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Find the *Cobham / Aeroflex / IFR TS-4317-1* at our website: ***Click HERE***

TS-4317

Frequency Agile Communications Test Sets

IFR is the leader in Defense Test Systems for Military Tactical Communications with comprehensive solutions for SINCGARS, HAVEQUICK, Special Tactics, Life Support, Airborne and International Military Communication systems



- ***500 kHz to 1 GHz frequency coverage***
- ***Single, portable, self-contained communications measurement instrument***
- ***Ruggedized for military applications***
- ***Solutions oriented, configurable platform for communications systems testing***

TS-4317 Overview

The TS-4317 is a microprocessor controlled, digitally synthesized communication service monitor that combines the operations of 18 different test instruments into a single, compact unit. The TS-4317 is capable of performing the following functions:

RF Generator
RF Receiver
Duplex
AF Generator
Spectrum Analyzer
Oscilloscope
Digital Multi-Meter
Deviation (Peak) Meter
Distortion Meter
SINAD Meter
Audio Frequency Meter
Frequency Error Meter
RF Power Meter
Modulation Meter
Signal Strength Meter
Bit Error Rate Meter
Phase Modulation Meter
Deviation (RMS) Meter
Tracking Generator
Cable Fault Detector

The TS-4317 utilizes an alphanumeric keypad, dedicated function keys, multi-task soft function keys and a high resolution color display to show, enter and edit functions and data. Testing with this instrument can be accomplished via remote control or manually by front panel control. Tests performed with the TS-4317 can use pre-programmed setups or formats determined at the time of the test. Microprocessor controlled memory allows storage and recall of parameters for each of the testing modes as well as storage and recall of oscilloscope and spectrum analyzer traces for signal comparison.

RF Generator

The RF Generator of the TS-4317 is capable of generating modulated or unmodulated carrier signals from 500 kHz to 999.9999 MHz (in 100 Hz steps). The output level is variable from -137 to 0 dBm. Modulation types include AM, FM and PM. Modulation can also be applied from an external source. The RF Generator also functions as a tracking generator for swept measurements or as an offset generator in Duplex Mode. Metering functions available for this operation mode include SINAD, Digital Multimeter (DMM), Distortion and Audio Frequency Level meters. The Oscilloscope and Spectrum Analyzer are also available for use with the RF Generator Operation Screen. The TS-4317 Generator is capable of executing user defined frequency scan and frequency list operations as well as single frequency operations.

RF Receiver

The Receiver of the TS-4317 is capable of receiving modulated and unmodulated signals from 500 kHz to 999.9999 MHz (in 100 Hz steps). The TS-4317 receives AM, FM, PM and SSB modulated signals. Metering functions in the TS-4317 available with the Receiver include RF Power, Modulation, Deviation, Distortion, Frequency Error, AF Frequency, Signal Strength and SINAD meters and counters. The Oscilloscope and Spectrum Analyzer are also available for use on the Receiver Operation Screen. The TS-4317 receiver is capable of executing user defined frequency scan and frequency list operations as well as single frequency operations. The Receiver accesses "off the air" signals through the ANTENNA IN connector, higher-powered signals are accessed through the T/R connector.

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Duplex

The TS-4317 combines the independent RF Generator and Receiver from 500 kHz to 999.9999 MHz for duplex operation. The operator has the option of monitoring on screen the transmitter under test, receiver under test or both. All features available with the RF Generator and Receiver are available in duplex as well as the ability to use an offset frequency from -999.7499 to +999.7499 MHz to test communication equipment capable of generating and receiving simultaneously on different frequencies.

Oscilloscope

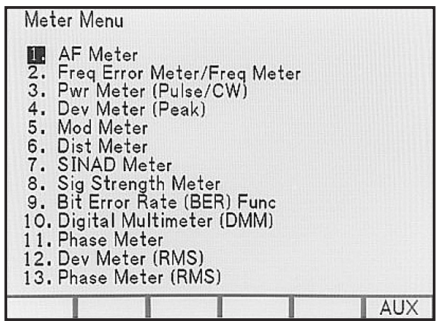
The TS-4317 includes a 1 MHz single trace Oscilloscope as one of its major test capabilities. The Oscilloscope allows input from 2 mV /div to 50 V/div with a maximum input voltage of 200 Vdc.

