# Wireless

## 3920 Series Analog and Digital Radio Test Platform

Featuring Advanced Automatic Test and Alignment operation for the latest digital radios

New Generation PMR Test Platform Now Includes DMM Standard!

- 1 GHz frequency range standard (2.7 GHz frequency range optionally available)
- 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™
- Color coded pass/fail results
- GPIB, Ethernet, USB and RS-232 interfaces
- Software upgradeable in the field
- High performance FM/AM/SSB analog duplex features
- HP/Agilent 8920B remote emulation
- EIA/TIA-603 land mobile radio test software
- P25 advanced parametric/protocol analysis
- P25 Trunking
- SmartNet™/SmartZone™ Trunking
- Automatic alignment for Motorola ASTRO®, EF Johnson and BK DPHx radios
- DMR (MOTOTRBO™) mobile and repeater tests
- TETRA mobile, base station and DMO tests
- HPD® (High Performance Data) base and mobile simulation
- NXDN™
- dPMR
- ARIB STD-T98

The 3920 is the latest radio test solution from Aeroflex for engineering, 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, TETRA, HPD®, NXDN™, dPMR, DMR and ARIB STD-T98 systems.

**Standard features include:**

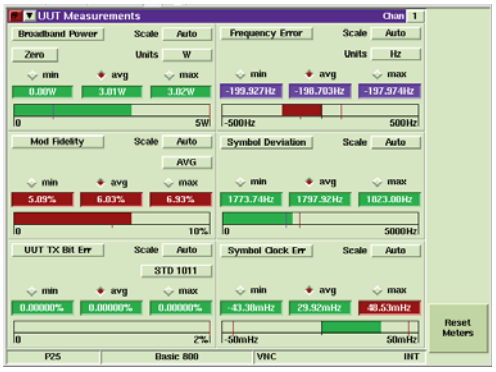
- Full AM, FM and SSB test capabilities
- 5 MHz channel spectrum analyzer
- Full-span spectrum analyzer to 1 GHz or 2.7 GHz (with option 392XOPT058)
- Dual-Channel oscilloscope to 4 MHz
- Full audio analysis for AF level, frequency, SINAD and distortion measurements
- Full RF parametric tests for power, 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 3920 delivers faster, accurate and more repeatable measurements than any of its predecessors and provides for future technology enhancements as new digital technology becomes available.

Combining the power of an onboard PC with a 30 GB hard-drive and Linux OS, the 3920 also supports USB mouse and keyboard

interface for very easy operation as well as almost unlimited save/recall setups, saving time and effort.

The 3920 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 3920 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 3920 to be completely reconfigured "on the fly" to provide advanced tests for analog and digital systems.

### High Performance Standard Features

**Wide Frequency Range:** The 3920 includes two variants. The 3920 comes standard with continuous frequency coverage from 10 MHz (usable down to 100 kHz) to 1 GHz. Option 392XOPT058 extends the maximum frequency to 2.7 GHz.

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

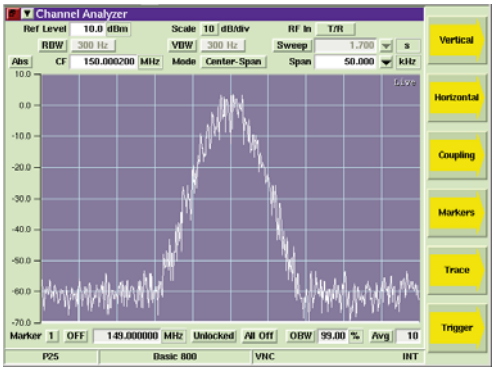
**Inband Low Level RF Power Measurements:** For sensitive measurement, e.g. off-air analysis, a low power input is provided via the antenna input port. This low level input gives the user the ability to measure an off the air signal as low as -100 dBm or -115 dBm with the internal pre-amp selected.

**High Stability Time Base:** With a 0.01 ppm OCXO frequency standard, the 3920 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 3920 provides consistent results in testing receiver parameters.

**Full Span Spectrum Analyzer:** View signals from 1 MHz to 1 GHz standard with the 3920 or to a full 2.7 GHz with the frequency extended option. With a DANL of -140 dBm (300 Hz RBW) with pre-amp enabled, the 3920 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.

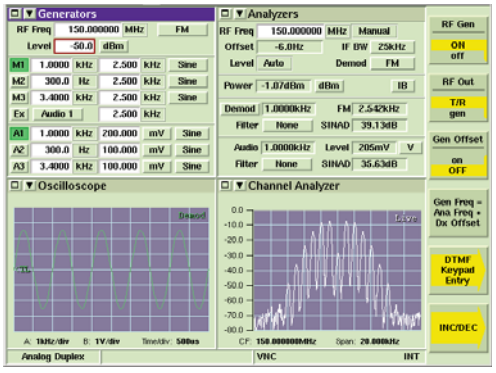
**Digital Multimeter:** Now standard for the 3920 is the Digital Multimeter. The Digital Multimeter comes with three new ports on the front panel that are used for measuring AC/DC volts, AC/DC amps and OHMS.

**High Performance Audio Features:** With high accuracy audio generators from 1 mV to 8 V rms, the 3920 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 3920 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 3920 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 3920 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.




*3920 Tiled Graphical Users Interface*

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 3920 supports remote control via GPIB for automated test system control. A VXI pnp VISA driver allows easy test system integration of the 3920. In addition to a native 3920 command set, the 3920 Series also supports commands for the HP/Agilent 8920B that allows migration from the 8920B to the 3920 extremely easy.

**Remote Operation:** Use of the 3920 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 3920 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 3920 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.

## Optional Application Software and Special Features Enhance Test Capabilities

### Site Monitoring Application (390XOPT051)

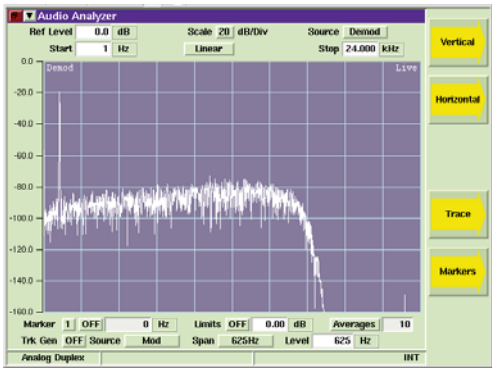
The 3920 brings impressive new capabilities to site monitoring applications. With option 392XOPT051, the user now has the ability to leave the 3920 on-site while the unit provides automated data logging of the site's effective receiver sensitivity. When connected to a good documented receiver (a "golden" radio), the 3920 will automatically calculate the Effective Receiver Sensitivity (ERS) at a predetermined interval (example: every 10 seconds) over a specified time (example: log ERS for 72 hours). As these measurements are taken, a min/average/max SINAD is displayed, and the data is logged to the 3920's internal hard-drive. Spectral information is also optionally logged with each measurement to help locate and track sources of interference. This gives the system engineer a valuable tool in determining site location performance and system RF boundaries. The 3920 provides the user with the ability to recall the ERS point at given intervals, as well as spectral data at each of the sample points to view interferes that may be present at one particular time, but not another (for example: 2AM).

