

# Avionics

## ATC-1400A Transponder/DME Test Set



The ATC-1400A is a microprocessor-based test set designed to accomplish comprehensive testing of modern ATC transponder and DME equipment

### Features:

- Continuous display of UUIT, PRF, % reply and transmitter frequency and power
- Variable SLS and Echo Pulse Level
- Digital display of decoded transponder reply pulses
- Acceleration, velocity and range DME Modes
- Two-year limited warranty

### SIGNAL GENERATOR

#### Frequency Select Modes

User selectable L-Band Output Frequency can be selected by direct MHz and VOR paired channel designation.

#### $\Delta F$ Capability

The selected frequency can be varied  $\pm 9.99$  MHz in 0.01 MHz increments.

#### Manual/Automatic Stepping

The selected frequency can be automatically varied in 1 MHz increments.

#### Suppressor ON/OFF

The suppressor pulse output may be switched ON or OFF and the level adjusted from the front panel.

### DME MODE

#### Range Delay

Switch selectable -1.00 to 399.90 NMi

#### Velocity

Select inbound or outbound. Inbound and outbound velocity decrements range to 0 NM, then increments range 9990 KTS.

#### Acceleration

Non-zero acceleration decrements the selected velocity to 0 KTS, then increments velocity to 9990 KTS.

#### Squitter

Digitally implemented to provide stable rate distribution and repeatability

#### Echo Pulses

Front panel selectable

#### Ident Pulses

Select continuous pulse or Morse code from front panel

#### Pulse Characteristics

DME Pulses are formed by filtering, which provides superior representation of Gaussian shaped pulses.

#### DME Serial Data Interface

The serial BCD distance word is generated to correspond to the range distance programmed in the test set. This serial BCD word is available at the back panel through a 25 pin D type connector.

## Frequency Channelling

The 2-out-of-5 VOR Paired Channel Frequency is available for control of the DME UUT when the test set is in the automatic frequency stepping mode.

ARINC 568 compatible

## Transponder Mode

Modes T, A, B, C, D, AC<sub>1</sub> and AC<sub>2</sub> are available.

## Variable Pulse Spacing

P<sub>2</sub> and P<sub>3</sub> pulse spacing may be varied in the “+” or “-” direction or may be selected to the calibrated spacing from individual switches on the front panel.

## Pulse Width

The generated pulse width may be varied or selected for a calibrated width by a front panel switch.

## Side Lobe Suppression

On/Off selectable P<sub>2</sub> pulse

## Interference/DBL Interrogation

The Interference pulse and double interrogation functions are combined in a single switch and are exclusively selectable.

## UUT Pulse Spacing Detector

Transponder reply pulses are verified for proper position by selection of a narrow window. A wide window is provided when pulse position accuracy verification is not desired.

## Suppression Recovery

Selection of double interrogation and suppressor pulse provides a single interrogation after suppressor pulse spacing may be varied by interference/DBL interrogation switch.

## UUT MEASUREMENTS

### Transmitter Frequency Counter

The average frequency of one pulse in a reply (XPDR Mode) or an interrogation (DME Mode) is counted and continuously displayed. In the DME Mode either P<sub>1</sub> or P<sub>2</sub> may be selected to be counted. In XPDR Mode the F<sub>1</sub> or F<sub>2</sub> may be counted.

### Transmitter Frequency Discriminator

View frequency variation within the measured pulse

### Transmitter Power Meter

Transmitter power of P<sub>1</sub> or P<sub>2</sub> in DME Mode and/or F<sub>1</sub> or F<sub>2</sub> in XPDR Mode may be selected and displayed on the front panel.

## Added Features

- IEEE-488-1978 GPIB
- Automatic frequency stepping
- VOR pairing or direct UHF frequency selection
- Variable interference and double interrogation pulse position
- DME serial data output
- DME serial data input
- 2-out-of-5 code frequency channeling outputs

## ATC-1400A

### Accessory Units

When interfaced with the T-1401, S-1403DL/MLD or SI-1404 accessory units, the ATC-1400A becomes a comprehensive test system for TACAN, Mode 4 XPDR/RADAR and Mode S XPDR avionics equipment. For more information see separate data sheets.

### Non-Coherent SLS Option

P<sub>2</sub> provided on separate 200 MHz carrier, phase unsynchronized. (Factory or factory service center installed option.)

