

Fax : (0522)-2452581
Telephone: (0522)-2450374
Email: dsetpl@gmail.com



भारत सरकार – रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ – 226011
Govt. of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011

No. EL/11.5.5/21

Date: 03-05-2019

Principal Chief Electrical Engineer,

- 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
- Diesel Locomotive Works, Varanasi – 221004.

Sub: Minutes of meeting held at RDSO, Lucknow on 15.04.2019 with M/s CGPISL make of IGBT based traction converter (SR) & Auxiliary converter (BUR) of 3-phase locomotives.

A meeting on reliability issues of M/s CGPISL make IGBT based traction converter and auxiliary converter was held with the RDSO and M/s CGPISL on 15.04.2019 at RDSO, Lucknow.

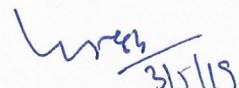
A MOM as above has been issued and same is being enclosed herewith for kind information and necessary action please.


Encl: As above

Copy to:

1. **Secretary (Elec. Engg./RS), Railway Board, Rail Bhawan, New Delhi-110 001.** For kind information. (Kind Attn.: Shri A.K. Goswami, DEE/RS)
2. **CEE, Chittaranjan Locomotive Works, Chittaranjan – 713 331(WB):** for kind information please
3. **M/s. CGPISL, Drives & Automation Division, Industrial Systems Plot no-9, New Industrial Area Phase-II, Mandideep, 462046, Bhopal, (MP)**

Encl: As above


(Suresh Kumar)
For Director General (Elect.)


(Suresh Kumar)
For Director General (Elect.)

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Minutes of performance review meeting held in chamber of PEDSE/RDSO on 15.04.2019 regarding issues of M/s CGL make propulsion equipment of IGBT based 3 Phase locomotives

Members Present:

| | | |
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| RDSO | 1. | Shri O. P. Kesari, PEDSE. |
| | 2. | " Suresh Kumar, DSE/TPS |
| | 3. | " Shailendra K. Deo, SSE/TPS. |
| M/s CGPISL | 4. | " Sanjay Ostwal, DGM |
| | 5. | " Nagarjuna, |
| | 6. | " Krishna Junwani, Manager |
| | 7. | " Barun Paira, Manager |
| | 8. | " Parashuram Naganur, Manager |

The meeting was convened to review the issues raised in last reliability meeting held in ELS/HWH on 14/15.02.2019. The detailed deliberations done during the meeting are as under:
Following issues were discussed during the meeting:

1. Failure statistics of M/s CGL make Traction Converter

Detailed failure – type wise and shed wise are indicated in table – 1 and 2 respectively.


Table – 1: Failure type wise details

| SN | Cause of failure | 2016-17 | 2017-18 | 2018-19 | | |
|----|-------------------------|---------|---------|-----------|-----------|-----------|
| | | | | (Apr-Jun) | (Jul-Sep) | (Oct-Dec) |
| 1 | Power module | 7 | 20 | 3 | 7 | 8 |
| 2 | PCB cards | 3 | 4 | 20 | 14 | 11 |
| 3 | Coolant pump | 1 | 1 | 0 | 3 | 1 |
| 4 | Software malfunctioning | 26 | 40 | 16 | 17 | 24 |
| 5 | Others | 6 | 14 | 19 | 9 | 19 |
| | Total | 43 | 79 | 58 | 50 | 63 |
| | Total Population (Loco) | 18 | 71 | 80 | 104 | 139 |
| | FRPCPY | 239 | 111 | 290 | 192 | 181 |

2. Issues of Traction Converter discussed during the meeting are as below:

| SN | Item | Issue | Decision |
|----|---|---|---|
| 1. | Failure of power module & their connector | CGL has proposed to modify the modules with bus-bar type arrangement in place of existing clip-lam arrangement. | <ul style="list-style-type: none"> Locos already modified 47 Locos still to be modified: 22 (BNDM-5, NKJ-4, GMO-12, KZJ-1) <p>The rate of modification is too slow and it seems that CGL is not making effort to complete the</p> |

