



**High Performance Computer Systems  
Hard Disc Drive Upgrade Kit  
Fitting Instructions**

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First Published 1987

Published by Acorn Computers Limited

Part No. 0476,245

Issue 2

March 1988

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**1. Introduction**

This document details the installation of a hard disc drive in an Archimedes 305, 310 or 410 computer system. The appropriate kit includes all the components needed to complete the installation.

**2. Upgrade Kit List**

Items common to models 305, 310 and 410:

Item	Part No.	Description	Qty
1	0176,244/T	3.5" Hard Disc Drive	1
2	0277,014	Hard Disc Drive Bracket	1
3	0882,121	Screw, M3 x 6mm Pan Hd. Pozi	2
4	0882,142	Screw, 6-32 UNC x 1/4" Pozi	4

Plus -

For models 305 and 310 only:

5	0176,241/A	34-way Ribbon Cable Assy. Long	1
6	0176,242/A	20-way Ribbon Cable Assy. Long	1
7	0176,243/A	LED Assembly	1
8	0276,035	Single Blanking Panel	1
9	0882,111	Screw, M2.5 x 6mm	2
10	0276,036	T' piece	1
11	0176,240	Hard Disc Podule Assy.	1
12	0476,240	Instructions for Use	1
13	0276,070	Front Label, 305H	1
14	0276,071	Front Label, 310H	1

Or -

For model 410 only:

15	0177,002/A	34-way Ribbon Cable Assy. Short	1
16	0177,003/A	20-way Ribbon Cable Assy. Short	1
17	0277,070	Front Label, 410H	1
18	0277,315	Front Label, 440H	1

### 3. Fitting the Upgrade

#### WARNING

TAKE ALL PRECAUTIONS REGARDING STATIC ELECTRICITY AND EARTHING IN ACCORDANCE WITH B.S. 5783

1. Disconnect the computer from the mains supply and all peripherals, including the keyboard.
2. Place the unit, with the rear panel facing you, on a worksurface with a clean, soft covering.
3. Remove the top cover as follows (see fig. 1):

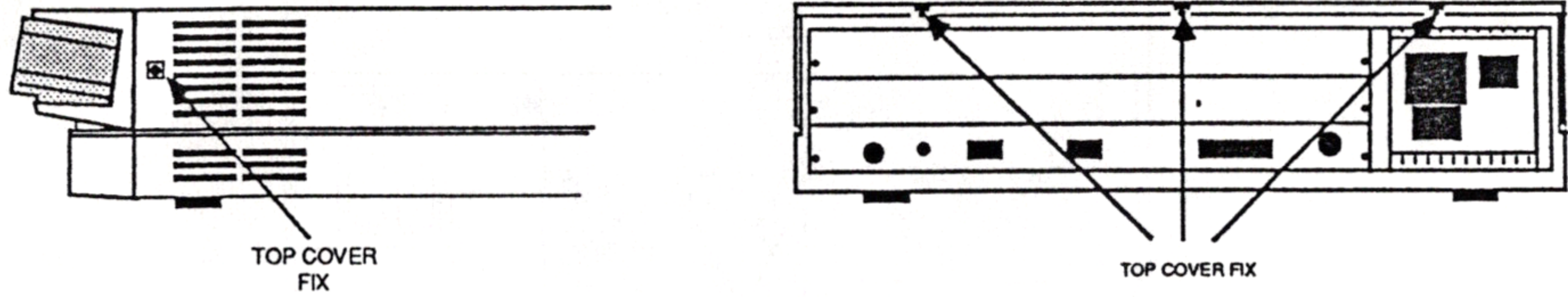


FIG. 1 REMOVING TOP COVER

Remove the two screws in the sides of the top cover, immediately behind the front moulding.

Remove the three screws along the top of the rear panel and remove the top cover by sliding it off from the rear of the unit.

#### Models 305 and 310:

4. Remove the two screws securing the front moulding assembly at each side. Stand the unit on one side and remove the three screws securing the front moulding assembly to the base metalwork (see fig. 2).
5. Stand the unit back on its feet and unplug the LED/speaker connector PL9 from the main board (see fig. 4). Grasp the front moulding assembly at each end and use a straight, steady pull to withdraw it from the front of the unit.
6. If one is not already fitted, fit a Podule backplane as per the instructions supplied with the Backplane Upgrade Kit but ignore the instruction on page 5 to re-tie any power cables to the PSU.
7. Fit the Hard Disc Podule as per the installation leaflet supplied with the Podule Kit, ignoring the final section 'REASSEMBLY'.

#### Model 410:

4. The hard disc drive power cable is tie-wrapped to the side of the power supply unit. Cut and remove the tie-wrap and free the cable.
5. Remove the two backplane mounting screws, unplug the backplane and rest it on top of the power supply unit. There is no need to disconnect the power leads.
6. No further mechanical disassembly is required - proceed to step 8.

