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Date: 21.08.2020

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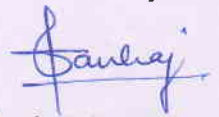
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Sub: Revised 'Schedule of Standard Examination of 1400 HP BG DEMU Report no. MP.MISC.157 (Rev-04) August-2020.

Ref: Railway Board's letter no. 2020/M(L)/101/2 (DEMU Schedule) dtd 03.07.2020

With reference to above, the revised '**Schedule of Standard Examination of 1400 HP BG DEMU RDSO Report no. MP.MISC.157 (Rev-04) August-2020**' has been uploaded on RDSO's website. The subject schedule can be accessed using path '**www.rdsso.indianrailways.gov.in/Motive Power/Other important links/Schedule of Standard Examination of 1400 HP BG DEMU Report no. MP.MISC-157 (Rev-04) August-2020.**

DA: Nil.


(Pankaj Saxena)
Dy. Director/MP (Hyd.)
for Director General (MP)

Copy to: (for kind information please)

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- ii. M/s Cummins India Limited, Cummins India Office Campus, Tower A, 2nd Floor, Survey no.21, Balewadi, **Pune** - 411 045
- iii. M/s GMMCO Limited, 6, G.S.T. Road, St. Thomas Mount, **Chennai** - 600 016



भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS



**Schedule of Standard Examination
of
1400 HP BG DEMU
1400 एच०पी० बी०जी० डी०ई०एम०यू०
का
मानक परीक्षण शेड्यूल**

**Report no. MP – MISC.- 157 (Rev.-04)
August-2020**

Issued by-
अनुसंधान अभिकल्प एवं मानक संगठन,
मानक नगर, लखनऊ- 226 011

**RESEARCH DESIGNS AND STANDARDS ORGANISATION
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Preface

1400 HP BG DEMU, manufactured by Integral Coach Factory (ICF), Chennai, is a Multiple Unit Self-Propelled Passenger Train powered by on-board diesel engines with AC-DC traction, and has been designed to run on non-electrified sections of Indian Railway tracks. One unit consists of one **Driving Power Car (DPC) & three Trailer Coaches (TC) i.e. (1DPC + 3TC)**. The maximum designed speed is 100 km/h. It may be run in multiples of maximum 5 such units as per traffic demand. 1400HP DEMUs were introduced in **Year'2000** over IR to meet the requirements of the fast-growing population of urban areas. It is provided with EP brake in combination of air brake and air suspension similar to EMUs.

The engines, fitted in 1400HP DEMUs, have been supplied by two different OEMs i.e. M/s **Cummins India Limited**, Pune (**Engine model KTA50L**) & M/s **Caterpillar**, Hosur (**Engine model CAT 3508B**). Similarly, the electrics have been supplied by two different OEMs i.e. **Bharat Heavy Electricals Ltd & CG Power & Industrial Solutions Ltd**. For trouble-free operation & effective maintenance, a **Schedule of Standard Examination for 1400HP DEMU Report no. MP-MISC.157 (Rev-00) May'2004** was issued by RDSO followed by **Revision-01, 02 & 03**.

A committee was nominated by Railway Board to deliberate on the various issues involved in **“Revision of maintenance schedules of 700hp, 1400hp & 1600hp DEMUs”**. The report, submitted by the committee, has been accepted by the Competent Authority vide Railway Board's letter no. 2020/M(L)/101/2 (DEMU Schedule) dated 03.07.2020. The committee recommended to revise the existing “Standard Schedules of Examinations of 1400HP & 1600HP DEMU”. This revision of schedule is based on the committee's recommendation & inputs provided from all concerned.

Key recommendations of committee are as under:

- **No. of days per trip shall be maximum 15 days**
- **EKM per trip shall be maximum 3500 km**
- POH schedule of Air dryer to be extended from 3 years to 4 years.

There is a difference between schedules of Cummins & Caterpillar engines. In order to synchronize the schedules of all major components/equipments/assemblies/sub-assemblies, the **Trip schedule** ideology, similar to diesel locos, has been adopted. This will not only match with the schedules prescribed by OEMs of diesel engines but also be cost effective. Based on the above assumptions each **trip schedule**, which is a multiple of **15 days**, has been numbered as **T1, T2, T3.....T36 upto 18 months (540 days)**. The month-wise schedules have been marked as **‘M’** alongwith its interval. For example, 3-months have been marked as **‘3M’**. Similarly, year-wise schedules too have been marked as **‘Y’** alongwith its interval. e.g. **4-Year** has been marked as **‘4Y’**.

Accordingly, changes have been incorporated in this revised schedule. Due to increase in trip schedule from 10 days to 15 days in this schedule, no. of trips upto 18 months i.e. upto POH of DPC, will reduce from **54 to 36**.

SCHEDULE OF STANDARD EXAMINATION OF 1400 HP BG DEMU

GENERAL DESCRIPTION

1. **Introduction:**

- 1.1 The schedule for examination and maintenance of 1400 HP BG Diesel -Electric Multiple Unit (DEMU) has been prepared taking into account the recommendations of OEM and suitably modified based on feedback received from DEMU users of IR.
- 1.2 The service periods of 1400HP DEMU specified in this schedule for maintenance attention are the maximum allowable periods between successive examinations. Variations in operating conditions in different regions may make it necessary to carry out examination more frequently, or introduce examinations not scheduled herein. In such cases, the matter should be brought to the notice of the appropriate Sr. DME/DME, who alone is authorized to introduce any change in the standard examination detailed herein. The Sr. DME/DME, in all such cases, will bring to the notice of the Motive Power Directorate of RDSO, for any modification to the schedules, providing full details.

2. **References:**

The following documents are also required to be referred for further information.

- i) Operation & Maintenance Manual, Bulletin No. 3243773-10 (released on 2017) of **Cummins India Limited**.
- ii) Operation & Maintenance Manual, Bulletin No. SEBU7179-11 March-2014 of **Caterpillar**.
- iii) Propulsion Equipments for BG DEMUs: Traction Sales Div. **BHEL & CG Power & Industrial solutions ltd.**
- iv) Operating Instruction and Maintenance Manual for ELGI Air Compressor Assembly model: 2507.
- v) INDIAN RAILWAYS: Maintenance Manual for BG Coaches, December (1995) issued by IRCAMTECH, Gwalior.
- vi) Maintenance Manual for AC/DC EMU & MEMU Bogie and Under gear Manual No. CMI-K001 (April'2000) issued by RDSO.
- vii) Maintenance Instruction for Air dryer RDSO MP.MI.18 (Rev-02) April'2008
- viii) Instruction Bulletin for E-beam cables; Document no. MP.IB.EM.07.14.08 dated 25.04.08
- ix) POH Schedule of Examination of 1400HP DEMU; Document no. MP-MISC.250 (Rev-01) Mar-2020 or latest.

3. **Scope of Maintenance Schedule:**

This booklet covers maintenance schedules for different assemblies & components under different heads, as under:

- PART - I : Engine, Air Brake, Compressor, etc.**
- PART - II : Electrical transmission & controls.**
- PART - III : Coach body, Underframe, Bogie, Brake rigging etc.**
- PART - IV : Carriage Electrical**
- PART - V : Schedule for Lavatory and Lavatory fittings**

- 3.1 General Schedules / Check sheets for Engine, Engine systems, Air Brake, Compressor, Air dryer etc. have been mentioned in individual schedules of **Part-I**.
- 3.2 At the end of each schedule of **Part-I**, the schedules attention for particular equipment fitted with 1400 HP DEMU-DPCs, as recommended by OEMs, has been given.

4. Type of Schedules & Periodicities of maintenance of Engine, Air Brakes, Compressor, Electrical Transmission & Controls (applicable for Part-I & Part-II)

SN	Type of Schedule	Equivalent trip	Periodicity
i.	Trip Schedule	T1	max. 15 days or EKM 3500, whichever is earlier
ii.	Monthly Schedule	T2	30 days \pm 3
iii.	Quarterly Schedule	T6	90 days \pm 7
iv.	Half-yearly Schedule	T12	180 days \pm 10
v.	Nine Monthly Schedule	T18	270 days \pm 15
vi.	Yearly Schedule	T24	360 days \pm 20
vii.	Eighteen monthly Schedule	T36	540 days \pm 30 Please also refer RDSO Report no. MP-MISC.250 (Rev-01) Mar-2020 or latest

4.1 Schedule-wise Periodicity of maintenance of Engine, Brakes, Compressor, Electrical Transmission & Controls (Applicable to Part-I & II):

SN	Type of schedule	Periodicity of Brakes, Compressor, Electrical Transmission & Controls	Periodicity of diesel engine	
			For Cummins engine model KTA50L	For Caterpillar engine model Cat 3508B
i.	Trip Schedule	At the end of each trip max. 15 days or EKM 3500	At the end of each trip max. 15 days or EKM 3500	At the end of each trip max. 15 days or EKM 3500
ii.	Monthly	1 M \pm 3 days (Also repeat Trip sch.)	1 M \pm 3 days (Also repeat Trip sch.)	1 M \pm 3 days (Also repeat Trip sch.)
iii.	Quarterly	3 M \pm 7 days. (Also repeat Trip & 1M sch.)	3 M \pm 7 days. (Also repeat Trip & 1M sch.)	3 M \pm 7 days (Also repeat Trip & 1M sch.)
iv.	Half-yearly	6 M \pm 10 days (Also repeat Trip, 1M & 3M sch.)	6 M \pm 10 days (Also repeat Trip, 1M & 3M sch.)	6 M \pm 10 days (Also repeat Trip, 1M & 3M sch.)
v.	9-Monthly	Repeat Trip, 1M & 3M sch.	Repeat Trip, 1M & 3M sch.	9 M \pm 15 days Also repeat Trip, 1M & 3M sch.
vi.	12-Monthly	Repeat trip, 1M, 3M & 6M sch.	Repeat trip, 1M, 3M & 6M sch.	12 M \pm 20 days Also repeat trip, 1M, 3M & 6M sch.
vii.	18-Monthly	18 M (for Compressor & Air dryer) (Also repeat trip, 1M, 3M & 6M, *9M sch.)	D-Check: 18 M \pm 30 days, (Also repeat trip, 1M, 3M & 6M 9M sch.)	18 M \pm 30 days, (Also repeat trip, 1M, 3M, 6M & 9M sch.)

SN	Type of schedule	Periodicity of Brakes, Compressor, Electrical Transmission & Controls	Periodicity of diesel engine	
			For Cummins engine model KTA50L	For Caterpillar engine model Cat 3508B
viii.	48-Monthly / 4Y	For Air Dryer only. (in every 4 th Yearly Sch.)	--	--
ix.	54-Monthly	Repeat the above schedules	Repeat the above schedule up to 54M. Carry out E-Check/ POH of engine	Repeat the above schedule up to 54M. Carry out 1 st Top end overhaul of engine.
x.	Other Schedules	-	-	<ul style="list-style-type: none"> • 2nd Engine POH at 8Y. • 3rd Engine POH at 12Y • 4th Engine POH at 16Y.

