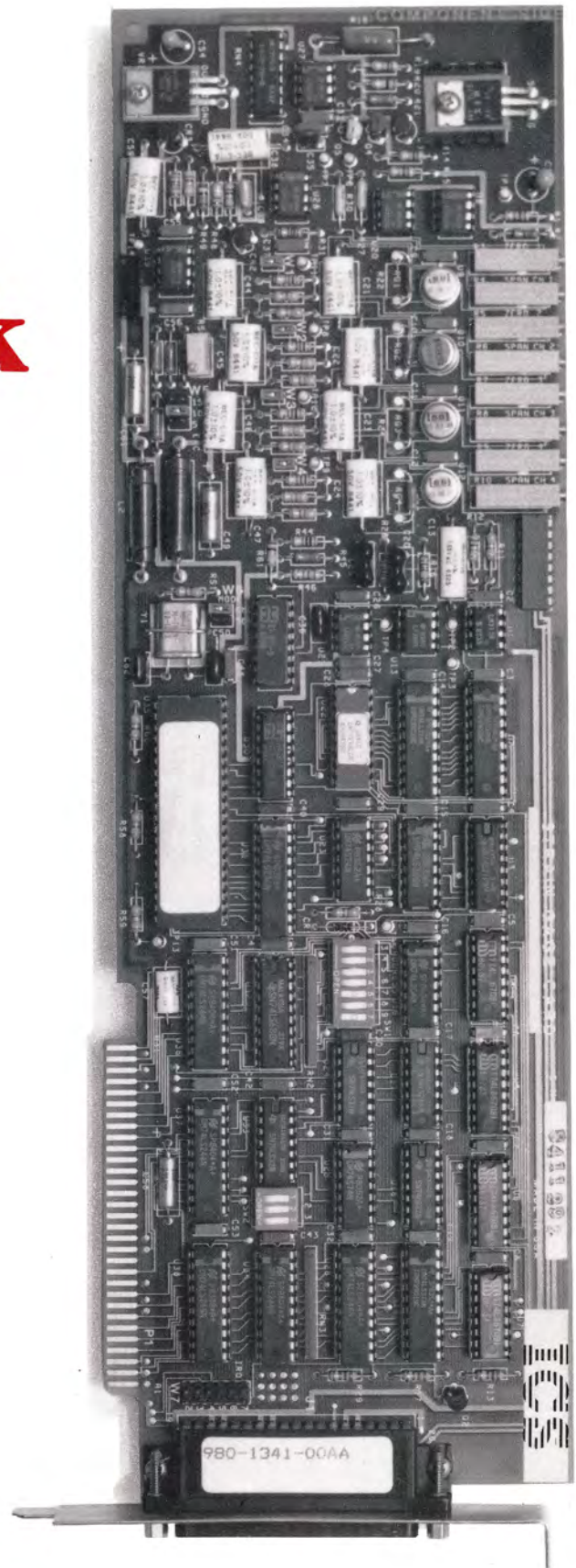


Industrial IBM PC SourceBook

1985

- REAL WORLD
I/O CARDS
- SOFTWARE
- ACCESSORIES
- 19" RACK MOUNT



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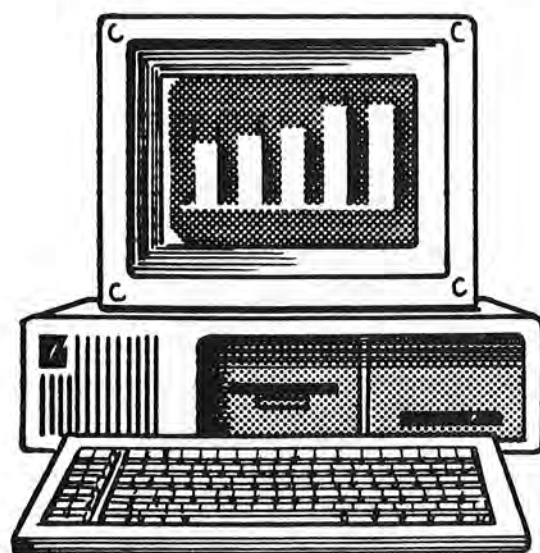
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Putting Your PC to Work



Personal Computers (PCs) are becoming commonplace in engineering and lab environments. Why? PCs have become an important tool in the lab because they are cost-effective and convenient. They offer mass storage, color displays, and the flexibility of a large standalone system, at 1/3 to 1/2 the price.

Data acquisition and analysis is one of the most common applications for a PC. This task is easily accomplished using any of the plug-in analog/digital I/O cards listed in the Sourcebook. Other applications for the cards include ATE (Automatic test), lab automation, batch control, robotics and industrial-process control. These industrial I/O cards form the vital link between the real world inputs and your PC.

SHORT LISTING OF CUSTOMERS

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ISI International
Centec
RBC Corporation
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Industrial Computer Systems
Electric Switches

Control Micro Systems
Zenith Electronics
Tekelec
InterRelated Instruments
Orange Micro
Action Technology, Inc.
Honeywell

**BUILD YOUR OWN PC
EASY AS 1-2-3**

6531 Industrial Computer 19" Rack Mount

Model 6531



Features

- Software and Hardware-Compatible with IBM PC and XT Systems
- Operates with MS™-DOS Concurrent CP/M®, GW™ BASIC
- 8088 CPU, Optional 8087 Math Coprocessor
- 128K Memory Standard, Expandable to 256K on Base-Board, 640K Total Memory with Extended Memory Adapter Card
- Floppy Disk Controller, Two RS-232 Serial Ports, Parallel Printer Port, Calendar/Real-Time Clock Included on Base-Board
- Five Expansion Slots for Industrial I/O
- 19 Inch Rack Mountable RETMA Enclosure

General Description

The 6531 Industrial Computer consists of the System Unit (the computer), packaged in a rack mountable enclosure, and a Keyboard. Program and data storage are provided by either one or two, double-sided, double-density floppy diskette drives, with or without an optional 10 megabyte Winchester disk drive mounted in the System Unit. A desktop enclosure is available.

The system base-board contains the microprocessor and its support logic, the basic system RAM memory array, the read-only ROM memory, a battery backed-up real-time clock, configuration switches, an interface for multiple diskette drives, a parallel printer interface, two serial interface

ports, the keyboard interface and the I/O expansion bus with five expansion slots. The integration of these essential hardware functions into the base-board is an economical feature, in that it eliminates the need to add expensive function cards, yet supports the addition of further enhanced function capabilities to the system if desired.

The heart of the system is the Intel 8088 CPU with an 8-bit external data bus and a full 16-bit internal bus. The CPU operates at 4.77MHz, with an 840ns bus cycle time and a 1.05µs I/O cycle time. A preconfigured socket to accept the Intel 8087 Math Coprocessor allows extended processing capability.

High performance CPU support chips provide four DMA channels, three timer-counter channels, and

eight prioritized levels of interrupt. One of the DMA channels is dedicated to refreshing the dynamic RAM memory; the other three are available to program software for high-speed memory data transfers.

The 6531 Industrial Computer is shipped with 128K bytes of RAM memory standard. Additional RAM sockets in the memory array allow the system unit base-board to house an additional 128K bytes, providing up to 256K bytes of on-board read-write RAM memory. An additional 384K bytes of RAM memory can be provided by the Expanded Memory Adapter Card when installed in one of the expansion slots.

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**Robotics
Batch Control
Process Control**

The diskette drive interface for 5¼-inch drives, using a Floppy Disk Controller, is incorporated on the base-board and does not occupy one of the expansion slots. Interrupt driven, the interface provides programmable drive parameters and supports the drive's write-protect logic. This interface will accommodate up to four drives, either MFM-coded double-density, or FM-coded single-density.

The Winchester Hard Disk Drive, which mounts within the System Unit, provides 10 megabytes (formatted) of program and data storage. All transfers to and from the disk are via direct memory access (DMA).

The system unit base-board also provides two EIA RS-232 asynchronous serial interface ports without occupying an I/O expansion slot. All

standard data baud rates and Clear-To-Send (CTS), Request-To-Send (RTS), Data-Set-Ready (DSR), Data-Terminal-Ready (DTR), Ring-Indicator (RI) and Carrier-Detect (CD) modem control signals are supported.

The Parallel Printer Interface is an integral part of the system base-board, and is a full interrupt driven parallel printer port.

A battery backed-up calendar/real-time clock provides the time and date used by the MS-DOS operating system to date-stamp files. In the power-down mode, the clock maintains time even if the System Unit is turned off or is disconnected from its power source.

The keyboard is styled after a conventional typewriter with the exception of two additional key groups: a program function key group,

and a cursor-control/numeric-data-entry key group. Additional features include LEDs on the caps lock and numeric lock keys which indicate to the user that these functions are activated.

The user may add analog or digital industrial I/O interfaces to the real world via the 5 available expansion slots.

Industrial I/O Cards Available

32 Digital InputDIM 32
 32 Digital OutputDOM 32
 Thermocouple InputTC15
 RTD InputRTD15
 Analog/Digital I/OAIO4
 Analog/Digital I/OAIO8
 Analog/Digital I/OAIO16
 Analog Output (6)AOB6
 Strain-Gauge InputSGO4

Specifications

Processor

16-bit 8088

Memory

128K dynamic RAM (expandable to 640K)

Disk Storage

One or two double-sided, double-density floppy disk drives.
 10 megabyte Winchester hard disk (optional)

Printer Port

One IBM PC/XT compatible parallel

Serial Ports

Two RS-232, asynchronous

I/O Expansion

Five Slots, IBM PC/XT compatible

Calendar/Real Time Clock

Hour, minute, second and date

Operating System

MS-DOS 2.0

Dimensions

Face Plate

Width: 19.0 inches

Height: 7.0 inches

Enclosure

Width: 17.0 inches

Depth: 22.125 inches

Height: 6.46 inches

Keyboard

Width: 17.75 inches

Depth: 7.625 inches

Height: 1.5 inches to 2.062 inches (Adjustable slant)

Power Requirements

System Unit

115Vac, 3A

Ordering Guide

6531-1*

One 360K Floppy Drive .. \$4,995.00

6531-2*

Two 360K Floppy Drive .. \$5,295.00

6531-3*

One 360K Floppy Drive,
 One 10 Mb Hard Disk ... \$7,795.00

6531-KB

19" Rack Mounted
 Keyboard \$595.00

6531-MM

19" Rack Mounted
 B/W Monitor \$869.00

6531-CM

19" Rack Mounted
 Color Monitor \$1,489.00

*All systems include:

MS-DOS and VRTX with IOX and FMX and interface to PASCAL,C and PLM.

GWB

GW-BASIC \$150.00

Information Processor 5160



Features

- Software and Hardware-Compatible with IBM PC and XT Systems
- MS-DOS 2.0 Operating System
- 8088 CPU, Optional 8087 Math Coprocessor
- 128K Memory Standard, Expandable to 256K on Base-Board, 640K Total Memory with Extended Memory Adapter Card
- Floppy Disk Controller
- Two RS-232 Serial Ports
- Parallel Printer Port Included on Base-Board
- Calendar/Real Time Clock Included on Base-Board
- Five Expansion Slots

General Description

The Information Processor 5160 consists of the System Unit (the computer), a CRT Display Monitor (either monochrome or color), and a Keyboard. Program and data storage are provided by either one or two, double-sided, double-density floppy diskette drives, with or without an optional 10 megabyte Winchester disk drive mounted in the System Unit.

The system base-board contains the microprocessor and its support logic, the basic system RAM memory array, the read-only ROM memory, a battery backed-up real-time clock, configuration switches, an interface for multiple diskette drives, a parallel printer interface, two serial interface ports, the keyboard interface and the I/O expansion bus with five expansion slots. The integration of these essential hardware functions into the base-board is an economical feature, in that it

eliminates the need to add expensive function cards, yet supports the addition of further enhanced function capabilities to the system if desired.

The heart of the system is the Intel 8088 CPU with an 8-bit external data bus and a full 16-bit internal bus. The CPU operates at 4.77MHz, with an 840ns bus cycle time and a 1.05µs I/O cycle time. A preconfigured socket to accept the Intel 8087 Math Coprocessor allows extended processing capability.

High performance CPU support chips provide four DMA channels, three timer-counter channels, and eight prioritized levels of interrupt. One of the DMA channels is dedicated to refreshing the dynamic RAM memory; the other three are available to program software for high-speed memory data transfers.

The Information Processor 5160 is shipped with 128K bytes of RAM memory standard. Additional RAM

sockets in the memory array allow the system unit base-board to house an additional 128K bytes, providing up to 256K bytes of on-board read-write RAM memory. An additional 384K bytes of RAM memory can be provided by the Expanded Memory Adapter Card when installed in one of the expansion slots.

The diskette drive interface for 5¼-inch drives, using a Floppy Disk Controller, is incorporated on the base-board and does not occupy one of the expansion slots. Interrupt driven, the interface provides programmable drive parameters and supports the drive's write-protect logic. This interface will accommodate up to four drives, either MFM-coded double-density, or FM-coded single-density.

The Winchester Hard Disk Drive, which mounts within the System Unit, provides 10 megabytes (formatted) of program and data storage. All transfers to and from the disk are via direct memory access (DMA).

**30 Day Unconditional Warranty
 Order Now!**

Industrial IBM PC

The system unit base-board also provides two EIA RS-232C asynchronous serial interface ports without occupying an I/O expansion slot. All standard data baud rates, and Clear-To-Send (CTS), Request-To-Send (RTS), Data-Set-Ready (DSR), Data-Terminal-Ready (DTR), Ring-Indicator (RI) and Carrier-Detect (CD) modem control signals are supported.

The Parallel Printer Interface is an integral part of the system base-board, and is a full interrupt driven parallel printer port.

A battery backed-up calendar/real-time clock provides the time and date used by the MS-DOS operating system to date-stamp files. In the power-down

mode, the clock maintains time even if the System Unit is turned off or is disconnected from its power source.

The Monochrome Display Monitor is a high-resolution (720 dots horizontal, 350 lines vertical), 12-inch amber CRT monitor. The power switch, brightness and contrast controls are located on the front panel for operator convenience.

The Color/Graphics Monitor is a high-resolution (640x200 PEL), high contrast, 12-inch black screen CRT monitor. The power switch and brightness controls are located on the front panel for operator convenience.

The keyboard is styled after a conventional typewriter with the exception of two additional key

groups: a program function key group, and a cursor-control/numeric-data-entry key group. Additional features include Leds on the caps lock and numeric lock keys which indicate to the user that these functions are activated.

Industrial I/O Cards Available

32 Digital Input DIM 32
 32 Digital Output DOM 32
 Thermocouple Input TC15
 RTD Input RTD15
 Analog/Digital I/O AIO4
 Analog/Digital I/O AIO8
 Analog/Digital I/O AIO16
 Analog Output (6) AOB6
 Strain-Gauge Input SGO4

Specifications

Processor

16-bit 8088

Memory

128K dynamic RAM (expandable to 640K)

Disk Storage

One or two double-sided, double-density floppy disk drives.
 10 megabyte Winchester hard disk (optional).

Printer Port

One IBM PC/XT compatible parallel

Serial Ports

Two RS-232, asynchronous

I/O Expansion

Five Slots, IBM PC/XT compatible

Calendar/Real Time Clock

Hour, minute, second and date

Operating System

MS-DOS 2.0

Ordering Guide

5160-1C

One 360K Floppy Drive .. \$2,999.00

5160-2C

Two 360K Floppy Drives . \$3,199.00

5160-3C

One 360K Floppy Drive,
 One 10MB Hard Disk \$4,999.00

All systems include:

MS-DOS, Keyboard, Color Adapter Card.

GW-BASIC..... \$150.00

Dimensions

System Unit

Width: 20.81 inches

Depth: 15.25 inches

Height: 6.25 inches

Keyboard

Width: 17.75 inches

Depth: 7.625 inches

Height: 1.5 inches to 2.062 inches
 (Adjustable slant)

Monitor

Width: 15.11 inches

Depth: 16.5 inches

Height: 11.0 inches

Power Requirements

System Unit

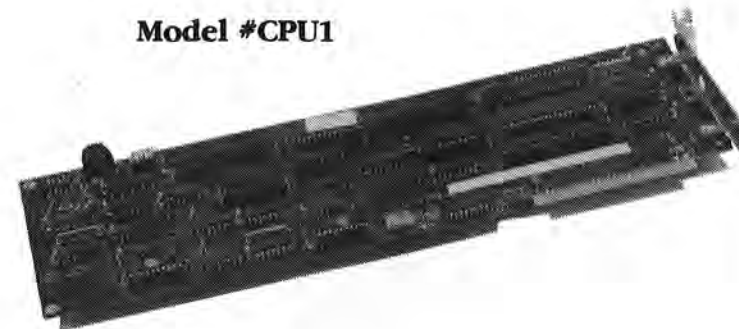
115Vac, 3A



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 Order Now!**

PC/CPU Card™

Model #CPU1



Features

- IBM PC Hardware/Software Compatible
- Compact Design
- Flexibility
- PC/XT Applications

The PC/CPU card is a single board computer designed to provide optimum compatibility with the IBM PC.

It allows for the addition of standard IBM PC add-on hardware products to create a PC/XT compatible. The PC/CPU Card allows you to configure a PC compatible system to exactly match your unique data processing requirements.

Features and Advantages

IBM PC Hardware/Software Compatible

The PC/CPU Card in a single board, provides full compatibility with the IBM PC at the CPU logic level.

Component level logic was designed to allow software checks to the hardware level. Our ROM BIOS software is designed to support IBM standard operating systems such as MS-DOS™ and CP/M-86™.

Compact Design

The entire IBM PC/XT CPU logic is placed on a standard IBM add-on board configuration. This compactness enables you to house PC compatible logic in a very small area.

Flexibility

PC/CPU Card can be used in IBM compatible bus structured chassis. This on-card PC Logic allows for the addition of IBM standard enhancements such as RAM Boards, Serial Boards, Network Transporters, Video Adapters, and other peripheral devices. This flexibility solves specific data processing needs at a cost-saving alternative to a full PC configuration.

PC/XT Applications

Our single board computer will support popular PC-DOS, MS-DOS and CP/M-86 operating systems.

Specifications

8088 CPU with optional 8087 co-processor.
 8K of EPROM space. Supports 2764, and 27128 EPROMS
 4 DMA channels (one for refresh)
 3 Timer channels (one for refresh)
 8 levels of interrupts
 IBM compatible keyboard port
 On-Board Mini-Speaker
 Reset switch on-board
 ROM BIOS included in EPROM
 Supports MS/DOS, PC/DOS, and CP/M-86 operating systems
 Small size: 4.2 in. x 13.13 multi (Standard IBM Add-on board size)

Operating temperature: 0-70 degrees C.

Power: +5 VDC @ 1.2a

BUILD YOUR OWN PC CARD #1

Ordering Guide

Model #CPU1 \$429.00
 Model #MV2 \$499.00
 Model #DMC3 \$429.00
 Model #MC4 \$429.00

Use the following Enclosures:

Model #XCH6
 (6-slot chassis) \$995.00
 Model #6531-XC
 (10-slot, rack mounted) .. \$1,399.00

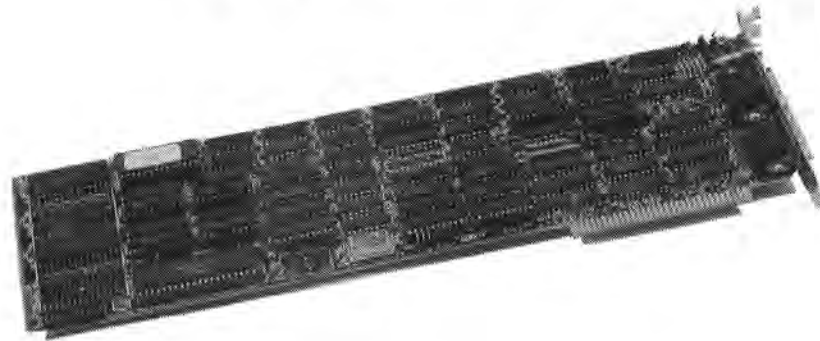
Model #6531 (10-slot,
 rack mounted) \$1,399.00

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PC/Multi-Video™

Model #MV2



Features

- IBM Compatibility
- 4 Video Display Types
- Flicker-Free Display
- Increased Screen Display Size

The PC/Multi-Video card combines the capabilities of the IBM Color/Graphics Monitor Adapter and the IBM Monochrome Display Adapter on one plug-in card. The PC/Multi-Video card supports all standard display devices for the IBM PC.

The flexibility of the PC/Multi-Video design allows you to upgrade from a monochrome monitor to a color graphics monitor without adding an additional video card. Whether your display requirements range from four-color graphics for games and business or high resolution text for word processing the PC/Multi-Video card is the solution.

Specifications

General

16K bytes of high speed display memory standard (expandable to 32K)
Motorola 6845 CRT controller
Four separate video output

connectors, selected by hardware or software:

9 pin D-shell connector for monochrome video monitors
9 pin D-shell connector for IBM compatible RGB direct drive monitors
Phono jack for composite monitors
4 pin on-board connector for RF modulated TV set

Monochrome Video

7 by 9 dot character in 9 by 14 dot box
80 columns by 25 rows on display screen
IBM standard character attributes; reverse video, blinking, highlighting and underlining
Character generator is an 8K by 8 EPROM

Color/Graphics Video

Text Mode
40 character columns by 25 rows on display screen
80 character columns by 25 rows on display screen

5 by 7 dot character in 8 by 8 dot box
IBM standard character attributes:
16 colors, and blinking

Graphics Mode

320 pixels by 200 rows, IBM standard
4 color sets, 2 palettes
640 pixels by 200 rows, black and white mode

Optional Features

720x348 dot resolution with extra
16K RAM in monochrome graphics mode
132 character columns by 44 rows with optional crystal

BUILD YOUR OWN PC CARD #2

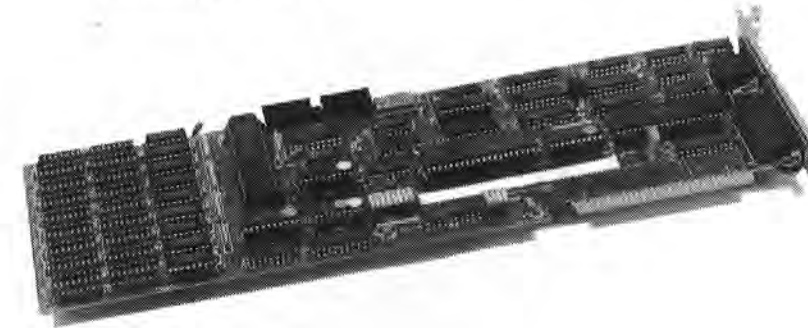
Ordering Guide

Model #MV2 \$499.00

**BUILD YOUR OWN PC
EASY AS 1-2-3**

PC/Disk Multi-Card™

Model #DMC3



Features

- Floppy Disk Controller
- Multi-Function RAM Expansion Memory
- Asynchronous Communications Port
- Parallel Port

The PC/Disk Multi-Card provides four important features on one plug-in card. One of the main features of this board is the IBM compatible floppy disk controller interface. Other features include an asynchronous communications port, a parallel port for connecting a printer, and user upgradable RAM up to 768K.

