AGILTRON®

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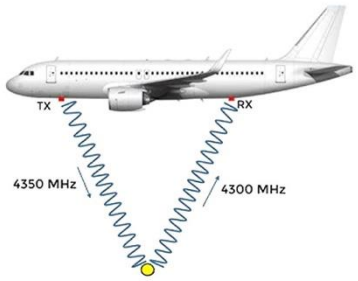
Radio/Radar Altimeter Test System

All Radar Altimeter Types, Up to 50 GHz, 1 inch precision, 25-bit highest resolution

The RATS Altimeter Test System is a high-precision instrument designed to test and calibrate all radio/radar altimeter systems by simulating altitudes from 10,000 feet down to 1 inch, with fast variable delay resolution up to 100 ns and support for operating frequencies from kHz up to 50 GHz. Based on advanced photonic technology, RATS offers ultra-wide bandwidth and waveform-independent operation, supporting all signal types — including FMCW, Constant Difference Frequency (CDF), pulsed, spread spectrum, frequency hopping, LPI, and encrypted protocols. It operates by converting the input RF signal into optical format, transmitting it over fiber, and converting it back to RF after a digitally controlled delay via N-bit resolution fiber segment switching. A variable attenuator simulates free-space propagation loss, configurable through a remote interface. The system features front-panel RF I/O, an intuitive touchscreen, and remote control via USB or Ethernet, with command sets provided for custom integration. Agiltron manufactures a range of compatible fiber optical components to support varying budget and speed needs.



Features

- Programmable for automated testing
- Altitude settings 0 to 10k feet in 5 foot steps
- 0.1- 50GHz waveform independent operation
- 10 ns zero-delay offset
- 4 aircraft cable compensation settings
- Programmable and user defined AID

Applications

- Altimeter testing and calibration
- Altimeter manufactures, calibration labs
- Aircraft avionics integration

Specifications

Parameter		Min	Typical	Max	Unit
Frequency Range		0.001	20	50	GHz
Attitude Range		0.1		10000	Feet
Attitude Accuracy		1			inch
Attitude Repeatability		0.01			%
Attitude Change Resolution [1]		1	10	20	Bit
Attitude Changing Speed	MEMS type		10	20	msec
	CL type		50	100	µsec
	NS type		100	300	nsec
Amplitude (variable) [2]		0		120	dB
Amplitude Adjust Resolution			2		dB
Aircraft Cable Compensation [3]		30		150	Feet
RF Response Flatness (within 1GHz@6GHz)			± 0.5		dB
RF Input Level		-20		10	dBm
Noise Figure [4]			32	40	dB
VSWR				2:1	
Spurious Free Dynamic Range		100			$dB/Hz^{2/3}$
Operating Temperature		0		50	°C
Input/Output Impedance					Ω
Storage Temperature		-40		80	°C
Power Supply		110		240	AVC
Power Consumption				250	W
Control		Touch Screen, USB, Ethernet, TTL			
Size		19" rack			

Notes:
[1]: See details on the next page
[2]: User defined or coupled to altitude settings (free space propagation loss)
[3]: Adding a fixed delay. Manual or User programmable 35 to 150 feet. (extra cost)
[4]: It is defined @ 6 GHz and 16-bit

RoHS COMPLIANT

Rev 09/30/26

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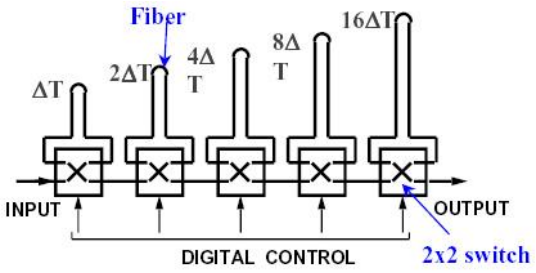
N-Bit Resolution

Switchable fiber loops in series



The RATS selectively routes signals through N fiber segments having different lengths. Each fiber segment is defined to have the time delay as

$$\Delta T_i = 2^{(i-1)}\delta T,\ i = 1, 2, ..., N$$

Where δT is the increment of time delay. Therefore, the module provides N-bit of digitally variable time delay, having the total time delay as

$$\Delta T_{Total} = (2^N - 1)\delta T$$

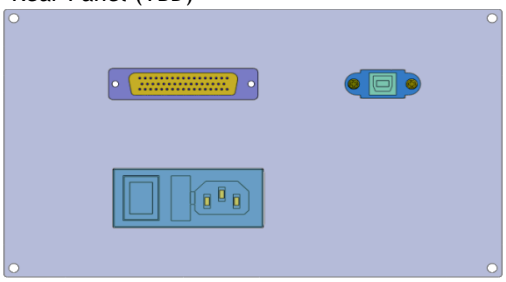
N and δT are defined by the customer. The attitude conversion = time delay x the speed of light. For example 7 bit resolution has 128 steps that is 50 foot per step for max 6350 feet. 10bit resolution has 1020 steps that is 20 foot per step for max 10200 foot. 14 bit resolution has 16384 steps that is 5 foot per step for max 81920 foot. Customer can select the max attitude to be tested and the required resolution.

