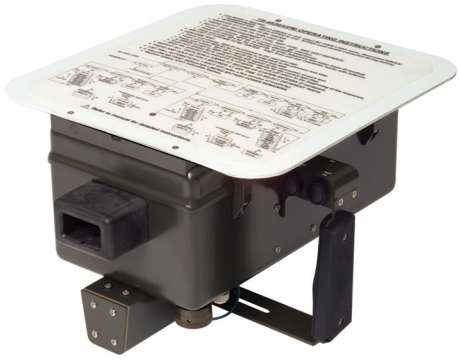
Avionics

TS-4530/UPM Interrogator/Transponder Test Set

NSN: 6625-01-483-7194



Easily accommodates a variety of aircraft, ground and ship platforms to test Transponder and Interrogator performance

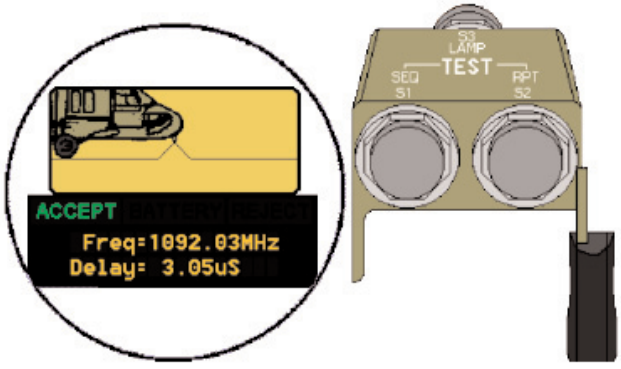
- Transponder Test Set Modes 1, 2, 3/A, C, 4, S
- Interrogator Test Set Modes 1, 2, 3/A, C, 4, S, TCAS, ETCAS
- Can be upgraded to Mode 5 testing capability (planned)
- Hand-held, Battery Powered and Lightweight (under 11 lb)
- One piece, 3-button point and shoot Go/No-Go Operation
- Self-diagnostic with extended calibration cycle
- Automated MTL measurement
- Parametric test results can be stored for immediate viewing or downloaded to PC for review or maintenance logging

The new AIMS certified TS-4530/UPM Test Set is a performance and capability upgrade to the popular AN/APM-424(V)2 "Star Wars" Test Set. The TS-4530/UPM is ruggedized and has passed all military environmental testing as specified in the MIL-STD.

Northrop Grumman licensed Aeroflex, to redesign the electronics inside the AN/APM-424(V)2 with the result being the new TS-4530/UPM. The TS-4530/UPM provides Interrogator and Transponder testing capability in a one-box test set, as well as growth to Mode 5.

The Mode S Interrogator/TCAS testing can provide as many as (8) different scenarios for testing TCAS systems.

The new TS-4530/UPM has the same point-and-shoot, easy-to-use operation as the 424(V)2. The small hand-held unit consists of an integrated mono-pulse antenna, electronics package and display unit. The antenna employs dual end-fire planar array elements mounted on the upper surface. The electronics package contains a transmitter, a two-channel digital receiver, DSP and FPGA based processing and control circuitry, power regulators and re-chargeable battery stick. All modulation and demodulation is done in the digital domain and results in a highly accurate and flexible ramp or bench test platform. The display unit consists of an LED alphanumeric display and an optical sight. The unit automatically adjusts both transmitter power and receiver sensitivity to the test environment. This permits the operator to set a distance of 10 to 150 feet for transponder testing and 30 to 70 feet for interrogator testing according to the unit being tested.



SPECIFICATIONS

USER INTERFACE

Display

16 character by 2 line alpha-numeric LED, 0.18" character height with green Accept, red Reject and yellow Battery indicators

Controls

3 buttons: test sequence advance, test sequence repeat and test result data

MODES OF OPERATION

TRANSPONDER TESTING

Test Range

10 to 150 ft.

