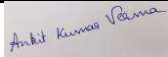

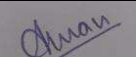





Activities completed for WAP5 AMRIT BHARAT Push – Pull locomotives during the visit to ICF 31.01.25
to 09.02.25- CDAC

1. Self-hold mode timing increased to 100 min from 10 min
2. Throttle latching implementation done and tested
3. Brake blending in slave locomotive is done and tested
4. Harmonic filter earth fault testing and its popup
5. Independent control of CP
6. Operation of all four Hotel load independently in master and slave locomotive
7. Parking brake application in slave and master after 2 KMPH, parking brake reset at boot-up
8. Parking application and release checked during communication loss and gain
9. Master and slave loco regeneration
10. Slave loco traction during NSN and notch latching
11. HLC switch ON for master and slave with MR low & earth fault message for master and slave
12. Automatic neutral section logic for VCB and panto lowering logic
13. Disabling of brake blending in slave loco
14. Failure mode operation in case of angle transmitter in master loco
15. Harmonic filter isolation in master slave operation
16. Trailing loco operation
17. Configuration of port 37, with bit wise data assistance given for ARC FSK module during interface with VCU, it is tested in loco this enabled to make the progress of node from 570 to 596 for taking traction.
18. STB2 software version showing in display is rectified. Copy of completed flash folder taken shall be shared to ToT partners.
19. New AMIT module for longer distance communication is tested with rack structure

All the above points are tested using FSK module of ARC make and new AMIT make WTB module in independent operation and by connecting both in parallel mode.

 Ankit Kumar SSE/D&D CLW	 Arun Raj Kumar K P, Scientist 'E'/CDAC	 Amandeep SSE/ELS/GZB	 Vignesh T, TCMS Eng ABB	 Rajashekara G, Service specialist ABB	 Raghavendra D B, Engineer ARC
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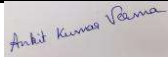

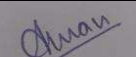



Joint Note between CDAC, ABB, ARC, CLW & ELS / GZB - Joint note dated – 10.02.25

Testing of Push-Pull configuration with cab redundancy features in P5 loco no – 35017 & 35025 1st pair & with M/s ABB Composite propulsion (ELS GZB based loco) received after Aerodynamic cab modification from CLW for Push-pull Amrit Bharat train configuration at ICF dated from 31-01-2025 to 09-02-2025. In this the Testing was done with FSK module of M/s ARC and new WTB module of M/s AMIT. The details for the same is mentioned below

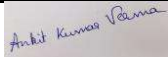

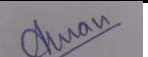



<u>AMIT Module (Model No. RRU-WEM/1158)</u> Software/firmware version -2.46.3 Serial Number: Loco No 35017AL21182 Loco No 35025- AL29790	<u>FSK Module of M/s ARC</u> Software /firmware version –1.1.0.1 Serial number: Loco no 35017 --> ARC/FSKTB/V1.0/0003 Loco no 35025 --> ARC/FSKTB/V1.0/0004
CDAC VCU software Version – 1501 (FLG1-1501, FLG2-1501, STB1-1501, STB2-1501, HBB1-1501, HBB2-1501)	

Below points are tested at ICF with Amrit Bharat formation.

SN	Description of logic	Test result at ICF
1	Independent Compressor Control	Functionality checked found okay.
2	Throttle Latching implemented in slave loco syncing	Logic implementation done and checked found okay. Maybe more tuning can be done depending on the field performance report
3	Both Master & Slave Regenerative braking	Functionality checked found okay.
4	Self-hold time (100mins)	Logic implementation done and checked found okay.
5	NSN Distance	Functionality checked found okay. (Slave VCB will open in 300 M after master VCB open and close after 780 M of slave VCB open)
6	Automatic NSN above 2 KMPH	Functionality checked found okay.
7	HLC Logic for switching on both Master and slave loco HLCs	Logic implementation done and checked found okay.
8	MR Low logic removal from HLC	Logic implementation done and checked found okay.
9	Master /Slave main power off for trailing mode operation	Functionality checked found okay.
10	Slave Loco traction during NSN	Logic implementation done and checked found okay.
11	Panto lowering logic like NSN	Functionality checked found okay.
12	Parking brake isolation in case of communication loss and non-application after 2kmph	Functionality checked found okay.
13	Disabling the blending brakes in slave loco to avoid the probabaility of wheel skidding	Functionality checked found okay.

