

## User Interface

### Displays

Internal: 20 character by 4 line alpha-numeric OLED, 0.197" character 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.
- 5 - Housing for 04-900A Option A and B; Requires Mode 5 crypto appliqué to operate.

Interrogates with Mode 5 Level 1 Formats 0-9, decodes and displays:

M1/M2 Reply Data: M1 Code, M2 Code, X pulse, Emerg/Ident

M3/MC Reply Data: M3 Code, MC Altitude in ft., X pulse, Emerg/Ident

PIN Reply Data: PIN, National Origin, X pulse, Emerg/Ident

Interrogates with Mode 5 Level 2 Formats 16-23, decodes and displays:

M1/M2 Report Data: M1 Code, M2 Code, X pulse, Emerg/Ident, Latitude, Longitude, Altitude in ft.

M3/MC Report Data: M3 Code, MC Altitude in ft., X pulse, Emerg/Ident, Latitude, Longitude, Altitude in ft.

PIN Report Format (0000): PIN, National Origin, X pulse, Emerg/Ident, Latitude, Longitude, Altitude in ft.

PIN Report Format(0011): PIN, National Origin, Platform Type, FOM, X pulse, Emerg/Ident, Latitude, Longitude

PIN Report Format(0100): PIN, GNSS/Baro Altitude in ft., National Origin, FOM, X pulse, Emerg/Ident, Latitude, Longitude, Altitude in ft.

S - Interrogates with: UFO, 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 Mode 4 crypto appliqué to operate

5 - Requires Mode 5 crypto appliqué to operate. Replies to Mode 5 Level 1 Formats 0-9 and Level 2 Formats 16-23.

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

**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.

**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 +40°C nominal battery temperature range.

Safety charge termination at +85°C 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, 5 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,4,5	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

## 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  $\mu$ s pulse width, 1% max duty cycle

#### Direct Input

+68 dBm

#### Antenna Input

+30 dBm at antenna connection

### Receiver Measurements

#### Power<sup>1</sup>

1 dB resolution,  $\pm 1.5$  dB accuracy at antenna port,  $\pm 1.5$  dB at direct port,  $\pm 2$  dB antenna field strength

Peak power of pulse obtained using 100 ns averaging period

#### Frequency<sup>1</sup>

0.01 MHz resolution  $\pm 0.10$  MHz accuracy with  $>400$  ns pulse width (transponder mode)

$\pm 0.05$  MHz accuracy with  $>750$  ns pulse width (interrogator mode)

Average frequency between 90% points

#### Pulse Spacing

$\pm 25$  ns measured between leading edges for pulses with rise times  $<100$  ns

#### Pulse Width

$\pm 25$  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

#### Applique Housing/Interface

Interchangeable side mounted housings to support the following Cryptographic computers:

04-900A Option A (KIV-78 / KIV-6)

04-900A Option B (KIV-77)

Note 1 - Within  $\pm 5$  MHz of nominal for specified accuracy of amplitude and frequency measurements

### Circular Connector Interface

Supports KIR-1A/1C, KIT-1A/1C and 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.<sup>2</sup>

KIV-6: 15  $\pm 0.75$  VDC at 200 mA max.<sup>2</sup>

KIV-77: +5 VDC, 2.2 W<sup>2</sup>

KIV-78: 15  $\pm 1.0$  VDC at 200 mA max.<sup>2</sup>

### Timekeeping

Internal Real Time Clock,  $\pm 3.5$  ppm accuracy

Internal GPS receiver for UTC synchronization of Real Time Clock

## Test Parameters

### Reply Code

Indicates reply code

M1/M2/M3A: 4096 code

MC: Altitude in ft.