1,2,3A - displays code, identification and emergency status

C - displays altitude

4 - stand alone operation, but must be filled with challenge video patterns from COMSEC, displays code A or B and verification bit status

S - Interrogates with: UF0, UF11 (all call), UF4(altitude), UF4 asking for DF20 containing AIS, UF5(Identity), UF5 asking for DF21 containing Datalink capability report, DF16(long TCAS surveillance)

Capable of upgrade to add IFF mode 5.

INTERROGATOR TESTING (INCLUDING TCAS)

Test Range

30 to 70 ft.

Static Targets

1 - responds with 12

2 - responds with 1202

3/A - responds with 1203 (4096 code)

C - responds with configurable altitude

4 - requires KIT or KIV to operate

S - Replies to: UF11(all call),UF0 (short TCAS surveillance), UF16 (long TCAS surveillance), UF4 (altitude), UF5 (Identity), UF20 (long altitude), UF21 (long identity)

Measures interrogation rate

Capable of upgrade to add IFF mode 5

Dynamic Target Scenarios

Level - Intruder closing level at configured altitude

Above - Intruder closing level 2000 ft. above configured altitude

Dive - Intruder closing from 5000 ft. above descending to configured altitude

Climb - Intruder closing from 5000 ft. below climbing to configured altitude

Intruder starts at 15 nmi distance from UUT, ends at approx. 0 nmi

Closing speed fixed at 720 knots

Configured altitude is 0-20,000 ft.

Target Simulation

Multiple 4, 8, 16, 32, 64, 128, and 256 nmi

Single 4 nmi, IDENT On/Off, EMERG On/Off

ANTENNA

(End-fire antenna with sum and difference feeds)

Interrogation Beamwidth

Approximately ±5 degrees

Polarization

Vertical

DIRECT CONNECTION PORT

Impedance

50 Ω

SWR

1.3:1 maximum

Connector

TNC

POWER SUPPLY

Operating Modes

Unit operates either from external DC input power or internal batteries

External DC Input

11.5 to 28 V DC input, 25 W maximum

Surge Protection

MIL-STD-704E figure 9 (50 volts peak for 12.5 ms, then reducing linearly to 29 V over 70 ms)

Reverse Polarity

-30 volts maximum

Battery Compatibility

Replaceable internal batteries, disassembly of unit is not required.
Reverse polarity protected
NiCAD re-chargeable battery assy, 7.2 volt DC nominal
Compatible with commercial 'C' size NiCAD, NiMH or alkaline batteries

Int. Battery Charger

Operates from external DC input

Full re-charge time within 8 hours from fully discharged state (actual charge time depends on level of discharge). Battery will charge with unit operating unless an external COMSEC is connected.

Automatic charge termination when fully charged

Automatic charge restriction to 0 to +40ºC nominal battery temperature range

Safety charge termination at +85ºC nominal battery temperature range

Low Battery Indication

Display indicates "BATTERY" when less than 20 % capacity remains, flashes "BATTERY" at slow rate when less than 5% capacity remains, flashes at high rate when battery is too low to run tests.

Discharge Protection

Test set automatically shuts off to prevent excessive battery discharge.

SIGNAL GENERATOR

Generator Frequency

1030 or 1090 ±0.01 MHz

Generator Power

+4 to -44 dBm, 1dB resolution, ±1.5 dB accuracy at antenna connector, +/- 2dB radiated antenna field strength -40 to -88 dBm, 1 dB resolution, ±1.5 dB accuracy at direct port

Pulse Shape and Timing

Modes 3/A, C, S comply with RTCA/DO-181C, mode 1, 2, 4 comply with DOD AIMS 97-1000

ISLS Amplitude

Equal to P1 on difference or sum ports when enabled

Interrogation Rate (transponder test mode)

Modes 1,2,3/A,C,4	*235 +/- 5 Hz*
Mode S	*50 +/- 5 Hz*

Harmonics

2nd and 3rd harmonic >30 dBc

Spurious

Applies at greater than 60 MHz from TX center frequency, -50 dBm maximum in standby / 50 dBc or -50 dBm max in transmit when measured at the antenna connection

