

# ATC-601 Mode S/A/C Transponder Ramp Test Set

The ATC-601 performs Mode S/A/C transponder tests required by Federal Aviation Regulations



- **Accurate measurement of transponder transmitting frequency, power and receiver sensitivity**
- **AUTO TEST minimizes test time**
- **Tests include Flight ID, Tail Number decode and UELM/DELM data link**
- **Non-volatile storage for two sets of test data**
- **Operating range of 0 to 300 feet from the aircraft under test**
- **Dump test data to printer via RS-232**
- **Built-in self test**
- **LCD display with automatic backlight**
- **Tripod mountable directional antenna**
- **2 hour battery operation**
- **FCC Type Acceptance approved**
- **Two-year limited warranty**

IFR is a leader in the design, manufacture and marketing of Avionics test systems.

The ATC-601 performs the ATC transponder test required by the revised Federal Aviation Regulations (91.172 and Part 43, Appendix F as amended August 18, 1990) for Mode S, A and C transponders.

The ATC-601 provides a comprehensive 'AUTO TEST' function which allows the operator to verify and certify the operation of Mode S/A/C transponders with little or no intervention once the test has been commanded.

Tests may be individually run for diagnostic fault finding purposes during routine maintenance.

The ATC-601 is environmentally packaged to operate in all weather conditions and be protected against the shock and vibration encountered during ramp use.

## OPERATION Setup Menu

The setup menus are used to program parameters for power and sensitivity measurements, RS-232 parameters, test data storage, recall and data dump.

```

** SETUP#1 MENU **
UUT ANTENNA: RANGE HEIGHT
             TOP = 63    18
             BOTTOM = 55    8
             SELECTED = BOTTOM
GAIN_1030=11.5 GAIN_1090=12 LOSS=1.0
  
```

## Auto Test

The AUTO TEST screen is selected with the 'AUTO TEST' key. When initiated with the 'RUN/STOP' key, this test runs through 23 discrete tests in approximately 30 seconds.

If the required operating modes pass, this completes the 'Part 43, Appendix F' requirements. The detailed results of individual tests conducted during AUTO TEST are stored in memory and may be reviewed by using the 'SELECT' keys. Once selected, the test may be initiated by the 'RUN/STOP' key and will continue to run until the 'RUN/STOP' key is pressed again.

```

** AUTO TEST - PASSED **
MODE TESTED - A,C,S   FREQ: 1090.00 MHz
MODE PASSED - A,C,S   ERP: 53 dBm
MODE FAILED -         MTL: -73 dBm
DIVERSITY ISOLATION: 25 dBm
Press RUN TO start
  
```

## Reply Delay Test

```
** REPLY DELAY TEST - PASSED **  
  
MODE S: 128.00 uS  
ITM A: 128.00 uS C: 128.00 uS  
ATC A: 3.02 uS C: 3.10 uS  
Press RUN to start
```

## ATCRBS Reply Test

```
** ATCRBS REPLY TEST - PASSED **  
F1 TO F2 SPACING A:20.30 uS C:20.30 uS  
F1 PULSE WIDTH A: 0.45 uS C: 0.45 uS  
F2 PULSE WIDTH A: 0.45 uS C: 0.45 uS  
CODE= 7777 ALT= 10,700 FT [6140]  
Press RUN to start
```

## Mode S UF0 Test

```
** MODE S UF0 TEST - PASSED **  
  
DF 0 VS=1 RI=C AC= 10,700 FT  
ADDRESS=3AC421  
  
Press RUN to start
```

## Mode S UF11 Test

```
** MODE S UF11 TEST - PASSED **  
  
DF11 CA=0 AA=3AC421 PI=000001  
  
Press RUN to start
```

## Mode S UF20 Test

```
** MODE S UF20 TEST - PASSED **  
  
DF20 FS=0 DR=00 UM=00 AC= 10,700 FT  
MB=0000000000000000 ADDRESS=3AC421  
  
Press RUN to start
```

