सत्यमेव जयते

भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

अनुसंधान अभिकल्प एवं मानक संगठन

RESEARCH DESIGN AND STANDARD ORGANISATION
MANAK NAGAR LUCKNOW-226011

भारतीय रेल के एल० एच० बी० कोचों में लोको और पावर कार /एल॰एस॰एल॰आर॰डी॰ कोच के बीच एच॰ ओ॰ जी॰ संचार के लिए वैकल्पिक व्यवस्था के लिये संशोधन शीट।

MODIFICATION SHEET FOR PROVISION OF ALTERNATE WIRELESS COMMUNICATION ARRANGEMENT BETWEEN POWER CAR/LSLRD AND LOCO FOR HOG OPERATION IN LHB TYPE EOG/HOG COACHES.

MODIFICATION SHEET NO. RDSO/PE/MS/TL/0096-2025 (Rev 0)

SN	DATE OF AMENDMENT	AMENDMENT NO.	PAGE NO.	REASON FOR AMENDMENT

अनुमोदित
APPROVED BY:

प्रघान कार्यकारी निदेशक/पीएस एंड ई0एम0यू0
PED/PS & EMU

RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011
Modification sheet no RDSO/PE/MS/TL/0096-2025(Rev-0)

1.0 TITLE:

Modification Sheet for provision of alternate wireless communication arrangement between power car/LSLRD and Loco for HOG operation in LHB Type EOG/HOG Coaches.

2.0 FOREWORD:

2.1 At present, as per RDSO modification sheet no. RDSO/PE/MS/AC/0051-2011 (Rev-2) with Amdt. 1, UIC coupler is used for HOG communication between Power Car/LSLRD and Loco so that HOG Power supply can be taken from the Loco at appropriate desirable times. The communication is needed between Loco & Power Car mainly to ensure that the power supply is fed in IV couplers either from EOG System or HOG System along with other safety reasons.

2.2 Zonal railways have reported several cases which have stopped the HOG supply from Loco to the rake in case of UIC coupler loosens during vibration, pins of UIC coupler is experiencing improper mating, UIC coupler pins having wear & tear/sulphation in contacts etc. These problems lead to poor reliability of HOG system and higher dependency on Backup EOG system.

2.3 Western Railway has suggested an alternate route for wireless communication between loco and Power Car/ LSLRD which shall be used in order to overcome problems arising due to UIC coupler failures online.

3.0 BRIEF DESCRIPTION

3.1 Railway Board vide letter no. 98/Elect(G)/114/1 HOG-II dated 14.08.2024 have advised RDSO to study the arrangement for the feasibility of its implementation as a measure of system improvement. The modification in the Control circuits of Loco and Power Car/LSLRD have been studied for wireless modification and detailed in this Modification Sheet.

3.2 RDSO vide letter no. EL/11.5.5/6 dated 27.06.2024 have already issued guidelines for redundancy in UIC Coupler for HOG operation in which UIC coupler for MU operation was reverted back to be utilized for HOG operation. One of the UIC sockets of the loco will be directly attached to power car with existing UIC coupler and other redundant UIC socket (for HOG operation) to be modified for alternate wireless communication arrangement between Power Car/LSLRD and Loco for HOG operation.

3.3 Wireless System details:

a. The system consists of one Transmitter mounted in Power Car and one Receiver mounted in Loco.
b. Both these equipment i.e. transmitter & receiver are housed in small boxes & can be mounted at places shown in Annexure A for Loco and Power Car/LSLRD.

c. The transmitter generates signal after checking the readiness of Power Car to receive HOG Supply. Further, Receiver sends back feedback signal back to the transmitter confirming the acknowledgement of the transmitter command.
d. The generated signal which was earlier transmitted through UIC Coupler now will be transmitted through wireless communication to a range of approx. 100 meters
e. The signal will be received by the receiver which will enable to switch 'ON' the converter supply from Loco
f. The converter supply will be fed from Loco to rake as usual.
g. The transmission of multiple simultaneous data to be made at **433-434 MHz** license free frequency range.

3.4 Electronic components used in the Master controller and LCD display unit shall be as under:-

a. IC (Integrated Circuits) shall be MIL Grade.
b. Electrolytic capacitors of Industrial grade shall be rated for minimum temperature of 105ºC.
c. The resistance shall be preferably made of metal film of adequate rating.
d. Switching devices such as transistors shall have maximum junction temperature of 150ºC.
e. Devices shall have the adequate thermal margin at an ambient of 55ºC.

