

# Wireless Radio Test Sets

## IFR 2975 Project 25 Radio Test Set



A test solution designed from the ground up to handle today's advanced digital radio applications

### Expanded Service Monitor Functions

- 2.7 GHz Frequency Range with 2.7 GHz Spectrum Analyzer and Tracking Generator
- "Try before you buy" Options
- New PassPort® Radio Test Option
- New Secondary Control Channel Broadcast Messaging Option
- 500 kHz (Useable) Dual-Channel Oscilloscope
- New Scope Markers
- New Capture for Front Screen Displays
- New Vrms Selection for Audio Function Generators
- New Demod Audio Routing to RF Generator
- 12.5, 25, 60 and 200 kHz IF Filters
- User Selectable Audio Filters
- Tone Signaling/Tone Remote Functions
- Auto-Tune Capabilities
- LTR® Trunking Option
- 40 kHz Audio Analyzer w/ Tracking Generator
- ANS KVL Support Option

### Exclusive P25 Test Features

- New Explicit Messaging Option
- New Adjacent Status Broadcast Messaging
- P25 Trunking Emulation
- Exclusive P25 Inbound Signaling Packet (ISP) Decode Function
- New Unit to Unit and PSTN Interconnect Option for Explicit Messaging
- Exclusive P25 Outbound Signaling Packet (OSP) Message Programmer
- Full TIA/EIA-102 Test Patterns
- AES and DES OFB Type III Encryption
- CQPSK Transmit and Receive
- CQPSK EVM and Constellation Display Exclusive SmartNet™/SmartZone™ Tests
- Control Channel Assignment to P25 or SmartNet™/SmartZone™ Traffic Channel

### Innovative Control and Operational Features

- Internet Remote Operation
- Quick Tune Spectrum Analyzer
- PS-2 Keyboard and Mouse Operation
- IP Addressable
- RS-232, GPIB and Ethernet Operation

## The NEW Standard for P25 Testing

Since 1976, Aeroflex has provided cutting-edge test solutions to the mobile radio industry. Aeroflex carries on that tradition with the IFR 2975 Radio Test Set. It's a test solution designed from the ground up to handle today's advanced communication applications.

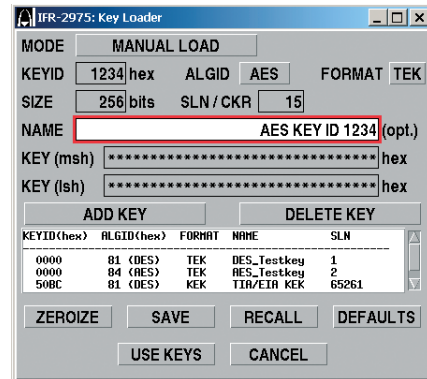
- Project 25 parametric, protocol and Common Air Interface testing
- IMBE vocoder and data encryption tests
- Modulation and demodulation of C4FM and CQPSK
- AES and DES OFB Type III encryption/decryption support
- Exclusive standard C4FM Modulation Fidelity meter and CQPSK EVM option allows for true transmitter alignment

### "Try before you buy" for IFR 2975 Test Set Options

The IFR 2975 offers unique "try before you buy" options where customers can try an option before purchase. Owners of IFR 2975 test sets can try IFR 2975 options for up to 30 days before making an investment decision. Once the choice is made, the options can be enabled in the field. Options for the IFR 2975 radio test set include:

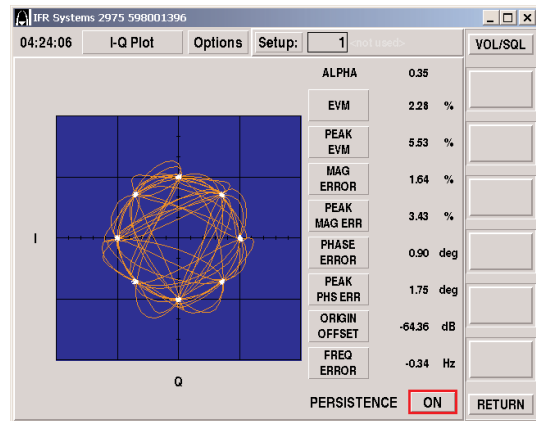
- **PassPort® Option:** provides the latest features for testing PassPort® radios and repeaters. This includes the new VHF PassPort® functions being deployed.
- **Explicit Messaging Option:** supports explicit messaging for trunked VHF/UHF radio systems that use this extended messaging for the latest P25 trunking systems.
- **SCCB Messaging Option:** supports the Secondary Control Channel Broadcast message for either explicit or normal P25 trunked operation. The addition of this feature allows the user to set up simulated control channels to verify how P25 radios switch over to secondary control channels.
- **Adjacent Status Broadcast Messaging Option:** supports the Adjacent Channel Broadcast message for explicit P25 trunked operation. The addition of this feature allows the user to set up a simulated adjacent control channel to verify how P25 radios switch over to adjacent control channels in roaming modes.
- **Unit to Unit and PSTN Interconnect Option:** supports Unit to Unit and PSTN interconnect calls in the explicit mode of operation. This feature allows users to verify that a radio can generate and receive Unit to Unit and PSTN calls.
- **Advanced Encryption Systems (AES) Option:** Includes support for higher security features as well as continued support for the current Digital Encryption System (DES) Type III used in existing P25 systems.

