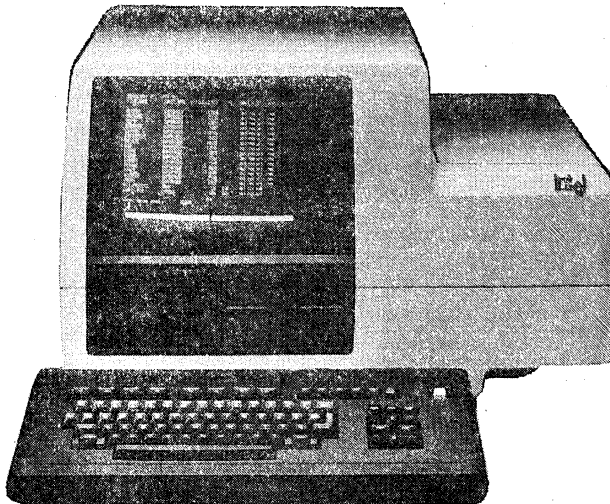# intel®

iMDX 430/431/440/441
INTELLEC® SERIES IV
MICROCOMPUTER DEVELOPMENT SYSTEM

- **Complete Microcomputer Development System for the iAPX 86/87/88/186/188/286, the MCS® -80/85 and the MCS -48/51/96 Family Microprocessors**

- **Advanced, Friendly Human Interface with Menu-Driven Function Keys, HELP, and Syntax Builder/Checker Capabilities for Increased User Productivity**

- **Foreground/Background Multiprocessing for Simultaneous Execution of Two Jobs by a Single User; Increasing System Throughput**

- **Multi-User Capability for Simultaneous Operation by Two Users, Significantly Reducing System Cost per User**

- **Hierarchical File System Provides File Sharing and Protection for Large Software Projects**

- **Software Compatible with Both Series IIE and Series IIIE Development Systems**

- **Supports PL/M, Pascal, C, and FORTRAN, and Basic High-Level Languages as well as Assemblers**

- **Provides Program Management Tools (PMTs), Advanced AEDIT Text Editor and Supports Powerful PSCOPE Symbolic, Source Level Debugger**

- **Can be Fully Integrated into the NDS-II Network Development System**

The Intellec® Series IV is a new generation development system specifically designed for supporting the iAPX family of advanced microprocessors. It also supports the MCS-80/85 and the MCS-48/51 families.

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Figure 1. Intellec® Series IV Microcomputer Development System

Series IV provides a state-of-the-art, easy-to-use, high performance host environment for running a wide variety of hardware and software development tools. A unique combination of tools provides an integrated microcomputer system design that results in highly improved designer productivity and considerable shortening of time to market. The length of the compile-link-load-debug-edit cycle is minimized by the friendly human interface, powerful and easy-to-use editors, a wide selection of language translators, source level debuggers, program management tools. The advanced operating system features a hierarchical file system, foreground/background multitasking, and multi-user capability. Furthermore, the Series IV can serve as a powerful workstation on the NDS-II distributed processing network for high performance milti-user software development. The networking architecture supports a distributed co-operative processing environment. Tasks like compilations can be executed in the background mode or exported to an idle workstation while the user is in the middle of an interactive edit session. The key benefit of this approach is a much higher system throughput and programmer productivity than, for instance, a system designed for raw-performance and fast compilations only.

The Series IV is offered in four different versions, providing a range of storage and performance options so that the user may select the configuration to suit his/her stand-alone or networking development station needs. The four versions are not only compatible with one another, but are also software compatible with the current generation enhanced Series IIE/IIIE systems. Existing ISIS-compatible software can run directly on the Series IV under the ISIS operation system. Finally, the NDS-II network provides an ideal means for the various hosts, e.g., Series II/III/IV to work with each other, protecting the user's past, and present, and future investment.

FUNCTIONAL DESCRIPTION

Systems Components

The Intellec Series IV model 430/431 Microcomputer Development System is an easy-to-use high-performance system in one package. It includes a CPU board for each of the iAPX 88 and MCS 85 processors and 640K bytes of system RAM. The system has eight function keys included in its detachable standard ASCII keyboard that also has cursor controls and uppercase/lowercase capability.

These function keys are menu driven and, with the use of the syntax builder/checker, greatly reduce user keystrokes. Peripheral configurations include: Model iMDX430WD, 440WD—two floppy disks, one 35MB Winchester; and Model iMDX 431, 441— one floppy disk, one 10MB Winchester.

The 5.25″ drives, a green phosphor screen, and a detachable keyboard are all integrated into the system. The main chassis has ten MULTIBUS® slots (three 12″ × 12″, seven 6¾″ × 12″) power supplies, fans and cables.

