

VOLTMETER & ELECTRONICS

PR-314 STANDARD RESISTANCE COILS

Having terminals, Each coil is non-inductively wound on insulated bobbins with constantan wire, enclosed in plastic case. Accuracy $\pm 0.1\%$.

0.1 to 0.2
0.1 to 0.9



PR-315 RESISTANCE BOX, PLUG TYPE

For accurate work, in polished wooden box and panel figured in white. Split brass contact blocks hold precision cut, interchangeable plug having moulded black fluted tops. Coils of constantan wire, double silk covered are wound co-efficient. Accuracy $\pm 0.1\%$.

Range in Ohms	Total Ohms	No. of Coils
1-50	110	8
1-100	210	9
1-500	1110	12
1-1000	2110	13
1-5000	11110	16
1-10000	21110	17



PR-316 DECADE CAPACITANCE BOX

High quality standard laboratory tool to fulfill the requirement of different values of standard capacitance. Each dial consisting of 10 steps.



PR-317 RESISTANCE BOX, SINGLE DIAL

Housed in metal box with knob and dial fitted. Provided with 4 mm. socket terminals. Accuracy $\pm 1\%$. 0.1 to 1 Ohms in step of 100 milliohms, 1 to 10 Ohms in step of 1 Ohm, 10 to 100 Ohms in step of 10 Ohms, 100 to 1000 Ohms in step of 100 Ohms, 1000 to 10000 Ohms in step of 1000 Ohms.



PR-318 DECADE RESISTANCE BOX

This decade resistance substitution box provides 4 decade ranges from 0 to 11110 Ω with a resolution of 1 Ω . Each decade is selected by a rotary switch. Tapping points are provided across each range to allow the unit to be used as an accurate potential divider. All resistance values are $\pm 2\%$ with a rating of 0.25 W maximum per range.



PR-319 AUDIO OSCILLATOR

Frequency Range : 20 Hz to 50 KHz in four switched range plus a fine control Accuracy $\pm 5\%$.
Waves : Sine & Square
Amplitude : Continuously variable from 0-8 Vpp. max.
Power : Output upto 1 W.
Operates on : 220V A.C. 50 Hz



TRANSFORMER & RESISTANCE BOX

PR-320 ZENER DIODE UNIT

Mounted on transparent base, with 4 mm. colour coded sockets, with circuit diagram printed for demonstration. Available from 2.7 V to 24 V.



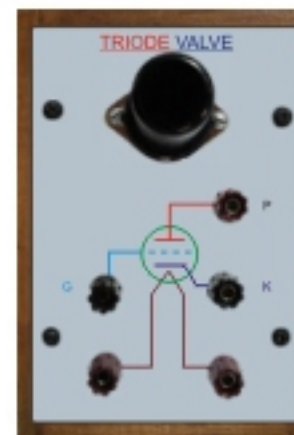
PR-321 TRIODE VALVE MOUNTED

Mounted on transparent base, with 4 mm. colour coded sockets, with circuit diagram printed for demonstration.



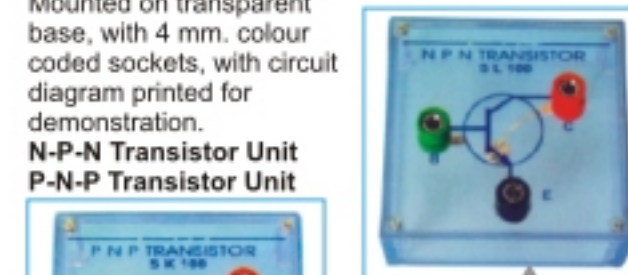
PR-322 TRIODE VALVE

For studying the characteristics of a TRIODE VALVE and its practical applications.



