

# Avionics

## IFR 6015 Ramp Test Set



**AEROFLEX**  
A passion for performance.

The IFR 6015 is a compact, lightweight and weatherproof unit designed for testing transponder modes 1,2,3A/C/S, TCAS I, II and Military E-TCAS as well as TACAN.

- One main user screen for each test mode
- Detachable antenna
- Large display
- Simple user interface
- Lightweight and compact <8 lbs. (3.6 kg)
- Battery 6 hours plus duration
- Fully FAR Part 43 Appendix F compliant
- European Elementary and Enhanced Surveillance
- TACAN and IFF Modes 1 & 2
- Emulates preset modes of TACAN Test Sets Generic DoD, AN/ASM-663, AN/ARM-184, Bradley 2650 & 2655



*The IFR 6015 features an extremely easy to use interface where every parameter the user commonly needs to view is displayed on screen.*

### Controls

Dedicated Mode keys for XPDR, TACAN/DME and TCAS allow quick selection of the operational mode.

The application dependant softkeys and data select/slew keys provide an intuitive man-machine interface.

TACAN mode is provided with dedicated keys for frequency/channel selection and RF level control. For frequently varied parameters in TACAN and TCAS modes, such as Range and Rate, dedicated keys are provided.

### Operational Modes

Each operational mode has one main user screen. The operational modes are:

XPDR (Sub-Modes: ADS-B MON, ADS-B GEN & GICB)

TACAN (Sub-Modes: T/R Norm, Inv, Range Only; A/A Beacon, Inv, Range Only)

TCAS 1, 2 (Sub-Mode: TIS)

E-TCAS

Most tests can be completed without leaving the main user screens. This simplifies the line technician's testing task.

For the very latest specifications visit [www.aeroflex.com](http://www.aeroflex.com)

XPDR-AUTO TEST **PASS** BAT 2.5 Hr

CONFIG: MK12/S-M4 LEVEL=4  
 ANTENNA: **BOTTOM**

REPLIES =1,2,3A,C,S FREQ =1090.12 MHz  
 TOP ERP =57.1 dBm MTL =-74.0 dBm  
**BOT ERP =56.0 dBm MTL =-73.1 dBm**

3A CODE =1234 C ALT =35000 ft  
 1 CODE =1234 2 CODE = 1234  
 TAIL =N12345 DF17 DETECTED=NO  
 FLT ID =AA-50 AA=AC3421(53032041)  
 FS=5-NO ALERT SPI IN AIR  
 VS=IN AIR COUNTRY=United States

RUN TEST TEST LIST CONFIG SELECT ANT

(IFF System Information in Public Domain)

## MK12/S Transponder

### Xpdr Auto-Test:

Every parameter the user commonly needs to view is displayed on one screen.

The auto-test performs all tests defined by FAR Part 43 Appendix F, including the proposed Eurocontrol additional tests.

The specific modes tested are determined by the selected config.

The Mode S tests are tailored automatically according to reported transponder level to avoid erroneous failures.

XPDR - TEST LIST BAT 2.5 Hr

1	3A/C DECDR/SLS	- PASS
2	1/2 DECDR/SLS	- PASS
3	3A/C F1/F2 SPACE/WIDTH	- PASS
4	1/2 SPACE/WIDTH	- PASS
<b>5</b>	<b>POWER/FREQ</b>	<b>- PASS</b>
6	S ALL-CALL	- PASS
7	S REPLY TIMING	- PASS
8	S REPLY	- PASS
9	UF0	- PASS
10	UF4	- PASS
11	UF5	- PASS
12	UF11	- PASS

SELECT TEST NEXT PAGE RETURN

The test list is selected from the auto-test screen. This provides an easy means of selecting any of the individual tests that comprise the auto-test.

Tests on the 2nd screen (not shown) include:

- 13 UF16
- 14 UF20
- 15 UF21
- 16 UF24
- 17 ELEMENTARY SURVEILLANCE 1
- 18 ELEMENTARY SURVEILLANCE 2
- 19 ENHANCED SURVEILLANCE

XPDR-3A/C SPAC/WIDTH **FAIL** BAT 2.5 Hr

F1 WIDTH ▶ 3A= 0.300 us C= 0.450 us  
 F2 WIDTH 3A= 0.400 us ▶ C= 0.600 us  
 F1-F2 3A=20.300 us C=20.300 us

REPLY DELAY 3A=3.05 us ▶ C=3.55 us  
 REPLY JITTER 3A=0.250 us C=0.000 us  
 REPLY RATIO 3A=100% C=100%  
 -81dBm REPLY RATIO 3A=0% C=0%

ATCRBS ALL-CALL 3A=PASS C=PASS  
 PULSE AMP VAR 3A=0.0 dB C=0.0 dB

RUN TEST PREV TEST NEXT TEST RETURN

Individual tests may be reviewed for failures which are identified by an arrow symbol.

XPDR - CONFIG BAT 2.5 Hr

- 1 GENERIC ATCRBS
- 2 ATCRBS CLASS A
- 3 ATCRBS CLASS B
- 4 GENERIC MODE S
- 5 MODE S CLASS A**
- 6 MODE S CLASS B
- 7 MODE S CL B OPT FREQ
- 8 MODE S CL B OPT PWR
- 9 MK10A/MK12-M4
- 10 MK12/S-M4

INFO RETURN

User selects config required for test.

For ATCRBS and Mode S Transponders if the class of the transponder is unknown, the generic config may be selected which applies to the widest limits.

The test set will automatically determine the Mode S transponder level.

The selected config parameters may be displayed by pressing the INFO softkey.

Ten predetermined configs are provided to meet ATCRBS, Mode S, MK10, MK12, MK12/S transponder test needs.