5. Type of Schedules and their periodicities of Coach body, Under frame, Bogie assembly, Brake rigging (for Part – III):

- i) Primary : max. 15 days or EKM 3500, whichever is earlier (for both- DEMU with toilets / without toilets) (Maintenance of toilets to be done during various schedules as mentioned in Part-V)
- ii) Schedule 'A' : 1 month \pm 3 days
- iii) Schedule 'B' : 3 months \pm 7 days.
- iv) IOH : 9 months \pm 15 days.
- v) POH : 18 months \pm 30 days (Pl. refer RDSO Report no.MP. Misc-250 with latest revision)

6. Type and periodicity of schedules of Carriage Electrical (for Part – IV):

- i) Primary : max. 15 days or EKM 3500, whichever is earlier (for DEMU with toilets / without toilets)
- ii) Monthly : 1 month \pm 3 days
- iii) Quarterly : 3 months \pm 7 days.
- iv) IOH : 9 months \pm 15 days.
- v) POH : 18 months \pm 30 days (Pl. refer RDSO Report no.MP. Misc-250 with latest revision)

7. Schedules of Periodical Overhauling(POH) of Major Items :

- i) Engine : As per para 4.1(viii & ix) mentioned above
- ii) Air dryer : 48 months /4Y (in every 4th Yearly Sch.)
- iii) Compressor : 18 months
- iv) E-beam cables : All conventional cables (Control & Power) should be replaced by E-beam cables as per **RDSO's Instruction Bulletin no. MP.IB.EM.07.14.08 dated 25.04.08** during POH of DPC, wherever required.
- v) Traction Alternators : 36 months
- vi) Traction Motors : 18 months
- vii) Roller bearing : 18 months
- viii) EP /Air brake system : 18 months

8. Based on the recommendations of OEMs (i.e. Cummins & Caterpillar), the periodicity of change of filters and oil in various systems of 1400HP DEMU, their specification and source of supply are summarized below for information:

- 8.1 **Periodicity of Filters & Oil change of Engine systems**, as recommended by OEMs:
The periodicities of Filters & Oil change of engine systems, as recommended by OEMs, are as follows: (**One Trip = 15 days**)

SN	Description	Periodicity (for CIL engine)	Periodicity (for CAT engine)
1.	Lube Oil system		
a.	Engine lube oil Filter	Bi-monthly (T4, T8, T12...., T36)	*3 month subject to differential pressure not more than 15 psi. (T6, T12, T18....T36)
b.	Engine Lube Oil		3 month subject to SOS report. (T6, T12, T18....T36)
c.	By-pass filter		NA
d.	Full flow filter		NA
2.	Fuel system		
	Fuel Filter	-do-	*3 month subject to differential pressure not more than 15 psi. (T6, T12, T18....T36)
3.	Cooling system		
	Coolant filter	-do-	NA
4.	Air intake system		
	Air filter	After every 4 months (T8, T16, T24, T32 & T36)	After every 3 months (T6, T12, T18....T36)
5.	Hydraulic System		
a.	Hydraulic Oil Filter	**After every 6 months (T12 , T24 & T36)	After every 9 months (T18 & T36)
b.	Hydraulic Oil	**After every 6 months (T12 , T24 & T36)	After every 18 months (T36)

Note:

* The Pressure gauge has been provided in display unit.

** Hyd. oil & filter to be changed only during first monthly & then during each half yearly schedule.

- 8.2 **Periodicity of Filters & Oil change for Cummins India Limited (CIL) engine (according to Trip):** This is for reference only, the recommendations as per Service literatures have to be followed. (**One Trip = 15 days**)

CIL ENGINE (KTA50L)								
Trip (CIL)	Engine Lube oil Filter	Engine Lube oil	By-pass filter	Fuel Filter	Coolant Filter	Air Filter	Hyd. Oil filter	Hyd. Oil
T1	-	-	-	-	-	-	-	-
T2	-	-	-	-	-	-	√	√
T3	-	-	-	-	-	-	-	-
T4	√	√	√	√	√	-	-	-
T5	-	-	-	-	-	-	-	-
T6	-	-	-	-	-	-	-	-
T7	-	-	-	-	-	-	-	-
T8	√	√	√	√	√	√	-	-

CIL ENGINE (KTA50L)								
Trip (CIL)	Engine Lube oil Filter	Engine Lube oil	By-pass filter	Fuel Filter	Coolant Filter	Air Filter	Hyd. Oil filter	Hyd. Oil
T9	-	-	-	-	-	-	-	-
T10	-	-	-	-	-	-	-	-
T11	-	-	-	-	-	-	-	-
T12	√	√	√	√	√	-	√	√
T13	-	-	-	-	-	-	-	-
T14	-	-	-	-	-	-	-	-
T15	-	-	-	-	-	-	-	-
T16	√	√	√	√	√	-	-	-
T17	-	-	-	-	-	-	-	-
T18	-	-	-	-	-	√	-	-
T19	-	-	-	-	-	-	-	-
T20	√	√	√	√	√	-	-	-
T21	-	-	-	-	-	-	-	-
T22	-	-	-	-	-	-	-	-
T23	-	-	-	-	-	-	-	-
T24	√	√	√	√	√	-	√	√
T25	-	-	-	-	-	-	-	-
T26	-	-	-	-	-	√	-	-
T27	-	-	-	-	-	-	-	-
T28	√	√	√	√	√	-	-	-
T29	-	-	-	-	-	-	-	-
T30	-	-	-	-	-	-	-	-
T31	-	-	-	-	-	-	-	-
T32	√	√	√	√	√	-	-	-
T33	-	-	-	-	-	-	-	-
T34	-	-	-	-	-	-	-	-
T35	-	-	-	-	-	-	-	-
T36	√	√	√	√	√	√	√	√

8.3 Periodicity of Filters & Oil change for Caterpillar (Cat3508B) engine (according to Trip; One Trip = 15 days)

CATERPILLAR ENGINE (Cat 3508B)									
Trip (Caterpillar)	Engine Lube Oil Filter	Engine Lube oil	By-Pass Filter	Fuel Filter	Coolant Filter	Air Filter	Hyd. Oil Filter	Hyd. Oil	Water separator filter
T1	-	-	NA	-	NA	-	-	-	-
T2	-	-	NA	-	NA	-	-	-	-
T3	-	-	NA	-	NA	-	-	-	-
T4	-	-	NA	-	NA	-	-	-	-
T5	-	-	NA	-	NA	-	-	-	-
T6	√	√	NA	√	NA	√	-	-	√
T7	-	-	NA	-	NA	-	-	-	-
T8	-	-	NA	-	NA	-	-	-	-
T9	-	-	NA	-	NA	-	-	-	-
T10	-	-	NA	-	NA	-	-	-	-

CATERPILLAR ENGINE (Cat 3508B)									
Trip (Caterpillar)	Engine Lube Oil Filter	Engine Lube oil	By- Pass Filter	Fuel Filter	Coolant Filter	Air Filter	Hyd. Oil Filter	Hyd. Oil	Water separa tor filter
T11	-	-	NA	-	NA	-	-	-	-
T12	√	√	NA	√	NA	√	-	-	√
T13	-	-	NA	-	NA	-	-	-	-
T14	-	-	NA	-	NA	-	-	-	-
T15	-	-	NA	-	NA	-	-	-	-
T16	-	-	NA	-	NA	-	-	-	-
T17	-	-	NA	-	NA	-	-	-	-
T18	√	√	NA	√	NA	√	√	-	√
T19	-	-	NA	-	NA	-	-	-	-
T20	-	-	NA	-	NA	-	-	-	-
T21	-	-	NA	-	NA	-	-	-	-
T22	-	-	NA	-	NA	-	-	-	-
T23	-	-	NA	-	NA	-	-	-	-
T24	√	√	NA	√	NA	√	-	-	√
T25	-	-	NA	-	NA	-	-	-	-
T26	-	-	NA	-	NA	-	-	-	-
T27	-	-	NA	-	NA	-	-	-	-
T28	-	-	NA	-	NA	-	-	-	-
T29	-	-	NA	-	NA	-	-	-	-
T30	√	√	NA	√	NA	√	-	-	√
T31	-	-	NA	-	NA	-	-	-	-
T32	-	-	NA	-	NA	-	-	-	-
T33	-	-	NA	-	NA	-	-	-	-
T34	-	-	NA	-	NA	-	-	-	-
T35	-	-	NA	-	NA	-	-	-	-
T36	√	√	NA	√	NA	√	√	√	√

8.4 Periodicity of Filters & Oil change of Engine systems in Cummins & Caterpillar Engine at a glance :

8.4.1 Periodicity of Filters & Oil change of Engine systems, as recommended by M/s CIL:

Trip	T2	T4	T8	T12	T16	T18	T20	T24	T26	T28	T32	T36
Engine Lube oil	-	√	√	√	√	-	√	√	-	√	√	√
Engine Lube oil Filter	-	√	√	√	√	-	√	√	-	√	√	√
By-Pass Filter	-	√	√	√	√	-	√	√	-	√	√	√
Fuel Filter	-	√	√	√	√	-	√	√	-	√	√	√
Coolant Filter	-	√	√	√	√	-	√	√	-	√	√	√
Air Filter	-	-	√	-	-	√	-	-	√	-	-	√
Hydraulic Oil filter	√	-	-	√	-	-	-	√	-	-	-	√

Hydraulic Oil	√	-	-	√	-	-	-	√	-	-	-	√
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8.4.2 Periodicity of Filters & Oil change of Engine systems, as recommended by M/s Caterpillar:

Trip	T6	T12	T18	T24	T30	T36
Engine lube oil filter	√	√	√	√	√	√
Engine Lube oil	√	√	√	√	√	√
Fuel Filter	√	√	√	√	√	√
Air Filter	√	√	√	√	√	√
Water sep. filter	√	√	√	√	√	√
Hydraulic Oil filter	-	-	√	-	-	√
Hydraulic Oil	-	-	-	-	-	√

8.5 *OEM Recommended Crank-case oil / Lube oils / Lubricants for Engine:

SN	Name of Manufacturer	Grade of oil (for CILKTA50L engine)	Brand name (for Cat 3508B engine)
i.	Indian Oil Corporation Ltd. (IOCL)	*Servo Pride XL 15W-40 CH4 or 15W40 CI4+ Equivalent (should meet CES 20078 standard)	NA
ii.	Hindustan Petroleum Corporation Ltd. (HPCL)	*HP Diesolino 15W40 CH4 or CI4+ Equivalent (should meet CES 20078 standard)	NA
iii.	Bharat Petroleum Corporation Ltd. (BPCL)	*MAK CH4 15W40 or 15W40 CI4+ Equivalent (should meet CES 20078 standard)	NA
iv.	Valvoline Cummins Limited	Valvoline Premium Blue 15W40 CH4 or Premium Blue 15W40 CI 4+	NA
v.	Exxon Mobil	*Mobil Delvac Super 1400 15W40 CH4 (should meet CES 20078 standard)	NA
vi.	M/s Caterpillar	NA	Cat DEO 15W40 CI 4

**Note: CES: Cummins Engineering Standards*

As per Cummins recommendation vide CIL's letter no. RDSO/DEMU/04/2020 dated 25.05.2020. Also, please also refer RDSO's letter no.SD.OIL.DEMU dated 10.11.2017 regarding use of lube oil grade 15W40 CH4 in M/s Cummins make diesel engines fitted on BG DEMUs.