## Squitter Test

```
** SQUITTER TEST - PASSED **  
PERIOD = 1.00 SECONDS  
TAIL NUMBER = N12345  
SQUITTER ADDRESS = 3AC421 [1654201]  
  
Press RUN to start
```

## Flight ID Test

```
** FLIGHT ID TEST - PASSED **  
  
DF20 BDS1=02 BDS2=00  
AIS=20420CCB9C1041 FLIGHT ID=BA349  
ADDRESS=3AC421  
Press RUN to start
```

## Mode S UELM Test

```
** MODE S UELM TEST - PASSED **  
RES: DF20 DR=15 IIS=F IDS=2  
ACK: DF24 KE=1 ND=0 TAS=000F  
CLO: DF20 DR=15 IIS=F IDS=2  
ADDRESS=3AC421 ERROR=  
Press RUN to start
```

## Power

```
** POWER TEST - PASSED **  
  
ERP MTL  
TOP AVG (dBm) = 53.0 -73.4 PASSED  
•BOT AVG (DBM) = 52.0 -74.3 PASSED  
INSTANTANEOUS = 47.0 -73.4  
Press RUN to start
```

## Individual Tests

### V2.23 Firmware

1. REPLY DELAY
2. REPLY JITTER
3. ATCRBS REPLY
4. SLS LEVEL
5. ATCRBS ONLY ALL-CALL
6. MODE S ALL-CALL
7. INVALID MODE S ADDRESS
8. SPR ON/OFF
9. MODE S UF0
10. MODE S UF4
11. MODE S UF5
12. MODE S UF11
13. MODE S UF16
14. MODE S UF20
15. MODE S UF21
16. SQUITTER
17. FREQUENCY
18. DIVERSITY
19. MTL DIFFERENCE
20. POWER
21. FLIGHT ID
22. UELM
23. DELM

## Specification

### Signal Generator

#### Output

1030 MHz DCXO controlled 10 kHz

#### Level

-57 to -7 dBm typically, into 50  $\Omega$  (Automatically controlled to determine receiver sensitivity [MTL] for the selected range and 4 dB typically, higher than MTL for test interrogations)

## Test Antenna

### VSWR

1.5:1

### Gain

10 dB typical, specified on the antenna

Range 1.83 meters (6 feet) to 91.44 (300 feet)

## Interrogation Test Signals

### Rate

235 Hz PRF ( $\pm 5$  Hz)

### Interlace Ratio

MTL Interrogations to test interrogations

ATCRBS 2:1

Mode S 8:1

Modes A, C, S, Intermode

NOTE: The ATC-601 Interrogates with the mode(s) necessary to run selected test.

## Pulse Characteristics

### ATCRBS/Mode S Pulse Spacing

#### Mode A

$P_1$  to  $P_2$  2.00  $\mu$ s ( $\pm 50$  ns)

$P_1$  to  $P_3$  8.00  $\mu$ s ( $\pm 50$  ns)

#### Mode C

$P_1$  to  $P_2$  2.00  $\mu$ s ( $\pm 50$  ns)

$P_1$  to  $P_3$  21.00  $\mu$ s ( $\pm 50$  ns)

#### Mode S

$P_1$  to  $P_2$  2.00  $\mu$ s ( $\pm 50$  ns)

$P_1$  to  $P_6$  3.5  $\mu$ s ( $\pm 50$  ns)

$P_1$  to spr 4.75  $\mu$ s ( $\pm 50$  ns)

### Intermode Pulse Spacing

#### Mode A

$P_1$  to  $P_3$  8.00  $\mu$ s ( $\pm 50$  ns)

$P_1$  to  $P_4$  10.00  $\mu$ s ( $\pm 50$  ns)

#### Mode C

$P_1$  to  $P_3$  21.00  $\mu$ s ( $\pm 50$  ns)

$P_1$  to  $P_4$  23.00  $\mu$ s ( $\pm 50$  ns)

