

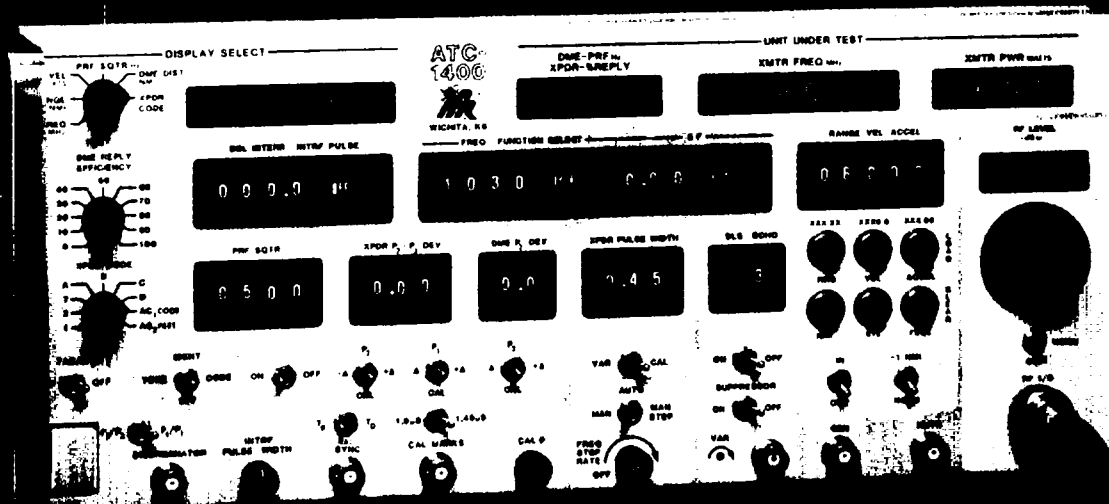


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Precision Simulators from...



ATC-1400

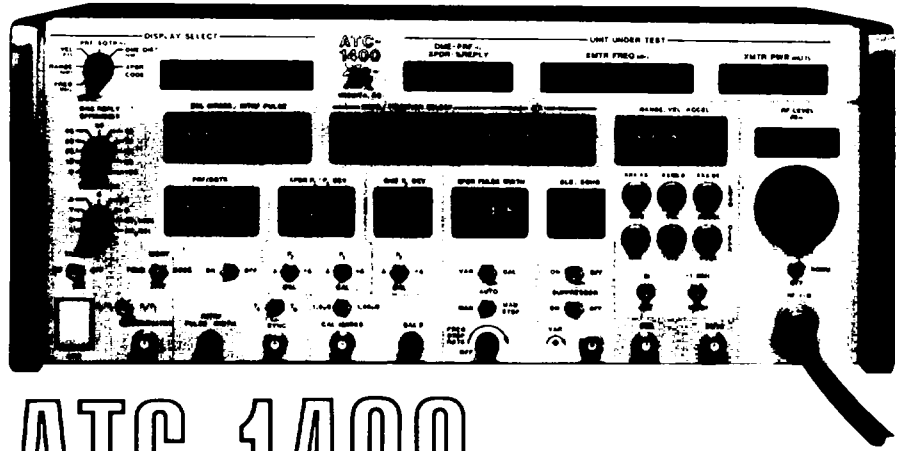


The ATC-1400 is a microprocessor-based test set designed to provide complete testing of modern ATC Transponder and DME equipment. It will be supported later by DABS, TACAN, Military IFF and ARINC-700 accessory units, making it a truly versatile and complete test instrument.

- Continuous display of UUT PRF, % Reply, Transmitter Frequency and Power
- Simple ATE changeover—just plug in the GPIB Connector, IEEE-488-1978 interface is built in.
- DABS Modulation Compatible
- Variable SLS and Echo Pulse Level
- Digital Display of Decoded Transponder Reply Pulses
- Automatic Frequency Change
- TACAN Channel, VOR pairing, or direct UHF Frequency Selection
- Acceleration, Velocity, and Range DME Modes
- Variable Interference and Double Interrogation Pulse Position
- DME Serial Data Output
- TACAN Modulation and Reference Bursts
- DME Serial Data Input
- 2-out-of-5 code frequency channeling Outputs
- Two-year limited warranty



10200 West York Street • Wichita, Kansas 67215 U.S.A. / 316 / 522-4981 / TWX 910-741-6952



ATC-1400

FEATURES AND CAPABILITIES

SIGNAL GENERATOR:

Frequency Select Modes: The desired L-Band Output Frequency can be selected by direct MHz, VOR paired, and TACAN channel designation.

ΔF Capability: The desired frequency is selected as indicated above in 1 MHz increments and can then be varied ± 9.99 MHz in 0.01 MHz increments.

