3920N Analog and Digital Radio Test Platform

AEROFLEX
A passion for performance.

- 2.7 GHz frequency range
- Sensitive receiver with built-in pre-amp for off air measurements
- -140 dBm (typical) DANL spectrum analyzer with 8 markers
- Tracking generator
- IQ generator for use with IQ Creator™
- GPIB, Ethernet, USB and RS-232 interfaces
- Software upgradeable in the field
- High performance FM/AM/SSB analog duplex features
- Aeroflex/IFR 2947A GPIB/RS-232 emulation mode
- HP/Agilent 8920B remote emulation
- P25 advanced parametric/protocol analysis

The 3920N is the latest radio test solution from Aeroflex forengineering, production and field service applications. The instrument provides a comprehensive range of general purpose analog measurement facilities as well as advanced digital test options for P25.

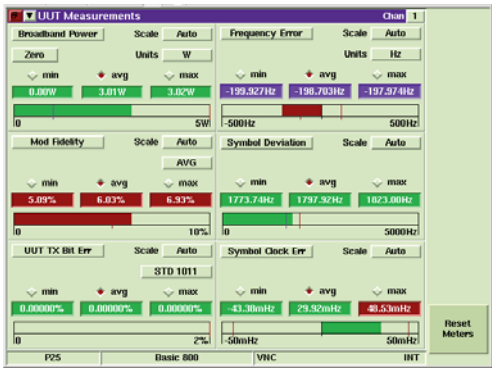
Standard features include:

- Full AM, FM and SSB test capabilities
- 5 MHz channel spectrum analyzer
- Full-span spectrum analyzer to 2.7 GHz
- Dual-Channel oscilloscope to 4 MHz
- Full audio analysis for AF level, frequency, SINAD and distortion measurements.
- Full RF parametric tests for power, frequency error, deviation (FM) and modulation index (AM)
- Three high accuracy audio modulators/function generators
- Three high accuracy audio baseband generators
- DTMF and DCS generators
- DTMF and DCS decode
- Encode and decode of tone remote, two tone sequential and 5/6- tone formats
- Variable notch SINAD, distortion and SNR meters
- Color coded Pass/Fail meter functions for fast test capabilities
- Accurate broadband and in band power meters
- Digital multimeter

The digital architecture of the 3920N delivers faster, accurate and more repeatable measurements than any of its predecessors and provides for future technology enhancements as new radio technologies become available.

Combining the power of an onboard PC with a 30 GB hard-drive and Linux OS, the 3920N also supports USB mouse and keyboard interface for very easy operation as well as almost unlimited save/recall setups, saving time and effort.

The 3920N features easy-to-read meters with Pass/Fail color coding for instant Go/NoGo testing. With these easy-to-configure meters, you can set up unique Pass/Fail parameters for each radio type that you are testing. When used with the save/recall locations, this allows for instant recall of the test parameters, so semi-technical or non-technical individuals can simply key the radio and test. The meters will display "Green" for good, "Red" for high and "Blue" for low. A quick glance and the operator will know that the radio is within established test parameters.



P25 UUT Measurements Tile Maximized, Showing Green, Red and Blue Indications

The 3920N provides a flexible platform for almost any application. Each of the modes of operations can be enhanced with optional applications and features. In addition, optional system personalities allow the 3920N to be completely reconfigured "on the fly" to provide advanced tests for analog and digital systems.

High Performance Standard Features

Wide Frequency Range: The 3920N comes standard with continuous frequency coverage from 10 MHz (usable down to 100 kHz) to 2.7 GHz.

Broadband RF Power: Direct input of signal power of up to 125 W is supported, making the 3920N compatible with virtually all practical requirements for mobile terminal and base station test.

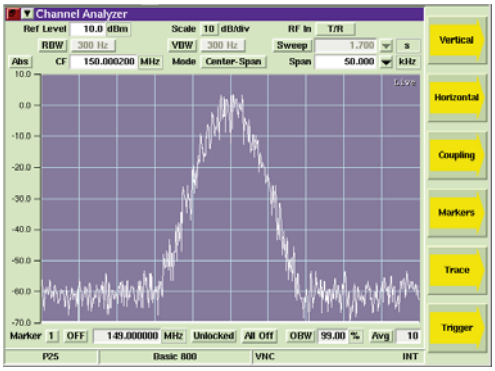
Inband Low Level RF Power Measurements: For sensitive measurement, e.g. off-air analysis, a low power input is provided via the antenna input port. This low level input gives the user the ability to measure an off the air signal as low as -100 dBm or -115 dBm with the internal pre-amp selected.

High Stability Time Base: With a 0.01 ppm OCXO frequency standard, the 3920N provides ultra-reliable RF frequency measurements.

0.6 dB Accurate (Typical) RF Generators: Level accuracy is important in determining today's receiver performance in design, manufacturing and field service environments. With a 1 dB (0.6 dB typical) level accuracy on the RF output ports, the 3920N provides consistent results in testing receiver parameters.

Full Span Spectrum Analyzer: View signals from 1 MHz to 2.7 GHz with the 3920N. With a DANL of -140 dBm (300 Hz RBW) with pre-amp enabled, the 3920N provides high performance spectrum analysis. This full band analyzer provides plenty of range to view harmonics and other spurious emissions in and out of band.

Channel Analyzer: The channel analyzer makes it possible to monitor a 5 MHz spectral window around the carrier while simultaneously demodulating the signal. This allows the spectrum around the carrier to be analyzed while the device under test is participating in a call.



