



सत्यमेव जयते

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Research, Designs & Standards
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No. EL/3.1.35/2 (brake lever)

Date: 17.09.2015

Chief Electrical Engineer,

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2. East Central Railway, Hazipur-844101.
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6. Northern Railway, Baroda House, New Delhi-110001.
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9. South Eastern Railway, Garden Reach, Calcutta-700 043.
10. Southern Railway, Park Town, Chennai-600 003.
11. West Central Railway, Jabalpur-482001.
12. Western Railway, Churchgate, Mumbai-400 020
13. Chittaranjan Locomotive Works, Chittaranjan - 713 331

MODIFICATION SHEET No. RDSO/2015/EL/MS/0443 Rev. '0', Date 17.09.2015

1.0 Title: Modification for improving the reliability of motor supports in bogie of WAP7/WAG9 locomotives.

2.0 Object: Railways have reported breakage of motor support in WAG9/WAP7 locomotives. On observation of the breakages in motor support lug, it is noted that the cracks generally initiates from motor support lug portion in fatigue manner and ultimately shears the lugs perpendicularly.

Failure investigation conclude that the motor lug not having 8R radius on the upper face results in stress concentration on the upper portion of the lug leading to its breakage.

To resolve the above problem, Railways were advised vide RDSO SMI no. 280 for making filet radius of 8R manually on the upper face of motor support using grinder. However, it is reported that breakage of rectified motor supports with 8R radius (made manually) on the upper face continues even after implementation of the SMI no. 280.

3.0 Existing Arrangement: Presently, the traction motor is suspended from motor support to CLW drawing no. 1209-01-112-009 Alt '1' through torque arm in WAP7/WAG9 Locomotives.

4.0 Modified Arrangement: The modified design of motor support has been developed based on FEA analysis having better factor of safety compared to its earlier design. Consequently, new drawings of motor support has been made as per CLW drawing no. 209-01.412-186 & 1209-01.412-187.

5.0 Work to be carried out:

- a. Motor support welded on bogie transom not having filet radius of 8R on upper face or the rectified motor support having 8R radius (made manually) on upper face after implementation of RDSO SMI no. 280 should be replaced with motor support having filet radius 15R as per CLW drawing no. 1209-01.412-186.

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- b. Motor support welded on pivot transom should be maintained as per RDSO SMI No. 280. However, if the sheds are not able to maintain the motor support as per the above SMI, the motor support on pivot transom should be replaced with new motor support as per CLW drawing no. 1209-01.412-187 along with pivot support sub assembly with in-built welded pivot pin.
- c. The procedure for replacement of motor support welded on bogie transom/pivot transom is explained in annexure 'A'.

6. Application to class of Locomotives : WAP7/WAG9 locomotives

7. Material Required: Motor support having file radius 15R as per CLW drawing no. 1209-01.412-186 for work to be carried out as per 5(a). Motor support as per CLW drawing 1209-01.412-187 along with Pivot support sub assembly with in-built welded pivot pin for work to be carried out as per 5(b).

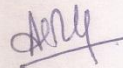
8. Material Rendered Surplus: Motor support welded on bogie transom for work to be carried out as per 5(a) and pivot support sub assembly with in-built welded pivot pin for work to be carried out as per 5(b) as per old design to CLW drawing no. 1209-01-112-009 Alt '1'

9. Reference: Railway Board letter no.2007/Elect(TRS)/441/8pt dated 01.07.2015

10. Modification Drawing : CLW drawing no. 1209-01.412-186 & 1209-01.412-187

11. Agency of Implementation: Replacement work will be carried out by **approved sources of three phase bogie (WAP7/WAG9) in shed/workshop premises.**

Note: This modification sheet supersedes TECHNICAL CIRCULAR No. RDSO/2015/EL/TC/0130 Rev. '0' DATED: 29.05.2015.



(A. K. Rastogi)
for Director General/Electrical

Enclosed: (i) Annexure 'A'
(ii) CLW drawing nos. 1209-01.412-186 & 1209-01.412-187

Copy to: As per standard mailing list

Annexure-A

Procedure for replacement of motor support

1. Two fixtures namely tack welding fixture and heavy duty welding fixtures are to be used for replacement of motor support (to be made by approved source).

The tack welding fixture (fig-1) is used to locate the position of motor support on the transom.