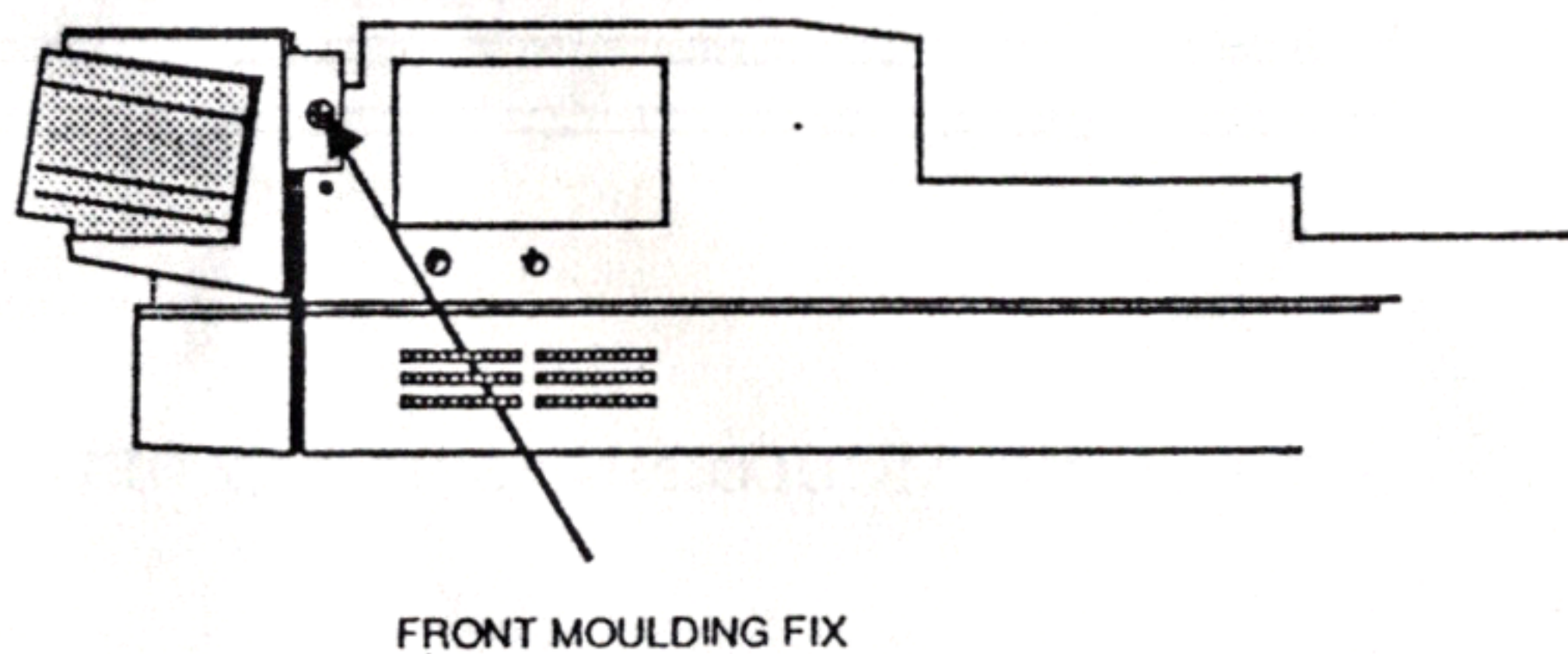
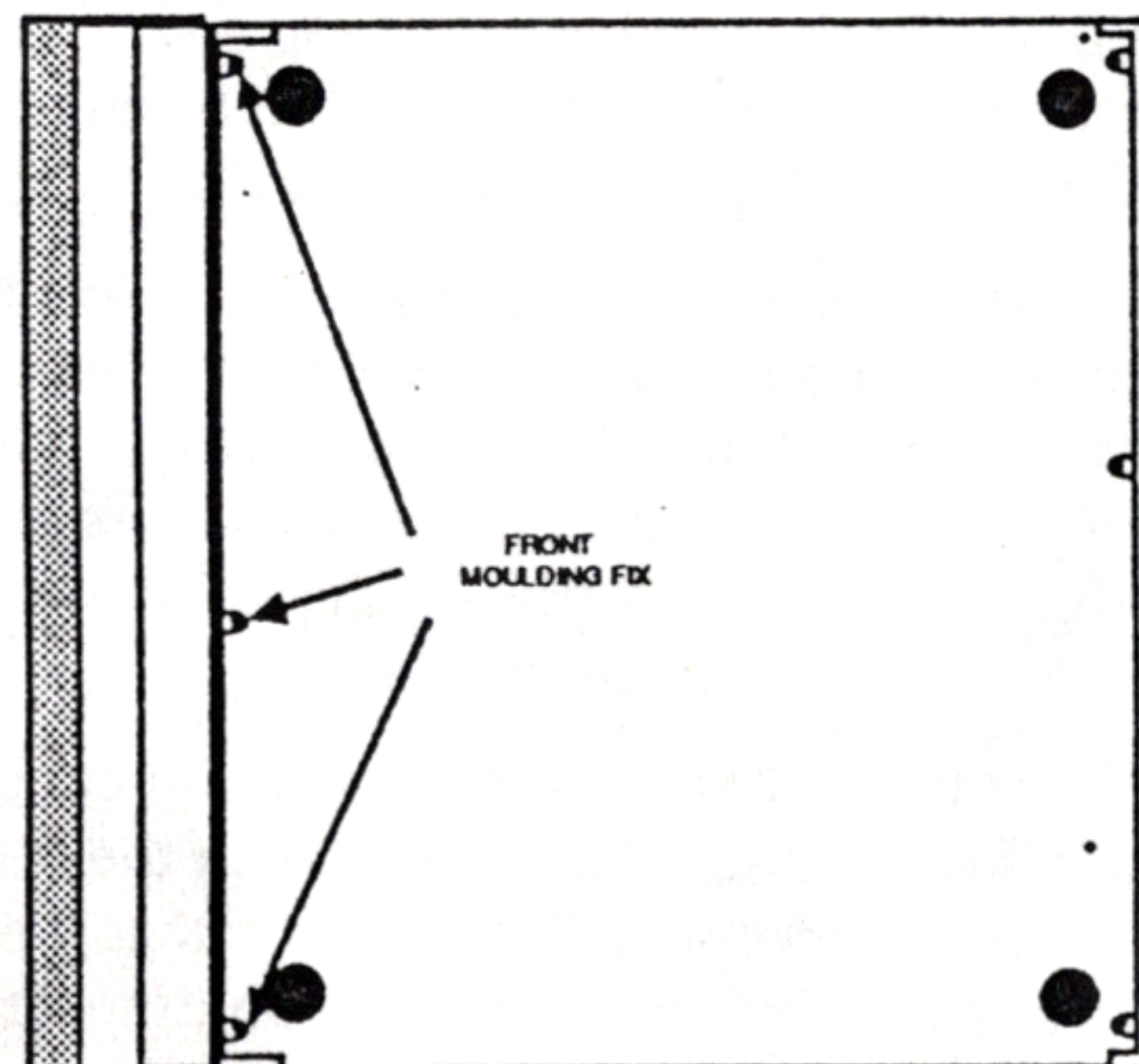