XPDR-ELEMENT SURV2 **PASS** BAT 2.5 Hr

BDS=1,7 :0,5 :0,6 :0,7 :0,8 :0,9  
 :0,A :2,0 :2,1 :4,0 :4,1 :4,2 :4,3  
 :4,4 :4,5 :4,8 :5,0 :5,1 :5,2 :5,3  
 :5,4 :5,5 :5,6 :5,F :6,0

BDS 1,8=0000000000000000  
 BDS 1,9=0000000000000000  
 BDS 1,A=0000000000000000  
 BDS 1,B=0000000000000000  
 BDS 1,C=0000000000000000

BDS=2,0 FLIGHT ID=UA661  
 BDS=3,0 ARA=11101010000000 RAC=1010  
 RAT=0

RUN TEST PREV TEST NEXT TEST RETURN

```

XPDR - ELEMENT SURV1 PASS BAT 2.5 Hr

BDS=1,0  SUBNETWORK VER =1
          ENH PROT IND   =LVL 2-4
          SPEC SERV CAP   =YES
          UELM CAPABILITY =16/1 s
          DELM CAPABILITY =16/500 ms
          AIRCRAFT ID CAP  =YES
          SURV IDENT CAP   =YES
          COMM USE GICB REP=1
          DTE              =YES
          CONT FLAG        =YES
          SQUITTER CAP     =YES

RUN TEST  PREV TEST  NEXT TEST  RETURN

```

```

XPDR-S ALL-CALL PASS BAT 2.5 Hr

ITM REPLY
  DELAY      3A=128.08 us  C=128.07 us
  JITTER     3A=0.510 us   C=0.510 us
  ADDRESS    3A=2AC421     C=2AC421
  RATIO      3A=100%       C=100%
  -81dBm     3A=0%        C=0%

MODE S ALL-CALL = PASS
ADDRESS         = 2AC421
TAIL= N12345
COUNTRY= United States

RUN TEST  PREV TEST  NEXT TEST  RETURN

```

The Eurocontrol Elementary Surveillance DAP's (Downlink Aircraft Parameters) are displayed on two screens

```

XPDR-ENHANCED SURV PASS BAT 2.5 Hr

DF=20
BDS4,0  MCP/FCU SEL ALT =65520 ft
BDS5,0  ROLL ANGLE      = 40.1 deg
        TRUE TRACK ANGLE= 90.3 deg
        GROUND SPEED    = 512 kts
        TRACK ANGLE RATE= 4.00 deg/s
        TRUE AIR SPEED  = 512 kts
BDS6,0  MAGNETIC HEADING= 180.3 deg
        IND AIR SPEED   = 512 kts
        MACH NO         = 0.300
        INERT VERT VEL  =-1400 ft/min
        BARO ALT RATE  =-1400 ft/min

RUN TEST  PREV TEST  NEXT TEST  RETURN

```

```

TACAN T/R NORM BAT 2.5 Hr

CHAN: 17X      RF LVL: - 80 dBm
FREQ: 978.0 MHz  RATE: 1000 kts  IN
                RANGE: 10000 nm

BRG: 270 deg   IDENT: MORSE
% REPLY: 100   SQTR: ON

TX FREQ = 1041.00 MHz  ERP= 250.0 WATTS
PRF=150 Hz

P1-P2= 12.0us(X)
P1 WIDTH= 3.5us    P2 WIDTH= 3.5us

RUN TEST  PREV PARAM  NEXT PARAM  STOP RATE  IN/OUT

```

## TACAN

All the user needs are on one screen.

- RF level control for track sensitivity tests
- Supports all TACAN channels
- Full UUT measured parameters are displayed
- TACAN test modes; T/R Norm, T/R Range Only, T/R Inverse, A/A Beacon, A/A Range Only and A/A Inverse

Eurocontrol Enhanced Surveillance DAP's are displayed on one screen.

```

XPDR - UFO PASS BAT 2.5 Hr

DF = 0
VS = 0 - IN AIR
CC = 0 - NOT SUPPORTED
SL = 0 - NO TCAS SENS LEVEL REPORTED
RI = 12 - AIRSPEED 301 TO 600 KNOTS

AC = 03A0(01640) 10700 FT
MODE C ALT COMPARE = PASS
AA = AC3421(53032041)
DF11 ADDRESS COMPARE = PASS

RUN TEST  PREV TEST  NEXT TEST  RETURN

```

```

TCAS BAT 2.5 Hr

SCENARIO: 0-CUSTOM
TCAS TYPE: E-TCAS      %REPLY: 100
INTRUDER TYPE:MODE S   CODE: 0000
RANGE START: 10.00 nm  STOP: 0.00 nm
RANGE RATE : 350 kts
ALT START: +1000 ft    STOP: 0 ft
ALT RATE : 600 fpm    CONVERGE :OFF
UUT ALT : 31200 ft    ALT DETECT: ON
FREQ= 1030.000 MHz    ERP= 57.0 dBm
RANGE= 21.00 nm IN    ALT= +1000 ft ↓
TCAS STATUS= TRACKING
STATUS= NON-THREAT    ENCOUNTER= 0:00

RUN TEST  PREV PARAM  NEXT PARAM  MON  STORE/RECALL

```

No more HEX data field interpretation!

All Mode S Format tests display parameter in engineering units.

```

XPDR-UF11 PASS BAT 2.5 Hr

DF=11
CA=0-LEVEL 2 CA MODE
PI =02F08D
AA=AC3421(53032041)
II LOCKOUT TIMER=18S
II MATCH=PASS
SI LOCKOUT TIMER=18S
SI MATCH=PASS

RUN TEST  PREV TEST  NEXT TEST  RETURN

```

## TCAS

TCAS types...

TCAS 1 MODE C

TCAS 2 ATCRBS

TCAS 2 MODE S

E-TCAS

The Auto-Altitude feature interrogates Mode S XPDR of aircraft under test to obtain current altitude.

Select pre-stored named scenarios directly from the auto-test screen.

