सत्यमेव जयते

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No. EL/4.2.17

Date: 12.06.2019

1. M/s C-DAC, P.B. No. 6520, Vellayambalam, Thiruvananthapuram – 695033, Kerala.
2. M/s ABB Limited, NelamangalaTaluk, Bangalore – 562 123
3. M/s. BHEL, EDN, PB.No.2606, Mysore Road, Bangalore-560 026
4. M/s. BTIPL, ERDA Road, Maneja, Vadodara-390 013
5. M/s. CGL, Plot No. 9, New Industrial Area, Mandideep – 462 046.
6. M/s Medha Servo Drives Pvt. Ltd., Nacharam, Hyderabad – 500076
7. M/s Secheron Hasler (INDIA) Pvt. Ltd. 310, 3rd floor, global foyer, sector 43, Golf course Road, Gurgaon 122002, Haryana.
8. M/s Klovertel Private. Ltd. 24 -30 Okhla Industrial Estate Phase III, 110020, New Delhi, INDIA

Sub: Minutes of the Meeting held at RDSO, Lucknow on 10.06.2019 on reliable scheme for operation of trains in push-pull mode.

Please find enclosed herewith a copy of Minutes of the Meeting held at RDSO, Lucknow on 10.06.2019 on reliable scheme for operation of trains in push-pull mode for kind information and necessary action please.

Suresh 12/06/19

(Suresh Kumar)
For Director General (Elect.)

Encl: As above.

Copy to:

1. Secretary (Electrical Engg./RS), Railway Board, Rail Bhawan, New Delhi-110 001. (Kind attn.: Shri A.K. Goswami, DEE/RS): For kind information. This connects item no. 2 of Railway Board letter No. 2007/Elect.(TRS)/440/15 Pt. Dt. 09.05.19.
2. Secy. to DG: for kind information of DG.
3. Principal Chief Electrical Engineer, Chittaranjan Locomotive Works, Chittaranjan – 713331 (WB): For kind information.
4. Principal Chief Electrical Engineer, Central Railway, HQs Office, 2nd floor, Parcel Office Bldg., Mumbai-400 001: For kind information.

Suresh 12/06/19

(Suresh Kumar)
For Director General (Elect.)

Encl: As above.

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Minutes of the Meeting on Technical Feasibility of Interface Control Document for MU with different makes of propulsion system held at RDSO on 10.06.2019

Members Present:

RDSO	1.	Shri O. P. Kesari, PEDSE
	2.	" Suresh Kumar, DSE/TPS
	3.	" M.N. Lodhi, SSE/TPS
	4.	" Shailendra Kumar Deo, SSE/TPS
	5.	" Ran Vijay, JE/TPS
ELS/AQ	6.	" Pawan Kumar Jayant/ DEE/ TRS/AQ
CLW	7.	" Pankaj Kumar, SEE/D&D/CLW
M/s ABB	8.	" Pradip Savaliya/ Product Manager /ABB/BLR
M/s CGL	9.	" Srinivas. D, DGM/Design
	10.	" Sudhir Yadav/ Sr. Executive
M/s BTIL	11.	" Manoj Khetan, System Engineering
	12.	" Ankur Somani, Head /Testing
M/s Medha	13.	" A.N.V. Rao/ Dy Manager
	14.	" Ambernath / Medha
M/s BHEL	15.	" B. C. Balaji Naik, Sr. Engineer
M/s C DAC	16.	" Renji Chacko/ Sr. Director, C-DAC/TVC
	17.	" Sigi C Joseph/ Scientist/ C-DAC

1.0 The meeting was convened to discuss the technical feasibility of Interface Control Document for MU with different makes of propulsion system.

2.0 PEDSE welcomed all the participants and stated that Push-pull operation was started on 13.02.2019 which was based on MICAS platform. No data loss was observed in intensive field trial and further during regular operation. Cables and connectors are compatible to transmit a data to the distance of 700-800 meters without distortion. Push-pull operation on TCN platform is required to be done. It is also necessary to have the compatibility of push-pull operation with same make and with other makes as per UIC556.

3.0 M/s BHEL representative was present for very short duration. No conclusive discussions were held on the subject issues with M/s BHEL.

4.0 The detail discussion/deliberations done during the meeting are given below:

4.1. Deliberation on WTB gateway

To have interoperability of MU/push-pull among different make of propulsion the standardization of Interface Control Document (ICD) of WTB is essential. For this purpose, the draft ICD was recommended and circulated by RDSO with propulsion system manufacturer for examination and comments within a week time. The copy of draft ICD is enclosed as annexure. This ICD shall be formulated and circulated to all OEMs/Pus for implementation.

