

BIO-MEDICAL INSTRUMENTATION TRAINER (Model: TMS-BOM)

Trinity



SALIENT FEATURES

- ◆ Battery operated body signal measurements for safety. Please replace 9V battery cells every semester.
- ◆ PC based graph drawing facility & display to capture body signals.
- ◆ Aesthetically designed injection moulded electronic desk. Master unit carrying useful experiment resources like Power supplies, Computer Interface while the central slot will carry replaceable experiment panel secured in an ABS molded plastic sturdy enclosure.
- ◆ Has colorful screw less overlay showing circuit & its connection tag numbers for easy connectivity.
- ◆ Hands on learning emphasized. Set of Users Guide provided with each Unit.

Specifications of Master Unit

Power Supply	DC Supply +5V / 1A, $\pm 12V$ / 500 mA 0 to 15V DC (Variable) / 100 mA. 0 to -15V DC (Variable) / 100 mA.
Computer Interface (CIA)	Optoisolated Adaptor to prevent damage to PC parallel port (25 pin LPT) due to wrong connections. Interfaces through 25 pin M to F cable 1mtr Length. P4/XP not in scope of supply. 4 ADC channels 0 to 2.5V full scale. 1 DAC channel : o/p 2.5 V FS. V to I Function block : Input : 0-2.5Vdc, O/P : 0-20 or 4-20mA, in 100E load Max V to PWM function block : I/P -0-2.5V, O/P-1KHz PWM O/P $\pm 9V$.
PC Software	PC (P4/XP/WIN7) USB based Graph Utility Software for online waveform measurement
USB I/O Module	USB IO module to interface 25 pin D connector on CIA panel to USB PC port enclosed in 25 pin D shell using Type A to mini B cable.
MIC Pre-Amplifier	Handheld Electret microphone with preamplifier function block with DC gain = 1, AC gain = 50
Audio Amplifier & speaker	Amplifier gain 20, for audio range, Built in Loud speaker - 8 ohm / 500 mw / earphone
Level Shifter card	2 No. level shifter converting $\pm 9V$ to 0-2.5 V for PC interface.
Operating Voltage	220/240Vac Switch settable $\pm 10\%$, 50Hz/35 VA
Mechanical Dimensions	(A) Master Unit : 460mm(W), 160mm(H), 350mm(D), Net weight : 7.5 Kg. Gross Wt. : 9.51 Kg. (B) Panel : 215mm(W), 165mm(H), 40mm(D), Net Weight = 700 gm approximately. (C) Patch Cords: 4mm male to male patchcords 16 Nos. [2 - 120 mm length, 14 - 500 mm length]

Modular experiment panels : Select one or more to work

1) RRM /BPM / HRM / Pulse Oximeter Expt. Panel (BM1)

(Provided with 16 banana & 2 test points)

◆ Function Blocks used:

- LED driver @ 350Hz, RED & IR LED, I to V converter circuit, Sample & hold circuit, Blood Pressure Sensor (300 mm Hg) mounted inside panel, Shares MIC with pre-amplifier and loudspeaker with Audio amplifier from Master Unit, Band pass filters (11Hz & 1.6 Hz) Analog wave to square wave converter, Wheastone Bridge, Instrumentation amplifier circuit (Gain= x 50 & x 1), Skin Contact Measurement go/no go circuit, AC Amplifier (X20 gain)

◆ Detachable Sensor Modules / Electrodes :

- Pulse oximeter probe / Module
- Lie detector with CAL & thermistor temperature sensor,
- Sphygmomanometer / blood pressure apparatus,
- Electronic stethoscope probe / Module using Electret mic

◆ List of Experiments :

- Pulse oximeter or Photo Plethysmogram (HRM) using optical transducer.
- Respiration rate measurement (RRM) using thermistor.
- Lie Detector based on skin impedance change.
- Blood Pressure Measurement (BPM) using Korotkoff 's Method
- Blood Pressure Measurement (BPM) using Oscillometry method
- Heart Rate Measurement (HRM) by using Electronic stethoscope
- Study of Bandpass (11 Hz) filter to plot frequency waveform for HRM
- Study of Bandpass (1.6 Hz) filter to plot frequency waveform for Oscillometry method

2) ECG / EMG Study Experiment Panel (BM2)

(Provided with 9 banana & 2 test points)

◆ Function Blocks used:

- Buffered 3 lead einthoven triangle creating 6 measurement combinations using 2 pole 6 way Rotary Switch, Instru-mentation amplifier (Gain = 10 / 100), NIV amplifier (Gain = 10 to 100), 1 no. of isolation amplifier, Span zero amplifier. (Gain = 2 to 20), Notch filter (50Hz), HPF or DC blocker, LPF or High pass noise suppressor, Battery operated body signal measurement for safety, ECG signal simulator.

◆ Detachable Sensor Modules / Electrodes :

- Supplied with Limb Electrodes (4no's), Disposable Electrodes (Ag/Agcl -10Nos)

◆ List of Experiments :

- Plotting & measurement of ECG, EMG, EOG waveform
- Study of band reject (50 Hz notch) filter.
- Working with simulated ECG signals.
- Optionally EEG Measurements.

3) RRM, BIA Experiment Panel/BM3

(Provided with 12 banana & 4 test points)

◆ Function Blocks used:

R & C component BI simulator, 50KHz wein bridge oscillator, 90° phase shifter, Buffered Excitation current source (800uA), instrumentation Amplifier(X10), Resistive component synchronous detector(IPS), Capacitive component synchronous detector (QPS), peak detector, AC amplifier (X10), Zero crossing detector, Isolation amplifier, Span zero amplifier (Gain = 2 to 20), Battery operated body signal measurement for safety.

◆ Detachable Sensor Modules / Electrodes :

- Supplied with Limb Electrode (4no's), Chest Electrodes (2 Nos)

◆ List of Experiments :

- Measure Body impedance using Body impedance Analyzer (BIA) and compare with standard
- Measurement of Respiration Rate using BIA

4) Ultra sound HRM + Audiometry Experiment Panel/BM4

(Provided with 16 banana & 4 test points))

◆ Function Blocks used:

- Ultrasound HRM :** Transmitter @2.55 MHz RF Oscillator, Receiver@2.75MHz detuned RF Amplifier, diode detector, bandpass filter (1.3Hz Center Frequency), AC amplifier with gain 7, notch filter (band stop filter) 50Hz.
- Audiometry:** Audio tone generator with built in LS Amplifier (Frequency range 20Hz - 20KHz), swept tone (FM sweep) generator using wobulator (warble), noise generator (pink noise) with built in LS amplifier, 3P-4W Rotary selector switch to select Audio or noise signal with Right or Left or Both ear's at a time, User response switch, optional PC Based GUI.

◆ Detachable Sensor Modules / Electrodes :

- 2 MHz Ultrasound Doppler combined sensor (Tx & Rx)
- Stereo Earphone

◆ List of Experiments :

- Heart rate measurement (H.R.M.) using Ultrasound Sensor.
- Detuned Amplifier.
 - Plot the graph of output in Vpp Vs constant amplitude sine frequency as input.
 - Using Detuned amplifier FM to AM converter.
- Band Stop (Notch) Filter.
- 1.3 Hz Band Pass Filter (BPF).
- Audiometry
 - Linearity checking of on board Audio waveform generator.
 - Checking your hearing range by applying variable DC to waveform generator & using earphone or can optionally control from PC using GUI program.
 - Checking hearing sensitivity using Pure tone.
 - Audio swept tone (Wobulator).
- Working with Switch Faults.