Sweep rates range from 1 μs/div to 100 ms/div in a 1-2-5 sequence. The TS-4317 Oscilloscope has a store and recall ability of up to nine signals. The recalled trace can be shown simultaneously with a live trace, giving the operator the opportunity to compare the two traces. Signals available for use include AC, DC, GND, Receiver IF, Demodulated Audio, Function Generators, External Audio, SINAD/BER and RF Power. The Oscilloscope can be used as a stand-alone instrument or in combination with all major Operation Modes except where Duplex Transmitter and Receiver are shown simultaneously. Size options for views in other modes are full-size and quarter-size.

Spectrum Analyzer

The Spectrum Analyzer monitors internal and external signals from 250 kHz to 999.9999 MHz. Scan widths range from 1 kHz/div to 100 MHz/div as well as zero scan. Available log scales are 2 and 10 dB/div. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. External signals can be displayed "off-the-air" through the ANTENNA IN connector or applied through the T/R connector. The Spectrum Analyzer also has a tracking generator function with a variable level from -137 to 0 dBm. The Spectrum Analyzer is available for display alone or in all major operation modes except where the Duplex Transmit and Receive functions are shown simultaneously. Size options for views in other modes are full-size and quarter-size.

Meters



Meter Menu selection screen

The TS-4317 provides the meters listed above for use as independent test functions as well as synthesizing them into the major mode functions. As independent functions, the meters provide a bar graph display and digital data. On the major operations screens, these meters display as bar graph display and digital data or just as digital data, depending on the Oscilloscope/Spectrum Analyzer display size. The meters can be used to monitor both internal and external inputs.

Audio Function Generator

There are two Audio Function Generators included in the TS-4317 with a range of 10 Hz to 40 kHz. Available waveforms include sine, square, triangle, ramp, pulse and DC levels. The TS-4317 is also capable of creating Manchester digital data bit patterns of 100 to 100,000 bits. Data rates include 75, 150, 300, 600, 1200, 2400, 4800 and 16000 bps. Pattern types include random, fixed and user defined (BER METER).

Data Entry and Display

Unless the TS-4317 is configured for remote testing, all data received by the operator is in the form of screens and menus. Each major test operation has a dedicated operation screen with subordinate setup menus. The microprocessor edits operation screens to reflect changes in parameters imposed by the operator or reflects changes in data delivered by the Unit Under Test (UUT).

Individual meters also have dedicated operation screens and subordinate setup menus. The meter operation screens can be accessed through the mode operation screen that is being supported by that specific meter operation or through the Meter Menu.

Once a specific mode of operation is selected, the operation screen appears on the display. The parameters shown reflect the parameters last entered in that operation. This specific operation screen is accessed with one of six dedicated MODE Keys.

Setup menus on all mode operation screens are accessed from the specific operation screen by pressing the SETUP Key. Operator entry and edit of data is performed on the operation screen or on the setup menu.

The operation screen and menus have active cursors that the operator can use to access a specific parameter. Once the parameter is accessed, data can be selected with DATA SCROLL Spinner or DATA SCROLL Keys or by using the alphanumeric DATA ENTRY Keypad.

Multi-task "Soft" Function Keys are also provided to perform setup, edit and entry. Each operation screen defines Soft Function Keys to fit the specific needs for that operation. These definitions are displayed on the screen above the defined key. Each operation screen may have several definitions for each Soft Function Key or make a definition unavailable depending on the parameters of the operation. Various functions performed by these multi-task keys include toggling between two values, selecting connectors for access, entering data or selecting a field for edit.

Setup storage and recall functions are available for each of the

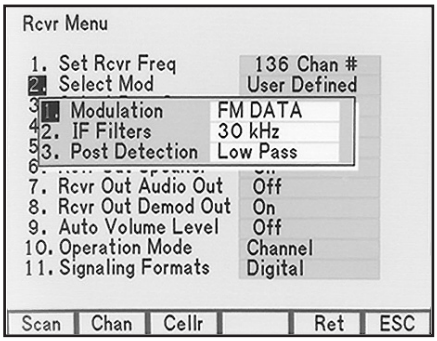
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MODE screens. This allows the user to store up to nine setups in each MODE screen for future recall. Selecting the Auxiliary Function (AUX) Menu and selecting the store function may also save the system configuration. This allows the user to store and recall up to nine system configurations.