8.6 Recommended Coolants for engine.

S.No	Name of Manufacturer	Brand name (for CIL KTA50L engine)	Brand name (for Cat 3508B engine)
i.	M/s Cummins India Ltd.	Compleat EG 50:50 PREMIX	NA
ii.	M/s Caterpillar	NA	Cat ELC 50/50 Premix

8.7 Recommended Hydraulic oil for cooling system of engine:

S.No	Name of Manufacturer	Brand name (for CILKTA50L engine)	Brand name (for Cat 3508B engine)
------	----------------------	--------------------------------------	---------------------------------------

i.	Indian Oil Corporation Ltd.	Servo System-68	NA
ii.	Hindustan Petroleum Corporation Ltd.	Enklo-68	NA
iii.	Bharat Petroleum Corporation Ltd.	Hydrol-68	NA
iv.	Cummins – Valvoline AWH VG – 68	Valvoline AWH VG – 68	
v.	Cummins India Ltd.	VG68	NA
vi.	M/s Caterpillar	NA	Cat HYDO Advanced 20

8.8 **Cleaning of Hydraulic oil:**

The hydraulic oil is required to be periodically cleaned by Centrifuge Cleaning arrangement. During oil change and also during top-up, oil should be added through Centrifuge Cleaning arrangement so that cleanliness of oil is maintained.

8.9 **High speed Diesel:**

The high-speed diesel oil shall be to IS 1460: 1995 read with Amendment 2 (February'1999)

9. **Recommended oils for coaches of DPC & TC: Dashpot & side bearer oil**

Supplier

IOCL

BPCL

HPCL

Brand Name

Servoline 100

Bharat Univol -100

Yantrol - 100

10. **General Instructions:**

The intensive utilization of the DEMUs necessitates properly laid down maintenance schedules to be followed. A well-organized inspection is essential to ensure reliability and freedom from failure in service. There are certain fundamental requirements that are important to any successful maintenance program. These are: -

10.1 Adequate provision of well-trained supervisors and skilled workmen.

10.2 Adequate provision of proper maintenance facilities and tools.

10.3 Adequate time for scheduled maintenance work to be completed properly before a DEMU is released for its next trip.

10.4 Provision of lubricating oil, water treatment etc. required to ensure satisfactory engine performance.

10.5 A well scheduled maintenance program including an adequate system of maintenance of records.

10.6 While carrying out the work of the schedule, all missing nuts, bolts, set-screws, cotters, split pins etc. must be REPLACED, as and when found defective. Split pins and cotters once removed should not be used again and new ones must be fitted. All loose nuts, set screws etc. must be tightened. Wherever cotters or split pins are fitted, they must be of the correct size and so fitted that they bear against the nut or washer properly. Examine and ensure that all locking devices, wherever provided, are properly secured.

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- 10.7 All measuring devices such as torque wrenches, electric meters, lubricant dispensers etc. which require calibration, should be checked once in a year or sooner, if required, for accuracy.
- 10.8 All tools and parts should be accounted for and removed from the DEMUs after any maintenance work has been performed.
- 10.9 All work done including methods and tools used must be in accordance with the manufacturer's instructions, maintenance manual or any technical orders issued.
- 10.10 Do not mix different brands of engine oil, hydraulic oil, gear oil, greases etc. Excessive lubrication is as harmful as inadequate lubrication.
- 10.11 Use of waste cotton on DEMUs is **PROHIBITED**. Use lint less rags or wiping towels. Exterior of 1400HP DEMU is to be washed after each trip. The underframe and top surface of fuel tanks should be cleaned to remove dirt and oil. Spraying of water directly on electrical equipment should be avoided. Interior of cab, all windows, headlight and warning light lenses and interior of the passenger compartment etc., must be thoroughly cleaned.
- 10.12 The fire extinguishers should be refilled and maintained as per the schedule. Under no circumstances should any DEMU be allowed to leave the shed without requisite number of fire extinguishers in working order.
- 10.13 **DURING ANY SCHEDULE EXAMINATION, ALL THE ITEMS OF THE LOWER SCHEDULES SHOULD ALSO BE CARRIED OUT.**
- 10.14 Columns of Condition/Action, Signature and Remarks to be added against each item of the schedules given ahead in this report. Also, Name and Signature of Technicians & Supervisors should be added at the end of each schedule form.

Part - I
Schedule for Engine, Air Brake, Compressor etc.
Trip Schedule (max. 15 days or EKM 3500)

DPC/TC No:

Cumulative km:

Date:

Cumulative hrs:

A. CONDITION: DIESEL ENGINE STOPPED

(I) GENERAL CHECKS:

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Oil & Water filling Check level and top-up if necessary: a) Lube oil b) Fuel oil c) Coolant d) Hydraulic oil e) Compressor oil		
2.	Drain residue from: a) Air reservoirs. b) Intercooler of compressor. c) After cooler of pneumatic circuit.		
3.	Engine fuel system a) Drain sediments from water separator. b) Check and clean fuel tank level gauge.		
4.	V-Belts Check the following belts for correct tension and serviceability: a) Belt for Compressor b) Belt for Hydraulic ventilation fan pump drive		
5.	Engine air intake system a) Remove and clean dust pan. b) Check for complete red band on vacuum indicator. Clean outer element only with dry compressed air from inside to outside. <i>(Note: Replace outer element after 4/5 cleanings or as soon as red band appears immediately even after cleaning.)</i>		
6.	Clean the following items with dry compressed air. a) Panel filter (Engine room). b) Outer body of engine air intake filters.		
7.	Hydraulic system: Check for red indication on return line filter on hydraulic tank . If 'Red', change the filter.		
8.	Check and ensure proper fitment of hose securing clamp and hose end fittings .		

(II) SPECIAL CHECKS FOR CIL KTA50L ENGINE:

SN	Details of work to be carried out	Special Periodicity, if any	Condition /Action	Remarks
1.	Check & collect coolant sample . Compare against Cummins recommendations and maintain record.	Every alternate		

2.	Check & collect lube oil sample . Compare against Cummins recommendations and maintain record. This should be done before the oil is changed.	trip i.e. T2, T4, T6....T36		
3.	Inspect & clean air filter outer element only. Compare against Cummins recommendations and maintain record.			
4.	Check Fuel- water separator & drain water from fuel system if available (To be attended in every trip schedule). Compare against Cummins recommendations and maintain record.	-		
5.	Check tightness of belts (water pump and alternator) . Compare against Cummins recommendations and maintain record.	-		
6.	Check tightness of mounting system . Compare against Cummins recommendations and maintain record	-		

(III) SPECIAL CHECKS FOR Cat 3508B ENGINE:

SN	Details of work to be carried out	Special Periodicity, if any	Condition /Action	Remarks
1.	Check & collect coolant sample	Every alternate trip i.e. T2, T4, T6....T36		
2.	Check & collect lube oil sample			
3.	Inspect & clean air filter outer element only			
4.	Check water separator & drain water from fuel system (To be attended in every trip schedule)	-		
5.	Check tightness of belts	-		
6.	Check tightness of mounting system	-		

B. CONDITION: DIESEL ENGINE RUNNING

i) GENERAL CHECKS FOR ENGINE:

SN	Details of work to be carried out	Condition /Action	Remarks
1.	<u>Mechanical (General examination)</u> a) General visual checking to be made to detect loose, defective , missing or leaky parts in the following systems: i) Cooling water ii) Lube oil iii) Fuel oil iv) Air intake & exhaust v) Hydraulic vi) Pneumatic b) Ensure proper working of all gauges . (DPC)		

SN	Details of work to be carried out			Condition /Action	Remarks
2.	Check and ensure that hydraulic valve is fully open.				
3.	Check radiator fan Hydraulic oil pressure & temperature Pressure: should be 100 – 110 bar during normal operation Temperature: Not more than 70°C				
4.	Check and record:				
		At Idle rpm	At 1800 rpm		
	i) Engine lube oil pressure: Permissible values	1-2 kg/ cm ²	3-7 kg/ cm ²		
	ii) Lube oil temp: Should lie between 75°C - 105°C				
	iii) Cooling water temp: Should not more than 95°C				

ii) **BRAKE SYSTEM:**

SN	Details of work to be carried out			Condition /Action	Remarks
1.	Pneumatic system (For DPC)				
	a)	Time for charging the Main Air Reservoir from 0 to 8 kg/cm ² with engine at idle notch	10 min. max.		
	b)	Compressor governor setting			
		i) Closed at	8 kg/cm ²		
		ii) Open at	7.4kg/cm ²		
	c)	Safety valve			
		i) Blowing pressure	8.5 ± 0.1 kg/cm ²		
		ii) Closing pressure	7.5 to 7.8 kg/cm ²		
	d)	Setting of Safety valve brake cylinder			
		i) DPC	1.8 kg/cm ²		
		ii) TC	1.4 kg/cm ²		
	e)	Setting of pressure limiting valve			
		DPC	1.6 kg/cm ²		
		TC	1.2 kg/cm ²		
	f)	Duplex check valve to charge horn reservoir opens at	5.0 kg/cm ²		
	g)	Control circuit governor			
		i) Closes at	4.2 kg/cm ²		
		ii) Opens at	3.4 kg/cm ²		
	h)	Equipment governor			
		i) Closes at	4.2 kg/cm ²		
		ii) Opens at	3.4 kg/cm		

SN	Details of work to be carried out		Condition /Action	Remarks
2.	Check and record the following:			
	a)	Brake Cylinder Pressure	-	
		i) DPC	$1.6 \pm 0.1 \text{ kg/cm}^2$	
		ii) TC	$1.2 \pm 0.1 \text{ kg/cm}^2$	
	b)	Brake Pipe pressure	$5.0 \pm 0.1 \text{ kg/cm}^2$	
	c)	Feed Pipe Pressure	$6.0 \pm 0.1 \text{ kg/cm}^2$	
	d)	Parking Brake pressure	$5.0 \pm 0.1 \text{ kg/cm}^2$	
3.	Full EP application:			
	a)	B.C. Pressure (for DPC)	1.4 kg/cm^2	
	b)	B.C. Pressure (for TC)	1.2 kg/cm^2	
	c)	Time for BC pressure built-up	3 to 5 sec	
4.	Auto application time		3 to 5 sec	
5.	Emergency application time			
	a)	In EP 'ON'	2 sec max.	
	b)	In EP 'OFF' (or Auto mode)	3 sec max.	
6.	Full EP release			
	a)	B.C. Pressure to drop to 0.4 kg/cm^2 (DPC) in 5.5 to 6.5 Secs & final pressure 0 kg/cm^2		
	b)	B.C. Pressure to drop to 0.4 kg/cm^2 (TC) in 5.5 to 6.5 Secs & final pressure 0 kg/cm^2		
7.	Auto Release Time		5 to 7 sec.	
8.	Leakage Tests			
	a)	Main Reservoir system with EP Brake application: $1.0 \text{ kg/cm}^2/\text{Hour}$ from 8 kg/cm^2 for 3-Car Unit	Observation 0.4 kg/cm^2 in 4 min	
	b)	Brake pipe system Handle at Lap/R.R. with Br. control isolating cock closed: $1 \text{ kg/cm}^2/\text{Hour}$ from 5 kg/cm^2	Observation 0.4 kg/cm^2 in 24 min	
	c)	Brake Cylinder (Handle Emergency, EP switch off): $1 \text{ kg/cm}^2/\text{Hour}$ from 1.6 kg/cm^2	Observation 0.4 kg/cm^2 in 24 min	
9.	Functional Test: (DPC & TC)			
	a)	A9 valve - Apply & Release	Satisfactory	
	b)	SA9 valve - Apply & Release	-do-	
	c)	EP brake - Apply & Release	-do-	
	d)	Auto brake - Apply & Release	-do-	
	e)	Emergency brake - Apply & Release	-do-	