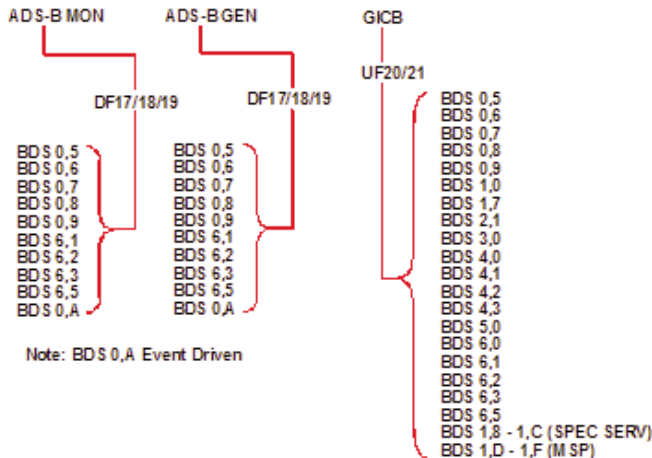
Comprehensive II/SI code and lockout timer test

TCAS		BAT 2.5 Hr	
SCENARIO: 0-CUSTOM			
TCAS TYPE: E-TCAS		%REPLY: 100	
INTRUDER TYPE: MODE S			
RANGE START: 10.00 nm		STOP: 0.00 nm	
RANGE RATE: 350 kts			
ALT START: +1000 ft		STOP: 0 ft	
ALT RATE: 600 fpm		CONVERGE: OFF	
UUT ALT: 31200 ft		ALT DETECT: ON	
FREQ= 1030.000 MHz		ERP= 57.0 dBm	
RANGE= 21.00 nm IN		ALT= +1000 ft ↓	
TCAS STATUS= TRACKING			
STATUS= NON-THREAT		ENCOUNTER= 0:00	
RUN TEST	PREV PARAM	NEXT PARAM	MON
STORE/RECALL			

ADS-B MON BDS 0,5		AVAIL		BAT 2.5 Hr	
BDS=0,5 AIRBORNE POS					
DF17 AA=3AC421 (16542041)		COUNT=1000		TYPE=14	
ME=0000000000000000 PERIOD=DEFAULT					
LAT= 37 39 00 N		LONG= 97 25 48 W			
POS=GLOBAL		SAF=1		T=N/UTC	
SURVEILLANCE STATUS		= NO INFO			
BARO PRES ALT=131025 ft					
RUN TEST		PREV TEST	NEXT TEST	RETURN	

#### ADS-B MON:

The BDS DATA screen displays full content of selected BDS format being received via DF17, DF18 or DF19 extended squitters.



ADS-B GEN DF17		BAT 2.5 Hr	
1 0,5 AIRBORNE POS - DISABLED			
2 0,6 SURFACE POS - ENABLED			
3 0,8 IDENT & CAT - ENABLED			
4 0,9 AIRBORNE VEL - ENABLED			
5 0,A ADS-B TEST MSG - ENABLED			
6 6,1 A/C STATUS - ENABLED			
7 6,2 TARG STATE - ENABLED			
8 6,3 A/C OP STATUS - ENABLED			
9 6,5 A/C OP STATUS - ENABLED			
RUN TEST	BDS DATA	BDS ON	RETURN

#### ADS-B GEN:

The BDS LIST shows BDS formats supported. The BDS SELECT key selects individual BDS numbers. The BDS ENABLE/DISABLE key enables or disables the selected BDS number for squittering via DF17 or DF18 extended squitter. The BDS DATA key displays the BDS DATA screen for the selected BDS number.

#### ADS-B and GICB

**ADS-B MON:** Used to monitor DF17 extended squitter from transponders and DF18 extended squitter from 1090 MHz ADS-B emitters.

**ADS-B GEN:** Used to generate DF17/DF18 extended squitter, simulating transponders and 1090 MHz ADS-B emitters.

**GICB:** Used to monitor DAP's (all fields).

ADS-B MON DF17		BAT 2.5 Hr	
1 0,5 AIRBORNE POS - AVAIL			
2 0,6 SURFACE POS - NOT CAP			
3 0,8 IDENT & CAT - AVAIL			
4 0,9 AIRBORNE VEL - AVAIL			
5 0,A ADS-B TEST MSG - AVAIL			
6 6,1 A/C STATUS - AVAIL			
7 6,2 TARG STATE - AVAIL			
8 6,3 A/C OP STATUS - NO SQTR			
9 6,5 A/C OP STATUS - NO SQTR			
RUN TEST	BDS DATA	RETURN	

#### ADS-B MON:

The ADS-B MON LIST shows BDS formats supported.

The BDS status is annunciated to indicate if the squitter has been captured, not available or not seen.

The BDS DATA key displays the BDS DATA screen for the selected BDS number.

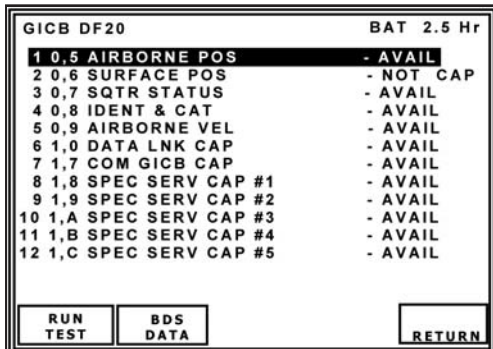
ADS-B GEN BDS 0,5		BAT 2.5 Hr	
BDS=0,5 AIRBORNE POS			
DF19 AA=3AC421 (16542041)		COUNT=1000	
ME=490844AE8319EA PERIOD: 1.00 s			
LAT: 37 39 00 N		LONG: 97 25 48 W	
POS:		SAF:1 T:N/UTC	
SURVEILLANCE STATUS		: NO INFO	
BARO PRES ALT:126700 ft			
GNSS ALT: N/A			
RUN TEST	BDS OFF	PREV PARAM	NEXT PARAM
RETURN			

#### ADS-B GEN:

BDS DATA screens display full content of the selected BDS format in RTCA/ICAO engineering units.

The NEXT PARAM and PREV PARAM keys select data fields for editing via the data slew keys.

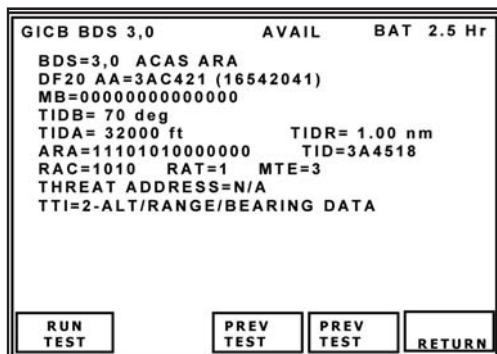




#### GICB:

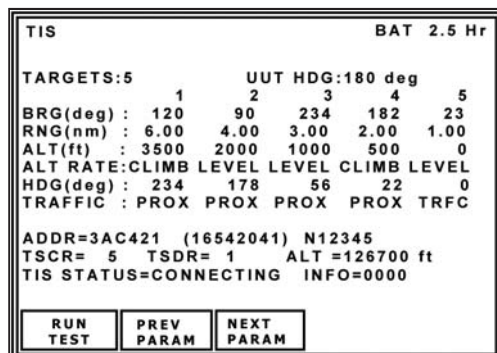
The BDS LIST shows BDS formats supported.

