ACHIEVEMENTS OF ELECTRICAL MAINTENANCE WING DURING 2024-25:

1. During 2024-25, **114** new electric locomotives were commissioned in SER. With this, total holding of electric loco has become **1465** in SER, which is highest on Indian Railway.

2. Failure/100 Loco (Ownership Basis) during 2024-25 up to Mar'25 is 6.2 in SER (2nd position) as compared to 11.9 in Indian Railway.

3. Major Schedules during 24-25 has been done on 507 locomotives as compared to 410 during same period of last year.

4. Cumulative Statistical and Hourly ineffective percentage during 24-25 was 6.2 & 7.8 respectively against Railway Board's target of 10.0 % & 12.2 % registering improvement of 38.0 % & 36.1 % respectively.

5. Cumulative Hourly availability of Goods locos during 24-25 was 1138.7 against Board's target of 1076.3 indicating an increased outage of 5.8 % (62.4 more locos offered to traffic over and above target).

6. Working pairs of DPWCS during 24-25 was average 62 numbers as compared to 46 during same period of last year.

7. ERS/POH/KGP carries out major schedules of electric locomotives with an outturn of 60 electric locomotives during 2024-25 and fulfills Railway Board's Target: 60 during 2024-25.

8. One no. CNC under floor wheel lathe received on 18.06.24 and under commissioning at ELS/TATE, loose wheel turning completed.

9. COE/ROU saved Rupees one crore 56 lakhs approximately by different types of card repair during FY 2024-25.

10. Wheel Flange Lubrication System has been installed in 09 locomotives of ELS/SRC, with the purpose to reduce the wear and tear of wheel disc on experimental basis.

11. Shunting notch modification has been completed in all conventional Electric locomotives as per target given by Railway Board.

12. Tool Box has been provided in 1393 Electric Locomotives during 2024-25.

13. CLI seat has been provided in 107 Electric Locomotives during 2024-25.

14. LED headlight modification has been carried out in 156 Electric Locomotives during 2024-25.

15. VCD acknowledgement PB modification has been completed in 175 Electric Locomotives during 2024-25.

16. **Motorised Hydraulic Press Machine for Mounting and Dismounting of Plane and Lipped Racer of WAG9 loco by ELS/ROU:**

A Motorised Hydraulic press machine for mounting and dismounting of plane & lipped CRU-150 type bearing Racer of WAG9 loco has been commissioned during Apr'24. This system is procured from M/s Sumanglam Equipments Pvt. Ltd.

17. **Installation of Automatic Digital Surge Comparison Tester by ELS/SRCE*:***

An Automatic Digital Surge Comparison Tester (Model: VM1001) was supplied by M/s. Vivid Metrawatt - Vasai East against P.O. No. IG226519100659 Dated 04.07.2023 and was installed at ELS/SRC. This test unit along with accessories has been commissioned on 09.05.2024.

18. **Pinion removing in on position from Traction Motor in Three phase locomotive by ELS/BKSE:**

Pinion removing in on position from Traction Motor in Three phase locomotive has been sussessfullly done at BKSE shed during May'24. **This will be useful for pinion removing in breakdown loco on line**. Presently for pinion removing on line pinion is cut by gas cutting, which takes more time and pinion also not used after cutting.

19. **50/06 T EOT CRANE at ELS/BNDL:**

50/6 Ton overhead EOT crane received on 26.02.2024 at BNDL vide COFMOW at no. COFMOW/IR/S/OP-207810 dated 03.05.2020 have been commissioned. Load testing (49T) done on dated 04.05.2024. This will reduce the downtime of locomotives waiting for heavy lifting/lowering as well as replacement of heavy equipment of locomotive thereby improving the availability/outturn of locomotives.

20. **Contact Pressure Test of Fixed IV Contact Pin on Loco Position with Push-pull Force Gauge by ELS/TATE:**

HLC fixed IV coupler power contact pins are getting flashed leading to HLC not working/single phase fault. In case of improper spring tension of IV coupler power contacts.
The contact pressure test is to be conducted on the pins by applying a force on the pins longitudinally and measuring the deflection of compression in the springs. The pressure exerted and deflection thus resulted shall not be more than the values indicated below (As per RDSO SPEC_0177, Rev-0).

SN	Pressure on the pin	Maximum deflection
1	12 kg	5.0 mm
2	18 kg	7.0 mm

21. **Retro fitment of Cab AC by KGPW POH Shop**:

Railways have been advised vide Board's letter No. 2021/Elect(TRS)/138/5, dated: 14.12.2023, to ensure the provision of Cab AC in locomotives during POH schedule.
In loco no-22855/WAP4/SRC Cab AC duct was not available so necessary modification in roof has been carried by ERS-POH for making space for Cab AC fitment during the Month of May'24. This is the 4th Loco on which retro fitment of Cab AC has been done by POH Shop KGPW during FY 24-25.

22. **Provision of Signal Exchange Light by KGPW POH Shop:**

After provision of air conditioning in loco cabs, it will be very inconvenient to Loco Pilots (LP)/Assistant Loco Pilots (ALP) in exchanging the flags (Red/Green) signals with station staff due to frequent opening of cab doors/windows for exchanging the signals. Therefore, provision of exchanging of signals through LED light has been provided in

22855/WAP4/SRC during the month of May'24. These lamps shall be operated by push buttons provided on the driving desk.

23. **ISO certification of ELS/BNDL, ELS/SRCE, ELS/IPTE and ELS/KGPE:**

After the certification audit conducted by external auditor, ELS/BNDL, ELS/SRCE, ELS/IPTE and ELS/KGPE has been awarded with the certification of ISO 9001:2015, ISO: 14001:2015 & ISO: 45001:2018.

24. **3-phase loco filter repairing by procuring new Vortex by ELS/TATE:**

Maintenance of Oil Cooling Blower (OCB), Machine Room Blower (MRB) and Traction Motor Blower (TMB) filters of 3- phase Electric Locomotives plays vital role in loco operation. Proper cleaning of cyclonic filters of these blowers helps in improving reliability and temperature control and thus avoids cases of equipment temperature going high. Detailed procedures for maintenance of filter of 3-phase locos (OCB, MRB and TMB) has already been issued by RDSO vide SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2016/EL/SMI/0286(REV.'0'), Dated 09.06.2016.

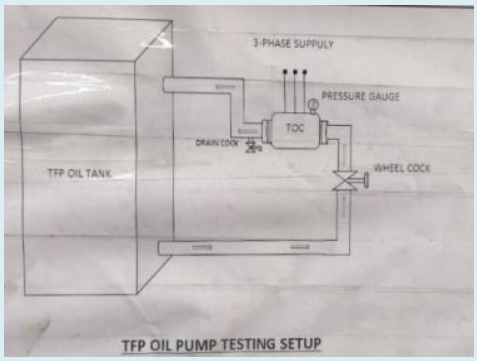
During maintenance of these filters, dislocation and shifting inwards/outwards of vortex type cyclonic filter elements provided in filter assembly is being observed by the shed. Shed is replacing the filter assembly having this kind of defects to improve the cooling system of loco. **In place of complete replacement of filter assembly, shed has started repairing of these filter assemblies by replacing the defective vortex tube only with new vortex tube. Non-stock procurement of new vortex tube was done from Silver Line Industrial Incorporation/New Delhi as per CLW drawing no. 1209.11.135.121 Rev-4. It has significantly reduced the replacement cost of complete filter assembly.** Shed has repaired 02 nos of OCB filter assembly by replacing complete vortex tubes with new one during the month and will be provided in loco for performance monitoring. **Saving cost per loco after 100% replacement of vortex tube in MRB, TMB & OCB filter = Rs. 334529.12.**

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">OCB filter assembly with dislocated vortex type cyclonic filter elements</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Repaired OCB filter with new vortex tubes</td></tr>
</table>

25. **TFP Oil Pump Testing Setup by ELS/ROUE:**

Earlier overhauled TOC motors were directly fitted in loco and if any abnormality was observed then complete TOC motor had to be removed again from loco which was causing loss of man power and time.