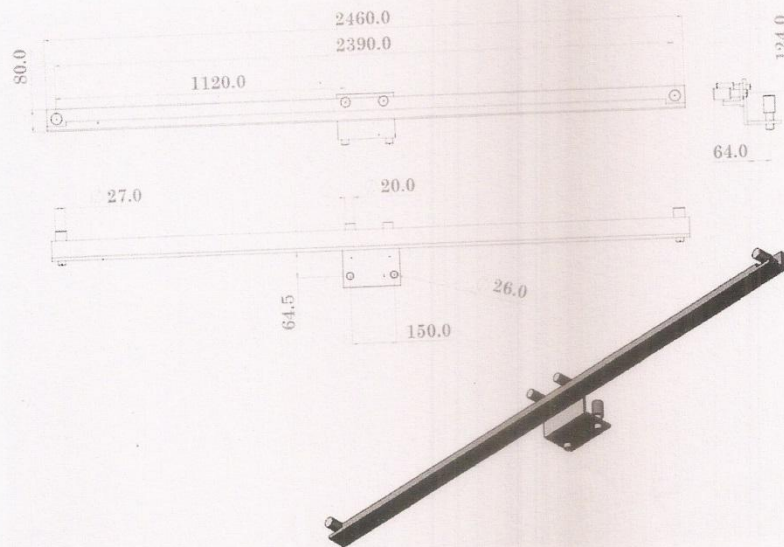


Fig-1

Whereas, the heavy duty welding fixture (fig-2) is used to hold the motor support for control distortion during complete welding.

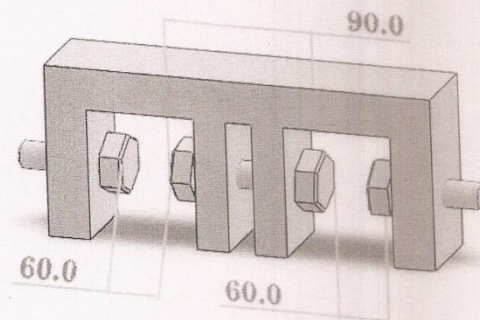


Fig-2

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2. Procedure for removing motor support:

- (i) Bogie frame should be kept up side down and motor support should be on the top for ease of replacement/welding.
- (ii) 4 motor support situated on the transom of bogie should be removed by cut-off grinding wheel slowly to avoid excessive heating.
- (iii) Pivot support sub-assembly base is to be removed first by oxy-gas cutting. This cut should be 10mm above the weld joints of 18mm base plate. Heat input to the bogie should be avoided during oxy-gas cutting suitably. The left out material (10mm) of structure should be removed by cut-off grinding wheel slowly to avoid heating in bogie frame.

3. Procedure for fixing motor support on bogie transom (4 Nos.):

- Finished modified two nos. motor support to CLW drawing No. 1209-01-412-186 will be tack welded in middle of frame using **tack welding fixture** maintaining distance shown in Fig- 3.
 - 1. X dir. 64.5 mm
 - 2. Y dir. 1155 mm (35+1120)
 - 3. Z dir. 163 mm
 - 4. Sequential Mig welding will be carried slowly using **heavy duty Welding Fixture** so that distance is arrested and dimensional accuracy with centre line is maintained in X, Y, Z, direction.

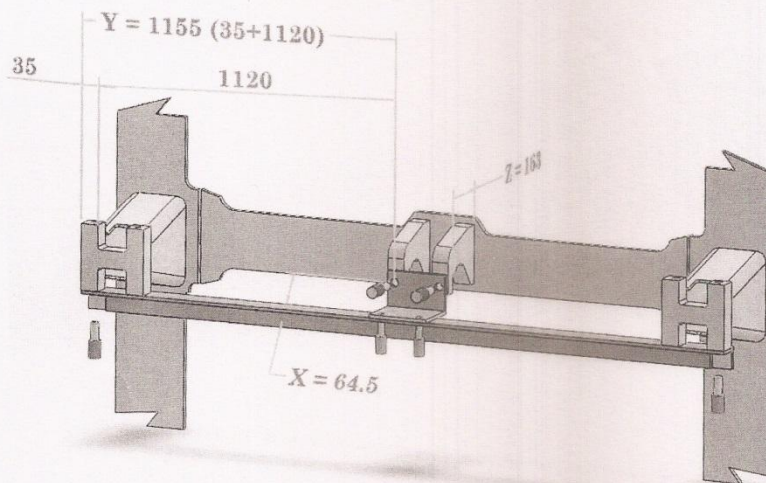


Fig -3

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4. Procedure for fixing pivot support sub – assembly with modified motor support as per CLW drawing No. 1209-01.412-187:-

➤ Pivot support sub assembly with in-built welded pivot pin will be welded with transom after locating its position using **tack welding fixture**, maintaining distance shown in Fig 4.