4.1.1 Status of M/s BTIPL:

Testing of Push-pull operation was done at ELS/AQ without using coaches in between two locos connected at either end. However, it is observed that when locos are connected at

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ELS/HWH to 22 coaches, push-pull operation was not taking place due to communication losses. M/s BTIPL has informed that data loss is due to use of non-UIC compliant cable in coaches and extra cable junctions in each coach. M/s BTIPL was advised to carry out trials in ELS/BRC based loco in WR. PDC – 25.06.2019.

4.1.2 Status of M/s BHEL:

Testing of Push-pull operation was done at ELS/LGD without using coaches in between two locos connected at either end. M/s BHEL stated that all the software has been tested at ELS/LGD and VSKP. However, this software is required to be tested with coaches placed between two locos. Locos with propulsion system of M/s BHEL is available in ELS/AQ, hence this software shall be tested in push-pull mode with more than 20 coaches placed between two locos in association with CR.

M/s BHEL shall co-ordinate with CR and inform the date of trial so that RDSO representative may attend the trial.

PDC – 25.06.2019.

4.1.3 Status of M/s Medha:

M/s Medha confirmed that modified software shall be downloaded in ELS/BRC based locos having Medha make propulsion system for push-pull testing and validations by 25.06.2019. WR may facilitate trials.

4.1.4 Status of C-DAC make TCN VCU used by M/s ABB & CGL:

- M/s ABB & CGL has provided C-DAC make TCN VCU in their propulsion system.
- C-DAC stated that their software does not support the MU operation in WAP7 locos but does in WAG9 loco only. C-DAC shall modify the WAP7 loco software for push-pull operations. ELS/TKD based locomotives shall be used for trial purpose.

4.2. Deliberation on Auto Flasher Light (AFL)

4.2.1. Status of provision of AFL is as below:
(i) M/s Medha: Implemented in all locomotives.
(ii) M/s BTIPL: Implemented in more than 25 locos.
(iii) M/s ABB: Not done yet.
(iv) M/s CGL: Not done yet.

4.2.2. As provision of AFL is related to safety aspect, hence M/s ABB & CGL to implement the same as early as possible. The detailed action plan to provide the same may be submitted to RDSO at the earliest. PUs to ensure operation of AFL during loco commissioning. Electric Loco Sheds to test AFL during IC0.

4.2.3. Functional test procedure for checking AFL operation shall be prepared by RDSO. PDC – 25.06.2019.

4.3. Deliberation on reliability of C-DAC TCN VCU

4.3.1 Deliberation was done on the issues discussed in MoM circulated vide this office letter No. EL/11.5.5/21 dtd. 20.02.2019 of last reliability meeting held at ELS/HWH on 13/14.02.2019.

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4.3.2 Issues resolved:

a. Life Sign Missing issue
b. Non formation of multiple units with same cab i.e. cab1 to cab1 and cab2 to cab2.
c. Software Mismatch SLG1/2
d. Up/Low Limit for Primary Voltage
e. Bogie Definition Mismatch
f. Multiple occurrences Shunt Mode DDS
g. Wrong display of value (20%) of 0101-XangTrans (FLG-1) at '0' position of Throttle.
h. Non-display of Primary current (IPri) in DDU.
i. VCB stuck-up: Messages come after passing neutral section.
j. Wrong sensing of Speed
k. Vigilance Emergency Brake Input

4.3.3 Issues to be resolved:

SN	Issues still to be resolved	Remarks
1.	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 still persists.	C-DAC stated that this issue will be resolved within a week.
2.	Non-display of Motor isolation pop up message on DDU still persists.	C-DAC stated that this issue will be resolved within a week.
3.	AFL not working.	C-DAC will collect the latest FUPLA logic from CLW to implement in their C-DAC VCU. PDC – 25.06.2019.
4.	Wrong panto sequence while making MU with dissimilar intermediate cabs i.e. Cab-1+Cab-2; but it was found normal with similar intermediate cabs i.e. Cab-1+Cab-1 & Cab-2+Cab-2.	C-DAC stated that this issue will be resolved within a week.
5.	Node information of leading loco not displaying in slave loco - Multi operation only	Not required.
6.	Display of spurious messages like 'More than one cab occupied, simulation fault, Emergency stop-shut down, Full TE/BE restore etc.' still logging during boot up -Multi operation only	C-DAC stated that issue will be resolved in s/w ver. 1011.
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.	C-DAC stated that issue will be resolved in s/w ver. 1011.