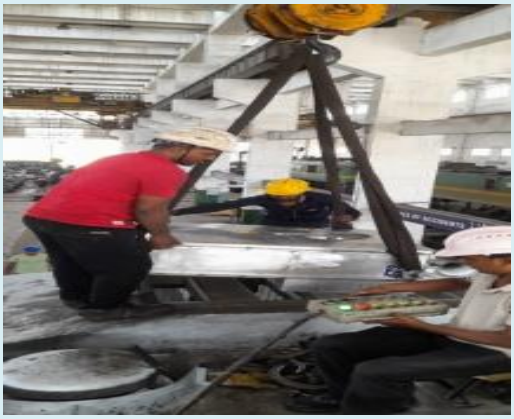
To overcome this issue TOC motor testing facilities is fabricated at shed floor where TOC motor can be tested after repair or overhauling and then it can be fitted in loco.



26. **Cab AC Provided in Non Cab-AC Loco by ELS/BKSE:**

During June-2024, after cutting AC dummy plate Cab-AC provided in Loco No.-32620 by shed staff. This has been done by ELS/BKSC for the first time.

Loco with AC-Dummy Plate



After Removing Dummy Plate Cab-AC Provided

27. **Cleaning of TMB and MRB Filters by ELS/ROUE:**

Filter cleaning is being carried out by removing filters from loco after that blowing by compressed air is done and then vortex are cleaned by pressurized hot water, to further improve cleaning shed has built an additional arrangement where the TMB and MRB filters undergo immersion in a detergent solution for approx. 10 mins where compressed air forced into the setup causing build up dirt to loosen up followed by thorough rinsing with a high-pressure hot water jet to enhance the cleaning effectiveness of the filters.

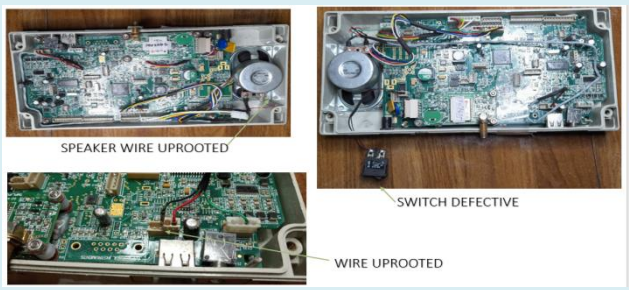
		
Fig 1: Cleaning with compressed air (5 to 6 kg/cm^2).	**Fig 2:** Immersing into detergent solution.	**Fig 3:** Cleaning with high pressure hot water (65 to 70^0 C).

28. **Provision of Top Operated CBC operating handle by ELS/BNDL:**

With the provision of "Top mounted CBC operating handle", the Crew and Station staff have the flexibility to couple or uncouple the loco with wagon from either side. The modification is being carried out by departmental staff of ELS/BNDL & Contract welders. During Jun'24 10 locomotives have been modified & so far total 101 locomotives have been provided with Top mounted CBC operating handle.

29. **Repair of Fog Safe Device by ELS/BKSE:**

ELS/BKSC has started repair of defective Fog Safe Device. Several types of problem are found in the defective FSD like dry soldering, display not working; switch defective, battery pack defective. All these are being repaired at shed and till now shed has repaired 11 nos. of defective FSD device.



30. **ELS/TATE has started provision of sensor coupler cover in Speed & Temperature sensor of Traction motor to avoid dust ingress inside and tips cover in Speed sensor of Traction motor to avoid hitting marks while kept in shed floor as healthy spare.** It will help further avoiding of TM temperature & speed sensors transient failures. Non-stock procurement of Sensor coupler cover and tips cover (1000 nos. each) was done from Bhawani Enterprises/Jamshedpur as per ELS/TATA drawing no. TATA/RS/MISC/13/6.

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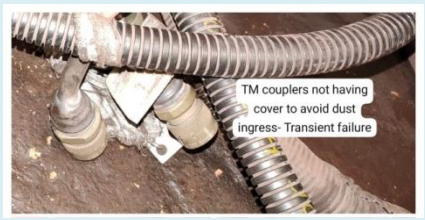
<tr><td> 
</td><td>  </td></tr>
<tr><td colspan="2">TM speed & temperature sensor without cover leads to hitting marks and dust ingress</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">TM speed & temperature sensor with cover provided avoids hitting marks and dust ingress</td></tr>
</table>

31. **Hydraulic test bench for testing of fire extinguisher by DLS/BNDX:**

DLS/BNDX has been developed Hydraulic Test bench for testing of fire extinguisher in-house. It is used for checking of leakage of cylinder and overall strength, and also to ensure the safety and effectiveness of a pressurized fire extinguisher before re-filling of fire extinguisher.

32. **Introduction of Compressor Dropping Detection System (CP DDS) in three phase locomotives** (Ref: RDSO modification sheet no. RDSO/2023/EL/MS/0496 Rev-0, Dated: 01/12/2023 for development of TMDDS)

History: There were cases of under-slung compressor falling on-line in TATA based locomotives & other shed's locomotives.

	
Loco no. 31429 while working Train no. N/Box/E, Compressor-1 was fallen and touching with rail on 06/07/2023	Breakage of compressor mounting leg motor end of loco no. 31624 on 09/07/2019

Fact: In three phase locomotives there are 02 Nos. of compressors which are under slung type and suspended from three legs. It is witnessed that compressor falls due to breakage of legs as well as breakage of part of compressor. RDSO has issue SMI 0242_Rev-3 for maintenance of compressor to avoid falling down.

But observations of ELS/TATE are different. In one case of CP leg broken the safety sling had carried out the load of compressor and prevented it to fall on track (Loco no. 31624). In another case, compressor was hanging and grounded (Loco no. 31429). Safety sling was sheared off badly with multiple rubbing marks on it. It was realized that at first safety sling holds the weight of compressor in case of breakage of leg and compressor rest on sling tightly. Compressors will continue to run/stop as their duty cycle. Safety sling of compressor is facing strong rubbing due to reciprocating vibration on run. As a consequence of few run cycles, damaged safety sling gets completely cut off due to weight of compressor and compressor falls further.

It is concluded that safety sling holds compressor for some times before further falling on track. This is the golden period during which it should be isolated and further accident can be perverted by withdrawing the loco safely from service.

Objects: There will be an arrangement in both cabs to get audio and visual indication at the instance of compressor dropping from its position and thereafter to isolate

respective compressor as immediate action by loco pilot. In this regard, Compressor Dropping Detection System (CP DDS) has been developed and provided in one loco no. 41195 (TATA) for trial purpose.

Scheme: Two CP DDS units are installed at back side of ALP in both loco cabs. It consists of one green and red LED with one buzzer for each compressor. One separate coupler arrangement is fixed on each compressor which breaks circuit at the instant of compressor dropping. This coupler arrangements are integrated with both CP DDS provided in cab. Breakage of circuit triggers the CP DDS to flash red LED and an audio indication.

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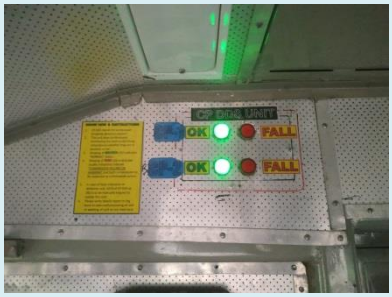
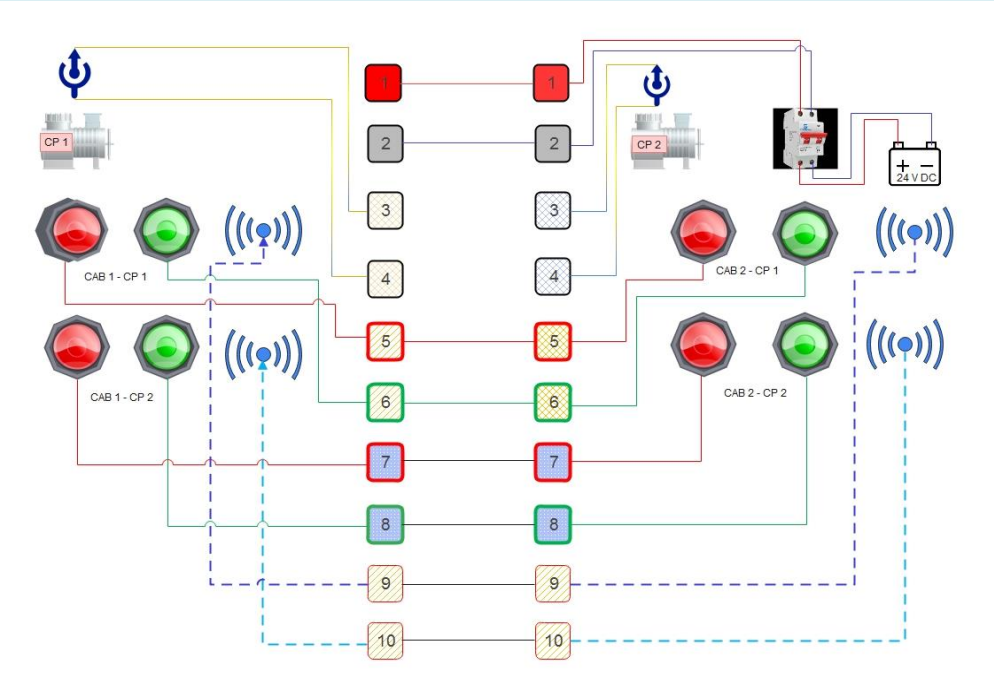
<tr><td colspan="2">   </td></tr>
<tr><td colspan="2">Coupler arrangement</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Coupler arrangement fixed on each compressor which breaks circuit at the instant ofcompressor dropping</td><td>CP DDS units installed at back side of ALP in both loco cabs</td></tr>
</table>