### IQ Gen Modulation (390XOPT054)

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 3920 and used as the modulation source in the Analog Duplex System.

### Audio Analyzer (390XOPT055)

With 390XOPT055, the 3920 Series provides audio spectral analysis of the recovered audio signal, either from the audio inputs or from the demodulated RF signal. This feature allows users to view frequency amplitude in relation to other audio frequencies and to isolate problems such as noise in audio circuits. With a frequency range of 1 Hz to 24 kHz, the audio analyzer covers more than the full audio frequency range of mobiles and hand-helds. In addition, there are two markers, plus a peak hold and average function. Traces can also be captured, stored and then recalled later for use as a comparison with a live trace. A tracking generator option (390XOPT210) is also available as an add-on to the audio analyzer.



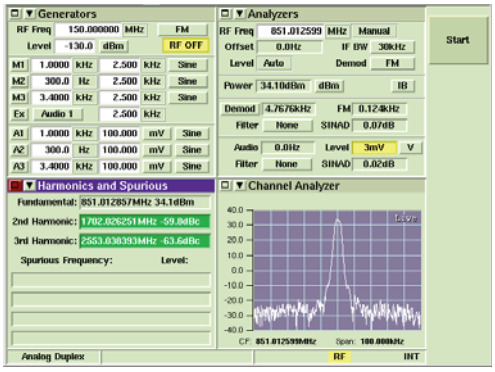

*Audio Analyzer Maximized*

### 2.7 GHz Frequency Range (392XOPT058)

The 3920 comes standard with a generate and receive frequency range of 10 MHz (100 kHz usable) to 1.05 GHz. This option will extend the range to 2.7 GHz.

### Harmonics and Spurious (390XOPT060)

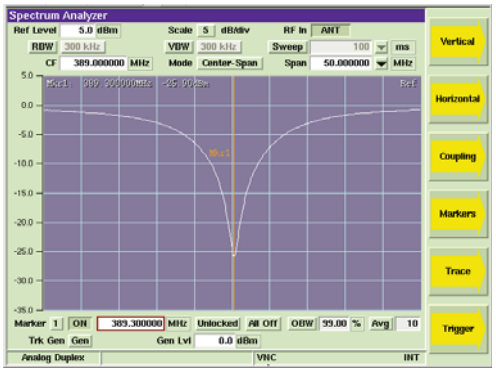
The ability to quickly and accurately measure the harmonics and spurious of the transmitter of a radio is the function of 390XOPT060. The fundamental frequency is automatically detected and measured and then the second and third harmonics are measured and compared. In addition, the spurious signals that are higher than the configured level are identified and displayed. The frequency and level of the fundamental as well as the harmonics and spurs are then displayed. This option makes finding the harmonics and spurious transmitter very simple. Simply connect the transmitter of the radio to the 3920, key the radio and press Start.




*Harmonics and Spurious*

### Tracking Generator (390XOPT061)

A full featured spectrum analyzer is available, standard, on all 3920s. Available as an option to the spectrum analyzer, the 3920 tracking generator allows the user to look at the response of a duplexer, filter bank or other RF device on the spectrum analyzer. This option 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).




*Spectrum Analyzer with Tracking Generator*

### Power Between Markers (390XOPT064)

Also available as an option, the power between markers option provides a measurement of the amount of power between the spectrum analyzer markers. With this feature, the user can set the position of two markers on the spectrum analyzer and then measure the amount of power in the bandwidth selected with those markers. This will enable the user to determine the amount of power in an adjacent channel or in the center channel.

### Chinese GUI (390XOPT090)

This option enables the selection of either Chinese or English as the language for the graphical user interface for the Analog Duplex system. When enabled, a selection is added to the utilities screen that allows the user to choose between English or Chinese character display in the audio Analog Duplex system.

*Illustration of Chinese GUI*

## OPTIONAL SYSTEM PERSONALITIES

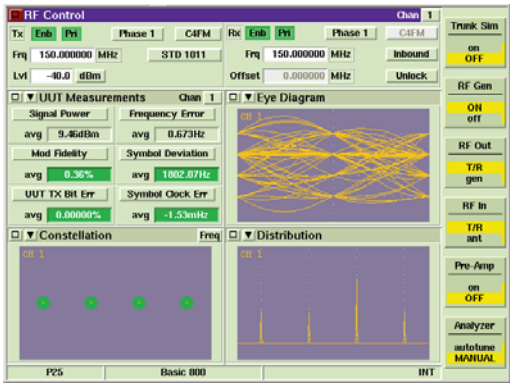
In addition to the Analog Duplex system, the 3920 can support a number of optional test systems or personalities, installed concurrently. Personalities include:

- TETRA digital trunked radio systems for mobile station and base station testing
- TETRA direct mode testing
- APCO P25 conventional and trunked radios
- SmartNet™ / SmartZone™
- DMR (Digital Mobile Radio)
- NXDN™
- HPD® (High Performance Data)
- dPMR (digital Private Mobile Radio)
- ARIB STD-T98 (Digital Convenience Radio Equipment For Simplified Service)

### P25 CONVENTIONAL OPERATION (390XOPT200)

The 3920 P25 Conventional Option 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:

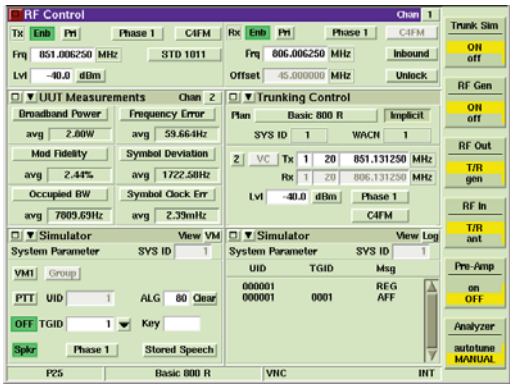
- Measure C4FM modulation fidelity and symbol deviation
- Measure power, frequency error and TX BER
- Measure symbol clock error
- Measure RX BER
- Display eye diagram of C4FM demodulation
- Display constellation plot of C4FM symbols
- Display C4FM symbol deviation distribution plot
- Transmit full TIA/EIA-102 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*