- **Encryption Key Management Option:** Provides the ability to fully manage keys via the KVL-3000+™ using the P25 key management protocol including the ability to load individual, multiple and groups of keys. The IFR 2975 also supports programming of keys through the front panel for manual key management.



Encryption Key Management with AES Support

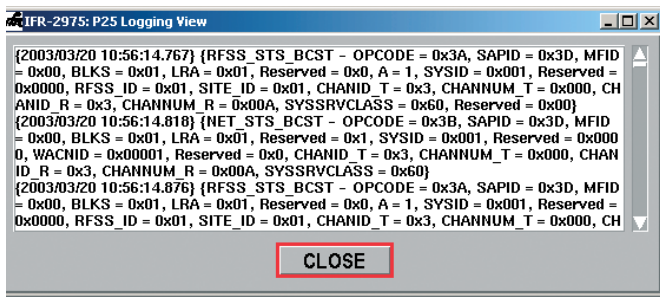
- **ASN KVL Support Option:** supports this legacy keyloader mode used with older KVL-3000 and earlier keyloaders.
- **CQPSK Modulation™ Option:** With both transmitter and receiver tests, the IFR 2975 now supports parametric measurements for repeater tests utilizing CQPSK modulation for LSM applications.



CQPSK Analysis for LSM Systems

- **CQPSK Option:** This enables all the functionality of the IFR 2975 for use in 6.25 kHz bandwidths.

- **Control Channel Logging Option:** This exclusive feature for P25 trunked operations allows users to verify conformance with various P25 radio systems offered by a number of different manufacturers.

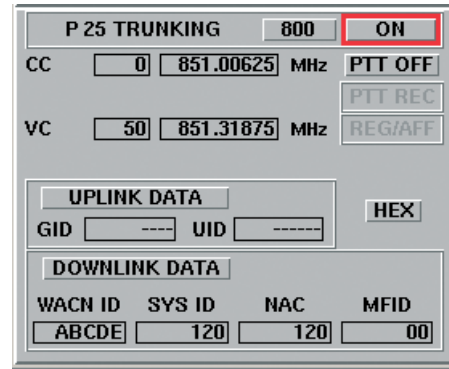


*P25 Control Channel Logging*

- **P25 Trunking Protocol Option:** With the ability to optionally set P25 OSP messages for control channel and decode ISP messages from user radios, the IFR 2975 verifies protocol operation of radios on P25 networks.
- **VHF/UHF and 800 MHz SmartNet™/SmartZone™ Option:** Support for SmartNet™/SmartZone™ Motorola trunked radio system testing.
- **900 MHz Band Option:** Support for SmartNet™/SmartZone™ systems used in commercial business applications.
- **LTR® Trunking Option:** Support for both repeater simulator and mobile simulation.
- **0 - 40 kHz Audio Analyzer Option:** Support for extended audio analysis.
- **Analog Simulcast Option:** Allows for fast alignment of analog simulcast systems.
- **BER Tests Option:** Allows for TX BER as well as RX BER measurements using a defined serial connection.
- **Auto-Test Application Option:** Speeds testing and logging of test results on analog and P25 conventional radio systems.