Circuit:

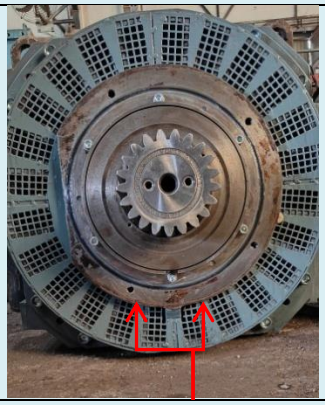
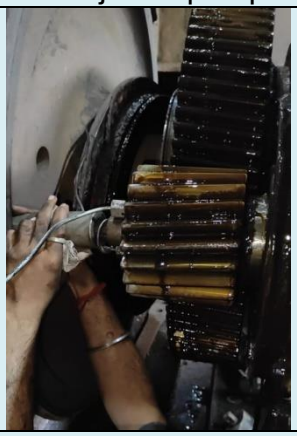


33. **Zig for pinion removing from Traction motor of 3-phase locomotives by ELS/TATE:**

Presently in case of on line bearing seizure, faulty traction motor pinion is required to be cut for free movement of loco or floating of wheel is required. It takes a considerable time for loco movement and attention at nearest shed or home shed. Also after cutting the pinion, the shaft of failed rotor become damaged and re-shafting is required for further rectification of TM and pinion cannot be re-used.

ELS/TATA has made Zig for on line pinion removing from Traction motor of 3-phase locomotives. For this purpose two oil injector pumps are used. These pumps are connected in the oil ejector holes of the pinion. Both pumps are operated simultaneously and oil pressure of approximately 1500-2000 Bar is injected in the pinion. Then the injected oil pressure pushes the pinion outside and thus pinion is removed from the shaft.

By this jig pinion of TM will be removed easily on line and its rotor as well as pinion can be reused. It will reduce downtime of locomotives and save manpower.

	
Oil injector pump	Oil ejector holes of pinion
	
Both pumps are operated simultaneously and oil pressure of approximately 1500-2000 Bar is injected in the pinion.	Injected oil pressure pushes the pinion outside and thus pinion is removed from the shaft.

34. **Installation of new Portable High pressure Pinion mounting and extraction machine for 3-phase traction Motors by POH/KGP:**

One no. new Portable hand operated hydraulic High pressure Pinion mounting and extraction machine of Make M/s Krijan for 3-phase traction Motors has been commissioned in ERS-POH. It will be utilized to remove and install the pinion on the traction motor of a locomotive. It will reduce the time required for dismounting and mounting the pinion. It can also lower the chance of damage to the pinion during installation improving reliability.

35. **VCB's Relay valve and QPDJ test setup by ELS/ROUE:**

ELS/ROU has developed an in-house setup for testing the VCB's relay valve and QPDJ. Previously, the QPDJ setting and relay valve testing were conducted only after the components were installed on the VCB.

36. **Installation of GPS Clock by ELS/BNDL:**

In an attempt to Synchronize/consistency of Real time among the SPM, VCU, CVVRS, DPWCS & CCB unit equipped in electric locomotives, 2 Nos. of GPS Clock have been installed by ELS/BNDL (at old Pit line no.2 & new pit PPO end). This will help in setting time during inspection and un-schedule repair.

37. **Installation of Hydraulic Spring Testing Machine by ERS/POH/KGP:**

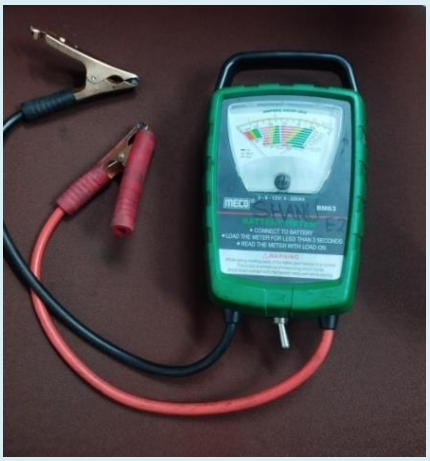
Hydraulic spring testing machine of M/s. Enkay Enterprises (Capacity: 20 tonnes) has been installed in the Bogie section of ERS-POH/KGPW.

It is used for compression / deflection testing and cycle testing of Helical Spring with respective loads for all sizes of Helical Springs of Electric Loco Bogies along with

digital Load indicator and length measurement device. It is equipped with data retrievable and storage unit.

38. **Battery Capacity Tester by ELS/KGPE:**

Checking of capacity of batteries of locomotives without removing them, with the help of battery AH Meter has been introduced for assessing the condition of the batteries by ELS/KGPE. The batteries in battery bench are also being checked. This will help in identifying weak and defective batteries and will in turn improve loco reliability.



39. **Bearing Pusher Fixture by ELS/KGPE:**

A bearing pusher fixture has been made in house at ELS/KGPE for fitment of bearing of cooling fan motor shaft in M/s AAL make SIV.

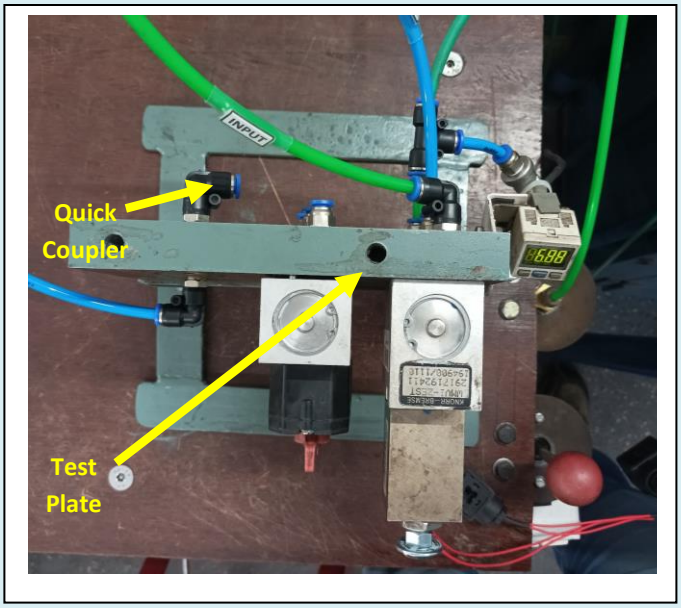
Earlier, the bearing was fitted in motor shaft by hammering with wooden hammer using a pipe. The bearing pusher helps in easy mounting of the bearing with less effort and in a safe manner. This eliminates the scope of deformation of bearing.

