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No. EL/11.5.5/5

Date: 27.07.2018

1. M/s ABB Limited, Survey No. 88/3-4, Nelamangala Taluk, Bangalore – 562 123
2. M/s. BHEL Limited, Electronics Division, PB.No.2606, Mysore Road, Bangalore-560 026
3. M/s BTIPL, ERDA Raod, Maneja, Vadodara-390 013
4. M/s. CGL, Plot No. 9, MPAKVN Phase-2, New Industrial Area, Mandideep – 462 046.
5. M/s Medha Servo Drives Pvt. Ltd., P-4/5 B, I.D.A., Nacharam, Hyderabad – 500076
6. M/s Hind Rectifier Limited, Regd. & H.O. Lake Road, Bhandup (W), Mumbai – 400 078
7. M/s Autometer Alliance Limited, C-63, Sector – 57, Noida – 201 307

Sub: Minutes of the Meeting on reliability of GTO and IGBT based traction converter (SR) auxiliary converter (BUR) and vehicle control unit (VCU) in three phase electric locomotives.

A meeting on reliability of GTO and IGBT based traction converter (SR) auxiliary converter (BUR) and vehicle control unit (VCU) in three phase electric locomotives was held at ELS/ Bhilai on 19th & 20th July-2018 in presence of RDSO, CLW, Railways and manufacturers of IGBT converters.

Minutes of the meeting of the same is enclosed herewith for kind information and necessary action please.

(P.K. Saraswat)
27.7.18

Encl: As above.

For Director General (Elect.)

Copy to:

1. **Secretary (Electrical), Railway Board, Rail Bhawan, New Delhi-110 001.** (Kind attention: Shri A.K. Goswami, DEE/RS/RB) For kind information.
2. **Chief Electrical Engineer, (For information and necessary action please)**
 - Central Railway, HQs Office, 2nd floor, Parcel Office Bldg., Mumbai-400 001
 - East Central Railway, Hajipur (Bihar)-844 101
 - Eastern Railway, Fairlie Place, Kolkata – 700 001
 - East Coast Railway, Railway Complex, Bhuvneshwar – 751 023
 - Northern Railway, Baroda House, New Delhi-110 001
 - North Central Railway, Allahabad – 211 001
 - South East Central Railway, Bilaspur-495 004
 - South Central Railway, HQs Office, Rail Nilayam, Secunderabad-500 071
 - South Eastern Railway, Garden Reach, Kolkata- 700 043
 - Southern Railway, Park Town, Chennai – 600 003
 - West Central Railway, HQs Office, Opp. Indira Market, Jabalpur-482 001
 - Western Railway, Churchgate, Mumbai – 4000 020
 - Chittaranjan Locomotive Works, Chittaranjan – 713 331(WB)

(P.K. Saraswat)
27.7.18

Encl: As above.

For Director General (Elect.)

31 PEDSE
22/6/18 may kindly approve. 26/7/18

**Minutes of performance review meeting held at ELS/BIA on 19/20-07-2018on
Propulsion equipment of IGBT based 3 Phase locomotives**

Members Present:

RDSO	1.	Shri O. P. Kesari, PEDSE.
	2.	" Suresh Kumar, DSE/TPL.
	3.	" M. N. Lodhi, SSE/TPL.
	4.	" Ran Vijay, JE/TPL.
CLW	5.	" Pankaj Kumar, ADE/D&D/CLW.
Railways	6.	" B. Naskar, CELE/SECR.
	7.	" Kaushalesh Singh, Sr. DEE/TRS/BIA.
	8.	" K. Thourya, Sr. DEE/ELS/LGD.
	9.	" Atul Kumar, Sr. DEE/TRS/BNDM.
	10.	" S. C. Choudhary, Sr. DEE/TRS/AQ
	11.	" JEET RAM, DEE/TRS/TATA.
	12.	" Shashank Kosta, DEE/TRS/BIA.
	13.	" P.K. Sharaf, ADEE/TRS/BIA.
	14.	" Jai Prakash Pal, DEE/TRS/HWH.
	15.	" K. Kiran Kumar, DEE/ELS/KZJ.
	16.	" M. Ashok Kumar, ADEE/ELS/WAT.
M/s BHEL	17.	" Shekar R., AGM/TE.
M/s ABB	18.	" Hemant Kumar, Service Manager
	19.	" Mohit Sharma, Service
M/s BTIPL	20.	" Ashok Agrawal - Lead Warranty.
	21.	" Manoj Khetan, Lead System Engineer.
M/s CGL	22.	" M.V. Pradhan, AGM.
	23.	" Varun Paira, Manager.
	24.	" Krishan Junwani, Manager.
M/s Medha	25.	" A. N. Venkateshwara Rao/ Assistant Manager.
	26.	" K. Lokesh, Engg. Marketing
M/s AAL	27.	" Akhtar Alam, Sr. Manager
	28.	" Manish Agarwal, Sr. Manager
	29.	" Vivek Singh
M/s Hind Rectifier	30.	" Sunil K. Jadhav, DGM-(R&D).
	31.	" Shailesh Mehta, DGM-(Project).
	32.	" Ramen Purkait, assistant Manager