Channel Analyzer Tile Maximized

Dual-Channel 4 MHz Oscilloscope: High performance baseband analysis of audio and digital signals can be performed easily and accurately.

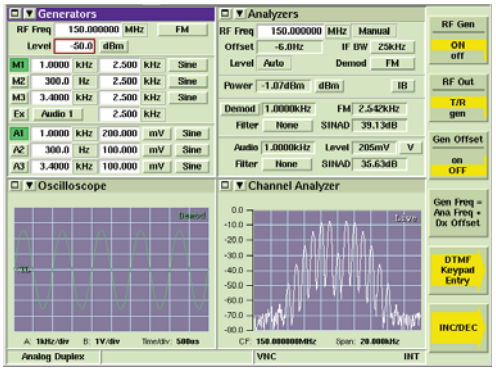
Digital Multimeter: Standard for the 3920N is the Digital Multimeter. The Digital Multimeter comes with three new ports on the front panel that are used for measuring AC/DC volts, AC/DC amps and OHMS.

High Performance Audio Features: With high accuracy audio generators from 1 mV to 8 V rms, the 3920N provides level accuracy to ±1% of the setting. The audio generator frequency ranges from 20 Hz to 40 kHz with 50 ppm accuracy (10 ppm typical), and 0.1 Hz resolution provides solid audio performance for audio testing. The AF Counter features full range from 20 Hz to 20 kHz.

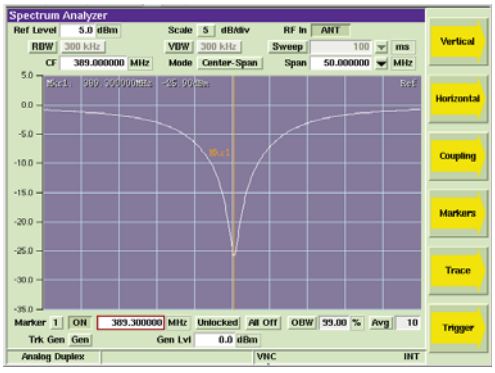
Speed: Measurement speed is directly related to processing power and internal communications. The 3920N digital architecture utilizes a mixture of powerful digital signal processors and programmable logic. Coupled to the use of a compact PCI backplane capable of delivering peak rates of >100 MB, this ensures that the instrument has the power to acquire, synchronize and process data, producing measurement results to the user with the minimum of delay.

Input and Output Capability: The 3920N provides a high degree of connectivity. Instrument remote control for automated testing is provided using GPIB and supports connection to a remote server via Ethernet. Connection of printers and other peripherals is supported including keyboard, mouse and external monitor connection to provide expansion of the instrument user interface.

Ease of Use: Whether using the 3920N manually, remotely or in Auto-Test II mode, the user interface is intuitive, logical and accessible. The instrument uses a tiled graphical display, which can be controlled by the front panel keypad or an external mouse. Tiles can be viewed in their full-detail maximized state or the minimized state, which shows key details and allows active tiles to be viewed at the same time for maximum information display.



3920N Tiled Graphical Users Interface



Spectrum Analyzer with Tracking Generator

The color display produces a bright and sharp daylight readable image that can be output to an external monitor. Color-coded fields are used to simplify testing, and graphical traces utilize color to clearly identify limit line and measurement traces.

Remote Control: The 3920N supports remote control via GPIB for automated test system control. In addition to a native 3920 command set, the 3920N also supports commands for the HP/Agilent 8920B that allows migration from the 8920B to the 3920N extremely easy. The 3920N also supports commands for the Aeroflex/IFR 2947A.

Remote Operation: Use of the 3920N Ethernet connection permits remote operation from anywhere in the world making it possible to download new software or remotely interrogate instrument status. With an internal VNC server, users can install VNC software on their PC or iPad and remotely operate the front panel of the 3920N from virtually anywhere on the planet. All that is needed is the ability to access the unit's IP address.

Cost of Ownership: To manage through life costs, the 3920N comes with a standard 2-year warranty. Users can also purchase a 36 or 60 month warranty period extension with or without scheduled calibration. On request, Aeroflex can provide customized premium warranty support designed around your specific needs.

IQ Gen Modulation

IQCreator™ is an Aeroflex developed PC based software utility that gives the user the ability to develop their own waveforms to use as the modulation source. Since the waveforms are defined by I and Q, virtually any type of complex digital modulation format can be created. With the IQ Gen Modulation option, once the IQ waveform is created it can easily be uploaded to the 3920N and used as the modulation source in the Analog Duplex System.

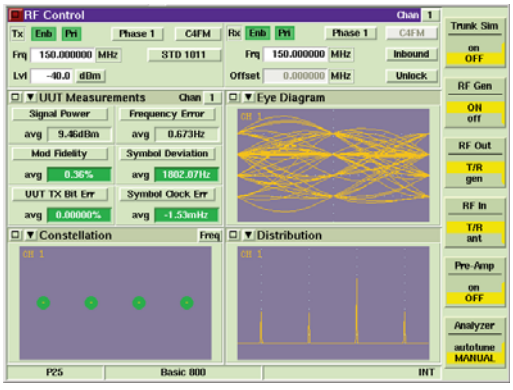
Tracking Generator

The 3920N tracking generator allows the user to look at the response of a duplexer, filter bank or other RF device on the spectrum analyzer. This greatly simplifies the often laborious process of checking or changing the tuning of a duplexer. When used with the optional return loss bridge (AC4105), the spectrum analyzer/tracking generator can measure the return loss of an antenna or cable (see screen below).

