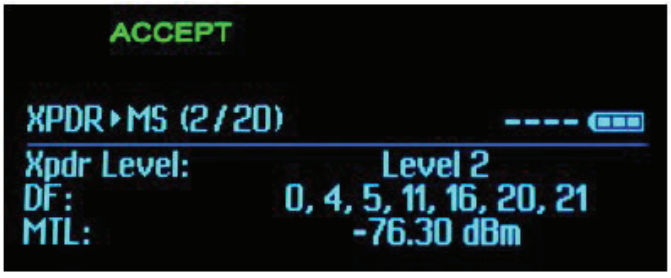
APM-424(V)4

Interrogator/Transponder Test Set (Including Mode S ELS/EHS) (NSN: 6625-01-600-6784)

Easily accommodates a variety of aircraft, ground and ship platforms to test Transponder and Interrogator performance including Mode S Elementary and Enhanced Surveillance

The APM-424(V)4 is a performance and capability upgrade to the TS-4530 and APM-424 test sets. The APM-424(V)4 is fully compliant with DoD AIMS standards for testing Mark XIIA performance of Mode 4 equipment, DO-260B ADS-B Out performance, and ICAO Annex 10 international standards for Mode S ELS/EHS performance.

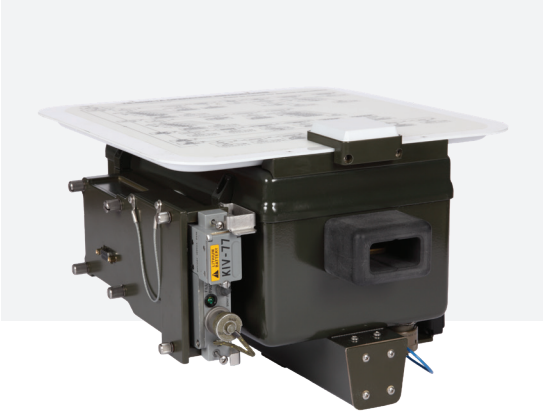
The APM-424(V)4 closely replicates legacy operation for utilization of existing procedures, making the APM-424(V)4 a cost effective, highly accurate upgrade to fielded test sets.



The 20-character 4-line display provides for easily viewable data and parametric measurements as required for Mode S Elementary and Enhanced Surveillance testing. For legacy test modes, the menu structure and displayed data format have been retained so that minimal changes are required of fielded procedures.

Key Features

- Transponder Test Set Modes 1, 2, 3/A, C, 4, S (including ELS and EHS)
- Interrogator Test Set Modes 1, 2, 3/A, C, 4, S, TCAS, ETCAS
- DO-260B compliant; ADS-B Out test capability
- Mode 5 upgradable
- Hand-held, battery powered and l ightweight (<11 lbs)
- One piece, 3-button point and shoot Go/No-Go operation
- Self-diagnostic
- Automated MTL measurement
- Parametric test results can be stored for downloading to a PC for review or maintenance logging
- TS-4542 shipboard interrogator test capability



Specifications

User Interface	
Displays	Internal: 20 character by 4 line alpha-numeric OLED, 0.197" font height with green Accept, red Reject and battery status 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.
Test Capability	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. Requires KIR or KIV with adapter to operate.
	S - Interrogates with: UF0, UF11 (all call), UF4 (altitude), UF5 (identity), UF4 asking for DF20 (altitude), UF5 asking for DF21 (identity), containing Datalink capability report, DF16 (long TCAS surveillance) Decodes and displays Mode S ELS DAP's BDS 1,0 Data Link Capability Report: Subnet Version, DTE, GICB Report, SI Capability, Specific Services Capability, Squitter Capability, Cont Flag, Aircraft ID Capability, UELM Capability, DELM Capability. BDS 1,7 Common Usage GICB Report BDS 1,8-1,C Specific Services Report BDS 2,0 Aircraft Identification Flight ID BDS 3,0 ACAS Resolution Advisory: RAT, RAC, ARA & EHS DAP's BDS 4,0 Vertical intention: MCP/FCU Alt BDS 5,0 Track and Turn: True Track Angle, Ground Speed, Track Angle Rate, Roll Angle BDS 6,0 Heading & Speed: Mach Nbr, Baro Alt Rate, Magnetic Heading, Indicated Air Speed
ADS-*B*	
DO-260B compliant, ADS-B Out	
Interrogator Testing (Including TCAS)	
Test Range	30 to 200 ft.
Static Targets	1 - responds with 1200
	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	PRF (Pulse Repetition Frequency)

