

2946A Avionics Communications Service Monitor

Communication and ramp testing of military and commercial aircraft in one instrument



- **Comprehensive Radio Communication Test Set**
- **Full span spectrum analyzer with offset tracking generator**
- **Avionics modes for ILS, VOR, marker beacons and SELCAL**
- **Displays in avionics terms: SDM, DDM, Bearing and TO and FROM**
- **Extensive pre-sets for avionics functions DDM and Bearing**
- **Auto-increment of VOR Bearing for aircraft display testing**
- **DC operation from aircraft power supplies or internal batteries**
- **Avionics testing in both Direct and 'Off Air' configurations**

IFR is a leader in the design, manufacture and marketing of Avionics test systems.

The 2946A Communications Service Monitor is the lightest, most rugged service monitor available with a full performance spectrum analyzer as standard. For field work, the 2946A provides an excellent combination of instruments for all types of maintenance work. In the workshop, it provides all of the performance you would expect for exacting measurements.

[Avionics Systems Test Facility](#)

The 2946A provides an impressive range of features for the aircraft and avionics maintenance industry.

In addition to the features provided by the general purpose 2945A, the dedicated 2946A Avionics Communications Service Monitor provides signals for testing the following: ILS receivers for localizer, including identification, glidescope and markers; VOR beacon receivers, with identification; SELCAL

selective calling receivers.

The 2946A screen gives a representation of the aircraft's display in each mode, with the effective test signal parameters clearly indicated both diagrammatically and numerically. Parameters can be altered in steps or continuously.

Field Operation

At under 12 kg (26 lbs.), the 2946A lightens the load to remote sites. The shape of the 2946A is ideal for carrying. The side handle ensures that the instrument is clear of the stairs when ascending buildings and the depth is suitable for the 2946A to be operated comfortably when placed on the floor. An optional bail arm is also available. This option allows a stowage cover to be fitted over the front panel for storage of adapters and further protection to the instrument's front panel. Full operation is possible from the protective "ever-ready" case so that your investment is protected from transit damage.

Battery - carry a spare

The battery fits neatly into the "ever-ready" case and is easily replaced with a spare when discharged. There is no memory effect associated with the battery, even when partially discharged.

Fast Warm Up - fast results

The standard TCXO allows results to be made reliably within a minute of switch-on. (Where even better stability is required, an optional OCXO is available.)

Stored settings may be recalled from internal memory or from a memory card, allowing fast and straightforward setup.

Accurate RF Signals

The signal generator provides coverage from 400 kHz to 1.05 GHz with +5 dBm output (+7 dBm overrange) and fast switching speed. Level accuracy is ± 2 dB at all levels above -127 dBm.

Duplex - provided as standard

Full duplex operation is provided by the 2946A. This allows testing of duplex radios as well as simultaneous testing of repeater transmit and receive paths. There are no restrictions to the duplex offset.

Cellular and Trunking - built in

AMPS, TACS and NMT analog cellular standards are available internally, with all country variants provided in each package. MPT 1327/1343 trunking system and variants of it are also available.

A new trunking capability has been added with the introduction of EDACS Radio and Repeater test capability.

Remote control of the inbuilt tests is provided, so that measurements can be started and results logged automatically.

Network Simulation

The 2946A simulates the signaling protocol that the radio would see from the real network. This allows calls to be set up and handled enabling receiver and transmitter parametric measurements to be made.

Fast Full Performance Spectrum Analyzer - provided as standard

The spectrum analyzer provides spans from 100 Hz per division to full span and also has a fully adjustable reference level. Speed is comparable with analog analyzers, allowing real time adjustments over a full 80 dB dynamic range. With the tracking generator provided as standard, duplexers and filters can be aligned quickly and easily. An offset facility provides testing of equipment with frequency translation. Channel stepping can be performed by defining an increment and then using the FREQ $\square\square$ keys. This is particularly useful when testing multi-channel systems.

Live Look and Listen

This feature puts the 2946A above all of its peers with the ability to examine signals on the screen and demodulate them simultaneously. Intermittent interference can be isolated quickly and the signals then easily identified. The trace can be saved to memory card along with the time and date, providing factual evidence that can be recalled later. This feature is particularly useful when looking for rogue transmissions, especially on busy base station sites.

