

**GOVERNMENT OF INDIA
(Ministry of Home Affairs)
COMMUNICATION & IT DIRECTORATE
CENTRAL RESERVE POLICE FORCE
EAST BLOCK-7, SEC-1, R.K. PURAM, NEW DELHI-110066**

(Email:- comncell@crpf.gov.in Tele/Fax:011-26109038)

No. B.V-7/2024-25-C (QRs)

Dated, the 16 April'2024

To


1. The DsG: AR, BSF, CISF, ITBP, NSG, SSB and BPR&D
2. Director, DCPW

Subject: Regarding Revision of QRs/TDs of "Radio Communication Test Set".

I am directed to refer on the subject mentioned above and to say that the revised QRs/TDs of "Radio Communication Test Set" which has been recommended by CAPFs sub-group and experts from DCPW has been approved by the DG CRPF.

2. QRs/TDs of "Radio Communication Test Set (Analog/Digital)" has forwarded earlier vide letter No.B.V-7/2014-15-C(QRs)-(29) dated 30/12/2014 is rescinded.

Encl:-As above


2
16/4/24

{Amit Taneja}

**DIG (Equipment)
Communication & IT Branch
Directorate General C R P F**


No. B.V-7/2024-25-C (QRs)

Dated, the 16 April'2024

Copy to:-

1. Mrs. Sugandhi, Technical Director, and North block, MHA with request to upload the revised QRs/TDs of "Radio Communication Test Set" on MHA website (e-mail ID: mpsugandhi@nic.in).

Encl:-As above


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16/4/24

{Amit Taneja}

**DIG (Equipment)
Communication & IT Branch
Directorate General C R P F**

QRs/TDs of Radio Communication Test Set (ANALOG/DIGITAL)

Radio Communication Test Set (ANALOG/DIGITAL) should consist of following:-

1. RF Signal Generator	2. RF Power Meter	3. Audio Frequency Counter
4. SINAD Meter	5. Distortion Meter	6. Hum & Noise Measurement/ meter
7. Signal to Noise Ratio Meter	8. Audio Function Generator	9. Oscilloscope(Optional)
10. RF Spectrum Analyzer	11. Audio Spectrum Analyzer	12. Harmonics & Spurious Measurement
13. Tracking Generator (Optional)	14. Analog and DMR Test mandatory.P-25-I&II, TETRA, LTE & LTE advanced (Test optional) as per user requirement.	15. Inter modulation distortion measurement
16. Automatic measurement for Analog & Digital radio tests	17. Automatic Report Generator in PDF,JPEG/Excel Format	18. Occupied Bandwidth Meter