MS: 4096 code

M5 (M1/M2/M3A/MC): 4096 code

### Pulse Spacing (Interrogator)

Displays  $\mu$ s

M1/M2/M3A/MC: P1, P3

MS: P1, P6

M4: P1, P4

M5: P1, P4 & P4, D11

### Pulse Width (Interrogator)

Displays  $\mu$ s

M1/M2/M3A/MC: P1, P3

MS: P1, P6

M4: P1, P4

### Pulse Spacing (Transponder)

Displays  $\mu$ s

M1/M2/M3A/MC: F1, F2

MS: P1, B56

M4: R1, R3

M5: Level 1: P1, P2 and P1, P4

Level 2: P1, P4 and P4, D33

### Pulse Width (Transponder)

Displays  $\mu$ s

M1/M2/M3A/MC: F1, F2

MS: P1, B56

M4: R1, R3

Note 2 - Power provided by the test set

**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, P6*

*M4: P1, P4*

*M5: P1, D11*

**Transmitter Power (Transponder)**

*Displays dBm*

*M1/M2/M3A/MC: F1, F2*

*MS: P1, B56*

*M4: R1, R3*

*M5: Level 1: P1, D9*

*Level 2: P1, D33*

**Transmitter Frequency (Interrogator)**

*Displays MHz*

*M1/M2/M3A/MC: P1, P3*

*MS: P1, P6*

*M4: P1, P4*

*M5: P1, D11*

**Transmitter Frequency (Transponder)**

*Displays MHz*

*M1/M2/M3A/MC: F1, F2*

*MS: P1, B56*

*M4: R1, R3*

**Squitter**

*Displays*

*M5: Level 2 squitter period (ms)*

*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  $\mu$ s*

**ISLS Operation**

*Indicates % reply*

**Identify Response**

*Indicates presence*

**Emergency Response**

*Indicates presence*

**Pilotless 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 5 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.*

**Mode 5 Testing**

*Indicates correct reply format as defined in NATO STANAG 4193 Part V and AIMS 03-1000A. Decodes, displays Level 1 ID & DATA reply types and Level 2 PIN, M1/M2 & M3/Altitude report types.*

**Accessory Specifications**

**AC Power Adapter**

<b>Temperature</b>	0 to +40°C
<b>Altitude</b>	Less than 2,000 m operating
<b>Humidity</b>	10 to 80% non-condensing, indoor operation only
<b>Weight</b>	1 lbs./0.45 kg
<b>Input Voltage</b>	100 to 240 VAC $\pm$ 10%
<b>Input Current</b>	1.0 A AC max.
<b>Frequency</b>	47 to 63 Hz
<b>Input Connector</b>	IEC 320 3 pin receptacle, 6 ft. (USA standard line cord provided)
<b>Output Connector</b>	6 ft./1.8 m cable with 5.5 x 2.5 x 9.5 mm barrel connector
<b>Output Voltage</b>	+12 V DC nominal
<b>Output Current</b>	2.0 ADC nominal
<b>EMC</b>	FCC class B, CISPR 22 class B
<b>Approvals</b>	UL, CE

### External Battery Charger

<b>Temperature</b>	0 to +40° C
<b>Altitude</b>	Less than 2,000 m operating
<b>Humidity</b>	10 to 80% non-condensing, indoor operation only
<b>Weight</b>	1 lbs./0.45 kg
<b>Size</b>	12.2" L x 2" H x 3.3" W
<b>Functions</b>	Charges or discharges one battery stick
<b>Power Source</b>	Requires connection to supplied AC Adapter, 12 V DC ±0.5 V, 2 A min, 4 A max.
<b>Input Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector
<b>Charge Time</b>	3 hours max. for 3 AH battery, dependent on battery charge state Automatic shut off when fully charged
<b>Discharge Rate</b>	700 mA typical, automatic shut off when discharged

### DC Power Cable

<b>Supply Connector</b>	Banana plugs
<b>Unit Connector</b>	5.5 x 2.5 x 9.5 mm barrel connector
<b>Length</b>	6 ft./1.8 m
<b>Weight</b>	0.22 lb./0.1 kg