### P25 Trunking Operation VHF/UHF/700/800 MHz (390XOPT201)

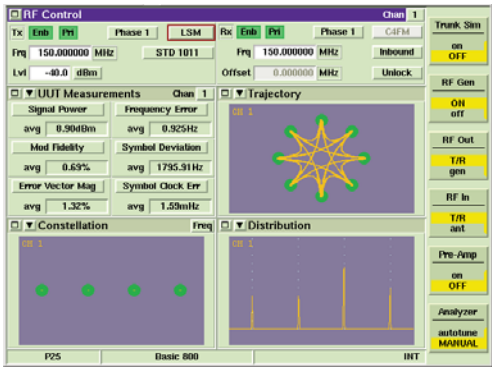
To further enhance P25 operation, the addition of the P25 trunking option allows simulation of a P25 control channel in any frequency band. Channel plans may be configured to test virtually any P25 trunked system. A simulator tile logs the messages sent by the radio under test and allows the 3920 to simulate a virtual mobile configured to talk to the radio under test. This option enables the user to originate a group call to the radio under test or make a group call from the radio under test to the 3920. In addition, the user can have multiple radios register and affiliate with the 3920 and then originate calls from one radio to the other radios.




*P25 Trunking Simulation*

### LSM Generate and Receive/Analysis (390XOPT204)

In addition to the standard P25 modulation, also available on the 3920 is the capability to generate and receive Linear Simulcast Modulation (LSM). This option, available as an extension of P25 conventional operation, enables measurements that are specific to LSM. It also adds a graphical analysis of the demodulated LSM signal that is normally only found in vector signal analyzers. Since LSM is a complex type modulation, this plot shows the inphase versus quadrature phase (I versus Q) of the demodulated LSM signal. In addition, this option adds Error Vector Magnitude to the selection of measurements available from the UUT Measurements tile.




*LSM Signal Analysis Screen*

### P25 Control Channel Logger Option (390XOPT206)

This option provides the user a tool to perform advanced protocol analysis on both control channel and voice channel data. With this option the user can log P25 data by streaming the received data in real time from the Ethernet port to a PC. This data is logged in an XML format so that the user can easily view the data using a text editor or use an external program to perform further analysis on the data. This data can be logged at three different levels ranging from the raw data symbols up through decoded data. The data is timestamped on a frame by frame basis. In addition to being able to log data, the user can also send data to the 3920 to be transmitted, making the 3920 into a completely user defined data modem for P25.

### SmartNet™/SmartZone™ (390XOPT207)

This option provides support for Motorola Astro® SmartNet™/SmartZone™ systems, including support for rebanded channels in the 800 MHz band.

### KVL Keyloader Option (390XOPT209)

This option provides an interface to the KVL Keyloader enabling the user to be able to directly enter keys into the 3920 using a KVL-3000+.

### Analog Simulcast Option (390XOPT210)

This option is actually an extension to the Audio Analyzer option and acts as a tracking generator for the audio analyzer. This feature is designed primarily for use in characterizing the performance of Motorola Analog Simulcast systems and enables detailed alignment of the 0-100 Hz band. In addition, this option allows for extended characterization of audio circuits from 0-10 Khz.

### Explicit Mode Trunking (390XOPT212)

The advanced form of frequency channel assignment known as Explicit Messaging is supported by adding option 390XOPT212 to the P25 Trunking Operation VHF/UHF/700/800 MHz option. The explicit mode of operation assigns the actual channel/frequency over the air by providing the exact TX and RX frequency assignments directly to the radio.

### Unit to Unit Call (390XOPT213)

This option adds capability of testing the unit to unit call functionality of a mobile station to the P25 trunking option. The user can either originate a unit to unit call from the mobile station or from the test set.

### Adjacent Channel Broadcast Message (390XOPT214)

This option adds the adjacent status broadcast message to the control channel messages transmitted by the 3920. This will enable the user to test the capability of the mobile station to operate correctly in the presence of this message. The purpose of this message is to inform mobile stations of the presence and status of sites adjacent to this particular site.

### Secondary Control Channel Broadcast message (390XOPT215)

This option adds the secondary control channel broadcast message to the control channel messages transmitted by the 3920. This will enable the user to test the capability of the mobile station to operate correctly in the presence of this message. This message is used to inform mobile stations of other control channels or other potential backup control channels at this site.

### Off Air Monitor Software for P25 Message Logging- Protocol Analysis Tool (390XOPT230)

The Aeroflex 3900 Series P25 Off Air Monitor (OAM) is used to capture and view APCO P25 messages sent over the air. The OAM can receive and demodulate P25 RF signaling, decode P25 messages and log these messages to a file for later viewing. Both trunked (control and traffic) and conventional channels are supported, allowing network engineers to:

- Verify compliance to P25 standards
- Troubleshoot existing P25 systems
- Analyze third party signaling

### P25 AES Encryption (390XOPT240)

With the addition of this option, the 3920 supports P25 encryption formats and manual key entry for systems that employ DES OFB Type III (included in 390XOPT200) or AES encryption (390XOPT240). These options allow decoding of encrypted voice frames to verify encrypted channel performance. Encryption keys may be loaded manually using either the front panel or external keypad or with option 390XOPT209, keys may be loaded with the Project 25 Key Fill Device (KFD) interface protocol. Additionally, keys may be loaded using KVL ASN mode of operation found in KVL-3000 and older model key loaders from Motorola.

### X2 TDMA Test Suite (390XOPT219)

Available for testing X2 TDMA test systems, this option is available through Motorola only.

### X2 TDMA Mobile Emulator (390XOPT245)

This option enables the testing of X2 TDMA base stations. This option is available through Motorola only.

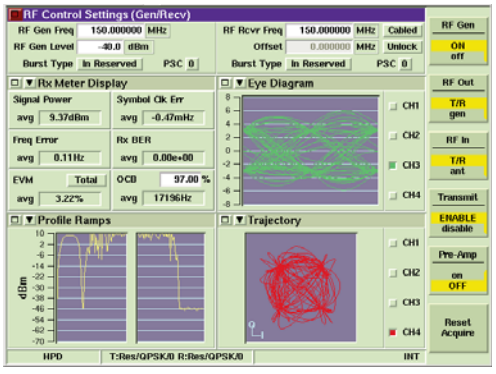
### X2 TDMA Advance Test Suite (390XOPT261)

This option combines 390XOPT216 and 390XOPT245.