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SN	Issues still to be resolved	Remarks
8.	Cab redundancy	Shall be covered in techno-commercial offer as explained in Para-4.3.2 below.
9.	Spurious ACP messages	C-DAC will collect the latest FUPLA logic from CLW to implement in their C-DAC VCU. PDC – 25.06.2019.

4.3.4 C-DAC insisted that modification in software have commercial repercussion. For this purpose, C-DAC shall submit techno-commercial offer to CLW and firms. M/s ABB & CGL have confirmed that they will share equally the cost of development/modification with C-DAC. CLW shall provide the necessary technical assistance required for the modifications.

4.3.5 C-DAC shall impart training on C-DAC TCN VCU to IR personnel. CLW shall develop expertise in C-DAC VCU software and start taking up the software modification in C-DAC TCN VCU.

11/06/19

DSE/TPS

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Draft

Wired Train Bus (WTB)

Interface Control Document

Research Design & Standards Organization

Lucknow

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1 PROCESS DATA INTERFACE

Leading parameters shall be as follows:

Maximum nos. of nodes	32
Individual node period	100 ms
WTB frame size	128 bytes
Transmission rate	1000 kbps
Maximum size of inauguration data	124 bytes
Node type	1
Node version	2
Number of sink ports	32
No. of source ports	1
Port size	128 bytes

1.1 R1 Telegrams

WTB Byte.Bit **Bit coding: 0 .. 7**	**Meaning**
1.3 .. .0	Kind of Usage 1 == UIC
1.7 .. .4	Type of Telegram 1 == R1
2	Version of Telegram 3 == actual supported version
41.1 + .0	Validity of Byte 47 .. 53
41.3 + .2	Validity of Byte 54 .. 57
41.7 + .6	Validity of Byte 59 .. 61
42.1 + .0	Validity of Byte 62.0 ..62.3
42.7 + .6	Validity of Byte 64
43.1 + .0	Validity of Byte 65
44.1 + .0	Validity of Byte 69
47.0	1 == Failure Clearing
47.1	1 == Traction release for remote control 1e
47.4	1 == Command Traction Interlock
47.6	1 == Command Sanding
47.7	1 == Command Open MCB & Pantograph Down
48.1 + .0	01 == Direction lever in UIC direction "1" 10 == Direction lever in UIC direction "2"
48.3 + .2	11 == Status MAC in position "0" 01 == Status MAC in position "Traction" 10 == Status MAC in position "Braking" 00 == Invalid
49, 50	Set value Tractive / Braking Effort

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
	(-100% .. 100%), 100% == 100% of nominal value of vehicle
51, 52	MAC Position (-12 .. 13), -12 == MAC Position-12, 13 == MAC Position 13
54.3 .. .0	4 == 25 kV ~, Selected catenary system
54.7 .. .4	Pantograph selection
57.0	1 == Command Pantograph Up
57.1	1 == Command Pantograph Down
57.2	1 == Command MCB On
57.3	1 == Command MCB Off
57.4	1 == Status Button Neutral Section
59.0	1 == Command EP Brake apply
59.1	1 == Command EP Brake release
59.2	1 == Command Emergency Brake apply
59.6	1 == Command Parking Brake apply
60	Set value Pneumatic Braking Effort (0 .. 255), 100 == 100% of nominal value of vehicle
62.1. + .0	11 == Command Fans in Automatic mode
62.2	1 == Status Compressor Enable
62.3	1 == Command Compressor On
62.4	1== Command Train Supply On
62.5	1== Command Train Supply OFF
64.4	1 == Command Pantograph Down
64.3	1 == Command Pantograph Up
65	Country selection of Pantograph
69.0	1 == Command Park Position On
69.1	1 == Command Park Position Off
69.2	1 == Command Parking Brake Apply
69.3	1 == Command Parking Brake Release
85.1 + .0	Validity of Byte 86 Usage of "Reserve National"
85.3 + .2	Validity of Byte 87 Usage of "Reserve National"
87.0	1 == Command Stop Automatic Sanding Usage of "Reserve National"
87.1	1== Command Soft Reset