Manual or Automatic Stepping: The selected frequency can be automatically varied in 1 MHz increments, upward in frequency, at a rate which can be adjusted by a front panel control.

Suppressor On/Off: The suppressor output may be switched ON or OFF from a front panel select switch. Suppression pulse level is adjustable on front panel.

DME MODE:

Range Delay: Switch selectable - 1 NM Range, for indicator calibration, from a front panel switch. When the - 1 NM is selected, one mile is subtracted from the range.

Velocity: May be selected as inbound or outbound by a front panel switch. Inbound velocity decrements range to 0 NM, then increments range to maximum. Outbound velocity increments range to maximum, then decrements velocity to 0 NM. The maximum range may be set internally to 100 NM, 200 NM, or 400 NM.

Acceleration: Non-zero acceleration decrements the selected velocity to 0 KTS, then increments velocity to 3990 KTS.

Squitter: Squitter is digitally implemented to provide stable rate and distribution, as well as repeatability.

TACAN Simulation: TACAN Simulation is selectable by a front panel switch. When TACAN/ON is selected, the output pulses are AM modulated with 15 and 135 Hz signals, the TACAN reference and auxiliary burst signals are generated representing a bearing of 180°.

External AM modulation and pulse modulation inputs are available from the rear panel. Used with an ATC-1400 accessory box it allows a complete TACAN simulation capability.

Echo Pulses: Selected ON or OFF from front panel control.

Ident Pulses: Continuous tone or morse code may be selected from front panel control. Equalizer pulses may be selected ON or OFF from rear panel control when Ident is enabled.

Pulse Characteristics: The DME Pulses are formed by filtering and not by Pin Diode switching, which results in a better representation of a Gaussian shaped pulse. The pulse spectrum has adequate side lobe shaping to allow adjacent channel rejection measurements.

DME Serial Data Interface: The serial BCD distance word is generated by the test set 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. This

interface is designed to be compatible with ARINC characteristic 568 requirements.

There is in addition an input on the back panel of the test set to receive the serial BCD distance data from the DME UUT and be displayed on the display function readout on the front panel of the test set.

Frequency Channeling: The 2-out-of-5 VOR Paired Channel Frequency is available at the rear panel for control of the DME UUT when the test set is in the automatic frequency stepping mode. This interface is designed to be compatible with ARINC characteristic 568 requirements.

TRANSPONDER MODE:

Modes: Modes 1, 2, T, A, B, C, D, AC₁, and AC₂ are available. Mode AC₁ and AC₂ alternate between modes A and C. AC₁ will result in XPDR Code Data in 4 digit Octal Code for Mode A response to be displayed. AC₂ Mode will have altitude data from the Mode C response displayed in feet ($\div 1000$).

Variable Pulse Spacing: The P₂ and P₃ pulse spacing may be varied in the + direction or - direction or may be selected to the calibrated spacing from individual switches on the front panel. P₂ and P₃ may not be varied simultaneously at different amounts, as there is a single selector for deviation amount.

Pulse Width: The pulse width generated in transponder mode may be varied or selected for a calibrated width by a front panel selector switch.

Side Lobe Suppression: The P₂ pulse may be switched ON or OFF from a front panel selector switch.

Interference/DBL Interrogation: The interference pulse and Double Interrogation functions are combined in one switch selector and cannot be selected simultaneously. The function may be switched ON or OFF by a front panel selector switch. The double interrogation may not be any closer than 24.5 μ sec to P₃ of the first interrogation and is independent of transponder mode selected.

UUT Pulse Spacing Detector: The transponder reply pulses are verified for proper position by selection of a Narrow Window, by use of a rear panel switch. In the narrow position the pulses must be within ± 100 ns of their designated position to be recognized and show up in the XPDR Code Display Readout. A Wide Window is provided by the rear panel selector switch when pulse position accuracy verification is not desired.

UUT MEASUREMENTS:

Transmitter Frequency Counter: The average frequency of one (1) pulse in a reply (XPDR Mode) or an interrogation (DME Mode) is counted and continuously displayed. In the DME Mode, either P₁ or P₂ may be selected to be counted by a selector switch on the front panel of the test set. In XPDR Mode, F₁ or F₂ may be counted.

Transmitter Frequency Discriminator: The frequency variation within the measured pulse may be viewed at the Discriminator Output Jack on the front panel of the test set. A reference line is supplied which represents the average frequency displayed on the UUT Transmitter Frequency counter display on the front panel.

Transmitter Power Meter: The transmitter power is measured in a peak power detector and displayed on the front panel. The resolution of the front panel readout is 1 watt. In DME mode, either P₁ or P₂ may be selected. In XPDR mode, either F₁ or F₂ may be selected to be measured by a switch on the front panel.

