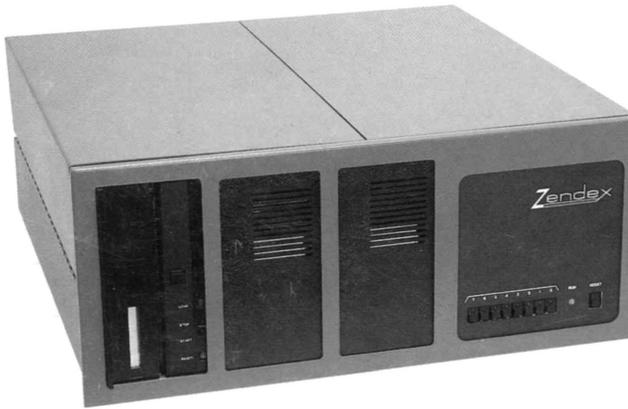


**Zendex Corporation
microcomputer
system
products**



Zendex®



6644 Sierra Lane • Dublin, California 94566 • 415/828-3000

WARRANTY

All products are warranted against defects in material and workmanship under normal and proper use and in their original unmodified condition. If found defective by Zendex Corp. within the terms of this warranty, Zendex Corp.'s sole obligation shall be to repair or replace at Zendex Corp.'s option the defective product. If Zendex Corp. determines that the product is not defective within the terms of this warranty, customer shall pay all costs of handling and return transportation. All replaced products become the property of Zendex Corp. As a condition of this warranty, customer must obtain a Zendex Corp. Return Material Authorization Number, and must return all products, transportation prepaid and insured, to Zendex Corp.'s Dublin, CA facility or other specified location.

Transportation charges for the return to customer shall be paid by Zendex Corp. within the contiguous United States only. These warranties outside the contiguous United States are limited to repair or replacement only and exclude all costs of shipping, customers clearance, and other related charges. Except for the express warranties stated above, Zendex Corp. disclaims all warranties on products, including all implied warranties of merchantability and fitness; and the stated express warranties are in lieu of all obligations or liabilities on the part of Zendex Corp. for damages, the use or performance with this product.

Warranty period is one (1) year from date of original shipment. Warranty registration card must be returned to Zendex for warranty to be in effect.

SERVICE POLICY

If a product should fail during the warranty period, it will be repaired for free. There will be a service charge for repair of a product after the warranty period. If a product exhibits misuse, negligence, or user misconnection, the failure will be treated as an out-of-warranty repair.

To return a product for in-warranty repair, first reverify that the unit is indeed at fault. Then, call the factory for Return Material Authorization (RMA) Number. The product should be carefully packaged and shipped prepaid using the provided RMA number on the outside of the package. Include a short statement of the malfunction, along with return address information, and the telephone number of technical contact, in case the need arises.

For out of warranty repairs, a purchase order for repair charges must also be included.

Items should not be returned freight collect, as they will not be accepted. It is absolutely necessary to return products in the manner stated here, otherwise considerable delay will result in processing the return.

OUT OF WARRANTY REPAIRS

After the warranty has expired, or if no warranty registration is on file, any Zendex board product will be repaired or replaced (at Zendex's option) for a flat fee of \$100, provided, in Zendex's opinion, the product has not been abused, misused, modified or damaged. Otherwise there will be a time and materials charge for returning it to original condition. This policy is subject to cancellation, modification, and change without notice.

Catalog Seven 1982 OEM Price List

(Subject to change without notice)

Effective January 1, 1982

ORDER NO.	DESCRIPTION			DATA
		1 — 9	10 — 24	SHEET
ZX-80/15	Single Board Computer. 3 SBX stations. 5 MHz CPU speed.	\$ 550	\$ 490	Pg. 7
ZX-85	Single Board Development System. MULTIBUS card CPU is software and hardware compatible to MDS-220 and 230. Features 10 MHz 8085A-2 CPU, 2732A fast EPROM and 64K byte RAM. Includes two 8251A USARTs and two 8259A PIC. Monitor program on EPROM.	\$2660	\$2414	Pg. 11
ZX-86	Single Board Computer. Based on 8086. Replaces SBC-86/05. Has 3 SBX Stations, Static RAM, MK 3884 SIO.	\$1612	\$1422	
ZX-88	Same as above with 8088 CPU and support chips. Includes 8088 boot/monitor with source listings.	\$2750	\$2503	Pg. 11
ZX-012	512 Byte Ram Board with error check & correct.	\$4218	\$3818	Pg. 6
ZX-028B	128K byte Random Access Memory Card. Byte swapping for compatibility with SBC-80 and SBC-86. Disable any 16K byte block. 1M range.	\$1280	\$1050	Pg. 15
ZX-118	Quad serial & 16K RAM combo. Uses 8251A USART 8237 DMAC.	\$1504	\$1312	
ZX-200A	Single Board Diskette Controller. Intel Media Compatible.	\$1500	\$1362	Pg. 17
ZX-203	Disk System Controller & Interface. Replaces SBC-201, 202, 206.	\$2818	\$2183	
ZX-204	Economical Diskette Controller. Plugs into one slot of MULTIBUS. Controls either Single or Double Density Mini or Standard Flexible Diskette Drives. CP/M BIOS listing included.	\$ 506	\$ 478	Pg. 19
ZX-208A	Single Board Disk Controller. Features PLL Data Separator and advance DMA Controller. Substitute for SBC-208 from Intel. FM/MFM Single or Double Density operation.	\$ 980	\$ 896	Pg. 21
ZX-602	2-Slot Flat MULTIBUS.	\$ 550	\$ 491	
ZX-609	9-Slot MULTIBUS Backplane. Accepts ZX-85, 88 IPB.	\$ 774	\$ 705	Pg. 23
ZX-635	Vendor Supplied Power Supply. Identical to SBC-635. ±5V and ±12V. Will fit in 3.5" chassis. AC-Low TTL output signal.	\$ 485	\$ 410	
ZX-640	Vendor Supplied Power Supply. Identical to SBC-640. ±5V and ±12V. will fit in 7" chassis. AC-Low TTL output signal. 30 Amps +5 Volts + others.	\$ 591	\$ 503	
ZX-655A	System Chassis. 3.5" high. Contains one ZX-604 4-slot cardcase compatible to MULTIBUS. Includes ZX-635 15 amp power supply, four whisper fans and AC cord, all in a 16-gauge steel 19" rack mountable chassis painted sky blue. Delivered with rubber feet for table top use. Matches ZX-700, 710/720, 730 disk drive cabinets.	\$1467	\$1218	Pg. 29
ZX-660A	Seven-Inch High System Chassis. Contains 9-slot MULTIBUS ZX-609 Backplane/Cardcase 30 AMP ZX-640 power supply, three whisper fans, pop-off front, user control panel all in a 19" rack mountable 16-gauge steel chassis painted sky blue. Delivered with rubber feet for table-top use. Matches ZX-700 series drive chassis.	\$1755	\$1515	Pg. 27
ZX-700A	Diskette Drive Chassis. For dual 8" drives, comes with power supply, fan and cables. Same as ZX-730 but no drives included. 16-Gauge steel painted blue. Suitable for Winchester Drives. Includes bottom panel.	\$ 950	\$ 825	

ORDER NO.	DESCRIPTION	1 — 9	10 — 24	DATA SHEET
ZX-705A	Diskette Hardware System. Includes ZX-204 Controller, ZX-730 Dual Drives; interconnecting cables and AC cord. (Shipping weight 60 lbs.)	\$3980	\$3522	Pg. 30
ZX-708	Diskette Hardware Subsystem. Includes ZX-208A Controller, ZX-730 Drives, and Cables.	\$4120	\$3709	Pg. 22 Picture
ZX-710/720 MOD 200	Diskette System. Combines ZX-200 Controller and ZX-730 Drives for a complete system that can substitute Intel MDS-710 or MDS-720 Systems. Needs only one MULTIBUS card slot.	\$4987	\$4538	Pg. 31
ZX-730	Double Density Add-On Drives. Fits where Intel MDS-730 does. Includes rack mountable chassis with two Shugart SA801 Drives and power supply.	\$3867	\$3123	
ZX-740WC	20 M Byte Hard Disk System. 10 M Byte removable/10 M fixed. SA1004 Fixed, DP100 Cartridge, DTC-900 Controller, FNBB-120 P.S. & DTC-86 I/F. Includes CP/M-80 CBIOS Listings..	\$13,450		Pg. 35
ZX-740WF	Hard Disk and Floppy Disk System — includes cabinet with one SA1004 Winchester Drive, SA 801R FDD, CP384 Power Supply, SA1403 Controller and cables. Includes MULTIBUS Interface. Dual Winchester Disk System.	\$10,450		
ZX-740WW	20 M Byte Dual SA1004. Includes SA1403 Controller and DTC-86 Multibus Interface.	\$11,980		
ZX-904	Parallel IO Module for TTY, CRT, LPT, & UPP. Connects to P2 of ZX-85 or ZX-88 through ZX-609.	\$ 768		
ZX-905	MULTIBUS Prototyping Card. Includes 5 edge connectors and enough room for 84 14-pin integrated circuit packs.	\$ 98	\$ 82	Pg. 45
ZX-906A	MULTIBUS Display. 20-Bit Address and 16-Bit Data Hexadecimal Displays and Single Stepper Circuits.	\$ 650	\$ 512	Pg. 46
ZX-907	MULTIBUS Tracer. Design aid for system integrator.	\$2900	\$2205	Pg. 25
ZX-908A	PROM Programmer. Fits in one slot of MULTIBUS. Programs 2716, 2732 or 2732A type EPROMs. Software compatible to Intel UPM and hardware substitute for UPP-103. Includes CP/M & ISIS-II utility files on diskette (ZPP).	\$ 720	\$ 655	Pg. 48
ZX-909	EPROM Programmer. Upgrade to Zendex Development Systems. Like ZX-908A but EPROM sockets are remote and can be mounted on front panel. Includes ZPP utility.	\$ 880	\$ 720	Pg. 49
ZX-955	Six-foot cable to connect J3 serial connector of SBC-80/XX CPU to CRT.	\$ 80	\$ 75	
ZX-957	Bus Extender. To adapt SBC card to an otherwise full 604/614 Chassis.	\$ 95	\$ 72	Pg. 45
ZX-958	25-pin "D" shell male connectors on 6' ribbon for CRT to systems I/F.	\$ 80	\$ 75	

CHANGEOVER KITS

KIT-85	Kit to convert ZX-88 to ZX-85.	\$ 350		
KIT-88	Kit to convert ZX-85 to ZX-88.	\$ 410		

ORDER NO.	DESCRIPTION	1 — 9	10 — 24	DATA SHEET
ZBX SERIES OF BOARD MODULES				
ZBX-218A	SBX-Module for Single/Double Density Disk Control. Includes 765 FDC Controller chip on SBX Card and cables for Shugart SA 801.	\$ 480	\$ 402	Pg. 50
ZBX-324	Two 8-Bit ADC and two 8-Bit DAC Analog IO channel board.	\$ 291	\$ 283	Pg. 52
ZBX-349	Centronics Line Printer Interface on an SBX-Module; includes printer cable.	\$ 141	\$ 123	Pg. 54
ZBX-350	SBX-Module for 24-line Digital I/O Expansion. Includes 8255A PIO.	\$ 141	\$ 128	Pg. 55
ZBX-351	Serial IO Module. Includes 8251A USART and 8253 Timer.	\$ 209	\$ 190	N.A.
ZBX-391	Prototype Board for single wide SBX Designs.	\$ 90	\$ 80	N.A.
ZBX-488	SBX-Module IEEE-488 Interface. Uses T.I. TMS 9914 GPIB VLSI CHIP.	\$ 534	\$ 483	Pg. 56
ZBX-960	SBX Male (Module) Connector.	\$ 25	\$ 19	N.A.
ZBX-970	SBX Female (baseboard) Connector.	\$ 24	\$ 18	N.A.

ZENDEX DEVELOPMENT SYSTEMS

MODEL 235 (110 VAC)	Compact Zendex Microcomputer Development System. CPU chassis suitable for 19" RETMA rack mounting. Does include ZX-904 PIO. 64K bytes of RAM on ZX-85 CPU and ZX-200 Disk Controller. 7" tall rack-mountable chassis includes two Shugart SA 801 R diskette drives. Comes with MP/M-II single user operating system.	\$7595		Pg. 41
MODEL 805	Complete Development System, similar to Model 835 but less CPU board. Use leftover Intel IPB-80 or IPC-85 board to complete system. Does not include Disk Operating System.	\$6740		Pg. 36
MODEL 835 (110 VAC)	Microcomputer Development System. This microcomputer development system package includes the basic system box with a dual drive FM and MMFM Intel compatible format floppy system. This is a complete micro-computer development center capable of running any standard software in Intel format that will run on the MDS-230. Includes MP/M-II single user software, ZX-85 CPU with 64K bytes RAM, ZX-200 Diskette Controller, ZX-730 Dual drive chassis, ZX-660A nine-slot chassis, ZX-903 Interrupt panel, ZX-904 Parallel IO board, and 30 amp power supply. ZX-909 EPROM Programmer, and ZX-906 Bus Display.	\$12,123		Pg. 37
MODEL 838	Same as Model 835 except CPU is ZX-88 and includes CP/M-86 Disk Operating System, and additional ZX-028 128K BYTE RAM Board.	\$12,423		Same as 37
MODEL 855 (110 VAC)	This package consists of three cabinets that form a complete hard disk-based development system. Cabinet (1) is a ZX-660A nine-slot chassis with ZX-903 Interrupt control panel, ZX-904 Parallel IO module for LPT, UPP, TTY and CRT, ZX-85 CPU with 64K bytes RAM, ZX-200 Intel format diskette controller, and DTC-1403D hard disk controller. Cabinet (2) is a ZX-730 dual diskette drive chassis with two Shugart SA801R floppy disk drives. Cabinet (3) is a Zendex ZX-740WC Hard Disk Subsystem. System includes MP/M software.	\$22,385		Pg. 41

ORDER NO.

DESCRIPTION

1 - 9

ZENDEX SYSTEM SOFTWARE

CP/M-80	Digital Research's CP/M disk operating system with Zendex custom BIOS and special utilities like CP/M < — > ISIS file translator, and ZX-908 PROM programmer utility ZPP. System may run a number of disk configurations with up to four double density, two single density floppy, and four hard disk drives. Check with factory for latest configuration stepping. Compatible also to Intel Series II development systems. Licenses to run Intel software on Zendex products must be obtained from Intel Corporation. Zendex and Quota are trademarks of Zendex Corporation.	\$ 450
CP/M-86	Digital Research's CP/M-86 hosted for Zendex/Intel systems. Supports hard disk (ZX-740WC). Includes PROM programmer utility (ZPP-86) for ZX-908A & ZX-909. Compatible with Zendex ZX-88 CPU and ZX-200A. FDC.	\$ 450
MP/M-86	Multi-user System Software supports ZX-88, ZX-200A, ZX-118, and up to 1M byte RAM. Hosted as above for CP/M-86.	\$ 750
ZX-CRT	Soroc IQ-130 CRT to complement series 400, 800, and 900 systems.	\$ 850

TERMS: Shipped open account to acceptably rated firms listed in Dunn & Bradstreet. FOB Dublin, CA \$100 minimum billing. 6½% sales tax for non-resale within CA. Master Charge and Visa accepted. Intel and MULTIBUS are Intel Corporation's trademarks. CP/M is a trademark of Digital Research, Inc. Prices subject to change without notice.

International Orders — Prepayment or full text telex cable, confirmed, irrevocable letter of credit in favor of Zendex Corporation, 6644 Sierra Lane, Dublin, CA 94566, payable at sight upon presentation of shipping documents at Bank of America, International Division, 7th Floor, 550 Montgomery Street, San Francisco, CA 94102.

**ZENDEX
SERIES 900 SYSTEMS**

MODEL	PROCESSOR — MEMORY — DISK CONFIGURATION	STORAGE	1 — 4	5 — 9
235	ZX-85 / 64KB / 2 Floppy Disks	1 MB	\$ 7595	\$ 6000
238	ZX-88 / 64KB / 2 Floppy Disks	1 MB	\$ 7995	\$ 6400
925	ZX-85 / 64KB / 3 Floppy Disks	1.5 MB	\$ 8610	\$ 7900
928	ZX-88 / 192KB / 3 Floppy Disks	1.5 MB	\$10355	\$ 9500
935	ZX-85 / 64KB / 2 Floppy Disks 1 fixed Winchester Hard Disk	11 MB	\$15800	\$14500
938	ZX-88 / 192KB / 2 Floppy Disks / 1 fixed Winchester Hard Disk	11 MB	\$17330	\$15900
945	ZX-85 / 64KB / 1 Floppy Disk / 2 fixed Winchester Hard Disks	20.5 MB	\$20165	\$18500
948	ZX-88 / 192KB / 1 Floppy Disk / 2 fixed Winchester Hard Disks	20.5 MB	\$21690	\$19900
955	ZX-85 / 64KB / 1 Floppy Disk / 1 fixed Winchester / 1 removable Winchester	10.5 MB F 10 MB R	\$22345	\$20500
958	ZX-88 / 192KB / 1 Floppy Disk / 1 fixed Winchester / 1 removable Winchester	10.5 MB F 10 MB R	\$23870	\$21900
965	ZX-85 / 64KB / 2 fixed Winchester 1 removable Winchester	20 MB F 10 MB R	\$26705	\$24500
968	ZX-88 / 192KB / 2 fixed Winchester 1 removable Winchester	20 MB F 10 MB R	\$28230	\$25900

All Systems Include CP/M Disk Operating System

ZX-900 CHASSIS

Includes chassis, card cage, power supplies, fans. Does not include disk drives, boards, or disk drive signal cables.

1 — 9	10 — 24	25 — 100
\$2799	\$2520	\$2270

Quantity discounts apply only when total quantity is placed on a single purchase order with scheduled deliveries not to exceed 12 months.

ORDER NO.	DESCRIPTION	1 — 9	10 — 24	DATA SHT.
ZX-9700	8.5" system chassis for 19" Retma racks. Uses ZX-640 power supply and ZX-609 card case. Provides trough for large cable bundles to card	\$2388	\$2211	Pg. 42

ZX-012 512KB RAM BOARD

- 20-BIT ADDRESSING
- BYTE-SWAPPING
- 5 VOLTS ONLY
- FULL ECC
- 20,000 HR MTBF
- 300 nS ACCESS

The ZX-012 provides ½ million bytes of dynamic ram storage on a single card. A two board set can provide a fully expanded memory system for 8088 or 8086 based systems.

The ZX-012 is reliable. 5 bit syndrome enables 2 bit error detect and single bit error correct. Prime quality RAMs are used on this vendor supplied product. Zendex backs up this product with it's one year warranty followed by it's fixed low-price swap/repair policy. Given the calculated 20,000 HR MTBF this board should provide up to 10 years error free service.

SPECIFICATIONS

Capacity — 512K x 8 or 256K x 16
Access — 300 nS
Cycle — 500 nS
Power — 5 Volt 2A Max

Weight — 280 g.
Environment — 0-55°c to 95% R.H.
Adjustments — 16K or 32K Address Boundaries
AACK/ or XACK/

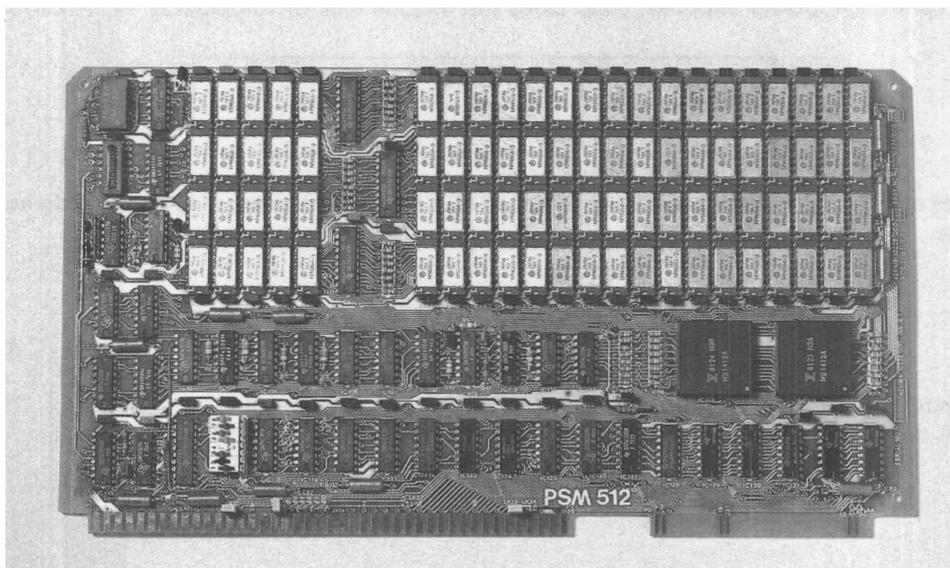


FIG.1: ZX-012 RAM



ZX-80/15 SINGLE BOARD COMPUTER

- REPLACEMENT FOR INTEL SBC-80/05 & SBC-80/10B
- THREE EXPANSION IO MODULE SOCKETS
- ACCEPTS 2716/2732/2764 TYPE EPROMS
- MULTIBUS BUS-MASTER
- 3.9/9.8 MHZ CPU CLOCK SELECTABLE FOR 8085AH-2
- HARDWARE TRANSPARENT TO SBC-80/05 SOFTWARE
- 1K x 8 RAM ON-BOARD
- SOCKETS FOR UP TO 32K BYTES EPROM

The Zendex ZX-80/15 is a 6.75" x 12" Multibus compatible single board computer. The ZX-80/15 is designed to be software transparent to code written for the Intel SBC-80/05 and is therefore preferred as a replacement to the Intel. The ZX-80/15 has four times the capacity for EPROM (32K) and double the RAM (1K) over the SBC-80/05.

The product features three expansion IO interface jacks to accept the Zendex series of ZBX modules that include analog, digital, time keeping and disk IO functions. The IO jacks meet the Intel SBX specification.

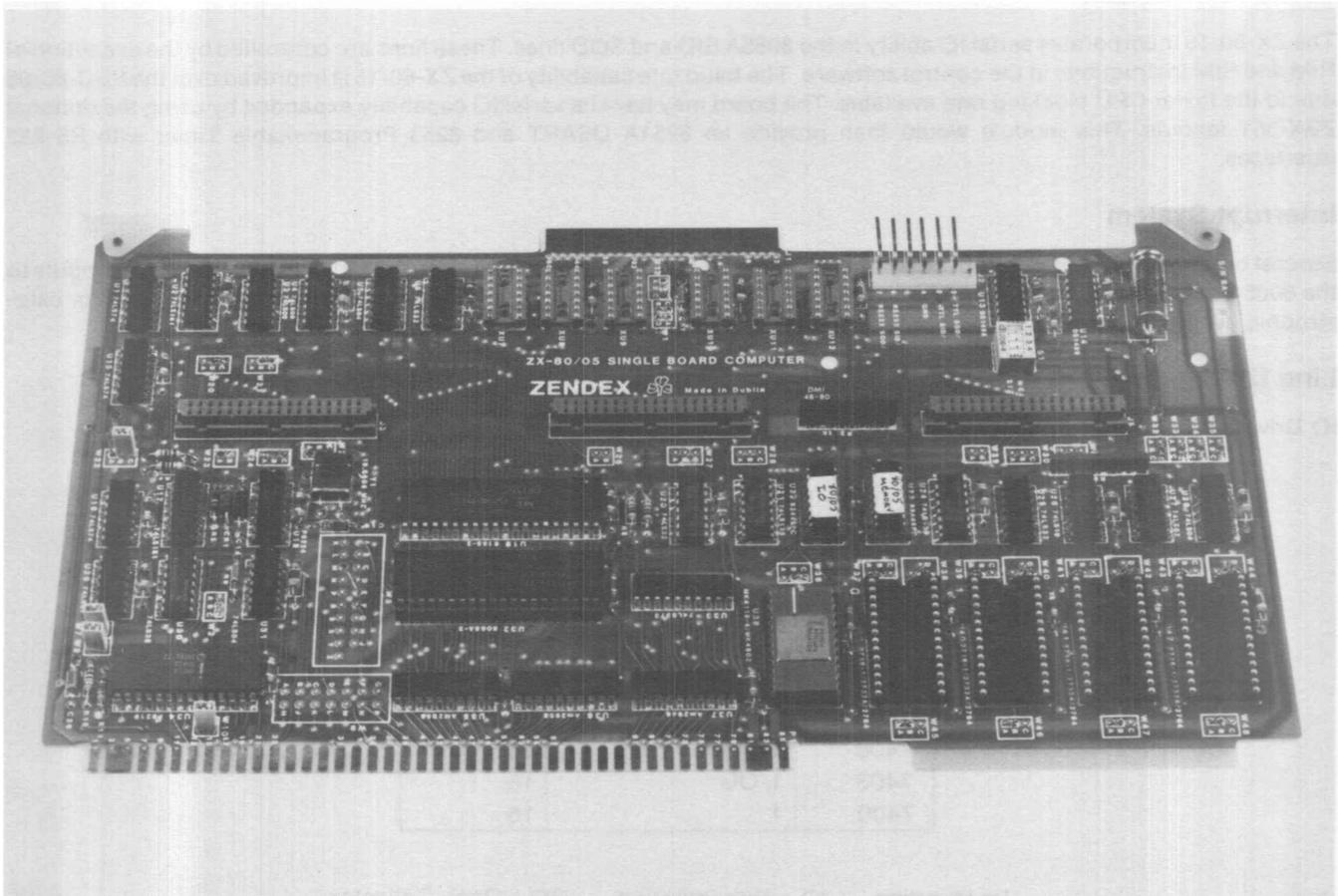


FIG. 1: ZX-80/15 SINGLE BOARD COMPUTER

Functional Description

The central processor of the ZX-80/15 is the 8085AH-2 CPU. Four 24/28 pin sockets are provided for 8K bytes of EPROM with 2716, 16K bytes with 2732, or 32K bytes with type 2764 EPROMS. 1K byte of static RAM is implemented with the Mostek MK4118. A block diagram of the ZX-80/15 is shown in Figure 2.

Parallel IO Interface

The ZX-80/15 contains 22 programmable parallel IO lines using the ports of an 8155 RAM/IO/Timer Chip. 14-pin sockets are provided for interchangeable IO line drivers and terminators. This enhancement of the IO interface flexibility allows the capability to select an appropriate combination of optional line drivers and terminators to provide the required sink current, polarity, and drive/termination characteristics.