Features & Advantages

Floppy Disk Controller

This built-in disk controller supports up to two 5¼" IBM compatible disk drives. Our state-of-the-art controller uses an all digital design which requires no adjustments or preventative maintenance. The advantage in an all digital design is increased reliability.

Multi-Function RAM Expansion Memory

The PC/Multi-Card is expandable in 64K increments to 192K. Using the latest 256K RAM chips, you can expand your PC to 768K bytes. The memory may be addressed on any 64K boundary.

User defineable switches also allow for intermixing rows of 64K and 256K RAM chips.

Asynchronous Communications Port

Our serial communications port interfaces to standard RS-232C communication devices. You can connect your modem, letter quality printer and other types of serial devices. This port is also selectable between COM1 or COM2 and fully supports PC communications software.

Parallel Port

Just plug your Centronics compatible printer into the parallel port connector and you're up and running. The parallel printer port is selectable between LPT1, LPT2, and LPT3. This flexibility allows the printer port to use IBM compatible software drivers and diagnostics.

Specifications

Floppy Disk Controller

NEC 765 Controller Chip
All digital design
Supports two 5¼" IBM compatible drives

Multi-Function RAM

Memory mix for interchanging 256K and 64K RAM chips
User selectable memory configuration
64K RAMS up to 192K
256K RAMS (optional) up to 768K

Asynchronous Communications Port

9 pin D-shell connector
INS 8250 Controller Chip
Programmable baud rate up to 9600 bps
COM1 or COM2 dip switch selectable

Parallel Port

25 pin D-shell connector
Supports IBM and standard Centronics printer
LPT1, LPT2, or LPT3 dip switch selectable

BUILD YOUR OWN PC CARD #3

Ordering Guide

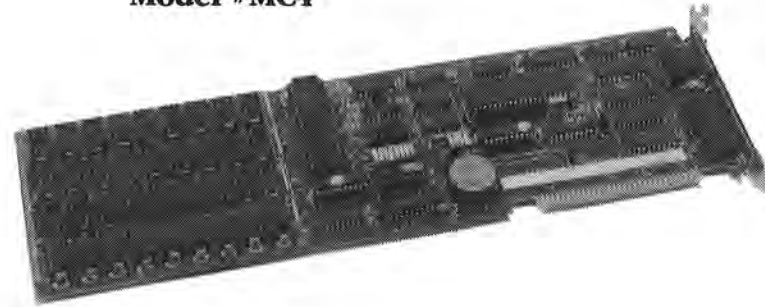
Model #DMC3 \$429.00

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**BUILD YOUR OWN PC
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PC/Multi-Card™

Model #MC4



Features

- **Multi-Function RAM Expansion Memory**
- **Asynchronous Communications Port**
- **Continuous Clock/Calendar Port**
- **Parallel Port**

The PC/Multi-Card provides four important functions on one plug-in card. The PC/Multi-Card provides user upgradeable RAM, a parallel port for connecting a printer, an asynchronous communications port, and a continuous clock/calendar for setting the system time and date. The PC/Multi-Card is a powerful enhancement for IBM PC/XT and PC compatible computers by using only one expansion slot for multiple functions.

Features & Advantages

Multi-Function RAM Expansion Memory

The PC/Multi-Card is expandable in 64K increments to 256K. Using the latest 256K RAM chips, you can expand your PC up to 1M bytes. The memory may be addressed on any 64K boundary. User defineable switches allow for intermixing rows of 64K and 256K RAM chips.

Parallel Port

Just plug your IBM or Centronics compatible printer into the parallel port connector and you're up and

running. The parallel printer port is user selectable between LPT1, LPT2, and LPT3. This flexibility allows the printer port to be fully IBM compatible and allows the user of IBM compatible software drivers and diagnostics.

Asynchronous Communications Port

The serial communications port interfaces to standard RS-232C communication devices. You can connect your modem, letter quality printer and other types of serial devices. This port is also selectable between COM1 or COM2 and fully supports PC communications software.

Continuous Clock/Calendar Port

The clock/calendar eliminates the trouble of manually setting the time and date each time you power up. Our state-of-the-art CMOS clock/calendar comes with a long-lasting lithium battery for years of accurate time-keeping, even when your computer is turned off.

Specifications

Multi-Function RAM

Memory mix for interchanging 256K and 65K RAM chips
User selectable memory configuration
64K RAMS up to 256K
256K RAMS (optional) up to 1M

Parallel Port

25 pin D-shell connector
Supports IBM and standard Centronics printers
LPT1, LPT2, or LPT3 dip switch selectable

Asynchronous Communications Port

9 pin D-shell connector
INS 8250 Controller Chip
Programmable baud rate up to 9600 bps
COM1 or COM2 dip switch selectable

Clock/Calendar Port

3 volt Lithium battery
CMOS Clock/Calendar circuit

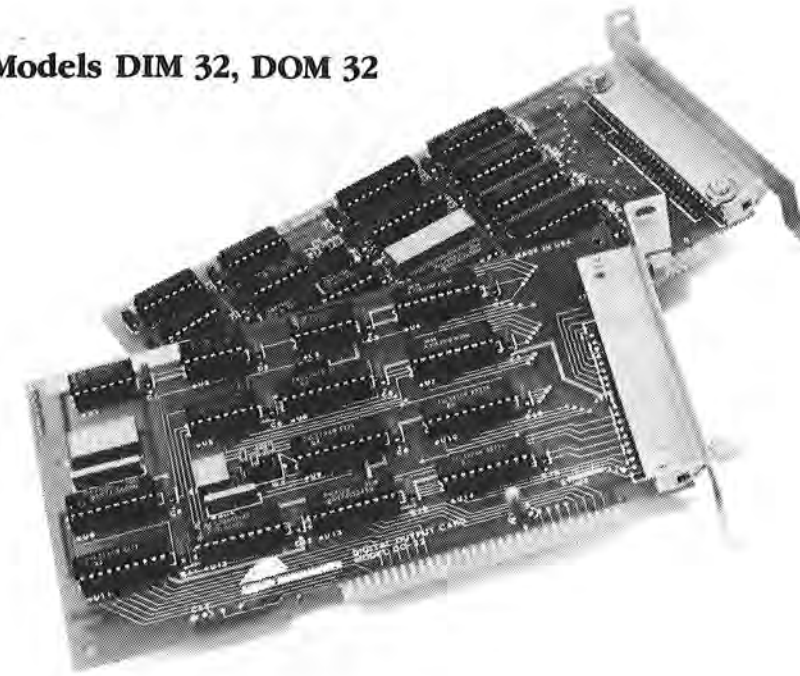
BUILD YOUR OWN PC CARD #4

Ordering Guide

Model #MC4 \$429.00

Digital Input Card and Digital Output Card

Models DIM 32, DOM 32



Features:

- **Compatible with IBM PC and XT Systems**
- **Interfaces 32 TTL Inputs DIM32**
- **Interfaces 32 TTL Outputs DOM32**
- **Connects to Standard I/O Racks**
- **Expandable to 256 Inputs or Outputs**
- **First 8 Digital Input Channels Can Generate Interrupts**

The DIM32 economically interfaces 32 digital input channels and the DOM32 interfaces 32 digital output channels to the IBM PC, PC/XT, 5531 or compatible computer. Each card occupies one half-length slot. Specifically designed for use in industrial applications, these cards are ideally suited for process control data acquisition, energy management, and other industrial applications requiring on/off inputs and outputs.

Description

The on/off digital inputs and outputs connect to the cards via one 50-pin male header which interfaces, through

a 50-conductor ribbon cable, directly to industrial, isolated high-level digital input/output racks and modules. (The cables, racks, and modules must be ordered separately.)

The inputs and outputs, which connect to either 8-, 16- or 24-position digital I/O racks and modules, are configured as negative true logic. Up to eight digital output cards may be used simultaneously with the driver software. This allows up to 256 digital inputs or outputs with no other cards in system or expansion chassis.

Interrupts

The first eight digital input channels

on each DIM32 digital input card may be individually selected to generate interrupts (IBM IRQ 2-7) on a level transition, a high input, or a low input.

Support Software

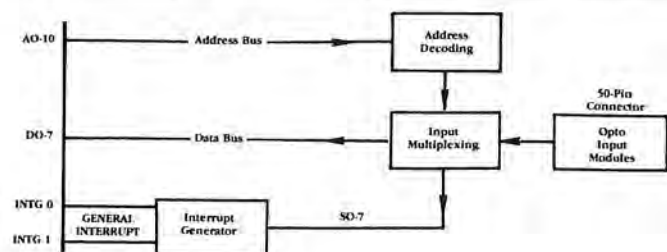
One software disk and one support manual are included with each DIM32 or DOM32 card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "CALL" statement. This CALL statement is used to transmit all digital inputs to or outputs from the card. The INP and OUT commands standard with IBM BASIC can also be used to access the I/O on the cards.

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EASY AS 1-2-3**

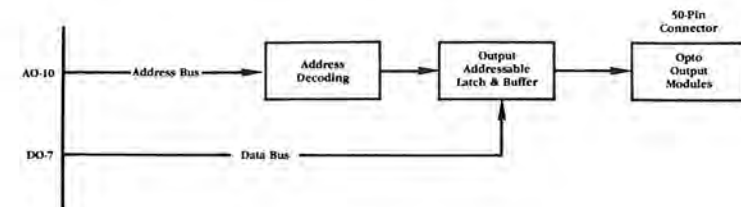
**Robotics
Batch Control**

Block Diagram

DIM32M



DOM32M



Pinout Information

Note: All even pins 18-50 are Ground

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	Ch23	10	Ch27	21	Ch13	39	Ch4
2	Ch31	11	Ch18	23	Ch12	41	Ch3
3	Ch22	12	Ch26	25	Ch11	43	Ch2
4	Ch30	13	Ch17	27	Ch10	45	Ch1
5	Ch21	14	Ch25	29	Ch9	47	Ch0
6	Ch29	15	Ch16	31	Ch8	49	+5 Volts
7	Ch20	16	Ch24	33	Ch7		
8	Ch28	17	Ch15	35	Ch6		
9	Ch19	19	Ch14	37	Ch5		

Specifications

Number of Inputs (DIM32)

32 LS-TTL Compatible (Negative True).

Number of Outputs (DOM32)

32 TTL Compatible (Negative True).

Input Logic Levels (DIM32)

Logic 0: 0 to 0.8 VDC, sink 2mA;
Logic 1: 2.3 to 5.0 VDC.

Output Logic Levels (DOM32)

Logic 0: 0 to 0.6 VDC, Sink 16mA;
Logic 1: 2.0 to 5.0 VDC.

Throughput Time

50 milliseconds per point.

Address Range

Any 8-byte boundary within Hex000 to Hex3FF.

Connector Type

50-Pin Male Header.

Supply Voltage

+5 Volts DC ($\pm 5\%$).

Supply Current Draw

DIM32
150mA (no inputs on);
250mA (all inputs on).

DOM32

350mA (no outputs on);
400mA (all outputs on);
700mA (all outputs @
maximum 10mA).

Operating Temperature Range

0-60°C (32-140°F).

Storage Temperature Range

-40 - +75°C (-40 - +175°F).

Relative Humidity Range

5-95%, non-condensing.

Ordering Guide

Model # DIM32 \$300.00

Description

• 32-Channel digital input card

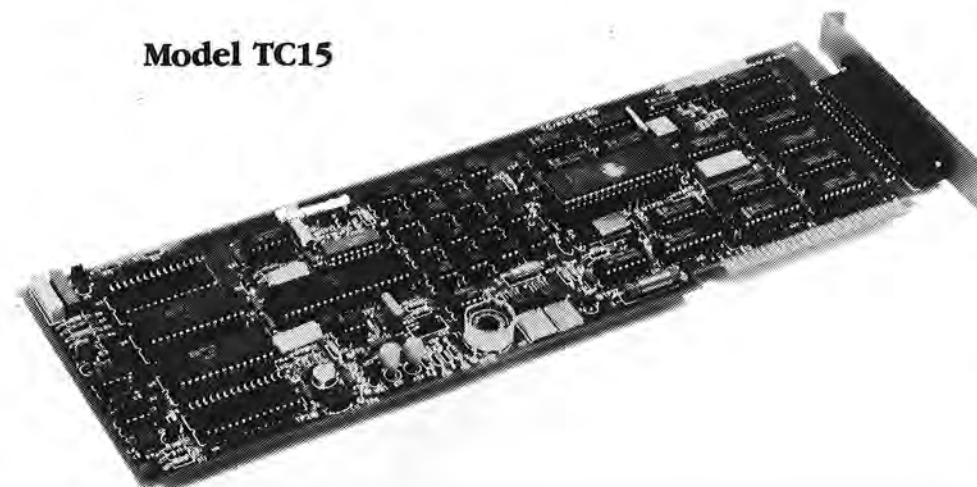
Model # DOM32 \$300.00

Description

• 32-Channel digital output card
• Cards supplied with a 50-conductor cable to interface digital I/O cards to digital racks (6-foot length).

Thermocouple Input Card

Model TC15



Features:

- Compatible with IBM PC and XT Systems
- Interfaces 15 Thermocouples to IBM Bus
- On-Board Microprocessor for Linearization & Scaling
- User-Selectable T/C Types J, K, S, T, & E
- Cold-Junction Compensated
- 500 Volts Isolation from the Bus
- 1.0 or .1 Degree Resolution Selectable

The Model TC15 provides an economical means for interfacing up to 15 thermocouples to the IBM PC, PC/XT, 5531 or compatible computer. Specifically designed for use in rugged environments, the card is ideally suited for process control, data acquisition, energy management, and other industrial applications requiring the collection of multiple temperature inputs.

Description

The Model TC15 thermocouple card accepts a maximum of 15 direct, fully differential thermocouple inputs, digitizes these signals to a resolution of ± 14 bits, and linearizes them according to standard millivolt/temperature tables. The data may be sent in either degrees F or C, with either 0.1 or 1.0 degree resolution.

All inputs to the card are optically isolated from the IBM PC data bus. This allows the common-mode voltage to be as high as 500 volts DC or peak AC above the digital or system ground. All thermocouple inputs have upscale

burnout for break detection. Industry standard cold-junction compensation is provided on the screw termination board, which is included with the Thermocouple Input Card at no extra charge.

Range and Resolution

The TC15 accepts any of 5 different user-selectable (via jumper connector) thermocouple types. The entire card may be configured for only one type of thermocouple. The following types and ranges are available with 1.0 degree resolution:

Sensor Type	Range (Degrees C)
J	-165 to 750
K	-165 to 1370
T	-165 to 400
E	-165 to 1000
S	-20 to 1765

If 0.1 degree resolution is configured (on-board), then the maximum input is +800 degrees Celsius.

Microprocessor

The TC15's dedicated, on-board microprocessor handles the various

overhead tasks associated with thermocouple temperature measurement. These tasks include analog/digital conversion, linearization, scaling and so forth. As a result, usable data, scaled by the card, is sent to the IBM PC-compatible data bus.

Mode of Operation

The TC15 features two user-selectable modes of operation which determine the manner in which the temperatures are collected for the IBM PC-compatible data bus. These two modes are convert-on-demand and continual scan.

In the convert-on-demand mode, the card idles in a wait-state until a conversion is initialized by the computer. The card then performs the conversion for the indicated channel number and sends the data to the data bus in a throughput time of approximately 150 milliseconds.

In the continual-scan mode, all input channels are scanned continuously and the data from each channel is retrieved to the data bus within 200 microseconds. The data sent to the data bus

Made in America

Data Logging

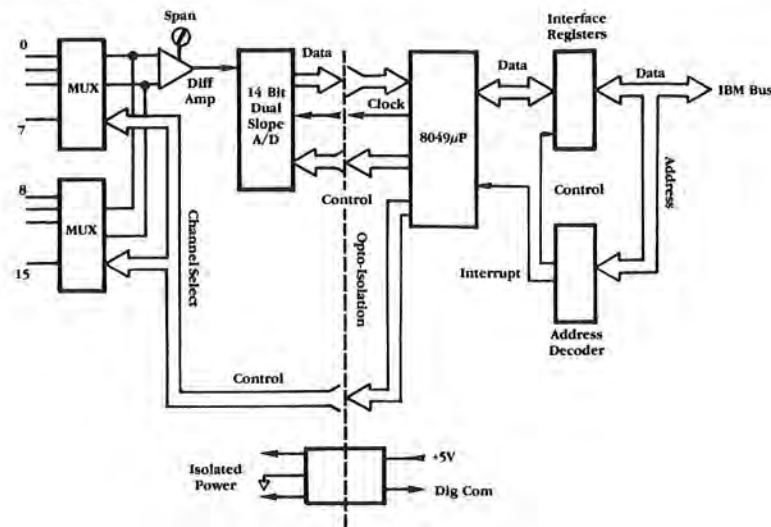
represents an average of the most recent data retrieved and that of the previous reading, a technique which achieves superior noise rejection. In the continual-scan mode, each channel is scanned once every 2.4 seconds.

Termination Board

A remotely mounted screw termination board, included at no extra cost, provides the real-world connections to the Model TC15 Thermocouple Input Card. Cold-junction compensation is provided on the termination board as well as prefiltering for the input. The termination board provides a 37-pin female DB-style connector with the appropriate pins matching the connector on the Thermocouple Input Card. The termination board may be mounted using screw standoffs or snap track which is provided.



Block Diagram



Software Support

One software disk and one support manual are included with the Thermocouple Input Card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. This call statement is used to access all inputs on the board. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O.

Pinout Information

Pin	Function	Pin	Function
1	Ch1 +	20	Ch9 -
2	Ch1 -	21	Ch10 +
3	Current Source B	22	Ch10 -
4	Ch2 -	23	Ch11 +
5	Ch2 +	24	Ch11 -
6	Current Source A	25	Ch12 +
7	Ch3 +	26	Ch12 -
8	Ch3 -	27	Ch13 +
9	Ch4 +	28	Ch13 -
10	Ch4 -	29	Ch14 +
11	Ch5 +	30	Ch14 -
12	Ch5 -	31	Ch15 +
13	Ch6 +	32	Ch15 -
14	Ch6 -	33	Ch16 +
15	Ch7 +	34	Ch16 -
16	Ch7 -	35	+8 volts
17	Ch8 +	36	-7.5 volts
18	Ch8 -	37	GND
19	Ch9 +		

Ordering Guide

Model # TC15 \$1,395.00

Description

Includes the following items:

- 15-Input Thermocouple Card for the IBM PC, PC/XT, 5531 or any compatible computer.
- Thermocouple Termination Board.
- Shielded ribbon cable (36") for connection between Thermocouple Input Card and Termination Board.
- Operator's Manual.
- Operating Software.

Specifications

Inputs

Fifteen thermocouples, maximum; Types J,K,S,T, and E (All inputs must be the same TC type).

Input Temperatures

-200 to +1800 degrees C (-328 to +3272 degrees F).

Zero & Span Adjustment

±10%, one zero and one span adjustment for entire card.

Conformity to NBS Tables

Above zero degrees C ±1.5 degrees.
Below zero degrees C ±2.5 degrees.

Resolution

14 bits (plus sign).

Input Connector

37-pin female DB-style connector.

Input Impedance

10 megohms.

T/C Break Detect Current

1 microamp.

Maximum Input Voltage

±15 volts DC or peak AC.

Common-Mode Rejection

140dB at 60Hz.

Isolation Potential

Inputs may be 500VDC (300VAC rms) above the digital or system ground.

Throughput Time

150 milliseconds. Power Supply Requirement 5V ±5% at 700mA.

Operating Temperature

0-60 degrees C.

Storage Temperature

-40 to 75 degrees C.

Relative Humidity

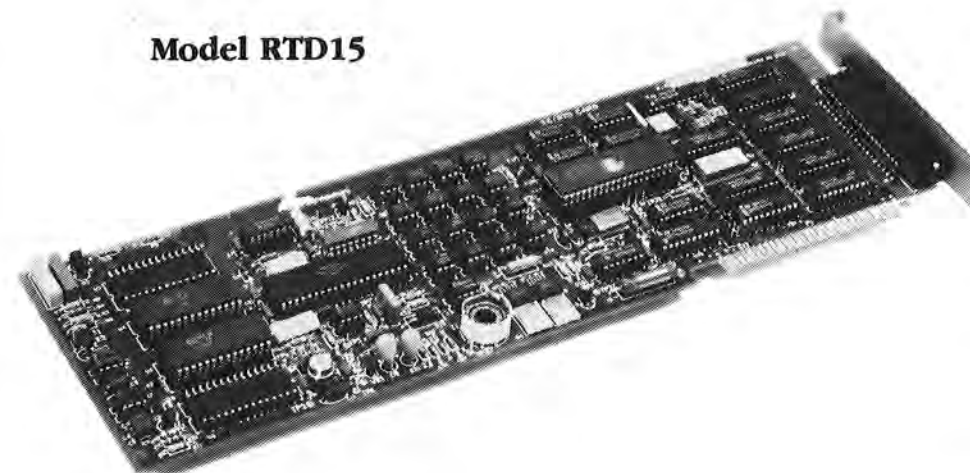
5% to 90%, non-condensing.

Address Range

Any 8-byte boundary within Hex 000 to Hex 3FF.

RTD Input Card

Model RTD15



Features:

- Compatible with IBM PC and XT Systems
- Interfaces fifteen 100 ohm RTD to IBM Bus
- 14-Bit Resolution
- Degree F or C Selectable
- On-Board Microprocessor for Linearization and Scaling
- 1.0 or .1 Degree Resolution Selectable

The Model RTD15 economically interfaces up to 15 resistance temperature devices (RTDs) to the IBM PC, PC/XT, 5531 or other compatible computer. Specifically designed for use in rugged environments, the card is ideally suited for process control, data acquisition, energy management, and other industrial applications requiring the collection of multiple temperature inputs.

Description

The Model RTD15 accepts up to 15 direct, fully differential, 100 ohm platinum RTD inputs, digitizes these signals to a resolution of ±14 bits, and linearizes them according to standard resistance/temperature tables. The data may be sent to the data bus in either degrees F or C at 0.1 or 1 degree resolution (jumper selectable).

All inputs to the RTD Input Card are optically isolated from the IBM PC data bus. This allows the common-mode

input voltage to be as high as 500 volts DC or peak AC above earth ground. Industry standard 3-wire lead-length compensation is provided on a screw termination board which is included with the RTD Input Card.

Range and Resolution

The RTD15 card accepts 100 ohm platinum inputs (alpha = 0.00385 or 0.00392 ohms/ohm/°C) over a full-scale range of -130 to +850 degrees Celsius at 1 degree resolution. If a resolution of 0.1 degree is selected (via jumper connector), the full-scale range is then -130 to +800 degrees Celsius.