SN	Details of work to be carried out			Condition /Action	Remarks
	f)	Guard's valve - Apply & Release	-do-		
	g)	Deadman's device - Apply & Release	-do-		
	h)	Brake application by opening brake pipe angle cock at one end - Apply & Release	-do-		
	i)	Manual release of brake cylinder pressure after emergency application (EP off) – Release of brake block	-do-		
	j)	Brake indication lamp	Effective		
	k)	Function of foot operated horn valve	Satisfactory		
	l)	Function of hand operated horn valve	-do-		
	m)	Function of Horn isolation	-do-		
	n)	Function of Wiper operation / switches	-do-		
	o)	Function of Unloader valve	-do-		
	p)	Function of Auto drain valve	-do-		
	q)	Function of Manual drain cock	-do-		
	r)	Function of Isolating cock with vent	-do-		
	s)	Function of End angle cocks	-do-		

iii) Air Dryer (Trip Schedule):

Maintenance schedule of **Air dryer** shall be carried out as per the following schedule.
(Please refer RDSO Document no. MP.MI-18 Rev. - 02, April-2008)

SN	Items to be checked	Condition/action	Remarks
1.	Open drain cock of final filter to drain off any accumulated water content	-	
2.	Check the colour of humidity indicator: It indicates condition of air after passing through air dryer. Indication of various colour are as under.		
2.1	Blue colour	Dryer is performing correctly	
2.2	Lavender colour	-Dryer is suspect - Verify dryer is cycling. - If dryer is cycling correctly and auto drain valve of main reservoir No.1 is operating correctly, release the DEMU for service	
2.3	White colour	-Possible damaged dryer - Verify dryer is cycling. -Remove humidity indicators and look for desiccant dust or residue on inside of manifold	

SN	Items to be checked	Condition/action	Remarks
		and humidity indicators. - If desiccant dust or residue is seen— Remove dryer for attention. - If no desiccant dust or residue is seen on inside of manifold- Install new humidity indicators. Again, verify dryer is cycling correctly & no.1 main reservoir drain valve is operating correctly - Release DEMU for service.	
2.4	Yellow or Brown colour	-Damaged dryer -It indicates that desiccant has been contaminated with oil. Replacement of coalescing element and desiccant is required.	
3.	Check auto drain of main reservoir no.1	It should function properly.	
4.	Check electrical connection of Air dryer and their tightness.	-	

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition /Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part - I
Schedule for Engine, Air Brake, Compressor etc.
Monthly Schedule (30 days)

DPC/TC No.:

Cumulative km.

Date:

Cumulative hrs.

Repeat all checks of Trip Schedule

A. CONDITION: DIESEL ENGINE STOPPED

(i) CIL KTA-50-L ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	General check: Check tightness of foundation/ mounting bolts of the following:		
	a) Engine		
	b) Radiators		
	c) Compressor		
	d) Radiator & Ventilation fan.		
	e) Inlet & Exhaust manifolds.		
2.	Change the following filters bi-monthly (T4, T8, T12...., T36) as per Para 8.1 of “General Description” of this report: (Pl. refer RDSO's letter no. SD.DEV.R.8.3 dated 10.11.2010)		
	a) Engine lube oil system: - i. Full flow filter ii. By-pass filter		
	b) Engine fuel filter		
3.	Change Engine Oil bi-monthly (T4, T8, T12...., T36) as per Para 8.1 of “General Description” of this report (Pl. refer RDSO's letter no. SD.DEV.R.8.3 dated 10.11.2010)		
4.	Fuel inlet connection screens: Check and clean magnetic filter screens in fuel system.		
5.	Breathers: Clean and inspect. Replace, if damaged.		
	a) Crank case breather		
	b) Compressor breather		
	c) Fuel Tank breather		
	d) Hydraulic Tank breather		
6.	Coolant (Compleat EG 50:50): Engines provided Glycol based coolant:		
	a) Check coolant with CAC Test Strip		
	b) Add Compleat EG, if value per liter < 1.6		
	c) If coolant color is light blue, pH is within limit (8.5 to 10)		
	d) If colourless, add coolant CAC to maintain concentration		
7.	Coolant: The coolant water should be changed at 18M when total hardness and total chloride content exceeds the following limits:		

SN	Details of work to be carried out	Condition /Action	Remarks
	a) Total hardness : 200 ppm as CaCO ₃		
	b) Chlorides : 50 ppm as NaCl		
	c) pH : < 7		
8.	Hydraulic Oil & Filter:		
	a) Hydraulic oil to be checked for water contamination by draining sample from the bottom plug and see if cloudiness is observed in the oil.		
	b) Hydraulic oil & filter to be changed (<i>only during first monthly and then during Half-Yearly schedule</i>)		
9.	Compressor:		
	a) Check Operational noise and vibration.		
	b) Check Oil leaks at the shaft seal.		
	c) Remove and clean suction filter thoroughly.		
10.	Air Piping & Hoses: Check air piping. Visually inspect hoses, pipes for damages/cracks and clamps for looseness.		
11.	Fire Extinguisher: Test and refill the fire extinguishers if necessary.		

(ii) **Cat 3508B ENGINE**

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Repeat trip schedule		
2.	Inspect water separator filter- subject to diesel quality <i>Note: Filters can be used up to 3 months.</i>	-	
3.	Check battery electrolyte level & connections	-	

B. CONDITION: DIESEL ENGINE RUNNING

i) **Diesel Engine (CIL KTA 50L and Cat 3508B):**

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Cooling water system Check that vent pipes in the system are clear.		
2.	Check working of radiator fan: Radiator fan RPM should be measured by inserting tachometer at fan shaft.		
	a) Radiator Fan	Min.: 750 Max.: 1600	
	b) Vent Fan	Max.: 1200	
3.	Compressors: Check safety valve operation of compressor. (9.0 kg/cm ²)		

ii) **Air Dryer:**

Maintenance Schedule of **Air dryer** shall be carried out as per the following schedule. *(Pl. refer RDSO Document no. MP.MI-18 Rev. - 02, April-2008):*

SN	Items to be checked	Condition/action	Remarks
1.	Check cyclic operation of air dryer.	While the dryer is cycling, there should be a slight and continuous exhaust from the relevant purge valve. After pre-determined cyclic time, exhaust from the purge valve stops and that of the second tower starts exhausting. This cycle should be reversed after cycle time. The cycle timings of various makes of air dryer are as per respective OEM's maintenance manual.	
2.	Check Memory Feature	When compressor gets unloaded purging of air should stop and when compressor again gets loaded purging should continue.	
3.	Examine the drain valve on the sump of pre-coalesce	With the dryer operation, the drain valve must expel a short burst of air once a minute (each cycle).	

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part - I
Schedule for Engine, Brake Power, Compressor etc.
Quarterly Schedule (3 months)

DPC/TC No.:

Date:

Repeat all checks of Trip & Monthly Schedule.

Cumulative km.

Cumulative hrs.

A. CONDITION: DIESEL ENGINE STOPPED

(i) CIL KTA-50-L ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Fuel injectors and valves: <i>(Only during first quarter and then during D/E check)</i>		
	a) Adjust fuel injectors.		
	b) Check and ensure valve clearance as: Inlet : 0.36 mm / 0.014 inch Exhaust : 0.69 mm. / 0.027 inch		
	c) Replace Rocker cover gasket & tighten the cover cap screw to 45 Nm.		
2.	Water Pump: Check water pump for free rotation and coolant leakage, if any		

(ii) Cat 3508B ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Replace fuel filter	Subject to differential pressure. It should not be more than 15psi.	
2.	Replace lube oil filter		
3.	Change lube oil - Subject to SOS report		
4.	Replace seal lube oil filter		
5.	Replace seal fuel filter		
6.	Replace water separator filter- subject to diesel quality <i>(Note: Max. life of water separator is 3 months)</i>		
7.	Replace air cleaner element inner <i>(Note: Inner element need to change every 3 cleaning of outer element)</i>		
8.	Replace air cleaner element outer <i>(Note: Outer element can be cleaned max. 6 times)</i>	The differential pressure should not be more than 6.2 kPa	
9.	Clean crankcase breather		
10.	Check & inspect engine protective device, sensors.		

(iii) **BRAKE SYSTEM**

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Compressors:		
	a) Change oil.		
	b) Check inlet air filter.		
	c) De-carbonize all disc valves.		
	d) Recondition all suction unloaders.		
	e) Check tightness of compressor pulley locknut.		
2.	A-9 & SA-9 brake valves for DPC & TC. Lubricate brake valve cams.		
3.	Pneumatic System: a. Clean aftercooler externally by blowing compressed air. b. Blow down air reservoirs with compressed air and clean.		

B. CONDITION: DIESEL ENGINE RUNNING

(i) **ENGINE (CIL KTA 50L and Cat 3508B):**

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Check for leakages in all the systems.		

(ii) **AIR DRYER:**

Maintenance schedule of **Air dryer** shall be carried out as per the following schedule.

(Pl. refer RDSO Document no. MP.MI-18 Rev. – 02, April-2008):

SN	Items to be checked	Condition / Action	Remarks
Quarterly			
1.	Repeat all the items of Monthly schedules.	-	
2.	Charge the system from zero pressure and check the dryer does not cycle immediately. Note the pressure when the dryer starts cycling. <i>(Note: Pressure settings of start of cyclic operation are as per respective OEM's maintenance manual.)</i>		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part - I
Schedule for Engine, Air Brake, Compressor etc.
Half-Yearly Schedule

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs.:

Repeat all checks of Trip, Monthly & Quarterly Schedule

A. CONDITION: DIESEL ENGINE STOPPED

(i) CUMMINS KTA 50L ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Hydraulic system		
	a) Change oil.		
	b) Change return line filter element.		
	c) Clean and check strainer for external damage. Change if necessary.		
2.	Compressor: Clean Coolers.		

(ii) Cat 3508B ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Engine cleaning		
2.	Check vibration damper		
3.	Clean radiator with compressed air		
4.	Engine mounts inspection		
5.	Driven equipment check (i.e. Alternator)		

B. CONDITION: DIESEL ENGINE RUNNING

(i) CUMMINS KTA50L ENGINE

SN	Details of work to be carried out	Condition /Action	Remarks
1.	Hydraulic systems-leak-offs from pumps: Check for leak-offs from pumps in the hydraulic systems. Remove leak-off hose and collect oil in measuring jar for one minute.		
	a. Radiator pump leak-off: i) Variable Displacement < 6.3 liters/min. ii) Fixed Displacement < 5.6 liters/min.		
	b. Vent pump leak-off < 1.9 litres/min.		
2.	Leakage: Check for leakages in the system.		

(ii) Air dryer:

Maintenance schedule of **Air dryer** shall be carried out as per the following schedule.
(Pl. refer RDSO Document no. MP.MI-18 Rev. - 02, April'2008):

SN	Items to be checked	Condition/ Action	Remarks
1.	Repeat all the items of Monthly schedules.		

