उच्च अनुरक्षण प्रौद्योगिकी केन्द्र
रेल मंत्रालय
डी.डी. नगर, महाराजपुर, ग्वालियर–474005
(आई.एस.ओ. 9001–2015 प्रमाणित संस्थान)
CENTRE FOR ADVANCED MAINTENANCE TECHNOLOGY
Ministry of Railways
DD Nagar, Maharajpur, Gwalior - 474005
(ISO 9001-2015 Certified Organisation)
EXCELLENCE IN MAINTENANCE
Phone:0751- 2470740, E-mail : direlcamtech@gmail.com

No.: IRCAMTECH/M/GWL/Power Car/Schedule Date: As Signed

PCME
All Zonal Railways

Sub: 5th Correction slip (Electrical) of LHB Maintenance Manual version July 2022 Volume-II

Ref: (i) Railway Board letter no.2006/Elect(G)/138/1Pt dated 16.07.2024
(ii) IRCAMTECH/GWL/MECH/2022-23/LHB/Manual/1.1 July 2022

In view of this, following correction is being issue in "LHB maintenance manual version 1.1 July 2022 Volume-II"

S.N.	Chapter	Para Number	Para Detail	Exiting Instruction	Modified/corrected instruction
1	13	13.17 (13.17.1 to 13.17.12 including 13.17)	Maintenance Schedules activity with periodicity of Power Car Electrical Equipment except Diesel Engine	Existing maintenance schedule activity with periodicity deleted	New maintenance schedule activity with periodicity added as below in same para i.e. 13.17
2	13	13.18	Maintenance Schedule Periodicity of Diesel Engine for Cummins make	Existing Maintenance Schedule Periodicity deleted	New Maintenance Schedule Periodicity added as below in same para i.e. 13.18
3	13	13.19	Maintenance Schedule Periodicity of Diesel Engine for Greaves make	Existing Maintenance Schedule Periodicity deleted	New Maintenance Schedule Periodicity added as below in same para i.e. 13.19
4	13	13.20	Maintenance Schedule Periodicity of Diesel Engine for Kiloskar Engine Ltd. (KOEL) make	Existing Maintenance Schedule Periodicity deleted	New Maintenance Schedule Periodicity added as below in same para i.e. 13.20

This has the approval of competent authority.

Digitally signed by HIMANSHU MAHESHWARI
Date: 2024.07.30 15:14:18 +05'30'

(Himanshu Maheshwari)
Jt. Director/Electrical

Copy to:
1. PED/CAMTECH: for kind information please.
2. All CESE Zonal Railways: for kind information and necessary action please
3. OSD/MTRS: for kind information please.
4. DSE/MRVC/RDSO for kind information please.

Ref: Railway Board Letter No.2006/Elect(G)/138/1Pt dated 16.07.2024

13.17 MAINTENANCE SCHEDULE

A. Power Car Items Pertain to Engine, Periodicity of which are as below:

Maintenance Periodicity of Diesel Engine

S.N	Make	A	B	C	D	E
1.	M/s Cummins (CPCB-I & II)	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis
2.	M/s Kirloskar Engine Ltd. (KOEL)	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis
		A	M1	M2+M3	M4	M5
3.	M/s Greaves Cotton	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis

Important Notes

1. Division while sending the power car to Workshop for POH will advise Workshop to carryout the due schedule of the DA set based on Running hours/Months as per the latest Railway board guidelines.
2. Workshop will carry out the activities listed for workshop in addition to the due schedule of DA set as advised by Divisions.

13.17A.1 Alternator

S N	Schedule Name	A Check	B/M1 Check	C/ M2+ M3 Check	D/M4 Check
	Schedule Periodicity / Activity	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.
1.	Check and ensure proper condition and tightness of mounting bolts. Take corrective action if Required	✓	✓	✓	✓
2.	Check and ensure proper Tightness of all connections of alternator outgoing & control cables. Take corrective action if Required	✓*	✓	✓	✓
3.	Check and ensure proper earthing connection. Take corrective action if Required	✓	✓	✓	✓
4.	Check and ensure proper Condition of coupling nut bolts and their tightness. Attend them, if required	✓	✓	✓	✓
5.	Check alternator for any unusual sound and attend same	✓	✓	✓	✓
6.	Check and ensure generation of proper voltage (750V, 50Hz)	✓	✓	✓	✓
7.	Ensure proper Cleaning and tightness of connection of Excitation System. Attend them, if required . Use thermal imager equipment to check temperature of cable nuts, connecting nut bolts etc. on load	✓*	✓	✓	✓
8.	Ensure proper Greasing of Bearings as per recommendation of OEMs	--	--	✓	✓

