

HABERSHAM COUNTY BOARD OF COMMISSION
EXECUTIVE SUMMARY

SUBJECT: Communication System Analyzer

DATE: 02/06/2023

BUDGET INFORMATION:

ANNUAL- X

CAPITAL-

(X) RECOMMENDATION

() POLICY DISCUSSION

() STATUS REPORT

() OTHER

COMMISSION ACTION REQUESTED ON: 02/20/2023

PURPOSE: The 911 center is requesting the approval to purchase 1 R8100 communications system analyzer. The R8100 will be used to perform preventive maintenance on the radio system and subscriber units for the county. The R8100 will also be capable of preventive maintenance on the new radio system and subscribers. The units come at a cost of \$24,910.00.

BACKGROUND / HISTORY: To prolong the life of the current radios system and portable radios, preventive maintenance is required. With the addition of a radio system administrator these activities can now be performed in house with a communications system analyzer.

FACTS AND ISSUES:

- a. The current radio system is end of life and finding issues before critical failure is a top priority.
 - b. Portable radios are just as important as the infrastructure and requires more care for prolonged life. The R8100 can align and tune portable radios helping to reduce failure.
 - c. The R8100 is an open communication system analyzer which means it is compatible with the new L3/Harris radios system and portables.
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OPTIONS:

- 1) Approve the purchase of R8100 Communications System Analyzer.
 - 2) Deny the purchase of R8100 Communications System Analyzer
 - 3) Utilize vendor for preventive maintenance on radio system and portable radios.
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RECOMMENDED SAMPLE MOTION: I approve the purchase of the R8100 Communication System Analyzer.

DEPARTMENT: Habersham County 911

Prepared by: Tom Priddy
Radio System Administrator

Director: Lynn Smith
911 Director

**ADMINISTRATIVE
COMMENTS:** _____

DATE: _____
County Manager

International Wireless Communication EXPO promotion discount

Send orders to

Phone: (903) 985-8999
Fax: (903) 985-8998
email: freedom.sales@astronics.com



Quotation For: Habersham County
Tom Priddy
175 EOC Drive
Cornelia, GA 30531

Phone: [706-525-1819](tel:706-525-1819)
email: tpriddy@habershamga.com

Please Make Purchase Orders to:
Freedom Communication Technologies
2002 Synergy Drive, Suite 200
Kilgore, TX 75662

DATE: 1/9/2023
Quotation #: Hambersham 8100-3

Quotation valid until: 3/24/2023

Prepared by: Glenn

MR FIRM	SALES PERSON	SHIP DATE	SHIP VIA	FCA POINT	TERMS
Comsel	Glenn V Searles	<2 weeks	Best Waay	Kilgore, TX	TBD

QUANTITY	PART #	DESCRIPTION	UNIT PRICE	AMOUNT
1	R8100	R8100 Communications System Analyzer - Includes R8-CF, R8-ESA and R8-TG	\$22,500.00	\$22,500.00
1	R8-DMR	DMR conventional (Tier 2)	\$2,950.00	
1	R8-AT_TRBO	AutoTune for MOTOTRO Mobiles and Portables (Except SL300)	\$3,000.00	\$3,000.00
1	RLN4460	Audio Breakout Box for Motorola Radios	\$850.00	\$850.00
1	R8-5Y	Five Year Service Plan	\$2,400.00	\$2,400.00
1	R8-GC	Protective glove case with LCD protection - R8XXX Family	\$110.00	\$110.00
1	R8-P25_II	APCO P25 Phase 2	\$3,000.00	\$3,000.00
1		2023 IWCE Show Discount Expires 3/24/23	(\$7,000.00)	(\$7,000.00)

NOTES:

- * FCT Standard Terms and Conditions shall apply, except as provided herein.
- * Any resultant Purchase Order is subject to FCT review and acceptance.
- * Changes in quantities or elimination of items may require a revision to this quotation at FCT's sole discretion.
- * While every effort will be made to ship by the estimated delivery date, no penalty shall apply for early or late deliveries.
- * Shipping costs are best estimates only.
- * A tax exemption certificate or number will be required if tax exemption is claimed.
- * A completed end-user statement will be required prior to shipment outside the U.S. for compliance with U.S. Export Control Regulations

