# 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 A/C/S, TCAS I, II and Military E-TCAS as well as DME.

- 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

*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, 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.

DME mode is provided with dedicated keys for frequency/channel selection and RF level control. For frequently varied parameters in DME 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:

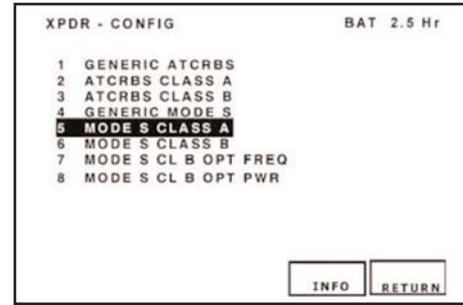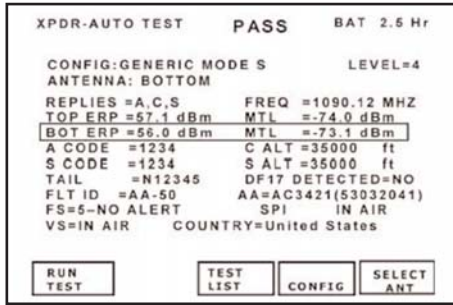XPDR (Sub-Modes: ADS-B MON, ADS-B GEN & GICB)

DME

TCAS 1, 2 (Sub-Modes: TIS & TIS-B)

E-TCAS

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

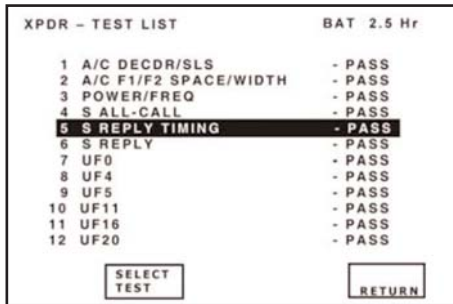For the very latest specifications visit **www.aeroflex.com**

```
XPDR-AUTO TEST    PASS    BAT  2.5 Hr

  CONFIG:GENERIC MODE S         LEVEL=4
  ANTENNA: BOTTOM
  REPLIES =A,C,S      FREQ =1090.12 MHZ
  TOP ERP =57.1 dBm   MTL  =-74.0 dBm
  BOT ERP =56.0 dBm   MTL  =-73.1 dBm
  A CODE  =1234       C ALT =35000   ft
  S CODE  =1234       S ALT =35000   ft
  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
```

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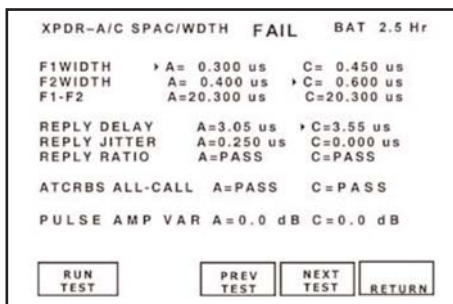
The tests are tailored automatically according to reported transponder level to avoid erroneous failures.



```
XPDR - TEST LIST         BAT  2.5 Hr

    1 A/C DECDR/SLS        - PASS
    2 A/C F1/F2 SPACE/WIDTH - PASS
    3 POWER/FREQ           - PASS
    4 S ALL-CALL           - PASS
    5 S REPLY TIMING       - PASS
    6 S REPLY              - PASS
    7 UF0                  - PASS
    8 UF4                  - PASS
    9 UF5                  - PASS
   10 UF11                 - PASS
   11 UF16                 - PASS
   12 UF20                 - PASS
        SELECT
        TEST                      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 UF21

14 UF24

15 ELEMENTARY SURVEILLANCE 1

16 ELEMENTARY SURVEILLANCE 2

15 ENHANCED SURVEILLANCE



```
XPDR-A/C SPAC/WDTH   FAIL   BAT  2.5 Hr

  F1WIDTH    ▸A= 0.300 us   C= 0.450 us
  F2WIDTH     A= 0.400 us  ▸C= 0.600 us
  F1-F2       A=20.300 us   C=20.300 us

