

MDFS

The Most

Advanced

File Server

for Econet[®]

SJresearch

THE MODULAR DISC FILE SERVER

SJ Research specialises in Econet® equipment for educational use. We produce the most advanced file servers offering many advanced features not found in other systems. The software has been refined with the help of our users to achieve the best networking system for teaching and research.

They are fully compatible with standard Econet® to ensure the widest range of software available for your network.



The MDFS is a self-contained modular-disc file server and printer server. The system is capable of supporting a very large network with hard discs and tape backup, but offers a low entry level cost using floppy discs.

ADVANCED HARDWARE

- Uses ordinary 80-track double sided disc drives
- Supports hard disc drives
- Fast backup using a 35 Megabyte tape drive
- 256 Kilobytes of RAM gives high performance
- Large cache RAM speeds up disc accesses
- Releases BBC micros from file serving and printer serving

POWERFUL SOFTWARE

- Compatible with level 2 and level 3 file server protocols
- Space accounting and access control
- Time and date stamping of information
- Extended error messages

EASY MANAGEMENT

- Large range of utilities
- Comprehensive and flexible System Management functions
- Free half day training course

THE SYSTEM

FLEXIBILITY

The MDFS has been designed to be as flexible as possible. The file server automatically configures itself to whatever combination of floppy or hard drives are attached. The MDFS system can easily be expanded to meet your changing requirements.

SIMPLICITY

The MDFS is supplied with a single floppy disc which doubles as the file server boot disc and as your master utilities disc. It is ready for you to boot up and start using immediately. The hard discs come with the software and utilities mounted on the disc. For other compatible hard discs a range of options are available to convert them to be used with the MDFS system.

HARD DISCS

Up to four hard discs can be fitted. The drives are built into a matching case and have a capacity of up to 35 Megabytes each giving a total capacity for the largest systems of up to 140 Megabytes. The system can use any combination of floppy and hard discs.

FLOPPY DISCS

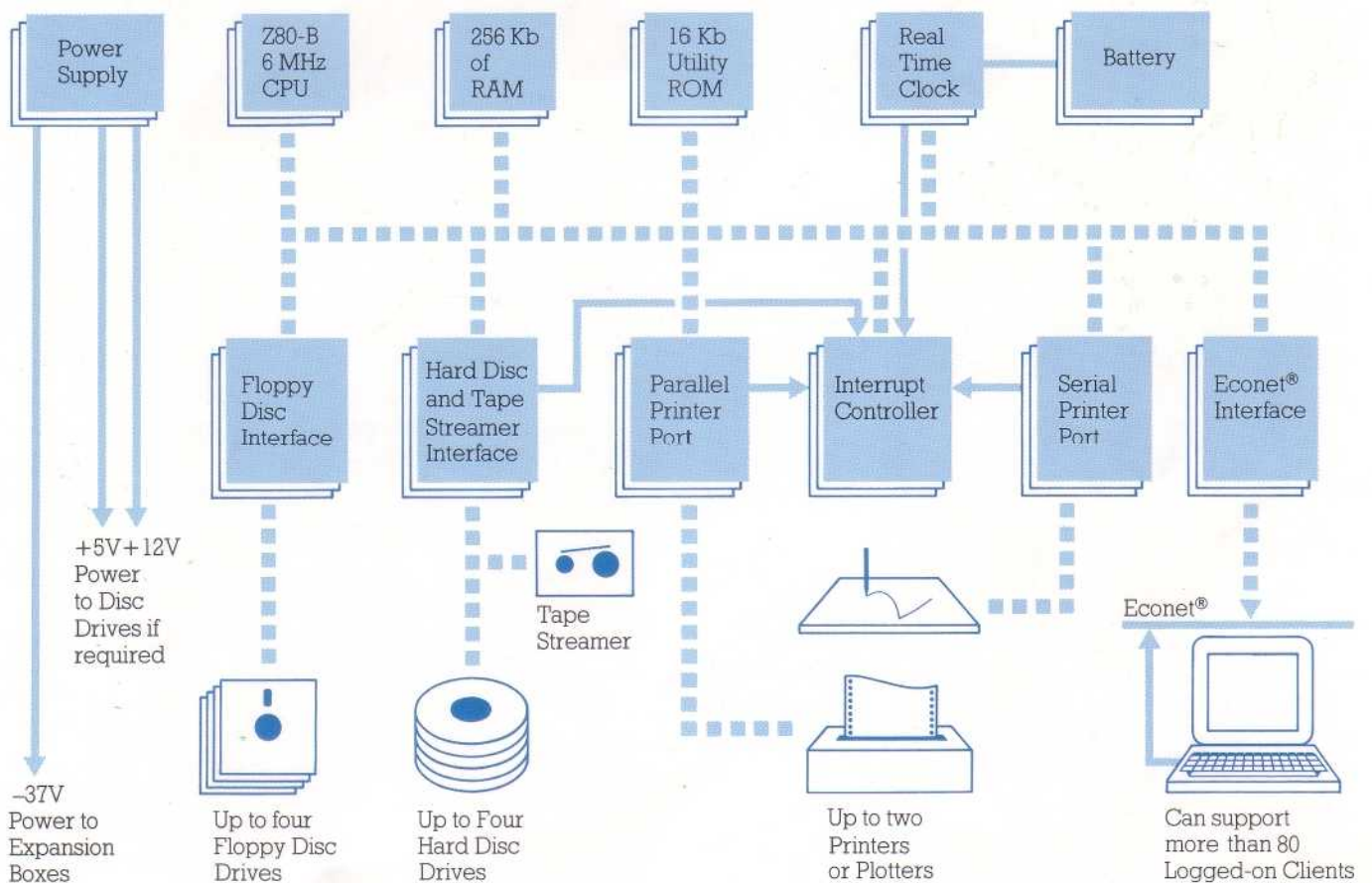
The MDFS can support up to four floppy disc drives. Standard drives have a capacity for 800 Kilobytes, since data is stored in a double density format.

