



भारत सरकार-रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ- 226011
E-mail: dse4group@gmail.com

Government of India - Ministry of Railways
Research, Designs & Standards
Organization, LUCKNOW - 226011
Telephone : 2465754 & 42226 (Rly)



No. EL/3.1.35/2 (TMS)

Date: 01.12.2023

प्रधान मुख्य विद्युत अभियंता,

Principle Chief Electrical Engineers,

1. मध्य रेलवे, मुम्बई सीएसटी-400 001
2. पूर्व मध्य रेलवे, हाजीपुर-844 101
3. पूर्व तटीय रेलवे, चन्द्रशेखरपुर, भुवनेश्वर-751 023
4. पूर्व रेलवे, फेयली प्लेस, कोलकाता-700 001
5. उत्तर मध्य रेलवे, ब्लॉक ए-2, सुबेदारगंज
इलाहाबाद- 211 033
6. उत्तर रेलवे, बड़ौदा हाऊस, नई दिल्ली-110 001
7. उत्तर पश्चिम रेलवे जयपुर- 302006
8. उत्तर पूर्व रेलवे गोरखपुर- 273001
9. दक्षिण मध्य रेलवे, रेल निलय, सिकंदराबाद-500 371
10. दक्षिण पूर्व मध्य रेलवे, बिलासपुर- 495 004
11. दक्षिण पूर्व रेलवे, गार्डनरीच, कोलकाता-700 043
12. दक्षिण रेलवे, पार्क टाउन, चेन्नई-600 003
13. दक्षिण पश्चिम रेलवे हुबली-580020
14. पश्चिम मध्य रेलवे, जबलपुर-482 001
15. पश्चिम रेलवे, चर्चगेट, मुम्बई- 400 020
16. पूर्वोत्तर सीमांत रेलवे, पान्दुपोर्टरोड, मालीगोंव, गुवाहाटी,
असम-781012
17. चित्तरंजन रेल इंजन कारखाना, चित्तरंजन- 713 331
18. बनारस रेल इंजन कारखाना वाराणसी 221004
19. पटियाला रेल इंजन कारखाना पटियाला 147003

1. Central Railway, Mumbai, CST-400 001.
2. East Central Railway, Hazipur-844 101.
3. East Coast Railway, Chandrashekharpur,
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4. Eastern Railway, Fairlie Place, Calcutta-700 001.
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Maligaon, Guwahati, Assam 781012 331
17. Chittaranjan Locomotive Works, Chittaranjan-713
18. Banaras Locomotive Works, Varanasi-221 004
19. Patiala Locomotive Works, Patiala. Punjab- 147003

Sub.: Modification Sheet for development of Traction Motor Dropping Detection System (TMDDS) in WAP-7/WAG-9, WAG-9H, WAG9HC type of Electric Locomotives.

A Modification Sheet No. RDSO/2023/EL/MS/0476 Rev '0' for development of Traction Motor Dropping Detection System (TMDDS) in WAP-7/WAG-9, WAG-9H, WAG9HC type of Electric Locomotives was issued vide RDSO letter No. EL/3.1.35/2 (TMS) dated 01.12.2023.

There was a typo error and the above modification sheet may read as **modification Sheet No. RDSO/2023/EL/MS/0496 Rev '0' dated 01.12.2023.** Fresh copy of the above modification sheet is being enclosed herewith for kind information and necessary action please.

This is for your kind information and necessary action please.

(Gaurang Gupta)

for Director General/Electrical

Encl: As above.



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Date: As signed

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8. उत्तर पूर्व रेलवे, गोरखपुर-273001
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Modification Sheet No. RDSO/2023/EL/MS/0496 Rev '0' Dated: 01.12.2023

- 1.0 Title:** Modification Sheet for development of Traction Motor Dropping Detection System (TMDDS) in WAP-7/WAG-9/9H/9HC type of Electric Locomotives.
- 2.0 Object:** There is no indication for loco crew in three phase Electric Locos regarding falling of TM on-line. In view of criticality of the issues it has been felt necessary to develop Traction Motor Dropping Detection System (TMDDS) in WAP-7/WAG-9/9H/9HC type of Electric Locomotives.
- 3.0 Existing Arrangement:** The ABB traction motor type 6FRA 6068 used in WAP-7/ WAG-9/9H/9HC Locos are suspended in the bogie frame from torque arm through motor support and TM holder plate and on the individual axles through suspension tube.

