

# Appendix C: Installing a File Server

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## C.1 Installing the Modular Disc File Server

The unit should be installed in a reasonably dust-free environment for the protection of floppy discs, preferably in a small room (for example a preparation or store room) near to the main computer classroom(s). A shelf or work-top of depth at least 400mm (16 inches) is best for the unit - this includes the depth of the File Server unit and also about 70mm for connectors on the rear. Take care to leave the ventilation slots clear under the unit and in the top, as overheating could otherwise occur.

It is recommended that wherever possible a special mains socket is fitted to run any File Server unit. This socket should be unswitched, and placed behind the unit or otherwise out of the way of accidental unplugging. If the computer area has a master switch, the File Server supply should be *independent* of it.

If you are using floppy disc drives connect one or more of them to the back of the unit. A maximum of 4 drives (normally two twin units) can be connected - one pair to each disc drive connector. If you possess a unit containing four drives, this should be connected to the socket marked DRIVES A AND B.

The disc drives should be set to *80 track* if they are switchable. Preferably 40/80 track switches should be removed, or at least taped into the 80 track position. Twin disc drives should be set up as for a BBC Microcomputer, with the lowest numbered drive select (DS) link (either DS0 or DS1) set for the top (or left-hand) drive, and the next numbered link (DS1 or DS2) for the bottom (or right-hand) one.

We cannot stress too strongly the need to use the best quality magnetic media and drives for a File Server, since in this application a considerable number of people will be affected by a disc failure.

Up to four hard disc drives can also be fitted to the MDFS (see §C.3 below). They should be plugged into the socket marked SCSI Bus Connector, on the rear of the unit.

Connect the printer(s) as described below. Connect the socket marked ECONET to the network with the lead provided. Connect the unit to the mains supply.

A BBC Microcomputer, or serial terminal, should be available fairly close by, so that operations using Utility Mode (see Chapter 7) can be done without too much walking. If you have a FAST EPROM (supplied with SJ Winchesters) it should be fitted to it as follows:

Remove the four screws, from the BBC microcomputer, securing the lid to the case; there are two at the back and two (with the larger size of head) underneath the keyboard. Lift off the lid. Remove the two or three nuts and bolts securing the keyboard, and pull the keyboard forward (there is no need to unplug it). Insert the EPROM, with the end containing a semicircular depression pointing toward the back of the computer. The BASIC ROM, which will be marked with the numbers PB01 or PB05 after the type number, should be plugged in to the right of the FAST EPROM. Reassemble the computer, and check that the EPROM works by typing \*HELP; the response should include **Fast terminal ROM ver n.nn.**

### C.1.1 Indicator lights

There are eight lights on the front of the MDFS unit.

#### **POWER** (green)

Indicates that there is a 5 volt supply to the MDFS microcomputer board. If this light does not come on when the unit is turned on, check the mains supply to the unit and the fuse in the 13 amp plug. If there is power at the socket and the fuse is OK but the light is still out, contact your dealer or SJ Research.

<b>ON LINE</b> (green)	Indicates that the File Server program is running correctly, and the File Server is in normal operation mode. This light will flash when the RELEASE DISCS button has been pressed to change the floppy discs in the File Server.
<b>UTILITY MODE</b> (yellow)	Indicates that the unit is in Utility Mode. If this light flashes, the system is waiting to enter Utility Mode, i.e. for a serial terminal, or a station running the FAST program to connect to the File Server. Pressing the RELEASE DISCS button in Utility Mode will boot the File Server.
<b>DISCS FREE</b> (yellow)	Comes on when it is safe to remove disc(s) from the system. Do not remove a disc in normal mode without pressing the RELEASE DISCS button and waiting for this light to come on. In Utility Mode this light will come on automatically when it is safe to change discs. The DISCS FREE light flashes when a File Server program is needed, and flashes more rapidly while the system loads the program.
<b>SERIAL PRINTING</b> (yellow)	Indicates that output is waiting to be printed on the serial printer; this may be users' or system output. This light will flash if the File Server printer buffer is full of system messages, so that the File Server cannot run until a suitable printer is available to print these out.
<b>PARALLEL PRINTING</b> (yellow)	Indicates that output is waiting to be printed on the parallel printer; this may be users' or system output. This light will flash if the File Server printer buffer is full of system messages, so that the File Server cannot run until a suitable printer is available to print these out.
<b>NO CLOCK</b> (red)	Comes on if the Econet clock signal is not present at the network connector on the rear: most commonly the MDFS will have been unplugged from the network, or someone has unplugged the clock box itself. If the clock box is connected and working, unplug it from the network and connect it directly to the File Server unit only, and check that the NO CLOCK light goes out. If it does not, there is a hardware fault either in the clock box, the MDFS or the connecting cable.
<b>SYSTEM ERROR</b> (red)	Lights when there is something wrong with the File Server. If the light comes on steadily, an explanatory message will be given on the system message printer. If this light flashes at power on, it indicates that some internal hardware device has failed (see appendix B).