  REPLY DELAY    A=3.05 us  ▸C=3.55 us
  REPLY JITTER   A=0.250 us  C=0.000 us
  REPLY RATIO    A=PASS      C=PASS

  ATCRBS ALL-CALL  A=PASS   C=PASS

  PULSE AMP VAR A=0.0 dB C=0.0 dB

   RUN          PREV    NEXT
   TEST         TEST    TEST    RETURN
```

Individual tests may be reviewed for failures which are identified by an arrow symbol.
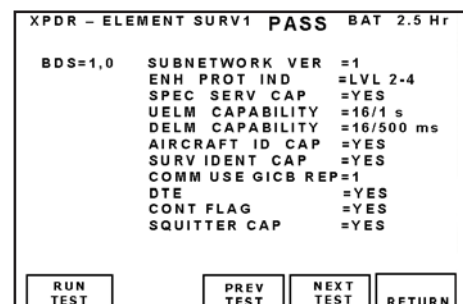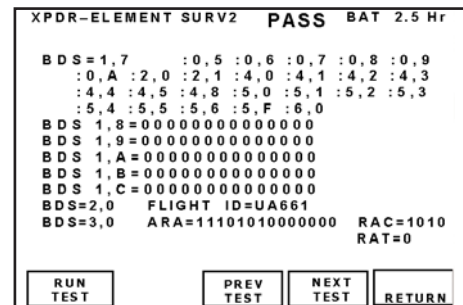
User selects config required for test.

If the class of the transponder is unknown, the generic config may be selected which applies to the widest limits.
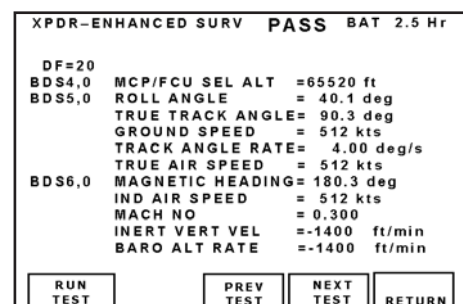
The test set will automatically determine the Mode S transponder level.

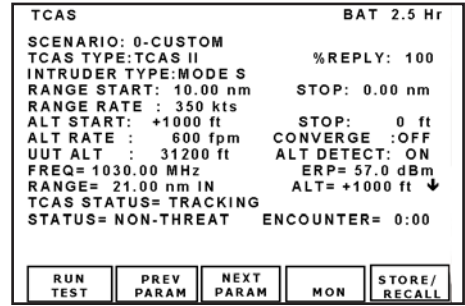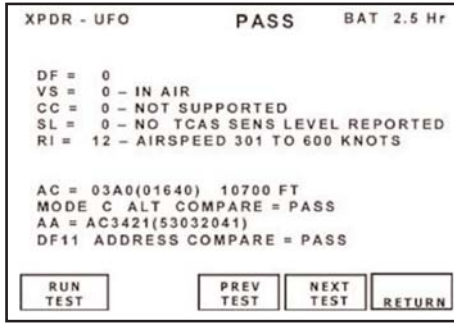The selected config parameters may be displayed by pressing the INFO softkey.

Eight predetermined configs are provided to meet the currently fielded transponder test needs.



```
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




                         INFO    RETURN
```



```
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=00000000000000
  BDS 1,9=00000000000000
  BDS 1,A=00000000000000
  BDS 1,B=00000000000000
  BDS 1,C=00000000000000
  BDS=2,0    FLIGHT ID=UA661
  BDS=3,0    ARA=11101010000000  RAC=1010
                                 RAT=0
   RUN          PREV    NEXT
   TEST         TEST    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          PREV    NEXT
   TEST         TEST    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          PREV    NEXT
   TEST         TEST    TEST    RETURN
```

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  │      │ PREV ││ NEXT │
│ TEST │      │ TEST ││ TEST │  RETURN
└──────┘      └──────┘└──────┘
```

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   MATCH=PASS
SI LOCKOUT TIMER=16S
SI   MATCH=PASS


┌──────┐      ┌──────┐┌──────┐
│ RUN  │      │ PREV ││ NEXT │
│ TEST │      │ TEST ││ TEST │  RETURN
└──────┘      └──────┘└──────┘
```

Comprehensive II / SI code and lockout timer test