## SPECIFICATIONS

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### SIGNAL GENERATOR CHARACTERISTICS

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#### Range

952.01 to 1222.99 MHz, selectable in 0.01 MHz increments

#### Accuracy

±0.001%

#### ΔF

±9.99 MHz in 0.01 MHz increments from the selected frequency

### OUTPUT CHARACTERISTICS

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#### Range

0 to -127 dBm (into 50 Ω) in 1 dB increments

#### Overall Accuracy

±2.0 dB 0 to -90 dBm

±2.5 dB -90 to -110 dBm

#### Frequency Flatness

±0.6 dB Maximum

#### ON/OFF Ratio

80 dB minimum

#### Output Impedance

50 Ω, VSWR < 1.2:1

#### Residual FM

5 kHz peak to peak maximum

#### Phase Noise

> 90 dBc/Hz measured at 150 kHz from the carrier

#### Spurious

>60 dBc from 350 to 1800 MHz

### SUPPRESSOR PULSE OUTPUT CHARACTERISTICS

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#### Pulse Width

33 μs (±3 μs)

#### Amplitude

Adjustable from 3 to 27 V

#### Timing

DME function nominally 3.5 μs prior to P<sub>1</sub> of range reply

#### XPDR Function

0.8 μs prior to P<sub>3</sub>

**DME MODE CHARACTERISTICS**

**RANGE DELAY**

**Range**

0 to 399.99 NM selectable in 0.01 NM increments. -1 NM selected by individual switch

**Accuracy**

±0.02 NM plus ±0.005% of selected range

**VELOCITY**

**Range**

0 to 9990 KT selectable in 10 KT increments

**Accuracy**

±0.05%

**ACCELERATION**

**Range**

0 to 399 ft/sec<sup>2</sup> selectable in 1 ft/sec<sup>2</sup> increments

**Accuracy**

±0.5 ft/sec<sup>2</sup>

**SQUITTER**

**Range**

Selectable from 10 to 5999 Hz in 1 Hz increments (Ave. squitter)

**Accuracy**

±2%

**Distribution**

At 2700 Hz the distribution is in compliance with the requirements presented in ARINC characteristics 568

**ECHO PULSE CHARACTERISTICS**

**Position**

30 NM (±1 NM) after the interrogation is received in X channel

**Amplitude**

-19 to +6 dB, referring to the desired reply, selectable in 1 dB increments

**Accuracy**

±0.2 dB (0 to -10 dB)  
±0.5 dB (-11 to -19 dB)

**REPLY EFFICIENCY CHARACTERISTICS**

**Range**

0% to 100% selectable in 10% increments (1% under GPIB control)

**Accuracy**

±1.0% of interrogations 0% and 100%  
±5.0% of interrogations 10% and 90% Typical

**PULSE CHARACTERISTICS**

**Spacing**

12 µs ±0.1 µs (X channel), P<sub>1</sub> to P<sub>2</sub>, 50% pk

30 µs ±0.1 µs (X channel), P<sub>1</sub> to P<sub>2</sub>, 50% pk

**P<sub>2</sub> Deviation**

±7.9 µs in 0.1 µs increments (X and Y Channel)

Note: in X channel, P<sub>1</sub> and P<sub>2</sub> merge when P2 is deviated greater than -5.0 µs

**Rise Time**

2.0 µs (±0.25 µs) (10% to 90%)

**Fall Time**

2.5 µs (±0.25 µs) (90% to 10%)

**Width**

3.5 µs (±0.5 µs) (50% to 50%)

**Spectrum**

>55 dB down from center frequency measured at ±800 kHz

**R-NAV CHARACTERISTICS**

**Spacing**

50 µs (±0.25 µs) at 0 NM (X Channel) 56 µs (±0.25 µs) at 0 NM (Y Channel)

P<sub>1</sub> at time of interrogation

P<sub>2</sub> at time of reply

**Width**

7 µs (±1 µs)

**IDENT PULSE CHARACTERISTICS**

**Rate**

1350 Hz (±0.02%)

**EQUALIZER PULSED CHARACTERISTICS**

100 µs after ident pulse

**TRANSPONDER MODE CHARACTERISTICS**

**INTERROGATION RANGE**

**Range**

10 to 7999 Hz selectable in 1 Hz increments

**Accuracy**

±0.005%

**PULSE CHARACTERISTICS**

**Mode Spacing**

8.0 µs (±5 ns) (Mode 3/A)

17.0 µs (±5 ns) (Mode B)

21.0 µs (±5 ns) (Mode C)

25.0 µs (±5 ns) (Mode D)

**Variable Pulse Spacing**

±1.85 µs selectable in 0.05 µs increments for P<sub>1</sub> to P<sub>2</sub>, P<sub>1</sub> to P<sub>2</sub> independently variable in direction relative to P<sub>1</sub>

**Width**

0.8  $\mu$ s ( $\pm$ 5 ns) (CAL switch position)  
0.20 to 1.85  $\mu$ s selectable in 0.05  $\mu$ s increments (VAR Switch Position)

