

IBM 3380 Direct Access Storage



The IBM 3380 Direct Access Storage offers increased capacity, improved access time and data transfer rate, and reduced storage costs to users of larger data processing systems. It features higher data densities, a number of engineering enhancements, and the proven stability of fixed media. It includes many facilities designed to give new levels of reliability, availability, and serviceability, crucial to today's online business environment.

The low cost per megabyte of storage allows the IBM 3380 to provide a new and more economical growth path. Migration programs are available to assist in transferring data from existing DASD. Data currently on magnetic tape can now also be placed economically online.

An interesting aspect of using the IBM 3380 to provide additional storage capacity is the saving in floor space. Compared with existing DASD, such as the IBM 3350, the floor space occupied per megabyte is considerably less. This allows more capacity to be installed in the existing space, and can mean better consolidation of the DASD subsystem, with greater flexibility in configuring large DASD installations. Other potential user benefits stem from its reduced power consumption and heat output.

Its high data transfer rate of 3 megabytes per second is especially significant in current online environments, where data sets can have typically block sizes of 4K or more. The data path will be busy for much less time for a given amount of data transferred.

Further system performance gains can be realised with the IBM 3380 when it is used in a Total Storage Management environment. This environment is created by selecting the best storage product mix (DASD, magnetic tape, and mass storage subsystems) and best storage programs to achieve the most effective storage configuration. To further support this approach, several new and improved hardware

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and software offerings are made available: new models of the MSS, providing new price/performance enhancements; increased function in the Hierarchical Storage Manager Program Product, including magnetic tape support; performance improvements in OS/VS SORT/MERGE and three new Program Products

(Data Facility/Device Support, Data Facility/Extended Function, and Data Facility/Data Set Services).

In addition, significant enhancements have been made to planning tools to better aid in evaluating storage needs.

Models

Four models of the IBM 3380 are available.

Each model has a capacity of 2520 MB (or 2.52 gigabytes), using count key data format. There are two sealed head, disk, and actuator assemblies of 1260 MB each per unit, each with two actuators accessing 630 MB each.



Option \ Model	AA4	AAF	B4	B4F
Fixed Head	no	yes	no	yes
Dynamic Path Selection	yes	yes	given by A model	

A 3380 string consists of one A model, which connects to an IBM 3880 for system attachment, and up to three B models, giving sixteen separately addressable actuators and a maximum total capacity of approximately 10080 MB.

Model changes between units in each model range are field installable.

Model changes between A and B units cannot be made in the field, and must be specified prior to time of manufacture.

Connection to the IBM 3880

The IBM 3880 Storage Control is designed to attach various types of DASD to processor channels. It consists essentially of two separate control paths (storage directors), which can transfer data simultaneously to and from two different actuators. Up to 32 actuators can be connected to each director.

3380 A models attach to IBM 3880 Model 2 or 3. Model 2 allows attachment of the IBM

3380 to storage director 1, and IBM 3330/3350, 3340/44, 3375, or 3370 (on IBM 4341 only) strings to director 2. Model 3 allows attachment of the IBM 3380 to both directors.

A maximum of two A units channels can be attached per director.

Highlights

New levels of Reliability, Availability, and Serviceability

In today's data processing environment, DASD has become a key resource. Recent studies have shown that since 1971, large systems users have increased their DASD capacity at an annual compounded growth rate of over 40 percent. As the use of online systems has expanded, the need to provide high levels of service has become more necessary. End users expect to access information quickly, whenever required.

Reliability for the IBM 3380 stems from its design and the use of advanced technologies. It uses the film head technology introduced with the IBM 3370 DASD and new logic design.

Advanced manufacturing processes, with computer-assisted quality control at every major stage, reinforce the extensive product testing carried out during the development period.

These design features and manufacturing techniques help to minimise the situations when a subsystem failure could deny data access to a user. But here, too, the IBM 3380 incorporates functions designed to allow continued operation, despite the occurrence of intermittent errors.

Among the principal **availability** features are:

- Command retry, which permits the retry of a failing function. It is used for recovery from:
 - . correctable errors
 - . defective/alternative track problems
 - . command and data overruns
 - . synchronisation errorsand for:
 - . disconnecting a channel during format write padding.
 - . initialising defective head information for those models incorporating fixed heads.
- Error correction code, which allows detection and correction of potential errors when data is read from the disk. The code is capable of correcting any single burst error involving three successive bytes and errors involving four successive bytes, provided that they are contained within two consecutive halfwords.
- A directory that contains skip displacement information for the head/disk address is recorded on a special cylinder. This information can be retrieved by an IBM customer engineer in the event of a home address being inadvertently destroyed.
- Dynamic path selection and channel switching capability of the IBM 3880. (Potential availability benefits are described under separate headings that follow.)