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14	Auto recovery after WTB Communication Loss	Functionality checked found okay. However, after recovery once panto needs to be lowered in master to sync the state machine
15	DDU to display slave loco status in master and master loco status in slave	loco number, node, pantograph and VCB for master and slave added. Rest to be added in the update. We need Boolean Mappings of PORT 4,5,7,8 for further implementation is to be done
16	BPCS Tuning to be done	Checked & found variation between 5Kmph in trail run. However, improvisation is required depending on field performance report.
17	MU Coupler redundancy through both channel A and Channel B. Also, MU coupler redundancy on basis of AMIT and FSK module	Functionality checked by removing one connector at a time and operation found okay. Further switching between FSK and AMIT module was also checked and found normal. However, FSK had priority due to less Booting up time so it's advisable to have only one module in service at a time.
18	Cab Redundancy by pulling out one processor at a time	Functionality checked found okay.
19	Amit WTB Communication and ARC FSK module communication	Checked with 22 Racks connected, communication and functionality found okay.
20	Master Node in DDU of Slave loco	CDAC need to be change in Software
21	Communication Loss Popup Message on the big screen.	Logic implementation done and checked found okay. Special message "S19: Trainbus COMMUNICATION RECOVERED Try to Lower PANTO & raise again Multiple operation not possible F1901P2" has been added
22	Loco speed in simulation mode for WAP5	Functionality checked found okay.
23	Logic for having NSN in Trailing mode	Functionality checked found okay.
24	Earth fault on Harmonic circuit Pop up message	Logic implementation done and checked found okay.
25	Earth fault Hotel circuit DDS and Pop-up message	Logic implementation done and checked found okay.
26	WTB Communication loss and Communication establishment pop up mapping	POP UP telegram was forced from VCU and verified the message status at testing, but it's not complied in the existing version is there in locomotive, observed in trail pop up is not generated, so while releasing official version CDAC to be compile and release.
27	Slave Panto down and node varying from 550 to 560	A disturbance in Node progress in slave VCB opening time in master DDU with ARC gateway in active. CDAC to improvise of software
28	Auto Flasher POP-UP and PIXY Massage	This logic needs to be implemented according to RDSO MS, wiring is pending in this loco. Once implemented