### P25 Trunking Test Gives Flexibility to P25 Radio Testing

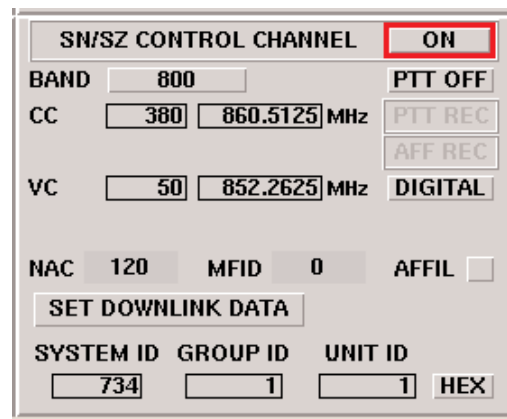
With the optional P25 Trunking application, the IFR 2975 now provides test professionals the ability to quickly and dynamically test P25 mobile subscriber units operating in the VHF/UHF, 700 MHz and 800 MHz bands. The IFR 2975 provides the required P25 control channel with user defined parameters for Unit/Group call procedures including the exclusive ability to set downlink OSP control channel message elements and to decode the uplink ISP messages for use in verification of mobile interoperability. With P25 Trunking (Options 4 and 14), the user can initiate tests without the need to go through a predetermined test sequence. These tests include transmitter verification of performance and receiver sensitivity tests that are separate, easy tests. With the IFR 2975's exclusive "meter panel", test times for subscriber units can be reduced to less than 30 seconds!



*P25 Trunking Options*

### SmartNet™/SmartZone™ Test Functions Provide Ways to Test Motorola Trunked Radio Systems (Options 3 and 8)

With the optional SmartNet™/SmartZone™ application, the IFR 2975 provides innovative ways to test trunked radio systems including a new "scanner" mode that allows the user to follow a call from the control channel to the voice channel. This unique function allows for fast testing of system operation as well as RF performance tests. The IFR 2975 also provides the ability to hand off to a P25 traffic channel directly from a SmartNet™ II Control Channel, allowing for interoperability testing in a repeater mode.

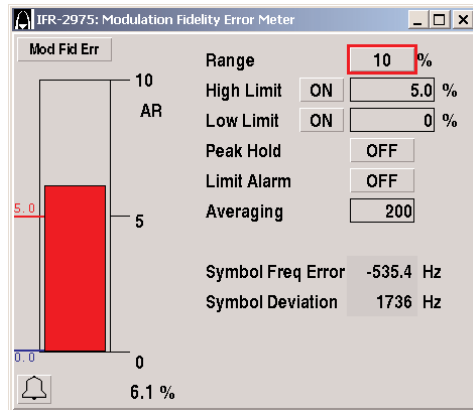


*SmartNet™/SmartZone™ Test Capabilities*

### Full-Featured Communications Test System

For complete transmitter spectrum performance testing, swept antenna and transmission line testing and at-a-glance troubleshooting, the IFR 2975 comes standard with a digitized 2.7 GHz spectrum analyzer and dual-channel digital storage oscilloscope. In addition, the IFR 2975 provides you with the functionality of over 20 discrete instruments integrated into a single platform. The IFR 2975 provides all the tools you need to perform comprehensive RF testing as standard equipment.

- RF Receive/Generate with full cross band Duplex Operation
- AM/FM/C4FM Modulation and Demodulation
- RF Power/Frequency/Frequency Error/Distortion/SINAD/Voltage Meters with PASS/FAIL Go - NoGo testing.



*Color Coded Meters Speed Test Time*

- Repeater simulation for Project 25 compliant radio testing in the conventional mode
- IF Filter settings match real-world application, with 12.5 kHz, 25 kHz, 60 kHz and 200 kHz selectable (FM)
- Extended post-detection audio filters
- Full-feature store and recall functions
- Tone and tone remote signaling
- Spectrum Analyzer and Tracking Generator from 1 MHz to 2.7 GHz
- 500 kHz (Useable) Dual-Channel Oscilloscope

### High Tech Testing That's Easy To Use

Building advanced functionality into a test instrument means little if it's too complex to use efficiently. That's why we've focused on ensuring the IFR 2975's advanced functions are easily harnessed.

Exclusive control features include a standard communication service monitor look and feel with push-key entry and soft-key functions for routine daily work. But added to this conventional operation is the power of today's technology including:

- Ethernet for remote control flexibility
- Internal web server for accessing files, status updates and remote display operation
- E-Manual support allows you to upload test and alignment procedure for display directly on the IFR 2975
- PS2 keyboard and mouse operation
- Full GPIB and RS-232 interface with Remote Command Language
- On-board 20 GB hard drive to support future enhancements

### Exclusive Spectrum Analyzer Features Include "Quick Tune" Feature

Tuning the spectrum analyzer is as simple as a double click on the mouse. With Aeroflex's exclusive "Quick Tune" spectrum analyzer, the IFR 2975 allows you to double click a signal on the spectrum analyzer screen and the analyzer will automatically change center frequency to the selected frequency.

### Supports Network Connectivity

Another key advancement is the use of modern network and connectivity technology. The IFR 2975 employs ethernet as one of its communication ports, thus allowing remote operation and data collection. You can also redirect display and keypad operations and software upgrades can be installed quickly over the internet, saving you valuable time and virtually eliminating instrument downtime.

