intel

MULTIBUS®
OEM PRODUCTS
1983
CONFIGURATION
GUIDE

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"Open Systems" ...

Today's avalanche of technology in the microcomputer industry is threatening products and entire companies with obsolescence. Survival requires moving away from the large, clumsy system and the traditional closed system. The driving force behind today's technology is VLSI, because of huge cost reductions, increasing functional density, high-performance, simplicity and reliability.
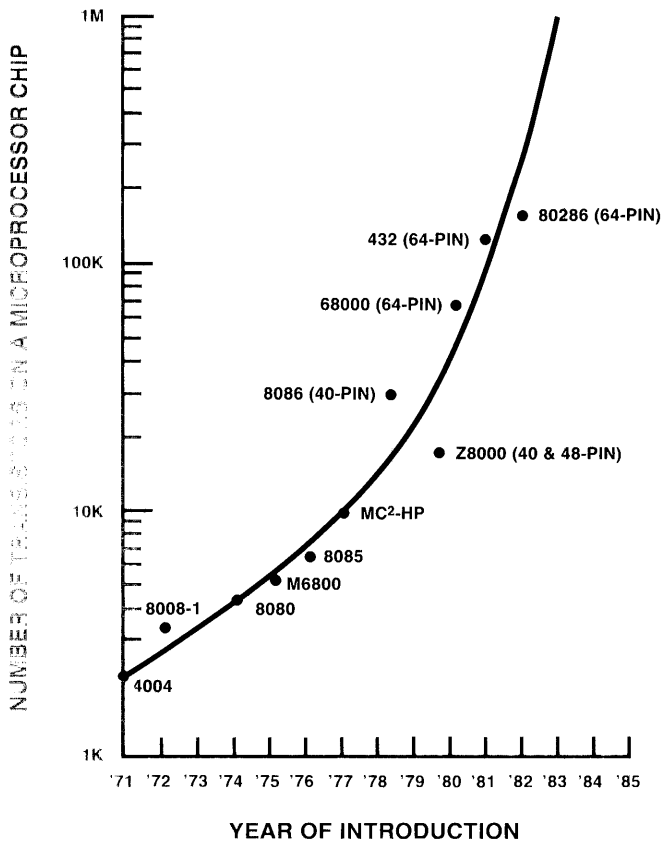
The key to future upgradeability and continued market leadership is the system which will allow continued integration of VLSI technology

That System is the Intel "Open System." Made possible through the use of industry standards, it provides total flexibility.

This System is:
- Open to future VLSI
- Open to all levels of integration
- Open to aftermarket suppliers
- Open to special system requirements.
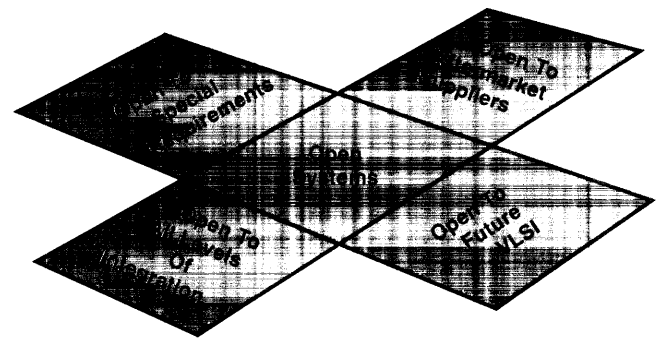
Lower system cost, higher performance and extended product life

Intel's use of both hardware and software interface standards ensure a compatible, evolutionary growth path designed to take advantage of all future VLSI, and to avoid major product redesign costs.

YEAR OF INTRODUCTION
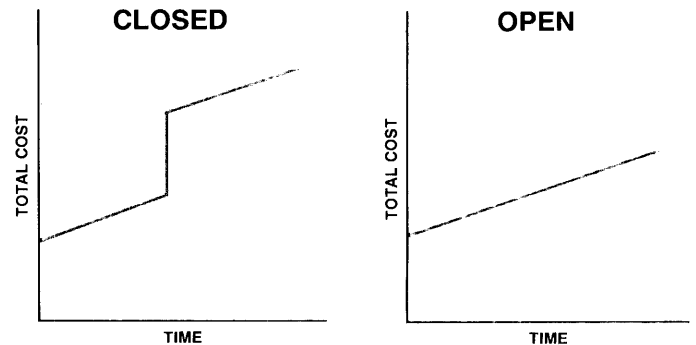
Introduction

Here are just some of the standards incorporated into Intel's "Open Systems." They are technically usable, adopted by standards bodies, and supported by multiple vendors.

- IEEE 796 - MULTIBUS®— system backplane bus
- IEEE P959 - iSBX™ Bus — on-board I/O expansion bus
- IEEE P754 - Floating Point Standard — floating point math
- JEDEC 28-pin sites — memory pinout
- IEEE 488 Bus — IEEE instrumentation bus
- Ethernet™ — three company standard
- UDI/iRMX™ 86 — Universal Development Interface on Intel's real-time operating system.

The ability to meet rapidly changing customer needs

Intel has opened up systems design with compatible products at three levels of integration: components, boards and systems. This allows the OEM to choose the optimal level for a given business environment and to change levels to adjust to new business conditions and opportunities as VLSI technology continues to expand. All is accomplished with minimal investment, minimal risk, and with no delay in getting to market.
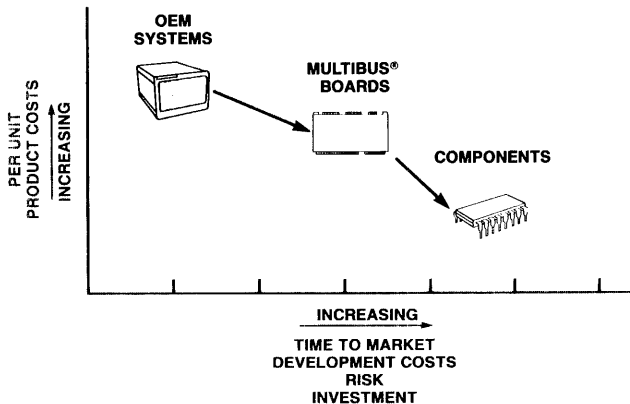
The aftermarket is rapidly expanding with products designed to meet these same standards

The development of this large aftermarket is providing significant benefits to the MULTIBUS user. There are now multiple sources of supplies, with highly competitive pricing, a wider selection of products and availability of custom parts. Intel's commitment to the "Open System" can do nothing but continue to strengthen this market.
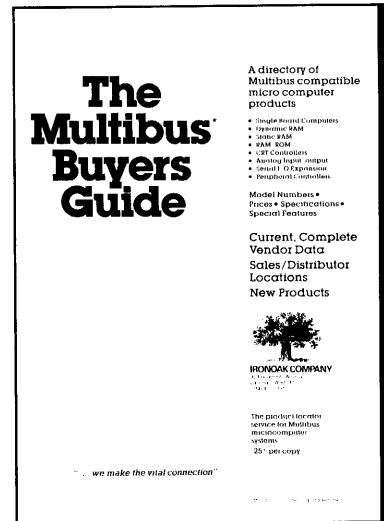
Special functions are no problem

Traditionally, OEMs have had only minimal ability to configure their unique system. Often it has required buying more than was needed, making do with less than was really requested, or designing the entire configuration from scratch.

With Intel's "Open System" modular products, flexible system expansion and customization is realized. This translates into minimal investment, less risk and optimal performance for the cost.

The components that make the "Open System" a reality ...

It all begins with MULTIBUS System Architecture: the industry standard architecture

The Foundation of Intel's microcomputer systems architecture was laid in 1976 with the introduction of the MULTIBUS® system bus, and Intel's first single board computer product, the iSBC® 80/10. It was a solution the microcomputer industry needed to make microprocessor technology easier to use and more readily available for new product design and development. It's widespread use and popularity made it a defacto industry and IEEE standard (IEEE 796).

This bus architecture is the conceptual foundation and physical framework for interfacing the various pieces of the microcomputer system into a family of systems solutions. This family now includes single board computers, memory expansion boards, a broad array of I/O expansion products, packaging products, microsystems software and integrated microsystems.

Support for multiple levels of expansion and design flexibility

The five levels of iSBC expansion suported by Intel's MULTIBUS provide OEMs with the widest range of cost/performance solutions and open system flexibility in the industry.

- The **MULTIBUS®** System Bus — system communication and interconnection
- The **iLBX™** Execution Bus — large amounts of high speed memory
- The **MULTICHANNEL™** I/O Bus — very high speed, high performance I/O
- The **iSBX** I/O Expansion Bus — low-cost modular I/O
- iSBC **MULTIMODULE™** Add-ons — on-board memory and math expansion.

Intel continues to develop new iSBC products to meet the industry's need for powerful, cost-effective, single board computer products. There are now more than 50 MULTIBUS expansion boards. There are also over 150 MULTIBUS vendors providing more than 1000 MULTIBUS compatible products, the largest assortment of compatible products in the industry today.

The iLBX Execution Bus for unparalleled performance

The iLBX bus is an architectural extension for MULTIBUS microsystems. It extends the processor board's on-board local bus to off-board resources allowing up to 16 megabytes of processor addressable memory to be accessed as though it were resident on the processor board.
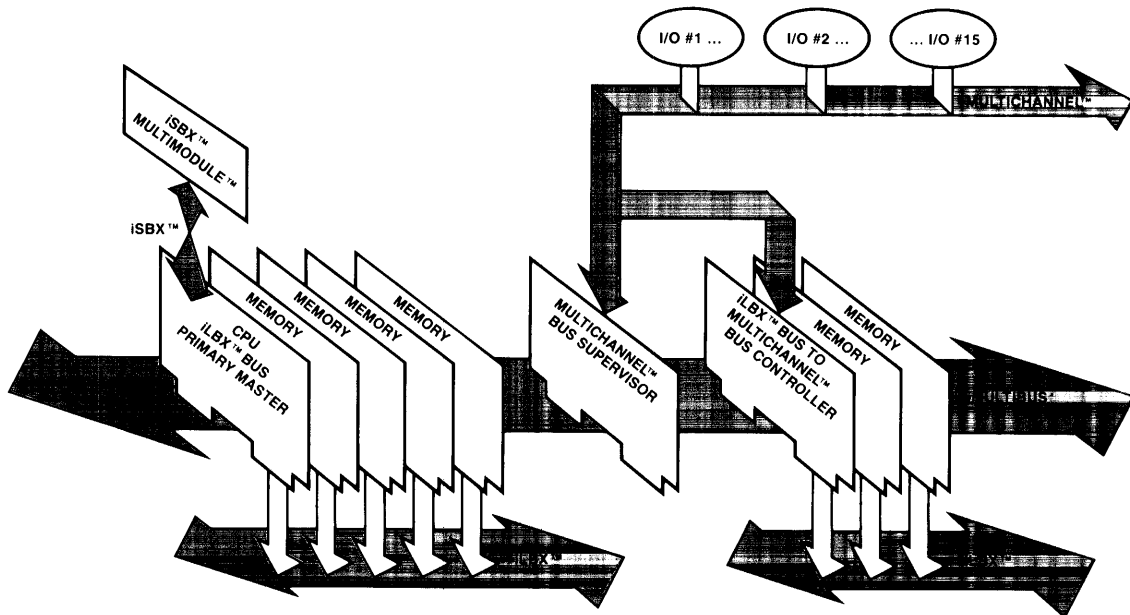
The "sub-system" created by the iLBX bus can be perceived as a "virtual single board computer" because the sub-system maintains all of the architectural characteristics and benefits of a single board computer. Implementation of these "virtual modules" make it possible to create powerful functional modules with a new level of flexibility, performance and memory capability.

To support the new iLBX bus standard, Intel has introduced:

- **iSBC 286/10** — iAPX 286-based CPU board
- **iSBC 028CX** — 128K byte ECC RAM board
- **iSBC 056CX** — 256K byte ECC RAM board
- **iSBC 512CX** — 512K byte ECC RAM board
- **iSBC 428** — JEDEC 28-pin 16-site memory board
- **iSBC 580** — MULTICHANNEL to iLBX DMA controller
- **iRMX 286R** — real-time operating system for iAPX 286-based microsystems

New products like the iSBC 286/10 single board computer, the "CX" family of high performance memory boards, and the iRMX 286R operating system combine a highly advanced VLSI microprocessor, high-speed memory, and a proven VLSI operating system, to make the iLBX bus and the MULTIBUS architecture the highest performance solution in the micro-computer industry.

The MULTICHANNEL I/O bus for extended power and performance

This new offering provides users with a high speed I/O bus designed to support high speed, burst type peripherals by allowing for high speed (8 megabytes/second) block transfers of data over a 8/16-bit wide data path between peripherals and single board computers. It provides a standardized interface with full speed operation at up to 15 meters with a simple asynchronous (488-like) protocol. Typical uses of the MULTICHANNEL bus include computer graphics, specialized peripheral control, data acquisition and high speed MULTIBUS system-to-system communication.

The intelligence on the MULTICHANNEL bus is provided by the iSBC 589, which combines the performance of a DMA controller with the intelligence of a

microprocessor. The iSBC 589 is the physical interface between the MULTIBUS system bus and the MULTICHANNEL I/O bus and regulates the activities of the MULTICHANNEL devices on the bus. Intel also provides a special controller board, the iSBC 580, to act as the MULTICHANNEL bus-to-iLBX bus interface allowing the addition of large buffer memory configurations with high speed MULTICHANNEL access.

The iSBX I/O expansion bus for added capability at minimal expense

Users of Intel's single board computers can incrementally expand system resources by adding small iSBX MULTIMODULE boards which plug directly into iSBC boards. Currently, the iSBX boards allow users to add capability to a single board computer in the areas of parallel I/O, serial I/O and advanced mathematics functions, without going to the expense of adding another full MULTIBUS expansion board.

Customers can choose iSBX MULTIMODULE boards to precisely configure single board computers for their individual applications at a lower cost than was previously possible. The iSBX boards enable users to buy exactly the capabilities they require for their iSBC-based systems, which keeps both system size and system cost at a minimum.

The iSBX bus interfaces iSBX boards to the on-board local bus of iSBC-based products allowing system expansion with minimal demand on the system's MULTIBUS interface. As a result, the system design achieves maximum on-board performance while freeing up the MULTIBUS interface for other system activities.

ISBX™ MULTIMODULE™ BOARD
- CUSTOMIZE A SINGLE BOARD COMPUTER TO AN APPLICATION BY INCORPORATING THE LATEST VLSI TECHNOLOGY

ISBX™ CONNECTOR
- HIGH RELIABILITY

ISBX™ BUS
- MAINTAIN HIGH PERFORMANCE
- COMPATIBILITY WITH ANY iSBC™ HOST BOARD HAVING iSBX™ CONNECTOR(S)

ISBC™ HOST BOARD
- ALL FUTURE 8-BIT AND 16-BIT SINGLE BOARD COMPUTERS WILL HAVE ISBX™ COMPATIBILITY

4
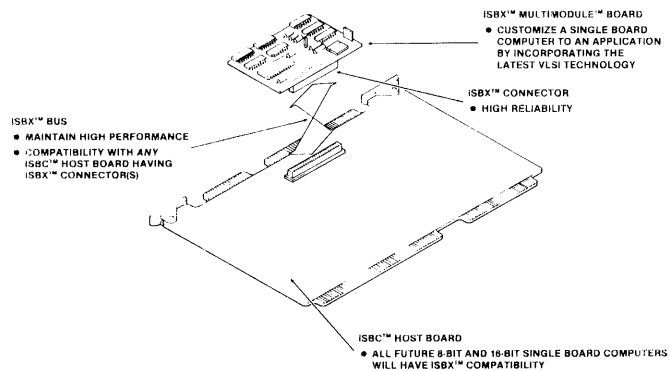
iSBC MULTIMODULE
add-ons for flexibility

The iSBC MULTIMODULEs mount on-board offering a new level of flexibility to system designers in defining and implementing system memory and math requirements. When the iSBC module is used, these additional on-board resources can be accessed as quickly as that of the existing single board computer memory. The small size and unique interface provides a low-cost, low-power alternative for adding small amounts of memory to a single board computer.
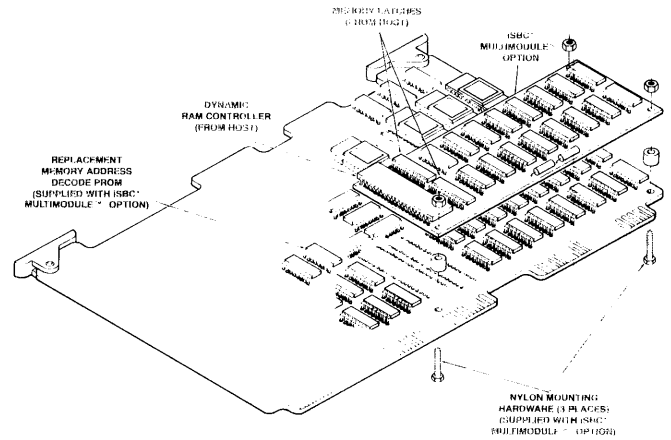
iSBC MULTIMODULE REFERENCE CHART

iSBC MULTIMODULE™s		Single Board Computers (iSBC®)												
Expansion	Product	86/30	86/14	86/12A	86/05	88/45	88/40	88/25	80/30	80/24	80/20-4	80/16	80/10B	80/05
64K EPROM	iSBC® 341				●	●	●	●						
16K EPROM	iSBC® 340			●										
H.S. Math	iSBC® 337	●	●	●	●	●	●	●						
Memory Mgmt.	iSBC® 309	●	●											
Memory Mgmt.	iSBC® 308			●										
128K RAM	iSBC® 304	●												
RAM Parity	iSBC® 303		●	●		●	●	●	●	●		●	●	●
8K RAM	iSBC® 302				●			●						
4K RAM	iSBC® 301						●			●				
32K RAM	iSBC® 300A		●											
32K RAM	iSBC® 300			●										

Systems software support
for a complete package

To effectively use today's advanced microsystems, well-designed system software of proven quality and reliability must be available. The basic software elements of a system, the operating system and its collection of compatible languages, are of major importance because they serve as the foundation for the system's power and versatility. Today, Intel offers the two industry standard microcomputer operating systems: iRMX 86 and XENIX 86.

The iRMX 86 and iRMX 286R operating systems are real-time, multitasking, and multi-user software systems designed to deliver high performance and explicit control over system resources in applications such as factory and process automation, CAD/CAM, data communications, and transaction processing. It is an open, modular system with a layered design.

This gives the user configuration freedom to meet a wide range of application requirements ... from an embedded application entirely in EPROM to a full computer system with on-target development capabilities. The Universal Development Interface (UDI) on iRMX 86 provides a standard interface for a wide range of Intel and ISV (Independent Software Vendor) languages and applications. Languages available on UDI include FORTRAN, PASCAL, PL/M, ASM, BASIC, C, and COBOL.

XENIX 86 is a Bell licensed, UNIX-based operating system available on several Intel microsystem products. It is a general purpose, multi-user operating system supporting a rich software environment with a large library of programming tools and a high degree of portability. Its attributes make it an effective mechanism for the support of software development activities and time-sharing data processing functions.

iRMX™ 86 VLSI OPERATING SYSTEM
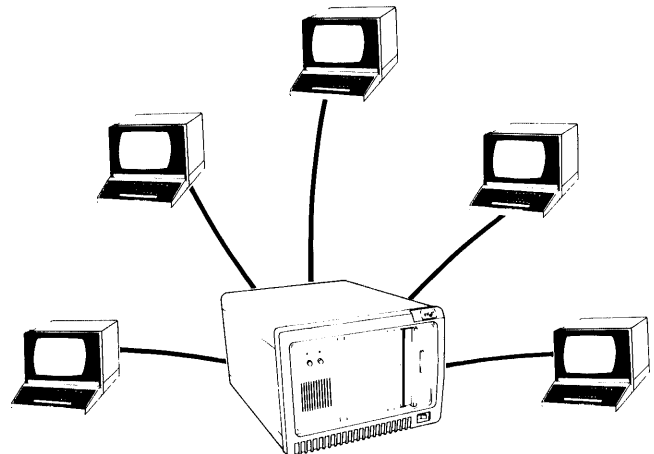
XENIX* 86 INTERACTIVE, MULTIUSER OPERATING SYSTEM

Intel workshops ... training in microcomputers

Whether your present involvement with microcomputers is a result of long-term planning or simply an exploratory project undertaken by your company in response to external circumstances, there exists an obvious and urgent need for you to familiarize yourself with this exciting new technology. If the microcomputer is, or is destined to become, a part of your working scene, then the importance of carefully planned training cannot be over-emphasized. A modest outlay in time and money now can save many weeks of self-study and could well prevent some very expensive mistakes during the initial development of your systems.

Why Intel training?

EXPERIENCE — Intel has been training engineers in the application of microprocessors and the development of microcomputer systems since the early '70s, and there are now many thousands of engineers creating the most advanced microcomputer systems as a direct result of successful training with us.

VARIETY OF COURSES — Intel offers a wide spectrum of workshops covering all Intel microprocessor families from components to the board and system levels. Microcontroller and microprocessor workshops cover assembly language programming; high level languages are covered in separate intense courses. Your particular training requirement may involve just one or several courses, so we have taken care to ensure that each workshop is a high-quality training module that can either stand independently or integrate with other modules to completely cover the subject. The workshops are frequently updated to include the latest developments in devices, boards, software, and development tools, and reviewed on a regular basis for clarity and content.

PRODUCT KNOWLEDGE — As the designers and manufacturers of the most widely accepted microcomputer products in the world, our knowledge is both comprehensive and topical. Remember the saying about "the horse's mouth"!

EXTENSIVE MATERIAL — Teaching aids include slide and video tape equipment, student notebooks and a wide range of printed materials which are designed to provide post-training assimilation and act as practical reference manuals in your own laboratory.

"HANDS-ON" EXPERIENCE — We believe that students learn better by doing than by listening, so a sizeable proportion of course time is devoted to dynamic training via the INTELLEC development System, appropriate single-board computers, In-Circuit Emulators (ICE), I/O units for programming exercises, and computer kits for design and debugging sessions. Each student therefore receives valuable "hands-on" experience of the principles and techniques featured in the lecture sessions.

Accreditation for workshops

Intel Customer Training offers Continuing Education Units (CEUs) for completion of our workshops. Attendees of our 5-day workshops receive 3.5 CEUs, while attendees of our 4-day and 3-day workshops receive 3.0 CEUs and 2.0 CEUs respectively. Education Units provide recognition of professional growth and achievement.

Intel Workshop Schedule

Workshops*	JAN 3	10	17	24	31	FEB 7	14	21	28	MAR 7	14	21	28	APR 4	11	18	25	MAY 2	9	16	23	30	JUN 6	13	20	27
Introduction to Microprocessors (4 days) M-TH		D			C		B			S		Ta	Dy		L	B			D	S					C	W/S
MCS 48/49 Microcontrollers							B																			C
MCS-51 Microcontrollers		S	B			C				S				B			C				S		B			
MCS-80/85 Microprocessors		D				B			C	S			W		B	L		C			W		S			
iAPX 86, 88, 186 Microprocessors Part I		W	S	B	D	W	L		B	C	W	S	B	W	D	B	S	W	C	B	L		W	S	B	D
iAPX 86, 88, 186 Microprocessors Part II			S	B				S			C		S	B					S		C	B			S	
iAPX 286 Architecture (3 days) W-F						B		S		D				L					B				C	S		
Software for Non-Programmers (4 days) M-TH			C					B				S				C				B				S		
PL/M Programming			W	S		D			S	B		C			W	D	B		S		C		L	W		
Pascal Programming							C									W				S					D	
Ada Programming							S														S					
iRMX 86 Operating System Part I		B		C	S		D			L			C	S			D	B		S			C		W	S
iRMX 86 Operating System Part II		B				S		D						C	S				B		S			C		
iRMX 88,80 Operating System Part II		S							C							S									C	
System 86/300 Users (4 days) TU-F									D				S					C					B			
NDS-II Network Development System Superuser (3 days) M-W	S				B		C					B				S	B		C					B		
Transaction Processing System (iTPS) (3 days) W-F			W				S												W						S	
Terminal Application Processing System (iTAPS)				W				S												W						S
iDBP Database Processor (4 days) M-TH						W							S				W						S			
8086-Based Personal Computers							B								C				S						B	
Peripheral Chips/Data Communications (4 days) M-TH						B								S							D					
Speech Communications with Computers (4 days) M-TH			S					W		S						S						W				
2920 Signal Processor							C																	C		

* All Workshops 5 days unless otherwise noted.

LEGEND

B Boston — 27 Industrial Ave., Chelmsford, MA 01824
   617-256-1374
C Chicago — 2550 Golf Rd., Suite 815, Rolling Meadows, IL 60008
   312-981-7250
S San Francisco — 1350 Bordeaux Dr., Sunnyvale, CA 94086
   408-734-8395
D Dallas — 12300 Ford Rd., Suite 380, Dallas, TX 75234
   214-241-8087

Dy Dayton, OH
    312-981-7250
L Los Angeles, CA
    408-734-8395
W Washington, D.C.
    617-256-1374
Ta Tampa, FL
    617-256-1374

Where is Intel training?

Intel Customer Training is a worldwide organization with workshops scheduled nearly every week of the year in our training centers:

Boston Area . . . . (617) 256-1374
TWX 710-343-6333
Chicago Area . . . . (312) 981-7250
TWX 910-651-5881
Dallas Area . . . . (214) 241-8087
TWX 910-860-5617
San Francisco Bay Area . . . . (408) 734-8395
Telex 352-005, TWX 910-338-7811
Washington, D.C. Area . . . . (617) 256-1374
TWX 710-343-6333
London Area . . . . Swindon (0793) 488-388
Telex 444447
Munich Area . . . . (089) 5389-1
Telex 523177
Paris Area . . . . Rungis (01) 687-22-21
Telex 270475
Stockholm Area . . . . Bromma (08) 98.53.85
Telex 12261
Tokyo Area 03-437-6611
Benelux Area . . . . Rotterdam (10) 149-122
Telex 844-22283
Copenhagen Area . . . . (1) 182-000
Telex 19567
Israel . . . . (972) 452-4261
Telex 46511

Workshops are presented in the local language.

Registration

To enroll, call the appropriate Intel Training Center listed between the hours of 8-12 and 1-5, ask for customer training. Enrollment is limited, registration 4-8 weeks in advance is recommended.

Confirmation

You will be quoted a confirmation number to guarantee your registration upon enrollment.

Payment

Check or money order payable to Intel Corporation is due before workshop begins.

Group rate tuition policy

Tuition is at a group rate when an organization enrolls 3 or more people in the same course (same date and location).

Worldwide technical assistance

Intel provides Field Application assitance at most field locations throughout the world. These application engineers offer technical expertise to assist you in your development efforts with Intel single board computers, Intel software, and Intellec Microcomputer Development Systems.

Service centers

Intel has established a network of service centers at a variety of sites in the United States. Trained Customer Service Representatives are on call for site service and repair.

Comprehensive Intel documentation

All Intel single board computers are supported with full documentation to assist the OEM in design. This documentation includes technical literature, reference cards, reliability reports, application notes, and both hardware and software manuals for single board computer users.

INSITE™ Microcomputer User's Library

Through the INSITE User's Library, Intel makes a broad collection of programs, procedures and macros written for the 8080/8085, 8086/8088, and 8048 processor families available. These general purpose programs can substantially cut programming and debugging time for INSITE users. The library has hundreds of programs, games and utilities and is continually updated. The INSITE Library is created by Intel customers, who exchange their own programs or routines for selections from the INSITE Library. Programs from the library are also available at a modest charge.

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Single Board Computers

iSBC® 286/10 SINGLE BOARD COMPUTER
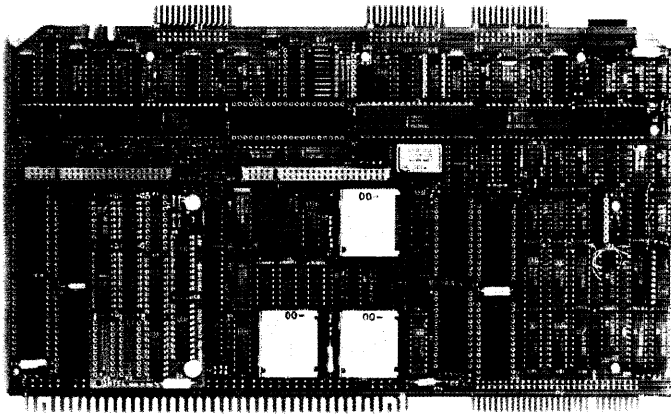
A complete computer system on a single 6.75 × 12-inch printed circuit board, including an Intel iAPX 286/10 CPU, system clock, eight JEDEC 28-pin sites for user installed RAM/EPROM/E²PROM; Multimaster MULTIBUS arbitration logic, 16 level programmable vectored interrupt control, 3 programmable timers, a printer interface, and 2 serial channels.

