



BIOMEDICAL INSTRUMENTATION TRAINER

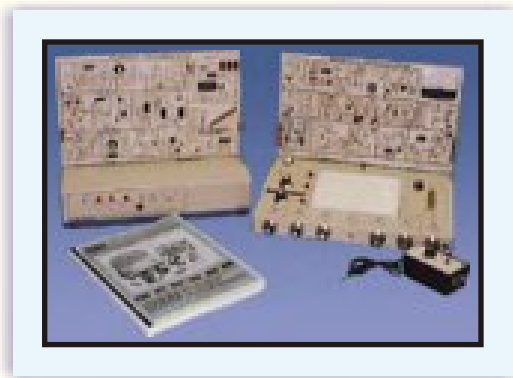
MODEL-BME100

The Biomedical Instrumentation Course, consisting of two insertion panels, hospital-type accessories (transducers) a comprehensive laboratory manual, places emphasis on understanding clinical monitoring equipment. Some of the major instruments studied in the course include ECG, EEG, EMR, GSR, pulse rate and temperature monitors.

This course is designed for use in technical programs where technicians are to be trained for positions in hospital equipment maintenance, medical research and medical equipment sales and service.

The panels for this course may be powered by inserting them into the S300B Master Builder, the S400C Smart Builder, or the S300PSB Power Supply Base. If it is desired to breadboard either variation of panel circuits or to do general bread boarding, select the S300B.

Standard types of test equipment are required. In addition, an ECG Simulator and Biocorder, both of which are manufactured by the Science Instruments Company, are recommended. The Science Instruments Biometer is also recommended for the general study of physiological applications and terminology.



FEATURES

- ❖ A Study of Biomedical Instrumentation Circuits
- ❖ Two Panels Containing 19 Basic Instrumentation and Monitoring Circuits
- ❖ Circuits are Evaluated Individually and Combined to Form Complete Working Monitors: ECG, EEG, EMG, GSR, Pulse Rate and Temperature
- ❖ Course Manual Contains 18 Major Experiments, Covering Detailed Circuit Theory and Evaluation Complete with Hospital-Type Accessories

EXPERIMENTS

1. Introduction to Biomedical Instrumentation
2. The Electrocardiograph (ECG/EKG) Recording
3. Differential Amplifiers
4. Optoelectronic Components
5. Band pass and Notch Filters
6. Pulse Shaping
7. Visual and Aural Pulse Indicators
8. Rate Meters
9. Electromyograms --EMG
10. The Electroencephalogram --EEG
11. Noise in Amplifier Systems
12. Pulse Rate by Photo-Plethysmography
13. Digital Pulse Rate Meters
14. Galvanic Skin Resistance --GSR
15. Temperature Measurement
16. Respiratory Rate
17. Hospital Equipment Safety
18. Biomedical Transducers

In keeping view of SIGMA policy of continuous development and improvement, the Specifications may be changed without prior notice or obligation.

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Dealer:-

SPECIFICATIONS

Two Panels contain basic circuits used in Biomedical Instrumentation.

Panel-1

- ❖ Differential Amplifier
- ❖ Differential Source
- ❖ Pulse Amplifier
- ❖ 50/60 Hz Notch Filter
- ❖ 8-14 Hz Band pass Amplifier
- ❖ Output Amplifier
- ❖ Differential power Supply
- ❖ Polarity Correction
- ❖ Pulse Stretcher

Panel 2:

- ❖ Pulse Rate Amplifier
- ❖ Temperature/Frequency Synthesizer
- ❖ Frequency Counter, Digital Display
- ❖ GSR Bridge Amplifier, Glide Tone
- ❖ Light Bar

EQUIPMENT INCLUDED

SIP385-1/2.	: Biomedical Instrumentation Panels
SIP385BM.	: Laboratory Manual
SIC385K	: Biomedical Disposable Accessories Package: Pulse Transducer; ECG Cables; ECG Electrodes, Straps (4); Temperature Probe; EEG Cables and EEG Paste; GSR Finger Electrodes and Cables; Lead Selector Box; Temperature Probe Sheaths

WEIGHT OF INCLUDED EQUIPMENT 9.0 lbs

ACCESSORIES (Optional)

S114	: ECG Simulator. Oscilloscope (Recommended), Slow speed of 0.5 sec/cm, long persistence screen
S118.1	: Compu-corder
S118.3	: Computer Interface Amplifier Cable, BNC to 9 Pin "D", 6 ft (Panel to Interface Box)

POWER BASES REQUIRED:

- ❖ S300PSB Power Supply Base
- ❖ S300PB Panel Base

SPECIFICATIONS

SIP385 Biomedical Instrumentation

The course contains two prewired panels with a variety of cables and accessories. It provides training in basic monitoring circuitry, such as ECG, EEG, EMG, pulse rate, GSR, and temperature monitors. Safety is stressed in the program, and live measurements can be made on students. The course provides for approximately 75-100 hours of instruction.