Specifications continued

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, Pilotless
Group	12 targets 2 nmi apart, starting at 4 nmi
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 max
Connector	TNC

Note: All over-the-air and direct connection port testing use identical test criteria to allow easy data comparison when evaluating or testing an installation.

Specifications continued

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 max.
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 max.
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
Internal 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	Battery fuel gauge indicates battery status
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, 1 dB resolution, ±1.5 dB accuracy at antenna connector
	±2 dB 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-181D, Modes 1, 2, 4 comply with NATO STANAG 4193 Part V & DOD AIMS 03-1000A
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 max. in standby; 50 dBc or -50 dBm max. in transmit when measured at the antenna connection

Specifications continued

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, ±2 dB 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 max. 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-6 with appropriate cable or adapter
Power for COMSEC	KIT-1A/KIR-1A - External 115 VAC provided through KIT/KIR-1A interface cable
	KIT-1C/KIR-1C: 22 to 29 VDC at 3 W max. (provided by test set)
	KIV-6: 15 ±0.75 VDC at 200 mA max. (provided by test set)

Specifications continued

Test Parameters	
Reply Code	Indicates reply code
	M1/M2/M3A: 4096 code
	MC: Altitude in ft.
	MS: 4096 code
Pulse Spacing (Interrogator)	Displays µs
	M1/M2/M3A/MC: P1, P3
	MS: P1, B56
	M4: P1, P4
Pulse Width (Interrogator)	Displays µs
	M1/M2/M3A/MC: P1, P3
	MS: P1, P6
	M4: P1, P4
Pulse Spacing (Transponder)	Displays µs
	M1/M2/M3A/MC: F1, F2
	MS: P1, B56
	M4: R1, R3
Pulse Width (Transponder)	Displays µs
	M1/M2/M3A/MC: F1, F2
	MS: P1, B56
	M4: R1, R3
Percent Reply	Indicates % reply
Receiver Sensitivity (Transponder)	Displays MTL in dBm
Receiver Sensitivity (Interrogator)	Tests MDL margin 0 to -12 dB
Interrogation Rate	Displays Hz
Transmitter Power (Interrogator)	Displays dBm
	M1/M2/M3A/MC: P1, P3
	MS: P1, B56
	M4: P1, P4
Transmitter Power (Transponder)	Displays dBm
	M1/M2/M3A/MC: F1, F2
	MS: P1, B56
	M4: R1, R3
Transmitter Frequency (Interrogator)	Displays MHz
	M1/M2/M3A/MC: P1, P3
	MS: P1, B56
	M4: P1, P4
Transmitter Frequency (Transponder)	Displays MHz
	M1/M2/M3A/MC: F1, F2
	MS: P1, B56
	M4: R1, R3
Squitter	Displays
	MS: DF11 Acquisition (sec)
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
Pilotless 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-181D and ED-73A (Additional equipment is required to simulate aircraft pressure altitude for the altitude reporting verification.) Decodes and displays ELS and EHS data.

Accessory Specifications

Ac Power Adapter	
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
Input Voltage	100 to 240 VAC ±10%
Input Current	1.0 A AC max.
Frequency	47 to 63 Hz
Input Connector	IEC 320 3 pin receptacle, 6 ft. (USA standard line cord provided)
Output Connector	6 ft./1.8 m 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 max. 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
DC Power Cable	
Supply Connector	Banana plugs
Unit Connector	5.5 x 2.5 x 9.5 mm barrel connector
Length	6 ft./1.8 m
Weight	0.22 lb./0.1 kg