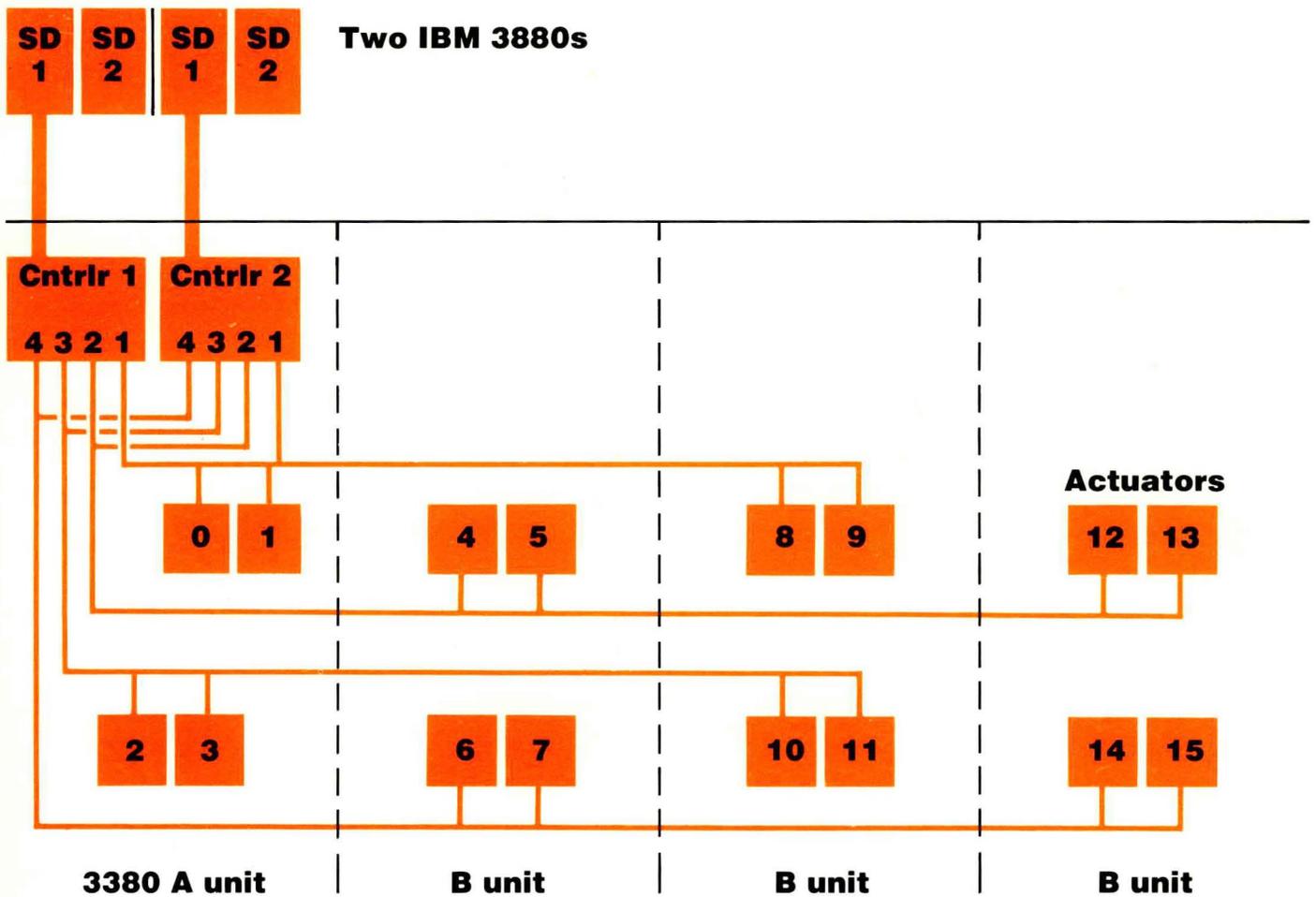
Serviceability of the IBM 3380 is characterised by aids designed to allow quick identification of failure cause with minimal disruption to normal system operation. For example, a customer engineer can diagnose and carry out repair actions on logic and components associated with an actuator without affecting the activity and the other actuators within the unit. In certain instances, a “quick fix” can be made by swapping internal cables that relate logic to a particular actuator. Among the more important serviceability items are:

- Hardware error indicators saved as sense bytes that describe the error and give the Fault Symptom Code. This code identifies the type of failure and the group of replaceable units that probably contains the failing component.
- 3380 error data recorded in SYS1.LOGREC contains information that uniquely defines the total path and components in the operation that failed. It is designed to:
 - . remove the need for “card swapping” in multi-processor configurations

- . positively identify the failing unit (no address duplication)
- . reduce the masking of path faults
- . remove the impact of configuration changes during the day on EREP reports.
- Maintenance Device, which consists of a microprocessor with 64K storage, a diskette reader, and hand-held keyboard and display. Through maintenance routines on diskette and diagnostic capabilities within the 3380, the customer engineer can be led through procedures that result in the display of the most likely cause of failure.

Dynamic Path Selection

Dynamic path selection introduces new double controller architecture that should improve the availability of data for 3380 users. As shown in the Figure, each controller can access each of the sixteen actuators.



SD: Storage Director

Dynamic path selection, unlike string switching (in which only one path at a time can be used), allows both paths to be used simultaneously to address separate actuators on different internal paths. Thus, two data or command transfers can occur at the same time. In addition, if one controller fails, all the 3380 data remains available via the second controller.

