Acorn A5000 and A540 FPA upgrade kit installation instructions

Introduction

The Floating Point Accelerator (FPA) significantly enhances the performance of your RISC OS machine when you are making intensive use of floating point operations.

The FPA implements a large subset of the standard ARM floating point instruction set in hardware, supporting the remaining instructions with software emulation.

The benefits of the machine's increased speed of operation are particularly noticeable when you are using

- scientific or engineering applications such as Finite Element Analysis and CAD
- office automation packages such as relational databases and spreadsheets.

The FPA may be fitted to the Acorn A5000 and A540. Note however, that the FPA10 is a 26MHz chip, and must not be installed in machines with ARM chips that run faster than 26MHz.

In relation to IEEE 754-1985, the FPA achieves conformance in single-precision arithmetic, and has an accuracy of plus or minus 2 units in the least significant place of the mantissa in double- or extended-precision arithmetic. For more detailed information, please refer to *Considerations in use* on page 14.

Packing list

The FPA upgrade kit (ALA23) should contain the following items:

- FPA10 chip in anti-static foam
- Floating point support disc containing the FPE400 code
- Acorn A5000 and A540 FPA *upgrade* kit installation instructions (this document)
- End User Licence Sheet
- Owner Registration Form.

if any of these items is missing or damaged, please contact your supplier immediately.

Tools required

Pozidriv No. 1 and No. 2 screwdrivers (or similar), and a pair of long-nosed pliers.

Fitting the kit

Any modification or upgrade carried out to the printed circuit board (PCB) of any Acorn equipment is undertaken at the sole risk of the person carrying out the modification or upgrade.

Acorn Computers Limited cannot accept any liability for damage caused to the product during installation of internal upgrades, whether or not carried out in accordance with the instructions in this document.

Before commencing an upgrade, please read all of the instructions carefully. if you do not feel confident to carry out this upgrade, please take the upgrade kit and your computer to an Acorn Computers authorised dealer, who will install it for you. A charge may be levied by the supplier for installing the upgrade kit; such a charge shall be entirely at the discretion of the supplier concerned.

Static electricity

IMPORTANT: Most electronic devices can be damaged by static electricity. To reduce the possible adverse effects of static electricity note the following points when installing any component(s) or upgrade:

- avoid working in areas where there are man-made fibres, such as nylon carpets and nylon clothing
- avoid touching the pins of the FPA during fitting, unless you have first discharged any static electricity you may have attracted.

Preparation

Make sure that the drive heads are parked before attempting to move or otherwise disturb the unit. To do this, choose Shutdown from the Task manager menu.

Before removing the top cover of the computer

1 switch off the computer

2 remove the power lead from the wall socket.

A5000

Disassemble the computer

1 Switch off and disconnect the computer from the mains supply. Then switch off and disconnect all peripherals (including the keyboard) and remove them from the computer completely.

2 Place the computer on a work surface with a clean, soft covering like a woollen blanket (NOT synthetic) or a piece of cardboard and turn it over so that it rests on its top cover.

3 Remove all six screws holding the metal wrap in place (see Figure 1: A5000 top cover fixing screws). Store them somewhere safe.

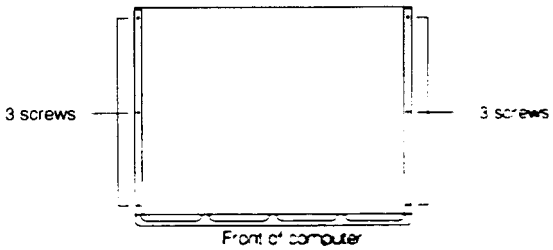

Figure I .A5000 top cover, fixing screws

4 Rest the computer on its base again and slide the lid **backwards** to the rear of the computer (see Figure 2 *Removing the top cover of the A5000*). Remove the lid completely

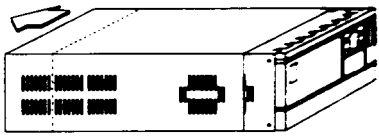

Figure 2: Removing the top cover o/ the A5000

5 Some models of the A5000 have an EMC **case shield which fits** over the inner case. To remove this, unscrew the five fixing screws on the righthand side of the computer, as seen from the rear (see *Figure 3: Removing the EMC shield).*

6 The shield has interleaved tabs which fit around the edges of the case. Slide the shield off the computer carefully; there is a hole on the top to help you slide the shield off by inserting a screwdriver.

