DIRECTORATE OF COORDINATION POLICE WIRELESS
MINISTRY OF HOME AFFAIRS
GOVERNMENT OF INDIA

TECHNICAL SPECIFICATION
OF
HF TRANSCEIVER
&
MANPACK

TECHNICAL STANDARD
No. DCPW/ TS-HF/01/13

Issue: January, 2013

Technical Specification

Of

HF Transceiver
(15 Watts to 100 Watts)
&
HF Manpack Transceiver
(5 Watts to 25 Watts)

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Directorate of Coordination
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Ministry of Home affairs
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1.0 Introduction

Long-Haul Radio communications take place in the high-frequency (HF) range of 2.0 to 30 MHz. The radio waves can propagate as sky waves in this band, which are refracted from the earth's ionosphere and enabling radio communications over very long distances without the use of repeaters or satellites. This unique ability of HF Radios can be utilized in tactical arena where *ad hoc radio* communications is required with minimal assets and planning.

1.1 Scope

These Technical Specification is intended to be used within State / UT Police Organizations and CAPFs. The purpose of this document is to ensure necessary performance and technical parameters in the form of firm requirements for interoperability and interface of long haul tactical radios in high frequency bands.

2. Technical Specification of 100 Watts HF Transceiver

2.1 General Specification:

General	
1.Frequency Range	2.0 MHz to 29.9999 MHz with 100 Channel Spacing and 10 Hz Resolution.
2. Modes	SSB(J3E) USB, LSB, AM/AM(E),CW/MCW,AFSK
3. Preset	200 Channels or more
4. Frequency Stability	± 1 PPM or better
5. Built-in-test	Front panel testing.
6. Input Power	+ 12 V DC Nominal (10.8V to 14.4V) & 230 V AC
7. Power Consumption	≤30W in Receive & ≤ 450W in Transmit
8. EMI / EMC	MIL-STD- 461 / 462C or ETSI or CISPR 22 or IEC 61000-4 Series (TEC/EMI/TEL-001/01 FEB-09)
9.Weight	Less than 10 KG
10.Antenna Impedance	50 Ω Unbalanced
11.Protection	(i) Reverse Polarity protection (without fuse) (ii) Protection against high VSWR. (iii) Over Voltage and under Voltage Protection.
12. Roles	Fixed/Transportable/Mobile
13. Headphone Impedance	150Ω / 300Ω / 600Ω
14.Cooling	Built in fan/ Heat sink
15.VSWR	Better than 1.5
16. Visual display	Front panel LCD display
17. Interface	RS-232 / USB
18. Programming	PC programming software and front panel Programming.
19.Communication Security	Approved encryption (SAG) may incorporated by user.

2.2. Transmitter Specification:

TRANSMITTER	
1.RF Power	15W to 100W PEP (Low, Medium , High) (user programmable)
2. Spurious Emission	≤ 50 mW and 40 db or more below PEP
3. Side Band Suppression	≥ 70db or better
4.Carrier Suppression	≥ 40db or better
5.Inter modulation distortion	30db min. below PEP
6.Audio Response	Within 6db from 350Hz to 2700Hz.
7.Side Tone Level	Better than 0.1 mW into 150Ω load for 5mV of audio input at 1 KHz.
8.Modulation Sensitivity	1 to 10 mV at 1 KHz for full power under SSB mode.

2.3 Receiver Specification:

RECEIVER	
1.Receiver Sensitivity	-111dbm for 10db SINAD or better
2.Image Rejection	≥70 db or better
3.IF Rejection	≥70 db or better
4.In band Inter Modulation Distortion.	35db min. below PEP
5.Audio Response	Within ±6db from 350Hz to 2700Hz
6.Audio Output	1W across loudspeaker or more
7. Audio Frequency Harmonics Distortion.	≤ 25 db or better

2.4 Environmental parameters:

Environmental	
1.Operating Temperature	-30˚C to +55˚ C
2.Storage Temperature	-30˚C to +60˚C
3.Humidity	95% non-condensing (-20˚C to +60˚C)
4. Dust	MIL-STD-810 C /D /E /F /G or JSS-55555
5.Vibration	MIL-STD-810 C /D /E /F /G or JSS-55555
6.Shock	MIL-STD-810 C /D /E /F /G or JSS-55555
7. Altitude	MIL-STD-810 C /D /E /F /G or JSS-55555

2.5 Features:

Features	
1.Selective calling	Digital FSK coding (4/6 digit select call)
2.Scanning	5 channels per second or better
3.ALE (2G / 3G)	Complying MIL-STD-188-141B
4. ALE link Quality data	24 hours of up to 100 stations and 100 channels Or better.
5. ALE link Quality data resolution	Local: 5 bits SINAD, 5 bits BER Remote: 5 bits SINAD, 5 BER
6.Flash messages	Predefined messages
7. Vocoder	MELP/ACLP (1200 / 2400 bps)
8.Frequency Hopping	Hop Rate: 6 / 12 / 25 hops per second (User programmable) as per regulation. Hop set table:100 frequencies or better.
9. Data Modem	MIL-STD -188 -110A single tone ≥ 4800 bps Option-1 : Built-in Option-2 : External
10.GPS Interface	Inbuilt GPS with polling facility.
11.Data Communication	Provision for data communication
12.Tele Call	The Radio set should have capability to dial and Operate data.
13.RS-232 control	The Radio set should have capability to operate at 4800 baud rate or better.
14.Tuneable receiver	Continuous tuneable.
15.Radio kill/un-kill	Should have kill/un-kill function.
16. Remote Operation	Capable to operate from remote location.
17.Audio input sockets	Mic and external socket.
18. Squelch	Coded squelch.
19. Push to talk.	Suitable Microphone to be provided.