- iAPX 286/10 (80286) Microprocessor with 7.7 MHz CPU clock.
- Optional iAPX 286/20 (80287) Numeric Data Processor.
- Local Bus Extension (iLBX) interface.
- Eight JEDEC 28-pin sites for maximum RAM/EPROM/E²PROM flexibility, four sites are dual-ported.
- Expandable to twelve JEDEC 28-pin sites with addition of iSBC 341 site expansion module.
- On-board I/O including: two iSBX connectors, a parallel I/O printer interface, two programmable multi-protocol serial channels, three programmable timers, and programmable 16-level interrupt controllers.
- MULTIBUS interface with Multimaster capabilities.

iSBC® 86/30 SINGLE BOARD COMPUTER
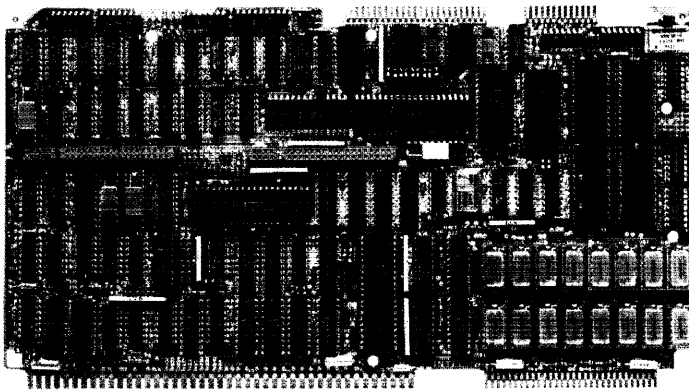
- iAPX 86/10 (8086-2) Microprocessor with 5 or 8 MHz CPU clock.
- Fully software compatible with iSBC 86 family of Single Board Computers.
- Optional iAPX 86/20 Numeric Data Processor with iSBC 337 MULTIMODULE board.
- 128K bytes of dual-port dynamic RAM expandable to 256K bytes via iSBC 304 MULTIMODULE board.
- Sockets for up to 64K bytes of EPROM.
- Two 8/16-bit iSBX bus connectors
- Programmable parallel I/O, serial I/O, timers and interrupt controllers.

iSBC® 286/10 SINGLE BOARD COMPUTER

CPU	80286 (16-bit)
Clock Rate	7.7 MHz
RAM (bytes)	0-80KB
EPROM (bytes)	0-192KB
Serial I/O Ports	2
Parallel I/O Lines	12
Timers	3
Interrupts	16

iSBX Connectors	2
iSBC MULTIMODULE Expansion	iSBC 341
Software Support	iRMX 286R, XENIX
Power Requirements +5V	7.0A
−5V	—
+12V	50 mA
−12V	50 mA
iLBX Interface	Yes

iSBC® 86/30 SINGLE BOARD COMPUTER

CPU	8086-2 (16-bit)
Clock Rate	5.0/8.0 MHz
RAM (bytes)	128K dual-port
EPROM (bytes)	64K (27128), 32K (2764), 16K (2732A), 8K (2716)
E²PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	24
Connectors	1

Timers	3
Interrupts	9 levels, 28 sources
iSBX Connectors	2
Software Support	iRMX/86, iRMX 88, CP/M 86, XENIX
Power Requirements +5V	5.1A
−5V	—
+12V	25 mA
−12V	23 mA

Single Board Computers

iSBC® 86/14 SINGLE BOARD COMPUTER
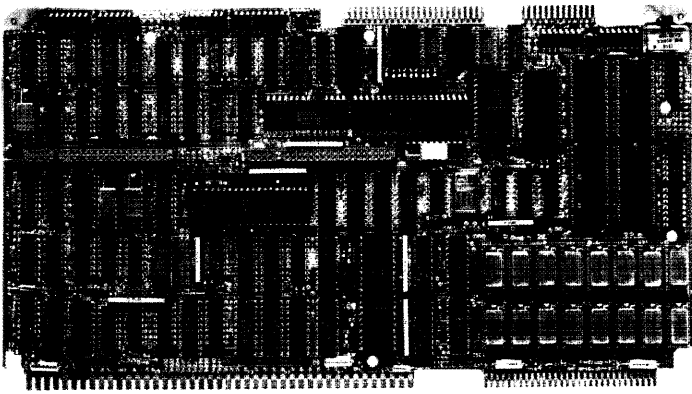
- iAPX 86/10 (8086-2) Microprocessor with 5 or 8 MHz CPU clock.
- Fully software compatible with iSBC 86 family of Single Board Computers.
- Optional iAPX 86/20 Numeric Data Processor with iSBC 337 MULTIMODULE board.
- 32K bytes of dual-port dynamic RAM expandable to 64K bytes via iSBC 300A MULTIMODULE board.
- Sockets for up to 64K bytes of EPROM.
- Two 8/16-bit iSBX bus connectors.
- Programmable parallel I/O, serial I/O, timers and interrupt controllers.

iSBC® 86/12A SINGLE BOARD COMPUTER
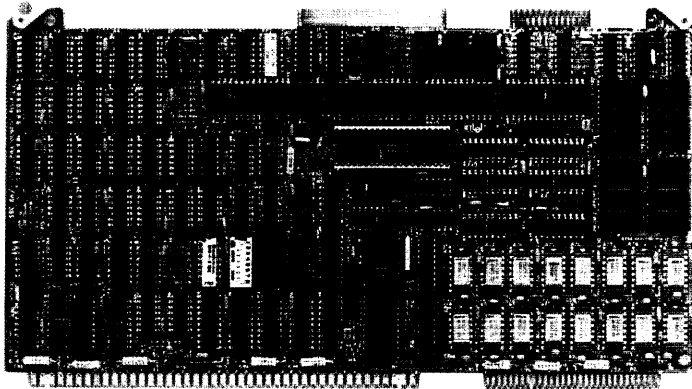
- iAPX 86/10 (8086) Microprocessor with 5 MHz CPU clock.
- Fully software compatible with iSBC 86 family of Single Board Computers.
- Optional iAPX 86/20 Numeric Data Processor with iSBC 337 MULTIMODULE processor board.
- 32K bytes of dual-port dynamic RAM expandable to 64K bytes via iSBC 300 MULTIMODULE board.
- Sockets for up to 16K bytes of EPROM; expandable to 32K bytes via iSBC 340 MULTIMODULE board.
- Programmable parallel I/O, timers and interrupt controllers.

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iSBC® 86/14 SINGLE BOARD COMPUTER

CPU	8086-2 (16-bit)
Clock Rate	5.0/8.0 MHz
RAM (bytes)	32K dual-port
EPROM (bytes)	64K (27128), 32K (2764), 16K (2732A), 8K (2716)
E²PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	24
Connectors	1

Timers	3
Interrupts	9 levels, 28 sources
iSBX Connectors	2
Software Support	iRMX 86, iRMX 88, CP/M 86, XENIX
Power Requirements +5V	5.1A
−5V	—
+12V	25 mA
−12V	23 mA

iSBC® 86/12A SINGLE BOARD COMPUTER

CPU	8086 (16-bit)
Clock Rate	5.0 MHz
RAM (bytes)	32K dual-port
EPROM (bytes)	16K (2732), 8K (2716), 4K (2758)
E²PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	24
Connectors	1

Timers	3
Interrupts	9 levels expandable to 65, 18 sources
iSBX Connectors	0
Software Support	iRMX 86, iRMX 88, CP/M 86, XENIX
Power Requirements +5V	5.2A
−5V	—
+12V	350 mA
−12V	40 mA

Single Board Computers

iSBC® 86/05 SINGLE BOARD COMPUTER
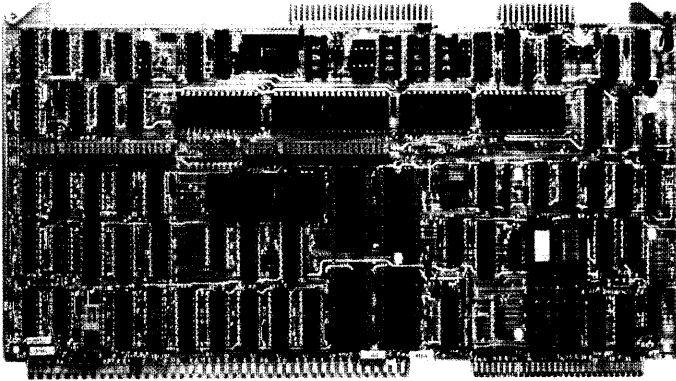
- iAPX 86/10 (8086-2) Microprocessor with 5 or 8 MHz CPU clock.
- Fully software compatible with iSBC 86 family of Single Board Computers.
- Optional iAPX 86/20 Numeric Data Processor with iSBC 337 MULTIMODULE processor board.
- 8K bytes of static RAM expandable on-board to 16K bytes via iSBC 302 MULTIMODULE RAM board.
- Sockets for up to 64K bytes of EPROM expandable to 128K bytes via iSBC 341 MULTIMODULE board.
- Two 8/16-bit iSBX bus connectors.
- Programmable parallel I/O, serial I/O, timers and interrupt controllers.

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iSBC® 86/05 SINGLE BOARD COMPUTER

CPU 8086-2 (16-bit)
Clock Rate .... 5.0/8.0 MHz
RAM (bytes) 8K
EPROM (bytes)..................... 64K (27128), 32K (2764),
16K (2732A), 8K (2716)
E²PROM Support .... —
Serial I/O Ports 1 RS232C
Parallel I/O Lines 24
Connectors 1

Timers 3
Interrupts .... 9 levels expandable to 65, 24 sources
iSBX Conncectors 2
Software Support .... iRMX 86, iRMX 88, CP/M 86, XENIX
Power Requirements + 5V 4.7A
− 5V .... —
+ 12V .... 25 mA
− 12V .... 23 mA

Single Board Computers

iSBC® 88/45 ADCP (ADVANCED DATA COMMUNICATIONS PROCESSOR)
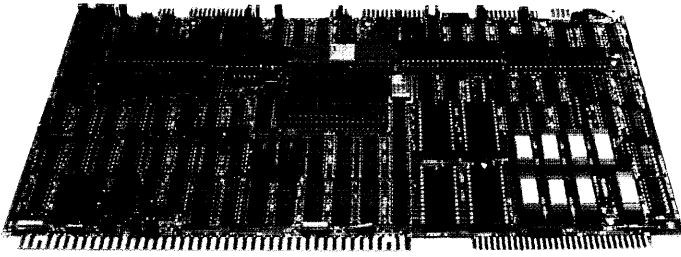
- Intelligent communications controller can function as a single board Multimaster CPU or slave data comm gateway.
- 8 MHz iAPX 88/10 (8088-2) Microprocessor controlled.
- Three half/full duplex communication channels support HDLC/SDLC/ASYNCH/SYNCH operation.
- Jumper support for RS232C, RS422A/449, or CCITT V.24 interfaces.
- Self-clocking NRZI SDLC loop, multidrop, or point-to-point interfaces.
- 16K bytes of static RAM (12K bytes is dual-ported).
- Four 28-pin JEDEC sites for up to 64K bytes of EPROM (expandable to 8 sites, 128K bytes, with iSBC 341).
- Two iSBX bus connectors to expand to 5 communication channels with iSBX 351 or iSBX 352 serial expansion modules.

iSBC® 88/40 MEASUREMENT AND CONTROL COMPUTER
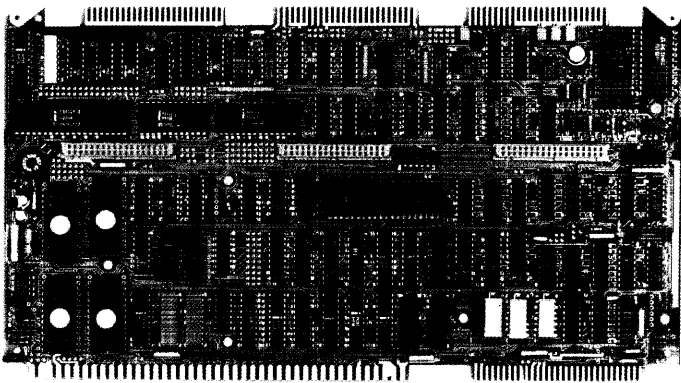
- High performance 5 MHz iAPX 88/10 8-bit HMOS processor.
- 12-bit, 20 kHz analog-to-digital converter with programmable gain control.
- 16 differential/32 single-ended analog input channels.
- Three iSBX MULTIMODULE connectors for analog, digital, and other I/O expansion.
- 4K bytes static RAM, expandable via iSBC 301.
- MULTIMODULE RAM board to 8K bytes (1K byte dual-ported).
- Four EPROM/E^{2}PROM sockets for up to 32K bytes of storage, expandable to 64K bytes with iSBC 341 expansion MULTIMODULE board.
- On-board 21-volt power supply for E^{2}PROM modification under program control.
- MULTIBUS Intelligent Slave or Multimaster.

iSBC® 88/45 ADCP (ADVANCED DATA COMMUNICATIONS PROCESSOR)

CPU 8088 (8-bit)
RAM . . . . 16K static (12K is dual-ported)
EPROM/ROM (bytes) . . . . 64K (27128), 128K with iSBC 341
Serial I/O Ports . . . . 3 total
    (2 HDLC/SDLC/ASYNCH/SYNCH, 1 HDLC/SDLC only)
Parallel I/O Lines 2
Timers 6

Interrupts . . . . 9 levels, 23 sources
Power Requirements +5V 5.1A
                   −5V . . . . —
                  +12V . . . . 20 mA
                  −12V . . . . 20 mA
Software Support . . . . iRMX 88, iMMX 800 + ISV software

iSBC® 88/40 MEASUREMENT AND CONTROL COMPUTER

CPU 8088 (8/16-bit)
Clock Rate . . . . 4.8 MHz
RAM (bytes) . . . . 4KB (1KB is dual-port)
EPROM (bytes) 32K (2764), 16K (2732)
E²PROM Support . . . . Yes, up to (8) 2816
Serial I/O Ports . . . . Use iSBX 351
Parallel I/O Lines 24
Connectors 1

Timers 3
Interrupts . . . . 9 levels, 26 sources
iSBX Connectors 3
Software Support . . . . iRMX 86, iRMX 88,
Power Requirements +5V 4A
                   −5V . . . . —
                  +12V . . . . 80 mA
                  −12V . . . . 30 mA

Single Board Computers

iSBC® 88/25 SINGLE BOARD COMPUTER
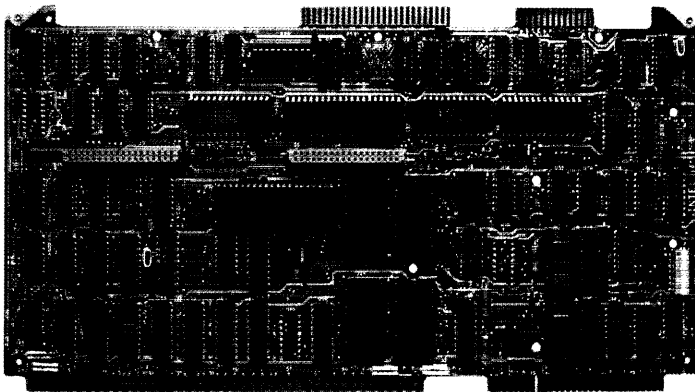
- 8-bit 8088 central processing unit; 5 MHz clock rate.
- Two iSBX bus connectors for iSBX MULTIMODULE board expansion.
- Optional iAPX 86/20 Numeric Data Processor with iSBC 337 MULTIMODULE processor board.
- 4K bytes of RAM expandable to 16K bytes.
- Sockets for up to 64K bytes of EPROM; expandable to 128K bytes via iSBC 341 MULTIMODULE board.
- Programmable parallel I/O, serial I/O, timers and interrupt controllers.

iSBC® 80/30 SINGLE BOARD COMPUTER
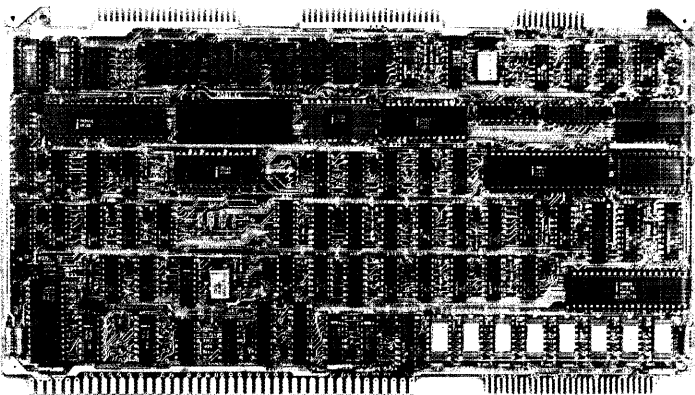
- 8085A central processing unit; 2.76 MHz clock rate.
- 16K bytes of dual port dynamic RAM.
- Sockets for up to 8K bytes of EPROM.
- 24 programmable parallel I/O lines.
- Programmable synchronous/asynchronous communications interface.
- Two programmable 16-bit BCD or binary interval timers/event counters.
- Socket for 8041A/8741A Universal Peripheral Interface.

iSBC® 88/25 SINGLE BOARD COMPUTER

CPU	8088 (8/16-bit)
Clock Rate	5.0 MHz
RAM (bytes)	4K
EPROM (bytes)	64K (27128), 32K (2764), 16K (2732), 8K (2716), 4K (2758)
E²PROM Support	Up to (4) with iSBC 341 and external power supply
Serial I/O Ports	1 RS232C
Parallel I/O Lines	24
Connectors	1
Timers	3
Interrupts	9 levels, 24 sources
iSBX Connectors	2
Software Support	iRMX 88, iRMX 86, CP/M 86
Power Requirements +5V	4.0A
−5V	—
+12V	25 mA
−12V	23 mA

iSBC® 80/30 SINGLE BOARD COMPUTER

CPU	8085A (8-bit)
Clock Rate	2.76 MHz
RAM (bytes)	16K dual-port
EPROM (bytes)	8K (2732A), 4K (2716), 2K (2708/2758)
E²PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	24
Connectors	1
Timers	3
Interrupts	12 levels, 18 sources
iSBX Connectors	0
Software Support	iRMX 80
Power Requirements +5V	3.5A
−5V	2.5 mA
+12V	220 mA
−12V	50 mA

Single Board Computers

iSBC® 80/24 SINGLE BOARD COMPUTER
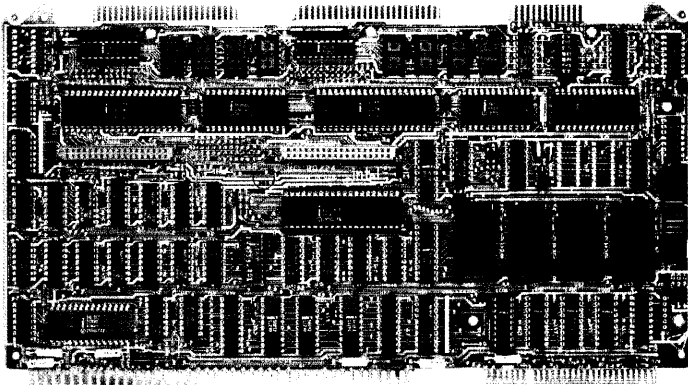
- 8085A-2 central processing unit; 4.84 MHz clock rate.
- Two iSBX bus connectors for iSBX MULTIMODULE board expansion.
- 4K bytes of static RAM expandable via iSBC 301 module to 8K bytes.
- Sockets for up to 32K bytes of EPROM.
- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous serial communications interface.
- Two programmable 16-bit BCD or binary interval timers/event counters.

iSBC® 80/20-4 SINGLE BOARD COMPUTER
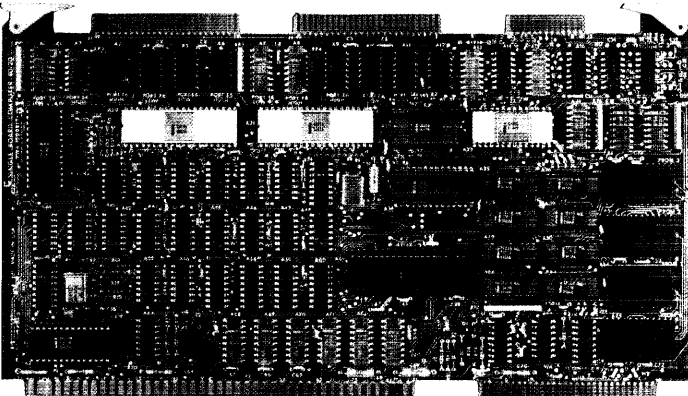
- 8080A central processing unit; 2.15 MHz clock rate.
- 4K bytes of static RAM.
- Sockets for up to 8K bytes of EPROM.
- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous serial communications interface.
- Two programmable 16-bit BCD or binary interval timers/event counters.
- Programmable interrupt controller.

CPU	8085A-2 (8-bit)
Clock Rate	4.84 MHz
RAM (bytes)	4K
EPROM (bytes)	32K (2764), 16K (2732), 8K (2716), 4K (2708/2758)
E^{2}PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	48
Connectors	2

iSBC® 80/24 SINGLE BOARD COMPUTER

Timers	3
Interrupts	12 levels, 23 sources
iSBX Connectors	2
Software Support	iRMX 80, CP/M 80
Power Requirements +5V	3.3A
−5V	—
+12V	40 mA
−12V	20 mA

CPU	8080A (8-bit)
Clock Rate	2.15 MHz
RAM (bytes)	4K
EPROM (bytes)	8K (2716), 4K (2708/2758)
E^{2}PROM Support	—
Serial I/O Ports	1 RS232C
Parallel I/O Lines	48
Connectors	2

iSBC® 80/20-4 SINGLE BOARD COMPUTER

| Timers	3
Interrupts	8 levels, 26 sources
iSBX Connectors	0
Software Support	iRMX 80, CP/M 80
Power Requirements +5V	4.0A
−5V	2 mA
+12V	90 mA
−12V	20 mA

Single Board Computers

iSBC® 80/16 SINGLE BOARD COMPUTER
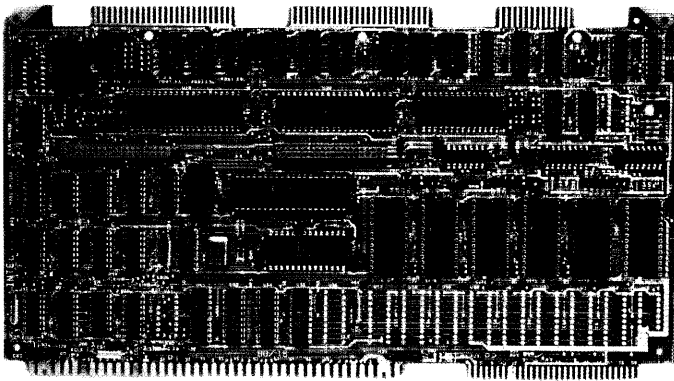
- 8080A central processing unit; 2.05 MHz clock rate.
- Two iSBX bus connectors for iSBX module expansion.
- Six 28-pin JEDEC sockets for EPROM, SRAM, and E^{2}PROM hold up to 64KB of memory.
- 2K × 8 static RAM in one of the six JEDEC sockets.
- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous communications interface.
- Single level interrupt with 12 interrupt sources.
- 1.04 or 10.4 millisecond timer.

iSBC® 80/10B SINGLE BOARD COMPUTER
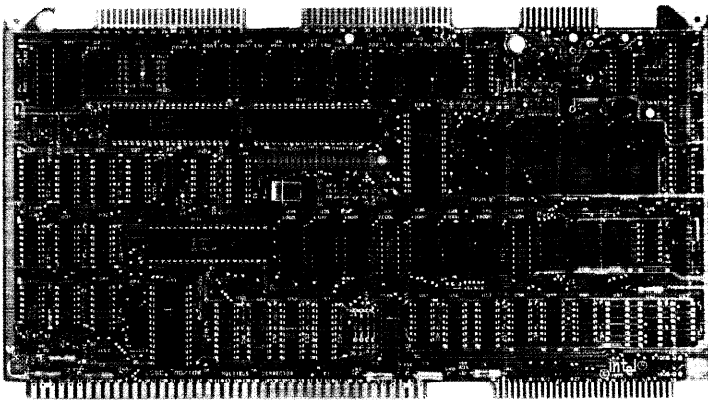
- 8080A central processing unit; 2.05 MHz clock rate.
- One iSBX connector for iSBX MULTIMODULE board expansion.
- 1K bytes of static RAM with sockets for expansion up to 4K bytes.
- Sockets for up to 16K bytes of EPROM.
- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous serial communications interface.
- 1.04 millisecond interval timer.

iSBC® 80/16 SINGLE BOARD COMPUTER

CPU	8080A (8-bit)
Clock Rate	2.05 MHz
RAM (bytes)	2K (expandable to 32KB)
EPROM (bytes)	64K (27128), 32K (2764), 16K (2732), 8K (2716)
E²PROM	2817 with external supply or 2817A
Serial I/O Ports	1 RS232C
Parallel I/O Lines	48
Connectors	2

Timers	1 (non-programmable)
Interrupts	1 level, 12 sources
MULTIBUS Expansion	Limited Master
iSBX Connectors	2
Software Support	iRMX 80
Power Requirements +5V	1.95A
−5V	—
+12V	160 mA
−12V	100 mA

iSBC® 80/10B SINGLE BOARD COMPUTER

CPU	8080A (8-bit)
Clock Rate	2.05 MHz
RAM (bytes)	1K with sockets to 4K
EPROM (bytes)	16K (2732), 8K (2716), 4K (2708/2758)
E²PROM Support	—
Serial I/O Ports	1 TTY or RS232C
Parallel I/O Lines	48
Connectors	2

Timers	1 (non-programmable)
Interrupts	1 level, 11 sources
iSBX Connectors	1
Software Support	iRMX 80
Power Requirements +5V	2.0A
−5V	2 mA
+12V	150 mA
−12V	175 mA

Single Board Computers

iSBC® 80/05 SINGLE BOARD COMPUTER
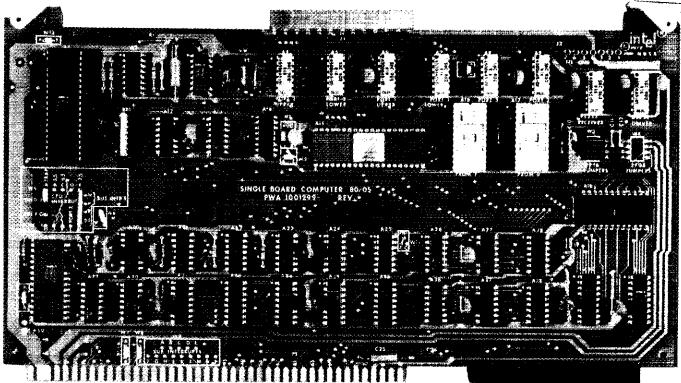
- 8085A central processing unit; 1.97 MHz clock rate.
- 512 bytes of static RAM.
- Sockets for up to 4K bytes of EPROM.
- 22 programmable parallel I/O lines.
- Two serial I/O lines.
- Programmable 14-bit binary interval timer/event counter.

iSBC® 80/05 SINGLE BOARD COMPUTER

CPU 8085A (8-bit)
Clock Rate . . . . 1.97 MHz
RAM (bytes) 512
EPROM (bytes) 4K (2716), 2K (2708/2758)
E²PROM Support . . . . —
Serial I/O Ports 1
Parallel I/O Lines 22
Connectors 1

Timers 1
Interrupts . . . . 4 levels, 12 sources
iSBX Connectors 0
Software Support . . . . —
Power Requirements +5V 1.8A
                   −5V . . . . —
                   +12V . . . . —
                   −12V . . . . —

