File No.ECR-HQ0SnT(GENL)/41/2020-O/o Dy.CSTE/HQ/ECR

East Central Railway

Office of the
General Manager (S&T)
Hajipur

No. ECR/S&T/Tele Policy/135 **Dated: 06.11.2020**

Sr.DSTEs
DHN, MGS, DNR, SEE & SPJ
E.C.Railway

Sub: Maintenance and Inspection Schedule of Telecom Assets.

Maintenance and inspection Schedule for Telecom Assets has been prepared primarily based on Telecom Manual and some schedules taken from other sources and is enclosed herewith as **Annexure-A** and further details are enclosed under **Annexure-1 to Annexure-6.**

Maintainers, JEs/SSEs, ASTEs & DSTEs may be advised to follow the Maintenance and Inspection Schedule strictly and record the same in the proper registers. The officer in-charge may ensure compliance of the same.

A monthly statement of the compliance of the schedule by Maintainer, JE/SSE and officers shall be advised to HQ along with MCDO.

DA: As above.

Signed by Pramod Kumar
Date: 06-11-2020 14:43:16
Reason: Approved

(Pramod Kumar)
Chief Communication Engineer
E. C. Railway, Hajipur

Annexure – A

1. Annual Inspection Schedule of officers:

(a)

SN	Item	Sr.DSTE	Sectional DSTE/ASTE
1	MTRC Network	25% Stns/Year	All stations at least once in a year.
2	Telephone Exchange	All exchanges exceeding 400 Ports once in a year.	All exchanges once in a year.
3	Control Office & Test Rooms	All control offices quarterly.	All control offices Once in a month
4	All Passenger Amenities at Rly.Stations like PA/PC-based announcement, TIB, CIB, Clock, Charting display board, Wi-Fi System etc	All major stations once in a year.	All stations once in a year.
5	OFC/Quad cable System (a)Cable Route (b)Cable Hut/Repeater (c)Emergency Sockets (d) Indoor system	(a) Each control section half yearly. (b) 10% of Stations in a year.	a) Cable route - once in a year. b) Cable hut & repeater - half yearly. (c) Emergency sockets – Once in a year and as & when required. (d) 100% of Stations in a year.
6	Repair& Maintenance Centre	Once in a year.	Twice in a year
7	Accident Relief Train	Once in a year	Once quarterly.
8	Video Surveillance System	All Major Stations in a year	All stations half yearly
9	Telecom Equipment's of data network for UTS, PRS, FOIS, Railnet etc.	All Major Stations in a year	All stations half yearly
10	ART	Once in a year	Once in 3 months.
(b)	**Few important items in Indoor Location:**		
1	Electronics		
2	Power Supply Equipments		
3	Checking of proper functioning of external alarms		
4	DG Sets (if provided)		
5	Aircondioning		
6	Earthing		
7	Fire alrms system		
8	Protective devices		
(c)	**Centralized Checking:**		
1	Link budget	Yearly	
2	Testing of various alarms and its appreance on NMS	Half Yearly	

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2. Maintenance and Inspection Schedule of Technician/Sectional JE/SSE/SSE In-charge

(i) Premises of Telecom Installations (Exchanges, OFC hut etc.):

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	General Cleaning	D	M	Q
2	Cleaning by vacuum cleaner/blower.	M	M	H
3	Checking condition of room in general & that of floor, doors, windows, lights, fans etc.	W	M	Q
4	Working of AC	W	M	Q
5	Sealing of equipment room to prevent entry of rodents, lizards etc.	W	M	Q

(ii) Power Plant Installation for Telecom Installation:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
(a) Charger:				
1	Checking of Mains/Power connections & auto changeover of SMRs	F	M	Q
2	General Checking, Measurement of input & output voltages and load current including cleaning of all front & back sides.	F	M	Q
3	Checking various indications, meter reading of voltage & current; mode of operation, earth connectivity 7 any other defects/deficiencies	F	M	Q
4	Inside cleaning by blower/vacuum cleaner by opening covers	Q	Q	H
5	Technical Audit	--	H	Y
(b) Battery:				
1	Checking of Electrolyte level/Spc. Gravity of each Cell on load	W	M	Q
2	Checking of Terminals	W	M	Q
3	Checking of Cell voltage and battery voltage at the equipment end	W	M	Q
4	Cleaning of terminal strips, tightening of nuts/bolts & applying petroleum jelly	M	Q	Y
5	Technical Audit	--	--	Y
(c) Generator:				
1	Measurement of voltage on load/OFF load	W	M	Q
2	Load current	W	M	Q
3	Checking of lubricant	W	M	Q
4	Cleaning of DG Set	W	M	Q
(d) Solar Panel:				
1	Cleaning of Solar panel	W	M	Q
2	Measurement of terminal voltage of solar panel	W	M	Q
3	Measurement of current of solar panel	W	M	Q

