

**GOVERNMENT OF INDIA**  
**(Ministry of Home Affairs)**  
**DIRECTORATE GENERAL**  
**CENTRAL RESERVE POLICE FORCE**  
**EAST BLOCK-7, SEC-1, R.K. PURAM, NEW DELHI-110066**  
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No. B.V-7-C/2023-24-C (RCTS)

Dated, the April'2023

**Subject:- REQUEST FOR COMMENTS OF STAKEHOLDERS/OEM/FIRMS ON QRs (QUALITY REQUIREMENT) & TDs of "RADIO COMMUNICATION TEST SET".**


1. The revised QRs/TDs "RADIO COMMUNICATION TEST SET" is attached as **Appendix 'A'**. The OEMs/Vendors are requested to forward information of the product, which they can offer and also forward correct specifications of their system against each parameter. Only complied or not complied remarks will not be accepted. The firms are also requested to furnish the following details:-
  - Whether you are OEM/Vendor?
  - If vendor, details of OEM.
  - Authorization certificate from OEM.
2. The required information/details may please be forwarded at the following addresses by 02<sup>nd</sup> May'2023.

Directorate General CRPF

East Block-7, Sec-1, R.K. Puram, New Delhi-110066

Email: [comncell@crpf.gov.in](mailto:comncell@crpf.gov.in)

3. An early response is requested.

  
{Sunil Kumar Singh, DC(Comn)}  
**For DIG (Equipment)**  
**Directorate General, C R P F**

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

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

1. RF Signal Generator(Receiver Testing)	2. RF Power Meter	3. Audio Frequency Counter
4. SINAD Meter	5. Distortion Meter	6. Hum & Noise 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. Digital Test (optional)P-25-I&II, TETRA, ,DMR LTE & LTE advanced	15. Inter modulation distortion meter
16. One button Automatic measurement for analog & digital radio tests	17. Automatic Report Generator in PDF & Excel Format	18. Occupied Bandwidth Meter

S.N.	Parameters	Specification	Trial Directives
1	<b>General Characteristics</b>		
	a) Operating Voltage	Operable on AC/ DC as per user requirement (Inbuilt battery optional)	B.O.O will check practically.
	b) Internal 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 Minimum 3 nos	B.O.O will check practically.
	e) Ethernet	RJ-45 1000/100/10 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	<p>a) The Product should be field upgradable to other Digital technologies such as: P25 Phase I&amp;II testing, DMR radio with Repeater, Tetra Mobile,LTE, LTE-adv and base station and DMO mode testing.</p> <p>b) The equipment should be capable of performing tests of Digital /Analog radio set and contain all functionalities</p>	<p>a) Firm will submit OEM certificate.</p> <p>b) Board will carry out testing of Digital/ Analog radios set practically and ensure its workability and compatibility.</p>	
2	<b>RF SIGNAL GENERATOR (Receiver Testing)</b>		
	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.

S.N.	Parameters	Specification	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	<-35 dBc or better	B.O.O will check practically.
2.1	<b>Modulation</b>		
	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	<b>FM Modulation</b>		
	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	<b>AM Modulation</b>		
	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.

<b>S.N.</b>	<b>Parameters</b>	<b>Specification</b>	<b>Trial Directives</b>
2.4	<b>SSB Modulation</b>		
	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	20 Hz to 20 KHz or better	
3	<b>Receiver (Transmitter test)</b>		
	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	<b>Demodulation Measurements</b>		
	a) FM Deviation	1 KHz to $\pm 75$ KHz or better	B.O.O will check practically by selecting the specified range and ensure its availability and workability.
	b) Accuracy	$\pm 5$ % 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	$\pm 5$ % 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	<b>RF Power Meter</b>		
	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.

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

<b>S.N.</b>	<b>Parameters</b>	<b>Specification</b>	<b>Trial Directives</b>
	d) frequency resolution	0.1 Hz or better	B.O.O will check practically.
	e) Level accuracy	1% or better	B.O.O will check practically.
11	<b>OSCILLOSCOPE (Optional)</b>		
	a) Nos of channel	<b>One</b>	B.O.O will check practically.
	b) Frequency range (vertical)	<b>DC to 21 KHz</b>	B.O.O will check practically.
13	<b>RF Spectrum analyzer</b>		
	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	<b>20 Hz to 5 MHz or better, auto selectable</b>	B.O.O will check practically.
	g) Video bandwidth (VBW)	<b>Selectable from 20 Hz 1 MHz</b>	B.O.O will check practically.
14	<b>Audio spectrum analyzer</b>		
	a) Frequency range	<b>20Hz to 20kHz</b>	B.O.O will check the specified frequency range practically and ensure its availability and workability.
	b) Frequency span	<b>20 Hz to 20 KHz</b>	B.O.O will check practically.
	c) Frequency accuracy	±50ppm,( ±10 ppm typical)	B.O.O will check practically.