P25 CONVENTIONAL OPERATION

The 3920N P25 Conventional Operation provides test features for testing P25 radios and systems. Featured is the ability to transmit P25 C4FM standard waveforms and analyze P25 received waveforms. The analysis of the received waveforms consists of the ability to perform RF and modulation parametric tests. An IMBE vocoder enables the user to perform transmit and receive audio testing. Included in this option is the capability to:

- Measure C4FM modulation fidelity and symbol deviation
- Measure power, frequency error and TX BER
- Measure symbol clock error
- Measure RX BER
- Display eye diagram of C4FM demodulation
- Display constellation plot of C4FM symbols
- Display C4FM symbol deviation distribution plot
- Transmit full TIA/EIA-102 test patterns (STD1011, CAL, SILENCE, etc.) as specified by TIA- EIA-102.CAAA-C
- Transmit and receive live audio using the IMBE vocoder
- Transmit stored speech patterns
- Decode voice channel header and link control messages
- Encode link control messages
- Perform DES encryption



P25 Conventional

AUTO-TEST II

Available as an option for the 3920N is the Auto-Test II operation. Providing the ultimate in flexibility, this option gives the user the ability to control the operation of 3920N using the TCL scripting language. The control of the functions of the 3920N is performed through the use of RCI commands, which are sent as part of the TCL program developed by the user.

- Develop your own automated tests for any system in the 3920N
- Design your own Graphical User Interface
- Uses TCL scripting language
- Utilizes the full set of 3920N RCI commands

SPECIFICATION

RF SIGNAL GENERATOR

FREQUENCY	
Range	*10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)* *10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)*
Resolution	*1 Hz*
Accuracy	*Frequency standard ±1 count*
OUTPUT LEVEL	
Range	*T/R Port: -130.0 to -30.0 dBm* *Duplex: -130.0 to +10.0 dBm (+10 dBm max for CW or FM; 0 dBm max for complex modulation)*
Resolution	*0.1 dB*
Accuracy	*1.0 dB for levels >-110 dBm (Typical better than 0.6 dB)* *1.5 dB for levels ≤-110 dBm (Typical better than 1.0 dB)*

SPECTRAL PURITY

Residual FM	*<15 Hz (300 Hz to 3 kHz bandwidth)*
Residual AM	*<0.1% RMS (300 Hz to 3 kHz bandwidth)*
Harmonics	*<-25 dBc (Typically -30 dBc, RF level set at +10 dBm)*
Non-Harmonics	*<-55 dBc (all freq. except Crossovers)* *<-35 dBc (Crossover freq. = 3411.4 MHz - Gen freq.)*
Phase Noise	*<-93 dBc/Hz (20 kHz offset, RF <1.05 GHz)* *<-90 dBc/Hz (20 kHz offset, RF >1.05 to 2.7 GHz)*

MODULATION

Selections	OFF, AM, FM, FM50us, FM75us, FM750us, AM USB, AM LSB, IQGEN
Waveforms	Sine, Square, Triangle, Ramp, DCS, DTMF
THD	<1% (1 kHz rate, 30 to 70% AM, 300 Hz to 3 kHz BW, Sine)
INTERNAL FM	
Deviation Range	±0.001 to ±150 kHz, OFF
Accuracy	3% (From ±1 kHz to ±100 kHz deviation, 20 Hz to 15 kHz rate)
Resolution	1 Hz
Deviation Rate	20 Hz to 20 kHz
INTERNAL AM	
Modulation Range	0 to 100%
Accuracy	1% (Modulation from 10% to 90% 20 Hz to 15 kHz rate)
Resolution	0.1%
Rate	20 Hz to 20 kHz
INTERNAL SSB	
Modulation Selection	Upper SideBand (USB) or Lower SideBand (LSB)
Modulation Range	0 to 100%
Resolution	0.1%
Rate	300 Hz to 20 kHz
EXTERNAL AM/FM/SSB	
AUDIO INPUTS	With 1 Vrms, AM/FM/SSB have same characteristics as internal sources, ±10% of indicated setting. (Audio 1 or Audio 2 input from 20 Hz to 15 kHz [300 Hz to 3 kHz SSB] unbalanced). 8 Vrms maximum modulation input level.
MICROPHONE INPUT	With 50 mVrms, AM/FM/SSB have same characteristics as internal sources, ±10% of indicated setting. (MIC Input from 100 Hz to 15 kHz [300 Hz to 3 kHz SSB]).
INTERNAL IQ GEN	
Sample Rate	<1.89 Msamples/sec
Size	<3.8 million samples
Source	File created by IQCreator

RF RECEIVER

RF RECEIVER	
Demod Selections	AM, FM, FM50us, FM75us, FM750us, AM USB, AM LSB
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Sensitivity	<-100 dBm (10 dB SINAD, FM, 25 kHz, 1 kHz rate, 6 kHz FM Deviation, 300 Hz to 3.4 kHz AF Filter, Pre-amp OFF) <-113 dBm (10 dB SINAD, FM, 25 kHz, 1 kHz rate, 6 kHz FM Deviation, 300 Hz to 3.4 kHz AF Filter, Pre-amp ON)
DEMOD OUTPUT LEVEL	
FM	2.5 Vrms ±10% (for deviation ±½ of selected BW; ±25 kHz BW same output level as 30 kHz BW)
AM	3.0 Vrms ±10% (for 100% AM)

