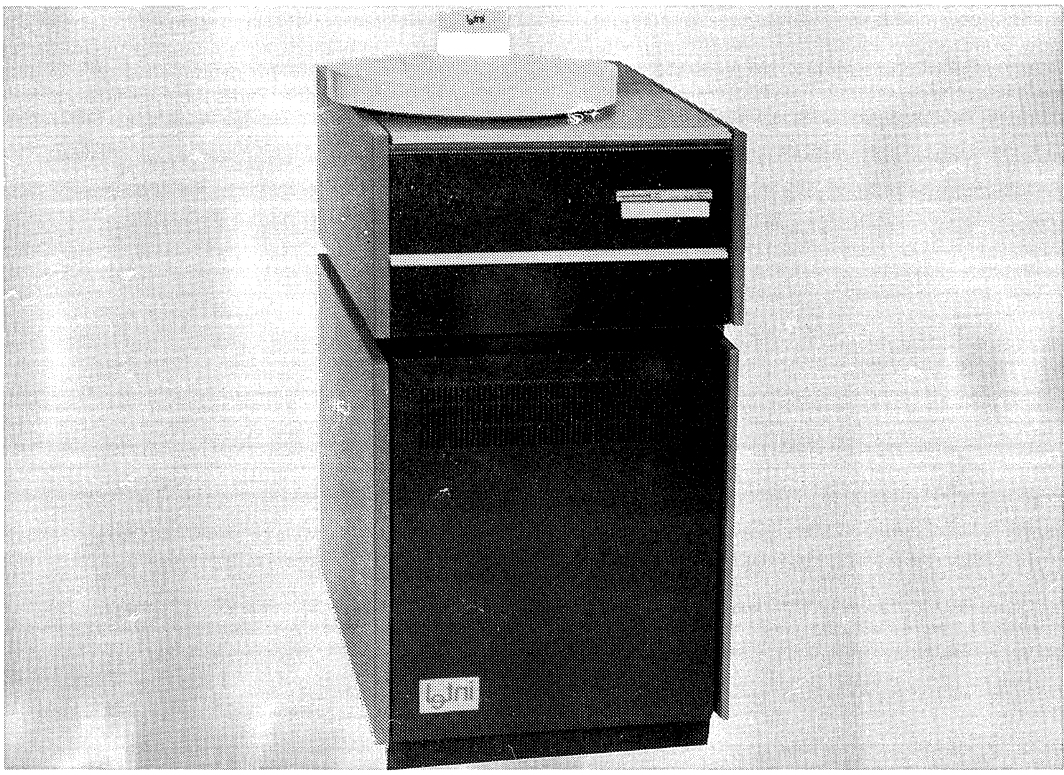# int_el ®

MODEL 740
INTELLEC® HARD DISK SUBSYSTEM

- **7.3 million bytes of on-line hard disk storage**

- **5440-type disk cartridge**

- **Enhanced development system performance**

- **Fixed and removable mass storage in one drive**

- **Separate write protect switch for each disk platter**

- **Intelligent 2-board controller**

The Intellec Model 740 Hard Disk Subsystem is a flexible, high capacity, mass storage peripheral for use with Intellec Microcomputer Development Systems. In addition to providing a large fixed and removeable storage component, the 740 can significantly improve throughput and reduce development time.

FUNCTIONAL DESCRIPTION

Hardware Components

The Intellec Hard Disk Subsystem consists of an intelligent controller and disk drive with one removeable cartridge and one fixed platter. Each provides 3.6 million bytes of storage (7.3 M total) with a data transfer rate of 2.5 MBits/second. The disk controller is implemented with Intel's powerful Series 3000 Bipolar Microcomputer Set. The controller provides an interface to the Intellec system bus, as well as the disk drive. Data is recorded in FM format on each surface (2 per platter). Each platter may be separately write protected via a front panel switch. The disk subsystem will perform six specific operations: recalibrate, seek, format track, write data, read data, and verify CRC.
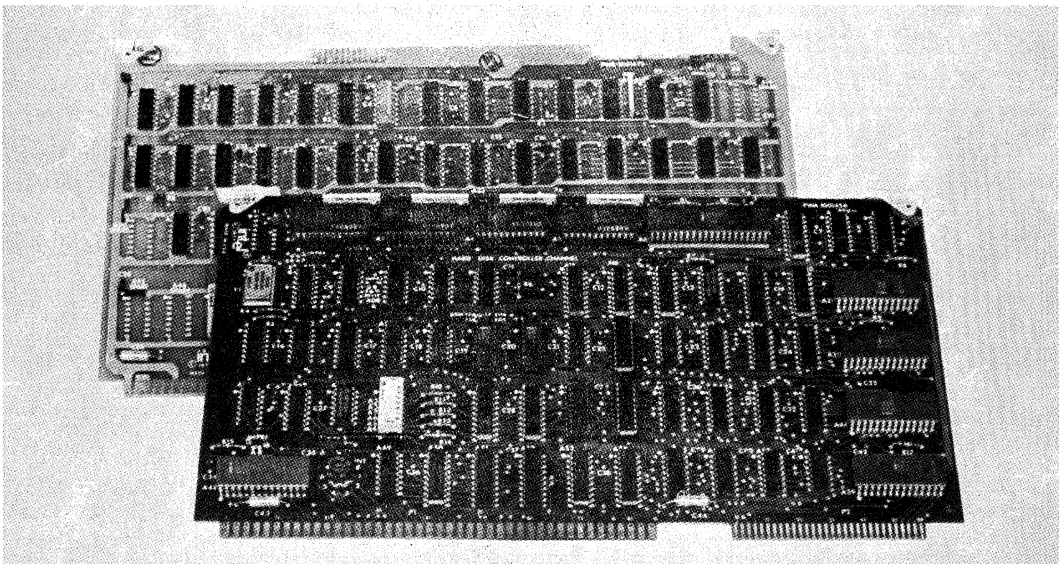
Disk Controller Boards