For questions concerning this quote, please contact:

Glenn V Searles
Phone: 770-923-1062
email: glenn@comselinc.com

SUBTOTAL	\$24,860.00
ESTIMATED TAX RATE	
ESTIMATED SALES TAX	\$0.00
ESTIMATED SHIPPING	\$50.00
TOTAL	\$24,910.00

Remit to: Freedom Communication Technologies, 2002 Synergy Blvd, Kilgore, TX 75662

This document contains trade secrets and commercial or financial information which are privileged and confidential and exempt from disclosure under the Freedom of Information Act pursuant to exemptions (b)(3) and (b)(4). Furthermore, this information is prohibited from disclosure under the Trade Secrets Act, 18 U.S.C. 1905.

THANK YOU FOR YOUR INTEREST IN OUR PRODUCTS

FREEDOM

Communications System Analyzer

R8100



DATA SHEET

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Operating/Display Modes

- AM/FM Duplex Monitor and Generator
- Audio Synthesizer
- Tracking Generator (Opt.)
- Dual Display (Opt.)
- Cable Fault Locator (Opt.)
- Spectrum Analyzer
- Frequency Counter
- Frequency Error Meter
- Digital Voltmeter
- Power Meter
- Oscilloscope
- Signal Strength Meter
- SINAD/Distortion Meter



General

Displayed Average Noise:	
Level (DANL):	-140dBm (50 Ohm input termination)
Dynamic Range:	80dB
Input Related Spurious:	-60dBc max
Residual Spurious (non-input related):	-70dBm
Power	
DC Power Requirements:	15-16VDC @ 8.0A max
AC Adapter Specs:	100-240VAC, 2.5A max, 50-60Hz
Battery Power:	Internal Battery
Battery Operation:	1.5 hour typical easily swappable for extended operation
MECHANICAL/ENVIRONMENTAL	
Weight:	13.75 lbs including internal battery 6.24kg)
Dimensions:	9.4" (23.9cm) H, 12.7" (32.3cm) W, 7.5" (19.1cm) D
Operating Altitude:	Up to 15,000 ft (4572 m)
Humidity:	80% maximum relative humidity
Operating Temperature:	-20° to 50°C with external DC; 0° to 50°C using supplied AC adapter
Storage Temperature:	Without battery: -30° to +80°C; With battery: -20° to +50°C
Battery Charging Temperature:	0° to +45°C
Shock and Vibration Rating:	MIL-PRF-28800F, Class 3
WARRANTY	
Standard Warranty:	Two years
Three Year Service Plan:	Optional
Five Year Service Plan:	Optional

Generator (Receiver Test)

Port Protection Limit	5W for 30 seconds
Frequency Range:	1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz
Extended Frequency Range (Optional):	1MHz to 3GHz (250kHz to 3GHz typical)
Frequency Resolution:	1Hz

OUTPUT LEVEL GENERATE PORT

Range FM:	+5dBm to -95dBm below 2GHz; -5dBm to -95dBm above 2GHz
Range AM:	-1dBm to -95dBm below 2GHz; -11dBm to -95dBm above 2GHz
Resolution:	0.1dB
Accuracy:	±2dB

OUTPUT LEVEL RF I/O PORT

Range FM:	-30dBm to -130dBm below 2GHz; -40dBm to -130dBm above 2GHz
Range AM:	-36dBm to -130dBm below 2GHz; -46dBm to -130dBm above 2GHz
Resolution:	0.1dB
Accuracy:	±1dB to 1GHz ; ±2dB > 1GHz

SPECTRAL PURITY

Harmonic Spurious:	-20dBc max
Non-Harmonic Spurious:	-35dBc max; <-30dBc at mixing product frequencies (3227MHz - Carrier)
Residual FM:	4Hz, 300Hz to 3kHz (<1GHz); 5Hz, 300Hz to 3 kHz (> 1GHz)
Residual AM:	1.0% max, 300Hz to 3kHz
SSB Phase Noise (20 kHz Offset):	-95dBc/Hz max below 1GHz (15° to 35°C); -93dBc/Hz max all frequencies (0° to 50°C)

