# CHAPTER 1

## GENERAL DESCRIPTION *(ELECTRICALS)*

# LHB VARIANT EOG NON-AC COACHES

# CHAPTER 1

# CHAPTER 1

# GENERAL DESCRIPTION (ELECTRICALS)
# LHB VARIANT EOG NON-AC COACHES

## 1.0 LHB VARIANT EOG NON-AC COACHES

These LHB variant new generation passenger coaches are being manufactured with stainless steel shells to increase the life span of coaches. These new generation passenger coaches have better parameters of passenger comfort, safety and reliability in comparison to conventional ICF design coaches. These coaches are fitted with FIAT bogies. The End on Generation (EOG), Linke Hoffmann Bosch (LHB) variant Non AC (TL) coaches can be broadly classified into following types:

i. LHB variant General Second Class EOG Non AC Coaches = LS
ii. LHB variant 3 Tier Sleeper EOG Non AC Coaches = LWSCN
iii. LHB variant EOG Non AC Chair Car = LWSCZ

**Figure 1.1 Exteriors and Interiors views of LHB EOG NON AC GS Coaches**

Figure 1.2 Exteriors and Interiors views of LHB EOG NON AC 3 Tier Sleeper Coaches

Figure 1.3 Exteriors and Interiors views of LHB EOG NON AC Chair Car

## 1.1 END ON GENERATION (EOG) SYSTEM

End on generation (EOG) system envisages the equipment of the power car in the front and rear end of a rake with diesel generating sets generating power at 750 V, 3 phase, 50 Hz ac supply with appropriate arrangement for the control and distribution to the entire rake composition through two sets 3 phase, 4 wire, 750 volts feeders. Feeders are taken to each coach in the rake composition with the help of inter locked electrical couplers.

LHB variant non AC EOG coaches are equipped with **9/15** kVA step down transformers for stepping down 750 V, 3 Φ AC, 4 wire, 50 Hz supply to 415 V/ 190V, 3 Φ AC, 4 wire, 50 Hz supply. Power cars at both ends take entire load of whole rake, which includes air conditioning (if AC coaches in rake), light and fan circuit, and regulated battery charger circuit and mini pantry equipment (if chair cars in rake). Each power car has two DG sets (normally out of which one DG set is standby).

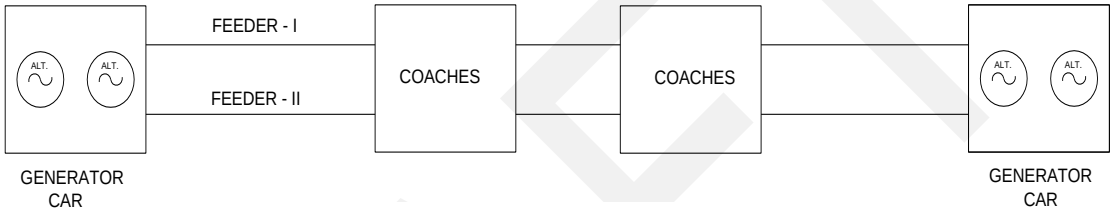



**Figure 1.4 End ON Generation System**

The neutral point of the 3 phase winding of the generator is solidly earthed in the power cars. The neutral conductor of the 750 volts, 3 phase, 4 wire system shall not be earthed at any other point in the rake composition.

## 1.2 ELECTRICAL FEATURES OF LHB VARIANT EOG NON-AC COACHES

- Constant voltage regulated battery charger.
- Onboard Switch Board panel with controls of lighting and fan and their fuses.
- Under slung panel for 750 volt and 415/ 190 volt supply.
- Onboard supply only 110 volt dc and 190/110 V ac for mobile charging sockets.
- Provision of Dry type Transformer without encapsulation.
- Elegant interior light fittings.
- Integrated modular mini pantry unit in Chair cars.
- Provision of Measuring and Monitoring relays in Feeder circuit.
- Wheel set earthing equipment for high life of axle bearings.
- Provision of under slung mounted earthing and disconnecting device.
- Provision of under slung mounted water raising pump with pump controller (in 3 tier sleeper coaches only). **As per Railway board L. no. 2010(M)(PU)/1/28 dtd. 06.03.2012, overhead water tanks are to be provided and WRA are to be eliminated.**
- Cable protection system with IP-67 protection and UL-94 V0 fire retardancy.
- **Provision of Emergency Feed Terminal (EFT) in future coaches and the same is to be implemented during POH in existing coaches.**
- **Provision of Battery Charging Terminal (BCT) in future coaches and the same is to be implemented during POH in existing coaches.**

## 1.3 ELECTRICAL ITEMS FITTED IN VARIOUS COACHES (Latest revision/alteration/amendment is applicable)

| S. No. | ITEM | Reference Specification/Drawing | Second class (LS) | 3 Tier Sleeper (LWSCN) | Chair Car (LWSCZ) |
|---|---|---|---|---|---|
| 1. | Set of panel | RCF EDTS-355,REV-1,AM-2 | ✓ | ✓ | ✓ |
| 2. | Transformer,9KVA/ 15kva,750/415/ 190V AC | RDSO/PE/SPEC/TL/0158-2010,REV-0, Type-Ist | ✓ (9 kVA) | ✓ (9 kVA) | ✓ (15 kVA) |
| 3. | VRLA battery, 110v, 70 Ah | RDSO/PE/SPEC/AC/0009-2008,REV-1,AM-1,ANNX-A | ✓ | ✓ | ✓ |
| 4. | Constant voltage regulated battery charger | RDSO/PE/SPEC/AC/129-2009, REV-1 | ✓ | ✓ | ✓ |
| 5. | Battery fuse box (+ve) | RCF LW71001 Alt. f | ✓ | ✓ | ✓ |
| 6. | Battery fuse box (-ve) | RCF LW71002 Alt. f | ✓ | ✓ | ✓ |
| 7. | Battery Charging Terminal (BCT) | RDSO/PE/SK/TL/0179-2014 Rev. '0' | ✓ | ✓ | ✓ |
| 8. | Emergency feed terminal (EFT) | RDSO/PE/SK/TL/0179-2014 Rev. '0' | ✓ | ✓ | ✓ |
| **9.** | **100 VA Transformer 750/110 V for Feeder contactor control** | | ✓ | ✓ | ✓ |
| 10. | Zs coupling, 400 Amp, 750v,3-ph, 50hz | RCF EDTS-105,REV-E,AM-1,2 & 3, CORE-1,TYPE-Ist | ✓ | ✓ | ✓ |
| 11. | Feeder junction box | RCF EDML-020,REV-I | ✓ | ✓ | ✓ |
| 12. | Wheel set earthing equipment | RCF EDTS-101,REV-C,AM-1 | ✓ | ✓ | ✓ |
| **13.** | Self priming mono- block pump- **(To be eliminated as per Railway Board Directives)** | RCF EDTS-186, REV-A, AM-1 & 2 | --- | ✓ | ---- |
| 14. | BLDC Fan | RDSO/PE/SPEC/TL/0021-2005,REV-2,COR-1, BLDC | ✓ | ✓ | ✓ |
| **15.** | **Exhaust Fan for Lavatory** | | ✓ | ✓ | ✓ |
| 16. | Fluorescent lamp(FL) | RCF CC76213 | ✓ | ✓ | -- |
| 17. | FL, CFL double | RCF LW76055 | -- | -- | ✓ |

| S. No. | ITEM | Reference Specification/Drawing | Second class (LS) | 3 Tier Sleeper (LWSCN) | Chair Car (LWSCZ) |
|---|---|---|---|---|---|
| 18. | Emergency Lighting Unit (ELU) | RCF EDTS-151,REV-C,AM-1 & 2 | ✓ | ✓ | ✓ |
| 19. | Passenger alarm coach indication light (PACIL) | RCF LW76005 | ✓ | --- | --- |
| 20. | Passenger alarm reservation chart indication light (PARCIL) | RCF CC76238 | --- | ✓ | ✓ |
| 21. | Door way light (DL) / gangway light (GL) | RCF CC76216 | ✓ | ✓ | ✓ |
| 22. | Lavatory light (LL) | RCF LW76033 | ✓ | ✓ | ✓ |
| 23. | Night lamp (NL) | RCF CC76289 | -- | ✓ | -- |
| 24. | Switch plate assembly | RCF EDML-127,REV-0, | ✓ | -- | --- |
| 25. | Switch plate assembly | RCF EDML-086,REV-4, | -- | ✓ | --- |
| 26. | Switch plate assembly | RCF EDML-125,REV-0, | -- | -- | ✓ |
| 27. | Set of cage clamp | RCF CC72069/ CC72070 | ✓ | ✓ | ✓ |
| 28. | Distribution panel for pantry equipments | RCF CC72172 | -- | -- | ✓ |
| 29. | Material list for compartment light | RCF EDML-126, REV-1 | -- | -- | ✓ |
| 30. | Mini pantry (LHB EOG type) | RCF EDTS-339, REV-B | -- | -- | ✓ |

## 1.4 DESCRIPTION OF VARIOUS ELECTRICAL EQUIPMENT

Brief description of various electrical equipment fitted in different types of Non AC LHB EOG coaches are described here.

### 1.4.1 Set of Electrical Panels

*(Ref: RCF EDTS-355, REV-1, AM-2)*

The set of panels comprises of the various cubicles consisting of power and control switchgear as mentioned below. Provision of halogen free electron beam irradiated cables conforming to RDSO specification no. ELRS/SPEC/ELC/0019 Rev-2.

i. High Voltage Cubicle (under-slung mounted)
ii. Battery Charger Box (under-slung mounted)
iii. Low voltage panel (onboard)

**(i) High Voltage Cubicle (under-slung mounted)**

This cubicle is made of stainless steel fabrication and mounted in under-slung in the coach. This panel houses the disconnecting and earthing device, switchgear and fuses for 750 V, 415 V, 190 V, 110 V, Pump controller, Anti skid device, MMR, RCBO (Residual Circuit Breaker with Overload), rotary switches for feeder selection etc. From the front of the panel all the equipment can be access for maintenance. For this front covers are provided with hinges and locking arrangement. The box is earthed with two earthing terminals on top and bottom on diagonally opposite ends.


Figure 1.4 High Voltage Cubicle

**Disconnecting and Earthing Device**

A disconnecting and earthing device along-with high voltage fuses is mounted inside the panel. It is an OFF load device rated for **63** amps at 750 volts fed from Generator Car through ZS couplings. It has two positions **ON** & **EARTH**. The main function of this device is to separate the two feeders (input supply) and simultaneously earthing 750 volts ac network of the coach in case of emergency like contactor jamming or maintenance of coach even during running of coaches.

Figure 1.5 Disconnecting and Earthing Device

High voltage fuses and contactor K01, K02 for net 1 and net 2.

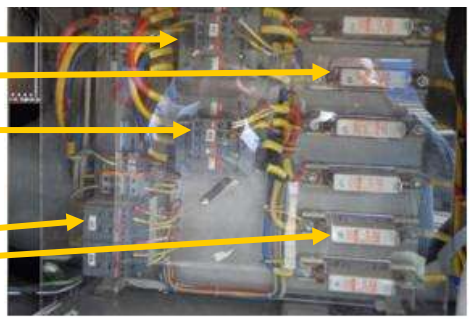



Figure 1.6 HV 750V Panel

Low voltage fuses for transformer secondary and other 415/190 volt circuit fuses and RCBO (Residual Circuit Breaker with Overload)

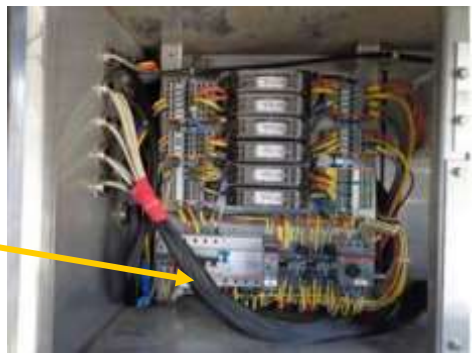


Figure 1.7 415/ 190 V Panel

Battery charging fuses and connections.

Figure 1.8 Battery Charging connection

Rotary switch for selecting net-1, OFF, net-2.
Rotary switch for selecting remote and local control of supply.

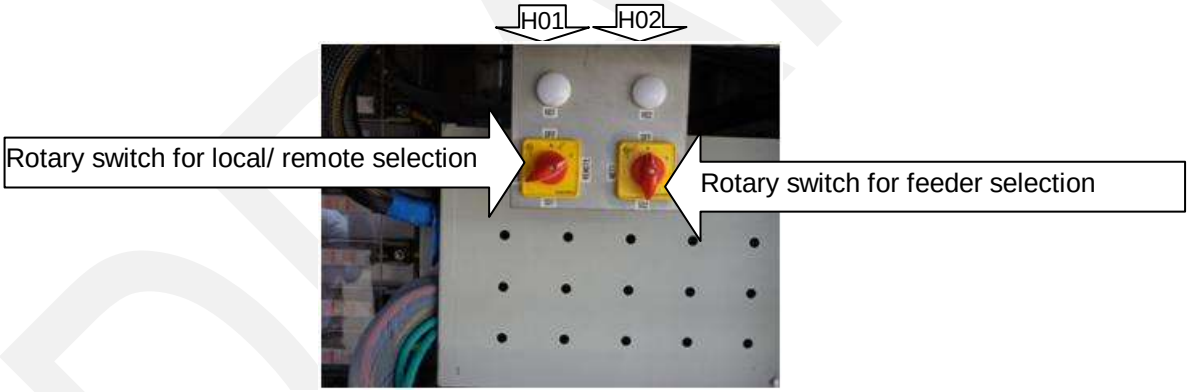



Figure 1.9 Rotary Switch Control with Remote

**(mono block pump and pump controller to be discontinued in future production by PUs)**

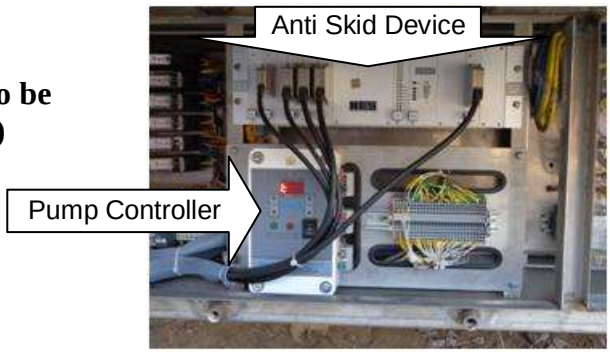



Figure 1.10 Pump controller and Anti Skid Device

**(ii) Regulated Battery Charger**

The under-slung mounted cubicle (as per RCF drg. no. LS 71104/EDTS 355) houses the regulated battery charger along-with connectors. This cubicle is totally enclosed and IP 53 ingress protection. Constant Voltage Regulated Battery Charger **(Ref: RDSO/PE/SPEC/AC/0129-2009, REV-1)** is provided for rectifying ac supply into dc for providing power supply in the coach at 110 V dc and at the same time to charge the VRLA batteries provided in the coach.