### RF Direct Connect Cable

<b>Length</b>	12 ft./3.6 m
<b>Connectors</b>	TNC male right angle, TNC male straight  TNC female to N male adapter included
<b>Weight</b>	0.5 lb./0.25 kg

### KIT/KIR-1C COMSEC Cable

<b>Supported COMSEC</b>	KIT-1C/TSEC, KIR-1C/TSEC
<b>Length</b>	4 ft./1.2 m
<b>Weight</b>	2 lbs./0.9 kg
<b>RS-232 Connector</b>	9 pin D sub-female
<b>External DC Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector
<b>KIT/KIR Power</b>	28 volt nominal at 3 W max. supplied from test set

### KIT/KIR-1A COMSEC Cable

<b>Supported COMSEC</b>	KIT-1A/TSEC, KIR-1A/TSEC
<b>Length</b>	4 ft./1.2 m
<b>Weight</b>	2 lbs./0.9 kg
<b>RS-232 Connector</b>	9 pin D sub female
<b>External DC Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector
<b>KIT/KIR Power</b>	115 V AC, 400 Hz supplied externally

### Option A (KIV-78/KIV-6/QRTK6 NG Adapter)

<b>Mounting</b>	Attaches to the 78 pin D sub female crypto interface adapter
<b>Size</b>	
<b>Length</b>	8.85 in./22.48 cm
<b>Height</b>	4.49 in./11.40 cm
<b>Width</b>	2.93 in./7.44 cm
<b>Weight</b>	2 lb./0.91 kg max.
<b>Humidity</b>	To 100%, rain exposure acceptable
<b>RS-232 Connector</b>	9 pin D sub female
<b>External DC Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector

### Option B (KIV-77/SIT-2010 Adapter)

<b>Mounting</b>	Attaches to the 78 pin D sub female crypto interface adapter
<b>Size</b>	
<b>Length</b>	7.75 in./19.68 cm
<b>Height</b>	4.2 in./10.67 cm
<b>Width</b>	1.76 in./4.47 cm
<b>Weight</b>	1 lb./0.45 kg max.
<b>Humidity</b>	To 100%, rain exposure acceptable
<b>RS-232 Connector</b>	9 pin D sub female
<b>External DC Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector

### RS-232 Serial Data Cable

<b>Connectors</b>	9 pin D sub-male/female
<b>Length</b>	5 ft./1.5 m
<b>Weight</b>	0.22 lb./0.1 kg

**KIV-6 Adapter**

<b>Mounting</b>	Attaches to handle and circular connector
<b>Size</b>	7" L x 5" H x 5" W/175 x 125 x 125 mm max.
<b>Weight</b>	1.5 lb./0.7 kg max. without KIV-6
<b>Humidity</b>	To 100%, rain exposure acceptable
<b>RS-232 Connector</b>	9 pin D sub-female
<b>External DC Connector</b>	Accepts 5.5 x 2.5 x 9.5 mm barrel connector

**Automotive DC Adapter Cable**

<b>Length</b>	10 ft./3 m
<b>Compatibility</b>	21 mm or 22.2 mm sockets
<b>Fuse</b>	3 AG 250 V 3 A

**Battery Stick**

<b>Type</b>	High Capacity Rapid Charge NiCad
<b>Voltage</b>	7.2 V DC nominal
<b>Capacity</b>	3 amp hour at +25° C nominal
<b>Temperature</b>	Operating -20 to +55° C recommended. Will operate at -40° C with 25% of +25° C capacity and degraded cycle lifetime Storage -55 to +85° C Re-charging 0 to +40° C
<b>Weight</b>	1.5 lbs./0.7 kg

**Transit Case**

<b>Type</b>	Watertight sealed enclosure with pressure release valve
<b>Size</b>	
<b>Length</b>	26.25"/667 mm
<b>Height</b>	16.75"/425 mm
<b>Width</b>	16.00"/406 mm
<b>Weight</b>	Empty 16 lbs./7.3 kg Full 41 lbs./18.6 kg