### MOTOROLA HPD® TESTING OPTION (390XOPT300)

- Generate/receive HPD® signals
- Modulation - 64QAM, 16QAM and QPSK (Inbound and Outbound)
- Transmitter parameters including signal power, frequency error, EVM
- Symbol clock error, RX BER, burst timing error and occupied bandwidth
- I & Q modulation analysis including constellation and trajectory plots of the data symbols, synch and pilot bits
- Display of Min/Max and average as specified by the number of bursts
- Pass/Fail indication using color codes meters

Aeroflex has developed this test mode for Motorola to address the need for testing their high performance packet data operation on both mobiles and base stations in the 700 and 800 MHz bands. HPD® systems operate within the normal 25 kHz mobile radio bandwidth. The 3920 HPD® options provide users with the ability to test High Performance Data systems. HPD® can be configured for two modes of operation. When configured to operate in BR Mode the test set simulates base radio operation and is used to test the functionality of Motorola HPD® Mobile Subscriber Units (MSU). When configured to operate in MSU Mode the test set simulates Mobile Subscriber Unit operation and is used to test the functionality of Motorola Base Repeaters (BR).




*Example of HPD® Tiles*

### Motorola HPD® Advanced Analysis Package (390XOPT301)

More advanced features are available with 390XOPT301 including:

- Received Data Stream Logger. Logs the data portion of the HPD® signal and displays it in hex.
- RX Time Display. Shows frequency error, power and symbol clock error over time.
- HPD® Magnitude/Phase Estimation. Displays magnitude and phase fluctuations of the received signal.
- Eye Diagram and I/Q over time displays
- Power Profile. Shows the power over time and in a burst (TDMA transmission).
- Power Ramps. Shows the power up and power down portion of the TDMA burst.

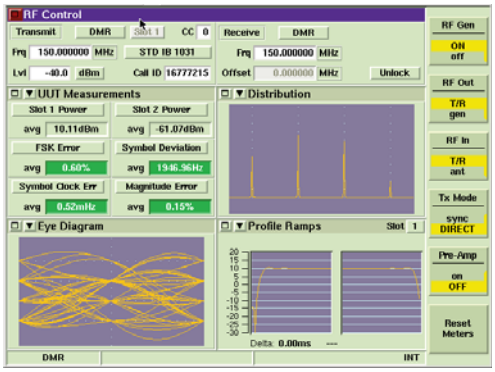
### Motorola HPD® Testing Suite (390XOPT302)

This option combines 390XOPT300 and 390XOPT301.

### DMR (390XOPT400)

Add advanced testing capability for DMR (Digital Mobile Radio) with 390XOPT400. This option enables the Aeroflex 3920 Series Digital Radio Test Set to test and align a wide range of DMR repeaters and mobile stations. DMR radio technology is a digital radio format offering advanced communications features specified by the ETSI technical standard ETSI TS 102-361-1. Capabilities of the 3920 include:

- Generate and receive DMR modulated signals
- Measure FSK error and magnitude error
- Measure symbol deviation
- Measure symbol clock err
- Measure slot power
- Distribution plot of symbol deviation
- Eye diagram of FSK demodulation
- Power profile of burst and of burst ramp up/ramp down
- Test duplex or simplex mobiles
- Wake-up burst for testing repeaters
- Synchronize with repeaters
- BER testing
- Encode color code and call ID
- Decode color code, unit ID and call ID




*Example of DMR Tiles*

### DMR XML Channel Logger Option (390XOPT402)

With this option, the user can now capture and log to a file (on a PC connected to the 3920 through a LAN) the raw data that is transmitted by a mobile station or repeater. The data is formatted using XML, so that it can be decoded with an external program (developed by the user) or viewed with a text editor. This is perfect for the engineer doing development work or the test engineer in the field that needs to capture the data being transmitted by a repeater or subscriber unit. The data is captured by connecting a PC to the 3920 through an Ethernet crossover cable.

### dPMR (390XOPT420)

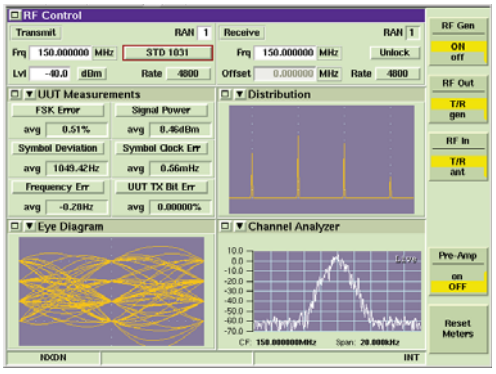
dPMR is an ETSI standard specified in ETSI TS 102 658. This option adds advanced testing capabilities that conform to the requirements of this ETSI standard. The transmitter tests include power, frequency error, FSK error, symbol deviation and symbol clock error. This option also provides several graphical screens that provide more insight into the accuracy of the dPMR modulation.

### NXDN™ (390XOPT440)

Add advanced testing capability for NXDN™ with 390XOPT440. This option enables the Aeroflex 3920 Series Digital Radio Test Set to perform a variety of Transmitter and Receiver tests on any NXDN™ radio. Transmitter measurements include:

- Signal power
- Frequency error
- FSK error
- Symbol deviation
- TX BER
- Symbol clock error

The system supports both 4800 and 9600 baud systems. Measurements can also be displayed as an EYE diagram, symbol distribution plot and a symbol constellation plot. A power over time graph is provided to diagnose a variety of power-related issues.




*Example of NXDN Tiles*

Receiver testing is supported with a variety of signal generation patterns.

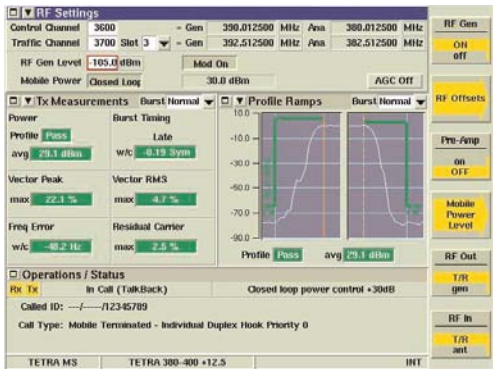
- STD 1031 (1031 Hz pattern)
- STD CAL (1031 Hz pattern with 5% BER)
- STD 511 (PN9 bit sequence)
- STD INTFR (PN15 bit sequence)

### ARIB STD T-98 (390XOPT460)

The option provides testing for mobile stations that conform to the ARIB T-98 standard. This testing is similar to dPMR and NXDN.

