Technical Information

altair™
Floppy Disk (88-DCDD)

The 88-DCDD consists of the Disk Controller and one Disk Drive with an interconnect cable. The Disk Controller consists of 2 PC boards (over 60 ICs) that fit in the Altair chassis. The Disk Drive unit consists of a PERTEC FD-400, a power supply PC board, and a Buffer/Address/Line Driver PC board. The Disk Controller converts the serial data to and from 8-bit parallel words (one word every 32 microseconds). The Disk Controller also controls all mechanical functions of the disk as well as presenting disk status to the computer.

Software and System Features

Altair Disk Extended BASIC is an enhanced version of Altair Extended BASIC with added capabilities for saving and loading programs, and for manipulating data files on disk.

Altair Disk Extended Basic uses random and sequential files for storing information on disk.

Utility software is included with Altair Disk Extended BASIC for copying diskettes, initializing blank diskettes, listing directories, etc.

Disk bootstrap loader is available on paper tape, cassette tape, or PROM (used with 88-PMC PROM Memory Card).

Hard sectored format (non IBM compatible) allows storage of over 300,000 data bytes.

Altair Disk Extended BASIC requires a minimum of 20K of RAM memory to operate in.

PROM Disk Bootstrap loader allows loading of Altair Disk Extended BASIC in less than 10 seconds from the time power is turned on.

Hardware

A. Description and Features

The Disk Controller, which acts as the interface between the Altair and the Disk Drives, consists of 2 PC boards that fit in the Altair chassis. They require 2 slots in the Altair, contain over 60 ICs, and connect to the Disk Drives via an 18 pair flat cable. The Controller can address up to 16 drives.

The Disk Drive Unit consists of a Pertec FD-400 drive in an Optima case 5½" high, 17" wide, and 17½" deep (same width and depth as the Altair 8800). Also in the Disk unit is a power supply and a Buffer/Address card for selecting the drive and interconnecting multiple disk systems. A fan is included to maintain low ambient temperature for continuous operation. The Disk Drive units interconnect to each other in daisy chain fashion and to the controller using 18 pair flat cables and DC-37 type 37-pin rectangular connectors.

B. Hardware Specifications

Access Time:
    Track to track: 10 ms.
    Head load and settle time: 45 ms.
    Average time to read or write: 400 ms.
    Worst case: 1135 ms.

Rotational speed: 360 RPM (166.7 ms/rev)

Tracks: 77 per disk

Sectoring: Hard sectored, 32 sectors per track, 5.2 ms/sector (non IBM compatible)

Data Transfer Rate: 250,000 bits/sec. (one 8-bit byte every 32 microseconds)

Maximum number of drives per system: 16

Data storage capacity: 310,000 bytes per disk

Data bytes per sector: 128

Data bytes per track: 4,096

Disk Drive head life: over 10,000 hours of diskette to head contact

Disk Drive MTBF: exceeds 4,000 hours

Disk Drive data reliability: not more than 1 in 10^9 soft (recoverable errors, 1 in 10^{12} hard (non-recoverable errors

Power:
    Controller: 1.1 amps at + 8V unregulated (from Altair bus)
    Disk Drive Unit: 110 watts 50/60 Hz 117/220 VAC

Diskette: Hard sectored, 32 sectors + index hole (Dysan #101, ITC #FD 32-100)

Disk Drive Unit Weight: 40 pounds

C. Operating Principle

The Disk Controller cards provide the interface between the Disk Drive Unit and the Altair bus. Serial read data from the disk is converted into 8-bit parallel form by the controller for transfer to memory via the CPU. Data is written on the disk by converting the 8-bit bytes outputted from the Altair CPU to serial form. All read and write data is transferred one byte at a time through the CPU.

Disk Controller Board #1 controls I/O address selection, sector counting, read data, and disk status. Disk Controller Board #2 controls disk drive addressing, write data, and disk drive functions.

Ordering information:

1. 88-DCDD

    Includes:
        Set of controller cards
        1 Disk Drive Unit
        1 interconnect cable—6 ft. long
        1 Assembly and Operators Manual
        1 Disk Extended BASIC Manual
        1 Blank Diskette

2. 88-DISC

    Includes:
        1 Disk Drive Unit (117 VAC unless otherwise requested)
        1 Interconnect cable—6 ft. long
        1 Blank Diskette

3. Altair Disk Extended BASIC
    Requires a minimum 20K of memory for operation.
    Includes:
        Altair Disk Extended BASIC on diskette
        Altair Disk Extended BASIC Manual
        Paper tape or cassette magnetic tape bootstrap loader (specify when ordering)

4. Disk Bootstrap Loader on PROM:
    Order 88-PMC (PROM Memory Card) and DBL PROM (PROM programmed with disk bootstrap loader routine)

5. Manuals only:
    Disk Hardware Manual
    Altair Disk Extended BASIC Manual