The battery charger is forced air cooled, IGBT based and DSP (digital signal processor) controlled working on a nominal input supply of 415 V, 3 phase, 50 Hz fed from 750/415 V transformer.

Figure 1.11 Regulated Battery Charger

### 1.4.2 Transformer 9/15 kVA 750/415 /190 V AC

*(RDSO/PE/SPEC/TL/0158-2010, REV-0)*

This is a 3 phase dry type distribution transformer designed for LHB type NON AC EOG coaches for providing power to coaches from 750 V supply of power cars. There are two types of transformer i.e. type I- 9 kVA for general IInd class and 3 tier sleeper coaches (train lighting load 6.5 kVA-415V + 2.5 kVA -190V AC) and Type II for chair cars (pantry load and train lighting load 12.5 kVA- 415V+ 2.5 kVA 190V AC).

Both types of the transformers are star- star-star connected, dry type and air cooled. T he class of insulation of winding is class 'H'. Transformer is fitted under slung with 4 nos. anti vibration mountings. Following protection fuses are provided in transformer:

**For 9 kVA transformer-**

HT HRC fuse 3.3 kV, 20 Amps. – 3 nos.
LT HRC fuse 500 V, 16 Amps – 6 nos.

**For 15 kVA transformer-**

HT HRC fuse 3.3 kV, 32 Amps. – 3 nos.
LT HRC fuse 500 V, 32 Amps – 6 nos.

Figure 1.12 Transformer

This is housed in stainless steel housing with IP 67 protection and over all dimensions, construction and mounting of the transformer is same as in 60 kVA transformer of LHB AC coaches.

### 1.4.3 Valve Regulated Lead Acid (VRLA) Battery110 V (9 modules of 12 volt, 70 Ah)

*(Ref: RDSO/PE/SPEC/AC/0009-2008,REV-1,Amend. No.-1, Annexure-A)*

VRLA battery requires no topping up under normal working conditions and minimal maintenance during lifetime of battery. It has self sealing safety valve, which normally does not open out during service.

These coaches are provided with 9 modules of 12 volt 70Ah, VRLA battery in series in one battery box mounted in under-slung. The auxiliary power required for charging is supplied by a regulated battery charger at constant voltage based as required by the battery. Current limit for battery charging is **20 Amp** at constant voltage with the voltage setting at **122.0** ± 1.0 volt.

**Module Salient Features**

- Capacity : 12 V, 70 Ah (at 27° C) battery module
- Container : PP-CP (Poly Propylene Co-Polymer) V2 grade/ ABS(Acrylonitrile Butadiene Styerene) FR V2 grade
- Rate of Discharge : 10 hr
- Handle is provided on container instead of lid.

Figure 1.13 Battery Box & Batteries

### 1.4.4 Battery Fuse Box +ve and –ve

*(Ref: RCF drg. no. LW 71001, LW71002)*

Battery fuse boxes (+ve and –ve) are provided in under frame supported on brackets by fixing bolts. These boxes are properly earthed by earth cable. These are totally covered and locked by hinged bolts.

Figure 1.14 : Battery Fuse Box (+ve)

Figure 1.15 : Battery Fuse Box (-ve)

Fuse Rating +ve 32 Amp/ 660 V = 01 no. as
Fuse Rating -ve 32 Amp/ 660 V = 02 nos.

**Note: As per RDSO letter no. EL/0.6.2/LHB/EOG/Non AC dtd. 19.06.2014, the main battery fuses are to be of 40 A instead of 32 A as the fuse provided in negative of rotary junction box is 40A.**

### 1.4.5 ZS Coupling, 400A, 750V, 3-PH, 50HZ

*(Ref: RCF EDTS-105,REV-E,AM-1,2 &3,CORE-1,TYPE-Ist)*

Under-frame mounted Inter-vehicular coupler unit are used for transmission of 3 phase, 5 wire, 750 V, 50 Hz power supply from power cars to rake/ coaches (LHB type) working on End On Generation (EOG) system.

Various sub assemblies of IVC are given as under:

i. Jumper Plug Assembly – RCF Drg. no. LW 71301 – 2 nos.
ii. Coupling Socket Assembly – RCF Drg. no. LW 71300 – 2 nos.
iii. Blind Socket Assembly – RCF Drg. no. LW 71302 – 2 nos.

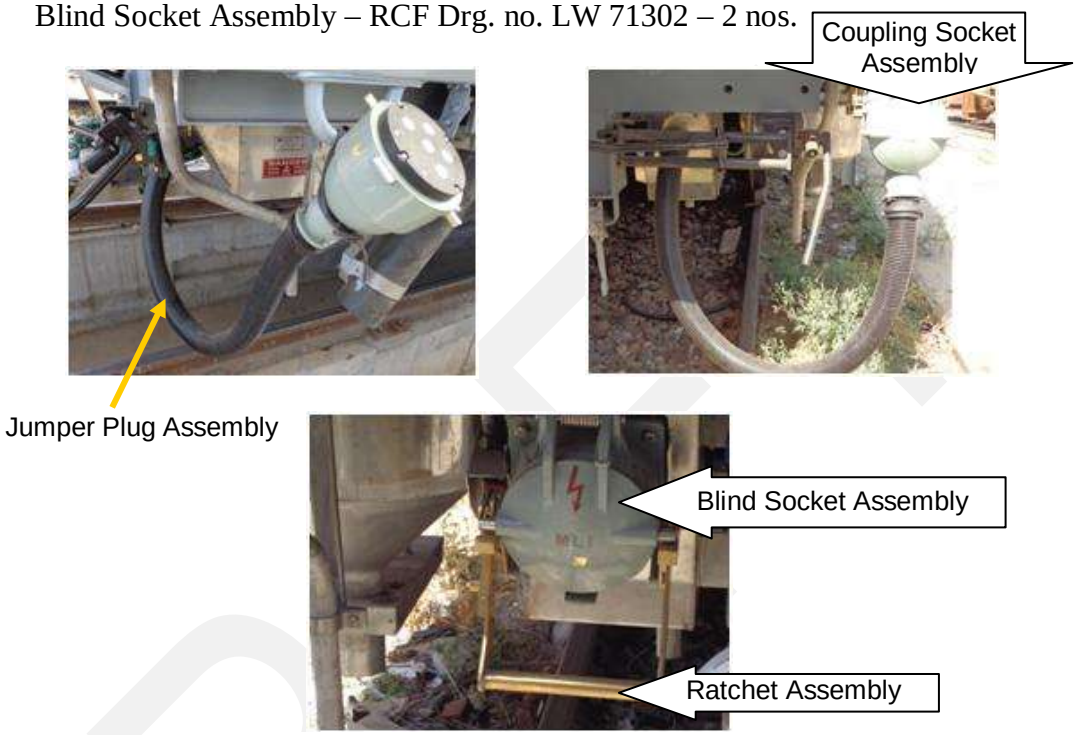



Figure 1.16 ZS Coupling

As per amendment 3 to EDTS 105 issued on date11.04.2014, the material of Ratchet assembly has been changed from the existing **brass** to **Stainless steel** casting in order to eliminate the incidences **of theft.**

### 1.4.6 Feeder Junction Box

*(Ref: RCF EDML-020, Rev. 1)*

Two types of feeder junction boxes are provided on the LHB coaches as given under:

i. Feeder junction box- plug side – RCF Drg. no. LW 71006 – 2 nos.
ii. Feeder junction box- socket side – RCF Drg. no. LW 71007 – 2 nos.


Figure 1.17 Feeder Junction Box

### 1.4.7 Wheel Set Earthing Equipment

*(Ref: RCF EDTS-101,REV-C,AM-1)*

Wheel set earthing equipment for the wheel set is provided to prevent return current flow through the axle bearings and likely damage. Thus the earthing contact system acts as a current bridge that creates a connection by means of wiper contact (brush) from the stationary bogie frame to the rotating wheel set.
This set comprises following subassemblies per bogie:

i. Wheel set earthing equipment with stainless steel braided earthing cable : RCF drawing no. LW 71231 – 1 set

ii. Earthing resistor assembly 0.1 Ohm (RCF drawing no. LW 71246) with mounting bracket (RCF drawing no. LW 71247) and grounding cable (RCF drawing no. LW 71248) – 3 sets

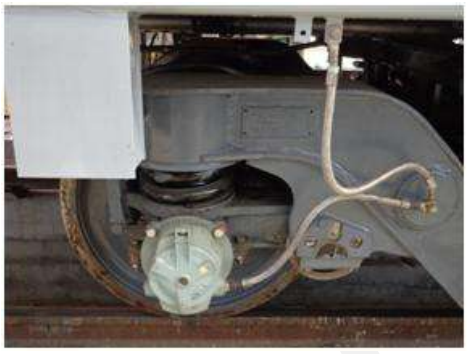


Figure 1.18 Wheel set and earthing equipment

Figure 1.19 Earthing resistor assembly

Resistances are provided to restrict the return current from certain bogie parts and providing return current path through pre-determined low resistance path.

### 1.4.8 Self Priming Mono-block Pump

**{To be discontinued in future production as per Railway Board L. No. 2010/M (PU)/1/28 dtd. 06.03.2012}**

*(Ref: RCF EDTS-186, REV-A,AM-1&2)*

Mono-block pump set are used on non AC 3 tier sleeper coaches for lifting water from main tanks mounted on the underframe to auxiliary tanks. The water raising 3 phase horizontal centrifugal self-priming mono-block pump with thermal switch as protection device embedded in the motor are designed as per RDSO specification no. RDSO/PE/SPEC/AC/0022 (Rev. 0) Amendt. 1.

The pumps are mounted on the underframe on a cradle arrangement with interconnecting stainless steel piping arrangement. Microprocessor based pump controller is programmed for alternate loading of pumps during operation, isolation of faulty pump, overload protection, running time etc. The pump controller is located in 750 V HV panel in under frame.

- The nominal input voltage to controller is 110 V AC/DC.
- The controller is preset to run one of the pumps for a period of 4 hrs. (adjustable) continuously and then automatically switch over to the other pump for same duration to enable equal loading of the pumps.

- In the event of failure of any one of the pumps, the controller automatically switches over to the other pump.
- It is also possible to run the pumps in manual mode by selection through a rocker switch provided on the controller.

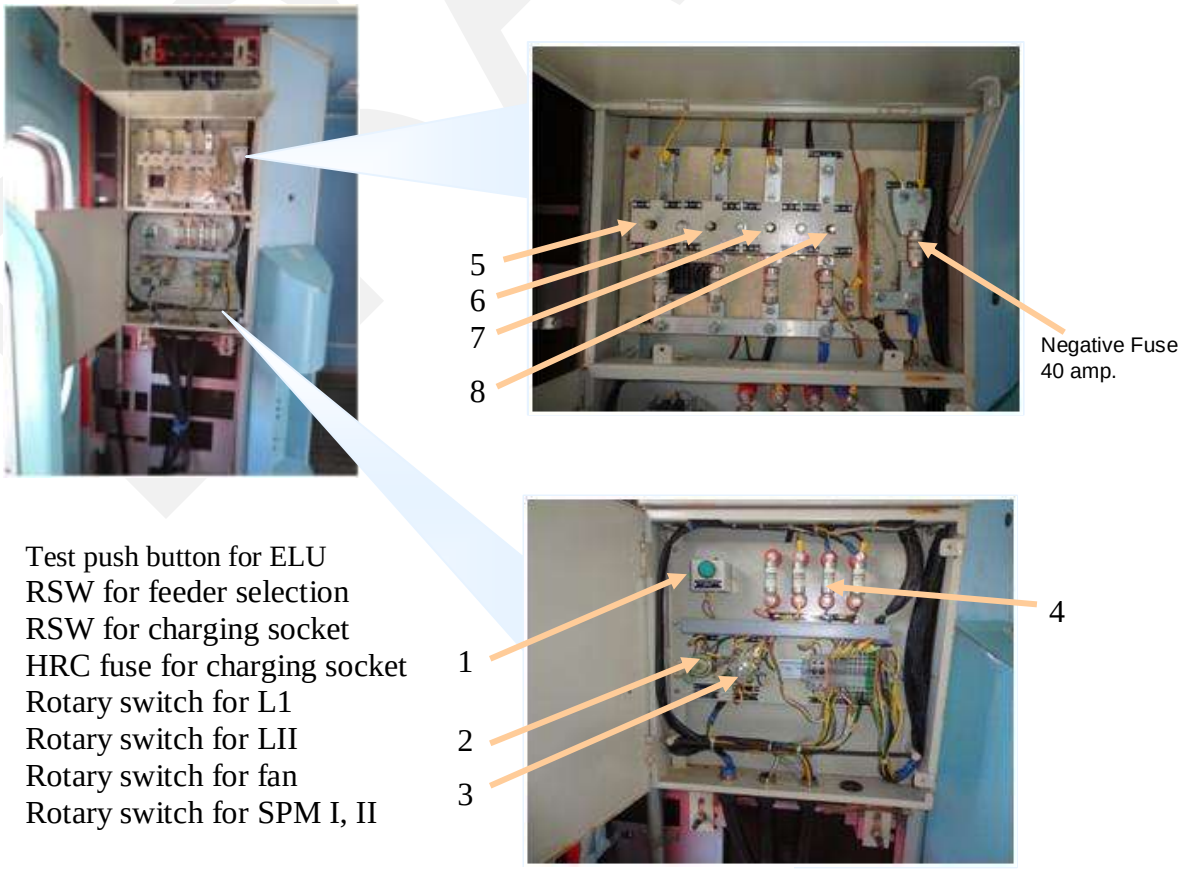
Figure 1.20 Pump controller

Figure 1.21 Mono-block pump set

### 1.4.9 On Board Rotary Switch Panel

*(Ref: RCF EDTS-355, Rev.01)*

The on-board panel houses the rotary switch panel as used in conventional coaches for distribution of light and fan. This also houses rotary switch for feeder selection to select the feeders as provided in the under-slung HV cubicle and rotary switch for mobile charging socket along-with connectors, push button for testing AEL is also provided in this box. This cabinet is made of CRCA (Cold Rolled Close Annealed) sheet of thickness 2 mm and powder coated to Siemens grey shade.




