Wireless

3500A Portable Radio Communications Test Set

Digital Radio Test Options for P25, DMR and NXDN™!

Featuring

- 2 MHz - 1 GHz operation
- Transmitter and Receiver testing
- AM/FM Transceiver testing
- P25/DMR/NXDN™ digital radio test options
- Spectrum analyzer with <-136 dBm noise floor
- Tracking generator for duplex tuning
- Oscilloscope
- Save/Recall user setups
- Antenna and cable tests

The Aeroflex 3500A, the First Truly Rugged, Portable Radio Test Set

With the latest in portability, battery life and performance, the Aeroflex 3500A builds upon Aeroflex's expertise in developing portable radio communications test sets with exclusive features and affordability that are destined to set a new standard in portable radio test sets. Designed to meet the needs of a multitude of radio tests, the 3500A provides fast, reliable measurements of the radio's transmitter and receiver parameters. With the additional capability to perform quick testing of antennas and cables, the 3500A provides the most complete portable test solution available to quickly isolate problems and assess performance of the radio, cable and antenna systems. In addition, the tracking generator gives you the ability to re-tune your antenna duplexer located at your remote repeater sites.

Digital Radio Options

Now with support for DMR and NXDN™ along with P25, the 3500A has the capability of supporting the latest digital radio systems. Key RF modulation fidelity parameters along with several modulation patterns give the 3500A the power to quickly check the operation of a digital mobile or base station.

Portable and Rugged

- Easy portability - weighs less than 8 lbs. (3.6 kg)
- Rugged construction - solid magnesium alloy weatherproof case
- -20° to +55°C operating temperature range
- 5 hour battery life

Aeroflex engineers designed the 3500A from the ground up to be portable and rugged, weighing in at less than 8 lbs. (3.6 kg) including the battery. It has a solid magnesium alloy weatherproof case, an operating temperature range of -20° to +55°C, and rugged construction specifications (Mil-PRF-28800A) for humidity, altitude, shock, and vibration. The battery gives the user 5 hours of operation and can be fully re-charged and ready to operate in only 4 hours.

Radio Installation Failures

- Handset and antenna allow over the air “Talk Test”
- RSSI meter
- RF Error meter
- Modulation measurements
- Audio frequency counter
- Spectrum analyzer
- Audio frequency oscilloscope
We designed the 3500A so that you could use it for quick installed radio testing and efficiently find radio failures. The 3500A is lightweight and perfect for hand-held testing. There is no need to connect to the radio under test, simply connect the supplied antenna, key up the radio and then measure the radio parameters over-the-air. A push-to-talk button on the handset controls whether your 3500A is transmitting or receiving. The Duplex test screen is ideal for making quick transmitter and receiver measurements on an installed radio system.

**Duplex Test Screen**

**Direct Connect Testing**
- RF power and frequency error
- AM modulation/FM deviation
- Audio frequency counter
- Receive Signal Strength Indicator (RSSI)
- DCS encode/decode
- DTMF encode/decode
- Distortion meter
- SINAD/sensitivity
- Spectrum analyzer
- Audio frequency oscilloscope
- Frequency find
- Audio level meter
- Pass/Fail limits

In addition to performing over the air measurements, the 3500A includes the capability to perform direct connect type testing on a radio. All radio parameters including power, frequency error, modulation accuracy, receiver sensitivity and audio performance are easily accessed and tested with the 3500A.

With the Receiver Test screen selected, the 3500A operates as a signal generator, enabling the testing of the receiver portion of the radio. Audio SINAD, distortion and frequency are among the tests that the 3500A can perform on the radio's receiver. With two internal generators that can be used as modulation sources, the 3500A can modulate the carrier with both a test tone and a squelch tone. Alternatively, the internal generators can generate both a test tone and DCS, enabling the testing of mobiles requiring a digitally coded squelch.

The Transmitter Test screen operates as a signal analyzer, measuring the parameters associated with the transmit portion of the radio being tested. Included in this screen are measurements of the modulation, the RF power, and RF frequency error. The frequency of sub-audible tones can also be measured by using the 0.3k LP filter and audio frequency counter.

