

Avionics

IFF-45TS MK XIIA/TACAN Bench Test Set



Optional controller shown

A leading edge RF signal generator designed for Mode 5 engineering and manufacturing applications

- AIMS Certified (All modes including Mode 5 (Level 1 & 2))
- Supports DoD AIMS 04-900A Option A (KIV-78) and Option B (KIV-77) crypto appliquéés
- Dual I/O for diversity transponder or sum/difference interrogator testing
- Separate RF I/O for direct connection to equipment under test, or connection to antennas for over-the-air testing
- Software defined radio design provides waveform flexibility and future growth potential
- Dual signal generators can produce coordinated signals for echo and interference testing
- Antenna ports provide one watt signal generator outputs and -44 dBm receiver sensitivity, to allow for extended range over-the-air testing
- Can produce levels above MTL at up to 3 kM (greater distances or power levels are achievable with a directional antenna)
- Remote interfaces: GPIB, RS-232 and Ethernet (VXI-11)

The IFF-45TS is an RF signal generator that provides support for AIMS Mark XIIA transponders and interrogators. It operates under remote control from a computer or ATE system and provides versatile signal generation and measurement capability of Mark XIIA system signals in bench and over-the-air applications. Typical applications include:

- Support for engineering development of Mark XIIA equipment (Mode 5)
- Manufacturing ATE for Mark XIIA equipment
- Support for AIMS 03-1000A and DO-181D certification testing
- Over-the-air testing of Mark XIIA equipment
- Test range to 3 km with appropriate antennas
- Ramp testing of installed equipment performance

SPECIFICATIONS

USER INTERFACE

Interfaces supported IEEE-488, RS232 and Ethernet (VXI-11)
PC Windows based GUI provided.

MODES OF OPERATION

Transponder Testing	1, 2, 3/A, C, S, 4, 5
Interrogator Testing	1, 2, 3/A, C, S, 4, 5
DME/TACAN Testing	G/A, INV G/A, BG/A, BA/A, A/A, INV A/A

SIGNAL GENERATOR

Frequency Range

955 to 1223 MHz, 10 KHz resolution

Output Amplitude

Direct Port

0.0 dBm to -110.0 dBm (into 50 Ω) in 0.1 dB increments

Accuracy @ 25° ± 5° C

0.0 dBm to -80.0 dBm ±0.5 dB
 <-80.0 dBm to -100 dBm ±[0.5 dB + 0.05 dB per dB below -80 dBm]²
 <-100.0 dBm ±[1.5 dB + 0.35 dB per dB below -100 dBm]²

Accuracy over full temp

0.0 dBm to -80.0 dBm ±1.0 dB
 <-80.0 dBm to -100 dBm ±[1.0 dB + 0.10 dB per dB below -80 dBm]²
 <-100.0 dBm ±[3.0 dB + 0.70 dB per dB below -100 dBm]²

Antenna Port

+30.0 dBm to -60.0 dBm (into 50 Ω) in 0.1 dB increments

Accuracy @ 25° ± 5° C

Power ≥ -30.0 dBm ±1.0 dB
 Power < -30.0 dBm ±[1.0 dB + 0.033 dB per dB below -30 dBm]²

Accuracy over full temp

Power ≥ -30.0 dBm ±2.0 dB
 Power < -30.0 dBm ±[2.0 dB + 0.066 dB per dB below -30 dBm]²

Pulse Formats

Transponder/Interrogator 1, 2, 3A, C, S

Secure Modes 4, 5

Modes 3/A, C, S comply with RTCA/DO-181C; Modes 1, 2, 4, 5 comply with DOD AIMS 03-1000A

DME/TACAN G/A, A/A, INVERSE G/A, INVERSE A/A, BEACON G/A, BEACON A/A

Pulse Position Deviations

XPDR ±1 μs

INT Non-Mode 5 ±1 μs

NT Mode 5 ±0.25 μs

Accuracy [XPDR/INT] ±10 ns

TACAN* ±12.0 μs

Accuracy [TACAN] ±50 ns

NOTES

¹Hence, for a power setting of -85 dBm, the accuracy will be ±[0.5 + 0.05*5], or ±0.75 dB, and for a power setting of -95 dBm, the accuracy will be ±[0.5 + 0.05*15], or ±1.25 dB