1. Test push button for ELU
2. RSW for feeder selection
3. RSW for charging socket
4. HRC fuse for charging socket
5. Rotary switch for L1
6. Rotary switch for LII
7. Rotary switch for fan
8. Rotary switch for SPM I, II

Figure 1.22 On Board Rotary Switch Panel

### 1.4.10 Fan

*(Ref: RDSO/PE/SPEC/TL/0021-2005,REV-2,COR-1,BLDC)*

Brushless DC carriage fans of sweep 400 mm, working on 110 V DC supply are being provided in railway coaches which requires minimum maintenance. The fan is suitable for working in voltage range 90-140 V DC. The motor of the fan is permanent magnet type, light in weight, and small in size without field winding, brushes and commutator. The permanent magnet is fitted on rotor embedded in the slots.

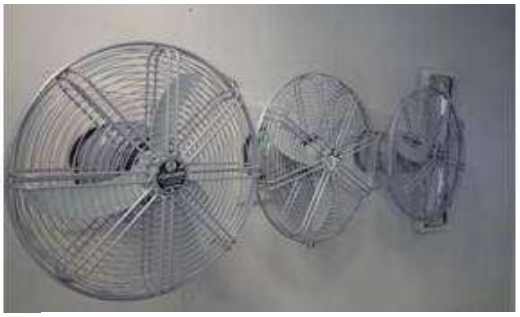


Figure 1.23 BLDC Fan

Fan blades are designed as per RDSO drg. no. RDSO/PE/SK/TL/0108-2008 (Alt.1), (Rev. 0) and are easily replaceable. SKF make 6201 ZZ ball bearings or equivalent in NBC/FAG make bearings are used.

A band of colour of about 20 mm wide over the periphery of the fan body approximately at its middle portion is applied as a colour code for the following:

Dark Green : BLDC fan without hall sensor
Dark yellow : BLDC fan with hall sensor

### 1.4.11 Fluorescent Light (FL) Fitting

*(Ref: RCF Drg. no. CC76213)*

Fluorescent light (FL) fitting works at 110V AC/DC ballast and is provided with poly carbonate diffusers. Universal type AC/DC ballast conforms to RDSO spec. no. RDSO/Spec/TL/0011-2000 rev.1. These fittings are provided in general IInd class coaches and in 3 tier sleeper coaches.

Figure 1.24 Fluotescent Light Fitting

In chair car ceiling light double FL fitting as per RCF drg. no. LW76055 are provided. These fittings comprise 2 nos. 14 watt T-5 lamps and LED light for night lamp inbuilt in the fitting.

Figure 1.25 Chair Car Light Fitting

### 1.4.12 Emergency Lighting Unit (ELU)

*(Ref: RCF EDTS-151, Rev. C, Amndt.1 &2)*

This unit has an inbuilt charger, adequately rated battery and interlocks. In General lighting inside the coach is provided by 110 V AC or 110 V DC supply from battery. During extreme emergencies like derailments and accidents, the supply system fails causing total darkness inside the coach. To facilitate easy exit of passengers and their immediate rescue during such emergencies, these emergency lights are provided.

These lights are provided in doorways and inside the coach (4 nos. in each coach) which will illuminate automatically on failure of normal power supply or dropping of supply voltage to a certain value inside the coach simulating accident conditions.. These light fitting can work up to 6 hrs continuous illumination.

Each emergency light unit consists VRLA battery of 6 AH capacity fixed inside the unit and LED cluster type lamp unit. Healthiness of battery voltage is indicated by one **AMBER** colour LED and if battery is discharged, a **RED** colour LED glows.

Figure 1.26 Emergency Lighting Unit

### 1.4.13 Gangway/ doorway Light (GL/DL)

*(Ref: RCF Drg. no. CC76216 alt. C)*

In each coach 2 nos. gangway/ doorway lights are provided each consisting 2 nos. 11 watt CFL with individual electronic ballast. Electronic ballast as per RCF EDTS -064 (Rev.A), Corr.-1. Ballast is suitable for 110 V AC/DC supply.

Figure 1.27 Gangway/ doorway Light

### 1.4.14 Lavatory Light (LL)

*(Ref: RCF drg. no. LW 76033, Alt. d)*

Lavatory light fitting with 11 watt CFL and electronic ballast as per RCF EDTS -064 (Rev. A) for individual lamp is provided. Ballast is suitable for 110 V AC/DC supply.

Figure 1.28 Lavatory Light

### 1.4.15 Night Light (NL) – LED Type

*(Ref; RCF drg. No. CC 76289)*

These lamps as per RCF drg. No. CC 76289 are provided in 3 tier Sleeper coaches. Night light fitting (LED based) are provided with bright white high intensity LEDs and acrylic milky diffuser.

Sticker indicating berth number are pasted on night light lamp.

Figure 1.29 Night Light – LED Type

### 1.4.16 Passenger Alarm Coach Indication Light

(PACIL- RCF drg. No. LW 76005) **and**

**Passenger Alarm Reservation Chart Indication Light**

(PARCIL- RCF drg. No. CC 76238)

Figure 1.30 Passenger Alarm Coach Indication Light

### 1.4.17 Switch Plate Assembly

**For LS/GS coaches - RCF EDML-127, Rev.0**

In 2nd general coaches 2 nos. fan switches and 1no. switch and 1 no. 5 pin mobile charging socket on each switch boards are mounted and total 20 nos. (10 nos. cabin side + 10 nos. corridor side) are provided in coaches. **1 no. 500 mA glass fuse is provided in phase wire in mobile charging socket with fuse holder.**

Figure 1.31

**For 3 tier sleeper coaches - RCF EDML-086, Rev.4**

In 3 tier sleeper coaches switch plate assembly complete with polycarbonate cover frame and powder coated steel plate with 4 nos. ON-OFF switches (2 nos. fan switches and 1no. light switch and 1 no. mobile charging switch) and 1 no. mobile charging socket with **2 nos. 500 mA glass fuses (one each in phase & neutral wire)** with fuse holders are provided on either side of each cabin.

Figure 1.32

**For Chair Car - RCF EDML-125, Rev.0**

In chair car switch plate assembly complete with polycarbonate cover frame and powder coated steel plate with 3 nos. ON-OFF switches (2 nos. fan switches and 1 no. mobile charging switch) and 1 no. mobile charging socket are provided. (16 nos. in a car)

Switch plate assembly complete with polycarbonate cover frame and powder coated steel plate with 2 nos. ON-OFF switches (1 no. fan switch and 1 no. mobile charging switch) and 1 no. mobile charging socket are provided. (4 nos. in a car).

**1 no. 500 mA glass fuse is provided in phase wire in mobile charging socket with fuse holder.**

Figure 1.33

## 1.5 ADDITIONS / MODIFICATIONS DONE

- No MCBs are provided.
- High voltage panel with regulated battery charger are provided under slung.
- Only 190/110V AC and 110 V DC provided in On-board panel.
- These coaches are HOG compatible.
- Provision of stainless steel cubicles for under slung panels.
- In the original design coaches, the feeder contactors (K01, K02) are with 110 volts DC control, however it is modified and these have been changed to 110 volts AC control by providing 2 nos. 100 VA transformer 750/110V.
- Provision of 500 mA glass fuse for individual mobile charging socket.

## 1.6 WIRING SCHEME

*(Ref: RDSO Specification No. EL/TL/48 (Rev.1) –2005)*

The general schematic wiring diagram is illustrated in RDSO Drawing No**. SKEL-3928 Alt. 2** which is to be followed for super structure of the coach.

The lights are arranged in two circuits (L-I, L-II) and fans in one circuit-F, each controlled by a rotary switch. Each circuit of lights and fans is protected by HRC fuse which acts as back up protection in case of any short circuit fault, isolating the faulty circuit only.

Figure 1.34 Rotary Junction Box

Figure 1.35 Fuse Distribution Boards

The circuit L-1 have essential/emergency lighting circuit which also include all Lavatory lights, 50% of compartment lights, doorway lights, Night lights in all types of IInd Class coaches. The L-II light circuit feeds all the balance lights in the coach.

**Glass fuses** of proper rating protect the branch circuits for lights and fans. These glass fuses are located on a **distribution fuse board**. All branch circuits are protected by the fuses, both on negative and positive sides. The grouping of negative wires is done in such a manner that the group load is within the capacity of the distribution fuse board and arrangements are identical on positive and negative sides.

Positive and negative wires shall be run in separate conduits on opposite side wall of the coach.

**Colour Code:**

For easy identification of the cables, the various circuits have colour code as indicated below:

Paralleling main and fan positive cables …….… Red
Light positive cables. ……..… ……Yellow
Fan negative cables ……..…… Black
All other negative cables except fan negatives … Blue

## 1.7 MINI PANTRY EQUIPMENT FOR LHB EOG NON AC CHAIR CAR
(Ref: RCF EDTS-339, Rev. 'B')

Mini pantry equipment for LHB EOG Non AC chair car comprises following equipment made of stainless steel:

a. Hot case 01 no.
b. Refrigerating unit (Bottle cooler) 01 no.
c. Storage compartment with sink 01 no.
d. Water boiler 01 no.
e. Bottle cooler/ deep freezer 01 no.
f. Cup board 01 no.


Figure 1.36 Mini Pantry Equipment

### 1.7.1 Hot Case

The hot case to RCF Drg. No. LW73209 is meant to keep warm and warm up respectively precooked dishes in casseroles. To fulfil this requirement, the hot case is divided into 2 separate parts. The temperature of these divisions is separately controllable by thermostat switches.


Figure 1.37 Hot Case

**Technical Details**

| | |
|---|---|
| Overall dimensions | H = 1095 mm.<br>W = 850 mm<br>D = 515 (475 + 40) mm |
| Power supply | 230V +/- 10%, 50Hz +/- 3% |
| Thermostat | Range 30°C to 110°C |
| Trays | 34 nos. x 3 mm dia stainless steel wire mesh trays |

The hot case is provided with a circulating air system (blower) to maintain evenly warm up. The blower, heating elements and switchgear in the control panel is easily accessible for maintenance. In order to maintain uniform temperature inside the compartments, thermostatic control is provided and initially set at 80°C. A safety thermostat at factory preset is provided to avoid excessive heating of the cabinet in case of blower motor failure.

**Items of Hot Case**

| Item | Brief description | Qty. |
|---|---|---|
| Hot air fan/ Blower | Cat. No. QLZ06/3000(LH)<br>Cat. No. QLZ06/0030(RH)<br>Insulation class 'H' | 01<br>01 |
| Tube air heating elements | M/s Escorts/ Eichen make 300mm long (maximum) | 02 |
| Rotary switch 16A, 2pole, 2 way with OFF | SG 16/61079 | 02 |
| Indicators (LED type)<br>i. Red<br>ii. Green | <br>For blower & heater 'ON'<br>For power 'ON' | <br>04<br>01 |
| Thermostat | Model No. EWS 110 | 2 |
| Safety thermostat | Temperature setting shall be at 95°C | 2 |
| Trays | 3mm dia stainless steel wire mesh trays | 34 |

### 1.7.2 Refrigerating Unit/ Bottle Cooler

To keep the 120 nos., 1 litre bottles of drinking mineral water bottles at a temperature level of 3°C to 5°C refrigeration unit is provided. A circulating fan is provided at the top of the unit for air circulation and uniform cooling.