1. X dir. 64.5 mm
2. Y dir. 1155 mm (35+1120)
3. Z dir. (Z1= 284 mm & Z2 = 163 mm) as shown in fig-4
4. Sequential Mig welding will be carried out slowly to avoid distortion during welding process to maintain dimensional accuracy with centre line in X, Y, Z, direction.

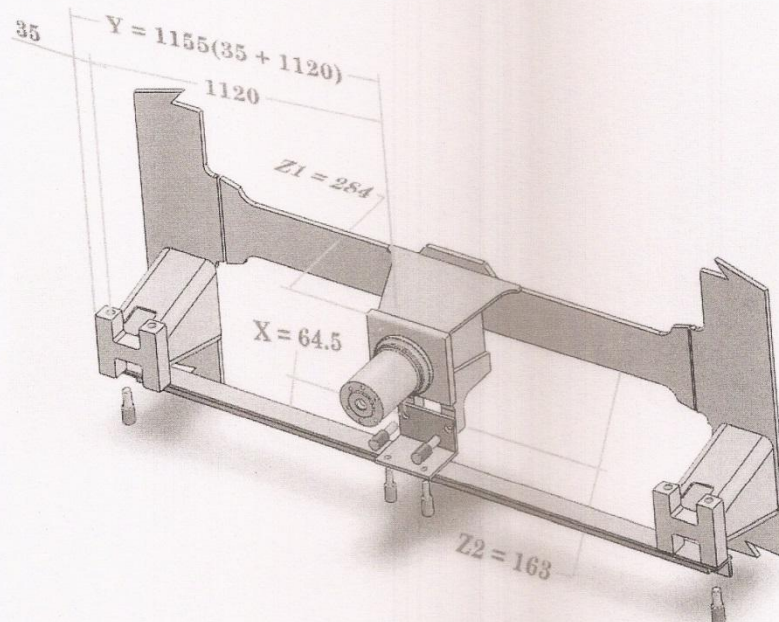
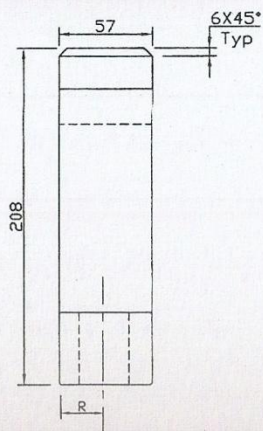


Fig-4






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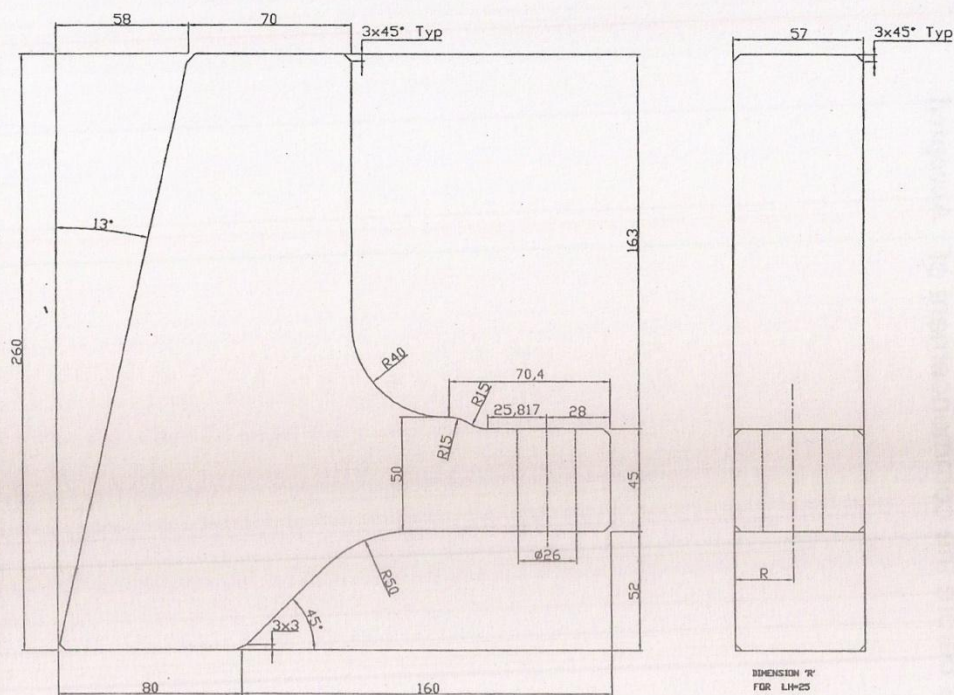