3. Technical Specification of 5 to 25 Watts HF Man pack Transceiver

3.1 General Specification:

General	
1.Frequency Range	2.0 MHz to 29.9999 MHz with 100 Hz Channel Spacing and 10 Hz Resolution
2. Modes	SSB (J3E) USB, LSB, AM/AM(E),CW/MCW,AFSK
3. Preset	200 Channels or more
4. Frequency Stability	± 1 PPM or better
5. Built-in-test	Front panel testing.
6. Input Power	12 V DC Nominal (10.8 V to 14.4V)
7.Battery life Duty Cycle : 5 / 5 / 90	Option-1 : 20 hrs or more Option-2 : 40 hrs or more
8. EMI / EMC	MIL-STD- 461 / 462C or ETSI or CISPR 22 or IEC 61000-4 Series (TEC/EMI/TEL-001/01 FEB-09)
9.Weight	Less than 6 Kg with battery
10.Antenna Impedance	50 Ω unbalanced
11.Protection	(i) Reverse Polarity protection. (ii) Protection against high VSWR.
12. Roles	Man pack
13. Headphone Impedance	150Ω / 300Ω / 600Ω
14.Cooling	Convection from case.
15.VSWR	Better than 1.5
16. Visual display	Front panel LCD display
17. Interface	RS-232 / USB
18. Programming	PC programming software and front panel Programming.
19.Communication Security	Approved encryption (SAG) may be incorporated by user

3.2 Transmitter specification:

TRANSMITTER	
1.RF Power	5W to 25W PEP (Low, Medium, high) (user programmable)
2. Spurious Emission	≤40 db below PEP
3. Side Band Suppression	≥ 70db or better
4.Carrier Suppression	≥ 40db or better
5.Inter modulation distortion	30db min. below PEP
6.Audio Response	Within 6db from 350Hz to 2700Hz.
7.Side Tone Level	Better than 0.1 mW into 150Ω load for 5mV of audio input at 1 KHz.
8.Modulation Sensitivity	1 to 10 mV at 1 KHz for full power under SSB mode.

3.3 Receiver Specification:

RECEIVER	
1.Receiver Sensitivity	- 111dbm for 10db SINAD or better
2.Image Rejection	≥70 db or better
3.IF Rejection	≥70 db or better
4.In band Inter Modulation Distortion.	35db min. below PEP
5.Audio Response	Within ±6db from 350Hz to 2700Hz
6.Audio Output	1W across loudspeaker or more
7. Audio Frequency Harmonics Distortion.	≤ 25 db or better

3.4 Environmental Parameters:

Environmental	
1.Operating Temperature	-30˚C to +55˚ C
2.Storage Temperature	-30˚C to +60˚C
3.Humidity	95% non-condensing (-20˚C to +60˚C)
4. Dust	MIL-STD-810 C /D /E /F /G or JSS-55555
5.Vibration	MIL-STD-810 C /D /E /F /G or JSS-55555
6.Shock	MIL-STD-810 C /D /E /F /G or JSS-55555
7.Water intrusion	MIL-STD-810 C /D /E /F /G or JSS-55555
8. Altitude	MIL-STD-810 C /D /E /F /G or JSS-55555

3.5 Features

Features	
1.Selective calling	Digital FSK coding (4/6 digit select call)
2.Scanning	5 channels per second or better
3.ALE (2G / 3G)	Complying MIL-STD-188-141B
4. ALE link Quality data	24 hours of up to 100 stations and 100 channels or better.
5. ALE link Quality data resolution	Local: 5 bits SINAD, 5 bits BER Remote: 5 bits SINAD, 5 BER
6.Flash messages	Predefined messages
7. Vocoder	MELP/ACLP (1200 / 2400 bps)
8.Frequency Hopping	Hop Rate: 6 / 12 / 25 hops per second (User programmable) as per regulation. Hop set table :100 frequencies or better
9.GPS Interface	Inbuilt GPS with polling facility.
10.RS-232 control	The Radio set should have capability to operate on 4800 baud rate or more.
11.Tuneable receiver	Continuous tuneable.
12.Radio kill/un-kill	Should have kill/un-kill function.
13.Audio input sockets	Mic and external socket.
14. Squelch	High Quality Syllabic Squelch
15. Push to talk.	Suitable Microphone to be provided.
16.Audio Socket	Suitable Headgear should be provided

Glossary

SSB	Single Side Band
USB	Upper Side Band
LSB	Lower Side Band
AM	Amplitude Modulation
AM (E)	Amplitude Modulation
CW	Continuous Wave
MCW	Modulated Continuous Wave
AFSK	Audio Frequency Shift Keying
PPM	Parts Per Millennium
EMI	Electromagnetic Interference
EMC	Electromagnetic Compatibility
VSWR	Voltage Standing Wave Ratio
LCD	Liquid Crystal Display
USB	Universal Serial Bus
PEP	Peak Envelop Power
SINAD	Signal -to -Noise and Distortion Ratio
FSK	Frequency Shift Keying
MELP	Mixed Excitation Linear Prediction
ACLP	Adaptive Multi Rate Coder
GPS	Global Positioning System
BER	Bit Error Rate

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