



भारत सरकार  
रेल मंत्रालय  
रेलवे बोर्ड

**भारतीय रेल**  
**सिगनल इंजीनियरी नियमावली**  
जुलाई - 2021

GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)

**INDIAN RAILWAYS**  
**SIGNAL ENGINEERING MANUAL**

**APPENDIX - I**  
**(MAINTENANCE SCHEDULE BOOKLET)**

JULY 2021

## PREFACE TO APPENDIX I OF SEM

1. This Book Contains of Maintenance schedules. They are given numbering such as Annexure: 14-MS2, where 14 stands for Chapter number, MS stands for Maintenance schedule and 2 indicates that it is second schedule for that Chapter.
2. These schedules shall be followed along with the Railway Board/RDSO/OEM`s latest guidelines duly Keeping in Mind spirit of Reliability, Availability, Maintainability & Safety and Industry`s Best Practices.
3. These maintenance schedules shall be read in conjunction with relevant provisions in concerned Chapter of SEM.
4. Telecommunication & Information Technology related equipments shall be maintained by associated Telecommunication staff (*Technician/Junior Engineer/Senior Section Engineer*) in coordination with Signalling staff.
5. Values measured for any equipment during maintenance, shall be compared with concerned equipment`s parameters as furnished by concerned OEM/RDSO and if such values are outside permissible Limits, then corrective action shall be taken to bring them within permissible limits.

*Disclaimer:- Any example given in Appendix I, inadvertently showing any equipment or usage of any acronym is only for Technical information/Guidance of signal Engineers & Technicians and does not endorse any particular make/Brand.*

<b>Appendix I: Maintenance Schedule Booklet of Indian Railways Signal Engineering Manual (IRSEM- July 2021)</b>	
<b>Contents</b>	<b>Page No</b>
<b>Index</b>	i-ii
<b>Ready Reckoner of Maintenance Schedules - Technician, Sectional JE/SSE, SSE (signal)/Incharge</b>	iii-v
<b>Chapter 11: Dataloggers &amp; Predictive Maintenance Systems</b>	1
<a href="#"><u>Annexure 11-MS1</u></a> : Datalogger	1
<b>Chapter 12: Installation, Testing &amp; Maintenance of Mechanical Signalling Equipment</b>	3
<a href="#"><u>Annexure 12-MS1</u></a> : Mechanical Signalling	3
<b>Chapter 14: Level Crossing Gates</b>	12
<a href="#"><u>Annexure 14-MS1</u></a> : Mechanical Lifting Barrier	12
<a href="#"><u>Annexure 14-MS2</u></a> : Power Operated Lifting Barrier	13
<a href="#"><u>Annexure 14-MS3</u></a> : Sliding Boom	16
<b>Chapter 15: Cables</b>	17
<a href="#"><u>Annexure 15-MS1</u></a> : Cable, Cable Insulation Resistance Test Sheet, Instructions For Insulation Resistance Testing Of Signalling Cable	17
<a href="#"><u>Annexure 15-MS2</u></a> : Earth Leakage Detector (ELD)	21
<b>Chapter 16: Power Supply systems for Signalling Installations</b>	24
<a href="#"><u>Annexure 16-MS1</u></a> : Integrated Power Supply System	24
<a href="#"><u>Annexure 16-MS2</u></a> : IPS with Battery Bank Readings	26
<a href="#"><u>Annexure 16-MS3</u></a> : Discrete Power Supply	28
<a href="#"><u>Annexure 16-MS4</u></a> : Conventional Power Equipment (Stabilizer, Charger & Inverter) with Battery Bank Readings	31
<b>Chapter 17: Train Detection - Track Circuits &amp; Axle Counters</b>	33
<a href="#"><u>Annexure 17- MS1</u></a> : Track Circuit Test Record Card	33
<a href="#"><u>Annexure 17- MS2</u></a> : DC track Circuit	34

<b>Appendix I: Maintenance Schedule Booklet of Indian Railways Signal Engineering Manual (IRSEM- July 2021)</b>	
Contents	Page No
<a href="#"><u>Annexure 17- MS3: Track Circuit – AFTC</u></a>	36
<a href="#"><u>Annexure 17- MS4: Analog(Universal)Axle Counter (UAC)</u></a>	38
<a href="#"><u>Annexure 17- MS5: Digital Axle Counters (DAC)</u></a>	40
<a href="#"><u>Annexure 17- MS6: Multi Section Digital Axle Counter (MSDAC)</u></a>	43
<b>Chapter 18: Block Instruments, BPAC &amp; IBS Working</b>	45
<a href="#"><u>Annexure 18-MS1: Block Instruments (Single Line, Double Line, Push Button)</u></a>	45
<a href="#"><u>Annexure 18-MS2: Block Instrument – Double Line (Lock &amp; Block)</u></a>	47
<a href="#"><u>Annexure 18-MS3: Tokenless Block Instrument - Single Line (Push Button type)</u></a>	49
<a href="#"><u>Annexure 18-MS4: Analog Block Axle Counter Systems (BPAC)</u></a>	50
<a href="#"><u>Annexure 18-MS5: Tokenless Block Instrument-Single Line (Handle Type)</u></a>	51
<a href="#"><u>Annexure 18-MS6: Universal Fail-Safe Block Interface (UFSBI)</u></a>	53
<b>Chapter 19: Outdoor Signalling-Installation, Testing and Maintenance of Equipment</b>	55
<a href="#"><u>Annexure 19-MS1: Color Light Signal</u></a>	55
<a href="#"><u>Annexure 19-MS2: Electrically Operated Points (Inclusive of Clamp type point)</u></a>	57
<a href="#"><u>Annexure 19- MS3: Electrical Point Detector</u></a>	60
<a href="#"><u>Annexure 19- MS4: Key locked checking Relay/Electric Key Transmitter(KLCR/EKT)</u></a>	61
<a href="#"><u>Annexure 19- MS5: Fuses and Fuse Alarm System</u></a>	62
<a href="#"><u>Annexure 19- MS6: Earthing and Lightning Protection</u></a>	63
<b>Chapter 21: Relay &amp; Electronic Interlocking</b>	64
<a href="#"><u>Annexure 21- MS1: Control Panel</u></a>	64
<a href="#"><u>Annexure 21- MS2: Relays &amp; Relay Room</u></a>	65
<a href="#"><u>Annexure 21- MS3: Electronic Interlocking</u></a>	66
<b>Supplementary Technical Data</b>	68

## READY RECKONER OF MAINTENANCE SCHEDULES

(Technician, Sectional JE/SSE, SSE (signal)/Incharge)

(1. FN- Fortnightly, 2. M- Monthly, 3.Bi-M- Bi-Monthly, 4. Q- Quarterly, 5. HY- half yearly, 6. Y- Yearly)

S No	Signalling Gears	Technician	Sectional SSE/JE	SSE/Incharge	Annexure
1.	Datalogger	DL1(M)	DL1(Q),DL2(HY), DL3(Y)	DL1(HY),DL2(Y), DL3(Y),DL4*	<a href="#">11-MS1</a>
2.	<b>Mechanical Signalling</b>				
(a)	Cabin	CB1 (FN), CB6 (M)	CB1(M), CB2(Random check), CB4(M),CB5(M), CB6 (M)	CB1(Q),CB4(Q), CB5(Q),CB6(Q) CB3(HY),CB2(Y)	<a href="#">12-MS1</a>
(b)	Lever Frame	LF1(FN),LF2(M)	LF2(Q),LF3(Q), LF1(M)	LF1(Q),LF2(HY), LF3(HY)	<a href="#">12-MS1</a>
(c)	Lead-Out and Cranks	LOC1(FN)	LOC1(M)	LOC1(Q)	<a href="#">12-MS1</a>
(d)	Rodding Run	RR1(FN),RR2(M), RR3(Q),RR4*	RR1(M),RR2(Q), RR3(HY)	RR1(Q),RR2(HY), RR3(Y)	<a href="#">12-MS1</a>
(e)	Wire Transmission(SW)	SW1(M)	SW1(Q)	SW1(HY)	<a href="#">12-MS1</a>
(f)	Wire Transmission (DW)	DW1(FN), DW2(M)	DW1(M), DW2(Q)	DW1(Q),DW2(HY )	<a href="#">12-MS1</a>
(g)	Points	MP1(FN), MP3(FN)	MP1(M),MP2(M), MP3(M)	MP1(Q), MP2(Q), MP3*# (Q)	<a href="#">12-MS1</a>
(h)	Detector	D(FN)	D(M)	D (Q)	<a href="#">12-MS1</a>
(i)	Signal	S1(FN),S2*, S3(M),S6(M), S4(Q),S5(Y)	S1 (M), S3 (M). S6(Q),S4(HY),S5(Y)	S1(Q),S3(Q), S6(HY),S4(Y),S5(Y) )	<a href="#">12-MS1</a>
3.	Mechanical Lifting Barrier	MLB1(FN), MLB2(M), MLB3(Q)	MLB1(M), MLB2(Q), MLB3(HY)	MLB1(Q), MLB2(HY), MLB3(Y)	<a href="#">14-MS1</a>
4.	Power Operated Lifting Barrier	LC1(FN), LC2(M), LC3(Q)	LC1(M),LC2(Q), LC3(HY)	LC1(Q),LC2(HY), LC3(Y),LC4(Y), LC5(Y)	<a href="#">14-MS2</a>
5.	Sliding Boom	SLB1(FN), SBL2(M)	SLB1(M),SBL2(Q)	SLB1(Q),SBL2(HY )	<a href="#">14-MS3</a>
6.	Cable	C1(M),C2(Q), C4*	C1 (Q),C2(HY), C3(Y)	C1(HY),C2(Y), C3(Y)	<a href="#">15-MS1</a>

S No	Signalling Gears	Technician	Sectional SSE/JE	SSE/Incharge	Annexure
7.	Earth Leakage Detector (ELD)	ELD1(M)	ELD1(Q),ELD2(Q), ELD3 (Y)	ELD1(HY), ELD2(HY)	<a href="#">15-MS2</a>
8.	Integrated Power Supply System	IPS1(M)	IPS1(Bi-Monthly), IPS2(Q),IPS3(Y)	IPS1(Q),IPS2(HY), IPS3*(Y)	<a href="#">16-MS1</a>
9.	Conventional Power Equipment	PS1(FN),PS2(M)	PS1(M),PS2(Q), PS3(Q)	PS1(Q),PS2(HY), PS3(HY),PS4(HY), PS5(1000 hrs)	<a href="#">16-MS3</a>
10.	DC Track Circuit	T1(FN),T2# (FN)	T1(M)(A.B.C route), T1(Q) (D&E route), T2 (Q),T4## (HY)	T1(HY), T2(HY), T3(HY),T4 ## (HY), T5(Y)	<a href="#">17-MS2</a>
11.	Track Circuit – AFTC	AFT1(FN)	AFT1(M),AFT2(Q), AFT3(HY), AFT4(HY)	AFT1(Q), AFT2(HY),AFT3(Y ),AFT4(Y)	<a href="#">17-MS3</a>
12.	Analog Axle Counter	AX1(FN), AX2(M)	AX1(M),AX2(Q), AX3(Q)	AX1(Q),AX2(HY), AX3(HY)	<a href="#">17-MS4</a>
13.	Digital Axle Counter (DAC)	DAC1(M), DAC2# (Q)	DAC1(Q),DAC2(Q), DAC3(Y), DAC4(HY)	DAC1(HY), DAC2 (HY), DAC4(Y)	<a href="#">17-MS5</a>
14.	Multi Section Digital Axle Counter	MSD1(M)	MSD1(Q), MSD2(Q), MSD3(HY)	MSD1(HY), MSD2(HY), MSD3(Y)	<a href="#">17-MS6</a>
15.	Block Instruments (Single Line, Double Line, Push Button)	TB1(M)	TB1(M),TB2(Q)	TB1(Q),TB2(HY), TB3(Y)	<a href="#">18-MS1</a>
16.	Block Instrument – Double Line (Lock & Block)	DB1(M)	DB1(M),DB2(Q), DB3(HY)	DB1(Q),DB2(HY), DB3(Y)	<a href="#">18-MS2</a>
17.	Block Instrument - Single Line (Push Button type)	PB1(M)	PB1(M),PB2(Q), PB3(HY)	PB1(Q),PB2(HY), PB3(Y)	<a href="#">18-MS3</a>
18.	Analog Block Axle Counter Systems (BPAC)	BP1(M)	BP1(M),BP2(Q)	BP1(HY),BP2(HY)	<a href="#">18-MS4</a>
19.	Tokenless Block Instrument-Single Line (Handle Type)	HB1(M)	HB1(M),HB2(Q), HB3(HY)	HB1(Q),HB2(HY), HB3(Y)	<a href="#">18-MS5</a>
20.	Fail-Safe Block Interface(UFSBI)	UF1(M)	UF1(M),UF2(M), UF3(Q),UF4(Y), UF5(HY)	UF1(Q),UF2(Q), UF3(HY),UF5(Y)	<a href="#">18-MS6</a>

S No	Signalling Gears	Technician	Sectional SSE/JE	SSE/Incharge	Annexure
21.	Colour Light Signal	CS1(M)	CS1(Q),CS2(HY)	CS1(HY),CS2(Y)	<a href="#">19-MS1</a>
22.	Electrically Operated Points	EP1(FN), EP2#(M), EP4(Q)	EP1(M),EP2(M), EP3#### (Q),EP4(HY), EP5(HY)	EP1(Q),EP2(Q), EP3#### (Q), EP4(Y), EP5(Y)	<a href="#">19-MS2</a>
23.	Electrical Point Detector (EPD)	ED1(FN)	ED1(M),ED2(HY)	ED1(Q),ED2(Y)	<a href="#">19-MS3</a>
24.	KLCR/EKT	K1(M),K2(M)	K1(Q),K2(HY)	K1(HY),K2(Y)	<a href="#">19-MS4</a>
25.	Fuses & Fuse Alarm System	F1(M)	F1(Q),F2(HY)	F1(HY), F2(Y)	<a href="#">19-MS5</a>
26.	Earthing and Lightning Protection	E1(M)	E1(Q),E2(HY), E3(Y)*	E1(HY),E2(Y), E3(Y)*	<a href="#">19-MS6</a>
27.	Control Panel	CP1(FN),	CP1(M),CP2(Q)	CP1(Q),CP2(HY), CP3*	<a href="#">21-MS1</a>
28.	Relays & Relay Room	R1(M)	R1(M),R2(M)	R1(Q),R2(Q), R3(HY)	<a href="#">21-MS2</a>
29.	Electronic Interlocking	EI1(M)	EI1(M),EI2(Q), EI3(HY),EI4(Y)	EI1(Q),EI2(HY), EI3(Y)	<a href="#">21-MS3</a>

**Note:**

1. Schedule Code: C4\* - Periodicity: As given in following pages
2. Schedule Code: RR4\* - Periodicity: Technician (Signal): (as and when required)
3. Schedule Code: S2\* - Applicable for Traffic Staff
4. Schedule Code: IPS3\* - Periodicity: SSE (Signal)/Incharge: Yearly duly staggered by 6 months
5. Schedule Code: CP3\* - Periodicity: SSE (Signal)/Incharge along with ASTE: Five yearly
6. Schedule Code: DL4\* - Periodicity: Only for SSE/DLMC yearly
7. Schedule Code: E3\* - Periodicity: They shall do in alternate Six months
8. # - Denotes: To be done by ESM in the presence of SSE/JE
9. ## - Denotes: Sectional SSE/JE (Signal) & SSE (Signal)/Incharge to carry out alternatively once in six months
10. ### - Denotes: Sectional SSE/JE & I/C SSE to carry out alternate inspections quarterly
11. \*# - Denotes: Joint Inspection with SSE/P.WAY.

## Maintenance Schedule of Datalogger

### Index

Periodicity	Schedule Code
Monthly	DL1
Quarterly	DL1
Half Yearly	DL1, DL2
Yearly	DL2, DL3, DL4 (only for SSE/DLMC)

	<b>Schedule Code: DL1</b> <i>Periodicity: Technician (Signal): Monthly,  Sectional SSE/JE (Signal): Quarterly  SSE (Signal)/Incharge: Half Yearly</i>
S.No.	Check the following:
1.	Datalogger free from rust, dirt & all the connectors & PCBs (Cards) in the main Euro rack inserted properly & all screws of cards tightened.
2.	The Earthing wire & its connectivity tightness.
3.	FAS (Fault Analysis System) free from dust & ensure proper connectivity with Datalogger.
4.	Check LED position of both side of modems. (a) CD, CTS-LED should continue glow & in normal condition. (b) TD & RD LED should blink (flickering) - In normal condition. I.e. data is getting transferred. If LED status is different then reset modem by pressing reset button or supply switching. (c) If LED status is different then reset modem by pressing reset button or supply switching.
5.	Reading of all cells of Datalogger battery bank voltage when charger is in on position. Switch off charger & Datalogger load takes on battery bank about 30 minutes then measure all cells voltage. (If power supply is not taken from IPS).
6.	Measure working voltage of Datalogger unit. It should be in permissible limit as given below. (a) Between 11.4 V to 12.6 V if Datalogger model was 90/98. (b) Between 22.8 V to 25.2 V if Datalogger model was 99/01 and 99/06.
7.	Functioning of SMS Alerts.
	<b>Schedule Code : DL2</b> <i>Periodicity: Sectional SSE/JE(Signal): Half Yearly  SSE (Signal)/Incharge: Yearly</i>
1.	Measure the communication channel (OFC) loss with Telecom (Technician/JE/SSE)& it should not be more than 25 dB between two modems of Datalogger.