* Alternate

Alternator (Workshop)

S N	Schedule Name	SS2	SS3
	Schedule Periodicity / Activity	36 Months/ 12 Lakh kms whichever is earlier	72 Months/ 24 Lakh kms whichever is earlier
9	Check IR Value of Alternator winding as per Table/Annexure 15.1 of Chapter 15 of LHB Maintenance Manual Volume II – System Documentation – July-2022	✓	✓
10.	Ensure proper Servicing and Overhauling by disassembly of Coupling, End covers, Rotor, Stator and Excitation system etc. and thorough cleaning of all parts including various windings by blower and thinner and application of anti-track varnish on exposed portion of windings. Ensuring proper cleaning and Greasing of Bearings and their replacement, if required. Replace rubber bushes of alternator and diesel engine coupling. Ensure alignment of alternator and diesel engine coupling with dial gauge during fitment after servicing and overhauling.	--	✓

13.17A.2 Self Starter Motor

S N	Schedule Name	A Check	B/M1 Check	C/ M2 + M3 Check	D/ M4 Check
	Schedule Periodicity / Activity	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.
1.	Check and ensure proper condition of mounting of starter motor ,isolation switch bracket/enclosure	✓	✓	✓	✓
2.	Ensure its proper working. Replace starter motor, relay, switch gears, cables, terminals etc., if found defective,	✓	✓	✓	✓
3.	Check and ensure proper cleaning by blower/ vacuum pump and replace the carbon brush, if required	--	✓	✓	✓
4.	Check and ensure proper condition of electrical wires and attend them as and when required on condition basis.	✓	✓	✓	✓
5.	Check IR Value of Motor as per Table/Annexure 15.1 of Chapter 15 of LHB Maintenance Manual Volume II – System Documentation –July-2022	--		✓	✓

Self Starter Motor (Workshop)

S N	Schedule Name	SS2	SS3
	Schedule Periodicity / Activity	36 Months/ 12 Lakh kms whichever is earlier	72 Months/ 24 Lakh kms whichever is earlier
6.	Ensure proper Servicing and Overhauling by disassembly of Coupling, End covers, Rotor ,Stator etc. and thorough cleaning of all parts including various windings by blower and thinner and application of anti track varnish on exposed portion of windings. Ensuring proper cleaning of bearings/bush and their greasing and replacement, if required. Ensure Replacement of Carbon Brushes	✓	✓*

* Replacement of bearing/bush

13.17A.3 Radiator, Radiator Pipeline and Radiator Chamber

S N	Schedule Name	A Check	B/M1 Check	C/ M2+ M3 Check	D/M4 Check
	Schedule Periodicity / Activity	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.
1.	Check and ensure proper condition of mounting bolts and anti vibration pads etc.	✓	✓	✓	✓
2.	Check and ensure proper cleaning of radiators. If found clogging, Clean by water jet machine 4.9-5.6 kg/cm2 (70-80 psi) with OGR and ID- 27 or any other suitable cleaning agent.	✓*	✓	✓	✓
3.	Check Radiator water & coolant level and top up with mixture of coolant & distilled water, if required.	✓	✓	✓	–
4.	Check filling cap, clamps, and coolant leakage in radiator pipelines. Attend if required	✓	✓	✓	✓
5.	Check the condition of radiator chamber, doors, hinges, latches, ceiling and intactness of baffles etc. and attend the same to ensure proper condition.	✓	✓	✓	✓

* Alternate

Radiator, Radiator Pipeline and Radiator Chamber (Workshop)

S N	Schedule Name	SS2	SS3
	Schedule Periodicity / Activity	36 Months/ 12 Lakh kms whichever is earlier	72 Months/ 24 Lakh kms whichever is earlier
6.	Strip and ensure thorough cleaning by water jet machine 4.9-5.6 kg/cm2 (70-80 psi) with OGR and ID-27 or any other suitable cleaning agent. Remove internal scaling, with the help of suitable descaling agent.	✓	✓
7.	Replacement of 'O' Ring of radiator pipe line	✓	✓
8.	Fill up the radiator with distilled water and coolant (or pre mixed coolant) as per OEM recommendations	✓	✓

