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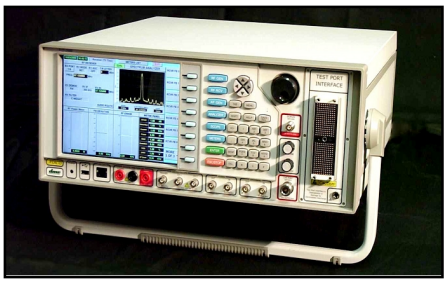
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ATS-2000A (Automated) Synthetic Bench-Top Advanced Test Set



- 250 kHz to 2000 MHz Frequency Coverage (Wideband/Narrowband)
- Single, Portable, Self-Contained Communications, Avionics, EW and Navigation Synthetic Bench-Top Measurement Instrument
- MIL-PRF-28800F Class III for Ruggedized Military Applications
- Software Defined, Configurable, Unique, Affordable Test Solution for Advanced Systems Testing

ATACTS Product Family

The ATACTS family of communications test systems provides our customers the ability to support all levels of performance verification, manual/automated testing, as well as fault isolation & repair from the Organizational Level (1st Line) through Intermediate Levels (2nd and 3rd line) and on into the Depots (4th line). Synthetic Test Functions offered in the ATS-2000A Advanced Test Set include:

Functional Capabilities

RF Signal Generator
RF Signal Receiver
AF Signal Generators
20 MHz or 200 MHz (Opt) Dual Oscilloscope
RF Spectrum Analyzer (Opt)
Tracking Generator (Opt)
Dynamic (AF) Signal Analyzer (Opt)
VSWR Meter & Cable Fault Analyzer (Opt)

Meters

RF Power Level	RF Frequency
RF Frequency Error	Audio Frequency
FM Deviation	AM Modulation
SINAD	Distortion
Digital Multi-Meter	EVM (Opt)
I/Q Constellation (Opt)	Bit Error Rate (Opt)

ATS-2000A Overview

The ATS-2000A is an automated, bench-top member of DME's next-generation ATACTS Family of Advanced Tactical Agile Communications Test Solutions. The unique Software-Defined capabilities exclusively available in the ATS-2000A provide both the Military and Commercial Wireless user/maintainer community with the first really affordable test solution destined to be the defining "standard" in "Automated" Synthetic Testing. The ATS-2000A is a Pentium IV Processor based, digitally synthesized test platform that combines the capabilities of many different stand-alone Test and Measurement Instruments into a single, ruggedized, compact unit.

The ATS-2000A utilizes an alphanumeric keypad, dedicated function keys and multi-task soft function keys combined with a high-resolution 1024 x 768 pixel color LCD-TFT display to enter, edit and display instrumentation test functions (stimulus/measurement) and test data (results). An Embedded Windows based multi-tasking Operation System and Advanced Graphical User Interface (GUI) allows the Engineer or Test/Field Technician to measure, compare and contrast the results of various test scenarios and recall various parameters associated with each of the testing modes to easily fault isolate (to the SRU) various communications LRUs such as; Radios, Antennas, Couplers, Pre/Post Selectors, RF Power Amplifiers, Remote Controls, Handsets, Headsets, Loud Speakers and System Interconnects. In addition, mass storage capability allows storage and recall of test results, waveforms and analysis information for comparison, as well as operational instrumentation mode setup parameters and individual test criteria from all measurement and metering devices.

The DME ATACTS product family offers our customers a high quality, low risk, best value solution focused on the Foreign and Domestic Armed Forces Aerospace & Defense communications testing community while ensuring a clearly defined migration path with the capability and flexibility to support future Communications, Avionics, Navigation and Electronic Warfare systems.

ATS-2000A Capabilities

The ATS-2000A provides coverage of the entire 250 kHz to 2000 MHz frequency band as allocated for the military's new Joint Tactical Radio System (JTRS) and many of today's new commercial 3G/4G wireless standards. The Digitally Synthesized RF Receiver and RF Generator coupled with the RF Front-End's advanced switching, power level handling and monitoring, supports both narrow-band and wide-band voice/data in single channel (SC), and spread spectrum (FHSS/DSSS) modes. An extremely frequency agile RF Upconverter and Downconverter system is fully capable of supporting the most advanced fast hopping waveforms.

The ATS-2000A is capable of generating, receiving and metering NB/WB analog signals (AM, FM, CW, USB, LSB), digital signals (ASK, FSK, PSK, GFSK, BPSK, DPSK, MSK, GMSK, QBL/MSK or quadrature signals (QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK) from 250 kHz to 2000 MHz. User configurable, synthetic metering functions are available including RF Power, RF Frequency, RF Frequency Error, RF Receive Signal Strength Indication (RSSI), FM Deviation, AM Modulation, SINAD/Distortion, AF Frequency, Digital Multi-Meter (DMM), Dual Channel Oscilloscope, RF Spectrum Analyzer (opt), Tracking Generator (opt), VSWR (opt), Cable Fault Analyzer (opt), Bit Error Rate (opt), Error Vector Magnitude (opt), Constellation Display (opt) and Dynamics Signal Analyzer (opt.). Extensive use of Field Programmable Gate Arrays (FPGA's), Digital Signal Processors (DSP's) and Software Defined Radio (SDR) technology, along with Direct Digital Synthesis (DDS), gives the ATS-2000A complete control of frequency, amplitude and phase, making it possible to support any current or future waveform modulation type. This same unique architecture makes it possible to support new capabilities via a simple software update without the need for returning the unit to the Depot or Manufacturer. Future hardware options such as a second out-of-band tunable, low phase-noise signal source are currently planned to support Out-of-Band Receiver IMD, Adjacent Channel Rejection and Selectivity.

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The ATS-2000A test set provides unprecedented Interface capability to support all legacy and emerging wireless communication systems. In its "Automated" configuration, the user has complete control of the signal routing and interface characteristics for proper connection to any interface port on the Unit Under Test (UUT). Through selectable signal loading, impedance characteristics and level control, the ATS-2000A is able to interface directly to the UUT without the need for external interface translation circuitry. To date, this level of fully programmable and configurable interface capability has not been available in any other portable "all-in-one" test set platform on the market.

Automated Test Extensions

For Automated Test Applications, the ATS-2000A offers optionally embedded UUT Interface Modules in the form of a UUT-ID (EIM) and UUT-COM (CIM) module resulting in ATE expandability without the need to increase size and complexity. This integrated automated test capability is supported by our TestEZ TPS development tool-set resulting in a LabView/Lab Windows environment that is familiar to our customers and allows TPS development for LRU's/SRU's in a fraction of the time required from the older, proprietary systems.