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(iii) Exchanges:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Cleaning by blower/vacuum cleaner of MDF, Power equipment, surge protection, cable trays & ways, cable terminations, C. T boxes, Telecom Equipments etc.	F	M	Q
2	Cleaning by blower/vacuum cleaner of IDF, exchange cabinets (fronts & back)	M	Q	Q
3	IDF: Check fuses & other protective devices, wiring &earthing.	W	M	Q
4	Check status of indication of various cards	Q	H	Y
5	Testing of junctions	W	M	Q
6	Testing of VIP numbers	W	Q	H
7	Technical Audit	--	--	Y

Details of Preventive Maintenance of Exchange can be seen at Annexure-1.

(iv) Earthing:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Watering of pits	M	--	--
2	Checking of physical connections including at equipment end.	W	M	Q
3	Tightening of nuts/bolts	W	M	Q
4	Checking of Earth Resistance (Value should be < 1 Ohm perfectly)	--	H	Y

(v) Fire Alarm System:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Cleaning of Fire sensors	M	--	--
2	Simulate the fire situation by applying smoke near sensor	W	M	Q
3	See the fire panels for reports and analysis	W	M	Q
4	General upkeep of co-related equipment	M	Y	Y

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(vi) Foot Plate Inspection of Underground cables (Quad Cable, OFC, JF cable):

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Check exposed cables.	F	Q	Y
2	Check cable route & Joint markers.	F	Q	Y
3	Check protective works at road, track & other crossings.	F	Q	Y
4	Check protective works at bridges & culverts.	F	Q	Y
5	Special check of bridge & culverts.	--	H	Y
6	Condition of joints if visible	F	Q	Y
7	Any earth works done/being done in the vicinity of cable	F	Q	Y

(vii) OFC System:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
General				
1	Cleaning of the flooring	W	--	--
2	Removal of dust from the equipment and cards	M	Q	H
3	Measurement of room temperature	M	Q	H
4	Checking of proper functioning of external alarms	W	M	Q
5	Earthing of the racks, power equipment etc.	W	M	Q
6	Check of electrical devices of hut	W	M	Q
7	Maintenance of pigtails, fibre distribution frame etc.	W	M	Q
OFCable:				
1	OTDR Measurement of spare fibres	--	Q	-
Periodical line up:				
1	OTDR meas. on all Fibres	--	--	Y
2	Tx/Rx optical power	--	--	Y
3	Pulse mask for all digital interfaces	--	Q	Y
4	Channel meas. as per CCITT	--	Q	Y
(a)	G821/G823 tests on 64KBPS/2MBPS for 10 days	--	Q	Y
(b)	Loss measurement with optical source & power meter.	--	Q	Y
(c)	Measurement of order wire performance circuits.	--	Q	Y

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(viii) Station Master Office equipment's:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Checking all connections & cleaning.	F	M	Q
2	Functional testing of all equipment's.	W	M	Q
3	Battery maintenance.	W	M	Q
4	Checking of Power Supply connection of all equipment's.	F	Q	Y
5	Checking of cable pairs used for all available phones control, block, Gate phones etc.	Q	H	Y
6	Checking of cable entry condition, sealing & dressing etc.	F	M	Q

(ix) Quad Cable:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Checking of wiring, transformers, soldering, earthling, U-link panels etc..	F	M	Q
2	Emergency Socket testing	F	M	Q
3	Attenuation Testing of Q-cable	M	Q	Y
4	Testing of Gate Telephones	F	M	Q
5	Gain adjustments	M	Q	Q
6	Attenuation Testing of block phones & Gate Phones working on Q-cable.	Q	H	Y
7	Transmission loss of E.C Sockets	H	H	Y
8	Insulation Testing (including station Wiring)	H	H	Y
9	Loop resistance measurement	Q	H	Y
10	Cross-talk measurement	--	H	Y
11	Equalizer testing & adjustment	--	--	Y
12	Foot Inspection	F	Q	Y
13	Derivation cable measurement	H	H	H

Details of Instruction of Maintenance of Cable can be seen at Annexure- 2.

