MAINTENANCE SCHEDULE / CHECK LIST

FOR

Stationary KAVACH V2.0

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DOCUMENT CONTROL SHEET

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CHANGE HISTORY

#	Name of the Document	Date	Reason for changes	Version No.
1	Maintenance Schedule / Check List for Stationary Kavach V2.0	26-04-2025	Initial Version	1.0

REFERENCES

#	Document Name	Document Number	Version Number/Year	Source
A	Safety and Reliability Requirements of Electronic Signaling Equipment	RDSO/SPN/ 144/2006	Rev 2	RDSO
B	RDSO Specification for Train Collision Avoidance System	RDSO/SPN/ 196/2020	4.0 Amdt-3	RDSO
C.	Railway Applications - Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS)	EN50126-1&2	1999 (with corrigendum 1-28 Feb 2007), Feb 2007	CENELEC

Glossary of terms

#	Abbreviation	Meaning
1	CENELEC	European Committee for Electro Technical Standardization
2	DC	Direct Current
3	DPS	Digital Power Supply
4	EI	Electronic interlock
5	FIU	Field Interface Unit
6	FSC	Field interface Unit - Scanner Card
7	GPS	Global Positioning System
8	GSM	Global System for Mobile Communications
9	IPS	Integrated Power System
10	LCD	Liquid Crystal Display
11	LC	Level crossing
12	LE	Light engine
13	LED	Light-emitting diode
14	KVCH	Kavach
15	Modem	Modulator- demodulator
16	NMS	Network Management System
17	OFC	Optical Fibre Cable
18	PPC	Peripheral Processing Card
19	PSR	Permanent speed restriction
20	PWR	Power
21	RDSO	Research Designs and Standards Organization
22	RTU	Radio Tower Unit
23	RF	Radio Frequency
24	RFID	Radio Frequency Identification Number
25	RIU	Remote interface unit
26	RS232	Recommended Standard 232
27	RS485	Recommended Standard 485
28	SM	Station Manager
29	SPD	Surge Protection Device

#	Abbreviation	Meaning
30	SM-OCIP	Station Manager Operation Cum Indication Panel
31	SMS	Short message service
32	SPN	Specification
33	SRPS	Station Radio power supply
34	TCAS	Train Collision Avoidance System
35	Tx	Transmit
36	TOC	Table of Control
37	V	Volts
38	VC	Vital Computer
39	VGW	Vital Gateway
40	VTR	Voter

Contents

1.0 Purpose:

1.1 This document provides schedules for periodic maintenance and for Stationary Kavach system along with its peripheral components.

2.0 Specification

2.1 The Kavach System has been designed to meet the RDSO Specification No: RDSO/SPN/196/2020 V4.0 Amdt 3.

3.0 Components of Stationary Kavach System:

3.1 Stationary Kavach System consists of the following sub-systems.

- 3.1.1 Stationary Kavach Unit
- 3.1.2 Station manager's Operation-cum-Indication Panel (SM-OCIP)
- 3.1.3 RF Communication and GPS/GSM Antennae
- 3.1.4 Relay panel
- 3.1.5 Inter-connection Cable Assembly

4.0 References:

Ref #	Document title	Document number
1	Personnel Safety Instruction Manual	5 16 76 0014
2	Stationary Kavach Power Supply Connectivity Diagram	5 16 49 0427
3	Block diagram of Stationary KAVACH Vital Computer	5 16 49 0631
4	Block diagram of SM-OCIP	5 16 49 0632
5	Block diagram of RADIO TOWER UNIT(RTU)	5 16 49 0633
6	Procedure for Commissioning of Stationary Kavach	5 53 76 0634
7	Maintenance schedule for Stationary TCAS by RDSO	SIF-0535 Ver 1 dt12-09-18

5.0 Safety instructions

Maintenance of Stationary Kavach and its associated sub-systems in a railway environment is prone to personnel safety risks. Instructions for personnel safety as indicated in document Personnel Safety Instruction Manual 5 16 76 0014 [Ref: 2] shall always be followed. Failure to follow these instructions will cause insurance claims to be invalid.