Expansion IO Interface

Three plug jacks are provided to the Intel SBX specification for the inclusion by the user of any of a number of small modular IO piggy-back boards. Current modules available now from Zendex include:

- ZBX-349 Centronics Printer I/F
- ZBX-350 Parallel IO (8255A)
- ZBX-351 Serial RS-232 I/F (8251A)
- ZBX-218 Floppy Disk Controller (NEC uPD765)
- ZBX-324 Dual Analog ADC and DAC, 8-Bit
- ZBX-488 IEEE-488 Interface Bus (TI TMS 9914A)

Multimaster Capability

The ZX-80/15 provides full Multibus arbitration control logic through the use of an Intel 8219 Chip. The control logic allows up to three masters on the Multibus using serial priority resolution or up to 16 masters using parallel priority resolution schemes. This capability makes the ZX-80/15 particularly suited for systems using bus master boards like other SBC CPUs, DMA, and disk controllers. The ZX-80/15 is the unit of choice over the SBC-80/10B in multi-master systems.

Serial IO Interface

The ZX-80/15 incorporates serial IO ability in the 8085A SID and SOD lines. These lines are controlled by the execution of RIM and SIM instructions in the control software. The baud rate capability of the ZX-80/15 is improved over the SBC-80/05 due to the faster CPU clocking rate available. The board may have its serial IO capability expanded by using the optional ZBX-351 module. This module would then provide an 8251A USART and 8253 Programmable Timer with RS-232 Interfaces.

Interrupt System

Several bus and on-board interrupt sources may be wire-wrap selected to the 4 interrupt inputs of the 8085A. The inputs to the 8085A are Trap, RST 5.5, RST 6.5 and RST 7.5. The Trap interrupt, since it is not maskable, is typically used for catastrophic events, like power fail and other events that always require immediate attention.

Line Drivers and Terminators

IO Drivers - The following line drivers are all compatible with the IO Driver sockets on the ZX-80/15:

DRIVER	CHARACTERISTIC	SINK (mA)
7438	I, OC	48
7437	I	48
7432	NI	16
7426	I, OC	16
7409	NI, OC	16
7408	NI	16
7403	I, OC	16
7400	I	16

I = Inverting NI = Non-inverting OC = Open Collector

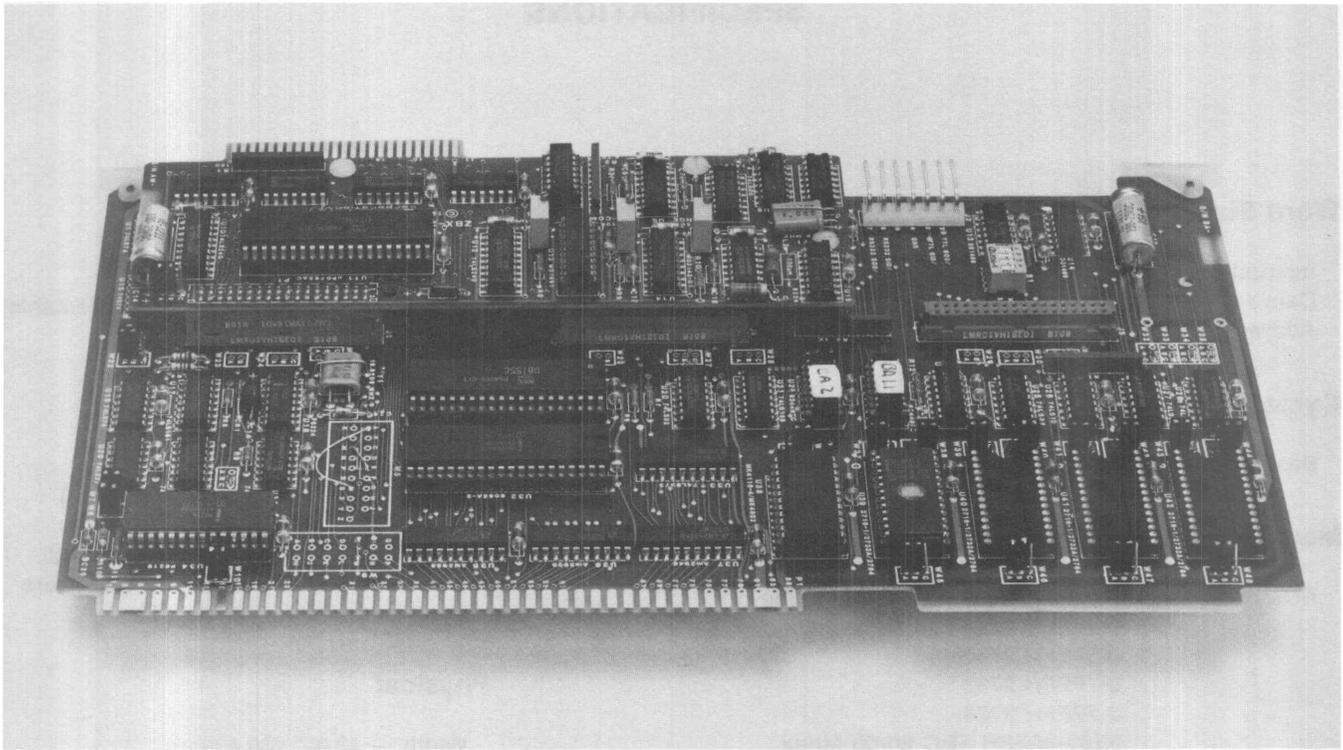
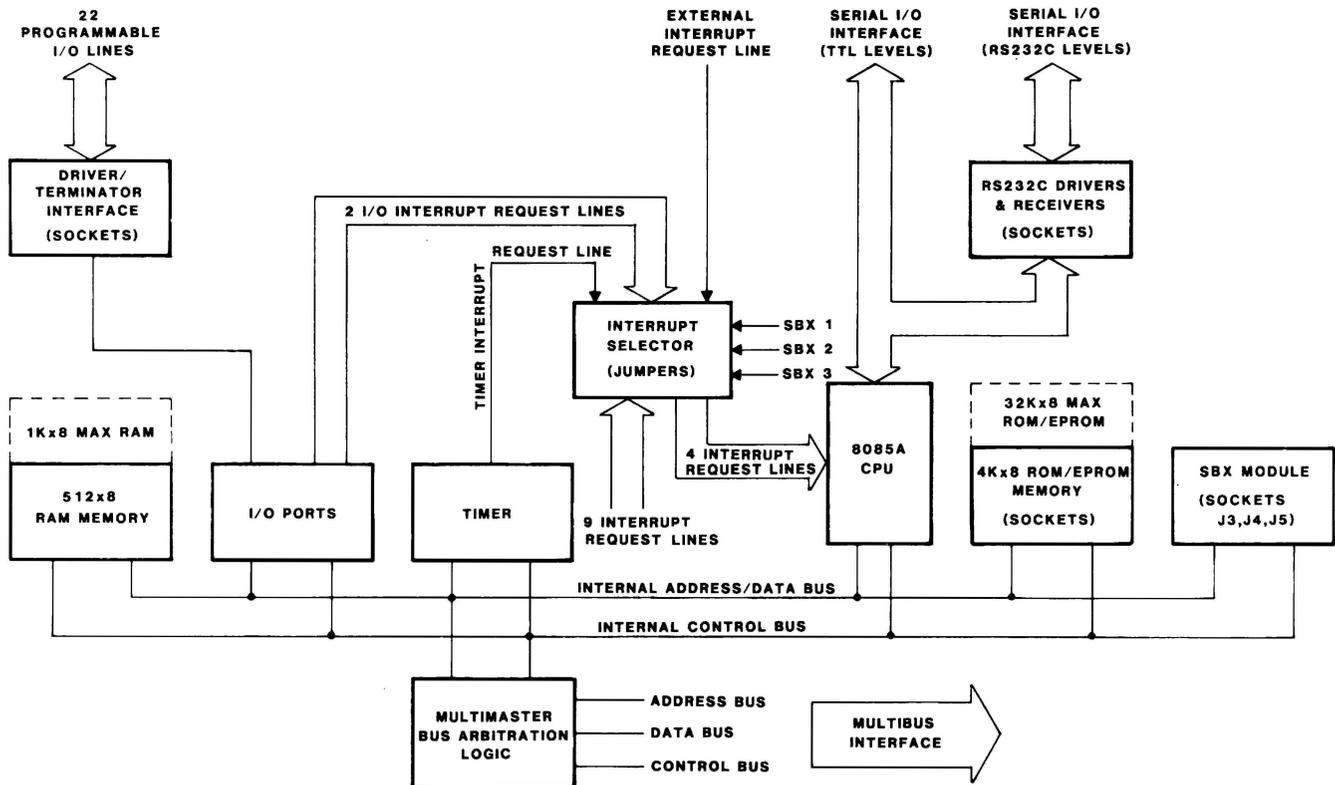


FIG. 2: ZX-80/15 WITH OPTIONAL ZBX-218 FLOPPY DISK CONTROLLER



ZX-80/15 BLOCK DIAGRAM

SPECIFICATIONS

Word Size

Instruction — 8, 16, 24-Bits
Data — 8 Bits
Address — 16 Bits

Cycle Time

Basic 4 Clock Instruction — 814 nSEC

Memory Addressing

ROM/EPROM — 0-0FFFH 2716 SBC-80/05 Mode
0-1FFFH 2716 Full (4 Sockets)
0-3FFFH 2732
0-7FFFH 2732
0-7FFFH 2764
3E00-3FFFH SBC-80/05 Mode
3C00-3FFFH Full Mode
7C00-7FFFH 2732 System
BC00-BFFFH 2764 System

ROM/EPROM/RAM type selection and addressing selected by dip switch programming and bipolar mapping PROM.

ROM sockets may be populated by Byte-wide 1K or 2K static Ram chips.

IO Capacity

Parallel — 22 Programmable Lines
Serial — 1 TxD, 1 RxD RS232 for CPU SID/SOD
SBX — 3 Jacks for Multimodules (J3, J4, J5)

Timer

Input Rate — 122.88 KHZ (8.14 uS Period)
Output Rates — Pulse 8.14 uS/66.67 uS
Sq. Rate Gen. 7.50 Hz/61.44 KHZ
Strobe 8.14 uS/133.33 mS

System Clock

CPU — 1.966 MHZ or
4.9152 MHZ Internal (Selectable)
Utility — 19.6608 MHZ (BCLK)
1.96608 MHZ (Timer)

Interfaces

Bus — 86 Line Multibus Spec (TTL)
J3, J4, J5 — SBX Spec (TTL)
Serial IO — TTL, Sockets for RS 232L
Line Drivers and Receivers
Parallel IO — All Signals TTL

Physical

Width — 12.00" (30.49 cm)
Height — 6.75" (17.15 cm)
Depth — 0.50" (1.27 cm) Max
Weight — 13 Ounces (368.1 gm)

Electrical

DC Power Requirement (Typical)
+5V — 1.0A without EPROMS
+12V — 20mA (RS232 only user)
-12V — 20mA (RS232 only user)

Operating Temperature

0°C to +55°C, to 95% R.H. Given Free
Air Flow Across Board Product.

Ordering Information

Part No.	Description
ZX-80/15	Single Board Computer (without EPROM) Manual Supplied

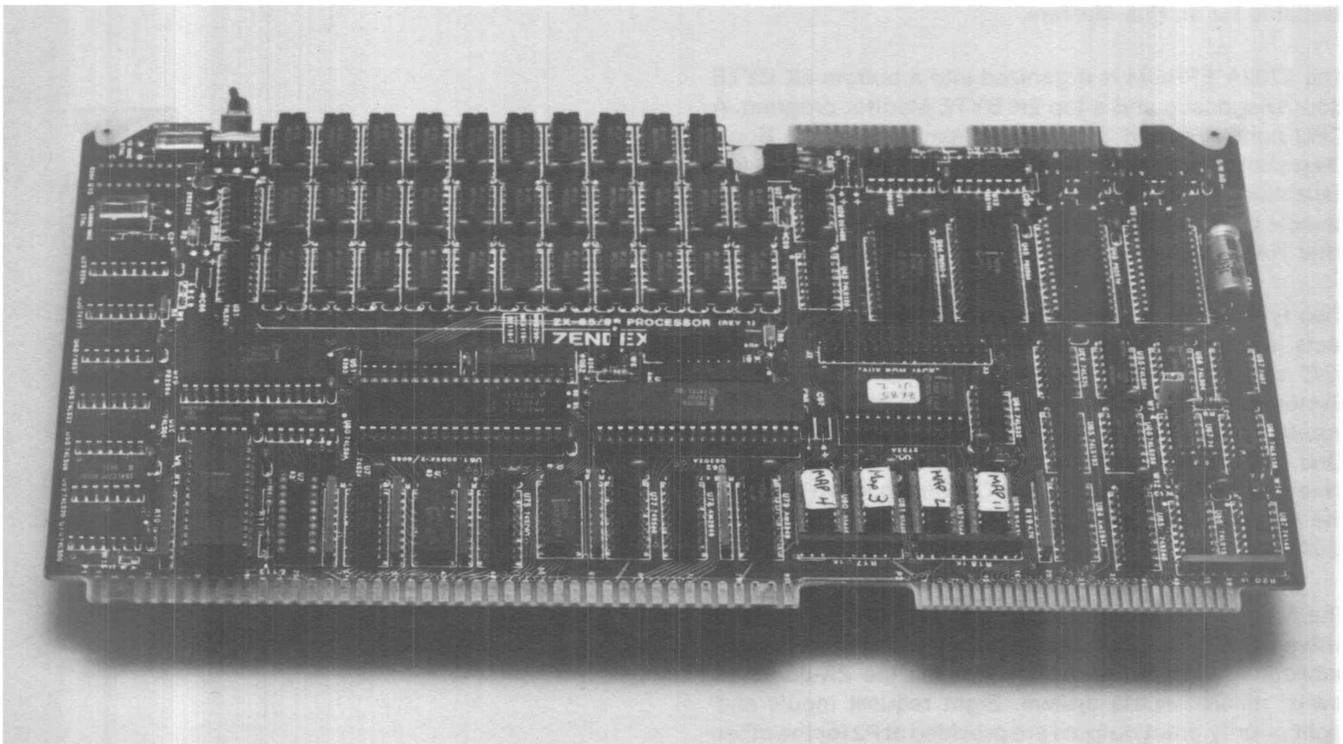


ZX-85 & ZX-88 PROCESSOR BOARDS

- 8085A-2 or 8088 CPU
- 64K BYTES of Dynamic RAM
- Two RS-232 Channels
- 8219 MULTIBUS Arbitrator
- MDS IPB-80, IPC-85 Compatible
- 5 MHz Internal CPU Operation
- MULTIBUS Compatible
- Boot/Monitor on a 2732A EPROM
- Two 8259A PIC's
- Run Standard MDS DOS Software

-
- ZX-85 and ZX-200 Form a Minimal Development System •
-

This Zendex offering in two versions with different CPU's as the ZX-85 and ZX-88 Microcomputer Boards support various standard Disk Operating Systems (DOS). The ZX-85 uses the 8085AH-2 CPU for execution of 8-bit code (MDS compatible) while the ZX-88 uses the 8088 CPU for execution of 8086 code over the 8-bit system MULTIBUS. The ZX-85/88 has an on-board complement of 64K BYTES of Dynamic RAM fully mapped into the first segment of the 1M BYTE range. Also provided as part of the on-board memory is a 4K BYTE 2732A EPROM shadowed in for a 2K BYTE Boot and a 2K BYTE Monitor. The programs on the EPROM are in the appropriate code for either the 8085 or 8088. The boards include two serial IO channels, three timers and two priority interrupt controllers. Each board presents two RS-232 interfaces to edge connectors opposite the MULTIBUS edge.



Functional Description:

Changeover from one CPU type to the other is easily accomplished through the use of four row sockets provided for the CPU chips. Other devices that must be removed, installed, or changed to complete the switchover have sockets installed.

The 8088 CPU version (ZX-88) has the circuitry installed to provide for the full 1M BYTE addressing capability of the MULTIBUS. Both CPU versions (ZX-85, ZX-88) have on-board clocking circuits to provide the 5 MHz maximum internal clocks.

The ZX-85/88 Processors are intended for use in a standard SBC System and are therefore configured on 6.75" x 12.00" circuit cards. The ZX-85 may however be run in the IPB slot of a Series II MDS Chassis for an overall speed improvement. The ZX-85/88 do not implement the interrupt push-buttons and displays found on the Intel IPB boards and do not have the attendant extension to the front panel. The user may generate these interrupts directly on the MULTIBUS with the appropriate switches mounted on this panel and associated logic. A Zendex ZX-903 may prove helpful in this regard. RS-232, IOC and PIO interfaces are pinned alike with the IPB for connection at the auxiliary connector P2 that faces the MULTIBUS. Opposite the MULTIBUS are two 26-pin edge connectors for user serial RS-232 that repeat the serial lines at P2.

The on-board 64K BYTE RAM is implemented as 64K x 8 bits. A negative 5 volt regulator for the type 4116 RAMS uses the -12V source as a supply. An Intel 8202A Dynamic RAM Controller simplifies the Dynamic RAM use and it provides refresh and arbitration functions. The RAM Block resides on the MULTIBUS as a slave unit and is available for all Bus-Masters.

The 2732A EPROM is organized into a bottom 2K BYTE Boot/Diagnostic and a top 2K BYTE Monitor program. A CPU control circuit in the IO system enables the Boot/Diagnostic portion at the reset address after system initialization. Later execution of a control sequence will disable the Boot portion of EPROM addresses, and thereafter RAM will exist at that location.

Two type 8259A Interrupt Controllers are used. One collects interrupts from on-board IO sources and PIO and IOC sources and then presents these to "INT 7" of the System Interrupt Controller. The system PIC has all of its inputs connected to the MULTIBUS Interrupt System. One of three timers within an 8253 Timer provides a real time clock interrupt to the IO PIC. The other two timers in the 8253 provide Serial Baud Rate Clocks to the 8251A USART's.

The MULTIBUS arbitration for the CPU is implemented with an Intel 8219 Controller. An on-board parallel priority network with input/output at P2 maps the ZX-85/88 as lowest master in the system. Eight request inputs and eight priority grant outputs are provided at P2 for the other masters in the system.

At connector P2 all the signals for the PIO (Parallel IO) and IOC (IO Controller) are provided along with partially decoded controls. A separate IOC board would provide interfaces to a built-in CRT, keyboard, and single diskette drive. A separate PIO board connected to P2 should provide Serial RS-232 connectors, PROM Programmer, Line Printer, and TTY interface circuitry. Zendex makes a PIO board under model number ZX-904.

The user may select to use the two RS-232 interfaces at J1 and J3 directly. The functions for PROM programming and diskette systems may be implemented on the MULTIBUS with such products of Zendex as the ZX-908 Programmer and ZX-710/720 Diskette System.

The Boot/Monitor program in the 2732A EPROM detects whether or not Zendex MULTIBUS boards are installed for the PROM programming and diskette functions and will steer data accordingly. User serial IO console detection is accomplished by typing a space bar at the terminal destined to be the console after reset. A reset switch is provided on the ZX-85/88 for manual system initialization.

Compatible software for the ZX-85 includes Intel ISIS-II, and CP/M.

Software compatible with ZX-88 includes CP/M-86 & MP/M-86 from Digital Research, CBasic-86 from Compiler Systems, and Wordmaster and Wordstar-86 from Micropro International.

SPECIFICATIONS

CPU	Intel 8085AH-2(ZX-85) or 8088(ZX-88)
Word Size	
Address	16/20-bits ZX-85/ZX-88
Data	8-bits
Instruction	8, 16, 24, 32, bits
Cycle Time	Basic Instruction - 800 nS
System Clock	19.6608 MHz (Crystal derived)

Memory Addressing

On-Board ROM/EPROM	O-7FFH Shadow
	E800-EFFF, F800-FFFF (ZX-85)
On-Board RAM	O-F7FF
	(OF800H-OFFFFH permanently shadowed)
	by Monitor EPROM in ZX-85)
ZX-88 RAM	64K BYTES locatable in segments
	0,1,2, or 3

Memory Capacity

On-Board ROM/EPROM	4K BYTES (2732A)
On-Board RAM	64K BYTES
Off-Board Expansion	Up to 1M BYTES for ZX-88 (8088 Mode)

IO Addressing:

PORT	8253 TIMER				8251A		8251A		EXT PIO		8259A		8259A		CPU CONTROL
	0	1	2	C/S	DAT	C/S	DAT	C/S	DAT	C/S	A	B	A	B	
ADDRESS	FO	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FF

Ports CO-C5 and F8-F9 accessed through the 60-pin auxiliary connector P2.

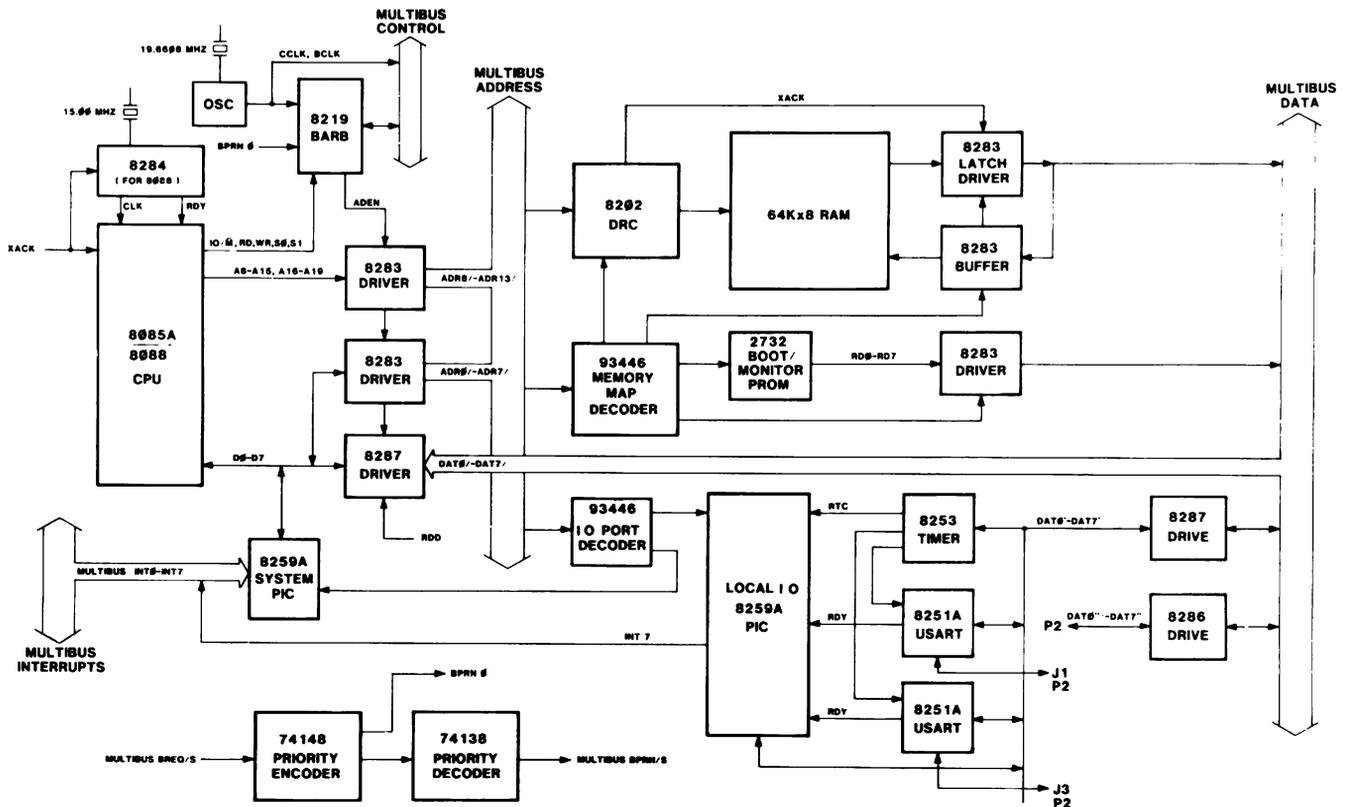


FIG. 2: ZX-85/88 PROCESSOR BLOCK DIAGRAM

Serial Baud Rate

Frequency (Programmable) Kilohertz	Baud Rate		
	Synchronous	Asynchronous Program Select	
		÷ 16	÷ 64
307.2	_____	19200	4800
153.6	_____	9600	2400
76.8	_____	4800	1200
38.4	38400	2400	600
19.2	19200	1200	300
9.6	9600	600	150
7.04	7040	_____	110
4.8	4800	300	75

Serial IO Modes

Synchronous 5-8 bit characters with internal or external synch jumper selectable. Auto synch.

Asynchronous 5-8 bit characters, BRK generation, 1, 1½, 2 bit stop.

Interrupts Single level to RST 7 on 8259A master over MULTIBUS from 8259A slave. I.D. available from slave 8259A on-poll to detect which 8251A and T/R.

Optional Order Numbers

Kit-85 Changeover Kit to Convert ZX-88 to ZX-85

Kit-88 Kit to Change ZX-85 to ZX-88

Interfaces

MULTIBUS	All signals TTL (P1-P2)
Serial IO	RS232C to J1, J3, P2
Interrupt	TTL Active Low, 8 levels
Memory Expansion	J2, CPU Bus

Physical

Width - 12.00 inches (30.48 cm)
 Length - 6.75 inches (17.15 cm)
 Thickness - 0.50 inches (1.27 cm)
 Weight - 18 oz. (622.8 gm)

MULTIBUS Drive Tri-state TTL 32 ma sink

Environmental 0°C to 55°C
 5-95% R.H.
 (no condensation)

Power Requirements

+5V ±5% 2.25 Amps Typ.
 +12V ±5% 0.09 Amps Typ.
 -12V ±5% 0.01 Amps Typ.