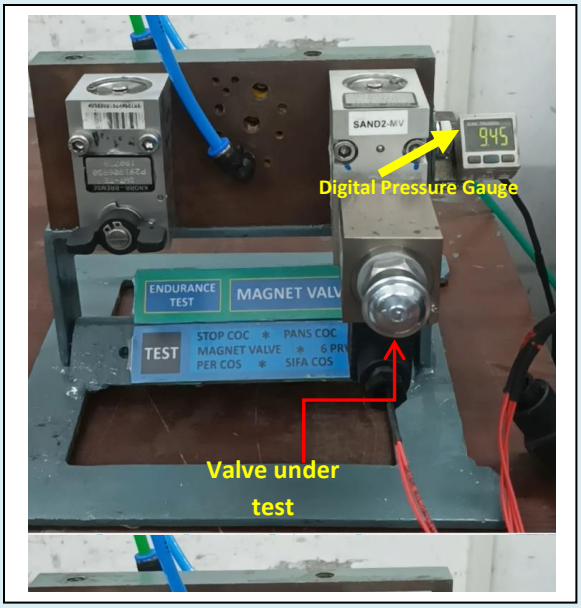
40. **Development of Table Top and Portable Test Setup for Valves in Auxiliary Panel of CCB Brake System by ELS/TATE:**

CCB brake system supplied M/s KBIL is having numbers of small valves in its auxiliary panel. One portable and table top test setup was developed by ELS/TATE for testing of these valves after overhauling work. Shed can test Magnet valves, Stop cock, Pans cock, 6 PRV, PER COC and SIFA cocks by this setup conveniently.

Special features and its benefits:

- It is a portable, compact and table top arrangement. It can be used at convenient place and manages space constrains.
- Quick couplers are provided here for pneumatic connection. It is very easy to connect and disconnect the pneumatic port by which different valves are being tested with changing connection quickly. It yields more output in less time.
- Highly precious digital pressure gauge is used for correct calibration of valves.
- Complete exhaust of air from stop cock through energised magnet valve was checked in loco. Magnet valve is being checked with this arrangement.
- Endurance test of magnet valve is also conducted by this test setup.



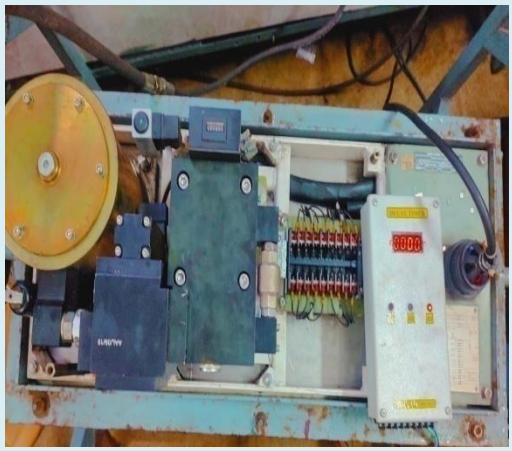


41. **Commissioning of EPC Test Bench by ELS/IPTE:**

EPC test bench commissioned by ELS/IPTE to improve the reliability of electro pneumatic contactor like Line contactor and shunt contactor during Aug'24.

42. **Commissioning of portable Delay Timer TI103C for VCB by ELS/IPTE:**

Portable Delay timer for VCB was commissioned by ELS/IPTE during Aug'24 for checking VCB close time and open time in situ position (inside loco) and on test bench during overhauling.



43. **E70 PCB Test Kit by POH/KGP:**

E-70 electronics card rack consists of four different types of PCBs for successful working of braking systems in three phase electric locomotives. E-70 panel consists of various types of pressure switches, valve, sensors etc. E-70 PCBs are responsible for proper working of all these equipments in E-70 panel. The four PCBs are as follows:-

- Power Supply card: This card supply (+) 15v DC and (-) 15v DC to other cards of the rack. Basically, it converts the incoming 110 v DC to (+) 15 v and (-) 15v DC.
- Control card: This card controls all the functions of E-70 panel such as activation of various valve, switches etc.
- LPO card: This card overcharges the brake pipe (BP) pressure for quick release of brakes.
- Blender card: This card ensures braking during no OHE power and during regenerative braking. In case of no OHE power, this card applies brake according to applied Tractive Effort (TE).

The developed setup will individually test all the cards of E-70 panel. The testing of card includes testing of voltages at different point in the card, observing the status of LEDs in the card, monitoring different cycles of LPO card.

44. **Testing Jig for Traction Motor Bearing by ELS/SRCE:**

ELS/SRCE has developed Testing Jig for Traction Motor Bearing with available resources in house during Sep'24. This Jig has been used for measuring radical clearance of Bearing and Labyrinth of Traction Motor.

45. **Hydraulic Pusher and Puller arrangements by ERS/POH/KGP:**

Portable Hydraulic Pusher and Puller arrangements (Make: Small Tools and Hardware Supply, Thane) commissioned in Auxiliary section of ERS-POH/KGP.

It is used for mounting and dismounting of impeller and bearing of TMB, OCB, MRB, SCTMB, SCMRB etc.

The hydraulic puller and pusher perform both pulling and pushing operation safely and without harming bearing surfaces.

The main benefit of hydraulic pullers and pusher arrangements compared to mechanical ones is their capacity to create strong force while requiring less human strength. This characteristic makes them perfect for taking out tough or rusted parts that might not respond well to other methods of removal.

46. **Testing facility of additional parameters in existing Speedometer Test Bench by ELS/SRCE:**

ELS/SRCE has developed an additional feature in existing Test Bench for Speedometer to test / check other parameters which was not available in it initially.

In the beginning, this Test unit was having facility to check / test parameters such as Coasting, Energy, Speed Accuracy and function of Sensor for PG.

In last year RDSO issued a modification (MS/0492, Rev.'0') for provisioning of Auto Regression Circuit in Tap-changer based Conventional Electric Locomotives for

ensuring the shunting mode operations i.e. auto-regression will take place on obtaining 15 kmph speed and above in shunting mode operation of Conventional Electric Locomotive.

Existing Speedometer Test Bench was not having the facility to check whether Speedometer works accordingly in shunting mode operation or not. ELS/SRCE has in-house developed a circuit in this Test unit to check shunting mode operation. During testing, there is an indication lamp on Test bench named HSM which will glow if shunting mode operation works perfectly.

Besides, another three testing facilities also developed by ELS/SRCE in this Test unit such as Live Sign, Over Speed 105% and Over Speed 110%.
Testing of these additional parameters ensure better maintenance practice.

47. **Fabrication of TFP Radiator Test Set-up by ELS/BNDL:**

To check the leakage of transformer oil in TFP radiators a radiator testing set-up has been fabricated in-house by departmental staff of ELS/BNDL and connected with TFP Oil pump.

48. **Fabrication of Filter Cleaning Tank by ELS/BNDL:**

For Cleaning of wall side filters of 3-phase locomotives, an additional tank with compressed air injection has been fabricated by departmental staff of ELS/BNDL.

This will eliminates the transportation of filters from new inspection pit no.1 & 2 to line no.5 & 6 of ELS/BNDL.

Filter Cleaning Tank

49. Cleaning of Mio Filter has been done with lukewarm water in every schedule with water jet machine by ELS/IPTE during Oct'24.

50. **Installation of Seal PE Ring Extracting Machine by ELS/SRCE:**

A Seal PE Ring Extracting Machine (Induction Heater for Racer Removing) with Intelligent Micro Controller Based Electronic Control Portable is supplied by M/s. GM Industries, Thane on 07.11.2024 against P.O. No. IG245796101416 Dated 21.10.2024. Testing and commissioning of this machine has been done at ELS/SRCE by M/s. GM Industries on 26.11.2024. Necessary training and demonstration for safe operation of this machine is imparted by representative of M/s. GM Industries.

This machine is used for extracting Bearing Racer of Traction Motor. This activity ensures hassle free maintenance practice.

Particulars of this Machine:

- Model: GMHF 50
- Machine No : 529
- Manufacturing Month & Year: 10/2024

51. **IP and MV4 Valve Testing Bench by ELS/SRCE:**

ELS/SRCE has developed a Test Setup for measuring different parameters of two types of IP Valve (Model No. SR 3403 and SR 30317-10) and MV4 Valve (Release Run Magnet Valve). It is an in-house development by Shed.

Parameters which are measured in this Test Setup as follows:

1) Coil Value.
2) Pick up and drop out voltage.
3) Air leakage test.
4) Function test (only for IP Valve).

Previously this arrangement was not available at ELS/SRCE. Now, it improves maintenance practice as a result performance of IP and MV4 valves will be better.

