



(Govt. of India)
(Ministry of Railways)

Handbook
on
Brake Binding in Freight Stock



(For official use only)
IRCAMTECH/GW/M/BBFS/1.0
August, 2013

Centre
for
Advanced
Maintenance
TECHnology



Excellence in Maintenance

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FOREWORD

Brake binding is burning problem of Mechanical C&W open line area and its repercussions are resulting as punctuality loss, increasing ineffective percentage and maintenance etc. of wagons.

This hand book contains important trouble shootings repeatedly experienced on line by the loco pilots as well as by open line maintenance staff.

I am sure that the “Handbook on Brake Binding in Freight Stock” will be very much useful to the concerned staff, to ensure trouble free service.

31st August, 2013
CAMTECH, GWALIOR

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Executive Director

PREFACE

Proper knowledge of trouble shooting of faults in brake binding in freight stock is necessary to ensure reliability and availability of Freight stock. This handbook on brake binding in freight stock has been prepared by CAMTECH with the objective that those involved in operation and maintenance of freight stock, must be aware of sufficient knowledge of trouble shootings.

Technological Up gradation and learning is a continuous process. Hence feel free to write to us for any addition / modifications or in case you have any suggestion to improve the handbook. Your contribution in this direction shall be highly appreciated.

31st August, 2013
CAMTECH GWALIOR

(K.P.Yadav)
Director/Mech

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HANDBOOK
ON
BRAKE BINDING IN FREIGHT STOCK
FOR
LOCO PILOTS AND MAINTENANCE STAFF

1.0 Brake Binding in Freight stock

It is the phenomenon of binding the wheels in which brake block grip the wheels of rolling stock undesired of driver/operator. It is the burning problem of Mechanical C&W open line. Its repercussions are as under:-

1. Detention to train causing loss of punctuality of trains.
2. Flat places on tyre of wheel leading to bearing failure, weld failure/ rail fracture.
3. As a preventive measure detachment of coach/ wagon en-route causing inconvenient to passenger to cover their journey.
4. Ineffective percentage will be increased subsequently maintenance cost will also be increased.
5. More Tractive force needed to locomotive.
6. Bad image to Railway.
7. D&AR action against the faulty employee.

2.0 Defining brake binding:

This is defined as the situation when brake block is in contact with wheel tread while Driver's brake valve (A- 9) kept in **RELEASED** position.

2.1 Avoiding confusion:

- Very often incidence of wheel skidding is referred as brake binding. Wheel skidding and brake binding are two different phenomenons.
- Force required to roll a brake binded wheel is less than to roll it.

- There will be increase in tractive effort to roll a binded wheel that depends on the point of pulling the wheel, acceleration and the adhesion. There is 20 – 40% increases in tractive effort for all practical condition.

2.2 Prevention is better than cure:

Instead of analysing a specific case of brake binding, it is worth to analyse the factors and the related maintenance practices that influence the incidence of brake binding. From the fundamental laws of statistics, 90-95 % of the actual cases of brake binding is due to the COMMON CAUSES and only 5 –10 % are due to SPECIAL CAUSE.

The steps involved are:

- Identify the FACTORS related to the incidence of brake binding.
- Identify the PRACTICES influencing these FACTORS
- Identify the SPECIAL ASPECTS in the maintenance practices.

Following table suggests the Factors and related maintenance/handling practices that influence the incidence of brake binding in most of the cases. The special aspects to be specially checked during maintenance have also been highlighted.

Factors	Related maintenance practice	Aspects to be specially checked
Defects in Locomotive	Inspection of air system	<ul style="list-style-type: none"> • Check for fluctuation in BP pressure. • Check for moisture/oil / dirt content in compressed air.