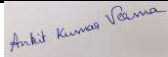

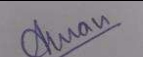



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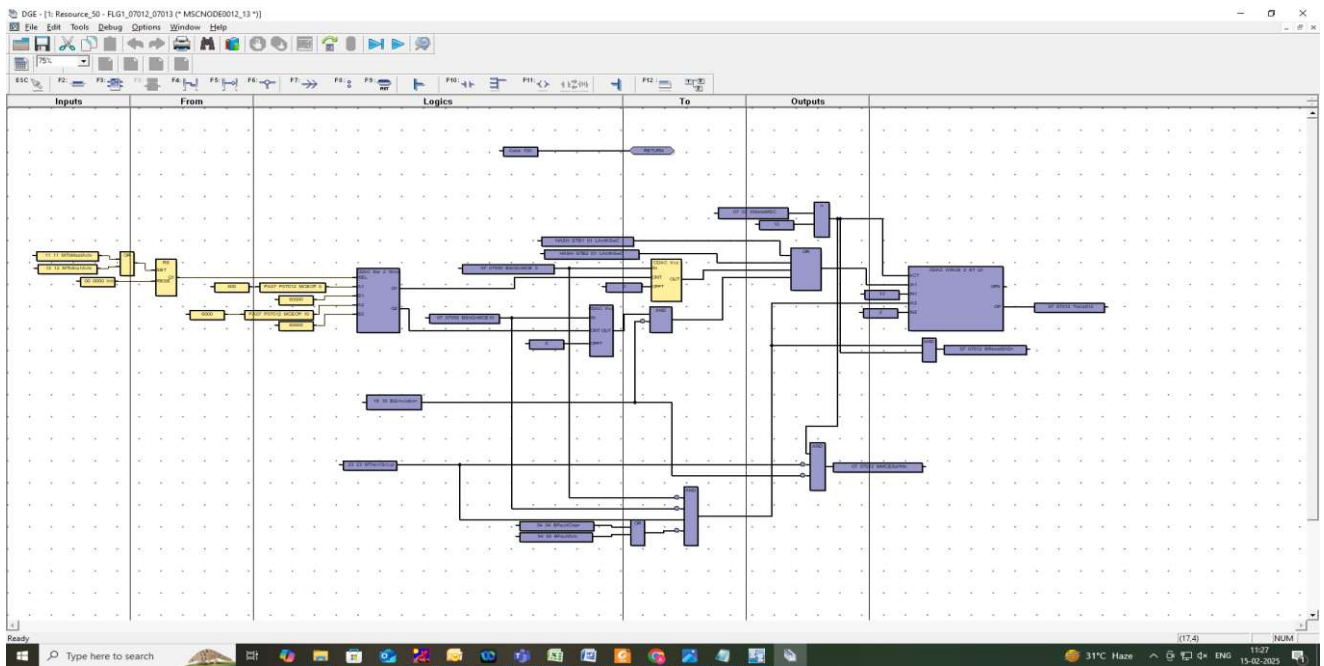
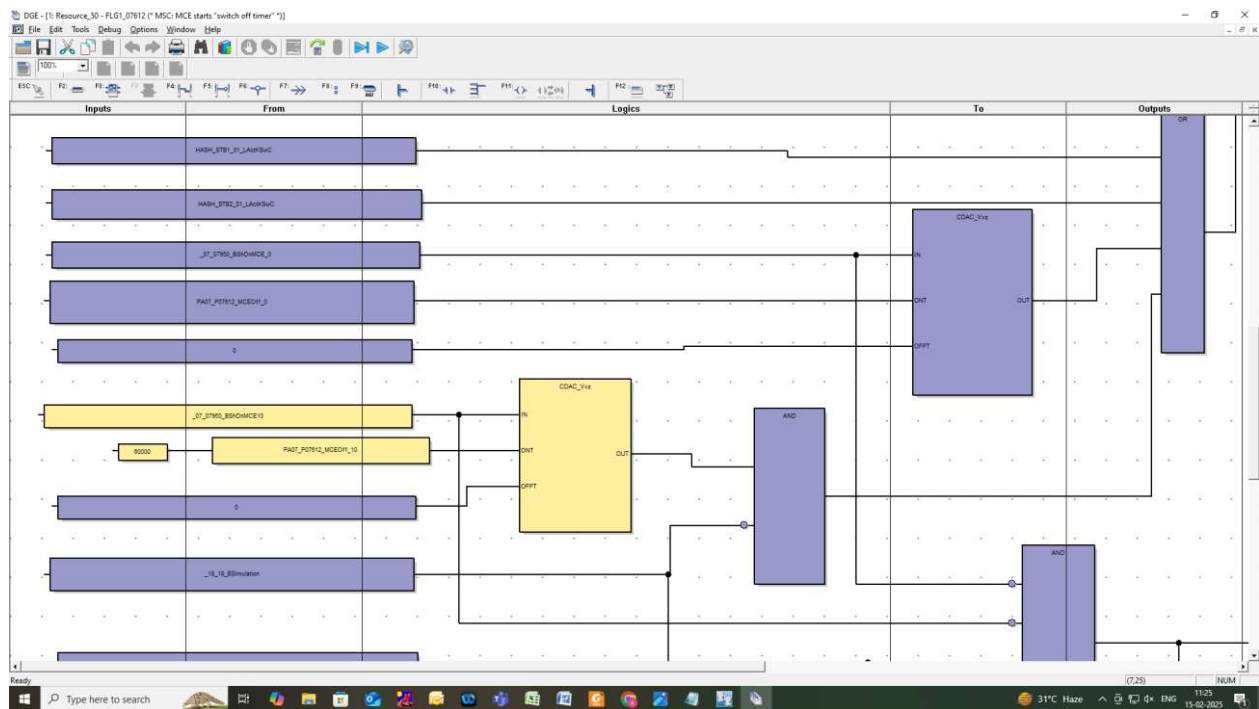
		same will be verified by M/s ABB personal
29	Other additional points cleared during testing	<ol style="list-style-type: none"> 1. STB2 software version showing in display is rectified. Copy of completed flash folder taken shall be shared to ToT partners. 2. New AMIT module for longer distance communication is tested with rack structure 3. ARC need to be Implement the DDU GUI as per CLW requirement. (Slave Loco details to be add into the Master loco DDU)
30	Software version 1501 of CDAC and further testing	As the software seems to be very stable, and the maximum issues have been resolved. Hence CDAC was requested to issue proper release notes so that some could be tried out in different locos. Also, it was requested that similar software for WAP7 may be released. Also two versions in which the distance of NSN should be changed to 5 and 10 Meters should be provided for WAP-5 and WAP-7 locos. Thus, CDAC was requested to provide all these four versions for testing. In addition to this M/s ABB was requested that M/s AMIT new WTB module should be tested in Amrit Bharat Loco which are already in service for which they may coordinate with ELS/GZB and the module can be shifted to the specified locos.

