

COMPUTER ASSISTED CIRCUIT TRAINER (Model : XPO - CAT)

- Advance Digital IC Trainer
- Plugin Component System Trainer
- 3360 Tiepoints Breadboard Trainer



Plug in Components

SALIENT FEATURES

- ◆ Aesthetically designed injection moulded electronic desk (Master unit) with common experiment resources like Power supplies, Function Generator, switches, indicators, DPM etc. while the slot will carry replaceable expt panels.
- ◆ 4 mm sockets arranged on a grid of 19 x19mm to receive plug in components useful for students in non electronic streams of engineering.
- ◆ Computer assisted Training through use of Lab view® based executables, optionally supported by variety of virtual instrumentation like toggle switches, leds, DMM, CRO etc. interface through USB IO module.
- ◆ Emphasis on troubleshooting skills through fault switches, locate hidden the experiment panels.
- ◆ Following Replaceable panels connect to Top Board resources / computer I/F on master unit through 64 pin Euro connector
- ◆ Set of Users Guide provided with each Unit.

Specifications of Master Unit

Power Supply	DC Supply	+5V / 1A, $\pm 12V$ / 500mA 0 to 18V DC (Variable)/ 1A (Isolated) -2 nos. With short ckt & overload protection. Both kept isolated to facilitate either 0 to 36V or $\pm 18V$ power supplies etc.		
	AC Supply	12-0-12V AC, 150mA. Short circuit protected.		
Function Generator	Waveform	Sine, Triangle & Square wave, output for TTL/CMOS with variable amplitude pot.		
	Frequency	1 Hz to 1MHz in 6 ranges, with amplitude & frequency control pots.		
	Voltage & current	15V p-p max. (Sin / TRG) open ckt. (7.5Vpp into 50 ohm termination)		
	Optional I/ps (on Hind Plate)	AM	FM	FSK
		AM (std.)- I/P voltage $\pm 5V$ (100% modulation) 0V - No Modulation AM (DSBSC) I/P Vtg. 0-9.8 Vpp., O/P Vtg. 0- 2.7	I/P voltage $\pm 400mV$ ($\pm 50%$ modulation)	I/P upto 500Hz, ± 4.5 square wave
3-Phase voltage Generator		6Vrms/50Hz/120 degree phase shifted 3 O/ps, max 10mA loading		
Frequency Counter (Optional)		5 digit frequency display, Max I/p - 10Vpp, 300mV sensitivity, Range : 2MHz. Max.		
Logic input switches & status Indicators		Bi-colour buffered LED status indicators 8X2 nos for High/Low indication. Input Data Switches (Slide switches) x 8nos.		

Computer Interface	Digital I/O	Using switch selectable parallel port or optional USB port (through optional converter supplied) 8 I/P, 8 O/P, 8Bidirectional I/O Lines (TTL), opto isolated Adaptor to prevent damage to pc
	Analog I/P	2nos. of $\pm 9V$ ADC channels, 2nos. of 0-2.5V ADC channels, Max BW-1KHz
	Analog O/P	O/P 0-10V max(optionally 0-2.5V), max. load 10 mA
Pulser switches (2no.)		with four debounced outputs (TTL), A, \bar{A} , B, \bar{B}
Logic probe		to detect High/Low, level TTL pulses upto 1MHz, with bi-colour LEDs to indicate status.
7 segment display		2-digit red led 7 segment with built in BCD to 7 segment decoder(TTL)
Onboard DPM (1no.)		provided with mode/range selection, DC volt - 2V/20V & DC current - 2mA/200mA
Mic Pre- Amplifier		Pre-amplifier function block with DC gain = 1, AC gain = 50 .
L/S Amplifier & speaker (optional)		Amplifier gain 20, with volume control driving 8ohm, 0.5W L/S , Mounted on hind Plate
Onboard POTS		1K,1M (Optional in place of counter module)
Fault Switches		14 nos. of gnd referred fault switches hidden under replaceable expt. panel on pcb carrying 64 Pin Euro connector
Accessories		1) Parallel Port 25pin Cable 2) Virtual Lab CD 3) USB I/O Module (optional) with type A to mini B cable 4) Dynamic Mic or electret Mic with builtin bias (cell) (optional)
Operating Voltage		220/240Vac Switch settable $\pm 10\%$, 50Hz/80 VA
Mechanical Dimensions		(A) Master Unit : 460mm(W), 160mm(H), 350mm(D), Net weight : 7.5Kg. Gross Wt : 9.5Kg. (B) PCB Panel : 439mm x 209 mm

Modular expt. panels offered (At least select one or more)