RF MEASUREMENTS

RF POWER METER (BROADBAND)	
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 2 MHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 2 MHz)
Level Range	100 mW to 125 W (Usable from 10 mW)
Resolution	4 digits for W or 0.1 dB
Accuracy	10%, 1 digit
Signal	CW, FM, C4FM
RF POWER METER (INBAND)	
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (Freq Ext Opt) (Usable from 100 kHz)
Level Range	T/R Port: -60 to +51 dBm Lowest reading is receiver BW dependent (Narrower bandwidths can measure lower levels). ANT Port: -100 to +10 dBm Lowest reading is receiver BW dependent (Narrower bandwidths can measure lower levels).
Resolution	0.1 dB
Accuracy	±1 dB (Input level above minimum for selected BW [display not yellow]; typically better than 0.6 dB)
AM Filter BW	6.25, 8.33, 10, 12.5, 25 and 30 kHz
FM Filter BW	6.25, 10, 12.5, 25, 30, 100, and 300 kHz
Signal	CW, FM, AM, C4FM
RF COUNTER	
Range	10 MHz to 2.7 GHz (Standard) (Usable from 100 kHz, Auto-tune)
Resolution	1 Hz
Accuracy	Frequency standard ±1 count
Level Range for Auto-tune	T/R Port: -10 to +50 dBm (Find level is selectable) ANT Port: -60 to +10 dBm (Find level is selectable)
Signal	CW, FM, AM <70% modulation
RF ERROR METER	
Range	0 to ±2.5 MHz from receiver frequency (5 MHz IF BW)
Resolution	1 Hz
Accuracy	Frequency Standard ±1 count
Level Range	T/R Port: -10 to +50 dBm ANT Port: -60 to +10 dBm
Signal	CW, FM, AM <70% modulation

DEMODULATION MEASUREMENTS

RF CHARACTERISTICS	
Frequency Range	10 MHz to 2.7 GHz (Standard) (Usable from 100 kHz))
Input RF Level	T/R Port: -10 to +50 dBm ANT Port: -80 to +10 dBm
DEMOD COUNTER	
Range	20 Hz to 20 kHz (1 to 100 kHz FM Deviation, IF BW set appropriately for the received modulation BW) 20 Hz to 10 kHz (30 to 90% AM, IF BW set appropriately for the received modulation BW)
Resolution	0.1 Hz
Accuracy	±50 ppm (±10 ppm typical)
Waveform	Sine or Square
FM DEVIATION METER	
Range	0 to 150 kHz
Resolution	10 Hz
Accuracy	±3% plus source residual, ±1 count (1 to 150 kHz FM deviation, IF BW set appropriately for the received modulation BW)
FM Rate	20 Hz to 20 kHz (IF BW set appropriately for the received modulation BW)
AM DEVIATION METER	
Range	0 to 100%
Resolution	0.1%
Accuracy	±3% + source residual, ±1 count (30 to 90% AM, IF BW set appropriately for the received modulation BW)
AM Rate	20 Hz to 15 kHz (IF BW set appropriately for the received modulation BW)

AUDIO AND MODULATION MEASUREMENTS

Audio Input Characteristics for the following meters	AF Counter, AF Level Meter, SINAD Meter, Distortion Meter, Hum and Noise Meter, Signal-to-Noise Meter
Front Panel Audio Inputs	Audio 1 or Audio 2 (unbalanced, chassis reference) Audio 1 and Audio 2 (balanced, 600 Ω differential input)
Audio Input Impedance (Audio 1 and 2)	Hi-Z (>10 kΩ) - Unbalanced input 600 Ω - Unbalanced input (8 Vrms MAX input*) 600 Ω - Balanced input (Audio 1 and 2) * Note - 600 Ω unbalanced will auto-switch to Hi-Z @ 8 Vrms
AF COUNTER	
Range	20 Hz to 20 kHz (usable from 10 Hz)
Resolution	0.1 Hz
Accuracy	±50 ppm max, ±10 ppm typical
Wave shape	Sine or square
Level Range (Audio)	20 mV to 30 Vrms
AF LEVEL METER	
Range	0 to 30 Vrms
Resolution	Volts: 1 mV (input <1 V), 10 mV (input ≥1 V) dBr, dBV, dBm: 0.01 dB
Accuracy	5% (Unbalanced, Hi-Z, 300 to 3 kHz, 0.1 to 30 Vrms)
Frequency Range	20 Hz to 20 kHz
SINAD METER	
Range	0 to 60 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (SINAD >3 dB, ≤40 dB, 5 kHz LP AF filter
Frequency Range	300 Hz to 5 kHz
Level Range (Audio)	0.1 to 30 Vrms
DISTORTION METER	
Range	0.0 to 100.0%
Resolution	0.1%
Accuracy	<±0.5% (Distortion 1 to 10%, 5 kHz LP AF Filter) <±1.0% (Distortion 10 to 20%, 5 kHz LP AF Filter)
Frequency Range	300 Hz to 5 kHz
Level Range (Audio)	0.1 to 30 Vrms
HUM AND NOISE	
Range	-100 dB to 0 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (>-60 dB, ≤-20 dB)
Signal Frequency	300 Hz to 5 kHz
Audio Input Level	0.1 to 30 Vrms
RF Input Level	T/R Port: - 10 to +50 dBm ANT Port: -80 to +10 dBm
SIGNAL-TO-NOISE RATIO	
Range	-100 to 0 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (>-60 dB, ≤-20 dB)
Signal Frequency	300 Hz to 5 kHz
Audio Input Level	0.1 to 30 Vrms
RF Input Level	T/R Port: - 10 to +50 dBm ANT Port: -80 to +10 dBm