(All include manual)

Ordering Information

Number	Description
ZX-85	Processor Board with 8085AH-2 CPU and Monitor
ZX-88	Processor Board with 8088 CPU and Monitor

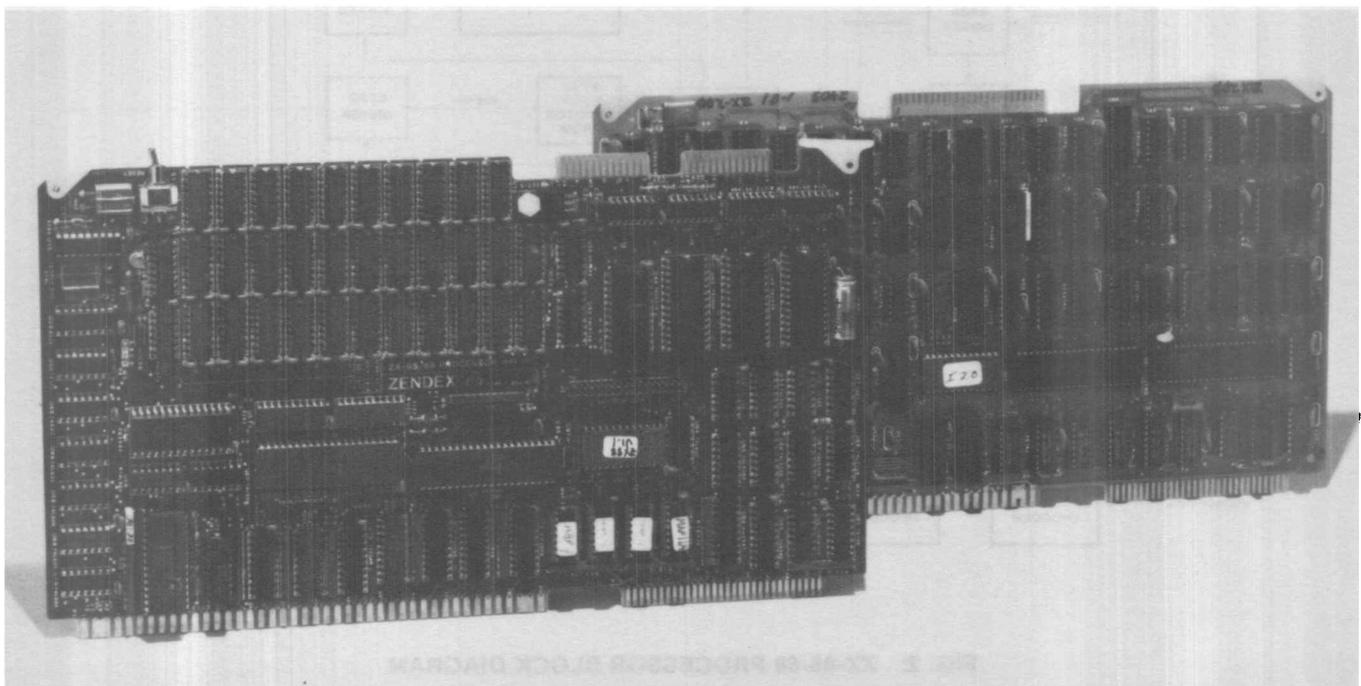


FIG. 3: ZX-88 with ZX-200 DISK CONTROLLER



ZX-028B 128K BYTE RAM CARD

- 8/16 BIT DATA TRANSFERS
- SWITCH ENABLE OF ANY 32K BLOCK IN 128K
- BYTE SWAPPING LOGIC FOR COMPATIBILITY WITH 8086 SYSTEMS
- READ/WRITE DATA BUFFERS
- MULTIBUS COMPATIBLE
- ON-BOARD HARDWARE REFRESH CONTROLLER (8202A OR 8203)

The Zendex ZX-028 is a member of Zendex's line of Intel MULTIBUS Compatible Products. The ZX-028 Board interfaces directly to any SBC-80 or SBC-86 Computer via the MULTIBUS Interface. The RAM Card is available populated with 128K BYTES. READ/WRITE Buffers on each board buffer all data written into or read from the memory array. The ZX-028 responds to the full 20-bit address and will transfer either 8 or 16 bits parallel data automatically. The memory inhibit feature is implemented with the INH1/signal.

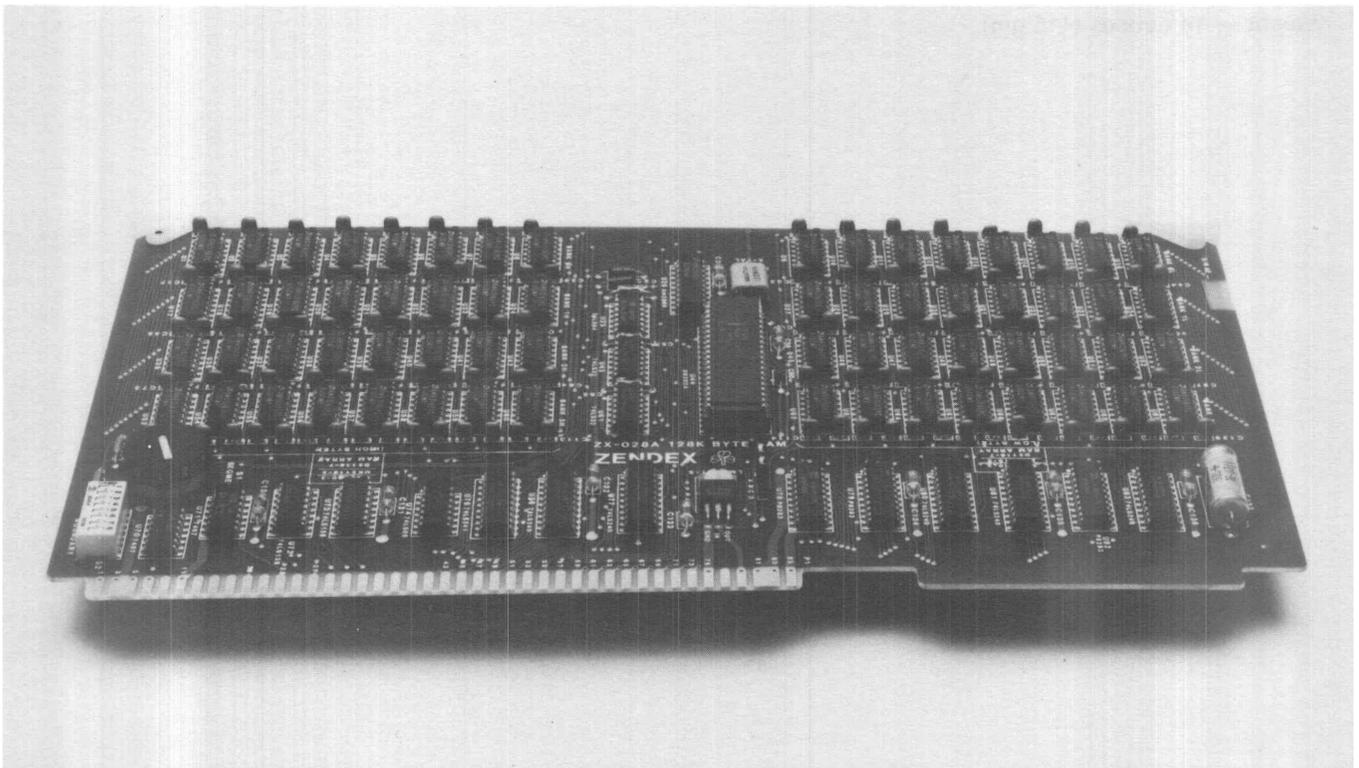


FIG. 1: Fully Populated ZX-028B

SPECIFICATIONS

Word Size — 8/16 bits

Memory Size OK, 32K, 64K, 96K, 128K Bytes Selectable by S1

Access Time — 414 nS (max)

Cycle Times —

Read Cycle — 489 nS max

Write Cycle — 489 nS max

Refresh Cycle — 489 nS max

Times measured with 24.0 MHz XTAL

Interface

All address, data, and control signals are TTL compatible and meet MULTIBUS specifications. BHEN/, ADRO/, and INH1/ Functions are fully implemented.

Address Selection

Switch selection for independent 32K byte blocks located in 128K Block.
Switch location of 128K Block in 1M Range on 128K Boundaries.
Full 20-Bit Addressing

Physical Characteristics

Width — 12.00 in. (30.48 cm)
Height — 6.75 in. (17.15 cm)
Depth — 0.50 in. (1.27 cm)
Weight — 14 ounces (415 gm)

Standard RAM Devices

MM 5290-3 National or
MK 4116-3 Mostek
or Equal

Power Requirement (Typ. fully loaded)

+5 Volts $\pm 5\%$ @ 0.60 Amps
+12 Volts $\pm 5\%$ @ 0.1 Amps
-12 Volts $\pm 5\%$ @ 0.001 Amps

Ordering Information

Number	Description
ZX-028B	128K Byte Ram Card (Includes Manual.)



ZX-200A SINGLE BOARD DISKETTE CONTROLLER

- **MEDIA COMPATIBLE INTEL SINGLE/
DOUBLE DENSITY FORMATS**
- **UPGRADE INTELLEC TO DOUBLE
DENSITY INTEL FORMAT**
- **DIRECT SHUGART SA801 INTERFACE**
- **PERFECT IN COMBINATION WITH ZX-85
FOR AN ECONOMY DEVELOPMENT
SYSTEM THAT'S INTEL COMPATIBLE**
- **REPLACES BOTH SBC-201
(PORT 88H) AND SBC-202 (PORT 78H)**
- **ISIS-II, RMX COMPATIBLE**
- **CONTINUE TO USE INTEL SINGLE
DENSITY LIBRARY ON HAND**
- **5 VOLT ONLY POWER REQUIREMENT**
- **SECONDED SOURCED BOARD
PRODUCT**

The Zendex ZX-200 Diskette Controller is a one board solution to running Intel's single and double density media on an Intellec MDS or SBC system. The hardware interface to the computer meets the Multibus specification and the software protocol required of the host allows use of unmodified ISIS-II disk operating software in the MDS or RMX software in SBC systems.

The FDD Interface is pinned alike with Shugart's SA800 Series and this allows the use of inexpensive ribbon connector systems. Up to four diskette drives may be operated over the single FDD Interface.

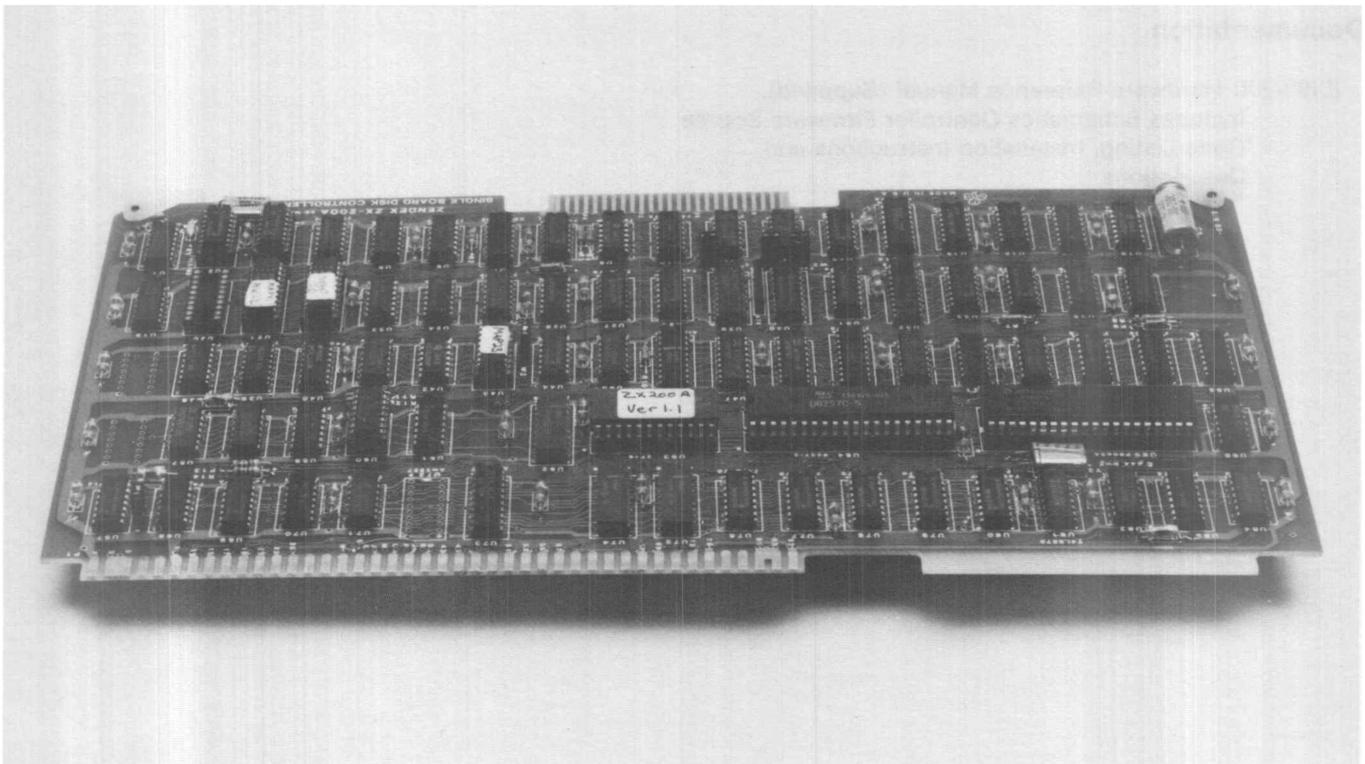


FIG. 1: ZX-200A CONTROLLER BOARD

The ZX-200 supports up to four drives, single sided 8" only. All four drives will play double density format while the first two only will play the single density format. The selection, by the host CPU, of which drive is to respond in what density is controlled by the selection of logical device names. Use of F0, F1, F2 or F3 results in double density operation to physical drives 0, 1, 2 and 3, respectively. By using logical device names, F4 and F5, the operation will be single density to physical drives 0 and 1, respectively.

The ZX-200 Controller maps into IO Ports 78H-7FH and 88H-8FH. The disk operation descriptor is placed in a 7-10 byte block of host memory called the IOPB. The host then outputs the address of the IOPB to a pair of ports on the ZX-200. The ZX-200 then fetches the IOPB constructed by the host and performs the operation described in the IOPB. When the task is complete the ZX-200 can issue an interrupt to signal the host that the result information is available. Performing a port input by the host will return result information over the data bus. The ZX-200 appears to a Multibus system as an SBC-202 addressed at 78H (system) and an SBC-201 addressed at 88H (add-on).

The ZX-200 uses TTL random logic for FDD Interface and format control and 8085A CPU for control, a 2716 EPROM and an 8257 DMA Controller.

SPECIFICATIONS

Electrical

Power — 5 Volts @ 1.0 Amps (Typical)
Transfer Rate — 250K, 500K
Data Bus — 8 Bit Parallel
IO Address — 8 Bit Parallel
MEM Addressing — 16 Bit Parallel
Master Modes — Multibus Slave or Master

Physical

Height — 6.75 Inches
Width — 12.00 Inches
Thickness — 0.50 Inches (Max)
Weight — 10 Ounces Net, 2 Pounds Shipping

Operating Temp — 0° to 50° C, 5 to 95% R.H.

Connectors

Bus: 86 PIN @ 0.156" Centers (Multibus)
Disk: 50 PIN @ 0.1" Centers (SA800)

Ordering Information

Number	Description
ZX-200A	Single Board Flexible Diskette Controller. (Includes Manual.)

Documentation

ZX98-200 Hardware Reference Manual (Supplied),
Includes Schematics Controller Firmware Source
Code Listing, Installation Instructions and
Descriptions



ZX-204 ECONOMICAL DISKETTE CONTROLLER

- **Single and Double Density
IBM Formats**
- **Standard and Mini FDD Interfaces**
- **Bus Arbitrator for Master
Mode Operation**
- **Digital Data Separator**
- **Write Precompensation**
- **5 Volt only Operation**
- **Direct Memory Access Controller**
- **MULTIBUS Compatible**
- **Memory-to-Memory Block
Move Latch**
- **Recommended for 5.25"
Mini-Floppy Use**

The ZX-204 is intended for use by the OEM systems designer who requires the maximum in speed and efficiency and a minimum of hardware costs in a Diskette Controller. The ZX-204 includes an integrated Floppy Disk Controller (FDC) chip, DMA Controller, Digital Data Separators, MULTIBUS Arbitration Logic, Standard and Mini FDD Interface, and MULTIBUS Interface circuits all on a standard size card that requires 5 Volts only.

The disk operation is set-up and described by IO Channel Commands and data transfers are carried out by a Direct Memory Access (DMA) Controller. The operation when complete is signaled by interrupt and the results are obtainable by further IO Channel Command executions.

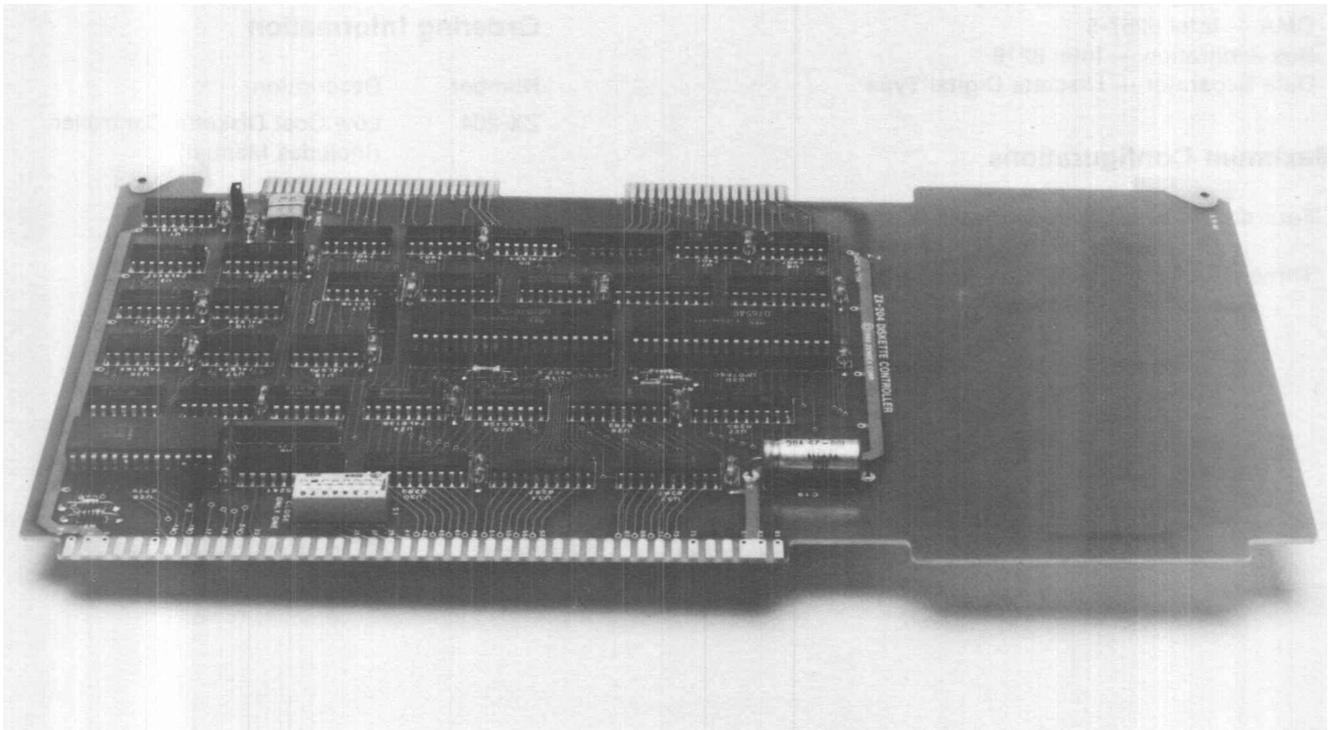


FIG. 1: ZX-204 CONTROLLER

The ZX-204 interfaces with most Standard and Mini-sized FDD's due to the programmable timing and hardware jumpers provided. Both sizes of drives are supported by individual 50 in and 34 pin card edge connector interfaces.

IBM Formats are used for soft sectored operation. Large, non-IBM, sector sizes may also be used due to the programmable specification available in the FDC.

The composite read data from the FDD is transferred through a digital data separator that requires no adjustment. Write data is precompensated by the FDC by 125 nSec early, late, or zero.

Fifteen FDC command types provide for full control of data transfer types and specification and include high speed disk to memory comparison scan commands. The disk can be scanned for comparison of one sector to a whole cylinder's worth of data to memory data.

A large blank area is left on the board for art work overlays by Zendex for customization. This area could contain a 16K x 8 Bit RAM, or a CPU and RS232 Channel.

SPECIFICATIONS

Electrical

Power — 5 Volts @ 1.0 Amps (typical)
Transfer Rate — 500K Bits/Second maximum
Data Bus — 8 bits parallel, Address — 16 bits
IO Addressing — 0-14H or 80H -94H jumper selectable
Interrupts — one of eight, selectable

Documentation

ZX98-204 Hardware Reference manual for ZX-204
Diskette Controller

Components Used

FDC — NEC 765 or Intel 8272
DMA — Intel 8257-5
Bus Arbitration — Intel 8219
Data Separator — Discrete Digital Type

Maximum Configurations

Four double or single sided, double or single density
8" Drives
Three double or single sided, double or single density
5.25" mini-drives

Physical

Height — 6.75 inches
Width — 12.00 inches
Thickness — 0.50 inches (max.)
Weight — 10 ounces net, 2 pounds shipping

Operating Temp. — 0° C to 50° C, 5 to 95% R.H.
no condensation or frost

Connectors

Bus: 86 pin @ .156" (MULTIBUS)
Disk: 34 pin @ .1" (SA800/801 pin)
34 pin @ .1" (SA400/450 pin)

Ordering Information

Number	Description
ZX-204	Low Cost Diskette Controller. (Includes Manual)



ZX-208A FLEXIBLE DISKETTE CONTROLLER

- ALTERNATE TO INTEL SBC-208
- SUPERIOR DATA RECOVERY CIRCUITRY FOR DOUBLE DENSITY RELIABILITY
- MULTI-SECTOR, MULTI-TRACK DATA OPERATIONS WITH DMA CAPABILITIES
- FEATURES POWERFUL NEC uPD 765A CHIP
- PHASE LOCK LOOP DATA SEPARATOR HAS WIDE EFFECTIVE MARGIN
- MAJOR SOFTWARE SUPPORT FOUND IN INTEL DRIVERS COMPATIBLE TO ZX-208A

The Zendex ZX-208A Flexible Diskette Controller will support a wide range of soft sector dual density drives. Up to four standard or mini drives may be accommodated by a single ZX-208A. The IBM System 34 and 3740 Data Recording Formats are handled by the ZX-208A. The user can elect to use the ZX-208A in either polled or interrupt mode and in either DMA or Non-DMA mode. A single SBX-Module connector is provided for incremental IO expansion of the user's system.

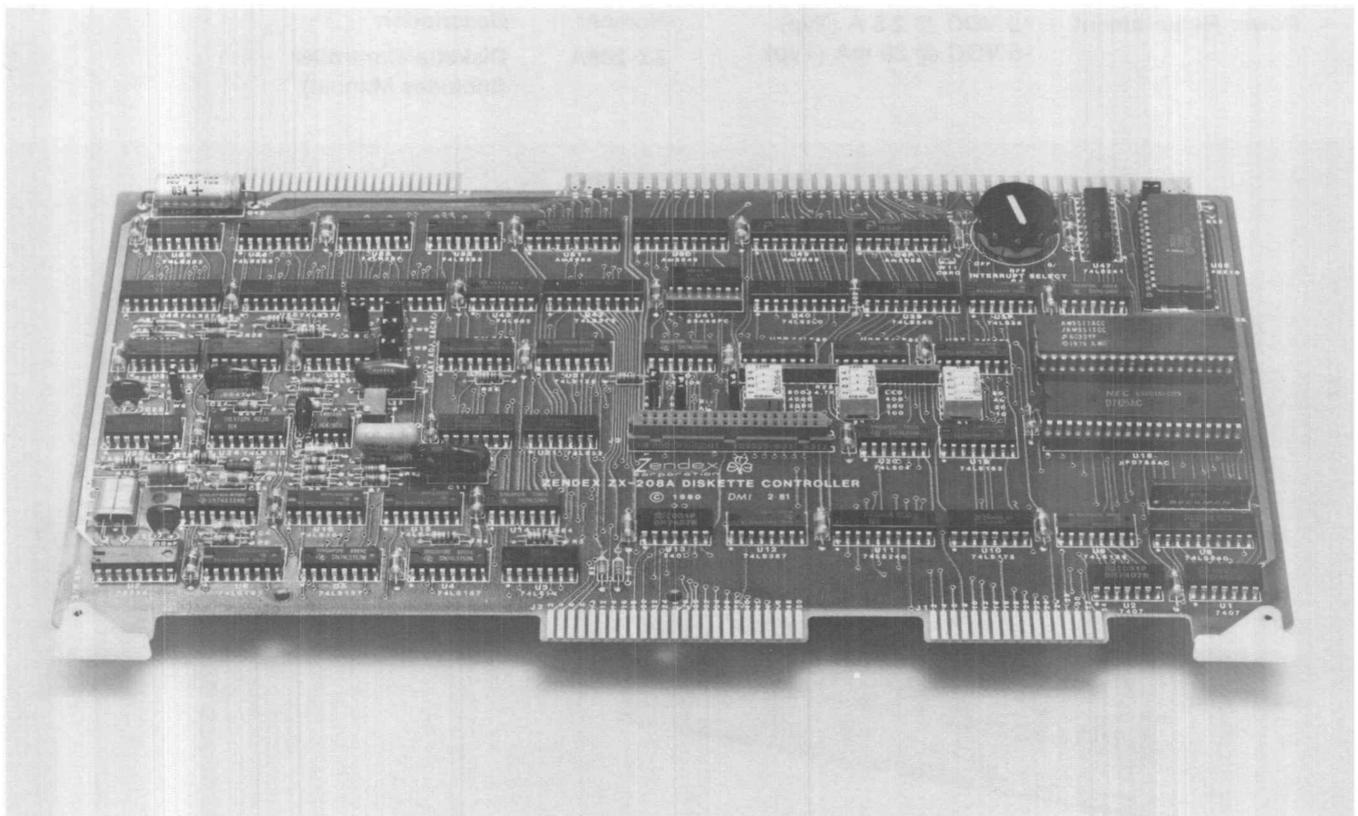


FIG. 1: ZX-208A

SPECIFICATIONS

Compatibility

CPU — Any Multibus SBC Board System
Devices — Single or Double Density Diskette Drives
Single or Double Sided, Standard or Mini-size
Compatible Drives include:

STANDARD (8")		MINI (5¼")	
Memorex	500, 550	Shugart	400, 450, 460, 410
MFE	700, 500 Series	Pertec	250, 200
Shugart	800, 801, 850, 851	Siemens	200-5, 100-5

Physical

Width — 6.75 Inches (17.15 cm)
Height — 0.5 Inches (1.27 cm)
Length — 12.0 Inches (30.5 cm)
Shipping Weight — 2 Pounds

Environmental

Temp — 0° to 55°C (Operating) — 55C to 85°C (Storage)
Humidity — Up to 90% R.H. Without Condensation

Electrical

Power Requirement — +5 VDC @ 2.5 A (Typ)
-5 VDC @ 20 mA (Typ)

Ordering Information

Number	Description
ZX-208A	Diskette Controller (Includes Manual)



FIG. 2: ZX-708 SYSTEM INCLUDES ZX-208A



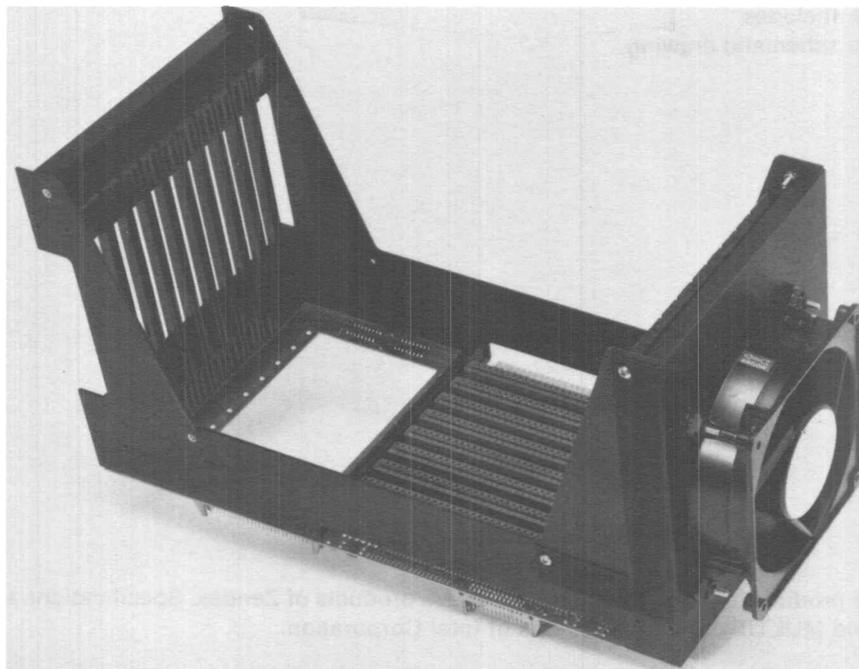
ZX-609 MULTIBUS™ 9-SLOT CARDCAGE

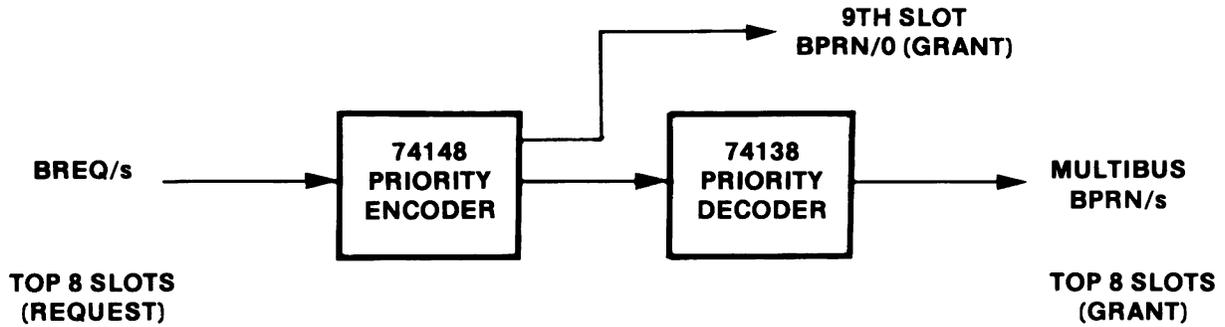
- **High Performance Versatile MULTIBUS™ Backplane and Cardcase Unit**
- **On-board Parallel Priority Network Resolves MULTIBUS™ Master Access Contention for Bus Exchanges**
- **Building-block for Economy Development System — Runs Leftover Spare Intel IPB-80 CPU or ZX-85**
- **9-Slot Capacity Compatible With MULTIBUS™ SBC Board Products Fits Standard 7-inch High System Chassis, Table-top Enclosures and RETMA Racks**
- **Clean Short Bus Wiring Geometry for Low Capacitive Loading and Immunity to Noise**
- **Supercedes Combination Intel SBC-604/614 Paired Modular 8-slot Cardcages**

The ZX-609 cardcage single unit provides housing for 9 MULTIBUS™ sized boards. Stand-alone ZX-609 is complete with bus signal termination circuits and power supply connectors. The unit may be packaged in a 7-inch high enclosure.