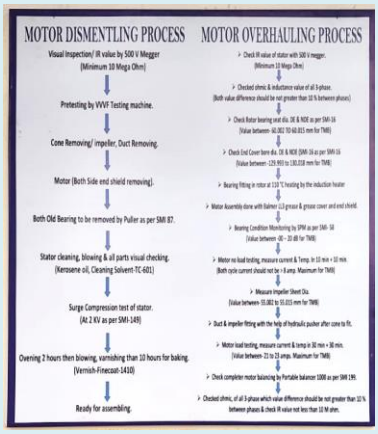
MV4 Valve IP Valve IP Valve

Model No. SR 30317 Model No. SR 3403

52. **Flex- Auxiliary motor dismantling and overhauling procedure by ELS/ROUE:**

A flex board has been put up on the wall of shop floor near motor section depicting the algorithm for auxiliary motor dismantling and overhauling process. It will be

utilized as training aid for staffs of section involved in maintenance and overhauling of the Auxiliary motor.



53. **Conversion of Roof mounted DBR to Vertical DBR by POH/KGP:**

Roof mounted DBR has been converted to vertical DBR in two locomotives (Loco no.28708 / WAG7 / IPTE and 27396 / WAG7 / BNDX during Nov'24.

Roof mounted DBR	Vertical DBR

Advantage of Vertical DBR over Roof mounted DBR:

a) This modification reduces structural stress on the locomotive by removing heavy roof-mounted components and improves cooling and diagnostics efficiency.
b) Additionally, it enhances durability by protecting critical equipment from environmental factors, contributing to improved reliability and performance of the locomotive.
c) Easy Maintenance.

54. **Commissioning of Portable Dynamic Balancing Machine by ELS/IPTE:**

Portable Dynamic balancing machine (Make: Baseline Technologies; Sl No: 09244252) was commissioned at IPTE during Nov 24. It is being used for checking of dynamic balancing of Auxiliary motors during overhauling which ensures working of motors without any vibration and improves reliability of motors as well as Locomotives.

55. **Water Load Testing Arrangement for HLC at ELS/SRCE:**

Hotel Load Converter (HLC) Load Testing Machine / Jig has been developed by ELS/SRC with available resources for health checking of HLC before given fit for coaching service.

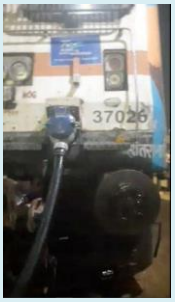
Presently HLC load testing available for testing of HLC load up to 150 Amps. continuous load and 250 Amps at the time of starting but in normal coaching service, one HLC requires more than 400 Amps. So an additional arrangement has been

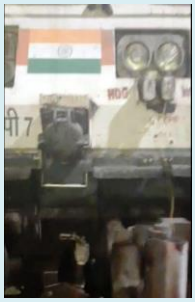
developed in-house for testing of HLC with more than 350 Amps. continuous load. This has been made with the help of salt water tank which is used for dissipation of heat or load on salt water which carries 250 Amps continuous current and achieve the current 400 Amps with combined system DBR and salt water tank.

Salt Water load testing is to evaluate HLC performance under load condition. The load bank consists of salt water solution as a resistive load to simulate gradual increase of load as performed during variation of load condition i.e. real-world operating condition. Gradual increase of load can be performed by adding more salt and depth of electrode into the water.

Materials used for this arrangement

- 2000 Ltrs. Water Tank.
- 150 sq.mm cable about 21 Metres.
- Copper Link Rod of 1.5 ft - 3 nos.
- Pulley - 01 no.
- Rope - 06 Metres.






56. **Speedometer Test Bench by ELS/BNDL:**

ELS/BNDL has commissioned one test bench for Microprocessor based Energy cum Speed monitoring (ESMON) 3-Phase electric locomotives. The new test bench is having features of:

- Calibration of Speed from 0-120 Kmph, 0-150 Kmph & 0-180 Kmph withminimumresolution of 1 KMPH by varying the speed control knob of the test bench.

- Rotation of Loco wheel is simulated by the three-phase induction motor with double ended shaft where speed sensor (PG) can be coupled. Hence; with same test bench can be used for speedometer of any make e.g. AAL, Laxven, Medha and VTL etc.

- Sensor-1 and Sensor-2 testing: Hardware switches will be provided in test bench to run ESMON speedometer on sensor-1 & sensor-2 of PG (Pulse generator) independently.

The test unit provides the facility to speed up to any desired speed and hence over speed trip alarm can be tested easily for AAL, Laxven, Medha and VTL make ESMON type speedometer.

57. **Installation of High DC Current Injection Test Setup by ELS/IPTE and POH/KGPW:**

High DC current injection test setup of (Vivid Metrawatt make) has been commissioned at IPTE and POH Shop KGPW during Dec'24. This will help to check susceptibility of brazing joint in stator of Traction motor and thus will reduce the failure and improve the reliability of locomotives.

As per RDSO SMI no. RDSO/2011/EL/SMI/0271 Rev '0', be used for prevention of failure of traction motors in service and detection of bad brazed joints of interconnectors of Main Pole and Commutating Pole coils of Traction motors type HS15250A and TA0659 at the time of overhauling in POH Workshop. It is also used for mili-volt drop test of CTF, Reverser, SL and diodes of RSI panel.

58. ELS/TATE has procured and commissioned VVVF Drive panel for light load run test of Traction motor and Auxiliary motor of 3-phase locomotives during Dec'24. By this

test panel, shed is doing light load test of 3-phase TM and Auxiliary motor at different frequencies (0-60 Hz for TM and 0-50 Hz for Aux. motor) and voltages.

VVVF Drive panel for Auxiliary motor

VVVF Drive panel for Traction motor

59. **Multipurpose Rack for Testing Equipment of Traction Motor byELS/ROUE:**

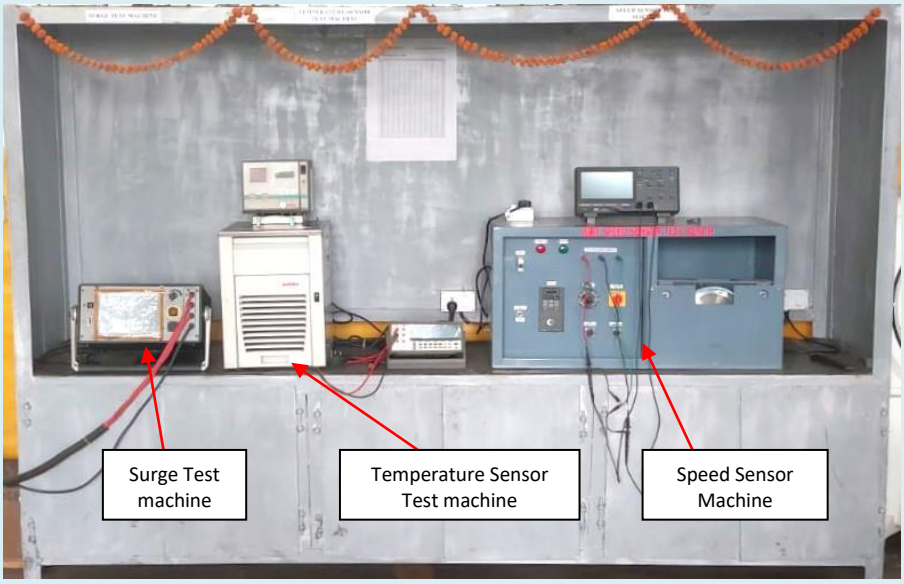
The installation of a multipurpose rack for testing equipment, including temperature sensors, speed sensors for 3-phase traction motor and surge test for auxiliary motor, has resulted in a more organized and efficient shop floor setup. This upgrade was successfully completed within the month, enhancing workflow and accessibility.

A surge test is a test that measures the dielectric strength of auxiliary motor's insulation and detects faults in the insulation.

Temperature Sensor Test is used to check healthiness of the temperature sensor which is used to measure the traction motor temperature in the locomotive.

Speed Sensor Test is used to check healthiness of the speed sensor which is used to

detect the motor speed in the locomotive.



60. **Commissioning of C3W distributer valve test bench by ELS/IPTE:**

A C3W distributer valve test bench along with pressure convertor and micro-controller based automatic operation system of Shivay Enterprises make having Srl. no. SH 20241001BKSC, Mfg: Oct-2024 is commissioned at IPTE on 21.01.2025.

This will help to test and verify the functionality of C3W distributor valve (Both newly procured & overhauled at bench) by simulating real time scenario by applying various inputs to assess its performance.

