

Technical Specification 8-Channel EMAT System

The 8-Channel EMAT equipment consists of two main components described below.

1. Base Unit, including:

- Synthesizer board
- Burst generator board (frequency range: 0.4 - 4MHz); burst length (number of cycles) and frequency are adjustable via PC
- Four receiver boards with eight delayed receiver channels (delay time of all channels can be modified separately), including preamplifier and filters
- Output amplifier and video unit (LCD color monitor)
- AT-compatible PC for system parameter control
- Power supplies

2. Front End, including:

- Eight transmitter power stages for EMAT transducers or transmitter and receiver boards for piezoelectric transducers
- Transducer(s) and transducer cable(s)
- Power supplies

General System Data

- Frequency range 0.4 to 4.0MHz, adjustable in 10kHz increments
- Burst duration 1 - 15 cycles, adjustable in 1 cycle increments
- Pulse repetition rate 2500µsec to 20msec, adjustable in 1µsec increments
- Delay time 0 to 25µsec, adjustable in 25nsec increments
- Total amplification 50dB, 40dB adjustable in 1dB increments

Controllable System Functions:

- Trigger mode selection.....internal, external, software trigger
- Transducer selection.....2x 4-segments, or 1x 8-segments
- Pulse repetition rate and ultrasonic frequency
- Number of cycles/burst
- Delay time for each transmitter and receiver channel
- Filter selection 0.4 - 1.3MHz, 0.8 - 2.3MHz and 2.0 - 4.0MHz
- Frequency settings..... 0.4 to 4MHz
- Burst duration..... 1 - 15 cycles, adjustable in 1 cycle steps
- Receiver attenuator 30dB, adjustable in 10dB increments
- Receiver amplifier 40dB, adjustable in 1dB increments

Transmitter Data

- Transmitter output impedance..... 8 to 9 Ω
- Transmitter current30 A_{PP} (impedance 22 Ω)
- Transmitter output voltage (open circuit)..... \approx 1kV_{PP}
- Transmitter output short circuit protected for burst signals

Receiver Data

- Pre-amplification 30dB
- Amplification..... 50dB; 40dB adjustable in 1dB increments
- Noise level of summation signal at output 100 mV (for band-pass filter 0.4 - 1.3 MHz)
- 3 selectable band-pass filters (-3dB)..... 0.4 - 1.3MHz, 0.8 - 2.3MHz and 2.0 - 4.0MHz
- Bandwidth (-3dB) 0.4 to 4MHz
- Input, output impedance..... 50 Ω
- Preamplifier input sensitivity..... 50 μ V
- Main amplifier input sensitivity..... 1.5 to 2mV
- Maximum RF-signal amplitude output..... 10V_{PP}

Signal Modes and Delay Times

- Transmitter mode digital
- Receiver mode analog
- Maximum delay time 50 μ sec fixed, 25 μ sec adjustable
- Minimum delay time 50 μ sec

Trigger Data

- Trigger IN: TTL, input impedance..... 1k Ω
- Trigger OUT: TTL, output impedance 50 Ω