Many of the meters can be “zoomed” into for additional setup, including programming the number of values to average and the pass/fail limits. The zoomed in meters also include bar graphs for a visual indication of the measurement.

**Modulation Meter**

Any of the test screens can be easily configured with the meters that are needed according to the type of tests that the user wants to perform by selecting the meters from the setup screen. Users can quickly define the “look” of the instrument by configuring the way the meters are displayed on the screen.
Isolate Cable and Antenna Problems

Since many radio faults in an installed radio system lie in the cabling and/or antenna and not with the radio, the 3500A includes the capability to measure the VSWR or return loss of an antenna and the loss or distance to fault of a cable. By isolating the problem to the cable, connector or antenna you can avoid returning good radios to the depot or manufacturer for repair, thus, avoiding radio system downtime. The ANT-CABLE Test screen provides the user with the option to display:

- VSWR versus frequency
- Return loss versus frequency
- Cable loss versus frequency
- Return loss versus feet

The display of VSWR or Return Loss (RL) versus frequency is valuable for observing the performance of an antenna.

Spectrum Analyzer (35XXOPT01)

- Noise floor <-136 dBm
- Spans from 10 kHz to 5 MHz
- Effective resolution bandwidths down to 19 Hz
- Peak hold
- Average function

Option 35XXOPT01 is an FFT based spectrum analyzer. An FFT analyzer uses a snapshot of the incoming RF signal that is within the selected span and converts it to a frequency spectrum. The advantage of using this method is that the spectrum is converted from one set of data and not from a sweep where the RF signal may have changed from the start of the frequency sweep to the finish. The noise floor of the spectrum analyzer is <-136 dBm in the 10 kHz span. The 3500A analyzer has a span width that ranges from 10 kHz to 5 MHz with an effective resolution bandwidth as narrow as 19 Hz. A marker function includes the capability of measuring the power within a particular bandwidth and at a specified offset from the center frequency. The 3500A Spectrum Analyzer can be accessed from the Transmitter Test screen, the Duplex Test screen, and as a stand-alone spectrum analyzer.
Oscilloscope (35XXOPT02)

- Horizontal range of 50 ms/Div to 0.1 Sec/Div
- Two markers
- Audio bandwidth

With the oscilloscope option, we can display external audio or the demodulated audio of a received signal. The oscilloscope features 2 markers and a horizontal range of 50 mS/Div to 0.1 Sec/Div, sufficient for observing and analyzing audio signals. The oscilloscope is available from the Duplex, Transmitter, or Receiver Test screens for use during any type of testing.

Tracking Generator (35XXOPT08)

- Spans from 10 kHz to full span
- 2 markers for pinpointing level of signal
- Output level adjustable from 0 to -60 dB (relative to maximum output of 3500A)

This option is totally software based and is upgradable to units that are already in the field. This option was designed specifically for aligning duplexer and filters.

Digital Radio Options

P25 Test (35XXOPT07)

- Modulation Fidelity, Deviation, and Frequency error meters
- Transmit BER meter
- Signal power meter
- Transmit standard 1011 Hz, 0.153, and calibration patterns

The 3500A P25 option gives you the capability to test P25 mobiles, hand-helds, repeaters, and base stations. With this option, you can measure Modulation fidelity, deviation and frequency error and transmit standard patterns as specified by TIA-102.CAAA-C. This function becomes part of the Duplex, Transmitter or Receiver testing screens when this option is installed.

NXDN™ Test (35XXOPT33)

- Signal power meter
- Frequency Error meter
- FSK Error meter
- Symbol Deviation meter
- Transmit BER meter
- RAN Decode
- Transmit 1031 Hz, 0.153, and calibration patterns
- User programmable RAN for transmit

With theNXDN™ test option you will be able to measure the keyNXDN™ RF parameters with the 3500A. These measurements verify
the correct operation of both the transmitter and receiver of an NXDN™ radio. The 1031 Hz pattern along with the selectable RAN enables a test of the audio of a NXDN™ radio without requiring it to be in test mode. With the O.153 random data pattern, you can perform BER testing of the receiver, to verify that it meets its sensitivity requirements.

