

Military Communications

3515 Series Portable Radio Communications Test Set



The Aeroflex 3515 is a first-line radio test set designed to verify that portable radios, man-pack radios, vehicle and aircraft radios are mission ready.

Does my radio meet mission requirements?

Will your radio work when you are far away from base? Does the microphone and speaker provide undistorted, clear audio? Will you be understood?

The Aeroflex 3515 Test Set can answer these questions and more. The Aeroflex 3515 includes the instruments and features needed to solve field testing problems for modern military radios, including digital radios.

Features and Functions

- *Reduces "No Fault Found"* - find broken components and faulty installations at the source, reducing warranty repair cost and minimizing down time.
- *Designed for field use* - the 3515 weighs less than 8 pounds, is battery operated and meets MIL-PRF-28800F, Class II environmental specifications.
- *Test radios over-the-air* - verifies the transmitter, receiver, antenna, microphone and speakers are mission ready - fast and unobtrusive, no need to "break open" a vehicle or aircraft to test it, eliminating test-induced failures.
- *Automated test applications* (optional) - automated test applications can guide novice

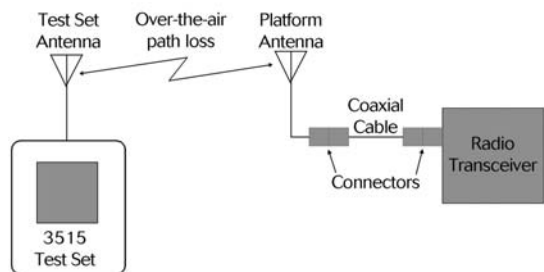
users through the radio test process step-by-step, even providing "how-to" instructions on setting up the radio. A test script may also store vehicle/aircraft inventory, test results or other important information.

- *Full-Featured Radio Test Set* - the 3515 includes the radio instruments and testing functions needed for testing antennas, coax cables, transmitters, receivers and audio systems.
- *Powerful and Expandable* - optional capabilities include automated test applications, a spectrum analyzer for signal monitoring and an oscilloscope for audio signal analysis.
- *Reduces your test equipment footprint* - the compact and portable 3515 will reduce the test equipment inventory required in the field. Standard instruments included in the 3515:

| | |
|---------------------|------------------------|
| RF Signal Generator | SINAD/Distortion Meter |
| RF Receiver | Audio Generators |
| Modulation Meters | RF Power Meters |



The 3515 tests the radio in its normal operation mode without having to disconnect any radio components to take measurements. The 3515 acts as an external radio and tests through your radios' antenna to perform a complete system operation check. The 3515 provides detailed and accurate measurements of critical parameters such as transmit power, frequency error, modulation and receiver sensitivity



to ensure peak radio operation throughout the mission.

Previous generation field testers, such as through-line watt meters and others, require opening the system and “breaking” connections within the radio signal path to insert the tester. This invasive activity requires extra time, causes disruption to deployment activities and is a source for test-induced failures.

What about digital radios?

Aeroflex understands that in today’s military, digital communications are just as important as voice communications. The 3515 verifies digital radios over-the-air and non-intrusively. The 3515 supports EPLRS, SADL and P25 radios.

Military Radios Systems and Platforms

Below is a partial list of radio systems and models that may be tested with the 3515 Series equipment. Some tests require optional testing application scripts and/or accessories.

| Radio Systems | In Vehicle Test | In Aircraft Test | Manual Test | Antenna/Coax Test |
|------------------------------------|-----------------|------------------|-------------|-------------------|
| VHF Ground COMMS (SINGARS, others) | X | X | X | X |
| VHF Airborne COMMS | - | X | X | X |
| UHF Airborne COMMS | - | X | X | X |
| UHF SATCOM/SLOS/BLOS | X | X | X | X |
| EPLRS/SADL | X | X | X | X |
| Public Safety/APCO-P25 | X | X | X | X |
| Conventional AM/FM COMMS | X | X | X | X |
| Audio and Intercom | X | X | X | - |
| Force Protection | X | - | X | X |
| Life Support | X | X | X | X |

| Ground Radio Models | OTA Test | Troubleshooting | Manual Test | Antenna/Coax Test |
|---------------------|----------|-----------------|-------------|-------------------|
| RT-1523() | X | X | X | X |
| PRC-117F | X | X | X | X |
| PRC-148 | X | X | X | X |
| PRC-150 | X | X | X | X |
| PRC-152 | X | X | X | X |
| VRC-103 | X | X | X | X |
| VRC-110 | X | X | X | X |