3.1 Background:

- a. Cases of Traction motor dropping on-line over Indian Railway in WAP-4/WAG-7/WAP-7/WAG-9 Electric Locomotives had happened due to breakages of traction motor nose/motor support.
- b. In regard to accident of train no. 15633 UP (Bikaner-Guwahati Express) in Alipurduar of Northeast Frontier, Commissioner of Railway Safety (CRS) recommended that the traction motor (in WAP-4 locomotive) comes to rest on the bogie transom with its lifting lugs in case of failure of top nose stay. This intermediate position can be detected electrically which can send alarm to driving cab and ALP/LP can immediately stop the train. Accordingly RDSO had already been issued a modification sheet No. RDSO/2022/EL/MS/0487 Rev. '0' for Traction motor Dropping Detection System (TMDDS) in Conventional Locomotives equipped with Hitachi HS 15250A Traction motors.
- c. In view of seriousness of the issue, it has been decided that similar arrangement for WAP7/WAG9 loco also needs to be developed.

4.0 Modified Arrangement:

4.1 How it Works:

TMDDS alert loco crew through signaling lamp (LSTM) and buzzer sound in CAB followed by DJ tripping with emergency brake application automatically by dropping of BP to zero and an event will be displayed in DDS display that "DJ tripped via BPEMS.

4.2 Scheme:

For provision of TMDDS, the following modifications need to be carried out.

a. Fabrication of TM lifting lug adapter:

Two no's of 5mm thick plates to be cut in the shape of lifting lug and both are to be joined by welding on top side with a plate duly maintaining the gap between them equal to TM lifting lug thickness as shown in **Fig.1**.

b. Preparation of L flats:

i). For TM 1 & 2:

Two flats of 220 mm (approx.) and 110 mm length with 6 mm thickness and 40 mm width are to be welded in 'L' shape. Flat of 220 mm length to be bended at 90 ° at the other end at a distance of about 40 mm as shown in **fig. 2**.

ii). For TM 3:

Two flats of 220 mm (approx.) and 210 mm length with 6 mm thickness and 40 mm width are to be welded in 'L' shape. Flat of 220 mm length to be bended at 90 ° at the other end at a distance of about 40 mm as shown in **fig. 2**.



Fig.1: TM Lifting Lug Adapter

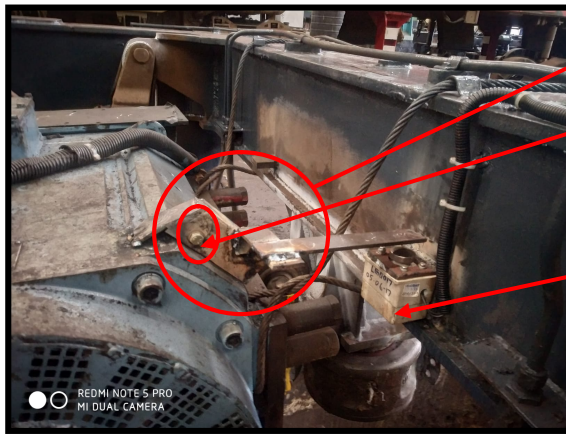


Fig.2: Welded 'L' flat



Fig.3: Adapter with welded 'L' flat

- c. This 'L' flat to be welded to lifting lug adapter at suitable location from side it is bend to operate foot switch. This arrangement is to be fixed on lifting lug by providing M-16 bolt, Flat washer and stainless steel locking nut as shown in **Fig-4**.
- d. Since the adapter is fabricated in the shape of TM lifting lug and joined by welding on top portion there is no scope for lateral movement of adapter on run which will avoids the malfunctioning of foot switch and also the adapter is seated on top of the lifting lug, avoids dropping on run.