MEASUREMENT RECEIVER

GENERAL

Frequency Range

1090 or 1030 MHz

Amplitude Range

+68 to +20 dBm at direct port, +24 to -24 dBm at antenna port

Input Protection

(1 µs pulse width, 1% max duty cycle)

Direct Input

+68 dBm

Antenna Input

+30 dBm at antenna connection

RECEIVER MEASUREMENTS

Received Power

1 dB resolution, ±1.5 dB accuracy at antenna port, ±1.5 dB at direct port, +/- 2dB antenna field strength

Method

Peak power of pulse obtained using 100 ns averaging period

Frequency

0.01 MHz resolution +/-0.10 MHz accuracy with >400 ns pulse width (transponder mode)
+/-0.05 MHz accuracy with >750 ns pulse width (interrogator mode)

Method

Average frequency between 90% points

Frequency Range

Within ±5 MHz of nominal for specified accuracy of amplitude and frequency measurements

Pulse Spacing

±25 ns measured between leading edges for pulses with rise times <100 ns

Pulse Width

±25 ns for pulses with rise times of 50 to 100 ns, fall times of 50 to 200 ns

Receiver Bandwidth

>10 MHz at 3 dB points

Oscillator Leakage

-50 dBm maximum at antenna connection

Image Rejection

>40 dBc

COMSEC INTERFACE

Connector

Accessory interface cable or adapter provides the required interface connector.

Compatibility

KIR-1A /1C, KIT-1A/1C, KIV-3 /6 with appropriate cable or adapter

Power for COMSEC

KIT-1A / KIR-1A	*External 115 V AC provided through KIT/KIR-1A interface cable (JPN: 55-1045-16)*
KIT-1C / KIR-1C	*22 to 29 V DC at 3 watts max. (provided by the test set)*
KIV-6	*15 +/- 0.75 V DC at 200 mA max. (provided by the test set)*

TEST PARAMETERS

Correct Reply Code

Indicates reply code

Correct Pulse Timing

Displays pulse spacing error or pulse width error

Percent Reply

Indicates % reply

Receiver Sensitivity

Displays MTL in dBm

Transmitter Power

Displays dBm

Transmitter Frequency

Displays frequency

Mode 4 Word

Indicates presence of A or B word

VER BIT 1 Word

Indicates presence of A1 or B1 word

Reply Delay

Displays in µs

ISLS Operation

Indicates % reply

Identify Response

Indicates presence

Emergency Response

Indicates presence

Angle Reflection

Indicates unacceptable levels of multi-path interference

Umbilical Testing

Connector provided for direct connection to transponder

Mode S Testing

Supports the RF link portion of the installed equipment performance requirements of DO-181C and ED-73A (Additional equipment is required to simulate aircraft pressure altitude for the altitude reporting verification.)

ENVIRONMENTAL

Physical Dimensions: (Test set without accessories)

Length 14.1 inches / 358 mm
Height 7.5 inches / 190 mm
Width 11.5 inches / 292 mm
Weight 10 lbs. / 4.55 kg (with battery)

Temperature

-40 °C to +55 °C operating, -55ºC to + 85ºC storage

Humidity

To 100%, rain exposure acceptable

Altitude

Less than 15,000 ft operating, 50,000 ft storage

Shock

12-inch drop without protection, 1-m drop in transit case

Vibration

5 g, 5 Hz to 55 Hz in transit case

EMI / RFI MIL-STD-461E

CE101 Power Leads, 30 Hz to 10 kHz

CE102 Power Leads, 10 kHz to 10 MHz

CS101 Power Leads, 30 Hz to 150 kHz

CS114 Bulk Cable Injection, 10 kHz to 200 MHz

CS115 Bulk Cable Injection, Impulse

CS116 Cables & Power Leads, Damped Sinusoidal Transients

RE101 Magnetic, 30 Hz to 100 kHz

RE102 Electric, 10 kHz to 18 GHz (RX and TX standby)

RE103 Antenna Spurious and Harmonics, 10 kHz to 40 GHz (TX active)

EXCEPTION: -50 dBc spurious limit, transmit harmonic levels are not required to be lower than 10 dB above the RE102 transmit standby limits.