Operating System Environments/ Features

The Series IV provides both an 8086/8088-based development environment and an 8080/8085 based development environment. The host execution mode is the 8086/8088, which runs under the iNDX operating system. To execute an 8080/8085 program, the ISIS-IV utility is invoked, entering the 8085 execution mode. All ISIS-compatible 8-bit software can thus be run directly on the Series IV, through a user interface that is compatible with ISIS-based development systems such as the Series II and the Series III.

HIERARCHICAL FILE SYSTEM

The iNDX operating system employs a hierarchical file system, providing file sharing and protection features. The hierarchical structure allows logical grouping of data. The structure resembles an inverted tree. The root of the system is called the logical system root. The system root logically "connects" the volumes within the file system. Each volume corresponds to a physical mass storage device. Volumes are further divided into files. Files can be either directory files or data files. Directory files contain references to further directory or data files. Data files contain only data.

It is not necessary to know the physical location of files to address them. Each file can be addressed by a path name, which is a character string recognized by the operating system.

The iNDX file system provides file protection features in the form of access rights. The owners of a file may set their access rights to their own files and separately set the WORLD's access rights (everyone else) to their files. File may thus be shared and also protected from accidental or deliberate addressing or destruction.

SINGLE-USER FOREGROUND/ BACKGROUND PROCESSING

Foreground/background processing capability allows the simultaneous execution of two jobs, resulting in improved system throughput. While a program is executing in the background, another program could be run in the foreground. For example, an interactive editor could be executing in the foreground while a compilation is taking place in the background.

A toggle key on the Series IV keyboard can be used to instantaneously move from one region to the other, allowing interactive operations in both foreground and background regions. For example, while a software debug session is taking place in the foreground, listing files can be displayed from the background.

MULTI-USER CAPABILITY

A low cost terminal can be attached to serial port 1. This terminal operates as an independent system, accessing one region, while the console and keyboard access the other region. In this mode two users will be able to perform software development tasks simultaneously at a significantly reduced cost per user.

The Human Interface

The Series IV is one of the easiest systems to learn and to use, as its human interface is designed to be friendly to both novice and expert users.

It offers eight softkeys that cut the number of keystrokes required to perform a function. On-line HELP provides instantaneous access to command definition. The menu-driven screen interface allows the user to see where he/she is at and to select the next operation. In conjunction with the soft function keys, it allows single key command invocation. The syntax builder and checker completes commands and insures proper command syntax before execution. Features such as type-ahead, auto-repeat keys, and quick view file facility are some of the many other human interface factors that improve programmer productivity.

The AEDIT Text Editor

The AEDIT text editor is one of the most poweful and easy-to-use editors available. It runs under the iNDX opeating system and offers features such as:

- Display and scroll text on the screen
- Move to any character position in the text file or to any point on the screen instantly
- Correct typing mistakes as you type
- Rewrite text by typing new characters over old ones
- Make insertions and deletions easily at any point in a file
- Find any string of characters and substitute another string, querying the operator if desired
- Move or copy sections of text within a file or to/ from another file
- Create macros to execute several commands at once, thereby simplifying repetitive editing tasks
- Edit two files simultaneously
- Indent text and delimit long lines automatically
- View lines over 80 characters long

Languages and Utilities

The Series IV supports popular high-level languages such as PL/M, Pascal, FORTRAN, and C, as well as powerful "high-level' macro assemblers such as ASM86. In addition, iRMX™ utilities such as ICU-86, PATCH utility, Files Utility, Crash analyzer and SDM 86 System Debug Monitor are supported by the Series IV.

The high-level language compilers produce code for the target processors. They also contain runtime floating-point arithmetic support for the 8087 Numeric Data Processor.

PSCOPE, the High-Level Language Debugger

The Series IV supports the PSCOPE debugger, an interactive, symbolic debugger for FORTRAN, Pascal, and PL/M programs. Operations are performed on source statements, procedure entry points, labels, and variables, as opposed to machine instructions memory addresses. PSCOPE improves productivity in the debug phase of development and produces more reliable software. It allows the user to peform extensive tests and consistency checks on the programs, and it automates much of the testing.

In-Circuit Emulators

The Series IV supports a host of ICE modules including the powerful I²ICE™ for iAPX family-based

development. These tools allow the debugging of microcomputer system hardware and software concurrently, saving considerable development cost and time.

Network Capability

The Series IV may be used as a high-performance workstation for use on the NDS-II Network Development System. It has complete access to all the network resources and facilities on the NDS-II. A stand-alone Series IV can be upgraded to an NDS-II workstation with the addition of an Ethernet Communication Board Set. The background partition of the Series IV may be made available as a network resource.

