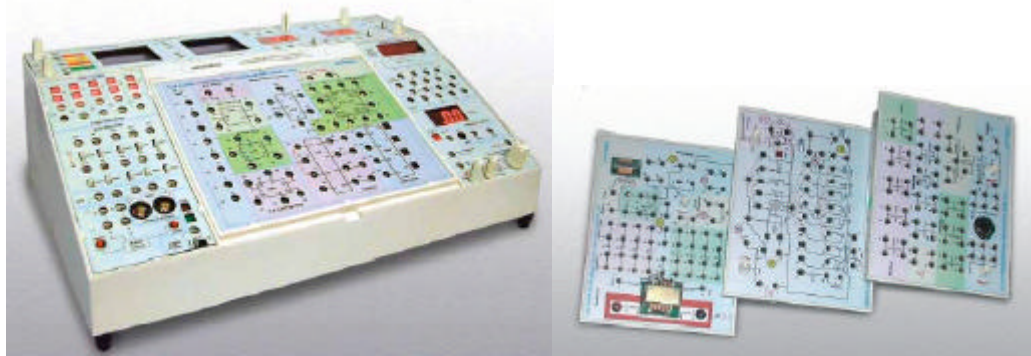


Electrical And Electronic System Trainer (Model - XPO - CT)



SALIENT FEATURES

- ✍ Aesthetically designed injection moulded electronic desk (Master unit) carrying useful experiment resources Variable Power supplies / Status / Pulsar / Function Generator , DPMs etc. while the central slot will carry replaceable experiment panel secured in an ABS molded plastic sturdy enclosure, and has colorful screw less overlay showing circuit & its connection tag numbers for easy connectivity.
- ✍ Connection through Sturdy 4mm Banana Sockets & Patch Cords.
- ✍ Hands on learning by constructing circuits using built in power bread board panel as well as optionally using Discrete component panel.
- ✍ Set of Users Guide provided with each Unit.
- ✍ Order 10 MUs & multiples of 10 or more panels set.



SPECIFICATIONS OF MASTER UNIT

- ✍ Built in Power Supply
 - [A] DC Supply : 5V / 1A. & $\pm 12V$, 500mA.
 - 0 to 15V DC (Variable), 100 mA (Isolated)
 - 0 to 30V DC (Variable), 100 mA (Isolated)
 - High Volt DC - 15V to 220 V, 100mA.
 - [B] AC Supply : 12-0-12V AC, 150 mA. Short circuit protected
- ✍ Built in Function Generator
 - Output Waveform - Sine, Triangle & TTL O/Ps
 - Output Frequency - 1 Hz to 1MHz in 6 ranges, with amplitude & frequency control pots. O/P Voltage 20V p-p max. (Sin / TRG)
 - Modulation I/P - AM : - I/P voltage $\pm 5V$ (100% modulation)
 - O/P - For 0V (min), + 5V (max.)
 - 5V (Phase reversal of O/P)
 - FM : I/P voltage $\pm 400mV$ ($\pm 50\%$ modulation)
- ✍ Clock Generator : 10 MHz TTL clock.
- ✍ Data Switches (10 no.) & bi-colour LED status indicators 10X2 nos, for High/Low indication.
- ✍ Pulsar switches (2 nos.) With four debounced outputs.....2no.
- ✍ Optional BNC to 2 channel banana adapter.....2no.
- ✍ Logic probe to detect High/Low level pulses upto 1MHz, with bi-colour LEDs to indicate status.
- ✍ 2 / 4 digit 7 segment display with BCD to 7 segment decoder.
- ✍ Onboard DPMs provided with mode/range selection.
 - (A) DC volt - 2V/200V.....1no.
 - (B) DC current - 2mA/200mA.....1no.
 - (C) DC Volts/Current - 20V/200mA.....1no.
- ✍ Onboard moving iron meters provided for
 - (A) AC Current : 1 AMP1No.
 - (B) AC Voltage : 15V.....1No.
- ✍ Onboard speaker - 8 Ohms, 0.5 Watt (1no.)
- ✍ Onboard POTS : 1K.....1no.
1M.....1no.
- ✍ Mechanical Dimensions
 - (A) Master Unit : 400mm(W), 125mm(H), 270mm(D)
Net weight: 8 Kg. Gross Wt: 10 Kg.
 - (B) Panel : 215mm(W), 165mm(H), 40mm(D)
Net weight: 700 gm approx.
- ✍ Operating Voltage - 220/240Vac switch settable +/- 10%, 50Hz/72VA.

ANSHUMAN Tech Pvt. Ltd.