- 1.0 The meeting was convened to address the reliability issues of IGBT based traction converters and Auxiliary converters and the status of the points discussed in meeting on 19.04.2018 at ELS/KYN.
- 2.0 PEDSE welcomed all the participants in the meeting. PEDSE expressed his concern on the poor reliability and high raisings of traction & Auxiliary converters.
- 3.0 It was emphasised that in spite of regular meetings there are several reliability issues which are yet to be closed. There is a need to develop expertise by the firms so that the reliability issues are taken up in more professional way expeditiously.

4.0 During the meeting RDSO gave a presentation on reliability issues of converters of all makes and following issues were discussed during the meeting:

4.1 M/s ABB make Traction Converter

SN	Item	Action plan	Remark
1	Failure of PEBB module	ABB has indicated that some issues for failure of IGBT modules have been identified and resolved in SW version 39 with serial no. -1.	<ul style="list-style-type: none"> • The failures are observed in 1500 A Hitachi make IGBTs only. • Provisional approval for download of V-39 has been done by RDSO for 5 locos of each loco type (5 nos WAP7 in ELS/GZB, 5 nos WAG9H in ELS/TKD and 5 nos WAP5 in ELS/BRC). • Software version-39 will address following issues <ol style="list-style-type: none"> I. over current protection during low OHE voltage II. Earthing fault in main transformer • Regular cut in of version 39 may be done in all locomotives in sheds and in new locomotives.
2	Timing issue in PEC Card	PEC-2 card software modified to reduce booting time from 67 sec as per the governing specification.	<ul style="list-style-type: none"> • Software modification is in progress. • Total locos to be modified: 75 • Locos already modified: 66 • Locos to be modified: 9(TATA-5, BSL-4) • PDC-15.08.2018
3	Gate Driver Unit (GDU) cards	<p>Cases of communication failure between GDU and PEC cards - Resolved.</p> <p>Firm has informed that tolerance limit has been relaxed for generation of GD link error in Ver-38.</p>	<ul style="list-style-type: none"> • In spite of the action by the firm failures are there. • Firm need to analyse all reported failure cases and provide investigation report.
4	Failure of door guide pin arising after 2-3 years of service	Modification in door guide pin which transfers weight on the door latch.	<ul style="list-style-type: none"> • 8 locos are pending for modification (TKD-1, TATA-1, BIA-2, WAT-1&AQ-3) • PDC-June-18

SN	Item	Action plan	Remark
5	Software malfunctioning, TE becomes 0.	Firm has informed that the issue has been identified as when OHE has a dip the converter goes into backup braking leading to fluctuation in TE/BE meter. This is software issue and has been resolved in SW Version 39 and under trial.	Issue addressed in software version 39.
6	Communication between one traction converter to other is with optical fiber cable. In case of lifting of converter, fiber optic cable is forced to cut. Suitable connector is required to be used to facilitate lifting of converters without cutting the fiber optic cable.	Firm has indicated that spare OFC will be maintained at shed in case OFC connector needs to be cut to facilitate lifting of converter.	Firm has done suitable modification in ELS/LGD. The details of the modification to be submitted to RDSO so that the same can be standardized.
7	The problem of dry solder in BA-Charger is observed in new Auxiliary converters.	Improvement of workmanship at firm's premises.	This was a workmanship problem. All the affected locomotives have been attended. Firm should ensure that such problem should not reoccur.
8	Failure of IGBT modules of BUR Earthing to be done as per GTO locomotives.	Firm has provided earthing circuit in load side. Same needs to be provided as per GTO loco motives.	<ul style="list-style-type: none"> • Total locos to be modified: 39 • Locos modified: 27 • Locos to be modified: 12 • (one each in BRC, TKD, RPM, VSKP, two locos in KYN and 6 locos in AQ) • PDC: 15.08.2018