**Duplex Screen with NXDN™**

**DMR Test (35XXOPT34)**
- Burst Power meter
- Frequency Error meter
- FSK Error meter
- Symbol Deviation meter
- Magnitude Error meter
- Transmit BER meter
- Color Code, Call ID, and Radio ID decode
- Transmit 1031 Hz, O.153, and calibration patterns
- Base Repeater pattern for duplex radio testing
- User programmable Color Code and Call ID

With the DMR option, the 3500A can now perform a complete test on the transmitter and receiver of a DMR radio. This testing includes the measurement of the key modulation fidelity parameters, FSK error, magnitude error, symbol deviation and frequency error. The 3500A can also measure the power during the burst and the power level between the bursts. In order to enable the testing of radios, without requiring them to be put into a special test mode, the 3500A also has a programmable color code and call ID. A key feature of the 3500A is the base repeater (BR) pattern. A radio in duplex mode must synchronize with this BR pattern before it can transmit. It would not be possible to test a duplex radio without this selection.

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**SPECIFICATION**

**RF SIGNAL GENERATOR**

**FREQUENCY**

- **Range**: 2 MHz to 1 GHz (Useable from 500 kHz)
- **Resolution**: 1 Hz

**OUTPUT LEVEL**

- **Range**: T/R port: -50 to -120 dBm/707.11 µV to 0.22 µV
- **Resolution**: Display 1 dB/0.01 µV
- **Step size**: 1 dB
- **Accuracy**: ±2 dB
- **±3 dB (<=-100 dBm)**

**SSB PHASE NOISE**

-80 dBc/Hz at 20 kHz offset,

**SPURIOUS**

- Harmonics -30 dBc
- Non-Harmonics -40 dBc (>±20 kHz offset from carrier) in Band

**RESIDUAL FM**

- <60 Hz in 300 Hz to 3 kHz BW
- Typically <20 Hz

**RESIDUAL AM**

- <5% in 300 Hz to 3 kHz BW
- Typically <1%

**PORT INPUT PROTECTION**

- **ANT port**: +20 dBm
- **SWR port**: +20 dBm
- **T/R port**: +44 dBm

**PORT VSWR**

- **ANT port**: <1.5 : 1
- **SWR port**: <1.5 : 1

For the very latest specifications visit www.aeroflex.com
FM DEVIATION (GEN 1 AND GEN 2)

Modulation Frequency Rate

Range
0.0 Hz to 20.0 kHz

Resolution
0.1 Hz

Accuracy
Timebase ±2 Hz

FM Modulation

Range
Off, 0 Hz to 100 kHz

Resolution
10 Hz

Accuracy
±10% (2 kHz to 50 kHz deviation, 150 Hz to 5 kHz rate)
Typically <2% (5.6 kHz deviation, 1 kHz rate)

Total Harmonic Distortion
3% (1 kHz rate, >2 kHz deviation, 300 Hz - 3 kHz BP filter)

EXTERNAL FM

MIC IN

Input Range
Range 1: 2–15 mVrms (8 mVrms nominal) MIC E-OPEN, F-GND
Range 2: 35-350 mVrms (100 mVrms nominal) MIC E-GND, F-OPEN
Range 3: 2-32 mVrms (20 mVrms nominal) MIC E-OPEN, F-OPEN
Range 2 turns on a nominal 3 Vdc bias voltage

AM MODULATION (GEN 1 AND GEN 2)

Modulation Frequency Rate

Range
10.0 Hz to 20.0 kHz

Resolution
0.1 Hz

Accuracy
Timebase ±2 Hz

AM Modulation

Range
OFF, 0 to 100%

Resolution
0.1%

Modulation Accuracy
10% off setting, 150 Hz to 5 kHz rate, 10% to 90% modulation

Total Harmonic Distortion
3% (20% to 90% mod, 1 kHz rate, 300 Hz to 3 kHz BP filter)

EXTERNAL AM

MIC IN

Input Range
Range 1: 2–15 mVrms (8 mVrms nominal) MIC E-OPEN, F-GND
Range 2: 35-350 mVrms (100 mVrms nominal) MIC E-GND, F-OPEN
Range 3: 2-32 mVrms (20 mVrms nominal) MIC E-OPEN, F-OPEN
Range 2 turns on a nominal 3 Vdc bias voltage