The unique innovation in the ZX-609 backplane consists of two sockets wired into the MULTIBUS™ to provide parallel technique, priority bus resolution using 74138/74148 DECODER/ENCODER TTL integrated circuit chips. These are removed whenever a ZX-85/88 or other SBC card is present with parallel priority resolution implemented on-board the SBC card. Serial (fixed) priority assignment schemes are effectively limited to three bus masters before the propagation delays become troublesome. The chips of the network resolver on the backplane are removed when serial techniques are employed. On-bus resolution circuitry simplifies and expands the utility of having many multimasters simultaneously on the bus.

Auxiliary connectors are provided on the backplane printed circuit board at the bottom of the cardcage. 50 lines on J11 provide for a parallel IO processor (ZX-904) capability for using CRT, line printer, TTY and UPP devices. Eight interrupt lines and reset on J12 provide for operator control via a control panel (ZX-903). DC power on J17 is designed to serve the parallel IO processor function.





ZX-609 CARDCAGE BACKPLANE

MULTIBUS PARALLEL PRIORITY RESOLUTION NETWORK

Connectors Supplied on Backplane

PIO on J11, ANSLEY 609 — 5022 MR
 INT/RESET on J12, ANSLEY 609 — 2622 MR
 DC Power on J17, MOLEX 09 — 66-1071
 (GND, -10V, -12V, +5V, GND)

Ordering Information

Part Number	Description
ZX-609B	Cardcage. Includes backplane schematic drawing.

Optional Accessories

74148/74138 TTL integrated circuits,
 (2 chips to fit Augat 516-AG110 sockets)
 Cable assemblies for connectors J11 and J12
 ZX-903 Interrupt Board
 ZX-904 Parallel IO Module
 ZX-640 Power Supply

ZX-907 BUS TRACER

- 40-BIT WIDE TRACE
- 1024 BUS CYCLES STORAGE IN ON-BOARD RAM
- ON-BOARD 8085A-2 PROCESSOR
- ADDITIONAL ON-BOARD PROM SPACE FOR PROGRAM EXPANSION
- COMPARATOR EXTERNAL OR CRT CONTROLLED ARM AND BREAK FUNCTIONS
- CRT DISPLAY AND CONTROL
- BREAKPOINT CAN BE SET ON ADDRESS +, <, >
- 8 OR 16 BIT PROCESSOR COMPATIBILITY
- USER FRIENDLY PROMPTING
- LIKE THE ZX-906 BUT PROVIDES TRACE DATA

The ZX-907 is a single board Multibus module which can trace up to 1024 bus events prior to a presettable breakpoint. Each event is determined by monitoring 20 address, 16 data, and 4 control bits. An interpretation is then made as to the action, memory or I/O location and data for each event. The interpreted events are then displayed on a CRT. In addition, the CRT provides control for all trace functions through software prompts. ARM and RESET switches are located on the PC board. An on-board 8085A-2 processor provides intelligence for all functions and PROM sockets are available for up to 16K of user program and enhancements.

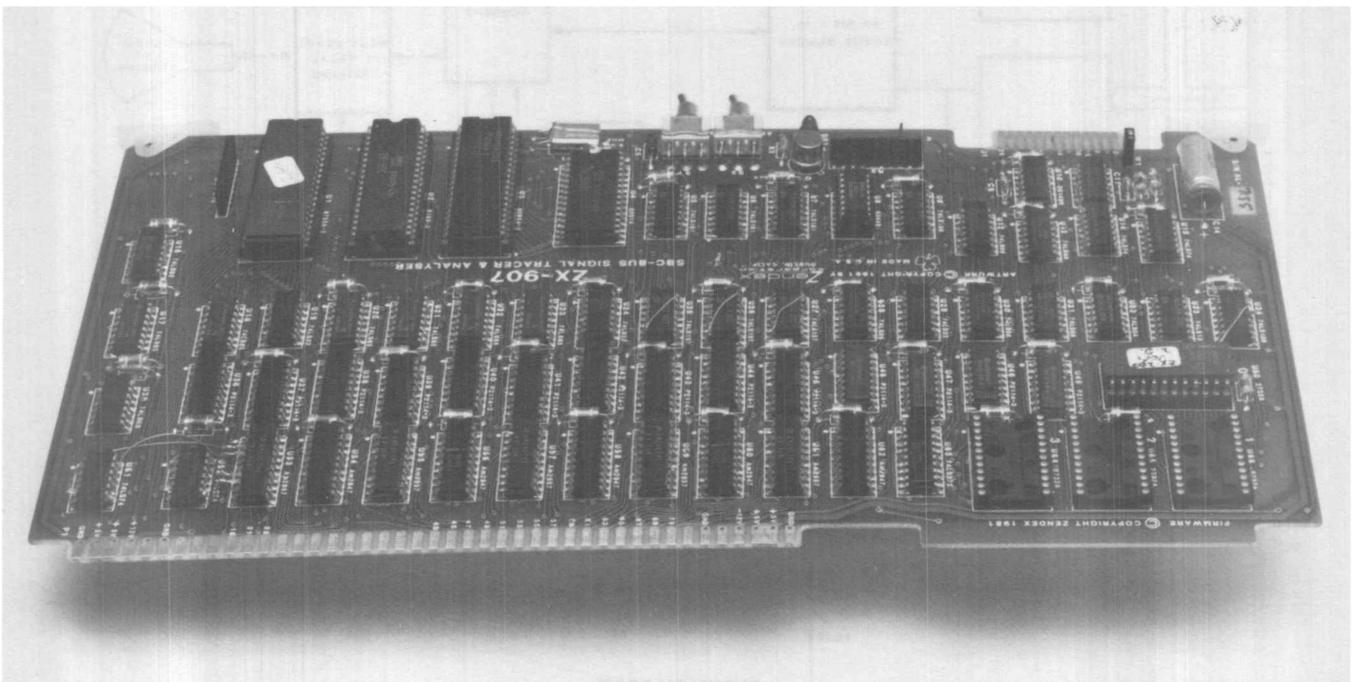


FIG. 1: ZX-907 BUS TRACER

Power Consumption

+5V @ 1.7 Amp
 -12V @ .015 Amp
 +12C @ .015 Amp

Bus Capture Speed

Less than 350 nanoseconds

Operating Temperature

0° -50° C, 5-95% R.H.

Physical

Width — 12 inches
 Length — 6.25 inches
 Thickness — 0.5 inch
 Weight — 12 ounces

CPU

Intel 8085A-2

System Clock

6.144 MHz

Interface

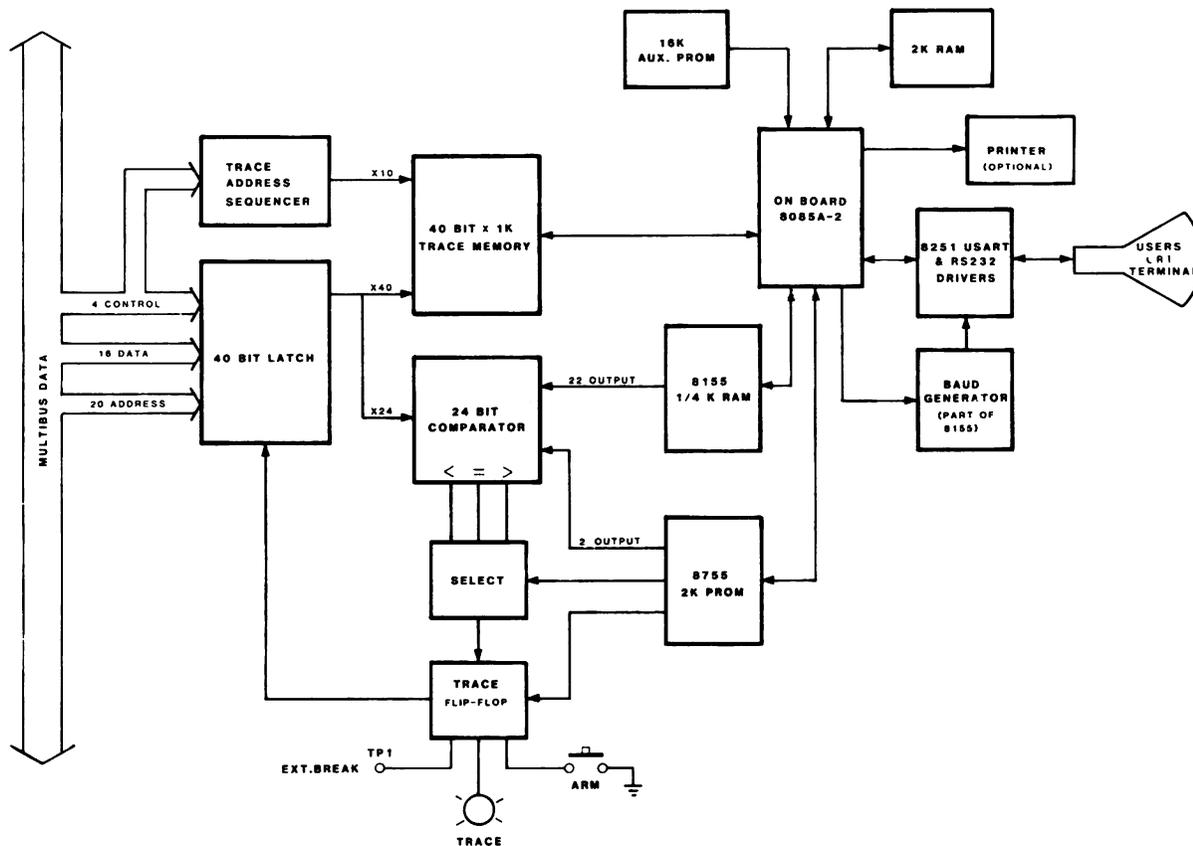
The ZX-907 can be installed in any slot in the Multibus. It is a passive listener and never can take control of the bus.

Memory

2K RAM
 2K PROM
 PROM expandable to 18K in 4K increments
 40X1K trace

Type

2114 Static and 8155
 8755
 2732A
 2114-3 static



BLOCK DIAGRAM

FIG. 2



ZX-660A SYSTEM CHASSIS

- Replacement for Intel SBC-660
- $\pm 5 \pm 12$ Volt Power Supply with 30 AMP 5 Volt
- Painted Sky Blue for Attractive System
- 110/220V. 50/60 Hz Operation
- 9-Slot Cardcase/Backplane
- Whisper Quiet Fans
- 19-inch Rack Mountable Chassis
- Pop-off Front, Top and Back Panels
- Hinged Front Panel for Easy Access

The ZX-660 System Chassis is an attractive seven-inch high chassis designed for use with Multibus compatible boards. The Chassis is finished painted sky blue and comes with rubber feet and features quiet muffin fans for use on a table top in an office environment. The ZX-660 is intended to be a more reasonably priced and configured chassis and is offered as a direct substitute to the Intel SBC-660.

The Cardcase and Power Supply may be reversed within the Chassis on the unique double-drilled bottom plate so the Multibus cards may be withdrawn through the front access. This feature can be important in testing a "racked" system. The front dress plate pops off and the control panel is hinged along the bottom and has magnetic keepers to hold the panel closed.

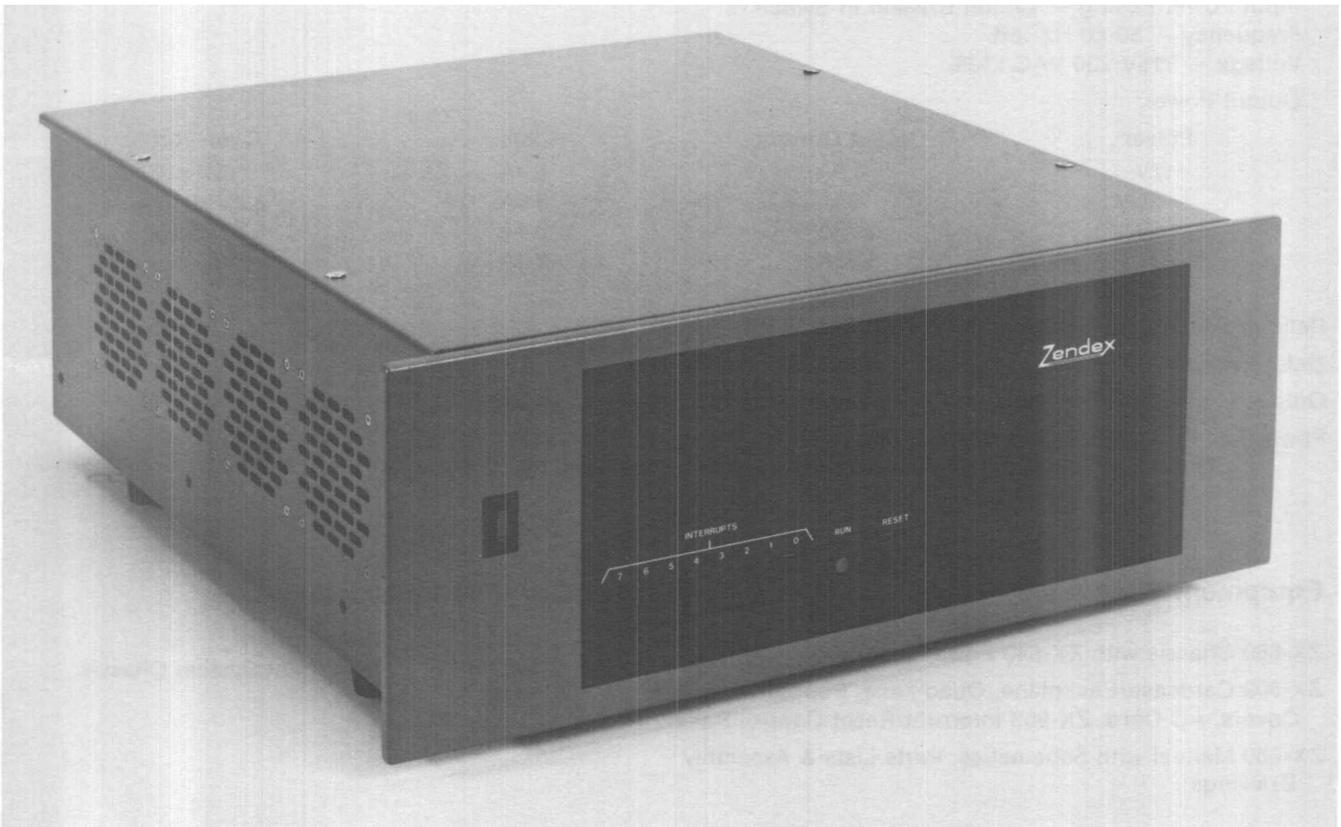


FIG. 1: ZX-660A CHASSIS

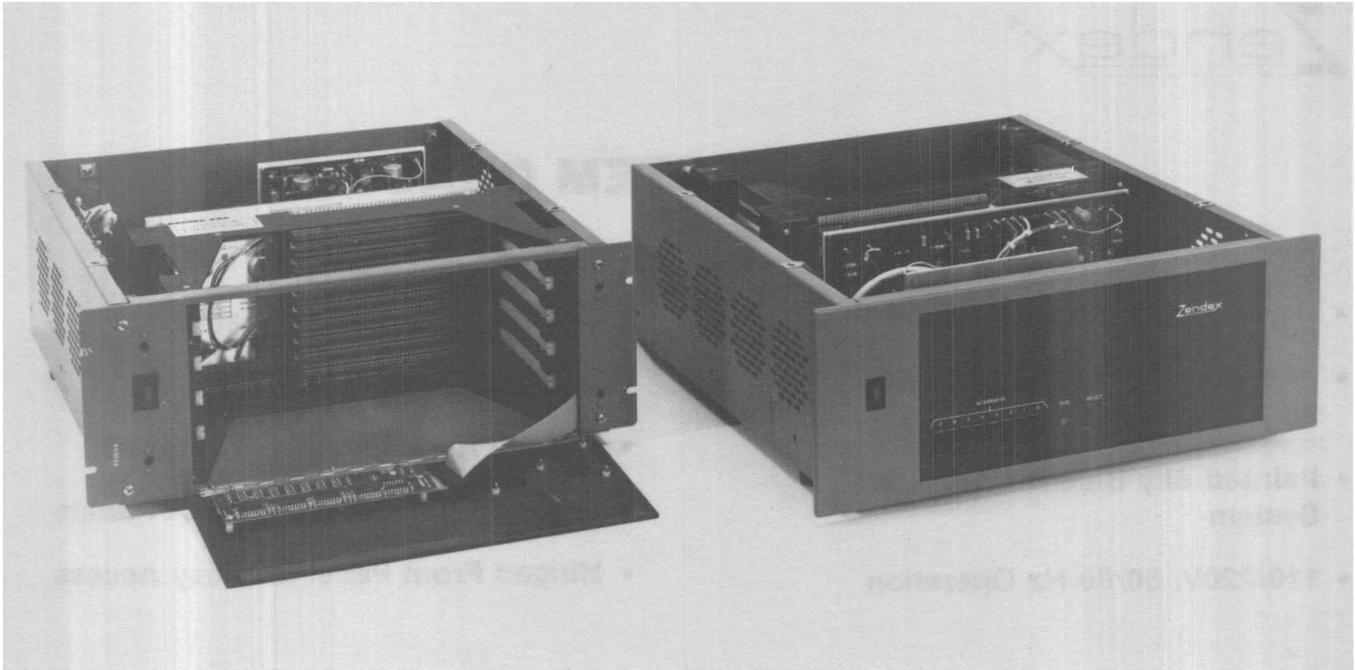


FIG. 2: Two ZX-660A CHASSIS' shown here with cardcase/power supply reversed in one. Top and front pop-off's removed for clarity.

SPECIFICATIONS

Electrical

Input Power Fusing — Circuit Breaker in Switch

Frequency — 50/60 Hz $\pm 5\%$

Voltage — 115V/230 VAC $\pm 10\%$

Output Power:

Power	Output Current	Limit	Over-Volt
+12V	4.5A	5.4A	15V $\pm 1V$
+5V	30A	3.6A	6.2V $\pm 0.4V$
-5V	1.75A	2.1A	-6.2V $\pm 0.4V$
-12V	1.75A	2.1A	-15V $\pm 1V$

Remote Sensing — Provided for +5 VDC Output

Output Ripple and Noise — 10 mV P-P max (DC-500khz)

Output Transient Response — No More Than 50mS for $\pm 50\%$ Load Change

Power Fail Detection — TTL Open Collector Signal Provided When Input Voltage Drops below 90% of Nominal. DC Voltages Remain Within 5% of Nominal for 3.0 mS After AC Low Goes True.

Equipment Supplied

- ZX-660 Chassis with ZX-640 Power Supply
- ZX-609 Cardcase/Backplane, Quad Fans, Pop-Off Covers, AC Cord, ZX-903 Interrupt/Reset Control Panel.
- ZX-660 Manual with Schematics, Parts Lists & Assembly Drawings.

Ordering Information

Part	Description
ZX-660A	Nine-Slot System Chassis



ZX-655A SYSTEM CHASSIS

- Direct Replacement for Intel SBC-655
- Quad Linear Power Supply
- 110 Vac/220 Vac 50/60 Hz Operation
- 4-Slot Cardcase
- 4 Whisper Fans for Quiet Operation
- Cards Can Be Removed Through Front or Rear

The Zendex ZX-655A chassis is an attractive 3.5" tall four-slot system box suitable for office use. The all-steel construction allows double duty in an industrial situation like 19" RETMA racks. This product features Zendex's unique innovation of double drilling the bottom plate so cardcase and power supply may be reversed by the user for cards-front or cards-rear configuration.

The linear quad supply is the ZX-635 (see data sheet) and it will power up to 14.0 AMPS on the +5V line. Each chassis is painted a rich blue (like IBM typewriters) and comes with rubber feet to protect table top surfaces.

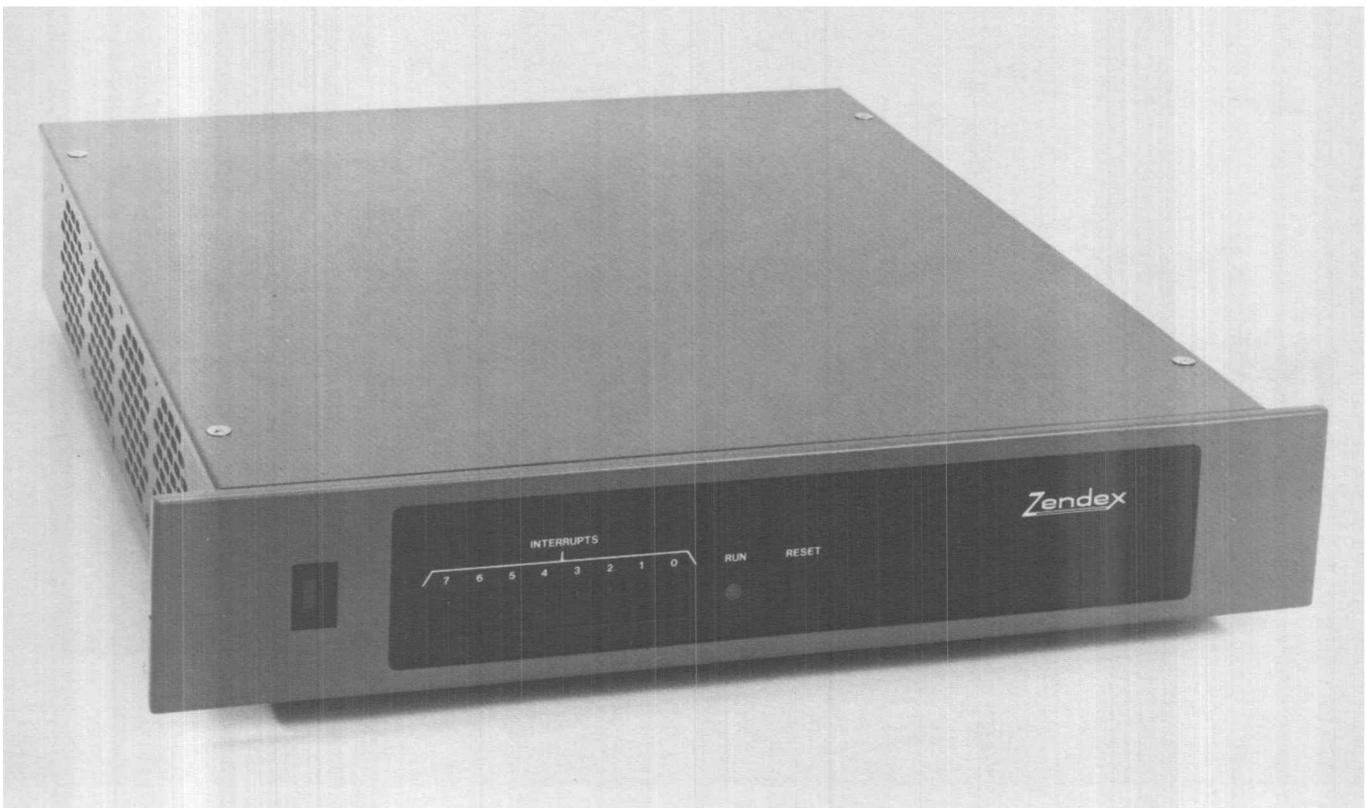


FIG. 1: ZX-655A 4 SLOT CHASSIS

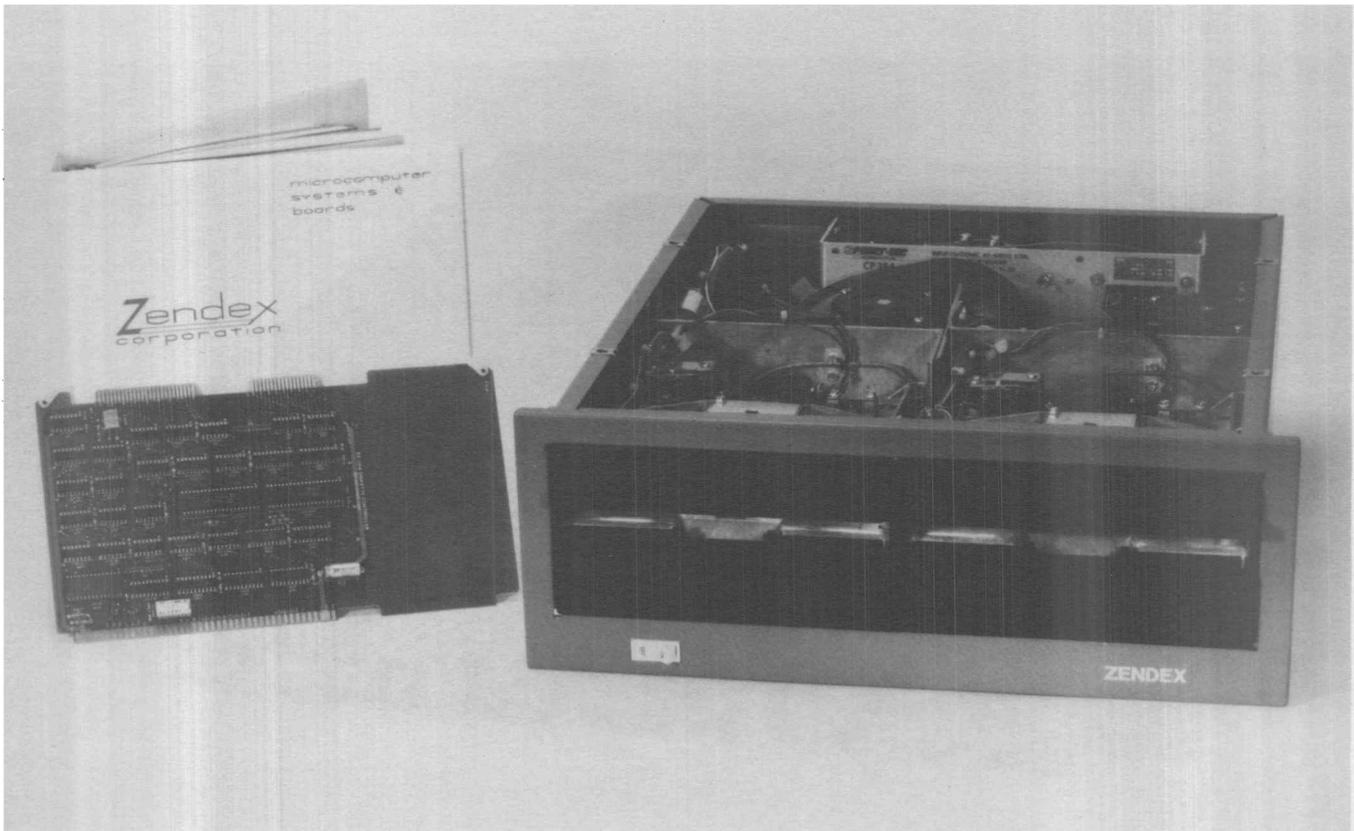


ZX-705A DISKETTE HARDWARE SYSTEM

- **Two Shugart SA801R Drives**
- **Includes Zendex ZX-204 Diskette Controller**
- **19" Rack Mountable Chassis**
- **Complete with Cables and Cord**

The ZX-705 is a complete diskette subsystem that includes the ZX-730 Dual Drive Chassis and ZX-204 Controller. The drive chassis is provided in a 16-gauge steel cabinet painted sky blue and comes with provision for slides for use in a 19" Retma rack.