Accessory Specifications continued

RF Direct Connect Cable	
Length	12 ft./3.6 m
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 COMSEC Cable	
Supported COMSEC	KIT-1C/TSEC, KIR-1C/TSEC
Length	4 ft./1.2 m
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 W max. supplied from test set
KIT/KIR-1A COMSEC Cable	
Supported COMSEC	KIT-1A/TSEC, KIR-1A/TSEC
Length	4 ft./1.2 m
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	115 V AC, 400 Hz supplied externally
RS-232 Serial Data Cable	
Connectors	9 pin D sub-male/female
Length	5 ft./1.5 m
Weight	0.22 lb./0.1 kg
KIV-6 Adapter	
Mounting	Attaches to handle and circular connector
Size	7" L x 5" H x 5" W/175 x 125 x 125 mm max.
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

Accessory Specifications continued

Automotive DC Adapter Cable	
Length	10 ft./3 m
Compatibility	21 mm or 22.2 mm sockets
Fuse	3 AG 250 V 3 A
Battery Stick	
Type	High Capacity Rapid Charge NiCad
Voltage	7.2 V DC nominal
Capacity	3 amp hour at +25º C nominal
Temperature	Operating -20 to +55º C recommended. Will operate at -40ºC with 25% of +25º C capacity and degraded cycle lifetime
	Storage -55 to +85º C
	Re-charging 0 to +40º C
Weight	1.5 lbs./0.7 kg
Transit Case	
Type	Watertight sealed enclosure with pressure release valve
Size	Length 26.25"/667 mm
	Height 16.75"/425 mm
	Width 16.00"/406 mm
Weight	Empty 16 lbs./7.3 kg
	Full 38 lbs./17.3 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
Environmental	
Physical Dimensions: (Test set without accessories)	Length 14.1"/358 mm
	Height 7.5"/190 mm
	Width 11.5"/292 mm
	Weight 12.25 lbs./5.6 kg (with battery)
Temperature	-40° C to +55° C operating, -55º C to + 85º C storage
Relative Humidity	To 100% for at least 6 hours
Splash Proof	Rain at 1.8 inches per hour and the wind velocity is at least 20 miles per hour (mph), for a period of no less than 60 minutes
Altitude	4,600 meters operating, 50,000 ft. storage

Accessory Specifications continued

Shock Transit	36 inch drop in transit case
Shock High Impact	36 inch drop
Shock Functional	30 G 11 ms half sine
Random Vibration	10 Hz to 2000 Hz/60 mins per axis
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

Versions, Options and Accessories

Order Number	Description
87866	APM-424(V)4 Interrogator/Transponder Test Set w/ ELS/EHS (NSN: 6625-01-600-6784)
Factory upgrade kits for existing units COMSEC adapters sold separately)	
67197	Kit, upgrade TS-4530 or AN/APM-424(V)3 to APM-424(V)4
86738	Kit, upgrade TS-4530 or APM-424(V)3 to APM-424(V)5
88573	Kit, upgrade APM-424(V)4 to APM-424(V)5
88572	Kit, upgrade TS-4530-1 to APM-424(V)5
Standard Accessories	
10246	Wheeled transit case with pressure release valve
58077	COMSEC cable - KIT/KIR-1C (55-1045-10)
58078	RF direct connect cable (55-1045-11)
58081	RS-232 serial data cable (55-1045-15)
38589	RF adapter (30-0225-01)
11492	AC power adapter (15-0360-MO)
58080	DC power cable (55-1045-14)
905	External battery charger (01-1045-10)
47621	Battery sticks (2) (43-0012-00)
88974	Getting Started manual
88470	Operators manual (CD)
67468	Bench utility software (CD)
6154	Battery instruction sheet
	Calibration certificate
Optional Accessories	
58082	Cable, KIT/KIR-1A (55-1045-16)
67474	Tripod
138331	Tripod, heavy duty
58084	Automotive DC adapter cable (55-1045-18)
86633	Bench utility with field maintenance (CD)
88568	Maintenance manual (CD)
84357	Extended warranty 3 Years w/ scheduled calibration
84358	Extended warranty 5 Years w/ 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.

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