From 2 μ V to 150 W

The 2946A measures the power of low level signals such as those encountered when monitoring off-air signals or those found when probing a circuit. 150 W measurement is provided without the need for external attenuators, so high power base stations can be measured directly. Measurement accuracy of better than 10% is guaranteed all the way down to 5 mW on the N-Type connector, allowing cellular radios to be qualified at low power levels.

Remote Control - RS-232 or GPIB

Remote control is provided with an RS-232 interface as standard. An IEEE488.2 interface (Option 5) can be fitted where other instruments are required to operate in a system with the 2946A.

Printing Made Easy

With the parallel printer port interface, screen dumps, automatic test results or previously stored results may be sent to any parallel printer. These facilities are available as standard using the serial RS-232 interface.

Autorun - internal control

With the (optional) Analog Systems Card fitted, automatic testing without an Ideal external controller is possible. Custom tests may be written and run by the operator. Four programmable relay contacts are provided with the optional parallel printer interface to allow remote control of radios or test fixtures from built-in automatic tests.

Custom Programs

Users may program the instrument to suit their own specific needs.

This is possible either by configuring any of the 4 built-in programs or by using the MIBASIC interpreter to produce a customized test program that can be executed internally, without an external controller.

Memory Card - with real time clock

The Memory Card Drive meets the PCMCIA standard format for PC cards. The 2945A provides a DOS based filing system that allows transfer of information to a PC fitted with a memory card slot. Test setups, test results, screen dumps, spectrum analyzer coordinates and test sequences can all be stored on the memory card, allowing information to be easily stored and retrieved when required.

Reliability

The 2946A features high integration and a rugged chassis design to maximize mechanical protection.

Audio Analysis

A comprehensive range of filters are provided as standard, including bandpass, low-pass and high-pass. Optional filters are available for psophometric weighting of audio signals and demodulation of signals in a simulated radio channel bandwidth.

The direct measurement of CTCSS is possible with the 300 Hz LP filter, even with speech present. Two comprehensive audio generators are provided as standard for internal modulation or audio sources for transmitter stimulus. External DC coupled FM is provided.

Comprehensive Oscilloscope

Analysis of audio signals, whether from the demodulated signal or the audio input direct, can be viewed for further inspection. The oscilloscope can either be combined with the measurement screen in the Tx, Rx or AF test modes or 'zoomed' to a full screen display. Different levels of persistence can be selected to allow short or long term effects to be captured.

Transient Analysis

The ability to capture transients on the rising or falling edge of a waveform provides a valuable tool for fault finding radios and radio systems. The user has full control of the trigger level and input attenuation as well as the timebase and five fixed trigger points, making this feature simple and flexible to operate.

Harmonic Analysis

An automatic harmonic analysis function is included in the 2946A. This complements the fast spectrum analyzer and allows a rapid check that the transmitter is not producing any large harmonics.

Tones Generation and Decoding

The tones menus now include full remote control so that radio workshops can further automate their tasks. These and other improvements are in response to user feedback and allow better control of the tones from the top level screens.

POCSAG Decode - built in option

Off-air decoding of POCSAG signals is provided as an option. This allows tone, numeric and alphanumeric signals to be displayed. Signals with bit rates of up to 4800 bits/s can be automatically detected making the 2946A an ideal surveillance tool. The 2946A can be set to detect all messages, a user selectable RIC (just like a Pager) or a fixed message string.

Specification

Avionics Systems

The Avionics feature provides amplitude modulated signals suitable for testing of Instrument Landing Systems (ILS) and VHF Omnidirectional Radio Range (VOR) receivers.

ILS MODE

Sum of Depth of Modulation (SDM)

0% to 90% glideslope, 0% to 50% localizer in 0.1% steps representing the arithmetic sum of each tone depth

Selection

Keyboard entry

Accuracy of SDM

±5% of setting for carrier frequencies up to 400 MHz

Difference of Depth of Modulation (DDM)

0% to 45% glideslope, 0% to 25% localiser in 0.1% steps limited by SDM

Selection

Keyboard entry and variation of rotary control

Localiser Presets

0%, 4.6%, 9.3% and 15.5% DDM

Data Entry

By table selection of 2 pairs of characters labeled 'A' to 'S'

Timing

1 s tone duration, 250 ms gap

MARKER BEACON MODE

Provides default modulation of 95% AM depth on a 75 MHz carrier at the rate of 400 Hz (outer beacon), 1.3 kHz (middle beacon) or 3 kHz (inner beacon). AM depth, carrier frequency and modulation frequencies can be changed from default values.