### Man-Machine Interface

The high-resolution color display and alphanumeric keypad with multi-function soft keys provide a user-friendly interface. The menu structure has been enhanced to make complex test routines simple and straightforward. A 20 GB internal hard drive and 3.5 in. floppy drive simplify program installation and maximize flexibility in storage and recall of setup information, frequency lists and test data.

### Portability

At 15 kg (33 lbs.), the IFR 2975 is perfect for the field technician with a lot of ground to cover. Plus, its rugged design makes it an ideal solution for the rigors of the field.

## SPECIFICATION

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### GENERATOR (RECEIVER TEST)

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#### GENERATE PORT

##### Port Protection

10 W (+40 dBm) for 30 sec.

#### FREQUENCY

##### Range

1 MHz to 2.7 GHz

##### Resolution

1 Hz

##### Accuracy

Same as Time Base

### OUTPUT LEVEL

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#### GENERATE PORT

##### Range

+10 to -110 dBm

##### Resolution

0.1 dB

##### Accuracy

$\pm 1.5$  dB (<1.3 GHz),  $\pm 2.5$  dB (>1.3 GHz)

#### T/R PORT

##### Range

-30 to -137 dBm

##### Resolution

0.1 dB

##### Accuracy

$\pm 1$  dB (<1.3 GHz >-120 dBm);  $\pm 1.5$  dB (>1.3 GHz >-110 dBm)

### SPECTRAL PURITY

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#### Harmonic Spurious

-25 dBc max >50 MHz

#### Non-Harmonic Spurious

-40 dBc max <1.5 GHz

-30 dBc max >1.5 GHz

#### Residual FM

<15 Hz rms (Post Detection BW = 300 Hz to 3 kHz)

#### SSB Phase Noise (20 kHz offset)

-100 dBc/Hz typical, -92 dBc/Hz max (<1 GHz), -90 dBc/Hz max (>1 GHz)

#### Residual AM

0.1% (Post Detection BW = 300 Hz to 3 kHz)

## GENERATOR MODULATOR

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### FM

#### Deviation Accuracy

3%, +residual,  $\pm$ LSD (1 to 20 kHz deviation, 1 to 10 kHz rate)

5%, +residual,  $\pm$ LSD (>20 kHz deviation, 1 to 20 kHz rate)

#### Deviation Range

Off, 10 Hz to 40 kHz deviation

#### Deviation Resolution

10 Hz

#### Modulation Rate Bandwidth

50 Hz to 20 kHz (MOD 1, MOD 2 and Audio in [SINAD] unbalanced)

50 Hz to 20 kHz (Audio in [SINAD] balanced and Mic in)

#### Modulation Distortion (THD)

1% (1 kHz rate, 6 kHz deviation, 50 Hz to 20 kHz bandwidth)

#### External FM Sensitivity

##### Audio in 1

1 Vpp = 4 kHz deviation  $\pm 15\%$  (50 Hz to 10 kHz unbalanced)

1 Vpp = 4 kHz deviation  $\pm 15\%$  (50 Hz to 10 kHz balanced)

##### MIC input

1 Vpp = 40 kHz deviation  $\pm 15\%$  (300 Hz to 3 kHz)

### AM

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#### AM Depth Range

30% to 90%

#### Resolution

1%

#### Rate

100 Hz to 3 kHz

#### Accuracy

$\pm 5\%$  (of full scale) + residual AM + resolution (1 kHz rate, RF Level <-40 dBm T/R, <0 dBm Gen Port)

#### Distortion

4% Typical (30% to 90% modulation, 1 kHz rate, 0.3 to 3 kHz BW, RF Level <-40 dBm T/R, <0 dBm Gen Port)

### DIGITAL MODULATION FORMATS

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C4FM at 9.6 kb/sec

#### FSK Error

<1% typical, <2% max

#### Project 25 Compliant Signals

1011 Hz tone

5% BER calibration tone

Speech (repeated test phrases)

Silence

Voice from audio inputs

## **ADDITIONAL MODULATION FORMATS**

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DTMF, tone, tone signalling, DCS, CTCSS, tone remote, ARB with recorded voice data for syllabic squelch test.