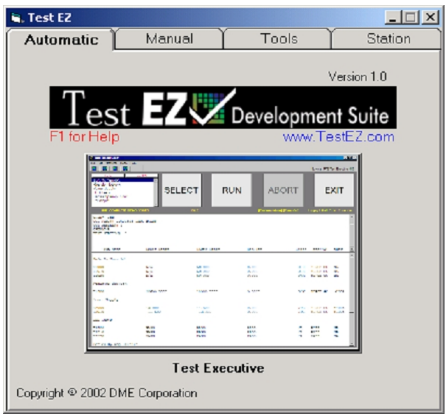
The ATS-2000A configuration offers automated test extensions in the form of a 1U "add-on" LRU Power Supply Adapter (PSA-2000) and a separate SRU Module Test Extension (MTE-2000).

The PSA-2000 may be operated under manual or TPS control and provides up to four independently controllable power sources with configurable/programmable capability to provide over 20 amps to the Unit Under Test (UUT).

The MTE-2000 provides complete Depot support for RF, Analog and Digital CCA's (modules). Utilizing Optical Inspection & Analysis (OIA), Signature Analysis (SA), Path Testing (Connectivity), Digital Functional Stimulus/Response (DFSR), In-Circuit Test (ICT), and Functional Parametric Testing (Synthetic Instrumentation) the MTE is able to provide various levels of cost effective test capability providing fault isolation & repair to the component.

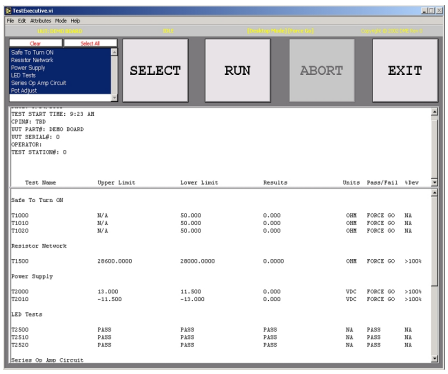
Test Application Software

The ATS-2000A is designed to allow full use of DME's TestEZ suite of TPS development tools. TestEZ provides all the software needed for complete, efficient, user-friendly, test application development & diagnostic maintenance.

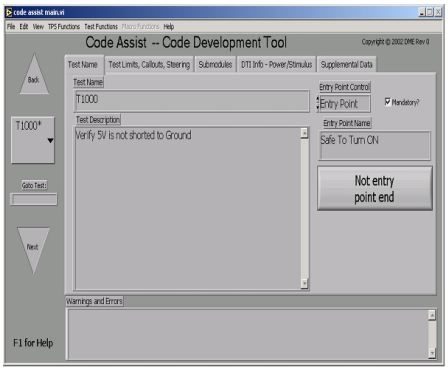


Toolkit Selection Menu

This software tool-set features an easy to use automated test operating system (Test Executive) and software-coding TPS development tool (Code Assist).

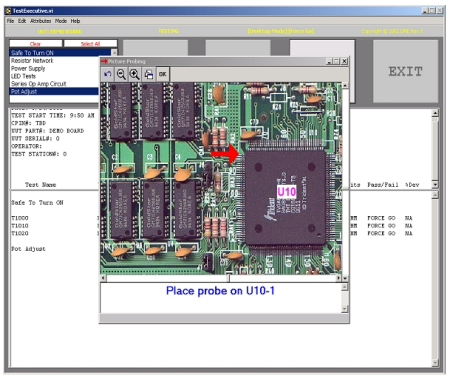


Test Executive TPS Runtime Screen

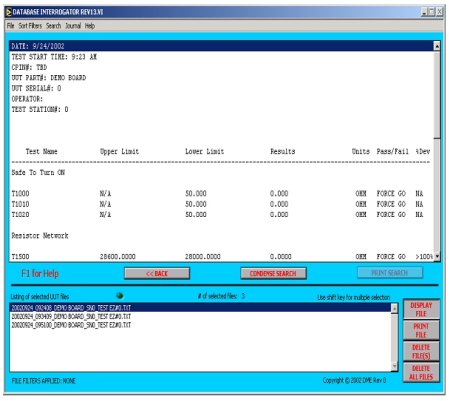


Code Assist Screen

Additional support tools are provided for picture probing (Probe Assist), archive management (Archive Manager) and test results documentation (Doc Assist).



Picture Probing Screen



Archive File Manager

DATE: 5/26/2004
TEST START TIME: 8:07 PM
TPS REVISION: V040904_01
UUT PART#: RT 1523E(V)_U
UUT SERIAL#: 0000136
OPERATOR: 1003
TEST STATION#: 0

Test Name	Upper	Lower	Results	Units	Status	%Dev
Safe To Turn On						
T501:UUT ID	Yes	Yes	Yes	NA	PASS	NA
T530:STTO 13V	N/A	80.00E+3	101.82E+3	OHM	PASS	NA
Ground Tests						
T550:J2-A CABLE GROUND FAULT	15.0	N/A	9.6	OHM	PASS	NA
T560:J3-A CABLE GROUND FAULT	15.0	N/A	9.8	OHM	PASS	NA
T570:J5-A CABLE GROUND FAULT	15.0	N/A	10.7	OHM	PASS	NA
T580:P1-U CABLE GROUND FAULT	15.0	N/A	9.5	OHM	PASS	NA
T590:J6-A CABLE GROUND FAULT	15.0	N/A	8.9	OHM	PASS	NA
Cold Start						
T600:PWR SUPPLY ON	YES	YES	YES	NA	PASS	NA
T610:CHECK DSPLY ON POWER UP	YES	YES	YES	NA	PASS	NA
BIT Test						
T1010:EXTERNAL CNTRL CHECK	Pass	Pass	Pass	NA	PASS	NA
T1020:BIT DISPLAY CHECK 1	YES	YES	YES	NA	PASS	NA
T1021:LOGIC 1 AT SNAP (P1-A)	7.25	6.25	6.76	VDC	PASS	2%
T1022:BIT DISPLAY CHECK 2	YES	YES	YES	NA	PASS	NA
T1023:ZA DISPLAY CHECK	YES	YES	YES	NA	PASS	NA
T1024:F100 DISPLAY CHECK	YES	YES	YES	NA	PASS	NA
T1025:LOGIC 0 AT SNAP (P1-A)	0.50	-0.50	0.02	VDC	PASS	4%
T1026:FAIL SNAP	YES	YES	YES	NA	PASS	NA
HW/SW Configuration						
Controller Build 90	Protocol Software 09		COMSEC Build 00			
Controller Software 4D	Waveform Build 30		COMSEC Software 30			
Protocol Build 11	Waveform Software 33					
T1035:FTCN=LD CHECK	0	0	0	NA	PASS	>100%
Equipment ID/SC/Net ID Load Checks						
T1040:EQUIPMENT ID CHECK	FFFF0E	FFFF0E	FFFF0E	NA	PASS	NA
T1045:LOAD PRESET M 30.000	Pass	Pass	Pass	NA	PASS	NA
T1046:LOAD PRESET 1 35.875	Pass	Pass	Pass	NA	PASS	NA
T1047:LOAD PRESET 2 39.975	Pass	Pass	Pass	NA	PASS	NA
T1048:LOAD PRESET 3 47.975	Pass	Pass	Pass	NA	PASS	NA
T1049:LOAD PRESET 4 55.000	Pass	Pass	Pass	NA	PASS	NA
T1050:LOAD PRESET 5 55.700	Pass	Pass	Pass	NA	PASS	NA
T1051:LOAD PRESET 6 72.000	Pass	Pass	Pass	NA	PASS	NA
T1052:LOAD PRESET C 87.600	Pass	Pass	Pass	NA	PASS	NA
T1055:FH NET ID	Pass	Pass	Pass	NA	PASS	NA
SC TX RF Power Output						
T1070:CHECK SNAP 35.875	35.875	35.875	35.875	MHz	PASS	>100%
T1072:RF PWR PA 30.000	39.00	35.00	38.05	dBm	PASS	52%
T1074:PA SEL IN PA	7.75	5.75	6.70	VDC	PASS	5%
T1076:FLTR A BAND A	7.75	5.75	6.70	VDC	PASS	5%
T1078:FLTR B BAND A	0.50	-0.50	0.01	VDC	PASS	2%
T1080:FLTR C BAND A	0.50	-0.50	0.01	VDC	PASS	2%

