Burroughs

OEM Products

FD 210 Fixed Disk Drives

General Description

The Burroughs Fixed Disk Drives are random access storage devices that use non-removable disks as the storage medium. Designed for the original equipment manufacturer, the FD 210 Series provides up to 80 million bytes of on-line storage in a compact, lightweight package.

The FD 210 Fixed Disk Series currently consists of two models: the FD 211 (20MB), and the FD 214 (80 MB).

Advanced Microprocessor Controller

Included in both models of the FD 210 Series is an Advanced Microprocessor Controller (AMC).

In addition to controlling the basic positioner and data channel functions the AMC also performs functions normally required of the host system. Among the functions provided by the AMC are the following:

- CRC Generation
- Error Detect, Retry and Correct
- Dual Sector Buffering
- Sector Relocation
- File Search using Host Supplied Parameters
- Error Logging and Analysis
- Confidence/Diagnostic Tests

Drive Module

The drive module is a sealed unit containing one or four disks mounted on a common spindle. A rotary positioner moves two flying heads across each surface to access the data tracks. At certain locations on each surface are servo tracks that are used by the AMC to correct for alignment variations due to environmental changes.

Applications

Interface and Compatibility

The standard FD 210 interface is a simple parallel data and control bus that permits rapid integration with a host system.

The FD 210 Series is interface compatible with the Burroughs MD122 Mini Disk Drive. The MD122 provides up to 3 million bytes of storage on a single, removable flexible disk and up to 6 MB per drive.

The MD122 also contains the Advanced Microprocessor Controller so that FD 210 drives and MD122 drives may be mixed on the same host system controller.

Standard Features

Software Simplicity

Due to the intelligence of the AMC, host system software to control the device is greatly simplified. Upon power-on of the FD 210; the AMC determines and reports to the host system how much storage capacity is available (20 or 80 MB, or in the case of the MD122 – 3 or 6 MB). This capability allows mixing, replacing or upgrading the disk subsystem without software change.

Options

- RETMA Rack Mount.
- Free-Standing Cabinet and Power Supply.

Specifications

Formatted Data

	FD 211	FD 214
Number of disks	1	4
Tracks per cylinder	4	16
Sectors per track	58	58
Bytes per sector	256	256
Bytes per cylinder	59,392	237,568
Cylinders per drive	336	336
Bytes per drive	19,955,712	79,822,848

Performance

Access time (ms) (including settling)		
Average	45	45
Maximum	85	85
Track-to-track	8	8

Latency (ms)

Average	10	10
Maximum	20	20

Transfer rate

(m bits/sec)	7.1	7.1

Recording Density

Tracks per inch	300	300
Bits per inch	5,500	5,500
Areal density (BPI^2)	1.65M	1.65M

Electrical Requirements

Power consumption running	295W	310W

Supply voltage: +5V, +12V, –12V.
Current, idle: 6A, 0.5A, 1.4A.
Current, maximum:9A, 4.5A, 4.5A.

Environmental

Operating temperature: 10°C to 40°C
Relative humidity: 10% to 85%
Maximum wet bulb temperature: 26°C
Non-operating temperature: –40°C to 60°C
Relative humidity, non-condensing: 5% to 90%

Physical Characteristics

(without optional cabinet)

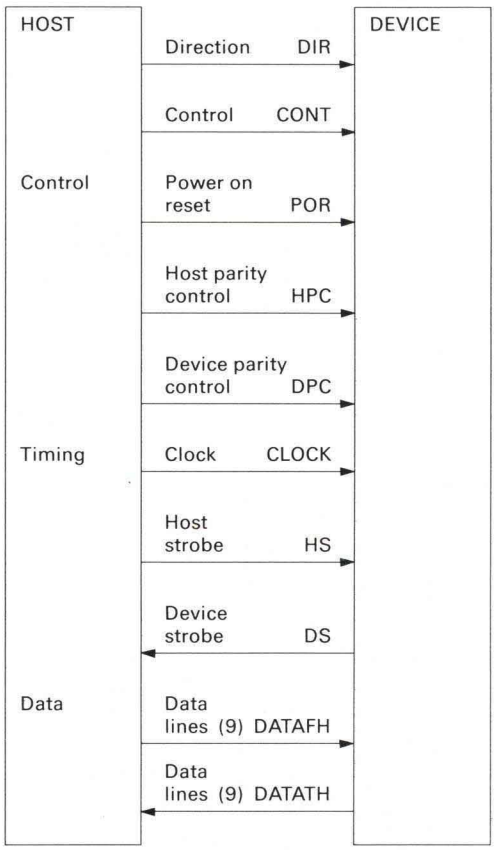
Length (in/mm)	30.0/762
Width (in/mm)	19.0/483
Height (in/mm)	10.5/266

Reliability

Preventive maintenance	None
MTBF	
Sealed module (two starts per day)	18,000 hrs AOT
Other components	4,000 hrs AOT
MTTR	
Board replacement	0.75 hrs
Component replacement	1.50 hrs
Service life	7 years or 35,000 hrs AOT
Irrecoverable error rate, maximum	one in 10^{12} bits

The card cage containing the controller must receive a continuous air flow of 70 C.F.M. minimum with an air inlet temperature of 40° max.