## **RECEIVER (TRANSMITTER TEST)**

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### **FREQUENCY RANGE**

1 MHz to 2.7 GHz

### **T/R PORT**

#### **VSWR - T/R Port**

<1.2:1 to 1 GHz, <1.3:1 >1 to 2.7 GHz

#### **Maximum Power**

50 W continuous, 125 W 1 min on/4 min off

#### **Alarm**

Alert sounds at 100°C pad temp or 135 W

## **ANTENNA PORT**

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### **Maximum Power**

10 W (+40 dBm) for 30 sec.

### **Alarm**

Switches to alarm on at 100 mW input (nominal)

## **FILTERS**

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### **IF Filters**

FM - 12.5 kHz, 25 kHz, 60 kHz, 200 kHz

AM - 6.25 kHz, 12.5 kHz, 25 kHz, 60 kHz, 200 kHz

P25 - 6.25 kHz, 25 kHz

## **FREQUENCY COUNTER/FREQUENCY ERROR METER**

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### **Accuracy**

Same as timebase  $\pm$ LSD

### **Resolution**

1 Hz

## **FM DEVIATION METER**

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### **Meter Range**

5 kHz, 10 kHz, 20 kHz, 50 kHz, 100 kHz, Auto

### **Resolution**

10 Hz

### **Demod Output Sensitivity**

1 V<sub>pp</sub> = 5 kHz typical

### **Accuracy**

$\pm$ 5%,  $\pm$ 2 LSD +residual FM (12.5 kHz bandwidth, 1 kHz rate, deviation >1 kHz and <5 kHz)

$\pm$ 5%,  $\pm$ 2 LSD +residual FM (25 kHz bandwidth, 1 kHz rate, deviation >1 kHz and <10 kHz)

$\pm$ 5%,  $\pm$ 2 LSD +residual FM (60 kHz bandwidth, 1 kHz rate, deviation >1 kHz and <25 kHz)

$\pm$ 7%,  $\pm$ 2 LSD +residual FM (200 kHz bandwidth, 50 to 20 kHz rate, deviation >5 kHz and <40 kHz)

## **AM MODULATION METER**

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### **Mod Depth**

1% to 100%

### **Resolution**

0.1%

### **Accuracy**

$\pm$ 5% of full scale +source residual AM  
(6 kHz IF BW, 1 kHz tone, 10%-90% AM depth)

### **Modulation Rate**

10 Hz to 3 kHz

### **Carrier Range**

1 MHz to 2.7 GHz

## **RECEIVE SIGNAL STRENGTH LEVEL METER**

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### **Sensitivity**

-70 to -20 dBm (no input attenuation selected)

Usable Input Range -80 to -10 dBm (no input attenuation selected)

### **Resolution**

0.1 dB

### **Accuracy**

$\pm$ 1.5 dB

## **BROADBAND POWER METER FUNCTIONS (T/R PORT)**

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### **Accuracy**

10%  $\pm$ LSD

### **Meter Range**

100 mW to 200 W in 1, 2, 5 sequence

### **Dynamic Range**

100 mW to 125 W

### **Resolution**

3 digits

## **NARROWBAND POWER METER FUNCTIONS (T/R PORT)**

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### **Accuracy**

$\pm$ 1.5 dB (input level = +27 dBm);  $\pm$ 3 dB typical > +27 dBm

### **Meter Range**

1  $\mu$ W (-30 dBm) to 200 W (+53 dBm)

### **Resolution**

3 digits

## **RECEIVE AUDIO FREQUENCY COUNTER**

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### **Accuracy**

Same as timebase  $\pm$ 1 Hz

### **Resolution**

0.1 Hz/1 Hz

## RECEIVE SINAD METER

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### Accuracy

$\pm 1$  dB  $\pm 1$  LSD @ 1 kHz rate and 12 dB SINAD

### Resolution

0.1 dB

### Test Frequency

1 kHz

## RECEIVE DISTORTION METER

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### Accuracy

$\pm 1.5\%$   $\pm 1$  LSD @ 1 kHz rate @ 5% distortion

### Resolution

0.1%

### Test Frequency

1 kHz

### Meter Range

5%, 10%, 20%, 50%, 100% full scale ranges

## DIGITAL DEMODULATION METERS

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### C4FM FSK ERROR

<2% + residual, 3% to 10% reading, 400 symbols

## SPECTRUM ANALYZER FUNCTIONS

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### SWEEP (HORIZONTAL) ACCURACY

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#### Frequency Range

1 MHz to 2.7 GHz

#### Frequency Resolution

1 Hz

#### Span Accuracy

$\pm 1\%$  of (total) Span Width

#### Frequency Display

Span accuracy + Frequency standard accuracy +50% of RBW

#### Sweep Rate Range

200 ms to 7 sec

#### Sweep Rate Accuracy

1%

### HARMONIC SPURIOUS

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-55 dBc @ -40 dBm (antenna port, no input attenuation)

### NON- HARMONIC SPURIOUS

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-60 dBc (10 MHz to 2.7 GHz) (antenna port, no input attenuation)

### RESIDUAL SPURIOUS

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-80 dBm (input terminated, antenna port, no input attenuation)