Modes (For Hum and Noise and Signal-to-Noise Ratio)

Mode	Stimulus	Stimulus Port	Measurement Input	Measurement Port
1	RF Generator	TR /Gen	AF Input	Audio In 1 or 2
2	AF Generator	Fctn Gen Out	RF Receiver	TR/Antenna

AUDIO FILTERS (CHARACTERISTIC RESPONSE)				
Filter	*Type*	*Ripple*	*-1 dB*	*-60 dB*
NONE	No Filter			
300 Hz	Low-Pass	<0.23 dB, above 20 Hz	330 Hz	590 Hz
5 kHz	Low-Pass	<0.02 dB, above 20 Hz	5.5 kHz	6.7 kHz
15 kHz	Low-Pass	<0.01 dB, above 20 Hz	16.1 kHz	17.8 kHz
20 kHz	Low-Pass	<0.01 dB, above 20 Hz	20.4 kHz	21 kHz
0.3 to 3.4 kHz	Band-Pass	<1.7 dB	320 Hz/ 3.8 kHz	60 Hz/ 5.2 kHz
0.3 to 5 kHz	Band-Pass	<1.7 dB	320 Hz/ 5.2 kHz	60 Hz/ 9.6 kHz
0.3 to 15 kHz	Band-Pass	<1.7 dB	320 Hz/ 16.1 kHz	60 Hz/ 19.9 kHz
0.3 to 20 kHz	Band-Pass	<1.7 dB	200 Hz/ 20.4 kHz	60 Hz/ 21 kHz
PSOPH C-MSG	Band-Pass	Per C-MSG Spec	Per C-MSG Spec	Per C-MSG Spec
PSOPH CCITT	Band-Pass	Per CCITT Spec	Per CCITT Spec	Per CCITT Spec
300 Hz	High-Pass	<1.7 dB	320 Hz	60 Hz

AUDIO FUNCTION GENERATOR(S)

WAVE SHAPE	*Sine, Square, Triangle, Ramp, Digital Coded Squelch, DTMF*
FREQUENCY	
Range	*Sine: 20 Hz to 40 kHz (usable 1 Hz to 40 kHz)* *Square, Triangle and Ramp: 20 Hz to 4 kHz (usable 1 Hz to 40 kHz)*
Resolution	*0.1 Hz*
Accuracy	*±50 ppm, ±10 ppm typical*
LEVEL	
Range	*1 mV to 5V RMS into a 10 kΩ load*
Resolution	*0.1 mV*
Accuracy	*±1% of setting (10 kΩ load)*
Impedance	*<10 Ω*
Spectral Purity	*<0.5% (1 kHz, 5 Vrms, 80 kHz BW, 10 kΩ load, Sine)* *<1.0% (Typical, 20 Hz to 20 kHz, 100 mV to 5 Vrms, 80 kHz BW, 10 kΩ load, Sine)*

OSCILLOSCOPE

DISPLAY	
Traces	*2*
Trace Types	*Live, captured, accumulated*
Markers	*2*
Marker Functions	*Time with amplitude, deviation or % depth* *Delta marker (including 1/Δ t, e.g. Hz)*

VERTICAL	
3 dB Bandwidth	*16 MHz*
Frequency Range	*DC to 4 MHz (40 MS/s sampling rate)*
Input Range	*0 to 100 Vpeak Max, Category II*
Scales	*2 mV to 20 V/division in a 1, 2, 5 sequence (8[h] x 10 [w] graticule display)*
Accuracy	*5% of full scale (DC to 1 MHz)* *10% of full scale (1 to 4 MHz)*
Resolution	*Better than 1% of full scale*
Coupling	*DC, AC, GND*
HORIZONTAL	
Sweep Factors	*1 µSec to 1 Sec/division in a 1, 2, 5 sequence*
Accuracy	*>1.5% of full scale*
Resolution	*>1% of full scale*
Input Impedance	*1 MΩ, 20 pF*
TRIGGER	
Trigger Source	*Trace A, Trace B, EXT, (or Trace C with no CH1 or CH2 Input)*
Trigger Edge	*Rising/falling*
Trigger Mode	*Auto/normal* *Continuous/single shot*
External Trigger Level	*Hi-Z BNC input on the rear panel of the unit* *Adjustable from -5 to +5 V*

DIGITAL MULTIMETER

AC/DC VOLTMETER	
Full Scale Range	*200 mV, 2 V, 20 V, 200 V, 2000 V, Auto* *(150 VAC RMS, or VDC MAX input, Category II)*
Resolution	*3-½ digits (2000 counts)*
Accuracy	*DC ±1% Full Scale ±1 count* *AC ±5% Full Scale ±1 count*
AC Volts Frequency Range	*50 Hz to 20 kHz*
AC/DC AMMETER	
Full Scale Range	*200 mA, 2 A, 20 A, Auto (20 A range uses optional shunt connected to Voltmeter)*
Maximum Open Circuit Input Voltage	*30 Vrms referenced to common or earth ground, Category I*
Resolution	*3-½ digits (2000 counts)*
Accuracy	*±5% Full Scale ±1 count*
AC Volts Frequency Range	*50 Hz to 10 kHz*
OHMMETER	
Full Scale Range	*200 ohms, 2 kohms, 20 kohms, 200 kohms, 2 Mohms, 20 Mohms, Auto*
Resolution	*3 ½ digits (2000 counts)*
Accuracy	*±5% Full Scale ±1 count*
EXTERNAL CURRENT SHUNT (OPTIONAL)	
Rating (Catergory I)	*10 amps, 100 mV* *20 amps - ON 1 minute, OFF 4 minutes*
Accuracy (18° to 28°C)	*DC to 10 kHz: ±0.25%*
Temperature Coefficient	*0.005%/°C*