The Receiver and Generator have a frequency list capability. This allows the user to store up to 100 frequencies into a list for use when performing tasks that require the same instrument setup to be utilized on many different frequencies.

Setup Menus

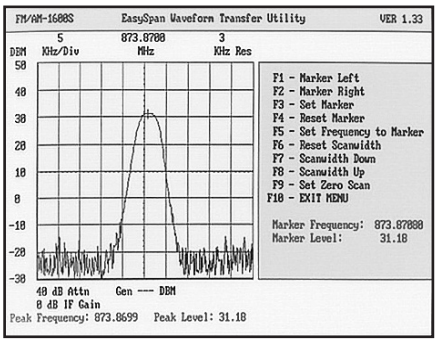
The major modes of operation each provide additional setup and control of functions not available for edit on the operation screen. A typical example setup screen for the receiver is shown below. Functions such as signal routings to the front panel connectors, AGC control, user defined IF and Post Detector bandwidth settings and signal formats are configured via this menu.



Setup Menu Screen for Receiver function

Application Software

The remote language has a screen for access of up to greater than 2 MB of optional application software files. Application programs are available for many different measurement applications or the user may develop his/her own routines. Expansion capability exists for additional memory, if required.



Application software example of the EasySpan Waveform Transfer utility

Radio Testing Software

The following application programs are available for use on the TS-4317 family of Frequency Agile Communications Test Sets. These software packages and their associated interconnection groups allow the Test Set to perform semi-automated verification, testing and repair of the following LRUs:

TS-4317 Radio Testing Software

RADIO SYSTEM	*LRU*	*DESCRIPTION*
VRC-12	RT-524	R/T (Manual)
PRC-77	RT-841	VHF/FM Manpack Transceiver
Various utility programs such as EasySpan		

TS-4317 Family

The TS-4317 family is designated by the customer as indicated below, however, no customer restrictions or limitations on availability are implied. The TS-4317 family of test sets supports and maintains total interchangeability and interoperability with all Radio Personality Modules (RPM) and Radio Test Applications Programs.

TS-4317	Army/Marine Corp Test Set
TS-4317-1	Air Force Test Set
TS-4317-2	Korean Military Test Set
TS-4317-3	Special Forces Test Set

Radio Communications Test Systems

In government communications, IFR provided the first multi-functional, multi-radio integrated test set (AN/GRM-114) fielded for the US Armed Forces. Its successors, the AN/GRM-114A, AN/GRM-114B, AN/GRM-122 and the AN/ARM-204 continued the migration path with increased capabilities designed to meet the growing demands of advanced communications systems.

Our experienced government staff continues to evolve our test equipment to provide "State of the Art" capabilities for semi-automated verification testing and/or fault isolation of military communications systems from a single, portable platform.

Radio Personality Modules (RPMs)

The TS-4317 family of frequency agile radio communications test sets along with the J-4843A generic appliqué unit and its associated Radio Personality Modules (RPMs) provides our customers a solutions oriented, cost effective, configurable approach to communication systems testing. Our ability to reduce life cycle cost, while assuring the highest degree of confidence in the military communications equipment, has successfully established a migration path with increased capabilities designed to meet the growing demands of advanced communications systems in the digital battlefield.

The RPM based configurable approach to LRU testing provides a cost-effective method to accomplish complete pin-to-pin functional communications systems testing. This approach is typically utilized for more complex communications systems testing requirements where multiple LRUs (Radios, RF Amplifier, Vehicular Adapter, Fill Device, Battery Box, etc.) are required to be tested in all their operational modes.