Single Board Computers

iSBC® 337 MULTIMODULE™ NUMERIC DATA PROCESSOR
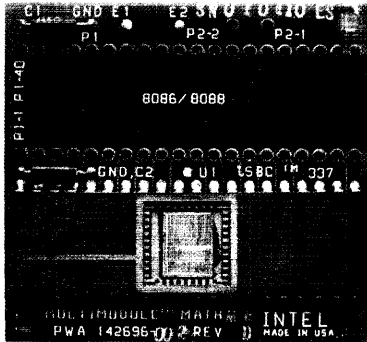
- High speed fixed and floating point functions for iSBC 86, 88 and iAPX 86, 88 systems.
- MULTIMODULE option containing 8087 Numeric Processing Extension.
- Supports seven data types including single- and double-precision integer and floating point.
- Implements proposed IEEE Floating Point Standard for high accuracy.
- Extends host CPU instruction set with arithmetic, logarithmic, transcendental and trigonometric instructions.
- 50X performance improvements in Whetstone benchmarks over iAPX 86/10 performance.
- Software support through ASM-86/88 assembly language and high level languages.

iSBX™ 332 FLOATING POINT MATHEMATICS MULTIMODULE™ BOARD
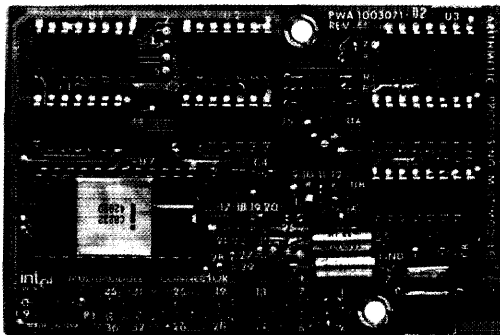
- Uses Intel 8232 Floating Point Processor at 4 MHz.
- Compatible with the proposed new IEEE floating point format and existing Intel standard single (32-bit) and double (64-bit) precision arithmetic and data manipulation functions.
- Add, subtract, multiply, and divide.
- End-of-operation and error interrupts to host processor.
- Software reset control.
- High-speed math (for example, 32-bit multiply in 50 sec.).

iSBC® 337 MULTIMODULE™ NUMERIC DATA PROCESSOR

Software Support .... All iAPX 86, 88 Languages,
iSBC 801, iRMX 88, iRMX 86

Maximum Execution Time (microseconds)
- Fixed Point Integer Multiply 28
  Divide 48
  Extended Divide 49
  Add 20
  Subtract......................... 20

Maximum Execution Time (con't.)
- Floating Point Multiply 29
  Divide 40
  Square 29
  Square Root........................... 37
Interrupts 1
Power Requirement +5V .... 475 mA max

iSBX™ 332 FLOATING POINT MATHEMATICS MULTIMODULE™ BOARD

Chip 8232
Speed .... 4 MHz
Fixed Point................................... No
Floating Point.................................. Yes
Transcendental Functions .... No
Interrupt Sources.. 2

Typical Execution Time (sec)
- 32-bit Floating Point Add 15
  Subtract 14
  Multiply 50
  Divide 57
Power Requirements +5V .... 365 mA
  +12V .... 75 mA

Single Board Computers

iSBX™ 331 FIXED/FLOATING POINT MATHEMATICS MULTIMODULE™ BOARD
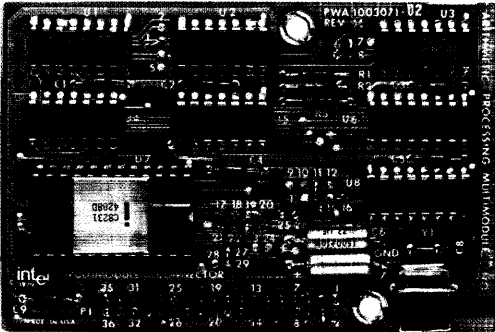
- Uses Intel 8231 Arithmetic Processing Unit at 4 MHz.
- Fixed point single (16-bit) or double (32-bit) precision arithmetic functions.
- Floating point 32-bit operation.
- Add, subtract, multiply and divide.
- Software reset control.
- High-speed math (for example: 16-bit fixed point multiply in 24 sec. or 32-bit floating point multiply in 42 sec).
- Trigonometric and inverse trigonometric functions.
- Square root, log, and exponential functions.
- End-of-operation interrupt to host processor.
- Fixed-to-float and float-to-fixed point conversion.

iSBX™ 331 FIXED/FLOATING POINT MATHEMATICS MULTIMODULE™ BOARD

Chip 8231
Speed . . . . 4 MHz
Fixed Point . . . . Yes
Floating Point . . . . Yes
Transcendental Functions . . . . Yes
Interrupt Sources 1

Typical Execution Time (sec)
– 32-bit Floating Point Add 14
        Subtract 18
        Multiply 37
        Divide 39
Power Requirements +5V . . . . 365 mA
       +12V . . . . 75 mA

Memory

iSBC® MEMORY BOARDS
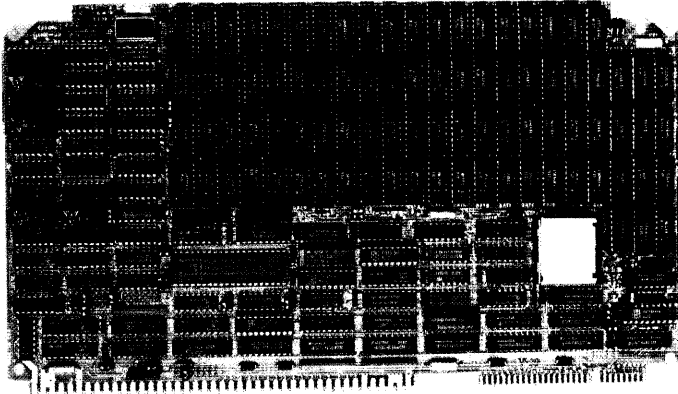
iSBC 012CX – 512K Byte Memory Board with ECC and iLBX
iSBC 028CX – 128K Byte Memory Board with ECC and iLBX
iSBC 056CX – 256K Byte Memory Board with ECC and iLBX

- 128K to 512K family of RAM boards.
- Allows 1 wait state memory access performance with iLBX at 8 MHz CPU operation.
- High performance MULTIBUS access time — 380 ns.
- On-board ECC capability utilizing 8206 ECC chip.

iSBC® MEMORY BOARDS
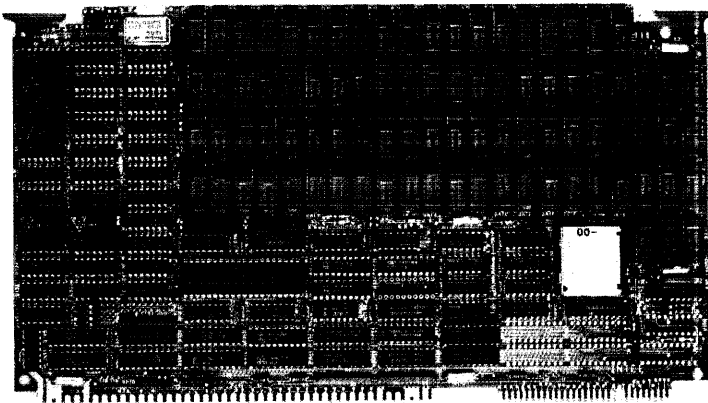
iSBC 012C – 512K Byte Memory Board with ECC
iSBC 028C – 128K Byte Memory Board with ECC
iSBC 056C – 256K Byte Memory Board with ECC

- 128K to 512K family of RAM boards.
- High performance MULTIBUS access time — 350 ns and cycle time — 460W.
- On-board ECC capability utilizing 8206 ECC chip.

MULTIBUS® RAM

iSBC® MEMORY BOARDS

Memory Type . . . . 64K (iSBC 012CX, 028CX & 056CX)
Memory Size (bytes) . . . . 512K (iSBC 012CX),
                 128K (iSBC 028CX), 256K (iSBC 056CX)
ECC . . . . Yes (iSBC 012CX, 028CX & 056CX)
Access Time (nsec) 380
Data Retention . . . . Yes (iSBC 012CX, 028CX & 056CX)

Power Requirements +5V . . . Yes (iSBC 012CX, 028CX & 056CX)
Base Board Compatiblity . . . . Yes (iSBC 012CX, 028CX & 056CX)
MULTIBUS Transfer Mode . . . Yes (iSBC 012CX, 028CX & 056CX)
MULTIBUS Address Range . . Yes (iSBC 012CX, 028CX & 056CX)
iLBX Compatible . . . . Yes (iSBC 012CX, 028CX & 056CX)

iSBC® MEMORY BOARDS

Memory Type . . . . 64K DRAM (iSBC 012C, 028C & 056C)
Memory Size (bytes) . . . . 512K (iSBC 012C),
                 128K (iSBC 028C), 256K (iSBC 056C)
ECC . . . . Yes
Access Time (nsec) 350

Data Retention . . . . Yes (iSBC 012C, 028C & 056C)
Power Requirements +5V . . . . . . Yes (iSBC 012C, 028C & 056C)
Base Board Compatiblity . . . . Yes (iSBC 012C, 028C & 056C)
MULTIBUS Transfer Mode . . . . . . Yes (iSBC 012C, 028C & 056C)
MULTIBUS Address Range . . . . . . Yes (iSBC 012C, 028C & 056C)

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Memory

iSBC® 032A, 064, 064A, 028A, 056A AND 012B RAM MEMORY BOARDS
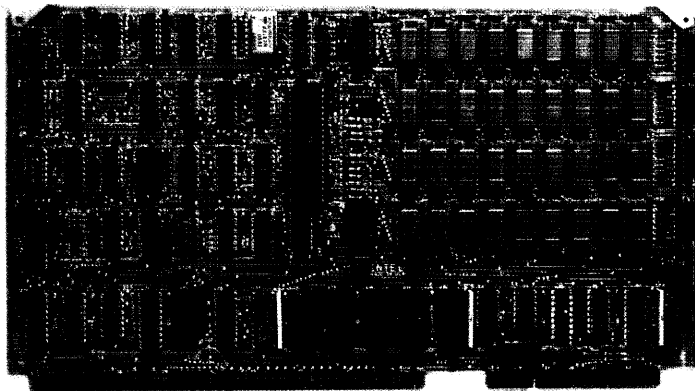
- 32K, 64K, 128K, 256K or 512K bytes of dynamic read/write memory with on-board refresh.
- Purity standard (except on iSBC 064).
- +5 volt only operation.

iSBC® 032A, 064, 064A, 028A, 056A AND 012B RAM MEMORY BOARDS

ISBC 032A
- Memory Type .... Dynamic RAM
- Memory Size 32K
- Parity.. Yes
- Access Time (nsec)..................................... 406
- Power Requirements +5V 3.5A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-16M

ISBC 064
- Memory Type .... Dynamic RAM
- Memory Size 64K
- Parity .... No
- Access Time (nsec)..................................... 450
- Power Requirements +5V 3.2A
  - −5V .... 10 mA
  - +12V 0.6A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-1M

ISBC 064A
- Memory Type .... Dynamic RAM
- Memory Size 64K
- Parity.. Yes
- Access Time (nsec)..................................... 406
- Power Requirements +5V 3.5A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-16M

ISBC 028A
- Memory Type .... Dynamic RAM
- Memory Size 128K
- Parity.. Yes
- Access Time (nsec)..................................... 500
- Power Requirements +5V 4.8A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-16M

ISBC 056A
- Memory Type .... Dynamic RAM
- Memory Size 256K
- Parity.. Yes
- Access Time (nsec)..................................... 500
- Power Requirements +5V 4.8A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-16M

ISBC 012B
- Memory Type .... Dynamic RAM
- Memory Size 512K
- Parity.. Yes
- Access Time (nsec)..................................... 330
- Power Requirements +5V 5.0A
- iSBC 86 Compatibility:
  - MULTIBUS Transfer Mode 8/16-bit
  - MULTIBUS Address Range........................ 0-16M

Memory

iSBC® 300 32K BYTE RAM MULTIMODULE™ BOARD
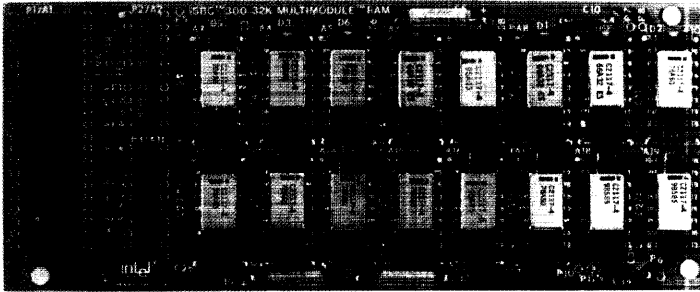
- Doubles the on-board RAM memory for the iSBC 86/12A board to 64K bytes.
- Provides 32K bytes of dual-port dynamic RAM memory.
- 0.3 watts incremental power dissipation.
- Mounts above the RAM area on iSBC 86/12A board.
- Single +5V supply.

iSBC® 300A 32K BYTE RAM MULTIMODULE™ BOARD
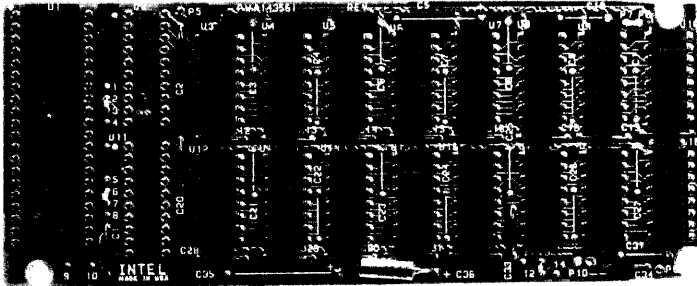
- Doubles the on-board RAM memory for the iSBC 86/14 board to 64K bytes.
- Provides 32K bytes of dual-port dynamic RAM memory.
- 256 milliamps incremental +5 volt power.
- Mounts above RAM area on iSBC 86/14 board.
- Single +5V supply.

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iSBC® 300 32K BYTE RAM MULTIMODULE™ BOARD

Memory Type .... Dynamic RAM	**Power Requirements** + 5V .... 256 mA	
Memory Size 32K	– 5V .... —	
Access Time .... Same as base board	+ 12V .... —	
	Base Board Compatibility .... iSBC 86/12A	

iSBC® 300A 32K BYTE RAM MULTIMODULE™ BOARD

Memory Type .... Dynamic RAM	**Power Requirements** + 5V .... 256 mA	
Memory Size 32K	– 5V .... —	
Access Time .... Same as base board	+ 12V .... —	
	Base Board Compatibility .... iSBC 86/14	

Memory

iSBC® 301 4K BYTE RAM MULTIMODULE™ BOARD
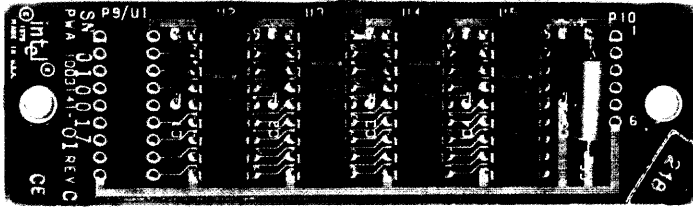
- Doubles the on-board memory for iSBC 80/24 and iSBC 88/40 boards to 8K bytes.
- Provides 4K bytes of static RAM that plugs directly on the iSBC 80/24 or iSBC 88/40 boards.
- Uses high-speed 5 MHz Intel 8185-2 RAMs.
- Single +5V power supply.
- 0.5 watts incremental power dissipation.
- Mounts above the RAM area in sockets on the iSBC 80/24 and iSBC 88/40 single board computers.

iSBC® 302 8K BYTE RAM MULTIMODULE™ BOARD
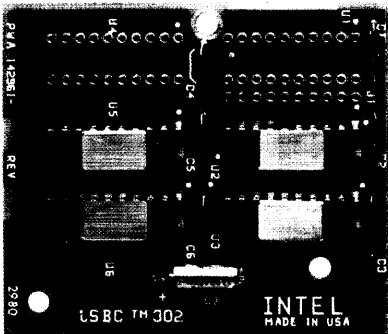
- Expands on-board memory of iSBC 86/05 boards to 16K bytes, and iSBC 88/25 board to 12K bytes.
- Uses four Intel 2168 static RAMs.
- Single +5V supply.
- On-board memory expansion eliminates system bus latency and increased system throughput.

MULTIMODULE™ RAM

iSBC® 301 4K BYTE RAM MULTIMODULE™ BOARD

Memory Type . . . . Static RAM	**Power Requirements** +5V . . . . 10 mA
Memory Size (bytes) 4K	−5V . . . . —
Access Time (nsec) 150	+12V . . . . —
	Base Board Compatibility . . . . iSBC 80/24, iSBC 88/40

iSBC® 302 8K BYTE RAM MULTIMODULE™ BOARD

Memory Type . . . . Static RAM	**Power Requirements** +5V . . . . 720 mA
Memory Size (bytes) 8K	−5V . . . . —
Access Time (nsec) 70	+12V . . . . —

Memory

iSBC® 303 PARITY MULTIMODULE™ BOARD
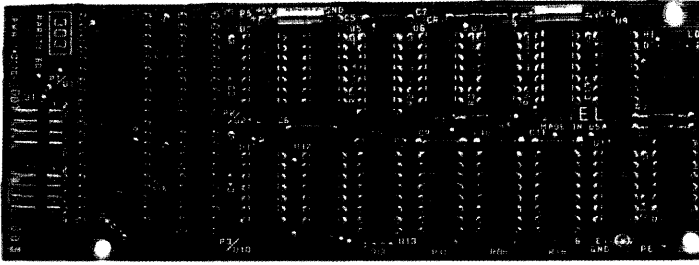
- Add-on parity option for the iSBC 86/12A or iSBC 86/14 Single Board Computer.
- Supports 32K or 64K (with iSBC 300 MULTIMODULE RAM) on-board RAM.
- Byte parity with programmable odd/even detection/generation.
- Two LED error indicators.
- Two interrupt requests for error reporting.
- No degradation of memory performance.
- Memory diagnostic capability.

iSBC® 304 128K BYTE RAM MULTIMODULE™ BOARD
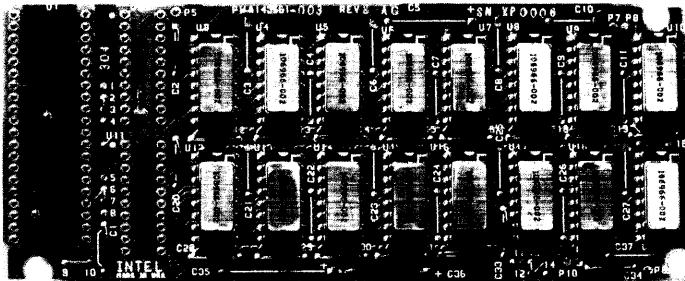
- Doubles the on-board RAM memory for the iSBC 86/30 board to 256K bytes.
- Provides 128K bytes of dual port dynamic RAM memory.
- Single +5V power supply.
- Mounts above RAM area on iSBC 86/30 board.

MULTIMODULE™ RAM

iSBC® 303 PARITY MULTIMODULE™ BOARD

Memory Type .... Parity for on-board RAM
Memory Size 32K/64K
Access Time .... Same as base board

Power Requirements +5V .... 605 mA
                            -5V .... —
                           +12V .... —
Base Board Compatibility .... iSBC 86/12A, iSBC 86/14

iSBC® 304 128K BYTE RAM MULTIMODULE™ BOARD

Memory Type .... Dynamic RAM
Memory Size 128K
Access Time .... Same as base board

Power Requirements +5V .... 640 mA
                            -5V .... —
                           +12V .... —
Base Board Compatibility .... iSBC 86/30

Memory

iSBC® 308 MEMORY MANAGEMENT MULTIMODULE BOARD
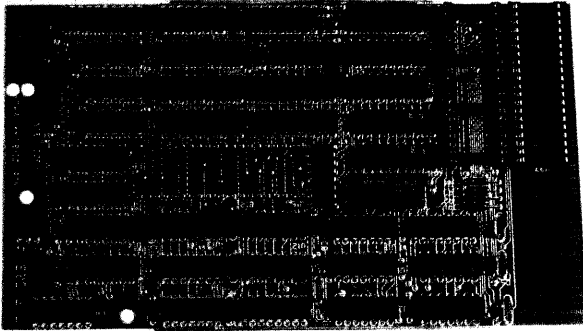
- Plug on memory management and protection board for the iSBC 86/12A Single Board Computer.

- Supports XENIX* 86 and other UNIX**-like operating systems.

- Provides memory mapping
  - Logical to physical address mapping
  - Memory mapped in 2K byte blocks
  - Multiple register sets for memory translation and attributes.

- Provides program protection
  - System and user modes
  - Three memory attributes: no access, read only, or read/write
  - Traps illegal user I/O
  - Traps user disable interrupts.

- Provides socket for 8087 Numeric Data Processor chip.

- Supports full speed CPU clock rate
  - iSBC 308 board at 5 MHz.

iSBC® 309 MEMORY MANAGEMENT MULTIMODULE™ BOARD
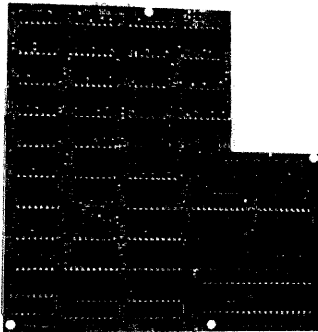
- Plug on memory management and protection board for the iSBC 86/14 and iSBC 86/30 Single Board Computers.

- Supports XENIX* 86 and other UNIX**-like operating systems.

- Provides memory mapping
  - Logical to physical address mapping
  - Memory mapped in 2K byte blocks
  - Multiple register sets for memory translation and attributes.

- Provides program protection
  - System and user modes
  - Three memory attributes: no access, read only, or read/write
  - Traps illegal user I/O
  - Traps user disable interrupts.

- Provides socket for 8087 Numeric Data Processor chip.

- Supports full speed CPU clock rate
  - iSBC 309 board at 8 MHz.

MULTIMODULE™ RAM

iSBC® 308 MEMORY MANAGEMENT MULTIMODULE™ BOARD

Base Board Compatibility .... iSBC 86/12A
Access Time .... Adds 200 nsec
Memory Maps 2-32

Mapped Block Size .... 2K bytes
Power Requirements +5V .... 2.0A (from base board)
Software Support .... Xenix*

   * XENIX is a trademark of Microsoft, Inc.
 ** UNIX is a trademark of Bell Laboratories

iSBC® 309 MEMORY MANAGEMENT MULTIMODULE™ BOARD

Base Board Compatibility .... iSBC 86/14, iSBC 86/30
Access Time .... Adds 250 nsec
Memory Maps 2-32

Mapped Block Size .... 2K bytes
Power Requirements +5V .... 2.0A (from base board)
Software Support .... Xenix*

   * XENIX is a trademark of Microsoft, Inc.
 ** UNIX is a trademark of Bell Laboratories

Memory

iSBC® 340 PROM EXPANSION MULTIMODULE™ BOARD
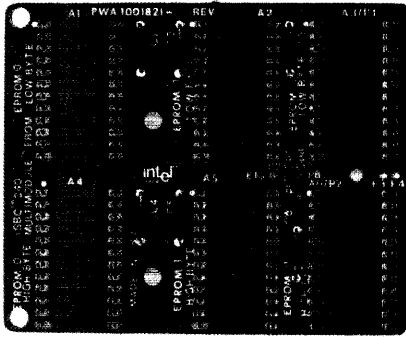
- Doubles the on-board EPROM memory capacity for the iSBC 86/12A board to 32K bytes.
- Provides sockets for up to 16K bytes of EPROM memory.
- Supports Intel 2732 EPROM.
- Mounts above the EPROM area on iSBC 86/12A board.

iSBC® 341 MULTIMODULE™ MEMORY BOARD
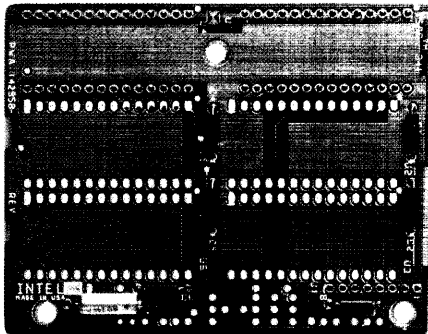
- On-board memory expansion for iSBC 286/10, iSBC 86/05, iSBC 88/25, iSBC 88/40 and iSBC 88/45 boards.
- Supports JEDEC 24/28-pin standard memory devices including EPROMs, byte-wide RAMs, and E^2PROMs.
- Sockets for up to 64K bytes of EPROM expansion with Intel 27128 EPROMs, or up to 32K bytes of RAM expansion with Intel 2168 iRAMs.
- On-board memory expansion eliminates system bus latency and increases system throughput.

iSBC® 340 PROM EXPANSION MULTIMODULE™ BOARD

Memory Type .... Dynamic RAM	Power Requirements +5V .... 640 mA
Memory Size 128K	−5V .... —
Access Time .... Same as base board	+12V .... —
	Base Board Compatibility .... iSBC 86/12A

iSBC® 341 MULTIMODULE™ MEMORY BOARD

Memory Type .... 24/28-pin sockets	Power Requirements +5V .... —
Memory Size .... Up to 64K bytes EPROM, 32K bytes RAM	−5V .... —
Access Time .... Selectable	+12V .... —
Data Retention .... Permanent	Base Board Compatibility .... iSBC 286/10, iSBC 86/05, iSBC 88/40, iSBC 88/45

Memory

iSBC® 428 UNIVERSAL SITE EXPANSION BOARD
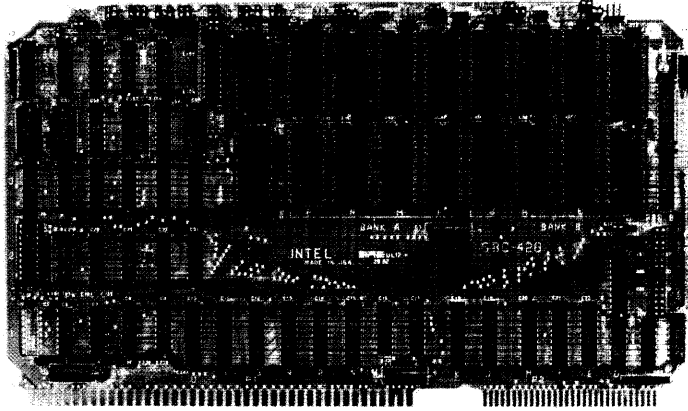
- Sixteen 28-pin universal sites.
- Bank configurable for EPROM, E^2PROM, byte-wide RAM, iRAM.
- iLBX or MULTIBUS configurable via on-board strapping.

iSBC® 464 EPROM MEMORY BOARD
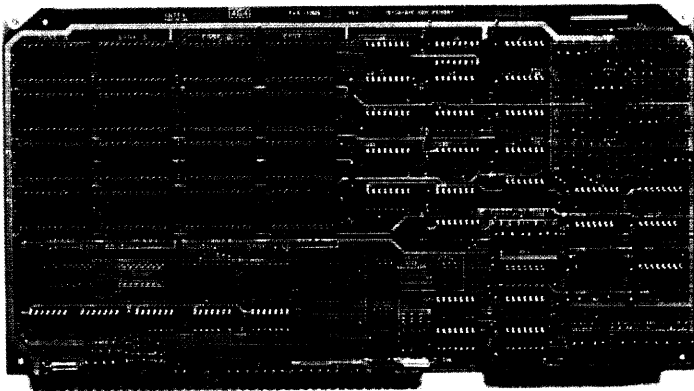
- Contain 16 sockets for up to 64K bytes of EPROM.
- EPROM memory can be added in 1K, 2K, or 4K byte increments.