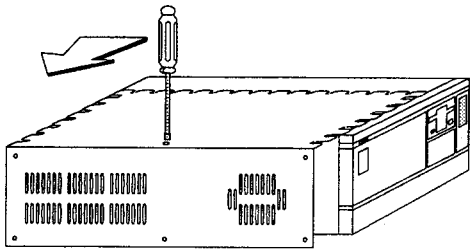

Figure 3: Removing the EMC *shield*

For the rest of the steps in this section, it's easiest to work from the back of the computer.

7 Unplug the 44-way ribbon cable from the hard disc drive unit.

8 Remove the W-shaped EMC spring clip (if fitted), which earths the **floppy drive** to the main case by pressing down and hooking it out with your fingernail (see Figure 4: *Releasing the drive* assembly).

9 Undo and remove the screw holding the drive support metalwork to the front of the metal case (see Figure 4: *Releasing the drive* assembly).

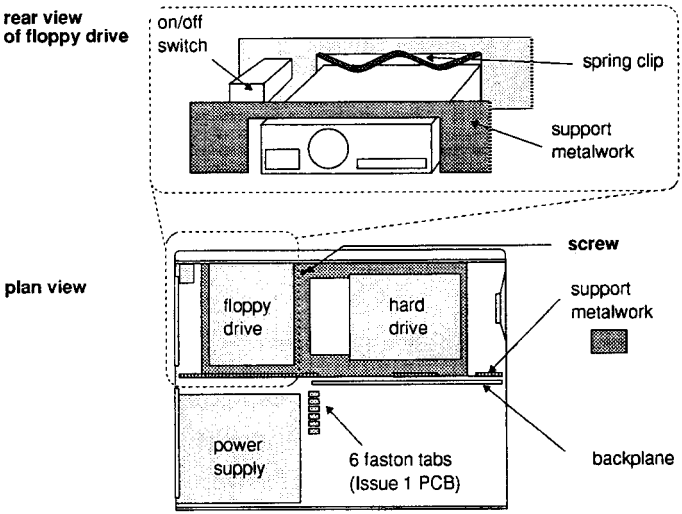

Figure 4: *Releasing the drive* assembly

10 (Issue 1 PCBs only.) Remove the two power supply faston tabs which are positioned **nearest** to the backplane (see Figure 4: Releasing *the drive* assembly). Use the pliers for this, and wiggle the tabs to ease them off. Remember which tab comes from which connector (mark the end one with a felt-tip pen before you remove it).

11 Grasp both ends of the support metalwork and lift it upwards firmly.

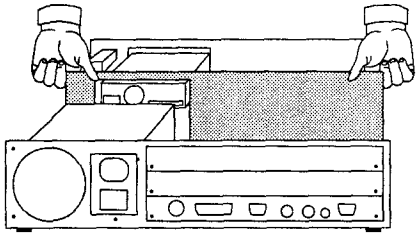

Figure 5: Lifting out the drive assembly

The whole assembly (including drives and backplane where fitted) should lift and the end tags disengage from the sides. You'll need to pull quite firmly, particularly if a backplane is fitted, as this has to disengage from its connector. If you feel resistance, check to make sure that you have undone the screw (shown in Figure 4: Releasing the drive assembly).

12 Lift the detached assembly completely clear. Flip it over (so that the front of the floppy drive comes over the top, towards you) and rest it across the top of the unit. Be careful not to stress any of the cables.

13 Reconnect the computer to the mains, but do not switch on.

While the power lead is connected to the wall socket:

- Do not switch on the computer.
- Do not switch on power at the wall socket.

14 Touch the power supply unit or the metalwork of the case to discharge any static electricity that you may have attracted. (If you are statically-charged, you may feel a tingling sensation when you do this.)