The BDS DATA key displays the BDS DATA screen for the selected BDS number.



#### GICB:

BDS DATA screens display full content of the selected BDS format being received via GICB DF20 or DF21 in RTCA/ICAO engineering units.



#### TIS

Up to 5 static intruders may be simulated relative to the A/C (UUT).

#### General

##### Radiated Testing:

The IFR 6015 is supplied with a lightweight, fully sealed, directional antenna that may be test set mounted, hand held or tripod mounted.

##### Direct Connect Testing:

The IFR 6015 may be directly connected to the UUT via a supplied RF coax cable via the RF I/O port.



#### Transit Case:

The IFR 6015 is supplied in a rugged plastic transit case which provides stowage for the test set, directional antenna, RF coax cable, antenna shield, breakout box, and power supply/charger.



# SPECIFICATION

## Notes

- ▲ - IFF System Information in Public Domain
- % - TACAN System Information in Public Domain (Ref. MIL STD 291C)

## TACAN/DME MODE SPECIFICATIONS

## SIGNAL GENERATOR

A 5-minute warm-up period is required for all specifications.

## OUTPUT FREQUENCY

### REPLY FREQUENCY

#### Range

962 to 1213 MHz

#### Accuracy

± 10 kHz

% **Variable Channel Selection 1 to 126 (X & Y)**

#### Preset Channel Selection

% **Preset 1 (DoD)**

T/R Mode 17X, 18X

A/A Mode 17X, 17Y

Inverse A/A Mode 80X, 80Y

% **Preset 2 (AN/ASM-663)**

5X, 5Y, 47X, 47Y, 89X, 89Y

Preset 3 (AN/ARM-184) No Preset

Preset 4 (2650/2655)

18X, 18Y, 47X, 47Y, 100X, 100Y, 123X, 123Y

## OUTPUT LEVEL

### ANTENNA PORT

#### Range

-67 to -5 dBm (T/R Norm, T/R Inv, A/A Beacon, A/A Inv)

-67 to -2 dBm (T/R Rng Only, A/A Rng Only)

#### Resolution

0.5 dB

#### Accuracy

± 2 dB

#### Distance to UUT antenna

6 to 250 ft with supplied antenna

### RF I/O PORT

#### Range

-115 to -50 dBm (T/R Norm, T/R Inv, A/A Beacon, A/A Inv)

-115 to -47 dBm (T/R Rng Only, A/A Rng Only)

#### Resolution

0.5 dB

#### Accuracy

-95 dBm to -50 dBm ± 1 dB

#### Accuracy

-115 dBm to <-95 dBm ± 2 dB

## REPLY PULSE SPACING

### P1 to P2

12 μs ± 0.1 μs (T/R X Channel) @ 50% peak

### P1 to P2

30 μs ± 0.1 μs (T/R Y Channel) @ 50% peak

## REPLY PULSE WIDTH

### P1/P2

3.5 μs ± 0.5 μs

## ECHO REPLY

### Control

On/Off

### Position

30 nmi ± 1 nmi

### Amplitude

-11 dB ± 1 dB relative to reply level

## REPLY PULSE RISE AND FALL TIMES

### ALL PULSES

#### Rise Time

2.0 μs ± 0.25 μs (10% to 90%)

#### Fall Time

2.5 μs ± 0.25 μs (90% to 10%)

## REPLY DELAY

### T/R X CHANNEL

#### Fixed Reply Delay

50 μs ± 100 ns

### T/R Y CHANNEL

#### Fixed Reply Delay

56 μs ± 100 ns

#### % A/A X CHANNEL

#### Fixed Reply Delay

62 μs ± 100 ns

#### % A/A Y CHANNEL

#### Fixed Reply Delay

74 μs ± 100 ns

## VARIABLE RANGE DELAY

### X AND Y CHANNEL

#### Range

0 to 450.00 nmi

#### Resolution

0.01 nmi

#### Accuracy

± 0.01 nmi

## PRESET RANGE DELAY

### X AND Y CHANNEL

#### Preset 1 (DoD) Range

0, 3, 10, 30, 100, 200, 300, 400 nmi

#### Preset 2 (AN/ASM-663) Range

0, 10, 150, 297 nmi

#### Preset 3 (AN/ARM-184) Range

0, 50, 100, 150, 200, 250, 300, 350, 400 nmi

#### Preset 4 (2650/2655) Range

0, 5, 125, 283 nmi

#### Resolution

0.01 nmi

#### Accuracy

± 0.01 nmi

## **VARIABLE RANGE RATE**

### **X AND Y CHANNEL**

#### **Rate**

0 to 6500 kts

#### **Resolution**

1 kts

#### **Accuracy**

$\pm 0.01\%$  typical, tested to  $\pm 0.5\%$

## **PRESET RANGE RATE**

### **X AND Y CHANNEL**

#### **Preset 1 (DoD) Rate**

0, 250 kts (1000 kts in A/A modes)