**Rise Time**

70 ns (+10 ns, -20 ns) (10% to 90%)

**Fall Time**

70 ns (+10 ns, -20 ns) (90% to 10%)

**SIDE LOBE SUPPRESSION (SLS)**

**Amplitude**

-19 to +6 dB, relative to  $P_1$ , selectable in 1 dB increments

**Accuracy**

$\pm$ 0.2 dB for -10 to +3 dB

**INTERFERENCE PULSE CHARACTERISTICS**

**Position Range**

-17.5 to +399.0  $\mu$ s referenced to  $P_1$ , selectable in 0.1  $\mu$ s increments

**Accuracy**

$\pm$ 0.05  $\mu$ s

**Width**

Continuously adjustable from 0.2 to 5  $\mu$ s by front panel control

**DOUBLE INTERROGATION CHARACTERISTICS**

**Range**

Measured from  $P_1$  first interrogation to  $P_1$  second interrogation, selectable to 0.1  $\mu$ s increments

**Accuracy**

$\pm$ 5 ns plus 0.05%

**UUT PULSE SPACING DETECTOR**

**Window Width**

Narrow: 220 ns nominal, referenced to  $P_1$   
Wide: 750 ns nominal, referenced to  $P_1$

**UUT MEASUREMENT CHARACTERISTICS**

**TRANSMITTER FREQUENCY COUNTER CHARACTERISTICS**

**Range**

1020 to 1155 MHz

**Accuracy**

$\pm$ 20 kHz (DME Mode)  
 $\pm$ 50 kHz (XPDR Mode)

**TRANSMITTER FREQUENCY DISCRIMINATOR OUTPUT**

**Response**

1 MHz/V  $\pm$ 10% into open load  
2 MHz/V  $\pm$ 10% into a 50  $\Omega$  load

**Bandwidth**

10 MHz minimum

**TRANSMITTER POWER METER CHARACTERISTICS**

**Frequency Range**

1020 to 1155 MHz

**Amplitude Range**

0 to 3999 W pk

**Accuracy**

$\pm$ 0.5 dB (from 50  $\Omega$  source) 100 to 3999 W  
 $\pm$ 0.7 dB (from 50  $\Omega$  source) 1 to 99 W

**GENERAL**

**Power**

**Source Voltage and Frequency**

100 to 120 VAC, 60 Hz  
220 to 240 VAC, 50 Hz.

**Power Consumption**

120 W maximum  
94 W nominal at 115 VAC  
86 W nominal at 230 VAC

**Nominal Input Current**

1.49 A at 115 VAC  
0.88 A at 230 VAC

**Electromagnetic Compatibility**

Complies with the limits specified in the following standards:  
EN 55011:1991 Class B  
EN 50082-1

**Safety**

Conforms with EN 61010-1 for class 1 portable equipment.

**Temperature**

5° to 40°C

**Relative Humidity**

$\leq$ 80% for temperatures up to 31°C, decreasing linearly to 50% at 40°C

**Altitude**

$\leq$ 4000 m (13,124 ft)

**Mains Supply Fluctuations**

$\leq \pm$ 10% of the nominal voltage

**Transient Overvoltages**

According to installation category II

**Pollution Degree**

2

**Dimensions**

426 mm wide, 185 mm high, 467 mm deep  
16.8 in. wide, 7.3 in. high, 18.4 in. deep

**Weight**

20 kg (44 lbs.) approximately

# VERSIONS AND ACCESSORIES

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When ordering please quote the full ordering number information.

## Ordering Numbers

### Versions

1400-110	ATC-1400A	Transponder/DME	Bench	Test
	Equipment, 110 VAC operation			
1400-220	ATC-1400A	Transponder/DME	Bench	Test
	Equipment, 220 VAC operation			

### Accessories

1401-110	T-1401 TACAN Bearing and DME Simulation, 110 VAC operation			
1401-220	T-1401 TACAN Bearing and DME Simulation, 220 VAC operation			
1403-110	S-1403DL Mode S Transponder, 110 VAC operation			
1403-220	S-1403DL Mode S Transponder, 220 VAC operation			
1403MLD-110	S-1403DL/MLD Mode S with Level Diversity, 110 VAC operation			
1403MLD-220	S-1403DL/MLD Mode S with Level Diversity, 220 VAC operation			
1404-110	SI-1404 Modes S & 4 Transponder with MLD, 110 VAC			
1404-220	SI-1404 Modes S & 4 Transponder with MLD, 220 VAC			

### Options

AC1000	Non-coherent SLS option
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All Aeroflex Avionics products delivered with Factory Certificate Of Calibration