Figure 1.38 Refrigerating Unit/ Bottle Cooler

**Technical Details**

| | | |
|---|---|---|
| a. | Overall dimensions | H = 1750 mm<br>W = 550 mm<br>D = 515 mm (including door) |
| b. | Power supply | 230V +/- 10%, 50Hz +/- 3% |
| c. | Thermal insulation | Foamed polystyrene (Styrofoam) or polyurethane foam |
| d. | Thermostat | Danfoss KP-61/ALCO/Honeywell make |
| e. | Compressor | R134a charged compressors |
| f. | Condenser and evaporator coils | comprise of copper tubes and aluminium fins |
| g. | Condenser and evaporator fans | impeller 230mm dia type-A |
| h. | Shut off valve | indfoss/ danfoss make. |

### 1.7.3 Bottle Cooler cum Deep Freezer

To keep the food/ drinks in cold storage, a refrigeration unit conforming to OGA Drg. No. LI73001 is provided for different cooling temperatures. The refrigeration unit consists of the following compartments:

**(i) Deep freezer compartment**

The deep freezer is to freeze and preserve ice cream. The permanent temperature setting shall be at least -18°C. The temperature setting range is from -18°C to -25°C.

**(ii) Cooling compartment**

The cooling compartment is to simultaneously cool curd & other cartons to a temperature level of 3°C to 5°C. The unit have shelves/ trays for storing the cartons vertically pulled out for easy handling.

**(iii) Bottle cooler compartment**

The bottle cooler is to simultaneously cool 12 nos., of 1 litre bottles of drinking water to a temperature level of 3°C to 5°C.


Figure 1.39 Bottle Cooler cum Deep Freezer

**Technical Details**

| | | |
|---|---|---|
| a. | Overall dimensions | Height = 775mm<br>Depth = 520 mm<br>Width = 850mm |
| b. | Max. Power | 400 Watts |
| c. | Operating voltage | 230V +/- 10%, 50Hz +/- 3% |
| d. | Thermostat make/Range | Dan Foss KP-61/Alco/Honeywell make<br>i. Deep freezer:- 18°C to -25°C<br>ii. Bottle cooler: 0 to + 10°C<br>iii. Cooling compartment : 0 to +10°C |
| e. | Thermal insulation | Foamed polystyrene (Styrofoam) or polyurethane foam |
| f. | Compressors | R134a charged compressors |
| g. | Condenser and evaporator fans | Impeller 230mm dia type-A |
| h. | Condenser and evaporator coils | Comprising of copper tubes and aluminium fins |
| i. | Shut OFF valve | Indfoss/ Danfoss make |

### 1.7.4 Water Boiler

The water boiler is rectangular type design conforming to RCF OGA drawing no. LW73208. Indications are provided on the terminal box for power 'ON' and heater 'ON'


Figure 1.40 Water Boiler

**Technical Details**

| | | |
|---|---|---|
| a. | Capacity of water boiler | 25 liters (approx.) |
| b. | Power supply | 230V AC ±10% 50Hz±3% |
| c. | Heating element | 2 x 1500 Watt tube type emersion heating element |
| d. | Thermostat | Range 40-110°C to IS:3017 (latest) |
| e. | Overall dimensions | Height = 675mm (max.) (600 + 75mm)<br>Width = 275mm (max.)<br>Depth = 380mm (max.) |
| f. | Thermal insulation | Rock wool plate/ bonded mineral wool having bulk density of 40-50 Kg/Cu.m |
| g. | Water Inlet | 15mm bore stainless steel pipe |
| h. | Water outlet | 15mm bore stainless steel pipe |

### 1.7.5 Storage Compartment with Sink

Below the water boiler an open cupboard compartment is provided. This comprises a stainless steel work surface with a surrounding raised edge (no slanting drip surface) and drawn type sink to dimensions 330 x 255 x 125 mm.


Figure 1.41 Storage Compartment with Sink

### 1.7.6 CUP BOARD

A wall mounted cupboard without door (2 shelves) is provided for storage of vacuum flask and cups to as per drawing no. LJ 73002. It is provided with aluminium bar to prevent the vacuum flask and cups falling out. Unit is fabricated form 1.0mm thick high grade stainless steel sheet.


Figure 1.42 Cup Board

## 1.8 RATINGS OF IMPORTANT EQUIPMENT

| SN | Equipment | Rating | Qty/ Coach |
|---|---|---|---|
| 1 | Step down Transformer | 750 V / 415V AC, 3 Ø, 15 / 9 kVA | 1 |
| 2 | Battery | 120 Ah, 12 V Mono-block, VRLA | 9 Mono blocks |
| 3 | Regulated Battery Charger | Input: 415V, 3 Ø, AC, 50 HZ<br>Output: 110 V DC | 1 |
| 4. | Self Priming Mono Block Pump | 3 phase 415 volt, 0.5 HP, 1.1 Amp, 2800 rpm, connection - Y, pump size 25x25 mm, head 8 m., discharge 2520 LPH, insulation class – F, | 02 |
| 5. | 100 VA Transformer for Feeder contactor control | 100 VA, 750/110 V | 02 |

## 1.9 DIFFERENT FUSES AND SWITCHES

*(Ref: RCF EDTS- 355, Rev.-01)*

| Sr.No | Item | Term, function & Technical data |
|---|---|---|
| | **HIGH VOLTAGE CUBICLE** | |
| 1. | 12 F01 | High voltage fuse (with holder) net 1<br>Gr. 00C 1000V/ 25A AC; oB |
| 2. | 12 F02 | High voltage fuse (with holder) net 1<br>Gr. 00C 1000V/ 25A AC; oB |
| 3. | 12 F03 | High voltage fuse (with holder) net 1<br>Gr. 00C 1000V/ 25A AC; oB |
| 4 | 12 F04 | High voltage fuse (with holder) net 2<br>Gr. 00C 1000V/ 25A AC; oB |
| 5 | 12 F05 | High voltage fuse (with holder) net 2<br>Gr. 00C 1000V/ 25A AC; oB |
| 6 | 12 F06 | High voltage fuse (with holder) net 2<br>Gr. 00C 1000V/ 25A AC; oB |
| 7 | 12 F10 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 25A GL/GG |
| 8 | 12 F11 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 25A GL/GG |
| 9 | 12 F12 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 25A GL/GG |
| 10 | 12 F13 | Fuse 5 x 20mm (fuse clamp) net-1<br>control 1 amps |
| 11 | 12 F14 | Fuse 5 x 20mm (fuse clamp) net-1<br>control 1 amps |
| 12 | 12 F15 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 16A GL/GG |
| 13 | 12 F16 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 16A GL/GG |
| 14 | 12 F17 | Low voltage fuse (with holder) transformer (sec.)<br>Gr. 00C 500V/ 16A GL/GG |
| 15 | 12 A1 | Disconnecting and earthing device, 8 pole, 2 way, no-OFF on load, 63A 750V AC (1000V insulation), 2NO + 2NC with heavy handle and pad locking arrangement. In earth position, mounted in a stainless steel enclosure suitable for AC23 duly confirming to IS:13947/IEC 947 |
| 16 | 21 F01 | Fuse<br>Fuse for voltage control, 1A; 1.2kV |
| 17 | 21F02 | Fuse<br>fuse for voltage control 1A/ 1.2kV |
| 18 | 21F03 | Fuse<br>fuse for voltage control 1A/ 1.2kV |

| Sr.No | Item | Term, function & Technical data |
|---|---|---|
| 19 | 21F04 | Fuse<br>fuse for voltage control 1A/ 1.2kV |
| 20 | 21F05 | Fuse<br>fuse for voltage control 1A/ 1.2kV |
| 21 | 21F06 | Fuse<br>fuse for voltage control 1A/ 1.2kV |
| 22 | 21 K01 | Voltage phase control, net 1<br>3AC, 750V, aux. voltage 24-60V AC/ DC |
| 23 | 21 K02 | Voltage phase control, net 1<br>3AC, 750V, aux. voltage 24-60V AC/ DC |
| 24 | 28 K01 | Drop out delay time relay<br>ARS time tron, UC 24.... 240V anti skid |
| 25 | 29 F01 | Low voltage fuse (with holder) switch cabinet Gr. 00, 25A |
| 26 | 30 F02 | Low voltage fuse (with holder) switch cabinet Gr.00, 25A |
| 27 | 31 F03 | Fuse 5 x 20mm (fuse clamp at the x 1.2) anti skid device, T6, 3A |
| 28. | 32 F04 | Fuse 5 x 20mm (fuse clamp at the x 1.2) anti skid device, T6, 3A |
| 29 | 32 K01 | Contactor LS 45K 4.00 DC 110V net1, aux. contact HS8K11(2nos.) aux. contact HS7K10(1nos.) AC3; 750V RC Unit |
| 30 | 32 K02 | Contactor LS 45K4.00 DC 110V net1, aux. contact HS8K11(2nos.) aux. contact HS7K10(1nos.) AC3; 750V RC Unit |
| 31 | 32 S01 | Rotary switch with marking "I-0-II", net 1- off- net2<br>(Change over switch with 0-position 3-pole) |
| 32 | 33 Q1 | Motor protective relay water pump MBS 25, 1-1.6A with Aux. contact HS9.11 and terminal block db. |
| 33 | 32 S07 | Toggle switch 0-1 power supply on-off with socket and 2 NC |
| 34 | 32 S08 | Rotary switch 3-pole, 2 way with OFF |
| 35 | 93 F01 | Fuse 5 x 20mm (fuse clamp at the X1.2), Insulation control T2A |
| 36 | 93 F02 | Fuse 5 x 20mm (fuse clamp at the X 1.2), Insulation control T2A |
| 37 | XI | Terminal block for high voltage Box |
| 38 | 33 K06 | Auxiliary contactor SH 5.31, DC110V with diode water pump 110V DC |
| 39 | 33 K07 | Auxiliary contactor SH 5.31, DC110V with diode water pump 110V DC |
| | **REGULATED BATTERY CHARGER CUBICLE** | |
| 40 | X3 | Terminal block X3, RCF drg. no. LS 70105 |
| | **ON BOARD LV CUBICAL** | |
| 41 | | RCBO suitable for 10 amps, 30 mAmps |
| 42 | | Rotary switch panel for Non-AC coaches, RCF drg. no. CC 72399 |
| 43 | | Rotary switch for mobile charging socket, 10A, 4 pole ON-OFF |
| 44 | | Rotary Switch for feeder -hangeover 16 Amps 2 way with off |

## 1.10 TERMINALBLOCK IN HV PANEL - S1X1

*(Ref: RCF EDTS- 355, Rev.-01)*

| | | |
|---|---|---|
| 1. | 283-901 | TRANSFORMER INPUT |
| 2. | 283-901 | |
| 3. | 283-901 | |
| 4. | 283-901 | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | 284-681 | TRANSFORMER OUTPUT 415V |
| 11. | 284-681 | TRANSFORMER OUTPUT 415V |
| 12. | 284-681 | TRANSFORMER OUTPUT 415V |
| 13. | 284-681 | TRANSFORMER OUTPUT 415V |
| 14. | 284-681 | |
| 15. | 284-681 | TRANSFORMER OUTPUT 190V |
| 16. | 284-681 | TRANSFORMER OUTPUT 190V |
| 17. | 284-681 | TRANSFORMER OUTPUT 190V |
| 18. | 284-681 | TRANSFORMER OUTPUT 190V |
| 19. | 284-681 | |
| 20. | 284-681 | BATTERY CHARGER INPUT |
| 21. | 284-681 | BATTERY CHARGER INPUT |
| 22. | 284-681 | BATTERY CHARGER INPUT |
| 23. | 284-681 | |
| 24. | 284-681 | |
| 25. | 284-681 | MOBILE CHARGING |
| 26. | 284-681 | MOBILE CHARGING |
| 27. | 284-681 | MOBILE CHARGING |
| 28. | | |
| 29. | | |
| 30. | 280-833 | DC +VE |
| 31. | 280-833 | DC +VE |
| 32. | 280-833 | DC -VE |
| 33. | 280-833 | DC -VE |
| 34. | 280-833 | pump control |
| 35. | 280-833 | pump control |
| | | |
| 41. | 280-833 | anti skid |

| | | |
|---|---|---|
| 42. | 280-833 | anti skid |
| 43. | 280-833 | anti skid |
| 44. | 280-833 | anti skid |
| 45. | 280-833 | anti skid |
| 46. | 280-833 | anti skid |
| 47. | 280-833 | anti skid |
| 48. | 280-833 | anti skid |
| 49. | 280-833 | anti skid |
| 50. | 280-833 | anti skid |
| 51. | 280-833 | anti skid |
| 52. | 280-833 | anti skid |
| 53. | 280-833 | anti skid |
| 54. | 280-833 | anti skid |
| 55. | 280-833 | anti skid |
| 56. | 280-833 | anti skid |
| 57. | 280-833 | anti skid |
| 58. | 280-833 | anti skid |
| 59. | 280-833 | anti skid |
| 60. | 280-833 | anti skid |
| 61. | 280-833 | anti skid |
| 62. | 280-833 | anti skid |
| 63. | 280-833 | anti skid |
| | | |
| 298. | 280-833 | PUMP |
| 299. | 280-833 | PUMP |
| 300. | 280-833 | PUMP |
| 301. | PE | PUMP |
| 302. | 280-833 | PUMP |
| 303. | 280-833 | PUMP |
| 304. | 280-833 | PUMP |
| 305. | PE | PUMP |

## 1.11 ELECTRICAL LOAD CHART

### LHB EOG TYPE NON-AC GS (LS) COACHES

**110V DC**

| Tiem Code | Description | Wattage | Qty Per Coach | Load In Watts | Drawing |
|---|---|---|---|---|---|
| FL | FLUORESCENT LIGHT | 20 | 20 | 400 | CC76213, Alt'd' |
| DL | DOOR WAY LIGHT | 20 | 6 | 120 | CC76213, Alt'd' |
| GL | GANGWAY LIGHT | 26 | 2 | 52 | CC76216, Alt'd' |
| LL | LAVAT0RY LIGHT | 13 | 4 | 52 | LW76033,Alt'c' |
| AEL | ACCIDENTAL EMERGENCY LIGHT | 10 | 4 | 40 | IEDTS-151,R-C,AM-1 &2 |
| PACIL | PASSENGER,ALARM, LIGHT | 10 | 2 | 20 | LW76005,Alt'e' |
| F | FAN | 38 | 30 | 1140 | RDSO/PE/SPEC /TL/0021 |
| | TOTAL LOAD | | | 1824 | |

