



THE GLOBAL LEADER IN HIGH POWER ULTRASONICS



## RITEC RAM System

Versatile Ultrasonic System for Pulsed Ultrasonics and Resonant Ultrasound Spectroscopy:

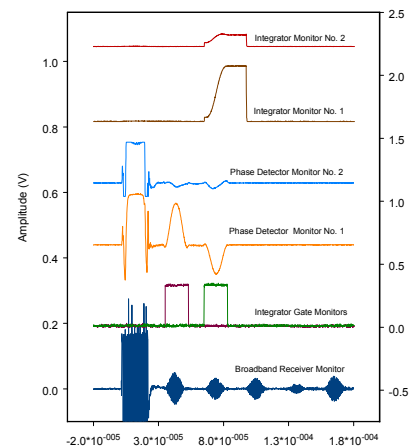
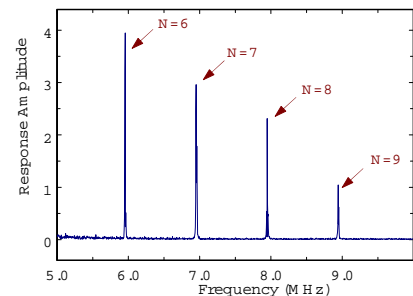
- Modular Approach allows Customization to Specific Experimental Requirements.
- A phase-sensitive superheterodyne receiver provides the ability to extract undetectable signals from the noise.
- Characterize materials by measuring attenuation, velocity, or resonant frequencies.
- Three Standard Frequency Ranges covering frequencies from 50 kHz to 40 MHz.
- High Power Gated Amplifier deliver high power RF tone burst pulses up to **5 kilowatts RMS** up to 7 MHz,
- Three channel pulser/receiver system available with independent control of burst width, frequency, delay and phase for each high power output.
- Easily customized to specific frequency and power requirements.

Generate Guided Waves using Piezoelectrics or EMATs



Measure Acoustic Resonances in a Variety of Materials

Acoustic Resonances in a 0.062" Aluminum Sample



RITEC, Inc. • 60 Alhambra Rd., Suite 5 • Warwick, RI 02886

(401) 738-3660 • FAX (401) 738-3661

[www.RitecInc.com](http://www.RitecInc.com)

## MOST POWERFUL ULTRASONIC PULSER / RECEIVER

The RITEC RAM-5000 System is a complete ultrasonic measurement system designed for ultrasonic research and applications of the nondestructive evaluation of materials properties. Some special capabilities not available in other commercial instruments include:

- The ability to make reproducible measurements using short (down to single cycle) RF burst excitations in composites and other difficult materials,
- High power RF tone burst excitations up to 5 kilowatts, providing ability to drive inefficient transducers,
- A modular approach permits a system to be customized by the user for specific experimental requirements. Standard configurations include a high power tone burst pulser, a broadband pulser/receiver and the complete superheterodyne measurement system.) The power frame was designed to accept up to five gated amplifier modules; this allows a wider frequency range using two or more gated amplifiers. Another configuration allows the system to fire several transducers simultaneously or in a designated sequence with adjustable delays between driving pulsers.
- Superior signal processing for amplitude and phase measurements of pulsed RF signals. Measurements of the phase angle are reproducible to within 0.3 degrees and amplitudes are reproducible to within 0.01 dB. For example, in a test sample with a transit time of 5 microseconds with 10 MHz transducers, a resolution of 4 picoseconds is possible. Phase detection can improve the signal to noise by up to 50 times.

This ability to measure signals automatically and accurately coupled with software to process these readings into acoustic time of flight and attenuation information combine to make the RAM System a very powerful ultrasonic research tool.

### GENERAL SPECIFICATIONS

1. The unit can be mounted in a standard 19-inch rack. The system is 17.5" (44.5 cm) wide, 10.5" (26.7 cm) high, 17.2" (43.7 cm) deep.
2. Total weight is approximately 50 pounds (23 kg). Universal line voltage requirements are from 85 to 240 Volts RMS at 50 to 60 Hertz. (300 Volt Amperes) at maximum duty cycle.