```
XPDR-S ALL-CALL    PASS      BAT 2.5 Hr

ITM REPLY
    DELAY     A=128.08 us   C=128.07 us
    JITTER    A=0.510  us   C=0.510  us
    RATIO     A=PASS        C=PASS
    ADDRESS   A=2AC421      C=2AC421

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


┌──────┐      ┌──────┐┌──────┐
│ RUN  │      │ PREV ││ NEXT │
│ TEST │      │ TEST ││ TEST │  RETURN
└──────┘      └──────┘└──────┘
```

```
DME                          BAT 2.5 Hr

VOR: 108.00 MHz     RF LVL: -100 dBm
FREQ: 978 MHz       RATE: 650  kts    IN
CHAN:  17X          RANGE: 450.00 nm

        % REPLY: 100    ECHO :OFF
        SQTR   : ON     IDENT: OFF

TX FREQ = 1041.00  MHZ    ERP=55.0 dBm
P1 WIDTH= 3.500 us        PRF=150 Hz
P2 WIDTH= 3.500 us
P1-P2    = 36.00 us(Y)


┌──────┐┌──────┐┌──────┐┌──────┐
│ RUN  ││ PREV ││ NEXT ││ STOP │
│ TEST ││ PARAM││ PARAM││ RATE │  IN/OUT
└──────┘└──────┘└──────┘└──────┘
```

## DME

All the user needs are on one screen.

- RF level control for track sensitivity tests

- Supports all DME/TACAN channels selectable in VOR paired channels

- Full UUT measured parameters are displayed.

```
TCAS                         BAT 2.5 Hr
SCENARIO: 0-CUSTOM
TCAS TYPE:TCAS II           %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= 1030.00 MHz          ERP= 57.0 dBm
RANGE= 21.00 nm IN         ALT= +1000 ft ↓
TCAS STATUS= TRACKING
STATUS= NON-THREAT   ENCOUNTER= 0:00


┌──────┐┌──────┐┌──────┐┌─────┐┌───────┐
│ RUN  ││ PREV ││ NEXT ││ MON ││STORE/ │
│ TEST ││PARAM ││PARAM ││     ││RECALL │
└──────┘└──────┘└──────┘└─────┘└───────┘
```

## TCAS

TCAS types…
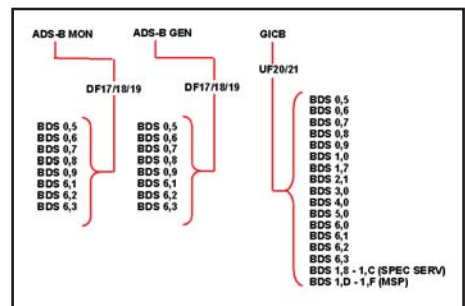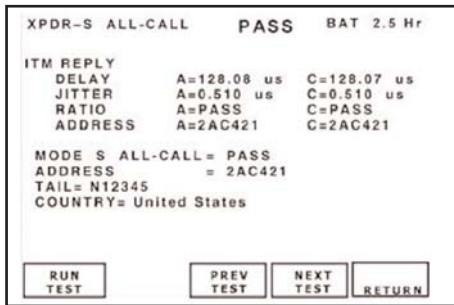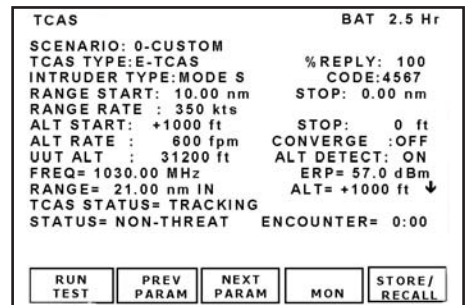
TCAS 1 MODE C

TCAS 2 ATCRBS

TCAS 2 MODE S

E-TCAS

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

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

```
TCAS                         BAT 2.5 Hr
SCENARIO: 0-CUSTOM
TCAS TYPE:E-TCAS            %REPLY: 100
INTRUDER TYPE:MODE S        CODE:4567
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= 1030.00 MHz          ERP= 57.0 dBm
RANGE= 21.00 nm IN         ALT= +1000 ft ↓
TCAS STATUS= TRACKING
STATUS= NON-THREAT   ENCOUNTER= 0:00