4.0 MODIFICATION TO BE CARRIED OUT:

4.1 Transmitter for Power Car/LSLRD

a. Comprises of NRF24L01 single chip 2.4GHz Transceiver operating on 5V DC Supply with on chip voltage regulator with supply range 1.9V to 3.6V. The Transmitter will also comprise of Real time clock, Relays and display & LED indications for Converter A&B Output available, Converter A&B Faulty and Input Contactor ON for feedback monitoring for feedback monitoring.
b. The range of Transceiver to be about 100 meter so that LVPH/Vista Dome coaches marshaled between the loco and Power Car/LSLRD shall not interrupt the HOG communication.
c. The Block Diagram for Connection of Transmitter in Power Car and LSLRD to be as per Annexure B and General Arrangement of the Transmitter box is as per Annexure C.
d. Transmitter should have a special address which can be configured with one receiver only. The address value to be settable in the software protected with user Id & password.

4.2 Receiver for Loco

a. Comprises of NRF24L01 single chip 2.4GHz Transceiver operating on 5V DC Supply with on chip voltage regulator with supply range 1.9V to 3.6V. The Transmitter will also comprise of Real time clock, Relays and LED indications for Converter A&B Output available, Converter A&B Faulty and Input Contactor ON for feedback monitoring.
b. The range of Transceiver to be about 100 meter so that LVPH/Vista Dome coaches marshaled between the loco and Power Car/LSLRD shall not interrupt the HOG communication.
c. The Block Diagram for Connection of Receiver in Loco to be as per Annexure D and General Arrangement of the Transmitter box is as per Annexure E.

d. Receiver should have a special address which can be configured with one transmitter only. The address value to be settable in the software protected with user Id & password.

5.0 APPLICATION:

In HOG Control Panel of LHB Power Car as per RCF specification no. EDTS 103 with RDSO Modification Sheet no. RDSO/PE/MS/AC/0051-2011 (Rev-2) with Amdt. 1, Power Panel of LHB LSLRD coaches as per RDSO specification no. RDSO/PE/SPEC/AC/0195-2018 (Rev.0) and Driver Cab of Locomotive.

6.0 MATERIALS REQUIRED:

The materials required to be purchased from RDSO approved sources as given below:

S.N	Description		Qty	Drawing/Catalogue no.	Make
a)	LED indication to be provided on single PCB mounted diagnostic panel on receiver. Material of PCB should be Copper clad glass epoxy of grade FR-4 or equivalent		2	-	RDSO/RCF/ICF/MCF approved Makes LEDs to be used
	H1	HOG A ON (Red Light ON)	2		
	H2	HOG B ON Red Light ON)	2		
	H3	Converter A Faulty (Red Light ON)	2		
	H4	Converter B Faulty (Red Light ON)	2		
	H5	Converter A output Available (Green Light ON)	2		
	H6	Converter B output Available (Green Light ON)	2		
	H7	Hotel Load Contactor in Loco is Switched ON (Amber light ON)	2		
b)	Transmitter and Receiver box Comprising of • NRF24L01 single chip 2.4GHz Transceiver operating on 5V DC Supply • On chip voltage regulator (range 1.9V to 3.6V) • DC-DC converter 110V to 12V with inrush current ≤25A • Consist of 4 Cards viz. Main control Card, Display Card, and Antenna Card & LED card. Material of PCB should be Copper clad glass epoxy of grade FR-4 or equivalent		1 no. each	-	With Prior Approval of RDSO
c)	E beam cables for control and Power		LOT	As per RDSO Specification no. ELRS/SPEC/ELC/0019, Rev.4 or latest	RDSO approved sources
d)	Computer generated ferrules Class R22/R23 in EN 45545-2 HL 3 Category (self-fire extinguishing low		LOT	N/A	Tyco Phoenix MV Electro systems

	smoke & low toxicity) Test report from EN certified lab for EN45545-2 HL-3 shall be furnished by the firm with supplied model no. and company name at the time of prototype and acceptance test.			Brady
e)	Flexible Poly amide Conduit	As required	As per RDSO specification no. RDSO/PE/SPEC/AC/0138-2009 (Rev-1) or latest.	As per Approved Sources on Vendor Directory.
f)	MCB, 2 A, 200 V DC, single pole, C curve for Transmitter and receiver boxes.	1 no. each	-	Lauritz Knudsen (L&T) Schneider Siemens C&S ABB
g)	Mechanical IV Coupler Ratchet limit switch	2 Nos.		