Example Test Report

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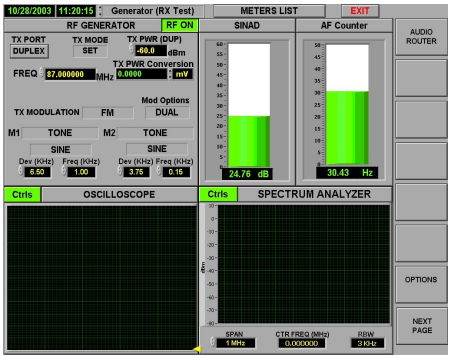
In addition to automatic testing, the Stand-Alone Instrumentation Mode and Test EZ drivers operate in a manual mode allowing the user GUI access to all ATS-2000A Synthetic Instrumentation assets. Test EZ is quickly configured to any ATACTS Platform through an easy to use, one-time, setup program and presents a GUI "point & click" interface to the user so no coding experience in any software language is required to operate or code with the TestEZ software suite.

ATS-2000A Synthetic Instrumentation

The ATS-2000A includes a RF Generator, RF Receiver, Dual AF Waveform Generators, RF Spectrum Analyzer, Swept Frequency Analyzer, Cable Fault/Distance-to-Fault Analyzer, Dynamic Signal Analyzer and Bit Error Rate Meter capable of monitoring internal and external signals from 30 Hz to 2000 MHz. The ATS-2000A provides independent operation of all meters for use as test instruments as well as synthesizing them into the major mode functions. As independent instruments, the meters provide a bar graph display and digital data readout.

Data Entry and Display

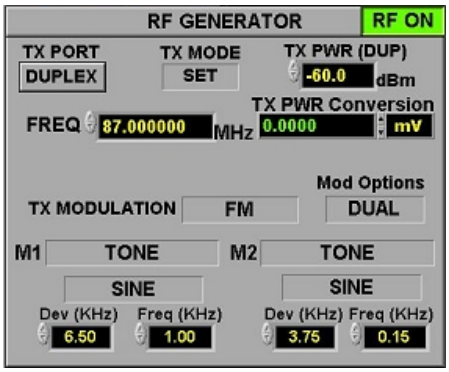
All data received by the operator is in the form of screens and menus. Each major instrumentation mode has a dedicated operation screen and user selectable meter list with subordinate setup menus. The host processor updates operation mode screens to reflect changes in parameters imposed by the operator or to reflect changes in data received from or delivered to the Unit Under Test (UUT).



All major instrumentation operation mode and individual meters have additional subordinate setup and control menus for functions not available on the operation mode screen. Functions such as signal routings to the front panel connectors, AGC control, user defined IF and Post Detector Filter bandwidth settings and signal formats are configured via expanded menus.

RF Signal Generator

The Digitally Synthesized RF Generator in the ATS-2000A is capable of generating modulated or unmodulated carrier signals from 250 kHz to 2000 MHz (in 1 Hz steps).



Digitally Synthesized RF Generator

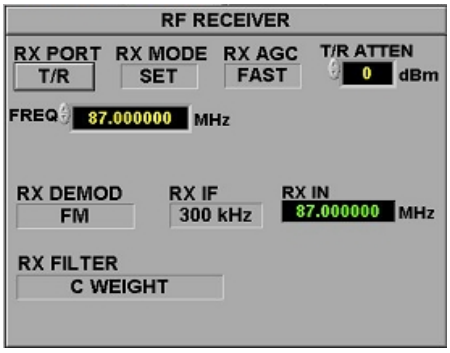
The RF output level is variable from -137 dBm to +10 dBm. Modulation types capable of being supported include analog signals (AM, FM, CW, USB, LSB), digital signals (ASK, FSK, PSK, GFSK, BPSK, DPSK, MSK, GMSK, QBL/MSK) or quadrature signals (QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK). Modulation can also be applied from either internal or external sources.

The RF Signal Generator also functions as a swept frequency/tracking generator or as an offset generator in Duplex Mode.

Configurable synthetic measurement and metering capabilities available in the RF Generator Mode include a Digital Multi-Meter (DMM), SINAD Meter, and Distortion meter. The Spectrum Analyzer and Oscilloscope are also available for use with the RF Generator Operation Mode Screen.

RF Signal Receiver

The Digitally Synthesized RF Receiver in the ATS-2000A is capable of receiving modulated and unmodulated signals from 250 kHz to 2000 MHz (in 1 Hz steps).



Digitally Synthesized RF Receiver

The ATS-2000A is capable of receiving and demodulating the following analog signals; (AM, FM, CW, USB, LSB), digital signals; (ASK, FSK, PSK, GFSK, BPSK, DPSK, MSK, GMSK, QBL/MSK) or quadrature signals; (QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK).

