
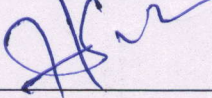
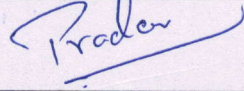


Page 4 of 4	Issued on: Sept. 2025	SOR No.:- PLW/EL/Propulsion system/SOR/002, Rev. 02
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technologies. This equipment shall perform the function of tracking of the locomotive and also communicate with the locomotive diagnostic system and pass on this information to the central server. The central server shall be provided by the contractor at mutually agreed locations with backup servers. It shall be possible to remotely send and obtain the information stored in the diagnostic memory of the computer system, depending on availability of the communication channel, for control and diagnosis, with the aim of facilitating and speeding up the maintenance process of the locomotives. It should also be possible to send the data on IR/CRIS server. Collective data shall have provision for seamless integration with Maintenance Management Information System (MMIS) in future. The GPS module available in the RMS should be used to fetch GPS time in the propulsion system and that shall be used for time stamp in the DDS.

7. Provision of additional hot redundant Battery charger in Auxiliary Converter-2, technically identical to the existing battery charger available in Auxiliary Converter-3. Reference scheme for the same is attached as Annexure-E. Vendor may also propose different scheme in their proposal which suit their Design and Space availability.
8. Minimum one no. spare analog channel shall be made available in the VCU-2 for recording of actual BP pressure. Accordingly, software of VCU shall be ready for reading the actual BP pressure and its recording in continuous data recorder file as 44th signal.

SSE/Design	AEE/Design	Dy.CME/Design
		

Signature Not

4792787/2026/O/o WM/Design/DMW/PTA

Digitally signed by

Subrata Majumder

Date: 2024.07.05

13:08:41 IST

Reason: IREPS

Document

Location: IREPS-CRIS

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Annexure-A

List of bare minimum Parameter to be recorded continuously with sampling rate of 1 Sec.

1. Loco speed (KMPH)	33. Traction Interlock(-)
2. OHE Volt (KV)	34. Node number
3. OHE Current (Amps)	35. Vig Warning(-)
4. Energy Consumed (Kwh)	36. VigEmgBrk(-)
5. Battery Volt (Volts)	37. Air Flow PrSw(-)
6. BP Pressure (Kg/cm2)	38. BC1 PrSw(-)
7. TE/BE Demand (%)	39. BC2 PrSw(-)
8. TE/BE BG1 (KN)	40. MR Low PrSw(-)
9. TE/BE BG2 (KN)	41. BrkEleHlth(-)
10. CABI FwSand (-)	42. Loco number
11. CAB2 FwSand (-)	43. LSP Status (-)
12. CABI Key in D(-)	
13. CAB2 Key in D(-)	
14. Compressor ON/OFF status(-)	
15. CABI DirFor (-)	
16. CABI DirRev(-)	
17. CAB1 MaxTELimit(-)	
18. CAB2 MaxTELimit(-)	
19. CAB1 EmgStop(-)	
20. CAB2 EmgStop(-)	
21. CAB1 FtSwLocBrk(-)	
22. CAB2 FtSwLocBrk(-)	
23. CAB2 DirFor (-)	
24. CAB2 DirRev (-)	
25. Panto 1 PrSw (-)	
26. Panto 2 PrSw (-)	
27. VCB Status(-)	
28. Motoring(-)	
29. Regenerative Brake(-)	
30. Emergency Brake Applied(-)	
31. Isolating Emg Exhaust(-)	
32. Start/Run Interlock(-)	

Aht

<p>Fax : (0522)-2452581 Telephone: (0522)-2465737 Email : dsetplgroup@gmail.com</p>	 <p>सत्यमेव जयते</p>	<p>भारत सरकार – रेल मंत्रालय अनुसंधान अभिकल्प और मानक संगठन लखनऊ – 226011 Government of India - Ministry of Railways Research, Designs & Standards Organization, Lucknow - 226011</p>
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No. EL/3.1.35.17

Dated: As signed

Principal Chief Electrical Engineer,

- Central Railway, HQs Office, 2nd floor, Parcel Office Bldg., Mumbai – 400 001.
- East Central Railway, Hajipur (Bihar) – 844 101.
- East Coast Railway, Railway Complex, Bhubaneswar – 751 023.
- Eastern Railway, Fairlie Place, Kolkata – 700 001.
- North Central Railway, Prayagraj – 211 001.
- North Eastern Railway, Gorakhpur – 273 001.
- North Western Railway, near Jawahar Circle, Jaipur – 302 017.
- Northeast Frontier Railways, Maligaon, Guwahati – 781 011
- Northern Railway, Baroda House, New Delhi – 110 001.
- Southern Railway, Park Town, Chennai – 600 003.
- South Central Railway, HQs Office, Rail Nilayam, Secunderabad – 500 071.
- South Eastern Railway, Garden Reach, Kolkata – 700 043.
- South East Central Railway, Bilaspur – 495 004.
- South Western Railway, Hubli – 580020.
- West Central Railway, HQs Office, Opp. Indira Market, Jabalpur – 482 001.
- Western Railway, Church gate, Mumbai – 400 020.
- Banaras Locomotive Works, Varanasi – 221 004.
- Chittaranjan Locomotive Works, Chittaranjan – 713 331 (WB).
- Patiala Locomotive Works, Patiala – 147 003.

MODIFICATION SHEET NO. RDSO/2020/EL/MS/0482 (Rev. '1')

1.0 Title:

Scheme for Energy Saving in 3-phase freight electric locomotives.