TAPE BACKUP

A cartridge tape drive can be added which makes backing up fast and easy. The tape cartridges have a capacity of 35 Megabytes, so each hard disc can be backed up onto a single tape. If you use hard discs we strongly recommend using a tape drive, as backing up onto floppies is a time consuming operation which is often neglected.

PRINTER SERVERS

Two printer outputs are available, one parallel and one serial. They may be accessed independently by all network users. The system manager can make the printers generally accessible, or restrict access to particular users. Printer spooling facilities allow users to send information to the printer at any time; the MDFS stores the output on disc and prints it when the printer is free.



WHAT THE SYSTEM PROVIDES

Whilst the SJ Research MDFS system incorporates the standard features of current Econet® file servers, we have built in a range of major enhancements and extensions. This provides a more powerful and flexible system that can easily grow to meet your future requirements.

FILE STRUCTURE

The file server is arranged hierarchically, in the same way as Acorn Level 2, Level 3 and Filestore structure. Maximum file size is 8 Megabytes (8,388, 608 bytes). Up to 255 files or sub-directories can be entered into any directory, and the directory tree can be extended to any depth.

NETWORK PROTOCOLS

Standard Acorn Econet®, totally compatible with the BBC Microcomputer. All documented and undocumented calls supported.

USER LEVELS

The flexibility of the accounts/privilege structure ensures that a range of different user levels can be readily created.

For example:

System manager	Data manager
Printer manager	Library manager
Departmental	Subject
Teacher	Group
Joint	Student
Shared	Technician
Boot	Default

ACCOUNTS STRUCTURE

The MDFS allows up to 2048 separate account users. By allocating common or joint accounts or setting up files and directories with different account numbers, the system allows specific users or groups of users to own different files in the same directory. For example you often require pupils to access application software or demonstration data without them being able to alter it, but also be able to save their own files in the same directory. Simply by placing the application and demonstration data files in one account number and the directory in another, only the system manager or possibly the teacher can change the applications and demonstration data. However other users are allowed to create and delete their own data.

ACCESS OPTIONS AND FILE SECURITY

The full range of options is PLWR/WR for files, PLD for directories.

W & R control the write and read access, which are separately defined for owners and non-owners (public).