RS101 Magnetic, 30 Hz to 100 kHz

RS103 Electric, 2 MHz to 18 GHz, 50 V/m

EXCEPTION: does not apply within 10% of RX and TX operating frequency

ACCESSORY SPECIFICATIONS

EXTERNAL POWER SUPPLY

Temperature

0 to +40 C

Altitude

Less than 2,000 m operating

Humidity

10 to 80% non-condensing, indoor operation only

Weight

1 lbs. / 0.45 kg

Input Voltage

100 to 240 V AC +/- 10%

Input Current

1.0 A AC Max

Frequency

47 to 63 Hz

Input Connector

IEC 320 3 pin receptacle, 6' (USA standard line cord provided)

Output Connector

6 ft / 1.8 meter cable with 5.5 x 2.5 x 9.5 mm barrel connector

Output Voltage

+12 V DC nominal

Output Current

2.0 ADC nominal

EMC

FCC class B, CISPR 22 class B

Approvals

UL, CE

EXTERNAL BATTERY CHARGER

Temperature

0 to +40ºC

Altitude

Less than 2,000 m operating

Humidity

10 to 80% non-condensing, indoor operation only

Weight

1 lbs. / 0.45 kg

Size

12.2" L x 2" H x 3.3” W

Functions

Charges or discharges one battery stick

Power Source

Requires connection to supplied AC Adapter, 12 V DC ±0.5 V, 2 A min, 4 A max.

Input Connector

Accepts 5.5 x 2.5 x 9.5 mm barrel connector

Charge Time

3 hours maximum for 3 AH battery, dependent on battery charge state

Automatic shut off when fully charged

Discharge Rate

700 mA typical, automatic shut off when discharged

EXTERNAL DC CABLE

Supply Connector

Banana Plugs

Unit Connector

5.5 x 2.5 x 9.5 mm barrel connector

Length

6 ft / 1.8 meter

Weight

0.22 lb / 0.1 kg

UMBILICAL RF CABLE

Length

12 ft / 3.6 meters

Connectors

TNC male right angle, TNC male straight
TNC female to N male adapter included

Weight

0.5 lb. / 0.25 kg

KIT/KIR-1C CABLE (JPN: 55-1045-10)

Supported COMSEC

KIT-1C / TSEC, KIR-1C / TSEC

Length

4 ft / 1.2 meters

Weight

2 lbs. / 0.9 kg

RS-232 Connector

9 pin D sub female

External DC Connector

Accepts 5.5 x 2.5 x 9.5 mm barrel connector

KIT/KIR Power

28 volt nominal at 3 watts max supplied from test set

RS-232 CABLE

Connectors

9 pin D sub male / female

Length

5 ft

Weight

0.22 lb / 0.1 kg

AUTOMOTIVE DC ADAPTER CABLE

Length

10 ft / 3 meters

Compatibility

21 mm or 22.2 mm sockets

Fuse

3AG 250 V 3 A

KIV-6 ADAPTER (OPTIONAL)

Mounting

Attaches to handle and circular connector

Size

7in. L x 5in. H x 5in. W / 175 x 125 x 125 mm maximum

Weight

1.5 lb. / 0.7 kg max without KIV-6

Humidity

To 100% , Rain Exposure Acceptable

RS-232 Connector

9 pin D sub female

External DC Connector

Accepts 5.5 x 2.5 x 9.5 mm barrel connector

BATTERY STICK

Type

High Capacity Rapid Charge NiCad

Voltage

7.2 volts DC nominal

Capacity

3 amp hour at +25ºC nominal

Temperature

Operating -20 to +55ºC recommended. Will operate at -40ºC with 25% of +25ºC capacity and degraded cycle lifetime

Storage -55 to +85ºC

Re-charging 0 to +40ºC

Weight

1.5 lbs.