Factors	Related maintenance practice	Aspects to be specially checked
Defects in train handling	Releasing practice of brake	<ul style="list-style-type: none"> • Wait for one minute at least after moving brake valve handle to release position after emergency application. • Avoid extended application of the pressure surge to avoid over charging
	Observing air flow meter	<ul style="list-style-type: none"> • Keep close watch in the airflow indicator to monitor incidence of excess leakage.
	Observing ampere meter	<ul style="list-style-type: none"> • Keep close watch in the Ampere meter reading for high current
	Controlling miscreant activity	<ul style="list-style-type: none"> • Keep vigilant on tampering DV isolating handle position
	Drainage of condensate	<ul style="list-style-type: none"> • Drain condensate from air reservoir, oil separator and filter. • Open drain cock slowly so that condensate is carried out with the air.
Defects related to DV	Mounting of DV on common pipe bracket	<ul style="list-style-type: none"> • Check holes of common pipe bracket are one-to-matched with the corresponding location on the CPB seal.

Factors	Related maintenance practice	Aspects to be specially checked
		<ul style="list-style-type: none"> • Check collars provided on the CPB seals are uniformly projected. • Use small quantity of hard grease on CPB before positioning of the seal to avoid displacement while mounting. • Check that release choke is clear.
	Assembly of DV with Intermediate flange	<ul style="list-style-type: none"> • Overhaul / Repair distributor valve with Intermediate flange as a single unit. • Check holes of Intermediate flange seal are one –to – one matched with respective location in the distributor valve. • Check collars provided on the seal are uniformly projected.
	Inspection of DV	<ul style="list-style-type: none"> • Check the valve is free from rubber buldging or debonded for valve plate (10) in KE type or valve (37) in C₃W type. • Check for smooth

Factors	Related maintenance practice	Aspects to be specially checked
		<p>movement of hollow stem in its guide during assembly. This may be ascertained by:</p> <ol style="list-style-type: none"> 1. Movement of hollow stem Check that hollow stem is not bent. 2. Check that outer surface of the hollow stem is polished. 3. Apply light coat of thin grease on the hollow stem. <ul style="list-style-type: none"> • Check the condition of CPB filter. This is ascertained by: <ol style="list-style-type: none"> 1. Clean CPB filter in every schedule. 2. Clean vertical passage in CPB.
Defect in Brake cylinder	Inspection of brake cylinder	<ul style="list-style-type: none"> • Check for breathing passage. This is ascertained by: <ol style="list-style-type: none"> 1. Avoid greasing of Trunk during assembly. 2. Clean annular space between Trunk and Front cover.
Defects in Dirt	Inspection of dirt collector.	<ul style="list-style-type: none"> • Condition of outlet passage. This is

Factors	Related maintenance practice	Aspects to be specially checked
collector		ascertained by : 1. Clean Dirt collector in every schedule.
Defects in SAB brake regulator	Inspection of Barrel	<ul style="list-style-type: none"> • Check that the barrel has no dent. • Confirm that Traction sleeve passes smoothly inside the entire length barrel during assembly.
	Inspection of Adjuster nut	<ul style="list-style-type: none"> • Check axial play of the Adjuster nut with the spindle. Since actual measurement is difficult, excessive play must be felt while assembly. • Make sure that the adjuster nut falls freely along the spindle when held vertical.
Defects in Brake gear	Adjustment of brake gear	<ul style="list-style-type: none"> • Adjust end pull rod hole and maintain length of pull rod such that the Equalising levers be in near vertical in brake applied position.
	Inspection of Equalising lever	<ul style="list-style-type: none"> • Ensure that the Z-lever pins used with Equalising levers are polished.

Factors	Related maintenance practice	Aspects to be specially checked
		<ul style="list-style-type: none"> • Ensure the corresponding bushes are without any oblong deformation. • Radial clearance is maintained within 0.75 mm.
	Inspection of Actuating rod	<ul style="list-style-type: none"> • Ensure that the Actuating rod is not twisted. The straightness is realised by smooth fitment of the Actuating rod with the both Equalising levers with the pins.