Adapter with 'L' flat fixed on TM lifting lug with M16 bolt, Flat washer and stainless steel locking nut

Foot switch fixed on bogie transom

Fig.:4

- e. Base plate for fixing of Foot switch to be welded on bogie transom near TM lifting lug as shown in **Fig-4**. Base plate is flat of 200 mm length with 6 mm thickness and 80 mm width in 'L' shape. Flat to be bended at 90° at one end at a distance of about 85 mm. One hole of Ø40 in center and 4 Nos. holes around it as shown in fig. 5 is made for fixing of foot switch.



Base plate to be welded on bogie transom for mounting of foot switch

Fig.5

- f. SB terminal to be welded in each bogie frame near to corner to extend the wiring to SB terminal of loco body as shown in **Fig.: 6 & 7**.

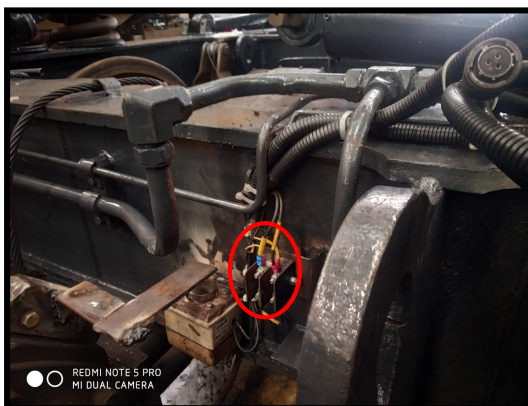


Fig.:6 SB in Bogie



Fig.:7 SB in Car Body

- g.** 2.5 Sq.mm 1 core cable to be laid from each foot switch on bogie frame up to the terminal SB and extend up to SB in loco body.
- h.** All the foot switches of TM 1 to 6 interlock wiring should be connected in parallel.
- i.** MCB of 2 Amps (TMDDS) to be provided in SB-2 panel to control the wiring.
- j.** LSTM LED indication lamp is to be provided on D panel of driver's desk in each cab.
- k.** 2 no. two pin circular coupler arranged between bogie and body connections to disconnect whenever loco is lifted.
- l.** A blocking diode VSTM and a Relay QEMS to be provided in SB-2 panel.

4.3 Working:

Whenever TM support/TM holder plate nose cracked TM falls from the normal position. In this process the 'L' flat welded on TM lifting lug adapter activates the foot switch. The interlock of foot switch allows 110 V supply to QEMS relay through 067 TM and energises the relay. On energisation of QEMS relay, LP gets the similar actions of BPEMS, (when pressed) along with glowing of LSTM with buzzer on drivers cab. Immediately, LP has to ensure the condition of the TM's before working further.

4.4 Periodic maintenance of components used in TMDDS:

Items to be checked in every schedule:

- a.** Outside surface of the foot switches to be cleaned.
- b.** Ensure free operation of foot switches.
- c.** Ensure continuity of the interlocks at bogie SBs.
- d.** Ensure the condition of the welded portion of the TM lifting lug adapter and its intactness.
- e.** During TOH: Foot switches to be replaced on conditional basis, During IOH: Foot switches must be change.
- f.** Whenever, loco is lifted and during major schedules, the circuit & modification needs to be checked for ensuring proper working.

4.5 Circuit Diagram:

Circuit diagram is enclosed herewith.

4.6 Resetting:

If no abnormality found or to clear the block section, LP has to switch off the TMDDS MCB for resetting and work further with cautious speed duly mentioning in the loco logbook.

5. Application to Class of Locomotives:

WAP-7 and WAG-9/9H/9HC

6. Material Required:

- a) 2.5 Sq. mm cable – 80 meters approx.
- b) Foot switches as used in WAG9 loco for sander and PVCD (110 V DC, 1.2A) – 6 numbers.
- c) Base plate for fixing of foot switches in bogie – 6 numbers.
- d) TM lifting lug adapter with L flat – 6 numbers.
- e) Indication lamp (Type: ID 16-22, Rating: 110 V AC/DC, 20mA) – 2 numbers for each cab.
- f) MCB 2 pole type A9N61522, 2A DC – 1 number.
- g) Two pin circular coupler– 2 sets (Male & Female)
- h) SB – 4 numbers
- i) VS diode as used in conventional loco (Type 12FMR, Rating:12 Amp) - 1 number
- j) Relay -1 number (LCD-128 type)

7. Material rendered surplus:

Nil.