EPROM

iSBC® 428 UNIVERSAL SITE EXPANSION BOARD

Memory Type ...... EPROM/ROM/E²PROM/SRAM/NVRAM/IRAM	**Data Retention** .... Device Dependent
Memory Size (bytes) 0-512K	**Power Requirements** +5A 2.0A
Parity .... No	+12V .... —
Access Time .... Selectable	−5V .... —

iSBC® 464 EPROM MEMORY BOARD

Memory Type .... EPROM 2758/2716/2732	**Data Retention** .... Permanent
Memory Size (bytes) 0-64K	**Power Requirements** +5V 1.1A
Parity .... No	+12V .... —
Access Time .... Selectable	−5V .... —

Memory

iSBX™ 251 AND iSBX™ 251C BUBBLE MEMORY MULTIMODULE™ BOARDS
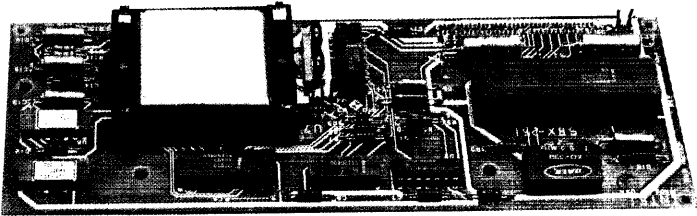
- 128K bytes non-volatile solid state bubble memory storage on a double-wide iSBX MULTIMODULE board.
- Ideal mass storage for volatile environments.
- Temperature ranges:
  - iSBX 251 — 0°-60°C
  - iSBX 251C — 10°-40°C.
- Performance:
  - Average access time 48 milliseconds
  - Burst data rate up to 50K bytes/sec. max.
- Automatic error detection and correction.
- Fast access storage option on iPDS.
- Software compatibility with iRMX 86 operating systems.
- Operates from standard +12 and +5 volt power supplies.
- Power-fail data protection.

iSBC® 254S   BUBBLE MEMORY BOARD
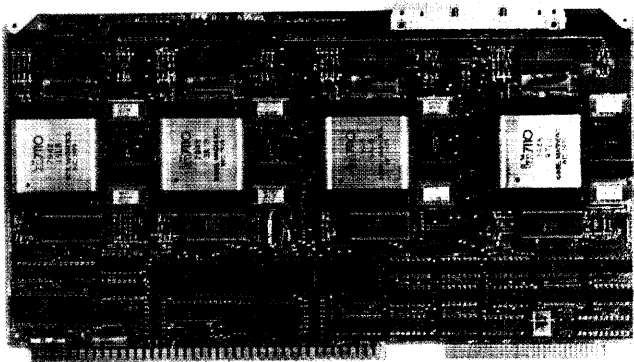
- 128K, 256K or 512K bytes non-volatile solid-state bubble memory storage.
- Direct MULTIBUS interface.
- Automatic error detection and correction.
- Average access time 48 milliseconds.
- Burst data rate up to 200K bytes/sec.
- Supported by iRMX 80 and iRMX 86 operating systems.
- DMA capability.
- Operates from standard +12 and +5 volt supplies.
- 0°-55°C operating temperature.
- −40°-+90°C non-volatile storage.
- Power-fail data protection.

iSBX™ 251 AND iSBX™ 251C BUBBLE MEMORY MULTIMODULE™ BOARDS

Memory Type .... Bubble memory
Memory Size (bytes) 128K
ECC .... Yes
Access Time .... 48 msec (avg.)
Data Transfer Modes .... Polled, interrupt, and DMA

Data Transfer Rate .... 50K bytes/sec. (max)
8.5K bytes/sec. (avg)
Data Retention .... Non-volatile read/write memory
Power Requirements +5V .... 365 mA (max)
+12V .... 400 mA (max)

iSBC® 254 S BUBBLE MEMORY BOARD

Memory Type .... Bubble memory
Memory size 128K, 256K, 512K
ECC .... Yes
Access Time .... 48 msec (avg.)
Data Transfer Modes .... Polled, interrupt, and DMA

Data Transfer Rate .... 200K bytes/sec. (max)
34K bytes/sec. (avg) with 512K bytes
Data Retention .... Non-volatile read/write memory
Power Requirements +5V 3.0A
+12V .... 1.4A (max)

iSBC® 108A AND iSBC® 116A COMBINATION RAM, EPROM AND I/O EXPANSION BOARDS
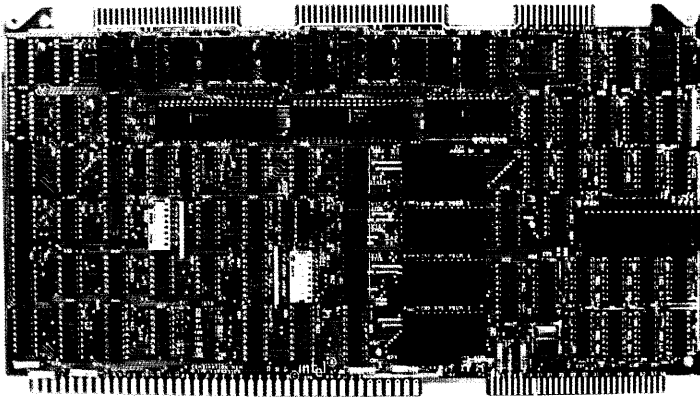
- Sockets for up to 32K bytes of EPROM.
- Available with 8K or 16K bytes of dynamic RAM with on-board refresh.
- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous serial communications interface.
- Jumper selected 1 ms interval timer.

iSBX™ 350 PROGRAMMABLE PARALLEL I/O MULTIMODULE™ BOARD
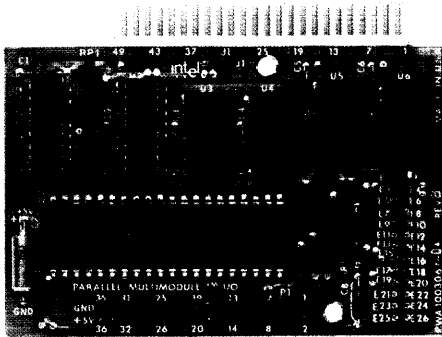
- 24 programmable I/O lines using 8255A-5.
- Sockets for interchangeable line drivers/terminators.
- Three jumper selectable interrupt request sources to host processor.
- Single + 5V low power requirement.

iSBC® 108A AND iSBC® 116A COMBINATION RAM, EPROM AND I/O EXPANSION BOARDS

RAM Memory (bytes) 8K (108A), 16K (116A)
EPROM Memory (bytes) 32K (2764), 16K (2732),
8K (2716), 4K (2708/2758)
Serial I/O Ports 1 RS232C
Parallel I/O Lines 48
Connectors 2

Timers 1
Interrupts . . . . 1 level, 9 sources
Power Requirements +5V 2.9A
−5V . . . . —
+12V . . . . 250 mA
−12V . . . . 70 mA

iSBX™ 350 PROGRAMMABLE PARALLEL I/O MULTIMODULE™ BOARD

Serial I/O Ports . . . . —
Programmable Parallel I/O Lines 24
Timers . . . . —
Interrupt Sources 3
Single or Double Wide . . . . Single

Power Requirements +5V . . . . 320 mA
+12V . . . . —
−12V . . . . —
Software Support . . . . iRMX 286R, iRMX 86, iRMX 88

iSBC® 517 COMBINATION EXPANSION BOARD

- 48 programmable parallel I/O lines.
- Programmable synchronous/asynchronous serial communications interface.
- Eight maskable interrupt request lines with a pending interrupt register.
- Jumper selectable 1 ms interval timer (real-time clock).

iSBC® 519 PROGRAMMABLE I/O BOARD
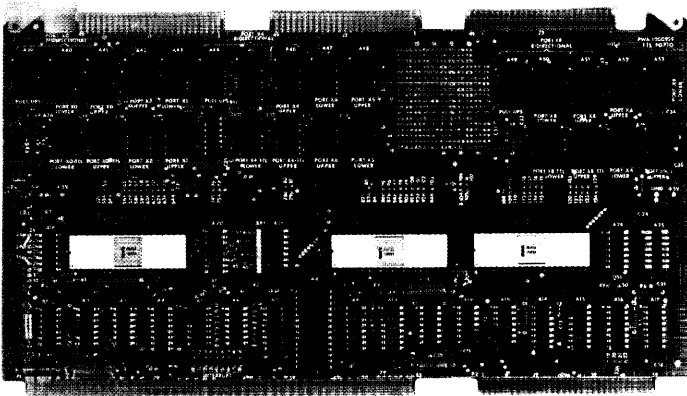
- 72 programmable parallel I/O lines.
- Programmable interrupt controller for vectoring of eight interrupt levels.
- Jumper selectable interval time (real-time clock).

iSBC® 517 COMBINATION EXPANSION BOARD

CPU	—
RAM (bytes)	—
EPROM/ROM (bytes)	—
Serial I/O Ports	1 RS232C
Parallel I/O	
– Programmable	48
– Dedicated In	—
– Lines Out	—
– Connectors	2

Timers	—
Interrupts	1 level, 8 sources
Power Requirements + 5V	2.4A
– 5V	—
+ 12	40 mA
– 12V	60 mA

iSBC® 519 PROGRAMMABLE I/O BOARD

CPU	—
RAM (bytes)	—
EPROM/ROM (bytes)	—
Serial I/O Ports	0
Parallel I/O	
– Programmable	72
– Dedicated In	—
– Lines Out	—
– Connectors	3

Timers	—
Interrupts	8 levels, 10 sources
Power Requirements + 5V	1.5A
– 5V	—
+ 12V	—
– 12V	—

iSBC® 569 INTELLIGENT DIGITAL CONTROLLER
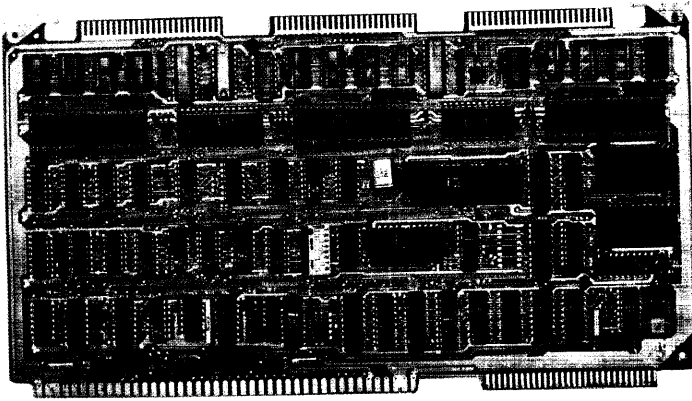
- Stand-alone digital I/O controller or intelligent slave digital I/O expansion board with sockets for up to four processors on one board.
- 8085A master processor for control algorithms and management of three UPI-41A processors, either programmed by user or using preprogrammed Intel UPIs, such as Intel's 8278 Printer Controller.
- 2K bytes dual-port static RAM.
- Three independent programmable interval timers/counters.
- Sockets for up to 8K bytes EPROM/16K bytes ROM.
- UPI-41A processors off-load 8085A of common digital tasks.

iCS™ 920 DIGITAL SIGNAL CONDITIONING/TERMINATION PANEL
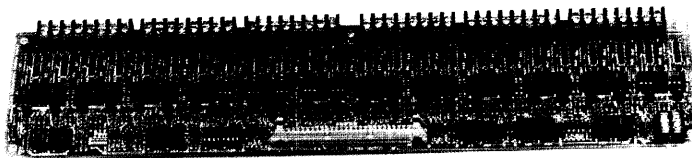
- Interconnects iSBC board digital I/O ports to field signal/control wiring.
- Ribbon cable connection from panel is pin-compatible with iSBC digital and CPU board I/O ports.
- Mounting kits for 19" width RETMA rack, NEMA-type backwall and the iCS 80 Industrial Chassis.
- Sockets for optically isolated input filters and solid state output switches.
- Pad space for transient suppressors, current limiting resistors and voltage dividers.

iSBC® 569 INTELLIGENT DIGITAL CONTROLLER

CPU 8085A
Clock Rate . . . . 3.07 MHz
RAM (bytes) . . . . 2K (dual-port)
EPROM/ROM (bytes) 16K (2364), 8K (2832),
4K (2716/2316E), 2K (2758)
Serial I/O Ports . . . . 1(6)
Parallel I/O
– Lines . . . . 54(6) 3 UPI-41As
– I/O Connectors 3

Timers 3
Interrupts . . . . 12 levels, 22 sources
Power Requirements +5V 2.6A
−5V . . . . —
+12V . . . . —
−12V . . . . —

iCS™ 920 DIGITAL SIGNAL CONDITIONING/TERMINATION PANEL

Parallel Lines In or Out . . . . 24 inputs/outputs
Connectors to iSBC 1

Power Requirements +5V . . . . 23 mA/line (inputs),
61 mA/line (outputs)
Compatible Isolators . . . . See "Optional Components"
MCS2, T1L113, T1L117, T175472

iCS™ 930 AC SIGNAL CONDITIONING/TERMINATION PANEL
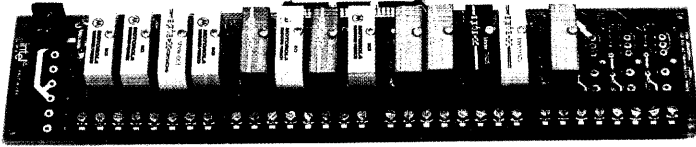
- Interconnects iSBC board digital I/O ports to field signal/control wiring.
- Handles higher AC and DC currents and voltages (up to 280V, 3A).
- Ribbon cable connection from panel is pin-compatible with iSBC digital and CPU board I/O ports.
- Mounting kits for 19" width RETMA rack, NEMA-type blackwall and the iCS 80 Industrial Chassis.
- Sockets for optically isolated input filters and solid state output switches plus socketed fuse for overload protection.
- Pad space for transient suppressors, current limiting resistors and voltage dividers.

iCS™ 930 AC SIGNAL CONDITIONING/TERMINATION PANEL

Parallel Lines In or Out . . . . 16 inputs/outputs
Connectors to iSBC . . . . 1 or 2

Power Requirements +5V . . . . 12 mA/line (inputs)
61 mA/line (outputs)
Compatible Isolators . . . . See "Optional Components"
IAC5, IDC5, OACa5, ODC5

iSBX™ 311 ANALOG INPUT MULTIMODULE™ BOARD
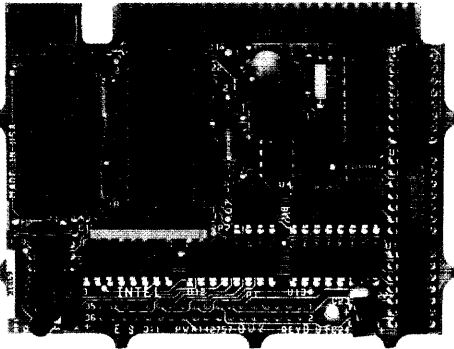
- 16 channels of analog input on a single-wide MULTIMODULE board.
- Jumper selectable differential (8 channels) or single-ended (16 channels).
- Gain selection (1X to 250X) by user-supplied resistors.
- Simple programming.
- 12-bit resolution.
- 50 μsec conversion time (18 kHz throughput).
- Unipolar (0 to +5V) or Bipolar (-5 to +5V).
- iCS 910 compatible; 30 volt fault protection on inputs.

iSBX™ 328 ANALOG OUTPUT MULTIMODULE™ BOARD
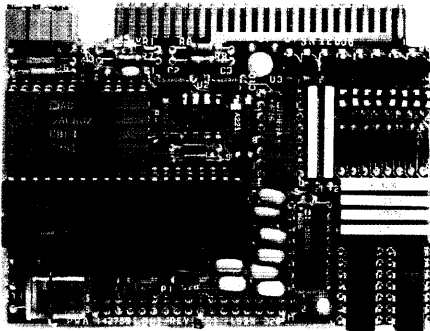
- Eight channels of analog output on a single-wide MULTIMODULE board.
- 12-bit resolution.
- Unipolar (0 to +5V) or Bipolar (-5V to +5V), jumper selectable.
- 4-20 mA current loop, jumper selectable.
- 5 kHz updates (one channel), 1 kHz (eight channels).
- Simple programming.
- iCS 910 compatible.
- Utilizes the Intel UPI-41 as intelligent, programmable MUX.

iSBX™ 311 ANALOG INPUT MULTIMODULE™ BOARD

Input Channels	8-16
Input Voltage Range	0 to +5, −5 to +5
Input Current Range	Use iSBC 910
Throughput Rate (max)	17 kHz
Programmable Gain	Resistor Select 1-250
Output Channels	—

Output Ranges	—
Resolution	12 bits
Power Requirements +5V	250 mA
+12V	50 mA
−12V	55 mA

iSBX™ 328 ANALOG OUTPUT MULTIMODULE™ BOARD

Input Channels	—
Input Voltage Ranges	—
Input Current Ranges	—
Throughput Rate (max)	—
Programmable Gain	—
Output Channels	8

Output Range	0 to +5, −5 to +5
Resolution	12 bits
Power Requirements +5V	140 mA
+12V	45 mA to 200 mA
−12V	60 mA

iCS™ 910 ANALOG SIGNAL CONDITIONING/TERMINATION PANEL
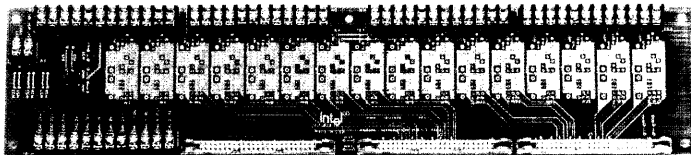
■ Screw terminations for 16 3-wire or 32 single-ended analog inputs and 4 analog outputs.

■ Rack mountable in 19″ RETMA standard rack or NEMA backwall. Ribbon cable extension to iSBC boards.

■ Engineered signal conditioning component mounting space for analog input filters, voltage dividers, current-to-voltage inputs, etc.

■ Plexiglass safety cover and signal labeling strip.

iCS™ 910 ANALOG SIGNAL CONDITIONING/TERMINATION PANEL

Connectors to iSBC 1
Power Requirements +5V . . . . —
Differential Input . . . . 16 (or 3-wire)
Single-ended Input . . . . 32 (or 3-wire)

Analog Signals
– Low Level Differential Input . . . . —
– Current Output 2
– Voltage Output 4
Connectors
– In 1
– Out 1

iSBX™ 488 GPIB MULTIMODULE™ BOARD
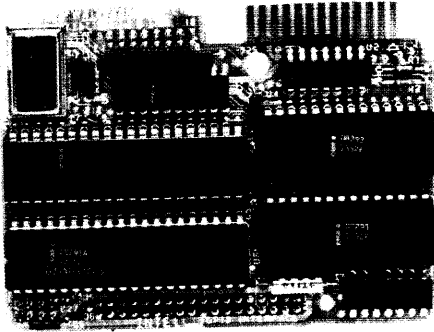
- Complete IEEE 488-1978 Talker/Listener functions including:
  - Addressing, handshake protocol, service request, serial and parallel polling schemes.
- Complete IEEE 488-1978 Controller functions including:
  - Transfer control, service request and remote enable.
- Software functions built into VLSI hardware for high performance, low cost and small size.
- Simple read/write programming.
- Standard iSBX bus interface for easy connection to Intel iSBC boards.
- IEEE 488-1978 standard electrical interface transceivers.
- 5 volt only operation.

iSBC® 576 SPEECH TRANSACTION BOARD
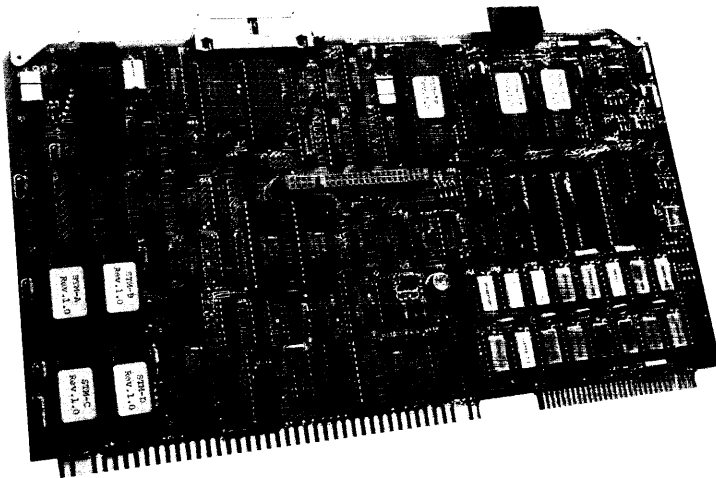
- Up to 200 recognition words or phrases.
- Automatic ASR and ESS handling.
- On-board Speech Transaction Manager.
- 8086, 16-bit CPU.
- On-board diagnostic.
- MULTIBUS or serial host interface.
- iSBX interface.
- Built-in buffer editing functions.
- Speech I/O man-machine interface with a fully buffered speech generated input transaction handling capability.

iSBX™ 488 GPIB MULTIMODULE™ BOARD

MULTIMODULE Board Type	iSBX single-wide
Talker	Yes
IEEE 488	—
1978 Capability Listener	Yes
Controller	Yes
IEEE Standard Interface	Yes

Power Requirements +5V	600 mA
−5V	—
+12V	—
Cable Available	iSBC 988
Cable Length	0.5 meter
Software Support	ISV software

iSBC® 576 SPEECH TRANSACTION BOARD

CPU	8086-2
Clock Rate	8 MHz
RAM	128KB
EPROM	64KB
E²PROM	—
Serial I/O	RS232C
Parallel Lines	None
Timer	1

Interrupts	16 level
SBX Connectors	1
MULTIMODULE Expansion	256K (iSBC 342), EPROM (iSBC 343)
Power Requirements +5V	5.5A
−5V	—
+12V	1A
−12V	34 mA

iSBC® 580 MULTICHANNEL™ TO iLBX™ BUS INTERFACE
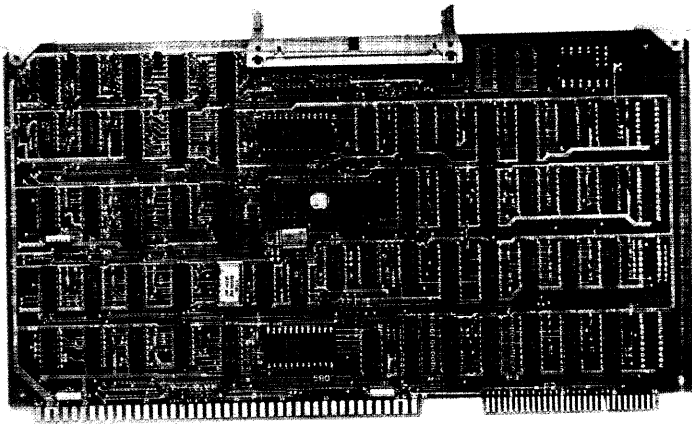
- MULTICHANNEL I/O bus 16-bit Talker/Listener interface.
- iLBX bus master interface (Primary or Secondary).
- Block transfer rates up to 5.3 megabytes/second.
- Addresses up to 16 megabytes of iLBX bus memory.
- MULTIBUS form factor.

iSBC® 589 INTELLIGENT DMA CONTROLLER
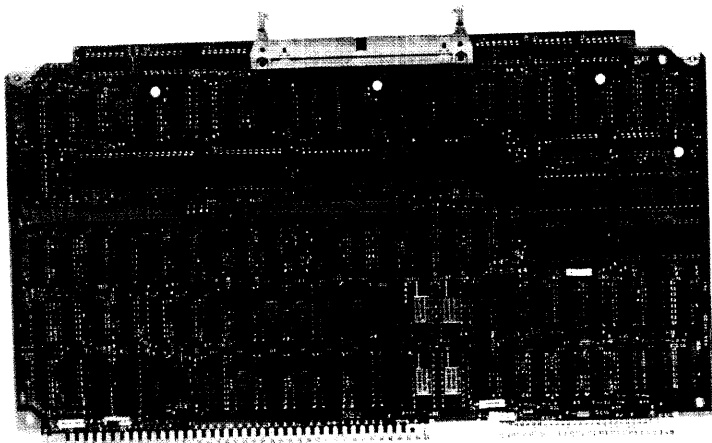
- MULTICHANNEL I/O bus interface with Supervisor, Controller or Basic Talker/Listener capabilities.
- 8089 I/O processor.
- Block transfer rates up to 1.25 megabytes/second.
- Two 8/16-bit iSBX bus connectors.
- User Command Interface Firmware Package provides high level I/O commands.

iSBC® 580 MULTICHANNEL™ TO iLBX™ BUS INTERFACE

CPU 8048
RAM (bytes) . . . . N/A
EPROM (bytes) . . . . N/A
Timers 1
MULTIBUS Interface . . . . Interrupts and power only

MULTICHANNEL Interface . . . . Talker/Listener
iLBX Bus Interface . . . . Master (Primary or Secondary)
Software Support . . . . On-Board Firmware
Power Requirements +5V* 3.38A
* Does not include power for EPROM or other optional components.

iSBC® 589 INTELLIGENT DMA CONTROLLER

CPU 8089
RAM (bytes) . . . . 8K dual-port static
EPROM (bytes) 32K (2764A)
Timers 3
MULTIBUS Interface . . . . Multimaster or Intelligent Slave

MULTICHANNEL Interface . . . . Supervisor, Controller
or Talker/Listener
iLBX Bus Interface . . . . —
Software Support . . . . On-board firmware
Power Requirements 4.7A

63

Peripheral/Graphic Controllers

iSBC® 204 UNIVERSAL FLEXIBLE DISK CONTROLLER
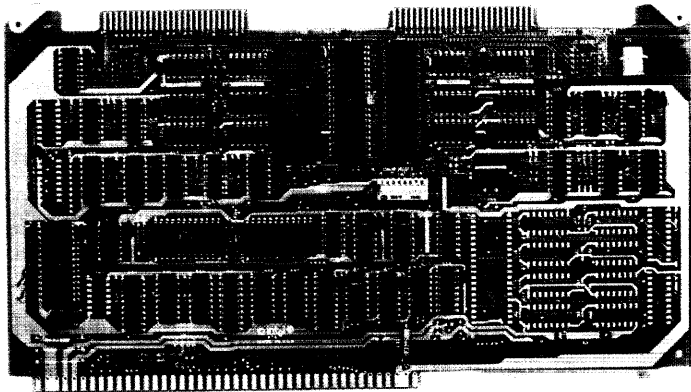
- Controls single-density diskette drives only, single- or dual-sided, in IBM 2740-compatible format and recording techniques.
- Non-IBM formats may be used for greater data capacity on the media.
- Also controls 5¼" mini-diskettes.

iSBC® 208 FLEXIBLE DISK CONTROLLER
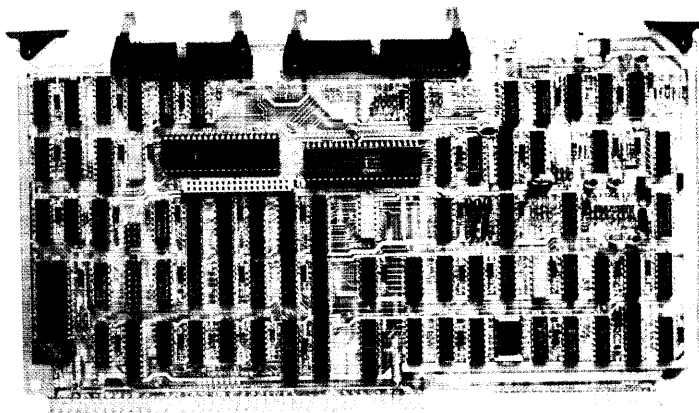
- Controls most single/double-density, single/double-sided diskette drives.
- Controls both 8" and 5¼" diskette drives.
- Phase lock loop data separator assures data integrity.
- User programmable drive parameters allow wide choice of drives.
- On-board iSBX bus accessible from the MULTIBUS, allows additional I/O expansion.
- High-speed DMA available for diskette or iSBX bus transfers to and from MULTIBUS.

iSBC® 204 UNIVERSAL FLEXIBLE DISK CONTROLLER

Number of Boards 1
Typical Recording Density . . . . Single
Recording Format . . . . FM
Maximum Capacity Disk or
Diskette Drive (formatted) . . . . 256K (std. size, single-sided),
512K (std. size dual-sided),
80K (mini-size)
Number of Drives Supported . . . . 4 single-sided, 2 dual-sided

Compatible Drives . . . . Shugart SA400, SA800, SA850,
Memorex 550, 552, CDC 9404, Pertred,
FD200, GSI 110, Wangco Mod 82, 765
Software Support . . . . iRMX 80, iRMX 86
Power Requirements +5V 2.5A
−5V . . . . —
+12V . . . . —
−12V . . . . —

iSBC® 208 FLEXIBLE DISK CONTROLLER

Number of Boards 1
Typical Recording Density . . . . Single/Double 48-96 TPI
Recording Formats . . . . FM/MFM
Maximum Capacity Disk or
Diskette Drive (formatted) . . . . 1M Byte
Number of Drives Supported 4
Software Support . . . . iRMX 88, iRMX 86