RF Signal Generator

FREQUENCY

Frequency Range

400 kHz to 1.05 GHz

Resolution

10 Hz

Indication

10 digit display

Setting

Keyboard entry, delta increment/decrement function and rotary control

Accuracy

As frequency standard

OUTPUT LEVEL

Output Level Range

Rx Test:

N-Type socket: -141 to -21 dBm

BNC socket: -115 to +5 dBm (overrange to +7 dBm)

Glideslope Presets

0%, 4.5%, 9.1% and 17.5% DDM

Accuracy of DDM

0.001 DDM (20% depth) at 0 dBm

Tone Frequencies

90 Hz and 150 Hz (either tone can be suppressed)

Additional Modulation

1020 Hz ident signal available on 0 DDM on ILS from an internal modulation source

VOR MODE

9.96 kHz Sub-Carrier Range

0.0% - 99.0% in 0.1% steps

Modulation

FM by a 30 Hz tone with 480 Hz deviation

30 Hz Tone Range

0.0% to 99.0% in 0.1% steps

Bearing Control

Relative phase of the 30 Hz tone and sub-carrier modulation adjustable from 0 to 360° in 0.1° steps by entering VOR bearing.

Bearing can be entered as TO or FROM the beacon.

Automatic VOR Test

Bearing automatically increments in 0.1° steps

Bearing Accuracy

±0.5°

Additional Modulation

Ident signal (1020 Hz) available on 0° bearing from an internal Source

SELCAL MODE

Provides amplitude modulation with SELCAL tones

Overload indicated by audible and visual warning.

BNC: 5 W Overload indicated by audible and visual warning.

Resolution

0.1 dB

Indication

4 digits plus sign (dBm, dBμV, μV, mV PD/EMF)

Accuracy

±2 dB for level above -127 dBm on N-Type socket up to 1 GHz

Reverse Power Protection

N-Type: 50 W continuous, normal operation. 150 W for 1 minute at 20°C

Output Impedance

Nominally 50 Λ

VSWR

N-Type

Better than 1.2:1 up to 500 MHz

Better than 1.35:1 up to 1.05 GHz

BNC

Better than 2.2:1 up to 1.05 GHz

SPECTRAL PURITY

(If you require even better spectral purity than that specified here, please consider the 2948.)

Residual FM

<15 Hz RMS (0.3 to 3.4 kHz) up to 500 MHz

<20 Hz RMS (0.3 to 3.4 kHz) up to 1.0 GHz (with OCXO)

Harmonics

Better than -20 dBc

Spurious Signals

Better than -30 dBc (± 10 kHz to 1.5 MHz offset from carrier frequency or over range 600 to 700 MHz).

Better than -40 dBc from 400 kHz to 1 GHz.

SSB Phase Noise (20 kHz offset)

Better than -95 dBc/Hz up to 1 GHz

RF Carrier Leakage

Less than 0.5 μ V PD generated in a 50 Λ load by a 2 turn loop 25 mm from the case. Output level <-40 dBm into a sealed 50 Λ load.

AMPLITUDE MODULATION - INTERNAL

Frequency Range

400 kHz to 1.05 GHz

AM Depth Range

0% to 99%

Resolution

1%

Indication

2 digits

Setting

Keyboard entry, delta increment / decrement function and rotary control

Accuracy

For carrier frequencies from 1.5 to 400 MHz

$\pm 7\% \pm 1$ digit for modulation frequency of 1 kHz

$\pm 10\% \pm 1$ digit for modulation frequencies from 50 Hz to 5 kHz

$\pm 15\% \pm 1$ digit for modulation frequencies from 50 Hz to 15 kHz

Distortion

<2% at 1 kHz for 30% AM, CCITT weighted

Modulation Frequency

20 Hz to 20 kHz

AMPLITUDE MODULATION - EXTERNAL

Input Impedance

Nominally 10 k Λ in parallel with 40 pF

Frequency Range

As internal AM

Modulation Frequency Range

As internal AM

Sensitivity

1 V RMS for 100% AM

FREQUENCY MODULATION - INTERNAL

Frequency Range

400 kHz to 1.05 GHz

Maximum Deviation

75 kHz

Indication

3 digits

Setting

Keyboard entry, delta increment/decrement function and rotary control

Accuracy (1)