## C.2 Connection of Printers

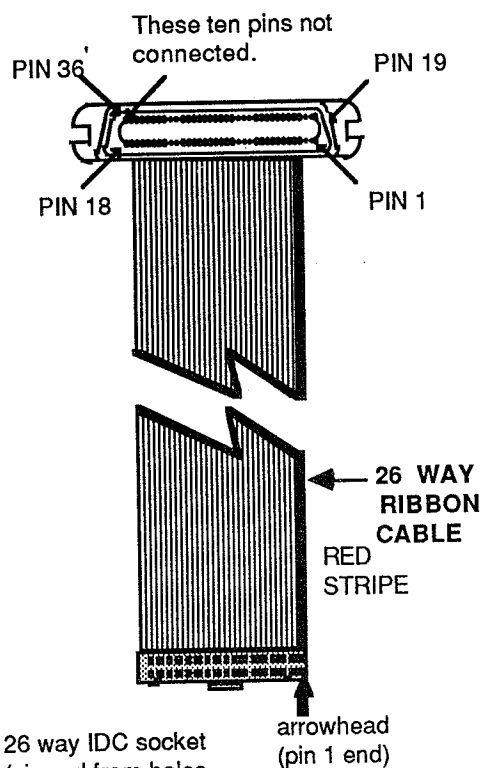
Two printer ports are supplied on the MDF5, so that a Centronics type parallel printer and a RS232 type serial unit may be connected.

The parallel printer is connected via a 26 way 'insulation displacement' socket and matching ribbon cable, to a suitable mating connector (usually a 36 way Amphenol type 57F-30360) for the printer. The lead and connections are exactly the same as those for a BBC Microcomputer (shown in Fig 1 below).

The serial printer also uses the same connector as on a BBC Microcomputer. This plug may unfortunately be inserted either way into the socket - no damage will be done, but the printer will not function. The socket is the same way up as on the BBC Microcomputer, so if the user subscribes to the convention of marking the top of the connector with a spirit marker, this will also hold good for the MDF5. The serial connections are given in Fig 2, along with the connections to be made to the industry standard D-type connector which will probably be fitted to a serial printer. The Baud rate for a serial printer is set up from Utility Mode, as described in Section 7.3.2.

Many printers (especially Epson types) have an internal buffer, and a facility to remain 'busy' (after the buffer is filled) until a certain number of characters has been printed. This number of characters can be varied by setting internal links - it should be set to its minimum value for use with any printer server.

Printer leads may be bought from most computer dealers or from component distributors such as RS Components, or suitable made-up cables can be obtained from SJ Research.

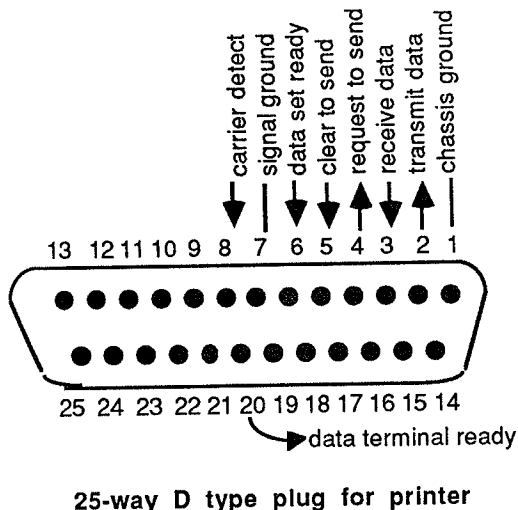


26 way IDC socket (viewed from holes side)

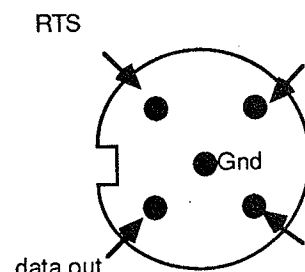
N.B. The pin numbering convention is different for IDC sockets.