Microprocessor

The card's dedicated, on-board microprocessor handles the various overhead tasks associated with RTD temperature measurement such as analog/digital conversion, linearization, scaling, and so forth. As a result, usable data scaled by the card is sent to the IBM PC-compatible data bus.

Mode of Operation

The RTD15 features two user-selectable modes of operation which determine the manner in which the input signals are converted. The two modes available are convert-on-demand and continual scan.

In the convert-on-demand mode, the card idles in a wait-state until a conversion is initiated by the computer. The card then performs the conversion for the indicated channel number and sends the data to the data bus in a throughput time of approximately 150 milliseconds.

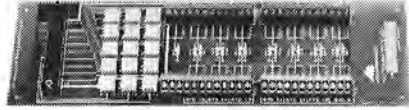
In the continual-scan mode, all input channels are scanned continuously and data is sent to the data bus from each channel within 200 microseconds. The data sent to the data bus represents an average of the most recent data retrieved and that of the previous reading, a technique which achieves superior noise rejection. In the continual-scan mode, each channel is scanned once every 2.4 seconds.

30 Day Unconditional Warranty

Energy Management

Termination Board

A remotely mounted screw termination board, included (with 36-inch shielded interface cable) at no extra cost, provides the real-world connections between the RTDs and the RTD Input Card and RTD zero adjustments. The termination board connector is a 37-pin female DB-style connector with the appropriate pins matching the connector on the card. The termination board may be mounted using screw standoffs or snap track.



Software Support

One software disk and one support manual are included with the Model RTD15 card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. This call statement is used to access all analog inputs to the board. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O.

Specifications

Inputs

Fifteen 100 ohm Platinum RTD, maximum.

Input Alpha

0.00385 or 0.00392 ohms/ohm/°C.

Input Range

-130 to +850 Degrees C
(-200 to +1560 Degrees F).

Zero & Span Adjustment

±10%, one zero and one span adjustment for entire card.

Resolution

±14 bits, 0.1 or 1 Degree.

Conformity to NBS Tables

Within ±1 Degree C.

Temperature Induced Drift

0.5 volt/Degree C.

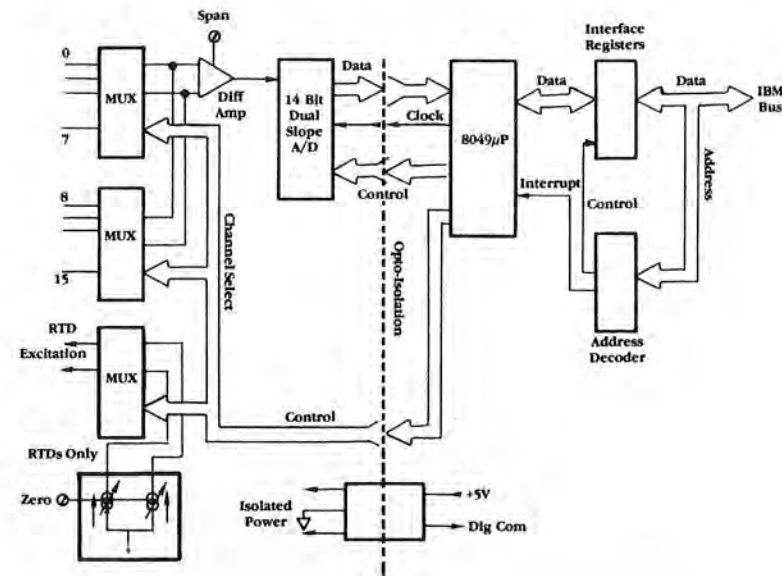
Input Impedance

10 Megohms.

RTD Excitation Current

0.5 milliamp.

Block Diagram



Pinout Information

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	Ch1 +	11	Ch5 +	21	Ch10 +	30	Ch14 -
2	Ch1 -	12	Ch5 -	22	Ch10 -	31	Ch15 +
3	Current Source B	13	Ch6 +	23	Ch11 +	32	Ch15 -
4	Ch2 -	14	Ch6 -	24	Ch11 -	33	Ch16 +
5	Ch2 +	15	Ch7 +	25	Ch12 +	34	Ch16 -
6	Current Source A	16	Ch7 -	26	Ch12 -	35	+8 volts
7	Ch3 +	17	Ch8 +	27	Ch13 +	36	-7.5 volts
8	Ch3 -	18	Ch8 -	28	Ch13 -	37	GND
9	Ch4 +	19	Ch9 +	29	Ch14 +		
10	Ch4 -	20	Ch9 -	30	Ch14 -		

Maximum Input Voltage

±15 volts DC or peak AC.

Common-Mode Rejection

140dB at 60Hz.

Isolation Potential (Maximum Common Mode Voltage)

Inputs may be 500Vdc (300VAC rms) above digital or system ground.

Input Connector

37-Pin female DB-Style Connector.

Power Supply Required

5 volts ±5% at 700 milliamps.

Operating Temperature

0-60 Degrees C.

Storage Temperature

-40 to 75 Degrees C.

Relative Humidity

5-90%, Non-Condensing.

Address Range

Any 8-byte boundary within Hex 000 to Hex 3FF.

Ordering Guide

Model # RTD15 \$1,395.00

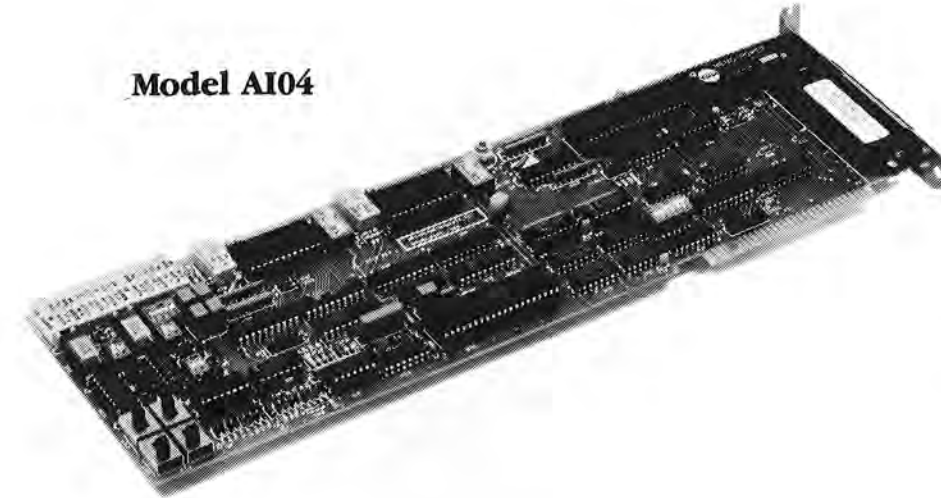
Description

Includes the following items:

- 15-Input RTD card for the IBM PC, PC/XT, 5531 or compatible computer.
- RTD Termination Board.
- Shielded ribbon cable (36") for connection between RTD Input Card and Termination Board.
- Operator's Manual.
- Operating Software.

Multi-Function Analog and Digital I/O Card

Model AI04



Features:

- Compatible with IBM PC and XT Systems
- 4 Analog Inputs
- 2 Analog Outputs
- 12 Digital I/O Channels
- 2 RTD Input Channels
- 12 Bit Resolution
- Selectable Gains of 10, 100, & 1000

The Model AIO4 multi-function analog and digital input/output card easily plugs into any expansion slot in the IBM PC, PC/XT, 5531 or compatible computer. Designed for use in rugged environments, the AIO4 card is ideally suited for process control, data acquisition, energy management, and other industrial applications requiring mixed analog and digital input and output capability.

Description

The AIO4 accepts four fully differential analog input channels (±2.0475 volts full scale) and digitizes these signals to a 12-bit-plus-sign resolution. Two of the input channels provide selectable gains of 10, 100, or 1000. The other two channels contain switch-selectable resistance temperature device (RTD) interfaces for an integral temperature measurement capability of -200 to 650 degrees Celsius using 2- or 3-wire RTDs. Each input channel is also provided with a switch-selectable input filter (30dB @ 60Hz) to enhance its signal

integrity. Over-voltage protection to 120 volts RMS is also provided for all analog input channels.

In addition to the analog inputs, the card features two channels of 12-bit analog output with switch-selectable output ranges of ±10, ±5, ±2.5, 0-5, and 0-10 volts. These outputs are especially useful for retransmitting inputs or for completing a control loop.

The AIO4 provides 12 channels of TTL/CMOS-compatible digital I/O. These 12 digital I/O channels are comprised of one 8-bit port and one 4-bit port. Both ports may be used for input, for output, or a combination of the two, based on your application needs.

Features

Several features of the AIO4 Multi-Function Analog and Digital I/O Card make it the most versatile I/O card on the market for industrial applications. For example, two precision voltage reference outputs provide adjustability between -6.8 to +6.8 volts at 5mA. Additionally, two precision 1mA

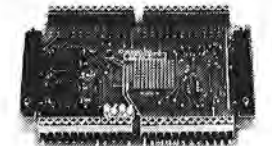
constant current sources (with a compliance of -10 to 25 volts) are provided.

Interrupt Capabilities

The AIO4 provides an external interrupt control. This enables the user to select any IBM PC interrupt level (2-5) for programming interrupt routines while still performing background data acquisition and interrupt control.

Termination Board

A remotely mounted screw termination board, included at no extra cost, provides the real-world analog and digital connections to the AIO4 card. Both the plug-in card and termination board provide 37-pin male DB-style connectors. The termination board is mounted using screw standoffs.



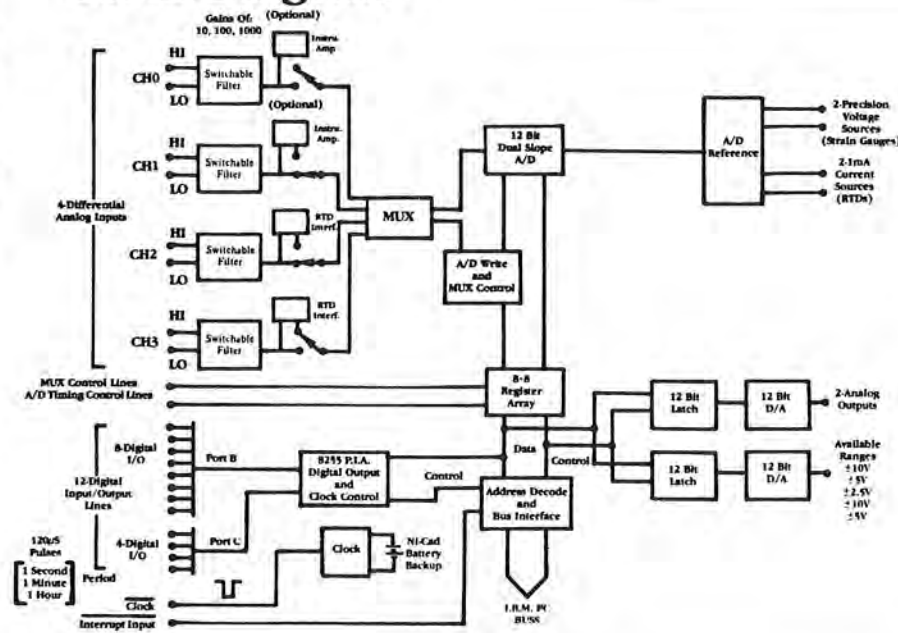
One Source

Data Logging

Software Support

One software disk and one support manual are available for the Model AIO4 Multi-Function Analog and Digital I/O Card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. The call statement is used to access all analog and digital I/O on the board. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O.

Block Diagram



Pinout Information

Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	IRQ In	9	PB1	17	Ch1 Lo.In.	25	Busy	33	Ch.3 Hi.In.
2	Conv Comp	10	PB0	18	Ch0 Lo.In.	26	PC3	34	Iexc2
3	PB7	11	Dig.Com.	19	Low Level Gnd.	27	PC2	35	Ch.2 Hi.In.
4	...PB6	12	D/A #1 Out	20	+5V	28	PC1	36	Ch.1 Hi.In.
5	PB5	13	Ref #1 Out	21	Run/Hold	29	PC0	37	Ch.0 Hi.In.
6	PB4	14	Ch3 Lo.In.	22	Ld. Ch. Addr.	30	Clock		
7	PB3	15	Iexc 3	23	Ch. Addr.1	31	D/A #0 Out		
8	PB2	16	Ch2 Lo.In.	24	Ch. Addr.0	32	Ref.#0 Out		

Rear view of main I/O connector (37 pin "D")

Specifications

Analog Inputs

Four, fully differential.

Gain Adjustment

1, 100, 1000 (ch. 0 and 1).

RTD Interface (selectable for Channels 2 & 3)

-200 to 650°C (alpha = 0.00385 ohms/ohm/°C).

Full Scale Range

±2.0475 volts.

Resolution

±12 bits.

Input Filtering (selectable)

30dB at 60Hz.

Input Overvoltage

120 volts RMS.

Common-Mode Rejection

70dB (Gain=1).

Overvoltage

120Vac continuous to one channel (28 channels/sec.).

Throughput Time

35 milliseconds.

Accuracy

±1 bit.

Analog Output Ranges

±2.5 volts, ±5 volts, ±10 volts
0-5 volts, 0-10 volts.

Analog Output Drive

±5mA.

Digital I/O Channels

12.

Digital Inputs

Logic 0: -0.5 to 0.8 Volts DC;
Logic 1: 2.0 to 5.0 Volts DC.

Digital Outputs

Logic 0: 0 to 0.4 Volts DC;
Logic 1: 2.4 to 5.0 Volts DC.

Operating Temperature Range

0 to 50 degrees C.

Storage Temperature Range

-20 to 70 degrees C.

Relative Humidity

0 to 90%, non-condensing.

Power Requirements

+5Vdc, 600mA;
-5Vdc, 15mA;
+12Vdc, 100mA;
-12Vdc, 100mA.

Ordering Guide

Model # AIO4 \$1,095.00

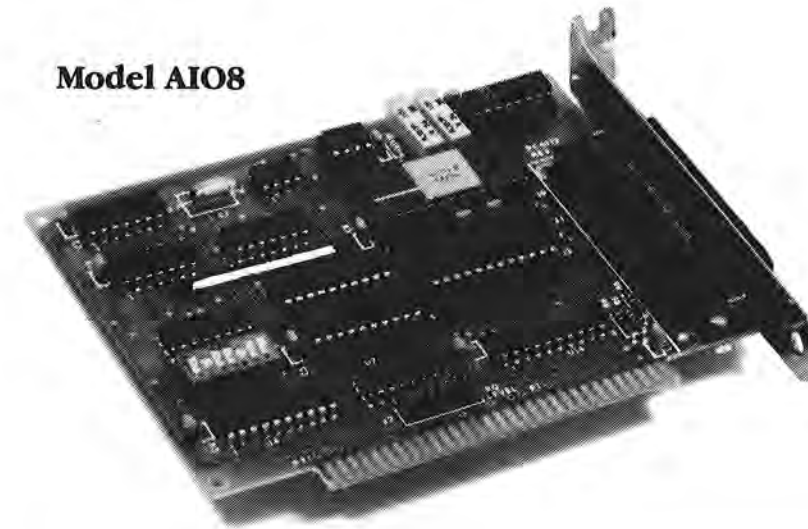
Description

Includes the following items:

- 4 analog input, 2 analog output, 12 digital I/O channel plug-in card.
- Termination Board.
- Shielded ribbon cable (36") for connection between the plug-in card and termination board.
- Operator's Manual.
- Operating Software.

Low-Cost Analog Digital I/O Card

Model AIO8



Features:

- Compatible with IBM PC and XT Systems
- 8 Single-Ended Analog Inputs
- 3 Digital Inputs (TTL)
- 4 Digital Outputs (TTL)
- 20,000 Samples per Second
- Event Counter

The Model AIO8 economically interfaces 8 high-level analog voltage inputs and 7 channels of digital I/O to the IBM PC, PC/XT, 5531 or compatible computer. The low-cost plug-in card is ideal for the multiple conditioned inputs common in data acquisition and energy management applications.

Description

The AIO8 card accepts 8 single-ended, ±5 volt (full scale) inputs, digitizes these signals to a resolution of ±12 bits (±1.22 mV), and sends the data to any IBM PC-compatible databus. Using the available software driver, the data throughput is typically 250 microseconds, if operating in compiled BASIC. However, the A/D throughput time of 50 microseconds enables 20,000 samples per second to be achieved.

Each analog input on the card can withstand a continuous overvoltage of ±30 volts, and each is failsafe (open) when power to the card is off.

The Model AIO8 also provides seven channels of TTL digital I/O interface. The digital I/O is composed of one 4-

channel output port and one 3-channel input port. As an added feature, a 10.0 volt (±0.1 volt) output is provided for applications requiring a reference.

The 3 channels of input can be used for frequency measurement, pulse and waveform generation, and pulse counting.

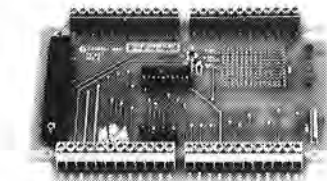
Interrupts & Event Counting

An 8253 programmable counter/timer provides periodic interrupts for the A/D converter and additional event counting, pulse and waveform generation, frequency, period, and pulse-width measurements. An external interrupt input (jumper selectable) for any of the IBM PC interrupt levels (2-7) is provided, which allows interrupt routines to provide background data gathering or interrupt-driven control.

Termination Board

A remotely mounted screw termination board, included at no extra cost, provides the real-world connections to the AIO8 plug-in card. Both the plug-in card and the termination board provide

37-pin male DB-style connectors. The termination board is wall mounted using screw standoffs.



Software Support

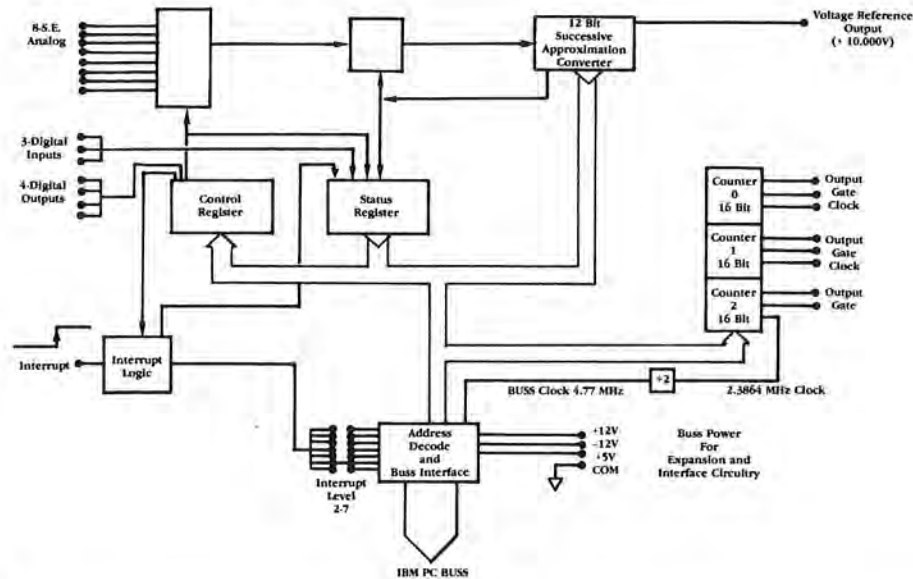
One software disk and one support manual are included with the AIO8 Low-Cost Analog/Digital I/O Card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. The call statement is used to access all analog and digital I/O on the board. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O on the card.

Pinout Information

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	+12v	11	DIG. COM.	20	-12v	30	ANALOG IN 7
2	CTR. 0 CLOCK	12	LLGND.	21	CTR. 0 GATE	31	ANALOG IN 6
3	CTR. 0 OUT	13	LLGND.	22	CTR. 1 GATE	32	ANALOG IN 5
4	CTR. 1 CLOCK	14	LLGND.	23	CTR. 2 GATE	33	ANALOG IN 4
5	CTR. 1 OUT	15	LLGND.	24	INTERRUPT INPUT	34	ANALOG IN 3
6	CTR. 2 OUT	16	LLGND.	25	IP1	35	ANALOG IN 2
7	OP1	16	LLGND.	26	IP2	36	ANALOG IN 1
8	OP2	17	LLGND.	27	IP3	37	ANALOG IN 0
9	OP3	18	LLGND.	28	DIG. COM.		
10	OP4	19	V _{ref}	29	+5v		

Note: +5v, +12v & -12v are outputs from computer power and should *not* be overloaded.

Block Diagram



Specifications

Number of Analog Inputs

8 Single-Ended.

Full Scale Range

±5 Volts DC.

Resolution

±12 bits (±4096 counts, 1.22mV/count).

Input Bias Current

100 nanoamps, maximum.

Common Mode Rejection

75dB, minimum.

Input Overvoltage

±30 Volts DC or peak AC

Stability

Zero: ±10μV/C, maximum;
Full Scale: ±25μV/C, maximum.

Throughput Time

250 microseconds
(4000 channels/sec.)

Digital Inputs

Logic 0: 0 to 0.4VDC, Source 0.4mA;
Logic 1: 2.0 to 5.0VDC Sink 20μA.

Digital Outputs

Logic 0: 0 to 0.5VDC, Sink 8.0mA;
Logic 1: 2.7 to 5.0, Source 0.4mA.

Operating Temperature Range

0 to 50 degrees C.

Storage Temperature Range

-20 to 70 degrees C.

Humidity

0 to 90% RH, non-condensing.

Power Requirements

+5 Volts DC, 200mA;
+12 Volts DC, 10mA;
-12 Volts DC, 15mA.

Address Range

Any 8-bit boundary within Hex 000
to Hex 3FF.

Ordering Guide

Model # AIO8 \$895.00

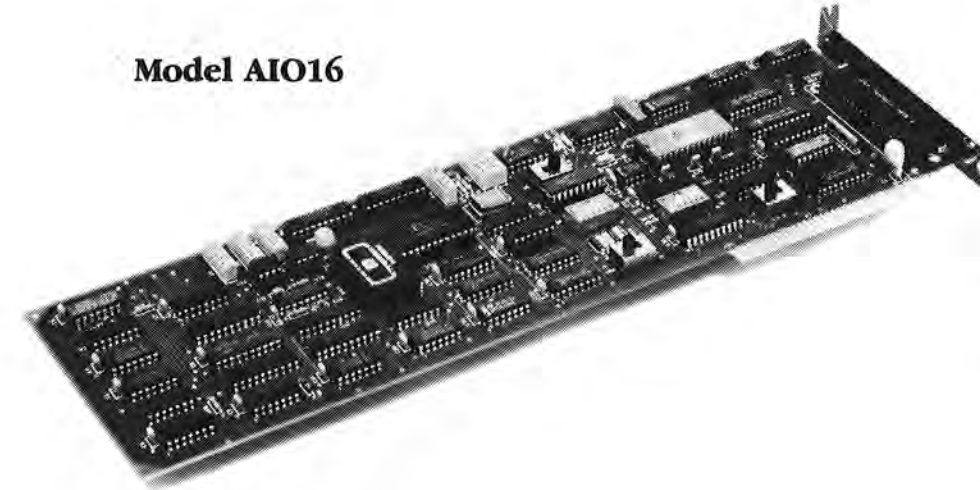
Description

Includes the following items:

- Plug-in card for the IBM PC, PC/XT, 5531 or compatible.
- Termination Board for real-world connection.
- Shielded ribbon cable (36") for connection between the plug-in card and termination board.
- Operator's Manual.
- Operating Software.