Frequency Range
300 Hz to 3 kHz

Modulation Range
Off, 0 Hz to 50 KHz

Audio IN

Switchable Loads
150 ohms, 600 ohms, 1 K ohms, DIV 10, High Z

Input Levels
0.05 to 3 Vrms

Frequency Range
300 Hz to 5 kHz

Level Sensitivity
1 kHz/35 mVrms

Slope
Positive voltage yields positive deviation
**Input Levels**
0.05 to 3 Vrms

**Frequency Range**
30 Hz to 5 kHz

**Level Sensitivity**
1% / 35 mVrms nominal

**AFGEN 1 AND AFGEN 2**

**FREQUENCY**
Range
30 Hz to 5 kHz (spec)
0.0 Hz to 20.0 kHz (usable)

**Resolution**
0.1 Hz

**Accuracy**
Timebase ±2 Hz

**OUTPUT LEVEL**
Range
0 to 1.57 Vrms (into 600 Ω)

**Resolution**
0.01 Vrms

**Accuracy**
±10%

**Distortion**
<3% (1 kHz rate, sine, 300 Hz to 3 kHz)

**RF RECEIVER**

**FREQUENCY**
Range
2 MHz to 1 GHz (usable from 750 kHz)

**Resolution**
1 Hz

**Accuracy**
Same as timebase

**INPUT AMPLITUDE**

**Minimum Input Level, Audio Sensitivity**
ANT: -80 dBm (22.4 μV), typical 10 dB SINAD (-110 dBm with preamp)
T/R: -40 dBm (2236 μV), typical, 10 dB SINAD

**Usable Input Level Range**
ANT: -60 dBm (-80 dBm with RF Amp On) to -10 dBm (RF Error, Distortion, Modulation, AF Counter and AF Level)
ANT: -90 dBm (-110 dBm with RF Amp On) to -10 dBm (RSSI)
T/R: -20 dBm to maximum input level (RF error, Distortion, Modulation, AF Counter and AF Level)
T/R: -50 dBm to maximum input level (RSSI)

**Maximum Input Level**
ANT: +20 dBm/0.1 W for 10 seconds
T/R: +43 dBm/20 W (FM) and +37 dBm (AM)
+47 dBm/50 W (FM) and +41 dBm (AM) with 50 W attenuator
+51.76 dBm/150 W (FM) and 45.76 dBm (AM) with 150 W attenuator

**AM/FM DEMODULATION**

**IF Bandwidth**
FM: 5 kHz, 6.25 kHz, 8.33 kHz, 10 kHz, 12.5 kHz, 25 kHz, 30 kHz, 100 kHz, 300 kHz
AM: 5 kHz, 6.25 kHz, 8.33 kHz, 10 kHz, 12.5 kHz, 25 kHz, 30 kHz

**Audio Filters Bandwidth**
0.3-20 kHz, 0.3-5 kHz, 0.3-3 kHz, 0.3 kHz, CCITT BP, CW BP, 15 K LP, 5 K LP, 3 K LP, 0.3 K LP

**Audio Output Level Sensitivity**
FM: (3 Vrms/kHz Dev)/IF BW (kHz) ±15%
AM: 7 mVrms/% AM ±15%

**SPEAKER OUTPUT**
75 dBA min. at 0.5 m, 600 - 1800 Hz, max volume

**VOLUME CONTROL**
Range
0 to 100

**LO EMISSIONS**
>-50 dBc

**QUIETED CHANNELS**
10 frequencies allowed between 2 MHz and 999.999 MHz quieted by no more than 30 dB RF TRANSMITTER TEST METERS

**RF FREQUENCY ERROR METER**

**Range**
±200 kHz

**Resolution**
1 Hz

**Accuracy**
Same as timebase ±2 Hz

**RSSI INDICATOR (RF POWER WITHIN RECEIVER IF BANDWIDTH)**

**Display Range**
dBm: -120 dBm to +43 dBm (+53 dBm with Ext Attn dB set to 20 dB)
Watts: 10 pW to 20 W (200 W with Ext Attn dB set to 20 dB)

