Radar Altimeter Test System

All Radar Altimeter Types, Up to 40 GHz, 1 inch precision, 25-bit highest resolution

The RATS Altimeter Test System is designed to test and calibrate any and all radar altimeter systems. It simulates altitudes from 10000 feet to 1 inch with high precision and fast variable speed up to 100ns, operating frequencies up to 40 GHz. Based on an advanced photonic technology, RATS features ultra wide bandwidth and intrinsic waveform independent operation regardless of protocol or encryption including FMCW, Constant Difference Frequency (CDF), pulsed or non-pulsed, spread spectrum, frequency hopping, variable power, and low probability of intercept (LPI). It has an RF input and an RF output on the front panel. In operation, the input RF signal is first converted into an optical signal and transmitted over a fiber optic cable to the receiver, where it converts back into the output RF signal. To simulate an attitude, the signal is delayed by a corresponding fiber length that can be digitally varied by switching to pass through N fiber segments, therefore providing N-bit resolution. To simulate free space propagation loss, it has a variable attenuator that is settable via the remote interface. Agiltron uniquely produces several families of fiber optical components to meet various budget and speed requirements.

The operation is made easy with a touch screen, and/or remote USB and Ethernet computer control GUI. We provide command list for customer to write interface code.

Features

- Programmable for automated testing
- Altitude settings 0 to 10k feet in 5 foot steps
- 0.1- 40GHz 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		0.1	20	40	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		70	dB
Aircraft Cable Compensation [3]		30		150	Feet
RF Response Flatness (within 1GHz@6GHz)			± 0.5		dB
RF Input Level				30	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 @ 6GHz and 16-bit

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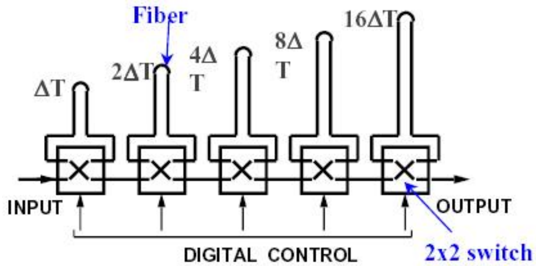
N-Bit Resolution

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

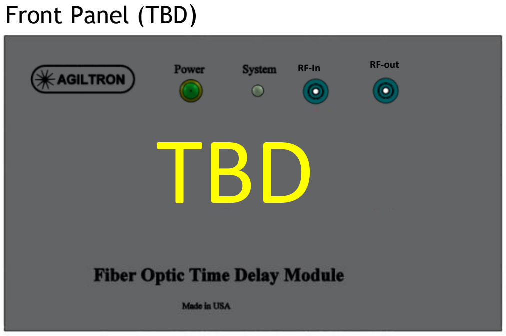
$$\Delta T_{Total} = (2^N - 1)\delta T$$

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.

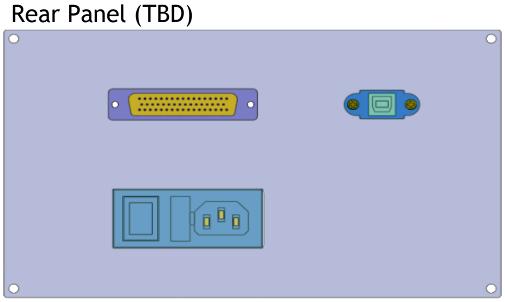
Enclosure Dimension (mm)

Typical 3U 19" rack

Front Panel (TBD)



Rear Panel (TBD)



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Ordering Information

	□□	□	□	□	□	□	□	□
Prefix	**Resolution**	**Frequency**	**Fix Delay [1]**	**Control [2]**	**Switch Type**	**LCD Display**	**Max Attitude**	**RF Connector**
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- 40GHz =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