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| | | | <p>task.</p> <p>M/s CGL stated that availability of locos is very limited in loco sheds especially in ELS/BNDM. ELS/GMO has transferred 25 locos having CGL make converters to ELS/BJU.</p> <p>Electric Loco Sheds are requested to facilitate the firm for early modification.</p> <p>M/s CGL to expedite the same at the earliest.</p> <p>PDC – 31.05.2019</p> |
| 2. | PCB card failure | <p>Failures of 45 PCB cards have been reported during year 2018-19 (Apr-Dec). This is very serious cause of concern and affecting reliability of 3-phase locomotive.</p> <p>M/s CGL shall submit the detailed investigation report of each and every card along with action plan to RDSO by 05.03.2019.</p>  | <p>Investigation report of PCB card failure has been submitted by M/s CGL. As per report, M/s CGL submitted that the failure of these electronics cards due to poor handling by their service staff. M/s CGL further stated that training on proper and secure handling of PCB cards have been given to their service staffs.</p> <p>Failure of MON card was increased due to IP recognition problem. Investigation report on failure of MON card is required to be submitted by 10.05.2019.</p> |
| 3. | Software issues | <p>1. Issues with Software version 0023:</p> <ol style="list-style-type: none"> Isolation of Traction bogie 1 & 2 with message 'Time out NSC pulse Bogie1/Bogie2'. Some times after MCE OFF/ON isolation of Traction bogie 1 and 2 with message 'Time out ALG test2 end Bogie1/Bogie2'. Vbus Max TE/BE reduces to zero <p>Modified software ver. 25 beta 04 provided in locomotive no. 39001, 39002, 39004 & 30680 of ELS/RPM. Results are not encouraging.</p> | <ul style="list-style-type: none"> For a. and b. Improved s/w ver. 26 beta 02 has been uploaded in one loco (30539) of ELS/RPM and shown improvements but issues not fully resolved. Performance will be monitored by 30.04.19 and further decision on regular cut-in/improvement of this version will be taken. To resolve the issues in c. and d. new test beta software version has been uploaded in one loco (32153) of ELS/GMO. Performance is under monitoring. |
| 4. | Issues with | 1. To reduce the booting time. The | <ul style="list-style-type: none"> M/s CGL stated that 2 sets of |

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| | UTIZEN CPU electronics | <p>problem of isolation of motors/bogie, non-logging of fault data in line with the VCU data could not be set right so far on converters with UTIZEN electronics. CGPISL is having 14 locomotive converters of UTGEN type (GMO-7, LDH-4, BNDM-3.</p> <p>2. M/s CGL has been impressed upon to replace the UTIZEN electronics with new VEGA electronics as there are several software issues which could not be solved.</p> | <p>Traction Converters replaced with new VEGA electronics have been dispatched to ELS/BNDM & ELS/LDH.</p> <ul style="list-style-type: none"> The replacement involves movement of UTIZEN electronics based traction converters from ELS to CGL works at Bhopal. M/s CGL stated that they have planned to lift 3 sets of power converter every month for modification from UTIZEN to VEGA. PDC – 31.07.2019. |
| 5. | | <p>For this CGPISL has modified the software and same has been uploaded in loco nos. 30680, 39001, 39002 & 39004 of ELS/RPM.</p> <p>Performance is under observation.</p> | <p>M/s CGL stated that new test software to resolve this issue has been uploaded in loco no. 32153 of ELS/GMO.</p> <p>Performance is being monitored. Based on analysis, the software will be modified for trial.</p> <p>PDC – 31.05.2019.</p> |
| 6. | Repeated failure of balancing resistor | <p>1. The issue is with Kiyosh make resistors. The failure is due to overheating of resistor and its outer cover is getting cracked. M/s CGL shall replace Kiyosh make resistors with HVR Pentagon make resistors.</p> <p>2. 10 locos each of ELS/RPM and ELS/BNDM shall be modified as per details given below:</p> <p>(i) Resistor with increased diameter from 54mm to 80mm shall be provided in 5 locos each of ELS/RPM and ELS/BNDM. The same has been provided in one loco no. 30693 of ELS/RPM yet.</p> <p>(ii) Two resistors of 1.95K Ohm each in cascaded in place of single resistor (3.91K Ohm) shall be provided in 5 locos each of ELS/RPM and ELS/BNDM. The same has been added in two locos no. 30577</p> | <p>Firm has informed that the solution under (i) has given desired results. Thus, it has been decided that resistor with increased diameter from 54 mm to 80mm shall be put into regular cut-in.</p> <p>A proposal along with investigation report shall be submitted by M/s CGL to RDSO by 10.05.2019.</p> |