WR	Read and Write possible
R	Read or load possible
W	Reading not possible but limited "append only" writing permitted.
P	"Privacy", which makes files or directories invisible to non-owners.
L	Locks against accidental deletion or overwriting
D	Indicates a sub-directory name

"+" and "-" are allowed in the *ACCESS command, allowing some attributes to be altered without effecting the others. For example "*ACCESS TEST* +L" will lock all files and directories whose names begin with "TEST".

By setting the appropriate options on a file or directory you can arrange for it to be fully accessible by some, available on a read and extend basis for others or on a read or extend only basis if required. As an example it would allow teachers to read a proposed document and pass comment on it without being able to see each others comments or change the document, while the originator (perhaps the head) could change the document and see all the comments.

Users can hide private files or directories from other people, or share files or directories with other users, either selectively or on a group or public basis.

SYSTEM SECURITY

A problem that all system managers come across at one time or another is users trying to discover each others passwords, or more importantly teachers or managers passwords. To counteract this the MDFS passwords are extended to 10 characters, should a user try to find out a password by continuously entering variations, after five attempts the file server will log him off for a period of time (programs to crack passwords by this method are therefore not feasible). Passwords can also be locked in the password file to prevent any user changing them.

SECURITY KEY

This prevents anyone, even the system manager, from changing the password file, remotely logging off users, or shutting down the file server without first turning the keyswitch to the system position.

SYSTEM PRIVILEGE

The range of system privilege commands available include: remote logging off of one or all users and debiting and crediting user space, without the necessity for the user with the privilege to have access to any information on the fileserver.

PASSWORD FILE MANAGEMENT

A suite of password file management utilities allow the creation/removal of individual or blocks of users with a standard text editor. The system manager can allocate a personal account number and ranges of account numbers to a user, give system privilege, specify which directory a user will end up in when he logs on (his User Root Directory or URD) and specify his default library (LIB) the manager can also lock the BOOT option and Password, this is particularly useful where common user names are utilised for teaching software and one user changing either the password or boot option can cause inconvenience to other users.

PRINTING FACILITIES

The MDFS has a parallel and serial printer port, both of these act simultaneously as network printer servers and are auto spooled. The system provides true printer spooling with one or more users' data being stored in a spool file on drive 0 (either floppy or hard disc). For example, if a class of pupils all pressed the print option from a word processor, their data would be stored on the disc drive, queued up and printed out in sequence when the printer is free. The print data is kept on the disc until the last character of a user's print file has been sent to the printer and then the spool file is automatically deleted. Each printer port has four presettable options using banner files, these can contain text or user information (eg station number, user id, time, date), to be printed out before and after each users print as well as automatically presetting any escape or control code options. Print options can be restricted to users or groups of users via the accounting system.

A user can flush their own print data, delete their own print files or reroute a print file from one option to another, for example from NLQ to DRAFT.

The printer manager can reroute or delete any or all of the spool files as well as stopping and starting the data going from the file server to the printer, this is useful if you have to replace a ribbon or re-align or re-feed paper.

REMOTE PRINTER SPOOLERS

For large network systems where printing is required in multiple locations, a program can be purchased which allows a BBC machine to run as a temporary or permanent despooler anywhere on the network.

EXTENDED LIBRARY

If a file is not found in the user's directory, the system will automatically check their library. The operations on which this is performed are LOAD & CHAIN, *LOAD, *RUN, *EXEC, OPENIN and OPENOUT allowing Basic programs stored in the library to be available to all users. The user can choose any directory to be their library, by using the *LIB command. Not all the files in the library need to be generally available; it is possible to have some library files accessible only to certain users such as teachers.

SUBJECT LIBRARIES

As libraries on the MDFS system have been extended to allow the use of Basic and Data files, directories can be created where all the programs and data for a particular subject are kept. A system can thus be set up where a user logs onto their own area and run the Mathematics or CAD packages from the subject library, saving the results of their work in their own directory area.

MANAGING THE SYSTEM

Using the MDFS, controlling the amount of disc space available to each user is done automatically by the space accounting system. This removes one of the more onerous tasks of the network manager. Users who try and grab too much space will go bankrupt, encouraging them to tidy up their own directories and files.