#### **Preset 2 (AN/ASM-663) Rate**

No Rate

#### **Preset 3 (AN/ARM-184) Rate**

0, 2400 kts

#### **Preset 4 (2650/2655) Rate**

No Rate

#### **Resolution**

1 kts

#### **Accuracy**

$\pm 0.01\%$  typical, tested to  $\pm 0.5\%$

## **SQUITTER**

### **% PRF**

**T/R(X) & T/R(Y) NORM, INVERSE, RNG ONLY**

2700 Hz

**A/A RNG ONLY, BEACON, INVERSE**

1350 Hz

#### **Accuracy**

$\pm 2\%$

#### **Distribution**

Per MIL STD 291C and ARINC 568

## **REPLY EFFICIENCY**

### **Range**

0 to 100%

### **Resolution**

1% increments

### **Accuracy**

$\pm 0.5\%$

## **% IDENT TONE PULSE PAIR**

### **T/R(X) & T/R(Y) Modes Selection**

Selectable four letter code or tone

### **Frequency**

1350 Hz

### **Accuracy**

$\pm 2$  Hz

### **Equalizer pulse pair**

Spacing from Ident pair  $100 \mu\text{s}$   $\pm 10 \mu\text{s}$

## **% IDENT TONE SINGLE PULSE**

### **A/A(X) & A/A(Y) Modes Selection**

Selectable four letter code or tone

### **Frequency**

1350 Hz

### **Accuracy**

$\pm 2$  Hz

## **INVERSE MODE**

### **A/A(X), A/A(Y), T/R(X), T/R(Y)**

Active Low North Reference Trigger Sync Output

## **% A/A MODE INTERROGATION**

### **P1 to P2**

$12 \mu\text{s} \pm 0.1 \mu\text{s}$  (A/A X Channel) @ 50% peak

### **P1 to P2**

$24 \mu\text{s} \pm 0.1 \mu\text{s}$  (A/A Y Channel) @ 50% peak

### **Interrogation Rate**

150 PPS,  $\pm 5$  Hz

## **% 15/135 HZ BEARING SIGNAL**

### **Modulation Levels**

15 Hz  $21\% \pm 2.5\%$

135 Hz  $21\% \pm 2.5\%$

### **Frequency**

15/135 Hz  $< \pm 0.2\%$

### **Phase Accuracy**

$< \pm 0.3^\circ$

### **Distortion**

$< 2.5\%$

## **% BEARING**

### **Variable**

0 to  $359.5^\circ$  in  $0.5^\circ$  increments

### **Accuracy**

$\pm 0.1^\circ$

### **PRESET**

#### **Preset 1 (DoD) Range**

$0^\circ, 45^\circ, 90^\circ, 135^\circ, 180^\circ, 225^\circ, 270^\circ, 315^\circ$

#### **Preset 2 (AN/ASM-663) Range**

$0^\circ, 45^\circ, 180^\circ, 225^\circ$

#### **Preset 3 (AN/ARM-184) Range**

$0^\circ, 90^\circ, 180^\circ, 337.5^\circ$

#### **Preset 4 (2650/2655) Range**

$90^\circ, 230^\circ, 320^\circ$

## **INTERROGATION PULSE DECODING**

### **Must Reply nominal code pair spacing**

$< \pm 0.5 \mu\text{s}$

### **Must Not Reply nominal code pair spacing**

$> \pm 1.0 \mu\text{s}$

## **% MRB T/RXX**

### **Group**

12 pairs of pulses

### **Pulse Spacing**

$12 \mu\text{s} \pm 0.1 \mu\text{s}$

### **Pulse Pair Spacing**

$12 \mu\text{s} \pm 0.1 \mu\text{s}$

## **% MRB T/R(Y)**

### **Group**

13 single pulses

### **Pulse Spacing**

30  $\mu\text{s} \pm 0.1 \mu\text{s}$

## **% MRB A/A BEACON (X & Y)**

### **Group**

10 single pulses

### **Pulse Pair Spacing**

30  $\mu\text{s} \pm 0.1 \mu\text{s}$

## **% ARB T/R(X)**

### **Group**

6 pairs of pulses

### **Pulse Spacing**

12  $\mu\text{s} \pm 0.1 \mu\text{s}$

### **Pulse Pair Spacing**

24  $\mu\text{s} \pm 0.1 \mu\text{s}$

## **% ARB T/R(Y)**

### **Group**

13 single pulses

### **Pulse Spacing**

15  $\mu\text{s} \pm 0.1 \mu\text{s}$

## **UUT MEASUREMENTS**

### **ERP**

#### **Range**

+47 to +66.1 dBm

#### **Resolution**

0.1 dB

#### **Accuracy**

$\pm 2 \text{ dB}$

## **DIRECT CONNECTION PEAK PULSE POWER**

#### **Range**

+47 to +66.1 dBm

#### **Resolution**

0.1 dB

#### **Accuracy**

$\pm 1 \text{ dB}$

## **FREQUENCY**

#### **Range**

1025.00 to 1150.00 MHz

#### **Resolution**

10 kHz

#### **Accuracy**

$\pm 20 \text{ kHz}$

## **INTERROGATION PULSE WIDTH**

### **P1 AND P2 PULSE WIDTHS**

#### **Range**

2.00 to 5.00  $\mu\text{s}$

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 50 \text{ ns}$

## **% INTERROGATION PULSE SPACING**

### **P1 to P2 Spacing**

10 to 14  $\mu\text{s}$  (T/R X and A/A X Channel)

### **P1 to P2 Spacing**

22 to 26  $\mu\text{s}$  (A/A Y Channel)

### **P1 to P2 Spacing**

34 to 38  $\mu\text{s}$  (T/R Y Channel)

### **Resolution**

10 ns

### **Accuracy**

$\pm 20 \text{ ns}$

## **INTERROGATION PRF**

### **Range**

1 to 300 Hz

### **Resolution**

1 Hz

### **Accuracy**

$\pm 2 \text{ Hz}$

## **% A/A REPLY DELAY**

### **A/A(X)**

62  $\mu\text{s}$  (-2 +4  $\mu\text{s}$  accept)

### **A/A(Y)**

74  $\mu\text{s}$  (-2 +4  $\mu\text{s}$  accept)