TRANSIT CASE

Type

Watertight sealed enclosure with pressure release valve

Size

Length 26.8 inches / 681 mm
Height 12.25 inches / 312 mm
Width 13.25 inches / 337 mm

Weight

Empty: 16 lbs./ 7.3 kg
Full: 36 lbs. / 16.4 kg

BENCH UTILITY SOFTWARE

Function

Allows download, viewing, and saving test data from test set.

Compatibility

Microsoft Windows 95, 98, 2000, XP, NT 4.x

Format

CD ROM

KIV-6 ADAPTER

The KIV-6 adapter can be used with a KIV-6 crypto appliqué to test both transponders and interrogators. For transponder testing with the TS-4530/UPM Radar Test Set, the KIV-6 adapter is used to connect the KIV-6 COMSEC to the test set during code load programming. The adapter provides the following:

· Interface between the test set and KIV-6 during Mode 4 interrogator testing

· 15Vdc to power the KIV-6

· A connector for external DC power to operate the test set and charge the batteries

· An RS-232 connector to allow an external PC to be connected to the test set

The TS-4530/UPM Test Set supplies power through the KIV-6 adapter to the COMSEC for code loading. This eliminates the need for a 15VDC or 115VAC source during code loading. The power supply is enabled by the test set during code loading and supplies 15VDC at up to 5 watts. In addition, the supply provides power to the KIV-6 COMSEC when attached during interrogator testing.

VERSIONS, OPTIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers

TS-4530/UPM-70 Interrogator/Transp. Test Kit, JPN 50-1045-70

Included with kit:

TS-4530/UPM Test Set, NSN: 6625-01-483-7194

COMSEC cable for KIT/KIR-1C

Transit case with pressure release valve

External battery charger

AC Power adapter - 115V to 230V, 50Hz to 400Hz

(2) Battery Sticks

Operator Training CD-ROM, Bench Utility CD-ROM

r-f Direct connect cable

r-f adapter

Calibration Certificate - Calibration interval (5) years

DC Power Cable

RS-232 cable

OPTIONAL ACCESSORIES

AC55104516	COMSEC cable w/ power adptr for KIT-1A or KIR-1A
AC55104513	COMSEC adapter for KIV-6
AC55104518	Cable, Automotive DC adapter
AC600694C0	TIBS (Trans/Inter Bench Software) CD-ROM

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.

FINLAND
Tel: [+358] (9) 2709 5541
Fax: [+358] (9) 804 2441

FRANCE
Tel: [+33] 1 60 79 96 00
Fax: [+33] 1 60 77 69 22

GERMANY
Tel: [+49] 8131 2926-0
Fax: [+49] 8131 2926-130

INDIA
Tel: [+91] 80 5115 4501
Fax: [+91] 80 5115 4502

KOREA
Tel: [+82] (2) 3424 2719
Fax: [+82] (2) 3424 8620

SCANDINAVIA
Tel: [+45] 9614 0045
Fax: [+45] 9614 0047

SPAIN
Tel: [+34] (91) 640 11 34
Fax: [+34] (91) 640 06 40

UK Burnham
Tel: [+44] (0) 1628 604455
Fax: [+44] (0) 1628 662017

UK Cambridge
Tel: [+44] (0) 1763 262277
Fax: [+44] (0) 1763 285353

UK Stevenage
Tel: [+44] (0) 1438 742200
Fax: [+44] (0) 1438 727601
Freephone: 0800 282388

USA Wichita
Tel: [+1] (316) 522 4981
Fax: [+1] (316) 522 1360
Toll Free: 800 835 2352

USA New Century
Tel: [+1] (913) 764 2452
Fax: [+1] (913) 782 5104

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A passion for performance.

www.aeroflex.com

info-test@aeroflex.com

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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