**Usable Meter Reading RF Level Range**
T/R port: -50 dBm to +43 dBm
ANT port (without RF amp on): -90 dBm to -10 dBm
ANT port (with RF amp on): -110 dBm to -10 dBm

**Resolution**
0.01 dBm

**Accuracy**
±3 dB (> -50 dBm into T/R, > -90 dBm into ANT or > -120 dBm into ANT with RF Amp On)

**RF POWER METER (BROADBAND RF POWER INTO T/R PORT)**

**Display Range**
0 to 43 dBm (0 to 20 W)

**Minimum Input Level**
0.10 W/+20 dBm

**Maximum Input Level**
20 W/43 dBm for 10 minutes at +25° C or until thermal alarm sounds
<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.01 W/0.1 dBm</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1 dB</td>
</tr>
<tr>
<td><strong>FM DEVIATION METER</strong></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>500 Hz to ±100 kHz</td>
</tr>
<tr>
<td>Modes</td>
<td>Peak+, Peak-, (Peak+ - Peak-)/2</td>
</tr>
<tr>
<td>Resolution</td>
<td>1 Hz</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±10% of reading 500 Hz to 100 kHz Deviation, ±5% 1 kHz to 10 kHz</td>
</tr>
<tr>
<td><strong>AM PERCENT METER</strong></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>5% to 100%</td>
</tr>
<tr>
<td>Modes</td>
<td>Peak+, Peak-, (Peak+ - Peak-)/2</td>
</tr>
<tr>
<td>Resolution</td>
<td>1%</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±5% of reading, 1 kHz rate, 30% to 90% modulation, 3 kHz LPF</td>
</tr>
<tr>
<td><strong>ANT-CABLE TEST</strong></td>
<td></td>
</tr>
<tr>
<td>Frequency Range</td>
<td>2.0 MHz to 1000.0 MHz</td>
</tr>
<tr>
<td>Span Range</td>
<td>10.0 MHz to 998 MHz</td>
</tr>
<tr>
<td>Start Range</td>
<td>2.0 MHz to 990.0 MHz</td>
</tr>
<tr>
<td>Stop Range</td>
<td>12.0 MHz to 1000.0 MHz</td>
</tr>
<tr>
<td>Frequency Resolution</td>
<td>0.1 MHz</td>
</tr>
<tr>
<td>Markers</td>
<td>3</td>
</tr>
<tr>
<td>Immunity to Interfering Signal</td>
<td>Typically -30 dBm</td>
</tr>
<tr>
<td><strong>SWR MEASUREMENT</strong></td>
<td></td>
</tr>
<tr>
<td>VSWR Range</td>
<td>1.00 to 20.00</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.02</td>
</tr>
<tr>
<td>VSWR Accuracy</td>
<td>±10% of SWR readings (calibrated) &lt;300 MHz</td>
</tr>
<tr>
<td></td>
<td>±20% of SWR readings (calibrated) =300 MHz</td>
</tr>
<tr>
<td><strong>RETURN LOSS (RL) MEASUREMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.0 to -50.0 dB</td>
</tr>
<tr>
<td><strong>CABLE LOSS MEASUREMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.0 to -50.0 dB</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 dB</td>
</tr>
<tr>
<td><strong>DTF MEASUREMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement Range</td>
<td>3 ft to 328 ft</td>
</tr>
<tr>
<td></td>
<td>1 m to 100 m</td>
</tr>
<tr>
<td>Return Loss Range</td>
<td>0.0 to -50.0 dB</td>
</tr>
<tr>
<td>Velocity</td>
<td>0.00 to 1.00, automatically selected by cable type</td>
</tr>
<tr>
<td>Loss</td>
<td>0.00 to 100.00 dB per 100 ft, automatically selected by cable type</td>
</tr>
<tr>
<td>Est Length</td>
<td>40, 80, 200 or 400 ft</td>
</tr>
<tr>
<td></td>
<td>12.2, 24.4, 61 or 121.9 m</td>
</tr>
<tr>
<td><strong>AUDIO METERS</strong></td>
<td></td>
</tr>
<tr>
<td>AUDIO INPUT (AUDIO IN)</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>BNC Input on front panel</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>300 Hz to 10 kHz</td>
</tr>
<tr>
<td>Level Range</td>
<td>0.2 Vp-p to 5 Vp-p</td>
</tr>
<tr>
<td><strong>SINAD METER (WITH 1 KHZ AUDIO)</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement Sources</td>
<td>Audio in, demod</td>
</tr>
<tr>
<td>Audio Frequency</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Display Range</td>
<td>0 to 40 dB</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 dB</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1.5 dB from 8 to 40 dB</td>
</tr>
<tr>
<td><strong>DISTORTION METER</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement Sources</td>
<td>Audio in, demod</td>
</tr>
<tr>
<td>Audio Frequency</td>
<td>1 kHz</td>
</tr>
</tbody>
</table>
Reading Range
0% to 100%