RF SPECTRUM ANALYZER

FREQUENCY	
Range	10 MHz to 2.7 GHz (standard) (Usable from 100 kHz)
Resolution	1 Hz
Accuracy	Same as frequency standard
SPAN	
Mode	Start/Stop, Center/Span and Zero Span
Range	Selection list is 2 kHz to Full Span in a 1, 2, 5 sequence, plus Zero Span (Span may be entered numerically down to 1 Hz resolution)
Display Accuracy	Span Accuracy + Frequency Accuracy +50% of RBW
Span Accuracy	±1% of span width
Marker Accuracy	±1% of span width
LEVEL	
Ref Level Range	T/R Port: -50 to +50 dBm ANT Port: -90 to +10 dBm
Vertical Scales	1, 2, 5, 10 dB/division
Reference Level Resolution	0.1 dB
Ref Level Units	dBm, dBµV, dBmV
Dynamic Range	70 dB (Antenna, no attenuation, Ref Level -30 dBm, 30 kHz RBW)
Bandwidth Switching Error	±1 dB (After Normalize)
Log Linearity	±1 dB (RBW: 3 kHz, 30 kHz, 60 kHz, 300 kHz, 6 MHz) ±1 dB (300 Hz RBW typical)
Accuracy	±1 dB (Input signal -10 dB from Ref Level, Normalized, preamp off)
Attenuator Selections	0 to 50 dB of attenuation, controlled by changing the Ref Level
3rd Order Intermodulation	-60 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Harmonic Spurious	-55 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Non-Harmonic Spurious	-60 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Displayed Average Noise Level (DANL)	-125 dBm (Typical, 300 Hz RBW, ANT Port terminated, 20 sweep average)
RESOLUTION BANDWIDTH	
RBW Selections	300 Hz, 3 kHz, 30 kHz, 60 kHz, 300 kHz, 6 MHz
RBW 60 dB/3 dB Filter Shape	>10:1
Selectivity - Filter Shape	60 dB/3 dB ratio better than 10:1
Accuracy	±10% of RBW for 3 kHz, 30 kHz, 60 kHz, 300 kHz -10%/+25% of RBW FOR 6 MHz ±20% of RBW for 300 Hz
Bandwidth Switching Error	±1 dB
VIDEO BANDWIDTH	
Range	10 Hz to 1 MHz in a 1, 3, 10 sequence, plus NONE
SWEEP	
Frequency Sweep Time	100 mS to 100 S in a 1, 2, 5 sequence
Zero Span Sweep Time	50 mS to 100 S in a 1, 2, 5 sequence
Sweep Trigger Source	Internal and external
Trigger Modes	Continuous (repeat), single (single-shot)
FUNCTION/FEATURE	
Display Modes	Live, average, max hold
Averages	1 to 100
MARKERS	
Track	Frequencies (or time) and amplitudes
Number of Markers	8
Marker Functions	Marker to Peak Marker to Next Right/Left Marker to Minimum Marker to Ref Level Marker to Center Frequency Marker sets Span Marker sets Vertical Scale (Zero Span only)

TRACKING GENERATOR

TRACKING GENERATOR OUTPUT	Refer to RF SIGNAL GENERATOR section for: - Frequency range and accuracy - Output level range, resolution and accuracy - Spectral purity
SPAN AND SWEEP TIME	Same as Spectrum Analyzer
TRACKING GENERATOR CONTROLS	Output port selection, RF level, Reference cal

FREQUENCY STANDARD I/O

INTERNAL FREQUENCY STANDARD OUTPUT	
Frequency	10 MHz (nominal)
Output Level	1 Vpp (nominal) into 50 Ω
Temperature Stability (0 to 50°C)	±0.01 ppm
Aging Rate	±0.1 ppm/year after 1 month continuous use
Warm Up Time	Less than 5 min. to ±0.02 ppm
EXTERNAL FREQUENCY INPUT	
Frequency	10 MHz
Input Level	1 to 5 Vpp for sine waves 3.3/5 V TTL for square waves
Connector	BNC socket (10 kΩ Input/50 Ω Output)

INPUT/OUTPUT CONNECTORS

ANT (RF INPUT)	
Connector Type	TNC
Function	Receiver input
Impedance	50 Ω (nominal)
VSWR (with Attenuation ≤10 dB):	Better than 1.44:1 (RF freq. <1.05 GHz) Better than 1.58:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	10 W with warning above +17 dBm (Remove power immediately when alarm sounds)
GEN (RF INPUT)	
Connector Type	TNC
Function	Generator high-level output
Impedance	50 Ω (nominal)
VSWR (with level <0 dBm):	Better than 1.7:1 (RF freq. <1.05 GHz) Better than 1.9:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	10 W with warning above +23 dBm (Remove power immediately when alarm sounds)
T/R (RF INPUT/OUTPUT)	
Connector Type	Type N
Function	RF power input, generator low-level output)
Impedance	50 Ω (nominal)
VSWR	Better than 1.2:1 (RF freq. <1.05 GHz) Better than 1.3:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	200 W with warning above 135 W or power termination temp >100°C. Recommended max of 30 s ON and minimum of 2 min OFF for power levels above 50 W. (Remove power immediately when alarm sounds.)
GPIB	
Connector Type	24 pin IEEE
Function	IEEE-488.1-1997
ETHERNET	
Connector Type	8 Position, RJ-45 100/10 Mbit/s
Function	10/100 Base-T network connection
RS-232	
Connector Type	9-pin, D-sub, Male
Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k
Stop Bits	1 or 2
Parity	Odd, even, none
VIDEO	
Connector Type	15-pin, D-sub, VGA
Function	VGA for external monitor
IF OUTPUT	
Connector Type	BNC
Function	10.7 MHz Receiver IF
Output Level	Proportional to Receive Signal Level
MIC/ACCESSORY	
Connector Type	8 position, female DIN
Function	Microphone connection, modulation input, demod output, PTT operation
PARALLEL PORT	
Connector Type	25 position, female D-sub
Function	Printer interface
USB	
Connector Type	Twin USB standard connection (rear panel) Single USB standard connection (front panel)
Function	USB Version 1.1 interface
TEST PORT	
Connector Type	15 position, female 3 tier D-sub
Function	Programmable I/O and voltage output (optional interface)
AUXILIARY IF INPUT	
Connector Type	High-density dual inline
Function	External digital receiver input (optional interface)