Enclosure Dimension (mm)

Typical 3U 19" rack

Front Panel (TBD)

Rear Panel (TBD)



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Ordering Information (Part Number)

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Resolution**	**Frequency**	**Fix Delay [1]**	**Control [2]**	**Switch Type**	**LCD Display**	**Max Attitude**	**RF Connector [3]**
RATS-	19-bit = 19 17-bit = 17 16-bit = 16 15-bit = 15 14-bit = 14 13-bit = 13 12-bit = 12 11-bit = 11 10-bit = 10 9-bit = 09 8-bit = 08	0.1 ~6GHz = 1 0.1 ~10GHz = 2 0.1 ~20GHz = 3 0.1- 50GHz = 4	No = 1 Yes = 2 Special = 0	TTL = 1 USB = 2 RS232 = 3 Special = 0	MEMS = M CLSW = C NSSW = N	No = 1 Yes = 2 Special = 0	7000ft = 1 10000ft = 2 5000ft = 5 3000ft = 3 Special = 0	SMA = 1 K type = 2 Special = 0

[1]. This feature compensates Aircraft Cable. The low cost version is to insert a fiber patch cable. This can also be electronically switching between several fiber cables.

[2]. Change rate > 2kHz must use TTL control.

Application Notes

Fiber Core Alignment
Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness
Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power
Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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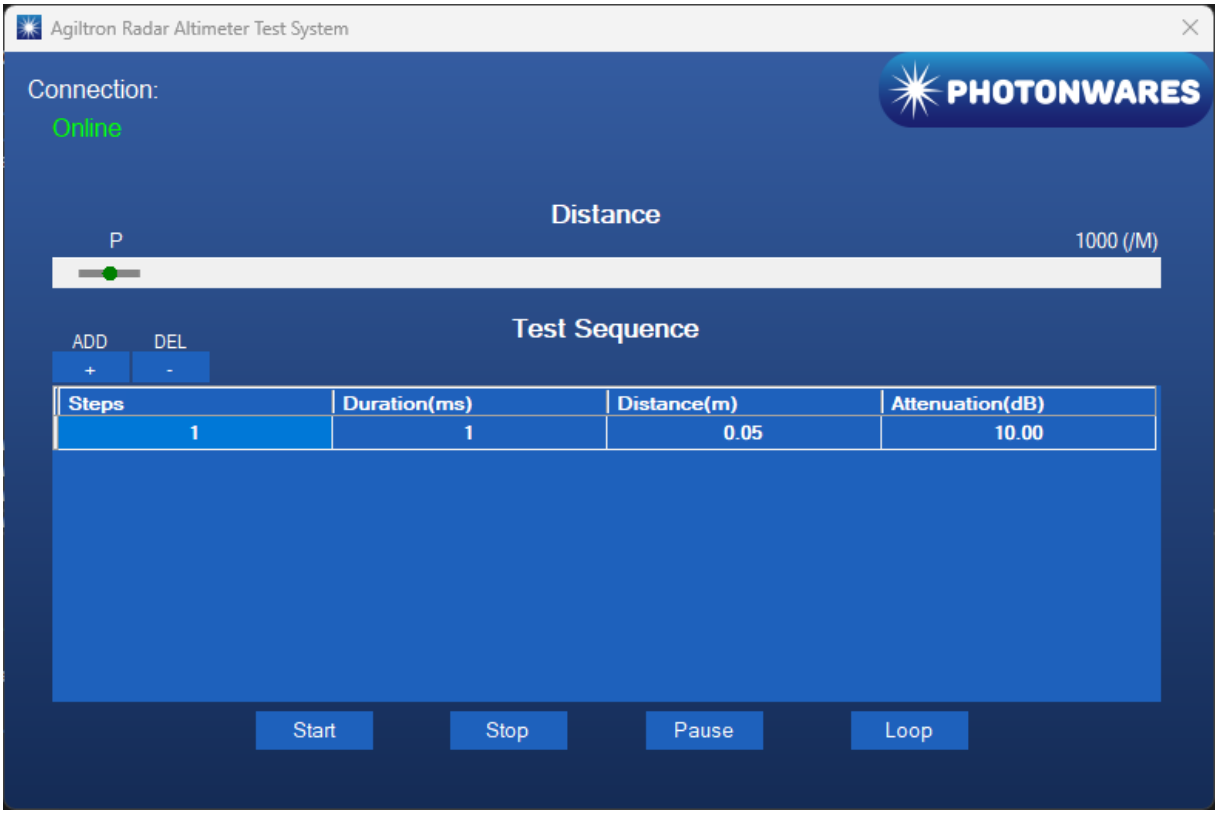
GUI



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