PR-324 N-P-N TRANSISTOR UNIT

Mounted on transparent base, with 4 mm. colour coded sockets, with circuit diagram printed for demonstration. N-P-N Transistor Unit P-N-P Transistor Unit



OTHER TYPES OF DIODES ARE ALSO AVAILABLES

PR-325 SOLDERING STATION MAINTENANCE CENTER

- Features**
- Power consumption 220V-310W
 - For Hot Air Soldering**
 - High quality heating element
 - Diaphragm air pump
 - Air flow 23e/min (maximum)
 - Supply with Air Nozzle
 - For Antistatic Soldering**
 - Temperature 200 C-480 C
 - Ceramic heating element
 - Antistatic design
 - Fast heating up safe & reliable



OTHER MODELS ARE ALSO AVAILABLE

PR-323 DISCRETE COMPONENT TRAINER (With Regulated Power Supply)

Lucidly illustrated User's manual unravels analog electronics concepts through brief theoretical reviews followed by experiments, self test questions and exercises. Modularly designed patch panel contains all commonly used discrete components.

FEATURES :

It consists of following

- Power Supply of +5V, +12V, -12V each of 250 mA (nominal)
- Silicon, Germanium diodes, Zeners
- PNP & NPN Transistors, FET
- One speaker
- 12 different values of carbon film resistances & they are of $\frac{1}{4}W$, $\frac{1}{2}W$ & 1 Watt.
- 12 assorted values of capacitors from 100 PF to 100 mF.
- Integrated Circuits (IC's), Thermistor
- LED, LDR, Photo diode, solar cell
- Logic switches & LED indicators etc.



BASIC ELECTRONICS LAB TRAINING MODULES

PR-326 BREAD BOARD TRAINER WITH POWER SUPPLIES (General Purpose)

Features :

1. Basic trainer for students to perform experiments of analog electronics.
2. Glass Epoxy PCB used as front panel of 270mmx170mm & mounted on light weight shock proof plastic cabinet.
3. On board power supplies & Bread Board mounted.
4. Supplied with connecting wires.

PR-327 OPERATIONAL AMPLIFIER TRAINER (BREAD BOARD MODEL)

Features :

1. Basic trainer for students to perform more than 15 basic experiment of operational amplifier.
2. Glass Epoxy PCB used as front panel of 300mmx220 & mounted on light weight shock proof plastic cabinet.
3. On board power supplies, function generator & Bread Board mounted.
4. Supplied with set of components & connecting wire.

PR-328 DIGITAL ELECTRONIC CIRCUIT TRAINER (BREAD BOARD MODEL)

Features :

1. Basic trainer for students to perform more than 15 basic experiment of operational amplifier.
2. Glass Epoxy PCB used as front panel of 300mmx220 & mounted on light weight shock proof plastic cabinet.
3. On board power supplies, function generator & Bread Board mounted.
4. Supplied with set of components & connecting wire.



ANALOG & DIGITAL ELECTRONICS LAB TRAINING MODULES

PR-329 ANALOG LAB TRAINER (BREAD BOARD MODEL)

Features :

1. Advanced lab trainer for students to perform more than 50 experiments of analog electronics
2. Compatible with optional ready to use experimental modules.
3. Glass Epoxy PCB used as front panel of 300mmx220mm & mounted on light weight shock proof plastic cabinet.
4. On board power supplies, Function generator, and other input signals
5. Bread board provided
6. Supplied with connecting wires



PR-330 DIGITAL LAB TRAINER (BREAD BOARD MODEL)

Features :

1. Advanced lab trainer for students to perform more than 50 experiments of digital electronics
2. Compatible with optional ready to use experimental modules
3. Glass Epoxy PCB used as front panel of 300mmx220mm & mounted on light weight shock proof plastic cabinet
4. On board power supplies, Function generator, and other input signals
5. Bread board provided
6. Supplied with connecting wires

LAB TRAINING MODULES

PR-331 TRANSISTOR CHARACTERISTICS APPARATUS

The objective is to plot the input, output and transfer characteristics of a PNP or NPN transistor in common emitter & common base configuration.