FM MODULATION

Deviation Range:	0 to 75kHz
Deviation Resolution:	1 Hz
Deviation Accuracy:	5% of setting
RF Output Frequency Range:	0 to 40 kHz
Modulation Output Frequency Range :	0 to 20kHz
RF Output Modulation Bandwidth:	DC to 100 kHz
Modulation Output Bandwidth:	5 Hz to 20kHz
IF Bandwidth:	> 200 kHz
Pre-emphasis:	750 µs (selectable)
Total Harmonic Distortion:	1% (1 kHz rate, 6 kHz Deviation FM, 300 Hz to 3 kHz Audio BW)

AM MODULATION

Deviation Range:	0 to 90% (AM Depth)
Deviation Resolution:	1%
Deviation Accuracy:	5% of setting
RF Output Modulation Frequency Range:	0 to 40 kHz
Modulation Output Frequency Range:	0 to 20 kHz
RF Output Bandwidth:	DC to 100 kHz
Modulation Output Bandwidth:	5 Hz to 20kHz
IF Bandwidth:	> 200 kHz
Total Harmonic Distortion:	1% (1 kHz rate, 10 % to 85 % AM, 300 Hz to 3 kHz Audio BW)

SSB-AM (USB or LSB) Modulation

AM Depth Range:	0 to 90%
Depth Resolution:	1%
Modulation Bandwidth:	300Hz to 20kHz

Receiver (Transmitter Test)

Frequency Range:	250kHz – 1GHz (3GHz optional)
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SENSITIVITY

Narrowband FM:	2.0uV for 10dB EIA SINAD
Wideband FM:	10uV for 10dB EIA SINAD
AM:	10uV for 10dB EIA SINAD

RF I/O PORT

VSWR:	< 1.2 to 2GHz, ~ 1.5 to 3GHz
Max Power:	50W for 5 minutes 150W for 30 seconds (30 sec. on, 5 min. off)
Absolute Max Power:	150W
Alarm:	Internal temperature alarm

ANTENNA PORT

Maximum Power:	0dBm
Alarm:	+10dBm

IF FILTERS:

6.25kHz, 12.5kHz, 25kHz, 50kHz, 100kHz, 200kHz

FREQUENCY ERROR MEASUREMENT

Type of Display:	Autoranging
Resolution:	1Hz

FM DEVIATION MEASUREMENT

Demodulation Range:	Up to ± 75 kHz
Accuracy:	$\pm 5\%$ plus residual FM
Frequency Response:	Selectable per the following: Low Pass Filters: 300Hz, 3kHz, 20kHz High Pass Filters: 1Hz, 300Hz, 3kHz

DEMODO HARWARE CHARACTERISTICS

Demodulation Output Level:	6.25kHz B/W: 2.56V / 1kHz 12.5kHz B/W: 1.28V / 1kHz 25kHz B/W: 0.64V / 1kHz 50kHz B/W: 0.32V / 1kHz 100kHz B/W: 1.6V / 10kHz 200kHz B/W: 0.8V / 10kHz
Demodulation Output Amplitude Flatness:	± 0.2 dB (300Hz to 3kHz), 1dB point @ 20kHz
Demodulation Output Impedance:	100 ohms nominal

AUDIO WEIGHTING FILTERS

Filters: none, C-message, CCITT	none, C-message, CCITT
De-emphasis (selectable):	750's

AM MODULATION MEASUREMENTS

Demodulation Range:	0 to 100%
Accuracy:	$\pm 5\%$ for levels below 80%
Frequency Response:	Selectable per the following:
Demodulation Output Level:	Low Pass Filters: 300Hz, 3kHz, 20kHz High Pass Filters: 1Hz, 300Hz, 3kHz
Demodulation Output Amplitude Flatness:	0.8V peak per 10% AM Modulation
Output Impedance:	± 0.2 dB (300Hz to 3kHz), 1dB point @ 20kHz 100 ohms nominal
SSB Sideband Suppression:	>70 dB