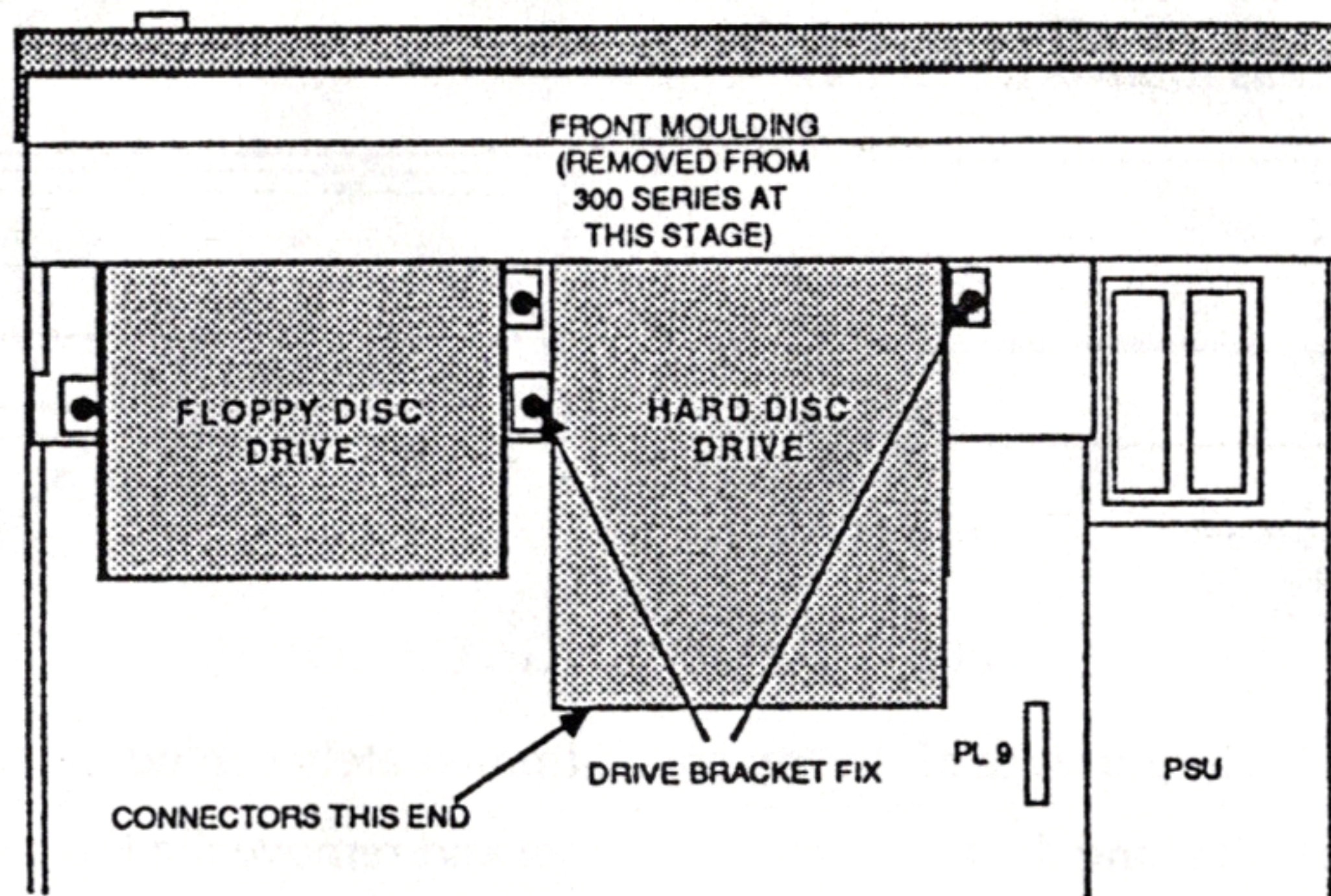


