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भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन

लखनऊ - 226011

Government of India - Ministry of Railways
Research Designs & Standards Organization,
LUCKNOW - 226011

No. EL/3.2.19/3-Phase

Dated: 02.04.2007

Chief Electrical Engineer,

- Central Railway, Mumbai CST-400 001.
- Northern Railway, Baroda House, New Delhi-110 001.
- North Central Railway, Hastings Road, Allahabad- 211001
- Eastern Railway, Fairlie Place, Kolkata -700 001.
- East Central Railway, Hazipur-844101.
- East Coast Railway, Chandrashekharapur, Bhubaneswar-751016.
- Southern Railway, Park Town, Chennai-600 003.
- South Central Railway, Secunderabad-500 371.
- South Eastern Railway, Garden Reach, Kolkata -700 043.
- South East Central Railway, Bilaspur-495004
- Western Railway, Churchgate, Mumbai-400 020.
- West Central Railway, Jabalpur-482001.
- Chittaranjan Locomotive Works, Chittaranjan-713 331 (WB)

**SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2007/EL/
SMI/ 0244, Rev. 'O' DATED 02.04.2007**

1. Title:

Provision of additional safety sling on brake levers of WAP7 & WAG9 locomotive.

2. Brief History :

In the existing arrangement, the TBU or the PBU are provided on each wheel on one side. The other side of the tread of each wheel is having only brake block and it is called the slave unit. There have been cases of breakages of the brake lever in WAP7 & WAG9 three phase electric locomotives. The cases of breakage of brake lever were investigated in consultation with the manufacturers, railways/sheds and CLW. Various possible causes of breakage of the brake levers are as under:

- a) Falling / missing of adjusting equipment assembly of the TBU/PBU would lead to undesirable lateral as well as longitudinal oscillation of the brake unit about its suspension point in the bogie frame. This may lead to hitting of the brake unit against the bogie frame as also against the wheels. This may in turn generate excess stress on the brake lever which is taking the load of the entire brake unit.
- b) The other parameters which could lead to the failure of the brake lever is the material of the brake lever itself as well as the effect of welding on the same. Findings of the M&C Directorate in one of the

earlier case have given indication vide their report no. M&C/MIT/INT/1/130/2004 dated 07.10.2004 that the welding, might have introduced bainite structure which may be brittle and may not be able to sustain the fatigue loads.

- c) Geometry and accuracy of the lever (shape, profile and the location of the holes), if not proper, is also expected to contribute to misalignment which finally would lead to uneven distribution of forces during braking and ultimately lead to unwanted stress concentration in the weakest areas on levers.
- d) Location and alignment of the mounting brackets as welded on the bogie frame may also contribute to stress concentration in the levers, of the mounting brackets are not properly aligned.
- e) The bolt material being high tensile steel of 10.9 grade, the load by the adjusting equipment assembly is not considered detrimental to the stud, as confirmed by the manufacturers i.e. M/s. FTIL and M/s. KBI.
- f) FEM analysis of the brake levers has been done and the strength of the brake levers has been found in order.

3. Object:

To avoid falling of brake unit (TBU or PBU) in event of breakage of brake lever.

4. Modified Instructions :

Considering the above factors, which are likely to cause the failure of brake lever, and the action plan suggested vide minutes of meeting held at ELS/GZB on 02.03.2007 on the subject, following is recommended to be followed by Railways/sheds and CLW :-

a) Adjusting Equipment Assembly:

- (i) Deficiencies of the adjusting equipment assemblies should be made good on all Locomotives at the earliest. Trip Shed/Base Shed should ensure that no Loco is turned out with any deficiencies in the brake rigging.
- (ii) Relocating of this assembly from outer end to inner end as discussed at ELS/GZB may not serve useful purpose since even in the proposed new location it is also susceptible for external hitting such as ballast etc. The existing location be maintained without change since it will give an additional advantage of ease of accessibility/adjustment during normal course of maintenance and inspection.
- (iii) The sheds are, therefore, advised to ensure that spring compression, clearance between slack adjuster cup and bogie frame lug etc are maintained strictly as given in the maintenance manual.

b) Safety Sling:

Though it was decided in the earlier meeting at ELS/GZB that a safety sling - wire rope will be provided in every TBU/PBU, the firms expressed their reservation against this proposal on the ground that such sling arrangement will not be able to control the oscillations of the TBUs/PBUs after breakage of lever. On the contrary, the firms feel that the TBU/PBU hanging from the sling will tend to sway more haphazardly causing more impacts on the bogie frame parts. Apart from this free body oscillation, the TBUs/PBUs, though with broken lever, will continue to operate during every brake application and will cause more lateral movement of the unit itself.