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2.	Charge the system from zero pressure and check the dryer does not cycle immediately. Note the pressure when the dryer starts cycling. <i>(Note: Pressure settings of start of cyclic operation are as per respective OEM's maintenance manual.)</i>		
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REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part - I
Schedule for Engine, Air Brake, Compressor etc.
Nine Monthly Schedule (9 monthly)

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs.:

CONDITION: DIESEL ENGINE STOPPED

(CATERPILLAR Cat 3508B ENGINE ONLY)

Repeat all checks of Trip, Monthly & Quarterly Schedule

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Hoses & clamps inspect / replace, if required.		
2.	Add Coolant If used Extended Life Coolant (ELC)		
3.	Check hydraulic lines & coolant joints		
4.	Replace Hydraulic oil Filter		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – I
Schedule for Engine, Air Brake, Compressor etc.
Yearly Schedule (12 monthly)

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs.:

Repeat All Checks of Trip, Monthly, Quarterly & Half Yearly Schedule

CONDITION: DIESEL ENGINE STOPPED

A. CATERPILLAR Cat 3508B ENGINE ONLY

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Engine Valve lash Check and adjust (Tappet Seal)	To be done by firm	
2.	Speed sensor: Clean/ Inspect		
3.	Fuel Injectors: Inspect& Adjust		

B. Brake System:

Air Dryer: (To be carried out in every 4th yearly schedule i.e. in 48 months)

Maintenance of **air dryer** shall be carried out in the following schedule:

SN	Items to be checked	Condition/action	Remarks
1.	Repeat all the lower schedules		
2.	*Overhaul the complete air dryer and change desiccant during 4-yearly schedule .		
3.	**Replace consumables as per respective manufacturer's recommended replacement kit		
4.	*Clean external muffler connected with purge valves.		
5.	Check condition of each pipe assembly and their tightness.		
6.	***Test each air dryer before putting it back in to service during alternate Eighteen Monthly Schedule		

Note:

* Follow the instructions given in maintenance manual of respective manufacturers.

** Please see Annexure-III of Ref. doc. **RDSO MP.MI-18 Rev.-02, April-2008** for list of items to be replaced.

*** Schematic diagram of test bench and list of tests to be conducted with format of record to be maintained are given in Annexure-IV and V respectively of Ref. Doc. **RDSO MP.MI-18 Rev. - 02, April-2008**. For further details, **specification no. MP.0.01.00.06** may be referred.

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / Action	Sign.	Remarks
1			
2			
3			
4			

	Technician	SSE/JE
Name		
Signature		

Part – I
Schedule for Engine, Air Brake, Compressor etc.
Eighteen-Monthly Schedule (18 months)/ D-Check

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs.:

Repeat all checks of Trip, Monthly, Quarterly and Half-yearly Schedule

CONDITION: DIESEL ENGINE STOPPED

(FOR CUMMINS KTA-50-L ENGINE)

SN	Details of work to be carried out	Condition/ Action	Remarks
1. Air Intake & Exhaust System			
1.1	Air-intake System: Check for leakage in air intake system, if any, rectify the same with necessary parts.		
1.2	Air Filter: Replace air cleaner inner & outer filter elements		
1.3	Vacuum Indicators: Check vacuum indicators for functioning of reset button & external damages and replace if necessary		
1.4	Check for leakage from exhaust system, if any; rectify the same with necessary parts.		
1.5	Check & replace hoses & clamps of air intake pipings on condition basis.		
1.6	Check air intake and exhaust pipings supports . Take corrective action accordingly.		
1.7	Clean the engine room panel filters by dry compressed air and replace if necessary.		
1.8	Turbocharger: i) Check oil leakages through intake & exhaust seals. ii) Check turbocharger shaft end clearance with a dial depth gauge (value: 0.05mm to 0.13 mm). iii) Repair the turbo with repair kit.		
2. Fuel System			
2.1	Clean water separator assembly.		
2.2	Replace fuel filter element.		
2.3	Replace all fuel line hoses .		
2.4	Calibrate the injectors after replacing the cups and O-rings.		
2.5	Calibrate the PT pump by replacing the necessary parts need to be changed for calibration (magnetic filter, gasket set, etc.)		
2.6	Adjust valve. Check the conditions of push rods, adjusting nut & screws, if necessary, replace.		
2.7	Check fuel lines & connections for leakage .		

SN	Details of work to be carried out	Condition/ Action	Remarks
2.8	Check fuel pump linkages.		
2.9	Check actuator functioning.		
2.10	Clean thoroughly fuel tank with steam and detergents and dry the tank with air blast.		
3. Lubricating Oil System			
3.1	Replace engine oil.		
3.2	Replace full flow & bypass filter elements.		
3.3	Replace all oil line hoses & clamps.		
3.4	Check external oil leakage from head gasket/rocker housing gasket, seals, etc. If necessary, replace the same.		
4. Cooling System			
4.1	Flush cooling water tank . Replenish with Compleat EG 50:50 coolant. Replace CR element of system with Compleat EG 50:50 coolant for DPCs having CR element. Check total hardness and total chloride content. The limits are given below:		
	a) Total hardness : 200 ppm as CaCO ₃		
	b) Chlorides : 50 ppm as NaCl		
	c) pH : < 7		
4.2	Replace water pump drive belts .		
4.3	Replace all hoses, clamps & coupling O-Rings of cooling system pipe lines and radiator assembly.		
4.4	Remove radiator assembly from the mounting & clean the radiator assembly.		
4.5	Check all radiator Anti Vibration Mountings and replace if necessary.		
5. Hydraulic System			
5.1	Replace hydraulic oil . Ensure that oil cleanliness level is of NAS1638 Class 9 or better		
5.2	Replace hydraulic oil return line filter .		
5.3	Replace vent pump belts .		
5.4	Clean hydraulic system strainer . Check for external damage, replace if necessary.		
5.5	Check thematic valve operation.		
5.6	Externally clean & check leak-offs from main hydraulic & ventilation pump at rated speed. i. Radiator fan pump : a) Variable Displacement < 6.3 litres/min. b) Fixed Displacement < 5.6 litres/min. ii. Vent fan pump : < 1.9 liters/min.		
5.7	Externally clean & check leak-offs from main hydraulic & ventilation motor at rated speed. Radiator fan motor : < 2.550 litres/min. Vent fan motor : < 0.8 litres/min		
5.8	Externally clean & check radiator fan operation		

SN	Details of work to be carried out	Condition/ Action	Remarks
5.9	Externally clean & check vent fan operation		
5.10	Hoses: i) Replace all hydraulic pressure line hoses. ii) Replace all hydraulic leak-off & return line hoses on condition basis.		
5.11	Clean hydraulic oil cooler externally.		
5.12	Check & set hydraulic system pressure at 170bar		
6.	Brake valves: i. Dismantle and overhaul all brake valves. ii. Replace all 'O' rings seals and gaskets. iii. Assemble and test to evaluate their performance.		
7.	Compressor: i. Dismantle and overhaul ii. Replace worn out parts. iii. Replace all 'O' rings, gaskets, oil seals. iv. Change inlet air filter element. v. Assemble and run the compressor to evaluate its performance.		
8.	Vibration Damper: Check Vibration damper, replace if necessary.		
9.	Carry out repairs advised by Shed in Pre-Shopping report.		

FOR CATERPILLAR Cat3508B ENGINE:

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Charging alternator check and inspect		
2.	Turbocharger check, clean & inspect		
3.	Water pump check & inspect		
4.	Change Extended Life Coolant (ELC)		
5.	Coolant temperature regulator replace (92 ⁰ C)		
6.	After cooler line temperature regulator (47 ⁰ C)		
7.	Speed sensor alongwith all other sensors, clean & inspect.		
8.	Replace Lube Oil Filter		
9.	Change Lube oil		
10.	Replace Fuel Filter		
11.	Replace Air Filter		
12.	Replace Coolant Water Separator Filter		
13.	Replace Hyd. Oil Filter		
14.	Change Hydraulic oil		

CONDITION: DIESEL ENGINE RUNNING

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Carry out the load box test to check the performance of engine.		
2.	Check for the leakages in various systems.		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – II
Schedule of Electrical Transmission & Controls
Trip Schedule (max. 15 days or 3500 EKM)

DPC No.
Dated

Cumulative km:
Cumulative hrs.:

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Check following items for unusual sound, high temperature and odour.		
a)	Traction motor (TM)		
b)	Traction alternator (TA)		
c)	Aux. Alternator (AA)		
d)	Rectifier blower motor (RBM)		
e)	24-volt battery charging alternator (Chg. Alt.)		
2.	Check the electronic governor in each notch (engine)		
a)	Raise the notch from 1 st to 8 th and check the LED indication on LCC / ELCM /G&EC.		
b)	Check RPM of engine from the RPM indicator in the cab. 1st notch – 700, 2nd notch – 1000 3rd notch – 1200, 4th notch – 1300 5th notch – 1400, 6th notch – 1500 7th notch – 1650, 8th notch –1800		
3.	110V Aux. alternator: Check charging rate and voltage of auxiliary generator in each notch. Charging voltage should be above 110 volt		
4.	24V Charging alternator: Record voltage of 24 volt alternator in each notch. Voltage of 24 volt alternator should be Min – 25 V and Max 27 V .		
5.	Batteries: Check electrolyte level of batteries. Electrolyte level should be maintained up to green mark of level indicator fitted on each cell.		
6.	Blowing of Electrical components: Stop the engine and blow all electrical components with dry compressed air at 3kg/cm² .		
7.	Rectifier Box: Clean rectifier box with dry compressed air at 3 kg/cm ² .		
8.	Check following electrical equipment for loose connection and for proper working .		
a)	Switches.		
b)	Lights		
c)	MCBs		
d)	Check working of indication lights on driver panel by indication test switches		
9.	Carbon brushes: Check carbon brushes /pig tail, brush holder and commutator surface (record details of flash-over if any and clean the commutator)		
a)	24 volts Alternator		
b)	Traction motor		
10.	Check suspension bearing – on TM4303CZ or equivalent motors		
a)	Use standard dipstick . Add oil as required.		
b)	In case of overheating or discoloration of oil , take out		

SN	Details of work to be carried out	Condition/ Action	Remarks
	felt wick carrier and examine the bearing		
c)	Check condition of nose cap bolts for any slackness		
11.	Check roller suspension bearing – on TM4303 DY or equivalent motors		
a)	Feel the bearing temperature by hand		
b)	Check for loose or missing bolts		
c)	Check for missing or damaged grease nipple		
12.	Check T/M gear case		
a)	Check if any gear case bolt is slack or missing		
b)	Add Cardium compound in gear cases (capacity 3.4kg Max.)		
13.	Check proper securing of train line couplers		
14.	Start engine and check the following:		
a)	Operation of self-starter (local and remote)		
b)	Drivers and guards key switches.		
c)	Proper working of relays and their sequence.		
d)	Ensure resetting of relays electrically from cab.		
e)	Power Contactors and Reverser contactors: Check leakage of air		
f)	Check working of load meter (LAM) at 1 st notch from both DPC and TC. LAM value at 1 st notch (300 – 800 amp)		
15.	Check the following safety items:		
a)	Pull passenger alarm chain i) DPC ii) TC Buzzer should sound in the Driver's cab.		
b)	Guard & Driver communication On pressing the buzzer button in one cabin, the Light should glow and buzzer should sound in other cabin.		
c)	Emergency bell		
d)	Signal bell		
e)	Headlight, flasher lights, tail lamps, emergency headlights.		
16.	Check V belts for correct tension and serviceability.		
a)	Auxiliary alternator (110 volts).		
b)	Auxiliary alternator (24 volts).		
17	Check IR values. Ensure minimum 1 mega ohm		
a)	Power to Ground		
b)	Power to Control		
c)	Control to Ground		
18	Master controller		
a)	Open the cover and clean the master controller.		
b)	Check and ensure that none of the cams is damaged or cracked.		
c)	Check and ensure proper operation of the contactors and interlocks.		
d)	Clean the cams and contactors.		
e)	Check visually connections for tightness.		
f)	Check and ensure proper working of Deadman's application device.		