2.0 Brief History:

- 2.1** Presently, 3-phase electric locomotives i.e. WAP5, WAP7 and WAG9HC is being manufactured by Production Units. WAP5 and WAP7 class of locomotives are passenger locomotives whereas WAG9HC class of locomotive is a freight locomotive. There are three variants of 3-phase freight electric locomotives produced by IR i.e. WAG9, WAG9H and WAG9HC however, only WAG9HC class of locomotives are being manufactured by Production Units i.e. CLW & BLW. Three nos. of auxiliary converters namely BUR1, BUR2 & BUR3 are provided in 3-phase locomotives to feed auxiliary machines. Presently, 13 Nos. of auxiliary machines are fed by

these converters for various functions. The distribution of loads of all these machines is detailed in following table.

Auxiliary Converter	Auxiliary loads	Frequency (Normal Mode)
BUR 1 supply	<ul style="list-style-type: none"> Oil Cooler Blower – 1&2 (OCB – 1&2) 	44 Hz, 50 Hz
BUR 2 supply	<ul style="list-style-type: none"> Traction Motor Blower –1&2 (TMB – 1&2) Transformer Oil Pump – 1&2 (TFP MPH – 1&2) Traction Converter Oil Pump – 1&2 (SR MPH – 1&2) 	50 Hz
BUR 3 supply	<ul style="list-style-type: none"> Scavenge blowers – 1&2 (ScTMB – 1&2) Main compressor – 1&2 (MCP – 1&2) Battery charger (CHBA) 	50 Hz

- 2.2** The most energy consuming blowers are OCB – 1&2 and TMB – 1&2 (rating of OCB is 30 KW and TMB is 25 KW). The rating of GTO based auxiliary converter is 100 KVA and IGBT based auxiliary converter is 130 KVA.
- 2.3** OCB – 1&2 is connected with BUR1. OCB motor runs on ventilation demand which depends on temperature level of transformer oil as per CLW manual. Below 47 deg. Celsius, there is no ventilation demand and OCB does not work. There are three ventilation levels depending upon the transformer oil temperature – Level-1 (47-50 Deg. C), Level-2 (52-55 Deg. C) and Level-3 (57-60 Deg. C and above). OCB starts running whenever the oil temperature exceeds 47 deg. irrespective of working of locomotive i.e. whether locomotive remains idle or in running [idle means locomotive is in standing condition, throttle (Tractive effort/braking effort) is Zero].
- 2.4** In the present system as per design configuration, TMB – 1&2 (25KW each) and ScTMB – 1&2 (3 KW each) is connected with BUR2 and BUR3 respectively. As soon as loco energies, BUR2 and BUR3 start working, therefore, TMB & ScTMB start working irrespective of ventilation demand. The ventilation demand in 3-phase locomotive totally depends upon temperature level of traction motor, converter oil & transformer oil. But in the present case, the traction motor blower and its scavenger blowers are running continuously irrespective of ventilation demand.
- 2.5** Machine Room Blower (MRB) and its Scavenge have been shifted to BUR-2 in order to implement the recommendations of 39th MSG meeting by CLW and Zonal Railways. CLW has further shifted MRB and its ScMRB to BUR-3 for WAG9H class of locomotive in order to implement energy saving scheme as mentioned in Annexure-1 of CLW letter No. C-D&D/T/42, Vol-I/Medha dtd. 07.11.2023. As per initial design, these MRBs and its Scavenge takes power directly from Auxiliary Winding of Main Transformer (1000V) through an auxiliary transformer having output of single phase 415V & 110V.

3.0 Objective:

To save Electrical Energy in 3-phase freight locomotives (WAG9/WAG9H/WAG9HC) by modification in existing scheme of load distribution and adding 'Energy Saving Mode' in software to put OCBs, coolant pumps, TMBs and ScTMBs in OFF condition when there is no requirement of cooling in the corresponding equipment for which these blowers are provided.

4.0 Modified scheme:

4.1 Load Distribution among the Auxiliary Converters

Auxiliary loads have been re-distributed among auxiliary converters in which ScTMB and Cab AC Unit has been removed from BUR-3 and added to BUR-2. Further, MRB and its Scavenge have been added to BUR-3 as mentioned in Para-2.5 above. Rest of the load distributions remains same. The distribution of load among the auxiliary converters in normal condition are detailed below:

Auxiliary Converter	Existing Load Distribution	Modified Load Distribution
BUR 1 supply	OCB – 1&2	OCB – 1&2
BUR 2 supply	TMB – 1&2 TFP MPH – 1&2 SR Pump – 1&2 Cab AC Unit - 1&2	TMB – 1&2 ScTMB – 1&2 TFP MPH – 1&2 SR Pump – 1&2
BUR 3 supply	CP – 1&2 ScTMB – 1&2 Battery charger	CP – 1&2 Battery charger MR Blower – 1&2 Scavenge to MRB – 1&2 Cab AC Unit – 1&2

4.2 Procedure for shifting of MRB-1&2 to BUR-3

To achieve shifting of MRB-1&2 to BUR-3, modifications in HB1 and HB2 Panels are required to be carried out as per following tables:

(i) Modification in HB1 Panel

WIRES TO BE REMOVED					
SN	WIRE DETAILS				Remarks
	Cable No.	Size	From	To	
1.	1121A	2.5 mm ²	MCB 53.1/1	MCB 54.1/1	If MRB is being fed by BUR-2.
2.	1122A	2.5 mm ²			
3.	1123A	2.5 mm ²			
4.	1201A	2.5 mm ²	MRB-1 Terminal Box	To tie with Dummy	If MRB is being fed by 1000/415V Auxiliary Transformer.
5.	1202A	2.5 mm ²			
6.	1218A	2.5 mm ²			