The ZX-204 Controller is capable of running up to four double-sided, double density drive units. Selection of disk side, density and unit are completely under software control of the ZX-204. The Controller features an NEC 765 FDC, and 8257 DMA Controller and an 8219 Multibus Arbitration Unit.



ZX-705 DISKETTE HARDWARE SYSTEM shown with optional software



ZX-710/720 MOD 200 DISKETTE HARDWARE SYSTEM

- Full compatibility with Intel SBC-80 and MDS Multibus computers
- Direct replacement for Intel MDS-710 & MDS-720
- Controls up to four double density drives
- Two Shugart SA 801 drives provided in rack mountable chassis/cabinet
- Software support is provided in ISIS, RMS/80 and CP/M compatibility
- Data transfers performed through DMA operations
- Emulator firmware in EPROM
- Single +5VDC supply for FDC
- Uses ZX-200A Controller

The Zendex ZX-710/720 Diskette Hardware System is an intelligent, high-speed, random access bulk storage system for use in Intel compatible SBC-80, System 80, and Intellec Series I and II Computers. The ZX-710/720 is a single replacement model for the MDS-710 and MDS-720 Systems offered by Intel. The single controller board simply plugs into any MULTIBUS type back-plane.



FIG. 1: ZX-710/720 DISKETTE HARDWARE SYSTEM

Functional Description

The ZX-710/720 Diskette System provides selectable single density (FM) and double density (MMFM) access to bulk storage on floppy diskettes. The controller hardware will allow up to 4 double sided drives to be used, thus providing up to 4 million bytes of data storage. The controller is implemented with the industry standard 8085A CPU and the versatile 8257 DMAC. The controller (available separately as the ZX-200) provides an interface to the two Shugart SA801 Floppy Disk Drives (FDD) in the ZX-730 Chassis. The diskette system can record all data in Intel compatible soft-sector formats.

Controller Board

The Floppy disk Controller (FDC) is capable of controlling up to four 8" standard Disk Drives. The ZX-710/720 or just the ZX-200 FDC and your drives, can be paired with any compatible single-board computer to make a very powerful two-board, floppy disk based computer system.

With on-board CPU, Firmware, RAM, and all necessary Direct Memory Access Control (DMAC), the ZX-200 is a complete interface between the ZX-730 Drives and any MULTIBUS Single Board Computer System. The ZX-710/720 can also serve as a direct replacement for bulk storage systems in MDS-800, and Series II Development Systems.

The standard 201/202 Emulator Firmware allows the ZX-710/720 to replace the following Intel Controllers/Systems:

Single Density	Double Density
SBC-201	SBC-202
SBC-211/212	MDS-DDS
MDS-2DS	MDS-720
MDS-710	

**Selection of single or double density operating modes is made with unit selection via software. See ZX-200 Data Sheet.*

Programming Capability

IOPB Purpose — all diskette operations are initiated with simple IO commands. Once started the FDC carries on the specified function without further intervention on the part of the Host CPU. There are only three steps required of the Host CPU to complete any diskette operation:

1. The Host must prepare an IO Parameter Block (IOPB) in memory accessible by the FDC (shared main memory).
2. The Host then passes the address of the IOPB to the FDC with IO output commands.
3. The Host must process the results of the operation available with IO input commands.

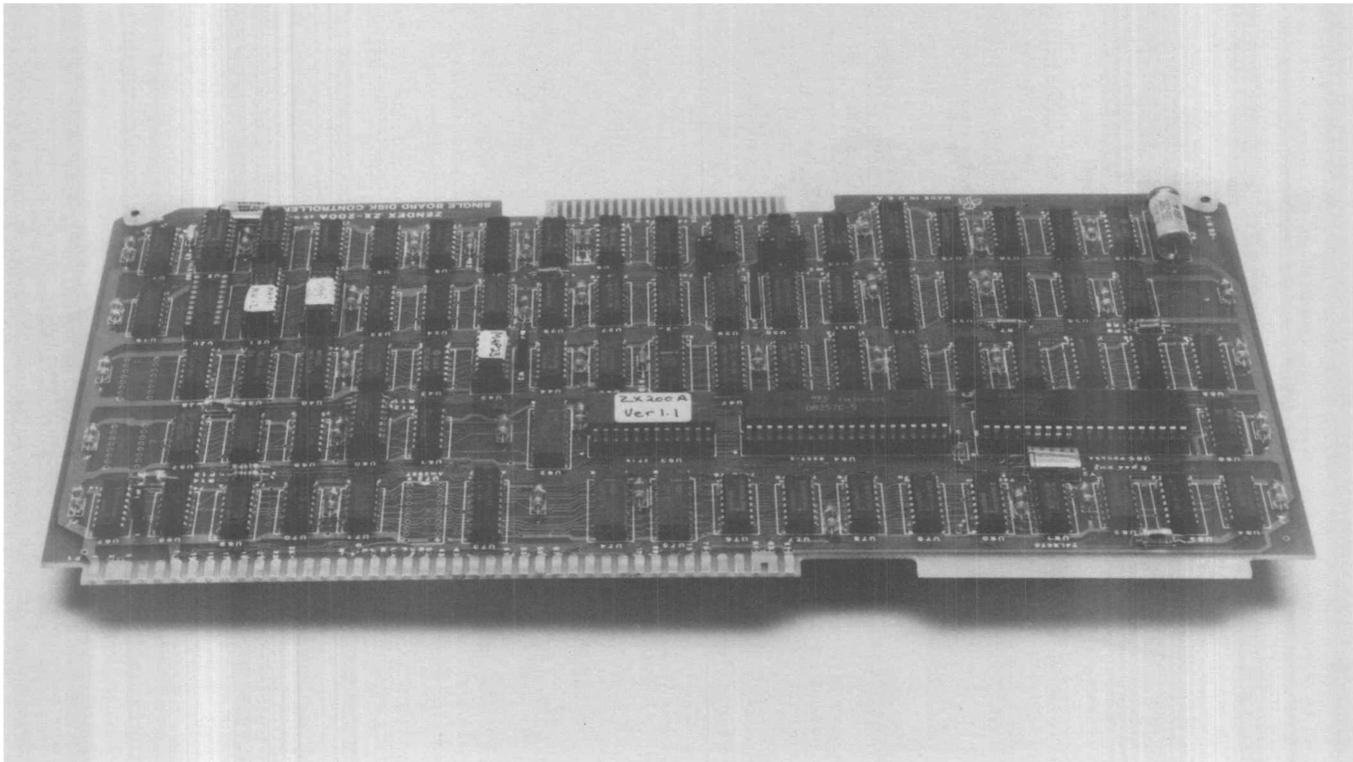


FIG. 2: ZX-200A CONTROLLER

IOPB Format — The Host CPU solely prepares the IOPB, as any block of data in memory would be prepared, following the format below:

BYTE	DESCRIPTION
1	Channel Word
2	Diskette Instruction*
3	Number of Records
4	Track Address
5	Sector Address
6	Buffer Address (lower)
7	Buffer Address (upper)
8	Block Number**
9	Next IOPB ADR (lower)**
10	Next IOPB ADR (upper)**

*The eight available instructions with 201/202 Emulator Firmware are:

BYTE 2	BITS 0-2
0	No Operation
1	Seek
2	Format
3	Recalibrate
4	Read Data
5	Verify CRC
6	Write Data
7	Write Deleted Data

**201 Mode only. Required to perform linked IOPB's.

Channel Commands — the IO Channel Commands provide the FDC with the method of assigning physical sector numbering during format, ENABLE/DISABLE interrupts, and provide FDC operation results to the Host CPU.

General Hardware

The ZX-710/720 FDC automatically polls all drive ready lines between operations. The FDC's CPU notifies the Host CPU (by interrupt) whenever a drive has gone from ready to not ready (and vice versa).

Hardware Specifications

(Floppy Disk Controller Card ZX-200)

MEDIA

- FLEXIBLE DISKETTE, 8" STANDARD
- ONE SURFACE PER DISKETTE
- 77 TRACKS PER SURFACE (8")
- 128 BYTES PER SECTOR SINGLE DENSITY AND DOUBLE DENSITY

Physical Characteristics

MOUNTING — occupies one chassis card slot

HEIGHT — 6.75 in. (171.5 mm)

DEPTH — 0.5 in. (12.7 mm)

WIDTH — 12.00 in. (304.8 mm)

WEIGHT — 14 ounces

Drives

The ZX-200 directly interfaces with the following drives. Other type may require modification or additional interface circuitry and/or software.

MANUFACTURER	8" FLOPPY DRIVES
BASF	-
Caldisk	143M
Memorex	550/552
Micropolis	-
Persci	70, 720, 288
Pertec	FD5x4, FD650
Qume	Datatrak-8
Siemens	FDD 200-8, 100-8
Shugart Assoc.	SA800, 801

Specifications

ACCESS TIME

Rotational Speed — 360 rpm

Average Latency — 83 ms

Recording Mode — FM/MMFM

Track-to-Track — 8 ms

Head Settling Time — 8 ms

Head Load Time — 35 ms

CHASSIS AND DRIVES

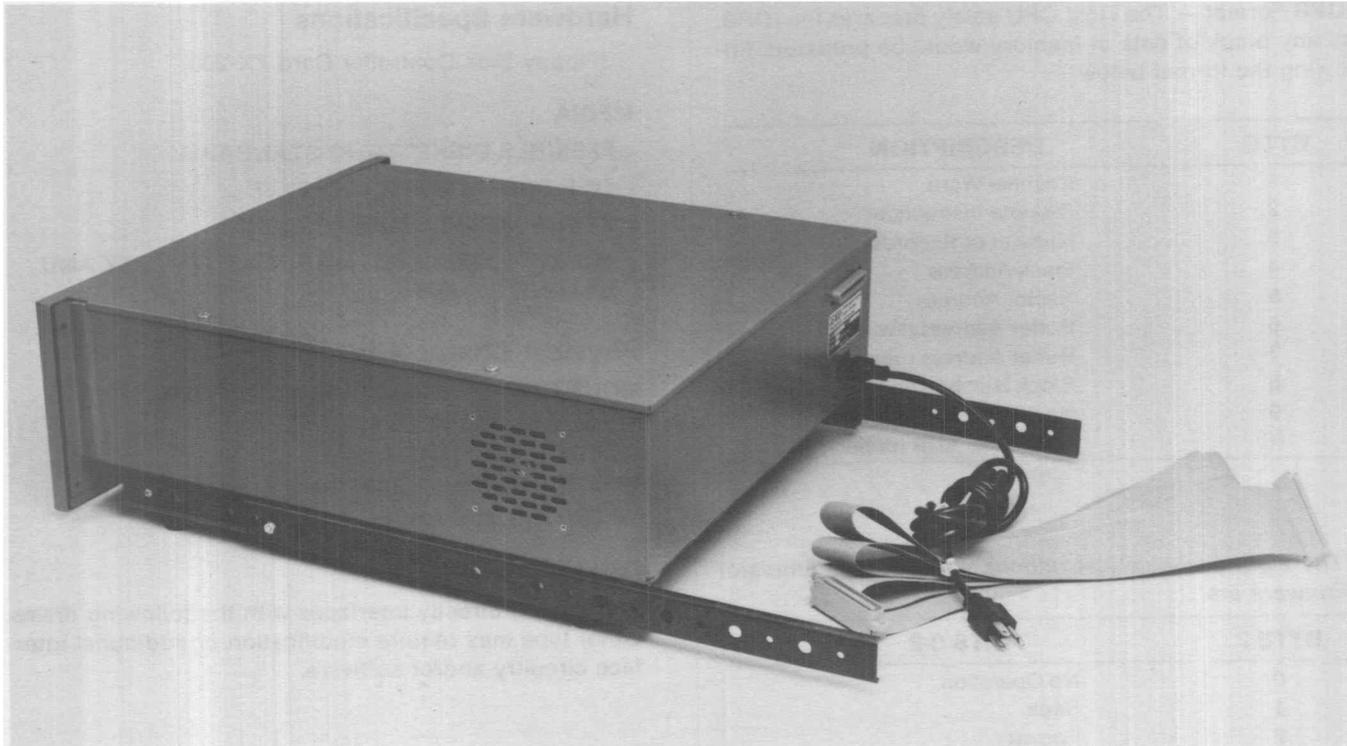
MOUNTING — Table-top or standard 19 in. RETMA cabinet

HEIGHT — 7.25 in.

DEPTH — 20.3 in.

WIDTH — 17.5 in.

WEIGHT — 56 pounds



Electrical Characteristics

CONTROLLER

DC Power Requirements: 5V @ 3.0A Typ.

CHASSIS

AC Power Requirements: 3-wire input with center conductor (earth ground) tied to chassis
Single Phase: 115/230V AC; 50-60Hz; 160W

Environmental Characteristics

MEDIA

TEMPERATURE - 15.6°C to 51.7°C operating
5°C to 55°C non-operating
HUMIDITY - 8% to 80% (wet bulb 29.4°C) operating
8% to 90% non-operating

CONTROLLER BOARD

TEMPERATURE - 0°C to 55°C non-operating
-55°C to 85°C non-operating
HUMIDITY - Up to 90% relative humidity without condensation, operating; all conditions without condensation of water or frost, non-operating

CHASSIS AND DRIVES

TEMPERATURE - 10°C to 38°C operating
-35°C to 65°C non-operating
HUMIDITY - 20% to 90% (wet bulb 26.7°C) operating
5% to 95% non-operating

Material Supplied

**ZX-710/720 DISKETTE HARDWARE SYSTEM
USERS MANUAL**

ZX-200A HARDWARE REFERENCE MANUAL
Schematics and Hardware descriptions

ZX-730 TWO DRIVE CHASSIS & CABLES

ZX-200A CONTROLLER with 201/202
Emulator Firmware

Ordering Information

Part No.	Description
ZX-710720 MOD 200	Diskette Hardware System.



ZX-740WC

10M FIXED, 10M REMOVABLE HARD DISK SYSTEM

- SA1004 10M BYTE WINCHESTER DISK DRIVE
- DTC-900 CONTROLLER (OR EQUAL)
- STEEL, RACK-MOUNT CABINET, PAINTED SKY-BLUE
- DATA PERIPHERALS LYNX DRIVE
- CONDOR FNBB-120W POWER SUPPLY
- DTC-86 MULTIBUS INTERFACE UNIT INCLUDED

The Zendex ZX-740WC is the "together" solution for the OEM who has selected the Shugart equipment for his use and requires it pre-packaged, ready to use. Zendex assembles and tests the drives and controller in its heavy-duty steel chassis and completes all wiring between. The host adaptor interface from the controller is brought out on an 8-foot ribbon cable terminated with a 50-pin edge connector. This connector then installs on the DTC MULTIBUS interface. CP/M-80 and CP/M-86 CBIOS for ZX-740WC are available. The ZX-740WC elegantly solves the backing up problem to 10M Byte fixed Winchester.

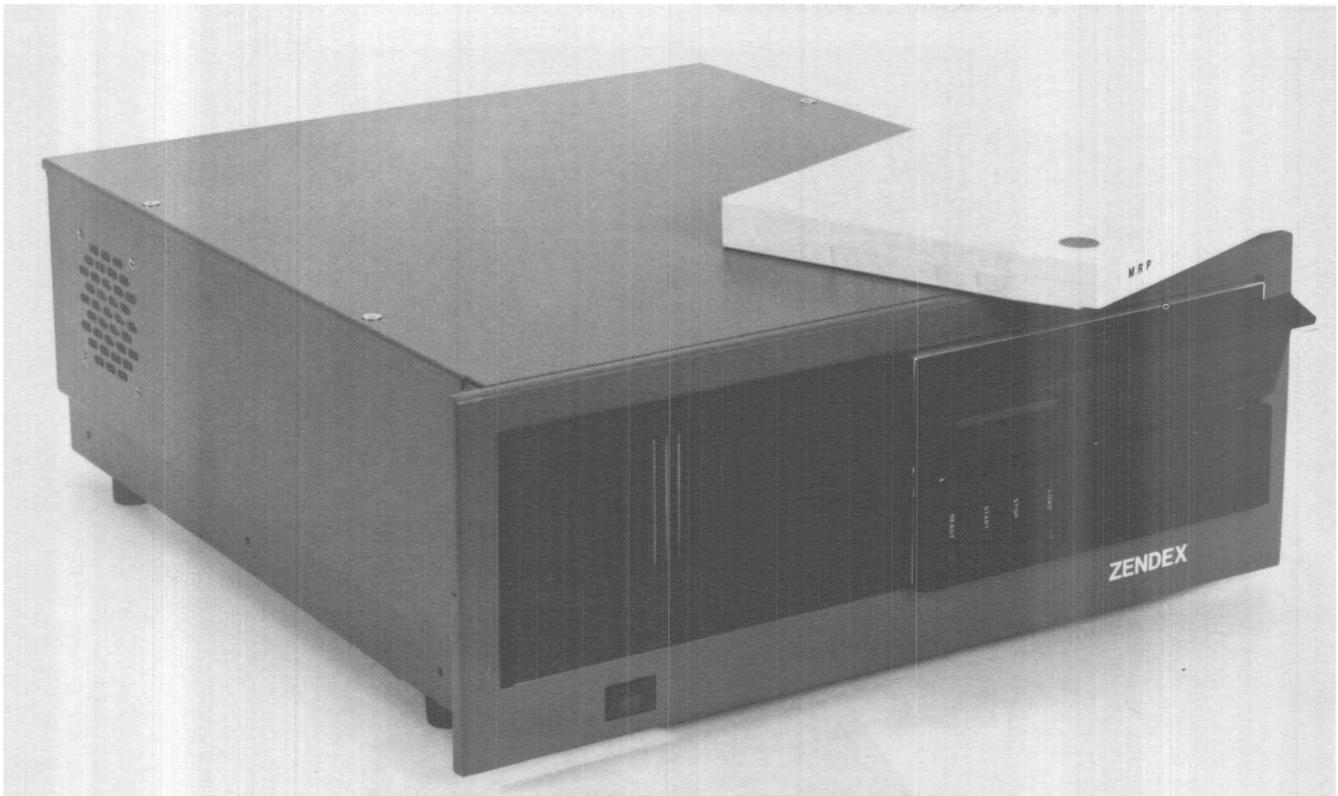


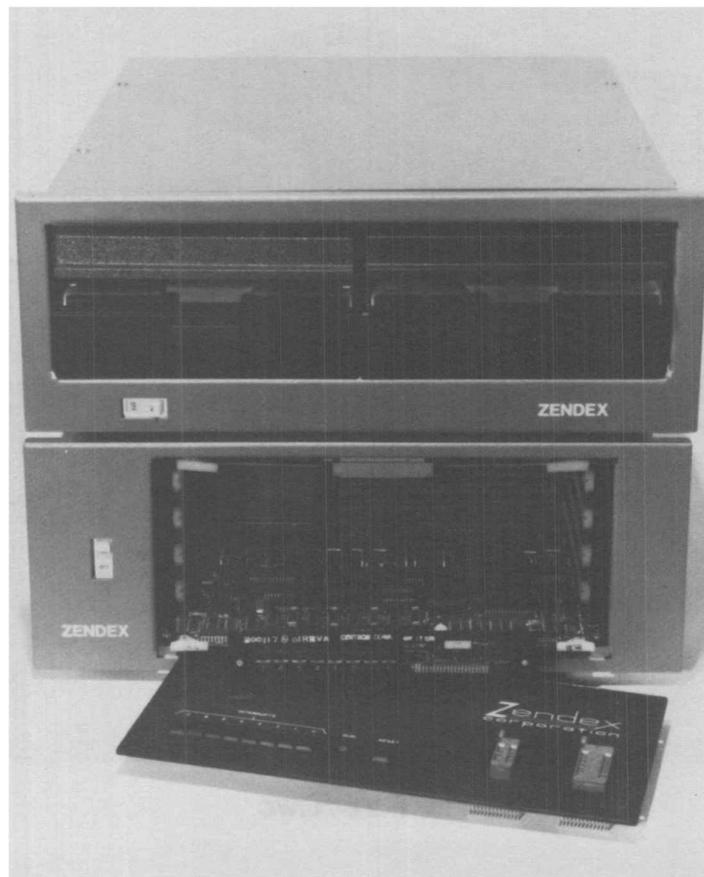
FIG. 1: ZX-740WC



MODEL 805 MICROCOMPUTER DEVELOPMENT SYSTEM

- Same as Model 835 Less an IPB CPU Card. See Model 835 Data Sheet for Complete Specs
- Easily Upgradable to MCS-86 Family With 8088 Based ZX-88 Board
- Series II Type Rear-Panel Interfaces to CRT, Line Printer, TTY and UPP. Optional PROM Programmer Sockets With CP/M & ISIS-II Utilities on Diskette Are Available
- Adds an Extra Complete Development System at a Small Fraction of the Replacement Cost — Uses Standard CRT Terminal
- Dual FD Drive System 1 MB Bulkstore in Its Own Cabinet
- Diskette Controller Operates Up To 4 Drives Over One MULTIBUS Interface Card
- Supports 8- and 16-Bit SBC Products in a 9-slot Cardcage With a Unique MULTIBUS Backplane
- Runs Various Design Aids and Diagnostic Tools, MULTIBUS Display, Tracer Analyzer and Assorted ICES, Among Others

Presents an ideal solution to the "left-over" IPB-80 CPU card and 32K byte RAM card when an Intellec Series-II has been upgraded using MDS-505, -556 or Series III to displace the original Intellec cards. Simply plug in the spare Intellec cards to work with the extra system that is fully ISIS-II *double density* compatible. Model 805 is immediately upgradable to Zendex Models 835 and 845 using Zendex add-ins and add-ons.

