

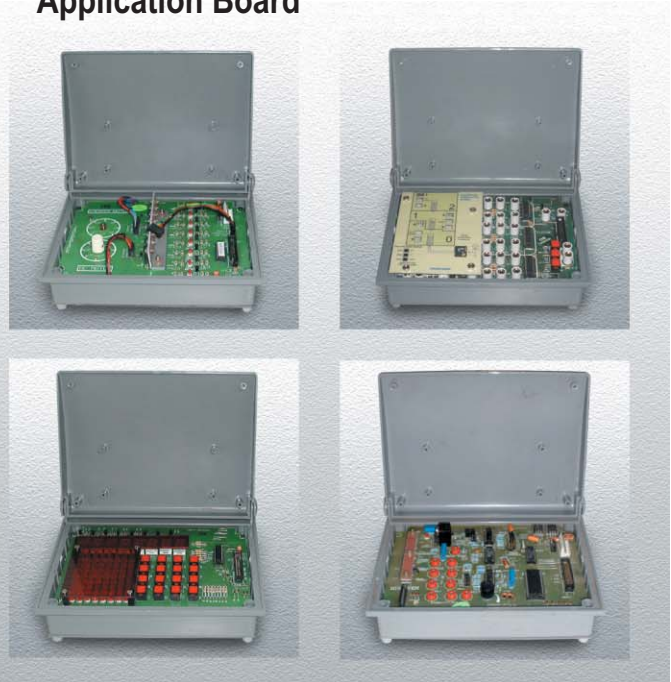
MICROPROCESSOR / MICROCONTROLLER TRAINER (Model : XPO-KIT) [a family of training systems]



KIT



Application Board



CPU WISE SPECIFICATIONS

MODEL	XPO-85/Z80	XPO-88/86	XPO-51/31	XPO-97/196	XPO 68K	XPO 11
CPU (bits)	8085/Z80 (8)	8088/86 (8/16)	8051/31(8)	8096/196(16)	68000(16/32)	68HC11 (8)
MEMORY CAPA.						
Monitor EPROM	36KB(64 KB)	128 KB	36 KB	24KB	128KB	24KB
Battery Back Up	16KB(64 KB)	64 KB (128 KB)	16 KB (64KB)	16KB	64KB (128 KB)	20KB
Scratch Pad	4KB(8 KB)	64 KB (64 KB)	2 KB (8KB)	8KB	64KB	8KB
(Expandability)						
ADVANCED S/W Assembler	1 Pass line assembler 2 pass Assembler	Line assembler Disassembler,	1 Pass line assembler	Disassembler and assembler facility with	1 Pass line assembler	1 Pass line assembler
Disassembler (Optional)	2 pass Disassembler Basic Interpreter Hex Dump	Hex Dump.	Disassembler	S/W on floppy.	Disassembler	Disassembler
ADDITIONAL SERIAL AND PARALLEL I/O	SID/SOD Based (8085) NA (Z80)	NA	<ul style="list-style-type: none"> Using built-in TxD/RxD Unused pins of P1 port offered through 10 pin reliamate. 	Using built-in TxD/RxD	Using built-in TxD/RxD (6850)	Using built-in TxD/RxD
INTERRUPTS	8 Nos.Using 8259(8085) 4 Nos. Using CTC(Z80)	8Nos. Using 8259A	Built in CPU 2no. of ints.	Built in CPU 8 no. of Ints.	Built in CPU 7 no. of Ints.	Built in CPU 7 no. of Ints.

8088/8086- Sockets provided for NDP 8087 And I/O controller 8089 .

8051/8031- Optionally I2C Bus Using 24C02 (512 x 8)EEPROM and Optionally RTC DS1307.

8097/196 - 8 nos. of Quasi Bi-directional port lines (CPU Ports),High Speed I/O Lines : 8 High Speed TTL, 4 dedicated I/O Lines & 4 Nos. Programmable I/O Lines. A/D converter 8 Channel 10 Bit A to D Converter with onboard Potentiometer for demonstration.

Timers - 2 Nos. of 16 Bit Timers from 8097/196,and 3 Nos from 8253.**Watch Dog** Timer from 8097.

PWM O/P - PWM O/P (Provides Pulse Train with variable duty cycle).Inbuilt 256 bytes RAM.

8085 and 8086 - Optional study card set (**PERIWARES**) compatible to trainers with LED's for indicating signals like READ, WRITE, CHIP SELECT, DATA LINES, etc, for peripheral IC's 8251, 8253, 8255, 8257, 8155, 8279, 8259, 6116, with bus converter (cum RE) Card & two 50 pin FRC cables to attach.