2.	Ensure that latest NMDL software (i.e. software used for network management in Datalogger) & test room yard layout, fault updated in FAS (Computer) at site & all NMDL utility programs (Reports, Simulation, track off etc.) running smoothly.
3.	Measure all AC& DC supply input voltage in Datalogger with true RMS meter then compare all these voltages with FAS (Computer) voltage reading. The variation of both readings is under $\pm 5\%$ for accuracy.
	<b>Schedule Code: DL3</b> <i>Periodicity: Sectional SSE/IE(Signal): Yearly</i> <i>SSE (Signal)/Incharge: Yearly</i>
1.	Measure the Earthing resistance & it should be less than 1 Ohm.
2.	Check & ensure that Datalogger validation register is kept at each station and details of potential free contacts of digital & Analog inputs and yard simulation must be tallied with NMDL at DLMC.
3.	All cable terminations (Analog, Digital input) are tightened & properly connected.
	<b>Schedule Code: DL4</b> <i>Periodicity: SSE (Signal)/DLMC: Yearly</i>
1.	Checking of all types of exception reports (As per RDSO) generated by Datalogger& analysis of the reports for reliability of Datalogger.
2.	To check & ensure that temperature of Datalogger is shown in NMDL.
3.	Ensure that DL-1 & DL-2 shall be followed for FEP, CMU & Server unit at DLMC.
4.	Zonal SSE/DLMC should carry out updation of Yard layouts of stations where modifications have been carried out.

**Maintenance Schedule for Mechanical Signalling  
Cabin  
Index**

Periodicity	Schedule Code
Fortnight	CB1
Monthly	CB1, CB4, CB5, CB6
Quarterly	CB1, CB4, CB5, CB6
Half Yearly	CB3
Yearly	CB2
Random	CB2

	<b>Schedule Code: CB1</b> <i>Periodicity: Technician (Signal): Fortnight</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following:</b>
1.	Cleaning the ground floor & locking.
2.	Check the inter changeability of keys of padlocks where available.
3.	Check from the operator any defect or discrepancy of the gears.
4.	Check the signals are visible from place of operation.
	<b>Schedule Code: CB2</b> <i>Periodicity: Sectional SSE/JE (Signal): Random Check</i> <i>SSE (Signal)/Incharge: Yearly</i>
1.	Test locking against interlocking table and yard diagram and broken wire test (if D.W)
	<b>Schedule Code: CB3</b> <i>Periodicity: SSE (Signal)/Incharge: Half Yearly</i>
1.	Conduct Dynamometer test, if double wire frame
	<b>Schedule Code: CB4</b> <i>Periodicity: Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
1.	Checking Cabin diagram, pull chart, station working instructions, maintainer's programme up to date and warning board (DW Cabin)
	<b>Schedule Code: CB5</b> <i>Periodicity: Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
1.	Check the lever frame is due for overhauling.
2.	Check the installation as per current plan.
	<b>Schedule Code: CB6</b> <i>Periodicity: Technician (Signal): Monthly</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
1.	Check the sealing and locking of interlocking tray, resetting handle box, etc.

### Lever Frame Index

Periodicity	Schedule Code
Fortnight	LF1
Monthly	LF1, LF2
Quarterly	LF1, LF2, LF3
Half Yearly	LF2, LF3

	<b>Schedule Code: LF1</b> <i>Periodicity: Technician (Signal): Fortnight</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following:</b>
1.	Check bolts and nuts for tightness and opening of split pins including the safety bolts of D.W. Compensator.
2.	Lubricate all accessible parts.
3.	Check the tipping of D.W. Clutch levers.
4.	All connections including down rods must be examined to detect cracks, slipped threads and spacing.
5.	Check the pulley block in D.W. cabin is in order.
6.	Check the lubrication of compensator, Wheel, grooves and wire rope with graphite grease Gr.I to IS 508. Check the lubrication of moving parts of axle oil. Check the lubrication when nipples are provided with grease IS-507.
7.	Check the drum lock fitted on the coupled clutch/direct lever for effectiveness.
	<b>Schedule Code: LF2</b> <i>Periodicity: Technician (Signal): Monthly</i> <i>Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: Half Yearly</i>
1.	Operate lever and check that full stroke is transmitted.
2.	Check the double wire compensator that when the transmission is at rest, both the grips of locking pawl are disengaged with the teeth of Ratched Rod. The weights must be floating freely and in level with each other during lever operation check that engaged ratched rod teeth.
3.	Check adjust weight lever in such a way that during the hottest period of the day, the lever must not reach the breakage mark on the ratchet rod.
	<b>Schedule Code: LF3</b> <i>Periodicity: Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: Half Yearly</i>
1.	Check the painting of levers.

## Lead-Out and Cranks

### Index

Periodicity	Schedule Code
Fortnight	LOC1
Monthly	LOC1
Quarterly	LOC1

	<b>Schedule Code: LOC1</b> <i>Periodicity: Technician (Signal): Fortnight</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly,</i>
<b>S.No.</b>	<b>Check the following:</b>
1.	Examine clean oils and observe cranks and wheels for lost motion or worn out parts and check the foundations are rigid. All worn out pins are replaced.

**Rodding Run  
Index**

Periodicity	Schedule Code
Fortnight	RR1
Monthly	RR1, RR2
Quarterly	RR1, RR2, RR3
Half Yearly	RR2, RR3
Yearly	RR3
As & when required	RR4

	<b>Schedule Code: RR1</b> <i>Periodicity: Technician (Signal): Fortnight</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following:</b>
1.	Check the Rodding run in true alignment. Spacing of roller trestles free from vegetation growth.
2.	Check joints are good and make solid connection.
3.	Check the coupling adjusting screws and joints looseness stripped threads are slack nuts and lubricate threads.
	<b>Schedule Code: RR2</b> <i>Periodicity: Technician (Signal): Monthly,</i> <i>Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: Half Yearly</i>
1.	Checks the rollers are moving freely and replace the missing or broken parts and check whether alignment requires earthwork.
2.	Check the Rodding run under the track is clear rails and obstructions.
3.	Check the Rodding run for any weak place due to rust, corrosion etc.
	<b>Schedule Code: RR3</b> <i>Periodicity: Technician (Signal): Quarterly,</i> <i>Sectional SSE/JE (Signal): Half Yearly</i> <i>SSE (Signal)/Incharge: Yearly</i>
1.	Check whether the roller trestles require realignment due to shifting or sinking.
2.	Check the adjusting sleeve of the adjusting crank and check the loss for track.
	<b>Schedule Code: RR4</b> <i>Periodicity: Technician (Signal): (as and when required)</i>
1.	Check the position of compensator when a point or lock doesn't work properly.

**Wire Transmission (Single Wire)**  
**Index**

Periodicity	Schedule Code
Monthly	SW1
Quarterly	SW1
Half Yearly	SW1

	<b>Schedule Code: SW 1</b> <i>Periodicity: Technician (Signal): Monthly, Sectional SSE/JE (Signal): Quarterly, SSE (Signal)/Incharge: Half Yearly.</i>
<b>S.No.</b>	<b>Check the following</b>
1.	Check the alignment level, Corrosion and for kinks.
2.	Check the wear pulley damage or broken pulleys to be replaced.
3.	Check the wire run underneath the track for rubbing against blast bottom rails or sides or sleeper and also for corrosion and kinks in the troughing underneath level crossing.
4.	Check the wire joints, split links and adjacent joints do not get entangled.
5.	Check for the spacing of stakes (not more than 10m is allowed).
6.	Check wheels are rigidly fixed on foundation and replace worn out wheels.

**Wire Transmission (Double Wire)  
Index**

Periodicity	Schedule Code
Fortnight	DW1
Monthly	DW1, DW2
Quarterly	DW1, DW2
Half Yearly	DW2

	<b>Schedule Code: DW1</b> <i>Periodicity: Technician (Signal): Fortnight</i> <i>Sectional SSE/JE (Signal): Monthly</i> <i>SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following</b>
1.	Check all transmission work freely and loss of stroke at the end of the transmission must be avoided.
2.	Check all pulleys are parallel to the wire run. Check that there is no binding in any part of transmission.
	<b>Schedule Code: DW2</b> <i>Periodicity: Technician (Signal): Monthly,</i> <i>Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: Half Yearly</i>
1.	Check the spacing of the stakes is not more than 15 meter for points and detector & 20 meter for signals.
2.	Check disconnecting pins are available at the end of transmission for conducting broken wire test.
3.	Check pull wire and return wire are properly identified by painting.
4.	Check the wheel guides are intact and avoid wire slipping from turnout wheels.

**Points  
Index**

Periodicity	Schedule Code
Fortnight	MP1,MP3
Monthly	MP1, MP2, MP3
Quarterly	MP1, MP2,MP3

	<b>Schedule Code: MP1</b> <i>Periodicity: Technician (Signal): Fortnight, Sectional SSE/JE (Signal): Monthly SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following</b>
1.	Cleaning and lubricating of moving parts. Also check point chairs are cleaned regularly by Nominated departments
2.	Check the gauge of the points, opening of the switches and squaring and packing condition of sleepers under gauge tie plate and slide chair fixing bolts through P.Way staff
3.	Check the switches are housed properly against stock rail and check spring on the switches equally in the normal & reverse positions.
4.	Check the points for Obstruction test
5.	Check the ends of plunger of the lock and notches are square.
6.	Check the lock plunger is 12 mm clear from the stretcher blades when unlocked. In case of EFP locks, check locking Dog protrudes 3 mm (at least) after locking both the stretcher.
7.	Check for tightness of Bolts & Nuts and arrange for tightening /replacing missing bolts and nuts of Flexible stretchers.
8.	Check lock bars are straight and examine the driving pieces for looseness.
9.	Check the lock bar clips and stops for tightness and lubricate the bearing of clips.
10.	Badly worn-out clips to be replaced and check if creep is affecting the working of lock bar.
11.	Check that lock bars lie 38mm below the top of the rail.
12.	Check the broken wire locks & test for easy movement & also check the point mechanism butting against its stop in normal & reverse.
	<b>Schedule Code: MP2</b> <i>Periodicity: Sectional SSE/JE (Signal): Monthly SSE (Signal)/Incharge: Quarterly</i>
1.	Check that no two similar wards exist for conflicting train movements for hand plunger lock, lever lock.
	<b>Schedule Code: MP3</b> <i>Periodicity: Technician (Signal): Fortnight, Sectional SSE/JE (Signal): Monthly SSE (Signal)/Incharge: Quarterly (Jointly with SSE/JE(P.Way)</i>
1.	Make visual check regarding the condition of switches, sleepers, and gauge tie plate.

**Detectors  
Index**

Periodicity	Schedule Code
Fortnight	D
Monthly	D
Quarterly	D

	<b>Schedule Code: D</b> <i>Periodicity: Technician (Signal): Fortnight, Sectional SSE/JE (Signal): Monthly SSE (Signal)/Incharge: Quarterly</i>
<b>S.No.</b>	<b>Check the following</b>
1.	Check the signal wires to the detectors are in alignment & check when the signal is returned to 'ON' all signal slides are travelling back to their stops.
2.	Check for obstruction test.
3.	Lubricate the detector slides thoroughly – Check the cross slides for any undue play. Also check the detectors are fixed rigidly.

### Signal Index

Periodicity	Schedule Code
Fortnight	S1
Monthly	S1, S3, S6
Quarterly	S1, S3, S4, S6
Half Yearly	S4, S6
Yearly	S4, S5

	<b>Schedule Code: S1</b> <i>Periodicity: Technician (Signal): Fortnight, Sectional SSE/JE (Signal): Monthly, SSE (Signal)/Incharge: Quarterly.</i>
<b>S.No.</b>	<b>Check the following</b>
1.	Check the condition of the post, fittings, level of arms and the posts are properly plumbed and lubricate working parts.
2.	Inspect the platforms where provided for decayed or loose boards.
3.	Check the founts of signal lamps are in good repair. Check for damaged flame guard, leaky founts and broken burners and non-standard wick.
4.	Where double wire mechanism is used, check lubrication of cam path.
	<b>Schedule Code: S2</b> <i>Applicable for Traffic Staff</i>
1.	Cleaning of the roundels, glasses and lenses.
	<b>Schedule Code: S3</b> <i>Periodicity: Technician (Signal): Monthly, Sectional SSE/JE (Signal): Monthly, SSE (Signal)/Incharge: Quarterly.</i>
1.	Check the focussing of Signals.
2.	Testing of Signals.
	<b>Schedule Code: S4</b> <i>Periodicity: Technician (Signal): Quarterly, Sectional SSE/JE (Signal): Half Yearly, SSE (Signal)/Incharge: Yearly.</i>
1.	Cleaning of Signal arms. Painting to be got done if required.
	<b>Schedule Code: S5</b> <i>Periodicity: Technician (Signal): Yearly, Sectional SSE/JE (Signal): Yearly, SSE (Signal)/Incharge: Yearly.</i>
1.	Check all signal lamps are overhauled.
	<b>Schedule Code: S6</b> <i>Periodicity: Technician (Signal): Monthly, Sectional SSE/JE (Signal): Quarterly, SSE (Signal)/Incharge: Half Yearly.</i>
1.	Check adjustment of back light.

## Maintenance Schedule of Mechanical Lifting Barrier

### Index

Periodicity	Schedule Code
Fortnightly	MLB1
Monthly	MLB1, MLB2
Quarterly	MLB1, MLB2, MLB3
Half Yearly	MLB2, MLB3
Yearly	MLB3

	<b>Schedule Code: MLB1</b> <i>Periodicity: Technician(Signal): Fortnightly,  Sectional SSE/JE(Signal): Monthly  SSE(Signal)/Incharge: Quarterly</i>
S.No.	Check the following:
1.	Check that mechanism is kept in good condition free from dust, rust, dirt etc.
2.	Check that moving parts, gate locks are lubricated properly
3.	Integrity of boom locking and 'E' type lock locking the winch shall be checked
4.	Audio Visual warning
5.	Approach warning
6.	Weeding out bushes, cleaning of Mud accumulation and general cleaning
	<b>Schedule Code: MLB2</b> <i>Periodicity: Technician(Signal): Monthly,  Sectional SSE/JE(Signal): Quarterly,  SSE(Signal)/Incharge: Half yearly</i>
1.	Proper adjustment of wire sag and tension shall be made
2.	Integrity of interlocking shall be checked.
	<b>Schedule Code: MLB3</b> <i>Periodicity: Technician(Signal): Quarterly,  Sectional SSE/JE(Signal): Half yearly  SSE(Signal)/Incharge: Yearly</i>
1.	Cleaning of all pipes and ducts to prevent obstruction by accumulation of dirt.

## Maintenance Schedule of Power Operated Lifting Barrier

### Index

Periodicity	Schedule Code
Fortnightly	LC1
Monthly	LC1, LC2
Quarterly	LC1, LC2, LC3
Half Yearly	LC2, LC3
Yearly	LC3, LC4, LC5

<b>Schedule Code: LC1</b> <i>Periodicity: Technician(Signal): Fortnightly, Sectional SSE/JE(Signal): Monthly, SSE(Signal)/Incharge: Quarterly</i>	
S.No.	Check the following:
1.	Ensure the smooth operation of gate barrier and check for auto stop of barrier in fully Open (within 85°-90°) & closed (within 0°-5°) position. Adjust circuit controllers / limit switches, if required.
2.	Cleaning the inside & outside of mechanism, booms, channels & hand Generator. Checking & cleaning of contacts, proper adjustment & condition of Limit switch/ Circuit controller/contactors.
3.	Check tightness of all fixing nuts & bolts of the mechanism counterbalance channels & adjust screws of base, gear box, clutch assembly, motor, pulleys, boom, machine foundation & the circuit controllers. <b>Along with this, any cracks on boom should also be checked.</b>
4.	Check all the indication on gate panel, Button & Emergency key.
5.	Checking and cleaning of operating panel, Road signals and retro reflective STOP board on both LB & hooter.
6.	Checking of Audio-Visual alarm/hooter for approach warning/approach locking. Wherever provided.
7.	Check the proper working of telephone.
8.	Availability of lubrication to its level in the gear box.
9.	<b>Locking Checking</b>
10.	<b>Solenoid Locking</b> : Clean inside the solenoid device and ensure that (a) The lever falls to the lock position by gravity. (b) Making of Magnet Switch contacts (check with continuity meter) when boom hook is inside lock unit & lock lever is in locked Position. (c) Contact does not break even when boom is moved up & down or sideways within allowable play in lock. (d) Contact of boom lock proving switch, Replace if required.
	<b>Motorized Locking</b>
11.	Ensure that the boom hook falls properly into the Boom Lock Post. Adjust position of Boom Hook/lock unit if required.