### **Resolution**

10 ns

### **Accuracy**

$\pm 100 \text{ ns}$

## **TRANSPONDER MODE SPECIFICATIONS**

## **SIGNAL GENERATOR**

## **RF OUTPUT FREQUENCY**

### **Interrogation Frequency**

1030 MHz

### **Accuracy**

$\pm 10 \text{ kHz}$

## **RF OUTPUT LEVEL**

### **ANTENNA PORT**

MTL + 6 dB typical, automatically controlled for a MTL range of -83 to -68 dBm

### **Range**

-67 to -2 dBm at antenna port

### **Resolution**

0.5 dB

### **Accuracy**

$\pm 2 \text{ dB}$

### **Distance to UUT antenna**

6 to 200 ft with supplied antenna

### **RF I/O PORT**

MTL + 6 dB typical, automatically controlled

### **Range**

-115 to -47 dBm

### **Resolution**

0.5 dB

### **Accuracy**

-95 to -47 dBm,  $\pm 1 \text{ dB}$



**Accuracy**-115 to <-95 dBm,  $\pm 2$  dB**ATCRBS/SIF/MODE S INTERROGATION PULSE SPACING**

---

**▲ MODE 1****P1 to P2**2.00  $\mu$ s  $\pm 25$  ns**P1 to P3**3.00  $\mu$ s  $\pm 25$  ns**▲ MODE 2****P1 to P2**2.00  $\mu$ s  $\pm 25$  ns**P1 to P3**5.00  $\mu$ s  $\pm 25$  ns**MODE 3A****P1 to P2**2.00  $\mu$ s  $\pm 25$  ns**P1 to P3**8.00  $\mu$ s  $\pm 25$  ns**MODE C****P1 to P2**2.00  $\mu$ s  $\pm 25$  ns**P1 to P3**21.00  $\mu$ s  $\pm 25$  ns**MODE S****P1 to P2**2.00  $\mu$ s  $\pm 25$  ns**P1 to P6**3.50  $\mu$ s  $\pm 25$  ns**P1 to SPR**4.75  $\mu$ s  $\pm 25$  ns**P5 to SPR**0.40  $\mu$ s  $\pm 50$  ns**INTERMODE INTERROGATION PULSE SPACING**

---

**MODE A****P1 to P3**8.00  $\mu$ s  $\pm 25$  ns**P1 to P4**10.00  $\mu$ s  $\pm 25$  ns**MODE C****P1 to P3**21.00  $\mu$ s  $\pm 25$  ns**P1 to P4**23.00  $\mu$ s  $\pm 25$  ns**INTERROGATION PULSE WIDTHS**

---

**MODE A,C,S,INTERMODE****P1,P2,P3**0.80  $\mu$ s  $\pm 50$  ns**MODE S****P6 (Short DPSK Block)**16.25  $\mu$ s  $\pm 50$  ns**P6 (Long DPSK Block)**30.25  $\mu$ s  $\pm 50$  ns**P5**0.80  $\mu$ s  $\pm 50$  ns**INTERMODE****P4 (Short)**0.80  $\mu$ s  $\pm 50$  ns**P4 (Long)**1.60  $\mu$ s  $\pm 50$  ns**INTERROGATION PULSE RISE AND FALL TIMES**

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**ALL MODES****Rise Time**

50 to 100 ns

**Fall Time**

50 to 200 ns

**PHASE MODULATION**

---

**ALL MODES****Transition Time** $\leq 80$  ns**Phase Shift** $180^\circ \pm 10^\circ$ **SLS LEVELS**

---

**ATCRBS/SIF****SLS Level (P2)**

-9 dB, -1 to +0 dB relative to P1 level

0 dB, -0 to +1 dB relative to P1 level

Off

**MODE S****SLS Level (P5)**

-12 dB, -1 to +0 dB relative to P6 level

+3 dB, -0 to +1 dB relative to P6 level

Off

Note: SLS level is automatically controlled in the SLS LEVEL test.

**INTERROGATION TEST SIGNALS**

---

**MODE S****PRF**50 Hz  $\pm 5$  Hz**ATCRBS/SIF****PRF**235 Hz  $\pm 5$  Hz**UUT MEASUREMENTS**

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**ERP (@ 1090 MHZ)**

---

**Range**

+ 45.5 to + 59 dBm (35.5 to 800 watts)

**Resolution**

0.1 dB

**Accuracy** $\pm 2$  dB**Direct Connection Peak Pulse Power (@1090 MHz)****Range**

+ 46.5 to + 59 dBm (45 to 800 watts)

**Resolution**

0.1 dB

**Accuracy** $\pm 1$  dB

## **TRANSMITTER FREQUENCY**

### **Range**

1087.000 to 1093.000 MHz

### **Resolution**

10 kHz

### **Accuracy**

$\pm 50$  kHz

## **RECEIVER SENSITIVITY, RADIATED MTL**

### **Range**

-67 to -79 dBm into 0 dBi antenna

### **Resolution**

0.1 dB

### **Accuracy**

$\pm 2$  dB, typical

## **RECEIVER SENSITIVITY, DIRECT CONNECTION MTL**

### **Range**

-67 to -79 dBm

### **Resolution**

0.1 dB

### **Accuracy**

$\pm 2$  dB

## **REPLY DELAY**

### **ATCRBS/SIF**

#### **Range**

1.80 to 7.00  $\mu$ s

#### **Resolution**

10 ns

#### **Accuracy**

$\pm 50$  ns

### **REPLY DELAY, MODE S AND ATCRBS MODE S ALL-CALL**

#### **Range**

125.00 to 131.00  $\mu$ s

#### **Resolution**

10 ns

#### **Accuracy**

$\pm 50$  ns

## **REPLY DELAY JITTER**

### **ATCRBS/SIF**

#### **Range**

0.00 to 2.30  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

### **MODE S AND ATCRBS MODE S ALL-CALL**

#### **Range**

0.00 to 6.00  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

## **PULSE SPACING**

### **F1 TO F2**

#### **Range**

19.70 to 21.60  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

### **MODE S PREAMBLE**

#### **Range, P1 to P2**

0.8 to 1.2  $\mu$ s

#### **Range, P1 to P3**

3.3 to 3.7  $\mu$ s

#### **Range, P1 to P4**

4.3 to 4.7  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

## **PULSE DECODER**

### **Modes 1,2,3/A**

4096 code & binary equivalent displayed, including X pulse.

Ident & Emergency Replies displayed.