In addition to this the aforesaid combination (individual and both) was checked with 22 Coaches connected in between the Master and slave loco and it was found that master & slave loco working normal in Push Pull configuration with no communication disturbance observed & signal strength good & working normal throughout the trail run. However, it is to be noted that the priority of ARC FSK module was higher than AMIT module due to less boot up time so it was decided to place only one module at a time. Hence during the trail runs FSK module and AMIT module was shifted sequential after every 8 hours to monitor the performance. In addition to this it was also observed that M/s ARC FSK module has temperature rising issue due to its location (above AUX-1 converter) so it is advised that M/s ARC should provide proper cooling arrangement to remove hotspot in future supplies. In addition to this ELS/GZB requested to carry out similar type of activity with M/s BHEL propulsion system for which M/s ARC and M/s AMIT maybe coordinated.

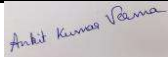

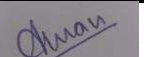



The changes made by CDAC in segment is attached for reference.

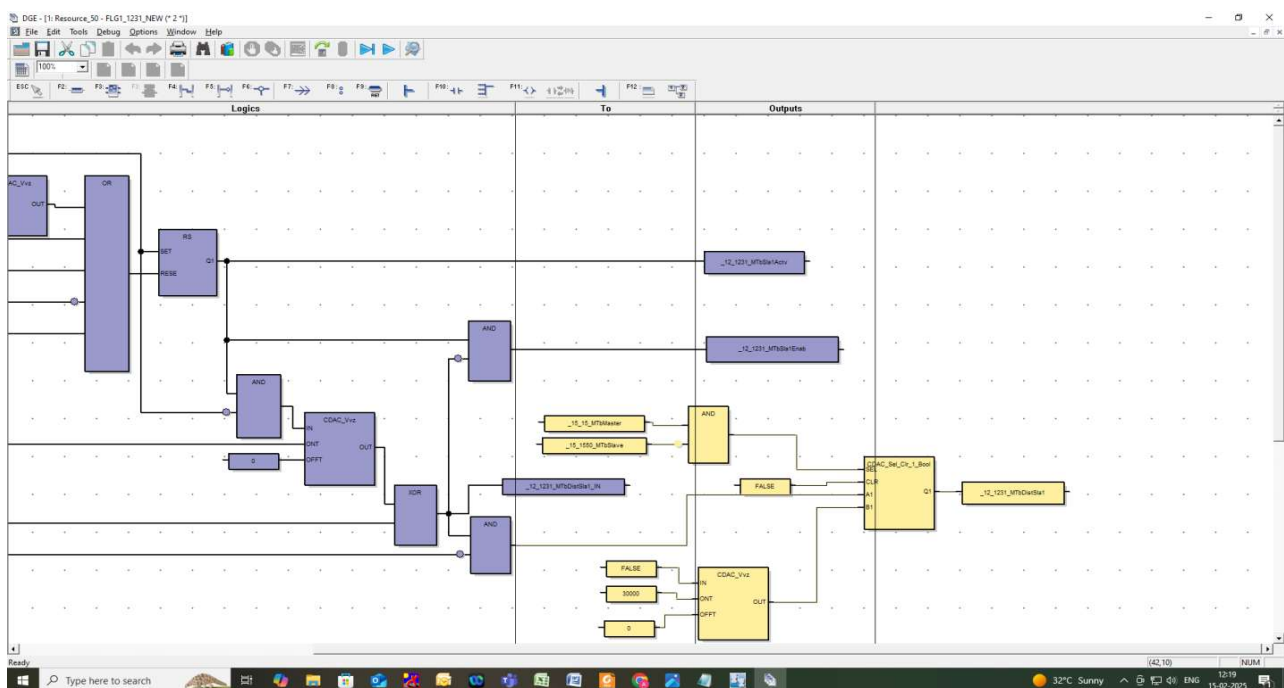
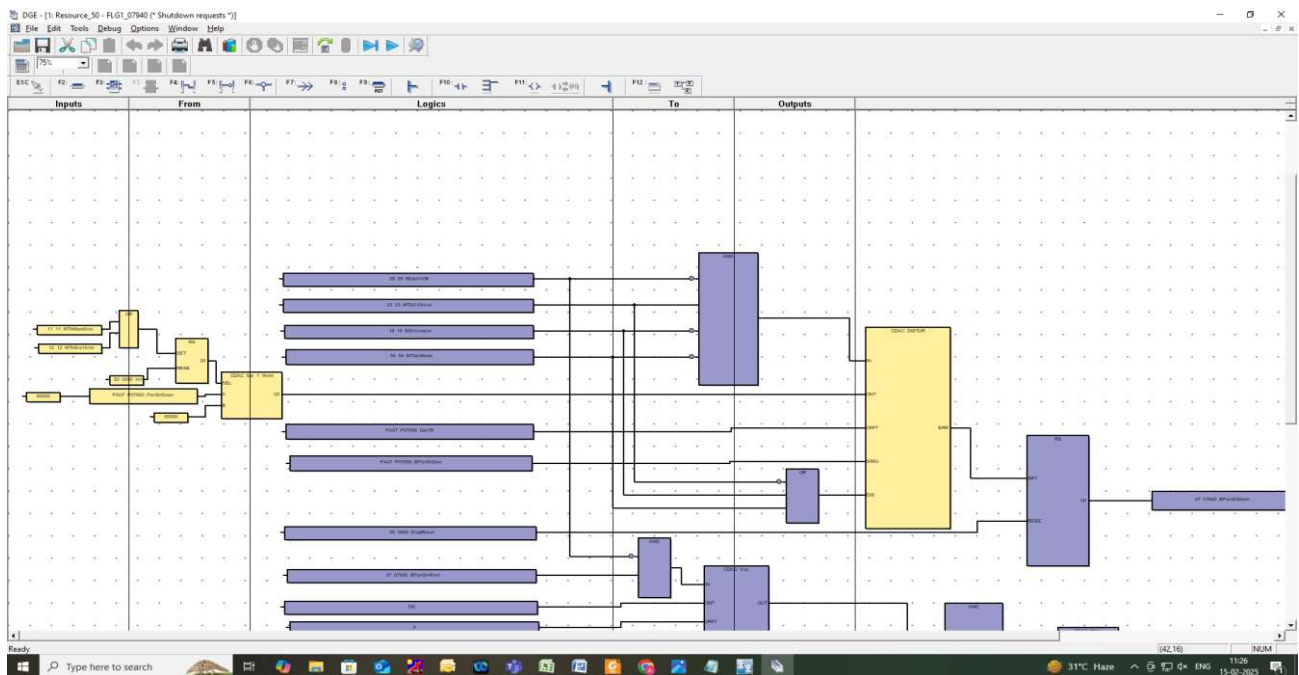
i. Self hold mode timing increased to 100 min from 10 min

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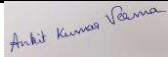