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| | | <p>& 39000 of ELS/RPM yet.</p> <p>It was advised that temperature stickers to be used to access the increase in the temperature of both modified and unmodified resistors.</p> | |
| 7. | Sludge formation even after flushing & filling up of coolant as per SMI-0325 | <ul style="list-style-type: none"> Formation of sludge has been experienced in 3 locomotives (Loco No. 31739, 31742 & 31917) by ELS/BNDM even after replacement of coolant of M/s Chemtex make with coolant of M/s Clariant make as per RDSO SMI 325. It appears that the procedures as per SMI-325 have not been strictly followed while cleaning the radiators. Also, M/s CGL to inspect the quality of coolant and submit the detailed report in this regard to RDSO. | <p>M/s CGL has stated that they are investigating the issue, however suspected on chrome plated bolts used for fixing coolant level indicators and replaced the same bolts using stainless steel.</p> <p>Coolant replacement status:</p> <p>Total locos in which coolant to be replaced – 109</p> <p>Coolant replaced – 59 locos</p> <p>To be replaced – 50 locos (BNDM-18, LDH- 6, GMO- 20, NKJ- 6)</p> <p>The pace of replacement of coolant is very slow. In light of upcoming summer, all the locos may be attended by 31.05.19.</p> |
| 8. | Failures of Speed sensors of M/s Jaquet make | Failures of speed sensors of M/s Jaquet & M/s Laxven make are being experienced. M/s Laxven make speed sensors have not been cleared by RDSO. | M/s CGL has stated that investigation report is awaited from OEM and will be submitted by 10.05.2019. |
| 9. | Isolation of both bogies | <p>ELS/RPM has reported that both bogies are getting isolated without fault messages at times. M/s CGL has stated that they have not found any data in DDS.</p> <p>M/s CGL to investigate the same and prepare joint note with ELS/RPM.</p> | As per telephonic discussion with ELS/RPM, this issue is not being experienced from last 2 months. ELS/RPM may keep a watch. |
| 10. | Other Software issues | <p>Following are other software issues being faced by maintenance sheds:</p> <ul style="list-style-type: none"> When any motor gets isolated, corresponding popup message of isolation does not get displayed. However, message is logged in DDS. Spurious messages of "Info: SLG has received a shutdown command" messages are getting logged in SR data. VCB stuck-up messages are more frequently coming after passing neutral section. SR isolation due to multiple life sign missing from MVB is frequent. | <p>M/s CGL has given following remarks:</p> <ul style="list-style-type: none"> M/s CGL stated that popup message comes. ELS to check and report the same. M/s CGL stated that this is the converter feature only. Will be eliminated in software ver. 1010 to be released by M/s C-DAC. Will be eliminated in software ver. 1010. |

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| | | <ul style="list-style-type: none"> Both bogies are getting isolated without fault messages at times. | <ul style="list-style-type: none"> M/s CGL stated that the issue is in investigation as no such fault messages reported again. |
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3. M/s CGL make Auxiliary Converter

Detailed failure – type wise and shed wise are indicated in table – 3 and 4 respectively.