4.2 M/s BHEL make IGBT based Traction Converter

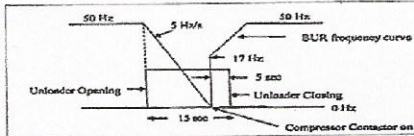
SN	Item	Action plan	Remark
1.	Power Module Failure	<p>Protection level of monitoring time has been modified for from existing 750ns to 1000ns.</p> <p>The vulnerable component shall be replaced with improved rating components.</p> <p>This will be implemented in two locomotives for trial.</p>	<ul style="list-style-type: none"> SW version- 774 with increased Timing parameter for addressing generation of SEPL_MAX error has been uploaded in locos across different sheds. Still the issue of power module failure is not resolved. This is a very serious issue and Railways is badly suffering due to unscheduled withdrawal of the locomotives. BHEL should look into the problem afresh. BHEL has indicated that they have involved M/s Strukton, OEM of the converter. 18 nos. of IGBT Power Modules with upgraded components have been dispatched to CLW on 28/8/2017 in traction converter numbers 722 to 725 which are in loco no. 31970 & 31975 of ELS/KAZIPET.
2.	Failure of Pressure Switch	The pressure switch needs to be replaced by Honeywell make in all the locomotives in phased manner.	Position of Honeywell make pressure switch as given by BHEL is placed at Annexure-1
3.	Reduction of TE/BE with no DDS.	<p>(i) M/s BHEL stated that this is occurring due to loss of Panto contact with OHE for more than 45ms. This has come to light after analyzing the data of loco 30129 of ELS/GZB where this problem occurred.</p> <p>(ii) DC link capacitor in M/s BHEL make traction</p>	<ul style="list-style-type: none"> Simulation with increase capacitance shall be completed by 31.07.18. Report to be submitted to RDSO and CLW. BHEL will submit the proposal for development of traction converter with increased capacitance based on simulation results.

SN	Item	Action plan	Remark
		converter is 6.75 mF (9x750 uF) whereas it is about 10 to 12 mF in other makes traction converters. BHEL was requested to explore the feasibility of increasing the DC link capacitance to the extent possible so as to reduce such problems by higher energy storage capacity.	
4.	Failure of Electronic Cards(VIU/DCU/ACI)	<p>VIU: BHEL has provided snubber circuit across the relay contacts.</p> <p>DCU: Board was getting corrupted when access with diagnostic s/w version 2.7.</p> <p>ACI: It was incidental failure because of AMC card.</p>	<ul style="list-style-type: none"> • 2 Nos. modified VIU cards have been installed in loco 31683 of LGD. 1 No. has been installed in loco 31535 of KYN. • M/s BHEL confirmed that all the loco commissioned after Apr'18 with converter sr. no. starting from 625 (TC order) and 823 (Propulsion Order) are being supplied to CLW with upgraded components. • DCU: Diagnostic software version changed from 2.7 to 2.9 that are used for accessing DCU board for programming and downloading. • ACI: After improved power-up circuit in AMC card the failures have reduced. However, the details of modifications in AMC card still to be submitted. • BHEL to submit the action plan for replacement of AMC cards in the running locomotives.