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S.N.	Parameters	Specification	Trial Directives
1	General Characteristics		
	a) Operating Voltage	Operable on AC/ DC as per user requirement (Inbuilt battery optional)	B.O.O will check practically.
	b) Storage capacity	Storage capacity (Internal/external) As per user requirement	B.O.O will check practically.
	c) Display	Internal (minimum size 8") /external (as per user requirement)	B.O.O will check size diagonally by standard scale.
	d) USB port	2.0 USB or better 2 nos or more	B.O.O will check practically.
	e) Ethernet	RJ-45 100/10 Mbit/s, minimum 1 port	B.O.O will check practically.
	f) Calibration support	Advance Govt/NABL accredited Calibration facilities should be Complied in India free of cost during the guarantee/warranty period.	Firm will submit certificate of Govt.Lab or NABL/ILAC accredited laboratory
	g) Field up gradations	a) The Product should be field upgradable to other Digital technologies such as: P25 Phase I&II testing, DMR radio with Repeater, Tetra Mobile, LTE, LTE-adv and base station and DMO mode testing. b) The equipment should be capable of performing tests of Digital /Analog radio set and contain all functionalities	a) Firm will submit OEM certificate. b) Board will carry out testing of Digital/ Analog radios set practically and ensure its workability and compatibility.
2	RF SIGNAL GENERATOR FOR RECEIVER TEST		
	a) Frequency Range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check practically by set the various frequencies within the specified range and ensure its availability.
	b) Frequency Resolution	1 Hz or Better	B.O.O will check practically.
	c) Output level Range	T/R Port :- -120 to -30 dBm or better Gen Port -120 to +3dBm or better	B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives
	d) Resolution	0.1 dB or Better	B.O.O will check practically.
	e) Port Protection Limit	Port Protection Limit:- T/R port-Minimum 100W Gen Port – +10dBm (with or without attenuator)	B.O.O will check practically.
	f) Harmonics	<-20dBc or better	B.O.O will check practically.
	g) Non-Harmonics	<-35dBc or better	B.O.O will check practically.
2.1	Modulation		
	a) Selection Mode	AM,FM,AM -USB, AM-LSB	B.O.O will check practically by selecting the all modes/ waveforms in the test set and ensure its availability and workability.
	b) waveforms	Sine, Dual Sine /DTMF	
2.2	FM Modulation		
	a)Deviation Range	100 Hz to 75 KHz or better	B.O.O will check practically by selecting one/ two frequencies of specified range and ensure availability.
	b)Deviation accuracy	+5% of setting or better	B.O.O will check practically by setting the accuracy and resolution as specified and ensure its availability.
	c)Resolution	1 Hz or better	
	d)modulation Range	20 Hz to 20 KHz or better	B.O.O will check by setting the desire range practically.
2.3	AM Modulation		
	a)AM depth range	1% to 90% or better	B.O.O will check practically by set percentage of modulation in the specified range and ensure availability.
	b)Accuracy	+5% of setting or better	B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives
2.4	SSB Modulation		
	a) Modulation selection	USB, LSB	B.O.O will check practically by set modulation mode /range /bandwidth in the specified range and ensure availability and workability
	b) SSB depth range	1% to 90%	
	c) Modulation bandwidth	30 Hz to 20 KHz or better	
3	Receiver (Transmitter test)		
	a) Frequency Range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check practically by set the different frequencies within the specified range and ensure their availability.
	b) Demodulation selection	AM, FM, AM USB, AM-LSB	B.O.O will check practically.
	c) Signal Code	Sine , Dual Sine /DTMF	B.O.O will check practically.
	d) Sensitivity	Less than -100 dBm (10 dB SINAD) or better	B.O.O will check practically.
3.1	Demodulation Measurements		
	a) FM Deviation	1 KHz to ± 75 KHz or better	B.O.O will check practically by selecting the specified range and ensure its availability and workability.
	b) Accuracy	± 5 % plus source residual (IF BW set approximately for received modulation BW)	B.O.O will check practically.
	c) Range	10 Hz to 20 KHz	B.O.O will check practically.
	d) AM Deviation	1% to 99% or better	B.O.O will check practically.
	e) Accuracy	± 5 % plus source residual (IF BW set approximately for received modulation BW)	B.O.O will check practically.
	f) AM rate	10 Hz to 20 KHz or better	B.O.O will check practically.
4	RF Power Meter		
	a) Range	0.1 W to 125 W (with or without attenuator)	B.O.O will check practically.
	b) VSWR	< 1.5:1 or better	B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives		
5	Audio Frequency counter				
	Range	20 Hz to 20 KHz or better	B.O.O	will	check
	Wave shape	Sine	B.O.O	will	check
	AF level meter	50 mVrms to 30 Vrms or Better	B.O.O	will	check
6	SINAD Meter				
	a)Frequency Range	300 Hz to 10 KHz or better	B.O.O	will	check
	b)Accuracy	± 1 dB	B.O.O	will	check
	c)Range	0 to 45dB or better	B.O.O	will	check
	d)Level	0.1 Vrms to 10 Vrms or better	B.O.O	will	check
7	Distortion Meter				
	a)Distortion Range	1% to 50%	B.O.O	will	check
	b)Frequency Range	300 Hz to 10 KHz or better	B.O.O	will	check
	c)Input level (Audio)	0.1 V rms minimum to 10 Vrms or better	B.O.O	will	check
	d)Resolution	1% or better	B.O.O	will	check
8	Hum and Noise Measurement/ meter				
	a)Range	-80 dB to 0 dB or better	B.O.O	will	check
	b)Signal Frequency	300 Hz to 3 KHz or better	B.O.O	will	check
	c)Resolution	1 dB or better	B.O.O	will	check
9	Signal to Noise Ratio Meter				
	a)Frequency range	300 Hz to 3 KHz or better	B.O.O	will	check
	b)Range	-63 dB to 0 dB or better	B.O.O	will	check
	c)Accuracy	± 1 dB or better	B.O.O	will	check
10	Audio function generator				
	a)Wave Shape	Sine , Dual Sine /DTMF	B.O.O	will	check
	b)Frequency Range	20 Hz to 20 KHz	B.O.O	will	check
	c)Level range	1 mV to 5 V or better	B.O.O	will	check