AC POWER REQUIREMENTS

Voltage	100 V to 120 VAC @ 60 Hz 220 V to 240 VAC @ 50 Hz
Power Consumption	Nominally 120 W (200 W Max)
Mains Supply Voltage Fluctuations	≤10% of the nominal voltage
Fuse Requirements	3 A, 250 V, Type F

ENVIRONMENTAL/SAFETY

OPERATING TEMPERATURE	0 to 50°C (Tested in accordance with MIL-PRF-28800F Class 3)
WARM-UP TIME	15 minutes
STORAGE TEMPERATURE	-40 to 71°C (Tested in accordance with MIL-PRF-28800F Class 3)
RELATIVE HUMIDITY	80% up to 31°C decreasingly linearly to 50% at 40°C (Tested in accordance with MIL-PRF-28800F Class 3)
ALTITUDE	4,000 m (13,123 ft) (MIL-PRF-28800F Class 3)
SHOCK AND VIBRATIONS	30 G Shock (functional shock) 5-500 Hz random vibrations (Tested in accordance with MIL-PRF-28800F Class 3)
USE	Pollution degree 2
EMC	EN 61329, Class A
RELIABILITY	>8,000 hour calculated MTBF (MIL-HDBK-217F, notice 2)
Safety Standards	UL 61010B-1 EN 61010-1 CSA C22.2 No.61010-1

DIMENSIONS AND WEIGHT

Height	7.75" (19.7 cm)
Width	14" (35.6 cm)
Depth	20.5" (52.0 cm)
Weight	36.8 lbs. (16.5 kg)
LCD Display Screen Size	6.4" diagonal (162.6 mm diagonal)

GENERAL CHARACTERISTICS

LCD DISPLAY Screen Size	6.4" diagonal 162.6 mm diagonal
Active Area	5.1" (h) x 3.8" (v) 129.6 mm (h) x 97.44 mm (v)
Resolution	640 x 480 pixels
Disk Storage	Internal 30 GByte hard disk available for user storage

P25

RF SIGNAL GENERATOR

FREQUENCY	
Range	10 MHz to 2.7 GHz (standard) (Usable from 100 kHz)
Resolution	1 Hz
Accuracy	Frequency standard ±1 count
OUTPUT LEVEL	
Range	T/R Port: -130.0 to -40.0 dBm Gen Port: -130.0 to +0.0 dBm
Resolution	0.1 dB
Accuracy	1.0 dB for levels >-110 dBm (Typical better than 0.6 dB) 1.5 dB for levels ≤-110 (Typical better than ±1.0 dB)
Modulation	C4FM, CQPSK, LSM
Test Patterns	STD 1011, STD CAL, STD SILENCE, STD INTFR, STD BUSY, STD IDLE, STD 511 (O.153), STORED SPCH, VOICE, 1011, SILENCE

RF RECEIVER

Frequency Range	10 MHz to 2.7 GHz (standard) (Usable from 100 kHz)
Resolution	1 Hz
Level Range	T/R Port: -10 to +50 dBm ANT Port: -60.0 to +10 dBm (with preamp -63)

P25 MEASUREMENTS

MODULATION FIDELITY	
Range	0 to 20%
Resolution	0.01%
Accuracy	<5.0% of reading (2.5 to 10%)
SYMBOL DEVIATION	
Range	1500 Hz to 2100 Hz
Resolution	0.1 Hz
Accuracy	±10 Hz (1620 to 1980 Hz)
SYMBOL CLOCK ERROR	
Range	±1000 mHz
Resolution	0.01 mHz
Accuracy	1 ppm (±48 mHz)

FREQUENCY ERROR	
Range	*±4000 Hz*
Resolution	*0.01 Hz*
Accuracy	*Frequency Standard ±1 count*
UUT TX/RX Bit Error Rate	
Range	*0 to 20%*
Resolution	*0.1%*
SIGNAL POWER	
Range	*T/R Port: -60 to +51 dBm* *ANT Port: -100 to +10 dBm*
Resolution	*0.1 dB*
Accuracy	*±1 dB (typically better than ±0.6 dB)*
ERROR VECTOR MAGNITUDE	
Range	*0 to 20%*
Resolution	*0.01%*
CARRIER FEEDTHROUGH	
Range	*0 to -80.00 dB*
Resolution	*0.01 dB*