FIG. 2 REMOVING FRONT MOULDING ASSEMBLY



**WARNING**  
**THE HARD DISC DRIVE IS FRAGILE.**  
**DO NOT DROP, JOLT OR SUBJECT IT TO EXCESSIVE VIBRATION.**  
**ALWAYS HANDLE THE DRIVE WITH CARE DURING INSTALLATION.**

8. Assemble the hard disc drive to the drive bracket (if this is not already done) with 4 off 6-32 UNC x 1/4" screws supplied. Ensure that the drive is orientated such that the PCB is at the bottom, with the connectors facing towards the rear of the main unit (see fig. 4).
9. Assemble the drive bracket to the disc drive support 'saddle', with 2 off M3 x 6mm screws supplied.



**FIG. 4 HARD DISC DRIVE INSTALLATION**

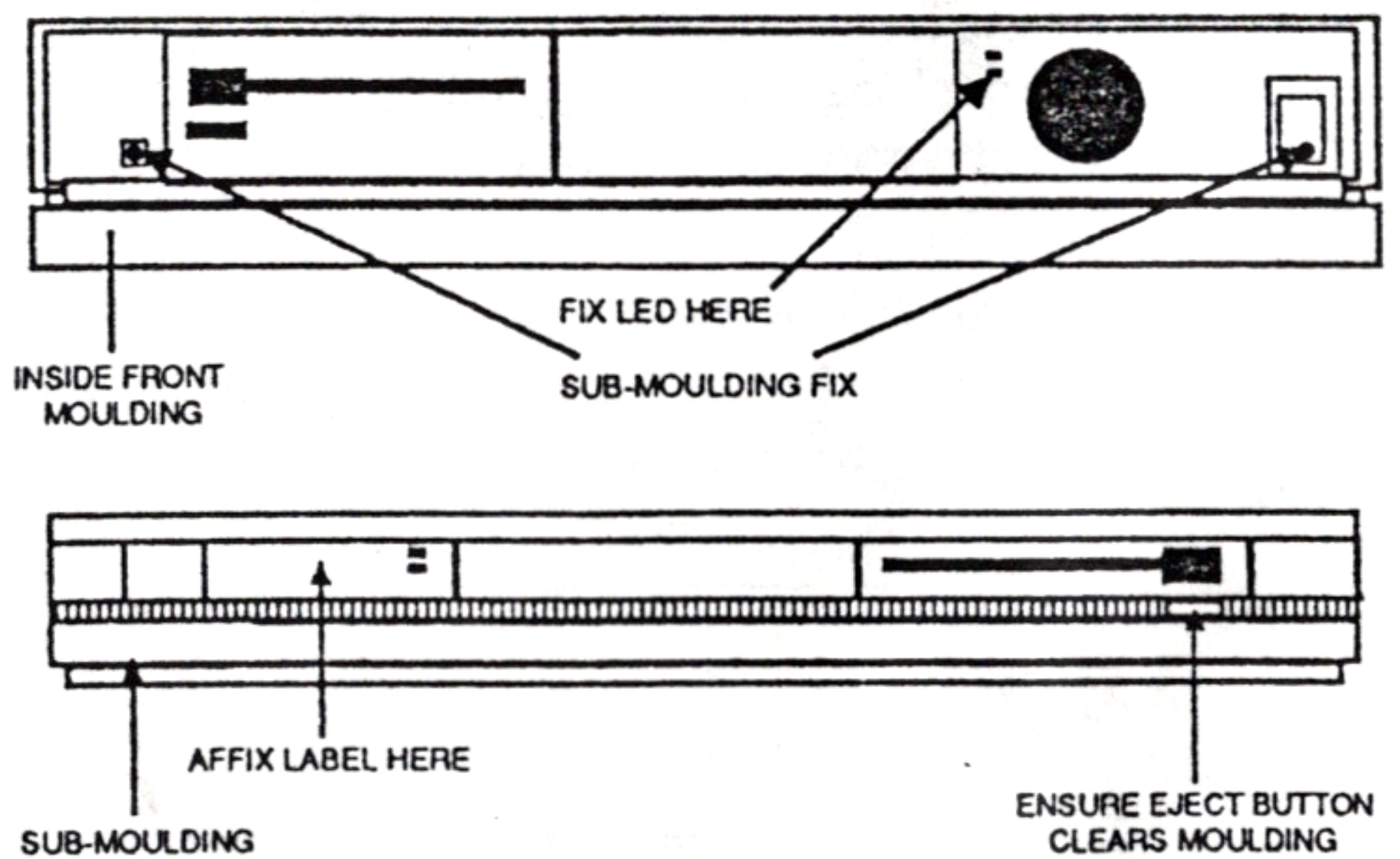
**Model 305 and 310:**

10. Taking the front moulding assembly, locate and remove the two self-tapping screws at each end inside the main moulding and slide the sub-moulding away from the main moulding (see fig. 5).
11. Insert the new LED into the 'spare' aperture in the front sub-moulding, immediately below the Power On LED. Fix the LED into place using a small blob of silicone rubber adhesive\*.
12. Offer up the sub-moulding, with the new LED fitted, to the main moulding, passing the LED wires through the "Drive 1" aperture. Ensure that the top edge of the sub-moulding fits into the slot between the rib and the top edge of the main moulding, then secure the sub-moulding using the two self-tapping screws previously removed.
13. Insert a disc into the floppy drive, then offer up the front moulding assembly to the main unit, ensuring that the LED/speaker cables pass over the top of the hard disc drive. The disc will aid alignment of the floppy disc eject button in the aperture in the front moulding.
14. Insert the front moulding assembly fixing screws and fully tighten them. Check that the floppy drive will accept and reject discs, that the eject button does not bind on the moulding, and that inserted discs clear the front moulding.

Provided that its position has not been disturbed, the floppy drive should align correctly.

**Model 410:**

10. The hard disc drive front panel LED is already fitted to this model. Proceed to step 16.



**FIG. 5 FRONT MOULDING ASSEMBLY DETAILS**

Model 305 and 310 cont'd:

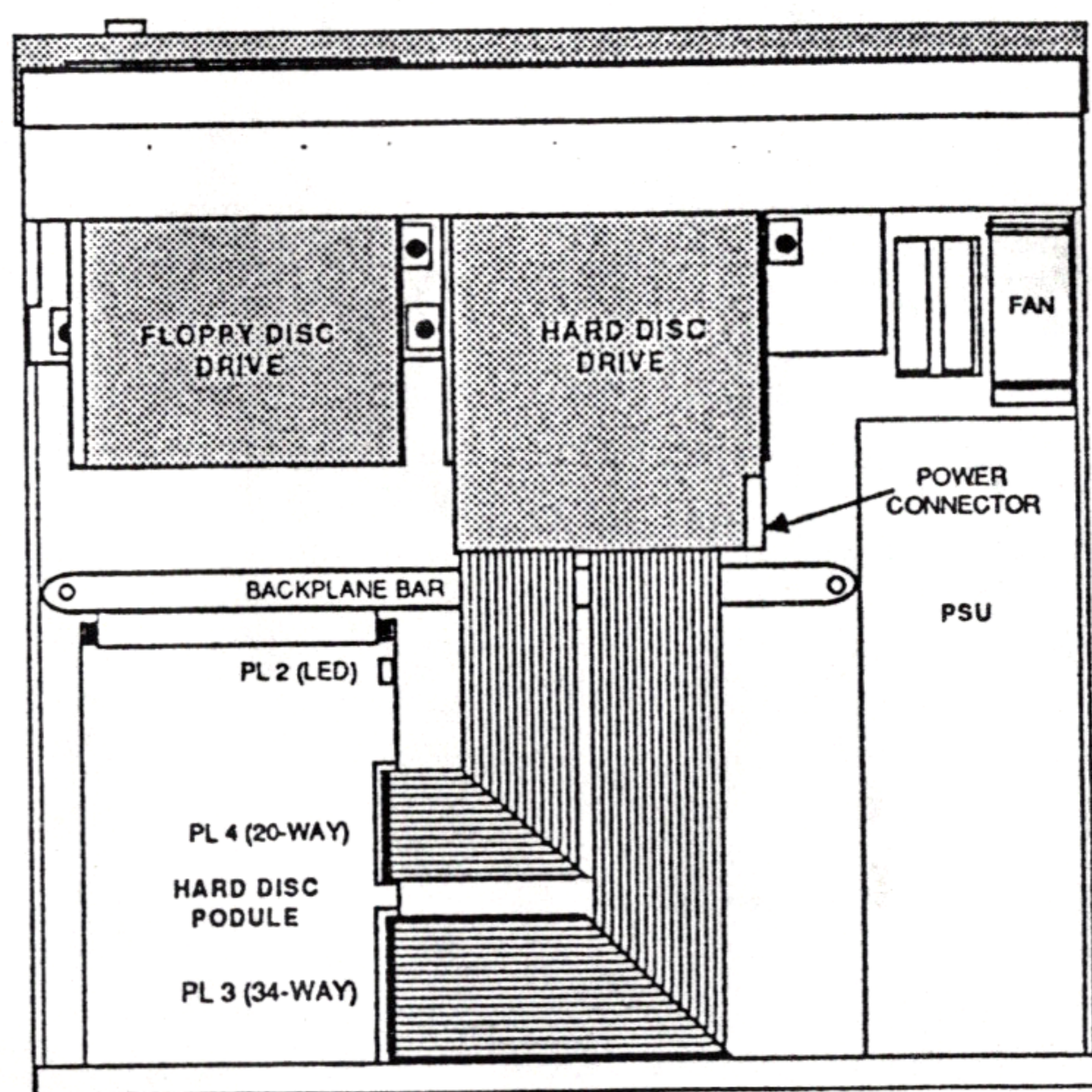
15. Connect the hard disc drive LED connector to PL2 (adjacent to the 64-way connector) on the Hard Disc Podule, ensuring that the locking ears on the connector locate either side of the locking tab on the board-mounted connector.
16. Connect the hard disc drive power cable, coming from the PSU, to the power connector on the hard disc drive (see fig. 6). Note: Some hard disc drives may have a power connector on a short flying lead.
17. Connect the 34-way and 20-way ribbon cable assemblies as follows:

Model 305 and 310:

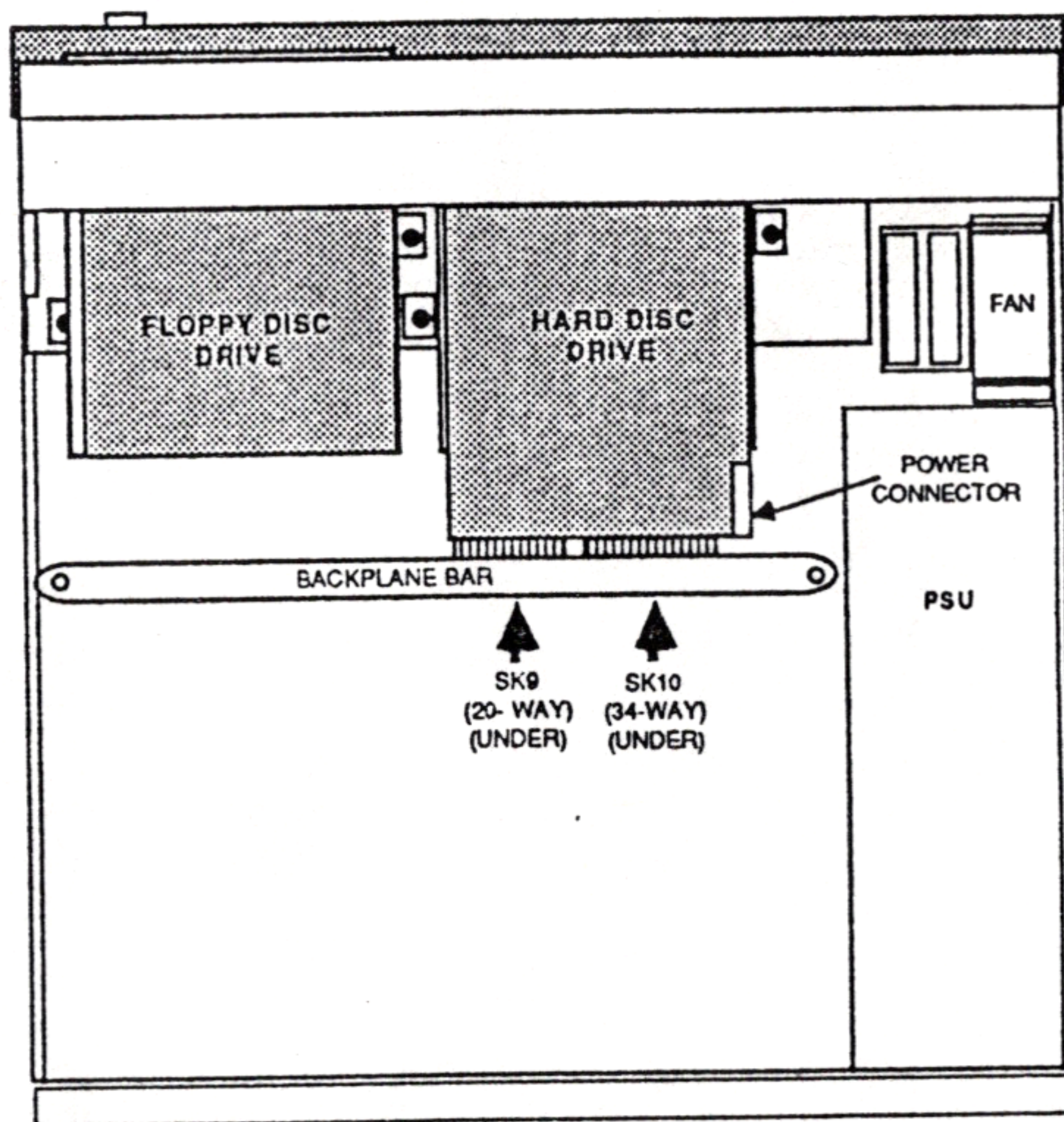
Connect the LONG 34-way cable between PL3 on the Hard Disc Podule and the 34-way connector on the rear of the drive; the LONG 20-way cable connects between PL4 on the Podule and the corresponding connector on the drive. Route the cables as indicated below in figure 6.