Configurable synthetic measurement and metering capabilities available in the RF Receiver Mode including RF Power, RF Frequency, RF Frequency Error, FM Deviation, AM Modulation, EVM, SINAD, Distortion, AF Frequency, Receive Signal Strength Indication (RSSI), and Constellation. The Spectrum Analyzer, Dynamic Signal Analyzer, and Scope are also available for use on the RF Receiver Operation Mode Screen. Low-level signals are accessed through the Duplex Port and high-powered signals through the T/R connector.

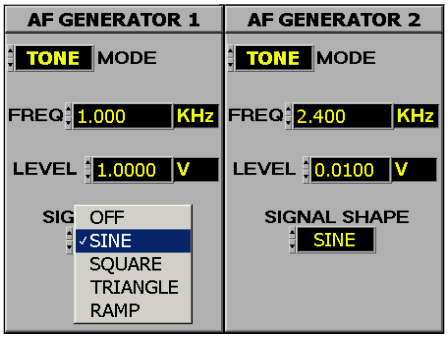
Duplex

The ATS-2000A provides the capability to combine the operation of the independent RF Generator and RF Receiver from 250 kHz to 2000 MHz for Duplex operation. The operator has three on screen monitoring options, the transmitter under test, receiver under test or both in parallel. All features available with the RF Generator and RF Receiver are available in Duplex Mode.

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Dual AF Generator

The ATS-2000A includes Dual Arbitrary Function Generators. These Audio Function Generators are configurable as Audio Sources routed to the Front Panel or to the UUT-ID Module.

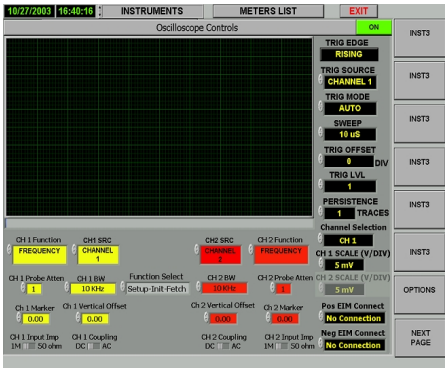


Digitally Synthesized AF Generator

All METERS (Synthetic Instruments) are available when displayed on the Function Generator screen.

Dual Oscilloscope

The ATS-2000A includes a Dual Channel 20 MHz Oscilloscope or an optional 250 MHz (2.5Gsps) Oscilloscope.

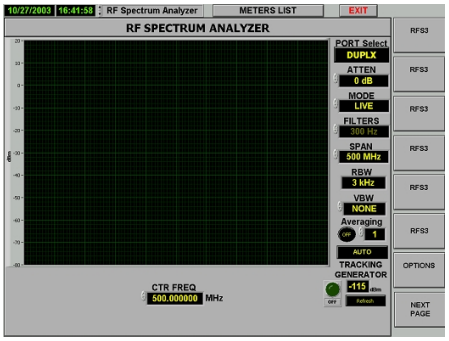


Dual Channel Oscilloscope

The Oscilloscope allows input from 1 mV to 50 V per division with a maximum input voltage of 200 Vdc. Sweep rates range from 5 ns/div to 1 s/div (200 MHz Opt). Stored traces may be recalled and displayed simultaneously with live traces, providing the operator the opportunity to compare the traces. Routed sources including the CH1, CH2, Receiver IF, Demodulated Audio, Audio Generators, and External Audio/Baseband. The Oscilloscope is available for stand-alone operation or in combination with all major Instrumentation Operation Modes.

RF Spectrum Analyzer

The RF Spectrum Analyzer monitors both internal and external signals from 250 kHz to 2000 MHz.

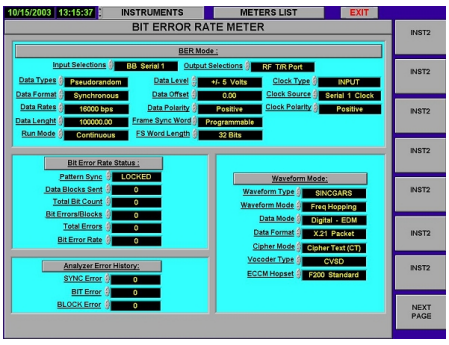


RF Spectrum Analyzer

Scan widths range from 1 kHz to 200 MHz as well as zero scan. Available log scales are 2 and 10 dB/div with amplitude scale units of dBm, dBmV, dBV, dBmW and dBW. Memory functions for the Spectrum Analyzer include trace store, recall, compare and peak hold. External low-level signals can be displayed "off-the-air" through the Duplex connector or applied through the higher power T/R connector. The Spectrum Analyzer also functions as a tracking generator with a variable level from -80 to +10 dBm. The Spectrum Analyzer is available for display alone or in all major operation modes.

Bit Error Rate Meter

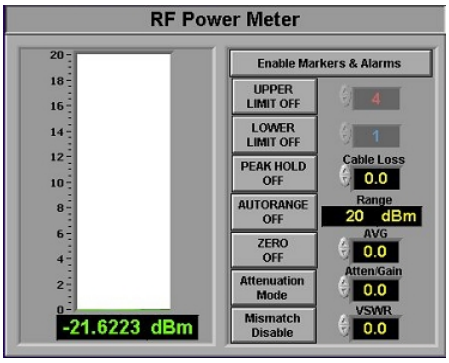
The ATS-2000A provides an independent Bit Error Rate Meter capable of measuring bit error rates and injecting simulated errors in Software-Defined Waveforms. Data stream programmable characteristics such as mode, pattern, rate and modulation are available various Synchronous/Asynchronous applications.



Bit Error Rate Meter

Meters

The ATS-2000A provides independent operation of the meters for use as synthetic test instruments as well as synthesizing them into the major mode functions.



RF Power Meter

As independent instruments, the meters provide a bar graph display and digital data readout. On the major operation mode screens, these meters display as bar graph display and digital data or just as digital data, depending on the number of meters selected and the Oscilloscope/Spectrum Analyzer display size. The meters may be used to monitor both internal and external inputs.



The Meter Panel is available in the Generator, Receiver and Duplex screens. This feature allows a group of meter values to be displayed in a single panel. Any of the meters is capable of expansion to allow adjustment to the individual meter parameters. This feature is useful to maximize the information content of a single screen.

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ATS-2000A Specifications

GENERAL NOTES

Warm-up time is 10 minutes for the following performance requirements.
RF measurements are referenced to 50 OHMS.
Where specified resolution exceeds specified accuracy, specified resolution takes precedence.