EQUIPMENTS:

- ❖ SIP385B-1P Biomedical Instrumentation Panel
Consists of the following sections:

SECTION DESCRIPTION

A Differential Amplifier:

- ❖ Common Mode Rejection Ratio (CMRR): 80 dB
- ❖ Gain: 120 dB

B Differential Amplifier with Sensitivity to 5 mV

- ❖ Frequency Response:
- ❖ DC to approximately 1 KHz
- ❖ Low-Pass and High -Pass Filters provide required frequency responses for ECG or EEG
- ❖ Input Safety Devices limit input voltage for protection against line power
- ❖ Control Switches for varying roll off frequencies and amplifier gain

C Optocoupler isolates the front end amplifier and reference ground from earth ground circuitry

D Signal Processor provides gain for such signals as the R wave in an ECG signal

E 60 Cycle Notch Filter can be switched in or out of the circuit to provide 50/60 Hz trapping

F 8-14 Hz Amplifier is designed to provide band pass for signals in the 8-14 Hz region

G Output Amplifier provides additional gain for recording various physiological signals

H Isolated Power Supplies to isolate the front end amplifier from the common earth ground supply (provides an additional margin of safety)

I Polarity Correction Circuitry enables the R wave to be either positive or negative; the output is always a positive signal

J Pulse Stretching Circuit uses the R wave as the signal and converts it into a rectangular pulse

K Tone Generator produces the tone whose on period is controlled by the Pulse Stretcher Circuit

L Integrator Circuit

SECTION DESCRIPTION

- ❖ Converts the pulse stretched signal into a DC level for the 1 mA meter
- ❖ Pulse Rate is read on a calibrated meter

The Panel operates from the Power Supply Base (S300PSB).

SIP385B-2P Biomedical Instrumentation Panel

- ❖ Pulse Generator uses photo plethysmo graphy
- ❖ Direct Digital Readout of Pulse Rate
- ❖ Temperature Control Circuits with digital display, accurate to 0.10° Centigrade or Fahrenheit, Switchable
- ❖ Galvanic Skin Resistance (GSR) with signal test button and variable gain control
- ❖ Signal Amplifier and gain control
- ❖ VCO controlled Light and Sound Bar for audiovisual effects
- ❖ GSR Circuit responds to sweat radiation on the hand (special Electrodes and cable are provided)

ACCESSORIES

- ❖ Lead Selector Box for selecting Leads #1, #2, or #3 during ECG measurements
- ❖ Set of ECG electrodes and straps, along with 5 terminal connector between the leads and the ECG box
- ❖ Pulse Rate Probe
- ❖ EEG Cable with 4 electrodes
- ❖ Temperature Sensor Cable
- ❖ Alcohol Pads and Temperature Sheaths

The Panel operates from the Power Supply Base (S300PSB) or the Panel Base (S300PB).

EQUIPMENT INCLUDED

SIP385-1/2 Biomedical Instrumentation Panels

SIP385BCM Laboratory Manual

SIC385-IC Biomedical Disposal Accessories Package

- ❖ Pulse Transducer

- ❖ ECG (EKG) Cables
- ❖ ECG (EKG) Electrodes/Straps (4)
- ❖ Temperature Probe
- ❖ EEG Cables and EEG Paste
- ❖ GSR Finger Electrodes and Cables
- ❖ Lead Selector Box
- ❖ Temperature Probe Sheaths

REQUIRED EXTRA EQUIPMENT

Power Supply Base (S300PSB)

Panel Base with Cable (S300PB)

ECG Simulator (S114)

All equipment operates on 120/240 VAC, 50/60 Hz.

OPTIONAL EQUIPMENT

Compucorder Software (S118.1)

Computer Interface Amplifier (S118.10)

Oscilloscope (Recommended):

Slow speed of 0.5 sec/cm, long persistence screen

LABORATORY MANUAL

The following list of topics indicates the scope of material and experimentation provided by this course.

1. Introduction to Biomedical Instrumentation
2. The Electrocardiograph (ECG/EKG) Recording
3. Differential Amplifiers
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ORDERING INFORMATION

1. Order course number SIP385BC for the complete course. NOTE: A Power Supply Base (S300PSB) and Panel Base (S300PB) should also be ordered.
2. One laboratory manual is supplied with each Trainer. Order SIP385BCM for additional manuals.
3. TOTAL WEIGHT: 9 lbs (4 Kg)
This is the weight of the complete set of equipment without the Power Bases.