It is however also thought that provision of sling will hold the brake lever from falling down at least for some time and allow driving crew to take necessary action such as isolating the brake unit pneumatically. Driving crew may be suitably advised.

It is, therefore, decided to provide safety sling arrangement on TBUs/PBUs expeditiously as an interim measure until more appropriate design proposals are finalized. Accordingly, sheds are advised to provide sling (8mm dia, 1220 mm long) double crimped at both ends and fastened with 16x45 mm bolt with lock nut and washers by drilling hole with 17.5mm drill on both levers at location as indicated in the drawing enclosed. Special care should be taken while drilling the hole in the brake lever so that all burrs and sharp edges are removed. Slings when provided should be loose enough not to take any load in normal condition and to avoid impact load in event of breakage of the levers.

c) Brake Levers:

- (i) Brake lever and other components of the brake rigging showing any sign of distress should be immediately replaced with proper quality and genuine material procured from approved vendor only i.e. M/s. Faively Transport India Ltd & M/s. Knorr Bremse India Pvt. Ltd.
- (ii) Railways/Sheds should ensure that all spare parts for the brake rigging assembly are being procured from approved vendor M/s. Faively Transport India Ltd & M/s. Knorr Bremse India Pvt. Ltd. only. It should be ensured during the inspection that levers are stress relieved after welding of the ring in the zone prone to breakage.
- (iii) One cycle of RDPT should be completed by the Sheds as early as possible. RDPT should be made a part of schedule during every MOH.
- (iv) The Railway/Sheds and CLW should also ensure conformance of the brake levers to CLW drawing no. 1209-01-116-023 and CLW

Drg. No. 1209-01-116-024 in respect of various hole position, the profiles, the radii and conformance to material specification.

d) Bogie Inspection:

Since misalignment in the brake hanger brackets may also cause lateral force, it is considered necessary that the bogie frames of WAP7 & WAG9 Locomotives are inspected by CLW in the locations of TBU/PBU suspension bracket particularly and ensure conformance to the relevant drawings with regard to the alignments, clearances, fitment of bushes etc.

e) Indigenous Sources of Brake Levers:

It has been observed that brake levers have also been procured from sources such as M/s. Tirupati Works, Kolkata and M/s Kay Pee Equipment Pvt. Ltd. Howrah, which are not approved by RDSO. Railway/sheds and CLW should ensure that various components of the brake system including the brake levers are procured only from RDSO approved sources i.e. M/s. Faively Transport India Ltd & M/s. Knorr Bremse India Pvt. Ltd. For subcontracted items of the approved vendors i.e. M/s. Faively Transport India Ltd & M/s. Knorr Bremse India Pvt. Ltd. Railway/Sheds and CLW should ensure that such materials are being procured by M/s. Faively Transport India Ltd & M/s. Knorr Bremse India Pvt. Ltd. as per RDSO's approved Bill of Material (BOM).

- f)** CLW and Railways/Sheds should follow recommended practices during manufacturing and maintenance respectively to ensure safety and reliability of the brake system.
- g)** CLW and Railways/Sheds are also advised to keep records of various important parameters laid down in the manuals/ drawings.
- h)** Location and alignment of the mounting brackets as welded on the bogie frame may also contribute to stress concentration in the levers. CLW should ensure this aspect for conformance to the manufacturing drawing without any deviation.
- i)** Railways/ sheds are also advised to furnish the details of the number of years/kilometers earned in service by the brake levers which have broken. This will help in deciding the frequency of scheduled replacement of the brake levers, if required.

j) Material Required:

- i)** Safety sling 8mm dia as per IS 2762:1982 with double crimping at both ends as given in the enclosed drawing.
- ii)** 16x45mm bolt with nut, spring and plain washers.

5. Application to class of Locomotives:

WAP7 and WAG9 Electric Locomotives.

6. Agency of Implementation:

CLW, All the Electric Loco Sheds & Electric Loco Workshops.

7. Periodicity of Implementation:

Sling to be provided on all WAP-7 Locomotives on priority followed by WAG9 Locomotives. Subsequently, the slings to be replaced on condition basis.