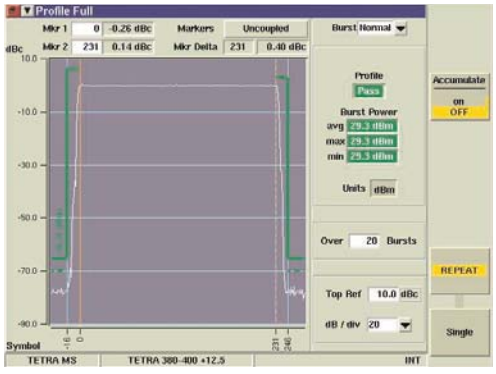
### TETRA

- Mobile station testing with test signal T1 (390XOPT110)
- Base station testing with test signal T1 (390XOPT111)
- Generate/analyze TETRA RF signals
- Base station and mobile station testing plus testing with test signal T1
- Transmit parameter measurements including power, frequency error, EVM and burst timing
- TETRA RF power meter and burst power analysis up to 125 W
- Modulation analysis with I/Q constellation and trajectory display
- Receiver Bit Error Rate (BER) and Message Error Rate (MER) measurements
- Pass/Fail indication using color coded meters
- TETRA protocol analyzer/simulator
- Data display mode
- Time stamped protocol history
- Option for testing Direct Mode Operation (DMO)

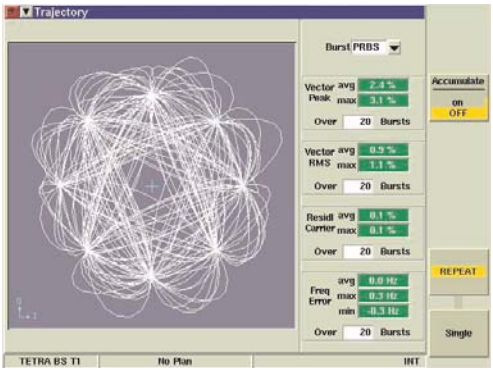



*Example of TETRA MS Tiles*

For TETRA applications, the 3920 is the successor to the Aeroflex 2968 TETRA Radio Test Set, the established industry standard for TETRA R&D, manufacturing, application development and service operations. Building upon the experience gained over many years of TETRA test, the 3920 with the TETRA options provides the world's best solution for testing TETRA radios. TETRA system options provide signaling and physical layer measurement requirements for testing TETRA radio equipment. Measurements are made in accordance with ETSI EN 300 394-1 for on channel transmitter and receiver parameters. Signaling functions support TIP (Tetra Interoperability Profile) compliant TETRA radios, thus ensuring optimum compatibility with TETRA equipment from various suppliers. Whatever the device under test, the TETRA system options have the flexibility to measure the various burst types specified by the TETRA standard including normal bursts, control bursts and synchronization bursts. The 3920 offers high speed measurement capabilities to expedite production testing. As a direct benefit of high power signal processing capacity, TETRA measurements are performed nearly nine times faster than its predecessor.




*Profile Full Tile Maximized TETRA*




*Trajectory Tile Maximized*

### Call Processing Highlights

The 3920 can be freely configured to emulate a TETRA network by selection of the appropriate channel plan, country code, network code, color code, etc. Once configured, registration, group attachment and TETRA call types including group call, private call, emergency call, telephone call and user defined call can all be tested. SDS messages (types 1 to 4 and SDS-TL) can be sent or received. The 3920 TETRA system option displays a range of mobile reported information relating to registration, group attachment, test mode, call type, called party, status messages, text messages and DTMF digits dialed.


*Protocol History Maximized Tile*

### TETRA Test Mode T1 and T1 Loopback

The TETRA MS and TETRA BS options provides various T1 test signals as defined in ETSI EN 300 394-1 for performing manual testing of TETRA base station and mobile stations receivers. The test signal T1 in the MS T1 application provides control information to the mobile to aid testing, e.g. burst type, max, TX power, loopback commands. These T1 test signals can be used by the mobile in a test mode to output received demodulated data to a test interface for external processing of receiver Bit Error Rate (BER). Alternatively, the mobile can be commanded by the test signal T1 to loop back the received data to the 3920 which can then perform BER/MER/ PUEM measurement. In the BS T1 application, the 3920 also supports T1 loopback BER/MER/PUEM measurements for base stations.

### TETRA Test (TT) Protocol Support

The TETRA MS option provides support for the TETRA Test (TT) protocol as defined in ETSI EN 300 394-1. The TT protocol allows the mobile to be tested in a loopback mode whereby the mobiles BER, MER and RBER can all be reported.

### Audio Testing

Subjective audio testing is supported for simplex and duplex calls. Audio spoken into the mobile's microphone is received and stored by the test set, which then re-transmits the speech so that it is replayed through the mobile's speaker or ear piece with 2 seconds delay added, thus, providing an end-to-end audio quality test.

### Direct Mode Functionality (390XOPT112)

The 3920 also supports the testing of Direct Mode Operation. The 3920 can initiate or receive calls from a mobile that is operating in direct mode and then make transmitter measurements such as power, frequency error and modulation accuracy. The operation and graphical displays are very similar to the normal TETRA operation.

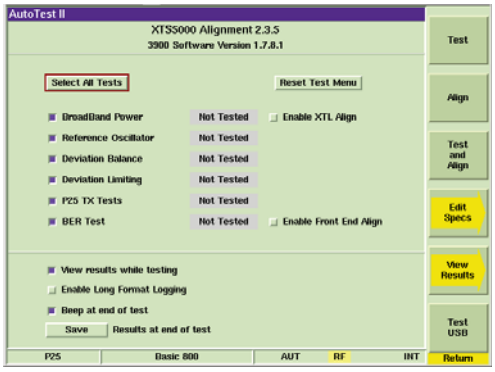
### TETRA Energy Economy Mode (390XOPT114)

This optional mode of operation provides protocol signaling to control a mobile's energy economy mode from "Stay alive" through energy groups EG1 (shortest sleep) to EG7 (longest sleep) and is used in conjunction with the comprehensive signaling capabilities already within the TETRA MS option. This operation enables developers, operators and users to configure battery test scenarios to simulate particular operational conditions. It gives them the testing flexibility to characterize the expected battery life performance in its intended operational use on the network.

### AUTO-TEST II

Available as an option for the 3920 is the Auto-Test II operation. Providing the ultimate in flexibility, this option gives the user the ability to control the operation of 3920 using the TCL scripting language. The control of the functions of the 3920 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 3920
- Design your own Graphical User Interface
- Uses TCL scripting language
- Utilizes the full set of 3920 RCI commands




*Example of Auto-Test II Display*

Auto-Test II is also the environment for running the auto alignment options. Auto alignment is available for several manufacturers' radios, and more are being added all the time.

The Auto-Test II Programming environment is available for all of the systems in the 3920:

- Analog duplex (390XOPT059)
- TETRA (390XOPT115)
- P25 radio systems (390XOPT218)
- HPD® radio systems (390XOPT303)
- DMR radio systems (390XOPT401)
- dPMR radio systems (390XOPT421)
- NXDN™ radio systems (390XOPT441)
- ARIB T98 radio systems (390XOPT461)

### XTS-5000 Auto Alignment (390XOPT600)

Validate radios faster than ever with ease. Connect a single cable, press "Test and Align" and you are free to do more important things. This application is self-contained within the 3920 and automatically performs the functions of radio alignment and verification to ensure optimal radio performance. This application can test and align radios in as little as 5 minutes. This package provides support for the following radios: XTS®5000, XTS®2500, XTS®1500, XTS®4000, MT 1500, PM1500™, SSE 5000, ASTRO® XTL™ 5000, ASTRO® XTL™ 2500, ASTRO® XTL™ 1500 and Astro® Spectra Plus. Requires 390XOPT200 and 390XOPT218.