(x) Detailed Schedule of Maintenance for Cable Hut (Quad Cable)

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	**Sectional JE/SSE**	**In-charge SSE**
1	General Cleaning.	F	Q	Y
2	Checking the condition of room, floor, roof, lights, fans, doors, Exhaust fan etc.	F	Q	Y
3	Checking of cable dressing, wiring, isolation transformers, soldering, earthling, U-link panels etc.	F	Q	Y
4	Checking & cleaning all the above by opening back cover of CT-rack and sealing of cable entry into CT-rack.	Q	Q	Q
5	Checking of correctness of description of terminals.	F	Q	Y
6	Complete redressing of loose wiring	Q	Q	Q
7	Complete re-soldering of all the terminals.	Y	Y	Y
8	VF-transformer testing.	H	H	Y

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(xi) Passenger Amenities:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Checking of connection, cleaning from outside of Amplifier, PCs, UPS, NTES, Touch Screens, POETs, Terminal Repeaters etc (Indoor Equipment's).	F	M	Q
2	Checking of connection, cleaning from outside of Display Boards, Clocks, Speakers etc (Outdoor equipment's).	M	Q	H
3	Visual checking & defect rectification of Display Boards, Clocks, Speakers etc.	W	M	Q
4	Checking of connections, cleaning from inside with blower/vacuum cleaner of all the indoor & outdoor equipment's.	Q	Q	Y
5	Checking correctness of recorded data like train's name, number, destination etc.	W	M	Q
6	Maintenance of software by running scandisk & de-fragmentation utilities.	Q	H	Y

(xii) Datacom Equipment's:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	The datacom equipment shall be kept clean and tidy without dust and shall be cleaned daily.	F	M	Q
2	The diversity channels shall be checked by switching of main channels and ensure that automatic switch over/routing is taking place	--	Q	Y
3	Condition of underground cables to be checked by carrying out routine checks done for U/G cables.	M	Q	Y
4	OFC cables and connectors to be checked as per routine checks done on OFC.	M	Q	Y

- In addition to the above, any other checks suggested by manufacturers
- The Antivirus patches to be updated in NMS system time to time.
- In case ISDN link is provided as backup to the main link, the connectivity of ISDN shall be checked by switching off main link. The voltage of ISDN channels to be measured at datacom equipment input termination and to be maintained with the standards.

Details of Do's and Don'ts for Datacom Equipment can be seen at Annexure- 3.

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(xiii) VHF Sets:

(a) Maintenance of 25 watts VHF:

SN	Description	Periodicity
1	VHF set's transmitting power at different frequencies/channels	Yearly by SSE/Tele
2	Spurious emission squelch operation current drain frequency stability, frequency deviation, sensitivity of receiver & adjacent channel selectivity	Yearly in repair Centre
3	Antenna system Physical and visual inspection & Fixed VHF Sets	(i)Weekly by Tech (ii) Monthly by Sectional JE/SSE (iii) Qrly. by SSE/In-charge

Measurements: Following measurements shall be done:

(i)	Input and output voltage & currents – weekly
(ii)	Specific gravity of each cell - weekly
(iii)	Care must be taken while using such sets when low battery indication is appearing on the set, it must be charged as specified in the manual.

(b) ANTENNA SYSTEM ALONG WITH FEEDER CABLE & CONNECTOR:

(i)	Antenna system Physical and visual inspection once in a week.
(ii)	VSWR, Power handling capacity, frequency band of operation, directivity, radiation pattern must be checked annually.

(C) Maintenance Schedule of Walkie-Talkies:

Once in a month: Test continuously for 4-5 days to cover all the sets in service.

1. Test all available Walkie-Talkies for power output.
2. Test battery & Spare battery – on load by applying 4 Ohms resistance and taking voltage after full charging of the battery or by physically checking by testing on running system.

Details of VHF Sets can be seen at Annexure- 4.

(xiv) ART:

ARTs are provided with prescribed equipments. The equipment's are to be periodically tested to ensure their satisfactory working at all times.

