Avionics

IFF-45TS Transponder/Interrogator/TACAN Bench Test Set

AEROFLEX
A passion for performance.

Optional controller shown

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

- AIMS Certified (All modes including Mode 5)
- 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
- Supports AIMS 04-900 Type B (KIV-77) Mode 4/5 cryptographic equipment
- Upgradeable to support AIMS 97-900 (external: KIT-1C, KIR-1C, KIT-1A, KIR-1A, KIV-6) Mode 4 cryptographic equipment or applique' AIMS 04-900 Type A (KIV-78).
- 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 sensitive receivers to allow for extended range over-the-air testing
- Can produce levels above MTL at up to 10,000 ft. (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 simulator 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-181C 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][1]*
<-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	*1,2,3/A,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	*Mode5*	*±0.25 μs*
	Accuracy [XPDR/INT]	*±10 ns*
*TACAN**		*±12.0 μs*
	Accuracy [TACAN]	*±50 ns*

Pulse Width Deviations

XPDR/INT		*±0.5 μs*
	Accuracy [XPDR/INT]	*±10 ns*
TACAN		*±5.5 μs*
	Accuracy [TACAN]	*±50 ns*

NOTES

*[1]Hence, 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*

[2]As per example above

** Pulse overlap not allowed*

Pulse Amplitude	
XPDR/INT	*+5 to -15 dB*
TACAN	*±5.5 μs*

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*
INT	*0 to 400.00 nmi*
Accuracy	*±0.05 nmi*

Diversity

Timing (either channel)	*0 to ±1 μs, ±10 ns accuracy*
Amplitude Variation	*±20 dB between outputs for specified accuracy*

Echo

Timing (either channel)	*0 to -1000 ns, <10 ns resolution, ±10 ns accuracy*
DME/TACAN	*30 nmi, fixed*
Amplitude Variation	*+5 to -15 dB, relative to PI*

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 μs*
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 ± 5° C	-10° to 55° C
Direct +30 dBm to +66 dBm	±0.5 dB	±1 dB
Antenna -40 to +30 dBm	±1dB	±2 dB
Resolution	0.01 dB	0.01 dB

Pulse to Pulse Spacing

XPDR/INT	
Non-Mode 5	±0.3 µs
Mode 5	±0.0625 µs
Accuracy	±10 ns
TACAN	±0.5 µs
Accuracy	±50 ns
Pulse Width	
XPDR/INT	±0.200 µs
Accuracy	±10 ns
TACAN	±0.5 µs
Accuracy	±50 ns
Reply Delay	
Accuracy	±20 ns
Reply Delay Jitter	
Accuracy	±20 ns
Frequency	
Accuracy	±50 KHz
% 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 µs to 9.0 µs
Accuracy	±0.1 µs
Velocity	
Range	0 to 9999 Kts
Accuracy	±0.001%
Acceleration	
Range	0 to 400 ft/s/s
Accuracy	±0.05% of setting
Squitter	
Range	10 to 8000 Hz
Accuracy	10 Hz or 2%, whichever is greater
Distribution	Compliant with ARINC 568 @ 2700 Hz

Secure IFF Compatibility

Appliqué Interface (standard)

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

Appliqué Interface (planned optional upgrade)

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

KIV-6 - Mode 4

External Crypto Interface (optional upgrade)

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

Mode 4 Internal Crypto Simulator (standard)

Word A/B

Mode 5 Internal Crypto Simulator (standard)

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 KΩ	12 V to 80 V
Variable Pulse Width	0.25 µs - 300 µs
Suppression In	
Amplitude	24 V nominal
Impedance	2 KΩ
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

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

Optional Accessories

64625	45TSOPT6 KIV 77 adapter
63974	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

Standard Accessories

PC Windows-based GUI

Getting Started Manual

Operation Manual (CD)

AC power cord

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

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