$\pm 5\% \pm 10$ Hz at 1 kHz modulating frequency

$\pm 10\%$ at modulating frequencies from 50 Hz to 15 kHz

Distortion

<1% at 1 kHz for deviation of 5 kHz, CCITT weighted

Modulation Frequency Range

20 Hz to 25 kHz

Resolution

25 Hz

Pre-emphasis

750 μ s selectable

FREQUENCY MODULATION - EXTERNAL

Input Impedance

Nominally 10 k Ω in parallel with 40 pF

Frequency Range

As internal FM

Modulation Frequency Range

DC to 100 kHz

Pre-emphasis

750 μ s selectable

Sensitivity

1 V RMS for 0 to 75 kHz deviation

MICROPHONE INPUT

Input Level

2 to 200 mV (AGC levelled)

Input Impedance

Nominally 150 Ω

Press To Talk (PTT)

When using the optional microphone in Tx Test mode, the PTT will switch instrument to Rx Test.

Audio Voltmeter

Input Impedance

Nominally 1 M Ω in parallel with 40 pF

Frequency Range

DC and 20 Hz to 50 kHz

AC only 20 Hz to 50 kHz

Level Ranges

0 to 100 mV to 0 to 100 V RMS in a 1, 3, 10 sequence

Digital readout also in mW (user selectable)

Maximum input voltage

30 VRMS, 50 Vdc

Resolution

1 mV or 1% of reading

Indication

3 digits and bar-chart

Accuracy

$\pm 3\% \pm 3$ mV \pm resolution

Audio Frequency Meter

Frequency Range

20 Hz to 20 kHz

Resolution

0.1 Hz, <10 kHz

1 Hz, at 10 kHz and above

Indication

5 digits

Accuracy

As frequency standard ± 1 digit \pm resolution

Sensitivity

50 mV

Audio Sinad Meter

Frequency

1 kHz

Range

0 to 18 dB and 0 to 50 dB

Resolution

0.1 dB

Indication

3 digits and bar-charts

Accuracy

± 1 dB

Sensitivity

50 mV (100 mV for 40 dB SINAD) reading suppressed if audio voltage is less than 5 mV

Audio Distortion Meter

Frequency

1 kHz

Range

0% to 10%, 0% to 30% and 0% to 100%

Resolution

0.1% distortion

Indication

3 digits and bar-charts

Accuracy

±5% of reading ±0.5% distortion

Sensitivity

50 mV (100 mV for 1% distortion) reading suppressed if audio voltage is less than 5 mV

Audio S/N Meter

Range

0 to 30 dB and 0 to 100 dB

Resolution

0.1 dB

Indication

3 digits and bar-chart

Accuracy

±1 dB

Sensitivity

50 mV (100 mV for 40 dB S/N) reading suppressed if audio voltage is less than 5 mV

Audio Oscilloscope

Operating Modes

Single repetitive sweep

Frequency Range

DC to 50 kHz, 3 Hz to 50 kHz AC coupled

Voltage Range

10 mV to 20 V per division in a 1, 2, 5 sequence

Voltage Accuracy

±5% of full scale

FM Ranges

±75, 30, 15, 6, 3 and 1.5 kHz deviation full scale, ±10% accuracy

AM Ranges

20, 10 and 5% per division, ±10% accuracy

Timebase

50 ns/div to 5 s/div in a 1, 2, 5 sequence

Graticule

10 Horizontal by 6 Vertical divisions

Special Features

Built in anti-aliasing circuitry

Audio Bar-Charts

Bar-Chart Displays

AF Voltage, SINAD, Distortion, S/N

Vertical Resolution

2% of full scale

Ranging

Autoranging, range hold or manual selection

1, 2, 5, sequence with hysteresis

Audio and Modulation Filters

300 Hz, 3 kHz, 15 kHz Low-pass

300 Hz to 3.4 kHz Bandpass

300 Hz High-pass

750 μs de-emphasis

50 kHz LP (No filter selected)

Audio Analyzer General Features

Tones Mode

RF Frequency Meter

Frequency Range

100 kHz to 1.05 GHz (manual tune)

10 MHz to 1 GHz (autotune)

Resolution

1 Hz or 10 Hz, selectable

Indication

Up to 10 digits

Accuracy

As frequency standard \pm resolution

Acquisition Time

Less than 1 s (manual)