	<b>Schedule Code: LC2</b> <i>Periodicity: Technician(Signal): Monthly,</i> <i>Sectional SSE/JE(Signal): Quarterly,</i> <i>SSE(Signal)/Incharge: Half yearly</i>			
1.	Apply a little grease to the cam surface which operates the limit switch.			
2.	Check Timing Belt tension for both barriers & Hand Generator. Adjust if required.			
3.	Check Gear Box for any leakage of oil.			
4.	Check clutch slippage current (as per OEM stipulation) and slippage of friction clutch. Adjust (if required & feasible).			
5.	Parallel operation/& Individual operation and opening of gate.			
6.	Gate operation to be tested with Crank handle.CH should be kept sealed in the box.			
7.	Check emergency switch for turning signal to danger. In case of approach lowered signal, emergency switch to be kept in break position and to be rotated to make position once gate is closed and panel push button is pressed.			
8.	All cable terminations are tight and properly connected.			
	<b>Schedule Code: LC3</b> <i>Periodicity: Technician(Signal): Quarterly,</i> <i>Sectional SSE/JE(Signal): Half yearly,</i> <i>SSE(Signal)/Incharge: Yearly</i>			
1.	Measure the time of operation, working voltage of ELB and operating current. These records shall be kept in record book. Also ensure all parameter under permissible limit.			
2.	The input voltage/Current range of ELB are (at motor terminals)			
3.	(a) For barriers without hand generator:			
	Type	Rated Voltage	Normal (Max.) operating Current/barrier for boom length up to 9.76 meter (= 10 meter)	Maximum rated current for each barrier for boom length up to 9.76 meter(= 10 meter)
	AC	110 V	2.5 Amps	4.0 Amps
	DC	24 V	4.0 Amps	7.0 Amps
	DC	110 V	1.0 Amps	1.8 Amps
	(b) For barriers with hand generator:			
	Type	Rated voltage	Normal (Max.) operating Current/barrier for boom length up to 9.76 meter (= 10 meter)	Maximum rated current for each barrier for boom length up to 9.76 meter (= 10 meter)
	DC	24 V	3.0 Amps	5.0 Amps
	DC	110 V	0.7 Amps	1.2 Amps
4.	Checking of NX switch/Crank handle.			
5.	Balancing of weight & booms.			
6.	Tightening of Screws of Ebonite cams of contacts.			

	<b>Schedule Code: LC4</b> <i>Periodicity: SSE(Signal)/Incharge: Yearly</i>
1.	Proper functioning and interlocking of Sliding Boom.
2.	Approach/dead approach locking.
3.	Boom is perpendicular to road.
4.	Check the resistance of all Limit switch/Circuit controller.
5.	Clearance of boom from road (0.8-1 meter).
6.	Boom opening (85-90 degree).
7.	Yellow reflector strips on all booms on both sides.
	<b>Schedule Code: LC5</b> <i>Periodicity: SSE(Signal)/Incharge: Yearly</i>
1.	Annual testing of tail cable insulation & motor insulation with 100 V megger.

## Maintenance Schedule of Sliding Boom

### Index

Periodicity	Schedule Code
Fortnightly	SLB1
Monthly	SLB1, SLB2
Quarterly	SLB1, SLB2
Half Yearly	SLB2

	<b>Schedule Code: SLB1</b> <i>Periodicity: Technician(Signal): Fortnightly,            Sectional SSE/JE(Signal): Monthly,            SSE(Signal)/Incharge: Quarterly</i>
S.No.	Check the following:
1.	Ensure Sliding boom is easy to operate and travels smoothly in its boom channel.
2.	E type lock and other moving parts to be oiled and free movement to be ensured.
3.	SBB E type key is taken out only when combination key is inserted.
4.	Stop board has retro-reflective paint/tape. Stop board of approx. size 600 mm to be provided.
5.	EKT/KLCR for slot transmission is effective. Ensure that Locking is directly with E type lock and not with Chain.
6.	Ensure locking of slide covers on sliding booms.
7.	Check and ensure that aspect of both sides road signal should be RED aspect before taking OFF of Gate signal by using sliding boom arrangement.
	<b>Schedule Code: SLB2</b> <i>Periodicity: Technician(Signal): Monthly            Sectional SSE/JE(Signal): Quarterly            SSE(Signal)/Incharge: Half yearly</i>
1.	Foundation of sliding boom channel and boom lock post should be intact so that sliding boom is not obstructed.
2.	Check tightness of base nuts & bolts of stand and jointing nuts & bolts of the sliding boom.
3.	Ensure ELB and Sliding boom Interlocking is effective. Check Integrity of Interlocking & working of Emergency switch with Sliding boom
4.	On opening back cover, wiring shall be in good laid out condition without any openings to avoid entry of rodents.

**Maintenance Schedule of Cable  
Index**

Periodicity	Schedule Code
Monthly	C1
Quarterly	C1, C2
Half Yearly	C1, C2
Yearly	C2, C3

	<b>Schedule Code: C1</b>
	Periodicity: Technician (Signal): Monthly, Sectional SSE/JE (Signal): Quarterly, SSE (Signal)/Incharge: Half yearly
<b>S.No.</b>	<b>Check the following:</b>
1.	All termination at CTR, Location Box, Junction Box and relay room should be checked for sulphation. Entries of cables in relay room, cable pit, location box etc. to be checked and should be sealed properly
2.	Check for possible rat bite, vulnerability to bush fire/likely damage due to ongoing works nearby.
3.	Visual check of connections, cable Armour earthing arrangement in location boxes.
	<b>Schedule Code: C2</b>
	Periodicity: Technician (Signal): Quarterly, Sectional SSE/JE (Signal): Half yearly, SSE (Signal)/Incharge: yearly
1.	Visual check of protective arrangement provided at track crossing, culverts, bridges, construction site and cable route marker in complete section. Special attention should be paid to these protective works soon after the monsoon
2.	Checking of exposed cable in earth, bridges, duct, Platform, pipe etc. Exposed cable shall be buried or protected by concreting. Ends of the pipe must be concreted.
3.	Condition of cable pipe to be checked. Cables, pipe on bridges to be fastened properly, bracket to be tightened & fixed. Entries of cables in pipes should be sealed properly.
	<b>Schedule Code: C3</b>
	Periodicity: Sectional SSE/JE (Signal): Yearly, SSE (Signal)/Incharge: Yearly
1.	Verification of cable route plan and ensuring availability of cable route markers. All missing/damaged cable markers shall be identified and provided Yearly.
	<b>Schedule Code: C4</b>
	Periodicity: As given in following pages
1.	Periodical Meggering of main and tail cables to be done. Periodicity and procedure described in Annexure B. The results of the insulation resistance tests should be recorded in proforma given in next page.

*NOTE: Ensure remedial measure in case of any deficiency in schedule mentioned above.*

स्टेशन  
STATION:

फामनं. एस एवं टी टी पि सी  
FORM No. S&T.T.P.C

केबल विसंवाही प्रतिरोध जांच शीट

### Cable Insulation Resistance Test Sheet

मुख्या/पिछला केबल

MAIN/TAIL CABLE

- |   |  |
|---|--|
| 1. स्थान से.....तक.....<br>Location From.....to.... | 6. स्क्रीन किया हुआ/न किया हुआ<br>Type unscreened/screened   |
| 2. कोड<br>Cores.....                                | 7. पीवीसी/रबड़/कागज़ विसंवाही<br>Insulation PVC/Rubber/Paper |
| 3. आकर<br>Size.....                                 | 8. संस्थापन की तारीख<br>Date of Installation Commissioning   |
| 4. ग्रेड<br>Grade 250/440/650/1100V....             | 9. निर्माता का नाम<br>Name of Manufacturer                   |
| 5. लम्बाई<br>Length.....                            |  |

विसंवाही प्रतिरोध ओम्स में

Insulation Resistance in Mega Ohms

परिक्षण की तारीख, महीने और वर्ष Date, Month & Year					
कोड नं. Core No.	सर्किट Circuit	विसंवाही मूल्य Insulation Value	विसंवाही मूल्य Insulation Value	विसंवाही मूल्य Insulation Value	विसंवाही मूल्य Insulation Value
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

अभ्युक्तियाँ Remarks:

हस्ताक्षर Signature:

पदनाम Designation

- NOTE: 1. Each conductor shall be meggered with respect to Earth and all other conductors.  
2. Please see Instructions given on next page

**Annexure: 15-MS1 (Contd..)**

**Instructions for Insulation Resistance Testing of Signalling Cable**

**1.0 GENERAL**

- 1.1 These instructions apply only to cables used for Railway Signalling and do not cover open line wires and internal wiring.
- 1.2 Insulation Resistance tests should be made in such a manner that safe operation of trains is not affected. It should be ensured that no unsafe conditions are set up by the application of test equipment.
- 1.3 All conductors in signalling cables must be tested for their insulation at the time of commissioning and thereafter in dry weather every year preferably during the same part of the year.
- 1.4 The insulation resistance tests should be made when conductors, cables and insulated parts are clean and dry.
- 1.5 In addition to regular testing of the cables in dry weather, random tests in wet weather may also be carried out where considered necessary.
- 1.6 The conductors of the cables possess appreciable electrostatic capacity and may accumulate electrostatic charge. The cable conductors should be shorted or earthed to completely discharge any accumulated charge (i) before connecting the insulation tester while commencing the test (ii) before the insulation tester is disconnected when the test is completed. This is in the interest of safety of personnel and protection of equipment.
- 1.7 A 500 V insulation tester should be used for insulation testing. The fact that the cable has capacitance means that it has to be discharged before a measurement of the insulation resistance can be made. The insulation resistance should therefore be recorded after the test voltage has been applied for one minute or so when the indicator of the insulation tester shows a steady reading. **(Insulation of all quad cables shall be tested with 100 V megger.)**
- 1.8 Any metallic sheath or metal work of any rack or apparatus case should be bonded to earth during test.

**2.0 PROCEDURE**

- 2.1 Disconnect all cores of a cable at both ends. The disconnection may be made through links of ARA terminals, if provided.
- 2.2 Connect one terminal of the insulation tester to the conductor under test and other terminal to all the other conductors being bunched together and connected to earth.
- 2.3 Similarly test remaining conductors of the cable one by one as in 1.2
- 2.4 Insulation Resistance so measured should not be less than 5 mega ohms per kilometer at buried temperature. If the insulation resistance is found to be lower than 5 mega ohms, the cause should be investigated and immediate steps taken to repair or replace the cable to prevent any malfunctioning of the equipment and circuits.

**2.5** The results of the insulation resistance tests should be recorded in approved proforma. A comparison of test results between successive tests carried out on a cable under similar conditions will give an indication of the trend towards deterioration of the insulation resistance of the cable. If sudden fall in the insulation resistance is observed the cause should be investigated and immediate steps taken to repair or replace the cable.

**Annexure: 15-MS1 (Contd..)**

**3.0 PERIODICITY OF CABLE TESTING: Extract of SEM is given below**

<b>SEM Para No 15.5.2</b>	<p>Periodical Testing of Signalling cables shall be as under;</p> <p>(a) First measurement of insulation of the cable should be carried out after laying of the cable and after first monsoon for all the conductors.</p> <p>(b) After major work in a yard, all cables should be meggered afresh.</p> <p>(c) In all other cases, Insulation Resistance shall be tested periodically as given below.</p>
---------------------------	--

<b>Type of Cable</b>	<b>Periodicity</b>
a) Main Cable	Every 2 years
b) Tail Cables – Signal/Track/Points etc	Once in 1 year
c) Spare conductors	Once in 1 year

**Maintenance Schedule of Earth Leakage Detector (ELD)  
Index**

<b>Periodicity</b>	<b>Schedule Code</b>
Monthly	ELD1
Quarterly	ELD1, ELD2
Half Yearly	ELD1, ELD2
Yearly	ELD3

	<p><b>Schedule Code: ELD1</b>                  Periodicity: Technician (Signal): Monthly  <i>Sectional SSE/JE (Signal): Quarterly</i>  <i>SSE (Signal)/Incharge: Half-yearly</i></p>
S.No.	Check the following:
1.	All cable terminations are tight & properly connected in ELD.
2.	Checking the ELD equipment free from dust.
3.	Check that "Bus Bar" indication is available. If indication is not available then check the fuses of positive and negative bus bars of the channel.
4.	Check & ensure that fault totalizer (counter) of each channel increase after each reset operation.
5.	Ensure bus bar name sticker on ELD channel for identification.
6.	Ensure earth connection soldered on earth side for corrosion free connection.
7.	Ensure that Reference value of resistance has been set within permissible limit. The insulation resistance is to be set as per the table attached (Table 1).
8.	Check the LED indication of each channel module of earth leakage detector & ensure that "NORMAL LED" is glowing. If "FAULT LED" is glowing, take the suitable corrective action to remove the earth fault immediately.
9.	Earth connection to ELD through E1 and E2 should be at two different points. Preferably one on Copper Ring and another on earth pit on which MEB wires/Cu tape are welded. If difference in earth resistance at two points increase more than 10 ohm then all channels will show earth fault which indicate poor earth resistance or loose connectivity. Same to be attended.
10.	Fault LED if glowing Red it means I) ELD module may be defective-ELD meter will show infinite but will not reset. Replace defective module. Or II) AC supply is not available. Attend to it. Or III) If meter showing some leakage resistance, ELD module is working and leakage is there in the circuit and it needs to be attended.

	<b>Schedule Code: ELD2</b> <i>Periodicity: Sectional SSE/JE (Signal): Quarterly</i> <i>SSE(Signal)/Incharge: Half-yearly</i>
1.	Measure working voltage of ELD unit is from 195 V to 265 V for 230 V and 93 V to 127 V for 110 V supply respectively.
2.	Measure Leakage resistance of all connected AC/DC (60 V/24 V/110 V) channel one by one after selecting through the channel selector and fill in Table 2 & keep in record book.
3.	Check Datalogger messages are generated after creating false earth faults during inspection by <i>SSE/JE (Signal)</i> .
	<b>Schedule Code: ELD3</b> <i>Periodicity: Sectional SSE/JE (Signal): Yearly</i>
1.	All fuses provided are of proper capacity in AC/DC channel. Ensure the wiring board fuse rating as follows, Bus bar(+ve & -ve each) 100 mA, Power supply 2 A.
2.	If any channel is not in use, it can be switched off with the help of individual switch in back side of terminal strip.
3.	Ensure that Potential free contacts of ELD are connected to Datalogger and working properly and Exceptional report for faulty cable is generated through the Dataloggers.

TABLE - 1

Desirable Settings for ELD		
S. No	Type of Station	Desirable setting
1.	3 line station	1M ohm
2.	4/5/6 line station	500K ohm
3.	RRI ( up to 300 routes)	100K ohm
4.	Big yard more than 300 routes	50k ohm

*NOTE: Above values are only indicative. Based on cable health and experience above settings may be adjusted as per site conditions.*

TABLE - 2

STATION:			DATE:	
S.No	Channel No.	Supply monitored	Leakage resistance in Kilo ohm	Remarks
1.	Channel -1	24 V EXT East		
2.	Channel -2	24 V EXT West		
3.	Channel -3	24 V/60V Int		
4.	Channel -4	110 V DC (Point)		
5.	Channel -5	110 V AC (Signal) East		
6.	Channel -6	110 V AC (Signal) West		
7.	Channel -7	110 V AC ( Track) East		
8.	Channel -8	110 V AC ( Track ) West		
9.	Channel -9	24 V Axle Counter		
10.	Channel -10	12 V Block Instrument		

## Maintenance Schedules for Integrated Power Supply System

### Index

Periodicity	Schedule Code
Monthly	IPS1
Bi- Monthly	IPS1
Quarterly	IPS1, IPS2
Half Yearly	IPS2
Yearly	IPS3

<b>Schedule Code: IPS1</b> <i>Periodicity: Technician (Signal): Monthly</i> <i>Sectional SSE/JE (Signal): Bi-Monthly</i> <i>SSE (Signal)/Incharge: : Quarterly</i>	
S.No.	Check the following:
1.	Visual checking & cleaning of entire IPS equipment carefully & making dust free.
2.	Ensure IPS front panel all ACDP & DCDP indications are properly functioning.
3.	Checking of all cables, connectors, terminations and ensuring in good condition & properly tightened.
4.	Physical checking & proper functioning of Status Monitoring Panel (SMP).
5.	Visual checking of the indication of SPD box/checking of NON-Indicative type SPD with SPD life tester (where ever available). Ensure that Potential free contact (if provided) is connected to Datalogger.
6.	Ensuring Earthing wire connectivity and its tightness. Ensure that equipment is properly earthed , nut & bolts are not corroded and earthing is as per RDSO's Technical Advisory Note (TAN)
7.	Cleaning all cells of IPS battery bank & applying petroleum jelly as required.
8.	Checking of both IPS & battery bank room ventilation & Exhaust fan is in working condition.
9.	Measure Main Supply voltage to IPS, should be within the specified limit of 170 V to 275 V.
10.	Check and adjust all outputs of ACDP & DCDP module Voltage as per load requirement. Record all the measurements in Register.
11.	Testing of auto changeover working in ACDP Panel. Switch off Inverter-1 & observe inverter- 2 takes load. Switch off both inverters then observe CVT takes the load. (To be done in presence of JE/SSE)
12.	Load taking Capacity of IPS battery bank about 2 hours Or 10 % of Depth of Discharge (DOD) & record the readings of all cells voltages & specific gravity (LMLA) in the register.
13.	The equipment is properly earthed, earth leads are proper in size. Nut , bolt etc are not corroded. Earthing is as per extant instructions.