3.0 ENROUTE TROUBLE SHOOTING ON AIR BRAKE TRAINS

(BRAKE BINDING):

S N	PROBLE M	PROBABLE CAUSE	REMEDIAL MEASURES
01	BP pressure less than 5.0 Kg/cm².	1.Leakage from coupling head due to Worn out/displaced MU washer. 2.Leakage from angle cock BP joints or Auxiliary and control reservoir.	1.Reset/Replace MU washer/Air hose. 2.Tighten loose joints and contact PCOR/TLC.
02	Application of Hand Brakes.	Hand Brakes may be “on”.	Release Hand Brakes fully.
03	Empty Load Box setting faulty.	1.Empty Load Box change over handle of empty wagon kept in load position. 2.Sleeve nut of Empty Load Box tempered.	Release the brakes and change this handle to its correct position. 2.Adjust sleeve nut to get correct “A” Dimension i.e. 70+20 mm.
04	Due to change of Loco	1. Difference of BP pressure maintained by two different locos. 2.Due to defective loco: internal leakage in loco air brake system.	1.Release each wagon manually by putting the manual release lever, then recharge the system with new locomotive. 2.Try to restore BP pressure setting of locomotive to 5 Kg/cm ² . If no success, contact PCOR.

S N	PROBLE M	PROBABLE CAUSE	REMEDIAL MEASURES
05	Brake not releasing on recharging	1. Insufficiently release time (Min 2-3 minutes) allowed by Driver. 2.Brake cylinder exhaust choke jammed badly. 3.Horizontal LIVE lever jamming against its guide bracket. 4. SAB not working.	1.Ensure 2 to 3 minutes release time. 2.Release brakes manually and isolate distribution valve. 3.Ensure Horizontal LIVE lever is released properly. 4.Isolate distributor

4.0 Instructions for Train crew on brake binding in Freight stock.

The incidences of flat tyre in Goods trains are viewed very seriously as the consequences of flat tyre are hazardous; the cases of rail fracture / weld failure and roller bearing failures in wagons are often reported. The instructions on the subject of preventing flat tyre in rolling stock are being issued time to time indicating the responsibilities of C&W staff, train crew, station staff, gate men etc. These instructions are to be reiterated for the guidance of staff through the safety circulars / bulletins to be issued by the divisions and also by conducting the safety seminars in the training schools of the divisions.

The most important issue is the brake binding in freight stock. In case of brake binding in a wagon enroute, the loco pilots and guards have to



FIG. - 1

take remedial action for releasing and isolating the brakes for affected wagon before working the train further. Though the train crew is trained, they are not in a position to do the proper job due to lack of practical experience. The crews are therefore required to refresh their knowledge. The following guidelines for their benefit are given as under.

- (i) The train crew shall be vigilant to detect brake binding, smoke emission, unusual sound etc. If they find any metal deposition, skidding marks, wheel disc unusually hot, brake blocks jammed, they should treat this as the case of brake binding.
- (ii) They shall release the distributor valve by pulling the release handle manually (as per figure No.1) and see that the brake blocks are released fully; there should be a gap between the wheel tread and the brake blocks.
- (iii) After ensuring that the brake blocks are free, distributor valve isolating handle shall be put in horizontal position (as per figure No.2).



C₃ W DV



ESCORT DV

FIG. No. – 2 ISOLATION OF DV

- (iv) In case brake blocks are still having the grip on the wheel tread, further action is needed for releasing the brake cylinder pressure. There is a drain plug provided at the rear side of brake cylinder, - a 12 mm size double end spanner or adjustable spanner is required for unscrewing the plug. The plug should be unscrewed by 2 or 3 threads carefully, so as to vent out the brake cylinder pressure to ensure that the piston has moved inside the cylinder thus releasing the brakes making the brake blocks free. (as per figure No.3).