	x	y
□	0	0
A	63.84	49.89
B	68.83	53.40
C	155	36
D	77.33	121.54

Dimension ' R '
For LH - 25
For RH - 32

- (1). MACHINED ALL OVER Rz 25
- (2). ALL DIMENSIONS ARE IN mm.
- (3). ALL EDGES SHOULD BE CHAMFERED BY 3X45°.
- (4). ALL FACES SHOULD BE MACHINED.
- (5). STEP IS NOT PERMITTED AT ANY PLACES.
- (6). FOR UNSPECIFIED TOLERANCE Ref. IS: 2102 FINE
- (7). THIS DRG. SUPERSEDES DRG. NO. 1209-01.312-047
- (8). **DRILL HOLE CAN BE DONE DURING FINAL MACHINING TO DRG.NO. 1209- 01-112-009**

		T211/045				MOTOR SUPPORT RH & LH MODIFIED		4+4	63 THK STEEL PLT.	IS 2062:2011 Gr. E410 Qty. 'C'	12				
		SIGN		C & D Nos.		REF. NO.		PART DRG. NO.		DESCRIPTION		NO/ LOCO	MATL.	SPECN.	Weight EACH IN KG
		DIMENSION 116 DELETED. NOTE 8 AND WEIGHT 12 KG. ADDED. DESCRIPTION				DRAWN				ASSLY. DRG. REF.		CHITTARANJAN LOCOMOTIVE WORKS			
				CHECKED				1209-01.012-011 Ref. 20		ELDO(M)					
				SSE											
				AME/D						USED FOR LOCOS					
				DY.CEE/ D-II				MOTOR SUPPORT RH & LH (MODIFIED)		WAP-7 & WAG-9					
				DATE:		29.5.13				DRAWING NO.					
				N.T.S.						1209-01.412-186					
		RDSO L. NO. EL/31.35/2		Dtd. 20/05/2014						ALT.					
		ALT. NO.		①											



- NOTE.
- (1). MACHINED ALL OVER Rz 25.
 - (2). ALL DIMENSIONS ARE IN mm.
 - (3). ALL EDGES SHOULD BE CHAMFERED BY 3X45°.
 - (4). ALL FACES SHOULD BE MACHINED "ON CNC".
 - (5). STEP IS NOT PERMITTED AT ANY PLACES.
 - (6). FOR UNSPECIFIED TOLERANCE Ref. IS: 2102 FINE.
 - (7). THIS DRG. SUPERSEDES DRG. NO. 1209-01.412-122.
 - (8). ALL EDGES SHOULD BE SMOOTHENED BY USING GRINDING WHEEL.
 - (9). FINAL PROFILE & DRILL HOLE 26 CAN BE MADE DURING MACHINING TO DRG. NO. 1209-01.112-009.

				SUPPORT	4	63 THK STEEL PLT.	IS 2062:2011 Gr. E410 QUALITY/B 9	13.25
	C & D Nos.	REF. NO.	PART DRG. NO.	DESCRIPTION	NO/ LOCC	MATL.	SPECN.	Weight EACH IN KG.
		DRAWN	ANGAD	ASSLY. DRG. REF. 1209-01.112-121 REF 1	CHITTARANJAN LOCOMOTIVE WORKS			
		CHECKED	PR22174		ELDO(M)			
		SSE	<i>[Signature]</i>	SUPPORT (NEW)	USED FOR LOCOS WAP-7 & WAG-9			
		AME/D	<i>[Signature]</i>					
		DY.CEE/ D-II	<i>[Signature]</i>					
		DATED: 21/10/2014			DRAWING NO. 1209-01.412-187			
		N.T.S.			ALT.			
		RDSO L. NO. EL/31.35/2(BRAKE LEVER) Dt. 20.08.14						