SN	Item	Action plan	Remark
5.	Coolant pump failure	<p>(i) The pump failure rate is on rise. firm to submit the failure investigation report.</p> <p>(ii) Approval for alternate make of Flowell has been given. Firm has been advised to install the same for early trial.</p> <p>(iii) M/s BHEL stated that Pump motors are burning probably due to higher harmonics in the supplies of auxiliary converters.</p>	<ul style="list-style-type: none"> BHEL indicated that the failure of pumps may be due to high harmonics in the auxiliary converters. It has been planned that M/s CGL, M/s BHEL and RDSO shall do harmonic analysis of IGBT BUR at ELS/TKD. Firm has given a target of 31.07.18 for installation of Flowell make pump for field trial. It is once again reiterated that Flowell make pump for field trial shall not be installed in new converters to be supplied to CLW. M/s BHEL shall supply TC as per approved BOM. Vide letter no. EL/3.1.35/17/BHEL dated: 17.10.2017 trial to be conducted in 5 loco sets (2-ELS/KYN and 3-ELS/LGD). Harmonic testing have been planned at ELS/TKD on 27.07.2018.

4.3 M/s BHEL make IGBT based Auxiliary Converter:

SN	Item	Action plan	Remark
1	Inverter module failure of Auxiliary converter	<ul style="list-style-type: none"> Assembly process reviewed to prevent damage of IGBT terminals in the module. Further, power-up issue in the AMC module shall be addressed with increased initializing current. 	<ul style="list-style-type: none"> Improved assembly process has been implemented. SW ver. 188 with less sensitive di/dt monitoring (2 to 3 μs) has been uploaded and regular cut-in since Jan'2018. However, failures are reported with the modified software. BHEL to relook the modification and submit the revised action plan by 10.08.2018.

SN	Item	Action plan	Remark
2	Control Rectifier Module	The failures of the Controlled rectifier modules have increased. Firm has not given the details of the cause.	<ul style="list-style-type: none"> As per BHEL, the failures are due to problem in AMC card for which action of replacement is underway. However, firm has not submitted any progress report. Firm need to give details of total locomotives already provided with modified AMC cards and locomotives yet to be modified by 31.07.2018.
3	Low BUR-2 frequency	Frequency of message TR-1 & 2 oil pressure not OK & Converter-1 & 2 Coolant pressure not OK is abnormally high. BUR-2 frequency at that moment is found 15 to 20 Hz. whereas; frequency of BUR-3 is 50 Hz in the back ground data.	<ul style="list-style-type: none"> Firm has indicated they have addressed the issue in software version -188.1. BHEL need to keep the existing logic of ramp up and ramp down cycle. The same is given as below: 
4	No DDS of BUR with BT make traction converter.	No DDS of BUR is being recorded other than life sign missing in Locos equipped with BT make Traction Converters.	Issue with the compatibility with BT make SR. BT and BHEL has modified the software to address the issue. It has to be tested in loco at ELS/LDH by 15.08.18.
5	Overheating of power cable terminal lug supporting stud	Overheating of power cable terminal lug supporting stud inside the BUR Box-1 & 2 due to bad conductivity between stud and hexagonal socket reported by ELS/GMO and ELS/BRC	<ul style="list-style-type: none"> Firm has stated that Brass studs have been made available to loco sheds. The details are as below: GMO-30, BRC-30, LGD-60, WAT-20, LDH-30, GZB-80, TATA-30 There are 27 studs (3x9) per locomotive. Therefore above quantity is very small as about 136 locos need replacement. Railways are requested to undertake replacement of studs available with them.

4.4 M/s BTIPL make IGBT based Traction Converter:

SN	Item	Action plan	Remark
1.	Failures of Power Modules	<p>Presently 2 IGBT being used in parallel combination (4.5 kV, 900 Amp. Rating). To avoid mismatch in paralleling, single IGBT of higher rating (4.5 kV, 1500 Amp, Hitachi make).</p> <p>However, failures of 1500 amp IGBT also being reported. Firm stated that the issues are under investigation by their principals. Firm to find out the root cause of failure of the IGBTs and submit the detailed investigation report for the failed module.</p>	<p>BT has improved the software for over current protection in software version 317T01BT/217T01BT and modified software has been uploaded in 210 locos out of 215 locomotives. However, there is no improvement. Further, BT have carried out temperature rise test to monitor the converter temperature at critical points. This test is being conducted at Kalyan Loco Shed in May'18. Data logger has been installed in loco no. 30490.</p> <p>Data upload for analysis expected when loco next visits shed (End of Jul 2018).</p>
2.	Main power OFF due to 'FLG-1 time out DC link circuit charge'	Addressed in the software version 317T02BT & 217T02BT.	<ul style="list-style-type: none"> • RDSO has given approval for regular use. • Modified software has already been downloaded in 80 locos out of 245 locos. • Railways have reported the generation of this message in certain conditions. • BTIPL to look into and suggested modification by 15.08.2018.
3.	No regeneration in rear loco in MU	This is software issue and suitable software modification in line with the existing WAG-	<ul style="list-style-type: none"> • 100% Regenerative breaking is already implemented by CLW in WAG-9/9H locomotives.