GRAPHICAL DISPLAYS

MODULATION FIDELITY DISPLAYS	
Constellation	*Line graph of the deviation at the symbol point.*
Distribution	*Graph of the statistical distribution of the deviation at the symbol point. This is a graph of the deviation at the symbol point versus the percentage of occurence of that deviation.*
Eye Diagram	*Graph of the demodulated signal versus time, synchronized with the symbol points. The number of symbol periods is selectable. Range is 2 to 16.*
Trajectory	*Graph of the demodulated signal in the complex domain. This graph shows the Inphase versus the Quadrature phase of the demodulated C4FM, CQPSK, or LSM signal.*

PROTOCOL

DATA LINK	
Header	*MFID, ALG, KEY, TGID, MI*
Voice Frame	*Frame #, NAC, DUID, KEY, ALG, MI, RAW, LCO, Protect, SF, EMG, LSD, STS 1, STS 2*
CONVENTIONAL MODE SIMULATION	*NAC, Call Type, TGID, UID, Alg ID, Key ID*

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Number	Description
3920	Analog and Digital Radio Test Platform
Accessories Standard with 3920N	
Front/Rear Cover 2 X Adapter (BNC-F to TNC-M) Adapter (N-M to BNC-F) 3900 Series Operation Manual (CD-ROM) Antenna (BNC) (450 MHz) Antenna (BNC) (800 MHz) Antenna (BNC) (150 MHz) 3900 Series Getting Started Manual Warranty Packet, 2 Year 2 X Fuse, 3 Amp, 250V Power Cord (configuration for use in the UK) Power Cord (configuration for use in North America) Power Cord (configuration for use in Continental Europe) 3-Wire (grounded) power cord	
Options	**Description**
390XOPT051	Site Monitoring Application
390XOPT055	Audio Analyzer
390XOPT060	Harmonics & Spurious Measurements
390XOPT064	Analog Duplex Power Between Markers
390XOPT110	TETRA MS (Mobile Station Testing)
390XOPT111	TETRA BS (Base Station Testing)
390XOPT112	TETRA DM (Direct Mode Testing)
390XOPT114	TETRA Energy Economy Mode (Requires 390XOPT110)
390XOPT 115	TETRA Auto-Test II 81532 - TETRALOG Protocol logging and Analysis Software (Requires 390XOPT110 and 390XOPT111)
390XOPT201	P25 Trunking Operation VHF/UHF/700/800 MHz (Requires 390XOPT200)
390XOPT204	LSM Generate and Receive/Analysis (Requires 390XOPT200)
390XOPT206	P25 Control Channel Logger Option
390XOPT207	SmartNet™/SmartZone™ Option
390XOPT209	KVL Keyloader Option
390XOPT210	Analog Simulcast Option (Requires 390XOPT055)
390XOPT212	Explicit Mode Trunking (Requires 390XOPT201)
390XOPT213	Unit to Unit Call (Requires 390XOPT201 and 390XOPT212)
390XOPT214	Adjacent Channel Broadcast Message (Requires 390XOPT201)
390XOPT215	Secondary Control Channel Broadcast Message (Requires 390XOPT201)
390XOPT218	Auto-Test II for P25 Radio Systems
390XOPT230	Off Air Monitor Software for P25 Message Logging - Protocol Analysis Tool (Requires 390XOPT206)
390XOPT240	P25 AES Encryption
390XOPT250	Occupied Bandwidth for P25
390XOPT600	XTS-5000 Auto-Test/Alignment Software (Requires 390XOPT200, 390XOPT218)
390XOPT601	XTS-3000 Auto-Test/Alignment Software (Requires 390XOPT200, 390XOPT218)
390XOPT602	XTL-2500, XTL-5000 Power Alignment Option for Auto-Test II (Requires 390XOPT600, 390XOPT200, 390XOPT218, 392XOPT053 and AC24011)
390XOPT603	TIA/EIA-603 Land Mobile Test Software (Requires 390XOPT059)
390XOPT606	EF Johnson Radio Alignment Software (Requires 390XOPT200, 390XOPT218)
390XOPT607	BK DPHx Radio Alignment Software (Requires 390XOPT200, 390XOPT201)

Accessories for 3920N	
AC24009	DMM Test Leads for use with 392XOPT053 Category 3 rated
AC24011	10 Amp Current Shunt 0.01 Ohm
AC24012	Rack Mount Kit
AC25011	Case, Transit W/Wheels
AC25012	Case, Soft Padded Carrying
AC25013	Kit, 10/20 dB Pads, TNC
AC25014	Scope Probe Kit
AC25023	Front/Rear Cover
AC25027	Adapter (BNC-F to TNC-M)
AC25029	Accessory Pouch
AC25036	DC to AC Converter, 12 VDC to 110-120 VAC
AC25042	Antenna (BNC) (50 MHz)
AC25043	Antenna (BNC) (450 MHz)
AC25044	Antenna (BNC) (800 MHz)
AC25045	Antenna (BNC) (150 MHz)
AC25059	6 dB / 150 Watt 1.5 GHz Attenuator
AC25060	10 dB / 150 Watt 1.5 GHz Attenuator
AC25061	50 ohm 250 Watt 5 GHz Termination
AC25081	Site Survey Software
AC4105	Return Loss Bridge (1.3 GHz)
AC8645	Microphone
CALFB390X	Calibration Certificate

Extended Standard Warranties for 3920N	
W390X/203	Extended Warranty 36 Months
W390X/205	Extended Warranty 60 months

Extended Standard Warranties with Calibration for 3920N	
W390X/203C	Extended Warranty 36 Months with scheduled calibration
W390X/205C	Extended Warranty 60 months with scheduled calibration