**110V AC LOAD**

| | | | | | |
|---|---|---|---|---|---|
| MCS | Mobile Charging Socket | 15 | 20 | 300 | EDML-127,REV-1 |
| | **Exhaust Fan for Lavatory** | | 04 | | |

### LHB EOG TYPE NON-AC 3 Tier Sleeper (LWSCN) COACHES

**110V DC**

| Item Code | Description | Wattage | Qty Per Coach | Load In Watts | Drawing |
|---|---|---|---|---|---|
| FL | Fluorescent Light | 20 | 20 | 400 | CC76213, Alt'd' |
| DL | Door Way Light | 20 | 4 | 80 | |
| GL | Gangway Light | 26 | 2 | 52 | CC76216, Alt'd' |
| LL | Lavat0ry Light | 13 | 4 | 52 | LW76033,Alt'c' |
| NL | Night Light | 10 | 10 | 100 | CC76289, Alt'a' |
| AEL | Accidental Emergency Light | 10 | 4 | 40 | IEDTS-151,R-C,AM-1 &2 |
| PARCIL | Passenger,Alarm,Cum,Reservation Chart Illumination Light | 21 | 2 | 42 | CC76238, Alt'd' |
| F | Fan | 38 | 30 | 1140 | RDSO/PE/SPEC/TL/0021 |
| | Total Load | | | 1906 | |

**110V AC LOAD**

| Item Code | Description | Wattage | Qty Per Coach | Load In Watts | Drawing |
|---|---|---|---|---|---|
| MCS | Mobile Charging Socket | 15 | 20 | 300 | EDML-86,REV-4,Corr-1 |
| | **Exhaust Fan for Lavatory** | | **04** | | |

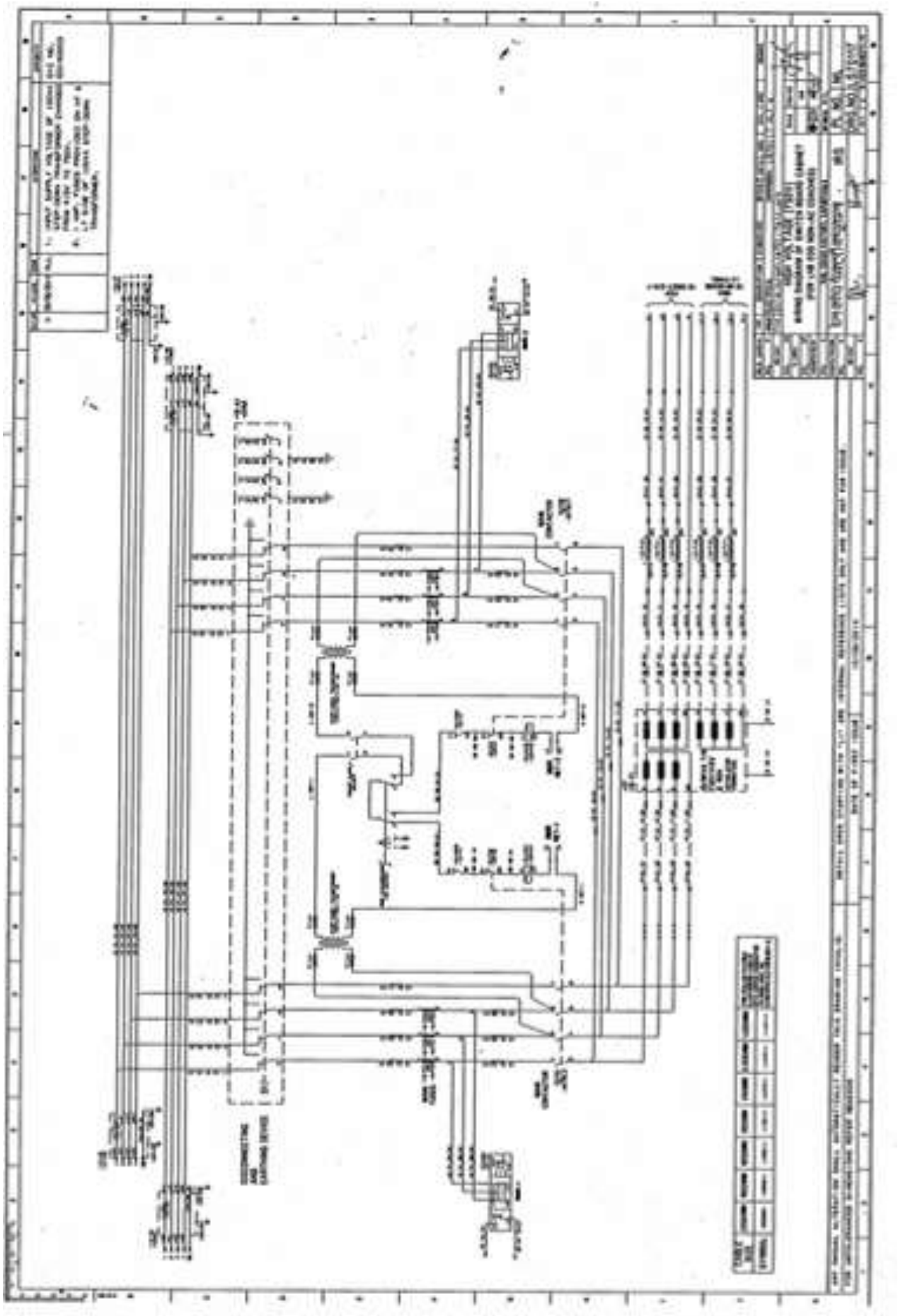
**LHB EOG TYPE NON-AC CHAIR CAR COACHES (LWSCZ)**
**110V DC**

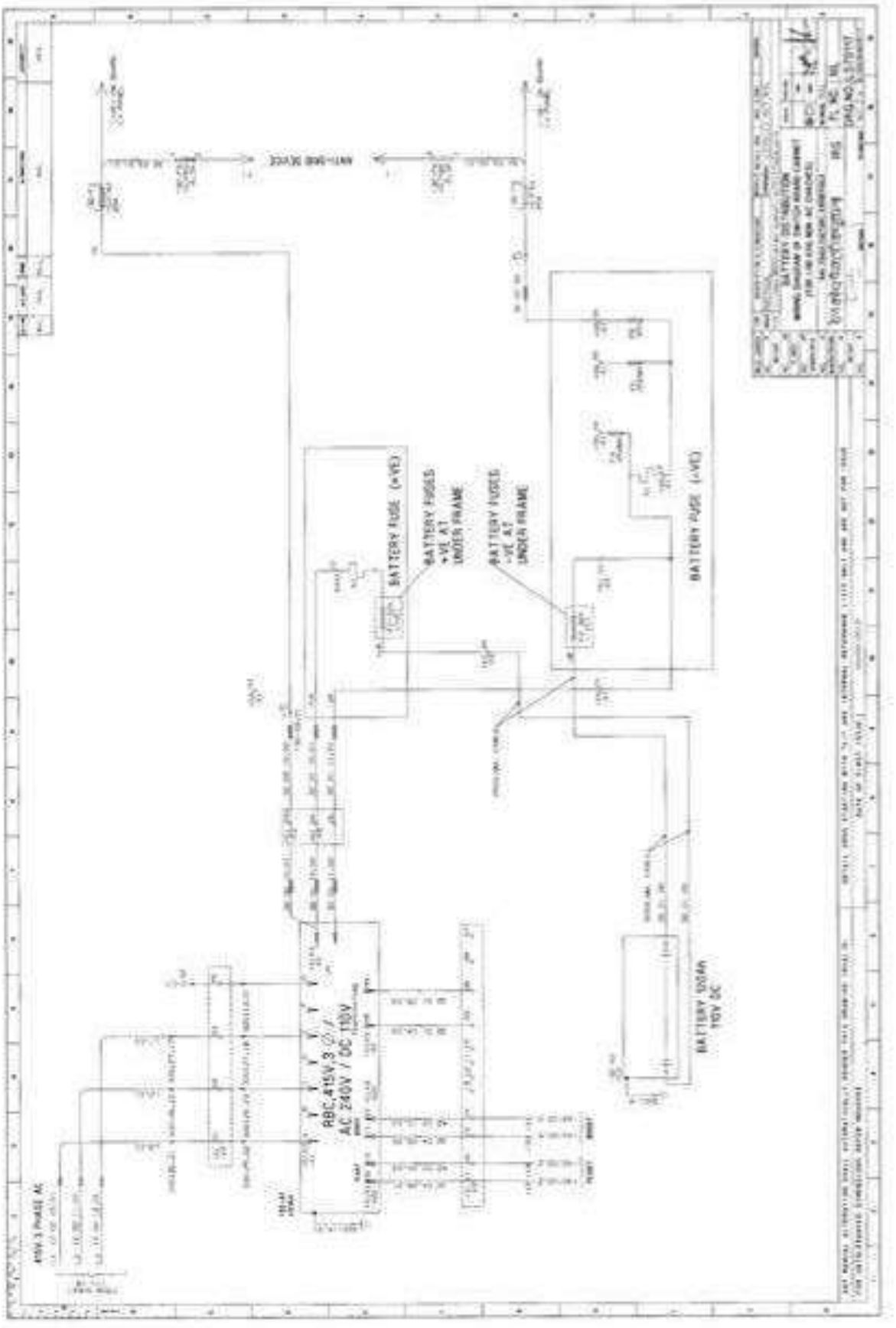
| Tiem Code | Description | Wattage | Qty Per Coach | Load In Watts | Drawing |
|---|---|---|---|---|---|
| FL | Fluorescent Light (28w+Nl-2w) | 30 | 10 | 300 | LW76055,Alt'e' |
| DL | Door Way Light | 26 | 4 | 104 | CC76216, Alt'd' |
| GL | Gangway Light | 26 | 2 | 52 | |
| LL | Lavat0ry Light | 13 | 4 | 52 | LW76033,Alt'c' |
| AEL | Accidental Emergency Light | 10 | 2 | 20 | IEDTS-151,R-C,AM-1 &2 |
| PARCIL | Passenger,Alarm,Cum,Reservation Chart Illumination Light | 21 | 2 | 42 | CC76238, Alt'd' |
| F | Fan | 38 | 36 | 1368 | RDSO/PE/SPEC/TL/0021 |
| | Total Load | | | 1938 | |