Multi-Function Analog and Digital I/O Card

Model AIO16



Features:

- Compatible with IBM PC and XT Systems
- 16 Single-Ended Analog Inputs
- 8 Differential Analog Inputs
- 12-Bit Resolution
- 2 Analog Outputs
- 4 Digital Inputs (TTL)
- 4 Digital Outputs (TTL)
- Switch-Selectable Gain

The Model AIO16 interfaces 16 single-ended or 8 differential analog voltage inputs, two analog outputs, four digital inputs, and four digital outputs to the IBM PC, PC/XT, 5531, or compatible computer. Designed for speed and use in rugged environments, the AIO16 is ideal for those industrial applications requiring a mixture of analog and digital inputs and outputs.

Description

The AIO16 accepts unipolar analog inputs of 0-1 volts up to 0-10 volts and bipolar inputs of ±0.5 volts up to ±10 volts, and digitizes these input ranges to a 12 bit resolution. These ranges are common to all input channels and are selectable by a gain switch controlling the instrumentation amplifier. Other ranges may be achieved by installing a gain resistor on the card. The analog inputs on the AIO16 can withstand a continuous overvoltage of ±30

volts DC.

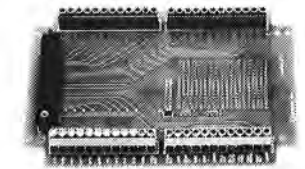
To compliment the analog inputs, the AIO16 also provides two channels of 12-bit resolution analog outputs. The digital-to-analog converters used to generate these analog outputs may be operated with a fixed reference available on the AIO16 producing a 0-5 volt output range, or may be operated using an external D.C. or A.C. reference to give different output ranges or attenuated A.C. signals.

Along with the analog input/output features, the AIO16 provides four channels of digital inputs, and four channels of digital outputs. All of these digital channels use TTL/DTL compatible logic levels.

Termination Board

A remotely mounted screw termination board, included at no cost, provides the real-world connections to the AIO16 plug-in card. Both the plug-in card and the termination board

provide 37-pin male DB-style connectors. The termination board is wall mounted using screw standoffs.



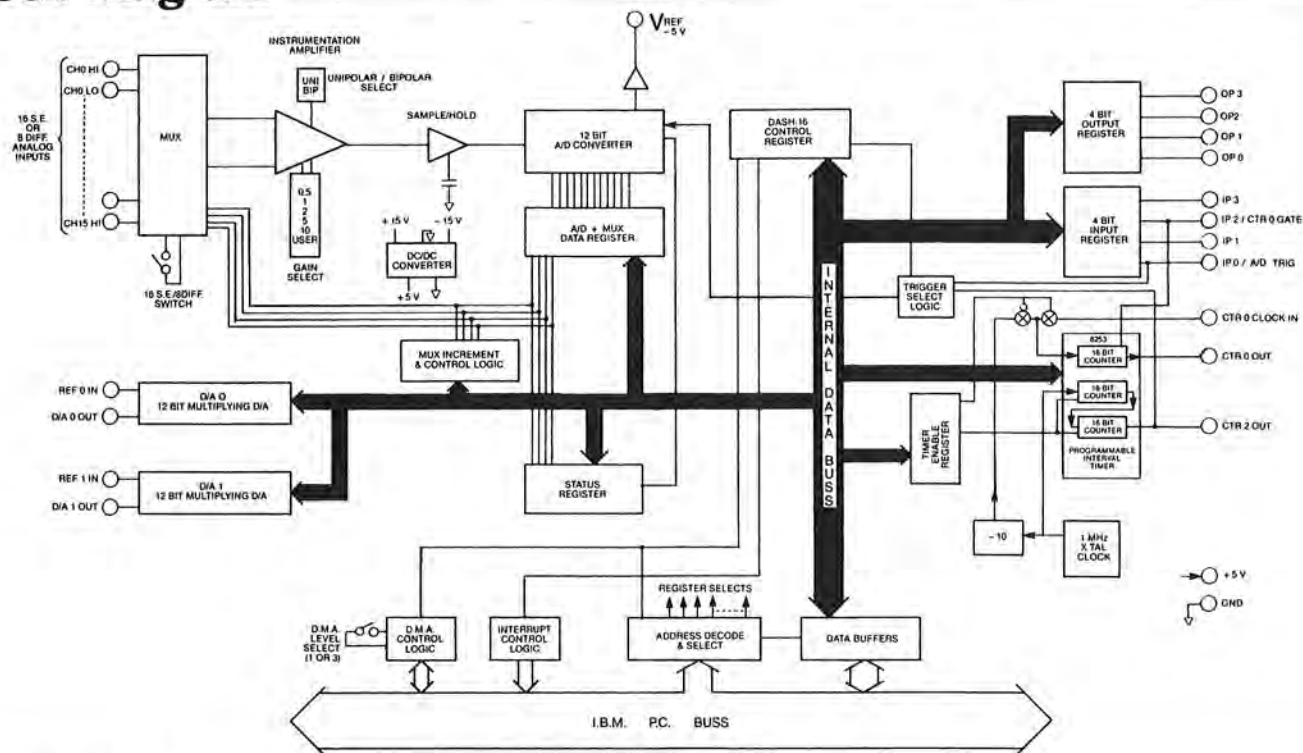
Software Support

One software disk and one support manual are included with the AIO16. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. The call statement is used to access all analog and digital I/O on the plug-in card. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O on the board.

Order Now!

Factory Automation

Block Diagram



Pinout Information

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	+5V	9	D/A 0 OUT	17	CH1 LO IN / *CH9 HI IN	25	IP0 / TRIG 0
2	CTR 0 OUT	10	D/A 0 REF IN	18	CH0 LO IN / *CH8 HI IN	26	D/A 1 REF IN
3	OP5	11	CH7 LO IN / *CH15 HI IN	19	LLGND.	27	D/A 1 OUT
4	OP1	12	CH6 LO IN / *CH14 HI IN	20	CTR 2 OUT	28	L.L. GND.
5	IP3	13	CH5 LO IN / *CH13 HI IN	21	CTR 0 CLOCK IN	29	L.L. GND.
6	IP1	14	CH4 LO IN / *CH12 HI IN	22	OP2	30	CH7 HI IN
7	POWER GND.	15	CH3 LO IN / *CH11 HI IN	23	OP0	31	CH6 HI IN
8	Vref (-5v)	16	CH2 LO IN / *CH10 HI IN	24	IP2 / CTR 0 GATE	32	CH5 HI IN

*Alternative connections apply in 16 channel Single Ended (S.E.) input configuration (set by 8/16 switch).
I/O connector (37 pin male "D")

Specifications

Analog Inputs

16 Single-Ended/8 differential (selectable)

Gain Adjustment

0.5, 1, 2, 5, 10

Full Scale Range

±10 volts

Resolution

12 bits (plus sign)

Input Overvoltage

±30 volts DC

Common Mode Rejection

90dB, typical

Throughput Time

10 milliseconds, maximum

A/D Conversion Time

25 microseconds, typical

Accuracy

±1 bit

Analog Outputs

2

Analog Output Range

0-5 volts dc with supplied on-board reference

Analog Output Drive

5mA

Digital Inputs

Logic 0: -0.5 to 0.8 Vdc

Logic 1: 2.0 to 5.0 Vdc

Digital Outputs

Logic 0: 0 to 0.4 Vdc

Logic 1: 2.4 to 5.0 Vdc

Operating Temperature Range

0 to 50°C

Storage Temperature Range

-20 to 70°C

Relative Humidity

5 to 90%

Power Requirements

+5 volts, 800mA

+12 volts, 2mA

-12 volts, 20mA

Ordering Guide

Model # AIO16 \$1,395.00

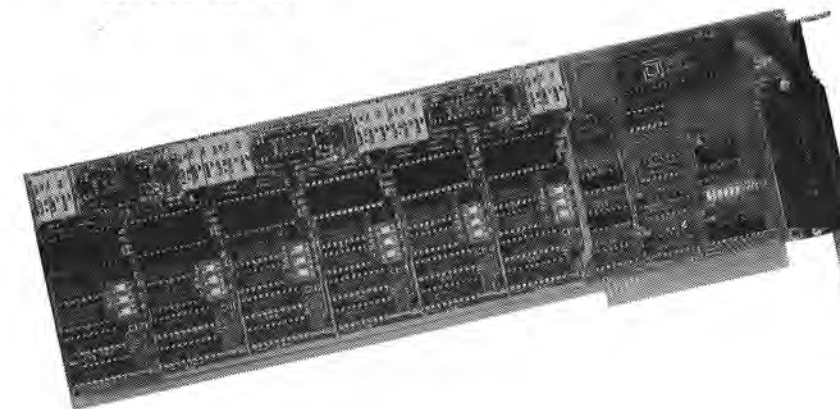
Description

- Includes the following items:
- 16 Single-Ended 8 differential analog input, 2 analog output, 4 digital input, 4 digital output plug-in card.
- Termination Board.
- Shielded ribbon cable (36") for connection between plug-in card and termination board.
- Operator's Manual.
- Operating Software.

**Made in America
Order Now!**

Digital/Analog Output Card

Model AOB6



Features

- 6 Analog Outputs
- 12 Bit Resolution
- 24 Digital I/O
- Plugs Directly Into The IBM PC
- Calibration Software Included
- +5, +10, ±5V Output
- 4-20mA Current Loop Capability

General Description

The AOB6 has 6 independent 12-bit D/A converters. Each D/A has a double buffered input for single step update and occupies its own I/O location. By means of jumper blocks, it is possible to select any or all of the D/As to update simultaneously. Since each D/A output uses one pin of the rear 37 pin connector, D/As may be operated in either voltage output (but not both simultaneously). In the voltage mode, output settling time is typically 3 microseconds. The AOB6 card also provides 24 lines of digital I/O. These connections are made via the rear connector consisting of 3 ports of 8 bits. Each port may be independently programmed as an input or output and is TTL/CMOS compatible.

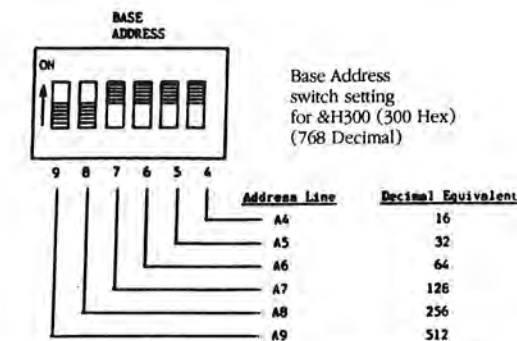
A floppy disk comes with this board which contains a calibration program for adjusting the various ranges on the board. It actually draws a picture of the

board and points to the appropriate potentiometer for adjustment.

An installation program also illustrates the base address switch settings based on the decimal or "HEX" value entered. Finally, a fully documented program which describes in detail the simple steps needed to

program the AOB6. The board uses the out command in basic.

The AOB6 is packaged on a 10" long full slot board suitable for use in all models of IBM PCs and most compatibles. The Board uses the internal +5V, +12V and -12V computer supplies.



Switches have decimal values as above in the "off" position. In the "on" position decimal value is zero.

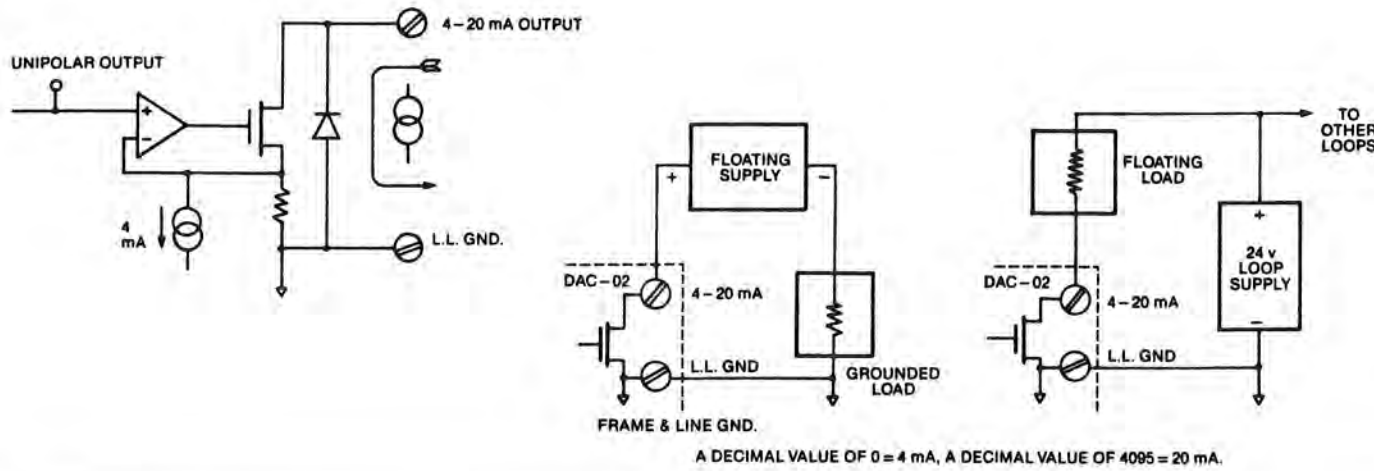
Process Control

4-20 mA Current Loop Output

The 4 — 20 mA current loop output consists of a precision current sink formed by a VMOS power F.E.T. and reverse protection diode as shown below:

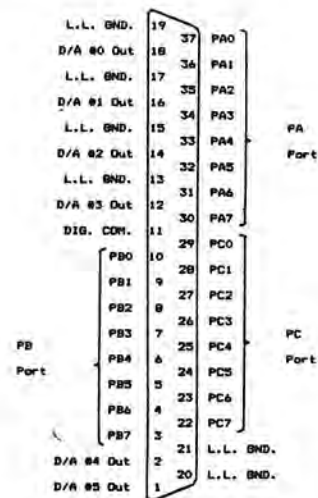
A minimum voltage of 8 volts must be maintained across this output circuit to insure correct operation. The maximum voltage should not exceed 36 volts for power dissipation reasons. A 24 v or 36 v loop supply is ideal. There are 2 ways of connecting the process loop, grounded load with

floating supply or floating load with grounded supply. Obviously the second method allows many loops to be powered by the same supply but constrains the load to be 2 wire floating. The alternative connections are shown below:



Connections

A rear view of the 37 pin D male connector on the back plate of the AO86 is shown below:



A standard 37 pin D female connector is required for the mating half; e.g.:

Solder cup type ITT/Cannon DC-37S
Flat cable type — Amp # 745242-1

Specifications

Power Supplies

+5 v supply

75 mA typical; 100 mA maximum

-5 v supply

Not used

+12 v supply

15 mA typical; 25 mA maximum

-12 v supply

25 mA typical; 35 mA maximum

Total power dissipation

0.85 watt typical

Analog Outputs Channels

6

I/O address

DIP switch selected on any 8 bit boundary

Resolution

12 bits (1 part in 4095)

Relative accuracy

1/2 LSB (0.01%) maximum

Differential linearity

1/2 LSB maximum

Fixed reference ranges

0 to +5 v (unipolar)

0 to +10 v (unipolar)

±5 v (bipolar)

±10 v (bipolar)

4 — 20 mA current loop

Variable reference ranges

±10 v (2 or 4 quadrant)

Reference input resistance

7K ohm minimum; 11K ohm typical;

20K ohm maximum

Voltage output impedance

< 0.1 ohm maximum

Voltage output

±5 mA minimum

Drive current

4-20 mA compliance (for current loop)

8 — 36 v

Digital I/O

24 bits (TTL compatible)

Environmental

Temperature coefficient

±25 ppm/deg.C. (with reference)

of gain

±5 ppm/deg.C. (external ref.)

Zero drift

±3 ppm/deg. C.

Operating temperature

0 — 70 deg.C.

Storage temperature

-55 to +125 deg.C.

Humidity

0 — 95% non-condensing

Weight

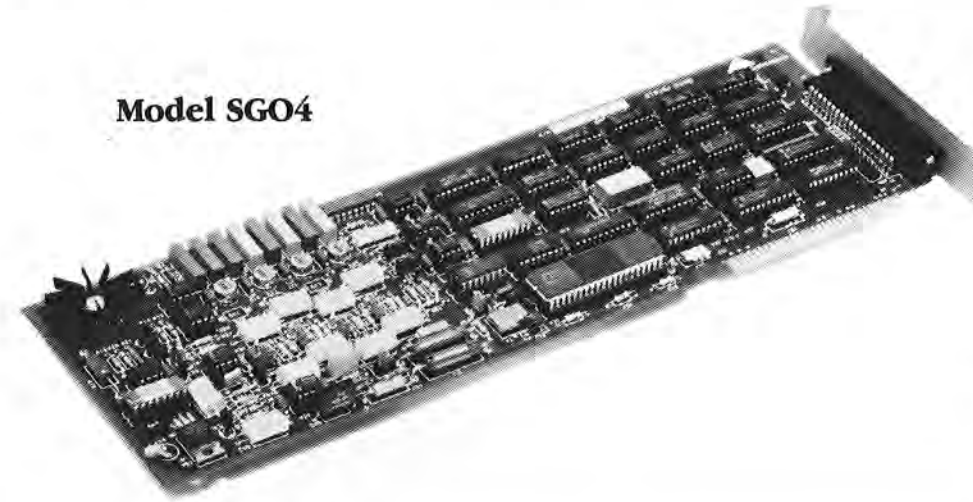
8 oz.

Ordering Guide

Model AOB6 \$719.95

Strain-Gauge Input Card

Model SGO4



Features:

- Compatible with IBM PC and XT Systems
- 4 Direct Strain Gauge Inputs
- User-Selectable Excitation 5, 10, & 15V DC
- Individual Alarm Setpoints for Each Channel
- On-Board Microprocessor to Control, Alarms & Deadbands
- Input Range ±10mV to ±10V Fullscale

The Model SGO4 Strain-Gauge Input Card is a general purpose, low-level analog input card with integral voltage excitation for interfacing load cells, strain-gauges, and pressure transducers to the IBM PC, PC/XT, 5531 or compatible computer. The features of this card are especially useful for process batching applications.

Description

The Model SGO4 card accepts up to four fully differential inputs from ±10 millivolts to ±10 volts full scale, and digitizes these signals to a resolution of 12 bits (plus sign). Each input channel features individual zero and span adjustments and selectable gain. Additionally, two filtering time constants are jumper-selectable for best response-versus-noise characteristics on the input channels. Two alarm limits per channel and two digital outputs associated with these alarm limits give the card increased capability.

Excitation

Excitation for the SGO4 plug-in card is user-selectable for voltage supplies of

5, 10, or 15 volts. Short-circuit proof, these voltages are capable of driving up to 200 milliamps of excitation current.

Alarm Setpoints

Each input channel on the SGO4 Strain-Gauge Input Card provides two independent alarm setpoints and adjustable deadbands. The sign (polarity) of the deadband determines whether or not the alarm operates as a "high" alarm (negative deadband) or a "low" alarm (positive deadband). This allows three possible alarm configurations per input: high-high, high-low, or low-low. Each of these alarm setpoints has a digital output which indicates the status of the alarm. These digital outputs operate independently from the computer and can be directly interfaced to solid state relay racks.

A desirable feature of the alarm limits on the card is the ability of an alarm to generate an interrupt so that the inputs do not have to be continuously scanned. In a batching application, for example, an alarm trip could be used for an interrupt upon reaching the

desired "fill-level."

Mode of Operation

The SGO4 card features two user-selectable modes of operation which determine the manner in which the inputs are converted. These two modes are convert-on-demand and continual scan.

In the convert-on-demand mode, the card idles in a wait-state until a conversion is initialized by the computer. The card then performs the conversion for the indicated channel number and sends the data to the data bus in a throughput time of approximately 2.3 milliseconds.

In the continual-scan mode, all input channels are scanned continuously and data is retrieved to the data bus, for each channel. The data sent to the data bus represents an average of the most recent data retrieved and that of the previous reading, a technique which achieves superior noise rejection. In the continual-scan mode, each channel is scanned once every 9.2 milliseconds.

**30 Day Unconditional Warranty
Order Now!**

Batch Control

Termination Board

A remotely mounted screw termination board, included at no extra charge, provides the real-world connections to the Strain-Gauge Input Card. This termination board provides a 37-pin female DB-style connector with the appropriate pins matching the connector on the plug-in card. The screw termination board may be mounted with screw standoffs or in a standard snap track.



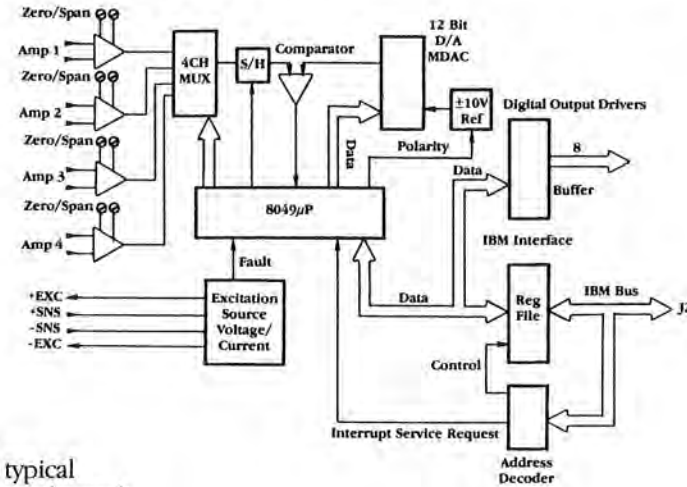
Software Support

One software disk and support manual are included with the Strain-Gauge Input Card. The software includes an easy-to-use I/O driver subroutine which is accessed by a single BASIC "call" statement. This call statement is used to access all analog and digital I/O on the board. The INP and OUT commands standard with IBM BASIC can also be used to access all I/O.