Model 410:

Connect the SHORT 34-way cable between the 34-way connector on the rear of the hard drive and SK10 on the main PCB - immediately below it. The 20-way SHORT cable connects in the same way between SK9 and the corresponding connector on the drive. Refit the backplane.



305/310



410

FIG. 6 CONNECTIONS

18. Tighten both hard disc drive bracket fixing screws.
19. Visually check that all is well, then connect the unit to the mains supply and peripherals. Power up and format and verify the hard disc drive as detailed in the Archimedes Service Manual section "Test Instructions".
20. Disconnect from the mains supply and peripherals, then refit the top cover and tighten all fixing screws.
21. Connect the unit to the mains supply and peripherals. Power up and carry out the "Soak Test" as detailed in the Archimedes Service Manual section "Test Instructions".
22. Using a scalpel or similar, carefully lift one edge of the model label on the front moulding and remove the label. Affix the appropriate label in its place.

**IMPORTANT**

**HANDLE THE COMPUTER WITH CARE WHEN THE HARD DISC DRIVE HAS BEEN INSTALLED.  
AVOID JOLTING, BANGING OR DROPPING THE UNIT.**

## IMPORTANT NOTES:

1. Always park the hard disc drive heads before switching off the unit, as described under Care and Handling of the Hard Disc in the Archimedes Hard Disc Upgrade instructions for use, part number 0476,240.
2. Ensure that the Archimedes is supplied by, and returned to, the customer in appropriate packing.
3. Remember to return the Archimedes Hard Disc Upgrade instructions for use, part number 0476,240 to the customer with the upgraded unit.

### \* Silicone rubber adhesive.

An air-curing one-part silicone rubber adhesive, formulated for use inside electronic equipment, must be used on this equipment.

Suitable types are: Dow Corning Silastic 738 RTV, or  
General Electric RTV 162 (available from RS Components)

Before using this adhesive, the manufacturer's data sheet should be consulted in relation to flammability and Health and Safety at Work notes. Apply only in a well-ventilated area.

# ARCHIMEDES HARD DISC UPGRADE

This leaflet provides information on the following:

- installing the upgrade
- using the hard disc
- care and handling of the hard disc
- formatting the hard disc

## INSTALLING THE HARD DISC UPGRADE

This hard disc upgrade is intended to be fitted by an Acorn Computers' authorised dealer who will install, format and test the hard disc unit. In order to use hard discs on the Archimedes 300 series, it is also necessary to have a Hard Disc Podule installed. This Podule should also be fitted and tested by an Acorn Computers' authorised dealer. On the Archimedes 400 series, the hard disc interface circuitry is integral and hence a Hard Disc Podule is not required.

The hard disc upgrade installer should give this leaflet to the user when returning the upgraded Archimedes.

## USING THE HARD DISC

The hard disc installed in the Archimedes gives you access to approximately 20Mb of filing space on which to store programs and data. The hard disc is similar in use to a floppy disc except that the hard disc is permanently 'present' whenever the Archimedes is switched on. The Advanced Disc Filing System (ADFS) provides facilities for the storage and retrieval of data on both the floppy disc and hard disc systems installed in the Archimedes.

It may be necessary to change the configuration of the Archimedes to allow access to the hard disc. The following configuration options may need to be set:

\*CONFIGURE HardDiscs 1

causes the machine to expect one hard disc drive on initialisation

\*CONFIGURE Drive 4

causes the machine to select drive 4 by default, ie the internal hard disc drive

\*CONFIGURE FileSystem 8

or

\*CONFIGURE FileSystem ADFS (for Arthur 1.2 onward)

selects the ADFS to be the default filing system on initialisation

The hard disc is represented on the desktop by a hard disc icon. This icon will appear at the bottom left of the main desktop screen (next to the floppy disc icon) once the hard disc drive is fitted and the Archimedes is configured to recognise its presence. The contents of the hard disc can be viewed and manipulated from the desktop in the same way as for a floppy disc. Further information on the use of discs and the ADFS can be found in the *Welcome Guide*, the *ADFSDemo* tutorial program in the *Welcome Suite* and in the *User Guide*, chapter *Filing Systems*.

It is possible for hard discs to develop 'defects' during normal use. In this context, a defect is a very small area of the hard disc surface which is no longer able to store data reliably. This type of defect is not unusual in hard disc systems and is not normally symptomatic of a failure in the equipment. It is however important that the ADFS, which organises where data is stored on the disc, is 'told' where these defects are located in order that it can avoid using these areas for future data storage. Such defects may be first noticed as 'Disc errors' during normal use of the hard disc.

There is currently only one way of informing the ADFS of the location of these defects and this requires that the hard disc be reformatted. During the verification process that always follows reformatting, all disc surfaces are checked for their ability to store data accurately. If any areas are found to be unreliable, then the locations of these areas are added to a list of defects which is then stored on the hard disc itself. The ADFS can then consult this list to determine where the defects on the hard disc are located and hence where not to store data.

It may be necessary, therefore, to reformat the hard disc occasionally. The method of formatting the hard disc is different to that for a floppy disc. For details, see the section on *Formatting the hard disc* later in this leaflet.