NOTE:

i. The electronics components should be confirming to RDSO specification no. ELRS/SPEC/SI/0015.

ii. All materials provided shall conform to EN 45545 with hazard level HL-3, vibration shock to IEC 61373 Category 1 Class B.

7.0 DRAWING/ REFERENCE:

a. ICF Drawing no. LWLRRM-7-0-010 Alt g.

b. RCF drawing no. 39-029-06A (3)

8.0 AGENCY FOR IMPLEMENTATION

All Zonal Railways and Workshops of Indian Railways.

9.0 DISTRIBUTION LIST

As per list enclosed

10.0 ENCLOSURES

S. No.	Annexure	Description
a)	Annexure A	Position of Transmitter Box & Receiver Box in Power Car/LSLRD & Loco Respectively
b)	Annexure B	Block Diagram for connection of Wireless Communication System for Transmitter In Power Car & LSLRD
c)	Annexure C	General Arrangement of the Transmitter box
d)	Annexure D	Block Diagram for connection of Wireless Communication System for Receiver in Loco
e)	Annexure E	General Arrangement of the Reciever box

ANNEXURE A

FIG: POSITION OF RECEIVER BOX ADJACENT TO D PANEL OF LOCO ON ONE OF THE DRIVER DESK

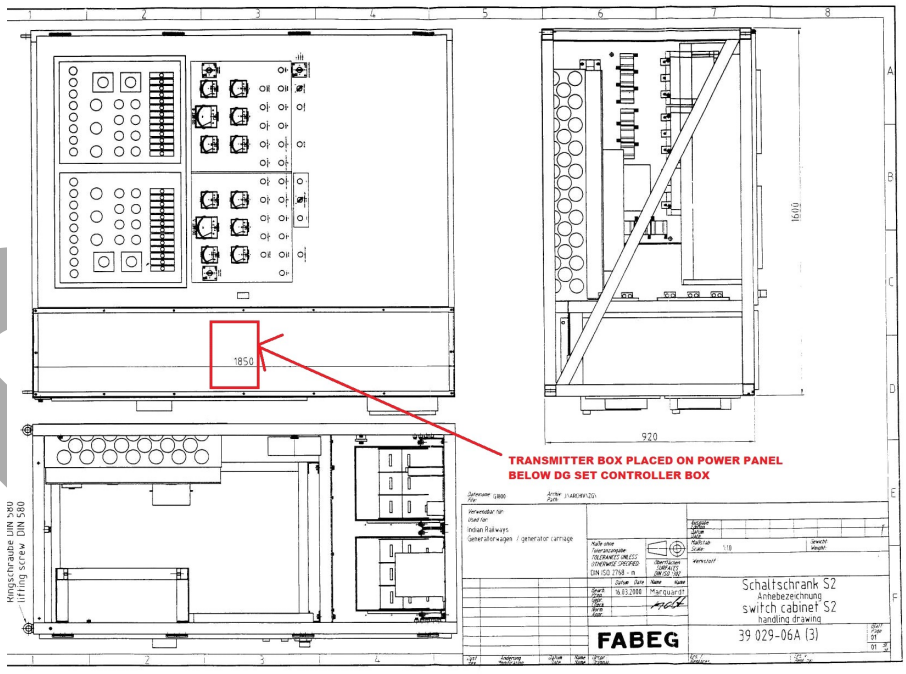


FIG: POSITION OF TRANSMITTER BOX ON POWER PANEL OF POWER CAR

ANNEXURE B

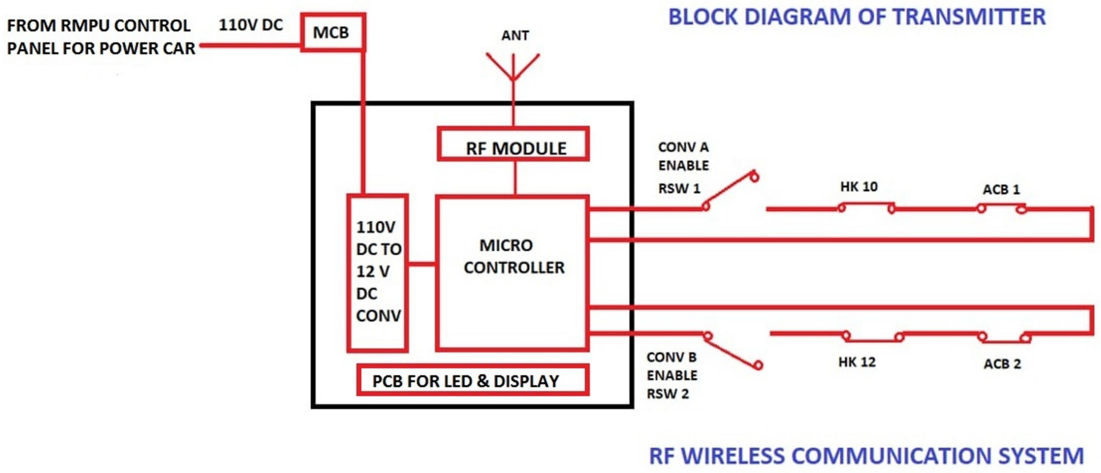


FIG: BLOCK DIAGRAM FOR CONNECTION OF WIRELESS COMMUNICATION SYSTEM FOR TRANSMITTER IN POWER CAR

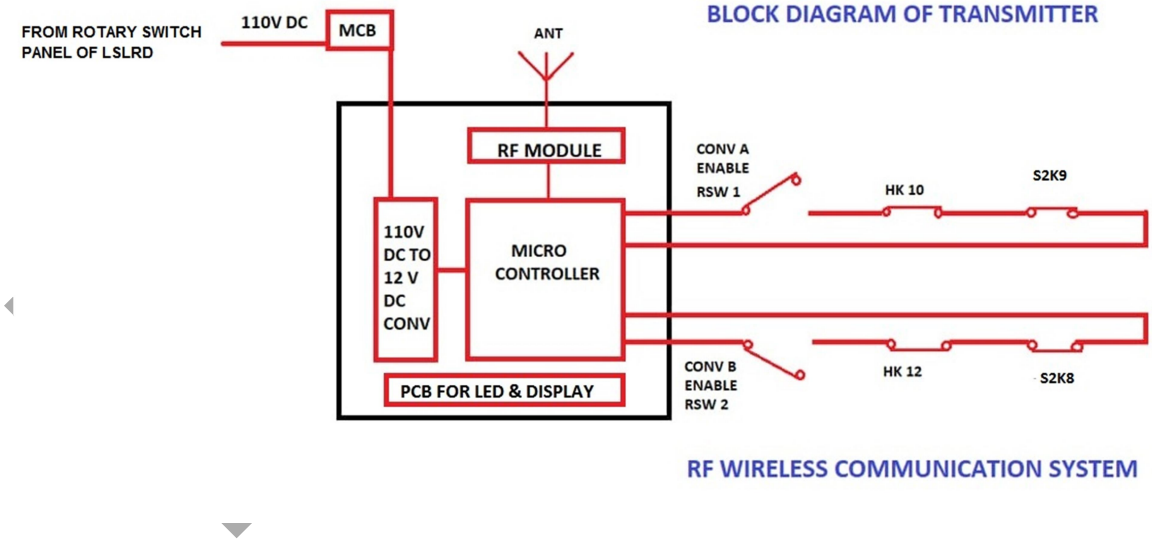
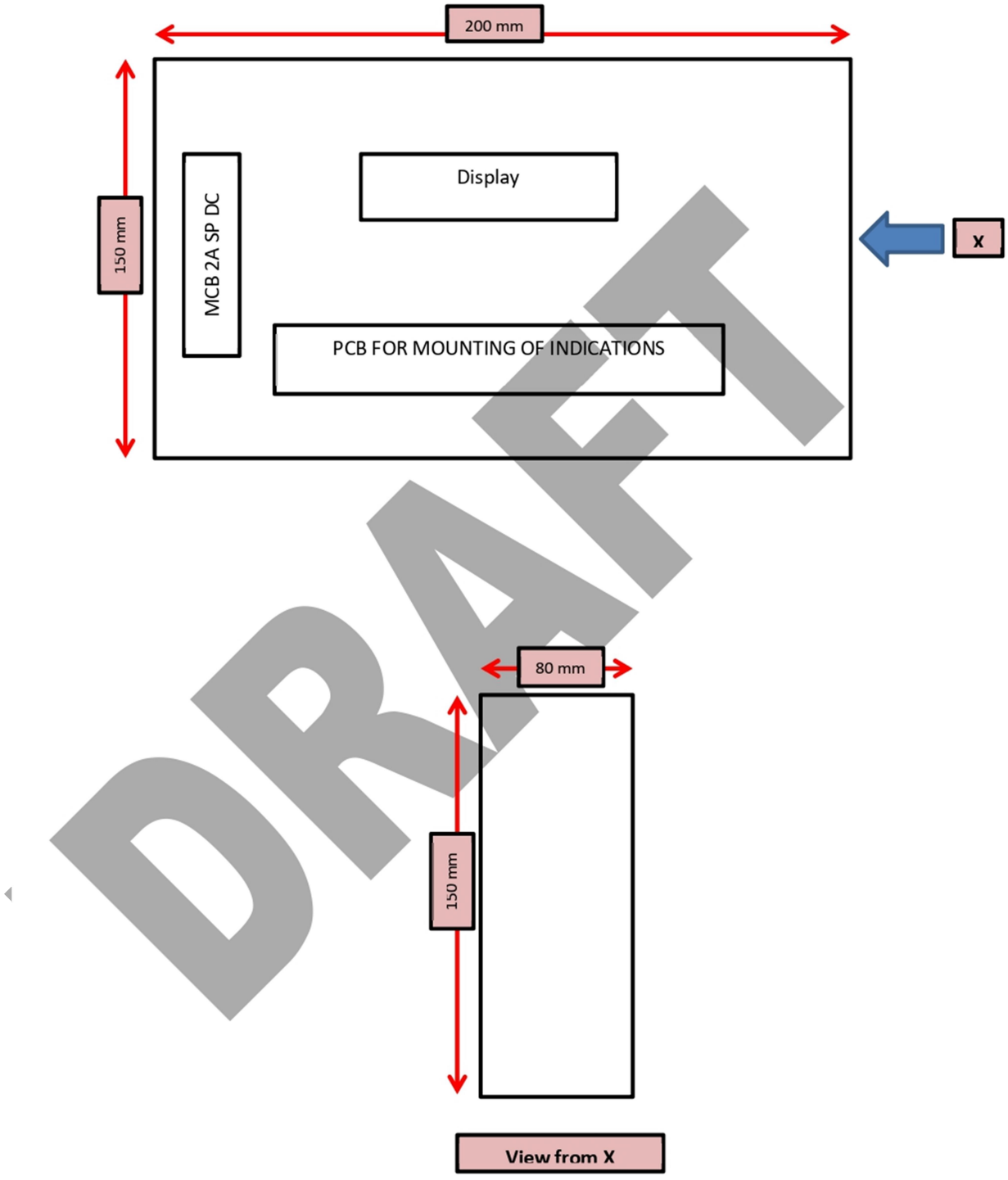