| Airborne Radio Models | OTA Test | Troubleshooting | Manual Test | Antenna/Coax Test |
|-----------------------|----------|-----------------|-------------|-------------------|
| ARC-164 | X | X | X | X |
| ARC-186 | X | X | X | X |
| ARC-190 | X | X | X | X |
| ARC-201 | X | X | X | X |
| ARC-210 | X | X | X | X |
| ARC-222 | X | X | X | X |
| ARC-231 | X | X | X | X |

| Data Radio Models | OTA Test | Troubleshooting | Manual Test | Antenna/Coax Test |
|-----------------------|----------|-----------------|-------------|-------------------|
| RT-1720G (EPLRS/SADL) | X | X | X | X |
| RT-1922 (EPLRS/SADL) | X | X | X | X |

Easy to Use - Powerful Test Capabilities

As shown below from actual screen displays, the 3515 provides an easy to use human interface and powerful radio testing capabilities, including application scripts that reduce or eliminate the learning curve. All the instructions for a test may be put into the application and the test results can be saved for documentation, data collection and analysis.

Duplex Screen showing VHF FM radio test

| | | |
|-----------------------------|----------------|----------------------|
| DUPLX TEST | | |
| Generator On | Receiver More | |
| MHz: 55.525000 | MHz: 55.525000 | Mod-FM Dev 8.110 kHz |
| Port: Ant | Port: Ant | |
| Level: -50 dBm | Mod: FM 25k | |
| Ext Attn dB: 0 | AFBW: None | |
| Modulator | Freq FM Group | RSSI |
| Gen 1: On 900.0 Hz 5.00 kHz | | -48.41 dBm |
| Gen 2: On 150.0 Hz 3.50 kHz | | |
| MIC: Off | 2.50 kHz | |
| Ext Aud: Off | Load: High Z | |
| Volume: 100 | Analyzer | RF Error -0.064 kHz |
| Squelch: -80 dBm | | |
| Speaker: Demod | | |
| AudOut: Demod | | |
| Save Recall | | |

Duplex Screen showing a P25 radio test

| | | |
|-------------------|-----------------|-------------------|
| DUPLX TEST | | |
| Generator On | Receiver More | P25 Demod More |
| MHz: 803.775000 | MHz: 803.775000 | BER 9.7222 |
| Port: T/R | Port: Ant | Freq Err -71.24 |
| Level: -110 dBm | Mod: P25 | Mod Fldly 20.34 |
| Ext Attn dB: 0 | | Deviation 1732.70 |
| Modulator | P25 Group | RSSI |
| Pattern: 1011 | | ... |
| NAC: 293 | | |
| Volume: 100 | Analyzer | Mod-FM Dev |
| Squelch: -80 dBm | | ... |
| Speaker: Audio In | | |
| AudOut: Audio In | | |
| Save Recall | | |

Ant-Cable Test showing a VSWR sweep of a 30 to 60 MHz antenna

| | |
|-----------------------|------------------------|
| ANT-CABLE TEST | |
| 2010-05-10 05:43:10 | |
| | |
| Marker: 1 On Delta: 1 | Pos: 26.67 Delta: 0.00 |
| Move Left Right | VSWR 3.20 Delta: 0.00 |

Ant-Cable Test showing a distance measurement of a 27 foot coax

| | |
|-----------------------|------------------------|
| ANT-CABLE TEST | |
| 2010-05-10 05:43:10 | |
| | |
| Marker: 1 On Delta: 1 | Pos: 27.17 Delta: 0.00 |
| Max Left Right | dB -13.80 Delta: 0.00 |

Audio Test showing a typical stimulus and response of an audio intercom

| | |
|----------------------------|----------------------------|
| AF GEN | |
| 2010-05-10 05:43:10 | |
| Function Generator | SINAD Audio In 12.3 dB |
| #1: On 1000.0 Hz 1.00 Vrms | |
| #2: On 2400.0 Hz 0.25 Vrms | |
| | |
| Distortion Audio In 24.3 % | |
| Volume: 0 | AF Cntr Audio In 1001.0 Hz |
| Squelch: -50 dBm | |
| Speaker: Audio In | 1.223 V |
| AudOut: Fgen | |
| Save Recall | |

Spectrum Analyzer monitoring over the air showing multiple transmitters

| | |
|-------------------------|------------------------|
| ANALYZER | |
| 2010-05-10 05:43:10 | |
| | |
| Freq (MHz): 96.300000 | Span: 5MHz |
| Start (MHz): 160.000000 | Stop (MHz): 180.000000 |

