

Military Communications

3515 Series Portable Radio Communications Test Set

AEROFLEX
A passion for performance.



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

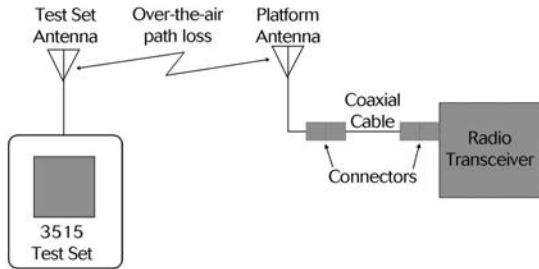
Modulation Meters

RF Power Meters



For the very latest specifications visit www.aeroflex.com

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 (SINCGARS, 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.

3515A

- 1 - DUPLEX TEST
- 2 - RECEIVER TEST
- 3 - TRANSMITTER TEST
- 4 - ANT-CABLE TEST
- 5 - AUDIO
- 6 - ANALYZER
- 7 - OSCILLOSCOPE
- 8 - TRACK GEN

Scripts Meters System Selftest Util

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
Gen 1: On	900.0 Hz	5.00 kHz
Gen 2: On	150.0 Hz	3.50 kHz
MIC: Off		2.50 kHz
Ext Aud: Off	Load: High Z	
Volume: 100		RSSI -48.41 dBm
Squelch: -80 dBm	Analyzer	RF Error -0.064 kHz
Speaker: Demod		
AudOut: Demod		
Save Recall		
Edit	Return	Hold Setup Ptt off

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
Pattem: 1011		...
NAC: 293		
Volume: 100		
Squelch: -80 dBm	Analyzer	Mod-FM Dev
Speaker: Audio In		...
AudOut: Audio In		
Save Recall		
Edit	Return	Hold Setup Ptt off

Ant-Cable Test showing a VSWR sweep of a 30 to 90 MHz antenna

ANT-CABLE TEST	
2010-05-10 05:43:10	
S/WR	
Marker: 1 On Delta: 1	Pos: 26.67 Delta: 0.00
Move Left Right	VSWR 3.20 Delta: 0.00
Edit	Return Hold Cal Scale

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

ANT-CABLE TEST	
2010-05-10 05:43:10	
dB	
Marker: 1 On Delta: 1	Pos: 27.17 Delta: 0.00
Max Left Right	dB -13.80 Delta: 0.00
Edit	Return Hold Cal Cable

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Scripts Meters System Selftest Util

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

AF GEN			
Function Generator	Freq	Level	SINAD Audio In
#1: On	1000.0 Hz	1.00 Vrms	12.3 dB
#2: On	2400.0 Hz	0.25 Vrms	
	AF Scope Audio In		Distortion Audio In
			24.3 %
Volume: 0	Audio Lvl Audio In	AF Cntr Audio In	
Squelch: -50 dBm	1.223 V	1001.0 Hz	
Speaker: Audio In			
AudOut: Fgen			
Save Recall			
Edit	Return	Hold	Setup

Spectrum Analyzer monitoring over the air showing multiple transmitters

ANALYZER		
2010-05-10 05:43:10		
RBW(Hz) 3244		
dBm		
Pbw(dBm) -71.281	Preamp Off	
93.8	98.8	
Freq (MHz): 96.300000	Span: 5MHz	Port: Ant
Preamp: Off	Ref Lvl: -60.0	Vscale: 10
Edit	Return	Hold Norm Marker

Tracking Generator display of a band-pass filter

TRACKING GENERATOR	
2010-05-10 05:43:10	
dB	
160.0	180.0
Freq (MHz): 170.000000	Span (MHz): 20 MHz
Start (MHz): 160.000000	Stop (MHz): 180.000000
Edit	Return Hold Marker

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- 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

System

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

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.

ENVIRONMENTAL/PHYSICAL

Overall Dimensions

9.1 in. x 11.2 in. x 2.8 in.

Weight

less than 8 lbs. (3515 unit)

Temperature

Storage: -51°C to +71°C storage

External DC 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 instrument¹)

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

¹ - Consider the use of the instrument for thermal operating temperature. All thermal ratings are dependent upon applied RF power. The 3515 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 3515 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.

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>
3515AR	Military Portable Radio Test Set - AR Configuration (NSN - 6625015726346)
3515N	Military Portable Radio Test Set - USMC (Navy) Configuration (NSN-6625015380285)
3515ARM	Military Portable Radio Test Set - ARM Configuration

Equipment and Accessories	Order Number	3515AR	3515N	3515ARM
Test Set, 3515AR	3515AR	Included	-	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	Optional	Optional	Included
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			
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	Included (Qty. 2)
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	67076	Optional	Optional	Optional
BER Test Cable	62408	-	Included	Optional

Equipment and Accessories	Order Number	3515AR	3515N	3515ARM
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	-
Case, Transit (Pelican)	91600	Optional	Optional	Included
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	Included	Optional	Included
Fuse (5 A, 32 Vdc, Type F, qty 2)	56080	Included	Included	Included
Handset (Speaker/Mic)	64606	Included	Optional	Included
Manual, Getting Started 3515AR	6134	Included	-	Included
Manual, Maintenance 3515AR (CD)	6133	Optional	-	Optional
Manual, Operation/ICW 3515AR (CD)	6132	Included	-	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	-
Power Cables (AC, 3-wire leads)	27516	Included	Optional	-
Power Cables (AC, Cont. Europe)	27480	Included	Optional	-
Power Cables (AC, N. America)	27478	Included	Included	-
Power Cables (AC, UK)	27477	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
Power Cable (AC)	62302	-	-	Included

3515AR



3515ARM



Software Options and Accessories	Order Number	3515AR	3515N	3515ARM
Spectrum Analyzer	35XXOPT01	Included	Optional	Included
Oscilloscope	35XXOPT02	Included	Optional	Included
High Stability Oscillator	3515OPT03	Optional	Optional	Optional
BER Test	35XXOPT04	Optional	Included	Optional
Script Language (includes training info)	3515OPT05	Included	Optional	Included
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	Included	Optional	Included
PRM-34 Application	3515OPT25	Included	Optional	Included
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	Included	Optional	Included
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.