S.N.	Parameters	Specifications	Trial Directives
	d) frequency resolution	0.1 Hz or better	B.O.O will check practically.
	e) Level accuracy	2% or better	B.O.O will check practically.
11	OSCILLOSCOPE (Optional)		
	a) Nos of channel	One	B.O.O will check practically.
	b) Frequency range (vertical)	DC to 21 KHz	B.O.O will check practically.
12	RF Spectrum analyzer		
	a) Frequency range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check the specified frequency range practically and ensure its availability and workability.
	b) Frequency resolution	1 Hz or better	B.O.O will check practically.
	c) Frequency accuracy	Same as frequency standard	B.O.O will check practically.
	d) Span accuracy	±5% of span width or better	B.O.O will check practically.
	e) Span mode	Start, stop, centrespan	B.O.O will check practically.
	f) Resolution bandwidth (RBW) filters	100 Hz to 5 MHz or better, auto selectable	B.O.O will check practically.
	g) Video bandwidth (VBW) / Trace average	Selectable from 20 Hz to 1 MHz	B.O.O will check practically.
13	Audio spectrum analyzer		
	a) Frequency range	20Hz to 20kHz	B.O.O will check the specified frequency range practically and ensure its availability and workability.
	b) Frequency span	1 KHz to 20 KHz	B.O.O will check practically.
	c) Frequency accuracy	±50ppm, (±10 ppm typical)	B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives
14	Harmonics and spurious measurement for Radio		
	a) Harmonic/ spurious level range	0 to -50dBc or better	B.O.O will check the specified level range practically
15	Tracking Generator (Optional)		Firm will submit OEM certificate
16	Digital radio tests		
16.1	Digital Mobile Radio (DMR) Technology		
	a)RF Signal Generator	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check the all specified parameters one by one practically after test the DMR technology based radio equipment and ensure their availability and workability in the instrument.
	b)Output level	T/R Port :- -120 to -30 dBm or better Gen Port -120 to +3dBm or better	
	c)Modulation	Should comply with DMR tier-I, II & III	
	d)Test pattern	Should comply with DMR tier-I, II & III	
	e)Duplex Radio /Repeater	Should have facility to test in duplex mode.	
	f)Vocoder Test (Optional)	IMBE/ AMBE, AMBE+2	
i)	DMR Measurement	a) It should have self freq. reading of DMR/Digital Radios. b) It should be able to read in dual capacity direct mode (DCDM). c) It should have facility test voice modulation in DMR /digital radio.	B.O.O will check the specified range practically.
	a)FSK -Error	0 to 10 %	B.O.O will check the specified resolution practically.
	b)Range	0.01%	B.O.O will check practically.
	c)Accuracy	5%	B.O.O will check the specified range practically.

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S.N.	Parameters	Specifications	Trial Directives
ii)	Magnitude Error		
	a) Range	0-5	B.O.O will check the specified range practically.
	b) Resolution	0.01	B.O.O will check the specified resolution practically.
	c) Accuracy	< 5% of reading	B.O.O will check practically and also refers the brochure of the instruments.
iii)	Frequency Error		
	a) Range	Auto ranging	B.O.O will check the specified range practically.
	b) Resolution	1 Hz	B.O.O will check the specified resolution practically.
	c) Accuracy	Frequency standard ± -0.1 ppm/year	B.O.O will check practically and also refers the brochure of the instruments.
16.2	P-25 Measurement (Optional)		
i)	RF Signal Generator		
	a) Frequency range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check the all specified parameters one by one practically after test the P25 technology based radio equipment and ensure their availability and workability in the instrument.
	b) Output level range	Gen Port :- -120 .0 to +3 dBm or better	
	c) Resolution	1Hz or better	
	d) Modulation	Should comply as per APCO-P25 Phase 1 & Phase 2	
	e) Test pattern	Should comply as per APCO-P25 Phase 1 & Phase 2	
	f) Duplex radio	Should have facility for test in duplex mode.	
	g) Vocoder Test (Optional)	AMBE+2	