┌──────┐┌──────┐┌──────┐┌─────┐┌───────┐
│ RUN  ││ PREV ││ NEXT ││ MON ││STORE/ │
│ TEST ││PARAM ││PARAM ││     ││RECALL │
└──────┘└──────┘└──────┘└─────┘└───────┘
```



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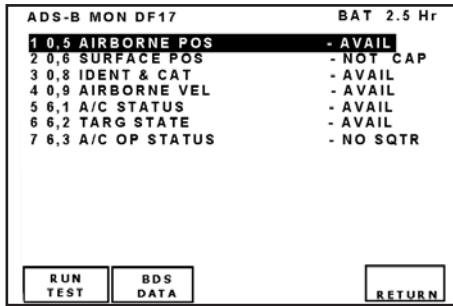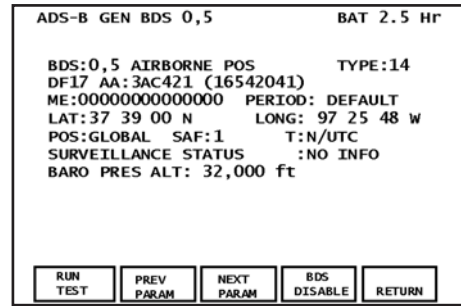
ADS-B GEN: Used to generate DF17/DF18 extended squitter, simulating transponders and 1090 MHz ADS-B emitters.

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 6,1 A/C STATUS        - AVAIL
6 6,2 TARG STATE        - AVAIL
7 6,3 A/C OP STATUS     - NO SQTR




    RUN      BDS
    TEST     DATA                    RETURN
```

**ADS-B MON:**

The ADS-B MON LIST shows BDS formats supported.

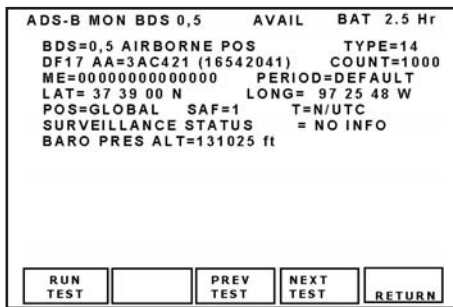The BDS status is annunciated to indicate if the squitter has been captured, not available or not seen.

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

```
ADS-B MON BDS 0,5    AVAIL   BAT  2.5 Hr
BDS=0,5 AIRBORNE POS         TYPE=14
DF17 AA=3AC421 (16542041)    COUNT=1000
ME=00000000000000    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              PREV    NEXT
    TEST             TEST    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       - ENABLED
2 0,6 SURFACE PO          - DISABLED
3 0,8 IDENT & CAT         - DISABLED
4 0,9 AIRBORNE VEL        - ENABLED
5 6,1 A/C STATUS          - DISABLED
6 6,2 TARGET STATE        - ENABLED
7 6,3 A/C OP STATUS       - DISABLED



    RUN      BDS             BDS
    TEST     DATA            DISABLE   RETURN
```
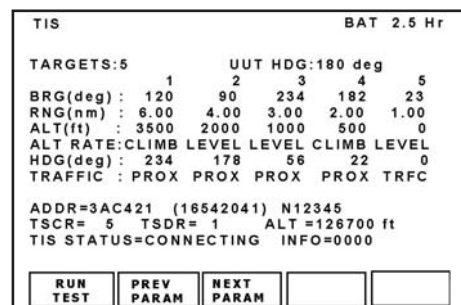
**ADS-B GEN:**

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 GEN BDS 0,5         BAT  2.5 Hr

BDS:0,5 AIRBORNE POS         TYPE:14
DF17 AA:3AC421 (16542041)
ME:00000000000000   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: 32,000 ft



    RUN    PREV    NEXT    BDS
    TEST   PARAM   PARAM   DISABLE  RETURN
```

**ADS-B GEN:**

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

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