Pinout Information

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	+ Excitation	11	Ch1 -	21	Gnd	31	Digital Outputs
2	+ Excitation	12	Gnd	22	Ch4 +	32	Digital Outputs
3		13	Gnd	23	Ch4 -	33	Digital Outputs
4		14	Ch2 +	24	Gnd	34	Gnd
5	- Excitation	15	Ch2 -	25	Gnd	35	Gnd
6	- Excitation	16	Gnd	26	Digital Outputs	36	+5
7	+ Excitation Sense	17	Gnd	27	Digital Outputs	37	+5
8	- Excitation Sense	18	Ch3 +	28	Digital Outputs		
9		19	Ch3 -	29	Digital Outputs		
10	Ch1 +	20	Gnd	30	Digital Outputs		

Block Diagram



Specifications

Inputs

Four, fully differential.

Input Range

±10mV, minimum; ±10V, maximum.

Gain

1 to 1000
(resistor-selectable).

Zero & Span Adjustment

±10% (each channel has individual zero and span adjustments).

Input Impedance

10 megohms (DC).

Input Bias Current

50 nanoamps, maximum.

Input Filtering (jumper-selectable)

#1: -18dB at 60Hz or
#2: -25dB at 60Hz in addition to filter #1.

Resolution

±12 bits (±4096 counts).

Linearity

±1 count.

Rollover Error

±2 counts, full scale.

Input Alarms

2 per Input Channel,
Adjustable ± Full Range.

Alarm Deadbands

Adjustable ± Full Scale.

Throughput Time

2.3 msec/channel, typical
(in continual-scan mode, each channel is updated at 9.2 msec intervals).

Excitation

5, 10, or 15Vdc @ 200mA, maximum.

Excitation Stability

0.005% per degree C.

Maximum Input Voltage

±15 volts DC or peak AC.

Common-Mode Rejection

120 dB @ 60Hz.

Digital Outputs

Logic 0: 0 to 0.4 VDC, sink 40mA;
Logic 1: 2.4 to 5.0 VDC, source 10mA.

Input Connector Type

37-Pin Female DB-Style Connector.

Operating Temperature Range

0 to 60 degrees C.

Storage Temperature Range

-40 to 75 degrees C.

Relative Humidity

5 to 90%, non-condensing.

Power Requirements

+5 Vdc, 500mA; +12 Vdc, 300mA;
-12 Vdc, 300mA.

Address Range

Any 8-byte boundary within Hex 000
to Hex 3FF.

Ordering Guide

Model # SGO4 \$1,395.00

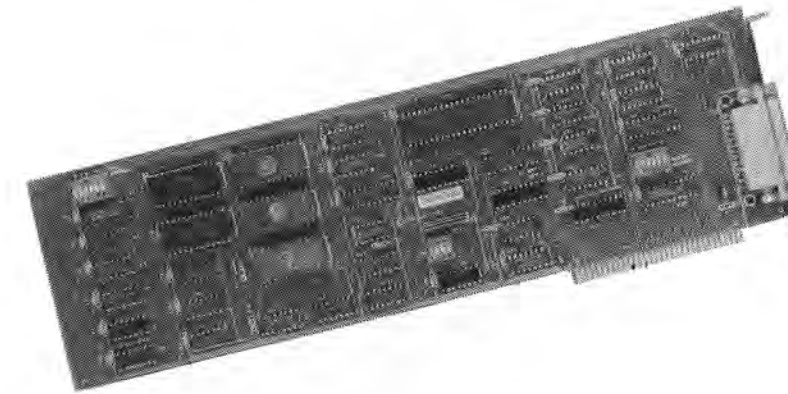
Description

Includes the following items:

- 4-Input Strain-Gauge Card for the IBM PC, PC/XT, 5531 or compatible computer.
- Strain-Gauge Termination Board.
- Shielded ribbon cable (36") for connection between the plug-in Card and Termination Board.
- Operator's Manual.
- Operating Software.

IBM® PC Multi-function Card

MODEL MFC2



FEATURES

Features

- IBM PC, XT or Compatible
- "Real World" Interface
- BSR-X10 Interface
- Memory = 64K of RAM
- RS232-C Serial Interface
- Parallel Interface
- Clock Is Battery Powered
- RAM Disk
- Spooler — A 20K Electronic Printer Buffer

General Description

The MFC2 card is the first IBM® multi-function card with 9 standard features. With 7 hardware and 2 software functions, MFC2 offers price performance unequalled by the competition.

Parallel and serial interfaces are standard, allowing the connection of printers, plotters, modems or terminals to your PC. A clock/calendar will keep track of time and date, even when your computer is off. 64K of RAM is expandable to 256K, to provide greater system memory. All these features are 100% IBM compatible, and you've come to expect them on quality multi-function products. But computing is changing.

Before long, microcomputers will be controlling everyday things.

Thermostat control, light detection, and security systems are just a few things your PC may be expected to work with and monitor. Only the MFC2 is designed for this today. Real World Interfacing will allow your PC to interact with thermostats, photo cells and many other discrete devices. BSR-AC Line Control will control lights, appliances or anything that uses an AC wall socket. These combined features let your computer read and react to a wide range of events (i.e., turn on lights when it's dark).

The seventh hardware feature is a Dual Game Port. This allows two game paddles or joysticks to be operated simultaneously, so you can play against the computer or duel with a friend. For scientific applications, this port can be used

for CAD/CAM hardware or mouse cursor controllers.

The two software features of MFC2 along with utilities supporting hardware features. RAM disk configures a portion of your PC's memory to act as a disk drive. This greatly reduces program accessing and execution time, and will improve your productivity. Print Spooling will use PC memory as a printer buffer. That means your computer doesn't have to wait while your printer prints.

The MFC2 will fit into any PC, XT or compatible long slot, and is compatible with all PC software. It comes complete with one of the friendliest manuals you'll find.

Ordering Guide

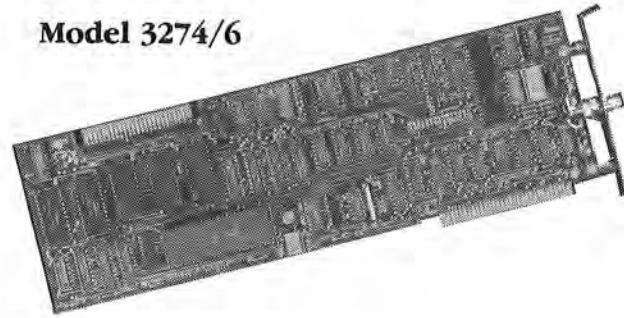
Model MFC2 \$395.00

**30 Day Unconditional Warranty
Order Now!**

Energy Management

Type A Interface Card

Model 3274/6



Features

- Emulates an IBM 3278 Display Station
- Operates Attached or Remote
- Allows Transfer Between an IBM PC/XT-Compatible Microcomputer and the IBM Host Processor
- Microcomputer Can Perform Standalone Functions
- Easily Switches between Terminal Standalone Mode Without Exiting Either One

General Description

IBM 3270 Display System emulation is now available for the IBM PC and XT or IBM PC/XT-compatible Microcomputer using the 3274/6 Type A Interface Card from ICS. This powerful card plugs into any available expansion slot in a system and allows the microcomputer to operate as either an IBM 3278 Display Station, or IBM 3279 Color Display Station. The 3274/6 Type A Interface Card also allows easy switching between the terminal emulation mode and the standalone microcomputing mode. In addition, associated software allows data files to be transferred between the host processor and microcomputer. IBM PC users can now have immediate access to existing 3270 applications and data bases while maintaining the power of local processing.

The 3274/6 Type A Interface Card is connected via a single coaxial cable, to an IBM 3270 Series Controller. Once connected, the card maintains communications with the host processor by responding to polls, and accepting data transfers independent of microcomputer operation. Any data sent from the host processor is stored in a buffer on the card.

Software Support

Software supplied with the card runs on the IBM PC and XT or PC/XT-compatible microcomputers to provide 3278/3279 emulation and file transfer capability. Once loaded into the microcomputer, any functions associated with the 3270 are now available to the user. In addition, the emulation program allows concurrent operation with another application program. This feature allows rapid switching between the applications program and the emulation program without exiting either one.

The card and its associated software also allows data files to be transferred between the microcomputer and a host processor running VM/CMS or TSO.

The 3274/6 Type A Interface Card combines the local processing power of the IBM PC/XT with the ability to access the 3270 network. This combination provides users with the fastest, simplest, most economical way to integrate microcomputers into big business.

Ordering Guide

3274/6 Type A Interface Card \$1,999.00

Specifications

Compatibility

IBM PC, XT or IBM PC/XT-compatible microcomputers

Standard Terminal Emulation

3278 Models 2, 3, 4
3279 Models 2A, 3A
3278 Model 2 with Extended Attributes
3279 Model 2B

Optional Terminal Emulation

3278 Models 3, 4 with Extended Attributes
3279 Model 3B

Processor

8X305 Micro Controller

Word Size

24 Bits (16 bits for 8X305 instruction and 8 bits for extended microcontrol)

Program PROM

1K x 24 Bits (Optional 2K x 24 Bits)

Processor Clock

8MHz (One processor cycle every 250ns)

Screen Buffer

4K x 8 Bits (Optional 8K x 8 Bits)

Coax Interface

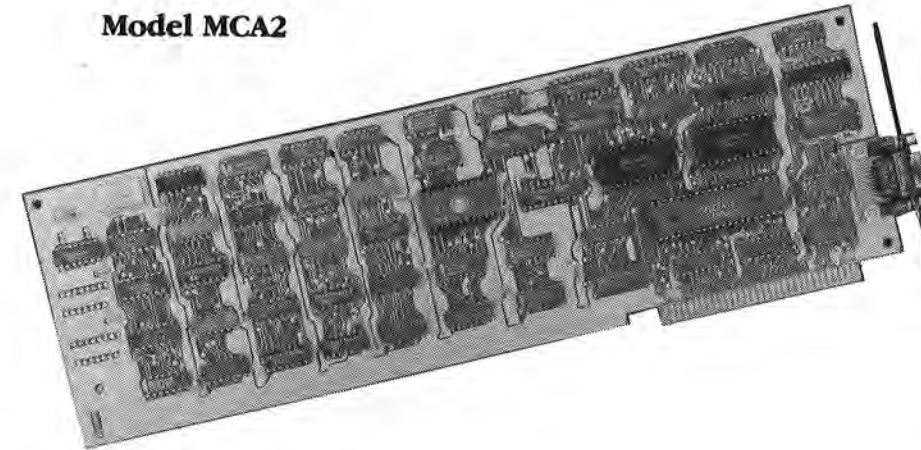
Standard Microsystems Inc.
COM 9004

Input Power Requirements

+5Vdc, 2A (max.)
+12Vdc, 30mA (max.)
-12Vdc, 30mA (max.)

Monochrome Display Adapter Card

Model MCA2



Features

- IBM PC and XT I/O Expansion Bus Compatible
- 720 x 350 PEL (Picture Element) Screen (80 Characters by 25 Lines)
- High Resolution: (9 x 14 Character Box) (7 x 9 Character)
- Character Attributes: Blink, Underline, Reverse Video, Intensification
- Block Graphics
- Direct Drive Output
- User Installable

General Description

The Monochrome Display Adapter is a plug-in expansion card designed to interface an IBM compatible monochrome display to the IBM PC and XT or IBM PC/XT hardware-compatible microcomputers.

Using a 9 by 14 character box with 7 by 9 characters, the on-card 4K-byte character generator provides 256 character codes. Upper-case alpha, lower-case alpha (with descenders), punctuation marks, special foreign language letters, symbols and block graphics are provided. The display adapter is under total software control, and supports reverse video, blinking characters, underscoring, and character intensification. Each character attribute is controlled separately so that a character can have multiple display features.

Specifications

Compatibility

IBM PC/XT I/O Expansion Bus

Display Buffer Memory

4K Bytes

ROM Character Generator

4K Bytes (256 Character codes)

Dot Clock Frequency

16.257 MHz

Sweep Rates

Horizontal 18.432 kHz; Vertical 50 Hz

Character Matrix

7 x 9 Dots

Character Box Matrix

9 x 14 Dots

Character Display

80 x 25 Characters

I/O Addresses (Hex)

Control Register 3B8
Status Register 3BA
6845 Index Register 3B4
6845 Data Register 3B5

Logic Levels

TTL Compatible

Power Requirement

+5Vdc \pm 0.5V at 1.0A (max.)

Operating Temperature

0° to 70° C

Storage Temperature

-40° to 80° C

Relative Humidity

0% to 90% (without condensation)

Display Port Interface

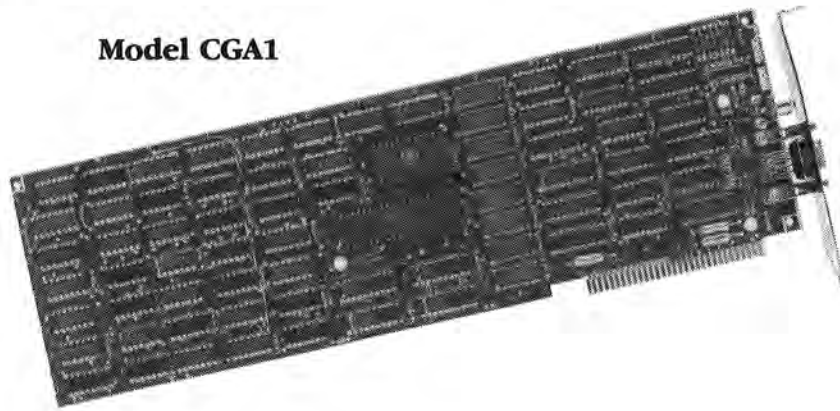
9-Pin D-Shell Female Connector
Pin 1 GROUND
Pin 2 GROUND
Pin 6 +HIGH LIGHT
Pin 7 +VIDEO
Pin 8 +HORIZ DRIVE
Pin 9 -VERT DRIVE

Ordering Guide

MCA2
Monochrome Display Adapter Card \$399.00

Color/Graphics Display Adapter Card

Model CGA1



Features

- IBM PC and IBM XT Compatible
- Supports Black and White or Color Displays
- Supports 16 Colors
- Contains Light-Pen Interface
- 16K-Byte Video RAM Storage
- Direct Drive Output
- User Installable

General Description

The Color/Graphics Display Adapter Card is designed to attach a high-resolution, multi-color display monitor to the IBM PC and XT or IBM PC/XT hardware-compatible microcomputers.

The adapter card has two basic modes of operation: alphanumeric and all-points-addressable graphics. In the alphanumeric mode, the character generator provides dot patterns for 256 different characters. These characters include alphanumeric, symbolic, foreign language, block graphics and other support characters. One of sixteen colors can be chosen for the screen's border and reverse video, blinking, and highlighting attributes are also supported. The display can be operated in either a 40-column by 25-row low-resolution mode or an 80-column by 25-row mode for high-resolution monitors. In both the high and low-resolution modes, characters are defined in an 8-wide by 8-high character box and are 7-wide by 7-high with one descender for lower-case letters.

The All-Points-Addressable Graphics Mode is operated in a low-resolution color graphics mode (160 PELs by 100

rows), a medium-resolution color graphics mode (320 PELs by 200 rows), or a high-resolution black-and-white graphics mode (640 PELs by 200 rows). Each picture element in the medium resolution mode can be one of four colors. The background can be any one of 16 colors.

The Color/Graphics Display Adapter uses the Motorola 6845 CRT controlled device. This makes the adapter raster and character parameters highly programmable.

Specifications

Character Box

8 PELs by 8 PELs Character Box

Screen Graphics

High Resolution: 640 × 200 Picture Elements

Medium Resolution: 320 × 200 Picture Elements

Dot Clock Frequency

7.159 or 14.318 MHz

Sweep Rates

Horizontal: 15.723 kHz

Vertical: 60 Hz Non-interlace Mode

Direct Drive Video Port Interface

9-Pin D Shell Female Connector

Pin 1 Ground

Pin 2 Ground

Pin 3 Red

Pin 4 Green

Pin 5 Blue

Pin 6 Intensity

Pin 7 Reserved

Pin 8 Horizontal Drive

Pin 9 Vertical Drive

Display Buffer Starting Address

B8000 Hex

Character Generator

2K × 8 EPROM

Power Requirement

+5 Vdc ± 0.5V at 1.2A (max.)

Operating Temperature

0° to 70° C

Storage Temperature

-40° to +80° C

Relative Humidity

0% to 90% (without condensation)

Ordering Guide

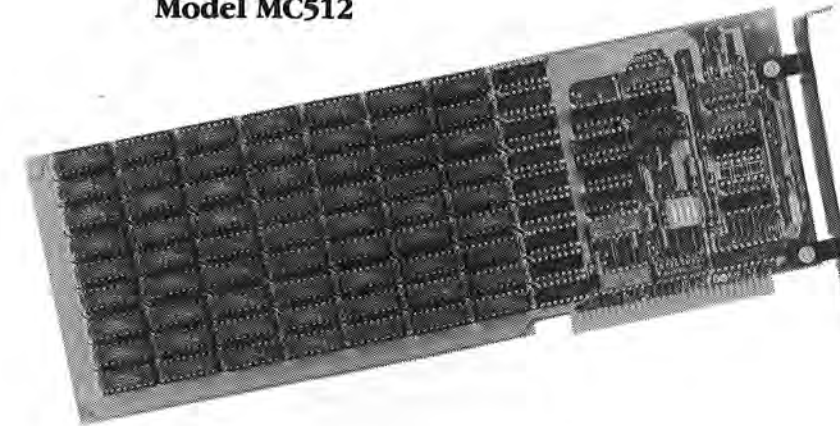
CGA1

Color/Graphics Adapter

Card \$469.00

Industrial Memory Adapter Card

Model MC512



Features

- Compatible with IBM PC and XT Systems
- High-Speed Random Access Memory
- RAM Locations Socketed for Easy Expansion
- 8-Bit Word Size with Parity
- Starting Address 64K, 128K, 192K or 256K
- Single +5V Operation

General Description

The 512KB Expanded Memory Adapter Card provides an additional 64K to 512K bytes of RAM for the IBM PC and XT or IBM PC/XT hardware-compatible microcomputers. Memory is parity checked, and RAM locations are socketed for future memory expansion. Parity is generated and stored during memory write operations and checked during read operations. Parity errors are reported on the I/O CHECK line.

Additional memory is obtained by populating the 512KB Expanded Memory Adapter Card in nine-RAM (64K) increments. Total capacity ranges from nine RAMs (64K bytes minimum) to seventy-two RAMs (512K bytes maximum). As the memory capacity is expanded, the card is switch-configured to be operationally compatible with the memory capacity. The starting address of the on card memory is selectable at 64K, 128K, 192K or 256K. This card comes fully assembled and tested, and can be easily installed into the system.

Specifications

Word Size

8 Bits with Parity

Memory Capacity

64K Bytes to 512K Bytes

Interface

All addresses, data, and command signals are TTL compatible, and compatible with the IBM PC and XT I/O expansion slots

Power Requirements

+5Vdc ± 0.5V at 1.0A (max.)

Operating Temperature

0° to 70° C

Storage Temperature

-40° to 80° C

Relative Humidity

0% to 90% (without condensation)

Ordering Guide

MC64

64K Expanded Memory Card \$489.00

MC128

128K Expanded Memory Card \$579.00

MC256

256K Expanded Memory Card \$839.00

MC384

384K Expanded Memory Card \$1,099.00

MC512

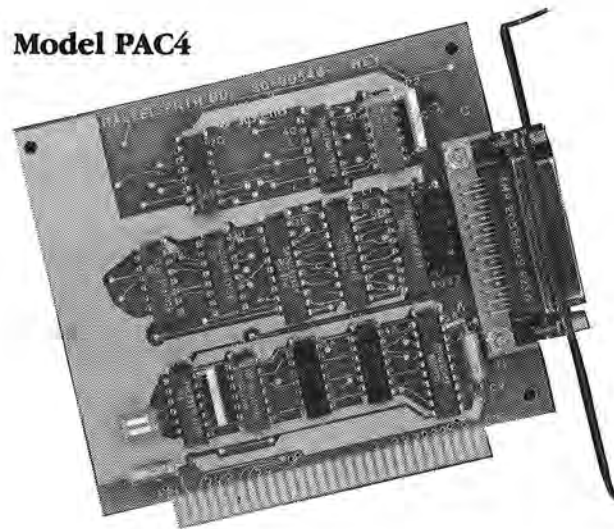
512K Expanded Memory Card \$1,195.00

**30 Day Unconditional Warranty
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Industrial Plug-In I/O Cards

Printer Adapter Card

Model PAC4



Features

- Compatible with the IBM PC and XT Systems
- Fully TTL Compatible
- Interrupt Driven
- Total Software Control
- Switch-Selectable I/O Addresses
- User Installable

General Description

The Printer Adapter Card is designed to provide an extra parallel I/O data port for the IBM PC and XT, or IBM PC/XT hardware-compatible microcomputers.

The adapter card can be used for any device which requires the use of a parallel data port. The card has 12 latched TTL-buffer output points which can be written to and read from under program control, and five steady-state input points. In addition, Interrupt Requests (IRQ7) can also be enabled and disabled under program control.

When the adapter card is attached to a printer, data or printer commands are loaded into an 8-bit, latched, output port. The strobe line is then activated, and data is written to the printer. The program can then read the input ports for printer status, or it may use the interrupt line to indicate when the printer is ready to accept the next character.

The interface connector is a 25-pin, D-type shell connector mounted so that it is located on the System Unit back panel when the adapter card is inserted into one of the I/O Bus Expansion slots.

Specifications

Compatibility

IBM PC/XT I/O Expansion Slot

I/O Addresses (Hex)

Switch-Selectable
Data Register 278/378/3BC
Control Register 27A/7A/3BE
Status Register 279/379/3BD

Printer Port Interface

25-Pin D-Shell Female Connector

Pin 1 -STROBE
Pin 2 +DATA BIT 0
Pin 3 +DATA BIT 1
Pin 4 +DATA BIT 2
Pin 5 +DATA BIT 3
Pin 6 +DATA BIT 4
Pin 7 +DATA BIT 5
Pin 8 +DATA BIT 6
Pin 9 +DATA BIT 7
Pin 10 -ACKNOWLEDGE

Pin 11 +BUSY
Pin 12 +P.END (Out of paper)
Pin 13 +SELECT
Pin 14 -AUTO FEED
Pin 15 -ERROR
Pin 16 -INITIALIZE PRINTER
Pin 17 -SELECT INPUT
Pins 18-25 GROUND

Logic

Standard TTL Levels

Power Requirement

+5Vdc \pm 5V at 0.2A (max.)