Interface



Transfer Format

All transfers are formatted similarly in both directions: 9-bit parallel, character serial. Data integrity is supported by an odd vertical parity check (VPC) with each data byte and an even longitudinal parity check (LPC) with each transfer sequence. The LPC byte terminating a sequence has an odd VPC bit.

Logic Signals

Direction (DIR) and Control (CON): these establish the four transfer modes as follows:

DIR	CONT	MODE	Transfer Description	BUS Used
0	0	Status	Status	DATATH
1	0	Command	Commands	DATAFH
0	1	Host Receive	Data	DATATH
1	1	Host send	Data	DATAFH

Host Strobe (HS) and Device Strobe (DS): depending on mode, these signal the host or device to read a data bus or acknowledge that a data bus has been read. See table below.

Host Parity Control (HPC) and Device Parity Control (DPC): used by a sending unit to indicate that the current byte is an LPC byte. Used by a receiving unit to indicate parity errors, both VPC and LPC. See table below.

Signal Indication

Command and Host Send Modes	
HS	DeviceshouldreadDATAFH
DS	Device has read DATAFH
HPC	LPC byte now on DATAFH
DPC	Parity error on DATAFH

Host Receive and Status Modes	
DS	Host should read DATATH
HS	Host has read DATATH
DPC	LPC byte now on DATATH
HPC	Parity error on DATATH

Data bus (DATAFH): a 9-line bus consisting of 8 data line and one parity bit line. DATAFH 7 is the most significant bit. Transfer is from host.

Data bus (DATATH): same as DATAFH except transfer is to host.

CLOCK: a self-starting, free-running, 1 MHz clock generated by the host. Used by device to trigger all changes on the interface.

Power On Reset (POR): generated by the host upon power-up or programmatically after. It causes the device controller to reset itself and connected drives. POR overrides any on-going commands in the device.

Commands

Format: a command consists of a variable number of bytes depending on the particular command. The first byte consists of two hexadecimal digits and is the "op code" for that command. Subsequent bytes express parameters (e.g., drive, sector address, number of bytes, etc.)

Command Set: these are listed in three groups below according to whether a seek and data transfer are both involved, a data transfer only, or neither.

Group 1

Read
Read Statistics
Read Location Map
Write

Group 2

Search
Read Search Result
Read Device Attribute Record
Read Status
Host Receive Maintenance Test Routine
Host Send Maintenance Test Routine

Group 3

Abort Device Controller
Abort Drive
Reset
Set Write Protect
Reset Write Protect
Unlock Door
Lock Door
Interlace

Status Format

The device reports its status condition by the transfer of one or more bytes to the host. Set bits have the significance shown:

Bit	Byte 1
0	Drive address, bit 0
1	Drive address, bit 1
2	Drive address, bit 2 (most significant)
3	Transfer delay
4	N sectors before read
5	N sectors before write
6	Operation complete
7	Interrupt

	Byte 2
0	Error
1	Search unsuccessful
2	Corrected
3	Command not accepted
4	Command error
5	Address error/end of drive
6	Mandatory interrupt to host
7	Address not found

	Byte 3
0	Not ready – Class 2
1	Disk expiring – Class 2
2	Write protected
3	New disk
4	Danger – Class 2
5	Confidence test completed
6	Temporarily not avail. Class 2
7	Unassigned

Note: Class 2 indicates a status of a "steady state" nature.

Electrical Interface

Supply voltage: +5V +/–10%

Common mode voltage: absolute value between host and device grounds must be less than 5V.

Line drivers/receivers: differential, RS422 compatible, types MC3487-Burroughs 2767 4498 and MC3486-Burroughs 2767 4506, or equivalents.

Line termination: 88.7 ohms ±2%

Cable: balanced twisted pair, characteristic impedance 87 ohms ±5%, max. cable length 25 ft. (7.6m).

For further information, reference this bulletin number and write to Burroughs OEM Marketing, Burroughs Place, Detroit, MI. 48232; or call one of our special sales/application numbers (313) 972-8031 in Detroit or (714) 835-7335 in California. For overseas inquiries, write Burroughs OEM Marketing, Langwood House, High Street, Rickmansworth, Herts., England. Tel. (44) 9237-70545.

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