Typically 3 s (autotune)

Sensitivity

Autotuned: 5 mW (N-Type)

0.05 mW (Antenna port)

Manual Tuned: -34 dBm (N-Type) -60 dBm (Antenna port)

VSWR

N-Type: Better than 1.2:1 up to 500 MHz

Better than 1.25:1 up to 1.0 GHz

BNC: Better than 3:1 up to 1.0 GHz

RF Power Meter (broadband)

Frequency Range

200 kHz to 1.05 GHz

Dynamic Range

5 mW to 150 W (N-Type)

0.05 to 250 mW (Antenna port)

Indication Units

Watts, dBm or dBW

Indication

3 digits or bar-chart

Resolution

0.1 dB maximum, typically 1%

Accuracy (N-Type)

$\pm 10\%$ \pm resolution up to 1 GHz

Maximum Continuous Rating

N-Type: 50 W at 20°C

Antenna port: 1 W

Intermittent Rating

N-Type: 150 W for limited periods, typically 1 minute at 20°C.

Overload indicated by audible and visual warning.

Harmonic and Transient Analysis

HARMONIC MEASUREMENT

Displays 1st to 5th harmonic of the selected carrier

Maximum Harmonic Frequency

1.05 GHz

Dynamic Range

0 to -60 dBc

TRANSIENT POWER ANALYSIS

Displays power profile against time

Frequency Range

1 to 1050 MHz

Dynamic Range

60 dB below spectrum analyzer reference level

Scale (power)

10 dB/div

Scale (time)

50 μ s/division to 5 s/div

Trigger Level

Adjustable over full dynamic range +ve or -ve trigger selection

Pre-trigger

0%, 25%, 50%, 75% or 100% of displayed period

Modulation Meter

Sensitivity

Autotuned: 5 mW (N-Type)

0.05 mW (Antenna port)

Manual Tuned: -34 dBm (N-Type)

-60 dBm (Antenna port)

Audio & Modulation Filters

300 Hz, 3 kHz, 15 kHz Low-pass

300 Hz to 3.4 kHz Bandpass

300 Hz High-pass

750 μ s de-emphasis

50 kHz LP (No filter selected)

AMPLITUDE MODULATION

Frequency Range

100 kHz to 1.05 GHz

Modulation Frequency Range

10 Hz to 15 kHz

AM Depth Range

0% to 99% (manually tuned)

0% to 90% below 100 MHz

0% to 80% from 100 to 400 MHz

Resolution

1% AM

Indication

2 digits and bar-chart

Accuracy ⁽¹⁾

±5% ±1 digit at 1 kHz

±8.5% ±1 digit from 50 Hz to 10 kHz

Demodulation Distortion ⁽¹⁾

<2%, at 1 kHz and 30% AM (CCITT weighted)

Residual AM

<1% (300 Hz to 3.4 kHz)

Demodulation Output

50 mVp-p for 1% AM

FREQUENCY MODULATION

Frequency Range

100 kHz to 1.05 GHz

Modulation Frequency Range

10 Hz to 15 kHz

Deviation Range

0 to 75 kHz

Resolution

10 Hz below 2 kHz deviation

1% above 2 kHz deviation

Indication

3 digits and bar-chart

Accuracy ⁽¹⁾

±5% ±resolution at 1 kHz modulation frequency

±7.5% ±1 digit for modulation frequencies 50 Hz to 10 kHz

Demodulation Distortion

<2% at 1 and 5 kHz FM (CCITT weighted)

Residual FM

<30 Hz (300 Hz to 3.4 kHz)

Demodulation Output Socket

200 mVp-p ±10% per 1 kHz deviation

RF Spectrum Analyzer

Frequency Range

100 kHz to 1.0 GHz

Spans

1 kHz/div to 100 MHz/div in a 1, 2, 5 sequence or continuously variable

Start - stop facility allows selection of infinitely variable span width

Resolution Bandwidth

300 Hz, 3 kHz, 30 kHz, 300 kHz, 3 MHz

Reference Level (top of screen)