SN	Description	Periodicity
1	Complete testing by ART nominated staff	once in 15 days.
2	Inspection by ASTE/DSTE	once in 3 months
3	Inspection by Sr.DSTE	once every year

Note:

a. A register is to be maintained in the ART for making entries for testing of equipment:

b. Whenever the ART returns from accident spot, equipments are to be immediately checked for their proper working.

c. Any short fall / missing equipment should be replaced with good working equipment at the earliest.

d. All equipment's having shelf life, viz. jointing kits, torch cells etc., shall be replaced in due time.

(xv) Wi-Fi System:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	The equipment shall be kept clean and tidy without dust.	W	M	Q
2	Any other checks suggested by manufacturer	F	Q	H

Details of Do's and Don'ts for Wi-Fi can be seen at Annexure- 5.

(xvi) VIDEO SURVEILLANCE SYSTEM:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Checking of Cameras, Servers, PC Workstation, Storage, connectivity to Switches, etc. &their cleaning.	F	M	Q
2	Checking of condition of various cables	F	M	Q

- Necessary action is to be taken to ensure uptime better than 99.5% in consultation with the manufacturer of video surveillance system &system integrator.

(xvii) MTRC:

(a) Premises of BSC & BTS Installations:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	General Cleaning	D	M	Q
2	Cleaning by vacuum cleaner/blower.	M	Q	H
3	Checking condition of room in general & that of floor, doors, windows, lights, fans etc.	W	M	Q
4	Working of AC	W	M	Q
5	Sealing of equipment room to prevent entry of rodents, lizards etc.	W	M	Q

(b) Power Plant Installation for BSC/BTS:

SN	Description	Periodicity of Maintenance/Inspection		
		TECH	Sectional JE/SSE	SSE/ In-charge
	(c) Charger:			
1	Checking of Mains/Power connections & auto changeover of SMRs	F	M	Q
2	General Checking, Measurement of input & output voltages and load current including cleaning of all front & back sides.	F	M	Q
3	Checking various indications, meter reading of voltage & current; mode of operation, earth connectivity 7 any other defects/deficiencies	F	M	Q
4	Inside cleaning by blower/vacuum cleaner by opening covers	Q	H	Y
5	Technical Audit	--	--	Y

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(d) Battery:				
1	Checking of Electrolyte level/Spc. Gravity of each Cell on load	W	M	Q
2	Checking of Terminals	W	M	Q
3	Checking of Cell voltage and battery voltage at the equipment end	W	M	Q
4	Cleaning of terminal strips, tightening of nuts/bolts & applying petroleum jelly	Q	H	Y
5	Technical Audit	--	--	Y

Details of VHF Sets can be seen at Annexure- 6.

Maintenance Schedule of BTS:

(a) Maintenance schedule to be performed at NMS room:

Daily Schedule:

1. Check and monitor alarm indication status of BTS on NMS.

2. Record O&M logs of BTS in log book kept in NMS room for all activities at BTS sites including their outage.

(b) Maintenance schedule to be performed at BTS site:

SN	**Description**	**Periodicity of Maintenance/Inspection**		
		TECH	Sectional JE/SSE	SSE/ In-charge
1	Check for any fault in the unit or any other alarm	W	M	Q
2	No visual damage to the equipment or BTS room is evident	M	Q	H
3	The waveguides and connectors are fixed properly.	W	M	Q
4	Air-Conditioners are functioning properly. There is no leakage of air-conditioned air through door, window or waveguide openings. The Air inlet/ filters to the cabinet are clean.	W	M	Q
5	Indoor light and indoor emergency light are working.	W	M	Q
6	All modules of the SMPS power plant are working properly and load is being shared by all.	W	M	Q
7	To clean the BTS equipment by Blower (In running condition after removing Fans)	W	M	Q
8	To clean the Fans of BTS racks	W	M	Q
	Checking of ground connections and earth bars	W	M	Q
9	Checking of antenna coupling unit	W	M	Q
10	O&M Logs and Histories of BTS are maintained at BTS sites in BTS maintenance logbook	F	M	Q
11	Surge suppresser connection and earthing connection (all Points)	F	M	Q
12	To check Splitter mounting status	F	M	Q

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13	To check antenna fixture mounting and Jumper status.	F	M	Q
14	To check feeder cable dressing, hanger clamps and weather proofing status	F	M	Q
15	Functioning of all alarms is tested for service worthiness. Printout of all cell data to be made once in every month and subsequently checking for any false/ extra data should be carried out	--	M	Q
16	Report to be made for Management review of the BSS/ MTRC system. This should contain Major interruptions in MSC, BSC, BTS (including cell outage for more than one hour).	--	M	Q

