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 9Ω
- Transmitter current ..... 30 A_{PP} (impedance 22Ω)
- Transmitter output voltage (open circuit) ..... ≈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 50Ω
- Preamplifier input sensitivity 50µV
- 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 ..... 50µsec fixed, 25µsec adjustable
- Minimum delay time 50µsec

Trigger Data

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