RF SIGNAL GENERATOR

RF SIGNAL GENERATOR - T/R and Duplex Connector

Frequency:

Range:	250.0 kHz to 2000 MHz
Resolution:	1 Hz
Accuracy:	*See Reference Oscillator*

Level:

T/R Port Range:	-137 dBm to 0 dBm	
T/R Impedance:	50 Ω	
VSWR/Return Loss:	1.25:1 (Return Loss > 16 dBrl)	
T/R Input Protection:	200 Watts for 15 Sec.	(With Alarm)
Duplex Port Range:	-127 dBm to +10 dBm -116 dBm to + 4dBm for AM	
w/Aux RFPA:	*+37 dBm High Power Output*	*(Optional)*
(to 450 MHz)	*+31 dBm maximum power for AM*	*(Optional)*
Duplex Impedance:	50 Ω	
VSWR/Return Loss:	1.25:1 (Return Loss > 16 dBrl)	
Duplex Input Protection:	10 Watts for 15 Sec.	(With Alarm)
Resolution:	0.1 dB	
Accuracy:	± 0.5 dB, +10 dBm to ≥ -110 dBm, ± 1.0 dB , ≥ +10 dBm ± 2.0 dB, < -110 dBm to -137 dBm	

Spectral Purity:

Residual FM:	< 45 Hz RMS	(Post Detection BW: 3 kHz)
	< 85 Hz RMS	(Post Detection BW: 15 kHz)
Residual AM:	< 0.20% RMS	(Post Detection BW: 15 kHz)
Phase Noise	< -84 dBc/Hz at 20 kHz from carrier <1500 MHz	
IMD:	< -45 dBc for two tones at 6dB below CW power	
Harmonics:	< -30 dBc (Typical)	
Non-Harmonics:	< -50 dBc (Typical)	

RF SIGNAL MODULATION - T/R and Duplex Connector

Internal/External FM Modulation: (External Optional)

Frequency Range:	1 MHz to 2000 MHz	
Deviation Range:	100 Hz to ± l00.0 kHz	(Operation to > ±2 MHz)
Accuracy:	± 5% of setting for ±1 kHz to ±20 kHz deviation	
Resolution:	1 Hz	
Deviation Rate:	10 Hz to 40.0 kHz, up to 300 kbps Digital	
Wave Forms:	Sine, Square and Pulse (Arbitrary)	
THD:	< 1.0%	

Internal/External AM (Includes LSB/USB) Modulation: (External Optional)

Frequency Range:	1 MHz to 2000 MHz	
Modulation Range:	0.1 % to 95%	
Accuracy:	± 5% of setting	(10% to 90% modulation)
Resolution:	0.1%	
Modulation Rate:	10 Hz to 40.0 kHz, up to 300 kbps Digital	
Wave Forms:	Sine, Square and Pulse (Arbitrary)	
THD:	< 1.0%	(30% to 90% modulation)

Internal/External Phase Modulation: (Optional)

Frequency Range:	1 MHz to 2000 MHz
Modulation Range:	0 Radians to 10 Radians
Accuracy:	± 5%
Resolution:	0.1 Radians
Modulation Rate:	10 Hz to 40.0 kHz, up to 300 KBS Digital
Wave Forms:	Sine, Square and Pulse (Arbitrary)
THD:	< 1.0%

Internal/External Digital Modulation: (Optional)

Digital:	ASK, FSK, PSK GFSK, BPSK, DPSK, MSK, GMSK, QBL/MSK
Quadrature:	QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK, etc.
Modes:	FDMA, TDMA, CDMA and others

FREQUENCY AGILITY (For both RF Generator & Receiver)

Settling Time:	< 200 µS for bandwidths up to 100 MHz (1 MHz to 2000 MHz) (Measured to within 1 kHz of desired frequency)

RF SIGNAL RECEIVER

Frequency:

Range:	250.0 kHz to 2000 MHz
Resolution:	1 Hz
Accuracy:	*See Reference Oscillator*

T/R Input Level Range:	-70 to +53 dBm Input < 70 mV (-10 dBm) for 10.0 dB SINAD, 30 kHz IF Bandwidth
T/R Impedance:	50 Ω
VSWR:	1.25:1 max.
Overload Protection:	≥ +53 dBm (Relay Protected & Audible/visual Alarm)
Duplex Input Level Range:	-110 to +10 dBm Input (-80 dBm for meter accuracy) < 2 µV (-101 dBm) for 10.0 dB SINAD, 30 kHz IF Bandwidth
ANT Impedance:	50 Ω
VSWR:	1.25:1 max.
Overload Protection:	≥ +40 dBm (Relay Protected & Audible/visual Alarm)
IF Bandwidths:	30 kHz, 300 kHz, 2 MHz and 5 MHz
Audio Filters:	300 Hz LP, 300 Hz HP, 15 kHz LP, 300 Hz - 3 kHz BP, None 3 kHz LP, 5 kHz LP, 8.33 kHz LP, C-MSG$_{wt}$ BP, CCITT BP (Opt)
Standard Waveforms:	
Analog:	AM, FM, USB, LSB, CW
Optional Waveforms:	
Digital:	ASK, FSK, PSK GFSK, BPSK, DPSK, MSK, GMSK, QBL/MSK
Quadrature:	QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK, etc.
Modes:	FDMA, TDMA, CDMA and others

Spectral Purity:

Residual Distortion:	< 0.5% + FM Residual
Phase Noise:	< -85 dBc/Hz at 20kHz offset from carrier
IMD:	< -50 dBc for two tones separated by 2MHz, RF>10MHz, each signal 6dB below sensitivity level
Noise Power Ratio:	-50 dB for Received signal bandwidth of 4 MHz, and notch width of 0.5MHz, for settings where nominal noise floor is 60dB below signal level during test.

Selectivity:

Receive IF Bandwidth:

Wide-band	5000 kHz ± 750 kHz, 12:1 40dB shape factor Digitally corrected amplitude and group delay variation to 4000 kHz BW, RF> 15 MHz
Medium-band	300 kHz ± 50 kHz, 12:1 40dB shape factor Digitally corrected amplitude and group delay variation to 220 kHz BW, RF>2 MHz
Narrow-band	30 kHz ± 5 kHz, 12:1 40dB shape factor Digitally corrected amplitude and group delay variation to 22 kHz BW

Adj. Channel Rejection:	Software Defined Waveform Dependent
SSB:	SSB Demodulator, selectable for lower and upper sideband, with selectable Offset from 10 Hz to 3 kHz from suppressed carrier for signal channel voice/data testing.

