

MICROPROCESSOR / MICROCONTROLLER TRAINER (MODEL XPO – KIT)



11 Nos. 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.

Injection moulded Plastic enclosure.

Use of standard PC 101 Key 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.

CPU WISE SPECIFICATIONS:

MODEL	XPO-85/Z80	XPO-88/86	XPO-51/31	XPO-97/196	XPO 68K	XPO 11
CPU	8085/Z80	8088/86	8051/31	8096/196	68000	68HC11
MEMORY CAPA. Monitor EPROM Battery Back Up Scratch Pad (Expandability)	36KB(64 KB) 16KB(64 KB) 4KB(8 KB)	128 KB 64 KB (128 KB) 64 KB (64 KB)	36 KB 16 KB (64KB) 2 KB (8KB)	24KB 16KB 8KB	128KB 64KB (128 KB) 64KB	24KB 20KB 8KB
ADVANCED S/W Assembler Disassembler (Optional)	1 Pass line assembler 2 pass Assembler 2 pass Disassembler Basic Interpreter Hex Dump	Line assembler Disassembler, Hex Dump.	1 Pass line assembler Disassembler	Disassembler and assembler facility with S/W on floppy.	1 Pass line assembler Disassembler	1 Pass line assembler Disassembler
ADDITIONAL SERIAL 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 relamate . 	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)	8 Nos. 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 (512×8)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. (These Above Port Lines are Terminated on 26 pin Male Berg connector.)

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 -Separate study card set 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 Rom emulation card mentioned in No. 7 of optional accessories & two 50 pin FRC cables.

Future CPU's - DSP Texas/ Analog Devices etc.

TECHNICAL SPECIFICATIONS

User Manual	Set of Manuals: Student Workbook, Instructor Guide and technical Reference, Sample programs on CD / floppy.		
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 on 6 pin reliamate.		
Display(Choose one of 3 Options)	8 digit 7 segment (Red Led)	16 × 2 LCD (Backlit)	20 × 4 LCD (Backlit)
Key Board (Optional)	Single chip micro- controller 89C2051 to support 101 Keys PC AT Keyboard. Use mechanical converter to use PS2 keyboard.		
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 (8Ω/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 optional	I) 5V/2.5Amp SMPS with RCA plug. II) 5V/2.5Amp. with RCA plug +12V/850mA, -12V/250mA with 4 pin reliamate SMPS. AC I/P230Vac +/-10% / 50Hz		
Mechanical Details	Aesthetically designed Injection moulded plastic enclosure of size 215(L) × 165(W) × 75(H) mm. Weight = 900 gm.(1.5 Kg with manuals)		

Application Boards (Optional) :

I/O port based :

- 1)Traffic light of 2 intersections cum logic study card with 24 tags and 24 LED's. Optionally Elevator overlay.
- 2)Stepper motor and 12V DC Motor Interface card with motors mounted in it to illustrate speed, direction control.
- 3)Scanning Techniques illustrating 8×8 LED Matrix,4×4 Keypad 7 segment 8 digit red LED display study card.
- 4)Temperature Controller with MINI OVEN with 8 bit ADC- 8 bit DAC cum Instrumentation Opamp study card.
- 5)Opto-isolated 24 Vdc 12 Input and 10 Output IO card with additional 2 relay output study card.
- 6)8bit 8 channel SAR ADC (unipolar) DAC (0-5V/+5V). Digital gain amplifier with built-in L/S interface Electret microphone with preamplifier, light sensor, Analog bar graph (0-5V), voice sampling and replay.

Bus Based Application Boards (Optional) :

- 1)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.
- 2)ROM Emulation cum converter Card with 2 No.28 pin DIP to DIP connectors for 8 bit/16 bit ROM connection of target system.

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).

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Specifications subject to change without notice.