## AMPLITUDE (VERTICAL)

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### Level Accuracy

$\pm 2$  dB @ -30 dBm, input, -20 dBm Ref level (normalized) Antenna port, no input attenuation (typical)

### Scales

2, 5 and 10 dB/div

### LOG Linearity

$\pm 2$  dB

### Reference Level Resolution

0.1 dB

### Attenuator Range

T/R: 0 to 40 dB (10 dB steps, auto-coupled to reference level)

Ant: 0 or 10 dB (auto-coupled to reference level)

### Attenuator Accuracy

$\pm 0.5$  dB/step, up to  $\pm 1$  dB max (typical)

### DYNAMIC RANGE

#### Antenna Port

<-100 (depends on RBW) to -20 dBm (no attenuation)  $\leq$  -10 dBm with 10 dB attenuation)

#### T/R Port

<-30 to +30 dBm (no attenuation)

#### Typical Noise Floor Performance

-110 dBm, 10 MHz to 2.7 GHz (300 Hz resolution bandwidth)

#### Residual Phase Noise

-92 dBc/Hz @ 20 kHz offset

### RESOLUTION BANDWIDTH

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#### Analyzer Screen

300 Hz, 3 kHz, 30 kHz, 60 kHz, 300 kHz, 6 MHz

#### Generate and Receive Screens

300 Hz, 3 kHz, 60 kHz

#### Selectivity

60 dB/3 dB ratio <15:1

#### Bandwidth Switching Error

$\pm 1$  dB

### VIDEO BANDWIDTHS

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None, 10 Hz to 3 MHz in 1-3-10 steps

### SPECIAL FUNCTIONS

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#### Display Modes

Live, Average, Peak, Compare, Tracking Generator, Coupled/Uncoupled (span/sweep time/RBW)

### SPECTRUM ANALYZER VIDEO OUTPUT

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#### Reference Level

= -5 V

## Bottom-of-Screen

= +5 V

## TRACKING GENERATOR

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### Frequency Range

10 to 2700 MHz

### Output Level Range

Generator Port: +10 to -110 dBm

T/R Port: -30 to -137 dBm

### Output Level Resolution

0.1 dB

### Output Flatness

$\pm 2$  dB  $\leq 500$  MHz span up to 1250 MHz center frequency

## OSCILLOSCOPE FUNCTIONS

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## VERTICAL INPUTS

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### Input Channels

2 input channels (Ch1 and Ch2), MIC Input, Audio I/O Input, Internal Demodulation

### Input Impedance

1 M $\Omega$

### External Coupling

AC, DC and GND

### Range

20 mV to 50 V/div in a 1, 2, 5 sequence

### Accuracy

10% of full scale (DC to 50 kHz, source impedance <100)

### Bandwidth

500 kHz usable

## HORIZONTAL SWEEP

### Range

10  $\mu$ s/div to 1 sec/div

### Accuracy

1% of full scale

## TRIGGER SOURCE

Channel 1, Channel 2, Internal or External Trigger

External Trigger: expects a TTL level (2 V-trigger level)

## SPECIAL FUNCTIONS (Markers, Delay, etc.)

Modes: Live, Triggered Mode (Auto, Normal, Single shot trigger, persistence)

## SMARTNET™ /SMARTZONE™ TRUNKING OPTION

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### Signaling Types

SmartNet™, SmartZone™ (Type II)

### Call Tests

Analog and P25 (Digital Traffic Channel) Mobile Initiated tests and System Initiated tests

## Testing Results

Power, frequency error, RSSI, deviation, sensitivity, SINAD, audio counter, C4FM EVM, distortion

## Protocol Trunking Message Elements

Analog: System ID, Group ID (Automatically determined upon PPT), Unit ID (Automatically determined upon PTT), Frequency Band, Control Channel, Traffic Channel (by frequency and channel number) Digital (P25 Traffic Channel): System ID, Group ID (Automatically determined upon PPT), Unit ID (Automatically determined on PPT), NAC and MFID (Automatically detected upon PPT), Frequency Band, Control Channel, Traffic Channel by Frequency and Channel Number)

## Frequency Bands

851 - 870 MHz, 866 - 870 MHz Split Channel,

403 - 522 MHz UHF, 132 - 175 MHz VHF, User defined

## Channel Plan Entry for VHF/UHF

Separate transmitter and receiver start-and-end frequency for threeblocks. Independent channel spacing for each block.

## Special Features

SmartNet™/SmartZone™ trunking channel assignment to P25 traffic channel

## Control Channel Scanner

Search and find control channel within the channels bands. Search by channel number with automatic verification and display of found control channels. Found control channels also display System ID information automatically. Upon selection of live control channel, the 2975 will track control channel, group ID or unit ID traffic.