### PULSERS

1. Sinusoidal Radio Frequency (RF) Tone Burst. Select from two power levels (1.5kW and 5kW) and different frequency ranges: 5kW is available in two standard ranges: from 50 kHz to 5 MHz or 250 kHz to 7 MHz. 1.5kW is available over almost two decades of frequency from 50 kHz to 5 MHz, or 250 kHz to 15 MHz. Custom frequency ranges are available. Gated amplifiers operate up to 30 MHz at reduced output powers.
2. Power Frame can accept up to five gated amplifier modules. Three gated amplifiers and three receivers can be incorporated into a three-channel pulser receiver system with delay and phase control.

3. Unique Triple synthesizer module allows independent control over frequencies and amplitude for two high power radio frequency tonebursts with the superheterodyne receiver or three high power radio frequency tonebursts with the broadband receiver. Each of the tonebursts can be delayed by up to 6 ms relative to the trigger.
4. Power Output: 5 kW version: 5kW to 7 MHz, The saturated power output in the primary frequency ranges is ~ 7 kW. 1.5kW version: 1.5kW to 15 MHz. The saturated power output in the primary frequency ranges can be as high as 2.5 kW. Level Control: Greater than 30 dB
5. Pulse Width: controllable in increments of time with dual or triple channel model. Controllable in increments of toneburst cycles for the single channel model. Maximum Pulse Width: limited to 200 microseconds.
6. Maximum Duty Cycle: limited by over current settings; 0.3% for the 5kW amplifier, 1% for the 1.5kW amplifier.
7. Two different protection circuits are provided: over current and over voltage.
8. Accepts an external gating signal and external RF signal from an arbitrary waveform generator (factory configured).

### RECEIVER

1. Can be factory configured into two different versions: a broadband receiver or a superheterodyne receiver to improve the signal to noise ratio of the received signal.
2. Total Gain: 0 to 78 dB for the broadband receiver or 22 dB to 100 dB for the superheterodyne receiver
3. Gain Control: 78 dB in 2 dB steps
4. Noise Figure: Approximately 6 dB at maximum gain.
5. Inputs: One of the two inputs can be active.
6. Three selectable high pass filters: 0.05, 1, or 4 MHz in the low frequency unit: 0.25, 1, or 4 MHz in the high frequency unit.
7. Three selectable low pass filters: 5, 10, and 20 MHz.
8. Maximum bandwidth: 50 kHz to 20 MHz
9. Input Impedance: 50 Ohms
10. Broadband receiver output: 1 Volts peak-to-peak into 50 Ohms.
11. Intermediate frequency of 20 MHz with selectable band-pass filter of 0.4, 1 or 4 MHz.
12. Phase detector filters of 50 kHz, 100 kHz, 150 kHz, 250 kHz, 400 kHz, 800 kHz, 1.5 MHz, and 2 MHz. Maximum phase detector output of +/-200mV peak.
13. Integrator Rates of 454 Hz, 769 Hz, 1.4, 2.4, 4.1, 7.3, 12.2, 21.3, 37, 66.7, 110, 196, 348, 617, 1100 or 2000 kHz. Maximum Integrator output of +/- 5V.
14. External Pre-Amplifier: can be powered by a rear panel connector. (+8V, -8V, +18V, -18V, and ground)

### TIMING

1. Triggered Internally, Externally or Software.
2. Internal Range: 0.08 Hz to 10,000 Hz in 42 steps with the triple synthesizer module or 0.017 Hz to 10,000 Hz in 24 steps with single channel synthesizer module.
3. Positive trigger output coherent with the RF burst. 20 MHz clock output coherent with the RF burst also available.

For additional information on the capabilities of the RAM-5000 along with applications and measurements, please see the expanded specifications at <http://www.ritecinc.com/ramspecs.pdf> and contact RITEC for further details.

RITEC, Inc. • 60 Alhambra Rd., Suite 5 • Warwick, RI 02886  
(401) 738-3660 • FAX (401) 738-3661

[www.RitecInc.com](http://www.RitecInc.com)