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SPECIFICATION

GENERAL NOTES

- *A warm-up time of 5 minutes is required for the following performance requirements.*
- *RF measurements are referenced to 50 Ω.*
- *Accuracy and Resolution stated in percent are referenced to measured or desired value.*
- *Where resolution exceeds accuracy, resolution takes precedence.*

RF SIGNAL GENERATOR (T/R AND DUPLEX CONNECTOR)

FREQUENCY

Range

500.0 kHz thru 999.9999 MHz

Resolution

100 Hz

Accuracy

±0.5 ppm

LEVEL

Range

T/R Port: *-137 to 0 dBm*

-40 dBm Max with Reverse Power Present

Duplex Port: *-120 through +7 dBm*

Resolution

0.1 dB

Accuracy

±1.5 dB (-110 to +7 dBm)

±2.5 dB, (< -110 to -127 dBm)

T/R Output Impedance

50 Ω (Return Loss > 16 dBRL)

T/R Input Protection

See Power Meter

Antenna and Duplex RF

Input Connectors Protection up to 65 W for 15 seconds with alarm

SPECTRAL PURITY

Residual FM

(Post Detection BW: 50 Hz to 15 kHz) <45 Hz rms

Phase Noise

<-90 dBc/Hz at 20 kHz from output frequency >1 MHz, <930 MHz

<-85 dBc/Hz at 20 kHz from output frequency ≥930 MHz

<-80 dBc/Hz at 20 kHz from output frequency ≤1 MHz

Harmonics

<-26 dBc

Non Harmonics

<-50 dBc

Residual AM

<0.10% rms, (Post Detection BW: 50 Hz to 15 kHz) (>1.0000 to 999.9999 MHz)

<0.20% rms, (Post Detection BW: 50 Hz to 15 kHz) (≤1.0000 MHz)

INTERNAL MODULATION - FM

Range

500.000 kHz to 999.9999 MHz

Deviation

Off, ±100 Hz to ±100 kHz

Accuracy

5%, ±1.0 to ±20.0 kHz

10%, <±1.0 and >±20.0 kHz

Resolution

100 Hz

Deviation Rate

0, 30.0 Hz to 20.0 kHz; up to 20 Kbps Digital

Waveforms

Sine, Square, Triangle, Ramp, Pulse

Total Harmonic Distortion

(Sine wave only) >6 kHz to <25 KHz Deviation

<0.7%, (700 Hz to 1.1 kHz)

<1.0%, (30 Hz to 10.0 kHz)

<2.0%, (> 10.0 to 20 kHz)

<2.0% for All Rates, >25 KHz to <100 KHz Deviation

<3 out of 10E6 BER for Digital

INTERNAL MODULATION - AM

Range

1.000 to 999.9999 MHz

Modulation

Off, 1% to 90%

Accuracy

±5% of setting for 30% to 90% modulation

Resolution

1%

Modulation Rate

100.0 Hz to 10.0 kHz (Note 1)

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Waveform

Sine, Square, Triangle, Ramp, Pulse

Total Harmonic Distortion for 30% to 70% Modulation (Sine wave only)

<0.7% (700 Hz to 1.1 kHz)

<1.5% (100 Hz to 6.0 kHz)

<2.5% (>6.0 to 10.0 kHz)

Note 1: Reference the AF Generator for modulation rate accuracy and resolution

INTERNAL PHASE MODULATION

Range

500.0 kHz to 999.9999 MHz

Phase Modulation Range

OFF, 0.1 to 10 radians

Accuracy

±10% (1 kHz rate, ≥0.3 radians)

Resolution

0.1 Radians

Modulation Rate

Off, 30 Hz to 6 kHz

Waveforms

Sine, Square, Triangle, Ramp, Pulse

Distortion

<2% (1 kHz rate, ≥0.3 radians)

EXTERNAL MODULATION - AM, FM, PM

External inputs with the same characteristics as the internal modulation source are supported . A 10 Vp-p injection level is required to obtain indicated setting ±10%.

FREQUENCY AGILITY (FOR BOTH RF GENERATOR & RECEIVER)

Settling Time

10.0 to 100.0 MHz only

1.22 ms to within 1.0 kHz of desired frequency for channel spacing of 25.0 kHz

A.F. GENERATOR #1 AND #2 AND BOOST MODE

FREQUENCY

Range

10.0 Hz to 40.0 kHz

Resolution

0.1 Hz (≤2.0 kHz)

1.0 Hz (>2.0 kHz)

Accuracy

±0.1%

AC LEVEL (SINEWAVE)

Range

0.7 mVrms to 2.5 Vrms into 150 Ω

Up to 3.0 Vrms into 600 Ω

Resolution

0.1 mVrms (0.7 to 200.0 mVrms)

0.8 mVrms (>200 mVrms)

Accuracy

±0.1 mVrms or 3% into 150 Ω

DC LEVEL (+1 LEVEL, 0 LEVEL, -1 LEVEL)