Resolution
0.1%

Accuracy
±10% from 1% to 20%

**AUDIO FREQUENCY COUNTER**

Range Demod

FM
15 Hz to 20 kHz (IF BW set appropriately for received modulation BW)

AM
100 Hz to 10 kHz (IF BW set appropriately for received modulation BW)

Range Audio Input
15 Hz to 20 kHz

Audio Input Level
10 mV p-p to 5 V p-p

Resolution
0.1 Hz

Accuracy
±1 Hz

**AUDIO FREQUENCY LEVEL METER**

Measurement Sources
AUDI O IN, DVM

Frequency Range
200 Hz to <5 kHz

Input Level

<table>
<thead>
<tr>
<th>Source</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDIO IN</td>
<td>10 mV rms to 3 V rms (x1)</td>
</tr>
<tr>
<td>DVM</td>
<td>10 mV rms to 3 V rms (x1)</td>
</tr>
<tr>
<td>DVM</td>
<td>1 V rms to 30 V rms (+10)</td>
</tr>
<tr>
<td>DVM</td>
<td>1 V rms to 30 V rms (+20)</td>
</tr>
</tbody>
</table>

Display Unit Resolution

<table>
<thead>
<tr>
<th>Unit</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volts</td>
<td>0.001 V</td>
</tr>
<tr>
<td>mV</td>
<td>0.001 mV</td>
</tr>
<tr>
<td>dBuV</td>
<td>0.001 dBuV</td>
</tr>
<tr>
<td>dBm</td>
<td>0.001 dBm</td>
</tr>
<tr>
<td>Watts</td>
<td>0.001W</td>
</tr>
</tbody>
</table>

Accuracy
±5% Audio In

**ANALYZER (OPTIONAL)**

**FREQUENCY**

Range
2 MHz to 1 GHz

Resolution
1 Hz

Accuracy
Same as timebase

Span
10 kHz to 5 MHz in 1,2,5 sequence

**EFFECTIVE RBW**

Range
19 Hz to 25 kHz (Effective RBW calculated based on FFT window type and Span)

**POWER BANDWIDTH**

Offset Range
0 to ±2.495 MHz

Bandwidth Range
1 kHz to 5 MHz in a 1,2,5 sequence (maximum bandwidth is the selected span)

Power Bandwidth Display Range
-137 dBm to +43 dBm

Power Bandwidth Display Resolution
0.001 dBm

Power Bandwidth Accuracy
±3 dB (> -50 dBm into T/R, > -90 dBm into ANT or > -110 dBm into ANT with RF Amp On)

Displayed Average Noise Level (DANL)
-120 dBm (Typical, 10 kHz span) -136 dBm with pre-amp enabled

Sweep time
700 ms (Typical)

**OSCILLOSCOPE (OPTIONAL)**

Source
DVM, Audio In, Demod

Traces
One

Markers
Two

Trigger

<table>
<thead>
<tr>
<th>Type</th>
<th>Edge</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto, Norm</td>
<td>Rising, Falling</td>
<td>-100 to +100 V</td>
</tr>
</tbody>
</table>

Horizontal

Range
0.5 ms/div to 0.1 sec/div

Accuracy
3% of full scale
Vertical
Range
FM demod
0.1 kHz to 50 kHz/div in a 1, 2, 5 sequence
AM demod
5, 10, 20, 50%/div
DVM and Audio in
10 mV to 10 V/div in a 1, 2, 5 sequence
Accuracy
10% of full scale
Coupling:
DVM Input: AC, DC and GND
AUDIO IN: AC
Input Impedance
DVM Input: 1 MΩ
AUDIO IN: 150 Ω, 600 Ω, 1 KΩ, High Z, Div by 10
Bandwidth
5 kHz
TIMEBASE
Temperature Stability
±0.25 ppm at 25°C
±0.5 ppm over temp range
Aging
1 ppm/year standard
Warm-up time
3 min.