### Pulse Widths

#### Mode A, C, S, Intermode

$P_1, P_2, P_3$  0.80  $\mu$ s

#### Mode S

$P_6$  (Short) 16.25  $\mu$ s

$P_6$  (Long) 30.25  $\mu$ s

## Intermode

$P_4$  (Short) 0.80  $\mu$ s

$P_4$  (Long) 1.60  $\mu$ s

## All Modes

Accuracy  $\pm 50$  ns

Rise Time 50 to 100 ns

Fall Time 50 to 200 ns

## Phase Modulation

### Transition time

$\leq 80$  ns

### Phase Shift

180° ( $\pm 10^\circ$ )

## Amplitude Levels

### SLS Level ( $P_2$ )

-9 dB ( $\pm 1$  dB) and 0 dB relative to  $P_1$  level

NOTE: SLS Level is automatically controlled in the SLS LEVEL Test.

## UUT Measurements (replies)

### XMTR Power (at 1090 MHz) Effective Radiated Power (ERP)

#### Range

+48.5 to +57 dBm (71 to 500 W)

#### Accuracy

$\pm 2$  dBm

### Direct Connection - Peak Pulse Power

#### Range

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

#### Accuracy

1 dB

#### Resolution

0.1 dB

### XMTR Frequency

#### Range

1087 to 1093 MHz

#### Accuracy

50 kHz

#### Resolution

10 kHz

### Receiver Sensitivity

#### Direct Connection - Minimum Triggering Level (MTL)

#### Range

-67 to -79 dBm

#### Accuracy

$\pm 2$  dB

### **Radiated Field Strength (MTL)**

#### **Range**

-69 to -77 dBm into 0 dBm antenna (-77 dB W/m<sup>2</sup> to -85 dB W/m<sup>2</sup>)

#### **Squitter Period**

#### **Range**

0.10 to 4.88 sec

#### **Accuracy**

±10 ms

#### **Reply Delay**

#### **ATCRBS**

#### **Range**

1.80 to 7.00 µs

#### **Accuracy**

±100 ns

#### **Mode S and ATCRBS/Mode S All Call**

#### **Range**

125.00 to 131.00 µs

#### **Accuracy**

±100 ns

#### **Diversity Isolation**

#### **Range**

0 to >20 dB (depending on Antenna range)

#### **Antenna Range**

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

#### **Accuracy**

±3 dB

### **General**

#### **Calibration Interval**

1 year

#### **Battery Operation**

Duration 2 hours before re-charge at 25°C

Automatic Shut-off after 15 minutes of non-use

#### **AC Supply**

103.5 to 129 VAC, 207 to 253 VAC, 47.5 to 420 Hz, ≤+10% of the nominal voltage

30 W (used to re-charge battery)

#### **Environmental**

#### **Temperature**

-20° to 55°C

#### **Relative humidity**

≤80% for temperatures up to 31°C decreasing linearly to 50% at 40°C (Non-condensing)

#### **Altitude**

≤4000 m (13,124 ft)

#### **Electromagnetic Compatibility**

Complies with the limits in the following standards:

EN 55011 Class B

EN 50082-1

#### **Safety**

Complies with EN 61010-1 for class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an installation category 1 or 2 supply.

#### **Dimensions**

284 mm wide; 361 mm deep; 279 mm high

11.2 in. wide; 14.2 in. deep; 11 in. high

#### **Weight**

13.7 kg (30 lbs.)

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## ***Versions and Accessories***

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

### **Ordering Numbers**

#### **Versions**

- 601-110 ATC-601 Transponder Mode S Ramp Test Equipment, 110 VAC operation
- 601-220 ATC-601 Transponder Mode S Ramp Test Equipment, 220 VAC operation

#### **Accessories (Supplied)**

- RF Coaxial Cable
- Antenna Shield
- Operation Manual
- Operator's Guide
- Line Cord
- Directional Antenna
- Tripod
- Omni-Directional Antenna

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All IFR Avionics products delivered with Factory Certificate Of Calibration

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*IFR is a world leader in developing leading edge test and measurement equipment. The priority at IFR is to understand your communications test needs and respond to them. IFR has the flexibility and expertise to create just the right test solution for you. We understand that just as you are the expert in designing wireless products, we are expert in wireless test.*

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