8. Periodicity:

Major Schedule or whenever loco in lifted condition.

9. Agency of Implementation:

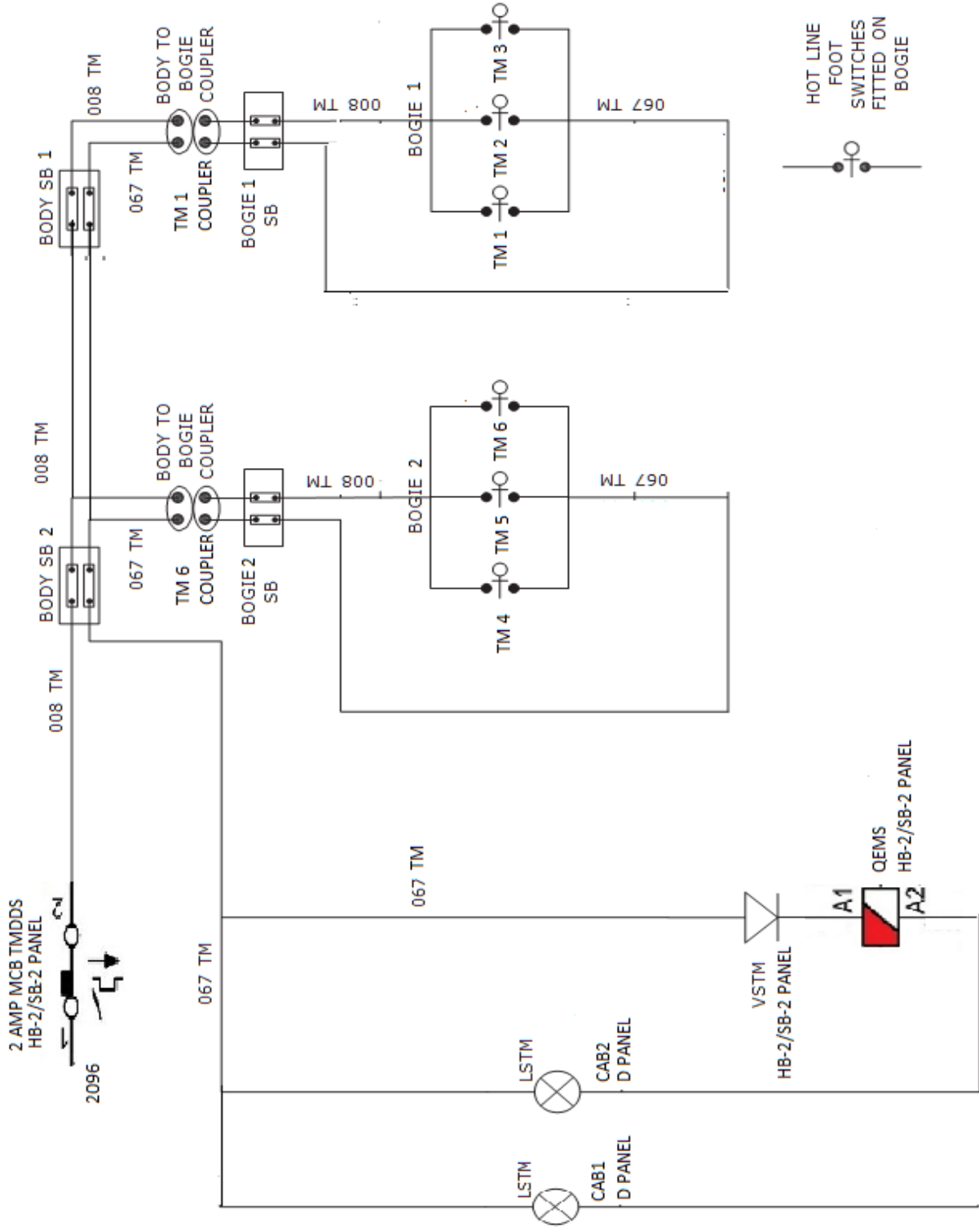
PU's, POH Workshops, Sheds

Encl: Electrical Circuit diagram of TMDDS Scheme


(Gaurang Gupta)
for Director General/Electrical

Copy to: As per standard mailing list.