61. **Milli Volt Drop Test Bench for UIC Coupler by ELS/BKSE:**

A test bench for checking millivolt drop testing has been made using in-house resources by ELS/BKSE during Jan'25. To ensure healthiness of pin used in MU formation millivolt drop between pin was checked. The permissible millivolt drop limit is 40 mV at 2 Amp supply.

62. **Development of Hotel Load Converter (HLC) Full Load Testing Unit with Variable Load by ELS/SRCE:**

Indian railway has travelled long way since 2010 when CLW turned out first HOG based Electric Loco 30277 (WAP7) equipped with 2x500 KVA Hotel Load Converter.

Passenger Control Loads as coach lighting, fans, mobile and laptop charging point, air conditioning equipment, pumps, heaters and pantry load such as bottle cooler, water boiler, refrigeration and loads of other equipment namely Battery Charger for emergency light etc. are collectively described as Hotel Load.

In HOG scheme, power is fed from the electric locomotive to entire train to cater for Hotel Load of the train. In electric locomotive, power is taken from OHE through Pantograph to Traction Transformer of the loco which is provided with two separate Hotel Load winding of 622.5KVA each, nominal voltage 960V single phase which varies with OHE variation. This 960V single phase supply is fed to Hotel Load Converter which gives 750 V, 3-Phase, 50 Hz supply as output for feeding the Hotel Load of the train.

<u>Advantages in HLC</u>:

- Reduction in oil consumption which leads to saving revenue.
- Reduce the oil consumption which reduces the air pollution in environment.

- ❖ Reduce the noise / sound pollution which create comfort to the passenger.

Trouble faced in HLC:

1) Fluctuation of HLC output voltage.
2) Wrong phase sequence
3) “ON COMMAND” not available.
4) Earth fault in HLC.
5) Load fluctuation in HLC affects on load of coach.
6) Single phasing of HLC.

To overcome these troubles,ELS/SRCE has developed Hotel Load Converter (HLC) Full Load Testing Unit with variable load testing facilities. This in-house developed HLC Load Testing Unit is first time of its own in Indian Railway. This test setup has features of automatically increasing load with desirable time interval.Variable load testing of HLC shows real scenario of adding coaching load on HLC of 3-phase locomotives and whole arrangement takes up to 400 Amps. current continuously.

This HLC Load Testing Unit finds out effectiveness of converter and rectifies the trouble if detected before giving in service which increases the overall performance of HLC. It is very helpful for maintaining reliability of Hotel Load Converter.

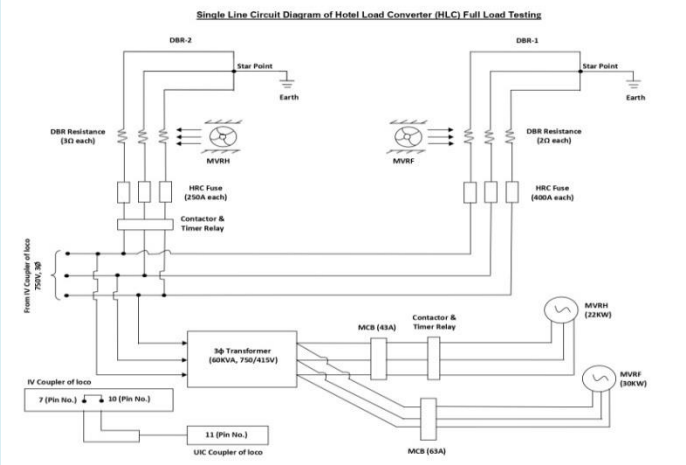
Items used in preparing this test setup:

- DBR Resistance Assembly: 01 No.
- MVRH with duct: 01 No.
- MVRF with duct: 01 No.
- Female IV Coupler / ZS Coupler coach side: 01 No.
- 60KVA Step down Transformer (750V, 3-Ph. Into 415V, 3-Ph.): 01 No.
- MCB 63A (output side): 01 No.
- HRC Fuse 63A: 03 Nos.
- HRC Fuse 250A: 03 Nos.
- Voltmeter: 01 No.
- Digital Ammeter: 01 No.
- Phase sequence Meter: 01 No.
- LED Lamp: 03 Nos.
- Cable 120 Sq. mm.: 45 Metres
- Cable 25 Sq. mm.: 30 Metres

Load Plan:

1) 1st Stage: (DBR-1 + MVRF)
2) 2nd Stage: (DBR-1 + MVRF) + (MVRH)
3) 3rd Stage: (DBR-1 + MVRF + MVRH) + DBR-2

Hotel Load Converter (HLC) Full Load Testing Unit with Variable Load



63. **Oil bath tank by ELS/BNDL:**

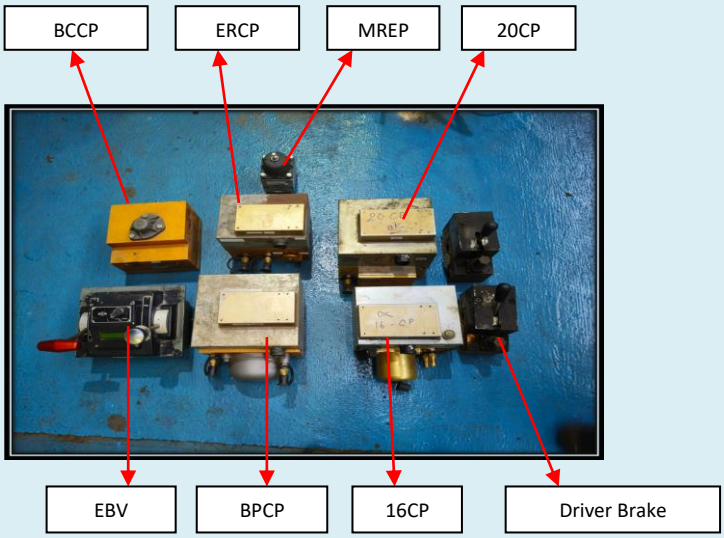
To increase the reliability of Auxiliary motor bearings an oil bath tank for heating of bearing during fitment to the rotor shafts of induction motors has been fabricated and commissioned by departmental staff of ELS/BNDL during Jan'25.

This will minimize the bearing failures of Auxiliary motors equipped in 3-phase locomotives.
Before fitment of bearings on shaft, it was heated by induction heater. For gradual and uniform increase in temperature of bearings, Oil bath heating was adopted.

64. **Overhauling of Brake Panel by POH/KGP:**

ERS/POH/KGP has been started overhauling of Knorr Bremse make Brake panel and successfully completed in 03 locos (30432/WAP7/TKD, 30435/WAP7/BIA & 30438/WAP7/BIA). Overhauling kits have been purchased from OEM through NSR.

- BCCP: Brake Cylinder Control Portion.
- ERCP: Equalizing Reservoir Control Portion.
- MREP: Main Reservoir Equalizing Pipe Valve.
- 20CP: 20 Control Portion.
- EBV: Electronic Brake Valve.
- BPCP: Brake Pipe Control Portion
- 16CP: 16 Control Portion.
- Driver Brake.



65. **VCB's sub-components display and parts nomenclature flex board by ELS/ROUE:**

A board for displaying sub-component of Vacuum Circuit Breaker (VCB) and a flex board for its parts **nomenclature** have been mounted on the wall of the VCB overhauling section, providing a clear understanding of the inner structure, mechanical arrangement, and functioning of the VCB. Each part of the VCB is clearly labeled on the flex board for easy identification. It will be utilized as training aid for the staff involved in the maintenance and overhauling of VCBs in the section.