**Fig.1 Parallel Printer Connections**

Signal pin No.	Return pin No.	Signal	Direction	Description
1	19	STROBE	In	STROBE pulse to read data in. Pulse width must be more than 0.5ns at receiving terminal. The signal level is normally "HIGH"; read-in of data is performed at the LOW level of this signal.
2	20	DATA 1	In	These signals represent information of the 1st to 8th bits of parallel data respectively. Each signal is at "HIGH" level when data is logical "1" and "LOW" when logical "0".
3	21	DATA 2	In	
4	22	DATA 3	In	
5	23	DATA 4	In	
6	24	DATA 5	In	
7	25	DATA 6	In	
8	26	DATA 7	In	
9	27	DATA 8	In	
10	28	ACKNLG	Out	Approx. 5ns pulse. "LOW" indicates that data has been received and that the printer is ready to accept other data.
11	29	BUSY	Out	A "HIGH" signal indicates that the printer cannot receive data. The signal becomes "HIGH" in the following cases; 1. During data entry 2. During printing operation 3. In OFF-LINE state 4. During printer error status
12	--	PE	Out	A "HIGH" signal indicates that the printer is out of paper.
13	--	SLOT	Out	This signal indicates that the printer is in the selected state.
14	--	OV	--	
15	--	NC	--	Not used.
16	--	OV		Logic GND Level.
17	--	CHASSIS -GND	--	Printer chassis GND. In the printer, the chassis GND and the logic GND are isolated from each other.
18	--	+5V	--	For CENTRONICS use only.
19 to 26	--	GND	--	RETURN signal GND level.



25-way D type plug for printer



5-way DIN plug

N.B. No connection to this pin

Plugs viewed from solder contact side.

CONNECT:

Gnd to pin 7  
data out to pin 3  
CTS to pin 4 or 20 (whichever works)

**Fig. 2 Serial Printer Connections**  
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## C.3 Installation of Winchesters and Tape Drives

### C.3.1 General Notes

Winchesters and Tape drives are all connected to the MDF5 SCSI bus connector. Additional devices are connected by *daisy-chaining*, i.e. plugging in a new device into the connector of the previous device.

**You are advised not to connect or disconnect drives with the power applied.**

The SCSI bus (*bus* meaning a collection of wires or a cable) allows up to seven devices to be connected together and for any two to communicate with each other. On the MDF5 communication is between the MDF5 and one of the other devices, e.g. a disc controller. If there is more than one device connected to the MDF5, there needs to be a way of deciding which device the MDF5 wishes to talk to. This is done by allocating each device a **unique** controller number in the range 0 to 7. All SCSI devices have a means of setting this number, although the procedure for doing this is manufacturer dependant: details are given below. On the MDF5, controllers 0 to 3 are allocated to disc controllers, controller 4 is allocated to the tape drive, controllers 5 and 6 are reserved and controller 7 is the MDF5 itself.

The second characteristic of the SCSI bus is that it has two ends. Electronic signals do not like ends because the signals tend to bounce back when they meet an end. They then travel to the other end of the bus and bounce back again. Eventually they lose all their energy and the bouncing (technically known as *ringing*) dies out. The consequences of the ringing is sometimes to cause devices 'listening' to the bus to miss-read it, causing all sorts of problems. In order to prevent the ringing we need a *terminator* at each end of the bus. The MDF5 already has a terminator in it, and therefore must be at one end of the bus. If you have a single winchester it must also have a terminator in it. This is usually not a problem because most drives come with terminators fitted as standard.

The problem comes when you want more than one device on the SCSI bus, such as a tape drive or a second winchester disc controller. In this case you will have to remove the terminators from the device or devices which are 'in the middle' (i.e. not at the ends), otherwise you would have more than two sets of terminators on the bus which will overload it.

Because each controller number must be unique, it follows that if you take two MDF5 systems, each with a disc drive set up as Controller 0 (the default), you cannot plug both disc drives into the same MDF5 without changing the controller number of one of the drives (to 1, for instance). You will also have to remove the terminators from one of the drives; these you will have to re-insert if you wish to connect the drives back onto the original MDF5, but you can leave the controller number set to 1, since that will not produce a conflict.

#### Further note to users of Adaptec Disc Controllers

It is also possible to use two drives connected to a single disc controller. As it is only the controller that is connected to the SCSI bus, one can add the second disc to the controller without changing the device number on the controller. However, you will have to change the device number on the disc for much the same reasons. See the drive manufacturer's instructions for how to do this.