-50 to +52 dBm 0.7 mV to 71 V

On Screen Dynamic Range

80 dB

On Screen Linearity

Typically ±2 dB ±1 resolution (10 dB/div) >10 dB above noise floor

Vertical Resolution

0.1 dB on 2 dB/div

0.5 dB on 10 dB/div

Level Flatness

±1 dB ±resolution over 50 MHz span

Intermodulation Distortion

Better than 70 dB for two signals at -30 dBm into first mixer

Sweep Speeds

10 ms/div to 200 ms/div in a 1, 2, 5 sequence (optimum sweep speed and bandwidth selected according to span or user selectable)

Span Resolution Update

Bandwidth (Sweeps/sec)

10 kHz 300 Hz 5

100 kHz 3 kHz 9

1 MHz 30 kHz 9
10 MHz 300 kHz 9
100 MHz 300 kHz 5
1000 MHz 3 MHz 5

Marker Indication

Level and frequency or delta marker from center line of screen
Single marker for frequency and level display
Marker to center frequency

⊗ marker

Features

Simultaneous 'Look and Listen' spans 100 kHz, 200 kHz, 500 kHz,
1 MHz
Start/stop frequency entry

Sensitivity

2 μ V

Tracking Generator Offset

0 to 999 MHz

Audio Generators

FREQUENCY

Frequency Range

10 Hz to 25 kHz (sine or square)

Setting

Keyboard entry, delta increment/decrement function and rotary control

Indication

5 digits

Resolution

0.1 Hz below 3.25 kHz

1 Hz above 3.25 kHz

Accuracy

0.01 Hz below 180 Hz

0.1 Hz above 180 Hz

LEVEL

Level Range

0.1 mV to 4 V RMS

Setting

Keyboard entry, delta increment/decrement function and rotary control

Indication

4 digits

Resolution

0.1 mV below 409 mV

1 mV above 409 mV

Accuracy

$\pm 5\%$ +resolution 50 Hz to 15 kHz

Output Impedance

Nominally 5 Ω (minimum load 25 Ω)

Distortion

<0.5% at 1 kHz

<1% from 50 Hz to 15 kHz

Signaling Encoder/Decoder

Sequential tones functions including revert

User defined tones

Encodes and decodes up to 40 tones

CCIR, ZVEI, DZVEI, EEA, EIA or user defined

Any of the tones may be extended

Continuous, burst and single step modes available

Up to two frequency plans may be defined and stored within the 2945A for sequential tones.

Any of the standard tone frequency plans may be copied to user defined and modified.

Tone length 20 ms to 1 s

Standard tone frequencies may be selected from a menu.

Generation and decoding of DTMF tones

Generation and decoding of DCS (Digitally Coded Squelch)

Generation of POCSAG code CCIR No.1 Rec 584

Bit rates from 400 to 4800 bit/s.

Inversion available

AUDIO MONITOR

Demodulated signals and audio signals may be monitored via the

internal loudspeaker and the accessory socket output on the front panel.

Cellular and Trunking

Test Modes

Auto test/manual test

Auto Test Programs

Call processing only

Call and RF testing

Brief testing

Comprehensive testing

Parametric Auto Test Routines

AF Frequency AF Level

FM Deviation Mod Frequency

Rx Distortion Rx Expansion

Rx Sensitivity Rx SINAD

Rx S/N Tx Compression

Tx Distortion Tx Frequency

Tx Level Tx Power Level

Tx Limiting Tx Mod Level

Tx Noise Tx SINAD

Tx S/N

Signaling Auto Test Routines

Registration/Roaming Update

Place Call

Page Mobile

Clear from Land

Clear from Mobile

Handoff

Hook Flash

DTMF Decode

Data Performance

PTT On

PTT Off

SAT Deviation

SAT Frequency

ST Duration

ST Frequency

ST Deviation

DSAT Deviation

Frequency Standard

Internal Frequency Standard (TCXO)

Frequency

10 MHz

Temperature Stability

0.5 ppm, 0° to 40°C

0.6 ppm 0° to 50°C

Ageing Rate

Better than 1 ppm per year

Warm up

1 minute to specified accuracy

External Frequency Standard Input

Frequency

1, 2, 5 and 10 MHz

Input Level

Greater than 1 Vp-p

Input Impedance

Nominally 1 k Ω

General

Keyboard and Display

Logical color coded keyboard with bright high resolution fast LCD

Display Size

160 x 85 mm

RS-232C

RS-232C interface is provided for printing and remote instrument control

Connector

9 way female "D" Type

POWER REQUIREMENTS

AC Supply Voltage

90 to 265 V

AC Supply Frequency

90 to 264 V 45 Hz to 67 Hz

90 to 132 V 45 Hz to 440 Hz

Maximum AC Power

190 VA

DC Supply Voltage

11 to 32 V

Maximum DC Power

100 W

Charge Output

13.8 V at 6 A maximum to charge a 12 V sealed lead acid battery

CALIBRATION INTERVAL

2 years

ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of the EEC Council directive 89/336/EEC.