AF GENERATOR (AFGEN #1 and AFGEN #2, software dependent)

Frequency:

Range:	10 Hz to 40.0 kHz	(Usable 0 Hz to 100 kHz)
Resolution:	0.1 Hz	
Accuracy:	± 0.1 %	

Level:

Baseband Port Range:	0.35 mV_{rms} to 3.5 V_{rms} (Typical)	
Audio Port Range:	90 mV_{rms} to 7 V_{rms} (Typical)	
Output Impedance:	8 Ω	(Nominal, Balanced)
	50 kΩ	(Nominal, Unbalanced)
Resolution:	0.1 mV_{rms}	(0.35 mV_{rms} - 200 mV_{rms})
	10.0 mV_{rms}	(>200 mV_{rms})
Accuracy:	< 5.0% @ >10mV_{rms}, 1 kHz Sine, for 150 Ω & 600 Ω load	

Spectral Purity:

THD:	< 1.0% @ >10mV_{rms}, 100 Hz to 20 kHz
Wave Forms:	Sine, Square, Triangle, Ramp Up, Ramp Down, Pulse (Arbitrary)

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ATACTS

Advanced Tactical Agile Communications Test System

RF POWER METER

Frequency:
- Range: 500 kHz to 2000 MHz

Carrier Level:
- Input Level: 0.1 mW to 200.0 W
- Resolution: 0.01 dB or 0.1 mW
- Accuracy: ± 10% (< ± 5% typical)
- Return Loss: > 16.0 dBrl
- Display Readings: Volts, Watts and dBm
- Compensation Factors: Programmable External Attenuation or Gain

Operating Power: 50 Watts continuous
30.0 Sec On, 1.0 Minute OFF at 50 -100 Watts
15.0 Sec On, 1.0 Minute OFF at 100 - 200 Watts

Distance to Fault (Cable Fault): (Optional)
- Test Range: 3 feet (1 Meter) to 328 feet (100 Meters)
  Or a Return Loss of 40 dB, whichever comes first
- Display Format: Return Loss/VSWR (dB, vert.) vs. DTF (feet, horiz.)

Horizontal Display:
- Scale: 10 divisions, 4 feet/div. to 40 feet/div.
- Resolution: 400 points min. full screen
- Accuracy: ± 3 feet max.

Vertical Display:
- Scale: 8 divisions, 2 dB/div., 5 dB/div. 10 dB/div.
- Resolution: 0.1 dB
- Accuracy: ± 1 dB max

RF FREQUENCY COUNTER & FREQUENCY ERROR METER

Radio Frequency Counter:
- Range: 250 kHz thru 2000 MHz
- Capture Bandwidth: ± 2.5 MHz (with 5 MHz wideband IF filter)
- Accuracy: *See Reference Oscillator*
- Resolution: 0.1 Hz
- Carrier Level: See T/R and DUPLEX connector specification

Radio Frequency Error:
- Range: ± 0 Hz to ± 2500 kHz (with 5 MHz IF)
- Accuracy: *See Reference Oscillator*
- Resolution: 0.1 Hz
- Carrier Level: See T/R and DUPLEX connector specification

FM DEVIATION METER

Range: ± 100 Hz to ± 100 kHz
Accuracy: ± 5.0% + source residual
Resolution: 1 Hz
Modulation Rate 100 Hz to 40 kHz
Carrier Level: See T/R and DUPLEX connector specification

AM MODULATION METER

Range: 1% to 95% (Operation to 100%)
Accuracy: ± 2.0% + source residual from 30% to 90%
Resolution: 1%
Modulation Rate: 100 Hz to 40 kHz
Carrier Level: See T/R and DUPLEX connector specification

PM DEVIATION METER (Optional)

Range: 0 to 10 Radians (Peak)
Accuracy: ± 1.0% + source residual
Resolution: 0.01 Radians
Modulation Rate: 100 Hz to 40 kHz
Carrier Level: See T/R and DUPLEX connector specification

ERROR VECTOR MODULATION METER (Optional)

Range: 0 to 100%
Accuracy: ± 3.0% + source residual
Resolution: 0.01%
Residual EVM: < 2%
Modulation Rate: 100 Hz to 40 kHz
Carrier Level: See T/R and DUPLEX connector specification

DISTORTION METER (THD and THD+Noise)

Range: 0.1 % to 50.0%
Accuracy: ± 0.5%
Resolution: 0.1%
Signal Frequency: 100 Hz to 10 kHz
Signal Level: See BASEBAND and AUDIO Input connector specification

SINAD METER

Range: 3.0 dB to 40.0 dB
Accuracy: ± 1.0 dB
Resolution: 0.1 dB
Signal Frequency: 100 Hz to 10 kHz
Signal Level: See BASEBAND and AUDIO Input connector specification

AUDIO FREQUENCY COUNTER

Range: 10 Hz to 100 kHz (In 4 decade ranges)
Accuracy: *See Reference Oscillator*
Resolution: 0.1 Hz
Input Waveform: Sine or Square Wave
External Level: See BASEBAND and AUDIO Input connector specification

3 ½ Digit DIGITAL MULTIMETER (Standard)

Voltmeter: (DC/AC)
- Range: 0.1mV to 300 VDC Maximum
  0.1mV to 250 VAC Maximum
- Accuracy: ± 5.0%, full scale (Typical AC)
  ± 1.0%, full scale (Typical DC)
- Resolution: 3.5-digit display, Max. Resolution (0.1 mV)
- Signal Frequency: 50 Hz to 10 kHz
- Input Impedance: >1 MΩ (Nominal), shunted by <100pF
- Internal Loads: Selectable 150 Ω, 300 Ω, 600 Ω (± 5%)

Current Meter: (DC/AC)
- Ranges: 0.01 mA to 2.5 A full scale (20 Amps with Shunt)
- Accuracy: ± 1.0 % full scale (Typical)
- Resolution: 3.5-digit display, Max. Resolution (0.01 mA)
- Signal Frequency: 10 Hz to 10 kHz

Ohmmeter:
- Ranges: 0.1 Ω to 30 MΩ
- Accuracy: ± 1.0% full scale (Typical)
- Resolution: 3.5-digit display, Max. Resolution (0.1 Ω)

6 ½ Digit DIGITAL MULTIMETER (Optional)

Voltmeter: (DC/AC)
- Range: 0.1mV to 200 VDC Maximum
  0.1mV to 150 VAC Maximum
- Accuracy: ± 1.0%, full scale (Typical AC)
  ± 0.01%, full scale (Typical DC)
- Resolution: 6.5-digit display, Max. Resolution (100nV)
- Signal Frequency: 10 Hz to 100 kHz
- Input Impedance: AC - 1 MΩ (Nominal), shunted by <100pF
  DC - 10 MΩ (Nominal)
- Internal Loads: Selectable 150 Ω, 300 Ω, 600 Ω (± 5%)

Current Meter: (DC/AC)
- Ranges: 0.01 mA to 2.5 A full scale (20 Amps with Shunt)
- Accuracy: ± 4.0% full scale (Typical AC)
  ± 0.5% full scale (Typical DC)
- Resolution: 6.5-digit display, Max. Resolution (10 nA)
- Signal Frequency: 10 Hz to 10 kHz