	operation.	9/9H need to be carried out.	Same need to be implemented and demonstrated at ELS/VSKP. • PDC:: 25.07.2018
4.	Isolating cock in cooling circuit	Isolating cock has not been provided in cooling circuit of traction converter. Required to incorporate the same to prevent drainage of coolant during radiator/converter replacement.	BTIPL has stated that they are working on the design and will come up with a proposal by 15.08.2018.
5.	Integration issue of BT SR with BHEL & AAL make BUR.	DDS messages regarding fault of IGBT Auxiliary converter of BHEL, AAL make (except life sign missing) is not recorded in DDS with BT make IGBT traction Converters.	<ul style="list-style-type: none"> • BTIPL has visited BRC on 3rd July'18 and AAL loaded the modified software version 54 in loco No 30466. As stated by BTIPL the diagnostic messages and parameters are visible at DDS as well as pop up available. • Joint report has been prepared between M/s AAL/ M/s BTIPL and ELS BRC by on dt 03.07.2018. • In similar lines the issue with the BHEL converters also to be resolved.

4.5 M/s CGL make Traction Converter

SN	Item	Action plan	Remark
1	IGBT module failure	CGL to propose the solution to provide bus-bar connections in place of Cliplam arrangement.	<p>CGL has proposed to modify the modules with bus-bar type arrangement.</p> <p>Modification of only 23 locos as on date has been carried out so far as against target of 69 locomotives. The progress is very slow.</p> <ul style="list-style-type: none"> • The total locos to be modified: 69 • Locos already modified:

SN	Item	Action plan	Remark
			<p>23 (14-BNDM, 9-RPM)</p> <ul style="list-style-type: none"> Locos still to be modified: 46 <p>The rate of modification needs to be increased.</p> <p>CGL has indicated that modification in all locos shall take time and will be done by Dec'18 end.</p>
2	Software issues	There are lots of software issues which need to be immediately addressed for the reliable operation of the locomotives.	<ul style="list-style-type: none"> Already addressed: <ol style="list-style-type: none"> Harmonic filter isolation Bogie isolation in WAP-7 at high speed, MU formation Modifications under trial: <ol style="list-style-type: none"> Frequency out of range: This issue has been resolved and performance is under observation. DC link over voltage/ Main Power off/ Rectifier error/Over voltage in BUS: Tuning of the scaling amplifier for Kp & Ki is completed & got satisfactory result. Implementation of ATD protection is completed. Performance is under watch. Earth fault trafo/motor: Introduced software filter of 400 Hz in V_{leak} signal to resolve the issue and the same is under observation. <p>The above software tuning have been done in loco no. 30578, 30541, 30538, 30680 of ELS/RPM and 31832, 31918, 31874, 31869, 31829, 31913 of ELS/BNDM.</p>

SN	Item	Action plan	Remark
			<p>After satisfactory performance of software trial version 22 beta (WAP7) and 23 beta (WAG9H) by July'18 end, CGL shall approach CLW/RDSO for regular approval.</p> <p>PDC: 31.07.2018</p>
3	<p>Monitoring tool:</p> <p>There is no snapshot in log viewer file due to which it is not possible to monitor electrical parameters at any particular time of fault. Monitoring tool is required to be modified and shall be provided to user Railways.</p>	<p>Firm has intimated that they are providing latest monitoring tool. Firm need to conduct trainings for different sheds/CLW/ RDSO.</p> <p>User manuals still to be submitted to CLW/RDSO/ Railways.</p>	<p>All messages have been made available on DDS. CGL stated that the same is included in their training schedule. List of faults having snapshots are as follows:</p> <ol style="list-style-type: none"> 1. Primary over current 2. Auxiliary over current 3. Harmonic filter over current 4. Catenary over voltage 5. Pre-charge Contactor stuck On 6. Inverter over current (U-V-W phase) 7. Bus over voltage(V bus Max) 8. Line bridge over current 9. Earth Fault 10. IGBT error <p>Railway to confirm by 15.08.2018.</p> <p>CGL shall submit revised user manual to CLW/RDSO/ Railways by 15.08.18.</p>
4	Discoloration of SR coolant with bad smell	<p>Discoloration of SR coolant with bad smell in machine room. In some converter black/brown turbidity is also being found. Firm indicated that this may be due to mixing of oil during OCB</p>	<p>The issue discussed under common issues heading.</p>