Operating Temperature

0° to 70° C

Storage Temperature

-40° to +80° C

Relative Humidity

0% to 90% (without condensation)

Ordering Guide

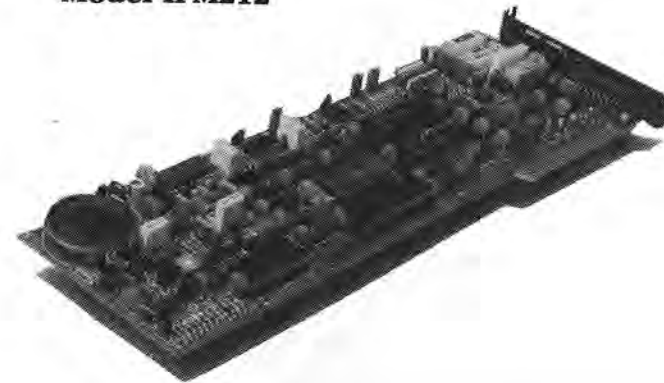
PAC4

Printer Adapter Card \$129.00

**One Source
Order Now!**

Industrial Plug-in Modem

Model IPM212



- Compatible with IBM PC, XT and 5531 Systems
- Bell 212A and 103 Compatible
- Auto/Manual Dial, Auto/Manual Answer
- Detects Busy, Ringback, Data Carrier Tone, Human Voice
- Tone or Rotary Pulse Dialing
- Auxiliary RS 232C Serial Port
- 8 Diagnostic Test Modes

Description

The Model IPM212 Industrial Plug-In Modem is a complete data communications solution for your IBM¹ PC/XT and compatibles. All the hardware, software, and accessories you need for easy installation and use are included in one package.

To install the IPM212, simply plug it into any of the computer's expansion slots, then connect it to the telephone line with the provided telephone cable. Next, run the included communications software and you're ready to communicate with the outside world.

The SOFTWARE programs your personal computer to act as an intelligent, menu driven, communications terminal. By using the computer's ten special function keys you can transmit or receive files, auto dial voice or data calls from a 60 name telephone book, access and log-on to such data bases at THE SOURCE² and DOW JONES NEWS/RETRIEVAL³, send and receive TWX and telexes and much more.

The IPM212 SOFTWARE is provided to you as a public domain program. You are free to copy, add to or modify it. In addition, the IPM212 modem will work with almost any communication

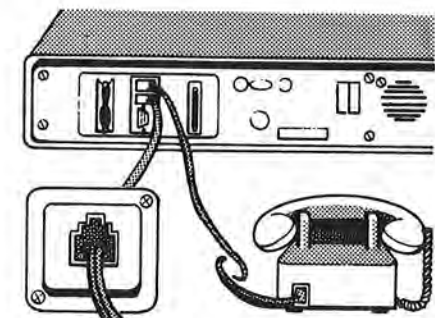
program, such as CROSSTALK XV1⁴. It accepts 14 different serial commands, such as DIAL, ANSWER, and END to automatically dial, answer, and hang-up calls. IPM212 also adapts to such communication parameters as speed, parity and the use of Touchtone⁵ or rotary-type pulses for dialing so you do not need to be greatly concerned with "computer to modem" compatibility issues. The modem's auto-dialer can be instructed to dial either voice or data calls. If the call is busy or unanswered, the software can re-dial the same or an alternate number.

To utilize the IPM212 and software, your IBM PC must have a minimum of 64K memory, one disk drive, an 80 column display and PC-DOS 1.1 or 2.0. With these minimal requirements you will be able to utilize all the intelligent features of the IPM212.

Notes

1. IBM is a registered trademark of International Business Machines Corporation.
2. THE SOURCE is a servicemark of Source Telecomputing.
3. DOW JONES NEWS/RETRIEVAL is a registered trademark of Dow Jones & Co., Inc.
4. CROSSTALK is a trademark of Microstuf, Inc.
5. Touch-Tone is a trademark of AT&T.

TYPICAL TELEPHONE LINE CONNECTION



SPECIAL FUNCTION KEY	MENU NAME	DESCRIPTION
F1	dial #	Auto-dial a number entered from the keyboard
F2	pbook	Auto-dial a number either from the 60 name phone book or from the keyboard
F3	f dir	Display file directory
F4	end	Hang-up the call
F5	break	Send a break signal
F6	echo N	Half/full duplex select
F7	rfile	Receive file
F8	tfile	Transmit file
F9	prt N	Printer ON/OFF select
F10	defin	Define data communication parameters, phone book entries, and printer type

Industrial Plug-In I/O Cards

Command Summary

COMMAND	DESCRIPTION
<com>Answer<CR>	Force off-hook and answer call.
<com>Break n<CR>	Send break n * 250 msec.
<com>Count n<CR>	Set ring and ring-back counter: 0 ignore ring signal, no auto answer. 1-9 answer after n rings; give up dialing after n + 4 ring-back signals.
<com>Dial s<CR>	Dial last, immediate, from memory, next number or until answered.
<com>End<CR>	Hang-up immediately.
<com>List<CR>	Lists the last number dialed.
<com>New n<CR>	Set new value of command character, <com>, to n.
<com>Originate<CR>	Force OFF HOOK and enter originate data mode.
<com>Program n<CR>	Set internal modem options.
<com>Query<CR>	Return modem status.
<com>Reset<CR>	Reset modem options to defaults.
<com>Test n<CR>	Start/stop modem tests.
<com>Unlisten n<CR>	Set IPM212 to LISTEN or UNLISTEN to commands during data transmission.
<com>Zzzz<CR>	Make modem quiet.

Auxiliary RS 232C Serial Port

The IPM212 incorporates a single serial port which may be optioned to connect to the on-board 212A type modem or to an RS 232C connector.

The on-board RS 232C connector supports the following signals:

RS 232C CONNECTOR SIGNALS

PIN NUMBER	SIGNAL NAME	SIGNAL DESCRIPTION	DIRECTION
2	BA	Transmit Data, TD	from the computer
3	BB	Receive Data, RD	to the computer
5	CB	Clear to Send, CTS	to the computer
6	CC	Data Set Ready, DSR	to the computer
7	AB	Signal Ground, GND	—
8	CF	Carrier Detect, DCD	to the computer
20	CD	Data Terminal Ready, DTR	from the computer

RS 232C CONNECTOR SIGNALS

When the on-board modem is not in use, this connector can be used to connect to other serial devices such as a printer or another modem.



Ordering Guide

Model # IPM212 \$559.00

Description

Includes the following items:
Model IPM212 Industrial Plug-In Modem
Telephone Cable
Operating Software
Operating Manual

Specifications

Compatibility

Bell 212A — 1200 bps
Bell 100 Series — 110/300 bps

Data Rate

1200 bps character — asynchronous +1%, -2.5%; 110 or 300 ±2.5% asynchronous.

Operation

2 wire full duplex

Telephone Interface

2-wire direct distance dial; telephone service drop USOC RJ-36X and RJ-45S or single telephone number drop with USOC RJ-11C.

Integral Repertory Dialer

DTMF tone or PULSE DIALING, specified or automatically selected.
— Pulse dialing at 10 pps nominal
— Tone dialing at 800 ms ON/800 ms OFF
— 32 digits per dialed number max.

Call Progress Tones Detected

Dial, busy, ring-back, modem answer tone, and voice.

Computer Interface

IBM PC/XT bus compatible

Modulation

1200 bps — PSK; 110/300 bps — FSK

Loss of Carrier Disconnect

307 milliseconds (optional)

Space Disconnect

1.6 seconds (optional)

Receive Carrier Sensitivity

-43 ± dBm ON
-48 ± dBm OFF

Transmit Level

-10 ± 1 dBm

Modem Commands

Answer, break, count, dial, end, list new, originate, program, query, reset, test, unlisten, Zzzz

Command Buffer

40 characters max.

Modem Status

Answered, no answer, busy, no dial tone, ring, error, acknowledgement

Test Modes

Analog loop originate mode, analog loop answer mode, analog loop originate mode self-test

Analog loop answer mode self-test

Digital loop, remote digital loop

Remote digital loop self-test, end-to-end self-test

Power Requirements

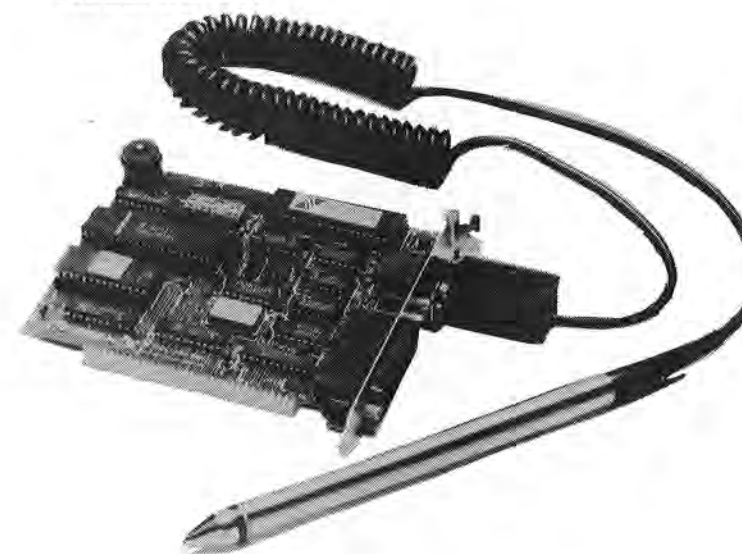
+ 5 volts @ 350 mA
-12 volts @ 70 mA
+12 volts @ 70 mA

Environment

Ambient temperature: 40°F (4°C) min./120°F (50°C) max.; relative humidity 20% to 90% non-condensing at 75°F (25°C); altitude to 10,000 feet max. (3,000 m)

Bar Code System for the IBM PC, PC/XT and PC/AT®

Model BCS100



Features

- Works with IBM PC, PC/XT, PC/AT and compatibles
- Reads all 5 major bar code symbologies auto-discriminately
- Generates bar codes on graphics printers
- Handles all communications protocols for remote data transfer
- Communicates directly with the PC bus
- Autoload ROM-based software for systems without disks or keyboards

General Description

The BCS-100 is a single board PC compatible bar code system that offers more functions than many other peripheral devices combined. It automatically discriminates between all 5 major bar code symbologies, and generates 3 of 9 or UPC code on a graphics printer. The BCS-100 is the only bar code decoder that plugs into the PC bus and communicates directly to the processor via its own interrupt structure. It does not require any external cabling through the keyboard plug. In fact, the ROM-based software will autoload on power up, so keyboards or even disks are not required. This makes the BCS-100 the perfect choice for remote data collection systems, like those used in MRP. When used with a conventional PC or PC compatible, the system is transparent to the user by allowing simultaneous input from both the wand and the keyboard.

9 Pin Port

Uses the BCW-2219 digital wand

25 Pin Port

Enables use of any decoder with RS-232 or RS-422 or Current Loop capabilities

Enables multiple decoder inputs through daisy chain or multiplexing techniques

Enables long remote cable lengths associated with RS-232/422/CL capabilities

Enables receiving of data from remote portable data collection terminals

Current Applications

Because the BCS-100 is firmware-controlled, its many features are determined by selecting and installing optional PROMs and hardware. This is very cost-effective for those who only require a basic bar code decoder, or those who have no intention of ever

reading a bar code, but simply want to capture remote data without complex communications software.

Bar Code Printing Option

The Print Pak™ firmware intercepts and translates the ASCII characters being sent to the printer into bar code symbols (Code 39 and UPC) simply by issuing a runtime control command. This command may be executed from any applications software, word processor, spreadsheet, or written into custom software. A diskette with several label printing routines written in BASIC is included with the PROM as part of Print Pak.

**30 Day Unconditional Warranty
Order Now!**

Factory Automation

Internal Decoder Option

The Scan Pak™ option consists of a single-chip bar code decoder that can "auto-recognize" five common bar code symbologies — Codabar, Code 39, UPC and EAN plus addenda, and Interleaved 2-of-5 code — in bidirectional scans of 3 to 30 inches/second.

The input to this chip is provided through the nine pin D connector which is designed to accept the output signal of the BCW-2219 digital wand. The BCW-2219 is a rugged, lightweight instrument offering excellent depth of field. It has a red LED light source

offering over 40,000 hours of operating life. The standard circular aperture is six mils, but other sizes are available. The BCW-2219 is included in the price of the Scan Pak, but may also be purchased separately.



Specifications

Size

Length: 5.25"
Height: 4.20"
Max. Component Height: 0.60"

Power Requirements

+5V 0.6A for digital wand
±12V 0.02A for RS-232
Provided by PC power supply

RS-232 Speed

110 to 9600 Baud

Connectors

9 Pin D (Male) connector for wand
25 Pin D (Male) connector for RS-232
62 Contact (31 each side) short slot edgeboard connector

Environmental

Operating temperature 0 to +70° C
Humidity 20% to 90%
(non-condensing)

Ordering Guide

Ordering Guide

BCS100

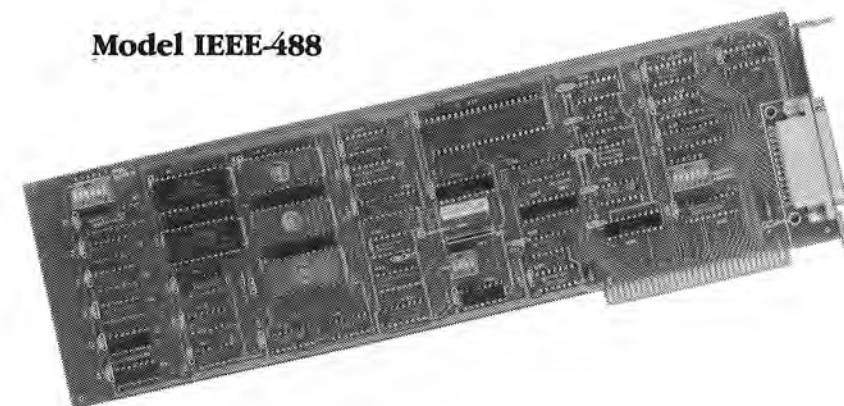
PC Board, Digital Wand,
Scan-Pak & Print-Pak
Software Included \$1,295.00



**30 Day Unconditional Warranty
One Source**

IBM PC/XT IEEE-488 Interface

Model IEEE-488



Features

- Plugs Directly Into The IBM PC
- Industry's Easiest IEEE-488 Board To Program
- Interrupt, DMA and Normal Transfer Modes
- DMA 450 Kbyte/Sec. Transfer Rate
- Supports Up To 15 Devices Simultaneously
- Software ROM Resident
- Fully Compatible With IEEE-488 1978 Spec.
- Controller Functions C1-C5 Implemented

Description

The ICS IE-488 General Interface (GPIB) I/O expansion board for the IBM-PC and Compatible computers is designed to plug directly into one I/O slot inside the IBM-PC. The IE-488 has a built-in 12 Kbyte ROM interpreter which handles all the required initialization and protocol functions required to use the IEEE-488 Interface. No disk files with driver routines are needed and the interpreter allows all commands to be programmed in conventional high level IEEE-488 command syntax; i.e.: REMOTE, ENTER, etc. The Interpreter is a relocatable 16 Kbyte block of codes which may be entered via a BASIC CALL statement or via DOS interrupt commands using assembly language programming. All commands are string coded for ease of use. The GPIB will handle up to 14 other Talker/Listener devices. The controller may be the IBM or any other of the 14 devices, any one of which may also be transferred to or from. The IE-488 interpreter includes a group of subroutines which may be

used to condition the data before data transfer when using assembly language programs.

The IEEE-488 hardware handles all of the system timing for TALKING and LISTENING and CONTROLLING the IEEE-488 GPIB. The controller used in the hardware is the NEC uPD 7210 LSI chip. The chip as a Talker, Listener or Controller complies 100% with the IEEE-488 Standard of November 1978.

Software

All modes of operation are determined by an ASCII STRING in a command (COMMAND\$ or CMD\$) referenced within a CALL statement. The CALL statement format is:
CALL IE488 (COMMAND\$, var[\$](%), FLAG%, BASADR%)
where:
COMMAND\$ is the COMMAND including device addresses or secondary commands and [image terminators]. This is always a STRING and is decoded by the Command Line Interpreter in the IE-488 firmware (ROM).

COMMAND is separated from the operands (devices, etc.) by one or more SPACES, any other delimiters will cause a SYNTAX error in command line. The separator for devices is always the comma "," and secondary address is always a period ".". The IMAGE string is identified by brackets "[]". The Command Line Interpreter is relatively tolerant of syntax error identification and will send back the appropriate error code to isolate the error. The format is:

CMD\$ = "COMMAND dev1, dev2, ...,devn [image]"

The [image] specifier allows the user to specify the variable field operations for the beginning and end of the data transfer variable. The variable may be a variable name, array identifier, numeric data value or a string.
var [\$] (%) is the data variable OUTPUT/INPUT to be transferred from/to. Data is transferred as specified by the image terminator/specifier. If the image specifier is not used, the data is treated as an integer. The data may be of String or Integer type.

Laboratory Automation

FLAG%
is the transfer status of the CALL statement. If an error occurs, FLAG% will contain a **HEX** number representing the error condition. A set of error and transfer message codes are generated at the completion of each CALL.

BASADR%
is the address of the interface board being used. BASADR% may be 0 or 1, or actual base address; e.g., 768.

IEEE-488 GPIB Function Classification Table

- T6** — Basic Talker, Serial Poll, Unaddressed if MIA
- TE0** — No extended talker function
- L4** — Basic Listener, Unaddressed if MTA
- LE0** — No extended listener function
- SH1** — Complete Source Handshake capability
- AH1** — Complete Acceptor Handshake capability
- SR1** — Complete Service Request capability
- PP1** — Parallel Poll Remote configuration capability
- RL1** — Complete Remote/Local capability
- DC1** — Complete Device Clear capability
- DT1** — Complete Device Trigger capability
- C1,C2,C3,C4,C5** — CONTROLLER states

Connector Pin Assignments

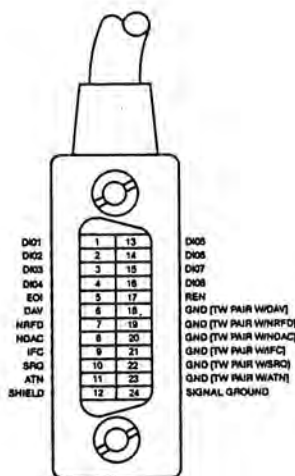
The slots on the rear of the IBM PC are slightly too narrow to accommodate a standard IEEE-488 connector directly. To make connection to the board, a standard 25 pin D type female connector is used on

the backplate (similar to RS-232 type connector). A special 1 meter long adapter cable, ICS part # C88-01, mates the board to the IEEE-488 buss.

Note that although the connector is of the same type as specified by IEC-625, the pinout is different. An adapter cable is required for IEC-625 instruments.

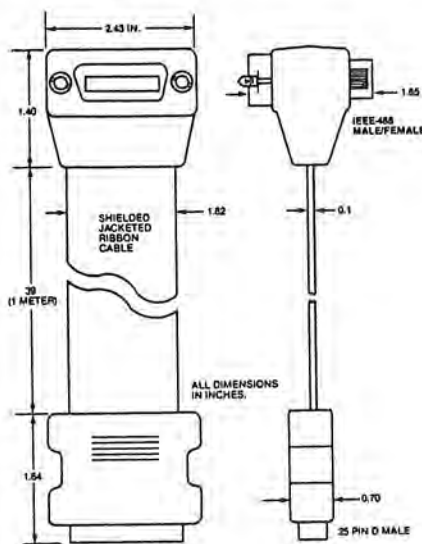
Pin	Function	Pin	Function
1	GND	14	GND
2	SHIELD	15	GND
3	ATN	16	GND
4	SRQ	17	GND
5	IFC	18	GND
6	NDAC	19	GND
7	NRFD	20	GND
8	DAV	21	REN
9	EOI	22	DIO-8
10	DIO-4	23	DIO-7
11	DIO-3	24	DIO-6
12	DIO-2	25	DIO-5
13	DIO-1		

GPIB Pin Connections



C88-01 GPIB Connector Cable

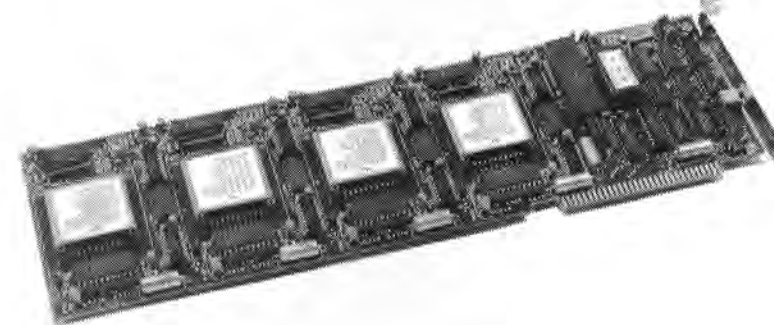
A drawing of ICS C88-01 adapter cable is shown below. The cable is of flat shielded type and has a standard length of 1 meter (approx. 3 feet). Different lengths are available to special order, specify C88-xx where xx = length in meters.



This cable is required to mate the IE-488 Board with the IEEE-488 Buss.

Industrial Bubble Memory Board

Model BDISK1



Features

- Non-volatile
- Reliable
- Rugged
- Fast
- Easy Installation
- Half-Megabyte Bubble Memory
- IBM Compatible

General Description

The Model BDISK1 Industrial Bubble Memory Board is the first half-megabyte bubble memory expansion board for the IBM personal computer. Formatted as a fixed disk, the Bubble Disk operates off the computer's power supply without requiring increased or external power.

Fixed Disk Emulation

BDISK1 responds to fixed disk commands under most operating systems including PC-DOS 2.0, Softech-Pascal IV.13 and CP/M-86 for the IBM PC/XT. Special hard disk commands such as RESTORE and BACKUP as well as partitioning to hold multiple operating systems are available to the user. BDISK1 can be used with copy protected software that normally allow copying and use to a hard disk but not to a floppy disk. BDISK1 truly emulates a mini-Winchester.

Reliable Intel Bubble Memory

The all solid-state expansion board contains four Intel 7110-4 one-megabit bubble memories, providing rugged, non-volatile mass memory that is impervious to vibration, dust and other hostile environments. Intel support chips include built-in 14 bit error checking and correction (ECC), as well as power-fail protection circuitry. Bubble memory technology makes the BDISK1 orders of magnitude more reliable than either the fixed or floppy disk.

The serious user will find the BDISK1 indispensable as highly reliable "working" storage for frequently accessed program or data files, while speeding program operation and saving disk wear and handling.

Operating System Compatibility

The BDISK1 does not require patches to the operating system. All

drivers are in a 64K EPROM on the bubble board whose address space is jumper selectable for compatibility with other adapter cards that have system-accessible ROM modules. After the operating system has been installed on the bubble disk it will cold boot the operating system when the AUTO SCAN ROM BIOS is installed on the IBM PC motherboard and the diskette drive door in drive A: is open.

Write Protection

A write-protect switch is accessible from the back of the PC cabinet. When this switch is enabled it will prevent any files on the bubble disk from being erased or written over.

Specifications

Number of Devices Serviced

15

Maximum Number of IE-488 Cards in PC

2

Mating Cable Required

C88-01

Total Buss Length

20 meters (not exceeding 2x the number of Instruments)

Data Transfer Rate

2 Kbyte/Sec.

DMA Data Transfer Rate

450 Kbyte/Sec.

Maximum Number of Talkers At One Time

1

Maximum Number of Listeners At One Time

15

Power Consumption at +5V

850mA Typ.; 1A Max.