FRONT PANEL DISPLAYS: _____

Generator Function:

Generator Frequency: The test set Frequency may be selected from the display selector switch and viewed on the Generator Function readout. Resolution of 10 kHz is available on this readout.

Range: The range delay of the test set in DME mode may be selected from the display selector switch and viewed on the Generator Function readout. Resolution is 0.01 NM. This is very useful when velocity and acceleration functions are being used, as the changing range delay may be viewed.

Velocity: The velocity may be selected from the display selector switch and viewed on the Generator Function readout. Resolution is 10 KT. This function is very useful when acceleration is being used.

Serial Data: The serial BCD distance data, from the UUT will be displayed when this function is selected. This verifies the DME is supplying proper data to the indicator without having to have an indicator in the test setup.

PRF: The test set PRF is displayed on the readout when this function is selected. This will occur in both DME and XPDR Modes. Resolution is 1 Hz.

XPDR Code: The XPDR reply is decoded and displayed when this function is selected. The code is displayed as a 4 digit Octal number for modes A, B, C, D and AC₁. The altitude data is displayed in feet ($\div 1000$) for mode AC₂.

DME PRF/XPDR % REPLY: The DME UUT PRF is displayed in DME Modes and the XPDR % Reply is displayed in XPDR Modes. The PRF resolution is 1 Hz and the % reply resolution is 1%.

XMTR FREQ: The UUT Frequency is displayed continuously in MHz with 10 kHz resolution.

XMTR PWR: The UUT Transmitter Power is continuously displayed with 1 watt resolution.

RF LEVEL: The test set Output Level at the RF Output Jack is displayed continuously with 1 dBm resolution.

REMOTE CONTROL: _____

IEEE-Interface: IEEE-488-1978 instrumentation interface is provided as a standard feature in the ATC-1400.

ATC-1400 SPECIFICATIONS

SIGNAL GENERATOR: _____

Frequency Characteristics:

Range: 952.01 MHz to 1222.99 MHz selectable in 0.01 MHz increments
Accuracy: (See Frequency Counter)
 ΔF : ± 9.99 MHz in 0.01 MHz increments from the selected frequency

Generator Frequency Counter:

Range: 950 to 1225 MHz
Accuracy: ± 15 kHz

Output Characteristics:

Range: 0 dBm to -110 dBm (into 50Ω) in 1 dB increments
Attenuator Accuracy: ± 0.3 dB or 1%
Leveler Accuracy: ± 0.3 dB
ON/OFF Ratio: 80 dB minimum
Impedance: 50Ω , VSWR $< 1.2:1$ measured at the RF Output Jack

Spectral Purity:

Residual FM: 5 kHz pk-pk maximum
Phase Noise: > 90 dBc/Hz measured at 150 kHz from the carrier
Spurious: > 60 dBc from 350 MHz to 1800 MHz

Suppressor Pulse Output Characteristics:

Pulse Width: $33 \mu s \pm 3 \mu s$ (Transponder Mode)
Continuous High Level (DME Mode)
Amplitude: Adjustable, with a screw driver adjustment on the front panel, from 3V to 27V into a $2K\Omega$ Load

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 $\pm 0.005\%$ of selected range

Velocity:

Range: 0 to 3990 KT selectable in 10 KT increments
Accuracy: $\pm 0.01\%$

Acceleration:

Range: 0 to 399 ft/sec^2 selectable in 1 ft/sec^2 increments
Accuracy: $\pm 0.5 \text{ ft}/\text{sec}^2$

Squitter:

Range: Selectable from 10 Hz to 5999 Hz in 1 Hz increments (Average Squitter)
Accuracy: $\pm 1\%$ plus ± 2 Hz
Distribution: At 2700 Hz the distribution is in compliance with the requirements presented in ARINC characteristic 568

TACAN Simulation Characteristics: (Internal)

AM Modulation Frequencies: 15 Hz and 135 Hz $\pm 0.02\%$
AM Modulation %: 21% $\pm 3\%$ each component
Bearing Output: 180° approximate

Echo Pulse Characteristics:

Position: 30 NM ± 1 NM after the interrogation is received in X channel
Amplitude: -19 to $+6$ dB, reference to the desired reply, selectable in 1 dB increments
Accuracy: -10 to $+3$ dB ± 0.2 dB

Reply Efficiency:

Range: 0% to 100% selectable in 10% increments
Accuracy: $\pm 0.01\%$

Pulse Characteristics:

Spacing: $12 \mu\text{s} \pm 0.1 \mu\text{s}$ (X channel), P_1 to P_2 , 50% pk.
 $30 \mu\text{s} \pm 0.1 \mu\text{s}$ (Y channel), P_1 to P_2 , 50% pk.
 P_2 Deviation: $-5.0 \mu\text{s}$ to $+7.9 \mu\text{s}$ from nominal in 0.1 μs increments (X channel)
 $\pm 7.9 \mu\text{s}$ from nominal in 0.1 μs increments (Y channel)
Rise Time: $2.0 \pm 0.25 \mu\text{s}$ (10% to 90%)
Fall Time: $2.5 \pm 0.25 \mu\text{s}$ (90% to 10%)
Width: $3.5 \pm 0.5 \mu\text{s}$ (50% to 50%)
Spectrum: 55 dB down at $f_0 \pm 800 \text{ kHz}$

R-NAV Pulse Characteristics:

Spacing: $50 \mu\text{s} \pm 0.25 \mu\text{s}$ at 0 NM (X channel)
 $56 \mu\text{s} \pm 0.25 \mu\text{s}$ at 0 NM (Y channel)
 P_1 at time of interrogation
 P_2 at time of reply
Width: $7 \mu\text{s} \pm 1 \mu\text{s}$

TRANSPONDER MODE CHARACTERISTICS: _____**Interrogation Rate:**

Range: 10 Hz to 7999 Hz selectable in 1 Hz increments
Accuracy: $\pm 0.005\%$

Pulse Characteristics:

Mode Spacing: $3.0 \pm 5 \text{ ns}$ (Mode 1)
 $5.0 \pm 5 \text{ ns}$ (Mode 2)
 $6.5 \pm 5 \text{ ns}$ (Mode T)
 $8.0 \pm 5 \text{ ns}$ (Mode A)
 $17.0 \pm 5 \text{ ns}$ (Mode B)
 $21.0 \pm 5 \text{ ns}$ (Mode C)
 $25.0 \pm 5 \text{ ns}$ (Mode D)

Variable Pulse

Spacing: $\pm 1.85 \mu\text{s}$ selectable in 0.05 μs increments for both P_2 and P_3 .
 P_2 and P_3 independently variable in direction relative to P_1 .
Width: $0.8 \pm 5 \text{ ns}$ (CAL Switch Position)
 $0.20 \mu\text{s}$ to $1.85 \mu\text{s}$ selectable in 0.05 μsec increments (VAR Switch Position)

Rise Time: $70 \pm 20 \text{ ns}$ (10% to 90%)

Fall Time: $70 \pm 20 \text{ ns}$ (90% to 10%)

Side Lobe Suppression (SLS):

Amplitude: -19 to $+6 \text{ dB}$, relative to P_1 , selectable in 1 dB increments

Accuracy: $\pm 0.2 \text{ dB}$ for -10 dB to -3 dB
 $\pm 0.5 \text{ dB}$ for -19 dB to -11 dB and $+4 \text{ dB}$ to $+6 \text{ dB}$

Interference Pulse Characteristics:

Position Range: $-19.5 \mu\text{s}$ to $+399.0 \mu\text{s}$, referenced to P_1 , selectable in 0.1 μs increments

Accuracy: $+0.00 \mu\text{s}$, $-0.05 \mu\text{s}$

Width: Continuously adjustable from 0.2 μs to 5 μs by front panel control

Double Interrogation Characteristics:

Range: Measured from P_1 first interrogation to P_1 second interrogation, selectable in 0.1 μs steps

Minimum: P_3 first interrogation plus 25 μs
Maximum: 399 μs

Accuracy: $\pm 0.03\%$

UUT Pulse Spacing Detector:

Window Width: $220 \pm 20 \text{ ns}$, (Narrow), referenced to F_1
750 nominal, (Wide), referenced to F_1

UUT MEASUREMENT CHARACTERISTICS: _____**Transmitter Frequency Counter Characteristics:**

Range: 1020 MHz to 1155 MHz

Accuracy: $\pm 20 \text{ kHz}$ (DME Mode)
 $\pm 50 \text{ kHz}$ (XPDR Mode)

Transmitter Frequency Discriminator Output:

Gain: 1 MHz/volt $\pm 10\%$

Bandwidth: 10 MHz minimum

Transmitter Power Meter Characteristics:

Frequency Range: 1020 MHz to 1155 MHz

Amplitude Range: 50W to 2.0KW pk.

Accuracy: $\pm 0.5 \text{ dB}$ (from a 50 Ω source)

ATC-1400

PHYSICAL CHARACTERISTICS

Power: 105 to 120 VAC or 220 to 250 VAC, 50 to 400 Hz. Power consumption is less than 100 watts.

Dimensions: 16.8" wide, 7.3" high, 18.4" deep (42.6cm W, 18.5cm H, 46.7cm D)

Weight: 44 lbs. (20 kg) approximately

The continuous improvement of its products is the intent of IFR, Inc., who reserves the right to make design changes without notice.

Contact IFR, Inc. for additional information and the name of your nearest distributor.



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