RDSO (MP)	Standard Schedule no. MP.MISC.-157	Rev.-04	August-2020
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REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / Action	Sign.	Remarks
1			
2			
3			
4			

	Technician	SSE/JE
Name		
Signature		

Part – II
Schedule of Electrical Transmission & Controls
Monthly Schedule (One Month)

DPC No.

Cumulative km:

Dated

Cumulative hrs:

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Carry out all Trip Schedule items.		
2.	Check and record traction alternator no load voltage (NLV)		
	Measure between 1711/1713 & 1712 terminals (of LCC/ELCM) by AC voltmeter At 1 st notch voltage should be 210 Volts At 8 th notch voltage should be 900 volts		
3.	Master controller		
	Lubricate with light machine oil all bush bearings, hinges and rollers (wipe out the excessive oil)		
4.	MAIN RECTIFIER		
a)	Open the rectifier box cover and clean with compressed air of 3kg/cm ² and observe whether any abnormality like heating mark etc. is there.		
b)	Check up all fixing bolts and nuts.		
c)	Checkup tightness of connections.		
d)	Clean diodes with brush.		
e)	Check for any abnormality in the connection and ensure there are no loose, broken or punctured leads.		
f)	Check connections and micro switches of fuse trip indicator		
g)	Clean filters of cooling duct		
5.	AUXILIARY RECTIFIER CUM REGULATOR		
	Open the rectifier box cover and clean the rectifier with compressed air of 3kg/cm ² and look for any abnormality like heating etc.		
6.	ITEMS TO BE CHECKED AFTER SHUTTING DOWN THE ENGINE		
	Blow out main and aux. alternator with dry compressed air; of 3 kg/cm ² , Open cover and tighten loose connections.		
7.	TRACTION MOTOR		
a)	Blow out with dry compressed air of 3 kg/cm ² , inspect brushes, brush holder and commutator. Clean and check connections.		
b)	Check the condition of covers, cables, clamps support chain etc.		
c)	Check the commutator for flash marks, crushed segments, grove fusion and creep. Check the armature glass band, whether intact or not		
d)	Check the condition of insulator and brush holder.		
e)	Clean the wire-mesh and check the condition of bellows.		
f)	Check and ensure that brush springs function properly.		
g)	Check the condition of carbon brushes and look for any cracked or damaged pigtails.		

SN	Details of work to be carried out	Condition/ Action	Remarks
8.	RECTIFIER FAN BLOWER MOTOR		
a)	Check that there are no abnormal vibration, noise or false indication		
b)	Check the wiring and connection of motors and air pressure switches.		
9.	RELAY BOX		
a)	Clean all relays and their covers properly.		
b)	Check and tighten, fastening nuts and bolts.		
c)	Operate the relay by hand and ensure proper operation.		
d)	Test check ground relay and overload relay (Earth fault and over-current)		
e)	Clean contacts of all relays		
10.	CONTACTOR BOX		
a)	Clean the contactors with brush.		
b)	Clean the arc chute.		
c)	Examine the arc chute for any damage due to excessive arcing.		
d)	Check and ensure that there are no loose nuts or bolts		
e)	Check for free movement of the moving contact and its carriers		
f)	Examine the condition of contact surface for abnormal wear or pitting. If the contact tip has become rough, grind it with fine polish paper and make the surface smooth so that tips are in good contact condition.		
g)	Check the springs for any breakage; also check the latch mechanism.		
11.	BATTERIES		
a)	Clean batteries, battery boxes, tighten the terminal lugs and apply petroleum jelly on all terminals.		
b)	Ensure that the plugs are clean		
c)	Check and record specific gravity Specific gravity should be (1200-1240)		
d)	Check electrolyte level & to be maintained up to green mark of indicator		
e)	Check if any battery is having reverse polarity		
f)	Check and record battery voltage. Should be min -1.8 V, max -2.2 V		
12.	SAFETY DEVICES		
a)	Ensure that oil pr. switch is in proper working order Setting of OPS at 12 PSI		
b)	Ensure proper working of hot water temp. Safety device. ETS-1 should pick-up at 91°C and should drop-out at 87°C. LED indication should come on Engine Control Panel & buzzer should sound. ETS-2 should pick up at 96°C and drop out at 91°C. LED indication should come, buzzer should sound and excitation should cut off.		
c)	Ensure proper working of low cooling water level safety device. On pickup engine should shut down along with LED indication and buzzer should sound		

RDSO (MP)	Standard Schedule no. MP.MISC.-157	Rev.-04	August-2020
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SN	Details of work to be carried out	Condition/ Action	Remarks
d)	Ensure proper working of engine over speed safety device. Raise engine RPM by pressing Fuel Actuator plunger. Engine should shutdown at 1980 RPM along with LED indication and buzzer should sound.		
e)	Check proper working of all interlocks of the cab		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – II
Schedule of Electrical Transmission & Controls
Quarterly Schedule (3 months)

DPC No.

Dated

Cumulative km:

Cumulative hrs:

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Repeat all items of trip& monthly schedules		
2.	Check tightness of main and aux. alternator foundation bolts . If found loose, tighten using a suitable range torque wrench to the recommended torque value.		
3.	Check MPU resistance and voltage: Internal resistance should be 50 –300 ohms & minimum voltage should be 1.5 volts AC (RMS) at 150 RPM and 10 V AC at 1800 RPM.		
4.	Check connection of the following: (a) LCC / ELCM / G&EC, (b) Starter, (c) 24V Alternator, (d) All Terminal boards and junction boxes		
5.	Check the tightness of Rectifier Blower locking nut and junction box connections		
6.	Check the condition of exciter output leads		
7.	Measure Exciter air gap		
8.	Suspension bearing		
8.1	Check roller suspension bearing – on 4303 DY motors		
a)	Feel the bearing temperature by hand		
b)	Check for loose or missing bolts		
c)	Check for missing or damaged grease nipple		
d)	Check for cracked suspension tube		
e)	Check for loose enclosure		
8.2	Sleeve Suspension bearing		
a)	Remove and clean Suspension bearing wick pads – on 4303 CZ motors		
b)	Check radial clearances by a feeler gauge, which is long enough (270 mm). Min : 0.8246 mm and Max : 2.9 mm		
c)	Check lateral clearance. Use feeler gauge and measure clearance between bearing flange and wheel hub. Min: 1 mm and Max: 2.5 mm at each side		
9.	Check operation of bells		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – II
Schedule of Electrical Transmission & Controls
Half - Yearly Schedule (6 months)

DPC No.

Dated

Cumulative km:

Cumulative hrs:

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Repeat all items of trip, monthly & quarterly schedules.		
2.	Check in situ (a) HWT Safety control (b) Signal/Alarm bell		
3.	Remove and overhaul the following (a) Starter (b) 24 V Alternator (c) Oil safety control (OPS) (d) Rectifier blower and blower motor (e) Engine Temperature sensors (ETS-1 & ETS-2)		
4.	Conduct Load Box test **		
a)	On 8 th notch, input to the alternator (excluding auxiliaries) should be 1317 HP. At least three different readings corresponding to Max. voltage limit, Max. current limit and constant HP curve should be recorded. Voltage and current values should be verified with VI curve of Alternator**		
b)	ELCM / G&EC characteristics ** Check LCC characteristics ***		

Note: Half-yearly Schedule be conducted after six months and should be repeated again after twelve months of commissioning/POH.

**** For BHEL Electrics refer BHEL manual:** Maintenance manual for Broad Gauge High HP (1400 HP) Diesel Electric Multiple Units (Electrical Equipment).

**** For CG Power & Industrial Solutions Ltd. refer CG Power & Industrial manual:** Operation & Maintenance manual of Electrical Equipment for High Horsepower Diesel Electric Multiple Units (AC/DC System).

***** For LCC refer Product Information Bulletin PIB 1097 of User Manual D 2000 of CIL.** For electrics other than BHEL and CG Power & Industrial Solutions Ltd make, refer respective manufacturer's maintenance manuals.

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

Part – III
Schedule of Coach body, Under frame, Bogie, Brake rigging etc.
Primary Examination (on rake) max. 15 days or EKM 3500

DPC/TC No.:

Cumulative km:

Date :

Cumulative hrs:

SN	Details of work to be carried out	Condition/ Action	Remarks
1.	Coach		
	Coach should be washed both from outside and inside .		
2.	Shell		
2.1	Visually check body panels/end walls for damages.		
2.2	Visually inspect destination board's brackets.		
2.3	Visually inspect window bars for damage/missing.		
2.4	Examine body side doors for working/damages.		
2.5	Inspect door handles for damages/missing.		
2.6	Inspect vestibule and its Rubber fittings for damages/missing, repair if necessary.		
2.7	Visually check vestibule fall plate , mounting brackets, pins and lock lever for ease of operation, damages/deficiency.		
3.	Under frame		
3.1	Visually examine center pivot mounting bolts and attend if needed.		
3.2	Check condition of head stock/sole bar .		
3.3	Visually inspect center pivot cover .		
4.	Bogie		
4.1	Bogie frame		
4.1.1	Examine visually the condition of bogie side frame, transom, longitudinal, bolster etc. at all welded locations.		
4.1.2	Examine rubber stopper/stop screw of axle box crown for damage/missing/loose.		
4.1.3	Inspect axle box safety straps/loops for damage/broken/missing.		
4.1.4	Brake hanger brackets for damages.		
4.1.5	Inspect safety brackets for brake hanger pins.		
4.1.6	Examine visually anchor link bracket of TC.		
4.2	Primary Suspension		
4.2.1	Visually examine axle box springs for breakage.		
4.2.2	Visually examine dashpot oil filling special screw for deficiency.		
4.2.3	Check oil leakages in dashpot through defective seals/vent screws.		
4.2.4	Visually examine axle box clearance.		
4.3	Secondary Air Suspension		
4.3.1	Visually check general condition of air spring for external damages, air leakage and infringement of any fitting etc.		
4.3.2	Drain 150-liter air reservoir of air spring.		
4.3.3	Drain 20-liter air reservoir of air spring.		