The system comes complete with a range of useful utilities and programs (currently in excess of 50), a number of these allow the system manager to readily keep a track of Users, Accounts, Directories and their structures.

BACKUP AND RESTORING

The MDFS system has an optional tape streamer which allows complete discs up to the size of the tape to be saved onto or restored from tape. The tape streamer can be run with the file server on-line for restore purposes, where it appears as a pseudo directory structure for read purposes only.

SPEED

The MDFS system uses Multi-Threaded software with 256 Kilobytes of memory (half of which is used for caching), this gives improved loading speed particularly with large files, databases or multiple users.

GLOSSARY

Cache An area of file server memory where frequently used data or files are stored. Information stored in cache is transferred to the network faster than if it has to be retrieved from disc first. When a number of stations are loading large files, performing random access or using common files, a file server with a large cache spends less of its time transferring information to and from disc. This ensures the file server spends more of its time transmitting and receiving network data allowing the network bandwidth to be used more efficiently.

Multi-Threaded The ability for a file server to process more than one user's request at a time, this ensures that when loading very large files across the network, stations are less likely to time out while waiting for the file server to finish processing other user's requests. The Modular Disc File Server is specifically designed as a file server and uses a single processor system, However the software uses an interrupt driven architecture and thus allows the MDFS to deal with more than one request at a time.

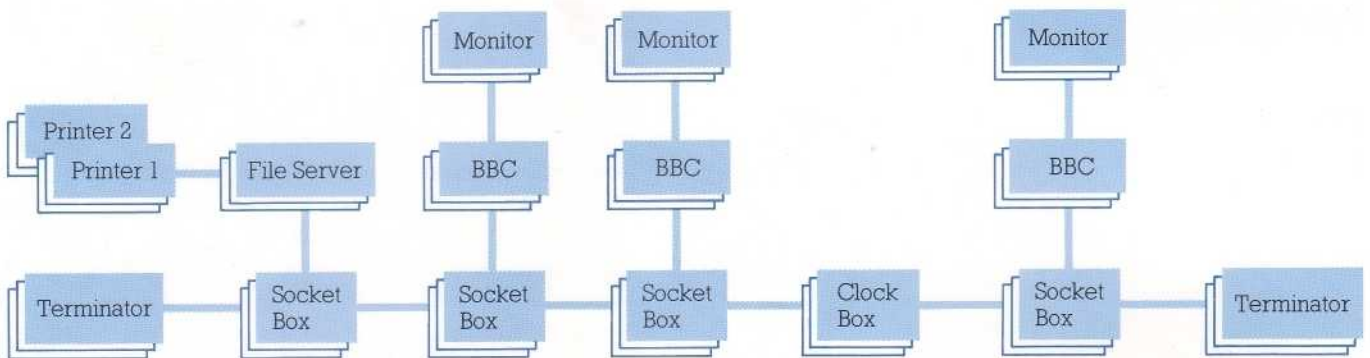
WHAT IS A NETWORK?

A network is any method of connecting two or more computers together. EconeO is a network system originally designed by Acorn for the BBC Microcomputer, which has now become the standard for educational use.

A File Server is a device which is capable of storing and retrieving information for other computers on the network. It may be the only storage device for the

network, or it may be used in addition to individual storage such as tapes or discs. Networking your computers makes it much easier to transfer information to other users, or to access common databases.

Adding a network printer server allows users to share printers too. All SJ Research file servers are also printer servers, as illustrated in this diagram of a simple network.