```
GICB DF20                BAT  2.5 Hr
1 0,5 AIRBORNE POS       - AVAIL
2 0,6 SURFACE POS        - NOT CAP
3 0,7 SQTR STATUS        - AVAIL
4 0,8 IDENT & CAT        - AVAIL
5 0,9 AIRBORNE VEL       - AVAIL
6 1,0 DATA LNK CAP       - AVAIL
7 1,7 COM GICB CAP       - AVAIL
8 1,8 SPEC SERV CAP #1   - AVAIL
9 1,9 SPEC SERV CAP #2   - AVAIL
10 1,A SPEC SERV CAP #3  - AVAIL
11 1,B SPEC SERV CAP #4  - AVAIL
12 1,C SPEC SERV CAP #5  - AVAIL

    RUN     BDS
    TEST    DATA                    RETURN
```

**GICB:**

The BDS LIST shows BDS formats supported.

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

```
GICB BDS 3,0        AVAIL    BAT  2.5 Hr
BDS=3,0 ACAS ARA
DF20 AA=3AC421 (16542041)
MB=00000000000000
TIDB= 70 deg
TIDA= 32000 ft          TIDR= 1.00 nm
ARA=11101010000000      TID=3A4518
RAC=1010   RAT=1   MTE=3
THREAT ADDRESS=N/A
TTI=2-ALT/RANGE/BEARING DATA



    RUN             PREV    PREV
    TEST            TEST    TEST     RETURN
```

**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                          BAT  2.5 Hr

TARGETS:5            UUT HDG:180 deg
             1     2     3     4     5
BRG(deg) : 120    90   234   182    23
RNG(nm)  : 6.00  4.00  3.00  2.00  1.00
ALT(ft)  : 3500  2000  1000   500     0
ALT RATE:CLIMB LEVEL LEVEL CLIMB LEVEL
HDG(deg) : 234   178    56    22     0
TRAFFIC  : PROX PROX PROX  PROX  TRFC

ADDR=3AC421 (16542041) N12345
TSCR= 5   TSDR= 1    ALT =126700 ft
TIS STATUS=CONNECTING  INFO=0000


    RUN    PREV    NEXT
    TEST   PARAM   PARAM
```

**TIS**

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

```
TIS-B                      BAT  2.5 Hr

TARGETS:5          UUT HDG:180 deg
UUT LAT:37 39 00 N      LONG: 97 25 48 W
           1      2      3      4      5
BRG(deg):  120    90    234   182    23
RNG(nm) :  6.00   4.00   3.00   2.00   1.00
ALT(ft) :  3500  2000   1000   500     0
ALT RATE:CLIMB LEVEL LEVEL CLIMB LEVEL
HDG(deg):  234    178    56    22      0

ADDR=3AC421  (16542041) N12345
DF18 PERIOD= 10 S      ALT =126700 ft
ERP =57.0 dBm          FREQ=1090.00 MHz

┌──────┬──────┬──────┬──────┬──────┐
│ RUN  │ PREV │ NEXT │      │      │
│ TEST │PARAM │PARAM │      │      │
└──────┴──────┴──────┴──────┴──────┘
```

**TIS-B:**

The user enters the A/C (UUT) LAT/LONG and heading.

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

### 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

### OUTPUT LEVEL

**ANTENNA PORT**

*Range*

  -67 to -2 dBm at Antenna port

*Resolution*

  1 dB

*Accuracy*

  ± 2 dB

*Distance to UUT antenna*

  6 to 300 ft with supplied antenna

**RF I/O PORT**

*Range*

  -115 to -47 dBm

*Resolution*

  1 dB

*Accuracy*

  -95 dBm to –47 dBm          ± 1 dB

*Accuracy*

  -115 dBm to <-95 dBm        ± 2 dB

### REPLY PULSE SPACING

**P1 to P2**

  12 µs ± 100 ns (X Channel) @ 50% peak

**P1 to P2**

  30 µs ± 100 ns (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**
2.5 µs ± 0.25 µs (10% to 90%)
**Fall Time**
2.5 µs ± 0.25 µs (90% to 10%)