Compatible Drives . . . . Shugart, Siemens, MPI,
Pertec, Caldisk, CDC, Remex,
Memorex, Tandon, MFE, Micropolis
Power Requirements +5V . . . . 3A (max)
−5V . . . . —
+12V . . . . —
−12V . . . . —

Peripheral/Graphic Controllers

iSBX™ 218 FLEXIBLE DISK CONTROLLER
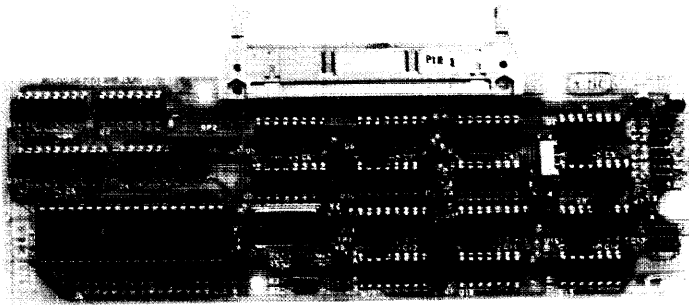
- Controls most single/double-density, single/double-sided diskette drives.
- Controls both 8″ and 5¼″ diskette drives.
- Phase lock loop data separator assures data integrity.
- User programmable drive parameters allow wide choice of drives.
- Provides back-up for iSBC 215 Winchester Controller.

iSBX™ 218 FLEXIBLE DISK CONTROLLER

Typical Recording Density .... Single/Double 48-96 TPI

Recording Formats .... FM/MFM

Maximum Capacity Disk or
Diskette Drive (formatted)......................... 1M Byte

Number of Drives Supported 4

Software Support .... iRMX 88, iRMX 86

Compatible Drives ...... Shugart, Siemens, MPI, Pertec, Caldisk, CDC, Remex, Memorex, Tandon, MFE, Micropolis

Power Requirements +5V 0.81A

−5V .... —

+12V .... —

−12V .... —

Peripheral/Graphic Controllers

iSBC® 215G WINCHESTER DISK CONTROLLER
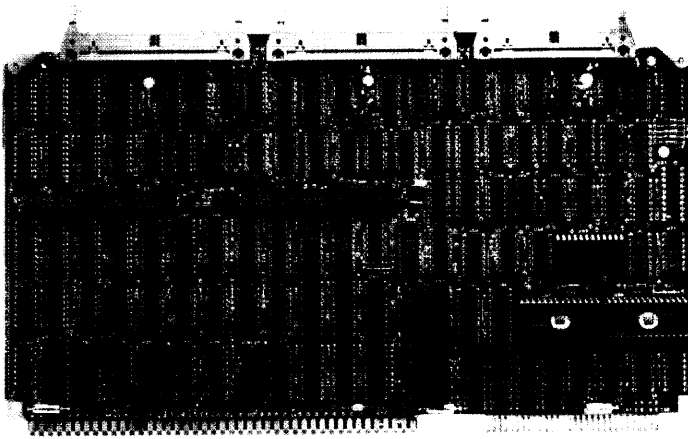
- Controls up to four 5¼", 8" or 14" Winchester disk drives from over 10 different vendors.
- Controls ANSI X379/1226 interface compatible drives.
- On-board diagnostics and ECC.
- Full sector buffering.
- Back-up provided via the iSBX 218 Flexible Disk Controller and iSBX 217 ¼" tape module connectors on-board.
- Two 8/16-bit iSBX connectors.
- Addresses 16MB of MULTIBUS system memory.
- Compatible with all 8/16-bit iSBC board products.

iSBC® 215G WINCHESTER DISK CONTROLLER

Number of Boards 1

Typical Recording Density .... 350-960 TPI

Maximum Capacity Disk or
  Diskette Drive (formatted) .... —

Number of Drives Supported 4

Compatible Drives .... Ampex, CDC, Fujitsu, IMI, Kennedy
  Memorex, Micropolis, Olivetti OPC, Pertec,
  Priam, Quantum, Rodine, RMS, Shugart

Software Support .... iRMX 88, iRMX 86, XENIX*

Power Requirements +5V .... 3.25A (max)

  −5V .... 0.15A (max)

  +12V .... —

  −12V .... —

* XENIX is a trademark of Microsoft Corporation.

Peripheral/Graphic Controllers

iSBC® 220 SMD DISK CONTROLLER

- Controls up to four SMD interface compatible disk drives.
- 12MB to 2.46 Gigabytes of storage per controller.
- On-board diagnostic and ECC.
- Full sector buffering.
- Addresses up to 1MB of MULTIBUS system memory.
- Compatible with all 8/16-bit iSBC board products.

SMD Disk

iSBC® 220 SMD DISK CONTROLLER

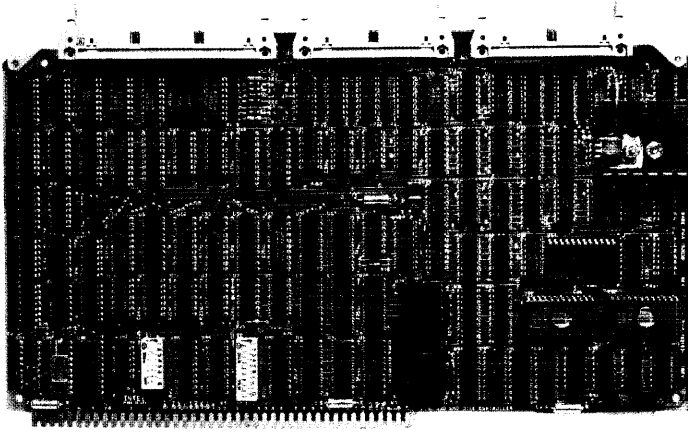Number of Boards 1
Typical Recording Density . . . . 600 TPI
Maximum Capacity Disk (formatted) . . . . 600M Bytes
Number of Drives Supported 4
Software Support . . . . iRMX 88, iRMX 86, XENIX

Compatible Drives . . . . All soft sectored
SMD interface compatible disks
Power Requirements +5V . . . . 3.25A (max)
−5V . . . . 0.75A (max)
+12V . . . . —
−12V . . . . —

Peripheral/Graphic Controllers

iSBX™ 217B ¼" TAPE INTERFACE
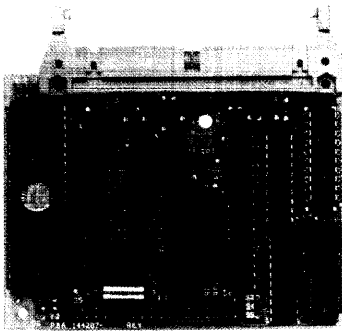
- Byte-wide intelligent interface for ¼" cartridge tape drives.
- Interfaces to both start/stop and streamers from 6 vendors.
- Single-wide MULTIMODULE.
- One-for-one cabling with all drives.
- Max. transfer rate: 88K bytes/second.
- Provides back-up for iSBC 215 Winchester Controller.
- Supports industry standard QIC-2 Interface.

iSBX™ 217B ¼″ TAPE INTERFACE

Typical Recording Density . . . . 8,000 BPI
Maximum Capacity Tape Drive (formatted) . . . . 60M Bytes
Number of Drives Supported 4
Compatible Drives . . . . 3M, Archive, Tanberg,
Cipher Data, Quantex, DEI, MFE

Software Support . . . . iRMX 88, iRMX 86
Power Requirements +5V 1.0A
　　　　　　　　　　 −5V . . . . —
Memory Transfer Range . . . . —
MULTIBUS Transter Range 8-bit
Assignable I/O Address Range . . . . —

Peripheral/Graphic Controllers

iSBX™ 270 VIDEO DISPLAY CONTROLLER
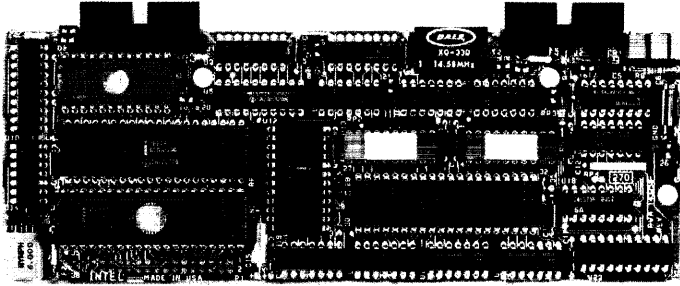
- Complete video display controller on a double-wide iSBX MULTIMODULE board.
- Interfaces to either black and white or color display monitors.
- Displays 7 × 9, 5 × 7, or 6 × 8 character fonts.
- High level software interface via a pre-programmed 8041A UPI.
- Interchangeable character fonts available in EPROM.
- Keyboard and light pen interface provided on-board.
- 50 Hz or 60 Hz frame rate operation.
- Provides cursor control, reverse video, blinking, underline, highlight and page or scroll mode.
- Graphics capability via pre-defined graphic character fonts.

iSBX™ 275 VIDEO GRAPHICS CONTROLLER
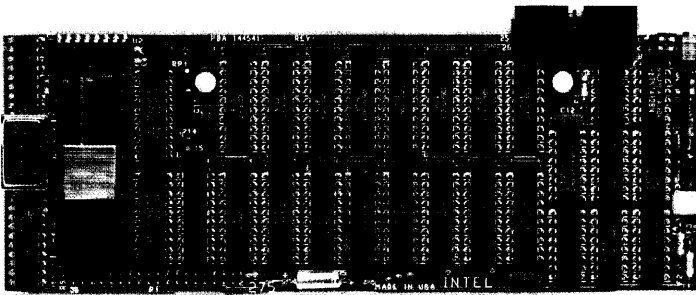
- Complete Video Graphics Display Controller on a double-wide iSBX MULTIMODULE board.
- Interfaces to either black and white or color display monitors.
- Displays 512 × 512 black and white or 256 × 256 eight color display resolution.
- High level drawing commands include line, arc, circle, rectangle, character, area fill, pan and scroll.
- Light pen interface provided on-board.
- 50 Hz or 60 Hz frame rate operation.
- Includes Intel's 82728 Graphic Display Controller.

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iSBX™ 270 VIDEO DISPLAY CONTROLLER

Screen Resolution (default)	24 x 80 characters
Character Sizes (default)	5 x 7, 7 x 9, 6 x 8
Color or B&W	8 color or B&W
Frame Rate	50 Hz or 60 Hz
Displayable Characters	256 max

I/O	TTL video, Keyboard, Lightpen
Compatible CRTs	Ball Brother, Motorola, TSD, Elston, IDT, CONRAC, NEC, Mitsubishi
Software Support	iRMX 88, iRMX 86
Power Requirements +5V	1.3A (max)

iSBX™ 275 VIDEO GRAPHICS CONTROLLER

Screen Resolution	512 x 512 x 1, 256 x 256 x 3
Character Size	Up to 8 x 8
Color or B/W	8 color or B/W
Frame Rate	50 Hz or 60 Hz
I/O	TTL video, Light pen
Software Support	iRMX 88, iRMX 86, VDI,[1] NAPLPS[2]

Compatible CRTs	Ball Brothers, Motorola, TSD, IDT, CONRAC, Hitachi, NEC, Mitsubishi
Power Requirements +5V	1.5A

[1] Virtual Device Interface Standard (ANSI x3H33)
[2] North American Presentation Level Protocol Syntax (ANSI x3L2)

Communications Controllers

iSBX™ 351 PROGRAMMABLE SERIAL I/O MULTIMODULE™ BOARD
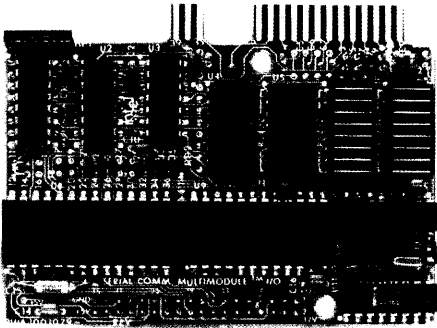
- Provides serial communications capability using 8251A USART (universal synchronous/asynchronous receiver transmitter).
- Serial interface RS232C or RS422/449 buffered.
- Software programmable baud rate generator.
- Two programmable 16-bit BCD/binary timers.
- Four jumper selectable interrupt requests to the host board.

iSBX™ 352 PROGRAMMABLE COMMUNICATIONS MULTIMODULE™ BOARD
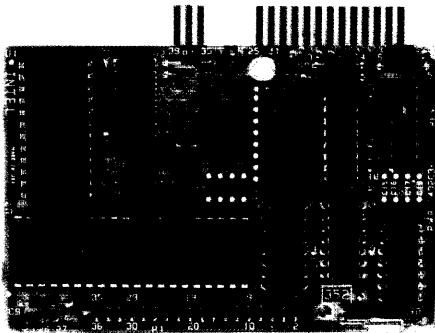
- Lowest cost building block for X.25 and IBM SNA software network implementations.
- Single HDLC/SDLC half/full duplex communications channel.
- Supports point-to-point, multidrop, and NRZI SDLC loop.
- Supports RS232C and RS422A/449 interfaces.
- Software programmable baud rate generation: up to 64K baud synchronous and 9.6K baud self-clocking.
- + 5 volt only when configured for RS422A/449.

iSBX™ 351 PROGRAMMABLE SERIAL I/O MULTIMODULE™ BOARD

Serial I/O Ports . . . . 1 RS232C or RS422
Programmable Parallel I/O Lines . . . . —
Timers 2
Software Support . . . . iRMX 286R, iRMX 86, iRMX 88

Power Requirements +5V . . . . 460 mA, 530 mA
+12V . . . . 30 mA
−12V . . . . 30 mA
Interrupt Sources 4
Single- or Double-wide . . . . Single

iSBX™ 352 PROGRAMMABLE COMMUNICATIONS MULTIMODULE™ BOARD

Serial I/O Port . . . . 1 HDLC/SDLC
Programmable I/O Lines . . . . —
Timers 3
Software Support . . . . ISV* protocols
Interrupt Sources 4

Single or Double-wide . . . . Single
Power Requirements +5V . . . . RS232C 595 mA,
RS422A 775 mA
+12V . . . . 30 mA
−12V . . . . 30 mA

* Independent Software Vendors — see Intel Yellow Pages

Communications Controllers

iSBC® 534 FOUR-CHANNEL COMMUNICATIONS BOARD
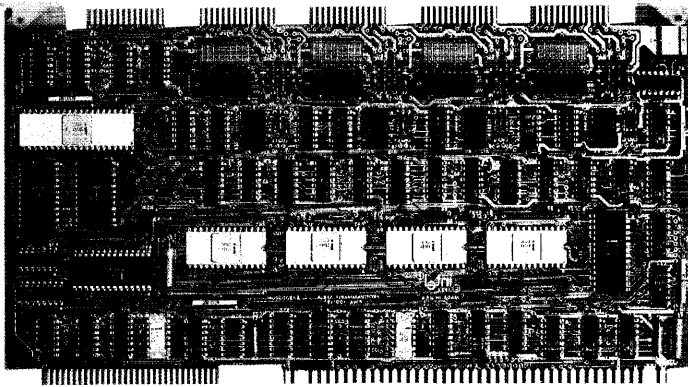
■ Four fully programmable synchronous and asynchronous serial communications channels (RS232C and 20 mA current loop).

■ 16-bit parallel I/O interface compatible with the Bell 801 Automatic Calling Unit (ACU).

■ Each serial I/O channel has individual software-programmable baud rate generation.

■ 16 maskable interrupt request lines.

■ Two independent programmable 16-bit interval timers.

iSBC® 544 INTELLIGENT COMMUNICATIONS CONTROLLER
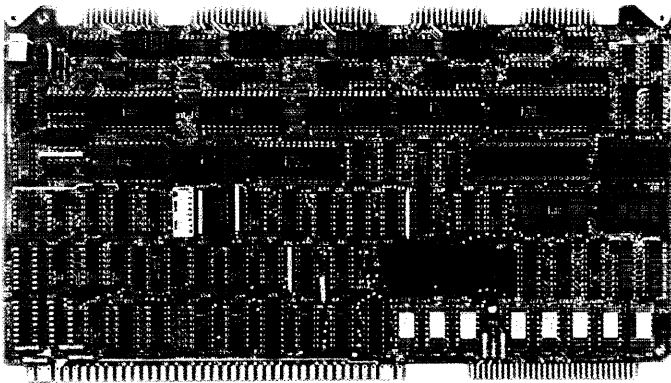
■ iSBC Communications Controller acts as a single board communications controller or an intelligent slave for multi-terminal communications expansion.

■ On-board dedicated 8085A CPU provides communications control and buffer management for four programmable synchronous/asynchronous channels (RS232C).

■ 16K bytes of dual-port dynamic RAM with on-board refresh.

■ Sockets for up to 8K bytes of EPROM.

■ 10 programmable parallel I/O lines compatible with Bell 801 Automatic Calling Unit (ACU).

■ Three independent programmable interval timer/counters.

iSBC® 534 FOUR-CHANNEL COMMUNICATIONS BOARD

CPU .... —	**Interrupts** .... 16 levels, 16 sources
RAM (bytes) .... —	**Power Requirements** +5V 1.9A
EPROM/ROM (bytes) .... —	−5V .... —
Serial I/O Ports .... 4 TTY or RS232C	+12V .... 275 mA
Parallel I/O Lines 16	−12V .... 250 mA
Connectors 5	**Software Support** ...... iRMX 286R, iRMX 86, iRMX 88, Xenix 86
Timers 2	terminal drivers

iSBC® 544 INTELLIGENT COMMUNICATIONS CONTROLLER

CPU 8085A	**Interrupts** .... 12 levels, 21 sources
RAM (bytes) .... 16K (dual-port) + 256 static	**Power Requirements** +5V 3.4A
EPROM/ROM (bytes) 8K (2732), 4K (2716/2316E)	−5V .... 5 mA
Serial I/O Ports 4 RS232C	+12V .... 350 mA
Parallel I/O Lines 10	−12V .... 200 mA
Connectors 5	**Software Support** ...... iRMX 286R, iRMX 86, iRMX 80, Xenix 86
Timers 3	terminal drivers

Communications Controllers

iSBC® 550/iSBC® 550 KIT ETHERNET* COMMUNICATIONS CONTROLLER
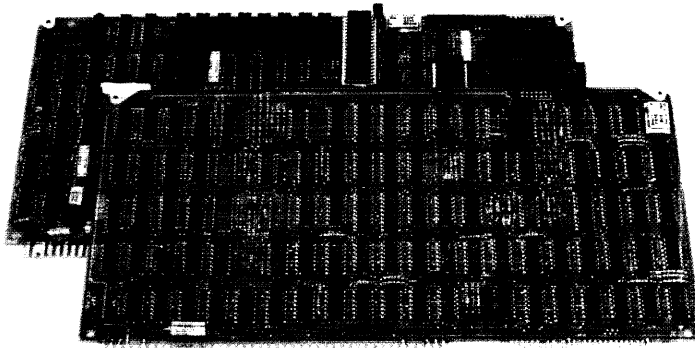
- Complete Ethernet communications controller for local area networks.
- Implements Ethernet/IEEE P802 communications standards.
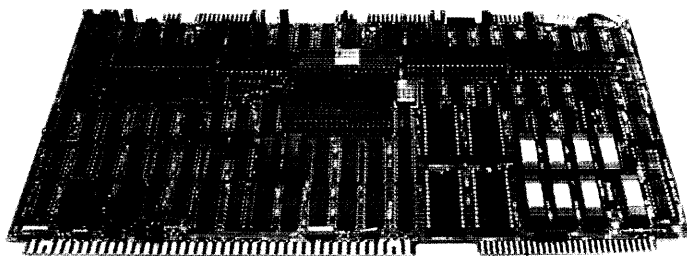- Supports data link layer and physical link layer with (CSMA/CD) Carrier Sense Multiple Access/Collision Detect implementation.
- Network Management functionality.
- Easy-to-use MULTIBUS Interprocessor Protocol supported in firmware.
- Ethernet software driver available in iMMX 800.
- Transport layer software for local area networks available with iNA-950-1 LAN software.
- Power-up confidence test.
- iSBC 550 kit offers software interface compatibility with the 82586 VLSI local communications controller
  - Bundled product with iSBC 550 and iSBC 550 FW (firmware)
  - Development path into silicon.

* Ethernet is a trademark of Xerox Corp.

iSBC® 88/45 ADCP (ADVANCED DATA COMMUNICATIONS PROCESSOR)

- Intelligent communications controller can function as a single board Multimaster CPU or slave data comm gateway.
- 8 MHz iAPX 88/10 (8088-2) Microprocessor controlled.
- Three half/full duplex communication channels support HDLC/SDLC/ASYNCH/SYNCH operation.
- Jumper support for RS232C, RS422A/449, or CCITT V.24 interfaces.
- Self-clocking NRZI SDLC loop, multidrop, or point-to-point interfaces.
- 16K bytes of static RAM (12K bytes is dual-ported).
- Four 28-pin JEDEC sites for up to 64K bytes of EPROM (expandable to 8 sites, 128K bytes, with iSBC 341).
- Two iSBX bus connectors to expand to 5 communication channels with iSBX 351 or iSBX 352 serial expansion MULTIMODULE boards.

iSBC® 550/iSBC® 550 KIT ETHERNET* COMMUNICATIONS CONTROLLER

CPU	8088
RAM (bytes)	16K dynamic, 8K static
EPROM/ROM (bytes)	8K (2732)
Serial I/O Ports	Ethernet Transceiver
Lines	—
Connectors	—
Timers	3

Interrupts		8 levels, 15 sources
Power Requirements	+5V	9.0A
	−5V	—
	+12V	0.5A
	−12V	—
Software Support		iMMX 800

iSBC® 88/45 ADCP (ADVANCED DATA COMMUNICATIONS PROCESSOR)

CPU	8088 (8-bit)
RAM	16K static (12K is dual-ported)
EPROM/ROM (bytes)	64K (27128), 128K with iSBC 341
Serial I/O Ports	3 total
	(2 HDLC/SDLC/ASYNCH/SYNCH, 1 HDLC/SDLC only)
Parallel I/O Lines	2
Timers	6

Interrupts		9 levels, 23 sources
Power Requirements	+5V	5.1A
	−5V	—
	+12V	20 mA
	−12V	20 mA
Software Support		iRMX 88, iMMX 800 + ISV* software

* Independent Software Vendor — see Intel Yellow Pages

Communications Controllers

INTELLINK™

- CONNECTS UP TO 9 ETHERNET-COMPATIBLE WORKSTATIONS WITHOUT THE NEED FOR TRANSCEIVERS OR COAXIAL CABLES (A)

- CONNECTS DIRECTLY TO THE ETHERNET COAXIAL CABLE THROUGH A STANDARD TRANSCEIVER AND TRANSCEIVER CABLE (B)

- CASCADABLE TO SUPPORT 17 - 81 WORKSTATIONS
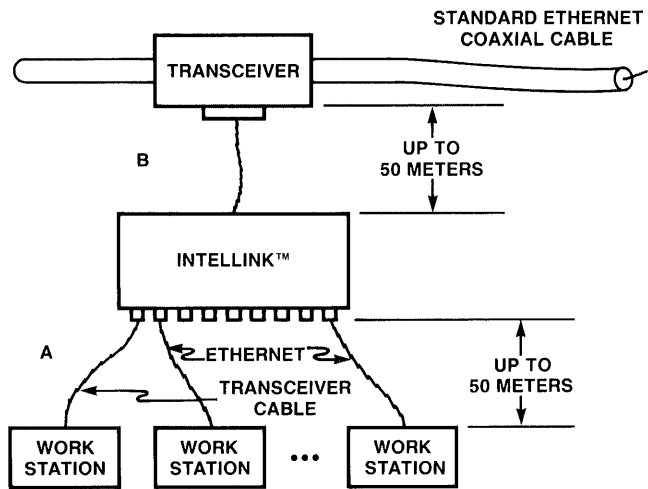
- Connects up to nine Ethernet-compatible workstations without the need for transceivers or coaxial cable (A).

- Connects directly to the Ethernet coaxial cable through a standard transceiver and transceiver cable.

NOTES

Packaging and Accessories

iCS™ 80 INDUSTRIAL CHASSIS
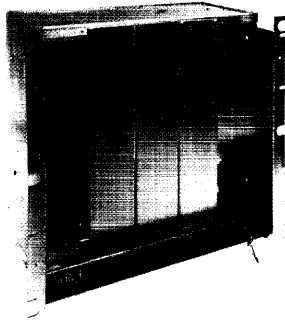
- MULTIBUS system bus standard 4-slot backplane, expandable to 12 slots.
- Vertical board orientation for convection cooling.
- 19″ width RETMA rack mounting or NEMA type backwall mounting brackets.
- Front access serviceability:
  - iSBC boards
  - Power supplies
  - Interrupt and reset buttons
  - Operation indicators and fuse.
- Recessed mounting space for signal conditioning/wire termination panels.

iSBC® 660 MICROCOMPUTER SYSTEM CHASSIS
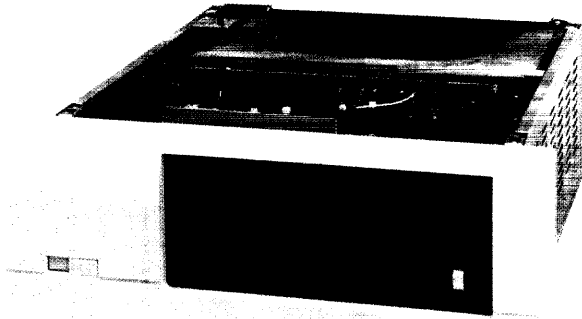
- Complete microcomputer system chassis for Intel Single Board Computer system.
- MULTIBUS-compatible backplane with eight slots for standard or custom expansion boards and provisions for optional auxiliary connector and provisions for seven additional auxiliary connectors.
- 7″H × 19″W rack-mountable chassis.
- Front panel with control switches and indicator lights.
- Heavy duty power supply.
- Dual fans for cardcage and power supply cooling.

iCS™ 80 INDUSTRIAL CHASSIS

ICS 80 Kit 635

Single Board Computer	All MULTIBUS iSBCs & options
Chassis Size	17.4″ 4 slots – 12 slots
Input Power Requirements	
– Frequency	47-63 Hz
– Voltage	115/215/230 VAC (+10%)
Output Power Available +5V	14A
–5V	0.9A
+12V	2.0A
–12V	0.8A
+24V	—
–24V	—

ICS 80 Kit 640

Single Board Computer	All MULTIBUS iSBCs & options
Chassis Size	17.4″ 4 slots – 12 slots
Input Power Requirements	
– Frequency	47-63 Hz
– Voltage	115/215/230 VAC (+10%)
Output Power Available +5V	30A
–5V	1.75A
+12V	4.5A
–12V	1.75A
+24V	—
–24V	—

iSBC® 660 MICROCOMPUTER SYSTEM CHASSIS

Single Board Computer	—
Product Capacity:	
– iSBC Boards	8
– Peripherals & Other Devices	—
Chassis Size	19″W, 7″H, 19″D
Input Power Requirements	
– Frequency	47-63 Hz
– Voltage	115 VAC or 215-230 VAC (+10%)
Output Power Available +5V	30A
–5V	1.75A
+12V	4.5A
–12V	1.75A
+24V	—
–24V	—

Packaging and Accessories

iSBC® 661-1 RACK MOUNT OR TABLE TOP CHASSIS WITH 230 WATT LINEAR POWER SUPPLY
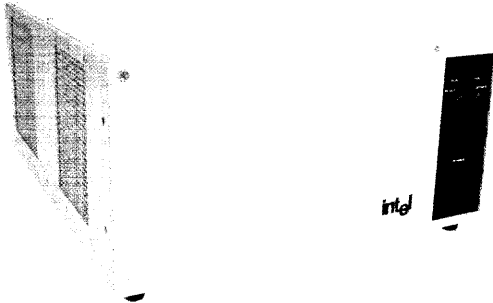
- Eight-slot iSBC 608 cardcage with parallel priority arbitration circuitry, and enhanced backplane noise immunity.
- Inter-slot spacing on cardcage for iSBC MULTIMODULE boards on all slots, and iSBX MULTIMODULE boards on two-slots.
- Mountable in standard 19" slide-racks or "NEMA-type" cabinet.
- Table-top provisions are designed-in with included kit of rubber feet and simple removal of rack mount hardware.
- UL, CSA, and FCC accredited for safety and emission specifications.
- 230 watt switching power supply.

iSBC® 665 SYSTEM CHASSIS
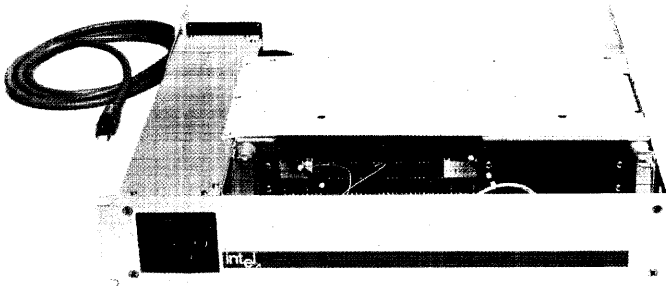
- Complete rack-mount microcomputer system chassis for Intel iSBC systems.
- Advanced high-efficiency switching power supply generates 110 watts.
- All controls and adjustments located on front panel.
- Power supply gives user 6 milliseconds warning in event of AC power failure.
- Chassis is UL recognized.
- Chassis is designed to pass FCC/VDE requirements for EMI and safety.
- Real-time clock (two times AC line frequency) is provided.
- Input circuitry suppresses AC line noise.

iSBC® 661-1 RACK MOUNT OR TABLE TOP CHASSIS WITH 230 WATT LINEAR POWER SUPPLY

iSBC Boards 8	**Power Requirements**	+ 5V 30A
Chassis Size . . . . 19"W, 8.75"H, 20"D		– 5V 1.75A
Input Power . . . . 100/120/220/240 VAC (± 10%)		+ 12V 4.5A
		– 12V 1.75A

iSBC® 665 SYSTEM CHASSIS

Single Board Computer . . . . —	**Output Power Available**	+ 5V 15A
Product Capacity:		– 5V 1A
– **iSBC Boards** 4		+ 12V 3A
– **Perilpherals & Other Devices** . . . . —		– 12V 1A
Chassis Size . . . . 19"W, 3.5"H, 16.25"D		+ 24V . . . . —
Input Power Requirements:		– 24V . . . . —
– **Frequency** . . . . 47-66 Hz		
– **Voltage** . . . . 90-126 VAC or 180-252 VAC		

Packaging and Accessories

iSBC® 680 MULTISTORE USER SYSTEM PACKAGE
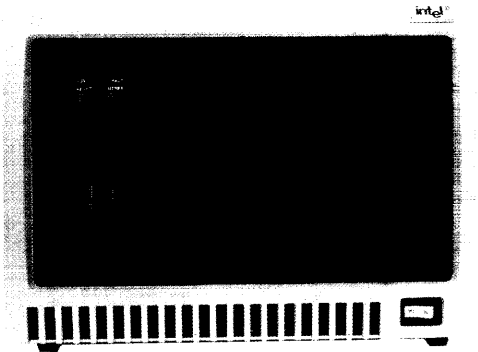
- Packaging for industry-standard boards and 8″ peripherals in table top configurations.
- Up to six iSBC boards may be installed, one of which may contain iSBX and iSBC MULTIMODULE boards.
- Up to two floppy, tape, and/or Winchester drives conforming to the 8″ industry standard physical size may be installed on the package's slide-out mounts.
- Six-voltage switching power supply supports boards and peripherals, including stepper and servo-positioned Winchester drives.
- Package is UL recognized for safety, and is designed to meet CSA and VDE safety requirements.
- A mounting position is provided for the data separator board required by some Winchester drives.
- Parallel priority resolution is provided on the backplane for operation of multiple master processor boards.