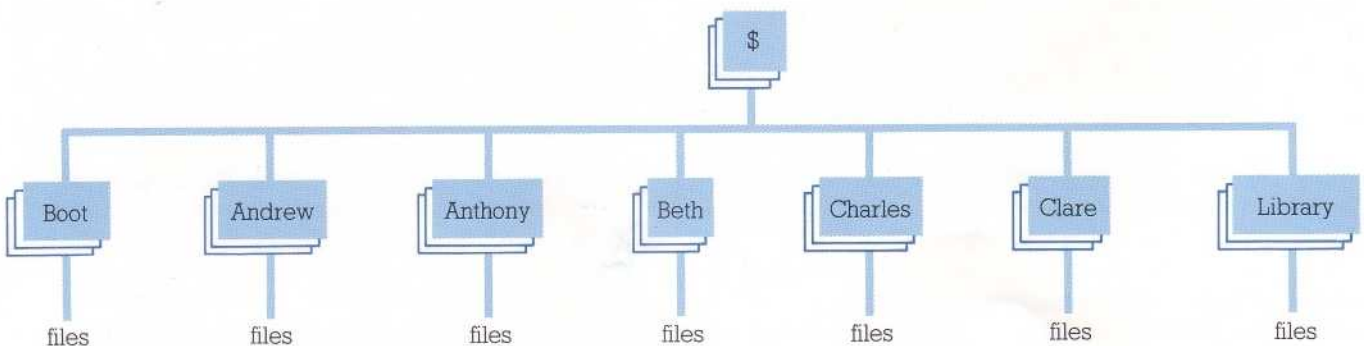
WHAT IS A HIERARCHICAL DIRECTORY STRUCTURE?

Filing systems allow files to be loaded, saved and otherwise accessed. Files are usually referred to by a name, and the filing system keeps a directory containing the file names and other information. As the number of files gets larger, a simple directory becomes too long to be manageable, and it is desirable to subdivide it. One method of doing this is to make the directory hierarchical, which means that entries in it can be names of sub-directories. Listing the contents of a hierarchical directory will give a mixture of files and sub-directories. A sub-directory can itself contain sub-directories and so on to lower levels, forming a directory tree,

The directory at the first level is called the root directory or simply the root. It is always called \$. There is only one root directory on each disc and the roots of different discs are distinguished by using the disc name explicitly, for example "\$ONE" or "\$MAIN-DISC".

For small installations, two levels of hierarchy will probably be all that is needed initially. The disc root directory \$ will contain a directory for each user, and arrangements will be made to select this user root directory automatically when the user logs on. There will also be a library directory, which will contain utility programs and other generally useful files.