²As per example above

* Pulse overlap not allowed

Pulse Width Deviations

XPDR/INT ±0.5 μs

Accuracy [XPDR/INT] ±10 ns

TACAN ±5.5 μs

Accuracy [TACAN] ±50 ns

Pulse Amplitude

XPDR/INT +5 to -15 dB

TACAN ±5 to -15 dB

Interference Pulse characteristics (1 or 2 pulses)

Position 1st pulse relative to reference pulse

Offset range

XPDR -44 μs to 400 μs

INT -1 μs to 400 μs

Accuracy ±10 ns

Interference Pulse Spacing (multiple pulse interference mode)

Range 0 to the end of the 1st pulse range

Max 2nd pulse position 400 μs - 1st pulse position

Accuracy ±10 ns

Range Delay

Range

DME/TACAN -1 to 400.00 nmi in 0.01 nm steps

INT 0 to 400.00 nmi

Accuracy ±0.02 nmi ±0.00003% of simulated range

Diversity

Timing (either channel) 0 to ±1 μs, ±10 ns accuracy

Amplitude Variation ±20 dB between outputs for specified accuracy

Echo

DME/TACAN 30 nmi, fixed

Amplitude Variation +5 to -15 dB, relative to PI

Accuracy ±0.25 dB

Channel Signal Assignment

Transponder Test Top/Bottom

Interrogator Test Sum/Difference

TACAN Top/Bottom

Interrogation Generator

Independent/Unique Interrogations 1-12

Fixed Mode

SIF Mode 1-10000 PRF

Mode 5 1-1200 PRF

Mode S 1-2500 PRF

Mode 4 1-3500 PRF

Double/Supermode

Spacing between interrogations (slaved delay)	0-400 μ s
Pair generation rate	1-400 PRF
Supermode interrogations	2 interrogations

Burst Mode

Bursts/trigger	1-1000 or infinite
Interrogations/burst	1-2500
Interrogation rate (within a burst)	1-2500 PRF
Spacing between burst sequences	0.1-20 sec

Interlaced Mode

Interlace ratio	1:1 - 1:63
Group rate	1-400 PRF

Reply Generator

Independent/Unique Replies	1-12
Data and Range	Individually configured
Selectable Modes	1,2,3/A,C,S,4,5
Selectable Efficiency	1-100%

Spectral Purity Residual Level

Harmonics	
Direct	<50 dBc
Antenna	<40 dBc
Spurious (> modulation BW)	<60dBc, 350 - 1800 MHz
Phase Noise	<80 dBc/Hz @ 100 kHz

SIGNAL RECEIVER MEASUREMENTS

Frequency Range

1020 to 1155 MHz

Input Amplitude

Pulse Power Measurements	25 \pm 5° C	-10° to 55° C
Direct +30 dBm to +66 dBm	\pm 0.5 dB	\pm 1 dB
Antenna -40 to +30 dBm	\pm 1dB	\pm 2 dB
Resolution	0.01 dB	0.01 dB

Pulse to Pulse Spacing

XPDR/INT	
Non-Mode 5	\pm 0.3 μ s
Mode 5	\pm 0.0625 μ s
Accuracy	\pm 10 ns
TACAN	
Accuracy	\pm 50 ns

Pulse Width

XPDR/INT	
Accuracy	\pm 10 ns
TACAN	
Accuracy	\pm 50 ns

Reply Delay

Accuracy	\pm 20 ns
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Reply Delay Jitter

Accuracy	\pm 20 ns
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Frequency

Accuracy	\pm 50 KHz
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% Reply

Range	0-100% for each interrogation type
Resolution	0.0125% (for sample size = 8000)
Sample Size	1 - 8000 interrogations

SPECIFIC APPLICATION

TACAN/DME

Pulse Width

Range (50% to 50%)	3.5 μ s to 9.0 μ s
Accuracy	\pm 0.1 μ s

Ident

Variable	10 sec to 60 sec
Alphanumeric char.	1 to 8 [A to Z]