## Configuration Bands

800, 800 Splinter, VHF/UHF, 900, User Defined

## LTR® TRUNKING OPTION

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### Modes

Repeater Simulator, Mobile Simulator

### Testing Results

Power, Frequency Error, RSSI, Deviation, SINAD, Audio Counter, Distortion

### Protocol Trunking Message Elements

RIC, Home Channel, GOTO Channel, Group, Free Channel, Area, Border Bit, Received Data analysis in both repeater and radio simulation modes

### Call Modes

Repeater Simulator: Idle, System Busy, Repeater Busy, Continuous Disconnect Radio Simulator: Idle, PTT Inverted Operation supported in both simulation modes

### Configuration Bands

User, 800 MHz, 900 MHz

### User Configurable RF parameters

Deviation

## AUDIO FREQUENCY GENERATOR

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### WAVE SHAPE FORMATS

#### Wave Shapes

Sine, Square, Triangle, Ramp



## AMPLITUDE

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### LEVEL

(FGEN 1 and 2 combined cannot exceed the following port limitations.)

#### Unbalanced

0 to 20 Vpp into 10 k $\Omega$  (Audio Out 1 [FGEN] and Audio Out 2 [DEM0D])

#### Balanced

High Range: 0 to 6 Vrms into 10 k $\Omega$  (Audio Out 1 [FGEN] only)

Low Range: 0 to 600 mVrms into 10 k $\Omega$  (Audio Out 1 [FGEN] only)

### RESOLUTION

#### High Range

1 mV (Audio Out 1 [FGEN] and Audio Out 2 [DEM0D])

#### Low Range

0.10 mV (Audio Out 1 [FGEN] only)

### ACCURACY (SINEWAVE)

Unbalanced (Audio 1 or 2, level >0.5 Vpp)

3% (20 Hz to 3 kHz)

#### Balanced

High Range: 10% (frequency at 1 kHz, level >0.5 Vpp)

Low Range: 10% (frequency at 1 kHz, level >0.05 Vpp)

### Distortion (THD, Sinewave)

<0.5% (1 kHz, 3 Vpp)

<2% (20 Hz to 20 kHz, 1 through 15 Vpp)

## FREQUENCY

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### RANGE

#### Unbalanced

DC to 20 kHz (Audio Out 1 [FGEN] and Audio Out 2 [DEM0D])

#### Balanced

50 Hz to 20 kHz (Audio Out 1 [FGEN] only)

### Resolution

0.1 Hz

### Accuracy

$\pm 1$  Hz

### TONE SIGNALING

DTMF, DCS, CTCSS, 5/6 Tone, Tone Remote

### FILTERS

#### High Pass

300 Hz, 4 kHz

#### Low Pass

300 Hz, 4 Bessel kHz, 15 kHz, 20 kHz, 4 kHz LP Butterworth

#### Band Pass

300 Hz to 4 kHz

80 Hz and 3 kHz Narrow

APCO-25

## SINAD

C-Weighted

## BASE-BAND AUDIO FUNCTIONS

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### INPUT LEVEL RANGE

#### Audio In

200 mVpp to 20 Vpp

#### MIC In

10 mVpp to 1 Vpp

### FREQUENCY RANGE

#### Unbalanced (10 k $\Omega$ Nominal)

Audio IN (SINAD) input - 50 Hz to 20 kHz

#### Balanced (600 $\Omega$ Nominal)

Audio IN (SINAD) input - 50 Hz to 20 kHz

#### Mic (MIC) Input (10 k $\Omega$ Nominal)

50 Hz to 20 kHz (unbalanced)

### AUDIO FREQUENCY COUNTER (DEM0D SELECTED)

#### Input Sources

Demodulated Audio, MIC Input, Audio (SINAD) Input

#### Ranges

200  $\Omega$ , 500  $\Omega$ , 1 k $\Omega$ , 2 k $\Omega$ , 5 k $\Omega$ , 10 k $\Omega$ , 20 k $\Omega$

#### Accuracy

$\pm 1$  Hz

#### Resolution

0.1 Hz

### MICROPHONE AUDIO INPUT

#### Modes

Electret: +5 V through 5 k $\Omega$  Nominal

Dynamic

## DVM FUNCTIONS

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### AC

#### Input Impedance

1 M $\Omega$ , 600  $\Omega$ , 150  $\Omega$

#### Range

400 mV to 100 V in a 1, 2, 4 sequence

#### Resolution

0.1 mV (0.4 V scale), 1.0 mV (1, 2, 4 V scales), 10 mV (10, 20, 40 V scales), 100 mV (100 V scale)