	<b>Schedule Code: IPS2</b> <i>Periodicity: Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: : Half Yearly</i>
S.No	Check the following:
1.	Testing Load Sharing of DC-DC Converters by measuring individual current of each DC-DC converter with Clamp meter for all outputs.
2.	Ensure Datalogger alarm, exception report and SMS alerts are generated for failure of Mains supply (i.e. ATs, local, DG, etc.) and all DC outputs.
3.	In case of VRLA batteries, 50 % DOD check for VRLA batteries by shutting down SMR for adequate time.
	<b>Schedule Code: IPS3</b> <i>Periodicity: Sectional SSE/JE (Signal): Yearly,</i> <i>SSE (Signal)/Incharge: Yearly duly staggered by 6 months</i>
S.No	Check the following:
1.	Measure Earth value using clamp on earth meter/megger. Earth resistance shall be $\leq 1 \Omega$ . Recorded the measured value of earth resistance. If it is beyond limit, suitable action taken and informed Section Officer.
2.	Ensure that all the potential free contacts of IPS (Mains fail, SMR, Invertors, DC-DC convertor, CVT, Transformer fail, SPD, 50% DOD, etc.) wired in Datalogger are functioning properly. (same as item 2 in IPS2)
3.	By switching OFF module (SMRs, DC-DC converter, Invertors, CVT, and Transformer) one by one, ensure that audio alarm, indications and acknowledgement are functioning on SMP.
4.	Remove one by one module & clean them using a soft cloth carefully. Gently blow some air to remove the dust inside, duly ensuring non-interruption of load.
5.	Checking of temperature of terminals and modules by using temperature gun.
6.	IPS Power auditing to be done by SSE/ Incharge.
7.	$\emptyset$ Adequate time for 10 % DOD should be calculated as, Time (in hours ) = $\frac{\text{Capacity (in AH )} \times 10}{\text{Load (in amp)} \times 100}$
8.	$\emptyset$ Adequate time for 50% DOD should be calculated as, Time (in hours ) = $\frac{\text{Capacity (in AH )} \times 50}{\text{Load (in amp)} \times 100}$

**NOTE:** 1) In the month of Scheduled Inspection at SSE In charge: level, Scheduled Inspection by Section SSE/JE may not be required, since it is repetitive. However, Section SSE/JE will associate during Scheduled Inspection of SSE Incharge.

### Maintenance Schedules of IPS with Battery Bank Readings

**Railway:**

**Division:**

**Station:**

IPS Manufacturer:	Battery Manufacturer:
IPS Installation Date:	Battery Bank Installation Date:
No. of working cells:	Battery Bank Voltage:
No. of spare cells:	Capacity of Battery Bank (AH):
	Type of Battery:

**Specific Gravity of LMLA cell 1180-1220**

**VRLA cell: Specific Gravity N/A**

**Voltage of LMLA cell 1.85 - 2.25 V**

**VRLA cell Voltage: 1.85 – 2.27 V**

#### Dates of measurement

Cell No.	Parameters	Date1	Date2	Date3	Date4	Date5	Contd...
Cell No.1	Specific Gravity						
	Voltage						
Cell No.2	Specific Gravity						
	Voltage						
Cell No.3	Specific Gravity						
	Voltage						
Contd ....	Specific Gravity						
	Voltage						
Cell No.55	Specific Gravity						
	Voltage						
Total Battery Voltage:							
Battery charging current:							
Load current:							

<b>SPARE CELLS:</b>							
Cell No.1	Specific Gravity						
	Voltage						
Cell No2	Specific Gravity						
	Voltage						
Cell No.3	Specific Gravity						
	Voltage						
Contd..							
Signature with Designation.							

<b>AC Input Voltage:</b>	
<b>AC Input Current:</b>	
<b>SMR 1: Voltage/Current:</b>	
<b>SMR 2: Contd.....</b>	
<b>Inverter 1: Input/Output Voltage:</b>	
<b>Inverter 1 Load Current:</b>	
<b>Inverter 2: Input/Output Voltage:</b>	
<b>Inverter 2 Load Current:</b>	
<b>CVT/AVR (Signals) 1 Input/Output Voltage:</b>	
<b>CVT/AVR (Signals) 1 Load Current:</b>	
<b>CVT/AVR (Signals) 2 Input/Output Voltage:</b>	
<b>CVT/AVR (Signals) 2 Load Current:</b>	
<b>CVT/AVR (Track) 1 Input/Output Voltage:</b>	
<b>CVT/AVR (Track) 1 Load Current:</b>	
<b>CVT/AVR (Track) 1 Input/Output Voltage:</b>	
<b>CVT/AVR (Track) 1 Load Current:</b>	
<b>110 V DC for Points:</b>	
<b>Battery Charging &amp; Load current may be included</b>	
<b>Signal transformer and DC-DC converter voltage may be included</b>	

Signature	
Name	
Designation	
Date	

**Maintenance Schedules for Discrete Power Supply**

**Index**

<b>Periodicity</b>	<b>Schedule Code</b>
Fort Night	PS1
Monthly	PS1, PS2
Quarterly	PS1, PS2, PS3
Half Yearly	PS2, PS3, PS4
1000 Hours	PS5

<p><b>Schedule Code: PS1</b>  <i>Periodicity: Technician (Signal): Fortnightly</i>  <i>Sectional SSE/JE (Signal): Monthly</i>  <i>SSE (Signal)//Incharge: Quarterly</i></p>	
S. No.	Check the following:
1.	Visual checking and cleaning of power supply equipment, their front panel and charging of batteries.
2.	Tightness of battery & load connections.
3.	Changing the power supply equipment to standby.
4.	Taking readings of voltages of all supplies and taking remedial action in case of abnormal variation is observed.
5.	Testing of UPS on Load, wherever applicable.
6.	Testing of Diesel Generators and Auto Push Button start.
7.	Checking of load current of different supply (using clamp ammeter) and remedial action in case of abnormal variation.
<b>Secondary cells –</b>	
8.	Cleaning & checking voltage and specific gravity (LMLA) of batteries and adjustment of charging current so that readings are within specified limits and record in the battery History card.
9.	The terminals and connections shall be coated with pure Vaseline or petroleum jelly to prevent corrosion. Grease shall not be used.

	<b>Schedule Code: PS2</b> <i>Periodicity: Technician (Signal): Monthly</i> <i>Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: : Half Yearly</i>
S. No.	Check the following:
1.	Testing of changeover of power supplies from AT (s) to local & Generator and vice-versa. Checking of AVR functioning.
2.	Load taking on Power supply battery bank about 1 hour/10% of DOD & reading of all cells' voltage & specific gravity (LMLA).
3.	Ensure Datalogger alarm, exception report and SMS alerts for failure of Mains supply (i.e. AT, local and DG supply, etc.) and all equipment output voltages.
4.	Calibration of different voltages in Datalogger & taking out report for all analog voltages.
5.	Check for cable fault by ELD or by measuring individual voltage with respect to earth wherever ELDs are not connected/not working. (+ve to earth & -ve to earth should be equal.)
	<b>Schedule Code: PS3</b> <i>Periodicity: Sectional SSE/JE (Signal): Quarterly</i> <i>SSE (Signal)/Incharge: Half Yearly</i>
S. No.	Check the following:
1.	Measurement of earth leakage currents and voltages of all power supplies (except 110V DC).
2.	Fuel tank shall be cleaned periodically. Fuel shall be filled through a wire gauze filter which shall form part of the fuel tank. Before filling up, unused fuel shall be decanted/ replaced if the DG set has been idle for a considerable time.
3.	Lubricating oil shall be periodically checked and proper level maintained.
4.	Leakage of fuel oil, lubricating oil and radiator water shall be effectively checked.
	<b>Schedule Code: PS4</b> <i>Periodicity: SSE (Signal)/Incharge: : Half Yearly</i>
S. No.	Check the following:
1.	Checking and cleaning of power supply equipment from inside by completely opening, checking of power wiring connections, Program switch terminals, contactors, terminals and wiring inside power panel etc.
2.	Meggering of insulation of transformer of power supply equipment.
3.	Opening and physical checking of power supplies. Taking load/no load currents and voltages.
4.	Load taking on Power supply battery bank about 5 hour/50% of DOD & reading of all cells' voltage & specific gravity (LMLA).

5.	Auditing of Power Supply and checking of Power panel jointly with SSE/TRD or Electrical for Capacity of Fuses, cable, terminations, load distribution, proper functioning of automatic power supply change over panel at ASM. Automatic change over buzzer operation, low voltage cut off & indication, UPS/IPS functioning with battery set invertors/set , OHE voltage variation (182 to 265V) & ensure that the supply arrangement in RE area as Joint circular (193/2015) or for suburban section as per joint circular (189/2014).
----	---

<b>Schedule Code: PS5</b>	
<i>Periodicity: SSE (Signal)/Incharge :1000 Hours</i>	
S.No.	Check the following:
1.	After 1000 hours of run, the diesel generator sets shall be overhauled. It is preferable to have them overhauled by the manufacturer or his authorized representative.

**NOTE:** (1) In the month of Scheduled Inspection at SSE Incharge: level, Scheduled Inspection by Section SSE/JE may not be required, since it is repetitive. However, Section SSE/JE will associate during Scheduled Inspection of SSE Incharge.

2) Date of inspection of SSE Incharge /Sectional SSE/JE and maintenance by Signal Technician shall be staggered since maintenance will take more time.

3) Any abnormalities found & unable to attend during maintenance/inspection or otherwise, shall be brought to the notice of higher level irrespective of Maintenance/Inspection schedule.

**Maintenance Schedules of Conventional Power Equipment  
(Stabilizer, Charger & Inverter) with Battery Bank Readings**

Railway:

Division:

Station:

<b>Charger make:</b>	<b>Battery make:</b>
<b>Charger Installation Date:</b>	<b>Battery Bank Installation Date:</b>
<b>No. of working cells:</b>	<b>Battery Bank Voltage:</b>
<b>No. of spare cells:</b>	<b>Capacity of Battery Bank (AH):</b>

**Dates of measurement**

Cell No.	Parameters	Date1	Date2	Date3	Date4	Date5	Contd...
Cell No.1	Specific Gravity						
	Voltage						
Cell No.2	Specific Gravity						
	Voltage						
Cell No.3	Specific Gravity						
	Voltage						
Contd ....	Specific Gravity						
	Voltage						
Cell No.55	Specific Gravity						
	Voltage						
Total Battery Voltage:							
Battery charging current:							
Load current:							
SPARE CELLS (if applicable) :							
Cell No.1	Specific Gravity						
	Voltage						
Cell No.2	Specific Gravity						
	Voltage						

Cell No.3	Specific Gravity						
	Voltage						
Signature with Designation.							

<b>AC Input Voltage to Stabilizer:</b>	
<b>AC Output Voltage from Stabilizer:</b>	
<b>AC Input Voltage to Charger:</b>	
<b>AC Input Current at Charger:</b>	
<b>Rectifier 1: Voltage/Current :</b>	
<b>Rectifier 2: Contd.....</b>	
<b>Inverter 1: Input /Output Voltage:</b>	
<b>Inverter 1: Load Current:</b>	
<b>Inverter 2: Input/Output Voltage:</b>	
<b>Inverter 2: Load Current:</b>	
<b>110 V DC for Point machines</b>	

Signature	
Name	
Designation	
Date	

**Maintenance Schedule of Track Circuit Test Record Card**

..... **Railway**

Signal and Telecommunication Department

**Track Circuit Test Record Card**

- |  |                                     |
|--|-------------------------------------|
| 1. Station or Section of line                  | 2. Track Circuit No.                |
| 3. Type of Relay                               | 4. Date Installed                   |
| 5. P.U. Volts                                  | 6. D.A. Volts                       |
| 7. P.U. Current                                | 8. D.A. Current                     |
| 9. Resistance of Relay                         | 10. Length of Track Circuit (m)     |
| 11. Length of Leads from feed end to track (m) | 12. Length of Leads Relay to Track  |
| 13. Type of Ballast                            | 14. Type of Track Feed              |
| 15. Size of track feed conductor               | 16. Size of conductor to Relay      |
| 17. Type of sleeper and condition              | 18. Type of insulated joints        |
| 19. Number of Ash pits in track                | 20. No. of Level Crossings on track |

21. Number of insulated joints in Track

$$\text{Ballast Resistance} = \frac{(V_F + V_R)}{2(I_F - I_R)}$$

$$\text{Rail Resistance} = \frac{2(V_F - V_R)}{(I_F + I_R)}$$

$$\text{Current at Relay} = \frac{\text{Voltage at Relay Terminals}}{\text{Resistance of Relay}}$$

- |   |  |
|---|--|
| 22. Date                                  | 23. Weather                              |
| 24. Condition of ballast Wet, Damp or Dry | 25. Percentage of ballast clear of rails |
| 26. Drainage of track Good, Fair or Bad   | 27. Condition of Rail Surface            |
| 28. Condition of Boards & Jumpers         | 29. Condition of Insulated joints        |
| 30. Condition of Track Battery            |  |

Track Feed End

- |                                     |   |
|-------------------------------------|---|
| 31. Feed Resistance                 | 32. Voltage at battery/track feed voltage |
| 33. V <sub>F</sub> Voltage at rails | 34. I <sub>F</sub> current at rails       |

Relay End

- |   |                                |
|---|--------------------------------|
| 35. V <sub>R</sub> Voltage at rails           | 36. Voltage at Relay Terminals |
| 37. I <sub>R</sub> current at relay terminals | 38. Ballast resistance         |
| 39. Rail resistance and Bond resistance       | 40. Drop shunt value (TSR)     |
| 41. Pick up shunt value                       |                                |

Signature of Sectional SSE/JE (Signal)	
Name	
Signature of SSE (Signal)/Incharge	
Name	
Station .....	

**Maintenance Schedule of DC Track Circuit**

**Index**

Periodicity	Schedule Code
Fortnightly	T1,T2
Monthly	T1
Quarterly	T1, T2
Half Yearly	T1, T2, T3, T4
Yearly	T5

<p align="center"><b>Schedule Code: T1</b>  <i>Periodicity: Technician(Signal): Fortnightly,                      Sectional SSE/JE(Signal): Monthly (on A, B &amp; C routes), Quarterly (on D &amp; E route)                      SSE(Signal)/Incharge: Half yearly</i></p>	
S.No.	Check the following:
1.	Cleaning of track lead junction boxes, track feed battery chargers, regulating resistance, Secondary cells & all terminals.
2.	Checking & replacement of defective Feed end, relay end lead wires, jumper cables & their terminations & securing them firmly.
3.	Checking & replacement of defective/corrosive track bonds, Continuity bonds, channel pins etc.
4.	Visual check and cleaning of insulated block joints/glued joints.
5.	Condition of insulation sleeve on OHE bond beneath rails to be ensured. It may be ensured that it is not displaced or worn out. Check that no Z/transverse bond, continuity bond and structural bond is loose.
6.	Check level & Specific gravity of electrolyte in all the LMLA cells & top-up distilled water if required, clean the terminals and connections shall be coated with pure Vaseline or petroleum jelly to prevent corrosion. Grease shall not be used. <i>Note: if TF alarm system is not provided then measurement to be done once in a week in A, B &amp; C route.</i>
7.	Measure and record Specific gravity (1180-1220) & voltage (1.8 to 2.2 V) of each & every cell by switching off charger, charger voltage and charging current, feed end/relay end voltage and currents, regulating resistance value & voltage across it, voltage across Choke and ensure all are in the acceptable ranges. Take suitable remedial action for values beyond acceptable range.
8.	Checking of TF charger failure alarms.
<p align="center"><b>Schedule Code: T2</b>  <i>Periodicity: Technician(Signal):Fortnightly (in the presence of Sectional SE/JE(Signal))                      Sectional SSE/JE(Signal): Quarterly                      SSE(Signal)/Incharge: Half yearly</i></p>	
1.	Interchange coil terminals R1 & R2 on Track Relays except in QBAT relay
2.	Checking train shunt resistance at relay, feed end and other parallel portions of track circuit.
3.	Testing of block joints/Glued joints/Point stretcher bar insulations and detecting faulty joints by using fault injection method/taking the voltage readings across track relay terminals and note if these reading changes when adjacent track circuit feed is shorted or disconnected.

	<b>Schedule Code: T3</b> <i>Periodicity: SSE(Signal)/Incharge: Half yearly</i>
1.	Checking that excitation with respect to rated pick up voltage, of DC track circuits is not more than 250% for shelf type relays, 300% for QTA2 and 235% for QBAT relays.
2.	Tail cables testing with 500 V Megger.
3.	Coating by insulating varnish/epoxy over GJ/IBJ.
4.	Replacement of insulations of all Block joints, insulations of Gauge tie plate, Stretcher bar and point Rodding etc, on main line.
	<b>Schedule Code: T4</b> <i>Periodicity: Sectional SSE/JE(Signal) &amp; SSE(Signal)/Incharge: Half yearly (Sectional SSE/JE(Signal) &amp; SSE(Signal)/Incharge to carry out alternatively once in six months)</i>
	<b>Joint check with JE/SSE (P-way) of track circuited portion for</b>
1.	The condition of rail and insulation at the rail joints, tightness of fish plate bolts, packing of sleepers in the vicinity of IBJ/GJ, ballast & sleepers, abnormal collection of brake dust, rusting of the rail, drainage and position of P-way fittings likely to cause short circuits like spike, pendrol clips and bearing plates.
2.	Condition of ballast, 50 mm ballast clearance from bottom of the rail flange and availability of anti-creep, 'J' clips at GJ/IBJ, minimum 97% GFN Liners and Pads for track circuits with PSC sleepers.
3.	Rail ends of insulated joint shall be square and true.
4.	Joint check with traction supervisors for availability of cross bonds/jumpers and good condition for return rail in single rail track circuits in AC electrified territory and rail bonds effectiveness.
5.	As per IRPWM, advance correction slip No.128 dated 05.03.2012, SSE/JE/P.Way and SSE/JE/S&T should jointly inspect insulated Steel Sleepers, every six months for checking the effectiveness of insulation in track circuited areas. SSE/JE/S&T should coordinate this.
	<b>Schedule Code: T5</b> <i>Periodicity: SSE(Signal)/Incharge: Yearly</i>
1.	Conducting visual inspection of track relays for arcing, pitting of contacts, dust on contacts, rusting/fungus of components, presence of Ants, cracks or breakages in components, correctness of label and presence of seal.
2.	Replacement of insulations of all Block joints, insulations of Gauge tie plate, Stretcher bar and point Rodding etc., on loop lines.