Complies with the limits specified in the following standards:

IEC/EN61326-1: 1997, RF Emission Class B, Immunity Table 1, Performance Criteria B

Safety

Conforms with the requirements of EEC Council Directive 73/23/EEC and Standard IEC/EN 61010-1 : 1993

Complies with IEC 1010-1, BS EN61010-1 for class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an installation category 1 or 2 supply.

Approved to UL3111-1

ENVIRONMENTAL

Rated Range of Use

0° to 50°C and up to 95% relative humidity at 40°C

Storage and Transport

Temperature

-40° to +71°C

Altitude

Up to 2500 m (pressurized freight at 27 kPa differential)

Dimensions

178 mm height; 380 mm weight; 457 mm depth (including handle, feet and covers)

7 in. height; 15 in. weight; 18 in. depth (including handle, feet and covers)

Weight

<11.4 kg (<25 lbs.)

Options and Accessories

600 ^ MATCHING UNIT (OPTION 1)

Switchable 600 ^ balanced audio input and output

Switchable 20 dB attenuator on AF generator output

ANALOG SYSTEMS CARD (OPTION 2)

This option provides automatic testing for cellular, trunked and FM radio's and a BASIC Interpreter for customized tests.

HIGH STABILITY INTERNAL FREQUENCY (OCXO) STANDARD (OPTION 3)

Frequency

10 MHz

Temperature Stability

Better than 0.05 ppm, 5° to 55°C

Ageing Rate

Better than 0.1 ppm, per year, after 1 month continuous use

Warm-up Time

<10 minutes to within 0.2 ppm at 20°C

PARALLEL INTERFACE (OPTION 4)

Allows direct connection of a parallel printer. Provides 4 software programmable output lines

Printer Port

Connector

25 way female "D" Type

Printers Supported

75, 100, 150 dpi laser printers, FX 80, FX 100 Epson format

Accessory Port

Connector

9 way female "D" Type

Outputs

4 independently programmable output lines, each one configurable as a logic line or as a relay contact closure, +5 V supply available

GPIB (OPTION 5)

Capability

For printing, remote instrument control or for programming of user defined test sequences

Complies with the following subsets defined IEEE488:

SH1, AH1, T6, L4, SR1, RL1, DT0, EI, DC1

MEMORY CARD DRIVE AND REAL TIME CLOCK (OPTION 6)

The memory card facility allows the storage of results, setup screen dumps and user programs with SRAM cards. Meets PCMCIA 2 standard

Allows the current date and time to be stored with results to the memory card and/or printed with a screen dump.

SSB DEMODULATOR (OPTION 8)

The SSB demodulator allows signals to be demodulated either via the internal loudspeaker or via the accessory socket. Provides demodulation of SSB signals (upper and lower sideband)

Frequency Range

400 kHz to 1 GHz

AF Demodulation Range

10 Hz to 15 kHz

Distortion

Typically <3% at 1 kHz (300 to 3.4 kHz)

Detection Range

2 μ V to 150 W

Features

Automatic detection of USB or LSB. BFO can be used for tuning of carrier for AM and FM radios.

NMT CELLULAR SOFTWARE (OPTION 10)

NMT 450 NMT 900

Benelux NMTF

Austria Spain

Malaysia Indonesia

Saudi 1 Saudi 2

Thailand Oman

Tunisia Hungary

Poland Russia

Czech Bulgaria

Slovenia Turkey

USER DEFINED NMT

AMPS CELLULAR SOFTWARE (OPTION 11)

USER DEFINED AMPS

TACS CELLULAR SOFTWARE (OPTION 12)

E-TACS TACS 2

C-TACS I C-TACS II

J-TACS N-TACS

USER DEFINED TACS

MPT 1327 TRUNKING SOFTWARE (OPTION 13)

BAND III JRC

UK WATER HONG KONG

AUTONET AMT

MADEIRA NL-TRAXIS

NZ MPT1327 PH-INDO

USER DEFINED MPT

PMRTEST SOFTWARE (OPTION 14)

USER DEFINED PMR for FM radios

EDACS RADIO TEST SOFTWARE (OPTION 15)

Provides Auto/Manual test capability for EDACS[®] radios. Up to 4 user defined variants can be created and stored, each with up to 24 spot channel frequencies.