Tracking Generator display of a band-pass filter

| | |
|-------------------------|------------------------|
| TRACKING GENERATOR | |
| 2010-05-10 05:43:10 | |
| | |
| Freq (MHz): 170.000000 | Span (MHz): 20 MHz |
| Start (MHz): 160.000000 | Stop (MHz): 180.000000 |

Script applications provide extended test capabilities for specific model of radio of specific vehicle or aircraft

| | |
|--|--|
| 3515A | |
| 1 - PRM-34 Test | |
| 2 - PRM-34 Quick Test | |
| 3 - PRC-117F (RT-1796) Radio Test | |
| 4 - PRC-148 Radio Test | |
| 5 - PRC-150 (RT-1694) Radio Test | |
| 6 - VRC-103 (RT-1796 w/VAU) Radio Test | |
| 7 - A-10 Test | |
| 8 - A-10 Troubleshooting Test | |

SELECTED SPECIFICATIONS

(For complete specifications, refer to the Operation Manual)

RF SIGNAL GENERATOR

FREQUENCY

2 MHz to 1 GHz

OUTPUT LEVEL

T/R port: -50 to -120 dBm

ANT port: -30 to -90 dBm

SWR port: -5 to -65 dBm

FM DEVIATION

Internal Sources Off, 0 Hz to 100 kHz

External FM Inputs AUDIO GEN, MIC IN, AUDIO IN

AFGEN 1 AND AFGEN 2

Range

0.0 Hz to 20.0 kHz

RF RECEIVER

FREQUENCY

Range

2 MHz to 1 GHz

INPUT AMPLITUDE

Minimum Input Level, Audio Sensitivity

T/R: typical, 10 dB SINAD -70 dBm

ANT: typical 10 dB SINAD (-110 dBm with preamp)

Maximum Input Level

T/R: +43 dBm

ANT: +20 dBm for 10 seconds

RF FREQUENCY ERROR METER

Range

±200 kHz

RSSI INDICATOR

Display Range

dBm: -120 dBm to +43 dBm (+53 dBm with Ext Attn)

Watts: 10 pW to 20 W (200 W with Ext Attn)

RF POWER METER

Display Range

Ext Attn, 0 dBm: 0 to 43 dBm (0 to 20 W)

Ext Attn, 20 dBm: 0 to 53 dBm (0 to 200 W)

Maximum Input Level

No external attenuator:

20 W/43 dBm for 10 minutes at +25°C or until thermal alarm

FM DEVIATION METER

Display Range

0 Hz to ±100 kHz

AM PERCENT METER

Display Range

0% to 100%

ANTENNA/CABLE TEST

Frequency Range

2.0 MHz to 1000.0 MHz

VSWR Range

1.00 to 7.00

RETURN LOSS Range

0.0 to -50.0 dB

CABLE LOSS Range

0.0 to -50.0 dB

Distance to Fault Range

3 ft to >300 ft

AUDIO METERS

AUDIO INPUT (EXT AUDIN)

Source

BNC

Frequency Range

300 Hz to 10 kHz

Level Range

0.2 Vp-p to 5 Vp-p

SINAD METER

Sources

AUDIO IN, DEMOD

Display Range

0 to 40 dB

DISTORTION METER

Sources

AUDION IN, DEMOD

Display Range

0 to 100%

AUDIO FREQUENCY COUNTER

Range

15 Hz to 20 kHz

AUDIO FREQUENCY LEVEL METER

Sources

AUDIO IN, DVM

Input Level

Audio In 10 mV rms to 30 V rms

DVM 10 mV rms to 30 V rms

SPECTRUM ANALYZER

FREQUENCY

Range

2 MHz to 1 GHz

Span

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

Vertical scales

2, 5, 10, 15, and 20 dB/division

EFFECTIVE RBW**Range**

20 Hz to 25 kHz

Displayed Average Noise Level (DANL)

-120 dBm (Typical, 10 kHz span)
-136 dBm with pre-amp enabled

OSCILLOSCOPE

Source

DVM, Audio In, Demod

Display Level

-50 to +50 V

Horizontal

0.5 ms/div to 0.1 sec/div1

Vertical

10 mV to 10 V per div

TIMEBASE (STANDARD)

Temperature Stability

±0.5 ppm over temp range

Aging

1 ppm/year

Warm-up time

3 min.

TIMEBASE (OPTION 03)

Temperature Stability

±0.15 ppm

Aging

±500 ppb (year 1)
±300 ppb/year (after year 1)

Warm-up time

5 min.

ENVIROMENTAL/PHYSICAL

Overall Dimensions

9.1 in. x 11.2 in. x 2.8 in.

