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

A passion for performance.



The ATC-601 performs Mode A/C/S 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
- Enhanced Surveillance Testing and ADS-B/GICB Testing to RTCA-DO260 & ICAO Annex 10 Vol 3 Chapter 5
- 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

Aeroflex 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
```

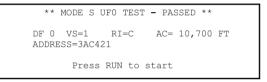
Reply Delay Test

** RE	PLY	DELAY	TEST	г —	PASSED	* *
ITN	A: A:) uS 2 uS	С:	128.00 3.10 rt	

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 H	RUN to start							

Mode S UF0 Test



Mode S UF11 Test

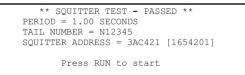
**]	MODE S	UF11 TEST - PASSED **
DF11	CA=0	AA=3AC421 PI=000001
	Pre	ess RUN to start

Mode S UF20 Test

** MODE S UF20 TEST - PASSED ** DF20 FS=0 DR=00 UM=00 AC= 10,700 FT MB=00000000000000 ADDRESS=3AC421

Press RUN to start

Squitter Test



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

V3.00R 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 UFO
- 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

European Enhanced Surveillance and DO-260 ADS-B testing capabilities

Elementary Surveillance:

Altitude Decode in 25ft increments Flight Status II & SI Code test BDS 1,0 Data Link Capability Report BDS 1,7 Common Usage GICB Capability Report BDS 2,0 Aircraft Identification BDS 3,0 ACAS Active Resolution Advisory

Enhanced Surveillance:

BDS 4,0 Selected Vertical Intention BDS 5,0 Track & Turn Report BDS 6,0 Heading & Speed Report

ADS-B:

BDS 0,5 Extended Squitter Airborne Position BDS 0,6 Extended Squitter Surface Position BDS 0,7 Extended Squitter Status BDS 0,8 Extended Squitter Ident & Category BDS 0,9 Extended Squitter Airborne Velocity

BDS 6,1 Extended Squitter Aircraft Status

** EXT SQUIT AIRB VEL #1 ** - PASSED DF20 BDS=0, 9 TYPE=19 AA=3AC421 SUBTYPE= VEL OVR GND NORMAL EAST-WEST VEL= 1000 Kts E NORTH-SOUTH VEL= 1000 Kts N Press RUN TO start

Extended Squitter Airbourne Velocity Part 1 Screen (GCIB)

** EXT SQUIT AIRB VEL #1 ** - PASSED DF17 PERIOD= 1s TYPE=19 AA=3AC421 SUBTYPE= VEL OVR GND NORMAL EAST-WEST VEL= 1000 Kts E NORTH-SOUTH VEL= 1000 Kts N Press RUN TO start

Extended Squitter Airbourne Velocity Part 1 Screen (DF17)

SPECIFICATION

SIGNAL GENERATOR

Output

1030 MHz DCXO controlled 10 kHz

Level

-57 to -7 dBm typically, into 50 Ω (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 (±5 Hz)

Interlace Ratio

MTL Interrogations to	o test interrogations	
ATCRBS	2:1	
Mode S	8:1	
Modes	A, C, S, Intermode	
NOTE: The ATC 601 Inte	produces with the mode(s) people and to run	a colocito di tac

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 μ s (±50 ns)

P_1 to P_3 8.00 μ s (±50 ns)

Mode C

 P_1 to P_2 2.00 μ s (±50 ns) P_1 to P_3 21.00 μ s (±50 ns)

Mode S

 $\begin{array}{l} P_1 \text{ to } P_2 & 2.00 \ \mu\text{s} \ (\pm 50 \ \text{ns}) \\ P_1 \text{ to } P_6 & 3.5 \ \mu\text{s} \ (\pm 50 \ \text{ns}) \\ P_1 \text{ to spr} & 4.75 \ \mu\text{s} \ (\pm 50 \ \text{ns}) \end{array}$

Intermode Pulse Spacing

Mode A

 P_1 to P_3 8.00 μ s (±50 ns) P_1 to P_4 10.00 μ s (±50 ns)

Mode C

 P_1 to P_3 21.00 μ s (±50 ns) P_1 to P_4 23.00 μ s (±50 ns)

Pulse Widths

Mode A, C, S, Intermode

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

Mode S

P₆ (Short) 16.25 μs P₆ (Long) 30.25 μs

Intermode

P₄ (Short) 0.80 μs P₄ (Long) 1.60 μs

All Modes

Accuracy ± 50 ns Rise Time 50 to 100 ns Fall Time 50 to 200 ns

Phase Modulation

Transition time

≤80 ns

Phase Shift

180° (±10°)

Amplitude Levels

SLS Level (P2)

-9 dB (±1 dB) and 0 dB relative to P1 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

±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

±2 dB

Radiated Field Strength (MTL)

Range

-69 to -77 dBm into 0 dBm antenna (-77 dB W/m² to -85 dB W/m²)

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, $\leq +10\%$ of the nominal voltage

30 W (used to re-charge battery)

Environmental

Temperature

-20° to 55°C

Relative humidity

 ${\leq}80\%$ for temperatures up to 31°C decreasing linearly to 50% at 40°C (Non-condensing)

Altitude

≤4000 m (13,124 ft)

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

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