The device consists of:

- Two regulated DC power supplies, one is 0-1 volt and other is 0-10 volts.
- 1PNP & NPN transistor with three terminals for base, emitter & collector.
- Four square transparent deluxe quality moving coil type meters, two meters are for measurement of different voltages and other two are for measurement of different currents.



These meters have different ranges as mentioned:

- a) 1st meter 0-1V for measurement of base voltage (input) (VB)
- b) 2nd meter 0-1/10V (double range) for measurement of collector voltage (output) (VC).
- c) 3rd meter 0-250μA/25mA for measurement of base current. (IB)
- d) 4th meter 0-25mA for measurement of collector current. (IC)



Connecting Cables with plugs

PR-332 LINEAR IC TRAINER

Brief Features :

1. DC regulated power supplies Fix $\pm 12V/250mA$, Variable 0 to $\pm 5V/250mA$
2. Sine wave oscillator of 1 KHz at 0.5 V p-p is built in
3. Functional diagram of IC 741 with input point is printed on board. Additional 8 pin IC base with machine pins is provided for putting any other IC of choice
4. Digital voltmeter 0-20 V DC 1 no
3.1/2 digit, LCD display, mains operated.
5. Assorted values of resistance 11No.
100, K, 3.3 K, 5K, 10K, 22K & 100 K ohms
6. Assorted value of capacitances 3 No
0.1, 1, & 10 μF
7. potentiometer 10 K ohm, Linear V 1 No
8. 2mm inter-connection leads 10 No
9. Toggle switch with selection of input or output V is provided.
10. Comprehensive USERS manual for performing 10 experiments on OP-AMP.



OPERATIONAL AMPLIFIER APPLICATION TRAINER

PR-333 OPERATIONAL AMPLIFIER KIT BOARD (BREAD BOARD MODEL)

Objective : To study more than 15 experiments based on Characteristics and Applications of Operational Amplifier.

Features : Instrument comprises of 3 DC Regulated Power Supplies of 0-5VDC, DC Regulated Power Supply ± 15 VDC, Sine, Square, Triangular wave outputs, one Bread Board having two main strips & two distributions strips. Complete with two dual range Deluxe Meters.

Standard Acc.: Necessary components (Resistances, Capacitors & IC's etc.)

Optional Acc.: CRO 10 MHz.

PR-334 STUDY OF OPERATIONAL AMPLIFIER AS ADDER, SUBTRACTOR, INTEGRATOR AND DIFFERENTIATOR

Features : Instrument comprises of 2 DC Regulated Power Supplies 0-5 VDC, DC Regulated Power Supply ± 15 VDC, 2 dual range round meters to measure input and output voltages & Combination of Resistances, Capacitors mounted on Front Panel.

Optional Acc. : Audio Frequency Function Generator, CRO 10 MHz.

PR-335 TRIODE VALVE CHARACTERISTICS APPARATUS WITH DC REGULATED POWER SUPPLY

Triode Valve Characteristics Appts. with DC Regulated Power Supply

Objective : V I char of Triode valve at various Grid voltages.

Features : Instrument comprises of DC Regulated Power Supply 0-300 VDC/30 mA & 0-25 VDC/30mA & One 0-25 VDC/10mA, AC Power Supply 6.3 VAC/1Amp, three round meters for voltage & current measurement, valve diagram is Printed on Front Panel, connections of Supplies & Valve brought out at 4mm Sockets.

Accessories : Set of single 6 point & 1 interconnectable patch cords.

PR-336 OPERATIONAL AMPLIFIER AND MULTIVIBRATORS

Objective : To study Operational Amplifier as Inverting & Non-Inverting Amplifier.

Features : Instrument comprises of DC Regulated Power Supplies of 0-1.5 VDC/ 150mA & ± 15 VDC, circuit diagram is Printed & different Resistances

can be connected externally for various observations.
Accessories : Digital Multimeter/3.5 Digit LED digital Voltmeter.