### C.3.2 Setting the Controller Number and Terminators

#### For the RODIME RO752:

If the drive is in a case, you will need to remove it. On the side of the drive with all the components on it you will find a double row of pins marked S1, and a blue plastic link over one set of the eight pairs of pins. The pair nearest to the mark S1 should be made to set the number to 0, the next pair only to set it to 1, the next pair up for 2 etc.

The terminators are the three long thin yellow things (they are called *resistor packs*) marked SIL1, SIL2 and SIL3 near to the 50-way connector on the drive. Take all three of them out and put them in a safe place: taping them to the inside of the case is a good idea. If you need to put them back in, with the word SIL1 the right way up, the 'dot' on the resistor pack should be to the left.

### For the Adaptec ACB4000A Controller:

You will need to identify the controller board as distinct from the drive itself, and then remove screws etc as necessary so that you can get to the component side of the controller board. You will see a double row of pins marked **J5**. The pin-pairs marked **A B**, **C D** and **E F** are used to select the controller number in binary. With all three pairs *open* (i.e. not connected) number 0 is generated. To make controller 1 you need the binary number 001, so that only the **A B** pair should be connected. To make the link you will need a molex connector which you can pinch from a BBC microcomputer's station number selector.

The terminators are two long thin things marked **RP3** and **RP4**. Store them in a safe place if you need to remove them, or if you need to put them back in again, the 'dot' should go nearest the big 50-way connector. **Warning:** there are some boards which have the terminators soldered in, and unless you feel very competent you should remove the terminators from another controller board instead.

### C.3.3 Installing Tape Drives

These notes apply to a tape drive supplied in a plastic case.

The tape drive has three connectors on it: two 50-way data connectors and a power connector. Plug the power plug into one of the two **Power Out** sockets on the back of the MDFS. Plug the 'flying' end of the 50-way tape cable into the MDFS, where the hard disc used to plug in. Plug the 'flying' end of the hard-disc box into the 50-way plug on the back of the tape. You power the hard-disc as before.

#### The Tape Drive should go in between the Winchester and the MDFS.

This is because the Tape Drive comes with no terminators installed. This means that you can remove the tape drive for use on another site by plugging the hard-disc back into the MDFS. When re-connecting the tape drive do not plug it straight into the back of the hard-disc.

### Copyright.

Use of the tape software is restricted to use on Tape Drives purchased from SJ Research, as laid down in our terms and conditions.

### C.3.4 Installing SJ Research Winchesters

SJ Research winchesters come ready formatted, with a copy of the standard release software and File Server code already mounted on them. To connect to an MDFS, first make sure that power is off, and then put the expansion case either above or below the MDFS. The power lead should be connected to the D-type outlet on the back of the MDFS **and the screws fastened**. This is important because without this fastening the connector can work its way out and the voltage to the expansion case can become intermittent, resulting in loss of data. Next connect the 50-way lead into the **SCSI Bus Connector** on the back of the MDFS (it will only go in one way round). At this stage, disconnect any floppy discs.

Power the MDFS on; you should notice the disc LED flash on very briefly and hear the drive motor speeding up. After a while the MDFS **Disc Free** LED will start to flash; press the **Release Discs** button on the MDFS and after about 4 seconds the disc LED will come on again while the MDFS searches for the File Server program. It should load this and turn on the **On Line** LED. You should log-on with **\*I AM SYST SYST** and check basic operation of the File Server. Ascertain the version of the new File Server code, by typing **\*VERS**.

The next thing to do is to assign a suitable name to the disc. It will currently be called **MASTER** or **HARD1**. If it is called the former then you **must** change it. To change the discname go into utility mode and use the **RENAME** option.

The rest of the procedure need only be followed if you have already used the MDFS with floppy discs; it ensures that you have a backup copy of the new File Server code.

## Making a backup copy of the File Server code.

Press the button, and power off. Reconnect a floppy disc drive and re-boot the File Server, using the disc with the File Server code on it that you normally use, log-on and find out the version number of the File Server code. If the version on the winchester is greater than that on the floppy, you will need to make a copy of the new version onto a floppy disc as a backup: see §4.4 for how to do this. If the versions are the same then you already have a backup, and if the winchester version is less than your usual version then we have supplied the wrong version: please inform us!