RECEIVE SIGNAL STRENGTH LEVEL METER

Frequency Range:	1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz
Accuracy:	± 2 dB
Sensitivity:	-120dBm (Antenna Port; Preamplifier on; 6.25kHz IF B/W)

BROADBAND POWER METER (RF In/Out Port)

Frequency Range:	1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz
Measurement Range:	0.1W to 150W
Input Impedance:	50 Ohms
Accuracy:	$\pm 10\%$ (2 KHz - 1GHz); $\pm 10\%$ (1GHz - 3GHz <2.5W)
Protection:	Over temperature alarms

FREQUENCY COUNTER

Frequency Range:	5Hz to 100kHz
Period Counter Range:	5Hz to 20kHz
Input Level:	0.1V rms min

SINAD METER

Accuracy:	$\pm 1\text{dB}$ @ 12dB SINAD
Input Level:	0.1V rms min
Frequency Range:	300 Hz to 10kHz
Reading Range:	0 to >60 dB
Resolution:	0.01dB

DISTORTION METER

Reading Range:	0.00% to 100%
Distortion Accuracy:	The greater of: $\pm 0.5\%$ of distortion or $\pm 10\%$ of reading
Input Level:	0.1V rms min
Frequency Range:	300Hz to 10kHz
Resolution:	0.01%

OPTIONAL MODES

DMR (MOTOTRBO™), dPMR, NDXN (Conventional and Type-C Trunking)
P25 Phase 1 (Conventional and Trunking), P25 Phase 2, PTC (ITCR), TETRA

Spectrum Analyzer

SWEEP

Frequency Range:	1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz
Frequency Resolution:	1Hz
Span Accuracy:	5%
Update Rate:	~10 times per second (depending on span)

AMPLITUDE

Level Accuracy:	$\pm 2\text{ dB}$
Scales (dB/div):	10 (1, 2, & 5 w/ESA option)
Log Linearity Accuracy:	<0.1dB
Reference Level Resolution:	1dB
Reference Level Range:	+60 to -70dB
T/R Port Dynamic Range:	80dB
Typical Noise Floor Performance:	-140dBm
SSB Phase Noise (20 kHz Offset):	-95dBc/Hz max below 1GHz (15° to 35° C) -93dBc/Hz max all frequencies (0° to 50° C)
Resolution Bandwidth	Auto Selected
Harmonic Spurious (Antenna Port, No Attenuation):	-20dBc max
Non-Harmonic Spurious (Antenna Port, No Attenuation):	-60dBc max
Residual Spurious (Input Terminated):	-70dBm
Markers:	Delta, Absolute, and Frequency
Modes:	Standard, Average, Freeze, Max Hold, and Peak Hold

Oscilloscope

VERTICAL INPUT

Input Impedance:	1 Meg Ohm / 600 Ohm (Selectable)
Range:	± 70 VDC, ± 33 Vrms AC / ± 24 VDC, ± 15 Vrms AC
Accuracy:	5% of full scale
Bandwidth:	0 to 50kHz

HORIZONTAL SWEEP

Range:	20 uSec to 1 Sec / div. (Selectable)
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TRIGGER SELECTION

Normal, Auto (Free Running), Single Sweep and Freeze

SPECIAL FUNCTIONS

Markers:	Absolute Voltage, Delta Voltage, Delta Frequency and Delta Period
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Audio Modulation Synthesizer