1) Digital Logic Panel /CAT1

(provided with 227 banana sockets)

- Consists of DIP sockets : 14 pin (7nos), 16 pin (5nos), 24nos. of buffered leds using 3nos. LS245 as LED driver, 4 TTL clock outputs 1, 10, 100Hz, 1KHz.
- Generic ICs used: 7400 (NAND), 7408 (AND), 7432 (OR), 7495 (SHIFT REG), 7404 (NOT), 7486 (EX-OR), 7476 x 2Nos. (J-K FF), 7490 (DECADE COUNTER), 74138 (DECODER), 74148 (ENCODER), CD4051 (MUX/DEMUX), 1X3 extender (2nos.).
- Experiments covered
 - Basic logic gates experiments-OR, AND, INVERTER, NOR, NAND, EX-OR, EX-NOR.
 - Boolean Algebra Theorems -25nos., Karnaugh Map
 - Combinational circuits Adder, subtractor, code converter Like Gray code, 7 seg BCD, Hex, Excess- 3, Parity checker, Encoder / Decoder, Multiplexer / Demultiplexer
 - Sequential Logic circuits like Flip-Flops- R-S, J-K, T, D, Counters- Async/Sync, decade, ring/twisted, divide by N (modulo N)
 - Multivibrator circuits(Mono/Bistable/Astable).
 - Applications- Traffic signal control, Staircase Lamp etc.

2) Plug-in Component Panel /CAT2

(provided with 205 banana sockets)

- Consists of 19 x 19 grid of 4 mm sockets, All plug in discrete components are housed in Acrylic transparent top module of size 50.5mm x 32.5mm x 32.5mm with 4 (8 optional) plugs to facilitate easy viewing & handling w/o fear of damage. Useful for students w/o electronic background.
- Plug in components (TTM) diode (4nos.), capacitor (4nos.), resistor (8nos.), Potentiometers (2nos.), led (2nos.), transistor (4nos.), Relay (1no.), Lamp (1no.) etc. Qty=25nos. assorted

3) Bread board Panel /CAT3

(Connectivity through 64 x 2 tie points)

- Consists of 3360 tie point bread board and 64 x 2 connectivity tie points offering top board resources like Function Generator, status switches, logic indicators , power supply, 8 I/O lines, pulser outputs,

4 TTL clock output 1, 10, 100 Hz, 1 KHz. etc for easy connectivity using 22/24 SWG single strand wires, 28 pin ZIF Socket, Input data switches - 8 Nos., Pulsar Switch-1 No., RC Circuits-4 Nos., On board pot 100K - 1 No., Bicolour buffered LED status indicators 8 x 2 for high low indication, BS5 to Bread Board converters- 8 Nos., BNC to banana converter - 2 Nos.

4) Digital logic Panel II /CAT4

(Provided with 269 banana sockets)

- Consists of DIP sockets :14 pin (7nos.), 16 pin (5nos.), 28 pin ZIF socket (1no.). 4 TTL clock outputs -1, 10, 100 Hz, 1 KHz. Bi-colour buffered LED status indicators 8X2 for high/low indication, Input Data Switches 8 nos., NO-NC Pulsar switch-1no., On board pot 100K-1no., RC ckts for Mono stable M.V., RC ckts for ADC. BNC to banana converter- 2 Nos.
- Generic ICs used: TTL, CMOS ICs like 74280 (Parity Generator), 7407 (buffer), 74HCT14 (Schmitt Inverter), CD4011 (NAND), 7485 (Comparator), 74191 (Counter), 74123 (Multi-vibrator), CD4013 (D F/F), CD4052 (MUX/DEMUX), CD4001 (NOR), CD4093 (Schmitt NAND), CD4007 (CMOS Inverter).
- Experiments covered : Study of TTL, CMOS characteristics, Schmitt gate circuits, Circuits using NAND gate, Multiplexer circuits, Open collector gate circuits, Parity generating circuits, High speed monostable circuits, Comparator circuits, Counter circuits, CMOS device characteristics, 12 bit ADC DAC optional using ZIF socket.

5) Analog Computer /CAT5

(Provided with 128 banana sockets)

- Experiments : Multiplier (2nos.), Divider (2nos.), Square-root(1), Invert summer (2nos.), Log Antilog(1no.), Bipolar to Unipolar level shifters (2nos.), Unipolar to bipolar level shifters (2nos.), 10K 10T Pots (4nos.), Transportation lag (1no.), 90 degree phase shifter (1no.), Integrator / lag (2 nos), Hysteresis Control (1 No.), Dead Band Relay Control (1 No.).