S.N.	Parameters	Specifications	Trial Directives
ii)	Modulation Fidelity		
	a)Range	0 to10 %	B.O.O will check the specified range practically.
	b)Resolution	0.1% or better	B.O.O will check the specified resolution practically.
	c)Accuracy	5 % or better	B.O.O will check practically and also refers the brochure of the instruments.
iii)	Frequency Error		
	a)Range	Auto ranging	B.O.O will check the specified range practically.
	b)Resolution	1 Hz or better	B.O.O will check the specified resolution practically.
	c)Accuracy	Frequency Standard ± 2 ppm or better	B.O.O will check practically and also refers the brochure of the instruments.
iv)	UUT TX/RX Bit Error Rate		
	a)Range	0 to 20 %	B.O.O will check the specified range practically.
	b)Resolution	0.1% or better	B.O.O will check the specified resolution practically.
v)	Error Vector Magnitude		
	a)Range	0-50%	B.O.O will check the specified range practically.
	b)Resolution	0.1% or better	B.O.O will check the specified resolution practically.
	c)Modulation Fidelity Display	Should have eye diagram, constellation, distribution, spectrum analyzer	B.O.O will check the specified display practically.
vi)	P 25 Phase II - HCPM TX/RX Test:- Up gradation facilities should be Complied		Firm will submit OEM certificate.
vii)	P25 Trunking Operation VHF /UHF /700/800 MHz LSM Generate and Receive/Analysis :- Facilities should be Complied		B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives
16.3	TETRA Measurement (Optional)		
	a) Modulation	Should comply with TETRA 1, II & III	B.O.O will check the specified function practically.
	b) $\pi/4$ DQPSK Error	0-10%	B.O.O will check the specified function practically.
	c) Resolution	0.01%	B.O.O will check the specified function practically.
i)	EVM (Error vector magnitude) Measurement		
	a)Range	0-5	B.O.O will check practically.
	b)Resolution	0.01	B.O.O will check practically.
ii)	Adjacent channel Power Meter		
	a)Frequency Range	250KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check practically.
	b)ACP Range	User defined Channel bandwidth and guard band	B.O.O will check practically.
17	Inter Modulation Distortion Measurement		
	a) Frequency Range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check practically by set the different frequencies within the specified range and ensure their availability.
	b) 3rd order inter modulation distortion	20dB or better	B.O.O will check practically.
18	Automatic measurement for Analog & Digital radio tests		
	a). Automation Development and deployment Software		B.O.O will check practically.
	b). Analog Radio Test Software Plug-In for automation		B.O.O will check practically.
	c). Digital Radio Test Software Plug-In for automation		B.O.O will check practically.
	d). Excel compatible spreadsheet Plug-In for automation		B.O.O will check practically.

S.N.	Parameters	Specifications	Trial Directives
19	Automatic report generator in PDF, JPEG/ EXCEL format		B.O.O will check practically.
20	OCCUPIED BANDWIDTH METER		
	a) Frequency Range	250 KHz to 3GHz or 250 KHz to 6 GHz (As per user requirement)	B.O.O will check practically by set the different frequencies within the specified range and ensure their availability
	b) Band width range	User defined bandwidth	B.O.O will check the specified resolution practically.
21	Environment and safety standard		
	a) Operating temperature	0° to +45° C	Firm will submit certificate of Govt Lab or NABL/ILAC accredited laboratory
	b) Storage temperature	-30° to +70° C	
	c) Relative humidity	80 %RH or better	
	d) Safety standard	Required	
22	Accessories	All required accessories for testing all the parameters of Equipment's and User/Maintenance Manual, included calibration testing software(As per user requirement)	B.O.O will check Physically.
23	Software	Generic software to test all digital UHF,VHF and HF Radios	B.O.O will check practically.

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S.N.	Parameters	Specifications	Trial Directives
24	Warranty	Minimum 5 Year guarantee/ warranty period. Supplier and manufacturer should give undertaking for supplying spares parts and service for 8 years including warranty period	Firm will submit OEM certificate.
25	Training	Training must be given in Three Time for proper utilization.	Firm will submit OEM certificate.

(Nb Sub Maheshwar Prasad Gupta)
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