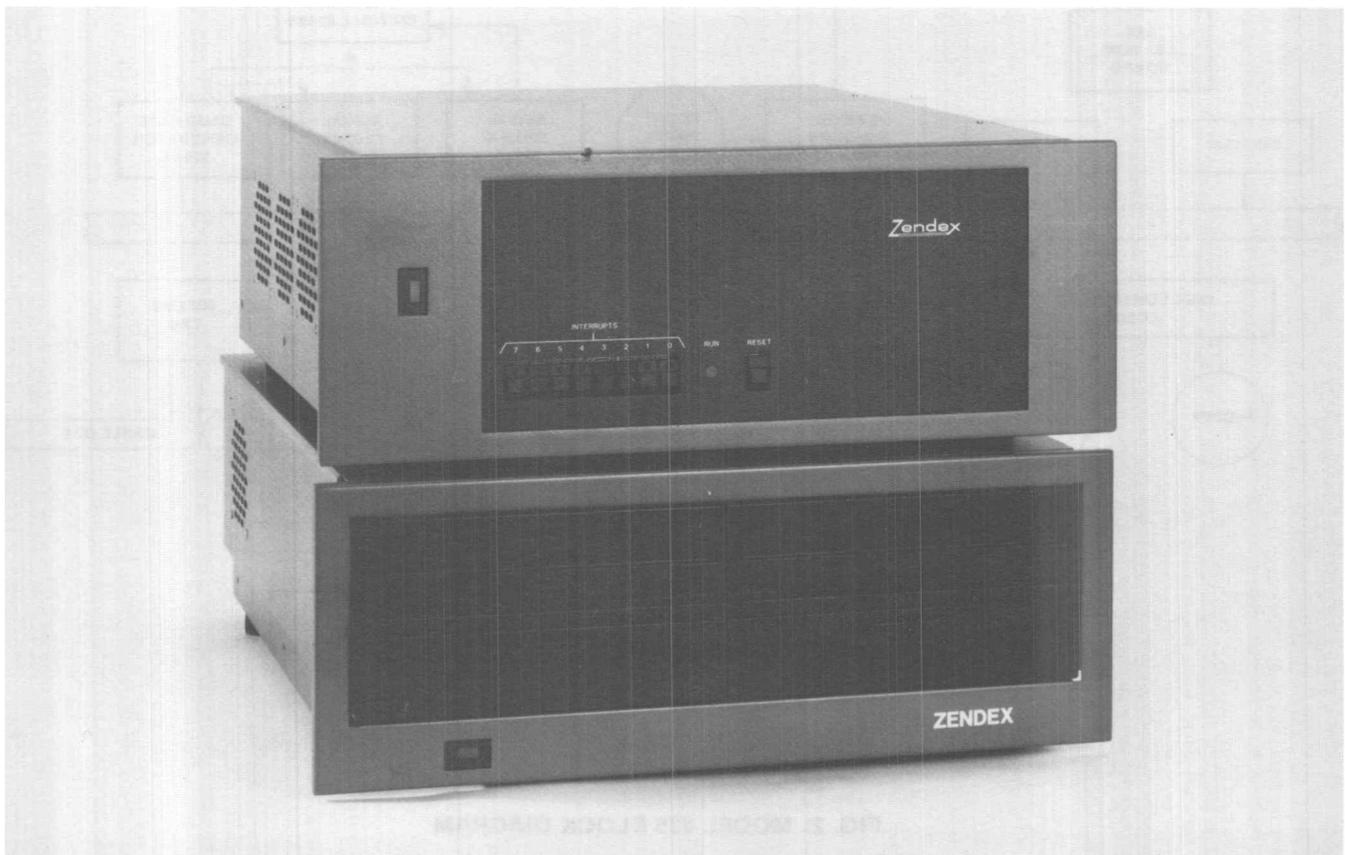


Zendex[®]

OUR BEST SELLER
IN 1981

MODEL 835 MICROCOMPUTER DEVELOPMENT SYSTEM

- Complete Microcomputer Development System Support for MCS-80 and -85 Families
- Upgradable Easily to Support MCS-86 Family With an 8088 Chip Changeover (KIT-88)
- 5 MHz Internal CPU Operation (8085AH-2) 64K Byte RAM Memory With Boot/Monitor in 4K Byte EPROM Memory On-board CPU Card
- MULTIBUS Standard Interface With a Unique and Versatile 9-slot Cardcage Backplane ZX-609
- MDS-800 Type Interfaces to CRT, Line Printer, TTY and UPP Universal PROM Programmer
- Dual Floppy Disk Drive System, 1 MB Bulk Store — Stacking Cabinet for Table Top Use or Rack Mounting
- Diskette Controller Operates up to Four Drives Over One MULTIBUS Interface Card, Compatibly With ISIS-II and CP/M Operating Systems
- Runs Compatible Design Aids and Diagnostic Tools: MULTIBUS Display Card (ZX-906), Tracer Analyzer (ZX-907) and Various In-circuit emulators and Prototyping Cards.
- Supports 8 and 16-bit SBC Products Available From 30 or More Plug-Compatible Manufacturers Building to the MULTIBUS Standard
- Uses Intel 8085AH-2 CPU Chip for Software License Compatibility.



Zendex Model 835 is a complete microcomputer development system, hardware and software compatible with Intel's Intellec Series II MDS models. Model 835 principally serves as a center to develop microcomputer-based products. The plug-compatible-manufacture hardware and software may be used interchangeably with Intellec's, particularly Models MDS-230 and -235, in expanding and upgrading systems in the field. Model 835 includes an integrated processor board, Zendex ZX-85 with a 10 MHz 8085AH-2 CPU, 64K byte RAM, 4k byte EPROM, two 8251A USARTs with RS232 compatible serial I/O ports and two 8259A interrupt controllers. The next electronics card in the 9-slot cardcage is a ZX-200 diskette drive controller, working in either FM/MMFM, single or double density Intel format; allowing software media to be exchanged with Intel for complete support. The electronics baseboards are housed in a unique ZX-609 MULTIBUS backplane and 9-slot chassis. The operator interrupt and reset control panel, ZX-903, is located on the front apron. Parallel IO interfaces for a CRT, line printer, TTY and UPP (universal PROM programmer) are mounted on the ZX-904 printed circuit board rear panel. Pop-off front, top and back panels provide easy access. Withdrawal of cards from the front has been facilitated with predrilled holes in the chassis, for reversing positions of power supply and cardcage, important when testing a rack-mounted system.

The dual, horizontally mounted, single or double density diskette drives are housed in a separate matching, stackable cabinet. One controller interfaces with up to four floppy disk drive units. Floppy disk drives and various hard disk system (10MB) options may be added in separate cabinets.

Industry standard MP/M V2.2 diskette-based operating system performs dynamic file management and fast assembly of user programs. It has many of the features and utilities found in Intellec ISIS-II DOS. Zendex provides a file transferring capability back and forth between CP/M and ISIS II. Breadth of compatible support based on CP/M includes, PL/1-80, LINK-80, PASCAL and FORTRAN higher level languages offered by Digital Research and other independent suppliers (extensive list available). Replete with software, development aids and diagnostic tools, the 835 development system is all that is required for assembling and/or compiling and debugging software and hardware for 8080/8085 microprocessor-based products. Zendex building-block system components and subsystems offer a complete range of mix and match microcomputer innovations in total systems, individual board products and in upgrading enhancements for existing MDS model development stations.

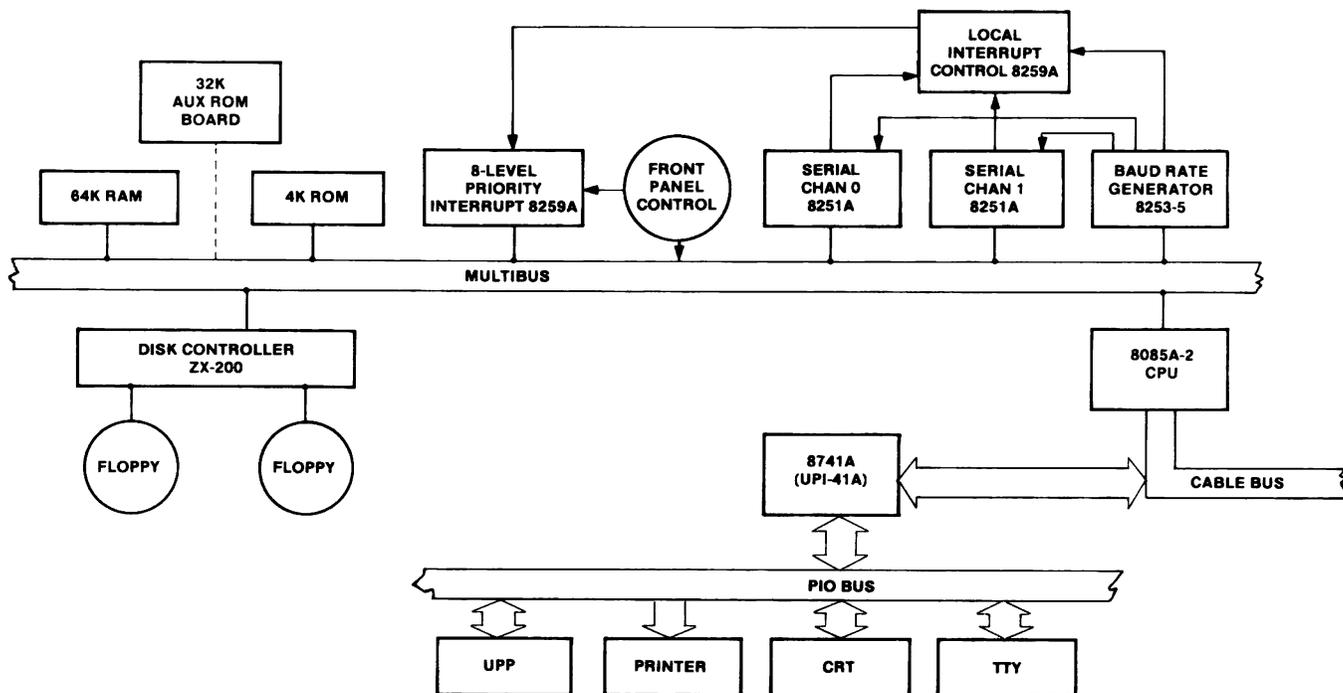


FIG. 2: MODEL 835 BLOCK DIAGRAM

FUNCTIONAL DESCRIPTION

Hardware Components

The Zendex Model 835, housed in two units, is an extremely versatile, plug-compatible-manufacture, microcomputer development system. The first cabinet houses a high performance, *multi-purpose*, MULTIBUS backplane card and chassis, with a 9-slot cardcage, power supply, fans, cables and holding three SBC-type and two auxiliary, panel mounted, printed circuit boards. Cards may be withdrawn from the front. A separate, matching and stackable chassis (with rubber feet included for table-top use) also allows easy, optional rack mounting, with predrilled holes for rack slides and all-around accessibility. This second cabinet houses the floppy disk subsystem. (Note, a ZX-200 single board diskette controller card is included in the first cabinet). Shugart SA-801 standard floppy disk drives, power supply and cables for connection to the main chassis, are included in the second cabinet. A block diagram of Model 835 is shown in Figure 2.

CPU Card — The Master host CPU card (ZX-85), integrated processor board (IPB), contains its own advanced, high performance microprocessor, memory, I/O, interrupt and bus interface circuitry. The IPB is interchangeably software transparent with Intel's IPC-85. It occupies the 9th slot of the cardcage. It resolves, multi-master parallel priority bus allocation and it services 8 level maskable interrupts.

MULTIBUS arbitration is implemented with an 8219 arbitor. The on-board, parallel priority network with input/output at P2 maps the ZX-85 CPU as the lowest master in the system. Eight request inputs and eight priority grant outputs are provided at connector P2 on the MULTIBUS for the other masters in the system.

No I/O controller (IOC), slave CPU or additional memory and control baseboards are required. As described above, a second baseboard slot in the cardcage holds the controller card for the two standard floppy disk drives.

PROM Programmer — the third card in the standard system is the ZX-909 with front panel mounted 24-pin ZIF. Sockets for programming of 2716, 2732, or 2732A type EPROMS.

Expansion — Six remaining slots in the cardcage are available for system expansion. A bus extender (ZX-957) is available from Zendex to run an SBC card in an otherwise full Model 835 chassis.

System Components

The heart of the IPB is a fast 8-bit N-channel microprocessor, the 8085AH-2 running internally at 4.98 MHz. 64K bytes of RAM memory are provided, on-board. 4K of EPROM is provided, pre-programmed with system bootstrap, diagnostic test and monitor. Both local interrupt control and the entire system 8-level, masked priority, interrupt control are implemented, each with a versatile 8259A PIC, and may be programmed by users, to meet specific expansion requirements.

Input/Output

IPB Serial Channels — Both serial I/O channels are on-

board the IPB. Each RS-232 compatible channel is implemented using an 8251A USART and interfaces to an edge connector opposite the MULTIBUS edge. Two of the timer circuits in an 8253 provide baud rate selection, asynchronously from 75 to 19,200 or synchronously from 4,800 to 38,400 baud. The third circuit in the 8253 serves as a real-time clock interrupt to the I/O PIC.

Peripheral Interface

A UPI-41A (8741A) universal peripheral interface on the ZX-904 PIO module provides the interface for standard Intel Intellec compatible peripherals, including a line printer, TTY, universal PROM programmer and CRT monitor display and ASCII keyboard combinations. Communication between the IPB and the ZX-904 PIO module is maintained over a separate 8-bit bi-directional data bus. Connectors for the four devices mentioned above are mounted externally on the rear apron. CRT display and ASCII character set, a 24 x 80 display screen with rollover and standard typewriter styling and quality keyboard combinations are suggested for use with the Model 835.

Control

Operator controls are located on the front panel, consisting of a power switch and indicator, reset switch, run light, and eight interrupt switches and indicators. The front panel circuit board is connected to the MULTIBUS allowing the eight interrupt switches to connect to the primary 8259A, as well as to the ZX-85 CPU.

Diskette System

The Model 835 provides a direct-access, bulk storage, intelligent controller with two Shugart SA-801R diskette drives. The drives are housed in a separate chassis. Each drive provides ½ million bytes of storage with a data transfer rate of 500K bits/sec. The ZX-200 controller provides an interface to the MULTIBUS and is capable of supporting up to four diskette drives. The diskette system records all data in soft sector format. Systems operations possible include: recalibrate seek, format track, read/write, write deleted data and verify CRC.

Single Board Diskette Controller — This printed circuit resides in the Model 835 electronic chassis. It receives, decodes and responds to channel commands from the 8085A-2 and will support an expansion pair of double density drives.

MULTIBUS Interface Capability

As in all Intellec Series II/85 models implementing the industry standard MULTIBUS protocol, the Zendex 835 implements the MULTIBUS. Several bus masters, such as CPU and DMA devices may share the bus and memory by operating at different priority levels. Resolution of bus exchanges may also be synchronized by a bus clock signal. Read/write transfers may take place at rates up to 5 MHz. The bus structure is suitable for use with any Zendex or Intel 8 or 16-bit microcomputer family development or operational requirements.

SPECIFICATIONS

Host Processor (IPB) — 8085AH-2 CPU

RAM — 64K Bytes (system monitor upper 2K)
 EPROM — 4K Bytes (2K monitor, 2K boot/diagnostic)

Diskette System Capacity — (basic two drives) (8 inch standard)

Unformatted		
	Single Density	Double Density
Per Disk:	400K Bytes	800K Bytes
Per Track:	5.2K Bytes	10.4K Bytes

Formatted (Intel MMFM)

Recording Mode	FM	MMFM
----------------	----	------

Diskette System

Transfer Rate	250K bits/sec	500K bits/sec
---------------	---------------	---------------

Diskette System Access Time

Track-to-track:	8 ms	8 ms
Head Settling Time:	8 ms	8 ms

Average Random

Position Time:	210 ms	210 ms
Head Load Time:	35 ms	35 ms
Rotational Speed:	360 rpm	360 rpm
Average Latency:	83 ms	83 ms

Physical Characteristics

	Dual Drive Chassis
Width — 19 in	Width — 19 in
Height — 7 in	Height — 7 in
Depth* — 19½ in	Depth* — 21 in
Weight — 51 lbs. (23kg)	Weight — 56 lbs (26 kg)

*Allow additional clearance for connectors

Ordering Numbers

Part Number	Description
Model-835 (110 VAC)	Zendex Model 835 Microcomputer development system (manuals and software included)
Model-835 (220-VAC)	Same as above but for 220 VAC Specify 50 or 60 Hz
Model-838 (110 VAC)	ZX-88 CPU
Model-838 (220-VAC)	ZX-88 CPU for 220 VAC 50Hz operation

Electrical Characteristics

Volts Supplied	Amps Supplied	Typical System Requirements
+5± 1%	30	5
-5± 1%	1.75	N/A
-12± 1%	1.75	0.1
+12± 1%	4.5	0.2

AC Requirements — 50/60 ±5% Hz
 115/230 ±10% VAC

Environmental Characteristics

Operating Temperature — 0° to 25° C (95° F)

Equipment Supplied

Model 835 chassis (ZX-609 package)
 Integrated processor board (ZX-85)
 ZX-200A Intel format floppy disk controller
 ZX-730 dual disk drives, chassis and cables
 EPROM — resident system monitor
 ZX-909 EPROM Programmer
 ZX-906A Bus Display
 MP/M-II Disk Operating System
 ZX-904 PIO Module
 ZX-903 Interrupt Panel

Reference Manuals Supplied

Model 835 Development Systems User's Manual
 CP/M™ Assembler (ASM) User's Guide
 ED: Context Editor for CP/M Disk System
 User's Manual
 Introduction to CP/M Features and Facilities
 CP/M 2.2 User's Guide
 CP/M 2.2 Interface Guide
 CP/M 2.2 Alteration Guide
 CP/M Dynamic Debugging Tool (DDT)
 User's Guide
 ZX-85 Hardware Ref. Manual
 ZX-200A Hardware Ref. Manual
 Schematic Drawings
 MP/M-II Manuals
 ZX-909 HRM
 ZX-906A HRM

Optional Equipment (for 835)

CP/M-86™ Runs on ZX-88
 KIT-88 Convert ZX-85 to ZX-88
 ZX-740 Hard Disk System
 ZX-907 Tracer Analyzer
 ZX-908 PROM Programmer Card

Specifications subject to change without notice. Systems soon to be shipped with single user MP/M-II instead of CP/M-80. Multi-user options forthcoming.

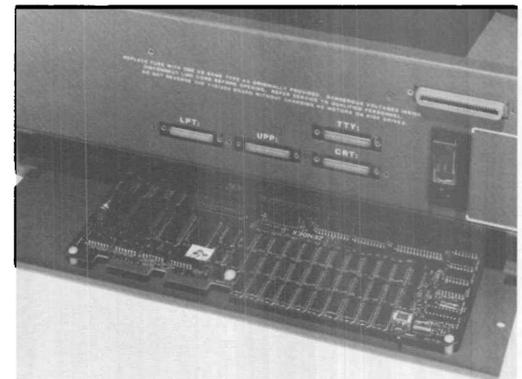
After January 1, 1981 Model 835 & 838 include ZX-909 & ZX-906A as standard equipment.

SYSTEM SNAP-SHOTS



Model 235 Development System. Includes ZX-85 CPU, ZX-200A Disk Controller, and dual 8" floppy disks. Includes ZX-904 for parallel printer and MDS-UPP input/output.

Rear view of 235 showing detail of ZX-85 mounted to plate in bottom compartment.



Model 855 Development System. Includes ZX-660 nine slot chassis, ZX-85 CPU, ZX-904 PIO, ZX-200 Disk Controller, ZX-740WC Hard Disk 20 M Byte Subsystem, ZX-730 Dual 8" Floppy Drives and CP/M operating System.





ZX-9700 SYSTEM CHASSIS



FIG. 1: ZX-9700 assembled with panels in place.

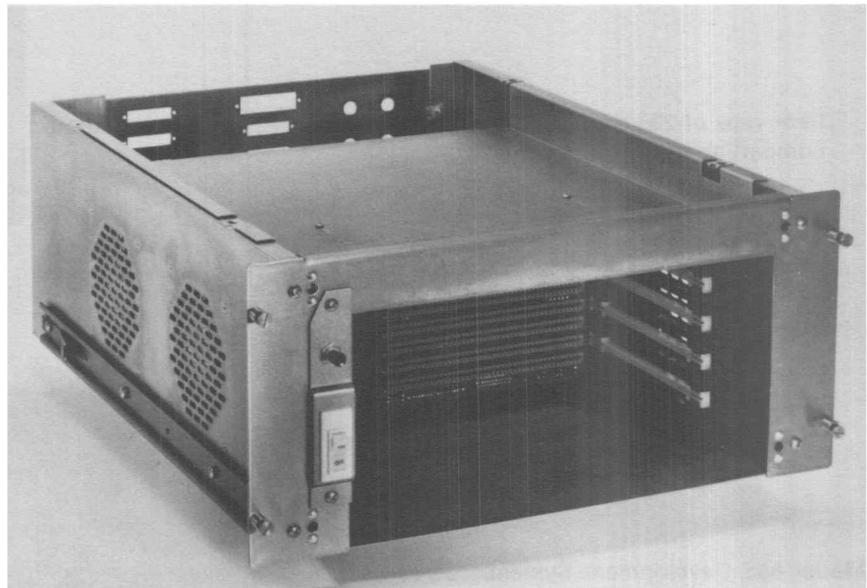
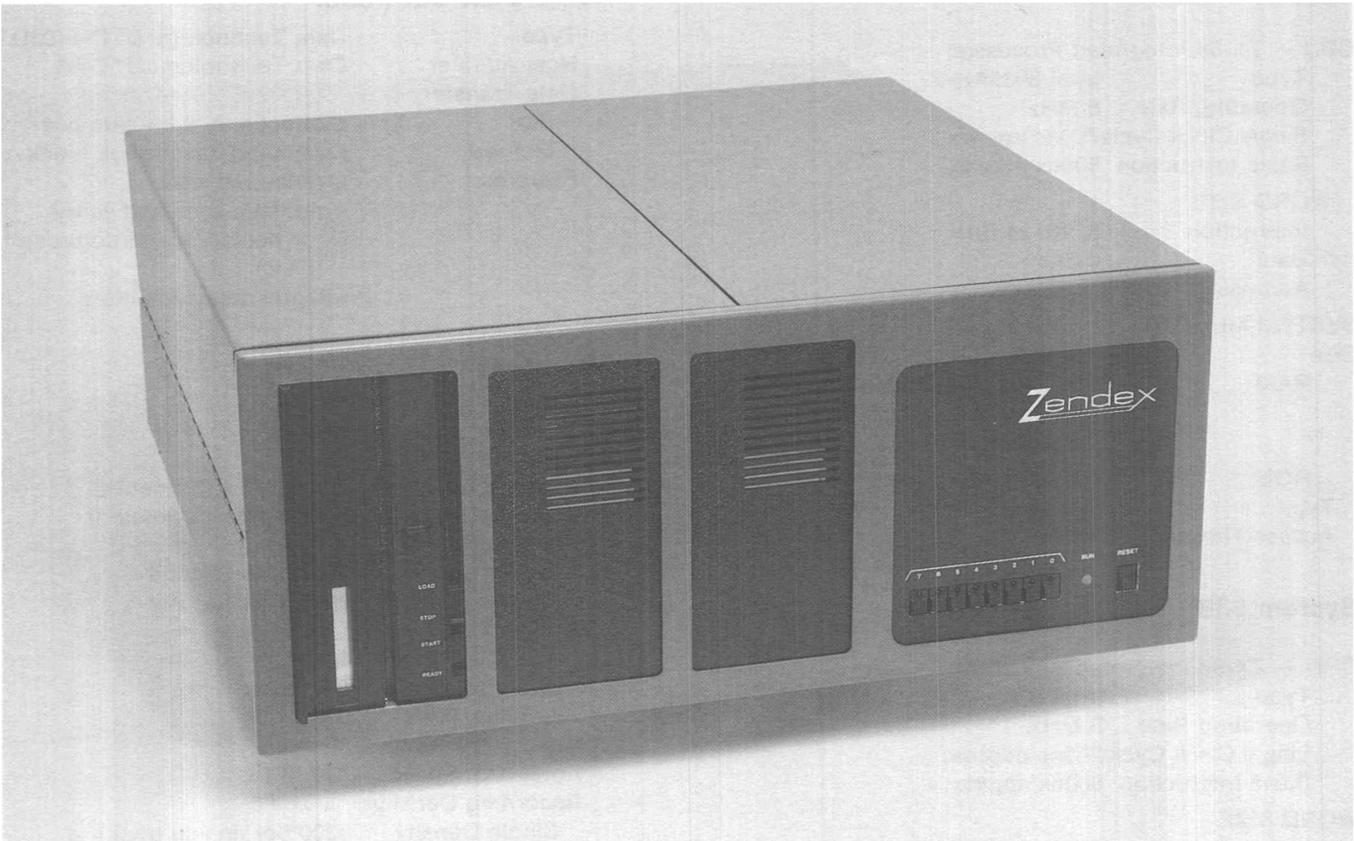


FIG. 2: ZX-9700 shown without front and top for detail of inside.

The Zendex ZX-9700 system chassis is intended for the user who must have front card withdrawal in a 19" rack. The ZX-9700 features an 1.5" trough for cables to pass over the card cage and power supply to the rear apron.

The ZX-9700 is similar to the ZX-660R chassis in many ways and features also the ZX-609B cage and ZX-640 linear power supply.

SYSTEM 935/938



Optimized Functionality

The System 935 and System 938 represent a major advancement in integrated computer systems. By using state-of-the-art components and design techniques Zendex has reduced the overall physical size of the computer without sacrificing performance or flexibility. The result is a computer system with the functionality of a large computer, packaged in a compact, attractive chassis suitable for use in a medium-sized business. The System has the power of computers twice its size; and twice its price.

Storage and Communication

System 935/938 utilizes a combination of flexible (floppy) and fixed Winchester hard disk drives for mass storage. Two floppy drives and one Winchester drive are incorporated within the chassis providing on-line storage for 11 million characters. The floppy disk features a removable flexible medium which can be changed when different on-line information is required. The floppy disk also offers a method for duplicating the information contained on the hard disk for back-up and storage of processed data, such as accounting records, mailing lists, and standard correspondence.

Video terminal, printer, and/or modem interface is accomplished through three communication ports on the

rear of the chassis. Two RS-232C ports provide serial communication and the other port is Centronics parallel compatible. The serial ports feature software selectable baud rates from 300 to 19,200.

System 935

This system features our ZX-85 general purpose central processing unit (CPU) and 64,000 characters (Bytes) of main memory, utilizing dynamic random access memory (RAM). The system is expandable to multi-users with the addition of our ZX-118 multi-user support board, the MP/M operating system and additional memory up to 320,000 characters. This system is suitable for general purpose applications with one to five users on-line.

System 938

This system features our advanced ZX-88 high speed CPU and 192,000 Bytes of main memory utilizing dynamic RAM. The main memory is expandable to One Million Bytes in increments of 128,000 or 512,000 Bytes. The system will support multiple users directly with the addition of our MP/M-86 multi-user operating system. This maximum throughput system is suitable for applications requiring high speed computation capability or extensive multi-user support.

SPECIFICATIONS

System 935

CPU — ZX-85 Integrated Processor
Type Intel 8085AH-2
Operating Rate 5 MHz
Single Clock Cycle 200ns approx.
Basic Instruction 800ns approx.

WORD SIZE

Instruction 8, 16, 24 Bits
Data 8 Bits
Address 16 Bits

SYSTEM MEMORY

Size
RAM 64K Bytes (expandable to 320K
with addition of ZX-118 memory
management unit)
ROM 4K Bytes
Type Dynamic
Access Time 300ns

System 938

CPU — ZX-88 Integrated Processor
Type Intel 8088
Operating Rate 5 MHz
Single Clock Cycle 200ns approx.
Basic Instruction 800ns approx.

WORD SIZE

Instruction 8, 16, 24, 32 Bits
Data 8 Bits
Address 20 Bits

SYSTEM MEMORY

Size
RAM 192K Bytes (expandable to 1 MB)
ROM 4K Bytes
Type Dynamic
Access Time 300ns

Input/Output

Two RS-232C Serial Ports — 5-8 bit characters; BRK
generation; 1, 1.5, or 2 bit stop
One Parallel Port — Centronics Parallel
Compatible

Floppy Disk Controller

Type Single Board ZX-200A
Density Simultaneous Single FM and
Double MMFM
Host Software CP/M; MP/M; Pascal;
Fortran; CBasic

Specifications and prices are subject to change without
notice. Intel and MULTIBUS are trademarks of Intel Cor-
poration.