The disk controller consists of two boards, the channel board and the interface board. These two PC boards reside in the Intellec Series II system chassis and constitute the disk controller. The channel board receives, decodes and responds to channel commands from the processor. The interface board provides the disk controller with a means of communication with the disk drive. The interface board validates data during reads using a cyclic redundancy check (CRC) polynomial and generates CRC data during write operations. When the disk controller requires access to Intellec system memory, the channel board requests and maintains DMA master control of the system bus, and generates the appropriate memory command. The channel board also acknowledges I/O commands as required by the Intellec bus.

Channel Board

The Channel Board is the primary control module within the hard disk subsystem. The Channel Board receives, decodes and responds to channel commands from the Central Processor Unit (CPU) in the Intellec system. The Channel Board can access a block of Intellec system memory to determine the particular disk operations to be performed and fetch the parameters required for the successful completion of the specified operation.

The control functions of the Channel Board have been achieved with an 8-bit microprogrammed processor, designed with Intel's Series 3000 Bipolar Microcomputer Set. This 8-bit processor includes four 3002 Central Processing Elements (2-bit slice per CPE), a 3001 Microprogram Control Unit, and 1K x 32 bits of 3628 programmable-read-only-memory (PROM) which stores the microprogram. It

Controller Boards

is the execution of the microprogram by the micro-computer set which actually effects the control capability of the Channel Board.

When the disk controller requires access to Intellec system memory, the Channel Board requests the DMA master control of the system bus, and generates the appropriate memory command. The Channel Board also acknowledges I/O commands as required by the Intellec bus.

Interface Board

The Interface Board provides the 740 disk controller with a means of communication with the disk drives, as well as with the Intellec system bus. Under control of the microprogram being executed on the Channel Board, the Interface Board generates those signals which cause the read/write head on the selected drive to move to the proper track and verify successful operation. The Interface Board accepts the data being read off the disk, interprets synchronizing bit patterns, checks the validity of the data using a cyclic redundancy check (CRC) polynomial, and then transfers the data to the Channel Board.

During write operations, the Interface Board outputs the data and clock bits to the selected drive at the proper times, and generates the CRC characters which are then appended to the data.

Associated Software

Intel Systems Implementation Supervisor (ISIS-II) — The Hard Disk Subsystem is to be used in conjunction with the ISIS-II Operating System. ISIS-II provides total file management capabilities, file editing, library management, run-time support, and utility management.

SPECIFICATIONS

Hardware

Disk Drive
Type — 5440 top loading cartridge and one fixed platter
Tracks per Inch — 200
Mechanical Sectors per Track — 12
Recording Technique — double frequency (FM)
Tracks per Surface — 400
Density — 2,200 bits/inch
Bits per Track — 62,500
Recording Surfaces per Platter — 2

Disk System Capacity
Per Surface — 15M bits
Per Platter — 29M bits
Per Drive — 59M bits
Per Drive — 7.3M bytes (formatted)

Disk Performance
Disk Transfer Rate — 2.5M bits/sec
Disk System Access Time —
  Track to Track: 13 ms max.
  Full Stroke: 100 ms
  Rotational Speed: 2,400 rpm

Physical Characteristics
Disk Drive on Pedestal
Width — 18.5 in. (47.0 cm)
Height — 34.0 in. (86.4 cm)
Depth — 29.75 in. (75.6 cm)
Weight — 202 lb. (92 kg)

Electrical Characteristics
Chassis
  DC Power Supplies — Internal to Cabinet
  AC Power Requirements
    110 VAC; 60 Hz; 5A (max)
    220 VAC: 50 Hz; 3A (max)
Controller Boards
  5V @ 5.5A (typ), 6.5A (max)

Environmental Characteristics
Media, Drive and Chassis
Temperature:
  Operating: 16°C to 32°C
  Non-operating: −10°C to 60°C
Humidity:
  20% to 80% non-condensing
Controller Boards
Temperature:
  Operating: 0°C to 55°C
  Non-operating: −55°C to 85°C
Humidity:
  Up to 90% non-condensing

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Equipment Supplied

Hard disk drive pedestal mounted
Hard disk controller (2 boards)
Cables
Disk Cartridge
ISIS-II System Diskette
9800306 — ISIS-II System User's Guide
9800943 — Hard Disk Subsystem Operation and
Checkout Manual

Optional Equipment

MDS-746   Box of 5 blank cartridges specified for
use on Model 240/241, 740/741

ORDERING INFORMATION

Part Number	Description
MDS-740/110V	Hard disk unit with cables,
741/220V	controller, and disk cartridge