Ohmmeter:
- Ranges: 0.1 Ω to 30 MΩ
- Accuracy: ± 0.01% full scale (Typical)
- Resolution: 6.5-digit display, Max. Resolution (100 μΩ)

20 MHz Dual Channel OSCILLOSCOPE (Standard)

Vertical Input: 2 Channels
Single Shot Rate: 100 MS/sec
Vertical Bandwidth: 20 MHz (-3 dB)
Bandwidth Limiters: None
Frequency Range: DC to 20 MHz
Vert. Input Ranges: 2 mV/Div to 50 V/Div (1-2-5 sequence)
Max Input Voltage: 200 V
Vertical Accuracy: ± 5% of full scale
Digitizer Resolution: 8 bits
Coupling: DC, AC, and GND
Horizontal Sweep Rate: 100 nSec/Div to 1 Sec/Div (1-2-5 sequence)
Timebase Accuracy: ± 2 ppm
Input Impedance: 1 MΩ shunted by 27pF or 50 Ω (Nominal)

200 MHz Dual Channel OSCILLOSCOPE (Optional)

Vertical Input: 2 Channels
Single Shot Rate: 2.5 GS/sec
Vertical Bandwidth: 200 MHz (-3 dB)
Bandwidth Limiters: 20 MHz and 10 kHz
Frequency Range: DC to 200 MHz
Vert. Input Ranges: 1 mV/Div to 50 V/Div (1-2-5 sequence)
Max Input Voltage: 200 V
Vertical Accuracy: ± 2.5% of full scale
Digitizer Resolution: 8 bits
Coupling: DC, AC, and GND
Horizontal Sweep Rate: 10 nSec/Div to 1 Sec/Div (1-2-5 sequence)
Timebase Accuracy: ± 2 ppm
Input Impedance: 1 MΩ shunted by 27pF or 50 Ω (Nominal)

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ATACTS

Advanced Tactical Agile Communications Test System

RF SPECTRUM ANALYZER (Optional)

RF Range: 250 kHz to 2000 MHz

Frequency Span:
- RF Range: 1 kHz/Div to 200 MHz/Div, plus zero scan
- Accuracy: ± 5%, limited by display resolution and RBW
- Timebase Accuracy: *See Reference Oscillator*

Level:
- Vertical Range: Log, 10 dB/Div and 2 dB/Div
- Vertical Resolution: 1.0 dB (10 dB/Div)
0.2 dB (2 dB/Div)
- Range (Display): 80 dB
- Overall Accuracy: ± 2 dB

Distortion:
- 3rd order IM: -60dBc for two tones at "Sensitivity Level"
- Phase Noise: -90dBc at 20 kHz offset (RBW = 1Hz to 1kHz)
-100 dBc at 200 kHz offset (RBW > 1kHz to 100kHz)

Attenuator: Scalable in 10 dB steps

DYNAMIC (AF) SIGNAL ANALYZER (Optional)

AF Range: 30 Hz to 250 kHz

Frequency Span:
- AF Range: 100 Hz/Div to 25 kHz/Div
- Accuracy: ± 5%, limited by display resolution and RBW
- Timebase Accuracy: *See Reference Oscillator*

Level:
- Vertical Range: Log, 10 dB/Div and 2 dB/Div
- Vertical Resolution: 1 dB (10 dB/Div)
0.2 dB (2 dB/Div)
- Range (Display): 80 dB
- Overall Accuracy: ± 2 dB

Distortion:
- 3rd order IM: -60dBc for two tones at "Sensitivity Level"
- Phase Noise: -90dBc at 20 kHz offset (RBW = 1Hz to 1kHz)
-100 dBc at 200 kHz offset (RBW > 1kHz to 100kHz)

Attenuator: Scalable in 10 dB steps

BIT ERROR RATE (BER) METER (Optional)

Test Modes:

- Generate: Generate Data and Digital Modulated Waveforms and accept Digital Baseband Data extracted from the radio under test for and calculate BER.
- Receive: Generate Baseband Data into the radio under test as the Source of Modulation and Receive/Demodulate Digital Modulation Waveforms and calculate BER

Range: 1×10^{-1} to 1×10^{-8}

Data:
- Modes: MIL-STD-188-114 Synchronous
RS-232 Asynchronous
X.21 Ethernet
- Data Rates: 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 12.8 kbps and 16.0 kbps
- Data Pattern Size: 100 to 1,000,000 Bits
- Data Pattern Type: Random, Fixed (511, 2047, Mark/Space), User defined
- Accuracy: $1 \times 10 E^{-8}$
- External Input Level: See BASEBAND and AUDIO Input Specification

Modulation schemes: FSK, BPSK

Display: Bit Error and Bit Error Rate

Error injection: Single and Fixed Rate Insertion

GENERAL CHARACTERISTICS

Dimensions: 7.25" H x 17.875" W x 21.75" D
(18.415 cm x 45.4025 cm x 55.245 cm)

Weight: <57 lbs (24.95 kg) w/o accessories

AC Power: 90 to 260 VAC
- Frequency 50-400 Hz
- Power 300 Watts typical

DC Power: 20 thru 32 VDC (Optional)

REFERENCE OSCILLATOR

Absolute Accuracy: ± 0.5 ppm (Optional 0.1 ppm)

Aging: 0.2 ppm

Temperature Stability: 0.3 ppm (-10° C to +55° C)

DISPLAY

Type: Color, TFT, and Sunlight Readable

Size: 8.4" diagonal

Resolution: 1024 x 768

INPUT/OUTPUT (I/O) Connectors

T/R Port Input Level: -70 dBm to +53 dBm (0.1 nW to 200 W)

T/R Port Output Level: -137 dBm to 0 dBm (0.013 ƒW to 1.0 mW)

Duplex Port In-Level: -110 dBm to +10 dBm (0.01 pW to 10.0 mW)

Duplex Port Output Level: -127 dBm to +10 dBm (0.12 ƒW t0 10.0 mW)

Duplex Port w/Aux RFPA: +10 dBm to +37 dBm (10.0 mW to 5.0 W)

Baseband Output: 0.35 mV_{rms} to 3.5 V_{rms} (Typical),
8 Ω (Balanced) or 50 kΩ (Unbalanced)

Baseband Input: 0.1 V_{rms} to 30 V_{rms} (Typical),
600 Ω (Balanced) or 50 kΩ (Unbalanced)

Audio Output: 90 mV_{rms} to 7 V_{rms} (Typical),
8 Ω (Balanced) or 50 kΩ (Unbalanced)