SN	Details of work to be carried out	Condition/ Action	Remarks
4.3.4	Visually check anchor links of TC.		
4.3.5	Visually examine the anchor link securing bolts and attend if needed of TC.		
4.3.6	Visually examine connecting stay.		
4.3.7	Examine vertical/lateral shock absorbers for damages.		
4.4	Brake rigging		
4.4.1	Check brake gear and adjust so that the piston stroke is within the limit.		
4.4.2	Examine brake beams breakages/damages.		
4.4.3	Check and attend brake beam safety wire ropes/safety straps.		
4.4.4	Check and attend brake shoe head and key and replace if necessary.		
4.4.5	Check and replace worn brake blocks.		
4.4.6	Visually inspect brake hangers, brake gear pins and cotters/split pins and replace if necessary.		
4.4.7	Visually inspected damaged/missing brake gear bushes and replace if necessary.		
4.4.8	Examine lever hanger pins.		
5.	Brake System		
5.1	Air brake system		
5.1.1	Conduct brake test as per rake test and attend leakages and defective components if any.		
5.1.2	Visually inspect for damage on brake pipe, feed pipe and hose coupling.		
5.1.3	Visually inspect suspension bracket for air brake equipment and anti-pilferage device for any defect and rectify.		
5.1.4	Check passenger alarm by pulling the chain with spring balance with 6.4 kg to 10 kg force.		
5.1.5	Carry out manual brake release test to ensure proper function of release lever.		
5.1.6	Check and adjust brake gear to achieve correct piston stroke .		
5.1.7	Service application & release test of every coach of the rake to ensure full brake power.		
5.1.8	Carry out guard van valve test to ensure proper functioning of guard van valve .		
5.2	EP brake system		
5.2.1	Conduct brake test as per rake test and attend leakages and defective components if any.		
5.2.2	Visually inspect for damage on brake pipe, feed pipe and hose coupling.		
5.2.3	Visually inspect suspension bracket for air brake equipment and anti-pilferage device for any defect and rectify.		
5.2.4	Check passenger alarm by pulling the chain with spring balance with 6.4kg to 10kg force.		
5.2.5	Carry out manual brake release test to ensure proper function of release lever.		
5.2.6	Check and adjust brake gear to achieve correct piston		

SN	Details of work to be carried out	Condition/ Action	Remarks
	stroke.		
5.2.7	Check service application & release of brakes under EP, auto & emergency mode through brake controller.		
5.2.8	Carry out guard van valve test to ensure proper functioning of guard van valve.		
5.3	Parking Brake System		
5.3.1	Check that the parking brakes are applied & released properly.		
5.3.2	Check the functions of indicators for parking brakes.		
5.4	Air dryer		
5.4.1	Check the condition of air dryer fuse & humidity indicators.		
6.	Schaku Coupler		
6.1	Check for physical damage/missing components.		
6.2	Examine rubber pads for damages.		
6.3	Check for slackness between two coupled couplers , which should not be more than 4mm or 2mm in case of individual coupler and to be checked with coupler play inspection gauge.		
7.	Buffing Gear		
7.1	Visually examine buffer plungers for damage/drooping/stroke length.		
7.2	Examine buffer mounting bolts and attend if necessary.		
7.3	Examine visually buffer casing for cracks/damages.		
8.	Running gear		
8.1	Examine visually axle box for grease oozing out, warm box if any.		
8.2	Visually examine wheel tyre profile and thickness of tyre and check with tyre profile gauge if they appear to be near condemning limit.		
8.3	Visually inspect axle box covers.		
8.4	Inspect wheel tread for shattered rim, spread rim, shelled tread, thermal cracks and heat checks.		
9.	Seats		
9.1	Oil or head stain and dirty spots if any should be cleaned with mild soap solutions and wipe dry.		
9.2	Seats and frames should be cleaned.		
10.	Doors		
10.1	Examine doors for proper functioning and securing with hinge pivots. Doors should not graze with floor or door sill plates.		
10.2	Examine door locks, latches firmly secured with correct sized screws and properly/smoothly engaging in their slot. The tongue of gravity type latch should be in proper alignment with its slot plate.		
10.3	Visually examine window shutters for smooth working and proper locking.		
10.4	Examine visually rolling shutters/sliding doors of vestibule for smooth working.		
10.5	Examine visually operation of sliding door for smooth		

SN	Details of work to be carried out	Condition/ Action	Remarks
	operation.		
11.	Windows		
11.1	Check window-balancing mechanism for proper function.		
11.2	Examine window safety catches for proper engagement in their slots.		
11.3	Window bars should be provided and fixed in prescribed manner and replaced if damaged.		
11.4	Check the availability of emergency exits in coaches. Examine and attend if necessary.		
12.	Interior fittings		
12.1	Examine laminated panels and mouldings for		
12.2	damage/cracks.		
12.3	Visually inspect amenity fittings, replace if found damaged/deficient.		
12.4	Examine ventilation grills for damages.		
12.5	Examine luggage racks/bunks for breakage.		
13.	Axle Box: Inspect for sign of overheating of roller bearing of axle boxes		
14.	Cattle Guards: Check proper fitting of cattle guards of DPC and TC		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – III
Schedule of Coach body, Underframe, Bogie, Brake rigging etc.
Monthly Schedule-`A`
(On rake at nominated primary depot.)

DPC/TC No.:

Cumulative km.:

Date :

Cumulative hrs.:

SN	Details of work to be carried out				Condition /Action	Remarks
1.	Repeat all items of Primary Schedule					
2.	Coach					
2.1	Disinfect and spray insecticide at corner and crevices of coaches after washing all coaches.					
2.2	Intensive cleaning of coach					
3.	Bogie					
3.1	Bogie frame					
	Examine oil level in side bearer oil-bath and oil-filling cap replenish oil if needed.					
3.2	Primary Suspension					
	Add specified grade of oil in dashpot.					
3.3	Secondary Air Suspension					
3.3.1	Checking of installation lever with inflated air spring for normal function, tightening of installation lever nuts, protection screen nuts, tightening of brackets of all flexible hoses.					
3.3.2	Cleaning of air filter of 150-liter reservoir.					
3.3.3	Cleaning of leveling valve filter.					
3.3.4	Thorough checking of air spring, bulging of bellow, air leakage					
3.3.5	Checking of Air suspension pipe leakage by using soap water.					
3.3.6	Removing dust, mud & oil deposit if any, on air spring and control equipment.					
3.3.7	Thorough checking of lower spring beam for any crack and deformation.					
3.3.8	Draining of 150-litres and 20-litres air reservoir of air spring.					
3.4	Brake rigging					
3.4.1	Check and attend brake block adjuster.					
3.4.2	Examine and attend brake levers.					
3.4.3	Examine and attend floating lever suspension brackets.					
4.	Air Dryer					
4.1	Check for proper purging, cycling, automatic draining, external leakage and proper functioning of pressure switch.					
4.2		Knorr Bremse	FTIL	SIL		
	a) Drain valve opens at	4.5 kg/cm ² or above	5-5.8 kg/cm ²	kg/cm ²		
	b) Drain valve closes at	Less than 4.5 kg/cm ²	3.4-4.2 kg/cm ²	kg/cm ²		
	c) Tower change over frequency	120 ± 5 Secs	60 ± 5 Secs	60 ± 5 Secs		

SN	Details of work to be carried out				Condition /Action	Remarks
	d) Indication	Gauge pin	Indication light	-		
	e) Humidity indication	Blue	Blue	-		
	f) Memory function	-	-	-		
5.	Seats					
5.1	Disinfect the seats and frames.					
5.2	Inspect seat and check for completeness.					

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part – III
Schedule of Coach body, Underframe, Bogie, Brake rigging etc.
Quarterly Schedule-`B`
(On rake at nominated primary depot)

DPC/TC No.:

Cumulative km.:

Date :

Cumulative hrs.:

SN	Details of work to be carried out	Condition / Action	Remarks
1.	Repeat all items of Monthly Schedule		
2.	Under frame		
	Examine trough floor, turn under and other under frame members from underneath for corrosion.		
3.	Secondary Air Suspension		
3.1	Checking of air spring, bulging of bellow and air leakage.		
3.2	Checking of air suspension pipe leakage by using soap water.		
3.3	Removing dust, mud & oil deposit if any, on air spring & control equipment.		
3.4	Thorough checking of lower spring beam for any crack and deformation.		
3.5	<i>Tightening of air spring bottom plate bolts and nuts.</i>		
3.6	Measurement of bogie clearances related to air springs.		
3.7	Air spring leak test: Since, this schedule will be carried out on rake; there is no need to check leakage of individual air spring. However, complete Air suspension pipe line leakage may be checked by using soap water and leakage of complete coach / rake may be checked and pressure drop of more than 0.2 kg/cm ² should not be allowed. The details of checking of leakage are as follows:		
	a) Under frame air spring pipe layout: 0.2 kg/cm ² in 10 minutes		
	b) Air spring: Checking of leakage at connection points with soap water.		
	c) 4-Point suspension: Checking of complete air suspension pipe line and various joints for any leakage by using soap water.		
3.8	Tightening of air spring bottom plate bolts and nuts.		
4.	Bogie:		
	Measure and record following clearances		
	a) Axle box crown clearance		
	b) Bogie bolster clearance		
	c) Body bolster to bogie frame clearance		
	d) Bolster stopper clearance		
5.	Brake cylinders		
	Check the piston strokes of brake cylinders under applied & released condition		
	a) Brake cylinder piston stroke 40 mm (DPC)		
	b) Brake cylinder piston stroke 32 ± 1mm (TC)		

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REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / action	Sign.	Remarks
1			
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	Technician	SSE/JE
Name		
Signature		

Part – III
Schedule of Coach body, Under frame, Bogie, Brake rigging etc.
Nine-Monthly Schedule (IOH)

DPC/TC No.

Date :

Cumulative km. :

Cumulative km. :

SN	Details of works to carried out	Condition / Action	Remarks
1.	Repeat all items of Quarterly Schedule.		
2.	Clean dust: Thoroughly clean and remove dust, rust accumulated at pillars through turn under holes with coir brush and compress air.		
3.	Sole bar: Examine for corrosion of sole bar and other under frame members with torch light or inspection lamp. Pocket between sole bars and turn under should be thoroughly cleaned through the inspection opening of the sole bars and inspected with the help of torch light or inspection lamps.		
4.	Bogie to be run out (for all: DPC/TC)		
4.1	Thorough repairs of running gear to be done.		
4.2	Bogie frame		
4.2.1	Check for damage, cracks or deformation on bogie frames.		
4.2.2	Examine condition of wearing piece and wearing plate.		
4.3	Examine and replace all the brake gear components found deficient/worn out.		
4.4	Primary Suspension		
4.4.1	Examine and replace primary and secondary suspension components as required.		
4.4.2	Free height of the springs should be checked and springs should be fitted after pairing.		
4.4.3	Check and attend axle guide assembly if necessary.		
4.4.4	Check axle box clearance with gauge.		
4.5	Secondary Suspension:		
4.5.1	Visual check: General conditions which includes any external damages, air leakage, infringement of any fittings etc. as mentioned in Para 3.3 of ‘ Monthly Schedule-A ’ and Para 3 of ‘ Quarterly Schedule-B ’		
4.5.2	Removal of air springs from bogie and conduct leakage test on test bench. During leak test at test bench pressure drop in one hour should be within 1% of test pressure i.e. 9kg/cm ² .		
4.5.3	Removal of all valves, the external cleaning and functional test should be done as given in maintenance manual supplied by respective vendors/OEMs.		
4.5.4	Functional checking of duplex check valves. Duplex check valve opening pressure should be 1.5 ± 0.12 kg/cm ² .		
4.5.5	Inspect all welding joints of the lower spring beam (cradle) and repair if required.		
4.5.6	Lower Spring Beam: Inspect, remove corrosion from lower spring beam, apply primer & black paint after proper de-rusting and surface preparation.		