ISBC® 680 MULTISTORE USER SYSTEM PACKAGE

Single Board Computer .... —
Product Capacity:
– iSBC Boards .... 6, with one containing
iSBX MULTIMODULE boards
– Peripherals & Other Devices .... Two 8″ peripherals
(8.55″ × 14.25″ × 4.65″)
Chassis Size .... 16.8″W, 12.2″H, 21.5″D

Input Power Requirements:
– Frequency .... 47-66 Hz
– Voltage .... 90-126 VAC or 180-252 VAC
Output Power Available: + 5V 30A
− 5V 2A
+ 12V 2.9A
− 12V 3A
+ 24V 7.8A
− 24V 1.6A

Packaging and Accessories

iSBC® 604 AND iSBC® 614 MODULAR BACKPLANE AND CARDCAGE
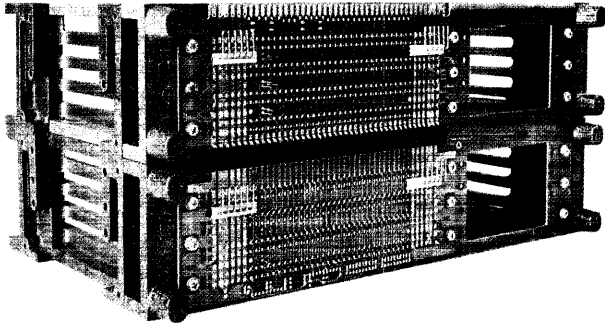
- Interconnects and houses up to four Intel iSBC boards per cardcage.
- iSBC 604 Cardcage provide terminator backplane.
- iSBC 614 Cardcage provides expansion backplane.
- Provides ground traces between all signal traces for noise suppression.
- Compatible with 3.5" RETMA rack mount increments.

iSBC® 608 AND iSBC® 618 MODULAR BACKPLANE AND CARDCAGE
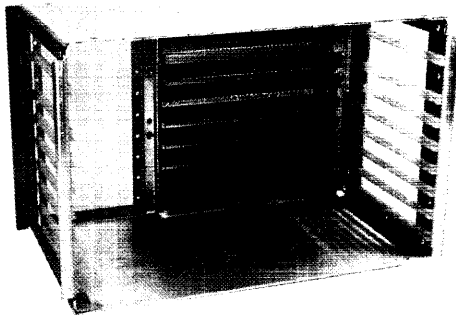
- Interconnects and houses up to eight Intel iSBC boards per cardcage.
- Board-to-board clearance for iSBC and iSBX MULTIMODULE boards.
- Parallel priority circuitry for Multimaster arbitration.
- Lightweight, precision-fit aluminum cardcage.
- Enhanced bus noise immunity for high-speed system.
- iSBC 608 Cardcage provides terminator backplane.
- iSBC 618 Cardcage provides expansion backplane.
- Fan mounting hardware and rack-mounting bracketry included with iSBC 608 unit.

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iSBC® 604 AND iSBC® 614 MODULAR BACKPLANE AND CARDCAGE

ISBC 604
Number of Slots 4
Terminators . . . . Included
Slot-to-Slot Spacing . . . . 0.6"
Height . . . . 3.5"

ISBC 614
Number of Slots 4
Terminators . . . . Not required
Slot-to-Slot Spacing . . . . 0.6"
Height . . . . 3.5"

iSBC® 608 AND iSBC® 618 MODULAR BACKPLANE AND CARDCAGE

ISBC 608
Number of Slots 8
Terminators . . . . Included
Slot-to-Slot Spacing . . . . 6 @ 0.8" 2 @ 1.25"
Height . . . . 8.4"

ISBC 618
Number of Slots 8
Terminators . . . . Not required
Slot-to-Slot Spacing . . . . 6 @ 0.8" 2 @ 1.25"
Height . . . . 8.4"

Packaging and Accessories

iSBC® 635 POWER SUPPLY
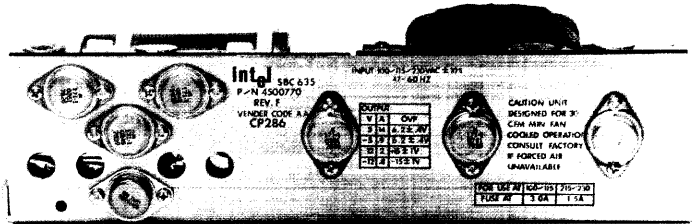
- Provides ±5 and ±12 volt system power.
- Sufficient power for a fully loaded Intel Single Board Computer plus residual power for up to three iSBC expansion boards.
- Single chassis.

iSBC® 640 POWER SUPPLY

- Provides ±5 and ±12 volt system power.
- Sufficient power for a fully loaded Intel Single Board Computer plus residual power for up to 11 iSBC expansion boards.
- Single chassis.

Power Supplies

Input Power Requirements
- **Frequency** .... 47-63 Hz
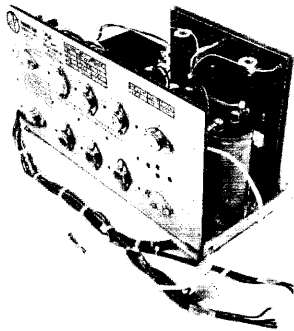- **Voltage** .... 115/215/230 VAC

Output Power Available +5V 14.0A
                           −5V 0.9A
                           +12V 2.0A
                           −12V 0.8A

iSBC® 640 POWER SUPPLY

Input Power Requirements:
- **Frequency** .... 47-63 Hz
- **Voltage** .... 115/215/230 VAC

Output Power Available: +5V 30A
                            −5V 1.75A
                            +12V 4.5A
                            −12V 1.75A

Packaging and Accessories

iSBC® 645 POWER SUPPLY
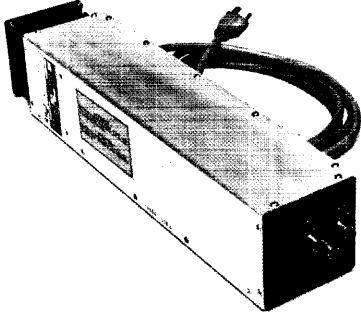
- Advanced high-efficiency switching power supply generates 110 watts.
- Controls for attached microcomputer system boards are included on front panel (DC ON/OFF, RESET, INTERRUPT).
- Real-time clock (two times AC line frequency) output is provided.
- Outputs provided for power-fail warning (6 milliseconds in advance of DC power failure) and memory protect (at DC power failure).
- Supply is UL recognized and designed to meet FCC/VDE EMI requirements.
- Wide AC input voltage range provides extra protection against "brown-outs".
- Input circuitry suppresses AC line noise.

iSBC® 645 POWER SUPPLY

Input Power Requirements:
- **Frequency** .... 47-66 Hz
- **Voltage** .... 90-126 VAC (jumper selectable), 180-252VAC

Output Power Available +5V 15A
                                   –5V 1A*
                                   +12V 3A
                                   –12V 1A

* Adjustable — 2.5 to – 12 VDC

Packaging and Accessories

iSBC® 905 PROTOTYPING BOARD

- MULTIBUS-compatible form factor; mounts in iSBC 604/614 backplane/cardcage assemblies.
- Can accommodate up to 9516-pin wire-wrapped sockets or equivalent mix of other standard DIP sockets.
- Includes 100-pin I/O edge connector.

iSBC® 960-5 MALE CONNECTORS

- 36-pin male connectors with mate directly to the female MULTIMODULE/iSBX Bus connector on single board computer.
- Package of five connectors.
- Allows easy implementation of custom MULTIMODULE boards.

iRMX™ 286R OPERATING SYSTEM
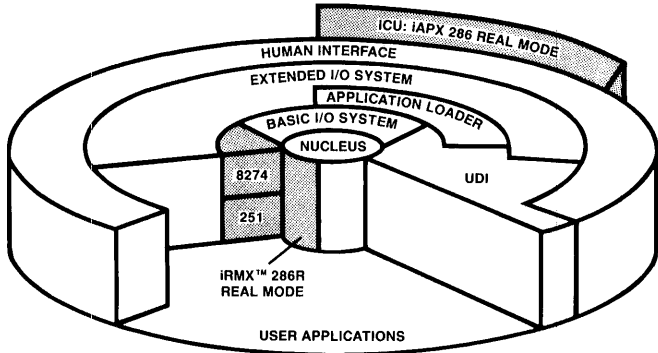
- Real-time processor management for time critical iSBC 286/10- and iAPX 286-based applications in real address mode.

- Higher performance, complete iRMX 86 compatibility.

- Complete support of 80287 numeric processor extension.

- Multi-terminal support with Multi-user Human Interface.

- On-target system development with Universal Development Interface (UDI).

- Configurable system size and function for diverse application requirements.

- All iRMX 286R code can be (P)ROM'ed to support totally solid state designs.

- Powerful utilities for interactive configuration and real-time debugging.
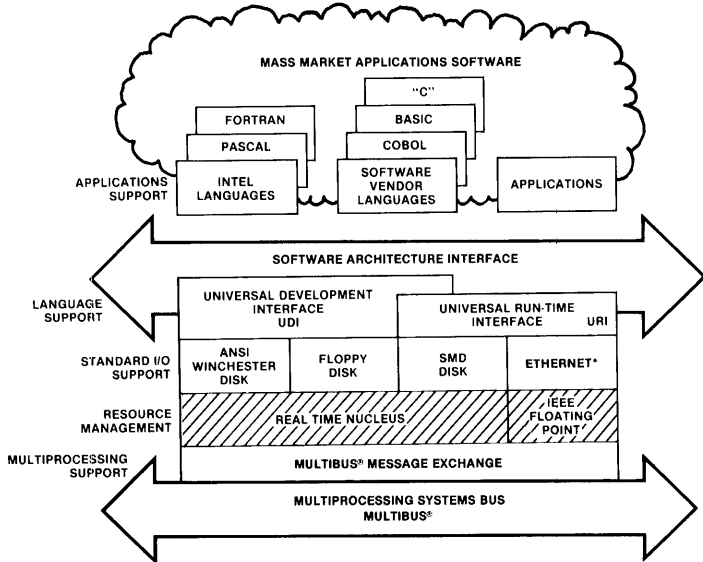
- Functions in conjunction with iRMX 86 Release 5.

iRMX™ 86 PC (PRECONFIGURED) OPERATING SYSTEM

- Ready-to-run Preconfigured iRMX 86 Operating System for iSBC systems.

- Efficient real-time multitasking scheduler with 255 priority levels.

- Complete support of 8087 numeric processor extension.

- Direct support of independent software vendor compilers and applications.

- Direct support for Intel on-target compilers and development tools.

- Simple program load and debug with Bootstrap and Monitor in 2732A EPROMs.

- Device drivers included for up to four diskettes, serial terminal interface, and parallel line printer.

- A complete, high-performance, execution engine for UDI applications.

Microsystem Software

iRMX™ 86 OPERATING SYSTEM
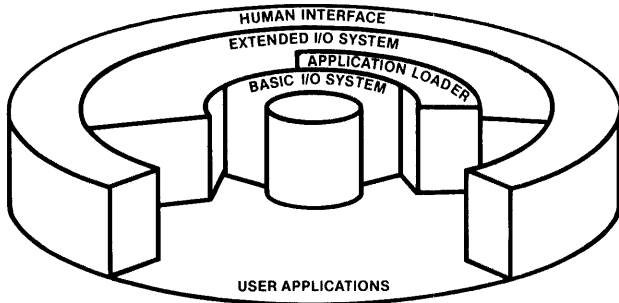
■ Structured multiple application environment.

■ Multitasking VLSI operating system.

■ Multi-user and Multi-terminal.

■ (P)ROM or RAM based.

■ User configurable and extensible.

■ Real-time priority-oriented scheduler.

■ Complete bootstrap and application loaders.

■ UDI support for HLL and development software.

■ Comprehensive I/O system.

■ Interactive system debugger and crash/dump analysis.

■ Support for 80130 Operating System Firmware.

iRMX™ 88 REAL-TIME MULTITASKING EXECUTIVE
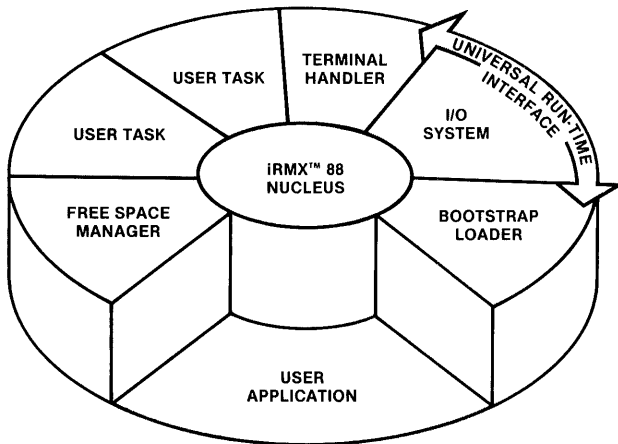
■ Event-driven multitasking executive.

■ Small, high performance Nucleus.

■ Supports 8087 numeric processor extension.

■ Interactive configuration support.

■ Device drivers and file format compatible with iRMX 86 Operating System.

■ Supports PASCAL, FORTRAN, and PL/M run-time.

■ Memory management of full megabyte.

■ Supports iAPX 8088 and 8086-based products.

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Operating System Software

iRMX™ 86 OPERATING SYSTEM

Minimum Development System Requirements
- Operating System .... ISIS-II
- Memory Size (bytes) .... 48K RAM
- Minimum Diskette Drives 2

Memory Requirements (bytes) — Minimum Code
- Nucleus 10.5K
- Terminal Handler 3.0K
- Basic I/O System 26K
- Extended I/O System 10.5K
- Human Interface 22K
- Boot Loader 500
- Application Loader 4K

Memory Requirements (bytes) — Maximum Code
- Nucleus 24K
- Terminal Handler 3K
- Basic I/O System 78K
- Extended I/O System 12.5K
- Human Interface 22K
- Boot Loader 1.5K
- Application Loader 10K

Memory Requirements (bytes) — Minimum Data Size
- Nucleus 2K
- Terminal Handler 0.3K
- Basic I/O System 1K
- Extended I/O System 1K
- Human interface 15K
- Boot Loader 6K
- Application Loader 2K

iRMX™ 88 REAL-TIME MULTITASKING EXECUTIVE

Memory Requirements (bytes)
- Nucleus 3.0K
- Terminal Handler 1.3K
- Free Space Manager 0.6K

I/O System Physical 20.0K
             Named 32.0K
Bootstrap Loader 5K

Microsystem Software

iRMX™ 80 REAL-TIME MULTITASKING EXECUTIVE
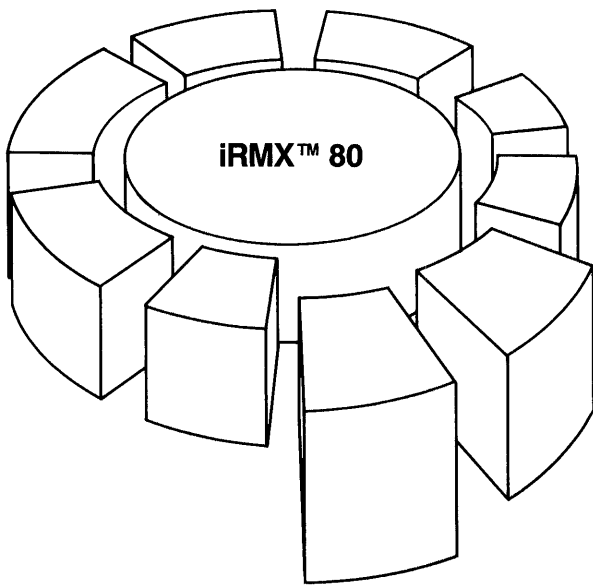
- Designed for Intel iSBC 80/10B, iSBC 80/16, iSBC 80/20-4, iSBC 80/24, and iSBC 80/30 Single Board Computer based applications.
- Completely user configurable through interactive configuration utility.
- Priority-oriented scheduling.
- Very small, performance-oriented nucleus.
- Simple user task interface.
- Fully supports iSBC 544 Communications and iSBC 569 Digital Controllers for distributed application solutions.
- Comprehensive multiple processor support through iMMX 800 MULTIBUS Message Exchange software.
- Structured application environment.

iRMX™ 80 REAL-TIME MULTITASKING EXECUTIVE

PROM Memory Requirements (bytes)
- Nucleus 2K
- Full Terminal Handler 3K
- Minimal Terminal Handler.......................... 600
- Free Space Manager 1K
- File System 5.5K
- Disk I/O 700
- Analog I/O.. 800
- Bootstrap Loader and Initializer 600

RAM Memory Requirements (bytes)
- Nucleus... 250
- Full Terminal Handler 950
- Minimal Terminal Handler.......................... 120
- Free Space Manager 250
- File System 1.6K
- Disk I/O 100
- Analog I/O.. 50
- Bootstrap Loader and Initializer 900

Microsystem Software

iMMX™ 800 MULTIBUS® MESSAGE EXCHANGE
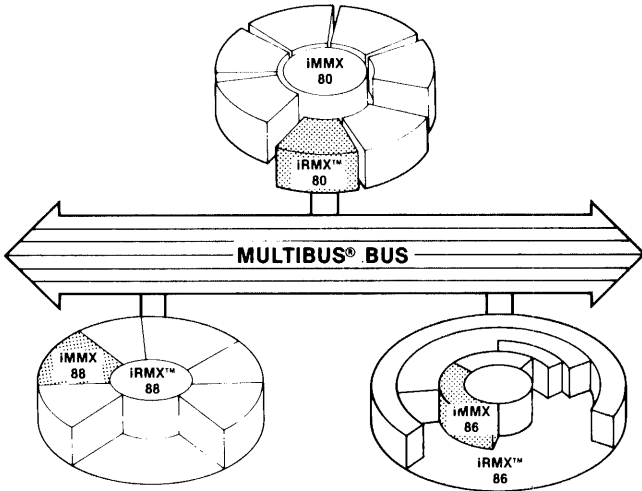
- Supports use of multiple processors on the MULTIBUS system bus.
- Increases total system throughput.
- Implements Intel-standard multiprocessing protocol.
- Supports combination of 8- and 16-bit boards in one design.
- Helps solve critical response time problems.
- Includes Ethernet device drivers.
- Provides hardware independent application interface.
- Supports iRMX 86, iRMX 88, and iRMX 80-based application.

ISDM™ 286 iAPX 286 SYSTEM DEBUG MONITOR
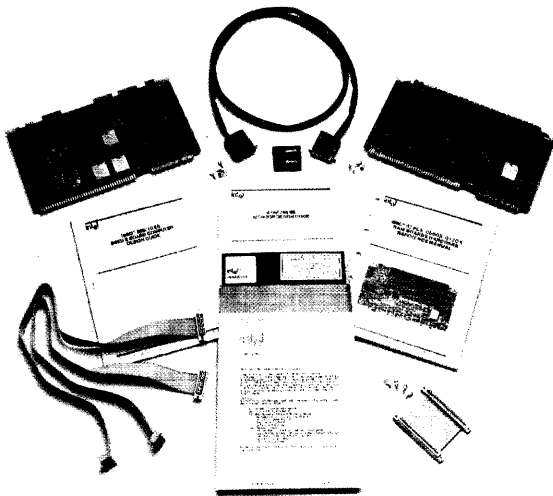
- Development support of iSBC 286- and iAPX 286-based applications.
- Real Address Mode (RAM) and Protected Virtual Address Mode (PVAM) support.
- Universal Development Interface (UDI) support via development system connection.
- Underlying debugging tool for iRMX 286R applications.
- Supports 80287 Numeric Processor Extension (NPX) for high-speed math applications.
- Program load capability from Intellec Series III Development systems.
- Bootstrap Loader for iRMX 86, 88, and 286R file compatible peripherals.
- iAPX 286 single step operation allowed.

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iMMX™ 800 MULTIBUS® MESSAGE EXCHANGE

Microsystem Software

iSBC® 957B, iAPX 86, 88 SYSTEM MONITOR
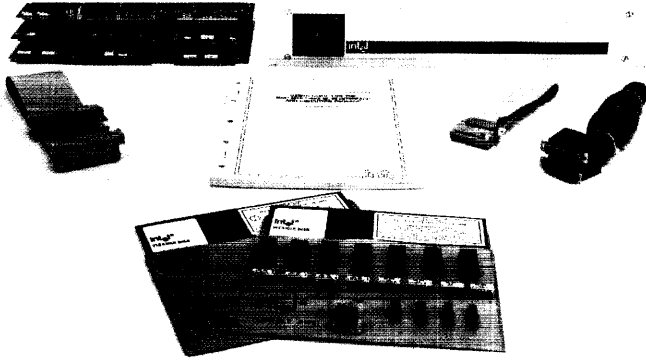
- Configurable monitor for any iAPX 86 or 88 design.
- Includes PROMs and cables to connect to Intellec Microcomputer Development system.
- Full support for 8087 numeric formats.
- Integral dis-assembly of machine instructions.
- Configurable E^2PROM support.

iOSP 86, iAPX 86/30 AND iAPX 88/30 SUPPORT PACKAGE
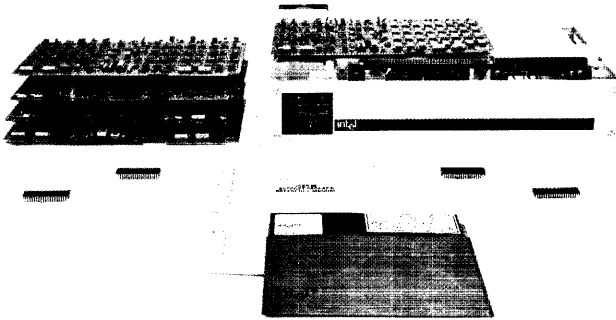
- Development and run-time support for iAPX 86/30 and 88/30 Operating System Processors.
- Total iRMX 86 Operating System software compatibility.
- Extendable with iRMX 86 Operating System calls.
- Compatible with Intel PL/M 86/88, PASCAL 86/88, FORTRAN 86/88, and iAPX 86/88 ASSEMBLER.
- Supports (P)ROM or RAM based system.
- Complete system initialization aids.
- Complete system configuration aids.

iNA-950-1 LOCAL AREA NETWORK SOFTWARE

■ Provides reliable "virtual circuit" process-to-process message delivery service.

■ Operating system independent via MIP in MULTIBUS applications.

■ Transport control layer services:
  - Guaranteed message integrity
  - Data rate matching
  - Multiple connections (process multiplexing)
  - Variable length messages.

■ Comprehensive network management functions:
  - Network usage statistics
  - Transport and data link parameter inspection and setting capability
  - Fault detection and isolation
  - Initialization.

■ iNA implemented on Intel's iSBC 550 Ethernet Controller board set.

Microsystem Software

iRMX™ 86 LANGUAGES
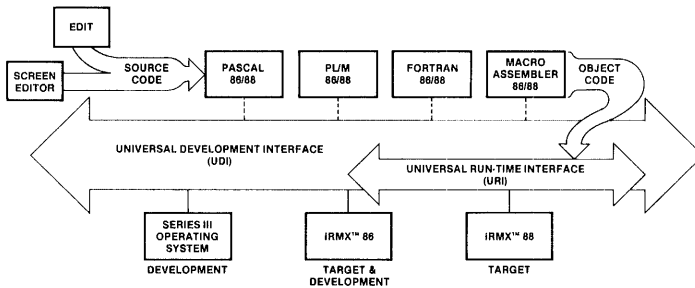
- Newest technology languages:
  - iRMX 861 — ISO PASCAL
  - iRMX 862 — ANS 77 Subset FORTRAN
  - iRMX 863 — Intel PL/M-86.

- Provide full software development capability for the SYSTEM 86/330, iSBC 86/88 or iAPX 86/88-based system.

- iRMX 86 utility software, including MACRO ASSEMBLER, EDIT, LINK, LOCATE and LIB.

- All implement the REALMATH standard for consistent and realiable results using the iAPX 88/20 or 86/20 Numeric Data Processors.

- Compilers optimized to increase application performance and decrease application size.

- Programming languages for OEMs to pass through to system end-users.