SN	Item	Action plan	Remark
		testing.	
5	Repeated failure of balancing resistor: The failure is due to overheating of resistor and its outer cover is getting cracked. The issue is with Kiyosh make resistors.	M/s CGL shall replace Kiyosh make resistors with HVR Pentagon make resistors.	<ul style="list-style-type: none"> Firm has informed to use 5 locos with HVR Pentagon make resistors & monitor the performance. The loco nos. are 31846, 31785, 31968, 31742 (BNDM) & 32028 (GMO). Firm stated that they will maintain spares of HVR Pentagon make resistors at various loco sheds so that these resistors may be replaced as and when required.
6	High arising of gate driver card failure	Gate driver card 5 nos failed. CGL has sent card for investigation to OEM Power integration / Switzerland.	Report shall be submitted to RDSO by 31.07.18 without fail.
7	Failure of modified X24 Card (Analog I/O card).	Two cards failed in two month service. Firm has sent this card to OEM CAF/Spain for investigation and report awaited.	Report shall be submitted to RDSO by 31.07.18 without fail.

4.6 M/s CGL make Auxiliary Converter:

SN	Item	Action plan	Remark
1.	Failure of PS card (KUC153A02)	In place of KUC153A02 card, firm modified KUB921 card of VCU and made it suitable for auxiliary converter.	<ul style="list-style-type: none"> Ten locomotives in Gomoh, Three locos in VSKP and Four locos in TATA are still remaining. Material is available in the shed.
2.	Failure of BUR processor card (CCPU)	Failure was due to over sensitivity of input channel. Sensing voltage has been modified from 10 V to 36 V.	<ul style="list-style-type: none"> It is observed that INVCC card and CCPU cards have still very high failure rates. It appears the solution offered by firm is not effective. Firm to study the

SN	Item	Action plan	Remark
3.	Failure of INVCC card	The failure is due to spurious inverter fault message in INVCC card. To resolve this problem the resistance to sense the over current has been increased in gate driver and corresponding software modification in INVCC card.	<p>matter again and suggest the solution.</p> <ul style="list-style-type: none"> • In the previous meeting also the firm was asked to submit the action plan but no action was taken by the firm. • PDC: 15.08.2018.
4.	Wrong generation of fault message, BA charger current < 10 Amp.	Problem raised by ELS/TATA in loco no. 31436, 31487 & 31429 and by ELS/BNDM in loco 31869.	<ul style="list-style-type: none"> • Firm was advised to visit ELS/Tata to study the issue and prepare joint note. Still no action has been taken by the firm. Firm again requested to visit ELS TATA to study the problem and take necessary action. • PDC:15.08.2018
5.	All BUR isolation in case of catenary voltage low.	The logic of logic of BUR ramp up and ramp down need to be implemented similar to MICAS.	Firm to complete the study and suggest modification by 31.07.2018

4.7 M/s Medha make Propulsion System:

SN	Item	Action plan	Remark
1.	Bursting of capacitor	<p>Bursting of capacitor:</p> <p>In locomotive no 30553 at ELS/TATA the DC link capacitor burst, which led to failure of Power module. The capacitor of Electronicon has failed twice in the same locomotive. Firm to investigate the failure with capacitor manufacturer and submit the detailed</p>	<ul style="list-style-type: none"> • Firm has indicated that the failure investigation is under progress. • PDC - 31.07.18.