TECHNICAL SPECIFICATIONS

User Manual	Set of Manuals: Student Workbook, Instructor Guide and technical Reference, Sample prog. on CD .		
Speed	20 MHz crystal operated multi-output clock source to operate various resources on Mother Board like CPU, Baud rate, T/C etc.		
Parallel I/O	48 I/O lines using two 8255 through 2 Nos. of 26 pin FRC header, printer I/F.		
Serial I/O	RS-232c serial interface using 8251 and RS232 driver IC through 9 Pin male D connector.		
Timer counter	3 Nos. T/C using 8253 pins brought out on 6 pin reliamate.		
Display(Choose one option)	8 digit 7 segment (Red Led)	16 X 2 LCD (Backlit)	20 X 4 LCD (Backlit)
Key Board (Optional)	Single chip micro- controller 89C2051 to support 101Keys PC AT / PS2 Keyboard and LCD		
System Bus	50 Pin FRC buffered Bus to connect periware cards as well as to facilitate ROM Emulation of 8 bit/16 bit system memory using external ROM emulation card cum converter card.		
Battery Backup	Rechargeable NiCd battery (3.6/60maH) provided to supply power to battery backup memory and Optional RTC 58167.		
Onboard Features	<ul style="list-style-type: none"> External Loud Speaker (8ohm/0.5W) interface for experiments on frequency synthesis. Reset and Single Step/Interrupt push button. EP socket for experiments with Cassette recorder interface. Programmable Wait state generator Real Time Clock IC 58167 (Optional) 11 Nos. fault links to teach troubleshooting skills by introducing faults in the circuit. PALs-All glue logic like Memory I/O decoders are implemented using 4(5) nos. of EEPROM PALs 16V8 		
Power Supply (SMPS) (Optional)	Select one of 2 options I) 5V /2.5 Amp SMPS with RCA plug. II) 5V /2.5 Amp SMPS with RCA plug +12 V/ 850 mA , -12V/250 mA with 4 pin reliamate SMPS.		
Mechanical Details	Aesthetically designed Injection molded plastic enclosure of size 215(L)X165(W) X 75(H) mm. Weight = 900 gm.(1.5 Kg with manuals)		

Application Boards (Optional) :

I/O port based :

- TLLC** : Traffic light of 2 intersections cum logic study card with 24 tags and 24 LED's. Optionally following - Elevator SAP consisting of 3 floors, Floor request keys, child protection lock, Thumb- Wheel Switch Module, Opto-coupler, Relay, Buzzer.
- STDC** : Stepper motor and 12V DC Motor Interface card with motors mounted to illustrate speed, direction control. Optional RPM Measurement.
- SCAN TECH** : Scanning Techniques illustrating 8X8 LED Matrix, 4X4 Keypad 7 segment 8 digit red LED display study card.
- AD-DA-I** : Temperature Controller with MINI OVEN with 8 bit ADC- 8 bit DAC cum Instrumentation Opamp study card.
- IOOC** : Opto-isolated 24 Vdc 12 Input and 10 Output IO card with 2 relay output card.
- AD-DA-II** : 8 bit 8 channel ADC & 8 bit DAC (0-5V), Digital gain amplifier with built in L/S interface Electret microphone with preamplifier, light sensor, analog bar graph, voice sampling and relay.
- LCD IO adaptor** : Adaptor PCB mountable on 26-pin FRC IO box connector to facilitate attachment of external LCD {Graphic/text} module or additional 8255/8155 IC.
- AD-DA-III** : 12 bit ADC either dual slope 7109 OR SAR 574 or SPI 3301, 12 Bit DAC: Either parallel R-2R CMOS DAC or SPI 4921, onboard voltage simulation pot, LM 35 temperature sensor (0-5V), buffered S/H amplifier, 16 differential channel MUX & variable gain instru. OPMP.

Bus Based Application Boards (Optional) :

- VCRO** : VGA monitor(64X32) / Oscilloscope (18 X 8) interface card to use them as console out device for the kit in place of LCD/7seg. Use 20MHz CRO with Z Input (1.25MHz Band width) & Ext. Triggering facility.

- ROM Emulation cum converter Card with 2 No. 28 pin DIP connectors for 8 bit/16 bit ROM connection of target uc.

Cables : 9 Pin Female to 25 Pin Female RS-232c Cable, 26 Pin FRC IO Cable, Centronics Interface cable (26 pin FRC to 36 pin Centronics female), USB to RS232 Cable (optional).

Fault Links:

- Shorts 2 Pins of Address Bus.
- Shorts 2 Pins of Data Bus.
- Shorts Address pin to Data Bus.
- Increasing Battery Discharge.
- Disables RD/ & WR/ into BBK RAM
- Permanent Wait State.
- Disables 7 Segment Scanning.
- Disables 7 Segment Data.
- Permanent Reset State.
- Stops 20MHz Clock.
- Disables Baud Rate Clock.

SALIENT FEATURES

- Ergonomical injection molded Plastic enclosure.
- Use of standard PC 101/PS2 Keyboard for programming.
- Emphasis on Hardware troubleshooting through on board short links.
- Exhaustive Didactic Courseware.
- Critical & delicate ICs are protected under acrylic cover from below.
- All in one Logical IO® Monitor design Supports both serial IO & Keyboard display console IO.

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