Audio Input: 0.1 V_{rms} to 30 V_{rms} (Typical),
600 Ω (Balanced) or 50 kΩ (Unbalanced)

Scope:
- Channel 1 In: See "Standard" & "Optional" Scope Specification
- Channel 1 In: See "Standard" & "Optional" Scope Specification
- External Trigger: ± 5 V P-P, Adjustable from -3VDC to + 3VDC

DMM:
- Volts/Ohms: See "Standard" & "Optional" DMM Specification
- Common: See "Standard" & "Optional" DMM Specification
- Amps: See "Standard" & "Optional" DMM Specification

Microphone: Standard Motorola RJ-45 Connector

- PIN-1 Power Out +5 Volts @ 500mA
- PIN-2 Power Ground
- PIN-3 Hook Switch (ground to enable CTCSS [PL] or open for monitor)
- PIN-4 Ground
- PIN-5 Microphone Audio In (1 to 140 mVrms)
- PIN-6 Microphone PTT
- PIN-7 Program
- PIN-8 Handset Audio Out (receive audio 6 Vrms max.)

10.7 MHz IF Output Level: 0 dB ± 10 dB (Typical) (Rear Panel)

70 MHz IF Output: 0 dB ± 10 dB (Typical) (Rear Panel)

10.7/70 MHz IF Input: 0 dB ± 10 dB (Typical) (Rear Panel)

10 MHz Ext Reference In: 0 dB ± 10 dB (Typical) (Rear Panel)

10 MHz Ext Reference Out: 0 dB ± 10 dB (Typical) (Rear Panel)

PSA-2000 Power Interface: LRU DC Voltage #1 Input (0-48 VDC @ 5/10 Amps)
LRU DC Voltage #2 Input (0-48 VDC @ 5/10 Amps)
LRU DC Voltage #3 Input (0-48 VDC @ 5/10 Amps)
LRU DC Voltage #4 Input (0-48 VDC @ 5/10 Amps)

Computer Ports:

PS2 (2 Ports)	Supports External Mouse and Keyboard Option
USB (Front Panel)	Supports External USB Accessories (100 mA)
USB (Rear Panel)	Supports External USB Accessories (500 mA)
USB (Rear Panel)	Supports External PSA-2000 LRU Power Supply Adapter
USB (Rear Panel)	Supports External MTE-2000 SRU Module Test Extension
Ethernet	Supports 10/100BaseT Port Internet & Intranet Connection
Video Output	Supports XVGA External Monitors
RS-232C	Supports Communications Rates: 300 to 115200

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ENVIRONMENTAL

Design:	Per MIL-PRF-28800F, Class III	
Reliability:	>3000 Hours	Per MIL-HDBK-781 Reference MIL–HDBK–217
Storage Temp:	-20 °C to +71 °C at 80% RH (non-condensing)	
Operating Temp:	0 to +50 ° C at 95% RH (non-condensing)	
Humidity:	Per MIL-PRF-28800F, Class III (0 to 95%)	
Altitude:	Per MIL-PRF-28800F, Class III (4600 Meters/15000 feet)	
EMI/RFI:	Per MIL-PRF-28800F, Class III	
Vibration:	Per MIL-PRF-28800F, Class III (2g all axis)	
Shock:	Per MIL-PRF-28800F, Class III (30g all axis)	
Safety:	Per MIL-PRF-28800F, Class III & EN 61010-1	

VERSIONS, OPTIONS AND ACCESSORIES

STANDARD ACCESSORIES

ACC-006	AC Power Cord (6' - USA)
ACC-017	PS2 Standard Computer Mouse
ACC-022	200 MHz BW Scope Probes (2 probes)
ACC-025	DMM Probe Kit
ADP-001	N (M) to BNC (F) Adapters (2)
ADP-003	TNC (M) to BNC (F) Adapter
ADP-004	RG-223 BNC to BNC Cable
ANT-001	Antenna, 7 Section Telescopic (5 ¼" to 24")
AHW-010	Operators Manual

OPTIONAL ITEMS

Software Options

ASW-000	TestEZ TPS Development Toolset
ASW-011	Cable Fault Analyzer/Distance-to-Fault
ASW-012	RF Spectrum Analyzer
ASW-013	Dynamic (AF) Signal Analyzer
ASW-014	USB/LSB Modulation/Demodulation Waveform
ASW-015	QAM Modulation/Demodulation Waveform
ASW-016	ASK, FSK, PSK Modulation/Demodulation Waveform
ASW-018	EVM Measurement & Metering
ASW-019	Constellation Display
ASW-TBD	Other Modulation/Demodulation Waveforms (contact factory)
TPS-001-059	Radio and Ancillary Device TPS's (contact factory)

Hardware Options

ACC-013	Compact Palm RJ-45 Microphone (HMN 3596A)
ACC-018	USB Standard Computer Mouse
ACC-020	PS2 Standard Computer Keyboard
ACC-026	10 Amp Current Shunt
ACC-027	40 Amp Current Shunt
ADP-002	TNC (M) to N (F) Adapter
ADP-010	Short Calibration, type N
ADP-011	Load Calibration, type N
ADP-012	Calibration Reference Cable
ADP-013	Return Loss Bridge (5 – 2000 MHz, 40dB Type-N Female)
ADP-014	Return Loss Bridge (5 – 3000 MHz, 40dB Type-N Female)
ADP-017	USB to GPIB Converter
ADP-019	MGA (360-Pin SDTP to 96/156-Pin ZIP, SINCGARS ON-373)
ANT-004	Antenna, 1.8 to 1800 MHz fold-over, right-angle (7" - 24")
ANT-006	Antenna, 10 section Telescopic (7" - 52")
HSC-002	Hard Transit Case (w/Wheels)
SSC-002	Soft Transit Case
AHW-011	Maintenance Manual
AHW-012	Calibration Procedure
AHW-013	Interactive Electronic Technical Manual (IETM)
AHW-014	Interactive Electronic Training Manual
AHW-016	VSWR Mismatch Assembly (None, 1.65:1, 2.3:1, 2.8:1, 4.7:1, 6.4:1)
AHW-017	Aux RFPA (Extends Duplex Port Output to +37 dB, 1 MHz to 250 MHz)
AHW-018	250 MHz Dual Channel Oscilloscope (2.5 Gsps)
AHW-019	6.5 Digit DMM (Signametrics SMX 2040)
AHW-021	UUT-ID Module (EIM support for Hypertronics SDTP)
AHW-022	UUT-COM Module (CIM support for Hypertronics SDTP)

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DME Corporation
Orlando Division
12889 Ingenuity Drive
Orlando, Florida 32826
Phone: (407) 381-6062
Fax: (407) 381-6063
http://www.dmecorp.com/

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