PR-337 APPLICATIONS OF OPERATIONAL AMPLIFIER

Objective : To study Operational Amplifier as Inverting, Non-Inverting, Summing, Difference, Integrator, Differentiator, Buffer, Sine to square wave converter, Square to Triangular wave converter & unity gain Amplifier.

Features : Instrument comprises of 3 DC Regulated Power Supplies of 0-1.5V/ 150mA (2 Nos.), ± 15 VDC & Two Dual Range moving coil meters.

Circuit diagram is Printed, different Resistances & Capacitors are provided on the front panel which can be connected for various experiments.

Optional Acc.: Audio Frequency Function Generator & CRO 10 MHz.

PR-338 STUDY OF CHARACTERISTICS OF OPERATIONAL AMPLIFIER

Objective : To Study the basis characteristics of Op-Amp as Input Offset Current, Offset Voltage, Slew Rate, Band Width and Null Balancing.

Features : Instrument comprises of ± 15 VDC Regulated Power Supply, 2 round meters, Different type of Resistances and Capacitors, IC 741 connected inside & Connections brought out at 4mm Sockets.

Optional Acc.: DMM, Audio Frequency Function Generator and CRO 10 MHz.

PR-339 LOGIC GATE CIRCUIT-1 BREAD BOARD MODEL

Objective : Verify truth tables of TTL logic gates, Boolean expressions, De-Morgan's Theorems, Adders, Subtractor's Flip Flops.

Features : Instrument comprises of 4 Debounced logic inputs, 4 red LED output indicators, 5 VDC/ 1 Amp Regulated Short Circuit Overload Protected Power Supply, 1 Hz monoshot clock pulse, breadboard with connection distribution strips having total 960 tie points all the components have been soldered on printed circuit board. Supplied complete with eleven IC's 20 mt. hook up wire of 4 colours.

PR-340 SPECTRUM ANALYSER

Spectrum Analyzer is used for the early test in the development of electrical products, troubleshooting of CATV/MATV system as well as the test and trouble diagnosis of cellular phone/paging system.

Features :

- Frequency Range : 150KHz to 1000MHz
- 4.5 Digit Display : Center & Marker Frequency, 0.1MHz Resolution
- Amplitude Range : -100dBm to +13dBm
- Filters : 20KHz, 250KHz & Video Filter
- AM/FM Demodulator : Included
- Full Range Built-in : 0.15MHz to 1000MHz, Tracking Generator
- Output Power : +1dBm to -50dBm (50ohms)

Optional near field sniffer probe set to locate cable and PC board Emission "Hot Spot, evaluate EMC problem at the breadboard and Prototype level. Ideal solution for RF leakage/radiation detection



LAB TRAINING MODULES

PR-341 LOGIC GATE CIRCUIT TRAINER/DIGITAL COMPUTER-II (BREAD BOARD MODEL)

Objective :

1. Study and verify Truth tubes of Logic Gates.
2. Verification of Boolean identities Demorgan's theorems.
3. Study and verify truth tables of Digital Adders and Subtractors.
4. Study of Flip-Flops and verification of their truth tables.
5. Study of Counters, Shift Registers and verification of their truth tables.
6. Study of Encoders, Decoders and verification of their truth tables.
7. Study of Multiplexers, Demultiplexers and verification of their truth tables.

Features : Instrument comprises of Two DC Regulated Power Supplies of 5VDC/1 Amp + 15 VDC/150mA, 10 Logic inputs with LED indicators selectable using SPDT switches, 1 Hz monoshot clock pulses. Breadboard is mounted on front panel to perform various experiments, 10 number logic output indicators 3 seven Segment Display mounted on front panel.

PR-342 FUNCTION GENERATOR

Function generator offers excellent waves shape, signal linearity, waveform symmetry and frequency range from 1Hz-100 KHz.

Selection of sine, square and triangle wave and amplitude variable from 0 to 10 V

The instrument is designed using easy obtainable parts which present trouble free service.