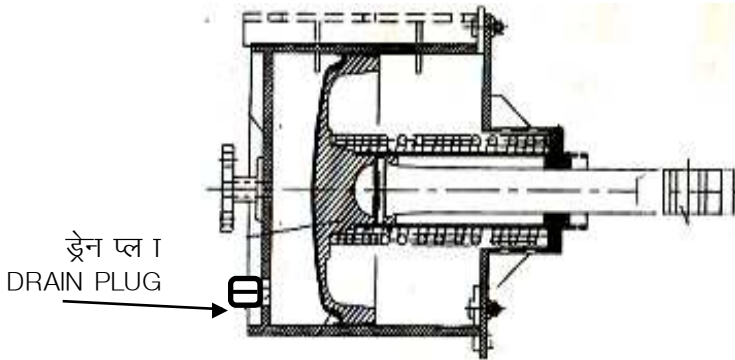


FIG. No. - 3

- (v) In case the brakes are still not released, the hand brakes should be checked, if it is in applied condition, releasing should be done by

rotating the hand brake wheel in the direction of 'Off' position to ensure that the brake blocks are not

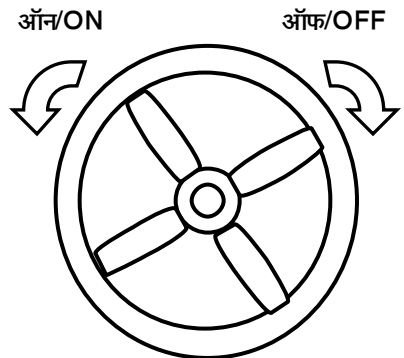


FIG. No. - 4

gripping on wheel tread.(as per figure No.4).

- (vi) Ensure that the empty load box handle is in proper position depending upon the empty / load condition of the wagon (as per figure No.5).

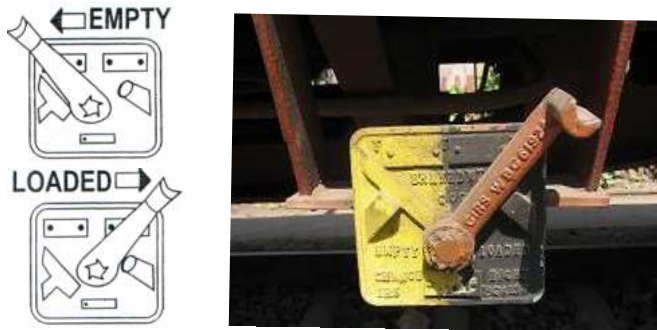


FIG. No. - 5

- (vii) In case the brakes are still not released, SAB Barrel should be rotated in anti clock wise direction by sitting the direction of SAB Pull rod (as per figure No.6). In the process length of SAB pull rod will increase and make sure that brake blocks are in loose condition.

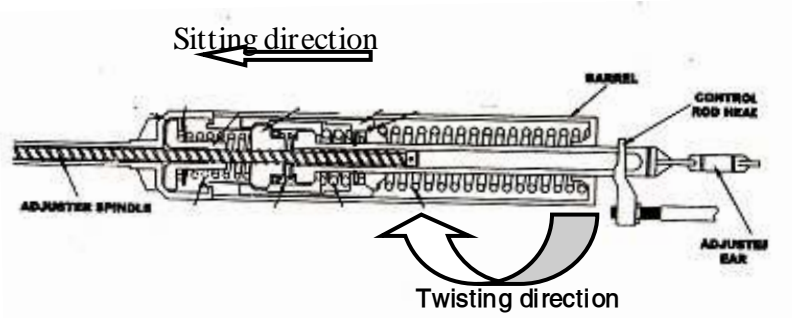


FIG. No. - 6

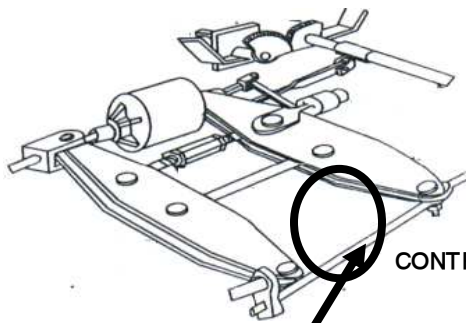
(viii) In case brake blocks are still gripping on the wheel tread, the control rod pin and end pull rod pin (as per figure No, 7 & 8) should be removed and gap created by applying little force manually between brake block and the wheel tread.