SN	Item	Action plan	Remark
		<p>investigation report to RDSO and CLW.</p> <p>Firm advised to replace the traction converter as complete unit by 31 Jan-18 and take it to firm premises for detailed investigation.</p>	
2.	Mapping and logging of fault messages in DDS:	<p>Instances of failure has been reported from sheds, ELS/TATA and ELS/LGD where it has been observed that either non-logging of fault messages in case of failure or logging of wrong messages taking place.</p> <p>Firm has been advised to ensure proper logging of fault messages in case of failure/fault and submit the fault list and diagnostic data list to CLW and RDSO. The compliance is pending. Firm to expedite. PDC 31/01/18</p>	<ul style="list-style-type: none"> • Firm stated that as per the trouble shooting directory for three Phase Locomotive Rev.8 dated Jan'14 they have implemented the fault messages. • Firm has submitted the detailed fault description document to RDSO & CLW & Sheds. • Railways may indicate if there are still some issues with the DDS mapping.
3.	Interoperability of MU units:	<p>Multi-operation of locomotive of MEDHA with propulsion of BHEL is pending. Many attempts has been made at ELS/LGD to resolve the issue.</p> <p>However, the firm indicated that the primary communication over WTB has been established successfully and application level integration is required for seamless transfer of messages and consequently successful</p>	<ul style="list-style-type: none"> • Multiple Unit between loco no. 31983 (Medha) and 31757 (BHEL) have been successfully completed under ELS/VSKP. The MU is under operation. • Performance is under watch. • CDAC-CDAC MU has been tested and trial on MU operation with C-DAC VCU and other make VCUs could be started.

SN	Item	Action plan	Remark
		multi-formation/ operation. Firm advised to visit the ELS/LGD with M/s BHEL and test the Multi-operation at the earliest.	
4.	Failure of MTCN Card:	Cases reported of failure of MTCN cards during multi formation of locomotive, firm introduced surge protection in cards 8 locos in ELS/TATA. Performance under watch, firm to submit the failure report.	<ul style="list-style-type: none"> Firm stated that they have added surge protection device in TCN card, and modified all Locomotives. The performance is under watch.
5.	ELS/TATA has reported isolation of Aux converter	ELS/TATA has reported isolation of Aux converter with fault message "AC input frequency disturbance" and "DC link voltage high". The firm has modified the software and uploaded in 20 locomotives. Performance under observation.	<ul style="list-style-type: none"> Improved software has been provided in 35 locomotives (Apr'18), all software updated locomotives working without any issues. Performance shall be monitored up to 31.07.2018 and further decision will be taken accordingly. Performance is under watch.
6.	High ramp-up/ramp-down	High ramp-up/ramp-down of 26 seconds to be reduced to 15 seconds as per existing MICAS logic and provided in 20 loco for trial, performance is under observation.	<p>Software for reduction in ramp up time up to 15 sec has been configured in ELS/BRCY Loco No 30607.</p> <p>Firm may upload software in 5 more locos.</p> <p>Based on performance (1 month) the same will be implemented in all locomotives.</p> <p>PDC – 31.07.2018.</p>
7.	Issues of Throttle not responding	Issues of Throttle not responding was resolved through Plausibility check Error recalibrated as per MICAS logic, Trial and	<ul style="list-style-type: none"> Firm has implemented the logic as per existing Loco logic i.e full scale error 40% of full scale at all 3 positions in all ver-2 locomotives To be implemented in ver-1 (29 nos.) locos.

SN	Item	Action plan	Remark
		testing under observation at ELS/TATA.	• PDC- 15-08-2018
8.	Failure of radiator	Zonal railway reported several cases of failure of radiator unit only in MEDHA make propulsion system. Firm advised to investigate and discuss the observation with RDSO for further action.	The issue has been discussed under common issues heading.
9.	Comprehensive maintenance tool	As per the PO condition firm needs to submit the comprehensive maintenance tool.	<ul style="list-style-type: none"> • Firm has said that only two nos. comprehensive tools to TATA-1, CNB-1 & LGD-1 have been given. • Firm to submit the details/user manual of comprehensive maintenance tool to Railways, CLW and RDSO.
10.	Software release note	Firm need to submit the software release note to RDSO and CLW	A Number of software modification

4.8 Other Issues

a. Issue of coolant.