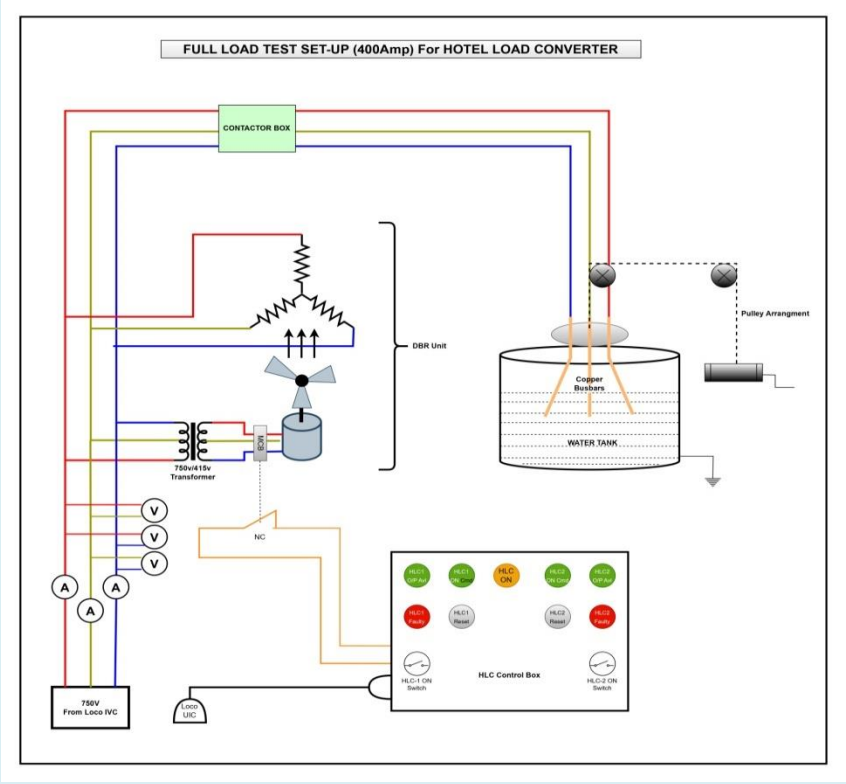
66. **Provision of Water less Urinals at ELS/ROUE:**

Two locomotives having no. 38900 & 38913 received from CLW for commissioning have been equipped with water less urinals. This is a part of an eco-friendly initiative and to improve the comfort and hygiene of train crew members operating trains over long distances. This water less urinal is designed to be used only when the VCB (Vacuum Circuit Breaker) of the locomotive is in the open condition.

67. **ELS/TATE has developed in-house test setup for Full load testing of Hotel Load Converter up to 400 Amps.**

Previously HLC testing was being carried out at around 240 Amps by utilizing a set of DBR with MVRF. In addition to that, the new test setup consists of three leg copper bus-bar submerged in water to increase the additional load of about 150 Amps. By adding up both loads of DBR with MVRF and water load, HLC is now being tested at full rated current of 384 Amps.

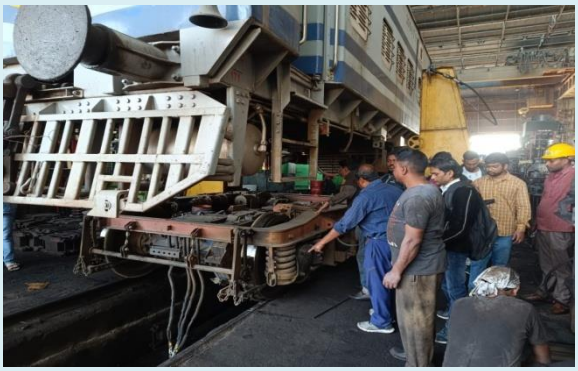
HLC full load test set-up consists of three leg copper bus-bar submerged in water



68. **Tower Wagon Coil Spring Changing by ELS/IPTE:**

Tower Wagon no. DETC-171 (SER-200079) of TRD/BKSC was under breakdown due to coil spring broken of Cab-1 side trolley. Tower wagon was lifted with the help of lifting jack and trolley run out. Traction motors, gear cases etc dismantled, trolley lifted and broken coil spring removed then new coil spring was fitted and all

components refitted in the trolley. Trolley placed in original position, all connection completed and finally given fit on 16.02.25 for service.


69. **Installation of Roof Mounted Cab AC in Non-Modular Cab by ERS/POH/KGP:**

ERS-POH/KGPW has taken initiative to provide CAB AC in non-modular locomotives during Feb'25. On trial basis, Cab AC has been provided in 27341 locomotive of ELS/BNDX shed. Following modification has been carried out for provision and protection of electrical equipments from water droplets due to moisture ingress in Cab.

Sl No.	Description	Reference Image
1	Cutting of Cab Roof	
2	The curved shape of the cab roof poses a challenge in the installation of the Cab AC unit, as it requires a flat surface for proper mounting. To address this issue, **aflat bar with suitable packing**is welded on to the roof, creating a stable and level base for secure installation.	
3	In Cab-2, the BD panel, TK panel, and relay panel are located below the AC duct. These panels are fully covered with a plate of an appropriate size and shape, ensuring protection from moisture.	 
4	The AC control box is fitted to the window shutter assembly.	

5	The AC is installed on the cab roof. Height of AC and Panto from Hood:- i) CAB-1: AC – 580 mm PT1- 710 mm. ii) CAB-2: AC- 570 mm PT2- 700mm		
6	CAB-1 and CAB-2 Side image after installation.		

70. **Wheel Flange Lubrication System by SRCE:**

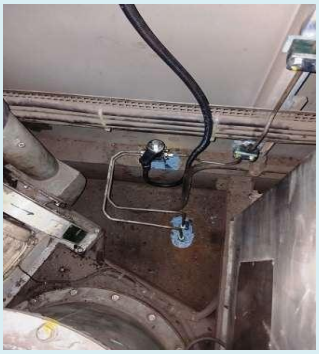
This modification consists of lubrication system installed with the purpose to reduce the wear and tear of wheel disc.

In 1st phase, this modification is scheduled to be done in 10 nos. WAP7 locos under the holding of ELS/SRCE.

At present, this system is installed in 07 nos. of WAP7 locomotives.

Function of the system:
In Straight Path: Just after 90 seconds while achieving speed 5kmph, purging will start and continue for six seconds and again will start after 90 seconds subject to loco's speed should remain 5kmph or more.
In Curvature Path: Purging will be started just after six second when loco enters in curvature path with speed 5kmph or more and same will be continuing in every six second.

Lubricant discharge: 0.5ml / nozzle in one purge.