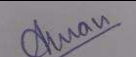





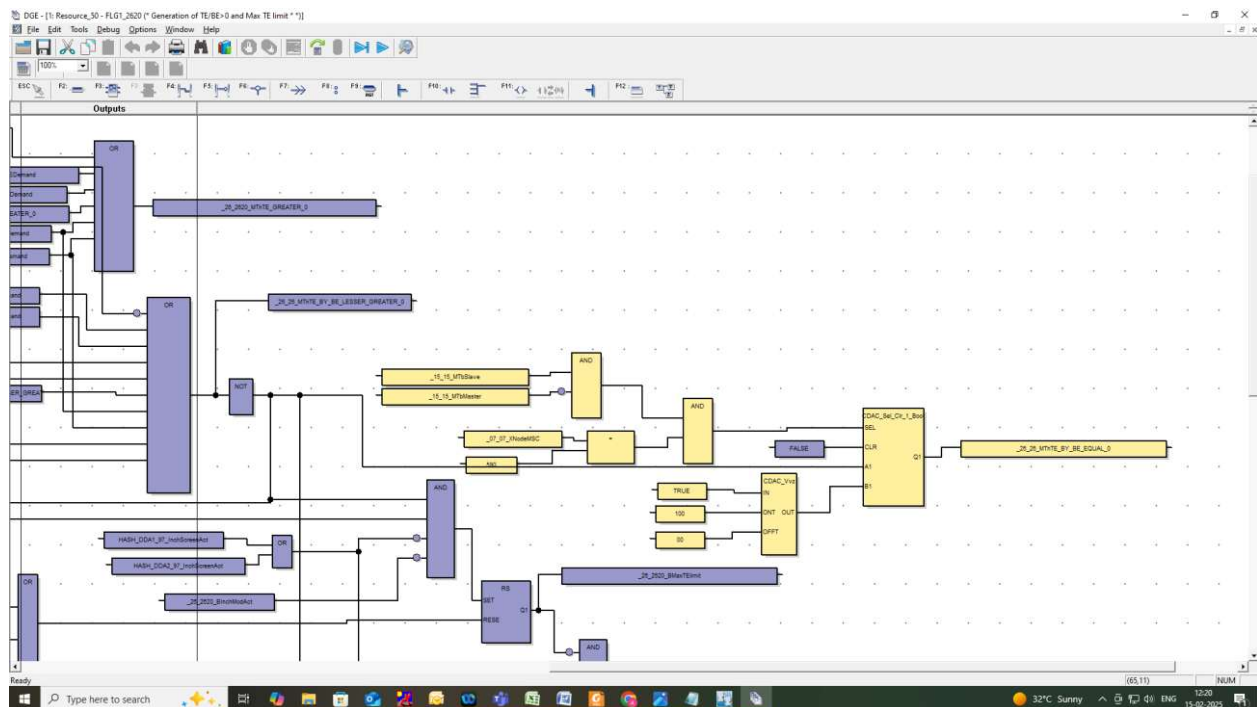
ii. Uprim:

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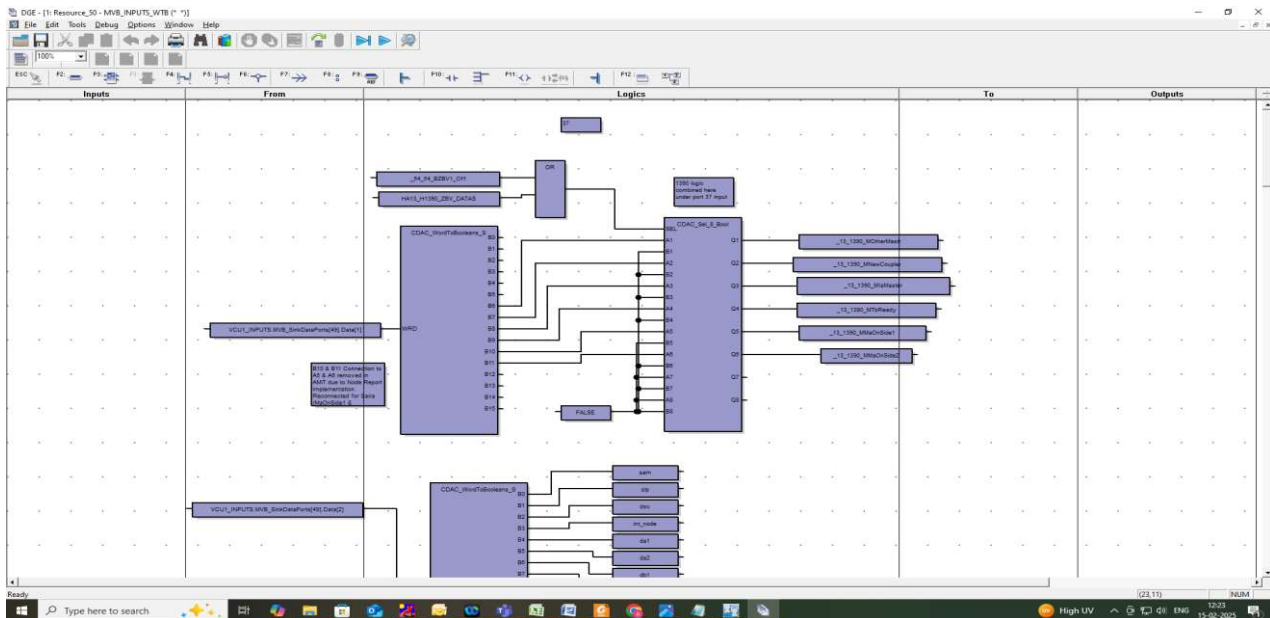
iii. Throttle latching implementation done and tested:

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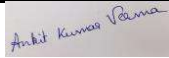

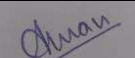





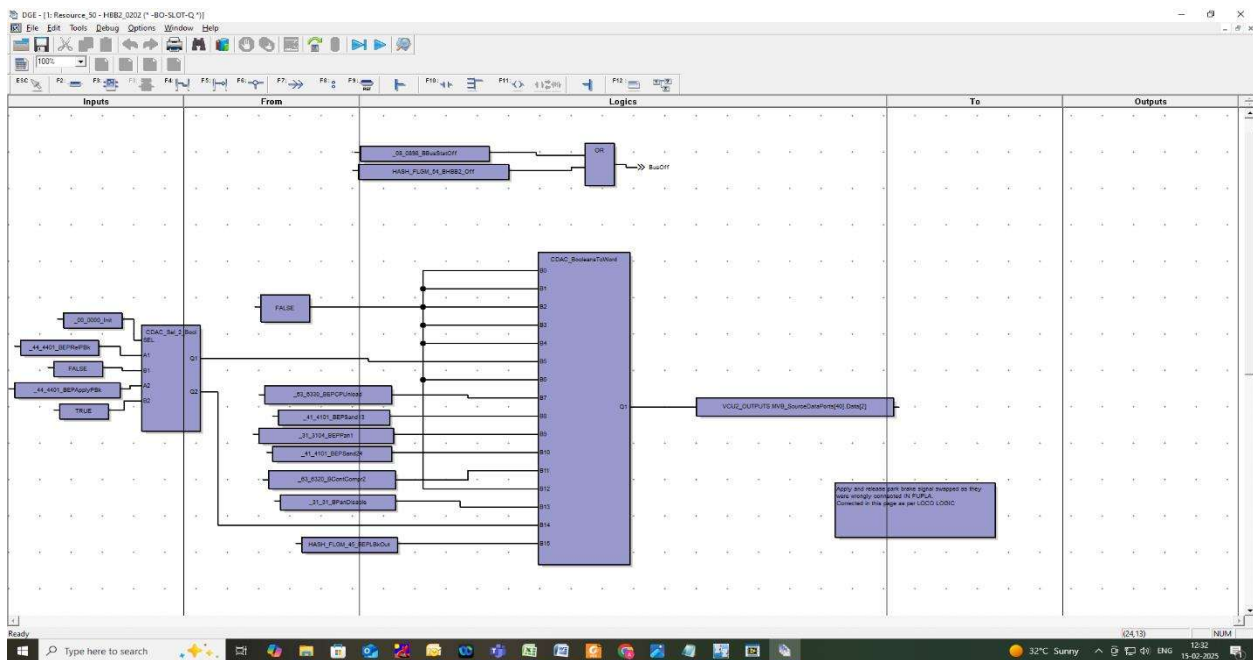
Delay = $100 * 50\text{ms} = 5 \text{ sec}$

iv. Configuration of 37 port for ARC FSK UNIT



v. Parking brake application during boot up:

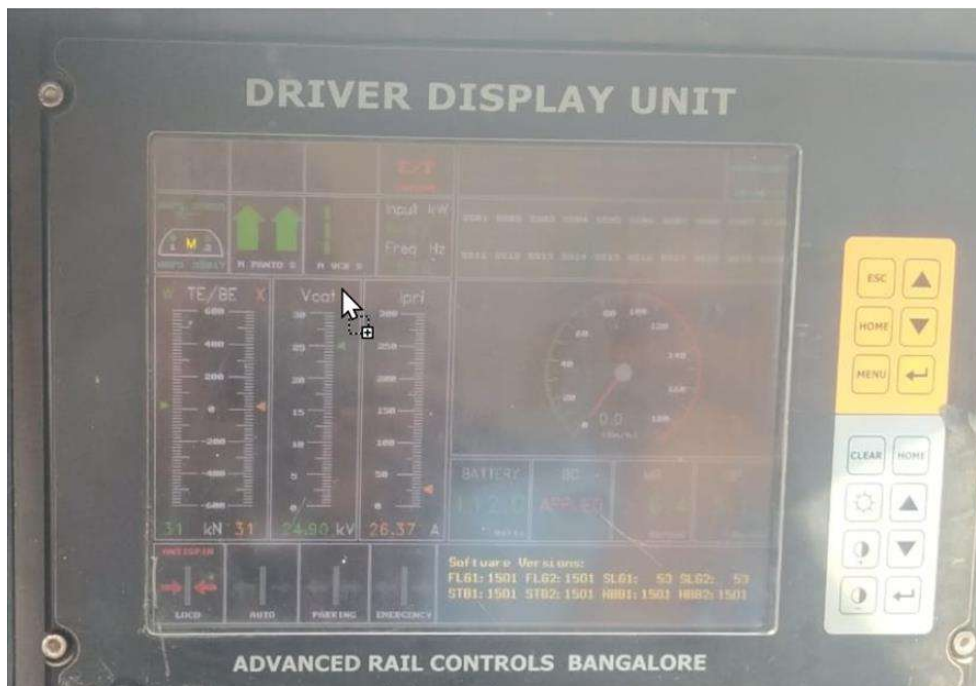
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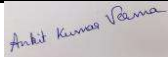

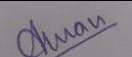



Reference images:

The changes made in GUI by ARC are attached for reference.

1. Software version



2. Slave loco status in master loco DDU

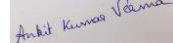

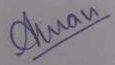



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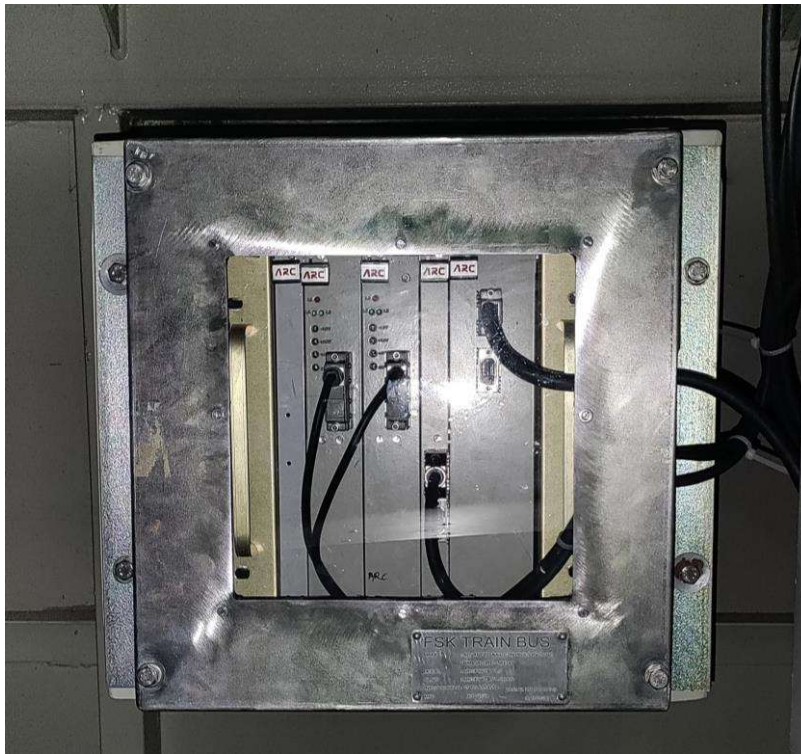


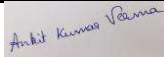

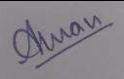
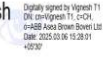


3. Communication re connection message



4.ARC FSK UNIT MOUNTED INSIDE LOCO

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 Ankit Kumar SSE/D&D CLW	 Arun Raj Kumar K P, Scientist 'E'/CDAC	 Amandeep SSE/ELS/GZB	Vignesh T1  Vignesh T, TCMS Eng ABB	 Rajashekara G, Service specialist ABB	 Raghavendra D B, Engineer ARC
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