Table – 3: Failure type wise details

| SN | Cause of failure | 2015-16 | 2016-17 | 2017-18 | 2018-19 | | |
|----|--------------------------------|---------|---------|---------|-----------|-----------|-----------|
| | | | | | (Apr-Jun) | (Jul-Sep) | (Oct-Dec) |
| 1 | Power supply card (KUC153 A02) | 74 | 106 | 24 | 3 | 3 | 6 |
| 2 | BUR processor card (CCPU card) | 9 | 39 | 49 | 24 | 14 | 10 |
| 3 | INVCC-01 electronic card | 21 | 60 | 75 | 29 | 16 | 29 |
| 4 | Inverter module | 0 | 2 | 18 | 4 | 11 | 9 |
| 5 | Others | 0 | 17 | 25 | 14 | 14 | 45 |
| | Total | 104 | 224 | 191 | 74 | 58 | 99 |
| | Total Population (Loco) | 182 | 217 | 308 | 321 | 349 | 392 |
| | FRPCPY | 57 | 103 | 62 | 92 | 66 | 101 |

4. Issues of Auxiliary Converter discussed during the meeting are as below:

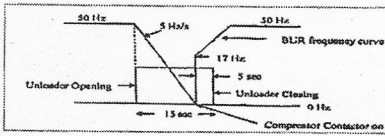
| SN | Item | Action Plan | Remarks |
|----|--|--|--|
| 1. | Modification in the INVCC and CCPU card. | 1. Firm has modified the software and provided modified software in following locomotives at four locations RPM, TKD, HWH and GMO. | M/s CGL stated that issue of 'BUR current greater than max.' and 'Battery charger current below 10A' will be addressed in software version 3.0. |
| 2. | BUR current greater than max. | <ul style="list-style-type: none"> HWH- 30305, 30506, 30454, 30503, 30455. RPM - 30679, 30680, 39004, 30678, 30675 GMO - 31267, 37047, 31316, 32153, 32074, 31596, 32152 TKD - 30653, 30683, 30451, 30637, 32200, 31548. | M/s CGL shall submit software release note by 10.05L.2019 to RDSO. |
| 3. | Battery charger current below 10 A. | 2. In spite of above measures, PCB cards failures are still there. The card failures are with message 'Battery charger current less than 10 Amp' and 'BUR current greater than maximum' and 'Inverter fault'. | <p>M/s CGL shall submit the proposal for regular cut-in of software ver. 3.0 along with joint note with Sheds on satisfactory performance of the same.</p> <p>ELS/HWH has submitted joint note indicating improvement. Therefore, the modified software may be put in trial in 5 more locos each in ELS/AQ, GZB, BRC, LGD & KYN.</p> |

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| 4. | MCB-100 trip message pop-up issue | MCB-100 (Battery charger MCB) trips and message not Pop-up on DDU. Due to this battery gets run down on line. | M/s CGL stated that after manual tripping of the MCB, it has been found that the message is getting pop up in DDU whenever MCB-100 (Battery charger MCB) trips. Railways may confirm. |
| 5. | Other issues | <ol style="list-style-type: none"> 1. High failure rates of the auxiliary machines: Harmonic contents in output of M/s CGL make Aux. converter fitted in loco No. 30445 of ELS/GZB to be measured in presence of RDSO representative in first week of March'19. 2. Date and time format & value gets corrupted in fault data of BUR. 3. BUR parameters are either not available or are erratic & unreliable in DDU. | <ol style="list-style-type: none"> 1. Measurement of Harmonic contents in Aux. Converter fitted in loco 30445 of ELS/GZB has been done on 09.03.19 & found to be within specified limit. 2. Issue addressed in software ver. 3.0. 3. Issue addressed in software ver. 3.0. |

5. **Performance of M/s. CGL make C-DAC VCU:** Issues of traction converter discussed during the meeting are as below.