FIG: BLOCK DIAGRAM FOR CONNECTION OF WIRELESS COMMUNICATION SYSTEM FOR TRANSMITTER IN LSLRD COACH

ANNEXURE C



Prepared by	Checked by
JE/TLAC-I	DSE/TL-AC & System Design

ANNEXURE D

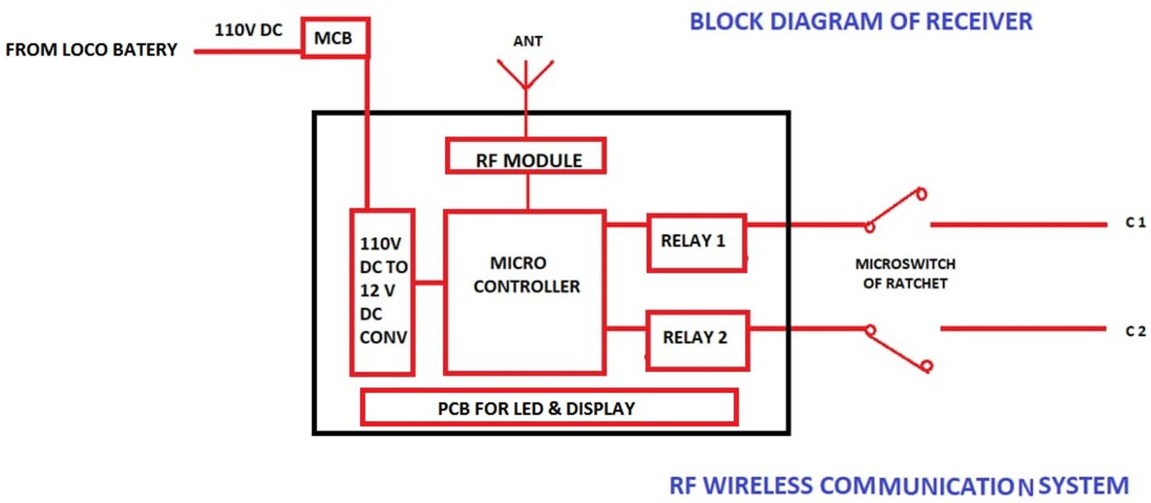
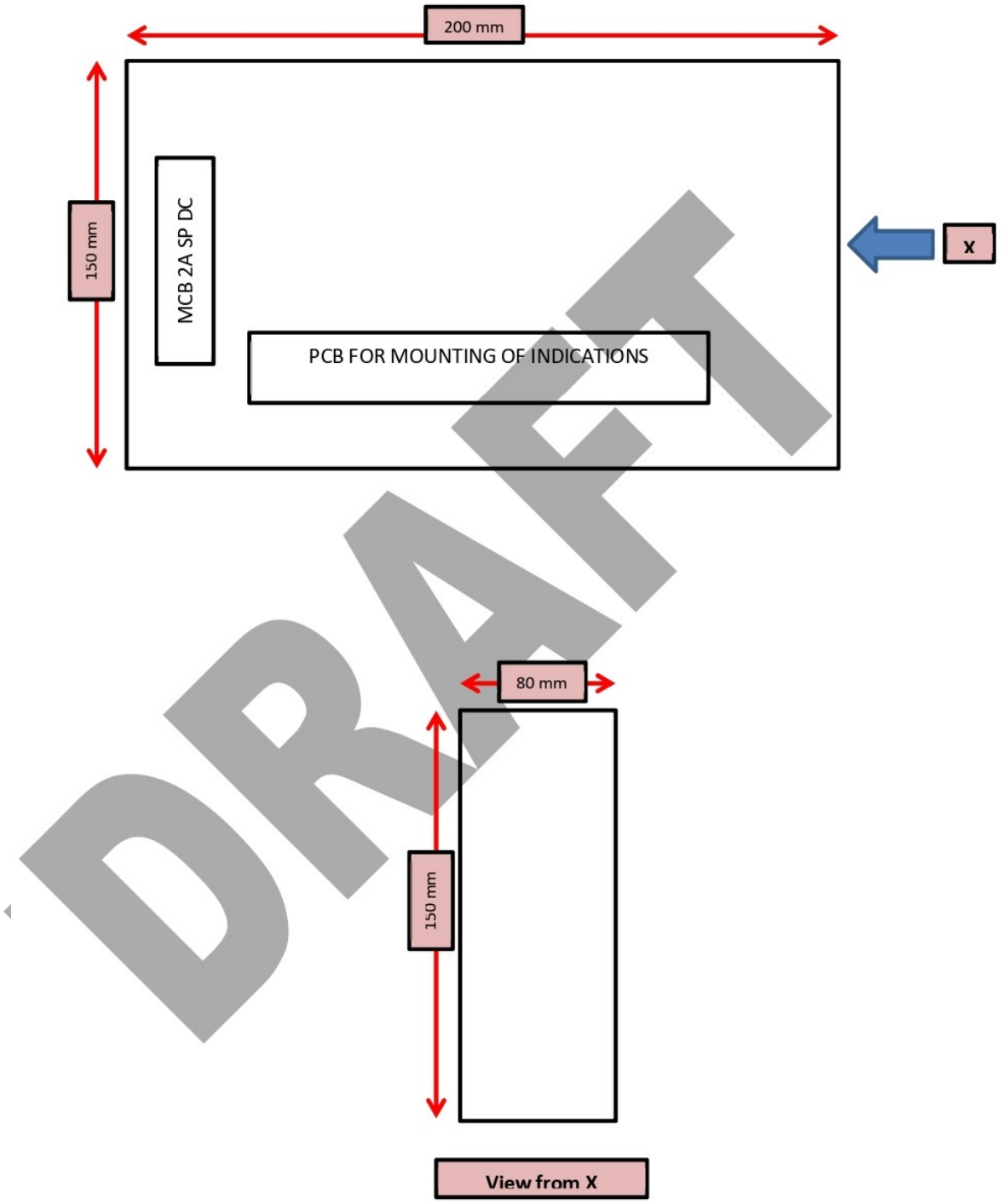


