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Author : Uffe Larsen.

DCA 701 Reference Manual.

Keywords: Disk cartridge controller, Disk cartridge drive, Disk cartridge adapter, DCC 701, DCA 701, DCD 701.

Abstract : This paper describe the function of Disk cartridge adapter and Disk cartridge drive.

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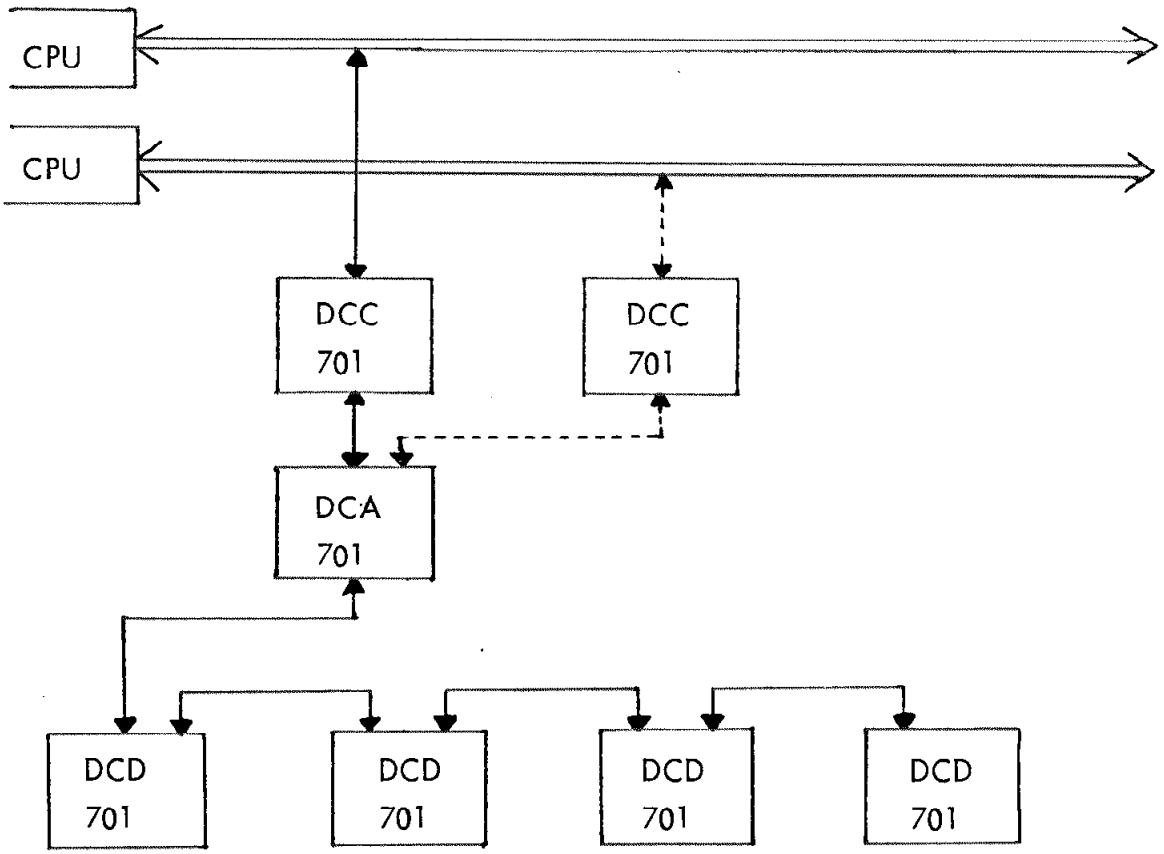
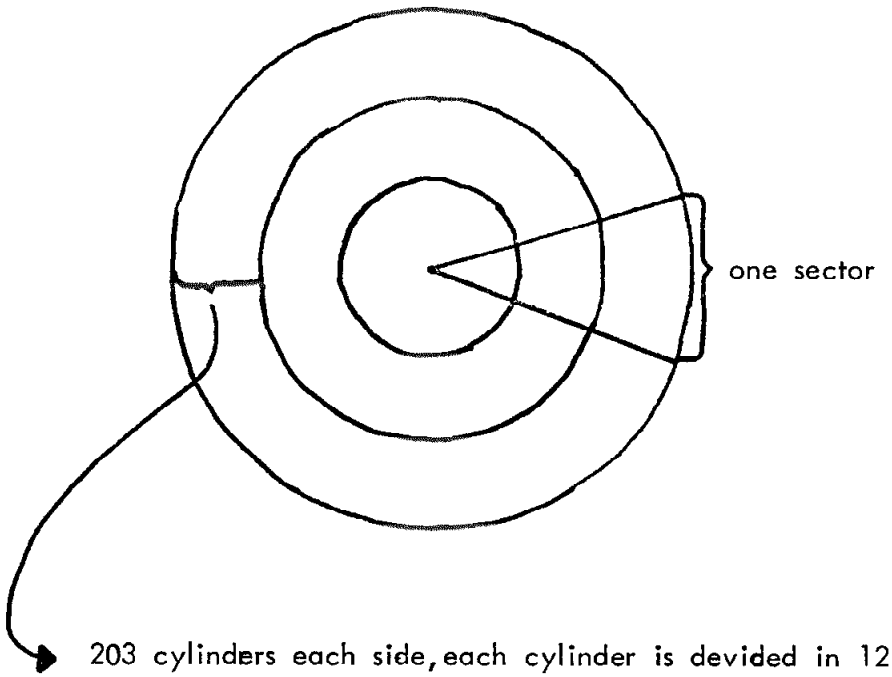
Main description.