Accuracy

±5% into 600 Ω

Note: The DC Voltage is the peak equivalent of the indicated RMS voltage

DC OFFSET of 0 Level

±10 mV

BOOST MODE

Maximum Level

4.0 Vrms

Level Accuracy

±5% (at levels >3.0 Vrms)

Distortion

<5% (at levels >3.0 Vrms), 600 Ω

SPECTRAL PURITY

Total Harmonic Distortion (Sinewave Only)

<0.5% THD at 10 Hz to 40 kHz at levels ≥100 mVrms to 3 Vrms into 600 Ω

Waveshape

Sine, Square, Triangle, Ramp, Pulse, +1 Level, 0 Level, -1 Level

DIGITAL DATA GENERATOR AND PATTERN GENERATOR FOR BER

DATA RATES

Rates

75, 150, 300, 600, 1200, 2400, 4800, 16000 BPS

Data Pattern Size

100 to 100,000 Bits

Type

Random, Fixed, User Defined

Accuracy

1 X 10 E_{-8}

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LEVEL

Range

0.1 to 5.0 V (Digital)

Resolution

0.1 V

Accuracy

±3%

AUDIO FREQUENCY COUNTER

FREQUENCY

Range

10.0 Hz to 40.0 kHz (In 4 decade ranges)

Accuracy

±0.5 ppm ±1 count

Resolution

0.1 Hz from 10.0 Hz to ≤2.0 kHz

1.0 Hz from >2.0 to ≤20.0 kHz

10.0 Hz from >20.0 to ≤40.0 kHz

Input Waveform

Sine or Square Wave

SIGNAL CHARACTERISTICS

Level

0.5 to 30 Vrms (SINAD/BER input)

0.1 to 3.5 Vrms (EXT MOD input)

Impedance

1 MΩ Nominal (SINAD/BER input)

100 kΩ Nominal (EXT MOD input)

RADIO FREQUENCY COUNTER

FREQUENCY

Range

250.0 kHz to 999.99999 MHz

Accuracy

±0.5 ppm ±1 count

Resolution

1 Hz (<20 MHz)

10 Hz (≥20 MHz)

LEVEL

Range

-10 to +50 dBm (T/R Connector)

-60 to +10 dBm (ANT Connector)

RADIO FREQUENCY ERROR METER

FREQUENCY

Counter Range

0 Hz to ±150.000 kHz (Note 2)

Meter Range

0 Hz to ±100.0 kHz (In 4 decade ranges)

Counter/Meter Accuracy

±0.5 ppm ±1 count

Counter/Meter Resolution

1 to 0 Hz to ≤ ±10.0 kHz

10 Hz to > ±10.0 kHz to ±150.0 kHz

Note 2: The receiver Bandwidth will determine the upper limits

COUNTER/METER LEVEL

-10 to +50 dBm at the T/R Connector

- 60 to +10 dBm at the ANT Connector

RF POWER METER

FREQUENCY

Range

1.5000 to 999.9999 MHz

LEVEL: (AVERAGE RF POWER OF STEADY CARRIERS)

Input Level

0.2 mW to 200 W (up to 30 MHz)

0.2 mW to 100 W (>30 to 200 MHz)

0.2 mW to 50 W (>200 to 999.9999 MHz)

Resolution

1% or 0.1 mW

Accuracy

±10%, ±1 count

Return Loss

>23.0 dBRL (1.5000 to 100.0 MHz)

>20.0 dBRL (>100.0 to 400.0 MHz)

>16.0 dBRL (>400.0 to 999.9999 MHz)

ON/ OFF TIMES (50°C, AMBIENT) (OPERATING CONDITIONS)

0 to 50 W

Continuous at 50°C

>50 to 100 W

On Maximum 30 seconds, Off 2 minutes at 50°C

>100 to 200 W

On Maximum 15 seconds, Off 2 minutes at 50°C

An overtemp alarm is provided for all input levels.