Hard Disk Controller

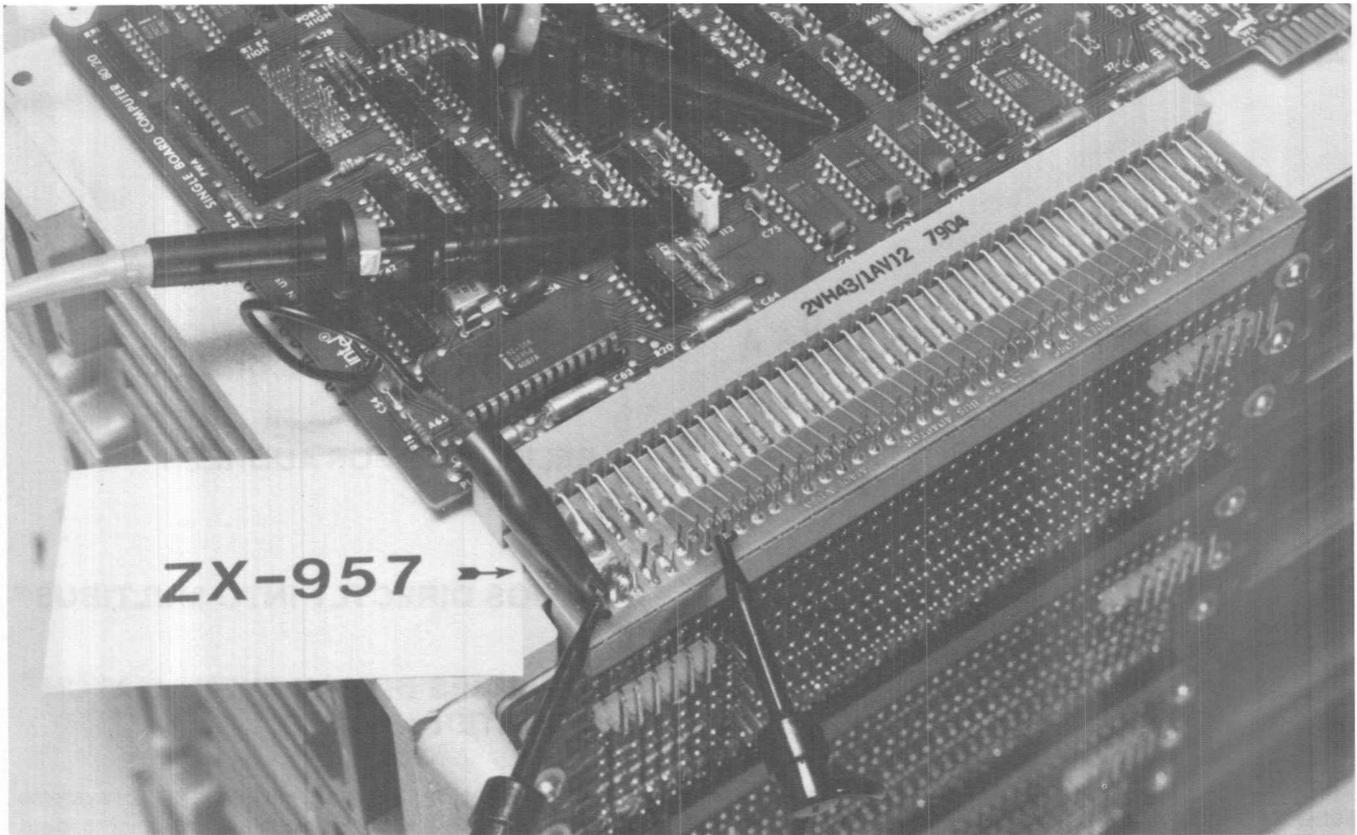
Type Data Technology DTC-1403D
Host Adapter Data Technology DTC-86
Data Transfer
Port Bidirectional 8 bit data bus
Method Command description block
Features Overlapped seek
Automatic seek and verify
Error detection and correction
(ECC)
Integral data separators

Floppy Disk Drive (Two)

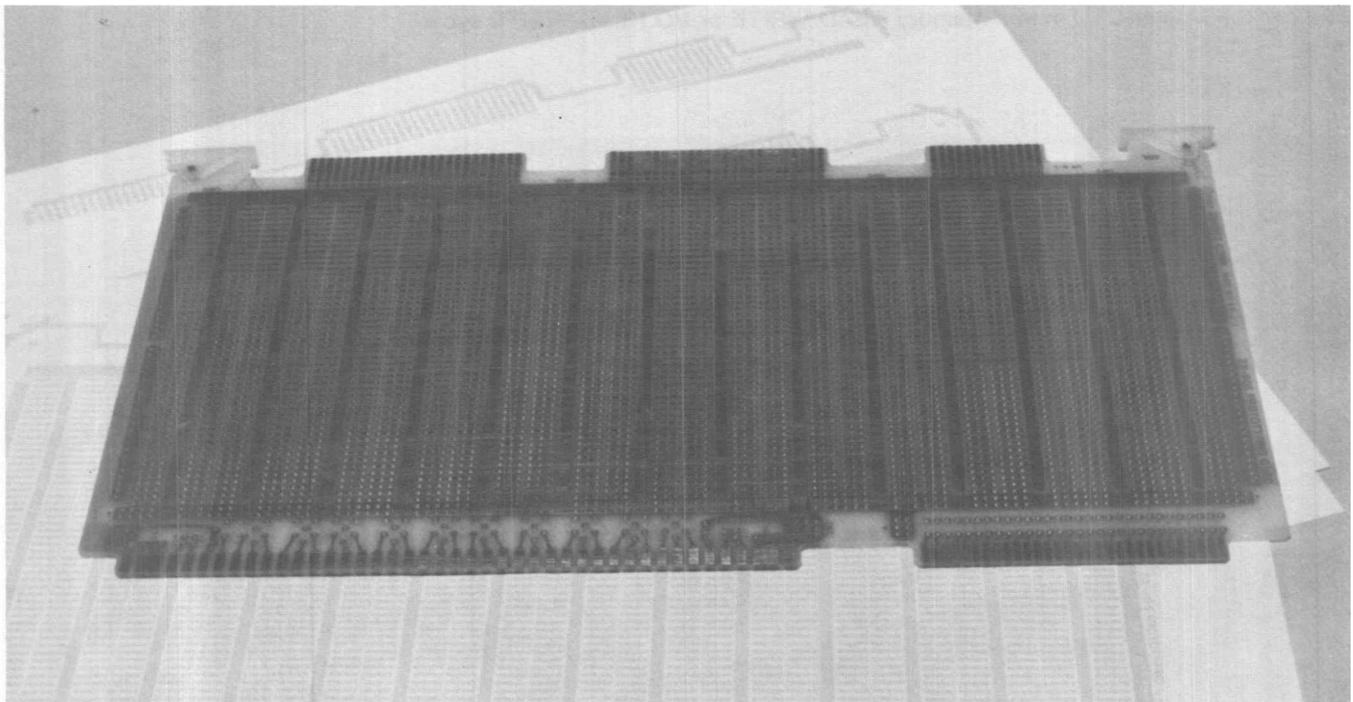
Type Shugart SA-801R
Capacity
Single Density 250K Bytes (formatted)
Double Density 500K Bytes (formatted)
Transfer Rate
Single Density 250K Bits/Second
Double Density 500K Bits/Second
Access Time
Track to Track 8 ms
Average 260 ms
Settling Time 8 ms
Head Load Time 35 ms
Rotational Speed 360 RPM
Recording Density
Single Density 3200 bpi (inside track)
Double Density 6400 bpi (inside track)
Flux Density 6400 fci
Track Density 48 tpi
Tracks 77
Encoding Method FM or MMFM
MTBF 8000 POH
MTTR 30 Min

Fixed Winchester Hard Disk (One)

Type Shugart SA-1004
Capacity
Unformatted 10.67 MBytes
Formatted 8.4 MBytes
Sectors/Track 32
Transfer Rate 4.34 MBytes/Second
Access Time
Track to Track 19 ms
Average 70 ms
Rotational Speed 3125 RPM
Recording Density 6270 bpi
Flux Density 6270 fci
Track Density 172 tpi
Cylinders 256
Tracks 1024
Read/Write heads 4
Disks 2
MTBF 8000 POH
MTTR 30 Min.



The ZX-957 MULTIBUS extender card plugs into the end of an SBC-604/614 card cage creating an extra slot outside the cage. The card under scrutiny is then plugged into this new slot, thereby eliminating the obstruction caused by the card cage. Every test point on that board can then be easily and quickly reached with probes.



The ZX-905 Prototyping Card comes with layout pads that can save a design engineer valuable time. The layout pad is printed with the top on one side and the bottom on the other, allowing the engineer to lay out his design and pass it on to a technician or assistant for wire-wrapping. Includes 5 edge connectors and enough room for 84 14-pin integrated circuit packs. This is a quality constructed card that meets all MULTIBUS specifications and is constructed of FR4 material with gold connectors. The plated through holes are .04" diameter on a .1" grid.

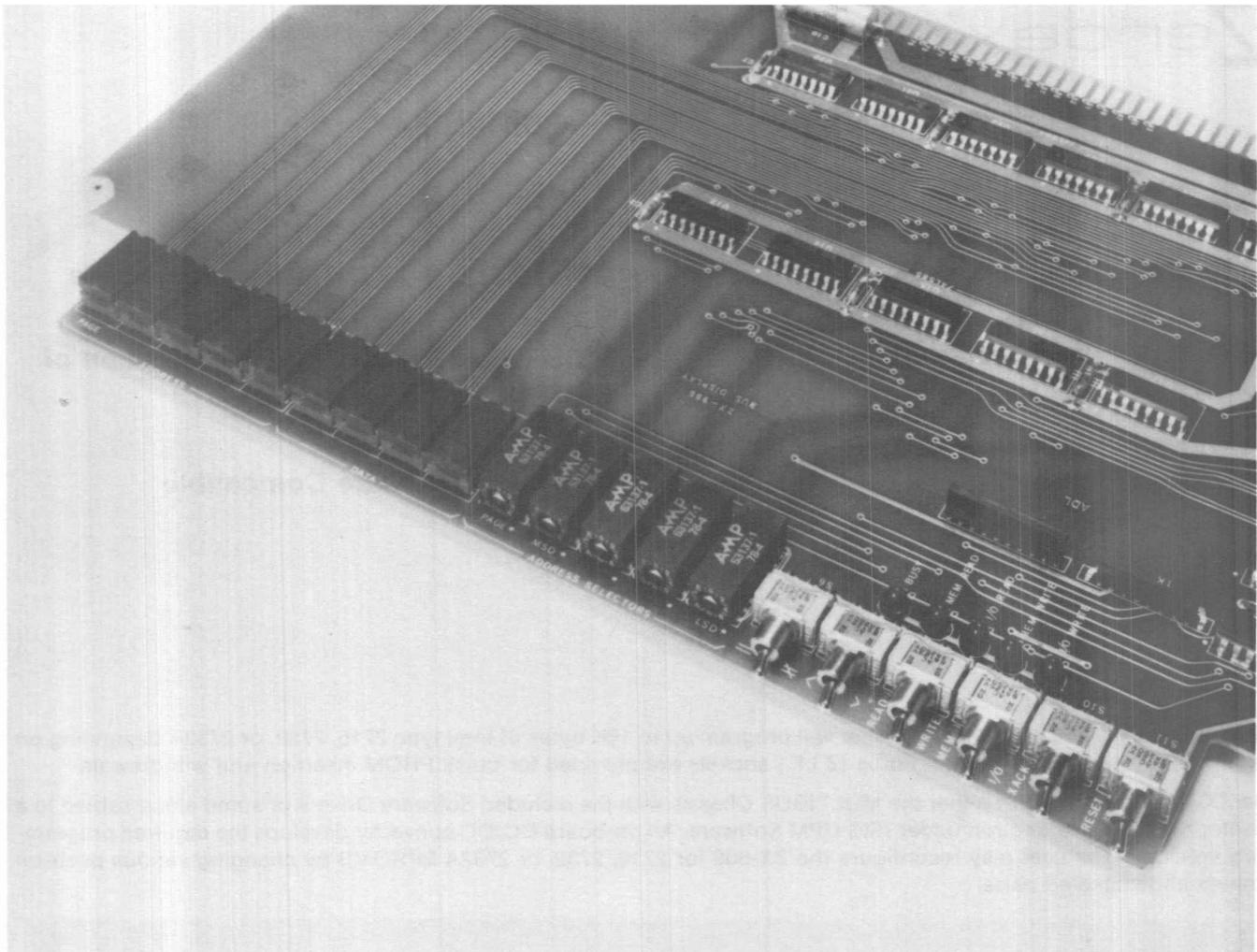


FIG. 2: Close-up View of ZX-906 CONTROL/DISPLAY EDGE

ZX-906 SPECIFICATIONS:

Selectors

5 Digit Hexadecimal Address Selection
 IO/MEM Cycle Select
 READ/WRITE Select
 =/= Address Select
 >/< Address Select
 XACK (Transfer Acknowledge) Single Stepper
 RESET (System Initialize)

General

12.00" x 8.00" x 0.50" Double Sided P.C. Board
 DC Supply requirements: 5V @ 1A (typ.)
 Temperature: 0 to 55°C
 Humidity to 95% non-condensing

Display

5 - Digit Hexadecimal address (20-Bits)
 4 - Digit Hexadecimal Data (16-Bits)
 4 - Cycle Indicators for 1) IO READ
 2) IO WRITE
 3) MEM READ
 4) MEM WRITE
 1 - Bus Busy Led Indicator

Ordering Information

Part Number	Description
ZBX-906A	BUS Display Board. (Includes Manual)

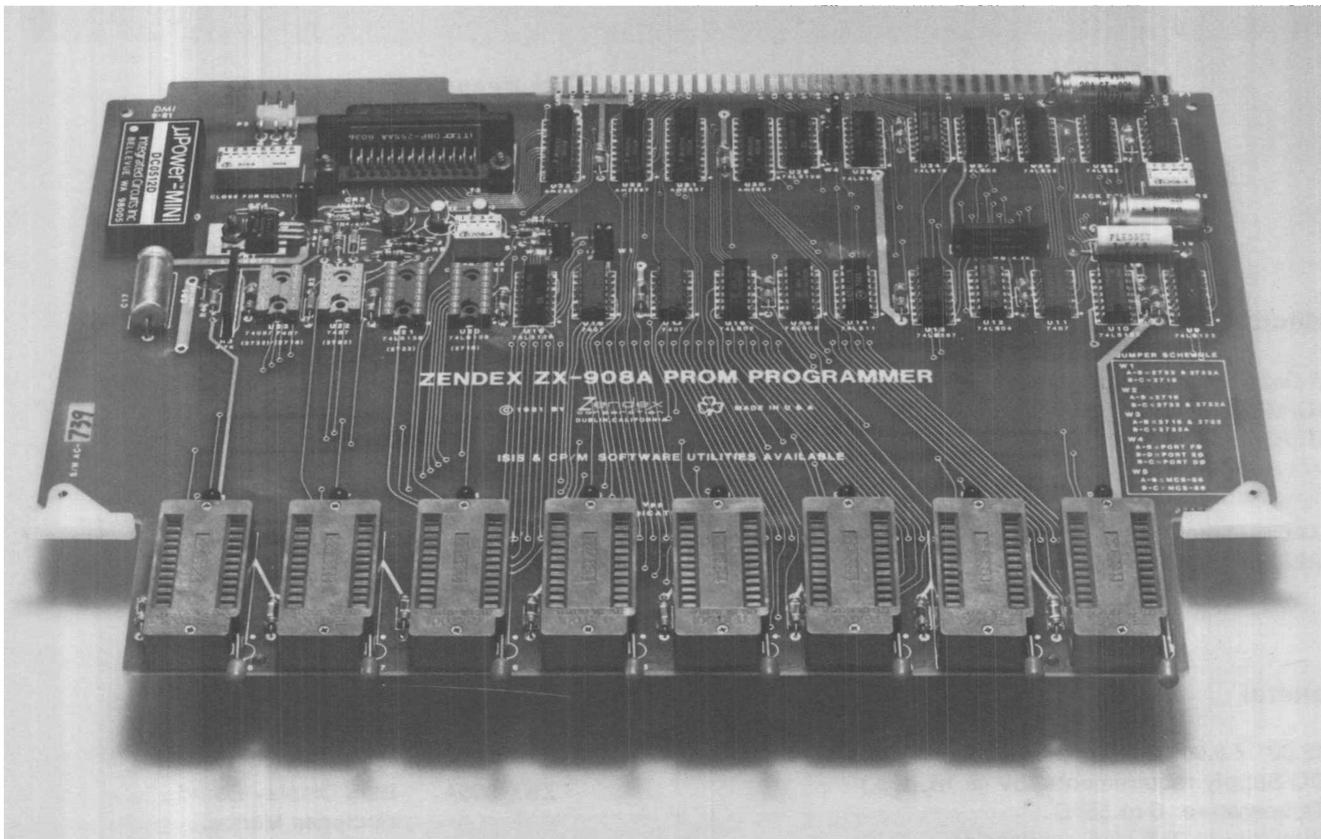


ZX-908A EPROM PROGRAMMER

- Multibus Compatible
- 5 Volts Only Operation
- Programs 16K Bytes of EPROM Storage in One Operation
- Includes ZPP Software Utility for use with CP/M or ISIS
- 2716, 2732, & 2732A Models Available
- MDS Cable Interface for Substitution of MDS-UPP-103
- ISIS UPM Software Compatible

The Zendex ZX-908 EPROM Programmer will program up to 16K bytes of Intel type 2716, 2732, or 2732A depending on users configuring. Zero-Insertion-Force (Z.I.F.) sockets are provided for quick PROM insertion and withdrawals.

The ZX-908 can operate in either the MULTIBUS Chassis with the included Software Drivers or stand alone cabled to a Development System and run under ISIS UPM Software. An on-board DC/DC converter develops the required programming voltages. The user may reconfigure the ZX-908 for 2716, 2732, or 2732A EPROMS by changing various push-on jumpers and socketed parts.



SPECIFICATIONS

IO Port Addressing

D0-D2, E0-E2, or F0-F2 for MCS-80 Systems
or
00D0-00D2, 00E0-00E2, or 00F0-00F2
for MCS-86 Systems

MDS Cable Interface

Pin for pin cable for Series II Intellec 220, 230 PROM
Programmer Interface Jack. Use Zendex ZX-958.

Access / Cycle Times (MULTIBUS Mode)

Read Data - Programmable in 100 nS steps from
100 nS - 1.5 uS
Write Address - Same as "Read Data"
Program Data - 100 ns to 1.5 uS for HOST to
Write Data. Programmer goes busy
for 50 mS while location is being
programmed.

Voltage & Pulse Timing to EPROM's

Tested to be within Intel's published specifications
for 2716, 2732, or 2732A EPROM's.

Physical Characteristics

Height - 8.75 inches (includes 2" extension
of ZIF sockets)
Width - 12.00 inches
Depth - 0.5 inches
Weight - 14 ounces

DC Power Requirements

5 Volts \pm 0.25V @ 1.5 Amps (Max.)

Ordering Information

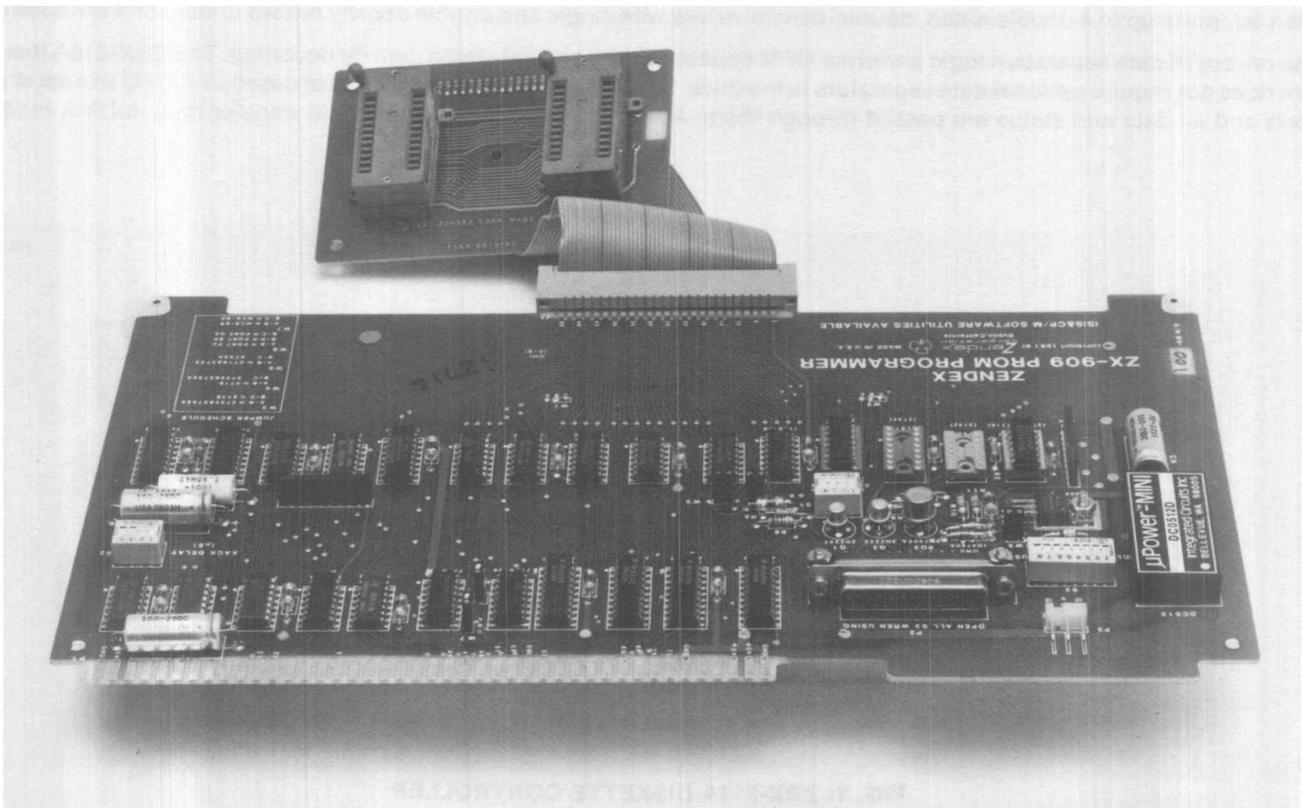
ZX-908A factory configured for 2716 type EPROM.
Instructions in manual describe how user can easily
change to 2732 or 2732A types.

Material Supplied

ZX-908 includes ZX-908 Board
ZX-98-908 User Manual
w/Schematics
DOS utility for ISIS and CP/M (ZPP)

Optional

ZX-958 Interface cable for use outside card case.



SPECIFICATIONS

uPD 765A Commands:

Read Data	Write Data
Read ID	Format A Track
Read Deleted Data	Write Deleted Data
Read A Track	Seek
Scan Equal	Recalibrate
Scan High or Equal	Sense Interrupt Status
Scan Low or Equal	Sense Drive Status
Specify	

Data Transfers in DMA or Non-DMA Mode
 Programmable Sector Lengths: 128, 256, 512
 or 1024 Bytes
 IBM 3740, IBM SYS 34 Formats
 Multi-Track, Multi-Sector Operations
 Parallel Seek

8" STD Drive

Data Capacity	Double Density						Single Density					
	IBM SYS 34			NON-IBM			IBM SYS 3740			NON-IBM		
Bytes/Sector	256	512	1024	2048	4096	8192	128	256	512	1024	2048	4096
Sectors/Track	26	15	8	4	2	1	26	15	8	4	2	1
Tracks/Disk	77			77			77			77		
Bytes/Disk (Per Surface)	512K — 630K			630K			250K — 315K			315K		

Electrical

Power — 5 Volts @ 0.25A, +12V @ 0.1A
 Baseboard Interface — SBX Specifications
 FDD Interface — 50-Pin Shugart SA800

Physical

Size — Double Wide SBX Module
 Length - 7.50"
 Width - 2.50"
 Profile - 0.467" Less SBX Connector
 Weight — 8 Ounces Net, 1 Pound Shipping

Ordering Information

ZBX-218A Floppy Disk Module.
 (Includes Manual)

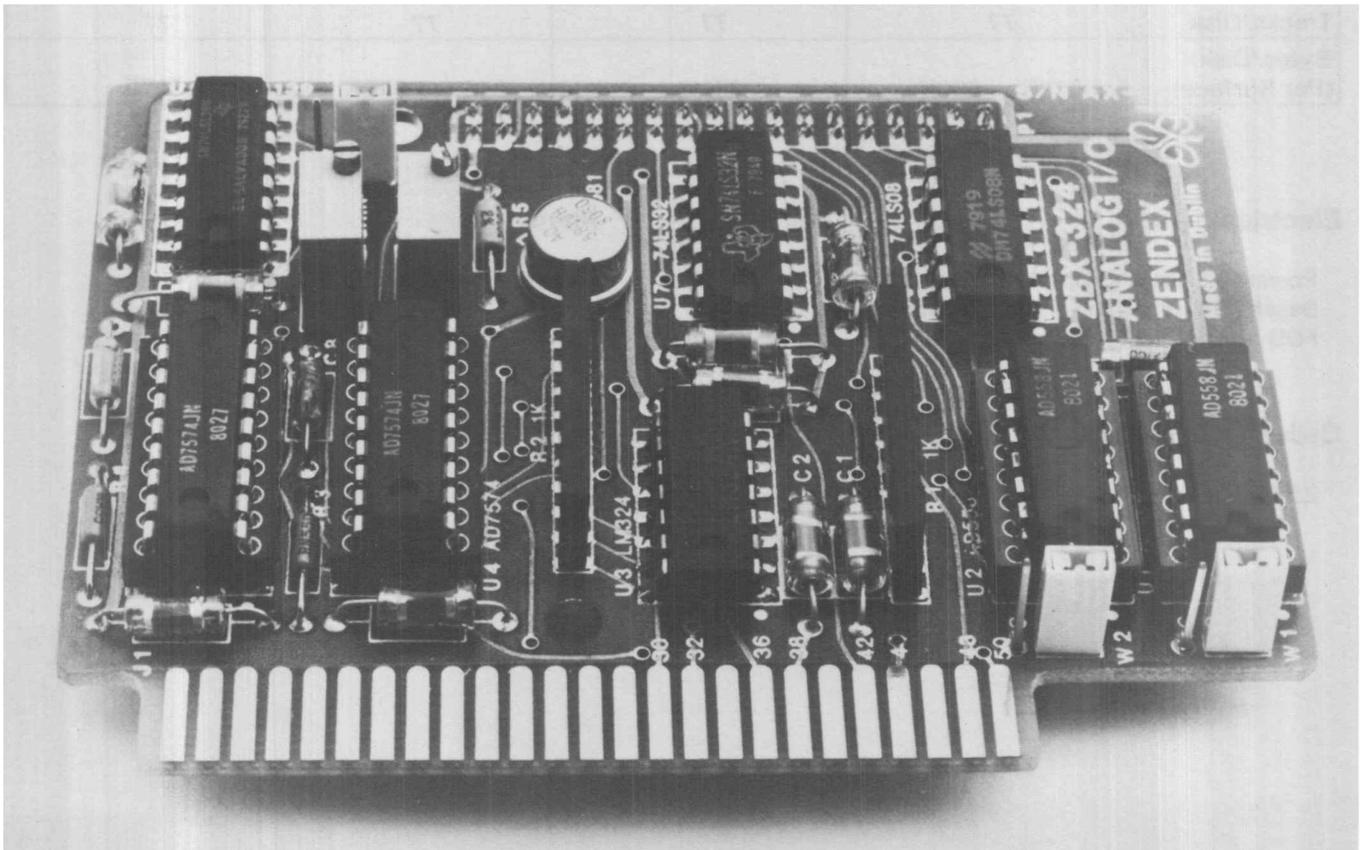


ZBX-324 ANALOG IO MODULE

- ISBX BUS COMPATIBLE ANALOG INPUT/OUTPUT MODULE
- TWO 8-BIT ANALOG OUTPUTS
- FAST ADC CONVERSION TIME: 15 u SEC
- PRECISION VOLTAGE REFERENCE SOURCE ON-BOARD
- TWO 8-BIT ANALOG INPUTS
- SELECT 10.0 V or 2.56 V FULL SCALE ANALOG OUTPUTS BY JUMPER WRAPPING
- FAST DAC SETTLING TIME: 1 u SEC TO 1/2 LSB
- SBX-MODULE ON-BOARD EXPANSION SAVES SYSTEM BUS LATENCY AND SPEEDS SYSTEM THROUGHOUT

The Zendex ZBX-324 Analog IO Module is a member of Zendex's growing series of baseboard expansion modules to fit the Intel SBX-Module Interface specification. The ZBX-324 is the first module to offer Analog IO capability to such baseboards as the SBC-80/10B and SBC-80/24 single board computers.

