CONTROL DATA® 852/853/854 DISK STORAGE DRIVES

your move to better man / machine communications

your move to speed and storage

CONTROL DATA 852, 853 and 854 Disk Storage Drives combine the desirable features of magnetic tape and magnetic disk recording: – unlimited shelf storage and fast random access. This is made possible by CONTROL DATA Model 850 disk packs which are fully enclosed for protection against dust and damage during both storage and recording. Pick a pack, new or recorded. Insert it on-line in an 852, 853, or 854 drive. Record or update on it. Then store it indefinitely like a magnetic tape reel. Your data recorded on any 852, 853 or 854 is readily available for reading on any Drive unit with the same model number. And when it's the 852 that is used, there's also compatability with any IBM Model 1311 Disk Storage Drive.

The 852, 853 and 854 all have direct seek capabilities: – the last address used is retained by the Disk Storage Drive and made available to the controller to determine the distance and direction of the next head movement. Then the speed with which the heads are moved is made proportional to the number of tracks that must be traversed to reach the new location. All this provides considerably faster access times than the older return-to-home method.

In addition, seek-overlap, a standard feature on all these models, permits any or all idle drive units in a computer system to be seeking new addresses while one unit is reading or writing. And as a final time-saving feature, the 853 and 854 provide latency-overlap which enables the controller to select the first drive unit on which a desired sector address will be available.

OPERATING PARTICULARS

DATA ACCESS TIME – An electronic, proportional control head actuator provides maximum access times of 165 milliseconds for each of the disk storage drives. Head movement speed is proportional to the distance the head must travel. Track-to-track access time, which is important in sequential processing operations, is 30 milliseconds. The disk rotation time (maximum latency time) for the 852 is 40 milliseconds. Maximum latency time for the 853 and 854 is 25 milliseconds.

STORAGE CAPACITY – Total capacity for the 852 Disk Storage Drive is 2,000,000 7-bit characters when used in the sector mode and 2,980,000 characters in the full-track mode. The 853 capacity is 4,096,000 6-bit characters, and the 854 capacity is 8,192,000 6-bit characters (sector mode only). This large on-line storage capacity is complemented by quickly replaceable disk packs which provide for unlimited shelf storage.

DATA TRANSFER RATE – The 852 has a transfer rate of 77,730 characters per second. The 853 and 854 Disk Storage Drives have a transfer rate of 208,333 characters per second.

RECORDING DENSITY – Accurately machined disk surfaces, precisely applied magnetic oxide coating, extremely close repositioning tolerances, and minimum spindle bearing run-out, combined with external and internal vibration isolation, allow high bit-packing densities without compromising the interchangeability of disk packs. Recording density for the 852 is 684 bpi (outer track) and 988 bpi (inner track). The density for the 853 and 854 is 765 bpi (outer track) and 1105 bpi (inner track).

RECORDING METHOD – The 852 Disk Storage Drive employs a non-return-to-zero (NRZI) recording format and is compatible with the IBM Model 1311 Disk Storage Drive. The recording method for the 853 and 854 is double frequency recording.

DESIGN FEATURES

DISK PACKS – The Model 850 Disk Packs used with 852, 853 and 854 Storage Drives are removable, light, compact units which can be easily and quickly interchanged by an operator. Each Pack contains six aluminum disks mounted on a common spindle and provides ten storage surfaces. (The uppermost and lowermost disk surfaces are not used for storage.)

All Model 850 Packs are mechanically useable on any 852, 853 and 854 unit and also on 1311's. Once magnetized, a pack can be read on any unit with the same model number as that on which it was recorded. And packs recorded on a CDC 852 or an IBM 1311 are not only mechanically but magnetically interchangeable as well.

READ/WRITE HEADS – The CONTROL DATA 852, 853, and 854 Disk Storage Drives employ 10 single-channel flying heads, one on the end of each actuator arm. The heads are mounted in pairs, one facing up and the other facing down – adjacent heads read or record on corresponding upper and lower disk surfaces.

The spring-loaded heads are gimbal mounted, with the bearing riding in a vee slot. This arrangement precludes the necessity for periodic adjustment and allows the heads to fly at a constant distance from the disk. The gimbal mounting also compensates for any variance in the disk surface or any run-out in the spindle bearing. The heads fly at 100 microinches (inner track)

and 125 microinches (outer track). All heads retract on loss of power so that the surface of the disks are not damaged.

DISK DRIVE – The disk pack is driven by a precision spindle with a total shaft runout of less than 0.00015 inch. The shaft runout is kept extremely small to eliminate repositioning errors when interchanging disk packs. A flat belt drive is used between the pack drive motor and the spindle to provide for a smooth transfer of power with a minimum of velocity fluctuations. This smooth transfer is essential for a constant data rate – also a requirement for interchangeability of packs.

An electromagnetic brake is attached to the lower end of the spindle shaft. This brake is used to provide a back torque when the operator locks a new pack on the spindle and is disengaged when the pack is rotating. When power is removed from the pack drive motor, the brake is engaged and the disk pack is brought to a stop.

A sector disk, mounted in the bottom of the disk pack, is used to monitor disk rotational speed. Notches cut into the periphery of the disk (one for each sector) interrupt a photocell circuit at a rate proportional to the rotational speed of the disk pack. When disk speeds fall below a predetermined level, the heads are retracted and the spindle is braked to a stop.

ACCESS MECHANISM – The access mechanism consists of ten arms with a read/write head mounted on the end of each arm. The heads are mounted in pairs so that one head reads or writes on the bottom of one disk and the other head reads or writes on the top of the adjacent disk. All arms move simultaneously in a horizontal linear direction.

The small mass of the access mechanism allows rapid movement of the arms and heads. Maximum access time with the standard direct seek capability is 165 milliseconds. The actuator is driven by a printed circuit motor which has a printed rotor for minimum inertia, and a fixed-magnet stator. An electronic access mechanism was chosen in favor of an hydraulic actuator to reduce maintenance requirements and provide lower cost.

The actuator is a proportional type – the motor is driven at a speed proportionate to the number of tracks that must be traversed to reach the new disk location. Positioning is accomplished by an open-loop servo system. The track positions are counted photoelectrically and the final positioning of the head over the desired track is accomplished mechanically by a detent gear. This allows extremely accurate repositioning to within .002 inch – a necessary requirement for interchangeability of disk packs between storage drive units.

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CONTROL DATA
CORPORATION

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