#### Accuracy

6% of full scale (50 Hz to 20 kHz)  $\pm 1$  LSB

### DC

#### Range

400 mV to 100 V in a 1, 2, 4 sequence

#### Resolution

Same as AC

## Accuracy

2% of full scale  $\pm 1$  LSB

## Input Impedance

10 M $\Omega$  Nominal

## TIME BASE

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### Output Frequency

10 MHz

### Time Base

$\pm 0.01$  ppm stability;  $\pm 0.1$  ppm/year aging

### Output Level

1 to 5 Vpp into 10 k $\Omega$

### Warm-up

<5 minutes

## DIGITAL I/O

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Parallel Printer Port; Video Monitor Port (VGA); Mouse Port (PS2 compatible); Keyboard Port; Front Panel Test Port; 3.5 in. Floppy Drive

## REMOTE COMMAND INTERFACE

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RS-232, GPIB or TCP/IP (Ethernet) Remote Control Interface

For more specialized testing, the IFR 2975 can be programmed through the industry standard language TCL.

## DISPLAY

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### Resolution

VGA

### Height

99 mm, 3.9 in.

### Width

131 mm, 5.15 in.

## AC LINE

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### Power Requirements

100 to 120 VAC at 60 Hz

Max. Power 200 W at 120 VAC

220 to 240 VAC at 50 Hz

## ENVIRONMENTAL/MECHANICAL

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### Weight

15 kg (33 lbs.)

### Dimensions

356 mm wide, 197 mm high, 520 mm deep

14 in. wide, 7.75 in. high, 20.5 in. deep

### Operating Temp Range

0° to 40°C

### Storage Temp Range

-25° to 70°C

## WARRANTY

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2 years

Extended warranty available upon request

## **VERSIONS AND ACCESSORIES**

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When ordering please quote the full ordering number information.

### **Ordering Numbers**

2975 Project 25 Radio Test Set

For the latest version of 2975 software please visit [www.p25.com](http://www.p25.com).

### **Options**

#### Options

2975OPT3 SmartNet™/SmartZone™ VHF/UHF and 800 MHz

2975OPT4 P25 Trunking 800 MHz

2975OPT6 Control Channel Logger

2975OPT8 SmartNet™/SmartZone™ 900 MHz (Requires 2975OPT3)

2975OPT9 Autotest 1

2975OPT10 AES (Export Restricted)

2975OPT12 KVL Keyloader

2975OPT14 P25 Trunking VHF/UHF/700 MHz

2975OPT15 Audio Analyzer

2975OPT16 Analog Simulcast Align (Requires 2975OPT15)

2975OPT17 RX BER

2975OPT18 LTR® Trunking

2975OPT19 PassPort® (Requires Version 1.9.x or later Firmware)

2975OPT20 KVL ASN Mode (Requires 2975OPT12)

2975OPT21 P25 Secondary Control Channel Broadcast Message (Requires 2975OPT4)

2975OPT22 P25 Explicit Mode Operation (Requires 2975OPT 14)

2975OPT23 P25 Explicit Unit to Unit and PSTN Emulation (Requires 2975OPT22)

2975OPT24 P25 Explicit Adjacent Status Broadcast Channel Message (Requires 2975OPT22)

2975OPT29 CQPSK Generate/Receive and Analysis

### **Accessories**

AC25007 Microphone/Audio Adapter\*

AC25009PP Maintenance Manual/Paper

AC25009CD Maintenance Manual / CD-ROM

AC25011 Case, Transit W/Wheels

AC25012 Case, Soft Padded Carrying

AC25013 KIT, 10/20 db Pads, TNC

AC25014 Scope Probe Kit

AC25023

Front/Rear Cover\*

AC25027

TNC to BNC Adapter\*

AC25029

Accessory Pouch

AC25036

DC to AC Converter, 12VDC to 110-120VAC

AC25042

HF Antenna

AC25043

Antenna, UHF 450\*

AC25044

800 MHz Antenna\*

AC25045

Antenna, VHF 150\*

AC4105

Return Loss Bridge (1.3 GHz)

CALFB2975

Calibration Certificate

W2975/201

Enhanced Standard Warranty

W2975/203

Warranty Extension one year (total warranty three years)

W2975/205

Warranty Extension three years (total warranty five years)

W2975/203C

Extended Standard Warranty 36 Months with scheduled calibration

W2975/205C

Extended Standard Warranty 60 Months with scheduled calibration

\*Included as standard features

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For more product related information visit [www.p25.com](http://www.p25.com).

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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.