

The James Ultrapulse

The most advanced ultra-sonic test system for accurately identifying basic characteristics of coarse grained materials.

Features and Benefits

- Direct digital read-out of transit time.
- Flaw detection.
- Simple calibration; no special bar required.
- Built-in wave form display on LCD.
- Portable, light weight with battery and A-C power.

Hand-Held Terminal with:

- RS-232 output for uploading to computer.
- Direct reading of calculated P-wave velocity and S-wave velocity.
- Direct reading of calculated modulus of elasticity.
- Direct reading of Poissons ratio.

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Applications

Ceramics and Refractories

The use of the **JAMES ULTRAPULSE** system is rapidly becoming a standard method for the quality measurement of refractories. Ultrasonic velocity measurement permits accurate and repeatable calculation of modulus of elasticity, bulk density and the detection of cracks. On a comparison basis, density variations within a single piece or between similar parts can be detected. Ultrasonic measurements can be correlated to modulus of elasticity, modulus of rupture, and degradation of thermal shock.

The ceramic and refractory industries are applying the Ultrapulse System to the testing of pouring shrouds, slide gates, pouring flues, furniture, metal clad brick, black heart detection in brick, fusion castings, crucibles, abrasive wheels, clay pipe, stopper heads, rotor rods, nozzles and other parts.

Carbon

The same technique and measurement used in ceramics and refractories have been widely used and accepted as quality measurements for carbon electrodes, brushes, and other carbon products.

Plastics and Laminates

The application of low frequency ultrasonics to plastic permits nondestructive testing and grading for strength and density. Basic parameters can be calculated from velocity such as modulus of elasticity, bulk density and porosity. Bonds between plastic and other materials, as well as laminates, can be measured.

Technical

The velocity of ultrasonic energy pulses travelling in a solid material are related to the density and elastic properties of the material. The pulse velocity is thus a measure of density and elastic properties of the material.

In transmitting ultrasonic energy through a coarse grained material such as concrete, ceramics or wood, it is necessary for the wave length of energy to be greater than the diameter of the largest grain particle. If it is not, all of the energy will be reflected back by the particles and none will reach the receiver.

Typically, the 150 KHz transducers are used for ceramic testing – the signal wave length is about 1.4 inches (34mm). Finer materials require higher frequencies for optimum resolution.

The basic **ULTRAPULSE** System contains a transmitter, a receiver and a very accurate high speed electronic clock. The transmitter generates an electrical pulse, which when applied to a transmitting transducer, converts the electrical energy into a pulse of ultrasonic mechanical vibration. This vibration is coupled with the specimen under test by placing the transducer in contact with the specimen. At another selected point on the specimen another receiving transducer is coupled by mechanical contact. Each transmitted pulse of energy registers on the high speed clock. The first energy wave reaching the receiving transducer is converted back to

an electrical signal and turns off the clock. The elapsed time is displayed on the LCD in 0.1 microsecond increments.

The large LCD display has a graphic display of waveform in the lower half of the LCD with option for displaying the envelope of the received signal or expanded front end of the signal.