Table 1-1: R1 Telegrams

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1.2 R2 Telegrams

WTB Byte.Bit Bit coding: 0 .. 7	Meaning
1.3 .. .0	Kind of Usage 1 == UIC
1.7 .. .4	Type of Telegram 2 == R2
2	Version of Telegram 3 == actual supported version
41.1 + .0	Validity of Byte 47.0 .. 47.5 Validity of Byte 48 Validity of Byte 51, 52
41.3 + .2	Validity of Byte 47.6 .. 47.7 Validity of Byte 49, 50
41.5 + .4	Validity of Byte 53 .. 57
42.1 + .0	Validity of Byte 60
42.3 + .2	Validity of Byte 61, 62
42.5 + .4	Validity of Byte 63, 64
42.7 + .6	Validity of Byte 65
43.1 + .0	Validity of Byte 66
47.3	0 == Command Traction Interlock Request
47.4	1 == Status Vehicle Ready for Traction
47.5	1 == Traction Interlock Request from Guided to Train
47.7	1 == Status protective MCB Off & Pantograph Down
48.1 + .0	01 == Driving into direction of leading vehicle selected 10 == Driving into opposite direction of leading vehicle selected 11 == No driving direction selected
49, 50	Set value of Tractive Effort of trailing vehicle
51, 52	100% = 300 kN, Actual value of Tractive Effort
53.3 .. .0	Selected catenary system 4 == 25 kV ~
53.7 .. .4	Status selected Pantograph 1 == Front Pantograph selected 2 == Rear Pantograph selected
54.0	1 == Status Pantograph Up
54.1	1 == Status MCB On
57	100 = 100% of selected nominal Catenary voltage
60.1 + .0	01 == Status Compressor On 10 == Status Compressor Off
61, 62	Available Tractive Effort

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
	-100% .. 100%, 100 = max. installed Tractive effort
63, 64	Available Braking Effort -100% .. 100%, 100 = max. installed Braking effort
65	Country Code for Pantograph acc. UIC
66.5 + .4	11 == Status vehicle in Parking Position 00 == Status vehicle not in Parking Position
85.3 + .2	Validity of Byte 87 Usage of "Reserve National"
85.5 + .4	Validity of Byte 88 Usage of "Reserve National"
85.7 + .6	Validity of Byte 89 Usage of "Reserve National"
87.7	1 == Status at least one motor manually isolated Usage of "Reserve National"

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
88	1 = 10 kN, Actual value of Tractive Effort Usage of "Reserve National"
89	1 = 10 kN, Actual value of Braking Effort Usage of "Reserve National"
90,91	100% = 300 kN Current tractive/Braking effort Bogie 1 Usage of "Reserve National"
92,93	100% = 300 kN Current tractive/Braking effort Bogie 2 Usage of "Reserve National"
94,95	100% = 100 V Battery Voltage Usage of "Reserve National"
96,97	100% = 100 A Primary Current Usage of "Reserve National" Format Little Endian
98,99	100% = 1000 Node FLG1 Usage of "Reserve National"
100,101	100% = 1000 Node FLG2 Usage of "Reserve National"
102,103	Node SLG1 Usage of "Reserve National" Format Little Endian
104,105	Node SLG2 Usage of "Reserve National" Format Little Endian
106,107	Node SPIF1 Usage of "Reserve National" Format Little Endian
108,109	Node SPIF2 Usage of "Reserve National" Format Little Endian
110,111	Locomotive Number Usage of "Reserve National" Format Little Endian

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
114	(0..255)Locomotive Type 0: invalid 1: WAP5 2: WAP7 Without Hotel Load 3: WAP7 4: WAG9 5: WAG9H Usage of "Reserve National"
115.0..7	Status Subsystem 01,02,03,04,05,06,07,08 (1: Isolated, 0: Normal working) 0 Normal working 1 Isolated/Off Usage of "Reserve National" Bit 0: Status Subsystem 01 Bit 1: Status Subsystem 02 Bit 2: Status Subsystem 03 Bit 3: Status Subsystem 04 Bit 4: Status Subsystem 05 Bit 5: Status Subsystem 06 Bit 6: Status Subsystem 07 Bit 7: Status Subsystem 08
116.0..7	Status Subsystem 09,10,11,12,13,14,15,16 (1: Isolated, 0: Normal working) 0 Normal working 1 Isolated/Off Usage of "Reserve National" Bit 0: Status Subsystem 09 Bit 1: Status Subsystem 10 Bit 2: Status Subsystem 11 Bit 3: Status Subsystem 12 Bit 4: Status Subsystem 13 Bit 5: Status Subsystem 14 Bit 6: Status Subsystem 15 Bit 7: Status Subsystem 16