TRACTION MOTOR DROPPING DETECTION SYSTEM FOR 3-PHASE LOCO



ELECTRICAL CIRCUIT

CABLE INDEX FOR QEMS RELAY

1. FOR PANTO AND VCB CIRCUIT

2064 XK77A 01 W03 → 2064 XF77S 01 SPARE WAGO SB-2 → 2064 QEMS - R1
 2064 XF 77S 01:01 ← 2064/1 QEMS – R2

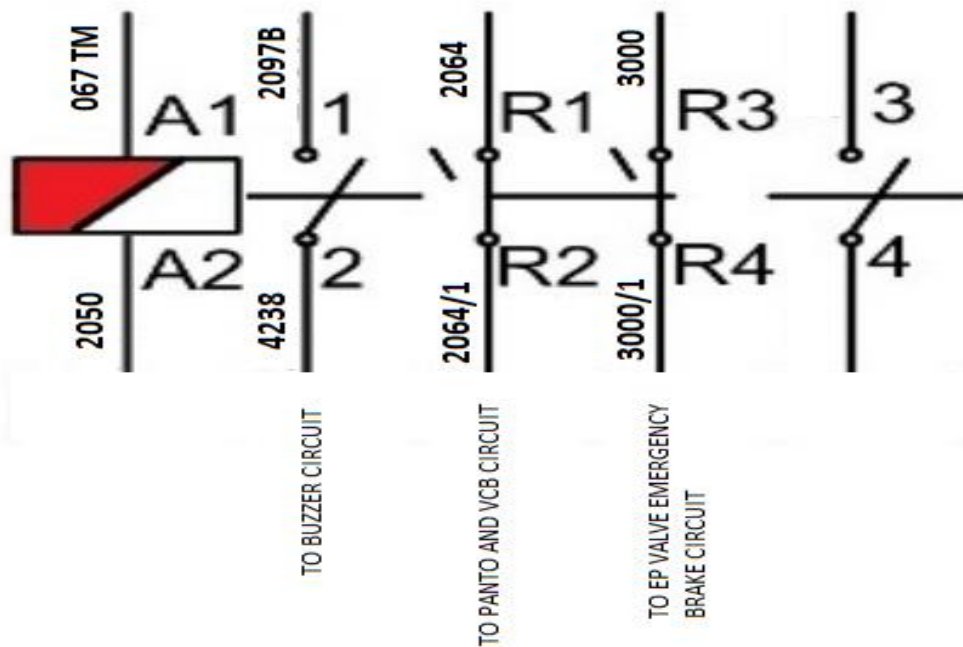
2. FOR BUZZER CIRCUIT

2097B XF77S 03:02 → 2097B QEMS - 01
 4238 XF77S 02:38 ← 4238 QEMS – 02

3. FOR EP VALVE EMERGENCY BRAKE CIRCUIT