RECEIVER

FREQUENCY RANGE

250.0 kHz to 999.9999 MHz

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SENSITIVITY

≤5 µV for 10.0 dB SINAD (Center Frequency ≥1 MHz)

30 kHz IF Bandwidth (1.0 kHz Tone, 6 kHz deviation CWT Audio Bandwidth)

SELECTIVITY

Receiver Nominal 3.0 dB Bandwidth	*>30.0 dB Down*
300 kHz	*±485 kHz Max*
30 kHz	*±52 kHz Max*
2.9 kHz	*±2.5 kHz Max (NOTE 3)*

Note (3): For USB & LSB Operation: Center frequency shifted +1.825 kHz or -1.825 kHz according to mode of operation

DEMODULATION OUTPUT

Output Level

(FM): 5 Vp-p (±10%) (at full scale, Ranges ≥10 kHz, into 600 Ω)

(PM): 50 mVrms (±20%) (5 Rad, into 600 Ω)

(AM): 1 Vrms (±10%) (80% modulation, into 600 Ω)

(SSB): 1 Vrms (±20%) (Beat tone, into 600 Ω)

DEVIATION METER

DEVIATION RANGE

Range

±1.0 to ±100 kHz

Resolution

100 Hz (≤20 kHz Ranges)

1 kHz (>20 kHz Ranges)

Accuracy

±4.0%, ±2 counts + source residual
(300 kHz IF, <20 kHz Rate, FM-ZEROED)
±7.0%, ±2 counts + source residual
(300 kHz IF, and 30 kHz IF ≥20 kHz Rate, FM-ZEROED)

MODULATION RATE

Rate

100 Hz to <40 kHz (300 kHz IF)

100 Hz to <3 kHz (30 kHz IF)

Carrier Range

500 kHz to 999.9999 MHz

Carrier Level

-10 to +50 dBm at the T/R Connector

-60 to +10 dBm at the ANT Connector

AM MODULATION METER

MODULATION

Range

1% to 95%

Scales

40%, 100%

Resolution

1%

Accuracy

5% full scale, ±1 count + source residual from 30% to 90%

Modulation Rate

100.0 Hz to 10.0 kHz

CARRIER RANGE

1.0000 to 999.9999 MHz

CARRIER LEVEL

-10 to +47 dBm on the T/R Connector

-60 to +10 dBm on the ANT Connector

SINGLE SIDE BAND (SSB)

Single Side Band Demodulator, selectable for lower or upper sideband, with an offset of 300 Hz to 3 kHz from suppressed carrier for single channel voice testing

PM DEVIATION METER

DEVIATION

Range

0 to 10 Rad (Peak)

Scales

1, 5, 10 Rad

Resolution

0.01 Rad (≤5 Rad)

0.1 Rad (>5 Rad)

Accuracy

±5% full scale, ±1 count + source residual (1 kHz rate >2 Rad)

MODULATION RATE

Rate

300 Hz to 4 kHz

CARRIER

Range

500 kHz to 999.9999 MHz

Level

-10 to +50 dBm (T/R connector)

-60 to +10 dBm (ANT connector)

DISTORTION METER

DISTORTION

Range

0.1% to 20.0%

Resolution

0.1%

Residual Distortion

0.7% maximum at 1 kHz

Accuracy

(Distortion levels from 1.0% to ≤10.0%)

±0.5% Distortion, ±1 count, at 770 Hz and 1000 Hz

±1.0% Distortion, ±1 count, at 600 to 1400 Hz

(Distortion levels from >10.0% thru 20.0%)

±2.0% Distortion, ±1 count

SIGNAL CHARACTERISTICS

Signal Frequency

600 to 1400 Hz

Signal Level

0.5 to 30 Vrms (SINAD/BER Input)

0.1 to 3.5 Vrms (EXT MOD Input)

SINAD METER

SINAD

Range

3.0 to 30.0 dB

Resolution

0.1 dB

Accuracy

±1.0 dB, ±1 count

SIGNAL CHARACTERISTICS

Signal Frequency

600 to 1400 Hz

Signal Level

0.5 to 30 Vrms (SINAD/BER Input)

0.1 to 3.5 Vrms (EXT MOD Input)

AF LEVEL METER

Input Connector

SINAD/BER Connector

Input Level Range

0.50 to 9.99 Vrms

Resolution

0.1 Vrms

Frequency Response

100 Hz to 20.0 kHz

Accuracy

±7% of Full Scale

DIGITAL MULTIMETER

VOLTMETER (DC/AC)