Performs BER tests to check performance of receiver and transmitter

EDACS REPEATER TEST SOFTWARE (OPTION 16)

Provides Auto/Manual test capability for EDACS[®] repeaters. Up to 4 User defined variants can be created and stored, each with up to 24 spot channel frequencies. A data logging facility is also available to continuously decode and display data messages from the repeater under test.

EDACS is an Ericsson GE registered trademark.

IFR Ltd is an EDACS trunking licensee.

DEMODULATION FILTERS (OPTION 21)

Provides a range of high selectivity channel filters in Spectrum Analyzer Look and Listen mode. Shape factor approximates to ETSI requirements.

Bandwidths

5, 12.5, 25, 50 and 300 kHz

POCSAG DECODE (OPTION 22)

Allows off-air decoding of POCSAG messages. Can decode a message as it is received or decoding can be triggered from a user selectable RIC code or fixed message pattern.

Bit Rate

Automatically decodes any standard bit rate up to 4800 bits/s.

Numeric or alphanumeric decoding is provided.

Number of received errors is displayed.

CCITT FILTER (OPTION 23)

Allows a CCITT filter to be inserted into either the demodulated audio path or the audio input path.

CMESS FILTER (OPTION 24)

Allows a CMESS filter to be inserted into either the demodulated audio path or the audio input path.

BAIL ARM/FRONT COVER (OPTION 30)

Provides a Bail arm carrying handle and front panel cover and storage area. The Bail arm also provides additional viewing angles when mounted on a bench.

BATTERY PACK

Type

12 V Sealed lead-acid

Connector XLR Type

Capacity

7 AH (30 minutes operation)

Weight

3 kg (6.6 lbs.)

Charge time from instrument

16 hours

Certain characteristics are shown as typical. These provide additional information for applying the instrument, but are unwarranted.

Versions and Accessories

When ordering please quote the full ordering number information.

Ordering Numbers

Versions

2945A Communications Service Monitor

2946A Avionics Service Monitor

2948 Low Phase-Noise Communications Service Monitor

Option 1 600 \wedge Matching Unit

Option 2 Analog Systems Card

Option 3 High Stability OCXO

Option 4 Parallel Interface †

Option 5 GPIB Interface †

Option 6 Memory Card Drive with real time clock

Option 8 SSB demodulator

Note: Option 2 required when ordering any of the following options 10 to 16

Option 10 NMT Cellular

Option 11 AMPS Cellular

Option 12 TACS Cellular

Option 13 MPT 1327 trunking

Option 14 PMRTEST

Option 15 EDACS| Radio Test

Option 16 EDACS| Repeater Test

Option 21 Demodulation Filters

Option 22 POCSAG Decode

Option 23 CCITT Filter †

Option 24 CMESS Filter †

Option 30 Bail Arm and Front Panel Stowage cover

Supplied Accessories

AC Supply lead

DC Supply lead

Operating Manual

Optional Accessories

44991/145 Microphone with PTT

59000/189 Memory Card (128 k)

43113/021 Battery Pack for 2945A/2946A ‡

46662/571 'Ever-Ready' Case

46662/616 'Ever-Ready' Case for use with Option 30

54112/163 Hard Transit case

54431/023 20 dB AF attenuator (BNC)

46884/728 Rack Mounting Kit

54421/001 BNC Telescopic Antenna

46884/650 Serial port to PC control cable (9 way)

46884/649 Serial port to PC control cable (25 way)

46884/648 RS-232 Printer cable (25 way)

59999/170 RF Directional Bridge

54421/002 (1 to 50 MHz) RF Directional Power Head

54421/003 (25 to 1000 MHz) RF Directional Power Head

54432/012 (100 Hz to 500 MHz) Wideband Amplifier

46880/079 Service Manual

† Options 4 and 5 cannot be fitted together.

† Options 23 and 24 cannot be fitted together.

‡ Battery Pack for previous model 2946 is still available under code 43113/018.

⁽¹⁾ At low modulation levels the residual AM/FM may become significant.