ENVIRONMENTAL/PHYSICAL
Overall Dimensions
231 mm x 285 mm x 70 mm (W x L x D)
9.1 in. x 11.2 in. x 2.8 in.
Weight
8 lbs. (3.6 kg); 12 lbs. (5.4 kg) with accessories and softbag
Temperature
Storage: -51°C to +71°C storage
Note: Battery must not be subjected to temperatures below -20°C, nor above +60°C
Operation:
DC only Operation: -20°C to +55°C (battery removed, contingent upon applied RF power over time¹).
Battery Operation: -20°C to +40°C (typical based on internal temperature rise and usage of the instrument²)
Note: Battery to be charged at temperatures between 0°C and +45°C
Humidity
95% max. (non-condensing) (MIL-PRF-28800F Class 2)
Altitude
4,600 m max. (15,092 ft.) (MIL-PRF-28800F Class 2)
Shock, Functional
30G (MIL-PRF-28800F Class 2)
Vibration
Random 10 - 500 Hz (MIL-PRF-28800F Class 2)
Bench Handling
MIL-PRF-28800F, Class 2
COMPLIANCE
ENVIRONMENTAL
Use
Pollution degree 2
Mil-PRF-28800F class 2
Salt fog
Splash proof
Acoustic noise
Explosive atmosphere
Fungus resistance
Dust resistance
Drip proof
Solar radiation
EMC
Emissions
Mil-PRF-28800F
EN61326: 1998 class A
EN61000-3-2
EN61000-3-3
Immunity
Mil-PRF-28800F
EN61326: 1998
EN61000-6-1
SAFETY
Standard
UL 61010-1
Usage Environment
Indoor use, maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% RH at +40°C, Installation Category II, Pollution degree 2
AC INPUT POWER (AC TO DC CONVERTER / CHARGER UNIT)
AC Input Voltage Range
100 to 240 VAC, 1.5 A max., 47 Hz - 63 Hz
AC Input Voltage Fluctuation
Less than 10% of the nominal input voltage
Transient Overvoltage
According to Installation Category II
Usage Environment
Indoor use, maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% RH at +40°C, Installation Category II, Pollution degree 2
Operating Temperature
0°C to +40°C
Storage Temperature
-20°C to + 85°C
¹ Consider the use of the instrument for thermal operating temperature. All thermal ratings are dependent upon applied RF power. The 3500A will alarm once the internal temperature exceeds safety limits. Applying power continuously in high ambient temperature environment will result in a heat build-up within the instrument. The 3500A is rated for 20 W (43 dBm) for 10 minutes at +25°C or until thermal alarm sounds. Exceeding these conditions will result in thermal shutdown.
EMI
EN55022 class B, EN61000-3-2 class D

Safety
UL 1950, CSA 22.2 No. 234 and No.950, IEC 950/EN 60950

DC INPUT POWER
DC Input Voltage Range (DC INPUT CONNECTOR)
11 VDC to 32 VDC

DC Power Input, Max. (DC INPUT CONNECTOR)
55 W

DC Power Input, Nominal (DC INPUT CONNECTOR)
25 W

DC Fuse Requirement (DC INPUT CONNECTOR)
5A, 32 VDC, Type F

Battery
Battery Type
Lithium Ion (Li Ion) battery pack

Note: Battery must not be subjected to temperatures below -20°C, nor above +60°C

Battery Operation Time
5 hours continuous use

No backlight, duty cycle 80% transmitter and 20% Receiver tests, Auto shutoff if key is not pressed for 10 minutes

7 hours typical use

Battery Charge Time
4 hours

Note: Battery to be charged at temperatures between +0°C and +45°C only

DIRECTIONAL COUPLER

Coupling
30 dB

Frequency Range
20 MHz to 200 MHz

Power Rating
250 W CW

Insertion Loss
0.25 dB Max.