Encl: Annexure - one sheet

(Kishore Kumar)
for Director General/Elect

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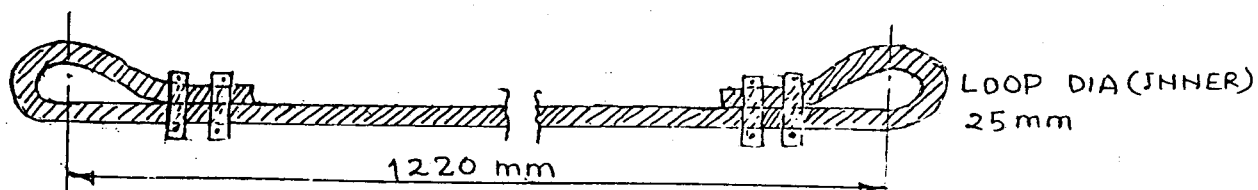
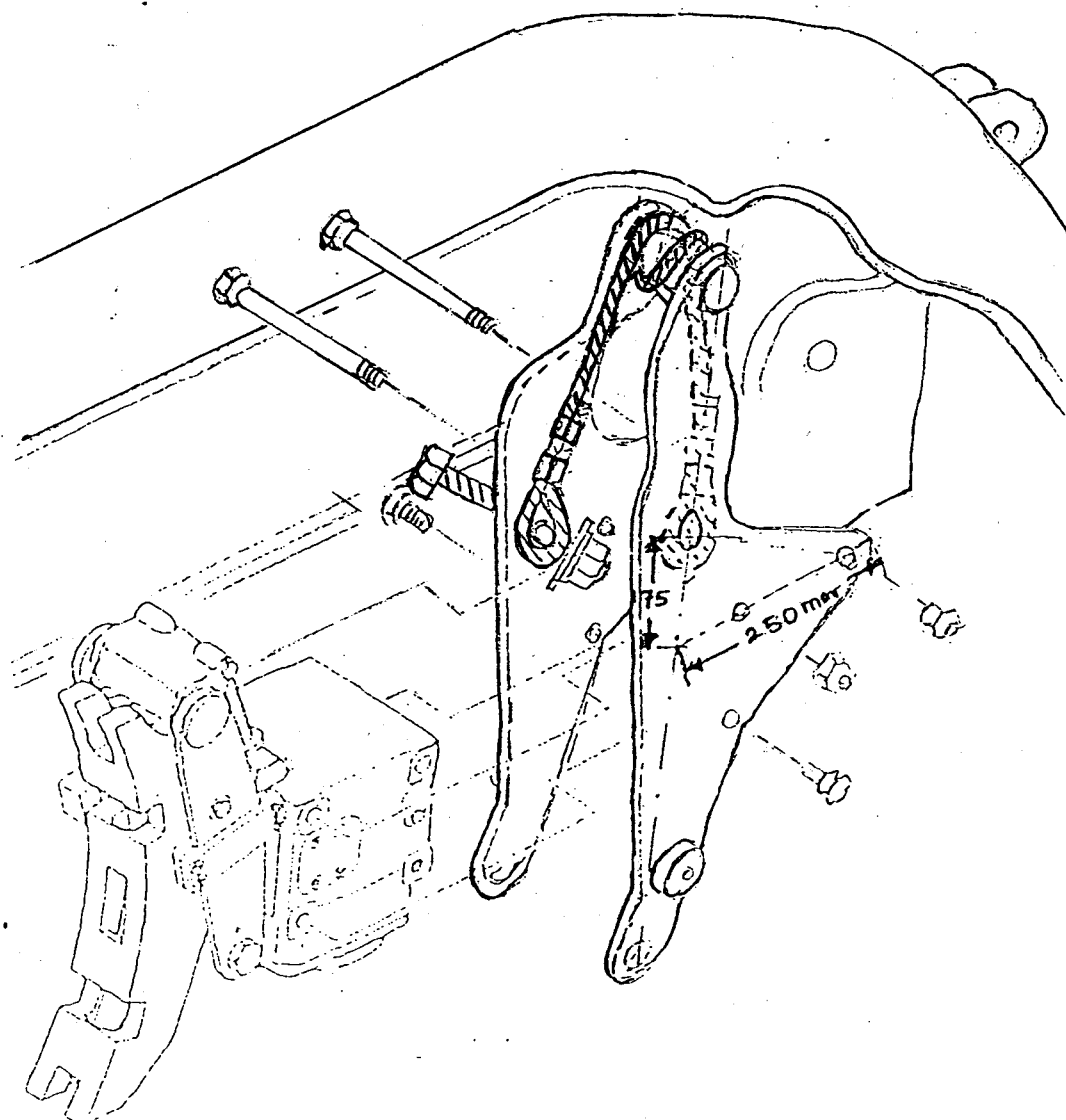
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Encl: Annexure - one sheet

(Kishore Kumar)
for Director General/Elect

**PROVISION OF SAFETY SLING FOR BRAKE LEVER
OF WAP7/WAG9 LOCOMOTIVES**

ANNEXTURE



Note:

1. Nominal size of wire rope sling diameter 8 mm as per IS: 2762-1982.
2. Minimum number of crimped clips should be 2 nos. on each side loop.
3. Inner diameter of loop 25 mm.
4. M16, clause 8.8, full threaded of 45mm length with knorlock nuts are to be used.