Languages

IRMX 86 Utilities
- Order Code .... iRMX 860 DRO
- Minimum iRMX 86 Version V1.4
- Minimum Memory Required 140KB
- Applicable Standard .... —
- 8087 Support .... Single precision, double precision

IRMX 86 PASCAL
- Order Code .... iRMX 861 DRO
- Minimum iRMX 86 Version V1.4
- Minimum Memory Required 140KB
- Applicable Standard .... ISO
- 8087 Support .... Single precision, transcendentals

IRMX 86 FORTRAN
- Order Code .... iRMX 862 DRO
- Minimum iRMX 86 Version V1.4
- Minimum Memory Required 140KB
- Applicable Standard ANSI-77
- 8087 Support .... Single precision, double precision,
                                              transcendentals

IRMX 86 PL/M
- Order Code .... iRMX 863 DRO
- Minimum iRMX 86 Version V1.4
- Minimum Memory Required 140KB
- Applicable Standard .... Intel PL/M
- 8087 Support .... Single precision, double precision,
                                     transcendentals via subroutine

IRMX 86 Screen Editor
- Order Code .... iRMX 864 DRO
- Minimum iRMX 86 Version V1.4
- Minimum Memory Required 140KB
- Applicable Standard .... —
- 8087 Support .... —

iSBX™ MULTIMODULE™
STANDARD FOR NEW
VLSI EXPANSION

8" PERIPHERAL AND
INTERFACE STANDARDS

35MB 8"
WINCHESTER
DISK DRIVE

1MB 8" DOUBLE SIDED/
DOUBLE DENSITY
FLEXIBLE DISK

ELECTRICAL AND
SAFETY STANDARDS

iSBX™ 218
FLEXIBLE DISK
CONTROLLER

iSBC® 215B
WINCHESTER DISK
CONTROLLER

iSBC® 056A
256K RAM
MEMORY BOARD

iSBC® 86/30
SINGLE BOARD
COMPUTER

iSBC® 337
MULTIMODULE™
NUMERIC DATA
PROCESSOR

IEEE 796 MULTIBUS®
SYSTEM BUS STANDARD
EXPANSION FOR INTELLIGENT
• ETHERNET* CONTROLLER
• DIGITAL/ANALOG I/O
• DATA COMMUNICATIONS

IEEE FLOATING
POINT STANDARD

* ETHERNET IS A TRADEMARK OF XEROX CORPORATION.

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SYSTEM 86/300 Family ... the XENIX™ and iRMX™ 86-based open microcomputer systems designed to keep pace with VLSI technology.

The Intel SYSTEM 86/300 family of microcomputer systems was designed for the OEM to bring you immediate access to the latest, powerful, low-cost VLSI. SYSTEM 86/300 products are fully integrated packages including VLSI co-processors, RAM memory, Winchester and floppy disk mass storage and system software (iRMX 86 and XENIX 86 operating systems available).

Meeting the open system needs of the OEM

The SYSTEM 86/300s were designed especially for the OEM with an architecture that offers the OEM:

- Instant access to the latest VLSI technology.
- Maintenance of the OEM's investment and price/performance leadership by being open to rapid incorporation of at least the next two generations of VLSI.
- Industry standard hardware and software modules and interfaces including the MULTIBUS system bus (IEEE 796), the iSBX MULTIMODULE bus, IEEE floating point formats, and the Ethernet* communications standard allow the OEM to use over 100 third party vendor hardware and software products.
- The ability to participate at any level of integration – systems, boards and components.
- Adherence to safety and EMI standards (UL, CSA, FCC, VDE).

Open to system expansion with MULTIBUS boards

To provide the system integrator with the widest possible set of options, a large number of Intel add-in products are available for SYSTEM 86/300:

- Analog and digital instrumentation I/O
- Ethernet local area communications
- Data communications interfaces
- RAM, (E)PROM/ROM, core, and bubble memories
- Graphics/CRT and peripheral controllers

In addition to the Intel products, over 90 other vendors provide MULTIBUS boards, giving the OEM an incomparable breadth of choice.

Systems open to expansion with multiple configurations

SYSTEM 86/330 is a self-contained solution with MULTIBUS board expansion for entry-level configurations.
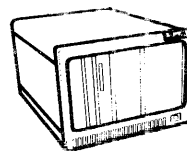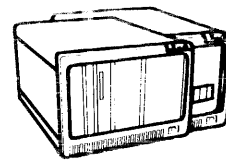
86/330   86/380

SYSTEM 86/380 is a two-chassis configuration, with extensive MULTIBUS board and peripheral expansion.

Intel quality, design, support, and service after shipment

Intel's commitment to the customer is reflected by our support. During product development, Intel supports its OEMs through Field Applications Engineers, providing guidance on implementation problems and for getting the answers when "it isn't in the manual." Maintenance for SYSTEM 86/300s is available from 70 U.S. and International Field Service offices. Service contracts can be written to cover a variety of requirements based on customer needs.

SYSTEM 86/330A and SYSTEM 86/380
— iRMX 86-based Microcomputer Systems

... hardware and software integrated to put Intel's VLSI Open System to work solving your real-time problems

- High performance 16-bit iAPX 86/20 processor set (iSBC 86/30 + iSBC 337 boards)
- MULTIBUS system bus (IEEE 796) multiprocessor architecture
- 384KB of high speed RAM memory to execute multiple jobs and tasks
- 35MB Winchester and 1 MB DS/DD 8" floppy for program/data storage and back-up
- Extensive self-test routines for reliable operation and simple fault isolation
- Full function iRMX 86 real-time multitasking operating system
- Intel resident languages include PL/M-86 and ASSEMBLER-86; Intel PASCAL-86, FORTRAN-86, plus independent software vendor languages (BASIC, COBOL, C), are also available
- SYSTEM 86/330A – Expansion provided for two iSBC boards
- SYSTEM 86/380 – Expansion provided for 11 iSBC boards and one 8-inch standard peripheral
- Compact desk-top or rack-mount integrated microsystems

iRMX 86 – the high performance, real-time operating system

The Intel iRMX 86 Multitasking Operating System is an easy-to-use, sophisticated, real-time software system designed to manage and extend the resources of all iSBC 86 and iSBC 88 Single Board Computer Systems, as well as the System 86/300 family of microcomputers. The iRMX 86 Operating System is designed to provide a structured and efficient environment for many time- and performance-critical applications such as controlling devices, business data and word processing, medical electronics, data communications, process control and factory automation. The system provides a number of standard hardware and software interfaces that allow iRMX 86 applications to take advantage of industry standard device controllers, architectural components, languages and advances in VLSI technology. Based on the UDI standard interface, and optional compilers and interpreters, the iRMX 86 Operating System supports development of sophisticated applications using the target hardware. The configurable layers of the system provide services ranging from interrupt management and standard device drivers for many sophisticated device controllers, to data-file-maintenance commands provided by a comprehensive Human Interface. For further information see the iRMX 86 Operating System section of this Configuration Guide.

SYSTEM 86/330A

CPU . . . . iAPX 86/20, 8086 processor plus 8087 floating point co-processor
RAM Memory . . . . 384K (128K on processor board)
EPROM Memory 16K
Memory Expansion Capability . . . . To 1MB (To 256K on processor board)
Winchester Disk . . . . 35MB (1 drive, expandable to 4 drives)
Flexible Disk . . . . 1MB DS/DD (1 drive, expandable to 4 drives)
Serial I/O Lines 1 RS232
Parallel I/O . . . . 24 lines configured for Centronics Printer Interface
MULTIBUS Board Slots . . . . . . 6; 2 available for system expansion
Operating System . . . . iRMX 86
Languages . . . . Standard, Assembler, PL/M, Options: Pascal, Fortran, C, Cobol, Basic
Utilities . . . . Editor, Link, Locate, Library Manager, Boot, Locator, Debug Monitor, Diagnostics

Input Power Requirements . . . . 6.5A @ 88-126 VAC @ 60 Hz
3.25A @ 176-252 VAC @ 50 Hz
6.5A @ 88-126 VAC @ 50 Hz
single phase, 660W max. power consumption
D.C. Power Available +5V 12.1A
−5V 0.3A
+12V 1.5A
−12V 1.5A
+24V 3.7A
−24V 1.6A
Size – Width . . . . 16.75 in (42.5 cm)
Height . . . . 12.25 in (31.1 cm)
Depth . . . . 21.0 in (53.4 cm)
Weight . . . . 75 lbs
Environmental Specifications . . . . 15-35°C operating, −25-60°C non-operating, 70-80% relative humidity non-condensing, wet bulb temperature not to exceed 26°C
Safety/EMI/RFI Standards . . . . UL, CSA, FCC, VDE

SYSTEM 86/380

CPU . . . . iAPX 86/20, 8086 processor plus 8087 floating point co-processor
RAM Memory . . . . 384K (128K on processor board)
EPROM Memory 16K
Memory Expansion Capability . . . . To 1MB (To 256K on processor board)
Winchester Disk . . . . 35MB (1 drive, expandable to 4 drives)
Flexible Disk . . . . 1MB DS/DD (1 drive, expandable to 4 drives)
Serial I/O Lines 1/RS232
Parallel I/O . . . . 24 lines configured for Centronics Printer Interface
MULTIBUS Board Slots . . . . 14; 11 available for system expansion
Operating System . . . . iRMX 86
Languages . . . . Standard, Assembler, PL/M, Options: Pascal, Fortran, C, Cobol, Basic
Utilities . . . . Editor, Link, Locate, Library Manager, Boot, Locator, Debug Monitor, Diagnostics
Input Power Requirements
– Processor Chassis . . . . 10A @ 92-126 VAC @ 60 Hz
5.0A @ 184-252 VAC @ 50 Hz
10A @ 92-126 VAC @ 50 Hz
single phase 1250W max. power consumption

Input Power Requirements (con't.)
– Peripheral Chassis . . . . 7.0A @ 92-126 VAC @ 60 Hz
3.5A @ 184-252 VAC @ 50 Hz
70A @ 92-126 VAC @ 50 Hz
single phase 500W max. power consumption
D.C. Power Available
– Power Chassis +5V 55A
−5V 2.5A
+12V 5.5A
−12V 5A
– Peripheral Chassis +5V 26.5A
−5V 2.0A
+12V 2.9A
−12V 2.5A
+24V 3.6A
−24V 1.5A
Size (two units of size) – Width . . . . 16.75 in (42.5 cm)
Height . . . . 12.25 in (31.1 cm)
Depth . . . . 21.0 in (53.4 cm)
Weight – Processor Chassis . . . . 55 lbs
Peripheral Chassis . . . . 70 lbs
Cables . . . . 5 lbs
Total . . . . 130 lbs
Environmental Specifications . . . . 15-35°C operating, −25-60°C non-operating, 70-80% relative humidity non-condensing, wet bulb temperature not to exceed 26°C
Safety/EMI/RFI Standards . . . . UL, CSA, FCC, VDE

SYSTEM 86/330X and SYSTEM 86/380X — XENIX *-based Microcomputer Systems

Standard modules and interfaces — quick, easy access to the technology of the future ... VLSI microcomputers

- Meets the open system requirements of the OEM
- Industry standard XENIX interactive operating system, with all UNIX V7 operating system utilities
- Memory management and protection for the high performance 8 MHz 16-bit iAPX 86/10 processor
- Standard language support includes C and ASSEMBLER-86. Other languages available soon
- MULTIBUS system bus (IEEE-796) multiprocessor architecture
- 35MB Winchester and 1 MB DS/DD 8" floppy for program, data storage and back-up
- 384KB of high speed RAM memory to execute multiple-user applications
- Extensive self-test routines for reliable operation and simple fault isolation
- 5 serial ports included (expandable to 16 ports)
- SYSTEM 86/330X – Expansion provided for one iSBC board
- SYSTEM 86/380X – Expansion for ten iSBC® boards and one 8-inch standard peripheral

XENIX 86 – the standard interactive operating system

If an OEM application requires a protected, multi-user system in an interactive environment, then the industry standard UNIX operating system is the best choice. The SYSTEM 86/300 Microcomputer Systems Family, both the SYSTEM 86/330X and SYSTEM 86/380X, are available with the high performance XENIX 86 operating system. The XENIX 86 operating system is an enhanced, fully-licensed microprocessor implementation of Bell Laboratories' UNIX V7. The XENIX 86 operating system is designed to make programmers productive. A flexible Human Interface coupled with the powerful C programming language, sophisticated file structure and system accounting tools make the XENIX 86 operating system an excellent base for terminal-oriented applications. Also, there is a wealth of independent vendor software ranging from data base management packages to editors to screen menu programs that can be used not only in program development but can also be passed through to end-customers.

SYSTEM 86/330X

CPU .... iAPX 86/20, 8086 processor plus
8087 floating point co-processor,
iSBC 309 Memory Management Unit
RAM Memory .... 384K (128K on processor board)
EPROM Memory... 16K
Memory Expansion Capability .... To 1MB
(To 256K on processor board)
Winchester Disk............................. 35MB (1 drive,
expandable to 4 drives)
Flexible Disk........................... 1MB DS/DD (1 drive,
expandable to 4 drives)
Serial I/O Lines .... 5 RS232 lines
expandable to 9 RS232 lines
Parallel I/O .... 24 lines configured for
Centronics Printer Interface
MULTIBUS Board Slots ...... 6; 1 available for system expansion
Operating System...................... Multiuser XENIX plus
preconfigured version of iRMX 86
Languages........... C language and debugger, Assembler 86
Utilities .... Standard XENIX Utilities (Spell, Editor,
Nroff, Troff Text Processing), communication with
other UNIX systems through uucp, Diagnostics (3 levels)

Input Power Requirements........ 6.5A @ 88-126 VAC @ 60 Hz
3.25A @ 176-252 VAC @ 50 Hz
6.5A @ 88-126 VAC @ 50 Hz
single phase, 660W max. power consumption
D.C. Power Available +5V 8.2A
−5V 0.3A
+12V 1.2A
−12V 1.2A
+24V 3.7A
−24V 1.6A
Size − Width .... 16.75 in (42.5 cm)
Height............................ 12.25 in (31.1 cm)
Depth .... 21.0 in (53.4 cm)
Weight .... 80 lbs
Environmental Specifications .... 15-35°C operating,
−25-60°C non-operating,
70-80% relative humidity non-condensing,
wet bulb temperature not to exceed 26°C
Safety/EMI/RFI Standards .... UL, CSA, FCC, VDE

SYSTEM 86/380X

CPU .... iAPX 86/20, 8086 processor plus
8087 floating point co-processor,
iSBC 309 Memory Management Unit
RAM Memory .... 384K (128K on processor board)
EPROM Memory... 16K
Memory Expansion Capability .... To 1MB
(To 256K on processor board)
Winchester Disk............................. 35MB (1 drive,
expandable to 4 drives)
Flexible Disk........................... 1MB DS/DD (1 drive,
expandable to 4 drives)
Serial I/O Lines .... 5 RS232 lines
expandable to 16 RS232 lines
Parallel I/O .... 24 lines configured for
Centronics Printer Interface
MULTIBUS Board Slots .... 14; 10 available for system expansion
Operating System...................... Multiuser XENIX plus
preconfigured version of iRMX 86
Languages........... C language and debugger, Assembler 86
Utilities .... Standard XENIX Utilities (Spell, Editor,
Nroff, Troff Text Processing), communication with
other UNIX systems through uucp, Diagnostics (3 levels)
Input Power Requirements
− Processor Chassis.............. 10A @ 92-126 VAC @ 60 Hz
5.0A @ 184-252 VAC @ 50 Hz
10A @ 92-126 VAC @ 50 Hz
single phase 1250W max. power consumption

Input Power Requirements (con't.)
− Peripheral Chassis .... 7.0A @ 92-126 VAC @ 60 Hz
3.5A @ 184-252 VAC @ 50 Hz
70A @ 92-126 VAC @ 50 Hz
single phase 500W max. power consumption
D.C. Power Available
− Power Chassis +5V................................. 51A
−5V 2.5A
+12V 5.5A
−12V 4.7A
− Peripheral Chassis +5V........................... 26.5A
−5V........................... 2.0A
+12V........................... 2.9A
−12V........................... 2.5A
+24V........................... 3.6A
−24V........................... 1.5A
Size (two units of size) − Width .... 16.75 in (42.5 cm)
Height............. 12.25 in (31.1 cm)
Depth .... 21.0 in (53.4 cm)
Weight − Processor Chassis........................... 60 lbs
Peripheral Chassis........................... 70 lbs
Cables .... 5 lbs
Total .... 135 lbs
Environmental Specifications .... 15-35°C operating,
−25-60°C non-operating,
70-80% relative humidity non-condensing,
wet bulb temperature not to exceed 26°C
Safety/EMI/RFI Standards .... UL, CSA, FCC, VDE

† UNIX is a trademark of Bell Laboratories.
* Xenix is a trademark of Microsoft Corporation.

iSBC® 570 SPEECH TRANSACTION DEVELOPMENT SET

■ Complete development support set for the Intel Speech Product Family including:
- Speech Transaction Generator
- iSBC 576 Speech Transaction board
- iSBC 575 Operator Control Unit
- Microphone
- Demo program
- Speech Transaction Design manual.

■ Intellec Microcomputer Development System based.

■ Speech Transaction Generator provides:
- Interactive design environment
- A speech transaction structure embodying good human factors engineering
- Automatic error checking of transaction design
- Symbolic labeling for easy system designer reference
- Speech Transaction file data base manager facilities
- Speech Transaction file changes.

iSBC® 570 SPEECH TRANSACTION DEVELOPMENT SET

MULTIBUS Address Range 0-4K

MULTIBUS Transfer Mode . . . . 8/12 bit

iPDS™ SYSTEM INTEL PERSONAL DEVELOPMENT SYSTEM
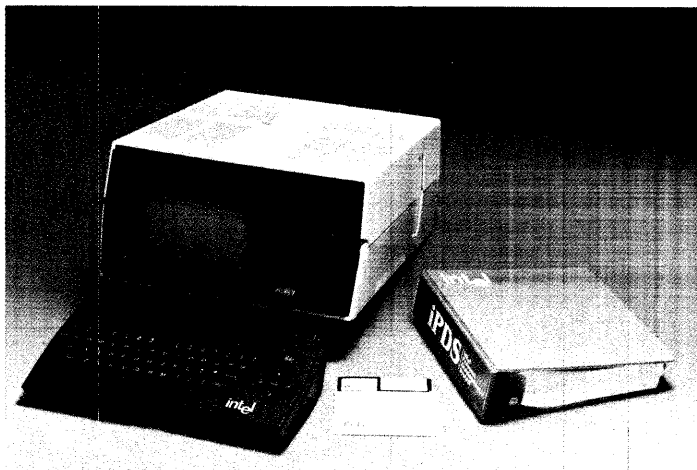
■ Comprehensive 8-bit design tool.

■ Compact, rugged, portable.

■ 640K byte integral disk drive, 9" CRT, 64 KB RAM.

■ Full software support including development software, CP/M* and applications packages.
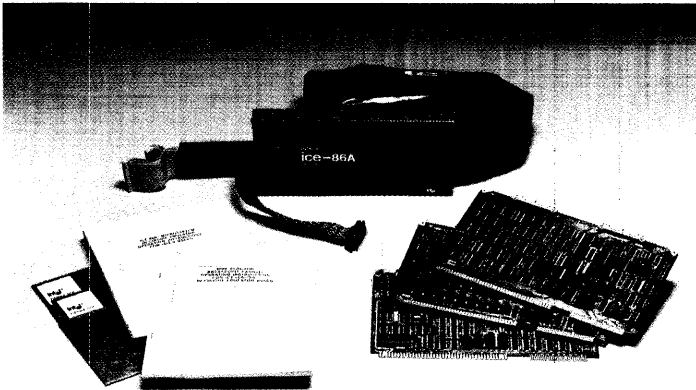
Development Software and Support

ICE™-80 MCS®-80 IN-CIRCUIT EMULATOR

- Directly connects Intellec system to user system via external cable and 40-pin plug, replacing user's 8080 CPU.
- Real-time emulation to MHz speed.
- Offers full symbolic debugging capability.
- Shares Intellec RAM, ROM, and PROM memory and Intellec I/O facilities with user system.

ICE™-85B MCS®-85 IN-CIRCUIT EMULATOR

- Directly connects Intellec system to user system via external cable and 40-pin plug, replacing user's 8085 CPU.
- Real-time emulation to 5 MHz speed.
- Offers full symbolic debugging capability.
- Include Multi-ICE software supporting dual processor environments.

ICE™-86A iAPX-86 IN-CIRCUIT EMULATOR

- Directly connects Intellec system to user system via external cable and 40-pin plug, replacing user's 8086 CPU.
- Real-time emulation to 5 MHz speed.
- Software debugging with or without user system.
- Handles full 1 megabyte addressability of iAPX 86.
- Offers full symbolic debugging capability.

ICE™-88A iAPX-88 IN-CIRCUIT EMULATOR

- Directly connects Intellec system to user system via external cable and 40-pin plug, replacing user's 8088 CPU.
- Real-time emulation to 5 MHz speed.
- Handles full 1 megabyte addressability of iAPX 88.
- Supports memory mapping, full symbolic debugging, breakpoints, comprehensive trace and program disassembly.

Development Software and Support

PSCOPE HIGH-LEVEL SOFTWARE DEBUGGER

- Runs on Intellec Series III systems to debug 16-bit applications programs at source level.
- Offers high level code patching, breakpoint, single step and execution trace by statement numbers, procedure names and labels.
- Supports PL/M, Pascal and FORTRAN debugging.
- Unlimited symbol table capacity.

iUP 200/201 UNIVERSAL PROM PROGRAMMERS
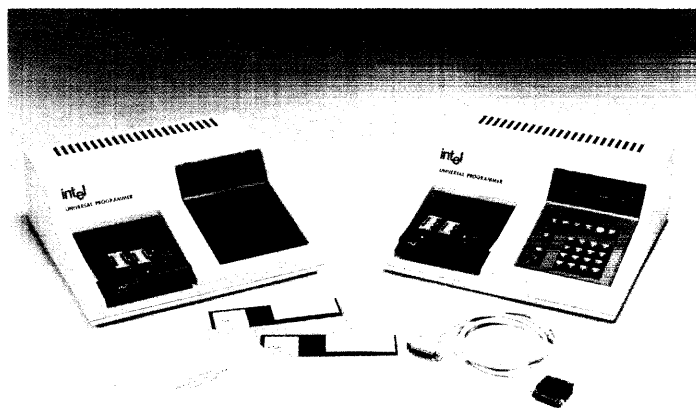
- Serial interface to Intellec systems or runs in stand-alone mode (201).
- Support for all Intel PROM families through multiple device personality modules.
- Powerful PROM Programming Software (iPPS).

PL/M 80 HIGH-LEVEL PROGRAMMING LANGUAGE INTELLEC® RESIDENT COMPILER

■ Produces relocatable linkable compact code.

■ Sophisticated code optimization reduces application memory requirements.

■ Speeds project completion with increased programmer productivity.

■ Cuts software development and maintenance costs.

PSCOPE HIGH-LEVEL PROGRAM DEBUGGER

■ Source-level debugging for high productivity.

■ Breakpoint, single-step and execution trace by statement numbers, procedure names and labels.

■ High-level code patching.

■ Operates with Intel's next family of incircuit emulators for target system debugging.

■ Supports PL/M, Pascal, and FORTRAN program debugging.

Development Software and Support

PROGRAM MANAGEMENT TOOLS

- Decreases the overhead of software administration.
- PMTs let users control, automate, and examine the evolution of a software project.
- SVCS maximizes control of program changes and version of all software modules.
- MAKE saves time by automatically generating new releases of a software system.

FORTRAN 80 8080/8085 ANS FORTRAN 77 INTELLEC® RESIDENT COMPILER

- Meets ANS FORTRAN 77 subset language specification plus adds Intel microprocessor extensions.
- Supports Intel Floating Point Standard with the FORTRAN 80 software routines, the iSBC 310 High Speed Mathematics board, or the iSBC 332 Math MULTIMODULE.
- Produces relocatable and linkable object code compatible with resident PL/M 80 and 8080/8085 Macro Assembler.
- Has well defined I/O interface for configuration with user-supplied drivers.

FORTRAN 86/88 SOFTWARE PACKAGE

■ Meets ANS FORTRAN 77 subset language specifications.

■ Supports iAPX 86/20, 88/20 numeric data processor for fast and efficient execution of numeric instructions.

■ Offers powerful extensions tailored to microprocessor applications.

■ Provides users ability to do formatted and unformatted I/O with sequential or direct access methods.

PASCAL 86/88 SOFTWARE PACKAGE

■ Object compatible and linkable with PL/M 86/88, ASM 86/88 and FORTRAN 86/88.

■ Strict implementation of ISO standard Pascal.

■ Useful extensions essential for microcomputer applications.

■ Separate compilation with type-checking enforced between Pascal modules.

Development Software and Support

8087 SOFTWARE SUPPORT PACKAGE

- Macro Assembler generates code for 8087 processor or emulator, while also supporting the 8086/8088 instruction set.
- 8087 emulator duplicates each 8087 floating point instruction in software, for evaluation of prototyping, or for use in an end product.
- Macro Assembler and 8087 emulator are fully compatible with other 8086/8088 development software.
- Implementation of the IEEE proposed floating point standard (the Intel Realmath Standard).

PL/M 86/88 SOFTWARE PACKAGE

- Language is upward compatible from PL/M 80, assuring MCS-80/85 design portability.
- Supports 16-bit signed integer and 32-bit floating point arithmetic in accordance with IEEE proposed standard.
- Produces relocatable object code which is linkable to all other 8086 object modules.
- Code optimization assures efficient code generation and minimum application memory utilization.

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8089 IOP SOFTWARE SUPPORT PACKAGE

- Contains 8089 Macro Assembler, plus relocation and linkage utilities.
- Relocatable object module compatible with all iAPX 86 and iAPX 88 object modules.
- Supports 8089-based addressing modes with a structure facility that enables easy access to based data.
- Provides timing information in assembly listing.

iAPX 286 SOFTWARE DEVELOPMENT PACKAGE

- Complete system development capability for high-performance iAPX 286 applications.
- Allows creation of Multi-user, virtual memory, and memory-protected systems.
- Macro Assembler for machine-level programming.
- System utilities for program linkage and system building.

Development Software and Support

PL/M 286 SOFTWARE PACKAGE

- Systems programming language for the protected virtual address mode iAPX 286.

- Upward compatible with PL/M 86 and PL/M 80 assuring software portability.

- Enhanced to support design of protected, multi-user, multitasking, virtual memory operating system software.

- Produces relocatable object code which is linkable to object modules generated by all other iAPX 286 language translators.

VAX*/VMS* RESIDENT iAPX 86/88/186 SOFTWARE DEVELOPMENT PACKAGES

- Executes on DEC VAX* Minicomputer under VMS* Operating System V2.2 (or later) to translate PL/M-86, Pascal-86 and ASM-86 programs for iAPX 86, 88 and 186 microprocessors.

- Packages include Pascal-86, PL/M-86, ASM-86, Link and Relocation Utilities, and Library Manager Program.

- Output linkable with code generated on an Intellec Series III Development system.

iMDX 557 iAPX 86 RESIDENT PROCESSOR CARD PACKAGE
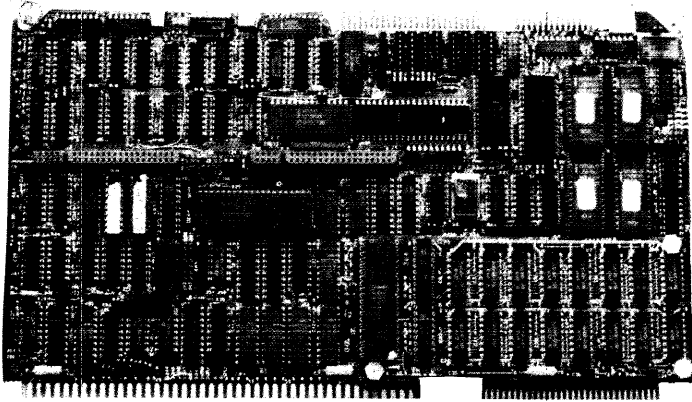
■ High performance 8086-based CPU board with 256K RAM (224K User RAM).

■ Upgrades Series II development system to Series III systems, and upgrades Model 800s to Series III functionality.

■ Includes 86/88 Macro Assembler, Linker, Locater, and Librarian, plus 16-bit, menu-driven ALTER editor.

■ Supports all iAPX 86/88-resident high-level languages plus PSCOPE.

iMDX 225 INTELLEC® SERIES II MICROCOMPUTER DEVELOPMENT SYSTEM
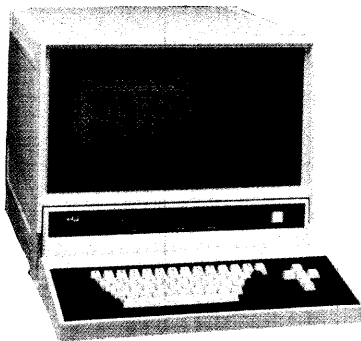
■ Microprocessor development system for MCS-86, 85, 80, 48 microprocessor families.