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
117.0..7	Bit 0 : Status of Sub-system 19 (1: Isolated, 0: Normal working) Bit 1 : Status of MR pressure(1: OK, 0: NOT OK) Bit 2 : Status of Wheel Slip (1: OK, 0: NOT OK) Bit 3 : Status of Sanding active(1: OK, 0: NOT OK) Bit 4 : Status of over current primary(1: OK, 0: NOT OK) Bit 5 : Status of Earth fault Power(1: OK, 0: NOT OK) Bit 6 : Status of Earth fault Auxiliary(1: OK, 0: NOT OK) Bit 7 : Status of Earth fault Control(1: OK, 0: NOT OK) Usage of "Reserve National"
118,119	100%=100KV Line Voltage Usage of "Reserve National" Format Little Endian
120..123	Slave ODBS Change Count Usage of "Reserve National" Format Little Endian
126	0,1:Validity of Byte 108,109 2,3: Validity of Byte 110,111 4,5: Validity of Byte 114,115,116,117 6,7: Validity of Byte 118,119 Usage of "Reserve National"
127	0,1:Validity of Byte 100,101 2,3: Validity of Byte 102,103 4,5: Validity of Byte 104,105 6,7: Validity of Byte 106,107 Usage of "Reserve National"
128	0,1:Validity of Byte 90..93 2,3: Validity Of Byte 94,95 4,5: Validity Of Byte 96,97 6,7: Validity Of Byte 98,99 Usage of "Reserve National"

Table 1-2: R2 Telegrams

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1.3 R3 Telegrams

R3 Telegram used as part of R1 and R2 telegrams.

WTB Byte.Bit Bit coding: 0 .. 7	Meaning
3.1 + .0	Validity of Byte 9.0 .. .3
3.7 + .6	Validity of Byte 10.7 Validity of Byte 11, 12
4.1 + .0	Validity of Byte 13 .. 18
4.3 + .2	Validity of Byte 19
5.3 + .2	Validity of Byte 23, 24
5.5 + .4	Validity of Byte 25
5.7 + .6	Validity of Byte 26 .. 28
6.1 + .0	Validity of Byte 29
8.1 + .0	Validity of Byte 37
8.3 + .2	Validity of Byte 38
8.5 + .4	Validity of Byte 39
8.7 + .6	Validity of Byte 40
9.1	1 = Status vehicle is trailing vehicle
11, 12	100% == 256 km/h, Actual vehicle speed value
13 .. 16	Actual vehicle time
19.0	0 == Status Train Line Off 1 == Status Train Line On
23.1 + .0	01 == Status Pneumatic Brake applied 10 == Status Pneumatic Brake released
23.5 + .4	01 == Status Parking Brake applied 10 == Status Parking Brake released 00 == Status Parking Brake isolated
24.1	1== Emergency brake applied 0 == Emergency brake not applied
27.2	1 == Fire extinguisher active
27.7	Traction chain switched off 1 == More than one axle isolated
28.1	1 == Dynamic(Regenerative) Brake isolated
29.0	1 == MCB on vehicle closed
29.3	Auxiliary supply disturbed / Main Power Isolated 1 == more than one auxiliary isolated
29.4	Critical vehicle operational state 0 == CCU-O 1 active 1 == CCU-O 2 active

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WTB Byte.Bit Bit coding: 0 .. 7	Meaning
37	(0 .. 100), 48 == 0.48 MPa, Actual Value Brake Cylinder Pressure Bogie 1 Usage of "Reserve International"
38	(0 .. 100), 48 == 0.48 MPa, Actual Value Brake Cylinder Pressure Bogie 2 Usage of "Reserve International"
39.0	0 == Command MCBs Off, Usage of "Reserve National"
39.1	1 == Pantograph lifted, Usage of "Reserve National"
39.2	0 == Pantograph isolated, Usage of "Reserve National"
39.3	1 == Status Emergency Brake Required from Vigilance Usage of "Reserve National"
39.4	1 == Command Pantographs Down, Usage of "Reserve National"
39.5	1 == Fault Status Lamp, Usage of "Reserve National"
39.6	1 == Fault Status Indication Lamp Usage of "Reserve National"
39.7	1== Error Status attempt to occupy more than one cab Usage of "Reserve National"
40.4	1 == Status Simulation Mode active, Usage of "Reserve National"
40.5	1 == Command Primary Compressor on, Usage of "Reserve National"
40.6	1 == Primary Compressor locked, Usage of "Reserve National"
40.7	1 == Primary Compressor enabled, Usage of "Reserve National"

Table 1-3: R3 Telegrams

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2 MESSAGE DATA INTERFACE (AS PER UIC 557)

Message Data Function	Used for
9	Diagnostics
15	UIC Mapping Server
151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 184, 185, 186, 187, 225	Internal Communication (Private Functions)

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