## CARE AND HANDLING OF THE HARD DISC

The hard disc unit is a delicate mechanism and requires careful handling. When the hard disc is in operation, the magnetic read/write heads are located very close to the surfaces of the rotating discs within the drive unit. As the gap between the read/write heads and the disc surfaces is extremely small, it is possible that if the Archimedes were jolted, the heads could momentarily touch the disc surface. This could cause damage to areas of the disc coating where the data is stored or under more extreme conditions actually damage the heads themselves. It is thus possible that moving the Archimedes while the hard disc is in operation could cause corruption of data on the disc or even irreparable damage to the disc unit.

When the Archimedes is switched off, and particularly when it is to be transported, the hard disc can be made much more immune to the adverse effects of movement by 'parking' the drive heads. Parking the drive heads involves moving them to a special area of the disc surface where no data is stored and where contact between the heads and the stationary surface of the disc will do no harm. In order to park the drive heads, enter the following commands:

\*ADFS

\*BYE

when the screen prompt reappears, the drive heads will be parked.

If you are in desktop, proceed as follows:

- position the pointer on the hard disc icon which appears at the bottom left of the desktop screen
- click the menu button of the mouse on the hard disc icon and a window containing the word bye will appear
- position the pointer on the word bye, click select and the drive heads will be parked.

It is good practice to park the drive heads everytime you switch the Archimedes off. If you intend to move the Archimedes then always transport it in appropriate packaging and take care not to subject it to undue bumping and jarring.

With careful handling, the hard disc drive installed in your Archimedes will operate reliably over a long period. If a failure of some sort should occur, which corrupts the data on the hard disc, it may be very difficult or even impossible to recover that data. The data on your hard disc may represent many hours of work and it is vital therefore to keep up-to-date backup copies of important data. Data may be copied onto floppy discs and these floppy discs then labelled, and stored in a separate location to your Archimedes. For advice on copying files from the hard disc to floppy discs, see the *Welcome Guide* (copying using the desktop) and the *User Guide* (copying using \*COPY). Alternatively, ask your supplier for information on backup systems which enable you to copy the entire contents of your hard disc onto a removeable media.

## FORMATTING THE HARD DISC

When your Archimedes is returned following the hard disc upgrade, the hard disc will be formatted and ready for use. The hard disc formatting utility, a BASIC program called HFORM, will be supplied on the hard disc in the Library directory. You should copy HFORM onto a floppy disc for possible future use.

**WARNING: reformatting your hard disc will destroy all data stored on the disc. It is essential that data which you wish to keep is copied to another media, eg floppy disc, before the disc is reformatted.**

In order to reformat your hard disc, load and run the HFORM program from either the hard disc or from your backup copy on floppy disc. HFORM (in the Library directory) can be accessed from either the desktop (double-click select on HFORM) or from BASIC (CHAIN "HFORM").

HFORM will prompt you for the various parameters required to format the hard disc, these parameters are referred to collectively as the hard disc drive 'shape'. The shape used by HFORM will be that read from the drive unless you specify otherwise. If the shape cannot be read from the drive, then you will have to select or specify the shape. In most cases, the shape will be read correctly from the drive and HFORM will give you the correct parameters for the hard disc drive fitted to your Archimedes. You will only have to enter a new shape if you are adding a new and previously unformatted drive or if the information on your drive has been corrupted or is incorrect.

For example, if you are reformatting your hard disc to add some defects to the list and your Archimedes is fitted with a 20Mb NEC hard disc, HFORM will prompt you as follows: (Press  if you wish to use the default values given.)

- 1 Format which drive (4 or 5)? 4   
4 is the value for the internally fitted hard disc drive  
5 is the value for an external (second) hard disc drive (if fitted)
- 2 The shape written on the disc matches that of a 20Mb NEC disc. Do you wish to retain this shape (Y/N)?
- 3 Sectors per track? 32

- 4 Heads? 4   
maximum value = 8
- 5 Cylinders? 612   
maximum value = 1024
- 6 Low current cylinder? 1023
- 7 Precompensation cylinder? 256
- 8 Parking cylinder? 672

HFORM will now list the current defects (if any) in the defect list and invites you to change the list. You may wish to add a new defect because the ADFS has previously returned an error message, such as:

Disc error 10 at :4/00831E00

You can use this logical address (ie 00831E00) directly in HFORM by selecting option C.

**NOTE:**if you are adding more than one defect by logical address, you must add them in descending order of magnitude. You must also complete the entry of any or all logical address defect before adding any defect by (physical) cylinder, head and sector address, ie by option B.

Option B is normally only used to establish an initial defect list on a brand new, previously unformatted disc. It is also necessary to use option B to re-establish the defect list in the unlikely event that it has been corrupted, eg due to a power failure during a previous format operation. Under these circumstances, it would be necessary to remove the top cover of the Archimedes to gain access to the written defect list stuck to the body of the hard disc drive. The defect information can then be typed into HFORM via option B. (See the *Welcome Guide* section *How to change the internal batteries* for information on how to remove the top cover of the Archimedes). Always disconnect the Archimedes from the mains by unplugging the power supply cable, before removing the top cover.

Select option A when the changes to the defect list are complete.

Confirm your intention to format the disc by typing Y  when prompted.

HFORM will now format and verify the hard disc. If the verification process detects any additional defects, you can simply add them to the defect list by confirming with Y  when prompted. HFORM will then repeat the formatting and verification process in order to include the new defects.

The formatting process is now complete.

## TEST INSTRUCTIONS: 2

# ARCHIMEDES HARD DISC & HARD DISC INTERFACE PODULE TESTS

### Contents

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2. Equipment required
3. Connecting up the Archimedes
4. Powering-up
5. Formatting the hard disc
6. Refitting the lid of the Archimedes
7. Soak test
8. Packing

Note: Please read all the instructions before you start.