*Note: (1) In the month of Scheduled Inspection at SSE/Incharge level, Scheduled Inspection by Sectional SSE/JE may not be required, since it is repetitive. However, Sectional SSE/JE will associate during Scheduled Inspection of SSE/Incharge.*

*(2) Date of inspection of SSE (Incharge)/Sectional SSE/JE and maintenance by Technician (Signal) shall be staggered (since maintenance will take more time).*

*(3) Any abnormalities found & unable to attend during maintenance/inspection or otherwise, same shall be brought to the notice of higher level irrespective of Maintenance/Inspection schedule.*

**Maintenance Schedule of Track Circuit – AFTC**

**Index**

<b>Periodicity</b>	<b>Schedule Code</b>
Fortnightly	AFT1
Monthly	AFT1,
Quarterly	AFT1, AFT2
Half Yearly	AFT2, AFT3, AFT4
Yearly	AFT3, AFT4

	<p><b>Schedule Code: AFT1</b>  <i>Periodicity: Technician(Signal): Fortnightly</i>  <i>Sectional SSE/JE(Signal): Monthly</i>  <i>SSE(Signal)/Incharge: Quarterly</i></p>
S.No.	Check the following:
1.	Cleaning junction boxes, tuning Units.
2.	Outside track lead wires, impedance bonds, bond wires and clips/Lug, cable connections.
3.	All nuts and bolts of tuning unit terminals (AFTC) and rail connection and ensure that these are fully tight. Also, Packing in and around TU is proper.
4.	Firmness, corroded/insulation condition of Track leads connections, replace track lead wire if insulation worn out or connections corroded & properly securing them. Replacing corroded AFTC bonds/Z-jumper
5.	That there is no cavity/butting at centre post of Glued joint, voltage across all the insulations of glued joint to be measured, if found zero/near to zero (generally it should be half of track voltage across rail) then plan it for replacement .
6.	Condition of insulation sleeve on OHE bond beneath rails to be ensured. It may be ensured that it is not displaced or worn out. Check that no Z/transverse bond, continuity bond and structural bond is loose.
7.	That all cable entry point or any opening of TU/TLJB junction box is sealed.
8.	That centre tap connection of S-bond is protected by insulating tape.
9.	Those Continuity jumpers are duplicate and not rusty.
	<p><b>Schedule Code: AFT2</b>  <i>Periodicity: Sectional SSE/JE(Signal): Quarterly (it will be done by ESM in presence of JE/SSE)</i>  <i>SSE(Signal)/Incharge: Half yearly</i></p>
1.	Checking the lightning arrester and its connection.
2.	For AFTC – Measurement, testing AFTC parameters and compare with last reading. Take necessary action if not found within range/deviation with respect to last reading (Voltages & current, AFTC Power Supply, TX Voltages, RX current and gain etc. as per Annex (AFTC) attached.
3.	Coating by insulating varnish/epoxy over GJ/IBJ.
4.	AFTC gain setting kept in the dynamic range/as prescribed for different AFTC.

	<b>Schedule Code: AFT3</b> <i>Periodicity: Sectional SSE/JE(Signal): Half yearly</i> <i>SSE(Signal)/Incharge: Yearly</i>
1.	Testing of cable from K-Board with 500 V megger.
2.	TSR also be tested whenever track circuit adjusted or AFTC gain setting changed.
	<b>Schedule Code: AFT4</b> <i>Periodicity: Sectional SSE/JE(Signal): Half yearly</i> <i>SSE(Signal)/Incharge: Yearly</i>
1.	Joint check with JE/SSE (P-way) of track circuited portion for The condition of rail and insulation at the rail joints, tightness of fish plate bolts, packing of sleepers in the vicinity of IBJ/GJ, ballast & sleepers, abnormal collection of brake dust, rusting of the rail, drainage and position of P-way fittings likely to cause short circuits like spike, pendrol clips and bearing plates, Bridge insulation on girder bridges installed/ maintained by P.Way, mud ballast accumulation near LC, Points, Trolley paths and other areas.
2.	As per IRPWM, Advance correction slip No. 128 dated 05.03.2012, SSE/JE/P.Way and SSE/JE/S&T should jointly inspect insulated Steel Sleepers, every six months for checking the effectiveness of insulation in track circuited areas. SSE/JE/S&T should coordinate this.
3.	Condition of ballast, 50 mm ballast clearance from bottom of the rail flange and availability of anti-creep, 'J' clips at GJ/IBJ, minimum 97% GFN Liners and Pads for track circuits with PSC sleepers.
4.	Test Glued joint insulation with 100 V Source (megger), it should not be less than 25 MΩ in dry condition & not less than 3 KΩ in wet condition.

*Note: Sectional JE/SSE & SSE (Incharge) to carry out every alternate inspection.*

## Maintenance Schedule of Analog (Universal) Axle Counter

### Index

Periodicity	Schedule Code
Fortnightly	AX1
Monthly	AX1, AX2
Quarterly	AX1, AX2, AX3
Half Yearly	AX2, AX3

	<b>Schedule Code: AX1</b> <i>Periodicity: Technician(Signal): Fortnightly,            Sectional SSE/JE(Signal): Monthly,            SSE(Signal)/Incharge: Quarterly</i>
S.No.	Check the following:
	<b>Outdoor Equipment</b>
1.	Checking of staggering of track devices and their fittings and connections.
2.	Checking & tightening of all connections & screw couplers on the oscillator/receiver amplifier unit.
3.	Observe packing conditions of supporting sleepers and ensure that fittings do not vibrate under movement of train and packing of the same shall be done, if required.
4.	Measurement of Amplifier output voltage of all channels & keeping within limit.
5.	Checking battery specific gravity & voltage and charging equipment.
6.	Measurement of charging current and keeping within limit. Charger output ripple voltage shall be < 10 mV RMS.
7.	Checking & keeping track circuits, its connection, rail joints in good condition.
	<b>Schedule Code: AX2</b> <i>Periodicity: Technician(Signal): Monthly,            Sectional SSE/JE(Signal): Quarterly,            SSE(Signal)/Incharge: Half yearly</i>
	<b>Evaluator Maintenance</b>
1.	Checking & tightening screw couplers.
2.	Checking that indication lamps lights in correct sequence.
3.	Measurement and Recording of
	(a) All incoming channels & keeping within limit.
	(b) Coil voltages on EVR & SUPR in drop condition (shall not be > 0.5 V).
	(c) DC-DC converter output voltage.
4.	Ensuring Reset switch is sealed & resetting entries tally with counter.
5.	Checking of earth connectivity.

	<b>Schedule Code: AX3</b> <i>Periodicity: Sectional SSE/IE(Signal): Quarterly</i> <i>SSE(Signal)/Incharge: Half yearly</i>
	<b>Outdoor equipment</b>
1.	Checking & tightening Transmitter, Receiver housing, fitting & clamps.
2.	Checking oscillator output voltage, frequency & output level of receiver amplifier (0.7 - 1.0 V) and indication lamps in resetting box lights in correct sequence.
3.	Ensuring TX/RX coils are at minimum 20 meters from nearest block joint.
4.	Evaluator Checking
	(a) 5 KHZ input signal of each channel for no interference & modulation.
	(b) Working of trolley protection circuit.
5.	Ensure that Switching ON/OFF of battery chargers should not register any counts in evaluator.

*Note: Interference with power supply, connection of evaluator, oscillator/receiver amplifier and transmitter and receiver coils are likely to cause random counting in the Evaluator and should be done only after ensuring that no train is occupying or approaching the controlled section.*

## Maintenance Schedule of Digital Axle Counter (DAC)

### Index

Periodicity	Schedule Code
Monthly	DAC1
Quarterly	DAC1, DAC2
Half Yearly	DAC1, DAC2, DAC4
Yearly	DAC3 DAC4

<b>Schedule Code : DAC1</b> <i>Periodicity: Technician(Signal): Monthly,</i> <i>Sectional SSE/JE(Signal): Quarterly,</i> <i>SSE(Signal)/Incharge: Half Yearly</i>	
S.No	Check the following:
	<b>Outdoor Equipment</b>
1.	Checking & visual inspection of track side Sensor (Tx & Rx coil). If rail contact bolt of sensor found loose then it must be tightened from Torque wrench with specified torque (88 N-m). Check that Tx, Rx heads & enclosures of rail contact are not damaged or deteriorated, the area is free from any P/Way defects, the heads are clear of metallic debris, there are no traction bonds close to detection set and heads are clear of ballast.
2.	Ensure that proper size & tightness of deflectors. The deflectors are at least 30 cm away from centre of Sensor (Tx & Rx coil).
3.	Check the resistance between Rx head to running rail & Rx head to M12 bolt. If it is less than 2 Mega ohms, the mountings needs to cleaned or replaced. M-12 rail mounting nuts to be torqued to 45 N-m, M-8 Tx head mounting nuts to be torqued to 25N-m. (added)
4.	Check physically sensor cable and duct/protective pipe including earthing connections is proper, tightened & not corroded.
5.	Ensure minimum of 400 mm Sleeper spacing & packing of sleepers in between track device (sensor) are fitted & fitting do not vibrate under train movement & packing of the same shall be done, if required.
6.	Ensure that the proper fixing of track side connection box (DP/EAK) on the mushroom base plate & all screws are tight, also visually check the condition of Mushroom foundation.
7.	Ensure that the rail contact (Sensor) cable must be free to loop near the Tx-Rx heads. The protective hose must not be fitted up to the rail contact otherwise the rail contact integral cables may get damaged by the rigid hose because of short bending radius.
8.	Ensure that all cable entry point or any opening of DP/EAK/EJB junction box is sealed.
9.	Ensure proper packing of supporting sleepers of sensor so that fittings do not vibrate during passage of train.

10.	Check auto resetting feature it must be applied whenever one of the DAC unit is failed then auto reset is to be applied by reset module & system resumes preparatory mode after time delay (10 to 15 seconds) or as per manual.
11.	Visual inspection of condition of earth rod, earth pit, connections and checking of earth continuity.
	<b>Indoor Equipment</b>
12.	Physical Checking & functioning of Reset box indication, counter & SM key. Without SM key reset shall not be applied.
	<b>For dual detection</b>
13.	Recording of reading of resetting counter of DAC in auto resetting mode and comparing of the same with the readings recorded by Datalogger logic.
14.	Recording & analyzing counter reading of reset box including Auto resets in the format as per type of redundancy provided for dual detection.
15.	Check working of independent power supply for redundant axle counter system.
	<b>Schedule Code: DAC2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly (to be done by ESM in presence of JE/SSE) SSE(Signal)/Incharge: Half Yearly</i>
1.	Opening the cover of Mushroom & inspect card free from dust, dirt & tightened. Ensure that the same shall not vibrate under movement of train. There should be no possibility for entry to rain water. All MOV's are connected at proper terminals & are in good working condition.
2.	Measure rated input/output voltage & other parameter of DP (outside) with DAC toolkit which is provided by manufacturer & record in book. Also ensure all parameters are under permitted limits. (All the measured data shall be filled in the maintenance log sheet attached with this schedule.)
3.	Screw coupler connections should be fully tight.
4.	Measure the Tx/Rx coil signal levels and record them. Values should be within the specified limits.
5.	Check all indication LEDs are lit in correct sequence.
6.	Check the working of trolley protection track circuit if available.
7.	Check indication LEDs in reset box are lit as per occupied and clear position of section.
	<b>Schedule Code: DAC3</b> <i>Periodicity: Sectional SSE/JE(Signal): Yearly</i>
1.	Where DAC is provided in block section, Measure the Quad cable insulation with 100 V Megger it should be not less than 10 M ohm & cable loop resistance not more than 56 ohm/Km. If diameter of the conductor is 0.9 mm.
2.	In case 64 kbps communication channel is used, attenuation/loss should be between 10 db to 25 db between two modems of DAC installed at entry & exit ends respectively at two station/IBS.

	<b>Schedule Code: DAC4</b> <i>Periodicity: Sectional SSE/IE(Signal): Half Yearly,  SSE(Signal)/Incharge: Yearly</i>
1.	Measurement of Earth value of SSDAC, including earth continuity up to equipment & paint its value on earth enclosures/nearest wall. Readings of earth value to be recorded in earth measurement register for future reference. It should be less than 1 ohm.

*Note: 1) Verification of parameter as per latest TAN issued by RDSO/Head Quarters if any.*

*2) Check the functioning of Event logger card. Data shall be analysed by attaching the same with any laptop/PC.*

## Maintenance Schedule of Multi Section Digital Axle Counter (MSDAC)

### Index

Periodicity	Schedule Code
Monthly	MSD1
Quarterly	MSD1, MSD2
Half Yearly	MSD1, MSD2, MSD3
Yearly	MSD3

<p align="center"><b>Schedule Code: MSD1</b>  <i>Periodicity: Technician(Signal): Monthly</i>  <i>Sectional SSE/JE(Signal): Quarterly</i>  <i>SSE(Signal)/Incharge: Half Yearly</i></p>	
S.No.	Check the following
	<b>Outdoor Equipment</b>
1.	Checking & visual inspection of track side Sensor (Tx & Rx coil) tightened properly. If rail contact bolt of sensor found loose then it must be tightened from Torque wrench with specified torque.
2.	Check physically sensor cable and duct/protective pipe including earthing connections is proper & tightened & not corroded.
3.	Ensure proper size & tightness of deflectors. The deflectors are at least 45 cm away from centre of Sensor (Tx & Rx coil).
4.	Ensure the proper fixing of track side connection box (DP/EAK) on the mushroom base plate & all screws are tight. Also check the condition of Mushroom foundation.
5.	Ensure the Minimum Sleeper spacing of 400 mm& packing of sleepers in between track device (sensor) are fitted & fitting do not vibrate under train movement.
6.	Ensure that all cable entry point or any opening of DP/EAK/EJB junction box is sealed.
7.	Ensure that the rail contact (Sensor) cable must be free to loop near the Tx-Rx heads. The protective hose pipe must not be fitted up to the rail contact otherwise the rail contact integral cables may get damaged by the rigid hose because of short bending radius.
8.	Ensure proper packing of supporting sleepers of sensor so that fittings do not vibrate during passage of train.
9.	Visual inspection of condition of earth rod, earth pit, connections and checking of earth continuity.
	<b>Indoor Equipment</b>
10.	All cable terminations are tight & properly connected in relay room.
11.	Ensure that the Armour of quad cable connecting DP to location & location to relay room should be properly earthed & tightened in relay room.

12.	All cards, PCB's & connectors are properly connected in Evaluator (MSDAC) & free from dust.
13.	Physical Checking & functioning of Reset box indication, counter & SM key. Ensure that without inserting SM key reset shall not be applied.
14.	All fuses provided in relay room, Evaluator PCB's & DP's are of proper capacity & tightened.
15.	Check sealing of Reset Box.
	<b>Schedule Code: MSD2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly, SSE(Signal)/Incharge: Half Yearly</i>
1.	Open the cover of DP/Mushroom & ensure that card is free from dust, dirt & tightened & do not vibrate when movement of train.
2.	Measure rated input/output voltage & other parameter of DP (outside) & Evaluator (MSDAC) with DAC toolkit which is provided by manufacturer and compare with last reading. Take necessary action if not found within range/deviation with respect to last reading. Readings to be recorded are indicated in annexure attached.
	<b>Schedule Code: MSD3</b> <i>Periodicity: Sectional SSE/JE(Signal): Half yearly, SSE(Signal)/Incharge: Yearly</i>
1.	Where DAC is provided in block section, Measure the Quad cable insulation with 100 V Megger it should be not less than 10 M ohm & cable loop resistance not more than 56 ohm/Km. If diameter of the conductor is 0.9 mm.
2.	In case 64 kbps communication channel is used, attenuation/loss should be between 10 db to 25 db between two modems of DAC which are installed in Block sections.
3.	Measure the earth resistance of indoor equipments & paint its value on earth enclosures/nearest wall. It should be less than 1 ohm.
4.	Check auto as well as manual resetting feature. System must come on preparatory mode after application of resetting (Manual/Auto). Conditional Hard resetting-system shall assume "working mode" after application of conditional hard resetting.