A DIRECTORY STRUCTURE WITH TWO LEVELS OF HIERARCHY

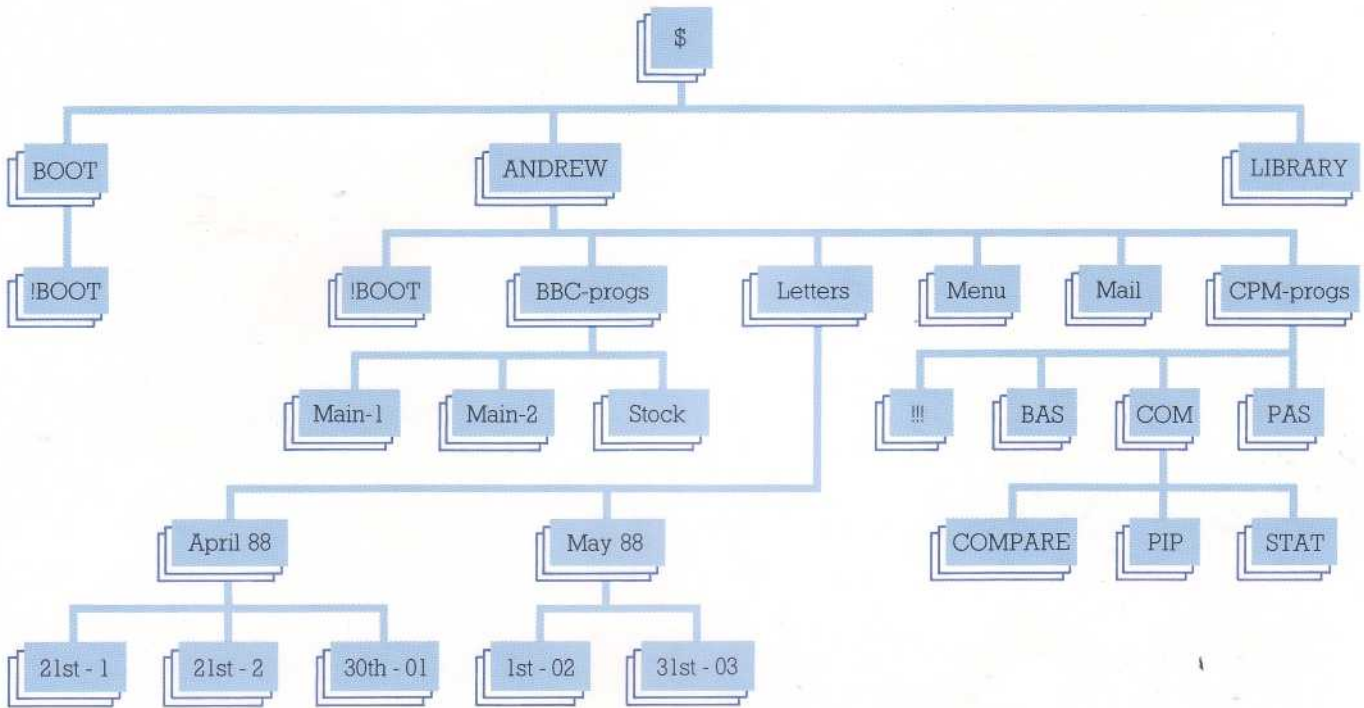


A DIRECTORY STRUCTURE WITH MULTIPLE LEVELS OF HIERARCHY

Beginners usually start with a single directory, but they soon find the advantages of having separate categories for things like "Drawings", "Maths", "Games" and SO on.

In SJ Research's file servers, these directory trees can

grow to any depth, and users are free to add or delete sub-directories as they wish, Simple commands allow users to move around the tree.



WHAT A CATALOGUE WILL TELL YOU

Each of these boxes represents a *CAT of a particular directory in the typical directory structure on the previous page.

Name of Directory

Every directory has a name, which may be up to ten characters long. A path name may be given by joining together the directory names of each level. For example 'ANDREW.PROGRAMS.PROG1'

Name of Disc

Like directories, discs are given names. Disc names can be included in path names, as in 'MAIN.ANDREW.LETTERS'

Currently Selected Directory (CSD)

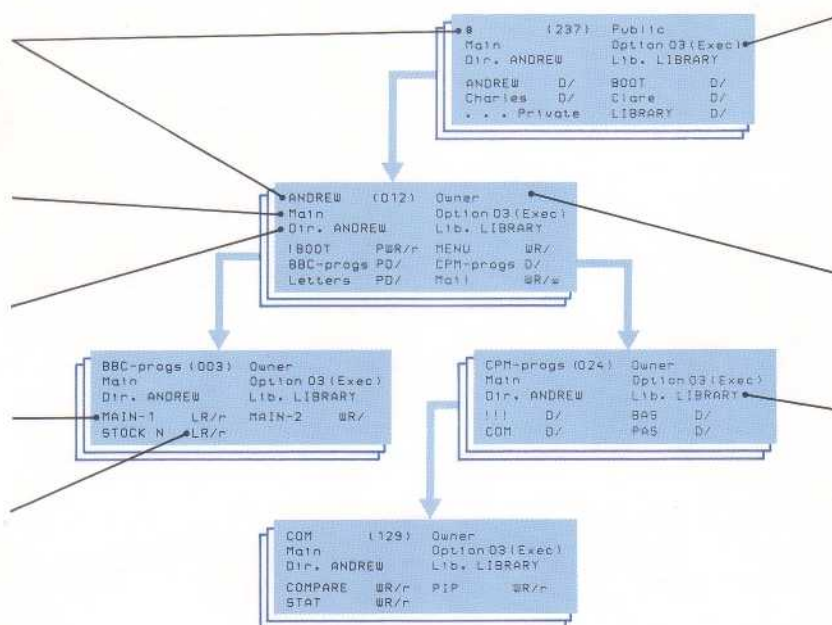
The name of directory that will be looked at first, unless a full path name is specified.

Files

Files may be stored anywhere in the directory structure.

Access Information

The current state of your access rights to each file is shown in capital letters, the alternative rights (for public access if you are an owner or vice versa) are shown in lower case. In addition to having read or write access (R & W) files may be locked (L) or private (P).