### 1. Introduction

These tests enable you to check the formatting and operation of a hard disc after you have performed the hard disc upgrade.

**Warning:** Running this test on a hard disc that has data stored on it will DESTROY ALL DATA currently held on the disc. Please ensure that the customer is aware of this and gives you their consent before you start.

### 2. Equipment required

In order to carry out the test, you will require the following equipment:

- Archimedes 305 or 310 fitted with a 2-way backplane (Acorn part number 0176,040)
- Archimedes keyboard (Acorn part number 0376,100 or 0377,100)
- 3.5 inch Test disc which is write protected (AKD52TEST)
- monochrome monitor or analogue RGB monitor

### 3. Connecting up the Archimedes

It is important to connect the equipment to the Archimedes in the correct order. Connect the:

- keyboard to the front panel connector AND
- monochrome monitor to the 'Mono Video' socket OR
- analogue RGB monitor to the 'Analogue RGB' socket
- the Archimedes to the mains supply.

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## 4. Powering-up

To begin the tests:

- 1 Turn on all equipment EXCEPT the Archimedes.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Turn the Archimedes on. Depending on the configuration, the screen will display either the Desktop environment, the Arthur supervisor prompt if the Archimedes has not been upgraded to Arthur 1.2 or BASIC.
- 4 If you are in the Desktop, quit to the Arthur supervisor prompt by clicking on the EXIT icon. If you are in BASIC or at the Arthur supervisor prompt, type:

```
*CON. HARDDISCS 1 
*CON. RMA SIZE 8 
```

- 5 Then hold down  and press the Reset button.
- 6 Go back to BASIC or to the Arthur Supervisor prompt and type:

```
*HFORM 
```

## 5. Formatting the hard disc

The Test program is then run and the following information is displayed on the screen.

```
HARD DISC FORMATTER (V.XX)
```

```
Format which drive 4 or 5 ?4
```

To continue press . Then, choose from the list of drives displayed on the screen. These are:

1. 20Mb NEC
2. 20Mb Tandon
3. 20Mb Miniscribe
4. 20Mb Olivetti
5. Other

Type in the number representing the type of drive and press . Then, at the end of each line, press  to display the following information:

```
Sectors per track ?32
Heads ?4
Cylinders ?615
Low current cylinder 1023
Precompensation cylinder ?128
Parking cylinder ?670
```

Current Defects (Cylinder, Head, Sector)

(Defects may be listed here)

A: no more changes

B: add defect by cylinder, head, byte/sector

C: add defect by LOGICAL disc address (eg disc error)

D: remove defect

?

Compare the list of defects displayed on the screen with the paper list of defects attached to the drive chassis. (If defects are listed, the hard disc is formatted and the known defects are already recorded. You should therefore skip steps 1 and 2, which are described below, and proceed to step 3.)

1 Type B

2 Enter the defects recorded by the manufacturer on the label on the hard disc unit.

3 Once you have entered the defects, the menu is re-displayed. To format the hard disc, you should type:

A

4 The screen then displays the message:

Are you certain you want to format drive 4 (Y/N)?.

To format the drive, type Y  and formatting begins. (The 'H/DISC' LED will flash rapidly.)

Note: If nothing happens, check that you carried out the upgrade correctly. The fault may be in the hard disc, the Podule or the cables. (Refer to the fitting instructions entitled: *Hard disc drive upgrade kit*.) If you have carried out the upgrade correctly and you are still unable to format the hard disc, replace either the cables, Podule or hard disc (in this order) with a known good part in order to locate the fault.

## 6. Refitting the lid of the Archimedes

Before carrying out the Soak test, refit the lid of the Archimedes.

## 7. Soak test

**Warning:** Running this test on a hard disc that has data stored on it will DESTROY ALL DATA currently held on the disc. Please ensure that the customer is aware of this and gives you their consent before you start.

When you are ready to carry out the Soak test, insert the AKD52 test disc into the drive and type

\*WIST

A warning appears on the screen. To continue, type YES and at the prompt for drive 4, press .

The Soak test then starts and runs for twelve hours. At the end of this period the program runs the Termination sequence and reports either a pass or fail. A record of the defects (if any) is displayed on

the screen and the defects file on the hard disc is updated automatically. The final step is to copy the hard disc formatter program (HFORM) onto the hard disc. You can remove the floppy Test disc while the Soak test is running, but you should not:

- subject the Archimedes to any mechanical shock or movement
- turn off the Archimedes unless the test has terminated, ie the PASSED/FAILED message is displayed and you have copied HFORM onto the hard disc.

During the Soak test the following information is displayed on the screen:

```
Acorn Computers Winchester Soak and Test (WIST)
-----
```

Elapsed time...	Test ends in...
Type	Read/Write/Format/Verify...Write
Serial Number	Data Pattern
Precompensation Cylinder	Working on track
Reduced Write Current Cylinder	Write errors
Heads	Re-reads Required
Cylinders	Defects added
Park Cylinder	Logged Defects

In the lower half of the screen there are four columns in which the cylinder, head and sector defects are listed as they are discovered. Any defects which the manufacturer or previous tests have logged on the drive are listed at the top of the left-hand column.

#### If any defects are detected

If any defects are detected during the Soak test, the figures for the Write errors, Re-reads required, Defects added, and Logged defects are highlighted in red. However, that the fact that new defects are discovered does not necessarily mean that the Soak test will fail.

You should write down the cylinder, head and sector defects on a piece of paper which you should give to the customer. This information may be needed if he, or she, wants to reformat the hard disc. You do not need to update the defects file as this is done automatically.

#### Copying HFORM onto the hard disc

Create a directory on the hard disc called LIBRARY and copy HFORM into it.

## 8. Packing

Finally, repack the Archimedes in its box. Note, however, that the packaging used for the Archimedes 305 and 310 is NOT suitable for an Archimedes which has been upgraded with a hard disc. Do NOT send the upgraded Archimedes through the post or by courier unless you have provided alternative appropriate packaging.