

**Product Name :**  
Power Electronics Trainer - Multi Experiment Model for Power  
Electronics Teaching Labs

**Product Code :**  
PET-TR-245



#### Description :

Power Electronics Trainer - Aesthetically designed injection molded electronic desk. Master unit carrying useful experiment resources like line. Each multi experiment panel is secured in an ABS molded plastic sturdy enclosure, and has colorful screw less overlay showing circuit & Connection through Sturdy 4mm Banana Sockets & Patch Chords

Aesthetically designed injection molded electronic desk. Master Unit carrying useful experiment resources like line synchronized firing circuits, Power supplies, lamp load, RLC loads, battery charging supply etc while the central slot will hold replaceable experiment panels.

#### Technical Specification :

##### Built in power supply

DC supply :  $\pm 12V$ , 500mA.

Unregulated power supply 17V / 750mA.

Regulated 13.5V/3A O/P is provided as 12V battery charging supply. In absence of battery, same may be used as simulated battery source to run experiments on inverters etc.

Isolated DC supply +12V/300mA with isolated common.

On board inverter transformer of Primary : 230V and secondaries : 12 ~ 11 ~ 0 ~ 11 ~ 12/3A.

On board lamp load of 15W / 230V AC provided .

### **AC Supply**

230V AC line voltage is made available on two banana 4mm sockets as well as 1.5A fuse extender for variac if used.

### **Aux DC Power Supply**

#### **Useful as Field/Armature Supply for DC Motor**

Variable up to 200Vdc / 0.5Amp (phase controlled thyristor half bridge).

Field ON/OFF control with field failure relay and over current protection circuit.

**OR**

#### **On-Board Analog Voltmeters (In place of Aux.DC supply)**

AC voltmeter (0 ~ 300V) - 1No.

DC voltmeter (0 ~ 300V) - 1No.

### **LSPT Panel Consisting of**

Two pulse transformers of 1:1:1 are provided for isolation and supplying firing pulses along with required DC power supply to experiment panel under test through 15 pin female "D" connector.

Selector switch of 2 pole 6 way for selecting different types of firing pulses like out of phase inverter firing using LM3525 with dead time and frequency and pulse width variation from 170Hz to 250Hz, 12.5 /25 /6.25Hz frequency gated with high frequency (3KHz) for cycloconverter, line synchronized UJT firing for converter etc.

### **R-L-C Load Panel**

Load resistor of 10 Ohm/ 40W and 100 Ohm / 10W -1no. each.

Center tapped 3A choke 4mH / 16mH each - 2 nos.

DC choke 0 MH ~ 100 MH ~ 200 MH / 750mA - 1No.

Commutation capacitors of 10 $\mu$ F / 100V - 4 Nos.

AC paper capacitors of 4 $\mu$ F / 440V - 1No.

DC cap 220 $\mu$ F / 63V - 1No.

Diode Byt 71 (5407) - 1No.

### **Accessories**

15 pin D connector cable assembly.

4mm banana patchcords : 100mm X 10nos. and 500mm X 20nos.

Optional power scope accessory for any lab CRO for off ground differential measurements up to 1000Vdc to facilitate checking inverter / converter waveform.

Optional isolation transformer (70VA, I/P, 230V, O/P 230Vac) for CRO isolation.

### **Operating voltage**

230V  $\hat{\pm}$  10%, 50Hz, 75VA.

## **EXPERIMENTS:**

### **1) Power Semiconductor Application Experiment Panel I**

(Provided with 29 banana tags)

Triac lamp dimmer, AC fan regulator, SCR operated light sensitive switch using LDR, SCR operated temperature sensitive switch using thermistor, UJT relaxation oscillator, half and full wave phase shift controlled) rectifier using SCR, timer using SCR and UJT built in lamp load.

## **2) Power Semiconductor Application Experiment Panel II**

(Provided with 16 banana tags)

SCR phase shift controlled converter using Ic555 through opto isolator (Potentiometric).

Triac AC power control using IC 555 (Potentiometric) (Optoisolated).

SCR AC power control using UJT /PUT (Potentiometric).

Triac AC power control using UJT /PUT (Potentiometric).

SCR/Triac temperature control using thermister.

SCR/Triac intensity control using LDR.

Opto isolated DC switch and photo relay ( Street light control).

## **3) CON/ INV Panel**

(Provided with 48 banana tags)

### **SCR Converter**

Provided with sturdy 800V/12A SCRs (4nos) with uncommitted snubbers, 6A diodes(2nos) commutations witch,  $47\mu$  / 450V cap, Ramp cosine firing circuit. However actual working currents are limited to 3A (maximum) for safety.

Half wave and full wave fully controlled converter.

AC voltage controller using lamp optionally universal motor foot mounted.

SCR controlled converter 1 phase with R-L load.

Effect of free wheeling diode on SCR converter performance with Inductive load.

Study of SCR converter (Open loop) output with inductance inputs and capacitance input filters.

Effect of source impedance on performance of SCR converters.

Study of closed loop SCR converters with resistive load.

Study of full wave-half controlled SCR bridge.

Resonant DC-DC converter .

### **Advanced Firing Schemes**

Study of H.F. gate type SCR triggering

Study  
of relation between control voltage and SCR converter output DC voltage  
using linear resistor controlled  
synchronized ramp firing (IC815 equivalent)

Study of linear relation between control voltage and SCR converter output using cosine firing scheme

### **SCR forced commutation techniques**

Study of forced commutation techniques for SCR, Class A, B, C, D, E, F

### **SCR based inverters**

SCR based parallel inverter

SCR based series inverter

SCR based bridge inverter

SCR based McMurray Bedford half bridge inverter

### **Cycloconverter**

SCR based cycloconverter

### **SCR based chopper**

SCR based Jones chopper resistive load, motor load (optional)

SCR based back (step dn), boost (set up), back boost chopper

## **Naugra Export**

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