एंड पुल रॉड पिन
END PULL ROD

FIG. No. - 7

A drive shall be launched to bring awareness among the train crew in order to implement the above instructions.



CONTROL ROD PIN



FIG .No. - 8

5.0 To overcome the problem reason/ cause-wise remedial measures are as under :

SN	CAUSE	REMEDY
1.	Wrong adjustment of brake rigging.	During maintenance ensure brake rigging is adjusted according to wheel dia.
2.	Handbrake wheel is in ON condition	Ensure during examination/ departure of train that handbrake wheel should be in OFF condition
3.	Mixing of brake block	Avoid mixing of brake block in same wheel set/ bogie/ coach because of different type of brake blocks i.e Cast Iron, L type & K type composite brake block having different coefficient of friction i.e 0.12, 0.17 & 0.25 respectively, resulting reaction force will be differ.
4.	Incorrect position of empty/ loaded box handle of wagon before unloading at goods shed	Ensure correct position of empty/ loaded box handle i.e in loaded position before unloading
5.	Coach/ wagon/ train is not released during brake power testing at workshop/ sickline/ yard, power changing, by passing of pressure en route and CRO	Ensure proper releasing of coach/ wagon/ train during brake power testing at workshop/ sickline/ yard, power changing, by passing of pressure en route and CRO
6.	Mal functioning of SAB due to SAB defective and its	Replace defective SAB

SN	CAUSE	REMEDY
	paying-out function is not working properly	
7.	Dropping of BP pressure more than prescribed limit i.e 0.2 Kg/ cm ²	
7a.	Leakage from palm end air hose	Reset MU washer /replace perished MU washer
7c.	Leakage from air hose	Replace teared air hose
7d.	Leakage from flange joint	Attend and arrest leakage by Teflon tape
7e.	Dirt collector broken by hitting foreign material	By- pass the BP pressure and allow train in single pipe system
7f.	Leakage from LSD	Attend the LSD leakage
7g.	Leakage from Passenger Emergency Alarm Signal System	Reset system by key/isolate the same
7h.	Leakage from levelling valve of air spring	Isolate bogie air spring levelling valves and allow train with 60 Km/h speed
7i.	Leakage from A9 valve	To be attended by LOCO staff because of pulling of load due to difference in BP and CR pressure.
7j.	Leakage from cut off angle cock	Set ball valve/ replace defective angle cock Note: such problem generally takes place from rear most cut off angle cock of train. To attend first of all close the pressure supply from engine end of coach by closing the cut-off angle cock and then put

SN	CAUSE	REMEDY
		the cut-off angle cock in closed position. Finally, again open the other end cut-off angle cock.
8.	Blockage of BP pressure from dirt collector resulting in malfunctioning of DV	Clean dirt collector in regular interval
9.	Difference in BP and CR pressure during change of Locomotive en-route	Ensure manual releasing of full rake before attaching outgoing power.
10.	After full service application sufficient time not given by LOCO pilot for releasing i.e. 90 sec for twin pipe and 180 for single pipe.	Ensure counseling of LOCO pilot
11.	Defective DV	Replace DV
12.	Any other component of Air Brake System not functioning properly	Attend/ Replace the same.

OUR OBJECTIVE

To upgrade maintenance technologies and methodologies and achieve improvement in productivity and performance of all Railway assets and man power which inter-alia would cover reliability, availability, utilization and efficiency.

If you have any suggestions and any specific comments, please write to us.

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