Plot 13, Sthairya, Behind Tol Hospital
Near Nav-Sahyadri Society, Karve Nagar
Pune - 411 052 (MH)INDIA

Tel : (0091)(020)25460892 / 25463052
Fax : (020) 25463052
Email : anshumanelectronics@vsnl.com /
info@anshumantech.com

Visit us at : www.anshue.com / www.anshumantech.com

Specifications subject to change without notice.

MODULAR EXPERIMENT PANELS : Following experiment panels normally work in conjunction with Master Unit. However they can be ordered as stand alone units with built in power supply at slightly extra cost.

Magnetism, Electromagnetism & Transformer Characteristics (P1)

(Provided with 38 banana tags.)

Faraday's law of magnetic induction, Left-hand rule for north pole of coils / conductors & Corkscrew rule for flux around current carrying conductor. Fleming's left-hand rule (motor law -force on a current carrying conductor in a magnetic field), Lenz's Law.

Transformer - DC / AC resistance, transformation/Voltage ratio, loading of transformer, Auto transformer, self & mutual inductance, **B-H curve tracer.**

DC/AC & Wave Shaping Circuit Experiment Panel (P2)

(Provided with 65 banana tags)

DC: Resistance, current and voltage measurements, Ohm's law, Power DC circuits, Series, parallel and mixed circuits, Kirchoff's law, Superposition theorem, Thevenin's theorem, Norton's theorem, Max. Power transfer theorem, Voltage distribution of capacitors in series & parallel, total capacitance of capacitors in series and parallel, charging and discharging of capacitor through resistance & time constant, Wheatstone's Bridge, 2 Port Network - Y, Z, ABCD Parameters & Star Delta Network. Millman's Theorem, Compensation Theorem, Reciprocity Theorem.

AC : AC Voltage & Current Measurements - R-L series, R-C series, R-L-C series circuit (Series Resonance). R - L parallel, R - C parallel, R - L-C parallel(Parallel Resonance),Active, Reactive power & power factor(Vector Diagram),average & RMS Value measurement.

Wave Shaping : Differentiator, Integrator, Clipping, Clamping, Passive filters - LC / RC, LPF/ HPF

Semiconductor & Power Semiconductor Devices Experiment Panel (P3)

(Provided with 54 banana tags)

Silicon diode, Semiconductor Testing using Multimeter, Germanium diode, zener diode, LED,LDR, diac, bipolar transistor (NPN , PNP) , Field Effect Transistor (FET), MOSFET (IGBT), UJT,PUT,Silicon Controlled Rectifier (SCR), Triac, Optocoupler, **Band gap energy Calculations**, Thermistor, V-I Characteristics on CRO of SCR, Triac.& Silicon Bilateral Switch(SBS)

Sensors & Transducers Experiment Panel (P4)

(Provided with 17 banana tags)

Temperature Sensors : AD 590 (IC Sensor), RTD (PT100), Thermistor, (NTC).

Light Sensor :Photo Transistor & Photo Diode,LDR, Photovoltaic Cell.

Rectifier, Filter, Zener Regulator Experiment Panel (P5)

(Provided with 67 banana tags)

Transformer & its study (Transformer DC/AC resistance, Transformation Ratio, Electromagnetic Induction, Loading of Transformer), Half wave rectifier, Full wave rectifier, Bridge rectifier, Filter, Voltage multiplier, Zener shunt regulator **Voltage Regulator Experiment Panel (P6)**

(Provided with 40 banana tags)

Zener regulator with current boost transistor, Transistorised series regulator, IC voltage(variable) regulator using IC 723(Positive/negative voltage regulator), IC current regulator using IC Lm317.

Transistor h-parameters & CB/CC/CE amplifiers experiment panel (P7)

(Provided with 62 banana tags)

Thermal stability(Transistor bias stability), Determination of h-parameters, Common base, common collector, common emitter amplifiers.

Transistor Amplifier Experiment Panel (P8)

(Provided with 44 banana tags)

Differential amplifier, 2 stage R-C coupled amplifier, Transformer coupled amplifier, FET amplifier, Push pull amplifier, Complementary symmetry amplifier, Switching amplifier(Class D), efficiency of power amplifier.

Transistor class A, Class B, Class C Amplifier Experiment panel (P9)

(Provided with 40 banana tags.)

Current & voltage series feedback amplifier, current & voltage shunt feedback amplifier, effect of Re/Ce, Darlington amplifier, RF tuned amplifier, Class A, B, AB & C amplifier, Switching amplifier (Class D).

Transistor / Diode Applications Experiment Panel (P10)

(Provided with 61 banana tags.)