#### Alignments

- Reference oscillator
- High power
- Mid power
- Low power
- Deviation balance
- Deviation limiting
- Front End alignment

#### Performance Tests

- P25 modulation fidelity
- P25 symbol deviation
- P25 RX BER

### XTS-3000 Auto Alignment (390XOPT601)

Provides the functionality of 390XOPT600 for the following radios: XTS® 3000, ASTRO® Saber, ASTRO® Spectra. Requires 390XOPT200 and 390XOPT218.

### XTL Automatic Power Alignment (390XOPT602)

Adds the capability for full power alignment of mobiles. Includes all current bias adjustments, power characterization and current limit settings for the XTL™5000, XTL™2500, XTL™1500 and PM1500™. Typical alignment time is less than 4 minutes for a full power characterization alignment. Requires 390XOPT200, 390XOPT218, 390XOPT053, AC24011 and 390XOPT600.

### EF Johnson Radio Auto Alignment (390XOPT606)

This option adds the capability to do a fully automatic alignment on EF Johnson P25 radios. The option has the same features as option 390XOPT600, but for EF Johnson P25 radios.

### BK DPHx Radio Auto Alignment (390XOPT607)

This option adds the capability to do a fully automatic alignment on BK DPHx radios.

### LMR Auto-Test (390XOPT603)

Validate radios faster than ever with ease. This application is self-contained within the 3920 and automatically performs the test functions as prescribed by the EIA/TIA-603 standards for testing any FM Land Mobile Radio. Configure up to 30 channels with independent test customization for each channel.

#### TX Tests

- Frequency
- Power
- CTCSS
- Microphone sensitivity
- Modulation limiting
- Audio distortion
- Audio frequency response
- FM hum and noise

#### RX Tests

- Audio distortion
- Audio sensitivity
- Audio frequency response
- Usable sensitivity
- Displacement bandwidth
- Audio squelch sensitivity
- Audio squelch blocking
- Hum and noise

Test High/Low or both power level settings on any channel with support for a PTT line to auto-key/de-key the transmitter. Single channel test execution is allowed to re-check failed channels. Supports re-test, accept failure or abort on any failed test. Supports store and recall for test configurations and test results. Network or local printer support allows for an immediate hard copy to be obtained.

# SPECIFICATION

## RF SIGNAL GENERATOR

| | |
|---|---|
| **FREQUENCY** | |
| Range | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)<br>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<br>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)<br>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)<br><-35 dBc (Crossover freq. = 3411.4 MHz - Gen freq.) |
| Phase Noise | <-93 dBc/Hz (20 kHz offset, RF <1.05 GHz)<br><-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)<br>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)<br><-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)<br>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, 4FSK |
| **RF POWER METER (INBAND)** | |
| Frequency Range | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (Freq Ext Opt) (Usable from 100 kHz) |
| Level Range | T/R Port: -60 to +51 dBm<br>Lowest reading is receiver BW dependent (Narrower bandwidths can measure lower levels).<br>ANT Port: -100 to +10 dBm<br>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, 4FSK, QPSK, QAM |
| **RF COUNTER** | |
| Range | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz, Auto-tune)<br>10 MHz to 2.7 GHz (392XOPT058) (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)<br>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 (6 MHz IF BW) |
| Resolution | 1 Hz |
| Accuracy | Frequency Standard ±1 count |
| Level Range | T/R Port: -10 to +50 dBm<br>ANT Port: -60 to +10 dBm |
| Signal | CW, FM, AM <70% modulation |

## DEMODULATION MEASUREMENTS

| | |
|---|---|
| **RF CHARACTERISTICS** | |
| Frequency Range | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz) |
| Input RF Level | T/R Port: -10 to +50 dBm<br>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)<br>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)<br>Audio 1 and Audio 2 (balanced, 600 Ω differential input) |
| Audio Input Impedance (Audio 1 and 2) | Hi-Z (>10 kΩ) - Unbalanced input<br>600 Ω - Unbalanced input (8 Vrms MAX input*)<br>600 Ω - Balanced input (Audio 1 and 2)<br>* 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)*<br>*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)*<br>*<±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*<br>*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*<br>*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)*<br>*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)*<br>*<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*<br>*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)<br>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<br>Continuous/single shot |
| External Trigger Level | Hi-Z BNC input on the rear panel of the unit<br>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<br>(150 VAC RMS, or VDC MAX input, Category II) |
| Resolution | 3-½ digits (2000 counts) |
| Accuracy | DC ±1% Full Scale ±1 count<br>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<br>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 1.05 GHz (standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (392XOPT058) (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<br>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)<br>±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<br>-10%/+25% of RBW FOR 6 MHz<br>±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<br>Marker to Next Right/Left<br>Marker to Minimum<br>Marker to Ref Level<br>Marker to Center Frequency<br>Marker sets Span<br>Marker sets Vertical Scale (Zero Span only) |

## TRACKING GENERATOR (OPTIONAL)

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

## HARMONICS AND SPURIOUS (OPTIONAL)

| HARMONIC LEVEL | |
|---|---|
| Range | 0 to -60 dBc |
| Resolution | 0.1 |
| Accuracy | Same as RF Spectrum Analyzer |
| **SPURIOUS LEVEL** | |
| Range | 0 to -60 dBc |
| Resolution | 0.1 |
| Accuracy | Same as RF Spectrum Analyzer |

## AUDIO SPECTRUM ANALYZER (OPTIONAL)

| FREQUENCY | |
|---|---|
| Range | Start and Stop Frequency - 0 Hz to 24,000 Hz |
| Resolution | 1 Hz |
| Accuracy | ±50 ppm (±10 ppm Typical) |
| Span | 2 kHz min to 24 kHz max |

| LEVEL | |
|---|---|
| Vertical Scales | 1, 2, 5, 10, 20 dB per division |
| Reference Level | 0 dB Full Scale (dBr) |
| Dynamic Range | Greater than 120 dB |
| Accuracy | ±1 dB from 300 Hz to 15 kHz |
| **MARKERS** | |
| Number of Markers | 2 |

## 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<br>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)<br>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)<br>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)<br>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)<br>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<br>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)<br>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<br>EN 61010-1<br>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<br>162.6 mm diagonal |
| **Active Area** | 5.1" (h) x 3.8" (v)<br>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 |