VSWR
1.10:1 Max.

Flatness
± 0.5 dB Max.

Directivity
20 dB Min

Connectors
RF In: Type N
RF Out: Type N
FWD: BNC
REV: BNC

Kit Includes
Coupler (Werlatone Model: C1569-13)
2 BNC cables (12 in)
2 Adapters (N-F to BNC-F)
1 10 dB attenuator

20 dB/50 W ATTENUATOR

Attenuator Type
Bi-Directional

DC - 18 GHz

Power Rating
(mounted horizontally): 50 watts average (bi-directional) to 25°C ambient temperature, derated linearly to 10 Watts @ 125°C. 1 kW peak (5 μsec pulse width; 2.5% duty cycle).

Maximum deviation over frequency
± 0.75 dB

Maximum SWR
1.15

Kit Includes
20 dB/50 W attenuator
N-F, BNC-F adapter
TNC-M, N-M adapter

20 dB/150 W ATTENUATOR

Attenuator Type
Uni-Directional

DC - 1.5 GHz

Power Rating
(mounted horizontally with finsvertical): 150 watts average (unidirectional) to 55°C ambient temperature, derated linearly to 10% @ 125°C.

Maximum deviation over frequency
± 0.50 dB

Maximum SWR
1.10

Kit Includes
20 dB/150 W attenuator
N-F, BNC-F adapter
N-M, BNC-F adapter

P25 FUNCTIONS

• C4FM modulation fidelity
• C4FM frequency error
• Power
• Tx BER
• STD 1011, 0.153 CAL generator for BER
### Versions, Options and Accessories

When ordering please quote the full ordering number information.

<table>
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<th>Ordering Numbers</th>
<th>Description</th>
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<tr>
<td>3500A</td>
<td>Portable Radio Test Set</td>
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<tr>
<td>3500AUK</td>
<td>Portable Radio Test Set plus upgrade kit</td>
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#### 3500A Supplied Accessories

- Case, Soft-Sided Carrying
- External DC Power Supply
- Power Cable (AC)
- Handset
- Short-Open-Load VSWR Calibrator
- Comm Breakout Box
- Cable (TNC) (M-M) (48 in)
- 2 x Cable (BNC) (M-M) (48 in)
- 5 x Adapter (BNC-F to TNC-M)
- 2 x Fuse, Spare (5 A, 32 Vdc, Type F)
- Case, Accessory
- Power Cable (DC cigarette lighter)
- Getting Started Manual (Paper)
- Operation/ICW Manual (CD)
- Antenna (BNC) (50 MHz)
- Antenna (BNC) (150 MHz)
- Antenna (BNC) (450 MHz)
- Antenna (BNC) (800 MHz)
- Flash Drive, 1 GB USB

#### 3500AUK Additional Supplied Accessories

- Flip Cover
- Attenuator (20 dB / 50 W)
- Adapter (N-M to TNC-M)
- 2 x Adapter (N-F to BNC-F)
- Attenuator (20 dB / 150 W)

### Options

- 35XXOPT01 Spectrum Analyzer
- 35XXOPT02 Oscilloscope
- 35XXOPT07 P25 Test
- 35XXOPT08 Tracking Generator
- 35XXOPT09 dPMR Test
- 35XXOPT33 NXDN™ Test
- 35XXOPT34 DMR Test

### Optional Accessories

#### AC number Description

| AC27002 | Attenuator (20 dB / 50 W), Adapter (N-F to BNC-F), Adapter (N-M to TNC-M) |
| AC27003 | Attenuator (20 dB / 150 W), Adapter (N-F to BNC-F), Adapter (N-M to BNC-F) |
| AC27013 | Directional Coupler (20 to 200 MHz), 2 x Adapter (N-M to BNC-F), Attenuator (10 dB), 2 x Cable (BNC) (M-M) (16 in) |
| AC27005 | Battery, Spare |
| AC27001 | Case, Transit |
| AC27006 | Flip Cover |
| AC27009 | Maintenance Manual (CD) |
| AC0820 | Desk Top Stand |
| AC0826 | Tripod |
| AC24006 | Tripod, Dolly, Stand |

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