SRAC_STN7: *On failure of VC module, the faulty VC module shall be replaced during the first instance of scheduled maintenance within fortnight after failure is recorded*

6.0 Technical description of Stationary KAVACH

6.1 Stationary Kavach Power Supply Connectivity Diagram [Ref: 2]
6.2 Block diagram of Stationary KAVACH Vital Computer [Ref: 3]
6.3 Block diagram of Radio Tower Unit [Ref: 5]
6.4 Block diagram of SM-OCIP [Ref: 4]

7.0 List of special tools:

7.1 Power Analyser app
7.2 Spare GSM cable, 20Mtr – 1No
7.3 Spare GPS cable, 20Mtr – 1No.
7.4 Allen key set - 1No
7.5 Screwdriver set- 1No
7.6 Digital multi meter-1No
7.7 Torque wrenches up to 60N-M – 1No

8.0 List of field replaceable spare parts:

#	Module Name	SAP Part number	Spare part description
1	Peripheral Processing Card (PPC)	6000041106	PPC MODULE ASSEMBLY STATIONARY
2	Vital Computer Card (VCC)	6000030472	VCC MODULE ASSEMBLY_51690003
3	Voter Card (VTR)	6000044351	VOTER_MODULE_ASSEMBLY_STATIONARY
4	Vital Gate Way card (VGW)	6000054725	VITAL_GATEWAY_MODULE_ASSEMBLY_STATIONARY
5	Scanner Card (FSC)	6000030478	FIU SCANNER MODULE ASSY
6	Station Radio Power Supply (SRPS)	6000033491	SRPS_UNIT_ASSY
7	RADIO	1000024985	GUARDIAN RADIO MODEM_10W RF POWER_CALAMP
8	Digital Power Supply-1 (DPS-1)	6000033735	MODULE DIGITAL POWER SUPPLY DPS1-ELECT
9	Digital Power Supply-2 (DPS-2)	6000033736	MODULE DIGITAL POWER SUPPLY DPS2-ELECT
10	RIU - Host	6000044136	RIU_COMMUNICATION_HOST_MODULE_ASSY
11	Media Converter	6000050754 6000051791	PPCB_RS485-OFC_CONVERTER_516150070 PPCB_RS232-OFC_CONVERTER
12	EI Gateway	6000054134	EI-GATEWAY_KAVACH_MODULE_ASSY
13	Field Termination Card	6000041817	PPCB_FIU_TERMINATION
14	Electro Magnet Interference (EMI) FILTER card	6000032852	PPCB_EMI_LINE_FILTER_ELECT
15	SM-OCIP	6000032844	PPCB_SM-OCIP_CARD
16	GPS+GSM ANTENNA	6000050102	GPS_GSM_UNIT_ASSEMBLY
17	STATIONARY ANTENNA	6000048812	STATIONARY KAVACH ANTENNA UHF-OMNISTAN06

18	GSM Antenna Cable (LMR200)	6000058270 6000057988	CABLE_ASY_LMR200_GSM A_15M_516490596 CABLE ASY_LMR200_GSM B_28M_516490585
19	GPS Antenna Cable (LMR200)	6000058268 6000057987	CABLE_ASY_LMR200_GPS A_15M_516490594 CABLE ASY_LMR200_GPS B_28M_516490584
20	RF Antenna Cable (LMR600)	1000103718	LMR-600DB_CABLE_ASSY_33M_95-82-342-011
21	SM-OCIP Interface Cable	6000032153	CABLE ASY_SMI SIGNAL_516490204