The disk cartridge drive (DCD 701) is connected to the RC 7000 bus via the disk cartridge adapter (DCA 701) and disk cartridge controller (DCC 701). The DCD 701 is a single disk high speed data storage medium which can receive and transmit data under RC 7000 program control. It is possible to have up to 4 DCD 701 connected to the disk data channel, but only one disk can be treated at a time.



The DCD 701 consist of a drive mechanisme and read/write heads with their associated electronic's which handle and control data, speed and timing. The data transfer rate is 781K bit pr. sec. in the standard density model and 1562K bit pr. sec. in the high density model. The max. storage capacity is 12 million bit in standard and 24 million bit in high density model. (6 and 12 million each side). The storage medium is a single disk magnetic cartridge with a diameter at 15 inch's and a track density at 100 tracks pr. inch.

DATA format's:



203 cylinders each side, each cylinder is devided in 12 sector's.

	standard density	high density
bit pr. cylider	60000	120000
bit pr. sector	2500	5000
bit pr. inch. innermost track	1100	2200

Data access time:

Disk rotation	1500rpm (+- 1%)
Average latency	20 msec. (half rotation)

Head positioning:

Adjacent tracks	15 msec.
Average	70 msec.
200 Track movement	135 msec.

DATA record format:

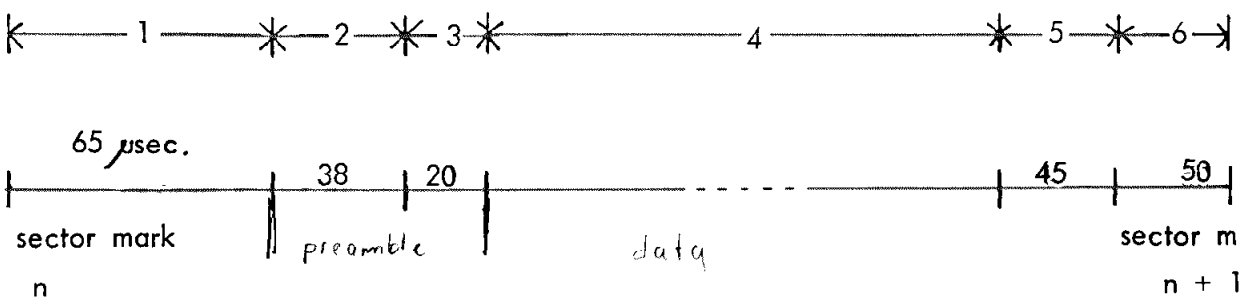
Write operation.

1. Detection of the sector mark indicating the beginning of the desired sector to be written.
2. Wait 65 μsec, then enable write gate and erase gate, thereby turning on current in the write and tunnel erase heads.
3. Commence writing of the preamble, a continuous stream of zeroes followed by a single one, for 58 μsec. The next recorded bit will be the first bit of the data records.
4. Write the data record, comprising no more than the computed maximum number of data bits, including check character. (For a 12 sector disk it is 2500 bit).
5. After writing the last bit of the data record, continue writing zeroes until 65 μsec after the next sector mark. At that time turn off the write gate, erase gate, and stream of zeroes.
6. Note: The entire surface of the disk that will be read must be recorded.

Read operation.

1. Detecting of sector mark indicating the beginning of the desired sector to be read.
2. Wait 101 μsec, then enable readgate, thereby reading the zeroes from the preamble and synchronizing the separation circuits.
3. If at least 6 μsec of zeroes followed by single one bit is detected, then the preamble has been properly read and the next bit is the first data record bit.
4. Disable read gate after reading the last bit of the data record.

A key to computation a data record.



1. Erase and write coil location.
2. Preamble, zeroes followed by one include alignment of sector transducer.
3. Sector jitter.
4. Sector location.
5. 1% allowed speed variation.

Nominal time pr. revolution 40 msec
Nominal time pr. sector 3,333 msec
Minimum time pr. sector for a 12 sector disk.

$$\frac{40000 \times 0,99}{12} - 168 = 3132\ \mu sec$$

The bit rate is 1440K bit pr. second 0,7 μsec/bit
Total number of data bit within a sector is

$$\frac{3132}{0,7} = 4470 \text{ bit.}$$

or 278 words of 16 bit.

Hardware description:

DCA 701 perform the interface between the DCC 701 disk cartridge controller and DCD 701 disk cartridge drive.
The DCA 701 input/output signals are multiplexed which make it possible to have two DCC 701 disk cartridge controllers on a DCA 701.
The clock is 11,5Mhz and with its associated circuit used for writing purpose DCA 701 also contain register's for unit,function command and cylinder address.
The preamble and postample in read and writing a sector require a lot of timing and synchronizing circuit. The last word written in a sector is a checkword. The combination of zero and ones in the checkword is dependent of the zero/ones information in the same sector. When read again, the checkword written should be equal with the checkword read.
Interface signal's (and main timing drawings) to/from DCD 701 and to/from DCC 701 are listed in the technical manual.

Applicable Documents

1. Drawings for DCA 701.
2. Drawings for DCD 701.
3. DCC 701 reference manual.
4. Technical manual for exchange able disc drive, series 30.