Environmental

Operating Temperature Range
0 to 50 Degrees C.

Storage Temperature Range

-40 to +100 Degrees C.

Humidity

0 to 90% (non-condensing)

Net Weight

8 oz. (0.227 Kg)

Ordering Guide

IE-488 \$649.00

C88-01 \$129.00

30 Day Unconditional Warranty

Industrial Plug-In I/O Cards

Rapid, Silent Operation

Mean access time and data transfer rate of the board result in file transfers that are eight times faster than a floppy disk. Data transfers are made using the system board direct memory access (DMA) with an internal level to signal operation completion. These signal lines are jumper selectable and tri-stated when not in use. The operation is completely silent.

Two Mbyte Expansion

Multiple bubble memory board expansion (up to 4 boards depending on power supply capacity) is possible through jumper configuration on the I/O port address of the board. Additional boards increase the capacity of the bubble drive while still appearing as a single drive, not separate drives.

Applications

In addition to the PC, the Industrial Bubble Memory Board works in the IBM XT, and most IBM compatible computers. The low power demands and compactness of the BDISK1 make it a unique enhancement to compatible portables as well.

Specifications

Total Storage

512 Kbytes

Memory Organization

4 heads, 15 cylinders,
17 sectors/cylinder

DMA

Jumper selectable channel 2 or 3

Interrupt

Jumper selectable channel 5 or 6

EPROM Driver Address

Jumper selectable C8000H, CA000H,
CC000H or CE000H

I/O Port Address

Jumper selectable 3CHOH-3C3H,
3C4H-3C7H, 3C8H-3CBH or
3CCH-3CFH

Mean Access Time

48 msec

Max. Data Transfer Rate (Burst)

400 Kbits/sec
(1.6 Mbits/sec during last page
of READ)

Operating Temperature

+10 to +55°C

Storage Temperature

-20 to +75°C

Dimensions

13.3" by 4.05"
(33.8 cm by 10.3 cm)

Power Requirements

Voltage: + 5VDC ±5%
+12VDC ±5%

Current:

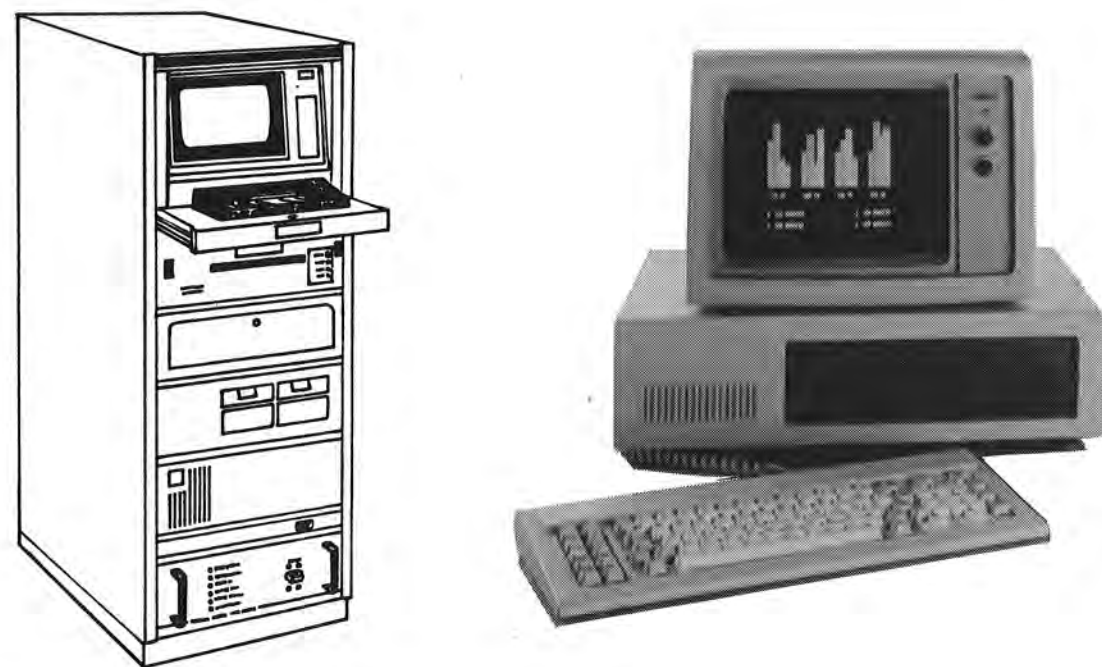
Standby: 490ma; 160ma
Read/Write: 500ma; 1000ma

Power Off/Power Fail; Decay Rate:
0.45 volts/msec; 1.10 volts/msec

Specifications subject to change without notice.

Ordering Guide

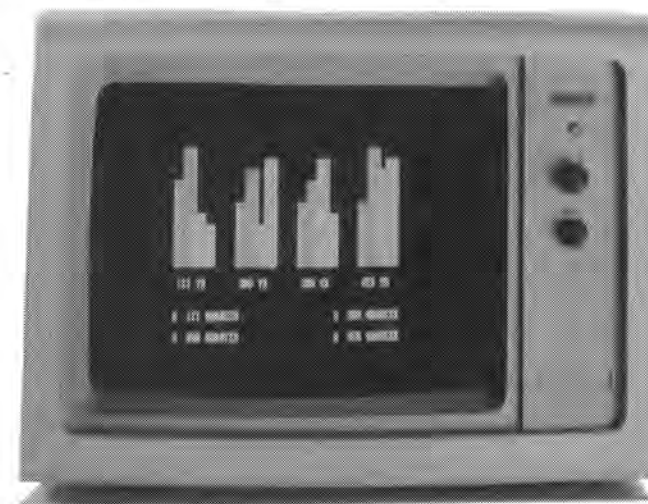
Model BDISK1 \$1,995.00



**30 Day Unconditional Warranty
Order Now!**

High-Resolution Monochrome Monitor

Model MMO1



Features

- Non-Glare, 12-Inch Diagonal Amber Display
- High-Resolution - 720 Dots Horizontal, 350 Lines Vertical
- Rapid Scan Rate Provides Flicker-Free Display
- IBM PC and XT Compatible

General Description

The High-Resolution Monochrome Monitor is designed to supply a 720-dot horizontal by 350-line vertical display which provides sharp alphanumeric characters or monochrome graphics. An 18.432 kHz horizontal scan rate gives a flicker-free display and the 12-inch diagonal amber screen is designed to reduce user eyestrain.

The Display Unit may be conveniently positioned on top of the system unit or on a nearby table top. A direct ac power connection to the system unit allows the system-unit power switch to also control the display unit; thus reducing the requirement for wall outlets. A direct drive interface cable connection from a monochrome adapter card installed in the system unit provides complete compatibility with IBM PC and XT and IBM PC/XT-compatible microcomputers.

Specifications

CRT

12-inch diagonal, non-glare screen

Input Signals

Video signal, horizontal sync,
intensity-positive TTL levels;
Vertical Sync - negative TTL levels

Video Bandwidth

18 MHz (-3 dB)

Scan Frequencies

Horizontal: 18.432 kHz
Vertical: 50 Hz

Display Size

204mm x 135mm

Resolution

Horizontal: 720 dots
Vertical: 350 lines

Input Connector

9-pin (DB9) cable supplied to plug
directly to IBM PC/XT

Power Source

120 Vac, 60 Hz

Power Consumption

30 Watts

Operating Temperature

0° to 50° C

Approval

FCC Class B approved

Ordering Guide

MM01

High Resolution Monochrome
Monitor \$459.00

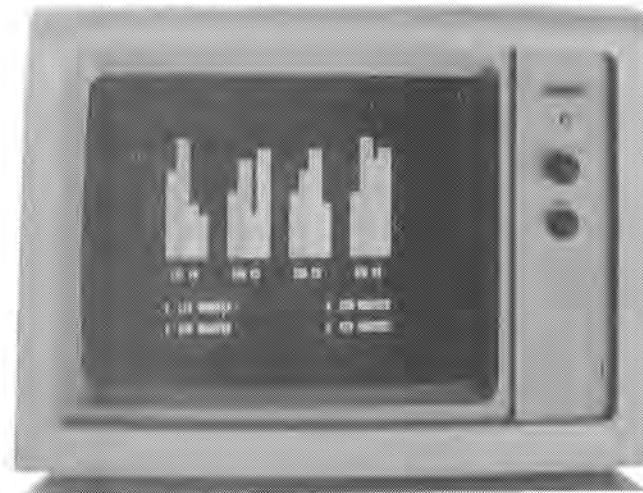
6531-MM

19" Rack Mounted B/W
Monitor \$869.00

Laboratory Automation

High-Resolution RGB Color Monitor

Model CMO2



Features

- 80 Characters × 25 Lines
- Characters Defined in 8 × 8 Dot Matrix
- High-Resolution 0.31mm Dot Pitch Tube
- Supports 16 Colors
- Non-Glare, High Contrast Black Matrix Screen
- IBM PC and XT Compatible

General Description

The High-Resolution RGB Color Monitor from ICS is designed with a 0.31mm dot pitch CRT to give up to 690 dots of horizontal resolution. Vertical resolution consists of 480 interlaced lines, or 240 non-interlaced lines. A 15.75 kHz horizontal scan rate provides a sharp, flicker-free display.

The monitor supports sixteen colors, and uses an 80-character by 25-line format when used in an alpha-numeric mode. The display has a 12-inch diagonal CRT with a non-glare surface to relieve eyestrain. It may be conveniently positioned on top of the system unit or on a nearby table top. A direct drive cable interface connection from the Color/Graphics Display Monitor Card installed in the system unit provides complete compatibility with the IBM PC and XT or IBM PC/XT compatible microcomputers.

Specifications

Enclosure Dimensions

11.0" H × 14.75" W × 15.5" D

CRT

12-inch diagonal, 76 degree, in-line gun, 0.31mm dot pitch black matrix, non-glare surface

Input Signals

R, G, B channels, horizontal sync, vertical sync, intensity - all positive TTL-levels

Video Bandwidth

15 MHz

Scan Frequencies

Horizontal: 15.75 kHz
Vertical: 60 Hz

Display Size

215mm × 160mm

Resolution

Horizontal: 690 dots
Vertical: 240 lines (non-interlaced)
480 lines (interlaced)

Misconvergence

Center: 6mm (max.)
Corner: 1.1mm (max.)

Display Colors

16 colors (black, blue, green, cyan, red, magenta, yellow, white; each with two intensity levels)

Characters

2000 characters (80 characters × 25 rows - 8 × 8 dots)

Input Connector

9-pin (DB9) cable supplied to plug directly to IBM PC/XT-compatible hardware

Power Source

120 Vac, 60 Hz; or 240 Vac, 50 Hz

Power Consumption

70 Watts

Operating Temperature

0° - 40° C

Approval

FCC Class B approved

Ordering Guide

CM02

High Resolution RGM Color Monitor \$1,079.00

6531-CM

19" Rack Mounted RGB Color Monitor \$1,489.00

Microline 82A Printer

Model ML82A



Features

- 120 cps bidirectional printing
- Short line seeking logic
- Dual interfaces, both serial and parallel
- Full 96 character ASCII set
- 80 columns with standard characters @ 10 cpi
- 132 columns with condensed characters @ 16.5 cpi

Quality Printing

Microline printers are setting the quality standards for the entire industry. Built on a cast aluminum base and driven by two heavy-duty stepper motors, these rugged units will run all day with no duty cycle limitations.

The unique 9-pin head uses energy stored in tension members. This stored energy technology permits the use of short, low-mass pins made of an extremely hard alloy. The head produces less heat, thereby extending its life to more than 200 million characters. The snap-in head is easily replaced by the operator.

Dual Interfaces

The Microline 82A is offered with both Centronics-compatible parallel and RS 232C serial interfaces as standard features. The parallel interface operates with TRS-80, Apple, IBM, and other popular personal computers. The standard RS 232C serial interface operates at speeds to 1,200 baud.

Versatility

Microline 82A users need not purchase different models for different forms. The standard roller platen accommodates both friction and pin feed forms, and optional tractors easily snap in place for variable form widths.

Character widths can be changed through program control to make possible standard width, double width, compressed print for 132-column printing, and even a special bold print.

The electronic VFU provides versatile forms controls for vertical tab, top of form, and also up to ten form lengths through switch and program control.

Specifications

Printing Characteristics

Matrix standard characters
9×9

Print buffer size

80 characters standard size print;
132 characters compressed print

Media

Number of parts
4

Maximum width of paper

Friction feed 8.5"
Pin feed 9.5"
Tractor feed 9.5"

Pin to pin measurements

Pin feed 9"
Tractor feed 2" to 9"

Paper path

Rear/bottom

Ribbon

Standard four mil, 1/2" wide on
2" spools

Interfaces

Parallel

Centronics-compatible
IEEE 488 compatible (optional)

Serial

RS 232C, 1200 Baud
RS 232C, 9600 Baud with
Current Loop (optional)

Format Controls

Vertical format unit
Top of form
Vertical tab

Reliability

MTBF

4,000 hours

MTTR

15 minutes

Power

Voltage

100/115 or 220/240 VAC; ±10%

Frequency

50 or 60 Hz

Power

120 watts

Physical

14.2"W×12.9"D×5.2"H
Weight: 19.9 pounds

Ordering Guide

Model ML82A..... \$649.00

30 Day Unconditional Warranty

Data Logging

Industrial Rack Mounted Printer

Model 6531-PR



Features

- 80 Column Impact Printing on 8½" Paper
- 5×7 Dot Matrix Standard 64 Character ASCII Subset
- 1X, 2X, 3X, 4X Print Sizes
- RS 232-C and 20ma Current Loop Serial Inputs
- Serial Input to 9600 Baud
- 100 Characters Per Second Printing Rate
- Data or Text Made Available
- Microprocessor Based Controller
- Vertical & Horizontal Tab Functions
- Selectable Parity and Stop Bits
- Single, Double, or Triple Spaced Printing
- Fast Paper Feed
- Independent Carriage Return and Line Feed Control

Description

The 6531-PR, 80 column printer is rack mountable (19"×7") offering a savings in valuable bench or floor space. Microprocessor control and EPROM program memory allows for special functions such as multiple size printing, tabs, and multiple line feeds. Printing is dot matrix impact type with or without ribbon cartridge. Typical applications for the 6531-PR are TEST Stations, Data Logger, and in emergency and control rooms where the operator is required to keep hard copy back-up.

Input Connections

Pin Function

- | | |
|---|--|
| 1 | Chassis ground |
| 3 | +20ma. current loop or RS232-C data in |
| 4 | Request to send — biased true |

- | | |
|----|------------------------------------|
| 7 | Signal ground |
| 11 | Reverse channel (busy) |
| 20 | Data terminal ready — biased false |
| 22 | -20ma. current loop return |

Power Requirements

- 110/220 VAC Operation; 50/60 Hz
225 watts Printing

Specifications

Printing

- 5×7 dot matrix
- Impact printing
- 80 columns
- 12 characters per inch
- 122 inch character height
- 100 characters per second print speed
- Multiple copy capability
- XTAL baud rate 9600 baud with dip switch

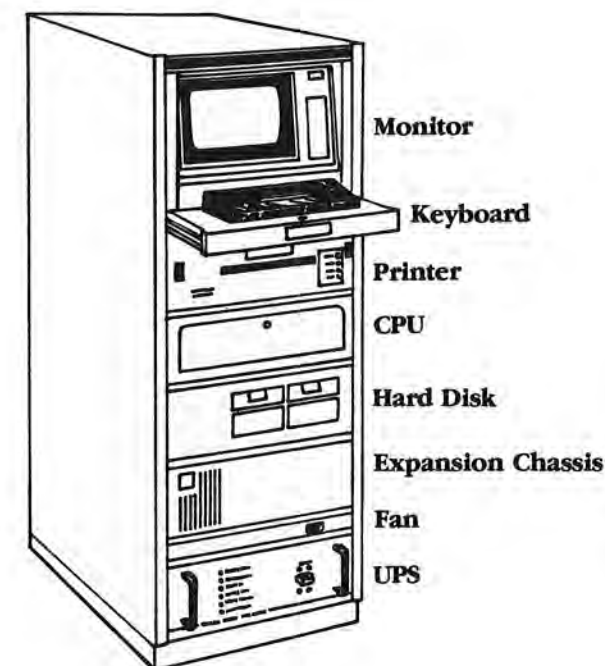
Input

- Serial RS232-C and 20 ma. current loop internal jumper selectable
- RS232-C busy signal
- Rear EIA connector
- Mating connector Cinch DB25-P
- Print Alignment
- Bidirectional ±.015
- Unidirectional ±.005
- Self Test Available

Ordering Guide

- Model 6531-PR \$1,795.00

Rack Accessories



In addition, the 6531 System offers VRTX, a multitasking kernel that permits you to run real-time interrupt-driven control applications.
Model 6531-1 \$4,995.00

EXPANSION CHASSIS

Provides ten expansion slots in a rugged industrialized 19" rack mount. The unit has an integral 135 watt fan cooled power supply. One slot is used for the IBM expansion card (included), leaving nine slots open for the user's application. Two 36" ribbon cables are included, every other wire in each ribbon cable is used as a ground for increased noise immunity.
Model 6531 XC \$1,399.00

FAN

The 6531-F is a compact cooling unit, taking only one RETMA units. The unit contains three 100 CFM fans and is usually mounted below the 6531XC, so cooling air can be moved up and around the P.C. cards.
Model 6531-F \$269.99

HARD DISK

The 6531-HD is a 19" rack mounted Industrial Hard Disk System with one quarter inch tape drive back-up.
Model 6531-HD \$3,995.00

HEAVY DUTY UPS

The 6531-UPS provides power for the small industrial computer. The unit continuously filters the AC power to the rack and protects against spikes and transients and even complete power outages. The 6531-UPS provides complete power during power outages. The 6531-UPS green light indicates ample reserve and when the red light blinks at 8 second intervals, 2 minutes of reserve power remain. Full load capacity is 15 minutes, half load is 48 minutes. UL and VDE approved. Shipping weight is 125 lbs.
Model 6531-UPS \$2,295.00
Add \$125.00 shipping charge.

RACK MOUNTED MONITOR The 6531 MM or CM

The 6531 Series rack mounted monitors offer two options. The 6531 MM is a 12" high resolution monochrome monitor (720 by 350). The 6531 CM is a 12 inch high-resolution RGB color monitor (690 by 480). Both monitors are 19" rack mounted with a non-glare screen.
Model 6531 MM \$ 869.00
Model 6531 CM \$1,489.00

KEYBOARD

The 6531-KB is an IBM-PC compatible keyboard with a 6' coiled cord. The 6531-KB mounts on the front of the rack and uses 3½" of rack space.
Model 6531-KB \$595.00

PRINTER

The 6531-PR is an 80-column printer that is rack mounted (19×7) offering a savings in valuable bench or floor space. The 6531-PR is microprocessor controlled and EPROM programs allow for special printing functions. Printing is dot matrix impact type.
Model 6531-PR \$1,795.00

6531 INDUSTRIAL COMPUTER

The 6531 Industrial Computer is an 8088 based computer that works with both MSDOS and CP/M. The 6531 consists of a system baseboard that is IBM PC/XT compatible, with five expansion slots, a 125 watt power supply and cooling fan, mounted in a rugged industrial 19" rack. The 6531 has a full 16 bit internal data bus as well as an eight-bit external data bus. The 6531 also supports the 8087 math chip.

**30 Day Unconditional Warranty
Order Now!**

**Factory Automation
Robotics**

COMPUTER ACCESSORIES

Cables and Accessories for Computers, Printers, and Other Peripherals

Ribbon Cables

DB25 Extension Cable

25 Conductor male to female, extends your DB25 cables, 4 ft.

Model 4612 \$39.95

DB25 Extension Cable

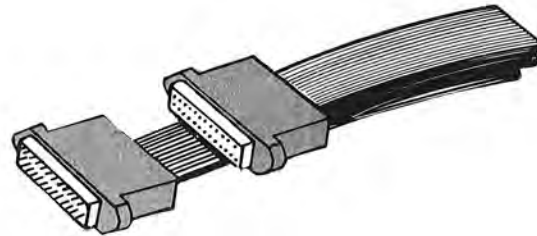
25 Conductor male to male, extends your DB25 cables, 4 ft.

Model 4614 \$39.95

DB25 Extension Cable

25 Conductor female to female, extends your DB25 cables, 4 ft.

Model 4616 \$39.95



General Use Cables

9 Conductor Cable

RS232 (1-8 20 wired) DB25, male to male, 10 ft.

Model 4600 \$39.95

9 Conductor Cable

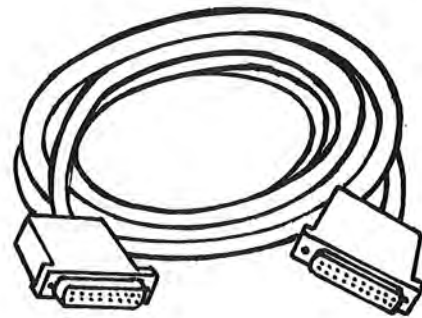
RS232 (1-8 20 wired) DB25, female to female, 10 ft.

Model 4602 \$39.95

9 Conductor Cable

RS232 (1-8 20 wired) DB25, male to female, 10 ft.

Model 4601 \$39.95



25 Conductor Cable

RS232 (1-25 wired) DB25, male to female, 10 ft.

Model 4604 \$49.95

25 Conductor Cable

RS232 (1-25 wired) DB25, male to male, 10 ft.

Model 4603 \$49.95

25 Conductor Cable

RS232 (1-25 wired) DB25, female to female, 10 ft.

Model 4605 \$49.95

Bulk Cable

Bulk Cable

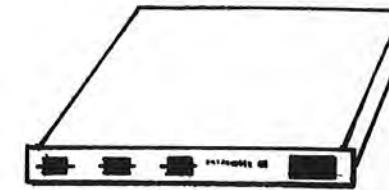
25 Conductor, for custom cable application, round, 10 ft.

Model 4628 \$12.99



COMPUTER ACCESSORIES

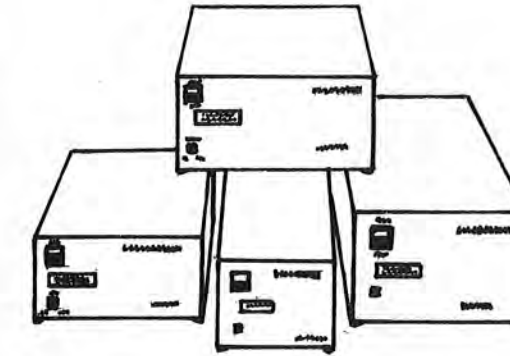
Power Line Accessories



POWER LINE CONDITIONER

The power line conditioner protects against line surges, spikes, overcurrents, and noise. Mounted either as a low-profile package, or a 19" rack mounted unit. The unit stands between the monitor and the IBM. As a power conditioner the unit also serves as a single source of power — eliminating a messy tangle of power cords.