9.0 Stationary Kavach Name:

Details of the Equipment	Name/Number	Date of Commissioning	Required Value	Observed Value	Remarks (OK/Not OK)
Signalling and Interlocking Plan			There shall not be any change in the SIP No.		
RFID Tag Layout			The RFID Tag layout shall be based on SIP layout No mentioned above.		
			Date of Commissioning on RFID Tag shall be on or after the Date of Commissioning as Indicated In SIP		
Selection Table (TOC)			There shall not be any change in Selection Table No.		
TCAS Table of Control			The TCAS Table of Control shall be based on Selection Table No mentioned above.		
			Date of Commissioning on TCAS Table of Control shall be on or after the Date of Commissioning as indicated in Selection Table of the Station		
Relay wiring Circuit diagram			There shall not be any change in the Relay Circuit Diagram.		
TCAS Wiring Circuit diagram			The TCAS wiring diagrams shall be an integral part of station wiring sheets		
			If not, they shall be separately located in a sealed transparent cover		
Is there any noticeable change in relay wiring			There shall not be any changes in the relay wiring		
Is there any noticeable change In Power Supply equipment			There shall not be any changes in the power supply equipment		

Details of the Equipment	Name/Number	Date of Commissioning	Required Value	Observed Value	Remarks (OK/Not OK)
Number and Name of LCs Connected to Station as per SWR In Up direction			"		
Number and Name of LCs Connected to Station as per					
TCAS In Up direction					
Number and Name of LCs Connected to Station as per SWR in Down direction					
Number and Name of LCs Connected to Station as per TCAS in Down direction					
Number and Name of LCs Connected to Station as per SWR towards branch direction					
Number and Name of LCs Connected to Station as per TCAS towards branch direction					
Is there any noticeable change in relay wiring					
Working time table no.					
PSR in up direction as per working timetable					

Details of the Equipment	Name/Number	Date of Commissioning	Required Value	Observed Value	Remarks (OK/Not OK)
PSR in Down direction as per working time table					
PSR towards branch line as per working time table					

10.0 Maintenance Schedule: Daily & Monthly

Item No	Location	Maintenance Task Description	Action taken/Range of Voltage levels	Frequency	Equipment condition	Remarks
1.	NMS PC	Ensure E1 network is always healthy, and all stations communication is Healthy on line	Ensure all TCAS stations are in working condition in NMS	Daily		SMS shall be generated by NMS.
2.	TCAS Eqpt Relay Room and LC gate equipment.	Check the communication status of the TCAS Modules (if Any) and DSL modem (if Any)	Relevant Communication and LEDs should be Glow/Blink	M		
3.	Radio Tower / Radio Modems	Check the Power voltages at PWR connector of Radio for both radios	23V to 25V to be observed	M		
4.		Check the communication status of the Radios	Tx LED shall blink alternative radios for every 2 seconds	M		
s.		Check whether Radios, SRPS, Media Converters / Modems are fixed properly to the frame inside the location Box	Check for healthy and fixing along with connectors	M		
6.		Ensure the radio status is healthy	POWER and STATUS LEDs shall not show red indication	M		
7.		Visually examine all the communication cables are connected properly and radio modems had tighten the corresponding screws	Ensure the tightness of the cables and modem modules	M		