Inserting the FPA

1 Locate the *FPA* socket on the PCB:

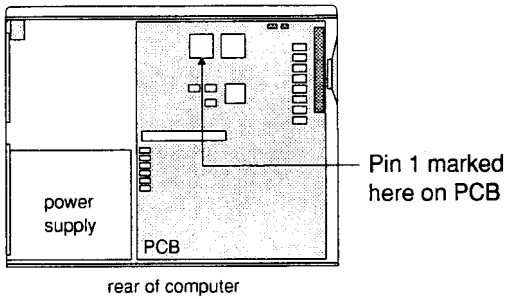

Figure 6: A5000 FPA socket location

2 Remove the *FPA* from its packaging and align it with the socket, making sure that Pin 1 (marked with a dot on the *FPA)* lines up with the 1 marked on the PCB, and that the printed side of the chip is facing upwards:

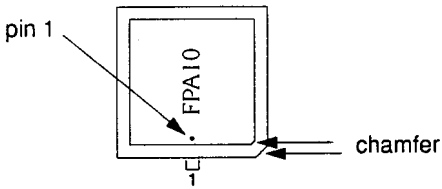

Figure 7: Identifying pin 1 of the FPA

3 Firmly push the *FPA* into position, making sure that the FPA sits flat in the socket.

Reassemble the computer

Disconnect the computer from the mains supply.

Reassembly is then essentially the reverse of the disassembly procedure (see page 3). Check all connections have been made securely.

A540

Disassemble the computer

1 Switch off and disconnect the computer from the mains supply. Then switch off and disconnect all peripherals (including the keyboard) and remove them from the computer completely.

2 Locate the screws holding the top cover in place (see Figure 8: The screws holding the top case). Remove the three screws at the top rear of the computer, then remove the single screw located on each side of the unit, towards the front.

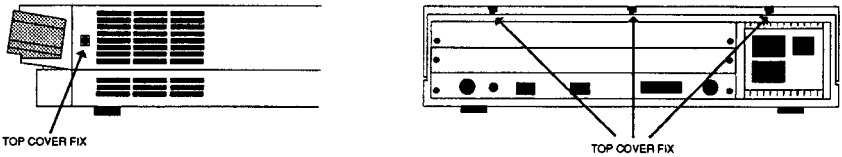

Figure 8: The screws holding the top case

3 Once you have removed the three rear screws and the two side screws, slide the cover to the rear of the computer, then remove it completely. Slightly spring the sides of the lid outwards, if necessary, to make it easier to slide.

4 Locate the backplane (the small printed circuit board mounted vertically on the main PCB), and the processor card.

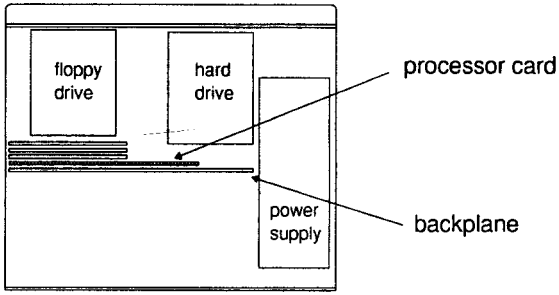

Figure 9: Inside the A540

5 If fitted, unscrew and remove the plastic retainer fixing the top of the backplane to the processor card.

6 Reconnect the computer to the mains, but do not switch on.

While the power lead is connected to the wall socket:

- Do not switch on the computer.
- Do not switch on power at the wall socket.

7 Touch the power supply unit or the metalwork of the case to discharge any static electricity that you may have attracted. (If you are statically charged, you may feel a tingling sensation when you do this.)

8 If you have any RAM cards fitted, remove these.

9 Ease the processor card out of its connector.

Inserting the FPA

1 Locate the FPA socket on the PCB:

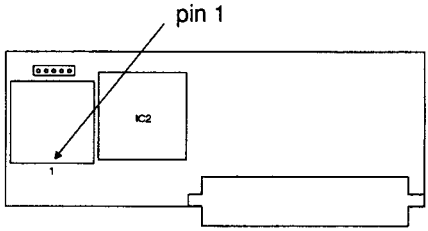

Figure 10: FPA on the processor card

2 Remove the FPA from its packaging and align it with the socket, making sure that Pin 1 (marked with a dot on the FPA) lines up with the 1 marked on the PCB, and that the printed side of the chip is facing upwards:

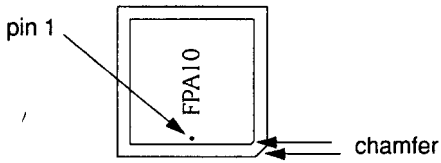

Figure 11: Identifying pin 1 of the FPA

3 Firmly push the FPA into position, making sure that the FPA sits flat in the socket.

Reassemble the computer

Disconnect the computer from the mains supply. Reassembly is then essentially the reverse of the disassembly procedure (see page 9). Make sure when you refit the plastic retainer, that the processor card slots squarely into the groove.