Specifications:

Frequency rang	1Hz-100 KHz in 5 steps
Functions	sine, square and triangle
Frequency Indication	dial
Accuracy	better than $\pm 5\%$
Amplitude	up to 10V P-P open circuit
Output impedance	600 ohms



DYNAMIC DEMONSTRATORS & TRAINERS

PR-343 FUNCTION DEMONSTRATORS & TRAINERS

Objective :

1. To study working principle & various faults of Function Generator
2. To study practical & theoretical aspects of circuitry
3. To study signals & voltages in different sections



PR-344 FUNCTION GENERATOR DEMONSTRATORS

Objective :

1. To study working principle & various faults of FM Radio Receiver
2. To study practical & theoretical aspects of circuitry
3. To study signals & voltages in different sections



PR-345 TELEPHONE TRAINER

Objective :

1. To study working principle & various faults of Telephone
2. To study practical & theoretical aspects of circuitry
3. To study signals & voltage in different sections



OTHER LAB TRAINING MODULES

1. Isolation Transformers
2. 1KVA/230VAC With Tappings at 50% & 86.6%
3. 2 KVA/230VAC With Tappings at 50% & 86.6%
4. 3KVA/440VAC
5. Variable Auto Transformers (VARIAC), Loading Rheostats & Motors
6. Variac (2, 4, 8, 10, 15 Amps) Single Phase
7. Variac (4, 8, 10, 15 Amps) Three Phase
8. Loading Rheostat 1 KW Single Phase in 5 Steps of 200 Watt
9. Loading Rheostat 2 KW Single Phase in 8 Steps of 200 Watt
10. Loading Rheostat 3 KW Three Phase (Each Phase of 1 KW) in 8 Steps
11. Resistive Lamp Load 1 KW
12. Capacitive Load 200mfd Single Phase in 20 Steps
13. Inductive Load 5 Amp. Single Phase in 5 Steps
14. Current Transformer (CT 30/5 Amp.)
15. Potential Transformer (PT 220/100V)
16. Phase Shifting Arrangement
17. Rheostat 10ohms/10Amps (300ohms/5Amps, 100ohms/5Amps are also available)
18. Induction Motor 2HP
19. Synchronous Motor 3 HP
20. DC Shunt Motor 1 HP
21. Loading Arrangement for DC Shunt Motor 1 HP
22. Starter DC Motor 1 HP (3 Point, 4 Point)
23. Experimental Control Panel for Electrical Lab (Without Optional Accessories)
24. Measurement of Power in 3 Phase Circuit by Two and Three Wattmeter Methods
25. Measurement of Power in 3 Phase Circuit by Two Wattmeter Method
26. Measurement of efficiency of Single Phase Transformer (Direct Loading)
27. Determination of Parameter and Losses in a Single Phase Transformer by OC and SC Test
28. Study of Single Phase Energy Meter
29. Earth Resistance by Fall of Potential Method
30. Calibration of Wattmeter by DC Potentiometer
31. Calibration of Voltmeter & Ammeter by DC Potentiometer
32. Starting and Reversing of DC Shunt Motor
33. Speed Control of DC Shunt Motor (By Voltage Control Method)
34. Sumpner's Test (Back to Back) Test on Single Phase Transformer
35. Parallel Operation Single Phase Transformer
36. Voltage Relation Ship of Three Phase Transformer in Various Connections
37. Speed Control of D.C. Shunt Motor (By Armature and Field Current Control Method)
38. Load Test of DC Shunt Motor
39. Different Type of Contactor Control Circuit
40. Angular Displacement Measurement of Synchronous Motor
41. Measurement of Power & Power Factor in Single Phase Circuit
42. Measurement of Power in 3 Phase Circuit by CT, PT & 3 Phase Wattmeter
43. To Connect, Start & Reverse the Direction of Rotation of a 3 Phase Induction Motor (Complete Setup)
44. To Perform the Block Rotor Test of 3 Phase Induction Motor (Complete Setup)
45. Electrical Machine Trainer (Complete Setup)

PR-346 OSCILLOSCOPE



- DC-60MHz
- Dual channel/Dual tracing, X-Y mode
- 6" display, high brightness cathode ray tube with scale illumination control.
- High sensitivity triggering, up to 1mV/division
- CH1 channel incremental amplification function for clearer display.
- TV synchronous separation circuit to observe stable TV signal.
- X-x10/Y-x5
- Polarity reversal, CH 1 Sync output.