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Annexures

Annexure-1

Preventive Maintenance of Exchange:

A) Daily:

SN	Action to be done
(i)	Batteries voltage and charger output voltage.
(ii)	AC supply voltage and charger output voltage.
(iii)	Cleaning of equipment rooms with vacuum cleaner and wiping of the floor for all rooms
(iv)	Failure list of the subscribers.
(v)	Testing of all the trunks (STD, OTD and other) circuits
(vi)	Working of Lights, Air conditioners.
(vi)	System status listing
(viii)	Failure history list
(ix)	Alarm checking
(x)	Room temperature recording

(B) **Weekly:**

Specific gravity, voltage and load test of the batteries, sulphation of terminals.

(C**) Monthly:**

SN	Action to be done
(i)	Wiring and connecting terminals of power supply arrangement
(ii)	The different modes of operation of FCBC, the internal checking and cleaning of FCBC
(iii)	Earthling connections of all equipment and earth electrodes
(iv)	All cabinets of equipment, Man machine interaction, terminal printer, attendant consoles to be cleaned
(v)	Cable termination MDF and IDF to be cleaned and checked
(vi)	Cable runs-inter rack, rack to IDF, MDF and Attendant consoles to be checked
(vi)	Transmission loss test of all trunk circuits
(viii)	Office Data Back up to be updated
(ix)	Checking of GD tubes
(x)	Functional Testing of Attendant console
(xi)	Tone testing of MW circuits & realignments
(xii)	Traffic data listing & analysis

D) Quarterly:

SN	Action to be done
(i)	Contact points of Attendant console to be cleaned with contact cleaner
(ii)	Testing of All Service features from the Test Telephones.
(iii)	Cleaning of terminations in CT boxes, Location boxes.
(iv)	Adjustment of SMPS modules

E) Yearly:

SN	Action to be done
(i)	Earth resistance value measurement
(ii)	Line loop resistance and insulation testing
(iii)	Checking of wiring of subscriber's premises, CT boxes and location boxes.
(iv)	Testing of spare cards
(v)	Analysis of load distribution among operator's console
(vi)	System programmer backup

F) **Inspection:**

The following are the details to be checked during routine Inspection.

a) Subscriber's office:

SN	Items
(i)	CT boxes
(ii)	Wiring
(iii)	Lightning arrester
(iv)	Batteries/power supply arrangement

b) Cables/overhead alignment:

SN	Items
(i)	Type of cable and length
(ii)	Cable route conditions with special attention at culverts, bridges, road-crossings, track crossing, building entry points.
(ii)	All registers pertaining to cable laying, testing

c) Exchange:

SN	Items
(i)	MDF/IDF wiring, connectors, terminals, fuses, GD tubes
(ii)	Earth connections, Earth readings
(iii)	Power supply arrangement, battery registers, battery terminals, wiring, charger and power panel.
(iv)	Internal cabling, cabinets, visual inspection of wiring.
(v)	Fault register

d) Periodical Inspection:

(i)	All exchanges and other telephones installations shall be inspected and tested, where necessary, by ASTE/DSTE/Sr.DSTE at least once a year. Maintenance records and faults registers shall be checked for their proper upkeep.
(ii)	Sr. Section Engineer Telecom should carry out detailed and effective inspection and testing once in a quarter year and Junior Engineer (Tele) once in a month

Testing and Commissioning:

(i)	Cable testing shall be conducted for each subscriber. Insulation, loop resistance for cable/OH line is to be tested and recorded.
(ii)	Provision of fuses, GD tubes are to be checked for all lines.
(iii)	The earth resistance for each earth electrode is to be measured. The connectivity of earth wires to each equipment is to be checked
(iv)	Hardware testing shall be conducted as per instructions of manufacturer.
(v)	Software testing shall be done as per guidelines given by supplier

Documentation of Exchange:

The exchange shall have the following documentation:

a) Indoor Equipment:

(i)	Exchange layout plan
(ii)	Rack layout plan for each rack with connection details
(iii)	MDF and IDF termination plan
(iv)	Installation manual for equipment
(v)	Software documentation
(vi)	Operation and maintenance manual
(vii)	Wiring diagram for power panel
(viii)	Manual for chargers

b) Outdoor Equipment:

(i)	Telephone No. wise subscriber's details
(ii)	Subscriber wise Telephone Directory
(iii)	Cable/Overhead layout plan
(iv)	Subscriber premises wiring plan typical

Tools: The tools available in exchange shall consist of

(i)	Screw drivers assorted
(ii)	Nose Plier
(iii)	Crimping tool
(iv)	Krone Extractor
(v)	Cutter
(vi)	Soldering kit

Test & Measuring Tools:

(i)	Line tester to test line conditions
(ii)	Megger for testing of insulation of line
(iii)	Digital multimeter

Annexure-2

(A) Instruction for Maintenance of Copper Cable:

(a) Maintenance Schedule: Following instruction shall be followed;

(i)	All cable termination devices, cable heads shall be kept clean & dry.
(ii)	All cables shall be tested as per following section of this chapter.
(iii)	Notice shall be given to sectional JE/SSE prior to digging along the cable route.
(iv)	(a) Earth shall be watered regularly. (b) Earth & Earth connection shall be examined once in a month. (c) Earth resistance shall be measured every year and entered in register.
(v)	Test room shall regularly monitor the performance of the circuits
(vi)	Each emergency socket shall be inspected once in 10 days by the maintainer for its performance and good shape and the marking on OHE mast shall be well painted. No two consecutive sockets along the route shall remain faulty.
(vii)	Protective works for cable track crossings, culverts, bridges shall be inspected once in a month and particular attention is to be given after the monsoon.

(b) Testing of Cables:

Following parameters shall be tested:

(i)Attenuation: Attenuation as measured at 800 Hz by Transmission Measuring Set
Loaded cable (RE) 0.25 dB/Km, Unloaded (RE) 0.80 dB/Km.

The record shall be maintained as under:

The record of Attenuation Test and Insulation Test shall be maintained as:

ATTENUATION

Section: ------ Station: -----

Sub-Section: ------ Measured By: ------

Cable Route Distance: ------ Date: -------

Size of Cable:

Name of the Circuit	Quad No.	Pair no.	Attenuation dB

(ii) Insulation Resistance: The insulation resistance shall be measured at ambient temperature with 500 Volt DC Megger and shall be better than 10,000 Mega Ohm/KM. Record shall be maintained as:

INSULATION

Section: ------ Station: -----

Sub-Section: ------ Measured By: ------

Cable Route Distance: ------ Date: -------

Size of Cable:

Name of the Circuit	Quad No.	Pair no.	Insulation Resistance (M. Ohms)		
			L1 to E	L2 to E	L1 to L 2

(iii) Loop Resistance: Maximum loop resistance of conductor pair measured with multimeter shall be 56 Ohms/Km at 20 degree centigrade. Nominal loop resistance shall be 55.2 Ohms/Km.

(iv) Cross Talk Level: Cross Talk level between two VF pairs of Quad cable shall be measured with Cross Talk Measuring Set as per IRS:TC;45 and limits as under:

Near End Cross Talk: Better than 61 dB
Far End Cross Talk: Better than 65 dB

(v) Psophometric Noise: The Psophometric Noise is measured by Psophometer and it should not exceed 2 mV.

Annexure-3

Do's and Don'ts for Datacom Equipment's:

SN	Do's	Don'ts
(i)	Do write the configurations changes if anyone in a register so that proper documentation is done for performance analysis and recode purpose.	Do not change the hardware of the routers like data cards when the router power supply is ON unless it is clearly mentioned that it supports hot swapping.
(ii)	Take the print outs of the configuration of the routers and document them.	Do not change the V.35 Data cable when the router and modems are ON.
(iii)	Store the configuration files of the routers in softcopy so that they will be useful at emergency whereby with one command entire configuration can be copied thereby reducing the down time	Do not change the IP addressing scheme and IP address of the working network without the written permission of the Network Administrator.
(iv)	Do proper lacing of the internal wiring.	Do not change the configuration of the router without the permission of the Network administrator.
(v)	Protect the cables form rodents where cabling is done through false flooring.	Do not run down the batteries of the UPS below specified level.
(vi)	Train the staff and update the knowledge to maintain the network more efficiently.	Never switch off the datacom equipment without following the proper shut down procedure.
(vii)	Use ESD wrist bands while handling datacom equipment.	Do not share the passwords of router's and servers with your colleagues.
(viii)	Use a good quality earth and maintain the earth resistance below 1 Ohms.	Never use water to clean the equipment room.
(ix)	Change the password of router/servers once in a month.	Don't use water-based fire extinguishers for datacom installations.
(x)	Take backup of the router configuration every time the configuration is changed. This will help in faster restoration in the event of software error/Flash failure.	
(xi)	Follow the housekeeping procedure of clearing the event and performance logs of the NMS at specified intervals.	
(xii)	Plan replacement of UPS batteries as per the specified lifecycle.	
(xiii)	Keep the operation and maintenance manual handy.	
(xiv)	Check the backup links at least once a week.	