FIG: BLOCK DIAGRAM FOR CONNECTION OF WIRELESS COMMUNICATION SYSTEM FOR RECIEVER IN LOCOMOTIVE

ANNEXURE E



Prepared by	Checked by
JE/TLAC-I	DSE/TL-AC & System Design

DISTRIBUTION LIST

CHIEF ELECTRICAL ENGINEER:	
1	Northern Railway, Baroda House, New Delhi – 110 001.
2	Central Railway, II Floor, Parcel office, CST Mumbai – 400 001.
3	Eastern Railway, Fairlie Place, Kolkata – 700 001.
4	South Eastern Railway, Garden Reach, Kolkata – 700 043
5	Southern Railway, Park Town, Chennai – 600 003.
6	Western Railway, Church gate, Mumbai – 400 020.
7	South Central Railway, Rail Nilayam, Secunderabad – 500 371.
8	East Central Railway, Dighi Distt- Vaishali, Hajipur Bihar- 844 101.
9	North Central Railway, North Central Railway, Block A, Subedarganj, Allahabad-211033.
10	South Western Railway, 1st Floor, DRM Office, Hubli 580 020
11	South East Central Railway, Bilaspur.495004
12	North East Frontier Railway, Maligaon, Guwahati - 781001
13	North Eastern Railway, Gorakhpur – 273001
14	North Western Railway, Jaipur – 302006
15	West Central Railway, Jabalpur – 482001
16	East Coast Railway, Bhuvneshwar, Orissa – 751016
17	Konkan Railway, Belapur Bhavan, Sector-11, Belapur, Mumbai - 400614
18	Metro Railway, 33 /1 J.L. Nehru road, Kolkata- 700071
19	Integral coach factory, Perambur, Chennai - 600038
20	Rail Coach Factory, Kapurthala (Punjab) – 144 602
21	Modern Rail Coach Factory, Lalganj, Raebareli(UP)-229120
CHIEF WORKS MANAGER:	
1	Matunga Workshop, Central Railway, Mumbai - 400 019.
2	Liluah Workshop, Eastern Railway, Howrah
3	C&W Workshop, Northern Railway, Alambagh, Lucknow-226 05
4	C & W Workshop, N. Rly., Jagdhari – 135 002
5	Mechanical Workshop, NER, Gorakhpur – 273 012
6	Carriage Workshop, Southern Railway, Perambur, Ayanavaram, Chennai – 600023.
7	SCR, Lallagudda Workshop, Lallaguda, Secunderabad - 500017
8	Carriage Workshop, Western Railway, Lower Parel, Mumbai-400013
9	CRWS, W. C. Railway, Nishatpura, Bhopal-462010
10	Carriage Workshop, NW Rly., Ajmer - 305001
11	Carriage Repair Workshop, Gadag Road, SWR, Hubli – 580 020
12	Carriage Workshop, S.W. Railway, Mysore Vishwanath.
13	Carriage Workshop, SE Rly., Kharagpur - 721301
14	New Bongaigaon, Railway Workshop, Dangtal, Distt. Bongaigaon, Assam-783380
15	Carriage and Wagon Workshop, N. C. Rly., Jhansi – 248003
16	Carriage and Wagon Workshop, WC Rly., Kota - 324002
17	Carriage and Wagon Workshop, Eastern Rly., Liluha - 711204
18	Carriage and Wagon Workshop, W. Rly., Pratap Nagar, Vadodara - 390004
19	Carriage and Wagon Workshop, N Rly., Amritsar - 143001
20	Central Workshop, Golden rock, S. Rly., Trichi - 620004
1	Director, IRIEEN, Nasik Road (Maharashtra). - 422101
2	Senior Professor (Elect.), Railway Staff College, Lalbaug, Vadodara. - 390004
3	Director, IRCAMTECH, Maharajpur, Gwalior – 474 020.