■ Enhanced human interface for greater productivity and ease of use.

■ High performance 8085A-2 CPU board with 64K bytes RAM.

■ Includes ROM-resident monitor program plus powerful ISIS-II operating system with relocating Macro Assembler, Linker, Locator, and CRT-based CREDIT editor.

Development Software and Support

iMDX 720 DOUBLE DENSITY FLEXIBLE DISK SYSTEM

- Each subsystem provides two double-density flexible disk drives.
- Data recorded in soft-sectored format which allows 0.5M byte data capacity with up to 200 files per disk.
- Controller supports up to four double density drives, providing up to 2.25 bytes of storage in one (development) system.
- Cable included to upgrade integral single-density drive to double density.

iMDX 201 EXPANSION CHASSIS INTELLEC® SERIES II MICROCOMPUTER DEVELOPMENT SYSTEM

- Four additional card slots for Intellec Series II Systems.
- Internal power supply.
- Fits beneath all Intellec Series II units.
- Cable connectable to main Intellec bus.

PROJECT CONFIGURATION WORKBOOK

THE FIRST STEP — Determine the system needs

Process interfacing needs

	What is being measured?		What is being controlled?	
	Analog	Digital	Analog	Digital
Number of Channels				
Signal- Voltage? Current? Pulses?				
Isolation				
Accuracy				
Speed				

Human interfacing needs (Type and how many on each CPU)

Keyboard/CRT _____   Graphics CRT _____   Control Panel _____   Other _____   Remote _____

Processing needs

Fixed Point Math _____   Floating Point _____   Precision (Bits)_____

Transactions Per Second _____   Interrupt Response Time _____

Storage needs

RAM _____ KB   Non-Volatile RAM (Bubble/BBU RAM) _____   ROM _____

Disk Storage —   Floppy _____ MB   Hard Disk _____ MB   Other _____

Communications needs

Transactions/sec _____   Local nodes _____   Remote nodes _____   Message size _____   Min. Response _____

Speed _____   Distance _____   Protocols _____

Software needs

Operating Systems: Multiple Asynchronous events?_____

Single or Multi Tasking _____   Task-To-Task Communications _____

Interrupt Response Time _____   Named File Management _____   Hierarchal Files_____

Languages: Run Time Support Only? _____   Development Tool on Run Time Machine? _____

Assembler _____   High-Level System Language _____   FORTRAN _____   PASCAL _____

Other _____

System packaging needs

Environment —   Max/Min Temperatures_____   Dirty?_____

19″ Rack Mount _____   NEMA Cabinet _____   Table Top _____   RFI/EMI/Safety Requirements? _____

THE SECOND STEP — Go to page vi

iCS™ _____

iCS™ _____

iCS™ _____

iSBX™ _____

iSBX™ _____

iSBX™ _____

iSBX™ _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____
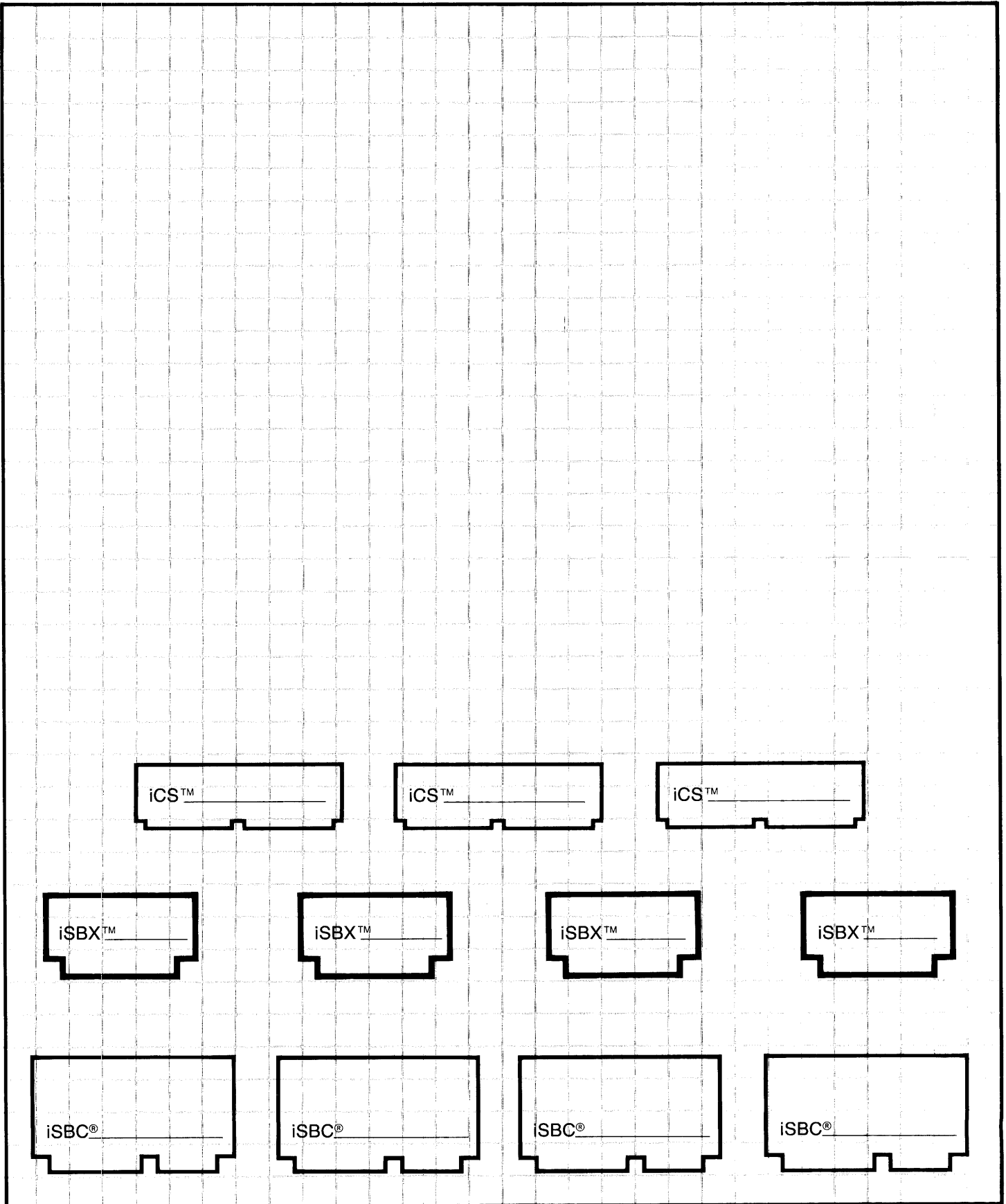
MICROCOMPUTER SYSTEM CONFIGURATION

iSBX™ _____

iSBX™ _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

MULTIBUS® System Bus

System Memory

iSBC® _____

iSBC® _____

iSBC® _____

iSBC® _____

Peripheral I/O

iSBC® _____

iSBC® _____

iSBC® _____

iSBX™ _____

Disk

Disk

M
T

Printer

Chassis

iSBC®_____

or

iCS™_____

System Software

iRMX™_____

iSBX™_____

iSBX™_____

iSBC®_____

iSBC®_____

iSBC®_____

iSBC®_____

iCS™_____

iSBC®_____

System I/O

iSBC®_____

iSBC®_____

iSBC®_____

iSBC®_____

USER
SYSTEM
DEVICES

CRT
Display

Keyboard

PROJECT CONFIGURATION WORKBOOK

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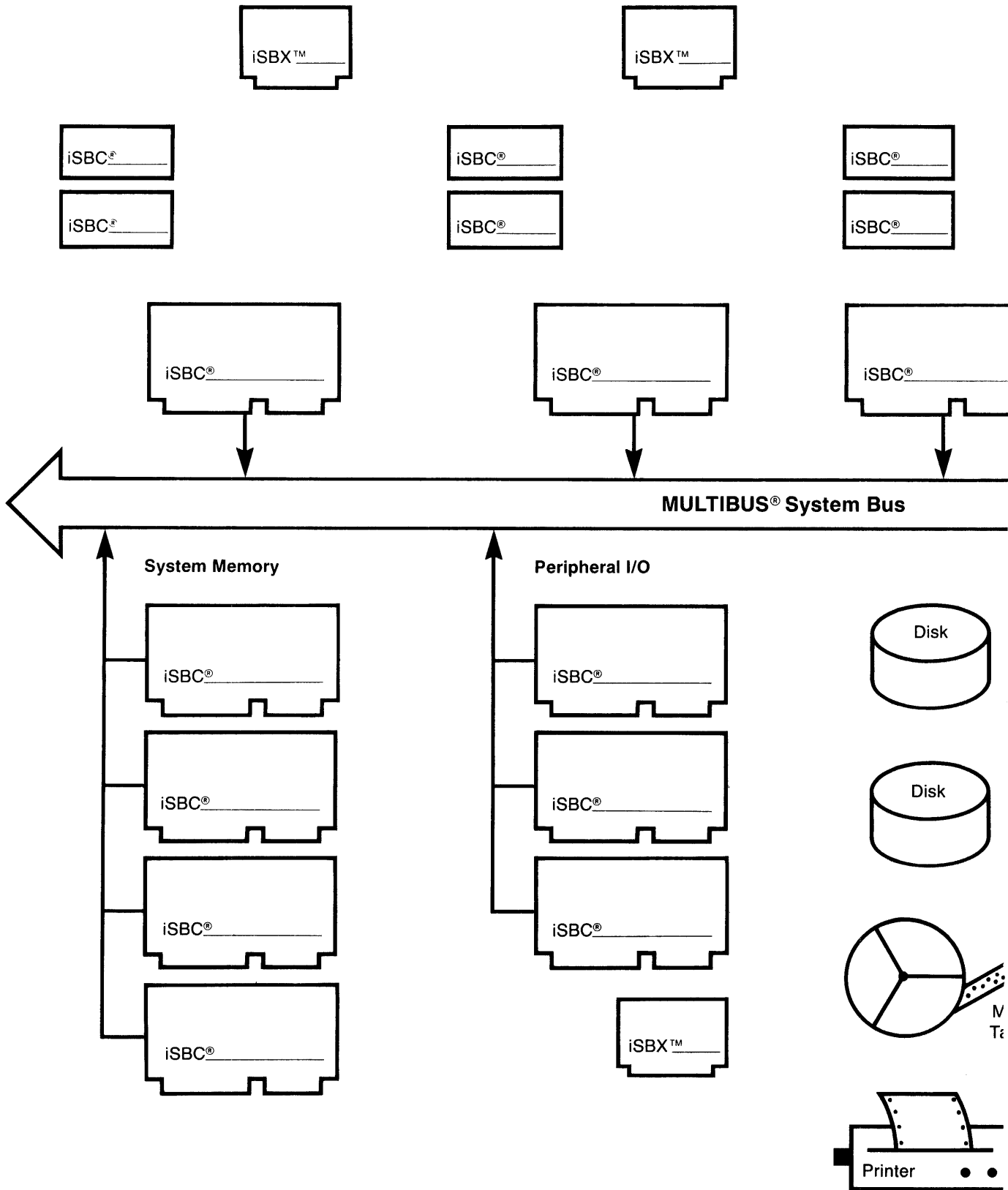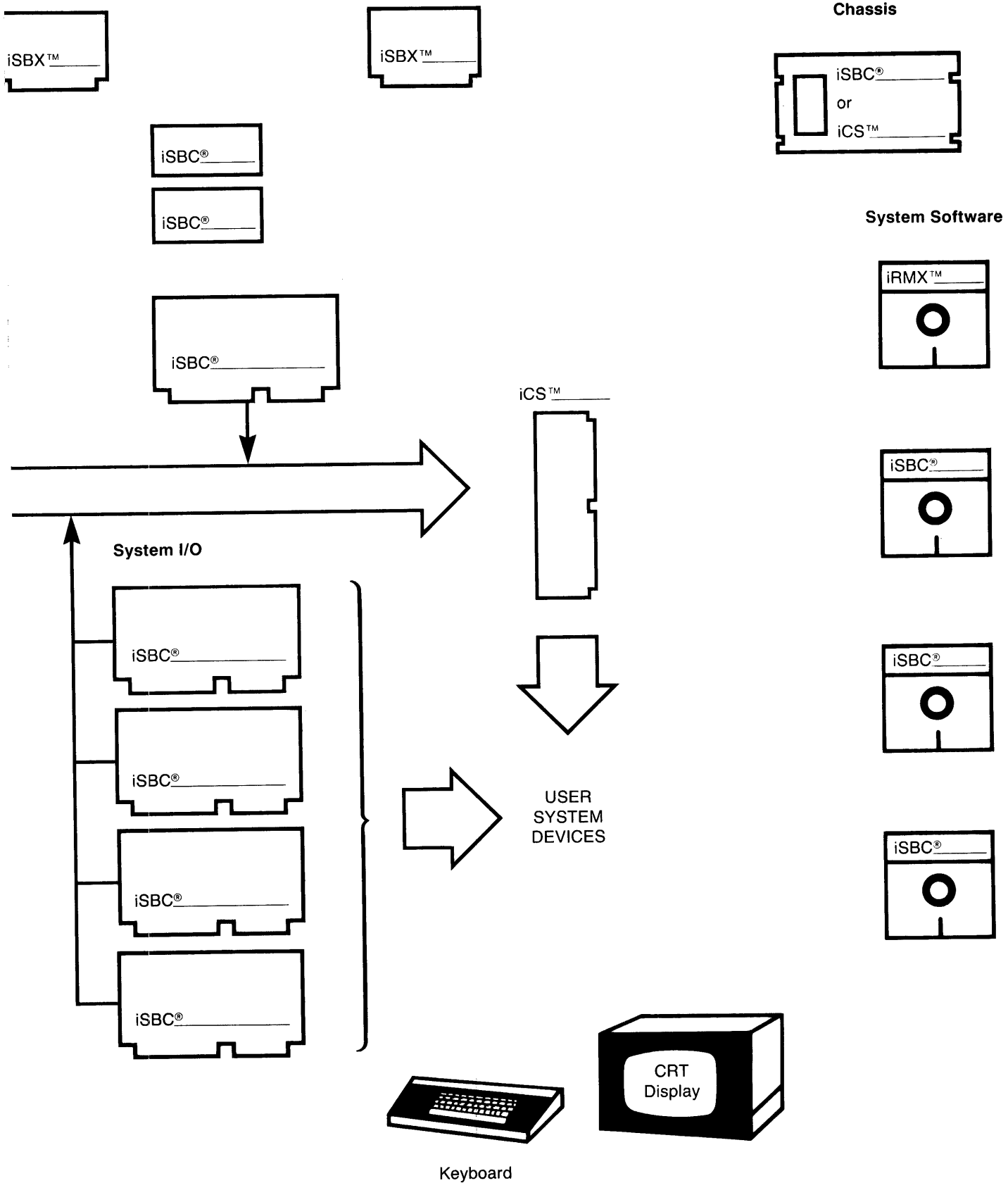
1. Define your input/output requirements:

■ If your application requires analog and/or digital signal conditioning strips, use the I/O Configuration Worksheets found on the following pages:
  — Analog Configuration Worksheet
  — Digital Configuration Worksheet

From these you can determine your mix of input/output requirements and need for signal conditioning strips. The final configuration can be planned on the Planning Worksheets. If no specific analog or digital I/O is required, go to Step 2.

2. Determine your computer and expansion boards:

■ Using the Configuration Guide determine which iSBC Single Board Computer, iSBX and iSBC MULTIMODULE Boards, and expansion boards meet your requirements, and enter the appropriate information into the slot rows in the section titled "Intel Solution." NOTE: If more than 12 slots are required, please consult with your Intel Field Applications Engineer.

Cost data for your configuration can be obtained from your Intel Field Sales Engineer or stocking Distributor.

3. Determine your accessories and packaging:

■ Enter the ROM/EPROM/EEPROM requirements, I/O Driver/Terminator, and custom hardware requirements to complete the board level configuration. See the "Summary of Key iSBC Configuration Parameters".

■ For completeness and accuracy, calculate the subtotals to compare the Intel solution to your requirements. You may also now determine total power requirements and partial cost.

■ Complete the system integration section to include your choice of mounting space and power supply. Power and slots available should be greater than or equal to your system requirements.

4. Estimate your memory requirements:

■ You can accomplish this by using the System Memory and I/O Maps in the Workbook.

5. Develop your system block diagram:

■ Draw in your system and its interface block diagram, showing the Intel products used to implement the interface to the computer system.

■ Using the blank MULTIBUS block diagram, develop the detailed configuration of Intel products by filling in the blanks on the board outlines and making bus and board connections as appropriate. At this point, insure that you have selected the system software required to support your development and implementation.

ANALOG CONFIGURATION WORKSHEET *PROJECT* _____

This worksheet will provide the required analog interface configuration data
which is required to complete the Project Configuration Worksheet.

Enter number of channels:

Enter # of Single Ended High Level Analog Channels . . . . _____ (A)

Enter # of Differential High Level Analog Channels . . . . _____ (B)

Enter # of Differential Low Level Analog Channels . . . . _____ (C)

Enter # of Analog Output Voltage Channels . . . . _____ (D)

Enter # of Analog Output Current Channels . . . . _____ (E)

Compute the number of iSBC® board edge connectors:

Unless otherwise noted, round all computations to the next largest integer!

Compute # of High Level Single Ended Analog Connectors (A/16) . . . . _____ (F)

Compute # of High Level Differential Connectors (B/8) . . . . _____ (G)

Compute # of Low Level Differential Connectors (C/8) . . . . _____ (H)

Compute # of Analog Interface Input Connectors (F + G + H) . . . . _____ (J)

Compute the number of iCS™-910 termination panels:

Enter Analog Out Connectors (D/4 + E/2) . . . . _____ (K)

Enter # of Analog In Connectors (J/2) . . . . _____ (L)

Enter larger of (K) or (L) . . . . _____ (M)

Place the appropriate data into the Project Configuration Worksheet as shown below:

See Instruction Sheet

PROJECT CONFIGURATION WORKSHEET

EQUIPMENT PARAMETERS: (Circled letters reference line from Worksheet)

YOUR REQUIREMENTS	ISBX or ISBC MULTIMODULE Board	MEMORY			SERIAL I/O		PARALLEL INPUT/OUTPUT				ANALOG INPUT/OUTPUT							TIMERS	POWER REQUIREMENTS					COST		QTY
		RAM (Bytes)	(EP)ROM (Bytes)	E²PROM (Bytes)	Serial Ports		Parallel Lines		DIGITAL CONNECTORS		Analog Signals (See legend)					ANALOG CONNECTORS			+5V	+12V	−5V	−12V	OTHER	LIST	QTY	
					RS422	RS232C	IN	OUT	16	24	DI	SI	LOW	IO	VO	IN	OUT									
(M) ea. iCS 910											(B) (A)(C)(E)(D)					(L)	(K)									
TOTAL																										
INTEL SOLUTION / SLOT #1																										

LEGEND:
DI — Differential Input
SI — Single-ended Input
IO — Current Output
VO — Voltage Output
LOW — Low Level Differential Input

DIGITAL CONFIGURATION WORKSHEET *PROJECT* _____

This worksheet will provide the required digital interface configuration data
which is required to complete the Project Configuration Worksheet.

Enter number of channels:

Enter # of Discrete AC Outputs (115-230 VAC) .... _____ (A)

Enter # of Discrete AC Inputs (115-230 VAC) .... _____ (B)

Enter # of Discrete DC Outputs (Current > 300 MA) .... _____ (C)

Enter # of Discrete DC Outputs (Current < 300 MA) .... _____ (D)

Enter # of Discrete DC Inputs .... _____ (E)

Compute the number of iCS™ 920 and iCS™ 930 termination panels:

First compute the number of Parallel I/O ports (8-bits each port) required on
your iSBC board. Remember to round all computations up to the nearest
whole integer unless instructed otherwise!

Compute # of iCS 930 Interface Output Ports ((A + C)/8) .... _____ (F)

Compute # of iCS 930 Interface Input Ports (B/8) .... _____ (G)

Compute # of iCS 930 Termination Panels ((F + G)/2) .... _____ (H)

Compute # of iCS 920 Interface Output Ports (D/8) .... _____ (J)

Compute # of iCS 920 Interface Input Ports (E/8) .... _____ (K)

Compute # of iCS 920 Termination Panels ((J + K)/3) .... _____ (L)

Optimization of digital I/O port usage for minimum I/O configuration:

Compute # of iCS 930 Output Overflow Channels (A + C)/8 (DO NOT ROUND OFF)

.... QUOTIENT ..... _____ (M)

. Overflow Channels REMAINDER ..... _____ (N)

Compute # of iCS 930 Input Overflow Channels (B/8) (DO NOT ROUND OFF)

.... QUOTIENT ..... _____ (P)

REMAINDER ..... _____ (R)

Compute # of iCS 920 Output Overflow Channels (D/8) (DO NOT ROUND OFF)

.... QUOTIENT ..... _____ (S)

REMAINDER ..... _____ (T)

Compute # of iCS 920 Input Overflow Channels (E/8) (DO NOT ROUND OFF)

.... QUOTIENT ..... _____ (V)

REMAINDER ..... _____ (W)

Compute 8-Bit Input Ports Required (P + V) .... _____ (X)

Compute 8-Bit Output Ports Required (M + S) .... _____ (Y)

Compute 4-Bit Output Ports Required ((N + T)/4) (ROUND UP) .... _____ (Z)

Compute 4-Bit Input Ports Required ((R + W)/4) (ROUND UP) .... _____ (AA)

Compute 8-Bit Port C Requirements ((Z + AA)/2) (ROUND UP) .... _____ (BB)

Total I/O Parallel Ports Required (X + Y + BB) .... _____ (CC)

Total # of 24 Channel Parallel I/O iSBC Board Edge Connectors

  (CC/3) — (ROUND UP TO INTEGER) .... _____ (DD)

Compute power requirements for the termination boards:

                        (DO NOT ROUND OFF)

Compute + 5V for iCS 920 Board Outputs (0.061 × D)...................... _____ (EE)

Compute + 5V for iCS 920 Board Inputs (0.023 × E) .... _____ (FF)

Compute + 5V for iCS 930 Board Outputs (0.020 × (A + C)) .... _____ (GG)

Compute + 5V for iCS 930 Board Inputs (0.012 × B) .... _____ (HH)

Compute iCS 920 Power Requirements (EE + FF) .... _____ (JJ)

Compute iCS 930 Power Requirements (GG + HH) .... _____ (KK)

Enter the appropriate data into the Project Configuration Worksheet as shown below:

See Instruction Sheet

PROJECT CONFIGURATION WORKSHEET

EQUIPMENT PARAMETERS: (Circled letters reference line from Worksheet)

YOUR REQUIREMENTS	ISBX or ISBC MULTIMODULE Board	MEMORY			SERIAL I/O		PARALLEL INPUT/OUTPUT				ANALOG INPUT/OUTPUT							TIMERS	POWER REQUIREMENTS					COST		
		RAM (Bytes)	(EP)ROM (Bytes)	E²PROM (Bytes)	Serial Ports		Parallel Lines		DIGITAL CONNECTORS		Analog Signals (See legend)					ANALOG CONNECTORS			+5V	+12V	−5V	−12V	OTHER	LIST	QTY	QTY
					RS422	RS232C	IN	OUT	16	24	DI	SI	LOW	IO	VO	IN	OUT									
(D)ea iCS-920					(E)	(D)													(JJ)							
(B)ea iCS 930					(B)	(A+C)	(DD)												(KK)							
TOTAL																										
INTEL SOLUTION SLOT #1																										

LEGEND:
    DI — Differential Input
    SI — Single-ended Input
    IO — Current Output
    VO — Voltage Output
    LOW — Low Level Differential Input

PROJECT CONFIGURATION WORKBOOK

ANALOG I/O SIGNAL PLANNING WORKSHEET

FUNCTION	SIGNAL TYPE	SCREW NO.	I/O ADDRESS		TERMINATION PANEL	REMARKS
			CHNL.	CONNECTOR		

EXAMPLES:

Oven Temp #3	DIO-5V	TB2-5*	1	J1	iCS 910	Thermistor
Oven Temp #4	SI4-20mA	TB2-2*	2	J1	iCS 910	T-to-I Transmitter

DI = Differential Input
SI = Single Ended Input

* Not required for configuration planning.
(They are used in wiring.)

x

DIGITAL I/O SIGNAL PLANNING WORKSHEET

FUNCTION	SIGNAL TYPE	SCREW NO.	I/O ADDRESS		TERMINATION PANEL	REMARKS
			CHNL.	CONNECTOR		

EXAMPLES:

Oven#4 Heater	AC OUT	TB1-4*	7	EA	iCS 930	OAC 5
Oven#1 "Intol"	DC OUT	TB6-6*	O	E8	iCS 920	TIL 113

DI = Differential Input
SI = Single Ended Input

* Not required for configuration planning.
(They are used in wiring.)

EQUIPMENT PARAMETERS:

See Instruction Sheet

YOUR REQUIREMENTS		iSBX or iSBC MULTIMODULE Board	MEMORY			SERIAL I/O		PARALLEL INPUT/OUTPUT				
			RAM (Bytes)	(EP)ROM (Bytes)	E²PROM (Bytes)	Serial Ports		Parallel Lines		DIGITAL CONNECTORS		
						RS422	RS232C	IN	OUT	16	24	
	TOTAL											
INTEL SOLUTION	SLOT #1											
	SLOT #2											
	SLOT #3											
	SLOT #4											
	SLOT #5											
	SLOT #6											
	SLOT #7											
	SLOT #8											
	SLOT #9											
	SLOT #10											
	SLOT #11											
	SLOT #12											
	ROM/EPROM/E²PROM											
	I/O DRIVERS TERMINATION											
	USER SUPP. HARDWARE											
	SUBTOTAL											

LEGEND:
DI– Differential Input
SI– Single ended Input
IO– Current Output
VO– Voltage Output
LOW– Low Level Differential Input

CHASSIS
CARDCAGE
POW. SPLY.

ANALOG INPUT/OUTPUT			ANALOG CONNECTORS		TIMERS	POWER REQUIREMENTS					COST		
Ignals (See legend)													
LOW	IO	VO	IN	OUT		+5V	+12V	−5V	−12V	OTHER	LIST	QTY ___	QTY ___

SYSTEM EGRATION	SLOTS AVAILABLE	POWER AVAILABLE						
		+5V	+12V	−5V	−12V			
		TOTAL SYSTEM COST						

SYSTEM MEMORY AND I/O MAPS

This worksheet will allow you to optimize the memory and I/O spaces utilized by the combination of Single Board Computers, memory and I/O expansion boards.

A. Referring to your completed Project Configuration Worksheet and the On-Board Dedicated Addresses column of the Summary Chart, enter the ROM and RAM low and high address limits into the appropriate spaces. Within the CPU Memory boxes indicate the iSBC designation and whether ROM or RAM is at the top or bottom of the address range.

B. Enter into the System Memory chart all memory which is accessible from the MULTIBUS. Include all dual-port RAM on the iSBC board which is mapped for MULTIBUS access and all expansion memory.[1]

NOTE: ROM contained on-board on iSBC card is not accessible from the MULTIBUS.

C. Enter the Dedicated I/O Address information for your Single Board Computers into the CPU I/O Address section.

D. Enter all I/O expansion board addresses into the System I/O Address chart.

NOTE: I/O resources located on-board a Single Board Computer are not accessible from the MULTIBUS.

[1] Also include memory mapped I/O options which have a "Number of Bytes Dedicated" column in the Summary to indicate memory mapped operation.

HIGH
LOW
_____(RAM or ROM)
iSBC_____
HIGH
LOW
_____(RAM or ROM)

CPU #1 MEMORY

HIGH
LOW
_____(RAM or ROM)
iSBC_____
HIGH
LOW
_____(RAM or ROM)

CPU #2 MEMORY

HIGH
iSBC_____
LOW

CPU #1 I/O ADDRESSES

HIGH
iSBC_____
LOW

CPU #2 I/O ADDRESSES

MAX
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____

SYSTEM MEMORY

MAX
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____
HIGH
LOW
iSBC_____

SYSTEM I/O ADDRESSES

INTEL CORPORATION