Weight

less than 8 lbs. (3515 unit)
12 lbs. (accessories, unit and soft bag)

Temperature

Storage: -51°C to +71°C storage
Operation: -20°C to +50°C

MIL-PRF-28800F CLASS 2 for the following

Humidity, Altitude, Shock, Vibration, Bench Handling, 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

UL61010-1
Installation Category II
Pollution degree 2

CONFIGURATION, EQUIPMENT, OPTIONS, ACCESSORIES, WARRANTY

When ordering please quote the full ordering number information.

The 3515 Series Test Sets are available in several configurations. These different configurations have been made to support customer usage and/or contractual items. Contact Aeroflex if you have questions regarding items within these configurations.

Included indicates the item is contained within the specified configuration.

Optional indicates the item is not contained within the specified configuration, but may be purchased as an add-on option.

Dash ("-") indicates the item is not contained within the configuration and is not available as an option.

| <u>Configuration</u> | <u>Description</u> |
|----------------------|--|
| 3515A | Military Portable Radio Test Set - General Purpose Configuration |
| 3515AR | Military Portable Radio Test Set - AR Configuration (NSN - 6625015726346) |
| 3515N | Military Portable Radio Test Set - USMC (Navy) Configuration (NSN-6625015380285) |

| Equipment and Accessories | Order Number | 3515A | 3515AR | 3515N | |
|-------------------------------------|--------------|----------|----------|----------|--|
| Test Set, 3515A | 3515A | Included | - | - | |
| Test Set, 3515AR | 3515AR | - | Included | - | |
| Test Set, 3515N | 3515N | - | - | Included | |
| | | | | | |
| Accessories | | | | | |
| Adapter (BNC-F to TNC-M, qty 5) | 23758 | Included | Included | Included | |
| Adapter (N-F to BNC-F) | 23770 | Included | Included | Included | |
| Adapter (N-F to BNC-M) | 23769 | Included | Included | Included | |
| Adapter (N-M to BNC-F) | 20327 | Included | Included | Included | |
| Adapter (N-M to TNC-M) | 23762 | Included | Included | Included | |
| Airborne Adapter Kit | 63972 | | | | |
| Adapter, TPS-M to BNC-F | 86064 | | | | |
| Adapter, TPS-F to BNC-M | 86065 | | | | |
| Adapter, BNC-F to BNC-F | 86066 | | | | |
| Adapter, HN to HF | 86067 | Optional | Optional | Optional | |
| Adapter, TNC-M to TNC-M | 86068 | | | | |
| Adapter, TNC-F to TNC-F | 86069 | | | | |
| Cable, ICS to Audio | 85893 | | | | |
| Cable, H-250 to ICS | 85892 | | | | |
| Antenna (BNC) (2 to 30 MHz) | 9138 | Included | Included | Included | |
| Antenna (BNC) (450 MHz) | 9147 | Included | Included | Included | |
| Antenna (TNC) (30 to 90 MHz) | 9151 | Included | Included | Included | |
| Antenna (TNC, 30 to 512 MHz, Flex) | 88336 | Optional | Optional | Optional | |
| Antenna (TNC, 30 to 512 MHz, 13") | 89173 | Optional | Optional | Optional | |
| Antenna (TNC, 100 to 1000 MHz, 12") | 89174 | Optional | Optional | Optional | |
| Attenuator (20 dB/150 W) | 38242 | Included | Included | Included | |
| Attenuator (20 dB/50 W) | 38240 | Included | Included | Included | |
| Battery, Spare | 67067 | Optional | Optional | Optional | |
| BER Test Cable | 62408 | - | - | Included | |