The User's Boot Option

When a user logs on using the "I AM <user name>" command, the system checks his boot option. If this is set to 1, 2 or 3, then a special file called "BOOT" will be loaded into memory, loaded and run, or executed as keyboard input respectively. The file !BOOT may be either in the user's own directory, or may have been put in the library directory by the system manager.

Access Rights to this Directory
Only Owners may save files into a directory. Unless the directory is private, anyone may catalogue it. The opposite of Owner is Public access.

Currently Selected Library

The name of the current library directory. If a file is not found in the users directory, the system will automatically check his library. Files can be LOAded, *LOAded,*EXECed,OPENIN-ed or OPENUP-ed from the library.

TECHNICAL SPECIFICATION OF THE MDFS SYSTEM

SIZE

452mm wide x 345mm deep x 80mm high

FLOPPY DISC DRIVES

The MDFS has two floppy disc connectors which allow drives to be configured as one set of drives A-D, or as two pairs of drives A & B. One or two pairs of standard BBC double disc drives can be used without modification. All drives must be 80-track double-sided floppy disc drives. Neither single-sided nor 40-track drives are supported.

HARD DISCS

The S.C.S. I. port allows up to four hard discs and controllers to be added to the system. It cannot be guaranteed that hard discs from other manufactures or suppliers will be compatible.

TAPE DRIVE

A 35 Megabyte Cartridge Tape Drive is available which also connects to the [S.C.S.I. port. This](#) allows hard discs to be saved to and restored from either as a complete disc restore or on an on-line file by file basis using DC2000 tape cartridges.

STORAGE CAPACITY

Each double density (standard) 80-track double sided disc drive will add 800 Kilobytes of disc space. Hard discs can add up to a total of 140 Megabytes of storage capacity.

PRINTER SPOOLING

Each printer can be defined as spooling or non-spooling. The users can abort their own queued output, the system manager can adjust the whole queue or start and stop data going to the printers.

FILE SERVER MODE

On a floppy disc based system the file server software is loaded from a boot disc. A double density disc suitable for reading on a normal drive is included with the MDFS. This is inserted into any appropriate drive for booting. The boot disc may then be used as a data disc of slightly reduced capacity, or further data discs without the boot code may be used.

UTILITY MODE

All normal maintenance tasks are carried out by attaching a network client through the network as a "terminal" to the file server. (This is similar to *REMOTE, but faster). This mode allows changing the station number, formatting new discs, copying discs, renaming discs and resetting the password file.

For more information, User Manuals and File Server Manager's Guides are available from SJ Research.

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SJ Research has a policy of continual improvements. Whilst every effort has been made to ensure the accuracy of the information in this brochure, it cannot be guaranteed.

HARDWARE

The processor is a 6MHz Z80-B with 256 Kbytes of RAM and 16 Kbytes of ROM. About half of the memory is used as cache RAM for disc sectors, which significantly improves the overall performance of the system.

PRINTERS

There are two independent printer channels, one parallel and one serial. Each channel can have up to four preset printer options (eg draft, NLQ if supported by the printer). Both outputs connect to the printers via standard BBC micro printer leads (not supplied).

Serial output

RS-232 with 5-pin "domino" DIN socket
Uses CTS/RTS or XON/XOFF
User selectable STOP bits and PARITY
Baud rated available: 75, 150, 300, 1200, 2400, 4800, 9600, 19200

Parallel Output

26-way IDC to 8-bit Centronics standard.
Uses STB/ACK handshake

REAL-TIME CLOCK

This provides date and time which may be read through the network or included in printer banners. It is also used to date and time-stamp files and directories when they are created or updated.

CONNECTORS

All the connections for floppy disc drives to the file server are identical to those on a BBC microcomputer except that there is no -5 volt power output (this is not required by disc drives). An additional power connector is provided for powering SJ Research hard disc expansion units.

POWER REQUIREMENTS

240 volts AC at 1.5 amps.

POWER OUTLETS

Two 6-pin AMP connectors for floppy disc drive power as used on the BBC micro, providing a total of 2.6 amps at +5 volts and 2.6 amps at +12 volts. One of these connectors is required when using the SJ Research tape drive. Surge capability is suitable for most 5" floppy disc drives.

One 9-pin D-type connector for SJ Research expansion cases, providing -37 volts at 4 amps.

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