### **Mode C**

Altitude

## **PULSE WIDTHS**

### **F1 AND F2**

#### **Range**

0.25 to 0.75  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

### **MODE S PREAMBLE**

#### **Range**

0.25 to 0.75  $\mu$ s

#### **Resolution**

1 ns

#### **Accuracy**

$\pm 20$  ns

## **PULSE AMPLITUDE VARIATION**

### **Range, Mode S (Relative to P1)**

+3 to -3 dB

### **Range, ATCRBS/SIF (Relative to F1)**

+3 to -3 dB

#### **Resolution**

0.1 dB (0.01 dB via RCI)

#### **Accuracy**

$\pm 0.5$  dB

## **DF 11 SQUITTER PERIOD**

### **Range**

0.10 to 4.88 sec

**Resolution**

10 ms

**Accuracy** $\pm 10$  ms**DIVERSITY ISOLATION**

---

**Range**

0 to &gt;20 dB (Depending on Test Distance)

**Test Distance**

1.83m (6ft) to 28.96m (95ft)

**Resolution**

0.1 dB

**Accuracy** $\pm 3$  dB**TCAS/E-TCAS MODE SPECIFICATIONS**

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**SIGNAL GENERATOR**

---

**OUTPUT FREQUENCY**

---

**REPLY FREQUENCY**

1090 MHz

**Accuracy** $\pm 10$  kHz**OUTPUT LEVEL (SIMULATED ERP)**

---

**ANTENNA PORT** Note 1**Radiated power at 0 dBi UUT antenna**

-68 dBm typical @ 10 Nmi Range, automatically controlled

**Range**

-67 to -2 dBm at Antenna port

**Resolution**

0.5 dB

**Accuracy** $\pm 2$  dB**Distance to UUT antenna**

6 to 300 ft with supplied antenna

**RF I/O PORT****Automatic mode**

-68 dBm @ 10 Nmi Range, automatically controlled

**Manual mode Range**

-115 to -47 dBm

**Resolution**

0.5 dB

**Accuracy**-95 to -47 dBm,  $\pm 1$  dB**Accuracy**-115 to <-95 dBm,  $\pm 2$  dB**REPLY PULSE SPACING**

---

**MODE C****F1 to F2**20.30  $\mu$ s  $\pm 25$  ns**F1 to C1**1.45  $\mu$ s  $\pm 25$  ns**F1 to A1**2.90  $\mu$ s  $\pm 25$  ns**F1 to C2**4.35  $\mu$ s  $\pm 25$  ns**F1 to A2**5.80  $\mu$ s  $\pm 25$  ns**F1 to C4**7.25  $\mu$ s  $\pm 25$  ns**F1 to A4**8.70  $\mu$ s  $\pm 25$  ns**F1 to B1**11.60  $\mu$ s  $\pm 25$  ns**F1 to D1**13.05  $\mu$ s  $\pm 25$  ns**F1 to B2**14.50  $\mu$ s  $\pm 25$  ns**F1 to D2**15.95  $\mu$ s  $\pm 25$  ns**F1 to B4**17.40  $\mu$ s  $\pm 25$  ns**F1 to D4**18.85  $\mu$ s  $\pm 25$  ns**MODE S****P1 to P2**1.00  $\mu$ s  $\pm 25$  ns**P1 to P3**3.50  $\mu$ s  $\pm 25$  ns**P1 to P4**4.50  $\mu$ s  $\pm 25$  ns**P1 to D1**8.00  $\mu$ s  $\pm 25$  ns**D1 to Dn (n=2 to 112)**1.00  $\mu$ s times (n-1)  $\pm 25$  ns**REPLY PULSE WIDTHS**

---

**MODE C****All Pulses**0.45  $\mu$ s  $\pm 50$  ns**MODE S****P1 through P4**0.50  $\mu$ s  $\pm 50$  ns**D1 through D112**0.50  $\mu$ s  $\pm 50$  ns, 1  $\mu$ s chip width**Reply Modes**

TCAS I/II Mode C (with altitude reporting)

TCAS II Mode S formats 0, 11, 16

E-TCAS Modes formats 0, 4, 5, 11, 16, 20, 21

**REPLY PULSE AMPLITUDES**

---

**ATCRBS** $\pm 1$  dB relative to F1**Mode S** $\pm 1$  dB relative to P1**REPLY PULSE RISE AND FALL TIMES**

---

**ALL MODES****Rise Time**

50 to 100 ns

**Fall Time**

50 to 200 ns

**PERCENT REPLY**

**Range**

0 to 100%

**Resolution**

10%

**Accuracy**

± 1%

**RANGE RATE**

**Range**

-1200 to +1200 kts

**Resolution**

10 kts

**Accuracy**

10%

**ALTITUDE RANGE**

**Range**

-1000 to 126,000 ft

**Resolution, Mode C**

100 ft

**Resolution, Mode S**

25 ft

**ALTITUDE RATE**

**Range**

-10,000 to +10,000 fpm

**Resolution**

100 fpm

**Accuracy**

10%

**SQUITTER**

**Control**

On/Off

**Rate**

0.8 to 1.2 seconds, randomly distributed

**RECEIVER**

**PULSE SPACING**

**ATCRBS (Mode C All Call)**

S1 to P1 2.0 us

Accepts ≤ ±200 ns

Rejects ≥ ±1.0 us

P1 to P3 21.0 us

Accepts ≤ ±200 ns

Rejects (<10% Replies) ≥ ±1.0 us

P1 to P4 23.0 us

Accepts ≤ ±200 ns

Rejects (<10% Replies) ≥ ±1.0 us

**Mode S**

P1 to P2 2.0 us

Accepts ≤ ±200 ns

Rejects (<10% Replies) ≥ ±1.0 us

P1 to SPR 4.75 us

Accepts ≤ ±200 ns

Rejects (<10% Replies) ≥ ±1.5 us

**SUPPRESION**

**ATCRBS (P2 or S1)**

>0.5 dB above level of P1 <10% Replies

**UUT MEASUREMENTS**

**ERP (@1030MHZ)**

**ATCRBS**

**Range**

+43 to +58 dBm (20 to 631 watts)

**Resolution**

0.1 dB

**Accuracy**

± 2 dB

**MODE S**

**Range**

+43 to +58 dBm (20 to 631 watts)

**Resolution**

0.1 dB

**Accuracy**

± 2 dB

**DIRECT CONNECTION PEAK PULSE POWER (@1030MHZ)**

**ATCRBS**

**Range**

+43 to +58 dBm (20 to 631 watts)

**Resolution**

0.1 dB

**Accuracy**

± 1 dB

**MODE S**

**Range**

+43 to +58 dBm (20 to 631 watts)