Bearing

Range	0° to 359.9° in 0.01° steps
Accuracy	\pm 0.05°
Rate	0° to 39° sec in 1° steps

Velocity

Range	0 to 9999 Kts in 1 Kt steps
Accuracy	\pm 0.001%

Squitter

Range	10 to 8000 Hz
Accuracy	10 Hz or 2%, whichever is greater
Distribution	Compliant with ARINC 568 @ 2700 Hz

Main Reference Burst

Adjustable Burst (all modes)	+1, +2, -1 or -2
Selectable	On/Off
X Channel	12 pulse pairs
Y Channel	13 single pulses
A/A (all channels)	10 single pulses
Accuracy	\pm 100 ns

Auxiliary Reference Burst

Adjustable Burst (all modes)	+1, +2, -1, or -2
X Channel	6 pulse pairs
Y Channel	13 single pulses
Accuracy	\pm 100 ns

TACAN Modulation

Range	0% to 39% in 1 Hz steps (15 Hz and 135 Hz separately adjustable)
Accuracy	\pm 1%
Distortion	<5% of either tone
A/A Interrogation Rate	0 to 3999 Hz in 1 Hz steps
Reply Efficiency	0 to 100% in 1% steps

Crypto Appliqué Compatibility

KIV-77 - AIMS Type B, Mode 4/5

KIV-78 - AIMS Type A, Mode 4/5

KIV-6 - Mode 4

KIT-1(A/C) / KIR-1(A/C) cables (external power cable)

Built-in Crypto Appliqué Function

Mode 4 Internal Crypto Simulator (standard)

Word A/B, C1 - C16

Mode 5 Internal Crypto Simulator (standard with options 1 and 3)

As defined by the U.S. Navy Mode 5 Program Office

INTERFACE SIGNALS

Analog Signal Ports (programmable output) 2

Programmable Sources Various
Level ± 1 V into 50 Ω

Trigger Out (front panel)

Programmable Source TX timing ref, RX detection
Level 3.3 V logic

Trigger In (front panel)

Functions Interrogation Trigger
Reply Trigger
Level 3.3 or 5 V logic

Programmable Outputs

15, rear panel, 3.3 V

Programmable Inputs

15, rear panel, 3.3 or 5 V

Suppression Out

Amplitude into 2 K Ω 12 V to 80 V
Variable Pulse Width 0.25 μ s - 300 μ s

Suppression In

Amplitude 24 V nominal
Impedance 2 K Ω
Action Inhibits response to incoming signal

GENERAL

Frequency/Time Reference

2.5 ppm composed of 1 ppm/year aging and 1 ppm accuracy over temp

External Reference Input

10 dBm nominal

Temp Range

-10° C to 55° C

Warmup (for specified accuracy)

45 minutes

Size

17.75" wide, 4" high, 21" deep
(45 cm x 10 cm x 53 cm)

Weight

24 lbs (10kg)

VSWR

Direct = 1.2:1 over frequency range
Antenna = 2.5:1 over frequency range

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
72438	IFF45TS Transponder Modes 1,2,3/A,4 (Internal Crypto),C,S (Mode 5 capable)
72439	IFF45TS-A Transponder Modes 1,2,3/A,4 (Internal Crypto),C,S

Ordering Numbers	Versions
83404	45TSOPT1 IFF Transponder Mode 5
83405	45TSOPT2 Interrogator Modes 1,2,3/A,C,S,4
83406	45TSOPT3 IFF Interrogator Mode 5 (requires option 2)
83407	45TSOPT4 DME/TACAN

Standard Accessories

PC Windows-based GUI

Getting Started Manual

Operation Manual (CD)

AC power cord

Optional Accessories

88631	45TSOPT6 KIV 77 adapter
89879	45TSOPT8 KIT/KIR-1A/C adapter
86075	45TSOPT9 KIV 78/KIV 6 adapter
63975	AC45TS-CNTR Touchscreen monitor/ controller
86931	UC-584 Universal Transponder Antenna Coupler

Extended Warranty

84363	Extended standard warranty 36 months with scheduled calibration
84364	Extended standard warranty 60 months with scheduled calibration

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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