Range

0.1 mv to 2000 V (5 scales) (1 MΩ)

Scales

200.0 mV, 2.000 V, 20.00 V, 200.0 V, 2000 V (Note 4)
Full Scale (1 MΩ)

Resolution

3.5 digit display,

Maximum Resolution 0.1 on 200 mV Scale

Accuracy

±5%, full scale (AC), ±1 count (Note 5, Note 6)

±1%, full scale (DC), ±1 count

Note 4: 1000 V max DC or 500.0 V max AC (True RMS)

Note 5: (AC accuracy applies for AC Volts times kHz product<140)

Note 6: Incorrect probe connection (lead reversal) during AC voltage measurements voids accuracy specifications.

Frequency

DC, AC mode: 50 Hz to 20 kHz

Input Impedance

Selectable ±5%

150 Ω (speaker load)

600 Ω (line load)

1 MΩ NOMINAL (SHUNTED BY ≤150 pf)

OHMMETER

Range

0.1 Ω to 20 MΩ

Scales

200.0 Ω, 2.000 kΩ, 20.00 kΩ, 200.0 kΩ, 2.000 MΩ, 20 MΩ

Resolution

3.5 digit display, Maximum Resolution

0.1 Ω on 200.0 Ω Scale

Accuracy

±5% full scale, or 0.1 Ω, ±1 count

CURRENT METER: (DC/AC)

Range

0.5 mA to 2.0 A

200 mA to 20.0 A DC using external shunt

500 mA to 5.0 A AC using external shunt

Scales

20 mA, 200 mA, 2 A (internal)

Resolution

3.5 digit display, Maximum Resolution

0.01 mA on 20.0 mA Scale

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Accuracy

±5% full scale

±10% using external shunt

Frequency

DC, AC Mode: 50 Hz to 10 kHz

Maximum Current: Direct Input

AC and DC 2.0 A maximum continuous

Maximum Current: External shunt

DC up to 10.0 A DC continuous using external shunt supplied

20.0 A DC for periods not to exceed 1 minute via external shunt supplied using voltmeter on 0.2 V scale

AC 5.0 A maximum AC up to 10 kHz

OSCILLOSCOPE

VERTICAL INPUT

Vertical Bandwidth

1.0 MHz (-3 dB)

Frequency Range

DC to 1.0 MHz (at 3 dB Bandwidth)

Input Range

0 to 200 vdc

Scales

2 mV, 5 mV, 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V, 20 V, 50 V/div with 8 divisions on the screen

(1-2-5 sequence)

Accuracy

±5% of full scale (±10% with x10 probe)

±10% of full scale in 2mV range (±10% with x10 probe)

Resolution

1.25% of full scale (digital scope data range 0 to 255, in 8 divisions)

Coupling

DC, AC, GND

HORIZONTAL SWEEP

Sweep Factors

1 µs/Div to 100 ms/Div

(With 10 divisions on the screen, 1-2-5 sequence)

Accuracy

±3% of full scale

Resolution

1% (digital scope data sweep 400 points displayed per sweep)

EXTERNAL INPUT IMPEDANCE

1 MΩ nominal. shunted by 27 pf

SPECTRUM ANALYZER

RANGE

250.0 kHz to 999.9999 MHz

FREQUENCY SPAN

Range

1 kHz/Div to 100 MHz/Div plus zero scan

(10 divisions in a 1-2-5 sequence)

Accuracy

±(5% of Span Width +0.5 PPM)

Marker Accuracy

±(5% of Span Width +0.5 PPM)

LEVEL

Vertical Range

0 to -85 dBm

Vertical Scales

Log: 10 and 2 dB/Div

Gratical Resolution

1 dB (10 dB/Div)

0.4 dB (2 dB/Div)

Marker Resolution

0.3 dB (10 dB/Div)

0.1 dB (2 dB/Div)

Range (Dynamic)

60 dB (At 0 dB attenuation)

Bandwidth Switching Error

<2 dB (5 kHz/Div to 1 MHz/Div) (3, 30 and 300 kHz RBW Filters)

<3 dB (<5 kHz/Div, >1 MHz/Div) (0.3 kHz and 3 MHz RBW Filters)

Overall Accuracy

±4 dB (1.0 to 400.0 MHz, NORMALIZED)

±6 dB (>400.0 to 999.9999 MHz, NORMALIZED) (Note 7)

ATTENUATOR

0, 20, 40 dB (user selectable), at ANT Connector and T/R Connector (Note 8)

Note 7: Normalization is to be performed with no input applied.