Components suitably arranged so that following 30 projects can be constructed :

Electronic storage tank, One way street, "Invisible power" Radio, Transistor, Electronic trigger, Transistor and amplification, Sunrise-Sunset light, Slow -motion Sunrise-Sunset light, Secret code key, Highs & lows of oscillations, Beacon light, Music from a pencil, Leaky facet, Bee, Electronic canary, Burglar alarm, Touching light, Rain detector, Radio station, Wireless rain detector, Metal detector, Blowing 'ON' a candle, Blinker, Two transistor oscillator, Timer, Memory, AND, OR, NAND, NOR gate.

Oscillator & Multivibrator Experiment Panel (P11)

(Provided with 22 banana tags.)

Hartley oscillator,Colpitts oscillator, Crystal oscillator, Clapp oscillator, Blocking oscillator, Astable multivibrator, Monostable multivibrator, Bistable multivibrator,

Digital Logic Gates Experiment Panel (P12)

(Provided with 28 banana tags.)

AND, OR, Invertor, NAND, NOR, EX-OR, EX-NOR, Demorgan's theorems, Input / Output characteristics, Propagation delay.

Flip Flop, Counters & Shift Register Experiment panel (P13)

(Provided with 60 banana tags.)

R-S Flip-flop, 'D' flip-flop, 'T' flip-flop, 'J-K' flip-flop, Master-slave J-K flip-flop, Binary Counter, Rotary feed back application of counter, Decade counter Shift registers :Shift left/Right/Ring counter, Parallel mode, Twisted ring counter.

Multiplexer, Decoder & Encoder Experiment panel (P14)

(Provided with 51 banana tags.)

Multiplexer, Decoder / Demultiplexer, BCD to seven segment decoder driver, Tristate logic, Encoder.

Half/Full Adder, Subtractor, ALU Experiment panel (P15)

(Provided with 56 banana tags.)

Half adder, Half subtractor, Full adder, Full subtractor, ALU, Applications of ALU : Mathematical - addition, subtraction; Logical - AND, OR, EX-OR, NOT etc; Code conversion-binary to gray, gray to binary,BCD to Excess-3, Excess-3 to BCD, 9's compliment,10's compliment, Substitution of CAM for timing control.

Operational Amplifier Circuit Experiment panel (P16)

(Provided with 56 banana tags.)

Inverting amplifier, Non - inverting amplifier, Summing amplifier, Difference amplifier, Integrator circuit, Differential circuit, Precision rectifier : Half wave & full wave, Voltage to current convertor, Current to voltage convertor, Op-amplifier characteristics, Instrumentation amplifier, Schmitt trigger, Comparator, Sign Changer, Offset Null, Peak detector, Clipping circuit, Clamping circuits (DC restorer), Waveform Generator.

Advance Operational Amplifier Experiment panel (P17)

(Provided with 56 banana tags.)

Lowpass filter, High pass filter, Bandpass filter, Band stop(Notch)filter, Wien Bridge oscillator, Phase Shift oscillator, Sample & hold circuit, Log amplifier, Antilog amplifier, Voltage to frequency converter, Frequency to voltage converter, Square Rooter.

Application of Operation Amplifier Experiment panel (P18)

(Provided with 41 banana tags.)

Using 555 : Timer (1 shot/Monostable), Free running (Astable), Bistable. Applications of 555 : Saw tooth generation, long duration timer, tachometer, missing pulse detector. Using PLL (IC565), VCO, Phase detector, Determination of Lock freq., Capture freq., & freq. Multiplier / Synthesizer, FM demodulation (Using PLL).

AM / FM Transistor Radio kit (P19)

(No. of Test points = 17)

Functional study of RF amplifier, Mixer, Local oscillator, IF amplifier, Detector & Audio amplifier for both AM & FM radios. Supplied either fully assembled or CKD form. Operates from 9V built in battery. Wall transformer optional, Switch fault (optional).

Power Semiconductor Application Experiment panel (P20)

(Provided with 29 banana tags.)

Triac lamp dimmer,AC fan regulator, SCR/DIAC operated light sensitive switch using LDR, SCR/DIAC operated temperature sensitive switch using thermistor, UJT relaxation oscillator, Half and full wave (Phase shift controlled) rectifier using SCR, Timer using SCR & UJT.

DC-DC, DC-AC converter Experiment panel (P21)

(Provided with 14 banana tags.)

DC to AC, AC to DC, DC to DC Voltage converter circuit. DC to AC Circuit (Converts SVDC I/P to 12-0-12VAC output) AC TO DC Circuit (Converts 12-0-12VAC I/P to ± 12 VDCO/P) DC TO DC by combining two above circuits to get (SVDC Input to ± 12 VDC output.

Power Semiconductor Application Experiment Panel -II (P22)

(Provided with 17 banana tags & 11 TPs)

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 thermistor, SCR/Triac intensity control using LDR, Opto isolated DC switch & Photo relay & thermal relay (street light control).