3000 XK77V 02:05 → 3000 XF77S 01 SPARE WAGO SB-2 → 3000 QEMS – R3
 3000 XF77S 01:16 ← 3000/1 QEMS – R4

QEMS RELAY FOR TMDDS



PHOTOGRAPHS OF 3-PHASE LOCO TMDDS MODIFICATION

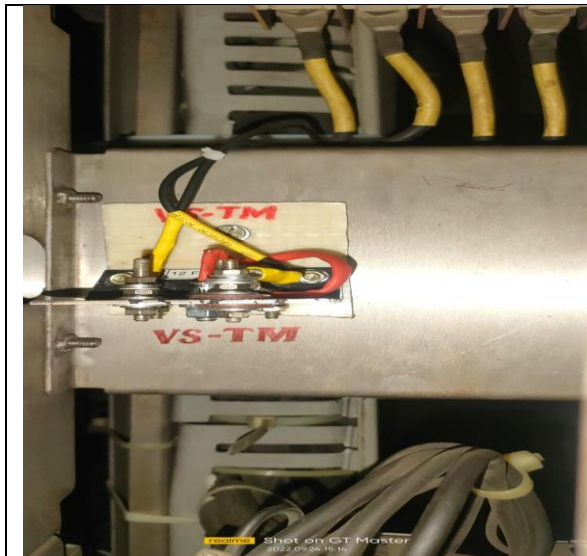


QEMS –LCD 128

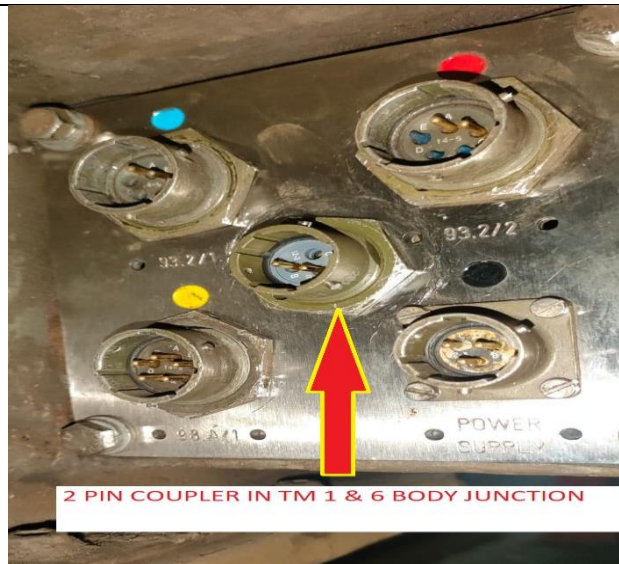
MCB TMDDS



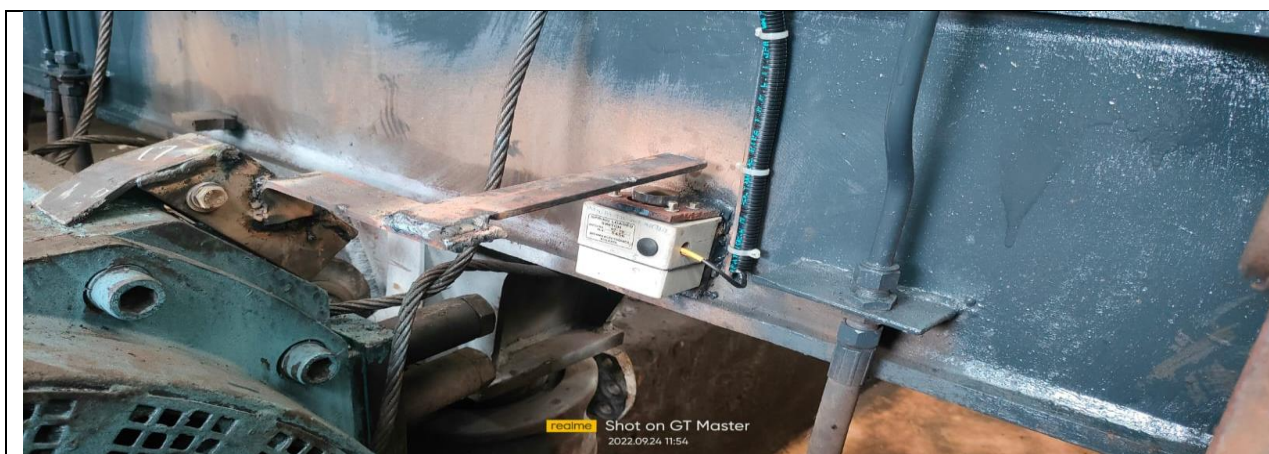
LSTM ON D PANEL



DIODE VSTM



BODY TO BOGIE 2 PIN COUPLER



FOOT SWITCH FITTED ON BOGIE