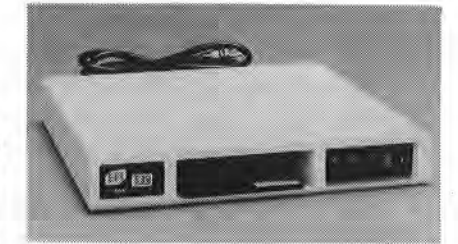
Model PC3-RLX \$159.00



UPS POWER SUPPLY

Provides enough power to comfortably back-up valuable data and continue short-term operation. When a power failure hits, the UPS switches within 4 mSeconds (under one-half cycle); thus keeping RAM data intact. The 300 Volt-Amps model provides power for 18 minutes. And the 500 Volt-Amp model provides power for 30 minutes.

Model UPS300VA \$1,095.00
Model UPS500VA \$1,369.00



POWER CONTROL CENTER

Attractive power conditioner designed to mount on top of the IBM PC in a low-profile case. Includes power conditioner, brown-out protection, fail safe fault indicator, and a disk storage space in front for convenient storage of valuable disks. Includes a small LCD watch.

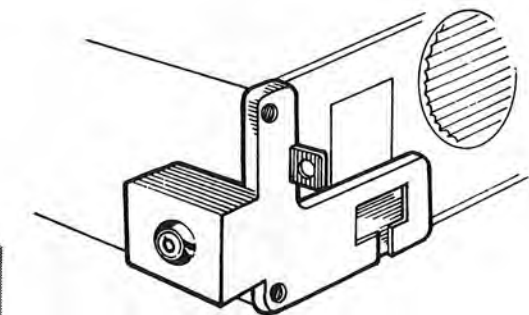
Model PCC2000 \$249.95

EXPANSION CHASSIS

Provides six/ten expansion slots in a rugged industrialized housing with an integral 65/135 Watts fan-cooled power supply. One slot is used for the IBM expansion card (included), leaving five/nine slots open for the user's application. Two 36-inch ribbon cables are also included; every other wire in each ribbon cable is used as a ground for increased noise immunity. The ten card chassis is 19" rack mountable.

Model (6 Slot Chassis) XCH6. \$995.00
Model (10 Slot, Rack-Mounted)

6531-XC \$1,399.00
(see rack mounted accessories)



POWER SWITCH LOCK

Keylock for the power switch preventing unauthorized entry into the IBM; prevents removal of the PC from the work station; and prevents removal of boards from IBM.

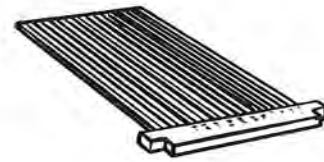
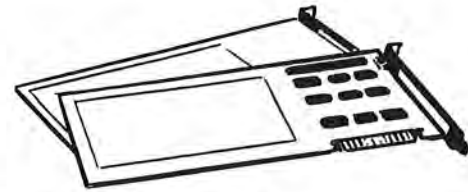
Model Stopper \$52.95
Model PSL10 (heavy duty) ... \$122.95

COMPUTER ACCESSORIES

DEVELOPMENT BOARD

Prototype development board, full size (10"), plugs directly into the IBM. Buffered IC connections. I/O connections on the board. Ground and power plains are on both sides of the board.

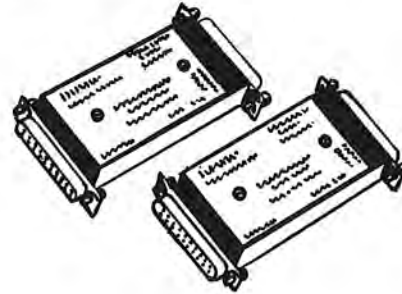
Model PB600 \$ 71.65
Model PB700 (buffered) \$164.95



INTERFACE CONVERTERS (RS-232C to RS-422)

A converter provides a convenient method of interfacing existing RS-232C based equipment with the newer RS-422 based devices which are appearing in the marketplace. The converter connections are DB-25P (male RS-232C); and DB-25P (male RS-422). Consequently the cables must be female (DB-25S) to and from the connector.

Model (host-powered) 634H . \$149.95
Model (self-powered) 634S .. \$195.95



IBM EXTENDER BOARD

An extender board for special work requiring board adjustment during operation. Strong enough to support a full size board making difficult adjustments easier.

Model EXB21 \$59.95

DRIVER CLEANER

A 5 1/4" drive disk cleaning kit. Maintains clean disk heads for longer life. Includes software, two polyester cleaning diskettes, reusable diskette jacket, and 1.5 ounce can of head cleaning spray. Menu driven software directs you step-by-step through the cleaning process.

Model DC35 \$72.95
Model DC35R
(Replacement Kit) \$28.50



KEYBOARD PROTECTION

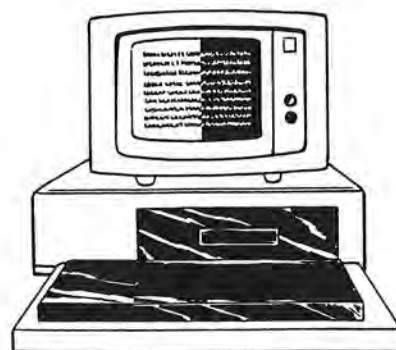
A plastic skin moulded in the shape of the keys mounts directly over the keyboard for permanent protection of the keys from coffee spills, and contamination.

Model IBM-15 \$39.95

IBM PC DUST COVER

High quality, smoke colored crystal styrene, that protects the IBM PC, XT, or 5531 from dust and contamination. The cover is a hard plastic shell that mounts on top of the keys maintaining the low profile of the keyboard. The disk drive cover is a hard plastic that covers the disks to prevent the entry of dust.

Model I60-80 \$39.95



ENHANCEMENT SCREEN

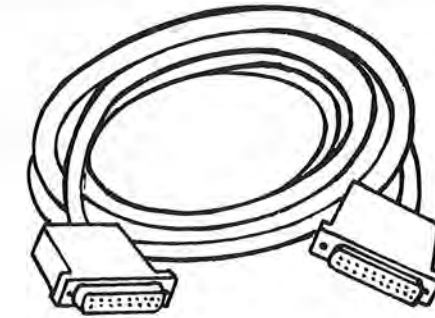
We've engineered our new visual enhancement screen for the IBM PC/XT to eliminate reflection and glare while enhancing the display on the PC monitor. This is valuable in reducing eye fatigue and strain. The enhancement screen is manufactured with woven black optical fiber mesh and is housed in a sturdy polycarbonate frame with a handy pull-out tab for easy removal. The frame also has a foam gasket around its perimeter to hold the screen securely in place during operation.

Model I10-85 (B/W) \$39.95
Model I00-85 (Color) \$49.95

COMPUTER ACCESSORIES

Specialized Cables/ Connectors

ICS Cabling Products are designed to interface most popular Micro-Computers to a variety of printers and other peripherals. ICS cables are manufactured to high quality standards and provide a selection of the most popular market items. Each cable is continuity tested for your assurance before packaging.



Crossover EIA Printer Cable

DB25S to DB25P, round 6 ft.
Model 4551 \$51.95

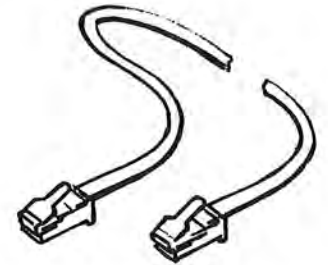
Standard EIA Printer

Cable, DB25S to DB25P, round, 6 ft.
Model 4552 \$51.95



Telephone "T" Adaptor

Adapts one modular connection to fit two hookups.
Model 4611 \$4.49



Telephone Extension

Modular Cord, male to male, used for modem connection, 25 ft.
Model 4610 \$6.89

Gender Changers

A convenient method of correcting mismatched cable connectors, for example, changing a male plug to a female jack.



25 Pin Male/Female Gender Changer

DB25 M/M
Model 4651 \$29.95

25 Pin Female/Female Gender Changer

DB25 F/F
Model 4652 \$29.95

Diskette Storage Accessories

Disk Storage Accessories are designed to protect, store, organize and identify disks. These products will simplify handling while offering protection from dust, static and other environmental hazards.

DISKETTE STORAGE BOX

(125 Capacity) 5 1/4" Storage protects your disks while organizing them.
Model 4121 \$34.79

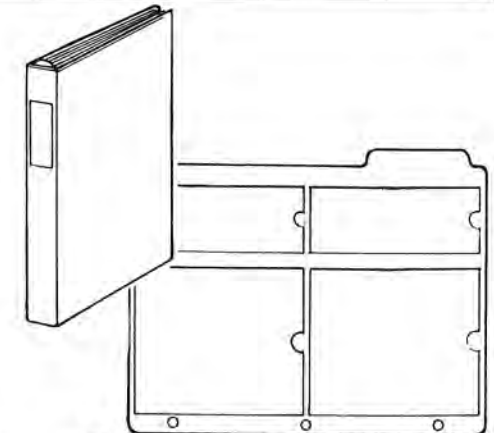
DISKETTE STORAGE BOX

(75 Capacity) This 5 1/4" Storage Box protects and organizes your disks.
Model 4122 \$23.27



DISKETTE STORAGE BINDER

1" Binder with 3 rings and 10 pocket pages for disk storage. Holds a total of 20 disks with envelopes.
Model 4116 \$15.49



DISKETTE STORAGE PAGES

Additional plastic pocket pages hold 2 disks and labels per page. Fits standard 3-ring binder. Set of 10.
Model 4117 \$9.87

COMPUTER ACCESSORIES

Computer Cleaning and Maintenance Accessories

The Cleaning and Maintenance products are designed to clean and lessen static problems, while reducing the chances for lost data or computer down time.

COMPUTER CLEANING SPRAY

Cleans computers and CRT units and will not damage plastics. 14 ozs.
Model 4450 \$7.69

ANTI-STATIC SPRAY

Stops the static control problems that plague computer users. Anti-static spray helps prevent equipment and data failure. 14 ozs.
Model 4451 \$8.69

DUST BLOWER

Pressurized air blows out dust from areas not usually accessible. Avoid risking data loss and equipment failure. 14 ozs.
Model 4452 \$8.69



5 1/4" HEAD CLEANING SET

Pre-moistened system cleaning floppy disks are used for disk drive only. Removes gym, dust and oxide particles which affect head operations. Two-pack.
Model 4454 \$25.49



Power Line and Surge Protection Accessories

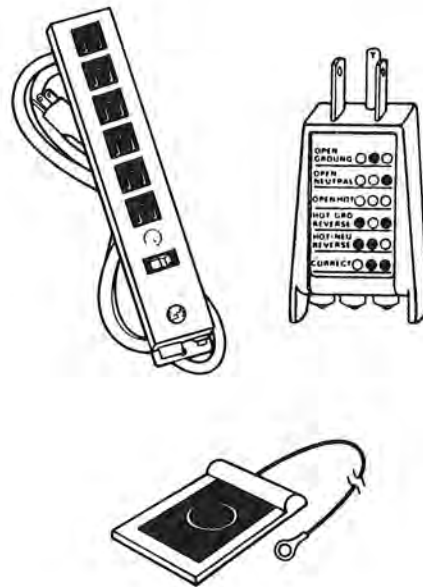
Voltage surges and static can occur anytime, anywhere and are hazardous to your equipment. These products will help protect, test and offer convenient power for computer systems and peripherals, and protect against static and high volume surges.

SURGE PROTECTOR BAR

Four outlet bar with surge protection. Features on/off switch and circuit breaker. UL approved.
Model 4666 \$59.50

SURGE PROTECTOR BAR

Six outlet bar with surge protection. On/off switch and circuit breaker included. UL approved.
Model 4667 \$62.95



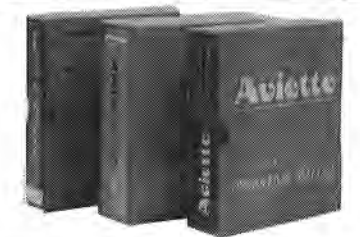
STATIC-OUT

Designed to discharge static electricity. Before using your computer, touch static-out and drain off static charges. Essential for protection of all memory devices.
Model 4669 \$27.95

GROUND FAULT INDICATOR

Protects your equipment. Ground fault indicator plugs in and gives a comprehensive test of your outlets. Light indicators reflect precise problem. UL approved.
Model 4668 \$12.99

SOFTWARE MART



uNETix

A high-performance operating system with multi-tasking operations. Compatible with UNIX (AT&T), the uNETix is both multi-foreground and multi-background while performing multiple tasks. The system calls for the standard UNIX conventions. Supports up to ten windows, and up to ten logical screens with a hierarchical file system. Inter-task communication: pipes and signals. Input and output redirection as well as tool building capability through the use of pipes.
Model uNET \$895.00

LABTECH NOTEBOOK

An Integrated Software package that reduces complicated data acquisition and control procedures to single button operations. Menu driven, easy to learn and use; and requires no computer skills on the part of the operator. Real-time process control, real time graphic display of data, continuous throughput of data to the disk, high quality graphic display for report, data-based management and file handling; and supports a wide range of personal computer data acquisition and control hardware.
Model LAB1 \$895.00

PC WRITE

A full screen text editor at a great price. Nine help screens throughout the programs for quick problem-solving. Backup, save and un-delete keys to prevent loss of wordprocessing information. Split screen into two different files for merging, copying, or modifying text files. Supports 35 printer formats.
Model PC WRITE \$100.00

PC-TALK

Easy-to-use Communications software, to "talk" to Compuserv and other Bulletin Board services, as well as to most other computers. On-line directory, and tone or pulse dialing facility. You can communicate to send and receive files; and more importantly to save files on disk once received thru serial ports.
Model PC TALK \$69.95

TURBO PASCAL

Borland International Software. Features windowing, spreadsheet, sound, color, graphics support, and full screen editor. Turbo Pascal is one of the most powerful languages available for the IBM PC, XT, or 5531. Quick to learn, points out errors, and designed to let you easily write Engineering and Scientific programs for your computer that include sound, color graphics, and even windows.
Model TP50 \$69.95

INSTRUCALC

Includes 36 microcomputer programs for the IBM PC/XT, covering the major instrument engineering calculations used in industry today. Two key features include: (1) a built-in engineering unit option that allows any combination of Imperial, SI, and user units for use during a program run making conversions unnecessary; (2) the ability to stop in the middle of a calculation, go to another calculation, obtain a printout, then go back to the original calculation without losing data. All input data and midstream calculations can be edited as many times as it takes to find the optimum answer. 36 programs, 3 ring binder, 264 pages, equations, tables, figures, and index.
Model 380-4 \$695.00

SOFT-LOCK

A highly sophisticated software program that protects your confidential information on floppy or hard disk. A Menu driven program that operates under MS DOS and is extremely easy to use: only two commands, "lock" and "unlock". You select a 10-character code that must be entered before program execution. Two levels of security are available: normal, and encryption modes. A locked file does not appear on the directory. You may lock a global group of files, or you can lock your files based on a predefined list of file names.
Model SLK23 \$129.95

ASYSY

The new, integrated, interactive software specifically for scientists and engineers. Designed for use with your IBM PC, XT, or compatible. It provides the capabilities for handling scientific, mathematical, or engineering tasks — capabilities not approached by any other microcomputer software system on the market today. Features include auto-plotting, Fast Fourier Transform, vectors, matrices, and simultaneous equations.
Model ASYSY1 \$1,795.00

DIAGNOSTIC DISK

A powerful software program that checks the disk speed, noise tolerance, write/read performance, track alignment, positioner backlash, disk clamping, erase crosstalk, and system compatibility.
Model DD85 \$59.95

MULTI-TASKING OPERATING SYSTEM

PC/VRTX offers a unique combination of powerful software and flexible hardware arranged to provide engineers and scientists with the medium and tools required to create real-time process controllers based on the IBM PC/XT. Includes the real-time multi-tasking executive, 64 K RAM (board provided), a diskette with utility program, and the IBM Macro Assembler Language interface package. The VRTX supports up to 448 K RAM and 128 K EPROM. Includes software, board, documentation, diskette, user manual, and utility programs.
Model PCX-1000 \$1,995.00

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BOOKMART



CHEMICAL ENGINEERING SOFTWARE GUIDE

By CAE Consultants
A directory of published software written by Chemical Engineers for process control applications. 180 pp. 1984.
Model CAE-1 \$39.00

INSIDE THE IBM PC: Access to Advanced Features and Programming

By Peter Norton
Complete description of the PC-DOS services, workings of the diskettes, how to decode diskettes, ROM service routines, and more. 320 pp.
Model 5610-3 \$89.95

RS-232 MADE EASY, CONNECTING COMPUTERS, PRINTERS, TERMINALS, AND MODEMS.

By Martin D. Seyer
A clearly written guide to the aspects of the RS-232C. 240 pp.
Model RS-232 \$21.95

UNIX On the IBM-PC

By William B. Twitty
Here's a practical guide to effectively using UNIX® on the IBM-PC! Scores of useful examples stressing skillful implementation of UNIX® commands and facilities ease you through programming with either the XENIX®, PC/IX®, or VENIX® systems. 224 pp. July 1984.
Model 93907-4 \$19.95

Programming in C on the IBM PC

By Lawrence Pollack & Bryan Cummings
Detailed coverage of the commands, syntax, conventions, programming techniques, and capabilities of the C language. Examples of how to create your own libraries, link relocatable files, and control program flow. 224 pp.
Model 72935-0 \$16.95

A Comprehensive Guide to the IBM Personal Computer

By George Markowsky
A large volume including DOS, BASIC, BASIC compiler, Technical Reference, and macro Assembler. 640 pp.
Model 16420-5 \$19.95

Pascal for the IBM PC

By Kevin Bowyer
Book and diskette for DOS Pascal, and UCSD p-system Pascal, control structure, looping constructs, guide, examples and description. 326 pp.
Model D7613 \$49.95

IBM PC/XT: BASIC Programming and Applications

By Louis Natsbelsky
Practical examples, applications, descriptions, and software examples on disk. 304 pp.
Model 44834-0 \$39.95

Microprocessors for Measurement and Control

By D. M. Auslander
How to design and use microprocessors for real-time control in the process environment. Describes prototype systems for projects. 310 pp.
Model 984 \$17.95

Everything You Wanted to Know About Computers but Were Afraid to Ask

By John L. Holm
A description of the structure of the micro-computer with examples of the IBM. An overview of computer architecture in clear, crisp terms. An extensive glossary. 110 pp.
Model 1220-8 \$9.95

The IBM PC Connection

By James W. Coffron
Examples and descriptions of designs for external devices. Burglar alarm systems, energy management, and remote security systems. 264 pp.
Model 127-6 \$17.95

BASIC PROGRAMS FOR SCIENTISTS AND ENGINEERS

By Alan Miller
A library of problem-solving programs written for Scientists and Engineers. A number of examples and explanations. BASIC language examples. 318 pp.
Model 0-073 \$18.95

ENGINEERING SOFTWARE

By Moore Data
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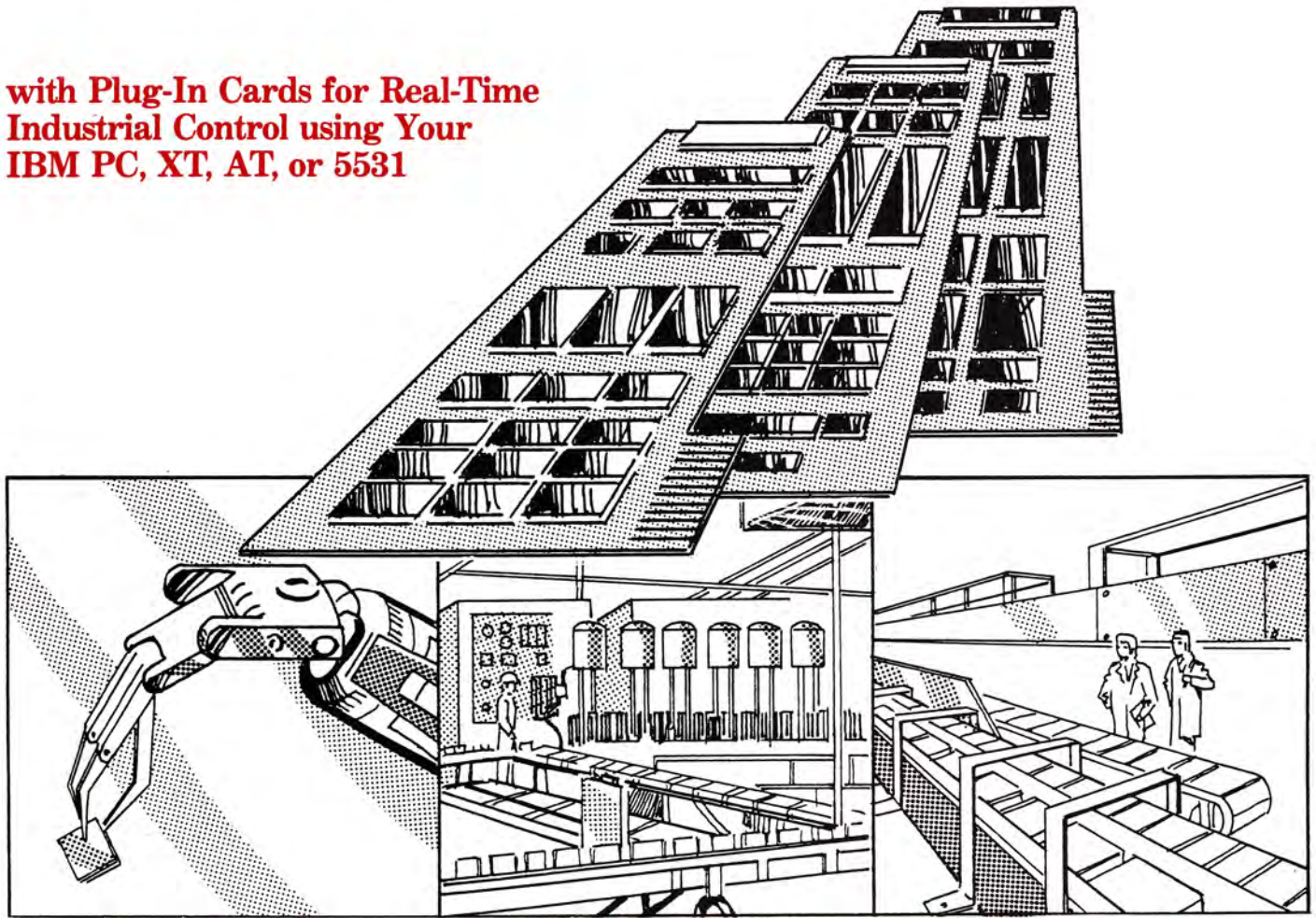
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