Channel Switching

The IBM 3380 by providing multiple data paths and expanded channel switching plays a very important role in improving data availability.

When used to connect the 3380 and/or 333X/3350 DASD, a new channel switch feature extends the maximum switching capability of the 3380 to eight channels per director. This feature is used in conjunction with the Two Channel Switch Pair and Two Channel Switch Pair, Additional features. The channels can be kept unique to each director or can be interconnected – a choice that offers a very wide range of configurations.

When combined with the dynamic path selection function of the 3380, users have the means for assuring data availability in the event of failure in any one of three levels: 3380 controller, 3380, and processor channel.

Software Support

The IBM 3380 is supported under MVS, VM/370, and ACP/TPF (for data streaming mode only).

MVS support is provided through MVS/System Product and Data Facility/Device Support Program Products. The 3380 is a new, unique device type in MVS systems, and a separate I/O generation should be planned for installation in an existing system.

VM/370 support is given by its System Product.

Data Facility/Device Support

This new Program Product provides two major functions: new indexed VTOC and the basic device support for the IBM 3380 and current DASD. The new indexed VTOC structure offers the potential for reduced channel utilisation and improved performance.

Data Facility/Extended Function

This new Program Product is a completely restructured VSAM catalogue designed to replace existing VSAM and OS catalogues in an MVS system. It offers major performance improvements, greatly simplified back-up and recovery procedures, and improvements in catalogue reliability and integrity.

Access Method Services utilities have been enhanced to provide new capabilities to move, merge, split, and migrate catalogues, as well as to diagnose and repair catalogue problems.

Data Facility/Data Set Services

This new dump/restore Program Product provides new and enhanced function over the current DRWDASDR. The various selectivity options are designed to simplify the efforts required to maintain back-up copies, reduce the amount of data transferred and channel and device activity, and provide these functions with a performance improvement.

It also provides the capability to move data sets between like direct access devices, and reduce fragmentation by reorganising volumes to combine free space.

OS/VS SORT/MERGE

The OS/VS SORT/MERGE Program Product takes advantage of the high-performance characteristics of the 3380 for input, output, and intermediate work file handling. Interfaces with applications coded in COBOL and PL/1 are simplified.

Hierarchical Storage Manager

Release 3 of the HSM Program Product now allows magnetic tape to be used with DASD for back-up and recovery. Release 3 also provides multi-tasking of up to 15 concurrent volume back-up tasks.

The benefits of HSM, therefore, become available to DASD installations, providing

automated operational procedures (such as back up and recovery, moving data between DASDs, migration and recall), as well as new functions with better performance.

HSM should become an integral part of every MVS installation for operating large multi-device type DASD subsystems.

Device Support Facilities

This utility is extended to support the IBM 3380. It provides functions for the initialisation, surface and hardware analysis, and maintenance of DASD. It can be used to create a VTOC, with or without an index, when a volume is initialised.

DASD Migration Aid

This new Program Product can be used to collect information about current disk data sets, calculate their space requirements on the new disk device, identify data sets that may be candidates for reblocking, and generate customised JCL and utility statements to place the data sets on the new device. It is a migration aid that can facilitate the transfer of data sets from current DASD to the 3380.

IBM 3380 Summary

Performance Characteristics

Average seek time 16 ms
Average latency 8.3 ms
Data transfer rate 3 MB/second

Storage Capacity

Per actuator 630.2 MB
Per head/disk assembly 1260.4 MB
Per unit 2520 MB
Per string of 4 units 10080 MB

Fixed Head Capacity

Per unit 5.6 MB
Per address 1.4 MB
The fixed head capacity replaces an equal amount of movable head capacity.

Head/Disk Assembly

Heads, disks, and actuators are placed within a sealed enclosure. There are two independent, movable actuators within each head/disk assembly. Each 3380 model contains two head/disk assemblies.

System Connection

The IBM 3380 connects to 3 MB/second data streaming channels on the IBM 303X Processors via IBM 3880 Model 2 or 3. The 3MB/second data streaming channel is an optional feature, which converts the first two 1.5 MB/second block multiplexer channels. Up to two 3380 controllers can be attached to each storage director of the IBM 3880.

Alternatively, a new speed matching buffer for the 3880 gives the opportunity to attach the 3380 to 1.5 MB channels, for example, on System/370 models 158 and 168.

Models Available

Models available consist basically of A units, with controllers and power supplies, and B units, without controllers and power supplies, to allow string building. (See Table given earlier for details.)



The IBM 3380 Direct Access Storage can offer you potential performance gains, with a new level of price/capacity plus additional opportunity to install more storage in your existing space and achieve savings in power consumption. The IBM 3380 can, therefore, now make the holding of more computer data online a practical proposition. But above all, when allied with the new models of MSS and new and enhanced program products, you can have the means to implement a Total Storage Management plan.

For more information on how you can best meet your organisation's total storage requirements today and in the future, please call your IBM representative.

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