13.17A.4 Radiator Motor and its Starter Panel

S N	Schedule Name	A Check	B/M1 Check	C/ M2 + M3 Check	D/M4 Check
	Schedule Periodicity / Activity	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.
1.	Check and ensure proper condition of mounting bolts	✓	✓	✓	✓
2.	Ensure Cleaning and checking of connection tightness of starters of radiator motors. Check the condition of gasket of the panel covers. Replace defective contactor/ overload relay/ MPCB, gasket in starter panel if required.	✓	✓	✓	✓
3.	Check and ensure proper protection setting of Relays and MPCB of starter panel	--	✓	✓	✓
4.	Check the condition of Radiator Motor, Radiator Fan blades, fan bolts and its tightness, attend defects if any. Replace motor if found defective	✓	✓	✓	✓
5.	Ensure greasing of radiator motor as per requirement.	--	–	✓	✓
6.	Check IR value of Radiator Motor and its cables as per Table/Annexure 15.1 of Chapter 15 of LHB Maintenance Manual Volume II – System Documentation –July-2022	–	--	✓	✓
7.	Use thermal imager equipment to check temperature of motor terminals and starter panel.	–	✓	✓	✓

Radiator Motor and its Starter Panel (Workshop)

S N	Schedule Name	SS2	SS3
	Schedule Periodicity / Activity	36 Months/ 12 Lakh kms whichever is earlier	72 Months/ 24 Lakh kms whichever is earlier
8.	Strip and overhaul radiator motor. Ensuring proper condition/ working of its bearings, replace if required.	✓	✓*
9.	Strip Overhaul starters panel of radiator motor	✓	✓

* Replacement of bearing

13.17A.5 Roof Exhaust Fans and Motors (at Depot)

S N	Schedule Name	A Check	B/ M1 Check	C/ M2+ M3 Check	D/M4 Check
	Schedule Periodicity / Activity	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.
1.	Check and ensure proper condition of mounting bolts	✓	✓	✓	✓
2.	Check and ensure proper condition of electrical cables/wires and attend them as and when required on condition basis.	✓*	✓	✓	✓
3.	Ensure, working Cleaning and checking of connection tightness of starters of Roof Exhaust motors. Check the condition of gasket of the panel covers. Check the condition of gasket of the panel covers. Replace defective contactor/ overload relay/ MPCB, gasket in starter panel if required.	✓	✓	✓	✓
4.	Ensure Checking of condition of Roof Exhaust Motor connection and its tightness. Replace motor, if found defective.	✓	✓	✓	✓
5.	Check IR value of Roof exhaust Motors as per Table/Annexure 15.1 of Chapter 15 of LHB Maintenance Manual Volume II – System Documentation –July-2022.	–	--	✓	✓
6.	Use thermal imaginer equipment to check temperature of cable lugs, connecting nut bolts etc. on load to find out loose connection.	--	✓	✓	✓

* Alternate

Roof Exhaust Fans and Motors (Workshop)

S N	Schedule Name	SS2	SS3
	Schedule Periodicity / Activity	36 Months/ 12 Lakh kms whichever is earlier	72 Months/ 24 Lakh kms whichever is earlier
7	Strip and overhaul Roof Exhaust motor. Ensuring proper condition/ working of its bearings.	✓	✓*
8	Strip and overhaul starters panel of Roof Exhaust motors.	✓	✓

* Replacement of bearing

13.17A.6 Safety System

S.No	Safety System	Circuit Checking*
1.	HWT (high water temperature)	A, B/ M1, C/M2+ M3* & D/M4
2.	LLOP (low lube oil pressure)	A, B/ M1, C/M2+ M3* & D/M4
3.	LWL (low water level)	A, B/ M1, C/M2+M3* & D/M4

***For all circuit check Availability of indication of all the relays and proper connection of connectors to the terminals to be ensured.**

Safety System (Workshop)

S.No	Safety System	Circuit Checking*	Calibration/ Replacement
1.	HWT (high water temperature)	SS2, SS3	SS2, SS3
2.	LLOP (low lube oil pressure)	SS2, SS3	SS2, SS3
3.	LWL (low water level)	SS2, SS3	SS2, SS3

***For all circuit check Availability of indication of all the relays and proper connection of connectors to the terminals to be ensured.**

13.17B. Other Power Car Items, Periodicity of which are as below:

Periodic Maintenance Schedules

- Schedule D1 : Trip / Weekly
- Schedule D2 : Monthly ± 3days
- Schedule D3 : Half Yearly ± 15 days
- Shop Schedule (SS-1), IOH : 18 Months+30 days/6 Lakh kms whichever is earlier
- Shop Schedule (SS-2), POH : 36 Months /12 Lakh kms whichever is earlier
- Shop Schedule (SS-3), POH : 72 Months/24 Lakh kms whichever is earlier