| SN | Item | Action plan | Remarks |
|----|-----------------|--|--|
| 1. | Software issues | <p>Issues yet to be resolved</p> <ol style="list-style-type: none"> 1. Wrong sensing of Speed: <i>At present there is no wheel diameter feature available. To be implemented.</i> 2. FLG1:0020- Emergency Vigilance Brake - Loco not moving due to TE/BE reads "ZERO": <i>To be investigated this issue by C-DAC in TKD/RPM.</i> 3. Issues with MU operation <ol style="list-style-type: none"> (i) Non-formation of multiple unit with same cab i.e. cab1 to cab1 and cab2 to cab2: <i>This is because of non-availability of signals.</i> (ii) Wrong panto sequence while activating locomotive from Cab-2 (Pantograph of unoccupied cab of both the locos rising), while it was normal from cab-1. 4. Non- display of Node information of | <ol style="list-style-type: none"> 1. Issue yet to be addressed. 2. Wheel diameter feature is yet to be addressed by C-DAC. 3. New Software ver. 2008 provided by C-DAC tested at ELS/BNDM on Loco 32119 MU 32386 on 19.03.2019 with similar cab. <ol style="list-style-type: none"> (i) Issue resolved in Software (ii) Wrong panto sequence still persists while making MU with dissimilar cab, but it was found normal with same cab i.e. Cab-1+Cab-1 & Cab-2+Cab-2). 4. Node information of leading |

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| | <p>Master loco in the DDU of slave loco:</p> <p><i>This is an issue of synchronisation of timings of BUR & SR. under study by C-DAC will study.</i></p> <p>5. Non-display of Primary current (Ipri) in DDU.</p> <p><i>Ipri signal is not available in MVB. To be looked into and C-DAC will study and proposed solution by 20.03.2019.</i></p> <p>6. Display of spurious messages in the DDU-'Angle Transmitter fail, More than one cab occupied, Emergency stop- shut down, Train bus disturbance slave, Simulation fault etc.</p> <p>7. Tripping of DJ and simultaneous dropping of pantograph in case of 'Low/No OHE voltage' or isolation of any subsystem.</p> <p>8. In fault messages, Date & Time of some messages get reset (i.e. 1.1.1970).</p> <p>9. In error log some fault messages logged as error undefined.</p> <p>10. Individual TM isolation is not addressed properly.</p> <p>11. Wrong display of value (20%) of 0101-XangTrans (FLG-1) at '0' position of Throttle.</p> <p><i>C-DAC will study the issues 6-11 and propose solution by 20.03.2019.</i></p> <p>12. Non-working of Unloader valves of Main compressor during closing of DJ, in case of MR pressure < 8 kg/cm2 caused excess current drawn by the main compressor thereby sometimes tripping of MCBs of Main compressor.</p> <p><i>C-DAC to study the standard unloader cycle and implement the same as below:</i></p>  | <p>loco is still not displaying in slave loco.</p> <p>5. Resolved in software ver. 2008/1010 of C-DAC.</p> <p>6. Partly resolved. Display of spurious messages like 'More than one cab occupied, simulation fault, Emergency stop- shut down, Full TE/BE restore etc.' still logging.</p> <p>7. Tripping of DJ and simultaneous dropping of pantograph in case of 'Low/No OHE voltage' is resolved but it is being experienced during isolation of any sub system.</p> <p>8. Yet to be addressed.</p> <p>9. Yet to be addressed.</p> <p>10. Yet to be addressed.</p> <p>11. M/s CGL stated that issue has been resolved.</p> <p>12. Yet to be addressed.</p> |
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| 2. | AFL not working. | AFL not working in standstill condition and also in running condition in some locos. M/s CGL and C-DAC shall take corrective action to eliminate the same. The logic as per RDSO letter no. EL/4.2.17 dtd. 19.12.2018. PDC – 20.03.2019. | Yet to be addressed by C-DAC. |
| 3. | VCB stuck-up. | Messages come after passing neutral section. C-DAC will study the issues propose solution by 20.03.2019. | Yet to be addressed by C-DAC. |
| 4. | MCB-100 trip message not Pop-up on DDU | C-DAC will study the issues propose solution by 20.03.2019. | Yet to be addressed by C-DAC. |
| 5. | Message "earth fault trafo or motor" logged in data with Traction Bogie isolated. | C-DAC will study the issues and propose solution by 20.03.2019. | Yet to be addressed by C-DAC. |
| 6. | Message display on DDU | Motor isolation popup message & BUR failure data is logged in DDS but not displayed on DDU. C-DAC will identify such messages and propose solution by 20.03.2019. | Yet to be addressed by C-DAC. |

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