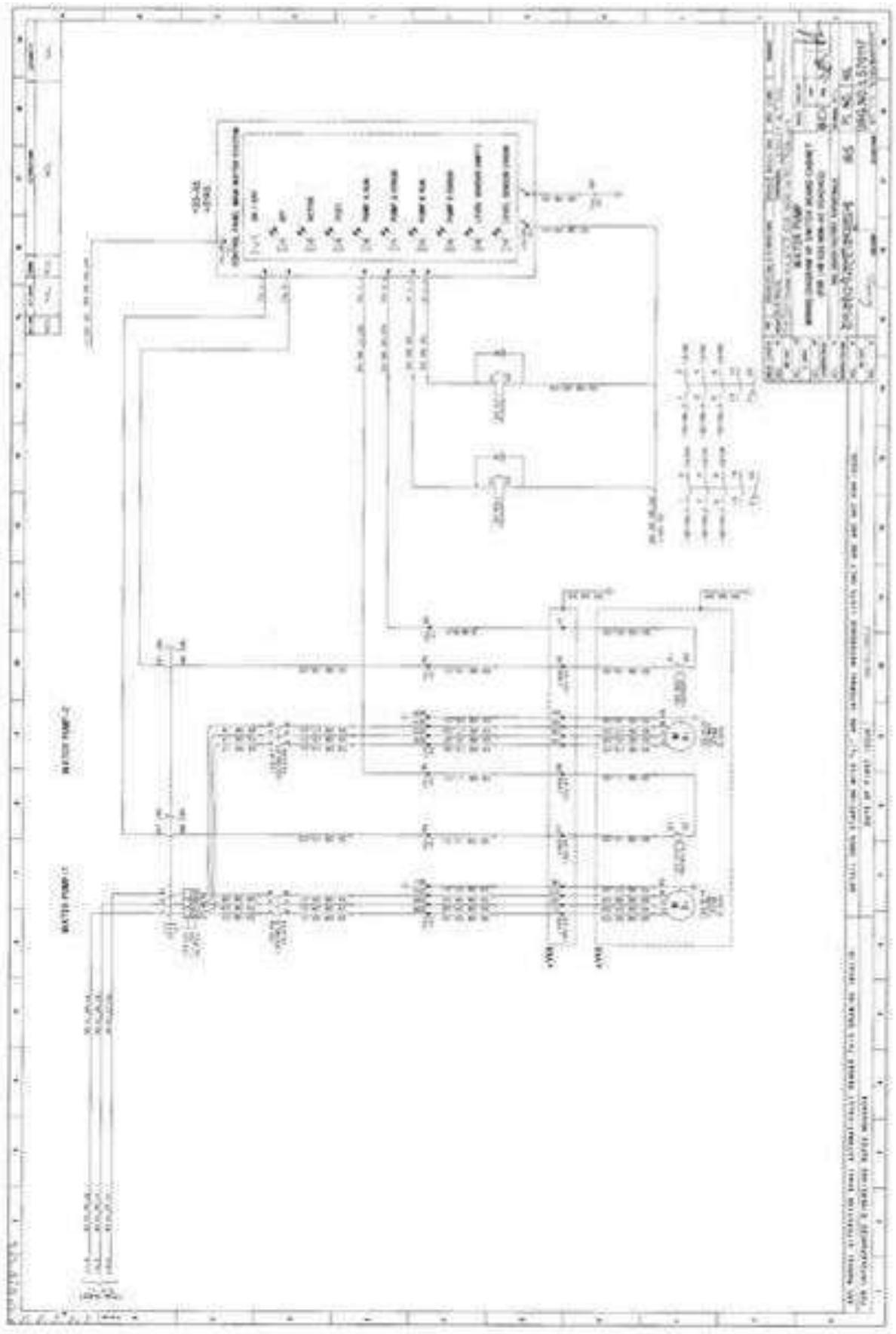
**110V AC LOAD**

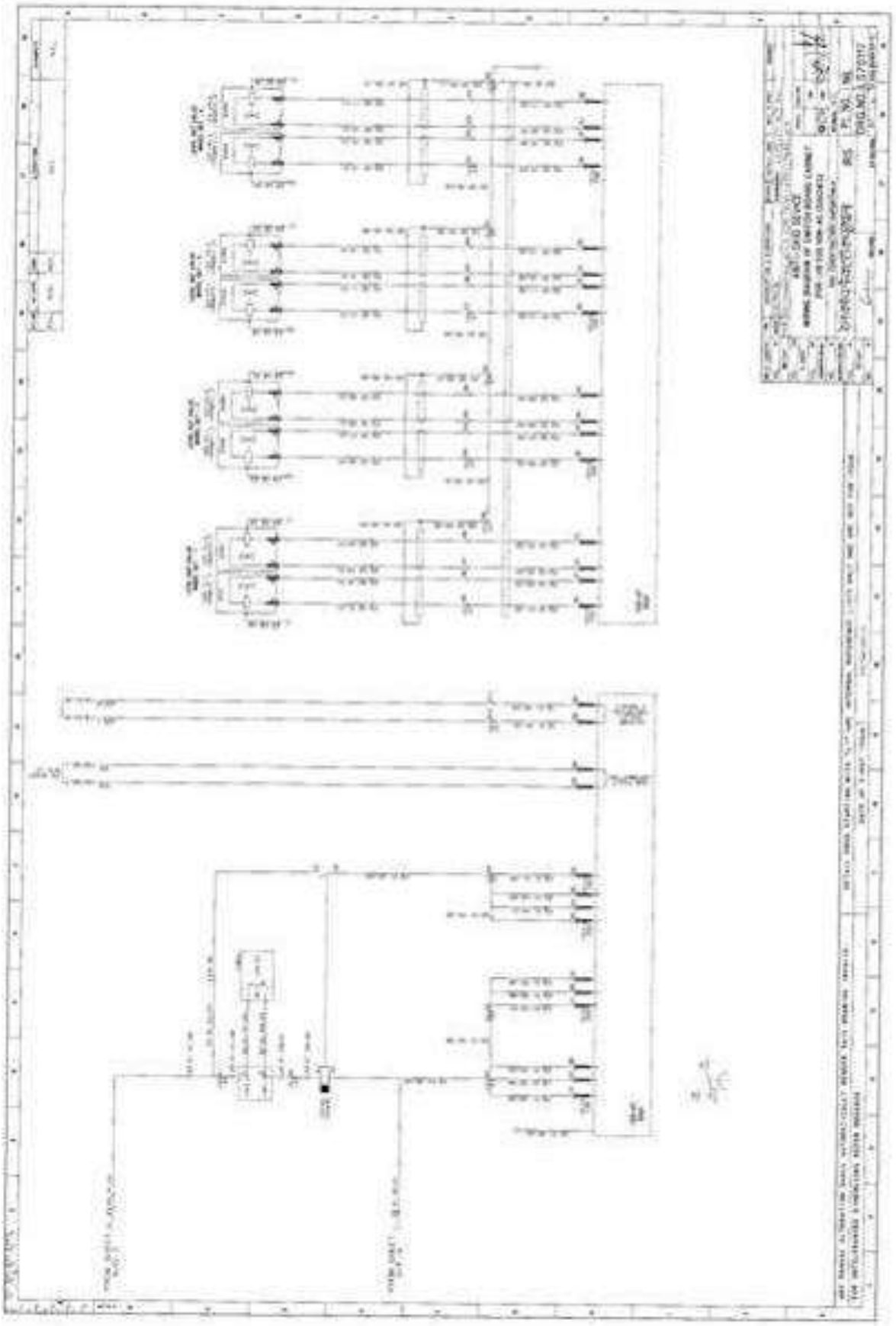
| Item Code | Description | Wattage | Qty Per Coach | Load In Watts | Drawing |
|---|---|---|---|---|---|
| MCS | Mobile Charging Socket | 15 | 17 | 255 | EDML-125.REV-1 |
| | **Exhaust Fan for Lavatory** | | **04** | | |

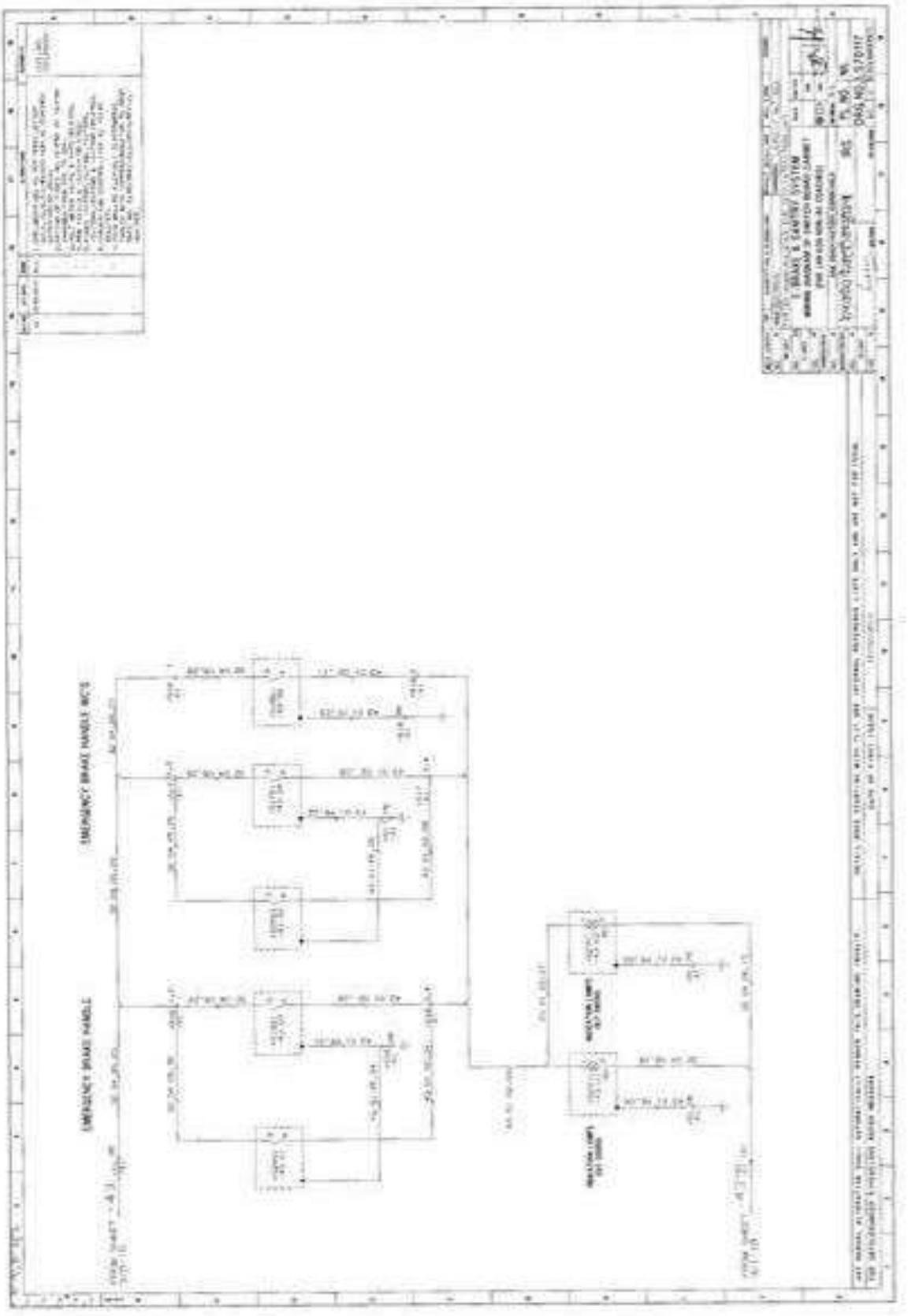
## ANNEXURE - I

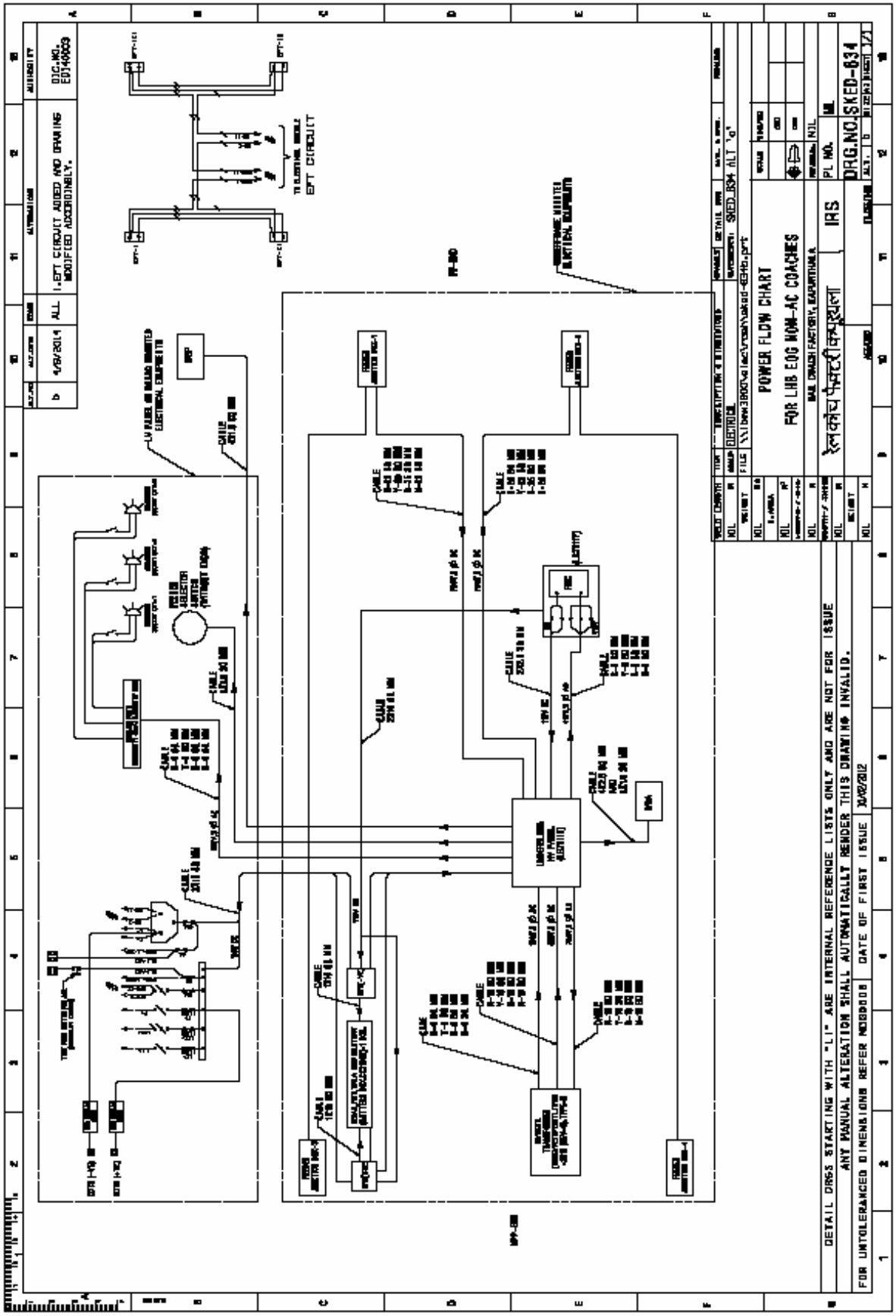



BATTERY FUSE (+VE)
BATTERY FUSES +VE AT UNDER FRAME
BATTERY FUSES -VE AT UNDER FRAME
BATTERY FUSE (-VE)
RBC 415V 3 Ø / AC 240V / DC 110V
BATTERY 120AH 110V DC








POWER FLOW CHART
FOR LHB EOG NON-AC COACHES
DRG.NO.SKED-634
IRS
DETAIL DRGS STARTING WITH "LI" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.
FOR UNTOLERANCED DIMENSIONS REFER M0000008 DATE OF FIRST ISSUE 30/08/2012

# CHAPTER 2

# MAINTENANCE SCHEDULES (ELECTRICAL)

# CHAPTER 2

# CHAPTER 2

# ELECTRICAL MAINTENANCE SCHEDULES

## 2.0 INTRODUCTION

The LHB variant of Non AC coaches is quite similar to LHB AC coaches except AC unit and its switchgears. The maintenance practices for these coaches are also more or less similar to LHB AC coaches. The various maintenance schedules and their periodicity are prescribed same as in case LHB AC coaches. [Ref.: Railway Boards letter no.95/M(C)/141/1 (LHB) Pt. dtd. 08.05.08].