*Note: 1) CRC/Checksum to be verified if application software is loaded due to failure or any other reason.*

*2) Maintenance and diagnostic tool to be used for analysing failures and its efficacy to be checked once in a year.*

### Maintenance Schedule of Block Instruments (Single Line, Double Line, Push Button)

#### Index

Periodicity	Schedule Code
Monthly	TB1
Quarterly	TB1, TB2
Half Yearly	TB2
Yearly	TB3

<b>Schedule Code: TB1</b> <i>Periodicity: Technician(Signal): Monthly</i> <i>Sectional SSE/JE(Signal): Monthly</i> <i>SSE(Signal)/Incharge: Quarterly</i>	
S.No.	Check the following:
	<b>Neal's Type</b>
1.	Locking & sealing.
2.	Proper working of SM's lock up key.
3.	Full deflection of Needle indicator.
4.	No burr on tokens and free movement of Token indicator.
5.	Token are not damaged/deformed.
6.	The force drop arrangement of TCF & TGT locks.
7.	Free movement of locks rocker arms (shall be 1 mm the rack) and Squareness of lock edge.
8.	The safety catch is in position and free to move about its fulcrum pin.
9.	Tightness of spigot.
10.	Intactness of tablet releaser actuating link screws.
11.	The contact surface and spring tensions, if pitted, cleaning them with chamois leather.
12.	The Block & Telephone batteries for cleanliness and voltages recorded in the card.
13.	The telephone and telephone cord.
14.	Cleaning Rack & pinion teeth and oiling with medium grade IS – 1628 axle oil.
15.	Measuring the line current.

	<b>Schedule Code: TB2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly, SSE(Signal)/Incharge: Half yearly</i>
1.	All wiring and the polarity of instruments.
2.	Polarized relay returns to its normal position when no current is flowing.
3.	Locking of pawl and notches in the rack are correctly shaped and square ended.
4.	Cross checking of Door lock keys & SM key of one instrument with other instrument.
5.	Tones of bells are distinct when two or more instruments are provided.
6.	Instrument is in level.
7.	Carry out census of working tokens and keeping records in register of Block Instrument & Signal History Book.
	<b>Schedule Code :TB3</b> <i>Periodicity: SSE(Signal)/Incharge: yearly</i>
1.	Token receiver can receive only the token of the correct configuration.
2.	Effectiveness of 'No Token' lock and handle does not turn to TGT when token indicator shows Red.
3.	Measure the earth value.
4.	Instrument is not due for overhauling (10 years periodicity).

## Maintenance Schedule of Block Instrument – Double Line (Lock & Block)

### Index

Periodicity	Schedule Code
Monthly	DB1
Quarterly	DB1, DB2
Half Yearly	DB2, DB3
Yearly	DB3

<p align="center"><b>Schedule Code: DB1</b>  <i>Periodicity: Technician(Signal): Monthly</i>  <i>Sectional SSE/JE(Signal): Monthly</i>  <i>SSE(Signal)/Incharge: Quarterly</i></p>	
S.No.	Check the following:
1.	Locking & sealing.
2.	Proper working of 'SM's lock up key.
3.	Full deflection of Needle indicator.
4.	The polarized relay returning to its normal position when no current is flowing.
5.	Proper condition of electrical and mechanical locks.
6.	All contacts are clean and free from pitting.
7.	All springs, Finger contacts & circuit controller contacts are in good condition and kept properly adjusted.
8.	Checking & tightening of all terminal screws, lock nuts and locking screws, and split pins opened.
9.	The Block & Telephone batteries for cleanliness and voltages recorded in the card.
10.	The telephone and telephone cord.
11.	Physical checking of earth wire and its connectivity.
12.	Checking that the commutator handle is locked first before the "Train On Line" indication appears on the indicator when the handle is turned from "Line Clear" to "Train On Line" position.
13.	Check that door lock coil is functioning properly and all the moving parts are properly oiled & cleaned. Check that half notch is effective in its proper position.

	<b>Schedule Code: DB2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly,  SSE(Signal)/Incharge: Half yearly</i>
S.No.	Check the following:
1.	Measure the line current and voltage reading to be taken in following steps: a) Receiving station at Line Clear/Line close and Sending station TOL. b) Receiving station at TOL and sending station TOL. c) Both station at Line clear condition.
2.	Measure and record voltages of block bell & block indication supply.
	<b>Schedule Code: DB3</b> <i>Periodicity: Sectional SSE/JE : Half yearly  SSE(Signal)/Incharge: yearly</i>
1.	Checking that LSS cannot be taken OFF without line clear and is automatically replaced to ON when train enters the Block section.
2.	Cross checking of Door lock keys & SM key of one instrument with other instrument.
3.	Measure the earth value.
4.	Cleaning and Checking Voltage of Block filter, Block Bell unit& condition of GD tube.
5.	Checking that instrument is not due for overhauling (7 years periodicity) and maintaining Register of Block Instruments containing information – the type of instrument, its serial number, location, and name of manufacturer, date of installation, date of last overhaul.

## Maintenance Schedule of Tokenless Block Instrument - Single Line (Push Button type)

### Index

Periodicity	Schedule Code
Monthly	PB1
Quarterly	PB1, PB2
Half Yearly	PB2, PB3
Yearly	PB3

	<b>Schedule Code: PB1</b> <i>Periodicity: Technician(Signal): Monthly, Sectional SSE/JE(Signal): Monthly, SSE(Signal)/Incharge: Quarterly</i>
S.No.	Check the following:
1.	Check that Block Instrument are free from mechanical damage/corrosion. Check tightness of all nuts/bolts.
2.	Checking of Push Buttons, Indicators, relays, bell & buzzer.
3.	Locking & sealing of all relays and counter.
4.	All the relays are properly plugged in block & holding clips are intact and contacts are clean and free from pitting.
5.	The telephone and telephone cord.
	<b>Schedule Code: PB2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly, SSE(Signal)/Incharge: Half yearly</i>
1.	Checking the working of releasing of shunting key.
2.	Measuring the line current and voltage.
3.	Working of cancellation counter.
4.	Cross checking of Door lock keys & SM key of one instrument with other instrument.
5.	Measuring the insulations between each individual insulated circuit and earth (shall not be < 10 M Ohm).
6.	Measure the earth value.
	<b>Schedule Code: PB3</b> <i>Periodicity: Sectional SSE/JE : Half yearly SSE(Signal)/Incharge: Yearly</i>
1.	LSS cannot be taken OFF without line clear and is automatically replaced to ON when train enters the Block section.
2.	The Last Stop Signal at the sending station cannot be taken 'OFF' until the receiving station instrument is set to "Train Coming From" condition and the sending station instrument is sent to "Train Going To" condition.
3.	The Line Clear can be granted only when reception signals and the Last Stop Signal are proved at 'ON'.
4.	The opposing Last Stop Signals of the block section cannot be taken 'OFF' at one and the same time.
5.	The circuit for proving the arrival of a train is directional.

## Maintenance Schedule of Analog Block Axle Counter Systems (BPAC)

### Index

Periodicity	Schedule Code
Monthly	BP1
Quarterly	BP2
Half Yearly	BP1, BP2

	<p align="center"><b>Schedule Code: BP1</b>  <i>Periodicity: Technician(Signal): Monthly,  Sectional SSE/JE(Signal): Monthly,  SSE(Signal)/Incharge: Half-Yearly</i></p>
S.No.	Check the following:
1.	All coupler connections, cable termination connection and MUX rack cable connections.
2.	Wires and button contacts on SM's Panel and SMDP Box connections.
3.	Keeping record of each resetting, analyzing and taking corrective action.
	<p align="center"><b>Schedule Code: BP2</b>  <i>Periodicity: Sectional SSE/JE(Signal): Quarterly,  SSE(Signal)/Incharge: Half yearly</i></p>
1.	Measurement of voltage levels of DC-DC converter and channels at MUX, keeping records and taking corrective action for proper adjustment and keeping within limits.

**Maintenance Schedule of Tokenless Block Instrument-Single Line (Handle Type)****Index**

<b>Periodicity</b>	<b>Schedule Code</b>
Monthly	HB1
Quarterly	HB1,HB2
Half Yearly	HB2,HB3
Yearly	HB3,

	<b>Schedule Code: HB1</b> <i>Periodicity: Technician (Signal): Monthly, Sectional SSE/JE(Signal): Monthly, SSE(Signal)/Incharge: Quarterly</i>
1.	Locking & Sealing.
2.	Proper working of 'SM's lock up key.
3.	All the relays are properly plugged in block & holding clips are intact & also contacts are clean & free from pitting.
4.	Full deflection of Needle indicator.
5.	Check all contacts in Block Handle, PB1, PB2 buttons (tightness of push button screw) S1, S2 switches are clean and free from grease or dirt. Check the alignment of push button plunger for smooth movement.
6.	Check that all mechanical parts such as springs of push button for its intactness, screws and nuts etc are in good condition and well tight. Also check all mechanical moving parts inside the token less Instrument work freely and are well lubricated.
7.	The Block & Telephone batteries for cleanliness and voltages recorded in the card.
8.	The telephone and telephone cord.
9.	Checking the working of releasing/locking of shunting key.
10.	Check the lock armature works freely and the locking portion is properly forced down for each locking portion. Also check that there is no undue tendency for the Lock Magnet to be held when electrically de-energized.
11.	Measure the earth value.
	<b>Schedule Code: HB2</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly, SSE(Signal)/Incharge: Half yearly</i>
1.	Working of all counters.
2.	The line current, voltage & frequency shall be measured both at the transmitting end and the receiving end.

<b>Schedule Code: HB3</b> <i>Periodicity: Sectional SSE/JE : Half yearly</i> <i>SSE(Signal)/Incharge: Yearly</i>	
1.	LSS cannot be taken OFF without line clear and is automatically replaced to ON when train enters the Block section.
2.	Try to operate the instrument without cooperation i.e. without receipt of functional code; it shall not be possible to turn the block handle from Line Closed to Train Going To or Train Coming From position.
3.	On receipt of TGT code, turn block handle from Line Closed towards Train going to & stop midway. Disconnect Line & try to turn the handle further. It shall lock in check lock position. Ensure armature of electric lock on block handle is force dropped in check lock notch and the block handle cannot be turned to Train Going to position.
4.	With a train in Block Section, try to bring the block handle to Line closed with & without cooperation from other station, it shall not be possible to turn the block handle to line closed position. The Block handle should remain locked in last operated position.
5.	Measure the earth value.
6.	Checking that instrument is not due for overhauling (7 years periodicity) and maintaining Register of Block Instruments containing information – the type of instrument, its serial number, location, and name of manufacturer, date of installation, date of last overhaul.

## Maintenance Schedule of Universal Fail-Safe Block Interface (UFSBI)

### Index

Periodicity	Schedule Code
Monthly	UF1, UF2
Quarterly	UF1, UF2, UF3
Half Yearly	UF3, UF5
Yearly	UF4, UF5

	<b>Schedule Code: UF1</b> <i>Periodicity: Technician (Signal): Monthly,  Sectional SSE/JE(Signal): Monthly,  SSE(Signal)/Incharge: Quarterly</i>
1.	Visual inspection of Block Panel- Intactness of panel buttons & its connections, checking of all indications as they are in working order or not.
2.	Block Panel & Interface free from rust, dirt & all the connectors & PCBs in the 6U rack inserted properly.
3.	All cable terminations are tight & properly connected.
4.	Physical checking & functioning of block Button, indication, buzzers, telephone & counter.
5.	Ensure effective working of SM key, LCB key, SH key & HKT for single line.
6.	All the relay in UFSBI rack are properly plugged & holding clip are intact & also contacts are clean & free from pitting.
7.	All fuses provided are of proper capacity.
8.	The Earthing wire & its connectivity & tightness.
9.	Failure indication on alarm panel: (i) Single CPU failure indication. (ii) Redundant DC-DC fail indication (iii) System failure indication.
	<b>Schedule Code: UF2</b> <i>Periodicity: Sectional SSE/JE(Signal): Monthly,  SSE(Signal)/Incharge: Quarterly</i>
1.	Measure working voltage of UFSBI unit. It should be in between 21.6 V & 28.8 V New DC & record in book.
2.	Check the various output of DC-DC converter & record all output supply voltage & output level should be as follow: (a) 5 V supply 4.85 V to 5.15 V (b) +12 V supply: 11.76 V to 12.24 V (c) -12 V supply: -11.76 V to -12.24 V (d) 24 V supply: 22.8 V to 25.2 V
3.	Check the current. UFSBI should draw around 1.8 Amp.

	<b>Schedule Code: UF3</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly, SSE(Signal)/Incharge: Half Yearly</i>
1.	Checking of media diversity from Quad to OFC or vice versa.
	<b>Schedule Code: UF4</b> <i>Periodicity: Sectional SSE/JE(Signal): Yearly,</i>
1.	The communication channel Testing for;
	a) Quad cable insulation & losses.
	b) Signal to Noise ratio (it should not be less than 20 dB).
2.	Check all communication links for following parameters & keep in record:
	a) Link parameter Max. Transmit Signal= -5 to 07 dBm (after removing cable side connection) Min receive level = -12 dBm to - 14 dBm (4 wire voice Channel on OFC).
	b) Loop resistance not more than 56 ohm/km.(Quad cable)
	c) Attenuation loss measured at 2.5 KHz should not be greater than 30dBfor full length of Quad cable used.
	d) Near End Cross Talk (NEXT) shall be better than 55 dB/Km at the frequency of 150 KHz.
	e) Far End Cross Talk (FEXT) shall be better than67.8 dB/Km at the frequency of 150KHz.
	f) Insulation resistance better than 10 MΩ/Km tested with 500 V megger.
3.	Checking of Datalogger report for validation of relay contacts of block panel.
	<b>Schedule Code: UF5</b> <i>Periodicity: Sectional SSE/JE(Signal): Half Yearly, SSE(Signal)/Incharge: Yearly</i>
1.	Measure the earthing resistance& it should be less than 1 ohm.
2.	Testing the timer is working & time delay of 120 second for cancellation of line clear is achieved.
3.	Checking that LSS cannot be taken OFF without line clear and is automatically replaced to ON when train enters the block section.
4.	Ensure that all the potential free contact of UFSBI (power supply monitor, single CPU failure detection & single system failure detection) is functioning properly and wired in Datalogger.

## Maintenance Schedule of Colour Light Signal

### Index

Periodicity	Schedule Code
Monthly	CS1
Quarterly	CS1
Half Yearly	CS1,CS2
Yearly	CS2

<b>Schedule Code: CS1</b> <i>Periodicity: Technician(Signal): Monthly,  Sectional SSE/JE(Signal): Quarterly,  SSE(Signal)/In charge: Half yearly</i>	
S.No.	Check the following:
1.	Cleaning of LED lighting unit & current regulator/integrated LED, all terminations, housing, signal units & around signal post.
2.	Measurement of input voltage & current with clamp type ammeter at input terminals of current regulator/LED signal for all signal aspects and V/I reading shall be within specified range as below:
	(a) Main signal Voltage: 82.5 to 137.5 V and Current: 112 to 154 mA
	(b) Calling on/A/AG Marker Voltage: 88 to 132 V and current: 120 to 165 mA.
	(c) Route signal Voltage: 88 to 132 V and Current: 23.75 to 26.25 mA per LED.
	(d) Shunt signal Voltage: 88 to 132 V and Current: 52.25 to 57.75 mA per LED.
3.	Checking of tightness of all adjusting screws of LED signal unit as well as Current regulator/integrated LED.
4.	Ensure condition of signal post is satisfactory.
5.	Check condition of Signal foundation, ladder & ensure proper alignment of signal post.
6.	Ensure Signal unit condition, closing of door & locking arrangements are satisfactory.
7.	Ensure Signal post & CLS unit should be earthed & screen earthing is effective.
8.	Complete signal unit should be cleaned for removing oxidation, rusting & tightened properly.
9.	Ensure that there is no opening/access for rain water/rodent entry.
10.	Ensure the cable terminations in location box should be cleaned for removing oxidation, rusting & tightened properly.
11.	Visual check of insulations of cables, PVC wires, proper termination without criss cross, condition of rubber gasket arrangement.
12.	(a) Check that where signals are infringing with SOD, their Implantation distance is marked on Red colour on white back ground. (b) Blanking off to be done as given in chapter 19 of SEM. (c) Right hand signals to be provided with an arrow mark pointing towards the relevant track.

<b>Schedule Code: CS2</b> <i>Periodicity: Sectional SSE/JE : Half yearly</i> <i>SSE (signal)/Incharge : Yearly</i>	
1.	Check infringement of Signal & all it's fitting with respect to schedule of dimensions jointly with SSE/P.WAY (infringement to be removed, if found).
2.	Test Route ECR- ensure that route ECR should be dropped if any 3 nos. of LEDs in the given route supply is cut for all the routes.
3.	Test Shunt ECR - ensure that shunt ECR should be dropped if any one of Shunt LED does not lit.
4.	Set jumper setting in current regulator as per ECR used & measure current with AC clamp meter. The range of current shall be within the limit as per ECR used.
5.	Implantation distance from center line of nearest track along with an arrow indicating towards nearest track should be painted on signal post in following colours.
	(a) Black on white background for normal implantation.
	(b) Red on white background for implantation distance < 2.36 meters.
6.	Ensure that Arrow Markers are provided on all RHS signals.
7.	Painting of Signal post, unit, ladder& number plate are satisfactory.