## REPLY DELAY

### X CHANNEL
**Fixed Reply Delay**
50 µs ± 100 ns
### Y CHANNEL
**Fixed Reply Delay**
56 µs ± 100 ns

## RANGE DELAY

### X AND Y CHANNEL
**Range**
0 to 450.00 nmi
**Resolution**
0.01 nmi
**Accuracy**
± 0.01 nmi

## RANGE RATE

### X AND Y CHANNEL
**Range**
10 to 6500 kts
**Resolution**
1 kts
**Accuracy**
± 0.01% typical, tested to ± 0.5%

## SQUITTER

### PRF
2700 Hz
### Accuracy
± 2%
### Distribution
Per ARINC 568

## REPLY EFFICIENCY

### Range
0 to 100%
### Resolution
1% increments
### Accuracy
± 0.5%

## IDENT TONE

### Selection
Selectable three letter code
### Frequency
1350 Hz
### Accuracy
± 2 Hz

## UUT MEASUREMENTS

## ERP

### Range
+47 to +64 dBm
### Resolution
0.1 dB
### Accuracy
± 2 dB

## DIRECT CONNECTION PEAK PULSE POWER

### Range
+47 to +64 dBm
### Resolution
0.1 dB
### Accuracy
± 1 dB

## FREQUENCY

### Range
1025.00 to 1150.00 MHz
### Resolution
10 kHz
### Accuracy
± 20 kHz

## INTERROGATION PULSE WIDTH

### P1 AND P2 PULSE WIDTHS
**Range**
2.00 to 5.00 µs
**Resolution**
1 ns
**Accuracy**
± 50 ns

## INTERROGATION PULSE SPACING

### P1 to P2 Spacing
10 to 14 µs (X Channel)
### P1 to P2 Spacing
34 to 38 µs (Y Channel)
### Resolution
10 ns
### Accuracy
± 20 ns