Modulation Types:	1 kHz tone, Standard formats (Private Line, Digital Private Line, DPL Invert, Two-Tone Paging, 5/6 Tone Paging, POCSAG, EURO Tones, or User Defined Tone Sequences), Tone-A, Tone B, Tone C (RF Output), DTMF, and external inputs from both a supplied microphone and BNC connector.
Modulation Output Level:	± 8 V peak (± 16 /BW V/kHz FM, ± 0.08 V/% AM)
Amplitude Flatness:	± 0.2 dB (300Hz to 3kHz), 1dB point @ 20kHz
1 kHz Tone Distortion:	Not to exceed 1% THD
Impedance:	100 Ohms
Modulation Input Level:	± 1 V peak reference
Amplitude Flatness:	± 0.2 dB (300Hz to 3kHz), 1dB point @ 20kHz
Impedance:	600 Ohms
Microphone Input Amplitude Flatness:	± 0.2 dB (300Hz to 3kHz), 1dB point @ 20kHz

Tracking Generator

Frequency Range:	1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz
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Digital Voltmeter (DVM)

Input Impedance:	1 Meg Ohm / 600 Ohm (Selectable)
Voltage Range:	1V, 10V, 70V full scale
Frequency Range:	50Hz to 20kHz
DC Accuracy:	1% full scale ± 1 LSB
AC Accuracy:	5% full scale ± 1 LSB

Timebase

Output Frequency:	10MHz
Stability:	Aging: ± 0.1 ppm / year Temp.: ± 0.01 ppm
Output Level:	Minimum 0dBm into 50 Ohms
Warm Up:	3 minutes: within ± 0.1 ppm

Display

FRONT PANEL DISPLAY

Resolution:	800 x 600
Size:	Size: 8.4" (21.3cm) Full Color LCD

EXTERNAL DISPLAY

External Display:	VGA
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REMOTE FRONT PANEL

Remote Front Panel:	Available over Ethernet
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Supplemental Digital Specifications

DMR

FSK ERROR

Range: 0 to 10%

Accuracy (2% to 10%): <5%

Resolution: 0.01%

MAGNITUDE ERROR

Range: 0-5%

Accuracy: <5% of reading

Resolution: 0.01%

SYMBOL DEVIATION

Range: 1500 to 2350Hz

Accuracy: ± 10 Hz

Resolution: .1Hz

BER

Range: 0 to 20%

Resolution: 0.00001%

NXDN

FSK ERROR

Range: 0 to 10%

Accuracy (2% to 10%): <5%

Resolution: 0.01%

MAGNITUDE ERROR

Range: 0-5%

Accuracy: <5% of reading

Resolution: 0.01%

SYMBOL DEVIATION

Range: 840 to 1260Hz (4800bps)
1920 to 2880Hz (9600bps)

Accuracy: ± 10 Hz

Resolution: .1Hz

BER

Range: 0 to 20%

Resolution: 0.00001%

dPMR

FSK ERROR

Range: 0 to 10%

Accuracy (2% to 10%): <5%

Resolution: 0.01%

MAGNITUDE ERROR

Range: 0-5%

Accuracy: <5% of reading

Resolution: 0.01%

SYMBOL DEVIATION

Range: 1500 to 2350Hz

Accuracy: ± 10 Hz

Resolution: .1Hz

BER

Range: 0 to 20%

Resolution: 0.00001%

TETRA

EVM (RMS)

Range: 0 to 20%

Accuracy (2% to 10%): <10%

Resolution: 0.10%

RESIDUAL CARRIER

Range: 0-10%

Accuracy: ± 0.1 %

Resolution: 0.10%

FREQUENCY ERROR

Accuracy: ± 500 Hz

Resolution: 1 Hz

P25 MEASUREMENT MODULATION FIDELITY

Range: 0 to 10%

Resolution: 0.01%

Accuracy: <5.0% of reading
for 2.0 % and higher

Remote Interface (Optional Feature)

REMOTE FRONT PANEL

Available over Ethernet

FREEDOM

Communication Technologies

2002 Synergy Blvd, Suite 200, Kilgore, Texas 75662

Toll Free Phone: (844)-90-FREEDOM or (844)-903-7333

Phone: 903-985-8999 Fax: 903-985-8998 Email: sales@freedomcte.com

Please visit our website at www.freedomcte.com

08 / Freedom / Communications System Analyzer R8100 / FCT-2036G



Complies With
UL 61010-1
CSA C22.2 No. 61010-1

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