## OPTIONAL SYSTEMS

## P25 (OPTIONAL)

### RF SIGNAL GENERATOR

| FREQUENCY | |
|---|---|
| Range | 10 MHz to 1.05 GHz (standard) (Usable from 100 kHz)<br>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 -40.0 dBm<br>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)<br>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 (0.153), STORED SPCH, VOICE, 1011, SILENCE |

### RF RECEIVER

| Frequency Range | 10 MHz to 1.05 GHz (standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz) |
|---|---|
| Resolution | 1 Hz |
| Level Range | T/R Port: -10 to +50 dBm<br>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<br>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 |
| **PHASE 1 TRUNKING SIMULATION** | |
| System Plans | Basic 800, Basic UHF, Basic VHF, Basic 700, plus multiple user defined |
| User defined fields | System ID, WACN, RFSS ID, Site ID, Announcement Group Address, Local Registration Area, Service Class, Active Network, Local/Global Affiliation, Group Affiliation, Registration, WGID Mapping, WUID mapping, Protected<br>16 Channel IDs with Base Frequency, Bandwidth, TX Offset, Channel Spacing |

| | |
|---|---|
| Trunking Control | Base Simulation sets System Plan, Implicit/Explicit mode, Control Channel ID/NUM/Frequency, Control Channel power level, Control Channel modulation, Traffic Channel ID/NUM/Frequency, Traffic Channel power level, Traffic Channel modulation. |
| Simulator | Call Type, TGID, UID, Alg ID, Key ID |
| Encryption | Supports DES Encryption (AES available with restrictions) |

## TETRA

### RF SIGNAL GENERATOR

| | |
|---|---|
| **FREQUENCY** | |
| Range | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz) |
| Resolution | 1.0 Hz |
| Accuracy | Frequency standard ±1 count |
| **OUTPUT LEVEL** | |
| Range | T/R Port: -130.0 dBm to -40.0 dBm<br>Gen Port: -130.0 dBm to 0 dBm |
| Resolution | 0.1 dB |
| Accuracy | 1.0 dB for levels >-110 dBm (typical better than 0.6 dB)<br>1.5 dB for levels ≤-110 (typical better than 1.0 dB) |
| **MODULATION** | |
| Type | π/4 DQPSK, 18 ksymbols/sec, TETRA filter (RRC with ≤0.35) |
| Accuracy | <3% RMS<br><6% peak |
| Residual Carrier Power | <-35 dBc |
| **TEST SIGNALS** | |
| TETRA MS | Main Control Channel (MCCH) Traffic Channel (TCH/S) containing silence or 1 kHz tone or talk-back, Fast Associated Control Channel (FACCH) |
| TETRA MS T1 | T1 test signals (in accordance with ETSI EN 300 394-1) T1 type 1 (TCH/7.2), T1 type 2 (SCH/F), T1 type 3 (BSCH + SCH/HD), T1 type 4 (TCH/2.4), T1 type 15 (TCH/S), T1 type 17 (TCH/4.8) |
| TETRA BS T1 | T1 test signals (in accordance with ETSI EN 300 394-1) T1 type 7 (TCH/7.2), T1 type 8 (SCH/F), T1 type 9 (STCH+ STCH UL), T1 type 10 (TCH/2.4), 18 Frame PRBS, Framed PRBS, Unframed PRBS |
| TETRA DM | Traffic Channel (TCH/S) containing silence or 1 kHz tone ot talk-back |

### RF RECEIVER

| | |
|---|---|
| **Frequency Range** | 10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz)<br>10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz) |
| **Level Range** | T/R Port: -40 dBm to +40 dBm<br>ANT Port: -80 dBm to 0 dBm |
| **Burst Types** | MS: Control Burst (CB), Normal Uplink Burst (NUB)<br>BS: Normal Downlink Burst (TS1+2, TS1, and TS2),<br>Synchronization Burst, PRBS with no training sequence |

### TETRA MEASUREMENTS

| | |
|---|---|
| **POWER** | Average power across the useful part of the burst measured at the symbol points through a TETRA filter |
| Resolution | 0.1 dB |
| Accuracy | ±1.0 dB (±0.6 dB typical) |
| **MODULATION ACCURACY** | Modulation accuracy measures the displacement of symbol points from their ideal position |
| Range | 20.0% RMS vector error<br>40.0% Peak vector error<br>20.0% Residual carrier |
| Resolution | 0.1% |
| Accuracy | ±0.5% at 10% error |
| **BURST TIMING ERROR** | Timing error relative to downlink results available for avg, max, min and worst case for a sample of up to 250 bursts |
| Range | ±510.00 symbols |
| Resolution | 0.01 |
| Accuracy | ±0.05 symbols |
| Timing offset range | ±999.99 symbols |
| **FREQUENCY ERROR** | |
| Range | ±500.0 Hz |
| Resolution | 0.1 Hz |
| Accuracy | ±15 Hz +frequency standard accuracy |
| BER Testing (TETRA MS T1 mode) | BER, MER and PUEM |
| BER Testing (TETRA MS mode) | BER, RBER and MER |
| BER Testing (TETRA BS T1 mode) | BER, MER and PUEM |

*GRAPHICAL DISPLAYS*

| | |
|---|---|
| *POWER PROFILE DISPLAY* | *Display of power versus time for a complete burst or ramp up/ramp down intervals measured at the symbol points and displayed relative to a TETRA mask (TETRA limits or user defined) with pass/fail indication. Measured through a TETRA filter referenced (0 dB) to average power.* |
| *Dynamic Range* | *70 dB* |
| *Vertical Scale* | *20 dB/div or 0.1 dB/div in 1, 2, 5 steps* |
| *Accuracy* | *±1.0 dB (±0.6 dB typical) at symbol points for levels greater than -10 dB* |
| *CONSTELLATION DISPLAY* | *Polar display of amplitude versus phase at the symbol point measured over all symbols (SN0 ~ SN max) through a TETRA filter. Also available as a rotated constellation display where all symbol point values are mapped to a single constellation point.* |
| *PHASE TRAJECTORY DISPLAY* | *Polar display of amplitude versus phase continuously measured over the duration (SN0 ~ SN max) through a TETRA filter.* |
| *VECTOR ANALYSIS DISPLAYS* | *Vector error (%), magnitude error (%) and phase error (degrees) measured at symbol points (SN0 ~ SN max) through a TETRA filter.* |
| *Vertical Scaling* | *Vector error 0.1%/div to 20%/div in 1, 2, 5 steps*<br>*Phase error ±0.1°/div to ±20°/div in 1, 2, 5 steps*<br>*Magnitude error ±1.0 %/div to ±20%/div in 1, 2, 5 steps* |