Check all connections have been made securely.

Loading the FPE400 module

When you have completed reassembly, set up the computer as shown in the computers *Welcome Guide,* and switch on the monitor. When the monitor has warmed up, switch on the computer.

You now need to load the FPE400 module.

Updating the !System directory using !SysMerge

!SysMerge is a utility for maintaining and combining !System directories. When new modules are released or !System is modified to provide new or enhanced facilities, you use the !SysMerge utility to manage the process of updating !System directories.

1 Insert the FPA software disc into the floppy disc drive and click on the floppy disc drive icon.

2 Start the !SysMerge utility by double clicking on it. The dialogue box shown here will appear:

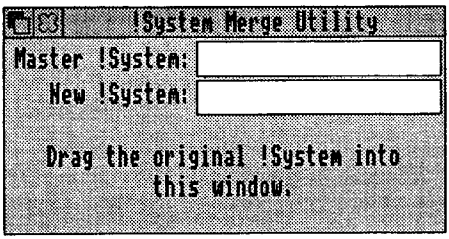

Figure 12: *!SysMerge dialogue box*

3 Drag the !System to be merged (your current !System on your hard disc) into the !SysMerge dialogue box.

The pathname in the box labelled Master !System changes to the pathname of your current master !System.

4 The !System on the floppy disc will be merged with the master !System. Drag this !System directory into the !SysMerge dialogue box.

The floppy disc !System's pathname is displayed in the box labelled New !System.

If all is well, the !System directories will be merged, and the message ! `System Updated will` appear.

If a problem occurs, an error message is displayed. !SysMerge will report `Update failed.` Take the appropriate action to resolve the problem, and then restart the merge process.

When !SysMerge is finished, you can quit the application, by selecting the Close icon on the window or by using the Quit menu option. Click Menu over the !SysMerge window to display the !SysMerge menu.

It is a good idea to make a backup copy of your new master !System directory, and to store this safely.

Creating a new !Boot file

To ensure that the FPE400 module is loaded each time you reboot your computer, you need to create a new !Boot file.

1. To enable you to continue running your existing !Boot file, rename it ! Boot2.
2. Create a new Obey file using Edit. (Choose Create from the Edit icon bar menu, then choose Obey from the submenu of file types).
3. Enter the line:

   ```
   rmensure FPEmulator 4.01 rmload !System.modules.FPE400
   ```

4. You then need to enter an instruction to run the original !Boot file. This will be either:

   ```
   *Run !Boot2
   ```

   to run the commands contained in the file !Boot2, or

   ```
   *Desktop -f !Boot2
   ```

   to start up the desktop and run !Boot2.

   Do not press Return after entering this instruction.
5. Make sure your hard disc is set to `Opt 4,2.
6. Save your file as !Boot.
7. Close !Boot.

Running the FPA

When you have merged your !System files and set up the Boot files, shutdown and restart your machine.

If the FPE400 module fails to load, switch off the computer and unplug it from the mains. Disconnect all peripherals and remove the top cover of the computer as shown earlier.

Check again that you have correctly installed the FPA. Reassemble the computer and restart your machine again.

If the module still fails to load, switch off your computer and consult your supplier.

Considerations in use

Single-precision multiplications will always give the correct answer to absolute accuracy according to the IEEE 754-1985 standard.

Occasionally, double- and extended-precision multiplications may be produced with an error of I or 2 units in the least significant place in the mantissa.

Further information

if you would like further technical details of the FPA, you can order the FPA10 Data Sheet, which includes block and functional diagrams, a description of signals, a programmers' model, and details of the floating point instruction set and boundary-scan test interface.

The FPA10 Data Sheet is available at a cost of £10.00. VAT is not payable, and the price includes postage and packing.

Please send cheques and postal orders (made payable to 'Acorn Direct') to:

Vector Services Limited
13 Denington Road
Wellingborough
Northamptonshire
NN8 2RL
England

if you wish to purchase using your Access or Visa card, please telephone (0933) 279300.

Warranty

The FPA has a 12 month warranty. Please keep your receipted invoice as proof of purchase in case you need to make a claim on the warranty.

Pozidriv is a trademark of European Industrial Services Ltd.

Published by Acorn Computers Limited
Part number 0493,503
Issue 1, June 1993