**Periodic Maintenance Schedules**

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

The EOG LHB Non AC coaches mainly comprises of second class (GS/LS) coaches, 3 Tier Non AC sleeper coaches and Non AC Chair cars. The electrical equipment of these coaches have been described in chapter 1 on "GENERAL DESCRIPTION" of this manual. The equipment wise maintenance activities of above schedules and procedures for SS-1 and SS-2 are described in this chapter.

## 2.1 INTERNAL LIGHT AND FAN FITTINGS

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Check visually for any damages. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Check function of lights, fans and emergency lights and replace defective lights/fans if any. | ✓ | ✓ | ✓ | ✓ | ✓ |
| c. | Check and clean lamp shades/ covers/ fan body | -- | ✓ | ✓ | ✓ | ✓ |
| d. | Clean and blow internally fan housing. | -- | -- | ✓ | ✓ | ✓ |
| e. | Check working of all light and fan switches. | ✓ | ✓ | ✓ | ✓ | ✓ |
| f. | Check working of mobile charging sockets and switches. | -- | -- | ✓ | ✓ | ✓ |
| g. | Replace broken reflectors, shades, defective invertors and holders | -- | -- | ✓ | ✓ | ✓ |
| h. | All shortages are to be replenished. | -- | -- | ✓ | ✓ | ✓ |

## 2.2 BATTERY AND BATTERY BOX

| | Activities | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Visually check battery box and suspension for any damage or irregularity. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Check container and inter-block connections and clean, if necessary. | -- | ✓ | ✓ | ✓ | ✓ |
| c. | Check battery connections for tightness. | -- | -- | ✓ | ✓ | ✓ |
| d. | Clean battery connections and apply petroleum jelly or Vaseline. | -- | -- | ✓ | ✓ | ✓ |
| e. | Remove the batteries from battery boxes. | -- | -- | -- | ✓ | ✓ |
| f. | Clean and repair battery boxes and repaint with anti corrosive epoxy based paint. | -- | -- | -- | ✓ | ✓ |
| g. | Check intactness/tightness of suspension arrangement of battery box. | -- | -- | -- | ✓ | ✓ |
| h. | Clean thoroughly corrosion/ sulphation of connectors etc. and protect them from further corrosion by applying petroleum jelly or vase-line. Change connectors and fasteners on condition basis. | -- | -- | -- | ✓ | ✓ |
| i. | Record lug date to determine the life of the battery. (codal life) | -- | -- | -- | ✓ | ✓ |
| j. | Charge the battery fully till 3 constant hourly readings of voltage indicates the conditions of a fully charged cell. | -- | -- | -- | ✓ | ✓ |
| k. | **Carry out the capacity test**<br>▪ Charge the battery fully till 3 constant hourly readings of voltage indicates the condition of a fully charged cell.<br>▪ Discharge the battery at 10 hours discharge rate. While discharging, record the voltage.<br>▪ Record the capacity of the battery during discharge. It should not be less than 80% of the rated capacity. | -- | -- | -- | -- | ✓ |
| l. | **In case while discharging, any of the battery voltage falls below specified limit within 08 hours disconnect the battery from the circuit for treatment with 01 or 02 cycles of slow charge & discharge as per manufacturers maintenance manual. (RDSO SMI no. RDSO/PE/SMI/TL/0024-2012 (Rev.2)** | -- | -- | -- | -- | ✓ |
| m. | After 2 cycles of charge & discharge, recharge the battery fully. | -- | -- | -- | -- | ✓ |

## 2.3 BATTERY CHARGER

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Visually check battery charger box suspension arrangement for any damage or irregularity. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Check the functions of battery charger | -- | -- | -- | ✓ | ✓ |
| c. | Check the male & female connector pin for any overheating mark etc. | -- | -- | -- | ✓ | ✓ |
| d. | Check intactness/tightness of suspension arrangement of battery charger box. | -- | -- | -- | ✓ | ✓ |
| e. | Open the cover of battery charger and clean with soft brush & vacuum cleaner. | -- | -- | -- | ✓ | ✓ |
| f. | Check the loose connection and overheating marks and take corrective action. | -- | -- | -- | ✓ | ✓ |
| g. | Take IR of live terminals to body. It should be more than as specified in Table- 2.1. | -- | -- | -- | ✓ | ✓ |
| h. | Replace cover sealing gasket | -- | -- | -- | -- | ✓ |
| i. | Clean and check ducts for ventilation in box | -- | -- | ✓ | ✓ | ✓ |

## 2.4 STEP DOWN TRANSFORMER 9/15 kVA

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Visually check transformer suspension arrangement for any damage or irregularity. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Open the cover and clean with compressed air/ vacuum cleaner. | -- | -- | ✓ | ✓ | ✓ |
| c. | Check loose connection, overheating marks, fuses condition and take corrective action. | -- | ✓ | ✓ | ✓ | ✓ |
| d. | Take IR of live terminals to body. It should be more than as specified in Table- 2.1. | -- | -- | -- | ✓ | ✓ |
| e. | Ensure proper clamping of cable conduits. | -- | -- | ✓ | ✓ | ✓ |
| f. | Check intactness/tightness of suspension arrangement. | -- | -- | -- | ✓ | ✓ |
| g. | Check sealing gasket and replace if required. | -- | -- | -- | ✓ | ✓ |
| h. | Check grommets of all cable-entry holes and replace if required. | -- | -- | -- | ✓ | ✓ |
| i. | Check / replace mounting bolts with grade of 10.9 ( high tensile). | -- | -- | -- | -- | ✓ |
| j. | Check/replace Anti Vibration Mounting (AVM) pad. | -- | -- | -- | -- | ✓ |

## 2.5 ELECTRICAL PANELS (Under slung HV and Onboard Panel)

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Visually check all under-slung panels suspension arrangement for any damage or irregularity. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Visually check panel covers for proper fitment along-with their securing arrangement. | ✓ | ✓ | ✓ | ✓ | ✓ |
| c. | Clean the panel with blower and vacuum cleaner and check for any loose connections. | -- | ✓ | ✓ | ✓ | ✓ |
| d. | Check panel covers hinges and gasket for proper condition. | -- | ✓ | ✓ | ✓ | ✓ |
| e. | Check the availability of proper rating HRC fuses. | -- | ✓ | ✓ | ✓ | ✓ |
| f. | Replace if fuse is blown/ missing. | -- | ✓ | ✓ | ✓ | ✓ |
| g. | Check rotary switches for proper working. | -- | -- | -- | ✓ | ✓ |
| h. | Check intactness/tightness of suspension arrangement of under-slung panels and mounting arrangement of on-board panels. | -- | -- | -- | ✓ | ✓ |
| i. | Ensure all cable entry holes are provided with grommets | -- | -- | -- | ✓ | ✓ |
| j. | Check the contacts of power contactors and other contactors. | -- | -- | -- | ✓ | ✓ |
| k. | Check the connection of switchgear terminal blocks for overheating and tightness. | -- | -- | -- | ✓ | ✓ |
| l. | Check the fixation and terminal connections of pump controller. | -- | -- | -- | ✓ | ✓ |
| m. | Check all the earthing shunts and replace, if required. | -- | -- | -- | ✓ | ✓ |
| n. | Take IR of live terminals to body for power and control supply. It should be more than as specified in **Table- 2.1** | -- | -- | -- | ✓ | ✓ |
| o. | Replace MCBs for pantry equipment, and MPCB for pumps on condition basis. | -- | -- | -- | -- | ✓ |
| p. | Check condition of contacts by measuring the contact area, mili volt drop etc. Replace them on condition basis if fails in test. | -- | -- | -- | -- | ✓ |
| q. | Check disconnecting & earthing device complete rotary switch. | -- | -- | -- | -- | ✓ |

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| r. | Replace open type control fuse unit for HT circuit with fuse base holder assembly unit. | -- | -- | -- | -- | ✓ |
| s. | Ensure working of MMRs (750Volts & 415Volts) & their replacement with new ones in IInd POH. | -- | -- | -- | ✓ | ✓ |
| t. | Replace Harting connectors/Cage clamps | -- | -- | -- | -- | ✓ POH 2nd |
| u. | Replace K-01, K02, K24, K25 in IInd POH. | -- | -- | -- | -- | ✓ POH 2nd |
| v. | Replace all rotary switches | -- | -- | -- | -- | ✓ POH 2nd |
| w. | Ensure internal wiring dressing and securing properly. | -- | -- | -- | ✓ | ✓ |

## 2.6 MISCELLANEOUS EQUIPMENT

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| **Battery Fuse boxes** | | | | | | |
| a. | Visually check battery fuse boxes suspension arrangement for any damage or irregularity. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Visually check fuse box covers for proper fitment along-with their securing arrangement. | ✓ | ✓ | ✓ | ✓ | ✓ |
| c. | Clean the panel with blower and vacuum cleaner and check for any loose connections. | -- | ✓ | ✓ | ✓ | ✓ |
| d. | Check panel covers hinges and gasket for proper condition. | -- | ✓ | ✓ | ✓ | ✓ |
| e. | Check the availability of proper rating HRC fuses. | -- | ✓ | ✓ | ✓ | ✓ |
| f. | Check intactness/tightness of suspension arrangement of fuse boxes. | -- | -- | -- | ✓ | ✓ |
| g. | Replace old positive and negative fuse boxes. | -- | -- | -- | -- | ✓ POH 2nd |
| **Feeder cable** | | | | | | |
| a. | Check the condition and IR of feeder cable. It should be more than as specified in **Table- 2.1**. | -- | -- | -- | ✓ | ✓ |
| b. | Check proper clamping arrangement | -- | -- | -- | ✓ | ✓ |
| **c.** | Check the connecting terminals for marks of overheating etc. | -- | -- | -- | ✓ | ✓ |
| **Fuse Distribution Board** | | | | | | |
| a. | Remove any foreign material. | ✓ | ✓ | ✓ | ✓ | ✓ |

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| b. | Clean and ensure proper fitment of all fuses. | -- | ✓ | ✓ | ✓ | ✓ |
| c. | Check all connections and ensure proper tightness. | -- | ✓ | ✓ | ✓ | ✓ |
| d. | Ensure proper fitment of fire safety strips /channels external and internal. | -- | ✓ | ✓ | ✓ | ✓ |
| **Inter vehicle electrical power couplers** | | | | | | |
| a. | Check HT power jumper cables for external damage and over heating. Repair if required. | --- | --- | ✓ | ✓ | ✓ |
| b. | Check I.V. couplers for proper mating with thermo vision device. | -- | --- | -- | ✓ | ✓ |
| c. | Check the condition of pins. | -- | -- | -- | ✓ | ✓ |
| d. | Replace loosely crimped pins. | -- | -- | -- | --- | ✓ |
| e. | Check the locking arrangement & ensure its proper locking. | -- | -- | ✓ | ✓ | ✓ |
| f. | Take IR of live terminals to body. It should be more than as specified in Table- 2.1 | -- | -- | -- | ✓ | ✓ |
| **Water supply system** | | | | | | |
| a. | Check functioning of water pumping arrangement in test mode/pump controller if provided. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Check the mounting arrangement for proper fitment. | --- | --- | --- | ✓ | ✓ |
| c. | Replace old Mono-block pump with new one in 2nd POH. | -- | -- | -- | --- | ✓ POH 2nd |
| **Lavatory equipment** | | | | | | |
| a. | Check and ensure working of lavatory exhaust fans. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Ensure cleaning and availability of sealing of covers/grills. | -- | -- | -- | ✓ | ✓ |
| c. | Cleaning the impellers of the exhaust items | -- | -- | -- | -- | ✓ |
| d | Replace old defective Lavatory light fitting/ exhaust fans. | -- | -- | -- | -- | ✓ |
| **Earthing** | | | | | | |
| a. | Check function of insulation monitoring device by creating single earth fault in supply lines. | -- | --- | ✓ | ✓ | ✓ |

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| b. | Check condition of disconnecting and earthing switch. Replace if require in SS-2 | -- | -- | -- | ✓ | ✓ |
| c. | Check tightness of all the earthing connections. | -- | -- | -- | ✓ | ✓ |
| d. | Measuring monitoring relay (MMR) to be calibrated on the test bench. | -- | -- | -- | -- | ✓ |

## 2.7 MINI PANTRY ITEMS FOR CHAIR CARS (DEEP FREEZER, BOTTLE COOLER, HOT CASE, WATER BOILER)

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| a. | Check working of all mini-pantry equipment. | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. | Clean all the pantry equipments thoroughly. | -- | -- | -- | ✓ | ✓ |
| c. | Check and record current drawn by compressors for bottle cooler & deep freezer. | -- | -- | -- | ✓ | ✓ |
| d. | Clean the condenser of refrigerator and deep freezer. | -- | -- | -- | ✓ | ✓ |
| e. | Check starting capacitor value with LCR meter. If value is low, replace it. | -- | -- | -- | ✓ | ✓ |
| f. | Check the working of starting relay for compressors. | -- | -- | -- | ✓ | ✓ |
| g. | Clean the boilers for removing scaling etc. | -- | -- | -- | ✓ | ✓ |
| h. | Check working of thermostats of boilers. | -- | ✓ | ✓ | ✓ | ✓ |
| i. | Check the heating element of boilers and replace if required. | -- | ✓ | ✓ | ✓ | ✓ |
| j. | Check for any leakage. | -- | -- | ✓ | ✓ | ✓ |
| k. | Check the working of thermostats of hot case. | -- | ✓ | ✓ | ✓ | ✓ |
| l. | Check the working of indication lamps. | -- | -- | ✓ | ✓ | ✓ |
| m. | Check the insulation resistance of live terminals to body. It should be more than as specified in **Table- 2.1**. | -- | -- | -- | ✓ | ✓ |
| n. | Check earthing of each equipment. | -- | -- | -- | ✓ | ✓ |
| o. | Replenish the item if found deficient. | -- | -- | ✓ | ✓ | ✓ |
| p. | Replace dented/pitted doors of Deep freezer. | -- | -- | -- | -- | ✓ |
| q. | Replace hot water boiler /geysers with new one on condition basis. | -- | -- | -- | -- | ✓ |

| Activities | | TI (D1) | M (D2) | HY (D3) | IOH (SS-1) | POH (SS-2) |
|---|---|---|---|---|---|---|
| r. | Replace complete Heater assembly with new one on condition basis. | -- | -- | -- | -- | ✓ |
| s. | Replace dented/pitted doors of Hot cases. | -- | -- | -- | -- | ✓ |

**Table- 2.1**

(As per RDSO specification and code of practice for wiring in 750 volt End-On-Generation system coaching stock, No. ELPS/SPEC/EOG/0l)

| Sr. No. | Circuit Voltage | Capacity of Megger used | Min. value of IR required |
|---|---|---|---|
| 1. | 750V | 1000V | 05 M ohms |
| 2. | 415V | 500V | 03 M ohms |
| 3. | 230V | 500V | 02 M ohms |
| 4. | 190V | 500V | 02 M ohms |
| 5. | 110V | 500V | 02 M ohms |
| 6. | 24V | 100V | 01 M ohms |

## 2.8 PROCEDURE FOR SHOP SCHEDULE SS-1

### 2.8.1 Pre-Inspection

- Place the coach on the pit line and inspect the electrical equipment.
- Check operation of all the lights, fans, mini pantry equipment, WRA mono block pump, regulated battery charger, protection fuses etc. and note down the defects and deficiencies.