| Equipment and Accessories | Order Number | 3515A | 3515AR | 3515N | |
|--|--------------|----------|----------|----------|--|
| Cable (BNC) (M-M) (48 in, qty 2) | 62368 | Included | Included | Included | |
| Cable (TNC) (M-M) (48 in) | 62398 | Included | Included | Included | |
| Case, Accessory | 5762 | Included | Included | Included | |
| Case, Soft-Sided Carrying | 10192 | Included | Included | Included | |
| Case, Transit | 10242 | Optional | Optional | Optional | |
| Comm Breakout Box | 64598 | Included | Included | Included | |
| Desktop, Stand | 63656 | Optional | Optional | Optional | |
| Directional Coupler Kit (20 - 200 MHz) | 63964 | Optional | Optional | Optional | |
| External DC Power Supply | 67374 | Included | Included | Included | |
| Flash Drive, USB | 37327 | Included | Included | Included | |
| Flip Cover | 63966 | Optional | Included | Optional | |
| Fuse (5 A, 32 Vdc, Type F, qty 2) | 56080 | Included | Included | Included | |
| Handset (Speaker/Mic) | 64606 | Included | Included | Optional | |
| Manual, Getting Started 3515A (Paper) | 6112 | Included | - | - | |
| Manual, Maintenance 3515A (CD) | 6113 | Optional | - | - | |
| Manual, Operation/ICW 3515A (CD) | 6110 | Included | - | - | |
| Manual, Getting Started 3515AR (Paper) | 6134 | - | Included | - | |
| Manual, Maintenance 3515AR (CD) | 6133 | - | Optional | - | |
| Manual, Operation/ICW 3515AR (CD) | 6132 | - | Included | - | |
| Manual, Getting Started 3515N (Paper) | 6126 | - | - | Included | |
| Manual, Maintenance 3515N (CD) | 6118 | - | - | Optional | |
| Manual, Operation/ICW 3515N (CD) | 6114 | - | - | Included | |
| Power Cable (DC NATO) | 62406 | Included | Included | Included | |
| Power Cables (AC, 3-wire leads) | 27516 | Included | Included | Optional | |
| Power Cables (AC, Cont. Europe) | 27480 | Included | Included | Optional | |
| Power Cables (AC, N. America) | 27478 | Included | Included | Included | |
| Power Cables (AC, UK) | 27477 | Included | Included | Optional | |
| Short-Open-Lead Calibrator | 38245 | Included | Included | Included | |
| Tripod | 67474 | | | | |
| Dolly | 6361 | Optional | Optional | Optional | |
| Stand | 63659 | | | | |
| USMC Documentation | - | - | - | Included | |
| USMC Labeling | - | - | - | Included | |
| Site Survey Software | 63927 | Optional | Optional | Optional | |



For the very latest specifications visit www.aeroflex.com

| Software Options and Accessories | Order Number | 3515A | 3515AR | 3515N | |
|--|--------------|----------|----------|----------|--|
| Spectrum Analyzer | 35XXOPT01 | Optional | Included | Optional | |
| Oscilloscope | 35XXOPT02 | Optional | Included | Optional | |
| High Stability Oscillator | 3515OPT03 | Optional | Optional | Optional | |
| BER Test | 35XXOPT04 | Optional | Optional | Included | |
| Script Language (includes training info) | 3515OPT05 | Optional | Included | Optional | |
| P25 Test | 35XXOPT07 | Optional | Optional | Optional | |
| Tracking Generator | 35XXOPT08 | Optional | Optional | Optional | |
| DPMR Test | 35XXOPT09 | Optional | Optional | Optional | |
| ARIB T-98 Test | 35XXOPT10 | Optional | Optional | Optional | |
| AR Test System | 3515AROPT24 | Optional | Included | Optional | |
| PRM-34 Application | 3515OPT25 | Optional | Included | Optional | |
| VRC-103 Application | 3515OPT26 | Optional | Optional | Optional | |
| PRC-117F Application | 3515OPT27 | Optional | Optional | Optional | |
| PRC-148 Application | 3515OPT28 | Optional | Optional | Optional | |
| PRC-150 Application | 3515OPT29 | Optional | Optional | Optional | |
| PRC-152 Application | 3515OPT30 | Optional | Optional | Optional | |
| NXDN Test | 35XXOPT33 | Optional | Optional | Optional | |
| DMR Test | 35XXOPT34 | Optional | Optional | Optional | |
| EPLRS/SADL Application | 3515OPT36 | Optional | Included | Optional | |
| A-10 Aircraft Application | 3515OPT37 | Optional | Optional | Optional | |
| Spectrum Monitor | 35XXOPT45 | Optional | Optional | Optional | |
| Warranty | | | | | |
| Standard Warranty, 24 months | - | Included | Included | Included | |
| Extended Warranty, 36 mo w/o cal | 84345 | Optional | Optional | Optional | |
| Extended Warranty, 60 mo w/o cal | 84347 | Optional | Optional | Optional | |
| Extended Warranty, 36 mo with cal | 84346 | Optional | Optional | Optional | |
| Extended Warranty, 60 mo with cal | 84348 | Optional | Optional | Optional | |

EXPORT CONTROL:

This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

EXPORT WARNING:

Aeroflex's military products are controlled for export under the International Traffic in Arms Regulations (ITAR) and may not be sold or proposed or offered for sale to certain countries including: Belarus, Burma, China, Cuba, Haiti, Iran, Liberia, Libya, North Korea, Somalia, Syria, Sudan, and Vietnam. See ITAR 126.1 for complete information.

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.