Note 8: The receiver is fixed on the center frequency for monitoring while the analyzer scans as configured.

BIT ERROR RATE METER (BER)

Data generated by Digital Data Generator. Inputs to BER meter from received RF or from front panel connector

RANGE

1 x 10^{-1} to 1 x 10^{-5}

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DATA

Data Rates

75, 150, 300, 600, 1200, 2400, 4800 BPS, 16 KBPS

Comparison Capacity

100,000 Bits

Data Pattern Size

100 to 100,000 Bits

Data Pattern Type

Random, Fixed, User Defined

Accuracy

1 x 10^{-6}

Range Indicators

Decimal Form. Measurements outside of Range are displayed as Overrange or Underrange.

EXTERNAL INPUT LEVEL

Signal Level

300 mVp-p to 5 Vp-p (SINAD/BER input)

INPUT/OUTPUT (I/O) CONNECTORS

IEEE-488.1-1987 CONNECTOR - (24 pin IEEE Connector)

The hardware interface is in accordance with IEEE-488.1-1987. All of the functions in the test set (including the Spectrum Analyzer, Oscilloscope and DMM) can be controlled through this interface. No manual intervention shall be required except for power On/Off. The interface provides talker/listener modes for all the functions in this specification. The following are to be provided:

SH1, AH1, T1, T2, TE0, L2, LE0, SR1, RL2

*PP0, DC1, DT1, (C0, 1, 2, 3, 4) **

** User selectable*

RS-232 CONNECTOR (ASYNCHRONOUS) - (9 PIN SUB-MINIATURE D, MALE CONNECTOR)

Operations Mode

Off, Host (Input/Output), Printer (Output)

Baud Rates

300, 600, 1200, 2400, 4800, 9600, 19200, 38400

Stop Bits

1, 2

Parity

Odd, Even, Mark, Space, None

AUXILIARY BOX INTERFACE (SCSI) (50 PIN IEEE CONNECTOR)

Interface Connector for Auxiliary Box Interface per the ANSI X3.131-1986 standard

EXTERNAL VIDEO (9 PIN SUB-MINIATURE D, FEMALE CONNECTOR)

EGA (Enhanced Graphic Adapter) interface for external EGA computer monitor

425 kHz IF OUTPUT (IF INSTALLED)

BNC output for providing an external IF signal for auxiliary uses

Output Level

60 mVp-p ±20% into 1 kΩ load

WEIGHT AND DIMENSIONS

Test Set (Without Bail Handle)

18.8 cm High, 43.2 cm Wide, 55.9 cm Deep

7.4 in. High, 17 in. Wide, 22 in. Deep

(With front panel cover in place)

Test Set (With Bail Handle)

18.8 cm High, 47.8 cm Wide, 63.5 cm Deep

7.4 in. High, 18.8 in. Wide, 25 in. Deep

(With front panel cover in place)

Weight

21.8 kg (48 lbs.)

POWER REQUIREMENTS

AC Line

Voltage:	*90 to 130 VAC*
	190 to 260 VAC

Frequency

47.5 to 420 Hz

Power

180 W typical

External DC

22 to 30 Vdc

Current

10 A (typical)

ENVIRONMENTAL

Per MIL-T-28800E, Class 5, Style C, TYPE II

Operating Temperature Range

32° to 122°F, 0° to 50°C

Storage Temperature Range

-40° to +160°F , -40° to +71°C

Relative Humidity

95% (±5%) >10°C

75% >30°C

45% >40°C

Uncontrolled ≤10° C

Vibration

2 g

Shock

30 g

Operating Altitude

10,000 ft. (3050 m)

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Storage Altitude

15,000 ft. (12192 m)

EMI

MIL-STD-461

Reliability

2000 hrs MTBF

SELF TEST

Built in Test

User accessible Self Operational Check (SOC)

ACCESSORIES

Antenna (flexible)

AC/DC Shunt

20 dB Pad

10 dB Pad

DC Power Cord

AC Power Cord

DMM Probes

Scope Probe

Extra fuses

Microphone

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