*Note: Whenever engineering Machine work is carried out, signal implantation shall be measured prior/ after to commencement/completion of work.*

### Maintenance Schedule of Electrically Operated Points (Inclusive of Clamp type point)

#### Index

Periodicity	Schedule Code
Fortnightly	EP1
Monthly	EP1,EP2
Quarterly	EP1,EP2, EP3, EP4
Half Yearly	EP4, EP5
Yearly	EP4,EP5

<b>Schedule Code: EP1</b> <i>Periodicity: Technician(Signal): Fortnightly</i> <i>Sectional SSE/JE(Signal): Monthly</i> <i>SSE (Signal)/Incharge : Quarterly</i>	
S.No.	Check the following:
1.	The machine for tightness and free from rust & dirt. Cleaning, graphite/oiling of slide chairs. Lubrication of slide chairs and assembly up to 3 sleepers from the toe of switch by Signal staff.
2.	Checking of Point Gear Assembly, slides, rollers & pins. Ensure that roller is free from wear and tear and falls freely on control and lift out disc.
3.	Tightening of all nuts, check nuts & bolts, lock nuts holding the detector slides & lock slides with lugs and condition of split pins to be checked.
4.	The Lubrication / Greasing of all gears and bearings, cleanliness & smoothness of commutator, checking contacts for freedom from pitting and proper adjustment.
5.	Visual checks of Points insulations and stretcher bars not rubbing with any fixture.
6.	The contacts for proper adjustment contact pressure& free from pitting. Wires are neatly dressed & clear of all moving part. Ensure they do not get trapped in the lid when closed.
7.	All the bridge contacts make & break at the same time.
8.	The setting of switch for having required amount of spring action.
9.	<b>Obstruction test of points</b> with 5 mm test piece (to be kept at 150 mm from the toe of the switch) to ensure that point cannot be locked, detection contacts shall not make & friction clutch should also slip. However Detection contacts shall make with obstruction of 1.6 mm test piece (to be kept at 150 mm from the toe of the switch) Testing may be done either by Crank Handle or by Point Motor operation.
10.	Also ensure that both sleepers are well packed & Ground connection rods are free from ballast.
11.	Checked the insulation of Gauge tie plate, all stretcher bars, P/D brackets & driving lug and replaced if found damaged/broken.

	<b>Schedule Code: EP2</b> <i>Periodicity: Signal Technician: Monthly (to be done by ESM in the presence of SSE/JE)</i> <i>Sectional SSE/JE(Signal): Monthly,</i> <i>SSE(Signal)/Incharge: Quarterly</i>			
1.	Measurements of operating values (voltage & current) of point machines, with and without obstruction for normal and reverse operation. Current required to operate the machine in either direction shall be 1.5 to 2 times of its normal operation and friction clutch shall slip within this range. Replace machine when difference between normal operating current and current under obstruction is less than 0.5 A.			
2.	Checking of feed disconnection time under obstruction is not less than 10 Seconds.			
3.	Ensure Hose pipe/GI pipe in good condition and without gaps/access.			
4.	Check MS pins of Switch Extension piece/'P' bracket for any rib formation or excessive wear.			
5.	In case of Clamp type point machine, Lubricate the following moving parts of the clamp lock. <ul style="list-style-type: none"> <li>(a) Stock rail bracket groove.</li> <li>(b) Moving part of tongue rail and lock arm assembly.</li> <li>(c) Between machine of lock bar and lock arm assembly</li> </ul>			
	<b>Schedule Code: EP3</b> <i>Periodicity: Sectional SSE/JE(Signal): Quarterly</i> <i>(Sectional SSE/JE &amp; I/C SSE to carry out alternate inspections)</i> <i>SSE(Signal)/Incharge : Quarterly (Sectional SSE/JE &amp; I/C SSE to carry out alternate inspection)</i>			
1.	Joint check with JE/SSE (P-Way), of points & crossing for levelling, squaring, creeping, packing, clearance of ballast and other P-Way fittings, etc. and measurement of LH, RH switch opening are as given below for normal point and as per proforma circulated by RDSO dated 14.2.19 for Thick Web Switches.			
	Normal Point (143 mm)		Thick Web Point (220 mm)	
	OPENING(Tolerance)		OPENING(Tolerance)	
	LH END	RH END	LH END	RH END
	115±3 mm	115±3 mm	160±3 mm	160±3 mm
2.	Joint checking of SSD Setting and its arm insulation with P-Way supervisor.			
	<b>Schedule Code: EP4</b> <i>Periodicity: Technician(Signal): Quarterly</i> <i>Sectional SSE/JE(Signal): Half-yearly</i> <i>SSE(Signal)/Incharge : Yearly</i>			
1.	Greasing/Oiling of point machine and Checking of all grease nipples in position.			
2.	Oiling of Point Gear Assembly, slides, rollers & pins with medium grade axle oil IS 1628. Avoid overflowing.			
3.	Smoothness& cleaning of Commutator, carbon brushes.			
4.	Ensure painting of connecting rods is satisfactory.			

<b>Schedule Code: EP5</b> <i>Periodicity: Sectional JSSE/JE(Signal): Half-yearly</i> <i>SSE(Signal)/Incharge : Yearly</i>	
1.	Check for detector contacts and cleaning if required, control contacts, friction clutch. Ensure contact pressure of control and detection contact is adequate. Ensure Brass tip on finger contact is intact. Conduct obstruction test.
2.	Visual check of brass strips provided between detector slides, without removing them.
3.	Checking of contact, connections and its effectiveness during power operation points.
4.	Working of point using crank handle shall also be checked. It shall not be possible to insert Crank Handle without assigned Key. Interlocking with signals shall be checked
5.	Checking of point motor insulation, cable and wire insulation (by 100 V Megger).
6	Testing of point tail cable from K Rack in N & R position of point with 100 V megger.

**Note:** *Whenever any wire, cable, gears etc. are opened and disconnected, care should be taken for proper reconnection of wires, cables, gears etc. and must be followed by correspondence test with panel before giving reconnection.*

**Maintenance Schedule of Electrical Point Detector (EPD)**

**Index**

<b>Periodicity</b>	<b>Schedule Code</b>
Fortnight	ED1
Monthly	ED1
Quarterly	ED1
Half Yearly	ED2
Yearly	ED2

	<p><b>Schedule Code: ED1</b>  <i>Periodicity: Technician(Signal): Fortnightly,                      Sectional SSE/JE(Signal): Monthly,                      SSE(Signal)/Incharge : Quarterly</i></p>
S.No.	Check the following:
1.	The contacts to Make or break at same time.
2.	The cross-protection contact makes only after concerned detection contact open. For Non-RE area.
3.	Normal detection opens then only normal shunt contact make and vice-versa. For Non-RE area.
4.	Shunt contacts – For Non-RE area.
5.	Sleepers are packed well.
6.	Entire contact of ED free from rust & pitting.
7.	Pressures of contact of ED.
8.	Tightening of all nuts and screws and nuts on lugs. Wires are neat and tidy.
9.	Slides are having free movement.
10.	Oiling the slides & rollers with the axle oil Grade Medium to IS: 1628.
11.	Testing and adjusting – for Normal & Reverse setting of point by obstruction test to ensure with 1.6 mm test piece detector contracts just make, with 3.25 mm test piece by fictitious locking contacts just break and with 5 mm test piece point is not locked and detector contacts not make and point lever should not latch.
12.	Weeding out of bushes/clearing of ballast in and around working/ moving parts.
	<p><b>Schedule Code: ED2 (SSE/SE)</b>  <i>Periodicity: Sectional SSE/JE(Signal): Half-yearly                      SSE(Signal)/Incharge: Yearly</i></p>
1.	Testing of point cable from K Board in N & R position of point with 100 V megger.

## Maintenance Schedule of Key Locked Checking Relay/Electric Key Transmitter (KLCR/EKT)

### Index

Periodicity	Schedule Code
Monthly	K1,K2
Quarterly	K1
Half Yearly	K1,K2
Yearly	K2

	<b>Schedule Code: K1</b> <i>Periodicity: Technician(Signal): Monthly, Sectional SSE/JE(Signal):Quarterly SSE(Signal)/Incharge: Half-yearly</i>
S.No.	Check the following:
1.	Clean and ensure dust free.
2.	Visually check the condition of PVC wires is good and intact.
3.	Checking the effectiveness of locking, sealing, indication and Buzzer.
4.	Voltage across KLCR shall be measured.
	(a) Permitted Range for 24 V DC Relay 19.2 to 28.8 V DC.
	(b) Permitted Range for 60 V DC Relay 48 to 72 V DC.
5.	Check & ensure "KEY IN" and "KEY OUT" indications are functioning properly.
6.	Check & ensure that Contact (NO/NC) of KLR key extracting button are functioning properly.
	<b>Schedule Code: K2</b> <i>Periodicity: Technician (Signal): Monthly, Sectional SSE/JE(Signal): Half yearly, SSE(Signal)/Incharge: yearly</i>
1.	Tail cables meggering with 500 V megger.
2.	Check and ensure that relays are in good condition & no dry soldering.

*Note:(i) During periodic schedule of SSE Incharge: inspection, section SSE/JE inspection not required since inspections are repetitive in nature.*

*(ii) Ensure that independent Power supply is connected to KLCR.*

### Maintenance Schedule of Fuses & Fuse Alarm System

#### Index

Periodicity	Schedule Code
Monthly	F1
Quarterly	F1
Half Yearly	F1,F2
Yearly	F2

<p align="center"><b>Schedule Code: F1</b>                      Periodicity: Technician(Signal): Monthly,                      Sectional SSE/JE(Signal): Quarterly,                      SSE(Signal)/Incharge: Half-yearly</p>	
S.No.	Check the following:
1.	Visually check the fuses and indication LED on fuse block provided to ensure intactness.
2.	Visual inspection of fuse blown off indications & their replacement with proper fuses, if blown off.
3.	In the Fuse Monitoring Panel (FMP), if fuse blown off indication is available/audio alarm bells, check for fuse/LED/Buzzer and replace them, if defective.
4.	<b>PPTC Fuses</b> - Ensure that the main fuse and Continuity of PPTC by checking individually (without disturbing the working circuit). If not replace the defective component.
<p align="center"><b>Fuse Auto Changeover System</b></p>	
1.	Visually check the Fuse monitoring changeover system, fuses and its indications.
2.	Physically check the functioning of fuse monitoring panel. If any main fuse is removed/blown-off, the audio alarm with indication appears on Fuse monitoring panel.
<p align="center"><b>Schedule Code: F2</b>                      Periodicity: Sectional SSE/JE(Signal): Half yearly,                      SSE(Signal)/Incharge: yearly</p>	
1.	Check that all fuses provided are of ND type/'D' type/'G' type, PPTC or approved type and of correct rating as per requirement.
2.	Ensure proper tightness of all terminals and fuses.
3.	Ensure that the Main fuse and Stand-by fuse are in working condition by checking individually (without disturbing the working circuit). If not replace the defective component.
4.	Check that fuse capacity as per specification for the maximum load current.

*Note: (i) while commissioning or any alteration, it has to be ensured that Fuses are provided in one limb of the circuits.*

*(ii) Checking that fuse capacity is not >2.5 times the load. Measure circuit current when fuse is blown off & investigating the cause if current is found more than initial value*

### Maintenance Schedule of Earthing (Conventional & Maintenance Free) and Lightning Protection

#### Index

Periodicity	Schedule Code
Monthly	E1
Quarterly	E1
Half Yearly	E1, E2
Yearly	E2, E3

	<b>Schedule Code: E1</b> <i>Periodicity: Technician(Signal): Monthly</i> <i>Sectional SSE/JE(Signal): Quarterly</i> <i>SSE(Signal)/Incharge: Half-yearly</i>
S.No.	Check the following:
1.	All earth connections of block earth, Axle counter, MUX and other equipment earth are intact.
2.	Earth wire lead is not corroded and is well protected.
3.	Nut connecting earth wires to electrode are not corroded.
4.	SPD (B & C type at 230 V entry stage) indications are OK.
5.	Connections to SPD are intact.
	<b>Schedule Code: E2</b> <i>Periodicity: Sectional SSE/JE(Signal): Half-yearly</i> <i>SSE(Signal)/Incharge: Yearly</i>
S.No.	Check the following:
1.	SPD (C type at the output side of DC supply) indications are OK. Before onset of monsoon and after every lightning it has to be verified.
2.	Connections to SPD are intact.
	<b>Schedule Code: E3</b> <i>Periodicity: Sectional SSE/JE : Yearly</i> <i>SSE(Signal)/Incharge: Yearly</i> <i>(Note: They shall do in alternate Six months)</i>
S.No.	Check the following:
1.	Proper rating and type of SPD used.
2.	Available potential free contacts are wired.
3.	Separate earth exists for each block.
4.	Different earthing conductors are insulated from each other.
5.	Measuring the value of earth resistance of the earthing provided for signaling circuit, improving earth resistance if found more than beyond specified limit of installed equipment, take steps to reduce it further.
6.	Keeping records of the earth resistance measurement and painting its value on earth enclosures/nearest wall.

*Note: There should not be any other earth or system earth of electrical, placed less than 20 meters away from the equipment earth.*

**Maintenance Schedule of Control Panel  
Index**

Periodicity	Schedule Code
Fortnight	CP1
Monthly	CP1
Quarterly	CP1, CP2
Half Yearly	CP2
Five Yearly	CP3

	<p><b>Schedule Code: CP1</b>  <i>Periodicity: Technician (Signal): Fortnight</i>  <i>Sectional SSE/JE (Signal): Monthly,</i>  <i>SSE (Signal)/Incharge: Quarterly</i></p>
<b>S.No.</b>	<b>Check the Following</b>
1.	Physical checking & cleaning of Panel, Panel Buttons/knobs, LED Lamps, etc. Checking for proper sealing of Emergency operation buttons.
2.	Checking visually that Earthing connectivity to the Panel is intact.
3.	Check visually all indications are illuminating properly. Check & ensure that all push buttons and keys are functioning properly (not having stuck up tendency)
4.	On opening back cover, wiring shall be in good laid out condition without any openings to avoid entry of rodents.
	<p><b>Schedule Code: CP2</b>  <i>Periodicity: Sectional SSE/JE(Signal): Quartely,</i>  <i>SSE (Signal)/Incharge: Half yearly</i></p>
1.	Testing of all Panel counters (if not operated in last 3 months), Buzzers, SM's Key.
2.	Checking of all time delay and timers provided for approach locking, calling ON, and CH release etc.
3.	Check & ensure that all Audio-visual alarm/buzzers are functioning effectively.
4.	Check& ensure that panel counters are functioning properly and tallying with panel counter register
5.	Check & ensure that setting of various timers is as per prescribed limit.
	<p><b>Schedule Code: CP3</b>  <i>Periodicity: SSE (Signal)/Incharge along with ASTE: Five yearly</i></p>
1.	System Integrity Test (SIT) for all circuits as per selection table and conflicting movements.

**Maintenance Schedule of Relays & Relay Room**

**Index**

Periodicity	Schedule Code
Monthly	R1,R2
Quarterly	R1, R2
Half Yearly	R3

	<p><b>Schedule Code : R1</b>  <i>Periodicity: Technician (Signal): Monthly</i>  <i>Sectional SSE/JE(Signal):Monthly</i>  <i>SSE(Signal)/Incharge: Quarterly</i></p>
<b>S.No.</b>	<b>Check the following</b>
1.	Checking & cleaning of dust on relays
2.	Working of Fans/AC's & Electrical fittings to be checked.
3.	Condition of windows & Main door to be checked.
	<p><b>Schedule Code: R2</b>  <i>Periodicity: Sectional SSE/JE : Monthly</i>  <i>SSE(Signal)/Incharge: Quarterly</i></p>
1.	Plugging of holes to rodent entries in relay room.
2.	Checking of Relay room double lock effectiveness
3.	In cable rack far ends functional relay voltages to be measured and recorded.
4.	Check for any rain water leakages.
5.	Relay room Proximity switch for Relay room door to be checked.
6.	Check the condition of Relay holding clip.
	<p><b>Schedule Code: R3</b>  <i>Periodicity: SSE(Signal)/Incharge - Yearly</i></p>
1.	Visual inspection of relays.
2.	Accuracy of time delay circuit.
3.	Sealing of relays are intact, effective and not tampered.
4.	Checking of No label relays. Painting of nomenclature wherever required.
5.	Cable Armour earth intactness and proper tinkering to be checked.
6.	Proper bunching and lacing of relay wiring.
7.	The relay to be checked for defects in respect of charring of contacts, dust accumulation on contacts, corrosion/rusting of components, crack or breakage in components, presence of fungus and ants inside the relay casing, charring of cover near contacts in the case of plug-in-type relays, corrosion of label, absence or tempering of seal, any other abnormal condition.