When configured as an NDS-II workstation, the Series IV can also serve as a host for up to four iMDX-580 ISIS cluster boards, providing a cost effective means for supporting incremental 8-bit software workstations on the network.

System Configurations

Series IV Systems are available in 110V, 60 Hz; 220V and 100V, 50 Hz models.

STAND-ALONE

iMDX 431
Stand-alone Intellec Development system with detachable keyboard and integral green CRT. Included in the main chassis is one 5.25″ floppy and one 5.25″ 10 MB Winchester drive.

iMDX 441 Kit
The same configuration as the iMDX 431, this model has an additional higher performance 8086 CPU.

NETWORK

iMDX 430WS Kit
A two floppy workstation that includes Ethernet NDS-II boards for network operation.

iMDX 440WS Kit
The same configuration as the iMDX 430WS, this system includes a high-performance option for resident 8086 execution and faster performance.

iMDX 430 TO 440 UPGRADE

iMDX 434
High-performance add-on option. Converts a model iMDX 430 or iMDX 431 to a model iMDX 440 or iMDX 441.

NETWORK UPGRADE

iMDX 456
Communication board set converts any Series IV stand-alone system to an NDS II workstation.

ND2TLB

The NDSII/Series IV Toolbox is a software only product that contains a valuable collection of tools developed for the NDSII and SIV user. These tools have been designed to make hybrid development system environments work together and to move fully automate the software developer's task. Many tools are provided with source to allow the engineer to customize these products to their own environment.

SECOND-USER TERMINALS

The following terminals have been tested and found to be interface-compatible with the Series IV CPIO board and can be used as second-user terminals.

    LEAR SEIGLER, Model ADM 3A
    TELEVIDEO, Model 910+

The following terminals have been successfully tested for interface-compatibility, however they do not meet Intel environmental specifications: adverse electrostatic conditions may produce unpredictable screen output, requiring terminal or system reset.

    Televideo, Model 925, 950
    Adds Viewpoint 3A+
    Qume 102
    Hazeltine 1510

PHYSICAL CHARACTERISTICS

Chassis		Keyboard	
Width	26.5″ (67.3 cm)	20.0″ (50.8 cm)	
Height	16.5″ (41.9 cm)	3.0″ (7.6 cm)	
Depth	18.5″ (47.0 cm)	8.0″ (20.3 cm)	
Weight	51 lb. (23.4 kg)	7 lb. (3.1 kg)	

ELECTRICAL CHARACTERISTICS

DC Power Supplies

Volts Supplied	Amps Supplied
+5.1 ± 1%	45.0
+12 ± 5%	3.0
−12 ± 5%	2.0
−10 ± 5%	0.5
+12 ± 5%	5.0

AC Requirements

110V, 60 Hz
220V, 50 Hz

Environmental Characteristics

Operating Temperature: 10°C to 35°C (50°F to 95°F)
Humidity: 10%–95% (non-condensing)

Equipment Supplied

Series IV System

Series II/III to Series IV link software diskettes and cable

Series IV Software
— iNDX OS
— ISIS IV OS
— AEDIT
— Macroassemblers and utilities
— ICE™ software
— Prom Programmer Software
— Debug 88
— Program Management Tools (MAKE, SVCS)
— Diagnostics

Documentation Supplied

- *Intellec Series IV Microcomputer Development System Overview,* Order Number 121752
- *Intellec Series IV Microcomputer Development System Installation and Checkout Manual,* Order Number 121757
- *Intellec Series IV Operating and Programming Guide,* Order Number 121753
- *Intellec Series IV Pocket Reference,* Order Number 121760
- *Intellec Series IVC ISIS-IV User's Guide,* Order Number 121880
- *Intellec Series IV ISIS-IV Pocket Reference,* Order Number 121890
- *AEDIT Text Editor User's Guide,* Order Number 121756
- *AEDIT Text Editor Pocket Reference,* Order Number 121767
- *DEBUG-88 User's Guide,* Order Number 121758
- *iAPX 88 Book,* Order Number 210200
- *iAPX 86, 88 User's Manual,* Order Number 210201
- *iAPX 86, 88 Family Utilities User's Guide,* Order Number 121616
- *MCS-80/85 Family User's Manual,* Order Number 121506
- *MCS-80/85 Utilities User's Guide for 8080/8085-Based Development Systems,* Order Number 121617
- *8080/8085 Floating-Point Arithmetic Library User's Manual,* Order Number 9800452
- *An Introduction to ASM86,* Order Number 121689
- *ASM86 Macro Assembler Operating Instructions for 8086-Based Systems,* Order Number 121628
- *ASM86 Language Reference Manual,* Order Number 121703
- *ASM86 Macro Assembler Pocket Reference,* Order Number 121674