13.17B.1 Side Body Filter

S N	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition of mounting and fitment of side body filters.	✓	✓	✓	✓	✓
2.	Check and attend packing provided along the mounting frame of side body filters to avoid inrush of unfiltered air in power car.	✓	✓	✓	✓	✓
3.	Remove and ensure proper cleaning of side body filters by dry compressed air at a pressure 1.75 kg/cm^2 (25psi) with help of portable compressor	--	✓	✓	--	--
4.	Ensure proper cleaning of sidewalls and ceiling of engine room	--	✓	✓	✓	✓
5.	Replace old side body filters with new.	--	--	--	✓*	✓

* Condition basis

13.17B.2 Starting Battery

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition of mounting of batteries on frame	✓	✓	✓	✓	--
2.	Check and repair mounting frame of batteries	--	--	--	--	✓
3.	Check and ensure proper condition of connection cables, terminal connection tightness and application of petroleum jelly on it. Check the electrolyte level and top up with distilled water if required	✓	✓	✓	✓	✓
4.	Check and ensure proper condition of Air Vents of batteries	✓	✓	✓	✓	--
5.	Check and ensure proper Specific Gravity (SPG) of batteries and it's electrolyte level. Top up with distill water, if required.	✓	✓	✓	✓	--
6.	Check and ensure proper battery voltage	✓	✓	✓	✓	--

13.17B.3 Battery Charger

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition of mounting bolts and covers	✓	✓	✓	✓	✓
2.	Check and ensure proper tightness of connections	✓	✓	✓	✓	✓
3.	Ensure proper cleaning by dry compressed air at a pressure 1.75 kg/cm2 (25psi) with help of portable compressor	--	✓	✓	✓	✓
4.	Check and ensure proper condition of electrical wires and attend them as and when required.	--	✓	✓	✓	✓
5.	Check operation of battery change over switch and replace if required. (applicable for power car with single starter battery charger)	✓	✓	✓	✓	✓
6.	Check and ensure proper operation of battery charger.	✓	✓	✓	✓	✓
7.	Ensure proper Servicing and Overhauling by opening the covers and thorough cleaning of all parts by blower and thinner. Replace the Voltmeter and Ampere meter with new calibrated meters	--	--	--	--	✓

13.17B.4 Power Panel /Control Panel/Other Motors Terminal

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition of mounting bolts /anti vibration pads etc.	--	✓	✓	✓	✓
2.	Check and ensure proper condition of electrical wires/ cables/ connections and attend/ tighten/ replace them, if required	--	✓	✓	✓	✓
3.	Check and ensure proper cleaning of Power Panel, Control Panel by Vacuum Pump and dry compressed air at a pressure 1.75 kg/cm2 (25psi) with help of portable compressor	--	✓	✓	✓	✓
4.	Check and ensure proper working of indication lamps, Push Buttons, Switches and Fuses and Replace them, if required	✓	✓	✓	✓	✓
5.	Check and ensure proper operation of ACB and its associated contactors. Attend/Replace if Required.	✓	✓	✓	✓	✓
6.	Check and ensure proper working of DC control & Panel Wiring System and attend, if required	--	✓	--	–	✓
7.	Check and ensure proper working of all measuring meters- Ammeter, Volt meter, kW meter, frequency meter, R.P.M. meter, multifunction and replace, if required.	✓	✓	✓	✓	✓
8.	Checking of the working of all Contactors Feeder Contactors and bus coupler contactors.	✓	✓	✓	✓	✓
9.	Ensure Cleaning and tightness of connections of Power Panel/Control Panel/Other Motors Terminal (starters of radiator motors, starters of Roof Exhaust motors). Use thermal imaginer equipment to check temperature of cable lugs, connecting nut bolt, contactors etc. on load	--	✓	✓	✓	✓

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
10.	Ensure tightness of Bus Bars	--	✓	✓	✓	✓
11.	Check Contactors, Bus Bars, MCBs, Air Circuit Breakers and all type of rotary switches etc. and Replace if defective. Cleaning of Panel and its equipment by blower. Replace contacts of Contactors, if required. Ensure Thermo Imaging of Power Panel on Load .	--	--	--	–	✓
12.	Check Milli volt drop across ACB terminals	--	--	✓	✓	✓
13.	Check the operation of RA Mode in Working Power car/ Non-Working power car mode.	✓	✓	✓	✓	✓
14.	Check for the availability of proper fuses (no wired fuse to be allowed)	✓	✓	✓	✓	✓