Each ZBX-324 comes with two 8-bit monolithic DAC's with buffered output (LM324) and two 8-bit CMOS ADC units with a common precision voltage reference (AD581). The ADC's are Analog Devices AD 7574 and the DAC's are the AD558. Data port reads of the ADC's automatically cause a convert-start and the ZBX-324 generates an mwait/to make the baseboard's CPU wait for the analog conversion to complete. When data is valid, the mwait/ signal is de-asserted allowing the CPU to proceed. Writes to the DAC's proceed at full CPU speed.



SPECIFICATIONS

WORD SIZE

Data — 8 Bits

ON-BOARD VREF

10.000 V \pm 30 mVmax

I/O Addressing

Function	Type of Operation	SBX Port Address
Analog In #1	Read	X0 or X4
Analog In #2	Read	X1 or X5
Analog Out #1	Write	X2 or X6
Analog Out #2	Write	X3 or X7

Note: Port addresses are determined by the host baseboard. Refer to the baseboard's hardware reference manual for specifics.

Input Range

0 to +10V Adjustable

Output Range

0 to +2.56V or +10.0V Selectable

ADC Accuracy

Resolution — 8 Bits
Relative Error — \pm 3/4 LSB max
Differential Nonlinearity — \pm 7/8 LSB max
FS Error (Gain Error) — \pm 5 LSB max (Adjustable to 0)
Offset Error — \pm 60 mV max

ADC Conversion Time

15uS min 18uS Typical

DAC Accuracy

Resolution — 8 Bits
Relative Accuracy — \pm 1/2 LSB max

DAC Output Settling Time

0 to 2.56V Range 0.8 uS (1.5 uS max)
0 to 10.00V Range 2.0 uS (3.0 uS max)

DAC FS Accuracy

@ 25° C \pm 1.5 LSB (\pm 0.6%) max

Interface

SBX Bus — All signals TTL Compatible

Physical Characteristics

Width — 2.5 Inches
Length — 3.7 Inches
Height — 0.80 Inches ZBX-324 Only.
1.3 Inches Including Baseboard

Weight — 2 Ounces

Electrical Characteristics

DC Power Requirements
+5 Volts @ 50 uA (Typ)
+12 Volts @ 60 uA (Typ)
-12 Volts @ 10 uA (Typ)

Environmental

Operating Temperature — 0°C to 55°C
Free moving air across the baseboard

Ordering Information

Part Number	Description
ZBX-324	Analog IO Module (Includes Manual, Data Sheets)



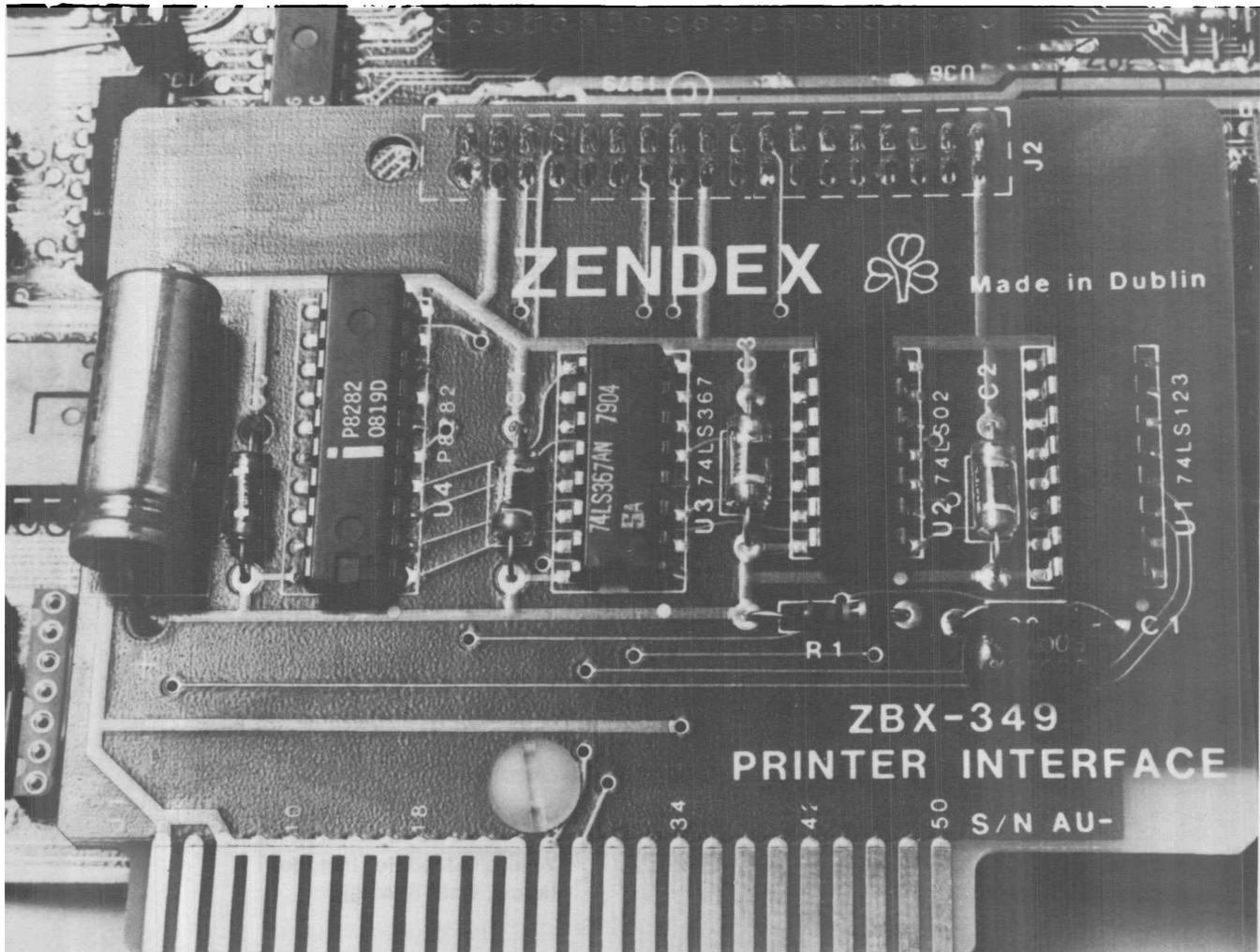
ZBX-349 PRINTER INTERFACE

- SBX-MODULE FOR IO EXPANSION
- HARDWARE LATCH AND STROBE DATA
- COMPLETE WITH PERIPHERAL CABLE
- CENTRONICS PARALLEL I/F PINOUT

The ZBX-349 is a small board module designed to plug onto the SBX connector of various Intel and Zendex baseboards. This product extends the SBX IO offering into the ready-to-use printer interface solution.

The ZBX-349 plugs directly to the SBX connector and bolts down to the card with nylon hardware supplied. The cable that is included is eight feet long and connects at one end to a 50-pin edge on the ZBX-349 and the other end will plug directly into the parallel connector on a Centronics line printer.

Software protocol is as simple as reading in a port and testing for busy bit false and if false output the data to the 8-bit parallel port on the ZBX-349. The module then generates the data strobe and latches data for the printer's use.

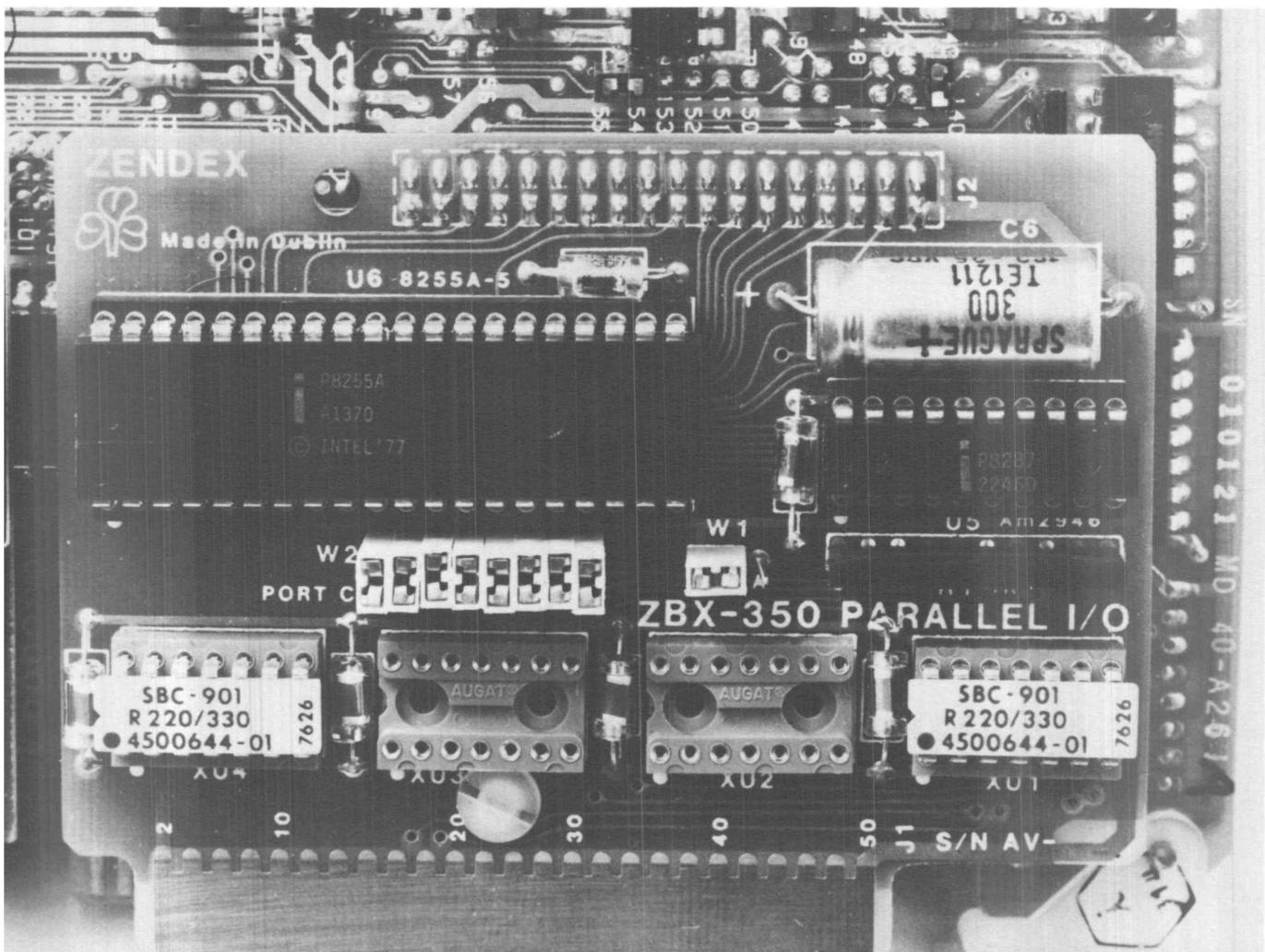




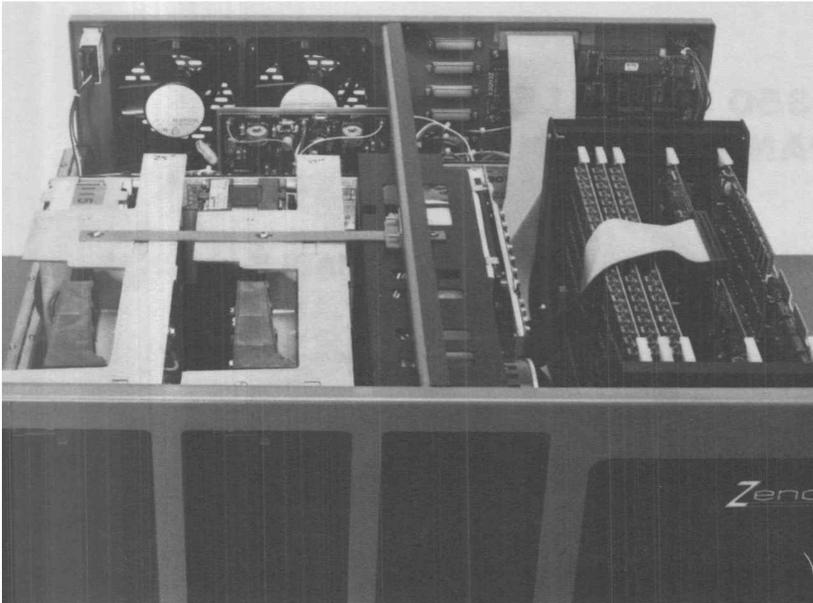
ZBX-350 PARALLEL IO EXPANSION MODULE

- ADDS 3 8-BIT PORTS TO COMPATIBLE BASEBOARD
- 4 SOCKETS FOR USER INSTALLED DRIVERS/TERMINATORS
- 8-BIT BUS TRANSCEIVER TO INTERFACE TO EXTERNAL BUSES
- 24 PROGRAMMABLE IO LINES
- 5-VOLTS ONLY
- SINGLE WIDE SBX-MODULE SIZE

The ZBX-350 Parallel IO Module is designed to increase the capabilities of any SBC microcomputer that contains a Multimodule connector. The ZBX-350 contains an 8255A programmable peripheral interface that may be set to one of three modes: 1) Basic IO, 2) Strobed IO, 3) Bidirectional bus interface. The board also includes an 8-bit bidirectional bus transceiver for interface to external busses. Four fourteen-pin dip sockets are provided to receive user installed drivers (7438 typ.) or resistor terminators (SBC-901 typ.).

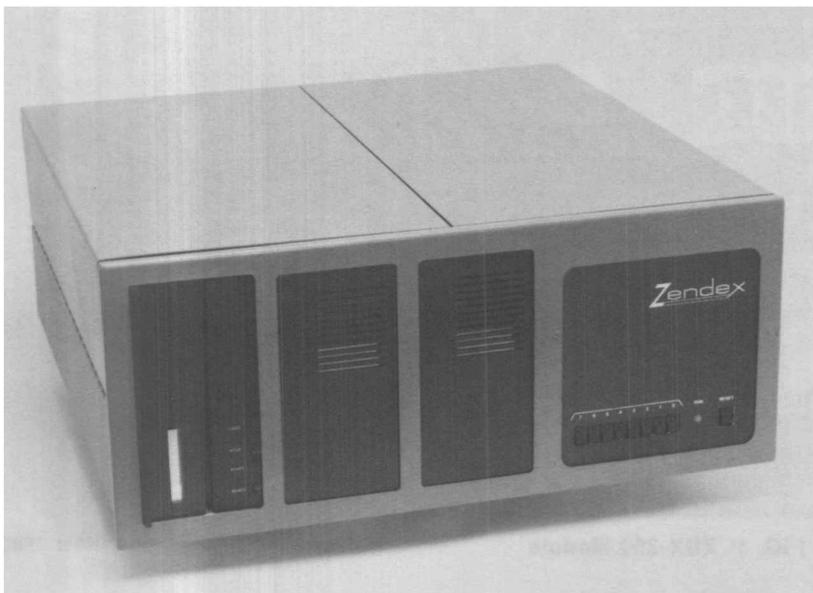
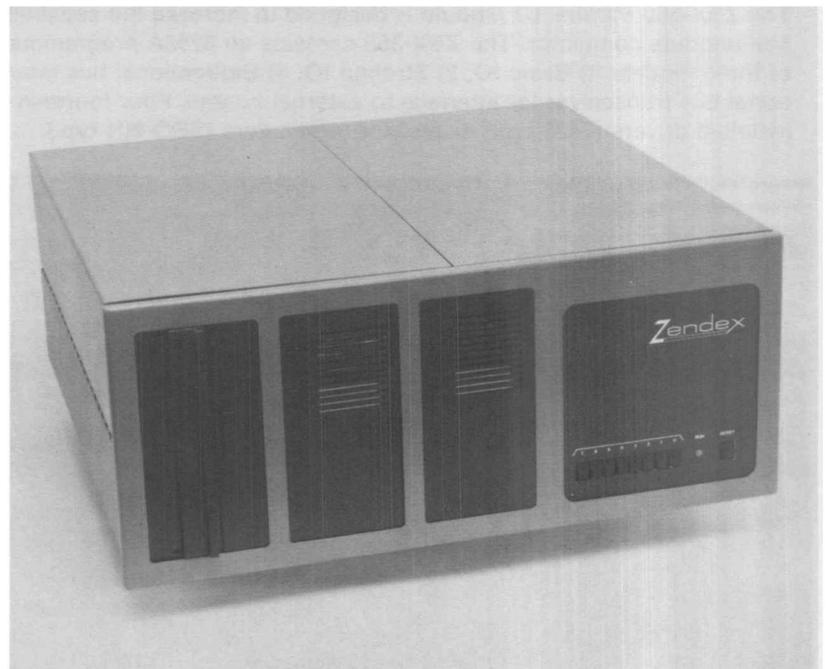


NEW



Inside view of Model 935 shows service accessibility.

Model 945



Model 965 with removable cartridge and two fixed drives.



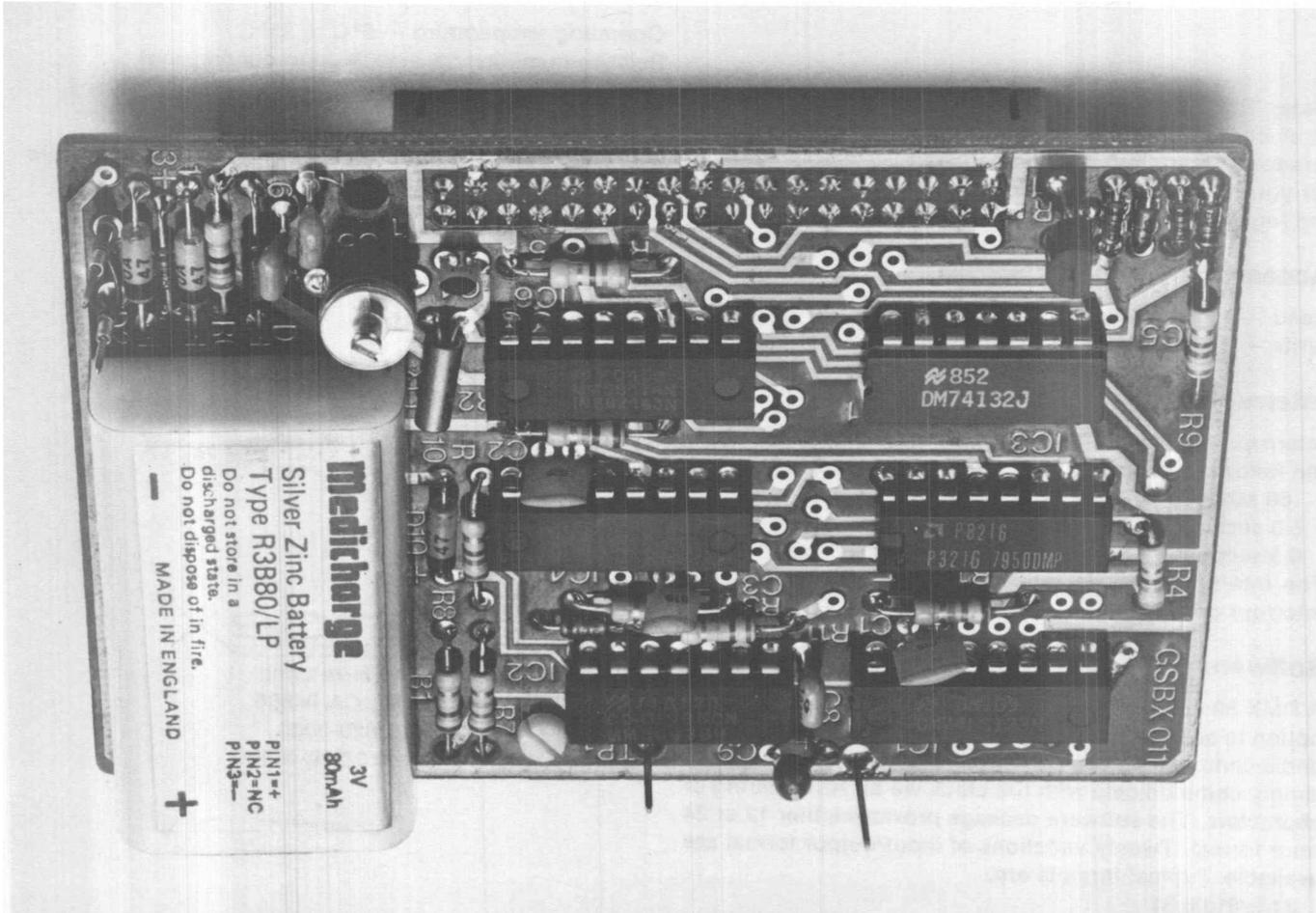
GSBX-011 TIME OF DRY CLOCK BOARD

**LOW COST TIME CLOCK FOR iSBX
MULTIMODULE COMPATIBLE
MULTIBUS BOARDS**

- TENTHS OF SECONDS, SECONDS, MINUTES, DAYS AND MONTHS
- LEAP YEAR ADJUSTMENT
- FLEXIBLE PERIODIC INTERRUPTS

- BATTERY BACKUP
- OPTIONAL RMS 80 SOFTWARE DRIVER AVAILABLE (WRITTEN IN PLM)
- ON-BOARD CRYSTAL PROVIDES PRECISE TIME GENERATION

The Giltspur GSBX011 Time of Day iSBX compatible board provides an accurate clock function for microprocessor systems. The single-wide board plugs directly on to any MULTIBUS board which has an iSBX compatible bus and connector. Many microprocessor systems require the provision of accurate time and date information. Traditionally this has been implemented by a software function driven by system clock interrupts. This has several disadvantages, namely, a high processing overhead and thus wasted processing power, loss of time and date information on powerdown or power failure and the need for an operator to input the correct time and date each time the system is powered up. The latter requirement also makes mandatory the provision of a VDU for this function whether or not it is required for the rest of the system and it is also prone to operator error. The GILTSPUR GSBX 011 board eliminates all of these disadvantages in a simple low-cost module. In addition, support software can be supplied if required.



iSBX, Multimodule, and Intel are trademarks of Intel Corporation.

*Manufactured in England by Giltspur Microsystems and distributed in the United States exclusively by Zendex Corporation.

GSBX 011 SPECIFICATIONS

Word Size

Data — 8 bits

Register Allocations

GSBX 011

Address	Type	Function
X0	Write	Test
X1	Read	Tenths of Seconds
X2	Read	Units of Seconds
X3	Read	Tens of Seconds
X4	Read/Write	Units of Minutes
X5	Read/Write	Tens of Minutes
X6	Read/Write	Units of Hours
X7	Read/Write	Tens of Hours
X8	Read/Write	Units of Days
X9	Read/Write	Tens of Days
XA	Read/Write	Days of Weeks
XB	Read/Write	Units of Months
XC	Read/Write	Tens of Months
XD	Write	Years
XE	Write	Stop/Start
XF	Read/Write	Interrupt/Status

Note: The first digit of each register address is listed as 'X' since it will change dependent on the type of host micro-computer used. Refer to the hardware Reference Manual for your host microcomputer to determine the first digit of the register address.

Access Time

Read — 750ns maximum

Write — 750ns maximum

Interrupts

Interrupt request can be originated from the GSBX 011 at the following intervals:

60 seconds

5.0 seconds ±16.6ms

0.5 seconds

The interrupts may be on a repetitive basis or a single interrupt only.

Software

A RMX 80 compatible software package is available as an option to support the GSBX 011 board. It is written in PLM and a complete source file is provided. It allows the user to simply communicate with the clock via an ASCII string of characters. The software package provides either 12 or 24 hour format. Twenty variations of input/output format are available. Typical formats are:

21/3/81:08.31

SAT21/3/81:08.31

Accuracy

±15 seconds/month over temperature range ±20°C

Fine adjustment of ±15ppm available on board

Battery Backup

On board battery guarantees time and date for a minimum of 30 days without external power.

Physical Characteristics

Width 6.35 cm (2.5 inches)

Height 2.03 cm (0.80 inches) GSBX module board only

2.85 cm (1.3 inches) GSBX module and multibus board

Depth 9.40cm (3.7 inches)

Weight 50gm (1.8 ounces)

Electrical Characteristics

DC Power requirements

Vcc = +5 volts (±0.25v), Icc = 125mA maximum

Environmental Characteristics

Operating temperature — 0°C to 55°C

Relative humidity: 5% — 90% (non-condensing)

Reference Manuals

98-011 GSBX011 Time of Day Clock Module with Hardware Reference Manual

Time of Day Clock Software (supplied)

Manual may be ordered separately.

Ordering Information

Part Number	Description
GSBX 011	Time of Day Clock Board



6644 Sierra Lane

Dublin, CA 94566

415/828-3000

TWX 910/389-4009