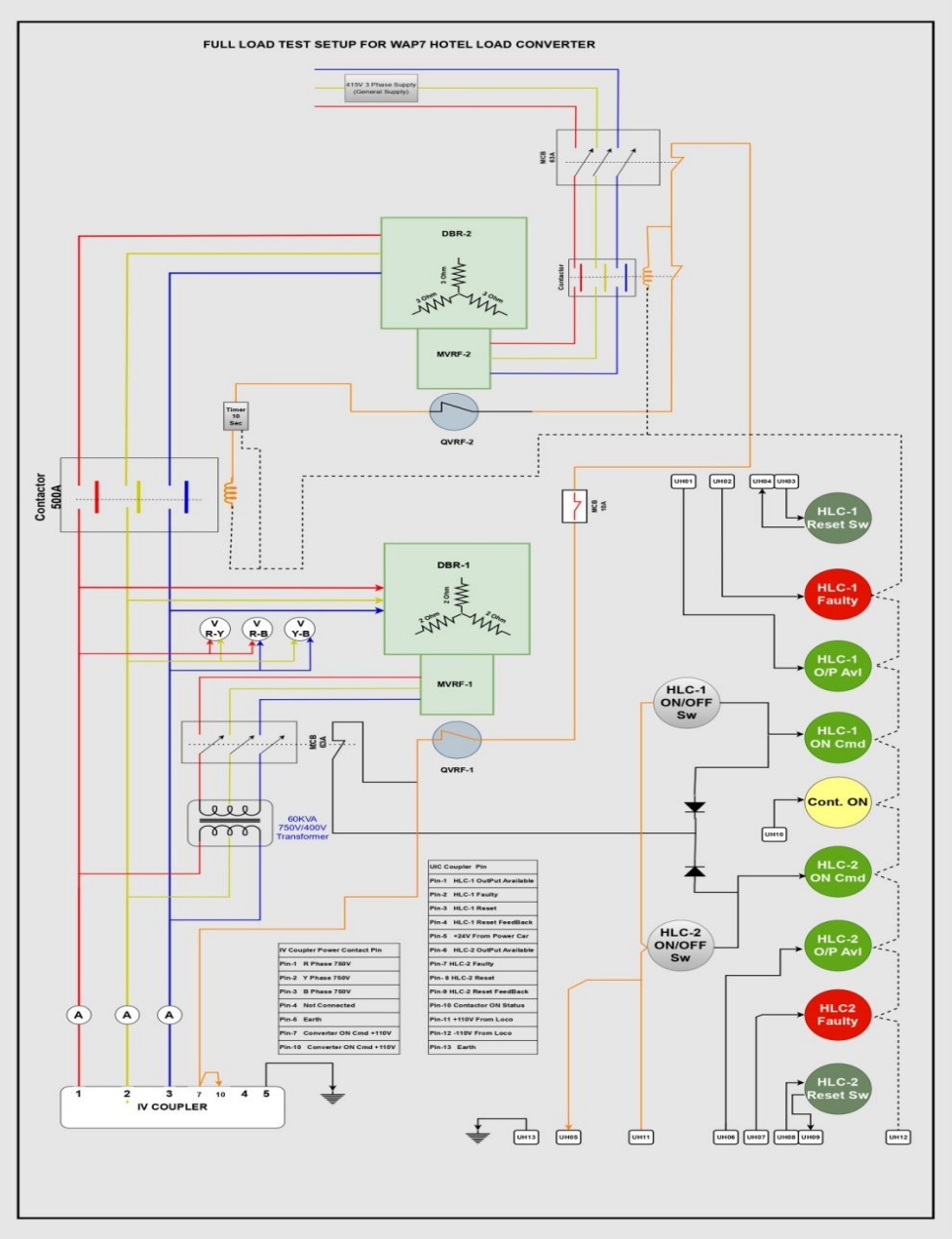
		
1) Main Electronic Control Unit. 2) Lubricant Tank for Bogie-1 3) Lubricant Tank for Bogie-2	1) Nozzle	1) Curve Sensor
		
1) Selonoid Valve	1) Main air cut out cock connecting at RGCP.	1) MCB for electrical supply

71. ELS/TATE has developed in-house test setup for Full load testing of Hotel Load Converter up to 400 Amps with variable load testing facilities. This test setup has features of automatically increasing load with desirable time interval. Variable load testing of HLC shows real scenario of adding coaching load on HLC of 3-phase locomotives by utilizing full load capacity of HLC up to400Amps. By virtue of this HLC Load Testing Unit, healthiness of converter can be verified and rectifies the trouble if detected before giving in service.

Material used for HLC test setup:

- DBR Resistance Assembly: 02 Nos.
- MVRF: 02 Nos.
- QVRF relay: 02 Nos.
- Female IV Coupler / ZS Coupler coach side: 01 No.
- 60 KVA Step down Transformer (750V, 3-Ph. Into 415V, 3-Ph.): 01 No.
- MCB 63A (output side): 02 Nos.
- Contactor (80 A): 01 No.
- Contactor (500 A): 01 No.
- Voltmeter: 03 Nos.
- Ammeter: 03 Nos.
- LED Lamp: 07 Nos.
- Cable 120 Sq. mm: 45 Metres
- Cable 25 Sq. mm: 30 Metres.

HLC full load test set-up



72. **Power Supply Card Load Test Setup for MICAS/CDAC Type VCU by ERS/POH/KGP:**

ERS/POH/KGP has been developed Power supply Card load test set up with in-house effort for MICAS and CDAC type VCU during Mar'25. Power supply card is very vital for the proper functioning of a locomotive as it functions as a power source for control electronics. So testing power supply card becomes necessary as its failure results in complete failure of locomotive. This setup consists of power supply card and various resistors acting as load for different voltage levels of card. The voltage level tested are ±5v (4 amp), ±15 v (1.5 amp) and ±24v (2 amp). Testing the power supply card

beforehand increases the reliability of the card during operation, which results in fewer failures and thus helps to maintain the punctuality.

73. **Sealing test for VCB's High Voltage Section by ELS/ROUE:**

A sealing test set-up for VCB's H.T section has been procured from M/s AAL during Mar'25. This test set-up helps to identify any leakage in the VCB's high voltage section during overhauling by applying pressure of 0.8 kg/cm^2 for 30 mins. The sealing test is suitable for both M/s AAL and M/s BT make VCBs.

74. **Provision of newly designed driver seat by ELS/ROUE:**

Four new locomotives (38900, 38907, 38891 & 38913) received from CLW for commissioning are equipped with a newly designed driver seat of M/s AB Industries make. This modified driver seatis crafted to provide support during long periods of sitting, featuring soft cushioning for added comfort for the train crew members. Additionally, the chair includes adjustable height, automatic swivel movement, adjustable arm and hand rest, helping to maintain proper alignment, reduce strain and enhance focus.

75. For testing the Hotel Load Converter at full load, the assembled Hotel Load Converter test bench (312 kVA) has been upgraded to 450 kVA by adding 2nd unit of 150 kVA by ELS/BNDL during Mar'25.

Now full load testing of both Hotel Load Converters along with phase sequence can be accomplished within an hour.

76. **Video Bore Scope by ELS/SRCE:**

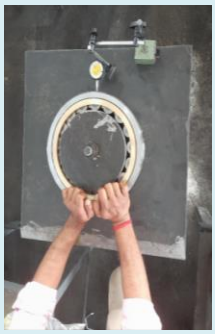
A Video Bore Scope is being started to use in ELS/SRCE with the purpose of checking the inaccessible location of electric locomotives to avoid failure.

During loco maintenance it is observed that certain inaccessible locations need to be checked visually for discrepancies as detection of cracks at visually unreached locations in under frame, cable faults / cuts at the backside / inside of panels or below footplates, flashing, ingress of foreign particles / broken parts inside ducts.

It is a hand held device which is attached with video camera & LED lights at its tip. The flexible portion can be put inside narrow / inaccessible location and video can be seen on the display screen.

Its application started in checking of crackness of TM Nose Liner and Bogie Nose by using Video Bore Scope.

77. **Interference Checking of Traction Motor Bearing by ELS/BKSE:**

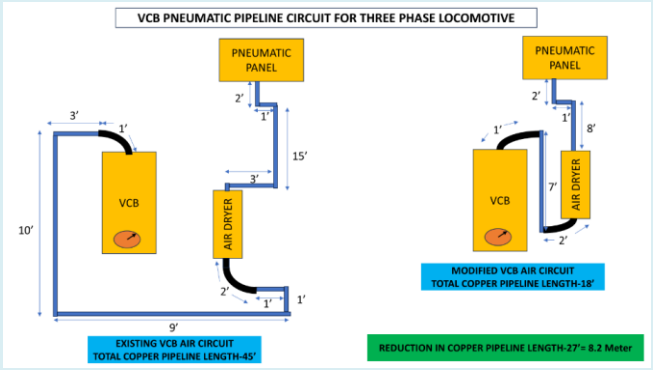


For checking of radial clearance of Traction Motor DE/NDE bearing a zig has been made by ELS/BKSE during Mar'25. A plane iron surface is taken. In this zig inner racer and bearing are placed and racer is fixed by disc plate at centre and bearing kept free movable. A dial gauge is fixed with the bearing. Bearing is pushed by hand from opposite of dial gauge and set it to zero. Then again pulled the bearing and deviation in the dial gauge is recorded. This process is repeated to 3 places at 120 degree and arithmetic mean is taken.

Permissible limit of deviation for DE side and NDE side bearing is 170 to 220 µm and 105 to 140 µm.

78. **Modification in VCB Pneumatic Pipeline Circuit by ELS/BKSE:**

Multiple Loco have failed due to fault of “VCB stuck-up in off condition” as per VCU data analysis. For rectification of this fault for quick recoupment of air pressure in VCB the length of copper pipeline from pneumatic panel to VCB is reduced.
Normally in the Three-phase loco its path is very zig-zag. After simplifying its path there is a reduction in the length of VCB copper pipe line of approx. 8 meter.
This modification has been completed in 4 locomotives of ELS/BKSE and working without problem.



79. **Reverser Test Bench by ELS/IPTE:**

Reverser Test Bench of Slazer Electronics make with Serial Number REV/BKSC/20 has been commissioned in ELS/IPTE during Mar’25.

It will be used for testing of drum type Reverser and CTF after overhauling and before fitment in locomotives. It will enhance the reliability of Reverser & CTF and thus reduce the chances of failure.

80. **Hydraulic Spring Testing Machine by ELS/IPTE:**

Hydraulic Spring testing machine is commissioned in ELS/IPTE during Mar’25 having make of Enkay Enterprises with Serial number 2025/01, Model no. CSTM-20. This test bench will help in load testing of primary spring (Both inner & outer) of bogie which will further help in sorting and grouping of spring according to its load carrying capacity. Bogie formation with same group of spring ensures uniformly distribution of load on all axles and thus improving reliability.