13.17B.5 Cables and Trenches/Trays

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition/ securing of fixing bolts and covers of all trenches/Trays	--	✓	✓	✓	✓
2.	Check and ensure proper cleaning of all trenches/Trays by Brush, Jute/cotton waste etc	--	--	✓	✓	✓
3.	Check and ensure proper condition of cables and attend/replace them, if required	--	--	✓	✓	✓
4.	Ensure proper securing of cables against any rubbing, sharp edges	--	--	✓	✓	✓

13.17B.6 Fuel Tank

SN	Schedule Name	(D1)	(D2)	(D3)	IOH (SS-1)	POH (SS-2)
	Schedule Periodicity / Activity	Trip/ Weekly	Monthly	6 Monthly	18 Monthly	36 Monthly
1.	Check and ensure proper condition of all mounting nuts/ bolts and mounting brackets/ clamps etc.	✓	✓	✓	✓	✓
2.	Ensure proper Cleaning of fuel tank externally		✓	✓	✓	✓
3.	Drain the fuel and clean the tank internally as well as externally including the pipe line and Sediment Junction Box etc.	--	--	--	--	✓
4.	Check Condition of diesel filling cap and Fuel Gauge/ diesel leakage and attend, if required	✓	✓	✓	✓	✓
5.	Replace wheel/ball valve of fuel pipeline if required.	--	--	--	--	✓
6.	Ensure Opening and servicing of fuel gauges and replacement of rubber items	--	--	--	--	✓
7.	Ensure replacement of fuel gauges if found not working.	--	--	--	--	✓
8.	Calibration and working of fuel flow meter	--	--	--	--	✓
9.	NRV Cleaning	--	--	✓	✓	--
10.	NRV replacement if required	--	--	–	--	✓

13.17B.7 Safety System

S. No	Safety System	Circuit Checking*	Calibration/ Replacement
1.	AEL (alternator earth leakage relay)	D1,D2, D3,SS1	SS2, SS3
2.	FEL (feeder earth leakage relay)	D1,D2, D3,SS1	SS2, SS3
3.	FOL (feeder overload relay)	D1,D2, D3,SS1	SS2, SS3
4.	OVR (over voltage relay)	D1,D2, D3,SS1	SS2, SS3
5.	UVR (under voltage relay)	D1,D2, D3,SS1	SS2, SS3

*** For all circuit check Availability of indication of all the relays and proper connection of connectors to the terminals to be ensured.**

13.18 MAINTENANCE SCHEDULES OF DIESEL ENGINES FOR CUMMINS MAKE
(Ref: Railway board letter No.2006/Elect.(G)/138/ Pt. dated 16.07.2024)

S.No	Make	A	B	C	D	E
1.	M/s Cummins (CPCB-I & II)	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis

Note:- Running Hours/Months whichever is earlier .

I. The schedule of alternator should be also same as Diesel Engine

II. This is applicable for all power car irrespective of their working in HOG or EOG system since running hours will take care of their working in EOG & Periodicity will take care of their working in HOG system.

III. Above periodicity is applicable for complete DA sets.

13.19 MAINTENANCE SCHEDULES OF DIESEL ENGINES FOR M/s Greaves Cotton.
(Ref: Railway board letter No.2006/Elect.(G)/138/ Pt. dated 16.07.2024)

S.No	Make	A	M1	M2+M3	M4	M5
3.	M/s Greaves Cotton	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis

Note:- Running Hours/ Months whichever is earlier .

I. The schedule of alternator should be also same as Diesel Engine

II. This is applicable for all power car irrespective of their working in HOG or EOG system since running hours will take care of their working in EOG & Periodicity will take care of their working in HOG system.

III. Above periodicity is applicable for complete DA sets.

13.20 MAINTENANCE SCHEDULES OF DIESEL ENGINES FOR M/s Kirloskar Engine Ltd. (KOEL)
(Ref: Railway board letter No.2006/Elect.(G)/138/ Pt. dated 16.07.2024)

S.No	Make	A	B	C	D	E
2.	M/s Kirloskar Engine Ltd. (KOEL)	Every Round Trip	12 Months or 500 Hrs.	36 Months or 1500 Hrs.	72 Months or 6000 Hrs.	On condition basis

Note:- Running Hours/Months whichever is earlier .

I. The schedule of alternator should be also same as Diesel Engine

II. This is applicable for all power car irrespective of their working in HOG or EOG system since running hours will take care of their working in EOG & Periodicity will take care of their working in HOG system.

III. Above periodicity is applicable for complete DA sets.