*TETRA CHANNEL PLANS AND SIGNALING*

| | |
|---|---|
| *Channel Plans* | *TETRA 380-400 (0 Hz or 12.5 kHz offset)*<br>*TETRA 410-430 (0 Hz, -6.25 kHz or 12.5 kHz offset)*<br>*TETRA 450-470 (0 Hz or 12.5 kHz offset)*<br>*TETRA 805-870 (0 Hz or 12.5 kHz offset)*<br>*TETRA 870-921 (0 Hz or 12.5 kHz offset)*<br>*No plan and user defined* |
| *System Identity* | *Mobile Country Code, MCC*<br>*Mobile Network Code, MNC*<br>*Base Color Code, BCC*<br>*Location Area Code, LA* |
| *Signaling Functions* | *Mobile parameter control for SSI, GSSI, power class, receiver class*<br>*Registration, test mode registration and de-registration*<br>*Private (individual) call, group call, phone call, emergency call, user defined call (mobile terminated)*<br>*Call timer and trunking type selection*<br>*Cell-re-selection (requires two test sets and a power splitter)* |
| | *Short data service*<br>*Status message and SDS types 1 to 4 call control (simplex calls)*<br>*Power control and Frequency control*<br>*Frequency handoff*<br>*RF loopback control (TT)*<br>*Display of mobile information*<br>*Demodulated and channel decoded data*<br>*Protocol history display*<br>*Talk back, silence and test tone (1 kHz digitally encoded)* |

## *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 3920** | |
| Front/Rear Cover<br>2 X Adapter (BNC-F to TNC-M)<br>Adapter (N-M to BNC-F)<br>3900 Series Operation Manual (CD-ROM)<br>Antenna (BNC) (450 MHz)<br>Antenna (BNC) (800 MHz)<br>Antenna (BNC) (150 MHz)<br>3900 Series Getting Started Manual<br>Warranty Packet, 2 Year<br>2 X Fuse, 3 Amp, 250V<br>Power Cord (configuration for use in the UK)<br>Power Cord (configuration for use in North America)<br>Power Cord (configuration for use in Continental Europe)<br>3-Wire (grounded) power cord | |
| **Options** | **Description** |
| 390XOPT051 | Site Monitoring Application |
| 390XOPT054 | IQ Gen Modulation (for IQ Creator waveforms) |
| 390XOPT055 | Audio Analyzer |
| 392XOPT058 | 2.7 GHz Frequency Range Extension Option |
| 390XOPT059 | Auto-Test II Analog |
| 390XOPT060 | Harmonics & Spurious Measurements |
| 390XOPT061 | Tracking Generator |
| 390XOPT064 | Analog Duplex Power Between Markers |
| 390XOPT090 | Chinese GUI |
| 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<br>81532 - TETRALOG Protocol logging and Analysis Software (Requires 390XOPT110 and 390XOPT111) |
| 390XOPT200 | P25 Conventional Operation (with DES OFB Type III) |
| 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 (Requires 390XOPT200) |
| 390XOPT207 | SmartNet™/SmartZone™ Option (Requires 390XOPT200) |
| 390XOPT209 | KVL Keyloader Option (Requires 390XOPT200) |
| 390XOPT210 | Analog Simulcast Option (Requires 390XOPT055) |
| 390XOPT212 | Explicit Mode Trunking (Requires 390XOPT200 and 390XOPT201) |
| 390XOPT213 | Unit to Unit Call (Requires 390XOPT200, 390XOPT201 and 390XOPT212) |
| 390XOPT214 | Adjacent Channel Broadcast Message (Requires 390XOPT200 and 390XOPT201) |
| 390XOPT215 | Secondary Control Channel Broadcast Message (Requires 390XOPT200 and 390XOPT201) |
| 390XOPT218 | Auto-Test II for P25 Radio Systems (Requires 390XOPT200) |
| 390XOPT219 | X2-TDMA™ Test Suite (Requires 390XOPT200 and 390XOPT201) - (Available through Motorola Only) |
| 390XOPT230 | Off Air Monitor Software for P25 Message Logging - Protocol Analysis Tool (Requires 390XOPT200 and 390XOPT206) |
| 390XOPT240 | P25 AES Encryption (Requires 390XOPT200) |
| 390XOPT245 | X2-TDMA™ Mobile Emulator (Requires 390XOPT200 and 390XOPT201) - (Available through Motorola only) |
| 390XOPT250 | Occupied Bandwidth for P25 (Requires 390XOPT200) |
| 390XOPT260 | P25 Performance Test Triggers |
| 390XOPT261 | X2-TDMA™ Advanced Test Suite - Combines 390XOPT219 and 390XOPT245 (Requires 390XOPT200, 390XOPT201 and 390XOPT219) - (Available through Motorola Only) |
| 390XOPT300 | Motorola HPD® Testing Option (Available through Motorola Only) |
| 390XOPT301 | Motorola HPD® Advanced Analysis Package (Available through Motorola Only) |
| 390XOPT302 | Motorola HPD® Testing Suite Combines 390XOPT300 and 390XOPT301 |
| 390XOPT303 | Auto-Test II for HPD® Radio Systems (Requires 390XOPT300) |
| 390XOPT400 | DMR (MOTOTRBO™) ETSI 102-361 |
| 390XOPT401 | Auto-Test for DMR Radio Systems (Requires 390XOPT400) |
| 390XOPT402 | DMR XML Channel Logger Option (Requires 390XOPT400) |
| 390XOPT420 | dPMR - ETSI 102-490 |
| 390XOPT421 | Auto-Test II for dPMR Radio Systems (Requires 390XOPT420) |
| 390XOPT440 | NXDN™ |
| 390XOPT441 | Auto-Test II for NXDN™ Radio Systems (Requires 390XOPT440) |
| 390XOPT460 | ARIB T98 |
| 390XOPT461 | Auto-Test II for ARIB T98 Radio Systems (Requires 390XOPT460) |
| 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 3920** | |
|---|---|
| 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 |

| Aeroflex High Performance Low Loss Blue Streak Cables (with Cable Loss vs. Frequency Certification) | |
|---|---|
| AC25046 | 4 ft Blue Streak BNC-M to TNC-M cable |
| AC25047 | 4 ft Blue Streak N-M to N-M cable |
| AC25049 | 4 ft Blue Streak BNC-M to N-M cable |
| AC25050 | QMA "Quick Connect" SMA - QMA Jack Adapter |
| AC25053 | 3 ft Blue Streak N-M to QMA-M quick connect cable |
| AC25054 | Quick Connect Combo Kit AC25053 + AC25050 Cable and Adapter |
| AC25055 | QMA Adapter Kit (Includes 24 assorted adapters) |
| AC25056 | 4 ft Blue Streak QMA to QMA quick connect cable |
| AC25057 | AC25055 + AC25056 Combo |

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

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