## What to do if you get a flashing System Error LED

Six short flashes followed by one long flash indicates that something is wrong with the SCSI Bus. This could be because the data cable is plugged-in the wrong way round (although the lead should be polarized to prevent this) or that there is no power to the drive. MDFS ROMs previous to version 0.96 had a problem (with identical symptoms) when used with certain batches of disc drive, so please inform SJ Research if you have such a ROM.

## Some technical information

A single winchester will come set up as controller 0, and with terminators fitted. The case has internal connections for a second winchester, which, if subsequently fitted, should be set to controller 1 and have the terminators removed. See the relevant sections in this chapter.

## C.3.5 Installing BBC-Compatible Winchester

We can summarize the operations needed for the installation into 4 parts:

- a) Copying any existing data off the disc onto some other media
- b) Removing some redundant parts and adding a new cable to the winchester disc unit in order to connect it to the MDFS
- c) Re-formatting the winchester
- d) Copying on the File Server code
- e) Copying back any data transferred off in a)

Clearly steps a) and e) are only relevant if the disc has any interesting information on it already. Methods of doing this all depend on what other system you intend to use for temporary storage. If you have winchester in Acorn Level III File Server format, SJ Research will, for a fee, perform the whole conversion operation for you, otherwise you can use the utilities **Archive** and **Getback** to transfer the data via floppy discs.

## Connecting the Winchester to the MDFS.

Take the cover off the winchester box. The 34-way ribbon cable that used to connect the BBC microcomputer and the winchester either plugs into the back of the box or goes directly inside the box. Either way, identify the 34-way cable that is inside the box. It should lead to a small board. Remove this board and all the 34-way cabling. The little board should also be connected to the Adaptec controller board via a short 50-way cable, or it may be plugged straight in. You won't need the short piece of 50-way cable either.

You will now need to make-up or buy (from your local computer store) another 50-way ribbon cable at least 1 metre long. This lead should have an **IDC receptacle** (i.e. female connector) at both ends. The lead should then be connected to the 50-way plug on the controller board, fed out of the box and the other end connected to the MDFS SCSI Bus Connector. Pin 1 on the Adaptec board is at the end nearest the red LED, and on the MDFS it is marked with a dash. When powering up the system you will need to apply power to the disc drive before the MDFS (or you can turn them on simultaneously) otherwise you will get a flashing System Error LED.

## Re-Formatting the Winchester.

You will need to get into Utility Mode in order to use the format program. Connect a floppy disc drive to the MDFS, insert the master release disc, and switch on the MDFS. Refer to section 7.2 for further details, bearing in mind that you will not have a copy of the \*FAST ROM. If you have Utility Mode version 1.00 or greater, then you can use the **List Discs** option to check that your winchester is connected properly.

For Example:

```
LIST DISCS
```

```
Discs currently available:
```

```
A: Name: Master      size: 800K  
E: Not an FS format disc.
```

or

```
E: Disc error in root - bad disc.
```

Do not worry about these two messages, as they are quite normal before you have formatted the disc.

However, if the Utility Mode version is less than 1.00 it will almost certainly hang up if you try the **List Discs** option. The version number is printed at the top of the main menu.

If the winchester has already been formatted (e.g. for use on a BBC microcomputer) it should be re-formatted using the 'B' (Acom) option in **FORMAT**. This option applies to all pre-formatted drives even if they were not purchased from Acorn. If the drive has never been formatted, or you get **Error 1C**, you will need to use the 'Z' option, referring to the drive manual for details of the number of Heads, Cylinders etc. For further information on formatting, see §7.3.6.

You should check the drive for a *defect list*, which should be stuck to the drive itself. This list should have numbers of the form xxx-y-zzzz (e.g. 110-3-2305), which list the locations of any *media defects* (imperfections on the surface of the discs). The disc controller must be informed of these defects so that it can avoid using them for any user data. If you have such a list, you should reply 'Y' to the prompt

```
Enter defect disc (Y/N)
```

and enter the numbers as appropriate. Do not loose the defect list, as you will need it if you have to format the winchester again, which will necessary if you wish to enter additional defects. Sectors which go bad during the life of the drive will have to be entered in this way.

After the format operation has finished (which takes approx. 5 minutes) the MDFS will write a header to the disc and then verify all sectors on the disc. You can use the **List Discs** command (on any version of the Utility Mode software!) and use your winchester as a normal File Server disc.

## Copying the File Server Code onto the Winchester

See §4.4 for details.