**Bench Utility Software**

<b>Function</b>	Allows download, viewing, and saving test data from test set.
<b>Compatibility</b>	Microsoft Windows 95, 98, 2000, XP, NT 4.x
<b>Format</b>	CD ROM

**Physical Characteristics****Size (test only):**

<b>Length</b>	14.1"/358 mm
<b>Height</b>	7.5"/190 mm
<b>Width</b>	11.5"/292 mm
<b>Weight</b>	12.25 lbs./5.6 kg (with battery)

**Environmental****MIL-PRF-28800, Class 1**

<b>Temperature</b>	-40° C to +55° C operating, -55° C to + 85° C storage
<b>Relative Humidity</b>	To 100% for at least 6 hours
<b>Splash Proof</b>	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
<b>Altitude</b>	4,600 meters operating, 50,000 ft. storage
<b>Shock Transit</b>	36 inch drop in transit case
<b>Shock High Impact</b>	36 inch drop
<b>Shock Functional</b>	30 G 11 ms half sine
<b>Random Vibration</b>	10 Hz to 2000 Hz/60 mins per axis

**EMI/RFI MIL-STD-461E**

<b>CE101 Power Leads</b>	30 Hz to 10 kHz
<b>CE102 Power Leads</b>	10 kHz to 10 MHz
<b>CS101 Power Leads</b>	30 Hz to 150 kHz
<b>CS114 Bulk Cable Injection</b>	10 kHz to 200 MHz
<b>CS115 Bulk Cable Injection</b>	Impulse
<b>CS116 Cables/Power Leads</b>	Damped Sinusoidal Transients
<b>RE101 Magnetic</b>	30 Hz to 100 kHz
<b>RE102 Electric</b>	10 kHz to 18 GHz (RX and TX stand-by)
<b>RE103 Antenna Spurious and Harmonics</b>	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.

<b>RS101 Magnetic</b>	30 Hz to 100 kHz
<b>RS103 Electric</b>	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
86335	APM-424(V)5 MK XIIIA Test Set w/KIV-77 Adapter NSN: 6625-01-583-2774
91066	APM-424(V)5 MK XIIIA Test Set w/KIV-78/6 Adapter
91067/SERD 65A06	APM-424(V)5 MK XIIIA Test Set w/KIV-77 & KIV-78/6 Adapter -includes Maint. Manual (86421) and Bench Utility Software w/ Field Maint. (86633)

### 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

### Standard Accessories

12028	Transit case with pressure release valve
64647	KIV-77 adapter (included with 86335 & 91067)
86769	KIV-78/KIV-6 adapter (included with 91066 and 91067)
58077	KIT/KIR-1C COMSEC cable (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-M0)
58080	DC power cable (55-1045-14)
905	External battery charger (01-1045-10)
47621	Battery sticks (2) (43-0012-00)
88976	Getting Started manual
86805	Operators manual (CD)
67468	Bench utility software (CD)
6154	Battery instruction sheet Calibration certificate Standard 2-year warranty

### Optional Accessories

86769	KIV-78/KIV-6 adapter (included with 91066 and 91067)
64647	KIV-77 adapter (included with 86335 & 91067)
58079	KIV-6 adapter (55-1045-13)
11958	Transit case for KIV-6 (ACKIV6CASE)
58082	Cable, KIT/KIR-1A COMSEC (55-1045-16)
58084	Automotive DC adapter cable (55-1045-18)
67474	Tripod
138331	Tripod, heavy duty
86633	Bench utility with field maintenance (CD)
86421	Maintenance manual (CD)

### Extended Standard Warranties with Calibration

84357	Extended warranty 36 mo w/ scheduled calibration
84358	Extended warranty 60 mo 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.

### EXPORT WARNING:

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