S.N.	Parameters	Specification	Trial Directives
15	<b>Harmonics and spurious measurement for Radio</b>		
	a) Harmonic/s purious level range	0 to -50dBc or better	B.O.O will check the specified level range practically
	b) Accuracy	Same as RF spectrum analyzer	B.O.O will check practically and also refers the brochure of the instruments.
16	<b>Tracking Generator</b> (Optional)		Firm will submit OEM certificate
17	<b>Digital radio tests</b>		
17.1	<b>P-25 Measurement</b>		
i)	<b>RF Signal Generator</b>		
	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 :- -130 .0 to +3 dBm or better	
	c) Resolution	1Hz or better	
	d) Modulation	Should comply as per APCO-P25 Phase 1 & Phase2	
	e) Test pattern	Should comply as per APCO-P25 Phase 1 & Phase2	
	f) Duplex radio	Should have facility for test in duplex mode.	
	g) Vocoder Test (Optional)	AMBE+2	
ii)	<b>Modulation Fidelity</b>		
	a)Range	0 to10 %	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 % or better	B.O.O will check practically.
iii)	<b>Frequency Error</b>		
	a)Range	Auto ranging	B.O.O will check the specified range practically.



<b>S.N.</b>	<b>Parameters</b>	<b>Specification</b>	<b>Trial Directives</b>
	b)Resolution	0.01 Hz	B.O.O will check the specified resolution practically.
	c)Accuracy	Frequency Standard $\pm 1$ Count	B.O.O will check practically.
iv)	<b>UUT TX/RX Bit Error Rate</b>		
	a)Range	0 to 20 %	B.O.O will check the specified range practically.
	b)Resolution	0.01%	B.O.O will check the specified resolution practically.
v)	<b>Error Vector Magnitude</b>		
	a)Range	0-50%	B.O.O will check the specified range practically.
	b)Resolution	0.01%	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)	<b>P 25 Phase II – HCPM TX/RX Test:-</b> Up gradation facilities should be Complied		Firm will submit OEM certificate
vii)	<b>P25 Trunking Operation VHF /UHF /700/800 MHz LSM Generate and Receive/Analysis :-</b> Facilities should be Complied		B.O.O will check practically
17.2	<b>Digital Mobile Radio (DMR) Technology</b>		
	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	

<b>S.N.</b>	<b>Parameters</b>	<b>Specification</b>	<b>Trial Directives</b>
i)	<b>DMR Measurement</b>	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.
ii)	<b>Magnitude Error</b>		
	a) Range	0-5	B.O.O will check the specified range practically.
	b) Resoluti on	0.01	B.O.O will check the specified resolution practically.
	c) Accurac y	< 5% of reading	B.O.O will check practically.
iii)	<b>Frequency Error</b>		
	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 $\pm$ - 0.1 ppm/year	B.O.O will check practically.
17.3	<b>TETRA Measurement</b>		
	a) Modulation	Should comply with TETRA 1, II & III	B.O.O will check the specified function practically.
	b) PSK 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.

<b>S.N.</b>	<b>Parameters</b>	<b>Specification</b>	<b>Trial Directives</b>
i)	<b>Magnitude error</b>		
	a)Range	0-5	B.O.O will check practically.
	b)Resolution	0.01	B.O.O will check practically.
ii)	<b>Adjacent Power Meter</b>		
	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.
18	<b>Inter Modulation Distortion Meter</b>		
	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.
19	<b>One button Automatic measurement for analog &amp; digital radio tests</b>		
	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)	Results Listener Plug-In for automation	B.O.O will check practically.
	e)	Excel compatible spreadsheet Plug-In for automation	B.O.O will check practically.
20	Automatic report generator in PDF & EXCEL format		B.O.O will check practically.
21	<b>OCCUPIED BANDWIDTH METER</b>		
	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
	Bandwidth range	3dB, User defined X-dB bandwidth	B.O.O will check the specified resolution practically.

22	<b>Environment and safety standard</b>		
	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	
23	<b>Accessories</b>	All required accessories for testing all the parameters of Equipment's and User/Maintenance Manual, included calibration testing software, BER (Bit error rate) <b>(As per user requirement)</b>	B.O.O will check Physically.
24	<b>Software</b>	Generic software to test all digital <b>UHF</b> ,VHF and HF Radios	B.O.O will check practically.
25	<b>Warranty</b>	Minimum 3 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
26	<b>Training</b>	Training must be given in Three Time for proper utilization.{ <b>To be incorporated in tender documents</b> }	Firm will submit OEM certificate