km in empty condition.

KML = Kilometers to run in loaded condition before next intensive examination.

KME = Kilometers to run in empty condition before next examination. The values of WL & WE are:

	WL(mm)	WE(mm)
BOXN/BCN/BRN etc.	0.47	0.28
BOY	0.66	0.40

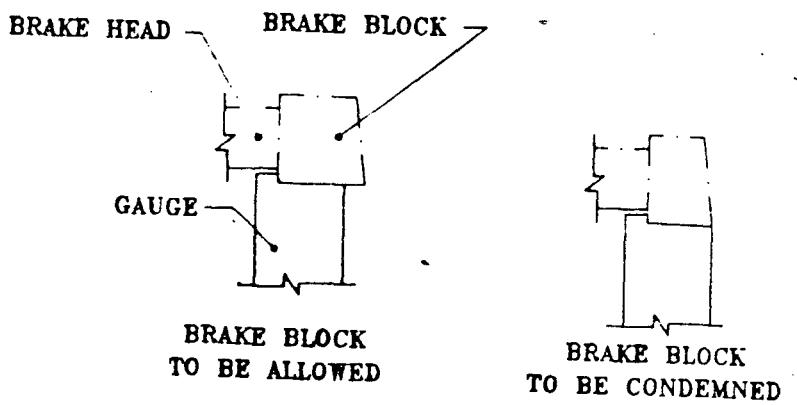
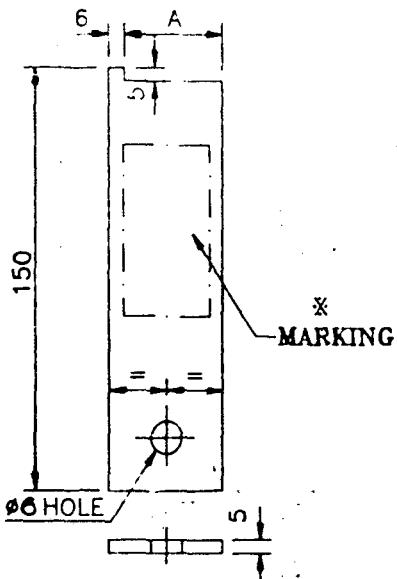
b) Non implementation of these instructions may result in continuation of following problems:

- .1 Heavy damages to brake head.
- .2 Bending of Control rod.
- .3 Poor Brake power on run.