FM Transmitter Experiment panel(P23)

(Provided with 10 banana tags.)

Single band frequency range : 88 MHz to 108 MHz. Power O/P : 100 mW.

DC/AC Bridge circuits Expt. Panel (P24)

(Provided with 52 banana tags.)

Wheatstone's Bridge, Kelvin's Bridge, Maxwell's Bridge, Hay's Bridge, DC Sauty's Bridge, Owen's Bridge, Anderson's Bridge, Shearing Bridge, Wien bridge.

Stepper Motor Demonstrator Expt.Panel(P25)

(Provided with 11 banana tags.)

Direction, speed, auto, manual operations of Stepper Motor **Analog Multiplexer / Demultiplexer & DAC Expt. Panel (P26)**

(Provided with 40 banana tags.)

16 Channel Analog Multiplexer, 1 to 16 Analog Demultiplexer, A to D Converter (3 bit), D to A Converter (4 bit)

Microphones Expt. Panel (P27)

(Provided with 15 banana tags.)

Frequency & directional response of Carbon Microphone,Dynamic/Moving coil Microphone, Condensor / Electret Microphone, Crystal Microphone.

Study of Logic Gates & Applications Expt. Panel (P28)

(Provided with 58 banana tags.)

Logic Gates, & input output characteristics Boolean Algebra Theorems, Demorgan's Theorems, Logical equations, Digital code lock, R-S flip-flop using NOR gates, Multivibrators - Astable, Monostable & Bistable multivibrator etc.,4 bit synchronous counter, Synchronous non binary counter/Decade counter /MOD 10 counter etc.

Switch Mode Power Supply Expt. Panel (P29)

(Provided with 11 banana tags.)

SMPS (TV), Crow Bar Protection circuit **3 Phase sequence indicator and Fault Study Expt. Panel (P30)**

(Provided with 7 banana tags.)

Study 3 phase 440V Electric utility supply - Determination of over voltage, under voltage, single phasing and reverse phasing / Displays OV,UV,SP,RP on digital display, 9V Battery / +12V supply operated.

JFET, MOSFET & IGBT Expt. Panel (P31)

(Provided with 49 banana tags)

MOSFET : Drain characteristics of MOSFET, MOSFET Amplifier, MOSFET Switch, JFET : Characteristics of JFET, JFET amplifier, JFET crystal oscillator, Phase shift osc. Using FET, Phase splitter using FET, FET Analog switch, IGBT : Characteristics of IGBT, IGBT as switch.

Passive / Active / M Derived Filter Panel (P32)

(Provided with 114 banana tags)

Passive (RC) filters- Low pass , High pass, Notch filter, Active filters- Low pass, High pass, Unity gain phase shifting, Butterworth, Bessel, Chebyshev filter LC (M derived / constant K type filters)- T type high pass Active filters, High pass m derived, Band stop, Band pass, M derived Band pass, Constant K type pass band, Band Elimination, Composite Low/High pass filter Can construct above filters & plot their characteristics.

ADC & DAC Circuits Experiment Panel(P33)

(Provided with 23 banana tags)

8 bit ADC, 0-5V I/P:- Dual slope ADC, Tracking ADC, SAR ADC, RAMP ADC, Bipolar ADC using level translator, Delta Sigma ADC , 8 bit DAC:- O/P Range 0 - 5V & +/-5V ..

Memory Experiment Panel (P34)

(Provided with 55 banana tags)

Constructing ROM with Diode Matrix (4x8 bits), RAM with D flip flop, EEPROM (28C64) - 8K x 8, EPROM (2764) - 8K x 8, RAM (6264) 8K x 8, Flash memory microcontroller.

Oscillator & Amplifier Experiment Panel (P35)

(Provided with 19 banana tags)

Blocking Oscillator Circuit, Schmitt Trigger/Oscillator, OTL Amplifier, OCL Amplifier, 0.5W/8? Loud speaker with Audio amplifier, Mic with preamplifier, Electronic Birdcall circuit, transistorized wien bridge oscillator & phase shift oscillator. 8 bit fault switches to simulate various commonly occurring faults.

3 Phase Laws Experiment Panel (P36)

(Provided with 40 banana tags)

3 phase Star, Delta relationship between V, I, use of Low voltage isolated secondaries to prevent shocks, various rectifier circuits, Phase sequence determination.

Advance DC to DC Converter Panel (P37)

(Provided with 63 banana tags)

Open loop & Closed loop scheme for Step Up (Boost), Step Down (Buck), Polarity Inverter, Forward, Fly back, Push Pull, Negative Voltage Converter, Cascaded Negative Voltage Converter.