### 2.8.2 Work to be done

Carry out all the activity as prescribed earlier in schedule format for all equipment.

### 2.8.3 Final Testing

After installation of all the electrical equipment on the coach, they shall be checked and tested as per proforma **2.1.**

### 2.8.4 Final Joint Inspection

Workshop supervisor with divisional supervisor shall jointly inspect the coach and the performance of electrical equipment shall be recorded as per proforma **2.2**

A details of equipment changed with new assemblies will also be handed over along with the coach to the divisional representative. Any attention, if required to the equipment shall be given before dispatch of the coach from workshop to division.

## 2.9 PROCEDURE FOR SHOP SCHEDULE SS-2

### 2.9.1 Pre-Inspection

- Place the coach on the pit line and inspect the electrical equipment.
- Check operation of all the lights, fans, mini pantry equipment, WRA mono block pump, regulated battery charger, protection fuses etc. and note down the defects and deficiencies

### 2.9.2 Striping

Remove the following electrical equipment for overhauling:

- Mono block pumps.
- Battery and regulated battery Charger.
- Light fittings.
- Fans & Exhaust fans
- Mini pantry equipment.

Before overhauling, measure the insulation resistance of all the electrical equipment to know the condition of equipment.

### 2.9.3 Equipping

1. Fit all the electrical equipment to its respective locations.
2. Connect all the electrical wirings and other electrical systems wherever required.

### 2.9.4 Final Testing

After installation of all the electrical equipment on the coach, they shall be checked and tested as per proforma **2.1.**

### 2.9.5 Final Joint Inspection

Workshop supervisor with divisional supervisor shall jointly inspect the coach and the performance of electrical equipment shall be recorded as per proforma **2.2**

A details of equipment changed with new assemblies will also be handed over along with the coach to the divisional representative. Any attention, if required to the equipment shall be given before dispatch of the coach from workshop to division.

**PROFORMA 2.1**

# ELECTRICAL TEST REPORT FOR LHB EOG NON AC COACHES

# AFTER SS-1/ SS-2

Type of Coach---------- Coach No.----------

Date of testing---------- Railway----------

## 1.0 INSULATION RESISTANCE

| Sr. No. | Circuit Voltage | Capacity of Megger used | Min. value of IR required | Actual value observed | Remarks |
|---|---|---|---|---|---|
| 1. | 750V | 1000 V | 05 M ohm | | OK / Not OK |
| 2. | 415 V | 500 V | 03 M ohm | | OK / Not OK |
| 3. | 230 V | 500 V | 02 M ohm | | OK / Not OK |
| 4. | 190 V | 500 V | 02 M ohm | | OK / Not OK |
| 5. | 110 V | 500 V | 02 M ohm | | OK / Not OK |
| **6.** | **24 V** | **100 V** | **01 M ohm** | | **OK / Not OK** |

## 2.0 MONO BLOCK PUMPS (FOR 3 TIER COACHES)

| Sr. No. | Description | Specified Load Current | | Actual observed | | |
|---|---|---|---|---|---|---|
| | | M/s. Elgi | M/s Kalsi | R | Y | B |
| | WRA/ Mono Block Pumps | Amps. | Amps | | | |
| 1. | 1 | 1.2 | 1.1 | | | |
| 2. | 2 | 1.2 | 1.1 | | | |

## 3.0 MINI PANTRY EQUIPMENTS -For Chair Cars

| | | |
|---|---|---|
| 1 | Deep Freezer | OK / Not OK |
| 2 | Bottle Cooler | OK / Not OK |
| 3 | Hot Case | OK / Not OK |
| 4 | Water Boiler | OK / Not OK |

## 4.0 LIGHTING & FAN CIRCUITS

| | | |
|---|---|---|
| 1 | Working of main lighting circuit | OK / Not OK |
| 2 | Working of emergency light unit (ELU) | OK / Not OK |
| 3 | Night Light | OK / Not OK |
| 4 | Gangway/ doorway light | OK / Not OK |
| 5 | Lavatory light | OK / Not OK |
| 6 | PACIL/PARCIL | OK / Not OK |
| 7. | Fans | OK / Not OK |
| 8. | Lavoratory exhaust fans | OK / Not OK |

## 5.0 TESTING OF ELECTRICAL PANELS

| | | |
|---|---|---|
| 1 | Regulated Battery Charger | OK / Not OK |
| 2 | Earthing and disconnecting device | OK / Not OK |
| 3 | Pump Controller | OK / Not OK |

## 6.0 PERFORMANCE OF OTHER EQUIPMENT

| SNo | Equipments | Performance |
|---|---|---|
| 1. | Flasher (L/V) | OK /Not OK |
| 2. | 750 V circuit | OK /Not OK |
| 3. | Feeder 1 | OK /Not OK |
| 4. | Feeder 2 | OK /Not OK |

(Signature of testing In-charge)

**PROFORMA 2.2**

## FINAL JOINT INSPECTION REPORT OF LHB EOG NON AC COACHES AFTER SS-1/ SS-2

| **Coach Particulars** | | |
|---|---|---|
| **S.No.** | **Particulars of the coach** | **Details** |
| 1. | Coach No. | |
| 2. | Depot / Railways | |
| 3. | Workshop name | |
| 4. | Coach booked on | |
| 5. | Coach booked for SS-I/ SS-II | |
| 6. | Date of Inspection | |
| 7. | Return Date | |

**Final Checking**

| | | |
|---|---|---|
| **1.0** | **ELECTRICAL PANELS** | |
| | Condition of rotary switches | OK / Not OK |
| | Condition of Rotary switches for<br>Light<br>Fan circuit<br>Mobile Charging | <br>OK / Not OK<br>OK / Not OK<br>OK / Not OK |
| | Condition of terminals | OK / Not OK |
| | Condition of contactors | OK / Not OK |
| | Condition of relays | OK / Not OK |
| | Condition of cable | OK / Not OK |
| | Condition of clamping of cables | OK / Not OK |
| | Condition of conduits | OK / Not OK |
| **2.0** | **Compartment** | |
| | Condition of fans | OK / Not OK |
| | Condition of lights | OK / Not OK |
| | Condition of night lights | OK / Not OK |
| | Condition of switches | OK / Not OK |
| | Condition of PACIL/PARCIL | OK / Not OK |
| | Condition of mobile charging sockets | OK / Not OK |
| **3.0** | **Battery** | |
| | Make<br>Lug date | |
| | Battery box suspension arrangement | OK / Not OK |
| | Battery box inside anti corrosion painting | OK /Not OK |

| | | |
|---|---|---|
| | Condition of battery lugs | OK / Not OK |
| | Condition of cell container | OK / Not OK |
| | Condition of battery fuse & fuse box | OK / Not OK |
| | Earth leakage of battery | leakage / Not leakage |
| | Battery no load voltage in volts | _____volts |
| **4.0** | **Regulated Battery Charger** | |
| | Make of battery charger | |
| | Condition of battery charger | OK / Not OK |
| | Condition of battery charger mounting arrangement | OK / Not OK |
| **5.0** | **Mini Pantry Equipment (chair car)** | |
| | Condition of Deep freezer | OK / Not OK |
| | Condition of bottle cooler | OK / Not OK |
| | Condition of water boiler | OK / Not OK |
| | Condition of hot case | OK / Not OK |
| **6.0** | **EOG Coupler** | |
| | Condition of coupler<br>PP Side<br>NPP Side | <br>1. OK / Not OK 2. OK / Not OK<br>1. OK /Not OK 2. OK /Not OK |
| | Condition of coupler pins<br>PP Side<br>NPP Side | <br>1. OK / Not OK 2. OK / Not OK<br>1. OK /Not OK 2. OK /Not OK |
| | Condition of locking arrangement<br>PP Side<br>NPP Side | <br>1. OK / Not OK 2. OK / Not OK<br>1. OK /Not OK 2. OK /Not OK |
| **7.0** | **9/ 15 KVA Transformer** | |
| | Condition of mounting arrangement | OK /Not OK |
| | Condition of terminals | OK /Not OK |
| **8.0** | **Earthing of all Equipment** | Provided / Not Provided |

**Equipment Replaced**

| S.No | Name of Equipment | Make | Rating/ Capacity | Serial No. |
|---|---|---|---|---|
| | | | | |
| | | | | |

(Signature of Inspecting Supervisor from Depot/ Railway)

(Signature of Inspecting Supervisor from Work Shop)

***********

**Annexure - 1**

## LIST OF MUST CHANGE ITEMS FOR NON AC LHB EOG COACHES

| S.No. | | Items | First POH | Second POH |
|---|---|---|---|---|
| 1 | **Electrical panels** | | | |
| | a | MCBs for Pump Controller F-36 | | Y |
| | b | MPCB for Pumps, F-21 & F-22 | | Y |
| | c | Rotary Switch for Disconnecting & Earth Device, A-2 | | Y |
| | d | Rotary Selector Switch for Net-1/Net-2 | | Y |
| | e | Rotary Selector Switch for local / remote | | Y |
| | f | Measuring & Monitoring Relay MMRs | | Y |
| | g | Main Feeder Contactors, K-01 & K-02 | | Y |
| | h | Harting connectors/ Cage Clamps | | Y |
| | i. | Pump contactor K24, K25 | | Y |
| 2 | **Light Fittings** | | | |
| | a | Lavatory Light Fitting | | Y |
| | b | Lavatory Exhaust Fan | | Y |
| | c | Switch plate assembly complete | | Y |
| 3 | **Mini Pantry Equipment** | | | |
| | a | Hot Water Boiler/Geyser | On condition basis | On condition basis |
| | b | Heating Element assembly complete with Blower unit rotary switch, thermostat & indicator for Hot cases | | |
| | c | MCBs for Mini Pantry Equipment | | |
| | f | Thermostats of bottle cooler, Deep freezer, etc | | |
| | g | Anti vibration mountings/pads of compressors of deep freezer, bottle cooler | | |
| 4 | **ZS Coupling** | | | |
| | a | Contact Pin assembly for Phases, Neutral & Earth with Springs | | Y |
| | b | Connector Female assembly Phases, Neutral & Earth with Springs | | Y |
| | c | Ratchet arrangement for coupling sockets assembly | | Y |
| | d | Insulating Base with fixing screw kit for coupling socket | Y | |
| | e | Insulating Base with fixing screw kit for Jumper Plug assembly | Y | |
| | f | Hinged cover assembly for Blind socket | Y | |
| | g | Ratchet arrangement for Blind socket assembly | Y | |
| | h | PMA protective sleeve for cables | Y | |
| | i | Conduit seal ring & all type gaskets | Y | |

| S.No. | Items | | First POH | Second POH |
|---|---|---|---|---|
| | j | Coupling socket housing assembly | | Y |
| | k | Lever Tie Bow RH & LH | | Y |
| | l | Connecting link lever arm | | Y |
| | m | Rivet Pin link long | | Y |
| | n | Complete ZS coupling with ratchet sockets assembly & Blind socket | | Y |
| **5** | **Monoblock Pump** | | | |
| | a | Complete Monoblock Pump unit | | Y |
| **6** | **Battery Fuse Box** | | | |
| | a | Positive Battery Fuse Box Complete | | Y |
| | b | Negative Battery Fuse Box Complete | | Y |
| **7** | | Earthing Shunts of all panels, electrical fitting, equipment | | Y |
| **8.** | | All cover gaskets such as transformer box, battery charger box, panel covers etc. | Y | |
| **9.** | | Gromets of all cable entry holes | Y | |
| **10.** | | Fitting hardware such as mounting bolts, washers, lock pins etc. with proper grade. | Y | |
| **11.** | | Anti vibration mounting pads of 9/15 kVA transformer | Y | |
| **12.** | | VRLA batteries | As per RDSO guidelines. | |