Technical Specifications

CRT	6" Rectangular screen with internal graticule, 8x10 divisions. (1 div.=1cm.)
Display mode	CH1, CH2, ADD, ALT, CHOP (CH1, CH2)
Deflection factor	5mV/div to 5V/Div $\pm 3\%$, 1 m V / d i v $\pm 5 (\times 5)$, 10 steps
Vertical deflection	Rise time $\leq 5.9\text{ns}$
Max. Input voltage	250V (DC+AC peak value) when $\leq 1\text{KHz}$ (250V, DC+AC)
Input coupling	AC, DC, GND
Polarity selection	$\pm$ (CH2 only)
Display mode	1, 10, X-Y
Horizontal Time base	0.2 $\mu\text{s}/\text{div}$ to 0.2s/div, 9 ranges
deflection	Sweep expansion x10, Accuracy 3%
Triggering Mode	Auto, NORM, TV-V, TV-H
Trigger source	VERT, CH1, LINE, EXT
Trigger system	Sensitivity AUTO 20Hz ~ 60MHz (VERT) 1.5 div INT, 0.8Vp-p EXT frequency TV-H At least 1 div. or 1Vp-p
Input impedance	1M ohm.
X-Y Phase Difference	$\leq 3^\circ$ DC-50KHz
Calibration waveform	Frequency : 1 KHz 20%, Voltage : 0.5 V 1%
Power Supply	230V $\pm 10\%$, 50 Hz
Dimensions	310 (W) x 130 (H) , 370(D)mm
Weight	8 Kg Approx.

All other range of OSCILLOSCOPES are also available.

OSCILLOSCOPES

ANALOG OSCILLOSCOPES 20 MHz/30MHz (With Component Tester / Frequency Counter)

PR 3020 / 3020 CT / 3030

1. DC-20MHz (PR 3020), 20MHz (PR 3020CT), 30MHz (PR 3030)
2. Dual channel / Dual tracing, X-Y mode
3. 6" display cathode ray tube, sensitivity triggering up to 1mV/division
4. TV synchronous separation circuit to observe stable TV signal
5. X-x10/Y-x5,
6. Polarity reversal, CH 1 Sync output

MODEL PR 3030 F

1. DC-30MHz (PR 3030F) with 6 Digit 30 MHz frequency counter
2. Dual channel/Dual tracing, X-Y mode
3. 6" display cathode ray tube
4. CH1 X 10 magnification, sensitivity triggering, up to 1 mV/division
5. TV synchronous separation circuit to observe stable TV signal
6. X-x10/Y-x5
7. Polarity reversal, CH 1 Sync. Output

MODEL PR 3060

1. DC-30MHz (PR 3060) Dual channel/Dual tracing, X-Y mode
2. 6" display, high brightness CRT with scale illumination control
3. High sensitivity triggering, up to 1 mV/division
4. CH 1 channel incremental amplification function for clearer display
5. TV synchronous separation circuit to observe stable TV signal
6. X-X10/Y-x5
7. Polarity reversal, CH 1 Sync output

MODEL PR 3060 CR

1. DC-60MHz (PR 3060CR) with CRT readout
2. Three channel/six traces with delayed scanning
3. CRT digital cursor readout, HOLD OFF function
4. CH 1 : Maximum 400V input voltage
5. Scan speed up to 50ns / division
6. 6" display cathode ray tube, High sensitivity triggering, up to 1mV/division
7. X-x10/Y-x5, Polarity reversal