*NOTE: (i) Effectiveness of anti-tilting arrangement on shelf-type relays (existing If any) to be checked.*

*(ii) Overhauling is not more than 10-12 years old for track relays and 15 years for shelf type line relays.*

*(iii) System Integrity Test (SIT) to be done once in five years.*

**Maintenance Schedule of Electronic Interlocking  
Index**

Periodicity	Schedule Code
Monthly	EI1, EI2
Quarterly	EI1, EI2
Half Yearly	EI2, EI3
Yearly	EI3, EI4

	<p><b>Schedule Code: EI1</b>  <i>Periodicity : Technician(Signal): Monthly</i>  <i>Sectional SSE/JE (Signal): Monthly</i>  <i>SSE(Signal)/Incharge: Quarterly</i></p>
<b>S.No</b>	<b>Check the following</b>
1.	Ensure all entries to EI room shall be suitably sealed to prevent entry of rodents, lizards, insects etc. & equipment/Racks are free from Dust. Rodent Ultrasonic repellent functioning to be ensured
2.	All modules are free from rust, dirt & are inserted properly & all screws of cards are tightened.
3.	Cleanliness of room and equipment.
4.	Visual checking of relays & its contact.
5.	Checking of all fuses and its indication.
6.	Visual checking of indication of switch.
7.	Ensure identification labels/markers are intact for all the terminals.
8.	Ensure that all the fittings in the racks are intact & adequately supported.
9.	The Earthing wire & its connectivity tightness.
10.	Checked unused slots are covered with blank plates in the housing.
11.	Visual checking of all the indication on EI and sub-systems i.e. EI modules, VDU or Panel.
12.	Checking of relay room ventilation, condition of Exhaust fan, cooling arrangement, and dust filters.
13.	Voltage shall be checked at Test Points.
14.	Ensure that VDUs & Maintenance Terminals shall not be loaded with external applications /software.
15.	Re start standby VDU PC, changeover working to this and then re start other VDU PC ( At every 15 days or early if VDU operation gets sluggish)
16.	Changeover of EI system shall be done from Main to Hot Standby and vice-versa once a month under supervision of sectional SSE/JE when there is no train movement in the yard.
	<p><b>Schedule Code: EI2</b>  <i>Periodicity: Sectional SSE/JE(Signal): Quarterly</i>  <i>SSE(signal): Half Yearly</i></p>
1.	Check System changeover and after changeover also keep in record. (Ensure that the system starts functioning without affecting train operation)
2.	Check Panel to VDU, VDU to VDU & VDU to Panel change over & ensure its Working satisfactory. Check MT for its proper functioning.

3.	Redundancy in communication, DC-DC Converter, working of both main and standby fiber path etc. Redundancy of 110 V DC supply from IPS also to be checked.
4.	Taking back up of System logs and keep the same in the safe data storing devices. Backup for last 3 months should be available in MT.
5.	Clean-up the memory and temporary files from VDU PC as per instructions given in OEM's maintenance manual for optimum performance.
6.	Check that all fuses provided are of as per approved circuits. Check all the fuses visually for its proper working and by touching for overheating. Also check whether spare fuses / terminals of all type are readily available at site.
7.	Check that all earth connections are intact, of proper size wire and making good contact & earth lead wire, nut connecting earth wires etc, are not corroded. Also check that there is no damage to earth wire.
8.	All cable terminations are tightened & properly connected.
	<b>Schedule Code: EI3</b> <i>Periodicity: Sectional SSE/JE (signal): Half Yearly</i> <i>SSE (signal)/incharge: Yearly</i>
1.	Testing of all panel & VDU counters, SM's Key, all types of cancellations & emergency crossover operation.
2.	Checking of parallelism of DC- DC converter supplying power to EI for load sharing.
3.	Check that the Ladders are insulated from the Racks & walls. Ensure ladder is properly earthed.
4.	Availability of spares as per RDSO guidelines to be ensured as applicable to each make.
5.	Checking & testing of Emergency crank handle.
	<b>Schedule Code: EI4</b> <i>Periodicity: SSE (Signal): Yearly</i>
1.	Measure the earth resistance & it should be less than 1 ohm. To be measured preferably before monsoon.
2.	Checking of working of spare cards available at stations by plugging in standby system.
3.	Synchronization of EI clock time with Maintenance PC and Datalogger.
4.	Condition of class A earth fittings and their pipes, supporting systems on the top of building and its counters, if provided.
5.	Check the CRC and checksum and crosscheck with records And latest checksum and CRC should be available on EI rack
6.	Check that potential is not exceeding 0.5 V between "Positive to earth" and "Negative to Earth".

**NOTE:**

- (i) CRC to be verified if application software is loaded due to failure or any other reason.
- (ii) Ensure that spare cards are wrapped in ESD sheets and opened in presence of OEM/core group railway member.
- (iii) An anti-static ESD (electro static discharge) wrist strap band should be worn before touching any EI equipment during maintenance.
- (iv) Competency certificate to ESM for EI shall be issued by Zonal Training Centres.
- (v) The available spare CPU card shall be readily loaded with application logic with same CRC of the concerned station and kept ready for replacement during failure. Station name & CRC shall be pasted on the card to avoid wrong insertion.
- (v) System Integrity Test (SIT) to be done once in five year.

**SUPPLEMENTARY  
TECHNICAL  
DATA**

### Technical Data for Mechanical Signalling

(Mechanical Signalling and Interlocking Equipment-Specification No RDSO/IRS: S10-78 Rev 8)  
(Electric Key Transmitter Rotary Type- (Tentative)-Specification No RDSO/IRS: S 21/2001)  
(Double Wire Rotary Detector (Vertical Type)-Specification No RDSO/IRS: S 29-64)  
(Eclectic Point Detector-NO RDSO/IRS: S: 29-64 S 49-74)

#### A. PARAMETERS OF REVERSER AND LEVER LOCK

Name of the Equipment	Normal Working Voltage	Working Current	Coil Resistance	Remarks
Lever Lock (IRS) Type	12 V DC	----	4.5 $\Omega$	-----
Electric Signal Reverser (Style B)	12 V DC (7.5 Volts Min.)	17 - 20 mA	600 $\Omega$	Minimum Working voltage is 7.5 V DC. At every 15 days coil terminals to be interchanged.

## Technical Data for Cable

(PVC Insulated Cables & Wires for Indian Railway Signalling (Tentative) - Specification No RDSO/IRS: S 76-89)

(PVC Insulated indoor cables for Railway signalling -- Specification No RDSO/IRS: S 76-89)

(PVC Insulated aluminium screened cables for Railway Signalling –Specification NO RDSO/IRS: S-35-93)

(PVC Insulated Underground, Unscreened Cable for Railway Signalling- Specification No RDSO /IRS: S 63/ 2014 Revision 4)

### A. INSULATION

<b>Applicable for power cable only</b>	<b>Applicable for Signalling Cable only</b>
The insulation resistance of each core shall not be less than 5.0 Mega-Ohm per kilo meter at 50° C.	The insulation resistance ( In Dry Condition) of each core shall not be less than 10.0 Mega-Ohm per kilo meter at 50° C and insulation resistance (In Wet Condition) shall not be less than 7.5 Mega-Ohm per kilo meter at 50° C for cable conductor Sizes up to 2.5 sq. mm. For cable conductor sizes more than 2.5 sq. mm, the insulation resistance (Dry and Wet Condition) shall be 5 Mega ohms / Km at 50° C.

## Technical Data for Track Circuit

(Track feed battery charger- Specification No RDSO/IRS/S 89 – 2013 Version 1.0)

(Channel Pins (For Bonding Track Circuiting Wires)- Specification No RDSO /IRS: S 17-75 Revision 3)

(Choke Coil For Signal Rail Track Circuits ON 25 KV 50 Hz Ac Electrified Section. (Tentative) Specification No RDSO /IRS: S 65 – 1983)

### A. NON-RE: Typical Parameters of D.C Track Circuits

Type of TC	Type of Relay	Resistance of Track Relay (L= Length of the Track Circuit)	Cells at Feed end	PU Voltage Approx	PU Current Approx
DC TC for Non-RE	Non ACI shelf type	For L < 100 Mts. → 9 Ω	1 cell (2 V)	0.4 V	40 mA
		For L > 100 Mts. → 2.25Ω	1 cell (2 V)	0.2 V	80 mA
	Non ACI Plug in Type (QT2)	For L < 100 Mts. → 9 Ω	1 cell (2 V)	1.4 V	150 mA
		For L > 100 Mts. → 4 Ω	2 cells (4 V)	0.5 V	125 mA

### B. RE AREA: Typical Parameters of DC Track Circuits

Type of TC	Type of Track Relay	Track Relay Resistance	Cells at Feed end	PU Voltage Approx	PU Current Approx
DC Single Rail Track circuit – AC RE Area	ACI Shelf type	9 Ω	1 cell (2 V)	0.68 V	72 mA
	ACI Plug in Type QTA2	9 Ω	2 cells up to < 100 Meters 3 cells > 100 Meters	1.4 V	140 mA
	ACI Plug in Type QBAT	9 Ω	2 cells up to < 100Meters. 3 cells > 100 Meters to 450 Meters. 4 cells up to 750 Meters	1.75 V	175 mA

### C. Maximum and Minimum excitation level for track relays

Subject	Under Conditions	Track Relay Voltage $V_R$
Minimum Excitation at Track Relay	Max leakage ( $R_B$ Minimum) & Minimum Battery voltage	<ul style="list-style-type: none"> <li>Not less than 125% of rated PU voltage for all Track Relays except QBAT.</li> <li>Not less than 122% of rated PU voltage for QBAT</li> </ul>
Maximum Excitation at Track Relay	Min Leakage ( $R_B$ Maximum), $R_r$ Minimum and Fully charged Battery voltage	<ul style="list-style-type: none"> <li>Not more than 250% of rated PU voltage for Shelf Type Track Relay</li> <li>Not more than 300% of rated PU voltage for Plug in Type Track Relay except QBAT</li> <li>Not more than 235% of rated PU voltage for QBAT</li> </ul>
Dropping of Track Relay	Irrespective of $R_B$ conditions, with the application of $TSR=0.5 \Omega$	<ul style="list-style-type: none"> <li>Not more than 85% of rated DA voltage</li> </ul>

## Technical Data for Block Instruments

**(Double Line Block Instrument Specification No IRS: S IRS: S 22/2016 Version 1.0)  
 (Push Button Type Single Line Tokenless Block Instrument (Tentative) Serial No S 32-66)  
 (Single Line Tokenless Block Instrument Handle Type (Tentative) Serial No. S 98-2001)**

### A. BLOCK SIGNALLING TLBI (FM & PB TYPES)

Feature	FM Handle type	Push button Instrument
Bell	-Ve on L1	+Ve on L1
TCF	+Ve, Carrier and 85Hz	- + -
TGT	+Ve, Carrier and 65Hz	- - +
TOL	Carrier and 65Hz	- - -
Line closed	+Ve, Carrier and 85Hz	- + +
Shunt Key	Is in-built and provided by the manufacturer	Shunt key is not in-built and not provided by the manufacturer
TOL Indication	Appears in sending and receiving instruments	Appears in sending and receiving instruments
TOL Buzzer	Sounds at both sending and receiving instruments	Sounds intermittently at the receiving end only.
Authority to proceed	OFF aspect of LSS	OFF aspect of LSS
Bell coil resistance	310 ohm	200 ohm
Shunt key can be extracted	In Line closed and TGT position	In Line closed and TGT- TOL position
Shunt key when taken out	Locks the Block handle mechanically	Makes the instrument inoperative electrically.
P.O.H	Since having some mechanical parts overhauling is required and it is 7 years.	Not required since it is purely relay interlocking.
Operated By	A block handle which is having three positions TCF, TGT & Line closed	Pressing different Knobs for different operations
No drain circuit feature	It is not there	It is there
Push back normalization	S2 Knob is provided for push back normalization	No Knob is provided
Galvo	Provided	Not Provided

**B. SINGLE LINE TOKEN & DLBI**

<b>Feature</b>	<b>Double Line</b>	
Types of token configuration	No Token	
Used for	Only for Double line	
TCF/TGT Coil	Separate Indication for Up & Down line (TGTK/TCFK) 140 Ohms, 25 mA, 2.4 V	
Galvo	Not applicable	
Polarised Relay	77 $\Omega$ 25 mA 1.8V	
Authority to proceed	Last stop signal	
Bell coil	Separate Bell coil & bell relay are available	
	Bell coil 60 $\Omega$ 200 mA	Bell Relay 500 $\Omega$ 24 mA
Door lock coil	50 $\Omega$ , 240 mA	
Manufacturer	Podanur, Byculla& Howrah	
No. of Position for Block Handle	Line closed, Line clear, & TOL	
Handle lock in	Only in TOL Position if it brought from line clear position	
TGT lock picks up	Not applicable	
TCF lock picks up	Not applicable	
TOL Lock or Door lock coil	Picks up release the block handle to line closed	
P.O.H	Once in 07 years	
P.O.H of PR	With the instrument	

## Technical Data for Colour Light Signal

(LED Signal Lighting Units For Railway Signalling Specification No RDSO/SPN/153/2011  
Revision: 4.1)

### A. PARAMETERS OF LED SIGNALS

S No	Parameter	Main Signal			Co-ON signal	Route Lighting unit	Shunt Lighting unit
1	Rated voltage at Input terminals Current Regulator	110 V AC $\pm 25\%$			110 V AC $\pm 20\%$	110 V AC $\pm 20\%$	110 V AC $\pm 20\%$
2	Current at rated voltage per unit at Input terminals of Current Regulator	140 mA +10%, -20% (rms) *			150 mA +10%, -20% (rms)	25 mA $\pm 5\%$ (rms)	55 mA $\pm$ 5% (rms)
3	Illumination measured at 1.5 m from LED Signal Lighting Unit in axial direction at rated voltage	150 LUX -10% + 40%	175 LUX -10% +40%	150 LUX -10% +40%	50 LUX -10% +40%	50 LUX -10% +40%	30 LUX -10% +40%
4	Colour	Red	Yellow	Green	Yellow	Lunar white	Lunar White

Note: (i) \* Input current shall be within the specified tolerance limits in all design conditions of lighting except for non-blanking failure mode.

## Technical Data for Electrical Point Detector (EPD)

(Electric point detector Specification No IRS/S 49 – 74 with amendment 1-90)

### A. ELECTRICAL POINT DETECTOR

S No	Parameter	Range
1.	Width of notch of point detection slide	15 mm
2.	Throw of the lock detection slide	32 mm
3.	Width of the lock detection slide	25 mm
4.	Clearance between signal slide and point slide	12 mm
5.	Section of signal slide	38 X12 mm
6.	Depth of signal slide notch	12 mm
7.	Section of point and lock slide	50 X12 mm
8.	Size of the notch of signal slide	27 X12 mm
9.	Size of the notch of the point slide	15 X12 mm
10.	Clearance are available between signal slide and point slide when signal slide is normal	3 mm

### B. DETECTION CONTACTS

S No	POSITION OF POINT	ND	RD	NORMAL SHUNT	REVERSE SHUNT
1.	POINT NOT SET &/OR NOT LOCKED	OPEN	OPEN	MAKE	MAKE
2.	POINT SET & LOCKED IN NORMAL	MAKE	OPEN	MAKE	OPEN
3.	POINT SET &/ LOCKED IN REVERSE	OPEN	MAKE	OPEN	MAKE

## Technical Data for Electrically Operated Points

**(Motors For Electric Point Machine Specification No IRS: S 37/1982 Revision 1.0 With Amendments 1,2 & 3)**

**(Thick Web Switch RDSO Drawing No RDSO/S-3454 ALT –A Ver.1.0 for 60 kg rail and RDSO/S-3455 for 52 kg rail)**

### A. PARAMETERS OF DIFFERENT ELECTRICAL POINT MACHINE

PARAMETER	IRS	IRS (CLAMP TYPE)
Rated voltage	110 V DC	110 V DC
Current consumption	≤4.5 Amp.	≤5.5 Amp
Stroke of the Point Machine	143 mm±2	220 mm +4/-1
Operating time (Max.)	4.0 sec	5.0 sec
Sleeper spacing Nos,3&4 Centre of hole of chair plate	685 mm	745 mm
Opening of Switches	115	160
Clearance at JOH (switch Open condition)	NA	60±3 mm
Clearance at JOH (switch closed condition)	NA	0-10 mm
The clearance between top edge of stretcher bar and bottom of the stock rail shall be	at least 1.5 mm but not more than 3.0 mm	-----
ballast Clearance below rail bottom is 50mm	50 mm	50 mm
Gauge testing (ahead of actual toe of switch)	150 mm	150 mm
Oiling	Pour 100 cc lubricating oil SAE 30 through oil inlet (Provided on the reduction gear box) into the oil reservoir.	Pour oil –BP Energer SHF 48 or ServoSystem-32 through the oil inlet.
Periodicity of oiling	At the time of installation and after 10,000 operations or at 6 month's interval whichever is earlier.	

## Technical Data for Key Locked Checking Relay/Electric Key Transmitter (KLCR/EKT)

[Electric Key Transmitter Rotary Type (Tentative) Specification No IRS: S 21/2001 Revision 1.0]

### A. PARAMETERS OF RKT/EKT

Name of the Equipment	Normal Working Voltage	Working Current	Coil Resistance
Rotary Key transmitter (RKT)	3.75VDC+ Line Voltage Drop, use appropriate resistance as min. 12 volt only available.	350 mA	12.5 $\Omega$

### B. CONTACT SPRING ASSEMBLY POSTION

Key Position	Contact spring (Finger) Position at transmitting END	Contact spring (Finger) Position at receiving END
1. When key is "IN" and locked	1&2,3&4	1&2,3&4
2. When key is "IN" and locked and turn to RHS forcefully.	1&2,3&5	1&2,3&4
3. When key is OUT at receiving end	1&2,3&4	All contacts open

#

Published by:

*Indian Railways Institute of Signal Engineering and Telecommunications, Secunderabad*

**For Government of India, Ministry of Railways (Railway Board), New Delhi**