## INTERROGATION PRF

### Range
1 to 300 Hz
### Resolution
1 Hz
### Accuracy
± 2 Hz

# TRANSPONDER MODE SPECIFICATIONS

## SIGNAL GENERATOR

### RF OUTPUT FREQUENCY

**Interrogation Frequency**

1030 MHz

**Accuracy**

± 10 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**

± 2 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, ± 1 dB

**Accuracy**

-115 to <-95 dBm, ± 2 dB

### ATCRBS/MODE S INTERROGATION PULSE SPACING

**MODE A**

**P1 to P2**

2.00 µs ± 25 ns

**P1 to P3**

8.00 µs ± 25 ns

**MODE C**

**P1 to P2**

2.00 µs ± 25 ns

**P1 to P3**

21.00 µs ± 25 ns

**MODE S**

**P1 to P2**

2.00 µs ± 25 ns

**P1 to P6**

3.50 µs ± 25 ns

**P1 to SPR**

4.75 µs ± 25 ns

**P5 to SPR**

0.40 µs ± 50 ns

### INTERMODE INTERROGATION PULSE SPACING

**MODE A**

**P1 to P3**

8.00 µs ± 25 ns

**P1 to P4**

10.00 µs ± 25 ns

**MODE C**

**P1 to P3**

21.00 µs ± 25 ns

**P1 to P4**

23.00 µs ± 25 ns

### INTERROGATION PULSE WIDTHS

**MODE A,C,S,INTERMODE**

**P1,P2,P3**

0.80 µs ± 50 ns

**MODE S**

**P6 (Short DPSK Block)**

16.25 µs ± 50 ns

**P6 (Long DPSK Block)**

30.25 µs ± 50 ns

**P5**

0.80 µs ± 50 ns

**INTERMODE**

**P4 (Short)**

0.80 µs ± 50 ns

**P4 (Long)**

1.60 µs ± 50 ns

### INTERROGATION PULSE RISE AND FALL TIMES

**ALL MODES**

**Rise Time**

50 to 100 ns

**Fall Time**

50 to 200 ns

### PHASE MODULATION

**ALL MODES**

**Transition Time**

≤ 80 ns

**Phase Shift**

180° ± 10°

### SLS LEVELS

**ATCRBS**

**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 ± 5 Hz

**ATCRBS**

*PRF*

  *235 Hz ± 5 Hz*

## UUT MEASUREMENTS

### ERP (@ 1090 MHZ)

**Range**

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

**Resolution**

  *0.1 dB*

**Accuracy**

  *± 2 dB*

**Direct Connection Peak Pulse Power (@1090 MHz)**

**Range**

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

**Resolution**

  *0.1 dB*

**Accuracy**

  *± 1 dB*

### TRANSMITTER FREQUENCY

**Range**

  *1087.000 to 1093.000 MHz*

**Resolution**

  *10 kHz*

**Accuracy**

  *± 50 kHz*

### RECEIVER SENSITIVITY, RADIATED MTL

**Range**

  *-67 to -79 dBm into 0 dBi antenna*

**Resolution**

  *0.1 dB*

**Accuracy**

  *± 2 dB, typical*

### RECEIVER SENSITIVITY, DIRECT CONNECTION MTL

**Range**

  *-67 to -79 dBm*

**Resolution**

  *0.1 dB*

**Accuracy**

  *± 2 dB*

### REPLY DELAY

**ATCRBS**

**Range**

  *1.80 to 7.00 µs*

**Resolution**

  *10 ns*

**Accuracy**

  *± 50 ns*

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

**Range**

  *125.00 to 131.00 µs*

**Resolution**

  *10 ns*

**Accuracy**

  *± 50 ns*

### REPLY DELAY JITTER

**ATCRBS**

**Range**

  *0.00 to 2.30 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

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

**Range**

  *0.00 to 6.00 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

### PULSE SPACING

**F1 TO F2**

**Range**

  *19.70 to 21.60 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

**MODE S PREAMBLE**

**Range, P1 to P2**

  *0.8 to 1.2 µs*

 **Range, P1 to P3**

  *3.3 to 3.7 µs*

**Range, P1 to P4**

  *4.3 to 4.7 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

### PULSE WIDTHS

**F1 AND F2**

**Range**

  *0.25 to 0.75 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

**MODE S PREAMBLE**

**Range**

  *0.25 to 0.75 µs*

**Resolution**

  *1 ns*

**Accuracy**

  *± 20 ns*

### PULSE AMPLITUDE VARIATION

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

  *+3 to -3 dB*

**Range, ATCRBS (Relative to F1)**

  *+3 to -3 dB*

**Resolution**

  *0.1 dB (0.01 dB via RCI)*

**Accuracy**

± 0.5 dB

## DF 11 SQUITTER PERIOD

**Range**

0.10 to 4.88 sec

**Resolution**

10 ms

**Accuracy**

± 10 ms

## DIVERSITY ISOLATION

**Range**

0 to >20 dB (Depending on Test Distance)