0000000859

**GAUGE FOR CONDEMNING
BRAKE BLOCK**

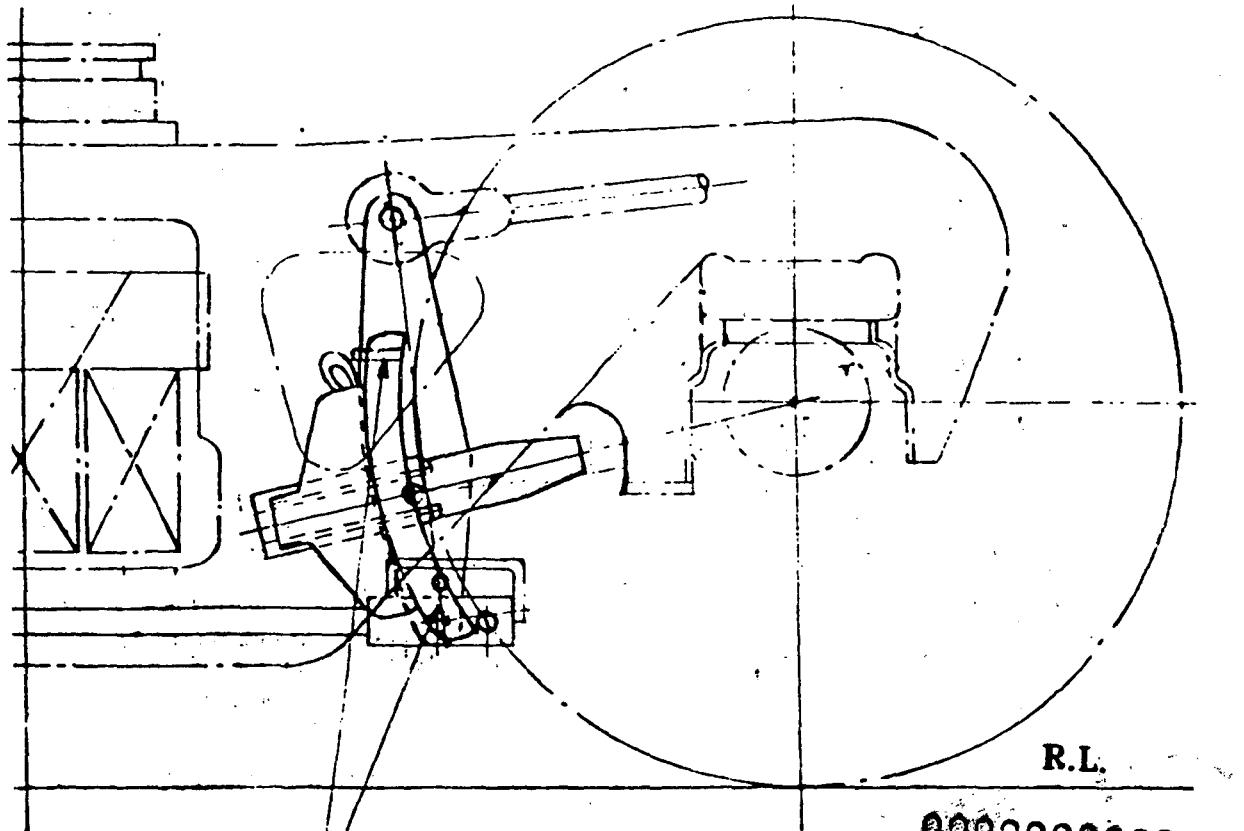
MATL :- CL-4 , IS:1875



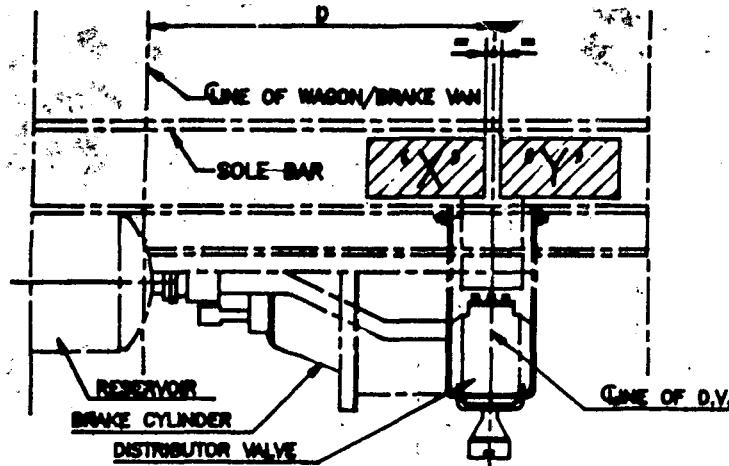
NOTE:-

- 1) DIMENSION 'A' SHALL BE EQUIVALENT TO MINIMUM WORN THICKNESS OF BRAKE BLOCK FIXED BY RAILWAY.
- 2) NAME OF YARD, RAILWAYS, TYPE OF STOCK TO BE MARKED LOCATION INDICATED THUS X

GAUGE APPLICATION



GAUGE APPLICATION POINTS.



LEGEND-X

0000000361

LEGEND-Y

ठ.सं.	क्रमांक	परिकल्पना तिथि	स्टेम लेड

NOTE:-

ANNEXURE - XVII

1. ON EVERY REPLACEMENT OF DISTRIBUTOR VALVE(D.V.) EITHER IN P.M. DEPOT OR IN POH WORKSHOP SHALL BE STENCILLED AS IN LEGEND.
 2. UNDER COLUMN D.V.MAKE,NAME OF MANUFACTURER TO BE STENCILLED.
 3. UNDER COLUMN REPLACED ON,MONTH AND YEAR OF REPLACEMENT TO BE STENCILLED.
 4. UNDER COLUMN STATION CODE,INITIAL OF RLY.AND CODE OF WORKSHOP/DEPOT WHERE D.V.REPLACED TO BE STENCILLED.
 5. ALL STENCILLING TO BE DONE ON SOLEBAR NEAR TO D.V. AS PER LEGEND 'X' IN ENGLISH AND 'Y' IN HINDI.
 6. 'D' IS THE DISTANCE FROM CENTRE LINE OF WAGON TO CENTRE LINE OF DISTRIBUTOR VALVE,HOWEVER THIS MAY BE SUITABLY ADJUSTED IF MARKING INFRINGES ANY STRUCTURE OR OTHER MARKINGS.

SUPERSDED		DATE	AIR-BRAKED WAGONS & BRAKE VANS	
SUPERSDES				
SCALE	PASSED			
/	CHECKED			
	DRAWN	BRAN 02-98		
	TRACED			
	J.SHEET			
			LEGEND MARKINGS FOR DISTRIBUTOR VALVES OF DIFFERENT MAKES	

B.C.

R.D.S.O. GROUP

WD-93003-S-01