Item No	Location	Maintenance Task Description	Action taken/Range of Voltage levels	Frequency	Equipment condition	Remarks
8.		Ensure the reverse power of Transmitter and receiver antennas is less than 1.5W	Measure reverse power of all 4 coaxial cables and record. Ensure reverse power is less than 1.5W for all cables	M		On NMS daily & SMS shall be generated at morning 8 :00 Clock when reverse power is >1.5 watt.
9.		Check the 110V DC output for Aviation Warning Lamp in the Location Box is correct and lamp is glowing	Check for correctness	M		
10.	Earthing, LA&SPD	Clean surface of the Earth electrode /MEEB/SEEB	Surface should be kept clean	M		
11.		Measure the Resistance of the Ring Earth If possible, fill water in the Earth Pits to keep low soil resistance	Resistance Should be < 2Ω (Ohm)	M		**SRAC- STN1**
12.		Check the SPD devices for any signs of physical degradation	Check the Indication LED status of SPD. (If SPD indicates FAIL then replace)	M		
13.		Check Lightning Arrestor at the top of the tower connection at copper wire to Ring earth. Tighten all the connections /Terminations	All the connections to be tightened.	M		
14.		Check the serviceability SPD at IPS 110 V DC-DC converter	Check the Indication LED status of SPD.(If SPD indicates FAIL then replace)	M		
15.		Check the serviceability SPD at Radio MODEM	Check the Indication LED status of SPD.(If SPD indicates FAIL then replace)	M		
16.	SM OCIP in SM ROOM	Ensure buttons are working properly	Insert SM key and turn to key in position. Press and hold each button for 6 seconds and wait for button stuck fault. After releasing, button stuck fault shall disappear from LCD.	M		

Item No	Location	Maintenance Task Description	Action taken/Range of Voltage levels	Frequency	Equipment condition	Remarks
17.		Ensure SM Key is working properly	The above operation shall fail when SM key is OUT.	M		

11.0 Maintenance Schedule: Quarterly & Half Yearly

#	Location	Maintenance Task Description	Action taken/Range of Voltage levels	Frequency	Equipment condition	Remarks
18.	IPS Room/ Equipment/ Relay Room and Radio Tower	Check the Voltage levels at 110V IPS Mains Input voltage	100V to 115V	Q		
19.		Ensure DC-DC Modules Fail indication should not Glow.	All Health and power ON Indications should glow.	Q		
20.		Check the voltages at Equipment End OF INTERNAL Supply.	22V to 26.5V to be observed	Q		
21.		Check the voltages at Equipment End of EXTERNAL (RADIO)	22V to 24V to be observed	Q		
22.	TCAS Equipment / Relay Room and LC gate equipment	Clean the TCAS equipment	To be free from dust	Q		
23.		Check all Health Status LEDs ,i.e System health Indication, Output Voltage Indication of system	LEDs should be Glow/Blink	Q		
24.		Check the Power voltages of active / standby	23V to 26.5V to be observed	Q		
25.		Visually examine all the active / standby cards are Inserted properly and tighten the corresponding screws	Ensure the tightness of the cards	Q		
26.		Check all Wago fuse indications	Disconnect type fuse Wago indications should not glow	Q		

#	Location	Maintenance Task Description	Action taken/Range of Voltage levels	Frequency	Equipment condition	Remarks
27.	GPS / GSM antenna (combo unit)	Check the communication status of the GPS Receivers	GPS1 and GPS2 LED shall blink / glow in PPC	Q		
29.		Tighten all the connections /Terminations	All the connections to be tightened.	Q		
30.		Clean surface of the GPS/GSM antennae	Surface should be kept clean	Q		
31.		Check the communication status of the GSM modems	GSM1and GSM2 LED shall blink /glow in VGW	Q		
32.		Due date for the GSM-1 recharge/Balance amount		Q		
33		Due date for the GSM-2 recharge/Balance amount		Q		
34	RFID Tag Fitments	Fitment of the RFID Tags in station section and block section is intact.	Found OK or not	Q		
35	TCAS Equipment Relay Room and LC gate equipment.	Relay output voltage to checked in Tapping Relay	Should be greater than >22 Volt	H		
36		Relay output voltage to checked in Tapping Relay	Should be greater than >22 Volt	H		
37	RF Antennae Connectivity	Check weather proofing of antennae connector terminals	Replace if it is not OK	H		
38	Surge arrestors	Shall be free from dust and contamination	Surface should be kept clean	H		
	Component Replaced during Preventive maintenance					
	Component Name			Qty	Reason for replacement	Remarks

Annual Schedule Maintenance Hrs	
Annual Shutdown	
Annual Operator hours	

Note : M means Monthly
Q means Quarterly
H means Half Yearly

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