**Test Distance**

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

**Resolution**

0.1 dB

**Accuracy**

± 3 dB

## TCAS MODE SPECIFICATIONS

## SIGNAL GENERATOR

## OUTPUT FREQUENCY

**REPLY FREQUENCY**

1090 MHz

**Accuracy**

± 10 kHz

## OUTPUT LEVEL (SIMULATED ERP)

**ANTENNA PORT** Note 1

**Radiated power at 0dBi UUT antenna**

-68 dBm typical @ 10 Nmi Range, automatically controlled

**Range**

-67 to -2 dBm at Antenna port

**Resolution**

0.5 dB

**Accuracy**

± 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, ± 1 dB

**Accuracy**

-115 to <-95 dBm, ± 2 dB

## REPLY PULSE SPACING

**MODE C**

**F1 to F2**

20.30 µs ± 25 ns

**F1 to C1**

1.45 µs ± 25 ns

**F1 to A1**

2.90 µs ± 25 ns

**F1 to C2**

4.35 µs ± 25 ns

**F1 to A2**

5.80 µs ± 25 ns

**F1 to C4**

7.25 µs ± 25 ns

**F1 to A4**

8.70 µs ± 25 ns

**F1 to B1**

11.60 µs ± 25 ns

**F1 to D1**

13.05 µs ± 25 ns

**F1 to B2**

14.50 µs ± 25 ns

**F1 to D2**

15.95 µs ± 25 ns

**F1 to B4**

17.40 µs ± 25 ns

**F1 to D4**

18.85 µs ± 25 ns

**MODE S**

**P1 to P2**

1.00 µs ± 25 ns

**P1 to P3**

3.50 µs ± 25 ns

**P1 to P4**

4.50 µs ± 25 ns

**P1 to D1**

8.00 µs ± 25 ns

**D1 to Dn (n=2 to 112)**

1.00 µs times (n-1) ± 25 ns

## REPLY PULSE WIDTHS

**MODE C**

**All Pulses**

0.45 µs ± 50 ns

**MODE S**

**P1 through P4**

0.50 µs ± 50 ns

**D1 through D112**

0.50 µs ± 50 ns, 1 µs 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**

± 1 dB relative to F1

**Mode S**

± 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%

## REPLY DELAY

**ATCRBS**
  3.0 μs ± 50 ns

**Mode S**
  128 μs ± 50 ns

## RANGE DELAY

**Range**
  0 to 260 nmi

**Resolution**
  0.1 nmi

**Accuracy**
  ± 0.02 nmi

## 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)**
  >0.5dB 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 Ω typical

**Maximum Input Level**

4 kW peak

10 W average

**VSWR**

< 1.3:1

**ANTENNA**

**Type**

Input/Output

**Impedance**

50 Ω typical

**Maximum Input Level**

10 W peak

1/2 W average

**VIDEO**

**Type**

Output

**Impedance**

50 Ω typical

**Generate Video Level**

1.1 ± 0.4V peak to peak into 50 Ω

**Receive Video Level**

Proportional to IF level

**Baseline**

± 0.5V referenced to ground

## TEST ANTENNA

**VSWR**

< 1.5:1

**Gain**

6 dB, Typical

## TIME BASE (TCXO)

**Temperature Stability**

± 1 ppm

**Aging**

± 1 ppm per year

**Accuracy**

± 1 ppm

**Test Limit**

± 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**

≤ 10% of the nominal voltage

**Transient Overvoltages**

According to Installation Category II

## ENVIRONMENTAL (TEST SET)

**Use**

Pollution Degree 2

**Altitude**

≤ 4800 meters

**Operating Temperature**

NOTE 3 -20°C to 55°C

**Storage Temperature**

NOTE 4 -30°C to 71°C

**Relative Humidity**

95% ±5% from 5° to 30°C

75% ±5% from 30° to 40°C

45% ±5% from 40° to 55°C

## ENVIRONMENTAL (SUPPLIED EXTERNAL AC TO DC CONVERTER)

**Use**

Indoors

**Altitude**

≤ 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 [NOTE 5] | MIL-PRF-28800F | Class 2 |
| Temp, not operating [NOTE 6] | 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 | |
| EMC | EN 61326 | |

### 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

[NOTE 1] Simulates a 50.5 dBm XPDR ERP at 10 nMi range.

[NOTE 2] Level automatically controlled based on actual distance to UUT antenna.

[NOTE 3] Battery charging temperature range: 5℃ to 40℃ (controlled by internal charger).

[NOTE 4] Li Ion Battery must be removed below -20℃ and above 60℃.

[NOTE 5] Temperature range extended to -20℃ to 55℃.

[NOTE 6] Temperature range reduced to -30℃ to 71℃.

## VERSIONS AND ACCESSORIES

*When ordering please quote the full ordering number information.*

### Ordering Numbers — Versions

| | |
|---|---|
| 6015-110 | IFR 6015 Mode A/C/S Transponder, DME, TCAS/E-TCAS, TIS and TIS-B Ramp Test Set, with US Mains Leads |
| 6015-220 | IFR 6015 Mode A/C/S Transponder, DME, TCAS/E-TCAS, TIS and TIS-B Ramp Test Set, with European Mains Leads |
| 6015OPT3 | ADS-B |

### Extended Standard Warranties with Calibration for 6015

| | |
|---|---|
| W6015/203C | Extended standard warranty 36 months with scheduled calibration |
| W6015/205C | Extended standard warranty 60 months with scheduled calibration |

### Accessories for 6015

| | |
|---|---|
| AC0820 | Desk Top Stand |
| AC0826 | Tripod |
| AC0825CD | IFR 6015 Operation Manual - CD |
| AC24006 | Tripod, Dolly, Stand |

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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