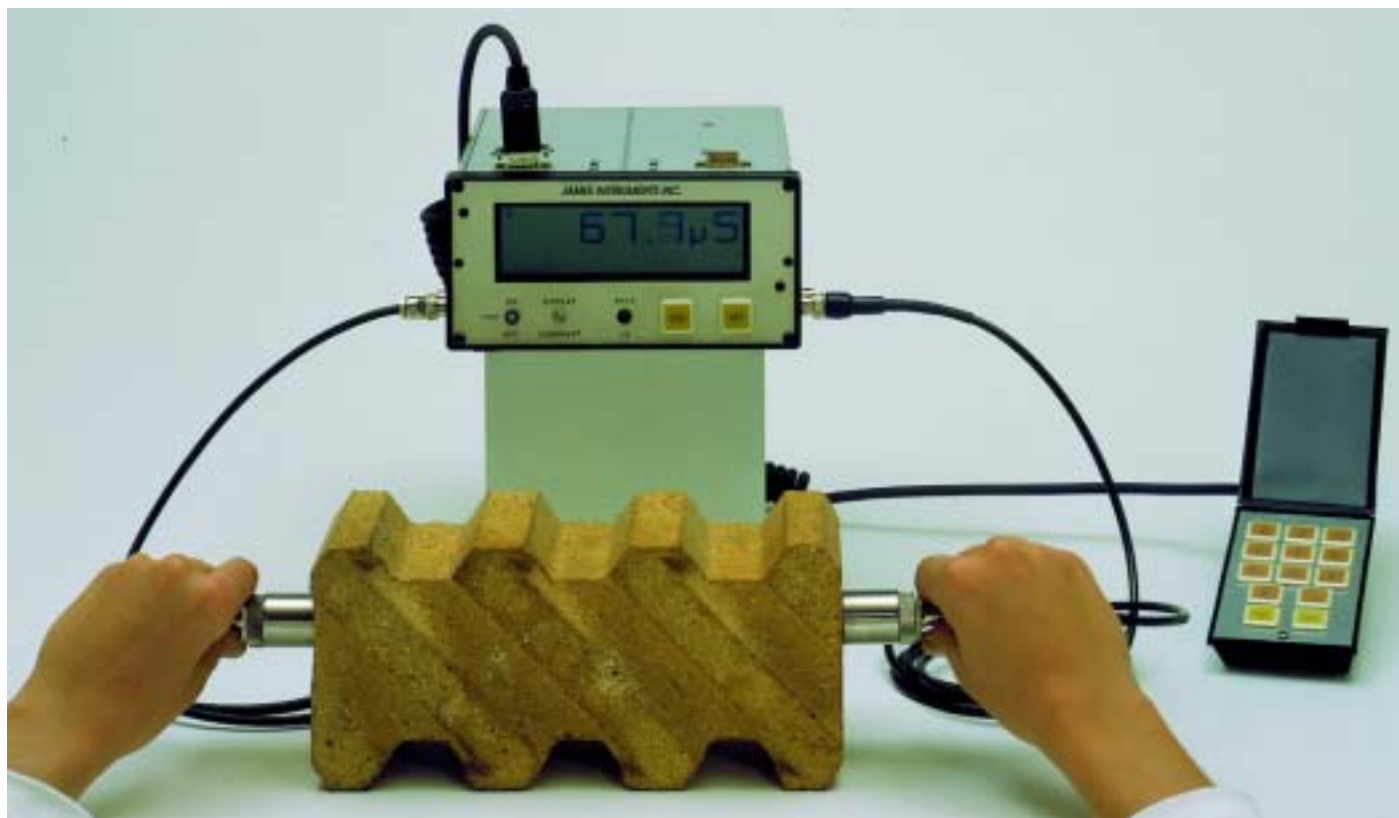
The hand-held terminal is an external input device; it facilitates input of:

- Distance between transducers.
- English or Metric Units.
- Density differences.
- Moisture correction.
- Selection of P or S wave transducers.

Enabling the following to be done automatically:

- Calculation of ultrasonic pulse velocity
- Calculation of Poissons Ratio
- Calculation of modulus of elasticity

Finally, the hand-held terminal with RS-232 adaptor enables stored data to be uploaded to a P.C.



Direct method of delamination detection in a refractory slide gate.

Technical Specifications



The James ULTRAPULSE System.

Model Numbers

V-C-8902 ULTRAPULSE, basic instrument, CRO attachment, 12 foot cables and application manual (*less transducers*).

V-C-8901 ULTRAPULSE, system for general use, including: C-8902 basic Ultrapulse, and two (2) C-4898 54 KHz transducers.

V-C-9860 Hand Held Terminal

V-C-4940 Pre-amplifier

Specifications

Frequency range: 24-500 KHz, based on transducers selected.

Receiver sensitivity: 250 micro volts, between 30 KHz and 100 KHz.

Receiver input impedance: approximately 2 M OHMS.
Transit time measurement: 0.1 to 6400 microseconds, direct digital display.

Measurement accuracy: + 0.1 microseconds.

Transmitter output: pulse 1000/500V, 2 microseconds.

Transmitter pulse rep rate: selectable 1,3 or 10.

Power supply: Internal rechargeable NI-CAD batteries, 9 hours portable operation.

Line input: 115/230 volts 50/60 Hz;

Weight: 2.7 KG (6 lbs.) with battery.

Dimensions: 190 x 100 x 220 MM (7.5" x 4" x 8").

Ambient temperature range: 0-40 degrees C.

Cathode ray oscilloscope output: permits external display of received signal for analysis.

Display: 240 x 64 LCD, graphic dot matrix.

Storage capacity: 1 K byte.

Data transfer: RS 232 C. Built-in software uploads to IBM PC

Hand terminal: 13 key, hand-held terminal for control and calculation.

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