Of late a number of cases of radiator failures, coolant fluctuation, coolant discolouration have been reported by Railways across different makes of traction converters which used the coolant supplied by M/s Chemtex. In this regard a study has been conducted by CLW and it has been concluded that the issue is attributed to incompatible coolant which chemically reacts with the radiators inner walls.

BHEL has indicated that they initially used coolant with polypropylene glycol 30% and demineralised water (70%). Subsequently, while standardising the coolant CLW has finalised ethylene glycol (30%) and mineralised water (70%) based coolant. All the firms, except BTPIL started procuring the coolant from M/s Chemtex. While M/s BTPIL kept on procuring the coolant from M/s Clairiant. Meanwhile vide CLW letter no. C-D&D/T/24 dated 06.07.2018 converter manufacturers have been asked to use only Clairiant make coolant.

In this regard, a meeting shall be held at RDSO on 03.08.2018 with converter manufacturers, coolant suppliers and Railways to sort out the issue of coolant.

b. Issue of ramp up/ramp down time of BUR

Railways have reported about non-standard timing of ramp up/ramp down in BUR which creates of lot of confusion and issue of generation of unwanted signal. In this

regards all converter manufacturers are advised to implement the ramp up/ramp down time as given below which has been successful implemented in MICAS based loco.

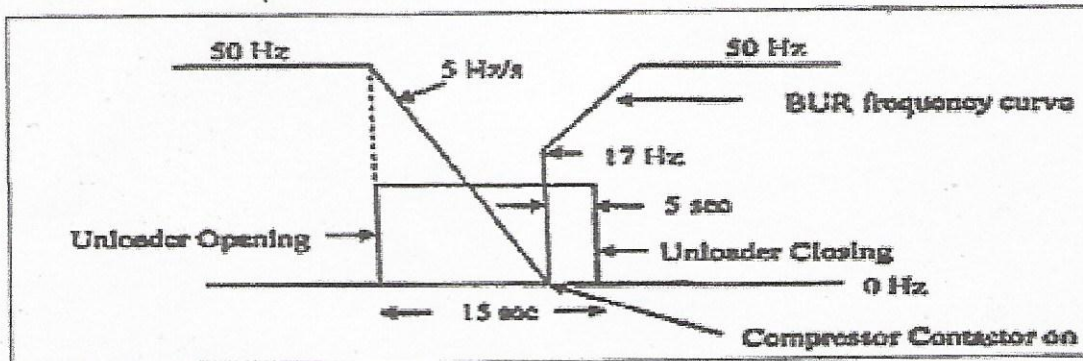


Fig: Schematic of BR ramp up/ramp down timings

Locos to be modified with Honeywell Pressure status

Material code: T10668110823

SLNO	SHED	Total No of Locos to be modified	Completed locos	Pending locos	Pressure switch QTY sent	Pressure switch Qty under dispatch	Remark/ Qty under dispatch
1	TATANAGAR-TATA	28	28	0	56	0	Completed / Nil requirement
2	LALLAGUDA-LGD	43	7	36	14	72	72no - under dispatch
3	KALYAN-KYN	18	9	9	18	18	18no - under dispatch
4	BHILAI-BIA	26	18	8	36	16	16no - under dispatch
5	VADODARA-BRC	26	10	16	20	32	32no - under dispatch
6	TUGLAKABAD-TKD	5	5	0	10	0	Completed / Nil requirement
7	VIZAG-WAT	43	13	30	26	60	60no - under dispatch
8	HOWRAH-HWH	15	15	0	30	0	Completed / Nil requirement
9	GOMO	4	4	0	8	0	Completed / Nil requirement
10	GHAZIABAD-GZB	10	10	0	20	0	Completed / Nil requirement
11	AJNI-AQ	9	9	0	18	0	Completed / Nil requirement
12	ROYAPURAM-RPM	20	20	0	40	0	Completed / Nil requirement
13	KAZIPET-KZJ	19	2	17	4	34	34no - under dispatch
14	SANTRAGACHI-SCR	2	0	2	0	4	4no - under dispatch
	TOTAL QTY	268	150	118	300	236	

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