SN	Details of works to carried out	Condition / Action	Remarks
4.6	Wheel & axles:		
4.6.1	The wheels & axles should be subjected to ultrasonic flaw detection for detecting internal flaws. In case any grease is found discolored or any abnormality in bearing is noticed, replace complete wheel sets with wheel sets received from work shop.		
4.6.2	Before, wheel changing / turning, the data like km. Earned/ no. of months shall also be considered.		
4.6.3	Check with wheel distance gauge for loose or tight wheel.		
4.7	Thorough checking of slack adjuster for control dimension and functioning. (DPC/TC). Defective ones to be sent to the base workshops for repairs, testing and return.		
5.	Buffing gear		
5.1	Ensure the length is within 584-635mm.		
5.2	Inspect buffer plunger false plate for wear and profile.		
5.3	Buffer and Coupler height adjustment to be done. Check wheel diameter and provide packing below the axle box springs to maintain buffer and coupler height if necessary.		
6.	Brake System (Conventional & EP)		
6.1	Clean, repair and test to ensure operation in a safe and suitable condition of service of the following: DPC i) SA 9 Independent brake valve ii) A 9 Automatic brake valve iii) E-3 Emergency application valve iv) 24A Double check valve v) Magnet valves vi) Safety valves vii) 3-way cut out cock DPC/TC i) C3W distributor valve ii) N1 reducing valve iii) Brake cylinders		
6.2	Air leakage test (5 mints) for DPC & TC a) Brake Pipe with DV isolated : 1.0 kg/cm² b) General leakage with DV including FP &BP: 1.0 kg/cm² i) DPC ii) TC		
6.3	Single car testing of the coach to be done, after assembly		
6.4	Air dryer		
6.4.1	Clean mufflers		
6.4.2	The following to be checked: Regenerative orifice operation, condition of Pre-coalescing, Desiccant and Final filter (replace, if contaminated), clean purge valve, clean auto drain valve, replace mufflers and proper functioning of Timer Circuit Board.		
7.	Windows, doors, Seat, * Toilets, ventilators etc.:		
	Thorough checking and full repairs of all roof ventilators, window shutters, doors, seat & cushions, safety catches, safety latches, staples and hasps of compartment, lavatory, body side and vestibule doors for ease of operations.		

SN	Details of works to carried out	Condition / Action	Remarks
8.	Flooring		
8.1	Inspect and attend torn/damaged/cracked flooring.		
8.2	Examine and attend opened joints.		
8.3	Examine Drain holes in trough floor for accumulation of water due to clogging if noticed, inspect affected area for corrosion.		
8.4	Clean sliding door guide rail pocket.		
9.	Painting:		
9.1	Touching up damaged paint of coaches on outside as well as inside.		
9.2	Polishing of the polished surfaces.		

**Note: Maintenance of toilets to be done during various schedules as mentioned in Part-V.*

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / Action	Sign.	Remarks
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	Technician	SSE/JE
Name		
Signature		

Part – IV
Schedule of Carriage Electrical
Trip Schedule (max. 15 days or EKM 3500)

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs. :

Note: To be carried out after EKM 3500 or 15 days for DEMU with toilet/ without toilet.

SN	Details of works to carried out	Condition / Action	Remarks
1.	Check fuse/deficient lamps/ tube lights and replace, if necessary		
2.	Check switches and replace defective switches, if necessary		
3.	Check proper working of fans and replace, if necessary.		
4.	Provide switch/ tube light covers and fuse covers promptly, if they are missing		
5.	Replace broken acrylic covers/grill of tube lights		
6.	Earth Checking		
7.	Check earth test by using a double test lamp as explained in the RDSO Code of practice of 110V coaches.		
8.	Check MCB/fuse controlling the fan circuits for correct rating. If found defective MCB to be replaced. Never replace a blown fuse by a higher gauge fuse		
9.	Check MCBs for light & fan circuit in junction box for proper operation and replace defective MCBs		
10.	Loose and exposed/hanging wires should be taped and to be properly secured.		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / action	Sign.	Remarks
1				
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	Technician	SSE/JE
Name		
Signature		

Part – IV
Schedule of Carriage Electrical
Monthly Schedule (One Month)

DPC/TC No.:

Cumulative km.:

Date :

Cumulative hrs.:

SN	Details of works to carried out	Condition / Action	Remarks
1.	Carry out all trip schedule items		
2.	Junction Box: Open Front Door a) Clean the junction box A, B, C, D & E in both MCB& Non –MCB end walls of DPC/TC. b) Blow with clean dry compressed air of 3 kg/cm ² c) Check all connections in MCB-cum-fuse panel for tightness/ heating sign on connections/joints, etc. d) Check availability of terminal lugs for all cables in junction box and replace (if necessary) by terminal lugs of correct size. e) Close front door and secure properly by the locking key. If found defective, the same may be attended/replaced.		
3.	Wiring & Accessories a) Wiring shall be tested separately for IR value by keeping negative MCB/fuse in open condition & all controlling MCBs for all circuits in off condition. All other MCBs/fuses shall remain in circuit. Insulation resistance shall be measured with all fittings and equipment connected to be tested. b) The IR value should be minimum 2 Mega-Ohm in fair weather condition and minimum 1 Mega-Ohm under adverse weather condition. Availability of inspection cover of junction box should ensure. c) Check at MCB & Non-MCB end wall with isolation of A, B, C, D & E cables from junction box. d) Check Terminal connections for loose connection on both non-MCB and & MCB end walls		
4.	Fans a) Studs used for fixing the fan to coach body, shall be checked and tightened, wherever necessary. Availability of all the three fixing studs should be ensured. b) All fans shall be checked for its smooth operation and correct working and replaced, where necessary. c) Fan blades shall be replaced if found bent, or if there is no proper air discharge.		
5.	Tumble/Toggle Switches Check each toggle switch of lights and fans for proper fixing and operation. Replace defective toggle switches. Toggle switches should be provided in the locations intended for them and provided with covers with their knobs exposed for operation by passengers.		

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REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / Action	Sign.	Remarks
1			
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	Technician	SSE/JE
Name		
Signature		

Part – IV
Schedule of Carriage Electrical
Quarterly Schedule (3 months)

DPC/TC no.:

Cumulative km.:

Date :

Cumulative hrs.:

SN	Items to be checked	Condition / Action	Remarks
1.	Carry out all Monthly & Trip schedule items		
2.	Fans: a) The fan body, guards and blade shall be thoroughly cleaned with cloth. b) All fans shall be opened and condition of commutator, brushes and brush gear shall be thoroughly checked. (not applicable for BLDC fans)		
3.	Carriage Lighting: a) Open each fitting with the grill/cover key and remove the dust off the fitting both from inside and outside. Ensure free operation of locking mechanism and replace defective fitting. Clean cover/grill first with wet cloth and then with a clean dry cloth. b) Replace rusted fittings and fittings with damaged surface. c) Check-up wattage of lamps and replace with that of correct wattage. d) Check up all lighting circuit MCBs/fuses in each coach for correct sizes and replace if necessary. Stencil the size of MCBs/fuses near the locations, if not already done.		

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING	Condition / Action	Sign.	Remarks
1			
2			
3			
4			

	Technician	SSE/JE
Name		
Signature		

Part – IV
Schedule of Carriage Electrical
IOH Schedule (9 months)

DPC/TC No.:

Cumulative km.:

Date:

Cumulative hrs.:

S. No.	Items to be checked	Condition / Action	Remarks
1.	Carry out all Monthly & Trip schedule items Measure insulation values as follows:		
2.	SUPER STRUCTURE:		
2.1	a) Short all the outgoing positive terminals from MCB cum fuse panel. b) Measure and record the following insulation values: i) Between the bunched outgoing terminals and earth. ii) Between bunched outgoing positive terminal and main negative out going terminal. iii) Between the main negative outgoing and earth c) Remove the coach electrical coupler from end wall and check the condition of male pin and female sockets.		
2.2	Note: Insulation resistance under fair weather conditions shall be minimum 2 mega ohm. However, under adverse (highly / wet) weather conditions, the minimum insulation upto 1 mega ohm is acceptable. In case the insulation resistance is found less than the values mentioned above, individual sub-circuits at junction box for super structure wiring shall be meggered separately. The sub circuit having insulation lower than that prescribed above shall be taken up for wiring. If the nature of repairs is heavy the coach shall be booked for shops for attention. Do not resort to patch in wiring with temporary joints. Proceed further as follows: a) Use crimped socket of appropriate size in all cable ends to avoid loose connections and consequent overheating. b) Coach wiring should be terminated in two-way connectors which shall be of tough non-ignitable molding materials of rigid PVC from which connection to the fitting shall be provided by flexible single core cable for the following: i). Fan ii). Tube light fitting iii). Emergency light fitting		

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REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		

Part-V
Schedule for Lavatory and Lavatory fittings

SN	Particulars	Schedule			
		Primary	'A'	'B'	'IOH'
	Frequency of Examinations	Max. 15 days or EKM 3500	1 month \pm 3 days	3 month \pm 7 days	9 month \pm 15 days
	Maintenance to be done at	On rake	On rake at nominated primary depot	On rake at nominated primary depot	Sick line at nominated primary depot
1.	* Check lavatory hinge door/ door latches/ tower bolts etc. for proper functioning & repair/rectify.				
2.	Examine push cock, flush valve etc. for proper functioning & attend leakage in pipes, pipe fittings and Passenger amenity in lavatory.				
3.	Clean drain grills and drain holes in Toilet/bath room and wash basin, if found choked.				
4.	Check and replace damaged/ missing mirrors/shelves/ soap dishes etc.				
5.	Examine & repair of squatting pans and foot rest for damages.				
6.	Intensive cleaning of lavatory pans and commodes with recommended cleaning agent for bio-toilets.				
7.	#Examine the condition of bio-toilets on arrival for blockage / choking in P- trap / S-trap, if any. Clear the choking with recommended tools. Check the push cock, if not working, maintain the push cock.				
8.	# Attend the daily routine complaints received through various modes.				

SN	Particulars	Schedule			
		Primary	'A'	'B'	'IOH'
	Frequency of Examinations	Max. 15 days or EKM 3500	1 month \pm 3 days	3 month \pm 7 days	9 month \pm 15 days
	Maintenance to be done at	On rake	On rake at nominated primary depot	On rake at nominated primary depot	Sick line at nominated primary depot
9.	Check the condition of Hose connector used for Bio toilets. It should not be damaged, loose, prominent and seepage from edges.				
10.	Checking for foul smell, if any. Take appropriate action.				
11.	Ensure hose clamp must not miss nor loose over Hose connector.				
12.	Check chlorinator unit for any leakage, tilting, thread missing and it must be ensured the availability of chlorine/KMnO ₄ tablets.				
13.	Check securing arrangement of bio-tanks, wire-rope and its mounting brackets etc.				
14.	Ensure availability of Dust-Bin in Bio-toilets.				
15.	Ensure cleaning of the bio-tanks externally.				

Note:

***Daily water filling & cleaning system.**

#Attend on daily basis.

REPAIRS BOOKED BY DRIVER AND REPEATED BOOKING		Condition / Action	Sign.	Remarks
1				
2				
3				
4				

	Technician	SSE/JE
Name		
Signature		