Annexure- 4

Details of VHF Sets

(a) TEST METERS REQUIRED AT CENTRALISED REPAIR CENTRE:

(i)	Tools
(ii)	Test jigs & fixture
(iii)	Antistatic work station
(iv)	Temperature Control soldering/de-soldering station
(v)	Digital Multi Meter
(vi)	Frequency Counter
(vii)	Power meter
(viii)	Oscilloscope
(ix)	Field strength meter
(x)	Insulation Tester
(xi)	Programmable frequency scanner
(xii)	Communication Radio Test set.

(b) INSPECTION:

(i)	VHF installation must be inspected every month by Section Engineer

(c) FAILURE REPORT

(i)	VHF system's failure must be reported to controlling officer daily in the morning.
(ii)	Monthly statement of a failure must be reported in the PCDO to Headquarter
(iii)	The VHF sets must not be opened at site as far as possible. Faulty sets must be sent to Repair Centre to prevent further damage at site by Electro Static discharge.
(iv)	Spare sets must be kept at site or at suitable location to replace the faulty sets.

(d) Maintenance Schedule of ECP/PCP sets provided in Locos:

Test each set once a month at the minimum:

1. Make weekly visit to Loco Shed and test all available sets.
2. Provide sufficient spare sets.
3. Give memo to Loco shed to make available sets which are overdue testing for a fortnight.

(e) Maintenance Schedule of ECP sets (Provided as Personal stores):

1. To be tested once in fifteen days.
2. Once a week give a memo to Lobby in-charge about the sets which have not been brought for testing.

Annexure-5

Do's and Don'ts for Wi-Fi Equipment:

SN	Do's	Don'ts
(i)	Take the printouts of the configuration and document them	Do not change the IP addressing scheme and IP address of the working network without the written permission of the Network Administrator.
(ii)	Softcopy of the configuration files shall be stored so that it will be useful by uploading the configuration when needed and reduce the down time	Do not change the configuration without the permission of the Network Administrator
(iii)	Protect the cables connecting the access point	Do not share the passwords with your colleagues
(iv)	Train the staff and update the knowledge to maintain the network more efficiently	Never use water to clean the equipment
(v)	Change the password periodically	

Annexure-6

Details of MTRC to be checked and maintained

LOGS & RECORDS:

1. Log Book has to be maintained for each and every BTS sites at BSC/NMS location. Weekly log for all activities at BTS sites including the outage are to be recorded invariably without fail.
2. Monitoring of performance of BSC, TRAU and their sub system.
3. Take key performance Indicators (KPIs) for initiated counters (BTS counter and adjacent cell counter) for performance measurement logs.
4. Record O&M logs of BSS in NMS room in log book.

Three Month schedule: (Jointly by SSE/In charge/ Section/JE/SSE/TECH):

The following task for preventive and corrective maintenance of the system shall be carried out once in three months in addition to the regular daily, weekly or monthly routines. Prompt remedial measures shall be taken as and when required and then shall be recorded for analysis:

1. To measure the Transmitter (BCCH) Power level and VSWR for both side of antenna and cable and waveguide. Measured value of parameters like Transmitter power, antenna gain, VSWR etc should be compared with reference values as per OEM's product manuals.
2. Checking of Antenna Coupling Unit.
3. Cleaning of Earthing Point of Tower top.
4. To clean the cards and their back planes (in non-running condition).
5. To switch the working BTS on its stand by and make stand by as working one.
6. Antenna orientation with compass and matching with preset values.
7. Antenna tilt with tilt meter and matching with preset values.
8. Signal strength testing at Site and coverage testing using OPH (Indicate signal strength).
9. Updating of data in BSS in case of any changes in the network.
10. Cell planning and RF planning should be reviewed for any possible error orchange in situation due to addition, deletion or change in configuration of BTS in the network.
11. The proper connection of waveguides and connectors.
12. Alarm Log to be generated and this is to be studied and analyzed for necessary corrective action

Yearly schedule: (Jointly by SSE/In charge/ Section/JE/SSE/TECH):

1. Signal strength, RF coverage testing and Network Optimization at site. QoS parameters of Network are placed below at **Enclosure-X.**
2. Orientation and re-alignment of antenna to achieve desired RF coverage.
3. Measurement of Earth resistance. Reference value should be taken as per OEM's product manual

Enclosure-X.