**Resolution**

0.1 dB

**Accuracy**

± 1 dB

**FREQUENCY**

**Range**

1029.900 to 1030.100 MHz

**Resolution**

1 kHz

**Accuracy**

± 10 kHz

**TCAS BROADCAST INTERVAL**

**Range**

1.0 to 12.0 sec

**Resolution**

0.1 sec

**Accuracy**

± 0.2 sec

**MISCELLANEOUS INPUT/OUTPUTS**

**RF I/O**

**Type**

Input/Output

**Impedance**

50  $\Omega$  typical

**Maximum Input Level**

4 kW peak

10 W average

**VSWR**

< 1.3:1

**ANTENNA****Type**

Input/Output

**Impedance**

50  $\Omega$  typical

**Maximum Input Level**

10 kW peak

1/2 W average

**VIDEO****Type**

Output

**Impedance**

50  $\Omega$  typical

**Generate Video Level**

0.2 V to 1.5 V peak to peak into 50  $\Omega$

**Receive Video Level**

Proportional to IF level

**Baseline**

$\pm 0.5$  V referenced to ground

**TEST ANTENNA**

---

**VSWR**

< 1.5:1

**Gain**

6 dB, Typical

**TIME BASE (TCXO)**

---

**Temperature Stability**

$\pm 1$  ppm

**Aging**

$\pm 1$  ppm per year

**Accuracy**

$\pm 1$  ppm

**Test Limit**

$\pm 0.3$  ppm

**BATTERY**

---

**Type**

Li Ion

**Duration**

> 4 hrs continuous operation

> 6 hrs, Typical

**INPUT POWER (TEST SET)**

---

**Input Range**

11 VDC to 32 VDC

**Power Consumption**

55 W Maximum

16 W Nominal at 18 VDC with charged battery

**Fuse Requirements**

5 A, 32 VDC, Type F

**INPUT POWER (SUPPLIED EXTERNAL AC TO DC CONVERTER)**

---

**Input Range**

100 to 250 VAC, 1.5 A Max, 47-63 Hz

**Mains Supply Voltage Fluctuations**

$\leq 10\%$  of the nominal voltage

**Transient Overvoltages**

According to Installation Category II

**ENVIRONMENTAL (TEST SET)**

---

**Use**

Pollution Degree 2

**Altitude**

$\leq 4800$  meters

**Operating Temperature**

NOTE 3 -20°C to 55°C

**Storage Temperature**

NOTE 4 -30°C to 71°C

**Relative Humidity**

95%  $\pm 5\%$  from 5° to 30°C

75%  $\pm 5\%$  from 30° to 40°C

45%  $\pm 5\%$  from 40° to 55°C

**ENVIRONMENTAL (SUPPLIED EXTERNAL AC TO DC CONVERTER)**

---

**Use**

Indoors

**Altitude**

$\leq 10,000$  meters

**Operating Temperature**

0° to 40°C

**Storage Temperature**

-20°C to 71°C

**PHYSICAL CHARACTERISTICS**

---

**DIMENSIONS****Height**

11.2 inches (28.5 cm)

**Width**

9.1 inches (23.1 cm)

**Depth**

2.7 inches (6.9 cm)

**Weight (Test set only)**

< 8 lbs. (3.6 kg)



## SUPPLEMENTAL INFORMATION

### Test Set Certifications

Altitude, operating	MIL-PRF-28800F	Class 2
Altitude, not operating	MIL-PRF-28800F	Class 2
Bench Handling	MIL-PRF-28800F	Class 2
Blowing Dust	MIL-STD-810F	Method 510.4, Procedure I
Drip-proof	MIL-PRF-28800F	Class 2
Explosive Atmosphere	MIL-STD-810F	Method 511.4, Procedure 1
Relative Humidity	MIL-PRF-28800F	Class 2
Shock, Functional	MIL-PRF-28800F	Class 2
Vibration Limits	MIL-PRF-28800F	Class 2
Temp, operating <sup>NOTE 5</sup>	MIL-PRF-28800F	Class 2
Temp, not operating <sup>NOTE 6</sup>	MIL-PRF-28800F	Class 2
Transit Drop	MIL-PRF-28800F	Class 2
Safety Compliance	UL-61010B-1 EN 61010-1 CSA 22.2 No 61010-1 EN 61326	
EMC		

### EXTERNAL AC-DC CONVERTER CERTIFICATIONS

Safety Compliance	UL 1950 DS CSA 22.2 No. 234 VDE EN 60 950
EMI/RFI Compliance	FCC Docket 20780 Curve "B"
EMC	EN 61326

### TRANSIT CASE CERTIFICATIONS

Drop Test	FED-STD-101C	Method 5007.1 Paragraph 6.3, Procedure A, Level A
Falling Dart Impact	ATA 300	Category I
Vibration, Loose Cargo	FED-STD-101C	Method 5019
Vibration, Sweep	ATA 300	Category I
Simulated Rainfall	MIL-STD-810F	Method 506.4 Procedure II of 4.1.2
	FED-STD-101C	Method 5009.1 Sec 6.7.1
Immersion	MIL-STD-810F	Method 512.4

## Notes

<sup>NOTE 1</sup> Simulates a 50.5 dBm XPDR ERP at 10 nMi range.

<sup>NOTE 2</sup> Level automatically controlled based on actual distance to UUT antenna.

<sup>NOTE 3</sup> Battery charging temperature range: 5°C to 40°C (controlled by internal charger).

<sup>NOTE 4</sup> Li Ion Battery must be removed below -20°C and above 60°C.

<sup>NOTE 5</sup> Temperature range extended to -20°C to 55°C.

<sup>NOTE 6</sup> Temperature range reduced to -30°C to 71°C.

## VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

### Ordering Numbers

72424

### Versions

IFR 6015 Mode 1,2,3A/C/S Transponder, TACAN/DME, TCAS I,II,E-TCAS, TIS Ramp Test Set (specify 110 V or 220 V)

NSN: 6625-01-574-2423

83411

6015OPT3 ADS-B Option

### Extended Standard Warranties with Calibration for 6015

84373

Extended standard warranty 36 months with scheduled calibration

84374

Extended standard warranty 60 months with scheduled calibration

### Accessories for 6015

63656

Desk Top Stand (AC0820)

67474

Tripod (AC0826)

6674

IFR 6015 Operation Manual - CD (AC0825CD)

6676

IFR 6015 Maintenance Manual - CD

82553

Tripod, Dolly, Stand (AC24006)

86931

UC-584 Universal Transponder Antenna Coupler

### 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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