QoS Parameters of GSM-R Network:

1. **Radio Environment**:
   (i) Coverage
   (ii) Interference Situation (BER)

2. System Performance:

(i) System Availability

(ii) Call Success Rate

(iii) Call Drop Rate

(iv) Handover Success Rate

3. Time Performance:

(i) Call Set up time:

(a) Voice Group Call

(b) Point to Point Call

(c) Emergency Call

(ii) Call release time

(iii) Handover break time

(iv) Handover recreation time

Weekly Testing of Dispatcher:

(1)

Date	Call initiated from Dispatcher to Mobile No. (Record Mobile No.)	Performance	Call initiated from any Mobile No. to Dispatcher Terminal (Normal Call & Emergency Call)	Performance	Name & Signature of Tech./ Supervisor

2. O & M Logs of Dispatcher Terminals to maintain at Controller's Room in Fixed Dispatcher Terminal log book.

3. Testing of Railway exchange to dispatcher and mobile terminal (OPH/GPH) and vice-versa.

(D) Weekly testing of Voice Recording System (VRS):

1. Monitor performance and any alarm of VRS Server.

2. Take key performance Indicators (KPIs) for performance measurement logs. These key performance Indicators are as under-

(i) No. of control boards.

(ii) No. of channels

(iii) Channel status

(iv) No. of channels in Voice logger

Schedule for Taking Back up of MSC & BSS:

(a) 15 days Routine:

1. To take back up of complete BSS (BSC, TRAU, BTS) and OMC-R server.

2. Any other back up seems necessary.

(b) Monthly Routine:

1. To save all backups of BSS and OMC-R and KPIs from OMC-R to different Hard Drive/storage device.

2. Any other back up seems necessary.

3. To take backup of VRS to different Hard drive/storage device.

(xvii) **T&P ITEMS AND MEASURING EQUIPMENTS FOR MAINTENANCE STAFF:**

S.No.	GANG	RECOMMENDED T&P ITEMS & EQUIPMENTS
1.	Equipment Maintenance	Soldering Iron, Vacuum Cleaner Standard Tool Kit containing Screw Drivers, etc. Digital Multi-meter, Optical Fibre connector Cleaning kit
2.	Sectional Supervisor Equipment	All equipment as prescribed for equipment maintenance gang. Portable BER & PCM Test Set, Meager Optical Attenuation Measurement set consisting of optical power meter, optical source and optical attenuator
3.	Supervisory In-charge for equipment	Test and Repair Van PCM Transmission Analyzer PCM Channel Analyzer along Digital Storage Oscilloscope Frequency Counter, Fibre Optic tool kit Mini portable Generators analyzer
4.	Sectional Engineer Cable Maintenance	Digital Multi-meter, Mini ODTR Mechanical splicing kit Ruggedized Optical Fibre cable 200 Mts Splicing machine with battery Fibre Optic Tool Kit All types of Adopters & Connectors Fibre Optic Talk set Insulation Tester, TMS kit
5.	HQ gang for cable	200 Mtr of OFC cable Test & Repair van Portable generator Automatic Fusion Splicing machine OTDR Fibre Optic Tool Kit Mechanical Splicing kit Optical Talk set All types of Adopters & Connectors. Lighting arrangements and emergency lamps (2 Nos) Emergency phones (4 Nos) Walkie-Talkie sets (4 Nos) Torches with batteries (6 sets) Spare batteries for splicing machines (1 No) Puncha (to remove ballast) (2 Nos) Pickaxe (4 Nos) Motar pan &showel (4 Nos) Spade (4 Nos) Portable tent (1 No) Crow bar (2 Nos) OFC spare cables (cables of adequate length) HDPE pipe pieces (10 Nos) Drinking water can (20 litres) (1 No) Glasses (2 Nos) Folding table and chair (1 each) Stool light weight (2 Nos) First aid box (1 No)

********** END **********